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CYCLOPÆDIA:

OR, AN

UNIVERSAL DICTIONARY

OF

ARTS AND SCIENCES.

CONTAINING
An EXPLANATION of the TERMS, and an ACCOUNT
OF THE SEVERAL SUBJECTS,
IN THE
LIBERAL AND MECHANICAL ARTS,
AND THE
SCIENCES HUMAN and DIVINE.

Intended as a COURSE of ANCIENT and MODERN LEARNING.

By E. CHAMBERS, F.R.S.

Floriferis ut apes in ſaltibus omnia libant,
Omnia nos— LUCRET.

WITH THE
SUPPLEMENT
AND
MODERN IMPROVEMENTS,
Incorporated in one ALPHABET.

By ABRAHAM REES, D. D. F. R. S.

IN FOUR VOLUMES.

VOLUME THE FOURTH.

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Q.

Q, A a conſonant, borrowed from the Latin or French, for which the Saxons generally uſed *cp*, *cw*; and the ſixteenth letter of the alphabet.

The name of this letter is *cue*, from *queue*, Fr. *tail*; its form being that of an O with a tail.

The *Q* has this peculiar to it, that it is always followed by an *U*, and is, therefore, reckoned among the mutes.

The *Q* is formed from the Hebrew ק, *koph*; which moſt other languages have borrowed; though ſome of them have rejected it again, particularly the Greeks, who now only retain it as a numeral character, called κοππα επισημον.

In effect, there is that reſemblance between the *Q* and the *C*, in ſome languages, and the *K* in others, that many grammarians, in imitation of the Greeks, baniſh the *Q* as a ſuperfluous letter. Papias even affirms, that all the Latin words now wrote with a *Q*, were wrote among the ancient Romans with a *C*; but we want better authorities for this. For, though that may hold in many caſes, inſomuch that ſome write indifferently *quur*, or *cur*; *cum*, or *quum*; *quotidie*, or *cotidie*, &c. yet does it not thence follow, that they ever wrote *cis*, *cæ*, *cid*, for *quis*, *quæ*, *quid*. What inſcriptions authorize ſuch a reading?

Far from this, the ancients ſometimes ſubſtituted *Q* for *C*; and wrote *quojus*, *quoi*; for *cujus*, *cui*, &c.

Varro, however, and ſome other grammarians, as we are told by Cenſorinus, &c. would never uſe the *Q*. The truth is, its uſe or diſuſe ſeems to have been ſo little ſettled, and agreed on, that the poets uſed the *Q* or *C* indifferently, as beſt ſuited their meaſures; it being a rule, that the *Q* joined the two following vowels into one ſyllable; and that the *C* imports them to be divided.

Hence it is that Lucretius uſes *cuiret* for three ſyllables, in lieu of *quiret*; *acua*, for *aqua*; and that Plautus uſes *relicuum*, for *reliquum*; as in *quod dedi, datum non vellem, relicuum non*; where the *cuum* muſt be two ſyllables, otherwiſe the trochaic verſe will be lame of a foot.

In the French, the ſound of the *Q* and *K* are ſo near akin, that ſome of their niceſt authors think the former might be ſpared. Ramus adds, that, till the eſtabliſhment of royal profeſſors in the univerſity of Paris, under Francis I. they always uſed *Q* in the Latin the ſame as in the French, pronouncing *kis*, *kalis*, *kantus*, &c. for *quis*, *qualis*, *quantus*. See K.

Some very learned men make *Q* a double letter, as well as *K* and *X*. According to them, *Q* is evidently a *C* and *U* joined together. It is not enough that the ſound is the ſame, but they ſee the traces of the *CU* in the figure of the *Q*; the *V* being only laid obliquely, ſo as to come within the cavity of the *C*; as C<. To confirm this, they ſay the ancients wrote *qi*, *qæ*, *qid*. Though Joſ. Scaliger, Littleton, &c. think this no proof of the point; for in Gruter's inſcriptions we find not only the *Q*, but alſo the *C*, put for *QU*; as *Cintus*, *Quintus*; *ſicis*, for *ſiquis*; &c. Yet nobody ever imagined the *C* a double letter.

Q, among the *Ancients*, was a numeral letter, ſignifying 500; as in the verſe,

Q velut A cum D quingentos vult numerare.

A daſh over it, as Q̄, denoted it to ſignify five hundred thouſand.

Q is alſo uſed as an abbreviature in ſeveral arts. *Q. pl.* in phyſicians bills, ſtand for *quantum placet*, or *quantum vis*, as much as you pleaſe of a thing; *q. ſ.* for *quantum ſufficit*, or as much as is neceſſary.

Q. E. D. among *Mathematicians*, ſignifies *quod erat demonſtrandum*, which was to be demonſtrated.

Q. E. F. *quod erat faciendum*, which was to be done.

Q. D. is alſo frequently uſed, among *Grammarians*, &c. for *quaſi dictum*, as if it were ſaid, &c. or as who ſhould ſay.

Q, in the proper names of the Romans, ſignifies Quintus, or Quintius. Upon the French coins this letter denotes that they were ſtruck at Perpignan.

QUAB, in *Ichthyology*, the name of a Ruſſian fiſh, which ſome report to be at firſt a tadpole, then a frog, and at laſt a fiſh. Dr. Mounſey, who made many enquiries concerning theſe pretended changes, apprehends that they are all fabulous. He had opportunity of ſeeing the fiſh itſelf, and found that they ſpawned like other fiſhes, and grew in ſize, without any appearances to juſtify the report. He adds, that they delight in very clear water, in rivers with ſandy or ſtony bottoms, and are never found in ſtanding lakes, or in rivers paſſing through marſhy or moſſy grounds, where frogs chuſe moſt to be. Phil. Tranſ. vol. xlv. p. 175.

QUACHILTO, in *Ornithology*, the name of a very beautiful Braſilian bird, of the moor-hen kind, called alſo *yacacintli*, and *porphyrio Americanus*. It is of a fine blackiſh purple colour, variegated with white; its beak is white while young, but becomes red as it grows older, and has a naked ſpace at its baſis, reſembling, in ſome ſort, the coot; its legs are of a yellowiſh green; it lives about the waters, and feeds on fiſh, yet is a very well taſted bird. It imitates the crowing of a common cock, and makes its muſic early in the morning. Margrave's Hiſt. Braſil.

QUACK, in *Medicine*. See EMPIRIC.

QUADRA, in *Building*, any ſquare border, or frame, encompaſſing a baſſo-relievo, pannel, painting, or rather work.

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The word is alſo uſed, erroneouſly, for a frame, or border, of any other form; as round, oval, or the like.

QUADRAGESIMA, a term ſometimes uſed for the time of LENT; becauſe conſiſting of forty days.

Hence ſome monks are ſaid to lead a *quadrageſimal* life; or to live on *quadrageſimal* food all the year.

QUADRAGESIMA *Sunday*, is the firſt Sunday in Lent; ſo called becauſe it is about the fortieth day before EASTER.

On the ſame account, the three preceding Sundays are called QUINQUAGESIMA, SEXAGESIMA, and SEPTUAGESIMA.

QUADRAGESIMALS, *quadrageſimalia*, denote *Mid-lent* contributions, or offerings.

It was an ancient cuſtom for people to viſit their mother-church on *Mid-lent* Sunday, and to make their offerings at the high altar; and the like was done in Whitſun-week. But as theſe latter oblations, &c. were ſometimes commuted for by a payment of *pentecoſtals*, or *Whitſun-farthings*; ſo were the former alſo changed into a cuſtomary payment, *quadrageſimals*, *denarii quadrageſimales*; and ſometimes *Lætare*, *Jeruſalem*, from a hymn ſo called, ſung on that day, beginning *Jeruſalem*, *mater omnium*, &c.

QUADRANGLE, in *Geometry*, a quadrangular, or quadrilateral figure; or a figure which has four ſides, or four angles.

To the claſs of *quadrangles*, or *quadrangular figures*, belong the *ſquare*, *parallelogram*, *trapezium*, *rhombus*, and *rhomboides*.

A ſquare, &c. is a regular *quadrangle*; a trapezium, an irregular one.

Quadrangular figures are not proper for fortification; the flanks, and flanked angles, being too ſmall.

QUADRANGULARIS *piſcis*, the *ſquare-fiſh*, in *Ichthyology*, the name of a fiſh, which, in its moſt uſual ſize, is about fifteen inches long, four inches high in the middle, and three inches and a half over; the forehead is ſquare, a little hollow, and, by the eminency of the eye-brows, two inches and a half over; the noſe blunt, and not very ſteep, with two holes in the place of noſtrils, and the mouth very ſmall; the back is a little convex toward the tail, and on the ſides a little obtuſely angled; as is alſo the belly, which is plain and flat, and a little riſing toward the tail; it has five fins, two near the gills, two near the tail, and the tail-fin, which is conſiderably long. Part of the head and tail are covered with a ſoft ſkin, the reſt of the body with a kind of cruſt, adorned all over with little round knots, reduced for the moſt part into hexagonal figures, and ſubdivided into equilateral triangles. Grew, Muſ. Reg. Sac. p. 110.

QUADRANS, in *Antiquity*, the fourth part of the as, or pound.

QUADRANS, in our *Cuſtoms*, is the fourth part of a penny, or a farthing.

QUADRANT, *quadrans*, in *Geometry*, an arch of a circle containing 90 degrees, or one-fourth of the entire periphery.

Sometimes, alſo, the ſpace, or area, included between this arch and two radii, drawn from the centre to each extremity thereof, is called a *quadrant*, or more properly, a *quadrantal ſpace*; as being a quarter of the entire circle.

QUADRANT alſo denotes a mathematical inſtrument, of great uſe in navigation and aſtronomy, for the taking of altitudes, angles, &c.

The *quadrant* is variouſly contrived, and furniſhed with different apparatus, according to the ſeveral uſes for which it is intended; but they have all this in common, that they conſiſt of a *quadrant*, or quarter of a circle, whoſe limb is divided into 90 degrees; and that they have a plumbet ſuſpended from the centre; and are furniſhed with pinnulæ or SIGHTS, through which to look.

The principal, moſt uſual, and uſeful *quadrants*, are, the *common* or *ſurveying quadrant*, the *aſtronomical quadrant*, *Davis's quadrant*, *Hadley's quadrant*, *horodictical quadrant*, *Gunter's quadrant*, *Sutton's*, or *Collins's quadrant*, and the *ſinical quadrant*.

QUADRANT, *the common*, or *ſurveying*, (repreſented *Tab* III. *Surveying*, *fig*. 46.) is made of braſs, wood, or other matter, uſually twelve or fifteen inches radius. Its circular limb is divided into 90°, and each of thoſe ſubdivided into as many equal parts as the ſpace will allow, either diagonally, or otherwiſe. On one edge, or ſemidiameter, are fixed two immoveable ſights; and in the angle, or centre, is hung a thread, with a plummet. To the centre is likewiſe, ſometimes, fixed a label, or moveable index, bearing two other ſights, like the index of a teleſcope. And, in lieu of the immoveable ſights, there is ſometimes fitted a teleſcope; though this more peculiarly belongs to the aſtronomical *quadrant*.

On the under ſide, or face, of the inſtrument, are fitted a ball and ſocket; by means whereof it may be put in any poſition, for uſe.

Beſides the eſſentials of the *quadrant*, there is frequently added on the face, near the centre, a kind of compartiment, called the *quadrat*, or *geometrical ſquare*; as in the figure. This, in ſome meaſure, making a diſtinct inſtrument of itſelf, ſee its deſcription and uſe under the article QUADRAT.

The *quadrant* is to be uſed in different ſituations, according to the dimenſions to be taken. To obſerve heights and depths, its plane is diſpoſed at right angles to the horizon; but to take horizontal diſtances, the plane is diſpoſed parallel thereto.

Heights and diſtances, again, may be taken two ways; viz. by means of the fixed ſights and plummet, and by the label.

QUADRANT, *uſe of the ſurveying*. *To take the height or depth of an object with the fixed ſights, and plummet*. Place the *quadrant* vertically, and the eye under the ſight next the arch of the *quadrant*: thus direct the inſtrument to the object, v. gr. the top of a tower, till the viſual rays thereof ſtrike through the ſights upon the eye.

This done, the portion of the arch intercepted between the thread and the ſemidiameter, whereon the ſights are faſtened, ſhews the complement of the object's height above the horizon, or its diſtance from the zenith; and the other portion of the arch intercepted between the thread and the other ſemidiameter, ſhews the height itſelf of the object above the horizon.

The ſame arch likewiſe gives the quantity of the angle made by the viſual ray, and a horizontal line, parallel to the baſe of the tower.

Note, to obſerve depths, the eye muſt be placed over that ſight next the centre of the *quadrant*.

From the height or depth of the object in degrees thus found, which ſuppoſe 35° 35′; and the diſtance of the foot of the object from the place of obſervation carefully meaſured, which ſuppoſe 47 feet; its height or depth in feet, yards, &c. is eaſily determined by the moſt common caſe in trigonometry.

For we have here, in a triangle, one ſide given; viz. the line meaſured, and we have all the angles; for that of the tower is always ſuppoſed a right angle; the other two, therefore, are equal to another right angle; but the angle obſerved is 35° 35′; therefore the other is 54° 25′.

The caſe, then, will be reduced to this; as the ſine of 54° 25′, is to 47 feet, ſo is the ſine of 35° 35′, to a fourth term, viz. 33½ feet; to which add the height of the obſerver's eye, ſuppoſe 5 feet, and the ſum 38½ feet, is the tower required.

QUADRANT, *the farther uſe of the*, *in taking of altitudes of objects both acceſſible*, *and inacceſſible*, ſee under the article ALTITUDE.

QUADRANT, *uſe of the*, *in taking heights and diſtances by the index and ſights*. To take, e. gr. a height, as that of a tower whoſe baſe is acceſſible. Place the plane of the inſtrument at right angles to the plane of the horizon, and one of its edges parallel thereto, by means of the plummet, which, in that caſe, will hang down along the other. In this ſituation turn the index, till, through the ſight, you ſee the top of the tower; and the arch of the limb of the *quadrant* between the ſide thereof parallel to the horizon and the index will be the height of the tower in degrees; whence, and from the diſtance meaſured as before, its height in feet, &c. may be found by calculation, as in the former caſe; or, without calculation, by drawing from the data, on paper, a triangle ſimilar to the great one; whoſe baſe is the diſtance, and its perpendicular, meaſured on the ſcale, is the height of the tower.

QUADRANT, *uſe of the*, *in meaſuring horizontal diſtances*. Though the *quadrant* be a leſs proper inſtrument for this purpoſe, than a theodolite, ſemicircle, or the like, becauſe angles greater than *quadrants* cannot be taken hereby, yet neceſſity ſometimes obliges perſons to have recourſe to it.

The manner of its application herein is the ſame with that of the ſemi-circle; all the difference between the two inſtruments conſiſting in this, that the one is an arch of 180°, and can therefore take an angle of any quantity; and the other is only an arch of 90°, and is therefore confined to angles of that quantity. See, therefore, SEMICIRCLE.

QUADRANT, *aſtronomical*, is a large *quadrant*, uſually made of braſs or iron bars, having its limb curiouſly divided, diagonally or otherwiſe, into degrees, and minutes, and even ſeconds, if poſſible; with plain ſights fixed to one ſide of it; or, inſtead thereof, a teleſcope, and an index moving about the centre, carrying either plain ſights, or a teleſcope.

Theſe *quadrants* are of principal uſe in taking obſervations of the ſun, planets, or fixed ſtars.

The ancients uſed only plain ſights; but the moderns have found it of great benefit to uſe teleſcopes inſtead of them.

This *quadrant* (ſee *Tab*. IV. *Aſtronomy*, *fig*. 84.) may be moved round horizontally, by turning a perpetual ſcrew fitted into the pedeſtal; for as this ſcrew is turned about by means of a key, at the ſame time it cauſes the axis to turn, by the falling in of its threads between the teeth of a ſtrong thick circle on the ſaid axis. Behind the *quadrant* is fixed, at right angles to its plane, a ſtrong thick portion of a circle, greater than a ſemicircle, having one ſemicircle of the outſide thereof cut into teeth. There is likewiſe another ſtrong thick portion of a circle, ſomewhat greater than a ſemicircle, behind the *quadrant*, which is moveable upon two fixed ſtuds, at right angles to the former portion; ſo that the plane of this portion may be parallel, inclined, or at right angles to the plane of the *quadrant*. On the ſide of this portion, which is made flat next to the other fixed portion, is a contrivance with a ſcrew, and perpetual ſcrew, ſuch that in turning the ſcrew, the threads of the perpetual ſcrew may be locked in between the teeth of the fixed circular portion; and by this means the *quadrant* fixed to any point, according to the direction of the plane of the fixed portion. And when the *quadrant* is to be moved a little in the foreſaid direction, this may be done by turning the perpetual ſcrew with a key. The outſide of the above mentioned moveable circular portion is cut into teeth, and about the centre thereof the axis is moveable, according to the direction of the plane of the ſaid portion. In this axis ſlides a little piece, carrying a perpetual ſcrew, whoſe threads, by means of a trigger, may be locked in between the teeth of the moveable circular portion. And ſo when the axis is ſet in the pedeſtal, the *quadrant* may be fixed to any point, according to the direction of the plane of the ſaid moveable portion. Therefore by theſe contrivances, the *quadrant* may be readily fixed to any required ſituation, for obſerving celeſtial phenomena, without moving the pedeſtal. There is a piece ſliding on the index, upon which the moveable teleſcope is faſtened, carrying a ſcrew and perpetual ſcrew; ſo that when the teleſcope and index are to be fixed upon any point in the limb of the inſtrument, this may be done by means of the ſcrew which locks the threads of the perpetual ſcrew in between ſome of the teeth cut round the curve ſurface of the limb of the inſtrument; and when the index and teleſcope are to be moved a very minute ſpace backwards or forwards along the limb, this is done by means of a key turning a ſmall wheel, faſtened upon the aforenamed piece, which is cut into a certain number of teeth, and whoſe axis is at right angles to the plane of the *quadrant*; for this wheel moves another (having the ſame number of teeth as that) which is at the end of the cylinder, on which is the perpetual ſcrew; and thus the perpetual ſcrew is turned about; and ſo the index and teleſcope may be moved a very ſmall ſpace backwards or forwards along the limb. The number of teeth into which the curve ſurface of the limb is divided muſt be as great as poſſible, and the threads of the perpetual ſcrew falling between them very fine; for upon this the exactneſs of the inſtrument very much depends. *Quadrants* of this kind are commonly two feet radius, and made altogether of braſs, except the pedeſtal and perpetual ſcrews; the teleſcopes have each two glaſſes and croſs-hairs in their foci.

The uſe of this inſtrument is obvious. Being adjuſted as above, and turned horizontally round on its axis, till, through the moveable teleſcope, the object be ſeen to fall in with the point of interſection of the croſs-hairs; the degrees cut by the index give the altitude required.

A large *quadrant* (with a teleſcope ſight) fixed in the plane of the meridian to a wall, is thence called a MURAL *arch*, and is found to be the moſt accurate, expeditious, and commodious inſtrument, for the chief purpoſes of aſtronomy. The particular conſtruction of this inſtrument, and the method of graduating it, with the curious apparatus lately invented by Mr. Bird, and applied to this purpoſe, would require a more ample and minute account than the nature of this work will allow; we ſhall, therefore, refer to the writers cited under MURAL *arch*.

M. Gerſton has given us a deſcription of a new aſtronomical *mural quadrant*, which he ſays is free from many of the uſual inconveniences attending the uſe of ſuch inſtruments. See Phil. Tranſ. Nº 483. ſect. 18.

QUADRANT, *Davis's*. See BACKSTAFF.

The theory of this *quadrant* is very intelligible; for the line AC (*Tab. Navigation*, *fig.* 6.) being horizontal, the arc fGC is equal to the height of the ſun above the horizon; but the arc $fGC =$ the arc $BE + GC$; and the arc $dfF = 90° =$ the altitude and zenith diſtance taken together; conſequently the zenith diſtance $=$ arcs $fd + CF = DB + CF$.

When the horizon is obſcured by hazy weather, *Davis's quadrant* is of no uſe; and this often occaſions melancholy conſequences. Means have, therefore, been ſought after to remedy this defect. Mr. Hadley has recommended and deſcribed a ſpirit level for this purpoſe. Mr. Leigh propoſes a water-level to be fixed to the *quadrant*; and he likewiſe has given the deſcription and uſe of an apparatus to be added to this inſtrument, conſiſting of a mercurial level, which he prefers, no doubt juſtly; to a water-level. See Phil. Tranſ. Nº 430, &c. or Martyn's Abr. vol. viii. p. 357, &c. 360, &c.

It has been obſerved, that one great objection againſt this inſtrument is the trouble and time loſt in ſliding the ſight-vane up or down, which ſometimes cannot conveniently be done without taking the quadrant from the eye, whereby an opportunity may be loſt in making the obſervation. But this defect is eaſily removed by having a long index or ruler fitted to the *quadrant*; one end moving round the centre to which the horizon vane is fixed, and having the ſight vane fixed to the other end. By this contrivance the ſight vane may be readily raiſed higher, or lowered, by the motion of the index about its centre, which may be done without taking the inſtrument from the eye.

QUADRANT, *Gunter's*, is a kind of *quadrant* (repreſented *Tab.* IV. *Aſtronomy*, *fig.* 85.) invented by our countryman Edm. Gunter.

This, beſide the graduated limb, fixed ſights, and a plummet, as in the other *quadrants*, has, likewiſe, a STEREOGRAPHICAL *projection* of the ſphere on the plane of the equinoctial, with the eye placed in one of the poles; by which, beſides the common uſes of other *quadrants*, ſeveral uſeful queſtions in aſtronomy, &c. are eaſily ſolved.

QUADRANT, *uſe of Gunter's*. 1. *To find the ſun's meriaian altitude for any given day; or the day of the month for any given meridian altitude.* Lay the thread to the day of the month in the ſcale next the limb; and the degree it cuts in the limb is the ſun's meridian altitude.

Thus, the thread being laid on the 15th of May, cuts 59° 30′, the altitude ſought. And, contrarily, the thread being ſet to the meridian altitude, will ſhew the day of the month.

2. *To find the hour of the day.* Having put the bead, which ſlides on the thread, to the ſun's place in the ecliptic, obſerve the ſun's altitude by the *quadrant*; then, if the thread be laid over the ſame in the limb, the bead will fall upon the hour required.

Thus, ſuppoſe on the 20th of April, the ſun being then in the beginning of Taurus, I obſerve the ſun's altitude by the *quadrant* to be 36°, I place the bead to the beginning of Taurus in the ecliptic, and lay the thread over 36° of the limb, and find the bead to fall upon the hour-line marked 3 and 9; accordingly, the hour is either 9 in the morning, or three in the afternoon. Again, laying the bead on the hour given (having firſt rectified, or put it to the ſun's place) the degree cut by the thread on the limb gives the altitude.

Note. The bead may be rectified otherwiſe; viz. by bringing the thread to the day of the month, and the bead to the hour-line of 12.

3. *To find the ſun's declination from his place given, and contrariwiſe.* Set the bead to the ſun's place in the ecliptic: move the thread to the line of declination ET, and the bead will cut the degree of declination required. Contrarily, the bead being adjuſted to a given declination, and the thread moved to the ecliptic, the bead will cut the ſun's place.

4. *The ſun's place being given, to find his right aſcenſion; or contrarily.* Lay the thread on the ſun's place in the ecliptic, and the degree it cuts on the limb is the right aſcenſion ſought. Contrarily, laying the thread on the right aſcenſion, it cuts the ſun's place in the ecliptic.

5. *The ſun's altitude being given, to find his azimuth; and contrariwiſe.* Rectify the bead for the time (as in the ſecond article), and obſerve the ſun's altitude; bring the thread to the complement of that altitude; thus the bead will give the azimuth ſought, among the azimuth lines.

6. *To find the ſun's amplitude either riſing or ſetting, when the day of the month or ſun's place is given.* Let the bead, rectified for the time, be brought to the horizon; and there it will ſhew the amplitude ſought.

7. *To find the hour of the night, from ſome of the five ſtars laid down on the quadrant.* 1. Put the bead to the ſtar you intend to obſerve, and find how many hours it is off the meridian (by article 2.): then, from the right aſcenſion of the ſtar, ſubtract the ſun's right aſcenſion converted into hours, and mark the difference; which difference, added to the obſerved hour of the ſtar from the meridian, ſhews how many hours the ſun is gone from the meridian; which is the hour of the night.

Suppoſe, e. gr. on the 25th of May, the ſun being in the fourth degree of Gemini, I ſet the bead to Arcturus; and, obſerving his altitude, find him to be in the weſt, about 52° high, and the bead to fall on the hour line of two afternoon; then will the hour be 11 hours 50 minutes paſt noon; or 10 minutes ſhort of midnight.

For 62°, the ſun's right aſcenſion, converted into time, makes 4 hours 8 minutes; which, ſubtracted from 13 hours 58 minutes (the right aſcenſion of Arcturus), the remainder will be 9 hours 50 minutes; which, added to 2 hours, the obſerved diſtance of Arcturus from the meridian, ſhews the hour of the night to be 11 hours 50 minutes.

Quadrant, *Hadley's*, the common name for the juſtly eſteemed *quadrant*, invented by the late John Hadley, eſq. This *quadrant*, which at firſt ſhared the fate of many other ingenious inventions, to be neglected by ignorant and obſtinate men, even though highly uſeful to them in their profeſſion, has at laſt made its way, in ſpite of habit and prejudice, and is now generally uſed.

The firſt idea of this excellent inſtrument ſeems to have been ſuggeſted by Dr. Hooke; for Dr. Sprat, in his Hiſtory of the Royal Society, p. 246. mentions the invention of a new inſtrument for taking angles by reflection, by which means the eye at the ſame time ſees the two objects both as touching the ſame point, though diſtant almoſt to a ſemicircle; which is of great uſe for making exact obſervations at ſea. This inſtrument is deſcribed and illuſtrated by a figure in Dr. Hooke's Poſthumous Works, p. 503. But as it admitted of only one reflection, it would not anſwer the purpoſe. This was at laſt effected by ſir Iſaac Newton, who communicated to Dr. Halley a paper of his own writing, containing the deſcription of an inſtrument with two reflections, which ſoon after the doctor's death was found among his papers by Mr. Jones, who communicated it to the Royal Society, and it was publiſhed in the Philoſophical Tranſactions, N° 465, anno 1742. See Martyn's Abridg. vol. viii. p. 129, &c. How it happened that Dr. Halley never mentioned this in his life-time is very extraordinary; more eſpecially as John Hadley, eſq. has deſcribed, in N° 240, anno 1731, an inſtrument conſtructed on the ſame principles, which is now in general uſe among the ſkilful ſeamen of moſt maritime nations. See Phil. Tranſ. abr. vol. vi. p. 139. Mr. Hadley, who was well acquainted with ſir Iſaac Newton, might have heard him ſay, that Dr. Hooke's propoſal could be effected by means of a double reflection; and, perhaps, in conſequence of this hint, he applied himſelf, without any previous knowledge of what ſir Iſaac Newton had actually done, to the conſtruction of his inſtrument. Mr. Godfrey of Penſylvania had recourſe to a ſimilar expedient; and, therefore, ſome gentlemen of that colony have aſcribed the invention of this admirable inſtrument to him. Martyn's Abr. Phil. Tranſ. vol. viii. p. 366, &c.

Hadley's *quadrant*, as it is now conſtructed and uſed, conſiſts of an arch A B C (*Tab. Navigation*, *fig.* 16.) which is an octant, or eighth part of a circle, though a ſextant, or ſixth part of a circle, renders it more uſeful; an index D, with its Vernier's ſcale; a ſpeculum E; two horizontal glaſſes F and G, with their adjuſters; two ſkreens K, K; and two ſight-vanes H, I. The octant conſiſts of the two radiuſes or bars AB, AC; the arch or limb BC; and the two braces L, M, which ſtrengthen and prevent it from warping. The arch contains only the eighth part of the circumference of a circle, or 45 degrees, which is divided into 90 primary diviſions, each of which repreſents degrees, and numbered 0, 10, 20, 30, &c. to 90, beginning at each end of the arch for the convenience of numbering both ways, either for altitudes or zenith diſtances. Every degree is ſubdivided into two or three parts, and theſe, either by the method of diagonals, or by Vernier's diviſion or ſcale (which is much better) are ſo divided as to ſhew one or two minutes. The index D is a flat rod or bar, moveable round the centre of the inſtrument; that part of the index which ſlides over the graduated arch B C having either a ſharp edge to cut the diagonal diviſions, when ſo divided, or having upon it a Vernier's ſcale. From the bottom of the index turns up, againſt the back of the inſtrument, a piece of braſs, with a ſcrew in it, ſerving to faſten the index againſt any diviſion. The index, when moved along the arch, ſhould be taken hold of by the bottom part, and not by the middle. For the conſtruction of the Vernier ſcale, ſee **Vernier**.

In order to underſtand its uſe in this inſtrument, we may obſerve, that Hadley's *quadrants*, being generally of eighteen inches radius, have each degree on the limb divided into three parts, of twenty minutes each, and the breadth of the Vernier ſcale equal to ſeven degrees; and as theſe ſeven degrees are divided into twenty-one parts on the limb, each of twenty minutes, the ſcale is divided into twenty equal parts; conſequently each diviſion on the ſcale is larger than each diviſion on the limb by one twentieth part of a diviſion on the limb, or one twentieth of twenty minutes; that is, each diviſion on the ſcale exceeds each on the limb by one minute of a degreee; conſequently in whatever place the Vernier's ſcale ſtands, one of its diviſions will always ſtand againſt, or cloſe to a diviſion on the limb. The middle line of the index D, which is the moveable radius of the *quadrant*, gives the index or pointer of the Vernier ſcale, which is uſually its middle line, having ten diviſions, or minutes, on each ſide and numbered 5, 10 to the right, and 15, 10 to the left; that is, the firſt 10 minutes of the ſcale are reckoned in order from the middle line or index to the right, and the latter 10 minutes are to be reckoned from the left-hand end of the ſcale towards the right, and end at the middle line. If the middle line or index of the Vernier ſtood againſt 48°, one diviſion, and leſs than half of another diviſion; and on examining the right-hand ſide of the ſcale, the ſeventh diviſion ſtood againſt a diviſion on the limb, the index in this caſe is reckoned to ſtand againſt 48° 27′. If the index of the ſcale ſtood againſt 34°, two diviſions, and more than half of another, and on examining the left-hand ſide of the ſcale, it was found that the ſixteenth diviſion thereof ſtood againſt a diviſion on the limb, it is to be read 34° 56′ and ſo of others. The exact coincidence of the diviſions on the limb and ſcale is beſt diſcovered by a magnifying glaſs, or double convex lens.

The ſpeculum of the *quadrant* is a piece of flat glaſs, quickſilvered on one ſide, and ſet in a braſs box, with the ſurface of the ſpeculum perpendicular to the plane of the inſtrument, againſt whoſe centre ſtands the middle of the glaſs, its ſurface coinciding with the middle line of the index. As the index ſlides along the arch, the poſition of the ſpeculum is altered, it being fixed to the index. The uſe of the ſpeculum is to receive the rays from the object obſerved, and reflect them on the horizon-glaſſes, which are ſmall pieces of looking-glaſs placed on one of the radiuſes, with their faces turned obliquely to the ſpeculum. The glaſs F has only its lower part quickſilvered, and ſet in braſs-work; the upper part being left tranſparent, to ſee the horizon through it. In the middle of the glaſs G is a tranſparent ſlip, through which the horizon is to be ſeen. Both theſe glaſſes are ſo mounted, as to have their poſitions ſet truly by their adjuſters at the back, if the frame of the inſtrument ſhould be warped.

The ſkreens are two pieces of coloured glaſs ſet in frames, and intended to prevent the ſun's rays from injuring the eyes of the obſerver. When they are uſed with the glaſs F, they are to be where the figure ſhews them; but when uſed with the glaſs G, they are to be ſet at the hole *r* above G. The ſight-vane at H is uſed with the glaſs G in back-obſervations, when the face is turned from the object; and the ſight-vane I, which has two holes, is uſed with the glaſs F in fore-obſervations, or when the face is turned towards the object.

Quadrant, *Hadley's*, *to rectify or adjuſt*. 1. *For the fore-obſervation.* Bring the index D cloſe to the button *b*, that the middle of the Vernier's ſcale may ſtand againſt 0 degree; look through the right-hand hole in the vane I, and direct the ſight through the tranſparent part of the glaſs F, to obſerve the horizon. Now if the horizon line, ſeen both in the quickſilvered part, and through the tranſparent part, ſhould coincide or make one ſtraight line, then is the glaſs F truly adjuſted; but if one of the horizon-lines ſtands above the other, ſlacken the ſcrew in the middle of the lever behind the glaſs F, and turn the ſcrew at the end of the lever, backwards or forwards, as there is occaſion, until the horizon lines coincide; faſten the ſcrew in the middle of the lever, and then is the horizon-glaſs adjuſted.

2. *For the back-obſervation.* Turn the button *b* on one ſide, and ſet the middle line of the index D as many degrees before 0 degree, as is twice the **dip** of the horizon, according to your height above the horizon; hold the plane of the inſtrument vertically, with the arch downwards; look through the hole in the vane H; and if the horizon-line, ſeen through the tranſparent ſlit in the glaſs G, coincides with the image of the horizon ſeen in the quickſilvered part of the ſame glaſs, then is the glaſs G in its proper poſition; if not, ſlacken the ſcrew-pin in the middle of the lever behind the glaſs G and looking through the vane H, as before directed, turn the ſcrew at the end of the lever backwards or forwards, as it is wanted, until the horizon-line coincides; then tighten the middle ſcrew, and the glaſs G is adjuſted. In ſetting this glaſs by the oppoſite horizon, the head ſhould be held a little backwards, not to intercept the light from behind. The horizon ſeen from behind will be inverted; that is, the water will appear above, and the ſky below; and if the two horizon-lines croſs one another, the inſtrument is not held upright.

Quadrant, *Hadley's*, *to take the ſun's altitude with*. 1. *By the fore-obſervation.* Fix the ſkreens K above the horizon-glaſs F, uſing either, or both of them, according to the ſtrength of the ſun's rays, by turning one or both of the frames of theſe glaſſes cloſe againſt the plane or face of the inſtrument; then the face being turned towards the ſun, hold the *quadrant* by the braces L, M, or by either radius, as is found moſt convenient, ſo as to be in a vertical poſition with the arch downwards; put the eye cloſe to the right-hand hole in the vane I; look at the horizon through the tranſparent part of the horizon-glaſs F; at the ſame time move the index D with the left-hand, until the image of the ſun, ſeen in the quickſilvered part, falls in with the line of the horizon, taking either the upper or under edge of the ſolar image; ſwing your body gently from ſide to ſide, and if the edge of the ſun uſed be obſerved not to cut, but to touch the horizon-line, like a tangent, the obſervation is well made; then ſhall the degrees on the arch, reckoned from that end next your body, give the altitude of that edge of the ſun which was brought to the horizon.

If the lower edge was obſerved, then 16 minutes added to the ſaid degrees, gives the altitude of the ſun's centre; but if the upper edge was uſed, the 16 minutes muſt be ſubtracted.

2. *By the back-obſervation.* Put the ſtem of the ſkreens K into the hole next the horizon-glaſs G, uſing them, as before ſaid, according to the ſtrength of the ſun's rays; then the back being turned to the ſun, hold the inſtrument by the radius C and brace L, in a vertical poſition with the arch downwards; put the eye cloſe to the hole in the vane H, look for the horizon through the tranſparent ſlit in the glaſs G; with the right-hand move the index D, until the image of the ſun, ſeen in the quickſilvered part of the glaſs G, ſtands in the horizon-line, ſeen through the tranſparent ſlit, uſing either the upper or under edge of the ſun; ſwing your body gently to the right and left, to try if the ſun's edge runs along the horizon; if it does, the obſervation is well made, and the degrees reckoned from that end of the arch fartheſt from your body, will give the altitude of that part of the ſun which was obſerved.

If the ſun's lower edge was obſerved, then 16 minutes ſubtracted from the before found degrees, will give the altitude of the ſun's centre; but if the upper edge was obſerved, then theſe 16 minutes are to be added.

In either of theſe obſervations, if the altitude of the centre could be obſerved, there would be then no need of uſing the 16 minutes.

To find the ſun more eaſily in the horizon; turn your back to the ſun, and look through the vane I and glaſs F, down on the middle of the ſhadow of your head; move the index forward, till the reflected image of the horizon before you is brought down to the place you look on, in the glaſs F; and the index will then be ſet pretty near to the altitude, and ſo fitted to find the ſun more readily, either in the fore or back-obſervation.

The fore-obſervation is rather moſt convenient, eſpecially in great altitudes, becauſe there is a much larger ſcope above and below the altitude wanted than there is in the back obſervation, which on account of the obliquity of the ſpeculum and horizon glaſſes, is more contracted in its uſe; and indeed the back-obſervations need never be uſed for the ſun, when there is a clear horizon forwards, or under the ſun; when this is hazy and ill defined, then it is beſt to uſe the back-obſervation, if the horizon is clear that way; and therefore it is proper that the horizon-glaſs G ſhould be always in readineſs, by having it well adjuſted; but becauſe the former method is not readily attained by beginners, we ſhall annex another, which is ſomewhat more convenient.

Another way to adjuſt for the back-obſervation. Take the altitude of the lower edge of the ſun by the fore-obſervation, as near to noon as can be; then put the ſkreens into the hole near the vane H, and turning your back to the ſun, and holding the inſtrument properly, taking care not to move the index, look for the horizon-line through the tranſparent ſlit of the glaſs G, and if the horizon-line touches the upper edge of the ſun's image in the glaſs G, it is properly adjuſted: if they do not touch, turn the glaſs by the lever behind, till they do.

This operation muſt be done quickly, before the ſun ſenſibly alters in altitude; and may be frequently repeated to make the fore and back-obſervations agree.

Quadrant, *Hadley's, to take the altitude of a ſtar with.*

1. *By the fore-obſervation.* Look directly up at the ſtar through the vane I, and tranſparent part of the glaſs H, the index D being cloſe to the button *b*; then will the image of the ſtar, by reflection, be ſeen in the ſilvered part right againſt the ſtar, ſeen through the other part: move the index forward, and as the image deſcends, let the centre of the *quadrant* deſcend alſo to keep it in the ſilvered part, till it comes down on a line with the horizon, ſeen through the tranſparent part; and the obſervation is made.

2. *By the back-obſervation.* Through the vane H, and the tranſparent ſlit in the glaſs G, look directly at the ſtar; at the ſame time move the index till the image of the horizon behind you, being reflected in the great ſpeculum, is ſeen in the quickſilvered part of G, and meets the ſtar; and the index will then ſhew the degrees of altitude.

If the altitude of the ſtar is pretty great, ſome other ſtars, beſide that wanted, may appear by the light paſſing by the great ſpeculum, and falling on the glaſs G; the light of theſe will dance with the motion of the inſtrument, but the true ſtar will remain about the middle of the glaſs at reſt, and ſo the others cannot be miſtaken for the true one.

Every altitude obſerved at ſea muſt be corrected: two corrections are common to the centre of every object; and three to the moon for the DIP of the horizon, the REFRACTION, and the PARALLAX; for which purpoſe tables are provided. See Tables requiſite to be uſed, with the Aſtronomical and Nautical Ephemeris, 1766; and Robertſon's Navigation, book ix. p. 303.

Hadley's *quadrants*, within a few years paſt, having been applied to take the neceſſary obſervations for finding the longitude at ſea, it has been found that ſuch obſervations required a degree of accuracy, of which the inſtruments, conſtructed in the common way, were not capable. And expert mariners having complained of theſe defects, different workmen have applied ſundry articles to the *quadrants* to remedy the inconveniences complained of; ſome of which are,

1ſt. A ſcrew to the lower end of the index, to regulate its motion when brought by the hand to a diviſion nearly ſhewing the contact required; and a magnifying glaſs to read off the diviſions between the limb and the Vernier.

2d. A ſmall tube, or teleſcope, inſtead of the ſight-vanes, to direct the line of ſight in a poſition parallel to the plane of the *quadrant*; which tube was ſcrewed into a ring fixed to a ſquare ſtem that ſlid in the ſocket made for the ſight-vane, and by the help of a ſcrew in its bottom (at the back of the *quadrant*) the ſtem could be raiſed or lowered ſo as to move the axis of the teleſcope to point to any part of the horizon-glaſs judged fitteſt for the obſervation.

3d. The extending the arch from an octant to a ſextant, or ſixth part of a circle, whereby angles exceeding 90 degrees may be obſerved; as is ſometimes wanted in taking the angular diſtance between the moon and ſun, or moon and ſtar: alſo, for the convenience of holding the inſtrument eaſily in ſuch obſervations, a ſtout handle was fixed to the back, which was a very neceſſary addition.

But other errors or inconveniences ſtill attend theſe inſtruments, namely,

1ſt. The ſpeculum being liable, in the ordinary way of fitting it, to be bent; and conſequently the ſame obſervation would have different meaſures, according as the object happened to be reflected from different parts of the ſpeculum. This has lately been rectified by a new manner of ſetting the ſpeculum in its frame.

2d. The adjuſtment of the horizon-glaſſes.

Both theſe glaſſes are to ſtand perpendicular to the plane of the inſtrument; and when 0 on the index ſtands againſt 0 on the arch, the plane of the fore-horizon-glaſs is to be parallel to the plane of the ſpeculum; and the plane of the back-horizon-glaſs is to be at right angles to the ſpeculum. A new method of adjuſting theſe glaſſes has been lately diſcovered, very accurate in principle, and ready in practice; particularly for the back-obſervation, which hitherto has been but little uſed on account of the difficulty of adjuſting its horizon-glaſs; which has lately been happily removed by the ingenious Mr. Peter Dollond, optician to his majeſty; and he alſo thought of the method of preventing the index ſpeculum from being bent in its frame. By his adjuſtments, angles of any magnitude under 180 degrees may be taken; viz. by the fore-obſervation all under 120°, with a ſextant; and by the back-obſervaition, all between 90 and 180 degrees. Phil. Tranſ. vol. lxii. art. 14. p. 95, &c.

3d. Although Mr. Hadley at firſt directed that the line of ſight ſhould be parallel to the plane of the inſtrument; and for preſerving it ſo, propoſed, that in the teleſcope ſhould be fixed two parallel wires, which in uſing ſhould be parallel to the *quadrant*, and the contact of the objects ſhould be obſerved in the middle between the two wires; yet theſe circumſtances not being ſufficiently attended to; therefore the two parallel wires are now placed in the focus of the eye-glaſs, and divide the diameter of the field of view into three equal parts; and when the teleſcope is adjuſted parallel to the plane of the inſtrument, it will remain ſo during the obſervation.

4th. As every glaſs mirror has two reflections, viz. one from the face, and one from the ſilvered back; theſe double reflections not only cauſe ſome confuſion among the reflected rays, but conſiderable errors might ariſe ſhould the face and back of the glaſs be not parallel planes: none of theſe could happen from a plane mirror which has but one reflection; and, therefore, the upper part of the index ſpeculum has its back rough ground and blacked; whereby this part will reflect the rays only which fall on its face, and theſe ſufficiently ſtrong when the object obſerved is bright; but when otherwiſe, the object may be obſerved from the lower part of the ſpeculum, which is ſilvered; the line limiting theſe two parts is parallel to the plane of the *quadrant*. This improvement was directed by the reverend Dr. Maſkelyne, aſtronomer royal. Phil. Tranſ. vol. lxii. art 15. p. 99, &c. The methods how theſe ſeveral adjuſtments are to be made, together with ſome other particulars relating to the uſe of the inſtrument, are fully treated of in the book which accompanies the ſale of Mr. Dollond's *quadrants*.

We ſhall here add, that one great inconvenience which mariners have to ſtruggle with at ſea is the frequent want of an horizon, ariſing from the hazineſs of the atmoſphere, and tremulous motion of the ſurface of the water. To remedy this, many methods have been propoſed; among which Serſon's whirling ſpeculum or top (ſee HORIZONTAL *ſpeculum*, and Phil. Tranſ. vol. xlvii. part ii. p. 352.) was, for ſome time, thought a proper inſtrument, but it has been found imperfect. See *Davis's* QUADRANT.

Some artiſts, ſays Mr. Robertſon, uſe the following method: into a wooden, or iron, circular box, of about two and a half, or three inches diameter, and about half an inch deep, pour about a pound or more of quickſilver; and on this lay a metal ſpeculum, or piece of plain glaſs, whoſe diameter is about one-third of an inch leſs than that of the box; this will float in the quickſilver, and ſhew the image of the ſun very ſteady. This apparatus being ſlung in jimbals, will preſerve a tolerable good horizon. The ſpeculum or glaſs ſhould be homogeneous, and have parallel ſides. There are ſome workmen who can work the two planes of a piece of glaſs, ſo that they ſhall be demonſtratively parallel. Or, the fine ſurface of the quickſilver will anſwer the purpoſe of itſelf. In all obſervations with theſe artificial horizons, a piece of coloured glaſs ſhould be fixed before the vane that is uſed to preſerve the eye; and the ſkreens K may be taken off.

QUADRANT, *Hadley's, theory of.* It is a firſt principle in optics, that the angle of incidence, whatever be the inclination of the incident ray, is equal to the angle of reflection, i. e. if the angle of incidence D B A be 30°, the angle of reflection D B C will be alſo 30°. It is alſo plain, that if while the radiant A (*Tab. Navigation*, *fig.* 17, and *fig.* 18.) remains in the ſame place, the mirror E F, by revolving round B, moves into the poſition *f e*, then the alteration in the angle between the incident and reflected ray will be double to the angle ſhewing the change of poſition in the mirror. Suppoſe the mirror changes 10° from the radiant, then the perpendicular B D goes 10° farther from the radiant A into the poſition B *d*; and the incident angle *d* B A is 40°, and the reflected angle *d* B *c* is 40°; ſo the angle A B C is altered from 60° to 80°; a difference of 20° for 10° change of poſition in the mirror. Suppoſe again the mirror to change, in poſition, 10° towards the radiant A, then the perpendicular is changed into B *d*, 10° nearer to the radiant; and the angle D B A of 30° becomes *d* B A of 20° = *d* B *c*; ſo that the angle A B *c* is 40°, whereas A B C was 60°; that is, by altering the poſition of the mirror 10°, the angle A B C was altered 20°. It may be otherwiſe demonſtrated, that with a Hadley's *quadrant*, the angle of elevation under which an object is ſeen, is equal to twice the arch which the index has paſſed over. The inſtrument or angle A C B (*fig.* 19.) is 45°; *a b* is a reflecting glaſs fixed parallel to C B; C D is the index with a reflecting glaſs at G, ſo fixed as to be parallel to *a b*, when C D coincides with C B; S the ſun; S G a ſolar ray reflected from G to F, and from F to E, the place of the eye; and H F E the horizontal line at the time of the obſervation. Then will the angle of elevation I G S be equal to twice the angle B C D; for the angle of reflection D G F = the angle of incidence S G C = C G L. And the angle of reflection *b* F E = the angle of incidence *a* F G = F L E (*a b* being parallel to L E) = F E L. But I G C = H P C = P C E + P E C (the external angle being equal to the two internal and oppoſite) = P C E + F L E = P C E + G C L + C G L. Or I G C = I G S + S G C = P C E (or G C L) + C G L = 2 B C D + C G L. Conſequently I G S = 2 B C D. See Robertſon's Navigation, book ix. p. 295, &c. p. 390, &c.

Mr Mitchell has recommended Hadley's *quadrant* for ſurveying, and eſpecially the ſurveying of harbours, and alſo for piloting ſhips into harbours. Phil. Tranſ. vol. lv. art. 10. p. 70.

Mr. Wales, in captain Cook's Voyage, applied it to meaſuring the quantity eclipſed in an eclipſe of the ſun; in which operation it anſwers the purpoſe of a micrometer, to a great degree of certainty. See an account of the improvements ſuggeſted in the conſtruction of theſe inſtruments, and alſo of the various uſes to which they may be applied, in Magellan's Deſcription des Octants & Sextants Anglois, &c. 4to.

Other *quadrants* have been contrived ſince, by ſome ingenious artiſts, all of which have their merit; but the particulars of their conſtructions are too many for this place; and perhaps, on the whole, nothing preferable to Mr. Hadley's invention has yet been found.

QUADRANT, *horodictical*, is a pretty, commodious inſtrument; thus called from its uſe in telling the hour of the day.

Its conſtruction is ſo ſimple and eaſy, and its application ſo ready, that we ſhall deſcribe both, for the uſe of ſome who may want other conveniences.

QUADRANT, *conſtruction and uſe of the horodictical.* From the centre of the *quadrant* C (*Tab.* IV. *Aſtron. fig.* 86.) whoſe limb A B is divided into 90°, deſcribe ſeven concentric circles at intervals, at pleaſure; and to theſe add the ſigns of the zodiac in the order they are repreſented in the ſcheme.

2. Applying a ruler to the centre C, and the limb A B, mark upon the ſeveral parallels the degrees correſponding to the altitude of the ſun when therein, for the given hours; connect the points belonging to the ſame hour with a curve line, to which add the number of the hour. To the radius C A fit a couple of ſights, and to the centre of the *quadrant* C, tie a thread with a plummet; and, upon the thread, a bead to ſlide.

If, now, the bead be brought to the parallel wherein the ſun is, and the *quadrant* be directed to the ſun till a viſual ray paſs through the ſights, the bead will ſhew the hour.

For the plummet, in this ſituation, cuts all the parallels in the degrees correſponding to the ſun's altitude. Since, then, the bead is in the parallel which the ſun then deſcribes, and through the degrees of altitude to which the ſun is elevated every hour there paſs hour-lines, the bead muſt ſhew the preſent hour. Some perſons who are not very nice, repreſent the hour-lines by arches of circles, or even by ſtraight lines; and that without any ſenſible error.

QUADRANT, *ſinical*, is an inſtrument of uſe in navigation. It is repreſented *Tab. Navigation*, *fig.* 20. and conſiſts of ſeveral concentric quadrantal arcs, divided into eight equal parts by radii, with parallel right lines croſſing each other at right angles.

Now any of the arcs, e. gr. B C, may be accounted a *quadrant* of any of the great circles of the ſphere, chiefly of the horizon and meridian: if, then, B C be taken for a *quadrant*, e. gr. of the horizon, either of the ſides, e. gr. A B, may repreſent the meridian; and the other, A C, will repreſent a parallel, or line of eaſt and weſt; and all the other lines parallel to A B will alſo be meridians; and all thoſe parallel to A C, will be eaſt and weſt; parallels, or eaſt and weſt lines.

Again, the eight ſpaces into which the arcs are divided by the radii, repreſent the eight points of the compaſs in a quarter of the horizon; each containing 11° 15′.

The arc B C is likewiſe divided into 90°, and each degree is ſubdivided into 12′, diagonal-wiſe.

To the centre is fixed a thread, as AL; which being laid over any degree of the *quadrant*, ſerves to divide the horizon.

If the *ſinical quadrant* be taken for a fourth part of the meridian, one ſide thereof, AB, may be taken for the common radius of the meridian and the equator; and then the other, A C, will be half the axis of the world. The degrees of the circumference B C will repreſent degrees of latitude, and the parallels to the ſide A B, aſſumed from every point of latitude to the axis A C, will be radii of the parallels of latitude, as likewiſe the ſine-complements of thoſe latitudes.

Suppoſe, then, it be required to find the degrees of longitude contained in 83 of the leſſer leagues, in the parallel of 48°. Lay the thread over 48° of latitude on the circumference, and count thence the 83 leagues, on A B, beginning at A; theſe will terminate at H, allowing every ſmall interval four leagues, and the interval between the broad lines twenty leagues. Then tracing out the parallel H G, from the point H to the thread; the part A G of the thread ſhews that 125 greater, or equinoctial leagues, make 6° 15′, allowing twenty leagues to a degree, and three minutes for one league; and therefore, that 83 leſſer leagues A H, which make the difference of longitude of the courſe, and are equal to the radius of the parallel G I, make 6° 15′ of the ſaid parallel.

If the ſhip ſail an oblique courſe, ſuch courſe, beſides the north and ſouth greater leagues, gives leſſer leagues eaſterly and weſterly; to be reduced to degrees of longitude of the equator. But theſe leagues being made neither on the parallel of departure, nor on that of arrival, but in all the intermediate ones, we muſt find a mean proportional parallel between them.

To find this, we have on the inſtrument a *ſcale of croſs latitudes*. Suppoſe, then, it were required to find a mean parallel between the parallels of 40° and 60°. With your compaſſes take the middle between the 40th and 60th degree on the ſcale: this middle point will terminate againſt the 51ſt degree, which is the mean parallel required.

Uſe of the ſinical **Quadrant.** There are formed triangles upon this inſtrument ſimilar to thoſe made by a ſhip's way, with the meridians and parallels; the ſides of which triangles are meaſured by the equal intervals between the concentric *quadrants* and the lines N. and S. E. and W.

The lines and arcs are diſtinguiſhed, every fifth, by a broader line; ſo that if each interval be taken for one league, there will be five between one broad line and another: and if every interval be taken for four leagues then there will be twenty leagues, which make a ſea degree, from one broad line to the other.

Now, ſuppoſe a ſhip to have ſailed 150 leagues north-eaſt, one fourth north; which is the third point, and makes an angle of 33° 45′, with the north part of the meridian. Here are given two things; viz. the courſe, and the diſtance ſailed; by which a triangle may be found on the inſtrument, ſimilar to that made by the ſhip's courſe, and her longitute and latitude; and hence may the unknown parts of the triangle be found.

Thus, ſuppoſing the centre A to repreſent the place of departure; count, by means of the concentric arcs, along the point the ſhip ſailed on, as A D, 150 leagues from A to D; then is the point D the place the ſhip is arrived at, which note. This done, let D E be parallel to the ſide A C; and then there will be formed a right-angled triangle A E D, ſimilar to that of the ſhip's courſe, difference of longitude, and latitude: the ſide A E gives 125 leagues for the difference of latitude northwards; which makes 6° 15′, reckoning twenty leagues to a degree, &c. and the ſide D E gives 83 leſſer leagues anſwering to the parallels; which being reduced, as ſhewn above, gives the difference of longitude. And thus is the whole triangle found.

Quadrant, *Sutton's*, ſometimes alſo called *Collins's pocket* Quadrant. One of the beſt of Mr. Sutton's *quadrants* (repreſented *Tab.* IV. *Aſtronomy, fig.* 87.) is the ſtereographic projection of one quarter of the ſphere between the tropics, upon the plane of the equinoctial, the eye being in the north pole.

This is fitted to the latitude of London. The lines running from the right hand to the left are parallels of altitude, and thoſe croſſing them are azimuths: the leſs of the two circles bounding the projection is one fourth of the tropic of Capricorn; the greater, one fourth of that of Cancer. The two ecliptics are drawn from a point on the left edge of the *quadrant*, with the characters of the ſigns upon them; and the two horizons are drawn from the ſame point. The limb is divided both into degrees and time; and, by having the ſun's altitude, the hour of the day may be here found to a minute.

The quadrantal arcs, next the centre, contain the calendar of months; and under them, in another arc, is the ſun's declination.

On the projection are placed ſeveral of the moſt noted fixed ſtars between the tropics; and next below the projection is the quadrant, and line of ſhadows, being only a line of natural tangents to the arcs of the limb; and by help thereof, the heights of towers, &c. may be taken with conſiderable exactneſs.

Uſe of Sutton's or Collins's **Quadrant.** *To find the time of ſun-riſing or ſetting, his amplitude, azimuth, hour of the day, &c.* Lay the thread over the day of the month, and bring the bead to the proper ecliptic, either that of ſummer or winter, according to the ſeaſon (which is called rectifying); then, moving the thread, bring the bead to the horizon; in which caſe the thread will cut the limb in the time of the ſun's riſing or ſetting, before or after ſix; and, at the ſame time, the bead will cut the horizon in the degrees of the ſun's amplitude.

Again, obſerving the ſun's altitude with the *quadrant*, and ſuppoſing it found 45° on the 24th of April; lay the thread over the 24th of April; bring the bead to the ſummer ecliptic, and carry it to the parallel of altitude 45°. In which caſe the thread will cut the limb at 55° 15′, and the hour will be ſeen among the hour-lines to be either forty-one minutes paſt nine in the morning, or nineteen paſt two in the afternoon.

Laſtly, the bead among the azimuths ſhews the ſun's diſtance from the ſouth, viz. 50° 41′.

But note, that if the ſun's altitude be leſs than what it is at ſix o'clock, the operation muſt be performed among thoſe parallels above the upper horizon; the bead being rectified to the winter ecliptic.

Quadrant, in *Gunnery*, called alſo the *gunner's ſquare*, is an inſtrument ſerving to elevate or point cannons, mortars, &c. according to the places they are to be levelled or directed to.

It conſiſts of two branches, made of braſs or wood; one about a foot long, eight lines broad, and one line in thickneſs; the other four inches long, and of the ſame thickneſs and breadth as the former. Between theſe branches is a *quadrant* divided into ninety degrees, beginning from the ſhorter branch, and furniſhed with a thread and plummet. See its figure repreſented in *Tab.* II. *Gunnery, fig.* 14.

The uſe of this inſtrument is eaſy; nothing more being required but to place the longeſt branch in the mouth of the cannon or mortar, and elevate or lower it, till the thread cuts the degree neceſſary to hit a propoſed object. See *Pointing of a* Gun.

Sometimes, alſo, on one of the ſurfaces of the long branch, is noted the diviſion of diameters, and weights of iron bullets; as alſo the bores of pieces. See Caliber.

Quadrant *of altitude*, is an appendage of the artificial globe; conſiſting of a lamina or ſlip of braſs, the length of a *quadrant* of one of the great circles of the globe; and divided into ninety degrees.

At the end, where the diviſions terminate, there is a nut riveted on, and furniſhed with a ſcrew, by means whereof the inſtrument is fitted on to the meridian; and is moveable round upon the rivet, to all points of the horizon. See its figure in *Tab. Aſtronomy, fig.* 61.

Its uſe is to ſerve as a ſcale in meaſuring of altitudes, amplitudes, azimuths, &c. See the manner of its application under the *Uſe of the* Globe.

QUADRANTAL, in *Antiquity*, a veſſel in uſe among the Romans for the meaſuring of liquids.

It was at firſt called amphora; and afterwards *quadrantal*, from its form, which was ſquare every way, like a die.

Its capacity was eighty libræ, or pounds of water, which made forty-eight ſextaries, two urnæ, or eight congii.

Quadrantal *ſpace*, in *Geometry*. See Quadrant.

Quadrantal *triangle*, is a spherical *triangle*, one of whoſe ſides at leaſt is a quadrant of a circle; and one of its angles a right angle.

QUADRANTATA *terræ*, in our *Ancient Law Books*, is uſed for a quarter of an acre; now called a rood.

QUADRAT, *quadratum*, called alſo *geometrical ſquare*, and *line of ſhadows*, is an additional member on the face of the common Gunter's and Sutton's quadrants; of ſome uſe in taking altitudes, &c. See Quadrant, and *Tab.* IV. *Aſtronomy fig.* 85.

The *quadrat* more diſtinctly exhibited in *Tab.* III. *Surveying, fig.* 46. has each of its ſides divided into a hundred equal parts, commencing from the extremes; ſo that the number 100 falls on the angle, repreſenting tangents to the arc of the limb.

The diviſions are diſtinguiſhed by little lines from 5 to 5, and by numbers from 10 to 10; and the diviſions being occaſionally produced acroſs, form a kind of lattice, conſiſting of 10000 little ſquares.

The proportion here is, as radius is to the tangent of the angle of altitude at the place of obſervation (i. e. to the parts of the *quadrat* cut by the thread) ſo is the diſtance between the ſtation and the foot of the object, to its height above the eye. See Altitude.

Uſe of the **Quadrat,** *geometrical ſquare*, or *line of ſhadows*. 1. The quadrant being vertically placed, and the ſights directed to the top of the tower, or other object whoſe height is required; if the thread cut the ſide of the *quadrat* marked *right ſhadows*, the diſtance from the baſe of the tower to the point of ſtation is leſs than the tower's height. If the thread falls on the diagonal of the ſquare, the diſtance is juſt equal to the height. If it fall on that ſide marked *verſed ſhadows*, the diſtance exceeds the height.

Hence meaſuring the diſtance, the height is found by the *rule of three*; inaſmuch as there are three terms given. Indeed, their diſpoſition is not always the ſame; for when the thread cuts the ſide of *right ſhadows*, the firſt term in the *rule of three* ought to be that part of the ſide cut by the thread; the ſecond, the ſide of the ſquare; and the third, the diſtance meaſured. If the thread cut the other ſide, the firſt term is the whole ſide of the ſquare; the ſecond, the parts of the ſide cut by the thread; and the third, the diſtance.

For an inſtance of each. Suppoſe, e. gr. in looking at the top of a ſteeple, the thread cut the ſide of *right ſhadows* in the point 40, and that the diſtance meaſures 20 poles, the caſe then will ſtand thus: as 40 is to 100, ſo is 20 to a fourth term, which I find to be 50; the height of the ſteeple in poles. Again, ſuppoſing the thread to fall on the other ſide, in the point 60, and the diſtance to meaſure 35 poles; the terms are to be diſpoſed thus: as 100 is to 60, ſo is 35 to a fourth term, viz. 21, the height required. See ALTITUDE.

Uſe of the QUADRAT *without calculation.* The preceding caſes may be performed without calculation, where the diviſions of the ſquare are produced both ways, ſo as to form the area into little ſquares.

Thus, ſuppoſe, 1. The thread to fall on 40 in the ſide of *right ſhadows*, and the diſtance be meaſured 20 poles: ſeek among the little ſquares for that perpendicular to the ſide which is 20 parts from the thread; this perpendicular will cut the ſide of the ſquare next the centre, in the point 50, which is the height required in poles.

2. If the thread cuts the ſide of *verſed ſhadows* in the point 60, and the diſtance be 35 poles; count 35 parts on the ſide of the *quadrat* from the centre; count alſo the diviſions of the perpendicular from the point 35 to the thread, which will be 21, the height of the tower in poles.

Note. In all caſes, the height of the centre of the inſtrument is to be added. See ALTITUDE, and SHADOW.

QUADRAT, in *Aſtrology*, called alſo QUARTILE, an aſpect of the heavenly bodies, wherein they are diſtant from each other a quadrant, or ninety degrees. See ASPECT.

QUADRAT, in *Printing*, is a ſort of ſpace; that is, a piece of metal, caſt like the letters, to be uſed occaſionally in compoſing, in order to form the intervals between words, at the end of lines, &c. See PRINTING.

There are *quadrats* of divers ſizes, as *m quadrats*, *n quadrats*, &c. which are reſpectively of the dimenſions of ſuch letters.

QUADRATA *legio*, among the Romans. See *Square* LEGION.

QUADRATIC *equation.* See EQUATION, and REDUCDUCTION *of equations.*

QUADRATING *of a piece*, among *Gunners*, is the ſeeing that a piece of ordnance be duly placed, and poiſed in its carriages; and that its wheels be of an equal height, &c.

QUADRATO, or QUADRO, in the *Italian Muſic*, is a name given to the note B, when it comes in the natural or diatonic order, and is thus marked ♮. It is a ſemitone minor higher than the B mol, or ♭, and in reſpect of that may be called *ſharp*. See FLAT and SHARP.

QUADRATO-CUBUS, QUADRATO-QUADRATO-CUBUS, and QUADRATO-CUBO-CUBUS, are names uſed by Diophantus, Vieta, Oughtred, and others, for the fifth, ſeventh, and eighth powers of numbers. See POWER.

QUADRATO-QUADRATUM, or *Biquadratum*, the fourth power of numbers; or the product of the cube multiplied by the root.

QUADRATRIX, in *Geometry*, a mechanical line, by means whereof we would find right lines equal to the circumference of circles, or other curves, and of the ſeveral parts thereof.

Or, more accurately, the *quadratrix of a curve* is a tranſcendental curve deſcribed on the ſame axis, the ſemiordinates whereof being given, the quadrature of the correſpondent parts in the other curve is likewiſe given. See CURVE.

Thus, e. gr. the curve AND (*Tab. Analyſis, fig.* 21.) may be called the *quadratrix* of the parabola AMC, ſince it is demonſtrated, that $APMA$ is $= PN^2$, or $APMA = AP \times PN$, or $APMA = PN \times a$, a conſtant quantity, &c.

The moſt eminent of theſe *quadratrices* are, that of Dinoſtrates, and that of Mr. Tſchirnhauſen for the circle; that of Mr. Perks for the hyperbola.

QUADRATRIX *of Dinoſtrates*, is a curve AM*mm* (*Tab. Analyſis, fig.* 22.) whereby the quadrature of the circle is effected, though not geometrically, but mechanically: it is thus called from its inventor Dinoſtrates.

Its geneſis is thus: divide the quadrantal arc ANB into any number of equal parts; in N, *n*, &c. by a continual biſection — divide the radius AC into the ſame number of parts in the points P, *p*, &c. Draw radii CN, C*n*, &c. Laſtly, on the points P, *p*, &c. erect perpendiculars PM, *pm*, &c. The curve formed by connecting theſe lines is the *quadratrix of Dinoſtrates*.

This curve may be deſcribed by continued motion; if we ſuppoſe the radius CN by its extreme N to deſcribe uniformly the arc AB, and at the ſame time a ruler PM, always parallel to itſelf, to move uniformly along AC, in ſuch a manner that when the ruler PM arrives at C, the radius CN may coincide with CB; and thus the continual interſection of CN with the ruler PM will deſcribe the *quadratrix* AMD.

Here, from the conſtruction, $ANB : AN :: AC : AP$; and therefore, if $ANB = a$, $AC = b$, $AN = x$, $AP = y$; $ay = bx$. See QUADRATURE.

QUADRATRIX *Tſchirnhauſiana*, is a tranſcendental curve AM*mm*B (*fig.* 23.) whereby the quadrature of the circle is likewiſe effected; invented by Mr. Tſchirnhauſen, in imitation of that of Dinoſtrates.

Its geneſis is thus conceived: divide the quadrant ANB, and its radius AC, into equal parts, as in the former; and from the points P, *p*, &c. draw the right lines PM, *pm*, &c. parallel to CB; and from the points N, *n*, &c. the right lines NM, *nm*, &c. parallel to AC. The points A, M, *m*, &c. being connected, the *quadratrix* is formed; wherein $ANB : AN :: AC : AP$. And, therefore, if $AB = a$, and $AC = b$, $AN = x$, and $AP = y$; $ay = bx$. See QUADRATURE.

This curve may be alſo deſcribed by continued motion, if two rulers, NM and PM, perpendicular to each other, be made to move uniformly and parallel to themſelves, the one along the quadrant of the circle AC, and the other along the radius.

QUADRATUM *cubi*, QUADRATO-QUADRATO-QUADRATUM, and QUADRATUM *ſurdeſolidi*, &c. are names uſed by the Arabs for the ſixth, eighth, and tenth powers of numbers. See POWER.

QUADRATURE, *quadratura*, in *Geometry*, the act of ſquaring; or of reducing a figure to a ſquare; or finding a ſquare equal to ſome other figure propoſed.

Thus, the finding of a ſquare containing juſt as much ſurface or area as a circle, an ellipſis, a triangle, or other figure, is called the *quadrature* of a circle, of an ellipſis, a triangle, or the like.

The *quadrature* of rectilinear figures comes under the common geometry; as amounting to no more than the finding their areas, or ſuperficies; which are, in effect, their ſquares.

Squares of equal areas are here eaſily had, by only extracting the roots of the areas thus found; and on ſuch root as a ſide conſtructing a ſquare. See the particular methods of finding the areas or ſquares, under each particular figure, as PARALLELOGRAM, TRAPEZIUM, TRIANGLE, &c.

The *quadrature of curves*, that is, the meaſuring of their area, or the finding of a rectilinear ſpace equal to a curvilinear ſpace, is a matter of much deeper ſpeculation; and makes a part of the higher geometry.

Though the *quadrature*, eſpecially of the circle, be a thing many of the firſt-rate mathematicians, among the ancients, were very ſolicitous about, and Archimedes ſeems to have been the firſt who has actually given the *quadrature* of a curvilinear ſpace, in finding the *quadrature* of the parabola; yet nothing, of this kind, has been done ſo conſiderable, as in and ſince the middle of the laſt century; when, viz. in the year 1657, ſir Paul Neil and lord Brouncker, and afterwards, in the ſame year, ſir Chriſtopher Wren, geometrically demonſtrated the equality of ſome curvilinear ſpaces to rectilinear ſpaces.

Soon after this, others, at home and abroad, did the like in other curves; and, not long afterwards, the thing was brought under an analytical calculus, the firſt ſpecimen whereof, ever publiſhed, was given by Mercator in 1688, in a demonſtration of lord Brouncker's *quadrature* of the hyperbola, by Dr. Wallis's reduction of a fraction into an infinite ſeries by diviſion.

Though it appears, by the way, that ſir Iſaac Newton had before diſcovered a method of attaining the quantity of all quadruple curves analytically, by his method of FLUXIONS, before the year 1668.

It is conteſted, between ſir Chriſtopher Wren and Mr. Huygens, which of the two firſt found the *quadrature* of any determinate cycloidal ſpace. Mr. Leibnitz afterwards found that of another ſpace; and Mr. Bernouilli, in 1699, diſcovered the *quadrature* of an infinity of cycloidal ſpaces, not only ſegments, but alſo ſectors, &c.

QUADRATURE *of the circle*, or *the finding a ſquare equal to a given circle*, is a problem that has employed the mathematicians of all ages, but ſtill in vain.

It depends on the ratio of the diameter to the periphery, which was never yet determined in preciſe numbers.

If this ratio were known (which would imply the circumference's being expreſſed by ſome affection of the diameter; and, of conſequence, that it were equal to a right line) the *quadrature of a circle* were effected: it being demonſtrated, that the area of a circle is equal to a rectangular triangle, whoſe two ſides, comprehending the right angle, are the radius, and a right line equal to the circumference. So that, to ſquare the circle, all that is required, is, to rectify it.

Many have approached very near this ratio. For an account of what has been done in this way, ſee DIAMETER.

Strict geometry here failing, authors have had recourſe to other means; and particularly, to a ſort of curves, called *quadratrices:* but theſe being mechanical curves, inſtead of geometrical ones, or rather tranſcendental inſtead of algebraical ones, the problem is never fairly to be ſolved thereby.

Hence, recourſe has been had, by others, to analytics. And the problem has been attempted by three ſorts of algebraic calculations. The firſt gives a kind of tranſcendental *quadratures,* by equations of indefinite degrees. The ſecond, by vulgar numbers, though irrationally ſuch; or by the roots of common equations, which for the general *quadrature,* or its ſectors, is impoſſible. The third, by means of certain ſeries, exhibiting the quantity of a circle by a progreſſion of terms. See SERIES.

In ſearching, e. gr. for a right line equal to the circumference of a circle, we find, that the diameter being put 1, the circumference will be $\frac{4}{1}-\frac{4}{3}+\frac{4}{5}-\frac{4}{7}+\frac{4}{9}$, &c. making an infinite ſeries of fractions, whoſe numerator is always 4, and the denominators in the natural ſeries of the uneven numbers; and all theſe terms, alternately, will be too great, and too little.

If the ſum of this ſeries could be found, it would give the *quadrature of the circle*; but this is not yet done: nor is it at all probable, that it ever will be done. That, however, is not yet demonſtrated; nor, of conſequence, is the *quadrature of the circle* yet demonſtrated impoſſible.

To this it may be added, that as the ſame magnitude may be expreſſed by ſeveral different ſeries, it is poſſible, the circumference of the circle may be expreſſed in ſome other ſeries, whoſe ſum may be found. We have two infinite ſeries; expreſſing the ratio of the circumference to the diameter, though indefinitely, as above. The firſt, diſcovered by ſir Iſaac Newton; where the radius being put 1, the quadrant is $1-\frac{1}{6}-\frac{1}{40}-\frac{1}{112}$, &c. The ſecond, diſcovered by Mr. Leibnitz; where the radius being 1, the quadrant is $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\frac{1}{9}$, &c. The inveſtigation of each of which ſeries, by the *calculus integralis,* is as follows:

Sir Iſaac Newton's QUADRATURE *of the circle*; or the inveſtigation of his ſeries, for ſquaring the circle. If the radius of the circle $AC=1$ (*Tab. Analyſis, fig.* 24.) $CP=x$, $y=\surd(1-x^2)$ and $\surd(1-x^2)=1-\frac{1}{2}x^2-\frac{1}{8}x^4-\frac{1}{16}x^6-\frac{5}{128}x^8-\frac{7}{256}x^{10}$, &c. to infinity; then (d expreſſing the DIFFERENTIAL or fluxion) will $y\,dx = dx-\frac{1}{2}x^2\,dx-\frac{1}{8}x^4\,dx-\frac{1}{16}x^6\,dx-\frac{5}{128}x^8\,dx-\frac{7}{256}x^{10}\,dx$, —, &c. to infinity; $\int y\,dx$ (or the fluent of $y\,dx$ or $y\dot{x}$) $=x-\frac{1}{6}x^3-\frac{1}{40}x^5-\frac{1}{112}x^7-\frac{5}{1152}x^9-\frac{7}{2816}x^{11}$, to infinity.

When x becomes equal to the radius CA, the ſpace DCPM is augmented into a quadrant. Subſtituting, therefore, 1 for x, the quadrant will be $1-\frac{1}{6}-\frac{1}{40}-\frac{1}{112}-\frac{5}{1152}-\frac{7}{2816}$, &c. *in infinitum.* Which ſame ſeries will meaſure the entire area of the circle, the diameter being 1.

Mr. Leibnitz's QUADRATURE *of the circle.* Let the tangent KB (*Tab. Analyſis, fig.* 25.) $=x$, $BC=1$; and the ſecant AC, infinitely near another CK, and the little arch KL be drawn with the radius CK: then will $AK=dx$, $KC=\surd(1+x^2)$. Now ſince the angles at B and L are right angles; and, by reaſon of the infinitely ſmall angle KCL, the angle $BKC = KAC$; we ſhall have

$$KC:BC::CA:KL$$

$$\surd(1+x^2):1::dx:\frac{dx}{\surd(1+x^2)}$$

Farther, $CK:KL::CM:mM$

$$\surd(1+x^2):\frac{dx}{\surd(1+x^2)}::1:\frac{dx}{1+x^2}$$

Therefore the ſector $CMm=\frac{1}{2}dx:(1+x^2)=\frac{1}{2}(dx-x^2\,dx+x^4\,dx-x^6\,dx+x^8\,dx-x^{10}\,dx$, &c.) whence, by the integral calculus, we find the ſector BCM (whoſe tangent $KB=x$) $\frac{1}{2}x-\frac{1}{6}x^3+\frac{1}{10}x^5-\frac{1}{14}x^7+\frac{1}{18}x^9-\frac{1}{22}x^{11}$, &c. *in infinitum.* And therefore if BM be the octant of the circle, or an arc of 45° whoſe tangent KB or x is equal to the radius or 1, the ſector will be $\frac{1}{2}-\frac{1}{6}+\frac{1}{10}-\frac{1}{14}$, &c. *in infinitum.* The double, therefore, of this ſeries, $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\frac{1}{9}-\frac{1}{11}$, &c. *in infinitum,* is the quadrant of the circle; or, if the diameter be $=1$, the entire area of the circle.

In order to exhibit more diſtinctly and at large the uſe of FLUXIONS, according to themodern method of notation, in finding the areas of curves, we ſhall premiſe the two following caſes.

Caſe 1. Let ARC (*Tab.* III. *Analyſis, fig.* 71.) be a curve of any kind whoſe ordinates R*b*, CB are perpendicular to an axis AB. Imagine a right line *b*R*g*, perpendicular to AB, to move parallel to itſelf from A towards B; and let its velocity, or the fluxion of the abſciſſe A*b*, in any propoſed ſituation of that line, be denoted by *bd*; then will the rectangle *bn* expreſs the FLUXION of the generated area A*b*R, which (if $Ab = x$, and $bR=y$) will be $=y\dot{x}$: whence, by ſubſtituting for y or $\dot{x}$ (according to the equation of the curve) and taking the fluent, the area itſelf will become known.

Caſe 2. Let ARM (*fig.* 72.) be any curve whoſe ordinates CR, CR are all referred to a point or centre; and conceive a right line CRH to revolve about the given centre C, and a point R to move along the ſaid line, ſo as to deſcribe the curve line ARM. If this point were to move from Q, ~~without changing its~~ direction or velocity, it would proceed along the tangent QS (inſtead of the curve) and deſcribe areas Q*s*C, QSC about the centre C, proportional to the times in which they were deſcribed; becauſe, having the ſame altitude CP, they are as the baſes Q*s* and QS. Conſequently, if RS be taken to denote the value of $\dot{z}$ the fluxion of the curve line AR, the correſponding fluxion of the area ARC will be juſtly repreſented by the uniformly generated triangle QCS; which, expreſſing CP by s, will be $=\frac{QS\times CP}{2}=\frac{s\dot{z}}{2}$: whence the area itſelf may be determined. But ſince, in many caſes, the value of $\dot{z}$ cannot be computed (from the property of the curve) without trouble, the two following expreſſions, for the fluxion of the area, will be found more commodious, viz. $\frac{sy\dot{y}}{2t}$ and $\frac{y^2\dot{x}}{2a}$; where $t=RP$ and $x=$ the arc BN of a circle, deſcribed about the centre C, at any diſtance $a=CB$. Theſe expreſſions are derived from that above in the following manner; viz. $\dot{z}:\dot{y}::y\,(CR):t\,(RP)$; therefore $\dot{z}=\frac{y\dot{y}}{t}$; conſequently $\frac{s\dot{z}}{2}=\frac{sy\dot{y}}{2t}$. Moreover, becauſe the celerity of R in the direction of the tangent is denoted by $\dot{z}$, that in a direction perpendicular to CQ (whereby the point R revolves about the centre C) will, therefore, be $=\frac{CP}{CR}\times\dot{z}=\frac{s\dot{z}}{y}$; which, being to $\dot{x}$ the celerity of the point N about the ſame centre as the diſtance or radius CR (y) to the radius CN (a), we ſhall, by multiplying extremes and means, have $\frac{as\dot{z}}{y}=y\dot{x}$, and, conſequently, $\frac{s\dot{z}}{2}=\frac{y^2\dot{x}}{2a}$. In the examples ſubjoined, the letters x, y, z, and u will be uſed to denote the abſciſſe, ordinate, curve-line, and area reſpectively.

QUADRATURE *of a right-angled triangle.* Let the baſe AH (*fig.* 73.) $=a$, the perpendicular $HM=b$, and let AB (x) be any portion of the baſe, conſidered as a flowing quantity, and BR (y) be the correſponding ordinate. Then, the triangles AHM and ABR being ſimilar, we ſhall have $a:b::x:y=\frac{bx}{a}$. Whence $y\dot{x}$ (the fluxion of the area ABR) $=\frac{bx\dot{x}}{a}$; and its fluent (ſee *Inverſe method of* FLUXIONS) or the area itſelf $=\frac{bx^2}{2a}$, which, when $x=a$ and BR coincides with HM, will become $\frac{ab}{2}=\frac{AH\times HM}{2}$ = the area of the whole triangle AHM. See *Menſuration of* TRIANGLES.

QUADRATURE *of a circular ſector.* Let AOR (*fig.* 74.) be the ſector; AO or OR, its radius, $=a$, the arc AR, conſidered as variable by the motion of R, $=z$, and $Rr=\dot{z}$; the fluxion of the area will be $\frac{a\dot{z}}{2}$ = the triangle OR*r*: whence the area itſelf is $=\frac{az}{2}=AO\times\frac{1}{2}AR$: that is, the area of any circle is expreſſed by a rectangle under half the circumference and half the diameter. See CIRCLE.

QUADRATURE *of a ſemicircle.* Let the ſemicircle be AREH (*fig.* 75); its diameter $AH=a$, $AB=x$, and $BR=y$, &c. and we have $y^2\,(BR^2)=ax-x^2$ $(AB\times BH)$, and, conſequently, $\dot{u}\,(y\dot{x})=\dot{x}\sqrt{ax-xx}$

= 4

$= a^{\frac{1}{2}} x^{\frac{1}{2}} \dot{x} \times \overline{1 - \frac{x}{a}}\Big|^{\frac{1}{2}}$; which expreſſion being reſolved into an infinite SERIES, we ſhall have $\dot{u} = a^{\frac{1}{2}} x^{\frac{1}{2}} \dot{x} \times \overline{1 - \frac{x}{2a} - \frac{x^2}{8a^2} - \frac{x^3}{16a^3} - \frac{5x^4}{128a^4}}$, &c. $= a^{\frac{1}{2}} \times \overline{x^{\frac{1}{2}}\dot{x} - \frac{x^{\frac{3}{2}}\dot{x}}{2a} - \frac{x^{\frac{5}{2}}\dot{x}}{8a^2} - \frac{x^{\frac{7}{2}}\dot{x}}{16a^3}}$, &c. Whence, the fluent of every term being taken, there will ariſe $u = a^{\frac{1}{2}} \times \overline{\frac{2x^{\frac{3}{2}}}{3} - \frac{x^{\frac{5}{2}}}{5a} - \frac{x^{\frac{7}{2}}}{28a^2} - \frac{x^{\frac{9}{2}}}{72a^3} - \frac{5x^{\frac{11}{2}}}{704a^4}}$, &c. $= x\sqrt{ax} \times \overline{\frac{2}{3} - \frac{x}{5a} - \frac{x^2}{28a^2} - \frac{x^3}{72a^3} - \frac{5x^4}{704a^4}}$, &c. = the area A B R. When $x = \frac{1}{2}a$, the ordinate B R will coincide with the radius O E; in which caſe the area becomes $= \frac{1}{2}a\sqrt{\frac{1}{2}aa} \times \overline{\frac{2}{3} - \frac{1}{10} - \frac{1}{112} - \frac{1}{576} - \frac{5}{11264}}$, &c. $= \frac{a^2\sqrt{\frac{1}{2}}}{2} \times \overline{0{,}6666 - 0{,}1 - 0{,}0089 - 0{,}0017 - 0{,}0004}$, &c. $= 0{,}1964\,a^2$; which, multiplied by 2, gives $0{,}3928\,a^2$ for the area of the ſemicircle, nearly. In order to obtain a more converging ſeries, let the arc A R be $= \frac{1}{3}$ A E = 30°, and the ſine B R (being half the chord of double the arc or half the ſide of a hexagon, i. e. half the radius) will be $= \frac{1}{2}$ A O; and A B (x) = AO − OB = A O − $\sqrt{\text{OR}^2 - \text{BR}^2}$; which, radius being 1, will be = 0,1339746 nearly: ſubſtitute this quantity, with the value of a in the above ſeries, $\sqrt{ax^3} \times \overline{\frac{2}{3} - \frac{x}{5a} - \frac{x^2}{28a^2} - \text{\&c.}}$ and we ſhall have $\overline{0{,}0693505} \times \overline{0{,}6666666 - 0{,}0133975 - 0{,}0001603 - 0{,}0000042 - \text{\&c.}} = 0{,}0693505 \times 0{,}6531046 = 0{,}0452931$ = the area A B R: which, added to the area O B R ($=$ OB $\times \frac{1}{2}$ BR $= \sqrt{\frac{3}{4}} \times \frac{1}{4} = 0{,}2165063$) gives 0,2617994 for the area of the ſector A O R; the treble of which, or 0,7853982 (A R being $= \frac{1}{3}$ A E) will be the content of the whole quadrant A O E; which number, found by taking only four terms of the ſeries, is true to the laſt decimal place.

QUADRATURE *of the lunes.* Though a definite *quadrature* of the entire circle was never yet given; yet there have been various portions of it ſquared. The firſt partial *quadrature* was given by Hippocrates of Chio; who ſquared a portion called, from its figure, the *lune*, or *lunule*. See LUNE, where the *quadrature* is ſhewn.

This *quadrature* has no dependence on that of the circle; but then it only extends to the entire lune, or its half: if you would ſquare any portion thereof at pleaſure, the *quadrature* of the circle comes in the way.

Yet ſome of the modern geometers have found the *quadrature* of any portion of the lune at pleaſure, independently of the *quadrature* of the circle; though ſtill ſubject to a certain reſtriction, which prevents the *quadrature* from being perfect, and, as the geometricians call it, abſolute and indefinite.

In 1701, the Marquis De l'Hôpital publiſhed a new manner of ſquaring the parts of the lune taken different ways, and under different conditions: though this, too, is imperfect in the ſame manner as the other.

QUADRATURE *of the ellipſis.* The *ellipſis*, alſo, is a curve whoſe preciſe *quadrature* in definite terms is not yet effected. We have here, therefore, as before, recourſe to a ſeries.

Let A C (*Tab. Analyſis, fig.* 26.) $= a$, G C $= c$, P C $= x$. Then will

$$\frac{y^2 = c^2\,(a^2 - x^2) : a^2}{y = c\sqrt{(a^2 - x^2)} : a}.$$

But $\sqrt{(a^2 - x^2)} = a - \frac{x^2}{2a} - \frac{x^4}{8a^3} - \frac{x^6}{16a^5} - \frac{5x^8}{128a^7} - \frac{7x^{10}}{256a^9}$, &c. *in infinitum.* Therefore $y\,dx = c\,dx - \frac{cx^2\,dx}{2a^2} - \frac{cx^4\,dx}{8a^4} - \frac{cx^6\,dx}{16a^6} - \frac{5cx^8\,dx}{128a^8} - \frac{7cx^{10}\,dx}{256a^{10}}$, &c. *in infinitum.* And $\int y\,dx$, or the fluent of $y\,dx$, i. e. $y\dot{x} = cx - \frac{cx^3}{6a^2} - \frac{cx^5}{40a^4} - \frac{cx^7}{112a^6} - \frac{5cx^9}{1152a^8} - \frac{7cx^{11}}{2816a^{10}}$, &c. *in infinitum.*

If then for x be put a; the quadrant of the ellipſis will be $ac - \frac{1}{6}ac - \frac{1}{40}ac - \frac{1}{112}ac - \frac{5}{1152}ac - \frac{7}{2816}ac$, &c. *in infinitum.* Which ſame ſeries exhibits the entire area of the ellipſis, if a denote the entire axis.

Hence, 1. If $\sqrt{ac} = 1$; the area of the ellipſis $= 1 - \frac{1}{6} - \frac{1}{40} - \frac{1}{112} - \frac{5}{1152} - \frac{7}{2816}$, &c. *in infinitum*: whence it is evident than an ellipſis is equal to a circle whoſe diameter is a mean proportional between the conjugate axes of the ellipſis.

2. Hence, alſo, an ellipſis is to a circle whoſe diameter is equal to the greater axis, as ac to a^2; that is, as c to a, or as the leſs axis to the greater.

Hence, laſtly, having the *quadrature* of the circle, we ſhall likewiſe have that of the ellipſis, and on the contrary. Thus, let the ellipſis propoſed be A E B (*Tab.* III. *Analyſis, fig.* 76.); its tranſverſe axis A B $= a$, the conjugate 2 C E $= c$; and by the property of the curve (ſee ELLIPSE, art. 15.) we have y (D R) $= \frac{c}{a}\sqrt{ax - xx}$; and, therefore, $\dot{u}\ (y\dot{x}) = \frac{c}{a} \times \dot{x}\sqrt{ax - xx}$ = the fluxion of the area A R D. But $\dot{x}\sqrt{ax - xx}$ expreſſes the fluxion of the correſponding ſegment A D n of the circumſcribing ſemicircle, whoſe fluent is given (ſee QUADRATURE *of a ſemicircle*); which being denoted by A, that of $\frac{c}{a} \times \dot{x}\sqrt{ax - x^2}$ will, conſequently, be $= \frac{c}{a} \times$ A. Hence the area of the ſegment of an ellipſis is to the area of the correſponding ſegment of its circumſcribing circle, as the leſſer axis of the ellipſe is to the greater; whence it follows, that the whole ellipſis muſt be to the whole circle in the ſame ratio.

QUADRATURE *of the parabola.* For the parabola we have a *quadratrix* or tranſcendent curve, which gives its ſquare.

But it may be likewiſe had thus: let the curve A R M H (*fig.* 77.) be the common parabola, in which y^2 (B R^2) $= ax$ (A B × a, the parameter) ſee CONIC *ſection*. Whence we have $y = a^{\frac{1}{2}}x^{\frac{1}{2}}$, and $\dot{u}\ (y\dot{x}) = a^{\frac{1}{2}}x^{\frac{1}{2}}\dot{x}$; and, therefore, $u = \frac{2}{3} \times a^{\frac{1}{2}}x^{\frac{3}{2}} = \frac{2}{3}a^{\frac{1}{2}}x^{\frac{1}{2}} \times x = \frac{2}{3}yx = \frac{2}{3} \times$ A B × B R. Hence a parabola is $\frac{2}{3}$ of a rectangle of the ſame baſe and altitude.

The value of the area may alſo eaſily be found in terms of y. Thus x being $= \frac{y^2}{a}$, we have $\dot{x} = \frac{2y\dot{y}}{a}$, and $\dot{u}\ (y\dot{x}) = \frac{2y^2\dot{y}}{a}$: whence $u = \frac{2y^3}{3a} = \frac{2y}{3} \times \frac{y^2}{a} = \frac{2y}{3} \times x = \frac{2}{3} \times$ A B × B R. See CONIC *ſection*.

QUADRATURE *of the hyperbola.* For this, too, we have a *quadratrix*, invented by Mr. Perks.

The analytical *quadrature* was firſt given by N. Mercator of Holſtein, the firſt inventor of infinite ſerieſes. But Mercator finding his ſeries by diviſion, ſir Iſaac Newton and Mr. Leibnitz improved upon his method; the one ſeeking them by the extraction of roots, the other by a ſeries preſuppoſed. See HYPERBOLA.

Mercator's QUADRATURE *of the hyperbola between its aſymptotes.* Since in an hyperbola within the aſymptotes, $a^2 = by + xy$; or if $a = b = 1$ (which may be ſuppoſed, ſince the determination of b is arbitrary).

Then will $\frac{1 = y + xy}{1 : (1 + x) = y}$.

That is (the diviſion being actually performed)

$y = \overline{1 - x + x^2 - x^3 + x^4 - x^5 + x^6}$, &c.

$y\,dx = \overline{dx - x\,dx + x^2\,dx - x^3\,dx + x^4\,dx - x^5\,dx + x^6\,dx}$, &c.

$\int y\,dx = x - \frac{1}{2}x^2 + \frac{1}{3}x^3 - \frac{1}{4}x^4 + \frac{1}{5}x^5 - \frac{1}{6}x^6 + \frac{1}{7}x^7$, &c. *in infinitum.*

QUADRATURE *of the cycloid.* Since in this curve (*Tab. Analyſis, fig.* 27.) we have

A Q : Q P : : M S : m S.

Let, then, A Q $= x$, A B $= 1$; then will M S $= dx$, P Q $= \sqrt{(x - xx)}$, and m S $= dx\sqrt{(x - xx)} : x$. But it is ſhewn, that $\sqrt{(x - xx)} = x^{\frac{1}{2}} - \frac{1}{2}x^{\frac{3}{2}} - \frac{1}{8}x^{\frac{5}{2}} - \frac{1}{16}x^{\frac{7}{3}}$, &c. *in infinitum.* Therefore, $dx\sqrt{(x - xx)} : x =$ (the numerators of the exponents being diminiſhed by two units in the diviſion by x) $x^{-\frac{1}{2}}dx - \frac{1}{2}x^{\frac{1}{2}}dx - \frac{1}{8}x^{\frac{2}{3}}dx - \frac{1}{16}x^{\frac{5}{2}}dx$, &c. *in infinitum.* Whoſe ſum $2x^{\frac{1}{2}} - \frac{1}{3}x^{\frac{3}{2}} - \frac{1}{20}x^{\frac{5}{2}} - \frac{1}{56}x^{\frac{7}{2}}$, &c. *in infinitum*, is the ſemiordinate of the cycloid Q M referred to the axis A B. Hence, Q M dx, or the element Q M S q of the cycloidal ſpace A M Q $= 2x^{\frac{1}{2}}dx - \frac{1}{3}x^{\frac{3}{2}}dx - \frac{1}{20}x^{\frac{5}{2}}dx - \frac{1}{56}x^{\frac{7}{2}}dx$, &c. *in infinitum.* Whoſe ſum $= \frac{4}{3}x^{\frac{3}{2}} - \frac{2}{15}x^{\frac{5}{2}} - \frac{1}{70}x^{\frac{7}{2}} - \frac{1}{252}x^{\frac{9}{2}}$, &c. *in infinitum*, expreſſes the ſegment of the cycloid A M Q.

If then m S $= g$ G $= dx\sqrt{(x - xx)} : x$ be multiplied into G M $=$ A Q $= x$, we ſhall find the element G M H g of the area A M G $= dx\sqrt{(x - xx)}$. Which being the ſame with the element of the ſegment of the circle A P Q, the ſpace A M G will be equal to the ſegment of the circle A P Q; and conſequently, the area A D C equal to the ſemicircle A B P.

Hence, ſince C B is equal to the ſemiperiphery of the circle, if that $= p$ and A B $= a$, the rectangle B C D A $= ap$; and the ſemicircle A P B, and conſequently, the external cycloidical ſpace A D C $= \frac{1}{4}ap$. Therefore the area of the ſemicycloid A C B $= \frac{3}{4}ap$, and A M C B P A $= \frac{1}{2}ap$. Conſequently, the area of the cycloid is triple of the generating circle. See CYCLOID.

The area ASRA (*Tab.* III. *Analyſis, fig.* 78.) included by the common cycloid ASM and its generating ſemicircle ARH, may be otherwiſe determined in the following manner. Let the radius AO or RO be $= a$, the ſine BR $= y$, the coſine OB $= x$, and the arc AR (= RS by the property of the CYCLOID) $= z$. Then AB being $= a - x$, its FLUXION will be $-\dot{x}$, whence $\dot{u}$, that of the area ARS, is $= -z\dot{x}$. To find the fluent of which, make $w = -zx$ (= the fluent, if z was conſtant) then $\dot{w}$ being $= -z\dot{x} - x\dot{z}$, we ſhall have $\dot{u}$ $(= -z\dot{x}) = \dot{w} + x\dot{z}$. But $\dot{z}$ (AR fluxion) : $\dot{y}$ (BR fluxion) :: radius : coſine of the angle ARB, or its equal ROB (ſee Simpſon's Fluxions, vol. i. art. 35. p. 26) :: OR (a) : OB (x). Therefore, by multiplying extremes and means, we obtain $x\dot{z} = a\dot{y}$; whence by ſubſtitution $\dot{u}$ $(= \dot{w} + x\dot{z}) = \dot{w} + a\dot{y}$; and conſequently, by taking the fluent, $u = w + ay = -zx + ay = AO \times BR - BO \times AR$ = the area ARS. Hence it follows, that the area (AEFA) when RB coincides with the radius FO, is barely $= AO \times FO = AO^2$: and that the whole area AMHFA is truly defined by $-ARH \times -OH$, or by $ARH \times OH$; that is, by four times the area of the generating ſemicircle.

QUADRATURE *of the logiſtic, or logarithmic curve.* Let the ſubtangent PT (*Tab. Anylaſis, fig.* 28.) $= a$, PM $= x$, P$p = dx$; then will

$$y\,dx : dy = a$$

$$y\,dx = a\,dy$$

$$\int y\,dx = ay.$$

Wherefore the indeterminate ſpace HPMI, is equal to the rectangle of PM into PT.

Hence, 1. Let QS $= z$; then will the indeterminate ſpace ISQH $= az$; and, conſequently, SMPQ $= ay - az = a(y - z)$; that is, the ſpace intercepted between the two logiſtic ſemiordinates is equal to the rectangle of the ſubtangent into the difference of the ſemiordinates.

2. Therefore the ſpace BAPM is to the ſpace PMSQ as the difference of the ſemiordinates AB and PM is to the difference of the ſemiordinates PM and SQ. See LOGARITHMIC *curve.*

QUADRATURE *of the logarithmic ſpiral.* Let CBAC (*Tab.* III. *Analyſis, fig.* 79.) be the area propoſed: let the right line AT touch the curve at A, upon which from the centre C let fall the perpendicular CT: then, ſince by the nature of the curve, the angle TAC is every where the ſame, the ratio of AT (t) to CT (s) will be conſtant: and, therefore, the fluent of $\frac{s}{t} \times \frac{y\dot{y}}{2} = \frac{s}{t} \times \frac{y^2}{4}$ = the required area.

QUADRATURE *of the ſpiral of Archimedes.* Let CRR (*fig.* 80.) be the curve, whoſe area CRgC is required. Let AC be a tangent at the centre C, about which centre, with any radius AC $(= a)$ ſuppoſe a circle Agg to be deſcribed: then the arc or abſciſſe Ag correſponding to any propoſed ordinate CR, being to that ordinate in a conſtant ratio (e. gr. as m to n) we have x (Ag) $= \frac{my}{n}$; therefore $\dot{u} = \frac{y^2\dot{x}}{2a} = \frac{my^2\dot{y}}{2an}$; conſequently $u = \frac{my^3}{6an}$ = the area CRRgC. See SPIRAL *of Archimedes.*

QUADRATURE *of Deſcartes's curve,* which is defined by the expreſſion, $b^2 : x^2 :: b - x : y$.

Since, $b^2y = bx^2 - x^3$

$$y = (bx^2 - x^3) : b^2$$

$$y\,dx = (bx^2dx - x^3dx) : b^2$$

$$\int y\,dx = x^3 : 3b - x^4 : 4b^2.$$

QUADRATURE *of all curves comprehended under the general equation,* $y = \sqrt[m]{(x+a)}$.

Since $y = (x+a)^{\frac{1}{m}}$

$$y\,dx = dx\,(x+a)^{\frac{1}{m}}.$$

To render the element integrable, ſuppoſe

$$(x+a)^{\frac{1}{m}} = v.$$

Then will $x + a = v^m$

$$dx = mv^{m-1}dv$$

$$y\,dx = mv^m dv$$

$$\int y\,dx = \frac{mv^{m+1}}{m+1} = \frac{m}{m+1}(x+a)\sqrt[m]{(x+a)}.$$

Let $x = 0$: the remainder will be $\frac{m}{m+1}a\sqrt[m]{a}$. Whence, the area of the curve $\frac{m}{m+1}(x+a)\sqrt[m]{(x+a)} - \frac{ma}{m+1}\sqrt[m]{a}$.

See on the ſubject of this article Wolfii Elementa Matheſeos, tom. i. part ii. ſect. 2. cap. 2. and Simpſon's Fluxions, vol. i. ſect. 7. p. 121, &c.

QUADRATURE, in *Aſtronomy*, that aſpect, or ſituation of the moon, when ſhe is ninety degrees diſtant from the ſun.

Or, the *quadrature* is when ſhe is in a middle point of her orbit, between the points of CONJUNCTION and OPPOSITION; which happens twice in each revolution, viz. in the firſt and third quarter.

When the moon is in her *quadrature*, ſhe exhibits that phaſis which we call the half-moon, i. e. ſhe ſhines with juſt half her face; and is ſaid to be biſected, or dichotomized.

In the moon's progreſs from the ſyzygies to her *quadrature*, her gravity towards the earth is continually increaſing by the action of the ſun; and her motion is retarded for the ſame reaſon. Her motion then, in her orbit, is ſloweſt as her gravity to the earth is greateſt when in the *quadratures*.

In her receſs from the *quadratures* to the ſyzygies, the gravity continually decreaſes, and the velocity increaſes. The ratio is thus: as radius is to the ſum, or difference of one and a half the coſine of double the diſtance of the moon from the ſyzygy, and half the radius; ſo is the addition of gravity in the *quadratures* to the diminution, or increaſe thereof in any other ſituation. See SYZYGY.

Hence the moon's orbit is more convex in the *quadratures* than in the ſyzygies; and hence the circular figure of the moon's orbit is changed into an oval, whoſe greater axis goes through the *quadratures*; and hence, alſo, the moon is leſs diſtant from the earth at the ſyzygies, and more at the *quadratures*.

It is no wonder, therefore, that the moon ſhould approach nearer the earth when her gravity is diminiſhed; that acceſs not being the immediate effect of this diminution, but of the inflexion of the orbit towards the *quadratures*.

In the *quadratures*, and within thirty-five degrees thereof, the apſides of the moon go backwards, or move *in antecedentia*; but they move forwards in the ſyzygies. See APSIDES.

The moon's orbit undergoes various alterations in each revolution. Its eccentricity is the greateſt when the line of the apſides is in the ſyzygies; and the leaſt, when in the *quadratures*.

Conſidering one entire revolution, the nodes move ſlower and ſlower as the moon approaches the *quadratures*, and they reſt when ſhe is therein; but, conſidering ſeveral revolutions, the nodes go back faſter in the *quadratures*.

The inclination of the plane of the moon's orbit increaſes as the nodes go from the ſyzygies, and is greateſt when the nodes are in the *quadratures*. See MOON and NODES.

QUADRATURE *lines*, or *Lines of* QUADRATURE, are two lines frequently placed on *Gunter's* SECTOR.

They are marked with the letter Q, and the figures 5, 6, 7, 8, 9, 10; of which Q ſignifies the ſide of a ſquare, and the other figures the ſides of polygons of 5, 6, 7, &c. ſides. S there ſtands for the ſemidiameter of a circle; and 90 for a line equal to ninety degrees in circumferenee.

QUADRATUS, in *Anatomy*, a name applied to ſeveral muſcles, in reſpect of their ſquare figure; as the PALMARIS, and PRONATORS.

There is alſo a QUADRATUS *femoris*, a member of the muſcle quadrigeminus, ariſing from the apophyſis of the iſchium, and maintaining an equal breadth and bulk to its inſertion juſt below the great trochanter. See *Tab. Anat.* (*Myol.*) *fig.* 7. *n.* 25.

It is fixed by one extremity along that obtuſe line which runs from under the acetabulum, toward the lower part of the tuberoſity of the iſchium; from whence it runs directly towards the great trochanter, and is inſerted in almoſt all the lower half of the oblong eminence in that apophyſis, but chiefly in the ſmall riſing tuberoſity in the middle of that eminence.

This aſſiſts with the other muſcles of the QUADRIGEMINUS, to turn the thigh outwards.

QUADRATUS *genæ*, or *maxillæ inferioris*, called alſo *montanus*, and (on account of its breadth) *platiſma ragoides*, is a ſquare muſcle lying immediately under the ſkin of the neck, thence called alſo SUBCUTANEUS. It ariſes thin and membranous from the upper part of the ſpines of the vertebræ of the neck, and the ſkin of the ſuperior parts of the cucullaris, and pectoral muſcle; whence, ſpreading over the neck, it becomes fleſhy, and is inſerted partly into the os hyoides, and partly into the under edge of the lower jaw. It adheres firmly to the panniculus carnoſus, from which it is not ſeparated without difficulty; and therefore was not anciently diſtinguiſhed from it. It ſerves to pull the lower jaw downward, and awry.

Quadratus *lumborum, ſive lumbaris externus,* a ſmall, oblong, flat muſcle, irregularly ſquare, narrower at its upper than at its lower part, lying along the ſides of the vertebræ lumborum, between the laſt falſe rib and the os ilium. It is fixed below to the external labium of almoſt all the poſterior half of the criſta of the os ilium, to the ligamentum ſacro-iliacum, and a little to the os ſacrum, by a fleſhy plane, the fibres whereof run obliquely backward; from thence it runs up between the ſacro-lumbaris and pſoas, by both which it is partly hid, and is inſerted in the extremities of all the tranſverſe apophyſes of the loins by oblique tendinous digitations. It is alſo fixed by a broad inſertion in the twelfth rib, on the inſide of the ligament which lies between it and the longiſſimus dorſi, by which that rib is connected to the firſt vertebra of the loins. Winſlow.

Quadratus *muſculus,* in *Anatomy,* is alſo a name given by Winſlow to the muſcle of the lips called by Albinus and Cowper DEPRESSOR *labii inferioris.*

QUADRELS, in *Building,* a kind of artificial ſtones, perfectly ſquare; whence their name. They are made of a chalky, or whitiſh and pliable earth, &c. dried in the ſhade for at leaſt two years.

They were formerly in great requeſt among the Italian architects.

QUADRIGA, formed from *quatuor, four,* and *jugum, yoke,* in *Antiquity,* a car, or chariot, drawn by four horſes, harneſſed abreaſt.

Various are the accounts we have of the author of the *quadriga.* Cicero makes it the invention of Minerva. Hyginus attributes it to Erichthonius IV. king of the Athenians; which ſentiment Virgil alſo follows in his Georgics, lib. iii. ver. 113. Æſchylus gives Prometheus the honour thereof. Tertullian, De Spectac. lib. ix. ſays, it was invented among the Argians, by Trochilus, in honour of Juno; and at Rome, by Romulus, in honour of Mars, or Quirinus. Ado of Vienne, Chronic. act iii. will have it to have been invented by one Procidus, about the time of the eſtabliſhment of the kingdom of Athens. Laziardels, Hiſt. Univerſ. Epitom. lib. xxiv. ſays the ſame of Triptolemus. Laſtly, if there be not opinions enough already, Herodotus gives us another; and ſays, the Greeks borrowed it from the Libyans. Pliny tells us, that his ſeal was a *quadriga,* lib. xvi.

On the reverſes of medals we frequently ſee Victory, or the emperor, in a *quadriga,* holding the reins of the horſes; whence theſe coins are called, among the curious, *nummi quadrigati,* and *victoriati.* See BIGATI.

Quadriga, in *Surgery,* otherwiſe called CATAPHRACTA, is a ſtrong bandage made uſe of in fractures of the ſternum. It is compoſed of a double-headed roller, about ſix Paris ells long, and three or four fingers broad. See Heiſter's Surgery, part iii. chap. 4. § 14.

QUADRIGEMINUS, in *Anatomy,* a muſcle, or rather an aſſemblage of four muſcles, ſerving to turn the thigh outward.

The firſt of the conſtituent muſcles of the *quadrigeminus* is the pyriformis; the ſecond and third are the gemini; and the fourth is the quadratus femoris. See each deſcribed under its proper article.

QUADRILATERAL, in *Geometry,* a figure whoſe perimeter conſiſts of four right lines, making four angles; whence it is alſo called a *quadrangular* figure.

If the ſeveral angles be right, the figure is a *rectangular quadrilateral.* If oblique, an *oblique-angular quadrilateral.*

If the ſides of a *quadrilateral* be equal, and the angles right, the figure is a *ſquare.*

If the ſides be equal, but the angles unequal, the figure is a *rhombus.*

If the angles be equal, and the ſides unequal, the figure is a *rectangle.*

If only the oppoſite angles and ſides be equal, the *quadrilateral* is a *rhomboides.*

If the oppoſite angles and ſides be unequal, the *quadrilateral* is a *trapezium.*

The two oppoſite angles of any *quadrilateral* figure inſcribed in a circle, always make two right angles.

QUADRILL, *quadrilla,* a little troop or company of cavaliers, pompouſly dreſſed and mounted; for the performance of carouſals, juſts, tournaments, runnings at the ring, and other gallant divertiſements. The word is borrowed from the Italian, being a diminutive of *ſquadra, a company of ſoldiers ranged in a ſquare;* for *ſquadrare* is, properly, *to diſpoſe any thing ſquare;* whence their *quadriglia,* the French *ſquadrille* and *quadrille,* and our *quadrill.* The French formerly wrote *ſquadrille,* and *eſquadrille.*

A regular carouſal is to have at leaſt four, and at moſt twelve, *quadrills.*

Of theſe *quadrills,* each is to conſiſt of at leaſt three cavaliers, and at moſt of twelve.

The *quadrills* are diſtinguiſhed by the form of their habits, or the diverſity of their colours.

QUADRILLE, a well-known game at cards; and which has been, in ſeveral caſes, the object of mathematical computations. See Mr. De Moivre's Doctrine of Chances, 3d. edit. p. 97, &c.

QUADRIPARTITION, the dividing by four; or a taking of the fourth part of any number, or quantity.

Hence *quadripartite,* &c. ſomething divided into four.

QUADRIREME, *quadriremis,* a galley, or veſſel, with four oars on a ſide; the invention of which was attributed by the ancients to the Carthaginians.

QUADRISETÆ, the *four-haired flies,* a term uſed by the writers in natural hiſtory to expreſs thoſe flies of the ſeticaude or hair-tailed kind, which have four hairs or briſtles growing from the tail, as the others have three, two, or one.

QUADRIVIUM, the centre of four ways, where four roads meet and croſs each other. By ſtatute, poſts with inſcriptions are to be ſet up at ſuch croſs ways, as a direction to travellers, &c. 8 & 9 W. III. c. 16.

QUADRUGATA *terræ,* in *Old Law Records,* denotes a team-land; or ſo much as can be tilled by four horſes.

QUADRULA, in *Natural Hiſtory,* a word ſometimes uſed in the ſame ſenſe as teſſela, and ſpoken of the cubic pyrites. Sometimes it is uſed alſo as the name of thoſe little ſpangles of ſhining matter that are mixed among ſand. Theſe are generally fragments of talc; and are of various colours, white, yellow, and blackiſh.

Solinus has uſed the word *quadrula* to expreſs the fragments of yellow talc that are found in that ſand called *ammochryſos,* or golden ſand. He miſtakes theſe ſhining particles for maſſes of real gold, and makes the ſand itſelf a kind of precious ſubſtance ranked among the gems, and brought from Perſia; but in this he does not agree with the reſt of the ancients.

QUADRUPED, in *Natural Hiſtory.* The eſſential character of *quadrupeds* is, that they have a hairy body and four feet, and that the females are viviparous, and give ſuck to their young.

Quadrupeds are diſtinguiſhed, by the number of their feet, from other animals, which have only two feet, as birds; from thoſe which have no feet, as fiſhes and reptiles; and from thoſe which have more than two feet, as inſects.

Ariſtotle diſtributes *quadrupeds* into three claſſes; denominating thoſe whoſe feet are terminated by a hoof in one piece, *ſolipedes;* thoſe which have a cloven hoof he diſtinguiſhed by the name of forked or cloven footed; and thoſe whoſe feet are digitated he called *fiſſipedes.* With this general diviſion he contented himſelf, without deſcending to a methodical diſtribution of each claſs into their ſeveral orders, genera, &c. Geſner, Aldrovand, Jonſton, and many other naturaliſts, have adopted the diſtribution of Ariſtotle: but we are indebted for the regular ſyſtematic arrangement of *quadrupeds* to Mr. Ray, who publiſhed his Synopſis Methodica Animalium Quadrupedum et Serpentini generis, &c. in 1693. According to this writer, *quadrupeds* are divided into thoſe which are hoofed, *ungulata;* and thoſe which are clawed, or digitate, *unguilata.* See an abſtract of his Synopſis under ANIMALS; which we ſhall here illuſtrate more at large.

Quadrupeds, *Hoofed,* are either,

I. *Whole-hoofed, ſolipeda,* μωνοχηλα, μωνυχα, *ſolidungula;* as the horſe, and aſs, the onager or wild aſs, the mule, and the zebra of Africa, or the fine ſtriped Indian or African aſs, almoſt like a mule in form and ſtature.

Of the whole-hoofed-kind, Ariſtotle has obſerved, that no one hath two horns (he might have ſaid any horns); no one hath the talus, or aſtragalus; nor have the males any appearance of teats.

II. *Cloven-footed:* and that either, 1. Into two diviſions only; as the διχηλα, or biſulcate kind; which are again ſubdivided into ſuch as are,

Firſt, *Ruminant,* μηρυκαζοντα, that is, ſuch as chew the cud; and theſe either have hollow and perpetual horns, as the bull, ſheep, and goat kind; or deciduous horns, as the hart and deer kind, which uſually ſhed their horns annually.

Of the *bull kind* are reckoned theſe: the common *bos* or bullock, of which the male is *taurus,* the female *vacca;*

the German *urus*, *urochs*, or *aurochs*; the *biſon*; the *bonaſus*; the *bubalus*, or *buſalo*; and the *bos Africanus* of Bellonius, Obſ. lib. ii. c. 50. which he takes to be the *bubalus* of the ancients.

Of the *ſheep kind*, beſides the common ſort, are reckoned the Arabian *ovis laticauda*, whoſe tail is ſometimes of thirty pounds weight; the *ovis ſtrepſiceros Cretica Bellonii*; the *ovis Africana*, with ſhort hair inſtead of wool; and the *ovis Guineenſis*, or *Angolenſis*, of Marcgrave, Hiſt. Braſil. lib. vi. c. 10.

Of the *goat kind* are, beſides the common *capra domeſtica*, the *ibex*, or German ſteinbock, found on the tops of the Alps; the *rupicapra*, French chamois, or German gems; the *gazella Africana*, or antelope; the *gazella Indica*; the *gazella Africana* with ſhorter, annulated, and bent horns; the *capra ſylveſtris Africana Grimmii*; the *capra Mambrina*, or *Syriaca* of Geſner; the *bucephalus*, or *moſchelaphus Caii* in Geſner; the *tragelaphus Caii* in Geſner; and the *tragelaphus* of Bellonius.

Of the *hart* or *deer kind* are reckoned, the *cervus*, ελαφος, or red deer; the *cervus platyceros* or *palamatus*, the fallow deer; *alce*, or the elk; *rangifer*, the rein deer; the *axis Plinii*, according to Bellonius; the *caprea Plinii*, the *cuguacu-ete*, and *cuguacu-apara* of Marcgrave; the *caprea Groenlandica*.

Secondly, Of animals whoſe feet are divided into two parts only, and which do not chew the cud, there is only the hog and ſwine kind. Under this head, beſides the common ſwine, are reckoned the wild boar, or ſwine; the *Guineenſis Marcgravii*; the *porcus Indicus*, or *babyrouſſa*; the *tajacu* or *aper Mexicanus moſchiferus* of Dr. Tyſon, called, by Marcgrave, *tajacu caaigoara*; by others, *quauhtla coymatl*, and *quapizotl*; and by Acoſta, and ſome others, *zaino*.

2. There are ſome *quadrupeds*, whoſe hoof is cloven into four diviſions, and theſe ſeem to be not ruminant; as the rhinoceros, the hippopotamus, the tapijerete of Braſil, the capy-bara of Braſil, and the animal moſchiferum.

QUADRUPEDS, *Clawed* or *digitate*. Of this kind, there are, firſt, a ſort whoſe claws are not divided or ſeparated, but adhere to one another, and are covered with one common ſkin, but with obtuſe nails, ſticking out round the margin of the foot; as the elephant, which is anomalous, and not clearly referable to this kind, or to that of cloven-footed *quadrupeds*.

A ſecond ſpecies of this *digitate* kind of *quadrupeds*, which has only two claws, is the camel; and though theſe have no horns, they both ruminate, and have alſo the four ſtomachs of horned ruminant animals.

Of the camel there are two ſorts; one having but one bunch on the back, the other two.

To this kind alſo belong the Peruvian *glama*, which ſome have reckoned among the ſheep kind; as alſo the *pacos*, the *ovis Indica*, or *Peruviana vulgo*, which is much leſs than the *glama*.

A third ſpecies of this *unguiculate* kind, includes ſuch animals as the Greeks called Πλατυωνυχα, and Ανθρωπομορφα, which have the foot divided into many claws, with broad nails on them; as the ape and monkey kind.

Of theſe, ſome have no tails, and are called *ſimiæ*, or *apes:* others have tails, and are called monkeys, *cercopitheci*; and ſuch as have either long or ſhort tails, if they are of a larger ſize, are called *papiones*, or baboons. There are great numbers and varieties of this ſpecies of *quadrupeds*; of which naturaliſts have deſcribed theſe, viz, the *orang outang*, or *homo ſylveſtris* of Dr. Tyſon, deſcribed by him in a particular diſcourſe; the *guariba* of Braſil, *Marcgravii*; the *cagui* of Braſil, greater and leſſer; the *cay* of the ſame region, deſcribed by Lerius; the *caitaia* of the ſame country; the *cercopithecus barbatus Guineenſis*, two or three ſorts of it; the *cercopithecus Angolenſis major*; the *cercopithecus non barbatus Cluſii*; the *cercopithecus Cluſ.* called *ſagouin*. Laſtly, if apes and monkeys have their ſnouts very prominent, like dogs, they are called *cynocephali*.

A fourth ſpecies of this *unguiculate* kind is, when though the claws are many, yet are not covered at the end with broad flat nails, like monkeys or apes; but are rather like the talons of hawks, &c. crooked, and ſharp-pointed.

Theſe, in reſpect of their teeth, may be divided into ſuch as have many dentes primores, or inciſores (that is, cutting teeth) in each jaw, of which there are two ſorts; a greater, which either have a ſhort, round head, as the cat kind; or a leſſer ſort, having a long ſlender body, with very ſhort legs, as the weaſel or vermin kind. There are alſo ſome of this ſpecies of *quadrupeds*, which have only two large remarkable teeth in each jaw: theſe are the hare kind; and theſe live only upon herbs, graſs, &c.

Of the *cat kind* of *quadrupeds* are reckoned to be the lion; the tyger; the *pardalis*, whoſe male is *pardus*, and female *panthera*; the leopard; the *lupus cervarius*, or lynx; the *catus pardus*, or cat-a-mountain; the common cat; and the bear.

Of the *dog kind* are reckoned the wolf; the *lupus aureus*, or jackall; beſides the common dog, of which kind they enumerate, the maſtive, or maſtiff; the *canis venaticus Graius*, *Græcus*, or *Scoticus*, the greyhound; *Graius Hibernicus*, or the Iriſh greyhound; the *canis venaticus ſagax*, *indagator*, *ſectator ferarum*, &c. the hound; *canis venaticus Hiſpanicus*, or *aviarus*, the ſpaniel for land or water; *vertagus*, or tumbler; *canis* Οικουρος, or *domeſticus*, the houſe-dog; *canis melitæus*, or the lap-dog; *canis Getulus*, or *Iſlandicus*, the ſhock: and of all theſe ſorts there are many varieties of mongrels, and hybridous breeds.

Other ſpecies of the dog kind are, the fox; the animal *zibethicum*, or civet-cat, as it is corruptly called, but by its teeth and ſnout is plainly of the dog tribe; the *American coati*, or *rackoon*, or *rattoon*; the *yzquiepatl*; the *carigueya*, *maritucaca*, *carigoy*, *ropoza*, or *opoſſum*; the *taiuba*; the *taxus* or *meles*, the badger, grey, or pate; the *lutra*, or otter. To theſe ſome add the *phoca*, ſea-calf, or ſeal: the *equus marinus*, morſe, or ſea-horſe, miſtaken by ſome for the *hippopotamus*; the Dutch call him *walrus*, the Danes and Icelanders *roſmarus*; laſtly, the *manati*, or *vacca marina*, the ſea-cow.

Of the *vermin*, or *weaſel kind* of *quadrupeds*, is, firſt, the *muſtela vulgaris*, the common weaſel, in Yorkſhire called *foumart*, or *fitchet*, γαλεη: the *viverra Indica*, called *quil* and *quirpele*; another ſort called *mungo*, and *mungathia*, of a reddiſh grey: the *muſtela ermine*, or *ſtoat*, and *muſtela ſylveſtris*, the ferret; *putorius*, the pole-cat; *martes*, or *foyna*, the martin, or martlet; *muſtela zibellina*, the ſable: laſtly, the *genetta*; and the *ichneumon Bellonii*.

Of the *hare kind* of *quadrupeds* are, firſt, *lepus*, or the common hare; *cuniculus*, the rabbit, or coney; *tapeti*, or Braſil coney, and the *aperea* of Braſil; the *hyſtrix*, or porcupine, and the *hyſtrix Americanus*, or *cuanda* of Braſil; caſtor, fiber, or the Beaver; *ſciurus vulg.* or ſquirrel; the Virginian, Zeylandic, Barbary, and American flying ſquirrel; *mus domeſticus*, major and minor, the common rat and mouſe: to theſe alſo may be referred *mus major aquaticus*, the water-rat; the muſk-rat, *mus avellonarum*, major and minor; the dormouſe or ſleeper, *mus Noricus*, *Cricetus*, *Alpinus*, *ſeu marmotta*; the *cavia cobaya*, or *cuniculus Americanus*, the Guinea-pig; the *aguti*, and *paca* of Braſil; the *mus Norwegicus* or *leming*; the *glis Geſneri*, or the *rell*; the *mus Indicus*, &c.

QUADRUPEDS, *Anomalous*. To theſe ſeveral kinds, the following anomalous ones muſt alſo be added:

1. Such four-footed viviparous animals, as have a longiſh ſnout, with their feet divided into many claws, and toes, and having teeth; as the *echinus terreſtris*, or common urchin, or hedge-hog; *erinaceus Indicus albus*; *tatu* or *armadillo prima* of Marcgrave; *tatuete* of Braſil, or the ſecond ſpecies of the *armadillo*, according to Marcgrave; *tatu apara*, his third ſpecies of *armadillo*; *tatu muſtelinus*, *Soc. Reg. Muſ.* the weaſel-headed *armadillo*; *talpa*, the mole, warp, or moldwarp; and the *mus araneus*, ſhrew, hardy ſhrew, ſhrew-mouſe.

2. *Quadrupedous* and viviparous animals with a longiſh ſnout, having their feet divided into many claws or toes, but without teeth; as the *tamandua guacu* of Braſil, *Marcgravii urſus formicarius Carduni*, the great ant-bear; the *tamandua* of Braſil, or Marcgrave, the leſſer ant-bear.

3. *Anomalous flying quadrupeds*, with a ſhorter ſnout, and their feet divided as above; being of the bat-kind, or flitter-mice, of which there are of ſeveral ſizes, and different forms.

4. There is one very anomalous animal, which has but three claws on each foot; and that is the *ai*, or *ignavus* of Marcgrave, the ſloth or ſluggard.

5. Viviparous and and ſanguineous *quadrupeds*, breathing with lungs, but having only one ventricle in the heart; as the *rana aquatica*, the frog, or froſh; *rana arborea*, *ſeu ranunculus viridis*, the ſmall tree or green frog; *bufo*, *ſive rubeta*, the toad; *teſtudo*, the tortoiſe, in Greek χελωνη; of theſe there are land and water ones, and many different ſpecies in foreign parts.

6. *Oviparous quadrupeds*, with a long tail ſtretched out horizontally. Such are the lizard kind; as *lacertus omnium maximus*, the crocodile; *cordylus*, *ſive caudiverbera*, *uromaſtrix Græcis*, larger than the green lizard; *tapayaxin Novæ Hiſpaniæ* or *lacertus orbicularis* of Hernandez; *lacertus vulgaris*, the common eft, ſwift, or newt; *lacertus viridis*, the green lizard; *lacertus fucetanus Aldrovandi*, at Rome and Naples called the *tarantula*;

lacertus Indicus, called *ſenembi* and *iguana*; *lacertus Braſilienſis*, called *tejuguacu*, and *temapara* by Marcgrave; the *taraguira*, *ameiva*, *taraguico Arcuraba*, *Americima*, *Curapopeba*, *Teiunhana*, &c. of Marcgrave; the *lacertus Indicus*; the *ſcincus*, or *crocodilus terreſtris*; the *ſeps*, or *lacerta chalcidica*, a kind of footed ſerpent; *ſtellio*, the ſwift, or ſpotted lizard; *ſalamandra*, called the *ſalamandra aquatica*, the water-eft, *lacerta volans Indica*; and the *chamæleo*, or camelion.

This ſyſtem of Mr. Ray obtained very generally among naturaliſts, till, in the year 1735, Linnæus firſt publiſhed his ſyſtem. This was followed by ſeveral others, varying in the arrangement of the animal kingdom, even to the laſt edition of 1767. Under the claſs, which he denominates MAMMALIA, he comprehends not only all the animals which we call *quadrupeds* (the lizard genus, or rather the reptiles pedati excepted) but alſo the cetaceous order, or whales, cachalots, and porpeſſes: juſtifying this arrangement of whales with *quadrupeds*, from the agreement of theſe animals in the ſtructure of the heart, in the reſpiration by means of lungs, in their having moveable eye-lids and ears, in being viviparous, furniſhed with teeth, and other particulars, by which they differ ſo materially from fiſhes, as more than to counterbalance their living with them in the ſame element. The mammalia are divided into ſeven orders, the diſtinctions of which are principally eſtabliſhed on the difference in the numbers, ſituation, and form of the three kinds of teeth, viz. the primores or inciſores, called fore-teeth, or cutting-teeth; the laniarii or canini, called dog-teeth, canine or lacerating teeth; and the molares, double teeth or grinders. But Linnæus does not entirely neglect the feet. See the characters of the ſeveral orders under PRIMATES, BRUTE, FERÆ, GLIS, PECORA, BELLUA, and *Cete* or WHALE. This part of the Linnæan ſyſtem, including a few ſpecies deſcribed in the Appendix of the third tome, and in the Mantiſſa of 1771, contains about two hundred and thirty ſpecies.

Mr. Pennant, in his Synopſis of *Quadrupeds*, and Profeſſor Martin, in his Elements of Natural Hiſtory, by including ſome animals that were unknown to Linnæus, and giving the rank of ſpecies to ſeveral that were conſidered by him as varieties, have extended the number of mammalia to two hundred and eighty-nine ſpecies. Mr. Klein, in 1751, publiſhed a new ſyſtem of *quadrupeds*, intitled *Quadrup.* Diſpoſitio breviſque Hiſt. Natur. in which he diſtributes them into two orders, the firſt comprehending thoſe whoſe feet are terminated by one or more hoofs, and the ſecond thoſe which are digitated; and each of theſe orders is ſubdivided into five families or claſſes. In his firſt order he follows the general arrangement of Mr. Ray, which he has conſiderably improved: but in the ſecond, by a ſervile regard to a method founded on the number of toes, he has combined very oppoſite animals; the camel and the ſloth, the mole and the bat, the glutton and apes. M. Briſſon, in 1756, publiſhed another ſyſtem, in which he has arranged animals by the number or defect of their teeth; beginning with thoſe that are toothleſs, ſuch as the ant-eater, and ending with thoſe that have the greateſt number, ſuch as the opoſſum. By this arrangement, ſome *quadrupeds*, very diſtant from each other in their manners, are too nearly connected. We ſhall ſay nothing of M. Buffon's Hiſtory of *Quadrupeds*, though it contains much valuable information, becauſe he ſeems to have diſregarded ſyſtematic arrangement. Mr. Pennant has introduced ſome uſeful alterations in his Hiſtory of *Quadrupeds*: this ingenious naturaliſt has followed Mr. Ray in his greater diviſion of animals into *hoofed* and *digitated*; but, after the manner of Mr. Klein, he has formed ſeparate genera of the rhinoceros, hippopotamus, tapiir, and muſk. The apes are continued in the rank in which Mr. Ray placed them, and are followed by the maucaucos. The carnivorous animals are arranged according to the ſyſtem of Linnæus, omitting the ſeal, mole, ſhrew, and hedge-hog. The herbivorous or frugivorous *quadrupeds* occupy the claſs aſſigned them by Mr. Ray, to which he has allotted likewiſe the ſhrew, the mole, and the hedge-hog. The fourth ſection of digitated *quadrupeds* conſiſts of thoſe which are abſolutely deſtitute of cutting teeth, ſuch as the ſloth and armadillo. The fifth ſection is formed of thoſe which are deſtitute of teeth of every kind, ſuch as the manis and ant-eater. The third and fourth orders or diviſions which Mr. Pennant has added, are the *pinnated* and the *winged quadrupeds*: the firſt comprehends the walrus, the ſeals, and (in conformity to preceding writers) the manati. But theſe, he obſerves, ſeem as the links between the *quadrupeds* and the cetaceous animals. The bats are *winged quadrupeds*, and form the next gradation from this to the claſs of birds. See Pennant's Hiſt. of *Quadrupeds*, ed. 8vo. 1781. Preface.

QUADRUPEDS, *alated*. Among the many fabulous things with which natural hiſtory has been loaded, ſtories of flying *quadrupeds* ſeem to claim a very high rank; the gryphon, the *quadruped* dragon, and a great many other imaginary animals, having been introduced ſo ſeriouſly among the deſcriptions of real animals, that too many have been taught to believe them. Scheuchzer, in his Phyſica Sacra Jobi, has done much toward diſcountenancing ſuch relations; and Hyacinthus Gemma, who has written expreſly De Fabuloſis Animalibus, has added much on the ſame occaſion; yet all is not done. The world have late hiſtories of lemmas and baſiliſks, which never exiſted but in the imagination of the relator, or in the ſubtle contrivance of the fabricator; as is evidently the caſe in the baſiliſks, which we find in the muſeums of the curious, and which are all made out of the wray-fiſh. And the generality of readers are ſo fond of any thing that is marvellous, that theſe things are ſure to be remembered, while perhaps all the truths in the book are forgotten.

Upon the whole, the ſtandard of the flying or *alated quadrupeds* ſeems to be properly enough reducible to this: that the words flying and *alated* are not ſynonymous terms, and that there are three kinds of flying among the *quadruped* claſs. The firſt abſolute and ſwift, flying as perfect as in birds: this peculiarly belongs to the bat; which is the only *alated* or winged *quadruped*, properly ſpeaking. 2. An imperfect flying by means of certain membranes ſerving as wings, but imperfectly, and not turning quick, or enduring long flights; ſuch is the flying of the lizard, which is not properly an *alated* animal. And laſtly, the imperfect flying, of the ſquirrel kind, which even in that ſpecies called, by way of eminence, the *flying ſquirrel*, is not properly flying, but only long leaping; the creature being able to turn but very little out of a right line, and only to ſuſpend itſelf during a ſhort time in a leap from a high place to a lower. Phil. Tranſ. Nº 247. p. 34.

QUADRUPLATORES, among the Romans, were informers, who had the fourth part of the confiſcated goods for their pains.

QUADRUPLE, a ſum or number multiplied by four, or taken four times.

QUADRUPLE is particularly uſed for a gold coin, worth four times as much as that whereof it is the *quadruple*.

The *quadruple* of the Spaniſh piſtole is a piece of four piſtoles, called alſo the *double doubloon*.

The *quadruple* of the louis d'or is a piece of gold coined in the reign of Louis XIII. in 1641. The legend on one ſide is CHRISTUS VINCIT, REGNAT, IMPERAT: and on the middle of this ſide it has a croſs with four crowns, and cantoned in four fleurs de lys: on the other ſide it has the legend, LUDOVICUS DECIMUS TERTIUS DEI GRATIA FRANCORUM REX, with the head of Louis XIII. Its value under this king was twenty livres.

QUÆ *eſt eadem*, in *Pleading*, is uſed to ſupply the want of a traverſe. 2 Lill. Abr. 405. In a *clauſum fregit* ſuch a day, the defendant pleads the plaintiff's licence to him to enter on the ſame day, and that *virtute inde* he entered; he need not ſay, *quæ eſt eadem tranſgreſſio*.

QUÆ *plura*, a writ that anciently lay where inquiſition had been made by an eſcheator, of ſuch lands or tenements as any man died ſeiſed of, and all was ſuppoſed not to be found by the office or inquiſition.

This writ was to inquire what more lands or tenements the party died ſeiſed of. But it is now made uſeleſs, by taking away the court of wards and offices poſt mortem.

QUÆ *ſervitia*. See PER *quæ ſervitia*.

QUÆRENS *non invenit plegium*, a return made by the ſheriff upon a writ directed to him with this clauſe, viz. *Si A. fecerit B. ſecurum de clamore ſuo proſequendo, &c.* F. N. B. 38.

QUÆSTA, in our *Ancient Writers*, denotes an INDULGENCE, or remiſſion of penance, expoſed to ſale by the popes.

QUÆSTIONARII, in our *Ancient Law Books*, were people who went about with indulgences from door to door, deſiring charity either for themſelves or others.

Matt. Weſt obſerves, 1240, that the king, *Terram ſuam per papale* queſtionarios, *depauperari, &c. permiſit.*

QUÆSTUS, in *Law*, is that eſtate, or thoſe effects, which a man hath by acquiſition, or purchaſe; in contradiſtinction to *hæreditas*, which is what he hath by deſcent. See ACQUEST, and GOODS.

Glanv. lib. vii. *aut habet hæreditatem tantum, vel* quæſtum *tantum, aut hereditatem &* quæſtum.

QUAHVITLA, in *Botany*, a name uſed by ſome authors for the tree from which the reſin commonly called *gum copal* is procured.

QUAIL, *coturnix*, or TETRAO *coturnix* of Linnæus, in *Ornithology*, the leaſt of all the birds of the gallinaceous kind. They have, however, the genius of the cock kind, and may be bred to fight like our game cocks.

This was an old cuſtom among the Athenians, and is ſtill kept up in ſome parts of Italy, and in Aſia.

Quails are birds of paſſage, ſome entirely quitting our iſland, others ſhifting their quarters from one county to another, and ſheltering themſelves among the weeds near the ſea-ſide; with us they frequent the corn-fields, and ſometimes the meadows. They begin to ſing in April, and they make their neſts in the month of May, building on the ground, and ſeldom lay more than ſix or ſeven whitiſh eggs, marked with ragged ruſt-coloured ſpots.

Quails are to be taken by means of the call, during their whole wooing time, which laſts from April to Auguſt. The proper times for uſing the call are at ſun-riſing, at nine o'clock in the morning, at three in the afternoon, and at ſun-ſet; for theſe are the natural times of the *quail's* calling. The notes of the cock and hen-*quail* are very different, and the ſportſman who expects to ſucceed in the taking them, muſt be expert in both; for when the cock calls, the anſwer is to be made in the hen's note; and when the hen calls, the anſwer is to be made in the cock's. By this means they will come up to the perſon, ſo that he may, with great eaſe, throw the net over them, and take them. If a cock-*quail* be ſingle, on hearing the hen's note he will immediately come; but if he have a hen already with him, he will not forſake her. Sometimes, though only one *quail* anſwers to the call, there will three or four come up; and then it is beſt to have patience, and not run to take up the firſt, but ſtay till they are all entangled, as they will ſoon be.

The *quail* is a neat cleanly bird, and will not run much into dirty or wet places; in dewy mornings they will often fly inſtead of running to the call; and in this caſe, it is beſt to let them go over the net, if it ſo happens that they fly higher than its top, and the ſportſman then changing ſides, and calling again, the bird will come back, and then will probably be taken in the net.

The calls are to be made of a ſmall leather purſe, about two fingers wide, and four fingers long, and made in the ſhape of a pear; this is to be ſtuffed half full of horſe-hair, and at the end of it is to be placed a ſmall whiſtle, made of the bone of a rabbit's leg, or ſome other ſuch bone; this is to be about two inches long, and the end formed like a flageolet, with a little ſoft wax. This is to be the end faſtened into the purſe, the other is to be cloſed up with the ſame wax, only that a hole is to be opened with a pin, to make it give a diſtinct and clear ſound. To make this ſound, it is to be held full in the palm of the hand, with one of the fingers placed over the top of the wax: when the purſe is to be preſſed, and the finger is to ſhake over the middle of it, to modulate the ſound it gives into a ſort of a ſhake. This is the moſt uſeful call; for it imitates the note of the hen-*quail*, and ſeldom fails to bring a cock to the net, if there be one near the place.

The call that imitates the note of the cock, and is uſed to bring the hen to him, is to be about four inches long, and above an inch thick; it is to be made of a piece of wire turned round and curled, and covered with leather; and one end of it muſt be cloſed up with a piece of flat wood, about the middle of which there muſt be a ſmall thread or ſtrap of leather, and at the other end is to be placed the ſame ſort of pipe, made of bone, as is uſed in the other call. The noiſe is made by opening and cloſing the ſpiral, and gives the ſame ſound that the cock does when he gives the hen a ſignal that he is near her.

QUAKERS, in *Eccleſiaſtical Hiſtory*, a religious ſect, who made their appearance in England about the middle of the ſeventeenth century. George Fox, an illiterate perſon, born at Drayton, in Leiceſterſhire, in the year 1624, by trade a ſhoe-maker, was the firſt who publicly preached the doctrine of this ſect. He propoſed but few articles of faith, dwelt moſtly on morality, and preached mutual charity and the love of God, and a deep attention to the inward motions of the Spirit. He would have a religion and worſhip ſimple, and without ceremonies; making it a principal point to wait, in profound ſilence, for the influence and direction of the Holy Spirit.

This teacher met with great ſucceſs in propagating theſe doctrines; and the uncommon fervency with which he and his friends preached, ſo affected the minds of many of their hearers, that they frequently broke out into tears and *trembled*, for which, in deriſion, they were called *Quakers*. This denomination is likewiſe ſaid to be partly owing to an exhortation addreſſed to Gervas Bennet, eſq. a juſtice of peace in Derbyſhire, by Fox and his companions, who, when they were called before him in the year 1650, deſired him with a loud voice, and a vehement emotion of body, to *tremble* at the word of the Lord; but, as a term of mutual love, which ought to ſubſiſt amongſt Chriſtians, they call themſelves *Friends*. An eager zeal at firſt led ſome of them, who were off their guard, into ſeveral extravagancies; and one of them, viz. James Naylor, is ſaid to have had the impiety to ſuffer himſelf to be called the ſon of God, ſon of Juſtice, and king of Iſrael, by a few deluded followers, who ſtrewed garments before him, and hailed him, at his entry into Briſtol, with Hoſanna, ſon of David! He had his trial for the ſame, and was whipped, and otherwiſe ſeverely puniſhed, for blaſphemy; and ſo far from being countenanced in theſe proceedings by his brethren, he was, in the early part of his deluſion, admoniſhed, and at length excommunicated by them; and he afterwards condemned publicly his own conduct.

The doctrines of the *Quakers* being in many reſpects different from thoſe generally held, together with their diſuſing the cuſtomary compliment of the hat, and the uſual ſalutations, ſubjected them to grievous ſufferings, ſuch as impriſonment, whipping, fines, and premunire, in this kingdom; and four of them were hanged in New England. Their refuſing to pay tythes, &c. and to frequent the eſtabliſhed worſhip, and their holding public meetings of their own (at that time contrary to law), were the chief crimes laid to their charge; and when theſe failed, their perſecutors were ſure to find occaſion againſt them by tendering to them the oath of allegiance, which, in common with all other *oaths*, their principles would not admit of their taking. Beſides theſe penalties they were ridiculed in writing, and expoſed on the ſtage; but they deſpiſed both the preſs and the priſon, and, notwithſtanding all oppoſition, they became a regular body, with ſtated laws and polity, which they retain, with great œconomy, to this day.

At length the peaceable demeanour of this people induced the legiſlature to grant them relief. They had ſhared, with other diſſenters, the benefits of the proclamation for liberty of conſcience, and of the act of toleration. The profeſſion of belief enjoined upon the *Quakers* by this act is as follows: "I, A. B. profeſs "faith in God the Father, and in Jeſus Chriſt his eternal ſon, the true God, and in the Holy Spirit, one "God bleſſed for evermore; and do acknowledge the "Holy Scripture of the Old and New Teſtament to be "given by divine inſpiration." But they were particularly eaſed by an act of 1 W. & M. cap. 18. which allowed to their affirmation (except in a few caſes) the validity of an oath. This indulgence was confirmed by ſubſequent acts: thus, in 1695, they obtained, by a temporary act, that their ſolemn *affirmation* ſhould be accepted in all caſes where the oath is required by law; except in criminal caſes, upon juries, and in places of profit and truſt under the government, in this form: "I, A. B. do declare, in the preſence of almighty God, "the witneſs of the truth of what I ſay," &c.

This act was afterwards continued, and at laſt made perpetual. But this form not being ſuch as was deſired, and having, in reality, all the eſſentials of an oath, they applied to the parliament for an alteration, which they obtained, anno 1721; when the following form was ſettled to their general ſatisfaction; viz. "I, A. B. do ſincerely, ſolemnly, and truly declare and *affirm*." Which is the form now uſed, in the ſame manner, and under the ſame limitation with the former. 8 Geo. 6. cap. 6. 22 Geo. II. cap. 46. Any perſon depoſing, upon his ſolemn *affirmation*, a known falſhood, incurs the penalty of wilful and corrupt perjury. 8 Geo. cap. 6. By the ſame act, *Quakers* are allowed inſtead of the oaths of allegiance and ſupremacy, to make a DECLARATION *of fidelity*. In conſequence of theſe ſtatutes, &c. proviſion being alſo made for the eaſy recovery of tythes, and other eccleſiaſtical demands, from them, they are at preſent generally unmoleſted in the exerciſe of their profeſſion. However, long before this happy change in their condition, they were conſtrained, by the vexations and perſecutions they ſuffered in their native country, during the reign of Charles II. to look about for ſome diſtant ſettlements, where they might ſhelter themſelves from the ſtorm; and with this view they begun to diſſeminate their religious principles in various countries. Attempts of this nature were made in Germany, Pruſſia, France, Italy, Greece, Holland, and Holſtein, but with little ſucceſs. The Dutch, however, were at length perſuaded to allow a certain number of them to ſettle in Holland, where they ſtill continue to reſide. Multitudes of them alſo went over to America, and formed ſettlements there, not long after the firſt riſe of their ſect; and it afterwards happened, by a ſingular concurrence of events, that this new world became the chief ſeat of their proſperity and freedom. William Penn, ſon of the famous vice-admiral of that name, who embraced *Quakeriſm* in the year 1668, received, in the year 1680, from Charles II. and from the Engliſh parliament, the grant of an ample, fertile, but uncultivated province in America, as a reward for the eminent ſervices of his father. This illuſtrious *Quaker* carried over with him into his new dominions a conſiderable colony of his friends and brethren; and founded a republic, whoſe form, laws, and inſtitutions, reſembled no other known ſyſtem of government; whoſe pacific principles and commercial ſpirit have long bleſſed it with tranquillity and opulence, and which, till the irruption of the late unhappy conteſt, continued in a proſperous and flouriſhing ſtate. The *Quakers* predominate in this colony, both by their influence and their numbers; but all thoſe who acknowledge the exiſtence and providence of one Supreme Being, and ſhew their reſpect to that being, either by external worſhip, or at leaſt by the regularity of their conduct, are admitted to the rights and privileges of citizens in this happy republic. The large province, that conſtitutes its territory, was called Penſylvania, from the name of its proprietor; and its capital city was named Philadelphia, from the ſpirit of union and fraternal love that reigned at firſt, and is ſtill ſuppoſed to prevail, more, or leſs, among its inhabitants.

As for the opinions of the *Quakers*, they hold Chriſt to be the light, which lighteth every man, and that whoever will ſoberly and ſeriouſly turn into himſelf, with a ſincere deſire to know and practiſe his duty, will not fail to find there a ſufficient director, a ray from the fountain of light, illuminating the underſtanding, and aſſiſting to diſtinguiſh good from evil; and that ſo far as they follow the directions and convictions of this light, they are infallible, and become holy and acceptable to God. They ſay that opinions, or ſpeculations, or notions of what is true, or ſubſcriptions of articles, or formulas of faith, how ſoundly ſoever worded, do not make a man a true believer or a Chriſtian; but a conformity of mind and practice to the will of God, according to the manifeſtation and dictates of this divine principle of light within them. Hence it has been ſaid, that the fundamental doctrine of *Quakers*, whence all their other tenets are derived, coincide with the opinion of the ancient **Mystics**.

They acknowledge the holy three that bear record in heaven, Father, Word, and Spirit; but they reject the ſchool-terms, trinity, diſtinct perſons, hypoſtaſes, &c. as not ſcriptural, and conveying ideas too groſs.

They believe all that is recorded in the New Teſtament concerning the nativity, life, ſufferings, death, reſurrection, and aſcenſion of Chriſt; and their beſt and moſt approved writers have been very explicit in their acknowledgment of the reality thereof.

They own the Scriptures to be given by divine inſpiration, and to be the outward rule of faith and practice; but they refuſe to call them *the Word of God*, as being a denomination properly attributed to Chriſt alone. They add, that what makes them the more ſcrupulous in this reſpect is, that people are hereby led to think, that if they have the Scriptures they have all neceſſary help and information, and ſo look for no farther Word or Light.

To this purpoſe Barclay, their celebrated apologiſt, obſerves, that they are not to be eſteemed the principal ground of all truth and knowledge, nor yet the adequate primary rule of faith and manners. But they are a ſecondary rule, ſubordinate to the ſpirit, from which they derive all their excellency and certainty; and, therefore, the ſpirit is more originally and principally the rule.

The only advantage, in their opinion, reſulting from a peruſal of the holy Scripture is, that the mind is hereby excited to liſten to the dictates of the internal word, and to go to the ſchool of Chriſt, who teaches within them. They alſo maintain, that all who are deſtitute of this written word, if they duly attend to the inward teacher, who always ſpeaketh when the man is ſilent, will ſufficiently learn from him every thing that is neceſſary to be known and practiſed in order to their final happineſs; and, therefore, that the kingdom of Chriſt comprehends the whole race of mankind.

They believe in a future ſtate of rewards and puniſhments; and diſclaiming the doctrines of predeſtination, and unconditionally imputed righteouſneſs, hold that *good works*, done through the influence and aſſiſtance of the holy Spirit, are neceſſary for ſalvation. They alſo profeſs, that as man by obedience to the principle of Light, with which he is enlightened, refuſes "to obey "any ſuggeſtion or temptation of the evil one," and ſo is "free from actual ſinning and tranſgreſſing of the law "of God," he is "in that reſpect *perfect*;" "yet that "this perfection ſtill admits of a growth, and there re"maineth a poſſibility of ſinning, where the mind doth "not moſt diligently and watchfully attend upon the "Lord."

As to public worſhip, in the words of one of their writers, "they judge it the duty of all to be diligent in the aſ"ſembling of themſelves together, and when aſſembled "to wait upon God; and, abſtaining from their own "thoughts and imaginations, to feel the Lord's preſence, "and know a gathering into his name indeed, where he "is in the midſt of them, according to his promiſe. "And as every one is thus inwardly gathered, the ſecret "power and virtue of life is known to refreſh the ſoul, "and the ſame motions and breathings of God's ſpirit "are felt to ariſe; from which, as words of declaration, "prayer, or praiſes, ariſe, the acceptable worſhip is "known, which edifies the church, and is well pleaſing "to God. Yea, though there be not a word ſpoken, "yet is the true ſpiritual worſhip performed, and the "body of Chriſt edified." Barclay's Apol. prop. ii. ſect. 6.

As they allow of no praying or preaching which does not proceed from the inward and immediate motion of the ſpirit, formal ſinging, which their great advocate ſays has no foundation in Scripture, and is liable to much abuſe, forms no part of their worſhip; and for artificial muſic, he obſerves, either by organs or other inſtruments, or voice, we have neither example nor precept in the New Teſtament. The worſhip by preaching, praying, and ſinging, for which he pleads on behalf of this ſect, is ſuch as proceedeth from the ſpirit of God, and is always accompanied with its influence; being begun by its motion, and carried on by the power and ſtrength thereof; and ſo is a worſhip purely ſpiritual.

As to miniſtry and ordinances, they deny that any are to be uſed of a man's will or wiſdom, or other than what the inward principle directs them to: accordingly they ſet apart no perſons for the miniſtry; but, without diſtinction of quality or ſex, all who are of ſober life, and approved converſation, and believe themſelves called or moved thereto, are permitted to ſpeak in the aſſemblies. Theſe, after a time of trial, in order to give proof of the ſoundneſs of their doctrine, and the conſiſtency of their converſation therewith, are acknowledged as miniſters; but no miniſter of this people receives any pecuniary emolument for his or her ſervices in the church; nevertheleſs the expences of thoſe who travel in the work of the miniſtry, are generally defrayed by the brethren amongſt whom they come.

Our Saviour's injunction about *baptiſm* they underſtand, in a figurative ſenſe, of a converſion and change of the heart, and wholly reject the outward ſign. Water-baptiſm they hold was no more than a type or figure, now uſeleſs in a diſpenſation that is ſpiritual and inward. The ſame they hold of the *ſupper*, alledging, that both were types or ſignifications of the approaching diſpenſation, and alluded to the rites and ceremonies practiſed under the Jewiſh law, which was fulfilled by the coming of Chriſt. They add, that the communion of ſaints conſiſts only in a participation of the divine principle ſhewing itſelf in an unity of ſpirit.

They hold the injunction of Chriſt, Matt. v. 34. reſpecting *oaths* to be abſolute, and to comprehend all judicial oaths. His command of univerſal love, and patience under injuries, they conceive to forbid all *war*; and therefore they refuſe to join in a practice which they deem antichriſtian.

They are remarkable in their ſpeech and apparel, uſing the ſingular number to one perſon of whatever rank or degree, calling the days and months by numerical names, and rejecting the uſual ornaments of dreſs as inconſiſtent with the ſimplicity of a Chriſtian life. They alſo condemn the practice of putting on mourning for the dead.

They hold marriage to be of divine appointment, but will not be married in the uſual form by the clergy; and the legiſlature hath indulged them in regard to this ſcruple. All marriages amongſt them are propoſed to the monthly meeting for their concurrence, without which they are not allowed; ſo that no clandeſtine marriages are heard of amongſt them. The permiſſion of the monthly meeting being obtained, they take each other in marriage, in a public meeting for worſhip.

As to *diſcipline and polity*, the affairs of the communion are managed by rules eſtabliſhed with common conſent, and this principally at their meetings, whereof they have many kinds; as monthly; quarterly; yearly; meeting for ſufferings; and meetings of miniſters and elders.

The monthly meetings are, in general, compoſed of ſeveral ſingle congregations, or particular meetings. The buſineſs of the monthly meetings compriſes the care of the poor (the *Quakers* every where maintaining their own); allowing and recording marriages; recording births, burials, and ſufferings; granting certificates of unity to thoſe who travel as miniſters, and of memberſhip to all who change their places of reſidence. Here alſo notice is taken of diſorderly conduct, appointments are made to viſit the delinquents, who, if unreclaimed by the endeavours of their brethren, are by theſe meetings diſunited from the ſociety. Here appointments are alſo made to confer with ſuch perſons as incline to join them. From theſe meetings, anſwers to certain queries are ſent, in writing, to the quarterly meetings. The ſubjects of enquiry are, the preſervation of love and unity; the education of youth; the adherence of the members to the principles of their profeſſion; juſtice in dealing; clearneſs from paying tythes, or receiving impropriate ones; from defrauding the king of his revenue, or bearing arms, or being concerned in privateers or armed veſſels, or dealing in prize goods, as ſuch; the attendance of their religious meetings; and the general care to maintain good order.

The quarterly meeting for each county conſiſts of repreſentatives from the monthly meetings therein. Its buſineſs is to digeſt the accounts received from the monthly meetings, and to prepare a general account to be ſent to the yearly meeting in the like form of anſwers to queries. To this meeting any perſon, thinking himſelf aggrieved by the judgment of the monthly meeting, may appeal for redreſs. It is proper to remark, that theſe people do not ſuffer their members to go to law with each other; but enjoin that all differences among themſelves be ſettled by arbitration.

The yearly meeting is held in London. It conſiſts of repreſentatives from the ſeveral quarterly meetings, approved miniſters, elders, and the members of the meeting for ſufferings. This aſſembly makes rules for the government of the ſociety; orders collections for general ſervice; hears appeals from the judgment of quarterly meetings, and finally confirms or reverſes it; gives advice and directions to the inferior meetings, and to the body at large. The yearly meeting is held in that called Whitſun-week; not, ſay they, from any ſuperſtitious regard to that time, but becauſe it is the moſt convenient ſeaſon that can be fixed upon.

The meeting for ſufferings conſiſts of correſpondents, appointed by the ſeveral places correſponding with the yearly meeting. In this meeting alſo approved miniſters have a ſeat. Its original inſtitution was to provide for the numerous exigencies of the times of perſecution; and it now adminiſters advice to thoſe who are proſecuted for non-payment of tythes, &c. and ſolicits their relief from proſecution. This meeting meets weekly in London, and hath the general care of the ſociety's affairs during the intervals of the yearly meeting; keeps the ſociety's ſtock, and hath the care of the expenditure thereof; which is for publiſhing books to give away, wages of a clerk, and defraying the expence of the paſſages of miniſters who viſit their brethren beyond ſea.

Beſides the meetings already mentioned, there are ſelect meetings of miniſters and elders. The care of reviſing manuſcripts intended to be publiſhed, on behalf of the ſociety, is committed to the meeting of miniſters and elders, which meets every week in London.

The women have diſtinct monthly and quarterly meetings, in which they attend to the wants of the poor of their own ſex.

The *Quakers* have always been peaceable and inoffenſive ſubjects of the governments under which they live; which their principles forbid them to reſiſt: nevertheleſs they think it lawful to remonſtrate whenever their civil or religious liberties are invaded. They hold ſlavery to be incompatible with the doctrines of Chriſtianity, and accordingly are not concerned in the ſlave-trade, and have aboliſhed amongſt them the practice of keeping ſlaves.

The doctrines of the *Quakers* are laid down in a well written apology, addreſſed to king Charles II. by Robert Barclay; and are alſo explained in the numerous writings of William Penn, Iſaac Pennington, and others of their ſect. Their hiſtory, written in Low Dutch by William Sewel, and ſince tranſlated into Engliſh, traces them from the beginning to the year 1717. A hiſtory of this people was alſo publiſhed by Gerard Croeſe, anno 1695; but that author is by them accuſed of having miſrepreſented facts, and in many reſpects done them injuſtice. They alſo complain that the learned Dr. Moſheim, in his Eccleſiaſtical Hiſtory, has not ſhewn his uſual accuracy and candour in the account he has given of them; having, as they alledge, greatly miſrepreſented their principles and practices; in which he has been followed by Dr. Formey, and by John Weſley, in a late extract of that celebrated work.

The editor is indebted for the compilation of this article (very few additions excepted) to a gentleman of the profeſſion deſcribed in it; whoſe judgment and liberality every reader muſt, he is perſuaded, approve and commend.

QUAKING *graſs*, in *Botany*. See GRASS.

QUALE *jus*, was an ancient writ judicial, which lay where a religious perſon had judgment to recover land; before execution was made of the judgment.

This writ was iſſued forth to the eſcheator between judgment and execution, to enquire whether the religious perſon had right to recover, or whether the judgment were obtained by colluſion between the demandant and tenant; to the intent that the true lord might not be defrauded.

QUALIFICATION for *killing game*, for *jurors*, *juſtices*, *members of parliament*, and *electors of members*, ſee GAME, JURY, JUSTICES, and PARLIAMENT.

QUALIFICATOR, in the *Canon Law*, a divine appointed to qualify, or declare the quality of, a propoſition brought before an eccleſiaſtical tribunal; chiefly before the inquiſition.

The *qualificators* of the office are not judges; they only give their ſentiments on the propoſitions preſented to them. They are the inquiſitors that judge.

QUALITY, *qualitas*, that affection of a thing, whence it is denominated ſuch; or that which occaſions a thing to affect our ſenſes in this or that manner, and gives it this or that denomination. Accordingly *quality* is ſaid to be an attribute, from which no ſubſtance is exempt. See MODE.

Thus, that power in fire, whatever it be, whereby it excites in us the ſenſation of heat, ſince it is that whence the fire is denominated hot, is called the *quality* of fire.

The word *quality*, *qualitas*, is ſaid to have been firſt introduced into the Latin by Cicero: till his time the Romans ſtudiouſly avoided uſing a term which denoted an abſtract; and in lieu thereof only conſidered the concrete, ſignified by *quale*. The like is obſerved of the ancient Greeks, who did not uſe ποιοτης, but ποιον.

Quality, it is to be obſerved, is an ambiguous term; and has been applied to ſome things which ought rather to have been looked upon as ſtates of matter, or aſſemblages of ſeveral *qualities*; as life, health, beauty, &c.

There are, alſo, other attributes, as ſize, ſhape, motion, and reſt, uſually reckoned among *qualities*, which might more conveniently be ranked among the primary modes of the parts of matter; ſince from theſe ſimple attributes all the *qualities* are derived.

The ancient ſchool-philoſophers diſtinguiſh *quality* in the general, which they call *metaphyſical* and *predicamental quality*, into *eſſential* and *accidental*. The moderns, more uſually, divide it into *ſpiritual* and *corporeal*.

QUALITIES, *ſpiritual*, or QUALITIES *of the ſoul*, are affections of the mind, conſidered as in this or that habitude or diſpoſition. Of theſe they make two kinds; the one belonging to the underſtanding, the other to the will: of the former kind are knowledge, opinion, certainty, doubting, &c. Of the latter, are all the moral virtues and vices.

QUALITIES, *corporeal or phyſical*, are what we chiefly conſider under this denomination, and to which the definition above laid down is accommodated.

Philoſophers are divided as to the nature of theſe *qualities*, or what they are in the body. The general language of the Perapatetic ſchool is, that they are things diſtinct from the bodies themſelves; and are ſuperadded to them, or flow from their ſubſtantial forms: on which principle, they hold *qualities* to be real, and denominate them *accidents*; ſuppoſing them to be inherent in ſubſtances, though not in the relation of parts, but to be ſuſtained thereby as in a ſubject, and incapable of ſubſiſting without them. In effect, the Thomiſts define *qualities* to be accidents following or ariſing from the form; in the ſame manner as quality is an accident following or ariſing from the ſubſtance.

The moderns abſolutely explode the notion of *qualities* diſtinct from the body; and inſiſt, that the powers whereby bodies excite in us the ideas of ſuch *qualities*, are no other than the mechanical affections of the bodies themſelves, viz. the figure, magnitude, motion, &c. of the parts whereof they conſiſt.

The principal conſiderations inſiſted on by the retainers to real *qualities* are, that theſe powers may be actually ſeparated from the ſubſtances they inhere in; as we ſee in light, heat, &c. That from theſe very *qualities*, conſidered as ſo many determinations, there ariſes a very great diverſity in bodies; and that bodies, according to the diverſity of their *qualities*, affect our ſenſes very differently.

The adherents to the experimental way, on the contrary, account for all the *qualities* of bodies from mechanical cauſes.

Thus all the phenomena of a clock, the motion of its wheels, its hands, &c. whereby it ſtrikes the hour, points the minute; day, moon's age, &c. do all evidently ariſe from the ſingle ſpring; which we never imagine to have any particular powers whereby it ſhould be enabled to make ſuch diſcoveries; nor any other principle but that one of elaſticity. Again, when the ſmith who firſt invented locks and keys, had made his firſt lock, it was only a piece of iron, forged into a particular ſhape; and when, afterwards, he made a key to it, that alſo, conſidered in itſelf, was nothing but a piece of iron of a determinate

terminate figure ; but as theſe two pieces of iron might now be applied to one another, after a certain manner, and as there was a congruity betwixt the wards of the lock and thoſe of the key, they now each obtained a new capacity ; and it became a principal part of the notion and definition of a lock, that it was capable of being made to open and ſhut by that other piece of iron called a key ; and it was looked on as a peculiar faculty and power in the key to be fit to open and ſhut the lock. And yet by theſe new attributes there was not added any real or phyſical entity, either to the lock, or the key ; each of them remaining the ſame piece of iron, juſt ſo ſhaped, as it was before. And, again, when the ſmith made other keys of different ſizes, or with different wards, though the firſt lock could not be opened with any of thoſe keys, yet that indiſpoſition was nothing new in the lock, or diſtinct from the figure it had before theſe keys were made.

Why, then, may we not conceive, as to ſenſible *qualities*, that though, by virtue of a certain congruity or incongruity in point of figure, texture, or other mechanical properties, the portions of matter they modify are enabled to produce various effects, on account whereof the bodies are ſaid to be endowed with *qualities* ; yet theſe are not, in the bodies endowed with them, any real or diſtinct entities, or differing from the matter itſelf of ſuch a determinate bigneſs, ſhape, and other mechanical modifications ?

Thus, though the modern goldſmiths and refiners reckon it among the moſt diſtinguiſhed *qualities* of gold that it is diſſoluble in aqua regia, whilſt aqua fortis will not work upon it ; yet theſe attributes are not in the gold any thing diſtinct from its peculiar texture ; nor is the gold we have now of any other nature than it was in Pliny's time, when aqua fortis and aqua regia were unknown.

If another menſtruum, of which Mr. Boyle ſuggeſts he was poſſeſſed, ſhould be brought into uſe to diſſolve pure gold in part, and change it into a different metalline body, there would then ariſe another new property, whereby to diſtinguiſh this from other metals ; yet the nature of gold is not at all different now from what it was before the diſcovery of this new menſtruum.

There are bodies neither cathartic nor ſudorific, with ſome of which gold being joined acquires a purgative virtue, and with others a power to produce ſweat. Nature herſelf ſometimes produces things that have no relations to others ; and art, eſpecially if aſſiſted by chemiſtry, may cauſe ſo many new productions, that no man can tell, but the moſt familiar bodies may have multitudes of *qualities* he dreams not of, which will hardly be imagined real phyſical entities.

We all know that the ſun hath a power to harden clay, ſoften wax, melt butter, thaw ice, turn water into vapour, make air expand itſelf in weather-glaſſes, contribute to blanch linen, render the white ſkin of the face ſwarthy, and mowed graſs yellow, ripen fruit, hatch the eggs of ſilk-worms, caterpillars, &c. and perform many other things, ſome of which ſeem contrary to others ; yet theſe are not diſtinct powers, or faculties in the ſun, but only the production of its heat, diverſified by the different textures of the body it chances to work on, and the condition of the other ſubſtances concerned in the operation. And, therefore, whether or no the ſun, in ſome caſes, has any influence at all diſtinct from its light and heat, we ſee that all the phenomena mentioned are producible by the heat of common fire, duly applied and regulated.

Some of the ancients, and particularly the Peripatetics, have diſtinguiſhed *qualities* into *ſenſible* and *occult*.

QUALITIES, *ſenſible*, or *manifeſt*, are thoſe ariſing from certain modifications of matter, and which become immediately the objects of our ſenſes. Such are all thoſe above mentioned.

Though, in ſtrictneſs, thoſe only are ſaid to be *ſenſible qualities*, which affect ſome one ſenſe alone ; as colour does the eye, ſound the ear, &c.

Theſe are ſometimes, alſo, called *tangible qualities*, becauſe they only produce their effect, i. e. excite their idea in us, when contiguous, or in contact with the organ.

QUALITIES, *occult*, are certain latent powers ariſing from the ſpecific forms of things, whereof no rational ſolution can be given on any principles of phyſics.

Senſible qualities are uſually ſubdivided into *primary* and *ſecondary*. See IDEAS.

QUALITIES, *primary*, or *general*, are ſuch as are found in all bodies ; or which agree to all matter, conſidered as matter, and therefore to the elements themſelves. Such are extenſion, figure, motion, reſt, ſolidity, impenetrability, and number.

QUALITIES, *ſecondary*, or *particular*, are ſuch as reſult from a compoſition or mixture of elements, and do not agree to body as body, but as a mixt. Such are light, heat, cold, colour, ſound, taſte, ſmell, hardneſs, ſoftneſs, fluidity, firmneſs, roughneſs, ſmoothneſs, opacity, tranſparency, &c.

According to Ariſtotle, and the Peripatetics, the primary, or elementary *qualities*, are thoſe of the four elements themſelves ; viz. heat, cold, moiſture, and dryneſs.

The ſecondary *qualities*, according to the ſame, are all the reſt ; which are combinations or aſſemblages of the former elementary ones ; as colour, odour, taſte, &c.

To give an idea of Ariſtotle's method of accounting for theſe ſecondary *qualities* from his primary ones, we ſhall inſtance in his account of colour. All colours then, ſays he, are generated of a mixture of the four elementary *qualities :* white, e. gr. is produced when the humidity ſurmounts the heat, as in old men, whoſe hair grows grey ; black is produced when the humidity dries off, as in walls, ciſterns, &c, red, &c.

Among the ſchool-philoſophers we meet with other diviſions of *qualities* ; as *active*, and *paſſive* ; *real*, and *intentional*.

QUALITIES, *active*, are thoſe by virtue whereof effects and operations are actually produced on other bodies duly diſpoſed with reſpect thereto. Such are the heat of fire, the moiſture of water, &c.

QUALITIES, *paſſive*, are thoſe whereby bodies are diſpoſed to receive the action of others. Such are inflammability in oil, &c.

QUALITIES, *real*, are thoſe which remain in the ſubject, and only act on things adjacent thereto. As fire in a piece of iron not ignited, &c.

QUALITIES, *intentional*, are thoſe which iſſue from the ſubject, and operate at a diſtance. Such is the light emitted from the ſun, &c.

But the moderns are agreed, that either all *qualities* are real, or all alike intentional. So that the diſtinction is impertinent. See on the ſubject of *quality*, its various ſpecies, and its different properties, Harris's Philoſophical Arrangements, chap. viii.

However ignorant we may be of the nature of *qualities*, or of the manner of their operation, yet we know the laws of their intention and remiſſion. Dr. Keil demonſtrates, that every *quality* which is propagated *in orbem*, ſuch as light, heat, cold, odour, &c. has its efficacy increaſed, or abated, in a duplicate ratio of the diſtances from the centre of radiation, or exertion of the *quality*, reciprocally.

Thus, let A (*Tab*. III. *Geometry*, *fig*. 77.) be a centre from whence any *quality* exerts itſelf round about, according to the right lines A *e*, A *f*, &c. The efficacy of the *quality*, be it heat, cold, odour, &c. will be (at equal diſtances from A) as the ſpiſſitude or denſity of the rays A *b*, A *c*, A *d*. But the rays within the inner circle, or rather ſpherical ſuperficies, *b c d* H, when they come to be extended to the other ſpherical ſurface, *e f g* K, will be much leſs cloſe than they were before, and that in the reciprocal proportion of the ſpaces they take up ; that is, if the outer ſurface be the double of the inner, the rays there will be but half as thick ; but ſince ſpherical ſuperficies are as the ſquares of their radii, therefore the efficacy of the *quality* in the inner ſurface will be to that of the outer, as A *e* ſquare, to A *b* ſquare. *Q. E. D.*

Sir Iſaac Newton lays it down as one of the rules of philoſophizing, that thoſe *qualities* of bodies which are incapable of being intended and remitted, and which are found to obtain in all bodies wherein the experiment could ever be tried, are to be eſteemed univerſal *qualities* of all bodies. See PHILOSOPHIZING.

QUALITIES, *chemical*. One may diſtinguiſh phyſical *qualities*, with Mr. Boyle, into *firſt*, *ſecond*, and *third* ; to the two laſt of which may be referred ſeveral *qualities* not treated of by the writers of phyſical ſyſtems ; and theſe, for diſtinction ſake, may, ſome of them, be ſtyled the *chemical qualities* of things ; becauſe Ariſtotle, and the ſchoolmen, were unacquainted with them ; and they have been principally introduced by means of chemical operations and experiments : as fumigation, amalgamation, cupellation, volatilization, precipitation, &c.

By theſe operations, among other means, corporeal things come to appear volatile or fixed, ſoluble or inſoluble in ſome menſtrua, amalgamable or unamalgamable, &c. and theſe as well deſerve the name of *quality* as ſeveral other attributes, to which it is allowed.

To theſe chemical *qualities* ſome others might be added, which, becauſe of the uſe that phyſicians principally make of them, may be called *medical qualities*, whereby ſome ſubſtances received into the human body, are reſolving, diſcuſſing, ſuppurating, abſterſive, &c. For though ſome faculties of medicine, as thoſe of heating, cooling, drying, attenuating, purging, &c. may be conveniently referred to the firſt, ſecond, or third *qualities*, mentioned by naturaliſts, whilſt others are reckoned occult ; yet as ſeveral of them ought not to be referred to the *qualities* whereto they are often aſcribed; ſo the handling of them may be looked upon as a deſideratum, and deſerves a diſtinct place in natural philoſophy.

QUALITIES, *coſmical.* See COSMICAL *qualities.*

QUALITY is alſo uſed for a kind of title, or degree of eminence given to certain perſons, in regard of their territories, ſignories, or other pretenſions.

Thus the king of Great Britain takes the *quality* of king of France; the king of Poland that of king of Sweden; the king of Sardinia that of king of Cyprus and Jeruſalem; the czars of Ruſſia, and kings of Spain, have whole pages of *qualities.* The emperor of China aſſumes the *quality* of ſon of the ſun.

QUALITY *of curvature*, in *Geometry*, is uſed to ſignify its form, as it is more or leſs inequable, or as it is varied more or leſs in its progreſs through different parts of the curve. Newton's Meth. of Flux. and Inf. Ser. p. 75. Maclaur. Flux. art. 369. See CURVATURE.

QUAM *diu ſe bene geſſerit*, a clauſe frequent in letters patent, or grants of offices, to ſecure them ſo long as the perſon they are granted to ſhall not be guilty of abuſing the ſame.

Thus, e. gr. we find it in thoſe given to the barons of the exchequer; where it intimates, that they ſhall hold the ſame as long as they ſhall behave themſelves well; which is to be reſtrained to matters of their offices; and ſignifies no more than the law would have implied, had the office been granted expreſly for life. See JUDGE.

A grant therefore, with this clauſe, is equivalent to a grant for life.

QUAMOCLIT, in *Botany.* See *Scarlet* CONVOLVULUS.

QUANDROS, a name given by writers of the middle ages to a ſtone to which they attribute great virtues, and which, they ſay, is found in the head of a vulture.

QUANTITY, *quantitas*, any thing capable of eſtimation, or menſuration; or, which being compared with another thing of the ſame kind, may be ſaid to be greater or leſs than it; equal, or unequal, to it.

Mathematics is the ſcience or doctrine of *quantity.*

Quantity is a general attribute, applied in a very different manner to things of very different nature; whence it is impoſſible to give any univerſal definition thereof.

Quantity is applied both to things, and to modes; and this either ſingularly, to one; or plurally, to ſeveral. In the firſt caſe it is called *magnitude*, in the latter *multitude.*

Quantity may be reduced to four claſſes; viz.

QUANTITY, *moral*, which depends on the manners of men, and the free determination of their wills. As the prices and value of things; degrees of dignity and power, good and evil, merit and demerit, rewards and puniſhments, &c.

QUANTITY, *national*, ariſing from the operation of the underſtanding only. Such as the largeneſs or narrowneſs of the capacity of the mind, and its conceptions. In *Logic*, univerſals, predicaments, &c. In *Grammar*, the *quantity* or meaſure of ſyllables, accents, tones, &c.

QUANTITY, *phyſical*, or *natural*, which is of two kinds: 1. That which nature furniſhes us with in matter, and its extenſion. And, 2. In the powers and properties of natural bodies; as gravity, motion, light, heat, cold, rarity, denſity, &c.

QUANTITY, *tranſcendental*, as duration, the continuation of any being, exiſtence, time, &c.

QUANTITY is alſo popularly diſtinguiſhed into *continued* and *diſcrete.*

QUANTITY, *continued*, or *continuous*, is when the parts are connected together, and is commonly called *magnitude.* This, again, is of two kinds; either *ſucceſſive*, or *improper*, as time.

QUANTITY, *diſcrete*, is when the parts whereof it conſiſts exiſt diſtinctly, and unconnected together; which makes what we call *number* or *multitude.*

The notion of continued *quantity*, and its difference from diſcrete, appears to ſome without foundation. Mr. Machin conſiders all mathematical *quantity*, or that for which any ſymbol is put, as nothing elſe but number, with regard to ſome meaſure, which is conſidered as one; for that we cannot know preciſely how much any thing is, but by means of number. The notion of continued *quantity*, without regard to any meaſure, is indiſtinct and confuſed; and though ſome ſpecies of ſuch *quantity*, conſidered phyſically, may be deſcribed by motion, as lines by the motion of points, and ſurfaces by the motion of lines; yet the magnitudes, or mathematical *quantities*, are not made by the motion, but by numbering according to a meaſure. Vide Phil. Tranſ. N° 447. p. 228.

Permanent quantity is farther diſtinguiſhable into length, breadth, and depth.

Wolfius ſeems to give us a more preciſe notion of mathematical *quantity*, and its two ſpecies of diſcrete and continued. Whatever is referred to unity in the ſame manner as one right line to another, is what we call *quantity*; or number in general.

If, now, the thing be referred to a given unit, as 3, it is called a determinate number: if to unity in the general, or at large, it is called a *quantity*; which, on this principle, is the ſame with indeterminate number.

Thus, e. gr. the breadth of a river is accounted a *quantity*: if then, it be enquired how great it is; to conceive its *quantity*, we take ſome unit at pleaſure, and ſee the relation of the breadth hereto; and according to the different unit aſſumed, we expreſs the breadth of the river in a different determinate number.

The breadth of the river, therefore, is *quantity* conſidered as referred to a vague unit, or to unity at large; but the unit being determined, the thing is underſtood by a determinate number.

In this ſenſe, algebra is the arithmetic of *quantities.* See on the ſubject of *quantity*, Harris's Philoſophical Arrangements, chap. ix.

QUANTITY *of action.* See ACTION.

QUANTITY *impoſſible*, and *imaginary.* See ROOT.

QUANTITY *of curvature* at any point of a curve is determined by the circle of curvature at that point, and is reciprocally proportional to its radius. Newton's Meth. of Flux. and Inf. Series, p. 60. Maclaurin's Fluxions, book i. chap. xi. See CURVATURE and EVOLUTE.

QUANTITY *of motion*, in *Mechanics*, is of two kinds; viz. of momentary motion, and of entire motion.

QUANTITY *of entire motion.* The Carteſians define the entire motion as the momentary one, by the factum of the maſs, or *quantity* of matter, into the velocity; but ſince motion is a ſucceſſive being, and has no parts coexiſting together, its *quantity* ought to be eſtimated by the aggregate of the ſeveral parts exiſting ſucceſſively; and is therefore equal to the factum of the momenta into the time.

QUANTITY *of momentary motion* is the factum of the velocity into the maſs; or it is a meaſure ariſing from the joint conſideration of the *quantity* of matter, and the velocity of the motion of the body; the motion of any whole being the ſum or aggregate of the motion in all its ſeveral parts.

Hence, in a body twice as great as another, moved with an equal velocity, the *quantity* of motion is double; if the velocity be double alſo, the *quantity* of the motion will be quadruple. Hence, the *quantity* of momentary motion coincides with what we call the momentum, or impetus of a moving body. See FORCE.

In the colliſion of bodies, the *quantity* of momentary motion, which is found by taking the ſum of motions tending the ſame way, or their difference, if they tend towards contrary parts, is not at all changed by any actions of the bodies on one another. See PERCUSSION.

QUANTITY *of matter* in any body, is the product of the denſity into the bulk; or a *quantity* ariſing from the joint conſideration of its magnitude and denſity.

As, if a body be twice as denſe, and take up twice as much ſpace as another, it will be four times as great.

This *quantity* of matter is the beſt diſcoverable by the abſolute weight of bodies. See MATTER.

QUANTITY *infinite.* See INFINITE *quantity.*

QUANTITIES, in *Algebra*, are indeterminate numbers, or things referred to unity in general. See NUMBER.

Quantities are properly the ſubject of algebra; which is wholly converſant in the computation of ſuch *quantities.*

Given quantities are uſed to be noted by the firſt letters of the alphabet a, b, c, d, &c. the *quantities* ſought by the laſt, z, y, x, &c. See CHARACTERS.

Algebraical quantities are chiefly of two kinds; *poſitive*, and *negative.*

QUANTITIES, *poſitive*, or *affirmative*, are thoſe which are greater than nothing; and which are affected with the ſign + prefixed; or ſuppoſed to be ſo.

QUANTITIES, *negative*, or *privative*, are thoſe leſs than nothing; which are affected with the ſign − prefixed.

Hence, 1. Since + is the ſign of addition, and − the ſign of ſubtraction; a poſitive *quantity* is produced by adding any real *quantity* to nothing; e. gr. $0+3=+3$; and $0+a=+a$. And a privative *quantity* is produced by ſubtracting any real *quantity* out of nothing; e. gr. $0-3=-3$; and $0-a=-a$.

For an illuſtration. Suppoſe when you are quite deſtitute of money, ſomebody gives you a hundred pieces; you have then a hundred pieces more than nothing; which pieces conſtitute a poſitive *quantity.*

On the contrary, ſuppoſe you have no money, yet owe a hundred pieces; you have then a hundred pieces leſs than nothing; for you muſt pay a hundred pieces to have juſt nothing. This debt is a negative *quantity*.

Thus in local motion, progreſs may be called a poſitive *quantity*, and regreſs a negative one; becauſe the firſt increaſes, and the ſecond diminiſhes the ſpace paſſed over.

And in geometry, if a line drawn towards any part be accounted an affirmative *quantity*, another the contrary way will be a negative one.

Privative or negative *quantities*, therefore, are equally real with poſitive *quantities*, but oppoſite to each other, ſo as to take away each other's effect, in any operation, when they are equal as to *quantity*. Thus $3 - 3 = 0$, and $a - a = 0$. However, though $+a$, and $-a$, are equal as to *quantity*, we do not ſuppoſe in algebra, that $+a = -a$; becauſe to infer equality in this ſcience, they muſt not only be equal as to *quantity*, but of the ſame quality, that in every operation the one may have the ſame effect as the other. A negative quantity is ſaid to be leſs than nothing, becauſe it is oppoſite to the poſitive, and diminiſhes it when joined to it; whereas the addition of 0 has no effect. But a negative is to be conſidered no leſs as a real *quantity* than a poſitive.

Quantities that have no ſign prefixed to them are underſtood to be poſitive. See NEGATIVE *ſign*.

QUANTITIES, *commenſurable*, *compound*, *exponential*, *heterogeneous*, *like*, *rational*, *ſimple*, *tranſcendental*, and *variable*. See the adjectives.

QUANTITIES, *addition of*. 1. If the *quantities* denoted by the ſame letter be affected with the ſame ſign, the numbers prefixed to them are added as in common arithmetic.

2. If they be affected with different ſigns, the addition is changed into ſubtraction; and to the remainder is prefixed the ſign of the greater.

3. *Quantities* denoted by different letters, are added by means of the ſign $+$; as in the following example:

$$\begin{array}{l} 4a + 2b - 2c - 5d - g \\ 5a - 2b + 6c + 2d - 3g \\ \hline 9a + 4c - 3d - 4g \end{array} \qquad \begin{array}{r} a - b \\ c \\ \hline a - b + c \end{array}$$

See ADDITION.

QUANTITIES, *ſubtraction of*. See SUBTRACTION.

QUANTITIES, *multiplication and diviſion of*. See MULTIPLICATION, and DIVISION.

QUANTITIES, *combination of*. See COMBINATION.

1. If a poſitive *quantity* be multiplied or divided by another poſitive *quantity*, the reſult is alſo a poſitive *quantity*.

2. If a negative *quantity* be multiplied or divided by a poſitive, the reſult is a negative.

3. If a negative *quantity* be multiplied or divided by another negative, the reſult is a poſitive.

4. If a poſitive *quantity* be multiplied or divided by a negative, the reſult is a negative *quantity*. See MULTIPLICATION, in *Algebra*.

QUANTITY, in *Grammar*, denotes the meaſure and magnitude of the ſyllables; or that which determines them to be called long, or ſhort; or, it is the meaſure of time requiſite for the diſtinct pronunciation of a ſyllable.

This *quantity* is the object of PROSODY; and it is the regard to this that diſtinguiſhes verſe from proſe.

The œconomy and arrangement of the *quantities*, i. e. the diſtribution of long and ſhort ſyllables, make what we call the *number*.

The *quantities* are uſed to be diſtinguiſhed among grammarians by the characters ſhort, and long.

The proportion between the long and ſhort ſyllables may be generally fixed the ſame as that between the crotchet and quaver in muſic; viz. as 2 to 1. See TIME.

Syllables are long or ſhort, either by their nature, or by accident; that is, on account of the place where they are put and the letters that follow them, which is called poſition.

In moſt languages, there are ſome ſyllables whoſe *quantities* vary, as the meaſure requires, which are called common; as in the Engliſh rĕcord and rēcord.

Some authors confound the *quantity* with the accent; but the difference is very evident; the former being the length or ſhortneſs of a ſyllable, the latter the raiſing or falling of the voice.

From two *quantities*, viz. long and ſhort ſyllables, ariſe all the varieties of poetic feet, which are very great. Horace alone uſes no leſs than twenty-eight. Yet the Greeks went vaſtly beyond the Romans in this reſpect. In effect, as many ways as two *quantities* may be varied by compoſition and tranſpoſition, from two to ſix ſyllables, ſo many different feet have the Greek poets contrived, and that under diſtinct names, to the number of 124. Though it is the opinion of ſome of the learned, that poetical numbers may be ſufficiently explained from the feet of two or three ſyllables, into which the reſt may be reſolved.

The feet, formed by the ancients of the long and ſhort ſyllables immediately, are the *ſpondee*, conſiſting of two long ſyllables; the *pyrrhic*, of two ſhort ones; the *trochee*, of a long and ſhort ſyllable; and the *iambic*, of a ſhort and long ſyllable.

Thoſe of three ſyllables are the *moloſſus*, conſiſting of three long ſyllables; the *tribrach*, of three ſhort ones; the *dactyl*, of one long and two ſhort ſyllables; and the *anapeſt*, of two ſhort and one long ſyllable.

The Engliſh tongue admits of no feet above two ſyllables, though both the Latin and Greek allow of ſix.

Our heroic verſes conſiſt of five long and five ſhort ſyllables intermixed alternately; though not ſo ſtrictly but that the order may be diſpenſed with. Dryden varies them with admirable beauty; frequently his heroic verſe begins with a long ſyllable followed by two ſhort ones.

The truth is, the *quantity* of the ſyllables is but little fixed in the modern tongues; and there is ſtill leſs regard had to it in the compoſition of modern verſes. The want of feet, or rather the ſhortneſs and uniformity of our feet, makes great difference between the numbers of the ancient and modern verſe. Our poets are fettered; and their fetters are ſo ſhort, conſiſting of but two poor links, that it is no wonder they can make no extraordinary motions.

The ancients ſubſiſted by their *quantities* alone; ſo well were they diſtinguiſhed, and ſuch a variety and harmony did they afford! Our *quantities* make ſuch poor muſic, that we are forced to call in the Gothic aid of rhyme to diſtinguiſh our verſe from proſe.

Yet have attempts been made to ſettle our verſe on the ancient and natural footing of *quantities*, in excluſion of rhyme, and with ſuch ſucceſs too (witneſs the immortal Paradiſe Loſt) as ſeems to leave the practice of rhyming inexcuſable. The French have likewiſe attempted the ſame in their tongue, particularly Jodelet, and after him Paſquier, Paſſerat, and Rapin; but they have all failed.

QUANTITY *of a degree*. See DEGREE.

QUANTITY *of an eclipſe*. See ECLIPSE.

QUANTUM *meruit*, called alſo an ASSUMPSIST, an action upon the caſe, grounded upon a neceſſity to pay a man for doing any thing ſo much as it deſerves or merits.

This valuation of his trouble is ſubmitted to the determination of a jury; who will aſſeſs ſuch a ſum in damages as they think he really merited.

QUANTUM *valebat*, or an implied ASSUMPSIT, is where goods and wares ſold, are delivered by a tradeſman at no certain price, or to be paid for them as much as they are worth in general; then *quantum valebat*, or an action on the caſe, lies, and the plaintiff is to aver them to be worth ſo much; ſo where the law obliges one to furniſh another with goods or proviſions, as an inn-keeper his gueſts, &c.

QUAPACHTOTOTL, in *Ornithology*, a name under which Nieremberg has deſcribed a bird, which, he ſays, imitates the human laugh. He ſays its body is eight inches long, and the tail as many; the beak of a bluiſh black, and bent and crooked; the breaſt grey, and the belly black; the tail of a browniſh black, and the wings, neck, and head, of a yellowiſh brown.

QUARANTAIN, in old *Law-Books*, written QUARENTINE, and QUARENTENA, denotes the ſpace of forty days.

Quatuor carucatas terræ arabilis, continentes in longitudine 8 quarentenas, & 8 quarentenas *in latitudine*. Chart. Withlaſii Reg. Merc. apud Ingulf.

Quarentena *in London. ponetur pro reſpectu habend.* 40 *dies poſt ſummonitionem per breve regis, ut conſulant*, &c. *ſi ſibi viderint expedire*. MS. de Temp. Ed. III.

The term is borrowed from the French *quarentain*; and is ſometimes uſed for the time of Lent.

QUARANTAIN *of the king*, in France, denotes a truce of forty days appointed by St. Louis, during which time it was expreſly forbid to take any revenge of the relations or friends of people who had fought, wounded, or affronted each other in words.

QUARANTAIN, or **QUARENTINE**, is more particularly uſed for the term of forty days, which veſſels, coming from places ſuſpected of contagion, are obliged to wait in certain places appointed to air themſelves before they come into port.

By the ſtat. 26 Geo. II. cap. 6. explained and amended by 29 Geo. II. cap. 8. the method of performing *quarentine*, or forty days probation, by ſhips coming from foreign countries, is put in a much more regular and effectual order than formerly; and maſters of ſhips coming from infected places, and diſobeying the directions there given, or having the plague on board, and concealing it, are guilty of felony without benefit of clergy. The ſame penalty alſo attends perſons eſcaping from the LAZARETTOS, and officers and watchmen neglecting their duty, and perſons conveying goods or letters from ſhips performing *quarentine*. See PLAGUE.

QUARANTAIN, QUARANTINE, or QUARENTINE, *quarantena*, in *Law*, denotes a benefit allowed by the laws of England to the widow of a man dying ſeiſed of land; whereby ſhe may challenge to continue in his capital meſſuage, or chief manſion-houſe (ſo it be not a caſtle), for the ſpace of forty days after his deceaſe.

If the heir or any other perſon attempt to eject her, ſhe may have the writ *de quarantena habenda*; which lies for a widow to enjoy her *quarantain*.

QUARANTAIN is alſo uſed for a meaſure or extent of land, containing forty perches.

QUARANTIA, in the Venetian *Polity*, a court of judicature compoſed of forty judges.

The Venetians have an old civil *quarantia*, a new civil *quarantia*, and a criminal *quarantia*.

The criminal *quarantia* takes cognizance of all crimes except thoſe againſt the ſtate, which belongs to the council of ten. The new civil *quarantia* judges of appeals made from ſentences made by judges out of the city. The old civil *quarantia* takes cognizance of appeals from ſentences of ſubaltern judges in that city.

QUARE *clauſum fregit*. See CLAUSUM *fregit*.

QUARE *ejecit infra terminum*, a writ which lies for a leſſee, in caſe he be caſt out of his farm before his term be expired, againſt the leſſor or feoffee, that ejects him.

It differs from *ejectione firmæ*, in that the former lies where the leſſor, after the leaſe made, enfeoffs another who ejects the leſſee; whereas the *ejectione firmæ* lies againſt any other ſtranger that ejects him.

The effect is the ſame in both; viz. the recovery of the reſidue of the term.

QUARE *impedit*, a writ which lies for him who has purchaſed an advowſon, againſt him that diſturbs him in the right thereof, by preſenting a clerk thereto when the church is void.

It differs from the aſſize of darrein preſentment, *ultimæ præſentationis*, which lies where a man, or his anceſtors, formerly preſented; this other lying for him who is the purchaſer himſelf Where a man may have the aſſiſe, he may have this writ; but not contrariwiſe.

QUARE *incumbravit*, a writ which lies againſt the biſhop, who within ſix months after the vacancy of a benefice, confers it on his clerk, while two others are contending at law for the right of preſenting. See PRESENTATION, &c.

QUARE *non admiſit*, a writ which lies againſt the biſhop for refuſing to admit his clerk, who has recovered in a plea of advowſon; on pretence of lapſe, &c.

QUARE *non permittit*, is a writ that lies for one who has a right to preſent for a turn againſt the proprietary.

QUARE *obſtruxit*, a writ that lies for him, who, having right to paſs through his neighbour's grounds, cannot enjoy the ſame, becauſe the owner has fenced it up.

QUARENTINE. See QUARANTAIN.

QUARERA, or QUARATIA. See QUARRY.

QUARREL, *querela*, in *Law*. See QUERELA.

Quarrel ſeems properly to relate to perſonal actions, or at moſt to mixed ones, wherein the plaintiff is called *querens*; and, in all declarations of treſpaſs, it is ſaid, *queritur*.

Yet if a man releaſe all *quarrels*, or *querels* (a man's own deed being taken moſt ſtrongly againſt himſelf, *quarrel* includes all actions; and accordingly all actions, both real and perſonal, are hereby releaſed.

Quarrels or affrays in a church or church-yard are eſteemed very heinous offences, as being indignities to him to whoſe ſervice thoſe places are conſecrated; therefore mere quarrelſome words, which are neither an affray nor an offence in any other place, are penal here. For it is enacted by ſtat. 5 & 6 Edw. VI. cap. 4. that if any perſon ſhall, by words only, *quarrel*, chide, or brawl, in a church or church-yard, the ordinary ſhall ſuſpend him, if a layman, *ab ingreſſu eccleſiæ*; and if a clerk in orders, from the miniſtration of his office during pleaſure. And if any perſon in ſuch church or church-yard proceeds to ſmite or lay violent hands upon another, he ſhall be excommunicated *ipſo facto*; or if he ſtrikes him with a weapon, or draws any weapon with intent to ſtrike, he ſhall beſides excommunication (being convicted by a jury) have one of his ears cut off; or having no ears, be branded with the letter F in his cheek.

QUARREL *of glaſs*. See QUARRY.

The word is formed, by diminution, from the Latin *quadratum*, or the French *quarré*, *ſquare*; or, perhaps, immediately from the Italian *quadrello*, *little ſquare*.

QUARRY, a place under-ground, out of which are dug marble, free-ſtone, ſlate, lime-ſtone, or other matters proper for building.

For *quarries* of free-ſtone, in many places, they firſt open a hole in manner of a well, twelve or fourteen feet in diameter; and the rubbiſh drawn out with a windlaſs in large oſier baſkets, they heap all around; placing their wheel, which is to draw up their ſtones, thereupon.

As the hole advances, and their common ladder becomes too ſhort, they apply a particular ladder for the purpoſe. When they have got through the earth, and are arrived at the firſt bank, or ſtratum, they begin to apply their wheel and baſkets to diſcharge the ſtones as faſt as they dig through them.

They uſually find ſix or ſeven of theſe different ſtrata, or beds of ſtones, of different heights, and ſerving for different purpoſes; though the number, as well as order, wherein they follow, is various.

In many parts of England we find ſea-ſhells buried in hard ſtone, and under great beds of earth.

Near Broughton, in Lincolnſhire, all the *quarries* abound with them. At the eaſt end of this town there is a *quarry* of a ſoft ſtone, which they dig through to get at a bed of clay, which is of a peculiar glutinous quality, and hardens like mortar in drying: this is uſed for cementing other ſtones together, and in this are innumerable fragments of ſhells of cockles, ſcallops, ſea-echini, and corals; and among theſe fragments there are found ſome whole ſhells of their natural colours, and often wholly unhurt; though ſome of them are bruiſed and preſſed quite flat by the great weight of earth that lies upon them. On the ſouth ſide of the town there is a *quarry* of a blue ſtone, which was doubtleſs at firſt a blue clay of the ſame nature with that juſt mentioned. This contains in its body vaſt numbers of the ſame ſorts of ſhells, and of many other kinds; but they are all ſo firmly bedded in the ſtone, that it is not eaſy to get them out whole; but there is this very remarkable, that they only lie in the ſuperficial part of the ſtone, the ſtratum being very thick, but not one ſhell found in it beyond the depth of two feet from the ſurface.

The ſurface of this ſtratum of ſtone is not even and ſmooth, but is waved and ridged irregularly, like a bed of ſnow, or like the waves of the ſea in the time of a ſmall wind. This has juſt the appearance that the ſurface of a maſs of half-hardened matter muſt have, if the wind blew fiercely upon it from one quarter; and by the direction of theſe undulations, it is eaſy to ſee from what quarter the wind blew at that time. In that part of the ſtone which forms this undulated roughneſs, there are as many ſhells as any where elſe; and theſe lie partly buried and partly ſtanding out of the ſtone, juſt as we ſee the freſh water ſhell-fiſh lie half in and half out of the mud of the bottom of a pond or river that is dried up in ſummer.

It is very obſervable, that, in this caſe, as much of the ſhell as is within the ſtone is perfectly well preſerved, and as hard as ſtone; whereas that part which ſtands out is either wholly decayed, or at the beſt of the nature of a rotten ſhell, which falls in pieces on being touched with the hands. The part of the ſhell within the ſtone is uſually converted into a maſs different from the ſhell in all things but figure; but that which ſtands out always preſerves the true texture of the natural ſhell, and is made up of many flakes and cruſts as the natural ſhells of the kind to which it belongs are.

The *quarries* about Broughton ſeem to have been but little diſturbed, and to have been originally the mud which formed the bottom of ſome large freſh water lake; for the ſhells found in greateſt plenty of all there, are freſh water ſhells. Theſe ſeem to have remained in their original mud while turned to ſtone; and the other ſhells, natives of the ſea, which are buried there among them, ſeem to have been ſome of that immenſe number and variety that muſt have rolled along the bottom of that bed of waters; and the viſcid nature of the clay detained many of theſe among its own proper inhabitants, and preſerved them together in its ſtrong ſtate.

Beſide the parts of animals theſe *quarries* have vegetable matters alſo in them; the leaves and branches of whortles are not uncommon, and pieces of wood turned black and reſembling charcoal are alſo found there. Theſe have been preſerved in the ſame manner with the leaves of fern on the ſlates of our coal-pits, and the plants and fiſh found in hard ſtone in many of the German mines. Many of theſe vegetable remains are alſo found in looſe nodules of ſtone reſembling pebbles: theſe are not leſs eaſily accounted for than the reſt; for it is not ſtrange to conceive, that leaves and pieces of plants might be, in that general confuſion, received into lumps of clay, which might afterwards be rolled into roundneſs by the motion of the water, and finally received into chaſms of the earth, and there petrified. Phil. Tranſ. Nº 266, p. 685.

As to the drawing of the ſtone. i. e. the freeing it from the bed, they find the common ſtones, at leaſt the ſofter kinds, as they lie, have two grains; a cleaving grain running parallel with the horizon, and a breaking grain running perpendicular thereto. After uncoping, then, i. e. clearing the earth from off it; they obſerve by the grain where the ſtone will cleave, and there they drive in a good number of wedges, till they have thus cleft it from the reſt of the rock.

This done, they proceed to break it; in order to which, applying the ruler to it at both ends (ten, e. gr. or twelve inches apart, according to the uſes the ſtone is intended for), they ſtrike a line, and by this cut a little channel with their ſtone-ax; and in the channel ſet five or ſix wedges (ſuppoſing the ſtone three or four feet), driving them in very carefully, with gentle blows, and ſtill keeping them equally forward.

Having thus broken the ſtone in length (which they are able to do to half an inch, of any ſize) applying a ſquare to the ſtraight ſide, they ſtrike a line, and proceed as before to break it in breadth.

This method of drawing is found vaſtly preferable to that where the ſtones are broken at random. One load of the former being found to do the buſineſs of a load and a half of the latter.

But it may be obſerved, that this cleaving grain being generally wanting in the harder kinds of ſtones, to break up theſe in the *quarries*, they have great heavy ſtone-axes, wherewith they work down a deep channel into the ſtone; and into this channel, at the top, lay two iron bars, driving their iron wedges between theſe bars.

Some in drawing of ſtone, eſpecially the very hard kinds, make uſe of gun-powder, and with very good effect. In order to which, making a ſmall perforation pretty deep into the body of the rock, ſo as to have that thickneſs of rock over it judged proper to be blown up at once, at the farther end of the perforation they diſpoſe a convenient quantity of gunpowder, filling up all the reſt with ſtones and rubbiſh, ſtrongly rammed in, except a little ſpace for the train. By this means is the rock blown into ſeveral pieces, moſt of them not too unweildy for a workman to manage.

Quarry, in *Glaziery*, a pane, or piece of glaſs, cut in a lozenge, or diamond-form.

The word ſeems formed by corruption, from *quarrel*, (which ſee); unleſs we will ſuppoſe it to come immediately from the French *quarre*, *ſquare*.

Quarries, or *quarrels* of glaſs, are of two kinds; viz. ſquare, and long; each whereof is of different ſizes, expreſſed by the number of pieces which make a foot of glaſs; viz. 8ths, 10ths, 12ths, 15ths, 18ths, and 20ths; but all the ſizes are cut to the ſame angle, the acute anble being 77° 19′, in the ſquare *quarries*, and 67° 22′, in the long ones.

Quarry, in *Falconry*, is the game or fowl, which the hawk is in purſuit of, or has killed.

Quarry, among *Hunters*, is ſometimes uſed for part of the viſcera of the beaſt taken; given by way of reward to the hounds.

QUART, q. d. fourth, in *Muſic*, *Fencing*, *Gaming*, &c. See Music, &c.

Quart is particularly uſed for a diminutive meaſure, containing one fourth, or quarter, of ſome other MEASURE.

The Engliſh *quart* is a fourth of a gallon, or two pints; the Roman *quart*, or *quartarius*, was the fourth part of their congius.

The French, from whom we borrow the word, beſides their *quart*, or *pot* of two pints, have various other *quarts*, diſtinguiſhed by the whole whereof they are quarters; as *quart de muid*, and *quart de boiſſeau*. See Muid, and Bushel.

QUARTAN, in *Medicine*, the name of a ſpecies of intermitting fever, which returns upon the patient every fourth day, including the days of both the paroxyſms, with a cold fit ſucceeded by a hot one. In this nature is endeavouring to relieve herſelf from ſome noxious matter adhering to ſome of the hypochondriac viſcera, and to prevent the injury that might thence happen to the part.

The *quartan* is, by authors, diſtinguiſhed into the ſimple and the continual.

The ſimple *quartan* is the moſt regular of all the ſpecies of intermitting fevers; it almoſt conſtantly ſeizes the patient about four or five in the afternoon with a cold fit; but this is not ſo violent as in the quotidian or tertian, nor does it occaſion any of the ſhaking of the limbs: it is, however, very ſenſible, and uſually laſts about two hours. This is preceded and accompanied by a general languor or faintneſs; but is not ſo frequently attended with vomitings as the other intermittents in the time of their cold fit, nor is there any tendency to a diarrhœa; but, on the contrary, the bowels are uſually coſtive, not only on the day of the fit, but on the intermediate ones. The hot fit ſlowly ſucceeds the cold one, and is not ſo violent as in the tertian; but rather is troubleſome from the ſenſation of drineſs it brings on, and is ſeldom ſucceeded by any ſweating. The hot fit uſually continues about four hours, ſometimes ſix, and ſometimes much longer than that in the firſt fits. During the heat the head is vertiginous, and afflicted with a heavy pain, not a very acute one. When the fit is over, the patient returns to tolerable good health again, and remains in that ſtate for two ſucceeding days, ſaving that he has a ſoreneſs in the limbs, and a wearineſs and general laſſitude. The fit afterwards returns at the very hour it firſt came on at, and rarely varies at all from this: when it is obſerved to anticipate its uſual time, there is juſt reaſon to fear its becoming continual. The perſons moſt ſubject to *quartans* are thoſe of a middle or advanced age; it rarely happens to young people unleſs epidemic, and of all other perſons, thoſe are moſt ſubject to it who live a ſedentary life, and are of a melancholy diſpoſition.

Cauſes of it. The general cauſe of a *quartan* is a morbid viſcous matter, lodged in the hypochondriac viſcera, and having communication by that means with the vena portæ. The liver, ſpleen, and glands of the meſentery, are frequently the ſeats of this, rarely the primæ viæ. That theſe viſcera are affected in *quartans*, is evident from the connection theſe diſeaſes have with their other affections, ſuch as dropſies, jaundice, and the like. The occaſional cauſes are very frequently a quotidian or tertian fever improperly treated, obſtructions or omiſſions of habitual diſcharges of blood, whether by bleeding, or by the menſes, or hæmorrhoids; a heavy diet, without ſufficient drink; a ſudden chilling of the abdomen in a humid air, after the body has been violently heated. The principal time for theſe fevers is the autumn, whence they have been called by ſome *autumnal fevers*; and nothing more endangers their frequent return than the abuſe of ſtrong liquors, or of acids, which coagulate the blood.

Prognoſtics. The tenacity of the morbific matter in theſe fevers, though in but a very ſmall quantity, yet renders them very difficult of cure. They often laſt many weeks or months, in ſpite of all medicines, and in ſome ages have been accounted the greateſt ſcandal to phyſicians. When they ſeize a perſon in the ſpring ſeaſon, they are naturally of ſhorter duration; but when they come on in their more uſual ſeaſon, the autumn, they generally hold the patient till the ſpring. *Quartans* are very apt to return upon people at the ſame ſeaſon of the year at which they firſt ſeized them, eſpecially when they have been but injudiciouſly treated in the cure. They are often, indeed, rather ſuppreſſed than cured, and then return uſually at ſhorter periods, and often almoſt immediately on feeding heartily, which is commonly the caſe with thoſe who have been freed from them by the bark injudiciouſly given. It has been already obſerved, that this diſeaſe does not naturally tend to any ſort of evacuation; and when ſuch diſcharges are unnaturally provoked by medicines, as by vomits, purges, and violent ſudorifics, it is eaſily changed into a hectic, or ſome other dangerous chronic malady.

A *quartan*, when properly cured, uſually carries off with it all tendency to hypochondriac complaints, to which the patient may before have been ſubject; but, on the contrary, when improperly ſuppreſſed, it too often brings on ſcirrhoſities of the liver and ſpleen, and of the meſaraic glands, with œdematous ſwellings, hectics, aſthmas, and other complaints.

A violent appetite after the fit of a *quarten*, or a tertian fever, is a ſign that the diſeaſe will be very difficult of cure. Eruptions on the ſkin in the time of *quartans*, uſually preſage the going off of the diſeaſe; and ſometimes hard tumors, and bad ulcers in the legs and feet, come on during the time of the illneſs; theſe generally preſage the going off of the original diſeaſe, but they have in themſelves a worſe complaint in the place of it; and it is obſerved alſo, that œdematous tumors, which have their riſe from ill-cured *quartans*, are much more obſtinate and difficult to cure than any others.

Method of cure. The uſe of the bark is now univerſal in all intermittents, and the ignorant as well as the judicious give it; but there are many authors who are greatly againſt the ſole uſe of it in *quartans*. Stahl ſays, that in this caſe the mucous matter lodged in the hypochondriac viſcera, which is the cauſe of the diſeaſe, ſhould be firſt attenuated and incided by the neutral and digeſtive ſalts, as vitriolated tartar and the like; and with the gums, as ammoniacum and ſagapenum; with the roots of arum and pimpernel; and by diluents, which would alſo take off the obſtinate coſtiveneſs of the bowels. That when the matter is by this means fitted for evacuation, it ſhould be thrown off by purges and diuretics, ſuch as black hellebore, mercurius dulcis, and the tartar pills; and afterwards the cure to be completed by reſtoring the viſcera to their due tone, by means of bitters and ſubaſtringents, as gentian, centaury, and the Jeſuit's bark given in ſmall quantities. By this means cures are much more regularly and happily effected than by bark alone. Junker's Conſp. Med. p. 373—376.

Bartholine, in his Medical Obſervations, gives us a very remarkable inſtance of a cure performed on a perſon long afflicted with a *quartan*, and who had tried all the common methods in vain. He was adviſed by ſome body to drink plentifully of very new beer: he did ſo, and going to bed, ſweat very largely upon it, and was abſolutely cured by it.

Quartans have ſometimes been cured by mercurials. Med. Eſſ. Edinb. vol. ii. p. 317.

The *quartan* ague is ſaid to be cured by a medicine compoſed of euphorbium, reſin of Jalap, mercurius dulcis, and ſugar. See AGUE, and *Intermitting* FEVER.

QUARTANS, *continual*, in *Medicine*, the name given to a ſpecies of compound fever, which has the paroxyſms of a common *quartan*; but in which the heat never goes wholly off, but continues till the time of the ſucceeding fit. In all reſpects, except the regular returns of the paroxyſms, this diſeaſe greatly reſembles a hectic.

Signs of it. Every fourth day there is a regular paroxyſm, which begins with a coldneſs and ſhivering: this, however, does not return exactly to an hour, as the ſimple *quartan* does in its fits; but uſually the ſucceeding fit anticipates the time of the former. When the cold fit is over, there comes on a violent day-burning; the heat is much greater the firſt day than the ſucceeding ones, but continues in ſome degree till the fourth day, when the cold fit returns again, and the patient is ſeldom able to keep long together out of bed in the whole time. There is a continual thirſt and drineſs of the mouth, and the ſaliva is very little in quantity and very frothy; the appetite is bad, and the patient uſually has more inclination to ſalted and cold foods than any other; the head is diſordered rather than aching, and there is a continual deſire to ſleep, but what ſleep the patient has is troubled and unſound, and gives very little refreſhment; the urine during the whole courſe of the diſeaſe reſembles that of hectical patients, and is reddiſh and turbid, depoſiting, after a time, a roſe-coloured ſediment.

Perſons ſubject to it. This diſeaſe is frequently brought upon perſons who have had a common *quartan*, by the injudicious treatment of that diſtemper, and particularly by the taking hot medicines in it before the approach of the fit; the too free uſe of aſtringents has alſo in many caſes changed that diſeaſe into this. People of a middle or more advanced age are more ſubject to it than youth; and of theſe, ſuch are principally ſeen to be afflicted with it as are of a melancholic habit and ſedentary life.

Prognoſtics in it. This diſeaſe, though in itſelf leſs dangerous than many others, yet very eaſily changes, under improper management, into a hectic, and ſometimes into a dropſy. This is the caſe not unfrequently when it is treated with large repeated doſes of aſtringents; on the other hand, when it is treated with vomits and a hot regimen, it eaſily paſſes into an acute and dangerous inflammatory fever.

Method of cure. Toward the time of the fit there ſhould be given powders compoſed of the digeſtive ſalts, ſuch as vitriolated tartar, with crabs-eyes, ſaturated with lemon-juice. So long as the heat continues violent, the perſon is to be kept quiet, and to drink plentifully of warm and weak liquors; and in the following days, when the heat is obſerved to be decreaſed, gentle purges are to be given, with gentle aperients and reſolvents, ſuch as the decoctions of dandelion and ſuccory roots; and towards evening a gentle doſe of ſome anodyne, as the ſtorax-pill, and the like. The common violent methods by vomits, bleeding, ſtimulating purges, and hot alexipharmics, have no place in the cure of this diſeaſe; but, on the contrary, violently diſturb nature, and add to the complaints. Abſorbents in large quantities are alſo to be avoided, leſt the viſcid matter, which is the cauſe of the diſeaſe, ſhould be increaſed by their effects; and when the patient is happily cured, he is not immediately to abſtain from medicines, ſince relapſes are very frequent. Digeſtives and ſtomachics taken for ſome weeks after, will ſerve to prevent them. Junker's Conſp. Med. p. 209, 401.

QUARTAN, *double*, is that fever which hath two fits every fourth day. The ſame name is alſo given to a fever which returns two days ſucceſſively, only leaving one day's intermiſſion.

QARTAN, *triple*, is that which has three fits every fourth day, or that which returns every day like a QUOTIDIAN, only at different ſeaſons of the day; the fourth fit anſwering to the time of the firſt, the fifth to the ſecond, &c. See *Intermitting* FEVER.

QUARTARIUS, a meaſure among the ancients, being the fourth part of a ſextary, and nearly equal to a quarter of a pint of our wine-meaſure.

QUARTATION, in *Metallurgy*, is the ſeparation of ſilver from gold by means of aqua fortis; which is an operation that has ſomething ſingular in it.

If ſilver and gold are mixed together into a maſs, and the gold is not leſs than one third part of the maſs in weight, the beſt aqua fortis poured upon it is not at all capable of diſſolving the ſilver; but if you add more ſilver to this maſs, by melting it again in the fire, with ſuch a neceſſary addition of that metal alone as ſhould bring the gold in the maſs to the proportion of leſs than one third of the whole, and ſuffer it to cool, then aqua fortis poured on it will corrode the ſilver from it: this is alſo by ſo much the more ſtrongly performed, as the quantity of gold is leſs than in the proportion of one third of the whole maſs; but experience has taught us, that aqua fortis diſſolves ſilver mixed with gold quickly enough when the gold conſtitutes but one, and the ſilver three parts of a mixed maſs of them; and in this caſe, if the ſolution is not too impetuouſly performed, the gold uſually remains in ſuch a proportion, in the ſame figure that the whole maſs had before the ſeparation of the ſilver by this menſtruum; ſo that in this caſe, there is no reaſon to apprehend the gold's being torn into minute particles, and diſſipated in ſome meaſure; though this can hardly be prevented when the ſilver exceeds the three quarter proportion, in regard to the gold in the maſs. The artificers, therefore, always make it their ſtudy to obſerve very exactly this proportion of the gold being one fourth part of the mixture; and thence it is that the operation itſelf has been called *quartation*.

In order to aſcertain nearly the proportion of gold and ſilver in a maſs, the aſſayers rub this maſs upon a touchſtone, ſo as to leave a mark upon it; and they then make marks upon the ſtone with ſome of thoſe needles, called TOUCH-*needles*, the colour of which they think comes neareſt to that of the maſs: by comparing the marks of theſe needles with the mark of the maſs, they diſcover nearly the proportion of the gold and ſilver in the maſs.

The maſs of gold and ſilver to be *quarted* ought previouſly to be granulated, by melting it in a crucible, and pouring it into a large veſſel full of cold water, while at the ſame time a rapid circular motion is given to the water by quickly ſtirring it round with a ſtick or broom. The veſſels generally uſed for this operation are called PARTING-*glaſſes*. The aqua fortis muſt be purified for this purpoſe, and ſhould be ſo ſtrong as to be capable of acting ſenſibly on ſilver when cold, but not ſo ſtrong as to act violently. If it be very ſtrong, and the veſſels well cloſed, a ſmall quantity of the gold will be diſſolved along with the ſilver, which is to be guarded againſt. Little heat ought to be applied at the beginning, the liquor being apt to ſwell and riſe over the veſſel; but when the acid is nearly ſaturated, the heat may be ſafely increaſed. When the ſolution ceaſes, which may be known by the diſcontinuance of the efferveſcence, or emiſſion of air-bubbles, the liquor is to be poured off. If any grains appear entire, more aqua fortis muſt be added, that all the ſilver may be diſſolved. If the operation has been performed ſlowly, the remaining gold will have ſtill the form of diſtinct maſſes, which are to receive ſolidity and colour by putting them into a teſt under a muffle, and making them red-hot. If the operation has been performed haſtily, the gold will have the appearance of a black mud or powder, which, after five or ſix waſhings with pure water, muſt be melted. The ſilver is uſually recovered by precipitating it from the aqua fortis by means of copper veſſels, into which the liquor is poured, or of plates of copper, which are thrown along with the liquor into glaſs veſſels. A conſiderable heat is required to accelerate this precipitation. Dr. Lewis obſerves, that when the aqua fortis has been perfectly ſaturated with ſilver, no precipitation is occaſioned by plates of copper, till a drop or two of aqua fortis is added to the liquor, and then the precipitation begins, and continues as uſual. The precipitated ſilver muſt be well waſhed in boiling water, and fuſed with ſome nitre, the uſe of which is to ſcorify any cupreous particles which may adhere to the ſilver.

Here we may add, that ſilver and gold may be parted from one another by the vitriolic acid, as effectually, though not ſo commodiouſly, as by the nitrous. If the compound be reduced into grains or thin plates, and boiled in about twice its weight of oil of vitriol to drineſs, the ſilver will be ſo far corroded, as to be eaſily waſhed off by a little more of the acid: or if the maſs, after the corroſion, be melted in a crucible, the gold will ſeparate and ſubſide, the ſilver forming a ſcoria above it. Gold may be purified in the ſame manner from ſeveral other metallic bodies. M. Scheffer ſays, that this is the moſt direct way of ſeparating tin from gold. Lewis's Com.

Phil. Techn. 95, 149, &c. See ASSAYING, DEPART, and GOLD.

QUARTELOIS, *cartelois*, or *cortucæ*, ſurtouts, or upper garments, with coats of arms quartered on them, worn by the ancient knights in their military expeditions.

QUARTER, the fourth part of a whole, or integer divided into four equal portions.

In working of fractions the *quarter* is expreſſed by $\frac{1}{4}$; three *quarters* by $\frac{3}{4}$.

QUARTER, in *Weights*, is a fourth part of the quintal, or hundred weight.

The *quarter* is 28 pounds avoirdupois.

QUARTER is alſo a dry meaſure, containing of corn eight buſhels ſtriked; and of coals the fourth part of a chaldron.

Quarterium frumenti conſtat ex octo buſſellis. Fleta, lib. ii

This ſeems to have ſignified originally the fourth part of a ton in weight, or capacity. See WEIGHT.

QUARTER, in *Law*, QUARTERIUM *anni*, is the fourth part of a year.

Hence the days whereon thoſe *quarters* ſtatedly commence, are called *quarter-days*.

Quarter-days are the 25th of March, called Lady-day; the 24th of June, called Midſummer-day; the 29th of September, called Michaelmas-day; and the 25th of December, or Chriſtmas-day.

QUARTER, in *Aſtronomy*, the moon's period, or lunation, is divided into four ſtages, or *quarters*; containing each from ſeven to eight days.

The firſt *quarter* is from the new moon to the quadrature; the ſecond thence to the full moon, &c.

QUARTER, in *Heraldry*, is ſometimes uſed for an eſcutcheon, or coat of arms.

In this ſenſe there are ſixteen *quarters* required to prove nobility, in companies, or orders, where none but nobles are admitted.

The word *quarters*, required as a proof of nobility, is derived hence, that they uſed anciently to put the coats of arms of the father, mother, grandfather, and grandmother, on the four corners of the tomb of the deceaſed. In Flanders and Germany we frequently ſee tombs that have eight, ſixteen, and even thirty-two *quarters*.

QUARTER is alſo applied to the parts or members of the firſt diviſion of a coat that is quartered, or divided into four *quarters*; as in *Tab. Herald. fig.* 45. See QUARTERING.

The king of Great Britain, in the firſt *quarter*, bears gules three lions paſſant or, &c. In the ſecond *quarter* he bears azure three fleurs-de-lys, &c.

QUARTER, *franc*, is a *quarter* ſingle, or alone; which is to poſſeſs one-fourth part of the field.

This makes one of the honourable ordinaries of a coat. See ORDINARY.

QUARTER, in *Navigation*. A *quarter* of a point, wind, or rhumb, is the fourth part of a cardinal point, wind, or rhumb; or of the diſtance between two cardinal points, winds, &c.

The *quarter* contains an arch of 11 degrees 15 minutes. The *quarter* is what Wolfius, with regard to the other diviſions, calls a ſecondary point of the ſecond order.

QUARTER *of a ſhip* is that part of the ſhip's ſide which lies towards the ſtern; or which is comprehended between the aftmoſt end of the main chains and the ſides of the ſtern, where it is terminated by the *quarter*-pieces. Although the lines by which the *quarter* and bow of a ſhip are determined, with reſpect to her length, are only imaginary, yet experience appears ſufficiently to have aſcertained their limits; ſo that if we were to divide the ſhip's ſides into five equal portions, the names of each ſpace would be readily enough expreſſed. Thus the firſt, from the ſtern, would be the *quarter*; the ſecond, abaft the midſhips; the third, the midſhips; the fourth, before the midſhips; and the fifth, the bow. Falconer.

QUARTER, *on the*, in *Sea Language*, may be defined an arch of the horizon, contained between the line prolonged from the ſhip's ſtern and any diſtant object, as land, ſhips, &c. Thus if the ſhip's keel lies on an eaſt and weſt line, the ſtern being weſtward, any diſtant object, perceived in the north-weſt or ſouth-weſt, is ſaid to be on the larboard or ſtarboard *quarter*.

QUARTER is alſo uſed for a canton, or diviſion of a city; conſiſting of ſeveral ranges of buildings, &c. ſeparated from ſome other *quarter* by a river, a great ſtreet, or by ſome other boundary.

Such are the twenty *quarters* of the city of Paris. Ancient Rome was divided ſeveral times, under its ſeveral augmentations, into *quarters*, which were called *regions*; as may be obſerved in the topographies of Aurelius Victor, Onuphrius Panvinius, Marillan, Pyrro Ligorio, Boiſſard, and other antiquaries.

In many cities there are commiſſaries of the *quarter* appointed to look to the policy thereof. The prior of the Caporions accounts himſelf the chief and colonel of the fourteen regions, or *quarters*, of Rome. Muſcarat, p. 134.

QUARTERS, *franchiſe of*. See FRANCHISE.

QUARTER, in *War*, the place allotted to certain forces to live, lodge, and encamp upon, during a ſiege, or the like. See CAMP.

The general's *quarter*, called the *head-quarters* of an army, is that where the general lodges and encamps in perſon. They uſed to make lines of communication, to join the ſeveral *quarters* together.

QUARTERS *at a ſiege*, are the encampments on the principal paſſes about a place; ſerving to ſtop the avenues, and to prevent relief and convoys.

QUARTER is alſo uſed for any lodgment made in the field, or champaign, out of a ſiege. Thus they ſay, the general has extended his *quarters* a good way; the enemy coming by made him contract his *quarters*.

QUARTERS, *intrenched*, denote a place fortified with a ditch and parapet, to ſecure a body of troops.

QUARTERS, *winter*, the place allotted troops to paſs the winter ſeaſon in. Wherein theſe differ from garriſons, ſee GARRISON.

Winter-quarters, when cold or moiſt, are productive of inflammatory diſorders, particularly hard coughs, with inflammations of the pleura or lungs. See BARRACKS.

QUARTERS, *winter*, are alſo uſed for the time the troops continue in this lodgment; and for the advantage the captains make thereof.

In Spain they have alſo *ſummer quarters*.

QUARTER *of aſſembly* is the place of rendezvous, where the troops are to meet and draw up, to march in a body.

QUARTERS *of refreſhment* denote ſome well-provided, fertile ſpot, to which troops, that have been much fatigued and harraſſed, are ſent to recover their ſtrength, or health; even during the ſeaſon of the campaign.

There are alſo *quarters* aſſigned for the huckſters, and their equipage.

QUARTER alſo denotes the ſafety and good treatment promiſed to perſons or troops that ſurrender, and lay down their arms. Thus they ſay, the enemy begged *quarter*.

The phraſe took its riſe from an agreement anciently made between the Dutch and Spaniards, that the ranſom of an officer, or ſoldier, ſhould be a quarter of his pay. Hence, to beg *quarter* was to offer a quarter of their pay for their ſafety; and to refuſe *quarter* was not to accept of that compoſition for their ranſom.

QUARTERS, in *Building*, thoſe ſlight, upright pieces of timber, placed between the punchions and poſts; uſed to lath upon. They are of two kinds, *ſingle* and *double*. The *ſingle quarters* are ſawn to two inches thick, and four inches broad; the *double* are four inches ſquare.

QUARTERS in a clock, are little bells, which ſound the *quarters* of an hour.

QUARTERS, in *Sea Language*. See QUARTERING *the Men*.

QUARTER, in the *Manege*. To work from *quarter* to *quarter*, is to ride a horſe three times upon the firſt of the four lines of a ſquare; then changing your hand to ride him three times upon the ſecond; and ſo to the third and fourth, always changing hands and obſerving the ſame order.

QUARTERS *of a ſaddle*, are the pieces of leather or ſtuff made faſt to the lower part of the ſides of a ſaddle, and hanging down below the ſaddle.

QUARTERS *of a horſe*, are the ſhoulders and fore-legs, called *fore-quarters*, and the hips and hinder legs, called *hind quarters*.

QUARTERS *of a horſe's foot*, are the ſides of the coffin, comprehended between the toe and the heel on one ſide and the other of the foot. The *inner* quarters are thoſe oppoſite to one another, facing from one foot to the other; and theſe are always weaker than the outſide *quarter*, which lie on the external ſides of the coffin.

QUARTER-*caſt*. A horſe is ſaid to be *quarter-caſt* when, for any diſorder of the coffin, we are obliged to cut one of the *quarters* of the hoof; and when the hoof thus cut grows a-new, it is called *new quarter*.

QUARTERS, *Falſe*, a cleft in the horn of a horſe's *quarters*, extending from the coronet to the ſhoe, which voids blood, and occaſions a great deal of pain, and makes the horſe lame.

QUARTER-*bill*, in *Sea Language*, a roll or liſt, containing the different ſtations, to which all the officers and crew of the ſhip are quartered, in the time of battle, and the names of all the perſons appointed to thoſe ſtations.

QUARTER-BULLET, a bullet quartered into four or eight parts.

QUARTER-*chord*, in *Mining*, is ſeven yards and a quarter, which the miner hath croſs-ways of his vein on either ſide, for liberty to lay his earth, ſtones, and rubbiſh on, and to waſh and dreſs up his ore.

QUARTERS, *cloſe*, in a *Ship*. See CLOSE-*Quarters*.

QUARTER-*Cloths*, in a *Ship*, are long pieces of painted canvas extended on the outſide of the quarter-netting from the upper part of the gallery to the gang-way. They are generally decorated with martial inſtruments, or allegorical figures.

QUARTER-DAY. See QUARTER.

QUARTER-DECK of a ſhip is that aloft the ſteerage, reaching to the round houſe. See *Tab. Ship*, *fig*. 2. *lit*. O, and DECK.

QUARTER, *Fat*, in a *Ship*, denotes the ſame with *broad*. Thus, if the truſſing in, or tuck of a ſhip's *quarter* under water be deep, they ſay, ſhe hath a *fat quarter*.

QUARTER-*Gallery*, in a *Ship*, a ſort of ſmall balcony, with or without balluſtrades, on the quarter of a ſhip; which generally communicates with the gallery on the ſtern, by means of a door paſſing from one to the other.

QUARTER-*Guard*. See GUARD.

QUARTER-*Gunner*, is an inferior officer under the direction of the GUNNER of a ſhip of war, whom he is to aſſiſt in every branch of his duty; as keeping the guns and their carriages in proper order, and duly furniſhed with whatever is neceſſary; filling the powder into cartridges; ſcaling the guns, and keeping them always in a condition ready for ſervice. The number of *quarter-gunners* in any ſhip is always in proportion to the number of her artillery; one *quarter-gunner* being allowed to every four cannon.

QUARTERED *Counter*. See COUNTER-QUARTERED.

QUARTERIDGE, money paid quarterly, or by the quarter.

QUARTERING of *Soldiers*. See MARTIAL *Law* and SOLDIERS.

QUARTERING, in the *Sea-language*. When a ſhip under ſail goes at large, neither by a wind, nor before a wind, but, as it were, betwixt both, ſhe is ſaid to go *quartering*.

The term is alſo uſed when a ſhip ſails with quarter-winds.

QUARTERING *the men*, in *Sea-language*, the diſpoſing of the ſhip's company at the time of an engagement in ſuch a manner, that each may readily know where his ſtation is, and what he is to do: as, ſome to the maſter, for the management of the ſails; ſome to aſſiſt the gunners to traverſe the ordnance: ſome for plying the enemy with ſmall ſhot; ſome to fill powder in the powder-room; others to carry it from thence to the gunners in cartridges, &c.

The number of men appointed to manage the artillery is always in proportion to the nature of the guns, and the number and condition of the ſhip's crew. They are in general as follow, when the ſhip is well manned, ſo as to fight both ſides at once occaſionally:

Nature of the Gun. Pounder.	No. of Men.
To a 42	15
32	13
24	11
18	9
12	7
9	6
6	5
4	4
3	3

This number, to which is often added a boy, to bring powder to every gun, may be occaſionally reduced, and the guns nevertheleſs well managed.

The number of men appointed to the ſmall arms, on board his majeſty's ſhips and ſloops of war, by order of the admiralty, are,

Rate of the Ship.		No. of Men.
1ſt		150
2d		120
3d	of 80 guns	100
—	of 70 guns	80
4th	of 60 guns	70
—	of 50 guns	60
5th		50
6th		40
ſloops of war		30

The lieutenants are uſually ſtationed to command the different batteries, and direct their efforts againſt the enemy. The maſter ſuperintends the movements of the ſhip, and whatever relates to the ſails. The boatſwain and a ſufficient number of men are ſtationed to repair the damaged rigging: and the gunner and carpenter, whatever may be found neceſſary, according to their reſpective offices. The marines are generally quartered on the poop and forecaſtle, or gang-way, under the direction of their officers: although, on ſome occaſions, they aſſiſt at the great guns, particularly in diſtant cannonading. Falconer. See ENGAGEMENT.

QUARTERING, in *Gunnery*, is when a piece of ordnance is ſo traverſed, that it will ſhoot on the ſame line, or on the ſame point of the compaſs, as the ſhip's quarter bears.

QUARTERING, in *Heraldry*, the act of dividing a coat into four or more quarters, or *quarterings*, by parting, couping, &c. i. e. by perpendicular and horizontal lines, &c. See QUARTER and QUARTERLY.

The king of Great Britain quarters with Great Britain, France, Ireland, Brunſwick, &c.

Colombiere reckons twelve ſorts of *quartering*; but other authors give us more—viz. Party per pale, dividing the eſcutcheons from top to bottom. See PALE.—Party per croſs, dividing it from ſide to ſide. See CROSS.—Party of ſix pieces, when the eſcutcheon is divided into ſix parts, or quarters.—Party of ten; of twelve; of ſixteen; of twenty; and of thirty-two; when there are ſo many partitions reſpectively.

Others give the diviſions in another manner: as—Party per croſs—per pale—per chief—per pale inclave—per bend dexter—per bend ſiniſter—per chevron—barry bendy of eighty pieces—paleways of ſix pieces—barry of ſix pieces—barry of eight pieces—bendy of ſix—checky—fuſilly, or lozengy—pale bendy, or bendy lozengy—barry bendy lozengy, or bend lozengy—gyronny—barry lozengy counterchanged—waved of ſix pieces—barry nebule of ſix pieces—party per ſaltier—and party per pale in point. See farther under their reſpective articles.

***Counter*-QUARTERING** *a coat* is when the quarters are quartered over again, or ſubdivided each into four. See COUNTER-*Quartered*.

There are *counter-quartered* coats which have twenty or twenty-five quarters.

QUARTERING is alſo applied to the partitions or compartments themſelves, that is, the ſeveral coats borne on an eſcutcheon, or the ſeveral diviſions made in it, when the arms of ſeveral families are to be placed on the ſame ſhield; on account of intermarriages, or the like.

Colombiere obſerves, that thirty-two is the greateſt number uſed in France; but that the Engliſh and Germans ſometimes extend to forty: as a teſtimony of the truth whereof, he ſays, he ſaw the eſcutcheon of the earl of Leiceſter, ambaſſador extraordinary in France in the year 1639, divided into the number of forty: and ſome, he affirms, do go on to ſixty-four ſeveral coats.

But a multitude of quarters make a confuſion; and, accordingly, all the writers of armoury exclaim againſt it as an abuſe.—The firſt inſtance of *quartering* whereof we have any account is ſaid to be in the arms of Renatus, king of Sicily, &c. in the year 1435, who quartered the arms of Sicily, Arragon, Jeruſalem, &c.

William Wickly obſerves, that ſuch *quarterings* are much properer for a pedigree, to be locked up in a cheſt, and occaſionally produced as an evidence for the clearing or aſcertaining of alliances of families, and titles to lands, &c. than to be borne as a cognizance.

In blazoning, when the *quartering* is performed per croſs, the two quarters a-top are numbered the firſt and ſecond; and thoſe at the bottom the third and fourth; beginning to tell on the right ſide. When the *quartering* is by a ſaltier, &c. the chief and point are the firſt and ſecond quarters, the right ſide the third, the leſt the fourth.

QUARTERING is ſometimes alſo uſed for the diſtinguiſhing of younger brothers from elder. See DIFFERENCE.

QUARTERIZATION, QUARTERING, part of the puniſhment of a traitor, by dividing his body into four quarters.

Walſingham in Ric. II. *Auditum & confeſſum turpiſſima ſcelera tractationi, ſuſpendio, decollationi, exenterationi, &* quarterizationi *adjudicavit*.

QUARTERLY, in *Heraldry*. A perſon is ſaid to bear *quarterly*, when he bears arms quartered.

The king of Great Britain bears *quarterly* of four; in the firſt quarter gules, &c. Great Britain; in the ſecond, azure, &c. Ireland, &c.

QUARTER-MASTER, an officer in the army, whoſe buſineſs it is to look after the quarters of the ſoldiers; their clothing, bread, ammunition, firing, &c. Every regiment of foot and artillery has a quarter-maſter, and every troop of horſe one, who are only warrant-officers, except in the blues. Whereof there are ſeveral kinds; viz. The

QUARTER-MASTER *general*, whoſe buſineſs is to provide good quarters for the whole army.

QUARTER-MASTER *of foot*, he who is to provide quarters for a regiment of foot.

QUARTER-MASTER *of horſe*, he who is to provide quarters for a troop of horſe.

QUARTER-MASTER, in a *Ship*, is an inferior officer, appointed by the MASTER of a ſhip of war to aſſiſt the mates in their ſeveral duties; as ſtowing the ballaſt and proviſions in the hold, coiling the cables on their platforms, overlooking the ſteerage of the ſhip, and keeping the time by the watch-glaſſes.

QUARTERN, **Quarteron**, a diminutive of *quart*, ſignifying a quarter of a pint, as a quart does a quarter of a gallon.

Quarter-*Netting*, is a ſort of net-work, extended along the rails on the upper part of a ſhip's *quarter*. In a ſhip of war theſe are always double, being ſupported by iron cranes, placed at proper diſtances. The interval is ſometimes filled with cork or old ſails, but chiefly with the hammocks of the ſailors, ſo as to form a parapet to prevent the execution of the enemy's ſmall arms in an ENGAGEMENT.

Quarter *Point of the Compaſs*. See POINT.

Quarter-*Rails*, in a *Ship*, are narrow-moulded planks, generally of fir, reaching from the top of the ſtern to the gang-way. They are ſupported by ſtanchions, and ſerve as a fence to the *quarter-deck*, to prevent the men from tumbling into the ſea by the rolling of the ſhip, particularly in ſmall veſſels.

Quarter-round, in *Architecture*, is a term uſed by the workmen for any projecting moulding in general, whoſe contour is a perfect quadrant, or quarter of a circle, or which approaches near that figure. See *Tab. Archit. fig.* 5.

The architects uſually call it *ovolo*; and Vitruvius, the *echinus*.

General **Quarter-sessions** of the *peace*, a court that muſt be held in every county, once in every quarter of a year; which by ſtat. 2 Hen. V. c. 4. is appointed to be in the firſt week after Michaelmas-day; the firſt week after the Epiphany; the firſt week after the cloſe of Eaſter; and in the week after the tranſlation of Saint Thomas á Becket, or the 7th of July. This court is held before two or more juſtices of the peace, one of whom muſt be of the *quorum*. The juriſdiction of this court by 34 Ed. III. c. 1. extends to the trying and determining of all felonies and treſpaſſes whatſoever; though they ſeldom, if ever, try any greater offence than ſmall felonies within the benefit of clergy; their commiſſion providing, that, if any caſe of difficulty ariſes, they ſhall not proceed to judgment, but in the preſence of one of the juſtices of the court of king's bench or common pleas, or one of the judges of aſſize. And, therefore, murderers, and other capital felonies, are uſually remitted for a more ſolemn trial to the aſſizes. They cannot alſo try any new-created offence, without expreſs power given them by the ſtatute which creates it. But there are many offences, and particular matters, which, by particular ſtatutes, belong properly to this juriſdiction, and ought to be proſecuted in this court: as, the ſmaller miſdemeanours againſt the public or commonwealth, not amounting to felony; and eſpecially offences relating to the game, highways, alehouſes, baſtard children, the ſettlement and proviſion for the poor, vagrants, ſervants wages, apprentices, and popiſh recuſants. Some of theſe are proceeded upon by indictment, and others in a ſummary way by motion and order thereupon: which order may, for the moſt part, unleſs guarded againſt by particular ſtatutes, be removed into the court of king's bench, by writ of *Certiorari facias*, and be there either quaſhed or confirmed. The records or rolls of the ſeſſions are committed to the cuſtody of a ſpecial officer denominated the CUSTOS *rotulorum*. In moſt corporation towns there are *quarter* ſeſſions kept before juſtices of their own, within their reſpective limits; which have exactly the ſame authority as the *general quarter-ſeſſions* of the county, except in very few inſtances: one of the moſt conſiderable of which is the matter of appeals from orders of removal of the poor, which, though they be from the orders of corporation juſtices, muſt be to the ſeſſions of the county, by 8 and 9 W. III. c. 30. In both corporations and counties at large, there is ſometimes kept a ſpecial or petty ſeſſion, by a few juſtices, for diſpatching ſmaller buſineſs in the neighbourhood between the times of the general ſeſſions; as, for licenſing alehouſes, paſſing the accounts of pariſh officers, and the like. Blackſt. Com. b. iv. p. 268, &c.

Quarter-staff, a long ſtaff, or pole, borne by foreſters, park-keepers, &c. as a badge of their office; and occaſionally uſed as a weapon.

Quarter-wheeling, or **Quarter** *of converſion*, in the *Military Art*, is a motion whereby the front of a body of men is turned round to where the flank was; this making the *quarter* of a circle.

If it be done to the right, the man in the right-hand angle keeps his ground, and faces about, while the reſt wheel; if to the left, the left-hand man keeps his place, &c.

Quarter-wind, at *Sea*, is a lateral, or ſide-wind; or a wind which does not blow in ſtern, but a little aſide of it. Properly the *quarter wind* is that which comes in abaft the main-maſt ſhrouds, even with the quarter of the ſhip.

The *quarter wind* is the beſt of all winds, as bearing into all the ſails; whereas a wind blowing full in ſtern, is kept off by the ſails of the mizzen.

QUARTILE, an aſpect of the planets when they are three ſigns, or 90 degrees diſtant from each other.

The *quartile* aſpect is marked thus □. See ASPECT.

QUARTO, or 4*to*, a book whereof four leaves, or eight pages, make a ſheet.

QUARTO-DECIMANS, **Quarto-decimani**, an ancient ſect in the church, who maintained, that Eaſter was always to be celebrated, conformably to the cuſtom of the Jews, on the fourteenth day of the moon in the month of March, whenſoever that day fell out.

And hence their name *Quarto decimani*, q. d. Fourteenthers.

The Aſiatics were mightily attached to this opinion, pretending that it was built on the authority of St. John, who was their apoſtle; and pope Victor could never bring them to obedience in this article, though he was upon the point of excommunicating them: but it is more probable he contented himſelf with menaces. See EASTER.

Quarto *die poſt*, in *Law*, denotes the fourth day incluſive beyond the return of a writ, in which thoſe that are ſummoned are allowed to make their appearance. See ESSOIGN *day of term*.

QUARTUM *par conſtringens*, in *Anatomy*, a name given by Spigelius and ſome other to the muſcle called by Albinus and Riolanus *orbicularis oris*; and by Cowper and ſome others, *conſtrictor labiorum*.

QUARTUS *hyoidis muſculus*, in *Anatomy*, a name given by Veſalius, Fabricius, and many other anatomiſts, to a muſcle now generally called the *coracohyoidæus*.

Quartus *oculum movens*, in *Anatomy*, a name given by Veſalius to one of the muſcles of the eye, called by ſome *rectus inferior*, and by others *humilis*.

It is the *depreſſor oculi* of Albinus, being one of the *quatuor recti oculi* of that author.

QUARTZ, in *Natural Hiſtory*, is a ſtone of the kind called by authors ſiliceous or vitrifiable. It is frequently found with ores, of which it often forms the matrix; and it is alſo often found where no ores are. Some of theſe ſtones conſiſt of impalpable particles, others have a granulated texture, and ſome have a ſparry or laminated texture. When pure, they are white and opake, or they are colourleſs and tranſparent. When mixed with calces of iron or of copper, they are black or red. This ſtone does not decay in the air, as ſome other ſiliceous ſtones do. According to Cronſtedt, it always forms hexagonal priſms, pointed at one or both ends, when there has been no interruption to its cryſtallization: and this cryſtallized *quartz* is rock-cryſtal, which, like the uncryſtallized *quartz*, is colourleſs or coloured, tranſparent or opake.

Wallerius ſays, that every *quartz* is fuſible by fire: but probaby the *quartz* coloured by metallic calces are only fuſible; for M. D'Arcet found that the tranſparent and ſemi-tranſparent *quartz*, and alſo the opake white *quartz* were rendered friable, but were not fuſed by a very violent and long-continued fire; and that by the ſame fire the form and tranſparency of rock-cryſtals were not altered.

Beccher and Hiærne obſerve, that from *quartz* a ſmall quantity of alkali may be obtained by diſtillation, or by frequent extinction of the heated ſtone in water. A ſimilar alkaline matter is ſaid to be obtainable by diſtillation from flints. Dict. Chem. art. *Quartz*, note (*a*).

QUASHING, in *Law*, the overthrowing and annulling a thing.

QUASI-CONTRACT, in the *Civil Law*, an act which has not the ſtrict form of a contract, but yet has the force thereof.

In a contract there muſt be the mutual conſent of both parties; whereas, in a *quaſi-contract*, one party may be bound or obligated to the other, without having given his conſent to the act whereby he is obliged.

For an example: I have done your buſineſs, in your abſence, without your procuration; and it has ſucceeded to your advantage: I have then an action againſt you for the recovery of what I have diſburſed; and you an action againſt me, to make me give an account of my adminiſtration: which amounts to a *quaſi-contract*.

Quasi-crime, or **Quasi-delict**, in the *Civil Law*, the action of a perſon who does damage, or evil, involuntarily.

The reparation of *quaſi-crimes* conſiſts in making good the damages, with intereſt.

Quasi-modo *Sunday*, *Low Eaſter-Sunday*, or the next Sunday after Eaſter; thus called from the initial words of the introit of the maſs for the day, *Quaſi modo geniti infantes.*

In the ancient deeds theſe words are ſignified by *q. m. g.*

QUASS, the name of a liquor in Ruſſia, which ſerves the natives not only for drink, but alſo for ſauce to a number of diſhes; and is the baſis of the favourite cold ſoup of the North, which is made by adding cold meat cut in pieces, with cucumbers ſalted after a peculiar manner, or with onions, or garlick, to a bowl of this ſubacid liquor. The common Ruſſian *quaſs* is prepared by putting into a large pot-full of cold water as much rye-flour as will make a thin dough: this is then placed in an oven moderately heated, for three hours, and afterwards taken out and thrown into a tub of cold water: the mixture is worked with a machine like a chocolate mill till it froths. To this liquor are added two baſons of the grounds of old *quaſs*, leaven, or a piece of their ſour bread; and the tub is covered with a cloth, and laid by till the liquor has acquired a ſouriſh taſte, which marks its being ready for uſe.

There is a better ſort of *quaſs*, which is prepared by putting one pood (thirty-ſix pounds Engliſh) of rye, flour or meal, and half that quantity of ground malt, into a tub, to which is fitted a cloſe cover, and pouring upon it a kettle-full of ſcalding water, ſtirring the mixture, and then covering it cloſe for an hour: at the expiration of this time, boiling water is added, till the mixture becomes as thin as ſmall beer. The tub is then placed in a cool ſituation for ſome hours, the cover being kept half open with a ſtick; then the liquor is paſſed through a ſieve into a caſk, and two baſons full of old *quaſs*, or the ſubſtitutes mentioned above, are aded, and the veſſel placed in a cellar for five or ſix days, till it acquires the ſubacid taſte, when it is fit for bottling. This liquor is much recommended on account of its antiſcorbutic quality. Phil. Tranſ. vol. lxviii. part ii. p. 627, &c.

QUASSIA, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are, that the calyx is five-leaved, that it has five petals, a five-leaved nectarium, and five pericarpia with ſingle ſeeds. There is only one ſpecies.

QUATER-COUSINS, Quatre-cousins, fourth couſins, or the laſt degree of kindred.

Hence, when perſons are at variance, it is ſaid they are not *quater*, or *cater-couſins.*

QUATERNA *folia*, among *Botaniſts*. See Leaf.

QUATOTOMOMI, in *Ornithology*, the name of an American bird of the wood-pecker kind, having a red creſt on its head, and two white lines running down the ſides of the neck to the breaſt. It is called by Nieremberg PICUS *imbriſcœtus.*

QUATRE-NATIONS, q. d. *Four Nations*, the denomination of a college founded in 1661, by cardinal Mazarin, for the education and maintenance of ſixty children, natives of the four countries conquered by Lewis XIV. viz. fifteen for Pignerol and Italy, fifteen for Alſatia, twenty for Flanders, and ten for Rouſſillon.

QUATRICHROMA, in the *Italian Muſic*, is what we call a *demi-ſemi-quaver*, thirty-two whereof make a bar in common time. See Time, and Triple.

QUATUOR *hominis prepoſiti*. See Prepositi.

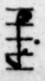
QUATUOR-VIR, in *Antiquity*, frequently written IIII. VIR, a Roman magiſtrate, who had three colleagues joined with him in the ſame adminiſtration.

To the *quatuor-vir* was committed the charge of conducting and ſettling the colonies ſent into the provinces.

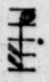
Upon unlucky accidents, and other dangerous affairs, it was uſual to create *quatuor-viri*, with commiſſion to take care *ne quid detrimenti reſpublica caperet, that the republic were not prejudiced.*

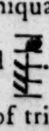
There were alſo *quatuor-viri* appointed to inſpect and take care of repairs, &c.

QUAVER, in *Muſic*, a meaſure of time, equal to one half of the crotchet, or one-eighth of the ſemi-breve.

The *quaver* is marked by the character .

The Engliſh *quaver* makes what the French call *crochue, crotchet*, becauſe of the hook at bottom. See Crotchet.

The *quaver* is divided into two ſemiquavers, noted .

and four demiſemiquavers, marked .

QUAVERING, in *Muſic*, the act of trilling, or ſhaking; or the running a diviſion with the voice.

QUAVITL, in *Botany*, a name given by ſome authors to the cocoa-tree. Hern. p. 79.

QUAUHAYOHUATLI, in *Botany*, a name by which ſome authors have called the tree whoſe fruit is the caſſia fiſtula of the ſhops. Hern. p. 87.

QUAUHTZONECOLIM, in *Ornithology*, the American name for a bird called by moſt a *quail*, but eſteemed by Nieremberg a ſpecies of partridge.

It is of the ſize of the European partridge, and of a browniſh colour, and ornamented with a creſt upon its head. There are alſo in America two other ſpecies of partridge much allied to this, the one with a yellow body, and black and white head; the other ſmall and brown, and without a creſt.

QUAUHYAC *oculenſium*, the name of a very large Indian tree, bearing leaves reſembling thoſe of the citron. The bark is aſtringent, heating, drying, and of a ſtrong ſmell: it reſtrains a diarrhœa, and excites a ſweat. The juice, ſnuffed up the noſe, cauſes ſneezing, purges the head, and thus removes fevers, and pains in the head; for which reaſons, it is preſerved in families as a popular remedy. Nieremberg.

QUAY, *Kay*, a ſpace of ground paved on the ſhore of a river, or port, deſtined for the loading and unloading of merchandize. See Kay and Wharf.

QUEEN, *regina*, a woman who holds the crown of a realm, ſingly, and by right of blood.

The word *queen* is derived from the Saxon *cwen, uxor, the wife of any one*, but applied, by way of excellency, to the wife of the king only; whence ſhe was anciently called the *king's queen*; the Weſt Saxons having no other name for a *queen* but the *king's wife*. Aſſer de Ælfred. rebus, &c. She was alſo called *lady*, in Saxon *wlæfdig*; juſt as *madame, mademoiſelle*, are ſtill uſed in France, for the wife and daughter of the duke of Orleans.

The name *queen* is alſo given by way of courteſy, to her that is married to the king; called by way of diſtinction, *queen conſort*. In reſpect whereof the former is called *queen regnant*, or regent.

The widow of a king is alſo called *queen*, but with the addition of *dowager*.

In the firſt ſenſe, *queen* is, in all conſtruction, the ſame with king; and has the ſame power and prerogative, in all reſpects, that the king has.

The *queen conſort* is inferior, and a perſon diſtinct from, and a ſubject of, the king. In England, though ſhe be a ſeme covert, yet may ſhe ſue, and be ſued, in her own name; and may make leaſes, and grants, &c. as a feme ſole.

She has ſeveral other prerogatives. Though an alien, ſhe may purchaſe lands in fee-ſimple, without either naturalization, or denization; ſhe may preſent to a benefice; nor is plenarty a bar againſt her more than againſt the king. She is alſo capable of taking a grant from the king, which no other wife can do from her huſband; and ſhe may have a ſeparate property in goods as well as lands, and has a right to diſpoſe of them by will. She pays no toll, and ſhall not be amerced, if ſhe be nonſuited in any action; and may not be impleaded till firſt petitioned.

To conſpire her death, or violate her chaſtity, is high treaſon. She has an ancient peculiar revenue, called *queen-gold*; beſides a very large dower, with a royal court, and officers, apart.

The *queen dowager*, as the widow of the king, enjoys moſt of the privileges belonging to her as *queen conſort*. But it is not high treaſon to conſpire her death; or to violate her chaſtity, becauſe the ſucceſſion to the crown is not thereby endangered. Yet ſtill, *pro dignitate regali*, no man can marry a *queen dowager* without ſpecial licence from the king, on pain of forfeiting his lands and goods. She has alſo this particular, that ſhe loſes not her dignity, though ſhe marry a private gentleman. Thus *queen* Catherine, widow of Henry V. being married to Owen ap Tudor, eſq. maintained her action as *queen* of England. Much leſs does a *queen regnant* follow her huſband's condition, or is ſubject to other *queens*; but ſhe is ſovereign to her own huſband, as *queen* Mary was to king Philip, and *queen* Anne to prince George of Denmark; unleſs it be otherwiſe appointed by parliament.

Queen *bee*, a term given by late writers to what uſed to be called the *king bee*, or king of the bees; a large and long-bodied bee, of which kind there is only one found in every ſwarm, and which is always treated with the greateſt reſpect by the reſt.

It is well known that the generation and whole œconomy of bees principally depend upon this female ſovereign, and that her preſence is abſolutely neceſſary to the proſperity and ſafety of the whole community; inſomuch that the loſs of the *queen* proves the certain and total deſtruction of the ſwarm or hive, unleſs the owner ſupplies them in time with another ruler. Without her preſence and direction, the other bees will do no manner of work; they will gather neither wax, nor honey, nor any other materials; nor can they breed and propagate their kind without her. A ſtock deprived of its *queen*, would yield to robbers, or elſe languiſh and pine away, ſo that the whole ſociety would periſh. But as ſoon as a languiſhing ſtock is ſupplied with a *queen*, pleaſure and activity are apparent through the whole hive; the preſence of the ſovereign reſtores vigour and exertion, and her voice commands univerſal reſpect and obedience: of ſuch importance is the *queen* to the exiſtence and proſperity of the other members of this community. As the parent and ſovereign of every ſwarm is a female, the whole government is veſted in one; ſo that where there happen to be more, as there ſometimes are, and eſpecially in ſwarms that are united, confuſion and diſcord prevail, until all, except one, are expelled and ſlain.

As in forming *artificial* SWARMS, and for other purpoſes, it will be neceſſary to diſtinguiſh the *queen* from the other bees, we ſhall obſerve, that ſhe may be known by her ſize, which is much larger than that of the common working-bees, and longer than that of the drones; by the form and ſhape of her body, eſpecially of the hinder part of it, which is more taper, and terminates in a much ſharper point than the bodies of the other bees, in order the more readily to reach the bottom of the cells, were the eggs are depoſited for the propagation of the ſpecies (ſee *Generation of* BEES): and alſo by her colour; her upper parts being ſcarce at all different in this reſpect from the honey bees, but her belly and legs are of a very deep yellow, reſembling the pureſt and the richer gold. It is ſaid that ſhe may alſo be diſtinguiſhed by the note of her voice, which is an octave; and by her being one of the laſt which falls with her belly upwards, when the bees of a ſingle ſtock are dropped into an empty hive, in order to be united with thoſe of another ſtock.

Naturaliſts have obſerved, that the *queen* bees are produced in a manner peculiar to themſelves, and different from the drones and working bees. Some have ſuppoſed that the eggs laid by the *queen* in a hive, and deſtined for the production of *queen* bees, are of a peculiar kind; but though this is not the caſe, as M. Schirach has lately diſcovered, yet there are particular cells appropriated for this purpoſe. Theſe cells are generally near the edges, and at the bottom of the comb, and ſometimes on the ſides of a honey-comb; they are of an oblong orbicular form, and very ſtrong; and are more or leſs numerous in different hives, as occaſion ſeems to require. It has been alſo ſuppoſed, that the matter with which they are nouriſhed is of a different kind and quality from that employed for the nouriſhment of the other bees; that which has been collected out of the royal cells being of a gummy glutinous nature, of a deep tranſparent red, and diſſolving in the fire rather than crumbling to powder.

It has been generally ſuppoſed, that the *queen* bee is the only female contained in the hive; that the drones are the males by which ſhe is fœcundated; and that the working bees are neutral, or of neither ſex. But M. Schirach has lately eſtabliſhed a different doctrine, which has been alſo confirmed by the later obſervations of Mr. Debraw. According to this writer, all the working or common bees are females in diſguiſe; and the *queen* bee lays only two kinds of eggs, viz. thoſe which are to produce the DRONES, and thoſe from which the working bees are to proceed; and from any one or more of theſe, one or more *queens* may be produced; ſo that every worm of the latter or common kind, which has been hatched about three days, is capable, under certain circumſtances, of becoming the *queen*, or mother of a hive. In proof of this doctrine, new and ſingular as it may ſeem, he alledges a number of ſatisfactory and deciſive experiments, which have been ſince verified by thoſe of Mr. Debraw. In the early months of the ſpring, and in any preceding month, even ſo late as November, he cut off from an old hive a piece of that part of the comb, which contains the eggs of the working bees; taking care, however, that it contained likewiſe worms which had been hatched about three days. He fixed this in an empty hive, or box, together with a portion of honey-comb, &c. or in other words, with a ſufficiency of food, and building materials, or wax, for the uſe of the intended colony. He then put into, and confined within, the ſame box, a ſufficient number of common working bees, taken from the ſame or any other hive. As ſoon as the members of this ſmall community found themſelves deprived of their liberty, and without a *queen*, a dreadful uproar enſued, which continued generally, with ſome ſhort intervals of ſilence, for the ſpace of about twenty-four hours; during which time it is to be ſuppoſed they were alternately meditating and holding council on the future ſupport of the new republic. On the final ceſſation of this tumult, the general and almoſt conſtant reſult was, that they betook themſelves to work; firſt proceeding to the conſtructing of a royal cell and then taking the proper meaſures for hatching and feeding the brood incloſed with them. Sometimes, even on the ſecond day, the foundations of one or more royal cells were to be perceived; the view of which furniſhed certain indications that they had elected one of the incloſed worms to the ſovereignty. The operation has been hitherto conducted in the houſe. This new colony may now be ſafely truſted in the garden, if the weather be warm, and have the liberty allowed them of paſſing out of the box; of which they inſtantly avail themſelves, and are ſeen in a ſhort time almoſt totally to deſert their new habitation. In about two hours, however, they begin to re-enter it. We ſhould not neglect to obſerve, that if they ſhould be placed near the old hive, from which they were taken, they will very often attempt to enter it, but are as conſtantly repulſed by their former companions and brethren. It is prudent, therefore, to place them at a diſtance from the mother ſtate, in order to avoid the inconveniences of a civil war. The final reſult of the experiment is, that the colony of the working bees thus ſhut up, with a morſel of common brood, not only hatch it, but are found, at the end of eighteen or twenty days, to have produced from thence one or two *queens*; which have apparently proceeded from worms of the common ſort, pitched upon by them for that purpoſe; and which, under other circumſtances, that is, if they had remained in the old hive, there is reaſon to ſuppoſe would have been changed into common working bees. In the preſent inſtance, the common worm appears to be converted by them into a *queen* bee, merely becauſe the hive was in want of one. Hence we may juſtly infer, that the kingdom of the bees is not, if the expreſſion may be uſed, a *jure divino* or hereditary monarchy, but an elective kingdom; in which the choice of their future ruler is made by the body of the people, while ſhe is yet in the cradle, or in embryo; and who are determined by motives of preference which will perhaps for ever elude the penetration of the moſt ſagacious naturaliſts.

The concluſions drawn by M. Schirach, from experiments of the preceding kind, very often repeated by himſelf and others with the ſame ſucceſs, are, that all the common or working bees were originally of the female ſex; but that when they have undergone their laſt metamorphoſis, they are condemned to a ſtate of perpetual virginity, and the organs of generation are obliterated; merely becauſe they have not been lodged, fed, and brought up in a particular manner, while they were in the worm ſtate. He ſuppoſes that the worm, deſigned by the community to be a *queen*, or mother, owes its metamorphoſis into a *queen*, partly to the extraordinary ſize of its cell, and its peculiar poſition in it; but principally to a certain appropriate nouriſhment found there, and carefully adminiſtered to it by the working bees, while it was in the worm ſtate; by which, and poſſibly other means unknown, the developement and extenſion of the germ of the female organs, previouſly exiſting in the embryo, is effected; and thoſe differences in its form and ſize are produced, which afterwards ſo remarkably diſtinguiſh it from the common working bees. Schirach's Hiſtoire Nat. de la Reine des Abeilles, &c. 8vo. 1772. Or, for an abſtract, Monthly Review, vol. xlviii. p. 564, &c. Phil. Tranſ. vol. lxvii. part i. p. 29, &c. See *Sex of* BEES.

This diſcovery is capable of being applied towards forming artificial SWARMS, or new colonies of bees, by which means the number of theſe uſeful inſects might be increaſed, and their produce in honey and wax proportionably augmented. M. Schirach, as well as M. Hatorff, ſeem, however, to have been miſtaken, when they aſſert, that the artificial *queens*, formed and reared in a community conſiſting *only* of working bees, proceed almoſt immediately to lay eggs, and to people the hive, without having had any communications with the drones, and at a time when, as they ſuppoſe, there were no drones in being. It is not neceſſary to admit the idea of the prolific quality of a virgin *queen* bee; as nature has provided drones of different ſizes, for the purpoſe of impregnating the eggs laid by the female, and continuing the ſpecies, adapted to different occaſions and circumſtances. See DRONE.

QUEEN'S *bench*. See KING'S *bench*, &c.

QUEEN'S *gilliflower*, or *violet*, in *Botany*. See *Dame's* VIOLET.

QUEEN *gold*, *aurum reginæ*, a royal revenue, belonging to the *queen* of England, during her marriage to the king; and payable by divers perſons (upon ſeveral grants of the king) by way of oblation out of fines, amounting to ten marks, or upwards; viz. one full tenth part above the entire fine, or ten pounds for every hundred pounds fine, on pardons and contracts, or agreements.

This becomes a real debt to the *queen*, by the name of *aurum*

aurum reginæ, upon the party's bare agreement with the king for a fine, and recording it; without any farther promiſe, or contract, for this tenth part extraordinary.

Queen *of the meadows*. See Spiræa.

Queen's *ware*. See Pottery.

QUE ESTATE, in *Law*, a plea whereby a man entitling himſelf to land, &c. ſaith, that the ſame eſtate which another had, he now has from him.

Thus, e. gr. the plaintiff alledges, that ſuch four perſons were ſeiſed of lands whereunto the advowſon in queſtion belonged in fee, and who did preſent it; and that afterwards the church was vacant; *que eſtate*, i. e. *which eſtate* he now has; and, by virtue thereof, he preſents, &c. See Prescription.

QUE EST MEME, in *Law*, a term uſed in actions of treſpaſs, &c. for a direct juſtification of the very act complained of by the plaintiff as a wrong.

Thus, in an action upon the caſe, the plaintiff ſaying the lord threatened his tenants at will in ſuch ſort, as he forced them to give up their lands; the lord in his defence pleads, that he ſaid to them, if they would not depart, he would ſue them at law. *Que eſt même*, i. e. this being the ſame threatening that he uſed, the defence is good.

QUEI, in *Natural Hiſtory*, a name given by the Chineſe to a peculiar earth found in many parts of the Eaſt.

It is of the nature of an indurated clay, and in ſome degree approaches to the talcs, as our ſteatites and the galactites do. It is very white and abſterſive, uſed by the women of China, to take off ſpots from the ſkin, and render it ſoft and ſmooth, as the Italian ladies uſe talc of Venice. They ſometimes uſe the fine powder of this ſtone dry, rubbing it on the hands and face after waſhing; ſometimes they mix it in pomatum.

QUEM *redditum reddit*, in *Law*, an old writ which lay where a rent-charge, or other rent, which was not rent-ſervice, was granted by fine holding of the grantor. If the tenant would not attorn, then the grantee might have had this writ.

QUEMI, in *Botany*, a name uſed by ſome authors for the nigella, or geth.

QUERCERA, in *Medicine*. See Epialos.

QUERCUS, the *oak*, in *Botany*. See Oak.

Quercus *marina*, the *ſea-oak*, in *Botany*, the name of one of the broad-leaved dichotomous ſea-fucuſes.

It is not agreed, among the late botaniſts, what was the *ſea-oak* of Theophraſtus; and the moſt ancient botaniſts, Cluſius and Cæſalpinus, ſuppoſe it to have been a ſpecies of the ſhrubby coralline; but that ſeems by no means to have been the caſe, ſince Theophraſtus ſays his *ſea-oak* had a long, thick, and fleſhy leaf, whence we may much more naturally conclude it to have been of the fucus claſs.

QUERELA, *quarrel*, in *Law*, denotes an action, or declaration, preferred in any court of juſtice. See Quarrel.

In an action where the plaintiff is called *querens*, i. e. complainant, his brief, complaint, or declaration, is called *querela*.

Querela *audita*. See Audita.

Querela *coram rege & concilio*, a writ whereby one is called to juſtify a complaint of a treſpaſs made to the king himſelf, before the king and his council.

Querela *duplex*. See Double *quarrel*.

Querela, *ex gravi*. See Ex, &c.

QUERFAA, in the *Materia Medica of the Arabians*, a name given by Avicenna and others to cinnamon, when gathered with the wood of the young branches.

It was a common practice in the early times not to ſtrip the ſmall bark from medicinal trees, but to cut off the little boughs, and uſe them bark and wood together. This the Greeks called *xylo cinnamomum*, or *woody cinnamon*; and the Arabians, *querfaa, querfe*, or *kerfe*.

QUERIA, in *Botany*, a genus of the *triandria trigynia* claſs. Its characters are, that the calyx is five-leaved; that it has no corolla; and that the fruit is a ſingle-celled, three-valved capſule, containing one ſeed. There are two ſpecies.

QUERPO. See Cuerpo.

QUERQUEDULA, in *Ornithology*. See Teal.

QUERRIES, or Equerries. See Equerry.

Querry, *Gentleman of the*, is an officer appointed to hold the king's ſtirrup, when he mounts on horſeback.

QUEST, or Inquest, an inquiſition, or inquiry, made upon oath of an impanelled jury. See Inquest, and Jury.

The word is formed from the French *quete*, *ſearch*; of the Latin *quæſitum*, *a thing ſought*.

Quest, in *Hunting*, the ſeeking out of hounds, or the venting and winding of ſpaniels. See Hound.

QUESTION, *quæſtio*, in *Logic*, &c. a propoſition, whoſe truth a perſon being inquiſitive about, propoſes it, by way of interrogation, to another.

Logical queſtions are variouſly diſtributed: the ordinary diviſion is into *firſt* or *primary queſtions*; as, *Quid eſt*, *What is ſuch a thing?* And *ſecondary*, which ariſe out of the former; as, *How is it?*

Question, *Quodlibetical*. See Quodlibetical.

Question, in *Law*. The *quæſtio de jure* is generally to be diſtinguiſhed from the *quæſtio de facto*.

Question is alſo ſometimes uſed for torture.

QUEST-MEN, perſons choſen yearly in each ward, to inquire into abuſes and miſdemeanours, eſpecially ſuch as relate to weights and meaſures.

QUESTOR, Quæstor, formed *à quærendo*, *ſeeking*, *ſearching*, or *collecting the revenues of the ſtate*, an officer in ancient Rome, who had the care of the public treaſure.

The *queſtorſhip*, *quæſtura*, is very ancient, as having been eſtabliſhed under the kings, probably in the time of Romulus or Numa, or at leaſt under Tullus Hoſtilius. Dionyſius and Livy date the original of *queſtors* about A. U. C. 269. Plutarch refers the inſtitution to the time of Valerius Poplicola, when he allotted the temple of Saturn for the treaſury, and granted the people the liberty of chuſing two young men for the treaſurers. Afterwards, viz. A. U. C. 332, two others were created to take care of the payment of the armies abroad, of ſelling the plunder and booty, &c. for which purpoſe they generally accompanied the conſuls in their expeditions; and they were diſtinguiſhed by the name of *peregrini* from the other *queſtors*, who aſſumed the title of *urbani*. This number continued till the entire conqueſt of Italy; and then, A. U. C. 439, it was again doubled. The four that were added reſided with the proconſuls and proprætors, in the provinces, where they were employed in regulating the taxes and cuſtoms due to the ſtate.

In the time of the republic, the ſenate appointed *queſtors* in each province, to aſſiſt the proconſuls, as lieutenants or treaſurers, in the adminiſtration of the revenues; but, under the emperors, there was properly but one *queſtor*, or treaſurer-general of the empire: thoſe other inferior or ſubordinate *queſtors* were then called aſſiſtants of the *queſtor*, *adjutores quæſtoris*.

The *queſtor*'s office was originally confined to the army. They paid the ſoldiery, and took charge of moneys coming by ſpoil and plunder, &c.

At length there were new ones erected to reſide in the city, and to receive the public money, taxes, tribute, &c. Their number was increaſed as the empire increaſed. Sylla augmented it to twenty; Julius Cæſar, to forty: ſome being nominated by the emperor, and the others by the people. Under ſucceeding emperors their number was not fixed. Of theſe two were appointed for the city, to take care of the public treaſure, and to keep the laws and decrees of the ſenate; the others pertained to the provinces and the armies.

The *queſtorſhip* was the firſt office which any perſon could bear in the commonwealth, and might be undertook at the age of twenty-four or twenty-five years. Accordingly, the *queſtorſhip* was called the firſt ſtep of honour, and the *queſtors*, who were generally employed in the provinces abroad, aſſigned to them ſeverally by lot, no ſooner returned from their provincial adminiſtration than they took their places in the ſenate; and from that time forward, from the rank of equeſtrians, or what we commonly call knights, became ſenators for life.

There was alſo another kind of *queſtors*, called *quæſtores parricidii*, whoſe office was to inquire into, and take cognizance of capital crimes, after the conſuls were denied this privilege.

Questor *ſacri palatii*, or of the *ſacred palace*, was one of the firſt dignities under the emperors of Conſtantinople.

It was this *queſtor* that ſubſcribed the reſcripts of the emperor, and the anſwers to the petitions and ſupplications preſented to him. He alſo drew up and ſigned the laws and conſtitutions which the emperor thought fit to publiſh; and took care of the adminiſtration of juſtice.

Some compare his function to that of our lord high chancellor. It was uſually one of the juriſconſulti that was charged with this office; it being required, that he ſhould know the laws of the empire, be able to preſcribe and ſee them executed, and judge of cauſes brought by way of appeal before the emperor.

Conſtantine was the firſt who erected *queſtors* of the ſacred palace.

QUESTUS, or Quæstus. See Quæstus.

Questus *eſt nobis*, a writ of nusance, which, by ſtat. 15 Edw. I. lies againſt him to whom a houſe, or other thing, that breeds a nuſance, is deſcended, or alienated;

whereas before that ſtatute, the action lay only againſt him who firſt levied, or cauſed the nuſance, to the damage of his neighbour.

QUEUE, in *Heraldry*, the tail of a beaſt.

If a lion has a forked tail, he is blazoned by *double-queued*.

Queue d'aronde, q. d. *ſwallow's tail*, in *Fortification*, a term applied to outworks, when narrower at the gorge than at the face or front; i. e. where the ſides open towards the champaign, and contract towards the gorge.

The name is occaſioned by its reſemblance in figure to a ſwallow's tail, which the French call *queue d'aronde*.

Of this kind are ſome ſingle as well as double TENAILLES; and ſome HORN-*works* whoſe ſides are not parallel.

On the contrary, when the ſides are leſs than the gorge, the work is called *contre queue d'aronde*.

Queue *d'aronde*, in *Carpentry*, a method of jointing, called alſo DOVE-*tail*.

QUI *tam*, in *Law*, is uſed where an information is exhibited againſt any perſon on a penal ſtatute at the ſuit of the king and the party who is informer, when the penalty for breach of the ſtatute is to be divided between them; and the party informing proſecutes for the king and himſelf. See INFORMATION.

QUIA, in *Logic*. See REASON.

Quia *dominus remiſit curiam*, in *Law*. See RECTO.

Quia *emptores*, in *Law*, a denomination given to the ſtatute of Weſtm. 3. 18 Edw. I. which directs, that upon all ſales or feoffments of land, the feoffee ſhall hold the ſame, not of his immediate feoffor, but of the chief lord of the fee, of whom ſuch feoffor himſelf held it: and hence it is held, that all MANORS exiſting at this day muſt have exiſted by immemorial preſcription, or at leaſt ever ſince this ſtatute was made: for no new manor can have been created ſince that ſtatute; becauſe it is eſſential to a manor, that there be tenants who hold of the lord, and that ſtatute enacts, that for the future no ſubject ſhall create any new tenants to hold of himſelf.

Quia *improvide*, a ſuperſedeas granted in many caſes where a writ is erroneouſly ſued out, or miſawarded.

Such is that granted in behalf of a clerk of the chancery ſued againſt the privilege of the court, in the common pleas, and purſued to the exigent.

QUICK. See MEDLAR.

Quick *beam*. See SERVICE *tree*.

Quick *hatch*, in *Zoology*. See GLUTTON.

Quick *lime*. See LIME.

Quick *match*, in *Artillery*, is formed of three cotton ſtrands drawn into length, and dipped in a boiling compoſition of white wine vinegar, ſaltpetre, and mealed powder. After this immerſion, it is taken out hot, and laid in a trough where ſome mealed powder, moiſtened with ſpirits of wine, is thoroughly incorporated into the twiſts of the cotton, by rolling it therein: thus prepared, they are taken out ſeparately and drawn through mealed powder, and then hung upon a line to dry. There is alſo *quick* match made of worſted inſtead of cotton. For its uſe, ſee FIRE-*ſhips*.

Quick *pulſe*. See PULSE.

Quick *ſand*, in *Sea Language*, denotes a looſe quaking ſand, into which a ſhip ſinks by her own weight, as ſoon as the water retreats from her bottom.

QUICKSET *hedge*. See HEDGE.

QUICKSILVER, a very ponderous fluid mineral, by the chemiſts called *mercury*. For the method of gaining, preparing it, &c. with its properties, uſes, &c. ſee MERCURY.

Quicksilver, *Virgin*. See VIRGIN.

Quicksilver *water*. See WATER.

Quick-*work*, in a *Ship*, is a general name given to all that part of a ſhip, which is under the ſurface of the water when ſhe is laden fit for a ſea voyage. The term is alſo applied, occaſionally, to that part of the ſide which is above the ſheer-rail, and which is uſually painted with trophies, &c. on the outſide. Falconer.

QUID, *what*, in the *Schools*, is uſed to denote the definition of a thing.

It is thus called, becauſe the definition anſwers to the queſtion, *Quid eſt, What is it?*

Hence we have two kinds of *quids*; nominal, *quid nominis*; and real, *quid rei*.

Quid *juris clamat*, in *Law*, a writ that lies where I grant the reverſion of my tenant for life by fine in the king's court, and the tenant will not attorn; then the grantee ſhall have this writ to compel him.

This writ ſeems to be obſolete, ſince the fourth and fifth of Anne. See ATTOURNMENT.

Quid *pro quo*, in *Law*, q. d. *what for what*, denotes the giving one thing of value for another; or the mutual conſideration and performance of both parties to a contract.

Quid *pro quo*, or **Qui** *pro quo*, is alſo uſed, in *Phyſic*, to expreſs a miſtake or cheat of an apothecary, in adminiſtering one medicine for another; or in uſing an ingredient in a compoſition different from that preſcribed.

A northern phyſician, in a printed theſis on *quid pro quos*, owns ingenuouſly, that they are very frequent. He diſtinguiſhes very accurately a great variety of kinds of *quid pro quos*; ſome with regard to the operation; others with regard to the ſubject; and others with regard to their form, or effects. The firſt comprehends the *quid pro quos* of the phyſician; the ſecond, thoſe of the patient; the third, thoſe of the apothecary.

QUIDDENY, **Quiddany** (of the Latin *cydonium*, or *cydoniatum*) a conſerve of quinces, called alſo MARMALADE.

QUIDDITY, *quidditas*, in the *Schools*, a word of the ſame ſignification with *eſſence*.

The name is derived hence, that it is by the eſſence of a thing that it is *tale quid*, ſuch a *quid*, or very thing, and not another. When upon ſeeing, or hearing the name of a thing with whoſe nature, &c. we are unacquainted, we aſk, *Quid eſt, What is it?* we mean no more by the interrogation, but that we deſire to have its nature and eſſence explained by a definition. Whence *quiddity* is uſually defined the eſſence known or expreſſed in a definition.

And hence what is eſſential to a thing is ſaid to be *quiddative*; as *quiddative* knowledge, &c.

QUIESCENT, ſomething at REST.

QUIETISM, in *Eccleſiaſtical Hiſtory*, the ſentiments of the *Quietiſts*, a religious ſect which made a great noiſe towards the cloſe of the laſt century.

Molinos, a Spaniſh prieſt, who died at Rome in the priſon of the inquiſition, paſſes for the author of *Quietiſm*; and yet the Illuminati in Spain had taught ſomething like it before.

A ſect ſimilar to this had appeared at Mount Athos in Theſſaly, towards the cloſe of the fourteenth century, under the appellation of *Heſychaſts*, which denotes the ſame with *Quietiſts*. Theſe were a branch of the MYSTICS, or thoſe more perfect monks, who, by a long courſe of intenſe contemplation, endeavoured to arrive at a tranquillity of mind entirely free from every degree of tumult and perturbation. Theſe *Quietiſts*, in conformity to an ancient opinion of their principal doctors (who imagined that there was a celeſtial light concealed in the deepeſt retirements of the mind) uſed to ſit every day, during a certain ſpace of time, in a ſolitary corner, with their eyes eagerly and immoveably fixed upon the middle region of the belly, or navel; and boaſted, that, while they remained in this poſture, they found, in effect, a divine light beaming forth from the ſoul, which diffuſed through their hearts inexpreſſible ſenſations of pleaſure and delight. To ſuch as inquired what kind of light this was, they replied, by way of illuſtration, that it was the glory of God, the ſame celeſtial radiance that ſurrounded Chriſt during his transfiguration on the Mount. Barlaam, a monk of Calabria, from whom the BARLAAMITES derived their denomination, ſtyled the monks, who adhered to this inſtitution, MASSALIANS and EUCHITES; and he gave them alſo the new name of *Umbilicani*. Gregory Palamas, archbiſhop of Theſſalonica, defended their cauſe againſt Barlaam; who was condemned in a council held at Conſtantinople in the year 1341.

The name is taken from a ſort of abſolute reſt, and inaction, which the ſoul is ſuppoſed to be in, when arrived at the ſtate of perfection, which in their language is called *the unitive life*. To arrive at this, a man is firſt to paſs through the purgative way; that is, through a courſe of obedience, inſpired by the fear of hell: hence he is to proceed into the illuminative way, before he arrives at perfection.

The ſentiments of the *Quietiſts*, with regard to God, are wonderfully pure and diſintereſted. They love him for himſelf, on account of his own perfections, independently of any rewards or puniſhments: the ſoul acquieſces in the will of God, even at the time when he precipitates it into hell; inſomuch that inſtead of ſtopping him on this occaſion, B. Angelo de Foligny cried out, *Haſte, Lord, to caſt me into hell: do not delay, if thou haſt abandoned me: but finiſh my deſtruction, and plunge me into the abyſs.*

At length, the ſoul, after long travail, enters into reſt, into a perfect *quietude*. Here it is wholly employed in contemplating its God; it acts no more, thinks no more, deſires no more; but lies perfectly open, and at large, to receive the grace of God, who by means thereof drives it where it will, and as it will.

In this ſtate it no longer needs prayers or hymns, or vows; prayers where the ſpirit labours, and the mouth opens, are the lot of the weak, and the imperfect: the ſoul of the ſaint is, as it were, laid in the boſom, and between the arms of its God, where, without making any motion, or exerting any action, it waits, and receives the divine graces. It then becomes happy: quitting the exiſtence it before had, it is now changed, it is transformed, and, as it were, ſunk and ſwallowed up in the Divine Being, inſomuch as not to know or perceive its being diſtinguiſhed from God himſelf. Fenel. Max. des Saints.

QUIETISTS, the diſciples of Mich. De Molinos; or the adherents to the opinions delivered in the article Quietism.

The ſentiments of Molinos were contained in a book, which he publiſhed at Rome, in the year 1681, under the title of the *Spiritual Guide*; in conſequence of which he was caſt into priſon in 1685, where he was ſoon obliged to renounce, in a public manner, the errors of which he was accuſed: and this ſolemn recantation was nevertheleſs followed by a ſentence of perpetual impriſonment, from which he was in an advanced age delivered by death, in the year 1696. Molinos had a conſiderable number of diſciples in Italy, Spain, France, and the Netherlands. One of the principal patrons and propagators of *Quietiſm* in France, was Marie Bouvieres de la Mothe Guyon, a woman of faſhion, remarkable for the goodneſs of her heart, and the regularity of her manners; but of an unſettled temper, and ſubject to be drawn away by the ſeduction of a warm and unbridled fancy. This female apoſtle of myſticiſm derived all her ideas of religion from the feelings of her own heart, and deſcribed its nature to others as ſhe felt it herſelf. Accordingly her religious ſentiments made a great noiſe in the year 1687; and they were pronounced unſound, after accurate examination by ſeveral men of eminent piety and learning, and profeſſedly confuted, in the year 1697, by the celebrated Boſſuet. Hence aroſe a controverſy of greater moment, between the prelate laſt mentioned, and Fenelon, archbiſhop of Cambray, who ſeemed diſpoſed to favour the religious ſyſtem of Madame Guyon, and who, in 1697, publiſhed a book, cited in the laſt article, containing ſeveral of her tenets. Fenelon's book, by the intereſt of Boſſuet, was condemned in the year 1699, by Innocent XII. and the ſentence of condemnation was read by Fenelon himſelf at Cambray, who exhorted the people to reſpect and obey the papal decree. Notwithſtanding this ſeeming acquieſcence, the archbiſhop perſiſted, to the end of his days, in the ſentiments, which, in obedience to the order of the pope, he retracted and condemned in a public manner.

QUIETUS, *freed*, or *acquitted*; a term uſed by the clerk of the pipe, and the auditors in the exchequer, in their acquittances or diſcharges given to accomptants, which uſually conclude with the words *abinde receſſit quietus*; which is called a *quietus eſt*.

A *quietus eſt* granted to a ſheriff diſcharges him of all accounts due to the king.

QUIJUBATUI, in *Ornithology*, the name of an American ſpecies of paroquette.

It is of the ſize of a lark, and in general of a yellow colour. Its eyes are black, and its beak grey. The edges of its wings are of a duſky green, and its tail long and yellow. It is a very beautiful bird, and very eaſily tamed.

QUIL, in *Zoology*. See Quirpele.

QUILAQUIL, in *Natural Hiſtory*, the name given by the people of the Philippine iſlands to a very beautiful ſpecies of parrots, which is commonly found wild in the woods there. It is all over of a fine green colour, and is ſmaller than the common parrots, and has a broad black bill and black legs. It is a very wild bird, and will not learn any thing.

QUILLOBO, in *Botany*, a name given by ſome to a ſpecies of ketmia, called alſo quingombo.

QUILTING, denotes the operation of weaving a ſort of coat or texture, formed of the ſtrands of rope, about the outſide of any veſſel, to contain water, &c. as a jar, caſk, bottle, &c.

QUINA *folia*, among *Botaniſts*. See Leaf.

QUINAQUINA. See Quinquina.

QUINARIUS, Quinary, in *Antiquity*, a little Roman coin, equal to half the denarius. See Coin.

The *quinarius* was properly the Roman halfpenny.

Medaliſts indeed uſe the term *quinarius* in the general for a medal of any matter, not exceeding the ſize of our ſix-pence; but F. Chamillart, in an expreſs diſſertation, ſhews this to be an abuſe. The ſilver coins, current under the republic, he ſhews, were two: the one weighing a drachm, and called *denarius*, as containing ten aſſes; the other weighing half a drachm, and called *quinarius*, as containing five aſſes: which coins continued on the ſame footing under the emperors.

Hence the origin of the word *quinarius*: and hence, in propriety, it is only the ſilver medal of the weight of half a drachm that the name belongs to; the Romans having never given it to any other ſpecies of the ſame ſize therewith. It is only by way of analogy, therefore, that the moderns apply it to the medals of gold, or copper, of the ſame ſize with the ſilver *quinarius*; thoſe of gold being fixed at a value much above, and thoſe of braſs much below five aſſes.

The only relation between theſe *quinarii* is, that the gold *quinary* is the half of a gold medal, as to weight and value, and the braſs *quinary* half a braſs medal, as the ſilver *quinary* is half a ſilver one.

Hence a ſeries of *quinaries* ſhould ſeem at leaſt as neceſſary in the cabinets of the curious, as the ſeries of great medals; they being all equally different ſpecies of money, which teach us how many kinds of pieces there were of any metal current in commerce.

Add to this, ſays our author, that the *quinaries* were of a finer and more finiſhed coin than the other medals, being wrought by the hands of the maſters; which ſeems owing to the nicety required in engraving whole figures in ſo ſmall compaſs. He adds, that though *quinaries* are very ſcarce, yet M. the duke of Maine had almoſt a complete ſet of them.

QUINCE *tree*, *cydonia*, in *Botany*. Its characters are theſe: the flower is compoſed of five large roundiſh concave petals, which are inſerted in the permanent empalement; the germen is ſituated under the flower; it hath five ſlender ſtyles, with near twenty ſtamina; the germen afterward becomes a pyramidal or roundiſh fruit, which is fleſhy, and divided into five cells, in which are lodged ſeveral hard kernels or ſeeds. Miller, enumerates three ſpecies. Linnæus has joined this genus, as well as the apple, to the pear.

The Portugal *quince* is moſt eſteemed for the delicate flavour of the fruit: they are all eaſily propagated, either by layers, ſuckers, or cuttings, which muſt be planted in a moiſt ſoil. Thoſe raiſed from ſuckers are ſeldom ſo well rooted as the others, and are ſubject to produce ſuckers again, in a greater abundance, which is not ſo proper for fruit-bearing trees.

The cuttings ſhould be planted early in the autumn; and, in dry weather, muſt be often watered, to aſſiſt them in rooting. The ſecond year, they ſhould be removed into the nurſery, and ſet in rows, at three feet diſtance, and one foot aſunder in each row. In two or three years time, they will be fit to tranſplant where they are to ſtand, which ſhould always be near a ditch or river, or in ſome moiſt ſoil; where they will produce a greater quantity of fruit than they will in a dry one, and the fruit will alſo be much larger: but thoſe in a drier ſoil are better taſted, and are earlier ripe. Theſe trees require little pruning: the chief thing to be obſerved is, to keep their ſtems clear from ſuckers, and to cut off ſuch branches as croſs each other, and alſo all upright luxuriant ſhoots.

Quince ſtocks are in great eſteem to graft and bud pears on, which, on a moiſt ſoil, will greatly improve ſome ſorts, eſpecially thoſe deſigned for walls and eſpaliers; for the trees upon theſe ſtocks do not ſhoot ſo vigorouſly as thoſe upon free ſtocks, and therefore may be kept in leſs compaſs, and are ſooner diſpoſed to bear fruit: but hard winter fruits do not ſucceed ſo well upon theſe ſtocks, their fruit being very ſubject to crack, and are commonly ſtony, eſpecially all the breaking pears, but more eſpecially if they be planted in dry ground; therefore theſe ſtocks are only proper for the melting pears, and for a moiſt ſoil. The beſt ſtocks are thoſe which are raiſed from cuttings or layers.

As the pear will take upon the *quince* by grafting or budding, and ſo *vice verſa*, we may conclude there is a near alliance between them; but as neither of theſe will take upon the apple, nor that upon either of theſe, ſo we ſhould ſeparate them under different genera. Miller.

The fruit of the *quince* is aſtringent and ſtomachic; and its expreſſed juice, in ſmall quantities, as a ſpoonful or two, is of conſiderable ſervice in nauſeæ, vomitings, nidorous eructations, and ſome kinds of alvine fluxes: but its chief uſe in the ſhops is in the *ſyrupus cydoniarum*, or ſyrup of *quinces*, prepared by digeſting three pints of the depurated juice with a dram of cinnamon, half a dram of ginger, and half a dram of cloves, on warm aſhes, for ſix hours, then adding a pint of red port, and diſſolving in the ſtrained liquor nine pounds of ſugar. An uſeful reſtringent marmalade is made by boiling the juice with fine ſugar to a due conſiſtence, in the proportion commonly of three pints to a pound. The juice of *quinces* becomes richer, by keeping them for ſome time, after they are gathered, in a dry airy place. The ſeeds of *quinces* abound with a mucilaginous ſubſtance, which they readily give out to boiling water.

QUINCUNX, *quinque unciæ*, denotes a thing that conſiſts of five twelfth parts of another.

Quincunx is chiefly uſed in *Gardening*, for a plantation of trees, diſpoſed originally in a ſquare; conſiſting of five trees, one at each corner, and a fifth in the middle; which diſpoſition, repeated again and again, forms a regular grove, wood, or wilderneſs; and then viewed by an angle of the ſquare, or parallelogram, preſents equal and parallel alleys. See Espalier.

Or, the *quincunx* is the figure of a plantation of trees diſpoſed in ſeveral rows, both length and breadthwiſe; in ſuch manner as that the firſt tree of the ſecond row commences in the centre of the ſquare formed by the two firſt trees of the firſt row, and the two firſt of the third, reſembling the figure of a five at cards. The fineſt manner of planting trees to form a grove, is in the *quincunx*.

It is of this kind of *quincunx* that Cicero ſpeaks, in his Cato Major; and Quintilian, lib. viii. cap. 3.

The modern *quincunces*, Daviler obſerves, are made like thoſe of the ancients, except for the fifth tree, which is now generally diſuſed; ſo that, being as it were netted, and their alleys viewed by the ſide of the rectangle, they form a perfect chequer.

Quincunx, in *Aſtronomy*, &c. denotes a poſition, or aspect of the planets when diſtant from each other a hundred and fifty degrees, or five ſigns.

QUINDECAGON, in *Geometry*, a plain figure which has fifteen ſides and fifteen angles.

The word is formed ſomewhat irregularly, from the Latin *quinque*, *five*, and the Greek *δεκα*, *ten*, and *γωνια*, *angle*. *Pentedecagon* would be a more regular term.

If the ſides be all equal, it is a regular *quindecagon*.

Euclid ſhews how to inſcribe it in a circle, Prop. xvi. lib. 4. And the ſide of a regular *quindecagon* ſo deſcribed, is equal in power to the half-difference between the ſide of the equilateral triangle, and the ſide of the pentagon; and alſo to the difference of the perpendiculars let fall on both ſides, taken together.

QUINDECIM VIR, XV. VIR, a Roman magiſtrate, who had fourteen colleagues joined with him in the ſame function.

Under Tarquin the Proud, there were firſt two magiſtrates erected to take care of the ſacrifices to be performed; theſe were called *duumviri*. Their number, at length, grew to ten, and then they were called *decemviri*. In the time of Cicero it had reached to fifteen, when they aſſumed the name of *quindecimviri*: and though their number grew to forty afterward, yet Servius obſerves, on the ſixth of the Æneid, that their name never after changed, but they ſtill continued to be called *quindecimviri*.

They were the perſons who examined the Sibyls' books, and were the interpreters thereof; yet they never did this but by expreſs order of the ſenate, declared by a ſenatus conſultum. They alſo preſided at the ſacrifices, and all other extraordinary ceremonies of religion.

On medals, a dolphin joined with a tripod marks the prieſthood of the *quindecimviri*; who, to publiſh their ſolemn ſacrifices, uſed, on the eve thereof, to carry a dolphin at the end of a pole, throughout the city; that fiſh being eſteemed ſacred to Apollo, as the crow was among birds.

QUINGOMBO, in *Botany*, the name given by the people of Congo to a ſpecies of ketmia, diſtinguiſhed by Mr. Tournefort by the name of the *ketmia Braſilienſis folio ficus, fructu pyramidato ſulcato*, the fig-leaved Braſilian ketmia, with a pyramidal ſulcated fruit.

QUINI-SEXTUM, in *Eccleſiaſtical Hiſtory*, denotes a council held at Conſtantinople in the year 692; called alſo the council in Trullo, and by the Greeks *Penthecte*, q. d. *five-ſixth*; as intimating that it was only a ſupplement of the two preceding councils. Though, in propriety, Fleury obſerves, it was a council itſelf.

Marſhall obſerves, that the fifth and ſixth general councils having made no canons, relating to the external celebration of divine worſhip, the government of the church, and the lives and manners of Chriſtians, the Orientals judged it neceſſary to ſupply that defect by this; ſo that the 102 canons falſly attributed to thoſe, were, in reality, made here. See Trullum.

QUINNET, in *Mining*, the name of a tool uſed in the cleaving rocks by means of gunpowder. This is a ſort of wedge fitted to the flat ſide of what is called the *gun*; that is, a cylindric piece of iron, only flatted in one part to receive this, and drilled through. When a proper hole has been made in the rock by the borer, the powder is put in, and then the orifice being ſtopped by the gun, and that wedged in by this *quinnet*, the powder being fired by a train communicating with the hole drilled through the gun, exerts all its force on the rock, and ſplits it in ſeveral directions at one exploſion. Phil. Tranſ. N° 167.

QUINQUAGENARIUS, among the *Romans*, was an officer in the army who had the command of a company of fifty men.

Quinquagenarius was alſo an officer of policy, who had the inſpection of fifty houſes, or families.

And in the ancient monaſteries, *quinquagenarius* was a ſuperior who had fifty monks under his guidance.

QUINQUAGESIMA-SUNDAY, *Shrove-Sunday*. It is thus called, as being about the fiftieth day before Eaſter. Anciently they uſed *Quinquageſima* for Whitſunday, and for the fifty days between Eaſter and Whitſunday; but to diſtinguiſh this *Quinquageſima* from that before Eaſter, it was called the *Paſchal Quinquageſima*.

QUINQUANGULAR *leaf*. See Leaf.

QUINQUANNION, *quinquennium*, in the *French Cuſtoms*, a reſpite of five years, which inſolvent debtors formerly obtained by virtue of the king's letters, to have time for the payment of their debts.

When the thing intended was only to prevent the ſale of their effects at an under-value, the term of one year was ordinarily granted, and this was called the benefit of *annion*.

But when the debtor would avoid the ſurrendering of his effects, upon proving that he was reduced by poverty, loſſes, &c. to make uſe of this expedient, the term of five years was granted, and called the benefit of *quinquannion*.

QUINQUATRIA, in *Antiquity*, a name given to the feaſts of Minerva, otherwiſe called Panathenæa.

Some think they were termed *quinquatria*, becauſe they laſted five days; but others, with more reaſon, think it was becauſe they fell out five days after the ides of the month.

QUINQUEFOLIUM. See Cinquefoil.

QUINQUENNALIA, in *Antiquity*, games, or feaſts founded at Tyre, celebrated every five years, in honour of the deified emperors.

The *quinquennalia* began to be expreſſed on medals about the middle of the third century. F. Pagi produces a medal whereon are engraven thoſe of the emperor Poſthumus; they are not found in any medals of his predeceſſors.

QUINQUENNALIS, in *Antiquity*, a magiſtrate in the colonies, and municipal cities of the Roman commonwealth; much the ſame with ædile at Rome.

They were not thus called from their continuing in their office five years; but becauſe they were elected every fifth year, to preſide at the cenſus, and to receive the declaration each citizen made of his effects.

QUINQUENNES, in ſome old *Hiſtorians*, a name given to a certain people of India, among whom the women began to bear children at five years old, and ſeldom lived to more than eight years. Pliny gives us this account; and Solinus, who repeats it from him, increaſes the miracle by telling us, that they were a nation of women who had no men among them.

QUINQUE *portus*, the five cinque *ports*.

Servitium quod barones quinque portuum *præſcriptorum recognoſcunt facere ad ſummonitionem regis per annum, ſi contigerit per* 15 *dies ad cuſtum eorum proprium*; *ita quod primus dies computatur a die quo vela navium erexerunt, uſque partes ad quas tendere debent, vel ulterius, quamdiu rex voluerit ad cuſtum ejus.* Thorn.

QUINQUEPRIMI, among the *Romans*, the five principal men in the ſenate of every municipal town.

QUINQUEREMIS, in the *Naval Architecture of the Ancients*, a name given to a galley which had five rows of oars. They divided their veſſels in general into monocrota and polycrota: the former had only one tier of rowers; the latter had ſeveral tiers of them, from two or three, up to twenty, thirty, or even forty; for ſuch a veſſel we have an account of in the time of Philopater, which required no leſs than four thouſand men to row it. See Polycrota.

QUINQUEPARTITE *leaf*, among *Botaniſts*. See Leaf.

QUINQUERTIONES, among the *Romans*, an appellation given to thoſe who had gained the victory in the *quinquertium*, or *pentathlon*.

QUINQUERTIUM, among the *Romans*, was the ſame with the Grecian pentathlon, comprehending the five exerciſes of running, leaping, throwing, darting, and wreſtling.

QUINQUE VIR, frequently wrote V. VIR, a Roman magiſtrate, who had four colleagues joined with him in the ſame function.

There were various kinds of officers thus denominated. Pomponius the lawyer mentions *quinqueviri* on this and on that ſide of the Tiber, eſtabliſhed for the adminiſtration of juſtice in the night-time, in lieu of the ordinary magiſtrates, who were not judged proper to run up and down the ſtreets in the dark.

Roſinus tells us, that they were ſometimes the *quinque-*

viri who conducted the colonies, and divided the lands aſſigned to them among the ſeveral families.

Sometimes the epulones were five in number; in which caſe they were called *quinqueviri*. See EPULO.

QUINQUEVIRI *monetarii*, were officers firſt erected under the conſulate of Valerius Poplicola, to moderate the exceſſive uſury, or intereſt, which creditors or bankers uſed to exact from the people.

QUINQUINA. See CORTEX *Peruvianus*.

QUINSEY, QUINZY, or QUINCY, in *Medicine*. See QUINZY.

QUINSIEME, or QUINZIEME, in our *Old Law Books*. See FIFTEENTH.

QUINT, a ſequence of five cards of the ſame colour. See SEQUENCE.

QUINTA *eſſentia*. See QUINTESSENCE.

QUINTAIN, *quintena*, in *Ancient Cuſtoms*, a poſt driven into the ground, with a buckler fixed to it, for the performance of military exerciſes on horſeback, the throwing of darts, breaking of lances, &c.

Matth. Paris deſcribes the *quintain* as a kind of mark, formed like a man from the navel upwards, holding a ſhield in his left hand, and in his right a ſword or ſtick; the whole ſo fitted as to turn round on its foot, and ſo as that a cavalier running a-tilt againſt it with a lance, if he hit it in the breaſt, it whiſked round, and, unleſs he were very dexterous, ſtruck him with the ſword held in the other hand.

In other places, at the top of a poſt, was erected a ſlender beam fitted to turn round a ſpindle; at one of whoſe ends was a ſlope or flat board, and at the other a bag of ſand, or dirt. The ſport was, with a long ſtaff, or wooden lance, to ride a-tilt at the board, and to be either ſo ſkilful or lucky as to eſcape the blow of the ſand-bag.

This ſome take to be the ſame with the *arietum levatio*, frequently prohibited in our old ſynods and epiſcopal conſtitutions.

The cuſtom is ſtill retained in Shropſhire, and ſome other counties, among the nuptial ſolemnities. He that breaks the moſt poles againſt the *quintain*, has the prize; which was anciently a peacock, but is now a garland.

Some derive the word from an ancient game called *quintus*; others from a man of the name of Quintus.

The vallus and palus, mentioned in Cæſar, are taken, by Vigenere, for a kind of *quintain*, or wooden man fixed up as an adverſary, or man of ſtraw, to prove one's dexterity againſt.

Mention is made of this exerciſe in the Code, De Aleatoribus, and in the Paratitles of Cujas on the ſame. Juvenal ſpeaks of women engaging therein:

> *Aut quis non vidit vulnera* pali? &c.

QUINTAIN was alſo a right which the lord had to oblige all the millers, watermen, and other young people unmarried, to come before his caſtle every three years, and break ſeveral lances, or poles, againſt a poſt, or wooden man, for his diverſion.

QUINTAL, in *Commerce*, the weight of a hundred pounds.

The *quintal* admits of ſome difference in different places, according as the pound conſiſts of more or fewer ounces, and as the ounce is lighter or heavier.

Thus, e. gr. the Paris *quintal*, or hundred, yields a hundred and twenty-three pounds at Montpelier; and the Montpelier hundred only eighty-one pounds at Paris.

The *quintal* of Conſtantinople is eſteemed the heavieſt of all thoſe uſed in the Levant: it contains forty-five ocquas, the ocquas weighing two Dutch pounds nine tenths; ſo that the *quintal* is equal to a hundred and twelve pounds three quarters of Amſterdam, a hundred and twenty-four pounds of Venice, and a hundred and ſixty of Leghorn.

The Engliſh *quintal* uſually conſiſts of a hundred and twelve pounds avoirdupois, and is divided into four quarters.

QUINTAL was alſo formerly uſed for a weight of lead, iron, or other common metal, uſually equal to a hundred pounds, at ſix ſcore to the hundred.

QUINTESSENCE, *quinta eſſentia*, in *Chemiſtry*, a preparation conſiſting of the eſſential oil of ſome vegetable ſubſtance, mixed and incorporated with ſpirit of wine.

Thus, on a proper quantity, e. gr. of eſſential oil of fennel, pouring twelve times the quantity of pure alcohol prepared *per ſe*, they inſtantly unite into one ſimilar liquor, which is the *quinteſſence* of that plant.

The ancients were perfectly unacquainted with the method of diſſolving oil in ſpirit of wine; and even ſome of the moderns have queſtioned its reality: but the certainty of the thing is eaſily proved, from the inſtance above, and from a thouſand others.

If ſuch *quinteſſence* be ſeveral times digeſted, cohobated, &c. the oil will at length be broken ſo fine, as, like the ſpirit itſelf, perfectly to mix with water; which is one of the moſt extraordinary effects in all chemiſtry.

After the like manner is made a *quinteſſence* of camphor, by only pouring on it ſpirit of wine.

Quinteſſences, thus prepared, have great medicinal virtues; as may appear from the pure and potent ingredients uſed in their compoſition; which retain, in a great degree, all the virtues of the plants they are procured from: and hence their denomination.

Boerhaave thinks, they might properly be called vegetable ſulphurs made potable, and raiſed to their utmoſt degree of power and efficacy.

Dry *quinteſſences* may be made from the liquid ones, by adding to them ſome more eſſential oil of the ſame vegetable from whence the liquid *quinteſſence* was procured, with a little ſugar, all mixed together, and diſtilled, by a very gentle heat, till all the moiſture is come over; the matter remaining is then a dry *quinteſſence*.

This form is principally uſeful for travellers, ſailors, &c. inaſmuch as it renders the *quinteſſence* portable; ſo that the quantity, e. gr. of a pin's point, ſhall be an efficacious medicine.

QUINTESSENCE, in *Alchemy*, is a myſterious term, ſignifying the fifth, or laſt and higheſt eſſence, or power, of a natural body.

This is ſuppoſed to be, as it were, the ſoul drawn from the groſs body and its four elements, by a moſt perfect diſtillation; and, by means hereof, the thing is ſaid to be ſpiritualized, i. e. rendered exceedingly pure, ſpirituous, and, as it were, incorruptible.

The ancients, who allowed nothing to be real but what has a body, would have the ſoul of man to be a fifth element, a kind of *quinteſſence* without a name, unknown here below, indiviſible, immoveable, all celeſtial, and divine. Fenelon.

QUINTESSENCE *of the elements*, is the hermetical MERCURY.

QUINTESSENCE *of wine*, a term uſed by Glauber to expreſs an eſſential oil of wine, which he directs to be made by a careful diſtillation; and which he is very fond of, as having a power to meliorate, improve, and even to ſpecificate the poorer wines into the nature of thoſe from which it was obtained.

This is one of the ſchemes of Glauber, generally eſteemed an impracticable one, though very plauſible in theory: but though in general there is a diſagreeable flavour in the *quinteſſence* drawn after his method, which is different from the true flavour of the wine, and ſpoils the liquor it is added to; yet, by proper care, there is a poſſibility of ſucceeding ſo far as to render this extraneous flavour almoſt imperceptible, and produce an oil that will mend poor wines extremely, and give a truly vinous flavour to ſuch as are in themſelves taſteleſs. But whatever may be done by this method, may alſo be done with much more certainty, and much leſs trouble, by the concentration of wines by freezing. This may be eaſily practiſed in the wine countries; and by this means Burgundy, Champagne, and other the moſt valuable wines, may be reduced into thick extracts and robs, by the means of which wines may be made in England; a very ſmall quantity of theſe concentrated wines being ſufficient to convert the whole of any of the poor taſteleſs and inſipid wines, which are of themſelves of little or no value, into the very wine from which the rob was made; and that in ſuch perfection, that the niceſt judge cannot find out the difference.

Theſe robs of wine made and preſerved upon the ſpot, would alſo be of infinite uſe in the wine countries, as they might be kept to improve the wines of bad years. Stahl, De Concentr. Vin. Shaw's Chem. Eſſ.

QUINT-EXACT, in *Old Law Books*, the laſt call of the defendant ſued to an outlawry. If he appear not to it, he is, by the judgment of the coroners, returned outlawed, if a feme, waived.

QUINTILE, *quintilis*, in *Aſtronomy*, an ASPECT of the planets, when they are ſeventy-two degrees diſtant from one another, or a fifth part of the zodiac.

QUINTILIANS, *Quintiliani*, a ſect of ancient heretics, the ſame with the PEPUZIANS; thus called from their propheteſs *Quintilia*.

In this ſect, the women were admitted to perform the ſacerdotal and epiſcopal functions; grounding their practice on that paſſage of St. Paul to the Galatians, where he ſays, *That in Chriſt there is no diſtinction of males and females*.

In their aſſemblies, it was uſual to ſee the virgins enter in white robes, perſonating the propheteſſes. The *Quintilians* bore ſome reſemblance to the modern QUAKERS.

QUINTILIS, in *Chronology*. See JULY.

QUINTUS *femoris*, in *Anatomy*, a name given by Fallopius and many others to one of the muſcles of the thigh, now called the PSOAS *magnus*.

QUINTUS *oculorum*, in *Anatomy*, a name given by Veſalius and ſome others to one of the muſcles of the eyes, more expreſſively called by others *obliquus ſuperior oculi*, and *opifex circumgyrationis oculi*.

QUINVA, in *Botany*, a name by which ſome authors have called the amaranth, or cockſcomb.

QUINZY, or QUINSEY, a diſeaſe which ſtops the freedom of reſpiration, and deglutition.

The word is formed from the French *ſquinance*, or Italian *ſquinantia*, or *eſquinancia*; and theſe, again, from the Greek *συναγχη*, of *αγχω*, *I ſuffocate*.

The *quinzy*, by phyſicians alſo called ANGINA, conſiſts in an inflammation of the throat, and, particularly, of the muſcles of the larynx or pharynx; which, exactly cloſing the chinks thereof, prevents the air from paſſing in and out of the trachea, and the food from being ſwallowed and conveyed into the ſtomach.

It is defined, by medical writers, to be an inflammatory ſtaſis of the blood about the throat, in which nature ſeems to have aimed at the diſcharging part of the load of a plethora, either by an hæmorrhage of the noſe, or by ſpitting of blood; but effecting neither, the *quinzy* is produced.

Authors have divided the *quinzy* in general into two kinds; the true, and the ſpurious. The true *quinzy* is that in which the tumor is internal, and is attended with an acute fever. The ſpurious, is that in which the tumor ſhews itſelf more outwardly, and is not attended with a fever, or with a fever which is not acute, but rather chronical, and of the catarrhal kind. Mr. Pott obſerves, that the inflammation of the tonſils conſtitutes this diſorder; that if they partially cover the pharynx, it is ſpurious; and if they ſhut it entirely up, it is a complete or true *quinzy*.

The ancients alſo divided the *quinzy* into four other kinds, which they called by as many names.

1. The *cynanche*. In this the tumor neither manifeſts itſelf outwardly nor inwardly, but is attended with a very violent fever.
2. The *paracynanche*. This was the name given it when the tumor appeared externally in the muſcles of the larynx, and was highly inflammatory.
3. The *ſynanche*. In this kind the tumor appears externally alſo, and there is a leſs difficulty of breathing, but a greater of ſwallowing than in the other kinds.
4. The *paraſynanche*. This name denoted an inflammation of the muſcles of the pharynx, attended with a fever.

We at this time diſtinguiſh alſo the *quinzy* into the idiopathic and ſymptomatic. The firſt, where it is itſelf the diſeaſe, and owes its origin only to a plethora. The ſecond, where it is but the accidental ſymptom of an inflammatory fever, or ſome other diſeaſe about the time of its criſis.

Cauſes of the quinzy. The idiopathic *quinzy* ſeldom happens to any, except young people of a remarkably plethoric habit of body; and people are moſt ſubject to it, who have been uſed to frequent bleedings at the noſe, and who live ſedentary lives, and feed high. The moſt frequent cauſes of this diſeaſe are a ſuppreſſion of hæmorrhages by the noſe; the neglect of bleeding, purging, or any cuſtomary evacuation; a ſudden cooling of the body, and eſpecially of the throat and parts adjacent, after exceſſive heat; wet clothes; damp beds; moiſt air; drunkenneſs; an improper uſe of ſtrong ſternutatory powders; acrid or irritating food; loud and long ſpeaking or ſinging, and, in general, whatſoever produces other inflammatory diſorders, as an obſtructed perſpiration, or any thing that heats and inflames the blood; and finally, luxations of the neck.

As to the ſymptomatic *quinzy*, the moſt common of all cauſes of it, is the improper uſe of bleeding in acute fevers, and other inflammatory diſeaſes.

Beſide the common occaſions of this diſeaſe, we have in the Philoſophical Tranſactions an account of a ſtone breeding at the root of the tongue, and cauſing one. The patient was almoſt choaked; and the tumor, which was large outwardly, though not tending to ſuppuration, yet was ready to break within, and ſhewed matter ready to be diſcharged. On breaking it with the finger, there iſſued out above a quarter of a pint of matter, and with it a ſmall ſtone, very hard, and of the ſame nature and ſubſtance with thoſe formed in the kidneys.

This diſorder may alſo proceed from any ſharp ſubſtances ſticking in the throat; or from the cauſtic fumes of metals or minerals taken in by the breath. This diſeaſe is ſometimes epidemic and infectious.

Signs of a quinzy. The firſt ſymptom of this diſeaſe is a difficulty of ſwallowing, joined with a tumor in the throat, and a ſenſation of a pricking pain. To theſe ſymptoms there ſucceed an inflammation and violent heat in the fauces: and in a little time theſe ſymptoms increaſe to ſo great a degree, that the patient becomes unable to ſwallow; the tongue ſwells violently, and the veins appear black and tumid under it; the face becomes red and tumid, and the temporal veſſels are diſtended, and the eyes become ſwelled, and ſeem as if they would ſtart out of the head; then reſpiration becomes very painful, and there is danger of abſolute ſuffocation. The hands become pale and cold to the touch; and the fleſh is at times very hot, and ſoon after very cold again: and in the progreſs of the diſeaſe, the patient is uſually found to be very low ſpirited. The pulſe is quick and hard, with other ſymptoms of a fever. If blood be let, it is generally covered with a tough coat of a whitiſh colour, and the patient ſpits a tough phlegm. There is a conſtant nauſea, or inclination to vomit; and the drink, inſtead of paſſing into the ſtomach, is often returned by the noſe.

Prognoſtics in quinzies. The more violent the attack of this diſeaſe is, the greater is the danger with which it is attended: and it is moſt fatal to young people of a ſanguine temperament. The ſpurious *quinzy* is always more favourable than the true one; and the mildeſt of all the kinds is the paraſynanche, as the cynanche is of all others the moſt fatal. Thoſe who die of this diſeaſe, rather die of convulſions than of ſuffocation. When the matter cannot be diſcuſſed, there uſually happens a ſuppuration; and in this caſe the event is very dubious and uncertain. When the breathing is laborious, with ſtraitneſs of the breaſt and anxiety, the danger is great. An external ſwelling is no unfavourable ſymptom: but if it ſuddenly falls, and the diſeaſe affects the breaſt; or if a *quinzy* is the conſequence of ſome other diſeaſe, which has already weakened the patient, his ſituation is dangerous. A frothing at the mouth, with a ſwelled tongue, a pale, ghaſtly countenance, and coldneſs of the extremities, are fatal ſymptoms.

Method of cure. The food in this diſeaſe muſt be light, and in ſmall quantity; and the drink plentiful, weak, and diluting, mixed with acids. The patient muſt be kept ſtill, and ſpeak little: ſuch a degree of warmth as to promote a conſtant gentle ſweat is proper; and it is peculiarly neceſſary that the neck be kept warm, by wrapping round it ſeveral folds of ſoft flannel. The jelly of black currants, kept conſtantly in the mouth, and ſwallowed gradually, or mixed in the patient's drink, is much eſteemed for complaints of the throat. Where this cannot be obtained, the jelly of red currants, or of mulberries, may be ſubſtituted in its ſtead. Gargles for the throat are very beneficial. They may be made of ſage tea, with a little vinegar and honey; or by adding to half a pint of the pectoral decoction two or three ſpoonfuls of honey, and the ſame quantity of currant jelly. This gargle may be uſed frequently; and if the patient be troubled with tough viſcid phlegm, it may be rendered more ſharp and cleanſing, by adding to it a teaſpoonful of the ſpirit of ſal ammoniac. See GARGARISM.

The practice of bathing the feet and legs in lukewarm water ſhould by no means be neglected: and it is obſerved by an experienced phyſician, that if people were careful to keep themſelves warm, to wrap up their throats with flannel, to bathe their feet and legs in warm water, and to uſe a ſpare diet, with diluting liquors, at the beginning of this diſeaſe, it would ſeldom proceed to any great height, or be attended with any danger. However, when more alarming ſymptoms appear, even in the firſt ſtage of this diſtemper, it will be proper to commence the cure by bleeding freely in the arm, or rather in the jugular vein; and to repeat the operation, if the conſtitution allow it, and the circumſtances require. The body ſhould likewiſe be kept gently open, by giving the patient for his ordinary drink a decoction of figs and tamarinds, or ſmall doſes of rhubarb and nitre, which may be increaſed according to the age and ſtrength of the patient, and repeated till they have the deſired effect. Some recommend, after bleeding, a briſk but cooling purge of the infuſion of ſena ℥ iij. and Glauber ſalts from ℥ ſs. to ℥ j. the operation of which may be haſtened by a clyſter, in which ʒ j. of nitre may be diſſolved, if the fever runs high. This draught may be repeated during the firſt three or four days: but if draughts of this kind cannot be ſwallowed, purging clyſters with nitre in them muſt be daily adminiſtered: and gentle purging ſhould be continued through the whole progreſs of this diſeaſe.

Dr. Buchan obſerves, that he has known good effects from a bit of ſal prunel, or purified nitre, held in the mouth and ſwallowed as it melted: this promotes the diſcharge of the ſaliva, and thus anſwers the end of a gargle, whilſt it abates the fever, by promoting the diſcharge of urine, &c. The throat may likewiſe be rubbed twice or thrice a day with a little of the volatile liniment, or flannel dipped in it may be applied to the throat. See LINIMENTUM *volatile*.

In violent inflammations of the throat, bliſtering on the back, neck, or behind the ears, is of great uſe; and in bad caſes, it will be neceſſary to lay a bliſtering plaſter quite acroſs the throat, from ear to ear. When theſe plaſters are taken off, the parts may be kept running, by the application of iſſue ointment, till the inflammation is gone, for fear of a relapſe. With this kind of treatment, a ſuppuration ſeldom happens: however, when the inflammation and ſwelling continue, and a ſuppuration is likely to enſue, it ſhould be promoted by drawing the ſteam of warm water through a funnel, or the like. Soft poultices ought likewiſe to be applied outwardly; and the patient may keep a roaſted fig conſtantly in his mouth. When the tumor is ſo great as entirely to prevent any thing from getting down into the ſtomach, the patient muſt be ſupported by nouriſhing clyſters of broth, or gruel, with milk, &c. But if the breathing as well as the ſwallowing, be prevented by the tumor, and the danger of ſuffocation is imminent, nothing can ſave the patient's life, but opening the trachea or wind-pipe. See BRONCHOTOMY.

In this diſtemper, beſides high bleeding, ſome recommend a gargariſm compoſed of ſublimate mercury half a drachm, cream of tartar two drachms, diſſolved in a pint of ſpring water. Med. Eſſ. Edinb. abr. vol. ii. p. 431.

We have a hiſtory of an uncommon *angina*, or *quinzy*, by Mr. Monro, in the Medical Eſſays of Edinburgh abridged, vol. ii. p. 400.

When a difficulty of ſwallowing is not attended with an acute pain or inflammation, it is generally owing to an obſtruction of the glands about the throat, and only requires that the part be kept warm, and the throat frequently gargled with ſomething that may gently ſtimulate the glands, as a decoction of figs with vinegar and honey, to which may be added a little muſtard, or a ſmall quantity of ſpirits. This ſpecies of *angina* has various names among the common people, as the pap of the throat, the falling down of the almonds of the ears, &c.

Thoſe who are ſubject to inflammations of the throat, ſhould avoid every kind of intemperance; or have frequent recourſe to purging, and other evacuations. They ought likewiſe to beware of catching cold, and abſtain from aliment and medicines of an aſtringent or ſtimulating nature. They may alſo uſe, as a preventive, a ribband dipped in hartſhorn, or a piece of flannel, conſtantly about their necks. Buchan's Domeſt. Med. chap. xxviii.

QUINZY, *malignant*, or *putrid ulcerous ſore throat*, called *angina aquoſa* or *gangrena*, is a putrid remittent fever, accompanied with an ulcerated ſore throat, or with an inflammation of the mucous membrane. Children are more liable to this diſorder than adults, females than males, and the delicate and relaxed than thoſe who are hardy and robuſt. It prevails chiefly in autumn, and is moſt common after a long courſe of damp, or ſultry weather.

Cauſes of the malignant quinzy. This is evidently a contagious diſtemper, and is generally communicated by infection. Moreover, whatever tends to produce *putrid* or *malignant* FEVERS, may likewiſe occaſion the putrid ulcerous ſore throat, as unwholeſome air, damaged proviſions, neglect of cleanlineſs, &c.

Symptoms of the malignant quinzy. This diſeaſe begins with alternate fits of ſhivering and heat. The pulſe is quick, but low and unequal; the urine is at firſt pale and crude, but as the diſeaſe advances, it becomes of a more yellowiſh colour; the patient complains of an oppreſſion of the breaſt, his ſpirits are low, and he is troubled with a nauſea, and often with a vomiting or purging. The eyes appear red and watery, and the face ſwells: the tongue is white, and generally moiſt, which diſtinguiſhes this from an inflammatory diſorder. The throat, on examination, appears internally ſwelled, and of a florid red colour, with pale or aſh-coloured ſpots interſperſed, and ſometimes one broad irregular ſpot, of a pale white colour, ſurrounded with florid red, and theſe whitiſh ſpots cover ſo many ulcers. About the ſecond or third day, there commonly appears an efflореſcence or eruption upon the neck, arms, breaſt, and finger; upon the appearance of which, the purging and vomiting, chiefly incident to children, ceaſe. This diſeaſe is often accompanied with a ſlight delirium, the face appears bloated, and the inſide of the noſtrils inflamed. The patient complains of a diſagreeable putrid ſmell, and his breath is very offenſive.

This kind of ſore throat may be diſtinguiſhed from the inflammatory by the vomiting and looſeneſs with which it is generally introduced; by the foul ulcers in the throat, covered with a white or livid coat; and by the exceſſive weakneſs of the patient, with other ſymptoms of a *putrid* FEVER.

Prognoſtics of the malignant quinzy. The unfavourable indications are an obſtinate purging, extreme weakneſs, dimneſs of the ſight, a livid or black colour of the ſpots, and frequent ſhiverings, with a weak, fluttering pulſe. If the eruption upon the ſkin ſuddenly diſappears, or becomes of a livid colour, with a diſcharge of blood from the noſe or mouth, the danger is very great. But if a gentle ſweat breaks out about the third or fourth day, and continues with a ſlow, firm, and equal pulſe; if the ſloughs caſt off in a kindly manner, and appear clean and florid at the bottom; if the breathing be ſoft and free, and the eyes are lively, a ſalutary criſis may be expected.

Method of cure. In this diſeaſe the patient muſt be kept quiet, and, for the moſt part, in bed; the air of the room being occaſionally purified by opening the windows, and by the vapours of myrrh, roſemary flowers, or vinegar. His food muſt be nouriſhing and reſtorative; as ſago gruel with red wine, jellies, ſtrong broths, &c. His drink ſhould be generous, and of an antiſeptic quality; as red wine negus, white wine whey, &c. All evacuations, as bleeding, purging, &c. which tend to weaken the patient, muſt be avoided in this diſorder: and cooling medicines, ſuch as nitre and cream of tartar, are hurtful. But ſtrengthening cordials are abſolutely neceſſary, and ſhould never be neglected.

At the firſt acceſs of this diſeaſe, eſpecially if there be a nauſea, or inclination to vomit, let the ſtomach be cleanſed by an infuſion of green tea, chamomile flowers, or carduus benedictus; and if theſe do not anſwer the purpoſe, by a few grains of ipecacuanha, or a ſmall quantity, to the amount of a grain or a grain and a half, of tartar emetic. If the diſeaſe be mild, the throat may be gargled with an infuſion of ſage and roſe leaves, adding to a gill of it a ſpoonful or two of honey, and as much vinegar as will make it agreeably acid: but if the ſymptoms are urgent, the ſloughs large and thick, and the breath very offenſive, Dr. Buchan recommends the following gargle: to ſix or ſeven ounces of the pectoral decoction, when boiling, add half an ounce of contrayerva root: let it boil for ſome time, and afterwards ſtrain the liquor; to which add two ounces of white wine vinegar, an ounce of fine honey, and an ounce of the tincture of myrrh. This mixture may not only be uſed as a gargle, but for cleanſing the mouth, before the patient takes any meat or drink. The ſteams of warm vinegar, myrrh, and honey, which are detergent and antiſeptic, conveyed into the mouth through an inverted funnel, are very beneficial. But the principal medicine, and that which is moſt to be depended upon, when the putrid ſymptoms run high, is the Peruvian bark, which ſhould be adminiſtered in ſubſtance, if the patient's ſtomach will bear it: otherwiſe an ounce of bark groſsly powdered, with two drams of Virginian ſnake-root, may be boiled in a pint and a half of water, to half a pint; to which may be added a tea ſpoonful of the elixir of vitriol: and a common tea-cupful of this may be taken every three or four hours. The bark may be alſo given with red wine, if the ſtate of the pulſe does not forbid. Bliſtering plaſters, applied in the firſt ſtage of this diſeaſe to the back, throat, or behind the ears, are of peculiar importance and benefit, eſpecially when the patient's pulſe and ſpirits are low.

Dr. Percival recommends two parts of the EMPLASTRUM *ſtomachicum* or è cymino, one part of the EMPLASTRUM *veſicatorium*, and a dram and a half of powdered camphor, to be mixed together for this purpoſe. This mild plaſter, he obſerves, ſufficiently diſcharges the ſerum, and at the ſame time is antiſeptic; and as the ſkin is peculiarly diſpoſed to inflammation, it is preferable to the common bliſtering plaſters. If it be ſpread and warmed, and a thin piece of muſlin be laid on its ſurface, it will irritate leſs, produce leſs ſtrangury, and may be thus ſafely applied even where the ſkin is eryſipelatous.

A cataplaſm of the bark and chamomile flowers, boiled in vinegar, with the addition of a dram and a half or two drams of camphor, laid acroſs the throat and renewed every four hours, will contribute much to relax and ſoften the glands of the neck, and exhale an antiſeptic vapour, which will be drawn in by the mouth at every inſpiration, and alſo abſorbed from it. In caſes leſs urgent, flannels, dipped in ſpirit of wine camphorated and ſharp vinegar, mixed in equal parts, may be applied to the neck, inſtead of this cataplaſm. A pediluve made with the bark and chamomile flowers, boiled in vinegar and water, may be uſed three or four times a day; or flannels wrung out of this decoction may be applied to the patient's limbs. Fixed air, adminiſtered by the mouth, or by way of clyſter, is a very important and uſeful medicine in this diſorder.

If the vomiting is troubleſome, the patient may take two table-ſpoonfuls of the ſaline julep every hour: and tea made of mint and a little cinnamon, with an equal quantity of red wine, will be proper for his common drink. In caſe of a violent looſeneſs, the ſize of a nutmeg of diaſcordium, or the japonic confection, may be taken two or three a times a day; or oftener, if neceſſary. In a diſcharge of blood from the noſe, the ſteams of warm vinegar may be received frequently up the noſtrils; and the drink muſt be ſharpened with ſpirits of vitriol, or tincture of roſes. In caſe of a ſtrangury, the belly muſt be fomented with warm water, and emollient clyſters given three or four times a day. After the violence of the diſeaſe is over, the body ſhould be kept open with mild purgatives, as manna, ſenna, rhubarb, &c.

If great weakneſs and dejection of ſpirits, or night ſweats, and other ſymptoms of a conſumption remain after this diſeaſe, the patient ſhould continue the uſe of the Peruvian bark, with the elixir of vitriol, and take frequently a glaſs of generous wine. Theſe, together with a milk diet, and riding on horſe-back, are the moſt likely means for recovering his ſtrength. Buchan's Dom. Med. chap. xxviii. p. 295, &c. Percival's Eſſays. Huxham, Fothergill, Northcote, &c. on the Sore Throat. See *Putrid* FEVER.

QUIRE *of paper*, of the French *cahier*, the quantity of twenty-four or twenty-five ſheets.

QUIRICIA, a name given by ſome to the ſtone called QUIRIS by the generality of writers.

QUIRINACIUM *opium*, in the *Materia Medica*, a name given by ſome to the gum we know by the name of aſſa fœtida.

QUIRINALIA, in *Antiquity*, feaſts celebrated, among the Romans, in honour of Romulus, who was called Quirinus. See QUIRITES.

The *Quirinalia*, called alſo *ſtultorum feriæ*, were held on the 13th of the calends of March, i. e. on our 17th of February.

QUIRIS, *quirinus lapis*, a name given, by the writers of the middle ages, to a ſtone famous among them for its imaginary virtues, but of which they have left us no deſcription.

QUIRISTER, or CHORISTER, *choriſta*, a perſon appointed to ſing in the quire, or choir, of a cathedral. See ANTHEM, CHANTOR, CHOIR.

QUIRITES, in *Antiquity*, an appellation given to the people of Rome, chiefly the common citizens, as diſtinguiſhed from the ſoldiery.

It took its riſe from the *Curetes*, the inhabitants of the Sabine town *Cures*. On this occaſion Romulus, and Tatius king of the Sabines, having united their two people, and their two ſtates, into one; upon Romulus's death and deification, the Sabines, outdoing the Romans in number, became maſters of the councils; and accordingly appointed, that Romulus ſhould be denominated *Quirinus*, from Cures, a city of the Sabines: or rather from *Quirinus*, the name of a god worſhipped in that city.

From the new *Quirinus*, all the people came afterwards to be called *Quirites*; unleſs we will ſuppoſe, that the ſame authority which denominated Romulus *Quirinus*, from Cures, did alſo denominate the people *Quirites*, immediately from the Curetes.

Some authors derive the word *Quirinus* from *Curis*; which, in the Sabine tongue, ſignified a pike, or halbert. Struvius adds, that Romulus was always painted with a pike in his hand.

QUIRK, in *Building*, a piece of ground taken out of any regular ground-plat, or floor.

Thus, if the ground-plat were ſquare, or oblong, and a piece be taken out of a corner, to make a court, or yard, &c. the piece is called a *quirk*.

QUIRPELE, in *Zoology*, the name of a ſmall animal, called by ſome authors the *Indian ferret*, or *viverra Indica*, and by others *quil*.

Garcias and ſome authors give very remarkable accounts of the enmity this creature has to ſerpents of all kinds. They tell us, that when this little creature intends an attack upon one of theſe animals, it firſt prepares againſt danger, by gnawing a quantity of the root of the *lignum colubrinum*, or ſnake wood; and when it has thoroughly impregnated its ſaliva, it wets with it firſt its fore-feet, and with them daubs over its head and its whole body: and that thus prepared, it boldly attacks the ſnake, and never leaves off till it has killed it. Garcias aſſures us, that many of the Portugueſe have been eye-witneſſes of theſe combats.

It is probable enough, that this creature may attack a ſnake when thoroughly hungry, knowing its fleſh to be good food; but the ſtory of the antidote is to be ſuſpected. See ICHNEUMON.

QUIS, in *Natural Hiſtory*, a kind of MARCASITE of iron or copper, from which VITRIOL is drawn. It is more frequently called PYRITES.

QUISQUALIS, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are, that the calyx is filiform, and divided into five ſegments; that the petals are five; and that the fruit is a quintangular drupe. There is only one ſpecies.

QUIT-CLAIM, a releaſe, or quitting one's claim or pretenſions to a thing.

QUIT-RENT, q. d. *quiet rent*, a certain ſmall rent, payable yearly, by the tenants of moſt manors, in token of ſubjection; upon the payment whereof, they are quiet, and free. It includes both *rents* of aſſiſe and CHIEF *rents*.

In ſome ancient records it is written *white rent*, becauſe paid in ſilver, to diſtinguiſh it from rent-corn, rent-pepper, &c.

QUITTANCE. See ACQUITTANCE.

QUITTER-BONE, among *Farriers*, a hard, round ſwelling, upon the coronet of a horſe's foot, or between the heel and the quarter.

Or it is an impoſthume breeding between the hoof and coffin-bone, on the upper part, and ſhewing itſelf by a ſwelling on the coronet.

Sometimes it is occaſioned by gravel under the ſhoe, or by a bruiſe, ſtab, or a prick of a nail; or from peccant humours deſcending to that place; or a blow, ſtrain, or over-reach, &c. It occaſions the horſe to halt much, and the ſwelling grows viſible, and comes to a head in four or five days, and breaks out with matter at a little deep hole, like a fiſtula.

QUITY, in *Botany*, a Braſilian name uſed by ſome authors for the ſapindus, or ſoap-berry tree of the Weſt Indies.

QUO *jure*, a writ that lies for him who has land, wherein another challengeth common of paſture time out of mind: its deſign is to compel the party to ſhew by what right or title he challengeth it.

QUO *minus* is alſo a writ which lies for the king's farmer or debtor in the court of exchequer, againſt him to whom he ſelleth any thing by way of bargain, touching his farm, or againſt whom he hath any cauſe of perſonal action; becauſe by the vendee's detaining any due from him, the farmer is made leſs able to pay the king's rent.

Quo minus is alſo a writ that lies for him who has a grant of houſe-bote in another man's wood, againſt the grantor making ſuch waſte, as that the grantee cannot enjoy his grant.

QUO *warranto*, a writ that lies againſt him who uſurps any franchiſe, or liberty, againſt the king; as to have waife, ſtray, fair, market, court baron, leet, or ſuch-like, without good title.

It alſo lies for miſ-uſer or non-uſer of privileges granted; and even, according to Bracton, againſt him that intrudeth himſelf as heir into land. See INTRUSION.

The judgment on a writ of *quo warranto* (being in the nature of a writ of right) is final and concluſive even againſt the crown. See INFORMATION.

QUOCOLOS, the name of a ſtone found in Tuſcany, as hard as a flint, ſomewhat tranſparent, and, in ſome meaſure, reſembling marble. In the fire it loſes its tranſparency, and becomes leſs ponderous, and white; and a ſtrong fire readily converts it into glaſs. It has no medicinal virtues, but is uſed at ſome glaſs-houſes.

QUOD *clerici non eligantur in officio*, is a writ that lies for a clerk, who, by reaſon of ſome land he hath, is made, or like to be made, a bailiff, beedle, reave, or ſuch like officer.

QUOD *ei deforceat*, in *Law*, a writ for tenant in tail, tenant in dower, by the courteſy, or for term of life, having loſt their lands by default, againſt him that recovers, or his heir. Reg. Orig. 171. Stat. Weſtm. 2. cap. 4.

QUOD *medium*. See MEDIUM.

QUOD *permittat*, in *Law*, a writ that lies where a man is diſſeiſed of his common of paſture, and the *diſſeiſor aliens* or dies ſeiſed, and his heir enters; then if the diſſeiſee die, his heir ſhall have this writ.

QUOD *permittat proſternere*, in *Law*. See *Aſſiſe of* NUSANCE.

QUOD *non permittat*. See CONSUETUDINIBUS & *ſervitiis*.

QUOD *perſona nec præbendarii*, &c. a writ that lies for ſpiritual perſons, when diſtrained in their ſpiritual poſſeſſions, for the payment of a fifteenth, with the reſt of the pariſh.

QUODLIBETICAL *queſtion*, *quæſtio quodlibetica*, a college term for a theſis, or problem, anciently propoſed to be debated in the ſchools, out of curioſity and entertainment, rather than for the ſettling of any uſeful point.

The term is formed from the Latin *quodlibet*, *any thing*, *what you pleaſe*: and ſo well ſatisfied were the public of the impertinences of theſe queſtions, that the term *quodlibet* has been ſince retained, to ſignify any little ridiculous quibble.

QUOIL, **Quoyl**, or **Coile**, in the *Sea Language*. A cable is ſaid to be *quoiled*, when it is laid round in a ring, one turn over another, on the deck of a ſhip.

The middle of ſuch ring or *quoil*, is a good place to lay ſhot in: they are more ſafe there, than in lockers along the ſide, where the enemy's ſhot may fall into them.

Quoil, *Weather*. See **Weather** *quoil*.

QUOIN, or **Coin**, formed from the French *coin*, of the Latin *cuneus*, *wedge*, aboard a ſhip, is a wedge faſtened on the deck, cloſe to the breech of the carriage of a gun, to keep it firm up to the ſhip's ſide, and prevent its rolling; and alſo to raiſe or depreſs it.

Quoins, *Cantic*, are ſhort three-legged *quoins*, put between caſks to keep them ſteady. See **Coin**.

Quoins, in *Architecture*, denote the corners of brick or ſtone walls.

The word is particularly uſed for the ſtones in the corners of brick buildings. When theſe ſtand out beyond the brick-work (their edges being chamferred off) they are called *ruſtic quoins*.

QUOITS, a kind of exerciſe or game, known among the ancients under the name of the *diſcus*. See **Disc**.

QUOLL, in *Zoology*, a name given by the natives of New Holland to an animal reſembling a pole-cat, with a brown back, ſpotted with white, and the belly of a pure white, in which it differs from others of theſe fetid animals. Cook's Voy. 1770. vol. iii. p. 626.

QUORUM, a term frequently mentioned in our ſtatutes, and often uſed in commiſſions, both of peace, and others.

It is thus called from the words in the commiſſion, *Quorum* A. B. *unum eſſe volumus*.

For an example: Where a commiſſion is directed to ſeven perſons, or to any three of them, whereof A. B. and C. D. are to be two; there A. B. and C. D. are ſaid to be of the *quorum*, becauſe the reſt cannot proceed without them.

So a juſtice of the peace and *quorum* is one without whom the reſt of the juſtices, in ſome caſes, cannot proceed.

Quorum *nomina*. In the reign of king Henry VI. the king's collectors, and other accomptants, were much perplexed in paſſing their accounts, by new extorted fees, and forced to procure a then late-invented writ of *quorum nomina*, for the allowance and ſuing out their quietus, without the allowance of the king.

QUOTATION, in *Literature*, a *citation*; or a paſſage rehearſed expreſsly in one author from another.

Quotations are uſed to be diſtinguiſhed by inverted commas.

The manner of quoting by book, and chapter, or ſection, is chiefly affected by men of erudition; but it is abuſed: this method ought only to obtain where the whole chapter or ſection is expreſsly on the ſubject. On other occaſions, quoting by page is more commodious; except in claſſics, and other ancient writings, whereof there are many editions in different forms; where this method is of little uſe, unleſs the edition be alſo ſpecified.

The *quotations from the Old Teſtament*, found in the New, have occaſioned infinite doubt, diſpute, and criticiſm. The apoſtles are frequently referring to the Old Teſtament, and quoting paſſages and prophecies thence, as fulfilled in our Saviour; yet theſe paſſages thus quoted, are frequently either not found in the Old Teſtament at all, or they are not urged in the New, according to the literal and obvious ſenſe they ſeem to bear in the Old.

A late ingenious author, in an Eſſay upon the Truth of the Chriſtian religion, frankly owns that the evangeliſts ſometimes apply to the Meſſiah paſſages of the Old Teſtament, which, as they lie in our preſent copies, plainly relate to ſome other perſon, or thing. This is evident, e. gr. in the paſſage, Matthew ii. 15. *Out of Egypt have I called my ſon*; which is quoted from Hoſea xi. where it is plainly underſtood of the coming of the Iſraelites out of Egypt.

This proves to many a heavy obſtacle in the way of Chriſtianity, which the divines, commentators, critics, &c. have long laboured to remove, though by very different means.

Some have recourſe to a double completion; and imagine, that though the prophecies were primarily accompliſhed in other events, yet they might have a ſecondary accompliſhment in the Meſſiah: but others ſet aſide a double completion, except where the prophet himſelf declares as much, this otherwiſe making all prophecy uſeleſs. See **Prophecy**.

The generality chuſe, therefore, to have recourſe to an allegorical, typical, or ſpiritual meaning in the prophecies, &c. and ſuppoſe them to have been thus underſtood among the ancient Jews, thus fulfilled in our Saviour, and thus applied by the apoſtles.

In effect, the Jewiſh rabbins, it is allowed, took great liberty in quoting and interpreting Scripture; and it is ſuppoſed the apoſtles might follow theſe rules in their quotations.

Accordingly, M. Surenhuſius, Hebrew profeſſor at Amſterdam, has endeavoured to retrieve theſe rules, long ſince loſt, in an expreſs treatiſe on this ſubject, publiſhed in 1713. This author obſerves a great deal of difference applied in the different forms of *quoting* uſed by the ſacred writers: as, *It has been ſaid*; *it is written*; *that it might be fulfilled which was ſpoken by the prophets*; *the Scripture ſays*; *ſee what is ſaid*; *the Scripture foreſeeing*; *is it not written*, &c. He adds that the books of the Old Teſtament having been diſpoſed in a different order at different times, and having had different names, it is thence, that one book or writer is ſometimes confounded with another.

For the rules of *quoting* and interpreting practiſed among the rabbins, he gives us ten; recovered with much ſtudy from the Talmud, and the ancient Jewiſh doctors: inſtances whereof he gives us in the writings of the apoſtles; and by thoſe rules he endeavours to explain and juſtify all the *quotations* made from the Old Teſtament in the New.

The rules are, 1. Reading the words not according to the points placed under them, but according to others ſubſtituted in their ſtead; as is done by St. Peter, Acts iii. 23. by Stephen, Acts vii. 43. and by Paul, 1 Cor. xv. 54. 2 Cor. viii. 15, &c.—The ſecond is by changing the letters; as is done by Paul, Rom ix. 33. 1 Cor. xi. 9 Heb. viii. 9. and x. 5. and by Stephen, Acts vii 43.—The third is by changing both letters and points; as is done by Paul, Acts xiii. 41. and 2 Cor. viii. 15.—The fourth is by adding ſome letters, and taking away others.—The fifth is by tranſpoſing words and letters.—The ſixth is by dividing one word into two.—The ſeventh, adding other words to make the ſenſe more clear.—The eighth, changing the order of the words.—The ninth, changing the order of the words and adding other words. Both of which are done by the apoſtles.—Laſtly, changing the order of words, adding words, and retrenching words; which is a method, often uſed by St. Paul.

Other authors, as biſhop Kidder, M. Le Clerc, Mr. Sykes, &c. ſolve the difficulty another way. That uſual form of *quotation* among the evangeliſts, "That it might "be fulfilled which was ſpoken by the prophets," according to theſe authors, means no more than an accommodation of the prophet's words to the caſe in hand.

The word πληρωθη, *fulfilled*, does not neceſſarily determine us to ſuch a ſenſe, as if the evangeliſts deſigned to ſpeak of a prediction of future events *accompliſhed*; but may barely expreſs an accommodation of borrowed words. In effect, ſays biſhop Kidder, a Scripture may be ſaid to be *fulfilled* two ways; *properly*, as when that which was foretold comes to paſs; and *improperly*, by way of accommodation, as when an event happens to any place or people like to what fell out ſome time before. And thus it is that St. Matthew ſays, on occaſion of the murder of the innocents, that "then was ful-"filled what was ſpoken by the prophet Jeremy, *In* "*Rama was a voice heard*," &c.

This interpretation is confirmed by M. Le Clerc, who obſerves that the Jews, in their language, uſed to ſay, that a paſſage of Scripture was *fulfilled*, as often as any thing happened which it might be applied to: ſo that the evangeliſt Matthew, who was a Hebrew, and wrote, as is commonly ſuppoſed, in that language, intended no more in the paſſage juſt cited, but that a thing happened, to which one might apply what Jeremy had formerly ſaid on another occaſion.

Accordingly, ſays Mr. Sykes, the evangeliſts, in citing that paſſage of Iſaiah, *Behold, a virgin ſhall be with child*, *&c.* only uſe it as words of that prophet remarkably agreeing to the miraculous birth of Jeſus, and not as a prophecy of his birth.

It may be added that this way of ſpeaking was not unknown among the heathen writers. Thus in Ælian, Diogenes Sinopenſis uſed continually to ſay of himſelf, that he fulfilled and underwent all the curſes of tragedy.

QUOTIDIAN, *quotidiana*, in *Medicine*, an intermitting fever, or ague, the acceſs whereof returns every day. See **Ague**.

This differs greatly from the continual *quotidian* fever. See *Catarrhal* **Fever**.

It is diſtinguiſhed from the double tertian by this, that the *quotidian* regularly obſerves its time of attack and of duration every day; but in the double tertian, the ſingle fits do not correſpond one with another, but only the alternate ones; that is, the paroxyſm of the third day correſponds with that of the firſt, that of the fourth with that of the ſecond, and ſo on.

Signs of it. This fever uſually attacks the patient in a morning, and moſt frequently about ſix or ſeven o'clock. The firſt ſymptom is a very violent chilneſs or coldneſs, which uſually laſts about an hour, and is attended either with a vomiting, or with a diarrhœa, or both. This cold fit is ſucceeded by a violent hot one, in which there is an intolerable thirſt and pain of the head. The whole duration of the fit is uſually ſix hours; and when the heat remits a little of its violence, then ſweats uſually come on. This returns regularly at the ſame hour the next day, and ſo on, unleſs diſturbed by any means; in which caſe, it anticipates or poſtpones the accuſtomed time.

Perſons ſubject to it. This is the leaſt frequent of all the intermittent fevers. Perſons of phlegmatic habits are more ſubject to it than thoſe of any other temperament; and it ſeizes old people oftener than young, and women much more frequently than men.

Cauſes of it. The firſt cauſe of this diſeaſe is a viſcous and mucous matter lodged in the primæ viæ. This is often attended with a ſpiſſitude of the blood in the vena portæ. The occaſional cauſes which bring on this ſpiſſitude of the blood and foulneſs of the primæ viæ, are a coarſe and thick diet, a ſedentary life, and a natural turn to melancholy. The cauſes of this, and of the tertian ſeem to be the ſame, only that in this they are ſtronger.

Method of cure. The general cuſtom of curing intermittents by vomits and the Peruvian bark alone, is cenſured by Stahl, and many other writers, as being faulty in two extremes; the vomiting throwing off the offending matter with too much violence, and the bark locking it up in the body. Vomits, when injudiciouſly given, often give violent reachings without bringing up any part of the matter of the diſeaſe; and the bark, and other aſtringents, bring on obſtinate coſtiveneſs, flatulencies, ſtraitneſs of the breaſt, and many other diſorders, ſuch as the jaundice, dropſy, œdematous ſwellings, and many other the like complaints, which often ſucceed the too large or injudicious uſe of it: for this reaſon, theſe authors prefer a regular method, by inciding the tough matter in the primæ viæ, with tartarum vitriolatum, and the like, then giving a gentle emetic; after this, gentle diaphoretics and diluents, ſuch as all warm and weak liquors; and afterwards ſtrenthening the ſtomach and bowels by bitters and ſubaſtringents, among which the bark has its place, though in ſmaller quantities than when truſted to alone in the uſual way. Junker's Conſp. Med. p. 360. See *Intermitting* FEVER.

QUOTIDIAN, *Louble*, returns twice in twenty-four hours.

QUOTIENT, *quotiens*, formed from the Latin *quoties*, q. d. *how often is ſuch a number contained in ſuch another*, in *Arithmetic*, the number reſulting from the diviſion of a greater number by a ſmaller; and which ſhews how often the ſmaller is contained in the greater, or how oft the diviſor is contained in the dividend.

In diviſion, as the diviſor is to the dividend, ſo is unity to the *quotient*. Thus the *quotient* of 12 divided by 3 is 4; which is thus diſpoſed, 3) 12 (4 *quotient*.

QUOUSQUE. *Execution with a* QUOSQUE. See EXECUTION.

QUOYL. See QUOIL.

R.

R, A liquid conſonant, and the ſeventeenth letter of the alphabet.

The grammarians hold it a ſemi-vowel; eſpecially in the Greek, where, in common with the other vowels, it admits an aſpirate, &c. though whether the aſpirate ſhould be ſounded before or after it, is ſome doubt. We find inſtances of each.

Thus ῥεδη the Latins wrote *rheda*; and ῥοδον the Ætolians wrote βροδον; and in Engliſh words derived from the Greek it is followed by an *h*, as *rhapſody*. The ancient Goths, and Teutones, Littleton obſerves, always prefixed *h* to *r*. See H.

The ſound is formed by a guttural extruſion of the breath, vibrated through the mouth, with a ſort of quivering motion of the tongue drawn from the teeth, with the tip a little elevated towards the palate.

The Hebrews allow the *r* the privilege of a guttural; that is, they never double it, which yet is done by the Arabs, Greeks, and Latins, &c.

Perſius calls the *r*, *litera canina*, becauſe the dogs ſeem to pronounce it in ſnarling; yet it ſhould ſeem to have had a ſofter ſound among the Romans than among us, by its being frequently interpoſed to prevent the claſhing of vowels; as in *rarus*, αραιος, *nurus* from νυος, *murex* from μυαξ, *mus muris* from μυς μυος; and this ſoftneſs was ſuch as frequently occaſioned its being dropt as uſeleſs in writing.

Thus for *Hetruſci* they frequently wrote *Thuſci*, and even *Tuſci*; and for *ſurſum*, *rurſus*, *prorſus*, *ſuſum*, *ruſus*, *proſus*. In effect, there was that agreement between the ſound of the *s* and *r*, that as the Romans avoided the doubling of their conſonants, it was no wonder they here dropped the *r* in ſuch words; the *s* ſupplying the place of both. Hence too it came to paſs, that what they at firſt pronounced *aſa*, *aſena*, *caſmen*, was afterwards *ara*, *arena*, *carmen*; and thoſe firſt named *Fuſii* and *Valeſii*, were afterwards called *Furii* and *Valerii*. Cicero tells us, the *Papirii* were firſt called *Papiſii*; and even fixes the time when the change was made, viz. in the year of Rome 415. Feſtus adds, that *olera*, *pignora*, *plurima*, were anciently written *oleſa*, *pignoſa*, *pluſima*.

From the ſame ſoftneſs of the ſound of the *r*, it came to be uſed indifferently with the *l*, in many words; e. gr. *Latiaris* and *Latialis*, *Palilia* and *Parilia*, &c.

Though the *r* more frequently degenerated into *l*; thus *remures* became changed into *lemures*; *interlego*, *perluceo*, into *intelligo* and *pelluceo*; *frater* into *fratellus*, &c. and the ſame is ſometimes done between *n* and *r*, as *æreus*, and *æneus*, &c.

In the notes of the ancients, *R.* or *RO.* ſignified *Roma*; *R. C. Romana civitas*; *R. G. C. rei gerendæ cauſa*; *R. F. E. D. recte factum & dictum*; *R. G. F. regis filius*; *R. P. res publica*, or *Romoni principes*; and *R. R. R. F. F. F. res Romana ruet ferro, fame, flamma.*

R was anciently a numeral letter, ſignifying 80; according to the verſe,

Octoginta dabit tibi R, *ſiquis numerabit.*

When a daſh was added at top, as $\overline{\mathrm{R}}$, it ſignified eighty thouſand.

The Greek *r*, ρ̀, with a ſmall mark over it, ſignified a hundred; with the ſame mark under it, it denoted 1000 × 100; thus ρ̦ ſignified 100,000.

In the Hebrew numeration ר denoted 200; and with two horizontal points over it 1000 × 200; thus ר̈ = 200,000.

R on the French coins, denotes their being ſtruck at Orleans.

R, or ℞, in *Medicinal Preſcription*, ſtands for *recipe*, *take*.

RABATE, in *Falconry*. A hawk is ſometimes ſaid to *rabate*, when, by the motion of the hand of the bearer, the lure, call, &c. ſhe leaves purſuing her prey, or quarry, and recovers the fiſt.

Rabate, in *Commerce*. See Rebate.

RABBET, in *Carpentry*, is a deep groove or channel, cut in a piece of timber longitudinally, to receive the edge of a plank, or the ends of a number of planks, which are to be ſecurely faſtened therein. The depth of this channel is equal to the thickneſs of the plank, ſo that when the end of the latter is let into the *rabbet*, it will be level with the outſide of the piece. Thus, in ſhip-carpentry, the ends of the lower planks of a ſhip's bottom terminate upon the ſtem afore, and the ſtern-port abaſt, with whoſe ſides their ſurfaces are even. The ſurface of the garboard ſtreak, whoſe edge is let into the keel, is, in the ſame manner, level with the ſide of the keel at the extremities of the veſſel.

Rabbet-*plane*. See *Rabbet*-Plane.

RABBETING, in *Carpentry*, the planing or cutting of channels, or grooves, in boards.

RABBI, or Rabbin, a doctor of the Jewiſh law.

The words in its original רבי ſignifies *maſter*.

The word *rabbi* and *rabbin*, have the ſame ſignification; yet is there ſome difference in their uſe. When we ſpeak abſolutely, and without applying the term to any proper name, we ſay *rabbin*, not *rabbi*. Thus, we ſay, it would be unjuſt to attribute to the ancient *rabbins* all the notions of the modern ones.

On the other hand, when we prefix the term to the proper name of ſome Jewiſh doctor, we ſay *rabbi*, not *rabbin*; *rabbi* Salomon Jarchi is of this opinion.

Yet *rabbi* having no plural, we ſay, the *rabbins* Juda Chiug, and Juda ben Chabin, are the authors of two ancient Hebrew grammars.

The title *rabbi* is ſaid to have been firſt aſſumed, as a diſtinguiſhing title of honour, by men of learning, about the time of the birth of Chriſt; though it had been anciently given to ſeveral magiſtrates and officers of ſtate, and to thoſe who were of ſuperior rank and condition in life. See Eſther, i. 8. Jer. xli. 1. Job, xxxii. 9.

The firſt Jewiſh *rabbi* ſaid to have been diſtinguiſhed with any title of honour, was Simeon, the ſon of Hillel, who ſucceeded his father as preſident of the Sanhedrim; and his title was that of *rabban*. The later *rabbies* tell us, that this title was conferred with much ceremony. When a perſon had gone through the ſchools, and was thought worthy of this degree, he was placed in a chair raiſed above the company; and then were delivered to him a key and a table-book; the key as a ſymbol of the authority conferred on him to communicate the knowledge he had acquired, which key he wore as a badge of honour, and when he died, it was buried with him; and the table-book was a ſymbol of his diligence in his ſtudies, and deſire of farther improvement. To theſe ceremonies were added the impoſition of hands by the delegates of the ſanhedrim, and the proclamation of his title. It has been diſputed, chiefly between Vitringa and Selden, whether our Lord had taken the degree and title of *rabbi* in the Jewiſh ſchools; Vitringa maintains the affirmative, and Selden the negative. See Jennings's Jewiſh Ant. vol. i. p. 400, &c.

The Jewiſh writers diſtinguiſh betwixt the titles *rab*, *rabbi*, and *rabban*. As for *rab* and *rabbi*, the only difference betwixt them is, that *rab* was the title of ſuch as had had their education, and taken their degree in ſome foreign ſchool, e. gr. at Babylon; whereas *rabbi* was the title of ſuch as were educated in the land of Judæa, and more honourable than the other. But the higheſt and moſt honourable title was *rabban*; which, they ſay, was never conferred on more than ſeven perſons; viz on R. Simeon, five of his deſcendants, and R. Jochanan, who was of a different family.

The modern *rabbins* are entitled to a conſiderable reſpect among the Jews: they have the firſt places in the ſynagogues; they determine all matters and controverſies of religion, and very frequently pronounce upon civil affairs. They have even a power to excommunicate the diſobedient.

They retain a vaſt number of ſuperſtitious traditions, from the writings of their predeceſſors; which they obſerve as ſcrupulouſly as they do the law of Moſes.

The ancients *rabbins* were infinite dealers in allegories. Their writings are almoſt wholly allegorical, particularly their comments and interpretations of the Scripture.

They had a great number of rules, and forms of interpreting and quoting, which ſome modern writers ſuppoſe to have been followed by the apoſtles, in their interpretation and quotation of the prophecies of the Old Teſtament, in the New. See QUOTATION.

RABBINICAL *character*. See HEBREW.

RABBINICAL *Hebrew*. See HEBREW.

RABBINIST, a follower of the doctrine of the rabbins; a term uſed in contradiſtinction to CARAITE.

Father Simon contends for *Rabbaniſt*, or *Rabbanite*, inſtead of *Rabbiniſt*: in effect, the former readings are apparently preferable to the latter; the word being derived from the Hebrew *Rabbanim*, which is the name of the ſect, and which the Jews uſe to diſtinguiſh their doctors from thoſe of the *Caraite* Jews.

Rabbiniſt, then, ſignifies a Jewiſh doctor who adheres to the traditions of his fathers; not ſimply a rabbin or doctor; for the *Caraites*, who oppoſe thoſe traditions, have their rabbins as well as the other Jews.

RABBIT, *cuniculus*, in *Zoology*, a well known animal of the HARE-*kind*, or the *lepus cuniculus* of Linnæus, with a ſhort tail and naked ears. In the wild ſtate the colour of the fur is brown; but in a tame ſtate it varies to a black, pied, and quite white; the eyes are of a fine red. In their wild ſtate they inhabit the temperate and hot parts of Europe, and the hotteſt parts of Aſia and Africa.

The female, or doe *rabbit*, goes with young thirty days, and then ſhe kindles; and if ſhe take not buck preſently ſhe loſes her month, or at leaſt a fortnight, and often kills her young and eats them.

In England they begin to breed at a year old, but in ſome places much ſooner; and they continue breeding very faſt from the time when they begin, four, five, ſix, or ſeven times a year being common with them. They have uſually from four to eight in a litter, and hence it is that a ſmall number at firſt will ſoon ſtock a whole warren, if left to breed a little while undiſturbed. The does cannot ſuckle their young till they have been at buck again; this therefore is to be done preſently, elſe there is a fortnight loſt of the time for the next brood, and the preſent brood alſo probably loſt. When the buck goes to the doe, he always firſt beats and ſtamps very hard with his feet, and when he has copulated with her, he falls backwards, and lies, as it were, in a trance; in this ſtate it is eaſy to take him, but he ſoon recovers from it.

The buck-*rabbits*, like our boar-cats, will kill the young ones, if they can get at them; and the does in the warrens prevent this, by covering their ſtocks, or neſts, with gravel or earth, which they cloſe ſo artificially up with the hinder part of their bodies, that it is hard to find them out. They never ſuckle the young ones at any other time than early in the morning, and late at night, and always, for eight or ten days, cloſe up the hole at the mouth of the neſt, in this careful manner, when they go out. After this they begin to leave a ſmall opening, which they increaſe by degrees, till at length, when they are about three weeks old, the mouth of the hole is left wholly open, that they may go out; for they are at that time grown big enough to take care of themſelves, and to feed on graſs.

People who keep *rabbits* tame for profit, breed them in hutches; but theſe muſt be kept very neat and clean, elſe they will be always ſubject to diſeaſes. Care muſt be taken alſo to keep the bucks and does apart till the latter have juſt kindled; then they are to be turned to the bucks again, and to remain with them till they ſhun and run from them.

The general direction for the chooſing of tame *rabbits* is, to pick the largeſt and faireſt; but the breeder ſhould remember, that the ſkins of the ſilver-haired ones ſell better than any other. The food of the tame *rabbits* may be colewort and cabbage-leaves, carrots, parſneps, apple-rinds, green corn, and vetches, in the time of the year; alſo vine-leaves, graſs, fruits, oats, and oat-meal, milk-thiſtles, ſow-thiſtles, and the like: but with theſe moiſt foods they muſt always have a proportionable quantity of the dry foods, as hay, bread, oats, bran, and the like, otherwiſe they will grow pot-bellied, and die. Bran and grains mixed together have been alſo found to be very good food. In winter they will eat hay, oats, and chaff, and theſe may be given three times a day; but when they eat green things, it muſt be obſerved, that they are not to drink at all, for it would throw them into a dropſy. At all other times, a very little drink ſerves their turn; but that muſt always be freſh. When any green herbs or graſs are cut for their food, care muſt be taken that there is no hemlock among it; for though they will eat this greedily among other things, when offered to them, yet it is ſudden poiſon to them.

Rabbits are ſubject to two principal infirmities. Firſt, the rot, which is cauſed by the giving them too large a quantity of greens, or from the giving them freſh gathered with the dew or rain hanging in drops upon them. It is exceſs of moiſture that always cauſes this diſeaſe; the greens therefore are always to be given dry, and a ſufficient quantity of hay, or other dry food, intermixed with them, to take up the abundant moiſture of their juices. On this account the very beſt food that can be given them is the ſhorteſt and ſweeteſt hay that can be got, of which one load will ſerve two hundred couples a year; and out of this ſtock of two hundred, two hundred may be eat in the family, two hundred ſold to the markets, and a ſufficient number kept in caſe of accidents.

The other general diſeaſe of theſe creatures is a ſort of madneſs: this may be known by their wallowing and tumbling about with their heels upwards, and hopping in an odd manner into their boxes. This diſtemper is ſuppoſed to be owing to the rankneſs of their feeding; and the general cure is the keeping them low, and giving them the prickly herb, called *tare-thiſtle*, to eat.

The general computation of males and females is, that one buck *rabbit* will ſerve for nine does; ſome allow ten to one buck; but thoſe who go beyond this always ſuffer for it in their breed.

The wild *rabbits* are to be taken either by ſmall cur dogs, or by ſpaniels bred up to the ſport; and the places of hunting thoſe who ſtraggle from their burrows, is under cloſe hedges or buſhes, or among corn-fields and freſh paſtures. The owners uſe to courſe them with ſmall greyhounds; and though they are ſeldom killed this way, yet they are driven back to their burrows, and are prevented from being a prey to others. The common method of taking them is by nets, called *purſe-nets*, and ferrets. The FERRET is ſent into the hole to force them out, and the purſe-net being ſpread over the hole, takes them as they come out. The ferrets mouth muſt be muffled, and then the *rabbit* gets no harm. For the more certain taking of them, itmay not be improper to pitch up a hay-net or two, at a ſmall diſtance from the burrows that are intended to be hunted: thus very few of the number that are attempted will eſcape. The method by the dog, called the LURCHER and TUMBLER, is alſo a very good one.

Some, who have no ferrets, ſmoak the *rabbits* out of their holes with burning brimſtone and orpiment. This certainly brings them out into the nets, but then it is a very troubleſome and offenſive method, and is very detrimental to the place as no *rabbit* will for a long time afterwards come near the burrows, which have been fumed with theſe ſtinking ingredients.

The teſticle of a *rabbit* is a very good object for examining the ſtructure of this part of generation in animals. The teſticles of various animals are very variouſly compoſed, but all, in general, of veſſels variouſly rolled and folded together; and even the human teſticles are of the ſame ſort, being compoſed ſolely of rolls of veſſels, without any intermediate ſubſtance, only conſiſting of veſſels and their liquors. Phil. Tranſ. N° 52.

The ſkins of *rabbits* are a great article of commerce, numbers being exported to China: the fur is of great uſe in the hat-manufactory.

RABCHORCADO, in *Ornithology*, the name of an American bird, deſcribed by Nieremberg with many fabulous circumſtances. All that ſeems certainly known is, that its tail is very remarkably forked.

RABDOIDES. See RHABDOIDES.

RABDOLOGY. See RHABDOLOGY.

RABDOMANCY. See RHABDOMANCY.

RABEBOIA, a name given by ſome to the roots of the flammula major.

RABIA *prior*, in *Chronology*, is the name of the third month of the Arabic year, conſiſting of thirty days; and *Rabia poſterior* is the name of the fourth month, conſiſting of twenty-nine days.

RABICH, a name given by Leo Africanus to a tree or ſhrub growing very plentifully in many parts of Africa, the fruit of which is much eſteemed by the natives. He ſays that the tree *rabich* is prickly, and that the fruit is round and like a cherry, but ſmaller, and of the taſte of the jujube.

RABIEL, a name given by ſome authors to DRAGON's *blood*.

RABIES *canina*. See MADNESS *from the bite*, &c.

RABINET, a name formerly given to a ſmall piece of ordnance, between a falconet and a baſe. Its dimenſions, &c. ſee under CANNON.

RABIRA, a word uſed by ſome of the chemical writers to expreſs TIN.

RABOLANE, in *Ornithology*, a name given by many to the *lagopus*, a bird found on the ſnowy mountains, and called by ſome the *white* PARTRIDGE.

RABRI, a name given by ſome authors to bole armenic.

RACA, or RACHA, a Syriac term, found in the Goſpel of St. Matthew, chap. v. 22. and preſerved in moſt tranſlations.

Father Simon obſerves, that the Greek tranſlator of St. Matthew's Goſpel retained the Syriac *raca*, which he found in the original, becauſe it was very common among the Jews. And St. Jerom, Luther, the Engliſh tranſlators, thoſe of Geneva, Louvain, Port-royal, &c. ſtill preſerve it in their reſpective languages.

F. Bouhours chooſes rather to expreſs the ſenſe thereof in a ſort of paraphraſe, thus: he that ſays to his brother, *homme de peu de ſens*, *man of little underſtanding*, ſhall deſerve to be condemned by the tribunal of the council, &c.

Moſt tranſlators, except the Engliſh, and F. Simon, for *raca* write *racha*; but the former orthography ſeems the beſt founded; all the Latin copies having *raca*, and all the Greek ones ῥακα, or, with Heſychius, ῥακκα, which is the ſame; all, we mean, but St. Irenæus, and Beza's copy, now at Cambridge, which have ῥαχα. In effect, the origin of the word ſhews it ſhould be *raca*; as coming from the Syriac רקא *raca*, of the Hebrew *rek* רק *empty*, *ſhallow*.

RACCOON, in *Zoology*. See RACKOON.

RACCOURCY, in *Heraldry*, ſignifies the ſame as *coupé*, that is, *cut off*, or *ſhortened*; and denotes a croſs, or other ordinary, when it does not extend to the edges of the eſcutcheon, as they always do when abſolutely named, without ſuch diſtinction.

RACE, in general, ſignifies running with others, in order to obtain a prize, either on foot, or by riding on horſeback, in chariots, &c.

Racing was one of the exerciſes among the ancient Grecian games, which was performed in a courſe, containing one hundred and twenty-five paces; and thoſe who contended in theſe foot-races were frequently clothed in armour. Chariot and horſe-races alſo made a part of theſe ancient GAMES.

RACE, in *Genealogy*, a lineage, or extraction, continued from father to ſon.

The word is French, formed from the Latin *radix*, *root*; as intimating the root of the genealogical tree.

In ſeveral orders of knighthood, as in that of Malta, &c. the candidates muſt prove a nobility of four races or deſcents.

In ſome republics the magiſtrates are to prove themſelves of plebeian *race*, to be qualified.

The French reckon their kings by *races*; as, the firſt *race*, the ſecond *race*, the third *race*. We alſo ſay the *race* of the Ottomans, the Arſacidæ, the Ptolemies, &c.

RACE, in *Natural Hiſtory*. See CIBDELOPLACIA.

RACEMIFEROUS, in *Botany*, denotes bearing in cluſters.

RACEMUS, or *cluſter*, in *Botany*, a ſtalk divided or branched into ſeveral foot-ſtalks, ſuſtaining the flowers or fruits ſet together, as the branches of grapes, currants, &c. The firſt of theſe conditions diſtinguiſhes it from a ſpike, the laſt from a panicle.

RACHA. See RACA.

RACHISAGRA, a term uſed by ſome phyſicians for the gout in the ſpine of the back.

RACHITIS, or rather RHACHITIS, in *Medicine*, a diſeaſe affecting the bones of children; more uſually called the RICKETS.

RACING, the riding heats for a plate or other premium.

Horſes for this uſe ſhould be as light as poſſible, large, long, and well-ſhaped, nervous, of great mettle, and good wind, with ſmall legs, and neat ſmall ſhaped feet.

The firſt thing to be conſidered in this ſort of gaming is the chooſing a rider; for it is not only neceſſary that he ſhould be very expert and able, but he muſt alſo be very honeſt.

He muſt have a very cloſe ſeat, his knees being turned cloſe to the ſaddle ſkirts, and held firmly there, and the toes turned inwards, ſo that the ſpurs may be turned outward to the horſe's belly; his left hand governing the horſe's mouth, and his right the whip. During the whole time of the race he muſt take care to ſit firm in the ſaddle, without waving or ſtanding up in the ſtirrups. Some jockies fancy this is a becoming ſeat; but it is certain, that all motions of this kind do really incommode the horſe. In ſpurring the horſe, it is not to be done by ſticking the calves of the legs cloſe to the horſe's ſides, as if it were intended to preſs the wind out of his body, but, on the contrary, the toes are to be turned a little outwards, that the heels being brought in, the ſpurs may juſt be brought to touch the ſides. A ſharp touch of this kind will be of more ſervice toward the quickening a horſe's pace, and will ſooner draw blood than one of the common coarſe kicks. The expert jockey will never ſpur his horſe until there is great occaſion, and then he will avoid ſtriking him under the fore-bowels between the ſhoulders and girth; this is the tendereſt part of a horſe, and a touch there is to be reſerved for the greateſt extremity.

As to whipping the horſe, it ought always to be done over the ſhoulder on the near ſide, except in very hard running, and on the point of victory; then the horſe is to be ſtruck on the flank with a ſtrong jerk; for the ſkin is the moſt tender of all there, and moſt ſenſible of the laſh.

When a horſe is whipped and ſpurred, and is at the top of his ſpeed; if he claps his ears in his pole, or whiſks his tail, it is a proof that the jockey heats him hard, and then he ought to give him as much comfort as he can, by ſawing the ſnaffle backwards and forwards in his mouth, and by that means forcing him to open his mouth, which will give him wind, and be of great ſervice. If there be any high wind ſtirring in the time of riding, the artful jockey will let his adverſary lead, holding hard behind him, till he ſees an opportunity of giving a looſe; yet, in this caſe, he muſt keep ſo cloſe behind, that the other horſe may keep the wind from him; and that he ſitting low, may at once ſhelter himſelf under him, and aſſiſt the ſtrength of the horſe. If the wind happen to be in their back, a juſt contrary method is to be taken with it; the expert jockey is to keep directly behind the adverſary that he may have all the advantage of the wind to blow his horſe along, as it were, and at the ſame time intercept it in regard to his adverſary.

When running on level carpet-ground, the jockey is to bear his horſe as much as the adverſary will give him leave, becauſe the horſe is naturally more inclined to ſpend himſelf on this ground: on the contrary, on deep earths he may have more liberty, as he will there ſpare himſelf.

In riding up hill the horſe is always to be favoured, by bearing him hard, for fear of running him out of wind; but in running down hill, if the horſe's feet and ſhoulders will bear it, and the rider dares venture his neck, he may have a full looſe. If the horſe have the heels of the reſt, the jockey muſt always ſpare him a little, that he may have a reſerve of ſtrength, to make a puſh at the laſt poſt.

A great deal depends on the jockey's knowing the nature of the horſe that is to run againſt him; for by managing accordingly, great advantages are to be obtained: thus, if the oppoſite horſe is of a hot and fiery diſpoſition, the jockey is either to run juſt behind him, or cheek by joul with him, making a noiſe with the whip, and by that means forcing him on faſter than his rider would have him, and conſequently ſpending him ſo much the ſooner; or elſe keep juſt before him, in ſuch a ſlow gallop, that he may either over-reach, or by treading on the heels of the fore horſe, endanger tumbling over.

Whatever be the ground that the adverſary's horſe runs worſt on, the cunning jockey is to ride the moſt violently over; that by this means it will often happen, that in following he either ſtumbles or claps on the back ſinews.

The ſeveral corrections of the hand, the whip, and the ſpur, are alſo to be obſerved in the adverſary, and in what manner he makes uſe of them: and when it is perceived, by any of the ſymptoms, of holding down the ears, or whiſking the tail, or ſtretching out the noſe like a pig, that the horſe is almoſt blown, the buſineſs is to keep him on to this ſpeed, and he will be ſoon thrown out or diſtanced. If the horſe of the opponent looks dull, it is a ſign his ſtrength fails him; and if his flanks beat much, it is a ſign that his wind begins to fail him, and his ſtrength will ſoon do ſo too.

After every heat for a plate, there muſt be dry ſtraw, and dry cloths, both linen and woollen, ready to rub him down all over, after taking off the ſweat with what is called a ſweat-knife; that is, a piece of an old ſword-blade, or ſome ſuch thing. Some adviſe the ſteeping the cloths in urine and ſalt-petre the day before, and letting them be dried in the ſun for this occaſion. After the horſe has been well rubbed with theſe, he ſhould be chaſed all over, with cloths wetted in common water till the time of ſtarting again. When it is certainly known that the horſe is good at the bottom, and will ſtick at the mark, he ſhould be rid every heat to the beſt of his performance; and the jockey is, as much as poſſible, to avoid riding at any particular horſe, or ſtaying for any, but to ride out the whole heat with the beſt ſpeed he can. If, on the contrary, he has a fiery horſe to ride, and one that is hard to manage, hard mouthed, and difficult to be held, he is to be ſtarted behind the reſt of the horſes with all imaginable coolneſs and gentleneſs; and when he begins to ride at ſome command, then the jockey is to put up to the other horſes; and if they ride at their eaſe, and are hard held, they are to be drawn on faſter; and if it be perceived, that their wind begins to rake hot, and they want a ſob, the buſineſs is to keep them up to that ſpeed; and when they are all come within three quarters of a mile of the poſt, then is the time to puſh for it, and uſe the utmoſt ſpeed in the creature's power.

When the race is over, the horſe is immediately to be clothed up, and rode home; and immediately on his coming into the ſtable the following drink is to be given him. Beat up the yolks of three eggs, and put them into a pint and a half of new milk made warm; let there be added to this three pennyworth of ſaffron, and three ſpoonfuls of ſalad-oil, and let the whole be given with a horn. After this he is to be rubbed well down, and the ſaddle place rubbed over with warm ſack, and the places where the ſpurs have touched, with a mixture of urine and ſalt, and afterwards with a mixture of powder of jet and Venice turpentine; after this he ſhould have a feed of rye-bread, then a good maſh, and at ſome time after theſe as much hay and oats as he will eat. His legs after this ſhould be bathed ſome time with a mixture of urine and ſalt-petre.

For the preparation of the horſe before running, &c. ſee **Plate.**

We ſhall here obſerve, that *horſe-races* were a ſpecies of amuſement known in England in very early times. Fitz-Stephen, who wrote in the days of Henry II. records the great delight which the citizens of London took in the diverſion. *Races* appear likewiſe to have been in vogue in the reign of queen Elizabeth, and to have been carried to ſuch exceſs as to have injured the fortunes of the nobility. Lord Herbert of Cherbury (ſee his Life by Mr. Walpole, p. 51.) enumerates theſe among the ſports which he thought unworthy of a man of honour. "The "exerciſe (ſays he) I do not approve of is running of "horſes, there being much cheating in that kind; nei-"ther do I ſee why a brave man ſhould delight in a crea-"ture whoſe chief uſe is to help him to run away." Jarvis Markham, who wrote on the management of horſes in 1599, mentions running horſes; but at this time there were only private matches made between gentlemen, who were their own jockies, and rode their own horſes. However, in the following reign of James I. public races were eſtabliſhed; and Garterly, in Yorkſhire, Croydon near London, and ſometimes Theobald's, near Enfield-chace, where the king reſided, were the courſes in which they were performed. The horſes at this time were prepared for running by the diſcipline of food, phyſic, airing, and ſweats and clothing, which compoſe the preſent ſyſtem. The weight alſo which each horſe was to carry was rigidly adjuſted; the uſual weight of the riders being ſtated at ten ſtones, who were put into ſcales, and weighed before they ſtarted. Moſt of the celebrated races in the kingdom were called bell-courſes, the prize and reward of the conquering horſes being a bell. To this purpoſe Camden ſays, that in 1607 there were races near York, and the prize was a little golden bell. Upon this Berenger offers a conjecture, whether the phraſe of *bearing the bell*, which implies being comparatively the beſt or moſt excellent, and correſponds with the expreſſion of bearing the palm among the ancients, as a reward decreed to the ſwifteſt horſe in a race, is not more aptly deduced from this cuſtom, than from the method of tying a bell round the neck of the ſheep, which leads the flock, and is, therefore, counted the beſt.

About the latter end of the reign of Charles I. it was cuſtomary to have races performed in Hyde Park. See the comedy of the Merry Beggars, or Jovial Crew, written in 1641, in Dodſley's Collection of Old Plays.

Racing was much encouraged by Charles II. after his reſtoration: he gave public rewards and prizes, and appointed races for his own amuſement at Datchet Mead, when he reſided at Windſor. But the moſt diſtinguiſhed ſpot for theſe exerciſes was Newmarket, which was at firſt frequented for the purpoſe of hunting, and ſeems not to have been deſtined to be a horſe-courſe till ſome time before the troubles of the reign of Charles I. when races were diſcontinued; but they were revived ſoon after the Reſtoration. The king attended in perſon, and eſtabliſhed a houſe for his accommodation, and kept and entered horſes in his own name. Inſtead of bells, a ſilver bowl or cup, of the value of a hundred guineas, was allotted for a prize; and upon this royal gift the exploits of the ſucceſsful horſe, and his pedigree, were generally engraved. The ſum of a hundred guineas is now given in lieu of the ſilver bowl.

When William III. was advanced to the throne, he not only added to the plates given to different places in the kingdom, but founded an academy for riding. Queen Anne continued the bounty of her predeceſſors, with the addition of ſeveral plates. George I. towards the end of his reign, diſcontinued the plates, and gave the ſum of a hundred guineas in their room.

In the thirteenth year of George II. an act was paſſed for the ſuppreſſion of races by poneys, and other ſmall and weak horſes, by which all matches for any prize under the value of 50*l.* are prohibited, under a penalty of 200*l.* to be paid by the owner of each horſe running, and 100*l.* by ſuch as advertiſe the plate; and by which each horſe entered to run, if five years old, is obliged to carry ten ſtone; if ſix, eleven; and if ſeven, twelve. It is alſo ordained, that no perſon ſhall run any horſe at a courſe, unleſs it be his own, nor enter more than one horſe for the ſame plate, upon pain of forfeiting the horſes: and alſo every horſe-race muſt be begun and ended in the ſame day. Horſes may run for the value of 50*l.* with any weight, and at any place. 13 Geo. II. cap. 19. 18 Geo. II. cap. 34. Pennant's Brit. Zool. vol. i. p. 6, &c. Berenger's Hiſt. and Art of Horſemanſhip, vol. i. p. 185, &c.

We ſhall here add, that at Newmarket there are two courſes, the long and the round: the firſt is exactly four miles, and about three hundred and eighty yards, i. e. ſeven thouſand four hundred and twenty yards. The ſecond is ſix thouſand ſix hundred and forty yards. Childers, the ſwifteſt horſe ever known, has run the firſt courſe in ſeven minutes and a half, and the ſecond in ſix minutes forty ſeconds; which is at the rate of more than forty-nine feet in a ſecond. But all other horſes take up at leaſt ſeven minutes and fifty ſeconds in completing the firſt and longeſt courſe, and ſeven minutes only in the ſhorteſt, which is at the rate of more than forty-ſeven feet in a ſecond, and it is commonly ſuppoſed, that theſe courſers cover, at every bound, a ſpace of ground in length about twenty-four Engliſh feet.

RACK, an engine of torture furniſhed with cords, &c. for extorting confeſſion from criminals.

The Duke of Exeter, conſtable of the Tower under Henry VI. with the duke of Suffolk, and others, having a deſign to introduce the civil law into England; for a beginning, the *rack*, or *brake*, allowed in many caſes by the civil law, was firſt brought to the Tower, where it is ſtill preſerved; in thoſe days the *rack* was called the duke of Exeter's daughter.

It was occaſionally uſed as an engine of ſtate, not of law, more than once in the reign of queen Elizabeth. But when, upon the aſſaſſination of Villiers, duke of Buckingham, by Felton, it was propoſed in the privy-council, to put the aſſaſſin to the *rack*, in order to diſcover his accomplices; the judges being conſulted, declared unanimouſly, to their own honour, and the honour of the Engliſh law, that no ſuch proceeding was allowable by the laws of England. The uncertainty of this puniſhment, as a teſt and criterion of truth, was long ago very elegantly pointed out by Tully (pro Sulla, 28.); though he lived in a ſtate wherein it was uſual to torture ſlaves, in order to furniſh evidence. *Tamen* (ſays he) *illa tormenta gubernat dolor, moderatur natura cujuſque tum animi tum corporis, regit quæſitor, flectit libido, corrumpit ſpes; infirmat metus; ut in tot rerum anguſtiis nihil veritati loci relinquatur.*

Rack, in the *Manege*, a pace wherein a horſe neither trots nor ambles, but ſhuffles, as it were, between both.

The *racking pace* is much the ſame as the **amble**; only that it is a ſwifter time, and a ſhorter tread.

Rack is alſo a wooden frame, made to hold hay or fodder for cattle.

To **Rack** *wines*, &c. is to draw them from off their lees, after their having ſtood long enough to clear and ſettle. Hence,

Rack-*vintage*, is frequently uſed for the ſecond voyage our wine-merchants uſed to make into France for racked wines; whence they uſed to return about the end of December.

Rack-*rent*, is the full yearly value of land let by leaſe, payable by tenant for life or years, &c.

RACKET, a kind of bat for ſtriking the ball at tennis; conſiſting uſually of a lattice, or net-work, of cat-gut, ſtrained very tight over a circle of wood, with a handle or ſhaft of a moderate length.

The word is formed from the French, *raquette*, which Menage derives from the Latin, *retetta*, a diminutive of *rete*, *net*; whence alſo *reticum*, and *reticulum*.

Paſquier obſerves, that anciently they uſed no *rackets* at tennis, but played with the palm of the hand: and hence he conjectures it is that the French call tennis play, *jeu de paume*. He adds, that *rackets* were not introduced till a little before his time.

RACKET is alſo a machine which the ſavages of Canada bind to their feet, to enable them to walk more commodiouſly over the ſnow; made much in the manner of a tennis-racket.

Its figure is a lozenge, whereof the two obtuſe angles are rounded off. It is bound about with very fine thongs of leather, and the meſhes of it are much ſmaller and cloſer than thoſe of our rackets.

In the middle is fitted a kind of ſhoe, lined with wool, or hair; to be tied on to the ankle: by which means the feet are prevented from ſinking in the ſnow. *Rackets* oblige the perſon to take very long ſteps, and, as we ſay, to walk a great pace, to keep them from knocking againſt each other.

RACKING, in *Sea-language*, denotes the faſtening of two oppoſite parts of a tackle together, ſo as that any weighty body ſuſpended thereby ſhall not fall down, although the rope, which forms the tackle, ſhould be looſened by accident or neglect. This expedient is chiefly practiſed when the boats are hung up to the ſhip's ſide in the night, in an open road or bay, leſt the rope of the tackle ſhould be untied by the inattention of ſome of the crew, by which accident the boat might be conſiderably damaged, and probably loſt or daſhed to pieces. Falconer.

RACKOON, or RACCOON, the URSUS *lotor* of Linnæus, in *Zoology*, the name by which we commonly know an American animal, called *coati* by the Braſilians. It is ſomething ſmaller than the beaver, and is of the ſhape of the beaver in the body, and its legs are as ſhort as in that creature. The face, cheeks, and chin are white: the upper part of the body is covered with hair, long, ſoft, and thick; black at the ends, whitiſh in the middle, and aſh-coloured at the root. Sometimes from this mixture of colour the back appears plainly grey; and Margrave mentions another ſpecies, which is of a deep yellow or ochre colour.

The head is very like that of the fox in ſhape; but that the ears are ſhorter, roundiſh, and naked, and it has from the forehead to the noſe a duſky line. The eyes are large, and ſurrounded with two broad patches of black; the noſe is black and ſharp-pointed; its tail is very buſhy and annulated with black. Its feet are each divided into five ſlender toes; by the help of which it climbs trees as expertly as a monkey, and uſes the fore-feet as hands, to reach up its food to its mouth. It is a very cleanly animal; and if there be water near, it always waſhes its food, be it what it will, before it eats it. It feeds on vegetables, but is alſo very fond of eggs, and will even ſeize birds if it can catch them. It is alſo very fond of ſweet things and ſtrong liquors, and will get exceſſively drunk: at low-water it feeds much on oyſters, watching their opening, and with its paw ſnatching out the fiſh, and is ſometimes caught in the ſhell. It is very common in the warm and temperate parts of America, in the mountains of Jamaica, and in the iſles of Maria in the South Sea, and is a creature eaſily tamed. It is hunted for its ſkin; the fur, next to that of the beaver, being excellent for making hats. Ray and Pennant. See *Tab*. IV. of *Quadrupeds*, N°. 52.

RACOW, *Catechiſm of*, in *Eccleſiaſtical Hiſtory*, a ſyſtem of theology compiled by the moſt eminent Socinian doctors, and firſt publiſhed at *Racow* in Poland in the year 1609, with a dedication to our king James I. This catechiſm, or a tranſlation of it, was committed to the flames in England in the year 1653, by order of parliament. A new edition of it, corrected and enlarged, was publiſhed at Stauropolis, in 1684. The SOCINIANS or UNITARIANS conſider this catechiſm as the great ſtandard of Socinianiſm, and an accurate ſummary of the doctrine of that ſect. However, Moſheim obſerves, that it is, in reality, no more than a collection of the popular tenets of the Socinians, and by no means a juſt repreſentation of the ſecret opinions and ſentiments of their doctors. Hence he ſays it never obtained among them the authority of a public confeſſion or rule of faith; and hence the doctors of that ſect were authoriſed to correct and contradict it, and to ſubſtitute another form of doctrine in its place. But to this account it has been replied, that it would have been inconſiſtent with the liberty, for which they argue in the preface to this catechiſm, to have limited their religious inquiries to this ſtandard, and by treating it as a rule of faith, they would have violated their expreſs declarations, that they dictated to no one, and aſſumed no authority. Moſh. Eccl. Hiſt. vol. iv. p. 196, 8vo.

RADIAL *Curves*. See CURVES.

RADIALIS *externus primus et ſecundus*, two muſcles cloſely united together; appearing at firſt ſight, like one muſcle; lying along the external angle of the radius; between the os humeri and the carpus, being fleſhy near the former, and tendinous near the latter.

In many ſubjects we find theſe two muſcles entirely diſtinct from one end to the other; and they may, in that ſtate, be named *radialis externus primus*, and *radialis externus ſecundus*, regard being had to the inſertion of their tendons. Sometimes the two fleſhy portions adhere cloſely together, appearing to make but one body, but the tendons are always diſtinct and ſeparate. The firſt is inſerted above in the criſta of the external condyle of the os humeri, below the inſertion of the ſupinator longus. The ſecond is inſerted in the ſame condyle below the inſertion of the firſt, and in the neighbouring articular ligament. From thence the two fleſhy bodies run down very cloſe together, and having reached the middle of the outſide of the radius, each of them terminates in a long tendon.

The two tendons accompany each other to the extremity of the radius, and having paſſed under a particular annular ligament, they are divided, as it were, into two cornua, from whence the ancients, who looked upon them as but one muſcle, called it bicornis. One of theſe tendons is inſerted anteriorly in the baſis of the firſt metacarpal bone, the other nearly in the ſame part of the ſecond bone; and the tendon of the firſt is ſometimes double, appearing like another bicornis. Winſlow. See EXTENSOR *carpi*.

RADIALIS *internus*, a long muſcle, very like in ſhape to the ulnaris externus, but ſituated more obliquely. Its fleſhy portion is fixed by a ſhort tendon to the outer and upper ſide of the inner condyle of the os humeri, from thence it paſſes obliquely toward the radius, and running along about two-thirds of that bone, it forms a long tendon, which continues in the ſame courſe; and at the lower extremity of the radius, paſſes under a particular annular ligament, and under the inſertion of the muſculus thenar. This tendon is at length inſerted chiefly in the inſide of the baſis of the firſt metacarpal bone, and alſo often in the ſecond, and a little in the firſt phalanx of the thumb; having firſt paſſed through the channel of the os trapezium which ſuſtains the thumb. Winſlow. See FLEXOR *carpi radialis*.

RADIANT *point*, or RADIATING *point*, is any point of a viſible object, whence rays proceed.

Every *radiant point* diffuſes innumerable rays all round: but only thoſe radiants are viſible, from which right lines may be drawn to the pupil; becauſe the rays are all right lines.

All the rays proceeding from the ſame *radiant* continually diverge; the cryſtalline collects or reunites them again.

Every ray is ſuppoſed to carry with it the ſpecies, or image, of the *radiant*.

RADIATED, in *Botany*, an epithet applied to round flat flowers, conſiſting of a diſk, and a ſingle row of longiſh pointed leaves, ranged all around it in manner of rays, or ſpokes.

Radiated flowers are properly ſuch as have ſeveral ſemi-florets ſet round a diſk, ſo as to reſemble a *radiant* ſtar: ſuch are daiſies, chamomile-flowers, ſun-flowers, &c. Theſe are ſometimes alſo called *radiated diſcous flowers*.

A *radiated* flower has two parts; its middle part, which is called the diſk, and which is wholly made up of floſcules; and the other part, which is called the circle or border, which is wholly made up of ſemi-floſcules, or elſe of plain flat leaves; but that is leſs common. The floſcules and ſemi-floſcules both uſually adhere to the embryos, and to the thalamus of the flower, being contained in one general cup. Theſe embryos finally ripen into ſeeds; ſometimes furniſhed with down, ſometimes with foliaceous heads, and ſometimes without either, and ſometimes marginated. Of theſe ſeeds ſome are wrapped round with a kind of caſe or capſule, others are ſeparated from one another by ſmall perpendicular leaves. See *Tab. X. of Botany, Claſs* 14. Tourn. Inſt. p. 480.

RADIATED *leaf*, among *Botaniſts*. See LEAF.

The word is alſo uſed in ſpeaking of medals, and in heraldry, where the ancient crowns are called *radiated crowns*, *coronæ radiatæ*. See CROWN.

RADIATION, in *Phyſics*, the action of a body diffuſing rays of light as from a centre.

Every viſible body is a *radiating* body; it being only by means of its rays that it affects the eye.

The ſurface of a *radiating* body may be conceived as conſiſting of radiant points.

RADIATION, *place of*. See PLACE.

RADIATION, or IRRADIATION, is alſo uſed by ſome authors, to expreſs the manner of the motion of the animal ſpirits; on a ſuppoſition that they are diffuſed from the brain towards all parts of the body, through the little canals of the nerves, as light is from a lucid body.

But, in lieu of a *radiation*, the moderns rather incline to the opinion of the CIRCULATION *of the ſpirits.*

RADICAL, *radicalis*, in *Phyſic*, &c. ſomething ſerving as a baſis or foundation; or which, like a *root*, is the ſource or principle whence any thing ariſes.

The ſchools talk much of a *radical moiſture* inherent in the ſeeds of all animals, which nouriſhes and preſerves the vital heat or flame, as oil does a lamp; and which, when exhauſted, life is extinguiſhed.

Dr. Quincy obſerves, that this *radical moiſture* is a mere chimera; unleſs we thereby mean the maſs of blood, which is the promptuary whence all the other juices and humours are derived; and which, while it circulates, ſuſtains life, &c.

In *grammar*, we uſe the term, *radical words*, for ROOTS and primitives; in oppoſition to compounds and derivatives.

RADICAL *numbers*, *numeri radicales*, in the Italian muſic, are 2, 3, 4, 5, 6, 7, 8, 9, and ſometimes 10, which are often met with in muſical compoſitions, to denote the accords of the thorough baſſes: 2 ſtands for the ſecond and its duplicates; 3 for the third; 4 for the fourth, &c.

RADICAL *leaf*, among *Botaniſts*. See LEAF.

RADICAL *ſign*, in *Algebra*, the ſign or character of the root of a quantity.

$\surd$ is the character of radicality, and expreſſes the ſquare root;

$\sqrt[3]{}$ the cube root, &c.

RADICATION, in *Phyſic*, the action whereby plants take root, or ſhoot out roots.

The French Royal Academy of Sciences have made a great number of curious obſervations on the germination and *radication* of plants.

RADICLE, *radicula*, *little root*, in *Botany*, denotes that part of the ſeed of a plant, which, upon its vegetation, becomes a little root, by which the tender plant at firſt receives its nouriſhment before the after-root is formed.

This is that part of the ſeed which, in making malt ſhoots forth, and is called the come or comb. See PLANTS and PERPENDICULARITY.

RADICULA, in *Botany*. See *Water*-CRESSES.

RADII *brevis*. See BREVIS.

RADII *pinnarum*, in *Ichthyology*, the little ſlender bones ſupporting the membrane, forming the fins in fiſhes, and called by Artedi *oſſicula radiata pinnarum*, from their running from the baſe to the ſummit in the form of rays. See FIN.

Of theſe *radii* ſome are prickly, others not. The prickly ones are always hard and rigid, the others are always ſoft and flexile, whether they terminate ſingle, or are ſplit into two or more branches at the extremity. The prickly ones are always formed of ſingle bones; the others always of two bones, each applied cloſely and evenly to one another. When the fiſh is alive, it is not always eaſy to ſeparate theſe, but when it is boiled, they are eaſily parted at the baſe, and ſometimes all the way up. The ſofter and the more flexile theſe bones are, the more numerous, tranſverſe, and lucid internodia they have in them. The cyprini give us many inſtances of this, as alſo the clupeæ, the coregones, and the eſoces. Thoſe which have fewer of theſe internodia, or tranſverſe lines, are ſomewhat more rigid, though not aculeate, or prickly: this we ſee in the pleuronecti and gadi. Beſide theſe *radii*, there are certain other ſmall bones which are of an oblong figure, and ſerve to ſuſtain the baſes of the back-fins, and the fin at the anus. The back-fins, and thoſe at the anus, are not joined by their rays to ſome one large muſcle, or large bone, as the pectoral and ventral fins are; but every *radius*, or bone in theſe fins, is affixed to an oblong bone, erected perpendicularly between the apophyſes of the vertebra and the back of the fin.

RADIOMETER, a name which ſome writers give to the *radius aſtronomicus*, or Jacob's *ſtaff*. See FORE-STAFF.

RADISH, *raphanus*, in *Botany*, a genus of the *tetradynamia ſiliquoſa* claſs. Its characters are theſe: the empalement of the flower is erect, and compoſed of four oblong leaves; the flower has four heart-ſhaped petals, placed in form of a croſs, which ſpread open and are narrow at their baſe; it hath four honey glands, one pair on each ſide the ſhort ſtamina between them and the ſtyle, and the other between each of the long ſtamina and the empalement; it hath ſix erect ſtamina, two, which are oppoſite, are of the length of the empalement, the other four are as long as the baſe of the petals, terminated by ſingle ſummits, with an oblong ſwelling germen, crowned by a headed ſtigma; the germen afterwards becomes an oblong, ſmooth, ſpungy pod, having an acute point, ſwelling and almoſt jointed, having two cells, divided by an intermediate partition, filled with roundiſh ſeeds. Miller enumerates five, and Linnæus four ſpecies.

There are ſeveral varieties of the root of the common garden *radiſh*, which is the only ſpecies cultivated by our gardeners: theſe are called by them the ſmall-topped *radiſh*, the deep red, the pale red or ſalmon, and the long-topped ſtriped *radiſh*. All theſe are only varieties ariſing from the culture. The ſmall-topped is the kind, the ſeed of which is moſt ſaved, and which is moſt valued about London, becauſe it does not take up much room. They are ſown at various ſeaſons, but the earlieſt is generally at the latter end of October; if theſe are not deſtroyed by froſts, they become fit to eat in March. Theſe are commonly ſowed about walls, pales, or hedges, where they may have ſome defence againſt the cold. The ſecond ſowing is commonly about Chriſtmas, if the weather be mild enough to let the ground be worked. Theſe are alſo to be ſown under a ſhelter, and, if they are not deſtroyed, will be fit to eat in April; and to have a conſtant ſupply, there ſhould be a new-ſowing every fortnight, from the middle of January to the beginning of April. The later crops ſhould be ſown on a moiſt ſoil, and in an open ſituation. Miller.

Radiſhes are opening, attenuating, and antiſcorbutic, and are much eaten in the ſpring; but afford little nouriſhment, and are very windy. They provoke urine, and are good for the ſtone and gravel. They are but ſeldom uſed in the ſhops.

The parts uſeful in medicine are the root and ſeed, which have been employed in waſting and expelling the ſtone; in provoking urine and the menſes; and in opening obſtructions of the liver and ſpleen.

RADISH, *horſe*, in *Botany*, a ſpecies of ſcurvy-graſs; for the characters, ſee SCURVY *Graſs*.

Horſe Radiſh is propagated by cuttings or buds from the ſides of the old roots. The beſt ſeaſon for this work is in October or February; the former for dry lands, the latter for moiſt; and the ground ſhould be trenched at leaſt two ſpits deep, or more if it will allow of it. The manner of planting it is as follows: provide a good number of offſets, which ſhould have a bud upon their crowns, but it matters not how ſhort they are; therefore the upper parts of the roots which are taken up for uſe, ſhould be cut off with the bud to it, which is eſteemed the beſt for planting. Then make a trench ten inches deep, in which the offſets ſhould be planted at about four or five inches diſtance, with the bud upward; cover them up with the earth taken out of the trench, and order the other trenches in like manner, until the ground is occupied. After this level the ground and keep it clear from weeds, until the plants are ſo far grown as to overbear and keep them down. With this management the roots will be long and ſtraight, and free from ſmall lateral ones: they will be fit for uſe the ſecond year after planting. Miller.

Horſe-Radiſh impregnates both water and ſpirit, by infuſion and diſtillation, very richly with its active matter: in diſtillation with water it yields a ſmall quantity of eſſential oil, exceedingly penetrating and pungent. As a medicine, *horſe radiſh* is moderately ſtimulating, aperient, and antiſeptic: it ſenſibly promotes perſpiration, urine, and the expectoration of viſcid phlegm, and excites appetite when the ſtomach is relaxed, without being ſo liable to produce immoderate heat, or inflammatory ſymptoms, as the ſtimulants of the aromatic kind. It is principally uſed in paralytic and rheumatic complaints, in ſcurvies and ſcorbutic impurities of the humours, in cachectic diſorders, and in dropſies, particularly in thoſe which follow intermitting fevers. In conſiderable quantities it promotes vomiting. Lewis.

RADIUS, RAY, in *Geometry*, the ſemidiameter of a circle; or a right line drawn from the centre to the circumference.

The word is derived from the Greek ῥαϐδος, *rod.* Fleta uſes the word *radius*, for a *furrow.*

The *radius* is alſo called, eſpecially in trigonometry, *ſinus totus*, the *whole ſine*

It is implied in the definition of a circle, and it is apparent from its conſtruction, that all the *radii* of the ſame circle are equal.

RADIUS, in the *Higher Geometry*. RADIUS *of the evoluta*, RADIUS *curvedinis*, or RADIUS *oſculi*, called alſo the *radius* of *concavity* and the *radius* of *curvature*, is the right line CM, (*Tab. Analyſis*, *fig.* 12.) repreſenting a thread, by whoſe evolution from off the curve BC, whereon it was wound, the curve AM*m* is formed: or it is the *radius* of a circle that has the ſame curvature in a given point of the curve, with that of the curve in that point. See CURVATURE and EVOLUTE, under which article the method of finding this *radius* may be ſeen.

RADIUS *aſtronomicus*, an inſtrument uſually called Jacob's *ſtaff*, the *Croſs-ſtaff* or FORE-STAFF.

RADIUS, in *Optics*. See RAY.

RADIUS, in *Mechanics*, is applied to the ſpokes of a wheel; becauſe iſſuing like rays from the centre thereof.

Radius *vector*, in *Mechanics*, is alſo uſed for a right line drawn from the centre of force in any curve in which a body is ſuppoſed to move by a centripetal force, to that point of the curve where the body is ſuppoſed to be. See Central *force*.

Radius, among the Romans, a name given to the iron rod with which the boys rolled the TROCHUS.

Radius, in *Anatomy*, is a long ſlender bone of the arm, deſcending along with the ulna from the elbow to the wriſt: called alſo *focile minus*, the *leſſer focil*. See *Tab. Anat. Oſteol. fig.* 3. *n.* 7. 7. **, &c. *fig.* 7. *n.* 9.

The *radius* is nearly of the ſame length with the ulna, bigger at one end than at the other, irregularly triangular, a little bent, and ſituated ſideways along the ulna, and has its name from the reſemblance it bears to the *radius*, or ſpoke of a wheel. Anatomiſts deſcribe in this bone a middle portion, and two extremities. One extremity is ſmall, and like a kind of head ſet upon a neck; the other is large, reſembling a pedeſtal, or baſis; and the bone might therefore be very properly divided into the head, body, and baſis.

The head, or ſmall extremity of the *radius*, is very ſhort or low, the top of it is concave, and the circumference cylindrical, and both the glenoide cavity, and whole circumference, are covered with the ſame ſmooth, ſhining cartilaginous cruſt, and about one quarter of the circumference is broader than the reſt. The neck is ſmall, and its ſituation a little oblique; it ends by a lateral tuberoſity, which lies directly under the broad part of the head, being rough in the middle and on one ſide, and ſmooth and ſuperficially cartilaginous on the other.

The baſis, or great extremity of the *radius*, is much broader than it is thick, and has two broad ſides, and one narrow one. One of the broad ſides is a little hollow, and pretty even; the other is unequally convex, and divided by longitudinal eminences, or bony lines, into three or four longitudinal channels; but theſe are much more diſtinct in freſh bones than in the dried ſkeleton. The narrow ſide is hollowed lengthwiſe, and between it, and the other two, are formed two angles, by which the three ſides are diſtinguiſhed; and oppoſite to it, the other two meet in a third angle. This narrow ſide ends in a ſemilunar cavity, bordered by a ſmooth cartilage, and lying almoſt in the ſame direction with the tuberoſity. The broad ſides end at their common angle by an obtuſe point, or production, which has been called the *ſtyloide apophyſis of the radius*, and is in reality a continuation of one of the bony lines already mentioned. The whole baſis ends in an oblong, triangular, glenoide cavity, the cartilage of which is continued over the hollow edge of the narrow ſide. This is an articular cavity, reſembling an arch, and ending on one ſide at the ſtyloide apophyſis, and hollowed on the other by the cavity of the narrow ſide. It appears divided into two portions by a ſmall tranſverſe line; and in the natural ſtate, the hollowed ſide is lengthened out by a cartilaginous production, which is loſt in the dried ſkeleton.

The middle, or body of the *radius*, is a little incurvated, the concavity lying between the tuberoſity in the head, and the ſemilunar cavity in the baſis. It has three ſides; one rounded, which is the convex ſide of the curvature, and two concave; three angles, two of which are obtuſe, diſtinguiſhing the two concave ſides from the convex, and the third acute, lying between the concave ſides, oppoſite to the convex ſide. In each of theſe ſides there are ſeveral muſcular impreſſions. The head and baſis of this bone are epiphyſes in children, and in ſome ſubjects remain ſuch for a long time afterwards. The *radius* is connected with the ulna, os humeri, and carpus. It is articulated with the ulna, at its two extremities, by a double lateral ginglymus, the cartilaginous ſubſtance of the head turning in the ſmall ſigmoide cavity, and the ſemilunar cavity in the baſis turning upon the ſmall head at the lower extremity of the other bone, and thus the ſmall extremity of one of theſe bones is joined to the great extremity of the other. It is articulated with the os humeri by the application of the cavity in the top of its head to the ſmall head at the lower extremity of the other bone: by this conformation it would be capable of moving in all directions; but as it is tied to the ulna at both extremities, its motions on the ſmall condyloide head, at the lower extremity of the os humeri, are confined to two kinds; that of rotation, when it turns on the ſides of the extremities of the ulna, and that of flexion and extenſion in common with the ulna; and both theſe motions may be performed at the ſame time. Winſlow's Anatomy, p. 80.

Cartilages of the Radius. At the baſis of this bone there is a particular cartilage, or triangular production, very thin, longer than it is broad, and rather flat than concave. It is fixed by the baſis, or ſhorteſt ſide, to the lateral ſigmoide notch of the baſis of the *radius*; the other ſide touches the flat extremity of the ſmall head of the ulna, but is not affixed to it. This may properly enough be called the inter-articular cartilage of the wriſt. It is tied to the *radius* by very ſhort ligaments; and ſliding on the ſmall head of the ulna, it follows all the motions of the *radius*. It is therefore a ſort of articular production of the lower ſide of the baſis of the *radius*, and in the natural ſtate fills the void ſpace which, in the ſkeleton, appears between the end of the ulna and neighbouring bone of the carpus. Winſlow's Anatomy, p. 140.

Ligaments of the Radius. Some of the ligaments of the bones of the fore-arm are common to them and to the os humeri, and others to them and the bones of the hand; two however there are which are proper to this part of the arm, the one called the *interoſſeous ligament of the fore-arm*, the other the *coronary ligament of the radius*; and to theſe may be added the annular ligaments, which ſerve only for the paſſage of tendons, and other ligamentary expanſions, which may be called muſcular ligaments. The interoſſeous ligament of the fore-arm is like that of the leg; it is fixed by one edge along the ſharp angle of the *radius*, the other along that of the ulna. It is principally made up of two very ſtrong planes of fibres, which croſs each other at oblique angles, and leave holes at different diſtances for the paſſage of blood-veſſels. This ligament ties the two bones cloſely together, and the two planes ſerve for the inſertion of ſeveral muſcles. The coronary ligament of the *radius* is a ſort of ligamentary hoop, ſurrounding the circular circumference of the head of that bone. It is very ſtrong, and is nearly as ſolid as a cartilage, and the ſide next the *radius* is very ſmooth. The capſular ligament of the joint of the elbow runs down from its inſertion in the os humeri, and is fixed in the olecranium, round the edge of the great ſigmoide cavity, including both the apex of the olecranum, and of the coronoide apophyſis.

The true common ligaments, by which the os humeri is connected to the bones of the fore-arm, called lateral ligaments, are the two faſciculi, which, after being inſerted in the condyles of the os humeri, are expanded like a gooſe's foot; that which is fixed in the inner condyle is called the brachio-cubital, the other the brachio-radical.

Of the ligaments by which the bones of the fore-arm are connected to thoſe of the hand, one is like a roundiſh cord fixed in the ſtyloide apophyſis of the ulna, and from thence paſſes over the os cuneiforme of the carpus; and another pretty broad ligament is fixed on the point of the *radius*, and by its other extremity in the bones of the carpus. From this ſtyloide ligament of the *radius*, along each edge of the baſis of that bone, are ranks of ligamentary fibres, lying much in the ſame direction with the ligament itſelf, and continued all the way to the ſtyloide ligament of the ulna. There are alſo ſeveral ſmall annular ligaments placed at different diſtances on the convex ſide of the baſis *radii*, from its ſtyloide apex to its articulation with the extremity of the ulna; theſe are at leaſt ſix in number, and ſome of them are double or triple. The firſt of theſe is fixed in the ſtyloide apex; the ſecond in the groove near that apex; the third in the ſmall, narrow, or middle groove; the fourth in the groove next the former; the fifth in the corner of the notch of the baſis, at its articulation with the ulna; and the ſixth in the extremity of the ulna, near the ſtyloide apophyſis. Theſe are all almoſt wholly covered by the great oblique ligament, and are fixed as ſtrongly in it on one ſide, as they are in the bones on the other. Winſlow's Anatomy, p. 141.

Muſcles of the Radius. The *radius* has four proper muſcles, beſides the biceps, common to it and the ulna; the proper are two PRONATORS, and two SUPINATORS.

Radius *articulatus*, in *Natural Hiſtory*, a name given by Mellius, Gmelin, and ſome other authors, to a kind of figured foſſils, of which there are a great many very different ſpecies, ſome of which have been deſcribed by authors among the belemnitæ, under the names of *alveoli belemnitarum*. Mr. Gmelin, who has taken great pains to inform himſelf, as well of the nature and figure of theſe ſtones, from the ſubjects themſelves, as of their hiſtory, and the various accounts of them from other authors, obſerves, that the place where they are moſt frequent is Sweden, and that there they are no where ſo common as in the Iſle of Oeland. Volkman figures ſome alſo which he found in Sileſia, and Helwing others which he collected in Pruſſia: he alſo found great numbers of them himſelf in Ruſſia.

They are uſually immerſed in lime-ſtone, and though at firſt ſight they may all appear alike, yet, on a careful examination, they will be found to differ very greatly. The moſt obvious general diſtinction, eſtabliſhed by Gmelin, is, that ſome of them are ſtraight, and others crooked. The ſtraight ones may be divided into two genera. The firſt of theſe comprehends, according to this gentleman, two ſpecies: the firſt ſmooth, and with a converging alveolus. The regular and nice configuration of theſe bodies, ſhews very plainly that they cannot be of mineral origin, but the ſeveral patellæ of which each is compoſed, the ſiphunculus of communication, obvious in ſeveral, and the ſhelly matter yet found remaining on many, prove them to have been once ſhell-fiſh of the univalve or tubular concamerated kind; the deſcription of which, ſo far as it can be gathered from theſe remains, muſt have been this. The ſhell muſt have been either cylindric or conic in figure, of a ſmooth ſurface, and divided into ſeveral chambers or cells; but this ſo that the ſepta which form the concamerations are not continued and whole, but in ſome part of the periphery are cut in, in the ſhape of a creſcent. Through theſe creſcents, which ſtanding altogether make a continued canal, there has paſſed another ſhelly body of a cylindric or conic figure, alſo divided into concamerations; and that in ſuch a manner, that the ſepta which form the cells are pierced with a ſmall aperture on one ſide, which grows gradually ſmaller as the ſhell extends in length; and finally, through theſe apertures in the concamerations, there paſſes another ſhell pointed at the end, and like the reſt divided into its concamerations, and pierced along its middle with a ſiphunculus. Mem. Acad. Petrop. vol. iii. p. 263.

This ſhell is therefore a compages of three ſhelly bodies, incloſed one within another; and it muſt be ſuppoſed, in order to carry an analogy with other ſhell-fiſh, that theſe three ſhelly bodies have communications with one another, by means of certain ſlits or perforations. The communication of theſe, one with another, ſeems alſo evident from their being all found in their foſſile ſtate, filled with the ſame ſtony matter; this has, doubtleſs, been all received in at the ſiphunculus of the inner ſhell, and thence has been thrown into the ſecond, and from this into the third ſhell, ſo as to fill up all the concamerations of the outer, as well as of the inner parts. This muſt have been the caſe with theſe; and the ſeveral various ſpecies that are at this day found foſſile, muſt have owed their origin to as many different ſpecies of the ſhells. The crooked and twiſted, or wreathed kinds, which have the ſiphunculus uſually placed near the ſide, greatly approach in their ſtructure to ſome of the cornua ammonis.

RADIX, Ῥίζα, *root*. See Root.

Radix is uſed among ſome anatomiſts for the ſole of the foot.

Radix *Carlo Sancto*; this root is found in temperate ſoils, in Mechoacan, a province of America. Its bark is eaſily ſeparated from it, is of an aromatic ſmell, and of a bitter and ſomewhat acrid taſte. The root itſelf conſiſts of very ſlender fibrils, which are eaſily ſeparated from each other. The bark is accounted ſudorific, and corroborates the ſtomach and gums: if chewed, it procures an agreeable breath. It is good for ſcurvies, catarrhs, epilepſies, haſtening deliveries, and removing hernias, and the ſmall pox, if taken either in powder or in the form of a decoction. The Spaniards have called it by the name of St. Charles, on account of its uncommon virtues.

Radix *entrochorum*, the *root of the entrochi*, a name given by ſome authors to a foſſile ſubſtance, uſually found among the entrochi, and ſeeming to have been the baſis from which they have grown. It is plainly a part of the *ſtella marina arboreſcens* petrified, as thoſe ſtones alſo are. This foſſil is rarely found whole, but the fragments of it are very common. When entire, it is about the ſize of a walnut; the top of it being flat, and in ſome degree reſembling the end of an entrochus, with a central hollow, but not having the leaſt appearance of the rays of thoſe ſtones. Theſe foſſils, though not properly judged of as to their origin, have yet been deſcribed by a great number of authors. Agricola, in particular, compares the form of them to a wheel. The body of this kind well reſembles indeed the nave of a wheel, the ſhape of it being conical toward one end, till you come to the top, and then a little flatted, with a hole in it. There is alſo a like hole in the oppoſite broad end of the ſame foſſil, ſeeming fit for an axle to paſs through; and there are five hollow ſtilts, or feet, iſſuing ſideways, at equal diſtances from the broad bottom, and equally carried on in the ſame direction, ſo as not amiſs to repreſent the ſpokes. At the end of each of theſe rays or ſpokes, there is a hollow, of the ſame nature with thoſe in the middle of the common entrochi, but this is cut acroſs by a ſeam, or ſtreak of the ſame ſtone, which paſſes directly over its centre, and covers about a third part of it, this goes no farther than the mouth of the hole, but it cuts it into two, and ſhews it in the form of two eyes. Theſe radii, or ſpokes, are very ſeldom found ſo perfect as here deſcribed. Liſter mentions them as being formed like creſcents at the end, which may very eaſily happen from the breaking off a part of the terminating part. Phil. Tranſ. Nº 129.

Radix *alba*, a word uſed by Dioſcorides, to expreſs the root of the dracunculus.

Radix, among *Grammarians*. See Radical.

RAD-KNIGHTS. See Redmans.

RADMANS. See Redmans.

RADULA. See Raspatory.

RAFFLING, a ſort of game with three dice, wherein he who throws the greateſt pair, or pair royal, in three caſts, wins the prize or ſtake.

The word probably comes from the baſe Latin, *rieflare, to rifle, plunder, take all away.*

The *raffle* is properly the doublet or triplet: a *raffle* of aces, or duces, carries it againſt mere points.

Raffling is alſo uſed when a company of perſons club to the purchaſe of a commodity; and he that throws the higheſt on three dice takes it.

RAFT, in *Sea language*, a ſort of float formed by an aſſemblage of various planks, or pieces of timber, faſtened together ſide by ſide, ſo as to be conveyed more commodiouſly to any ſhort diſtance in a harbour or road, than if they were ſeparate. The timber and planks, with which merchant-ſhips are laden in the different parts of the Baltic ſea, are attached together in this manner, in order to float them off to the ſhipping.

Raft-*Port*, in a *Ship*, a ſquare hole cut through the buttocks of ſome ſhips, immediately under the counter, to receive the planks or pieces of timber which are brought to lade her for tranſportation; and which, on account of their great length, could not be received aboard otherwiſe.

RAFTERS, in *Building*, are pieces of timber, which, ſtanding by pairs on the reaſon-piece, or raiſing-piece, meet in an angle at the top, and form the roof of a building.

It is a rule in architecture, that no *rafter* ſhould ſtand farther than twelve inches from one another.

For the ſizes or ſcantlings of *rafters*, it is provided by act of parliament, that *principal rafters* from 12 feet 6 inches to 14 feet 6 inches long, be 5 inches broad a-top, and 8 at the bottom, and 6 inches thick. Thoſe from 14, 6 to 18, 6 long, to be 9 inches broad at the foot, 7 a-top, and 7 thick. And thoſe from 18, 6, to 21, 6, to be ten inches broad at the foot, 8 a-top, and 8 thick.

Single rafters, 6 feet 6 inches long, to be 4 and 3 inches in their ſquare. Thoſe eight feet long muſt be 4½ and 3½ inches ſquare.

RAG, or Rake, among *Hunters*, denotes a company or herd of young colts.

RAGS. In ſome counties of England, particularly in Oxfordſhire, it is a common thing to uſe old woollen *rags* by way of manure upon land. Taylor's ſhreds anſwer this purpoſe in ſome degree; but the old *rags* of cloaths, which have been worn by men and women, are much better, which is owing to the ſalts they have imbibed from the perſpiration of the body they uſed to cover. Plot's Oxfordſhire, p. 250.

Rag-*bolts*, in a *Ship*. See Bolts.

RAGGED *hawk*, in *Falconry*, is a hawk that hath its feathers broken.

RAGGED, in *Heraldry*. See Raguled.

RAGGULED. See Raguled.

RAGMAN's-*roll*, or Ragimund's-*roll*. See Roll.

RAGOUT, or Ragoo, a ſauce, or ſeaſoning, intended to rouſe or recover the appetite when languiſhing, or loſt.

The term is French, but naturalized. It is alſo uſed for any high-ſeaſoned diſh, prepared of fleſh, fiſh, greens, or the like, by ſtewing them with the addition of bacon, ſalt, pepper, cloves, and the like high-flavoured ingredients.

We have *ragoos* of beef, of cray-fiſh, of giblets, of aſparagus, of endive, of cocks-combs, of gammon, of celery, &c.

The ancients had a ragout, called garum.

RAG-*paving*. See Paving.

Rag-*ſtone*, a name given by our artificers to a kind of ſtone, which they uſe for ſetting an edge upon knives, chiſſels, and other tools. It is a greyiſh coloured ſtone, containing a large quantity of talcky particles, and ſplits eaſily into thin flakes. It is a ſoft ſtone, and is uſed only to finiſh the ſetting an inſtrument after the edge has been prepared by grinding or rubbing the tool upon ſome other ſtone of a coarſer texture. We have this from Newcaſtle and many other parts of the north of England, where there are very large rocks of it in the hills.

RAGGED-*robin*, in *Botany*. See Campion.

RAGULED, or ragged, in *Heraldry*, is applied to an ordinary, e. gr. a croſs, whoſe out-lines are jagged or knotted (*Tab.* II. *Herald. fig.* 48)

He beareth ſable, a croſs *raguled*, or, by the name of *Sloway*.

Ragged differs from indented, as the latter is regular, and the former not.

The bearing is very ancient: Julius Cæſar gave for his badge, a boar's head, on a *ragged* ſtaff.

Raguled is ſometimes alſo uſed in the ſenſe of *truncated*, or *couped*, and applied to a branch that is ſawed from the tree; or a ſtock ſawed from its root.

RAGWORT, *othonna*, in *Botany*, a genus of the *ſyngeneſia polgygamia neceſſaria* claſs. Its characters are theſe: it hath a radiated flower, compoſed of hermaphrodite florets, which form the diſk, and female half florets, which form the rays or border; theſe are included in one common ſingle empalement of one leaf. The hermaphrodite flowers are tubulous, indented at the top in five parts; the female half florets are ſtretched out like a tongue, and the point has three indentures which are reflexed. The hermaphrodite florets have ſhort hairy ſtamina, terminated by cylindrical ſummits, and an oblong germen ſupporting a ſlender ſtyle, crowned by a ſingle ſtigma. The female half florets have an oblong germen with a ſlender ſtyle crowned by a large, bifid, reflexed ſtigma. The hermaphrodite florets are ſeldom fruitful, but the female half florets have an oblong ſeed, which is ſometimes naked, and at others crowned with down; theſe ſit in the permanent empalement. Of the othonna Miller enumerates ten, and Linnæus nine ſpecies. There are ſeveral other ſpecies of *ragwort*, which are referred to the genera of Senecio and Solidago.

RAHAS, in *Ichthyology*, a name given by ſome authors to the torpedo, or cramp-fiſh.

RAJA, denoting *king*, an appellation given in Hindoſtan or the empire of the Mogul, to princes deſcended from thoſe that ruled there before the conqueſt of the Moguls; who exerciſe all rights of ſovereignty, only paying a tribute to the Great Mogul, and obſerving the treaties by which their anceſtors recognized his ſuperiority.

There are ſome *rajas* who ſtill retain a more independent ſovereignty in the mountains: the Indians call them *rai*; the Perſians, plurally, *raian*: our travellers *rajas*, or *ragias*. Theſe have under their command ſoldiers, called *raja-poots*, or perſons deſcended from *Rajahs*, who are a robuſt and brave people, and who enter into the ſervice of thoſe who will pay them. The Great Mogul has ſeveral of theſe *rajahs* in his ſervice.

The chief lords of the Moguls, viz. the vice-roys, governors of provinces, and chief miniſters of ſtate, F. Catrou obſerves, are called *ombras*; and the idolatrous *rajas*, or Indian lords who governed petty ſtates before the conqueſt of their country, hold the ſame rank at court with the omhras.

All the difference is, that the children of the *rajas* ſucceed their fathers in the ſhew of the ſovereignty left them; whereas the children of the Mahometan lords loſe all in loſing their fathers.

The Indians account four ages from the beginning of the world: and in the ſecond, which laſted 1296000 years, they hold the *rajas* or kchatrys had their riſe; a noble caſt, though inferior to the Bramins. Vice then, they ſay, began to creep into the world; men only lived to 300 years, and their ſtature was reduced, &c. See Age.

RAIA, in the *Linnæan Syſtem of Zoology*, the name of a diſtinct genus of animals, of the general order of the *nantes*, or of thoſe amphibious animals which breathe by means of gills and lungs, and which have the rays of their fins cartilaginous. The diſtinguiſhing characters of this genus are, that the body is flatted, that the mouth is under the head, and that they have five branchial apertures on each ſide the neck underneath.

In the Artedian ſyſtem of ichthyology, the characters of this genus of fiſh are theſe: they are of the chondropterygious kind; the apertures of the bronchia are five on each ſide, and are ſituated on the breaſt a little below the mouth; the head and the whole body are of a remarkably depreſſed or flatted figure; the ſides are terminated in broad fins, which are in the place of pectoral ones in other fiſhes; the eyes are placed in the upper ſide of the head, and the mouth generally in the lower; there is on each ſide of the head a foramen behind the eyes; and the tail is generally long and ſlender.

Of this genus there are nine ſpecies, five with ſharp teeth and four with obtuſe teeth; the principal are the torpedo, ſkate, ſharp-noſed ray, rough ray, ſting-ray, and thornback. See Ray, &c.

Rays are generally divided by authors into the ſmooth and the prickly. The ſmooth are what we call the *ſkates* and *flairs*; the prickly we call *thornbacks*, and the young ones of both kinds *maids*. But Willughby thinks they are more regularly divided into two orders, the one containing thoſe which have teeth, the other thoſe which have none. Willughby's Hiſt. Piſc. p. 68.

RAJANIA, in *Botany*, a genus of the *diœcia hexandria* claſs. Its characters are theſe: it produces ſeparate male and female flowers; in the male flower the perianthium is divided into ſix ſegments, which are oblong and pointed, and ſtand cloſe in the baſis, ſo as to form a ſort of bell, and expand more at their points; there are no petals, and the ſtamina are ſix briſtly filaments, ſhorter than the cup, and terminated by ſimple apices. In the female flower the perianthium is one-leaved, campanulated, and ſtands upon the germen, but afterwards withers away; this alſo is divided into ſix ſegments at the edge; there are no petals, and the germen of the piſtil is compreſſed, and edged with a membrane on one ſide; the ſtyles are three in number, and are of the length of the cup; the ſtigmata are ſimple and obtuſe; the fruit is roundiſh, and has a membrane growing on one ſide, which, in fine, ſpreads almoſt round it; in this is contained a ſingle ſeed of a roundiſh figure. There are three ſpecies.

RAIL, in *Architecture*, is applied variouſly; particularly to thoſe pieces of timber, which lie horizontally between the panels of wainſcot, and over and under them.

The word is alſo applied to thoſe pieces of timber which lie over and under ballusters in balconies, ſtair-caſes, &c.

Alſo, to the pieces of timber that lie horizontally from poſt to poſt in fences, with pales or without.

Rail, or *Water*-**Rail**, in *Ornithology*, the name of the rallus *aquaticus* of authors, which is a bird of a long ſlender body, with ſhort concave wings. The bill is ſlender, ſlightly incurvated, and one inch three quarters long: the upper mandible black, edged with red, the lower orange-coloured; the irides red; the head, hind-part of the neck, the back and coverts of the wings and tail are black, edged with an olive brown; the baſe of the wing is white; the quill-feathers and ſecondaries duſky; the throat, breaſt, and upper part of the belly are aſh-coloured; the ſides under the wings, as far as the rump, finely varied with black and white bars; the tail is very ſhort, conſiſting of twelve black feathers; the ends of the two middle tipt with ruſt colour; the feathers immediately beneath the tail white; the legs are placed far behind, and are of a duſky fleſh-colour; the toes very long, and divided to their origin: though the feet are not webbed, it takes the water, and will ſwim on it with much eaſe, but is often obſerved to run along the ſurface. It delights leſs in flying than in running, which it does very ſwiftly along the edges of brooks covered with ruſhes. When it runs, it every now and then flirts up its tail, and in flying hangs down its legs. Pennant.

This bird, ſays Mr. Pennant, is properly *ſui generis*, agreeing with no other, but forming a ſeparate tribe; though M. Briſſon and Linnæus place it with the land-*rail*, and Mr. Ray with the water-hens. It is a well-taſted bird.

Rail, *land*, the **Rallus** *Crex* of Linnæus, is a migrating bird, with a ſhort, ſtrong, thick bill; always found among corn, graſs, broom, or furze. It leaves this kingdom before winter. They have long legs, and a ſingular note reſembling the word crex, often repeated. The feathers on the crown of the head, hind part of the neck, and the back, are black edged with bay colour; the coverts of the wings of the ſame colour, but not ſpotted; the tail is ſhort and of a deep bay, the belly white, and the legs aſh-coloured. They are in greateſt plenty in Angleſea, where they appear about the 20th of April, ſuppoſed to paſs over from Ireland, where they abound. They are found in moſt of the Hebrides, and the Orkneys. Pennant.

RAILS, in a *Ship*, are narrow planks, generally of fir, upon which is ſtuck a moulding. They are for ornament, and are nailed acroſs the ſtem, above the wing-tranſom and counters, &c. They are likewiſe nailed upon ſeveral planks along the ſide: one in particular is called the *ſheer-rail*, which limits the height of the ſide from the fore-caſtle to the quarter-deck, and runs aſt to the ſtern, and forward to the cat-head: to this the wales are nearly parallel.

Fife-**Rails.** See Fife.

Rails of the *head* are certain curved pieces of timber, extending from the bows on each ſide to the continuation of the ſhip's ſtem, to ſupport the knee of the head, and the ornamental figure fixed upon it.

RAIN, a very frequent and uſeful meteor, deſcending from above in form of drops of water.

Rain is, apparently, a precipitated cloud; as clouds are nothing but vapours raiſed from moiſture, waters, &c.

And vapours are demonſtratively nothing elſe but little bubbles or veſiculæ detatched from the waters, by the power of the ſolar, or ſubterraneous heat, or both.

Theſe veſiculæ, being ſpecifically lighter than the atmoſphere, are buoyed up thereby, until they arrive at a egion where the air is in a juſt balance with them; and here they float, till by ſome new agent they are converted into clouds, and thence either into rain, ſnow, hail, miſt, or the like.

But the agent in this formation of the clouds into *rain*, &c. is a little controverted; the generality will have it the cold, which, conſtantly occupying the ſuperior regions of the air, chills and condenſes the veſiculæ, at their arrival from a warmer quarter; congregates them together, and occaſions ſeveral of them to coaleſce into little maſſes: and by this means their quantity of matter increaſing in a greater proportion than their ſurface, they become an overload to the thin air, and accordingly they deſcend in *rain*.

Dr. Derham accounts for the precipitation, hence; that the veſiculæ being full of air, when they meet with a colder air than that they contain, their internal air is contracted into a leſs ſpace; and conſequently the watry ſhell or caſe, is rendered thicker, ſo as to become heavier than the air, &c.

Others only allow the cold a part in the action, and bring in the winds as ſharers with it: indeed it is clear, that a wind blowing againſt a cloud will drive its veſiculæ upon one another, by which means ſeveral of them, coaleſcing as before, will be enabled to deſcend; and the effect will be ſtill more conſiderable, if two oppoſite winds blow together toward the ſame place. Add to this, that clouds already formed, happening to be aggravated by freſh acceſſions of vapour, continually aſcending, may thence be enabled to deſcend.

Yet the grand cauſe, according to Rohault, is ſtill behind: that author conceives it to be the heat of the air, which after continuing for ſome time near the earth, is at length carried up on high by a wind, and there thawing the ſnowy villi, or flocks of the half-frozen veſiculæ, it reduces them into drops; which coaleſcing, deſcend, and have their diſſolution perfected in their progreſs through the lower and warmer ſtages of the atmoſphere.

Others, as Dr. Clarke, &c. aſcribe this deſcent of the clouds rather to an alteration of the atmoſphere than of the veſiculæ; and ſuppoſe it to ariſe from a diminution of the ſpring, or elaſtic force of the air.

This elaſticity, which depends chiefly or wholly on the dry terrene exhalations, being weakened, the atmoſphere ſinks under its burden, and the clouds fall, on the common principle of precipitation.

Now, the little veſiculæ, by any or all theſe means, being once upon the deſcent, will perſiſt therein, notwithſtanding the increaſe of reſiſtance they every moment meet with in their progreſs through ſtill denſer and denſer parts of the atmoſphere.

For, as they all tend toward the ſame point, viz. the centre of the earth, the farther they fall, the more coalitions will they make; and the more coalitions, the more matter will there be under the ſame ſurface; the ſurface only increaſing as the ſquares, but the ſolidity as the cubes; and the more matter under the ſame ſurface, the leſs friction or reſiſtance there will be to the ſame matter.

Thus, if the cold, the wind, &c. happen to act early enough to precipitate the aſcending veſiculæ, before they are arrived at any conſiderable height, the coalitions being few in ſo ſhort a deſcent, the drops will be proportionably ſmall: and thus is formed what we call *dew*.

If the vapours prove more copious, and riſe a little higher, we have a *miſt* or *fog*.

A little higher ſtill, and they produce a *ſmall rain*, &c. If they neither meet with cold, nor wind enough to condenſe or diſſipate them, they form a heavy, thick, dark ſky; which laſts ſometimes ſeveral weeks.

Hence we may account for many of the phenomena of the weather; e. gr. why a cold is always a wet ſummer; and a warm a dry one; becauſe the principle of precipitation obtains in the one caſe, and is wanting in the other. Why we have ordinarily moſt *rain* about the equinoxes; becauſe the vapours ariſe more plentifully than ordinary in the ſpring, as the earth becomes looſened from the brumal conſtipations; and becauſe, as the ſun recedes from us in autumn, the cold increaſing, the vapours that had lingered above during the ſummer heats, are now diſpatched down, &c. Why a ſettled, thick, cloſe ſky ſcarce ever *rains* till it have been firſt clear; becauſe the equally diffuſed vapours muſt firſt be condenſed, and congregated into ſeparate clouds, to lay the foundation of *rain*; by which means the reſt of the face of heaven is left open, and pervious to the rays of the ſun, &c.

For other phenomena of *rain*, as they relate to the weather-glaſs, ſee BAROMETER.

For a more particular account of the generally received theory for explaining the aſcent of vapours, the formation of clouds, and the fall of *rain*, ſee EVAPORATION.

Beſides the cauſes of *rain* mentioned above, Deſaguliers thinks it owing to the loſs of electricity in the vapours whereof the clouds are formed.

Other writers, in the progreſs of this part of philoſophical ſcience, have conſidered *rain* as an electrical phenomenon: or at leaſt they have ſuppoſed, that the powers of electricity may concur with other cauſes in producing it. See EVAPORATION. Signior Beccaria, whoſe obſervations on the general ſtate of electricity in the atmoſphere have been more extenſive and accurate than thoſe of any other perſon, reckons *rain*, HAIL, and SNOW among the effects of a moderate electricity in the atmoſphere. Clouds that bring *rain*, he thought, were produced in the ſame manner as thunder clouds, only by a moderate electricity. He deſcribes them at large, and the reſemblance which all their phenomena bear to thoſe of thunder clouds is very ſtriking. He notes ſeveral circumſtances attending *rain* without lightning, which render it probable, that it is produced by the ſame cauſe as when it is accompanied with lightning. Light has been ſeen among the clouds by night in rainy weather; and even by day rainy clouds are ſometimes ſeen to have a brightneſs evidently independent of the ſun. The uniformity with which the clouds are ſpread, and with which the *rain* falls, he thought were evidences of an uniform cauſe like that of electricity. The intenſity alſo of electricity in his apparatus generally correſponded very nearly to the quantity of *rain* that fell in the ſame time. Sometimes all the phenomena of thunder, lightning, hail, *rain*, ſnow, and wind have been obſerved at one time; which ſhews the connection they all have with ſome common cauſe. Signior Beccaria therefore ſuppoſes, that, previous to *rain*, a quantity of electric matter eſcapes out of the earth, in ſome place where there was a redundancy of it; and in its aſcent to the higher regions of the air, collects and conducts into its path a great quantity of vapours. The ſame cauſe, that collects, will condenſe them more and more; till, in the places of the neareſt intervals, they come almoſt into contact, ſo as to form ſmall drops; which, uniting with others as they fall, come down in *rain*. The *rain* will be heavier in proportion as the electricity is more vigorons, and the cloud approaches more nearly to a thunder cloud. He imitated the appearance of clouds that bring *rain* by inſulating himſelf between the rubber and conductor of his electrical machine; and with one hand dropping colophonia into a ſpoon faſtened to the conductor, and holding a burning coal, while his other hand communicated with the rubber. In theſe circumſtances the ſmoak ſpread along his arm, and, by degrees, all over his body, till it came to the other hand that communicated with the rubber. The lower ſurface of this ſmoke was every where parallel to his cloaths, and the upper ſurface was ſwelled and arched like clouds replete with thunder and *rain*. In this manner, he ſuppoſes, the clouds that bring *rain* diffuſe themſelves from over thoſe parts of the earth which abound with electric fire, to thoſe parts that are exhauſted of it; and by letting fall their *rain*, reſtore the equilibrium between them. Signior Beccaria alſo thought, that the electricity communicated to the air, which both receives and parts with it ſlowly, would account for the retention of vapours in a clear ſky; for ſmall disjointed clouds, not diſperſed into *rain*; for the ſmaller and lighter clouds in the higher regions of the air, which are but little affected by electricity; and alſo for the darker, heavy, and ſluggiſh clouds in the lower regions, which retain more of it. He even imagined, that ſome alteration in the weight of the air might be made by this electricity of it: the phenomena of *rain*, he thought, favoured the ſuppoſition, that the electric matter in the air did, in ſome meaſure, leſſen its preſſure: for when the electric matter is actually in the air, collecting and condenſing the vapours, the barometer is loweſt. When the communication is made between the earth and the clouds by the rain, the quickſilver begins to riſe; the electric matter, which ſupported part of the preſſure, being diſcharged. Lettere dell Elettriciſmo. Prieſtley's Hiſt. &c. of Electricity, vol. i. p. 427, &c. 8vo.

As to the general *quantity* of rain that falls, and its proportion in ſeveral places at the ſame time, and in the ſame place at ſeveral times, we have many obſervations, journals, &c. in the Memoirs of the French Academy, the Philoſ. Tranſ. &c. an idea whereof may not be unacceptable. See an obſervation neceſſary to be regarded in all experiments of this kind under EVAPORATION.

Upon meaſuring, then, the *rain* falling yearly, its depth, at a medium, is found as in the following table:

Depth of Rain *falling yearly, and its proportion in ſeveral places.*

	Inches.
At Townley, in Lancaſhire, obſerved by Mr. Townley	42½
Upminſter, in Eſſex, by Dr. Derham - - -	19¼
Zurich, in Swiſſerland, by Dr. Scheuchzer - -	32¼
Piſa in Italy, by Dr. Mich. Ang. Tilli - - -	43¼
Paris, in France, by M. de la Hire - - -	19
Liſle, in Flanders, by M. de Vauban - - -	24

	At Upminſter.		At Paris.	
1700	19 Inch.	.03	21 Inch.	.37
1701	18	.69	27	.77
1702	20	.38	17	.45
1703	23	.99	18	.51
1704	15	.80	21	.20
1705	16	.93	14	.82

From the Meteorological Journal of the Royal Society, kept by order of the preſident and council, it appears that the whole quantity of *Rain* at London, in each of the years ſpecified below, was as follows: viz.

				Inches.	
1774	-	-	-	26	.328
1775	-	-	-	24	.083
1776	-	-	-	20	.354
1777	-	-	-	25	.371
1778	-	-	-	20	.772
1779	-	-	-	26	.785
1780	-	-	-	17	.313

Proportion of the Rain *of the ſeveral ſeaſons to one another.*

1708	Depth at Piſa. Inch.	Depth at Upminſ. Inch.	Depth at Zurich. Inch.	1708	Depth at Piſa. Inch.	Depth at Upminſ. Inch.	Depth at Zurich. Inch.
Jan.	6 .41	2 .88	1 .64	July	0 .00	1 .11	3 .50
Feb.	3 .28	0 .46	1 .65	Aug.	2 .27	2 .94	3 .15
Mar.	2 .65	2 .03	1 .51	Sept.	7 .21	1 .46	3 .02
April	1 .25	0 .06	4 .69	Oct.	5 .33	0 .23	2 .44
May	3 .33	2 .02	1 .91	Nov.	0 .13	0 .86	0 .62
June	4 .90	2 .32	5 .91	Dec.	0 .00	1 .07	2 .62
Half Year	21 .82	10 .67	17 .31	Half Year	14 .94	8 .57	15 .35

See Philoſ. Tranſ. abr. vol. iv. p. ii. p. 81. &c. and alſo Meteorological Journal of the Royal Society, publiſhed annually in the Phil. Tranſ.

As to the uſe of *rain*, we may obſerve, that it moiſtens and ſoftens the earth, and thus fits it for affording nouriſhment to plants; by falling on high mountains, it carries down with it many particles of looſe earth, which ſerve to fertilize the ſurrounding valleys, and purifies the air from noxious exhalations, which tend in their return to the earth to meliorate the ſoil; it moderates the heat of the air; and is one means of ſupplying fountains and rivers. However, vehement *rains* in many countries are found to be attended with barrenneſs and poorneſs of the lands, and miſcarriage of the crops in the ſucceeding year: and the reaſon is plain; for theſe exceſſive ſtorms waſh away the fine mould into the rivers, which carry it into the ſea, and it is a long time before the land recovers itſelf again. The remedy to the famine, which ſome countries are ſubject to from this ſort of miſchief, is the planting large orchards and groves of ſuch trees, as bear eſculent fruit; for it is an old obſervation, that in years, when grain ſucceeds worſt, theſe trees produce moſt fruit of all. It may partly be owing to the thorough moiſtening of the earth, as deep as their roots go, by theſe rains, and partly to their trunks ſtopping part of the light mould carried down by the rains, and by this means furniſhing themſelves with a coat of new earth. Phil. Tranſ. N° 90.

Rains, *preternatural.* We have numerous accounts in hiſtorians of *preternatural rains*, ſuch as the *raining* of ſtones, of duſt, of blood, nay, and of living animals, as young frogs, and the like. We are not to doubt the truth of what thoſe who are authors of veracity and credit relate to us of this kind, ſo far as to ſuppoſe that the falling of ſtones and duſt never happened; the whole miſtake is the ſuppoſing them to have fallen from the clouds; but as to the blood and frogs, it is very certain that they never fall at all, but the opinion has been a mere deception of the eyes. Men are extremely fond of the marvellous in their relations; but the judicious reader is to examine ſtrictly whatever is reported of this kind, and is not to ſuffer himſelf to be deceived.

There are two natural methods by which quantities of ſtones and duſt may fall in certain places, without their having been generated in the clouds, or fallen as *rain*. The one is by means of hurricanes: the wind which we frequently ſee tearing off the tiles of houſes, and carrying them to conſiderable diſtances, being equally able to take up a quantity of ſtones, and drop them again at ſome other place. But the other, which is much the moſt powerful, and probably the moſt uſual way, is for the eruptions of volcanos, and burning mountains, to toſs up, as they frequently do, a vaſt quantity of ſtones, aſhes, and cinders, to an immenſe height in the air; and theſe being hurried away by the hurricanes and impetuous winds, which uſually accompany thoſe eruptions, and being in themſelves much lighter than common ſtones, as being half calcined, may eaſily be thus carried to vaſt diſtances, and their falling in places where the inhabitants know nothing of the occaſion, they cannot but be ſuppoſed by the vulgar to fall on them from the clouds. It is well known, that in the great eruptions of Ætna and Veſuvius, ſhowers of aſhes, duſt, and ſmall cinders, have been ſeen to obſcure the air, and overſpread the ſurface of the ſea for a great way, and cover the decks of ſhips; and this at ſuch a diſtance, as it ſhould appear ſcarce conceivable that they ſhould have been carried to; and probably, if the accounts of all the ſhowers of theſe ſubſtances mentioned by authors be collected, they will all be found to have fallen within ſuch diſtances of volcanos; and if compared, as to the time of their falling, will be found to correſpond in that alſo with the eruptions of thoſe mountains. We have known inſtances of the aſhes from Veſuvius having been carried thirty, nay forty leagues, and peculiar accidents may have carried them yet farther.

The *raining* of blood has been ever accounted a more terrible ſight, and a more fatal omen, than the other *preternatural rains* already mentioned. It is very certain that nature forms blood no where but in the veſſels of animals, and therefore ſhowers of it from the clouds are by no means to be credited. Thoſe who ſuppoſe that what has been taken for blood, has been actually ſeen falling through the air, have had recourſe to flying inſects for its origin, and ſuppoſe it the eggs or dungs of certain butterflies diſcharged from them as they were high up in the air. But this ſeems a very wild conjecture, as we know of no butterfly whoſe excrements, or eggs, are of ſuch a colour, or whoſe abode is ſo high, or their flocks ſo numerous, as to be the occaſion of this.

It is moſt probable that theſe bloody waters were never ſeen falling, but the people ſeeing the ſtanding waters blood-coloured, were aſſured, from their not knowing how it ſhould elſe happen, that it had *rained* blood into them. A very memorable inſtance of this there was at the Hague in the year 1670. Swammerdam, who relates it, tells us, that one morning the whole town was in an uproar on finding their lakes and ditches full of blood, as they thought, and having been certainly full of water the night before, they agreed it muſt have *rained* blood in the night; but a certain phyſician went down to one of the canals, and taking home a quantity of this blood-coloured water, he examined it by the microſcope, and found that the water was water ſtill, and had not at all changed its colour, but that it was full of prodigious ſwarms of ſmall red animals, all alive, and very nimble in their motions, whoſe colour and prodigious number gave a red tinge to the whole body of the water they lived in, on a leſs accurate inſpection. The certainty that this was the caſe, did not however perſuade the Hollanders to part with the miracle; they prudently concluded, that the ſudden appearance of ſuch a number of animals was as great a prodigy as the *raining* of blood would have been; and are aſſured at this day, that this portent foretold the ſcene of war and deſtruction which Lewis the Fourteenth afterwards brought into that country, which had before enjoyed forty years uninterrupted peace.

The animals which thus colour the water of lakes and ponds, are the *pulices arboreſcentes* of Swammerdam, or the water-fleas with branched horns. Theſe creatures are of a reddiſh yellow, or flame colour; they live about the ſides of ditches, under weeds, and among the mud, and are therefore the leſs viſible, except at a certain time, which is in the end of May or beginning of June; it is at this time that theſe little animals leave their receſſes to float looſe about the water, to meet for the propagation of their ſpecies, and by that means become viſible in the colour they give the water. This is viſible, more or leſs, in one part or other of almoſt all ſtanding-waters at this ſeaſon; and it is always at this ſeaſon that the bloody waters have alarmed the ignorant.

The *raining* frogs is a thing not leſs wonderful in the accounts of authors who love the marvellous, than thoſe of blood or of ſtones; and this is ſuppoſed to happen ſo often that there are multitudes who pretend to have been eye-witneſſes of it. Theſe *rains* of frogs always happen after very dry ſeaſons, and are much more frequent in the hotter countries than the cold ones. In Italy they are very frequent; and it is not uncommon to ſee the ſtreets of Rome ſwarming both with young frogs and toads in an inſtant, in a ſhower of *rain*; they hopping every where between the people's legs as they walk, though there was not the leaſt appearance of them before. Nay, they have been ſeen to fall through the air down upon the pavements. This ſeems a ſtrong circumſtance in favour of their being *rained* down from the clouds, but when ſtrictly examined, it comes to nothing; for theſe frogs that are ſeen to fall, are always found dead, lamed, or bruiſed by the fall, and never hop about as the reſt; and they are never ſeen to fall, except cloſe under the walls of houſes, from the roofs and gutters of which they have accidentally ſlipped down.

To the *raining* of frogs we ought to add the *raining* of graſhoppers and locuſts, which have ſometimes appeared in prodigious numbers, and devoured the fruits of the earth. There has not been the leaſt pretence for the ſuppoſing that theſe animals deſcended from the clouds, but that they appeared on a ſudden in prodigious numbers. The naturaliſt, who knows the many accidents attending the eggs of theſe, and other the like animals, cannot but know that ſome ſeaſons will prove particularly favourable to the hatching them, and the prodigious number of eggs that many inſects lay, could not but every year bring us ſuch abundance of the young, were they not liable to many accidents, and had not provident nature taken care, as in many plants, to continue the ſpecies by a very numerous ſtock of ſeeds, of which perhaps not one in five hundred need take root, in order to continue an equal number of plants.

The *raining* of fiſhes has been a prodigy alſo much talked of in France, where the ſtreets of a town at ſome diſtance from Paris, after a terrible hurricane in the night, which tore up trees, blew down houſes, &c. were found in a manner covered with fiſhes of various ſizes. No body here made any doubt of theſe having fallen from the clouds; nor did the abſurdity of fiſh, of five or ſix inches long, being generated in the air, at all ſtartle the people, or ſhake their belief in the miracle, till they found upon enquiry that a very well ſtocked fiſh-pond, which ſtood on an eminence in the neighbourhood, had been blown dry by the hurricane, and only the great fiſh left at the bottom of it, all the ſmaller fry having been toſſed into their ſtreets.

Upon the whole, all the ſuppoſed marvellous *rains* have been owing to ſubſtances naturally produced on the earth, and either never having been in the air at all, or only carried thither by accident.

Rain, *freezing*. See Freezing.

Rain-*fowl*, an Engliſh name given by many to the common green wood-pecker, or *picus viridis*, from an obſervation that it is always moſt clamorous when *rainy* weather is coming on. The Latins have, for the ſame reaſon, called it the *pluvialis avis*.

Rain-*water*. See Water.

Rains, in the *Sea-Language*, denote all that tract of ſea to the northward of the equator, between 4 and 10 degrees of latitude; and lying between the meridian of Cape Verde and that of the eaſtermoſt iſlands of the ſame name.

It takes its name from the almoſt continual calms, conſtant *rains*, and thunder and lightning, to a great degree, always found there. The winds, when they do blow, are only ſmall uncertain guſts, and ſhift about all round the compaſs; ſo that ſhips are ſometimes here detained a long while, and can make but very little way.

RAINBOW, *iris*, or, ſimply, the *bow*, a meteor in form of a party-coloured arch, or ſemicircle, exhibited in a rainy ſky, oppoſite to the ſun, by the refraction of his rays in the drops of falling rain.

There is alſo a ſecondary, or fainter *bow*, uſually ſeen inveſting the former at ſome diſtance. Among naturaliſts, we alſo read of *lunar rainbows*, *marine rainbows*, &c.

The *rainbow*, ſir Iſaac Newton obſerves, never appears but where it rains in the ſun-ſhine; and it may be repreſented artificially, by contriving water to fall in little drops, like rain, through which the ſun ſhining, exhibits a *bow* to a ſpectator placed between the ſun and the drops; eſpecially if a dark body, e. gr. a black cloth, be diſpoſed beyond the drops.

That the *rainbow* is oppoſite to the ſun, has always been obſerved. It was, therefore, natural to imagine, that the colours of it were produced by ſome kind of reflexion of the rays of light from drops of rain or vapour. The regular order of the clouds was another circumſtance that could not have eſcaped the notice of any perſon. But though mere reflexion had in no other caſe been obſerved to produce colours, and it could not but have been obſerved that refraction is frequently attended with that phenomenon, yet no perſon ſeems to have thought of having recourſe to a proper refraction in this caſe before one Fletcher of Breſlaw, who, in a treatiſe which he publiſhed in 1571, endeavoured to account for the colours of the *rainbow* by means of a double refraction, and one reflexion. But he imagined that a ray of light, after entering a drop of rain, and ſuffering a refraction, both at its entrance and exit, was afterwards reflected from another drop, before it reached the eye of the ſpectator. He ſeems to have overlooked the reflexion at the farther ſide of the drop, or to have imagined that all the bendings of the light within the drop would not make a ſufficient curvature, to bring the ray of the ſun to the eye of the ſpectator. Antonio de Dominis, biſhop of Spalato, whoſe treatiſe De Radiis Viſus et Lucis, was publiſhed by J. Bartolus in 1611, was the firſt perſon who advanced, that the double refraction of Fletcher, with an intervening reflexion, was ſufficient to produce the colours of the *rainbow*, and alſo to bring the rays that formed them to the eye of the ſpectator, without any ſubſequent reflexion. He diſtinctly deſcribes the progreſs of a ray of light entering the upper part of the drop, where it ſuffers one refraction, and after being thereby thrown upon the back part of the inner ſurface, is from thence reflected to the lower part of the drop; at which place undergoing a ſecond refraction, it is thereby bent ſo as to come directly to the eye. To verify this hypotheſis, he procured a ſmall globe of ſolid glaſs, and viewing it when it was expoſed to the rays of the ſun, in the ſame manner in which he had ſuppoſed that the drops of rain were ſituated with reſpect to them, he actually obſerved the ſame colours which he had ſeen in the true *rainbow*, and in the ſame order. The theory of A. de Dominis was adopted, and in ſome degree improved, by Deſcartes. Philoſophers were, however, for a long time at a loſs when they endeavoured to aſſign reaſons for all the particular colours, and for the order of them. Indeed, nothing but the doctrine of the different refrangibility of the rays of light, which was a diſcovery reſerved for the great ſir Iſaac Newton, could furniſh a complete ſolution of this difficulty.

Rainbow, *theory of the*. To conceive the origin of the *rainbow*, let us conſider what will befall rays of light coming from a very remote body, e. gr. the ſun, and falling on a globe of water, ſuch as we know a drop of rain to be.

Suppoſe, then, ADKN (*Tab.* V. *Optics*, *fig*. 94.) to be a drop of rain, and the lines EF, BA, ON, to be rays of light coming from the centre of the ſun; which, on account of the immenſe diſtance of the ſun, we conceive to be parallel.

Now the ray BA, being the only one that falls perpendicularly on the ſurface of the water, and all the reſt obliquely, it is eaſily inferred, that all the other rays will be refracted towards the perpendicular. See Refraction. Thus the ray EF, and others accompanying it, will not go on ſtraight to G; but, as they arrive at HI, they will deflect from F to K; where ſome of them, probably, eſcaping into the air, the reſt are reflected upon the line KN, ſo as to make the angles of incidence and reflexion equal.

Farther, as the ray KN, and thoſe accompanying it, fall obliquely upon the ſurface of the globule, they cannot paſs out into the air, without being refracted, ſo as to recede from the perpendicular LM; and, therefore, they will not proceed ſtraight to Y, but will deflect to P.

It may be here obſerved, that ſome of the rays, arriving at N, do not paſs out into the air, but are again reflected to Q; where being refracted, like the reſt, they do not proceed right to Z; but, declining from the perpendicular TV, are carried to R; but ſince we here only regard the rays as they may affect the eye placed a little below the drop, e. gr. at P, thoſe which deflect from N to Q, we ſet aſide, as uſeleſs; becauſe they never come to the eye. On the contrary, it is to be obſerved, that there are other rays, as 2 3, and the like; which, being refracted from 3 to 4, and reflected to 5, and from 5 to 6, may at length, by refraction at 6, arrive at the eye 7, placed beneath the drop.

Thus much is obvious; but to determine preciſely the quantities of refraction of each ray, there muſt be a calculation; by ſuch calculation it appears, that the rays which fall on the quadrant AD, are continued in lines, like thoſe here drawn in the drop ADKN; wherein there are three things very conſiderable: firſt, that the two refractions of the rays, in their ingreſs and egreſs, are both the ſame way; ſo that the latter does not deſtroy the effect of the former. Secondly, that of all the rays paſſing out of AN, NP, and thoſe adjoining to it, are the only ones capable of affecting the ſenſe, as being ſufficiently cloſe and contiguous, and becauſe they come out parallel; whereas the reſt are diverging, and diſperſed too far to have any ſenſible effect, at leaſt to produce any thing ſo vivid as the colours of the *bow*. Thirdly, that the ray NP has ſhade or darkneſs under it; for, ſince there is no ray comes out of the ſurface N 4, it is the ſame thing as if the part were covered with an opake body. We might add that the ſame ray N P has darkneſs above it; ſince the rays that are above it are ineffectual, and ſignify no more than if there were none at all.

Add to this, that all the effectual rays have the ſame point of reflexion, i. e. the parallel and contiguous rays, which alone are effectual after refraction, will all meet in the ſame point of the circumference, and be reflected thence to the eyes.

Farther, it appears by calculation, that the angle ONP, included between the ray NP, and the line ON drawn from the centre of the ſun, which is the angle whereby the *rainbow* is diſtant from the oppoſite point of the ſun, and which makes the *ſemidiameter* of the bow, contains 41° 30'. The method of determining it ſee hereafter.

But ſince, beſide thoſe rays coming from the centre of the ſun to the drop of water, there are many more from the ſeveral points of its ſurface; there are a great many other effectual rays to be conſidered, eſpecially that from the uppermoſt, and that from the loweſt part of the ſun's body.

Since, then, the apparent diameter of the ſun is about 16 minutes, it follows, that an effectual ray from the upper part of the ſun will fall higher than the ray E F by 16 minutes: thus does the ray GH (*fig.* 95.) which, being refracted as much as EF, deflects to I, thence to L, and at length emerging equally refracted with the ray NP, proceeds to M; and makes an angle ONM, of 41° 14', with the line ON. In the like manner, the effectual ray Q R coming from the loweſt part of the ſun, falls on the point R, ſixteen minutes lower than the point F, on which the ray E F falls; and this, being refracted, declines to S, whence it is reflected to T; where, emerging into the air, it proceeds to V; ſo that the line TV, and the ray OT, contain an angle of 41° 46'. Again, upon computing the deflexions of the rays, which, like that 23 (*fig.* 94.) coming from the centre of the ſun, and being received into the lower part of the drop, we have ſuppoſed to be twice reflected, and twice refracted, and to enter the eye by lines like that 67 (*fig.* 96.) we find that which may be accounted effectual, as 67 with the line 86 drawn from the centre of the ſun, contains an angle 867, of about 52 degrees; whence it follows, that the effectual ray from the higheſt part of the ſun, with the ſame line 86, includes an angle leſs by 16 minutes; and that from the loweſt part of the ſun, an angle greater by 16 minutes.

Thus, ſince ABCDEF is the path of the efficacious ray, from the higheſt part of the ſun to the eye in F, the angle 86 F becomes of about fifty-one degrees and forty-four minutes. In like manner, ſince GHIKLM is the way of an effectual ray from the loweſt part of the ſun to the eye, the angle 86 M becomes nearly of fifty-two degrees and ſixteen minutes.

Since, then, we admit ſeveral rays to be effectual, beſides thoſe from the centre of the ſun, what we have ſaid of the *ſhade* will need ſome alteration; for of the three rays deſcribed (*fig.* 95. and 96.) only the two extreme will have a ſhadow joined to them, and that only on the outer ſide. Hence it is evident, that theſe rays are perfectly diſpoſed to exhibit all the colours of the priſm.

For the great quantity of denſe or intenſe light, i. e. the bundle of rays collected together in a certain point, v. gr. in the point of reflexion of the effectual rays, may be accounted as a lucid or radiant body, terminated all around by *ſhade*. But the ſeveral rays, thus emitted to the eye, are both of different colours; that is, they are fitted to excite in us the ideas of different colours; and are differently refracted out of the water into the air, notwithſtanding their falling alike upon the refracting ſurface.

Hence it follows, that the different or heterogeneous rays will be ſeparated from one another, and will tend ſeparate ways; and the homogeneous rays will be collected, and tend the ſame way; and, therefore, this lucid point of the drop, wherein the refraction is effected, will appear fringed or bordered with ſeveral colours; that is, *red*, *green*, and *blue* colours, will ariſe from the extremes of the red, green, and blue rays of the ſun, tranſmitted to the eye from ſeveral drops, one higher than another, after the ſame manner as is done in viewing lucid or other bodies through a priſm.

Thus, adds ſir Iſaac Newton, the rays that differ in refrangibility, will emerge at different angles; and, conſequently, according to their different degrees of refrangibility, emerging moſt copiouſly at different angles, they will exhibit different colours in different places.

A great number, then, of theſe little globules being diffuſed in the air, will fill the whole ſpace with theſe different colours; provided they be ſo diſpoſed as that effectual rays may come from them to the eye; and thus will the *rainbow*, at length, ariſe.

Now, to determine what that *diſpoſition* muſt be, ſuppoſe a right line drawn from the centre of the ſun through the eye of the ſpectator, as the line VX (*fig.* 95.) called the *line of aſpect*, or *axis of viſion*; being drawn from ſo remote a point, it may be eſteemed parallel to all other lines drawn from the ſame point; but a right line, falling on two parallels, makes the alternate angles equal.

If, then, an indefinite number of lines be imagined drawn from the ſpectator's eye to a part oppoſite to the ſun where it rains; which lines make different angles with the line of aſpect, equal to the angles of refraction of the differently refrangible rays, e. gr. angles of 41° 46', and of 41° 30', and of 41° 14'; theſe lines, falling on drops of rain illumined by the ſun, will make angles of the ſame magnitude with rays drawn from the centre of the ſun to the ſame drops. And, therefore, the lines thus drawn from the eye will repreſent the effectual rays that occaſion the ſenſation of any colour.

That, e. gr. making an angle of 41° 46', repreſenting the leaſt refrangible or red rays of the ſeveral drops, and of 41° 14', the moſt refrangible or violet rays, the intermediate colours and refrangibilities will be found in the intermediate ſpace.

Now it is known, that the eye, being placed in the vertex of a cone, ſees objects upon its ſurface, as if they were in a circle; and the eye of our ſpectator is here in the common vertex of ſeveral cones, formed by the ſeveral kinds of efficacious rays, with the line of aſpect. Now in the ſurface of that whoſe angle at the vertex, or eye, is the greateſt, and wherein the others are included, are thoſe drops, or parts of drops, which appear red; and in the ſurface of that cone whoſe angle is leaſt, are the purple drops; and in the intermediate cones, are the green, blue, &c. drops. Hence, then, ſeveral kinds of the drops muſt appear as if diſpoſed into ſo many circular coloured faſciæ, or arches, as we ſee in the *rainbow*. Rohault's Syſtem of Nat. Phil. vol. ii. part iii. cap. 17.

This part of the ſolution ſir Iſaac Newton expreſſes more artfully, thus: ſuppoſe O (*fig.* 97.) the eye, and OP a line parallel to the ſun's rays; and let P O E, P O F, be angles of 40° 17', and 42° 2'. And ſuppoſe the angles to turn about their common ſide O P, with their other ſides O E and O F, they will deſcribe the bounds, or verges, of the *rainbow*.

For, if E, F be drops placed any where in the conical ſurface deſcribed by O E, O F, and be illuminated by the ſun's rays SE, SF; the angle S E O being equal to the angle P O E, or 40° 17', ſhall be the greateſt angle in which the moſt refrangible rays can, after reflexion, be refracted to the eye; and, therefore, all the drops in the line O E ſhall ſend the moſt refrangible rays moſt copiouſly to the eye, and therefore ſtrike the ſenſes with the deepeſt violet colour in that region.

And in like manner the angle S F O being = to the angle P O F = 42° 2', ſhall be the greateſt in which the leaſt refrangible rays after one reflexion can emerge out of the drops; and theſe rays ſhall come moſt copiouſly to the eye from the drops in the line O F, and ſtrike the ſenſes with the deepeſt red colour in that region.

And, by the ſame argument, the rays which have intermediate degrees of refrangibility, ſhall come moſt copiouſly from drops between E and F, and ſo ſtrike the ſenſes with the intermediate colours, in the order which their degrees of refrangibility require; that is, in the progreſs from E to F, or from the inſide of the bow to the outſide, in this order, *violet*, *indigo*, *blue*, *green*, *yellow*, *orange*, *red*; though the violet, by the mixture of the white light of the clouds, will appear faint, and incline to a purple.

Here it may be obſerved, that all the rays but the violet in the line SE will emerge from E in a greater angle than SEO made by the violet, and conſequently will paſs below the eye; and all the rays but the red in the line SF will emerge from F in a leſs angle than SFO made by the red, and conſequently will paſs above the eye; by which means only red will appear in the line SF, and only violet in the line SE.

And, ſince the lines O E, O F, may be ſituated any where in the above mentioned conical ſurface; what is ſaid of the drops and colours of theſe lines, is to be underſtood of the drops and colours throughout the whole ſuperficies. Thus is the *primary* or *inner bow* formed.

RAINBOW, *ſecondary*, or *outer*. As to the ſecondary, or fainter *bow*, uſually ſurrounding the former, in aſſigning what drops would appear coloured, we excluded ſuch as lines drawn from the eye, making angles a little greater than 42° 2', ſhould fall upon, but not ſuch as ſhould contain angles much greater.

For, if an indefinite number of ſuch lines be drawn from the ſpectator's eye, ſome whereof make angles of 50° 57', 57′, with the line of aſpect, e. gr. O G; other angles, of 54° 7′, e. gr. O H; thoſe drops whereon theſe lines fall muſt of neceſſity exhibit colours; particularly thoſe of 50° 57′.

E. gr. The drop G will appear red; the line G O being the ſame with an effectual ray; which, after two reflexions, and two refractions, exhibits a red colour. Again, thoſe drops which receive lines of 54° 7′, e. gr. the drop H will appear purple; the line O H being the ſame with an effectual ray; which, after two reflexions and two refractions, exhibits purple.

Now there being a ſufficient number of theſe drops, it is evident there muſt be a *ſecond rainbow*, formed after the like manner as the firſt.

Thus, according to ſir Iſaac Newton, in the leaſt refrangible rays, the leaſt angle at which a drop can ſend effectual rays after two reflexions, is found by computation to be 50° 57′; and in the moſt refrangible, the leaſt angle is found 54° 7′.

Suppoſe, then, O the place of the eye, as before, and POG, POH, to be angles of 50° 57′, and 54° 7′; and theſe angles to be turned about their common ſide O P; with their other ſides O G, O H, they will deſcribe the verges, or borders of the *rainbow* C H D G.

For, if G, H be drops placed any where in the conical ſuperficies deſcribed by OG, OH, and be illuminated by the ſun's rays, the angle SGO, being equal to the angle POG, or 50° 57′, ſhall be the leaſt angle in which the then leaſt refrangible rays can, after two reflexions, emerge out of the drops; and, therefore, the leaſt refrangible rays ſhall come moſt copiouſly to the eye from the drops in the line O G, and ſtrike the ſenſes with the deepeſt red in that region.

And the angle SHO being equal to POH, 54° 7′, ſhall be the leaſt angle in which the moſt refrangible rays, after two reflexions, can emerge out of the drops; and, therefore, thoſe rays ſhall come moſt copiouſly to the eye from the drops in the line OH, and ſo ſtrike the ſenſes with the deepeſt violet in that region.

And, by the ſame argument, the drops in the region, between G and H, ſhall ſtrike the ſenſes with the intermediate colours, in the order which their degrees of refrangibility require; that is, in the progreſs from G to H, or from the inſide of the bow to the outer, in this order: *red*, *orange*, *yellow*, *green*, *blue*, *indigo*, *violet*.

And ſince the lines OG, OH, may be ſituated any where in the conical ſurface; what is ſaid of the drops and colours in theſe lines is to be underſtood of the drops and colours every where in this ſuperficies.

Thus are formed two bows, an *interior* and ſtronger, by one reflexion; and an *exterior* and fainter, by two; the light becoming weaker and weaker by every reflexion.

Their colours will lie in a contrary order to one another; the firſt having the red without, and the purple within; and the ſecond, the purple without, and red within; and ſo of the reſt.

Rainbow, *artificial*. This doctrine of the *rainbow* is confirmed by an eaſy experiment; for upon hanging up a glaſs globe, full of water, in the ſun-ſhine, and viewing it in ſuch a poſture as that the rays, which come from the globe to the eye, may, with the ſun's rays, include an angle either of 42°, or 50°; if, e. gr. the angle be about 42°, the ſpectator, ſuppoſed at O, will ſee a full red colour in that ſide of the globe oppoſite to the ſun, as at F. And if that angle be made a little leſs, ſuppoſe by depreſſing the globule to E, the other colours, yellow, green, and blue, will appear ſucceſſively, in the ſame ſide of the globe, alſo exceedingly bright.

But if the angle be made about 50°, ſuppoſe by raiſing the globule to G, there will appear a red colour in that ſide of the globe towards the ſun, though ſomewhat faint; and if the angle be made greater, ſuppoſe by raiſing the globe to H, this red will change ſucceſſively to the other colours, yellow, green, and blue.

The ſame thing is obſerved in letting the globe reſt, and raiſing or depreſſing the eye ſo as to make the angle of a juſt magnitude. Newton's Optics, part ii. prop. 9 prob. 4. p. 147, ed. 3.

Rainbow, *dimenſion of the*. Deſcartes firſt determined its diameter by a tentative and indirect method; laying it down, that the magnitude of the bow depends on the degree of refraction of the fluid; and aſſuming the ratio of the ſine of incidence to that of refraction, to be in water as 250 to 187.

But Dr. Halley has ſince, in the Philoſophical Tranſactions, N° 267, given us a ſimple direct method of determining the diameter of the *rainbow* from the ratio of refraction of the fluid being given; or, *vice verſa*, the diameter of the *rainbow* being given, to determine the refractive power of the fluid.

The principles of Dr. Halley's conſtruction for this purpoſe, illuſtrated and facilitated by Dr. Morgan, biſhop of Ely, will be underſtood from the following view of them. Let SN, sn (*Tab.* V. *Optics*, *fig.* 98.) be two of the efficacious rays incident upon a drop of rain; theſe when refracted to the ſame point F, and thence reflected to G, g, will have the parts within the drop on one ſide NF, nF, equal to thoſe on the other ſide FG, Fg, from the nature of the circle, and becauſe the angles of incidence CFN, CFn, are equal to the angles of reflexion CFG, CFg. And ſince the parts within the drop are equal and alike ſituated, they will be ſimilarly ſituated with regard to the drop itſelf; and conſequently as the incident rays SN, Sn, are ſuppoſed to be parallel, the emergent rays GR, gr, will be alſo parallel. From C the centre, draw the radii CN, Cn, CF, then will $CNF = CFN$, be the angle of refraction, and the ſmall arc Nn is the naſcent increment of the angle of incidence BCN; and as it meaſures the angle at the centre NCn, it is double of the angle at the circumference upon the ſame arc, viz. NFn, which is the naſcent increment of the angle of refraction NFC. Farther, let the ray SN (*fig.* 99.) enter the lower part of the drop, and be twice reflected within the drop at F and G; then is the ray NF equal to the ray FG, and the arc $NF =$ the arc FG. Draw fg parallel to FG, and it will be the reflected part of ſome ray sn, whoſe obliquity to the drop makes it croſs the ray NF in its refraction; then will the part $nf = fg$, and the arc $nf = fg$, and the ſmall arc $Ff = Gg$. Therefore, $2Ff = (Ff + Gg = \text{the arc } FG - fg = NF - nf =)\ Nn - Ff$; conſequently $Nn = 3Ff$, i. e. the naſcent increment of the angle of incidence is equal to three times that of the angle of refraction. After a like manner it may be ſhewn, that after three, four, five, &c. reflexions, the increment of the angle of incidence will be four, five, ſix, &c. times greater than that of the angle of refraction. Hence, in order to find the angle of incidence of an efficacious ray, after any given number of reflexions, we are to find an angle whoſe naſcent increment has the ſame ratio to the increment of its correſponding angle of refraction, generated in the ſame time, as the given number of reflexions (n) increaſed by unity has to unity; i. e. as $n + 1$ to 1. But theſe increments are as the tangents of the reſpective angles directly. For, let ACD, ABD (*fig.* 100.) be the angles of incidence and refraction propoſed; and if we ſuppoſe the line AC to move about the point A in the plane of thoſe angles, the extremity of it, C, will deſcribe the circular arc Cc; and when AC is arrived at the ſituation Ac, the line BD will be thereby removed into the ſituation Bd. Draw cD, then is the angle $ACD = ABC + CAB$, and the angle $Acd = ABc + cAB$; therefore the exceſs of Acd above ACD, or the increment of ACD, is equal to both the angles CBc and CAc. But ſince the angle AcC differs infinitely little from a right one, a circle deſcribed on the diameter AC ſhall paſs through the points D and c; and, therefore, the angles CAc, CDc (inſiſting on the ſame arc Cc of the ſaid circle) will be equal; and, therefore, the increment of the angle ACD is equal to $CBc + CDc = Dcd$. But the naſcent angles Dcd and DBc are as their ſines, that is, as their oppoſite ſides BD and $Dc = DC$, the angle CDc being infinitely ſmall; but $BD : CD :: DE : DA$ (the line BE being parallel to AC) :: tangent of the angle $EBD = ACD$: tangent of the angle ABD. Therefore the increment Dcd of the angle ACD is to the increment CBc of the angle ABD (generated in the ſame time) as the tangent of the former to the tangent of the latter directly. Hence the praxis is as follows:

Firſt, *The ratio of the ſine of incidence* I *to the ſine of refraction* R *being given*; *to find the angles of incidence, and refraction of a ray, which becomes effectual after any given number (n) of reflexions.* Suppoſe any given line as AC (*fig.* 101.) which divide in D; ſo as that $AC : AD :: I : R$; and again divide it in E, ſo that AC may be to AE as the given number of reflexions, increaſed by unity, is to unity; i. e. as $n + 1 : 1$. Upon the diameter CE deſcribe a ſemicircle CBE, and from the centre A, with the radius AD, deſcribe an arc DB interſecting the ſemicircle in B; then drawing AB, CB, and letting fall the perpendicular AF on CB produced; ABC, or its complement to two right angles, ABF, will be the angle of incidence; and ACB the angle of refraction required. For, drawing BE parallel to AF, the triangles ACF and ECB are ſimilar. Now the ſine of the angle ABC, or ABF, is to the ſine of ACB as AC to $AB = AD$, i. e. as I to R; therefore if ABF be the angle of incidence, ACF will be the angle of refraction. Moreover, the naſcent increment of ABF is to that of ACB (generated in the ſame time) as $CF : BF :: CA : AE$, on account of the ſimilar triangles; i. e. as $n + 1$ to 1, by conſtruction. The ratio, therefore, of the naſcent increment of the angle of incidence ABF to that of the angle of refraction ACB, is that which is required in the angles of incidence and refraction of an efficacious ray, after a given number of reflexions; conſequently the angles ABF and ACF, are thoſe required. From this conſtruction we may eaſily deduce ſir Iſaac Newton's rule for finding the angle of incidence ABF. See his Optics, p. 148, 149.

For AC : AB :: I : R; whence $AC = \frac{I}{R} \times AB$; and CF : BF :: $n + 1 : 1$; therefore $CF = \overline{n+1} \times BF$; or (putting $n + 1 = m$) $CF = m \times BF$; and, on account of the right angle at F, $AC^2 - CF^2 = AB^2 - BF^2$, i. e. $\frac{II}{RR} AB^2 - m^2 BF^2 = AB^2 - BF^2$; and, therefore, $m^2 BF^2 - BF^2 = \frac{II}{RR} AB^2 - AB^2$; and, conſequently, $\frac{BF}{AB} = \sqrt{\frac{II - RR}{m^2 R^2 - R^2}}$. Hence, becauſe in the firſt bow, the ray emerges after one reflexion, we have $n = 1$, $m = 2$, $m^2 = 4$, and $m^2 - 1 = 3$; therefore, $\sqrt{3RR} : \sqrt{II - RR}$ :: AB : BF :: radius : coſine of the angle of incidence. In the ſecond bow, where there are two reflexions, $m^2 - 1 = 8$; whence $\sqrt{8RR} : \sqrt{II - RR}$ :: AB : BF. In the third bow, after three reflexions, $m^2 - 1 = 15$; and $\sqrt{15RR} : \sqrt{II - RR}$ :: AB : BF, and ſo on for any given number of reflexions. Wherefore, ſuppoſing the ratio of refraction to be, as ſir Iſaac Newton has determined it, viz. as 108 to 81 in the red rays, and as 109 to 81 in the violet rays; we ſhall have I (in the leaſt refrangible rays) $= 108$, $II = 11664$; and $R = 81$, and $RR = 6561$, and $I^2 - R^2 = 5103$, $\sqrt{3RR} = 140{,}3$ and $\sqrt{I^2 - R^2} = 71{,}4$: therefore,

As $\sqrt{3RR} = 140{,}3$, whoſe logarithm is	2,147045
Is to $\sqrt{I^2 - R^2} = 71{,}4$ - - - - - - -	1,853913
So is radius - - - - - - - - - - - -	10,000000
To the coſine of the angle of incidence, BAF = 30° 37′ - - -	9,706868

Hence the angle of incidence ABF is 59° 23′, in the red rays.

Secondly, *Having given the angle of incidence, and the ratio of* I *to* R, *or of refraction; to find the angle which a ray of light emerging out of a refracting ſphere, after a given number of refractions, makes with the axis of viſion, or an incident ray; and, conſequently, to find the diameter of the rainbow.* The angle of incidence, and the ratio of refraction, being given, the angle of refraction is given; which angle being multiplied by double the number of reflexions increaſed by 2, and double the angle of incidence ſubtracted from the product, the angle remaining is the angle ſought.

In order to find the angle of refraction, ſay

As I = 108, whoſe logarithm is - - -	2.033424
Is to R = 81 - - - - - -	1.908485
So is the ſine of incidence 59° 23′ - - -	9.934798
To the ſine of the angle of refraction 40° 12′	9.809859

Then, making the angle CNF (*fig.* 102.) = 40° 12′, NF will be the refracted ray, which at F is reflected into FG, and at G emerges in GR. Produce the incident and emergent rays SN and RG, till they interſect each other at X, and as CF biſects the angle NFG, it will, if produced, biſect the angle SXR. Then $CFN = CXN + FNX$; but $FNX = CNX - CNF$, or CFN; therefore $CFN = CXN + CNX - CFN$; that is, $2\,CFN - CNX = CXN$; or $80°\,24' - 59°\,23' = 21°\,1' = CXN$; therefore $2\,CXN = SXR = 42°\,2'$, which is the meaſure of the angle that the incident and emerging rays, which are the leaſt refrangible, contain with each other. If inſtead of the ratio 108 to 81, we take that of 109 to 81, we ſhall find the values of $\sqrt{3RR}$, and $\sqrt{I^2 - R^2}$, ſuch as will give the angle of incidence BCN, and the arc BN = 58° 40′, and the angle SXR = 40° 17′, for the moſt refrangible, or extreme violet rays.

If the ray be twice reflected, viz. at F and G, as in the production of the extreme bow, and emerges at H in the direction HA, interſecting the incident ray SN in Y, we may find the angle AYS thus: produce AH till it meets GX, produced in R; then in the triangle HGR, the external angle $HGX = HRG + GHR$. But becauſe of equal angles of reflexion at F and G, $GHR = FGX$, therefore $HGX - FGX = HGF = HRG = 2\,CGF$, or CNF. But $SXR = 4\,CNF - 2\,CNX$; therefore in the triangle YXR we have the two internal angles $R + X = 6\,CNF - 2\,CNX =$ the external angle at Y, viz. AYN. In this caſe, to find the angles of incidence and refraction, we have $\sqrt{8RR} : \sqrt{I^2 - R^2}$ :: radius : coſine of the angle of incidence; whence the ſaid angle will be found 71° 50′ = CNX. And as 108 : 81 :: ſine of 71° 50′ : ſine of 45° 27′ = CNF, the angle of refraction; therefore $\overline{6 \times 45°\,27'} - \overline{2 \times 71°\,50'} = 129°\,3' = AYN$; and, therefore, its complement AYS = 50° 57′, the angle required for the leaſt refrangible rays. But for the moſt refrangible rays, where I : R :: 109 : 81, we have the angle of incidence 71° 26′, and the angle of refraction 44° 47′; and, therefore, the angle AYS = 54° 7′. In the ſame manner the ſame angles are calculated after three or four reflexions.

From the preceding problems we obtain the following reſults, viz.

I. Rainbow,	Red	42°	2′	The ſpectator's back being turned to the ſun.
	Violet	40	17	
II. Rainbow,	Red	50	57	
	Violet	54	7	

If the angle made by a ray, after three or four reflexions, were required, and therefore the diameters of the third and fourth *rainbow* (which are ſcarce ever ſeen, on account of the great diminution of the rays, by ſo many repeated reflexions) they will be found,

III. Rainbow,	Red	41°	37′	The ſpectator being turned towards the ſun.
	Violet	37	9	
IV. Rainbow,	Red	43	52	
	Violet	49	34	

Dr. Morgan's Diſſertation upon the *Rainbow*, among the notes upon Rohault's Syſtem of Philoſophy, part iii. chap. xvii.

Hence, the *breadth of the rainbows* is eaſily found: for the greateſt ſemidiameter of the firſt bow, i. e. from red to red, being 42° 2′, and the leaſt, viz. from violet to violet, 40° 17′, the breadth of the *faſcia* or *bow*, meaſured acroſs from red to violet, will be 1° 45′; and the greateſt diameter of the ſecond bow being 54° 7′, and the leaſt 50° 57′, the breadth of the *faſcia* will be 3° 10′. And hence the diſtance between the two will be found 8° 55′.

In theſe meaſures the ſun is only eſteemed a point; wherefore, as his diameter is really about 30′, ſo much muſt be added to the breadth of each *faſcia* or *bow*, from red to violet, and ſo much muſt be ſubtracted from the diſtance between them.

This will leave the breadth of the *primary bow*, 2° 15′; that of the *ſecondary bow*, 3° 40′; and the interval between the bows 8° 25′; which dimenſions, deduced by calculation, ſir Iſaac Newton aſſures us from his own obſervations, agree very exactly, with thoſe found by actual menſuration in the heavens. Optics, p. 153. ed. 3.

Rainbow, *particular phenomena of the.* From this theory of the *rainbow*, all the particular phenomena of it are eaſily deduced: hence we ſee why the iris is always of the ſame breadth; becauſe the intermediate degrees of refrangibility of the rays between red and violet, which are its extreme colours, are always the ſame. See *Apparent* Magnitude.

Secondly, Why it is more diſtinctly terminated on the ſide of the red than on that of the violet? there being no efficacious rays in the ſpace adjoining to the red drops, i. e. to the ſpace between the bows, whence it terminates abruptly; whereas, in the ſpace on the ſide of the violet ones, there are ſome rays emitted to the eye, which, though too feeble to affect it ſtrongly, yet have this effect, that they ſoften the violet edge inſenſibly, ſo that it is difficult to determine preciſely where it terminates.

Thirdly, Why the bow ſhifts its ſituation as the eye does; and, as the popular phraſe has it, *flies from thoſe who follow it; and follows thoſe that fly from it?* the coloured drops being diſpoſed under a certain angle about the axis of viſion, which is different in different places: whence alſo it follows, that every different ſpectator ſees a different bow.

Fourthly, Why the bow is ſometimes a larger portion of a circle, ſometimes a leſs? its magnitude depending on the greater or leſs part of the ſurface of the cone, above the ſurface of the earth, at the time of its appearance; and that part being greater or leſs, as the line of aſpect, or axis of viſion, is more inclined or oblique to the ſurface of the earth; which inclination, or obliquity, is greater as the ſun is higher: whence, alſo, the higher the ſun, always the leſs the *rainbow*.

Fifthly, Why the bow never appears when the ſun is above a certain altitude? the ſurface of the cone, wherein it ſhould be ſeen, being loſt in the ground, at a little diſtance from the eye, when the ſun is above 42° high.

Sixthly, Why the bow never appears greater than a ſemicircle, on a plane? ſince be the ſun ever ſo low, and even in the horizon, the centre of the bow is ſtill in the line of aſpect; which, in this caſe, runs along the earth, and is not at all raiſed above the ſurface.

Indeed, if the ſpectator be placed on a very conſiderable eminence, and the ſun in the horizon, the line of aſpect, wherein the centre of the bow is, will be notably raiſed above the horizon (conſidering the magnitude of the circle whereof the bow uſes to be a part). Nay, if the eminence be very high, and the rain near, it is poſſible the bow may be an entire circle.

Seventhly, how the bow may chance to appear inverted, i. e. the concave ſide be turned upwards? to wit, a cloud happening to intercept the rays, and prevent their ſhining on the upper part of the arch: in which caſe, only the lower part appearing, the bow will ſeem as if turned upſide down; which, probably, has been the caſe in ſeveral prodigies of this kind, related by authors.

Indeed the bow may appear inverted from another cauſe: for, if when the ſun is in 41° 46′ high, his rays fall upon the ſmooth ſurface of ſome ſpacious lake, in the middle whereof a ſpectator is placed; and if, at the ſame time, there be rain falling, to which the rays may be reflected from the lake, it will be the ſame as if the ſun ſhould ſhine below the horizon, and the line of view be extended upwards: thus the ſurface of the cone, wherein the coloured drops are to be placed, will be wholly above the ſurface of the earth.

But ſince the upper part will fall among the unbroken clouds, and only the lower part be found among the drops of rain, the arch will be inverted.

Eighthly, Why the bow ſometimes appears inclined? the accurate roundneſs of the bow depending on its great diſtance, which prevents us from judging of it exactly; if the rain, which exhibits it, chance to be much nearer, we ſhall ſee its irregularities; and if the wind, in that caſe, drive the rain ſo that the higher part be farther from the eye than the lower, the bow will appear inclined.

Ninthly, why the legs of the *rainbow* ſometimes appear unequally diſtant? if the rain terminate on the ſide of the ſpectator, in a plane ſo inclined to the line of aſpect as to make an acute angle on the left hand, and an obtuſe angle on the right, the ſurface of the cone, which determines what drops will appear, will fall upon them in ſuch manner as that thoſe on the left hand will appear farther from the eye than thoſe on the right. For the line of aſpect being perpendicular to the plane of the bow, if you ſuppoſe two rectangular triangles, a right and left, the cathetus of each to be the line of view, and the baſe of the ſemidiameter of the bow, inclined as above; it is evident, ſince thoſe angles of the triangles, next the eye, muſt always be the ſame (viz. 43° in the inner bow), the baſis of the right hand angle will, in this caſe, appear much longer than that of the left.

Dr. Langwith, in the Phil. Tranſ. N° 375, deſcribes a remarkable *rainbow*, in which he obſerved ſeveral ſeries of colours, which increaſed the bow to a breadth far exceeding what had been determined by calculation. The colours of the primary *rainbow*, he ſays, were as uſual; under this was an arch of green, and then alternately two arches of reddiſh purple, and two of green, and under all a faint appearance of another arch of purple. The order of the colours was, 1. Red, orange, yellow, green, light blue, deep blue, and purple. 2. Light green, dark green, and purple. 3. Green and purple. 4. Green, and faint vaniſhing purple.

M. Bouguer frequently ſaw a phenomenon of this kind, when he was upon the mountains of Peru, where the ſky is often extremely ſerene. Similar appearances have been alſo obſerved by others. Dr. Pemberton has attempted to explain them by means of the Newtonian doctrine of fits of eaſy reflexion and tranſmiſſion; but he goes upon the ſuppoſition that the differently coloured rays have their ſeparate fits, on their arrival at the ſurface of any medium, without any regard to the thickneſs of it; whereas it is plain, that, in ſuch a caſe, all kinds of rays are reflected or tranſmitted promiſcuouſly. It is moſt probable that theſe colours are formed in very minute drops of water or vapour, intermixed with the larger drops, that their formation depends upon the ſame principle with the colours of thin plates, and that they are ſimilar to thoſe of ſeveral kinds of HALOS. Dr. Pemberton himſelf obſerves, that it is moſt likely, that theſe additional rings of colours are formed in the vapour of the cloud, which the air, being put in motion by the fall of the rain, may carry down along with the large drops. This, he ſays, may be the reaſon, why theſe colours appear under the upper part of the bow only, this vapour not deſcending very low. As a farther confirmation of this, theſe colours, he obſerves, are ſeen ſtrongeſt when the rain falls from very black clouds, which cauſe the fierceſt rains; by the fall of which the air will be moſt agitated. Phil. Tranſ. abr. vol. vi. p. 140. Prieſtley on Light and Colours, p. 593.

Rainbow, *lunar*. The moon, ſometimes, alſo exhibits the phenomenon of an iris, or bow, by the refraction of her rays in the drops of rain in the night-time.

Ariſtotle ſays, he was the firſt that ever obſerved it; and adds, that it never happens, i. e is never viſible, but at the time of the full moon; her light, at other times, being too faint to affect the ſight after two refractions, and one reflexion.

The lunar iris has all the colours of the ſolar, very diſtinct and pleaſant; only faint, in compariſon of the other; both from the different intenſity of the rays, and the different diſpoſition of the medium.

In that mentioned, Philoſophical Tranſactions, N° 331. Mr. Thoreſby obſerves, the largeneſs of the arch was not ſo much leſs than that of the ſun, as the different dimenſions of their bodies, and their diſtances from the earth, ſhould ſeem to require; but as to its entireneſs, and the beauty of its colour, it was admirable. This continued about ten minutes before the interpoſition of a cloud hindered its obſervation.

Rainbow, *marine*. The *marine*, or *ſea-bow* is a phenomenon ſometimes obſerved in a much agitated ſea; when the wind, ſweeping part of the tops of the waves, carries them aloft; ſo that the ſun's rays, falling upon them, are refracted, &c. as in a common ſhower, and paint the colours of the bow.

F. Bourzes, in the Philoſophical Tranſactions, obſerves, that the colours of the marine *rainbow* are leſs lively, leſs diſtinct, and of leſs duration, than thoſe of the common bow; that there are ſcarce above two colours diſtinguiſhable, a dark yellow on the ſide next the ſun, and a pale green on the oppoſite ſide.

But theſe bows exceed as to number, there being ſometimes twenty or thirty ſeen together: they appear at noonday, and in a poſition oppoſite to that of the common bow, i. e. the concave ſide is turned upwards, as, indeed, it is neceſſary it ſhould be, from what we have ſhewn in accounting for the phenomena of the ſolar bow.

To this claſs of bows may be referred a kind of *white* or *colourleſs rainbows*, which Mentzelius, and others, affirm to have ſeen at noon-day. M. Mariotte, in his fourth Eſſai de Phyſique, ſays, theſe bows are formed in miſts, as the others are in ſhowers; and adds, that he has ſeen ſeveral, both after ſun-riſing and in the night.

The want of colours he attributes to the ſmallneſs of the vapours which compoſe the miſt; but we ſhould rather account for it from the exceeding tenuity of the little veſiculæ of the vapour; which being, in effect, only little watry pellicles bloated with air, the rays of light undergo but little refraction in paſſing out of air into them; too little to ſeparate the differently coloured rays, &c.

Hence, the rays are reflected from them, compounded as they came, that is, white.

Rohault mentions coloured *rainbows* on the graſs; formed by the refractions of the ſun's rays in the morning dew. Trait. de Phyſ.

Rainbows have been alſo produced by the reflexion of the ſun from a river; and in the Philoſophical Tranſactions, vol. 1. p. 294, we have an account of a *rainbow*, which muſt have been formed by the exhalations from the city of London, when the ſun had been ſet twenty minutes, and conſequently the centre of the bow was above the horizon. The colours were the ſame as in the common *rainbow*, but fainter.

RAISE, in the *Manege*, is uſed for working. See Raising.

Raise is likewiſe uſed for placing a horſe's head right, and making him carry well, and hindering him to carry low, or to arm himſelf.

To Raise *a ſiege*. See Siege.

RAISED *airs*. See Air.

Raised *plan*. See Plan.

RAISER, in *Building*, a board ſet on-edge under the foreſide of a ſtep, a ſtair, &c. See Stair, &c.

RAISING, in the *Manege*, one of the three actions of the horſe's legs; the other two being the ſtay, and the tread. The *raiſing* or lifting up of his leg in caprioles, curves, &c. is eſteemed good if he perform it hardily, and with eaſe; not croſſing his legs, nor carrying his feet too much out or in; yet bending his knees as much as is needful.

Raising *the land*, in *Sea Language*. See *Laying the* Land.

Raising *a purchaſe*, denotes the act of diſpoſing certain inſtruments or machines in ſuch a manner, as that, by their mutual efforts, they may produce a mechanical force ſufficient to overcome the weight or reſiſtance, of the object to which the machinery is applied.

Raising-*pieces*, or Reason-*pieces*, in *Architecture*, are pieces that lie under the beams, and over the poſts or puncheons: thoſe lying on the brick-work are called platbands.

RAISINS, grapes prepared by drying them in the ſun, or in the air; to fit them for keeping, and for ſome medicinal purpoſes.

Of theſe there are various kinds: as, *raiſins* of Damaſcus, thus called from the capital city of Syria, in the neighbourhood whereof they are cultivated. They are much uſed in the compoſition of ptiſans, together with jujubes and dates; they are brought flat, and ſeeded, of the ſize of the thumb; whence it is eaſy judging of the extraordinary bulk of the grape, when freſh. Travellers tell us of bunches weighing twenty-five pounds. Their taſte is faintiſh, and diſagreeable.

Raiſins of the ſun are a kind of *raiſins* brought from Spain, of a reddiſh or bluiſh colour, ſeeded, and very agreeable to eat.

There are various other ſorts, denominated either from the place where they grow, or the kind of grape, &c. as *raiſins* of Calabria, Muſcadine *raiſins*, &c.

The fineſt and beſt *raiſins* are thoſe called in ſome places Damaſcus and jube *raiſins*. Theſe are the fruit of the *vitis Damaſcena*, and are diſtinguiſhable from the others by their largeneſs and figure; they are flat, and wrinkled on the ſurface; ſoft and juicy within, near an inch long, and ſemipellucid, when held againſt a good light; they have a ſweet, agreeable, and vinous taſte; and when freſh, and growing on the bunch, are of the ſize and ſhape of the large olive.

The common *raiſins* are the fruit of ſeveral ſpecies of grape, which are better or worſe, according as they have been more or leſs carefully cured. The *raiſins* of the ſun, or jar-*raiſins*, ſo called, becauſe they are imported in jars, are all dried by the heat of the ſun; and theſe are the ſorts uſed in medicine.

The common way for drying grapes for *raiſins* is to tie two or three bunches of them firmly together, while yet on the vine, and dip them into a hot lixivium of wood-aſhes, with a little oil olive in it. This diſpoſes them to ſhrink and wrinkle; and after this they are left on the vine three or four days, ſeparated on ſticks in an horizontal ſituation, and then dried in the ſun at leiſure, after being cut from the tree. Some *raiſins* are dried by the heat of an oven; and the difference between theſe and ſuch as are dried in the ſun, is obvious; the latter are ſweet and pleaſant, but the former have a latent acidity with the ſweetneſs, that renders them much leſs agreeable. See CURRANTS.

All the kinds of *raiſins* have much the ſame virtues; they are nutritive and balſamic, but they are very ſubject to fermentation with juices of any kind; and hence, when eaten immoderately, they often bring on colics. They are allowed to be attenuant, and are given in caſes where the humours are too thick and viſcid, and they are ſaid to be very good in nephritic complaints; they are, however, too familiar in our foods, to be much regarded at preſent as a medicine. They are an ingredient, indeed, in our pectoral decoctions, and in ſome other medicines of that intention; in which caſes, as alſo in others where aſtringency is not required of them, they ſhould have the ſtones carefully taken out. They are uſed in ſome compoſitions rather with an intent of taking off the nauſeous taſte of other ingredients, and for obtunding their acrimony, than of doing any extraordinary ſervice themſelves.

RAISIN-*brandy*, a name given by our diſtillers to a very clean and pure ſpirit, procured from *raiſins* fermented only with water. Thus treated, they yield a ſpirit ſcarce at all diſtinguiſhable from ſome of the wine-ſpirits; for there are as many kinds of wine-ſpirits as there are of grapes. The coarſer the operation of diſtilling is performed in this caſe, the nearer will be the reſemblance of the wine-ſpirit; that is, there will be moſt of this flavour in the ſpirit, when as much as can be of the oil is thrown up with a galloping heat.

The diſtillers are very fond of the wine ſpirit, with which they hide and diſguiſe the taſte of their nauſeous malt, and other ſpirits; and in defect of that ſpirit, this of *raiſins*, made in this coarſe manner, will go almoſt as far. It is indeed ſurpriſing how extenſive the uſe of theſe flavouring ſpirits is, ten gallons of *raiſin*-ſpirit, or ſomewhat leſs of the wine-ſpirit, being often ſufficient for a whole pipe of malt-ſpirit, to take off its native flavour, and give it an agreeable vinoſity. It is no wonder, therefore, that the diſtillers, and ordinary rectifiers, are ſo fond of this, as it is a good cloak for their defects, and the imperfection of their proceſſes.

When *raiſin-brandy* is intended for common uſe, the fire ſhould be kept ſlower and more regular in the diſtillation; and the ſpirit, though it hath leſs of the high flavour of the grape, will be more pleaſant and more pure.

RAISIN-*wine*. See WINE.

RAITING, or RATING, the laying hemp, flax, timber, &c. when green, in a pond, or running water, to ſeaſon and diſpoſe it for future uſes.

RAKE *of a ſhip*, is ſo much over her hull as over-hangs at both ends of her keel.

That part of it which was before, is called the *rake forward on*; and that part which is at the ſetting on of the ſtern-poſt, is called her *rake-aft*, or *afterward-on*.

When a ſhip hath but a ſmall *rake* forward-on, but is built with her ſtern too ſtraight up, ſhe is called *bluffe-headed*.

RAKE *of the rudder*, is the hindermoſt part of it.

RAKE, among *Hunters*. See RAG.

RAKE, in *Huſbandry*, *Gardening*, &c. a well-known inſtrument, that needs no deſcription.

RAKE, *drill*, in *Huſbandry*, an inſtrument invented by Mr. Vanduffel, for drilling peaſe, &c. This inſtrument, which is chiefly calculated for ſmall incloſures of light grounds, is a ſort of ſtrong plough *rake*, with four large teeth at *a*, *a*, *b*, *b*, a little incurvated, as repreſented in *Tab.* II. *Agriculture*, *fig.* 18. The diſtance from *a* to *a*, and from *b* to *b*, is nine inches. The interval between the two inner teeth, *a* and *b*, is three feet ſix inches, which allows ſufficient room for the hoe-plough to move in. To the piece of timber *c c*, forming the head of the *rake*, are fixed the handles *d*, and the beam *e*, to which the horſe is faſtened. When this inſtrument is drawn over a piece of land made thoroughly fine, and the man who holds it bears upon the handles, four furrows, *f*, *g*, *h*, *i*, will be formed, at the diſtances determined by the conſtruction of the inſtrument. Theſe diſtances may be accurately preſerved, provided that the teeth *a*, *a*, return, when the ploughman comes back after having ploughed one turn, in two of the channels formed before, marked *b*, *b*: thus all the furrows in the field will be traced with the ſame regularity. When the ground is thus formed into drills, the peaſe may be ſcattered by a ſingle motion of the hand at a certain diſtance from one another into the channels, and then covered with the flat part of a hand-*rake*, and preſſed down gently. This inſtrument is ſo ſimple, that any workman may eaſily make or repair it.

RAKE, in the *Manege*. A horſe *rakes*, when being ſhoulder-ſplaid, or having ſtrained his fore quarter, he goes ſo lame, that he drags one of his fore-legs in a ſemicircle; which is more apparent when he trots, than when he paces.

RAKE, in *Mining*, is the ſame with VEIN.

RAKING *of a horſe*, is the drawing his ordure with the hand out of the fundament, when he is coſtive, and cannot dung. In order to do this, the hand muſt be anointed with ſallad-oil, or butter.

RAKING *a ſhip*, is the act of cannonading a ſhip on the ſtern or head, ſo that the balls ſhall ſcour the whole length of her decks, which is one of the moſt dangerous incidents that can happen in a naval action. This is frequently called *raking* fore and aft, being the ſame with what is called enfilading by engineers. See ENFILADE.

RAKING *table*, or RAKED *table*, among *Architects*, a member hollowed in the ſquare of a pedeſtal, or elſewhere. See CAVETTO, and SCOTIA.

RALLUS, in the Linnæan ſyſtem of *Ornithology*, a genus of GRALLÆ; the characters of which are, that the bill is ſlender, a little compreſſed, thicker at the baſe, and ſmaller towards the apex, being ſlightly incurvated; the noſtrils are ovated, the feet cloven with four toes, and the body compreſſed. Of this genus there are ten ſpecies; as the RAIL, GRINETTA, &c.

RALLYING, in *War*, the reaſſembling, or calling together of troops, broken, routed, and put to flight.

RAM, in *Zoology*, the male of the ſheep kind. See SHEEP.

RAM, in *Aſtronomy*. } See ARIES.
RAM, *battering*. }

RAM-*head*, on board a *Ship*, the name of a great block belonging to the fore and main halliards. It hath in it three ſhivers, into which the halliards are put, and at its head the tyes are reeved into a hole made there for that purpoſe.

RAM'S-HORNS, in *Fortification*, a name given by M. Belidor to the TENAILLES.

RAMADAN, a ſort of lent obſerved by the Mahometans, in obedience to the expreſs command of the Koran, during which they faſt the whole day, from the time the new moon firſt appears, till the appearance of the next new moon, with ſuch extreme ſuperſtition, that they not only abſtain from eating, drinking, and women, but dare not waſh their mouth, nor even ſwallow their ſpittle, from day-break till night, or ſun-ſet.

The men, indeed, are allowed to bathe themſelves; but it is on condition they do not plunge the head under water, leſt ſome drops enter by the mouth or ears, &c. But as for the women they are ſtrictly forbid bathing. Some are ſo cautious, that they will not open their mouths to ſpeak, leſt they ſhould breathe the air too freely. The faſt is alſo deemed void if they kiſs or touch a woman. To make amends, they feaſt all night, till day-break; though the more rigid begin the faſt again at midnight; and uſually ſpend more in this month than in ſix others.

The *Ramadan* happens at different ſeaſons of the year; and when it is in the ſummer, is very hard on the labourers. This month once in thirty-three years is in every ſeaſon of the year, the Turkiſh month being lunar, and they beginning at the day they can ſee the moon; whereas the Jews begin their account from the day the moon makes, which is a day before the Turks.

The reaſon given why the month of *Ramadan* was fixed upon for this purpoſe is, that on this month that Koran was ſent down from heaven. From this faſt of *Ramadan* none are excuſed, except travellers and ſick perſons; under which latter denomination are included all whoſe health would be manifeſtly injured by keeping the faſt; but then they are obliged, ſo ſoon as the impediment is removed, to faſt an equal number of other days; and breaking of the faſt is ordered to be expiated by giving alms to the poor.

RAMAG, a word uſed by ſome of the chemical writers to expreſs aſhes.

RAMAGE, a term uſed for the boughs or branches of trees. Hence,

RAMAGE-*hawk*, or *falcon*, one that is wild and coy, as having been long among the boughs, preying for itſelf.

All falcons retain this name till they have left the aery; being ſo called in May, June, July, and Auguſt. Theſe are very rarely reclaimed. See BRANCHER, FALCON, and HAWKING.

RAMAGE *velvet*. See VELVET.

RAMAI, in *Natural Hiſtory*, a name given by many old writers to bole armenic.

RAMALIS *vena*, a name given by ſome anatomical authors to the *vena portæ*.

RAMED, a name given by ſome chemical writers to rhubarb.

RAMESAN, an oriental term for a month of faſting, very religiouſly obſerved among the Turks, and otherwiſe called RAMADAN.

RAMEX, a word uſed by ſome as a name for a hernia, or rupture.

RAMIFICATION, the production of boughs or branches, or of figures reſembling branches.

RAMIFICATIONS, in *Anatomy*, are the diviſions of the arteries, veins, and nerves, ariſing from ſome common trunk. See *Tab. Anat.* (*Angieol.*) *fig.* 1. *n.* 18. 18. *fig.* 4. *fig.* 5.

RAMIGRI, a word uſed by ſome writers as a name for colophony.

RAMINGUE, in the *Manege*. A horſe gets this name that is RESTIVE, and reſiſts or cleaves to the ſpurs; that is, defends himſelf with malice againſt the ſpurs; ſometimes doubles the reins, and frequently yerks to favour his diſobedience. See TICKLISH and DOUBLE.

RAMISTS, in the *Hiſtory of Learning*, the diſciples of Peter Ramus, who was born in a ſmall village in Picardy, in 1515, and was one of the moſt famous profeſſors of the ſixteenth century. By attacking the authority of Ariſtotle, and attempting to ſubſtitute in the place of his logic a method of reaſoning better adapted to the uſe of rhetoric and improvement of eloquence, he excited a terrible uproar in the Gallic ſchools; ſo that the two firſt books he publiſhed, viz. his Inſtitutiones Dialecticæ, and Ariſtotelicæ Animadverſiones, were prohibited through the kingdom of France, and the author prohibited from any more teaching philoſophy. However, Ramus afterwards recovered his credit, ſo that he obtained the royal profeſſorſhip of philoſophy and eloquence at Paris, in 1551. But his enemies were inveterate in their perſecution of him, ſo that he was obliged once again to withdraw himſelf from the effects of their reſentment. In 1571 he ſettled at Paris, where he periſhed in the maſſacre on St. Bartholomew's day. The diſciples of Ramus, ſuch was the aſtoniſhing influence of their maſter's learning and character, prevailed ſo far as to baniſh the Peripatetic philoſophy from ſeveral ſeminaries of learning, and to ſubſtitute in its place the ſyſtem of their maſter, which was of a more practical kind; and better adapted to the purpoſes of life.

RAMMER, or beetle, an inſtrument uſed for driving down ſtones or piles in the ground; or for beating the earth and making it more ſolid for a foundation. See BEETLE.

RAMMER *of a gun*, the *gun-ſtick*; a rod or ſtaff uſed in charging a gun, to drive home the powder to the breech, as alſo the ſhot, and the wad, which keeps the ſhot from rolling out.

The rammer of a great gun is a cylinder of wood, whoſe diameter and length are each equal to the diameter of the ſhot, with a handle fixed to it. See SPUNGE.

RAMOSE *leaf*. See LEAF.

RAMPANT, in *Heraldry*, is applied to a lion, bear, leopard, or other beaſt, in poſture of climbing, or ſtanding upright on his hind-legs, and rearing up his fore-feet; ſhewing only half his face, as one eye, and one ear.

The term is French; and ſignifies, literally, *creeping*.

It is different from *ſaliant*, which denotes a poſture leſs erect, or ſomewhat ſtooping forwards, as if making a ſally.

This poſture is to be ſpecified, in blazoning, in all animals, except in the lion and gryphon; it being their natural ſituation.

RAMPART, or RAMPIER, in *Fortification*, a maſſy bank, or elevation of earth about the body of a place, to cover it from the direct fire of the enemy, and of ſufficient thickneſs to reſiſt the efforts of the cannon for many days; and formed into baſtions, curtins, &c. See *Tab. Fort. fig.* 5. *lit. y x.*

The word is formed from the Spaniſh *amparo*, *defence*, or *covering*.

Upon the *rampart* the ſoldiers continually keep guard, and pieces of artillery are planted there for the defence of the place. Hence, to ſhelter the guard from the enemies ſhot, the outſide of the *rampart* is built higher than the inſide, i. e. a PARAPET is raiſed upon it with a PLATFORM. Hence, alſo, earth not being capable to be raiſed perpendicular, like ſtone, the *rampart* is built with a talus or ſlope, both on the inner and outer ſide.

The *rampart* is ſometimes lined, i. e. fortified with a ſtone wall within ſide, otherwiſe it hath a BERME.

It is encompaſſed alſo with a moat or ditch, out of which the earth that forms the *rampart* is dug.

The height of the *rampart* ſhould not exceed three fathom, this being ſufficient to cover the houſes from the battery of the cannon: neither ought its thickneſs to be above ten or twelve, unleſs more earth be taken out of the ditch than can be otherwiſe beſtowed. See FORTIFICATION, *according to M. Vauban's firſt method.*

The *ramparts* of half-moons are the better for being low, that the ſmall fire of the defendants may the better reach the bottom of the ditch; but yet they muſt be ſo high, as not to be commanded by the covert-way.

RAMPART is alſo uſed, in *Civil Architecture*, for the ſpace left void between the wall of a city and the next houſes. This is what the Romans call *pomœrium*, wherein it was forbid to build, and where they planted rows of trees, for the people to walk and amuſe themſelves under.

RAMPHASTOS, in *Ornithology*. See TOUCAN.

RAMPIN, in the *Manege*. See TOE.

RAMPION, *rapunculus*, or, according to Linnæus, *phyteuma*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the empalement of the flower is of one leaf, divided into five acute parts, ſitting upon the germen; the flower hath one petal, which is ſtarry, cut into five linear ſegments, which are recurved; it hath five ſtamina, which are ſhorter than the petal, terminated by oblong ſummits; the germen, which is ſituated under the flowers, ſupports a ſlender recurved ſtyle, crowned by an oblong, twiſted, three-pointed ſtigma, which afterwards becomes a roundiſh capſule, with three cells, filled with ſmall roundiſh ſeeds. There are ſix ſpecies.

As theſe plants do not continue above two or three years, they ſhould be ſown every other year to continue the ſorts; for they are plants which require little trouble to cultivate, and their flowers make a pretty variety in large gardens; therefore they may be allowed a place amongſt other hardy flowers. Miller.

RAMPIONS, *creſted*, a ſpecies of the LOBELIA.

RAMPIONS, *common eſculent*, a ſpecies of the CAMPANULA.

RAMPIONS *with ſcabious heads*. See IASIONE.

RAMPS, in *Fortification*, are gentle ſlopes made for the cannon to be drawn up and down by, and alſo for the eaſy communication of the troops poſted in a battery that is raiſed above the level of the ground on which it is built. The riſe of theſe ſlopes is about two inches, on twelve of baſe, or the length of the *ramp's* baſe is ſix times the height, and this is general for the draught of carriages; but footways need not be of ſo gentle a ſlope, as a riſe in one foot in three may anſwer the purpoſe; or, inſtead of *ramps*, ſtairs may be and commonly are uſed for the paſſage of the foot. The breadth of a carriage *ramp* is uſually about nine or ten feet, that breadth being ſufficient both for the carriage and foot-way; but thoſe for foot-paſſage only need not be above three or four feet wide. *Ramps* may either riſe on the ſide of an elevated work, or againſt a ſaliant angle of that work, or on each ſide of an entering angle.

RAMSONS, in *Botany*, a name given to the broad-leaved wild allium. See GARLICK.

RAMTRUT, in *Modern Hiſtory*, the name of a deity worſhipped by the Kanazins, a people of Indoſtan, where he has a celebrated temple, at Onor. The characters under which he is repreſented more reſemble thoſe of a monkey than of a man.

RAMULOSE *leaf*, in *Botany*. See Leaf.

RAMUS, in *Anatomy*, &c. a branch of a greater veſſel.

Ramus *anterior* is particularly uſed for a branch of the ſubcutaneous vein, paſſing under the muſcles of the ulna.

Ramus poſterior denotes a branch of the ſame vein, running near the elbow.

Ramus, in the *Anatomy of Plants*, a name given to the firſt or lateral branches, which go off from the petiolum, or middle rib of a leaf. The ſubdiviſions of theſe are called *ſurculi*; and the final diviſions of theſe into the moſt minute of all, are by ſome called *capillamenta*: but in general, both theſe kinds are comprehended under the name of *ſurculus*.

RAN, in our *Old Writers*, is uſed for open and public robbery, ſo manifeſt that it cannot be denied. Ran *dicitur aperta rapina quæ negari non poteſt*. Lamb. 125. Leg. Canut. cap. 58. Hence it is to this day vulgarly ſaid of one who takes the goods of another injuriouſly and violently, that he has taken or ſnatched all hecould *rap* and *ran*.

RANA, in *Zoology*. See Frog.

Rana *arborea*, the *tree-frog*, in *Zoology*. See Ranunculus *viridis*.

Rana *piſcatrix*. See Sea-*devil*.

Rana, in *Surgery*. See Ranula.

RANCID, *rancidus*, denotes a fatty ſubſtance that is become rank or muſty; or that has contracted an ill ſmell by being kept cloſe.

The word is particularly underſtood of old ruſty bacon. It comes from the Latin *rancidus*, of *ranceo*, *to be rank*.

RANDIA, in *Botany*, a genus of the *pentandria monogynia* claſs. The characters are, that the empalement of the flower is permanent, of one leaf cut into five ſhort ſegments at the brim; the flower is ſalver-ſhaped; and the fruit is a ſingle-celled berry with a capſular rind. There are two ſpecies.

RANDOM-*ſhot*, a ſhot made when the muzzle of a gun is raiſed above the horizontal line, and is not deſigned to ſhoot directly, or point-blank.

The utmoſt *random* of any piece is about ten times as far as the bullet will go point-blank; and the bullet will go fartheſt when the piece is mounted to about forty-five degrees above the level range.

The ſpace or diſtance of the *random* is reckoned from the platform to the place where the ball firſt grazes.

RANFORCE *ring*. See Reinforced *ring*.

RANGE, in *Gunnery*, the path of a bullet, or the line it deſcribes from the mouth of the piece to the point where it lodges.

If the piece be laid in a line parallel to the horizon, it is called the *right* or *level range*. See Horizontal *range*.

If it be mounted to 45 degrees, the ball is ſaid to have the *utmoſt range*; and ſo proportionably; all others between 00 degrees and 45 degrees being called the *intermediate ranges*. See Cannon, Gun, and Projectile.

Range *of a projectile, Amplitude of the*. See Amplitude.

Range, *Point-blank*. See Point-*blank*.

Range, in a *Ship*, denotes a ſufficient length of the cable, drawn up on the deck, before the anchor is caſt looſe from the bow, to let it ſink to the bottom, without being interrupted, that the flukes may be forced the deeper into the ground, by the additional weight which the anchor acquires in ſinking. For this reaſon, the *range*, which is drawn up out of the tire, ought to be equal in length to the depth of the water, where the ſhip anchors.

RANGER, a ſworn officer of the foreſt, whoſe buſineſs it is to walk daily through his charge, to drive back the deer out of the pulieus or diſafforeſted places into the foreſt lands; and to preſent all treſpaſſes done in his bailiwick at the next court held for the foreſt.

The *ranger* is made by the king's letters, and has a fee paid yearly out of the exchequer, and certain fee-deer. In the Charter de Foreſta mention is made of twelve kinds of *rangers*.

RANGES, in a *Ship*, are two pieces of timber going acroſs from ſide to ſide; one aloft on the fore-caſtle, a little abaft the foremaſt; and the other in the beak-head, before the wouldings of the bowſprit.

RANGING, in *War*, the diſpoſing of troops in a condition proper for engagement, or for marching.

In *Building*, the ſide of a work that runs ſtrait, without breaking into angles, is ſaid to *range*, or *run range*.

RANGLE, in *Falconry*, is when gravel is given a hawk to bring her to her ſtomach.

RANINÆ *venæ*. See Ranulares.

RANK, a due order, or a place allotted a thing ſuitably to its nature, quality, or merit.

Kings are perſons of the firſt *rank* on earth. In cavalcades, proceſſions, &c. every perſon is to obſerve his *rank*.

Rank, in *Military Diſcipline*, denotes a ſeries, or row of ſoldiers, placed ſide by ſide; a number of which *ranks* form the depth of the ſquadron or battalion, as a number of files does the width.

When infantry is drawn up three deep, the firſt *rank* is called the *front rank*; the ſecond, the *centre rank*; and the third, the rear *rank*.

To *cloſe the rank*, is to bring the men nearer; to *open it*, is to ſet them farther apart. To *double the ranks*, is to throw two into the ſpace of one, by which the files are thinned. See Doubling.

Rank, in the *Army* and *Navy*, is uſed for the order of precedence: thus, the admiral or commander in chief of his majeſty's fleet has the *rank* of a field-marſhal; admirals, with the flags on the top-maſt-head, *rank* with generals of horſe and foot; vice-admirals, with lieutenant-generals; rear-admirals, as major-generals; commodores, with broad pendants, as brigadier-generals; captains of poſt-ſhips, after three years from the date of their firſt commiſſion, as colonels; other captains, commanding poſt-ſhips, as lieutenant-colonels; captains, not taking poſt, as majors; and lieutenants, as captains.

Rank, in reſpect of *Ships*. See Rate.

Ranks and *Files*, are the horizontal and vertical lines of ſoldiers, when drawn up for ſervice, &c.

Rank *keel*, in *Ships*. See Keel.

Rank *modus*, in *Law*. See Modus.

RANSOM, a ſum of money paid for the redemption of a perſon out of ſlavery, or for the liberty of a priſoner of war.

In our *Law Books*, *ranſom* is alſo uſed for a ſum paid for the pardoning of ſome notorious crime.

Horn makes this difference between *ranſom* and *amerciament*, that *ranſom* is the redemption of a corporeal puniſhment due to any crime.

When one is to make a fine and *ranſom*, the *ranſom* ſhall be treble the fine.

RANT, in the *Drama*, an extravagant flight of paſſion, overſhooting nature and probability.

Lee's tragedies abound with *rants*: yet the wildeſt of them, it is obſerved, frequently meet with applauſe on the ſtage.

We find inſtances of *rants*, even in our ſevereſt poets. Such, e. gr. is that in the beginning of Ben Johnſon's Cataline, where the parricide, in ſpeaking to Rome, ſays, *I'd plow up rocks, ſteep as the Alps in duſt; and lave the Tyrrhene waters into clouds, but I would reach thy head!*

RANULA, or Rana, in *Surgery*, a tumor under the tongue, which, like a ligature, hinders a child from ſpeaking, or ſucking.

The *ranula ſub lingua*, is ſometimes the ſame with what we popularly call being tongue-*tied*; a defect which is uſually cauſed by a ſhort frænum not permitting the tongue to perform its proper motions. Though, at other times, there is a ſtrong concretion, or rather impoſthume under the tongue, which is the proper *ranula*, by the Greeks called βατραχιον.

This impoſtume contains in a bag matter that is ſometimes œdematous, at other times melicerous, ſcirrhous, black, or livid; in which caſes the operation of cutting is dangerous: it uſually grows to the magnitude of a bean or cheſnut. Shaw.

RANULARES, or Raninæ *venæ*, in *Anatomy*, two veins under the tongue, ariſing from the external jugular, and running on either ſide the linea mediana.

Theſe veins are opened with good ſucceſs in quinzies. They take their denomination from a reſemblance of their ſtate to that of little frogs, called in Latin *ranulæ*, becauſe never out of water.

RANUNCULUS, *crowfoot*, and *leſſer celandine*, in *Botany*, a genus of the *polyandria polygynia* claſs. Its characters are theſe: the empalement of the flower is compoſed of five oval concave leaves; the flower has five obtuſe petals, which have a narrow baſe; each of theſe have an open nectarium upon their tails; it hath many ſtamina, terminated by oblong, erect, twin ſummits, and numerous germina collected in a head, having no ſtyles, but crowned by ſmall reflexed ſtigmas; the germina afterward become ſeeds of uncertain irregular figures, faſtened to the receptacle by very ſhort foot-ſtalks. There are eleven ſpecies of this genus cultivated in gardens. Miller. Linnæus enumerates thirty-nine ſpecies.

The *ranunculi* are in general hardy plants, and will thrive very well againſt hedges, and in ſhady borders, where they require no other care than to take up their roots every other year when their leaves decay, and part them, planting out the off-ſets into other borders.

Beſides thoſe we have been long uſed to, there have been ſome of late times brought from Turkey and from Perſia, which produce ſemi-double flowers of great beauty, and annually ripening their ſeeds. There are numbers of varieties, or, as the gardeners call them, new flowers, continually raiſed from them; many of theſe are finely ſcented, and the roots, when ſtrong, produce twenty or thirty flowers on each. The double-flowered *ranunculuſes* not producing ſeeds, they are only to be propagated by parting their roots, taking off the off-ſets, which they uſually produce in great plenty.

The proper ſeaſon for planting their roots is in October. The beds in which the Perſian *ranunculus* roots are planted, ſhould be made with freſh light ſandy earth, at leaſt three feet deep. Common paſture land is the beſt for this uſe, which being cut about ſix inches deep, with the green ſward, ſhould be laid in a heap to rot for twelve months, and often turned; to which ſhould be added a fourth part of very rotten neat's dung, and a proper quantity of ſea-ſand, as the earth is lighter or ſtiffer: and this ſhould be mixed eight months or a year before it is uſed. This mixture ſhould be turned often, and the larger ſtones and clods taken out; but it muſt not be ſkreened or ſifted very fine, for that has been the occaſion of the loſs of many roots, both of this and other plants, by cohering into a hard clod with the wet, and rotting the roots.

The beds being prepared ſhould lie about a fortnight to ſettle, and then drawing ſtraight and traverſe lines over the beds, at about ſix inches diſtance each way, the plants muſt be planted regularly, placing the roots exactly in the middle, with their crowns upright at each croſs, about two inches below the ſurface, and the earth carefully drawn over them with a rake. In the end of November the heads will appear, and then about half an inch depth of freſh earth ſhould be added, which will greatly ſtrengthen the plants. And if it ſhould be very ſevere weather, when the heads appear above this ſecond covering, they ſhould be defended with mats laid over arched hoops. In the beginning of March the flower-ſtems will appear, when the beds ſhould be cleared of weeds, and the earth between the roots ſtirred with the fingers; and when the flowering is paſt, and the leaves are decayed, the roots are to be taken up, and laid by for the October following.

The Perſian *ranunculuſes* may alſo be multiplied by ſeeds, which ſhould be ſown annually, and thus new varieties may every year be produced. Miller.

Ranunculus, *Globe*, in *Botany*. See HELLEBORE.

Ranunculus *viridis*, in *Zoology*, the name of an animal common in many parts of the world, and uſually known by the name of the *tree-frog*, or *rana arborea*.

The creature is eaſily diſtinguiſhed from the common frog, by its being much ſmaller, and of a green colour. It uſually ſits upon the leaves of trees and ſhrubs, and makes a great noiſe in an evening; but that is rather like the ſinging of a ſmall bird than the croaking of a frog.

Theſe creatures have been kept alive many years together in glaſs veſſels, giving them flies and other ſmall inſects: and in winter, when theſe are ſcarce, they uſually become very lean and feeble; but in ſummer, when they are plentiful, they will grow fat again, as if at their liberty. This is eſteemed a poiſonous creature. Ray.

RAPA, in *Botany*. See TURNEP.

RAPACIOUS *animals*, in the general, are ſuch as live upon prey.

Naturaliſts divide birds into *rapacious*, *carnivorous*, and *frugivorous*.

The characteriſtic notes of *rapacious* birds, which are the ACCIPITRES of Linnæus, are, that they have a great head, and a ſhort neck; hooked, ſtrong, and ſharp-pointed beak and talons, fitted for tearing of fleſh; ſtrong and brawny thighs, for ſtriking down their prey; a broad thick fleſhy tongue like that of man: twelve feathers in their train; and twenty-four flag-feathers in each wing. And the two appendices, or blind guts, are always very ſhort.

Rapacious birds have a membranous ſtomach; and not a muſculous one, or a gizzard, ſuch as birds have which live on grain.

They are very ſharp-ſighted, and gather not in flocks; but, generally ſpeaking, are ſolitary; though vultures will fly fifty or ſixty in a company.

RAPAX, in *Ichthyology*, a name given by Schoneveldt to the *corvus piſcis* of ſome writers, a ſpecies of chub or cyprinus, called *rappe* by the Germans, and by Geſner and others *capito fluviatilis rapax*.

RAPE, *raptus*, in *Law*, a *raviſhing*; or the having carnal knowledge of a woman by force, and againſt her will. If the woman conceived, the law formerly eſteemed it no *rape*; from an opinion, that ſhe cannot conceive, unleſs ſhe conſented. But this opinion has been ſince queſtioned. Coke on Litt. lib. ii. cap. 11.

This crime, by the Jewiſh law, Deut. xxii. 25. was puniſhed with death, in caſe the damſel was betrothed to another man; and in caſe ſhe was not betrothed, then a heavy fine of fifty ſhekels was to be paid to the damſel's father, and ſhe was to be the wife of the raviſher all the days of his life; without that power of divorce, which was in general permitted by the Moſaic law.

The civil law (cod. 9. tit. 13.) puniſhes the crime of raviſhment with death and confiſcation of goods; including under this crime both the offence of FORCIBLE *abduction*, and alſo that of forcibly diſhonouring; either of which, without the other, is in that law ſufficient to conſtitute a capital crime. And the ſtealing away a woman from her parents or guardians, and debauching her, is equally penal by the emperor's edict, whether ſhe conſent or is forced.

Rape was puniſhed by the Saxon laws, particularly thoſe of king Athelſtan, with death; which was alſo agreeable to the old Gothic or Scandinavian conſtitution. Inſtead of this, another puniſhment was inſtituted by William the Conqueror, viz. caſtration and loſs of eyes, which continued till after Bracton wrote in the reign of Henry III. But it was then the law, and ſtill continues in APPEALS *of rape*, that the woman ſhould immediately after go to the next town, and there make diſcovery to ſome credible perſons of the injury ſhe has ſuffered; and afterwards ſhould acquaint the high conſtable of the hundred, the coroners and the ſheriff, with the outrage: the time of limitation for this purpoſe was by ſtat. Weſtm. 1. cap. 13. extended to forty days. But there is now no time fixed; for as it is now uſually puniſhed by indictment at the ſuit of the king, the maxim of law takes place, *nullum tempus occurrit regi:* however, the jury will rarely give credit to a ſtale complaint. During the former period it was alſo held for law, that the woman (by conſent of the judge and her parents) might redeem the offender from the execution of his ſentence, by accepting him for her huſband, if he alſo was willing to agree to the exchange, but not otherwiſe.

In the 3 Edw. I. by the ſtat. Weſtm. I. cap. 13. the puniſhment of *rape* was much mitigated: the offence being reduced to a treſpaſs, if not proſecuted by the woman within forty days; and ſubjecting the offender only to two years impriſonment, and a fine at the king's will. But in the 13 Edw. I. it was found neceſſary to make the offence of *rape* felony, by ſtat. Weſtm. 2. cap. 34. And by 18 Eliz. cap. 7. it was made felony without benefit of clergy; as is alſo the abominable wickedneſs of carnally knowing or abuſing any woman-child, under the age of ten years; in which caſe the conſent or non-conſent is immaterial, as, by reaſon of her tender years ſhe is incapable of judgment and diſcretion. Sir Matthew Hale is indeed of opinion, that ſuch profligate actions committed on an infant under the age of twelve years, the AGE of female diſcretion by the common law, either with or without conſent, amount to *rape* and felony, as well ſince as before the ſtatute of queen Elizabeth; but the law has in general been held only to extend to infants under ten. A male infant, under the age of fourteen years, is preſumed by law incapable of committing a *rape*; and, therefore, cannot be found guilty of it.

The civil law ſeems to ſuppoſe a proſtitute incapable of any injuries of this kind; not allowing any puniſhment for violating the chaſtity of her who hath indeed no chaſtity at all, or at leaſt hath no regard to it. But the law of England holds it to be felony to force even a concubine or harlot; becauſe the woman may have forſaken that unlawful courſe of life.

As to the material facts requiſite to be given in evidence and proved upon an indictment of *rape*, we ſhall here only obſerve, that the party raviſhed may give evidence upon oath, and is in law a competent witneſs; but the credibility of her teſtimony muſt be left to the jury, upon the circumſtances of fact that concur in that teſtimony: e. g. if the witneſs be of good fame; if ſhe preſently diſcovered the offence, and made ſearch for the offender; if the party accuſed fled for it; theſe and the like are concurring circumſtances, which give greater probability to her evidence. But, on the other ſide, if ſhe be of evil fame, and ſtands unſupported by others; if ſhe concealed the injury for any conſiderable time after ſhe had opportunity to complain; if the place, where the fact was alledged to be committed, was where it was poſſible ſhe might have been heard, and ſhe made no outcry; theſe and the like circumſtances carry a ſtrong, but not concluſive preſumption, that her teſtimony is falſe or feigned. Moreover, if the *rape* be charged to be committed on an infant under twelve years of age, ſhe may ſtill be a competent witneſs, if ſhe hath ſenſe and underſtanding to know the nature and obligation of an oath; and, even if ſhe hath not, it is thought by ſir Matthew Hale that ſhe ought to be heard, without oath, to give the court information; though that alone will not be ſufficient to convict the offender. And, indeed, it is now ſettled, that infants of any age are to be heard; and if they have any idea of an oath, to be alſo ſworn: it being found by experience, that infants of very tender years often give the cleareſt and trueſt teſtimony. Blackſt. Com. book iv. p. 210. &c.

The civilians make another kind of *rape*, called *ſubornatio*, *rape of ſubornation*, or *ſeduction*; which is when a perſon ſeduces or entices a maid to uncleanneſs, or even marriage, and that by gentle means; provided there be a conſiderable diſparity in age or condition between the parties. In this caſe, the father and mother intend their action reciprocally for the *crimen raptus*, or *ſubornationis*.

The French laws make no difference between the *rape* of violence and that of ſolicitation, or ſubornation; they make both capital. This kind of rape our laws call RAVISHMENT.

Rape of the foreſt, is a treſpaſs committed in the foreſt by violence.

This is mentioned in the laws of Henry I. as one of the crimes cognizable alone by the king.

Rape is alſo a name given to the wood or ſtalks of the cluſters of grapes, when dried, and freed from the fruit.

The *rape* is uſed in making vinegar, ſerving to heat and ſour the wine: but it is firſt put into a place to ſour itſelf, before it be caſt into the vinegar veſſel; to which end, preſently after the vintage, it is carefully put up in barrels, leſt it take air, otherwiſe it would heat itſelf and be ſpoiled. There is no other way of keeping *rape* hitherto diſcovered, but to fill the veſſel, wherein it is contained, with wine or vinegar.

Rape, *rapa*, is alſo uſed for a part or diviſion of a county; ſignifying as much as a *hundred*.

Though ſometimes *rape* is taken for a diviſion containing ſeveral hundreds. Thus Suſſex is divided into ſix *rapes*, viz. thoſe of Chicheſter, Arundel, Bramber, Lewes, Pevenſey, and Haſtings: every one of which, beſides its hundreds, has a caſtle, a river, and foreſt belonging to it.

The like parts in other counties are called *tithings*, *lathes*, or *wapentakes*.

Rape, in *Botany*. See Napus.

Rape, *Broom*, *orobanche*, in *Botany*, a genus of the *didynamia angioſpermia* claſs. The empalement is divided into two ſegments, the flower is ringent, and the fruit is a ſingle-celled, double-valved, polyſpermous capſule, with a glandule at the baſe of the germen. There are ſix ſpecies.

It frequently grows to the roots of geniſta or broom, whence it is call *rapum geniſtæ*, or *broom rape*: it is alſo found among corn. The herb preſerved, or its ſyrup, is of excellent uſe in ſplenetic or hypochondriac diſorders; and an ointment prepared of it with ſwine's fat, is good for hard and ſcirrhous tumors.

Rape, *Wild*, in *Botany*. See Mustard.

RAPHA, or Raphe, in *Anatomy*, the ridge or line which runs along the under ſide of the penis, and reaching from the frænum to the anus, divides the ſcrotum and perinæum in two.

This line is not uſually cut in the grand operation of cutting for the ſtone, becauſe it is both harder than the reſt of the ſkin thereabouts, and alſo becauſe you muſt then cut upon the interſtices of the muſcles, which will make the re-union the more difficult.

RAPHANIS, in *Botany*, the name by which the Attics, among the Greeks, called the radiſh; for the word *raphanos*, or *raphanus*, with them, does not expreſs the radiſh, but the cabbage. The Greeks of all other places concurred in calling the radiſh *raphanos*, and the cabbage *crambe*; and it is owing to this that we have many authors who confound together theſe two plants, though ſo very unlike one another in appearance and uſe. It is generally to be underſtood, that wherever Theophraſtus mentions the word *raphanos*, he means by it the cabbage; and the ſame being obſerved, in regard to all the other Attic writers, the whole danger of confuſion and error will ceaſe.

RAPHANISTRUM, *white-flowered charlock, with jointed pods*, in *Botany*, a ſpecies of the *raphanus* or RADISH.

RAPHANUS, in *Botany*. See Radish.

RAPHIDIA, in the *Hiſtory of Inſects*, the name of a genus of four-winged flies, of the NEUROPTERA kind.

The head of the *raphidia* is of a horny ſubſtance, depreſſed, and furniſhed with two teeth and four feelers. This genus has alſo three ſtemmata, deflexed wings, and a cylindric thorax. The tail is armed with a weapon of a ſlender form, ſharp, horny, and ſimple, not bifid at the extremity. There are three ſpecies.

RAPIER, properly denotes a long, ordinary, old-faſhioned cutting ſword, ſuch as thoſe worn by the common ſoldiers.

The word is formed from the French *rapiere*, of the Greek ῥαπιζειν, *cædere*, *to ſmite*, or *ſtrike*.

In this ſenſe do the French ſtill uſe the term; ſo that among them, to *take the rapier*, is to enter in the army.

Rapier, in a modern ſenſe among us, uſually denotes a ſmall ſword, as contradiſtinguiſhed from a back-ſword, or cutting ſword.

RAPINE, *rapina*, in *Law*. To take a thing in private, againſt the owner's will, is properly *theft*; but to take it openly or by violence, is *rapine*, or ROBBERY.

RAPISTRUM, in *Botany*, a ſpecies of the *ſea-cabbage* or CRAMBE.

RAPPE, in *Ichthyology*, a name given by ſome to the *capito fluviatilis rapax* of Geſner, more frequently known by the name of the CORVUS *piſcis*.

RAPSODIST. See Rhapsodist.

RAPSODY. See Rhapsody.

RAPTU *hæredis*, an ancient writ which lies for taking away an heir, holding in ſocage; of which there are two ſorts; one when the heir is married, the other when not. See Ravishment.

RAPTURE, *raptura*, an extaſy, or tranſport of mind. See Extasy, Enthusiasm, Rhapsody, &c.

RAPUNCULUS, in *Botany*. See Rampion.

RAPUNTIUM, in *Botany*. See Cardinal *flower*.

RARE, in *Phyſics*, denotes a body that is very porous, whoſe parts are at a great diſtance from one another, and which contains but little matter under a great deal of bulk.

In this ſenſe *rare* ſtands oppoſed to *denſe*.

The corpuſcular philoſophers, viz. the Epicureans, Gaſſendiſts, Newtonians, &c. aſſert that bodies are *rarer* ſome than others, in virtue of a greater quantity of vacuity included between their pores. The Carteſians hold, that a greater *rarity* only conſiſts in a greater quantity of materia ſubtilis included in the pores. Laſtly, the Peripatetics contend, that *rarity* is a new quality ſuperinduced upon a body, without any dependence, either on vacuity, or ſubtile matter.

RAREFACTION, *rarefactio*, in *Phyſics*, the act whereby a body is rendered *rare*; that is, is brought to poſſeſs more room, or appear under a larger bulk, without acceſſion of any new matter.

Rarefaction is oppoſed to CONDENSATION.

Our more accurate writers reſtrain *rarefaction* to that expanſion of a maſs into a larger bulk, which is effected by means of heat. All expanſion from other cauſes they call *dilatation*.

The Carteſians deny any ſuch thing as abſolute *rarefaction*: extenſion, with them, conſtituting the eſſence of matter, they are obliged to hold all extenſion equally full.

Hence, they make *rarefaction* to be no other than an acceſſion of freſh, ſubtile, and inſenſible matter, which, entering the parts of the body, ſenſibly diſtends them. See this diſproved under Vacuum.

It is by *rarefaction* that gunpowder has its effect; and to the ſame principle alſo we owe our æolipiles, thermometers, &c.

The degree to which the air is *rarefiable* exceeds all imagination: Merſennus, long ago, by means of an intenſe heat, found that air might be rarefied ſo as to poſſeſs more than 70 times its former ſpace.

Mr. Boyle afterwards found, that air, by its own elaſticity, and without the help of any heat, would dilate itſelf ſo as to take up nine times its former ſpace; then 31 times; then 60; then 150: at length, by many degrees, he found it would reach to 8000 times, then 10000, and finally to 13679.

Such is the *rarefaction* of common air, from its own principle of elaſticity, and without any previous condenſation; but if it be compreſſed, the ſame author found its greateſt ſpace when moſt rarefied, is to its leaſt when moſt condenſed, as 55000 to 1.

Such an immenſe *rarefaction*, ſir Iſaac Newton ſhews, is inconceiveable on any other principle than that of a repelling force inherent in the air, whereby its particles mutually fly from one another.

This repelling force, he obſerves, is much more conſiderable in air than in other bodies, as being generated from the moſt fixt bodies, and that with much difficulty, and ſcarce without fermentation; thoſe particles being always found to fly each other with the moſt force, which, when in contact, cohere the moſt firmly. See Air.

The members of the French Royal Academy have be-ſhewed much attention on the different *rarefactions*, or rather the different *rarities* of the air at different heights. M. Mariotte eſtabliſhed this as a principle, from experiments, that the different *rarefactions*, or condenſations, of the air, follow the proportion of the weights wherewith it is preſſed.

Hence, ſuppoſing the mercury in the level of the ſea ſuſpended to twenty-eight inches, which is the weight of the whole atmoſphere; and that ſixty feet height of air are equivalent to a line, or one twelfth of an inch of mercury; ſo that the barometer, at the height of ſixty feet from the ſea, would fall a line; it is eaſy finding what height of air would be equal to a ſecond, or any other line of mercury: for as twenty-eight inches of mercury one twelfth are to twenty-eight inches, ſo is the height of ſixty feet of air to a fourth term, which is the height of air correſponding to a ſecond line of mercury.

And after the ſame manner may the height of air correſponding to each line be found; which will make a geometrical progreſſion, the ſum whereof will be the whole *height of the* ATMOSPHERE; and, of conſequence, a certain part of that ſum will be the height of a mountain, at whoſe top the barometer ſhall have ſunk a certain quantity.

Meſſ. Caſſini and Maraldi, upon meaſuring the heights of ſeveral mountains, found, that this progreſſion of M. Marriotte was defective; that it always gave the height of the mountains, and conſequently the *rarefactions* leſs than they really were: and from ſome farther experiments M. Amontons found, that the principle will only hold in the mean *rarefactions*, not in the extremes.

RAREFACTIVES, *rarefacientia*, in *Medicine*, remedies which open and enlarge the pores of the ſkin, to give an eaſy vent to the matter of perſpiration.

Such are aniſe, mallows, pellitory, chamomile flowers, linſeed, &c.

RARUM, *non-ſpiſſum*, in the *Ancient Muſic*. See APYCNON.

RASA, a word uſed by ſome authors to expreſs RESIN of any kind.

RASAKETI, a name given by ſome of the chemiſts to *æs uſtum*, or burnt copper.

RASANT, or RAZANT *flank*, in *Fortification*. See FLANK.

The defence of the baſtion is *raſant*.

RASANT *fire*. See FIRE.

RASCETA, a word uſed by the Arabian phyſicians to expreſs the wriſt or ankle.

RASE, *raſarium*, in our old writers, ſeems to have been a meaſure of corn now diſuſed: toll ſhall be taken by the *raſe*, and not by the heap or cantel.

RASE, in the *Manege*. To *raſe*, or glance upon the ground, called in French *razer le tapis*, is to gallop near the ground, as our Engliſh horſes do.

RASH, in *Clock Work*. See RATCH.

RASH, in *Medicine*, an eruption or efflorescence upon the ſkin, thrown out in fevers, or ſurfeits.

RASILIS *ærugo*, in the *Materia Medica of the Ancients*, one of their kinds of verdigriſe. It was prepared in the following manner: they ſet ſome ſharp vinegar over the fire in a ſtrong earthen veſſel, and covered it with a braſs pot inverted, well cleaned, and without any vent-hole. And after ſome time the veſſels were to be ſeparated; and the verdigriſe, which was found concreted on the inſide of the braſs pot, was ſcraped off, and put up for uſe.

RASP, a coarſe ſort of FILE.

RASPATORY, a ſurgeon's inſtrument, wherewith they ſcrape foul, carious, or fractured bones.

RASPBERRY *buſh*, *rubus*, in *Botany*, a genus of the *icoſandria polygynia* claſs. Its characters are theſe: the flower has a permanent empalement of one leaf, which is cut into five ſpear-ſhaped ſegments; it hath five roundiſh petals, which are inſerted in the empalement, and a great number of ſtamina which are alſo inſerted in the empalement, terminated by roundiſh compreſſed ſummits with a great number of germina, having ſmall hair-like ſtyles on their ſides, crowned by permanent ſtigmas. The germina afterward become berries, compoſed of many acini, collected into a head, each having one cell, in which is contained one oblong ſeed. Miller enumerates ten, and Linnæus fourteen ſpecies.

The *raſpberry* buſh is often found wild in ſome of our northern countries, but is cultivated in gardens throughout England for the delicacy of its fruit. There are two or three varieties of this, one with a red, and the other a white fruit, and the third generally produces two crops of fruit annually; the firſt ripens in July, and the ſecond in October, but thoſe of the latter ſeaſon have ſeldom much flavour.

Theſe ſhrubs ſend up great plenty of ſuckers from their roots, and are very eaſily propagated by them; though ſuch plants as are raiſed by layers are preferable. They ſhould be taken up in October, and before they are replanted their fibres ſhould be ſhortened; but the buds, which are at a ſmall diſtance from the ſtem of the plant, muſt not be cut off, becauſe theſe produce new ſhoots the next ſummer. They ſhould be planted two feet aſunder, and ſet in rows, which ſhould be four or five feet diſtant from one another. The ſoil they thrive in beſt is a freſh ſtrong loam. The time for dreſſing them is in October, when all the old wood which produced fruit the preceding ſummer, ſhould be cut down below the ſurface of the ground, and the young ſhoots ſhortened to about two feet in length. The ſpaces between the rows ſhould then alſo be dug up, and ſome other rotten dung buried in them. In the ſummer they muſt be kept clean from weeds, and once in three or four years there ſhould be new beds made, and the old ones deſtroyed, for they ſeldom bear well after that time. Miller.

For the dietetic and medicinal uſe of *raſpberries*, ſee SUMMER *fruits*.

RASPECON, in *Ichthyology*, a name given by ſome to the URANOSCOPE, or ſtar-gazer.

RASPHUYS, or RASP-*houſe*, a celebrated work-houſe, or houſe of correction, at Amſterdam. See WORK-*houſe*.

RASSE *coronde*, in *Natural Hiſtory*, a name given by the Ceyloneſe to a peculiarly fine kind of cinnamon, which is the bark of a tree, growing no where but in that iſland. The name they give it ſignifies *ſharp* or *biting cinnamon*. This choice kind is exported annually, in conſiderable quantity, by the Dutch Eaſt India company, who prohibit the mixing any other kind of cinnamon with it, under a very ſevere penalty. Phil. Tranſ. Nº 409.

RASTIS, a word uſed by ſome chemical writers as a name for TIN.

RASTOL, or RASOES, a name given by ſome of the chemical writers to copper.

RASTUL, a word uſed by ſome of the chemical writers to expreſs ſalt in general.

RASURA, a word uſed by the pharmaceutic writers to expreſs the ſhavings of woods, or other hard ſubſtances, to make them readily yield their virtues by decoction. Phyſicians alſo uſe it to expreſs the corroſion of acrid humours.

RASURE *in a deed*, in *Law*. See DEED.

RAT, in *Zoology*. See MUS.

RAT, in the *Sea Language*, is uſed to expreſs a part of the ſea, where there are rapid and dangerous currents, or counter-currents.

RAT-*gooſe*, in *Ornithology*, the name of a ſmall ſpecies of wild gooſe, common in ſome of the northern counties of England. See GOOSE.

RAT, *Mountain*. See MARMOTTE.

RAT, *Muſk*. See MUS.

RAT, *Norway* or *brown*, *mus Norwegicus*, is a *rat* whoſe head, back, and ſides are of a light brown colour, mixed with tawny and aſh colour; the breaſt and belly are of a dirty white; the feet naked, and of a dirty fleſh colour; the fore-feet are furniſhed with four toes, and a claw inſtead of the fifth: the length from the noſe to the tail is nine inches, and the tail is of the ſame length. This animal is more ſtrongly made than the common black *rat* or MUS *rattus*.

This ſpecies of *rat*, which is the ſame animal that is called in the Eaſt Indies a *bondicote*, now inhabits moſt parts of Europe; whither it is ſuppoſed to have been brought within the laſt century, in ſome of the Indian ſhips. It came into Great Britain about fifty years ago, but has not been known in the neighbourhood of Paris above half that time. They ſwarm in Peterſburg, and are known in Pruſſia; but have not yet reached the oppoſite ſide of the Baltic, as Linnæus takes no notice of this ſpecies. Theſe were probably the *mures Caſpii* of Ælian, which made periodical viſits in great multitudes to the countries bordering on the Caſpian ſea, ſwimming boldly over the rivers, holding by one another's tail. Ælian. Hiſt. An. 17. cap. 17. They burrow like the water *rat*, on the ſides of ponds and ditches; ſwim and dive well; live on grain and fruits, but will deſtroy poultry and game; increaſe faſt, producing from fourteen to eighteen young at a time; are very bold and fierce; will turn, when cloſely purſued, and faſten on the ſtick or hand that offers to ſtrike them: they have deſtroyed the common black *rat* in moſt places: they inhabit the fields part of the year, but migrate in great numbers into houſes, and do much miſchief. The bite of theſe *rats* is not only ſevere but dangerous; the wound being immediately attended with a great ſwelling, and healing very ſlowly. Pennant.

RAT, *Norway*, is alſo a name given by ſome writers to the *lemming* or *ſable* MOUSE.

RAT-*tails*, in the *Manege*. See ARRETS.

RAT-*tailed*. A horſe is thus called that has no hair upon his tail.

RAT-*tailed worms*, in *Natural Hiſtory*, a ſpecies of fly-worms with long tails, reſembling thoſe of *rats*, whence they have their name. They are of ſeveral ſizes, and found alſo in different places, but all change into two-winged flies, having very much the reſemblance of bees, and commonly called *bee-flies*. See *Tab. of Inſects*, Nº 49. See DRONE-*fly*.

RATA *pro* RATA. See PRO *rata*.

Onerando pro RATA *portionis*. See ONERANDO.

RATAFIA, a fine ſpirituous liquor, prepared from the kernels, &c. of ſeveral kinds of fruits, particularly of cherries and apricots.

Ratafia of cherries, is prepared by bruiſing the cherries, and putting them into a veſſel wherein brandy has been long kept; then adding to them the kernels of cherries, with ſtrawberries, ſugar, cinnamon, white pepper, nutmegs, cloves; and to twenty pounds of cherries, ten quarts of brandy. The veſſel is left open ten or twelve days, and then ſtopped cloſe for two months before it be tapped.

Ratafia of apricots is prepared two ways; viz. either by boiling the apricots in white wine, adding to the liquor an equal quantity of brandy, with ſugar, cinnamon, mace, and the kernels of apricots; infuſing the whole for eight or ten days; then ſtraining the liquor, and putting it up for uſe: or elſe by infuſing the apricots, cut in pieces, in brandy, for a day or two; paſſing it through a ſtraining-bag, and then putting in the uſual ingredients.

RATCH, or RASH, in *Clock Work*, a ſort of wheel having twelve fangs, which ſerve to lift up the detents every hour, and to make the clock ſtrike.

RATCHETS, in a *Watch*, are the ſmall teeth at the bottom of the fuſee, or barrel, which ſtop it in winding up.

RATE, a ſtandard or proportion, by which either the quantity or value of a thing is adjuſted.

The *rates* of bread, &c. in London, are fixed by authority. See *Aſſiſe of* BREAD.

ate of intereſt, as now eſtabliſhed by law in Eng- is five per cent. The *rate* of intereſt in Italy, is per cent. In Sweden, ſix. In France, five. In Spain, ten. In Barbadoes, ten. In Ireland, twelve. In Turky, twenty. Low *rates* of intereſt advance the prices of land.

The *rates* or *fares* of hackney-coachmen, chairmen, and watermen, are fixed by act of parliament. See *Hackney* COACHES, &c.

The *rates* of exchange, factorſhip, &c. are different. See EXCHANGE, FACTORAGE, &c.

RATES, *Books of*. See BOOK and CUSTOMS.

RATE, *Poor*. See POOR.

RATE-*tythe*. When ſheep, or other cattle, are kept in a pariſh for leſs time than a year, the owner muſt pay tythe for them *pro rata*, according to the cuſtom of the place.

RATE *of a ſhip of war*, is its order, degree, or diſtinction, as to magnitude, burden, force, &c.

The Britiſh fleet is accordingly diſtributed into ſix *rates*, excluſive of the inferior veſſels that uſually attend on naval armaments; as ſloops of war, armed ſhips, bomb-ketches, fire-ſhips, and cutters or ſchooners commanded by lieutenants.

Ships of the *firſt rate* mount a hundred cannon, having forty-two pounders on the lower deck, twenty-four pounders on the middle deck, twelve pounders on the upper deck, and ſix pounders on the quarter-deck and forecaſtle. They are manned with eight hundred and fifty men, including their officers, ſeamen, marines, and ſervants.

In general, the ſhips of every *rate*, beſides the captain, have the maſter, the boatſwain, the gunner, the chaplain, the purſer, the ſurgeon, and the carpenter; all of whom, except the chaplain, have their mates or aſſiſtants, in which are comprehended the ſail-maker, the maſter at arms, the armourer, the captain's clerk, the gunſmith, &c. The number of other officers is always in proportion to the *rate* of the ſhip. Thus a *firſt rate* has ſix lieutenants, ſix maſter's mates, twenty-four midſhipmen, and five ſurgeon's mates, who are conſidered as gentlemen; beſides the following petty officers: quarter-maſters, and their mates, fourteen; boatſwain's mates, and yeomen, eight; gunner's mates and aſſiſtants, ſix; quarter gunners, twenty-five; carpenter's mates, two, beſides fourteen aſſiſtants; with one ſteward, and ſteward's mate to the purſer.

Ships of the *ſecond rate* carry ninety guns upon three decks; of which thoſe on the lower battery are thirty-two pounders; thoſe on the middle, eighteen pounders; on the upper deck, twelve pounders; and thoſe on the quarter-deck, ſix pounders, which uſually amount to four or ſix. Their complement of men is ſeven hundred and fifty, in which there are ſix lieutenants, four maſter's mates, twenty-four midſhipmen, and four ſurgeon's mates, fourteen quarter-maſters and their mates, eight boatſwains mates and yeomen, ſix gunner's mates and yeomen, with twenty-two quarter-gunners, two carpenter's mates, with ten aſſiſtants, and one ſteward and ſteward's mate.

Ships of the *third rate* carry from ſixty-four to eighty cannon, which are thirty-two, eighteen, and nine pounders. The eighty gun ſhips, however, begin to loſe their repute, and to give way to thoſe of ſeventy-four, ſeventy, &c which have only two whole batteries; whereas the former have three, with twenty-eight guns planted on each; the cannon of their upper deck being the ſame as thoſe on the quarter-deck and forecaſtle of the latter, which are nine pounders. The complement in a ſeventy-four is ſix hundred and fifty; and in a ſixty-four, five hundred men: having, in peace, four lieutenants; but in war, five; and when an admiral is aboard, ſix. They have three maſter's mates, ſixteen midſhipmen, three ſurgeon's mates, ten quarter-maſters and their mates, ſix boatſwain's mates and yeomen, four gunner's mates and yeomen, with eighteen quarter-gunners, one carpenter's mate with eight aſſiſtants, and one ſteward and ſteward's mate under the purſer.

Ships of the *fourth rate* mount from ſixty to fifty guns, upon two decks and the quarter-deck. The lower tier is compoſed of twenty-four pounders; the upper tier, of twelve pounders; and the cannon on the quarter-deck and forecaſtle are ſix pounders. The complement of a fifty gun ſhip is three hundred and fifty men, in which there are three lieutenants, two maſter's mates, ten midſhipmen, two ſurgeon's mates, eight quarter-maſters and their mates, four boatſwain's mates and yeomen, one gunner's mate and one yeoman, with twelve quarter-gunners, one carpenter's mate and ſix aſſiſtants, and a ſteward and ſteward's mate.

All veſſels of war under the *fourth rate*, are uſually comprehended under the general name of frigates, and never appear in the line of battle. They are divided into the *fifth* and *ſixth rate*, the former mounting from forty to thirty-two guns, and the latter from twenty-eight to twenty. The largeſt of the *fifth rate* have two decks of cannon, the lower battery being of eighteen pounders, and that of the upper deck of nine pounders; but thoſe of thirty-ſix and thirty-two guns have only one complete deck of guns, mounting twelve pounders, beſides the quarter-deck and forecaſtle, which carry ſix pounders. The complement of a ſhip of forty-four guns is two hundred and eighty men; and that of a frigate of thirty-ſix guns, two hundred and forty men. The firſt has three, and the ſecond two lieutenants; and both have two maſter's mates, ſix midſhipmen, two ſurgeon's mates, ſix quarter-maſters and their mates, two boatſwain's mates and one yeoman, one gunner's mate and one yeoman, with ten or eleven quarter-gunners, and one purſer's ſteward.

Frigates of the *ſixth rate*, carry nine pounders; thoſe of twenty-eight guns having three pounders on their quarter-deck, with two hundred men for their complement; and thoſe of twenty-four, one hundred and ſixty men: the former has two lieutenants; the latter, one; and both have two maſter's mates, four midſhipmen, one ſurgeon's mate, four quarter-maſters and their mates, one boatſwain's mate and one yeoman, one gunner's mate, and one yeoman, with ſix or ſeven quarter-gunners, and one purſer's ſteward.

The ſloops of war carry from eighteen to eight cannon; the largeſt of which have ſix pounders; and the ſmalleſt, viz. thoſe of eight or ten guns, four pounders. Their officers are generally the ſame as in the *ſixth rates*, with little variation; and their complements of men are from one hundred and twenty to ſixty, in proportion to their force or magnitude.

Bomb-veſſels are on the ſame eſtabliſhment as ſloops; but fire-ſhips and hoſpital ſhips are on that of *fifth-rates*.

If the dimenſions of all ſhips of the ſame *rate* were equal, it would be eaſy to collect them into one point of view in a table; but as there is no invariable rule for the general dimenſions, we ſhall ſelect thoſe of ſome of the lateſt conſtruction in each *rate*.

Rates.		Guns.	Length of the keel.		Length of the lower deck.		Extreme breadth.		Depth in the hold.		Burthen in tons.
			Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	
1ſt *rate*,	Victory -	100	151	3	186	—	51	10	21	6	2162
2d *rate*,	Barfleur -	90	144	$\frac{3}{4}$	177	6	50	—	21	-	1934
3d *rate*,	Arrogant -	74	138	—	168	3	47	4	19	9	1644
	Europa -	64	139	—	159	—	44	4	19	4	1366
4th *rate*,	Saliſbury -	50	120	8	146	—	40	4	17	4	1044
5th *rate*,	Phœnix -	44	116	11	140	9	37	$1\frac{3}{8}$	16	-	856
	Venus -	36	106	3	128	$4\frac{1}{2}$	35	9	12	4	722
6th *rate*,	Carysfort -	28	97	$3\frac{1}{2}$	118	4	33	8	10	6	586
	Dolphin -	24	93	4	113	—	32	1	11	-	511
Sloop	Nautilus -	16	80	$7\frac{5}{8}$	98	—	27	2	12	8	316

Ships of the *ſecond rate*, and thoſe of the *third*, which have three decks, carry their ſails remarkably well, and labour very little at ſea. They are excellent in a general action, or in cannonading a fortreſs. Thoſe of the *third rate*, which have two tiers, are fit for the line of battle, to lead the convoys and ſquadrons of ſhips of war in action; and in general, to ſuit the different exigencies of the naval ſervice. The *fourth rates* may be employed on the ſame occaſions as the *third rates*; and may be alſo deſtined for ſervice among the foreign colonies, or on expeditions of great diſtance; ſince theſe veſſels are uſually excellent for keeping and ſuſtaining the ſea. Veſſels of the *fifth rate* are too weak to ſuffer the ſhock of a line of battle; but they may be deſtined to lead the convoys of merchant ſhips, to protect the commerce in the colonies, to cruiſe in different ſtations, to accompany ſquadrons, or be ſent expreſs with neceſſary intelligence and orders. The ſame may be obſerved of the *ſixth rates*.

The frigates which mount from twenty-eight to thirty-eight guns upon one deck, with the quarter-deck, are extremely proper for cruizing againſt privateers, or for ſhort expeditions, being light, long, and uſually excellent ſailers. Falconer.

RATEEN, or Ratten, in *Commerce*, a thick woollen ſtuff, quilled, woven on a loom with four treddles, like ſerges, and other ſtuffs that have the whale or quilling.

There are ſome *rateens* dreſſed and prepared like cloths; others left ſimply in the hair; and others where the hair, or knap is frized.

Rateens are chiefly manufactured in France, Holland, and Italy; and moſtly uſed in linings.

The frize is a ſort of coarſe *rateen*; and the drugget is a *rateen* half linen, half woollen.

RATEL, in *Zoology*, a name given by the Hottentots to an animal inhabiting the Cape of Good Hope, which lives on honey, and is a great enemy to bees. It has a blunt black noſe; no external ears, but a ſmall rim round the orifice; a rough tongue, ſhort legs, very long claws, which are ſtraight like thoſe of a badger, and guttered beneath: the colour of the forehead, crown, and whole upper part of the body is a cinereous grey; the cheeks, and ſpace round the ears, throat, breaſt, belly, and limbs, black; from each ear to the tail extends along the ſides a duſky line, leaving beneath another of grey. Its length from the noſe to the tail is forty inches, and the tail twelve.

This animal preys in the evening, and aſcends to the higheſt parts of the deſart to look about; and will then put one foot before its eyes, to prevent the dazzling of the ſun. The reaſon of its going to an eminence is for the ſake of ſeeing or hearing the honey-guide cuckoo, or CUCULUS *indicator*, which lives on bees, and, as it were, conducts it to their haunts. Pennant.

RATIFICATION, *ratificatio*, an act, approving of, and confirming, ſomething done by another, in our name.

A treaty of peace is never ſecure till the princes have *ratified* it.

All procuration imports a promiſe of ratifying and approving what is done by the proxy, or procurator: after treating with a procurator, agent, factor, &c. a *ratification* is frequently neceſſary on the part of his principal.

Ratification is particularly uſed, in our *Laws*, for the confirmation of a clerk in a benefice, prebend, &c. formerly given him by the biſhop, &c. where the right of patronage is doubted to be in the king.

Ratification is alſo uſed for an act confirming ſomething we ourſelves have done in our own name.

An execution, by a major, of an act paſſed in his minority, is equivalent to a *ratification*.

RATING. See Raiting.

RATIO, in *Arithmetic* and *Geometry*, that relation of homogeneous things which determines the quantity of one from the quantity of another, without the intervention of any third.

The homogeneous things thus compared, we call *the terms of the ratio*; particularly that referred to the other, we call the *antecedent*; and that to which the other is referred, the *conſequent*.

Thus, when we conſider one quantity by comparing it with another, to ſee what magnitude it has in compariſon of that other; the magnitude this quantity is found to have in compariſon thereof, is called the *ratio*, *reaſon*, of this quantity to that; which ſome think would be better expreſſed by the word *compariſon*.

Euclid defines *ratio* by the *habitude or relation of magnitudes of the ſame kind in reſpect of quantity*. But this definition is found defective; there being other relations of magnitudes which are conſtant, yet are not included in the number of *ratios*: ſuch as that of the right ſine, to the ſine of the complement in trigonometry.

Hobbes endeavoured to mend Euclid's definition of *ratio*, but unhappily: for in defining it, as he does, by *the relation of magnitude to magnitude*, his definition has not only the ſame defect with Euclid's, in not determining the particular kind of relation; but it has this farther, that it does not expreſs the kind of magnitudes which may have a *ratio* to one another.

Ratio is frequently confounded with *proportion*; yet ought they, by all means, to be diſtinguiſhed, as very different things. Proportion, in effect, is an identity or ſimilitude of two *ratios*.

Thus, if the quantity A be triple the quantity B; the relation of A to B, i. e. of 3 to 1, is called the *ratio* of A to B. If two other quantities, C, D, have the ſame *ratio* to one another that A and B have, i. e. be triple one another, this ſameneſs of *ratio* conſtitutes *proportion*; and the four quantities A : B : : C : D, are in proportion, or proportional to one another.

So that *ratio* exiſts between two terms; PROPORTION requires more.

There is a two-fold compariſon of numbers: by the firſt, we find how much they differ, i. e. by how many units the antecedent exceeds, or comes ſhort of, the conſequent.

This difference is called the *arithmetical ratio*, or exponent of the arithmetical relation or habitude of the two numbers. Thus, if 5 and 7 be compared, their arithmetical *ratio* is 2.

By the ſecond compariſon, we find how oft the antecedent contains, or is contained in, the conſequent; i. e. as before, what part of the greater is equal to the leſs.

This *ratio*, being common to all quantity, may be called *ratio* in the general, or by way of eminence: but is uſually called *geometrical ratio*; becauſe expreſſed, in geometry, by a line, though it cannot be expreſſed by any number.

Wolfius better diſtinguiſhes *ratio*, with regard to quantity in the general, into *rational* and *irrational*.

Rational Ratio is that which is as one rational number to another; e. gr. as 3 to 4.

Irrational Ratio is that which cannot be expreſſed by rational numbers.

Suppoſe, for an illuſtration, two quantities, A and B; and let A be leſs than B. If A be ſubtracted as often as it can be, from B, e. gr. five times, there will either be left nothing, or ſomething. In the former caſe, A will be to B, as 1 to 5; that is, A is contained in B five times; or $A = \frac{1}{5} B$. The *ratio* here, therefore, is *rational*.

In the latter caſe, either there is ſome part, which, being ſubtracted certain times from A, e. gr. three times, and likewiſe from B, e. gr. 7 times, leaves nothing; or there is no ſuch part: if the former, A will be to B as 3 to 7, or $A = \frac{3}{7} B$; and therefore the *ratio*, *rational*. If the latter, the *ratio* of A to B, i. e. what part A is of B, cannot be expreſſed by rational numbers; nor any other way than either by lines, or by infinite approaching ſeries.

The *exponent of a geometrical ratio* is the quotient ariſing from the diviſion of the antecedent by the conſequent. Thus the exponent of the *ratio* of 3 to 2, is $1\frac{1}{2}$; that of the *ratio* of 2 to 3, is $\frac{2}{3}$: for when the leſs term is the antecedent, the *ratio*, or rather the *exponent*, is a proper fraction. Hence the fraction $\frac{3}{4} = 3 : 4$. If the conſequent be unity, the antecedent itſelf is the exponent of the *ratio*: thus the exponent of 4 to 1, is 4. See Exponent.

If two quantities be compared, without the intervention of a third; either the one is equal to the other, or unequal: hence, the *ratio* is either of *equality* or *inequality*.

If the terms of the *ratio* be unequal, either the leſs is referred to the greater, or the greater to the leſs: that is, either the leſs to the greater, as a part to the whole; or the greater to the leſs, as the whole to a part. The *ratio*, therefore, determines how often the leſs is contained in the greater, or how often the greater contains the leſs; i. e. to what part of the greater the leſs is equal.

The *ratio* which the greater term has to the leſs, e. gr. 6 to 3, is called the *ratio of the greater inequality*: the *ratio* which the leſs term has to the greater, e. gr. 3 to 6, is called the *ratio of the leſſer inequality*.

This *ratio* correſponds to quantity in the general, or is admitted of by all kinds of quantities, diſcrete or continued, commenſurable or incommenſurable: but diſcrete quantity, or number, does likewiſe admit of another *ratio*.

If the leſs term of a *ratio* be an aliquot part of the greater, the *ratio* of the greater inequality is ſaid to be *multiplex*, multiple; and the *ratio* of the leſs inequality, *ſubmultiple*.

Particularly, in the firſt caſe, if the exponent be 2, the *ratio* is called *duple*; if 3, *triple*, &c. In the ſecond caſe, if the exponent be $\frac{1}{2}$, the *ratio* is called *ſubduple*, if $\frac{1}{3}$, *ſubtriple*, &c.

E. gr. 6 to 2 is in a triple *ratio*; becauſe 6 contains two thrice. On the contrary, 2 to 6 is a ſubtriple *ratio*; becauſe 2 is the third part of 6.

If the greater term contains the leſs once, and over and above an aliquot part of the ſame; the *ratio* of the greater inequality is called *ſuper particularis*, and the *ratio* of the leſs *ſub-ſuperparticularis*.

Particularly, in the firſt caſe, if the exponent be $1\frac{1}{2}$, it is called *ſeſquialterate*; if $3\frac{1}{3}$, *ſeſquitertial*, &c. In the other, if the exponent be $\frac{2}{3}$, the *ratio* is called *ſubſeſquialterate*; if $\frac{3}{4}$, *ſubſeſquitertial*, &c.

E. gr. 3 to 2 is in a *ſeſquialterate ratio*; 2 to 3 in a *ſubſeſquialterate*.

If the greater term contains the leſs once, and over and above ſeveral aliquot parts; the *ratio* of the greater inequality is called *ſuperpartiens*; that of the leſs inequality is *ſubſuperpartiens*.

Particularly, in the former caſe, if the exponent be $1\frac{2}{3}$, the *ratio* is called *ſuperbipartiens tertias*; if the exponent be $1\frac{3}{4}$ *ſupertripartiens quartas*; if $1\frac{1}{4}$, *ſuperquadripartiens ſeptimas*, &c. In the latter caſe, if the exponent be $\frac{3}{5}$, the *ratio* is called *ſubſuperbipartiens tertias*; if $\frac{4}{7}$, *ſubſupertripartiens quartas*; if $\frac{7}{11}$, *ſubſuperquadripartiens ſeptimas*.

E. gr. the *ratio* of 5 to 3 is *ſuperbipartiens tertias*; that of 3 to 5 *ſubſuperbipartiens tertias*.

If the greater term contains the leſs ſeveral times, and, beſides, ſome quota part of the ſame; the *ratio* of the greater inequality is called *multiplex ſuperparticularis*; and the *ratio* of the leſs inequality, *ſubmultiplex ſubſuperparticularis*.

Particularly, in the former caſe, if the exponent be $2\frac{1}{2}$, the *ratio* is called *dupla ſeſquialtera*; if $3\frac{1}{4}$, *tripla ſeſquiquarta*, &c. In the latter caſe, if the exponent be $\frac{2}{5}$, the *ratio* is called *ſubdupla ſubſeſquialtera*; if $\frac{4}{13}$, *ſubtripla ſubſeſquiquarta*, &c.

E. gr. the *ratio* of 16 to 5 is *tripla ſeſquiquinta*; that of 4 to 9, *ſubdupla ſubſeſquiquarta*.

Laſtly, if the greater term contains the leſs ſeveral times, and ſeveral aliquot parts thereof beſides; the *ratio* of the greater inequality is called *multiplex ſuperpartiens*; that of the leſs inequality, *ſubmultiplex ſubſuperpartiens*.

Particularly, in the former caſe, if the exponent be $\frac{8}{3}$, the *ratio* is called *dupla ſuperbipartiens tertias*; if $3\frac{4}{7}$, *tripla ſuperbiquadripartiens ſeptimas*, &c. In the latter caſe, if the exponent be $\frac{3}{8}$, the *ratio* is called *ſubdupla ſubſuperbipartiens tertias*; if $\frac{7}{25}$, *ſubtripla ſubſuperquadripartiens ſeptimas*, &c.

E. gr. the *ratio* of 25 to 7 is *tripla ſuperquadripartiens ſeptimas*; that of 3 to 8, *ſubdupla ſubſuperbipartiens tertias*.

Theſe are the various kinds of *rational ratios*; the names whereof, though they occur but rarely among the modern writers (for in lieu thereof they uſe the ſmalleſt terms of the *ratios*, e. gr. for *duple* 2 : 1, for *ſeſquialterate* 3 : 2); yet are they abſolutely neceſſary to ſuch as converſe with the ancient authors.

Clavius obſerves, that the exponents denominate the *ratios* of the greater inequality, both in deed and name; but the *ratios* of the leſs inequality, only in deed, not in name: but it is eaſy finding the name in theſe, if you divide the denominator of the exponent by the numerator.

E. gr. if the exponent be $\frac{5}{8}$, then $5 : 8 = 1\frac{3}{5}$; whence it appears, the *ratio* is called *ſubſupertripartiens quintas*.

As to the names of *irrational ratios*, nobody ever attempted them.

Same, or *identic ratios*, are thoſe whoſe antecedents have an equal reſpect to their conſequents, i. e. whoſe antecedents, divided by their conſequents, give equal exponents. And hence may the identity of irrational *ratios* be conceived.

Hence, firſt, as oft as the antecedent of one *ratio* contains its conſequent, or whatever part it contains of its conſequent, ſo oft, or ſuch part of the other conſequent does the antecedent of the other *ratio* contain: or, as oft as the antecedent of the one is contained in its conſequent, ſo oft is the antecedent of the other contained in its conſequent.

Secondly, if A be to B as C to D; then will A : B : : C : D; or A : B = C : D. The former of which is the uſual manner of repreſenting the identity of *ratios*, the latter is that of the excellent Wolfius; which has the advantage of the former, in that the middle character =, which denotes the ſameneſs, is ſcientifical; i. e. it expreſſes the relation of the thing repreſented, which the other : : does not. See CHARACTER.

Two *equal ratios*, e. gr. B : C = D : E, we have already obſerved, do conſtitute a proportion: of two *unequal ratios*, e. gr. A : B and C : D, we call A : B the *greater*, if $A : B \urcorner C : D$; on the contrary, we call C : D the *leſſer*, if $C : D \urcorner A : B$.

Hence, we expreſs a greater and leſs *ratio* thus: E. gr. 6 to 3 has a greater *ratio* than 5 to 4; for, $6 : 3 \; (= 2) \urcorner 5 : 4 \; (= 1\frac{1}{4})$. But 3 to 6 has a leſs *ratio* than 4 to 5; for $\frac{3}{6} = \frac{1}{2} \urcorner \frac{4}{5}$. Compound *ratio* is that made up of two or more other *ratios*, which the factum of the antecedents of two or more *ratios* has to the factum of their conſequents. Thus 6 to 72 is in a *ratio* compounded of 2 to 6, and 3 to 12.

Particularly, if it be compounded of two, it is called a *duplicate ratio*; if of three, a *triplicate*; if of four, *quadruplicate*; and, in the general, *multiplicate*, if it be compoſed of ſeveral ſimilar *ratios*. Thus 48 : 3 is a *duplicate ratio* of 4 : 1 and 12 : 3.

Additive RATIO. See ADDITIVE.

Alternate RATIO. See ALTERNATE.

Ordinate RATIO. See ORDINATE.

RATIO *modularis*. See LOGARITHM.

Denominator of a RATIO. See DENOMINATOR.

Properties of RATIOS.—Firſt, *ratios* ſimilar to the ſame third are alſo ſimilar to one another; and thoſe ſimilar to ſimilar, are alſo ſimilar to one another.

Secondly, if A : B = C : D; then, inverſely, B : A = D : C.

Thirdly, ſimilar parts P and p have the ſame *ratio* to wholes T and t; and if the wholes have the ſame *ratio*, the parts are ſimilar.

Fourthly, if A : B = C : D; then, alternately, A : C = B : D. And hence, if B = D : A = C; hence, alſo, if A : B = C : D; and A : F = C : G; we ſhall have B : F = D : G. Hence, again, if A : B = C : D; and F : A = G : C; we ſhall have F : B = G : D.

Fifthly, thoſe things which have the ſame *ratio* to the ſame, or equal things, are equal; and *vice verſa*.

Sixthly, if you multiply any quantities, as A and B, by the ſame, or equal quantities; their products D and E will be to each other as A and B.

Seventhly, if you divide any quantities, as A and B, by the ſame or equal quantities, the quotients F and G will be to each other as A and B.

Eighthly, the exponent of a compound *ratio* is equal to the factum of the exponents of the ſimple *ratios*.

Ninthly, if you divide either the antecedents or the conſequents of ſimilar *ratios*, A : B, and C : D, by the ſame E; in the former caſe, the quotients F and G will have the ſame *ratio* to the conſequents B and D; in the latter, the antecedents A and B will have the ſame *ratio* to the quotients H and K.

Tenthly, if there be ſeveral quantities in the ſame continued *ratio* A, B, C, D, E, &c. the firſt A, is to the third C, in a *duplicate ratio*; to the fourth D, in a *triplicate*; to the fifth E, in a *quadruplicate*, &c. *ratio* of the *ratio* of the firſt A, to the ſecond B.

Eleventhly, if there be any ſeries of quantities in the ſame *ratio*, A, B, C, D, E, F, &c. the *ratio* of the firſt A to the laſt F is compounded of the intermediate *ratios* A : B, B : C, C : D, D : E, E : F, &c.

Twelfthly, *ratios* compounded of *ratios*, whereof each is equal to each other, are equal among themſelves. Thus the *ratios* 90 : 3 = 960 : 32, compounded of 6 : 3 = 4 : 2, and 3 : 1 = 12 : 4; and 5 : 1 = 20 : 4.

For other properties of ſimilar or equal *ratios*, ſee PROPORTION.

When a *ratio* is given, expreſſed in large numbers, it is often very uſeful to find an approximated value of it in ſmaller numbers. Mr. Huygens and Dr. Wallis have given methods for this purpoſe, but that of Mr. Cotes being the moſt convenient in practice, we ſhall here inſert it. Suppoſe the *ratio* 2,718281828459, &c. to 1, or of 1 to 0,367879441171, &c. were propoſed to be reduced to ſmaller terms, ſo that no leſs numbers ſhall expreſs it nearer. The operation may be as follows:

Ratios greater than the true.			*Ratios* leſs than the true.		
1	0	× 2	0	1	
2	1		2	0	
3	1	× 2	2	1	× 1
8	3		6	2	
11	4	× 1	8	3	× 1
76	28		11	4	
87	32	× 1	19	7	× 4
106	39		87	32	
193	71	× 6	106	39	× 1
1264	465		1158	426	
1457	536	× 1	1264	465	× 1
21768	8008		1457	536	
23225	8544	× 1	2721	1001	× 8
25946	9545		23225	8544	
49171	18089	× 10	25946	9545	× 1
&c.	&c.		&c.	&c.	

Divide the greater term 2,71828, &c. by the leſſer 1, or the greater 1 by the leſſer 0,367879, &c. and again the leſſer by the remainder, and this again by the laſt remainder, and ſo on (ſee COMMON *Meaſure* and FRACTION): the quotients ariſing will be 2, 1, 2, 1, 1, 4, 1, 1, 6, 1, 1, 8, 1, 1, 10, 1, 1, 12, 1, 1, 14, 1, 1, 16, 1, 1, &c. Theſe being found, two rows or columns of *ratios* muſt be made, the one containing the *ratios* greater than the true, and the other ſuch as are leſs; beginning the computation from the *ratios* 1 to 0, 0 to 1, which are moſt remote from the truth, and from thence proceeding to ſuch as approach continually nearer. Let then the terms 1 and 0 be multiplied by the firſt quotient 2, and write the products 2 and 0, under the terms 0 and 1; then adding, there will ariſe the *ratio* 2 + 0 to 0 + 1, or 2 to 1. Multiply the terms of this *ratio* by the ſecond quotient 1, and add the products 2 and 1 to the terms 1 and 0 in the firſt column, there will ariſe the *ratio* 2 + 1 to 1 + 0, or 3 to 1. The terms of this *ratio* being multiplied by the third quotient 2, and the products 6 and 2 added to the terms 2 and 1 of the ſecond column, will give the *ratio* 8 to 3. Theſe multiplied by the fourth quotient 1, and the products 8 and 3 added to the preceding terms 3 and 1 in the firſt column, will give the *ratio* 11 to 4. Whoſe terms multiplied by the fifth quotient 1, and the products 11 and 4 added to the *ratio* 8 to 3 give the *ratio* 19 to 7; whoſe terms being multiplied by the 6th quotient 4, and the products 76 and 28 being added to 11 and 4, give the *ratio* 87 to 32. And thus we may go as far as we think fit; proceeding alternately from one column to the other. This being done, we ſhall find *ratios* greater than the true, to be 3 to 1, 11 to 4, 87 to 32, 193 to 71, 1457 to 536, 23225 to 8544, 49171 to 18089, &c. And the *ratios* leſs than the true will be 2 to 1, 8 to 3, 19 to 7, 106 to 39, 1264 to 465, 2721 to 1001, 25946 to 9545, &c. And theſe are the principal and primary *ratios*, which continually approximate to the *ratio* propoſed.

But if the whole ſeries of *ratios* greater than the true be required, ſo that no *ratios* greater than the true, and expreſſed in ſmaller terms, ſhall come nearer the truth; and if alſo the whole ſeries of *ratios* leſs than the true, and ſuch, as that no *ratios* leſs than the true and expreſſed in ſmaller terms, ſhall approach nearer to the truth, be deſired, then other ſecondary *ratios* muſt be inſerted between the primary already found. And theſe take place where the quotients ſurpaſs unity. They may be found by changing the multiplication by the quotient as above directed, into a continual addition of the terms, as often as there are units in the quotient. Thus, the firſt quotient being 2, the terms 1 and 0 are to be twice added to the terms 0 and 1. The ſums will give the *ratios* 1 to 1 and 2 to 1. Theſe laſt terms 2 and 1, the ſecond quotient being 1, muſt be once added to the terms 1 and 0, and the ſums will give the *ratio* 3 to 1. Alſo the terms 3 and 1, the third quotient being 2, are to be twice added to the terms 2 and 1; and the ſums will give the *ratios* 5 to 2, 8 to 3. Theſe laſt terms 8 and 3, the fourth quotient being 1, muſt be once added to the terms 3 and 1, and the ſums will give the *ratio* 11 to 4 Theſe terms 11 and 4, the fifth quotient being 1, muſt be once added to the terms 8 and 3, and the ſums will give the *ratio* 19 to 7. Laſtly, theſe terms 19 and 7, the ſixth quotient being 4, muſt be four times added to the terms 11 and 4. The ſums will give the *ratios* 30 to 11, 49 to 18, 68 to 25, 87 to 32. And ſo we may proceed as far as we think fit. The operation being performed, we ſhall find the whole ſeries of *ratios* greater than the truth to be 1 to 0, 3 to 1, 11 to 4, 30 to 11, 49 to 18, 68 to 25, 87 to 32, &c. and in like manner, the whole ſeries of *ratios* leſs than the truth will be 0 to 1, 1 to 1, 5 to 2, 8 to 3, 19 to 7, &c.

Example of the operation.

Ratios greater than the true.			*Ratios* leſs than the true.		
1	0	× 2	0	1	
2	1		1	0	
3	1	× 2	1	1	
8	3		1	0	
11	4	× 1	2	1	× 1
19	7		3	1	
30	11		5	2	
19	7		3	1	
49	18		8	3	× 1
19	7		11	4	
68	25		19	7	× 4
19	7		87	32	
87	32	× 1	106	39	× 1
&c.	&c.		&c.	&c.	

See Cotes, Harmonia Menſurarum, p. 7, &c.

The ingenious author has not given the demonſtration of his method; but Dr. Saunderſon has ſhewn the reaſon of it, in the fifth book of his Algebra, to which we refer the reader.

By means of this method, the approximated values of the *ratio* of the circumference to the diameter of a circle may be found in ſmall terms. Thus the proportion of the circumference of a circle to its DIAMETER, being according to Van Ceulen's numbers when abridged, 314159265359 to 100000000000; dividing the greater by the leſſer, &c. as before directed, we ſhall find the quotients 3, 7, 15 and 1, which will give the following *ratios*, 3 to 1, 22 to 7, 333 to 106, and 355 to 113; the ſecond is that of Archimedes, and the fourth that of Adrian Metius.

This proportion of 113 to 355 approaches very near the truth, only erring by 2 in the ſeventh decimal, when reduced to that form, for 355 : 113 :: 3,1415929 : 1, whereas it ought to be 3,1415927 to 1. To remember this proportion the better, we may make uſe of the following artifice. Take the three firſt odd numbers 1, 3, 5, and write each twice, thus 113355, then will the three firſt figures of this number 113, be the diameter, and the three laſt, 355 the circumference. Theſe approximations are of uſe in many practical parts of mathematics. See inſtances thereof in Huygens's Deſcriptio automati Planetarii among his Poſthumous Works, tom. ii. p. 174. edit. Amſt. 1728, where he deſcribes his method, and demonſtrates it. In muſic, it is the foundation of the different ſchemes of geometrical temperatures. See TEMPERAMENT.

After all, if we conſider each of the above ſeries ſeparately, we ſhall always find, that the *ratios* expreſſed by larger numbers approach nearer the truth, than thoſe expreſſed by ſmaller numbers. But if we compare the *ratios* of one ſeries with thoſe of the other, it may often happen, that a *ratio* expreſſed in ſmaller numbers ſhall approach nearer the truth than another expreſſed by greater numbers. For inſtance, let the *ratio* 519529 to 328612, expreſſing the proportion of the ſemi-tone major to the ſemi-tone minor in muſic, be propoſed. The quotients, according to the method here deſcribed, will be 1. 1. 1. 2. 1. &c. Hence the *ratios* greater than the true will be 2 : 1, 5 : 3, &c. and the *ratios* leſs than the true will be 1 : 1, 3 : 2, 11 : 7, &c. Now the *ratio* 3 : 2, though expreſſed in ſmaller numbers, approaches nearer to the truth than 5 : 3; for the exponent of the propoſed *ratio* $\frac{519529}{328612} = 1{,}581$, and $\frac{3}{2} = 1{,}5$; alſo $\frac{5}{3} = 1{,}667$. Hence the exponent of the *ratio* 5 to 3 will exceed the truth by 0,086 = 1.667—1,581; but the exponent of the *ratio* 3 to 2 will be deficient by no more than 0.081 = 1.581—1.5. Again, ſuppoſe the *ratio* of 927707238 to 659826661, expreſſing the chance of the dealer at whiſt having four trumps, were propoſed: dividing the firſt term by the ſecond, &c. the quotients will be 1. 2. 2. 6. 3. 1. 1. 4. &c. which gives the *ratios* greater than the true 2 : 1, 3 : 2, 10 : 7, or 17 : 12, &c. and leſs than the true 1 : 1, 4 : 3, 7 : 5, 52 : 37, &c. And here the *ratio* 7 : 5, though expreſſed in ſmaller numbers, approaches nearer to the truth than either 10 : 7, or 17 : 12, as will eaſily appear by reducing their exponents to decimals. But no inconveniencies of this kind can happen, if we content ourſelves with the principal and primary *ratios*, they being alernately greater and leſs, and continually approaching nearer to the truth. See WHIST.

Ratio, in our *Law-writers*, is uſed for a judgment given in a cauſe.

Hence, *ponere ad rationem* is to cite one to appear in judgment. Walſingh. 88.

Ratio *ſtatus*, Ragione *di ſtato*. See Reason *of State*.

Ratio *victus*. See Victus.

RATIOCINATION, the act of reasoning.

RATION, or Ratian, in the *Army*, a pittance or proportion of ammunition, bread, drink, or forage, diſtributed to each ſoldier for his daily ſubſiſtence.

Some write the word *racion*, and borrow it from the Spaniſh *ration*; but they both come from the Latin *ratio*. In ſome parts they call it a *reaſon*.

The horſe have *rations* of hay and oats, when they cannot go out to forrage.

The *rations* of bread are regulated by weight.—The ordinary *ration* of a foot-ſoldier is a pound and a half of bread per day. The officers have ſeveral *rations*, according to their quality, and the number of attendants that they are obliged to keep.

When the *ration* is augmented on occaſions of rejoicing, it is called a *double ration*.

The ſhips crews have alſo their *rations* or allowances of biſcuit, water, &c. proportioned according to their ſtock. The uſual *ration* at ſea, particularly among the Portugueſe, &c. is, a pound and half of biſcuit, a pint of wine, and a quart of freſh water per day; and each month an arrobe, or thirty-one pounds of ſalt meat, with ſome dried fiſh and onions.

RATIONABILES *expenſæ*, *reaſonable expences*. The commons in parliament, as well as the proctors of the clergy in convocation, were anciently allowed *rationabiles expenſas*; that is, ſuch allowance as the king, conſidering the prices of all things, ſhall judge meet to impoſe on the people to pay for the ſubſiſtence of their repreſentatives.

This in the 17th of Edward II. was ſettled at ten groats per day for knights, and five for burgeſſes: afterwards, four ſhillings a day for knights, and two ſhillings for burgeſſes; which was then deemed an ample retribution, both for expences, for labour, attendance, neglect of their own affairs, &c. See Burgess and Knights *of the ſhire*.

RATIONABILI *parte bonorum*, a writ which lies for the wife, againſt the executors of her huſband, denying her the third part of her huſband's goods, after debts and funeral expences paid.

Fitzherbert quotes Magna Charta, and Glanville, to prove, that, by the common law of England, the goods of the deceaſed, his debts firſt paid, ſhould be divided into three parts; whereof his wife is to have one, his children a ſecond, and the executors a third; adding, that this writ lies as well for the children, &c. as the wife. Such is the general law of Scotland at this day. And whatever may have been the cuſtom of late years, in many parts of the kingdom, or however it was introduced in derogation of the old common law, the ancient method continued in uſe in the province of York, the principality of Wales, and the city of London, till very modern times; when in order to favour the power of bequeathing, and to reduce the whole kingdom to the ſame ſtandard, three ſtatutes have been provided; the one 4 and 5 W. and M. c. 2. explained by 2 and 3 Ann. c. 5, for the province of York; another, 7 and 8 W. III. c. 38. for Wales; and a third, 11 Geo. I. c. 18. for London; (*ſee* Custom *of London*) whereby it is enacted, that perſons within thoſe diſtricts, and liable to thoſe cuſtoms, may, if they think proper, diſpoſe of all their perſonal eſtates by will; and the claims of the widow, children, and other relations, to the contrary, are totally barred. Thus is the old common law now utterly aboliſhed throughout all the kingdom of England, and a man may deviſe the whole of his chattels as freely as he formerly could his third part or moiety. Blackſt. Com. b. ii. p. 493.

Recto de Rationabili *parte*. See Recto.

RATIONABILIBUS *diviſis* is a writ that lies where two lords have ſignories joining together, for him that finds his waſte encroached upon, within the memory of man, againſt the encroacher, thereby to rectify the bounds of the ſignories: in which reſpect, Fitzherbert ſays, it is of the nature of a writ of right.

RATIONABILIS *dos*, in *Law*, a third part of ſuch lands and tenements as the huſband was ſeiſed of at the time of the eſpouſals, with which his wife was formerly endowed by the common law, if no ſpecific dotation was made at the church porch. See Dower and Jointure.

RATIONAL, *reaſonable*. See Reason.

Rational *fable*. See Fable.

Rational *fraction*, or *broken number*, is that equal to ſome aliquot part or parts of unity. See Fraction.

Rational or *true horizon*, is that whoſe plane is conceived to paſs through the centre of the earth; and which therefore divides the globe into two equal portions, or hemiſpheres. See Horizon.

It is called the *rational horizon*, becauſe only conceived by the underſtanding; in oppoſition to the *ſenſible* or apparent horizon, which is viſible to the eye.

Rational *integer*, or *whole number*, is that whereof unity is an aliquot part. See Number and Aliquot *part*.

Rational *mixt number* is that conſiſting of an integer, and a fraction; or of unity, and a broken number.

Commenſurable quantities are defined by being one to another as one *rational* number to another.

For unity is an aliquot part of a *rational number*; and a fraction has ſome aliquot part common with unity; in things, therefore, that are as a *rational* to a *rational* number, either the one is an aliquot part of the other, or there is ſome common aliquot part of both; therefore they are commensurable.

Hence, if a *rational* number be divided by a *rational*, the quotient is always a *rational*.

Rational *phyſicians*. See Physician.

Rational *quantity* or *number*, a quantity or number commenſurable to unity.

Suppoſing any quantity to be 1, there are infinite other quantities, ſome whereof are commenſurable to it, either ſimply, or in power: theſe Euclid calls *rational quantities*. The reſt, that are incommenſurable to 1, he calls *irrational quantities*, or *ſurds*.

Rational *ratio*. See Ratio.

Rational *ſoul*. See Soul.

RATIONALE, a ſolution or account of the principles of ſome opinion, action, hypotheſis, phenomenon, or the like. Hence,

Rationale is alſo the title of ſeveral books. The moſt conſiderable is the *Rationale of Divine Offices*, by Guil. Durandus, a celebrated ſchool-divine, biſhop of Mende, finiſhed in 1286, as he himſelf tells us. See Printing.

Rationale alſo denotes an ancient ſacerdotal veſtment, worn by the high-prieſt under the old law; and called by the Hebrews, חשן *hhoſchen*; by the Greeks, λογιον; by the Latins, *rationale* and *pectorale*; and by the Engliſh tranſlators, *breaſt-plate*.

The *rationale* was a piece of embroidered ſtuff worn on the breaſt, about a ſpan ſquare. Du-Cange deſcribes it as a double ſquare of four colours, interwoven with gold, and ſet with twelve precious ſtones in four rows, whereon were engraven the names of the twelve tribes, and faſtened to the ſhoulder by two chains and two hooks of gold. The form of the *rationale* was preſcribed by God himſelf, Exod. xxviii. 15—29.

A *rationale* appears alſo to have been anciently worn by the biſhops under the new law. But authors are in doubt about its form; ſome will have it reſemble that of the Jews; others take it to be only the pallium.

RATIONALIS, an officer mentioned in ſeveral ancient inſcriptions.

Lampridius, in the life of Alex. Severus, uſes *rationalis* as ſynonymous with procurator.

The *rationales* were intendants or ſurveyors under the emperors; and though Lampridius pretends they were firſt eſtabliſhed by Severus, it is evident there were ſome under Auguſtus.

RATIONARIUM, among the Romans, a book which contained the accounts of the empire. It was otherwiſe called *breviarium*. See Breviary.

RATIONIS *Ens*. See Ens.

Rationis *Diſtinctio*. See Distinctio.

Rationis *os*, in *Anatomy*, the bone of the forehead, otherwiſe called Os *frontis*.

RATLINES, or, as the ſeamen call them, Rutlins, or Rattlings, are certain ſmall lines which traverſe the ſhrouds of a ſhip horizontally, at regular diſtances from the deck upwards, and forming a variety of ladders, whereby to climb to any of the maſt-heads, or deſcend from them. Hence the term ſeems to be derived from *rath*, an obſolete word, ſignifying *a hill*. In order to prevent the rattling from ſlipping down by the weight of the ſailors, they are firmly attached by a knot, called a *clove-hitch*, to all the ſhrouds, except the foremoſt or aftmoſt; where one of the ends, being fitted with an eye-ſplice, is previouſly faſtened with twine-thread or pack-thread. Falconer.

RATTAN *canes*. See Cane.

RATTEN. See Rateen.

RATTLE, among the *Ancients*, a muſical inſtrument called by the Romans *crepitaculum*.

Mr. Malcolm takes the tintinnabulum, crotalum, and ſiſtrum, to have been only ſo many different kinds of *rattles*.

The invention of the *rattle* is aſcribed to the famous mathematician Archytas; whence Ariſtotle calls it, Αρχυτε πλαταγην, πλαταγη, Archytas's *rattle*. Diogenianus adds the occaſion of the invention; viz. that Archytas having children, he contrived this inſtrument to prevent their tumbling over things about the houſe. So that, how much ſoever ſome inſtruments have changed their uſes, the *rattle*, we are ſure, has preſerved its original application.

Rattle *graſs*. See **Louse** *wort*.

Rattle *net*. See **Wolf** *net*.

Rattle-*ſnake*. See **Snake**.

Rattle-*ſnake root, ſenegow*. See **Milk** *wort*.

Rattle-*ſnake root*, Dr. Witt's, a ſpecies of *Prenanthes*. See *Wild* **Lettuce**.

Rattle-*ſnake weed*, a ſpecies of *Eryngium*. See **Eryngo**.

Yellow **Rattle**, in *Botany*, a ſpecies of *Rhinanthus*. See *Yellow* **Louse-wort**.

RATZE, the name of a ſmall coin, ſtruck at Friburgh, &c. nearly of the ſame value with the **Blare**, which, in France, is worth two ſols and a denier.

RAUCA *avis*, in *Ornithology*, the name of a bird deſcribed by Nieremberg, as common about the lakes and rivers of America, and of the king-fiſher kind, but nearly as large as a duck, and black on the crown, and white on the breaſt and belly. Its neck is naturally very long in proportion to its body, yet it can occaſionally contract and ſhorten it in a very wonderful manner. It is a native of Mexico, and is eſteemed very good for the table. Mr. Ray has placed this among the birds, the accounts of which he is diſtruſtful of.

RAVEL-*bread*, a ſort of *bread*, called alſo *blackwhytloſ*, as being of a middle fineneſs betwixt white and brown.

RAVELIN, in *Fortification*, was anciently a flat baſtion, placed in the middle of a curtin.

Ravelin is now a detached work, compoſed only of two faces, which make a ſaliant angle, without and ſometimes with flanks; and raiſed before the curtin on the counterſcarp of the place; ſerving to cover it and the joining flanks from the direct fire of an enemy.

A *ravelin* is a triangular work reſembling the point of a baſtion, with the flanks cut off. See *Tab*. II. *Fortif. fig.* 21. N° 2. *lit.* i i i. Its uſe before a curtin is, to cover the oppoſite flanks of the two next baſtions. It is uſed alſo to cover a bridge or a gate, and is always placed without the moat.

What the engineers call a *ravelin*, the ſoldiers generally call a **demi-lune**, or half-moon.

There are alſo *double ravelins*, which ſerve to defend each other. They are ſaid to be *double* when they are joined by a curtin.

Ravelins, or *half-moons*, are conſtructed by ſetting off 50 toiſes from the re-entring angle O of the counterſcarp (*Tab*. VIII. *Fortification. fig.* 55.) on the capital O L of the *ravelin*, or on the perpendicular produced, and from the point L drawing lines to the ſhoulders A, B; whoſe parts L M, L N terminate by the counterſcarp will be the faces M O, O N, the ſemi-gorges of the *ravelin* required. Others will have the faces of the *ravelin* to terminate on thoſe of the baſtions within three toiſes of the ſhoulders, in which caſe the *ravelins* cover the flanks better than the others. The ditch before the *ravelin* is 12 toiſes, and its counterſcarp parallel to the faces of the *ravelins*, and made in a circular arc before the ſaliant angle. When the *ravelins* are made with flanks, the faces ſhould terminate thoſe of the baſtions, at leaſt 5 toiſes from the ſhoulders. Theſe flanks are made by ſetting off 10 toiſes from the extremities of the faces, and from the points thus determined, the flanks are drawn parallel to the capital of the *ravelin*. When redoubts or *keeps* are formed in the *ravelin*, this is done by ſetting off 16 toiſes from the extremities of the faces, on the ſemi-gorges from N to b, and from M to a; and from the points b, a, the faces are drawn parallel to thoſe of the *ravelin*: the ditch before this redoubt is 6 toiſes, and its counterſcarp parallel to the faces. This work ſhould be covered in the faces by a wall, a foot or two thick, furniſhed with loop-holes for the muſketry to fire through; and it will ſerve to ſecure a retreat for the troops who defend the *ravelin*; they may thus prevent the enemy from making a lodgment in the outward part of the *ravelin*, or at leaſt greatly obſtruct their attempts for this purpoſe. Nor can they be drove from this place, until the enemy has erected a battery, and brought cannon on the *ravelin* to batter the redoubt. When the **counterguard** is placed before the *ravelin*, 40 toiſes are ſet off on the capital of the *ravelin* from its ſaliant angle to the ſaliant angle of the counterguard, and 10 on the counterſcarp of the ditch. For the conſtruction of crown-works before the *ravelin*, ſee **Horn**-*work*. Within the *ravelin* are conſtructed a rampart of about 16 or 20 yards and a parapet of about 6 yards: ramps are alſo annexed in the ſlope of a rampart, and a barbet, when it is proper, is conſtructed in the ſaliant angle. In wet ditches, where the troops paſs from the town to the *ravelin* in boats, it is proper to make, in the gorge of the *ravelin*, a kind of harbour, where the boats may be covered from the fire of the enemy. In dry foſſes, there ſhould be ramps or ſtairs in the gorge of the *ravelin*, to preſerve a free communication, if the bridges ſhould be broken down by the enemy's ſhot. The celebrated general Coehorn, in the *ravelins* which he built at Bergen-op-zoom, contrived a very good defence for the covered way before the faces of the baſtions, by making retired flanks in the breaſts of the *ravelin*, where one or two cannon might be placed as ſecure from the enemy's fire as thoſe behind the orillon of a baſtion.

RAVEN, *corvus*, in *Aſtronomy*. See **Corvus**.

Raven, *corvus corax* of Linnæus, in *Ornithology*, a large bird of the crow-kind, well known throughout the world, as being found in all climates, and all regions. The colour of the whole bird is black, finely gloſſed with a rich blue; the belly excepted, which is duſky. The *ravens* build in high trees, or upon the ruins of lofty buildings in the neighbourhood of great towns, being held in the ſame veneration as the vultures are in Egypt, and for the ſame reaſon; for devouring the carcaſes and filth that would otherwiſe prove a nuiſance. They lay five or ſix eggs, of a pale greeniſh colour, marked with ſmall browniſh ſpots. There are many fabulous ſtories of the longevity of the raven, but birds are in general long lived, and the crow-kind not leſs ſo than the reſt. The *raven* is a very docile bird, and may be taught to ſpeak as well as to fetch and carry. In clear weather *ravens* are remarked to fly in pairs at a great height, making a deep loud noiſe, different from the common croaking; and their ſcent is remarkably good.

The quills of *ravens* are uſed in tuning the lower notes of a harpſichord, when the wires are ſet at a conſiderable diſtance from the ſticks.

It is rare to find this creature white, yet it happens ſometimes. Boyle mentions one. There was alſo one ſhewn to the Royal Society not long ago. Boyle's Works abr. vol. ii. p. 46.

Raven, *night*, an Engliſh name for a heron, which flies in the night, and makes a very odd and hoarſe noiſe. It has been applied by ſome to the bittern, or *ardea ſtellaris*, but improperly, belonging of right to the *ardea cinerea minor*, or ſmaller grey heron, called *nycticorax*.

Raven, *ſea*, or *corvorant*. See **Corvus** *Aquaticus*.

RAVINE, in *Field Fortification*, a deep hollow, uſually formed by a great flood, or long-continued running of water; frequently turned to good purpoſes in the field.

RAVIS, the ſame with *raucedo*. See **Hoarseness**.

RAVISHMENT, in *Law*, denotes an unlawful ſeducing either a woman, or an heir in ward; for which there is a remedy by a writ of *raviſhment*, or action of treſpaſs *vi et armis*, *de filio vel filia rapto vel abducto*, in the ſame manner as the huſband may have it *de uxore raptâ et abductâ*, on account of the abduction of his wife. This action lay at the common law; and thereby the huſband ſhall recover, not the poſſeſſion of his wife, but damages for taking her away: and by ſtatute Weſtm. 1. 3 Edw. I. c. 13. the offender ſhall alſo be impriſoned two years, and fined at the pleaſure of the king. Both the king and the huſband may, therefore, have this action; and the huſband is alſo intitled to recover damages in an action on the caſe againſt ſuch as perſuade and intice the wife to live ſeparate from him without a ſufficient cauſe.

Sometimes it is alſo uſed in the ſame ſenſe as **Rape**.

Ravishment *de gard*, is a writ which anciently lay, and ſtill lies, for the guardian in ſocage againſt him who took from him the body of his ward, or pupil: but then he muſt account to his pupil for the damages he ſo recovers. It is expreſsly provided by ſtatute 12 Car. II. c. 24. that teſtamentary guardians may maintain an action of *raviſhment*, or treſpaſs, for recovery of any of their wards, and alſo for damages, to be applied to the uſe and benefit of the infants.

RAUVOLFIA, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has a permanent empalement of one leaf, cut into five parts at the top; the petal is funnel-ſhaped, the tube cylindrical, and cut at the brim into five parts; it has five ſtamina, which are a little ſhorter than the tube, terminated by erect ſummits; and a roundiſh germen ſupporting a ſhort ſtyle, crowned by a headed ſtigma; the germen becomes a globular berry with two cells, incloſing one compreſſed ſeed in each. Linnæus enumerates three and Miller two ſpecies, natives of the warm parts of America.

RAUTY-*mummy*, or **Rauty**-*muddum*, *ſtone-mummy*, a name given by the people of the Eaſt-Indies to a kind of foſſile ſubſtance, much valued for its medicinal virtues.

It is of the nature of the ſelenites, and is found upon the high rocks, and ſuppoſed to be generated of the dew which falls from the heavens; but this is an idle opinion, and the formation of it is evidently the ſame with that of the European rhomboidal ſelenites. They beat it to powder, and after boiling it in milk, they give it in caſes of the venereal kind. In a common clap, they give half a ſcruple, night and morning.

RAW *hide*. See HIDE.

RAW *ſilk*. See SILK.

RAY, in *Geometry*. See RADIUS.

RAY, RADIUS, in *Optics*, a beam or line of light, propagated from a radiant point, through any medium.

Sir Iſaac Newton defines *rays* to be the leaſt parts of light, whether ſucceſſive in the ſame line, or contemporary in ſeveral lines.

For, that light conſiſts of parts of both kinds, appears hence, that one may ſtop what comes this moment in any point and let paſs that which comes the next; and again, one may ſtop what comes in this point, and let paſs that in the next. Now, the leaſt light, or part of light, which may be thus ſtopped alone, he calls a *ray of light*.

If the parts of a *ray* of light do all lie ſtraight between the radiant and the eye, the *ray* is ſaid to be DIRECT: the laws and properties whereof make the ſubject of optics.

If any of them be turned out of that direction, or bent in their paſſage, the *ray* is ſaid to be REFRACTED.

If it ſtrike on the ſurface of any body, and be driven back, it is ſaid to be REFLECTED.

In each caſe, the *ray* as it falls either directly on the eye, or on the point of reflection, or of refraction, is ſaid to be *incident*.

Again, if ſeveral *rays* be propagated from the radiant equidiſtantly from one another, they are called PARALLEL *rays*.

If they come inclining towards each other, they are called CONVERGING *rays*.

And if they go continually receding from each other, they are called DIVERGING *rays*.

It is from the circumſtance of *rays*, that the ſeveral kinds of bodies are diſtinguiſhed in optics. A body, e. gr. that diffuſes its own light, or emits *rays* of its own, is called a *lucid*, or *luminous* body.

If it only reflect *rays* which it receives from another, it is called an *illuminated body*.

If it only tranſmit *rays*, it is called a *tranſparent body*.

If it intercept the *rays*, or refuſe them paſſage, it is called an *opake body*.

Hence no body radiates, i. e. emits *rays*, unleſs it be either luminous, or illumined.

It is by means of *rays* reflected from the ſeveral points of illumined objects to the eye, that they become viſible, and that viſion is performed; whence ſuch *rays* are called VISUAL *rays*.

In effect, we find that any point of an object is ſeen in all places to which a right line may be drawn from that point: but it is allowed, nothing can be ſeen without light; therefore every point of an object diffuſes innumerable *rays* every way. Again, from other experiments it appears, that the images of all objects, whence right lines may be drawn to the eye, are painted in the eye, behind the cryſtalline, very ſmall, but very diſtinct.

And laſtly, from other experiments, that each *ray* carries with it the ſpecies, or image of the radiating point: and that the ſeveral rays emitted from the ſame point are again united in one point, by the cryſtalline, and thus thrown on the retina.

It is the ſpiſſitude or cloſeneſs of the *rays* emitted from a luminous body, that conſtitutes the intenſeneſs of the light. Yet the direction wherein the *rays* ſtrike the eye has a great ſway. In effect, a perpendicular *ray*, ſtriking with more force than an oblique one, in the ratio of the whole ſine to the ſine of the angle of obliquity (as follows from the laws of PERCUSSION), a perpendicular *ray* will affect the eye more vividly than an oblique one, in that ratio.

If then the ſpiſſitude of the *rays* be equal, the intenſity will be as the direction; if the direction be the ſame, the intenſeneſs will be as the ſpiſſitude: if both differ, the intenſeneſs will be in a ratio compounded of the direction and the ſpiſſitude.

Hence, firſt, if light be propagated in *parallel rays* through an unreſiſting medium, its intenſity will not be varied by diſtance.

Secondly, if light be propagated in *diverging rays* through an unreſiſting medium, its intenſity will decreaſe in a duplicate ratio of the diſtances from the radiant point, reciprocally.

Thirdly, if light be propagated in *converging rays* through an unreſiſting medium; its intenſity will increaſe in a duplicate ratio of the diſtances from the point of concourſe, reciprocally.

Fourthly, if the breadth of an illumined plane be to the diſtance of the radiant point as 1 to 2,000,000, it is the ſame thing as if the *rays* ſtruck upon it parallel: and hence, ſince the diameter of the pupil of the eye, when largeſt, ſcarce exceeds ⅛ of an inch; the *rays* will fall upon it parallel, as to ſenſe, at the diſtance of 3860 Engliſh feet, which is nearly ſix furlongs. See LIGHT.

The effect of concave lenſes, and convex mirrors, is to make parallel *rays* diverge; converging *rays* become parallel; and diverging *rays* to become more divergent.

The effect of convex lenſes, and concave mirrors, is to make diverging *rays* become parallel; parallel *rays* become convergent, and convergent *rays* to converge the more. See LENS.

The *rays* of light are not homogeneous, or ſimilar, but differ in all the properties we know of; viz. refrangibility, reflexibility, and colour.

It is probably from the different refrangibility, that the other differences have their riſe; at leaſt it appears, that thoſe *rays* which agree or differ in this, do ſo in all the reſt.

Thus, from the different ſenſations the differently diſpoſed *rays* excite in us, we call them *red rays*, *yellow rays*, &c.

The effect of the priſm is to ſeparate and ſort the different kinds of *rays*, which come blended promiſcuouſly from the ſun; and to throw each kind by itſelf, according to its degree of refrangibility and colour, red to red, blue to blue &c.

Beſides refrangibility, and the other properties of the *rays* of light already aſcertained by obſervation and experiment, ſir Iſaac Newton ſuſpects they may have many more: particularly, a power of being inflected, or bent, by the action of diſtant bodies; and thoſe *rays* which differ in refrangibility, he conceives likewiſe to differ in this flexibility.

In paſſing by the edges and ſides of bodies, he conceives that the *rays* may be bent ſeveral times backwards and forwards, with a motion like that of an eel; and that thoſe *rays* which appear to fall on bodies, are reflected or refracted before they arrive at the bodies: and adds, that they may be refracted, reflected, and inflected, all by the ſame principle acting in different circumſtances. See INFLECTION and LIGHT. See alſo REFLECTION and REFRACTION.

Again, do not the *rays* falling on the bottom of the eye excite vibrations in the retina; which, being propagated along the fibres of the optic nerve into the brain, cauſe viſion? and do not ſeveral ſorts of *rays* make vibrations of ſeveral bigneſſes, which excite ſenſations of ſeveral colours, much after the manner as the vibrations of the air, according to their ſeveral bigneſſes, excite ſenſations of ſeveral ſounds?

Particularly, do not the moſt refrangible *rays* excite the ſhorteſt vibrations, to make a ſenſation of a deep violet; and the leaſt refrangible, the largeſt, to make a ſenſation of a deep red? and the ſeveral intermediate kinds of *rays*, vibrations of intermediate bigneſſes, to make ſenſations of the intermediate colours?

And may not the harmony and diſcord of colours ariſe from the proportion of theſe vibrations; as thoſe of ſound depend on the vibrations of the air? for ſome colours, if viewed together, are agreeable, as gold and indigo; others diſagreeable. See COLOUR.

Again, have not the *rays* of light ſeveral ſides endued with ſeveral original properties? It is certain we find, that every *ray* of light has two oppoſite ſides, originally endued with a property, whereon the unuſual refraction of iſland cryſtal depends, and other two oppoſite ſides not endued with that property.

Laſtly, are not the *rays* of light very ſmall bodies emitted from ſhining ſubſtances?

Such bodies may have all the conditions of light: and there is that action and re-action between tranſparent bodies and light, which very much reſembles the attractive force between other bodies. Nothing more is required for the production of all the various colours, and all the degrees of refrangibility, but that the *rays* of light be bodies of different ſizes; the leaſt of which may make violet the weakeſt and darkeſt of the colours, and be the moſt eaſily diverted by refracting ſurfaces from its rectilinear courſe; and the reſt, as they are bigger and bigger, may make the ſtronger and more lucid colours, blue, green, yellow, and red. See COLOUR and LIGHT.

Nor is any thing more requiſite for the putting of the *rays* into fits of eaſy reflection, and eaſy tranſmiſſion, than that they may be ſmall bodies, which, by attraction, or ſome other force, excite vibrations in the bodies they act upon; which vibrations, being ſwifter than the *rays*, overtake them ſucceſſively, and agitate them ſo as by degrees to increaſe and diminiſh their velocity, and thereby put them into thoſe fits. Laſtly, the unuſual refraction of iſland cryſtal looks very much as if it were performed by ſome attractive virtue lodged in certain ſides both of the *rays*, and of the cryſtal.

Ray, *common*, in *Optics*, is ſometimes uſed for a right line drawn from the point of concourſe of the two optical axes, through the middle of the right line which paſſes through the middle of the centres of the pupils of the two eyes.

Rays, *cone of*. See Cone.

Rays, *deflection of*. See Deflection.

Rays, *inclination of incident*. See Inclination.

Rays, *optic*. See Optic.

Rays, *reflexibility of*. See Reflexibility.

Ray, *principal*, in *Perſpective*, is the perpendicular diſtance between the eye and the vertical plane or table, as ſome call it. See Perspective.

Rays, *pencil of*. See Pencil *of Rays*.

Rays, *pyramid of*. See Optic *Pyramid*.

Ray, *raia*, in *Ichthyology*. See Raia.

Ray, *clavated*. See Thornback.

Ray, *eagle*. See *Sea* Eagle.

Ray, *electric* or *ſmooth*, a ſpecies of the raja. See Torpedo.

Ray, *fuller*, or *rough*, *raja fullonica*, a ſpecies of *ray*, deriving its name from the inſtrument which fullers uſe in ſmoothing cloth, the back being rough and ſpiny. The noſe is ſhort and ſharp; at the corner of each eye are a few ſpines; the membrane of nictitation is fringed; the teeth are ſmall and ſharp; on the upper part of the pectoral fins are three rows of ſpines pointing towards the back, and crooked; on the tail are three rows of ſtrong ſpines, the middle row reaching up part of the back; the tail is ſlender, and rather larger than the body; the colour of the upper part of the body is cinereous, uſually marked with black ſpots, and the lower part white; the ſize is equal to that of a ſkate. At Scarborough, where it is common, it is called the white hans or gullet. Pennant.

Ray, *oblong*. See Rhinobatos.

Ray, *oculated*. See Miraletus.

Ray, *ſhagreen*, called at Scarborough the French *ray*, is about the ſize of the ſkate, but narrower in its form than the common kinds. The upper part of the body is covered cloſely with ſmall ſhagreen-like tubercles, reſembling the ſkin of the dog-fiſh: and from the noſe to the beginning of the pectoral fins is a tuberculated ſpace. Pennant.

Ray, *ſharp-noſed*, *raia oxyrinchus*, is a ſpecies of *ray* with a very long, narrow, and ſharp-pointed noſe, ſmooth and thin body, the upper part aſh-coloured with many white and a few black ſpots, the lower part white, thick tail, with two ſmall fins towards the end, and on each ſide a row of ſmall ſpines, with another in the middle, running ſome way up the back, and a very large mouth furniſhed with many minute ſharp teeth bending inwards. This fiſh makes a ſnorting noiſe, and is ſuppoſed to be the *bos* of the ancients, which Oppian deſcribes as the broadeſt among fiſhes, and fond of human fleſh; adding, that the method it takes of deſtroying men is by overlaying and keeping them down by its vaſt weight till they are drowned. Pennant.

Ray, *ſting*. See Pastinaca *marina*.

Ray, in our *Old Writers*, a word appropriated to cloth never coloured, or dyed, 11 Hen. IV. c. 6. Blount, Cowel.

Ray *of curvature*, in *Geometry*, is uſed to ſignify the ſemidiameter of the circle of curvature.

RAYCHE, in *Ichthyology*. See Rayte.

RAYTE, or Ryche, in *Ichthyology*, a name given by Joannes Cuba, Albertus, and others, to the common ſkate, or ſlaire.

RAZANT. See Rasant.

Razant *flank*. See Flank.

Razant *line of defence*. See Defence.

RAZE, in the *Manege*. A horſe is ſaid to have *razed*, whoſe corner teeth ceaſe to be hollow; ſo that the cavity, where the black mark was, is filled up; that is, even, ſmooth, and *razed*, or ſhaven, as it were, and the mark diſappears. See Mark.

RAZOR-*bill*, in *Ornithology*, the common Engliſh name of the alka, a web-footed bird with no hinder toes, common on our ſea ſhores.

Razor-*fiſh*, in *Ichthyology*, the Coryphæna *novacula* of Linnæus, having the head and fins barred with bluiſh lines. See Novacula.

RE, in *Grammar*, &c. an inſeparable particle, or prepoſition, prefixed to the beginning of words, to vary, double, or otherwiſe modify their meaning.

The modificative *re* was firſt introduced by the Latins, from whom it is borrowed into moſt of the modern tongues: Priſcian derives it from *retro*, backwards; others rather derive *retro* from *re*; others derive *re* from the Greek ῥεα, *eaſy*; or from ῥεω, *I flow*.

The effect of the *re* is various: uſually it ſignifies *again*, *rurſum*, ανα; as in *re*-join, *re*-ſign, *re*-ſume, *re*-courſe, *re*-bound, *re*-cite, *re*-hear, *re*-cognize, *re*-compare, *re*-double, *re*-linquiſh, &c.

Sometimes it ſtands for *contra*, αντι, *againſt*; as in *re*-luctance, *re*-cumbent, *re*-cline, &c.

Sometimes for υπερ, *ſuper*, over, as in *re*-dundant; ſometimes for ποῤῥω, *longe*, *far*, as in *re*-moving, &c.

Re, in *Muſic*. See Notes.

Re, in *Matters of Money*. See Ree.

REACH, in *Sea-language*, the diſtance between any two points on the banks of a river, wherein the current flows in a ſtrait uninterrupted courſe.

RE-ACTION, in *Phyſics*, the action whereby a body acted upon, returns the action by a reciprocal one upon the agent.

The Peripatetics define *re-action* to be that which a paſſive body returns upon the agent, by means of ſome quality contrary to that received from it, in the ſame part wherewith the agent acted, and at the ſame time; as if water, while it is heated by the fire, does at the ſame time cool the fire.

It was known, even in the ſchools, that there is no action in nature without *re-action*; and it was a maxim among them, *omne agens, agendo repatitur.*

But the equality of the actions was not known: ſir Iſaac Newton eſtabliſhed it as one of the laws of nature, that *action and re-action are equal and contrary*; or that the mutual actions of two bodies, ſtriking one againſt another, are exactly equal, but in contrary directions; or, in other words, that by the action and *re-action* of bodies one on another, there are produced equal changes in each: and thoſe changes are impreſſed towards directly contrary parts or ways. See *Laws of* Nature.

Some of the ſchool-philoſophers deny any ſuch thing as *re-action*, properly ſo called, at all; urging, that action ariſes only from the ratio of the greater inequality; that is, we are only to account for action the exceſs of action, or what the agent does more than is returned by the patient. But the equality between action and *re-action* ſets aſide this exception.

READING. See Lectio.

Reading *of a deed*. See Deed.

READINGS, in *Criticiſm*. *Various* Readings, *variæ lectiones*, are the different manners of reading the text of authors in ancient manuſcripts; where a diverſity has ariſen from the corruption of time, or the ignorance of copyiſts.

A great part of the buſineſs of the critics lies in ſettling the *readings*, by confronting the various *readings* of the ſeveral manuſcripts, and conſidering the agreement of the words and ſenſe. The various *readings* in the Bible, (ſee *Hebrew* Bibles) and in the claſſic authors, are almoſt innumerable.

Readings are alſo uſed for a ſort of commentary or gloſs on a law, text, paſſage, or the like; to ſhew the ſenſe an author takes it in, and the application he conceives to be made of it.

RE-AFFORESTED, is where a foreſt, having been diſafforeſted, is again made a foreſt. As the foreſt of Dean was, by an act of parliament in the 20th of king Charles II. See Forest.

RE-AGGRAVATION, in the Romiſh *Eccleſiaſtical Law*, the laſt monitory, publiſhed after three admonitions, and before the laſt excommunication.

Before they proceed to fulminate the laſt excommunication, they publiſh an aggravation, and a *re-aggravation*. Fevret obſerves, that in France the miniſter is not allowed to come to *re-aggravation*, without the permiſſion of the biſhop or official, as well as that of the lay judge. See Excommunication.

REAL, *reale*, is applied to a being that actually exiſts; in which ſenſe it coincides with *actual*.

Real, in *Law*, is oppoſed to personal.

Real *action*, that whereby the plaintiff lays title to land, &c. See Action.

Cuſtoms are ſaid to be *real*; that is, they determine all inheritances within their extent; and none may diſpoſe of them, but according to the conditions allowed by the cuſtoms where they are ſituated.

Real *altitude*, *aſſets*, *character*, *chattels*, *covenant*, *diſtinction*, *diſtreſs*, *eſtate*, *horizon*, *optic place*, *patronage*, *privilege*, *qualities*, *root*, *ſervices*, *ſuit*, and *writs*. See the ſeveral ſubſtantives.

Real, Rial, or Ryal, in *Commerce*. See Rial.

REALGAR, or **REALGAL**, *riſigallum*, in *Chemiſtry*, is a compoſition of ſulphur and arſenic; which two ſubſtances are capable of uniting together, eſpecially when they are reduced to vapours, and ſublimed together. The whiteneſs of cryſtalline arſenic is always altered by union with ſulphur, and the new compound becomes yellow, inclining more or leſs to an orange, or even to a red colour, according to the quantity of ſulphur united with the arſenic. When the ſulphur is only a tenth part of the whole mixture, the ſublimate is yellow; and it is then called *yellow realgar*, or yellow arſenic, and in commerce ORPIMENT. When the ſulphur is a fifth part of the combination, the ſublimate is red, and it is then called *red realgar*, ſandarach, red arſenic, &c. As ſulphur fixes arſenic a little, the *red realgar* may be melted with a gentle heat; and when it has become ſolid, it is tranſparent, and is then called ruby of ſulphur, or arſenical ruby. When arſenic and ſulphur are thus well combined by ſublimation, they cannot be ſeparated without ſome intermediate ſubſtance, becauſe they are volatile; but this ſeparation may be effected by means of fixed alkali or mercury. The yellow and red artificial arſenics are of an acrimonious nature, and reputed poiſonous, though not in any great degree. The principal uſe of theſe ſubſtances is for painting.

In the Hiſtory of the French Academy, we have an account of a cup brought to Paris by the ambaſſadors of Siam, and preſented there, as a remedy uſed by that people againſt all diſeaſes.

Upon an examination, which had like to have coſt M. Homberg dear, he found it to be a kind of *realgar*, or red arſenic, much more cauſtic than ours.

Its uſe among the Siameſe, he takes to have been the ſame with that of regulus of antimony; viz. to give an emetic quality to the wine drank out of it.

As the doſe of medicines is much ſtronger in the torrid zone than among us (the quantity of ipecacuanha, e. gr. ordinarily taken by the Indians, being twenty times as great as that among us), it is very poſſible a cup of *realgar*, though enough to poiſon an European, may prove a gentle medicine to a Siameſe.

REALISE, in *Commerce*, a term little known in trade before the year 1719, when thoſe immenſe fortunes began to be made in France and England, by the buſineſs of actions or ſtock.

By *realizing* is meant the precaution many of thoſe who had gained moſt, took, to convert their paper into real effects; as lands, houſes, rich moveables, jewels, plate; but, above all, into current ſpecies. A precaution capable of ruining the ſtate; but the French regency had the wiſdom to fruſtrate it, by taking proper meaſures to have the money, thus ready to be hoarded up, returned to the public.

REALISTS, *Realiſtæ*, a ſect of ſchool-philoſophers, who followed the doctrine of Ariſtotle with reſpect to univerſal ideas, formed in oppoſition to the NOMINALISTS, who embraced the hypotheſis of Zeno and the Stoics upon that perplexed and intricate ſubject.

Ariſtotle held againſt Plato, that, previous to, and independent on, matter, there were no univerſal ideas or eſſences, and that the ideas or exemplars which the latter ſuppoſed to have exiſted in the Divine Mind, and to have been the models of all created things, had been eternally impreſſed upon matter, and were coeval with, and inherent in, their objects. Zeno and his followers, departing both from the Platonic and Ariſtotelian ſyſtems, maintained, that theſe pretended univerſals had neither form nor eſſence, and were no more than mere terms and nominal repreſentations of their particular objects.

Under the *Realiſts* are included the Scotiſts, Thomiſts, and all excepting the followers of Occam.

Their diſtinguiſhing tenet is, that univerſals are realities, and have an actual exiſtence, out of an idea and imagination; or, as they expreſs it in the ſchool-language, *a parte rei*; whereas the Nominaliſts contend, that they exiſt only in the mind; and are only ideas, or manners of conceiving things.

Dr. Odo, or Oudard, a native of Orleans, afterwards abbot of St. Martin de Tournay, was the chief of the ſect of the *Realiſts*: he wrote three books of dialectics; where, on the principles of Boethius and the ancients, he maintained that the object of that art is things, not words; whence the ſect took its riſe and name.

REALITY, *realitas*, in the *Schools*, a diminutive of *res*, *thing*, firſt uſed by the Scotiſts to denote a thing which may exiſt of itſelf, or which has a full and abſolute being of itſelf, and is not conſidered as a part of any other.

Yet a *reality* is conceived as ſomething leſs than *res*; and accordingly every *res* is ſuppoſed to contain a number of *realities*, which they otherwiſe call *formalities*.

Thus, e. gr. in a man, according to the doctrine of the Scotiſts, are a number of *realities*; viz. a ſubſtance, life, animal, and reaſon.

Some diſtinguiſh *reality* into ſubjective and objective.

REALM, *regnum*, *kingdom*, a country which gives its head or governor the denomination of king.

The word is formed of the French *royaume*, which denotes the ſame.

REAR, a term frequently uſed in compoſition, to denote ſomething behind or backwards in reſpect of another, in oppoſition to *van*, or *avant*, *before*.

It is formed by corruption of the French *arriere*, ſignifying the ſame.

REAR, in a *Military Senſe*, is uſed for the hind part of an army, &c. in oppoſition to the *front*, or face thereof.

REAR, in *Naval Language*, is a name given to the laſt diviſion of a ſquadron, or the laſt ſquadron of a fleet, and which is accordingly commanded by the third officer of the ſaid fleet or ſquadron.

REAR-*admiral*. See ADMIRAL.

REAR-*guard*. See GUARD.

REAR-*half-files*, are the three hindmoſt ranks of a battalion when it is drawn up ſix deep. See FILE-*leaders*.

REAR-*line* of an army encamped, is always twelve hundred feet at leaſt from the centre line, both of which run parallel to the front line, and alſo to the reſerve.

REAR-*rank* is the laſt rank of a battalion, or ſquadron, when drawn up, and generally ſixteen or eighteen feet from the centre line, when drawn up in open order.

REAR-*up*, in the *Manege*, called in French *cabrer*, is ſaid of a horſe that riſes upon his hinder legs, as if he would come quite over.

REARED, or *Wale*-REARED. See WALE-*reared*.

REASON, *ratio*, a faculty or power of the ſoul, whereby it diſtinguiſhes good from evil, and truth from falſhood.

Or, *reaſon* is that principle, whereby, comparing ſeveral ideas together, we draw conſequences from the relations they are found to have.

Some of the latter ſchool-philoſophers define *reaſon* to be the comprehenſion of many principles which the mind ſucceſſively can conceive, and from which concluſions may be drawn.

Others conceive *reaſon* as no other than the underſtanding itſelf, conſidered as it diſcourſes.

Reaſon, Mr. Locke obſerves, comprehends two diſtinct faculties of the mind; viz. *ſagacity*, whereby it finds intermediate ideas; and *illation*, whereby it ſo orders and diſpoſes of them, as to diſcover what connexion there is in each link of the chain, whereby the extremes are held together; and thereby, as it were, draws into view the truth ſought for.

Illation, or inference, conſiſts in nothing but the perception of the connexion there is between the ideas in each ſtep of the deduction, whereby the mind comes to ſee either the certain agreement or diſagreement of any two ideas; as in demonſtration, in which it arrives at knowledge; or their probable connexion, on which it gives or with-holds its aſſent; as in opinion.

Senſe and intuition reach but a little way: the greateſt part of our knowledge depends upon deductions, and intermediate ideas. In thoſe caſes, where we muſt take propoſitions for true, without being certain of their being ſo, we have need to find out, examine, and compare, the grounds of their probability: in both caſes, the faculty which finds out the means, and rightly applies them to diſcover certainty in the one, and probability in the other, is that which we call *reaſon*.

In *reaſon*, therefore, we may conſider four degrees: firſt, the diſcovering and finding out of proofs. See INVENTION.

Secondly, the regular and methodical diſpoſition of them, and laying them in ſuch order, as that their connexion may be plainly perceived. See METHOD.

Thirdly, the perceiving of their connexion (ſee JUDGMENT); and,

Fourthly, the making a right CONCLUSION.

Reaſon fails us in ſeveral inſtances: as, firſt, where our ideas fail.

Secondly, It is often at a loſs, becauſe of the obſcurity, confuſion, or imperfection, of the idea it is employed about. Thus, having no perfect idea of the leaſt extenſion of matter, nor of infinity, we are at a loſs about the diviſibility of matter.

Thirdly, Our *reaſon* is often at a ſtand, becauſe it perceives not thoſe ideas which would ſerve to ſhew the certain or probable agreement or diſagreement of any two other ideas.

Fourthly, Our *reaſon* is often engaged in abſurdities and difficulties, by proceeding upon falſe principles, which, being followed, lead men into contradictions to themſelves, and inconſiſtency in their own thoughts.

Fifthly, Dubious words, and uncertain ſigns, often puzzle men's *reaſon*, and bring them to a nonplus.

Though the deducing one propoſition from another be a great part of the office of *reaſon*, and that about which it is uſually employed; yet the principal act of ratiocination is the finding the agreement or diſagreement of two ideas one with another, by the intervention of a third. As a man, by a yard, finds two houſes to be of the ſame length, which could not be brought together to meaſure their equality by juxta-poſition. Words have their conſequences as the ſigns of ſuch ideas and things agree or diſagree with what they really are; but we obſerve it only by our ideas.

Hence we may be able to form an idea of that ordinary diſtinction of things, into ſuch as are *according to*, thoſe that are *above*, and thoſe *contrary to reaſon*.

Thoſe *according to reaſon* are ſuch propoſitions, whoſe truth we can diſcover by examining and tracing thoſe ideas we have from ſenſation and reflection, and by natural deduction find to be true or probable.

Thoſe *above reaſon* are ſuch propoſitions, whoſe truth or probability we cannot by *reaſon* derive from thoſe principles.

Thoſe *contrary to reaſon* are ſuch propoſitions as are inconſiſtent with, or irreconcilable to, our clear and diſtinct ideas.

Thus the exiſtence of one God, is according to *reaſon*; the exiſtence of more than one God, is contrary to *reaſon*; and the reſurrection of the body after death, above *reaſon*.

Above *reaſon* may be alſo taken in a double ſenſe; viz. above probability or above certainty.

They who diſpute moſt againſt the power and privileges of human *reaſon*, do it becauſe their own *reaſon* perſuades them to that belief; and ſo, whether the victory be on their or our ſide, they are equally defeated.

They ſeek to terrify us with the example of many great wits, who, by following this *ignis fatuus* (ſo they call the only pole-ſtar God has given us to direct our courſe by) have fallen into wild and ridiculous opinions, and increaſed the catalogue of hereſies to ſo great a number; but theſe men either followed not their *reaſon*, but made it follow their will; or elſe they firſt hoodwinked it by intereſt and prejudice, and then bad it ſhew them the way; or were wanting in thoſe neceſſary diligences required for ſo doubtful a paſſage: or if, without any of theſe, the weakneſs of their underſtanding had deceived them, the error is neither hurtful to themſelves, nor would be to others, if this doctrine of governing ourſelves by our own *reaſon*, and not by authority and example, were generally eſtabliſhed. Diſ. Concern. Hum. Reaſ.

It is not the uſe of ſuch liberty, but the appropriating it to ourſelves, that is the cauſe of all the diſorders charged thereon; for thoſe who lay a reſtraint on other men's *reaſon*, have firſt made uſe of their own to ſettle them, and to make uſe of it in this very reſtraining of others. Ibid.

REASON, in *Matters of Religion*, is uſed in oppoſition to FAITH.

This uſe of the word, Mr. Locke, takes to be in itſelf very improper; for faith is nothing but a firm aſſent of the mind; which, if it be regulated, as it is our duty, cannot be afforded to any thing but upon good *reaſon*, and ſo cannot be oppoſite to it.

He that believes without having any *reaſon* for believing, may be in love with his own fancies; but he neither ſeeks truth as he ought, nor pays the proper obedience due to his Maker, who would have him uſe thoſe diſcerning faculties he has given him, to keep him out of miſtake and error. But ſince *reaſon* and faith are by ſome men oppoſed, it may be neceſſary to conſider them together.

Reaſon, as contradiſtinguiſhed to faith, is the diſcovery of the certainty or probability of ſuch propoſitions, or truths, which it has got by the uſe of its natural faculties; viz. by ſenſation, or reflection.

Faith, on the other hand, is the aſſent to any propoſition upon the credit of the propoſer, as coming immediately from God; which we call revelation.

REASON, in *Logic* and *Rhetoric*, denotes a neceſſary or probable argument; or an anſwer to the queſtion, *cur eſt? why is it?*

As if it be inquired, why do the ſubject and predicate agree? and it is anſwered, becauſe they are ſpoken of the ſame thing: this laſt enunciation is a *reaſon*.

Hence, ſay the ſchoolmen, becauſe *quia* is the ſign or character of a reaſon, as *non*, *no*, of a negation, and *eſt*, *is*, of an affirmation.

They make three kinds of *reaſons*, *rationes*; viz. *ratio ut*, *that*; *ne*, *leſt*; and *quia*, *becauſe*. For, anſwering to a queſtion, *cur*, *why*, we begin with becauſe, *quia*; as, why do you ſtudy? that I may become learned; which is the *ratio ut*. Again, why do you ſtudy? leſt I ſhould be ignorant; which is the *ratio ne*. Laſtly, why is a body tangible? becauſe matter is impenetrable; which is the *ratio quia*.

The *reaſon ut* properly denotes the end, or final cauſe; and *reaſon ne* the beginning: accordingly the one is called the beginning, the other end; ſo that the *reaſon quia*, is left the only *reaſon*, properly ſo called.

REASON, among *Metaphyſicians*, is uſed in the ſame ſenſe with eſſence; or that whereby any thing is what it is.

This is ſometimes alſo called formal *reaſon*, as repreſenting the thing under that form or nature under which it is conceived.

REASON, in *Mathematics*. See RATIO.

REASON *of ſtate*, *ratio ſtatus*, in *Matters of Policy*, denotes a rule or maxim, whether it be good or evil, which may be of ſervice to the ſtate.

The phraſe is borrowed from the Italians, who firſt uſed *ragione di ſtato* in this ſenſe.

Reaſon of ſtate is properly underſtood of ſomething that is neceſſary and expedient for the intereſt of the government, but contrary to moral honeſty, or juſtice.

Politicians have a long time diſputed about the *ratio ſtatus*; whether ſtates and governments are tied down to the ſame laws of morality with individual perſons; or whether things, otherwiſe immoral and unlawful, may not be practiſed on urgent occaſions, by way of *reaſon* of ſtate?

The queſtion is, whether any thing be unlawful, or prohibited a ſtate, that is neceſſary to the preſervation of that ſtate, or whether it be allowed to preſerve itſelf on any terms?

REASON, *challenge upon*. See CHALLENGE.

REASON *ſufficient of Leibnitz*. See LEIBNITZIAN *Philoſophy*.

REASONABLE *aid*, a duty which the lord of the fee anciently claimed of his tenants, holding in knight's ſervice, or on ſocage, towards the marrying his daughter, or the making his eldeſt ſon knight.

This is taking away by ſtat. 2 Car. II. See AID.

REASONING, *ratiocination*, the exerciſe of that faculty of the mind called *reaſon*: or, it is reaſon deduced into DISCOURSE.

The agreement or diſagreement of two ideas does not appear from the bare conſideration of the ideas themſelves, unleſs ſome third be called in, and compared, either ſeparately, or conjointly therewith: the act, then, whereby from ideas thus diſpoſed and compared, we judge this or that to be ſo, or not ſo, is called *reaſoning*. Or, it is that operation of the mind, whereby we infer one thing, i. e. one propoſition from two or more propoſitions premiſed. Or, again, it is the drawing of a concluſion, which before was either unknown, or dark, or doubtful, from ſome propoſitions which are more known and evident. It is the narrowneſs of the human mind which introduces the neceſſity of *reaſoning*; for if the mere perception and compariſon of two ideas would always ſhew us whether they agree or diſagree, then all rational propoſitions would be matters of intelligence, or firſt principles, and there would be no uſe of *reaſoning*, or drawing any conſequences. But when we are unable to judge of the truth or falſehood of a propoſition in an immediate manner, by the mere contemplation of its ſubject and predicate, we are then conſtrained to uſe a medium, and to compare each of them with ſome third idea, that by ſeeing how far they agree or diſagree with it, we may be able to judge how far they agree or diſagree among themſelves. Watt's Logic, part iii. chap. 1.

Rohault defines *reaſoning* to be a judgment depending on ſome antecedent judgment: thus having judged that no even number can be compoſed of five uneven numbers, and that ten is an even number; to conclude, that ten cannot be divided into five uneven parts, is a *ratiocination*, or *reaſoning*.

This agrees with father Malebranche's doctrine, one of the great points whereof is, that *reaſoning*, on the part of the underſtanding, is only a mere *perceiving*.

That ingenious author endeavours to ſhew, that, as to the underſtanding, there is no difference between a ſimple *perception*, a *judgment*, and a *reaſoning*, except in this, that the underſtanding perceives a ſimple thing without any relation to any thing elſe, by a ſimple *perception*; that it perceives the relations between two or more things in a *judgment*, and, laſtly, that it perceives the relations that are between the relations of things, in a *reaſoning*. So that all the operations of the underſtanding are no more than mere perceptions.

Thus, e. gr. when we conclude, that 4 being leſs than 6, twice 2 being equal to 4, are of conſequence leſs than 6, we do no more than perceive the relation of the inequality between the relation of twice 2 and 4, and the relation of 4 and 6.

The manner of proceeding juſtly in *reaſoning*; ſo as to arrive with the greater ſafety at the knowledge of truth, makes what we call METHOD.

For the real benefit of logic to *reaſoning*, ſee LOGIC and SYLLOGISM.

RE-ATTACHMENT, in *Law*, a ſecond attachment of him who was formerly attached, and diſmiſſed the court without day, by not coming of the juſtices, or the like caſualty.

Brook makes *re-attachment* either *general* or *ſpecial*. *General* is where a man is *re-attached* for his appearance on all writs of aſſize lying againſt him: *ſpecial*, for one or more certain writs.

REAUMURIA, in *Botany*, a genus of the *polyandria pentagynia* claſs. Its characters are, that the calyx is ſix-leaved, that it has five petals, and that the fruit is a ſingle-celled, five-valved, polyſpermous capſule. There is one ſpecies.

RE-BAPTISANTS, a religious ſect, who maintain, that perſons irregularly baptized are to be baptized afreſh.

The Anabaptiſts are *re-baptizants*, inaſmuch as they baptize thoſe at maturity, who had been before baptized in childhood.

St. Cyprian and pope Stephen had mighty differences about the re-baptization of converted heretics.

Donatus was condemned at Rome in a council, for having re-baptized ſome perſons who had fallen into idolatry after their firſt baptiſm.

REBATE, *rebatement*, in *Commerce*, a term much uſed at Amſterdam for a diſcount or abatement in the price of certain commodities, when the buyer advances the ſum in hand, for which he might have taken time. See DISCOUNT.

Rebate (among us uſually called *prompt payment*) is eſtimated by months, and is only allowed for certain kinds of merchandizes, which, according to the cuſtom of Amſterdam, are,

German wools,	which are ſold at	15	months *rebate*.
Aſhes and pot-aſhes,		18	
Italian ſilks,		33	
Sugars of Brazil,		18	
Spaniſh wools,		21	

That is, thoſe commodities are ſold for ready money, only deducting or *rebating* the intereſt of the money, which ought not to be paid till the end of 15, 18, &c. months. This intereſt, called *rebate*, is uſually regulated on the footing of 8 *per cent. per annum.*

The reaſon of this expedient is, that the merchants having not always wherewithal to pay for their goods in hand, by means of the *rebatement*, ſuch as have will find their account in it; and ſuch as have not will be engaged to diſcharge themſelves as ſoon as poſſible, for the ſake of the diſcount.

REBATEMENT, in *Heraldry*, a diminution or ABATEMENT of the dignity of the figures or bearing in a coat of arms.

REBELLION originally ſignified a ſecond reſiſtance or riſing of ſuch as had been formerly overcome in battle by the Romans, and had yielded themſelves to their ſubjection.

It is now generally uſed for a traiterous taking up of arms againſt the king, either by his own natural ſubjects, or by thoſe formerly ſubdued.

Rebel is ſometimes alſo uſed, in our ancient ſtatutes, for a perſon who wilfully breaks a law; and ſometimes for a villain diſobeying his lord.

REBELLION, *commiſſion of*. See COMMISSION.

REBELLIOUS *aſſembly*, a gathering of twelve perſons, or more, intending, going about, or practiſing, unlawfully, and of their own authority, to change any laws of the realm, or to deſtroy the incloſure of any park or ground incloſed, banks of fiſh ponds, pools, conduits, &c. to the intent the ſame ſhall remain void, or that they ſhall have way in any of the ſaid grounds; or to deſtroy the deer in any park, fiſh in ponds, coneys in any warren, dove-houſes, &c. or to burn ſtacks of corn, or to abate rents, or prices of victuals. See RIOT, ROUT, and UNLAWFUL *aſſembly*.

REBHIANG, one of the Hebrew ACCENTS, anſwering to our comma, and enumerated among their kings and pauſes. It is marked by a dot over the middle of a letter. See ATHNACH, SYLLUK, &c.

REBINARE, was to give a ſecond ſtirring or ploughing to arable land that lay fallow, to prepare it for ſowing wheat, &c. or to plough the ground a third time for that purpoſe. *Tempus* rebinandi *erit poſt feſtum Nativitatis ſancti Johannis Baptiſte cum terra pullulaverit poſt carucam.* Fleta, lib. ii. cap. 73.

REBOUND. See RECOIL.

REBUS, a name-device, as Camden engliſhes it; or an enigmatical repreſentation of ſome name, &c. by uſing figures or pictures, inſtead of words, or parts of words. Such is that of the gallant mentioned by Camden, who expteſſed his love to Roſe Hill, by painting in the border of his gown a roſe, a hill, an eye, a loaf, and a well; which, in the *rebus* ſtyle, is read, *Roſe Hill I love well.* The Picards have the honour of the invention of this notable kind of wit; whence the French, to this day, call it *rebus de Picardie.* Camden adds, that the Engliſh firſt learnt it of them in the reign of our Henry III. by means of the garriſons we then had in Calais, Guienne, and other places bordering on Picardy.

Its origin is by Menage, &c. aſcribed to the prieſts of Picardy, who, it ſeems, anciently, in carnival-time, uſed every year to make certain libels, entitled, *de rebus quæ geruntur*, being railleries on what intrigues and tranſactions had paſſed about the city; wherein they made great uſe of ſuch ſort of equivoques and alluſions, breaking and joining words, and ſupplying them with paintings.

Camden tells us, the *rebus* was in wonderful eſteem among our foreſathers; and that he was nobody who could not hammer out of his name an invention by this wit-craft, and picture it accordingly.

The ſieur Des Accords has made an ample collection of the moſt famous *rebuſes* de Picardie. And Mr. Camden has done ſomething of the ſame kind in his Remains.

Abel Drugger's device in Ben Johnſon's Alchemiſt, and Jack of Newberry in the Spectator, are known to every body. But the *rebus*, being once raiſed to ſign-poſts, grew out of faſhion at court.

Yet has *rebus* antiquity on its ſide, as having been in uſe in the pure Auguſtan age: Cicero, in a dedication to the gods, inſcribed Marcus Tullius, with a little pea, called by the Latins *cicer*, by us a *chich pea.* And Julius Cæſar, in ſome of his coins, uſed an elephant, called *Cæſar* in the Mauritanian tongue. Add to theſe, that the two mint-maſters in that age, L. Aquilius Florus, and Voconius Vitulus, uſed, the firſt a flower, the ſecond a calf, on the reverſe of their coins.

REBUS, in *Heraldry*, a coat of arms which bears an alluſion to the name of the perſon; as three caſtles, for Caſtleton; three cups, for Butler; three conies, for Coniſby; a kind of bearings which are of great antiquity.

REBUS is alſo uſed by the chemical writers ſometimes to ſignify ſour milk, and ſometimes for what they call the ultimate matter, of which all bodies are compoſed.

REBUTTER, from *re*, and the French *bouter*, *to repel*, or *bar*, in *Law*, the anſwer of the defendant in a cauſe to the plaintiff's ſur-rejoinder.

The plaintiff's anſwer to the defendant's *rebutter*, is called a *ſur-rebutter*.

REBUTTER is alſo when a man warrants any land or hereditament to another, and the perſon making the warranty, or his heir, ſues him to whom the warranty is made, or his heir or aſſignee, for the ſame thing: if he, who is ſo ſued, plead the deed or fine with warranty, and pray judgment, if the plaintiff ſhall be received to demand the thing which he ought to warrant to the party, againſt the warranty in the deed, &c. this is called a *rebutter*.

Again, if I grant to the tenant to hold *ſine impetitione vaſti*, and afterwards implead him for waſte, he may debar me of the action, by ſhewing my grant; which is likewiſe a *rebutter*.

RECANTATION. See PALINODY, or RETRACTATION.

RECAPITULATION, in *Oratory*, &c. a part of the peroration, or concluſion; called alſo ANACEPHALÆOSIS.

Recapitulation is a ſummary of the preceding diſcourſe; or a conciſe, tranſient enumeration of the principal things inſiſted on at large therein; whereby the memory of the hearers is refreſhed, and the force of the whole collected into one view.

An inſtance of this may be given in the peroration of Cicero's Manilian: *Quare, cum bellum ita neceſſarium ſit, ut negligi non poſſit: ita magnum, ut accuratiſſime ſit adminiſtrandum; & cum ei imperatorem præficere poſſitis, in quo ſit eximia belli ſcientia, ſingularis virtus, clariſſima auctoritas, egregia fortuna; dubitabitis, Quirites, quin, &c.*

In order to conſtitute a good repetition or *recapitulation*, it muſt be ſhort and conciſe; it is alſo convenient to recite things in the ſame order in which they were at firſt laid down; but ſometimes a repetition is made, by running a compariſon between the ſpeaker's own arguments and thoſe of the adverſe party, and placing them in oppoſition to each other; and this method Cicero takes in the concluſion of his third oration upon the Agrarian law. In ſome caſes, when the diſcourſe is very long, and the arguments inſiſted on have been many, the orator only mentions ſuch things which he thinks of leaſt conſequence, by ſaying that he omits or paſſes over them, till he comes to what is of greater moment, which he repreſents more fully. See PRETERITION. Ward's Orat. vol. i. ſect. 18.

RECAPTION, *recaptio*, or REPRISAL, in *Law*, is a remedy given to the party himſelf for an injury to his perſonal property. This happens, when any one hath deprived another of his property in goods or chattels perſonal, or wrongfully detains one's wife, child, or ſervant; in which caſe the owner of the goods, and the huſband, parent, or maſter, may lawfully claim and retake them, wherever he happens to find them, ſo it be not in a riotous manner, or attended with a breach of the peace. Thus, e. gr. if my horſe is taken away, and I find him in a common, a fair, or a public inn, I may lawfully ſeize him to my own uſe; but I cannot juſtify breaking open a private ſtable, or entering on the grounds of a third perſon to take him, except he be feloniouſly ſtolen, but muſt have recourſe to an action at law. *Recaption* is unlawful, if it be done with intention to ſmother or compound a larceny. See RESTITUTION *of ſtolen goods*.

Recaption alſo is the taking a ſecond diſtreſs of one formerly diſtrained for the ſame cauſe, and alſo during the plea grounded on the former diſtreſs.

Recaption is alſo the name of a writ lying for the party thus diſtrained to recover damages. See REPLEVIN.

RECEIPT, or **Receit**, in *Commerce*, an acquittance or diſcharge; or an act whereby it appears, that a thing has been paid off, or acquitted.

Where the *receipt* is on the back of a bill, &c. it is uſually called an ENDORSEMENT.

Among tradeſmen *receipt* uſually makes the ſecond of the three articles of an account; the *receipt* contains the monies received; the two others the expence, and the return or balance.

Receipt, or **Resceit**, in *Law*. See RESCEIT.

Receipt *of homage*. See RESCEIT.

Receipt *of the exchequer*. See COURT *of exchequer*.

Receipt, in *Medicine*. See RECIPE.

Receipts, *auditor of*. See AUDITOR.

RECEIVER, or **Recipient**, in *Chemiſtry*, a veſſel which is adapted to the neck or beak of an alembic, retort, or other diſtillatory veſſel, in order to collect, receive, and contain the products of diſtillations.

Recivers ſhould be made of glaſs, not only becauſe this matter reſiſts the action of the ſtrongeſt and moſt corroſive ſubſtances, but alſo becauſe being tranſparent, it allows the operator to ſee through it, and to judge by the frequency of the drops, if the diſtillation be too quick or too ſlow, and alſo if the quantity and nature of the ſubſtances that come over be ſuch as are required.

Almoſt all *receivers* are kinds of bottles of different ſizes, of a ſpherical form, the necks of which are cut ſhort, and each of which is pierced with a ſmall hole in its lateral or upper part, to give vent to the air or vapours, which are too expanſive. *Receivers* of this form are called BALLOONS. Some *receivers* are matraſſes with long necks. Theſe are generally adapted to the beaks of glaſs alembics. The long neck ſerves to keep the belly of the *receiver*, where the liquor is collected, at a proper diſtance from the fire.

Receivers have different forms for particular operations. Such are thoſe which have two or three beaks, either to be adapted to other *receivers*, or to admit at the ſame time the necks of ſeveral diſtillatory veſſels, when the intention of the operator is, that the vapours of different ſubſtances ſhould meet in the ſame *receiver*. Such alſo are *receivers* for eſſential oils, obtained from aromatic plants diſtilled with water, which are ſo made, that they are never full, but that the water runs out, and leaves the oil behind. Theſe are a kind of glaſs concurbits, which contract as they riſe higher; ſo that their neck or upper opening is but nearly of a convenient ſize to receive the beak of the worm. Theſe *receivers* have another opening about the middle of the ſwelling or belly; and to this opening is joined a glaſs tube, which bends and riſes vertically along the outer part of the *receiver*, ſo as to be within two inches and a half as high as the upper opening. At this height the tube bends again towards the ſide oppoſite to the body of the *receiver*, to pour into another veſſel the liquor which ariſes there. It forms the figure of S.

When this *receiver* is to be uſed, it is to be placed vertically under the beak of the worm. During the diſtillation, the liquor riſes to an equal height in the body of the *receiver*, and in the crooked tube; when, therefore, the height of the liquor in the *receiver* becomes greater than the height of the tube, it muſt begin to flow from the mouth of this tube into another veſſel placed on purpoſe to receive it; but as eſſential oils are either lighter or heavier than water, and as they are, therefore, always collected either above or under the water, and as the liquor which diſcharges itſelf through the tube is taken from the middle part of the *receiver*, nothing but water can be evacuated at the mouth of the pipe, while the oil always remains in the *receiver*. With ſuch a *receiver* diſtillation may be performed without the trouble of changing the veſſels. Chem. Dict.

For different forms of *receivers*, ſee *Tab.* II. *Chemiſtry*, *fig.* 26, 27, 28, 29, 30.

Receiver *of an air-pump*, is part of its apparatus; being a glaſs veſſel glaced on the top of the plate, out of which the air is to be exhauſted. To an AIR-*pump* belong various *receivers*, of various forms and ſizes, and ſerving for various purpoſes.

Receiver, *exhauſted*, in *Pneumatics*. See EXHAUSTED.

And for the method of repairing thoſe that are cracked, ſee CÆMENT.

Receiver, **Receptor**, or **Receptator**, in *Law*, is uſed commonly in the bad ſenſe, for ſuch as knowingly receive ſtolen goods from thieves, and conceal them.

This offence is only a miſdemeanor at common law: however, by the ſtatutes 3 & 4 W. & M. and 5 Ann. cap. 31. the offender is made acceſſory to the theft and felony. But becauſe the acceſſory cannot in general be tried, unleſs with the principal, or after the principal is convicted, the *receivers* by that means frequently eluded juſtice; to remedy which it is enacted by ſtatute 1 Ann. cap. 9. and 5 Ann. cap. 31. that ſuch *receivers* may be ſtill proſecuted for a miſdemeanor, and puniſhed by fine and impriſonment, though the principal felon be not before taken, ſo as to be proſecuted and convicted. And in caſe of receiving ſtolen lead, iron, and certain other metals, ſuch offence is, by ſtatute 29 Geo. II. cap. 30. puniſhable by tranſportation for fourteen years. See LARCENY. So that now the proſecutor has two methods in his choice; either to puniſh the *receivers* for the miſdemeanor immediately, before the thief is taken, or to wait till the felon is convicted, and then puniſh them as acceſſories to the felony. But it is provided by the ſame ſtatutes, that he ſhall only make uſe of one, and not of both theſe methods of puniſhment.

Receiver, alſo, denotes an officer; whereof there are various kinds, denominated from the particular matters they receive, the places where, or the perſons for whom, &c.

As *receiver* of rents; *receiver* general of the CUSTOMS; *receiver* of the fines, upon original writs in chancery, &c.

Receiver *general* of the duchy of Lancaſter, is he who gathers all ~~the~~ revenues and fines of the lands of the ſaid duchy, all forfeitures, aſſeſſments, &c.

Receiver *general* of the public revenue is an officer appointed in every county, to receive the taxes granted by parliament, and remit the money to the treaſury.

Receiver's *office*. See *Greenwich* HOSPITAL.

RECENT *fruits*. See FRUIT.

RECEPTACULUM *chyli*, **Receptaculum** *commune*, or *ciſterna chyli*, in *Anatomy*, a reſervoir or cavity near the left kidney, into which the LACTEAL veſſels do all diſcharge their contents.

This receiver, called alſo *receptaculum Pecquetticum*, from M. Pecquet, a phyſician at Dieppe, in Normandy, who firſt demonſtrated, by inconteſtible experiments, this receptacle, which had been long before diſcovered by Euſtachius, lies under the emulgent and great arteries, between the two origins of the diaphragma. Hither do the lacteal veſſels of the ſecond order, or of the third claſs, according to the diſtribution of Winſlow, bring the chyle after its being diluted and rendered thinner by the lympha in the glands of the meſentery.

The greateſt part of the *receptaculum chyli* lies behind the right portion of the inferior muſcle of the diaphragm, on the right ſide of the aorta, at the union of the laſt vertebra of the back with the firſt of the loins. It is a kind of membranous veſicle, the conformation of which is various in human ſubjects. Sometimes it is of an uniform, long, oval figure, like the veſicula fellis; ſometimes it is divided by ſtrictures into ſeveral ſmall roundiſh bags, more or leſs flatted, and ſometimes it ſurrounds the trunk of the aorta like a collar. It is compoſed of very thin coats, and its cavity is divided by ſmall pelliculæ, or membranous ſepta, the diſpoſition of which is irregular. It is chiefly round the lower part of this receptacle that the laſt lacteal veſſels are inſerted, ſome on the ſides, and ſome behind the aorta; and they are accompanied by numerous lymphatic veſſels.

In a preparation of this part, by filling it with mercury, Mr. Cowper found it to conſiſt of three ſeveral large trunks; two of them more than a quarter of an inch in diameter.

This diviſion is only obſerved in human bodies, in whom Dr. Drake thinks its erect poſition makes it neceſſary, in order to take off the reſiſtance which would ariſe from the preſſure of the chyle and lympha, were it contained in a ſingle receiver. In quadrupeds, its horizontal poſition may make one trunk ſufficient.

Its upper portion is contracted between the aorta and vena azygos, and forms a particular canal, which runs up through the thorax ; and thence is called the THORACIC *duct*.

RECEPTACULUM *ſeminum*, or **RECEPTACLE** *of the ſeed*, in *Botany*, the name given by authors to the baſe of the flower and fruit of plants, which connects the other ſix parts of FRUCTIFICATION. This is alſo called, by ſome writers, *thalamus floſculorum*. The flowers ſtand on this in conſiderable numbers, and without any pedicles. The diſk of the *receptacle* is of various ſhapes in the various plants; in ſome it is flat, in others concave, in others convex ; in ſome globular, and in many pyramidal. Its ſurface is ſometimes naked, and ſometimes paleaceous. In thoſe plants, in which the ſurface is naked, it is either abſolutely ſmooth, or furniſhed with ſmall tubercles, or with a few hairs. In thoſe in which it is paleaceous it is all over beſet with narrow pointed paleæ, which are erect, compreſſed, and ſtand between the flowers.

The various appellations of the *receptacle* are as follow ; viz. a *proper receptacle*, which belongs only to the parts of a ſingle fructification : and this is called a *receptacle of the fructification*, when it is common both to flower and fruit ; a *receptacle of the flower*, when it is a baſe to which the parts of the flower only are faſtened without the germen ; a *receptacle of the fruit*, when it is a baſe for the fruit only, remote from the *receptacle* of the flower ; and a *receptacle of the ſeeds*, when it is a baſe that faſtens the ſeeds within the pericarpium. A *common receptacle* is that which connects many florets in ſuch a manner, as that the taking away any of them would cauſe an irregularity.

RECEPTARII, a term of reproach uſed for ſuch phyſicians as write pompous receipts for loads of medicines, more conſulting the good of the apothecary than the patient ; as alſo for ſuch as give receipts for general medicines, to be uſed at the diſcretion of people wholly unacquainted with the nature of diſeaſes.

RECEPTION, *receptio*, in *Philoſophy*, denotes the ſame with *paſſion*, conſidered as oppoſed to *action*.

RECEPTION is alſo properly uſed for the manner of treating or entertaining a perſon ; and the ſolemnities and ceremonies practiſed on that occaſion. See ENTRY.

The *reception* of ambaſſadors is uſually performed with a great deal of pomp.

RECEPTION is ſometimes alſo uſed for the act of approving, accepting, and admitting a thing. See ACCEPTANCE.

The canon-law only binds where it is *received* : the civil law is received in ſome countries, not in others.

The French would never *receive* the council of Trent, the Spaniſh inquiſition, nor the dogmata of the ultramontane canoniſts.

RECEPTION, in *Aſtrology*, is a dignity befalling two planets when they exchange houſes ; e. gr. when the ſun arrives in Cancer, the houſe of the moon ; and the moon, in her turn, arrives in the ſun's houſe.

The ſame term is alſo uſed, when two planets exchange exaltation.

RECEPTITIOUS *goods*. See GOODS.

RECESSION *of the equinoxes*. See PRECESSION *of the equinoxes*.

RECESSUS, a word uſed by ſome medical writers to expreſs an abſceſs, or apoſthumation.

RECESSUS *imperii*, **RECESS** *of the empire*, a phraſe uſed in ſpeaking of the affairs of Germany ; ſignifying a collection of the votes or determinations of a diet.

At the end of each diet, before it breaks up, they gather together all their reſolutions, and reduce them into writing ; the act which contains them they call the *receſſus imperii*, becauſe made when on the point of retiring.

RECHABITES, a kind of religious order among the ancient Jews, inſtituted by Jonadab the ſon of Rechab ; and comprehending his family and poſterity.

Their founder preſcribed them three things : firſt, Not to drink any wine. Secondly, Not to build any houſes, but to dwell under tents. Thirdly, Not to ſow any corn, or plant any vines.

The *Rechabites* obſerved theſe rules with great ſtrictneſs, as appears from Jerem. xxxv. 6, &c. Whence, St. Jerom, in his thirteenth epiſtle to Paulinus, calls them *monachi*, *monks*. Jonadab, their founder, lived under Jehoaſh, king of Judah, contemporary with Jehu king of Iſrael ; his father Rechab, from whom his poſterity were denominated, deſcended from Raguel or Jethro, father-in-law to Moſes, who was a Kenite, or of the race of Ken ; whence *Kenite* and *Rechabite* are uſed as ſynonymous in Scripture.

RECHACING, in *Hunting*, the driving back of the deer, or other beaſts, into the foreſts, chaces, &c. which had ſtraggled out into the copſes or thickets, &c.

Anciently there were offices of *rechacers* of the deers beſtowed by the king on gentlemen, or old hunters, with ſalaries for the keeping of running dogs to *rechace* the deer into the foreſts, and then to beat the dogs off, without purſuing any farther.

RECHANGE, in *Commerce*. See RE-EXCHANGE.

RECHANGE is alſo uſed at ſea for ſuch tackle as is kept in reſerve aboard the ſhip, to ſerve in caſe of failure of that already in uſe. See TACKLE.

The Levantines uſe the word *reſpect* or *reſpit* in the ſame ſenſe.

RECHARGE *of a fire-arm*, is a ſecond loading or charge.

The *recharge* ſhould never be ſo ſteep as the firſt charge, leſt the piece, being overheated, ſhould burſt.

RECHEAT, in *Hunting*, a leſſon which the huntſman winds on the horn, when the hounds have loſt their game, to call them back from purſuing a counter-ſcent.

RECIMUS, among the Romans, a kind of ſquare mantle, or veil, worn by women on their head. Salmaſius will have it to have been a ſort of gown uſed by the Roman ladies, and tucked up before with a ſquare pin, of a purple colour.

RECIPE, in *Medicine*, a preſcription, or formula, of a remedy, appointed to be adminiſtered to a patient. See PRESCRIPTION.

It is thus called, becauſe always beginning with the word *recipe*, *take* ; ordinarily expreſſed by the abbreviation ℞.

RECIPIANGLE, or **RECIPIENT-ANGLE**, a mathematical inſtrument, ſerving to take the quantity of angles ; uſed eſpecially in the drawing plans of fortifications.

The *recipiangle* was formerly a popular inſtrument among the French, but little known among us ; it is uſually very ſimple, in form of a ſquare, or rather a BEVEL ; conſiſting of two arms or branches, rivetted together, and yet moveable, like a ſector on the centre or rivet.

To take an angle with it, they lay the centre of a protractor to the joint, and the degrees cut by the edge ſhew the quantity of the angle : otherwiſe the angle made by the two rulers is drawn on paper, and then meaſured with a protractor.

Sometimes there is a circle divided into degrees added over the centre or rivet, with an index to ſhew the degrees without a protractor. At other times the under-branch is divided.

To meaſure a ſaliant angle with any of the *recipiangles*, apply the inſides to the lines that form the angle ; for a re-entering angle, apply the outſides, &c.

RECIPIENDO *excommunicato*. See EXCOMMUNICATO.

RECIPIENDO *& faciendo attornato*. See ATTORNATO.

RECIPIENT, in *Chemiſtry*. See RECEIVER.

RECIPIENT *of an air-pump*. See RECEIVER.

RECIPROCAL, *reciprocus*, ſomething that is mutual, or which is returned equally on both ſides, or affects both parties alike.

The end of human ſociety is to afford each other *reciprocal* aid : there are *reciprocal* duties between the prince and his ſubjects, the huſband and wife, &c. There is a *reciprocal* action between the agent and patient.

The *lex talionis* eſtabliſhes a kind of *reciprocation* of juſtice.

If two ſimilar triangles be cut by parallel lines, the ſections of the ſides will be proportional ; and *reciprocally*, if the ſides be cut proportionably, the triangles are ſimilar.

RECIPROCAL, in *Logic*, is applied to terms which have the ſame ſignification, or are convertible ; as, *reaſonable animal* and *man*.

Schoolmen define *reciprocation* a converſion of the ſeveral terms in an enunciation. And terms are ſaid to be converted in an enunciation, when the predicate is put in the place of the ſubject, and, *reciprocally*, the ſubject in that of the predicate.

Thus, rationality and riſibility are ſaid to *reciprocate* ; for we ſay equally, *a rational is riſible*, and *a riſible is rational*.

RECIPROCAL, in *Grammar*, is applied to certain verbs and pronouns in ſome of the modern languages ; in regard of their turning or reflecting the noun, or perſon, upon himſelf.

Thus the pronoun relative, *himſelf*, refers Cato to Cato's ſelf.

The abbé de Dangeau defines *reciprocal verbs* to be thoſe whoſe nominative is plural, and denotes perſons acting mutually on one another : as, *Ces quatre hommes s'entrebattoient*, *theſe four men fought together* ; *Pierre & toi vous vous louez*, *Peter and you praiſe one another*, &c.

Reciprocal verbs are a ſpecies of thoſe which that author calls *pronominals*, and which he diſtinguiſhes into *reciprocal* and *identical*.

RECIPROCAL, in *Poetry*, is applied to verſes which run the ſame both backwards and forwards ; called alſo *recurrents*. See RETROGRADE.

RECIPROCAL, in *Mathematics*, is applied to quantities, which multiplied together produce unity. Thus $\frac{1}{x}$ and

x, y and $\frac{1}{y}$ are *reciprocal* quantities. And $\frac{1}{x}$ is ſaid to be the *reciprocal* of x, which, *vice verſa*, is the *reciprocal* of $\frac{1}{x}$.

Reciprocal *figures*, in *Geometry*, are ſuch as have the antecedents and conſequents of the ſame ratio in both figures. See *Tab.* III. *Geom. fig.* 78. Here,

$$A : B :: C : D, \text{ or},$$
$$12 : 4 :: 9 : 3$$

That is, as much longer as the ſide A, in the firſt rectangle, is than the ſide B of the ſecond rectangle; ſo much deeper is the ſide C in the ſecond rectangle, than the ſide D in the firſt; and, conſequently, the length of one is compenſated by the depth of the other.

Alſo, as the ſide A is $\frac{1}{4}$ longer than the ſide C, ſo the ſide B is $\frac{1}{4}$ longer than D: wherefore the rectangles muſt needs be equal.

This is the foundation of that catholic theorem; that the rectangle of the extremes muſt always be equal to that of the means; and, conſequently, the reaſon of the rule of three, or golden rule.

For, ſuppoſe there were given any three numbers, or quantities, geometrically proportional, as A, B, and C; and that it were required to find a fourth, D, proportional to them: ſince $A : B :: C : D$, therefore $AD = BC$, and, conſequently $D = \frac{BC}{A}$; that is, the fourth term is equal to the quotient of the ſecond, multiplied by the third term divided by the firſt.

Or, thus in numbers: ſuppoſe given 12, 4, and 9; required a fourth proportional. Now as $12 : 4 :: 9 : Q$. But $12\,Q = 4 \times 9 = 36$. Therefore $Q = \frac{4 \times 9}{12} = 3$, by dividing both ſides by 12.

And hence it follows, that if any two triangles, parallelograms, priſms, parallelepipeds, pyramids, cones, or cylinders, have their baſes and altitudes *reciprocally* proportional, thoſe two figures or ſolids are equal to one another; and, *vice verſâ*, if they are equal, their baſes and altitudes are *reciprocally* proportional.

Reciprocal *proportion*, is when in four numbers the fourth is leſs than the ſecond, by ſo much as the third is greater than the firſt; and *vice verſâ*. See Proportion.

This is the foundation of the inverſe, or indirect rule *of three*. Thus, 4 : 10 : 8 : 6.

Great uſe is made of this *reciprocal proportion*, by Sir Iſaac Newton. and others, in demonſtrating the laws of motion.

Reciprocal *theorem*. See Theorem.

RECISSION, in *Law*. See Ademption.

RECITAL, in *Law*, the rehearſal or making mention in a deed or writing of ſomething which has been done before.

A *recital* is not concluſive, becauſe it is no direct affirmation; and by feigned *recitals* in a true deed, men might make what titles they pleaſed, ſince falſe *recitals* are not puniſhable. If a perſon by deed of aſſignment *recite* that he is poſſeſſed of an intereſt in certain lands, and aſſign it over by the deed, and become bound by bond to perform all the agreements in the deed; if he is not poſſeſſed of ſuch intereſt the condition is broken; and though a *recital* of itſelf is nothing, yet being joined and conſidered with the reſt of the deed, it is material. And where it is but a *recital*, that before the indenture the parties were agreed to do ſuch a thing, it is a covenant, and the deed itſelf confirms it. The *recital* of one leaſe in another, is not a ſufficient proof that there was ſuch a leaſe as is *recited*. But the *recital* of a leaſe in a deed of releaſe, is good evidence of a leaſe againſt the releſſor, and thoſe who claim under him. A new reverſionary leaſe ſhall commence from the delivery, where an old leaſe is *recited*, and there is none, &c. A. *recites* that he hath nothing in ſuch lands, and in truth he has an eſtate there, and makes a leaſe to B. for years; the *recital* is void, and the leaſe good. In this caſe, if the *recital* were true, the leaſe would not bind.

RECITATION, the act of *reciting*, or delivering a diſcourſe, either in the way of narration, rehearſal, declamation, or reading.

RECITATIVO, or **Recitative** *muſic*, a kind of ſinging, which differs but little from ordinary pronunciation: ſuch as that wherein ſeveral parts of the liturgy are rehearſed in cathedrals, or that wherein the actors ordinarily deliver themſelves on the theatre, at the opera, &c. See Music.

The Italians value themſelves on their performance in the *recitative* way. The *recitatives*, or *recitativos*, in our operas, uſually tire the audience, becauſe they do not underſtand the language; but the ſongs make them amends.

Recitative *ſtyle*, is the way of writing accommodated to this ſort of muſic.

RECKONING, in *Navigation*, the act of eſtimating the quantity of a ſhip's way; or of the diſtance run between one place and another.

Or, more generally, a ſhip's *reckoning* is that account, whereby at any time it may be known where the ſhip is, and on what courſe or courſes ſhe is to ſteer to gain her port. See Log-*board*, Log-*book*, and Journal.

This is uſually performed by means of the log-line: the manner of applying which, ſee under its proper article, Log-line.

Yet this is liable to great irregularities. Vitruvius adviſes an axis to be paſſed through the ſides of the ſhip, with two large heads propending out of the ſhip, wherein are to be included wheels touching the water, by whoſe revolution the ſpace paſſed over in any given time may be meaſured. The ſame has been ſince recommended by Snellius; but there are few who have written of navigation, but have ſhewn the inſufficiency of this method.

Reckoning, *dead*. See Dead *reckoning*.

RECLAIMING, or **Reclaming**, in our *Ancient Cuſtoms*, the action of a lord purſuing, proſecuting, and recalling his vaſſal, who had gone to live in another place, without his permiſſion.

Reclaiming is alſo uſed in a ſimilar ſenſe, for the demanding of a perſon or thing to be delivered up, or ſurrendered, to the prince or ſtate it properly belongs to; when, by any irregular means, it has come into the poſſeſſion of another.

Reclaiming, in *Falconry*, is the calling of a hawk, or bird of prey, back to the fiſt.

The ſpar-hawk, gos-hawk, &c. are *reclaimed* with the voice; the falcon only by ſhaking the lure. So that the term luring, with regard to the falcon, is more proper than *reclaiming*.

The partridge is alſo ſaid to *reclaim* her young ones, when ſhe calls them together upon their ſcattering too much from her.

Reclaiming is alſo uſed for taming animals that are wild by nature.

Reclaiming, in a monaſtic ſenſe. See Religious.

RECLINATE *ſtalk*. See Stalk.

RECLINATION *of a plane*, in *Dialling*, the number of degrees which a dial-plane leans backwards, from an exactly upright or vertical plane, i. e. from the zenith.

The *reclination* is eaſily found, by means of a ruler, and a quadrant; for having drawn an horizontal line on the plane by a level or quadrant, and to it another line at right angles, apply a ruler, ſo that one end of it may hang over, or reach beyond the plane; then will a quadrant, applied to the under-edge of the ruler, ſhew the degrees and minutes of the plane's *reclination*; accounting from that ſide of the quadrant that is contiguous to the edge of the ruler.

RECLINER, or **Reclining** *dial*, is a dial whoſe plane *reclines* from the perpendicular; i. e. leans from you when you ſtand before it.

When this reclination is equal to the height of the pole, the dial is ſaid to be equinoctial. See Dial.

Recliner, *declining*, or *Declining* Reclining *dial*, is a dial which neither ſtands perpendicularly, nor oppoſite to one of the cardinal points. See Dial.

RECLUSE, among *Religious*, a perſon cloſe ſhut up in a very narrow cell of an hermitage, or other religious houſe; and cut off, not only from all converſation with the world, but even with the houſe.

The word is chiefly uſed for ſuch as thus impriſon themſelves out of devotion, to do penance. It is ſometimes alſo applied to incontinent wives, whom their huſbands procure to be thus kept in a perpetual priſon in ſome convent.

Recluſes were anciently very numerous: they were then a kind of ſolitaries who ſhut themſelves up in ſome little cell, with a vow never to ſtir out of it.

None were admitted to this oath until they had given ſufficient proofs of their abſtinence, and had leave from the biſhop, or the abbot of the monaſtery where they were ſhut up; for the cells of the *recluſes* were always to join to ſome monaſtery.

The prelate's permiſſion being obtained, they were tried for a year in the monaſtery; out of which, during that time, they never ſtirred.

They were then admitted to their vow of ſtability in the church before the biſhop; which being done, and the *recluſe* having entered his little cell, the biſhop ſet his ſeal on the door.

The cell was to be very ſmall, and very exactly cloſed. The *recluſe* was to have every thing within it neceſſary to life; and even, if he were a prieſt, an oratory conſecrated by the biſhop, with a window which looked into the church, through which he might make his offerings at the maſs, hear the ſinging, ſing himſelf with the community, and anſwer thoſe who talked to him. But this window was to have curtains before it, both withinſide and without; ſo that the *recluſe* might neither ſee, nor be ſeen.

Indeed he was allowed a little garden in his *recluſion*, to plant a few herbs, and take freſh air; adjoining to his cell was that of his diſciples, which he was very rarely without; with a window, through which they ſerved him with neceſſaries, and received his inſtructions.

When it was judged proper to have two or three *recluſes* together, their cells were made contiguous to each other, with windows of communication: if any woman would conſult them, or confeſs to them, it was to be in the church, and in the face of all the world.

Where there were two or three *recluſes* together, they were never to hold any conference, but on ſpiritual matters, and to confeſs to each other: where there was but one, he was to confeſs and examine himſelf.

If the *recluſe* fell ſick, his door was opened for people to come in and aſſiſt him; but he was not allowed to ſtir out on any pretence whatever.

Theſe articles are extracted from the rule, compiled for the *recluſes*, by Grimlaic, a prieſt in the ninth century.

There were alſo women *recluſes*, who led the ſame life, in proportion. St. Viborade lived a *recluſe* at St. Gall, and was there martyred by the Hungarians in 825.

RECLUSION, the ſtate of a Recluse; or the cell and other appurtenances thereof.

F. Helyot gives a particular account of the ceremonies practiſed in the *recluſion* of a woman, in that of mother de Cambray, inſtitutrix of the order of the repreſentation of Notre Dame. A cell being built for her in 1625, adjoining to the church of St. Andrew in Tournay, the biſhop waited for her early in the morning at the church-door. Upon her arrival, proſtrating herſelf at the feet of that prelate, he gave her his benediction; conducted her to the grand altar; and there bleſſing a mantle, veil, and ſcapular, he put them on her, and gave her a new name.

Having here made her vow, and the biſhop having harangued the people in praiſe of the new *recluſe*, he conducted her proceſſionally to her *recluſion*; the clergy all the way ſinging *Veni, ſponſa Chriſti*, &c.

Here the biſhop, bleſſing her afreſh, conſecrated the *recluſion*, and ſhut her up in perpetual confinement.

RECOGNISANCE. See Recognizance.

RECOGNITION, *recognitio*, denotes an acknowledgment. The word is particularly uſed in our law-books, for the title of the firſt chapter of the ſtat. 1 Jac. I. whereby the parliament acknowledged the crown of England, after the death of queen Elizabeth, to have rightfully deſcended to king James.

Recognitions *of Clement*, in *Eccleſiaſtical Hiſtory*, a ſuppoſititious or apocryphal book, aſcribed to St. Clement, but really compoſed by ſome learned and eloquent man in the ſecond century. This book is, for the moſt part, ſays the learned Dr. Lardner, a fiction or romance, in which divers things concerning the Chriſtian religion are repreſented in a philoſophical manner, in order to render them more agreeable to the Greeks. It is called the Travels and Acts of Peter, from its ſubject, as it contains an account of the apoſtle Peter's diſputes with Simon Magus, and his diſcourſes to other people, and his miracles. It is called the *Recognitions*, from Clement's recogniſing his father and mother and brethren, who had been long ſeparated from each other. Coteler. ap. Patr. Apoſt. tom. i. p. 484. Lardner's Cred. Goſpel. Hiſt. vol. iv. p. 786, &c. See *Clementine* Homilies.

Recognition, in the *Drama*. See Discovery.

RECOGNITIONE *adnullanda per vim & duritiem facta*, is a writ to the juſtices of the common bench for ſending a record touching a recognizance, which the recognizor ſuggeſts to have been acknowledged by force and hard dealing; that, if it ſo appear, it may be annulled.

Tranſcriptio **Recognitionis** *factæ coram juſtitiariis itinerantibus*. See Transcriptio.

RECOGNITORS, *recognitores*. The jury impanelled upon an aſſize are called *recognitors*, becauſe they acknowledge a diſſeiſin by their verdict.

RECOGNIZANCE, or **Recognisance**, in *Law*, a bond or obligation of record acknowledged to the king: teſtifying the *recognizor* to owe to the *recognizee* a certain ſum of money; with condition to do ſome particular act, as to appear at the aſſizes, to keep the peace, to pay a debt, or the like.

It is thus called, becauſe *recognized*, or acknowledged, in ſome court of record, or before ſome judge, maſter in chancery, or juſtice of the peace.

Mere *recognizances* are not ſealed, but inrolled; and execution, by force thereof, is of all the recognizor's goods or chattels (except draught-beaſts, or implements of huſbandry) and the moiety of his land.

There are alſo *recognizances* for Bail, others for appearing at the ſeſſions to proſecute a felon, others for Good *behaviour*, &c.

There are alſo other *recognizances*, of a private kind, in nature of a Statute *ſtaple*, by virtue of the ſtatute 23 Hen. VIII. cap. 6. which are a charge upon real property.

Recognizance is alſo uſed, in our *Ancient Statutes*, for the verdict of the twelve jurors impanelled upon an aſſize; hence called *recognitors*.

RECOGNIZEE, is he to whom one is bound in a recognizance. He that is ſo bound is called Recognizor.

RECOIL, or **Rebound**, the reſilition of a body, chiefly a fire-arm; or the motion whereby, upon exploſion, it ſtarts or flies backwards; the cauſe of which is the impelling force of the powder, which acts equally on the breech and on the ball; ſo that if the piece and ball were of equal weight, and other circumſtances the ſame, the piece would *recoil* with the ſame velocity as that with which the ball is diſcharged; but the heavier any body is, the leſs will its velocity be, when the force impelling it continues the ſame. Therefore ſo many times as the cannon and carriages are heavier than the ball, juſt as many times will the velocity of the cannon be leſs than that of the ball; and the ſpace through which the cannon *recoils* whilſt the ball moves along the cylinder is to the length of the cannon diminiſhed by the ſpace behind the ball, as the weight of the ball is to the weight of the cannon. Let a twenty-four pounder of ten feet be 6400 pounds weight, and when the ball quits the piece, the cannon will have *recoiled* $\frac{24}{6400} \times 10 = \frac{3}{80}$ of a foot, leſs than half an inch.

The greater the charge, *cæteris paribus*, the greater the rebound. By an experiment made before the Royal Society, and related in the Philoſophical Tranſactions, it was found, that cannons, charged to a certain degree, throw the ball from right to left of their own direction; but that the cannons themſelves *recoil* from left to right.

Some of the gentlemen of the French academy doubting the juſtneſs of the obſervation, Mr. Caſſini, the younger, undertook to repeat the experiment; which he did by means of a machine, as like that uſed in England as he could: and that tried over and over again.

The reſult was, that the ball, when the gun had liberty to *recoil*, was always thrown to the right of the point to which it was thrown when the gun was fixed without a poſſibility of rebounding; but then the *recoil* was always made the ſame way, viz. to the right; and he never found that contrariety of directions between the ball and the rebound, obſerved in the Engliſh experiment. See Hiſt. Acad. R. Scienc. A. 1703, p. 120, &c.

The cauſe of the phenomenon ſeems very difficult to aſſign; for ſuppoſing the guns of a common make, with the touch-hole on the top, we cannot ſo much as gueſs what cauſe ſhould conſtantly determine the ball from right to left; unleſs ſome very material circumſtances be omitted in the recital they have given us in the experiment.

Guns whoſe vents are a little forward in the chaſe *recoil* moſt. To leſſen the *recoil* of a gun, the platforms are generally made ſloping towards the embraſures of the battery. See Projectile.

RECOLATION, a method of fining the decoctions of vegetables, &c. by repeated percolation, or ſtraining them ſeveral times ſucceſſively through a linen or woollen-bag.

RECOLLECTION, a mode of thinking, whereby thoſe ideas, ſought after by the mind, are with pain and endeavour found, and brought again to view. See Memory and Imagination.

RECOLLETS, a congregation of reformed Franciscans, called alſo *friers minor of St. Francis, of the ſtrict obſervance*. They were eſtabliſhed about the year 1532, when ſome religious of the order of St. Francis being willing to keep his rule to the letter, Clement VII. gave them houſes, whither they might retire, and receive ſuch as were diſpoſed to follow them. The ſame year he approved the reform; and in 1584 it was carried from Italy into France, where theſe religious had already been eſtabliſhed, in the towns of Tulles, in Limoſin, and Murat, in Auvergne. They had a convent at Paris in 1603; and ſince they have erected no leſs than a hundred and fifty in the whole kingdom, where they are divided into ſeven provinces.

RECOMMENDATI. See Affidatus.

RECOMPOSITION, in *Chemiſtry*, the compounding of bodies from their ſeparated parts, or principles, ſo as to compoſe the original whole again. This is extremely difficult to effect univerſally, but in ſome caſes it may be done, and that ſo perfectly, that the *recompoſed* body ſhall not be diſtinguiſhable by the ſenſes from that which never had been ſeparated by the fire. If the art of chemiſtry were perfect, we ſhould thus be able, at leaſt in ſome degree, to *recompoſe* all the bodies we divide; but this is far from being the caſe at preſent. We can by no means do this in vegetable and animal bodies, where there is a vaſcular ſtructure, and therefore we are carefully to diſtinguiſh between the regeneration of organized, and that of unorganized bodies.

RECONCILIARI, in our *Law-Books*, &c. A church is ſaid *reconciliari*, to be *reconciled*, when it is conſecrated afreſh, after having been polluted or profaned; as by the poſſeſſion of pagans, heretics, &c.

RECONCILIATION *of penitents*, in *Church Hiſtory*. See Poenitentes.

RECONNOITRE, in *War*, implies to view and examine the ſtate of things, in order to make a report thereof.

The word is French, ſignifying, literally, *to know, recollect.*

We ſay, to *reconnoitre* the coaſts, to *reconnoitre* a port, &c. A body of horſe was ſent to *reconnoitre* their camp, the ground, the condition of the roads, rivers, &c.

A general ought to go to *reconnoitre*, in perſon, the place to be beſieged, in order to learn its ſituation and avenues, its ſtrength and weakneſſes.

Reconnoitre is alſo uſed at ſea. To *reconnoitre* a veſſel, a fleet, &c. is to approach near enough to examine the rate and burden of a veſſel, &c. the force it may have aboard, what nation it is of, &c.

To *reconnoitre* a land, or ſhore, is to obſerve its ſituation, in order to find what land it is.

RECORD, *recordium*, in *Law*, an authentic teſtimony of any thing in writing, contained in rolls of parchment, and preſerved in a court *of record.*

Records are ſaid to be *vetuſtatis & veritatis veſtigia.* An act committed to writing in any of the king's courts, during the term wherein it is written, is alterable, being no *record*; but that term once ended, and the act inrolled, it is a *record*, and of ſuch credit as admits no alteration, or proof to the contrary.

Lawyers reckon three ſorts of *records*; viz. a *judicial record*, as attainder, &c. a *miniſterial record* upon oath, as an office of inquiſition found; and a *record* made by *conveyance* and conſent, as a fine, or deed inrolled, and the like.

Record, *aſſurances by matter of*, in *Law*, are ſuch as do not entirely depend on the act or conſent of the parties themſelves; but the ſanction of a court of *record* is called in, to ſubſtantiate, preſerve, and be a perpetual teſtimony of the transfer of property from one man to another; or of its eſtabliſhment, when already transferred: of this nature are private acts of parliament, the king's grants, fines, and common recoveries.

Record, *court of.* See Record, ſupra, and Court.

Record, *debt of*, is a ſum of money, which appears to be due by the evidence of a court of *record.* Thus, when a ſpecific ſum is adjudged to be due from the defendant to the plaintiff, on an action or ſuit at law, this is a contract of the higheſt nature, being eſtabliſhed by the ſentence of a court of judicature. Recognizances, together with ſtatutes merchant, and ſtatutes ſtaple, &c. if forfeited by non-performance of the condition, are alſo debts of *record*; the contract, on which they are founded, being witneſſed by the higheſt kind of evidence, viz. by matter of *record.*

Records, *imbezzling of.* See Imbezzle.

Record, *matter, muſter, oyer, priſoner upon matter of*, ſee Matter, Muster, Oyer, and Prisoner, &c.

Record, *trial by*, is uſed only in one particular inſtance; where a matter of record is pleaded in any action, as a fine, a judgment, or the like; and the oppoſite party pleads "*nul tiel record*," that is, there is no ſuch matter of *record* exiſting: upon this iſſue is tendered and joined in the following form, "and this he prays may be enquired of *by the record*, and the other doth the like;" and hereupon the party pleading the *record* has a day given him to bring it in, and proclamation is made in court for him "to bring forth his *record*, or he ſhall be "condemned;" and, on his failure, his antagoniſt ſhall have judgment to recover. The trial of this iſſue is, therefore, merely by the *record.* Thus, titles of nobility ſhall be tried by the king's writ or patent only, which is matter of *record.* Alſo in caſe of an action, whether alien, friend, or enemy, ſhall be tried by the league or treaty between his ſovereign and our's; for every league or treaty is of *record.* And alſo whether a manor be held in ancient demeſne or not, ſhall be tried by the *record* of Domeſday in the king's exchequer. Blackſt. Com. book iii. p. 331.

Record, among *Fowlers.* A bird is ſaid to *record*, when it begins to tune or ſing within itſelf; or to form its notes, and diſpoſe its organs for ſinging.

The cock thruſh is diſtinguiſhed from the hen in *recording*; the firſt being more loud and frequent in it than the ſecond. Inſtances have been known of birds beginning to *record* when they were not a month old. This firſt eſſay does not ſeem to have the leaſt rudiments of the future ſong; but as the bird grows older and ſtronger, one may perceive what the neſtling is aiming at. A young bird commonly continues to *record* for ten or eleven months, when he is able to execute every part of his ſong, which afterwards continues fixed, and is ſcarcely ever altered. The term *record* is probably derived from a muſical inſtrument, formerly uſed in England, called a *recorder*, which ſeems to have been a ſpecies of flute, and was probably uſed to teach young birds to pipe tunes. Lord Bacon deſcribes this inſtrument (in his ſecond Century of Experiments) to have been ſtraight, to have had a leſſer and greater bore, both above and below, to have required very little breath from the blower, and to have had what he calls a fipple or ſtopper.

RECORDARI *facias loquelam*, a writ directed to the ſheriff to remove a cauſe depending in an inferior court, as hundred-court, county-court, court of ancient demeſne, &c. to the king's bench, or common-pleas, &c.

It is thus called, becauſe it commands the ſheriff to *make a record* of the proceedings either by himſelf, or others; and then to ſend up the cauſe.

RECORDER, *recordator*, a perſon whom the mayor, or other chief magiſtrate of any city, or town corporate, having juriſdiction, and a court of *record*; within their precincts, does aſſociate with him, for his better direction, in matters of juſtice, and proceedings according to law. He is uſually a counſellor, or other perſon, verſed and experienced in the law. In ſome towns, which have their particular aſſizes within themſelves, and no mayor, the *recorder* is the judge.

The *recorder* of London is one of the juſtices of oyer and terminer, and a juſtice of peace of the *quorum*, for putting the laws in execution for preſerving the peace and government of the city; and being the mouth of the city, he delivers the ſentences and judgments of the courts therein, and alſo certifies and *records* the city-cuſtoms, &c. He is choſen by the lord mayor and aldermen, and attends the buſineſs of the city, on any warning by the lord mayor, &c.

Recorder, in *Muſic.* See Record, ſupra.

RECORDO & *proceſſu mittendis* is a writ to call a *record*, together with the whole proceedings in the cauſe, out of an inferior court into the king's court.

RECOVERY, in a legal ſenſe, an obtaining of any thing by judgment, or trial at law; anſwering to *evictio* among the civilians.

There is a *true* and a *feigned recovery.*

Recovery, *true*, is an actual or real *recovery* of any thing, or of the value thereof, by judgment. As if a man ſue for any land, or other thing, and have a verdict or judgment for him.

Recovery, *feigned* or *common*, is a ſort of *fictio juris*, being a certain form or courſe preſcribed by law to be obſerved for the better aſſuring of lands and tenements to us; the end and effect whereof is, to diſcontinue and deſtroy eſtates-tail, remainders, and reverſions, and to bar the intails thereof.

Theſe common *recoveries* were invented by the eccleſiaſtics to elude the ſtatutes of mortmain; and afterwards encouraged by the fineſſe of the courts of law in 12 Edw. IV. in order to put an end to all fettered inheritances, and bar not only eſtates-tail, but alſo all remainders and reverſions expectant thereon.

This *recovery* is either with a *ſingle* or a *double voucher*; and ſometimes a treble or farther voucher, as the exigency of the caſe may require.

In Recovery *with a ſingle voucher* there are three parties required; the *demandant*, the *tenant*, and the *vouchee.*

The demandant is he who brings the writ of entry, and may be termed the *recoverer.* The tenant is he againſt whom the writ is brought, and may be called the *recoveree.* The vouchee is he whom the tenant voucheth, or calls to warranty for the land in demand.

Recovery *with double voucher* is where the tenant voucheth one, who voucheth another, or the common vouchee.

To explain this matter: ſuppoſe a man deſirous to cut off an eſtate-tail in lands or tenements, to the end that he may ſell, give, or bequeath them; the firſt thing he does is to cauſe a feigned writ of entry *ſur diſſeiſin in le poſt* to be brought for the lands of which he intends to dock or cut off the intail; and, in a feigned declaration thereupon made, he pretends he was diſſeiſed by him, who, by a feigned fine, or deed of bargain and ſale, is named and ſuppoſed to be tenant of the lands.

This feigned tenant, if it be a ſingle *recovery*, is made to appear, and vouch the bag-bearer of writs of the cuſtos brevium, or cryer, of the common pleas (where alone theſe common *recoveries* are allowed) who makes default; upon which a judgment is, by this fiction, entered, that the demandant ſhall recover, and have a writ of ſeiſin for the poſſeſſion of the lands in queſtion ; and that the tenants ſhall recover the value of the lands againſt the lands of the vouchee ; which is an imaginary ſatisfaction for the heir in tail, though he is never to be the better for it.

Clerk of inrollments of RECOVERIES *and fines.* See CLERK.

RECOUPE, French ; formed of *re*, and *couper, to cut again*, in *Law*, to rebate, or DISCOUNT.

Thus, if a man have ten pounds iſſuing out of certain lands, and he diſſeiſes the tenant of the land ; in an aſſiſe brought by the diſſeiſee, if he recover the land and damages, the diſſeiſor ſhall *recoupe* the rent due in the damages.

RECOUPE alſo denotes a quick, ſharp reply, to a peremptory demand. See REPARTEE.

RECREANT, in our *Old Law Books*, implies cowardly, faint hearted.

Hence *recreantiſe*. See CRAVEN and CHAMPION.

Recreant was ſo reproachful a word, that Glanville would not deſcribe it. *Recreantes equi* is uſed by Fleta, lib. ii. cap. 2. for dull, jaded horſes.

RECREMENT, *recrementum*, in *Medicine*, ſome ſuperfluous matter ſeparated from ſome other that is uſeful.

In which ſenſe, it amounts to much the ſame with FÆCES, or EXCREMENT.

RECREMENT is ſometimes alſo uſed to denote ſuch ſecreted juices in the body, as are afterwards of uſe in the œconomy ; as the lympha, gall, &c. which are thus called, in contradiſtinction to *excrements*, which are expelled out of the body, as of no farther uſe.

RECRIMINATION, a poſterior accuſation brought by the accuſed againſt his accuſer, upon the ſame fact.

When two parties have made their mutual complaint at the ſame time ; the buſineſs is, firſt, to determine who ſhall be the accuſer, and who the accuſed ; i. e. on whom ſhall fall the *recrimination*.

By the French laws, *recrimination* is of no force till the criminal hath been purged legally.

RECRUDESCENCE, *recrudeſcentia*, in *Medicine*, is a relapſe, when a diſeaſe that has gone off returns again.

RECRUITS, in the *Military Art*, new men raiſed to ſupply the places of ſuch as have loſt their lives in the ſervice, or are rendered unſerviceable by age or wounds. See LISTING.

RECRUIT-*horſes*, are the *horſes* brought up for completing the regiments of horſe or dragoons every year.

RECTANGLE, in *Geometry*, called alſo *oblong*, and *long ſquare*, a quadrilateral rectangular figure MLIK, (*Tab.* III. *Geometry*, *fig.* 79.) whoſe oppoſite ſides ML and IK, as well as MI and LK, are equal.

Or, a *rectangle* is a parallelogram, whoſe ſides are unequal, but its angles right.

To find the area of a rectangle. See PARALLELOGRAM.

If from the ſame point A, *fig.* 80. be drawn two lines, one whereof, AD, is a tangent to a circle, the other a ſecant AB ; the ſquare of the tangent AD will be equal to the *rectangle* under the ſecant AB, and that part of it without the circle AC. If two or more ſecants A*a*, AB, &c. be drawn from the ſame point A ; the *rectangles* under their wholes, and their parts without the circle, will be equal. If two chords interſect each other, the *rectangles* under their ſegments will be equal.

RECTANGLES, *ſimilar*. See SIMILAR.

RECTANGLE, in *Arithmetic*, is the ſame ith PRODUCT or *factum*.

RECTANGLED, RIGHT-ANGLED, *triangle*, is a triangle, one of whoſe angles is right, or equal to 90°. See TRIANGLE.

There can be but one right angle in a plain triangle ; therefore a *rectangled* triangle cannot be equilateral.

RECTANGULAR, in *Geometry*, is applied to figures and ſolids which have one or more angles right.

Such are ſquares, rectangles, and rectangled triangles, among plain figures ; cubes, parallelepipeds, &c. among ſolids.

Solids are alſo ſaid to be *rectangular* with reſpect to their ſituation : thus, if a cone, cylinder, &c. be perpendicular to the plane of the horizon, it is called a *rectangular* or *right* cone, cylinder, &c.

The ancients uſed the phraſe *rectangular ſection of a cone*, to denote a parabola ; that conic ſection, before Apollonius, being only conſidered in a cone, whoſe ſection by the axis would be a triangle, right-angled at the vertex. See CONIC *ſection*.

Hence it was that Archimedes entitled his book of the quadrature of the parabola, by the name of Rectanguli Coni Sectio.

RECTANGULAR *barometer*. See BAROMETER.

RECTANGULAR *windmills*. See WINDMILLS.

RECTIFICATION, compounded of *rectus, right, direct*, and *fio, I become*, the act of *rectifying*, i. e. of correcting, remedying, or redreſſing, ſome defect or error, in reſpect either of nature, art, or morality.

RECTIFICATION, in *Chemiſtry*, is the repeating of a diſtillation or ſublimation ſeveral times, in order to render the ſubſtance purer, finer, and freer from aqueous and earthy parts.

Rectification is a reiterated depuration of a diſtilled matter, e. gr. brandy, ſpirits, or oils, by diſtilling them over again, to render them more ſubtile, and exalt their virtues.

That the *rectification* of ſpirits may, in all caſes, proceed with the greateſt exactneſs, a due regard to it muſt be had even from the firſt fermenting the ſubſtance from which they are to be made, and continued through all the ſtages of diſtillation, the low wines, proof ſpirit, and alcohol. The management of the fermented liquor, to this purpoſe, is principally the letting it ſtand to ſubſide after the fermentation is over, and the drawing it off clear and thin, not too rich for the ſtill. The ſtill is not to be overfilled with this. Great care muſt be taken to prevent its burning, and the faints that run laſt muſt be kept ſeparate, not mixed with the reſt of the liquor diſtilled, which is now called the low wines. In the *rectifying* theſe into proof ſpirit, great caution muſt be uſed that the fire be kept regular, not raiſed by ſudden ſpirts, which always throw up the oil in large quantities, which is to be left behind. In the ſucceeding *rectification* of the proof ſpirit into alcohol, the ſame cautious management of the fire is neceſſary ; and, in both this and the laſt, the faints are not to be ſuffered to run in among the ſpirit, but to be ſaved ſeparate. They may be all mixed together at laſt, and reduced to a ſpirit fit for burning in lamps ; but the keeping out of the *rectified* liquor will keep away the coarſeſt and moſt ſtinking part of the oil of the ingredients.

By theſe eaſy means, without any additional trouble or charge, we might be furniſhed with a ſpirit greatly exceeding what we commonly meet with. And in general, the art and myſtery of our ſellers of the ſeveral ſorts of Engliſh brandies, ſeem to conſiſt in this prudent management, and in the adding a little of the *oleum vini*, or oil of wine lees, to the ſpirits thus procured pure : this gives the flavour of foreign brandies, and is ſo extenſive in its uſe, that half an ounce of it is ſufficient for a hogſhead of pure ſpirits.

Malt ſpirit is that which principally requires all this care in the *rectification*, becauſe its oil is more nauſeous and offenſive than that of any other ſpirit ; but all others will be greatly the better for being treated in the ſame manner, and it is indeed neceſſary that they ſhould for ſome particular uſes.

It is remarkable, that no one method of combinatory *rectification*, that is, of the *rectification* performed by means of ſalt, and other additions (ſee *Combinatory* DISTILLATION), is ſuited to all the ſeveral kinds of ſpirits ; ſcarce indeed will any one way ſerve for any two ſpirits ; but this method, by ſimple and careful diſtillation, is equally ſuited to all. Melaſſes ſpirit, cyder ſpirit, wine ſpirit, or brandy, rum, and arrack, are all improved by it ; and all of them are then known to be perfectly *rectified*, when in the ſtate of alcohol they not only prove totally inflammable in a little veſſel floating upon cold water, but when poured into the pureſt ſpring water they have not the leaſt power of making any change in it, nor leave any marks of oilineſs, or that unctuoſity, which, on the mixture of the leſs pure ſpirits, floats on the top, and in certain lights give the rainbow colours. Shaw's Eſſay on Diſtillery.

Fixed ſalts are *rectified* by calcination, diſſolution, or filtration.

Metals are *rectified*, i. e. *refined*, by the coppel ; and reguluſes by repeated fuſions, &c.

In a word, all *rectifications* are founded upon the ſame principle ; and conſiſt in ſeparating ſubſtances more volatile from ſubſtances leſs volatile ; and the general method of effecting this is to apply only the degree of heat which is neceſſary to cauſe this ſeparation.

RECTIFICATION *of vitriolic acid.* See CONCENTRATION.

RECTIFICATION, in *Geometry*, is the finding of a right line equal to a curve.

All we need to find the quadrature of a circle is, the *rectification* of its circumference ; it being demonſtrated, that the area of a circle is equal to a rectangled triangle, whoſe two ſides, comprehending the right angle, are the radius, and a right line equal to the circumference.

To *rectify* the circle, therefore, is to *ſquare* it ; or, rather, both the one and the other are impoſſible. See QUADATURE *of the circle*.

The *rectification of curves* is a branch of the higher geometry ; wherein the uſe of the new-invented integral calculus, or inverſe method of fluxions, is very conſpicuous.

cuous. For ſince a curve line may be conceived to conſiſt of innumerable right lines, infinitely ſmall; if the quantity of one of them be found, by the differential calculus; their ſum, found by the integral calculus, gives the length of the curve.

Thus, if A M O (*Tab. Analyſis, fig.* 18.) be a curve of any kind, whoſe ordinates are parallel to one another, and perpendicular to the axis A H; and the fluxion of the abſciſs A P be denoted by P *p* or M R, and R *m* be taken to repreſent the correſponding fluxion of the ordinate P M, then will the tangent M *m* be the line which the generating point of the curve would deſcribe, if its motion were to become uniform at M; conſequently this line will truly expreſs the fluxion of the ſpace A M. Hence putting A P $=x$, P M $=y$, and A M $=z$, we have $\dot{z}\,(=Mm=\sqrt{MR^2+Rm^2})=\sqrt{\dot{x}^2+\dot{y}^2}$; from which, and the equation of the curve, the value of z may be determined. But if all the ordinates of the propoſed curve A R M (*Tab.* III. *Analyſis, fig.* 72.) be referred to a centre C; then, putting the tangent RP, intercepted by the perpendicular C P, $=t$, the arc B N, of a circle deſcribed about the centre C $=x$, the radius C N or (C B) $=a$, &c. (ſee Quadrature *of curves, Caſe* 2.) we ſhall have $\dot{z}:\dot{y}::y$ (CR) : t (R P); and conſequently, $\dot{z}=\frac{y\dot{y}}{t}$; whence the value of z will be found, if the relation of y and t is given.

I. *To rectify the common parabola*; or to find the length of any parabolic arc A M (*Tab. Analyſis, fig.* 18). Suppoſe the parameter $=a$, the abſciſs $=$ A P $=x$, &c. as above. From the well known property of this curve, $ax=y^2$; and $a\dot{x}=2y\dot{y}$ (ſee Fluxion); conſequently $\dot{x}=\frac{2y\dot{y}}{a}$, and $\dot{x}^2=\frac{4y^2\dot{y}^2}{a^2}$, which ſubſtituted for $\dot{x}^2$ in the general expreſſion for the length of the curve, makes $\dot{z}=\overline{\frac{4y^2\dot{y}^2}{a^2}+\dot{y}^2}\big|^{\frac{1}{2}}=\frac{\dot{y}}{a}\times\overline{a^2+4y^2}\big|^{\frac{1}{2}}$; which, thrown into an infinite Series, becomes $=\frac{\dot{y}}{a}\times\overline{a+\frac{2y^2}{a}-\frac{2y^4}{a^3}+\frac{4y^6}{a^5}}$, &c. i. e. $\dot{z}=\dot{y}+\frac{2y^2\dot{y}}{a^2}-\frac{2y^4\dot{y}}{a^4}+\frac{4y^6\dot{y}}{a^6}$, &c. And the fluent of this ſeries (ſee *Inverſe Method of* Fluxions) is $z=y+\frac{2y^3}{3a^2}-\frac{2y^5}{5a^4}+\frac{4y^7}{7a^6}-$, &c. $=$ the length of the curve A M required.

Otherwiſe: the above $\dot{z}=\frac{\dot{y}}{a}\times\overline{a^2+4y^2}\big|^{\frac{1}{2}}$ is $=\frac{\dot{y}}{a}\times\frac{a^2+4y^2}{\overline{a^2+4y^2}\big|^{\frac{1}{2}}}=\frac{a^2y\dot{y}+4y^3\dot{y}}{a\times\overline{a^2y^2+4y^4}\big|^{\frac{1}{2}}}=\frac{\frac{1}{2}a^2y\dot{y}+4y^3\dot{y}}{a\times\overline{a^2y^2+4y^4}\big|^{\frac{1}{2}}}+\frac{\frac{1}{2}a^2\dot{y}}{a\times\overline{a^2+4y^2}\big|^{\frac{1}{2}}}=\frac{1}{a}\times\overline{a^2y^2+4y^4}\big|^{-\frac{1}{2}}\times\overline{\frac{1}{2}a^2y\dot{y}+4y^3\dot{y}}+\frac{1}{4}a\times\frac{\dot{y}}{\overline{\frac{1}{4}a^2+y^2}\big|^{\frac{1}{2}}}$. But the fluent of the firſt of theſe two terms is $=\frac{1}{2a}\times\overline{a^2y^2+4y^4}\big|^{\frac{1}{2}}=\frac{y}{a}\times\overline{\frac{1}{4}a^2+y^2}\big|^{\frac{1}{2}}$; and the fluent of the laſt of the two terms is $=\frac{1}{4}a\times$ hyp. log. of $y+\overline{\frac{1}{4}a^2+y^2}\big|^{\frac{1}{2}}$; therefore $z=\frac{y}{a}\times\overline{\frac{1}{4}a^2+y^2}\big|^{\frac{1}{2}}+\frac{1}{4}a\times$ hyp. log. of $y+\overline{\frac{1}{4}a^2+y^2}\big|^{\frac{1}{2}}$. But when z and y vaniſh, or become $=0$, as they do at the vertex, this fluent becomes $=\frac{1}{4}a\times$ hyp. log. of $\frac{1}{2}a$; and, therefore, the ſaid fluent being corrected (ſee *Inverſe Method of* Fluxions), gives the true value of z, or the length of the curve A M $=\frac{y}{a}\times\overline{\frac{1}{4}a^2+y^2}\big|^{\frac{1}{2}}+\frac{1}{4}a\times$ hyp. log. of $\overline{y+\overline{\frac{1}{4}a^2+y^2}\big|^{\frac{1}{2}}}-\frac{1}{4}a\times$ hyp. log. of $\frac{1}{2}a=\frac{y}{a}\times\overline{\frac{1}{4}a^2+y^2}\big|^{\frac{1}{2}}+\frac{1}{4}a\times$ hyp. log. of $\frac{y+\overline{\frac{1}{4}a^2+y^2}\big|^{\frac{1}{2}}}{\frac{1}{2}a}$.

Hence, if A C and D C (*fig.* 19.) be the conjugate ſemiaxes of an equilateral hyperbola; and A C $=a$, M P $=2y$, Q M $=x$, then will A P $=x-a$; and $x^2-a^2=4y^2$; therefore $x^2=4y^2+a^2$; conſequently $x=\sqrt{4y^2+a^2}$. If then qm be ſuppoſed infinitely near Q M, we ſhall have Q $q=\dot{y}$, and therefore the element of the area C Q M A $=\dot{y}\times\sqrt{a^2+4y^2}$. Whence it appears, that the *rectification* of the parabola depends on the quadrature of the hyperbolic ſpace C Q M A.

II. *To determine the length of an arc of the common hyperbola.* Let the ſemitranſverſe axis be repreſented by b, and the ſemiconjugate by c, and we ſhall have $\frac{b^2y^2}{c^2}=2bx+x^2$, from the nature of the curve (ſee Hyperbola); and, therefore $x=\frac{b\sqrt{c^2+y^2}}{c}-b$: hence $\dot{x}=\frac{by\dot{y}}{c\sqrt{c^2+y^2}}$, and $\dot{z}\,(=\sqrt{\dot{y}^2+\dot{x}^2})=\sqrt{\dot{y}^2+\frac{b^2y^2\dot{y}^2}{c^2\times\overline{c^2+y^2}}}=\dot{y}\sqrt{1+\frac{b^2y^2}{c^4+c^2y^2}}$; which, by converting $\frac{b^2y^2}{c^4+c^2y^2}$ into an infinite ſeries, becomes

$\dot{y}\sqrt{1+\frac{b^2y^2}{c^4}-\frac{b^2y^4}{c^6}+\frac{b^2y^6}{c^8}-\frac{b^2y^8}{c^{10}}}$, &c. But ſtill we have the ſquare root to extract: in order thereto let it be aſſumed $=1+Ay^2+By^4+Cy^6+Dy^8$, &c. Then, by ſquaring, and tranſpoſing, there ariſes

$$\left.\begin{array}{l} 1+2Ay^2+2By^4+2Cy^6+2Dy^8,\ \&c. \\ \qquad\qquad +A^2y^4+2ABy^6+2ACy^8,\ \&c. \\ \qquad\qquad\qquad\qquad +B^2y^8,\ \&c. \\ -1-\frac{b^2}{c^4}\times y^2+\frac{b^2}{c^6}\times y^4-\frac{b^2}{c^8}\times y^6+\frac{b^2}{c^{10}}\times y^8,\ \&c. \end{array}\right\}=0$$

Hence $A=\frac{b^2}{2c^4}$; $B=-\frac{b^2}{2c^6}-\frac{1}{2}A^2=-\frac{b^2}{2c^6}-\frac{b^4}{8c^8}$; $C=\frac{b^2}{2c^8}-AB=\frac{b^2}{2c^8}+\frac{b^4}{4c^{10}}+\frac{b^6}{16c^{12}}$, &c. &c. Therefore $\dot{z}\,(=\dot{y}\sqrt{1+\frac{b^2y^2}{c^4}}$, &c. $=\dot{y}\times\overline{1+Ay^2+By^4}$, &c.$)=\dot{y}+\frac{b^2}{2c^4}\times y^2\dot{y}-\overline{\frac{b^2}{2c^6}+\frac{b^4}{8c}}\times y^4\dot{y}+\overline{\frac{b^2}{2c^8}+\frac{b^4}{4c^{10}}+\frac{b^6}{16c^{12}}}\times y^6\dot{y}$, &c. And conſequently $z=y+\frac{b^2y^3}{6c^4}-\overline{\frac{b^2}{c^2}+\frac{b^4}{4c^4}}\times\frac{y^5}{10c^4}+\overline{\frac{b^2}{c^2}+\frac{b^4}{2c^4}+\frac{b^6}{8c^5}}\times\frac{y^7}{14c^6}$, &c.

By the very ſame way of proceeding the arc of an ellipſis may be found, the equations of the two curves differing in nothing but their ſigns.

III. *To rectify the ſpiral of Archimedes.* The value of t (A T, *Tab.* III. *Analyſis, fig.* 81.) being denoted by $\frac{by}{\sqrt{b^2+y^2}}$ (ſee Tangent *of the ſpiral*, &c.) we have $\dot{z}\left(=\frac{y\dot{y}}{t}\right)=\dot{y}\frac{\sqrt{b^2+y^2}}{b}$; which fluxion being the ſame as that expreſſing the arc of the common parabola (Prob. I.) by inſerting in the expreſſion $\dot{z}=\frac{\dot{y}}{a}\times\overline{a^2+4y^2}\big|^{\frac{1}{2}}$, b for $\frac{1}{2}a$, its fluent will, therefore, be truly repreſented by the meaſure of the ſaid arc, or by $\frac{\frac{1}{2}y\sqrt{b^2+y^2}}{b}+\frac{1}{2}b\times$ hyp. log. $\frac{y+\sqrt{b^2+y^2}}{b}$, the value there found, by making the propoſed ſubſtitution.

IV. *To* rectify *the involute of a circle*, whoſe nature is ſuch, that the part PR (*fig.* 82.) of the tangent intercepted by the point of contact and the perpendicular C P, is every where equal to the radius C O of the generating circle. In this caſe $\dot{z}\left(=\frac{y\dot{y}}{t}\right)=\frac{y\dot{y}}{a}$, we obtain $z=\frac{y^2}{2a}$, which, corrected by making $y=a=$ A C, becomes $\frac{y^2-a^2}{2a}\left(\frac{CP^2}{2CA}\right)$ the true meaſure of the required arc A R.

V. *The right ſine* C B *of an arc of a circle being given*, (Tab. Analyſis, *fig.* 20.) *to find the arc* A C. Let A B $=x$, C B $=y$, O A $=a$, C E the fluxion of the abſciſs, E D the fluxion of the ordinate, and C D the fluxion of the arc C A $=z$. From the property of the circle $2ax-xx=yy$, whence $2a\dot{x}-2x\dot{x}=2y\dot{y}$, and, therefore $\dot{x}=\frac{y\dot{y}}{a-x}$ and $\dot{x}^2=\frac{y^2\dot{y}^2}{\overline{a^2-y^2}\big|^{\frac{1}{2}}}$, becauſe $a-x$ (O B $=\overline{OC^2-CB^2}\big|^{\frac{1}{2}}=$) $\overline{a^2-y^2}\big|^{\frac{1}{2}}$. But C D² ($\dot{z}^2$) $=\dot{y}^2+\dot{x}^2=\dot{y}^2+\frac{y^2\dot{y}^2}{\overline{a^2-y^2}\big|^{\frac{1}{2}}}$, and $\dot{z}=\overline{\frac{y^2\dot{y}^2}{\overline{a^2-y^2}\big|^{\frac{1}{2}}}+\dot{y}^2}\Big|^{\frac{1}{2}}=\frac{a\dot{y}}{\overline{a^2-y^2}\big|^{\frac{1}{2}}}=a\dot{y}\times\overline{a^2-y^2}\big|^{-\frac{1}{2}}$, which laſt quantity thrown into an infinite ſeries, will give $\dot{z}=a\dot{y}\times\overline{\frac{1}{a}+\frac{y^2}{2a^3}+\frac{3y^4}{8a^5}+\frac{5y^6}{16a^7}+\frac{35y^8}{128a^9}+\frac{63y^{10}}{256a^{11}}+\frac{231y^{12}}{1024a^{13}}+\frac{429y^{14}}{2048a^{15}}}$, &c. $=\dot{y}+\frac{y^2\dot{y}}{2a^2}+\frac{3y^4\dot{y}}{8a^4}+\frac{5y^6\dot{y}}{16a^6}+\frac{35y^8\dot{y}}{128a^8}+\frac{63y^{10}\dot{y}}{256a^{10}}+\frac{231y^{12}\dot{y}}{1024a^{12}}+\frac{429y^{14}\dot{y}}{2048a^{14}}$, &c. And the fluent of this ſeries is $z=y+\frac{y^3}{6a^2}+\frac{3y^5}{40a^4}+\frac{5y^7}{112a^6}+\frac{35y^9}{1152a^8}+\frac{63y^{11}}{2816a^{10}}+\frac{231y^{13}}{13312a^{12}}+\frac{429y^{15}}{30720a^{14}}$, &

&c. = the length of the arc AC. Suppoſing the radius OA $= a = 1$, and the angle COA $= 30°$, then (becauſe the ſine of any arc is equal to half the chord of double of that arc, and the chord of 60° is equal to the radius) the ſine, or ordinate CB $(= y)$ will be $= \frac{1}{2}$, and, therefore, the terms of the above fluent being reduced into decimals, and placed under one another, will ſtand thus; viz.

.500000000, &c.
.020833333
.002343750
.000348772
.000059339
.000010923
.000002118
.000000426, &c.

The ſum of which is .5235987, &c. { = the length of the arc AC;
which × by - - - 12
gives - 6.283185, &c. { = the periphery of a circle whoſe radius is 1;
therefore - 3.141592, &c. { = the periphery of a circle whoſe diameter is 1.

VI. *The right ſine, verſed ſine, tangent, or ſecant of an arc of a circle being given, to find the length of the arc itſelf in terms thereof.* Let the verſed ſine A$b = x$ (*Tab.* III. *Analyſis, fig.* 83.), the right ſine R$b = y$, the tangent AT $= t$, the ſecant OT $= s$, the arc AR $= z$, and the radius AO or RO $= a$; and let R$n = \dot{x}$, $nr = \dot{y}$, and R$r = \dot{z}$. Since the angle rnR (= a right angle) = ObR, and rRn (= a right angle − nRO) = ORb, the triangles rRn and ORb are therefore equi-angular; and it will be, Rb (y) : OR (a) : : Rn $(\dot{x})$: Rr $(\dot{z}) = \frac{a\dot{x}}{y} = \frac{a\dot{x}}{\sqrt{2ax-xx}}$ (becauſe, by the property of the circle $\sqrt{2ax-xx} = y$.) Alſo, Ob $(\sqrt{a^2-y^2})$: OR (a) : : nr $(\dot{y})$: Rr $(\dot{z}) = \frac{a\dot{y}}{\sqrt{a^2-y^2}}$. Theſe two values exhibit the fluxion of the arc in terms of the verſed-ſine and right-ſine reſpectively; but to get the ſame in terms of the tangent and ſecant, we have (by ſimilar triangles) OT $(= s = \sqrt{a^2+t^2})$: OA (a) : : OR (a) : Ob $= \frac{a^2}{s} = \frac{a^2}{\sqrt{a^2+t^2}}$: hence A$b = a - \frac{a^2}{s} = a - \frac{a^2}{\sqrt{a^2+t^2}}$; whoſe fluxion is therefore $= \frac{a^2\dot{s}}{s^2} = \frac{a^2t\dot{t}}{\overline{a^2+t^2}|^{\frac{3}{2}}}$; whence (again by ſimilar triangles) AT $(= \sqrt{s^2-a^2} = t)$: OT $(= s = \sqrt{a^2+t^2})$: : Rn : R$r = \frac{a^2\dot{s}}{s\sqrt{s^2-a^2}} = \frac{a^2\dot{t}}{a^2+t^2} = \dot{z}$.

Now, from any one of the four forms of fluxions $\left(\frac{a\dot{x}}{\sqrt{2ax-xx}}, \frac{a\dot{y}}{\sqrt{a^2-y^2}}, \frac{a^2\dot{t}}{a^2+t^2}, \frac{a^2\dot{s}}{s\sqrt{s^2-a^2}}\right)$ here found, the value of the arc itſelf (by taking the fluent, in an infinite ſeries) will likewiſe become known.

But the third form, expreſſed in terms of the tangent, being entirely free from radical quantities, will be the moſt ready in practice, eſpecially where the required arc is but ſmall; though the ſeries ariſing from the firſt form, always, converges the faſteſt.

If, therefore, $\frac{a^2\dot{t}}{a^2+t^2}$ be now converted into an infinite ſeries, we ſhall have $\dot{z} = \dot{t} - \frac{t^2\dot{t}}{a^2} + \frac{t^4\dot{t}}{a^4} - \frac{t^6\dot{t}}{a^6}$, &c. and conſequently $z = t - \frac{t^3}{3a^2} + \frac{t^5}{5a^4} - \frac{t^7}{7a^6} + \frac{t^9}{9a^8}$, &c. = AR.

Where, if (for example ſake) AR be ſuppoſed an arc of 30 degrees, and AO (to render the operation more eaſy) be put = unity, we ſhall have $t = \sqrt{\frac{1}{3}} = .5773502$, becauſe O$b$ $\sqrt{\frac{3}{4}}$: bR $(\frac{1}{2})$: : OA (1) : AT $(t) = \sqrt{\frac{1}{3}}$) Whence

$t^3 \; (= t \times t^2 = t \times \frac{1}{3}) = .1924500$
$t^5 \; \left(= t^3 \times t^2 = \frac{t^3}{3}\right) = .0641500$
$t^7 \; \left(= t^5 \times t^2 = \frac{t^5}{3}\right) = .0213833$
$t^9 \; \left(= t^7 \times t^2 = \frac{t^7}{3}\right) = .0071277$
$t^{11} \; \left(= t^9 \times t^2 = \frac{t^9}{3}\right) = .0023759$

$t^{13} \; \left(= t^{11} \times t^2 = \frac{t^{11}}{3}\right) = .0007919$
$t^{15} \; \left(= t^{13} \times t^2 = \frac{t^{13}}{3}\right) = .0002639$
&c.

And therefore AR $= .5773502 - \frac{.1924500}{3} + \frac{.0641500}{5} - \frac{.0213833}{7} + \frac{.0071277}{9} - \frac{.0023759}{11} + \frac{.0007919}{13} - \frac{.0002639}{15} + \frac{.0000879}{17} - \frac{.0000293}{19} + \frac{.0000097}{21} - \frac{.0000032}{23} = .5235987$; which multiplied by 6, gives 3.141592 + for the length of the ſemi-periphery of the circle whoſe radius is unity.

VII. *To rectify the common cycloid.* Let the radius AO (*Tab.* III. *Analyſis, fig.* 78.) of the generating ſemicircle be denoted by a, we ſhall have BR $= \sqrt{2ax - x^2}$; and its fluxion $= \frac{a\dot{x} - x\dot{x}}{\sqrt{2ax-x^2}}$, which, being added to $\frac{a\dot{x}}{\sqrt{2ax-xx}}$, the fluxion of AR, or its equal RS (given by the preceding article), we thence get $\frac{2a\dot{x} - x\dot{x}}{\sqrt{2ax-x^2}} = \frac{\dot{x} \times \overline{2a-x}}{x^{\frac{1}{2}} \times \overline{2a-x}|^{\frac{1}{2}}} = \frac{\dot{x}}{x^{\frac{1}{2}}} \times \overline{2a-x}|^{\frac{1}{2}}$, for the true fluxion of the ordinate BS of the cycloid. Hence $\dot{z}\,(\sqrt{\dot{x}^2+\dot{y}^2}) = \sqrt{\dot{x}^2 + \frac{\dot{x}^2 \times \overline{2a-x}}{x}} = \dot{x}\sqrt{\frac{2a}{x}} = 2a^{-\frac{1}{2}} \times x^{-\frac{1}{2}}\dot{x}$; and conſequently, by taking the fluent, $z = \overline{2a}|^{\frac{1}{2}} \times \frac{x^{\frac{1}{2}}}{\frac{1}{2}} = 2\sqrt{2ax}$ = the arc AS of the CYCLOID; whence by writing $2a$ for x, the length of the ſemicycloid AM, appears to be equal to twice the diameter AH of its generating ſemicircle. Simpſon's Fluxions, vol. i. ſect. 8. p. 156, &c. Rowe's Fluxions, p. 158, &c. ed. 3.

RECTIFIED *ſpirits*, &c. are ſuch as have undergone the operation of *rectification*, or have been diſtilled over and over, to ſeparate from them any heterogeneous matter, which might have ariſen with them in the former diſtillations.

Hence, we ſay, ſpirit of wine twice *rectified*, thrice *rectified*, &c.

It is the rectification that makes the difference between brandy and *rectified* SPIRITS of wine.

RECTIFIER, in *Navigation*, is an inſtrument uſed for determining the variation of the compaſs, in order to rectify the ſhip's courſe, &c.

It conſiſts of two circles, either laid upon, or let into one another, and ſo faſtened together in their centres, that they repreſent two compaſſes, the one fixed, the other moveable: each is divided into thirty-two points of the compaſs, and three hundred and ſixty degrees, and numbered both ways, from the north and the ſouth, ending at the eaſt and weſt in ninety degrees.

The fixed compaſs repreſents the horizon, in which the north, and all the other points, are liable to variation.

In the centre of the moveable compaſs is faſtened a ſilk thread, long enough to reach the outſide of the fixed compaſs: but if the inſtrument be made of wood, an index is uſed, inſtead of the thread.

RECTIFIER, in the *Diſtillery*, the perſon whoſe employment is to take the coarſe malt-ſpirit of the malt-ſtiller, and re-diſtil it to a finer and better liquor. The art of the *rectifier* might be entirely ſet aſide, if the malt-ſtiller could make his ſpirit perfect at a ſecond operation; which ſeems very practicable, if the malt-ſtillers could be got to forſake their old track. The great things to be recommended for the improvement of their art, would be, firſt, the brewing in perfection; and ſecondly, the keeping their waſh after the manner of ſtale beer, till it has entirely loſt its malt flavour, and acquired a pungent acid vinoſity; and then, thirdly, leaving out the lees, to diſtil with a well-regulated fire. It is ſcarce to be thought how pure a ſpirit is to be obtained from malt this way; but the great art would be, the finding a way to make malt liquors artificially ſtale, bright, and flavourleſs, though otherwiſe vinous. Shaw's Lectures, p. 223.

RECTIFYING *of curves.* See RECTIFICATION.

RECTIFYING *of the globe* or *ſphere*, is a previous adjuſting of the globe or ſphere, to prepare it for the ſolution of problems. For the method of doing it, ſee *Uſe of the celeſtial* GLOBE.

RECTILINEAR, *right-lined*, in *Geometry*, is applied to figures whoſe perimeter conſiſts of right lines.

RECTILINEAR *angle*, *maps*, and *ſuperficies*. See the ſubſtantives.

RECTITUDE, *rectitudo*, *rectum*, in matters of philoſophy, refers either to the act of judging, or of willing; and therefore, whatever comes under the denomination of *rectitude* is either what is true, or what is good: theſe being the objects about which the mind exerciſes its two faculties of judging and willing.

Rectitude of the mind, conſidered as it judges, i. e. *rectitude* of the faculty of judgment, conſiſts in its agreement and conformity to the nature and reaſon of things, and in its determining and deciding about them according to what their conſtitutions, properties, uſes, &c. really are.

Rectitude of the mind, conſidered as it wills, called alſo *moral rectitude*, or *uprightneſs*, conſiſts in the chooſing and purſuing of thoſe things which the mind, upon due inquiry and attention, clearly perceives to be good; and avoiding thoſe that are evil.

RECTITUDINES, in *Law*, rights, or legal dues, belonging either to God, or man. See RIGHT.

RECTO, in *Law*, a writ uſually called a *writ of right*; of ſo high a nature, that whereas other writs in real action are only to recover the poſſeſſion of the lands, &c. in queſtion, loſt by the plaintiff, or his anceſtor; this aims to recover both the ſeiſin thus loſt, and the property of the thing: ſo that both rights are here pleaded together; that of *property*, and that of *poſſeſſion*.

If a man loſe his cauſe upon this writ, he is without all remedy.

There are two kinds of this writ: *breve magnum de recto*, or *breve de recto patens*, a writ of right patent: and *recto clauſum*, a writ of right cloſe.

The firſt is ſo called, becauſe ſent open. It lies only for him that hath fee-ſimple in the lands ſued for, againſt the tenant of the freehold at leaſt.

Indeed, the writ of right patent is extended, in practice, beyond its original intention; for a writ of right of dower, which lies for the tenant in dower, is patent; and ſo in ſeveral other caſes. Fitzherb.

The writ of right cloſe, called alſo *breve parvum de recto*, is directed to the lord of ancient demeſne, or the bailiff of the king's manors; and lies for thoſe who hold lands and tenements by charter, in fee-ſimple, or in fee-tail, or for term of life, or in dower, if they be ejected out of ſuch lands, or diſſeiſed. In ſuch caſe a man, or his heirs, may ſue out the writ of right cloſe, directed to the lord of ancient demeſne, commanding him to do him right in his court. This is called a writ *ſecundum conſuetudinem manerii*.

RECTO *de advocatione eccleſiæ*, a writ of right, lying where a man has right of advowſon in fee to him, and his heirs; and, the incumbent dying, a ſtranger preſents his clerk to the church; and he, not having brought his action of *quare impedit*, nor *darrein preſentment*, within ſix months, has ſuffered the ſtranger to uſurp upon him. See *Diſturbance of* PATRONAGE.

RECTO *de cuſtodia terræ & hæredis*, a writ which lies for him whoſe tenant dying in his nonage, a ſtranger enters, and takes the body of the heir.

This writ, as to lands holden *in capite*, or by knight's ſervice, is become uſeleſs by the ſtat. 12 Car. II. but not where there is a guardian in ſocage or appointed by the laſt will of the anceſtor.

RECTO *de dote*, a writ of right of dower, which lies for a woman that has received part of a dower, and proceeds to demand the remnant in the ſame town againſt the heir, or his guardian.

RECTO *de dote unde nihil habet*, is a writ of right which lies in caſe where the huſband, having divers lands and tenements, has aſſured no dower to his wife; and ſhe is thereby driven to ſue for her thirds againſt the heir, or his guardian.

RECTO *quando* or *quia dominus remiſit*, a writ of right, which lies in caſe where lands or tenements in the ſignory of any lord, are in demand by a writ of right.

If the lord hold no court, or, at the prayer of the demandant or tenant, ſend his writ to the king's court, to put the cauſe thither for that time; this writ iſſues for the other party, and has its name from the words compriſed, which is the true occaſion thereof.

RECTO *de rationabili parte*, a writ that lies between privies of blood, as brothers in gavel-kind, or ſiſters, or other coparceners, as nephews and nieces, and for land in fee-ſimple.

If a man leaſe his land for life, and afterwards die, leaving iſſue two daughters, and, after, the tenant for life likewiſe dies; the one ſiſter entering on the land, and ſo deforcing the other, the ſiſter ſo deforced ſhall have this writ to recover her part.

RECTO *ſur diſclaimer*, a writ which lies where the lord, in the court of common pleas, does avow upon his tenant, and the tenant diſclaims to hold of him: upon which diſclaimer the lord ſhall have this writ.

RECTO *folio*. See FOLIO.

RECTOR of a pariſh, the PARSON, or he who has the charge or cure of a pariſh church.

If the predial tythes of the pariſh be impropriated, or appropriated, i. e. either in lay hands, or in thoſe of ſome eccleſiaſtical community, then, inſtead of *rector*, the parſon is called VICAR. In England are reckoned 3485 rectories.

The name *rector* denotes him governor, or ruler, *quia tantum jus in eccleſia parochiali habet, quantum prælatus in eccleſia collegiata*.

RECTOR alſo denotes the chief elective officer in ſeveral foreign univerſities, particularly in that of Paris.

RECTOR is alſo uſed in ſeveral convents for the ſuperior, or officer who governs the houſe.

The Jeſuits uſe it for the ſuperiors in ſuch of their houſes as are either ſeminaries, or colleges.

RECTORY, or **RECTORATE**, *rectoria*, a pariſh church, parſonage, or ſpiritual living, with all its rights, glebes, and tythes.

RECTRICES, in *Ornithology*, denote the ſtrong feathers of the tails of birds.

RECTUM, in *Law*. See RECTO.

RECTUM, in our *Old Law Writers*, is alſo uſed for a TRIAL, or accuſation.

Commune **RECTUM**, denotes a trial at law, or in the common courſe of law. *Stare ad rectum*, denotes to ſtand a trial. *Rectum rogare*, to petition the judge to do right.

RECTUM, in *Anatomy*, denotes the third and laſt of the large inteſtines, or guts. See *Tab. Anat.* (*Splanch.*) *fig.* 9. *lit. f.*

It is thus called, becauſe it paſſes ſtraight from the os ſacrum to the anus; without making any turns or circumvolutions, as all the other guts do. See INTESTINES.

RECTUS, in *Anatomy*, a name common to ſeveral muſcles, on account of the ſtraightneſs of the courſe of their fibres, from their origin to their inſertion; having particular denominations from the parts to which they miniſter: ſuch are the *rectus abdominis*, *rectus femoris*, *rectus capitis lateralis*, *major externus*, *minor externus*, *major internus*, *minor internus*, and *rectus palpebræ*.

RECTUS *abdominis*, is a muſcle of the lower belly, which ariſes from the ſternum, and the extremity of the laſt two ribs: and goes ſtraight down the fore-part of the abdomen, to be inſerted in the os pubis. See *Tab. Anat.* (*Myol.*) *fig.* 1. *n.* 47. *fig.* 2. *n.* 28.

It has veins and arteries, which creep on its inſide from the mamillary and epigaſtric veſſels; theſe communicate together, that the blood may return by the mamillary veins, when the paſſage is ſtopped by the epigaſtric, which are compreſſed in women with child.

The *recti abdominis* (for Winſlow deſcribes two muſcles under this appellation) lie near each other, like two large bands from the lower part of the thorax to the os pubis, the linea alba coming between them. Their breadth diminiſhes, and their thickneſs increaſes gradually from above downward. The ſuperior extremity of each of theſe muſcles is fixed to a part of the lower extremity of the ſternum, to the three loweſt true ribs, and to the firſt falſe rib, by the ſame number of digitations, of which that which is fartheſt from the ſternum is the broadeſt.

The body of the muſcle lies in the vagina formed by the aponeuroſis of the broad muſcles of the abdomen: exteriorly it is divided into ſeveral portions, reſembling diſtinct muſcles placed endwiſe, by tranſverſe tendons termed enervations, which commonly are all above the umbilicus, very ſeldom below it, and adhere very cloſely to the vagina. Theſe inſertions are pretty irregular: they do not always penetrate the whole thickneſs of the muſcle; and, in that caſe, they do not at all appear, or but very little, on the inner ſurface. Sometimes thoſe which are ſeen on the ſurface do not run quite croſs the whole breadth of the muſcle. The lower extremity of this muſcle ends in a thin tendon, fixed in the internal labium of the upper edge of the os pubis near the ſymphyſis, and there it touches the tendon of the other *rectus*. Above the umbilicus, theſe muſcles are at ſome diſtance from each other, according to the breadth of the linea alba; but below it they come nearer the linea alba, being there narrower; and near their lower extremity, that line is almoſt entirely hid by their thick edges. Winſlow.

RECTUS *anterior*, or *femoris*, a muſcle called alſo *gracilis anterior*, as long as the os femoris, and lying directly along the fore-ſide of the thigh. The greateſt part of it is fleſhy, and its middle is broader than the two extremities. It has its name *rectus* from the ſtraight diameter in which it lies; and its other, *gracilis*, from its thinneſs and flatneſs. It terminates above by a pretty ſtrong tendon, which is divided into two branches, one ſhort and ſtraight, the other long and bent; the ſhort branch, running up in a ſtraight line, is inſerted in the anterior inferior ſpine of the os ilium. The long branch is inflected backward over the ſupercilium of the acetabulum, and runs in the direction of it from the ſpine, toward the great iſchiatic ſinus: it is ſtrong and flat, adhering very cloſely to the bone, and covered by the orbicular ligament and the glutæus minimus; and, according to the common method of diſſecting, is therefore uſually cut off, and the ſmall branch of the tendon only left obſervable. From hence the muſcle runs down wholly fleſhy, and partly penniform, ſome of its fibres meeting above and ſeparating below. It is narrow at the upper extremity, and grows gradually broader towards the middle, afterwards contracting in the ſame manner, and at the lower extremity of the os femoris ending in a flat tendon. Through its whole courſe it lies between the two vaſti, and covers the crureus; and its inferior tendon is inſerted in the upper edge of the patella, from whence it ſends down a ſmall plane of tendinous fibres, which adhere very cloſely to the convex ſide of that bone, and having reached the great ligament, ſeem to be loſt therein. Winſlow. See *Tab. Anat.* (*Myol.*) *fig.* 1. *n.* 52.

Rectus, *muſculus*, in *Anatomy*, a name given by Fabricius, in his Treatiſe of the Eyes, to the muſcle, which ſerves to elevate the upper eye-lid, called by Cowper and others APERIENS *palpebram*, and by Albinus LEVATOR *palpebræ ſuperioris*.

Rectus *palpebræ*, is a muſcle which lifts up the eye-lid: It ariſes from the bottom of the orbit of the eye, where the optic nerves pierce the cranium; and, paſſing above the ſuperbus, is inſerted by a large tendon into the border of the eye-lid.

Rectus *capitis lateralis*, a pair of ſhort thick fleſhy muſcles, riſing from the ſuperior part of the tranſverſe proceſs of the firſt vertebra of the neck, whence it aſcends, and is inſerted into the os occipitis.

Its uſe is, to move the head laterally towards either ſhoulder: when they act together, being antagoniſts, they keep it ſteady.

Rectus *externus capitis major*, the third of the muſcles of the head, ariſing fleſhy and tendinous from the upper part of the double ſpine of the ſecond vertebra of the neck; and, ſpreading in its aſcent, is inſerted into the poſterior part of the os occipitis, at a ſmall diſtance from the criſta, being a little covered by the obliquus ſuperior. It ſerves to draw the head directly back upon the firſt vertebra.

Rectus *externus minor*, a muſcle ariſing from the hind-part of the firſt vertebra of the neck; and inſerted into the middle of the os occipitis.

It ſerves likewiſe to draw the head directly backwards.

Theſe two muſcles are otherwiſe called *renuentes*.

Rectus *internus capitis major*, or **Rectus** *anticus longus*, a muſcle in ſome degree of a pyramidal figure, lying along the anterior and lateral parts of the vertebræ of the neck, all the way up to the baſis cranii. It is fixed to the anterior parts of the tranſverſe apophyſes of the third, fourth, fifth, and ſixth vertebræ, in a digitated manner; from thence it runs up obliquely inwards, and towards the lateral parts of the bodies of the vertebræ, paſſes on the fore-ſide of the firſt and ſecond, without being inſerted in them; and approaching gradually toward the ſame muſcle on the other ſide, it is inſerted near it in the fore part of the lower ſide of the apophyſis baſilaris, or great apophyſis of the os occipitis. Winſlow.

Rectus *internus minor*, or **Rectus** *capitis anticus brevis*, a ſmall flat muſcle, about the breadth of one finger, ſituated laterally on the part of the body of the firſt vertebra. It is fixed below to the baſis or root of the tranſverſe apophyſis of that vertebra, near the anterior eminence; from thence it runs obliquely upward, and inward, to a tranſverſe impreſſion in the lower ſide of the apophyſis baſilaris of the occipital bone immediately before the condyle on the ſame ſide, being covered by the anticus longus. Winſlow.

Theſe ſerve to nod the head forwards, being antagoniſts to the *rectus externus*, or renuens, on the back of the head; and they are hence alſo called *annuentes*.

Rectus *capitis poſticus major*, in *Anatomy*, a name given by Albinus, in his Hiſtory of the Muſcles, to a muſcle called *magnus rectus capitis* by Winſlow, and deſcribed by Veſalius by the name of the *tertius caput moventium*, and by Spigelius and others under that of *rectus major*.

Rectus *capitis poſticus minor*, a name given by Albinus to a muſcle of the head, called by Riolanus and others *poſticus minor*, and by Winſlow *rectus parvus*. Veſalius has deſcribed it under the name of *quartus caput moventium*.

Rectus *exterior oculi*, in *Anatomy*, a name given by Fabricius and others to one of the muſcles of the eye, called by Riolan and others the *ſuperbus*, and by ſome the *elevator oculi*. It is the *abductor* of Albinus, one of his *quotuor recti*.

Rectus *inferior oculi*, in *Anatomy*, a name given by Fabricius and ſome others, to one of the muſcles of the eye, called by others *humilis*, and by Albinus the *depreſſor*. It is one of the *quatuor recti oculi* of that author.

Rectus *interior oculi*, in *Anatomy*, a name given by Fabricius to one of the muſcles of the eye, called by Molinet the *bibitorius*; and by Cowper, Albinus, and others, the ADDUCTOR *oculi*.

Rectus *ſuperior oculi*, in *Anatomy*, a name given by Fabricius to one of the muſcles of the eye, called the *attollens* by Albinus, and by others the ELEVATOR *oculi* and the *ſuperbus*.

Rectus *in curia*, in *Law*, one who ſtands at the bar, and no man objects any thing againſt him.

When a man hath reverſed the outlawry, and can participate of the benefit of the law, he is ſaid to be *rectus in curia*.

RECUPERATORES, among the Romans, were commiſſioners appointed to take cognizance of private matters in diſpute, between the ſubjects of the ſtate and foreigners, and to take care that the former had juſtice done them.

It came at laſt to be uſed for commiſſioners, to whom the prætor referred the determination of any affair between one ſubject and another.

RECURRENT, *recurrens*, in *Anatomy*, a nerve ariſing from the par vagum, and diſtributing ſeveral branches to the larynx, to aſſiſt in the formation and modulation of the voice; whence it is alſo called the *vocal nerve*.

It has its name *recurrent*, from its reaſcending or running back again from the thorax to the larynx.

There are really two *recurrents*, right and left: the left ariſes from the trunk of the vagum; the right from a plexus thereof, immediately under the clavicle. They both run up along the trachea, to which they impart ſome twigs, and end at laſt in the muſcles of the larynx. Their office appears partly hence, that a dog is not able to bark after they are cut.

RECURRING *ſeries*. See SERIES.

RECURVIROSTRA, in *Ornithology*, a genus of the *grallæ*; the characters of which are, that the bill is long, ſlender, very thin, depreſſed, and bending upwards, whence the name; the feet are palmated, and have three toes. There is only one ſpecies, which is a very remarkable bird, and named *avoſetta* by the Italians.

It is a little larger than the common lapwing, weighing uſually about ten ounces; its beak is three fingers breadth long, very ſlender, black, and flatted, and bending upwards, which is peculiar to it alone; its head is moderately large and very round, and both that and the upper part of the neck is black, but above and beneath each eye is a ſmall white ſpot; its breaſt, belly, and throat are all of a ſnowy whiteneſs, and its back is variegated with black and white; its wings are alſo variegated with black and white; its tail is all white; its legs very long and bluiſh, and naked far above the knees. It is very common in Italy, and is not unfrequently ſeen about the ſhores of England.

In flying, theſe birds carry their necks and long legs quite extended, and make a ſhrill noiſe (*twit*) twice repeated during the whole time; whence they are called by the country people *yelpers*, and ſometimes *picarini*. They feed on worms and inſects ſcooped with their bills out of the ſand, leaving alternate ſemicircular marks after the ſearch for food. They lay two eggs, about the ſize of thoſe of a pigeon, being white tinged with green, and marked with large black ſpots. Ray and Pennant. See *Tab.* IV. *Birds*, Nº 48.

RECUSANTS, perſons who refuſe to acknowledge the king's ſupremacy.

Such are the Roman catholics, who hold the pope to be over him; and are hence called popiſh *recuſants*. See PAPISTS and PREMUNIRE.

RECUSATION, *recuſatio*, an act whereby a judge is deſired to refrain from judging ſome certain cauſe, on account of his relation to one of the parties; or of ſome capital enmity, or the like.

By the French laws, kinſhip within the fourth degree is deemed a legal cauſe of *recuſation*; as alſo the judge's being godfather, &c. of one of the parties.

By the laws of England alſo, in the times of Bracton and Fleta, a judge might be refuſed for good cauſe; but now the law is otherwiſe, and it is held that judges or juſtices cannot be challenged.

RED, in *Phyſics*, one of the ſimple or primary colours of natural bodies, or rather of the rays of light.

The *red* rays are thoſe which are of all rays the leaſt refrangible: hence, as ſir Iſaac Newton ſuppoſes the different degrees of refrangibility to ariſe from the different magnitudes of the luminous particles whereof the rays conſiſt, the *red* rays, or *red* light, is concluded to be that which conſiſts of the largeſt particles. See COLOUR and LIGHT.

Authors diſtinguiſh three general kinds of *red*; one bordering on the blue, as colombine, or dove-colour, purple, and crimſon; another bordering on yellow, as flame-colour and orange; and between theſe extremes is a medium, partaking neither of the one nor the other, which is what we properly call *red*.

Acids generally turn black blue, and violet into *red*; and *red* into yellow, and yellow into a very pale yellow. Alkalis change *red* into violet, or purple; and yellow into feuillemort, or dead leaf-colour.

Terreſtrial and ſulphureous matters become *red* by extreme heat; and ſome, at length, black, as we ſee in brick, *red* bole, *red* chalk, ſlate, &c. All theſe, when vitrified by a burning-glaſs, become black.

Lobſters become *red* by a moderate fire; and by a violent one, black. Mercury and ſulphur mixed and heated over a moderate fire, make a beautiful *red*, called *artificial cinnabar*.

An acid ſpirit, as lemon juice, being poured on a blue ſolution of turnſole, turns it into a beautiful *red*. Alkali reſtores it again to its original blue. Filtrating of ſome reddiſh wines takes from them all their *red* colour.

M. De la Hire obſerves, that a very luminous body viewed through a black one, always appears *red*; as when the ſun is ſeen ſhining through a black cloud. He adds, that ſome people who ſee all the other colours perfectly well, yet have no idea of *red*, and only ſee it as black.

RED, in *Dying*, is one of the five ſimple or mother colours of the dyers.

Some reckon ſeven kinds or caſts of *red*; viz. ſcarlet *red*, crimſon *red*, madder *red*, half-grain red, half crimſon *red*, lively orange *red*, and ſcarlet of cochineel. But they may be all reduced to three, according to the three principal drugs which give the colours; which are kermes, cochineel, and madder.

The fine ſcarlet, called *ſcarlet of the Gobelins*, is given with agaric, bran-water, woad, and ſcarlet grain, or kermes. Some dyers add cochineel, and others fenugreek; brightening it with bran-water, agaric, tartar, and turmeric. See KERMES and SCARLET.

Crimſon red is dyed with bran-water, tartar, and meſtique cochineel. See CRIMSON.

Madder red is dyed with madder; to which ſome add realgar, or *red* arſenic; others, common ſalt, or other ſalts, with wheat-flour; or agaric with ſpirit of wine, with galls or turmeric. See MADDER.

The *half-grain* is made with agaric and bran-water, half ſcarlet grain, half madder, and ſometimes turmeric.

The *half-crimſon* is made of half madder, half cochineel.

As to the *lively orange red*, the ſtuff muſt be firſt put in yellow, then in a liquor made of goat's hair (which has been boiled ſeveral times with madder) diſſolved over the fire with certain ſaline liquors, as urine, tartar, &c.

The *ſcarlet of cochineel*, or Dutch ſcarlet, as the French call it, is made with ſtarch, tartar, and cochineel; after firſt boiling it with alum, tartar, ſal gemma, and aqua fortis wherein pewter has been diſſolved.

Beſides theſe ſeven *reds*, which are good and allowed colours, there is alſo a Braſil *red*; which is diſcouraged, as fading eaſily.

Of the ſeven good *reds*, only four have particular caſts, or ſhades; the madder *red*, crimſon *red*, lively orange *red*, and ſcarlet of cochineel.

The caſts or ſhades of crimſon are fleſh colour, peach colour, carnation roſe colour, and apple-tree flower colour. Thoſe of madder are fleſh colour, onion-peel colour, and flame colour. Thoſe of orange are the ſame with thoſe of crimſon. Scarlet, beſides the ſhades of all the reſt, has ſome peculiar to itſelf, as cherry colour, fire colour, &c. See DYING.

RED, in *Painting*. For painting, in oil colours they uſe a *red* called *cinnabar*, or vermilion; and another called *lacca*. See each in its place.

In limning, and freſco, for a violet *red*, inſtead of lacca they uſe *reddle*, a natural earth found in England; for a brown *red*, they uſe burnt *oker*, which is a native yellow earth, made *red* by calcination. It is chiefly brought from Oxfordſhire; and burnt, by thoſe who prepare it, in large ovens. The marks of its goodneſs are brightneſs of colour, an d friable chalky texture, without manifeſting any gritty roughneſs when rubbed betwixt the fingers.

The *common Indian red*, which is of a hue verging to the ſcarlet, is much uſed, on account of its ſtanding and warm though not bright colour, in finer as well as coarſer paintings in oil. It may be prepared by taking of the caput mortuum or oker left in the iron pots after the diſtillation of aqua fortis from nitre and vitriol, two parts; and of the caput mortuum or colcothar left in the long necks after the diſtillation of oil of vitriol, one part; breaking the lumps found among them, and putting them into tubs with a good quantity of water: and having left them to ſtand for a day or two, frequently ſtirring them, then lading off as much water as can be obtained clear from them, and adding a freſh quantity; repeating the ſame treatment till all the ſalts be waſhed out, and the water comes off nearly inſipid. The *red* powder which remains muſt then be waſhed over, and, being freed from the water, laid out to dry. When this is deſigned for nicer purpoſes, it ſhould again be waſhed over in baſons.

The *true Indian red* is a native ochrous earth of a purple colour, brought from the iſland of Ormus, in the Perſian gulf; and called, among the authors on theſe ſubjects, *terra* PERSICA. At preſent it is very rarely to be found; but it is certainly very valuable (there being no other uncompounded purple colour in uſe with oil) as well for the force of its effect, as for the certainty of its ſtanding. In its genuine ſtate, it needs no other preparation than grinding or waſhing over. It may be eaſily diſtinguiſhed from any fictitious kind, by its being more bright than any other oker which can be made ſo purple; and if it be rendered artificially purple by any addition, the fire will ſoon betray it; into which the genuine may be put without any hazard of change.

Venetian red is a native *red* oker (ſee VENETA *bolus*) not much different from the common Indian *red*, but fouler; and may be eaſily prepared, by mixing common *red* oker with the colcothar or caput mortuum taken out of the aqua fortis pots, and waſhed over. As it is generally uſed by the houſe painters in imitations of mahogany, it requires no other preparation than to be well ground with the oil with which it is uſed; but when it is uſed in miniature painting, it ſhould be carefully waſhed over.

RED, in *Heraldry*. See GULES.

RED, in *Coſmetics*, a fucus or paint wherewith the ladies enliven their cheeks and lips.

There are two kinds of *reds*; the one in leaves, called Spaniſh *red*; the other a liquor, which is an extract of a ſcarlet dye.

RED *arſenic*, *chalk*, *deer*, *fiſh*, *ſtar*, *ſtorax*, *tartar*. See the ſubſtantives.

RED, in the *Manufacture of Glaſs*. See *Red* GLASS.

To make a deep *red* in glaſs, the following method is that moſt practiſed by the glaſs-men. Take cryſtal frit twenty pounds, broken pieces of white glaſs one pound, calcined tin two pounds; mix theſe well together, and put them into a pot to melt and purify. When theſe are melted, take ſteel calcined, ſcales of iron from the ſmith's anvil, both powdered very fine, of each an equal quantity; put leiſurely an ounce of this mixed powder to the before mentioned metal; mix all well together, and let them ſtand ſix or eight hours in fuſion to incorporate; take out a proof after this, and if there be too little of the powder, it will appear of a duſky yellow; then more of the powder muſt be added, and then add three quarters of an ounce of calcined braſs, ground to a fine powder; mix them thoroughly together, and the maſs will be of a blood *red*; continue ſtirring the whole together, and frequently taking out proofs of the colour, when is is right, work it immediately, otherwiſe it will loſe its colour and become black. The mouth of the pot muſt in this proceſs be left open, elſe the colour will be loſt. Neri's Art of Glaſs. p. 100.

RED, *blown*, in the *Porcelain Manufacture*, a name given to a peculiarly coloured china ware, of a ſpangled *red*, or to the colour alone that ſpangles it. It is an ornament eaſily introduced into uſe in our own manufactories of porcelain ware, and is done in the following manner. The colour is to be prepared of common copperas, calcined to a *red* colour in a charcoal fire, in a crucible, with another luted on the top of it inverted, and with a hole in its bottom. The ſignal of the calcination being finiſhed, is, when the black clouds ceaſe to come up through the hole, and a fine white thin vapour ariſes in their place. The veſſels are to be then ſuffered to cool, and the *red* matter in them is to be reduced to a fine powder, while the veſſels to be coloured with this are yet wet. The operator is to provide a glaſs pipe, and covering one end of it with a piece of fine gauſe, he is to dip this into the powder, and taking it carefully out, with what little is ſticking to it, he is to blow againſt the veſſel at ſome diſtance from it: thus the fineſt part of the powder only will reach the veſſel, and will be laid on in form of glittering ſpangles, very ſmall, but all diſtinct. This is a ſort of colouring much eſteemed by the Chineſe themſelves, and they have a way of uſing the common blue in the ſame manner; but few of the veſſels, thus painted, come over to us.

Red *breaſt*, in *Ornithology*, the MOTACILLA *rubecula* of Linnæus, a well-known bird; the bill of which is duſky; the forehead, chin, throat, and breaſt are of a deep orange colour; the head, hind part of the neck, the back, and tail are of a deep aſh colour, tinged with green; the wings darker, with the edges inclining to yellow; and the legs and feet duſky. The ſong of this bird is remarkably fine and ſoft, and continues through the greateſt part of the winter, ſpring, and ſummer. Many of the autumnal ſongſters ſeem to be the young cock *red* breaſts of that year. Pennant.

Thompſon, in his Seaſons, Winter, line 246, has admirably deſcribed the annual viſits of this gueſt: and the ancient ballad of The Babes in the Wood, recording the affection of this bird for mankind, is univerſally known.

Red *eye*, *erythrophthalmus*, in *Ichthyology*, the CYPRINUS *erythrophthalmus* of Linnæus, called, by ſome, *rootang*, which, in the German language, ſignifies the ſame. It very much reſembles the common river bream in ſhape, but that it is ſomewhat thicker. The fins are all red, and the whole body of the fiſh is ſtained with a very elegant red, but no part of it ſo much as the iris of the eyes. When the ſcales are off, the body is of a greeniſh hue; and it has a yellow ſpot under the tongue. It much reſembles the river mullet in ſome particulars; but it is of a more beautiful colour, and its eyes are more red. Its largeſt ſize ſeems a foot in length. It is a well-taſted fiſh; and ſpawns in April, under cover of the roots of trees. Ray.

This fiſh is called *rudd* by ſome Engliſh authors; it is alſo called *rutilus latior*, *rubellio fluviatilis*, and *finſcale*. It is very common in many of the rivers of Germany and England; and is in ſeaſon all the year, except in ſpawning time, when the male is ſubject to a great number of white ſpots on its head, and is more rough than at any other ſeaſon. Willughby.

Red *game*, an Engliſh name of a bird, common in the mountainous parts of Yorkſhire, and ſome other of our northern counties. See Gor *cock*.

Red *ink*. See Ink and Printing.

Red *land*, in *Agriculture*, a term much uſed by huſbandmen, to expreſs a ſandy ſoil of a reddiſh hue, interſperſed for the moſt part with pieces of ſand-ſtone of the ſame colour, or ſomewhat deeper.

There are ſeveral varieties of this ſoil, one of which is almoſt entirely made up of ſand; another with an admixture of clay with the ſand, the whole making a looſe loamy earth; and a third full of fragments of a poor ſandy iron ore, and often containing ſhining ſpecks of ſelenitæ.

Red *lead*. See Minium and Lead.

Red *ſhank*, in *Ornithology*, the name of a water bird, called by authors *gallinula erythropus*, and *callidrys*; the SCOLOPAX *calidris* of Linnæus. It is about the ſize of the common plover. The back is of a greyiſh or browniſh green, uſually ſpotted with black; its neck grey, and its throat variegated with black and white; the breaſt is white, with a few looſe ſtreaks of black; the wing-feathers are variegated with black, brown, and white; the bill is two fingers breadth long, ſlender, and ſhaped like the beak of the woodcock; reddiſh at the baſe, and blackiſh lower down; its legs are of a fine beautiful red, and the hinder toe is very ſhort and ſmall. It breeds in the fens and marſhes; is found on moſt of our ſhores; conceals itſelf in winter in the gutters; and is generally found ſingle, or at moſt in pairs. When diſturbed, it flies round its neſt, making a noiſe like a lapwing. It lays four eggs, of a whitiſh colour tinged with olive, and marked with irregular ſpots of black, chiefly on the thicker end. Ray and Pennant. See *Tab.* IV. *Birds*, N° 51.

Red *ſtart*, in *Ornithology*, the Engliſh name of the *ruticilla*, or MOTACILLA *phœnicurus* of Linnæus, a very beautiful bird. The bill and legs of the male are black; the forehead white; the crown of the head, hind part of the neck, and the back, are of a deep blue grey; the cheeks and throat black; the breaſt, rump, and ſides, are red; the two middle feathers of the tail brown, the others red; the wings brown. In the female, the top of the head and back are of a deep aſh colour; the rump and tail of a duller red than thoſe of the male; the chin white; the lower ſide of the neck cinereous; and the breaſt of a paler red.

This bird appears among us only in the ſpring and ſummer, and is obſerved to come over nearly at the ſame time with the nightingale. It is ſo ſhy, that it will forſake its neſt, formed with moſs on the outſide, and hair and feathers within, in hollow trees and the holes of buildings, if the eggs are only touched. It has a very fine ſoft note; and is remarkable for ſhaking its tail, and moving it horizontally as a dog does when fawning. Pennant.

Red *ſtone poll*. See Linnet.

Red *weed*, in *Botany*, a name given to a plant common in Bermudas, and ſome other places; and called, by our firſt travellers to that part of the world, the *Summer Iſland redweed*. Its berry is of a fine red colour, and affords a tincture little inferior to that of cochineal, and poſſeſſing all its virtues in medicine; the only misfortune of this, and ſome other very fine vegetable colours, is, that they fade ſoon. The juice of the fruit of the opuntia, or prickly pear, is as fine a dye as can be procured from the cochineal, but it will not ſtand; the inſect feeding on this, however, we find affords a colour of the ſame nature that will ſtand. The fruit of the *red weed* is in the ſame manner liable to be eaten by inſects as that of the prickly pear; and it is worthy a trial, whether its colour obtained at ſecond hand from thoſe inſects, will not ſtand as well as the cochineal does, and whether the inſects may not be propagated in a ſufficient abundance to ſerve the markets in the ſame manner. Phil. Tranſ. N° 40.

Red *wing*, in *Ornithology*, the name of a bird of the turdus, or thruſh kind, called alſo in ſome places the *wind thruſh*, or *ſwine pipe*; and by Linnæus and others the TURDUS *iliacus*, or *tylas*.

It is a little ſmaller than the common thruſh, and is leſs ſpotted. Its back, neck, and head are of the ſame colour with thoſe of the common thruſh; but its ſides under the wings, and the feathers which line the wings, are of an orange colour, or duſky red; its belly and breaſt are whitiſh, and its throat yellowiſh, with brown ſpots: the wings are of a ſort of cheſnut colour, a little variegated. It feeds on inſects, as worms, and the like; and is a bird of paſſage, coming to us in large flocks about the ſame time with the fieldfare, and leaving us alſo when that bird does. When the *red wing* appears on the coaſt in autumn, it is certain the woodcocks are near. It is not well known where they breed, though ſome have gueſſed it to be in the mountains of Germany and Bohemia. They have a bitteriſh taſte, and are leſs valued than the fieldfare. With us they have a diſagreeable piping note; but in Sweden, during the ſpring, they ſing very finely, perching on the top of ſome tree among the foreſts of maples. They neſt in hedges, and lay ſix bluiſh-green eggs ſpotted with black. Ray and Pennant.

REDANS, or Redant. See Redens.

RED BOOK *of the exchequer (liber rubeus ſcaccarii)* is an ancient record, wherein are regiſtered the names of thoſe that held hands *per baroniam* in king Henry the Second's time. It is a manuſcript volume of ſeveral miſcellany teatiſes, in the keeping of the king's remembrancer, in his office in the exchequer; and hath ſome things (as the number of the hides of land in many of our counties, &c.) relating to the times before the Conqueſt. There is likewiſe an exact collection of the eſcuages under king Henry, Richard II. and king John; and the ceremonies uſed at the coronation of queen Eleanor, wife to king Henry III. &c.

REDDAT. *Precipe quod* Reddat. See Precipe.

REDDENDIS *chartis*. See Chartis.

REDDENDUM, in *Law*, a clauſe in a leaſe, &c. whereby a rent is reſerved to the leſſor.

REDDIDIT *ſe*, is where a man procures bail for himſelf to an action in any court at law, if the party bailed at any time before the return of the ſecond *ſcire facias* againſt the bail, renders himſelf in diſcharge of his bail, they are thereby diſcharged.

REDDITARIUM, an ancient law term for a tarrier, roll, or rental, in which the rents and ſervices of a manor are ſet down.

REDDITION, *redditio*, a ſurrendering or reſtoring. In *Law*, it alſo denotes a judicial acknowledgment that a thing in queſtion belongs to the demandant.

REDDLE, or Ruddle, a ſpecies of MARLE, in *Natural Hiſtory*, the common Engliſh name for the ſubſtance called in Latin *rubrica*, and uſed in painting, and for marking ſheep, &c. There are two kinds of it, a harder and a ſofter.

The firſt or harder kind, is but little in uſe, except among the turners in wood, as it does not mark ſo eaſily, requiring to be firſt wetted, and then preſſed hard upon the ſubſtance to be marked. This is dug in Lincolnſhire, Hampſhire, and Suſſex; and is a hard and dry earth, of a ſomewhat pale red, like the common pale red bricks, and is of a very regular and cloſe texture, and always compoſed of a number of thin laminæ, lying cloſely and evenly on one another. It is of a rough uneven ſurface, adheres firmly to the tongue, is not eaſily broken between the fingers, and ſtains the hands a little; it is of a very aſtringent taſte, and melts pretty readily in the mouth. It is very readily diffuſible in water, mouldering to powder, ſoon after being thrown into it; and makes no efferveſcence with acids.

The ſecond, or ſofter kind, is very common, and put to a number of different uſes. It makes ſimply a very good pale red for the painters, and is very ſerviceable to them in their mixed colours. It is in conſtant uſe in many parts of the kingdom for the marking of ſheep; and when waſhed and ſeparated from its ſandy particles, is, by ſome of our modern druggiſts, ſold under the name of bole armenic.

It is found in many parts of the world: the beſt in England is that from ſeveral parts of Derbyſhire, from whence the colour-ſhops and druggiſts of London are ſupplied; many of the latter thinking this a ſhorter method than the common one of our bole armenic makers, of preparing it from a mixture of tobacco-pipe clay, and the red ochre called Spaniſh brown.

This ſoft, or common *reddle*, is a looſe ponderous earth, of a lax texture, and very friable; and of a pale, but tolerably bright red, of a ſomewhat ſmooth and gloſſy ſurface, ſoft to the touch, adhering firmly to the tongue, eaſily broken between the fingers, and ſtaining the hands. It is of a rough auſtere taſte, very readily breaks, and falls to powder in water, and makes no efferveſcence with aqua fortis. Hill's Hiſt. of Foſſ. p. 48.

Some call *reddle*, *lapis hæmatites*; but the real hæmatites is another thing.

REDEEMABLES, are lands, funds, &c. ſold with a reſervation of the equity of REDEMPTION.

Crown lands are *redeemable* for ever; others only for a certain time.

REDEMISE, in *Law*. See DEMISE.

REDEMPTION, *redemptio*, in *Law*, a faculty or right of re-entering upon lands, &c. that have been ſold, and aſſigned; upon reimburſing the purchaſe-money, with legal coſts.

Bargains wherein the *faculty*, or, as ſome call it, the EQUITY *of redemption*, is reſerved, are only a kind of pignorative contracts.

A certain time is limited, within which the faculty of *redemption* ſhall be exerciſed; and beyond which it ſhall not extend.

REDEMPTION, in *Theology*, denotes the recovery of mankind from ſin and death, by the obedience and ſacrifice of Chriſt, who on this account is called the *Redeemer* of the world. See COVENANT.

REDEMPTIONS, *redemptiones*, in our *Old Law Writers*, denote grievous mulcts impoſed by way of commutation for the head or life of the delinquent.

REDEMPTION *of the national debt*. See FUND.

REDENS, REDANS, or REDANT, in *Fortification*, a kind of work indented in form of the teeth of a ſaw, with ſaliant and re-entering angles; to the end that one part may flank or defend another.

It is alſo called *ſaw work*, and *indented work*. The faces in this flank one another.

Redens are frequently uſed in the fortifying of walls, where it is not neceſſary to be at the expence of building baſtions; as when they ſtand on the ſide of a river, a marſh, the ſea, &c. But the fault of ſuch fortification is, that the beſiegers from one battery may ruin both the ſides of the tenaille or front of a place, and make an aſſault without fear of being enfiladed, ſince the defences are mined.

The parapet of the corridor alſo is frequently *redented*, or carried on by the way of *redens*.

REDHIBITION, *redhibitio*, in the *Civil Law*, an action allowed a buyer, whereby to annul the ſale of ſome moveable, and oblige the ſeller to take it back again, upon the buyers finding it damaged, or that there was ſome perſonal cheat, &c.

The *redhibition*, or *redhibitory action*, has place in ſeveral caſes, in the body of the civil law. If a horſe was ſold that had the glanders, were broken-winded, or foundered, it was a *redhibitory caſe*; and the ſeller might be obliged to take him again within nine days.

REDIMICULUM, among the *Romans*, a girdle, which going about the neck, divided on the breaſt, and paſſing down each ſide, went round, and kept the robe tight to the body.

REDINTEGRATED *medals*. See MEDAL.

REDINTEGRATION, *redintegratio*, in the *Civil Law*, the act of reſtoring a perſon to the enjoyment of a thing whereof he had been illegally diſpoſſeſſed.

In France, where a perſon is deſpoiled of his property, he claims it again by a *redintegrand*, or action of reſtitution. But the *redintegrand* muſt be demanded within a year and a day, otherwiſe it is precluded.

REDINTEGRATION, in *Chemiſtry*, the reſtoring of any mixed body, or matter, whoſe form has been deſtroyed by calcination, corroſion, ſublimation, or the like, to its former nature and conſtitution.

The *redintegration* of mercury is properly called REVIVIFICATION. Mr. Boyle has an expreſs treatiſe on the *redintegration* of ſaltpetre; where he ſhews, that after reducing it by fluxion into fixed nitre, which is next of kin to ſalt of tartar in all its properties, he could preſently *redintegrate* it, by pouring a ſufficient quantity of ſpirit of nitre on it; i. e. he could re-produce true cryſtals of the uſual form and virtue of ſaltpetre.

It is a ſtrong objection againſt the chemical principles, that we cannot *redintegrate* the body they were procured from, by re-mixing them.

This ſeems to argue, that the body did not properly conſiſt of ſuch elements, or that they were not originally contained in it, but were rather produced by the fire.

REDIRE *ad pacem*, in *Law*, is applied to a perſon, whoſe outlawry is reverſed, and who is reſtored to the king's peace.

REDISSEISIN, in *Law*, a diſſeiſin made by him who once before was found and adjudged to have diſſeiſed the ſame man of his lands or tenements; for which there lies a ſpecial writ, called a *writ of rediſſeiſin*. See POST-*diſſeiſin*.

REDMANS, or RADMANS, in Doomſday and other ancient books, are probably the ſame with rod, or rad-knights; viz. men who, by the tenure or cuſtom of their lands, were to ride with, or for, the lord of the manor, about his buſineſs.

REDOUBT, or REDOUTE, *reductus*, in *Fortification*, a ſmall ſquare fort, without any defence but in front, uſed in trenches, lines of circumvallation, contravallation, and approach; as alſo for the lodging of corps de garde, and to defend paſſages. See FORT.

They are uſually figures of three, four, five, or ſix ſides, encompaſſed with a ditch, and a bank of earth, which conſiſts of two parts, called rampart and parapet.

In marſhy grounds, *redoubts* are often made of ſtone-work, for the ſecurity of the neighbourhood; their face conſiſts of from ten to fifteen fathom; the ditch round them from eight to nine feet broad and deep; and their parapets, which are cut into embraſures and merlons, have the ſame thickneſs. See REDUCT.

The inner ſides of ſquare *redoubts* are uſually between the limits of twelve and thirty-two yards; and when they are to be defended by muſketry, the number of men neceſſary to the defence may be thus determined: half the ſide ſquared gives the number of troops; and twice the ſquare root of a given number of men, ſhews the length in yards of the ſide of a ſquare *redoubt* proper to contain them.

To conſtruct a ſquare *redoubt*. Mark out a ſquare, whoſe ſide is adapted to the number of troops allotted for the defence, as A B (*Tab.* VIII. *Fortification*, *fig.* 56.) for the inſide of the rampart. About this ſquare, at the diſtance of ten or twelve feet, deſcribe another ſquare, whoſe ſide C D is the inner boundary of the parapet; make a parapet of about nine or ten feet thick, whoſe outline is the line E F; leave a berm about three or four feet broad, whoſe ſide is G H; and dig a ditch about ſixteen feet wide, and about ſix or ſeven feet deep, which ſhould be rounded before the angles of the *redoubt*. Make the rampart from four feet to nine or ten feet high; let the parapet be ſix or ſeven feet higher, and let the foot-bank be four feet and a half lower than the crown of the parapet. On that ſide moſt ſecure from the enemy, make a bridge acroſs the ditch, and a paſſage through the rampart, about four or five feet broad when the defence is muſketry, about nine or ten feet broad when cannon are to be uſed; and ſhut up the paſſage by a ſtrong gate. If the *redoubt* is to be defended by cannon, both the rampart and parapet ſhould be at leaſt five or ſix feet thicker. In order to make the fire pretty nearly equal on all ſides, and ſufficient for defending the angles of the work, M. Clairac has contrived to cut the inſide of the parapet into notches, whoſe two ſides, of a yard each, are at right angles to one another; and make half-right angles with the ſides of the work; the manner of which, and its defence, are plainly ſhewn in the figure, where the lines with dots at the ends repreſent the fire three different ways from the ſame ſide.

For the method of conſtructing flanked *redoubts*, ſee FORT.

A *detached redoubt* is a kind of work reſembling a ravelin, with flanks, placed beyond the GLACIS; ſuch as B (*Tab.* VII. *Fortification*, *fig.* 41.) They are made in order to occupy ſome ſpot of ground which might be advantageous to the beſiegers; and likewiſe to oblige the enemy to open their trenches farther off than they would otherwiſe do. Their diſtance from the covert-way ought not to exceed a hundred and twenty toiſes, that they may be defended by muſket-ſhot from thence. The gorge *a b* is forty toiſes; the flanks *a c*, *b f*, which are perpendicular to the gorge, ten; and the faces *e d*, *f d*, thirty: the ditch before it is ſix toiſes, ending in ſlopes at both ends; the covert-way, four; the branches of the covert-way about forty-two toiſes long; the faces of the places of arms *y*, *y*, which are perpendicular to the branches, ten; and the other, which is parallel to them, fourteen. The communication from the covert-way to the *redoubt* is five or ſix toiſes wide; and there is a traverſe made juſt at the entrance, and another in the middle when it is pretty long. The parapets of this communication terminate in a ſlope or glacis. Robertſon's Marine Fortif. p. 20, &c. Muller's Fort. p. 43, &c.

Redoubts are alſo ſmall works of the ſame form made in a RAVELIN.

REDRESSING, the rectifying or ſetting any thing ſtraight again.

Trees and other plants have a natural faculty of *redreſſing* themſelves, when, by any external cauſe, they are forced out of the perpendicular. See PERPENDICULARITY.

In the moral ſenſe, to *redreſs* grievances, is to reform or remove them.

To *redreſs* a ſtag, among hunters, is to put him off his changes.

REDSEAR. See IRON.

REDUBBORS, thoſe who buy ſtolen cloaths, &c. and, to the end they may not be known, turn them into ſome other faſhion, &c. See FRIPPERY, and REGRATOR.

REDUCE, in *Chemiſtry*. See REDUCT.

To REDUCE *a place*, in *Military Language*, is to oblige the governor to ſurrender it to the beſiegers by CAPITULATION.

REDUCED *chart*. See CHART.

REDUCING *ſcale*, is a thin broad piece of box, with ſeveral lines and ſcales of equal parts, thereon; for turning chains and links into acres and rods, by inſpection.

It is uſed by ſurveyors, to reduce maps and draughts from one dimenſion into another; it is ſometimes alſo called a *ſurveying* SCALE.

REDUCT, REDUIT, or REDOUBT, a military term, ſignifying an advantageous piece of ground, intrenched and ſeparated from the reſt of the place, camp, &c. for an army, gariſon, &c. to retire to, in caſe of a ſurprize. See DONJON.

REDUCT, in *Building*, a quirk, or little place, taken out of a larger, to make it more uniform and regular; or for ſome other convenience, as for a little cabinet aſide of a chimney, for alcoves, &c.

REDUCT, or REDUX, among *Chemiſts*, is a powder by which calcined metals and minerals are reduced again to their regulus, or pure ſubſtance.

REDUCTION, *reductio*, in the *Schools*, a manner of bringing a term or propoſition, which before was oppoſite to ſome other, to be equivalent to it.

Reduction is effected by the addition or retrenchment of a negative particle. Thus, to *reduce* this propoſition, *no man is an animal*, to be equivalent to its oppoſite, *every man is an animal*, I drop the negative, and ſay, *man is an animal*. After the like manner might the term *every man* be *reduced*, by adding the negative, and ſaying, *there is no man*.

REDUCTION *of propoſitions* is uſed in a more general ſenſe, for any expreſſion of one propoſition, by another propoſition equivalent to it.

To a *reduction*, therefore, there are two propoſitions required, the *reduced*, and the *reducing*; which are conſidered as the extremes thereof, and to be connected in the *reduction*, by means of the particle *that is*; which here has the effect of a copula.

As here, *only animals think*; *that is*, *animals think*, *and nothing beſides animals thinks*. Where the propoſition preceding the particle is *reduced*, and the ſubject of the *reduction*, that following the particle *reduces*, and has the effect of the predicate of the *reduction*; and the particle *that is* acts as a copula, importing, not barely that the propoſition is expreſſed by another, but by another equivalent one, or, as it were, the ſame.

REDUCTION *of ſyllogiſms*, is a regular changing or tranſforming of an imperfect ſyllogiſm into a perfect one. Or, it is a change of a ſyllogiſm in reſpect of form, whereby the neceſſity of the illation, or inference, is made more evident.

Reduction obtains in ſyllogiſms of the ſecond and third figure; as alſo in the indirect modes of the firſt. By it theſe are all brought to the firſt.

There are two kinds of this *reduction*; the one *direct*, or *oſtenſive*, performed merely by a converſion of one or both the premiſes, or by a tranſpoſition thereof; as when *cameſtres* is reduced to *celarent*: the other *indirect*, called *per impoſſibile*, or *ad abſurdum*; whereby the perſon who denies the goodneſs and legitimacy of an imperfect ſyllogiſm, is reduced to aſſert or grant ſomething abſurd and impoſſible, or contradictory to ſome other thing maintained by him.

Suppoſe, e. gr. a perſon granting the premiſes of the following ſyllogiſm, denies the concluſion: *All fraud is prohibited*; *but ſome trading is not prohibited*; *therefore ſome trading is not fraud*. We thus proceed againſt him: if the ſyllogiſm be not good, the antecedent is juſt, but the conſequent falſe; and, therefore, the contrary of the concluſion muſt be true: now I take the contrary of the concluſion, which you thus give, viz. *all trading is fraud*; and of that, with the other premiſe of the former ſyllogiſm, viz. the major, which you likewiſe grant, make a new ſyllogiſm; thus, *all fraud is prohibited*; *all trading is fraud*: *therefore all trading is prohibited*. But this propoſition, *all trading is prohibited*, and the other, *ſome trading is prohibited*, which you granted me in the firſt ſyllogiſm, are contradictories.

REDUCTION, in *Arithmetic*, is the converting of moneys, weights, or meaſures, into the ſame value in other denominations; e. gr. pounds into ſhillings and pence; or ſhillings and pence into pounds.

The *reductions* of the principal monies, coins, weights, and meaſures, ancient and modern, foreign and domeſtic, are found under COIN, WEIGHT, MEASURE, POUND, FOOT, &c.

Reduction is of two kinds: 1. *Deſcending*, when a quantity is to be brought from a higher denomination to a lower.

This is done by conſidering how many of the next leſs denomination are contained in the next greater before, and by that number multiplying the greater.

Thus pounds are reduced into ſhillings, by multiplying by 20; ſhillings into pence, by multiplying by 12; and pence into farthings by multiplying by 4.

Troy pounds are reduced into grains by multiplying by 12, 20, and 24: and avoirdupois hundreds into ounces, by 4, 28, and 16.

2. *Aſcending*, when a lower denomination is to be reduced to a higher.

In order to this the buſineſs is to divide the leaſt by ſo many of its denomination as are contained in the next greater: thus 24720 pence, divided by 12, and the quotient by 20, gives 103 pounds.

If there remain any thing in each diviſion, it is reſpectively either odd pence, or ſhillings: thus, 6713 pence reduced, give 27*l.* 19*s.* 5*d.* cut off the laſt, the reſt are the pounds required.

To expedite the practice, ſeveral compendious ways of *reduction* have been invented. See PRACTICE.

Thus, yards are turned into ells by ſubtracting a fifth; and into ells Flemiſh by adding a fifth. Ells Flemiſh are reduced into yards by ſubtracting a quarter. Ells Flemiſh reduced to ells Engliſh by multiplying by 6, and cutting off the right-hand figure.

Great pounds of ſilk of twenty-four ounces reduced to pounds of ſixteen ounces by adding one half; and pounds of ſixteen ounces into pounds of twenty-four, by ſubtracting one third.

REDUCTION *of fractions*. See FRACTION.

REDUCTION *of equations*, in *Algebra*, is the clearing them from all ſuperfluous quantities, bringing down the quantities to their loweſt terms, and ſeparating the known quantities from the unknown ones, till at length only the unknown quantity is found on one ſide, and known ones on the other.

The *reduction* of an equation is the laſt part of the reſolution of the problem.

The end of all algebraical operations is, to have the unknown letter alone in one member of the equation; and in the other, all the known letters, without any mixture of unknown; for, in this caſe, it is evident the value of the unknown quantity is found.

This *reduction* of equations depends upon a right application of the five following axioms: 1. If equal quantities be added to equal quantities, the ſums of thoſe quantities will be equal. 2. If equal quantities be ſubtracted or taken from equal quantities, the quantities remaining will be equal. 3. If equal quantities be multiplied by equal quantities, their products will be equal. 4. If equal quantities be divided by equal quantities, their quotients will be equal. 5. Quantities that are equal to one and the ſame thing, are alſo equal to one another.

If theſe axioms be well underſtood, the *reduction* of equations will appear very plain, and the operations be eaſily performed.

1. *Reduction* by tranſpoſition is performed by transferring a quantity to the other ſide of the equation with a contrary ſign; or by equal addition, if the quantity be negative; and by equal ſubtraction, if affirmative. Thus

the equation $x - 10 = 40$, is reduced by adding $+ 10$ to each ſide, and the reſult will be the ſame as if $- 10$ had been tranſpoſed to the oppoſite ſide with the contrary ſign; for $x - 10 + 10 = 40 + 10$, is the ſame with $x = 40 + 10$, the $- 10$ and $+ 10$ deſtroying each other. In the ſame manner $x + 10 = 40$, is reduced to $x = 40 - 10$, by tranſpoſing the $+ 10$ with a contrary ſign.

2. *Reduction* is performed by equal multiplication, in caſe there are fractional quantities; for by multiplying every term in the equation by the denominators of the fractions, it will be cleared of fractions: thus by multiplying every term of the equation $\frac{z}{a} = b$ by the denominator a, we ſhall have $z = a b$. Again, if $\frac{z^3 + 3 a^2}{c} + n + a = z + a$; then by multiplying by the denominator c, we ſhall have an equal equation free from fractions, viz. $z^3 + 3 a^2 + c n + a c = c z + a c$, or $z^3 + 3 a^2 + c n = c z$, the $a c$ on each ſide being rejected.

3. By equal diviſion, as in the equation $a x = c$; for by dividing each ſide by a, we ſhall have $x \left(\text{or } \frac{a x}{a}\right) = \frac{c}{a}$. In the ſame manner, in the equation $a z + e z = c b$, by dividing each ſide by $a + e$, we get the equation $z = \frac{c b}{a + e}$.

4. Equations are cleared of ſurd quantities by involution: thus, if the equation be $\sqrt{a} = 6$; then by involution or ſquaring each ſide of the equation, we have the equation $a = 36$. If both ſides be ſimilar ſurds, or of the ſame power, all that we have to do is to reject the radical ſign: thus, for $\sqrt{a} = \sqrt{d + c}$, we write $a = d + c$, rejecting the radical ſign of both.

5. When any ſingle power of the unknown quantity is on one ſide of the equation, evolve or extract the root of both ſides, according as the index of that power denotes, and their roots will be equal. Thus if $z z = 25$, by extracting the root of each ſide we have $z = 5$. In the ſame manner, if $a a a = 27$, their cube roots will be equal, viz. $a = 3$. Or, if any compound power of the unknown quantity be on one ſide of an equation, that hath a true root of its kind; then, by evolving both ſides of the equation, it will be expreſſed in lower terms: for example, $a^2 + 2 b a + b^2 = d^2$, by evolving both ſides, comes out $a + b = d$.

6. A proportion may be converted into an equation, aſſerting the product of the extremes to be equal to that of the means; or any one of the extremes may be made equal to the product of the means divided by the other extreme: thus, if $12 - x : \frac{x}{2} :: 4 : 1$, then $12 - x = 2 x$; and by tranſpoſing the $- x$, we ſhall have $3 x = 12$, and dividing by 3, $x = \frac{12}{3} = 4$, by the preceding rules.

7. If any quantities be found on both ſides of the equation, with the ſame ſign prefixed, they may be taken away from both: thus, for $3 x + b = a + b$, we ſay $3 x = a$. Alſo, if all the quantities of the equation be multiplied or divided by the ſame quantity it may be ſtruck out of them all: thus, if $3 a x + 5 a b = 8 a c$, dividing by a, we have $3 x + 5 b = 8 c$; and tranſpoſing $5 b$ and dividing by 3, we have $x = \frac{8 c - 5 b}{3}$, according to the firſt and third rules.

8. Inſtead of any quantity in an equation, you may ſubſtitute another equal to it: thus, if $3 x + y = 24$, and $y = 9$; then $3 x + 9 = 24$, or $x = \frac{24 - 9}{3} = 5$.

Solution of ſimple equations. 1. After an equation is formed (ſee EQUATION) if you have only one unknown quantity, then, by the preceding rules, bring it to ſtand alone on one ſide, ſo as to have none but known quantities on the other ſide; by which means you will diſcover its value.

Example. A perſon being aſked what was his age, anſpered, that $\frac{3}{4}$ of his age multiplyed by $\frac{1}{12}$ of his age gives a product equal to his age: what was his age? Calling his age x, we ſhall have, by the conditions of the queſtion,

$$\frac{3x}{4} \times \frac{x}{12} = x$$

$$\frac{3x^2}{48} = x$$

and $3 x^2 = 48 x$ by the ſecond rule,

and $3 x = 48$ by the ſeventh rule,

and $x = \frac{48}{3} = 16$ by the third rule.

2. If there are two unknown quantities, then there muſt be two equations ariſing from the conditions of the queſtion; ſuppoſe the quantities x and y. The rule is, to find a value of x or y from each of the equations, and then by putting theſe two values equal to each other, there will ariſe a new equation involving only one unknown quantity, which muſt be reduced by the preceding rules.

Example. Let the ſum of two quantities be s, and their difference d; let s and d be given, and let it be required to find the quantities themſelves.

$$\begin{aligned} x + y &= s \\ x - y &= d \\ \hline x &= s - y \\ x &= d + y \\ s - y &= d + y \\ 2 y &= s - d \\ y &= \frac{s - d}{2} \\ x &= \frac{s + d}{2} \end{aligned}$$

Suppoſe the quantities to be x and y; then, by the queſtion, $x + y = s$, and $x - y = d$; whence $x = s - y = d + y$; and, by tranſpoſition, $2 y = s - d$; ſo that dividing by 2, we have $y = \frac{s - d}{2}$; and by comparing the value of x, viz. $s - y$, we find $x = s - \frac{s + d}{2}$, or $2 x = 2 s - s + d$, and dividing by 2, the value of $x = \frac{s + d}{2}$, as expreſſed in the margin.

3. When in one of the given equations, the unknown quantity is of one dimenſion, and in the other of a higher dimenſion; you muſt find a value of the unknown quantity from that equation where it is of one dimenſion, and then raiſe that value to the power of the unknown quantity in the other equation; and by comparing it, ſo involved, with the value you deduce from that other equation, you will obtain an equation that will have only one unknown quantity and its powers: that is, when you have two equations of different dimenſions, if you cannot reduce the higher to the ſame dimenſion with the lower, you muſt raiſe the lower to the ſame dimenſion with the higher.

Example. The ſum of two quantities, and the difference of their ſquares, being given, to find the quantities themſelves. Suppoſe them to be x and r, their ſum s, and the difference of their ſquares d. Then,

$$\begin{aligned} x + y &= s \\ x^2 - y^2 &= d \\ \hline x &= s - y \\ x^2 &= s^2 - 2 s y + y^2 \\ x^2 &= d + y^2, \text{ whence} \\ d + y^2 &= s^2 - 2 s y + y^2 \\ d &= s^2 - 2 s y \\ 2 s y &= s^2 - d \\ y &= \frac{s^2 - d}{2 s} \end{aligned}$$

$$\text{and } x = s - \frac{s^2 - d}{2 s} = \frac{2 s^2 - s^2 + d}{2 s} = \frac{s^2 + d}{2 s}.$$

4. If there are three unknown quantities, there muſt be three equations in order to determine them, by comparing which you may, in all caſes, find an equation involving only one unknown quantity; which may be reſolved by the rules for *reduction* of equations already mentioned. From three equations involving any three unknown quantities, x, y, and z, to deduce two equations involving only two unknown quantities, the following rule will always ſerve: find three values of x from the three given equations; then, by comparing the firſt and ſecond value, you will find another equation involving only y and z: again, by comparing the firſt and third, you will find another equation involving only y and z: and, laſtly, thoſe equations are to be ſolved by the ſecond direction.

Example. Suppoſe

$$\left.\begin{aligned} x + y + z &= 12 \\ x + 2 y + 3 z &= 20 \\ \frac{x}{3} + \frac{y}{2} + z &= 6 \end{aligned}\right\} \text{then } x = \left\{\begin{aligned} &12 - y - z \\ &20 - 2y - 3 z \\ &18 - \frac{3y}{2} - 3 z \end{aligned}\right. \left\{\begin{aligned} &\text{1ſt} \\ &\text{2d} \\ &\text{3d} \end{aligned}\right\} \text{value.}$$

$$12 - y - z = 20 - 2 y - 3 z$$

$$12 - y - z = 18 - \frac{3 y}{2} - 3 z.$$

Theſe two laſt equations involve only y and z, and are to be reſolved by the ſecond direction. Thus,

$$\left\{\begin{aligned} &2 y - y + 3 z - z = 20 - 12 = 8 \\ &y + 2 z = 8 \end{aligned}\right.$$

$$\left\{\begin{aligned} &36 - 3 y - 6 z = 24 - 2 y - 2 z \\ &12 = y + 4 z \end{aligned}\right.$$

$$\text{whence } y = \left\{\begin{aligned} &8 - 2 z \text{ 1ſt} \\ &12 - 4 z \text{ 2d} \end{aligned}\right\} \text{value.}$$

$$\begin{aligned} \text{and } 8 - 2 z &= 12 - 4 z \\ 2 z &= 12 - 8 = 4 \\ z &= \tfrac{4}{2} = 2 \\ y\,(= 8 - 2 z) &= 4 \\ x\,(= 12 - y - z) &= 6. \end{aligned}$$

This method is general, and will extend to all equations that involve three unknown quantities; but there are often eaſier and ſhorter methods, to deduce an equation involving only one unknown quantity, which are beſt learned from practice. For other examples, ſee EQUATION.

Solution of quadratic equations. In the ſolution of any queſtion, where you have got an equation that involves only one unknown quantity, but involves at the ſame time the ſquare of that quantity, and the product of it multiplied by ſome known quantity; then you have what is called an adfected quadratic equation, which may be reſolved by the following rules: 1. Tranſpoſe all the terms that involve the unknown quantity to one ſide, and the known terms to the other ſide of the equation. 2. If the ſquare of the unknown quantity is multiplied by any coefficient, you are to divide all the terms by that coefficient, that the coefficient of the ſquare of the unknown quantity may be unit. 3. Add to both ſides the ſquare of half the coefficient prefixed to the unknown quantity itſelf, and the ſide of the equation that involves the unknown quantity will then be a complete ſquare. 4 Extract the ſquare root from both ſides of the equation, which you will find, on one ſide, always to be the unknown quantity with half the foreſaid coefficient ſubjoined to it; ſo that by tranſpoſing this half, you may obtain the value of the unknown quantity expreſſed in known terms. Thus, ſuppoſe the quadratic equation to be

$$y^2+ay=b$$

Add the ſquare of $\frac{a}{2}$ to both ſides, $\Big\}$ $y^2+ay+\frac{a^2}{4}=b+\frac{a^2}{4}$

Extract the root $y+\frac{a}{2}=\pm\sqrt{b+\frac{a^2}{4}}$

Tranſpoſe $\frac{a}{2}$, and $y=\sqrt{b+\frac{a^2}{4}}-\frac{a}{2}$.

Here it is to be obſerved, that the ſquare root of any quantity, as $+a^2$, may be $+a$, or $-a$; and hence all quadratic equations admit of two ſolutions. Alſo, ſince the ſquares of all quantities are poſitive, it is evident that the ſquare root of a negative quantity is imaginary, and cannot be aſſigned. However, the following examples will illuſtrate the rules for quadratic equations.

Example 1. The ſum of two quantities is 32, and their product 240; required the quantities themſelves? Suppoſe them to be x and y: then

$x+y=32$; and $x=32-y$

$xy=240$; and $x=\frac{240}{y}$

therefore $32-y=\frac{240}{y}$

and $32y-y^2=240$

tranſpoſe $y^2-32y=-240$

add 16^2, $y^2-32y+256=-240+256$

extract √, $y-16=\pm\sqrt{16}$

and $y=\pm\sqrt{16}+16=20$

$x\,(=32-y)=12$.

Example 2. Three merchants join ſtocks; the ſtock of the firſt was leſs than that of the ſecond by 13*l.* and the ſum of the ſecond and third man's ſtock amounted to 175*l.* In trading they gained 48*l.* more than their whole ſtock was; and the firſt man's ſhare of the gain was 78*l.* required each man's ſtock and ſhare of the gain?

Suppoſe	1	x, y, z to repreſent each man's ſtock
Then	2	$x+y+z=s=$ the whole ſtock
	3	$s+48=$ the whole gain
By the queſtion	4	$x+13=y$
	5	$y+z=175$
$5+x$	6	$x+y+z=175+x$
2, 6	7	$s=175+x$
7, 3	8	$s+48=223+x$
By the queſtion	9	$175+x:223+x::x:78$
9 ×	10	$x^2+223x=78x+13650$
$10-78x$	11	$x^2+145x=13650$
11 □	12	$x^2+145x+5256{,}25=18906{,}25$
12 $\sqrt{}^2$	13	$x+72{,}5=\sqrt{18906{,}25}=137{,}5$
13 − 72, 5	14	$x=137{,}5-72{,}5=65$
14, 4	15	$y=x+13=78$
5, 15	16	$z=175-y=97$
Then	17	$65+78+97+48=288$ the whole gain
And	18	y's gain$=93$*l.* 12*s.* and z's $=116$*l.* 8*s.*

See *Quadratic* EQUATION.

There is another method of reſolving quadratic equations by taking away the ſecond term, in the manner directed under TRANSFORMATION *of equations*: thus, if we ſubſtitute, in the equation $x^2-px+q=0$, $y+\frac{1}{2}p$ for x, we ſhall have $x=\frac{1}{2}p\pm\sqrt{\frac{1}{4}p^2-q}$, which expreſſion agrees with the reſult of the preceding rule.

Solution of cubic equations. The ſecond term of a cubic equation can be taken away, ſo that it may be transformed to this form $x^3 * +qx+r=0$. See TRANSFORMATION *of equations*.

Let us ſuppoſe that $x=a+b$; and $x^3+qx+r=a^3+3a^2b+3ab^2+b^3+qx+r=a^3+3ab\times\overline{a+b}+b^3+qx+r=a^3+3abx+b^3+qx+r=$ (by ſuppoſing $3ab=-q$) $=a^3+b^3+r=0$. But $b=-\frac{q}{3a}$, and $b^3=-\frac{q^3}{27a^3}$, and conſequently $a^3-\frac{q^3}{27a^3}+r=0$; or, $a^6+ra^3=\frac{q^3}{27}$. Suppoſe $a^3=z$, and you have $z^2+rz=\frac{q^3}{27}$; which is a quadratic, the reſolution whereof gives

$$z=-\tfrac{1}{2}r\pm\sqrt{\tfrac{1}{4}r^2+\frac{q^3}{27}}=a^3,\text{ and}$$

$$a=\sqrt[3]{-\tfrac{1}{2}r\pm\sqrt{\tfrac{1}{4}r^2+\frac{q^3}{27}}};\text{ and}$$

$$x=a+b=a-\frac{q}{3a}=\sqrt[3]{-\tfrac{1}{2}r\pm\sqrt{\tfrac{1}{4}r^2+\frac{q^3}{27}}}-\frac{q}{3\times\sqrt[3]{-\tfrac{1}{2}r\pm\sqrt{\tfrac{1}{4}r^2+\frac{q^3}{27}}}}$$

in which expreſſions there are only known quantities. This method is commonly called Cardan's rule. See *Cubic* EQUATION.

Again, any cubic equation may be reduced to this form, and the value of x diſcovered, without exterminating the ſecond term.

$$\left.\begin{array}{l} x^3-3px^2-3qx-2r \\ \qquad\quad +3p^2x-p^3 \\ \qquad\qquad\quad +3pq \end{array}\right\}=0;$$ which, by ſuppoſing $x=z+p$, will be reduced to $x^3 * -3qz-2r=0$, in which the ſecond term is wanting. But, from what is advanced above, it follows that $z=\sqrt[3]{r+\sqrt{r^2-q^3}}+\sqrt[3]{r-\sqrt{r^2-q^3}}=$ (if you ſuppoſe that the cubic root of the binomial $r+\sqrt{r^2-q^3}$ is $m+\sqrt{n}$) $=m+\sqrt{n}+m-\sqrt{n}=2m$. And, ſince $x=z+p$, it follows that $x=p+2m$. But, as the ſquare root of any quantity is twofold, ſo the cubic root is threefold, and can be expreſſed three different ways. See ROOT.

Example. Let it be required to find the roots of the equation $x^3-12x^2+41x-42=0$.

Comparing the coefficients of this equation with thoſe of the general equation, viz.

$$\left.\begin{array}{l} x^3-3px^2\left.\begin{array}{l}-3q\\+3p^2\end{array}\right\}x\begin{array}{l}-2r\\ \\ -p^3\\+3pq\end{array}\end{array}\right\}=0;$$ you will find $3p=12$, ſo that $p=4$; $3p^2-3q\,(=48-3q)=41$, ſo that $q=\frac{7}{3}$; and $3pq-p^3-2r\,(=-36-2r)=-42$, ſo that $r=3$. And conſequently $r^2-q^3=9-\frac{343}{27}=-\frac{100}{27}$, and $r+\sqrt{r^2-q^3}=3+\sqrt{-\frac{100}{27}}$. Now the cube root of this binomial is found to be $-1+\sqrt[2]{-\frac{4}{3}}\,(=m+\sqrt{n})$; whence,

1. $x=p+2m=4-2=2$.
2. $x=p-m-\sqrt{-3n}=4+1-\sqrt{4}=5-2=3$.
3. $x=p-m+\sqrt{-3n}=5+2=7$.

So that the three roots of the propoſed equation are 2, 3, and 7.

Solution of biquadratic equations. The roots of theſe may be found by reducing them to cubic ones. Thus:

Let the ſecond term be taken away, as directed under TRANSFORMATION *of equations*;

And let the equation that reſults, be $x^4 * +qx^2+rx+s=0$. Suppoſe this biquadratic to be the product of theſe two quadratic equations.

$$\begin{array}{l} x^2+ex+f=0.\\ \underline{x^2-ex+g=0}\\ x^4 * \left.\begin{array}{l}+f\\+g\\-e^2\end{array}\right\}\times x^2\left.\begin{array}{l}+eg\\-ef\end{array}\right\}\times x+fg=0. \end{array}$$

Where e is the coefficient of x in both equations, but affected with contrary ſigns; becauſe when the ſecond term is wanting in an equation, the ſum of the affirmative roots muſt be equal to the ſum of the negative.

Compare now the propoſed equation with the above product, and the reſpective terms put equal to each other, will give $f+g-e^2=q$, $eg-ef=r$, and $fg=s$. Whence it follows, that $f+g=q+e^2$, and $g-f=\frac{r}{e}$; and conſequently, $f+g+g-f\ (=2g) = q+e^2+\frac{r}{e}$ and $g=\frac{q+e^2+\frac{r}{e}}{2}$. In the ſame manner you will find, by ſubtraction &c. $f=\frac{q+e^2-\frac{r}{e}}{2}$, and $f\times g\ (=s)=\frac{1}{4}\times\overline{q^2+2qe^2+e^4-\frac{r^2}{e^2}}$; and, multiplying by $4e^2$, and ranging the terms, you have this equation, $e^6+2qe^4+\overline{q^2-4s}\times e^2-r^2=0$. Suppoſe $e^2=y$, and it becomes $y^3+2qy^2+\overline{q^2-4s}\times y-r^2=0$, an equation whoſe roots are to be diſcovered by the method of reſolving cubic equations.

Then the values of y being found, their ſquare roots will give e (ſince $y=e^2$); and having e, you will find f and g, from the equations $f=\frac{q+e^2-\frac{r}{e}}{2}$, and $g=\frac{q+e^2+\frac{r}{e}}{2}$. Laſtly, extracting the roots of the equations $x^2+ex+f=0$, and $x^2-ex+g=0$, you will find the four roots of the biquadratic $x^4 * +qx^2+rx+s=0$; for either $x=-\frac{1}{2}e\pm\sqrt{\frac{1}{4}e^2-f}$, or $x=+\frac{1}{2}e\pm\sqrt{\frac{1}{4}e^2-g}$.

Or you may find the roots of a biquadratic, without taking away the ſecond term. Suppoſe it to be of this form.

$$x^4-4px^3\left.\begin{matrix}-2q\\+4p^2\end{matrix}\right\}x^2\left.\begin{matrix}-8r\\+4pq\end{matrix}\right\}x\left.\begin{matrix}-4s\\+q^2\end{matrix}\right\}=0$$

then the values of x will be

$$\left.\begin{aligned}x&=p-a\pm\sqrt{p^2+q-a^2-\frac{2r}{a}}\\ \text{and } x&=p+a\pm\sqrt{p^2+q-a^2+\frac{2r}{a}}\end{aligned}\right\}$$

where a^2 is equal to the root of the cubic equation

$$y^3\left.\begin{matrix}-p^2\\-q\end{matrix}\right\}y^2\left.\begin{matrix}+2pr\\+s\end{matrix}\right\}y-r^2=0.$$

Every equation has as many roots as the unknown quantity of the firſt term has dimenſions, or as the exponent thereof contains units.

All equations have as many affirmative roots as there are permutations of ſigns; and as many negative roots as there are ſucceſſions of them: thus, in the quadratic $x^2+x-6=0$, there is only one ſucceſſion of ſigns, $++$; and one permutation of them, $+-$; hence the equation has two roots, one affirmative $+2$, and the other negative -3. Alſo in the cubic equation $x^3-3x^2-10x+24=0$, there are two permutations of ſigns, $+-$ and $-+$; and only one ſucceſſion, $--$: hence its roots are found to be two affirmatives, $+2$ and $+4$; and only one negative, -3.

For the methods of approximating to the roots of equations, by means of their limits and ſerieſes, ſee **Approximation** and **Equation**.

See on the ſubject of this article Maclaurin's Algebra, part i. chap. 10, 11, 13. part ii. chap. 8.

Reduction *of intereſt of the public debt*. See **Fund**.

Reduction *of curves*. See **Curve**.

Reduction *of a figure, deſign*, or *draught*, is the making a copy thereof, either larger or ſmaller than the original; ſtill preſerving the form and proportion.

The great uſe of the *proportional* **compasses** is in the *reduction* of figures, &c. whence they are alſo called *compaſſes of reduction*.

There are various methods of reducing figures, &c. the moſt eaſy is by means of the **pentagraph**, or parallelogram; but this has its defects. The beſt and moſt uſual methods of *reduction* are as follow:

To reduce a figure, as ABCDE (*Tab.* III. *Geometry*, *fig.* 81.) *into a leſs compaſs*. About the middle of the figure, as z, pitch on a point; and from this point draw lines to its ſeveral angles A, B, C, &c. then drawing the line *ab* parallel to AB, *bc* parallel to BC, &c. you will have the figure *abcde* ſimilar to ABCDE.

If the figure *abcde* had been required to be enlarged, there needed nothing but to produce the lines from the point beyond the angles, as zD, zC, &c. and to draw lines, viz. DC, CB, &c. parallel to the ſides *dc*, *cb*, &c.

To reduce a figure by the angle of proportion. Suppoſe the figure ABCDE (*fig.* 82.) required to be diminiſhed in the proportion of the line AB to *ab* (*fig.* 83.): draw the indefinite line GH (*fig.* 84.) and, from G to H, ſet off the line AB; on G deſcribe the arch HI; ſet off the line *ab* as a chord on HI, and draw GI. Then with the angle IGH you have all the meaſures of the figure to be drawn. Thus, to lay down the point *c*, take the interval BC, and upon the point G deſcribe the arch KL; alſo on the point G deſcribe MN; and upon *a* with the diſtance MN deſcribe an arch cutting the preceding one in *c*, which will determine the ſide *bc*. And, after the ſame manner, are all the other ſides and angles to be deſcribed.—The ſame proceſs will alſo ſerve to enlarge the figure.

To reduce a figure by a ſcale. Meaſure all the ſides of the figure, e. gr. ABCDE, by a ſcale and lay down the ſame meaſures reſpectively, from a ſmaller ſcale in the proportion required.

To reduce a map, deſign, or figure, by ſquares. Divide the original into little ſquares, and divide a freſh paper of the dimenſions required, into the ſame number of ſquares; which are to be larger or leſs than the former, as the map is to be enlarged or diminiſhed.

This done, in every ſquare of the ſecond figure, draw what you find in its correſpondent one in the firſt.

Reduction *to the ecliptic*, in *Aſtronomy*, is the difference between the argument of latitude, as NP (*Tab. Aſtron. fig.* 26.) and an arch of the ecliptic NR, intercepted between the place of a planet, and the node N.

To find the reduction. The angle of inclination PNR, and the argument of latitude NP, being given, find, by the doctrine of ſpherics, the arch NR, ſubtract NR and NP from each other, the remainder is the *reduction*.

Reduction *into firſt matter*, is a term which alchemiſts uſe when they find their ſubſtances putrefy, and grow black.

Reduction is more particularly uſed for the converting of a dry matter into a liquid, particularly into water; which by the alchemiſts is held the principle of all things.

The *reduction* of metals into their firſt matter, or principles, according to theſe philoſophers, can only be effected by mercury; nothing elſe being able to looſen the fixed ſulphur of metallic bodies, which binds them together.

Reduction, in *Metallurgy*, is the bringing back metalline ſubſtances, which have been changed into ſcoriæ or aſhes, or otherwiſe diveſted of their metallic form, into their natural and original ſtate of metals again. Cramer's Art of Aſſaying, p. 185.

All metals and ſemi-metals may be reduced by proper management, whatever have been their changes, except only zinc, which having been burnt to aſhes, admits of no *reduction*. But the mixture of gold and ſilver was never yet radically diſſolved by any experiment, whatever ſome may have imagined. Even ſome earths will turn into metals by the admixture and intimate union of a phlogiſton, or inflammable principle; but theſe metals never need any ſuch principle to aſſiſt their *reduction*. See **Revivification**.

Reduction, in *Surgery*, denotes an operation whereby a diſlocated, luxated, or fractured bone is reſtored to its former place. *Reduction*, or *repoſition*, is always to be performed before any remedy be applied.

REDUIT, in *Military Affairs*. See **Reduct**.

REDUNDANCY, or **Redundance**, a fault in diſcourſe, conſiſting in the uſe of a ſuperfluity of words.

Words perfectly ſynonymous are *redundant*, and ought to be retrenched. *Redundancy* neceſſarily makes the ſtyle weak and languid. See **Pleonasm**.

REDUNDANT *hyperbola* is a curve of the higher kind, thus called, becauſe it exceeds the conic ſection of that name in the number of its hyperbolic legs; being a triple hyperbola, with ſix hyperbolical legs.

Redundant *interval*, in *Muſic*, is uſed for an interval exceeding the truth by a comma.

Some apply *redundant* to an interval exceeding a diatonic interval by a ſemitone minor; but this is more uſually called a ſuperfluous interval. See **Interval** and **Second**.

REDUPLICATION, in *Rhetoric*, a figure whereby a verſe begins with the ſame word as the preceding one ends with. See **Anadiplosis**.

Reduplication, in *Logic*, is a kind of condition expreſſed in a propoſition, indicating or aſſigning the manner wherein the predicate is attributed to the ſubject.

The uſual *reduplicative* words are, *quatenus*, *as*, *ſo far as*, *conſidered as*, *inaſmuch as*, &c. Hence,

REDUPLICATIVE *propoſitions*, are ſuch wherein the ſubject is repeated, with ſome circumſtance or condition.

Thus, *Men, as men, are rational; kings, as kings, are ſubject to none but God.*

REDUVIA, in *Medicine*, a word uſed by ſome for a whitlow, and by others for a painful crack, or other diſorder about the nails, either of the fingers or toes.

REDUX, in *Chemiſtry*. See REDUCT.

REE, RE, REIS, or RES, a little Portugueſe copper coin, nearly equal to the late French denier Tournois, or to a third part of the Engliſh farthing.

The *ree* is both a current and an imaginary money; the Portugueſe uſually reckoning by *rees*, as the Spaniards by maravedis. See COIN.

REED, *arundo*, in *Botany*, a genus of the *triandria digynia* claſs. Its characters are theſe: it is of the graſs tribe; the flowers grow in ſpikes, and are included in a chaff which is oblong and pointed, and opens with two valves; the petals of the flowers are bivalve, having a down at their baſe, and three hairy ſtamina; in the centre is ſituated an oblong germen, with two ſlender ſtyles; the germen becomes an oblong pointed ſeed, with long down adhering to the baſe. There are ſix ſpecies: the common marſh *reed*; the manured *reed*, or *donax* of Dioſcorides, ſometimes called by gardeners the ever-green *reed*; the Indian variegated *reed* of Theophraſtus, with another ſpecies of bamboe; the reed with a tree-like ſtalk, and leaves pointed at both ends; and the Eaſtern *reed* with a narrow leaf and a full ſtalk, of which the Turks make their writing pens. See BAMBOE, CANE, &c.

The firſt ſort is common by the ſides of rivers and ſtanding waters, and is uſed for making hedges in kitchen gardens, and for other purpoſes. The ſecond ſort, though a native of a warm country, will bear the cold of our ſevereſt winters; and if kept ſupplied with water in dry weather will grow ten or twelve feet in the ſame ſummer. The ſtalks of this ſort are brought from Portugal and Spain, and are uſed by the weavers, as alſo to make fiſhing rods. The third ſort is ſuppoſed to be a variety of the ſecond: the two ſorts of bamboe are of great ſervice to the inhabitants of India, who make moſt of their common utenſils with the ſtems of theſe canes, which grow to a prodigious magnitude. See BAMBOE. The leaves of the fourth ſort make part of the package of tea cheſts, being faſtened together ſo as to form a kind of mat. The fifth ſort is rare in Europe, though the moſt common on the coaſt of Malabar.

The root of the *arundo donax* of Dioſcorides, attracts any matter lodged in wounds, if powdered and applied to them with wine; or if it is taken freſh and reduced to powder with an onion, or mixed with honey. Oribas de Morb. Cur. lib. iii. cap. 32. It alſo removes pains ariſing from diſlocation of limbs, and carries off pains in the hips. The green leaves cut and applied, are ſaid to cure the eryſipelas. Poor people boil the flowers in water or in beer, which they mix with honey, and drink, after being filtrated, to cure coughs, oppreſſions of the breaſt, and conſumptions. The ancients made flutes and other muſical inſtruments of the *reed*. James's Med. Dict.

REED, *Barr*, in *Botany*. See SPARGANIUM.

REED, *Indian flowering*, in *Botany*. See CANNA.

REED, *calamus*, likewiſe denotes a Jewiſh meaſure, otherwiſe called CANNA.

REED, in the *Manufactory of Tapeſtry*. See TAPESTRY.

REED, *Ezekiel's*. See EZEKIEL's *reed*.

REED *mace*, in *Botany*. See TYPHA.

REED *ſparrow*, in *Ornithology*. Ser *Reed* SPARROW.

REEDS, in a *Fire-ſhip*, are made up in ſmall bundles of about twelve inches in circumference, cut even at both ends, and tied each with two bands. There are two kinds of them; the long, which are four feet; and the ſhort, which are two feet five inches in length. Some of them are ſingly dipped, i. e. at one end, the reſt are dipped at both ends, in a kettle of melted compoſition. After being immerſed about ſeven or eight inches in this preparation, and then drained, they are ſprinkled over with pulveriſed ſulphur upon a tanned hide. See FIRE-*ſhip*.

REEF (*reef*, Dutch) in *Navigation*, denotes a certain portion of a ſail, comprehended between the top or bottom, and a row of eyelet-holes parallel thereto. The intention of the *reef* is to reduce the ſurface of the ſail in proportion to the increaſe of the wind; for which purpoſe there are ſeveral *reefs* parallel to each other in the ſuperior ſails, whereby they may be ſtill farther diminiſhed, in order to correſpond with the ſeveral degrees of the gale. The top-ſails of ſhips are uſually furniſhed with three *reefs*, parallel to the yard; and there are always three or four *reefs*, parallel to the bottom, on thoſe main-ſails and fore-ſails, which are extended upon booms; a circumſtance common to many of the ſmall veſſels. Falconer.

REEF alſo denotes a chain of rocks, lying near the ſurface of the water.

REEF *band*, in *Sea Language*, a piece of canvaſs, ſewed acroſs the ſail, to ſtrengthen it in the place where the eyelet holes of the *reefs* are formed.

REEFING, in *Sea Language*, the operation of reducing a ſail, by taking in one or more of the *reefs*, which is performed by lines, points, or knittles. The top-ſails are always, and the courſes generally, *reefed* with POINTS, which are flat braided pieces of cordage, whoſe lengths are nearly double the circumference of the yard. Theſe, being inſerted in the eyelet-holes, are fixed in the ſail by means of two knots in the middle, one of which is before, and the other behind the reef-band. In order to reef the top-ſails with greater facility and expedition, they are lowered down, and made to ſhiver in the wind, which conſiderably relaxes their tenſion. The extremities of the reef are then drawn up to the yard-arms by an aſſemblage of pullies communicating with the deck, termed the *reef-tackle*; and they are ſecurely faſtened to the yard-arms by ſmall cords, called EARINGS. The ſpace of ſail, comprehended in the reef, is then laid ſmoothly over the yard, in ſeveral folds or doubles; and the whole is completed by tying the points above the yard, ſo as to bind the reef cloſe up to it. The courſes of large ſhips are reefed either with points or ſmall cords, which are thence called *reef-lines*. In the latter caſe, the line is paſſed ſpirally through the eyelet-holes of the reef, and over the head of the ſail alternately, and afterwards ſtrained as tight as poſſible. It muſt be obſerved, however, that the reef-line is ſometimes paſſed round the yard, and ſometimes only round the head of the ſail; and each of theſe methods has its advocates. But if it ſhould appear eſſential to prevent the friction by which a ſail is galled between the line and the yard, and as the rope-bands are ſufficient to ſuſtain the effort of the ſail, it is better to paſs the line only round the ſail, provided that the turns are inſerted through the roband legs; a circumſtance carefully practiſed by every ſkilful ſailor. The ſame reaſon may be alledged in favour of tying the points of the courſes in the ſame manner; i. e. the after-end of the point ſhould be thruſt forward between the head of the ſail and the yard; and the fore-end of the ſaid point ſhould come aft over the head of the ſail, and alſo under the yard; and thus croſſed over the head of the ſail, the point ſhould be extended, and the two ends brought over the yard; and tied on the upper ſide of it as ſtraight as poſſible.

When a ſail is reefed at the bottom, it is done by KNITTLES, which, being thruſt through the eyelet-holes thereof, are tied firmly about the ſpace of canvas of which the reef is compoſed, and knotted on the lower ſide of the bolt-rope. Theſe knittles are accordingly removed as ſoon as the reef is let out. Falconer.

REEF-*tackle*, is a rope which paſſes from the deck to a block at the top-maſt-head, and thence to another block at the topſail-yard-arm, where it communicates with another rope, called its *pendant*, that runs downwards through a hole in the yard, and is afterwards attached to a cringle, a little below the loweſt reef. It is uſed to pull the ſkirts of the reefs cloſe up to the extremities o the top-ſail yards, in order to lighten the ſail, the weight of which would otherwiſe render it very difficult to perform this operation. Falconer.

REEL, in the *Manufactories*, a machine ſerving for the office of *reeling*.

There are various kinds of *reels*; ſome very ſimple, others very complex. Of the former kinds thoſe moſt in uſe are,

1. A little *reel*, held in the hand, conſiſting of three pieces of wood, the biggeſt and longeſt whereof (which does not exceed a foot and a half in length, and a quarter of an inch in diameter) is traverſed by two other pieces, diſpoſed different ways.

2. The *common reel*, or *windlace*, which turns upon a pivot, and has four flights, traverſed by long pins, or ſticks, whereon the ſkain to be reeled is put; and which are drawn cloſer or opened wider, according to the ſkain.

Other *reels*, uſed in particular arts, are explained under their particular articles; as the *reel* uſed in milling of ſilk, under the article MILLING; and that in the reeling or winding of ſilks, under the article of SILK, &c.

REEL *of the log*, in *Navigation*. See LOG.

REELING, in the *Manufactories*, the winding of thread, ſilk, cotton, or the like, into a ſkain, or upon a bottom, to prevent its entangling.

It is alſo uſed for the charging or diſcharging of bobbins, or quills, to uſe them in the manufacture of different ſtuffs, as thread, ſilk, cotton, &c.

Reeling is performed different ways, and by different engines.

REEMING *irons*, a kind of chiſſels, broader than ordinary, uſed for opening the ſeams of ſhips, before they are caulked.

REEN *moſſa*, a name uſed by ſome for the mountain coralloides, or rein-deer moſs.

RE-ENTERING *angle*, in *Fortification.* See ANGLE, and FORTIFICATION *according to M. Vauban's firſt method.*

RE-ENTRY, in *Law*, the reſuming or retaking that poſſeſſion which any one had lately foregone.

As, if I make a leaſe of land, or tenement, I do thereby forego the poſſeſſion: and if I condition with the leſſee, that, for non-payment of the rent at the day, it ſhall be lawful for me to *re-enter*; this is as much as if I conditioned to take again the lands, &c. into my own hands, and to recover the poſſeſſion by my own act, without the aſſiſtance of judge, or other proceſs.

REER *county.* See RIER.

REEVE, in *Ornithology*, the name of a bird which is the female of the *avis pugnax*; the male of which, from the long feathers round his neck, is called the RUFFE.

REEVE *of a church*, is the guardian of it, or the CHURCH-*warden.*

So *ſhire-reef* is the SHERIFF, or guardian of a county; and *port-reeve*, the warden of a port, or haven.

REEVING, in the *Sea Language*, is the putting a rope through any hole, as the channel of a block, &c. Hence, to pull a rope out of a block, is called *unreeving.*

RE-EXCHANGE, in *Commerce*, a ſecond payment of the price of exchange, or rather the price of a new exchange, due upon a bill of exchange that comes to be proteſted; and to be refunded the bearer, by the drawer or indorſer. See EXCHANGE.

The occaſion of *re-exchange* is, when the bearer of a bill of exchange, after proteſting it, for want either of acceptance, or of payment, borrows money on his own promiſe, bond, or the like; or draws a bill of exchange in the place where the payment was to be made, on the perſon who furniſhed the firſt for which he pays a ſecond exchange; which, being added to the firſt already paid, the drawer of the firſt bill is anſwerable for two exchanges, properly called *exchange*, and *re-exchange.*

The bearer of a proteſted bill has a right to recover both the one and the other on the drawer. Yet the ſimple proteſtation which the bearer makes in the act of proteſt, that he will take up a like ſum at *re-exchange*, for want of his bill being accepted or paid, is not ſufficient to entitle him to demand the reimburſement of his *re-exchange*, unleſs he make it appear, that he has actually taken up money in the place whereon the bill was drawn.

Otherwiſe, the *re-exchange* will only amount to the reſtitution of the firſt exchange, with intereſt, the expences of proteſting, and thoſe of the journey, if there have been any.

If a bill of exchange, payable to the bearer or order, come to be proteſted, the *re-exchange* is only due upon the drawer for the place where the remittance was made, not for thoſe places where it may have been negociated; at leaſt, the drawer has a right to be refunded his *re-exchange* for thoſe places, by the indorſer.

Indeed the *re-exchange* is due from the drawer upon all places where a power of negociation is given by the bill; and upon all others, if the power of negociating be indefinite.

Laſtly, the intereſt of the *re-exchange*, of the expences of the proteſt, and the journey, are only due from the day of the demand.

It is ſuppoſed to be the GIBELINS driven out of Italy by the faction of the Guelphs, and ſheltered at Amſterdam, who firſt eſtabliſhed the cuſtom of *re-exchange*, on pretence of the intereſts, damages, and expences they underwent, when the bills given them for the effects they had been obliged to abandon, were not accepted, but came to be proteſted.

RE-EXTENT, in *Law*, a ſecond extent made upon lands or tenements, on complaint that the former extent was partially made. See EXTENT.

REFECTION, *refectio*, among *Monks* and *Eccleſiaſtics*, a ſpare meal or repaſt, juſt ſufficing for the ſupport of life.

REFECTION is alſo uſed, in *Ancient Authors*, for a duty or ſervice incumbent on any perſon to provide meals for eccleſiaſtics, or even for princes.

REFECTORY, or **REFECTUARY**, *refectorium*, a ſpacious hall in convents, and other communities, where the monks, nuns, &c. take their refections or meals in common.

The *refectory* of the Benedictines of St. George at Venice, deſigned by Palladio, is one of the fineſt in the world. Daviler.

REFERENCE, in *Writing*, &c. a mark relative to another ſimilar one in the margin, or at the bottom of the page, where ſomething, omitted in the text, is added; and which is to be inſerted, either in reading or copying. A copyiſt muſt be very expert at taking *references.*

References are alſo uſed in books, where things being but imperfectly handled, the reader is directed to ſome other part or place where they are more amply explained.

Dictionaries are full of *references* denoted by *ſee*, or *vide.* By means of theſe *references* the dictionary-writer ſettles a correſpondence between the ſeveral parts of his work, and may give his dictionary moſt of the advantages of a continued treatiſe.

Indices or tables are only *references* to the ſeveral parts of the work, where the ſeveral matters are handled.

REFERENDARY, *referendarius*, in *Ancient Cuſtoms*, an officer who exhibited the petitions of the people to the king, and acquainted the judges with his commands.

An officer of this kind, Spelman obſerves, we had in England, in the time of the Saxons. The like office was afterwards diſcharged by others, called maſters of requeſts.

REFINING, the art or act of purifying a thing; or of rendering it finer, clearer, and purer.

Refining is chiefly uſed in ſpeaking of metals, ſugar, and ſalt.

The **REFINING** *of gold* is performed three ways; either with antimony, with ſublimate, or with aqua fortis; which laſt method, much the moſt uſual and leaſt dangerous of the three, is called *departing* or *parting*, the proceſs whereof ſee under DEPART and QUARTATION.

REFINING or **PURIFICATION** *of gold with antimony.* The proceſs for this purpoſe has been already deſcribed under the article ANTIMONY, and need not be repeated. We ſhall here add, that as the antimony is apt to ſwell in this operation, the crucible ought to be large enough to contain thrice the quantity of metal. But as the crucibles are apt to crack, and to be corroded by the ſulphureous matter, Scheffer recommends thoſe which have been ſteeped ſeveral days in linſeed oil; then cleared from the oil, ſo as to remain only of ſuch a degree of moiſtneſs, that ſome borax in fine powder may adhere and ſpread all over the inner ſurface, and afterwards ſet by to dry ſlowly; with ſuch CRUCIBLES, he ſays, he can perform two or three hundred fuſions. It is nevertheleſs adviſable, in a caſe where the veſſel is ſo apt to fail, to take precautions for preſerving its contents, in caſe of ſuch accident; as inſerting it into another crucible, or placing a baſon underneath. The ſeparation of metals from gold in this way is really occaſioned by the ſulphur of the antimony. Sulphur has leſs affinity to the antimonial metal than to ſilver, copper, or the other metals commonly mixed with gold; and accordingly, when antimony and alloyed gold are melted together, the ſulphur of the antimony unites with and ſcorifies the alloy of the gold, while the gold falls to the bottom blended with the metal of the antimony, which laſt may be afterwards diſſipated from it by fire, as in the proceſs. Hence it appears, that this purification of gold is a kind of *dry* PARTING; but it ſucceeds better than the dry parting by ſulphur alone, which being very volatile and inflammable, is in great meaſure diſſipated and conſumed, when it is employed alone, before it can ſeize the metals alloyed with gold.

The ancient chemiſts called antimony the *balneum regis*, or the *balneum ſolis*, and the *lupus metallorum*, from this property which it poſſeſſes of purifying gold. However, it may be obſerved in general, that gold cannot be ſo effectually purified by ſubſtances which operate upon the alloy, and not upon the gold, as by thoſe which act upon the gold itſelf and not on the alloy. A ſmall portion of the gold is commonly retained in the ſulphureous ſcoriæ, together with the ſilver or other metals with which it had been debaſed. The ſcoriæ of the laſt fuſions, in which the ſulphur and metal of the antimony have ſuffered little ſeparation, are therefore to be reſerved for the ſame purpoſes again. From thoſe of the firſt, both the gold and ſilver may be recovered, by keeping them in fuſion in a crucible, and blowing off the antimonial matter in the manner directed for diſſipating it from gold.

REFINING *of gold by means of ſublimate.* The proceſs is begun like that with antimony; i. e. in the ſame furnace, with the ſame coal, the ſame fire, and the ſame crucibles.

The gold being melted in the crucible, they caſt in the ſublimate, not pulveriſed, but only broken in pieces. As to the proportion; to eight ounces of gold to be refined, they put an ounce or ounce and a half, or even two ounces, if the gold be of twenty-two carats; three ounces, if of twenty carats; and four or ſix ounces, if it only be from eighteen to twenty carats. In which laſt caſe, they part the ſublimate into two; putting half at a time with the gold, into a new crucible; which, when the operation is over, leaves the gold from eighteen to twenty-three carats, according to its fineneſs before. After this, they raiſe it farther by the fire, as follows.

The broken ſublimate being put into the crucible with the melted gold, the crucible is immediately covered up to ſmother the mineral; which done, the furnace is filled with charcoal, and the head put on. A quarter of an hour afterwards they take off the head, lay the crucible bare, and give the gold air, i. e. blow off all the aſhes, and other impurities that may be floating on the liquid gold, with a pair of bellows, the nozzle whereof is crooked.

This they repeat again and again, till all the impurities of the gold being carried off, by virtue of the ſublimate, it be found of a bright glittering colour; after which it is taken out of the crucible, and the gold is caſt into an ingot. In this way ſmall proportions of lead, tin, and other metals may be ſeparated from gold by ſublimate; the marine acid of the ſublimate having leſs affinity to the mercury of the ſublimate than it has to the others, and accordingly parting from the former to join itſelf to the latter.

The method of *refining* by ſublimate, is both more complete and cheaper than that by antimony; but they are both exceedingly dangerous, by reaſon of their ſulphureous and arſenical exhalations; the only difference in their malignity conſiſting in this, that the poiſon of the antimony is ſlower than that of the ſublimate.

REFINING *of gold by aqua regia.* As this compound does not at all diſſolve ſilver, the gold may be extracted by it from a mixture of gold and ſilver, in the ſame manner as the ſilver is extracted by aqua fortis; and as the extraction of the ſilver by aqua fortis requires the quantity of ſilver in the mixt to exceed that of the gold, ſo the extraction of the gold by aqua regia requires the gold to exceed the ſilver; the two metals may be ſo proportioned, that neither aqua fortis nor aqua regia ſhall be able to diſſolve either, till an addition is made to the quantity of one or the other metal. When the quantity of gold in the mixt amounts to ſo much as a third part of the ſilver (ſee QUARTATION), aqua fortis leaves always a ſmall portion of the ſilver undiſſolved along with the gold; and in like manner, when the quantity of gold amounts to ſo much as a third of the ſilver, aqua regia leaves a little of the gold undiſſolved along with the ſilver: when either metal is in ſmall proportion, the other appears to be completely extracted by its proper menſtruum.

Aqua regia may be employed to purify gold from platina, ſilver and baſe metals in the following manner. The gold, flatted into thin plates or reduced into grains, is to be put into about thrice its weight of moderately ſtrong aqua fortis, and the veſſel being ſet in a gentle heat, a little ſea-ſalt is to be added; the diſſolution will immediately begin, with a conſiderable effervеſcence, and when the action ceaſes, the addition of a little more ſea-ſalt will renew it; the injection of ſea-ſalt is to be continued, by a little at a time, till the whole of the gold appears to be diſſolved; the quantity of ſalt requiſite is generally about a third of the aqua fortis. The clear part of the ſolution is to be poured off, and the remainder paſſed through a double filter of paper; the undiſſolved matter is to be waſhed two or three times with water in the filter, and this liquor poured to the reſt. For recovering the gold from the ſolution, Cramer directs two methods; diſtilling off the menſtruum, and precipitating the gold by mercury. But in either of theſe ways we cannot be certain of having the gold pure. The purity of the gold is ſecured by precipitation with common green vitriol. The vitriol is to be diſſolved in cold water, the ſolution paſſed through a filter, and added in large quantities to the ſolution of gold; the quantity of vitrol before its diſſolution ſhould be ten or twelve times greater than that of the gold. As the precipitate falls ſlowly, the mixture is to be ſet by for twenty-four hours or more; the liquor then become clear, though of a deep colour, is to be poured off; the browniſh powder at the bottom, boiled in a little aqua fortis, then waſhed with water, and melted with the addition of a little nitre. Gold, thus purified, appears to be perfectly fine, which cannot be obtained by any other known means that can be practiſed in the way of buſineſs: and the proceſs is leſs expenſive than that by aqua fortis. Lewis's Phil. Com. Techn. p. 159, &c. &c.

REFINING *of gold by cæmentation.* See CÆMENTATION.

REFINING *of gold with lead and aſhes,* or *by cupellation.* See ASSAYING and TESTING.

REFINING *gold by ſulphur.* See *Dry* PARTING.

REFINING *gold with vitriolic acid.* See QUARTATION.

REFINING *of ſilver.* There are two ways of *refining* ſilver; the one with lead, the other with ſaltpetre. The beſt and cheapeſt is that with lead; though that with ſaltpetre ſtill obtains in many places, for want of workmen who underſtand the proceſs of the latter; and principally becauſe it is more quick and expeditious than cupellation. For the proceſſes in both theſe methods of *refining* ſilver, ſee SILVER.

REFINING *of copper* is only performed by giving the mineral matter ſeveral lotions before the melting it, and then giving it ſeveral repeated fuſions. See COPPER.

REFINING *of tin* is performed much after the ſame manner as that of copper. See TIN.

Though we may diſtinguiſh two kinds of fineneſs of this metal: the one ariſing from its fuſion; that tin taken firſt out of the furnace wherein it is melted, being always purer than that towards the bottom.

The other kind of fineneſs is that given the tin by adding ſome other metal or mineral to it, to render it more ſonorous, as well as brighter: ſuch is tin with antimony, pewter, &c.

REFINING *of iron* is begun by the melting it. See IRON.

The greater degree of fuſion the mineral has, the more the metal is purified: but this firſt fuſion is not ſufficient. To render the iron malleable, and fit it to endure the file, it muſt be melted a ſecond time in a furnace intermixed with charcoal; a ſtrong blaſt of air being impelled on the ſurface of the metal, by which its fuſion is remarkably promoted. On diſcontinuing the action of the bellows, the iron thickens into a maſs called a *loop*, which is then forged or beaten a long time with large heavy hammers, which are wrought by water. The iron, beat into a thick ſquare, is heated in the fire till ready to melt; and at laſt reduced on the anvil, into bars of ſeveral thickneſſes. A large quantity of vitreous ſcoria ſeparates both in the fuſion and the forging: the rough *caſt* IRON obtained from ſome ores, loſes mote than half its weight in being made into bars.

The more the iron is heated in the fire, and the more it is beaten, whether hot or cold, the finer it always becomes.

Steel is only iron *refined* to a great degree by heating it, with ſome other ingredients, which cloſe up the pores, and heighten the grain thereof.

REFINING *of lead* is performed like that of moſt other imperfect metals, by frequent melting, ſtill ſcumming it before it be cold; and caſting in tallow, and other kinds of fat.

They alſo make eſſays of lead; not to refine it, but to ſee if it be pure, and without mixture of any other metal.

REFINING *of ſugar.* This operation is begun by ſeveral ſtrong lixiviums or leys of lime water and eggs, ſhells and all, mixed and beaten together.

The firſt *refining* is performed in the Caribbees, and other places, where the ſugar-canes are cultivated; and only ſerves to make the brown or coarſe ſugars.

When theſe are imported into Europe, the ſugar-bakers take them up, and refine them farther, by a ſecond operation, or rather a repetition of the firſt.

To render the ſugar very fine, fit for confections, &c. they give it a third *refining*; wherein they only uſe the whites of eggs and their ſhells beaten together, and thrown into the melted ſugar; which is called *clarifying the ſugar*. See SUGAR.

REFINING *of ſalt-petre.* The ſalt being put into an earthen or iron veſſel, as much ſpring-water is poured on it as ſuffices to diſſolve it. The veſſel is then put over a gentle fire; and as ſoon as the water begins to boil, alum powder is thrown into it: the proportion is, one pound of alum to one hundred and twenty-eight pounds of ſalt-petre; and a little vinegar is added. As it boils, the ſcum is to be taken off; and it is to be evaporated till a pellicle appears on it, and then ſet to ſhoot.

For the *refining* of other matters, as *camphor*, *cinnabar*, *ſulphur*, *ſalt*, *borax*, &c. ſee CAMPHOR, CINNABAR, SULPHUR, SALT, &c.

REFITTING, in *Sea Language*, denotes the repairing of any damages which a ſhip may have ſuſtained in her ſails and rigging, by battle or tempeſtuous weather.

REFLECTED *ray.* See RAY.

REFLECTED *viſion.* See REFLEX and VISION.

REFLECTING, or **REFLECTIVE** *dial*, is a ſort of dial, which ſhews the hour by means of a thin piece of looking-glaſs plate, duly placed to caſt the ſun's rays to the top of a cieling, on which the hour-lines are drawn.

REFLECTING *microſcope.* See MICROSCOPE.

REFLECTING *level.* See LEVEL.

REFLECTING *teleſcope.* See TELESCOPE.

REFLECTION, or **REFLEXION**, in *Mechanics*, the return, or regreſſive motion of a moveable, occaſioned by the reſiſtance of a body, which hindered its purſuing its former direction.

It is controverted, whether there be any moment's reſt or interval between the incidence and the *reflection*. For the affirmative ſtand the Peripatetics, and all who conceive the reflected motion to be different from the incident one of the ſame body. The motion of incidence, according to theſe authors, is wholly loſt, and deſtroyed, by the reſiſtance of the obſtacle ſtruck againſt; and the moveable is thus rendered abſolutely quieſcent in the point of contact, till a new motion of *reflection* is produced therein, from a contrary cauſe.

The Carteſians aſſert the negative; abſolutely denying any reſt at all between the incidence and *reflection*: urging, that if the motion were once deſtroyed, though but for a moment, there would be nothing to excite it again; but the body would perſevere in that new ſtate, as much as if it had been at reſt a thouſand years.

Accordingly, Rohault, and others, define *reflexion* to be no other than a change of determination; or a continuation of the former motion in a new direction.

As, ſay they, a pendulum, when arrived at its greateſt ſweep, does not ſtop; ſo a hard body, ſtriking on another hard one, does not reſt, but purſues its motion the contrary way, according to the eſtabliſhed law of nature; and this from the immediate influence or impulſe of the cauſe that firſt moved it. But this doctrine is now generally ſet aſide.

Reflexion is conceived, by the lateſt and beſt authors, as a motion peculiar to elaſtic bodies, whereby, after ſtriking on others which they cannot remove, they recede, or turn back by their elaſtic power.

On this principle, it is aſſerted, that there may be, and is, a period of reſt between the incidence and the *reflexion*; ſince the reflected motion is not a continuation of the other, but a new motion, ariſing from a new cauſe or principle, viz. the power of elaſticity.

It is one of the great laws of *reflection*, that the angle a reflected body makes with the plane of a reflecting obſtacle, is equal to that wherein it ſtruck on that obſtacle. For the ſeveral laws of motion obſerved in the *reflections* of bodies, ſee Percussion.

Reflection *of the rays of light*, in *Optics*, is a motion of the rays, whereby, after impinging on the ſolid parts of bodies, or rather after a very near approach thereto, they recede, or are driven therefrom.

The *reflection* of the rays of light from the ſurfaces of bodies, is the means whereby bodies become viſible.

And the diſpoſition of bodies to reflect this or that kind of rays moſt copiouſly, is the cauſe of their being of this or that colour.

The *reflection* of light from the ſurfaces of mirrors, makes the ſubject of catoptrics.

The *reflection* of light, ſir Iſaac Newton has ſhewn, is not effected by the rays ſtriking on the very parts of the bodies; but by ſome power of the body equally diffuſed throughout its whole ſurface, whereby it acts upon the ray, attracting or impelling it without any immediate contact.

This power he ſhews to be the ſame, whereby, in other circumſtances, the rays are refracted; and whereby they are at firſt emitted from the lucid body.

The arguments he produces to prove this, are as follow.

1. Becauſe the ſurfaces of poliſhed glaſſes, which to the eye appear ſmooth, are yet, in reality, very rugged and uneven (poliſhing being nothing but the grating, ſcratching, and breaking off the coarſer protuberances, by means of ſand, glaſs, putty, tripoli). If the rays of light, therefore, were reflected by ſtriking on the ſolid parts of the glaſs, the *reflections* would never be ſo accurate as we find they are, but the rays would even be as much ſcattered by the moſt poliſhed glaſs, as by the rougheſt. It remains, therefore, a problem how glaſs, poliſhed by fretting ſubſtances, can reflect light ſo regularly as it does; which problem is ſcarce otherwiſe to be ſolved, than by ſaying, that the *reflection* of a ray is effected, not by a ſingle point of the reflecting body, but by ſome power of the whole body, evenly diffuſed all over its ſurface, and by which it acts on a ray without immediate contact: for that the parts of bodies do act upon light at a diſtance, is already ſhewn under the articles Inflection and Light.

2. If the colours, ſeparated by a priſm placed at the entrance of a beam of light into a darkened room, be ſucceſſively caſt on a ſecond priſm placed at a greater diſtance from the former, in ſuch manner as that they all fall alike, or with an equal obliquity, upon it; the ſecond priſm may be ſo inclined to the incident rays, that thoſe, which are of a blue colour, ſhall be all reflected by it; and yet thoſe of a red colour pretty copiouſly tranſmitted. Now, if the *reflection* were cauſed by the parts of the air or glaſs, we would aſk, why, at the ſame obliquity of incidence, the blue ſhould wholly impinge on thoſe parts ſo as to be all reflected; and yet, the red find pores enough to be, in a great meaſure, tranſmitted.

3. Where two glaſſes touch one another, there is no ſenſible *reflection*; and yet we ſee no reaſon why the rays ſhould not impinge on the parts of the glaſs, as much when contiguous to other glaſs, as when contiguous to air.

4. When the top of a water-bubble, by the continual ſubſiding and exhaling of the water, grows very thin, there is ſuch a little, and almoſt inſenſible quantity of light *reflected* from it, that it appears intenſely black; whereas round about that black ſpot, where the water is thicker, the *reflection* is ſo ſtrong, as to make the water ſeem very white. Nor is it only at the leaſt thickneſs of thin plates or bubbles, that there is no manifeſt *reflection*, but at many other thickneſſes gradually greater and greater. For, in one of our author's obſervations, the rays of the ſame colour were, by turns, tranſmitted at one thickneſs, and *reflected* at another thickneſs, for an intermediate number of ſucceſſions: and yet in the ſuperficies of the thinned body, where it is of one thickneſs, there are as many other parts for rays to impinge on, as where it is of any other thickneſs.

5. If the red and blue rays, ſeparated by a priſm, fall ſucceſſively on a thin plate of any pellucid matter, whoſe thickneſs increaſes in continual proportion (ſuch as a plate of air between two glaſſes, the one plane, and the other a little convex) the ſame plate will, in the ſame part, *reflect* all the rays of one colour, and tranſmit all thoſe of the other; but, in different parts, will *reflect* the rays of one and the ſame colour at one thickneſs, and tranſmit them at another; and thus alternately, and *in infinitum*. Now, it can never be imagined, that at one place the rays, which, for inſtance, exhibit a blue colour, ſhould happen to ſtrike on the ſolid parts, and thoſe which exhibit a red, to hit on the void parts of the body; and at another place, where the body is either a little thicker, or a little thinner, that, on the contrary, the blue ſhould hit on the pores, and the red upon the ſolid parts.

6. In the paſſage of light out of glaſs into air, there is a *reflection* as ſtrong as in its paſſage out of air into glaſs, or rather a little ſtronger, and by many degrees ſtronger that in its paſſage out of glaſs into water. Now, it ſeems improbable, that air ſhould have more *reflecting* parts than water or glaſs: but if that ſhould be ſuppoſed, yet it will avail nothing; for the *reflection* is as ſtrong, or ſtronger, when the air is drawn from the glaſs by the air-pump, as when it is adjacent to it. If any ſhould here object, on Deſcartes's hypotheſis, that, though the air be drawn away, there is a ſubtle matter remaining to ſupply its place, which, being of a denſer kind, is better fitted for the *reflection* of light than any other body; beſides that we have elſewhere ſhewn ſuch ſubtle matter to be fictitious, and that, ſuppoſing its exiſtence, and its *reflecting* power, no light could ever have been propagated, but muſt have been all *reflected* back to the lucid body, immediately after it was firſt emitted, the following experiment does evidently convict it of falſity.

7. If light, in its paſſage out of glaſs into air, ſtrike more obliquely than at an angle of forty or forty-one degrees, it is then wholly *reflected*: if leſs obliquely, it is in great meaſure tranſmitted. Now, it is not to be imagined, that light at one degree of obliquity ſhould meet with pores enough in the air to tranſmit the greater part of it, and at another degree ſhould meet with nothing but parts to it *reflect* wholly; eſpecially conſidering, that, in its paſſage out of air into glaſs, how oblique ſoever be its incidence, it finds pores enough in the glaſs to tranſmit a great part of it. If any ſuppoſe, that it is not *reflected* by the air, but by the outmoſt ſuperficial parts of the glaſs, there is ſtill the ſame difficulty: beſides, that ſuch a ſuppoſition is unintelligible, and will alſo appear to be falſe, by applying water behind ſome part of the glaſs, inſtead of air; for ſo in a convenient obliquity of the rays, ſuppoſe of forty-five or forty-ſix degrees, at which they are all *reflected*, where the air is adjacent to the glaſs, they ſhall be in great meaſure tranſmitted where the water is adjacent to it; which argues, that their *reflection* or tranſmiſſion depends on the conſtitution of the air and water behind the glaſs, and not on the ſtriking of the rays upon the parts of the glaſs, the rays not being *reflected* until they have reached the laſt part of the ſurface, and are begun to go out. For if, in going out, they fall upon a ſurface of oil and water, they proceed, the attraction of the glaſs being balanced by an equal force the contrary way, and prevented from having its effect by the attraction of the liquor adhering to it: but if the rays, in paſſing out of this laſt ſurface, fall into a vacuum, which has no attraction, or into air, which has

but little, not enough to counterbalance the effect of the glaſs in this caſe, the attraction of the glaſs draws them back, and *reflects* them.

This will appear ſtill more evident by laying two glaſs priſms, or the object-glaſſes of two teleſcopes, the one plane, and the other a little convex, upon each other, ſo as they may neither touch, nor yet be too far apart; for that light which falls on the hinder ſurface of the firſt glaſs, where the glaſſes are not above $\frac{1}{1000000}$ part of an inch apart, will be tranſmitted through the ſurface and through the air or vacuum between the glaſſes, and will paſs into the ſecond glaſs; but, if the ſecond glaſs be taken away, then the light paſſing out of the ſecond ſurface of the firſt glaſs into the air or vacuum, will not proceed, but will return into the firſt glaſs, and be *reflected*.

Whence it follows, that the rays are drawn back again by ſome force in the firſt glaſs, there being nothing elſe to occaſion their return. And hence too it follows, that the *reflection* is not effected by means of any ſubtle matter contiguous to the hinder ſurface, according to the principles of Deſcartes; ſince that matter ought to *reflect* them when the glaſſes were nearly contiguous, as well as when the ſecond glaſs is quite removed.

Laſtly, if it be aſked, how ſome of the rays come to be *reflected*, and others tranſmitted; and why they are not all alike *reflected*, ſuppoſing the *reflection* owing to the action of the whole ſurface? the ſame great author ſhews, that there are, both in the rays of light, and in the bodies themſelves, certain vibrations (or ſome ſuch property) impreſſed on the rays, by the action either of the luminary that emits them, or of the bodies that *reflect* them; by means whereof it happens that thoſe rays, in that part of their vibration which conſpires with the motion of the parts of the body, enter the body, are refracted and tranſmitted; but thoſe in a contrary part of their vibration are *reflected*.

Add, that every ray of light, in its paſſage through any refracting ſurface, is put into a certain tranſient conſtitution or ſtate, which, in the progreſs of the ray, returns at equal intervals, and diſpoſes the ray, at each return, to be eaſily tranſmitted through the next refracting ſurface; and between each return, to be eaſily *reflected* by it.

Theſe alternate diſpoſitions, which ſir Iſaac Newton calls *fits of eaſy reflection*, and of eaſy *tranſmiſſion*, he accounts for by ſuppoſing, that they are occaſioned by the vibrations of a ſubtle fluid, in which the ray paſſes, which happening to move faſter than the rays, when a ray is in that part of the vibration which conſpires with its motion, it paſſes through; but when in the contrary part of the vibration, it is beat back again: whence every ray is ſucceſſively diſpoſed to be eaſily *reflected*, or eaſily tranſmitted, by every vibration which overtakes it.

He alſo thought that theſe vibrations might be excited by the mutual action and reaction of light, of bodies and of this medium, at the inſtant of *reflection* or refraction: ſo that, in fact, he ſuppoſes two cauſes of this diſpoſition to be *reflected* or tranſmitted, when rays of light arrive at any new ſurface. One of them is the regular vibration of the etherial medium, affecting them through the whole of their progreſs from the luminous body; and the other the tremulous motion, or irregular vibration of the ſame medium at the ſurfaces of bodies, occaſioned by the action and reaction between light and them: for this laſt cauſe can hardly be ſuppoſed to affect the whole etherial medium equally, and produce the regular returns of theſe fits in every ray.

M. Boſcovich ſuppoſes with Newton, that the fits of *reflection* or tranſmiſſion affect the rays themſelves, in the whole of their paſſage from the luminous body, but that they ariſe from an alteration in their form, by means of the elaſticity of their component parts, having been originally driven from the luminous body by a force which acted more ſtrongly on the hinder parts than on the reſt of the maſs, and thereby put them into a vibratory motion. He alſo ſuppoſes, that the intervals of the fits of eaſy *reflection* and tranſmiſſion may be different in different rays on the three following accounts. 1. The rays that are differently refrangible have different velocities, at leaſt after refraction; ſo that, though the fits ſhould return at equal intervals, it will affect different rays in different parts of their progreſs. 2. The unequal action between the points that compoſe the ſame particle of light may make a difference in their oſcillations, at the time of changing their medium. And laſtly, rays coming in different inclinations to the new ſurface, the internal motions of theſe points will be in different directions with reſpect to the ſurface, and conſequently the whole maſs of the medium will act upon all the points differently. Boſcov. Theoria, p. 232.

Upon the whole, ſays Dr. Prieſtley, is it not more probable that the rays of light are tranſmitted from the ſun, with an uniform diſpoſition to be *reflected* or refracted, according to the circumſtances of the bodies on which they impinge; and that the tranſmiſſion of ſome of the rays under the ſame circumſtances, apparently, with others that are *reflected*, is owing to the minute vibrations of the ſmall parts of the ſurfaces of the mediums through which the rays paſs; vibrations that are independent of action and re-action between the bodies and the particles of light at the time of their impinging, though, probably, excited by the action of preceding rays. As to the tranſmiſſion or *reflection* of certain kinds of light only, producing colours in thin plates, the cauſe may be this; viz. that every particle of the medium has a great number of equal alternate intervals of attraction and repulſion, relatively to the particles of light; but that theſe intervals are of different magnitudes, according as the particles of light are of different colours. Now if the thickneſs of any tranſparent medium in which the particles of matter are uniformly placed is ſuch, that the attracting intervals of the extreme particles, as well as the repelling intervals, coincide with one another, i. e. attracting with attracting, and repelling with repelling, in regard to any one kind of rays, e. g. the red; by the united force of theſe extremes (all the intermediate particles of the medium mutually deſtroying each other's effects) theſe rays will be *reflected*. But where the plate is of an intermediate thickneſs between this and the next thickneſs, where the attracting intervals coincide, attracting with attracting, and repelling with repelling, the attracting intervals will coincide with the repelling ones, and the repelling ones with the attracting ones, and theſe mutually deſtroying one another's effects, theſe rays will paſs on freely, and be tranſmitted. But as the intervals of attraction and repulſion are different for differently coloured rays, the thickneſs of the plates at which theſe coincidences will, or will not happen, in the differently coloured rays, will be different. So that it appears probable, ſays Dr. Prieſtley, in conformity to a doctrine firſt ſuggeſted to him by Mr. Michell, that the whole myſtery of coloured plates depends upon the attractions and repulſions of the particles of the bodies that compoſe them, affecting different rays in a different manner, according to their thickneſs. Hiſt. &c. of Light and Colours, p. 309, &c. See COLOURS *of thin laminæ*, &c. and RINGS *of colours*.

Sir Iſaac Newton concludes his account of the *reflection* of light with obſerving, that if light be reflected not by impinging on the ſolid parts of bodies, but by ſome other principle, it is probable that as many of its rays as impinge on the ſolid parts of bodies are not reflected, but ſtifled and loſt in the bodies. Otherwiſe, he ſays, we muſt ſuppoſe two kinds of *reflection*; for ſhould all the rays be reflected which impinge on the internal parts of clear water or cryſtal, thoſe ſubſtances would rather have a cloudy colour than a clear tranſparency. To make bodies look black, it is neceſſary that many rays be ſtopped, retained, and loſt in them; and it does not ſeem probable that any rays can be ſtopped and ſtifled in them, which do not impinge on their parts: and hence, he ſays, we may underſtand, that bodies are much more rare and porous than is commonly believed. However, M. Bouguer, diſputes the fact of light being ſtifled or loſt by impinging on the ſolid parts of bodies. See ABSORBING.

REFLECTION, in *Catoptrics*, is the return of a ray of light from the poliſhed ſurface of a ſpeculum or mirror, as driven thence by ſome power reſiding therein.

The ray, thus returned, is called a *reflex*, or *reflected ray*, or a *ray of reflection*; and the point of the ſpeculum, whence the return commences, is called the *point of reflection*.

Thus the ray A B (*Tab.* II. *Optics*, *fig.* 26.) proceeding from the radiant A, and ſtriking on the point of the ſpeculum B, being returned thence to C, B C repreſents the *reflected ray*, and B the *point of reflection*; in reſpect whereof A B repreſents the *incident ray*, or *ray of incidence*, and B the *point of incidence*.

Again, a line C G drawn from any point, as C, of the *reflected* ray B C, perpendicular to the ſpeculum, is called the *cathetus of reflection*, or *cathetus of the eye*: as a line A F, drawn from the radiant perpendicular to the ſpeculum, is called the *cathetus of incidence*.

Of the two angles which the *reflected ray* B C makes with the mirror, the ſmalleſt, C B E, is called the *angle of reflection*: as of the two angles the incident ray makes with the ſpeculum, the ſmalleſt A B D, is called the *angle of incidence*.

If the mirror be either concave or convex, the ſmalleſt angles the ray makes with the tangent to the point of *reflection*

flection and incidence, are the *angles of reflection* and incidence.

The angle C B H, which the *reflected ray* makes with a perpendicular to the point of *reflection*, is called the *inclination of the reflected ray*: as the angle A B H is called the *inclination of the incident ray.*

REFLECTION, *general laws of.*—I. *If a ray of light be reflected from a ſpeculum of any form, the angle of incidence is ever equal to the angle of reflection.* This law obtains in percuſſions of all kinds of bodies; and conſequently muſt do ſo in thoſe of light. See *Laws of* PERCUSSION; ſee alſo ANGLE.

It might therefore be here aſſumed as an axiom: but it is of that importance, and its demonſtration ſo beautiful, that we cannot omit it. Suppoſe, then, D C (*Tab.* V. *Optics*, *fig.* 103.) an incident ray, propagated from the radiant D: here, though the motion of the ray be ſimple, yet its determination in the line D C, being oblique with reſpect to the obſtacle, is really compounded of two determinations; the one along D E, the other along D G.

The force along D C, therefore, is equal to the two forces along D G and D H. But the obſtacle G F only oppoſes one of the determinations; viz. that along D G (for it cannot oppoſe a determination parallel to itſelf, as D E): therefore only the force along D G will be loſt by the ſtroke, that along D H or G C remaining entire. But a body perfectly elaſtic (ſuch as we ſuppoſe the ray of light) will recover, by its elaſticity, the force it loſt by the ſhock.

The ray, therefore, will recover the force D G, or C H: thus, retaining both its forces, and both its former determination H C and C F, after percuſſion, it will be impelled along C F and C H by the ſame forces as before along D H and D G. By its compound motion, therefore, it will deſcribe the right line C E, and that in the ſame time as D C; and H E and D H will be equal as being deſcribed by the ſame force. Now, the two triangles D C H and C H E are equal, and conſequently their ſimilar angles are equal. Since, then, H C A=H C F; D C A, the angle of incidence, is equal to E C F, the angle of *reflection.* *Q. E. D.*

This law is confirmed in light by an eaſy experiment. For a ray of the ſun falling on a mirror, in a dark room, through a little hole, you will have the pleaſure to ſee it rebound, ſo as to make the angle of *reflection* equal to that of incidence. See CAMERA *obſcura.*

The ſame may be ſhewn various other ways: thus, e. gr. placing a ſemicircle F *i* G (*Tab.* II. *Optics*, *fig.* 26.) on a mirror D E, its centre on B, and its limb perpendicular to the ſpeculum; and aſſuming equal arcs, F *a* and G *e*; place an object in A, and the eye in C: then will the object be ſeen by a ray *reflected* from the point B. And if B be covered, the object will ceaſe to be ſeen.

For the concluſions drawn from this general doctrine of *reflection*, ſee *the doctrine of* MIRRORS, &c.

II. *Each point of a ſpeculum reflects rays falling on it, from each part of an object.* See *the doctrine of* MIRRORS, &c.

III. *If the eye* C, *and the radiant point* A *change places, the point will continue to radiate upon the eye, in the ſame courſe or path as before.*

For if the object be removed from A to C, it will ſtill radiate on its former point of *reflection* B; but there can be but one right line drawn between the two points G and D; and the rays are right lines. Therefore that which was before the ray of *reflection*, will now be the ray of incidence, and ſince it will be *reflected* under the ſame angle as that under which it fell, that which was before the ray of incidence, will now be the ray of *reflection.* So that the object removed to C will radiate on the eye placed in A, by the right lines C B and B A. *Q. E. D.*

Hence, an object is ſeen by the *reflected* ray A B, with the eye placed in A, the ſame as if the eye were in C, and the object in A.

The truth of this theorem is ſo eaſily confirmed by experiment, that ſome, with Euclid, aſſume it as a principle; and demonſtrate the great law of *reflection* from it. Thus: ſuppoſe the angle of incidence a little greater than the angle of *reflection*, then will the angle A B F be greater than that C B E. Wherefore, changing the places of the eye and the object, the angle C B E will become the angle of incidence; and therefore C B E greater than A B F by the ſuppoſition. So that the ſame angle A B F will be both greater and ſmaller than the other C B E; which being abſurd, A B F cannot be greater than C B E. The ſame abſurdity will follow, if you ſuppoſe the angle of incidence leſs than the angle of *reflection.* Since then the angle of incidence can neither be greater nor leſs than that of *reflection*, it muſt be equal to it.

IV. *The plane of reflection*, that is, the plane wherein the incident and reflected rays are found, *is perpendicular to the ſurface of the ſpeculum*; *and, in ſpherical ſpecula, it paſſes through the centre.*

Hence the cathetus, both of incidence and *reflection*, is in the plane of *reflection.*

That the *plane of reflection is perpendicular to the ſpeculum*, is aſſumed by Euclid, Alhazen, and others, as a principle, without any demonſtration; as being evident from all obſervation and experiment.

V. *The image of an object ſeen in a mirror is in the cathetus of incidence.* This the ancients aſſumed as a principle; and hence, ſince the image is certainly in the *reflected* ray, they inferred, it muſt appear in the point of concourſe of the *reflected* ray, with the cathetus of incidence; which indeed holds univerſally in plane and ſpherical mirrors, and uſually alſo in concave ones, a few caſes only excepted, as is ſhewn by Kepler.

For the *particular laws of* REFLECTION, *ariſing from the circumſtances of the ſeveral kinds of ſpecula, or mirrors, plane, concave, convex, &c.* ſee them laid down under the article MIRROR.

REFLECTION, *cauſtic by.* See *Cauſtic* CURVE.

REFLECTION, *point of.* See POINT.

REFLECTION *of the moon*, is a term uſed by ſome authors for what we otherwiſe call her VARIATION, being the third inequality in her motion, whereby her true place out of the quadratures differs from her place twice equated. See MOON.

REFLECTION is alſo uſed in the Copernican ſyſtem, for the diſtance of the pole from the horizon of the diſk; which is the ſame thing as the ſun's declination in the Ptolemaic ſyſtem.

REFLECTION is alſo uſed figuratively for an operation of the mind, whereby, turning as it were back upon itſelf, it makes itſelf, and its own operation, its object; and conſiders or contemplates the manner, order, and laws which it obſerves in perceiving, reaſoning, willing, judging, doubting, believing, &c. and frames itſelf new ideas of the relations diſcovered therein.

REFLECTOIRE *curve.* See CURVE *reflectoire.*

REFLEX, REFLECT, in *Painting*, is underſtood of thoſe places in a picture which are ſuppoſed to be illuminated by a light *reflected* from ſome other body repreſented in the ſame piece. See LIGHTS.

Or, *reflexes* may be defined thoſe places which, beſide the general light that illumines the whole piece, receive ſome particular light from their ſituation with reſpect to ſome more illuminated poliſhed body, that reflects part of the rays it receives upon them.

Reflexes are ſcarce ſenſible, except in the ſhadowed parts. The management of the *reflexes* requires great accuracy and ſkill. All reflected light is ſuppoſed to carry with it part of the colour of the body which reflects it; ſo that thoſe places which receive this light, muſt have their colour mixed or tinged with that colour. But the ſame place may receive *reflexes* from different objects, differently coloured, and thoſe again receive *reflexes* from others. The painter, therefore, muſt have a view to every circumſtance of the colour, light, and poſition of each figure; he muſt conſider what effect each has on others, and purſue nature through all the variety of mixtures. See CLAIR-OBSCURE.

REFLEX *viſion*, or REFLECTED *viſion*, is that performed by means of rays reflected from the poliſhed ſurfaces of objects to the eye.

Reflex viſion is the ſubject of catoptrics. Under *reflex viſion* come all the phenomena of ſpecula or mirrors of all kinds.

REFLEXIBILITY *of the rays of light*, is that property whereby they are diſpoſed to be *reflected.* See REFLECTION.

Or, it is their diſpoſition to be turned back into the ſame medium, from any other medium on whoſe ſurface they fall: hence thoſe rays are ſaid to be *more* or *leſs reflexible*, which are returned back more or leſs eaſily under the ſame incidence.

Thus if light paſs out of glaſs into air, and by being inclined more and more to the common ſurface of the glaſs and air, begins at length to be totally reflected by that ſurface, thoſe ſorts of rays which at like incidences are reflected moſt copiouſly, or the rays which by being inclined begin ſooneſt to be totally reflected, are the moſt *reflexible* rays.

That rays of light are of different colours, and endued with different degrees of *reflexibility*, was firſt diſcovered by ſir Iſaac Newton: and is ſhewn by the following experiment. Applying a priſm D F E (*Tab.* V. *Optics*, *fig.* 104.), whoſe angles are each 45°, to the aperture C of a darkened room, in ſuch manner as that the light is reflected from the baſe in G; the violet rays are ſeen firſt reflected into H G; the other rays continuing ſtill refracted in I, K—After the violet the blue are all refracted, the green, &c. See COLOUR. Hence it appears, that the differently coloured rays differ in degree of *reflexibility*.

From the other experiments it appears, that thoſe rays which are moſt *reflexible*, are alſo moſt *refrangible*. See REFRANGIBILITY.

REFLEXION. See REFLECTION.

REFLUX *of the ſea*, the ebbing of the water; or its return from the ſhore. It is thus called, as being the oppoſite motion to the flood, or flux. See TIDE.

REFORM, a re-eſtabliſhment, or revival of former neglected diſcipline; or a correction of ſome reigning abuſes therein.

The term is much uſed in a monaſtic ſenſe, for the reducing an order or congregation of religious to the ancient ſeverity of the rule from which it had gradually ſwerved; or even for the improving on the ancient rule and inſtitution itſelf, and voluntarily making it more ſevere.

In this ſenſe the order of St. Bernard is ſaid to be only a *reform* of that of St. Benedict.

To **REFORM**, in a *Military Senſe*, is to reduce a company, regiment, or other body of men, either by diſbanding the whole, or only breaking a part, and retaining the reſt; or ſometimes by incorporating them with other regiments. Hence,

REFORMADO, or REFORMED *officer*, one whoſe troop or company is ſuppreſſed in a *reform*, and he continued either in whole or half-pay, doing duty in the regiment. A *reformed* captain of foot follows the company, and aſſiſts the ſtanding officer as a ſecond; but he ſtill maintains his degree and precedence.

REFORMATION, *reformatio*, the act of *reforming*, or correcting an error, or abuſe, in religion, diſcipline, or the like.

The *reformation of religion*, called by way of eminence, *the Reformation*, was begun by the elector of Saxony, at the ſolicitation of Luther, about the beginning of the ſixteenth century. See LUTHERANISM.

There were many circumſtances which concurred at this time to bring about that happy *reformation* in religion, which reſcued one part of Europe from the papal yoke, mitigated its rigour in the other, and produced a revolution in the ſentiments of mankind, the greateſt as well as the moſt beneficial that has happened ſince the publication of Chriſtianity. How far the ſale of indulgences, publiſhed by Leo X. contributed to this event, we have already ſhewn under the article LUTHERANISM. We ſhall here obſerve, that the ſame corruptions in the church of Rome which Luther condemned, had been attacked long before his appearance, and the ſame opinions which he propagated had been publiſhed in different places, and ſupported by the ſame arguments. Waldus in the 12th century, Wickliff in the 14th, and Huſs in the 15th, had inveighed againſt the errors of popery with great boldneſs, and confuted them with more ingenuity and learning than could have been expected in thoſe illiterate ages in which they flouriſhed. But all theſe premature attempts towards a *reformation* proved abortive. Many powerful cauſes contributed to facilitate Luther's progreſs, which either did not exiſt, or did not operate with full force in their days; the principal of theſe we ſhall here enumerate. The long and ſcandalous ſchiſm which divided the church, during the latter part of the fourteenth, and the beginning of the fifteenth centuries, had a great effect in diminiſhing the veneration with which the world had been accuſtomed to view the papal dignity. The proceedings of the councils of Conſtance and Baſil ſpread this diſreſpect for the Romiſh ſee ſtill wider, and by their bold exertion of authority in depoſing and electing popes, taught the world that there was in the church a juriſdiction ſuperior even to the papal power, which they had long believed to be ſupreme. The wound given on that occaſion to the papal authority was ſcarcely healed, when the pontificate of Alexander VI. and Julius II. both able princes, but deteſtable eccleſiaſtics, raiſed new ſcandal in Chriſtendom. Beſides, many of the dignified clergy, ſecular as well as regular, neglected the duties of their office, and indulged themſelves, without reſerve, in all the vices to which great wealth and idleneſs naturally give birth: and groſs ignorance and low debauchery rendered the inferior clergy as contemptible as the others were odious. So that we find, long before the ſixteenth century, that many authors of reputation give ſuch deſcription of the diſſolute morals of the clergy, as ſeems almoſt incredible in the preſent age. The ſcandal of theſe crimes, which very generally prevailed, was greatly increaſed by the facility with which ſuch as committed them obtained pardon. The exorbitant wealth of the church, the vaſt perſonal immunities of eccleſiaſtics, and their encroachments on the juriſdiction of the laity, and their various devices to ſecure their uſurpations, created much diſſatisfaction among the people, and diſpoſed them to pay particular attention to the invectives of Luther. Beſides theſe cauſes of his rapid progreſs, we may alſo reckon the invention of the art of printing, about half a century before his time, the revival of learning at the ſame period, and the bold ſpirit of inquiry which it excited in Europe; ſo that many were prepared to embrace his doctrines, who did not really wiſh ſucceſs to his undertaking. In the writings of Reuchlin, Hutter, and the other revivers of learning in Germany, the corruptions of the church of Rome are cenſured with an acrimony of ſtyle little inferior to that of Luther himſelf. The raillery and oblique cenſures of Eraſmus in particular, upon the errors of the church, as well as upon the ignorance and vices of the clergy, prepared the way for Luther's invectives and more direct attacks. To all which we may add, that the theological doctrines of popery were ſo repugnant to the ſpirit of Chriſtianity, and ſo deſtitute of any foundation in reaſon, in the word of God, or in the practice of the church, that this circumſtance combined in favouring the progreſs of Luther's opinions, and in weakening the reſiſtance of his adverſaries.

The riſe of the *reformation* in Switzerland was at leaſt as early as in Germany; for Ulric Zuingle had, in the year 1516, begun to explain the ſcriptures to the people, and to cenſure, though with great prudence and moderation, the errors of a corrupt church. He had very noble and extenſive ideas of a general *reformation*, at the time when Luther retained almoſt the whole ſyſtem of popery, indulgences excepted; and he had actually called in queſtion the authority and ſupremacy of the pope, before the name of Luther was known in that country. In the year 1524, Nuremberg, Francfort, Hamburgh, and ſeveral other cities in Germany, of the firſt rank, openly embraced the reformed religion, and by the authority of their magiſtrates aboliſhed the maſs, and the other ſuperſtitious rites of popery. The elector of Brandenburgh, the dukes of Brunſwick and Lunenburgh, and prince of Anhalt, became avowed patrons of Luther's opinions, and countenanced the preaching of them among their ſubjects. The reformers derived great advantage from the tranſactions of the diet at Nuremberg, which preſented to the pope a catalogue of a hundred grievances, which the empire imputed to the iniquitous dominion of the papal ſee. The progreſs of the *reformation* in Germany was likewiſe promoted by the proceedings of the diet, held at Spire in the years 1526 and 1529. See PROTESTANTS.

During theſe tranſactions in Germany, the dawn of truth aroſe upon other nations. The light of the *reformation* ſpread itſelf far and wide; and almoſt all the European ſtates welcomed its ſalutary beams and exulted in the proſpect of an approaching deliverance from the yoke of ſuperſtition and ſpiritual deſpotiſm. Some of the moſt conſiderable provinces of Europe had already broke their chains, and openly withdrawn themſelves from the diſcipline of Rome and the juriſdiction of its pontiff. The reformed religion was propagated in Sweden, ſoon after Luther's rupture with Rome, by Olaus Petri, one of his diſciples, who was countenanced and encouraged by the valiant and public-ſpirited prince Guſtavus Vaſa Ericſon, to whoſe firmneſs and magnanimity it was owing, that from the year 1527 the papal empire in Sweden was entirely overturned, and Guſtavus declared head of the church. The light of the *reformation* was alſo received in Denmark ſo early as the year 1521, in conſequence of the ardent deſire diſcovered by Chriſtian or Chriſtiern II. for purpoſes of mere ambition, of having his diſciples inſtructed in the doctrines of Luther. His ſucceſſor Frederick, duke of Holſtein and Sileſia, contributed greatly to the progreſs of the *reformation*, by his ſucceſsful attempts in favour of religious liberty, at the aſſembly of ſtates that was held at Odenſee, in the year 1527, when he procured the publication of the famous edict which declared every ſubject of Denmark free, either to adhere to the tenets of the church of Rome, or to embrace the doctrine of Luther; that no perſon ſhould be moleſted on account of his religion; that a royal protection ſhould be granted to the Lutherans; and that eccleſiaſtics of every order ſhould be allowed to marry. But the honour of accompliſhing this glorious work was reſerved for Chriſtiern III. a prince equally diſtinguiſhed by his piety and prudence. The religious doctrine, diſcipline, and worſhip of this kingdom, were ſettled according to a plan laid down by Bugenhagius. And the aſſembly of the ſtates at Odenſee, in 1539, gave a ſolemn ſanction to all theſe tranſactions, and thus the work of *reformation* was brought to perfection in Denmark.

In France, the auſpicious patronage of Margaret, queen of Navarre, ſiſter to Francis I. encouraged ſeveral pious and learned men, whoſe religious ſentiments were the ſame with her own, to propagate the principles of the *reformation*, and even to erect ſeveral proteſtant churches in that kingdom. It appears, that, ſo early as the year 1523, there were many, and even perſons of rank, and ſome of the epiſcopal order, who had conceived the utmoſt averſion both againſt the doctrine and tyranny of Rome. But the wavering and inconſiſtent conduct of Francis I. rendered the ſituation of the proteſtants in this country always precarious, often diſtreſſed. Upon the whole, we may obſerve, that, before the diet of Augſburg, the doctrine of Luther had made a conſiderable, though perhaps a ſecret progreſs in Spain, Hungary, Bohemia, Britain, Poland, and the Netherlands; and had, in all theſe countries, many friends, of whom ſeveral repaired to Wittemberg to improve their knowledge, and enlarge their views under ſuch an eminent maſter. At this diet, held in 1530, the Augſburg or AUGUSTAN *Confeſſion* was preſented to the emperor Charles V. and after many debates between the friends of liberty and the votaries of Rome, the latter prevailed; and the diet, in compliance with the opinion and remonſtrances of Campeggio, the papal nuncio, iſſued a decree, condemning moſt of the peculiar tenets held by the proteſtants; forbidding any perſon to protect or tolerate thoſe who taught them; enjoining a ſtrict obſervance of the eſtabliſhed rites, and prohibiting any farther innovation, under ſevere penalties. Thoſe who refuſed to obey this decree were declared incapable of acting as judges, or of appearing as parties in the imperial chamber, the ſupreme court of judicature in the empire. The proteſtants, alarmed at the ſeverity of the decree, aſſembled at Smalcald, and concluded a league of mutual defence againſt all aggreſſors, by which they formed the proteſtant ſtates of the empire into one regular body; and they reſolved to apply to the kings of England, France, and Denmark, to implore them to aſſiſt and patronize this new confederacy. After various negociations between the emperor and the proteſtant princes, terms of pacification were agreed upon at Nuremberg, and ratified ſolemnly in the diet at Ratiſbon, in the year 1532. In this treaty it was ſtipulated, that univerſal peace be eſtabliſhed in Germany, until the meeting of a general council, the convocation of which, within ſix months, the emperor ſhall endeavour to procure; that no perſon be moleſted on account of religion; that a ſtop be put to all proceſſes begun by the imperial chamber againſt proteſtants, and the ſentences already paſſed to their detriment be declared void. On their part, the proteſtants engaged to aſſiſt the emperor with all their forces in reſiſting the invaſion of the Turks. Thus the proteſtants, by their firmneſs, unanimity, and dexterity in availing themſelves of the emperor's ſituation, obtained terms which amounted almoſt to a toleration of their religion. But neither the emperor nor the pope were diſpoſed to abide by the unbiaſſed ſenſe of a general council, aſſembled, as the proteſtants wiſhed, within the limits of the empire, but determined to decide their religious debates by the force of arms. After many evaſions and delays, it was propoſed, in the year 1545, to aſſemble a council at Trent, which was vigorouſly oppoſed by the proteſtants. The emperor and the pope had mutually agreed to deſtroy all who ſhould dare to oppoſe this council. The meeting of that aſſembly was to ſerve as a ſignal for their taking arms; and accordingly its deliberations were ſcarcely begun, in the year 1546, when the proteſtants perceived undoubted marks of a formidable union to overwhelm and cruſh them by one blow. The fathers aſſembled in the council of Trent, promulgated their decrees; and the proteſtant princes in the diet of Ratiſbon proteſted againſt their authority, and were, in conſequence of this, proſcribed by the emperor, who raiſed an army to reduce them to obedience. Thus commenced the war of Smalcald, which was proſecuted with various ſucceſs on both ſides, till, in the year 1552, Charles was ſurpriſed at Inſpruck by Maurice of Saxony and was conſtrained to conclude at Paſſau the famous treaty of *pacification* with the proteſtants, which is conſidered by thoſe of Germany as the baſis of their religious liberty; and to promiſe in ſix months to aſſemble a diet, in which all the tumults and diſſenſions, that had been occaſioned by a variety of ſentiments in religious matters, ſhould be entirely removed. This diet, though not aſſembled at the ſtipulated time, met, however, at Augſburg, in the year 1555, and terminated thoſe deplorable ſcenes of bloodſhed, deſolation, and diſcord, that had ſo long afflicted both church and ſtate by that *religious peace*, as it is commonly called, which ſecured to the proteſtants the free exerciſe of their religion, and eſtabliſhed this ineſtimable liberty upon the firmeſt foundations. For, after various debates, the following memorable acts were paſſed; that the proteſtants who followed the confeſſion of Augſburg, ſhould for the future be conſidered as entirely exempted from the juriſdiction of the Roman pontiff, and from the authority and ſuperintendance of the biſhops; that they were left at perfect liberty to enact laws for themſelves, relating to their religious ſentiments, diſcipline, and worſhip; that all the inhabitants of the German empire ſhould be allowed to judge for themſelves in religious matters, and to join themſelves to that church whoſe doctrine and worſhip they thought the pureſt and moſt conſonant to the ſpirit of Chriſtianity; and that all thoſe, who ſhould injure or perſecute any perſon under religious pretexts, and on account of their opinions, ſhould be declared, and proceeded againſt, as public enemies of the empire, invaders of its liberty, and diſturbers of its peace.

In the year 1533 Henry VIII. king of England, who, in the beginning of theſe troubles, had oppoſed the doctrine and views of Luther with the utmoſt vehemence, having ſued for a divorce from Catharine of Arragon, his brother's widow, at the court of Rome, for almoſt ſix years, during which period Clement VII. negociated, promiſed, retracted, and concluded nothing, determined to apply to another tribunal for that decree which he had unſucceſsfully ſolicited at Rome. Cranmer, archbiſhop of Canterbury, by a ſentence founded on the authority of univerſities, doctors, and rabbies, who had been conſulted with reſpect to the point, annulled the king's marriage with Catharine; and Anna Boleyn, whoſe charms had captivated the king, was acknowledged as queen of England. Clement, apprehenſive leſt England would revolt from the holy ſee, determined to give Henry ſuch ſatisfaction as might ſtill retain him within the boſom of the church. But the violence of the cardinals precipitated him, in 1534, to iſſue a bull reſcinding Cranmer's ſentence, confirming Henry's marriage with Catharine, and declaring him excommunicated, if, within a time ſpecified, he did not abandon the wife he had taken, and return to her whom he had deſerted. Enraged at this unexpected decree, Henry kept no longer any meaſures with the court of Rome; his ſubjects ſeconded his reſentment; an act of parliament was paſſed, aboliſhing the papal power and juriſdiction in England; by another the king was declared ſupreme head of the church, and all the authority of which the popes were deprived was veſted in him; the MONASTERIES were ſuppreſſed, and their revenues applied to other purpoſes. Henry, however, with the caprice peculiar to his character, continued to defend the doctrines of the Romiſh church as fiercely as he attacked their juriſdiction. He alternately perſecuted the proteſtants for rejecting the former, and the catholics for acknowledging the latter. Nevertheleſs his ſubjects having been encouraged, by his example, to break ſome of their fetters, were ſo impatient to ſhake off all that remained, that in the following reign, under his ſon Edward VI. with the general applauſe of the nation, a total ſeparation was made from the church of Rome in ARTICLES of doctrine, as well as in matters of diſcipline and juriſdiction. In 1553 his death retarded the progreſs of the *reformation*; and his ſiſter Mary, who ſucceeded him, impoſed a-new the arbitrary laws and tyrannical yoke of Rome upon the people of England. But the execution of a great number of perſons, who were burnt for the proteſtant faith in the five years of her perſecuting and bloody reign, ſo alienated the people from popery, that queen Elizabeth, her ſiſter, found it no hard matter to deliver her ſubjects from the bondage of Rome, and to eſtabliſh that form of religious doctrine and eccleſiaſtical government, which ſtill ſubſiſts in England.

The ſeeds of the *reformation* were very early ſown in Scotland, by ſeveral noblemen of that nation, who had reſided in Germany during the religious diſputes that divided the empire. The firſt and moſt eminent oppoſer of the papal juriſdiction was John Knox, a diſciple of Calvin, who ſet out from Geneva for Scotland in 1559, and in a little while prevailed with the greateſt part of the Scotch nation entirely to abandon the ſuperſtitions of Rome, and to aim at nothing leſs than the total extirpation of popery. From that period to the preſent times the form of doctrine, worſhip, and diſcipline, that had been eſtabliſhed at Geneva by the miniſtry of Calvin, has been maintained in Scotland with invincible obſtinacy and zeal, and every attempt to introduce, into that kingdom, the rites and government of the church of England, has proved impotent and unſucceſsful. See PRESBYTERIANS.

The cauſe of the *reformation* in Ireland underwent the ſame viciſſitudes that had attended it in England. When Henry VIII. after the abolition of the papal authority, was declared ſupreme head of the church of England, George Brown, a native of England, and a monk of the Auguſtin order, whom that monarch had created, in the year 1535, archbiſhop of Dublin, began to act with the utmoſt vigour in conſequence of this change in the hierarchy. He purged the churches of his dioceſe from ſuperſtition in all its forms, pulled down images, deſtroyed relics, aboliſhed abſurd and idolatrous rites, and by the influence as well as authority he had in Ireland cauſed the king's ſupremacy to be acknowledged in that nation. Henry ſhewed ſoon after that this ſupremacy was not a vain title, for he baniſhed the monks out of that kingdom, confiſcated their revenues, and deſtroyed their convents. In the reign of Edward VI. farther progreſs was made in the *reformation*, but the acceſſion of Mary retarded it, in conſequence of which Brown and other proteſtant biſhops were deprived of their dignities in the church. When Elizabeth aſcended the throne, the Iriſh were again obliged to ſubmit to the form of worſhip and diſcipline eſtabliſhed in England.

The *reformation* had not been long eſtabliſhed in Britain, when the Belgic provinces, united by a reſpectable confederacy which ſtill ſubſiſts, withdrew from their ſpiritual allegiance to the Roman pontiff. The means which Philip II. king of Spain uſed to obſtruct the *reformation*, promoted it: the nobility formed themſelves into an aſſociation, in the year 1566, and rouſed the people; who, under the heroic conduct of William of Naſſau, prince of Orange, ſeconded by the ſuccours of England and France, delivered this ſtate from the Spaniſh yoke: in conſequence of which the reformed religion, as it was profeſſed in Switzerland, was eſtabliſhed in the United Provinces: and, at the ſame time, an univerſal toleration granted to thoſe whoſe religious ſentiments were of a different nature, whether they retained the faith of Rome, or embraced the *reformation* in another form, provided that they made no attempts againſt the authorityof the government, or the tranquillity of the public. See, on the ſubject of this article, Robertſon's Hiſt. of Charles V. vol. ii. p. 113, &c. vol. iii. p. 44, &c. Moſheim's Eccl. Hiſt. Eng. ed. 8vo. vol. iii. p. 284, &c. Burnet's Hiſt. of the Reformation, paſſim.

REFORMATION, *right of*, *jus reformationis*, is a right which the princes of Germany claim to *reform* the church in their reſpective territories; as being inveſted with the ſpiritual as well as the temporal power.

The *jus reformationis* is annexed to the ſovereignty; by this they have the power of conſcience, the diſpoſition of eccleſiaſtical revenues, &c. as they enjoyed the ſame at the treaty of Munſter in 1624.

REFORMATION of *images*, in *Optics*. See ANAMORPHOSIS.

REFORMED *calendar* and *church*. See the ſubſtantives.

REFORMED *officer*. See REFORMADO.

REFRACTED *angle*, in *Optics*, the angle contained between the refracted ray and the perpendicular.

REFRACTED *dials*, are ſuch as ſhew the hour by means of ſome *refracting* tranſparent fluid. See DIALS *refracted*.

REFRACTED *ray*, or *ray of* REFRACTION. See RAY, and REFRACTION.

REFRACTED *viſion*. See VISION.

REFRACTING *teleſcope*. See TELESCOPE.

REFRACTION, *refractio*, in *Mechanics*, the deviation of a moving body from its direct courſe, by reaſon of the different denſity of the medium it moves in; or a flexion and change of determination, occaſioned by a body's falling obliquely out of one medium into another of a different denſity.

Thus a ball A (*Tab.* VI. *Mechanics*, *fig.* 103.) moving in the air in the line AB, and falling obliquely on the ſurface of the water CD, does not proceed ſtraight to E, but deviates, or is inflected, to F. Again, if the ball, moving in water in the ſame line AB ſhould fall obliquely on a ſurface of air CD; it will not proceed ſtraight to E, nor yet deflect to F, but to G. Now the deflexion in each caſe is called the *refraction*; and the two caſes are diſtinguiſhed by means of the perpendicular MI; that BG being called *refraction towards the perpendicular*, or to the *axis of refraction*; and the other BF, *refraction from the perpendicular*, or *from the axis of refraction*.

Theſe *refractions* are ſuppoſed to ariſe hence, that the ball arriving at B, in the firſt caſe finds more reſiſtance or oppoſition on the one ſide O, i. e. from the ſide of the water, than it did from the ſide P, or that of the air; and in the latter more reſiſtance from the ſide P, which is now the ſide of the water, than the ſide O, which is that of the air.

The *great law of refraction*, then, which holds in all bodies, and all mediums, is, that a body paſſing obliquely out of a medium which reſiſts it more, is refracted towards the perpendicular; and in paſſing out of a medium which oppoſes it leſs into another, which oppoſes it more, it is refracted from the perpendicular.

Hence the rays of light falling out of air into water are refracted towards the perpendicular; whereas a ball thrown into the water is refracted from it; becauſe water, which reſiſts the motion of light leſs than air, reſiſts that of the ball more; or to ſpeak more juſtly, becauſe water, by its greater attraction, accelerates the motion of the rays of light more than air does; for that this is the true cauſe of *refraction*, at leaſt in light, ſhall, be ſhewn under REFRACTION *of light*.

To have a body *refracted*, it is neceſſary that it ſhould fall obliquely on the ſecond medium. In perpendicular incidence there is no *refraction*.

Voſſius indeed, and Snellius, imagined they had obſerved a perpendicular ray of light undergo a *refraction*; a perpendicular object appearing in the water nearer than in reality it was; but this was to attribute that to a *refraction* of the perpendicular rays, which was owing to the divergency of the oblique rays after *refraction*, from a nearer point.

Yet there is a manifeſt *refraction* even of perpendicular rays found in *iſland* CRYSTAL.

Rohault adds, that though an oblique incidence be neceſſary in all other mediums we know of, yet the oblique muſt not exceed a certain degree; if it do, the body will not penetrate the medium, but will be *reflected* inſtead of being *refracted*.

Thus cannon-balls, in ſea engagements, falling very obliquely on the ſurface of the water, are obſerved to mount aloft again, and frequently to ſweep the men from off the oppoſite decks; and the like happens to the little ſtones wherewith children make their ducks and drakes.

The ancients confounded *refraction* with *reflection*, and it was ſir Iſaac Newton who firſt taught us the juſt difference between them.—He ſhews likewiſe, that there is a good deal of analogy between them, and particularly in the caſe of light.

The laws of *refraction* of the rays of light in mediums differently terminated, i. e. whoſe ſurfaces are plain, concave, convex, &c. make the ſubject of dioptrics.

By *refraction* it is, that convex glaſſes, or lenſes, collect the rays, magnify objects, burn, &c. and hence the foundation of microſcopes, teleſcopes, &c.

By *refraction* it is, that all remote objects are ſeen out of their real places; particularly, that the heavenly bodies are apparently higher than they are in reality, &c.

The *refraction* of the air has many times ſo uncertain an influence on the places of celeſtial objects, very remote from the zenith, that wherever *refraction* is concerned, the concluſions deduced from obſervations that are much affected by it, will always remain doubtful, and too precarious in many caſes to be relied upon. See Dr. Bradley, in Phil. Tranſ. N° 485.

REFRACTION *of light*, in *Optics*, is an inflection or deviation of the rays from their rectilinear courſe upon falling obliquely out of one medium into another, of a different denſity.

It does not appear that, before Deſcartes, any perſon attempted to explain the cauſe of *refraction*, which he undertook to do by the reſolution of forces, on the principles of mechanics; in conſequence of which he was obliged to ſuppoſe that light paſſes with more eaſe through a denſe medium than a rare one: thus the ray AB (*Tab.* V. *Optics*, *fig.* 105.) falling obliquely on a denſer medium at B, is ſuppoſed to be acted on by two forces, one of them impelling it in the direction AC, and the other in AD, which alone can be affected by the change of medium: and ſince, after the ray has entered the denſer medium, it approaches the perpendicular BH, it is plain that this force muſt have received an increaſe, whilſt the other continued the ſame; for if BE be taken equal to BD, or CA, the conſequence of the angle IBH being leſs than ABC will be, that BH muſt be longer than BC or AD.

The firſt perſon who queſtioned the truth of this explanation of the cauſe of *refraction* was M. Fermat, who aſſerted, contrary to Deſcartes, that light ſuffers greater reſiſtance in water than in air, and greater in glaſs than in water; and he maintained that the reſiſtance of different mediums, with reſpect to light, is in proportion to their denſities. M. Leibnitz adopted the ſame general idea; and they reaſoned upon the ſubject in the following manner. Nature, they ſay, accompliſhes her ends by the ſhorteſt methods; light, therefore, ought to paſs from one point to another, either by the ſhorteſt road, or that in which the leaſt time is required. But it is plain that the line in which light paſſes, when it falls obliquely upon a denſer medium, is not the moſt direct or the ſhorteſt; ſo that it muſt be that in which the leaſt time is ſpent. And, whereas it is demonſtrable, that light falling obliquely upon a denſer medium (in order to take up the leaſt time poſſible, in paſſing from a point in one medium to a point in the other) muſt be refracted in ſuch a manner, that the ſines of the angles of incidence, and *refraction* muſt be to one another, as the different facilities with which light is tranſmitted in thoſe mediums; it follows that, ſince light approaches the perpendicular when it paſſes obliquely from air into water (ſo that the ſine of the angle of *refraction* is leſs than that of the angle of incidence) the facility with which water ſuffers light to paſs through it is leſs than that of the air; ſo that the light meets with greater reſiſtance in water than in air. This method of arguing from final cauſes could not ſatisfy philoſophers. Dr. Smith obſerves that it agrees only to the caſe of *refraction* at a plain ſurface; and that the hypotheſis is altogether arbitrary. Dechales, in order to explain the law of *refraction*, ſuppoſes that every ray of light is compoſed of ſeveral ſmaller rays which adhere to one another; and that they are refracted towards the perpendicular, in paſſing into a denſer medium, becauſe one part of the ray meets with more reſiſtance than another part; ſo that the former traverſes a ſmaller ſpace than the latter; in conſequence of which the ray muſt neceſſarily bend a little towards the perpendicular. This hypotheſis was adopted by the famous Dr. Barrow, who, as ſome ſay, was the author of it. On this hypotheſis, it is plain that mediums of a greater attractive power muſt give greater reſiſtance to the paſſage of the rays of light than mediums of a leſs refractive power, which is contrary to fact.

The Bernouillis, both father and ſon, have attempted to explain the cauſe of *refraction* on mechanical principles; the former on the equilibrium of forces, and the latter on the ſame principles with the ſuppoſition of etherial vortices; but neither of theſe hypotheſes have gained much credit. M. Mairan ſuppoſes a ſubtle fluid, filling the pores of all bodies, and extending, like an atmoſphere, to a ſmall diſtance beyond their ſurfaces; and then he ſuppoſes that the refraction of light is nothing more than a neceſſary and mechanical effect of the incidence of a ſmall body in thoſe circumſtances. There is more, he ſays, of the refracting fluid in water than in air, leſs in water than in glaſs, and in general leſs in a denſe medium than in one that is rarer. M. de Maupertuis ſuppoſes that the courſe which every ray takes, in paſſing from one medium into another, is that which requires the leaſt quantity of action, which depends upon the velocity of the body and the ſpace it paſſes over; ſo that it is in proportion to the ſum of the ſpaces multiplied by the velocity with which bodies paſs over them. From this principle he deduces the neceſſity of the ſine of the angle of incidence being in a conſtant proportion to that of *refraction*: and alſo all the other laws relating to the propagation and reflection of light.

Dr. Smith (in his Optics, Remarks p. 70.) obſerves, that all other theories for explaining the reflection and *refraction* of light, except ſir Iſaac Newton's, ſuppoſe that it ſtrikes upon bodies, and is reſiſted by them, which has never been proved by any deduction from experience. On the contrary, it appears by various conſiderations, and might be ſhewn by Mr. Molyneux's and profeſſor Bradley's obſervations on the parallax of the fixed ſtars, that their rays are not at all impelled by the rapid motion of the earth's atmoſphere, nor by the object-glaſs of the teleſcope through which they paſs. And by ſir Iſaac Newton's theory of *refraction*, which is grounded on experience only, it appears, that light is ſo far from being reſiſted and retarded by *refraction* into any denſe medium, that it is ſwifter there than in vacuo in the ratio of the ſine of incidence in vacuo to the ſine of *refraction* into the denſe medium. Prieſtley's Hiſt. of Light, &c. p. 102, &c. p. 333, &c.

The *refraction* of light, ſir Iſaac Newton ſhews, is not performed by the very rays falling on the ſurface of bodies; but it is done without any contact, by the action of ſome power belonging to bodies, and extending to a certain diſtance without their ſurfaces; by which ſame power, acting in other circumſtances, they are alſo emitted and reflected.

The ſame arguments whereby we have proved, that REFLECTION is performed without immediate contact, go a great way towards demonſtrating the ſame of *refraction*: to which may be added the following ones.

1. Becauſe, if when light falls out of glaſs into air with the utmoſt obliquity it will be tranſmitted at, it be then made to fall a little more obliquely, it becomes wholly reflected: for the power of the glaſs, after it has refracted light emerging as obliquely as poſſible, ſuppoſing the rays to fall ſtill more obliquely, will be too ſtrong to let any of the rays paſs; conſequently, inſtead of being *refracted*, they will all be reflected.

2. Becauſe in thin lamellæ, or plates of glaſs, light is reflected and tranſmitted ſeveral times alternately, as the thickneſs of the lamellæ increaſes in arithmetical progreſſion: for here it depends on the thickneſs of the lamina which of the two the glaſs ſhall do, whether reflect it, or let it be tranſmitted.

3. Becauſe, whereas the power of other bodies both to reflect and refract light are very nearly proportional to their denſities; yet unctuous and ſulphureous bodies are found to reflect more ſtrongly than according to their mere denſities: for as the rays act more ſtrongly on thoſe bodies to kindle them than on others, ſo do they again, by their mutual attraction, act more ſtrongly on the rays to *refract* them.

Laſtly, Becauſe not only thoſe rays tranſmitted through glaſs are found to be *refracted*, but alſo thoſe paſſing in the air, or in a vacuum near its extremities, or even near the extremes of many opaque bodies, e. gr. the edge of a knife, undergo a ſimilar inflection, from the attraction of the body. See LIGHT.

The manner wherein *refraction* is performed by mere attraction, without contact, may be thus accounted for: ſuppoſe H I (*Tab.* IV. *Optics*, *fig.* 56. Nº 2.) the boundary of two mediums, N and O; the firſt the rarer, e. gr. air; the ſecond the denſer, e. gr. glaſs; the attractions of the mediums here will be as their denſities. Suppoſe *p* S to be the diſtance to which the attracting force of the denſer medium exerts itſelf within the rarer. Let now a ray of light A *a* fall obliquely on the ſurface which ſeparates the mediums, or rather on the ſurface *p* S, where the action of the ſecond and more reſiſting medium commences. All attraction being performed in lines perpendicular to the attractive body, as the ray arrives at *a*, it will begin to be turned out of its rectilinear courſe by a ſuperior force, wherewith it is attracted by the medium O, more than by the medium N, i. e. by a force wherewith it is driven towards it in a direction perpendicular to its ſurface: hence the ray is bent out of its right line in every point of its paſſage between *p* S and R T, within which diſtance the attraction acts. Between thoſe lines, therefore, it deſcribes a curve *a* B *b*; but beyond R T, being out of the ſphere of attraction of the medium N, it will proceed uniformly in a right line, according to the direction of the curve in the point *b*.

Again, ſuppoſe N the denſer and more reſiſting medium, O the rarer, and H I the boundary, as before; and let R T be the diſtance to which the denſer medium exerts its attractive force within the rarer: even when the ray has paſſed the point B, it will be within the ſphere of ſuperior attraction of the denſer medium; but that attraction acting in lines perpendicular to its ſurface, the ray will be continually drawn from its ſtraight courſe B M perpendicularly towards H I: thus, having two forces or directions, it will have a compound motion, whereby, inſtead of B M, it will deſcribe B *m*, which B *m* will in ſtrictneſs be a curve.

Laſtly, after it has arrived in *m*, being out of the influence of the medium N, it will perſiſt uniformly, in a right line, in the direction wherein the extreme of the curve leaves it.

Thus we ſee how *refraction* is performed, both *towards the perpendicular*, and *from it*.

But note, the attraction of the denſer medium, e. gr. N, is continually diminiſhing, as the ray proceeds from B, towards the limit of attraction R T; in regard fewer and fewer parts ſtill come to act; at I H, e. gr. all the parts between that and *p* S attract; but at R T, none but thoſe in the line H I. Note, alſo, that the diſtance between *p* S and R T being ſmall, when we conſider *refractions*, no notice is taken of the curve part of the ray, but we conſider it as conſiſting of two ſtraight lines, C B, A B, or *m* B, A B.

REFRACTION, in *Dioptrics*, is the inflexion or bending of the rays of light, in paſſing the ſurfaces of glaſſes, lenſes, and other tranſparent bodies of different denſities.

Thus a ray as A B (*Tab.* IV. *Optics*, *fig.* 56. Nº 2.) falling obliquely from the radiant A, upon a point B, in a diaphanous ſurface, H I, rarer or denſer than the medium along which it was propagated from the radiant; has its direction there altered by the action of the new medium; and inſtead of proceeding to M, it deviates, e. gr. to C.

This deviation is called the *refraction of the ray*; B C the *refracted ray*, or *line of refraction*; and B the *point of refraction.*

The line A B is called the *line of incidence*, or *ray of incidence*; and, in reſpect thereof, B is alſo called the *point of incidence.*

The plane wherein both the incident and *refracted* rays are found is called the *plane of refraction*; a right line B E drawn in the *refraictng* medium perpendicular to the *refracting* ſurface in the point of *refraction* B, is called the *axis of refraction*: and a right line D B drawn perpendicular to the *refracting* ſurface, in the point of incidence B, along the medium through which the ray fell, is called the *axis of incidence.*

The angle A B I, included between the incident ray, and the *refracting* ſurface, is called the *angle of incidence*; and the angle A B D, included between the incident ray and the axis of incidence, is called the *angle of inclination.* The angle MBC, which the *refracted* ray makes with the incident, is called the *angle of refraction*; and the angle CBE, which the *refracted* ray makes with the axis of *refraction*, is called the *refracted angle.*

REFRACTION, *general laws of.* 1. *A ray of light in its paſſage out of a rarer into a denſer medium*, e. gr. *out of air into glaſs, is refracted towards the perpendicular*, i. e. *towards the axis of refraction.*

Hence, the *refracted* angle is leſs than the angle of inclination; and the angle of *refraction* leſs than that of incidence; as they would be equal were the ray to proceed ſtraight from A to M. Hence, alſo, a ray perpendicular to the *refracting* ſurface. will paſs through without being *refracted*, as it cannot be *refracted* to the perpendicular. The phyſical cauſe thereof is, that the attraction of the denſer medium, which, in an incidence oblique to its ſurface acting perpendicular to that ſurface, draws the ray out of its courſe: this attraction, we ſay, in a perpendicular incidence, acts in the direction of the ray.

2. *The ratio of the ſine of the angle of inclination, to the ſine of the refracted angle, is fixed and conſtant*; viz. if the *refraction* be out of air into glaſs, it is found greater than as 114 to 76, but leſs than 115 to 76; that is, nearly as 3 to 2.

This ratio, aſſigned by Huygens, agrees with another of ſir Iſaac Newton, who makes the ſine of the angle of inclination to the ſine of the *refracted* angle, as 31 to 20; which is, likewiſe, nearly as 3 to 2. Indeed there is ſome difference in the quantity of *refraction*, in different kinds of glaſs; but in phyſical matters, preciſeneſs is not neceſſary. In rain water, Des Cartes found, the ratio of the ſine of the angle of inclination, to the ſine of the *refracted* angle as 250 to 187, that is, nearly as 4 to 3; which agrees with ſir Iſaac Newton's obſervation, who makes it as 529 to 396. In ſpirit of wine, the ſame great author makes the ratio as 100 to 73; which is not far from the ſeſquitertian ratio. In air he makes it as 3201 to 3200; and as to air, he ſhews, that a ray of light, in traverſing quite through the atmoſphere, is *refracted* the ſame as it would be, were it to paſs with the ſame obliquity out of a vacuum into air of equal denſity with that in the loweſt part of the atmoſphere.

See the following table, in which the proportion of the ſines which meaſure the *refractions* of ſeveral bodies; the denſities of the bodies, eſtimated by their ſpecific gravity; and their refractive power, in reſpect of their denſities, are ſet down in ſeparate columns.

The refracting bodies.	The proportion of the ſines of incidence and refraction of yellow-light.	The denſity and ſpecific gravity of the body	The refractive power of the body in reſpect of its denſity.
A pſeudo-topaz, being a natural, pellucid, brittle, hairy ſtone, of a yellow colour.	23 to 14	4.27	3979
Air.	3201 to 3200	0.0012	5208
Glaſs of antimony.	17 to 9	5.28	4864
A ſelenites.	61 to 41	2.252	5386
Glaſs vulgar.	31 to 20	2.58	5436
Cryſtal of the rock.	25 to 16	2.65	5450
Iſland cryſtal.	5 to 3	2.72	6536
Sal gemmæ.	17 to 11	2.143	6477
Alum.	35 to 24	1.714	6570
Borax.	22 to 15	1.714	6716
Nitre.	32 to 21	1.9	7079
Dantzick vitriol.	303 to 200	1.715	7551
Oil of vitriol.	10 to 7	1.7	6124
Rain water.	529 to 396	1.	7845
Gum arabic.	31 to 21	1.375	8574
Spirit of wine well rectified.	100 to 73	0.866	10121
Camphor.	3 to 2	0.996	12551
Oil olive.	22 to 15	0.913	12607
Linſeed oil.	40 to 27	0.932	12819
Spirit of turpentine.	25 to 17	0.874	13222
Amber.	14 to 9	1.04	13654
A diamond.	100 to 41	3.4	14556

Newton's Optics, edit. 3. p. 247.

M. Euler the younger, purſuing a ſcheme ſuggeſted by his father for aſcertaining the refractive powers of tranſparent liquors, made uſe of two Meniſcus glaſſes, which he put together, when they were plunged in the fluid, the refractive power of which he wanted to determine: the edges of theſe glaſſes being ground flat, they immediately cohered, ſo that none of the fluid could eſcape; and then they might both together be wiped, and uſed as one object-glaſs in a long tube, which he could lengthen or ſhorten at pleaſure; and applying an eye-glaſs to it, the whole obſervation he had to make was to meaſure the exact length of his tube, when he could ſee through it moſt diſtinctly a turret, which was at a conſiderable diſtance from him. Or, when the focal diſtance was leſs than a foot, he only obſerved, at what diſtance from a wall the image of an oppoſite window was the moſt diſtinct. Ac. Berlin. 1762, p. 302.

The refractive power of the fluids which he examined in this manner, he expreſſed in the following tables.

A ray of light paſſing from air into	The ſine of the angle of incidence will be to that of refraction as	
Diſtilled water – – – –	1.3358	To unity.
Rain water – – – – –	1.3358	
Well water – – – – –	1.3366	
French wine – – – – –	1.3453	
French brandy – – – –	1.3603	
Ditto a ſtronger kind – – –	1.3646	
Rectified ſpirit of wine – – –	1.3685	
Ditto more highly rectified – –	1.3706	
The white of an egg – – –	1.3685	
Diſtilled vinegar – – – –	1.3442	
A ſolution of gum arabic – – –	1.3467	
A ſolution of two ſcruples of white ſugar in an ounce of water – –	1.345y	
A ſolution of two ſcruples of rock ſalt, in ditto	1.3477	
A ſolution of 2 ſcruples of ſalt of urine, in ditto	1.3400	
Oil of Provence – – – –	1.4651	
Oil of turpentine – – – –	1.4822	

N. B. The rock-ſalt and the ſalt of urine, were purified by a double cryſtallization.

By a ſecond pair of Meniſcuſes.

Diſtilled water – – – –	1.3358	To unity.
Rain water – – – – –	1.3358	
Well water – – – – –	1.3362	
French wine – – – –	1.3458	
French brandy – – – –	1.3600	
Ditto a ſtronger kind – – –	1.3618	
Spirit of wine rectified – – –	1.3683	
Ditto more highly rectified – –	1.3705	
Tea – – – – – –	1.3376	
Mineral alkali ſaturated (I ſuppoſe with water)	1.3600	
Spirit of nitre – – – –	1.4025	
A ſolution of 2 ſcruples of Glauber's ſalt in an ounce of water – –	1.3430	
A ſolution of 2 ſcruples of digeſtive ſalt of Sylvius in ditto – – –	1.3454	
A ſolution of 2 ſcruples of ſal ammoniac in do	1.3488	
A ſolution of 2 ſcruples of copperas in ditto	1.3395	
Oil of tartar per deliquium – –	1.3917	
Oil of Provence – – – –	1.4648	
Oil of turpentine – – – –	1.4822	

The *refractive* power of ſome other fluids found by the ſecond pair of Meniſcuſes, 18 Auguſt, 1761, Reaumur's thermometer being 31 *degrees above the freezing point.*.

A ray of light paſſing from air into	The ſine of the angles of incidence will be to that of refraction.	
Well water – – – – –	1.3351	To unity.
Four different ſolutions of nitre, viz. –		
12 grains of depurated nitre to an oz. of water	1.3380	
24 – – – – – –	1.3398	
38 – – – – – –	1.3450	
to 2 ounces of water	1.3540	
Four different infuſions – – –	1.3351	
Of parſley – –	1.3355	
Of nutſhells – –	1.3359	
Of ſaffron – –	1.3363	
Of fiſh-ſcales –	1.3353	
Of Zeltzer water –	1.3353	
Of Eger water –	1.3358	
Anodyne liquor – – – –	1.3650	
Spirit of camphor – – – –	1.3757	
Spirit of Saxon ſope – – –	1.4088	

That the *refractive* power of theſe fluids, thus determined by M. Euler, may be more eaſily compared with Mr. Hauſkbee's and ſir Iſaac Newton's experiments, he reduced the reſult of their obſervations into the following tables, exactly ſimilar to his own.

The *refractive* power of certain fluids found by Mr. Haukſbee, ſee his Experiments, p. 292.

A ray of light paſſing from air to	The ſine of the angle of incidence will be to that of refraction as	
Water	1.3359	To unity.
Spirit of honey	1.3359	
——— ſal ammoniac	1.3377	
Oil of amber	1.3377	
Spirit of hartſhorn	1.3390	
Human urine	1.3419	
White of an egg	1.3511	
Jelly of hartſhorn	1.3541	
French brandy	1.3626	
Spirit of wine	1.3721	
Diſtilled vinegar	1.3721	
Gum ammoniac	1.3723	
Aqua regia	1.3898	
——— from aqua fortis and ſal ammoniac	1.3964	
Aqua fortis	1.4044	
Spirit of nitre	1.4076	
The cryſtalline humour of an ox's eye	1.4635	
Butter of antimony	1.6831	
Oil of vitriol	1.4262	
Oil of wax	1.4524	
Oil of lavender	1.4960	
Oil of roſemary	1.4719	
Oil of origanum	1.4770	
Oil of ginger	1.4799	
Oil of oranges	1.4833	
Oil of turpentine	1.4833	
Oil of ſavine	1.4857	
Oil of flowers of muſk	1.4878	
Oil of mint	1.4911	
Oil of amber	1.5010	
Oil of cummin	1.5088	
Oil of fennel	1.5114	
Oil of cloves	1.5136	
Oil of aniſe	1.5191	
Oill of cinnamon	1.5340	
Oil of ſaſſafras	1.5443	

The *refractive* powers of ſome tranſparent liquors according to the obſervations of ſir Iſaac Newton. See Optics, p. 247.

A ray of light paſſing from air into	The ſine of the angle of incidence will be to that of refraction as	
A yellow pſeudo topaz	1.6429	To unity.
Air	0.9997	
Glaſs of antimony	1.8889	
A ſelenites	1.4878	
Glaſs	1.5500	
Cryſtal of the rock	1.5620	
Iſland cryſtal	1.6666	
Sal gem	1.5455	
Alum	1.4577	
Borax	1.4667	
Nitre	1.5238	
Dantzick vitriol	1.5000	
Oil of vitriol	1.4285	
Rain water	1.3558	
Gum arabic	1.4771	
Spirit of wine well rectified	1.3698	
Camphor	1.5000	
Oil of olive	1.4666	
Linſeed oil	1.4814	
Spirit of turpentine	1.5625	
Amber	1.5556	
A diamond	2.4390	

See Prieſtley's Hiſt. of Light, &c. p. 479, &c.

Whence the different *refractive* power in different fluids ariſes, is not determined. Sir Iſaac Newton ſhews, that in many bodies, e. gr. glaſs, cryſtal, a ſelenites, pſeudo-topaz, &c. the *refractive* power is proportionable to their denſities; only in ſulphureous bodies, as camphor, linſeed oil, olive, amber, ſpirit of turpentine, &c. the power is two or three times greater than in other bodies of equal denſity; yet even theſe have the *refractive* power with reſpect to each other nearly as their denſities.

Water has a *refractive* power in a middle degree between thoſe two kinds of ſubſtances, and is, probably, of a middle nature. Salts and vitriols have *refractive* powers in a middle degree between thoſe of earthy ſubſtances and water, and accordingly are compoſed of thoſe two ſorts of ſubſtances. Spirit of wine has a *refractive* power in a middle degree between thoſe of water and oily ſubſtances; and accordingly ſeems to be compoſed of both, united by fermentation. It appears, therefore, that all bodies ſeem to have their refractive powers proportional to their denſities, or very nearly, excepting ſo far as they partake more or leſs of ſulphureous oily particles, and thereby have their refractive powers made greater or leſs. Whence it ſeems reaſonable to attribute the refractive power of all bodies chiefly, if not wholly, to the ſulphureous parts with which they abound.

From the obſervations of M. Euler it appears, that there is no fluid, and probably no tranſparent ſubſtance of any kind, the refractive power of which is leſs than that of rain water, or diſtilled water; and betwixt air and rain water there is no ſubſtance that has an intermediate refractive power.

After rain water immediately follows *well water*; but there are probably as many varieties in its refractive power as there are different wells. We may, however, conclude, that the ratio of *refraction* from air into well water is contained between the limits of 1.336 to 1, and 1.337 to 1.

Spirituous liquors have a greater refractive power in proportion to their ſtrength; but the ratio of refraction from air into any ſpirituous liquor is never leſs than 1.34, nor greater than 1.37.

There is, probably, no kind of ſalt, but what, being diſſolved in water, increaſes its refractive power.

The ſolutions of ſalt of urine and of vitriol have the leaſt refractive powers, and thoſe of rock ſalt and ſal ammoniac the greateſt; but the ratio of *refraction* from air into any ſaline ſolution, preſerving the proportion of one ounce of ſalt to twelve of water, will be contained between the limits of 1.34 to 1, and 1.35 to 1.

Diſtilled vinegar and the ſolution of gum arabic have nearly the ſame refractive power with common French wine; and the refractive power of white of egg is the ſame as that of rectified ſpirit of wine.

Mineral alkali ſaturated, ſeems to have the ſame refractive power with very ſtrong brandy.

Spirit of nitre and oil of tartar per deliquium have a medium refractive power between ſpirituous liquors and oils.

The refractive powers of oils approach the neareſt to that of glaſs, eſpecially oil of turpentine, which had the greateſt refractive power of all the fluids on which he had made experiments.

Sir Iſaac Newton ſuſpected that different *degrees of heat* might have ſome effect on the refractive power of bodies, but this method of determining the general *refraction* was not ſufficiently accurate to aſcertain this circumſtance; but happily this method of M. Euler's proved to be well adapted to this purpoſe.

From his experiments made for this purpoſe, he infers, that the focal diſtance of a ſingle lens of glaſs diminiſhes with the heat communicated to it; and this diminution of the focal diſtance is not owing to the increaſe of bulk in the glaſs by heat; for the effect of this change is both inconſiderable, and of a contrary nature. There can be no doubt, therefore, but that this alteration in the focal diſtance is owing to a change in the refractive power of the glaſs itſelf, which, as well as, probably, that of all other tranſparent ſubſtances, is increaſed by heat, and diminiſhed by cold.

It may ſeem ſurpriſing that the focal diſtance of a ſingle lens ſhould decreaſe with heat, and yet that of the Meniſcuſes filled with any fluid, ſhould increaſe with heat; but M. Euler obſerves, that it by no means follows from hence, that theſe fluids are affected by heat in a manner different from glaſs; and, after computing the effect of every circumſtance of this complex experiment, of the two glaſſes and the fluid combined, he concludes, that heat increaſes the refractive power of water, and of other fluids as well as that of glaſs.

He farther obſerves, that as 66 degrees of heat diminiſhed the focal diſtance $\frac{1}{65}$ part, 33 degrees ought to have miminiſhed it $\frac{1}{130}$ part; whereas the diminution in this caſe was $\frac{1}{97}$. From hence, ſays he, one may perhaps conclude, that when it is very cold, the ſame change in the thermometer has a greater effect on the refractive power of the glaſs than when it is very hot. But he acknowledges that experiments of this kind are not capable of ſo much preciſion as one could wiſh, and that, perhaps, in reality, the 66 degrees made a change of $\frac{1}{60}$, and the 33 degrees of $\frac{1}{126}$; but he imagined that a great number of experiments, made in different temperatures of the air, might decide this queſtion, eſpecially if object-glaſſes of a very great focal diſtance were made uſe of. See Prieſtley's Hiſt. of Light, &c. p. 483, &c.

From the law above laid down, it follows, that one angle of inclination, and its correſpondent *refracted* angle, being found by obſervation, the *refracted* angles, correſponding to the ſeveral other angles of inclination, are eaſily computed. Now, Zahnius and Kircher have found that if the angle of inclination be 70°, the *refracted* angle will be 38° 50′; on which principle Zahnius has conſtructed a table of *refractions* out of air into glaſs, for the ſeveral degrees of the angle of inclination; a ſpecimen whereof follows:

Ang. of Inclin.	Refracted Angle			Angle of Refraction			Ang. of Inclin.	Refracted Angle			Angle of Refraction		
1°	0°	40′	5″	0°	19′	55″	10°	6°	39′	16″	3°	20′	44′
2	1	20	6	0	39	54	20	13	11	35	6	48	25
3	2	0	3	0	59	56	30	19	29	29	10	30	31
4	2	40	5	1	19	55	45	28	9	19	16	50	41
5	3	20	3	1	39	57	90	41	51	40	48	8	20

Hence it appears, that if the angle of inclination be leſs than 20°, the angle of *refraction* out of air into glaſs is almoſt $\frac{1}{3}$ of the angle of inclination; and therefore a ray is refracted to the axis of *refraction*, by almoſt a third part of the quantity of its angle of inclination. And on this principle it is that Kepler, and moſt other dioptrical writers, demonſtrate the *refractions* in glaſſes; though in eſtimating the law of theſe *refractions* he followed the example of Alhazen, and Vitellio, and ſought to diſcover it in the proportion of the angles, and not in that of the ſines.

The true law of *refraction* was firſt diſcovered by Willebrord Snellius, profeſſor of mathematics at Leyden; who found by experiment that the ſecants of the complements, or coſecants of the angles of incidence and *refraction*, are always in the ſame ratio. It is vulgarly attributed, however, to Des Cartes; who having ſeen it in Snellius's MS. firſt publiſhed it in his Dioptrics, without naming Snellius; as we are informed by Huygens. The form in which Des Cartes gives this law, is different from that of Snellius, and in general more commodious; but it might have been eaſily deduced from it. According to him, the ſine of the angle of *refraction* always bears the ſame proportion to the ſine of the angle of incidence. Indeed, as the rays of light are not all of the ſame degree of *refrangibility*, this conſtant ratio muſt be different in different kinds. The ratio, therefore, obſerved by authors is to be underſtood of rays of the mean *refrangibility*, i. e. of green rays. The difference of *refraction* between the leaſt and moſt *refrangible* rays, that is, between violet and red rays, ſir Iſaac Newton ſhews, is about the $27\frac{1}{2}$th part of the whole *refraction* of the mean *refrangible*; which difference he owns is ſo ſmall, that there ſeldom needs to be any regard paid to it.

3. *When a ray paſſes out of a denſer into a rarer medium,* e. gr. *out of glaſs into air, it is refracted from the perpendicular, or from the axis of refraction.* And hence the angle of *refraction* is greater than the angle of inclination.

Hence, alſo, if the angle of inclination be leſs than 30°, MBC is nearly equal to $\frac{1}{3}$ of MBE; therefore MBC is one half of CBE; conſequently, if the *refraction* be out of glaſs into air, and the angle of inclination leſs than 30°, the ray is refracted from the axis of *refraction* by almoſt one half part of the angle of inclination. And this is the other dioptrical principle uſed by moſt authors after Kepler, to demonſtrate the *refractions* of glaſſes.

If the *refraction* be out of air into glaſs. the ratio of the ſine of inclination to the ſine of the refracted angle is as 3 to 2, or, more accurately, as 17 to 11; if out of air into water, as 4 to 3: therefore, if the *refraction* be the contrary way, viz. out of glaſs or water into air, the ratio of the ſines, in the former caſe, will be as 2 to 3, or 11 to 17, and in the latter as 3 to 4.

Hence if the *refraction* be from water or glaſs into air, and the angle of incidence or inclination be greater than about $48\frac{1}{2}$° in water, or greater than about 40° in glaſs, the ray will not be refracted into air, but will be reflected into a line, which makes the angle of reflection equal to the angle of incidence; becauſe the ſines of $48\frac{1}{2}$° and 40° are to the radius, as 3 to 4, and as 11 to 17 nearly, and therefore when the ſine has a greater proportion to the radius than as above, the ray will not be refracted.

4. *A ray falling on a curve ſurface, whether concave or convex, is refracted after the ſame manner as if it fell on a plane which is a tangent to the curve in the point of incidence.*

For the curve and plane ſurface touching it, have an infinitely ſmall part common to them both (each being originally generated by the flux of a point.) But a ray is refracted in ſuch a little part; therefore it is the ſame as if it were refracted in ſuch a plane.

5. *If a right line,* EF (*Tab.* V. *Optics, fig.* 106.) *cut a refracting ſurface,* GH, *at right angles; and if, from any point in the denſer medium, as* D, *be drawn* DC *parallel to the incident ray* AB; *this will meet the refracted ray in* C; *and will be to it as the ſine of the refracted angle to the ſine of the angle of inclination.*

For $o=x$; but if BC paſs out of a denſer medium into a rarer, $y \reflectbox{$\angle$} x$; and out of a rarer into a denſer, $y \angle x$; therefore, in the former caſe, $y \reflectbox{$\angle$} o$, in the latter $y \angle o$; conſequently, in the former, $o+u \angle y+u$; in the latter $y+u \angle o+u$. But in the one caſe $o+u$, and in the other $y+u$, are equal to two right angles; therefore, $o+u$ in this, and $y+u$ in the other, are leſs than two right angles, and, conſequently, DC will meet BC. But ſince $o=x$, or the angle of inclination, and y is the refracted angle, it is evident that CB is to CD as the ſine of the angle o to the ſine of the angle y, or in the ratio of the ſine of the angle of inclination to the ſine of the refracted angle.

Hence, if BC paſs out of glaſs into air, it is in a ſubſeſquialterate ratio to CD; if, on the other hand, it paſſes out of air into glaſs, it is in a ſeſquialterate ratio to CD.

Hence alſo, if light paſs out of water into air, CB is in a ſubſeſquitertain ratio to CD; if out of air into water, in a ſeſquitertain. See *fig.* 106. and 107.

REFRACTION *in plane ſurfaces, laws of.* 1. If parallel rays be refracted out of one tranſparent medium into another of a different denſity, they will continue parallel after *refraction*. The phyſical reaſon is, that, being parallel, their obliquity, or angle of incidence, is the ſame; but, at equal obliquities, we have ſhewn the *refraction* is equal; conſequently the paralleliſm, which they had before the *refraction*, will be retained after it.

But this may be alſo demonſtrated geometrically: thus, if the rays be perpendicular to the refracting ſurface, they will paſs without any *refraction*; conſequently being parallel before their paſſage, they will be ſo after it. If they fall obliquely, as AB and DC (*fig.* 108.) the angles of incidence o and u, and, conſequently, alſo the angles of inclination x and y, will be equal. But the ſines of the angles of inclination x and y have the ſame ratio to the ſines of the refracted angles m and n; therefore the refracted angles m and n, and alſo the angles s and r, are equal; conſequently the refracted rays are parallel.

Hence a glaſs, plane on both ſides, being turned directly to the ſun, the light paſſing through it will be propagated after the ſame manner as if the glaſs were away; for the rays, being perpendicular, will paſs without *refraction*. If the glaſs be turned obliquely to the ſun, the light, after *refraction*, will be of the ſame intenſity as before, the intenſity depending on the ſpiſſitude or cloſeneſs of the rays, and on the angle wherewith they ſtrike the object, or the eye; both which are here unvaried.

2. If two rays CD and CP (*fig.* 109.) proceeding from the ſame radiant C, and falling on a plane ſurface of a different denſity, ſo that the points of *refraction* D and P are equally diſtant from the cathetus of incidence GK, the refracted rays DF and PQ have the ſame virtual focus, or the ſame point of diſperſion G.

Hence, 1. Since, in rays very near each other, the diſtance from the cathetus is the ſame as to ſenſe, very near rays will diverge from the ſame point G, i. e. they will have the ſame virtual focus G.

And hence, 2. When refracted rays, falling on the eye placed out of the cathetus of incidence, are either equally diſtant from the cathetus, or very near each other, they will flow upon the eye, as if they came to it from the point G; conſequently the point C will be ſeen by the refracted rays as in G.

3. If a ray CD fall obliquely out of a thinner into a denſer medium, having a plane ſurface, the diſtance of the radiant point CK will have a leſs ratio to the diſtance of the point of diſperſion, or virtual focus KG, than the ſine of the refracted angle to the ſine of the angle of inclination. But if the diſtance of the point of *refraction*, from the cathetus of incidence KD, be leſs than the eleventh or nineteenth part of the diſtance of the radiant point CK; and if in the former caſe the tenth, and in the latter the hundredth, part thereof be ſo ſmall, that it cannot be aſſigned, or need not be minded, then will CK be to KG, as to ſenſe, in the ratio of the ſine of the refracted angle, to the ſine of the angle of inclination.

Hence, 1. If the refraction be out of air into glaſs, the diſtance of the point of diſperſion of rays near the cathetus is ſeſquialterate of the radiant point; of more remote rays greater than ſeſquialterate. But if the *refraction* be out of air into water, the diſtance of the ſame point will be ſeſquitertain, when the rays are near the cathetus; and when more remote, greater than ſeſquitertian.

Hence, 2. If the eye be placed in a denſe medium, objects in a rarer will appear more remote than they are; and the place of the image, in any given caſe, may be determined from the ratio of the *refraction*. *Thus, to fiſhes ſwimming under water, objects out of the water muſt appear farther diſtant than in reality they are.*

4. If a ray DG fall obliquely out of a denſer into a rarer medium AB, the diſtance of the radiant point GK has a

greater ratio to the diſtance of the point of diſperſion KC, than the ſine of the refracted angle has to the ſine of the angle of inclination. In the other caſe of the preceding theorem, KG will be to KC, as to ſenſe, in the ratio of the ſine of the refracted angle, to the ſine of the angle of inclination.

Hence, 1. If the *refraction* be out of glaſs into air, the diſtance of the point of diſperſion of the rays near the cathetus of incidence is ſubſeſquialterate of the diſtance of the radiant point; that of the more remote rays is leſs than ſubſeſquialterate

But, 2. If the *refraction* be out of water into air, the diſtance of the point of diſperſion of rays near the cathetus is ſubſeſquitertian; of thoſe more remote, leſs than ſubſeſquitertian.

And, 3. The eye, therefore, being placed in a rarer medium, objects, placed in a denſer, appear nearer than they are; and the place of the image may be determined in any given caſe by the ratio of *refraction*. Hence, the bottom of a veſſel full of water is raiſed by *refraction* to a third part of its height, with reſpect to an eye perpendicularly over the refracting ſurface; and hence, *fiſhes, and other bodies, under water, appear nearer than they really are.*

5. If the eye be placed in a rarer medium, an object ſeen in a denſer medium, by a ray *refracted* in a plane ſurface, will appear larger than it really is. If the object be in a rarer, and the eye in a denſer medium, the object will appear leſs than it is. And, in each caſe, the apparent magnitude is to the real one in a ratio compounded of the diſtance of the point to which the rays tend before *refraction*, from the refracting ſurface DE (*fig.* 110.) to the diſtance of the eye GL from the ſame, and of the diſtance GM of the object AB from the eye, to its diſtance FM from a point F, to which the rays tend before *refraction*.

Hence, 1. If the object AB be very remote, FM will be phyſically equal to GM; and, therefore, the real magnitude MB is to its apparent one MH, as GL to FL, or the diſtance of the eye G from the refracting plane to the diſtance of the point of convergence F from the ſame plane.

Hence, 2. *Objects under water, to an eye in the air, appear larger than they are; and to fiſhes under water, objects in the air appear leſs than they are.*

Laws of REFRACTION *in ſpherical ſurfaces, both concave, and convex.* 1. A ray of light DE (*fig.* 111.) parallel to the axis of a denſer ſphere, after a ſingle *refraction* in E, falls in with the axis in the point F, beyond the centre C.

For the ſemidiameter CE, drawn to the point of *refraction* E, is perpendicular to the ſurface KL, and is therefore the axis of *refraction*; but a ray out of a rarer into a denſer medium, we have ſhewn, is refracted towards the perpendicular, or the axis of *refraction*; therefore, the ray DE will converge to the axis of the ſphere AF; and will, therefore, at length concur with it, and that beyond the centre C, in F; becauſe the angle of *refraction* FEH is leſs than the angle of inclination CEH.

2. If a ray DE fall on a ſpherically convex ſurface of a denſer medium, parallel to its axis AF; the ſemidiameter CE will be to the refracted ray EF in the ratio of the ſine of the angle of *refraction* to the ſine of the angle of inclination; but the diſtance of the focus, or point of concurrence from the centre CF is to the refracted ray FE, in the ratio of the ſine of the refracted angle to the ſine of the angle of inclination.

3. If a ray DE fall on a denſer ſpherical convex ſurface KL, parallel to the axis AF, the diſtance of the focus from the refracting ſurface FB muſt be to its diſtance from the centre FC, in a ratio greater than that of the ſine of the angle of inclination to the ſine of the refracted angle. But if the rays be very near the axis, and the angle of inclination BCE be only of a few degrees, the diſtances of the focus from the ſurface, and the centre FB and FC, will be nearly in the ratio of the ſine of the angle of inclination to the ſine of the refracted angle.

Hence, 1. If the *refraction* be out of air into glaſs; in the caſe of rays near the axis, BF : FC : : 3 : 2. And in the caſe of rays remote from the axis, BF : FC ⊿ 3 : 2. Conſequently, in the former caſe, BC : BF : : 1 : 3; and in the latter BC : BF ∠ 1 : 3.

And, 2. If the *refraction* be out of air into water; in the former caſe, BF : FC : : 4 : 3; and in the latter, BF : FC ⊿ 4 : 3. Conſequently, in the former, BC : BF : : 1 : 4; and in the latter, BC : BF ∠ 1 : 4.

Hence, 3. Since the ſun's rays are parallel as to ſenſe, if they fall on the ſurface of a ſolid glaſs ſphere, or of a ſphere full of water, they will not concur with the axis within the ſphere; ſo that Vitellio was miſtaken, when he imagined, that the ſun's rays, falling on the ſurface of a cryſtalline ſphere, were refracted to the centre.

4. If a ray DE (*fig.* 112.) parallel to the axis FA, fall out of a denſer into a rarer ſpherical medium, after *refraction*, it will diverge from the axis; and the diſtance of the point of diſperſion, or the virtual focus from the centre of the ſphere, FC, will be to its ſemidiameter CE in the ratio of the ſine of the refracted angle to the ſine of the angle of *refraction*; but to the portion of the refracted ray drawn back, FE, it will be in the ratio of the ſine of the refracted angle to the ſine of the angle of inclination.

5. If a ray ED fall parallel to the axis AF on the ſpherically convex ſurface KL of a rarer medium, out of a denſer, the diſtance of the point of diſperſion from the centre FC, is to its diſtance from the ſurface FB, in a ratio greater than that of the ſine of the refracted angle to the ſine of the angle of inclination. But if the rays DE be very near the axis FA, the ratio will be very nearly the ſame with that of the ſine of the refracted angle to the ſine of the angle of inclination.

Hence, 1. If the *refraction* be out of glaſs into air, in the caſe of rays near the axis, FC : FB : : 3 : 2. Conſequently BC : FB : : 1 : 2. Therefore, in the caſe of rays more remote from the axis, FC : FB ⊿ 3 : 2.

2. If the *refraction* be out of water into air; in the former caſe FC : FB : : 4 : 3. Conſequently BC : FB : : 1 : 3; in the latter caſe therefore, FC : FB ⊿ 4 : 3.

3. Since then the point of diſperſion F is more remote from the refracting ſurface KL, if the rays proceed out of water, than if they paſs out of glaſs into air; parallel rays are leſs diſperſed in the former caſe than in the latter.

6. If a ray HE (*fig.* 111.) fall parallel to the axis FA, out of a rarer, on the ſurface of a ſpherically concave denſer medium; the refracted ray EN will be driven from the point of the axis F; ſo that FE will be to FC in the ratio of the ſine of the angle of inclination, to the ſine of the refracted angle.

7. If a ray EH fall parallel to the axis FB on the concave ſurface KL of a ſpherical denſer medium, from a rarer; the diſtance of the point of diſperſion from the refracting ſurface FB, is to its diſtance from the centre FC, in a ratio greater than that of the ſine of the angle of inclination, to the ſine of the refracted angle. But if the rays be very near the axis, and the angle BCE be very ſmall; BF will be to CF very nearly in the ratio of the ſine of the angle of inclination, to the ſine of the refracted angle.

Hence, 1. If the refraction be out of air into glaſs; in the caſe of rays near the axis, FB : FC : : 3 : 2; in the caſe of rays more remote from the axis, FB : FC ⊿ 3 : 2; conſequently in the former, BC : FC : : 1 : 2. And hence, in the latter, BC : FC ∠ 1 : 2.

Hence alſo, 2. If the *refraction* be out of air into water; in the caſe of rays near the axis, FB : FC : : 4 : 3. In the caſe of rays more remote from the axis, FB : FC ⊿ 4 : 3; conſequently in the firſt caſe, BC : FC : : 1 : 3. And hence, in the latter, BC : FC ⊿ 1 : 3.

And hence, 3. Since the point of diſperſion F is farther from the centre C, if the *refraction* be in water, than in air; the rays will be leſs diſperſed in the latter caſe than in the former.

8. If the ray HE (*fig.* 112.) fall parallel to the axis AF, from a denſer, upon the ſurface of a ſpherically concave rarer medium, the refracted ray will concur with the axis AF, in the point F; ſo that the diſtance of the point of concourſe from the centre CF, may be to the refracted ray FE in the ration of the ſine of the refracted angle, to the ſine of the angle of inclination.

9. If a ray HE fall parallel to the axis AF on the concave ſurface of a rarer medium out of a denſer, the diſtance of the focus from the centre FC will be to its diſtance from the refracting ſurface F B in a greater proportion than the ſine of the refracted angle to the ſine of the angle of inclination. But if the rays be very near the axis, FC will be to FB in the proportion of theſe ſines.

Hence, 1. If the *refraction* be out of glaſs into air; in the caſe of rays near the axis FC : FB : : 3 : 2; in the caſe of rays more remote from the axis, FC : FB ⊿ 3 : 2. Whence in the former caſe BC : FB : : 1 : 2.

2. If the *refraction* be out of water into air; in the caſe of rays near the axis, FC : FB : : 4 : 3; in the caſe of rays more remote, FC : FB ⊿ 4 : 3. Whence, in the former caſe, BC : FB : : 1 : 3. For the demonſtration of theſe ſeveral laws of *refraction*, we refer to Wolfius's Elem. Matheſ. &c. tom. iii. p. 179, &c. See alſo LENS.

REFRACTION *in a glaſs priſm.* If a ray of light DE (*fig.* 113.) fall obliquely out of air on a priſm ABC; being refracted towards the perpendicular, inſtead of proceeding to F, it will decline to G, i. e. towards a line HI, drawn perpendicular to the ſurface AB in the point of *refraction* E. Again, ſince the ray EG, paſſing out of the

the glaſs into air, falls obliquely on CB, it will be refracted to M, ſo as to recede from the perpendicular NGO. *And hence ariſe the various phenomena of the priſm.* See Colour.

Refraction *in a convex lens.* If parallel rays AB, CD, and EF (*fig.* 114.) fall on the ſurface of a lens 2 B 3 K, the perpendicular ray A B will paſs unrefracted to K, where emerging into air perpendicular, as before, it will proceed ſtraight to G. But the rays CD and EF falling obliquely out of air into glaſs, in D and F, will be refracted towards the axis of *refraction* (i. e. towards lines HI and LM drawn perpendicular to the refracting ſurface in the points of *refraction* D and F) and decline to Q and P. Again, emerging obliquely out of the glaſs into the ſurface of the air, they will be refracted from the perpendicular, and, therefore, DQ will not proceed to X, but to G; and FP, not to V, but to G: thus, likewiſe, might all the other rays, falling on the ſurface of the glaſs, be ſhewn to be refracted ſo as to meet the reſt about the point G. See Focus and Lens.

Hence the great property of convex glaſſes; viz. *that they collect parallel rays, or make them converge into a point.*

Refraction *in a concave lens.* Parallel rays AB, CD, and EF (*fig.* 115.) falling on a concave lens GBHIMK, the ray AB falling perpendicular on the glaſs at B, will paſs unrefracted to M; where being ſtill perpendicular, it will paſs into the air, without *refraction*, to L. But the ray CD, falling obliquely on the ſurface of the glaſs, will be refracted towards the perpendicular NDO, and proceed to Q; and the ray DQ, again falling obliquely out of the glaſs upon the ſurface of air, will be refracted from the perpendicular RQS, and proceed to V. After the ſame manner might the ray EF be ſhewn to be refracted to Y, and thence to Z.

Hence the great property of concave glaſſes; viz. *that they diſperſe parallel rays, or make them diverge.* See Lens.

Refraction *in a plane glaſs.* If parallel rays EF, GH, IL (*fig.* 116.) fall obliquely on a plane glaſs ABCD, the obliquity being the ſame in all, by reaſon of their paralleliſm, they will be all equally refracted towards the perpendicular; and accordingly being ſtill parallel at M, O, and Q, they will paſs out into the air equally refracted again from the perpendicular, and ſtill parallel.

Thus will the rays EF, GH, and IL, at their entering the glaſs, be inflected towards the right; and in their going out as much inflected to the left; ſo that the firſt *refraction* is here undone by the ſecond; though not ſo as that the object is ſeen in its true place. For the ray BQ, being produced back again, will not coincide with the ray LI, but will fall to the right thereof; and this the more as the glaſs is thicker; however, as to matter of colour, the ſecond *refraction* does really undo the firſt. See Colour.

Refraction *in iſland cryſtal.* See *Iſland* Crystal.

The particular laws of Refraction *in the ſeveral kinds of lenſes*, ſee under Lens.

Refraction, *cauſtics by.* See Curve *cauſtic.*

Refraction, in *Aſtronomy*, or Refraction *of the ſtars*, is an inflection of the rays of thoſe luminaries, in paſſing through our atmoſphere; whereby the apparent altitudes of the heavenly bodies are increaſed.

This *refraction* ariſes hence, that the atmoſphere is unequally denſe in different ſtages or regions; rareſt of all at the top, and denſeſt of all at bottom; which inequality, in the ſame medium, makes it equivalent to ſeveral unequal mediums. See Atmosphere.

Sir Iſaac Newton has ſhewn, that a ray of light, in paſſing from the higheſt and rareſt part of the atmoſphere, down to the loweſt and denſeſt, undergoes the ſame *refraction* that it would do in paſſing immediately, at the ſame obliquity, out of a vacuum into air of equal denſity with that in the loweſt part of the atmoſphere.

The effect of this *refraction* may be thus conceived. Suppoſe ZV (*Tab. Aſtronom. fig.* 49.) a quadrant of a vertical circle deſcribed from the centre of the earth T, under which is AB a quadrant of a circle on the ſurface of the earth, and GH a quadrant of the ſurface of the atmoſphere; and ſuppoſe SE a ray of light emitted by a ſtar at S, and falling on the atmoſphere at E. This ray coming out of the ethereal medium, which is much rarer than our air, or perhaps out of a perfect vacuum, and falling on the ſurface of the atmoſphere, will be refracted towards the perpendicular; and ſince the upper air, again, is rarer than that nearer the earth, and grows ſtill denſer as it approaches us; the ray, in its progreſs, will be continually refracted, ſo as to arrive at the eye in the curve line EA.

Suppoſing, then, the right line AF to be a tangent to the arch in A, the ray will enter the eye A, according to the direction of AF. And ſince objects are always ſeen in that line according to the direction whereof the rays enter the eye, the ſtar will appear in AF; that is, in the heavens at Q, which is nearer the zenith than the ſtar really is.

Hence ariſe the phenomena of the crepusculum, or twilight. See Atmosphere.

And hence, alſo, it is, that the moon is ſometimes ſeen eclipſed, when ſhe is really below the horizon, and the ſun above it.

That there is a real *refraction* of the ſtars, &c. is deduced not only from phyſical conſiderations, and from arguments *à priori* and *a ſimilitudine*; but alſo from preciſe aſtronomical obſervations: thus,

The diſtance of the two ſtars, Spica Virginis and the Lion's Tail, when near the meridian, or even when near the weſt, is conſtantly found 35° 2′; but when the Lion's Tail is riſen in the eaſt 34° 0′ high, Spica Virginis is obſerved to be in almoſt the ſame vertical circle. Add to this an obſervation of the Dutch, who wintered at Nova Zembla in 1596, in the latitude of 76°, from whom the ſun totally diſappeared on the third of November; and again began to appear on the twenty-fourth of January, which was ſeventeen days ſooner than he ſhould have returned, according to aſtronomical calculations; as is obſerved by Kepler in his Aſtr. Opt. p. 138. Some have thought that the Hollanders miſreckoned either their latitudes or their time; but their accounts ſeem too accurate to admit of ſuch a ſuſpicion. The cauſe of this extraordinary *refraction* was probably the very great condenſation of the air, in that extremely cold region, during a night of above three months continuance. Nor muſt it be omitted, that Charles XI. king of Sweden, being, in 1694, in Tornou, in Weſt Bothnia, in the latitude of 65° 43′, obſerved that the ſun never ſet between the fourteenth and fifteenth day of June, but was viſible in the middle of the night. The following year he appointed two mathematicians, Bilembergius and Spolius, to obſerve the ſame more accurately; who accordingly found, that at Tornou, in the middle of the night between the tenth and eleventh of June, the ſun was ¼ of his diameter above the horizon; and on the fourteenth of June, at Kangis, in the latitude of 66° 15′, they found the ſun at midnight two diameters above the horizon. Acta Erudit. A. D. 1697. p. 93.

Hence it is argued, that as light is propagated in right lines, no rays could reach the eyes from a luminary below the horizon, unleſs they were deflected out of their courſe, at their entrance into the atmoſphere; it is evident, therefore, that the rays are refracted in paſſing through the atmoſphere. Hence the ſtars appear higher by *refraction* than they really are; ſo that to bring the obſerved or apparent altitudes to the true ones, the quantity of *refraction* muſt be ſubtracted.

And hence, as the ancients were unacquainted with the *refraction*, reckoning upon too great altitudes, it is no wonder they ſometimes committed conſiderable errors.

From the doctrine of *refractions* it appears, that we never ſee the real ſun riſing or ſetting, but only a phantom, or image, thereof; the ſun himſelf being at that time hid below the horizon. So that *refraction* lengthens the day and ſhortens the night, by making the ſun appear above the horizon a little before his riſing, and a little after his ſetting. *Refraction* alſo makes the moon and ſtars appear to riſe ſooner and ſet later than they really do. The apparent diameter of the ſun or moon is about half a degree: the horizontal *refraction* is a little more than this quantity; whence the ſun and moon appear wholly above the horizon when they are entirely below it.

And from the obſervations juſt mentioned, it follows, that the *refractions* are greater nearer the pole than at leſſer latitudes, cauſing the ſun to appear ſome days above the horizon, when he is really below it; doubtleſs, from the greater denſity of the atmoſphere, and the greater obliquity of the incidence.

M. de la Hire aſſures us, he could never find any difference in the meridian altitudes of the ſtars; ſo that the *refractions* remain always the ſame; though he owns, near the horizon, the different conſtitution of the air, &c. may occaſion ſome variations in the *refractions*.

Stars in the zenith are not ſubject to any *refraction*. Thoſe in the horizon have the greateſt of all. From the horizon the *refraction* continually decreaſes to the zenith; all which follows hence, that in the firſt caſe the rays are perpendicular; in the ſecond their obliquity is the greateſt, and they paſs through the largeſt ſpace of the lower and denſer part of the air, and through the thickeſt vapours; and in the third, the obliquity is continually increaſing.

The horizontal *refraction* being the greateſt is the cauſe of the ſun and moon appearing of an oval form, at their riſing and ſetting; for the lower edge of each being more refracted than the upper edge, the perpendicular diameter is ſhortened, whereas *refraction* does not ſhorten the tranſverſe diameter: beſides, the lower edge ſuffering the greateſt *refraction*, the horizontal ſun or moon does not appear a complete ellipſis, but the lower half is part of a more oblong oval than the upper half. Hence alſo, if we take with an inſtrument the diſtance of two ſtars when they are in the ſame vertical and near the horizon, we ſhall find it conſiderably leſs than if we meaſure it when they are both at ſuch a height as to ſuffer little or no *refraction*; becauſe the lower ſtar is more elevated than the higher. There is alſo another alteration made by *refraction* in the apparent diſtance of ſtars: if two ſtars are in the ſame almicantar, or circle parallel to the horizon, their apparent diſtance is leſs than the true; for ſince *refraction* makes each of them higher in the vertical or azimuth in which they appear, it muſt bring them into parts of the vertical where they come nearer to one another; becauſe all vertical circles converge and meet in the zenith. This contraction of diſtance, according to Dr. Halley (Phil. Tranſ. Nº 368.) is at the rate of at leaſt one ſecond in a degree; ſo that, e. gr. if the diſtance between two ſtars in a poſition parallel to the horizon meaſures 30°, it is at moſt to be reckoned only 29° 59′ 30″.

The air is condenſed, and, conſequently, *refraction* is increaſed by cold; and, therefore, it is greater in cold countries than in hot; it is alſo greater in cold weather than in hot, in the ſame country; and the morning *refraction* is greater than that of the evening, becauſe the air is rarefied by the heat of the ſun in the day, and condenſed by the coldneſs of the night. *Refraction* is alſo ſubject to ſome ſmall variations at the ſame time of the day in the fineſt weather.

Fa. Laval, in 1710, January 22, obſerved the meridian altitude of the ſun to be 70° 25′ 50″; and, on the 23d of June he obſerved the ſame to be 70° 26′ 0″; which is 10″ more, that ſhould be leſs. Having met with ſome like obſervations before, he takes occaſion to ſuſpect the *refraction* to be varied according to the different winds which blow from the different quarters. When the north-weſt wind blows, he thinks the *refraction* is the greateſt; and adds, from obſervations made at St. Baume and St. Pilon, that the *refraction*, at twenty-four fathoms above the ſurface of the ſea, is double that at ſix hundred fathoms. Huygens long ago obſerved the *refraction* to be changed every hour; though his experiments were made at very little altitudes, and in terreſtrial objects

At the ſame altitudes, the ſun and ſtars all undergo the ſame *refraction*; for at equal altitudes the incident rays have the ſame inclinations; but the ſines of the refracted angles are as the ſines of the angles of inclination, &c.

Indeed, Tycho Brahe, who firſt deduced the *refractions* of the ſun, moon, and fixed ſtars, from obſervation, and whoſe table of the *refraction* of the ſtars is not much different from thoſe of Flamſteed and Newton, except near the horizon, makes the ſolar *refractions* about 4′ greater than thoſe of the fixed ſtars; and the lunar *refraction* ſometimes greater than thoſe of the ſtars, and ſometimes leſs. But the theory of *refractions* (which we have obſerved is owing to Snellius) was not fully underſtood in his age. De la Hire and Caſſini find the *refraction* the ſame in all.

Tycho Brahe will have the *refractions* of the ſun to vaniſh at the altitude of 46°, thoſe of the moon at 45°, and thoſe of the fixed ſtars at 20°; but Caſſini has found, that they reach even to the zenith. Indeed, Tycho repreſented all the *refractions* leſs than they are, except the horizontal one, which he made too great; for he makes the horizontal *refraction* in the ſun 34′, in the moon 33′, in the fixed ſtars 30′. De la Hire makes it 32′, and Caſſini 32′ 20″ in all the heavenly bodies. Tycho, again, makes the *refraction* of the ſun at 33° altitude, to be 55″; but Caſſini 1′ 30″.

The following table ſhews the *refractions* of the heavenly bodies at the ſeveral degrees of altitude, according to Newton, Flamſteed, and Bradley.

Apparent alt.		Refractions.					
		Newton		Flamſt.		Bradley	
°	′	′	″	′	″	′	″
0	0	33	45	33	0	33	0
0	5	——		——		32	10
0	10	——		——		31	22
0	15	30	24	——		30	35
0	20	——		——		29	50
0	30	27	35	26	38	28	22
0	32	——		——		28	5
0	36	——		——		27	30
0	40	——		——		27	0
0	45	25	11	——		——	
0	50	——		——		25	42
1	0	23	7	23	22	24	29
1	10	——		——		23	20
1	15	21	2	——		——	
1	20	——		——		22	15
1	30	19	46	20	17	21	15
1	40	——		——		20	16
1	45	18	22	——		——	
1	50	——		——		19	25
2	0	17	8	17	26	18	35
2	10	——		——		17	48
2	20	——		——		17	4
2	30	15	2	15	15	16	24
2	40	——		——		15	45
2	50	——		——		15	9
3	0	13	20	13	23	14	36
3	10	——		——		14	4
3	20	——		——		13	34
3	30	11	57	11	53	13	6
3	40	——		——		12	40
3	50	——		——		12	15
4	0	10	48	10	39	11	51
4	10	——		——		11	29
4	20	——		——		11	8
4	30	9	50	9	38	10	48
4	40	——		——		10	29
4	50	——		——		10	11
5	0	9	2	8	48	9	54
5	10	——		——		9	38
5	20	——		——		9	23
5	30	8	21	——		9	8
5	40	——		——		8	54
5	50	——		——		8	41
6	0	7	45	7	26	8	28
6	10	——		——		8	15
6	20	——		——		8	3
6	30	7	14	——		7	51
6	40	——		——		7	40
6	50	——		——		7	30
7	0	6	47	6	25	7	20
7	10	——		——		7	11
7	20	——		——		7	2
7	30	6	22	——		6	53
7	40	——		——		6	45
7	50	——		——		6	37
8	0	6	0	5	37	6	29
8	10	——		——		6	22
8	20	——		——		6	15
8	30	5	40	——		6	8
8	40	——		——		6	1
8	50	——		——		5	55
9	0	5	22	5	2	5	48
9	10	——		——		5	42
9	20	——		——		5	36
9	30	5	6	——		5	31
9	40	——		——		5	25
9	50	——		——		5	20
10	0	4	52	4	33	5	15
10	15	——		——		5	7
10	30	——		——		5	0
10	45	——		——		4	53
11	0	4	27	4	6	4	47
11	15	——		——		4	40
11	30	——		——		4	34
11	45	——		——		4	29
12	0	4	5	3	45	4	21
12	20	——		——		4	16
12	40	——		——		4	9
13	0	3	47	3	29	4	3
13	20	——		——		3	57
13	40	——		——		3	51
14	0	3	31	3	13	3	45
14	20	——		——		3	40
14	4	——		——		3	35
15	0	3	17	3	0	3	30
15	30	——		——		3	24
16	0	3	4	2	48	3	17
16	30	——		——		3	10
17	0	2	53	2	38	3	4
17	30	——		——		2	59
18	0	2	43	2	29	2	54
18	30	——		——		2	49
19	0	2	34	2	21	2	44
19	30	——		——		2	39
20	0	2	26	2	14	2	35
20	30	——		——		2	31
21	0	2	18	2	7	2	27
21	30	——		——		2	24
22	0	2	11	2	1	2	2[illegible]
23	0	2	5	1	55	2	14
24	0	1	59	1	50	2	7
25	0	1	54	1	45	2	2
26	0	1	49	1	40	1	56
27	0	1	44	1	36	1	51
28	0	1	40	1	31	1	47
29	0	1	36	1	27	1	42
30	0	1	32	1	23	1	38
31	0	1	28	1	20	1	35
32	0	1	25	1	17	1	31
33	0	1	22	1	14	1	28
34	0	1	19	1	11	1	24
35	0	1	16	1	9	1	21
36	0	1	13	1	7	1	18
37	0	1	11	1	5	1	16
38	0	1	8	1	2	1	13
39	0	1	6	1	0	1	10
40	0	1	4	0	58	1	8
41	0	1	2	0	56	1	5
42	0	1	0	0	54	1	3
43	0	0	58	0	52	1	1
44	0	0	56	0	50	0	59
45	0	0	54	0	48	0	57
46	0	0	52	0	46	0	55
47	0	0	50	0	45	0	53
48	0	0	48	0	44	0	51
49	0	0	47	0	42	0	49
50	0	0	45	0	40	0	48
51	0	0	44	——		0	46
52	0	0	42	——		0	44
53	0	0	40	——		0	43
54	0	0	39	——		0	41
55	0	0	38	0	34	0	40
56	0	0	36	——		0	38
57	0	0	35	——		0	37
58	0	0	34	——		0	35
59	0	0	32	——		0	34
60	0	0	31	0	29	0	33
61	0	0	30	——		0	32
62	0	0	28	——		0	30
63	0	0	27	——		0	29
64	0	0	26	——		0	28
65	0	0	25	——		0	26
66	0	0	24	——		0	25
67	0	0	23	——		0	24
68	0	0	22	——		0	23
69	0	0	21	——		0	22
70	0	0	20	0	19	0	21
71	0	0	19	——		0	19
72	0	0	18	——		0	18
73	0	0	17	——		0	17
74	0	0	16	——		0	16
75	0	0	15	——		0	15
76	0	——		——		0	14
77	0	——		——		0	13
78	0	——		——		0	12
79	0	——		——		0	11
80	0	——		0	9	0	10
81	0	——		——		0	9
82	0	——		——		0	8
83	0	——		——		0	7
84	0	——		——		0	6
85	0	——		——		0	5
86	0	——		——		0	4
87	0	——		——		0	3
88	0	——		——		0	2
89	0	——		——		0	1
90	0	——		0	0	0	0

The table of Mr. Flamſteed is taken from his Hiſtoria Cæleſtis, vol. i. p. 396, and is the reſult of his own obſervations. Sir Iſaac Newton's table was firſt publiſhed in the Philoſophical Tranſactions, Nº 368, for May 1721; Dr. Bradley's is publiſhed in the tables requiſite to be uſed with the Aſtronomical and Nautical Ephemeris, 1766, and is adapted to a mean temperature of the air at Greenwich; the height of the barometer being 29 $\frac{6}{10}$ inches, and that of Fahrenheit's thermometer 50 degrees, or 30 inches of the barometer, and 55 of the thermometer, which gives the ſame reſult: it is deduced from a rule which he invented, and by him adapted to his obſervations, viz. that the *refraction* at any altitude is to 57″, the *refraction* at the altitude of 45°, as the tangent of the apparent zenith diſtance leſſened by three times the *refraction* taken out of any common table is to the radius. In order to allow for the variations of *refraction* in different temperatures of the air, he has ſtated another rule, derived alſo from or confirmed by his own obſervations, that the true *refraction* is to that expreſſed by his firſt rule, or contained in this table, in a direct ratio of the altitude of the barometer to $29\frac{6}{10}$ inches, and in an inverſe ratio of the altitude of the thermometer increaſed by 350 to the number 400.

It is evident that all obſerved altitudes of the heavenly bodies ought to be diminiſhed by the numbers taken out of this table, particularly the meridian altitudes of the ſun and ſtars, &c. the altitudes of the ſun and ſtars deſigned for computing the apparent time of the day, and the altitudes of the ſun taken for computing his azimuth. Where the utmoſt degree of accuracy is required, there are other tables and rules formed by Mr. Lyons, and publiſhed in the tables juſt cited.

The *refraction* diminiſhes the right and oblique aſcenſions of a ſtar, and increaſes the deſcenſions; it increaſes the northern declination, and diminiſhes the ſouthern.

Refraction, in the eaſtern part of the heavens, diminiſhes the longitude of a ſtar; but it increaſes the ſame in the weſtern part of the heavens; it diminiſhes the ſouthern latitude alſo, and increaſes the northern.

The *refraction*, therefore, is by no means to be overlooked in aſtronomy. It is abſolutely neceſſary to the determining of the phenomena of the heavenly motions to any degree of accuracy; ſo that the ancient aſtronomy, where no regard was had to it, muſt of neceſſity have been exceedingly defective on this very account.

To obſerve the REFRACTION *of a ſtar*, &c. 1. Obſerve the meridian altitude of a ſtar near the zenith; whence the latitude of the place being known, the true declination of the ſtar is eaſily had, the ſtar being now void of any ſenſible *refraction*. 2. Obſerve the altitude of the ſame ſtar in any other degree, and note the time by a pendulum. 3. For the given time of obſervation, from the declination of the ſtar compute its true altitude.

This being thus found leſs than the altitude obſerved, ſubtract the one from the other; and the remainder is the *refraction* for that moment, in that degree

REFRACTION *of altitude* is an arch of a vertical circle, as S *ſ* (*Tab. Aſtronomy, fig.* 28.) whereby the altitude of a ſtar SE is increaſed by the *refraction*.

REFRACTION *of declination*, is an arch of a circle of declination, as *ſ* I, whereby the declination of a ſtar DS is increaſed or diminiſhed by the *refraction*.

REFRACTION *of aſcenſion and deſenſion* is an arch of the equator D*d*, whereby the aſcenſion and deſcenſion of a ſtar, whether right or oblique, is increaſed or diminiſhed, by means of the *refraction*.

REFRACTION *of longitude* is an arch of the ecliptic T *t*, *fig.* 29. wher by the longitude of a ſtar is increaſed or diminiſhed by means of the *refraction*.

REFRACTION *of latitude* is an arch of a circle of latitude *ſ*I, whereby the latitude of a ſtar TS is increaſed or diminiſhed by means of *refraction*.

REFRACTION, in *Commerce*, is a term ſometimes uſed by merchants, where there has been an overſight in an account, to the prejudice of a perſon; who thereupon demands reſtitution of ſo much, added or omitted by miſtake.

You muſt make me a *refraction* of five pounds forgot in your account. I will deduct or make you a *refraction* of 20*s*. charged inadvertently in my bill.

REFRACTORY, in *Chemiſtry*. See an explication of the term under APYROUS.

REFRANGIBLE, whatever is capable of being refracted. See REFRANGIBILITY.

REFRANGIBILITY *of light*, the diſpoſition of the rays to be refracted.

A *greater* or *leſs refrangibility* is a diſpoſition to be more or leſs refracted, in paſſing at equal angles of incidence, into the ſame medium.

That the rays of light are differently *refrangible*, is the foundation of ſir Iſaac Newton's whole theory of light and colours. The truth of the principle will appear from the following experiments:

1. Let EG (*Tab.* VI. *Optics*, *fig.* 117.) repreſent the window ſhutter of a dark room, and F a hole in it, through which the light is tranſmitted to the priſm ABC, which refracts it towards P Γ, where it appears in an oblong form; its length being about five times greater than its breadth, and exhibiting the various colours of the rainbow. In *fig.* 118. *a g b* repreſents a ſecond priſm, which refracts the light back again to Q, where the image is round; whereas, without the interpoſition of this ſecond priſm, the light would have proceeded to PΓ, and, conſequently, have been oblong as before. In this experiment ſir Iſaac Newton took care that the plane *a g* was placed exactly parallel to BC, and alſo *b g* to AC, that the rays might be equally refracted, though in contrary ways, by both priſms. He alſo obſerved, that both priſms muſt be placed very near to one another; for if their diſtance be ſo great, that colours begin to appear in the light, before its incidence on the ſecond priſm, thoſe colours will not be deſtroyed by the refraction of that priſm.

2. Having placed one of two boards behind the priſm at the window, ſo that the light might paſs through a ſmall hole made in it for the purpoſe, and fall on the other board at the diſtance of about twelve feet, a hole being made in it to admit the paſſage of the incident light, he then placed another priſm behind the ſecond board, ſo that the light which was tranſmitted through both the boards might paſs through that alſo, and be again refracted before it arrived at the wall. This being done, he took the firſt priſm in his hand, and turned it about its axis ſo much as to make the ſeveral parts of the image, caſt on the ſecond board, ſucceſſively to paſs through the hole in it, that he might obſerve to what places on the wall the ſecond priſm would refract them; and he ſaw, by the change of thoſe places, that the light tending to that end of the image, towards which the refraction of the firſt priſm was made, did, in the ſecond priſm, ſuffer a refraction conſiderably greater than the light which tended to the other end. The true cauſe, therefore, of the length of that image was diſcovered to be no other, than that light is not ſimilar or homogeneal, but that it conſiſts of rays, ſome of which are more *refrangible* than others; ſo that without any difference in their incidence on the ſame medium, ſome of them ſhall be more refracted than others; and therefore, that according to their particular degrees of *refrangibility*, they will be tranſmitted through the priſm to different parts of the oppoſite wall.

To make this capital experiment, which ſir Iſaac Newton himſelf juſtly calls the *experimentum crucis*, let SF (*fig.* 119.) repreſent a ray of the ſun, which, after paſſing through a hole in the window-ſhutter F, is received by the priſm ABC, cloſe behind which is placed a board DE, with a hole in it at G, to admit any of the rays after they have been ſeparated by the priſm; then *d e* will repreſent the other board, placed at a conſiderable diſtance from the former, with a hole in it *g*, to receive any part of the light tranſmitted through the other board. Behind this ſecond board is placed another priſm, *a b c*, through which different rays of light, falling upon it in the very ſame place, and with preciſely the ſame angle of incidence, will be refracted higher or lower, on the oppoſite wall M N. This experiment was conducted with the utmoſt circumſpection and accuracy; and it is obſerved, that neither the different magnitude of the hole in the window-ſhutter, nor the different thickneſſes of the priſm, at the place where the rays paſſed through it, nor the different inclinations of the priſm to the horizon, nor the different matter of the priſms, made any ſenſible change in the length of the image.

3. In order farther to eſtabliſh this famous hypotheſis of the different *refrangibility* of the rays of light, he held a priſm in a beam of the ſun, which was tranſmitted into the room through a hole in the window-ſhutter, ſo that its axis might be perpendicular to that beam; and having turned the priſm about its axis to make the image aſcend and deſcend, and when it ſeemed to be ſtationary between theſe contrary motions, he fixed the priſm ſo that the refractions of both ſides might be equal to each other. In this ſituation he looked at the hole through the priſm, and obſerved the length of its refracted image to be many times greater than its breadth: the moſt refracted part of it was violet, the leaſt refracted red, the middle parts blue, green, and yellow, in order. The ſame thing happened when he removed the priſm out of the ſun's light, and looked through it upon the hole ſhining by the light of the clouds beyond it.

4. Conſidering that if the image of the ſun ſhould be drawn into an oblong form, either by a dilatation of every ray, or by any other caſual inequality of the refractions, the ſame oblong image would, by a ſecond refraction, made ſideways, be drawn out as much in breadth, he placed a ſecond priſm immediately after the firſt, in an oblique poſition with reſpect to it, that it might again refract the light of the beam of the ſun's light, which came to it through the firſt priſm; ſo that in the firſt priſm, the beam would be refracted upwards, and in the ſecond ſideways. But he found that the breadth of the image was not increaſed by the refraction of the ſecond priſm, but only its upper part, which in the firſt priſm ſuffered the greateſt refraction, and appeared violet and blue, did again, in the ſecond priſm, ſuffer a greater refraction than the lower part of it, which was red and yellow, and this without any dilatation of the breadth of the image. Thus let S (*fig.* 120.) repreſent the ſun, F the hole in the window, ABC the firſt priſm, and DH the ſecond. If Y repreſent the round image of the ſun, made by a direct beam of light, when the priſms are taken away, P Γ will be the oblong image of the ſun, made by the ſame beam paſſing through the firſt priſm only, and *p t* will be the image made by the croſs refractions of both priſms together. Sometimes he placed a third priſm after the ſecond, and ſometimes a fourth after the third;

by all which the image might be often refracted ſideways, but the rays which were more refracted than the reſt in the firſt priſm, were alſo more refracted in all the others, and that without any dilatation of the image ſideways; and, therefore, thoſe rays, on account of their conſtancy of a greater refraction, he called the more *refrangible* ones. He obſerves, that all the rays, which are equally *refrangible*, fall upon a circle anſwering to the ſun's diſk. If the ſecond priſm DH (*fig.* 121.) be placed not immediately after the firſt, but at ſome diſtance from it, ſo that the light from the firſt priſm may fall upon it in the form of an oblong ſpectrum *q r*, parallel to this ſecond priſm, and may be refracted ſideways, to form the oblong image *p t* upon the wall, it will be found that this image *p t* is inclined to the image PT, which the firſt priſm would have formed without the ſecond; the blue ends, P and *p*, being farther diſtant from one another than the red ones, T and *t*; and, conſequently, the rays which go to the blue end *q* of the image *q r*, and which, therefore, ſuffer the greateſt refraction in the firſt priſm, are again, in the ſecond priſm, more refracted than the reſt. Hence it appears, that the blue rays are more refracted than the red ones, and that there is, likewiſe, unequal refraction in the intermediate rays; and upon the whole it appears, that the ſun's rays have not all the ſame *refrangibility*, and, conſequently, are not of the ſame nature. It is alſo obſerved, that thoſe *rays* which are moſt *refrangible* are alſo moſt reflexible. See the proof of this under REFLEXIBILITY. Newton's Optics, p. 22, &c. ed. 3.

The difference between *refrangibility* and reflexibility, was firſt diſcovered by ſir Iſaac Newton, in 1671-2, and communicated in a letter to the Royal Society, dated February 6, 1671 2, and publiſhed in the Philoſophical Tranſactions, N° 80. p. 3075, and from that time vindicated by him, from the objections of ſeveral authors; particularly F. Pardies, M. Mariotte, Fr. Linus, or Lin, and other gentlemen at the Engliſh college at Leige; and at length it was more fully laid down, illuſtrated, and confirmed, by a great variety of experiments, in his excellent treatiſe of Optics.

But farther, as not only thoſe colours of light produced by refraction in a priſm, but alſo thoſe reflected from opake bodies, have their different degrees of *refrangibility* and reflexibility; and as a white light ariſes from a mixture of the ſeveral coloured rays, the ſame great author concluded all homogeneous light to have its proper colour, correſponding to its degree of *refrangibility*, and not capable of being changed by any reflections, or any refractions; that the ſun's light is compoſed of all the primary colours; and that all compound colours ariſe from a mixture of the primary ones, &c.

The different degrees of *refrangibility* he conjectures to ariſe from the different magnitude of the particles whereof the different rays conſiſt. Thus the moſt refrangible rays, i. e. the red ones, he ſuppoſes to conſiſt of the largeſt particles; the leaſt refrangible, i. e. the violet rays, of the ſmalleſt particles; and the intermediate rays, yellow, green, and blue, of particles of intermediate ſizes. See COLOUR.

For the method of correcting the effect of the different *refrangibility* of the rays of light in glaſſes, ſee ABERRATION and TELESCOPE.

REFRESHMENT, *quarters of*. See QUARTERS.

REFRET, in *Muſic*. See RITORNELLO.

REFRIGERATIVE, in *Medicine*, a remedy which refreſhes the inner parts, by cooling them. Such, uſually, are ptiſans, clyſters, &c.

REFRIGERATORY, *refrigeratorium*, in *Chemiſtry*, a copper veſſel filled with cold water, ſoldered round the capital of an ALEMBIC, to cool and condenſe the vapours raiſed thither by the fire, and to convert them into a liquor, to be diſcharged thence through the beak. See *Tab. Chemiſtry, fig.* 1. E.

The water in the *refrigeratory* is to be changed from time to time, as it begins to grow warm.

Sometimes they content themſelves with wrapping a wet cloth about the head of the alembic, inſtead of a *refrigeratory*; but the more uſual method now is, to ſupply the place of the *refrigeratory* by a worm, or ſpiral pipe, running through a tub of cold water.

Diſtillation chiefly conſiſts in evaporation and *refrigeration*.

REFUGE, *refugium*, in our *Old Cuſtoms*, a SANCTUARY, or ASYLUM.

At Paris there is an hoſpital called the *Refuge*, wherein diſſolute women are ſhut up.

REFUGEES, French proteſtants, who, by the revocation of the edict of Nantes, in 1685, have been conſtrained to quit their country, and retire for *refuge* into Holland, Germany, England, &c. to ſave themſelves from the neceſſity of abandoning their religion.

REFUSAL, in *Law*, is where one hath by law a right and power of having or doing ſomething of advantage to him, and he *refuſeth* it. An executor may *refuſe* an executorſhip; but the *refuſal* ought to be before the ordinary: if an executor be ſummoned to accept or *refuſe* the executorſhip, and he doth not appear upon the ſummons and prove the will, the court may grant adminiſtration, &c. which ſhall be good in law till ſuch executor hath proved the will; but no man can be compelled to take upon him the executorſhip, unleſs he hath intermeddled with the eſtate. Where there are ſeveral executors and they all *refuſe*, none of them ſhall adminiſter afterwards; but if there is a *refuſal* by one, and the other proves the will, the *refuſing* executor may adminiſter when he will, during the life of his co-executor.

There is a *refuſal* of a clerk preſented to a church, for want of literature, &c. and if a biſhop once refuſes a clerk for inſufficiency, he cannot accept of him afterward, if a new clerk is preſented. In action of trover and converſion, a demand of the goods, and *refuſal* to deliver them muſt be proved, &c.

REFUTATION, *refutatio*, in *Rhetoric*, that part of the anſwer made to an opponent, which diſproves what had been advanced by him.

REGAL, *regius*, or *regalis*, ſomething belonging to a king. *Regal* is of the ſame import with ROYAL; the former being formed of the Latin *rex*; the other of the French *roy, king*.

REGAL *fiſh*. See ROYAL *fiſh*.

REGAL, in *Muſic*. See RIGOLL.

REGAL *ſuit*. See SUIT.

REGALE, in the French *Juriſprudence*, is a right belonging to the king over all benefices in that kingdom.

The *regale* conſiſts in enjoying the revenues of biſhopricks, during the vacancy of their ſees, and of preſenting to the benefices dependent thereon, which become vacant during that time, and till a ſucceſſor have taken the oath of fidelity, and have procured letters patent, to ſecure him from the *regale*.

The enjoyment of the fruits of the ſee is called the *temporal regale*; that of preſenting the benefices, the *ſpiritual regale*.

Some refer the origin of the *regale* to the time of Clovis; and ſay, the clergy granted this privilege to the king upon his defeating the Viſigoths; others alledge, that pope Hadrian I. gratified Charlemagne with it, in a council held at Rome It is obſerved by others, that the *regale* was originally no more than a ward, or adminiſtration; and that the kings were only depoſitaries of the fruits of the vacant biſhopricks; and appointed œconomi to look to them during the vacancy.

It is added that the kings of the firſt and ſecond race never enjoyed any ſuch privilege; and that it was only introduced in the twelfth century, in favour of inveſtitures.

Whatever was the origin of the *regale*, it occaſioned a very important and warm debate between Lewis XIV. and pope Innocent XI. which began about the year 1678, and was carried on with great animoſity and contention for ſeveral years after. Lewis was deſirous, that all the churches in his dominion ſhould be ſubject to the *regale*. Innocent pretended, on the contrary, that his claim could not be granted with ſuch univerſality; nor would he conſent to any augmentation of the prerogatives of this nature that had formerly been enjoyed by the kings of France. Lewis ſummoned, for ſettling this diſpute, the famous aſſembly of thirty-five biſhops, and as many deputies of the ſecond order, which met at Paris in the year 1682, and which extended the *regale* to all the churches in France, without exception. In this convocation the ancient doctrine of the Gallican church, that declares the power of the pope to be merely ſpiritual, and alſo inferior to that of a general council, was drawn up in four propoſitions, which were ſolemnly adopted by the whole aſſembly, and were propoſed to the whole body of the clergy, and to all the univerſities through the kingdom, as a ſacred and inviolable rule of faith.

REGALE, *regalio*, a magnificent treat, or entertainment, given to ambaſſadors, or other perſons of diſtinction, to entertain or do them honour.

In Italy it is uſual at the arrival of any traveller of eminence, to ſend him a *regale*, that is, a preſent of fruits, ſweetmeats, &c. by way of refreſhment.

REGALIA, in *Law*, the royal rights or prerogatives of a king.

Theſe are reckoned by civilians to be ſix. 1. Power of judicature. 2. Power of life and death. 3. Power of war and peace. 4. Maſterleſs goods, as waifs, eſtrays, &c. 5. Aſſeſſments. 6. Minting of money.

REGALIA is alſo uſed for the ſeveral parts of the apparatus of a coronation: as the ſceptre with the croſs; ſceptre with the dove; St. Edward's ſtaff; four ſeveral ſwords; the globe, and the orb with the croſs, &c. uſed at the coronation of our kings.

Regalia *of the church* are thoſe rights and privileges which cathedrals, &c. enjoy by grants, and other conceſſions of kings.

Regalia is ſometimes alſo uſed for the patrimony of a church; as, *regalia Sancti Petri.* And more particularly, for ſuch lands and hereditaments as have been given by kings to the church.

Cæpimus in manum noſtram baroniam & regalia *quæ archiepiſcopus Eborum de nobis tenet.* Pryn. Lib. Ang.

Theſe *regalia*, while in poſſeſſion of the church, were ſubject to the ſame ſervices as all other temporal inheritances; and, after the death of the biſhop, they reverted to the king, till he inveſted another with them; which, in the reigns of William the Conqueror, and ſome of his immediate ſucceſſors, was frequently delayed, and as oft did the biſhops make complaint thereof, as appears from Malmſbury, Neubrigenſis, &c.

This laſt author ſays, that great complaint was made againſt Henry II. *Quod epiſcopatus vacantes, & provenientia perciperet commoda, diu vacare voluit, & eccleſiaſticis potius uſibus applicanda in fiſcum redegit.*

Regalia *facere* is uſed for the biſhop's doing homage, or fealty, to the king, when he is inveſted with the *regalia.* Thus Malmſbury, in Anſelm: Regalia *pro more iſtius temporis faciens principi* vii. *kalend Octobris Cantuariæ aſſedit.*

REGALITIES. See Royalties.

REGARD *of the foreſt*, the overſight, or inſpection, thereof; or the office and province of the *regarder*; which is, to go through the whole foreſt, and every bailiwick thereof, before the holding of the ſeſſions of the foreſt, or juſtice-ſeat, to ſee and enquire of the treſpaſſes therein, and for the ſurvey of dogs. A court for this purpoſe is to be holden every third year. See Expeditation, and Forest.

Ad vivendum, ad inquirendum, ad certificandum, &c. See Regarder.

Regard is alſo uſed for the extent of the *regarder's* charge, i. e. for the whole foreſt; or all the ground that is parcel thereof.

REGARDANT, in *Heraldry*, is underſtood of a lion, or other beaſt of prey, borne in a poſture of looking behind him, with his face towards his tail.

Others apply it to a beaſt which only ſhews the head, and ſome part of the neck, as moving from out of ſome diviſion of the coat into another. He bears azure, three bends, or, in a chief, argent, charged with a lion *regardant*, gules.

Regardant, *villain*, or **Regardant** *to the manor*, denotes an ancient ſervant or retainer to the lord; thus called, becauſe charged to do all baſe ſervices within the manor, to ſee the ſame freed of all filthy and loathſome things that might annoy it, &c. Coke upon Littleton, fol. 120.

REGARDER *of a foreſt*, **Regardator** *foreſtæ*, an ancient officer of the king's foreſt, whoſe buſineſs was every year, upon oath, to make a regard, i. e. to take a view of the foreſt limits; alſo to inquire of all offences and defaults committed by the foreſters within the foreſt, and of all the concealments of them; and whether all the other officers did execute their reſpective duties or not.

Manwood refers this inſtitution to king Henry II. but Spelman thinks the name, at leaſt, was given ſince; and that they were the ſame with thoſe officers called *cuſtodes venationis.*

REGATTA is a name given, at Venice, to a kind of exhibition on the water, in which the gondoliers conteſt for ſuperiority in the art of rowing their gondolas.

A ſplendid entertainment, under this appellation, was exhibited on the Thames in 1775.

REGE *inconſulto*, in *Law*, is a writ, iſſued from the king to the judges, not to proceed in a cauſe which may prejudice the king, until he is adviſed. A *rege inconſulto* may be awarded, not only for the party to the plea, but upon ſuggeſtion of a ſtranger, on cauſe ſhewn that the king may be prejudiced by the proceeding, &c.

Rege *querela coram.* See Querela.

REGEL, or **Rigel**, a fixed ſtar of the firſt magnitude, in Orion's left foot. Its longitude, latitude, &c. ſee among the reſt of the conſtellation Orion.

REGENERATED *tartar.* See Tartar *regenerated.*

REGENERATION, in *Theology*, the act of being born again by a ſpiritual birth, or becoming a child of God: or it is that change of heart and life experienced by a perſon who forſakes a courſe of vice, and ſincerely embraces a life of piety and virtue.

When an infidel is converted, baptiſm is always adminiſtered as a ſign of *regeneration.*

REGENT, *regens*, a perſon who governs a kingdom during the minority or abſence of a king.

In France, the queen-mother has the regency of the kingdom, under the title of *queen-regent*, while the king is a minor. Some have urged, that women, being incapable of ſucceeding to that crown, were incapable of the regency; but cuſtom has declared in their favour.

Regent is alſo uſed for a profeſſor of arts and ſciences, who holds a claſs, or ſet of pupils, in a college.

The foreign univerſities are generally compoſed of doctors, profeſſors, and *regents.* *Regent* and ſcholar are relative terms. See Tutor.

Regent is generally reſtrained to the lower claſſes, as *regent* of rhetoric, *regent* of logic, &c. thoſe of philoſophy are rather called profeſſors.

REGERENDARIUS, among the Romans, an officer who ſubſcribed and kept a regiſter of all petitions preſented to the præfect. Pitiſc. in voc.

REGESTOLA, in *Ornithology*, a name uſed, by ſome authors, for the mattagess, or larger butcher-*bird*, a very ſmall hawk, not exceeding the ſize of a common thruſh, but very fierce and voracious.

REGIA *aqua.* See Aqua.

Regia *via.* See Via.

Regia *villa.* See Villa.

REGICIDE, *regicida, a king-killer.* The term is alſo uſed for the act itſelf of murdering a king; of *rex, king*, and *cædo, I ſlay.*

Regicide is chiefly uſed with us in ſpeaking of the perſons concerned in the trial, condemnation, and execution, of king Charles I.

REGIFUGE, *Regifugium*, a feaſt held in ancient Rome on the ſixth of the calends of March, i. e. on our 24th of February, in memory of the expulſion of their kings, particularly of Tarquin's flying out of Rome on that day. Some will have the feaſt to bear this name from the *rex ſacrorum, king of the ſacrifices*, flying out of the comitia, or place of aſſembly, as ſoon as the ſacrifice was over, in imitation of the flight of Tarquin the Proud.

Some critics and antiquaries will have *Regifugium* the ſame with Fugalia; others hold them to be different.

REGIMEN, in *Medicine*, a rule or courſe of living, with regard to eating, drinking, clothing, and the like, accommodated to ſome diſeaſe, and to a particular courſe of medicine the patient is under.

The word is Latin, and ſignifies *government* or *rule.*

It is doubted whether the hot or cold *regimen* be moſt convenient in fevers. The hot *regimen*, which anciently obtained in the ſmall-pox, is now altogether diſuſed.

The *regimen* is very different in different countries. Bartholin ſays, a ſlice of bacon in Denmark, is a uſual diſh for a perſon in a high fever. See Diet and Food.

Regimen, in *Chemiſtry* and *Alchemy*, is the method of ordering and conducting any thing, that it may anſwer its intention.

Thus *regimen of fire* is the method of making and ordering fire, and the degrees thereof.

Regimen *of the work*, that is of the philoſophers ſtone, called *the work of patience*, is the rule and conduct to be obſerved to obtain projection.

There are three things, they ſay, to be chiefly regarded in the *regimen of the work.* The firſt, to adminiſter a gentle eaſy heat at the beginning of the coction.

The ſecond to continue this external heat according to the ſeaſon of the work, always obſerving four ſeaſons, as in the common and aſtronomical year; the beginning being the winter, the progreſs the ſpring, then ſummer, and laſtly autumn, which is the time of maturity and perfection of the ſtone; in all which the heat is to be augmented in proportion to the augmentation obſerved in nature.

It is to be added, that the work may not be begun in any ſeaſon; but regard is to be had to the ſeaſons of nature, leſt the winter of the work be found in the ſummer of the year, &c. Which, however, is to be underſtood of the day wherein the mercury is put in the ovum philoſophicum, not of that when it is begun to be ſet at liberty from the priſons which nature had incloſed it in.

The third is, that in augmenting the fire, the augmentation be not of a whole degree at once, the ſpirits being unable to bear ſuch violence; but a degree is to be divided into four parts, and one part is to be taken at a time.

All the operations of the firſt *regimen* are occult and inviſible: in the ſecond *regimen* comes putrefaction, which, they ſay, is the firſt ſenſible change, ſhewing itſelf by its black colour.

Regimen, or *government*, in *Grammar*, is that part of ſyntax or conſtruction, which regulates the dependency of words, and the alterations which one occaſions in another.

Thus, we ſay, the *regimen* of a verb active is an accuſative, i. e. a verb active governs an accuſative; or requires, that the noun, which receives its action, be in the accuſative caſe.

Prepoſitions have a *regimen*, i. e. they require certain caſes in the nouns they are prefixed to; by which they are diſtinguiſhed from adverbs, which have none.

The *regimen*, or conſtruction of government, is entirely arbitrary, and differs in all languages; one language forming its *regimen* by caſes, as the Latins and Greeks; others by particles in lieu thereof, as the Engliſh by *of*, *to*, &c. the French, Spaniards, and Italians, by *de*, *a*, *da*, &c.

There are, however, ſome general maxims, which hold good in all languages; as, 1. That there is no nominative caſe in any ſentence, but has a reference to ſome verb, either expreſſed or underſtood.

2. That there is no verb but has its nominative caſe, either expreſſed or underſtood. Indeed, in languages which have proper accuſatives, as the Latin, before infinitive there is an accuſative, not a nominative caſe; as, *Scio Petrum eſſe doctum.*

3. That there is no adjective but has a relation to ſome ſubſtantive.

4 That there is no genitive caſe but is governed by ſome other noun; inaſmuch as that caſe always expreſſes the poſſeſſor, which muſt be governed by the poſſeſſed. This rule does not hold ſo apparently in the modern as it does in the ancient languages; becauſe the particles *of*, *de*, &c. which are the proper ſigns of the genitive caſe, are frequently uſed as prepoſitions. See Genitive.

5. That the *regimen* of verbs is frequently laid on different kinds of relations, according to cuſtom or uſage; which yet does not change the ſpecific relation of each caſe, but only ſhews, that cuſtom has made choice of this or that, according to fancy. Thus the Latins ſay, *juvare aliquem*, and *opitulare alicui*, *to help one*. So the French ſay, *ſervir quelqu'un*, and *ſervir à quelqu'un*, *to ſerve one*. Thus the Engliſh ſay, *fight one*, or *fight with one*. And thus, in Spaniſh, moſt of the verbs active govern indifferently either a dative or an accuſative.

Sometimes, alſo, the verb admits of ſeveral *regimens*; as *præſtare aliquem*, or *alicui*; *eripere morti aliquem*, or *aliquem à morte*.

Indeed, the different *regimen* ſometimes makes an alteration in the ſenſe; in which, particular regard is to be had to the uſage of the language. Thus, the Latin *cavere alicui* ſignifies *to watch*, or *be careful of the preſervation of any one*; *cavere aliquem* ſignifies *to beware of him*.

There is one very common fault in *regimen*, which our accurate writers ſhould be very careful to avoid; viz. the uſing of two verbs that require different caſes together, as only governing one caſe; as in this example; *after embracing and giving his bleſſing to his ſon*; where *embracing* requiring an accuſative, and *giving* a dative caſe, the *regimen* or conſtruction of the firſt verb with the noun is irregular; *embrace a ſon*.

The ſame may be obſerved in nouns; as, *I conjured him by the memory and the friendſhip he bore my father*; where *memory* does not agree with *he bore*.

REGIMENT, in *War*, a body conſiſting of ſeveral troops of horſe, or companies of foot, commanded by a colonel, lieutenant-colonel, and major.

The number of men in a *regiment* is as undetermined as that of the men in a troop, or company.

Each regiment of foot is divided into companies, but the number of companies is various; though in England our *regiments* are generally ten companies, one of which is always grenadiers, excluſive of two independent companies. *Regiments* of horſe are generally ſix troops, but there are ſome of nine. Dragoon *regiments* are commonly in war-time eight troops, and in time of peace but ſix. Each regiment, has a chaplain, quarter-maſter, adjutant, and ſurgeon.

Some German *regiments* conſiſt of 2000 foot; and the *regiment* of Picardy, in France, conſiſts of 120 conpanies, or 6000 men.

The French *regiments* of horſe are not commanded by a colonel as the foot are, but by a meſtre de camp.

Some obſerve, that there were no *regiments* of horſe before the year 1637. Till then the troops were looſe and independent of each other, and not incorporated into a body or *regiment*.

Regiments, it is ſaid, were firſt formed in France, under the reign of Charles IX. though F. Daniel refers them to the time of Henry II. and in England in the year 1660.

REGIMENTAL *ſtaff*. See Staff.

REGIMENTALS, the uniform clothing of the army, conſiſting of a hat, coat, waiſtcoat, breeches, ſhirts, ſtocks, ſhoes, ſtockings, ſpats, ſpatterdaſhes, &c.

REGINA *aurarum*, in *Ornithology*, a name given by Nieremberg to a bird called by the Mexicans *cozcacoauhtli*. It has obtained its name from its being able to fly againſt the ſtrongeſt winds. It is of the bigneſs of an eagle, and its whole body is of a blackiſh purple, variegated with a browniſh yellow and a deep black; it wings are variegated with black, yellow, and grey; its legs are red; its claws very ſtrong and ſharp; and its beak like that of a parrot; it has ſome rugoſe ſkin on the forehead, and about the beak; and its tail is black above, and grey underneath. It feeds on ſnakes, rats, and other vermin, but will alſo eat human dung; it flies very high; it is a native of Mexico, and breeds in ſpring; its feathers are ſaid to be a remedy for many diſeaſes; but the truth of this account is much to be doubted. Ray.

Regina, *ſalve*. See Salve.

REGIO *aſſenſſu* is a writ whereby the king gives his royal aſſent to the election of a bishop.

REGION, *regio*, in *Geography*, a country or particular diviſion of the earth; or a tract of land inhabited by people of the ſame nation.

The modern aſtronomers divide the moon into ſeveral *regions*, or provinces, to each whereof they give its proper name.

Region, in *Phyſiology*. Authors divide the atmosphere into three ſtages, called the *upper*, *middle*, and *lower regions*.

The loweſt *region* is that wherein we breathe, and is bounded by the reflection of the ſun's rays, that is, by the height to which they rebound from the earth.

The middle *region* is that wherein the clouds reſide, where meteors are formed, &c. extending from the extremity of the loweſt, to the tops of the higheſt mountains.

The upper *region* commences from the tops of the mountains, and reaches to the utmoſt limits of the atmoſphere. In this reigns a perpetual equable calmneſs, clearneſs, and ſerenity.

Region, *elementary*. See Elementary.

Region, *etherial*, is uſed for the whole extent of the univerſe, including the orb of the fixed ſtars, &c.

Regions *of the ſea*. As the naturaliſts, in their deſcriptions of the ſubterranean parts of the globe diſtinguiſh the earth into three *regions* of different depths, in which different temperatures are obſerved; ſo in deſcribing the ſea, they allow it two *regions*; the one extending from the ſurface of the water, down ſo low as the rays of the ſun can pierce, and extend their influence; and the other, from the loweſt bounds of that to the bottom.

It is eaſy to ſee, that theſe *regions* rather regard quality than ſpace, and that their boundaries are far from being regular, or equal in all places, and at all times. The places expoſed to the hotteſt ſunſhine will have the largeſt upper *region*; thoſe where the ſun has leaſt power will have the ſmalleſt; and the ſame part of the ſea will have its upper *region* more or leſs deep, according to the ſeaſon of the year. This upper *region* of the ſea is always more or leſs hot; the lower *region*, except in ſome few particular places, is every where cold; and the water, where the upper *region* is large, is always remarkably ſtill and quiet in the lower. Boyle of Coſmical Qualities.

Region, *ſubterranean*. The earth is not only divided on its ſurface into *regions* and countries, but philoſophers, who have had occaſion to diſcourſe of its inner parts, have alſo divided them into three diſtinct *regions*, according to their different depths from the ſurface. The temperature of the ſubterranean parts of the globe is diſtinguiſhed according to the diviſion of theſe *regions*, but is not ſo regular and preciſe as ſome have ſuppoſed. The firſt *region* of the earth is very variable, both as to bounds and temperature. The ſecond *region* ſeems for the moſt part cold, in compariſon of the other two; but in ſeveral places, which, by reaſon of their diſtance from the ſurface of the earth, it would be natural to call the middle *region*, the temperature of the air is very different at the ſame ſeaſons of the year, which ſhews that it depends on ſomething more than bare depth from the ſurface. The third *region* of the earth is univerſally obſerved to be warm, but by no means regularly or uniformly: the ſame depth in ſome places, giving only a moderate warmth, while in others it gives a very conſiderable heat.

Borrichius tells us of a certain abbé, fond of chemiſtry, and particularly curious in the matter of long digeſtions by regular heat, who found a way of making a furnace perpetually warm, by piercing the earth to a certain depth, and uſing the heat of this third *region* of it. His method, we are told, was to bore a hole with a pike twenty feet deep, and pour into it ten or twelve pounds of quickſilver; this made its way into the ſtrata, and through them in a body into the chambers of heat in this third *region*, where the heat, having a vent upwards, made by this opening, never failed to aſcend in a perpetual and regular ſtream, and gave that regular digeſting heat that no artificial fire could equal. But this is an alchemical ſtory. Boyle of Coſmical Qualities. Borrich. de Ortu Chem.

Region, in ancient Rome, a part or diviſion of the city. They were only four in number till Auguſtus's time, who divided the city into fourteen *regions*, over each of which he ſettled two ſurveyors, called *curatores viarum*, who were made annually, and took their diviſions by lot. Theſe fourteen *regions* contained 424 ſtreets, 31 of which were called great or royal ſtreets, which begun at the gilt pillar that ſtood at the entry into the open place in the middle of the city.

The extent of theſe diviſions varied greatly, ſome being from 12,000 or 13,000 to 33,000 feet and upwards in circumference. Authors, however, are not agreed as to the exact limits of each.

Region, in *Anatomy*, denotes alſo a diviſion of the human body. Anatomiſts divide the body into three *regions*, or venters.

The upper *region* is that of the head, reaching as low as the firſt vertebra, and comprehending the animal organs, the brain, &c. See Head, &c.

The middle *region* is that of the thorax or breaſt, which Hippocrates calls the upper venter, and which reaches from the clavicles to the diaphragm: in this are contained the vital parts, as the heart, lungs, &c. See Heart, Lungs, &c.

The third, or lower *region*, is the abdomen or belly, &c. containing the natural parts, deſtined for digeſtion, purgation, and generation. See Abdomen.

Region, *epicolic*, *epigaſtric*, and *umbilical*. See the adjectives.

REGIONARY, *regionarius*, in *Eccleſiaſtical Hiſtory*, a title given from the fifth century to perſons who had the charge and adminiſtration of the church affairs within a certain diſtrict or region.

At Rome there were anciently ſeven *regionary* deacons, who preſided over a kind of hoſpitals, and looked to the diſtribution of alms.

There were alſo *regionary* ſubdeacons, and *regionary* notaries, as alſo *regionary* biſhops, &c.

A *regionary* biſhop was properly a miſſionary inveſted with an epiſcopal character, but without being attached to any particular ſee, that he might be at liberty to go to preach, and perform other functions of his miniſtry, whitherſoever the Spirit of God and the wants of the people ſhould call him.

REGIS *pondus*. See Pondus.

Regis *villa*. See Villa.

REGISTER, *regiſtrum*, a public book ſerving to enter and record memoirs, acts, and minutes, to be had recourſe to occaſionally, for the juſtifying of matters of fact. Menage derives the word, by corruption, from *regeſtum*, a book containing extracts of ſeveral books, &c. collected together: *Dicitur regeſtum quaſi iterum geſtum*. Others derive it from the old French *giſter*, *to lie down in a bed*, &c.

The law of Scotland is rendered very eaſy and regular by means of the great number of *regiſters*, for recording the conveyances of lands, &c. of private perſons. Of theſe there are two kinds: the one general, fixed at Edinburgh, under the direction of the *lord regiſter*, who, before the Union, was the fifth officer of the ſtate, and, beſides the regiſtry, was clerk of the parliament, treaſury, exchequer, and ſeſſion.

The other is particularly kept in the ſeveral ſhires, ſtewarties, and regalities. The clerks hereof are obliged to tranſmit the *regiſters* of their reſpective courts to the general *regiſter*; and the notaries their procotols: and here they are ſo diſpoſed, that, on demand, the lieges can have a view of any writs, which the law requires to be regiſtered, or which parties, for their ſecurity, have thought fit to record.

The *regiſters* were firſt ſet on foot by act of parliament under king James VI. to the unſpeakable advantage of the ſubject.

No man can have a right to any eſtate, but it muſt be regiſtered within forty days of his becoming ſeiſed of it, otherwiſe it is null; and by this means all ſecret conveyances are cut off.

By a law, 1704, it was enacted, that a memorial of all deeds and conveyances, and of all wills and deviſes in writing, whereby any honours, manors, &c. in the Weſt Riding of Yorkſhire, might be any way affected in law or equity, may, at the election of the party or parties concerned, be regiſtered: and that, after ſuch *regiſter*, every ſubſequent deed or conveyance of the ſaid honours, manors, &c. ſo regiſtered, or any part thereof, ſhall be adjudged fraudulent and void, unleſs a memorial thereof ſhall alſo be regiſtered: and the like of wills, &c. But this act did not extend to copyhold eſtates, nor to leaſes at rack-rent, nor to any leaſe not exceeding twenty-one years.

In the year 1708, a ſimilar ſtatute was paſſed for the regiſtering of deeds, conveyances, wills, deviſes, mortgages, &c. in the Eaſt Riding of Yorkſhire: and all the proviſions and clauſes in this act were hereby extended to the honours, manors, lands, and tenements, in the Weſt Riding of the ſame county.

In 1709, a law was made for the public regiſtering of deeds, conveyances, wills, &c. in the county of Middleſex; which may be done for the fee of one ſhilling: and every deed or conveyance, which ſhall hereafter be executed, ſhall be adjudged fraudulent and void, againſt any ſubſequent purchaſer or mortgagee for valuable conſideration, unleſs ſuch memorial thereof be regiſtered according to the direction of this act, before the regiſtering of the memorial of the deed or conveyance, under which ſuch ſubſequent purchaſer or mortgagee ſhall claim; and the like as to memorials of wills not regiſtered.

In 1735, a ſimilar *regiſter* of mortgages, &c. was legally enacted for the North Riding of the county of York; whence York and Middleſex are *regiſter* counties. 2 & 3 Ann. cap. 4. 6 Ann. cap. 35. 7 Ann. cap. 20. 8 Geo. II. cap. 6.

Many have wiſhed that the ſame regulation was extended to all the counties of England and Wales: but judge Blackſtone obſerves, that, however plauſible theſe proviſions may appear in theory, it hath been doubted, by very competent judges, whether more diſputes have not ariſen in thoſe counties, by the inattention and omiſſion of parties, than prevented by the uſe of *regiſters*.

Register, *regiſtrarius*, is alſo uſed for the clerk, or keeper of a *regiſter*, or *regiſtry*.

Of theſe we have ſeveral, denominated from the *regiſters* they keep; as *regiſter of the high court of delegates*, *regiſters of the arches court of Canterbury*, *regiſter of the court of admiralty*, *regiſter of the prerogative court*, *regiſters of the province of Canterbury*, *regiſter of the archdeaconry of Middleſex*, *&c.* *regiſter of the faculty office*, and *regiſter of the Garter*, who is always dean of Windſor, and deputy *regiſters*.

There are alſo, in the court of chancery, the *principal regiſter*, the *lord chancellor's regiſters*, the *regiſters of the maſter of the rolls*, *entering regiſters*, and *regiſter of the affidavits*.

Register, *city*. See Town-*clerk*.

Register of a pariſh-church is a book, wherein the yearly baptiſms, marriages, and burials, of each pariſh, are orderly regiſtered. See Marriage.

This practice was laudably inſtituted by that great but unfortunate perſon Thomas Cromwell, earl of Eſſex, anno 1538, while he was vicar-general to king Henry VIII.

Theſe pariſh-*regiſters* are to be ſubſcribed by the miniſter and church-wardens; and the names of the perſons ſhall be tranſmitted yearly to the biſhop: and it has been enforced by canon 70. and by ſtatute, &c.

By 26 Geo. II. cap. 33. to make a falſe entry in a marriage-*regiſter*, to alter it when made, to forge or counterfeit ſuch entry or a marriage-licence, or aid and abet ſuch forgery, to utter the ſame as true knowing it to be counterfeit, or to deſtroy or procure the deſtruction of any *regiſter*, in order to vacate any marriage, or ſubject any perſon to the penalties of this act; all theſe offences, knowingly and wilfully committed, ſubject the party to the guilt of felony, without benefit of clergy.

Register is alſo the title of a book containing the forms of moſt of the writs uſed in common law. This is called the *regiſter of writs*, or *regiſtrum omnium brevium*. This *regiſter*, Coke on Littleton obſerves, is one of the moſt ancient books of the common law. And judge Blackſtone obſerves concerning it, that it is the moſt ancient and highly venerable collection of legal forms, upon which Fitzherbert's Natura Brevium is a comment, and in which every man, who is injured, will be ſure to find a method of relief, exactly adapted to his own caſe, deſcribed in the compaſs of a few lines, and yet without the omiſſion of any material circumſtances.

Register, in *Antiquity*, a book or table at Athens, belonging to each particular *φρατρια*, or ward, in which all fathers were obliged to enroll their ſons, making oath, at the ſame time, that every ſon, ſo regiſtered, was either borne to them in lawful wedlock or lawfully adopted. The adopted ſons were regiſtered in the feſtival Thargelia; the natural, upon the third day of the feſtival Apaturia.

At what age children were thus regiſtered is not agreed. Some are of opinion, that at every return of the Apaturia it was cuſtomary to *regiſter* all the children that had been born that year. Others affirm, that they were commonly three or four years old before they were regiſtered.

There were two other ſeaſons when young Athenians were enrolled in a public *regiſter*: one, when they arrived at the age of eighteen years, and were admitted into the number of the εφηϐοι, and was performed on the third day of the feſtival Apaturia; and the other, before the feſtival PANATHENÆA, when thoſe who were twenty years old were entered in a *regiſter*, called ληξιαρχικον γραμματειον, wherein the names of all perſons of that borough, who were of age to ſucceed in the ληξις, or inheritance of their fathers, were entered. This was termed *to be regiſtered among the men*: and the perſons, thus enrolled, became their own maſters, and free from the government of their guardians. Potter's Arch. Græc. vol. i. p. 48.

REGISTER *of ſeamen*. See MANNING *the fleet*.

REGISTER *ſhips*, or *ſhips of* REGISTER, in *Commerce*, are veſſels to which the king of Spain, or the council of the Indies, grants permiſſion to go and traffic in the ports of Spaniſh America.

They are thus called becauſe the ſhips are to be regiſtered before they ſet ſail from Cadiz, which is the place where they uſually load for Buenos Ayres,

Theſe veſſels, by the tenor of the cedula or permit, are not to exceed three hundred tons; but there is that good underſtanding between the merchants and the council of the Indies, that ſhips of five or ſix hundred tons frequently paſs unnoted.

Theſe *regiſter*-ſhips, which were firſt introduced in order to furniſh America with a regular and timely ſupply, and thus to prevent a contraband trade with the Engliſh, French, and Dutch iſlands, are fitted out, during the intervals between the ſtated ſeaſons when the GALLEONS and FLOTA ſail, by merchants in Seville or Cadiz, upon obtaining a licence from the council of the Indies, for which they pay a very high premium, and are deſtined for thoſe ports where any extraordinary demand is foreſeen or expected. In proportion as experience manifeſted the advantages of carrying on trade in this mode, the number of *regiſter*-ſhips increaſed, and at length, in the year 1748, the galleons, after having been employed upwards of two centuries, were finally laid aſide. From that period there has been no intercourſe with Chili and Peru, but by ſingle ſhips, diſpatched from time to time, as occaſion requires, and when the merchants expect a market will open. Theſe ſail round Cape Horn, and convey, directly to the ports in the South Sea, the productions and manufactures of Europe, for which the people ſettled in thoſe countries were formerly obliged to repair to Porto Bello or Panama.

But as all the *regiſter* ſhips deſtined for the South Seas, muſt ſtill take their departure from Cadiz, and are obliged to return thither, this branch of the American commerce, even in its new and improved form, continues ſubject to the reſtaints of a ſpecies of monopoly, and feels its pernicious effects.

REGISTER, among *Letter Founders*, is one of the inner parts of the mould wherein the printing types are caſt. Its uſe is to direct the joining of them juſtly together again, after opening them to take out the new-caſt letter.

REGISTER, in *Printing*, the diſpoſing the forms of the preſs ſo as that the lines and pages printed on one ſide of the ſheet meet exactly againſt thoſe on the other; which is done by means of two points in the greater or outward tympan.

REGISTERS, in *Chemiſtry*, are holes, or chinks, with ſtopples to them, contrived in the ſides of furnaces, to regulate the fire; i. e. to make the heat immediately more intenſe, or remiſs, by opening them to let in the air, or keeping them cloſe to exclude it. See FIRE-*places*.

REGISTRY, *regiſtrum*, comprehends the office, books, and rolls, wherein the proceedings of chancery, or any ſpiritual court, are regiſtered or recorded.

REGIUS *profeſſors*. King Henry VIII. founded five lectures in each of our univerſities; viz. of Divinity, Hebrew, Greek, Law, and Phyſic; the readers of which lectures are in the univerſity ſtatutes called *regii profeſſores*.

REGIUS *market*. See JAUNDICE.

REGLET, or RIGLET, in *Architecture*, a little flat narrow moulding, uſed chiefly in compartiments, and pannels, to ſeparate the parts or members from one another, and to form knots, frets, and other ornaments.

The word is a diminutive of the French *regle*, *rule*.

The *reglet*, according to Daviler, differs from the *fillet* and *liſt l*, in that it projects equally like a ruler.

REGLETS, or RIGLETS, in *Printing*, are thin rulers, or ſlips of wood, of different dimenſions, placed in the chaſe, betwen the pages, and at the extremes thereof, to keep them aſunder, and to hold them tight.

The *reglets* make the chief part of what they call *the furniture of the chaſe*. See CHASE.

They are particularly denominated from the place they hold in reſpect of the pages, *head-ſticks*, *gutter-ſticks*, &c.

The term *reglets* is alſo uſed abroad for a ruler of metal, three quarters of an inch long, but which may be lengthened out by joining ſeveral together; uſed to ſeparate the columns, in books that have ſeveral in the ſame page; as alſo for lines to place the notes on in printing of muſic. See PRINTING.

Reglet is alſo uſed for a little thin ſlip of wood, occaſionally though ſeldom uſed by compoſitors for the preſs to take off the lines from the compoſing ſtick, and place them on the galley, where the lines are of an extraordinary length: and where the lines are at great diſtances, thoſe diſtances are made by leaving a *reglet* between each line, when printed.

REGNANT *queen*. See QUEEN.

REGNO, *ne exeat*, in *Law*. See NE *exeat*, &c.

REGRADATION *regradatio*. See DEGRADATION.

REGRATOR, *regratarius*, a law-word, formerly uſed for one that bought wholeſale, or by the great, and ſold again by retail.

The term is now chiefly uſed as it is deſcribed by ſtat. 5 & 6 Edw. VI. cap. 14. to denote one that buys corn, or other dead victual, in any market, and ſells them again, in the ſame market, or within four miles of the place.

Regrating is an offence againſt the public, and is liable, by the ſtatute juſt cited, to the ſame penalty with ENGROSSING and FORESTALLING.

REGRATOR is alſo uſed for a perſon who furbiſhes up old moveables, to make them paſs for new. See FRIPPERY.

Among maſons, &c. to *regrate* is to take off the outer ſurface of an old hewn ſtone, with the hammer and ripe, in order to whiten and make it look freſh again.

REGRESSION, or *retrogradation* of curves, &c. See RETROGRADATION.

REGULA. See RULE.

REGULA, in *Architecture*. See REGLET.

REGULAR, *regularis*, denotes the relation of any thing that is agreeable or conformable to the rules of art.

In this ſenſe, the word ſtands oppoſed to *irregular*, or anomalous.

Thus we ſay, a *regular* proceeding, a *regular* building, *regular* poem, *regular* verb, &c.

REGULAR *figure*, in *Geometry*, is a figure which is both equilateral and equiangular; i. e. whoſe ſides, and conſequently its angles, are all equal.

The equilateral triangle and ſquare are *regular figures*.—All other *regular figures*, conſiſting of more than four ſides, are called *regular polygons*.

Every *regular figure* may be inſcribed in a CIRCLE.

For the dimenſions, properties, &c. of *regular figures*, ſee POLYGON.

REGULAR *body*, called alſo *Platonic body*, is a ſolid terminated on all ſides by regular and equal planes, and whoſe ſolid angles are all equal.

The *regular bodies* are five in number; viz. the *cube*, which conſiſts of ſix equal ſquares; the *tetrahedron*, of four equal triangles; the *octahedron*, of eight; the *dodecahedron*, of twelve; and the *icoſahedron*, of twenty. See each under its proper article. Beſides theſe five, there can be no other *regular bodies* in nature.

To meaſure the ſurface and ſolidity, &c. of the five REGULAR *bodies*. The ſolidity, &c. of the cube is ſhewn under the article CUBE. The tetrahedron being a pyramid, and the octahedron a double pyramid; and the icoſahedron conſiſting of twenty triangular pyramids; and the dodecahedron of twelve quinquangular ones, whoſe baſes are in the ſurface of the icoſahedron and dodecahedron, and their vertices meeting in a centre; the ſolidities of theſe bodies are all found from what we have ſhewn under PYRAMID.

1. Their ſurface is had by finding the area of one of the planes, from the lines that bound it; and multiplying the area thus found, by the number from which the body is denominated: e. gr. for the tetrahedron, by 4; for the hexahedron, or cube, by 6; for the octahedron, by 8; for the dodecahedron, by 12; and for the icoſahedron, by 20. The product is the ſuperficial area.

Or, the ſuperficial contents of any of the five Platonic bodies may be had by the following proportion: as 1 is to the ſide of the given Platonic body,

$$\text{ſo is}\left\{\begin{array}{l}1.73205\\3.40410\\6.00000\\8.66025\\20.64573\end{array}\right\}\begin{array}{c}\text{to the ſuperficial}\\\text{content of the}\end{array}\left\{\begin{array}{l}\text{Tetrahedron.}\\\text{Octahedron.}\\\text{Hexahedron.}\\\text{Icoſahedron.}\\\text{Dodecahedron.}\end{array}\right.$$

2. The diameter of a ſphere being given, to find the ſide of any of the Platonic bodies, that may be either inſcribed in the ſphere, or circumſcribed about the ſphere, or that is equal to the ſphere.

As 1 is to the number in the following table, reſpecting the thing ſought, ſo is the diameter of the given ſphere to the ſide of the Platonic body ſought.

The diameter of a ſphere being unity, the ſide of a	That may be *inſcribed* in the ſphere, is	That may be *circumſcribed* about the ſphere, is	That is *equal* to the ſphere, is
Tetrahedron	0.816497	2.44948	1.64417
Octahedron	0.707107	1.22474	1.03576
Hexahedron	0.577350	1.00000	0.88610
Icoſahedron	0.525731	0.66158	0.62153
Dodecahedron	0.356822	0.44903	0.40883

3. The ſide of any of the five Platonic bodies being given, to find the diameter of the ſphere, that may be inſcribed in that body, or circumſcribed about it, or that is equal to it. As the reſpective number, in the above table, under the title, *inſcribed*, *circumſcribed*, or *equal*, is to 1, ſo is the ſide of the given Platonic body to the diameter of its inſcribed, circumſcribed, or equal ſphere, or ſolidity.

4. The ſide of any of the five Platonic bodies being given, to find the ſide of either of the Platonic bodies, which are equal in ſolidity to that of the given body.—As the number under the title *equal*, againſt the given Platonic body, is to the number under the ſame title, againſt the body whoſe ſide is ſought, ſo is the ſide of the given Platonic body to the ſide of the Platonic body ſought.

5. To find the ſolid contents of any of the five Platonic bodies. As 1 is to the cube of the ſide of any of theſe bodies, ſo is 0.117851 to the ſolid content of a tetrahedron, 0.417404 to that of the octahedron, 1.00000 to that of the hexahedron, 2.181695 to that of the icoſahedron, and 7.663199 to the ſolid content of the dodecahedron. Ferguſon's Tables and Tracts, &c. p. 219.

If one of theſe bodies be required to be cut out of the ſphere of any diameter, let dr (*Tab.* IV. *Geometry*, *fig.* 85.) be the diameter of any ſphere, and da $\frac{1}{3}$ of it, $= ab = br$. Erect the perpendiculars ae, cf, and bg; and draw de, df, er, fr, and gr; then will (1) re be the ſide of the tetrahedron; (2) df the ſide of the hexahedron; (3) de the ſide of the octahedron; (4) and cutting de in extreme and mean proportion in h, dh will be the ſide of the dodecahedron; (5) ſetting the diameter dr up perpendicular at r, from the centre c, to its top, draw the line cg, cutting the circle in g, let fall the perpendicular gb; ſo is br the ſide of the icoſahedron.

Regular *curve*. See Curve.

Regular *architecture*, *fortification*, &c. See Architecture, and Fortification.

Regular *attacks*, in a ſiege, are thoſe that are made in form, or by regular approaches. See Parallels.

Regular *baſtion*. See Bastion.

Regular *place*. See Place.

Regular, in the *Monaſtic Senſe*, denotes a perſon who has made the vows in ſome religious houſe. See Religious and Vow.

Under *regulars* are comprehended the whole body of monks, friars, and mendicants, &c.

The denomination of *regulars*, in this caſe, ariſes hence, that they are bound to obſerve the regula or rule of the order they are entered into. Hence,

Regular *prieſt* is uſed for a prieſt who is in ſome religious order, in oppoſition to a *ſecular* prieſt, who lives in the world, or at large.

A cardinal is reputed both *regular* and ſecular, and is intitled to the privileges of both ſtates.

Regulars may be promoted to biſhopricks and archbiſhopricks, as well as ſeculars; but their promotion ſecularizes them; the epiſcopal dignity diſpenſing them from the obſervation of the rule whereof they had before made profeſſion.

Regular *abbots*. See Abbot.

Regular *benefices* are ſuch as can only be held by monks or religious; or at leaſt, *per cupientem profiteri*, by a perſon deſirous to embrace the monaſtic life. See Benefice.

It is a maxim in the Romiſh canon law, *regularia regularibus*; i. e. *regular benefices* are to be conferred on *regular* prieſts. The abbeys that are chiefs of their reſpective orders are all *regular*, and can only be ſerved by monks and cardinals. All benefices are preſumed to be ſecular, unleſs they be proved *regular*.

Anciently, the *regular benefices* were almoſt all conferred by way of adminiſtration or curacy; the religious incumbents being always *ad manum* to their ſuperiors, who diſplaced them at pleaſure. Hence the common maxim among the canoniſts, *omne beneficium regulare manuale*.

The benefices appropriated to *regulars* are abbeys, conventual priories, ſimple priories, and clauſtral offices.—They may be conferred on ſeculars *in commendam*.

Regular *canons*. See Canon.

Regular *places* are thoſe within the boundary or incloſure of the convent; as the cloiſter, dormitory, chapter, and refectory. In oppoſition to thoſe deſtined for gueſts, and for the neceſſaries of the houſe, which are reputed without the incloſure.

Regular *corporation*. See Corporation.

REGULATION, a rule or order preſcribed by a ſuperior, for the uniform and orderly management of ſome branch of policy, juſtice, or the like.

REGULATOR *of a watch*, is a ſmall spring belonging to the balance, ſerving to adjuſt the going, and to make it go either faſter or ſlower.

REGULO, a title given to the ſons of the emperor of China.

REGULUS, *petty king*, in our *Ancient Cuſtoms*, is a term frequently uſed, in the Saxon councils, for comes or count.

Hence *ſub-regulus* was alſo uſed for a vice-comes or viſcount: though in many places the two ſeem uſed indifferently for the ſame dignitary. Thus in the archives of the cathedral of Worcheſter, Uthredus ſometimes ſtyles himſelf *regulus*, and ſometimes *ſub-regulus*, of the city of Worceſter.

But in other places we find a diſtinction. *Offa rex Merciorum*; *Uthredus regulus*; *Aldredus ſub-regulus*, &c.

Regulus, in *Chemiſtry*, denotes the fineſt and pureſt part of a metal or mineral, which ſinks or precipitates to the bottom of the crucible, or furnace, in melting the mineral or ore.

The alchemiſts will have this matter called *regulus*, i. e. *little king*, as being the firſt-born of the royal metallic blood; which is, as they expreſs it, really a ſon, but not a perfect man; i. e. not yet a perfect metal, for want of time, and proper nouriſhment.

To procure the *regulus*, that is, the mercurial parts of metals, &c. flux-powders are commonly uſed; as nitre, tartar, &c. which purge the ſulphureous part adhering to the metal, by attracting and abſorbing it to themſelves.

The ſeparation of ſilver out of the *regulus* made from the ſilver ore by means of lead, is to be performed in this manner: put two coppels, of the ſame bigneſs, perfectly dry, and capable of containing at leaſt one third more than the *regulus*, under a muffle in an aſſay-furnace; make a ſtrong fire, and let them be red-hot for a quarter of an hour, then free the *regulus* from its ſcoriæ, by ſtriking it gently with a hammer, and put it carefully into one of the hot coppels, and into the other put, at the ſame time, the ſame quantity of granulated lead alone, as was uſed in making the *regulus*. When the *regulus* boils and ſmokes, diminiſh the fire a little, and let the coppels be kept moderately, but not violently red-hot. When it has ſtood ſo long, that the ſkin of litharge, continually produced from the lead, and covering the ſurface of the *regulus*, diſappears, and the coppel ſhews the ſcoriæ only of the lead, with the pure ſilver, either in fuſion, or hard and bright in the middle, let the coppel continue only a minute or two longer on the fire; then take it out with a pair of tongs, take away the metal in grains, and if any ſcoria, or fragment of the coppel adhere to it, wrap it together in a paper, and ſqueeze it between the cheeks of a vice, or a pair of tongs, to break off that brittle matter without hurting the *regulus*. If this *regulus* be pure ſilver, it will now be very white; but if it contain any gold, it will ſhew it by its yellowneſs.

To determine exactly how much ſilver the quantity of ore contained, weigh it nicely in a fine balance, and take out the ſmall reguline lumps from the other coppel, and weighing that, deduct its weight from that of the other, becauſe ſo much ſilver that owes to the lead uſed in making it, and the remainder is the proportion of ſilver contained in the ore. Cramer's Art of Aſſaying, p. 211.

Regulus is principally uſed for that of antimony, which is a ponderous ſemi-metallic maſs, that, upon fuſing ſome of the mineral in its crude ſtate, ſinks to the bottom, being ſeparated from the ſulphur which mineralizes it, and leaving the ſcoria or impurities at the top.

This ſemi-metal, when very pure and well fuſed, is of a white ſhining colour, and compoſed of many laminæ applied to each other. It is remarkable for the regular arrangement of its parts, when it is perfectly fuſed and gradually cooled, which, by a kind of cryſtallization, form upon its upper ſurface a ſort of a ſtar, compoſed of many radii iſſuing from one centre. This ſubſtance is moderately hard, but, like other ſemi-metals, has no ductility. It loſes about one ſeventh part of its weight in water, and loſes its luſtre by the action of air and water. It is fuſible with a moderate heat, but when heated to a certain degree is diſſipated in vapours. Its fumes, paſſing through air, form the *argentine* FLOWERS of *regulus* of *antimony*.

By calcination, with a moderate fire, this *regulus* is deprived of more and more of its phlogiſton, and is ſucceſſively changed, firſt into a grey calx, capable of being fuſed by a ſtronger heat either into a vitreous and brittle matter, which is brown and opake, or to a reddiſh tranſparent glaſs, according to its degree of calcination. The former is called LIVER, and the latter GLASS of *antimony*. If the calcination be continued longer, the calx of the *regulus* loſes more of its phlogiſton, colour, volatility, and fuſibility, and reſembles *diaphoretic* ANTIMONY and BEZOARD *mineral*. The beſt menſtruum for this *regulus* is aqua regia.

Regulus of antimony is eaſily obtained pure and diſengaged from ſulphur, by calcining the ore, and thus depriving it of its mineralizing ſubſtances, ſulphur and arſenic, and afterwards by fuſing the metallic earth with a matter proper to give it phlogiſton. But the uſual method of making ſmall quantities of *regulus*, in laboratories, is more expeditious, and conſiſts in mixing four parts of crude antimony, with three parts of tartar, and one part and a half of nitre: in detonating this mixture, by parts, in a large red-hot crucible, and afterwards raiſing the heat ſo as to produce fuſion. When the crucible is cold it is to be broken, and the *regulus* will be found at the bottom, lying under a ſaline ſcoria.

Regulus of antimony is one of the moſt important metallic matters, as it furniſhes very powerful emetic and purgative remedies, and is uſeful in many arts. See ANTIMONY.

REGULUS, *martial, of antimony*. See ANTIMONY.

REGULUS *of arſenic*, is white arſenic, combined with a ſufficient quantity of phlogiſton, to give it the properties of a ſemi-metal.

The proceſs of making it, anciently uſed, conſiſted in mixing four parts of arſenic with two parts of black flux, one part of borax, and one part of filings of iron, or copper, and quickly fuſing the mixture in a crucible.

Mr. Brandt directs that white arſenic ſhould be mixed with ſoap (or olive oil will anſwer the purpoſe), and the mixture to be put into a retort or glaſs matraſs, and to be diſtilled or ſublimed with a fire, at firſt very moderate, and only ſufficient to raiſe the oil, and when the oily vapours ceaſe to riſe, increaſed; and the metallized arſenic will be ſoon ſublimed to the upper part of the veſſel, and form on the inſide a metallic cruſt, which may be eaſily ſeparated by breaking the veſſel. The *regulus*, thus prepared, has all the properties of a ſemi-metal: it has metallic gravity, opacity, and luſtre; its colour is white and livid; it tarniſhes in the air, is very brittle, but much more volatile than any other ſemi-metal, and eaſily loſes its inflammable principle, when ſublimed in veſſels to which the air has acceſs. It may be combined with acids and moſt metals. Dict. Chem. Art. *Regulus*. See ARSENIC.

REGULUS *of cobalt*, is a ſemi-metal obtained from cobalt, by thoroughly torrefying it, to deprive it of all the ſulphur and arſenic it contains, and ſeparating the unmetallic earthy and ſtony matters from it by waſhing. The cobalt, thus prepared, is then to be mixed with double or triple its quantity of black flux, and a little decrepitated ſea-ſalt, and fuſed either in a forge or hot furnace. After it has cooled, by breaking the crucible, a metallic *regulus*, covered with a ſcoria of a deep blue colour, is obtained. See COBALT.

REGULUS, in *Aſtronomy*, is a ſtar of the firſt magnitude, in the conſtellation Leo; called alſo, from its ſituation, *Cor Leonis*, or the *Lion's Heart*; by the Arabs, *Alhabor*; and by the Chaldeans, *Kalbeleced*, or *Kalbeleceid*; from an opinion of its influencing the affairs of the heavens; as is obſerved by Theon.

The longitude of *Regulus*, as fixed by Mr. Flamſteed, is 25° 31′ 21″; and its latitude 0° 26′ 38″ north. See LEO.

REGULUS *criſtatus*. See WREN.

REHABILITATION, *rehabilitatio*, in the *Civil* and *Canon Law*, an action whereby a prince or pope, by diſpenſations or letters patent, reſtores a delinquent to the condition he was in before his delinquency. See DEGRADATION.

The king alone can rehabilitate an officer, noted, condemned, and degraded; or a gentleman who has derogated from his rank.

The pope alone pretends to rehabilitate, i. e. to render capable of benefices and orders, ſuch as had fallen into hereſy or other irregularities.

In Romiſh countries, an eccleſiaſtic who aſſiſts at the execution of a ſentence of death, is to be rehabilitated by an abſolution, called *a ſævis*.

REHEARING, in the *Court of Chancery*, is a proceſs to which either party that thinks himſelf aggrieved, may have recourſe, before the execution of a final decree.—Every petition for a *rehearing*, muſt be ſigned by two counſel of character, certifying that they apprehend the cauſe is proper to be reheard. And upon the *rehearing*, all the evidence taken in the cauſe, whether read before or not, is now admitted to be read; becauſe it is the decree of the chancellor himſelf, who only now ſits to hear reaſons why it ſhould not be enrolled and perfected; at which time all omiſſions of either evidence or argument may be ſupplied. But after the decree is once ſigned by the chancellor and enrolled, it cannot be reheard or rectified, except by bill of review, or by appeal to the houſe of lords.

REHEARSAL, in *Muſic* and the *Drama*, an eſſay or experiment of ſome compoſition, which is made in private, previous to the repreſentation or performance thereof in public; to habituate the actors or performers, and make them more ready and perfect in their parts.

REI *domeſticæ domeſticus*. See DOMESTICUS.

REJECTIO, a word uſed by medical authors for the caſting any thing up preternaturally by the mouth, whether it be by vomiting, or by ſpitting.

REIGNING *winds* are thoſe winds which uſually prevail in any particular coaſt or region, the knowledge of which is eſſentially neceſſary to every pilot, who is charged with the navigation in thoſe ſeas.

REIMBURSEMENT, in *Commerce*, the act of repaying or returning what monies a perſon had received, by way of advance, &c. or what another had diſburſed or paid for us. A perſon who gives a bill of exchange in payment, is to reimburſe it, if it come to be proteſted, for want of being accepted or paid.

REIMBURSING is alſo uſed for paying the price a commodity coſts its owner.

REIN *Deer*. See DEER.

REINFORCE, in *Gunnery*, is that part of a gun next to the breech, which is made ſtronger, to reſiſt the force of the powder. There are generally two *reinforces* in each piece, called the firſt and ſecond *reinforce*: the ſecond is ſomewhat ſmaller than the firſt, upon the ſuppoſition that when the powder is inflamed and occupies a greater ſpace, its force is diminiſhed, which is very abſurd. See *Great* GUNS, and A E and E F, *Tab. Gunnery*, *fig.* 1.

REINFORCE *rings* of a cannon are flat mouldings like iron hoops, placed at the breech end of the firſt and ſecond *reinforce*, projecting beyond the reſt of the metal about one fourth of an inch. See *Great* GUNS, and *Tab. Gunnery*, *fig.* 1.

REINFORCEMENT, in *War*, a ſupply, or new proviſion of men, arms, ammunition, &c.

REINS, in *Anatomy*, the kidneys; or that part of an animal whereby the urine is ſeparated from the blood. See KIDNEY.

The word, according to Varro, is formed from the Greek ῥειν, *quaſi rivi obſceni humoris ab iis oriantur*.—The Greeks call the rein νεφρος, from the verb νεφειν, *to rain*, *ſnow*, &c.

In the manege they ſay, a horſe ſhould have *double reins*; that is, he ſhould have them a little more elevated on each ſide of the back bone, than upon it; ſo that, paſſing your hand along it, you find it large, well furniſhed, and double, by the hollow that goes all along the back bone. The back ſhould be firm and not hollow, or bending from the withers to the croup, but ſtraight.

REINS, of a bridle, alſo denote two ſtraps of leather meeting in the bridle-hand of the horſeman, in order to make the bit bear, and keep the horſe under ſubjection. See BRIDLE.

It is alſo a name given by the duke of Newcaſtle to two ſtraps or ropes of a caveſſon, which he ordered to be made faſt to the girths, or the pommel of the ſaddle, with intent that the rider ſhould pull them with his hand, in order to bend and ſupple the neck of the horſe.

REIN, *falſe*, is a lath of leather, paſſed ſometimes through the banquet, to bend the horſe's neck, which is diſapproved of by the duke of Newcaſtle, becauſe it ſlacks the curb, and makes the bit no more than a trench that has no curb.

REINS *of a vault*. See VAULT.

REINSTATING, the reſtoring of a perſon or thing to its former ſtate or condition, from whence it had been diſturbed or diſplaced. See REHABILITATION.

REINTEGRATION. See REDINTEGRATION.

REJOICING *fire*, in *Military Affairs*, is uſed on obtaining a victory, or in celebrating ſome public feſtival: of this there are two ſorts, viz. one by a VOLLEY, and the other by a *running* FIRE, from the right to the left of the battalion or line.

REJOINDER, in *Law*, the defendant's anſwer to the plaintiff's replication.

The order of the court of chancery is thus: firſt, the defendant puts in an anſwer or plea to the plaintiff's bill, which is ſometimes alſo called an *exception*; the plaintiff's anſwer to this is called a *replication*; and the defendant's anſwer to that, a *rejoinder*.

The plaintiff may anſwer the *rejoinder* by a *ſur-rejoinder*, upon which the defendant may *rebut*; and the plaintiff may anſwer him by a *ſur*-REBUTTER: which pleas, replications, *rejoinder*, ſur-*rejoinders*, rebutters, and ſur-rebutters, anſwer to the *exceptio*, *duplicatio*, *triplicatio*, and *quadruplicatio* of the Roman laws. See PLEADING.

REJOINTING, or REJOYNTING, in *Architecture*, the filling up of the joints of the ſtones in old buildings, &c. when worn hollow by the courſe of time, or by weather.

Rejointing is to be performed with the beſt mortar, as that of lime and cement: ſometimes alſo with plaiſter; as in the joints of vaults, &c.

REIS, RE, or RES. See REE.

REIS *effendi*, in Turkiſh affairs. See EFFENDI.

REITERATED *grafting*. See ENGRAFTING.

REITERATING, in *Printing*. See PRINTING.

REITERATION, the act of repeating a thing, or doing it a ſecond time.

The church does not allow of the *reiteration* of baptiſm. St. Gregory obſerves, that it is no *reiteration* when there are wanting proofs of the thing's having been regularly done before.

REITTERS, an ancient title given the German cavalry. The word is originally High Dutch, and ſignifies a horſeman, cavalier or even knight.

RELAIS, in *Fortification*, a French term, the ſame with BERME.

RELAPSE, a return or backſliding into a danger or evil, out of which a perſon had eſcaped.

Fevers, dropſies, &c. are diſeaſes into which *relapſes* are very frequent and dangerous. Such a perſon is *relapſed* into a hereſy he had abjured.

RELATION, *relatio*, in *Philoſophy*, the mutual reſpect of two things; or what each is with regard to the other.

The word is formed *a referendo*; *relation* conſiſting in this, that one thing is *referred* to another; whence it is alſo called *reſpect*, *habitude*, and *compariſon*.

The idea of *relation* we acquire, when the mind ſo conſiders any thing, that it doth, as it were, bring it to, and ſet it by, another, and carry its view from the one to the other. Hence the denominations given to things intimating this reſpect, are called *relatives*; and the things ſo brought together, are ſaid to be *related*.

Thus, when I call Caius *huſband*, or this wall *whiter*, I intimate ſome other perſon or thing in both caſes, with which I compare *him* or *it*. Hence the wall is called by the ſchoolmen the *ſubject*; the thing it exceeds in whiteneſs, the *term*; and the whiteneſs, the *foundation* of the *relation*.

Relation may be conſidered two ways; either on the part of the mind referring one thing to another; in which ſenſe *relation* is only a mode or affection of the mind, whereby we make ſuch compariſon: or on the part of the things referred, which being no other than ideas, *relation*, in this ſenſe, is only a new idea reſulting or ariſing in the mind upon conſidering of two other ideas. So that *relation*, take it as you will, is only in the mind, and has nothing to do with the things themſelves.

Any of our ideas, Mr. Locke obſerves, may be the foundation of *relation*. Though, where languages have failed to give correlative names, the relation is not eaſily taken notice of; as in concubine, which is a *relative* name, as well as wife.

There is, in effect, no idea but is capable of an infinite number of *relations*: thus, one ſingle man may at once ſuſtain the *relations* of father, brother, ſon, huſband, friend, ſubject, general, European, Engliſhman, iſlander, maſter, ſervant, bigger, leſs, &c. to an almoſt infinite number; he being capable of as many *relations* as there can be occaſions of comparing him to other things in any manner of agreement or diſagreement, or any reſpect whatſoever.

The ideas of *relations* are much clearer and more diſtinct than thoſe of the things *related*; becauſe the knowledge of one ſimple idea is oftentimes ſufficient to give the notion of a *relation*; but, to the knowing of any ſubſtantial being, an accurate connection of ſeveral ideas is neceſſary.

The perception we have of the *relations* between various ideas wherein the mind acquieſces, makes what we call *judgment*. Thus, when I judge that twice 2 make 4, or do not make 5, I only perceive the equality between twice 2 and 4, and the inequality between twice 2 and 5.

The perception we have of the *relations* between the *relations* of various things, conſtitutes what we call *reaſoning*. Thus, when from this, that 4 is a ſmaller number than 6, and that twice 2 is equal to 4, I gather, that twice 2 is a leſs number than 6; I only perceive together the *relation* of the numbers twice 2 and 4, and the *relation* of 4 and 6.

The ideas of cauſe and effect, we get from our obſervation of the viciſſitude of things, while we perceive ſome qualities or ſubſtances begin to exiſt, and that they receive their exiſtence from the due application and operation of other beings. That which produceth, is the cauſe; that which is produced, is the effect.

Thus, fluidity in wax is the effect of a certain degree of heat, which we obſerve to be conſtantly produced by the application of ſuch heat.

The denominations of things taken from time are, for the moſt part, only *relations*. Thus, when it is ſaid, that queen Elizabeth lived ſixty-nine, and reigned forty-five years, no more is meant, than that the duration of her exiſtence is equal to ſixty-nine, and of her government to forty-five, annual revolutions of the ſun; and ſo are all words anſwering to how long.

Young and old, and other words of time, that are thought to ſtand for poſitive ideas, are indeed *relative*, and intimate a *relation* to a certain length of duration, whereof we have the ideas in our minds. Thus, we call a man young or old, that had lived little or much of that time which men uſually attain to: and thus a man is called young at twenty, but a horſe old at the ſame period.

There are other ideas that are truly *relative*, which we ſignify by names that are thought poſitive and abſolute; ſuch as great and little, ſtrong and weak. The things thus denominated are referred to ſome ſtandards, with which we compare them: thus, we call an apple *great*, which is bigger than the ordinary ſort of thoſe we have been uſed to; and a man *weak*, that has not ſo much ſtrength or power to move as men uſually have, or as others of his own ſize have.

Authors give various diviſions of *relations*. The ſchool philoſophers commonly divide them into thoſe of *origination*, under which are comprehended the *relations* of cauſe and effect; thoſe of *negation*, which are between oppoſite things; and thoſe of *affirmation*, which are *relations* of agreement between whole and part, the ſign and thing ſignified, the adjunct and ſubject. This diviſion is founded upon this, that the mind can only compare things three ways; viz. by inferring, denying, and affirming.

Others divide *relations* into thoſe of *origination*; thoſe of *agreement*, e. gr. ſimilitude, parity, &c. thoſe of *diverſity*; and thoſe of *orders* as priority, poſteriority, &c.

Others divide them into *predicamental* and *tranſcendental*. Under the firſt come thoſe *relations* between things that belong to the ſame predicament, e. gr. between father and ſon. To the latter belong thoſe which are more general than the predicaments, or are of different predicaments; as the *relations* of ſubſtance and accident; of cauſe and effect; and of Creator and creature.

Mr. Locke gives us a diſtribution of *relations* on a different principle. All ſimple ideas, he obſerves, wherein are parts or degrees, afford an occaſion of comparing the ſubjects wherein they are to one another, in reſpect of thoſe ſimple ideas; as whiter, ſweeter, more, leſs, &c. Theſe, depending on the equality and exceſs of the ſame ſimple idea, in ſeveral ſubjects, may be called *proportional relations*.

Another occaſion of comparing things being taken from the circumſtances of their origin, as father, ſon, brother, &c. theſe may be called *natural relations*.

Sometimes the foundation of conſidering things is ſome act, whereby any one comes by a moral right, power, or obligation, to do ſomething: ſuch are general, captain, burgher: theſe are *inſtituted* and *voluntary relations*, and may be diſtinguiſhed from the natural, in that they are alterable and ſeparable from the perſons to whom they ſometimes belonged, though neither of the ſubſtances ſo related be deſtroyed. But natural *relations* are not alterable, but are as laſting as their ſubjects.

Another *relation* is the conformity or diſagreement of men's voluntary actions to a rule, to which they are referred, and by which they are judged of: theſe may be called *moral relations*.

It is this conformity or diſagreement of our actions to ſome law (whereby good or evil is drawn on us from the will and power of the law-maker, and is what we call *reward* or *puniſhment*) that renders our actions morally good or evil.

Of theſe moral rules or laws there ſeem to be three ſorts with their different enforcements. Firſt, the divine law; ſecondly, civil law; thirdly, the law of opinion or reputation. By their *relation* to the firſt, our actions are either ſins or duties; to the ſecond, criminal or innocent; to the third, virtues or vices. Locke's Eſſay, vol. i. chap. 25, 26, 33.

RELATION, in *Logic*, is an accident of ſubſtance, accounted one of the ten categories or predicaments.

Each ſubſtance admits of an infinity of *relations*. Thus the ſame Peter conſidered with regard to Henry, is in the *relation* of a maſter; with regard to John, in that of a tenant; with regard to Mary, in that of a huſband, &c. Again, with regard to one perſon, he is rich; with regard to another, poor; with regard to another, he is far, near, tall, ſhort, a neighbour, ſtranger, learned, unlearned, good, bad, equal, &c. It is diſputed among the ſchool philoſophers, whether or no the *relation* be a thing formally and really diſtinct from the foundation of the ſubſtance.

RELATION, *relatio*, in *Rhetoric*, is ſometimes uſed to ſignify the ſame with RECRIMINATION.

RELATION is alſo uſed, in the *School Theology*, to denote certain of the divine perfections, called *perſonal* ones; becauſe by theſe one Divine Perſon is referred to another, and diſtinguiſhed from it.

Hence they reach, that in God there is one nature, two proceſſions, three perſons, and four *relations*.

Theſe *relations* are paternity, filiation, active ſpiration, and paſſive ſpiration.

RELATION, in *Geometry*, *Arithmetic*, &c. is the habitude, or reſpect of two quantities to one another, with regard to their magnitude. This we more uſually call RATIO, or *reaſon*.

The equality or ſameneſs of two ſuch *relations* we call PROPORTION.

RELATION, in *Grammar*, is the correſpondence which words have to one another in CONSTRUCTION.

Faulty and irregular *relations* are the things chiefly to be guarded againſt, in writing correctly; they make the ſenſe obſcure, and frequently equivocal. Thus: the orator was attended to with a coldneſs, which was the more remarkable, as the audience were under ſome emotion before he began. Here *coldneſs* being put indeterminately, the relative *which* can have no juſt and regular *relation* to it.

RELATION is alſo frequently uſed for ANALOGY, or what ſeveral things have in common.

In painting, architecture, &c. a certain relation of the ſeveral parts and members of the building, or picture, conſtitutes what we call SYMMETRY.

RELATION *inharmonical*, in *Muſical Compoſition*, is that whoſe extremes form a falſe or unnatural interval, incapable of being ſung.

This is otherwiſe called a *falſe relation*, and ſtands oppoſed to a *juſt* or *true relation*.

RELATION, in *Law*, is where two things, as times, &c. are conſidered as if they were one; the thing ſubſequent being conſidered as taking effect, by *relation*, at the time preceding.

As if A deliver a writing to B, to be delivered to C, as the deed of A; the writing ſhall be deemed to be delivered to C, at the time when it was given to B, by *relation*.

So bills in parliament to which the king aſſents on the laſt day of parliament, ſhall relate and be of force from the firſt day thereof. Coke calls this *fictio juris*.

RELATIVE *propoſitions*, are ſuch as include ſome relation and compariſon.

Thus, Where the treaſure is, there will the heart be; As much as thou haſt, ſo much thou art worth, &c. are *relative propoſitions*.

RELATIVE *gravity*, *levity*, *motion*, *neceſſity*, *place*, *ſpace*, *time*, *velocity*. See the ſeveral ſubſtantives.

RELATIVE *terms*, in *Logic*, are words which imply a relation, or a thing conſidered as compared to another.

Relative terms include a kind of oppoſition between them; yet ſo, as that the one cannot be without the other.

Such are *father* and *ſon*, *huſband* and *wife*, *king* and *ſubjects*, &c.

RELATIVE, in *Grammar*, is a word or term which in the conſtruction anſwers to ſome word foregoing, called the ANTECEDENT.

All *relatives* are ſaid to reciprocate, or mutually infer each other; and, therefore, they are often expreſſed by the genitive caſe.

RELATIVE, *Pronoun*. See PRONOUN.

RELAXATION, *relaxatio*, in *Medicine*, &c. the act of looſening or ſlackening the tone or tenſion of the fibres, nerves, muſcles, &c.

The *relaxation* of a muſcle is ſuppoſed to be effected, either by the perſpiration of the nervous ſpirits, or the regreſs of the ſpirits, blood, &c. which inflated its fibres; or by the contraction of the air, in the globules of blood before expanded by the ſudden influx and admixture of the ſpirits, &c. See MUSCULAR *motion*.

RELAXATION, in *Surgery*, is a preternatural extenſion, or ſtraining of a nerve, tendon, muſcle, or the like; either through violence or weakneſs.

Hernias are deſcents or *relaxations* of the inteſtines, &c. From the ſame cauſe ariſe deſcents or prolapſions of the anus, &c.

RELAXATION, in *Law*, is uſed for a *releaſing*. See RELEASE.

In this ſenſe we ſay the *relaxation* of an attachment in the court of admiralty.

The tenor of indulgence is a *relaxation*, or diminution, of the pains of purgatory.

RELAY, a freſh equipage, horſe, &c. ſent before, or appointed to be ready, for a traveller to change, to make the greater expedition; as in riding poſt.

The term is borrowed from the French, *relais*, which ſignifies the ſame thing. In France, the general of the poſts entitles himſelf ſuperintendant of the *relays*.

RELAY *horſes*, in the *Artillery*, are horſes that march with the artillery or baggage, and are ready to relieve others, or to aſſiſt in going up a hill, or through bad roads, &c.

RELAYS, in *Hunting*, are freſh ſets of dogs, or horſes, or both, diſpoſed here and there for readineſs, in caſe the game come that way, to be caſt off, or to mount the hunters in lieu of the former, which are ſuppoſed to want reſpite.

RELAY, in *Tapeſtry*, is an opening left in a piece of tapeſtry, where the colours or figures are to be changed; becauſe, on thoſe occaſions, the workmen are changed; or elſe, the places are left to be filled up, till the reſt of the work is done. See TAPESTRY.

RELEASE, *relaxatio*, in *Law*, denotes an inſtrument, whereby eſtates, rights, titles, entries, actions, and other things, are ſometimes extinguiſhed and annulled, ſometimes transferred, ſometimes abridged, and even ſometimes enlarged: and it is a ſpecies of conveyance which preſuppoſes ſome other conveyance precedent, and ſerves to enlarge, confirm, alter, reſtrain, reſtore, or transfer the intereſt granted by ſuch original conveyance.

A *releaſe* is either in fact or in law.—A *releaſe in fact*, is that which the very words do expreſly declare.

A *releaſe in law*, is that which acquits by way of conſequence, or intendment of law. Theſe *releaſes* may enure either, 1. By way of *enlarging an eſtate*, or *enlarger l'eſtate:* as if there be tenant for life or years, remainder to another in fee, and he in remainder *releaſes* all his right to the particular tenant and his heirs, this gives him the eſtate in fee. But in this caſe the releſſee muſt be in poſſeſſion of ſome eſtate, for the *releaſe* to work upon: for if there be leſſee for years, and, before he enters and is in poſſeſſion, the leſſor releaſes to him all his right in the reverſion, ſuch *releaſe* is void for want of poſſeſſion in the releſſee. 2. By way of *paſſing an eſtate*, or *mitter l'eſtate:* as when one of two co-parceners *releaſeth* all her right to the other, this paſſeth the fee-ſimple of the whole. And in both theſe caſes there muſt be a privity of eſtate between the releſſor and the releſſee; that is, one of their eſtates muſt be ſo related to the other, as to make but one and the ſame eſtate in law. 3. By way of *paſſing a right*, or *mitter le droit:* as if a man be diſſeiſed, and *releaſeth* to his diſſeiſor all his right; hereby the diſſeiſor acquires a new right, which changes the quality of his eſtates, and renders that lawful which before was tortious. 4. By way of *extinguiſhment:* as if my tenant for life makes a leaſe to A for life, remainder to B and his heirs, and I *releaſe* to A; this extinguiſhes my right to the reverſion, and ſhall enure to the advantage of B's remainder as well as of A's particular eſtate. 5. By way of *entry and feoffment:* as if there be two joint diſſeiſſors, and the diſſeiſee *releaſes* to one of them, he ſhall be ſole ſeiſed; and ſhall keep out his former companion; which is the ſame in effect as if the diſſeiſee had entered, and thereby put an end to the diſſeiſin, and afterwards had enfeoffed one of the diſſeiſors in fee. And hereupon we may obſerve, that when a man has in himſelf the poſſeſſion of lands, he muſt at the common law convey the freehold by feoffment and livery; which makes a notoriety in the country: but if a man has only a right or a future intereſt, he may convey that right or intereſt by a mere *releaſe* to him that is in poſſeſſion of the land: for the occupancy of the releſſee is a matter of ſufficient notoriety already. Blackſt. Com. book ii. p. 324. &c. See LEASE *and releaſe*.

RELEGATION, *relegatio*, a kind of EXILE or BANISHMENT, wherein the obnoxious perſon is commanded to retire to a certain place preſcribed, and to continue there till he be recalled.

Lord Coke calls *relegation* a baniſhment for a time only:

Courtin more adequately defines *relegation* a baniſhment to a certain place or a certain term.

In Rome, *relegation* was a leſs ſevere puniſhment than deportation, in that the *relegated* perſon did not thereby loſe the rights of a Roman citizen, nor thoſe of his family, as the authority of a father over his children, &c.

RELICS, *reliquiæ*, in the *Romiſh Church*, certain remains of the body or cloaths of ſome ſaint or martyr, devoutly preſerved in honour to his memory, carried at proceſſions, kiſſed, revered, &c.

The abuſes of that church in point of *relics* are very flagrant. F. Mabillon, a Benedictine, complains of the great number of ſuſpected *relics* expoſed on altars: he owns, that, were there to be a ſtrict inquiſition into the *relics*, vaſt numbers of ſpurious ones would be found offered every where to the piety and devotion of the faithful; and adds, that bones are frequently conſecrated, ſo far from belonging to ſaints, that, in all probability, they do not belong to Chriſtians.

The catacombs are an inexhauſtible fund of *relics*; yet it is ſtill diſputed who were the perſons interred therein.

In the eleventh century, a method was introduced of trying ſuppoſed *relics* by fire. Thoſe which did not conſume in the fire, were reputed genuine; the reſt not.

It is an ancient cuſtom, which ſtill obtains, to preſerve the *relics* in the altars whereon maſs is celebrated. To this purpoſe, a ſquare hole is made in the middle of the altar, big enough to receive the hand; and herein is the *relic* depoſited, being firſt wrapped in red ſilk, and incloſed in a leaden box.

The Romaniſts alledge a good deal of antiquity in behalf of their *relics*. The Manichees, it ſeems, out of hatred to the fleſh, which they held an evil principle, are recorded as refuſing to honour the *relics* of ſaints; which is eſteemed a kind of proof, that the Catholics did it in the firſt ages.

Indeed, folly and ſuperſtition got into religion but too early. Even the touching of linen cloths on *relics*, from an opinion of ſome extraordinary virtue derived therefrom, appears to be as ancient as the firſt ages, there being a hole made in the coffins of the forty martyrs at Conſtantinople, expreſly for this purpoſe.

This practice of honouring the *relics* of ſaints, on which the church of Rome, in ſucceeding ages, founded her ſuperſtitious and lucrative uſe of them, as objects of devotion, as a kind of charms or amulets, and as inſtruments of pretended miracles, ſeems to have originated in a very ancient cuſtom, that prevailed among Chriſtians, of aſſembling at the cœmiteries or burying-places of the martyrs, for the purpoſe of commemorating them, and of performing divine worſhip. When the profeſſion of Chriſtianity obtained the protection of the civil government, under Conſtantine the Great, ſtately churches were erected over their ſepulchres, and their names and memories were treated with every poſſible token of affection and reſpect. See SAINTS. In proceſs of time, this reverence of the martyrs exceeded all reaſonable bounds; and thoſe prayers and religious ſervices were thought to have a peculiar ſanctity and virtue, which were performed over their tombs. Hence probably proceeded the practice, which obtained in the fourth century, of depoſiting *relics* of the ſaints and martyrs under the altars in all their churches. This practice, however, was then thought of ſuch importance, that St. Ambroſe would not conſecrate a church, becauſe it had no *relics*; and the council of Conſtantinople in Trullo ordained, that thoſe altars ſhould be demoliſhed, under which there were found no *relics*. The rage of procuring *relics* for this and other purpoſes of a ſimilar nature became ſo exceſſive, that, in 386, the emperor Theodoſius the Great was obliged to paſs a law, forbidding the people to dig up the bodies of the martyrs, and to traffick in their *relics*.

Such was the commencement of that reſpect for ſacred *relics*, which, in after ages, was perverted into a formal worſhip of them, and became the occaſion of innumerable proceſſions, pilgrimages, and miracles, from which the church of Rome hath derived incredible advantage. Towards the cloſe of the ninth century, it was not enough to reverence departed ſaints, and to confide in their interceſſions and ſuccours; it was not enough to clothe them with an imaginary power of healing diſeaſes, working miracles, and delivering from all ſorts of calamities and dangers; their bones, their cloaths, the apparel and furniture they had poſſeſſed during their lives, the very ground which they had touched, or in which their putrified carcaſes were laid, were treated with a ſtupid veneration, and ſuppoſed to retain the marvellous virtue of healing all diſorders both of body and mind, and of defending ſuch as poſſeſſed them againſt all the aſſaults and devices of Satan. The conſequence of this wretched notion was, that every one was eager to provide himſelf with theſe ſalutary remedies, for which purpoſe great numbers undertook fatiguing and perilous voyages, and ſubjected themſelves to all ſorts of hardſhips; while others made uſe of this deluſion, to accumulate their riches, and to impoſe upon the miſerable multitude by the moſt impious and ſhocking inventions. As the demand for *relics* was prodigious and univerſal, the clergy employed all their dexterity to ſatisfy theſe demands, and were far from being nice in the methods they uſed for that end. The bodies of the ſaints were ſought by faſting and prayer, inſtituted by the prieſt in order to obtain a divine anſwer and an infallible direction, and this pretended direction never failed to accompliſh their deſires; the holy carcaſe was always found, and that always in conſequence, as they impiouſly gave out, of the ſuggeſtion, and inſpiration of God himſelf. Each diſcovery of this kind was attended with exceſſive demonſtrations of joy, and animated the zeal of theſe devout ſeekers to enrich the church ſtill more and more with this new kind of treaſure. Many travelled with this view into the Eaſtern provinces, and frequented the places which Chriſt and his diſciples had honoured with their preſence, that, with the bones and other ſacred remains of the firſt heralds of the Goſpel, they might comfort dejected minds, calm trembling conſciences, ſave ſinking ſtates, and defend their inhabitants from all ſorts of calamities. Nor did theſe pious travellers return home empty; the craft, dexterity, and knavery of the Greeks found a rich prey in the ſtupid credulity of the Latin *relic*-hunters, and made a profitable commerce of this new devotion. The latter paid conſiderable ſums for legs and arms, ſkulls and jaw-bones (ſeveral of which were Pagan, and ſome not human), and other things that were ſuppoſed to have belonged to the primitive worthies of the Chriſtian church; and thus the Latin churches came to the poſſeſſion of thoſe celebrated *relics* of St. Mark, St. James, St. Bartholomew, Cyprian, Pantaleon, and others, which they ſhew at this day with ſo much oſtentation. But there were many, who, unable to procure for themſelves theſe ſpiritual treaſures by voyages and prayers, had recourſe to violence and theft; for all ſorts of means and all ſorts of attempts in a cauſe of this nature were conſidered, when ſucceſsful, as pious and acceptable to the Supreme Being.

Beſides the arguments from antiquity to which the Papiſts refer, in vindication of their worſhip of *relics*, of which the reader may form ſome judgment from this article, Bellarmine appeals to ſcripture in ſupport of it, and cites the following paſſages, viz. Exod. xiii. 19. Deut. xxxiv. 6. 2 Kings xiii. 21. 2 Kings xxiii. 16, 17, 18. Iſaiah xi. 10. Matthew xi. 20, 21, 22. Acts v. 12—15. Acts xix. 11, 12. See POPERY.

Relics are forbidden to be uſed or brought into England by ſeveral ſtatutes; and juſtices of peace are empowered to ſearch houſes for popiſh books and *relics*, which, when found, are to be defaced and burnt, &c. 3 Jac. I. cap. 26.

RELICT, *relicta*, in *Law*. See WIDOW.

RELICTA *verificatione*, in *Law*, is when a defendant relinquiſhes his proof or plea, and thereupon judgment is entered for the plaintiff.

RELIEF, *relevium*, *levamen*, in *Law*, a fine paid to the chief lord, by a perſon at his coming to the inheritance of land held by military ſervice.

This was ſaid *relevare hereditatem caducam*; and the money thus paid was called *relevamen*, *relevium*, or *relief*. *Relief* is uſually to the value of a year's rent or revenue.

The origin of the cuſtom is thus: a feudatory or beneficiary eſtate in lands being at firſt only granted for life, after the death of the vaſſal, it returned to the chief lord; and was hence called *feudum caducum*, q. d. fallen to the lord by the death of the tenant.

In courſe of time, theſe feudatory eſtates being converted into inheritances by the connivance and conſent of the lord; when the poſſeſſor of ſuch eſtate died, it was called *hæreditas caduca*, q. d. an inheritance fallen to the lord, from whom it was to be recovered, by the heir's paying a certain ſum of money. But this ſum was arbitrary, and at the will of the lord; ſo that, if he pleaſed to demand an exorbitant *relief*, it was in effect to diſinherit the heir. The Engliſh ill brooked this conſequence of their new-adopted policy; and therefore William the Conqueror by his laws (cap. 22, 23, 24.) aſcertained the *relief*, by directing (in imitation of the Daniſh heriots) that a certain quantity of arms and habiliments of war ſhould be paid by the earls, barons, and vavaſours reſpectively; and if the latter had no arms, they ſhould pay one hundred ſhillings. William Rufus broke through this compoſition, and again demanded arbitrary uncertain *reliefs*, as due by the feodal laws; thereby in effect obliging every heir to new-purchaſe or redeem his land: but his brother Henry I. by his charter, reſtored his father's law; and ordained that the *relief* to be paid ſhould be according to the law ſo eſtabliſhed, and not an arbitrary redemption. But afterwards, when, by an ordinance in 27 Hen. III. called the Aſſiſe of Arms, it was provided that every man's armour ſhould deſcend to his heir, for defence of the realm, and it thereby became impracticable to pay theſe acknowledgments in arms, according to the laws of the Conqueror, the compoſition univerſally accepted of was one hundred ſhillings for every knight's fee; as we find it ever after eſtabliſhed. But it muſt be remembered, that this *relief* was only then payable, if the heir at the death of his anceſtor had attained his full age of twenty-one years.

Relief *reaſonable*, called alſo *lawful*, and *ancient relief*, is that enjoined by ſome law, or fixed by ancient cuſtom; and which does not depend on the will of the lord.

Thus, in a charter of King John, mentioned by Matthew Paris :-- *Si quis comitum vel baronum noſtrorum, ſive aliorum tenentium de nobis in capite per ſervitium militare, mortuus fuerit, & cum deceſſerit, hæres ſuus plenæ ætatis fuerit, &* relevium *debet, habeat hæreditatem ſuam per* antiquum relevium.

What this was, may be ſeen in the laws of William the Conqueror, &c. Bracton ſays, this fine was called a *relief, quia hæreditas, quæ jacens fuit per anteceſſoris deceſſum*, relevatur *in manus hæredum*, &c.

A *relief* is alſo paid in ſocage tenure, or petit ſerjeanty; where a rent, or other thing, is paid by rendering as much as the rent or payment reſerved.

By the cuſtom of Normandy, *relief* is due for lands held in villainage as well as in fee. By the cuſtom of Paris, *relief* is not due upon inheritances in the direct line.

The quantity of the relief is very different; there are *ſingle reliefs, double reliefs*, &c. The quality, too, is diverſe: there are *reliefs of property*, paid by the heir; *reliefs of bail*, or *tutorage*, paid by the guardian for his minor, or by the huſband for the fiefs of his wife, &c. *relief of horſe and arms*, &c.

By the laws of king Canutus, the *relief* of an earl, paid to the king, was eight war-horſes with their bridles and ſaddles, four cuiraſſes, four helmets, four ſwords, four hunting-horſes, and a palfrey. The *relief* of a baron or thane was four horſes, &c.

Relief, in *Chancery*, denotes an order ſued out for the diſſolving of contracts, and other acts, on account of their being unreaſonable, prejudicial, grievous, or from ſome other nullity, either *de jure*, or *de facto*.

Minors obtain *relief* againſt acts paſſed in their minority.

Majors have *relief* in caſes of enormous damage, deceit, violence, over-reaching, extravagant bargains, &c.

Among the Romaniſts it is a rule, that the church obtains *relief* any time, and againſt all acts paſſed in its prejudice; no preſcription prevailing againſt it.

Relief, *Aid de*. See Aid.

Relief *of a hare*, among *Hunters*, is the place where ſhe goes to feed in the evening.

Relief, in *Sculpture*. See Relievo.

RELIEVE, in the *Military Senſe*. To *relieve*, is to take the poſt of another body. Hence, to *relieve* the guard, to *relieve* the trenches, &c. is to bring freſh men upon the guard, or to the trenches, and to ſend thoſe to reſt, who have been upon duty before. They alſo ſay, *relieve* a ſentinel, which is generally done every two hours, by a corporal who attends the relief; *relieve* the ſteerſman, &c.

To *relieve* a place that is beſieged, is to furniſh it with a ſupply of men, proviſions, ammunition, &c.

RELIEVER, in *Artillery*, is an iron ring fixed to a handle by means of a ſocket, ſo as to be at right angles to it. It ſerves to diſengage the firſt SEARCHER of a gun, when any of its points are retained in a hole, and cannot be got out otherwiſe.

RELIEVING *tackles*, in a *Ship*, are two ſtrong tackles, uſed to prevent a ſhip from overturning on the careen, and to aſſiſt in bringing her upright after that operation is completed. The *relieving* tackles are furniſhed with two ſtrong *guys* or pendants, by which their efforts are communicated, under the ſhip's bottom, to the oppoſite ſide, where the ends of the guys are attached to the lower gun-ports. The other ends of the tackles are hooked to the wharf, or pontoon, by which the veſſel is careened. Thus if a ſhip is firſt laid down on the larboard ſide, which is neareſt the wharf, the *relieving* tackles are paſſed under her bottom from the ſaid wharf, and attached to the ſtarboard ſide, by which they will reſtrain her from falling lower than is neceſſary. Falconer.

Relieving *tackle* is alſo a name given to the train tackles of a gun-carriage.

RELIEVO, or **Relief**, *imboſſment*, is applied to a figure which projects, or ſtands out prominent, from the ground or plane whereon it is formed, whether that figure be cut with the chiſſels, moulded, or caſt. There are three kinds of *relievo*; viz. *alto*, *baſſo*, and *demi-relievo*.

Relievo, *Alto*, *haut relief*, or *high relievo*, is when the figure is formed after nature, and projects as much as the life.

Relievo, *Baſſo*, *bas relief*, or *low relievo*, is when the work is but raiſed a little from its ground, as we ſee in medals, and, in the frontiſpieces of buildings, particularly the hiſtories, feſtoons, foliages, and other ornaments in friezes. See Basso *relievo*.

Relievo, *Demi*, is when one half of the figure riſes from the plane, i. e. when the body of a figure ſeems cut in two, and one half is clapped on a ground. When in a *baſſo relievo* there are ſome parts that ſtand clear out, detached from the reſt, the work is called a *demi-boſſe*.

Relievo, in *Architecture*, denotes the ſally or projecture of any ornament.

This, Daviler obſerves, is always to be proportioned to the magnitude of the building it adorns, and the diſtance at which it is to be viewed.

If the work be inſulate, terminated on all ſides, it is called a *figure in relievo*, or a *round imboſſment*. Such are ſtatues, acroters, &c.

Relievo, in *Painting*, denotes the degree of force or boldneſs whereby a figure ſeems, at a due diſtance, to ſtand out from the ground of the painting, as if really imboſſed.

The *relievo* depends much on the depth of the ſhadow, and the ſtrength of the light; or on the light of the different colours bordering on one another; and particularly on the difference of the colour of the figure from that of the ground.

When the light is well choſen, to make the neareſt parts of figures advance; and well diffuſed on the maſſes, ſtill diminiſhing inſenſibly, and terminating in large a ſpecious ſhadow, brought off inſenſibly; the *relievo* is ſaid to be *bold*, and the *clair obſcure*, *well underſtood*.

RELIGION, *religio*, that worſhip or homage due to God, conſidered as Creator, Preſerver, and, with Chriſtians, as Redeemer, of the world.

The foundation of all *religion* is, that there is a God; and that he requires ſome ſervice at the hands of his creatures. From the different manners wherein we arrive at the knowledge of this ſervice, *religion* is divided into *natural* and *revealed*.

Religion, *Natural*, is whatever we diſcover to be due and meet, by the mere dictates of natural reaſon; as to love and honour God, not to abuſe his creatures, &c.

Religion, *Revealed*, is what we receive as the expreſs declaration of God himſelf, by the mouths of prophets, &c. See Revelation.

The firſt flows immediately from the relation between the creature and the Creator; the latter does not follow from ſuch a relation, but is ſuperadded from the mere will and pleaſure of the Creator.

The firſt we originally call MORALITY, or ETHICS; becauſe immediately converſant about the manners and duties of men towards one another; and towards themſelves, conſidered as creatures of that Being.

The latter we call, by way of eminence, *religion*, as being the rule of our duty immediately to God himſelf.

The firſt ſuppoſes a God, a providence, a future ſtate, rewards and puniſhments; the latter likewiſe ſuppoſes an immediate miſſion from God himſelf, atteſted by miracles, &c. See Christian *religion*.

Religion is more particularly uſed for that ſpecial ſyſtem of faith and worſhip, which obtains in a particular age, ſect, or country, &c.

In this ſenſe we ſay the Romiſh *religion*, the Reformed *religion*, the *religion* of the Greeks, the Mahometan *religion*, the Jewiſh *religion*, &c. See Judaism, Mahometanism, &c.

The Siameſe hold the diverſity of *religion*, i. e. the different manners of honouring God, to be pleaſing to him; inaſmuch as they have all the ſame object, and all tend to the ſame end, though by different means. Claude.

This ſentiment of theſe idolaters is doubtleſs more juſt than that of our zealots, who hold all but thoſe of their own religion odious to God. The ſeveral ſects in *religion* ſee under their proper articles. See alſo Sect.

Of the *religion* of the ruling part of the world, you may find a lively deſcription in a chorus of Seneca's Troas, at the end of the ſecond act, beginning thus: *Verum eſt, an timidos fabula decipit? umbras corporibus vivere conditis*, &c. This, according to Patin, is the *religion* of princes, and great men, of magiſtrates, monaſtic ſuperiors,

riors, and even ſome phyſicians and philoſophers. M. Du Maine, head of the leaguers in France, uſed to ſay, that princes have no *religion* till after they are turned of forty. *Cum numine nobis mors inſtat, majore facit.* Patin. Lett. Choiſ. 106.

Religion, again, is applied to a military order, conſiſting of knights who live under ſome certain rule, &c.

In this ſenſe we ſay the *religion of Malta*, &c. See Malta.

Religion is ſometimes alſo uſed for a convent. Thus we ſay, there are *religions* of men, i. e. monks; *religions* of women, i. e. nuns. There are new *religions* eſtabliſhed every day, i. e. there are continually new monaſteries built.

The **Religion** uſed abſolutely, denotes the Reformed in France. Thus, they ſay, D'Ablancourt and Dacier were of the *religion*. See Huguenots.

RELIGIOUS, in a general ſenſe, ſomething that relates to religion.

We ſay, a *religious* life, *religious* ſociety, &c. Churches and church-yards are *religious* places. A *religious* war is alſo called a croisade.

Religious is more particularly uſed for a perſon engaged by ſolemn vows to the monaſtic life; or a perſon ſhut up in a monaſtery, to lead a life of devotion and auſterity, under ſome rule or inſtitution.

The male *religious* we popularly call *monks* and *friars*; the female, *nuns* and *canoneſſes*. See Canon, Monk, Nun, &c.

M. Nicole obſerves, that ſome domeſtic chagrins, and a certain pride, which leads people to abſcond when they cannot make a figure to their mind, make as many *religions* as real piety. He adds, that a girl muſt often be made a *religious* for no other reaſon, but becauſe ſhe cannot be married anſwerable to her condition.

A *religious* cannot make any will. By the council of Trent, a *religious* may reclaim his vows within five years.

Anciently the *religious* were all laymen, and it was even prohibited them to take up orders. In 1557, the parliament of Paris made a difficulty of receiving a biſhop of Laon to the oath of a duke and peer, by reaſon of his being a *religious*: yet a *religious*, being promoted to a biſhoprick, is thenceforth ſecularized or diſpenſed from the obſervation of his rule.

In ancient deeds and conveyances of lands, we often find the ſeller reſtrained from giving or alienating it, *viris religioſis, vel Judæis*, to *religious*, or to Jews; to the end the land might not fall into mortmain.

In a memorial directed by king John to his viſcounts, they are ordered to proclaim through their reſpective counties, that nobody, as they love their bodies and cattle, injure the *religious* or clerks, either in word or deed, on penalty of being hanged up on the next oak. *Nulli, ſicut diligunt corpora & catalla ſua, malum faciant vel dicant* viris religioſis *vel* clericis. *Si quem inde attingere poſſimus, ad proximam quercum eum ſuſpendi faciemus.*

Religious *impoſtors*. See Impostors.

Religious *order*. See Order.

Moſt military orders pretend likewiſe to be *religious*; as thoſe of Malta, who make vows, &c. See Malta.

RELINQUISHMENT, in *Law*, is a forſaking, abandoning, or giving over. It hath been adjudged, that a perſon may *relinquiſh* an ill demand in a declaration, &c. and have judgment for that which is well-demanded.

RELIQUA, the remainder or debt, which a perſon finds himſelf debtor in, upon the balancing or liquidating an account.

Hence, *reliquitary*, the debtor of a *reliqua*; as alſo a perſon who only pays piece-meal.

The term *reliqua* is pure Latin.

RELIQUARY, a ſhrine or caſket, in which the relics of a dead ſaint are kept.

RELIQUE. See Relics.

RELIQUIÆ, *relics*, in *Antiquity*, the aſhes and bones of the dead, which remained after burning their bodies; and which they very religiouſly gathered, and put into urns, and afterwards depoſited in tombs.

RELL, *mouſe*, in *Zoology*, the Engliſh name of the white-bellied mouſe, with a blackiſh back and long body. See Glis.

REM, *Information in*, in *Law*. See Information.

REMAINDER, *remanentia*, in *Law*, an eſtate limited to take effect and be enjoyed after another eſtate is determined. As if a man ſeiſed in fee-ſimple granteth lands to A for twenty years, and, after the determination of the ſaid term, then to B and his heirs for ever: here A is tenant for years, *remainder* to B in fee. In the firſt place, an eſtate for years is created or carved out of the fee, and given to A; and the reſidue or *remainder* of it is given to B. But both theſe intereſts are in fact only one eſtate; the preſent term of years and the *remainder* afterwards, when added together, being equal only to one eſtate in fee. Thus alſo if land be granted to A for twenty years, and after the determination of the ſaid term to B for life; and after the determination of B's eſtate for life, it being limited to C and his heirs for ever: this makes A tenant for years, with *remainder* to B for life, *remainder* over to C in fee. In this caſe alſo, the firſt eſtate, and both the *remainders*, for life and in fee, are one eſtate only. Hence it is eaſy to infer, that no *remainder* can be limited after the grant of an eſtate in fee-ſimple; becauſe this is the higheſt and largeſt eſtate that a ſubject is capable of enjoying; and he that is tenant in fee, hath in him the whole of the eſtate; a *remainder*, therefore, which is only a portion, or reſiduary part of the eſtate, cannot be reſerved after the whole is diſpoſed of.

The rules that are laid down by law to be obſerved in the creation of *remainders*, are as follow. 1. There muſt neceſſarily be ſome particular eſtate, precedent to the eſtate in *remainder*; which particular eſtate is ſaid to ſupport the *remainder*. 2. The *remainder* muſt commence or paſs out of the grantor at the time of the creation of the particular eſtate: as where there is an eſtate to A for life, with *remainder* to B in fee; here B's *remainder* in fee paſſes from the grantor at the ſame time that ſeiſin is delivered to A of his life-eſtate in poſſeſſion. And it is this which induces the neceſſity at common law of livery of ſeiſin being made on the particular eſtate, whenever a freehold *remainder* is created. 3. The *remainder* muſt veſt in the grantee during the continuance of the particular eſtate, or *eo inſtanti* that it determines. As if A be tenant for life, *remainder* to B in tail: here B's *remainder* is veſted in him, at the creation of the particular eſtate to A for life: or if A and B be tenants for their joint lives, *remainder* to the ſurvivor in fee; here, though during their joint lives the *remainder* is veſted in neither, yet on the death of either of them, the *remainder* veſts inſtantly in the ſurvivor; whence both theſe are good *remainders*. But if an eſtate be limited to A for life, *remainder* to the eldeſt ſon of B in tail, and A dies before B hath any ſon; here the *remainder* will be void, for it did not veſt in any one during the continuance, nor at the determination, of the particular eſtate: and even ſuppoſing that B ſhould afterwards have a ſon, he ſhall not take by this *remainder*; for, as it did not veſt at or before the end of the particular eſtate, it never can veſt at all, but is gone for ever. Hence *remainders* are either *veſted* or *contingent*. *Veſted remainders* (or *remainders* executed, whereby a preſent intereſt paſſes to the party, though to be enjoyed *in futuro*) are ſuch where the eſtate is invariably fixed, to remain to a determinate perſon after the particular eſtate is ſpent. As if A be tenant for twenty years, *remainder* to B in fee; here B's is a *veſted remainder*, which nothing can defeat or ſet aſide. *Contingent* or executory *remainders* (whereby no preſent intereſt paſſes) are where the eſtate in *remainder* is limited to take effect, either to a dubious and uncertain perſon, or upon a dubious or uncertain event; ſo that the particular eſtate may chance to be determined, and the *remainder* never take effect. In the firſt caſe, if A be tenant for life, with *remainder* to B's eldeſt ſon (then unborn) in tail, this is a contingent *remainder*; and if A dies before B's ſon is born, the *remainder* is abſolutely gone; even though A leaves his wife big with child, and after his death a poſthumous ſon is born. But to remedy this hardſhip, it is enacted by ſtatute 10 & 11 W. III. cap. 16. that poſthumous children ſhall be capable of taking in *remainder*, in the ſame manner as if they had been born in their father's lifetime; that is, the *remainder* is allowed to veſt in them, while yet in their mother's womb. In the ſecond caſe, where land is given to A for life, and in caſe B ſurvives him, then with *remainder* to B in fee; here B is a certain perſon, but the *remainder* to him is a contingent *remainder*, depending upon the uncertainty of his ſurviving A. During the joint lives of B and A it is contingent; and if B dies firſt, it can never veſt in his heirs, but is for ever gone; but if A dies firſt, the *remainder* to B becomes veſted. *Contingent remainders* may be defeated, by deſtroying or determining the particular eſtate upon which they depend, before the contingency happens, whereby they become veſted.

In deviſes by laſt will and teſtament, *remainders* may be created in ſome meaſure contrary to the rules here laid down: though our lawyers will not allow ſuch diſpoſitions to be ſtrictly *remainders*; but call them by another name, that of executory *deviſes*, or deviſes hereafter to be executed. Blackſt. Com. book ii. chap. 11. § 3.

Spelman makes the difference between a *remainder* and *reverſion* to conſiſt in this; that by a reverſion, after the appointed term, the eſtate returns to the donor, or his heirs, as the proper ſountain; whereas by *remainder* it goes to ſome third perſon, or ſtranger.

Or, a *remainder* is an EXPECTANCY, created by act of the parties; whereas a REVERSION is created by act of law.

The limitations of perſonal goods and chattels, in *remainder* after a bequeſt for life, are permitted in laſt wills and teſtaments: ſo that if a man, either by deed or will, limits his books or furniture to A for life, with *remainder* over to B, this *remainder* is good. But where an eſtate-tail in things perſonal is given to the firſt or any ſubſequent poſſeſſor, it veſts in him the total property, and no *remainder* over ſhall be permitted on ſuch a limitation.

Glanville obſerves, that biſhops and abbots, in regard their baronies are the king's alms, cannot give any part thereof by way of *remainder*.

REMAINDER, *Writ of formedon in the*. See FORMEDON.

REMAINDER, in *Mathematics*, is the difference; or that which is left after the taking a leſſer number, or quantity, from a greater.

REMANCIPATION, *remancipatio*, among the Romans, a form of divorce obſerved in marriages that had been contracted by *coemption*. This was done by delivering the wife into the huſband's hands; ſo the marriage was diſſolved by the huſband's delivering the wife into any perſon's hands, agreed upon between them.

RE-MARRYING, the repeating of a marriage; or the going through the ſolemnities of a ſecond marriage.

Clandeſtine and uncanonical marriages are deemed null; and the parties are to be *re-married* in form; at leaſt, it had always better be ſo to avoid diſputes.

It was anciently expreſly forbid to *re-marry* in the firſt year of viduity. M. Bayle obſerves, that a perſon who does not *re-marry*, is anſwerable to the public for all the time loſt in his viduity, or widowerhood.

REMEDIAL *part of a law*. See LAW.

REMEDIAL *ſtatutes*, are thoſe which are made to ſupply ſuch defects, and abridge ſuch ſuperfluities, in the common law, as ariſe either from the general imperfection of all human laws, from change of time and circumſtances, from the miſtakes and unadviſed determinations of unlearned judges, or from any other cauſes whatſoever. And this being done, either by enlarging the common law where it was too narrow and circumſcribed, or by reſtraining it where it was too lax and luxuriant, hath occaſioned another ſubordinate diviſion of *remedial* acts of parliament into enlarging and reſtraining ſtatutes. E. g. In the caſe of treaſon, clipping the current coin of the kingdom was an offence not ſufficiently guarded againſt by the common law; therefore it was thought expedient by ſtatute 5 Eliz. cap. 11. to make it high treaſon, which it was not at the common law; ſo that this was an enlarging ſtatute. At common law alſo ſpiritual corporations might leaſe out their eſtates for any term of years, till prevented by the ſtatute 13 Eliz. cap. 10. this was, therefore, a reſtraining ſtatute. Blackſt. Com. book i. p. 86.

REMEDY, in *Law*, is the action or means given by law for the recovery of a right. *Lex ſemper dabit remedium.*

REMEDY, *remedium*, in *Phyſic*, a medicine, or preparation, applied either internally or externally, for the cure of a diſeaſe.

Emplaſters, unguents, cataplaſms, &c. are *topical remedies*. Mercury and the bark are *ſpecific remedies*. Mineral waters, and aſs's milk, and country air, are uſually the *laſt remedies*. Salivation is ſometimes called, by way of eminence, *the remedy*.

When *remedies* are ſtuffed with too many ingredients, they load the ſtomach with a ſlimy mucilage, which ſwells, obſtructs, and does more hurt than good.

REMEDIES *appended*. See APPENSA.

REMEDY *for the maſter of the mint*, in the *Engliſh Coinage*, denotes a certain latitude allowed him with reſpect to the STANDARD of gold coin. Out of every fifteen pounds of gold coined at the mint (according to the account publiſhed by the learned Mr. Folkes, in his curious tables of Engliſh ſilver coins) ſome pieces are taken at random, and depoſited in a ſtrong box called the pix: at certain intervals, ſometimes of one year, and ſometimes of ſeveral years, the pix is opened at Weſtminſter, in the preſence of the lord chancellor, the lords commiſſioners of the treaſury, and others; portions taken from the pieces of each coinage are melted together, and an aſſay made of the collective maſs by a jury of the Goldſmiths' company. At this trial, the mint-maſter is held excuſable, though the moneys be either too baſe or too light; provided the imperfection and deficiency together are leſs than the ſixth part of a carat, which amounts to forty grains of fine gold on the pound of ſtandard, or the one hundred and thirty-ſecond part of the value. It is ſaid that the *remedy* is contained within as narrow limits, as any workers can reaſonably be ſuppoſed to make themſelves anſwerable for.

REMEMBRANCE, is when the idea of ſomething formerly known recurs again to the mind, without the operation of a like object on the external ſenſory. See MEMORY, REMEMBRANCE, and RECOLLECTION.

REMEMBRANCERS *of the exchequer*, are two officers, or clerks therein, formerly called *clerks of the remembrance*.

They are now diſtinguiſhed by the appellations of the *king's remembrancer*, and the *lord treaſurer's remembrancer*. There is alſo another officer, called the *remembrancer of the firſt fruits*. Their buſineſs is to put the lord treaſurer and juſtices of the court in *remembrance* of ſuch things as are to be called upon, and dealt in for the king's benefit.

The king's REMEMBRANCER enters into the office of all recognizances taken before the barons, for any of the king's debts; for appearance; or for obſerving orders; and makes out proceſs againſt the collectors of cuſtoms, ſubſidies, exciſe, and other public payments, for their accounts. All informations upon penal ſtatutes are entered in this office; and there all matters upon Engliſh bills in the exchequer-chamber remain. He makes the bills of compoſition upon penal law; takes the ſtatement of debts; has delivered into his office all manner of indentures, fines, and other evidence whatſoever that concern the aſſuring of any lands to the crown: he every year, *in craſtino Animarum*, reads, in open court, the ſtatute for election of ſheriffs, gives them their oath, and reads the oath of all the officers of the exchequer, when they are admitted.

The Lord treaſurer's REMEMBRANCER is charged to make proceſs againſt all ſheriffs, eſcheators, receivers, and bailiffs, for their account; proceſs of fieri facias, &c. extent for any debts due to the king, either in the pipe, or with the auditors; and proceſs for all ſuch revenues as are due to the king, by reaſon of his revenue. He alſo makes record, whereby it appears whether ſheriffs, or other accountants, pay their proffers due at Eaſter and Michaelmas. He makes another record, whether ſheriffs, or other accountants, keep their days of prefixion: all eſtreats or fines, iſſues, and amerciaments, ſet in any of the courts at Weſtminſter, or at the aſſize or ſeſſions, are certified into his office, and are by him delivered to the clerk of the eſtreats to write proceſs upon them, &c.

The REMEMBRANCER *of the firſt fruits* takes all compoſitions and bonds for firſt fruits and tenths; and makes proceſs againſt ſuch as do not pay the ſame.

REMEMBRANCER is alſo the title of an officer in the city of London, who is to attend the lord mayor on certain days, and whoſe buſineſs is to remind his lordſhip of the ſelect days, when he is to go abroad with the aldermen, &c. He is to attend daily at the parliament houſe, during the ſeſſions, and to report to the lord mayor their tranſactions.

REMIGES, in *Ornithology*, denote the primary and ſecondary wing feathers.

REMINISCENCE, *reminiſcentia*, is that power of the human mind, whereby it recollects itſelf, or calls again to its remembrance ſuch ideas or notions as it had really forgot: in which it differs from *memory*, which is a treaſuring up of things in the mind, and keeping them there, without forgetting them.

Hence memory may be conſidered as a continual *remembrance*; and *reminiſcence*, as an interrupted memory.

How near akin ſoever the two faculties may ſeem, yet they are generally found ſeparated; ſo that they who excel in the one, are generally defective in the other.

The ancient Platoniſts were of opinion, that all learning and knowledge conſiſted in the *reminiſcence* or recollection of notices which had been in the ſoul before its union with the body.

REMINISCERE, the ſecond Sunday in Lent: anciently thus called from the firſt word of the introit of the maſs ſaid on that day, *Reminiſcere miſerationum tuarum*.

REMISIT. — *Recto quando dominus* REMISIT. See RECTO.

REMISSION, in *Law*, &c. denotes the pardon of a crime, or the giving up the puniſhment due thereto.

REMISSION, in *Medicine*, is when a diſtemper abates, but does not go quite off, before it returns again; as is common in fevers which do not quite intermit.

REMISSION, *remiſſio*, in *Phyſics*, the abatement of the power or efficacy of any quality. In oppoſition to the increaſe of the ſame, which is called its *intenſion*.

In all qualities capable of intenſion and *remiſſion*, the intenſion decreaſes reciprocally as the ſquares of the diſtance from the centre of the radiating quality increaſe.

REMISSION, *remiſſio*, *ανεσις*, in the *Ancient Muſic*, was uſed to ſignify the paſſage of the voice from acute to grave, being oppoſite to intention.

REMIT, in *Commerce.* To *remit* a ſum of money, bill, or the like, is to ſend a ſum of money, &c.

To *remit* is alſo uſed among bankers for what is accuſtomed to be given a banker, or, as it were, diſcounted with him, for his giving a bill of exchange.

To *remit* is alſo to give up part of one's due to a debtor; as, I would *remit* you a fourth of what you owe on condition of paying me the reſt in hand.

REMITTANCE, in *Commerce*, the traffic or return of money from one place to another, by bills of exchange, orders, or the like.

A *remittance* is properly a bill of exchange, or the like, ſent to a correſpondent, and the content thereof to be received by him, or ſome other perſon, on whom it is drawn.

By means of theſe *remittances*, large ſums of money are returned from one city to another, without danger, without carriage, &c.

In London it is eaſy to get *remittances* upon any city in the world; in the country it is more difficult.

REMITTANCES, *Book of*. See BOOK.

REMITTANCE is alſo uſed in ſpeaking of the payment of a bill of exchange. Thus, I have received a hundred piſtoles on your *remittance*. Mr. N. banker in your city, ſhould have paid you two hundred crowns on my *remittance*.

REMITTANCE alſo denotes the due or fee allowed the banker or merchant, both on account of his trouble, and the different value of the ſpecies in the place where you pay the money, and where he *remits* it.

The *remittance* at London is very high. This *remittance* is more uſually called *change* and RECHANGE.

REMITTER, in *Law*. Where a man has two titles to land, and is ſeized by the latter; and, that proving defective, he is *remitted* or reſtored to the former more ancient title, this is called a *remitter*, from the Latin, *remittere, to ſend back*.

If land deſcend to him that had right to it before, he ſhall be *remitted* to his better title, if he pleaſe.

REMITTING *fever*. See FEVER, and BILIOUS *fever*.

REMOLADE, in the *Manege*. See CHARGE.

REMONSTRANCE, an expoſtulation, or humble ſupplication, addreſſed to the king, or other ſuperior, to beſeech him to reflect on the inconveniences, or ill conſequences, of ſome order, edict, or the like.

REMONSTRANCE is alſo uſed for an expoſtulatory counſel or advice; or a gentle and handſome reproof, made either in general or particular, to appriſe or correct ſome fault.

REMONSTRANTS, *Remonſtrantes*, a title given to the ARMINIANS, by reaſon of the *remonſtrance* they made in 1610 to the ſtates of Holland, againſt the ſynod of Dort, wherein they were condemned.

Epiſcopius and Grotius were at the head of the *Remonſtrants*. And as the patrons of Calviniſm preſented an addreſs in oppoſition to their remonſtrance, which they called their counter-remonſtrance, they received, in conſequence of this, the name of *Counter-remonſtrants*.

REMORA, in *Natural Hiſtory*, the *ſucking-fiſh*; a little fiſh, reſembling a herring, called by the Greeks *echeneis*, famous for ſticking to the ſides of ſhips. It belongs to the genus of *echeneis* and claſs of *thoracici* in the Linnæan ſyſtem.

Its characters, according to Artedi and Linnæus, are theſe: the branchioſtege membrane on each ſide contains about ten bones; the head is thick, depreſſed, naked, and marked on the upper ſide with tranſverſe rough ſtriæ; the body is oblong, roundiſh, and naked, but ſomewhat compreſſed; the back-fin is oblong, and placed very far toward the tail; its under jaw is longer than its upper; it has a great number of teeth in both jaws; the colour of its body is hoary, and it has ſeven fins; two pectoral ones, two ventral ones placed farther from the ſnout than the pectoral ones, one at the anus, one on the back, and one at the tail; the ſtriæ of the head are from eighteen to twenty-four in number, they are rough and tranſverſe, but are divided as it were into two ſeries by a middle longitudinal line. By means of theſe ſtriæ or ridges the fiſh can fix itſelf to any animal or other ſubſtance, and has often been found adhering to the ſides of ſhips and the bodies of ſharks, &c.

Linnæus enumerates two ſpecies of the *echeneis*; the *remora* and *neucrates*: the former has a forked tail, and eighteen ſtriæ on the head; the latter has an entire tail, which is longer than that of the former, twenty-four ſtriæ, a larger body, and ſharper fins. They are both inhabitants of the Indian ocean. See *Tab.* IV. *Fiſh*, N°42.

The *remora* is much talked of by the ancients, who, as we find from Pliny, lib. ix. cap. 25. lib. xxxi. cap. 31. unanimouſly believed it had the force to ſtop a veſſel in full ſail, or a whale in ſwimming; and hence called it *remora, a remorando*. See Ælian's Hiſt. de Animal. lib. ii. cap. 17. Plutarch. Sympoſ. lib. ii.—But Mr. Cateſby obſerves, that even ſeveral of thoſe fiſhes together can do no more than ſhells or corals, and other foulneſſes of the ſame bulk, which make a ſhip ſail ſomewhat the ſlower. And in the ſame manner, only they may be ſome ſmall hindrance to a whale. The author laſt mentioned aſſures us he has taken five of them off the body of a ſhark. Vide Phil. Tranſ. N° 438. p. 113.

REMORA, among *Surgeons*, is alſo an inſtrument uſed for ſetting broken bones.

REMORA *mutiani*, in *Natural Hiſtory*, a name given by ſome to the genus of ſhells called *concha venerea*, and *porcellana*. See PORCELAIN *ſhell*.

REMOTION, *remotio*, in *Rhetoric*, the ſame with what is otherwiſe called METASTASIS.

REMOVAL *of the poor*. See POOR.

REMOULIN, in the *Manege*, is uſed to denote a ſtar upon a horſe's forehead.

REMOUNT, in *War*. To REMOUNT *the cavalry*, or *dragoons*, is to furniſh them with freſh horſes, in lieu of ſuch as have been killed or diſabled in the ſervice.

REMPHAN, in *Antiquity*, the Egyptian name for the planet Saturn. Some think that *remphan* was the moon, others Mercury and Mars, and others the ſun. See CHIUN.

REMPLY, in *Heraldry*, ſomething *filled up*. The term is chiefly uſed to denote, that the chief is quite filled up with a ſquare piece of another colour, leaving only a bordure of the proper colour of the chief about the ſaid piece.

REMURIA, among the Romans, a feſtival inſtituted in honour of Remus by his brother Romulus. See LEMURIA.

RENAL, *renalis*, ſomething belonging to the reins or kidneys.

RENAL *glands, glandulæ renales*, in *Anatomy*. See *Renal* GLANDS.

RENALIS *lapis*, in *Natural Hiſtory*, the name given by many authors to a ſort of ſiderochitum, or cruſtated ferruginous body of that kind, containing a nucleus of a different matter from that of the cruſts. It is found about Prague, and in ſome other places, lying near the ſurface in ſtrata of a yellow clay. Its uſual bigneſs is that of a ripe peach, and its cruſts are of a duſky ferruginous brown colour; and its internal nucleus of a pale yellowiſh green, compoſed of a marley earth, and uſually of a kidney like ſhape, whence its name.

RENCOUNTER, formed from the French, *rencontre, meeting*, in the *Military Art*, the encounter of two little bodies or parties of forces.

In which ſenſe, *rencounter* is uſed in oppoſition to a pitched battle.

RENCOUNTER, in ſingle combats, is uſed by way of contradiſtinction to DUEL.

When two perſons fall out, and fight on the ſpot, without having premeditated the combat, it is called a *rencounter*.

RENCOUNTRE, or RENCONTRE, in *Heraldry*, is applied to animals when they ſhew the head in front, with both eyes, &c. or when the face ſtands right forward, as if they came to meet the perſon before them.

Indeed, in deer, this is called *maſacré*; and, in the leopard, it is the natural ſituation. He bears ſable, in *rencountre*, a golden fleece.

RENDER, in *Law*, a term uſed in levying a fine. A fine with *render*, is that whereby ſomething is rendered back again by the cogniſee to the cogniſor.

The lawyers alſo ſay, there are certain things in a manor, which lie in *prender*, i. e. which may be taken by the lord, or his officers, when they pleaſe, without the tenant's leave; and others which lie in *render*, that is, muſt be *rendered* or anſwered by the tenant, as rents, reliefs, heriots, and other ſervices. See PRENDER.

Some ſervice conſiſts in ſeiſance, ſome in *render*.

RENDERING, in *Building*. See PARGETING.

RENDERING, in *Sea-language*, is generally underſtood to be the effect of yielding or giving way, without reſiſtance, to the efforts of ſome mechanical power. It is uſually expreſſed of a complicated tackle, laniard or laſhing, when the effect of the power applied is communicated with facility to all the parts, without being interrupted in its paſſage. It is therefore uſed in contradiſtinction to JAMMING.

RENDEZVOUS, or RENDEVOUS, a place appointed to meet in, at a certain day and hour.

The word is French, and is found ſo commodious, that moſt nations uſe it in its purity, for want of a word of equal import in their reſpective languages.

Thus, in a military ſenſe, the *rendezvous* is the place appointed by the general, where all the troops that compoſe the army are to meet at the appointed time, in caſe of an alarm; and the regiments have their particular *rendezvous*, called their QUARTERS of aſſembly.

In a naval ſenſe, it denotes the port or place of deſtination, where the ſeveral ſhips of a fleet, or ſquadron, are appointed to rejoin the whole, in caſe of a ſeparation, occaſioned by tempeſtuous weather, or other unforeſeen accident.

RENDS, in a *Ship*, are the ſame as the ſeams between her planks.

RENEGATE, Renegado, a perſon who has apoſtatized, or renounced the Chriſtian faith, to embrace ſome other religion, particularly Mahometaniſm.

They are the *renegadoes* who prove the moſt barbarous to the Chriſtians when they fall into their hands. The *renegate* is thus called, *quaſi re-negat Chriſtum*—Hoveden mentions this in the year 1192, under the name of *renier*, from the French, *renier, to deny again.*

RENES *ſuccenturiati*, in *Anatomy*, are glands thus called, as reſembling the figure of kidneys; and hence accounted a kind of *ſecondary reins*; *ſuccenturiatus* ſignifying ſomething in the place of another.

They are alſo called CAPSULÆ *renales*, and *glandulæ renales*. See Glands.

Valſalva has endeavoured to prove the *renes ſuccenturiati*, or *glandulæ renales*, to be organs of generation, or aſſiſtant to them. Valſalva claimed this diſcovery. Mr. Ranby ſuſpected that the duct which the Italian journals mentioned as the principal part of this diſcovery, was no other than an artery ſent off from that of the capſula on each ſide, to the teſticles of men, and ovaria of women. Morgagni explained Valſalva's doctrine more fully. Valſalva gives the following reaſons for his opinion. He obſerves the ſeminary veſſels of ſeveral fowls to come out from theſe capſulæ, before they are ſent from the teſticles. In the viper and water-tortoiſe, he remarks ſuch membranous connections between the *renes ſuccenturiati* and teſticles, as make it probable that ſuch excretories are ſent through the capſulæ to the teſticles. He affirms his having ſeen veſſels, which were neither nervous, ſanguiferous, nor lymphatic, going from the human capſulæ to the teſticles. His obſervations are much the ſame as to females. To theſe he ſubjoins the conſent and ſympathy obſerved between the loins and genital parts. To confirm all, he cut away one teſticle, and extirpated the *kidney* of the oppoſite ſide, of a whelp. The wounds healed, but the creature was of a very lax habit, and ſo far from attempting coition, that he did not ſeem fond of bitches when they were proud. Acad. Bonon. Comment. p. 367, & ſeq. See alſo Phil. Tranſ. N° 387. ſect. 3. where we have an inquiry into this diſcovery made by Valſalva, of an excretory duct from the glandula renalis to the epididymis by Mr. John Ranby. And in N° 395. ſect. 12. there are mentioned, by the ſame gentleman, two newly diſcovered arteries in women, going to the ovaria; which he thinks to be probably the ſame with what Valſalva took for excretory ducts of the glandulæ renales. Valſalva's diſcovery was firſt mentioned in the Giornale di Leterati of Venice for 1719, and inſerted in the Phil. Tranſ. N° 385. ſect. 9.

RENETTE, in the *Manege*, is an inſtrument of poliſhed ſteel with which they ſound a prick in a horſe's foot.

RENEWING of *leaſes* and *lives*. See Reversion, Annuity, Political *arithmetic*, &c.

RENIFORM *leaf*. See Leaf.

RENITENCY, *renitentia*, or *reniſus*, among *Philoſophers*, that force in ſolid bodies, whereby they reſiſt the impulſe of other bodies; or re-act as much as they are acted on.

RENNET. See Runnet.

RENT, *reditus*, in *Law*, a ſum of money, or other conſideration, iſſuing yearly out of lands or tenements, alienated on that condition.

It is thus called from the corrupt Latin, *rendita*, for *reddita*, of *redditus*; becauſe, as Fleta tell us, *retroit, et quotannis redit.*

The original of *rents* is to be ſought for in the conſtitution of the ancient feuds, which were of a military nature, and in the hands of military perſons: however, the feudatories, being under frequent incapacities of cultivating and manuring their own lands, ſoon found it neceſſary to commit part of them to inferior tenants, obliging them to ſuch returns in ſervice, corn, cattle, or money, as might enable the chief feudatories to attend their military duties without diſtraction, which returns, or *reditus*, were the original of *rents*.

Rent is regularly due and payable upon the land from whence it iſſues, if no particular place is mentioned in the reſervation; but, in caſe of the king, the payment muſt be either to his officers of the exchequer, or to his receiver in the country. And ſtrictly the *rent* is demandable, and payable before the time of ſunſet of the day wherein it is reſerved, though ſome have thought it not abſolutely due till midnight. The uſual remedy for non-payment of *rent* is DISTRESS: however, by the common law, diſtreſſes were incident to every *rent-ſervice*, and by particular reſervation to *rent-charges* alſo, but not to *rent-ſeck*, till the ſtatute 4 Geo. II. c. 28. extended the ſame remedy to all *rents* alike. Moreover, by this ſtatute it is enacted, that every landlord, who hath, by his leaſe, a right of re-entry in caſe of non-payment of *rent*, when half a year's *rent* is due, and no ſufficient diſtreſs is to be had, may ſerve a declaration in ejectment on his tenant, or fix the ſame upon ſome notorious part of the premiſes, which ſhall be valid, without any formal re-entry or previous demand of *rent*. And a recovery in ſuch ejectment ſhall be final and concluſive, both in law and equity, unleſs the *rent*, and all coſts, be paid or tendered within ſix calendar months afterwards. Other remedies are action of DEBT, an ASSISE of *mort d' anceſtor* or *novel diſſeiſin*, the writ *de* CONSUETUDINIBUS *et ſervitiis*, which compels a ſpecific payment of the *rent*, the writ of CESSAVIT, and the writ of right *ſur diſclaimer*.

The *rents* of all the lands of England and Wales appear, by the computation of Dr. Davenant and Mr. King, from the land-tax, to be nearly ten millions per annum; thoſe of houſes, not let with lands, two millions more; and thoſe of all other hereditaments, two millions more; in all, fourteen millions. See Political *Arithmetic*.

The lawyers ordinarily reckon three ſorts of *rents*, viz. *rent-ſervice*, *rent-charge*, and *rent-ſec*.

Rent-*ſervice* is where a man holds lands of his lord by fealty, and certain rent; or by fealty-ſervice, and certain rent; or that which a man, making a leaſe of lands to another for term of years, reſerveth to be yearly paid for them.

Rent-*charge* is where a man makes over his eſtate to another by deed indented, either in fee, or fee-tail, or for term of life; yet reſerves to himſelf, by the ſame indenture, a ſum of money yearly to be paid to him, with a clauſe of diſtreſs for non-payment; ſo called, becauſe, in this manner, the land is charged with diſtreſs for the payment of it.

Rent-*ſec*, or *Dry* Rent, is that which a man, making over his eſtate by a deed indented, reſerveth yearly to be paid to him, without any cauſe of diſtreſs mentioned in the indenture. There are alſo other ſpecies of *rents*, which are reducible to theſe three.

Rents *of aſſize* are the certain eſtabliſhed *rents* of freeholders, and ancient copyholders; thus called, becauſe aſſized and certain, in oppoſition to *reditus mobiles*.

Thoſe of the freeholders are often called CHIEF *rents*, *reditus capitales*, and both ſorts are indifferently denominated QUIT *rents*, becauſe thereby the tenant goes quit and free of all other ſervices.

Rent, *fee-farm*, is a *rent*-charge iſſuing out of an eſtate in fee; and at leaſt one fourth of the value of the lands, at the time of its reſervation: for a grant of lands, reſerving ſo conſiderable a *rent*, is indeed only letting lands to farm in fee-ſimple, inſtead of the uſual method for life, or years.

Rents *reſolute* are reckoned among the fee-farm *rents* to be ſold by the ſtat. 22 Car. II. being ſuch *rents* or tenths as were anciently payable to the crown from the lands of abbeys, and other religious houſes; which lands, upon the diſſolution of abbeys, being demiſed to others, the ſaid *rents* were ſtill reſerved, and made payable to the crown.

Rents, *aſſart*, *chauntry*, *chief*, *gold*, *paſchal*, *rack*, *quit*, and *white*. See the ſeveral adjectives.

RENTAL, a roll wherein the rents of a manor are written and ſet down, and by which the lord's bailiff collects the ſame: it diſtinguiſhes the lands and tenements, and the names of the tenants, the ſeveral *rents* ariſing, and for what time, uſually a year.

RENTER *warden*, an officer in moſt of the companies of London, whoſe buſineſs is to receive the rents or profits belonging to the company.

RENTERING, and Fine-drawing, in the *Manufactories*, the ſewing of two pieces of cloth, edge to edge, without doubling them; ſo as that the ſeam ſcarce appears at all: hence it is called *fine-drawing*.

The word is formed from the French *rentraire*, which ſignifies the ſame thing; and which Menage, after Salmaſius, derives from the Latin *retrahere*, of *re*, *in*, and *trahere*, by reaſon the ſeam is drawn out of ſight, and covered.

Serges, &c. are to be ſewed; cloths *fine-drawn*. The author of one of the Let. Edif. et Cur. ſpeaking of the great dexterity of the *fine-drawers* in the Eaſt Indies, aſſures us, that, if you tear a piece of fine muſlin, and give it one of them to mend, it ſhall be impoſſible for you to diſcover the place where it is rejoined, even though you had made a mark to know it by.

The dexterity of our own *fine-drawers*, though inferior to that above mentioned, is nevertheleſs ſuch, as puts them in a condition to defraud the king, by ſewing a head or ſlip of Engliſh cloth on a piece of Dutch, Spaniſh, or other foreign cloth; or a ſlip of foreign cloth on a piece of Engliſh, ſo as to paſs the whole, as of a piece; and by that means avoid the duties, penalties, &c. The trick was firſt diſcovered in France, by M. Savary, author of the Diction. de Commerce.

To renter, in *Tapeſtry*, is to work new warp into a piece of tapeſtry damaged, eaten by the rats, &c. and on this warp to reſtore the ancient pattern, or deſign—The warp is to be of woollen, not linen. Among the titles of the French tapeſtry-makers, is included that of *renterers*.

FINE-DRAWING is particularly uſed for a rent, or hole, happening in the dreſſing or preparing of a piece of cloth, artfully ſewed up or mended with ſilk.

All *fine-drawings* are reputed defects or blemiſhes; and ought to be allowed for in the price of the piece. Hence, M. Savary eſtabliſhes it as a rule, which is certainly founded on natural equity, that every manufacturer mark the *fine-drawings* of his cloth with a piece of packthread tied to the liſt; to direct the draper to the ſpot: and that the draper apprize the taylor, or other perſon, to whom he ſells it, of the ſame, that he may not come to damage in the cutting; there being inſtances of drapers condemned to take back their cloth, when cut to pieces, for omitting to mention the *fine-drawings*, and other flaws.

On this occaſion M. Savary extols the procedure of an Engliſh merchant, who, ſending a piece of cloth damaged in one ſpot, to his correſpondent at Paris, put a piece of gold in the damaged place, to make up the damage. But as this example is perhaps the only one of its kind, that author recommends it to the merchant, or draper, to unfold all the pieces entirely, as they come to him; to diſcover the *fine-drawings*, and other flaws, in order to make the clothier accountable for them.

RENVERSE', *inverted*, in *Heraldry*, is when any thing is ſet with the head downward, or contrary to its natural way of ſtanding: thus a chevron *renverſé* is a chevron with the point downwards.

The ſame term they alſo uſe when a beaſt is laid on its back.

RENVERSED *volte*. See VOLTE.

RENVERSING. See REVERSING.

RENUENTES, in *Anatomy*, a pair of muſcles of the head, thus called as being antagoniſts to the annuentes; and ſerving to throw the head backward, with an air of refuſal.

From their ſituation they are alſo called RECTUS *capitis, major et minor*.

RENUNCIATION, *renunciatio*, the act of renouncing, abdicating, or relinquiſhing any right, real or pretended.

Renunciations are ſometimes *expreſs*; as by contracts, &c. ſometimes *tacit*, as by contrary acts.

To *renounce* an inheritance, a community, &c. is to paſs a ſolemn act before a notary, or public officer, whereby a perſon declares he will not intermeddle in an inheritance, or profit in a company; but ſurrenders his part, and quits all pretenſions.

REORDINATION, *reordinatio*, the act of conferring orders on one already ordained.

The ceremony of ordination impreſſes what the divines call an indelible character; and cannot, therefore, be repeated: yet is *reordination* practiſed in England, with regard to the diſſenting miniſters, who conform to the church; the biſhops pretending, that they alone have right to confer holy orders, and that every prieſt or miniſter, who does not receive them at their hands, has no lawful or regular vocation.

This has formerly proved a great obſtacle to the reunion of thoſe miniſters to the church of England; many of whom, otherwiſe diſpoſed to conform, have ſcrupled to be *reordained*; inſomuch as *reordination* implies their former vocation to be null; that they had adminiſtered the ſacraments without any right thereto; and that all their miniſterial acts were invalid.

In the eleventh century, the crime of ſimony having been very flagrant, many people fell into the error to believe, that the ſimoniacal biſhops could not ordain validly, and thoſe who had received orders at their hands ſhould be *reordained*. The people of this opinion made a party of themſelves, and were diſtinguiſhed by the title of *Reordinantes*.

REPAIRING, in *Building*, &c. See REPARATION and RESTAURATION.

The repairing of large walls, doors, cielings, coverings, &c. belongs to the proprietor or landlord: the tenant is only charged with ſmall *repairs*, as glaſs windows, locks, &c. by the French called *locative repairs*.

To REPAIR a *ſtatue*, or other piece of ſculpture, is to touch up a ſtatue, &c. (caſt in a mould) with a chiſſel, graver, or other inſtrument, to finiſh the places which have not come well off.

To REPAIR a *caſt*, figure, or the like, they clear off the barb, and what is redundant in the joints and projectures. See STATUE.

To REPAIR a *medal*, is to retouch it; ſo as, from ruſty and defaced as it was, to render it clean, neat, and perfect. In order to this, they take off the ruſt with a graver; touch up the letters, poliſh the ground, and raiſe and reſtore the figures which before were ſometimes ſcarce ſeen. When the figures are eroded or broken, they fit a piece of cement on the ſpot; and on this cut with a graver ſo dextrouſly, that the figures appear entire, and well kept; yet nothing ſpoils medals ſo much as *repairing* them. See MEDAL.

To REPAIR a *ſhip*, is to amend any injuries, or ſupply any deficiencies, which a ſhip may have received by age, battle, tempeſtuous weather, &c. The repair is neceſſarily greater or ſmaller, in proportion to the loſs or damage the veſſel has ſuſtained. Accordingly a ſuitable number of the timbers, beams, or planks, or a ſufficient part of either are removed, and new pieces fixed in their places. The whole is completed by *breaming*, *calking*, and *paying* the body with a new compoſition of ſtuff.

REPAIRERS, artificers who chaſe figures, and beautify, ſword-hilts, &c.

REPAIRS, in *Hunting*, are the haunts and places which the hare runs to.

REPAND *leaf*, *repandum folium*, among *Botaniſts*. See LEAF.

REPARANDIS *pontibus*. See PONTIBUS.

REPARATION, *reparatio*, the act of repairing, re-eſtabliſhing, retrieving, or mending a building, or other work, damaged, or gone to decay.

The enemy *repaired* the breach as ſoon as it was made. The eſtabliſhment of turnpikes is for *repairing* of the roads. An eccleſiaſtical patron is by ancient cuſtom obliged to repair the choir or chancel of a church, and the pariſhioners the nave.

REPARATIONE *facienda*, is a writ which lies in divers caſes; e. gr. where there are tenants in common, or joint tenants of a houſe, &c. which is fallen to decay, and the one being willing to *repair* it, the other two will not; in this caſe, the party willing ſhall have this writ againſt the other two.

REPART, in the *Manege*, is to put a horſe on, or make him part a ſecond time.

REPARTEE. See REPARTY.

REPARTITION, *repartitio*, a dividing or ſharing a thing a ſecond time.

REPARTY, or REPARTEE, a ready, ſmart reply: eſpecially in matters of wit, humour, or *raillery*.

The word in the original French, *repartie*, has the ſame ſignification.

Wicquefort obſerves that there is a great difference between a free, ſprightly *reparty*, and an offenſive SARCASM.

REPAST, *repaſtum*, a meal or refection, taken at a ſtated hour.

In old law-books REPAST is particularly uſed for a meal's meat given to ſervile tenants, while at work for their lord.

The French call their meal *repaſt*; the Latins, *paſtus*; the Italians and Spaniards *paſto*.

In antiquity the *repaſts* were frequently ſacrifices; for which reaſon we find them often prepared by kings themſelves.

REPEALING, in *Law*, the revoking or annulling of a ſtatute, deed, or the like. See ABROGATION, REVOCATION, &c.

No act of parliament ſhall be *repealed* in the ſame ſeſſion it was made in. A deed or will may be *repealed* for a part, and ſtand good for the reſt.

Brook uſes the word *repellance* in the ſame ſenſe.

REPEAT, in *Muſic*, a character ſhewing that what was laſt played or ſung, muſt be *repeated*, or gone over again.

The *repeat* ſerves inſtead of writing the ſame thing twice over. There are two kinds of *repeats*; the *great* and the *ſmall*.

The great REPEAT, is only a double bar, dotted on each ſide; or two parallel lines drawn perpendicular acroſs the ſtaff; with dots on either hand. See its form under CHARACTERS *of muſic*.

This mark ſhews, that the preceding ſtrain is to be *repeated*; that is, if it be near the beginning of the piece, all hitherto ſung or played is to be *repeated*; or, if towards the end of a piece, all from ſuch another mark.

In gavots, we uſually find the *repeat* at about the third part of a piece; in minuets, borees, courants, &c. towards the end.

Some make this a rule, that if there be dots on each ſide the bar, they direct to a *repetition* both of the preceding and the following ſtrain; if there be only dots on the ſide, then only the ſtrain on that ſide is to be *repeated*.

REPEAT, *the ſmall*, is where only ſome of the laſt meaſures of a ſtrain are to be repeated: this is denoted by a character ſet over the place where the *repetition* begins (ſee CHARACTERS *in muſic*) and continues to the end of the ſtrain.

When the ſong ends with a *repetition* of the firſt ſtrain, or part of it, inſtead of a *repeat*, they uſe the word *da capo*, i. e. from the beginning.

REPEATTING *watches*. See WATCH.

REPELLENT, *repellens*, in *Medicine*, a remedy which *repels* or drives back a morbid humour into the maſs of blood, from which it was unduly ſecreted.

Repellents are medicines which prevent ſuch an influx of the fluids to any particular part, as might raiſe it into a tumor, or drive them back when they are collected.

The Greek name given, by ſome writers, to what (from the Latin) are called repellents, is *apocruſtics*, *αποκρουστικα*, compounded of *απο*, *from*, and *κρουω*, *to beat*.

To form an idea of the manner of their operation, it may be obſerved, that all tumors ariſe either from an increaſe in the velocity or quantity of the fluids, or a weakneſs in ſome particular part, though ſometimes both concur. Now an increaſe in the velocity of the fluids makes them more forcibly puſh againſt, and diſtend, all the parts in their circuit: if therefore any part be unequally preſſed or relaxed by external injuries, that will be more elevated than any other; and, for want of equal reſiſtance with the reſt of the body, it will at length receive ſuch a quantity of fluid, as will raiſe it into a tumor, eſpecially if any of its veſſels be obſtructed, becauſe the protruſion of freſh matter, a tergo, will continue to add thereunto, till the part is on the utmoſt ſtretch, and can hold no more.

In this caſe all thoſe means are ſaid to be *repellent*, which check the growth of the tumor, and aſſiſt the refluent blood in taking up the obſtructed matter, and waſhing it again into the common ſtream.

This intention is chiefly ſavoured by evacuation and revulſion; for whatſoever leſſens the quantity of the fluid, will diminiſh the force upon the tumefied part: but it concerns us moſt to know how external application to the part itſelf helps this affair.

Herein a medicine comes to be *repellent*, by conſiſting of ſuch ſubtile parts, as may tranſmit ſome of them through the pores, and help to render the obſtructed matter more fluid; ſo that it comes the more eaſy to be looſened, and fall again into the circulating current: but in this caſe there is a hazard of ſuch things likewiſe putting the obſtructed humour into a ferment, whereby it turns ſooner into pus; and then they come under the denomination of *ſuppuratives* or *ripeners*.

What, therefore, in the moſt ſtrict ſenſe, is to be reputed a *repeller*, is that which aſtringes and ſtrengthens the part, ſo as to make it reſiſt any ſuch lodgment.

Theſe are ſuch whoſe qualities are moſt manifeſt in their coldneſs, and drying properties; but there are ſo few inſtances wherein bandage is not better than any ſuch application, that very little comes to be uſed for that purpoſe. In hæmorrhages and ouſings out of ſerum, ſo as to deform the ſkin, ſimples of this nature moſtly take place; which anſwer their ends in aſtringing the fibres, whereby their apertures are ſo cloſed, as not to admit through them afterwards any ſuch fluid.

Some things alſo anſwer this end only by ſtimulating the fibres of the tumefied part, ſo as to give them ſudden and forcible twitches, whereby the obſtruction is ſometimes looſened, and ſhaken away, as it were, into the refluent current. Such a ſort of motion will be occaſioned by the ſudden application of any thing extremely cold, as common water; but the practice is ſeldom ſafe, becauſe, if the firſt efforts which the fibres are put upon by thoſe means, do not ſucceed in breaking away the incloſed matter, they will be ſtrained, and not able afterwards to repeat their natural vibrations; the conſequence of which is weakening the part, which will render the tumor more obſtinate.

REPELLING *power*, *vis repellens*, in *Phyſics*, is a certain power or faculty reſiding in the minute particles of natural bodies, whereby under certain circumſtances, they mutually fly from each other.

This power is the reverſe of the *attractive* power.

Sir Iſaac Newton, having eſtabliſhed the attractive power of matter from obſervation and experiment, argues, that, as in algebra, where poſitive quantities ceaſe, there negative ones commence; ſo in phyſics, where the attractive force ceaſes, there a *repelling* force muſt begin; and adds, that there is ſuch a force, does likewiſe appear from obſervation.

As the *repelling* power ſeems to ariſe from the ſame principle as the attractive, only exerciſed under different circumſtances, it is governed by the ſame laws: now the attractive, we find, is ſtronger in ſmall bodies than in great ones, in proportion to the maſſes; therefore the *repelling* is ſo too. But the rays of light are of all others the moſt minute bodies we know of; therefore, of all others, their *repelling* force muſt be the greateſt.

Sir Iſaac Newton computes, that the attractive force of the rays of light is above 1000000000000000 times as ſtrong as the force of gravity on the ſurface of the earth: hence ariſes that inconceivable velocity wherewith light muſt move, to reach from the ſun to our earth in ſeven minutes. For the rays emitted from the body of the ſun by the vibrating motion of its parts are no ſooner got without the ſphere of attraction of the ſun than they come within the action of the *repelling* power.

The elaſticity or ſpringineſs of bodies, or that property whereby, after having their figure altered by an external force, they return to their former figure, follows from the *repelling* power. See REPULSION.

REPENTANCE, in *Theology*, is a change of ſentiments followed by a change of conduct: or *repentance* denotes ſuch a conviction of the evil and danger of a ſinful courſe, as is ſufficient to produce ſhame and ſorrow in the review of it, and effectual reſolutions of amendment. This definition expreſſes the ſenſe of the two words, *μεταμελεια* and *μετανοια*, which are commonly uſed by the evangelic writers to ſignify *repentance*.

REPERCUSSION, in *Mechanics*. See REFLECTION.

REPERCUSSION, in *Muſic*, a frequent repetition of the ſame ſounds.

This often happens in the modulation, where the eſſential chords of each mode, or of the harmonical triad, are to be ſtruck oftener than the reſt; and of theſe three chords, the two extremes, i. e. the final and the predominant one, (which are properly the *repercuſſions* of each mode) oftener than the middle one.

REPERTORY, *repertorium*, a place wherein things are orderly diſpoſed, ſo as to be eaſily found when wanted.

The indices of books are *repertories*, ſhewing where the matters ſought for are treated of. Common places are a kind of *repertories*, very uſeful to the learned,

REPERTORIUM *anatomicum*, denotes a large hall near an amphitheatre of diſſections, where ſkeletons, both human and brutal, are orderly preſerved. Such is the *repertory* in the French king's garden at Paris.

REPETEND, in *Arithmetic*, is uſed for that part of an indeterminate or infinite decimal fraction, which is continually repeated ad infinitum.

Thus in the indeterminate decimal fraction 317.45 316 316,316, &c. the figures 316 are called the *repetend*.

Theſe *repetends* often ariſe in the reduction of vulgar fractions to decimals, thus $\frac{1}{3}=0.3333$, &c. $\frac{1}{7}=0.142857$, 142857, &c. $\frac{1}{11}=0.09\,09$, 09, &c.

Decimals of this kind are called repeating or circulating DECIMALS, on account of this continual repetition or circulation of the ſame figures. Infinite decimals are of two kinds, which may be diſtinguiſhed by the general denominations of certain and uncertain. A certain infinite decimal is ſuch whoſe numerator runs into infinity by a continual repetition of one or more figures, as .44, &c. .033, &c. Uncertain decimals are ſuch, whoſe numerator goes on for ever without a conſtant circulation of figures. The eſſential difference between theſe two kinds is this; that the certain infinite decimals have a determinate, finite, and certain value, in that there is a certain determinate vulgar fraction, which expreſſes the true and complete value of that infinite decimal, whereas the uncertain have no ſuch finite and aſſignable value: and hence the reaſon of the names.

REPETEND, *ſingle*, is that where only one figure is repeated, as in 0. 3 3 3, &c.

REPETEND, *compound*, is that where two or more figures are repeated, as in 0. 09 09, &c. or in 0. 142857 142857, &c.

Decimals with *repetends* may always be reduced to vulgar fractions. For either the *repetend* begins with the decimal, or not.

If the *repetend* begins with the firſt place of decimals, or if the decimal is a pure circulate, make it the numerator of a vulgar fraction, and make the denominator conſiſt of as many 9's as the *repetend* has figures; or if there be cyphers between the point and *repetend*, with as many cyphers to the right hand of the denominator, then will this vulgar fraction be equal to the decimal.

Thus, if the *repetend* be ſingle, as in 0. 3 3 3 3, the vulgar fraction equal to it will be $=\frac{3}{9}=\frac{1}{3}$. So if the *repetend* be compound, as in 0. 09 09, &c. the equivalent vulgar fraction will $=\frac{09}{99}=\frac{9}{99}=\frac{1}{11}$.

And in like manner 0. 142857 142857, &c. $=\frac{142857}{999999}=\frac{1}{7}$.

The reaſon is obvious from this conſideration, that the decimal 0. 3 3 3, &c. is $=\frac{3}{10}+\frac{3}{100}+\frac{3}{1000}$, &c. the ſum of which will be equal to $\frac{3}{10}$ divided by $1-\frac{1}{10}=\frac{3}{9}=\frac{1}{3}$; and ſo of the reſt.

If the *repetend* does not begin with the firſt place of decimals, but at ſome place farther on towards the right, or if it be a mixed circulate, as in the decimal 0.8 3 3 3 3 &c. where the *repetend* does not begin till the ſecond place of decimals, obſerve, that 0. 8 3 3 3 + &c. $=\frac{8}{10}$

$+ \frac{3}{100} + \frac{3}{1000} +$, &c. $= \frac{8}{10} + \frac{1}{10} \times \frac{3}{10} + \frac{3}{10^2} +$, &c. But $\frac{3}{10} + \frac{3}{10^2}$ +, &c. $= \frac{3}{9} = \frac{1}{3}$, as before: therefore the propoſed decimal is $= \frac{8}{10} + \frac{1}{10} \times \frac{1}{3} = \frac{8}{10} + \frac{1}{30} = \frac{24+1}{30} = \frac{25}{30} = \frac{5}{6}$.

Thus alſo if the decimal 0. 2 27 27, &c. were propoſed, we ſhall find it $= \frac{2}{10} + \frac{1}{10} \times \frac{27}{100} + \frac{27}{100^2} +$, &c. And $\frac{27}{100} + \frac{27}{100^2}$ +, &c. being $= \frac{27}{99} = \frac{3}{11}$, the decimal will be $= \frac{2}{10} + \frac{1}{10} \times \frac{3}{11} = \frac{2}{10} + \frac{3}{110} = \frac{22+3}{110} = \frac{5}{22}$. The reaſon of which is obvious from what has been ſaid.

It may perhaps be worth while to obſerve, that if the numerator of a vulgar fraction be unity, and the denominator any prime number, except 2 and 5, the decimal equal to the propoſed fraction will always be a *repetend*, beginning at the firſt place of decimals; and this *repetend* muſt neceſſarily be a ſubmultiple, or an aliquot part of a number expreſſed by as many nines as the *repetend* has figures; that is, if the *repetend* have ſix figures, it will be a ſubmultiple of 999999; if four figures, it will be ſubmultiple of 9999, &c. From whence it follows, that if any prime number be called p, the ſeries 9999, &c. produced as far as is neceſſary, will always be diviſible by p, and the quotient will be the *repetend* of the decimal fraction $= \frac{1}{p}$. For the management of decimals of this kind, ſee Malcolm's Arithmetic, book v. chap. iv.

REPETITION, *repetitio*, the reiterating of an action. See Reiteration.

Habits are acquired by the frequent *repetition* of actions. *Repetition* is ſometimes uſed for rehearsal.

School-philoſophers call the *repetition* of the ſame numerical effect, in another place, the *replication* of that effect.

Repetition, in *Muſic*, denotes a reiteration or playing over again of the ſame part of a compoſition, whether it be a whole ſtrain, or part of a ſtrain, or a double ſtrain. The *repetition* is denoted by a character, called a repeat; which is varied ſo as to expreſs the various circumſtances of the *repetition*.

Repetition, *reply*, is alſo uſed in *Muſic*, when, after a little ſilence, one part *repeats* or runs over the ſame notes, the ſame intervals, the ſame motions; in a word, the ſame ſong, which a firſt part had already gone over during the ſilence of this.

Repetition, *reply*, is alſo a doubling or trebling, &c. of an interval, or reiteration of ſome concord or diſcord.

Thus a fiſteenth is a *repetition* of the octave, i. e. a double octave, or ſecond octave.

Repetition, in *Rhetoric*, is a figure whereby the orator rehearſes the ſame words or phraſe over again.

Of this there are two kinds. In the firſt, the word is repeated preciſely in the ſame ſenſe: as, *Oh, Jeruſalem, Jeruſalem, who killeſt the prophets*, &c. *My God, my God, why haſt thou forſaken me?*

Such *repetitions* have the ſame effect in diſcourſe, with ſecond ſtrokes of the pencil in painting; they render the colours more ſtrong and lively.

Sometimes the orator begins again and again with the ſame word, of which we have an inſtance in the beginning of Cicero's firſt oration againſt Catiline: *Nihilne te nocturnum præſidium palatii, nihil urbis vigiliæ, nihil timor populi, nihil conſenſus bonorum omnium, nihil hic minutiſſimus habendi ſenatus locus, nihil horum ora vultuſque moverunt?* Where the word *nihil* ſo often reiterated gives an admirable force and vehemence to the diſcourſe. Again, the ſame author: *Quem ſenatus damnârit, quem populus R. damnârit, quem omnium exiſtimatio damnârit, eum vos ſententiis veſtris abſolvetis?* Again, *Non feram, non patiar, non ſinam.*

The ſecond kind of *repetition*, called ϖλοκη, ploce, is a *repetition* of the ſame word, in the ſame phraſe; but in ſuch a manner, as that ſome new idea or character is added to the word in the ſecond, which it had not in the firſt.

As, *Corydon is always Corydon: Ex illo Corydon Corydon eſt tempore nobis*; by which we ſignify, that Corydon is no ordinary perſon; and that nothing can diſtinguiſh him but the *repetition* of his own name: as if we ſhould ſay, *he is Corydon, that is enough.* By the ſame figure our Saviour ſpeaks, when he ſays: *Let your language be yea, yea; and nay, nay.* See Recapitulation.

REPLANTING, in *Gardening*, the act of planting a ſecond time.

The gardeners uſed to diſplant their tulips every year, and *replant* them. Lettuces muſt be diſplanted and *replanted* yearly, to make them head and knit. If ſtrawberries, &c. be not diſplanted and *replanted* once in a few years, they degenerate.

REPLEADER, *replacitare*, in *Law*, is to plead over again what was once pleaded before.

If, by the miſconduct or inadvertence of the pleaders, the iſſue be joined on a fact totally immaterial, or inſufficient to determine the right, ſo that the court upon the finding cannot know for whom judgment ought to be given, the court will after verdict award a *repleader quod partes replacitent*; unleſs it appears from the whole record that nothing material can poſſibly be pleaded in any ſhape whatſoever, and then a *repleader* would be fruitleſs. And, whenever a *repleader* is granted, the pleadings muſt begin *de novo* at that ſtage of them, whether it be the plea, replication, or rejoinder, &c. wherein there appears to have been the firſt defect, or deviation, from the regular courſe.

REPLEGIANDO *homine, writ de.* See Homine.

REPLEGIARE *de averiis*, a writ brought by one whoſe cattle are diſtrained, and put in a pound, by another; upon ſecurity given the ſheriff to purſue, or anſwer the action at law againſt the diſtrainer.

REPLETION, in *Medicine*, a plenitude or plethora.

Repletion is more dangerous than inanition. Bleeding and diet are the great reſources when a perſon is incommoded with a *repletion*.

Repletion is ſometimes alſo uſed where the ſtomach is overloaded with too much eating or drinking. The phyſicians hold all *repletion* prejudicial; but that of bread is of all others the worſt.

Repletion, in the *Canon Law*, is where the revenue of a benefice or benefices is ſufficient to fill or occupy the whole rite or title of the graduate who holds them.

When there is a *repletion*, the party can demand no more by virtue of his degrees. In England, where benefices are not appropriated to degrees, *repletion*, ſtrictly ſpeaking, has no place.

In France, ſix hundred livres, or 45*l.* ſterling per annum, make a *repletion*, when the benefice is obtained otherwiſe than by a degree; and 30*l.* per annum, when it is obtained by virtue of a degree.

REPLEVIN, *plevina*, in *Law*, a remedy granted on a diſtreſs; being a re-deliverance of the goods diſtrained to the firſt poſſeſſor, on ſecurity or pledges given by him to try the right with the diſtrainer, and anſwer him in the courſe of law.

If a perſon diſtrain another's goods or cattle for rent, or damage feſant, &c. the owner, upon giving ſecurity to the ſheriff, that he will proſecute his action againſt the party diſtraining, and return the goods or cattle again if the ſeizure ſhall be adjudged good, may have a writ of *replevin* or *replegiari facias*. See Distress and Replevy, *infra.*

REPLEVISH, in *Law*, is to let one to mainpriſe, upon ſurety. See Mainprise.

REPLEVY, *replevie*, in *Law*, (from the Latin *replegiare*, to re-deliver to the owner upon pledges of ſurety), is the bringing of a writ of *replevin*, or *replegiari facias*, iſſuing out of chancery, by him whoſe cattle or goods are diſtrained by another upon any cauſe; having firſt given ſecurity to the ſheriff, that, on the delivery of the thing diſtrained, he will proſecute the action againſt the perſon who made the diſtreſs.

In the ſtat. 24 of Henry VIII. we read of *canes replegiati*, or *hounds replevied*, in a caſe between the abbot of St. Albans and Geoffery Childwic.

Goods may be *replevied* two ways; viz. *by writ*, which is that uſed by the common law; and *by plaint*, which is that by ſtatute law, for the more ſpeedy having again the cattle and goods; and is brought in the ſheriff's court.

Accordingly the ſtatute of Marlbridge (52 Hen. III. cap. 21.) directs, that (without ſuing a writ out of chancery) the ſheriff, immediately upon complaint made to him, ſhall proceed to *replevy* the goods. And for the greater eaſe of the parties, it is farther provided by ſtatute 1 P. & M. cap. 12. that the ſheriff ſhall make at leaſt four deputies in each county, for the ſole purpoſe of making replevins. Upon application, therefore, either to the ſheriff, or one of his ſaid deputies, ſecurity is to be given, in purſuance of the ſtatute of Weſtm. 2. 13 Edw. I. cap. 2. 1. That the party replevying will purſue his action againſt the diſtreinor; for which purpoſe he puts in *plegios de proſequendo*, or pledges to proſecute: and, 2. That if the right be determined againſt him, he will return the diſtreſs again; for which purpoſe he is alſo bound to find *plegios de retorno habendo*. Beſides theſe pledges, which are merely diſcretionary in the ſheriff, the ſtatute 11 Geo. II. cap. 19. requires, that the officer, granting a replevin on a diſtreſs for rent, ſhall take a bond with two ſureties, in a ſum of double the value of the goods diſtrained? which bond ſhall be aſſigned to the avowant or perſon making cognizance, on requeſt made to the ſheriff; and if forfeited, may be ſued in the name of the aſſignee. The ſheriff, on receiving ſuch ſecurity, is immediately, by his officers, to cauſe the chattels taken in diſtreſs to be reſtored into the poſſeſſion of the party diſtrained upon; unleſs the diſtreinor claims a property in the goods ſo taken. If this be the caſe, the party replevying muſt ſue out a writ *de* PROPRIETATE *probanda.* But if no claim of property be put in, or if (upon trial) the ſheriff's inqueſt determines it againſt the diſtreinor, then the ſheriff is to *replevy* the goods, if they be found within his county. When the goods are delivered back to the party replevying, he is then bound to bring the action of replevin, which may be proſecuted in the county-court; but either party may remove it to the ſuperior courts. Blackſt. Comm. book iii. p. 147.

REPLICATION, *replicatio*, in *Logic*, the aſſuming or uſing the ſame term twice in the ſame propoſition; otherwiſe called REDUPLICATION.

Some philoſophers uſed the phraſe *replicatio mundi*, *replication* of the world, for its converſion, or turning round.

The human ſoul is ſaid to be in a place *replicatively*, *replicative*, when conceived to be all in the whole, and all in every part thereof.

REPLICATION, in *Law*, is an exception of the ſecond degree, made by the plaintiff to the plea or firſt anſwer of the defendant.

The *replication* is particularly that which the plaintiff replies to the defendant's anſwer in chancery; and which is either *general* or *ſpecial.* The *ſpecial* is grounded upon matter ariſing out of the defendant's anſwer, &c. The *general* is ſo called from the general words therein uſed. See REJOINDER, and CONFESS *and avoid.*

REPOLON, in the *Manege*, is a DEMIVOLTE, the croupe in, cloſed at five times. The Italians are extremely fond of this ſort of manege. In making a demivolte, they ride their horſes ſhort, ſo as to embrace or take in leſs ground, and do not make way enough every time of the demivolte.

REPORT, the relation made upon oath, by officers or perſons appointed to viſit, examine, ſtate, or eſtimate, any thing.

Damages, repairs, &c. are judged from the *reports* of experienced perſons. Proviſions for perſons wounded are only granted on the *reports* of ſurgeons, &c. in caſes of rapes, a *report* of matrons is to be had.

REPORT, in *Law*, is a public relation, or bringing to memory, of caſes judicially argued, debated, reſolved, or adjudged, in any of the king's courts of juſtice, with the cauſe and reaſon of the ſame delivered by the judges.

Theſe *reports*, which, in matters of conſequence and nicety, the judges direct to be ſearched, are extant in a regular ſeries from the reign of king Edward the Second incluſive; and from his time to that of Henry the Eighth were taken by the prothonotaries, or chief ſcribes of the court, at the expence of the crown, and publiſhed annually; whence they are known under the denomination of the *Year-books.* And it is much to be wiſhed (ſays judge Blackſtone) that this beneficial cuſtom had, under proper regulations, been continued to this day; for though king James the Firſt, at the inſtance of lord Bacon, appointed two reporters, with a handſome ſtipend, for this purpoſe, yet that wiſe inſtitution was ſoon neglected; and from the reign of Henry the Eighth to the preſent time, this taſk has been executed by many private and cotemporary hands; who ſometimes through haſte and inaccuracy, ſometimes through miſtake and want of ſkill, have publiſhed very crude and imperfect (perhaps contradictory) accounts of one and the ſame determination. Some of the moſt valuable ancient *reports* are thoſe publiſhed by lord chief juſtice Coke, which are ſo highly eſteemed, that they are generally cited without the author's name. The *reports* of judge Croke are alſo cited in a particular manner, by the name of thoſe princes in whoſe reigns the caſes reported in his three volumes were determined, viz. queen Elizabeth, king James, and Charles the Firſt, as well as by the number of each volum. Blackſt. Com. book i. p. 71, &c.

When the chancery, or any other court, refers the ſtating of ſome caſe, or comparing an account, &c. to a maſter in chancery, or other referee, his certificate therein is alſo called a *report.*

REPORTS, in *Military Matters*, are daily, weekly, and monthly *reports* of the ſtate of the companies or regiments, relative to their being preſent or abſent, on duty, ſick, confined, &c.

REPORT, *pinion of.* See PINION.

REPOSE, in *Poetry*, &c. See REST, PAUSE, &c.

REPOSE, in *Painting*, is applied to certain maſſes, or large ſyſtems or aſſemblages of light and ſhade; which, being well conducted, prevent the confuſion of objects and figures; by engaging and taking up the eye ſo as it cannot attend to the other parts of the painting for ſome time; and thus leading it to conſider the ſeveral groupes gradually, and, as it were, to proceed from ſtage to ſtage.

REPOSITION *of the foreſt* (formed from *re*, and *ponere*, *to lay again)*, an act whereby certain grounds, before made purlieu, are, upon a ſecond view, laid to the foreſt again.

REPOSITION, in *Surgery*, the REDUCTION of a bone.

REPOSITORY, *repoſitorium*, a ſtore-houſe or place where things are laid up, and kept. In which ſenſe we ſay, the *repoſitory* of the Royal Society, &c. See MUSEUM.

REPREHENSION, in *Rhetoric.* See PARRHESIA.

REPRESENTATION, *repræſentatio*, in the *Drama*, the exhibition of a theatrical piece; including the ſcenes, machines, recitation, &c.

Sir Richard Steele's principle is, that the deſign of a play is not to be read but *repreſented*; ſo that it is on the ſtage, not in the preſs, it is to be judged of; and that the pit, not the public, are the proper judges.

REPRESENTATIVE, one that perſonates or ſupplies the place of another; and is inveſted with his right and authority.

The word *repreſentative* is equivalent to procurator or proxy.

The commons are the people's *repreſentatives* in parliament.

There is this defect in the conſtitution of our parliament; that whereas all Engliſhmen who have conſiderable eſtates ought not to be taxed without their own conſent in parliament, by themſelves, or their *repreſentatives*; copyholders, whereof ſome have a thouſand pounds a year, have no voice in the election of knights of the ſhire. See PARLIAMENT.

REPRESENTATIVE *power*, in *Metaphyſics*, a term introduced by Leibntiz, to ſignify that power of the human ſoul, by which it repreſents to itſelf the univerſe, according to the ſituation of the body in the univerſe.

Wolfius calls this power *vis repreſentativa*, to denote its being an active power, or rather a force actually exerting itſelf. For he expreſsly ſays, *quod vis conſiſtat in continuo agendi conatu.* And he thinks that from this principle of a *vis repreſentativa*, every phenomenon of the human mind may be accounted for. See his Pſycholog. Ration. art. 529.

But it may be preſumed, that many will find this principle too obſcure to be admitted.

When it is ſaid, that our ideas are *repreſentative* of things without us, or of the univerſe; it may be aſked in what ſenſe this is to be underſtood? Do they *repreſent* it, 1. As a picture does its original? Or, 2. As an effect of a cauſe? Or, 3. As a ſign repreſents the thing ſignified? The firſt opinion is exploded in part by Locke and the Carteſians, and totally by Dr. Berkeley, late biſhop of Cloyne. The ſecond is admitted by Hobbes, but denied by Leibnitz himſelf, and the idealiſts. The third ſhould ſeem to be the opinion of Leibnitz, but he is not ſufficiently explicit.

Dr. Berkeley admits ideas to be ſigns; but, according to him they are arbitrary ſigns, depending on the immediate will of the Deity: hence the viſual language; and ideas only ſignify or ſuggeſt each other, and ſpirits; but not bodies, the exiſtence of which is totally unknown.

REPRIEVE, or REPRIVE, from *reprendre*, *to take back*, in *Law*, a ſuſpending or deferring the execution of the law upon a priſoner for the preſent time.

A *reprieve* is properly a warrant from the king, for ſuſpending the execution of a perſon condemned.

This may be, firſt, *ex arbitrio judicis*, either before or after judgment; as, where the judge is not ſatisfied with the verdict, or the evidence is ſuſpicious, or the indictment inſufficient, or he is doubtful, whether the offence be within clergy; or ſometimes, if it be a ſmall felony, or any favourable circumſtances appear in the criminal's character, in order to give room to apply to the crown for either an abſolute or conditional pardon. Theſe arbitrary *reprieves* may be granted or taken off by the juſtices of goal-delivery, although their ſeſſion be finiſhed, and their commiſſion expired; but this rather by common uſage than by ſtrict right. *Reprieves* may alſo be *ex neceſſitate legis*, as where a woman is capitally convicted, and pleads her pregnancy; which is referred to a *jury of* MATRONS. Another cauſe of regular *reprieve* is, if the offender become *non compos* between the judgment and the award of execution. See LUNATIC.

REPRIMAND, a ſharp authoritative reproof. Such a perſon was *reprimanded* in court by the bench, &c.

REPRISALS, or REPRIZALS, *repriſalia*, in the *Civil Law*, a right which princes have to retake from their enemies ſuch things as they unjuſtly detain from them; or other things equivalent thereto.

The word is formed from the Italian *repreſaglia*, which ſignifies the ſame thing.

When a place is taken or held from a prince, he ſeizes another by way of *repriſal.* Sometimes he takes men of the oppoſite party, by right of *repriſals.*

The Romans called this CLARIGATIO; and the Greeks had ſomething like it under the name of ANDROLEPSIA.

REPRISALS is alſo uſed for a letter or permiſſion which a prince ſometimes gives a ſubject, upon a full cognizance of the cauſe; authorizing him to retake from the firſt perſons he meets of the oppoſite party, as many effects as make an equivalent to what have been violently forced from him, and for which the oppoſite prince has refuſed to do him juſtice.

Theſe permiſſions are alſo called LETTERS *of marque*, or *mart*; and in the ſtat. 27 Edw. III. *law of marque*; in regard a perſon denied juſtice in another man's territory, redreſſes himſelf by goods belonging to men in that territory.

REPRISAL is alſo uſed in the ſame ſenſe with RECAPTION.

REPRISE, or **REPRIZE**, in the commerce by ſea, a merchant-ſhip, which, having been taken by a corſair, privateer, or other enemy, is retaken or recovered by a veſſel of the contrary party.

The word is French, and ſignifies a *reſumption* or *retaking*.

When a veſſel thus retaken has been twenty-four hours in the hands of the enemy, it is deemed a lawful prize.

If the *reprize* has been made within twenty-four hours, the veſſel is to be reſtored to the proprietor, with every thing therein, upon his allowing one third to the veſſel who made the *reprize*.

If the *reprize* has been abandoned by the enemy, either in a tempeſt, or from any other cauſe, before it have been led into any port, it is to be reſtored to the proprietor.

REPRISE, in the *Manege*, is a leſſon repeated, or a manege recommenced. Thus we ſay to give breath to a horſe upon the four corners of the volte with only one *repriſe*, that is, all with one breath.

REPRIZES, in *Law*, are deductions, drawbacks, or duties paid yearly out of a manor, or lands. Such are rent-charges, penſions, fees of ſtewards or bailiffs, &c. The manor of Doll yields 40*l*. per annum, *ultra reprizas*, beſides all *reprizes*.

REPRIVE. See REPRIEVE.

REPROBATION, *reprobatio*, in *Theology*, a decree or reſolve, which God has taken from all eternity to puniſh ſinners, who ſhall die in impenitence.

Reprobation ſtands in direct oppoſition to *election*.

Divines hold it a ſymptom of *reprobation* when a ſinner is hardened ſo as not to feel any farther remorſe or miſgivings of conſcience.

The caſuiſts diſtinguiſh two kinds of *reprobation*, *poſitive* and *negative*.

REPROBATION, *poſitive*, is that whereby God is ſuppoſed to create men with a poſitive and abſolute reſolution to damn them eternally.

This opinion of *reprobation* is countenanced by St. Auguſtine, and others of the fathers; and is ſtrongly maintained by Calvin, and moſt of his followers. Something like it is alſo found in the thirty-nine articles of the church of England; but it is now generally exploded, as injurious to the juſtice of God.

REPROBATION, *negative* or *conditional*, is that whereby God, though he creates all men with a ſincere deſire to ave them, and furniſhes them with the neceſſary means hereto, ſo that all may be ſaved, if they will; yet ſees there are ſeveral who will not do it, with the aids he ſhall afford them, how powerful ſoever; and ſees, at the ſame time, they would do it with certain other aids, which he ſees, but will not give them. *O altitudo!* &c.

REPRODUCTION, *reproductio*, the act whereby a thing is produced anew, or grows a ſecond time.

When the ſtock of an oak, a fruit-tree, or the like, is cut off ſhort, it *reproduces* an infinity of young ſhoots.

By *reproduction* is uſually underſtood the reſtoration of a thing before exiſting, and ſince deſtroyed.

It is very well known, that trees and plants are to be raiſed from ſlips and cuttings; and ſome late obſervations have ſhewn, that there are ſome animals which have the ſame property.

The polype was the firſt inſtance we had of this; but we had ſcarce time to wonder at the diſcovery Mr. Trembley had made, when Mr. Bonett diſcovered the ſame property in a ſpecies of water-worm. See POLYPE and *Water*-WORM.

Amongſt the plants which may be raiſed from cuttings, there are ſome which ſeem to poſſeſs this quality in ſo eminent a degree, that the ſmalleſt portion of them will become a complete tree again. See PLANT.

It deſerves enquiry, whether or not the great Author of nature, when he ordained, that certain inſects, as theſe polypes and worms, ſhould reſemble thoſe plants in that particular, allowed them this power of being *reproduced* in the ſame degree; or, which is the ſame thing, whether this *reproduction* will or will not take place in whatever part the worm is cut. In order to try this, Mr. Bonett entered on a courſe of many experiments on the water-worms which have this property. Theſe are, at their common growth, from two to three inches long, and of a browniſh colour, with a caſt of reddiſh. From one of theſe worms he cut off the head and tail, taking from each extremity only a ſmall piece of a twelfth of an inch in length, but neither of theſe pieces were able to *reproduce* what was wanting. They both periſhed in about twenty-four hours; the tail firſt, and afterwards the head. As to the body of the worm from which theſe pieces were ſeparated, it lived as well as before, and ſeemed indeed to ſuffer nothing by the loſs, the head part being immediately uſed as if the head was thereon, boring the creature's way into the mud. There are beſides this, two other points in which the *reproduction* will not take place; the one of theſe is about the fifth or ſixth ring from the head, and the other at the ſame diſtance from the tail; and in all probability the condition of the great artery in theſe parts is the cauſe of this.

What is ſaid of the want of the *reproductive* power of theſe parts, relates only to the head and tail ends; for as to the body, it feels very little inconvenience from the loſs of what is taken off, and very ſpeedily *reproduces* thoſe parts. Where then does the principle of life reſide in ſuch worms, which, after having their heads cut off, will have not only the ſame motions, but even the inclinations that they had before? and yet this difficulty is very ſmall, compared to ſeveral others, which at the ſame time offer themſelves to our reaſon. Is this wonderful *reproduction* of parts only a natural conſequence of the laws of motion, or is there lodged in the body of the creature a chain of minute buds or ſhoots, a ſort of little embryos, already formed and placed in ſuch parts where the *reproductions* are to begin? Are theſe worms only mere machines, or are they, like more perfect animals, a ſort of compound, the ſprings of whoſe motions are actuated or regulated by a ſort of ſoul? And if they have themſelves ſuch a principle, how is it that this principle is multiplied, and is found in every ſeparate piece? Is it to be granted, that there are in theſe worms not a ſingle ſoul (if it is to be ſo called) in each, but that each contains as many ſouls as there are pieces capable of *reproducing* perfect animals? Are we to believe with Malpighi, that theſe ſort of worms are all heart and brain from one end to the other? This may be, but yet if we knew that it was ſo, we ſhould know in reality but very little the more for knowing it; and it ſeems after all, that in caſes of this kind we are only to admire the works of the great Creator, and ſit down in ſilence.

The nice ſenſe of feeling in ſpiders has been much talked of by naturaliſts; but it appears that theſe worms have yet ſomewhat more ſurpriſing in them in regard to this particular. If a piece of ſtick, or any other ſubſtance, be brought near them, they do not ſtay for its touching them, but begin to leap and friſk about as ſoon as it comes towards them. There want, however, ſome farther experiments to aſcertain whether this be really owing to feeling or to ſight; for though we can diſcover no diſtinct organs of ſight in theſe creatures, yet they ſeem affected by the light of the ſun or a candle, and always friſk about it in the ſame manner at the approach of either; nay even the moon-light has ſome effect upon them.

A twig of willow, poplar, or many other trees being planted in the earth, takes root, and becomes a tree, every piece of which will in the ſame manner produce other trees. The caſe is the ſame with theſe worms; they are cut to pieces, and theſe ſeveral pieces become perfect animals; and each of theſe may be again cut into a number of pieces, each of which will in the ſame manner produce an animal. It had been ſuppoſed by ſome that theſe worms were oviparous; but Mr. Bonett on cutting one of them to pieces, having obſerved a ſlender ſubſtance, reſembling a ſmall filament, to move at the end of one of the pieces, ſeparated it, and on examining it with glaſſes, found it to be a perfect worm of the ſame form with its parent, which lived and grew larger in a veſſel of water into which he put it. Theſe ſmall bodies are eaſily divided, and very readily complete themſelves again, a day uſually ſerving for the production of a head to the part that wants one, and in general the ſmaller and ſlenderer the worms are, the ſooner they complete themſelves after this operation. When the bodies of the large worms are examined by the microſcope, it is very eaſy to ſee the appearance of the young worms alive and moving about within them; but it requires great preciſion and exactneſs to be certain of them; ſince the ramifications of the great artery have very much the appearance of young worms, and they are kept in a ſort of continual motion by the ſyſtoles and diaſtoles of the ſeveral portions of the artery which ſerve as ſo many hearts. It is very certain, that what we force in regard to theſe animals by our operations, is done alſo naturally every day in the brooks and ditches where they live. A curious obſerver will find in theſe places many of them without heads or tails, and ſome without either; as alſo other fragments of various kinds, all which are then in the act of completing themſelves; but whether accidents have reduced them to this ſtate, or they thus purpoſely throw off parts of their own body for the *reproduction* of more animals, is not eaſy to determine. They are plainly liable to many accidents, by which they loſe the ſeveral parts of their body, and muſt periſh very early, if they had not a power of *reproducing* what was loſt; they often are broken into two pieces, by the reſiſtance of ſome hard piece of mud, which they enter; and they are ſubject to a diſeaſe, a kind of gangrene, rotting off the ſeveral parts of their bodies, and muſt inevitably periſh by it, had they not this ſurpriſing property.

This worm was a ſecond inſtance, after the polype, of the ſurpriſing power in an animal of recovering its moſt eſſential parts, when loſt; but nature does not ſeem to have limited her beneficence in this reſpect to theſe two creatures; Mr. Bonett tried the ſame experiments on another ſpecies of water-worm, differing from the former in being much thicker; this kind of worm, when divided in the ſummer ſeaſon, very often ſhews the ſame property; for if it be cut into three or four pieces, the pieces will lie like dead for a long time, but afterwards will move about again, and will be found in this ſtate of reſt to have recovered a head, or a tail, or both. After recovering their parts, they move very little, and according to this gentleman's experiments, ſeldom live more than a month.

It ſhould ſeem that the more difficult ſucceſs of this laſt kind of worm, after cutting, and the long time it takes to recover the loſt parts, if it do recover them at all, is owing to its thickneſs; ſince we always find in that ſpecies of worms which ſucceeds beſt of all, that thoſe which are thinneſt always recover their parts much ſooner than the others.

The water-inſects alſo are not the only creatures which have this power of recovering their loſt parts. The earth affords us ſome already diſcovered to grow in this manner from their cuttings, and theſe not leſs deſerving our admiration than thoſe of the water; the common earth-worms are of this kind. Some of theſe worms have been divided into two, others into three or four pieces, and ſome of theſe pieces, after having paſſed two or three months without any appearance of life or motion, have then began to *reproduce* a head or tail, or both. The *reproduction* of the anus, after ſuch a ſtate of reſt, is no long work; a few days do it; but it is otherwiſe with the head, that does not ſeem to perform its functions in the divided pieces, till about ſeven months after the ſeparation. It is to be obſerved, that in all theſe operations both on earth and water-worms, that the hinder part ſuffers greatly more than the fore part in the cutting, for it always twiſts itſelf about a long time, as if actuated by ſtrong convulſions; whereas the head uſually crawls away without the appearance of any great uneaſineſs.

The *reproduction* of ſeveral parts of LOBSTERS, CRABS, &c. makes alſo one of the great curioſities in natural hiſtory. That, in lieu of an organical part of an animal broken off, another ſhall ariſe perfectly like it, may ſeem inconſiſtent with the modern ſyſtem of generation, where the animal is ſuppoſed to be wholly formed in the egg. Yet has the matter of fact been well atteſted by the fiſhermen, and even by ſeveral virtuoſos, who have taken the point into examination, particularly M. de Reaumur, and M. Perrault, whoſe ſkill and exactneſs in things of this nature will hardly be queſtioned. The legs of lobſters, &c. conſiſt each of five articulations: now, when any of the legs happen to break by any accident, as in walking, &c. which frequently happens, the fracture is always found to be in a part near the fourth articulation; and what they thus loſe, is preciſely *reproduced* in ſome time afterwards; that is, a part of a leg ſhoots out, conſiſting of four articulations, the firſt whereof has two claws as before; ſo that the loſs is entirely repaired. If a lobſter's leg be broken off by deſign at the fourth or fifth articulation, what is thus broken off always comes again; but it is not ſo, if the fracture be made in the firſt, ſecond, or third articulation. In thoſe caſes, the *reproduction* is very rare, if things continue as they are. But what is exceedingly ſurpriſing is, that they do not; for, upon viſiting the lobſter maimed in theſe barren and unhappy articulations, at the end of two or three days, all the other articulations are found broken off to the fourth; and it is ſuſpected they have performed the operation on themſelves, to make the *reproduction* of a leg certain.

The part *reproduced* is not only perfectly like that retrenched, but alſo, in a certain ſpace of time, grows equal to it. Hence it is, that we frequently ſee lobſters, which have their two big legs unequal, and that in all proportions. This ſhews the ſmaller leg to be a new one.

A part thus *reproduced* being broken, there is a ſecond *reproduction*. The ſummer, which is the only ſeaſon of the year when the lobſters eat, is the moſt favourable time for the *reproduction*. It is then performed in four or five weeks; whereas it takes up eight or nine months in any other ſeaſon.

The ſmall legs are ſometimes *reproduced*, but more rarely, as well as more ſlowly, than the great ones; the horns do the ſame. Vide Mem. Acad. Roy. Scienc. ann. 1712. p. 295. Hiſt. p. 45. ſeq. item ann. 1718, p. 31.

The experiment is moſt eaſily tried on the common crab.

REPROOF, *objurgatio*, in *Rhetoric*, is diſtinguiſhed from INVECTIVE.

REPRODUCTIVE *ſyſtem of preſervation.* See ANNIHILATION.

REP-SILVER, money anciently paid by ſervile tenants to their lord, to be quit of the duty of reaping his corn.

REPTILES, formed from *repo, I creep*, in *Natural Hiſtory*, a kind of animals ſo denominated from their creeping or advancing on the belly. Or, *reptiles* are diſtinctly a genus of animals and inſects, which, inſtead of feet, reſt on one part of the body, while they advance forward with the reſt.

Such are earth-worms, ſnakes, &c. Indeed, many of the ordinary claſs of *reptiles* have feet, only thoſe very ſmall, and the legs ſhort in proportion to the bulk of the body.

Naturaliſts obſerve great contrivance for the motion of *reptiles*. Thus, particularly in the earth-worm, Dr. Willis tells us, the whole body is only a chain of annular muſcles; or, as Dr. Derham ſays, it is only one continued ſpiral muſcle, the orbicular fibres whereof, by being contracted, render each ring narrower and longer than before; by which means it is enabled, like the worm of an augre, to bore its paſſage into the earth. Its *reptile* motion may alſo be explained by a wire wound on a cylinder, which, when ſtripped off, and one end extended, and held faſt, will bring the other nearer it. So the earth-worm having ſhot out or extended its body (which is formed with a wreathing) it takes hold by thoſe ſmall feet it hath, and ſo contracts the hinder part of its body. Dr. Tyſon adds, that when the fore part of the body is ſtretched out and applied to a plane at a diſtance, the hind part, relaxing and ſhortening, is eaſily drawn toward it as a centre.

The little feet of this creature are diſpoſed in a quadruple row the whole length of the worm; with which, as with ſo many hooks, it faſtens down ſometimes this, and ſometimes that, part of the body to the plane, and at the ſame time ſtretches out, or drags after it, another.

The creeping of ſerpents is effected after a ſomewhat different manner, there being a difference in their ſtructure; in that theſe laſt have a compages of bones articulated together.

The body here is not drawn together, but, as it were, complicated, part of it being applied on the rough ground, and the reſt ejaculated and ſhot from it; which, being ſet on the ground in its turn, brings the other after it. The ſpine of the back, variouſly wreathed in theſe creatures, has the ſame effect in leaping, as the joints of the feet in other animals; they making their leaps by means of muſcles that extend the plicæ, or folds.

In the Linnæan ſyſtem, *reptiles* conſtitute an order of animals under the claſs of *amphibia*; the characters of which are, that they breathe through the mouth by means of lungs only, and are furniſhed with four feet. To this order belong four genera, viz. the TORTOISE, FROG, dragon, or DRACO, and lizard, or LACERTA, and eighty-two ſpecies. Linnæus has referred moſt of thoſe animals, which others have denominated *reptiles*, to the order of *ſerpents*, and claſs of *vermes*, or worms.

REPTILE is likewiſe uſed, abuſively, for plants which creep on the earth, or on other plants, as wanting ſtrength of ſtalk to ſuſtain themſelves.

Such are cucumbers, melons, &c. ſuch alſo are ivy, the vine, and bryony.

REPUBLIC, *reſpublica*, *commonwealth*, a popular ſtate or government; or a nation where the body, or only a part of the people, have the government in their own hands.

When the body of the people is poſſeſſed of the ſupreme power, this is called a DEMOCRACY. When the ſupreme power is lodged in the hands of a part of the people, it is then an ARISTOCRACY.

The celebrated *republics* of antiquity are thoſe of Athens, Sparta, Rome, and Carthage. At preſent, there is ſcarce any ſuch thing as a real *republic*, i. e. a ſtrictly popular ſtate. Indeed, the Venetians and Genoeſe call their ſtates *republics*; but their government is apparently *oligarchic*.

The Dutch come the neareſt to the character of a *republic*; yet they are very defective, at leaſt in the ſenſe and ſeverity wherewith Rome, Carthage, &c. were *republics*. See States-*general*.

It is a remark of M. St. Evremont, that, if the Dutch love the *republican* form, it is more for the ſake of their trade than of their liberty.

Holland, which is compoſed of about fifty *republics*, all different from one another, may be conſidered as a confederate *republic*; which is a convention by which ſeveral petty ſtates agree to become members of a larger one, which they intend to eſtabliſh. In this view, Germany, which conſiſts of free cities, and of petty ſtates, ſubject to different princes, and the Swiſs cantons, are conſidered in Europe as perpetual *republics*.

Republic *of letters*, is a phraſe uſed in ſpeaking collectively of the whole body of the people of ſtudy and learning.

There is a journal, begun in Holland, by M. Bayle, and continued by M. Bernard, conſiſting of extracts of books, printed in the courſe of the year, called Nouvelles de la *Republique* des Lettres, News from the *Republic* of Letters.

REPUDIATION, *repudium*, in the *Civil Law*, the act of divorcing. See Divorce.

REPULSION, *repulſio*, in *Phyſics*, the act of a repelling *power*, whereby natural bodies, under certain circumſtances, naturally fly from each other.

Repulſion is the counter-part to *attraction*. Attraction only reaches to a little diſtance; where that terminates, there *repulſion* commences. See Air and Compression.

Indeed, we meet with many obvious inſtances of *repulſion* among bodies, as between water and oil, and, in general, between water and all unctuous bodies; between mercury and iron, as alſo between the particles of duſt, &c.

Thus, if a fat body, lighter than water, be laid on the ſurface thereof, or if a piece of iron be laid on mercury, the ſurface of the fluid will be depreſſed about the bodies laid on it. This is a plain indication of *repulſion*; as the riſing up of the fluid about the ſurfaces of other incumbent bodies is of attraction.

In the latter caſe, the fluid is ſuſpended, by an attractive power, above the level, and kept from falling by its gravity: in the former, a depreſſion is made by the repelling power, which the liquor, notwithſtanding its gravity, cannot run down into, and fill up.

Upon this depend all the phenomena of very light glaſs bubbles floating on water, about which, when clean, the water riſes; but when greaſed, the water ſinks into a channel all around them. Hence alſo it is, that, in a glaſs-veſſel of water, the fluid ſtands higher all about the edges near the glaſs than towards the middle; but when the glaſs is filled till the water run down on all ſides, then it ſtands higher at the middle than at the ſides. Hence, alſo, in a glaſs not full of water, a clean glaſs bubble always runs to the ſide, by reaſon the preſſure, which is upon it towards the middle, is partly taken off by the attractive force wherewith the water is raiſed near the edge. If the glaſs be ſo full as to be ready to run over, the bubble returns from the ſide towards the middle, the force wherewith the water is raiſed in the middle taking off part of the preſſure.

Juſt the reverſe happens if the bubble be greaſy; becauſe there the force, whereby the water and the bubble repel each other, is greateſt where the water is higheſt. Two clean bubbles and two greaſy ones always run towards each other, as being attracted; and a greaſy and a clean one always fly each other, as being repelled.

REQUEST, in *Law*, a ſupplication or petition preferred to a prince, or court of juſtice, begging relief in ſome conſcionable caſes, where the common law grants no immediate redreſs.

The term *requeſt* is now, ſince the inſtitution of chancery, much diſuſed; together with the court of *requeſts*, where *requeſts* were cognizable.

In France, *requetés civiles, civil requeſts*, ſtill obtain for the annulling of contracts, &c. made by ſurprize.

They have eighty *maſters of requeſts* to take cognizance of cauſes between the officers of the crown, the ſervants of the houſhold, &c.

Requests, *court of*. See Court *of requeſts*, and Court *of conſcience*.

Request, in *Hunting*, is when the dogs have loſt the Quest or track of the beaſt, and muſt *requeſt*, or *queſt* it again. They ſay, *to call to the* requeſt, *come to the* requeſt, &c.

To *requeſt* the game is chiefly uſed, when, after having run it down the night before, they ſeek it again the next morning with the blood-hound, or the like.

REQUIEM, a maſs ſung in the Romiſh church for the reſt of the ſoul of a perſon deceaſed.

It is thus called, becauſe the introit begins with *Requiem æternam dona eis*, *Domine*, &c.

RERE *county*. See Rier *county*.

Rere *fiefs*, a name given in the Scotch laws to thoſe fiefs which were held by inferior tenants or feudatories, who cultivated the lands under the chief feudatories, who held by military ſervice.

Rere *ward, arriere-garde*. See Rear, and Guard.

RES, *thing*. See Reality, Ens, Esse, Substance, &c.

Res *mancipi*. See Abalienation.

Res *naturales*. See Naturals.

Res *non naturales*, &c. See Non *naturals*, &c.

RESCEIT, *receptio*, in *Law*, an admiſſion or receiving of a third perſon to plead his right, in a cauſe formerly commenced between other two.

As, when an action is brought againſt a tenant for life or years, and he makes default; in ſuch caſe he in the reverſion may come in and pray to be *received*, to defend the land, and to plead with the demandant.

Resceit is ſometimes alſo applied to an admittance of plea, though the controverſy be only between two. He in reverſion may come into court, and pray to be *received* in a ſuit againſt his particular tenant.

Resceit *of homage*, *receptio homagii*, denotes the lord's receiving homage of his tenant, at his admiſſion to the lands.

RESCISSION, *reſciſſio*, formed of *re*, and *ſcindo*, q. d. *I cut or divide again*, in the *Civil Law*, an action intended for the annulling or ſetting aſide of any deed, contract, or the like.

A thing's being found damaged, or ſold at above double the juſt value, is a good cauſe of *reſciſſion*.

The deed or contract thus annulled, or *reſcinded*, is ſometimes called a *reſciſſory*; though that denomination be more properly given to the action brought for *reſcinding* or ſetting it aſide; which is properly called *actio reſciſſoria*.

RESCOUS, or Rescue, *reſcuſſus*, in *Law*, an illegal taking away, and ſetting at liberty, a diſtreſs taken, or a perſon arreſted, by proceſs, or courſe of law. This is properly a *reſcous in fact*. If one diſtrain beaſts for damage feaſant in his ground, and as he drives them along the highway towards the pound, they enter into the owner's houſe, and he with-holds them there, and will not deliver them upon demand; this detainer is a *reſcous in law*.

Reſcous, in matters relating to treaſon, is deemed treaſon; and in matters concerning felony, is felony; and in miſdemeanors, a miſdemeanor. By the ſtat. 16 Geo. II. cap. 31. to aſſiſt a priſoner in cuſtody for treaſon or felony with any arms, inſtruments of eſcape or diſguiſe, without the knowledge of the gaoler, or any way to aſſiſt ſuch priſoner to attempt an eſcape, though no eſcape be actually made, is felony, and ſubjects the offender to tranſportation for ſeven years. And by the ſtatutes 25 Geo. II. cap. 37, and 27 Geo. II. cap. 15. to *reſcue*, or attempt to *reſcue*, any perſon committed for murder, or for any of the offences enumerated in that act, or the black act, 9 Geo. I. cap. 22. is felony without benefit of clergy. The *reſcue* of a priſoner from any of the king's ſuperior courts of juſtice in Weſtminſter-hall, or at the aſſizes, without ſtriking a blow, is puniſhed with perpetual impriſonment and forfeiture of goods, and of the profits of lands during life.

He that commits a *reſcue* or *reſcous*, is called the *reſcuſſor*.

Rescous is alſo uſed for a writ which lies for this fact, called *breve de reſcuſſu*.

RESCRIPT, *reſcriptum*, an anſwer delivered by an emperor, or a pope, when conſulted by particular perſons, on ſome difficult queſtion or point of law, to ſerve as a deciſion thereof.

The civil and canon laws are full of ſuch *reſcripts*.

When the *reſcript* was made in anſwer to the inquiry of a community, it was called a *pragmatic ſanction*.

The papal *reſcripts* are a kind of bulls or monitories, beginning with theſe words, *Significavit nobis dilectus filius*, &c.

They never obtained either in England or France, when contrary to the liberties of the Engliſh and Gallican churches; but were declared abuſive.

Among the Romans the contending parties, and even the magiſtrates themſelves, frequently conſulted the emperor on the meaſures they were to take in certain and nice difficult caſes; and the anſwers returned by the emperor on ſuch conſultations, were called *reſcripts*. Theſe had not, indeed, the full force of laws; but they were deemed a ſtrong prejudice or preſumption.

Juſtinian has inſerted a great number of them in the Code; and by that means given them the authority they before wanted.

The author of the life of the emperor Macrinus obſerves of that prince, that he would have his officers judge by laws, not by *reſcripts*; as eſteeming it abſurd to admit the wills of ignorant men, ſuch as Commodus and Caracalla, for rules of judging; and becauſe Trajan never gave any *reſcripts* at all, as being loth to countenance a cuſtom, where what is frequently granted as a favour, in particular caſes, might be afterwards pleaded as a precedent. It is added, that Macrinus had a deſign to ſtrip the *reſcripts* of all their authority.

M. Schulting, in his Diſſertations, does not at all approve of this deſign; and to the emperor's reaſons anſwers, that indeed all *reſcripts* are not to be admitted; that thoſe which appear dictated out of favour, are to be thrown aſide; but thoſe which appear founded in reaſon, and natural equity, are, with Juſtinian, to be allowed. He adds, that it cannot be denied but the worſt emperors have frequently made good laws, and uſeful *reſcripts*.

As to what is urged of the emperor Trajan's never giving any *reſcripts*, it appears but ill ſupported. For what is it but a *reſcript* that he delivers to Pliny on the ſubject of the Chriſtians, lib. x. epiſt. 28.? Or that on the Iſclaſtici, lib. x. epiſt. 120.? The Digeſt, and Pliny's Epiſtles, need only to be opened and compared, to find *reſcripts* of Trajan.

RESCUE. See RESCOUS.

RESCUSSOR, in *Law*. See RESCOUS.

RESEARCH, formed of the French *recherche*, and literally denoting a *ſecond ſearch*, a diligent ſearch or enquiry into any thing.

RESEARCH, in *Muſic*, is a kind of prelude or voluntary played on the organ, harpſichord, violin, &c. wherein the composer ſeems to *ſearch* or look out for the ſtrains and touches of harmony, which he is to uſe in the regular piece to be played afterwards.

This is uſually done off-hand; and conſequently it requires a maſter's ſkill. When in a motetto, the compoſer takes the liberty to uſe any thing that comes into his head, without applying any words to it, or ſubjecting himſelf to the ſenſe or paſſion thereof, the Italians call it *fantaſia ricercata*, the French *recherche*, and the Engliſh *reſearch* and voluntary.

RESEARCHING, in *Sculpture*, the repairing of a caſt, figure, &c. with proper tools; or the finiſhing it with art and exactneſs, ſo as that the minuteſt parts may be well defined.

RESEDA, in *Botany*. See ROCKET.

RESEISER, *reſeiſire*, in *Law*, a taking of lands into the king's hands, where a general delivery, or ouſter le main, was formerly miſuſed, contrary to order of law.

RESEMBLANCE. See SIMILITUDE.

RESERVATION, *reſervatio*, in *Law*, an action or clauſe whereby ſomething is *reſerved*, i. e. is retained, kept, or ſecured to one's ſelf.

Thus when a man lets his land, he reſerves a rent to be paid to himſelf for his maintenance, &c.

William the Conqueror, getting all the lands of England, except thoſe belonging to the church and religious houſes, into his hands by right of conqueſt, beſtowed a great part thereof among his followers, *reſerving* ſome retribution of rents and ſervices to him and his heirs; which *reſervation* is now, and it was before the Conqueſt, called the tenure of the lands.

Sometimes *reſervation* ſignifies as much as an exception; as, when a man lets a houſe, and *reſerves* to himſelf one room, that room is excepted out of the demiſe.

RESERVATION, *mental*, is a propoſition which, ſtrictly taken, and according to the natural import of the terms, is falſe; but if qualified with ſomething *reſerved* or concealed in the mind, becomes true.

Mental *reſervations* are the great refuge of religious hypocrites, who uſe them to accommodate their conſciences with their intereſts. The Jeſuits are zealous advocates for mental *reſervations*; yet are they ſtrictly all real lyes, as including an intention to deceive.

RESERVATORY. See RESERVOIR.

RESERVE, in *Law*, the ſame with *reſervation*.

Benefices are ſometimes reſigned with *reſerve* of a penſion. By the canon law, no perſon may *reſerve* to himſelf a penſion out of a benefice, unleſs he hath ſerved it ten years.

In the Romiſh church the ordinary prieſts have only a power to abſolve, in *reſerve* of certain caſes, hence called *reſerved caſes*, as being *reſerved* to the biſhop.

The court *reſerves* the cognizance of ſuch an affair to itſelf. The lawyers ſay, that no prince ever granted ſuch a power by his letters or patents, but that he *reſerves* to himſelf a greater.

RESERVE, *body of*, *corps de reſerve*, in *War*. See BODY *of reſerve*.

RESERVE *guard* denotes the ſame as a *picquet* GUARD, except that the one mounts at troop-beating, and the other at retreat-beating.

RESERVED *caſes*. See CASES.

RESERVOIR, *receptacle*, a place where water is collected and reſerved. See BASON.

The *reſervoir* in a building is a large baſon, uſually of wood, lined with lead, where water is kept to ſupply the occaſions of the houſe. At Cannons, the late noble ſeat of the duke of Chandois, there was a very large *reſervoir* at the top of the houſe, to which the water was raiſed by a curious engine contrived for the purpoſe. This *reſervoir* was of ſuch capacity, as that, beſides ſupplying all parts of the houſe by means of pipes and cocks, it likewiſe turned a mill.

The *reſervoir* is ſometimes alſo a large baſon of ſtrong maſonry, clayed or paved at the bottom, where the water is reſerved to feed jets d'eau, or ſpouting fountains. Such is that large one on the top of Marley, called *trou d'enfer*, *hell mouth*, whoſe ſurface, Daviler tells us, contains fifty acres, and its depth ſuch as to contain a hundred thouſand cubic fathom of water.

RESERVOIR, in *Anatomy*. See RECEPTACULUM.

RESET, in *Law*, the receiving or harbouring an outlawed perſon. Hence a receiver of an outlawed perſon is called a *reſetter*.

RESIANCE, *reſiantia*, in *Law*, a man's abode or continuance in a place.

The word has the ſame ſignification with regard to laymen, as *reſidence* with regard to eccleſiaſtics.

Glanville obſerves, that in the ancient law, *reſiance* properly ſignified a diſeaſe, whereby the perſon was diſabled from ſtirring out of doors. Whence their *eſſoin de reſiantia*, was the ſame as our *eſſoin de malo lecto*.

RESIANT *rolls*, are rolls wherein the *reſiants* of a tithing, &c. are ſet down.

RESIDENCE, *reſidentia*, in *Canon* and *Common Law*, the abode of a perſon or incumbent upon his benefice; and his aſſiduity in attending on the ſame.

The default of *reſidence*, called NON-*reſidence*, unleſs where the party has a diſpenſation for the ſame, with us is the forfeiture of ten pounds for each month. Thus, by ſtatute 21 Hen. VIII. cap. 13. perſons wilfully abſenting themſelves from their benefices for one month together, or two months in the year, incur a penalty of 5*l.* to the king, and 5*l.* to any perſon that will ſue for the ſame; except chaplains to the king, or others therein mentioned, during their attendance in the houſhold of ſuch as retain them; and alſo except all heads of houſes, magiſtrates, and profeſſors in the univerſities, and all ſtudents under forty years of age reſiding there, *bona fide*, for ſtudy. Legal *reſidence* is not only in the pariſh, but alſo in the parſonage houſe; for it hath been reſolved, that the ſtatute intended *reſidence*, not only for ſerving the cure, and for hoſpitality, but alſo for maintaining the houſe, that the ſucceſſor alſo may keep hoſpitality there. 25 Hen. VIII. cap. 16. 33 Hen. VIII. cap. 28. 28 Hen. VIII. cap. 13. See LEASE.

By the canon law, beneficiaries are obliged to *reſidence*, under pain of deprivation of their benefices. The original reaſon is, that in the primitive church none were promoted to holy orders, but ſuch as had a benefice in promptu, which they were obliged to ſerve; ſo that this ſervice was neceſſarily attached to the orders; and whoever was honoured therewith, at the ſame time was obliged to perſonal ſervice.

But this ſtrict diſcipline was not obſerved long. The beneficiaries by degrees got diſpenſations from ſerving their benefices themſelves; and thus pluralities very ſoon got footing.

France, of all other countries, ſeems to be that where *reſidence* is the moſt ſtrictly regarded. All their cures, or miniſters who have cure of ſouls, are obliged to actual *reſidence*; and the parliaments have declared all the diſpenſations granted by popes, &c. abuſive, as eſteeming the obligation of *reſidence* to be jure divino.

Under Charles I. there was even a deſign to re-eſtabliſh the primitive diſcipline in all its ſeverity; and in 1651, a declaration was regiſtered, appointing all biſhops to reſide, conformably to the ancient canons, in their biſhopricks. The ſame parliament alſo forbad the biſhops to aſſume the quality of counſellors of the king; in regard ſuch a quality was deemed inconſiſtent with the indiſpenſable obligation they were under to reſide in their biſhopricks.

Du Pin adds, that the procureur general, or attorney-general Buordin, even ſeized the temporalities of ſuch biſhops as continued in Paris fifteen days after this declaration; having firſt certified them, that if they had any buſineſs there, he would undertake the management thereof.

RESIDENCE, in *Chemiſtry*, &c. the *ſettling* or what remains of a liquor, or other ſubſtance, in the veſſel, after the chief part of it has been poured or taken out, to change the manner of the operation on what is left.

RESIDENT, a public miniſter, who manages the affairs of a king in the court of a prince, or petty ſtate; or the affairs of a prince, or petty ſtate, in the court of a king or prince.

Thus the king of England has *reſidents* in the courts of the electors, and other princes of Germany and Italy; at the republics of Genoa and Lucca; and they, reciprocally, have *reſidents* in the court of Great Britain.

Reſidents are a claſs of public miniſters inferior to ambaſſadors and envoys; but, like them, they are under the protection of the law of nations.

Resident, *reſidens*, in our *Antient Cuſtoms*, was a tenant who was obliged to reſide on his lord's land, and not to depart from the ſame, called alſo *homme levant* and *couchant*, and in Normandy *reſſeant du fief*.

Quantumque de aliis teneat, ei magis obnoxius eſt; & *ejus* reſidens *eſſe debet, cujus legius eſt*. Leg. H. I.

RESIDENTIARY, *reſidentiarius*, a canon inſtalled to the privileges and profits of reſidence.

RESIDUAL *figure*, in *Geometry*, the figure remaining after ſubtraction of a leſſer from a greater.

Residual *root*, is a root compoſed of two parts or members, only connected together with the ſign —.

Thus, *a*—*b*, or 5—3, is a *reſidual* root: and is ſo called, becauſe its true value is no more than its *reſidue*, or difference between the parts *a* and *b*, or 5 and 3.

RESIDUARY *legatee*. See Legatee.

RESIDUE, *reſiduum*, the remainder or reliqua of an account, debt, or obligation.

RESIDUUM *of a charge*, in *Electricity*, firſt diſcovered by Mr. Gralath, in Germany, in 1746, is that part of the charge that lay on the uncoated part of a Leyden *phial*, which doth not let go all its electricity at once; ſo that it is afterwards gradually diffuſed to the coating.

Residuum, in *Law*. See Executor, and *Reſiduary* Legatee.

RESIGNATION, *reſignatio*, in the *Canon Law*, the ſurrender or giving up of a benefice into the hands of the ordinary or biſhop.

Reſignation is of equal import with *ſurrender*; only the former is reſtrained to ſpiritual benefices, and the latter to temporal offices or employments.

It is a maxim in the eccleſiaſtical law, that all *reſignation* muſt be made to ſome ſuperior; therefore a biſhop muſt reſign to his metropolitan; but the archbiſhop can reſign to none but the king himſelf. * No *reſignation* can be valid, till it is accepted by the proper ordinary; and in the regular courſe, it muſt be made in perſon, and not by proxy.

Reſignations are either *ſimple*, or *conditional*.

Resignations, *ſimple* or *pure*, are thoſe whereby the incumbent ſtrips himſelf of all his right, abſolutely, and without any conditions, or reſerve of penſion. Theſe are made to the biſhop, or ordinary.

Resignations *in favour*, or *conditional* **Resignations**, are ſuch as are only made on condition that ſuch other perſons ſhould be inveſted therewith; ſo that the *reſignations* are null, unleſs the conditions be punctually executed. Theſe *reſignations in favorem* are not of above two hundred and fifty years ſtanding. Strong oppoſition was at firſt made to them, they being eſteemed a kind of ſucceſſion or tranſmiſſion of benefices, as of patrimonies belonging to a family. Accordingly, theſe *reſignations* are not made into the hands of the ordinary, or collator, as pure *reſignations* are, but to the collator paramount, who in the Romiſh church is the pope, there being a ſuſpicion of ſimony or other unlawful paction, therein, where admitted of, in prejudice to the lay patron.

By the 31 Eliz. cap. 6. § 8. if any incumbent of any benefice, with cure of ſouls, ſhall corruptly reſign the ſame, or corruptly take for, or in reſpect of reſigning the ſame directly or indirectly, any penſion, ſum of money, or other benefit whatſoever; as well the giver, as the taker, ſhall loſe double the value of the ſum given or received; half to the queen, and half to him that ſhall ſue for the ſame. Before the ſtatute, the biſhop, in caſes of *reſignation*, might and did frequently aſſign a penſion, during life, out of the benefice reſigned, to the perſon reſigning. But by the aforeſaid act no penſions whatſoever can be reſerved. See Simony. But a man may bind himſelf by bond to reſign, and it is not unlawful.

RESIGNEE, in *Law*, the party to whom a thing is reſigned.

RESIN, *reſina*, a fat, viſcid, ſulphureous juice, ouſing either ſpontaneouſly, or by inciſion, from ſeveral kinds of trees, particularly the pine, fir, &c.

Camphor is a kind of *reſin*. Maſtic is the *reſin* of the lentiſk. The beſt of all the claſs of *reſins* is turpentine. The coarſeſt is what we commonly call Rosin.

Reſin is properly a juice of the bark of a tree only According to Theophraſtus *reſin* was obtained by ſtirpping off the bark from pines, and by inciſions made in the ſilver-fir and the pitch-pine. The inhabitants of Mount Ida, he tells us, ſtripped the trunks of pines on the ſunny ſide two or three cubits from the ground. He obſerves, that a good pine might be made to yield *reſin* every year, but the indifferent pines only every other year, and the weaker trees once in three years; and that three runnings were as much as a tree could bear. It is remarked by the ſame author, that a pine doth not at once produce fruit and *reſin*; but the former only in its youth, and the latter in its old age.

Boerhaave will have it to be the oil of the bark farther inſpiſſated by the heat of the ſun, &c. ſo as to become friable. He adds, that *reſin* may be produced from any vegetable oil, by boiling it much and long.

If turpentine be ſet over a gentle fire, it firſt diſſolves, and becomes an oil, then a balſam, then pitch, and then *reſin*; in which ſtate it is friable in the cold, fuſible by fire, and withal inflammable and combuſtible, and diſſoluble in ſpirit of wine, but not in water, which are all the characters of a *reſin*.

There are two kinds of *reſins*, the one *liquid*, the other *dry* and hard. The firſt is the natural *reſin*, as it flows from the tree; the ſecond only differs from the firſt, in that it is condenſed by the heat of the ſun, or by that of a culinary fire.

Reſins will incorporate with oil, or rectified ſpirits, but not with an aqueous menſtruum.

The difference between *reſins* and *gums* conſiſts in this, that *reſins* are more ſulphureous, and gums more aqueous; ſo that the firſt diſſolve in oil, or ſpirit of wine, and the laſt readily in water.

M. Tournefort makes a kind of intermediate claſs of vegetable juices, which he calls *gum-reſins*; which diſſolve partly in ſpirit of wine, partly in water. Such are *galbanum*, *bdellium*, *opopanax*, *ſagapenum*, &c. See Gum, and Gum-*reſins*.

The *reſins* of ſeveral vegetables which abound with reſinous particles, but not ſo as to yield any by inciſion, as jalap, benzoin, ſcammony, turbith, &c. are thus obtained. The vegetable, being groſly powdered, is put into a matraſs, and rectified ſpirit of wine is poured on it, to the height of four fingers above the matter. Then the neck of another matraſs being luted into the former, to make a double veſſel, the matter is digeſted three or four days in a ſand-heat, till it have given a good tincture to the ſpirit of wine. Then the diſſolution is filtrated, and two thirds of the clear liquor evaporated off, and the remainder poured into a large veſſel of water, where it turns into a kind of milk; whence the *reſin*, in time, precipitates to the bottom in form of a white powder. This, when waſhed and dried in the ſun, grows into the ordinary conſiſtence of a *reſin*.

Reſins are employed for many purpoſes. The cheapeſt kinds are uſed for torches, and to cover the outſides of ſhips and boats. The fine, tranſparent *reſins*, compoſe varniſhes. Many of them are employed medicinally: ſuch are thoſe which enter into the compoſition of ointments and plaſters; or internally, as the *reſins* of ſcammony, jalap, and turpeth, which are purgative. Other *reſins*, the ſmell of which is agreeable, as benjamin and ſtorax, are employed as perfumes.

Resin, *elaſtic*. See Caoutchouc.

Resin, *maſtic*. See Mastic.

RESISTANCE, or **Resisting** *force*, in *Phyſics*, any power which acts contrarily to another, ſo as to deſtroy or diminiſh its effect.

Of *reſiſtance* there are various kinds, ariſing from the various natures and properties of the reſiſting bodies, and governed by various laws: as, the *reſiſtance* of ſolids, the *reſiſtance* of fluids, the *reſiſtance* of the air, &c. The doctrine of each whereof will be ſeen under the following articles.

Resistance *of ſolids*, in *Mechanics*, is the force wherewith the quieſcent parts of ſolid bodies oppoſe the motion of others contiguous therewith.

Of this there are two kinds. The firſt, where the reſiſting, and the reſiſted parts, i. e. the moving and quieſcent bodies, are only contiguous, and do not cohere; i. e. where they conſtitute ſeparate bodies or maſſes. This *reſiſtance* is what M. Leibnitz calls *reſiſtance of the ſurface*; and we, properly, *friction*; the conſideration whereof being of the laſt importance in the doctrine of machines, ſee its laws under the article Friction.

The ſecond caſe of *reſiſtance* is where the reſiſting and reſiſted parts are not only contiguous, but cohere; i. e. are parts of the ſame continued body or maſs. This *reſiſtance* is what we may properly call *renitency*; and was firſt conſidered by Galileo.

Resistance *of the fibres of ſolid bodies, theory of the*. To conceive an idea of this *reſiſtance* or renitency of the parts, ſuppoſe a cylindrical body ſuſpended vertically by one end. Here all its parts, being heavy, tend downwards, and endeavour to ſeparate the two contiguous planes, where the body is the weakeſt; but all the parts reſiſt this ſeparation by the force wherewith they cohere, or are bound together: here then are two oppoſite powers; viz. the weight of the cylinder, which tends to break it; and the force of coheſion of the parts, which reſiſts the fracture.

If the baſe of the cylinder be increaſed without increaſing its length; it is evident the *reſiſtance* will be increaſed in the ſame ratio as the baſe; but the weight alſo increaſes in the ſame ratio; whence it is evident, that all cylinders of the ſame matter and length, whatever their baſes be, have an equal *reſiſtance*, when vertically ſuſpended.

If the length of the cylinder be increaſed without increaſing the baſe, its weight is increaſed without increaſing its *reſiſtance*; conſequently the lengthening it weakens it.

To find the greateſt length a cylinder of any matter may have without breaking, there needs nothing but to take any cylinder of the ſame matter, and faſten to it the greateſt weight it will ſuſtain before it break; and then ſee how much it muſt be lengthened by the addition of its weight, till it equals its former weight with the addition of a foreign weight. Let A be the given weight, B that of the cylinder, L its length, C the greateſt weight it can bear, and x the length ſought; then we ſhall have $A+\frac{Bx}{L}=C$, and $x=\frac{CL-AL}{B}$. By this means Galileo found a copper-wire, and of conſequence any other cylinder of copper, might be extended to 4801 braccios or fathoms of ſix feet each.

If one end of the cylinder were fixed horizontally into a wall, and the reſt ſuſpended thence, its weight and *reſiſtance* would then act in a different manner; and if it be broke by the action of its weight, the rupture would be at the end fixed into the wall. A circle or plane contiguous to the wall, and parallel to the baſe, and conſequently vertical, would be detached from the contiguous circle within the plane of the wall, and would deſcend. All the motion is performed on the loweſt extremity of the diameter, which remains immoveable, while the upper extremity deſcribes a quadrant of a circle, and till the circle, which before was vertical, become horizontal; i. e. till the cylinder be entirely broken.

In the fracture of the cylinder it is viſible two forces have acted, and the one has overcome the other: the weight of the cylinder, which aroſe from its whole maſs, has overcome the *reſiſtance* which aroſe from the largeneſs of the baſe; and as the centres of gravity are points wherein all the forces, ariſing from the weights of the ſeveral parts of the ſame bodies, are conceived to be united, one may conceive the weight of the whole cylinder applied in the centre of gravity of its maſs, i. e. in a point in the middle of its axis: and the *reſiſtance* of the cylinder applied in the centre of gravity of its baſe, i. e. in the centre of the baſe; it being the baſe which reſiſts the fracture.

When the cylinder breaks by its own weight, all the motion is on an immoveable extremity of a diameter of the baſe. This extremity, therefore, is the fixed point of a lever, whoſe two arms are the radius of the baſe, and half the axis; and, of conſequence, the two oppoſite forces do not only act of themſelves, and by their abſolute force, but alſo by the relative force they derive from their diſtance with regard to the fixed point of the lever.

Hence it evidently follows, that a cylinder, e. gr. of copper, which, vertically ſuſpended, will not break by its own weight, if leſs than four hundred and eighty fathom long, will break with a leſs length in an horizontal ſituation; becauſe the length in this latter caſe contributes two ways to the fracture; both as it makes it of ſuch a weight, and as it is an arm of a lever to which the weight is applied. Hence, alſo, the ſmaller the baſe is, the leſs length or weight will ſuffice to break it; both becauſe the *reſiſtance* is really leſs, and becauſe it acts by a leſs arm of a lever.

If two cylinders of the ſame matter, having their baſes and lengths in the ſame proportion, be ſuſpended horizontally; it is evident, that the greater has more weight than the leſſer, both on account of its length, and of its baſe. But it hath leſs *reſiſtance* on account of its length, conſidered as a longer arm of a lever, and has only more *reſiſtance* on account of its baſe; therefore it exceeds the leſſer in its bulk and weight more than in *reſiſtance*, and conſequently it muſt break more eaſily.

Hence, we ſee why, upon making models and machines in ſmall, people are apt to be miſtaken as to the *reſiſtance* and ſtrength of certain horizontal pieces, when they come to execute their deſigns in large, by obſerving the ſame proportion as in the ſmall. Galileo's doctrine of *reſiſtance*, therefore, is no idle ſpeculation, but becomes applicable in architecture, and other arts.

The weight required to break a body, placed horizontally, being always leſs than that required to break it in a vertical ſituation; and this weight being to be greater or leſs according to the ratio of the two arms of the lever, the whole theory is always reducible to this; viz. to find what part of the abſolute weight the relative weight is to be, ſuppoſing the figure of the body known; which indeed is neceſſary, becauſe it is the figure that determines the two centres of gravity, or the two arms of the lever. For if the body, e. gr. were a cone, its centre of gravity would not be in the middle of its axis, as in the cylinder; and, if it were a ſemi-parabolical ſolid, neither would its centre of gravity be in the middle of its length or axis, nor the centre of gravity of its baſe in the middle of the axis of its baſe. But ſtill, whereſover theſe centres fall in the ſeveral figures, the two arms of the lever are regulated by theſe.

It may be here obſerved, that, if the baſe, whereby the body is faſtened into the wall, be not circular, but e. gr. parabolical, and the vertex of the parabola be at the top, the motion of the fracture will not be on an immoveable point, but on a whole immoveable line; which may be called the *axis of equilibrium*; and it is with regard to this that the diſtances of the centres of gravity are to be determined.

Now, a body horizontally ſuſpended, being ſuppoſed ſuch as that the ſmalleſt addition of weight would break it, there is an equilibrium between its poſitive and relative weight; and of conſequence thoſe two oppoſite powers are to each other reciprocally as the arms of the lever to which they are applied. On the other hand, the *reſiſtance* of a body is always equal to the greateſt weight which it will ſuſtain in a vertical ſituation, without breaking, i. e. is equal to its abſolute weight. Therefore, ſubſtituting the abſolute weight for the *reſiſtance*, it appears that the abſolute weight of a body, ſuſpended horizontally, is to its relative weight as the diſtance of its centre of gravity from the axis of equilibrium is to the diſtance of the centre of gravity of its baſe from the ſame axis.

The diſcovery of this important truth, at leaſt an equivalent to it, and to which this is reducible, we owe to Galileo. From this fundamental propoſition are eaſily deduced ſeveral conſequences: as, for inſtance, that, if the diſtance of the centre of gravity of the baſe from the axis of equilibrium be half the diſtance of the centre of gravity of the body, the relative weight will only be half the abſolute weight; and that a cylinder of copper, horizontally ſuſpended, whoſe length is double the diameter, will break, provided it weigh half what a cylinder of the ſame baſe, 4801 fathoms long, weighs.

On this ſyſtem of *reſiſtance* of Galileo, M. Mariotte made a very ſubtle remark, which gave birth to a new ſyſtem. Galileo ſuppoſes, that, where the body breaks, all the fibres break at once; ſo that the body always reſiſts with its whole abſolute force; i. e. with the whole force that all its fibres have in the place where it is to be broke. But M. Mariotte, finding that all bodies, even glaſs itſelf, bend before they break, ſhews that fibres are to be conſidered as ſo many little bent ſprings which never exert their whole force till ſtretched to a certain point, and never break till entirely unbent. Hence, thoſe neareſt the axis of equilibrium, which is an immoveable line, are ſtretched leſs than thoſe farther off; and, of conſequence, employ a leſs part of their force.

This conſideration only takes place in the horizontal ſituation of the body: in the vertical, the fibres of the baſe all break at once; ſo that the abſolute weight of the body muſt exceed the united *reſiſtance* of all its fibres; a greater weight is therefore required here than in the horizontal ſituation, i. e. a greater weight is required to overcome their united *reſiſtance* than to overcome their ſeveral *reſiſtances* one after another. The difference between the two ſituations ariſes hence, that, in the horizontal, there is an immoveable point or line, as a centre of motion, which is not in the vertical.

Mr. Varignon, has improved on the ſyſtem of M. Mariotte, and ſhewn, that, to Galileo's ſyſtem, it adds the conſideration of the centre of percuſſion. The compariſon of the centres of gravity with the centres of percuſſion, afford a fine view, and ſet the whole doctrine in a moſt agreeable light.

In each ſyſtem, the baſe, whereby the body breaks, moves on the axis of equilibrium, which is an immoveable line in the ſame baſe; but in the ſecond, the fibres of this baſe are continually ſtretching more and more, and that in the ſame ratio as they recede farther and farther from the axis of equilibrium; and, of conſequence, are ſtill exerting a greater and greater part of their whole force.

Theſe unequal extenſions, like all other forces, muſt have ſome common centre where they all meet, and with regard to which they make equal efforts on each ſide; and as they are preciſely in the ſame proportion as the velocities which the ſeveral points of a rod moved circularly would have to one another, the centre of extenſion of the baſe, whereby the body breaks, or tends to break, muſt be the ſame with its centre of percuſſion. Galileo's hypotheſis, where fibres ſtretch equally, and break all at once, correſponds to the caſe of a rod moving parallel to itſelf, where the centre of extenſion or percuſſion does not appear, as being confounded with the centre of gravity.

The baſe of fraction being a ſurface, whoſe particular nature determines its centre of percuſſion, that is neceſſary to be firſt known, to find on what point of the vertical axis of that baſe it is placed, and how far it is from the axis of equilibrium. Indeed, we know in the general, that it always acts with ſo much the more advantage as it is farther from it; becauſe it acts by a longer arm of a lever; and of conſequence it is the unequal *reſiſtance* of the fibres in M. Marriotte's hypotheſis, which produces the centre of percuſſion; but this unequal *reſiſtance* is greater or leſs, according as the centre of percuſſion is placed more or leſs high on the vertical axis of the baſe, in the different ſurfaces of the baſe of the fracture.

To expreſs this unequal *reſiſtance*, accompanied with all the variation it is capable of, regard muſt be had to the ratio between the diſtance of the centre of percuſſion from the axis of equilibrium, and the length of the vertical axis of the baſe. In which ratio, the firſt term, or the numerator, is always leſs than the ſecond, or the denominator; ſo that the ratio is always a fraction leſs than unity; and the unequal *reſiſtance* of the fibres in M. Marriotte's hypotheſis is ſo much the greater, or, which amounts to the ſame, approaches ſo much nearer to the equal *reſiſtance* in Galileo's hypotheſis, as the two terms of the ratio are nearer to an equality.

Hence it follows, that the *reſiſtance* of bodies in M. Marriotte's ſyſtem is to that in Galileo's, as the leaſt of the terms in the ratio is to the greateſt. Hence, alſo, the *reſiſtance* being leſs than what Galileo imagined, the relative weight muſt alſo be leſs; ſo that the proportion already mentioned between the abſolute and relative weight cannot ſubſiſt in the new ſyſtem, without an augmentation of the relative weight, or a diminution of the abſolute weight; which diminution is had by multiplying the weight by the ratio, which is always leſs than unity. This done, we find that the abſolute weight, multiplied by the ratio, is to the relative weight as the diſtance of the centre of gravity of the body from the axis of equilibrium is to the diſtance of the centre of gravity of the baſe of the fracture from the ſame axis: which is preciſely the ſame thing with the general formula given by M. Varignon for the ſyſtem of M. Mariotte. In effect, after conceiving the relative weight of a body, and its *reſiſtance* equal to its abſolute weight, as two contrary powers applied to the two arms of a lever, in the hypotheſis of Galileo, there needs nothing to convert it into that of M. Mariotte, but to imagine that the *reſiſtance*, or the abſolute weight, is become leſs, every thing elſe remaining the ſame.

We have here only conſidered bodies as to be broke by their own weight. It will amount to the ſame, if we ſuppoſe them void of weight themſelves, and to be broken by a weight applied to their extremities: only it is to be obſerved, that a foreign weight acts by an arm of a lever equal to the whole length of a body; whereas their own weight, being all united in their centre of gravity, is only the diſtance of that centre from the axis of equilibrium.

One of the moſt curious, and perhaps the moſt uſeful queſtions in this reſearch is to find what figure a body muſt have, that its *reſiſtance* may be equal in all its parts, whether it be conceived as loaden with a foreign weight, or as only ſuſtaining its own weight. We ſhall here only conſider the latter caſe, from which the former will be eaſily determined.

For a body, then, ſuſpended horizontally, to reſiſt equally in all its parts, it is neceſſary, ſome part of it being conceived as cut-off in a plane parallel to the baſe or fracture of the body, the weight of the body retrenched be to its *reſiſtance* in the ſame ratio as the weight of the whole to its *reſiſtance*; theſe four powers acting by arms of levers peculiar to themſelves. Now the weight of any body thus conceived, is its whole weight multiplied by the diſtance of the centre of gravity of the body from the axis of equilibrium; and the *reſiſtance* is the plane of the baſe of fracture multiplied by the diſtance of the centre of gravity of the baſe from the ſame axis; conſequently theſe four quantities are to be proportional in the whole, and in each part, of a ſolid of equal *reſiſtance*. From this proportion, M. Varignon eaſily deduces two ſolids, which ſhall reſiſt equally in all their parts. Galileo had found one before: that diſcovered by M. Varignon is in form of a trumpet, and is to be fixed into a wall at its greater end; ſo that its bigneſs and weight is always diminiſhed in proportion as its length, or the arm of the lever whereby its weight acts, increaſes. It is added (which ſeems very remarkable) that, howſoever different the two ſyſtems may be, the ſolids of equal *reſiſtance* are the ſame in both.

For the *reſiſtance* of a ſolid ſupported at each extreme, as of a beam between two walls, ſee Beam.

Resistance *of fluids*, in *Hydroſtatics*, is the force wherewith bodies, moving in fluid mediums, are impeded and retarded in their motion.

Resistance, *laws of, of the fluid mediums*. A body moving in a fluid is reſiſted from two cauſes: the firſt, the coheſion of the parts of the fluid. For a body, in its motion, ſeparating the parts of a liquid, muſt overcome the force with which thoſe parts cohere.

The ſecond is the inertia, or inactivity of matter, whereby a certain force is required to move the particles from their places, in order to let the body paſs.

The retardation from the firſt cauſe is always the ſame in the ſame ſpace, the ſame body remaining whatever be the velocity. Hence, the *reſiſtance* increaſes as the ſpace run through; in which ratio the velocity alſo increaſes; and therefore the *reſiſtance* is as the velocity itſelf.

The *reſiſtance* from the ſecond cauſe, when the ſame body moves through different fluids with the ſame velocity, follows the proportion of the matter to be removed in the ſame time, which is as the denſity of the fluid.

When the ſame body moves through the ſame fluid with different velocities, this *reſiſtance* increaſes in proportion to the number of particles ſtruck in an equal time; which number is as the ſpace run through in that time, that is, as the velocity. But, farther, it increaſes in proportion to the force with which the body ſtrikes againſt every part; which force is alſo as the velocity of the body; and therefore, if the velocity be triple, the *reſiſtance* is triple, from a triple number of parts to be removed. It is alſo triple from a ſtroke three times ſtronger againſt every particle; therefore the whole *reſiſtance* is ninefold, that is, as the ſquare of the velocity. Hence, a body moved in a fluid is reſiſted partly in a ratio of the velocity, and partly in a duplicate ratio of it.

The *reſiſtance* from the coheſion of parts in fluids, except glutinous ones, is not very ſenſible in reſpect of the other *reſiſtance*, which increaſes in the ratio of the ſquares of the velocities; but the firſt in the ratio of the velocity itſelf. By how much the velocity increaſes, by ſo much more do theſe *reſiſtances* differ; wherefore, in ſwifter motions, the *reſiſtance* alone is to be conſidered, which is as the ſquare of the velocity.

If a fluid be included in a veſſel of a priſmatic figure, and there be moved along in it, with equal velocity, and in a direction parallel to the ſides of the priſm, two bodies, the one ſpherical, the other cylindric, ſo that the diameter of the baſe of the latter be equal to the diameter of the ſphere, and the cylinder be moved in the direction of its axis; theſe bodies will ſuffer the ſame *reſiſtance*.

To demonſtrate this, ſuppoſe the bodies at reſt, and that the fluid moves in the veſſel with the ſame velocity that the bodies had; by this, the relative motion of the bodies and the fluid is not changed: conſequently, the actions of the bodies on the fluid, and of the fluid on the bodies, are not changed. The retardation which the liquor ſuffers in paſſing by the body, ariſes only from this; that, in that place, it is reduced to a narrower ſpace: but the capacity of the veſſel is equally diminiſhed by each body; therefore each body produces an equal retardation: and becauſe action and reaction are equal to one another, the fluid acts equally upon each body; wherefore, alſo, each body will be equally retarded, when the bodies are moved, and the fluid is at reſt.

The greateſt part of authors have eſtabliſhed it as a certain rule, that whilſt the ſame body moves in the ſame medium, it is always reſiſted in the duplicate proportion of its velocity; that is, if the reſiſted body move in one part of its track, with three times the velocity with which it moved in ſome other part, then its *reſiſtance* to the greater velocity will be nine times the *reſiſtance* to the leſſer. If the velocity in one place be four times the velocity in another, the *reſiſtance* to the greater velocity will be ſixteen times the *reſiſtance* to the leſſer, and ſo on.— This rule, though exceſſively erroneous, when taken in a general ſenſe, is yet undoubtedly very near the truth, when confined within certain limits.

In order to conceive the *reſiſtance of fluids* to a body moving in them, it is neceſſary to diſtinguiſh between thoſe fluids, which being compreſſed by ſome incumbent weight, perpetually cloſe up the ſpace deſerted by the body in motion, without permitting, for an inſtant, any vacuity to remain behind it; and thoſe fluids, in which (they being not ſufficiently compreſſed) the ſpace left behind the moving body remains for ſome time empty. Theſe differences, in the reſiſting fluids, will occaſion very remarkable varieties in the laws of their *reſiſtance*, and are abſolutely neceſſary to be conſidered in the determination of the action of the air on ſhot and ſhells; for the air partakes of both theſe affections, according to the different velocities of the projected body.

If a fluid was ſo conſtituted, that all the particles compoſing it were at ſome diſtance from each other, and there was no action between them, then the *reſiſtance* of a body moving therein would be eaſily computed, from the quantity of motion communicated to theſe particles: for inſtance, if a cylinder moved in ſuch a fluid in the direction of its axis, it would communicate to the particles it met with a velocity equal to its own, and in its own direction, ſuppoſing that neither the cylinder, nor the parts of the fluid were elaſtic; whence, if the velocity and diameter of the cylinder be known, and alſo the denſity of the fluid, there would thence be determined the quantity of motion communicated to the fluid, which (action and re-action being equal) is the ſame with the quantity loſt by the cylinder, conſequently the *reſiſtance* would be hereby aſcertained.

In this kind of diſcontinued fluid, the particles being detached from each other, every one of them can purſue its own motion in any direction, at leaſt for ſome time, independent of the neighbouring ones; wherefore, if, inſtead of a cylinder, moving in the direction of its axis, a body, with a ſurface oblique to its direction, be ſuppoſed to move in ſuch a fluid, the motion which the parts of the fluid will hereby acquire, will not be in the direction of the reſiſted body, but perpendicular to its oblique ſurface; whence the *reſiſtance* to ſuch a body will not be eſtimated from the whole motion communicated to the particles of the fluid, but from that part of it only, which is in the direction of the reſiſted body.—In fluids then, where the parts are thus diſcontinued from each other, the different obliquities of that ſurface, which goes foremoſt, will occaſion conſiderable changes in the *reſiſtance*; although the ſection of the ſolid, by a plain perpendicular to its direction, ſhould in all caſes be the ſame. And ſir Iſaac Newton has particularly determined, that, in a fluid thus conſtituted, the *reſiſtance* of a globe is but half the *reſiſtance* of a cylinder of the ſame diameter, moving in the direction of its axis with the ſame velocity.

But though the hypotheſis of a fluid, thus conſtituted, be of great uſe in explaining the nature of *reſiſtances*; yet, in reality, no ſuch fluid does exiſt within our knowledge: all the fluids, with which we are converſant, are ſo formed, that their particles either lie contiguous to each other, or at leaſt act on each other in the ſame manner as if they did; conſequently, in theſe fluids, no one particle, contiguous to the reſiſted body, can be moved, without moving at the ſame time a great number of others, ſome of which will be diſtant from it; and the motion thus communicated to a maſs of the fluid, will not be in any one determined direction, but will in each particle be different, according to the different manners in which it lies in contact with thoſe from which it receives its impulſe; whence, great numbers of the particles being diverted into oblique directions, the *reſiſtance* of the moving body, which will depend on the quantity of motion communicated to the fluid in its own direction, will be hereby different in quantity, from what it would be in the preceding ſuppoſition, and its eſtimation becomes much more complicated and operoſe.

If the fluid be compreſſed by the incumbent weight of its upper parts (as all fluids are with us, except at their very ſurface), and if the velocity of the moving body be much leſs than that with which the parts of the fluid would ruſh into a void ſpace, in conſequence of their compreſſion; it is evident, that in this caſe the ſpace left by the moving body will be inſtantaneouſly filled up by the fluid; and the parts of the fluid, againſt which the foremoſt part of the body preſſes in its motion, will, inſtead of being impelled forwards in the direction of the body, circulate, in ſome meaſure, towards the hinder part of the body, thereby to reſtore the equilibrium, which the conſtant influx of the fluid behind the body would otherwiſe deſtroy; whence the progreſſive motion of the fluid, and conſequently the *reſiſtance* of the body, which depends thereon, would be, in this inſtance, much leſs than in the hypotheſis, where each particle is ſuppoſed to acquire, from the ſtroke of the reſiſting body, a velocity equal to that with which the body moved, and in the ſame direction. Sir Iſaac Newton has determined, that the *reſiſtance* of a cylinder, moving in the direction of its axis, in ſuch a compreſſed fluid as we have here treated of, is but one fourth part of the *reſiſtance* which the ſame cylinder would undergo, if it moved with the ſame velocity, in a fluid, conſtituted in the manner deſcribed in the firſt hypotheſis, each fluid being ſuppoſed to be of the ſame denſity.

But again, it is not only in the quantity of their *reſiſtance* that theſe fluids differ, but likewiſe in the different manner in which they act on ſolids, of different forms, moving in them. In the diſcontinued fluid, firſt deſcribed, the obliquity of the foremoſt ſurface of the moving body would diminiſh the *reſiſtance*; but in compreſſed fluids this holds not true, at leaſt not in any conſiderable degree; for the principal *reſiſtance* in compreſſed fluids ariſes from the greater or leſſer facility with which the fluid, impelled by the forepart of the body, can circulate towards its hindermoſt part; and this being little, if at all, affected by the form of the moving body, whether it be cylindrical, conical, or ſpherical, it follows, that while the tranſverſe ſection of the body, and conſequently the quantity of impelled fluid is the ſame, the change of figure in the body will ſcarcely affect the quantity of its *reſiſtance*.

And this caſe, that is, the *reſiſtance* of a compreſſed fluid to a ſolid, moving in it with a velocity much leſs than what the parts of the fluid would acquire from their compreſſion; this caſe has been very fully conſidered by ſir Iſaac Newton, who has aſcertained the quantity of ſuch a *reſiſtance*, according to the different magnitudes of the moving body, and the denſity of the fluid. But he very expreſsly informs us, that the rules he has laid down are not generally true, but upon a ſuppoſition that the compreſſion of the fluid be increaſed in the greater velocities of the moving body: however, ſome unſkilful writers, who have followed him, overlooking this caution, have applied his determination to bodies moving with all kinds of velocities, without attending to the different compreſſions of the fluids they are reſiſted by; and by this means they have accounted the *reſiſtance* of the air to muſket and cannon-ſhot, to be but one third part of what it is found to be by experience.

Indeed it appears plain enough, that the reſiſting power of the medium muſt be increaſed, when the reſiſting body moves ſo faſt that the fluid cannot inſtantaneouſly preſs in behind it, and fill the deſerted ſpace; for when this happens the body will be deprived of the preſſure of the fluid behind it; which in ſome meaſure balanced its *reſiſtance*, and muſt ſupport on its forepart the whole weight of a column of the fluid, independent of the motion it gives to the parts of the fluid; and beſides, the motion in the particles driven before the body, is, in this caſe, leſs affected by the compreſſion of the fluid, and conſequently they are leſs deflected from the direction in which they are impelled by the reſiſted ſurface; whence this ſpecies of *reſiſtance* approaches more and more to that deſcribed in the firſt hypotheſis, where each particle of the fluid being unconnected with the neighbouring ones, it purſued its own motion, in its own direction, without being interrupted or deflected by their contiguity; and therefore, as the *reſiſtance* of a diſcontinued fluid to a cylinder, moving in the direction of its axis, is four times greater than the *reſiſtance* of a fluid ſufficiently compreſſed of the ſame denſity, it follows, that the *reſiſtance* of a fluid, when a vacuity is left behind the moving body, may be near four times greater than that of the ſame fluid, when no ſuch vacuity is formed; for when a void ſpace is thus left, the *reſiſtance* approaches in its nature to that of a diſcontinued fluid.

This then may probably be the caſe in a cylinder moving in the ſame compreſſed fluid, according to the different degrees of its velocity; ſo that if it ſet out with a great velocity, and moves in the fluid till that velocity be much diminiſhed, the reſiſting power of the medium may be near four times greater in the beginning of its motion than in the end.

In a globe the difference will not be ſo great, becauſe, on account of its oblique ſurface, its *reſiſtance* in a diſcontinued medium is but about twice as much as in one properly compreſſed; for its oblique ſurface diminiſhes its *reſiſtance* in one caſe, and not in the other: however, as the compreſſion of the medium, even when a vacuity is left behind the moving body, may yet confine the oblique motion of the parts of the fluid, which are driven before the body, and as in an elaſtic fluid (as is our air) there will be ſome degree of condenſation in thoſe parrs; it is highly probable, that the *reſiſtance* of a globe, moving in a compreſſed fluid with a very great velocity, will be between that of a globe and of a cylinder, in a diſcontinued medium; that is, (in proportion to its velocity), we may ſuppoſe it to be more than twice, and leſs than four times the *reſiſtance* of the ſame globe, moving ſlowly through the ſame medium; whence, perhaps, we ſhall not much err in ſuppoſing the globe, in its ſwifteſt motions to be reſiſted near three times more, in proportion to its velocity, than when it is ſloweſt.

And as this increaſe of the reſiſting power of the medium will take place, when the velocity of the moving body is ſo great that a perfect vacuity is left behind it, ſo ſome degree of augmentation will be ſenſible in velocities much ſhort of this; for even when, by the compreſſion of the fluid, the ſpace left behind the body is inſtantaneouſly filled up; yet, if the velocity with which the parts of the fluid ruſh in behind, is not much greater than that with which the body moves, the ſame reaſons we have urged above, in the caſe of an abſolute vacuity, will hold in a leſs degree in this inſtance; and therefore we are not to ſuppoſe, that in the increaſed *reſiſtance*, which we have hitherto treated of, it immediately vaniſhes, when the compreſſion of the fluid is juſt ſufficient to prevent a vacuum behind the reſiſted body; but we muſt conſider it as diminiſhing only, according as the velocity, with which the parts of the fluid follow the body, exceeds that with which the body moves.

Hence then we conclude, that if a globe ſets out in a reſiſting medium, with a velocity much exceeding that with which the particles of the medium would ruſh into a void ſpace, in conſequence of their compreſſion, ſo that a vacuum is neceſſarily left behind the globe in its motion: the *reſiſtance* of this medium to the globe will be near three times greater, in proportion to its velocity, than what we are ſure, from ſir Iſaac Newton, would take place in a ſlower motion. We may farther conclude, that the reſiſting power of the medium will gradually diminiſh as the velocity of the globe decreaſes, till at laſt, when it moves with velocities which bear but a ſmall proportion to that with which the particles of the medium follow it, the *reſiſtance* becomes the ſame with what is aſſigned by ſir Iſaac Newton in the caſe of a compreſſed fluid.

And from this determination we may learn how falſe that poſition is, which aſſerts the reſiſtance of any medium to be in the duplicate proportion of the velocity of the reſiſted body; for it plainly appears, by what we have ſaid, that this can only be conſidered as nearly true in ſmall variations of velocity, and can never be applied in the comparing together the *reſiſtances* to all velocities whatever, without the moſt enormous errors. See New Principles of Gunnery, by Mr. Robins, chap. 2. prop. 1. See RESISTANCE *of the air*. See alſo PROJECTILE and GUNNERY.

Reſiſtance and retardation are uſed indifferently for each other, as being both in the ſame proportion, and the ſame *reſiſtance* always generating the ſame retardation. But, with regard to different bodies, the ſame *reſiſtance* frequently generates different retardations; the *reſiſtance* being the quantity of motion, and the retardation the celerity. For the difference and meaſure of the two, ſee RETARDATION.

The retardations from this *reſiſtance* may be compared together, by comparing the *reſiſtance* with the gravity. It is demonſtrated that the *reſiſtance* of a cylinder, which moves in the direction of its axis (to which the *reſiſtance* of a ſphere of the ſame diameter is equal), is equal to the weight of a cylinder of that fluid through which the body moves, having its baſe equal to the body's baſe, and its height equal to half the height from which a body falling in vacuo may acquire the velocity with which the cylinder moves through the fluid.

From the given celerity of the body moved, the height of the fluid cylinder is found, as alſo the weight of it, from the known ſpecific gravity of the liquid, and diameter of the body. Let a ball, for inſtance, of three inches diameter, be moved in water with a celerity wherewith it would go ſixteen feet in a ſecond: from experiments on falling bodies, and others made on pendulums, it has been found, that this is the celerity which a body acquires in falling from a height of four feet; therefore the weight of a cylinder of water of three inches diameter, and two feet high, that is, a weight of about ſix pounds and three ounces, is equal to the *reſiſtance* of the aforeſaid ball. See DESCENT.

Let the *reſiſtance*, ſo diſcovered, be divided by the weight of the body which determines its quantity of matter, and you will have the retardation.

RESISTANCE *of fluid mediums to the motion of pendulums*. The arc deſcribed by a pendulum oſcillating in vacuo with the celerity it has acquired in deſcending, is equal to the arc deſcribed by the deſcent; but the ſame does not happen in a fluid; and there is a greater difference between thoſe arcs, the greater the *reſiſtance* is; that is, the greater the arc is which is deſcribed in the deſcent.

Let the *reſiſtance* of the fluid be in proportion to the velocity; and let two pendulums, entirely alike, oſcillating in a cycloid, perform unequal vibrations, and begin to fall the ſame moment; they here begin to move by forces that are as the arcs to be deſcribed. If thoſe impreſſions alone, which are made the firſt moment, be conſidered; after a given time the celerities will be in the ſame ratio as at the beginning; for the retardations, which are as the velocities themſelves, cannot change their proportions, the ratio between quantities not being changed by the addition and ſubtraction of quantities in the ſame ratio; therefore, in equal times, however, the celerities of bodies are changed in their motion by the *reſiſtance*, the ſpaces gone through are as the forces in the beginning, that is, as the arcs to be deſcribed by the deſcent; therefore, after any times, the bodies are in the correſpondent points of thoſe arcs. But in theſe points the forces generated are in the ſame ratio as in the beginning; and the proportion of the celerities, which is not varied by the *reſiſtance*, ſuffers no change from the gravity. In the aſcent, gravity retards the motion of the body; but in correſpondent points its actions are in the ſame ratio as its deſcents; and therefore every where, in correſpondent points the celerities are in the ſame ratio: but as in the ſame moments the bodies are in their correſpondent points, it follows, that the motion of both is deſtroyed in the ſame moment; that is, they finiſh their vibrations in the ſame time. The ſpaces run through in the time of one vibration are as the forces by which they are run through; that is, the arcs of whole vibration are as the arcs deſcribed by the deſcent, the doubles whereof are the arcs to be deſcribed in vacuo. The deficiencies of the arcs to be deſcribed in fluids, from the arcs to be deſcribed in vacuo, are the differences of quantities in the ſame ratio, and are as the arcs deſcribed in the deſcent.

RESISTANCE *of fluid mediums to the motion of falling bodies*. The *reſiſtances* are as the ſquares of the celerities; and therefore every where, in correſpondent points, as the ſquares of the arcs deſcribed by the deſcent; in which ratio, alſo, the retardations are: but as each of them retain the ſame proportion in correſponding points, the ſums of them all will be in the ſame proportion; that is, the whole retardations, which are the defects of the arcs deſcribed in the fluid, from the arcs to be deſcribed in vacuo; or, which is the ſame, the difference between the arcs deſcribed in the deſcent, and the next aſcent. Therefore theſe differences, if the vibrations are not very unequal, are nearly as the ſquares of the arcs deſcribed by the deſcent, which is alſo confirmed by experiments in greater vibrations; for in theſe the proportion of *reſiſtance*, here conſidered, obtains.

A body freely deſcending in a fluid is accelerated by the reſpective gravity of the body, which continually acts upon it, yet not equably, as in a vacuum: the *reſiſtance* of the fluid occaſions a retardation, that is, a diminution of acceleration, which diminution increaſes with the velocity of the body. Now there is a certain velocity, which is the greateſt a body can acquire by falling; for if its velocity be ſuch, that the *reſiſtance* ariſing from it becomes equal to the reſpective weight of the body, its motion can be no longer accelerated: for the motion here continually generated by the reſpective gravity, will be deſtroyed by the *reſiſtance*, and the body forced to go on equably. A body continually comes nearer and nearer to this greateſt celerity, but can never attain to it.

When the denſities of a fluid body are given, the reſpective weight of the body may be known; and by knowing the diameter of the body, it may be found from what height a body falling in vacuo can acquire ſuch a velocity as that the *reſiſtance* in a fluid ſhall be equal to that reſpective weight, which will be that greateſt velocity above mentioned. If the body be a ſphere, it is known, that a ſphere is equal to a cylinder of the ſame diameter, whoſe height is two third parts of that diameter; which height is to be increaſed in the ratio wherein the reſpective weight of the body exceeds the weight of the fluid, in order to have the height of a cylinder of the fluid, whoſe weight is equal to the reſpective weight of the body; but if you double this height, you will have a height from which a body falling in vacuo acquires ſuch a velocity as generates a *reſiſtance* equal to this reſpective weight, and which therefore is the greateſt velocity which a body can acquire, by falling in a fluid, from an infinite height. Lead is eleven times heavier than water; wherefore its reſpective weight is to the weight of water, as ten to one: therefore a leaden ball, as it appears from what has been ſaid, cannot acquire a greater velocity, in falling in water, than it would acquire in falling in vacuo, from a height of thirteen one-third of its diameters.

A body lighter than a fluid, and aſcending in it by the action of the fluid, is moved exactly by the ſame laws as a heavier body falling in the fluid. Wherever you place the body, it is ſuſtained by the fluid, and carried up with a force equal to the difference of the weight of a quantity of the fluid of the ſame bulk as the body, from the weight of the body; therefore you have a force that continually acts equably upon the body; by which not only the action of gravity of the body is deſtroyed, ſo as that it is not to be conſidered in this caſe; but the body is alſo carried upwards by a motion equably accelerated, in the ſame manner as a body heavier than a fluid deſcends by its reſpective gravity: but the equability of the acceleration is deſtroyed in the ſame manner by the *reſiſtance*, in the aſcent of a body lighter than the fluid, as it is deſtroyed in the deſcent of a body heavier.

When a body ſpecifically heavier than a fluid is thrown in it, it is retarded upon a double account; on account of the gravity of the body, and on account of the *reſiſtance* of the fluid: conſequently, a body riſes to a leſs height than it would riſe to in vacuo with the ſame celerity. But the defects of the height in a fluid from the height to which a body would riſe in vacuo with the ſame celerity, have a greater proportion to each other than the heights themſelves: and in leſs heights the defects are nearly as the ſquares of the heights in vacuo.

RESISTANCE *of the air*, in *Pneumatics*, is the force wherewith the motion of bodies, particularly of projectiles, is retarded by the oppoſition of the air or atmoſphere.—See GUNNERY.

The air being a fluid, the general laws of the *reſiſtance* of fluids obtain therein; only the different degrees of denſity, in the different ſtages or regions of the atmoſphere, occaſion ſome irregularity.

As to the *reſiſtance* of the air, it has been thus determined from experiments. Mr. Robins, in his New Principles of Gunnery, chap. 2. prop. 2, &c. having taken a muſket barrel, and charging it ſucceſſively with a leaden ball of three quarters of an inch diameter, and about half its weight of powder, and taking ſuch precaution in weighing of the powder, and placing it, as to be ſure, by many previous trials, that the velocity of the ball could not differ by 20 feet in 1″ from its medium quantity, fired it againſt a pendulum (deſcribed under GUNNERY), placed at 25 feet, at 75 feet, and at 125 feet diſtance from the mouth of the piece reſpectively. In the firſt caſe, it impinged againſt the pendulum with a velocity of 1670 feet in 1″; in the ſecond caſe, with a velocity of 1550 feet in 1″; and in the third caſe, with a velocity of 1425 feet in 1″; ſo that in paſſing through 50 feet of air, the bullet loſt a velocity of about 120 or 125 feet in 1″; and the time of its paſſing through that ſpace being about $\frac{1}{32}$, or $\frac{1}{30}$ of 1″, the medium quantity of *reſiſtance* muſt, in theſe inſtances, have been about 120 times the weight of the ball; which, as the ball was nearly $\frac{1}{12}$ of a pound, amounts to about 10 lb. avoirdupoiſe.

Now if a computation be made, according to the method laid down for compreſſed fluids, in the 38th propoſ. of lib. ii. of ſir Iſaac Newton's Principia, ſuppoſing the weight of water to be to the weight of air as 850 to 1, it will be found that the *reſiſtance* of a globe of three quarters of an inch diameter, moving with a velocity of about 1600 feet in 1″, will not, on thoſe principles, amount to any more than a force of $4\frac{1}{6}$ lb. avoirdupoiſe; whence we may conclude (as the rules in that propoſition for ſlow motions are very accurate), that the reſiſting power of the air in ſlow motions is leſs than in ſwift motions, in the ratio of $4\frac{1}{6}$ to 10, a proportion between that of 1 to 2, and 1 to 3.

Again, charging the ſame piece with equal quantities of powder, and balls of the ſame weight, and firing three times at the pendulum, placed at 25 feet diſtance from the mouth of the piece, the medium of the velocities with which the ball impinged was nearly that of 1690 feet in 1″. Then removing the piece 175 feet from the pendulum, the velocity of the ball, at a medium of five ſhots, was that of 1300 feet in 1″. Whence the ball, in paſſing through 150 feet of air, loſt a velocity of about 390 feet in 1″; and the *reſiſtance*, computed from theſe numbers, comes out ſomething more than in the preceding inſtance, amounting to between 11 and 12 pounds avoirdupoiſe: whence, according to theſe experiments, the reſiſting power of the air to ſwift motions is greater than in ſlow ones, in a ratio which approaches nearer to the ratio of 3 to 1, than in the preceding experiments.

Next, to exame this *reſiſtance* in ſmaller velocities, the pendulum, being placed at 25 feet diſtance, was fired at five times, with an equal charge each time, and the mean velocity, with which the ball impinged, was that of 1180 feet in 1″. Then removing the pendulum to the diſtance of 250 feet, the medium velocity of five ſhot, at this diſtance, was that of 950 feet in 1″; whence the ball, in paſſing through 225 feet of air, loſt a velocity of 230 feet in 1″, and as it paſſed through that interval in about $\frac{1}{14}$ of 1″, the *reſiſtance* to the middle velocity will come out to be near $33\frac{1}{2}$ times the gravity of the ball, or 2 lb. 10 oz. avoirdupoiſe. Now the *reſiſtance* to the ſame velocity, according to the laws obſerved in ſlower motions, amounts to $\frac{7}{11}$ of the ſame quantity; whence in a velocity of 1065 feet in 1″ (the medium of 1180 and 950) the reſiſting power of the air is augmented in no greater proportion than that of 7 to 11; whereas in greater degrees of velocity, as before, it amounted very near to the ratio of 1 to 3.

By other experiments, it appears, that the *reſiſtance* of the air is very ſenſibly increaſed, even in ſo ſmall a velocity as that of 400 feet in 1″.

That this reſiſting power of the air to ſwift motions is very ſenſibly increaſed beyond what ſir Iſaac's theory for ſlow motions makes it, ſeems hence to be evident. It being, as has been ſaid, in muſket, or cannon ſhot, with their full charge of powder, near three times the quantity aſſigned by that theory.

However, this increaſed power of *reſiſtance* diminiſhes as the velocity of the reſiſted body diminiſhes, till at length, when the motion is ſufficiently abated, the actual *reſiſtance* coincides with that ſuppoſed in the theory.

The *reſiſtance* of a bullet of three quarters of an inch diameter, moving in air with the velocity of 1670 feet in 1″, amounting, as we ſaid, to 10 lb. the *reſiſtance* of a cannon ball of 24 lb. fired with 16 lb. or its full charge of powder, and thereby moving with a velocity of 1650 feet in 1″ (which ſcarce differs from the other), may hence be determined. For the velocity of the cannon ball being nearly the ſame as the muſket bullet, and its ſurface above 54 times greater, it follows, that the *reſiſtance* on the cannon ball will amount to more than 540 lb. which is near 23 times its own weight. And from hence it appears how raſh and erroneous the opinion of thoſe is, who neglect the conſideration of the *reſiſtance* of the air as of no importance in the doctrine of projectiles. See PROJECTILE.

Profeſſor Euler has ſhewn, that the common doctrine of *reſiſtance* anſwers very well when the motion is not very ſwift, but in very ſwift motions it gives the *reſiſtance* leſs than it ought to be, on two accounts. 1. Becauſe in very quick motions the air does not fill up the ſpace behind the body faſt enough to preſs on the hinder parts, that the *reſiſtance* on the fore part is increaſed. 2. The denſity of the air before the ball, being increaſed by the quick motion, will preſs more ſtrongly on the forepart, and, being heavier than in its natural ſtate, will retard its motion.

He has ſhewn, that Mr. Robins has reſtrained his rule to velocities not exceeding 1670 feet in 1″; whereas had he extended it to greater velocities, the reſult muſt have been erroneous; as he apprehends that it is not perfectly exact, when the motion is not extremely ſwift. He has inveſtigated a formula for determining the degree of this *reſiſtance*, and deduced concluſions differing from thoſe of Mr. Robins. See Principles of Gunnery inveſtigated, &c. 1777, p. 224, &c.

Mr. Robins, having proved that, in very great changes of velocity, the *reſiſtance* does not accurately follow the duplicate proportion of the velocity, lays down two poſitions, which may be of conſiderable ſervice in the practice of artillery, till a more complete and accurate theory of *reſiſtance* and the changes of its augmentation, may be obtained. The firſt of theſe is, that till the velocity of the projectile ſurpaſſes that of 1100 feet in a ſecond, the *reſiſtance* may be eſteemed to be in the duplicate proportion of the velocity: and the ſecond is, that if the velocity be greater than that of 11 or 1200 feet in a ſecond, the abſolute quantity of the *reſiſtance* will be near three times as great as it ſhould be by a compariſon with the ſmaller velocities. Upon theſe principles, he proceeds in aproximating the actual ranges of pieces with ſmall angles of elevation, viz. ſuch as do not exceed 8° or 10°, which he ſets down in a table, compared with their correſponding potential ranges.—See his Mathematical Tracts, vol i. p. 179, &c.

Mr. Glenie, in his Hiſt. of Gunnery, 1776, p. 49. obſerves, in conſequence of ſome experiments with a rifled-piece, caſt at Carron, and properly fitted for experimental purpoſes, that the *reſiſtance* of the air to a velocity ſomewhat leſs than that mentioned in the firſt of the above propoſitions is conſiderably greater than in the duplicate ratio of the velocity; and that, to a celerity ſomewhat greater than that ſtated in the ſecond, the *reſiſtance* is conſiderably leſs than that which is treble the *reſiſtance* in the ſaid ratio. Some of Mr. Robins's own experiments ſeem neceſſarily to make it ſo: ſince, to a velocity no quicker than 400 feet in a ſecond, he found the *reſiſtance* to be ſomewhat greater than in that ratio.

Resistance, *different, of the ſame medium to bodies of different figures.* Sir Iſaac Newton ſhews, that if a globe and a cylinder, of equal diameters, be moved with equal velocity in a thin medium, conſiſting of equal particles, diſpoſed at equal diſtances, according to the direction of the axis of the cylinder; the *reſiſtance* of the globe will be leſs by half than that of the cylinder.

Resistance, *ſolid of the leaſt.* From the laſt propoſition the ſame author deduces the figure of a ſolid which ſhall have the leaſt *reſiſtance* of any containing the ſame quantity of matter and ſurface.

The figure is this. Suppoſe D N F G (*Tab.* VI. *Mechanics, fig.* 104.) to be ſuch a curve, as that if from any point N be let fall a perpendicular N M, to the axis A B; and from a given point G be drawn a right line G R parallel to a tangent to the figure in N, and cut the axis, when continued, in R; M N be to G R as G R *cub.* to 4BR × GB*q*; a ſolid deſcribed by the revolution of this figure about its axis A B, moving in a medium from A towards B, is leſs reſiſted than any other circular ſolid of the ſame area, &c.

This theorem, which ſir Iſaac Newton has given without a demonſtration, has been demonſtrated by ſeveral mathematicians, as Fatio, Craig, M. D'Hoſpital, Bernoulli, &c. See Dr. Horſley's edition of Newton, vol. ii. page 390, and Maclaurin's Fluxions, ſect. 606 and 607.

Resistance *of a globe* perfectly hard, and in a medium whoſe particles are ſo too, is to the force wherewith the whole motion may either be deſtroyed, or generated, which it has at the time when it has deſcribed four thirds of its diameter, as the denſity of the medium to the denſity of the globe. Hence, alſo, ſir Iſaac Newton infers, that the *reſiſtance* of a globe is, *cæteris paribus*, in a duplicate ratio of its velocity. Or its *reſiſtance*, is, *cæteris paribus*, in a duplicate ratio of its diameter; or, *cæteris paribus*, as the denſity of the medium. Laſtly, that the actual *reſiſtance* of a globe is in a ratio compounded of the duplicate ratio of the velocity, and of the duplicate ratio of the diameter, and of the ratio of the denſity of the medium.

In theſe articles the medium is ſuppoſed to be diſcontinuous, as air probably is; if the medium be continuous, as water, mercury, &c. where the globe does not ſtrike immediately on all the particles of the fluid generating the *reſiſtance*, but only on thoſe next it, and thoſe again on others, &c. the *reſiſtance* will be leſs by half: and a globe in ſuch a medium undergoes a *reſiſtance* which is to the force wherewith the whole motion it has after deſcribing eight thirds of its diameter, might be generated, or taken away, as the denſity of the medium to the denſity of the globe.

Resistance *of a cylinder*, moving in the direction of its axis, is not altered by any augmentation or diminution of its length; and therefore is the ſame with that of a circle of the ſame diameter, moving with the ſame velocity in a right line perpendicular to its plane.

The *reſiſtance* of a cylinder, moving in an infinite unelaſtic fluid, ariſing from the magnitude of a tranſverſe ſection, is to the force wherewith its whole motion, while it deſcribes four times its length, may be taken away, or generated, as the denſity of the medium to that of the cylinder, very nearly.

Hence, the *reſiſtances* of cylinders moving length-wiſe, in infinitely continued mediums, are in a ratio compounded of the duplicate ratio of their diameters, the duplicate ratio of their velocities, and the ratio of the denſity of the mediums.

The *reſiſtance* of a globe, in an infinite unelaſtic medium, is to the force whereby its whole motion, while it deſcribes eight thirds of its diameter, might be either generated, or taken away, as the denſity of the fluid to the denſity of the globe, *quam proximè.*

Mr. James Bernoulli demonſtrates the following theorems, Acta Erud. Lipſ. for June 1693, p. 252, &c.

Resistance *of a triangle.* If an iſoſceles triangle be moved in a fluid according to the direction of a line perpendicular to its baſe; firſt, with the vertex foremoſt, and then with its baſe; the *reſiſtances* will be in the duplicate ratio of the baſe, and of the ſum of the legs.

Resistance, *the, of a ſquare*, moved according to the direction of its ſide, is, to the *reſiſtance* of the ſame ſquare, moved with the ſame celerity in the direction of its diagonal, as the diagonal is to the ſide.

Resistance, *the, of a circular ſegment*, leſs than a ſemicircle, carried in a direction perpendicular to its baſis, when it goes with the baſe foremoſt, and when with its vertex foremoſt (the ſame direction and celerity continuing), is as the ſquare of the ſame diameter to the ſame, leſs $\frac{1}{3}$ of the ſquare of the baſe of the ſegment. Hence, the *reſiſtances* of a ſemicircle, when its baſe and when its vertex go foremoſt, are to one another in a ſeſquialterate ratio.

Resistance *of a parabola.* A parabola moving in the direction of its axis, firſt with its baſis, and then its vertex, foremoſt, has its *reſiſtances* as the tangent to an arc of a circle, whoſe diameter is equal to the parameter, and the tangent equal to half the baſis of the parabola.

Resistances, *the, of an hyperbola and ellipſis*, when the vertex and baſe go foremoſt, may be thus computed.—Say, as the ſum (or difference) of the tranſverſe axis and latus rectum is to the tranſverſe axis, ſo is the ſquare of the latus rectum to the ſquare of the diameter of a certain circle; in which circle apply a tangent, equal to half the baſis of the hyperbola or ellipſis. Then ſay again, As the ſum (or difference) of the axis and parameter is to the parameter, ſo is the aforeſaid tangent to another right line. And farther, as the ſum (or difference) of the axis and parameter is to the axis, ſo is the circular arc correſponding to the aforeſaid tangent to another arc.—This done, the *reſiſtances* will be as the tangent to the ſum (or difference) of the right line thus found, and the arc laſt mentioned.

In the general, the *reſiſtances* of any figure whatever, going now with its baſe foremoſt, and then with its vertex, are as the figures of the baſe to the ſum of all the cubes of the elements of the baſe, divided by the ſquares of the elements of the curve line.

All which rules may be of uſe in the conſtruction of ſhips, and in perfecting the art of navigation univerſally; as alſo for determining the figures of the balls of pendulums for clocks, &c.

Non-**Resistance**, in *Politics.* See Passive *obedience.*

RESOLUTION, *reſolutio*, or *ſolutio*, in *Phyſics*, the reduction of a body into its original or natural ſtate, by a diſſolution or ſeparation of its aggregated parts.

Thus ſnow and ice are ſaid to be reſolved into water; and a compound is reſolved into its ingredients, &c. water reſolves into vapour by heat; and vapour is again reſolved into water by cold.

Some of the modern philoſophers, particularly Mr. Boyle, M. Mariotte, Boerhaave, &c. maintain, that the natural ſtate of water is to be congealed, or in ice; inaſmuch as a certain degree of heat, which is a foreign and violent agent, is required to make it fluid: ſo that near the pole, where this foreign force is wanting, it conſtantly retains its fixed or icy ſtate. On this principle, the *reſolution* of ice into water, muſt be allowed an improper expreſſion.

Resolution, in *Chemiſtry*, is the reduction of a maſs, or mixed body, into its component parts, or firſt principles, by a proper analyſis.

The *reſolution* of bodies is performed variouſly; by diſtillation, ſublimation, diſſolution, fermentation, &c. See each operation under its proper article. See alſo Dissolution and Solution.

Resolution, in *Ethics*, is that paſſion which encounters difficulties and dangers; but when it has to do more peculiarly with dangers, it is called boldneſs. Deſire, joy, and ſorrow, enter into its conſtitution; but joy is much the principal ingredient. When *reſolution* degenerates into a concern to maintain our miſtakes, humours, or vices, it is more properly denominated obſtinacy. See Passions.

Resolution, in *Logic*, is a branch of method, called alſo analysis.

The buſineſs of *reſolution* is to inveſtigate or examine the truth or falſhood of a propoſition, by aſcending from ſome particular known truth, as a principle, by a chain of conſequences, to another more general one in queſtion. *Reſolution*, or the analytic method, ſtands in direct oppoſition to *compoſition*, or the ſynthetic method; in which laſt we deſcend from ſome general known truths to a particular one in queſtion.

For an inſtance of the method of *reſolution*; ſuppoſe the queſtion this: Whether, on the ſuppoſition of man's exiſtence, we can prove that God exiſts?

To reſolve this, our method is thus: "Mankind did not always exiſt. It is evident, from a thouſand conſiderations, the ſpecies had a beginning; and that, according to all hiſtory, not ſix thouſand years ago; but if it had a beginning, there muſt be ſome cauſe of its beginning; ſomething to induce it to exiſt then more than it did before; in effect, there muſt be a cauſe or author of its exiſtence; for from nothing, nothing ariſes: this cauſe, whatever it is, muſt at leaſt have all the faculties we find in ourſelves; for none can give more than he has: nay, he muſt have others, which we have not, ſince he could do what we cannot do, i. e. create, make man exiſt, &c. Now, this cauſe either exiſts ſtill, or has ceaſed to do ſo: if the former, he did not exiſt from eternity; for what is from eternity is neceſſary, and can neither by itſelf nor any other cauſe be reduced to nothing: if the latter, it muſt have been produced from ſome other; and then the ſame queſtion will return upon the producer. There is then ſome firſt cauſe, and this cauſe has all the properties and faculties we have; nay more, has exiſted from eternity, &c. Therefore, from the ſuppoſition of man's exiſtence, it follows there is a God.

Resolution, or **Solution**, in *Mathematics*, is an orderly enumeration of ſeveral things to be done, to obtain what is required in a problem.

Wolfius makes a problem to conſiſt of three parts. The *propoſition* (which is what we properly call the *problem)*, the *reſolution*, and the *demonſtration*.

The general tenor of all problems is, thoſe things being done which are injoined by the *reſolution*, the thing is done which was to be done.

As ſoon as a problem is demonſtrated, it is converted into a theorem; whereof the *reſolution* is the hypotheſis; and the propoſition the theſis.

The proceſs of a mathematical *reſolution*, ſee in the following article.

Resolution, in *Algebra*, or *algebraical*, is of two kinds; the one practiſed in numerical problems, the other in geometrical ones.

To reſolve a given numerical problem algebraically, the method is thus. 1. Diſtinguiſh the given quantities from the quantities ſought; and note the former with the firſt letters of the alphabet, and the latter with the laſt.

2. Find as many equations as there are unknown quantities: if that cannot be, the problem is indeterminate; and one or more of the ſought quantities may be aſſumed at pleaſure. The equations, unleſs they be contained in the problem itſelf, are found by theorems relating to the equality of quantities.

3. Since, in an equation, the unknown quantities are mixed with the known; it muſt be reduced, in ſuch manner as that only one unknown quantity be found on one ſide, and none but known quantities on the other. This reduction is performed by adding the ſubtracted quantities, dividing the multiplied quantities, and multiplying the divided ones, extracting the roots out of powers, raiſing roots to their powers, &c. ſo as that the equality may be ſtill preſerved. See Reduction *of equations*.

To reſolve a geometrical problem algebraically. The proceſs in the former article is to be obſerved throughout; but as it rarely happens we come at an equation in geometrical problems by the ſame means as in numerical ones, there are ſome farther things to be noted: 1ſt then, ſuppoſe the thing done, which was propoſed to be done. 2. Examine the relations of all the lines in the diagram, without any regard to known or unknown, in order to find which depends on which; and from which being had, what others are had, whether by ſimilar triangles, or rectangles, &c. 3. To obtain the ſimilar triangles or rectangles, the lines are to be frequently produced, till they become either directly or indirectly equal to given ones, or interſect others, &c. Parallels and perpendiculars to be frequently drawn: points to be frequently connected; and angles to be made equal to others. If thus you do not arrive at a neat equation, examine the relation of the lines in another manner. Sometimes it is not enough to ſeek the thing directly, but another thing muſt be ſought, whence the firſt may be found.

The equation being reduced, the geometrical conſtruction is to be deduced therefrom, which is done in various manners in the various kinds of equations.

Resolution, *problematical*. See Problematical.

Resolution, in *Medicine*, that coction, or alteration of the crude, peccant matter of any diſeaſe, either by the natural ſtrength of the patient, or of its own accord, or by the application of remedies, whereby its bulk, figure, coheſion, &c. are ſo far changed, as that it ceaſes to be morbid, and becomes laudable.

This, the learned Boerhaave obſerves, is of all others the moſt perfect cure, where it is effected without any evacuation; as ſuppoſing the matter favourable, the conſtitution excellent, and the medicines good. See Inflammation.

Resolution *of motion*. See Motion.

Resolution, in *Muſic*, is when a canon or perpetual fugue is not written all on the ſame line, or in one part; but all the voices that are to follow the guida, or firſt voice, are written ſeparately, either in ſcore, i. e. in ſeparate lines, or ſeparate parts, with the pauſes each is to obſerve, in the beginning, and in the tone proper to each.

RESONANCE, **Resounding**, in *Muſic*, &c. a ſound returned by the air incloſed in the bodies of ſtringed-muſical inſtruments; as lutes, &c. or even in the bodies of wind inſtruments, as flutes, &c.

Elliptic and parabolic vaults reſound ſtrongly, i. e. they ſtrongly reflect or return the ſound. See Echo.

The mouth, and the parts thereof, as the palate, tongue, teeth, noſe, and lips, Monſ. Dodart obſerves, contribute nothing to the tone of the voice; but their effect is very great as to the *reſonance*.

Of this we have a very ſenſible inſtance in that vulgar inſtrument called *Jews-harp*, or *trompe de Bearn*: for if you hold it in your hand, and ſtrike the tongue or ſpring thereof, which yields all the ſound of the inſtrument, it ſcarce makes any noiſe at all; but, holding the body of the inſtrument between the teeth, and ſtriking the ſpring as before, it makes a muſical buzz, which is heard to a good diſtance, and eſpecially in the lower notes.

So alſo in the hautboys, the tone of the reed is always the ſame; being a ſort of drone: the chief variety is in the tone of the *reſonance*, produced in the mouth by the greater or leſs aperture, and the divers motions of the lips.

RESOLVENTS, *reſolventia*, in *Medicine*, remedies proper to reſolve and diſſipate tumors and gatherings, to ſoften indurations, and, by their tenuity and warmth, evacuate redundant or peccant humours through the pores.

Under this claſs come various unguents, emplaſters, &c.

RESORT. See Ressort.

RESPECTU *computi vicecomitis habendo*, a writ for the reſpiting a ſheriff's accompt, upon juſt occaſion, directed to the treaſurer and barons of the exchequer.

RESPECTUANDO *homagio*. See Homagio.

RESPIRATION, *reſpiratio*, the act of reſpiring, or breathing the air.

Reſpiration is an involuntary motion of the breaſt, whereby the air is alternately taken in and thrown out: it therefore includes two contrary motions, the one called *inſpiration*, whereby the fluid is received into the cavity of the lungs; the other, *expiration*, whereby it is again expelled.

The principal organs of *reſpiration* are the lungs, trachea, larynx, &c. the deſcriptions whereof ſee under Larynx, Lungs, and Trachea.

For the manner whereby Respiration *is performed.* It is to be obſerved, that the lungs, when ſuſpended in the open air, by the contractive power of the muſcular fibres, which tie together the ſquamous parts of the bronchia, are reduced to leſs ſpace than they poſſeſſed while in the cavity of the thorax: and when thus contracted, if a quantity of new air be injected through the glottis, they again become diſtended, ſo as to poſſeſs an equal, nay a greater ſpace than that aſſigned them in the thorax.

Hence it appears, that the lungs, by their proper force, are always endeavouring to contract themſelves into leſs compaſs than they poſſeſs when incloſed in the thorax; and that therefore they are always in a ſtate of violent dilatation while the man lives. For the air that encompaſſes them in the thorax, ſhut up between their external membrane and the pleura, is not of equal denſity with common air.

In effect, the ingreſs of the air, through the glottis, into the lungs, is always free, but that on the outſide, wherewith they are compreſſed, is impeded by the diaphragm, ſo as it cannot enter the thorax in quantity ſufficient to make an equilibrium.

Since, then, in inſpiration, the air enters the lungs in greater quantity than it was before, it will dilate them more, and will overcome their natural force. The lungs therefore are wholly paſſive in the matter: what it is that acts muſt be learnt from the phenomena.

1. It is obſerved that in inſpiration, the nine upper ribs, articulated to the vertebræ and the ſternum, riſe archwiſe towards the clavicles; and the three lower are turned downwards; and the eighth, ninth, and tenth, are drawn inwards.

2. That the abdomen is dilated. And,

3. The thorax inlarged.

4. The diaphragm is brought from its convex and ſinuous poſition to a flat figure.

Now, as theſe are the only viſible actions in inſpiration, the cauſe of the operation muſt be referred to them, or rather to the muſcles of theſe parts, which are the intercoſtals, the ſubclavian, &c.

The capacity of the thorax being inlarged by the action of theſe muſcles on the ribs, &c. a ſpace is left between the pleura and the ſurface of the lungs; ſo that the air, entering the glottis, inflates them till ſuch time as they become contiguous to the pleura and diaphragm. In this caſe, now, the air preſſes the lungs as much as the thorax reſiſts them. And hence the lungs become at reſt; the blood paſſes leſs freely, and is forced in leſs quantity into the left ventricle of the heart; and ſo leſs comes into the cerebellum, and its nerves; and the arterial blood acts leſs on the intercoſtal muſcles and diaphragm. The cauſes, therefore, which at firſt dilated the thorax, grow weaker; conſequently, the ribs become depreſſed; the diſtended fibres of the muſcles of the abdomen reſtore themſelves; the viſcera thruſt the diaphragm up again into the thorax; the ſpace whereof being thus contracted, the air is driven out of the lungs; and thus is expiration performed. Immediately the blood, being quickened in its motion, begins to flow ſtronger, and more plentifully to the cerebellum and muſcles; and thus the cauſes of the contraction of the intercoſtals and diaphragm being renewed, inſpiration is repeated. Such is the true, immediate, adequate manner of vital *reſpiration*.

The alternate motion of the thorax and lungs in *reſpiration* is evident, but it is not eaſy to determine the mechaniſm by which theſe motions are performed.

Dr. Martine thinks this has not been accounted for in a ſatisfactory manner, either by Swammerdam, Borelli, Bellini, Pitcairn, or Boerhaave, and has given us an eſſay on this ſubject in the Medic. Eſſ. Edin. vol. i. art. 12.

According to Swammerdam, thoſe muſcles, which are not exactly balanced by equally ſtrong antagoniſts, muſt neceſſarily be contracted and relaxed by turns; as in the motions of the ventricles and auricles of the heart, of the reſpiratory muſcles, of the antagoniſts of wounded or paralytic muſcles, &c. But he does not attempt to explain the mechaniſm of the alternate contracting and relaxation of the muſcles in ſuch motions.

Borelli accounts for *reſpiration* by merely obſerving, that after it is once begun, the animal, from the good it feels by it, is neceſſarily determined to continue the ſame all its life afterwards; but by what natural mechaniſm this operation is performed, he does not inform us.

Bellini's account is equally vague, who ſays, that, when the muſcles of the breaſt are once contracted, the animal muſt neceſſarily continue to reſpire, as theſe muſcles will be alternately contracted and relaxed.

Dr. Pitcairn tells us, that muſcles without antagoniſts, ſuch as he conceives the inſpiratory muſcles to be, muſt neceſſarily be contracted and relaxed alternately; on account of the alternate influx of the animal ſpirits through the nerves into them, proceeding from the alternate compreſſion of the brain, by the pulſation of its arteries. On this ſuppoſition it ſhould ſeem, that the alternate dilatation and contraction of the thorax ſhould always correſpond, and be iſochronous to the pulſes of the heart and arteries, which is contrary to fact.

Dr. Boerhaave's explication of the alternate motions of *reſpiration* occurs in the preceding part of this article.

To this Dr. Martine objects, not only the diſſonance of the motion of the heart and thorax juſt mentioned, but that it will be difficult to perſuade us, that the diaphragm and intercoſtal muſcles ceaſe to contract for want of a ſufficient ſtore of blood furniſhed to the left ventricle of the heart, and for want of ſpirits furniſhed to the cerebellum and the vital nerves. Would not, upon the ſame account, all the other muſcles, whether voluntary or involuntary, and the brain itſelf, and all the nerves of ſenſe and motion, alternately ſuffer ſome failure at the end of every inſpiration, from the diminiſhed quantity of blood ſupplied to the left ventricle, and thence to the reſt of the body? Is not the beating of the heart and arteries, equally full, ſtrong, and frequent at all the different moments of *reſpiration*? Which plainly ſhews, that, in a ſound ſtate, the heart never wants blood, nor the cerebellum ſpirits, to furniſh the organs that depend upon them: ſo that the inſpiratory muſcles, which are ſuppoſed to be much ſtronger than their antagoniſts, would always remain rigid and contracted, if there were not ſome otheir way provided to ſuſpend alternately the cauſe of their contraction.

According to Dr. Martine, the nerves of the diaphragm, which is allowed to be the chief organ of *reſpiration*, are in a great degree ſubſervient to this operation. Theſe nerves have their chief origin from the middle cervical nerves, and are conveyed by a long courſe, through the cavity of the breaſt, to this muſcular membrane. The preſſure of the external air on the pulmonary veſicles, and on the membrane inveſting the lungs, and incloſing theſe veſicles, is thus propagated (he ſays) to the membrane lining the thorax, called the pleura. But at the end of expiration, when the thorax is collapſed, it will be eaſy to conceive, by conſidering the natural contractility of the membranes and fibres of animals, and the reticulated work of muſcular fibres ſurrounding the lungs, how the contractile pulmonary membranes and fibres will, by their reaction, in ſome meaſure, ſupport the action or preſſure of the inflating air, which, therefore, cannot preſs with its whole force upon the pleura, nor on the phrenic nerves, that are ſlightly covered by it; hence the preſſure of the air on theſe nerves muſt be leſs then upon the other parts of the body, to which it has freer acceſs, at the end of expiration; and, therefore, the liquor of the nerves, or whatever influence is communicated by them, has an eaſier paſſage to the midriff, cauſing that muſcle immediately to contract itſelf; and thus by the enlargement of the thorax, inſpiration commences, and will continue till the thorax has acquired its ordinary enlargement, by the natural and ordinary depreſſion of the diaphragm. But the inſpired air, rarefied by heat, and not finding a free exit, by the narrow ſlit of the glottis, will every way preſs the veſicles of the lungs, and this preſſure will be at length propagated to the pleura and phrenic nerves: on this account their influence muſt ceaſe, and the diaphragm be relaxed; and expiration muſt ſucceed by the ſpontaneous reſtitution of the overſtretched peritoneum and abdominal muſcles, compreſſing their contained viſcera, and puſhing the midriff into the thorax, and thus ſqueezing the lungs. Thus does Dr. Martine endeavour to account for ſucceſſive inſpiration and expiration, as they depend on the alternate dilatation and compreſſion of the lungs, and theſe again on the alternate contraction and relaxation of the midriff.

Dr. Hoadley, in his lectures on *reſpiration*, endeavours to prove, that the external intercoſtal muſcles ſerve for inſpiration, while the internal intercoſtals are their antagoniſts, depreſſing their ribs in expiration. He thinks it proved by Dr. Hales's experiments, that there is air in the cavity of the thorax, between the lungs and the pleura, and endeavours to take off the force of Dr. Houſton's aſſertion, that he ſaw the lungs and pleura contiguous. He grants, however, that ſometimes there may be little or no air. He accounts for *reſpiration* much in the ſame way with thoſe who aſſume the contiguity of the lungs and pleura. He joins with thoſe who think the impetus, which the internal ſurface of the lungs ſuſtains in common *reſpiration*, to be very little. He ſubjoins the picture and deſcription of an ingenious inſtrument for illuſtrating the manner in which *reſpiration* is performed.

As to the uſes and effects of *reſpiration*, they are greatly diſputed among anatomiſts. Hippocrates reckoned air among the aliments of the body; but the ancients more generally believed, that, as there was a kind of vital fire kept up in the heart, the heat of the blood was tempered in the lungs. To this purpoſe Galen ſuppoſed, that the chief uſe of this organ was to carry off ſuch vapours, as were equivalent to ſmoak thrown off from that fire; and Carteſius alſo maintains, that air was neceſſary for cooling and condenſing the blood.

Other authors, as Sylvius, Etmuller, &c. take a great uſe of *reſpiration* to be, by the neighbourhood of the cold nitrous air, to cool the blood, coming reeking hot out of the right ventricle of the heart, through the lungs, and to act as a refrigeratory.

Mayow, and others, aſſert one grand uſe of expiration to be, to throw off the fuliginous vapours of the blood along with the expelled air; and for inſpiration, he aſſerts, that it conveys a nitro-aerial ferment to the blood, to which the animal ſpirits, and all muſcular motion, are owing.

The learned Boerhaave takes the principal uſes of *reſpiration* to be the farther preparation of the chyle, its more accurate mixture with the blood, and its converſion into a nutritious juice, proper to repair the decays of body.

Borelli takes the great uſe of *reſpiration* to be the admiſſion and mixture of air with the blood in the lungs, in order to form thoſe elaſtic globules it conſiſts of; to give it its red florid colour, and to prepare it for many of the uſes of the œconomy. Some ſuppoſed that the effect of the admiſſion of this air into the blood is a fermentation; others ſuppoſe, that it acts by its ſpring preventing the too cloſe contact of the globules, and thereby preſerving its fluidity, inteſtine motion, and heat.—Van Helmont aſcribed the volatility of the fixed elements in the food to this air; and Stevenſon thought, that the air, which had circulated in the blood, and which had too much heated the blood, was exhaled by the lungs. Others again ſay, that a vital ſpirit is ſeparated from the air, and paſſes from the lungs to the heart and arteries, and at length becomes the animal ſpirits, which are by this means generated from the air.

Malpighius ſuppoſes this vital principle to be a ſaline vapour; Liſter, a hot, inflammable, ſulphureous ſpirit; Vieuſſens, a volatile ſalt, which keeps up the fermentation of the blood; and Bryan Robinſon, the aerial acid, which preſerves the blood from putrefaction, maintains its denſity, and ſtrengthens the animal fibres. They who ſuppoſe that nitre is taken from the air into the blood, aſcribe to that principal its fermentation, heat, and denſity.

Dr. Thurſton maintains the principal uſe of *reſpiration* to be to move or paſs the blood from the right to the left ventricle of the heart, and ſo to effect the circulation.

Whence it is, that perſons hanged, drowned, or ſtrangled, ſo ſuddenly die; viz. becauſe the circulation of the blood is ſtopped; and for the ſame reaſon it is, that animals die ſo ſpeedily in the air pump.

He inſtances an experiment, made by Dr. Croon, before the Royal Society, who, after ſtrangling a pullet, ſo as not the leaſt ſign of life appeared, yet by blowing into the lungs through the trachea, and ſo ſetting the lungs a-playing, brought the bird to life again. Another experiment of the ſame kind is, that of Dr. Hook, who, after hanging a dog, cut away the ribs, diaphragm, and pericardium, as alſo the top of the windpipe, that he might tie it on to the noſe of a pair of bellows; and thus, by blowing into the lungs, he reſtored the dog to life; and then ceaſing to blow, the dog would ſoon fall into dying fits, but recover again by blowing, and thus alternately, as long as he pleaſed.

This uſe of *reſpiration* Dr. Drake not only confirms, but carries farther, making it the true cauſe of the diaſtole of the heart; which neither Borelli, Dr. Lower, or Mr. Cowper had well accounted for.

The weight of the incumbent atmoſphere, he ſhews to be the true antagoniſt to all the muſcles, ſerving both for ordinary inſpiration, and the contraction of the heart. As in the elevation of the ribs, that author obſerves, the blood, by the paſſage opened for it, is, in a manner, ſolicited into the lungs; ſo in the depreſſion thereof, by the ſubſidence of the lungs, and the contraction of the blood-veſſels conſequent thereon, the blood is forcibly driven through the pulmonary vein into the left ventricle of the heart; and this, together with the general compreſſion of the body by the weight of the atmoſphere, is that power which cauſes the blood to mount in the veins, after the force impreſſed on it by the heart is ſpent; and which forces the heart itſelf from its natural ſtate of contraction, to that of dilatation.

The uſes of *reſpiration*, according to Dr. Hoadley, are to diſcharge from the venal blood and chyle ſuch parts as are unfit to render them arterial blood, and to admit air into the blood. And from this doctrine he accounts for the phenomena of the diſeaſes of the lungs.

It is a received opinion, that one uſe of the lungs is to attenuate the blood; and Malpighius adds, that, by this means, the different particles of the blood become thoroughly mixed together; while others think that the blood is condenſed in the lungs; and others, that the globules, and all the finer humours, receive their configuration there. Some, without conſidering the air as of any other uſe than to put the lungs in motion, think that heat is produced in the lungs by the attrition of the blood in paſſing through them; to which alſo they have erroneouſly aſcribed the red colour of the blood.

Dr. Whytt thought that there was ſomething of a vital and ſtimulating nature derived from the air into the blood, by means of which it made the heart to contract.

Dr. Hales ſeems at different times to have adopted different opinions concerning the uſe of air in *reſpiration*. He ſuppoſes, that air is rendered alkaline by breathing, and corrected, in ſome meaſure, by the fumes of vinegar. In agreement, as he obſerves, with Boerhaave, he elſewhere ſays, that the blood acquires its warmth chiefly in the lungs, where it moves with much greater rapidity than in any other capillary veſſels of the body; but that one uſe of the air is to cool the blood, and he makes an eſtimate of the degree of this refrigeration. He alſo ſuppoſes, that another great uſe of the lungs is to attenuate and ſeparate the globules of the blood; he adds, that the blood may probably, in the lungs, derive ſome other important influence from the air, which is in ſuch great quantities inſpired into them, exploding, however, in other places, the doctrine of a vivifying ſpirit in the air.

One great deſign of nature, he ſays, in the ſtructure of this important and wonderful viſcus, was to frame the veſſels ſo very minute, as effectually to hinder the ingreſs of groſs, feculent particles, which might be injurious to the animal œconomy. Laſtly, he concludes that the effect of *reſpiration* is to abate, and in part deſtroy the elaſticity of the air. Hales's Statical Eſſays, vol. ii. paſſim.

Haller, after reciting the opinions of all that had gone before him, ſuppoſes, with Dr. Hales, that in conſequence of the air loſing its ſpring in the lungs, they cannot be kept dilated; and, therefore, they muſt collapſe, and the circulation of the blood be impeded. In ſtating his opinion, concerning the uſe of the lungs, more fully, he obſerves, that the true uſe of them is partly inhaling, and partly exhaling; that the lungs inhale both water and air; but that in the lungs the air loſes its elaſtic property, ſo as to be eaſily ſoluble in water or vapour; and he thinks it probable, that this air ſerves as a cement to bind the earthy parts together. He alſo makes no doubt but that various other matters, miſcible with water, are inhaled by the lungs, and he thinks it not improbable, that the air may carry ſome electric virtue along with it. The principal exhalation of the lungs, he thinks, to be water, abounding with oily, volatile, and ſaline principles; and theſe oily and fetid vapours he thinks to be the *fuligines* of Galen and the ancients. Haller's Syſtem of Phyſiology, vol. iii. paſſim.

M. Cigna, of Turin, takes it for granted, that air, which has been once breathed, is unfit for farther *reſpiration*, on no other account than its being loaded with noxious vapours, which diſcover themſelves by a fetid ſmell: and that the elaſticity of air is diminiſhed by *reſpiration*, though he does not conſider that diminution of elaſticity as the cauſe of its noxious quality. He, therefore, concludes, that air, which has been breathed, ſuffocates by means of the irritation which it occaſions to the lungs, by which the bronchia and the lungs themſelves are contracted, ſo as to reſiſt the entrance of the air; and, therefore, that reſpired air is noxious on the ſame account as mephitic vapours, or thoſe of burning brimſtone; that, in frequently breathing the ſame air, it becomes ſo loaded with theſe vapours, as to excite a convulſion in the lungs, and thereby render them unfit for tranſmitting the blood. He ſuppoſes that air enters the pores of the blood, retaining its elaſtic power; and that it continues at reſt there, becauſe its endeavour to eſcape is counteracted by the equal preſſure of the ambient medium. This air, he ſuppoſes, to be introduced into the blood by chyle, and never by the way of the lungs, except when, by ſome means or other, the equilibrium, between the air and the blood, and the external air, is loſt. If the external air be rarer than the internal, the air in the blood, expanding itſelf will inflate the animal, and have the ſame effect as air introduced into the veins. To the contact of air with the blood he aſcribes its florid colour; an hypotheſis which has ſince been ſatisfactorily aſcertained and eſtabliſhed by the experiments of Dr. Prieſtley. See *Analyſis of the* BLOOD.

Upon the whole, M. Cigna concludes, that the principal uſe of air to the blood is to preſerve the equilibrium with the external air, and to prevent the veſſels from being rendered unfit to tranſmit the blood, on account of the external preſſure; whereas, by means of the air they contain, the fluids move in their proper veſſels as freely as in *vacuo*, and the membranes and viſcera alſo eaſily ſlide over one another. And with reſpect to the uſe of the lungs, ſince he imagined that air is not introduced into the blood by means of them, he thinks, that becauſe ſuch lungs as thoſe of man are given to the warmer animals only, the chief uſe of *reſpiration* is exhalation, and conſequently the cooling of the blood. Miſcel. Taurin. vol. v. p. 30, &c.

Such are the various and diſcordant opinions, that have prevailed, with reſpect to the uſe of *reſpiration*. It is evident, that without breathing moſt animals would preſently die; and it is alſo well known, that the ſame air will not long anſwer the purpoſe; for if it has been frequently reſpired, the breathing of it is as fatal as the total deprivation of air. But by what property it is, that air contributes to the ſupport of animal life, and why air that has been much breathed will no more anſwer the purpoſe, ſeems not to have been diſcovered by any of the numerous philoſophers and phyſicians who have profeſſedly written upon the ſubject. For this curious and important diſcovery we are indebted to the penetrating genius and indefatigable application of Dr. Prieſtley, who, in purſuing his ſucceſsful reſearches into the properties of different kinds of air, had occaſion repeatedly to obſerve, that *reſpiration* is a phlogiſtic proceſs, affecting air in the ſame manner as every other phlogiſtic proceſs (viz. putrefaction, the efferveſcence of iron filings and brimſtone, or the calcination of metals, &c.) affects it; diminiſhing the quantity of it in a certain proportion, leſſening its ſpecific gravity, and rendering it unfit for *reſpiration* or inflammation, but leaving it in a ſtate capable of being reſtored to a tolerable degree of purity, by agitation in water, &c. See AIR, AIR *fixable*, AIR *phlogiſticated*, &c.

Having diſcovered this, he concluded, that the uſe of the lungs is to carry off a putrid effluvium, or to diſcharge that phlogiſton, which had been taken into the ſyſtem with the aliment, and was become, as it were, effete; the air that is reſpired ſerving as a menſtruum for that purpoſe. This general concluſion he afterwards more directly demonſtrated in a ſeries of experiments by which he proved, that this proceſs was effected by means of the blood, in conſequence of its coming ſo nearly into contact with the air in the lungs; the blood appearing to be a fluid wonderfully formed for imbibing and parting with that principle which the chemiſts call PHLOGISTON, and changing its colour in conſequence of being charged with it, or being freed from it; and affecting air in the very ſame manner, both out of the body and in the lungs; and even notwithſtanding the interpoſition of various ſubſtances, which prevent its coming into immediate contact with the air.

Philoſ. Tranſ. vol. lxvi. pt. i. p. 226, &c. or Obſ. and Exp. on Air, vol. iii. p. 55, &c. See BLOOD.

The reciprocal dilatation and contraction of the ſuperficial dimenſions of the body conſequent on *reſpiration*, are ſo neceſſary to animal life, that there is no animal ſo imperfect as to want it.

Though moſt kinds of fiſh and inſects want both lungs, and moveable ribs, and conſequently have no dilatable thorax; yet that want is made up to them by an analogous mechaniſm.

Fiſh, for inſtance, have gills, which do the office of lungs; receiving and expelling alternately the water, whereby the blood-veſſels ſuffer the ſame alteration of dimenſions as they do in the lungs of more perfect animals.

Inſects having no thorax, or ſeparate cavity, for the heart and lungs, or air-veſſels, have the latter diſtributed through the whole trunk of their bodies; by which they communicate with the external air through ſeveral ſpiracles, or vent-holes, to which are faſtened ſo many little tracheæ, or wind-pipes, which ſend their branches to all the muſcles and viſcera, and ſeem to accompany the blood-veſſels all over the body, as they do in the lungs only of the more perfect animals. By this diſpoſition, in every inſpiration, the whole body of theſe little animals is inflated, and in every expiration compreſſed; and, conſequently, the blood-veſſels muſt ſuffer a viciſſitude of extenſion and compreſſion.

The only animal exempted from the neceſſity of breathing is a FOETUS; but this, while included in the womb, ſeems to have little more than a vegetative life, and ought ſcarce to be reckoned among the number of animals: it is rather a graft on, or a branch of the mother.

RESPIRATION, *the laws of*, are of the laſt importance to a right underſtanding of the animal œconomy; for which reaſon a computation of the force of the reſpiring organs, and, of the ſtreſs and preſſure of the air upon the ſame, may not be unacceptable. It may therefore be obſerved, that, by blowing into a bladder, a conſiderable weight will be raiſed by the mere force of the breath; for, with a bladder that is oblong, nearly of a cylindrical figure, and tied at both ends, if a pipe be fixed at one end, and a weight at the other, and the pipe faſtened at ſuch a diſtance from the ground, as juſt allows the weight to reſt upon the ground, the bladder, by an eaſy inſpiration, will raiſe ſeven pounds weight, and by the greateſt inſpiration of a pretty ſtrong man, twenty-eight pounds weight. Now, the force by which the air enters this pipe is that force by which it is driven out of the lungs; if therefore the force by which the air enters the pipe can be determined, we ſhall have the force by which the air is driven into the trachea. But the preſſure of air upon the bladder is equal to twice the weight it can raiſe; becauſe the upper part of the bladder being fixed, it reſiſts the force of the air juſt as much as the weight at the other end. And again, ſince the air preſſes every way equally, the whole preſſure will be to that part of it which preſſes on the orifice of the pipe, as the whole ſurface of the bladder is to the orifice of the pipe; that is, as the ſurface of a cylinder, whoſe diameter, for inſtance, is four inches, and axis ſeven, is to the orifice of the pipe.

Thus, if the diameter of the pipe be 0.28, and its orifice 0.616, the ſurface of the cylinder will be 88. Therefore, as 88 : 0.616 : : 14, double the leaſt weight raiſed, to 0.098, which is almoſt two ounces; and, in raiſing the greateſt weight, it is near ſeven ounces.

Theſe, therefore, are the forces by which the air is driven through the trachea in an eaſy and ſtrong inſpiration.— Now, if we conſider the lungs as a bladder, and the larynx as a pipe, the preſſure upon the orifice of the trachea, when the air is driven out, will be to the preſſure upon the lungs as the whole ſurface of the lungs is to the orifice of the trachea.

Suppoſe, e. g. the diameter of the larynx to be 5, the orifice of the larynx will be 0.19; and ſuppoſe the two lobes of the lungs to be two bladders, or ſpheres, whoſe diameters are each ſix inches; their ſurfaces are each 113 inches, and the preſſure on the larynx will be to the preſſure upon the whole external ſurface as 0.19 to 226, which is as 1 to 1189; and, therefore, if the preſſure upon the larynx in an ordinary breathing be two ounces, the preſſure upon the whole external ſurface of the lungs will be 148 pounds; and the utmoſt force, when the preſſure upon the larynx is ſeven ounces, will be equal to 520 pounds. But the lungs are not like an empty bladder, where the air preſſes only upon the ſurface; for they are full of veſicles, upon the ſurface of each of which the air preſſes, as it would upon the ſurface of an empty bladder: and, therefore, to know the whole preſſure of the air, we muſt determine the internal ſurfaces of the lungs. To do this, ſuppoſe that $\frac{1}{3}$ part of the lungs is taken up with the branches of the trachea, that another third part is filled with blood-veſſels, and the remainder to be veſicles, where we ſuppoſe the chief preſſure upon the blood-veſſels to be made: now both lobes of the lungs contain 226 ſolid inches, of which one-third, or 75 inches, is full of veſicles. Let the diameter of each veſicle be $\frac{1}{50}$ part of an inch, the ſurface of a veſicle will be .001256, and the ſolidity .0000043, by which ſum if we divide 75 (the ſpace filled by the veſicles) the quotient gives us 17441860 for the number of veſicles in both lobes of the lungs. This number multiplied by .001256, the ſurface of a veſicle, gives the ſum of the ſurfaces of all the veſicles, to wit, 21906.976 inches. And, therefore, the preſſure upon the larynx will be to the preſſure upon the whole ſurface of the lungs, as 0.19 to 21906.976; and conſequently when in an ordinary expiration the preſſure upon the larynx is two ounces, the preſſure on the whole internal ſurface of the lungs will be 14412 pounds weight; and the utmoſt force of the air in breathing, when the preſſure upon the larynx is ſeven ounces, will be 50443 pounds weight.— Though theſe ſeem to be prodigious weights, yet it muſt ſtill be underſtood, that the preſſure upon each part of the ſurface of the lungs equal to the orifice of the larynx, is not greater than it is at the larynx; and that theſe vaſt weights ariſe from the vaſt extent of the ſurfaces of the veſicles, upon which it was neceſſary that the blood ſhould be ſpread in the ſmalleſt capillary veſſels, that each globule of blood might, as it were, immediately receive the whole force and energy of the air, and by that be broken into ſmaller parts, fit for ſecretion and circulation.

And hence we may learn the mechanical reaſon of the ſtructure of the lungs; for, ſince the whole blood of the body was to paſs through them, in order to receive the effect of the air, and that this could not be unleſs the blood were diffuſed in ſmall capillary veſſels, it was neceſſary, that the ſurfaces upon which they were to be ſpread, ſhould be proportioned to their number: which is admirably well provided for by the wonderful fabric of the lungs.

If the gravity of the air was always the ſame, and if the diameter of the trachea, and the time of every expiration, were equal in all, this weight upon the lungs would be always the ſame. But, ſince we find by the barometer, that there is three inches difference between the greateſt and the leaſt gravity of the air, which is a tenth part of its greateſt gravity; there muſt be, likewiſe, the difference of a tenth part of its preſſure upon the lungs at one time and another: for the momenta of all bodies, moved with the ſame velocity, are as their gravities.

This is a difference which ſuch as are aſthmatic muſt be very ſenſible of; eſpecially if we conſider, that they likewiſe breathe thicker, that is, that every expiration is performed in leſs time; if in half the time, and the ſame quantity of air be drawn in, then the weight of the air upon the lungs muſt be 57648 pounds; of which a tenth part is 5764 pounds; and conſequently aſthmatic people, upon the greateſt riſe or fall of the barometer, feel a difference of the air, equal to above one-third of its preſſure in ordinary breathing.

Again if the trachea be ſmall, and its aperture narrow, the preſſure of the air increaſes in the ſame proportion as if the times of expiration were ſhorter; and therefore a ſhrill voice is always reckoned among the prognoſtic ſigns of a conſumption, inaſmuch as that proceeds from the narrowneſs of the larynx, or trachea; and conſequently increaſes the preſſure of the air upon the lungs, which, upon every expiration, beats the veſſels ſo thin, that at laſt they break, and a ſpitting of blood comes on.

The eſtimate of the capacity and dimenſions of the human lungs above given is calculated by Dr. James Keill (ſee his Tentamina Medico-phyſica, p. 80, &c.); but Dr. Hales apprehends them to be much more capacious than 226 cubic inches; for he calculated the ſurface of the whole lungs of a calf, and found it to be 41635 ſquare inches, or 289 ſquare feet, which is equal to nineteen times the ſurface of a man's body, which, at a medium, is computed to be equal to fifteen ſquare feet. And Dr. Jurin, by an accurate experiment, found that he breathed out, at one large expiration, 220 cubic inches of air, with which his own experiments agreed: and there muſt be a large allowance made for the bulk of the remaining air, which could not be expired from the lungs, and alſo for the ſubſtance of the lungs. Suppoſing then, that, according to Dr. Jurin's eſtimate (in Motte's Abridgement of the Phil. Tranſ. vol. i. p. 415,) we draw in, at each common inſpiration, 40 cubic inches of air; that will be 48000 cubic inches in an hour, at the rate of 20 inſpirations in a minute. Dr. Hales made ſeveral experiments, with a view of determining the effect of *reſpiration* on air; and, in one of theſe, he found that near two gallons of air being breathed to and fro for two minutes and a half, became thereby unfit for reſpiration. Dr. Prieſtley (Experiments and Ob. vol. v. p. 117.) by a more accurate method of inveſtigation found, that the quantity of air which he could completely phlogiſticate by the reſpiration of two minutes, amounted to about a quart in a minute; whereas it is generally ſuppoſed, that we phlogiſticate, or as it has uſually been termed, that we conſume a gallon of air in a minute: and if by conſuming be meant reducing the air to a ſtate in which a candle will not burn in it, the eſtimate will be pretty near the truth.

With regard to the quantity of moiſture carried off by *reſpiration*, Dr. Hales, by an experiment on wood-aſhes, eſtimates it to be equal to 17 grains in 50 expirations; and this he takes to be nearly the quantity of moiſture with which 522 cubic inches of air are impregnated, when it becomes unfit for *reſpiration*; ſince we breathe 50 times in $2\frac{1}{2}$ minutes. And ſince a quantity of moiſture equal to 17 grains, was breathed off in 50 expirations, he concludes, that there will be proportionably 408 grains evaporated in the 1200 expirations of an hour, and in 24 hours 9792 grains, or 1.39 pound; which, ſuppoſing the ſurface of the lungs to be 41635 inches, will give the quantity evaporated from that ſurface $\frac{1}{1074}$ part of an inch depth. Hales's Stat. Eſſ. vol. i. p. 262, &c. vol. ii. p. 322, &c.

RESPITE, *reſpectus*, in *Law*, &c. a delay, forbearance, or prolongation of time, granted any one for the payment of a debt, or the like.

Menage derives the word *reſpite* from the Latin *reſpectus*; as *deſpite* from *deſpectus*. Du-Cange will rather have it come from *reſpirare*, *to breathe*; *reſpite* being, in effect, a breathing-while, granted a debtor, &c.

In the cuſtomary of Normandy, *reſpite* is a judicial delay or demur given to procedures.

Respite, *letters of*, or Credit. See Letters.

Respite *of homage* is a forbearance of the homage, due from the vaſſal, or tenant, holding by homage, or by knight-ſervice, to his lord.

Anciently, thoſe who held by theſe tenures paid a ſmall ſum every fifth year into the exchequer, to be reſpited doing their homage or ſervice.

By ſtat. 12 Car. II. this *reſpite* of homage is taken away, as a charge ariſing from knight-ſervice; which is thereby likewiſe annulled.

Respite *of execution*. See Reprieve.

Respite *of jury*. See Jury.

RESPOND, in *Eccleſiaſtical Hiſtory*, was a ſhort anthem ſung after reading three or four verſes of a chapter: after which they proceeded with the chapter.

RESPONDEAS *ouſter*, in *Law*, is to anſwer over in an action to the merits of the cauſe: or put in a more ſubſtantial plea.

RESPONDEAT *ſuperior*, a *Law* phraſe. Where the ſheriffs are removeable, as in London, for inſufficiency; *reſpondeat ſuperior*, that is, the mayor and commonalty are to anſwer for them.

For the inſufficiency of a bailiff of a franchiſe, *reſpondeat ſuperior*, that is, the lord of the franchiſe is to anſwer.

RESPONDENT, *reſpondens*, in the ſchools, a perſon who maintains a theſis in any art or ſcience.

He is thus called, as being to anſwer all objections propoſed by the opponent, or impugner, &c.

The *reſpondent*'s buſineſs is to ſee whether the oppoſition made by the contrary party be juſt and legitimate; or whether ſome of the laws and conditions of oppoſition be not broken; which is called *ignoratio elenchi*. He is alſo to examine the moods and figures of the ſyllogiſms, to ſee whether the premiſes be juſt, &c. and through the whole to anſwer rather by diſtinguo's, than by direct negation.

Respondent, formed from the Latin *reſpondere*, *to anſwer*, q. d. *pro alio ſpondere*, *to promiſe for another*, in *Law*, a perſon who undertakes to anſwer for another; or binds himſelf as ſecurity for the good behaviour of another.

The *reſpondent* is to anſwer for the damages done by the perſon for whom he reſponds. There are four ordonnances of the kings of France, whereby the citizens are expreſly forbid to take ſervants without *reſpondents*, bound in writing.

RESPONDENTIA, in *Commerce*, a term applied to money which is borrowed, not upon the veſſel, as in BOTTOMRY, but upon the goods and merchandize contained in it, which muſt neceſſarily be ſold or exchanged, in the courſe of a voyage; in which caſe the borrower, perſonally, is bound to anſwer the contract; and he is ſaid to take up money at *reſpondentia*.

It is enacted, by ſtat. 19 Geo. II. cap. 37. that all monies, lent on bottomry, or *reſpondentia*, on veſſels bound to or from the Eaſt Indies, ſhall be expreſsly lent only upon the ſhip, or upon the merchandize; that the lender ſhall have the benefit of ſalvage; and that, if the borrower has not on board effects to the value of the ſum borrowed, he ſhall be reſponſible to the lender for ſo much of the principal as hath not been laid out, with legal intereſt and all other charges, though the ſhip and merchandize be totally loſt.

RESPONSA *prudentum*. See Civil *law*.

RESPONSALIS, in *Law*, he who appears for another in court, at a day aſſigned.

Fleta makes this difference between *reſponſalis atturnatus*, and *eſſoniator*, that the *eſſoniator* came only to allege the cauſe of the party's abſence, be he demandant or tenant; whereas *reſponſalis* came for the tenant not only to excuſe his abſence, but to ſignify what trial he means to undergo, the combat, or the country.

RESPONSARY *ſong*, an anthem in which the choriſters ſing by turns.

RESPONSE, Responsal, *reſponſatio*, an anſwer, reply, or repartee.

The word is chiefly uſed in ſpeaking of the anſwers made to the prieſt, by the people, in the litany, the pſalms, and other parts of the office.

It has its uſe, too, in ſpeaking of the opinions or anſwers of the ancient juriſconſulti, when conſulted on points of law.

The fifty books of the *Digeſt* are compoſed of *reſponſa prudentum*, the *reſponſes* of Papinian, Ulpian, Scævola, &c. collected by Juſtinian; who afterwards gave them the force of laws. See Civil *law*.

The *reſponſes* of the emperors were more properly called *reſcripts*.

RESPONSIONS, *reſponſiones*, a term uſed in the *Military Orders*, for certain penſions, or charges, which the knights, or the commandries they held, paid to the order.

Such a knight Templar paid a *reſponſion* of fifty pounds per annum to his order, on account of ſuch a COMMANDRY.

In Rot. parl. 9 Ric. II. the word is written *reſponcies*.

RESSAULT, in *Architecture*, the effect of a body which either projects, or falls back, i. e. ſtands either more out or in than another; ſo as to be out of the line, or range, therewith.

The term *reſſault* is French, and but little uſed in Engliſh; though the want of a word of equal import pleads for its naturalization.

RESSELA, a term uſed by Paracelſus to ſignify, as himſelf explains it, any thing that expels heat, in oppoſition to *aſſa*, which with him ſignifies any thing that promotes it.

RESSORT, or Resort, a term purely French, yet frequently uſed, by our late writers, to ſignify the juriſdiction or authority of a court.

The word, in its popular meaning, ſignifies *ſpring*, or the force of elaſticity. Hence it is alſo uſed for a juriſdiction, and the extent or diſtrict thereof; as when we ſay, ſuch a thing belongs to his *reſſort*; a judge out of his *reſſort* has no authority. But its chief uſe among us is in ſpeaking of a court or tribunal, where appeals are judged; or of a court or perſon who judges finally and ultimately, and whence there is no appeal.

The houſe of lords judge in the laſt *reſſort*, *en dernier reſſort*. Preſidials judge in the laſt *reſſort* of all criminals proſecuted by the provoſts of the marſhals. See Dernier *reſſort*.

Ressort, or Resort, is alſo uſed in a writ of ayel, or couſenage, in the ſame ſenſe as *deſcent*, in a writ of right.

RESSOURCE, or Resource, a term purely French, yet uſed by Engliſh writers, to denote a means or foundation of a man's recovering himſelf from his fall or ruin; or an after-game for the repairing his damages.

Skinner derives the word from the French *reſoudre*, *to reſolve*. A *reſource* ſtrictly and literally expreſſes a means which preſents itſelf afreſh.

This merchant has credit and friends ſtill left; he has great *reſources*.

REST, *quies*, in *Phyſics*, the continuance of a body in the ſame place; or its continual application or contiguity to the ſame parts of the ambient and contiguous bodies.—See Space.

Reſt is either *abſolute* or *relative*, as PLACE is.

Some define *reſt* the ſtate of a thing without motion; and hence again *reſt* becomes either abſolute or relative, as motion is.

Sir Iſaac Newton defines true or abſolute *reſt* to be the continuance of a body in the ſame part of abſolute and immoveable ſpace; and relative *reſt* to be the continuance of a body in the ſame part of relative ſpace.

Thus, in a ſhip under ſail, relative *reſt* is the continuance of a body in the ſame region of the ſhip, or the ſame part of its cavity. True or abſolute *reſt* is its continuance in the ſame part of univerſal ſpace, wherein the ſhip, with its cavity and contents are all contained.

Hence, if the earth be really and abſolutely at *reſt*, the body relatively at *reſt* in the ſhip will really and abſolutely move, and that with the velocity wherewith the veſſel moves. But if the earth do likewiſe move, there will then ariſe a real and abſolute motion of the body at *reſt*; partly from the real motion of the earth in abſolute ſpace, and partly from the relative motion of the ſhip on the ſea. Laſtly, if the body be likewiſe relatively moved in the ſhip, its real motion will ariſe partly from the real motion of the earth in immoveable ſpace, and partly from the relative motion of the ſhip on the ſea, and of the body in the ſhip.

Thus, if that part of the earth, where the ſhip is, move eaſtward with a velocity of 10010 parts, and the veſſel be carried by the wind weſtward ten parts, and, at the ſame time, a ſeaman aboard walk with the velocity of one part, the ſeaman will be moved really and abſolutely in immoveable ſpace eaſtwards, with 10001 parts of velocity; and relatively on the earth, with nine parts of velocity weſtwards.

It is an axiom in philoſophy, that matter is indifferent as to *reſt* or motion. Hence ſir Iſaac Newton lays it down, as a *law* of NATURE, that every body perſeveres in its ſtate, either of *reſt* or uniform motion, except ſo far as it is diſturbed by external cauſes.

The Carteſians will have firmneſs, hardneſs, or ſolidity of bodies to conſiſt in this, that their parts are at *reſt* with regard to each other; and this *reſt* they eſtabliſh as the great nexus, or principle of coheſion, whereby the parts are connected together.

Fluidity, they add, conſiſts in a perpetual motion of the parts, &c. But the Newtonian philoſophy furniſhes us with much better ſolutions. See SOLIDITY, FLUIDITY, and COHESION.

Monſieur de Maupertuis aſſerts that when bodies are in equilibrio, they muſt be ſo ſituated, that, if any ſmall motion be impreſſed on them, the quantity of action reſulting will be the leaſt poſſible. This he calls the law of *reſt*, and from this law he deduces the fundamental propoſition of ſtatics. See Mem. de l'Acad. de Berlin, tom. ii. p. 294.

Monſieur de Maupertuis deduces the laws of percuſſion from the ſame principle. See *Quantity of* ACTION.

REST, *repoſe*, or *pauſe*, in *Poetry*, is uſed for the CÆSURA, which, in Alexandrine verſes, falls on the ſixth ſyllable; and, in verſes of ten or eleven ſyllables, on the fourth.

The *reſt* ſhould never fall on a monoſyllable, whereon the voice may not dwell: it is called *reſt*, becauſe the ear and the pronunciation have both a repoſe, or reſpite.

REST, in *Muſic*, is a pauſe, or interval of time, during which there is an intermiſſion of the voice, or ſound.

Reſts are ſometimes uſed in melody, that is, in muſic of a ſingle part, to expreſs ſome ſimple paſſion, or even for variety-ſake; but more frequently in harmony, or compoſitions of ſeveral parts, for the ſake of the pleaſure of hearing one part move on while another *reſts*, and this interchangeably.

Reſts are either for a whole bar, or more than a bar, or but for a part of a bar. When the *reſt* is for a part it is expreſſed by certain ſigns, correſponding to the quantity of certain notes of time; as minim, crotchet, &c. and is accordingly called *minim-reſt*, *crotchet-reſt*, &c.

The characters or figures whereof, ſee under CHARACTERS *of muſic*, where the notes and correſponding *reſts* are found together.

When any one of thoſe characters occurs, either on a line or ſpace, that part is always ſilent for the time of a minim, or crotchet, &c. Sometimes a *reſt* is for a crotchet and quaver together, or for other quantities of time for which there is no particular note; in which caſe the ſigns of ſilence are not *reſts*, but ſuch ſilence is expreſſed by placing together as many *reſts*, of different time, as make up the deſigned *reſt*. When the *reſt* is for a whole bar, the ſemibreve *reſt* is always uſed. If the *reſt* be for two meaſures, it is marked by a line drawn acroſs a whole ſpace. For three meaſures, it is drawn acroſs a ſpace and an half, and, for four meaſures, acroſs two ſpaces. But, to prevent ambiguity, the number of bars is uſually written over the ſign.

Some of the more ancient writers in muſic make theſe *reſts* of different value in different ſpecies of time. *E. gr.* the character of a *minim-reſt*, in common time, ſay they, expreſſes the *reſt* of three crotchets in triple time; in that of the triples $\frac{6}{8}$, $\frac{6}{16}$, $\frac{12}{8}$, $\frac{12}{16}$, it always marks a half-meaſure, how different ſoever theſe may be among themſelves.

They add, that the *reſt* of a crotchet in common time is a *reſt* of three quavers in the triple $\frac{9}{8}$, and that the *quaver-reſt* of common time is equal to three ſemiquavers in the triple $\frac{6}{16}$. But this variety in the uſe of the ſame character is now laid aſide. Malcolm's Treat. of Muſic, p. 409, &c.

REST *Harrow*, *ononis*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the empalement of the flower is cut into five narrow ſegments, the upper being a little raiſed and arched, the lower bending under the keel; the flower is of the butterfly kind; the ſtandard is heart-ſhaped, and larger than the wings; the wings are oval and ſhort; the keel is pointed and longer than the wings; it hath ten ſtamina joined together, and an oblong hairy germen, ſupporting a ſingle ſtyle, crowned by an obtuſe ſtigma; the germen afterwards becomes a turgid pod with one cell, incloſing kidney ſhaped ſeeds. Miller. There are nineteen ſpecies.

The common ſort of *reſt-harrow* is a weed frequent in moſt parts of England, ſo is rarely admitted into gardens. It has a ſtrong creeping root, which ſpreads far in the ground, and is with great difficulty eradicated; the ſtalks riſe a foot and a half high; they are ſlender, reddiſh, and hairy, ſending out ſmall branches on their ſide, which are armed with ſharp prickles. The flowers come out ſingly from the ſide of the branches, they are of the butterfly kind, of a purple colour, which are ſucceeded by ſmall pods, containing one or two kidney-ſhaped ſeeds. It flowers great part of ſummer, and the ſeeds ripen in the autumn. The root of this is one of the five opening roots; the cortical part of it is eſteemed a good medicine for ſtoppage of urine, and to open obſtructions of the liver and ſpleen; for this purpoſe it is ſometimes given in powder, in doſes of a dram, and made an ingredient in apozems or decoctions, as an aperient and diuretic. Its virtue is extracted both by water and ſpirit. There is a variety of this with white flowers. Miller and Lewis.

RESTAUR, RESTOR, in *ancient Cuſtoms*, the remedy, or recourſe, which aſſurers have againſt each other, according to the date of their aſſurances; or againſt the maſters, if the average ariſe through their default; as through ill loading, want of caulking, or want of having the veſſel tight.

The word is alſo uſed for the remedy, or recourſe a perſon has againſt his guarantee, or other perſon, who is to indemnify him from any damage ſuſtained. Hence *reſtaurant*, and *reſtauration*. In the lower Latin they alſo uſe the words *reſtor*, and *reſtaur*.

RESTAURATION, *reſtauratio*, RESTORATION, the act of re-eſtabliſhing, or ſettling a thing in its former good eſtate.

Thus we ſay, the *reſtauration* of a minor to the poſſeſſion of his effects alienated in the time of his minority. In the French laws it is an ancient formula, uſed for the *reſtoring* a perſon to his good name, after he has been wrongfully accuſed and condemned.

In England we ſay *the* RESTAURATION, by way of eminence, for the return of king Charles II. in 1660, after the civil wars.

The 29th of May is an anniverſary feſtival, appointed to be held in commemoration of the *reſtauration* of regal and epiſcopal government, by ſtat. 12 C. II. c. 14.

We ſhall here obſerve, that the form of prayer for the 29th of May, as well as for the 30th of January, were of a different complexion in the reign of king Charles II. from the preſent, of which the reaſon is ſaid to be this: the parliament, and other leading men, who were active in his *reſtoration*, and who had been concerned in oppoſing his father's meaſures, would not be called traitors; and required that a diſtinction ſhould be made between the commencement of the war and the concluſion of it; they would not ſuffer the firſt oppoſition made to the meaſures of that unhappy prince to be ſtyled rebellion, though they diſapproved of the abolition of regal government which enſued. And accordingly the offices for theſe two ſolemnities were drawn up, without any reflection on the firſt authors or promoters of the oppoſition, and, in general, breathe more a ſpirit of piety than of party, of humiliation than of revenge; and, throughout, are modeſt, grave, decent, ſenſible, and devout. King James II. altered theſe forms, and king William did not venture to reduce them to their primitive ſtate; and ſo they have continued, with very little variation, to this day.

RESTAURATION, in *Architecture*, the act of repairing all the parts of a building gone to decay, either through the courſe of time, or other injuries; in ſuch manner, as that it is not only re-eſtabliſhed in its firſt form, but conſiderably augmented.

It is evident, from the plinths of the Corinthian columns of the Pantheon (which are almoſt wholly under ground), that the pavement of this temple is only a *reſtauration* made in the time of Septimius Severus. Daviler.

The temple of Concord, behind the Capitol at Rome, having been burnt long after it was built, and having angular baſes different from the reſt, ſeems to have been *reſtored* from the ruins of ſeveral ancient buildings.

Reſtauration, in *Sculpture*, is the repairing of a mutilated ſtatue, &c. See Repairing.

Moſt of the antique ſtatues have undergone a *reſtauration*; as the Farneſe Hercules, the Faunus in the Villa Borgheſe at Rome, the Wreſtlers in the gallery of the great-duke of Florence, the Venus of Arles, in the gallery at Verſailles. But theſe *reſtaurations* have all been made by the ableſt ſculptors. Daviler.

RESTINCTION, *reſtinctio*, in *Chemiſtry*, the quenching of a metal or mineral in ſome liquor, in order either to correct or to exalt it; by giving it ſome new quality, power, &c.

RESTIO, in *Botany*, a genus of the *dioecia triandria* claſs: its characters are, that it hath male and female flowers; the calyx of the male is an ovated ſpike, imbricated with membranaceous, ovated, ſingle flowered ſcales; and the corolla has ſix oblong, almoſt equal, membranaceous, permanent petals, ſhorter than the ſcales of the calyx; the ſtamina are three capillary filaments, and the antheræ are oblong and erect; the calyx and corolla of the female flowers are like thoſe of the male; the piſtil is a roundiſh germen, formed into ſix flowers; the ſtyles, which are three, are awl-ſhaped, erect, and permanent; the ſtigmata are filiform and withering; the pericarpium is a roundiſh, ſexplicate capſule, with three cells, containing ſeveral obtuſe ſeeds.

RESTITUTION, *reſtitutio*, in *Phyſics*, the returning of elaſtic bodies forcibly bent to their natural ſtate, by ſome called the *motion of reſtitution*. See Elasticity.

Contraction being the proper and natural action of muſcular fibres, ſome authors aſcribe dilatation to a motion of *reſtitution*; but the expreſſion, as well as the idea, is very faulty.

Restitution, in the moral and legal ſenſe, is the act of reſtoring a perſon to his right, or of returning ſomething unjuſtly taken or detained from him.

Reſtitution is reducible to commutative juſtice; and till it be made, the caſuiſts determine the party all the while guilty of theft.

The illegal incumbents of benefices are condemned to a *reſtitution* of the fruits of the benefices. In the Romiſh church, uſurers, &c. are obliged to a *reſtitution* of their ill-gotten goods; otherwiſe the prieſt has no authority to give them abſolution.

Restitution *of ſtolen goods*, in *Law*, is allowed to the proſecutor, on a conviction of larceny, by ſtat. 21 Hen. VIII. c. 11. For, by the common law, there was no *reſtitution* of goods upon an indictment, becauſe it is at the ſuit of the king only; and therefore the party was forced to bring an appeal of robbery, in order to have his goods again. But it being conſidered that the party, proſecuting the offender by indictment, deſerves as much encouragement as he who proſecutes by appeal, this ſtatute was made, which enacts, that if any perſon be convicted of larceny by the evidence of the party robbed, he ſhall have full *reſtitution* of his money, goods, and chattels, or the value of them out of the offender's goods, if he has any, by a writ to be granted to the juſtices. And this writ of *reſtitution* ſhall reach the goods ſo ſtolen, notwithſtanding the property of them is endeavoured to be altered by ſale in market overt; or elſe, without ſuch writ of *reſtitution*, the party may peaceably retake his goods, wherever he happens to find them, unleſs a new property be fairly acquired therein; or, laſtly, if the felon be convicted and pardoned, or be allowed his clergy, the party robbed may bring his action of trover againſt him for his goods, and recover a ſatisfaction in damages: but ſuch action lies not before proſecution, for ſo felonies would be made up and healed. See Recaption.

Restitution *in integrum*, is uſed for what is otherwiſe called *reſciſion*.

Religious obtain *reſtitution* againſt their vows, i. e. they are freed from their obligation, when they proteſt againſt them within five years of their profeſſion.

In the hiſtory of Germany for the XVIIth century, the firſt day of January 1624, is called the *term of reſtitution*; becauſe by the peace of Munſter, then concluded, the Lutheran and Calviniſt princes were obliged to *reſtitute*, or reſtore what they had taken from the Roman catholic churches in their territories till that day.

By the peace of Weſtphalia in 1648, the *reſtitution*-edict was abrogated, and both the contending parties confirmed in the perpetual and uninterrupted poſſeſſion of whatever they had occupied in the beginning of the year 1624. And all the articles agreed upon by this peace were confirmed and ratified, in the year 1650, at Nuremberg.

Restitutions *of medals*, or **Restituted** *medals*, is a phraſe uſed by antiquaries, for ſuch medals as were ſtruck by the emperors, to renew or retrieve the memory of their predeceſſors.

Hence it is, that in ſeveral medals we find the letters rest. Claudius was the firſt who began this practice, by ſtriking afreſh ſeveral medals of Auguſtus. Nero did the ſame; and Titus, after the example of his father, ſtruck *reſtitutions* of moſt of his predeceſſors. Some, however, have maintained that the *reſtituted* medals of Claudius and Nero are modern and ſpurious, and that the practice began under Titus.

Gallienus ſtruck a general *reſtitution* of moſt of the preceding emperors in two medals, the one bearing an altar, the other an eagle, without the rest. F. Joubert chooſes rather to call them *converſations* than *reſtitutions*, as being done quite anew. Theſe were deſigned to preſerve the remembrance of the conſecration of thoſe emperors in honour of whom they were ſtruck, and they have all the ſame legend on the reverſe, viz. consecratio.

RESTITUTIONE *extracti ab eccleſia*, a writ anciently granted for the reſtoring a man to the church, or ſanctuary, from which he had been forced way.

Restitutione *temporalium*, a writ which lies where a man is elected and confirmed biſhop of a dioceſe, for the recovery of the temporalities, or barony, of the ſaid biſhoprick.

It is directed from the king to the eſcheator, or rather ſheriff of the county.

RESTIVE, or **Resty**, a term applied to a horſe, &c. that ſtops, or runs back, inſtead of advancing forwards.

In the manege, a *reſtive* horſe is a rebellious, refractory, ill-broken horſe, which only goes where it will, and when it will. The word is formed from the Latin *reſtivus*; which ſignifies the ſame thing. See Ramingue.

A horſe of this ſort, who has been too much conſtrained and tyrannized over, ſhould be treated with the ſame lenity as a young colt. The ſpurs are improper to be uſed to either; inſtead of which a ſwitch ſhould be uſed, in order to drive him forward, as he will be thus leſs alarmed; becauſe the ſpurs ſurpriſe a horſe, abate his courage, and are more likely to make him *reſtive* than oblige him to go forward if he refuſes to do ſo. There is likewiſe another method to puniſh a *reſtive* horſe, which is to make him go backward the moment he begins to reſiſt. Theſe corrections generally ſucceed; but the general rule is to puſh and carry your horſe forward, whenever he refuſes to advance, and continues in the ſame place, and defends himſelf either by turning or flinging his croupe on one ſide or the other; and, for this purpoſe, nothing is ſo efficacious as to puſh him forward vigorouſly. Berenger's Horſemanſhip, vol. ii. p. 29, &c.

RESTOR. See Restaur.

RESTORATION. See Restauration.

RESTORATIVE, in *Medicine*, a remedy proper for the reſtoring and retrieving ſtrength and vigour.

Reſtoratives belong to the claſs of balſamics; and are otherwiſe called analeptics.

The medicines that come under this denomination are of an emollient, ſoftening nature, but nutritive withal; and are rather adminiſtered to repair the waſtes of the conſtitution than to alter and rectify its diſorders.

Such are the leaves of white and black maidenhair, rocket, eruca, ſcabious, colts-foot, bohea-tea, chich-peas, hops, chocolate, piſtachia-nuts, balſam of Tolu, bdellium, benzoin, ſtorax, eryngo, iris, ſatyrion, &c.

RESTRAINING *ſtatute*. See Remedial.

Restraining *ſtatute* of *leaſes*. See Leases by *ſtatute*.

RESTRAINT is when an action is hindered, or ſtopped, contrary to volition, or the preference of the mind.

RESTRICTION, the act of modifying, limiting, or reſtraining a thing to narrower bounds.

General laws always bear ſome *reſtriction*. In contracts it is uſual to have *reſtrictive clauſes*, which bind the covenants down to certain bounds.

Restriction, *mental*. See Reservation.

Restriction, among *Logicians*, is underſtood of the limiting a term, ſo as to make it ſignify leſs than it uſually does.

In which ſenſe the name philoſopher is *reſtrained* to Ariſtotle; Great, to Alexander; City, to Rome, &c.

RESTRICTIVE *propoſition*. See Proposition.

Restrictive *future*. See Suture.

RESTRINGENT, in *Medicine*. See Astringent.

RESTY. See Restive.

RESULT, what is gathered from a conference, an inquiry, meditation, diſcourſe, or the like; or the concluſion and effect thereof.

The uſual *reſult* of diſputes, Mr. Bayle obſerves, is, that each perſon remains more attached to his own opinion.

RESULTING *uſe*, in *Law*. See USE.

RESUMMONS, *reſummonitio*, a ſecond ſummons or calling a man to anſwer an action where the firſt ſummons is defeated, or ſuſpended, by an accident; as the death of a party, &c.

RESUMPTION, *reſumptio*, in a *Law*-ſenſe, ſignifies the taking again into the king's hands ſuch lands or tenements as before, upon falſe ſuggeſtions, or other error, he had delivered to the heir, or granted, by letters patent, to any man.

RESUMPTION, in the *Schools*, a ſummary repetition, or running over, of an argument, or of the ſubſtance thereof, in order to refute it.

RESUMPTION is alſo uſed by *Logicians* for the reduction of ſome figurative or quaint propoſition, to a more intelligible and ſignificant one.

RESUMPTIVE, in *Pharmacy*, an epithet given to a kind of unguent, uſed to recruit and reſtore arid languiſhing conſtitutions, and to diſpoſe the dry bodies to receive nouriſhment. It is called in Latin *unguentum reſumptivum*.

RESURRECTION, *reſurrectio*, RESUSCITATION, the act of returning to a new, or ſecond life, after having been dead.

The great argument for the truth of Chriſtianity, and that urged with the moſt force and conviction for the ſame, is drawn from the *reſurrection* of our Saviour. The circumſtances thereof are ſuch as almoſt admit of a demonſtration; which has accordingly been attempted on the ſtrict principles of geometricians. See Ditton on the *Reſurrection*.

Many Chriſtians believe the *reſurrection* of the ſame identical body, the very ſame fleſh and bones, at the day of judgment. The two principal philoſophical objections againſt it are theſe:

1. That the ſame piece of matter, or ſubſtance, may happen to be a part of two or more bodies: thus a fiſh feeding on a man, and another man afterwards feeding on the fiſh, part of the body of the firſt man becomes firſt incorporated with the fiſh, and afterwards in the fiſh, with the laſt man. Again, inſtances have been known of one man's feeding immediately on another; and, among the cannibals of the Weſt Indies, the practice is frequent.

Now, where the ſubſtance of one is thus converted into the ſubſtance of another, each cannot ariſe with his whole body; and to which ſhall the common part be allotted?

To this objection ſome anſwer, that, as all matter is not fit, or diſpoſed, to be aſſimilated to the body, and incorporated with it, human fleſh may very probably be of this kind; and, therefore, what is thus eaten, may be again excreted, and carried off. But Mr. Leibnitz's anſwer ſeems the more ſolid. All that is eſſential to the body, he urges, is the original ſtamen which exiſted in the ſemen of the father; nay, and on the footing of the modern theory of generation, which exiſted in the ſemen of the firſt man. This we may conceive as the moſt minute ſpeck, or point, imaginable; and therefore not to be ſeparated, or torn aſunder, and any part of it united with the ſtamen of any other man. All this bulk we ſee in the body, is only an accretion to this original ſtamen; an addition of foreign matter, of new juices, to the primary, ſolid ſtamen, there is, therefore, no reciprocation of the proper matter of the human body.

The ſecond objection is this: the human body, we know, by the late diſcoveries in the animal œconomy, is continually changing; a man has not entirely the ſame body to-day as he had yeſterday; and it is even computed, that in leſs than ſeven years time, his whole body undergoes a change, and not a particle of the ſame body remains. Which of thoſe many bodies, then, which the ſame perſon has in the courſe of his life, is it that ſhall riſe? or does all the matter that has ever belonged to him riſe again? or does only ſome particular ſyſtem thereof? The body, e. gr. he had at twenty, at thirty, or at ſixty years old? If only this or that body ariſe, how ſhall it be rewarded or puniſhed for what was done in the other? with what juſtice does one perſon ſuffer, &c. for another?

To this it may be anſwered, on Mr. Locke's principles, that perſonal identity, or the ſameneſs of a rational being, conſiſts in ſelf-conſciouſneſs; in the power of conſidering itſelf the ſame thing in different times and places. By this every one is to himſelf what he calls *ſelf*; without conſidering whether that ſelf be continued in the ſame or divers ſubſtances. So far reaches the identity of that perſon. It is the ſame ſelf now it was then; and it was by the ſame ſelf which now reflects on an action, that action was performed. Now, it is this perſonal identity that is the object of rewards and puniſhments, which we have obſerved may exiſt in different ſucceſſions of matter; ſo that to render the rewards and puniſhments juſt and pertinent, nothing needs but that we riſe again with ſuch a body as that we retain the conſciouſneſs of our paſt actions.

RESUSCITATION. See RESURRECTION, and REVIVIFICATION.

RESUSCITATION *of plants*, in *Chemiſtry*, the art of reproducing a plant from its aſhes. See PALINGENESIA.

Many have pretended to this art, and have ſhewn *reſuſcitated* plants in vials; but all theſe ſeem only particular inſtances of artificial chemical vegetations, of which many others may be given. The external appearances of theſe reſemble plants, and the ignorant may eaſily take them for ſuch; but, when cloſely conſidered, there is a great difference to be found. See *artificial* VEGETATION.

RETAIL, in *Commerce*, &c. the buying of goods in the great, or by wholeſale, and ſelling them out again in ſmall parcels.—*Qui rem integram ementes, per minutiores eam partes diſtrahebant*.

To **RETAIN**, ſpoken of mares, ſignifies *to hold*, i. e. to conceive after covering.

RETAINER, in *Law*, a ſervant not menial or domeſtic, that is, not continually dwelling in the houſe of his lord and maſter, but only wearing his livery, and attending on ſpecial occaſions.

This livery was anciently given by a great man, and frequently for the maintenance of quarrels; whence it was juſtly prohibited by ſeveral ſtatutes; as under Richard II. on pain of impriſonment, and grievous forfeiture to the king.

It was farther prohibited by other ſtatutes of the ſucceeding kings, whereby the delinquents were ſubject to make ranſom at the king's pleaſure; and knights and eſquires hereof duly attainted were to loſe their ſaid liveries, and forfeit their fees for ever.

Edward IV. added a ſpecial penalty of five pounds per month on every man that gave ſuch livery, and as much on every perſon ſo *retained*, either by writing, word, or oath. But moſt of theſe ſtatutes are repealed by a ſtatute 3 Car. I.

RETAINER *of debts*, in *Law*, a remedy which the law gives to an executor or adminiſtrator for the debt, by allowing him to retain ſo much as will pay himſelf, before any other creditors whoſe debts are of equal degree. See DEBT. The debts of co-executors ſhall be diſcharged in proportion. An EXECUTOR of his own wrong ſhall not, in any caſe, be permitted to retain.

RETAINING-*fee*, is the firſt fee given in any cauſe to a ſerjeant or counſellor at law, whereby to make him ſure, that he ſhall not be on the contrary ſide.

RETALIATION, *retaliatio*, the act of returning like for like. See TALIONIS *lex*.

RETARDATION, *retardatio*, in *Phyſics*, the act of *retarding*; that is, of delaying the motion or progreſs of a body, or of diminiſhing its velocity.

The *retardation* of moving bodies ariſes from two great cauſes, the *reſiſtance of the medium*, and the *force of gravity*.

The RETARDATION *from the reſiſtance* is frequently confounded with the reſiſtance itſelf; becauſe with reſpect to the ſame moving body, they are in the ſame proportion.

With reſpect to different bodies, however, the ſame reſiſtance often generates different *retardations*. For if bodies of equal bulk, but different denſities, be moved through the ſame fluid with equal velocity, the fluid will act equally on each; ſo that they will have equal reſiſtances, but different *retardations*; and the *retardations* will be to each other as the velocities which might be generated by the ſame forces in the bodies propoſed; that is, they are inverſely as the quantities of matter in the bodies, or inverſely as the denſities.

Suppoſe, then, bodies of equal denſity, but of unequal bulk, to move equally faſt through the ſame fluid, their reſiſtance increaſes according to their ſuperficies; that is, as the ſquares of their diameters. But the quantities of matter are increaſed in proportion to the cubes of the diameters: the reſiſtances are the quantities of motion; the *retardations* are the celerities ariſing from them; and dividing the quantities of motion by the quantities of matter, you will have the celerities; therefore the *retardations* are directly as the ſquares of the diameters, and inverſely as the cubes of the diameters; that is, inverſely as the diameters themſelves.

If the bodies be equal, move equally ſwift, and are of the ſame denſity, but move through different fluids, their *retardations* are as the denſities of thoſe fluids.

And when bodies equally denſe, and of bulk equal, are carried through the ſame fluid with different velocities, the *retardations* are as the ſquares of the velocities.

The **RETARDATION** *from gravity* is peculiar to bodies projected upwards. A body thrown upwards is *retarded* after the ſame manner as a falling body is accelerated; only, in the one caſe, the force of gravity conſpires with the motion acquired; and in the other, it acts contrary to it.

As the force of gravity is uniform, the *retardation* from that cauſe will be equal in equal times.

Hence, as it is the ſame force which generates motion in the falling, and diminiſhes it in the riſing body, a body riſes till it has loſt all its motion; which it does in the ſame time wherein a body falling would have acquired a velocity equal to that wherewith the body was thrown up.

Thus, alſo, a body thrown up, will riſe to the ſame height from which falling it would acquire the velocity wherewith it is thrown up; therefore the heights which bodies thrown up with different velocities can riſe to, are to each other as the ſquares of the velocities.

Hence, the *retardations* of motions may be compared together: for they are, firſt, as the ſquares of the velocities; ſecondly, as the denſities of the fluids through which the bodies are moved; thirdly, inverſely, as the diameters of thoſe bodies; laſtly, inverſely, as the denſities of the bodies themſelves.

The numbers in the ratio compounded of thoſe ratios, expreſs the proportion of the *retardations*; multiplying the ſquare of the velocity by the denſity of the fluid, and dividing the product by the product of the diameter of the body multiplied into its denſity; and working thus for ſeveral motions, the quotients of the diviſions will have the ſame compound ratio to one another.

RETARDATION *of motion, Laws of.* 1. If the motion of a body be uniformly *retarded*, that is, if its celerity be diminiſhed equally in equal times, the ſpace it paſſes over is one half of that it would paſs over in the ſame time by an uniform motion.

2. The ſpaces deſcribed in equal times by an uniformly *retarded* motion, decreaſe according to the uneven numbers 9, 7, 5, 3, &c. See ACCELERATION and MOTION.

RETCH, or **RETCHES**, a name given by our farmers to an iron, or a pair of irons, which in the common plow ſerve to faſten the ſheat to the beam. The *retches* are faſtened to the ſheet with nails, and to the beam with pins.

RETCHING, or **REACHING**, the effort or endeavour to vomit. See NAUSEA.

RETE *mirabile*, in *Anatomy*, a ſmall plexus or net-work of veſſels in the brain, ſurrounding the pituitary gland.

The *rete mirabile* is very conſpicuous in brutes; but it is either not exiſtent in man, or is ſo very minute, that its exiſtence has been doubted.

Willis will have it to conſiſt of arteries, veins, and nerves; Vieuſſens, of arteries only; and others, of arteries, and ſmall veins.

Vieuſſens aſſerts, with many other anatomiſts, that there is no *rete mirabile* in man, in the horſe, dog, &c. but that it is found in the calf, ſheep, goat, &c.

It was obſerved and deſcribed by Galen, who, upon finding it in ſome brutes, concluded it to be likewiſe in man; but all we ſee like it in man is, that on the ſides of the pituitary gland, where its place ſhould be, the carotid arteries make a double flexure in form of ∽, before they penetrate the dura mater.

The uſe of the *rete mirabile* Galen takes to be for concocting and elaborating the animal ſpirits; as that of the epididymides is for elaborating the ſeed.

Dr. Willis thinks, with more probability, it may ſerve to bridle the too rapid incurſions of the blood into the brain of thoſe creatures, whoſe head hangs down much; to ſeparate ſome of the ſuperfluous ſerous parts of the blood and ſend them to the ſalival glands, as the blood enters the brain; and to obviate obſtructions which may happen in the arteries.

RETE *mucoſum*. See SCROTUM.

RETE *peny*, in *Ancient Records*, a cuſtomary due of one penny for every perſon to the pariſh prieſt.

RETEINER, or **RETAINER**. See RETAINER.

RETENEGI, in the *Materia Medica*, a name uſed by Avicenna, and others, to expreſs the common reſin of the pine, or fir-tree, and ſometimes common black pitch. The lexicographers have given us *ſtorax* as the explanation of *retenegi*, but this is not warranted by any paſſage in the authors who uſe the word. It is certain, indeed, that the generality of authors have confounded the ſeveral ſorts of reſin and pitch-making trees together, and among them the pine, fir, cedar, and turpentine trees, are called by the ſame name, but the ſtorax-tree is never included among the number. Theſe were only confounded together, becauſe of the ſimilitude of the things they produced; but the ſtorax was too different from all theſe, and too precious a gum not to be diſtinguiſhed.

RETENTA, a word uſed by the medical writers to expreſs things retained in the body, or which are not to be retained in a ſtate of good health.

RETENTIO, *retinentia*, in our law-books, is ſometimes uſed to ſignify RETINUE.

RETENTION, *retentio*, a faculty of the human mind, whereby, in order to a farther progreſs in knowledge, it keeps or *retains* thoſe ſimple ideas, which it before received by ſenſation or reflection.

This is done two ways. Firſt, by keeping the idea which is brought into the mind for ſome time actually in view. This is called CONTEMPLATION.

Secondly, by reviving thoſe ideas in our minds, which have diſappeared and have been, as it were, laid out of ſight. This is MEMORY, which is, as it were, the repoſity of our ideas.

RETENTION is alſo uſed, in *Medicine*, &c. for the ſtate of contraction in the ſolids, or vaſcular parts of the body, which makes them hold faſt their proper contents.

In this ſenſe, *retention* ſtands oppoſed to *evacuation* and *excretion*.

Retention and excretion make two of the non-naturals.

RETENTION is alſo frequently conſidered as a diſorder, and defined the act of retaining the excrements, humours, &c. ſo as they cannot be voided out of the body. See INFANT.

It is the *retention* of peccant humours which cauſes ſuch a diſeaſe. A *retention* of urine is very painful and dangerous. See SUPPRESSION of *urine*.

RETIARII, in *Antiquity*, a kind of gladiators, thus denominated from a net which they made uſe of againſt their antagoniſts, who were called *ſecutores*, and ſometimes *myrmillones*. See GLADIATOR.

The word is formed from the Latin, *rete*, *net*; or perhaps from *retejaculum*; for they call their net *jaculum*, and ſometimes in one word *retejaculum*.

This net they carried under their buckler, and, when opportunity ſerved, caſt it over the head of their antagoniſt, and, in this condition, killed him with a trident, which they bore in the other hand.

Lipſius and others obſerve, that they fought in tunics, and were furniſhed with ſponges to wipe off the ſweat, blood, &c. and to ſtop their wounds.

RETICENCY, *reticentia*, a figure in *Rhetoric*, whereby we make oblique mention of a thing, in pretending to paſs it over unmentioned.

Thus: *to ſay nothing of the nobility of his anceſtors: I forbear to ſpeak of his courage, and paſs over the ſeverity of his morals.* See APOSIOPESIS and PRETERITION.

RETICULA, *reticule*, in *Aſtronomy*, a contrivance for the exact meaſuring the quantity of eclipſes, introduced ſeveral years ago by the Royal Academy of Paris. See ECLIPSE.

The *reticule* is a little frame, conſiſting of thirteen fine ſilken threads, equidiſtant from each other, and parallel; placed in the focus of object-glaſſes of teleſcopes; that is, in the place where the image of the luminary is painted in its full extent. Of conſequence, therefore, the diameter of the ſun and moon is hereby ſeen divided into twelve equal parts or digits; ſo that, to find the quantity of the eclipſe, there is nothing to do but to number the luminous and the dark parts.

As a ſquare *reticule* is only proper for the diameter, not for the circumference of the luminary, it is ſometimes made circular, by drawing ſix concentric equidiſtant circles. This repreſents the phaſes of the eclipſe perfectly.

But it is evident that the *reticule*, whether ſquare or circular, ought to be perfectly equal to the diameter or circumference of the ſun or ſtar, ſuch as it appears in the focus of the glaſs, otherwiſe the diviſion cannot be juſt. Now this is no eaſy matter to effect, becauſe the apparent diameter of the ſun and moon differ in each eclipſe; nay, that of the moon differs from itſelf in the progreſs of the ſame eclipſe.

Another imperfection in the *reticule* is, that its bigneſs is determined by that of the image in the focus; and of conſequence it will only fit one certain magnitude.

But M. de la Hire has found a remedy for all theſe inconveniencies, and contrived that the ſame *reticule* ſhall ſerve for all teleſcopes, and all magnitudes of the luminary in the ſame eclipſe. The principle whereon his invention ſtands is, that two object-glaſſes applied againſt each other, having a common focus, and there forming an image of a certain magnitude, this image will increaſe in proportion as the diſtance between the two glaſſes is increaſed as far as a certain limit.

If then a *reticule* be taken of ſuch a magnitude, as juſt to comprehend the greateſt diameter the ſun or moon can ever have in the common focus of two object-glaſſes applied to each other, there needs nothing but to remove them from each other, as the ſtar comes to have a leſs diameter, to have the image ſtill exactly comprehended in the ſame *reticule*.

Another improvement is, that whereas the ſilken threads are ſubject to ſwerve from the paralleliſm, &c. by the different temperature of the air; a *reticule* may be made of a thin looking-glaſs, by drawing lines or circles thereon with the fine point of a diamond; which ſhall be ſafe from any alteration of the air. See MICROMETER.

RETICULAR *body*, *corpus reticulare*, in *Anatomy*, a body of veſſels lying immediately under the cuticle or ſcarfſkin.

Theſe veſſels contain a mucous liquor, from the tincture whereof Malpighi imagines the colour of the ſkin to be derived; founding his conjecture on this, that the cutis, as well as the cuticle of blacks, is white; and that they differ in no other circumſtance from thoſe of Europeans but in this particular.

RETICULAR *plexus*, *plexus reticularis*, ſometimes denotes the CHOROIDES, which is thus called, becauſe its fibres are interwoven like a net.

RETICULUM, a name ſometimes given to the *caul* or OMENTUM, from its net-like ſtructure.

RETIFORMIS *lacis*, in *Anatomy*, the ſame with RETE *mirabile*.

RETINA, in *Anatomy* and *Optics*, one of the tunics of the eye; called alſo *amphibleſtroides*, *retiformis*, and *reticularis tunica*, as being woven in manner of a net.

The *retina* is the laſt or innermoſt of the coats of the eye, lying immediately under the choroides.

It is formed of an expanſion of the medullary part of the optic nerve; whence it is very thin, ſoft, white, &c. reſembling the ſubſtance of the brain, with the tranſparency of the horn of a lantern. When ſeparated from the choroides, it runs into a mucous maſs, or lump.

The *retina* is uſually ſuppoſed to be the great organ of viſion, which is effected by means of the rays of light reflected from each point of the objects refracted in their paſſage through the aqueous, vitreous, and cryſtalline humours, and thus thrown on the *retina*, where they paint the image of the object; and where they make an impreſſion, which is continued thence, by the fine capillaries of the optic nerves, to the ſenſory. See VISION.

Indeed, whether the *retina*, or the choroides, be the principal organ of viſion, and that whereon the images of objects are repreſented, has been much controverted between ſeveral members of the Royal Academy; particularly Meſſ. Mariotte, Pecquet, Perrault, Mery, and de la Hire. Mariotte firſt referred viſion to the choroides, and was ſeconded by Mery: the reſt aſſerted the cauſe of the *retina*.

The *retina* was always judged to have all the characters of the principal organ. It is ſituate in the focus of the refraction of the humours of the eye; and of conſequence receives the vertices of the cones of rays, proceeding from the ſeveral points of objects. It is very thin, and conſequently very ſenſible. It has its origin from the optic nerve, and is itſelf wholly nervous; and it is the common opinion, that the nerves are the vehicles of all ſenſations. Laſtly, it communicates with the ſubſtance of the brain, where all ſenſations terminate.

As to the choroides, its uſe was ſuppoſed to be to ſtop the rays, which the extreme tenuity of the *retina* ſhould let paſs; and to do the ſame office with reſpect to the *retina* which the quickſilver does to a looking-glaſs; eſpecially in thoſe animals wherein it is black.

But from an experiment of a cat plunged into water, M. Mery conceived a different opinion. See PUPIL. He obſerved the *retina* to diſappear abſolutely on that occaſion, as well as all the other humours of the eye; while the choroides ſtill appeared diſtinctly, and even with all the lively colours which it has in that animal. Hence he concluded, that the *retina* was as tranſparent as the humours, but the choroides opake; conſequently the *retina* was not a proper inſtrument to terminate and ſtop the cones of rays, or to receive the images of objects; but that the light muſt paſs through it, and could only be ſtopped on the choroides; which therefore would become the principal organ of viſion. The black colour of the choroides in man is extremely favourable to this opinion: the principal organ ſhould ſeem to require, that the action of the light ſhould terminate on it as it arrives; which it is certain it here does in the black, that abſorbs all the rays, and reflects none; and it ſhould alſo ſeem neceſſary, that the action of the light ſhould be ſtronger on the organ of ſight than any where elſe: now, it is certain that the light, being received and abſorbed in a black body, muſt excite a greater vibration there than any where elſe; and hence it is that black bodies are kindled by a burning-glaſs much ſooner than white ones.

The ſituation of the choroides behind the *retina* is another circumſtance on its ſide; M. Mery having obſerved the ſame poſition of the principal organ behind a mediate organ in the other ſenſes, which makes an happy analogy. Thus the cuticle extended over the ſkin is the mean organ of feeling; but the cutis underneath is the principal organ. The like is obſerved in the ear, noſe, &c.

The *retina*, therefore, ſhould ſeem a kind of mediate or ſecondary organ, ſerving to break the too ſtrong impreſſion of the light on the choroides, or to preſerve it; which is the uſe aſcribed to the cuticle. Add to all this, that the *retina* is inſenſible, as having its origin from the medullary ſubſtance of the brain, which is ſo too; and the choroides, on the contrary, is very ſenſible, as ariſing from the pia mater, which is certainly ſenſible in a great degree.

This laſt argument being doubted of, M. Mery was engaged to prove it; which he did before the Royal Academy, where he ſhewed that the optic nerve is not compoſed, like the other nerves, of fibres; that it is only a train of the medulla incloſed in a canal, out of which it is eaſily ſeparable.

This ſtructure of the optic nerve, hitherto unknown, ſhews that the *retina* can be no membrane; it is only a dilatation of the medulla, incloſed under two membranes; and a pith or medulla ſeems no proper ſubſtance to be the ſeat of ſenſation. It can ſcarce ſerve for any thing but to filtrate the ſpirits neceſſary for the action of viſion. The vibration whereby the ſenſation itſelf is effected, muſt be made on a part more ſolid, more firm, and more ſuſceptible of a briſk impreſſion.

For other arguments in favour of the choroides being the ſeat of viſion, ſee CHOROIDES.

RETINACULUM, the name of a chirurgical inſtrument uſed in caſtration, and in the operation for a hernia, to prevent the inteſtines from falling into the ſcrotum.

RETINUE, *retinentia*, the attendants or followers of a prince, or perſon of quality, chiefly in a journey.

In *Law*, thoſe perſons are properly ſaid to be of a nobleman's *retinue*, who belong to him in quality either of ſervants or retainers.

RETIRADE, in *Fortification*, a kind of retrenchment made in the body of a baſtion, or other work, which is to be diſputed inch by inch, after the firſt defences are diſmantled. It uſually conſiſts of two faces, which make a re-entering angle. When a breach is made in a baſtion, the enemy may alſo make a *retirade*, or a new fortification behind it.

RETIRED *flank*, in *Fortification*. See FLANK.

RETORNO *falſo brevium*. See FALSO.

RETORNO *habendo*, &c. See RETURNO *habendo* and REPLEVIN.

RETORT, *retorta*, in *Chemiſtry*, a kind of crooked matraſs, or a round bellied veſſel, either of earth or glaſs, with a ſlender crooked beak or neck, to which the recipient is to be faſtened.

From this form this veſſel has been probably called a *retort*. The moſt capacious part is called the belly; its upper part the arch or roof of the *retort*; and the bent part, which makes with the belly an angle of about ſixty degrees, is the neck; and the paſſage from the belly to the neck ſhould be free and wide, and gradually diminiſhing to the extremity of the neck or mouth of the *retort*.

Retorts differ in form and materials; their bellies are generally round: ſome of them are oblong, and ſhaped like a cucurbit, and theſe are called *Engliſh retorts*. They are preferable for the diſtillation of matters which are ſubject to ſwell, and to paſs into the receiver before they be decompoſed.

A *retort*, which has a little hole pierced in its roof, is called a *tubulated retort*. This hole muſt be capable of being exactly cloſed with a ſtopper of proper materials. *Retorts* of this kind are employed in diſtillations, where ſome matter muſt be introduced into the *retort* after the receiver is joined to it, as in the diſtillation of ſmoking marine acid, and in the operations for procuring the ſeveral kinds of clyſſus. See *Tab.* II. *Chemiſtry*, *fig.* 31, 32. &c.

When the *retort* is of glaſs, it is uſually covered with a lute of loam, &c. an inch thick, to enable it to bear the fire the better: and it is uſed for all operations which require a leſs heat than is ſufficient for its fuſion. Earthen *retorts* are neceſſary when great heat is requiſite, as in the preparation of phoſphorus.

The *retort* ſeems to draw ſpirits and oil from woods, gums, minerals, earths, and other matters which require a ſtrong fire.

The *retort* is a kind of compendium or improvement on the cucurbit and bolt-head; anſwering all the purpoſes of both, without the aſſiſtance of a capital or head, which the other require.

The quantity of air riſing from ſome ſubſtances is apt to burſt glaſſes in diſtilling; Dr. Browne Langriſh has therefore given us a new contrivance of applying receivers to *retorts*, by which ſuch accidents may be prevented. To his firſt receiver he adapts a ſecond, inſerted into an opening at the top of the firſt, in order to give more room to the rarefied and new generated air. To an opening at the bottom of each of theſe receivers, he fixes a bottle, tied on cloſe by means of a bladder, ſo that they may be removed at any time, and another inſtantly placed in their room; by which means very little of the ſteam will eſcape. He alſo ties on a bladder to an opening, or upper neck of the ſecond recipient; and this bladder being much thinner and weaker than any of the glaſſes, will always give way firſt, and prevent their burſting. And even when there is the greateſt danger of this accident, the ſmalleſt pin-hole made through the top of the bladder, as ſoon as the fumes begin to riſe, will be ſufficient to let out the air as faſt as it is generated. See Philoſ. Tranſ. Nº 475. ſect. 3. where we have a figure of the whole apparatus. See alſo *Tab. of Chemiſtry*, Nº 33, and 34.

RETRACTATION, *retractatio*, the act of unſaying what a perſon had ſaid or written.

Galileo made a public *retractation* of his doctrine of the world, De Mundo, after its being cenſured and condemned by the pope. See COPERNICAN *Syſtem*.

Among St. Auguſtine's works is a book of *retractations*; where, however, the word is to be underſtood in a new ſenſe; not as if he recanted or unſaid any thing he taught, but only treated of the ſame matter, or handled the ſame ſubject, a ſecond time. This ſenſe the word will very well bear; being a compound of *re*, *again*, and *tracto*, *I handle*, *treat of*.

RETRACTION, *retractio*, formed from *retrahere*, *to draw back*, in *Anatomy*, the contraction or ſhortening of a part.

A *retraction* of the nerves takes away the uſe of the limbs.

RETRACTS, among *Horſemen*, pricks in a horſe's feet, ariſing from the fault of the farrier in driving nails that are weak, or in driving them ill-pointed, or amiſs.

Theſe, unleſs timely prevented, feſter, and prove very dangerous. When the farrier, in ſhoeing, perceives the horſe to ſhrink at every blow on the nail, it is a ſign of a *retract*, and the nail is to be pulled out again; which is done without any harm.

When the horſe halts immediately after he is ſhod, it is concluded ſome of the nails preſs the veins, or touch him in the quick.

To find where the grievance lies, they knock the nails round with a hammer, till the horſe's ſhrinking upon hitting a particular nail diſcovers the place.

Some farriers give this as a rule, that throwing water on the hoof, the place where he is hurt will be dry ſooner than any of the reſt. The places where the horſes are moſt uſually pricked, are the heel in the fore-foot, and the toe in the hind-foot.

RETRACTOR *alæ naſi*, in *Anatomy*, a muſcle called alſo ELEVATOR *labii ſuperioris*.

RETRAHENS *auriculam*, in *Anatomy*, a muſcle of the external ear, conſiſting of a parcel of fleſhy fibres, which in ſome bodies are divided into three diſtinct muſcles, ariſing from the os temporale, and fixed to the hind part of the concha.

But theſe muſcles are ſo ſmall in men, that the auricle is ſeldom moveable at all. See EAR.

RETRAXIT, in *Law*, is where the plaintiff comes into court in perſon, alone, or with the defendant; and declares he will proceed no farther in his action.

A *retraxit* is peremptory, and a perpetual bar, and may be pleaded as ſuch to the plaintiff in the ſame action for ever. See NONSUIT.

RETREAT, in *War*, the retiring or moving back again of an army, or part thereof.

We ſay, to found a *retreat*, to ſecure a *retreat*, &c.

What they call a *retreat* in the armies, is really a flight; only a flight made by deſign, and with conduct.

The ſkill and ability of the general is known by his *retreats* more than his engagements. The *retreat* of the ten thouſand Greeks under the command of Xenophon, has been admired in all antiquity.

RETREAT, or TATTOU, in *the Art of War*, is a beat of the drum in the evening, at the firing of a piece called the evening-gun, at which the drum-major, with all the drums of the battalion, except ſuch as are upon duty, beat round the regiment; the drums of the quarter-guards, of the general-guards, and all other ſmall guards, do likewiſe beat; the trumpets at the ſame time ſounding at the head of their reſpective troops. This is to warn the ſoldiers to forbear firing, and the ſentinels to challenge, till break of day, that the reveille is beat.

The *retreat* is likewiſe called *ſetting the watch*.

RETREAT, or RELAY, in *Maſonry*, denotes a little receſs or diminution of the thickneſs of a wall, rampart, &c. in proportion as it is raiſed.

The *retreat* is properly the diminution of a wall, withoutſide, or the contraction of its upper courſes more than the foundation. Where the foundation is very large, they uſually make two or three *retreats*. Parapets are always built with *retreats*.

RETRENCHMENT, in a general ſenſe, literally ſignifies the cutting off, or taking from a thing: in which ſenſe it coincides with ſubtraction, diminution, &c.

The word is French, *retrenchment*, formed of *re*, and *trencher*, *to cut*.

RETRENCHMENT, in *Architecture*, *Carpentry*, &c. is uſed not only for what is cut off from a piece when too large, in order to a better proportioning it, or ſome other convenience, but alſo for the projectures taken out of ſtreets, public ways, &c. to render them more even, and in a line.

RETRENCHMENT, in *War*, denotes any kind of work caſt up to ſtrengthen or defend a poſt againſt the enemy.

Such are ditches with parapets, gabions, faſcines, &c. for a covering, &c.

The enemy came with deſign to oblige them to raiſe the ſiege; but could not force the *retrenchments*.

RETRENCHMENT is more particularly uſed for a ſimple retirade made on a horn-work or baſtion, when it is intended to diſpute the ground inch by inch. See RETIRADE.

It is uſually a re-entering angle, whoſe faces flank each other; and is fortified with ditches, parapets, gabions, &c.

RETRIBUTION, *retributio*, an handſome preſent, gratuity, or acknowledgment, given in lieu of a formal ſalary or hire, to perſons employed in affairs that do not ſo immediately fall under eſtimation, nor within the ordinary commerce in money.

Thoſe who miniſtered at the altar anciently lived on *retributions*, which they received for the ſervices they did the church. But theſe *retributions* were afterwards judged proper to be fixed to preciſe ſums.

RETRIEVE, *retrouver*, to recover, get again, or repair a thing loſt or damaged.

To *retrieve*, in *Falconry*, ſignifies to bring or find partridges again, which have been once ſprung before.

RETROACTIVE, compounded of *retro*, *backwards*, and *ago*, *I act*, in *Law*, that which has an influence or effect on time paſt.

New laws and ſtatutes, we ſay, have no *retroactive* effect; that is, they have no force or effect as to what is already paſſed; nor can be alledged as rules for any thing done before their promulgation. Their authority is wholly as to what is to come.

Indeed we have ſome inſtances of laws that have a retroſpect or *retroaction*, i. e. are made with expreſs deſign to extend to things already paſt. Theſe we uſually call laws *ex poſt facto*.

RETROCESSION, *retroceſſio*, the act of going backwards, more uſually expreſſed by *retrogreſſion* or *retrogradation*.

RETROCESSION *of the Equinox*. See PRECESSION.

RETROCESSION *of Curves*, &c. See RETROGRADATION.

RETROGRADATION, or RETROGRESSION, the act or effect of a thing moving backwards.

RETROGRADATION, in *Aſtronomy*, is an apparent motion of the planets, wherein they ſeem to go backwards in the ecliptic, and to move contrary to the order or ſucceſſion of the ſigns.

When a planet moves *in conſequentia*, i. e. towards the following ſigns, or according to the order of the ſigns, as from Aries to Taurus, from Taurus to Gemini, &c. that is, from weſt to eaſt, it is ſaid to be direct.

When it appears for ſome days in the ſame point of the heavens, it is ſaid to be *ſtationary*.

And when it goes *in antecedentia*, i. e. towards the antecedent ſigns, or contrary to the order of the ſigns; viz. from eaſt to weſt; it is ſaid to be *retrograde*.

The ſun and moon always appear direct. Saturn, Jupiter, Mars, Venus, and Mercury, ſometimes direct, ſometimes ſtationary, and ſometimes *retrograde*.

The ſuperior planets are *retrograde* about their oppoſition with the ſun; the inferior ones about their conjunction.

The intervals of time between two *retrogradations* of the ſeveral planets, are unequal. In Saturn it is a year and 13 days, in Jupiter a year and 43 days, in Mars two years 50 days, in Venus one year and 220 days, and in Mercury 115 days. Again, Saturn continues *retrograde* 140 days, Jupiter 120, Mars 73, Venus 42, Mercury 22; yet are not the ſeveral *retrogradations* of the ſame planet conſtantly equal.

Theſe changes of the courſes and motions of the planets are not real, but only apparent: when viewed from the centre of the ſyſtem, i. e. from the ſun, they appear always uniform and regular. The inequalities ariſe from the motion and poſition of the earth whence they are viewed, and are thus accounted for:

Suppoſe PNO (*Tab. Aſtronomy, fig.* 53.) a portion of the zodiac, ABCD the earth's orbit, and EMGHZ the orbit of a ſuperior planet, e. gr. Saturn; and ſuppoſe the earth in A, and Saturn in E, in which caſe he will appear in the zodiac at the point O. If now Saturn remained without any motion, when the earth arrives at B, he will be ſeen in the point of the zodiac L, and would appear to have deſcribed the arch OL, and to have moved according to the order of the ſigns from weſt to eaſt. But becauſe, while the earth is paſſing from A to B, Saturn likewiſe moves from E to M, where he is ſeen in conjunction with the ſun, he will appear to have deſcribed the arch OQ greater than that OL. In this ſtate the planet is direct, and its motion is from weſt to eaſt, or according to the order of the ſigns. And its motion, now that it is in conjunction with the ſun, and moſt remote from us, is quicker than at any other time.

The earth arriving in C, while Saturn deſcribes the arch MG, he will be obſerved in the zodiac at R. But the earth being advanced to K, and Saturn to H, ſo that the line KH, joining the earth and Saturn, be for ſome time parallel to itſelf, or nearly ſo, Saturn will be ſeen all that time in the ſame point of the zodiac at P, and with the ſame fixed ſtars; and is therefore at this time ſtationary.

But the earth being come to D, and Saturn arrived in oppoſition to the ſun in Z, he will appear in the zodiac in V, and will ſeem to have been *retrograde*, or to have gone backwards through the arch PV. Thus the ſuperior planets, on optical conſiderations, are always *retrograde*, when in oppoſition to the ſun.

The arch which the planet deſcribes while thus *retrograde*, is called the *arch of retrogradation*.

The arches of *retrogradation* of the ſeveral planets are not equal. That of Saturn is greater than that of Jupiter; that of Jupiter than that of Mars, &c.

Retrogradation *of the nodes*, is a motion of the line of the nodes, whereby it continually ſhifts its ſituation from eaſt to weſt, contrary to the order of the ſigns; completing its *retrograde* circulation in the compaſs of about nineteen years: after which time, either of the nodes, having receded from any point of the ecliptic, returns to the ſame again. See Nodes.

Retrogradation *of the ſun*. When the ſun is in the torrid zone; and has his declination AM (*Tab. Aſtronomy, fig.* 54.) greater than the latitude of the place AZ, but either northern or ſouthern as that is, the ſun will appear to go backwards, or to be *retrograde* both before and after noon. This can never happen, without the tropics, in a natural way.

For, draw the vertical circle ZGN to be a tangent to the ſun's diurnal circle in G, and another ZON through the ſun's riſing, in O, it is evident all the intermediate vertical circles cut the ſun's diurnal circle twice; firſt, in the arch GO, and the ſecond time in the arch GI. Wherefore, as the ſun aſcends through the arch GO, it continually arrives at farther and farther verticals. But as it continues its aſcent through the arch GI, it returns to its former verticals; and therefore is ſeen *retrograde* for ſome time before noon. The ſame it may be ſhewn, after the ſame manner, it does for ſome time after noon. Hence, as the ſhadow always tends the oppoſite way to that of the ſun, the ſhadow will be *retrograde* twice every day in all places of the torrid zone, where the ſun's declination exceeds the latitude.

Retrogradation, or Retrogression, in the *Higher Geometry*, is the ſame with what we otherwiſe call *contrary flection*. See Flexure and Inflexion.

The general rule given by the marquis de l'Hopital, for finding the point of reflection in curves whoſe ordinates are parallel, is the ſame as that for finding the point of contrary flexture, and conſiſts in taking the ſecond fluxion of the ordinate of the curve, and ſuppoſing it nothing or infinite: but this rule admits of many exceptions. See Maclaurin's Flux. b. i. c. 9. and b. ii. c. 5.

RETROGRADE, *retrogradus*, formed from *retro, backwards*, and *gradior, I go*, ſomething that goes backwards, or in a direction contrary to the natural one.

If the eye and the object both move the ſame way, but the eye much faſter than the object, the object will appear to be *retrograde*, i. e. to go back, or to advance the contrary way from what it really does.

Hence it is that the planets in ſome parts of their orbits appear to be *retrograde*.

Retrograde order, in matters of numeration, is when, in lieu of accounting 1, 2, 3, 4, we count 4, 3, 2, 1.

Retrograde *verſes*, are ſuch as give the ſame words, whether read backwards or forwards: called alſo *reciprocal verſes*, and *recurrents*. Such is

Signa te ſigna; temere me tangis et angis.

RETROGRESSION, or Retrocession, the ſame with retrogradation.

RETROMINGENTS, compounded of *retro, backwards*, and *mingo, I make water*, in *Natural Hiſtory*, a claſs or diviſion of animals, whoſe characteriſtic is, that they ſtale backwards, both males and females. Such are lions, cats, &c.

RETROPANNAGIUM, *retropannage*, in our *Ancient Law Books, after-pannage*; or what is left when the beaſts have done, or eaten the beſt. See Pannage.

Et debent habere retropannnagium *a feſto Sancti Martini uſque ad feſtum Pur. Beatæ Mariæ*. Petit. in Parl. temp. Edw. III.

RETROSPECT, a look or view backwards. See Retroactive.

RETROVERSIO *uteri*, in *Midwifery*, a diſorder to which pregnant women are occaſionally ſubject, and commonly occurring in the early ſtages of pregnancy, ſeldom ſo late as the fourth month; and conſiſting, as the term imports, in a diſtorted and unnatural poſition of the uterus. This diſorder was firſt demonſtrated by Dr. Hunter, in his public lectures, in the year 1754, and has been ſince illuſtrated in his tables of the gravid uterus. In this caſe the uterus may be *fully retroverted*, by means of the diſtenſion of the bladder, which, as it riſes upwards in the abdomen, where it has room to expand, naturally tends to drag along with itſelf the cervix uteri, and adjacent part of the vagina, to which it is fixed. Or when there is a coincidence of ſuch cauſes as, in ſome degree, obſtruct the revolution of the uterus, it will be only *partially*, or *half retroverted*. Or, again, when theſe cauſes operate powerfully in keeping the uterus ſteady, it will be ſo *little retroverted*, that the orifice of the uterus will be puſhing out of the body, as in a common procidentia. The particular form and ſtate of the pelvis may contribute, in many inſtances, to various degrees of the *retroverſion*; the pelvis, which is moſt capacious below, and narroweſt above, being the moſt diſpoſed to ſuch diſorders. They have been alſo occaſioned by frights and accidents, in the firſt months of pregnancy; and they have produced firſt a difficulty, and by degrees a ſuppreſſion of urine, and ſoon after a ſuppreſſion even of the inteſtinal diſcharge. The following method of treatment has uſually ſucceeded in this complaint: after the caſe has been ſuſpected from the ſuppreſſion of urine, and then certainly known by examination with the fingers, both in the vagina and in the rectum, the urine muſt be firſt completely drawn off by the catheter, and then a ſufficiently ſtimulating clyſter injected; and when the inteſtines have been thus well evacuated, the uterus has ſometimes recovered its natural ſituation; but as this is uncertain, it has been thought more adviſeable to replace it; becauſe if the impregnated uterus is once thrown into this unnatural poſition, and continues in it for ſome time, it will probably always remain ſo, unleſs reduced by art before it becomes ſo bulky as to be locked in the graſp of the pelvis; and in proportion as this proceſs advances, the diſcharge both of urine and of ſtool will become more difficult, and at length both will be entirely ſuppreſſed. When ſuch ſuppreſſions once begin, they aggravate the evil, not merely by cauſing pain, but by occaſioning a load of accumulated urine and fæces in the abdomen above the uterus, which preſſes it ſtill lower in the cavity of the pelvis; at the ſame time that the diſtention of the bladder, in this ſtate, draws up that part of the vagina and cervix uteri with which it is connected, ſo as to throw the fundus uteri ſtill more directly downwards. In order to reduce the uterus to its natural ſituation, the woman muſt be placed upon her knees and elbows, with her head and ſhoulders as low as poſſible; one hand muſt be introduced into the vagina, and two fingers of the other into the anus; and thus the operator muſt endeavour to replace the uterus, by puſhing it up with the two fingers, and by trying, at the ſame time, to draw down the upper part of the vagina. While there is reaſon to apprehend the *retroverſion* of the uterus, it will be favourable to be frequently in a recumbent poſture, and to take care that the bladder be never much diſtended with urine, nor the rectum and colon much loaded with fæces. London Med. Obſ. &c. vol. iv. p. 388, &c. vol. v. p. 104—110—378—381—388.

RETURN, Returna, or Retorna, in *Law*, hath divers acceptations. As

Return *of writs* by ſheriffs and bailiffs, is a certificate made to the court by the ſheriff, bailiff, &c. of what is done with regard to the execution of the writ directed to them.

Whence the day, on which the defendant is ordered to appear in court, and on which the ſheriff is to bring in the writ, and report how far he has obeyed it, is called the *return* of the writ; it being then returned by him to the king's juſtices at Weſtminſter. And it is always made returnable at the diſtance of at leaſt fifteen days from the date or teſte, that the defendant may have time to come up to Weſtminſter, even from the moſt remote parts of the kingdom; and upon ſome day in one of the four terms, in which the court ſits for the diſpatch of buſineſs. See RETURNS, infra.

Such alſo is the *return of a commiſſion*, which is a certificate, or anſwer of what is done by the commiſſioners to whom ſuch commiſſions, precepts, mandates, or the like, are directed.

RETURN is alſo uſed in caſe of a replevin. If a man diſtrain cattle for rent, &c. and afterwards juſtify or avow his act, ſo as it is found lawful, the cattle before delivered unto him that was diſtrained, upon ſecurity given to proſecute the action, ſhall now be *returned* to him that diſtrained them. See RETURNO *habendo*, and REPLEVY.

RETURN *of members of parliament*. See PARLIAMENT.

RETURN *to a mandamus*. See MANDAMUS.

RETURNS, RETURN-*days*, or *days in bank*, *dies in banco*, that is, days of appearance in the court of common pleas, uſually called *bancum*, or *commune bancum*, to diſtinguiſh it from *bancum regis*, or the court of king's bench, are certain days in each term peculiarly ſet apart for the ſeveral kinds of proceedings in any cauſe to be determined. Theſe days are generally at the diſtance of about a week from each other, and regulated by ſome feſtival of the church. On ſome one of theſe days in bank all original writs muſt be made returnable, and therefore they are commonly called the *returns* of that term; whereof every term has more or leſs, ſaid by the Mirror (cap. 5. § 108.) to have been originally fixed by king Alfred, but certainly ſettled as early as the ſtatute of 51 Hen. III. ſtat. 2. But though many of the *return*-days are fixed upon Sundays, yet the court never ſits to receive theſe *returns* till the Monday after; and, therefore, no proceedings can be had, or judgment can be given, or ſuppoſed to be given on the Sunday. See DAY.

Hilary term has four ſuch *returns*; viz. *octabis Hilarii*, eight days after Hilary day; *quindena Hilarii*, fifteen days; *craſtina Purificatione*, the day after the Purification; and *octabis Purificationis*, eight days after, incluſive.

Eaſter term has five *returns*; viz. *quindena Paſchæ*, fifteen days after Eaſter; *tres Paſchæ*, three weeks after; *menſe Paſchæ*, the day month after Eaſter; *quinque Paſchæ*, the day five weeks from Eaſter; and *craſtino Aſcenſionis Domini*, the day after Aſcenſion-day.

Trinity term has four *returns*; viz. *craſtino Trinitatis*, the day after Trinity; *octabis Trinitatis*, eight days after, incluſive; *quindena Trinitatis*, fifteen days after; and *tres Trinitatis*, three weeks after.

Michaelmas term has four *returns*, by ſtat. 24 Geo. II. cap. 48. viz. *craſtino Animarum*, morrow of All Souls; *craſtino Martini*, the morrow of St. Martin; *octabis Martini*, eight days after, incluſive; and *quindena Martini*, fifteen days after.

The firſt *return* in every term is, properly ſpeaking, the firſt day in that term; e. gr. the octave of St. Hilary, which falling on the thirteenth of January, the octave, or firſt day of Hilary term, is the twentieth of January; and this is called the ESSOIGN *day of term*. But by reaſon of the QUARTO *die poſt*, the court does not ſit, at the beginning of each term, for diſpatch of buſineſs, till the fourth day, as in Hilary term on the twenty-third of January; and in Trinity term, by ſtatute 32 Hen. VIII. cap. 21. not till the ſixth day; which is, therefore, uſually called and ſet down in the almanacs as the firſt day of TERM.

RETURN, in the *Military Language*, denotes the liſt of the ſick, given in once a week by the ſurgeon to the commanding officer of a regiment.

Commiſſioned officers are not put in the *returns*, which, on that account, are but an imperfect liſt of the ſick.

Twelve ſick, in a battalion of 780 private men, is the loweſt *return* that can be expected, even in the moſt healthy ſeaſon and climate, as well as beſt quarters. *Returns* are often much higher, but ſeldom exceed ſeventy in a battalion.

It is to be obſerved, that *returns* include all accidents unfitting a ſoldier for duty; together with a general ſtate of the army, regiment, or company. See Pringle's Obſerv. on the Diſeaſes of the Army, p. 12—36.

RETURN, in *Building*, denotes a ſide, or part, that falls away from the foreſide of any ſtraight work.

RETURNS *of a trench*, in *Fortification*, are the turnings and windings which form the lines of a trench.

RETURNS *of a mine*, in the *Military Art*, are the turnings and windings of the GALLERY.

RETURNING *ſtroke*, in *Electricity*, is an expreſſion uſed by lord Mahon to denote the effect produced by the *return* of the electric fire into a body from which, in certain circumſtances, it has been expelled.

In order to underſtand the meaning of theſe terms, it is neceſſary to premiſe that, according to the noble author's experiments, an inſulated ſmooth body, immerged within the electrical atmoſphere, but beyond the ſtriking diſtance, of another body, charged poſitively, is at the ſame time in a ſtate of threefold electricity. The end next to the charged body acquires negative electricity; the farther end becomes poſitively electrified; while a certain part of the body, ſomewhere between its two extremities, is in a natural, unelectrified, or neutral ſtate; ſo that the two contrary electricities balance each other. Moreover, it may be added, that if the body be not inſulated, or have a communication with the earth, the whole of it will be in a negative ſtate; a certain portion of its natural quantity of electricity being driven into the common maſs, by the preſſure, repulſion, or other action of the electric matter belonging to the charged prime conductor. Let us then ſuppoſe a braſs ball, which we may call A, to be conſtantly placed at the ſtriking diſtance of a prime conductor; ſo that the conductor, the inſtant when it becomes fully charged, explodes into it. Let another large conductor, which we may call the ſecond conductor, be ſuſpended, in a perfectly inſulated ſtate, farther from the prime conductor than the ſtriking diſtance, but within its electrical atmoſphere: let a perſon ſtanding on an inſulated ſtool touch this ſecond conductor very lightly with a finger of his right hand; while, with a finger of his left hand, he communicates with the earth, by touching very lightly a ſecond braſs ball fixed at the top of a metallic ſtand, on the floor, which we may call B; while the prime conductor is receiving its electricity, ſparks paſs (at leaſt if the diſtance between the two conductors is not too great) from the ſecond conductor to the inſulated perſon's right hand; while ſimilar and ſimultaneous ſparks paſs out from the finger of his left hand into the ſecond metallic ball B, communicating with the earth. Theſe ſparks are part of the natural quantity of electric matter belonging to the ſecond conductor, and to the inſulated perſon, driven from them into the earth, through the ball B, and its ſtand, by the elaſtic preſſure or action of the electrical atmoſphere of the prime conductor; the ſecond conductor, and the inſulated perſon, are hereby reduced to a negative ſtate. At length, however, the prime conductor, having acquired its full charge, ſuddenly ſtrikes into the ball B, of the firſt metallic ſtand, placed for that purpoſe at the ſtriking diſtance. The exploſion being made, and the prime conductor ſuddenly robbed of its elaſtic atmoſphere, its preſſure or action on the ſecond conductor, and on the inſulated perſon, as ſuddenly ceaſes; and the latter inſtantly feels a ſmart *returning ſtroke*, though he has no direct or viſible communication (except by the floor) either with the ſtriking or ſtruck body, and is placed at the diſtance of five or ſix feet from both of them. This *returning ſtroke* is evidently occaſioned by the ſudden re-entrance of the electric fire naturally belonging to his body and to the ſecond conductor, which had before been expelled from them by the action of the charged prime conductor upon them, and which *returns* to its former place in the inſtant when that action or elaſtic preſſure ceaſes. When the ſecond conductor and the inſulated perſon are placed in the denſeſt part of the electrical atmoſphere of the prime conductor, or juſt beyond the ſtriking diſtance, the effects are ſtill more conſiderable; the *returning ſtroke* being extremely ſevere aad pungent, and appearing conſiderably ſharper than even the main ſtroke itſelf, received directly from the prime conductor. Lord Mahon, in the application of this experiment, and of the doctrine deduced from it, obſerves, that perſons and animals may be deſtroyed, and particular parts of buildings may be conſiderably damaged, by an electrical *returning ſtroke*, occaſioned even by ſome very diſtant exploſion from a thunder cloud; poſſibly at the diſtance of a mile or more. It is certainly eaſy to conceive (ſays a very ingenious anonymous writer, in his reflections on this ſubject) that a charged extenſive thunder cloud muſt be productive of effects ſimilar to thoſe produced by the prime conductor. Like the conductor, while it continues charged, it will, by the ſuperinduced elaſtic electrical preſſure of its atmoſphere, drive into the earth a part of the electrical fluid naturally belonging to the bodies which are within the reach of its widely extended atmoſphere, and which will, therefore, become negatively electrical. This portion too of their electric fire will, on the exploſion of the cloud, at a diſtance, and the ceſſation of its action upon them, ſuddenly *return* to them, ſo as to produce an equilibrium, and reſtore them to their natural ſtate. But the effects are not ſo great, nor the danger ſo terrible, as the noble author ſeems to apprehend. If the quantity of electric fluid naturally contained, e. gr. in the body of a man, were immenſe or indefinite, his lordſhip's eſtimate between the effects producible by a cloud, and thoſe cauſed by a prime conductor, might be admitted; but ſurely an electrified cloud, how great ſoever may be its extent and the height of its charge, when compared with the extent and charge of a prime conductor, cannot expel from a man's body (or any other body) more than the natural quantity of electricity which it contains. On the ſudden removal, therefore, of the preſſure by which this natural quantity had been expelled, in conſequence of the exploſion of the cloud into the earth, no more (at the utmoſt) than his whole natural ſtock of electricity can re-enter his body, provided he be ſo ſituated, that the *returning* fire of other bodies muſt neceſſarily paſs through his body. But we have no reaſon to ſuppoſe that this quantity is ſo great, as that its ſudden re-entrance into his body ſhould deſtroy or even injure him.

In the experiment above deſcribed, the inſulated perſon receives into his body, at the inſtant of the *returning ſtroke*, not only all that portion of his own natural electric fire which had been expelled from it, but likewiſe tranſmits through it, at the ſame inſtant, in conſequence of his peculiar ſituation, all the electric fire of which the large ſecond conductor had been robbed, and which muſt neceſſarily repaſs through his body, to arrive at that conductor. To render the caſe ſomewhat parallel, in natural electricity, the man's body muſt be ſo peculiarly circumſtanced, ſuppoſing him to be in a houſe, that the electric matter which has been expelled from the houſe into the earth, by the preſſure of an extenſive thunder cloud, could not return back into the building, on the exploſion of the cloud at a diſtance, without paſſing through his body; a caſe not likely to happen, unleſs the houſe were inſulated (like the ſecond conductor in the preceding experiment), and his body became the channel through which alone the houſe could have its electric matter reſtored to it. It appears much more probable, that the electric matter returns to the houſe through the ſame channels by which it before inſenſibly paſſed out, and with equal ſilence, though more ſuddenly. In the caſe of a man who is abroad, and in an open field, during the time of an exploſion; as he is unconnected with other maſſes of matter above him no more than the preciſe quantity of electric fire, which had been before expelled from his body, will ſuddenly return into it at the inſtant of a diſtant exploſion; and that this quantity is not very large, may be inferred from many conſiderations. Allowing, therefore, the exiſtence of the *returning ſtroke*, as ſufficiently aſcertained and well illuſtrated, in a variety of circumſtances, by the author's experiments, the magnitude and danger of it are not ſo alarming as he apprehends. Lord Mahon's Principles of Electricity, &c. 4to. 1779. p. 76—113—131. Monthly Review, vol. lxii. p. 436—442.

RETURNO *habendo*, or **Returnum** *averiorum*, a writ which lies for him who has avowed a diſtreſs made of cattle, and proved his diſtreſs to be lawfully taken; for the *return* of the cattle diſtrained unto him, which before were replevied by the party diſtrained, upon ſurety given to purſue the action.

The ſame writ is granted when the plaint or action is removed by *recordare*, or *accedas ad curiam*, into the court of common pleas; and he whoſe cattle were diſtrained makes default, and does not proſecute his action. See Replevy.

RETURNUM *averiorum*, a judicial writ, the ſame with retorno *habendo*.

Returnum *irreplegiabile*, a judicial writ, ſent out of the Common Pleas to the ſheriff, for the final reſtitution or return of cattle to the owner, unjuſtly diſtrained damage-feaſant, and ſo found by the jury before juſtices of aſſize in the county, or otherwiſe through default of proſecution.

RETUSE *leaf*, *retuſum folium*, among *Botaniſts*. See Leaf.

REVE, **Reeve**, or **Greve**, in *Ancient Cuſtoms*, the bailiff of a franchiſe, or manor, thus called; eſpecially in the weſtern parts.

Hence, *ſhire-reve*, ſheriff, *port-greve*, *church-reve*, &c. See Sheriff, Port-Greve, &c.

Reve, *reva*, is alſo uſed, in *Ancient Cuſtoms*, for a duty or impoſition on merchandizes imported.

M. Du-Cange derives the word from the Latin *roga*, of *rogare*, *to aſk*; the word formerly ſignifying a tribute anciently granted princes at their requeſt, as a free gift.

Reve-*land*. The land which in Domeſday is ſaid to have been *thane-land*, and afterwards converted into *reve-land*, ſeems to be ſuch lands as being reverted to the king after the death of his thane, who had it for life, was not ſince granted out to any by the king, but reſted in charge upon the account of the *reve*, or bailiff of the manor. Spelm. Feuds, cap. 24.

REVEALED *religion*. See Religion, and Revelation.

Revealed *theology*. See Theology.

REVEILLE, formed of the verb *reveiller*, *to awake*, a beat of drum in the morning, intended to give notice that it is day-break; and that the ſoldiers are to ariſe, and the ſentinels forbear challenging.

REVELATION, *revelatio*, formed from *revelo*, of *re*, and *velum*, q. d. *to unveil*, the act of revealing, or making a thing public, which before was a ſecret, or unknown.

The *revelation* of a confeſſion, made by the confeſſor, is adjudged, in the Romiſh church, to deſerve the moſt exemplary puniſhment.

Revelation is uſed, by way of eminence, for the diſcoveries made by God to his prophets, &c. and by them to the world.

Revelation is more particularly uſed for the diſcovery which God has made to the world, by the mouths of his prophets, of certain points of faith and duty, which they could not learn from natural reaſon.

Religion is divided into natural religion and *revelation*, or *revealed* religion.

The Chriſtian *revelation* is that made by Chriſt, and his apoſtles, in the New Teſtament. The Jewiſh *revelation* is that made by Moſes and the prophets, in the Old Teſtament. See Christian *religion*, and Judaism.

A late author obſerves, ſomewhat invidiouſly, that it is the common method of all new *revelations*, to be built on precedent ones. Thus, the miſſion of Moſes to the Iſraelites, ſuppoſes a former *revelation* to Abraham, &c. The miſſion of Chriſt ſuppoſes that of Moſes; and the pretended miſſion of Mahomet ſuppoſes the miſſion of Chriſt. The miſſion of Zoroaſter to the Perſians ſuppoſes the religion of the Magi, &c.

The general foundation of all *revelation* is this, that God is pleaſed man ſhould know ſomething relating to himſelf, his own nature, diſpenſation, &c. which the natural faculties with which he was pleaſed to create him could not attain to; and that he requires ſome duty or ſervice at our hands more than what neceſſarily follows from the relation we are under to him as our creator, preſerver, &c.

This is alſo urged by deiſts, to the diſcredit of all particular *revelations*, as derogating from the perfections of God; ſuch ſupplementary informations and inſtructions arguing, according to them, a prior deficiency in the eſtabliſhed œconomy of nature, of which he is the author. But many able anſwers have been given to ſuch cavils.

Particular or occaſional *revelations* have their particular geniuſes, characteriſtics, and deſigns. That made by Moſes and the prophets chiefly related to the nation of the Jews, conſidered as the deſcendants of Abraham; its deſign ſeems to have been to reſcue that people from their ſlavery; to ſettle them in a new plantation; to give them a ſet of laws; to new form their manners; to ſupport them under difficulties and dangers of their enemies, from an opinion of their being under the immediate direction and appointment of God; to keep them from intermixing again with their neighbours, from an opinion of their being a choſen people, and of a Meſſiah to be born among them; and thus to preſerve and tranſmit the knowledge and hope of the Meſſiah, till the period of his appearance arrived. To ſome other of theſe ends do all the Old Teſtament prophecies ſeem to tend.

The Chriſtian *revelation* is founded on a part of the Jewiſh. The Meſſiah promiſed in the one is *revealed* in the other.

All the reſt of the Jewiſh *revelation* which related peculiarly to the Jewiſh people, is here ſet aſide; and only that part of it in which the world in general was intereſted, and that relating to the advent, offices, and character of the Meſſiah, is retained.

Indeed, it muſt be owned, the Jews ever looked on this to be as peculiar to themſelves as any of the reſt; the Meſſiah was promiſed to them; he was to be their deliverer, their reſtorer, &c. and under this character he actually appeared. But, upon taking place of this new *revelation*, a new ſcene was opened, different from what many of them apprehended, becauſe they miſinterpreted the prophecies relating to the Meſſiah. The ceremonial part of their inſtitution, local and temporary in its eſtabliſhment and uſe, was aboliſhed; and the Meſſiah appeared, not as they erroneouſly imagined, to be the reſtorer of their civil ſovereignty and liberties, which were now fallen into the hands of the Romans; but to reſtore and re-eſtabliſh mankind in general, who had loſt their original righteouſneſs, and were become ſlaves of ſin; to preach repentance and remiſſion; and at laſt to ſuffer death, that all who believed in him might not die, but have everlaſting life.

Such is the tenor and deſign of the Chriſtian *revelation*, which, in the event, was ſo far from being what it had been apprehended to be by the people to whom it was firſt promiſed, that it proved the very reverſe; and, inſtead of re-eſtabliſhing and confirming the other branches of their *revelation*, it ſuperſeded, and ſet them all aſide. The pale was now broken down, and the being of the ſeed of Abraham ceaſed to be a privilege, all the world being invited on the ſame terms with the Jews.

The conſequence was, that the Jews, denying this to be the Meſſiah that had been promiſed to them, becauſe their pride and prejudice prevented their diſcerning the accompliſhment of their ancient prophecies in him, were generally excluded from the privileges of that miſſion which they had vainly ſuppoſed to be not only primarily but wholly intended for themſelves; and had their ruin completed from the very means whence they expected their redemption: becauſe they expected a redemption, different in its nature, from that which their own prophecies, fairly interpreted, propoſed.

REVELS, formed from the French *reveiller, to awake*, as alluding to the night ſeaſon, when they were chiefly held; entertainments of dancing, maſking, gaming, acting comedies, farces, &c. anciently very frequent in inns of courts, at certain ſeaſons, and in noblemen's houſes, &c. but now much diſuſed.

The officer who has the direction or ordering of the *revels* at court, is called the MASTER *of the revels*.

REVENUE, the yearly rent or profits ariſing to a man from his lands, poſſeſſions, &c.

The word is French, formed from *revenir, to return*. Whence *revenue* is ſometimes alſo uſed in ancient authors for a return; as the *revenue* of Eaſter.

The *revenues* of the Engliſh clergy were firſt fixed by king Ethelwulph, anno 853, who granted them for ever the tithe of all goods, and the tenth part of all the lands of England, free from all ſecular ſervice, taxes, impoſitions, &c. Though Rapin obſerves, that tithes were ſettled on the clergy by the laws of Ina and Offa. But theſe laws were probably not obſerved, or perhaps Ethelwulph extended the law of TITHES all over England.

The certain *revenues* of the king of England were anciently greater than thoſe of any king in Europe; and till the time of the civil wars they enjoyed in domains and fee-farm-rents almoſt enough to diſcharge all the ordinary expences of the crown, without any tax or impoſition on the ſubject.

The *revenue* which the Britiſh conſtitution hath veſted in the royal perſon, in order to ſupport his dignity, and maintain his power, is either *ordinary* or *extraordinary*.

The king's *ordinary revenue* is ſuch, as hath either ſubſiſted time out of mind in the crown, though, by reaſon of royal grants, the king be not at preſent in the actual poſſeſſion of the whole of it; or elſe has been granted by parliament, by way of purchaſe or exchange for ſuch of the king's inherent hereditary *revenues*, as were found inconvenient to the ſubject. Of the king's ordinary *revenues* there are four, which are of an eccleſiaſtical kind. Such are, 1. The cuſtody of the the temporalities of biſhops, or all the lay *revenues*, lands, and tenements (in which is included his barony), which belong to an archbiſhop's or biſhop's ſee, which, upon the vacancy of the biſhoprick, revert immediately to the king, as his right, during the vacancy. This branch of the royal *revenue* was formerly very conſiderable, but is now, by cuſtomary indulgence, reduced almoſt to nothing; for, at preſent, as ſoon as the new biſhop is conſecrated and confirmed, he uſually receives the reſtitution of his temporalities, entire and untouched, from the king; and then, but not ſooner, he has a fee-ſimple in his biſhoprick, and may maintain an action for the profits. 2. A CORODY out of every biſhoprick, or a right of ſending one of his chaplains to be maintained by the biſhop, or to have a penſion allowed him till the biſhop promotes him to a benefice; which is now fallen into total diſuſe. 3. The tithes ariſing in extra-parochial places, which are held, indeed, under an implied truſt, that the king will diſtribute them for the good of the clergy in general. 4. The FIRST-*fruits* and TENTHS of all ſpiritual preferments in the kingdom.

The following branches of the king's *ordinary revenue* are of a lay or temporal nature. 5. The firſt of theſe conſiſts in the rents and profits of the demeſne lands of the crown, which are either the ſhare reſerved to the crown at the original diſtribution of landed property, or ſuch as came to it afterwards by forfeitures or other means, and were formerly very extenſive, but are now contracted within a very narrow compaſs, having been almoſt entirely granted away to private ſubjects. 6. The advantages which uſed to ariſe to the king from the profits of his military tenures, to which moſt lands in the kingdom were ſubject, till they were in a great meaſure aboliſhed by the ſtatute 12 Car. II. cap. 24. to which may be alſo referred the profitable prerogative of PURVEYANCE and PRE-EMPTION; which branches of the royal *revenue* and power were reſigned entirely by king Charles at his Reſtoration; in recompence for which the parliament ſettled on him, his heirs and ſucceſſors for ever, the hereditary EXCISE of fifteen pence per barrel on all beer and ale ſold in the kingdom, and a proportionable ſum for certain other liquors; ſo that this hereditary exciſe forms the ſixth branch of his majeſty's ordinary revenue. 7. The rents payable to the crown by ſuch perſons as are licenſed to ſell WINE by retail throughout England, except in a few privileged places, firſt ſettled on the crown by the ſtatute 12 Car. II. cap. 25. but aboliſhed by the ſtatute 30 Geo. II. cap. 19, when an annual ſum of upwards of 7000*l.* per annum, iſſuing out of the new ſtamp duties impoſed on wine licences, was ſettled on the crown in its ſtead. 8. The profits ariſing from the king's FORESTS, conſiſting principally in amercements or fines levied for offences againſt the foreſt-laws, for levying which few, if any, courts have been held ſince 1632, 8 Car. I. 9. The profits ariſing from the king's ordinary courts of juſtice; conſiſting not only in fines impoſed upon offenders, forfeitures of recognizances, and amercements levied upon defaulters, but alſo in certain fees due to the crown in a variety of legal matters; as for ſetting the great ſeal to charters, original writs and other forenſic proceedings, and for permitting fines to be levied of lands in order to bar entails, or otherwiſe to enſure their title. Theſe, in proceſs of time have been almoſt all granted to private perſons, or elſe appropriated to certain particular uſes. All future grants of theſe, by 1 Ann. ſtat. 2. cap. 7. are to endure for no longer time than the prince's life who grants them. 10. The right to ROYAL *fiſh*. 11. The *revenue* ariſing from ſhipwrecks, which is frequently granted out to lords of manors, as a royal franchiſe. See WRECK. 12. The right to mines of ſilver and gold. See MINE. 13. The *revenue* of TREASURE-*trove*. 14. WAIFS. 15. ESTRAYS, which the law gives to the king as the general owner and lord paramount of the ſoil; though they now moſt commonly belong to the lord of the manor, by ſpecial grant from the crown. 16. Forfeitures of lands and goods for offences. See CONFISCATE and DEODAND. Theſe are for the moſt part granted out to the lords of manors, or other liberties. 17. The *revenue* ariſing from the ESCHEATS of lands, reverting, upon the default of heirs to ſucceed to the inheritance, to the king, who is eſteemed, in the eye of the law, the original proprietor of all the lands in the kingdom. 18. The laſt branch of the king's *ordinary revenue* conſiſts in the cuſtody of IDIOTS. Such is the king's *ordinary revenue*, or the proper patrimony of the crown, which was formerly very large and capable of being increaſed to a magnitude truly formidable; but, fortunately for the liberty of the ſubject, this hereditary landed *revenue* is now ſunk almoſt to nothing; and the caſual profits, ariſing from the other branches of the *cenſus regalis*, are likewiſe almoſt all of them alienated from the crown. In order to ſupply the deficiencies of which, we are now obliged to have recourſe to new methods of raiſing money, unknown to our early anceſtors; which methods conſtitute the king's *extraordinary revenue*. See TAX, FUND, and NATIONAL *debt*. We ſhall here obſerve, that the *aggregate* FUND ſtands mortgaged by parliament to raiſe an annual ſum for the maintenance of the king's houſhold, and the CIVIL *liſt*. For this purpoſe, in the late reigns, the produce of certain branches of the exciſe and cuſtoms, the poſt-office, the duty on wine licences, the revenue of the remaining crown lands, the profits ariſing from courts of juſtice (which articles include all the hereditary *revenues* of the crown), and alſo a clear annuity of 120,000*l.* in money, were ſettled on the king for life, for the ſupport of his majeſty's houſhold, and the honour and dignity of the crown. And, as the amount of theſe ſeveral branches was uncertain (though in the laſt reign they were computed to have ſometimes raiſed almoſt a million), if they did not ariſe annually to 800,000*l.* the parliament engaged to make up the deficiency. But his preſent majeſty, ſoon after his acceſſion, having accepted the limited ſum of 800,000*l.* per annum for the ſupport of his civil liſt (charged alſo with three life-annuities, to the princeſs of Wales, the duke of Cumberland, and the princeſs of Amelia, to the amount of 77,000*l.*) the ſaid hereditary and other *revenues* are now made a part of the aggregate fund, which is charged with the payment of the whole annuity to the crown of 800,000*l.* per annum. The expences defrayed by the civil liſt are thoſe that in any ſhape relate to civil government; as the expences of the houſhold; all ſalaries to officers of ſtate, to the judges, and each of the king's ſervants; the appointments to foreign ambaſſadors; the maintenance of the queen and royal family; the king's private expences, or privy purſe; and other very numerous outgoings, as ſecret ſervice money, penſions, and other bounties; which ſometimes have ſo far exceeded the *revenues* appointed for that purpoſe, that application has been made to parliament to diſcharge the debts contracted on the civil liſt; as particularly in 1724, when one million was granted for that purpoſe by the ſtatute 11 Geo. I. cap. 17. and in 1769, when half a million was appropritated to the like uſe, by the ſtatute 9 Geo. III. cap. 34.

The civil liſt is, indeed, properly the whole of the king's *revenue* in his own diſtinct capacity; the reſt being rather the *revenue* of the public, or its creditors, though collected and diſtributed again in the name and by the officers of the crown.

The whole *revenue* of queen Elizabeth did not amount to more than 600,000*l.* a year; that of king Charles I. was 800,000*l.* and the *revenue* voted for king Charles II. was 1,200,000*l.* but under theſe ſums were included all kinds of public expence. The ſame *revenue*, ſubject to the ſame charges, was ſettled on king James II. but by the increaſe of trade, and better management, it amounted on an average to a million and a half per annum (beſide other additional cuſtoms, granted by parliament, which produced an annual *revenue* of 400,000*l.*) out of which his fleet and army were maintained at the yearly expence of 1,100,000*l.* At this time the *revenues* of the king of France were computed at ſeven millions ſterling; and thoſe of the ſtates of Holland at three millions. After the Revolution, when the parliament took into its own hands the annual ſupport of the forces, both maritime and military, a civil liſt *revenue* was ſettled on the new king and queen, amounting, with the hereditary duties, to 700,000*l.* per annum; and the ſame was continued to queen Anne and king George I. That of king George II. was nominally augmented to 800,000*l.* and in fact was conſiderably more. But that of his preſent majeſty is expreſly limited to that ſum; and by reaſon of the charges upon it, amounts at preſent to little more than 700,000*l.* Blackſt. Comm. vol. i. chap. viii. The clear yearly ſum of 100,000*l.* to commence from the fifth of January, 1777, over and above the ſum of 800,000*l.* before granted, was granted to his majeſty out of the aggregate fund by ſtat. 17 Geo. III. To which if we add the *revenue* from Hanover, Ireland, Wales, Lancaſter, Cornwall, the 4½ per cent. in the Weſt Indies, the coal-pits at Louiſbourg, and the intereſt of debts due to the late king, the clear royal income may be eſtimated at conſiderably more than one million; and the expenditure for one year, viz. from Jan. 6, 1776, to January 5, 1777, has been ſtated at 984,100*l.* but by ſome late regulations (1782) is reduced to 850,000*l.*

For more particulars of this kind, ſee POLITICAL *arithmetic*, FUND, and TAX.

REVENUE, *auditors of the.* See AUDITOR.

REVENUE, *court of.* See COURT *of Exchequer.*

REVENUE, *officers of*, are excluded from voting in elections for members of parliament by 22 Geo. III.

REVENUE, *revenu*, in *Hunting*, a fleſhy maſs or lump, formed chiefly of a cluſter of whitiſh worms on the heads of deer, and ſuppoſed to occaſion them to caſt their horns, by thoſe worms gnawing the roots thereof.

The *revenue* diſtilled, is ſaid to help women in travail.

REVENUE is alſo uſed for a new tail of a partridge, growing out after the loſs of a former. The *revenue* is meaſured by fingers: thus they ſay, a partridge of two, three, four fingers *revenue.*

REVERBERATION, *reverberatio*, formed from *re*, and *verbero*, q. d *I beat again*, in *Phyſics*, the act of a body repelling or reflecting another, after its impinging thereon. In the glaſs-men's furnace the flame *reverberates* or bends back again to burn the matter on all ſides. Echoes are occaſioned by the *reverberation* of ſounds from arched obſtacles.

Reverberation and *reſilition* refer to the ſame action; only the one to the agent, the other to the patient. A poliſhed body *reverberates* the rays all around; the *reſilition* of the rays does not ariſe from their ſtriking againſt the ſolid parts of bodies. See RELECTION.

REVERBERATION, in *Chemiſtry*, denotes a kind of circulation of the flame, by means of a *reverberatory*; or the return of the flame from the top of the furnace back to the bottom, chiefly uſed in calcination.

Reverberation is of two kinds. The firſt with a *cloſe fire*; that is, in a *reverberatory* furnace, where the flame has no vent a-top; being covered with a dome, or capital, which repels its action back on the matter, or the veſſel that contains it, with increaſed vehemence.

After this manner are refining, the diſtillation of acid ſpirits, &c. performed.

Reverberation with an *open fire*, is that performed in a furnace or *reverberatory*, whoſe regiſters are all open; uſed in calcination, &c.

REVERBERATORY, or **REVERBERATING** *furnace*, is a chemical furnace built cloſe all round, and covered at the top with a capital of brick or tiles, ſo as not to give any vent to the heat or flame, but to determine it to *reverberate* or turn back from the brick-work with new force, upon the matters placed at bottom.

When the fire has no vent or paſſage a-top, it is a whole *reverberatory*; when the middle of the capital is open, and only the ſides cloſe, ſo that there is only a half circulation of the flame, it is called a *half reverberatory.*

The *reverberating* furnace is chiefly uſed in the fuſion and calcination of metals and minerals, and on other occaſions, where the moſt intenſe heat is required, as in aſſaying, &c. Whence it is alſo called the *melting furnace*, and *aſſaying furnace.* See *Reverberating* FURNACE.

REVEREND, *reverendus*, a title of reſpect given to eccleſiaſtics.

The religious abroad are called *reverend* fathers; and abbeſſes, prioreſſes, &c. are called *reverend mothers.*

With us, biſhops are *right reverend*; and archbiſhops *moſt reverend.* In France, their biſhops, archbiſhops, and abbots, are all alike *reverendiſſimes, moſt reverend.*

REVERIE, a term purely French, frequently uſed of late in Engliſh, to ſignify a delirium, raving, or diſtraction. It is an ill ſign in fevers when the patient falls into a *reverie.*

Hence alſo *reverie* comes to be uſed for any ridiculous, extravagant imagination, action, or propoſition, a chimera or viſion. Thus we ſay, authors obtrude abundance of their *reveries* upon us for ſolid truths.

But the moſt ordinary uſe of the word *reverie*, among Engliſh writers, is for a deep, diſorderly muſing or meditation, equivalent to what we popularly call a *brown ſtudy.* Thus, a litle diſtraction I would allow; but for that continued ſeries of *reveries* ſome people are guilty of, who are ever abſent from the place where you ſee them, and are never preſent any where, it is inexcuſable.

REVERS, *battery de.* See BATTERY.

REVERSATA *arma.* See ARMA.

REVERSE, in the *Military Art*, ſignifies on the back, or behind. Thus we ſay, a *reverſe view*, a *reverſe commanding ground*, a *reverſe battery*, &c.

REVERSE, formed of *re, again*, and *verſus, turned*, in *Law*, &c. To *reverſe*, ſignifies to undo, repeal, or make void.

A judgment may be *reverſed* or voided for matters foreign to or *dehors* the record, that is, not apparent upon the face of it, by writ of error, and by act of parliament. The effect of falſifying or reverſing an outlawry is, that the party ſhall be in the ſame plight as if he had appeared upon the capias; and if it be before plea pleaded, he ſhall be put to plead to the indictment; if after conviction, he ſhall receive the ſentence of the law; for all the other proceedings, except only the proceſs of outlawry for his non-appearance, remain good and effectual as before. But when judgment, pronounced upon conviction, is falſified or *reverſed*, all former proceedings are abſolutely ſet aſide, and the party ſtands as if he had never been at all accuſed; reſtored in his credit, his capacity, his blood, and his eſtates. But he ſtill remains liable to another proſecution for the ſame offence. See ATTAINDER, JUDGMENT, and OUTLAWRY.

REVERSE of a medal, coin, &c. denotes the ſecond, or back ſide; in oppoſition to the head or principal figure.

F. Chamillart, a Jeſuit, has an expreſs diſſertation on this point, whether or no the *reverſes* of medals have always a regard to the emperors or empreſſes whoſe heads are repreſented on the front-ſide of the medal? He ſays, that till of late the antiquaries have made no doubt of it; but that there are now ſeveral authors of another opinion.

The knowledge of the *reverſes* of medals conſtitutes a diſtinguiſhing part of this ſcience. With reſpect to the conſular medals, it is obſerved, that the ſame *reverſe* is common to many of them; as Caſtor and Pollux on horſeback, firſt uſed; then a Victory, or one of the gods; or the perſon to whoſe honour the medal was ſtruck, driving a chariot with two or four horſes; whence the denomination of the DENARIUS *bigatus*, and *quadrigatus.* The ratis or ſhip, or prow of a ſhip, as an emblem of naval power, was no uncommon *reverſe* on the conſular coins; which were, on this account, called *ratiti.* Some of the conſular medals, that bore on the face the impreſs of their ancient kings, preſerved on the *reverſe* the record of ſome worthy action which they had performed, as the famous aqueduct on the *reverſe* of Ancus, in honour of his having begun it. Medals, ſtruck on occaſion of founding colonies, have ſometimes on the *reverſe* a prieſt following a yoke of oxen, with a plough; deſigned to denote the manner in which the boundaries of colonies were marked out, or that they were planted by the common people; and thoſe trophies that are ſometimes ſeen on medals of this kind, ſignify that they were planted by the veteran ſoldiers.

The *reverſes* of imperial medals are very various; but the chief of them may be reduced to three claſſes, viz. figures or perſonages; public monuments or buildings; and inſcriptions. The figures are ſometimes thoſe of princes in miniature, whoſe portraits are exhibited more at large on the face; as on the *reverſes* of the emperors of the family of Conſtantine, we often ſee the emperor ſtanding with a labarum in his right hand, and a globe, ſurmounted with a victory, in his left. Sometimes the emperor is diſguiſed under the figure of ſome god; as on the *reverſe* of a Diocleſian, who had aſſumed the name Jovius, he appears in the figure of Jupiter, ſitting in a chair, with a globe in his hand, ſurmounted with a Victory; the legend being IOVI. H. U C. C. i. e. *Hoc voluerunt conſules.* Sometimes the figure on the *reverſe* is ſome relation of that on the face; as Auguſtus on the *reverſe* of Julius, and Claudius on the *reverſe* of his mother Antonia. The figure of ſome deity is ſometimes ſeen on the *reverſe*; as Minerva on the *reverſe* of a Domitian; and the goddeſs Salus, with a patera in her hand, ſacrificing to Eſculapius, on the *reverſe* of a Marcus Aurelius. The virtues for which the emperors were or wiſhed to be celebrated, are alſo frequently expreſſed by the figures on the *reverſes*; as Virtue or Courage, repreſented by a bold armed woman with a ſpear in her right hand, and a parazonium in her left, on the *reverſe* of a Domitian; Liberty, carrying in her right hand the cap of liberty, and in her left the wand called rudis or vindicta, on the *reverſe* of a Commodus; and Equity, with a ſpear in her right hand, and a balance in her left, on the *reverſe* of a Veſpaſian. The virtues of the ladies are alſo celebrated on the *reverſes* of their medals; as Piety, in the habit of a Veſtal virgin, ſtrewing frankincenſe on an altar, on the *reverſe* of a Fauſtina; Fœcunditas on another medal of the ſame, and Spes Reipublicæ, expreſſed by a female figure, wearing a helmet to repreſent the republic, and two children at her breaſts, on the *reverſe* of a Maximiana Fauſta, ſecond wife of Conſtantine the Great. Provinces are alſo repreſented by figures or perſonages, denoting either the emperor's conqueſt or care of them; as Judæa, ſitting in a melancholy poſture at the bottom of a pillar adorned with trophies, to ſignify her captive ſtate, on the *reverſe* of a Veſpaſian; and Italia, with a cornucopia, in her right hand, to denote her fruitfulneſs; a crown of towers on her head, to repreſent her many cities; a ſceptre in her left hand, and ſitting on a globe, to ſhew that ſhe was ſoverign of nations, on the *reverſe* of a Commodus. Moreover, the figure is ſometimes deſigned to immortalize ſome worthy action of the emperor; as the goddeſs Moneta, with a cornucopia in her left hand, and a balance in her right, on the *reverſe* of a Domitian, to denote his care about the public coin. There are ſometimes two, three, or more figures, on the ſame *reverſe*; as Honos and Virtus on the *reverſe* of Galba; and three kings, with the emperor crowning them, on a medal of Trajan. There are alſo the figures of animals on the *reverſes* of ſome medals; as the eagle and peacock, to denote the apotheoſis of princes and princeſſes; the crocodile, as the ſymbol of Egypt; a ſerpent, of Eſculapius; a camel of Arabia, &c. and elephants in trappings on the *reverſe* of an Antoninus Pius and a Severus, importing that theſe emperors procured theſe beaſts to entertain the people at the public ſhews. We meet alſo with fabulous animals; as the griffin on the *reverſe* of one medal of Gallienus, a centaur on another, and a phœnix on ſome medals of Conſtantine and his ſons, denoting the perpetuity of the empire.

The ſecond ſort of *reverſes* comprehends public monuments and buildings; as the Temple of Janus ſhut, on the *reverſe* of a Nero, to ſignify the univerſal peace he gave to the empire; the Macellum, or ſhambles, which he cauſed to be erected, on another; the ſumptuous Bridge built by Trajan over the Tiber, on the *reverſe* of one of his medals; and the Amphitheatre and Naval Column, on thoſe of Titus.

The third ſort of *reverſes* includes inſcriptions on the table or field of the medal. On ſeveral Latin and Greek imperial medals, we find nothing on the reverſe but S. C. or Δ. E for δημαρχικης εξουσιας, incloſed in a crown. Others repreſent ſignal occurrences; as VICTORIA GERMANICA IMP. VI. COS. III. on the *reverſe* of M. Aurelius. Others have titles of honour granted to the princes; as S. P. Q. R. OPTIMO PRINCIPI, on the *reverſe* of a Trajan, and alſo of an Antoninus Pius. Other inſcriptions again have reſpect to public vows, which were made for the emperor every ten years, or ſometimes, in the lower empire, every five years. Thus we have on the *reverſe* of a Conſtantius VOTIS XXX. MULTIS XXXX. importing probably their engagement to make new vows at the expiration of thirty years, that he might reign forty years.

Beſides the *reverſes* already enumerated, there are others, called by Addiſon riddles, which cannot be referred to any of the above claſſes. Thus, Mercury in the form of a Terminus, ſtanding on a thunder-bolt, on the *reverſe* of an Auguſtus, was probably intended for a rebus, to expreſs the ſenſe of that emperor's motto, *feſtina lente.* Inſtruments of religion were ſymbols of the pontifex maximus, and ſignified the piety of the prince on whoſe coin they appear; as the lituus, the ſimpulum, the aſperſorium, and the capula, on the *reverſe* of a Nerva. Two hands joined, holding two ears of corn, and a caduceus betwixt them, on the *reverſe* of a Titus, import the good harmony and union ſubſiſting betwixt the prince and the public, the peace ariſing from ſuch an union, and the plenty, which is the fruit of ſuch a peace. Jennings's Introduction to the Knowledge of Medals, p. 44, &c. Addiſon's Three Series of Medals, in his Works, vol. i. p. 522, &c. See MEDALS.

REVERSE, in *Fencing*, a back-ſtroke.

REVERSED, in *Heraldry*, a thing turned backwards, or upſide down.

REVERSED *talon*, in *Architecture*. See TALON.

REVERSING, or **RENVERSING**, in *Muſic*, the inverting the order of the parts; that is, placing the higher part, or treble, in the room of the lower part or baſs.

Reverſing is frequently practiſed in figurative counterpoint, where the baſs ſerves as treble, and the treble at the ſame time, as baſs; and all this in ſuch manner, as that the harmony, though very different, is yet as correct as before the *reverſing*, when the parts were in their natural order.

A *reverſed* fugue, or counterfugue, called by the Italians *per contrarii movementi*, is when the guida falls, and the other, inſtead of imitating by falling, imitates by riſing; or, it is a figure *per arſin & theſin.*

REVERSION, *reverſio*, in *Law*, is defined by Coke, a returning of lands, &c. into the poſſeſſion of the donor, or his heirs, after the expiration of the term for which they were given or granted to another. Or, an eſtate in *reverſion*, is the reſidue of an eſtate left in the granter, to commence in poſſeſſion after the determination of ſome particular eſtate granted out by him.

The word has a double acceptation. The firſt is, *jus revertendi, cum ſtatus poſſeſſionis defecerit*; which is no more than an intereſt in the land, when the occupation or poſſeſſion of it ſhall fall.

The ſecond is, when the poſſeſſion and eſtate, which was parted with for a time, ceaſeth, and is determined in the perſon of the alienees, aſſignees, grantees, or their heirs, or effectually returns to the donor, his heirs or aſſigns, whence it was derived.

This is the moſt proper ſignification of the word, which is derived from *revertor: Et apte dici non poteſt* reverſio, *antequam revertatur in facto.* Littlet.

The difference between a *reverſion* and a REMAINDER conſiſts in this, that a remainder is general, and may remain or belong to any man but him that granteth or conveyeth the land, &c.

Whereas a *reverſion* is to himſelf, from whom the conveyance of the land, &c. proceeded, and is commonly perpetual as to his heirs alſo. And yet ſometimes *reverſion* is confounded with remainder.

A *reverſion* is never created by deed or writing, but ariſes from conſtruction of law; a remainder can never be limited, unleſs by either deed or deviſe. But both are equally transferable, when actually veſted, being both eſtates *in præſenti*, though taking effect *in futuro.* The uſual incidents to *reverſions* are ſaid to be fealty and rent. When no rent is reſerved on the particular eſtate, fealty however reſults of courſe, as an incident quite inſeparable, and may be demanded as a badge in tenure, or acknowledgment of ſuperiority, being frequently the only evidence that the lands are holden at all. Where rent is reſerved, it is alſo incident, though not inſeparably ſo, to the *reverſion.* The rent may be granted away, reſerving the *reverſion*; and the *reverſion* may be granted away, reſerving the rent, by ſpecial words; but by a general grant of the *reverſion*, the rent will paſs with it, as an incident thereunto; though by the grant of the rent generally, the *reverſion* will not paſs. The incident paſſes by the grant of the principal, but not *e converſo*; for the maxim of the law is, *acceſſorium non ducit, ſed ſequitur, ſuum principale.*

The law has carefully diſtinguiſhed remainders from *reverſions*. Thus, if one ſeiſed of a paternal eſtate in fee makes a leaſe for life, with remainder to himſelf and his heirs, this is properly a mere *reverſion*, to which rent and fealty ſhall be incident; and which ſhall only deſcend to the heirs of his father's blood, and not to his heirs general, as a remainder limited to him by a third perſon, would have done; for it is the old eſtate, which was originally in him, and never yet was out of him. And ſo, likewiſe, if a man grants a leaſe for life to A, reſerving rent with *reverſion* to B and his heirs, B hath a remainder deſcendible to his heirs general, and not a *reverſion* to which the rent is incident; but the granter ſhall be entitled to the rent, during the continuance of A's eſtate.

For the aſſiſtance of thoſe who have any eſtate in remainder, *reverſion*, or expectancy, after the death of others, againſt fraudulent concealments of their deaths, it is enacted by 6 Ann. cap. 18. that all perſons on whoſe lives any lands or tenements are holden, ſhall (upon application to the court of chancery, and order made thereupon) once in every year, if required, be produced to the court or its commiſſioners; or, upon neglect or refuſal, they ſhall be taken to be actually dead, and the perſon entitled to ſuch expectant eſtate may enter upon and hold the lands and tenements, till the party ſhall appear to be living. Blackſt. Comm. book ii. p. 175, &c.

For the method of finding the values of *reverſions*, or eſtates in *reverſion*, ſee ANNUITIES and SURVIVORSHIP.

REVERSION *of ſeries*, in *Algebra*, is a method of finding a natural number from its logarithm given; or the ſine from its arch; or the ordinate of an ellipſis from an area given to be cut off from any point in the axis.

Or more generally thus. The value of any indefinite quantity, y, for inſtance, being expreſſed by an infinite ſeries of ſimple terms, including different powers of another variable quantity, x, the value of x is thence to be found, by a kind of reverſed operation, expreſſed in a ſeries of ſimple terms, including different powers of the quantity y.

There are various ways of doing this. One, which is often convenient, is by aſſuming a ſeries with indeterminate coefficients of a certain form.

Example 1. Let $ax+bx^2+cx^3+dx^4+ex^5$, &c. $=y$; to *revert* the ſeries, or to find x in an infinite ſeries expreſſed in the powers of y.

Here, by writing y^n for x, the indices of the powers of y, in the equation, will be n, $2n$, $3n$, &c. and 1; therefore $n=1$; and the differences are 0, 1, 2, 3, 4, 5, &c. and ſo the ſeries to be aſſumed, in this caſe, is $Ay+By^2+Cy^3+Dy^4$, &c. which being involved and ſubſtituted for the reſpective powers of x (neglecting, every where, all ſuch powers of x and y as exceed the higheſt you would have the ſeries carried to) there ariſes

$$\left.\begin{array}{lllll} aAy+aBy^2 & +aCy^3 & +aDy^4 & \text{\&c.} \\ * \quad +bA^2y^2 & +2bABy^3 & \left.\begin{array}{l}+2bACy^4 \\ +bB^2y^4\end{array}\right\} & \begin{array}{l}\text{\&c.}\\ \text{\&c.}\end{array} \\ * \qquad * & +cA^3y^3 & +3cA^2By^4 & \text{\&c.} \\ * \qquad * & \quad * & +dA^4y^4 & \text{\&c.} \end{array}\right\}=y$$

Whence, by comparing the homologous terms, $A=\frac{1}{a}$; $B=-\frac{b}{a^3}$; $C\left(=-\frac{2bAB+cA^3}{a}\right)=\frac{2bb-ac}{a^5}$; $D\left(=-\frac{2bAC+bB^2+3cA^2B+dA^4}{a}\right)=\frac{5abc-5b^3-a^2d}{a^7}$, &c. and conſequently $x=\frac{y}{a}-\frac{by^2}{a^3}+\frac{2bb-ac}{a^5}\times y^3-\frac{5b^3-5abc+a^2d}{a^7}\times y^4$, &c.

For an inſtance of the uſe of this concluſion, let $x-\frac{x^2}{2}+\frac{x^3}{3}-\frac{x^4}{4}$, &c. $=y$. Then a being, in this caſe, $=1$, $b=-\frac{1}{2}$, $c=\frac{1}{3}$, $d=-\frac{1}{4}$, &c. we ſhall, by ſubſtituting theſe values, have $x=y+\frac{y^2}{2}+\frac{y^3}{6}+\frac{y^4}{24}$, &c.

From whence, when y is given, x will alſo be given; provided the value of y be ſufficiently ſmall.

Example 2. Let there be given $ax+by+cx^2+dxy+ey^2+fx^3+gx^2y+hxy^2+iy^3+kx^4+lx^3y$, &c. $=0$; to find y.

By aſſuming $y=Ax+Bx^2+Cx^3+Dx^4$, &c. and proceeding as above, A will be found $=-\frac{a}{b}$, $B=-\frac{c+dA+eA^2}{b}$, $C=-\frac{dB+2eAB+f+gA+hA^2+iA^3}{b}$, $D=-\frac{dC+2eAC+eB^2+gB+2hAB+3iA^2B+k+lA+mA^2+nA^3+pA^4}{b}$, &c.

Example 3. Laſtly, let $x^{m}+bx^{m+p}+cx^{m+2p}+dx^{m+3p}+$ &c $=z$.

Here, in order to determine the form of the ſeries to be aſſumed, let z^n be wrote for x in the given equation, according to the uſual method; and then the exponents, ſuppoſing z tranſpoſed, will be 1, nm, $nm+np$, $nm+2np$, $nm+3np$, &c. reſpectively; whereof the two leaſt (1 and nm) being made equal to each other, n is found $=\frac{1}{m}$; and the differences are $\frac{p}{m}$, $\frac{2p}{m}$, $\frac{3p}{m}$, &c. Whence the ſeries to be aſſumed for x is $z^{\frac{1}{m}}+Bz^{\frac{1+p}{m}}+Cz^{\frac{1+2p}{m}}+Dz^{\frac{1+3p}{m}}+$, &c. (for it is evident, by inſpection, that the coefficient (A) of the firſt term muſt here be an unit). This ſeries being therefore raiſed to the ſeveral powers of x, in the given equation, and the coefficients of the homologous terms in the new equation compared together, it will be found that, $B=-\frac{b}{m}$, $C=\frac{\overline{1+m+2p}\times bb-2mc}{2m^2}$, $D=-\frac{\overline{2m^2+9mp+9p^2+3m+6p+1}\times b^3}{6m^3}+\frac{\overline{1+m+3p}\times bc}{m^2}-\frac{d}{m}$, &c.

From the general value of x, found above, innumerable theorems, for *reverting* particular forms of ſerieſes, may be deduced.

Thus, if $x+bx^2+cx^3+dx^4$, &c. $=z$; then (m being $=1$, and $p=1$) x is $=z-bz^2+\overline{2bb-c}\times z^3-\overline{5b^3-5bc+d}\times z^4$, &c.

And, if $x+bx^3+cx^5+dx^7+$, &c. $=z$; (m being $=1$, and $p=2$) $x=z-bz^3+\overline{3bb-c}\times z^5-\overline{12b^3-8cb+d}\times z^7$, &c.

Alſo, if $x^{\frac{1}{2}}+bx^{\frac{3}{2}}+cx^{\frac{5}{2}}+dx^{\frac{7}{2}}$, &c. $=z$; then (m being $=\frac{1}{2}$, and $p=1$) $x=z^2-2bz^4+\overline{7bb-2c}\times z^6-\overline{30b^3-18bc+2d}\times z^3$, &c. &c.

It may be obſerved that in all theſe forms of ſerieſes, the firſt term is without a coefficient (which renders the concluſion much more ſimple). Therefore, when the ſeries to be *reverted* has a coefficient in its firſt term, the whole equation muſt be firſt of all divided thereby. Thus, if the equation was $3x-6x^2+8x-13x^4$, &c. $=y$; by dividing the whole by 3 it will become $x-2x^2+\frac{8x^3}{3}-\frac{13x^4}{3}$, &c. $=\frac{1}{3}y$; where, putting $z=\frac{1}{3}y$, we have, by Form. 1. $x=z+2z^2+\frac{16}{3}z^3$, &c. $=\frac{y}{3}+\frac{2y^2}{9}+\frac{16y^3}{81}$, &c. Simpſon's Fluxions, vol. ii. p. 302, &c. Mac Laurin's Algebra, p. 263. and Mr. De Moivre, in the Phil. Tranſ. N° 240.

Other methods may be ſeen in Mr. Stuart's explanation of ſir Iſaac Newton's Treatiſe of Analyſis by Equations of an infinite Number of Terms, p. 455. See alſo Horſley's edition of Newton's Works, vol. i. p. 291, &c. and Colſon's Comment. on Newton's Fluxions, &c. p. 219, &c.

REVERT, in *Law*. A thing is ſaid to *revert*, when it returns or falls back to its firſt owner.

All honours and royal fees, alienated, *revert* to the crown, or are *revertible*. Apanages, or portions of younger ſons of kings, are granted on condition of *reverſion*.

REVERTER, *formedon in the*, in *Law*. See FORMEDON.

REVETEMENT, in *Fortification*, is a ſtrong wall built on the outſide of the rampart and parapet, to ſupport the earth, and prevent its rolling into the ditch. See CORDON.

REVIEW, in *Chancery*. A *bill of review* is where the cauſe has been heard, and a decree therein ſigned and enrolled; but ſome error in law appears in the body of the decree, or ſome new matter is diſcovered in time, after the decree made. A bill of *review* is not exhibited but by leave of the court.

A *commiſſion of review* is a commiſſion ſometimes granted, in extraordinary caſes, to reviſe the ſentence of the COURT *of delegates*; when it is apprehended they have been led into a material error. This commiſſion the king may grant, although the ſtatutes 24 and 25 Hen. VIII. declare the ſentence of the DELEGATES definitive; becauſe the pope, as ſupreme head by the canon law, uſed to grant ſuch commiſſions of *review*; and ſuch authority, as the pope heretofore exerted, is now annexed to the crown by ſtatutes 26 Hen. VIII. cap. 1. and 1 Eliz. cap. 1. But this is not matter of right, which the ſubject may demand *ex debito juſtitiæ*, but merely a matter of favour, and which, therefore, is often denied. See APPEAL.

REVIEW, in *Military Language*, is the appearance of an army, or part of an army, arranged in form of battle and exerciſed, in preſence of the king or of a general. The firings in *reviews* are generally thirty-ſix rounds, viz. by companies; by grand diviſions; by ſubdiviſions; obliquely, advancing, retreating; by files; in the ſquare; ſtreet-firings, advancing and retreating; and, laſtly, a volley.

The intention of a *review* is to know the condition of the troops, and to ſee that they are complete, and that they perform their exerciſe and evolutions well.

REVILING *the ordinances of the church*, in *Law*, is an offence puniſhable by ſtatute. Thus it is provided by 1 Edw. VI. cap. 1. and 1 Eliz. cap. 1. that whoever *reviles* the ſacrament of the Lord's Supper ſhall be puniſhed by fine and impriſonment. See COMMON *Prayer*.

REVISE, among *Printers*, a ſecond proof of a ſheet to be printed, taken off after correcting the firſt.

REVIVER. See REVIVOR.

REVIVIFICATION, RESUSCITATION, or REDUCTION, in *Chemiſtry*, the art of reſtoring a mixed body to its firſt ſtate, after it had been altered and diſguiſed by diſſolution, calcination, or the like.

This term, in its more confined ſenſe, is uſually applied to thoſe operations by which metals are reſtored to their metallic ſtate, after they have been deprived of this ſtate, either by the loſs of their phlogiſton, or by the union of ſome heterogeneous matters which diſguiſe them, as fulminating gold, luna cornea, cinnabar, and other ſuch compounds. The *revivification* of metallic calces regards only imperfect metals, which alone loſe their metallic properties by the loſs of phlogiſton, and which are deprived of this principle by the action of air or water, whereby they are changed into ruſt, or by the action of acids, or by ordinary calcination. Theſe are capable of recovering their metallic properties, by being recombined with the inflammable principle, provided that their calcination or dephlogiſtication has not been too complete, and that the phlogiſton be applied in a ſtate favourable for combination. The calces of thoſe metals which cannot be radically calcined, as lead, biſmuth, iron, and copper, may recover their phlogiſton, and be revivified, without fire or fuſion, merely by the contact of phlogiſtic vapours, e. gr. by the vapour of liver of ſulphur; or by being precipitated by ſome ſubſtance capable of applying phlogiſton to them. However, metals, whoſe maſſes are large, are only ſuperficially revivified in this way. A much more expeditious method of revivifying metals is by fuſion; in which operation care ſhould be taken to well mix the metallic calx with a proper quantity of the matter, that is to furniſh it with phlogiſton; to add to the mixture ſome ſaline or vitreous matter, capable of facilitating the fuſion, and ſeparation of the reduced metal from the ſcoria; to prevent any communication with external air, that the phlogiſton may not be conſumed; and to keep the fire low at firſt, and to raiſe it towards the end, ſo that both the metal and the ſuperabundant ſcoria may be perfectly fuſed. The reduction of very volatile ſemi-metals, as zinc and arſenic, ſhould be made in veſſels perfectly cloſe; as in an earthen retort.

The reduction of metals, which do not loſe their inflammable principle, as gold, ſilver, and mercury, is to be performed, not by reſtoring phlogiſton, but by ſome intermediate ſubſtance, capable of ſeparating from them the matter which is united with them; which will, therefore, be different, according to the matter united with the metal. Thus, fulminating gold may be reduced by fuſing it with ſulphur, or with fixed alkali; becauſe either of theſe ſubſtances will decompoſe the nitrous ammoniacal ſalt which gives the fulminating property to gold. Luna cornea is reduced by fuſing it with a large quantity, e. gr. with twice its weight of fixed alkali, which ſeparates the marine acid united with the ſilver. It may alſo be well reduced by precipitation, and by treating it with other metals which have more affinity than ſilver with marine acid; ſuch as tin, iron, and regulus of antimony. The mercury of cinnabar is to be reduced or ſeparated from the ſulphur, by mixing with the cinnabar any ſubſtance which has greater affinity with ſulphur than mercury has, ſuch as fixed alkalis, abſorbent earths, iron, copper, lead, ſilver, or regulus of antimony. Filings of iron are generally employed in this operation; an equal weight of which is to be mixed with the cinnabar, and the whole diſtilled together, by which the mercury will be raiſed and collected at the bottom of the receiver under ſome water placed there to facilitate its condenſation. The ſulphur of the cinnabar remains in the *retort* united with the intermediate ſubſtance employed for the ſeparation. This is called *mercury revived from cinnabar*. Chem. Dict. art. *Reduction*. See CINNABAR *of antimony*.

REVIVIFIED *antimony*. See ANTIMONY.

REVIVING, in *Law*, a renewing of rents and actions after they had been extinguiſhed.

REVIVOR, or REVIVER, in *Law*. A bill of *revivor* is where a bill has been exhibited in chancery againſt one who anſwers; but, before the cauſe is heard, or at leaſt before the decree is enrolled, one of the parties dies.

In this caſe, a bill of *revivor* muſt be brought, praying the former procedings may ſtand *revived*, and be put in the ſame condition as at the time of the abatement.

REVOCATION, *revocatio*, in *Law*, the act of *revoking*, calling back, or annulling, a power, grant, &c. made before.

The *revocation* of an offer, after it is accepted of, is invalid. All preceding wills or teſtaments are *revoked* by the laſt; but the republication of a former will revokes one of a later date, and eſtabliſhes the firſt again.

The *revocation* of a deviſe of lands and tenements muſt be in writing, ſigned by the teſtator, or ſome other perſon in his preſence, and by his expreſs direction; and be ſubſcribed, in his preſence, by three or four credible witneſſes.

A prior clauſtral is *revocable* at pleaſure. The *revocation* of the *edict of* NANTES was fatal to the French proteſtants.

REVOCATION *of uſes*. See USE.

REVOLUTION, formed from *revolvo*, *to roll backwards*, in *Politics*, denotes a grand turn or change of government.

There are no ſtates in the world but have undergone frequent *revolutions*. The abbot de Vertot has furniſhed us with two or three good hiſtories of the *Revolutions* of Sweden, the *Revolutions* of Rome, &c.

The REVOLUTION, uſed with us by way of eminence, denotes the great turn of affairs in England in 1688, when king James II. abdicating, the prince and princeſs of Orange were declared king and queen of England, &c. See *Right of* CROWN.

The true ground and principle upon which that memorable event proceeded, was an entirely new caſe in politics, which had never before happened in our hiſtory; the abdication of the reigning monarch, and the vacancy of the throne thereupon. Accordingly, in a full aſſembly of the lords and commons, met in convention on occaſion of this vacancy, both houſes came to this reſolution: “That king James the Second, having endea“voured to ſubvert the conſtitution of the kingdom, by “breaking the original contract between king and peo“ple; and, by the advice of Jeſuits, and other wicked “perſons, having violated the fundamental laws; and “having withdrawn himſelf out of this kingdom, has “abdicated the government, and that the throne is “thereby vacant.” The lords and commons having determined this fundamental article, that there was a vacancy of the throne, proceeded to fill up that vacancy in ſuch manner as they judged the moſt proper. And this was done by their declaration of 12 February, 1688, in the following manner: “That William and Mary, “prince and princeſs of Orange, be, and be declared “king and queen, to hold the crown and royal dignity “during their lives, and the life of the ſurvivor of them; “and that the ſole and full exerciſe of the regal power “be only in, and executed by, the ſaid prince of Orange, “in the names of the ſaid prince and princeſs, during “their joint lives; and after their deceaſes the ſaid “crown and royal dignity to be to the heirs of the body “of the ſaid princeſs; and for default of ſuch iſſue to “the princeſs Anne of Denmark, and the heirs of her “body; and for default of ſuch iſſue to the heir of the “body of the ſaid prince of Orange.” This tranſaction, founded in equity, and ſtrictly agreeable to the ſpirit of our conſtitution, and the rights of human nature, formed a new æra in the hiſtory of our country, in which the bounds of prerogative and liberty have been better defined, the principles of government more thoroughly examined and underſtood, and the rights of the ſubject more explicitly guarded by legal proviſions, than in any other period of the Engliſh hiſtory. Blackſt. Comm. book i. p. 211, &c. book iv. p. 433.

REVOLUTION, in *Geometry*. The motion of any figure quite round a fixed line, as an axis, is called the *revolution* of that figure; and the figure ſo moving is ſaid to *revolve*.

Thus, a right-angled triangle, revolving round one of its legs, as an axis, generates, by that *revolution*, a CONE.

REVOLUTION, in *Aſtronomy*, denotes the period of a ſtar, planet, comet, or other phenomenon; or its courſe from any point of its orbit, till it return to the ſame.

The planets have a twofold *revolution*. The one about their own axis, uſually called their *diurnal rotation*, which conſtitutes what we call their *day*.

The other about the ſun, called their *annual revolution* or *period*, conſtituting their year. See *Motion of the* Planets.

REVOLUTUM *folium*, among *Botaniſts*. See Leaf.

REUTELE, in *Ichthyology*, a name uſed by ſome for the *umbla minor*, or red charr, a fiſh common in the lakes of Germany, and of the northern parts of England and Wales. The name is originally German.

REVULSION, *revulſio*, in *Medicine*, the turning a flux of humours from one part of the body to another, either neighbouring or oppoſite part.

In very dangerous wounds, where the loſs of blood is great, and the ſtopping it ſpeedily enough is impracticable, it is uſual to open a vein in ſome remote part, to cauſe a *revulſion*; that is, to turn the courſe of the blood from the former part to that where the aperture is made. *Revulſions* are alſo cauſed by cupping, friction, &c.

Revulsion is alſo uſed for the ſpontaneous turn or reflux of humours in the body. Sudden diſeaſes are occaſioned by great *revulſions* of humours, which fall all at once on certain parts.

REWARDS. Military *rewards*, among the Athenians, conſiſted ſometimes in crowns preſented to thoſe that had merited them; on which their names and noble actions were inſcribed. Some had leave granted them to erect pillars or ſtatues in honour of ſome god, with inſcriptions ſetting forth their victories. This was a favour that was ſeldom granted; Cimon indeed was honoured with it, but Themiſtocles could never obtain the like. Another honour conferred at Athens on the valiant, was to have their arms placed in the citadel, and to be called *Cecropidæ*, or citizens of the true old blood. Others were preſented with a πανοπλια, or complete ſuit of armour. Songs of triumph were honorary compliments paid to ſome. The children of thoſe who were killed in battle were maintained at the public expence, till they came to maturity; at which time they were preſented before the aſſembly of the Athenian people with a complete ſuit of armour, one of the public miniſters proclaiming before them, "that hitherto, in remembrance "of their father's merits, the commonwealth had edu"cated theſe young men, but now diſmiſſed them ſo "armed, to go forth and thank their country by imitat"ing their fathers examples."

Solon made a farther proviſion for the parents of thoſe that died in the wars, it being extremely reaſonable that they ſhould be maintained at the public expence, who had loſt their children, the comfort and ſupport of their declining age, in the ſervice of the public.

As to thoſe who were any wiſe diſabled, they had an allowance from the public towards their maintenance. Potter, tom. ii. p. 118, ſeq.

Rewards, in a *Legal Senſe*. There are *rewards* given in many caſes, by ſtatute, for the apprehending of criminals, and bringing them to juſtice; as a *reward* of 40*l.* to thoſe who apprehend robbers on the high-way, and proſecute them to conviction, by 4 & 5 W. & M. c. 8. to be paid to them (or, if killed in the endeavour to take them, their executors) by the ſheriff of the county; to which the ſtatute 8 Geo. II. c. 16. ſuperadds 10*l.* to be paid by the hundred indemnified by ſuch taking. Alſo the like *reward* of 40*l.* for apprehending and proſecuting of burglars. Stat. 5 Ann. cap. 31. See Larceny.

The ſame *reward* for apprehending of money-coiners or clippers, &c. 6 & 7 W. III. And the like *reward* for the apprehenſion of thief-takers, not proſecuting felons; and of perſons reſiſting the officers of the cuſtoms, by force of arms, &c. 6 Geo. I. cap. 20. 22. See Discovery *of accomplices*.

REWEY, a term among *Clothiers*, ſignifying cloth unevenly wrought, or full of *rewes*. 43 Eliz. cap. 10.

REX *mullorum*, in *Ichthyology*, a name given by ſome authors to a ſpecies of mullet, diſtinguiſhed from all the others by its having a prominent belly, and having no beards under the mouth.

REY, or Rye *graſs*, in *Botany*. See Grass.

RHABARBARUM, in *Botany*. See Rhubarb.

RHABDOIDES, Ῥαϐδοειδης, formed from ῥαϐδος, *rod*, or *ſtaff*, and ειδος, *form*, in *Anatomy*, a name given the ſecond true ſuture of the ſkull, called alſo the *ſagittal* suture.

RHABDOLOGY, or Rabdology, in *Arithmetic*, a name ſometimes given to the method of performing the two moſt difficult and operoſe rules, viz. multiplication and diviſion, by the two eaſieſt, viz. addition and ſubtraction, by means of two little rods or laminæ, whereon are inſcribed the ſimple numbers, and which are to be ſhifted according to certain rules.

Theſe rods are what we popularly call *Neper's bones*, from their inventor, a Scottiſh baron, who likewiſe invented logarithms. For their deſcription and uſe, ſee Neper's *bones*.

RHABDOMANCY, an ancient method of divination, performed by means of rods or ſtaves. Whence its name, from the Greek ῥαϐδος, *rod*, and μαντεια, *divination*.

St. Jerom makes mention of this kind of divination, in his commentary on Hoſea, chap. iv. 12. The ſame he finds again in Ezekiel xxi. 21, 22.

If it be the ſame kind of divination that is mentioned in the two paſſages, *rhabdomancy* muſt have been alſo the ſame ſuperſtition with belomancy.

In effect, the two are ordinarily confounded. The Seventy themſelves tranſlate the חצים of Ezekiel, by ῥαϐδος, a *rod*; though in ſtrictneſs it ſignifies an *arrow*.

This, however, is certain; the inſtruments of divination mentioned by Hoſea are different from thoſe of Ezekiel. In the former it is עצו *etſo*, מקלו *maklo*, his *wood*, his *ſtaff*; in the latter, חצים *hhitſim*, *arrows*. Though it is poſſible they might uſe rods or arrows indifferently; or the military men might uſe arrows, and the reſt rods. It appears by the laws of the Friſones, that the ancient inhabitants of Germany practiſed *rhabdomancy*. The Scythians were likewiſe acquainted with the uſe hereof; and Herodotus obſerves, lib. iv. that the women among the Alani ſought and gathered together fine ſtraight rods or wands, and uſed them in the like ſuperſtition.

RHABDONALEPSIS, Ῥαϐδον Αναληψις, among the Greeks, the Reception or Elevation of the Rod, a feſtival kept every year in the iſland of Cos, at which the prieſts carried a cypreſs-tree.

RHABDOPHORI, Ῥαϐδοφοροι, among the Greeks, officers appointed to preſerve peace and good order, and to correct the unruly at their public games.

RHABDUS, Ῥαϐδος, among the *Ancients*, the iron rod with which the boys rolled the trochus.

RHACHITIS, Ῥαχιτις, in *Medicine*. See Rickets.

RHACOMA, in *Botany*, a genus of the *tetrandria monogynia* claſs. It characters are, that the calyx and the corolla are each of them divided into four ſegments; and that the capſule is unilocular and monoſpermous. There is only one ſpecies.

RHACOSIS, Ῥακωσις, in *Medicine*, is a relaxation of the ſkin of the ſcrotum without that of the contained bodies; being an affection very indecent to the ſight.

The method of cure uſed by Leonides, was to lay the patient upon his back, and to cut off the ſuperfluous ſkin againſt a board, or a piece of hard leather; after which he ſewed up the wound. But Antyllus uſed to take up the ſuperfluous ſkin with three or four ſtitches of a needle, and then with a knife, or ſharp pair of ſciſſars, cut off what was without the ſtitches; ſecuring the place with a ſuture, he cured it as he did other bleeding wounds.

RHADAMANTHUS, in *Mythology*, one of the three judges or ſovereigns of Hades, or the inviſible world, to whom was aſſigned Tartarus, as Erebus was to Minos, and Elyſium to Æacus. He was the brother of Minos, and the ſon of Jupiter and Europa; and is ſaid to have been preferred to the honour of preſiding over Tartarus, on account of the diſtinguiſhed wiſdom and juſtice of his adminiſtration. His office is deſcribed by Virgil, Æneid, lib. iv.

Gnoſſius hæc Rhadamanthus *habet duriſſima regna*
Caſtigatque auditque dolos, ſubigitque fateri,
Quæ quis apud ſuperos, furto lætatus inani
Diſtulit in ſerum commiſſa piacula mortem.

RHAGADES, Ῥαγαδες, in *Medicine*, a Greek term uſed for the chaps or clefts in the lips, hands, anus, and other ſoft parts of the body.

Rhagades are a ſort of fiſſures, and little chapped ulcers of the œdematous kind; formed of the ſharp ſaline humour, and occaſioning a great contraction and ſtraightening of the part, which is by this means ſhrivelled up like a wet parchment, when held to the fire.

They are chiefly found on the fundament, the neck of of the womb, the præputium, lips, &c. ſometimes even in the mouth; in which caſe the patient is not able to ſpeak, chew, or the like.

They are ſometimes moiſt, and of a cancerous nature, eating deep, and difficult to cure; but they are more commonly of a leſs malignant tendency, being often in the anus the conſequence of a diarrhœa, dyſentery, or the like.

RHAGADIOLUS, in *Botany*, a ſpecies of the *lapſana*. See Nipple-*wort*.

RHAGE, a word uſed by medical writers for a fiſſure or chap in any part. The ſtones of grapes are alſo by ſome called *rhages*; and by others the ſame word is made to expreſs the extremities of the fingers or toes.

RHAGOIDES, Ῥαγοειδης, in *Anatomy*, the ſecond coat or tunic of the eye; more uſually called uvea.

It has its name *rhagoides*, as reſembling a grape-ſtone.

In the tunica *rhagoides* is the hole called the pupil.

RHAMNOIDES, a name given by Tournefort, and others, to a genus of plants called by Linnæus *hippophae*. See Sea *buckthorn*.

RHAMNUS, *luckthorn*, in *Botany*. See BUCKTHORN.

RHAMNUSIA, in *Mythology*, an appellation given to Nemeſis, on account of her celebrated ſtatue at Rhamnus, in Attica.

RHAPONTICUM and RHAPONTICOIDES, in *Botany*, a ſpecies of CENTAURY.

RHAPONTICUM, a medicinal root, in form reſembling rhubarb; and nearly of the ſame virtues.

It was called *rhaponticum*, q. d. *root of Pontus*; becauſe chiefly produced in the country of Pontus in Aſia.

It is the root of a plant, which is a ſpecies of the *rheum*, with ſmooth roundiſh leaves, and ſomewhat channelled pedicles. It grows wild on the mountain Rhodope in Thrace, from whence it was brought into Europe by Alpinus about the year 1610; it bears the hardeſt winters of this climate. The root of this plant, ſays Dr. Lewis, which appears to have been the true rhubarb of the ancients, is confounded by ſome with the modern rhubarb, though conſiderably different from that root in appearance as well as in quality. The *rhapontic* is of a duſky colour on the ſurface, and of a looſe ſpongy texture; more aſtringent than rhubarb, and leſs purgative; in this laſt intention two or three drams are required for a doſe. Lewis's Mat. Med.

It has, however, been much controverted, whether the *rhaponticum* of the ancients, and the rhubarb of the moderns be one and the ſame plant; the reaſoning on both ſides may be ſeen in the appendix to the ſecond volume of John Bauhin's Hiſtory of Plants. See RHUBARB.

RHAPSODI, 'Ραψῳδοι, RHAPSODISTS, in *Antiquity*, perſons who made a buſineſs of ſinging or reciting pieces of Homer's poems.

Cuper informs us, that the *rhapſodi* were clothed in red when they ſung the Iliad; and in blue when they ſung the Odyſſey.

They performed on the theatres; and ſometimes ſtrove for prizes, in conteſts of poetry, ſinging, &c.

After the two antagoniſts had finiſhed their parts, the two pieces, or papers they were written in, were joined together again; whence the name, viz. from ῥαπτω, *ſuo*, *I join together*, and ῳδη, *ode*, *ſong*.

But there ſeem to have been other *rhapſodi* of higher antiquity than theſe; people who compoſed herioc poems, or ſongs in praiſe of heroes and great men, and ſung their own compoſitions from town to town, for a livelihood; of which profeſſion, it is ſaid, was Homer himſelf.

Hence, ſome critics, inſtead of the former origin, derive the word *rhapſodiſt* from ῥαβδῳ ᾀδειν, *to ſing with a laurel-rod in the hand*, which, it ſeems, was the badge of the primitive *rhapſodi*.

Philochorus, again, derives the word from ῥαπτειν τας ῳδας, q. d. συντιθεναι, to compoſe ſongs or poems; as if they were the authors of the poems they ſung. This opinion, to which Scaliger inclines, reduces theſe *rhapſodi* to the ſecond kind.

In effect, it is probable, that they were all of the ſame claſs, whatever diſtinction ſome authors may imagine among them; and that their buſineſs was to ſing or rehearſe poems, either of their own, or other people's compoſition, as might beſt ſerve their purpoſe, which was gaining a pecuniary advantage by them. So that we do not apprehend it any injury to them, to ſet them on the foot of our ballad-ſingers; ſome of whom may probably pen their own ditties. After Homer's time, it is no wonder they confined themſelves altogether to his pieces, for which the people had the utmoſt veneration; nor is it ſurpriſing, that they ſhould erect ſtages, &c. and diſpute the point of recitation in fairs and markets.

RHAPSODOMANCY, ῥαψῳδομαντεια, an ancient kind of divination performed by fixing on a paſſage of a poet at hazard, and reckoning on it as a prediction of what was to come to paſs.

There were various methods of practiſing this *rhapſodomancy*. Sometimes they wrote ſeveral verſes or ſentences of a poet on ſo many pieces of wood, paper, or the like; ſhook them together in an urn; and drew out one, which was accounted the lot.

Sometimes they caſt dice on a table, whereon verſes were written; and that whereon the die lodged, contained the prediction.

A third manner was by opening a book, and pitching on ſome verſe, at firſt ſight. This method they particularly called the *ſortes Prænestinæ*, and afterwards, according to the poet thus made uſe of, *ſortes Homericæ*, *ſortes Virgilianæ*, &c.

RHAPSODY, ῥαψῳδια, in *Antiquity*, a diſcourſe in verſe, ſung or rehearſed by a rhapſodiſt.

Others will have *rhapſody* properly to ſignify a collection of verſes, eſpecially thoſe of Homer; which, having been a long time diſperſed in pieces and fragments, were at length, by Piſiſtratus's order, digeſted into books, called *rhapſodies*; from the Greek ῥαπτω, *ſuo*, *I ſew*, and ῳδη, *ſong*.

Hence, among the moderns, *rhapſody* is alſo uſed for an aſſemblage of paſſages, thoughts, and authorities, raked together from divers authors, to compoſe ſome new piece. Lipſius's Politics make ſuch a *rhapſody*, wherein there is nothing of the author's own but conjunction and particles.

RHEA, in *Mythology*, one of the titles of CYBELE, derived from ῥεω, *I flow*, on account of that abundance of benefits which ſhe diſpenſes.

RHEA, in the *Linnæan Syſtem of Ornithology*, a ſpecies of the *ſtruthio* or OSTRICH, the ſame bird with the NHANDUGUACU of the Braſils.

RHEEDIA, in *Botany*, the name of a genus of plants, of the *polyandria monogynia* claſs, ſo called from Mr. Van Rheed. The characters of the genus are theſe: the flower has no cup; it conſiſts of four petals, which are of an oval figure, and are hollowed, and expanded wide open; the ſtamina are five filaments; the germen of the piſtil is globoſe; the fruit is ſmall, and of an oval figure; it is ſucculent, and conſiſts only of one cell, and contains three very large ſeeds, which are of an oval oblong figure, and marked with ſtrangely irregular lines, reſembling ſeveral characters. There is only one ſpecies.

RHEGMA, formed of ῥηγνυμι, *I break*, a word uſed by the ancients to expreſs any breaking, or burſting of a ſoft part without a wound, but moſt frequently for abſceſſes breaking inwardly.

RHENONES, among the ancient Germans, a kind of garment covering the ſhoulders and breaſt down to the middle. It was either entirely made of ſkins, or covered over with them; the long hair of which being outward, proved a good defence againſt rain.

RHEO-STATICS, is uſed by ſome for the ſtatics, or the ſcience of the equilibrium of fluids.

RHETORIANS, *Rhetorii*, a ſect, in the fourth century, in Egypt, ſo nominated from their leader Rhetorius.

His diſtinguiſhing doctrine, as repreſented by Philaſtrius, was, that he approved of all the hereſies before him, and taught that they were all in the right. But what Philaſtrius mentions of him appears ſo abſurd and ridiculous, that St Auguſtine, Hæreſ. 7. could not perſuade himſelf it was true.

RHETORIC, *rhetorica*, formed from ῥητορικη, of ῥεω, *I ſpeak*, whence ῥητωρ, *ſpeaker*, *orator*, &c. the art of ſpeaking copiouſly on any ſubject, with all the advantages of beauty and force. See ORATORY.

RHETORIC. *characters in*. See CHARACTER.

RHETORICAL *numbers*. See NUMBERS.

RHETORICAL *accent*, among *Hebrew Grammarians*. See ACCENT.

RHETORICIAN. See ORATORY.

RHEUM, in *Botany*. See RHUBARB.

RHEUM, *rheuma*, 'Ρευμα, in *Medicine*, formed from ῥεω, *I flow*; a thin ſerous humour, occaſionally ouſing out of the glands about the mouth and throat.

A fluxion of *rheum*, uſually happening after taking cold, occaſions excoriations and inflammations of the fauces, &c.

RHEUM is alſo uſed for a *catarrh*, or the defluxion of ſuch humours on the trachea, and the neighbouring parts, occaſioning a coughing, ſpitting, hoarſeneſs, running at the noſe, &c.

The *rheum* is not cauſed from a pituita falling from the brain on thoſe parts, as the ancients imagined, there being no paſſage from the brain thither; but from a thin, ſharp, ſerous humour ouſing out of the extremities of the glands about the fauces and throat.

The moſt ordinary occaſion of *rheums* is external cold, eſpecially the being expoſed to it when the body is much heated; and hence the diſorder itſelf is popularly called a *cold*.

Rheums falling on the breaſt, lungs, &c. are dangerous; others, not very violent, ſerve to clear the head, &c. See CATARRH.

RHEUMATISM, in *Medicine*, a painful diſorder, affecting the intermediate ſpaces between the joints and muſcles in different parts of the body, and occaſionally the viſcera, and ſometimes attended with inflammation and ſwelling. As to the origin of the denomination given to this diſorder, we may obſerve, that the ancients called all kinds of pains affecting the external parts or joints by the name of *arthritis*; but about the end of the ſixteenth or the beginning of the ſeventeenth century, ſome celebrated French Phyſicians called thoſe that were ſituated any where but in the joints, that is, in their tendinous and nervous ligaments, by the name of *rheumatiſm*. The proper ſeat of this diſorder, whatever part of the body it attacks, is ſuppoſed to be the cellular membrane; and it is moſt common in the ſpring and towards the end of autumn. The *rheumatiſm* bears a great analogy to the gout, being, as Boerhaave calls it, the *agnatus morbus* to the gout, whence ſome call it the univerſal gout. The difference between them conſiſts chiefly in this, that the *rheumatiſm* attacks not only the joints with an exquiſite pain, as the gout does, but alſo the muſcles and membranes between the joints. See Gout.

Some have diſtinguiſhed the *rheumatiſm* into *univerſal* and *particular*; the former being that which attacks all the parts of the body, even the internal ones; and the latter, that which is confined to particular parts; in which caſe the pains are uſually erratic, paſſing from one ſide to another, but ſometimes fixed. This is alſo called ſometimes a windy, and ſometimes a ſcorbutic *rheumatiſm*. But the *rheumatiſm* is more uſually and more properly diſtinguiſhed into the *acute* and *chronic*, or the *rheumatiſm with* and *without* a fever.

Rheumatism, *cauſes of the.* The *rheumatiſm* is ſuppoſed to ariſe from a ſharp ſerous humour thrown on the ſenſible parts, and occaſioning a pain by its vellication. Quincy ſays, it proceeds from the ſame cauſe as that whereby the mucilaginous glands become ſtiff and gritty in the gout.

Muſgrave takes it to be occaſioned by a ſharp alcaline ſalt, rather than an acid one; from this conſideration, that the urine of *rheumatic* people does not afford above the thirtieth part of the alkaline ſalt found in that of healthful perſons.

Hence, he conjectures that the ſalt, which ſhould go off this way, is retained in the blood, implicated and embarraſſed in the pituita; by which means it forms a viſcidity, which occaſions all the pains and tumors of the *rheumatiſm*.

The remoter cauſes are frequently the ſame as thoſe of an inflammatory fever, viz. an obſtructed perſpiration, the immoderate uſe of ſtrong liquors, and the like. Sudden changes of the weather, and all quick tranſitions from heat to cold, wet cloaths, damp beds, ſitting and lying on the damp ground, travelling in the night, &c. have often been productive of this diſorder: it has likewiſe been occaſioned by exceſſive evacuations, or the ſtoppage of cuſtomary diſcharges; and it has often proceeded from chronic diſeaſes, which vitiate the humours; as the ſcurvy, the lues venerea, obſtinate autumnal agues, &c. The *rheumatiſm* prevails moſt in cold, damp, marſhy countries; and it is moſt common among the poorer ſort of peaſants, who are ill-clothed, live in low damp houſes, and eat coarſe unwholeſome food, not eaſily digeſted, and affording little nouriſhment.

Rheumatism, *ſymptoms of the.* The acute *rheumatiſm* commonly begins with wearineſs, ſhivering, a quick pulſe, reſtleſſneſs, thirſt, and other ſymptoms of a fever. Afterwards the patient complains of flying pains, which are increaſed by the leaſt motion, and at length fix in the joints, which are often affected with ſwelling and inflammation. If blood be let in this diſeaſe, it has generally the ſame ſizy appearance as in the pleuriſy. The violence of the *acute rheumatiſm* ſeldom continues above fourteen days, though a weakneſs and puffineſs will remain, perhaps many months, if the diſeaſe attacks the patient in autumn. The *chronic rheumatiſm* is ſeldom attended with any conſiderable degree of fever, and is generally confined to ſome particular part of the body, as the ſhoulders, the back, or the loins. In this caſe there is ſeldom any inflammation or ſwelling. Perſons in the decline of life are moſt ſubject to this kind of *rheumatiſm*, and with them it often proves extremely obſtinate, and ſometimes incurable. If their conſtitutions are weak and viſcera decayed, it ſometimes ſeizes the head. When the pain is in the hip, and extends down the thigh, it is called SCIATICA. When rheumatic pains are attended with the ſymptoms of a ſcorbutic habit, which is not uncommonly the caſe, the diſorder is called a ſcorbutic *rheumatiſm*. When a violent pain is fixed in the loins, ſometimes making to the os ſacrum, and attended with nephritic complains, it is called a rheumatic LUMBAGO. Dr. Rutherford, of Edinburgh, obſerves that, wherever a *rheumatiſm* is ſeated, that part never ſweats, and that as ſoon as a ſweat can be raiſed in the pained part, the diſorder will be conquered: it may alſo be obſerved, that when in either the acute or chronical *rheumatiſm* the ſymptoms vaniſh, and at the ſame time a free perſpiration comes on, and the ſame is arrived on the parts affected, and the urine is turbid and copious, a cure may be expected.

Method of cure.—The *acute rheumatiſm* requires a treatment ſimilar to that of an acute or inflammatory fever. If the patient be young and ſtrong, the ſymptoms violent and threatening, and the wandering pains ſhift ſuddenly from the extremities to the internal parts, and affect the ſides or the breath, bleeding is neceſſary, and may be repeated, with conſiderable advantage, according to the exigencies of the caſe. However, profuſe bleedings ſhould be very cautiouſly, if at all, admitted, as they have retarded the criſis of the diſeaſe, and laid a foundation for the *chronic rheumatiſm*, and other diſorders. Dr. Sydenham much laments the neceſſity of repeated bleeding, and expreſſes his anxiety for diſcovering another effectual method of curing this diſeaſe; for this purpoſe he had recourſe to a diet of whey, which had the deſired effect: and he obſerves, that the *rheumatiſm* may be as ſucceſsfully cured in young perſons, who live temperately, and drink wine with moderation, by a very cooling and moderately nouriſhing diet, as by repeated bleeding, which they cannot ſo well bear. The body ſhould be kept open with gentle purges, emollient clyſters with nitre, and cool laxative liquors. Nitre is particularly recommended in the inflammatory *rheumatiſm*, and ſhould be taken in conſiderable quantities, as freely as the ſtomach will bear. In the decline of *acute*, and in every ſtage of *chronical rheumatiſms*, it may be given to advantage in conjunction with the ſal vol. c. c. Opiates ſhould be occaſionally adminiſtered, as they will be ſometimes neceſſary to moderate thoſe rheumatic pains which are moſt ſevere in the night; but the uſe of them requires peculiar caution. Dr. Sydenham obſerves, that they fix the diſeaſe; Dr. Tiſſot condemns them, as really augmenting the cauſe of the diſeaſe, deſtroying the efficacy of the proper medicinces, and, inſtead of aſſuaging, increaſing the pains: Dr. Cullen ſays that opiates, unleſs where they are directed to procure ſweat, always prove hurtful in every ſtage of the *rheumatiſm*: however, Dr. Cheyne obſerves, that opium is the ſovereign relief in all acute and vehement pain, as of the *rheumatiſm*, &c. From theſe, and many other diſcordant opinions that might be alledged, we may infer that it requires ſkill and attention to know how and when to adminiſter opiates without injury; but, in general, it will be proper to bleed and purge before recourſe is had to opium. The medicine which has been lately much extolled in *rheumatic* and gouty complaints is the volatile tincture of gum guaiacum. This may be given from two drachms to half an ounce twice a-day, in any liquor which the patient drinks; and to prevent its paſſing off by ſtool, and to determine it as much as poſſible to the ſurface, a few drops of the tinctura thebaica may be added to each doſe. The firſt perſon who preſcribed the tincture of guaiacum in ſuch a large doſe as half an ounce, and to be ſo often repeated, was the late Dr. Dawſon; and he found, in a variety of caſes, its beneficial effects, as a gentle laxative, in promoting a free perſpiration and a large diſcharge of urine, and in producing a ceſſation both of rheumatic pains and fever. And he directed it to be adminiſtered in the *acute* as well as in the *chronic rheumatiſm*, to which latter kind the uſe of it had been chiefly confined by other medical practitioners. He propoſes the following general form for adminiſtering it:

> ℞ Tinct. guaiac. vol. ℥ſs. ſolve in vitel. ov. mucilag. gum. arab. vel mel com. q. ſ. dein adde gradatim
> Aq. hordeat. ℥ i. ſs.
> Syr. balſam. ℥ſs. m. fiat hauſt.

However, he ſays, he generally gave it in common water, with which it mixes very well, and thus ſits eaſieſt on the ſtomach, and bids faireſt for anſwering every beneficial intention. Dawſon's caſes in the Acute Rheumatiſm, &c. 1781. But we believe it is now generally agreed by the faculty, that the exhibition of large doſes of the volatile tincture of guaiacum, in the *acute rheumatiſm*, is a practice requiring much caution, and neither ſo univerſally ſafe nor ſucceſsful, as Dr. Dawſon ſeemed to imagine. See Dr. Sanden's Short Strictures on the Method of Treatment recommended by Dr. Dawſon in the Acute Rheumatiſm, 1781.

Farther, the preparations of antimony may be alſo given, at proper intervals, betwixt the doſes of other medicines. When the *acute rheumatiſm* aſſumes the appearance of an intermittent, the bark is neceſſary; and whether it intermits or no, when plentiful ſweat breaks out, and the urine depoſits a copious ſediment, the bark will contract the duration of the diſeaſe. Bliſters have been ſometimes applied to the affected part with advantage: Dr. Cullen ſays, that they may be very effectual in removing the pain from any particular part, but will be of little uſe, except where the pains are much confined to one part, and therefore their efficacy and uſe are moſt conſiderable in *chronic rheumatiſms*. Warm bathing, after proper evacuations, has often produced an exceeding good effect; with this view the patient may be either put into a bath of warm water, or have cloths wrung out of it applied to the affected parts; but great care muſt be taken that he does not catch cold after bathing: and it would be adviſeable, after rubbing him dry, to put him between the blankets, in order to promote a perſpiration. Some have recommended the patient's keeping his bed, after the feveriſh ſymptoms have abated, during the continuance of the pain, and whilſt he is taking ſuch things as promote perſpiration, e. gr. white wine whey, ſpiritus Mindereri, guaiacum, &c. But Dr. Sydenham adviſes the patient in the *acute rheumatiſm* to ſit up ſome hours every day, becauſe the heat which proceeds from always lying in bed promotes and increaſes the diſeaſe; and he alſo recommends the uſe of ſmall beer, among other diluting liquors, in inflammatory diſorders. The diet ſhould be light and in ſmall quantity, conſiſting chiefly of roaſted apples; groat gruel, or weak chicken broth. After the cure the cold bath is uſeful, in order to prevent returns of the *rheumatiſm*, and the ſtrength ſhould be confirmed by the uſe of bitters, aromatics, and chalybeats.

In the *chronic rheumatiſm* the regimen ſhould be nearly the ſame as in the *acute:* the diet ſhould be cool and diluting, conſiſting chiefly of vegetable ſubſtances, as ſtewed prunes, coddled apples, and currants or gooſeberries boiled in milk. According to Arbuthnot, whey and cream of tartar in water gruel are of great uſe in eaſing rheumatic pains. Mild mercurials, a decoction of the rad. ſeneca, and the volatile tincture of guaiacum, in large doſes, have been alſo much recommended; eſpecially the latter. Leeches, cupping, or bliſters, have been alſo beneficially applied to the affected parts; and obſtinate fixed rheumatic pains have been removed by the *warm* PLASTER, or a plaſter of Burgundy pitch, or by rubbing the diſeaſed part with tincture of cantharides. Dr. Brockleſby relates ſome caſes, in which gentle and continued frictions on the pained rheumatic parts with common ſallad oil afforded conſiderable relief. And he recommends it to be tried how far, after bleeding, where it is indicated, animal oils applied by friction long continued, to the aggrieved parts, in the gout, *rheumatiſm*, and other painful diſeaſes, will eaſe the pain, without repelling or obſtructing the matter which nature is labouring to throw off. Phil. Tranſ. vol. xlix. p. 245.

We may obſerve with regard to the *rheumatiſm*, and the *chronic* kind in particular, that the uſe of medicines, which do not ſeem to produce any immediate effect, ſhould be perſiſted in for ſome time; and that the diſorder is, like the gout, moſt likely to be extirpated by the uſe of medicines, when the patient is moſt free from the diſorder. The warm baths of Matlock and Buxton are very ſerviceable in obſtinate *rheumatiſms:* and when the diſorder is complicated with ſcorbutic complaints, the waters of Harrowgate and Moffat are proper, and ſhould both be drank and uſed as a warm bath.

Dr. Buchan obſerves, that there are many of our own domeſtic plants which may be beneficially uſed in the *rheumatiſm*. A table ſpoonful of the ſeed of white muſtard may be taken twice or thrice a day, in a glaſs of water or ſmall wine. Water-trefoil, infuſed in wine or ale, and drank as tea, may be alſo of great uſe; as are likewiſe ground-ivy, chamomile, and other bitters, uſed in the ſame manner, and continued for ſome time.

Cold bathing, eſpecially in ſalt-water, often cures the *rheumatiſm*. Riding on horſeback and wearing flannel next the ſkin are alſo particularly recommended. Iſſues are proper, eſpecially in chronic caſes: if the pain affects the ſhoulders, an iſſue may be made in the arm; but if it affects the loins, it ſhould be opened in the leg or thigh. In obſtinate *rheumatiſm* ſmall doſes of emetic wine are much recommended by Dr. Huxham. The beſt medicines for ſcorbutic perſons afflicted with the *rheumatiſm*, are bitters and mild purgatives. An ounce of Peruvian bark, and half an ounce of powdered rhubarb, may be infuſed in a bottle of wine, and one, two, or three wine glaſſes of it taken every day, as may be found neceſſary for keeping the body open. If the bark is of itſelf ſufficiently purgative, the rhubarb may be omitted.

Thoſe who are ſubject to the *rheumatiſm* ſhould chooſe a dry warm ſituation, and avoid the night air, wet cloaths, and wet feet, as much as poſſible. Their clothing ſhould be warm, they ſhould wear flannel next their ſkin, and make frequent uſe of the fleſh bruſh. Buchan's Dom. Med. ed. 5. p. 422. &c. Tiſſot's Advice, &c. p. 177, &c. Pringle's Obſ. on Diſeaſes of the Army, p. 152, &c. Many perſons have received conſiderable benefit in this diſorder from being electrified. See *Medical* ELECTRICITY.

The following receipt for the *rheumatiſm* is famous in America: take of garlick two cloves, and of gum ammoniac one drachm, and bruiſe them together; make them into two or three boluſes with fair water, and ſwallow them, one at night and one in the morning: drink, in the uſe of this medicine, very ſtrong ſaſſafras tea. Thus, it is ſaid, after taking a few doſes, the *rheumatiſm*, and even contractions of the joints have been removed.

RHEUMATISM, *electary for the*, may be compoſed of conſerve of roſes, two ounces; cinnabar of antimony, levigated, an ounce and a half; gum guaiacum, in powder, an ounce; and a ſufficient quantity of ſyrup of ginger. In obſtinate *rheumatiſms*, not accompanied with a fever, ſays Dr. Buchan, a tea-ſpoonful of this electary may be taken twice a day with conſiderable advantage. Dom. Med. p. 716.

RHEUMATISM, *liniment for the*. See LINIMENT.

RHEXIA, in *Botany*, a genus of the *octandria monogynia* claſs. Its characters are theſe: the empalement of the flower is permanent, oblong, tubulous, and of one leaf divided into four parts at the brim; the flower has four roundiſh petals inſerted in the empalement; it has eight ſlender ſtamina, which are inſerted in its empalement, terminated by declining furrowed ſummits; it has a roundiſh germen, ſupporting a declining ſtyle the length of the ſtamina, crowned by a thick oblong ſtigma; the germen afterwards becomes a roundiſh capſule, with four cells on the ſwollen empalement, opening with four valves filled with roundiſh ſeeds. There are two ſpecies, natives of North America. Miller.

RHEXIS, or RHEGMA, formed from ῥηξις, *rupture*, of ῥηγνυμι, *I break*, among *Oculiſts*, denotes a rupture of the cornea of the eye.

RHIME, or RIME, in *Poetry*. See RHYME.

RHINANTHUS, in *Botany*. See *Yellow* LOUSEWORT.

RHINE, in *Ichthyology*, a name given by Ariſtotle, Appian, and moſt of the Greek writers to that ſpecies of the *ſqualus*, which we uſually call the *ſquatina*; the *ſquatus* of Iſidore and Pliny. Artedi has diſtinguiſhed this from all the other ſpecies of the *ſqualus*, by the having no pinna ani, and the mouth in the extremity of the ſnout.

RHINE-GRAVE, in *Germany*, a count palatine of the Rhine. See GRAVE, and PALATINE.

RHINE-LAND-*Rod*, in *Fortification*, &c. a meaſure of two fathom, or twelve feet, uſed by the Dutch and German engineers, &c.

RHINECHITIS, a name of a chirurgical inſtrument, uſed for ſyringing the noſtrils.

RHINGAU, in *Ichthyology*, a name given by ſome authors to the LAVARETUS, a ſmall fiſh caught in the German lakes, and ſent in pickle into many parts of the world.

RHINOBATOS, in *Ichthyology*, the name of a flat cartilaginous fiſh, of the *ſquatina* or *monk-fiſh* kind, but differing from it in this, that the body is proportionably longer, and the head is more pointed; and the mouth is a great way below the end of the ſnout, and placed under the head. It is from three to four feet long, and is common in the Mediterranean, and brought to market in ſome parts of Naples. This is a ſpecies of RAY in the Linnæan Syſtem.

RHINOCEROS, in *Zoology*, the name of a genus of quadrupeds, of the order of *belluæ*, in the claſs of *mammalia* in the Linnæan ſyſtem, ſo called from a horn growing on their noſe.

Of this genus there are only two known ſpecies. 1. The *rhinoceros* with only one horn on its noſe; and 2. The *rhinoceros* with two horns.

In the year 1739 we had a young *rhinoceros* with one horn ſhewn in England, of which Dr. Parſons has given a very accurate account in the Philoſophical Tranſactions, Nº 470. p. 523, &c. or Abridg. vol. ix. p. 94, &c.

The creature fed on rice, ſugar, and hay; his keeper uſed to mix the rice and ſugar in the following manner: ſeven pounds of rice and three pounds of ſugar made the proviſion for one day; he eat this at three meals: and beſides this he eat about a truſs of hay every week, and a large quantity of greens that were brought to him at different times, and of which he ſeemed more fond than of dried food. He drank often, and always ſwallowed a large quantity of water at a time.

He appeared very peaceable in his temper, and bore to be handled on any part of his body with great patience, except when he was hungry; but he was then always outrageous, as alſo when he was ſtruck. His moſt violent paſſions, even on the laſt occaſion, were however always immediately appeaſed by giving him victuals.

Notwithſtanding the lumpiſh aſpect and heavy make of this creature, he would jump about very nimbly in his fits of paſſion, and often leap to a great height; and one common mark of his fury was the ſtriking his head againſt the walls, or any thing elſe that was in the way, and this he would do with terrible violence. He was very apt to fall into theſe paſſions in a morning before his rice and ſugar were given him, and from the whole he appeared quite untractable, and ſeemed able, in his paſſion, to have run ſo faſt, as that a man on foot could not have eſcaped him.

This creature was two years old, and did not exceed a young heifer in height, but was remarkably broad and thick. His head was very large; and the hinder part of it, near the ears, remarkably elevated above the reſt of the face, which was flat, and ſunk down in a remarkable manner in the middle, riſing again towards the origin of the horn, but in a much ſmaller degree.

The horn in this young animal did not riſe above an inch high from its tough baſis (though in full grown animals it is ſometimes three feet and an half long), and was black and ſmooth at the top, but ragged downwards; and the determination of its growth is backward, not ſtraight up; this is very evidently ſeen in the horns of old *rhinoceroſes*, which are always curved in a conſiderable degree that way. If we conſider the proportion of this animal's ſize to the length of its horn, and thence carry the proportion to that between the large horns we ſee in the muſeums of the curious, we muſt ſuppoſe the animal of a very ſtupendous ſize, when at its full growth.

The ſides of the under-jaw in this creature ſtand very wide aſunder, ſlanting outward to the lower edge, and backward to the neck; the edges turn outwards from this ſtructure of the bones, and the head neceſſarily looks very large. The *rhinoceros* has four cutting teeth, one on each corner of each jaw, and ſix grinders in each; the firſt remote from the cutting teeth. That part of the head which reaches from the forepart of the horn to the upper lip may be called the noſe; this is very thick and bulky, and has a kind of circular ſweep down towards the noſtrils; on all this part there is a great number of rugæ or wrinkles.

The noſtrils are ſituated very low, in the ſame direction with the opening of the mouth, and not more than an inch from it; and, when viewed in a foreview, the whole noſe, from the top of the horn to the verge of the lower-lip, is ſhaped like a bell. The under-lip is like that of an ox, but the upper more like that of a horſe, and he uſes it as that creature does, to gather up hay from the rack, or graſs from the ground; but with this ſuperior advantage, that this creature has a power of extending this lip to ſix or ſeven inches in length from the noſe, and there drawing it to a point; with this lip, thus extended, the creature is able to graſp a ſtick, or any ſmall ſubſtance, and hold it extremely faſt; and this power of prolonging the lip ſerves, in many purpoſes, to the ſame end as the trunk of that other unwieldy animal the elephant.

The tongue of the *rhinoceros* is ſaid to be ſo rough as to be able to rub a man's fleſh off from the bones; but in this young ſubject it was ſo ſoft, that it reſembled that of a calf. It may poſſibly grow harder with age; but the ſtory of its effects ſeems of a piece with the many other falſe marvels reported of this animal. The eyes are dull and ſleepy, much like thoſe of a hog in ſhape; he ſeldom opens them entirely; and it is to be obſerved, that they are ſituated nearer the noſe than thoſe of any other known quadruped. The ears are broad and thin towards the top; the neck is very ſhort; the ſhoulders are thick and heavy; the body is thick and juts out at the ſides, and has a hollow in the back; the belly hangs low; the legs are ſhort, thick, and ſtrong; the hoofs are divided into three parts, each pointing forward; the tail is ſlender, flatted at the end, and covered on the ſides with very ſtiff thick black hairs; the ſkin is naked, rough or tuberculated, lying about the neck in vaſt folds; there is another fold from the ſhoulders to the fore-legs; and another from the hind part of the back to the thighs. The ſkin is thick, and ſeems almoſt impenetrable, inſomuch that it will turn the edge of a ſcymitar, and reſiſt a muſket ball; it feels like a piece of board of half an inch thick. It is covered in all parts, more or leſs, with a ſort of incruſtations, reſembling ſcales. Theſe are ſmall on the neck, and largeſt of all on the ſhoulders and hips; between the folds of this thick ſkin, the cuticle, which is left bare, is ſoft and eaſily penetrable. The ſcabby incruſtations of the ſkin have been called ſcales by ſome writers, but this is a very wrong term, for they have nothing of the nature of ſcales, nor any thing of regularity in them.

The creature is of the retromingent, and therefore probably of the retrogenerative kind. Thoſe animals that have been brought to Europe have been young and ſmall; but, according to Bontius, they equal the elephant in the bulk of their bodies, though they are lower on account of the ſhortneſs of their legs. They inhabit Bengal, Siam, Cochin-China, Quangſi in China, and the iſles of Java and Sumatra: they are fond of ſhady foreſts, the neighbourhood of rivers, and marſhy places; and are fond of wallowing in the mud like the hog. The *rhinoceros* is a ſolitary animal, brings one young at a time; is quiet and inoffenſive, but furious when provoked; very ſwift and dangerous; and, though dull of ſight, has a moſt exquiſite ſmell. It grunts like a hog. The fleſh of this animal is eaten. The ſkin, fleſh, hoofs, teeth, and dung itſelf, are uſed in India medicinally. The horns are in great repute as an antidote againſt poiſon, eſpecially thoſe of the virgin female called abbada; cups of which are ſaid to communicate virtue to the liquor poured into them. Redi, who has been very ſagacious in diſcovering the falſity of many of the pretended medicines taken from animals, yet gives us, on the teſtimony of his own experience, an account of ſome very remarkable virtues in the parts of the *rhinoceros*. The blood, he aſſures us, is excellent in colics and in dyſenteries. The decoction of the ſkin, he aſſures us, is a grand ſtomach antidote, and the horns are very valuable and alexipharmic.

This animal is the UNICORN of ſcripture, and the Indian aſs of Ariſtotle, who ſays it has but one horn. See *Tab.* IV. *Quadrupeds*, Nº 53.

The *rhinocereos* with two horns has no fore-teeth; the ſkin is without folds, granulated, and of a deep aſhen grey: between the legs it is ſmooth, and fleſh-coloured; in other parts there are a few briſtles, but they are moſt numerous about the ears and end of the tail. See *Tab.* IV. *Quadrupeds*, Nº 54. This animal inhabits Africa only; and ſeems, in its manners, to agree with the former. The michief it does is more the effect of a ſenſeleſs impulſe than of rage; for, though its ſight is bad, its ſenſes of hearing and ſmelling are exquiſite, ſo that the leaſt noiſe or ſcent puts it in motion, and in running to the ſpot whence the alarm proceeds, it overturns and tramples on animals, or any thing elſe which it meets with in its way, but never ſtays or returns to renew the charge. This was the ſpecies deſcribed by Martial, under the name of *rhinoceros cornu gemino*, who relates its combat with the bear.

> *Namque gravem gemino cornu ſic extulit urſum*
> *Jactat ut impoſitas taurus in aſtra pilas.*
>
> Spect. Epig. 22.

The Romans, who procured their *rhinoceroſes* from Africa, repreſent them with double horns. That figured in the Preneſtine pavement, and that in a coin of Domitian, have two horns; that which Pauſanias deſcribes (ix. 9.) under the name of Æthiopian bull, had one horn in the noſe, and another leſſer higher up; and Coſmar Ægyptius, (tom. ii. 334.) who travelled into Æthiopia, in the reign of Juſtinian, alſo attributes to it the ſame number. Auguſtus introduced a *rhinoceros* (probably of this kind) into the ſhews, on occaſion of his triumph over Cleopatra. Dion Caſſius, lib. ii. Phil. Tranſ. abr. vol. ix. ubi ſupra. Id. vol. lvi. p. 32, &c. Pennant's Hiſt. of Quadrupeds, vol. i. p. 138.

RHINOCEROS *avis*, the *rhinoceros-bird*, a name given by authors to a ſpecies of Indian raven, called by others *corvus Indicus cornutus:* the beak of which is frequently brought over into Europe. This, in the Linnæan ſyſtem, is a ſpecies of BUCEROS.

It is a very ugly bird, and of a very rank ſmell. It much exceeds the European raven in bigneſs, and its head and neck are very thick. Its eyes are very large, and its beak of a very remarkable figure, having a large and thick horn-like protuberance on its upper part. The whole beak is bent like a bow, not hooked at the end like the beaks of the hawk, &c. It is of a yellowiſh white below, and on the upper part towards the head is of a fine gay red, and the reſt of a yellowiſh white; the upper chap is ſerrated. The horn grows out from the head with this and runs along it, and bends up at its extremity; its upper and under part are red, its middle yellow. The bird feeds on carrion.

RHINOCEROS, in the *Hiſtory of Inſects*, a ſpecies of beetle, ſo called, becauſe it has a kind of horn upon its head.

RHINOPTES, a word uſed by the ancients to expreſs a perſon, who, from an ulcer in the great canthus of the eye, laying open the paſſages to the noſe, can ſee through his noſtril.

RHINSBERGERS, in *Eccleſiaſtical Hiſtory*. See COLLEGIANS.

RHIPTASMOS, a word uſed by the ancients to expreſs a reſtleſſneſs and frequent toſſing about, a very common ſymptom in fevers.

RHIZAGRA, the name of a chirurgical inſtrument, uſed to extract the ſtumps of teeth.

RHIZOPHORA, in *Botany*, the name given by Linnæus to a genus of plants, deſcribed under the name of *mangles* by Plumier. See MANGROVE.

RHODES, *coloſſus of*. See COLOSSUS.

RHODIOLA, in *Botany*. See ROSE *root*.

RHODITES *lapis*, the *roſe-ſtone*, in *Natural Hiſtory*, the name given by authors to kind of *aſtroites*, or STAR-*ſtone*, in which the figures more repreſent roſes than ſtars; they are in both owing to coralloide bodies immerſed in the ſtone; which, according to their various ſpecies, afford a different figure, when cut tranſverſely, in cutting the ſtone into plates for uſe.

RHODIUM *lignum*. See ASPALATH.

RHODIUM *marmor*, a name given by the ancients to a marble brought from Rhodes; it was of a good white, but inferior to the Parian, and was uſed by the Romans in their public buildings, and ſometimes in ſtatuary.

RHODODENDRON, *dwarf roſe-bay*, in *Botany*, a genus of the *decandria monogynia* claſs: its characters are, that the flower has a permanent empalement cut into five parts; the flower has one wheel funnel-ſhaped petal; it has ten ſlender declining ſtamina, of the length of the petal, terminated by oval ſummits, and a five-cornered germen ſupporting a ſlender ſtyle of the length of the petal, crowned by an obtuſe ſtigma; the germen afterwards becomes an oval capſule with five cells, filled with ſmall ſeeds. Miller enumerates two and Linnæus ſix ſpecies.

RHODOMELON, a name given by the ancients to a confection made of roſes, quinces, and honey, uſed as a grateful aſtringent and detergent in many caſes.

RHODON, in *Pharmacy*, from ῥοδον, *roſa*, a name applied to ſome compoſitions, wherein roſes are the chief ingredient, as *diarrhodon*, &c. Hence alſo RHODOSACCHARUM, i. e. *ſugar of roſes*. See ROSE.

RHODOPUS *gallinula*, in *Ornithology*, a name given by ſome authors to the bird more uſually known by the name TRINGA.

RHOITES, the name of a medicine among the ancients, which is a ſort of rob of the juice of pomegranates. Dioſcorides deſcribes it as the ſimple juice of the fruit, evaporated over the fire to the conſiſtence of an extract; but Paulus Ægineta gives the receipt to be three parts juice of pomegranate, and one part honey, boiled to the evaporation of a third part. So that the *rhoites* of Dioſcorides was a true rob of pomegranates; the other, rather honey of pomegranates, like our honey of roſes.

RHOMB. See RHOMBUS.

RHOMBO, the name of a peculiar fiſh of the *rhombus*, or turbot kind, called *rhombus aculeatus* by Aldrovand, Geſner, and other writers. It is a large fiſh, of an aſh-coloured green on the back, and white on the belly. It has no ſcales; but the ſkin of its back is divided by lines, ſomething in the manner of the ſkins of ſnakes. The mouth is very large, and is well furniſhed with teeth; and the palate has a number of tubercles, armed alſo with a ſort of teeth. It feeds on fiſh, and its fleſh is very delicate. It is very common in the markets at Venice, and is caught in the neighbouring ſeas, and in many other places. See *Tab.* IV. *Fiſh.* N° 43. See TURBOT.

RHOMBOIDÆUS *major* and *minor*, names given by Albinus to what he makes two muſcles, though Winſlow and others account it only one. What Winſlow calls the inferior portion of the rhomboidalis Albinus calls *rhomboidæus major*, and what he calls the upper portion of that muſcle, Albinus calls *rhomboidæus minor*. See RHOMBOIDES

RHOMBOIDALIS. See RHOMBOIDÆUS.

RHOMBOIDES, in *Geometry*, a quadrilateral figure, whoſe oppoſite ſides and angles are equal, but which is neither equilateral nor equiangular.

Such is the figure NOPQ, *Tab. Geometry*, *fig.* 21.

For the method of finding the area of a *rhomboides*, ſee RHOMBUS.

RHOMBOIDES, in *Anatomy*, a muſcle thus called from its figure. See *Tab. Anat.* (*Myol.*) *fig.* 6. *n.* 29.

It is a thin, broad, and obliquely ſquare fleſhy plane, ſituated between the baſis of the ſcapula and the ſpina dorſi.

It may be divided into two portions, one ſuperior, the other inferior, which ſometimes appear ſeparate. The ſuperior portion, which ſeems in ſome ſubjects to be made up of two, is fixed by an inſertion wholly fleſhy in the two or three loweſt ſpinal apophyſes of the neck, and partly in the poſterior cervical ligament. The inferior portion is mixed by a tendinous plane in the three or four uppermoſt ſpinal apophyſes of the back.

Theſe two portions, of which the inferior is much the broadeſt, being united, are inſerted in the edge of the baſis ſcapulæ, from the ſmall triangular ſpace to the inferior angle, the ſuperior portion covering a ſmall portion of the angularis at its inſertion. This whole muſcle is covered by the trapezius, and covers the ſerratus poſticus ſuperior, being joined to each of theſe muſcles by a filamentary or cellular ſubſtance. According to its inſertions and direction, its general uſe muſt be to draw backward and upward the ſub-ſpinal portion of the baſis ſcapulæ. It is likewiſe a moderator to the trapezius and ſerratus major, when they raiſe the ſhoulder; and it brings the ſcapula back to its natural ſituation, when the action of theſe muſcles ceaſes. Winſlow.

RHOMBOIDIA, in *Natural Hiſtory*, the name of a genus of ſpars, given them from their being of a rhomboidal form. They owe this figure to an admixture of particles of iron, and conſiſt of ſix planes.

Of this genus there are only two known ſpecies, viz. a white thin one with very thin cruſts, and a whitiſh brown thick one with thicker cruſts. They are both found in the foreſt of Dean in Glouceſterſhire, and in other places, where there are iron-ores. Hill.

RHOMBUS, Ῥομβος, is formed of ῥομβος, of ῥεμβειν, *to incompaſs* or *turn round*, in *Geometry*, an oblique-angular parallelogram; or a quadrilateral figure, whoſe ſides are equal and parallel, but the angles unequal; two of the oppoſite ones being obtuſe, and the other two acute. Such is the figure ABCD, *Tab. Geometry*, *fig.* 22.

To find the area of a rhombus, *or* rhomboides. Upon CD, which is here aſſumed as a baſe, let fall a perpendicular AE, which will be the altitude of the parallelogram: multiply the baſe by the altitude, the product is the area. Thus, if CD be $= 456$, and AE $= 234$, the area will be found 106704.

For it is demonſtrated, that an oblique-angular parallelogram is equal to a rectangle upon the ſame baſe CD, and of the ſame altitude AE (ſee PARALLELOGRAM). But the area of a rectangle is equal to the factum of the baſe into the altitude; therefore the area of an oblique-angular parallelogram is equal to the ſame. See RECTANGLE.

RHOMBUS, *ſolid*, in *Geometry*, two equal and right cones joined together at their baſes.

RHOMBUS, in *Ichthyology*, a ſpecies of the PLEURONECTES See PEARL.

RHOMBUS, in *Conchyliology*, the name given by the generality of authors to a genus of the ſhell-fiſh, much more properly called by ſome CYLINDRUS.

RHOMBUS, among *Surgeons*, denotes a ſort of BANDAGE of a *rhomboidal* figure.

RHOMBUS *aculeatus*. See TURBOT.

RHOPALIC *verſes*, among the *Ancients*, a kind of verſes which began with monoſyllables, and were continued in words growing gradually longer and longer to the laſt, which was the longeſt of all.

They had their name from the Greek ῥοπαλον, *a club*, which, like them, begins with a ſlender tip, and grows bigger and bigger to the head. Such is that verſe of Homer,

> Ω μακαρ Ατρειδη μοιρηγενες, ολβιοδαιμων.

And this Latin one of Auſonius:

> *Spes deus æternæ ſtationis conciliator.*

RHOPALOSIS, a diſtemper of the hair deſcribed by the ancients, and ſeeming to be the ſame with what we call the PLICA *Polonica*, being a ſort of matting together of the hair into long and thick treſſes.

RHOPE, formed of ῥεπω, to *preponderate*, a word uſed by the Greek writers to expreſs a violent tendency of the humours to any particular part of the body.

RHOPOGRAPHI, Ῥοπογραφοι, formed of ῥοπος, *toys or odd ware*, and γραφω, *I paint*, in *Antiquity*, an appellation given to certain painters, who confined themſelves to low ſubjects, ſuch as animals, plants, landſcapes, &c. The ſame appellation has been alſo given to ſuch as cut figures of men, &c. in box, philyrea, yew, &c. in gardens.

RHOX, a word uſed by ſome authors to expreſs the tunica uvea of the eye.

RHUBARB, *rhabarbarum*, *rheum*, in *Botany*, a genus of the *enneandria trigynia* claſs. Its characters are theſe: the flower has no empalement; it hath one petal, which is narrow at the baſe, and impervious; the brim is cut into ſix parts, which are obtuſe and alternately ſmaller; it hath nine hair-like ſtamina inſerted in the petal, and of the ſame length, terminated by oblong ſummits, which are obtuſe, and a ſhort three-cornered germen, with ſcarce any ſtyle, crowned by three-feathered ſtigmas, which are reflexed; the germen afterwards becomes a large three-cornered ſeed, with acute membranaceous borders. Miller reckons four and Linnæus five ſpecies. The true rhubarb is now ſown in many gardens, and may probably ſucceed ſo well here in time, as that a ſufficient quantity of that valuabledrug may be raiſed, to ſupply our conſumption. Miller.

The *rhubarb* with hairy leaves and equal foot-ſtalks has been generally reckoned the true *rhubarb* plant, having been produced from the ſeeds ſent from Ruſſia, as thoſe of the true *rhubarb*, to Juſſieu of Paris, Rand at Chelſea, and Linnæus at Upſal. It is a native of China and Siberia, and has been raiſed in ſome of our own gardens, where it is found to grow with vigour in the open ground. Some have derived its name from *Rha*, the river called by us Wolga, and *barbarum*, q. d. the root found by the Barbarians on the river *Rha*. However it is neceſſary to obſerve, that Dr. Hope received, in 1763, *rhubarb* ſeeds from Ruſſia, which Dr. Mounſey aſſured him were the ſeeds of the true *rhubarb*; and having ſown them in the open ground at Edinburgh, they produced a different ſpecies, viz. the *rheum palmatum Linnæi*, with the leaves deeply cut into pointed ſegments. He obſerves that the root of this plant, though taken up too young, and at an improper ſeaſon, viz. in July, agreed perfectly with the beſt foreign *rhubarb* in colour, ſmell, taſte, and purgative quality. See his botanical deſcription and drawing of the plant in Phil. Tranſ. vol. lv. art. 32. Perhaps, ſays Dr. Lewis, the roots of both ſpecies may be of the ſame quality, and taken promiſcuouſly. The *rhaphonticum* is a different ſpecies from either of theſe. Mr. Bell informs us, in his travels, that the beſt *rhubarb* grows in that part of the Eaſtern Tartary called Mongallia, which ſerves as a boundary between Ruſſia and China. This plant, he ſays, does not run and ſpread itſelf like docks, but grows in tuſts at uncertain diſtances, as if the ſeeds had been dropped with deſign. As the Mongalls do not think it worth cultivating, the MARMOTS, which burrow under the ſhade of its ſpreading leaves, and probably feed on its leaves and roots, contribute to its increaſe, partly by the manure which their dung affords it, and principally by caſting up and looſening the earth, into which the ripe ſeeds, blown by the wind, fall, and where they immediately take root. After digging and gathering the *rhubarb*, the Mongalls cut the large roots into ſmall pieces, in order to make them dry the more readily. In the middle of every piece they ſcoop a hole, through which a cord is drawn, in order to ſuſpend them in a convenient place; and by this practice they deſtroy ſome of the beſt part of the root.

All *rhubarb* plants, ſays Miller, are propagated by ſeeds, which ſhould be ſown in autumn ſoon after they are ripe, and then the plants will come up the following ſpring; whereas, if they are ſown in the ſpring, they will not come up till the next ſpring. The plants ſhould remain where the ſeeds are ſown, and when they appear in the ſpring, the ground ſhould be hoed to cut up the weeds, and they ſhould be thinned, like carrots and parſnips, leaving them at the firſt hoeing ſix or eight inches aſunder; and, at the ſecond hoeing, at the diſtance of at leaſt a foot and a half. After this the plants will require no other culture but to keep them clean from weeds: in autumn the leaves decay, when the ground ſhould be made clean; and it ſhould alſo be hoed and cleaned in the ſpring, when the plants put out their new leaves. In the ſecond year after they come up the ſtrongeſt will produce flowers and ſeeds; and, in the third year, moſt of them will flower. The roots will remain many years without decaying, and, it is ſaid, that the old roots of the true *rhubarb* are much preferable to the young ones. They delight in a rich ſoil, not too dry nor too moiſt, and where there is a good depth for their roots to run down; in ſuch land their leaves will be very large, and their roots will grow to a great ſize.

Two ſorts of *rhubarb* roots are met with in the ſhops. The firſt is imported from Turkey and Ruſſia, in roundiſh pieces, freed from the bark, with a hole through the middle of each, externally of a yellow colour, internally variegated with lively reddiſh ſtreaks. The other, which is leſs eſteemed, comes immediately from the Eaſt Indies, in longiſh pieces, harder, heavier, and more compact than the foregoing. The firſt ſort, unleſs kept very dry, is apt to grow mouldy and worm-eaten; the ſecond is leſs ſubject to theſe inconveniences. Some of the more induſtrious artiſts are ſaid to fill up the worm-holes with certain mixtures, and to colour the outſide of the damaged pieces with powder of the finer ſorts of *rhubarb*, and ſometimes with cheaper materials. The marks of the goodneſs of *rhubarb* are, the livelineſs of its colour when cut, its being firm and ſolid, but not flinty or hard; its being eaſily pulverable, and appearing, when powdered, of a fine bright yellow colour; its imparting to the ſpittle on being chewed, a deep ſaffron tinge, and not proving ſlimy or mucilaginous in the mouth. Its taſte is ſubacrid, bitteriſh, and ſomewhat ſtyptic; the ſmell is lightly aromatic.

Rhubarb is a mild cathartic, and commonly conſidered as one of the ſafeſt and moſt innocent of the ſubſtances of this claſs. Beſides its purgative virtue it has a mild aſtringent one, diſcoverable by the taſte, and by its ſtriking an inky blackneſs with chalybeate ſolutions; hence it is found to ſtrengthen the tone of the ſtomach and inteſtines, to leave the belly coſtive, and to be one of the moſt uſeful purgatives in diarrhœas, dyſenteries, and all diſorders proceeding from a debility and laxity of the fibres: it is frequently given with a view to this ſtomachic and corroborating virtue rather than to its producing any conſiderable evacuations. It tinges the urine of a high yellow colour. *Rhubarb* in ſubſtance purges more effectually than any preparation of it: the doſe is from a ſcruple to a dram. By roaſting it with a gentle heat, till it becomes eaſily friable, its cathartic power is diminiſhed, and its aſtringency ſuppoſed to be increaſed. The purgative virtue of *rhubarb* is extracted more perfectly by water than by rectified ſpirit; the root remaining after the action of water is almoſt if not wholly inactive; whereas, after repeated digeſtion in ſpirit, it proves ſtill very conſiderably purgative: when the *rhubarb* has given out to ſpirit all that this menſtruum can extract, it ſtill imparts a deep colour, as well as a purgative impregnation, to water. A dram of the extract, formed by inſpiſſating the watery infuſion, is not more efficacious than a ſcruple of the root in ſubſtance; but half a dram of the extract formed from the ſpirituous tincture proves moderately purgative, though ſcarcely more ſo than an equal quantity of the powder. The ſpirituous extract diſſolves almoſt wholly in water, and hence the tincture, like the ſpirituous infuſions of moſt other vegetables, does not turn milky on being mixed with aqueous liquors; of the watery extract ſcarce above one fourth is diſſolved by rectified ſpirit, and the part that does not diſſolve proves more purgative than that which does. Hence it appears, that *rhubarb* contains much more gummy or mucilaginous than reſinous matter; and its purgative quality ſeems to reſide chiefly in a combination of gummy and ſaline matter.

Tinctures of this root are drawn in the ſhops with proof ſpirit and with Mountain wine, in the proportion of an ounce of *rhubarb* to a pint of the menſtruum. Theſe preparations, uſed chiefly as mildly laxative corroborants, in weakneſs of the ſtomach, indigeſtion, diarrhœas, cholicky and other ſuch complaints, are commonly aromatiſed with a little cardamom ſeeds, and ſaffron, as two drams of the former and one of the latter to the above quantity of the root, and thus are formed the *tincture of rhubarb, vinoſa & ſpirituoſa*. For ſome purpoſes a tincture, called *tinctura rhei dulcis*, is drawn from the *rhubarb* and cardamom ſeeds with proof ſpirit, and two ounces of white ſugar-candy diſſolved in the ſtrained liquor. For others, inſtead of ſweets and aromatics, gentian and ſnake-root are joined, in the proportion of a dram and a half of the former and a dram of the latter, with the addition of a ſcruple of cochineal as a colouring ingredient; this laſt tincture, called *tinctura rhei amara*, is, in many caſes, an uſeful aſſiſtant to the Peruvian bark in the cure of intermittents.

The Turkey *rhubarb* is generally preferred to the Eaſt India ſort, though the latter is more aſtringent, but has ſomething leſs of an aromatic flavour. Tinctures made from both, with equal quantities of rectified ſpirit, have nearly the ſame taſte; on drawing off the menſtrua, the extract left by the tincture of the Eaſt India *rhubarb* proves in taſte conſiderably ſtronger than the other. They ſeem both, ſays Dr. Lewis, to be the produce of the ſame climate, and roots of the ſame ſpecies of plant, taken up probably at different ſeaſons, or cured in a different manner. Lewis's Mat. Med.

The yellow colour of *rhubarb*, it is ſaid, is much leſs deſtructible than many other vegetable yellows. Aqua fortis, and other acids which deſtroy the colour of ſaffron, turmeric, &c. make no change in that of *rhubarb*, or at moſt render it only turbid. Volatile ſpirits heighten the colour, and incline it to red. Fixed alkaline ſalts have this effect in a greater degree. Mr. Model affirms that a conſiderable quantity of ſelenites is contained in *rhubarb*. In one experiment he obtained ſix ounces of ſelenites from four pounds of *rhubarb*; and in the other, no leſs than an ounce of ſelenites from two ounces and five drams of old *rhubarb*. Rozier's Journal for July, 1775.

The Indian *rhubarb* ſown in our gardens has this peculiar property, that it yields a fine and clear gum. This is perfectly white and pellucid, and in the months of June and July is ſo plentiful, that an ounce may ſometimes be gathered at a time from one plant of it. It exſudates of itſelf from all parts of the ſtalks and ribs of the leaves, and ſometimes from the under part of the leaves themſelves. It ſtands in ſome places in large drops, and in others the ſtalks, &c. ſeem only to be covered with a thin layer of it; and the under part of the leaves in ſome have it in form of twiſted wires or long icicles. The plant may always be ſeen wounded by a ſort of cauſtic in the places where the germen makes its way out, and theſe may be followed with any pointed inſtrument through the ſkin; in ſome parts of the plant this juice is found to be turned gummy within it, and looks like clear ice. As this is the only known herbaceous plant that yields a true gum like that of trees, it would be worthy obſervation, whether or not ſome of our own plants have ſome tendency of nature to form a juice of the ſame kind. It would be moſt proper to look for this in the plants of the ſame genus, and as nearly related to the *rhubarb* as we can. The docks, ſo common about our fields, are of the ſame genus; and the ſorrel ſhews, by its taſte, that it is particularly allied to the plant; for both are alike of the dock-kind, and both alike ſour. It would be proper to look carefully about the leaves of ſorrel a little before it flowers, to ſee whether any thing like the ſame gum appears on it.

There is yet this farther analogy between this *rhubarb* and our common ſorrel; that the huſks of our ſorrel, boiled in water, with a little alum, turn it to a ſine red colour; and the huſks of *rhubarb* do the ſame, and both the one and the other often turn red in decaying.

The juice of the roots of this *rhubarb*, extracted by bruiſing and ſteeping it in common water, when the liquor is ſtrained and evaporated, becomes only a clear uninflammable gum, and melts in the flame of a candle. This gum, as well as that of the ſtalks and leaves, is of an inſipid taſte; and it is obſervable, that though the plant naturally yields it in ſo large a quantity, yet it will not flow from wounds made by art in any part of the plant. Upon the conſideration of the inſipid taſte of this gum, and its ſolubility in water, we may found ſome probable conjecture, in regard to the different virtues of this plant in purging and binding.

The woody fibres have a ſtrong taſte; and, in all probability, are alone endued with the aſtringent quality. An infuſion of *rhubarb* is known to purge, and a powder of it to bind: the reaſon is eaſily ſeen on this conſideration. The water in infuſion takes up all this gummy juice, and its other juices, but leaves the fibroſe part behind, in conſequence of which it ought to purge without binding; but in caſe of giving the powder, the juices are in great part evaporated in the drying, and the woody part left almoſt alone; it therefore purges but little, and proves powerfully aſtringent. Phil. Tranſ. N°. 224.

Rhubarb, *monk's*, a ſpecies of DOCK.

The root of this plant is more aſtringent than *rhubarb*, but is much inferior in its purgative virtue, though given, as uſually directed, in double its doſe; nauſeating the ſtomach, without producing any conſiderable evacuation. It communicates a deep yellow tincture, both to water and ſpirit. Lewis.

Rhubarb, *white*. See Mechoacan.

RHUMB, Rumb, or Rum, in *Navigation*, a vertical circle of any given place; or the interſection of a part of ſuch a circle with the horizon.

Rhumbs, therefore, coincide with *points* of the world, or of the horizon.

And hence the mariners diſtinguiſh the *rhumbs* by the ſame names as the points and winds. But we may obſerve, that the *rhumbs* are denominated from the points of the compaſs in a different manner from the winds: thus, at ſea, the north-eaſt wind is that which blows from the north-eaſt point of the horizon towards the ſhip in which we are; but we are ſaid to ſail upon the north-eaſt *rhumb*, when we go towards the north-eaſt.

They uſually reckon 32 *rhumbs*, which are repreſented by the 32 lines in the roſe, or card, of the compaſs.

Aubin defines a *rhumb* to be a line on the terreſtrial globe, ſea-compaſs, or ſea-chart, repreſenting one of the 32 winds which ſerve to conduct a veſſel. So that the *rhumb* a veſſel purſues is conceived as its route, or courſe.

Rhumbs are divided and ſubdivided like points. Thus, the whole *rhumb* anſwers to the cardinal point. The half *rhumb* to a collateral point, or makes an angle of 45 degrees with the former, The quarter *rhumb* makes an angle of 22 deg. 30 min. therewith. And the half-quarter *rhumb* makes an angle of 11 deg. 15 min.

Sometimes navigators divide the 32 points into four quarters, and call the *rhumb* next the eaſt the firſt *rhumb*, the next to that the ſecond *rhumb*, &c.

For a table of the *rhumbs*, or points, and their diſtances from the meridian, ſee Wind.

Rhumb-Line, *loxodromia*, in *Navigation*, is a line prolonged from any point of the compaſs in a nautical chart, except the ſour cardinal points: or it is the line which a ſhip, keeping in the ſame collateral point, or *rhumb*, deſcribes throughout its whole courſe.

The great property of the *rhumb-line*, or loxodromia, and that from which ſome authors define it, is, that it cuts all the meridians under the ſame angle.

This angle is called the *angle of the rhumb*, or the *loxodromic* angle.

The angle which the *rhumb-line* makes with any parallel to the equator, is called the *complement of the rhumb*.

An idea of the origin and properties of the *rhumb-line*, the great foundation of navigation, may be conceived thus: a veſſel beginning its courſe, the wind wherewith it is driven makes a certain angle with the meridian of the place; and, as it is ſuppoſed, the veſſel runs exactly in the direction of the wind, it makes the ſame angle with the meridian which the wind makes.

Suppoſing then the wind to continue the ſame, as each point or inſtant of the progreſs may be eſteemed the beginning, the veſſel always makes the ſame angle with the meridian of the place where it is each moment, or in each point of its courſe, which the wind makes.

Now a wind, e. gr. that is north-eaſt, and which, of conſequence, makes an angle of 45 degrees with the meridian, is equally north-eaſt wherever it blows, and makes the ſame angle of 45 degrees with all the meridians it meets. A veſſel, therefore, driven by the ſame wind, always makes the ſame angle with all the meridians it meets with on the ſurface of the earth.

If the veſſel ſail north and ſouth, it makes an angle infinitely acute with the meridian, i. e. it is parallel to it; or rather ſails in it. If it run eaſt and weſt, it cuts all the meridians at right angles.

In the firſt caſe, it deſcribes a great circle; in the ſecond, either a great circle, viz. the equator, or parallel to it. If its courſe be between the two, it does not then deſcribe a circle; ſince a circle, drawn in ſuch a manner, would cut all the meridians at unequal angles, which the veſſel cannot do.

It deſcribes therefore another curve, the eſſential property whereof is, that it cuts all the meridians under the ſame angle. This curve is what we call the *loxodromic curve*, *rhumb-line*, or *loxodromy*.

It is a kind of ſpiral, which, like the logarithmic ſpiral makes an infinity of circumvolutions without ever arriving at a certain point, to which it yet ſtill tends, and towards which it approaches at every ſtep.

This aſymptotic point of the *rhumb-line* is the pole: at which were it poſſible for it to arrive, it would find all the meridians conjoined, and be loſt in them.

The courſe of a veſſel then, except in the two firſt caſes, is always a *rhumb-line*; which line is the hypothenuſe of a rectangled-triangle, whoſe two other ſides are the ſhip's way, or diſtance run in longitude and latitude. Now the LATITUDE is uſually had by obſervation, and the angle of the *rhumb*, with one or other of the two ſides, by the COMPASS.

All, therefore, that is required by calculation in ſailing, is the value of the length of the *rhumb-line*, or the diſtance run.

But as ſuch curve line would prove very perplexing in the calculation, it was neceſſary to have the ſhip's way in a right line; which right line, however, muſt have the eſſential property of the curve line, viz. to cut all the meridians at right angles. The method of effecting which, ſee under the article Chart.

If PA, PF, PG, &c. (*Tab. Navigation*, *fig.* 21.) be ſuppoſed meridians, AI the equator, and EB, KL, MN, parallels; AO will repreſent a *rhumb-line*, which makes equal angles with the meridians, and conſequently different from thoſe made by a great circle, which cuts the meridians at unequal angles; whence it follows, that the *rhumb* is not a great circle of the ſphere. If a ſhip, therefore, be at firſt directed towards E, and conſtantly perſiſt in the ſame *rhumb*, it will never arrive at the place E, but at the place O, which is farther from the equator AI.

Hence, as on the ſurface of a ſphere the ſhorteſt way between A and O is an arch of a great circle between A and O; the *rhumb-line* is not the ſhorteſt way, or leaſt diſtance from one place to another.

Rhumb-Lines, *uſe of the*, in *Navigation*. 1. If the meridians PA, PB, PC, PD, &c (*fig.* 23.) be not very far apart, the *rhumb-line* AIHG is divided by the equidiſtant parallels, LE, MF, NG, &c. into equal parts.

Hence, 1. The parts of the *rhumb* AI and AG are as the latitudes AL and AN of the places A and G. 2. Since the arcs, AB, IK, HF, are equal in magnitude, and therefore unequal in number of degrees; the ſum of the arcs, called the *latus mecodynamicum*, or *miles of longitude*, is not equal to the difference of longitude AD of the places A and G.

2. The length of the *rhumb-line* AG is to the change or difference of latitude GD, in the ſame ratio as the whole ſine to the co-ſine of the angle of the *rhumb*.

Hence, 1. The *rhumb* ſailed on being given, together with the difference or change of latitude, turned into miles, the length of the *rhumb-line*, or the diſtance from the place A to the place G upon the ſame *rhumb*, is had by the rule of three. 2. The *rhumb* being given, together with the quantity of the ſhip's way on the ſame *rhumb*, i. e. the length of the *rhumb* AG; the difference of latitude DG is had, by the rule of three, in miles, to be converted into degrees of a great circle. 3. The difference of latitude DG being given in miles, as alſo the length of the *rhumb-line* AG, the angle of the *rhumb*, and conſequently the *rhumb* ſailed on, is had by the rule of three. 4. Since the co-ſine of an angle is to the whole ſine, as the whole ſine to the ſecant of the ſame angle;

the difference of latitude G D is to the length of the *rhumb-line* A G, as the whole ſine to the ſecant of the angle of the *rhumb*.

3. The length of the *rhumb-line*, or of the ſhip's way in the ſame *rhumb*, A G, is to the *latus mecodynamicum* or *mecodynamic* ſide A B + I K + H F, as the whole ſine to the ſine of the *loxodromic* angle GAP.

Hence, 1. The *rhumb*, or angle of the *rhumb*, being given; as alſo the ſhip's way in the ſame *rhumb line* A G, the *mecodynamic* ſide is had, by the rule of three, in miles, i. e. in the ſame meaſure wherein the length of the *rhumb* is given. 2. In like manner, the *mecodynamic* ſide A B + I K + H F being given, as alſo the *rhumb-line* or ſhip's way A G, the *rhumb* ſailed in is found by the rule of three.

4. The change of latitude G D is to the *mecodynamic* ſide A B + I K + H F; as the whole ſine to the tangent of the *loxodromic* angle P A G or A I B.

Hence the *rhumb* or *loxodromic* angle P A G, and the change of latitude G D being given, the *mecodynamic* ſide is found by the rule of three.

5. The *mecodynamic* ſide A B + I K + H F is a mean proportional between the aggregate of the *rhumb* A G, and the change of latitude G D, and their difference.

Hence the change of latitude G D, and the *rhumb-line* A G being given in miles, the *mecodynamic* ſide is found in the ſame meaſure.

6. The *mecodynamic* ſide A B + I K + H F being given, to find the longitude A D.

Multiply the change or difference of latitude G D by ſix, which reduces it into parts of ten minutes each; divide the *mecodynamic* ſide by this product, and the quotient gives the miles of longitude, anſwering to the difference of latitude in ten minutes: reduce theſe miles of longitude in each parallel into differences of longitude from a loxodromic table, and the ſum of theſe is the longitude required.

7. If a ſhip ſail on a north or a ſouth *rhumb*, it deſcribes a meridian; if on an eaſt or weſt *rhumb*, it deſcribes either the equinoctial, or a parallel thereto. Wolfii Elem. Math. tom. iv. cap. 11.

8. *To find the* rhumb *between two places by calculation, or geometrically*, we have two canons, or proportions: the firſt, As the radius is to the co-ſine of the middle latitude, ſo is the difference of longitude to the whole departure from the meridian, in the courſe between the two places propoſed.

The ſecond, As the radius is to the half-ſum of the co-ſines of both latitudes, or (rather for geometrical ſchemes) as the diameter is to to the ſum of the coſines of both latitudes, ſo is the difference of longitude to the departure from the meridian.

For an example of the former proportion, let the *rhumb* be required between cape Finiſterre, latitude 43°, longitude 7° 20′, and St. Nicholas iſle, latitude 38°, longitude 352°. The middle latitude is 40° 30′, the complement 49° 30′; and the difference of longitude 15° 20′. Out of theſe leſſer equal parts prick down 15° from C to L (*fig.* 24.) and deſcribe the arc B D with 60° of the chords, and make it equal to 49° 30′, and draw C D continued farther to A. From L take the neareſt diſtance to A C, which is equal to L M, and make it one leg of a right-angled triangle; make the other leg the difference of latitude 5°, which prick from the equal parts from L to B. Then the extent M B, meaſured on the ſaid parts, ſhews the diſtance to be 13° 24′; which, allowing 20 leagues to a degree, is almoſt 268 leagues. Then with the radius C B, ſetting one foot at M, croſs the *rhumb* triangle at G H; which extent, meaſured on the greater chord, is almoſt 22°, the complement whereof is 68°; and ſo much is the *rhumb* from the meridian between the two places, amounting to 6 points and upwards of 80 minutes.

For an inſtance of the latter proportion, let it be required to find the *rhumb* and diſtance between the Lizard and Bermudas. The latitude of the Lizard being 56°, and that of Bermudas 32° 20′, or 32° 41 centeſms, and their difference of longitude 55 degrees: draw the lines A C and C D (*fig.* 25.) at right angles, and with 60 degrees of the leſſer chords deſcribe the quadrant H I, and prick the radius from I to D; ſo is C D the diameter: then count both latitudes from H to F and G, the neareſt diſtance from F to C I is the co-ſine of Bermudas latitude, which prick from C to E. Again, the neareſt diſtance from G to C I is the co-ſine of the Lizard's latitude, which place from C to S, ſo is C S the ſum of both co-ſines; draw D S, and prick down 55 degrees, the difference of longitude from C to V, out of the greateſt equal parts, and draw V B parallel to D S; ſo is C B the departure from the meridian in the courſe between both places. Making that, therefore, one leg of a right-angled triangle, prick down 17 degrees 59 centeſms, the difference of latitude between thoſe places, out of the ſame equal parts, from C to L, and draw B L. This repreſents the courſe and diſtance between the Lizard and Bermudas; and the extent L B, meaſured on the ſame equal parts, ſhews the diſtance to be 44 degrees 31 centeſms; which, allowing 20 leagues to a degree, is 886 leagues.

Then to find the courſe: with 60 degrees of the chords; ſetting one foot in L, with the other make marks at Y and Z; then the extent Z Y, meaſured on the chord, ſhews the *rhumb* to be 66° 37′ from the meridian. This proportion, in the preſent example, holds very juſt, according to Mercator's chart; whereas the former proportion, by the middle latitude, would have given the *rhumb* 67° 2′ from the meridian, and the diſtance 962 leagues.

Again, making C A equal to C V, a line joining L A would be the courſe and diſtance according to the ſame longitudes and latitudes laid down on the plain chart, whereby the courſe ſhould be 72° 17′ from the meridian, and the diſtance 1155 leagues. See SAILING.

RHUS, in *Botany*. See SUMACH, and POISON-*wood*.

RHUSELNIUM, in *Botany*, a name given by ſome authors to the RANUNCULUS.

RHYAS, Ῥυας, formed from ῥειν, *to flow*, in *Medicine*, a diminution or conſumption of the caruncula lacrymalis ſituate in the great canthus or angle of the eye.

The *rhyas* is uſed in oppoſition to the *encanthis*, which is an exceſſive augmentation of the ſame caruncle.

The cauſe of the *rhyas* is a ſharp humour falling on this part, and gnawing and conſuming it away by degrees; though it is ſometimes alſo produced by the too great uſe of catheretics in the fiſtula lacrymalis. It is to be cured by incarnatives.

RHYME, RHIME, RYME, or RIME, in *Poetry*, the ſimilar ſound or cadence and termination of two words which end two verſes, &c.

Or, *rhyme* is a ſimilitude of ſound between the laſt ſyllable or ſyllables of one verſe, and the laſt ſyllable or ſyllables of a verſe ſucceeding either immediately, or at a diſtance of two or three lines.

Rhyme is a modern invention, and the product of a Gothic age: Milton calls it the *modern bondage*. Yet ſome authors will have it, that the Engliſh, French, &c. borrow their *rhyme* from the Greeks and Latins. The Greek orators, they ſay, who endeavoured to tickle the ears of the people, affected a certain cadence of periods which ended alike, and called them ομοιοτελευτα. The Latins, who imitated them, called theſe chiming terminations, *ſimiliter deſinentia*.

This affectation increaſed as the Latin tongue declined; ſo that, in the later Latin writers, ſcarce any thing is more common than rhyming periods.

The French, and from them the Engliſh, &c. adopted this cadence of *rhyme*, which ſeemed to them more pretty and agreeable than the metrical verſes of the Greek and Roman poets.

This kind of Latin poetry in *rhyme* was much in vogue in the twelfth century; and the verſes thus running were called LEONINE *verſes*, for what reaſon Camden owns he does not know (for a lion's tail, ſays he, does not anſwer to the middle parts, as theſe verſes do); but, doubtleſs, they had their name from a canon called *Leoninus*, who firſt compoſed them with ſucceſs, and of whom we have ſeveral pieces in them remaining, addreſſed to pope Adrian IV. and Alexander III.

Camden has given us a collection of Latin *rhymes* of our ancient Engliſh writers; among whom, Walter de Mapes, archdeacon of Oxford, in the time of king Henry II. makes a principal figure, eſpecially for two pieces; the one in praiſe of wine, beginning,

Mihi eſt propoſitum in taberna mori,
Vinum ſit appoſitum morientis ori;
Ut dicant, cum venerint, angelorum chori,
Deus ſit propitius huic potatori.

The other againſt the pope, for forbidding the clergy to have wives, beginning,

Priſciani regula penitus caſſatur,
Sacerdos per hic *&* hæc *olim declinatur;*
Sed per hic *ſolummodo nunc articulatur,*
Cum per noſtrum præſulem hæc *amoveatur.*

Since the reſtoration of learning in the fifteenth century, attempts have been made to baniſh *rhyme* out of the modern poetry, and to ſettle the Engliſh and French verſes on the footing of the ancient Greek and Latin ones, by fixing the quantities of the ſyllables, and truſting wholly to thoſe, and to the numbers or meaſure.

This Milton has done, with great ſucceſs, in his Paradiſe Loſt, and other pieces; and after him Philips, Addiſon, and ſome others. Verſes of this kind we call *blank verſes*.

The French have attempted the ſame, but not with the ſame ſucceſs. Jodelet made the firſt eſſay, and after him

Paſquier; but they both failed. Paſſerat and Rapin followed them, and failed, like them. Their hexameter and Sapphic verſes were neither imitated nor approved; and the cadence of *rhyme* was generally preferred to quantity, or the uſe of long and ſhort ſyllables. Des Portes, likewiſe, made ſome eſſays of verſes, conſtructed of long and ſhort lines, without *rhyme*; but the attempt only ſerved to convince the world, that this kind of meaſure is inconſiſtent with the genius of the French tongue.

To ſucceed in ſuch kind of verſes, there muſt be a liberty of varying the order of the words, or of changing their ſituation, as may beſt ſuit the occaſions of the poet; of making the ſubſtantive either go before or follow after the verb, as the verſe requires, &c. Now none of the modern tongues will admit of ſuch an arbitrary ſituation of the words, equally with the ancients; yet none will allow this more than the Engliſh, nor any leſs than the French.

Rhymes are either *ſingle*, or *double*, or *triple*, though the two laſt are now much diſuſed.

RHYMES, *ſingle*, are divided into perfect or whole *rhymes*, and imperfect or half *rhymes*.

RHYME, *a whole or perfect*, is where there is a ſimilitude of ſound without any difference; or where a thorough identity of ſound appears in the pronunciation of the two ſyllables, notwithſtanding that there may be ſome difference in the orthography.

RHYME, *a half* or *imperfect*, is where there is a ſimilitude, with a difference either in reſpect of the pronunciation, or the orthography, but chiefly the former.

RHYME, *the feminine*, is that where the laſt ſyllable of the *rhyme* ends with an *e* mute, or quieſcent, as in *dove*, *belle*, &c.

RHYMES, *maſculine*, are thoſe of all other words.

Menage obſerves, that the maſculine *rhymes* cloſe the periods better; but the feminines, being the ſofter, and more languiſhing, end more agreeably, eſpecially in mournful ſubjects.

RHYMES, *double*, by the French called *rich rhymes*, are thoſe where the two words terminate alike through the whole two laſt ſyllables, as *ſquabble* and *rabble*, &c.

RHYMES, *plain*, are thoſe where the two rhyming verſes ſucceed immediately to each other.

RHYMES, *croſs*, are thoſe where the verſes are ſo diſpoſed, as that the firſt *rhymes* with the third, and the ſecond with the fourth, &c.

RHYMES, *aſſonant*. See ASSONANT.

RHYNE, in *Botany*, a name uſed by ſome authors for the camphor tree.

RHYPTICS, **RHIPTICS**, Ῥυπτικα, in *Medicine*, detergent remedies, or cleanſers. See DETERGENT.

RHYTHM, **RHYTHMUS**, Ῥυθμος, in *Muſic*, the variety in the movement, as to the quickneſs or ſlowneſs, and length and ſhortneſs, of the notes.

Or the *rhythmus* may be defined, more generally, the proportion which the parts of a motion bear to each other.

Ariſtides, among the ancient muſicians, applies the word *rhythmus* three ways; viz. either to immoveable bodies, when their parts are rightly proportioned to each other; as a well-made ſtatue, &c. or to things that move regularly, as in handſome walking, in dancing, in the dumb ſhews of the pantomimes, &c. or, thirdly, to the motion of ſound, or the voice; in which the *rhythmus* conſiſts of long and ſhort ſyllables, or notes, joined together in ſucceſſion in ſome kind of order, ſo that their cadence on the ear may be agreeable.

This, in oratory, conſtitutes what we call *a numerous ſtyle*; and when the tones of the voice are well choſen, *a harmonious ſtyle*.

In effect, *rhythmus*, in the general, is perceived either by the eye or ear, and may be either with or without metre: but the ſtrict muſical *rhythm* is only perceived by the ear, and cannot exiſt without it. The firſt either exiſts without ſound, as in dancing; or with ſounds: it may be either without any difference of acute and grave, as in a drum, or with a variety of theſe, as in a ſong.

The *rhythmus* of the ancients, Mr. Malcolm obſerves, was very different from that of the moderns. The former was only that of the long and ſhort ſyllables of the words and verſes; it depended altogether on the poetry, and had no other forms or varieties than what the metrical art afforded. The changes therein are none but thoſe made from one kind of metre to another, as from iambic to choraic, &c.

In the modern muſic, the conſtitution of the *rhythmus* differs from that of the verſe ſo far, that in ſetting muſic to words, the thing chiefly regarded is to accommodate the long and ſhort notes to the ſyllables in ſuch manner, as that the words be well ſeparated, and the accented ſyllable of each word ſo conſpicuous, that what is ſung may be diſtinctly underſtood.

Voſſius, in his book De Poematum Cantu & Viribus *Rhythmi*, extols the ancient *rhythmus*. Though he owns it was confined to the metrical feet; yet ſo well did they cultivate their language, eſpecially in what relates to the *rhythmus*, that the whole effect of the muſic was aſcribed to it, as appears by that ſaying of theirs, το παν παρα μουσικοις ὁ ῥυθμος. See, on this ſubject, Burney's General Hiſtory of Muſic, vol. i. ſect. 6.

RHYTHM, **RHYTHMUS**, in the *Ancient Poetry*, denotes the meaſure of the feet, or the number and combination of long and ſhort ſyllables; called alſo *metre* and *quantity*.

Voſſius attributes the whole force of the ancient muſic to their happy *rhythmus*: but this is ſomewhat inconceivable. Mr. Malcolm rather takes it, that the words and ſenſe of what was ſung had the chief effect; and that hence it was that in all ancient muſic the greateſt care was taken, that not a ſyllable of the words ſhould be loſt, leſt the muſic ſhould be ſpoiled.

Pancirollus ſeems of this opinion; and the reaſon he gives why the modern muſic is leſs perfect than the ancient is, that we uſually hear ſounds without words.

Voſſius ſays, the *rhythm* which does not expreſs the very forms and figures of things can have no effect; and that the ancient poetical numbers alone are juſtly contrived for this end. He adds, that the modern languages and verſe are altogether unfit for muſic; and that we ſhall never have any right vocal muſic till our poets learn to make verſes capable of being ſung; i. e. till we new-model our language, reſtore the ancient quantities and metrical feet, and baniſh our barbarous rhymes.

Our verſes, ſays he, run all as it were on one foot; ſo that we have not any real *rhythmus* at all in our poetry; he adds, that we mind nothing farther than to have ſuch a number of ſyllables in a verſe, of whatever nature, and in whatever order. But this is an unjuſt exaggeration.

RHYTHMICA, **RHYTHMICE**, Ῥυθμικη, in the *Ancient Muſic*, that branch of muſic which regulated the *rhythmus*.

The *rhythmica* conſidered the motions; and regulated their meaſure, order, mixture, &c. ſo as to excite the paſſions, keep them up, augment, diminiſh, or allay them.

Ariſtides, and other ancient muſical writers, divided artificial muſic into *harmonica*, *rhythmica*, and *metrica*.

But the *rhythmica*, with them, likewiſe comprehended dumb motions, and, in effect, all *rhythmical*, i. e. all regular motion.

Porphryry divides muſic into *harmonica*, *rhythmica*, *metrica*, *organica*, *poetica*, and *hypocritica*.

The ancient ſeem to have had no rhythm in their muſic beſide the long and ſhort ſyllables of their words and verſes, which were ſung, and always made a part of their muſic; ſo that the *rhythmica* with them was only the application of the metrical feet, and the various kinds of verſes uſed by them. The modern goes much farther.

RHYTHMOPŒIA, one of the muſical faculties, as they are called, which preſcribes rules for the motions, or *rhythm*.

The ancient *rhythmopœia* is very defective. We find nothing of it in the books of the ancients, but ſome general hints, which can ſcarce be called rules. In their explications there appears nothing but what belongs to the words and verſes of their ſongs, which is a ſtrong preſumption they had no other. See RHYTHMICA.

RHYTIDOSIS, formed of ῥυτιδοω, *to wrinkle*, the name of a diſtemper of the eye, in which it waſtes and wrinkles up.

RIADHIAT, in *Modern Hiſtory*, a ſuperſtitious practice among the Mahometans, and chiefly among thoſe of Hindoſtan, which conſiſts in ſhutting themſelves up for fifteen days, without any other nouriſhment than bread and water, in a place where there is no light; during which time, the devout Muſſulman inceſſantly repeats the word *hou*, which denotes one of the attributes of God.

RIAL, **RYAL**, a Spaniſh ſilver coin; being the eighth part of the piaſter or PIECE *of eight*.

The word in the original Spaniſh, *real*, ſignifies *royal*.

The *rial* is equal to about ſix pence ¼ ſterling.

The ſilver *rial* is equal to 34 ſilver maravedis; the copper *rial* to 44 copper maravedis, which only amount to 18 ſilver maravedis.

There are alſo *rials* of eight, *rials* of four, *rials* of two, and half *rials*. The *rials* of eight are the piaſters, thoſe of four are half piaſters, &c.

Great quantities of *rials*, or *rials* of eight, are carried into the Eaſt Indies, where they are divided into three claſſes, and received on different footings; viz. the *old rial*, known by the chaplet around, whereof 100 are current for 215 rupees; the *ſecond*, known by the largeneſs of its bead, current at 212¼ rupees for 100; and the *new*, at 208½ rupees for 100 *rials*. See **Rupee**.

Rial, or **Royal**, is alſo the name of a piece of gold, anciently current among us for ten ſhillings.

In 1 Henry VI. by indenture of the mint, a pound weight of gold of the old ſtandard was coined into 45 *rials*, going for ten ſhillings a-piece, or a proportional number of *half rials*, going at five ſhillings a-piece; or *rial farthings*, which went at two ſhillings and two pence.

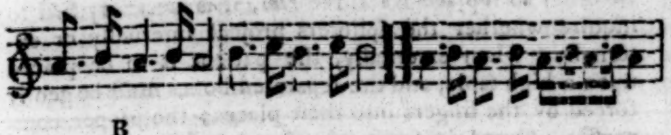
In 1 Henry VIII. the gold *rial* was ordered to go at eleven ſhillings and three pence. In 2 Elizabeth, gold *rials* were coined at fifteen ſhillings a-piece, when a pound weight of old ſtandard gold was to be coined into 48 *rials*. In 3 James I. *roſe-rials* of gold were coined at thirty ſhillings a-piece, and *ſpur-rials* at fifteen ſhillings.

RIB. See **Ribs**.

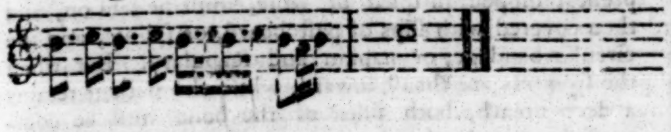
RIBATTUTA, in the *Italian Muſic*, a ſtriking or ſounding the ſame note over again. Hence.

Ribattuta *di gola*, one of the graces in ſinging, is performed by repeated beating or ſtriking a note, from that which is immediately above it. See example A. It differs from a ſhake.

A



B



Ribattuta *di gola doppia*. See example B. This is pretty near what the French call *tour de goſier*, or double cadence.

RIBBAND, or **Ribbond**, a narrow ſort of ſilk, chiefly uſed for head ornaments, badges of chivalry, &c.

The knights of the Garter wear a blue *ribband*; thoſe of the Thiſtle, a green *ribband*, &c. ſcarfwiſe. See **Collar**, **Garter**, &c.

Ribbands, *figured*. See **Figured**.

Ribband, or **Ribbon**, in *Heraldry*, is the eighth part of a bend. See *Tab.* II. *Herald. fig.* 82. See alſo the article **Bend**. It is borne a little cut off from the outlines of the eſcutcheon: thus; he beareth or, a *ribband*, gules.

Ribbands, in *Naval Architecture*, long narrow flexible pieces of timber, nailed upon the outſide of the ribs, from the ſtem to the ſtern-poſt, ſo as to envelop the ſhip lengthways, and appear on her ſide and bottom like the meridians on the ſurface of the globe.

The *ribbands*, being judiciouſly arranged, with regard to their height and diſtance from each other, and forming regular ſweeps about the ſhip's body, will compoſe a kind of frame, whoſe interior ſurface will determine the curve of all the intermediate or filling timbers, which are placed between the principal ones. Falconer.

Ribband-*ſcrew-ſhell*, the Engliſh name of the **turbo**, with broad ſpiral faſciæ, and a ſmall mouth.

RIBBING, in *Huſbandry*. See **Ploughing**.

Ribbing *nails*. See **Nail**.

RIBES, in *Botany*. See **Currant** *tree*.

RIBS, *coſtæ*, in *Anatomy*, certain long arched bones, ſerving to form or ſuſtain the inner ſides of the thorax or breaſt. See *Tab. Anat.* (*Oſteol.*) *fig.* 7. *lit. p. p. p.* &c.

The *ribs* are in number twenty-four; twelve on each ſide; though their number ſometimes varies. Their figure is an imperfect ſegment of a circle: they are harder, rounder, and more incurvated towards their articulation with the vertebræ than at the other extremity towards the ſternum, which is thinner, broader, and more ſpongy.

The *ribs* are divided into *true* or genuine, and *ſpurious* or falſe.

The *true ribs* are the ſeven upper pair, which are thus diſtinguiſhed, as forming the moſt perfect arches, and as having a ſtrong articulation with the ſternum. See *Tab. Anat.* (*Oſteol.*) *fig.* 3. *lit. a. a.* &c.

The five lower are called *nothæ*, or *ſpurious ribs*, as being ſmaller, ſhorter, and more cartilaginous than the reſt, and not forming entire arches, nor reaching ſo far as the ſternum, which makes their articulation very lax; becauſe they terminate in long ſoft cartilages, which bending upwards are joined to the upper ribs. See *Tab. Anat.* (*Oſteol.*) *fig.* 3. *lit. c. c.* &c.

Anatomiſts have divided each *rib* into the middle part, or body, two extremities, the one anterior, the other poſterior; two ſides, one external and convex, the other internal and concave; two edges, one ſuperior, and the other inferior; and two labia in each edge, one external, the other internal. The poſterior extremity, which may be called the head of the *rib*, is articulated with the vertebræ of the back. At the anterior extremity freſh *ribs* are lengthened out by cartilaginous epiphyſes, ſtuck into their bony ends. Each of the true *ribs* at the poſterior extremity, has two ſmall cartilaginous impreſſions, diſtinguiſhed by a kind of angle, by which they are articulated with the lateral cartilaginous impreſſions in the bodies of two vertebræ of the back; but the firſt *rib* has no more than one ſuch impreſſion, being articulated with one vertebra only. At a ſmall diſtance from the head of this extremity poſteriorly is another cartilaginous impreſſion on each ſide, a little convex, and cloſely joined to a ſmall tuberoſity. By theſe the *ribs* are articulated with the lateral cartilaginous depreſſions in the tranſverſe apophyſes of the dorſal vertebræ; and the tuberoſities ſerve for the inſertion of ligaments: the portion which lies between the head and theſe impreſſions is contracted, and repreſents a neck. When the poſterior extremity of a *rib* is articulated with two vertebræ, the ſecond articulation is always with the tranſverſe proceſs of the loweſt of the two. Between the tuberoſity and middle part of the *ribs*, there is, on their outſide, a kind of oblique rough angle of different breadths. In the firſt *rib*, this angle is not diſtinct from the tuberoſity; in the ſecond, it reaches but to a ſmall diſtance from it; in the third *rib*, this diſtance is ſtill greater, and from thence it continues to increaſe gradually all the way to the third falſe *rib*; ſo that if we look directly at the back of the ſkeleton, theſe angles repreſent the legs of a pair of compaſſes, opened pretty wide. On the inſide of the *ribs*, toward the lower edge, we obſerve a groove reaching all the way from the angle to the extremity, and that chiefly in the five lower true *ribs*, and the three firſt falſe ones. The upper edge of the two firſt *ribs* is ſharp, the lower a little rounded. The upper edge of the third is more obtuſe, and the lower a little more flat. In the reſt, the upper edge is rounded, the lower more or leſs ſharp.

In all the *ribs* the anterior extremity is lower than the poſterior; the *ribs* are much more crooked in the back than in the forepart; the appendices, epiphyſes, or cartilaginous portions of the true *ribs*, increaſe in length, as they deſcend in the ſame manner as the *ribs* themſelves; the cartilages of the firſt three or four *ribs* lie nearly in the ſame direction with the *ribs* themſelves. In the *ribs* below theſe, the cartilages make angles, at which they turn upward towards the ſternum, and this curvature increaſes in proportion as the *ribs* deſcend; and the loweſt cartilages, in changing their direction upwards, lie very cloſe to each other, and thoſe of the laſt two true *ribs* have often, at their inferior edge, a ſort of apophyſis or production, by which they are connected with the cartilages immediately below them. The laſt two true *ribs* extend conſiderably in breadth toward their lower ſharp edges, from the angle for a good diſtance anteriorly. Afterwards they contract in breadth and increaſe in thickneſs, forming a ſort of neck, a little longer than that at their poſterior extremity; then their breadth begins to increaſe again, by degrees, to the anterior extremity. In all the *ribs*, this extremity terminates in a cavity, in which the cartilages are grafted.—The three uppermoſt falſe *ribs* increaſe in breadth from the angle forward, and the grooves are moſt conſiderable in theſe. They have alſo heads, necks, tuberoſities, and angles, almoſt the ſame as in the laſt true *ribs*. All the falſe *ribs* have cartilaginous appendages; the firſt of which is longeſt, and fixed to the cartilage of the laſt true *rib*; the two following are united together at their extremities, and the two laſt are connected only to muſcles and ligaments. They are both very ſhort, eſpecially the laſt, which is not above a quarter of an inch in length, and all theſe cartilages of the falſe *ribs* are pointed at their extremities.

The *ribs* are articulated anteriorly with the ſternum, and behind with the vertebræ of the back; the firſt *rib* is entirely united with the ſternum, by means of its cartilage, and in the ſix following the extremities of the cartilages join that bone. The three upper falſe *ribs* are joined to each other by the extremities of their cartilages; the connection of the *ribs*, with the vertebræ of the back, is for the moſt part by ginglymus. The ten upper *ribs* are confined to two motions only, upward and downward; whereas the two laſt are left more at liberty, and are therefore termed floating *ribs*. Winſlow.

All the *ribs*, together with the ſternum, are raiſed by the reſpiratory muſcles, in the action of inſpiration, by which means, and by the deſcent of the diaphragm in that action, the cavity of the thorax is enlarged for the more commodious expanſion of the lungs.

Ribs, *cartilages of the*. All the *ribs* have cartilaginous portions, which differ from each other in length, breadth, incurvations, adheſions, and in their extremities. It is to be obſerved, that theſe cartilages are white, more poliſhed, broader, and thicker in their natural ſtate, than in the dried ſkeleton. The cartilages of the falſe *ribs* are naturally ſofter and more pliable than thoſe of the true; the middle or inner ſubſtance of theſe acquires the conſiſtence of bones in old age, and their extremities ſometimes oſſify, and are immoveably fixed to the ſternum.

Ribs, *ligaments of the.* All the *ribs* are connected to the bodies of the vertebræ by ſtrong, ſhort, ligamentary faſciculi, fixed by one end round the foſſulæ in the vertebræ, and by the other round the head of each *rib.*—They are alſo tied together by thin ligaments, which go from the cartilage of each *rib* obliquely to that of the next. The ten uppermoſt *ribs* on each ſide are connected to the tranſverſe apophyſes of the vertebræ of the back, by ſtrong, ſhort, articular ligaments, fixed to the tuberoſities of the *ribs*, and round the foſſulæ of the apophyſes, much in the ſame manner with thoſe which go between the heads of the *ribs* and bodies of the vertebræ: both theſe articulations are provided with capſular ligaments. The eleventh *rib*, on each ſide, having no articulation with the tranſverſe apophyſes, is connected to them by auxiliary, ſtrong, ſhort ligaments, fixed in its neck. The laſt *rib* is only joined by its head to the body of the twelfth vertebra of the back; but it is connected, in a particular manner, to the tranſverſe apophyſis of the firſt vertebra of the loins, by a broad ligament, fixed in the whole upper edge of the apophyſis, and in the lower edge of the *rib*, through about two-thirds of its length. The firſt true *rib* has no ligamentary connection with the ſternum, the cartilaginous ſymphyſis being ſufficient; the reſt are cloſely joined to that bone by ſmall ligamentary portions, fixed by one end round the extremity of the cartilage, and by the other round the notches in the ſternum. The cartilage of the firſt falſe *rib* is joined to that of the laſt true *rib*, by ſeveral ſhort filaments, which go from the lower edge of the one to the upper edge of the other, near its ſmall extremity. The other falſe *ribs* are connected together much in the ſame manner; except that the filaments, by which the fourth is connected to the third, are longer than thoſe above them, and thoſe between the fifth and fourth are much longer than any of the reſt; and for this reaſon theſe *ribs* are leſs ſteady than the others.—The ligamentary expanſions of the vertebræ are in place of a perioſteum, but the *ribs* and ſternum have a perioſteum like other bones, only that the cartilaginous portions of the *ribs* generally give their covering the name of a perichondrium. Winſlow.

Ribs, *diſlocated.* The *ribs* are ſometimes, though but ſeldom diſlocated; for they are ſometimes diſplaced by ſome external violence, and thruſt either upwards or downwards, outwards or inwards. They cannot eaſily indeed be luxated outwards, becauſe prevented by the vertebral proceſſes, and reſiſted by very thick and ſtrong muſcles; but when they are driven into the cavity of the thorax, which oftener happens, they not only lacerate the pleura, or membrane, which lines the cavity of the thorax, but generally do great injury alſo to the contained parts: in conſequence of which ariſe moſt ſharp pains, inflammation, difficulty of breathing, coughs, ulcers, immobility, and many other dangerous ſymptoms.

When the *rib* is luxated, either upwards or downwards, in order to replace it conveniently, the patient is to be laid on his belly upon a table, and the ſurgeon muſt endeavour to reduce the luxated bone to its right place with his hands; or the arm of the diſordered ſide may be ſuſpended over a gate or ladder; and while the *ribs* are thus ſtretched up from each other, the heads of ſuch as are luxated may be puſhed into their former ſeat.

Thoſe luxations, where the heads of the *ribs* are found to be thruſt inwards into the cavity of the thorax, are much the moſt difficult to be reduced, becauſe neither the hand, nor any other inſtrument, can be applied internally, to aſſiſt and direct the bone in the operation. In this caſe it ſeems proper to lay the patient on his belly, over ſome gibbous or cylindric body, and move the forepart of the *rib* inwards toward the back, ſhaking it ſometimes; for thus it ſometimes happens, that the head of the luxated *rib* ſlips into its former place. But if this method of cure will not avail, we have no remedy left but inciſion, and endeavouring to replace the luxated head of the *rib* by the fingers, plyers, or little hooks. In the mean time, where the ſymptoms are not very urgent, and the heads of the *ribs* but little diſplaced, it is much more adviſeable to have recourſe to none of thoſe means, becauſe there are ſeveral inſtances where the luxated *ribs* have ſafely retained their diſlocated ſtations; but, above all, care muſt be taken to lay on a compreſs, dipped in warm ſpirit of wine upon the part, and retain it on by the napkin and ſcapulary bandage.—Heiſter.

Ribs, *fractured.* Sometimes the *ribs* are only fiſſured in ſuch a manner, that the external or internal part of them are only hurt, without their being removed out of their place. This is uſually attended by no bad accident, and the bone frequently grows together again of itſelf, without the accident being diſcovered. But if the whole *rib* be fractured, and ſome part of it be removed out of its place, it is a more dangerous caſe: for the coſtal muſcles, and the pleura, that lines the internal cavity of the thorax, will be much diſturbed by the fragments of the bone.

When a *rib* is fractured, it projects either externally or internally in the form of a broken arch; when it projects externally, the ſymptoms are uſually much milder; but when it is drove inward the caſe is uſually much worſe, eſpecially if any vein or artery be divided by it, ſo as to let blood run into the cavity of the thorax; in conſequence of which there follow prickings, inflammation, difficult reſpiration, coughs, fevers, ſpitting of blood, ſuppuration, extravaſation of blood, and other bad ſymptoms, particularly if any of the viſcera are hurt at the ſame time.

In order to replace fractured *ribs*, it is neceſſary firſt to inquire whether the ſplinters project internally or externally; when externally, the patient is to be placed upon a high table, and the ſeparated bones muſt be gently forced by the fingers into their places; the proper compreſſes, dipped in ſpirit of wine, muſt be laid on, and then covered with ſlips of paſteboard, or ſplints, and the circular bandage, or napkin and ſcapulary. But when the ſplinters are thruſt inward, while the patient retains a deep breath, both ſides of the bone muſt be compreſſed with the hands, and agitated till they are properly fixed. When they are replaced, the paſteboard muſt not be applied in this caſe, but only the bandage drawn a little leſs tight. By theſe means, fractures of this kind are uſually cured in three or four weeks.—Heiſter.

Ribs *of fiſh.* There is a very great variety in the ſhape and other peculiarities of the *ribs of fiſh.* They are in ſome ſmooth and flatted ſideways, as in the cyprini; in others they are rounded, as in the cotti and gadi. In the cyprini the ſeveral ſpecies have from thirteen to nineteen *ribs* on a ſide, and the vertebræ are from thirty-ſeven to forty-nine in number, differing greatly in number in the ſeveral ſpecies of the ſame genus. The *ribs* in many fiſh adhere to the vertebræ, by means of cartilages, and ſeem only continued parts of them; but in others they are free and looſe, and do not ſo much as touch the vertebræ. We find inſtances of the firſt ſort of ſtructure in the cyprini, ſalmons, &c. and of the other in the pearch, the gadi, and the pleuronectæ. In the ſpinoſe fiſhes, the laſt vertebra always is terminated by a pair of broad apophyſes placed perpendicularly, and touching one another, and by means of cartilages theſe are fixed to the bones of the tail. Artedi Ichthyolog.

Ribs *of a ſhip*, are the timbers of the futtocks, when the planks are off, ſo called becauſe they are bent like the *ribs* of a carcaſe or ſkeleton.

Ribs *of parrel*, in a ſhip. See Parrels.

Ribs, among *Jewellers*, the lines, or ridges, which diſtinguiſh the ſeveral parts of the work, both of brilliants and roſes.

Rib-*wort*, in *Botany*. See Plantain.

RICA, among the Romans, a veil with which the ladies covered their heads.

RICCIA, *Marſh liver-wort*, in *Botany*, the name of a genus of plants of the *lichen* claſs, or, according to Linnæus, of the *algæ*. The characters of this genus are theſe: the male flower ſtands on the ſurface of the leaf without a pedicle, and has neither cup nor petals, nor even ſtamina, but is a ſimple anthera, or apex, of a cylindric form, but truncated, and opening at the top when ripe. The female flower grows ſometimes on the ſame, ſometimes on different plants; it has ſcarce any cup, and no petals, but is loaded with a globoſe fruit, having only one cell, which contains a vaſt number of ſeeds. Linnæus enumerates five ſpecies.

RICE, *oryza*, in *Botany*, a genus of the *hexandria digynia* claſs. Its characters are theſe: the chaff is ſmall, acute-pointed, having two valves, nearly equal, incloſing a ſingle flower; the petal has two valves, which are boat-ſhaped, ending in a beard or awn; it has a two-leaved nectarium, and ſix hairy ſtamina, the length of the petal, terminated by ſummits, bifid at their baſe, and a turbinated germen, ſupporting two reflexed hairy ſtyles, crowned by feathered ſtigmas; the germen afterward becomes one large, oblong, compreſſed ſeed, having two channels on each ſide, ſitting on the petal of the flower. There is but one ſpecies of this plant.

This grain is greatly cultivated in moſt of the Eaſtern countries, where it is the chief ſupport of the inhabitants; and great quantities of it are brought into England, and other European countries, every year, where it is in great eſteem for puddings, &c.

It is too tender to be produced in theſe Northern countries, without the aſſiſtance of artificial heat; but from ſome ſeeds, which were ſent to South Carolina, about the year 1697, there have been great quantities produced, and it is found to ſucceed as well there as in its native country, which is a very great improvement to the American ſettlements.

This plant grows upon moiſt ſoils, where the ground can be flowed over with water, after it is come up; ſo that whoever would cultivate it in England, for curioſity, ſhould ſow the ſeeds upon a hot-bed; and when the plants are come up, they ſhould be tranſplanted into pots, filled with light rich earth, and placed in pans of water, which ſhould be plunged into a hot-bed; and as the water waſtes, ſo it muſt from time to time be renewed again. In July, theſe plants may be ſet abroad in a warm ſituation, ſtill preſerving the water in the pans, otherwiſe they will not thrive. Toward the latter end of April they will produce their grain, which will ripen tolerably well, provided the autumn proves favourable. Miller.

The Chineſe water their *rice*-fields by means of moveable mills, placed as occaſion requires, upon any part of the banks of a river. The water is raiſed in buckets to a proper height, and afterwards conveyed in channels to the deſtined places.

Rice is much uſed as food in the Roman Catholic countries in time of Lent. The ordinary preparation is by firſt ſteeping it in water, then boiling it in milk. Some make it into a ſort of farina, or flour, by pounding it in a mortar, after having firſt put it in hot water, and again waſhed it out in cold.

Among the common kinds of grain, *rice* is accounted the mildeſt and moſt nutritious, and is ſuppoſed to be particularly ſerviceable in dyſenteries and diarrhæas. It is leſs viſcous than wheat, or of leſs tenacity, when boiled with water.

The northern nations eat their fowls and other meats with *rice* and ſaffron. The Chineſe make a wine of *rice*, which is of an amber colour, and taſtes like Spaniſh wine, and ſerves them for their common drink. In ſome parts of Europe they alſo draw a very ſtrong brandy, or ſpirit, from *rice*.

RICERCATA, in the *Italian Muſic*. See RESEARCH.

RICHARDIA, in *Botany*, the name of a genus of plants, of the *hexandria monogynia* claſs; the characters of which are theſe: the cup conſiſts of one leaf, divided into ſix parts, and is erect and pointed, and of about half the length of the flower; the flower is monopetalous, and of a cylindric funnel-like ſhape, the edge is divided into ſix ſegments; the ſtamina are ſix filaments, ſo ſhort as to be ſcarce obſervable; the antheræ are roundiſh and ſmall, and ſtand in the notches of the flower; the germen of the piſtil ſtands beneath the cup; the ſtyle is capillary, of the length of the ſtamina, and divided into three parts at the top; the ſtigmata are obtuſe; the ſeeds ſtand naked, and are three in number, they are roundiſh but angular, and are broad at the upper part and gibbous. There is only one ſpecies.

RICINOCARPODENDRON, compounded of *ricinus*, καρπος, *fructus*, and δενδρον, *arbor*, in *Botany*, the name of a genus of plants, eſtabliſhed by Dr. Amman, the characters of which are theſe: the flower is of the roſaceous kind, conſiſting of three petals, diſpoſed in a circular order, in the centre of which there ariſes a large and open tube, through which ſhoots up the piſtil, which grows at the bottom of the cup; this piſtil, finally, becomes a trigonal fruit, divided into three cells within, and containing each one ſeed in a rough coat.

The leaves of this tree ſometimes reſemble thoſe of the aſh, being compoſed of three or four pairs of ſmaller leaves joined to a middle rib, theſe are not ſerrated, and terminate in a ſharp point; the flowers grow at the alæ of the leaves, they are white, and are diſpoſed in lax ſpikes; the fruit is green at firſt, afterwards it becomes of a yellowiſh red, and finally ſcarlet; it is of the bigneſs of a walnut, and in ſhape much reſembles the fruit of the ricinus; the covering of the ſeeds is black on the outſide, and red within, and each ſeed is divided into two lobes; when ripe, the fruit burſts, and the ſeeds fall out. It is a native of the Eaſt Indies. Act. Petropol. vol. viii. p. 214.

RICINOIDES, in *Botany*. See CROTON.

RICINUS, in *Botany*. See PALMA *Chriſti*.

RICK, in *Huſbandry*, a pile of corn, hay, ſtraw, &c. regularly heaped up in the open air, and ſheltered from wet. See STACK.

RICKETS, *rhachitis*, in *Phyſic*, a diſorder affecting the bones of children, and cauſing a conſiderable protuberance, incurvation, or diſtortion thereof.

This diſeaſe, which appeared firſt in England about the time when manufactures began to flouriſh, and ſtill prevails moſt in towns, where the inhabitants follow ſedentary employments, generally attacks children betwixt the age of nine months and two years.

RICKETS, *cauſes of the*. Diſeaſed parents often produce rickety children. Any diſorder that weakens the conſtitution, or relaxes the habit of children, as the ſmall-pox, meaſles, teething, the hooping-cough, &c. diſpoſes them to this diſeaſe: but the chief cauſe is bad nurſing. It ſometimes ariſes from a fault in ſwathing the child, rolling it too tight in ſome places, and too looſe in others; placing it in an inconvenient, or too often in the ſame poſture; or ſuffering it to be long wet. It is likewiſe attributed to the want of proper motion, for a healthy child ſhould be always in motion, unleſs when aſleep; and if it be ſuffered to lie or ſit, inſtead of being toſſed or dandled about, it will not thrive. It is likewiſe occaſioned by uſing the child to be borne in one arm only; whence the legs and knees remain too long in the ſame incurvated ſituation.

Or it may be the effect of improper diet, or of ſome fault in the digeſtion, occaſioning the aliment to be unequally applied to the body; by which ſome parts of the body increaſe in bulk more than the reſt.

The want of free air is alſo very pernicious to children.—When a nurſe lives in a cloſe ſmall houſe, where the air is damp and confined, and is too indolent to carry her child abroad in the open air, it will hardly eſcape this diſeaſe.

RICKETS, *ſymptoms of the*. At the beginning of this diſeaſe, the part which it affects grows lax, flaccid, and weak; and, if it be the legs, they become unable to ſupport the body. All the parts ſubſervient to voluntary motion are likewiſe debilitated and enfeebled; and the child becomes unuſually grave, pale, ſickly, ſlothful, and cannot ſit erect.

His head generally becomes too large for the trunk, and cannot be ſupported or managed by the muſcles of the neck, which gradually wear away. Swellings, and knotty excreſcences, appear in the wriſts, ancles, and tips of the ribs; and the bones of the legs and thighs grow bowed or crooked. The like diſorder ſometimes alſo ſeizes the bones of the arms.

If the ſymptoms continue long, the thorax becomes ſtrait; a difficulty of reſpiration enſues, as alſo a cough, and a hectic fever; the abdomen ſwells; the face appears full, and the complexion florid; the pulſe grows weak and languid; the appetite and digeſtion fail; the teeth come ſlowly, and with difficulty, and often rot and fall out; and the ſymptoms increaſing, at length prove mortal.

When a child is able to talk before he can make uſe of his legs, he is commonly preſumed to have the *rickets*.

Method of cure. The chief aim, for this purpoſe, muſt be to brace the ſolids, and to promote digeſtion and the due preparation of the fluids. Theſe ends will be beſt anſwered by wholeſome nouriſhing diet, open dry air, and ſufficient exerciſe. In a cold ſeaſon, the child ſhould be kept warm, and in hot weather it ought to be kept cool: the limbs ſhould be frequently rubbed with a warm hand, and the child kept as chearful as poſſible.

This diſeaſe is more likely to be cured by the nurſe than by the phyſician.

However, if the children are of groſs habits, gentle vomits, and repeated purges of rhubarb may ſometimes be of uſe. Iſſues have been ſometimes found beneficial in this diſeaſe, eſpecially if the children abound with groſs humours. An infuſion of the Peruvian bark in wine or ale is likewiſe of uſe. Buchan.

Rickety children have larger livers, and leſs hearts and leſs blood, than children in health, from too full and too groſs a diet, and too little exerciſe; and they have larger livers than children in health, from the livers always increaſing in weight, when the weight of the heart and quantity of blood leſſen.

Dr. Hahn, in a letter on the cyrtonoſus, or *rickets*, which is commonly thought to be a modern diſeaſe, quotes Hippocrates, and ſeveral other ancient writers, as treating of it. Med. Eſſ. Edinb.

When the diſorder is taken early, it may be remedied by proper bolſters and bandages, ſuited to the parts affected: but when the bones are grown rigid and inflexible, other mechanical contrivances, as padding, ſtrait boots, and ſeveral ſorts of machines, or engines, made of paſteboard, whale-bone, tin, &c. are made uſe of, to reſtore the diſtorted bones to their natural ſtraitneſs.

Cold bathing is alſo found of ſervice in the *rickets*, before the diſtemper comes to be too much confirmed. This is beſt done during May and June, continuing the child in the water two or three ſeconds at each plunge, and rubbing it well with a dry cloth, after he comes out: but, if cold bathing is found to weaken the child, it ſhould be diſcontinued.

Others chuſe a liniment of rum and palm-oil; and others a plaſter of the de minio and oxycroceum, applied along the back, to cover the whole ſpine. Dry frictions over the whole body, with a warm linen cloth before the fire, eſpecially on the parts affected, are found of ſervice. What is called the oil of ſnails is very famous for the ſame intention: this is what drops from them, after bruiſing and ſuſpending them in a flannel bag. With this the limbs and ſpinal bone are to be anointed. But more depends on regimen than on any medicines.

RICOCHET *battery*, in *Fortification*. See BATTERY *à ricochet*.

RICOCHET *firing*, in the *Military Art*, is a method of firing with pieces elevated from three to ſix degrees, and loaded with a ſmall charge, ſo that the ball may bound and roll along the inſide of the parapet. The ball or ſhot, thus diſcharged, goes rolling and bounding, killing, maiming, or deſtroying all it meets with in its courſe, and creates much greater diſorder, by moving thus ſlowly, than if thrown from the piece, whoſe elevation is greater, with greater violence.

The word *ricoche* ſignifies *duck and drake*, terms applied to the bounding of a flat ſtone thrown almoſt horizontally into the water.

RICOTIA, in *Botany*, a genus of the *tetradynamia ſiliquoſa* claſs. Its characters are, that the pod is unilocular, oblong, and compreſſed, and formed with ſmall flat valves. There is only one ſpecies.

RIDDLE. See ÆNIGMA.

RIDDLE, in *Huſbandry*, an oblong ſort of ſieve, uſed to ſeparate duſt, and the ſeeds of plants, from corn.

RIDE of hazle, or other wood, is a group or cluſter of ſprigs ſhooting out of the ſame root or foot.

RIDE, in the *Manege*. To *ride* ſignifies to learn to *ride*. Thus, he *rides* under a good maſter.

The knowledge and utility of the art of riding conſiſt in being able to diſcern, and dextrous to employ the means by which the horſe may be brought to execute what the rider requires of him, with propriety, readineſs, and ſafety: and this knowledge in the man, and obedience in the horſe, ſhould be ſo intimately connected, as to form one perfect whole: this union being ſo indiſpenſibly neceſſary, that, where it is not, there is no meaning between the man and horſe; they talk different languages, and all is confuſion.

RIDE, in the *Sea Language*, a term variouſly applied.—Thus, a ſhip is ſaid to *ride*, when her anchors hold her faſt, ſo that ſhe drives not away by the force of the wind or tide.

A ſhip is ſaid to *ride well*, or *eaſy*, when ſhe does not labour heavily, or feel a great ſtrain, when anchored in an open road or bay. On the contrary, when ſhe pitches violently into the ſea, ſo as to ſtrain her cables, maſts, or hull, ſhe is ſaid to *ride hard*, and the veſſel is termed a bad roader.

A ſhip *rides acroſs*, when ſhe *rides* with her main-yards and fore-yards hoiſted up to the hounds, and both yards and arms topped alike.

She is ſaid to *ride apeek*, when one end of the yard is peeked up, and the other hangs down: this is alſo ſaid of a ſhip, when, in weighing, ſhe is brought directly over her anchor.

She is ſaid to *ride athwart*, when her poſition lies acroſs the direction of the wind and tide, when the former is ſo ſtrong as to prevent her from falling into the current of the latter: and to *ride betwixt wind and tide*, when the wind hath equal force over her one way, and the tide another, ſo that ſhe is in a manner balanced between them, and *rides* without the leaſt ſtrain on her cables.—If the wind have more power over her than the tide, ſhe is ſaid to *ride wind-road*.

She is ſaid to *ride hawſeful*, when, in ſtreſs of weather, ſhe falls ſo deep, that the water runs in at her hawſes.

She is ſaid to *ride portoiſe*, when her yards are ſtruck down upon the deck, or when they are down a-port-laſt.

To RIDE *land-locked*, at ſea. See LAND-*locked*.

To RIDE *by the ſtoppers*, at ſea. See STOPPERS.

RIDEAU, in *Fortification*, a ſmall elevation of earth, extending itſelf lengthways on a plain; ſerving to cover a camp, or give an advantage to a poſt.

The word, in its original French, ſignifies a *curtain* or *cover*, formed from the Latin *ridellum*. Borel derives it from *ridere*.

A *rideau* is alſo convenient for thoſe who would beſiege a place at a near diſtance, and to ſecure the workmen in their approaches to the foot of a fortreſs.

RIDEAU is ſometimes alſo uſed for a trench, the earth whereof is thrown up on its ſide, to ſerve as a parapet for covering the men.

RIDER, in *Artillery Carriages*, a piece of wood, ſomewhat higher than it is broad, and of a length equal to that of the body of the axle-tree, upon which the ſide pieces reſt in a four-wheel carriage; ſuch as the ammunition-waggon, block-carriage, and ſling-waggons.

RIDERS, in a *Ship*, are a ſort of interior RIBS, fixed occaſionally in a ſhip's hold, oppoſite to ſome of the principal timbers, and reaching from the kelſon to the beams of the lower deck, and ſometimes higher, in order to ſtrengthen her frame. They are bolted to the other timbers to ſupport them, when it is apprehended the ſhip is not ſufficiently ſtrong in the part where they are fixed, which is generally amidſhips. See *Tab. Ship. fig.* 2. *n.* 47, 49, 50.

RIDER is alſo uſed for after-clauſes, added to bills, whilſt they are depending in PARLIAMENT.

RIDER-*roll*. See ROLL.

RIDERS, *out*. See OUT-*riders*.

RIDGE, in *Building*, the higheſt part of the roof or covering of a houſe.

Ridge is particularly uſed for a piece of wood, wherein the rafters meet.

RIDGE-*tyle*. See TYLE.

RIDGE, in *Sea Language*, is a long aſſemblage of rocks, lying near the ſurface of the ſea, ſo as to intercept the paſſage of a ſhip under ſail.

RIDGES, in *Agriculture*, are long pieces of riſing ſoil, between two furrows.

The method of ploughing land up into *ridges* is a particular ſort of tillage. The chief uſe of it conſiſts in the alteration it makes in the degrees of heat and moiſture; theſe being two of the grand requiſites of vegetation, and very different degrees of them being requiſite to the different ſorts of plants. Thoſe plants commonly ſown in our fields require a moderate degree of both, not being able to live upon the ſides of perpendicular walls in hot countries, nor under the water in cold ones, neither are they amphibious; but they muſt have a ſurface of earth, not covered, nor much ſoaked with water, which deprives them of a proper degree of heat, and cauſes them to languiſh. In this caſe they look weak, and their leaves yellowiſh; they ceaſe growing; and, in fine, die in a weak and very bad ſtate.

The only way to cure the land of giving this diſeaſe to plants is to lay it up in *ridges*, that the water may fall off, and run into the furrows below, from whence it may be conveyed by drains and ditches into ſome river, or otherwiſe carried wholly off from the land.

The more any ſoil is filled with water the leſs heat it will have. The two ſorts of land moſt liable to be overglutted with water are hills, the upper ſtratum of mould in which lies on clay; and generally all deep and ſtrong lands. Hills are made wet and ſpewy by the wet that falls in rains, dews and miſts; and this wet not being able to ſink through the clay, in theſe ſoils, runs down between it and the mould; but extending itſelf through the mould all the way, and making it continually waſhy. The ploughing this ſort of land in *ridges*, made from the higher to the lower part of the field, is of no benefit; for the water will preſs from below upwards in theſe *ridges*, being forced by the addition of freſh ſupplies above.

There are two methods of draining a hill-ground like this. The one is to dig ſeveral deep trenches croſs-wiſe, or horizontally, on the ſides of the hill: let theſe be nearly filled up with ſtones, and the ſurface covered in the common method: the wet will be received into theſe in all parts, and diſcharged at the ends; and the plough will go over the ſtones, without ſtriking through the depth of earth that covers them. Thus the land will be dried for a time; but as theſe channels fill up with earth between the ſtones, they become of no uſe, and the expence of making new ones is very great.

The other way is to plough the land in *ridges* almoſt horizontally, and then the furrows between them are ſo many drains, carrying off the water at their lower ends; if the plough is made to ſtrike a few inches deep into the clay, and the ends of the furrows are no higher than the other parts, every furrow will be a drain to every *ridge*, and the land of the *ridges* will be kept dry. If there were no other manner of ploughing the *ridges* on the ſides of hills, than there is in the plain lands, this method of having open furrows, or drains, on declivities would be impracticable; becauſe the plough could not turn up the furrows againſt the hill and againſt the *ridge* alſo, from the lower ſide of it. But the eaſy remedy againſt this inconvenience is to plough ſuch *ridges* in pairs, without throwing any earth into the trenches, and then the *ridges* will be plain at top, and the rain-water will run ſpeedily downward to the next trench, and thence to the head-land, and ſo out of the field. Theſe trenches will be made, as well as kept, always open by ploughing in pairs; and this is abundantly more eaſy than the way of ploughing *ridges* ſingly.

Every time of ploughing, the *ridges* muſt be changed as to the pairs; ſo that the furrow, which had two *ridges*, or lands, turned towards it one time, muſt have two turned from it the next time; and this method keeps the ſurfaces of all the *ridges*, or lands, pretty nearly even. This, however, cannot be done on a hill, whoſe declivity is ſo great, that the plough is not able to turn a furrow againſt it; but, in this caſe, perhaps, it may be ſufficient to plough the *ridges* obliquely enough for the furrows to be turned both ways.

This ploughing in a horizontal manner, on hills, is the beſt of all others; but our farmers are not to be eaſily brought into it, though they ſee thin lands of this kind ruined for want of it: their reaſons for not doing it are, that it would prevent the ſuppoſed benefit of croſs ploughing; and that they loſe more ground by having more furrows between the *ridges*, than when they lay their lands flat; where the lands are made much larger than the round ridges can conveniently be. But theſe are in reality very erroneous, as well as miſchievous opinions; for more miſchief than good is done by croſs ploughing in general; and inſtead of any real loſs of land by *ridges*, the true ſtate of the caſe is, that much ground is gained by it; that is, the ſurface of the earth is increaſed in quantity; for if a flat piece be ploughed into *ridges*, and if in earth ſixteen feet in breadth, there be an empty furrow of two feet; and yet, by the height and roundneſs of the *ridges*, they have eighteen feet of ſurface, capable of producing corn equally with eighteen feet, while the piece was flat; there is then, inſtead of any loſs, one eighth part of profitable ground, gained by the altering the piece from a level into a *ridge*. Tull's Horſe-hoeing Huſbandry, chap. 16. See Ploughing.

Ridges *of a horſe's mouth* are wrinkles or riſings of the fleſh in the roof of the mouth, running acroſs from one ſide of the Jaw to the other, with interjacent furrows.

It is commonly in the third or fourth *ridge* that the farriers ſtrike with the horn, in order to bleed a horſe, whoſe mouth is overheated.

RIDGLING, or **Ridgel**, among *Farriers*, &c. the male of any beaſt that has been but half caſtrated.

RIDICULE, in *Ethics*, is commonly uſed in the ſame ſenſe with irriſion; and has for its objects the abſurdities and misfortunes of mankind. The latter, however, are very improperly objects of *ridicule*, whoſe province ſhould extend only to the careleſſneſs, inconſtancy, humour, affection, impertinence, and in ſhort all the leſſer follies and imperfections of mankind. Such are generally the ſubjects of Horace's Satires; and Dr. More obſerves, that irriſion, which is the parent of *ridicule*, was the original of ſatire.

Ridicule, in a *Comedy*. See Comedy.

RIDICULI *ædicula*, or the *chapel of laughter*, in *Roman Antiquity*, was a building erected at Rome, about two thouſand paces beyond the gate Capena, in memory of the flight of Hannibal from the ſiege of the city, on account of the ruin and tempeſt that befel him on that occaſion. The Romans, in *ridicule* of his flight, built and conſecrated this chapel.

RIDING, a corruption of trithing, a diviſion of Yorkſhire, whereof there are three; viz. the Eaſt-*riding*, Weſt-*riding*, and North-*riding*.

In indictments, in that county, it is neceſſary that the town and *riding* be expreſſed. See Register.

Riding *academy*. See Academy and Manege.

An academy for *riding* was founded in this country, by king William III. See Ride.

Riding *armed*, with dangerous and unlawful weapons, is an offence at common law. 4 Inſt. 160. By the ſtatute 2 Edw. III. cap. 3. none ſhall ride armed by night or day to the terror of the people; or come with force and arms before the king's juſtices, &c. doing their office, upon pain to forfeit their armour, and ſuffer impriſonment at the king's pleaſure: and a fine may be ſet upon them by the Juſtices, by 20 Ric. II. cap. 1. And no perſon can excuſe the *riding armed*, in public, by alledging that he wears armour for his defence againſt an aſſault; but men may wear common arms, according to their quality and the faſhion, and have attendants with them armed agreeable to their characters: alſo perſons may ride or go armed to take felons, ſuppreſs riots, execute the king's proceſs, &c. 3 Inſt. 162.

Riding *caſt*, in *Huſbandry*, a term uſed by the farmers for a particular method of ſowing their grounds, by making two caſts upon the ground at the ſame time.—This is not much uſed, but it is a quicker way than the double caſt, which is the method now moſt uſed. Plot's Oxfordſhire, p. 251.

Riding-*clerk*, one of the ſix clerks in chancery, who in his turn, for one year, keeps the controlment-books of all grants that paſs the great ſeal that year. Blount.

RIEMLING, in *Ichthyology*, a name given by ſeveral to the ſmall freſh water fiſh, called by the Latins *poxinus*, and vulgarly the *pink*.

RIENS *arrear*, in *Law*, a kind of plea uſed to an action of debt upon arrearages of accounts; whereby the defendant alleges, that there is nothing in arrear.

Riens *paſſe par le fait*, *nothing paſſes by the deed*, is the form of an exception taken in ſome caſes to an action.

Riens *par deſcent*, *nothing by deſcent*, is the plea of an heir when ſued for his anceſtor's debt, though he had no lands from it by deſcent, nor has aſſets in hand.

RIER, or **Reer-county**, *retro-comitatus*, is uſed in the ſtatute of Weſtm. 2 c. 39. 2. Ed. III. cap. 5. and in our law-books, in oppoſition to *open county*.

This appears to be ſome public place, which the ſheriff appoints for the receipt of the king's money, after the end of the county-court. Fleta ſays it is *dies craſtinus poſt comitatum*.

RIFLE *Guns*, in the *Military Art*, are thoſe whoſe barrels, inſtead of being ſmooth on the inſide, like our common pieces, are formed with a number of ſpiral channels, reſembling female ſcrews, except that the threads or *rifles* are leſs deflected, and approach more to a right line: the threads, with which the *rifled* barrel is indented, taking uſually a little more than one turn in its whole length. The numbers of theſe threads in each barrel are different, according to the fancy of the workman and the ſize of the barrel; and, in like manner, the depth, to which theſe channels or *rifles* are cut down, is not regulated by any invariable rule; but differs according to the country where the work is performed, or the caprice of the artificer. There are different methods of charging pieces of this kind, but the uſual method is as follows: after the powder is put in, they take a leaden bullet ſomewhat larger than the bore of the gun, and having greaſed it well, they lay it on the mouth of the piece, and ram it down with an iron rammer, hollow at the end; the ſoftneſs of the lead giving way to the violence with which the bullet is impelled, that zone of the bullet, which is contiguous to the piece, varies its circular form, and acquires the ſhape of the inſide of the barrel, ſo that it becomes the part of a male ſcrew, exactly fitting the indents of the *rifle*. And hence it happens that, when the piece is fired, that indented zone of the bullet follows the ſweep of the *rifles*, and thereby, beſides its progreſſive motion, acquires a circular motion round the axis of the piece, which motion will be continued to the bullet after its ſeparation from the piece; by which means a bullet diſcharged from a *rifled* barrel is conſtantly made to whirl round an axis, which is coincident with the line of its flight. And hence it follows, that the reſiſtance on the foremoſt ſurface of the bullet is equally diſtributed round the pole of its circular motion, and acts with an equal effort on every ſide of the line of direction, ſo that this reſiſtance can produce no deviation from that line: and if, by the caſual irregularity of the foremoſt ſurface of the bullet, or by any other accident, the reſiſtance ſhould be ſtronger on one ſide of the pole of the circular motion than on the other; yet, as the place where this greater reſiſtance acts muſt perpetually ſhift its poſition round the line, in which the bullet flies, the deflection, which this inequality would occaſion, if it acted conſtantly with the ſame given tendency, is now continually rectified by the various and contrary tendencies of that diſturbing force, during the courſe of one revolution; ſo that the ball will always go right forwards, and thus that deflection or deviation, already taken notice of under the article projectile, will be prevented. This may be explained by the motion of an arrow; for if an arrow that is not feathered be ſhot from a bow, its motion will be very irregular; but when the feathers of the arrow are properly arranged in a ſpiral form, ſo as to make the arrow ſpin round its axis, it will always fly ſtraight forward. Upon the ſame principle every ſchoolboy finds himſelf under the neceſſity of making his ſhuttlecock ſpin, before he can depend upon the truth of its flight. Mr. Robins obſerves, that the actual motions of bullets diſcharged from *rifled* pieces correſpond very well with theſe ſpeculations. Although the uſe of pieces of this kind hath long prevailed in Europe, particularly in Germany and Switzerland, the advantages reſulting from them have been very imperfectly underſtood, and, as Mr. Robins obſerves unaccountably miſrepreſented. The three following reaſons have been conſtantly alleged in favour of this conſtruction: either that the inflammation of the powder was greater by the reſiſtance which the bullet thus forced into the barrel gave it, and that hereby the bullet received a much greater impulſion than it would have done from the ſame quantity of powder in a common piece; or that the bullet, by the compounding of its circular and revolving motion, did, as it were, bore the air, and thereby flew to a much greater diſtance than it would otherwiſe have done; or that, by the ſame boring motion, it made its way much eaſier through all ſolid ſubſtances, and penetrated much deeper into them, than if diſcharged in the common manner. The ingenious writer, juſt mentioned, ſatisfied himſelf by numbers of experiments made with *rifled* barrels of various ſizes, that none of theſe reaſons hold true in the uſe of ſuch pieces; but that the advantage of their conſtruction reſults from its preventing the deflection of the ball, as we have above repreſented it. And that it produced this effect he found by obſerving, that the ſame hemiſphere of the bullet which lies foremoſt in the piece, continued foremoſt during the whole courſe of its flight, which was almoſt ſteady for about a mile and a half, whereas the deviation with a common piece would often amount to half a mile, and perhaps conſiderably more, in a ſimilar trial.

In Germany and Switzerland, an improvement is made to the method, already recited, of charging theſe pieces; eſpecially thoſe of the larger ſort, which are uſed for ſhooting at great diſtances. This is done by cutting a piece of very thin leather, or of thin fuſtian, in a circular ſhape, ſomewhat larger than the bore of the barrel. This circular piece being greaſed on one ſide is laid upon the muzzle with its greaſy parts downwards, and the bullet being placed upon it, is then forced down the barrel with it; by which means the leather or fuſtian incloſes the lower half of the bullet, and by its interpoſition between the bullet and the *rifles*, prevents the lead from being cut by them. But in thoſe barrels, where this method is practiſed, the *rifles* are generally ſhallow, and the bullet ought not to be too large. The *rifle*-barrels, which have been made in England, where they are not very common, are contrived to be charged at the breech, the piece being, for this purpoſe, made larger there than in any other part. The powder and bullet are put in through the ſide of the barrel by an opening, which, when the piece is loaded, is filled up with a ſcrew. By this means, when the piece is fired, the bullet is forced through the *rifles*, and acquires the ſame ſpiral motion as in the former kind of pieces. Some barrels ſcrew off at the breech, for the convenience of charging them. With regard to the defects of theſe *rifled* pieces, Mr. Robins obſerves, that if either the angle of elevation, or the curvature of the bullet's track through the air be great, the inclination of the axis round which it whirls will cauſe irregularities, which will often produce conſiderable deflections. Accordingly, he propoſes to make uſe of bullets of an egg-like form, inſtead of ſpherical ones, and to fire them with their broad ends foremoſt, that thus their longer axes may be always carried, by their centres of gravity, into the lines of their flight. Upon the whole he concludes, that whatever tends to diminiſh the friction of theſe pieces, tends, at the ſame time, to render them more complete; and conſequently the leſs the *rifles* are indented, the better they are, provided that they are juſt ſufficient to keep the bullet from turning round in the piece. Beſides, the bullet ought to be no larger than to be juſt preſſed by the *rifles*, for the eaſier the bullet moves in the piece, ſuppoſing it not to ſhift its poſition, the more violent and accurate its flight will be. And to render them in this reſpect ſtill more complete, the ſweep of the *rifles* ſhould be in each part exactly parallel to each other: for then, after the bullet is once put in motion, it will ſlide out of the barrel without any ſhake, and with a much ſmaller degree of friction than if the threads of the *rifles* have not all of them the ſame degree of incurvation. The foreigners are ſo exact in this article, that they try their pieces, with a view to this particular, in the following manner: they firſt pour melted lead into them, and letting it cool, they procure a leaden cylinder of perhaps two or three diameters in length, exactly fitted to one part of the inſide of the piece; then if this leaden cylinder, being gently puſhed by the rammer, will paſs from one end of the barrel to the other, without any ſenſible ſtrain or effort, they pronounce the piece perfect, but if it any where ſticks or moves hard, they eſteem it defective. In ſome late experiments made in Scotland with *rifle* field-pieces, caſt at Carron, leaden balls with protuberances or knobs caſt upon them, ſo as exactly to fit the *rifles*, were made uſe of; and thus the *rifles* are exactly filled, whilſt the bullets themſelves are not prevented from being eaſily ſent home in the pieces. From the nature of *rifled* pieces it is evident, that they can be uſed only with leaden bullets, and conſequently cannot be adapted, without ſome new contrivance, to the adjuſting of the motions of either ſhells or cannon-bullets. Mr. Robins cloſes his account of theſe pieces with predicting, that whatever ſtate ſhall thoroughly comprehend the nature and advantage of *rifled* barrel pieces, and having facilitated and completed their conſtruction, ſhall introduce into their armies the general uſe of them, with a dexterity in the management of them, they will by this means acquire a ſuperiority, which will almoſt equal any thing that has been done, at any time, by the particular excellence of any one kind of arms, and will perhaps fall but little ſhort of the wonderful effects, which hiſtories relate to have been formerly produced by the firſt inventors of fire-arms. See his Diſcourſe on the Nature and Advantage of *Rifled*-barrel Pieces in his Tracts, vol. i. p. 328, &c.

RIFTS, in *Farriery*, a diſeaſe in horſes, ariſing from corruption lodged in the palate of the mouth.

RIG. See RIDGLING.

RIGADOON, a kind of briſk and gay dance, borrowed originally from Provence, and performed in figure by a man and a woman.

The word is formed from the French, *rigadon*, which ſignifies the ſame.

RIGAL, in *Muſic*. See RIGOLL.

RIGEL, in *Aſtronomy*. See REGEL.

RIGGING *of a ſhip* includes her whole cordage; or all the ropes employed to ſupport the maſts, and to extend or reduce the ſails, or arrange them to the diſpoſition of the wind. The former, which are uſed to ſuſtain the maſts, remain uſually in a fixed poſition, and are called *ſtanding rigging*; ſuch are the ſhrouds, ſtays, and back-ſtays. The latter, whoſe office is to manage the ſails, by communicating with various blocks or pullies, ſituated in different places of the maſts, yards, ſhrouds, &c. are comprehended under the general term *running rigging*; ſuch are the braces, ſheets, halliards, clue-lines, brails, &c. See *Tab. Ship. fig.* 1.

A ſhip is ſaid to be *well rigged*, when all her ropes are of their fit ſize in proportion to her burden. She is ſaid to be *over-rigged*, when her ropes are too big for her; which wrongs her much in her ſailing, and is apt to make her heel.

RIGGING *out a boom* is the operation of running out a pole, upon the end of a yard or bowſprit, to extend the foot of a ſail. Theſe booms are confined in thoſe places by double rings, formed like a figure of 8, one part of which is faſtened to the reſpective yard-arm, or bowſprit-end, and the other receives the boom, which is occaſionally rigged out, or drawn in through it. The rings uſed in this ſervice are termed boom-irons. Falconer.

RIGGING, *ſerving the*. See MALLET.

RIGHT, in *Geometry*, ſomething that lies evenly, without inclining or bending one way or another.

Thus a *right line* is that whoſe ſeveral points all tend the ſame way.

In this ſenſe, *right* ſignifies as much as *ſtraight*, and ſtands oppoſed to *curved* or *crooked*.

RIGHT *angle*. See ANGLE.

In this ſenſe, the word *right* ſtands oppoſed to *oblique*.

RIGHT-*angled* is underſtood of a figure, when its ſides are at *right* angles, or ſtand perpendicularly one upon another.

This ſometimes holds in all the angles of the figure, as in ſquares and rectangles; ſometimes only in part, as in *right-angled* triangles.

RIGHT *cone*. See CONE.

RIGHT-*lined angle*. See ANGLE.

RIGHT *ſine*. See SINE.

The word here ſtands contradiſtinguiſhed to VERSED.

RIGHT *ſphere* is that where the equator cuts the horizon at *right* angles: or, that wherein the poles are in the horizon, and the equator is in the zenith.

Such is the poſition of the ſphere with regard to thoſe who live directly under the equator. The conſequences hereof are, that they have no latitude, nor elevation of the pole. They can ſee nearly both poles of the world; all the ſtars riſe, culminate, and ſet, with them; and the ſun always riſes and deſcends at right angles to their horizon, and makes their days and nights equal.

In a *right ſphere* the horizon is a meridian; and, if the ſphere be ſuppoſed to revolve, all the meridians ſucceſſively become horizons, one after another.

RIGHT *aſcenſion*. See ASCENSION.

RIGHT *aſcenſion, angle of*. See ANGLE.

RIGHT *aſcenſion, parallax of*. See PARALLAX.

RIGHT *deſcenſion*. See DESCENSION.

RIGHT *deſcenſion, parallax of*. See PARALLAX.

RIGHT *ſailing* is when a voyage is performed on ſome one of the four cardinal points.

If a ſhip ſail under the meridian, that is, on the north or ſouth points, ſhe varies not in longitude at all, but only changes the latitude, and that juſt ſo much as the number of degrees ſhe has run.

If a ſhip ſail under the equinoctial upon the very eaſt or weſt points, ſhe alters not her latitude at all, but only changes the longitude, and that juſt ſo much as the number of degrees ſhe has run.

If ſhe ſail directly eaſt or weſt, under any parallel, ſhe there alſo altereth not her latitude, but only the longitude; yet that not according to the number of degrees of the great circle ſhe hath ſailed in, as under the equinoctial, but more according as the parallel is remoter from the equinoctial towards the pole. For the leſs any parallel is, the greater is the difference of longitude.

Right *circle*, in the *Stereographical Projection of the Sphere*, is a circle at *right* angles to the plane of projection, or that which paſſes through the eye. See PROJECTION.

Right, *rectum*, in *Logic* and *Ethics*.

In this ſenſe, the word ſtands oppoſed to *wrong*, *erroneous*, *falſe*, &c.

Right, *jus*, in *Law*, ſignifies not only a property, for which a writ of *right* lies, but alſo any title or claim, either by virtue of a condition, mortgage, or the like, for which no action is given by law, but only an entry.

Such are *jus proprietatis*, *a right of* PROPERTY; *jus poſſeſſionis, a right of* POSSESSION; and *jus proprietatis et poſſeſſionis, a right both of property and poſſeſſion.*

This laſt was formerly called *jus duplicatum*. As, if a man be diſſeiſed of an acre of land, the diſſeiſee has *jus proprietatis*; the diſſeiſor hath *jus poſſeſſionis*; and, if the diſſeiſee releaſe to the diſſeiſor, he hath *jus proprietatis et poſſeſſionis*. See JUS.

Right, *hereditary*. See HEREDITARY.

Right, *petition of*. See PETITION.

Right, *pretenſed*. See PRETENSED.

Right *of reformation*. See REFORMATION.

Right, *writ of*. See WRIT and RECTO.

Right *in court*. See RECTUS *in curia*.

Right *diſtillation*. See DISTILLATION.

Right *the helm*, a ſea-phraſe, ordering to replace the helm even with the middle of the ſhip, after it has wheeled her to the right or left, as much as appeared neceſſary.

RIGHTING, in *Sea Language*, denotes alſo the act of reſtoring a ſhip to her upright poſition, after ſhe has been laid on a careen. This is generally the natural effect of caſting looſe the careening pullies, by which ſhe had been drawn down. But it is ſometimes neceſſary to apply mechanical powers to *right* the ſhip in ſuch a ſituation; and the principal of theſe are the RELIEVING-*tackles*.

A ſhip is ſaid alſo to *right* at ſea, when ſhe riſes with her maſts erected, after having been preſt down on one ſide by the effort of her ſails, or a heavy ſquall of wind. Falconer.

RIGHTS, *bill of*, in *Law*, is a declaration, delivered by the lords and commons to the prince and princeſs of Orange, 13 February, 1688; and afterwards enacted in parliament, when they became king and queen. This declaration ſets forth, that King James II. did, by the aſſiſtance of divers evil counſellors, endeavour to ſubvert the laws and liberties of this kingdom, by exerciſing a power of diſpenſing with and ſuſpending of laws; by levying money for the uſe of the crown, by pretence of prerogative, without conſent of parliament; by proſecuting thoſe who petitioned the king, and diſcouraging petitions; by raiſing and keeping a ſtanding army, in time of peace; by violating the freedom of election of members to ſerve in parliament; by violent proſecutions in the court of king's bench; and cauſing partial and corrupt jurors to be returned on trials, exceſſive bail to be taken, exceſſive fines to be impoſed, and cruel puniſhments inflicted; all which were declared to be illegal. And the declaration concludes in theſe remarkable words, "And they do claim, demand, and inſiſt upon, all and ſingular the premiſes, as their undoubted *rights* and liberties." And the act of parliament itſelf (1 W. & M. ſtat. 2. cap. 2) recognizes "all and ſingular the *rights* and liberties aſſerted and claimed in the ſaid declaration to be the true, ancient, and indubitable *rights* of the people of this kingdom."

RIGID *marble*. See MARBLE.

RIGIDITY, among *Philoſophers*, a brittle HARDNESS; or that kind of hardneſs ſuppoſed to ariſe from the mutual indentation of the component particles within one another.

Rigidity is oppoſed to ductility, malleability, &c.

RIGLET. See REGLET.

RIGOLL, or **Regals**, a kind of muſical inſtrument, conſiſting of ſeveral ſticks bound together, only ſeparated by beads. It makes a tolerable harmony, being well ſtruck with a ball at the end of a ſtick.

Such is the account which Graſſineau gives of this inſtrument.

Skinner, upon the authority of an old Engliſh dictionary, repreſents it as a clavichord, or CLARICORD; poſſibly founding his opinion on the nature of the office of the tuner of the *regals*, who ſtill ſubſiſts in the eſtabliſhment of the king's chapel at St. James's, and whoſe buſineſs is to keep the organ of the chapel royal in tune; and not knowing that ſuch wind inſtruments as the organ need frequent tuning, as well as the clavichord and other ſtringed inſtruments.

Sir Henry Spelman derives the word *rigol* from the Italian *rigabello*, a muſical inſtrument, anciently uſed in churches inſtead of the organ.

Walther, in his deſcription of the *regal*, makes it to be a reed-work in an organ, with metal and alſo wooden pipes, and bellows, adapted to it. And he adds, that the name of it is ſuppoſed to be owing to its having been preſented by the inventor to ſome king.

From an account of the *regal*, uſed in Germany, and other parts of Europe, it appears to conſiſt of pipes and keys on one ſide, and the bellows and wind-cheſt on the other.

We may add, that lord Bacon (Nat. Hiſt. cent. ii. § 102.) diſtinguiſhes between the *regal* and organ, in a manner which ſhews them to be inſtruments of the ſame claſs.

Upon the whole there is reaſon to conclude, that the *regal*, or *rigol*, was a pneumatic, and not a ſtringed inſtrument.

Merſennus relates that the Flemings invented an inſtrument, *les regales de bois*, conſiſting of ſeventeen cylindrical pieces of wood, decreaſing gradually in length, ſo as to produce a ſucceſſion of tones and ſemitones in the diatonic ſeries, which had keys, and was played on as a ſpinnet; the hint of which, he ſays, was taken from an inſtrument in uſe among the Turks, conſiſting of twelve wooden cylinders, of different lengths, ſtrung together, which, being ſuſpended, and ſtruck with a ſtick, having a ball at the end, produced muſic. Hawkins's Hiſt. Muſ. vol. ii. p. 449.

RIGOR, in *Medicine*, a convulſive ſhuddering from ſevere cold, an ague-fit, or other diſorder.

RIGOURISTS, in *Eccleſiaſtical Hiſtory*. See JANSENISM.

RILL, or RIVULET. See RIVER.

RIM, in a watch or clock, the circumference or circular part of a wheel.

RIMA literally denotes a fiſſure or chink. See FISSURE, and RHAGADES.

Hence, it is applied to ſeveral parts of the body, that bear a reſemblance thereto: as *rima pudendi*, fiſſura magna, the ſame with vulva; and *rima laryngis*, the aperture of the larynx, called the *glottis*.

Rima is alſo uſed for a narrow aperture of a ſmall cavity under the fornix, opening into the infundibulum; called alſo the third ventricle of the brain.

RIME, in *Poetry*. See RHYME.

RINÆUS *muſculus*, the name of a muſcle mentioned by Douglas, which he alſo calls *naſalis*. It ariſes fleſhy from the extremity of the os naſi, and adjacent parts of the os maxillare, and is inſerted into all the cartilages of the alæ.

Its uſe is to open and dilate the noſtril, by pulling that part outwards.

RINAR, a word uſed by the chemiſts to expreſs filings of any thing.

RIND, a ſkin of any fruit that may be cut off, or pared.

The outer coat of the cheſnut, ſet with prickles, is particularly called the *urchin-like rind*.

Rind is alſo uſed for the inner bark of trees; or that ſoft, whitiſh, juicy ſubſtance, adhering immediately to the wood.

Through this it is that the ſap has been ſuppoſed to return from the extremities of the branches to the root: the veſſels hereof are by ſome alſo ſuppoſed to do the office of arteries; whence Mr. Bradley calls them *arterial* veſſels. See PLANTS.

Rind, *grafting in the*. See ENGRAFTING.

RINEUS *marinus*, a name given by ſome botanical writers to the *crithmum*, or *ſamphire*, a ſea plant, uſed as a pickle.

RING, *annulus*, a little moveable, put on the finger, either by way of ceremony, or of ornament.

The biſhop's *ring* makes a part of the pontifical apparatus; and is eſteemed a pledge of the ſpiritual marriage between the biſhop and his church.

The epiſcopal *ring* is of a very ancient ſtanding. The fourth council of Toledo, held in 633, appoints, that a biſhop condemned by one council, and found afterwards innocent by a ſecond, ſhall be reſtored, by giving him the *ring*, ſtaff, &c.

From biſhops, the cuſtom of the *ring* has paſſed to cardinals, who are to pay a very great ſum, *pro jure annuli cardinalitii*.

Rings, *origin of*. Pliny, lib. xxxvii. cap. 1. obſerves, that we are in the dark as to the perſon who firſt invented, or wore the *ring*; becauſe what is ſaid of Prometheus, as alſo of Midas's *ring*, are fables. The firſt people among whom we find the *ring* in uſe, are the Hebrews, Gen. xxxviii. where Judah, Jacob's ſon, gives Tamar his *ring* or ſignet, as a pledge of his promiſe; but the *ring* appears to have been in uſe at the ſame time among the Egyptians, from Gen. xli. where Pharaoh puts his *ring* upon Joſeph's hand as a mark of the power he gave him. And in the firſt book of Kings, chap. xxi. Jezebel ſeals the warrant ſhe ſent for the killing of Naboth, with the king's *ring*.

The ancient Chaldeans, Babylonians, Perſians, and Greeks, had likewiſe the uſe of the *ring*; as appears from ſeveral paſſages in Scripture, and from Quintus Curtius, who tells us, that Alexander ſealed the letters he wrote into Europe, with his own ſeal; and thoſe in Aſia with Darius's *ring*.

The Perſians will have Guiamſchild, the fourth king of the firſt race, to have firſt introduced the *ring*, for ſealing his letters and other acts. The Greeks, Pliny thinks, knew nothing of the *ring* in the time of the Trojan war; the reaſon he gives is, that we find no mention thereof in Homer, but that when letters, &c. were to be ſent away, they were tied up, and the ſtrings knotted.

The Sabines had *rings* in Romulus's time; and it is to them, probably, the practice firſt came from the Greeks; and from them that it paſſed to the Romans, though it was ſome time before it got footing there. Pliny cannot learn which of the kings of Rome firſt adopted it; but there are no ſigns of it in any of their ſtatutes, before thoſe of Numa, and Servius Tullius. He adds, that it was alſo in uſe among the ancient Gauls and Britons.

Rings, *matter of ancient*. There were ſome of one ſingle metal, and others of a mixture, or two. For the iron and ſilver were frequently gilt; or at leaſt the gold part was fixed within the iron, as appears from Artemidorus, lib. ii. cap. 5. The Romans were contented with iron *rings* a long time; and Pliny aſſures us, that Marius firſt wore a gold one in his third conſulate, which was in the year of Rome 650. Sometimes the *ring* was iron, and the ſeal gold; ſometimes it was hollow, and ſometimes ſolid; ſometimes the ſtone was engraven, and ſometimes plain; and the graving ſometimes was in relievo, and ſometimes in creux: the laſt were called *gemmæ ectypæ*; the former *gemmæ ſculptura prominente*.

Ring, *the manner of wearing the*, has been various. From Jeremiah, chap. xxii. it appears, that the Hebrews wore it on their right hand. Among the Romans, before they came to be adorned with ſtones, and while the graving was yet on the metal itſelf, every one wore them at pleaſure, on what hand and finger he pleaſed. When ſtones came to be added, they wore them altogether on the left hand; and it would have been held an exceſſive foppery to have put them on the right.

Pliny ſays, they were at firſt worn on the fourth finger, then on the ſecond or index; then on the little finger; and at laſt on all the fingers, excepting the middle one. The Greeks wore them altogether on the fourth finger of the left hand, as we are informed by Aul. Gellius, lib. x. and the reaſon he gives for it is, that having found from anatomy, that this finger had a little nerve that went ſtraight to the heart, they eſteemed it the moſt honourable, by reaſon of this communication with that noble part. Pliny ſays, the Gauls and ancient Britons wore the *ring* on the middle finger.

At firſt they only wore a ſingle *ring*, then one on each finger, and at length ſeveral on each finger. Martial, lib. xi. epig. 60. At laſt one on each joint of each finger. Ariſtoph. in Nub. &c. Their foppery at length aroſe to that pitch, that they had their weekly *rings*. Juvenal, Sat. vii. ſpeaks of *annuli ſemeſtres*; as alſo of winter and ſummer *rings*. But, of all others, Lampridius, cap. 32. obſerves, that Heliogabalus carried the point fartheſt, who never wore the ſame *ring*, or the ſame ſhoe, twice.

Rings have been alſo worn in the noſe, as pendants in the ears. Bartholin has an expreſs treatiſe, De *Annulis Narium*, *Of* Rings *of the Noſtrils*. St. Auguſtine aſſures us, it was in his time the faſhion of the Moors; and Pietro della Valle obſerves the ſame of the modern Orientals.

In effect, there is no part of the body where *rings* have not been worn. Several Eaſt India travellers affirm, that the natives now commonly wear them on their noſe, lips, cheeks, and chin. Ramuſio tells us, that the ladies of Narſinguay in the Levant, and Diodorus Siculus, lib. iii. that thoſe of Ethiopia uſed to adorn their lips with iron *rings*.

As to the ears, the cuſtom ſtill obtains of wearing *rings* therein, both of men and women, almoſt all over the world. See Pendant.

The Indians, particularly the Guzzarats, have worn *rings* on their feet. And when Peter Alvarez had his firſt audience of the king of Calicut, he found him all covered with ſtones ſet in *rings*, having bracelets and *rings* both on the hands and fingers, and even on the feet and toes. Louis Bartome repreſents a king of Pegu as ſtill more extravagant, having *rings* ſet with precious ſtones on every toe.

Rings, *uſe of*. The ancients had three different kinds; the firſt ſerved to diſtinguiſh conditions or quality. Pliny aſſures us, that the ſenators at firſt were not allowed to wear the gold *ring*, unleſs they had been ambaſſadors at ſome foreign court. Nor was it even allowed them to wear the gold *ring* which was given them in public, except on public occaſions; at other times they wore an iron one. And thoſe who had a triumph obſerved the ſame rules.

At length the ſenators and knights were allowed the common uſe of the gold *ring*; but Acron on Horace, lib. ii. ſat. vii. obſerves, they could not do it unleſs it were given them by the prætor.

In after days the gold *ring* became the badge of the knights, the people wearing ſilver *rings*, and the ſlaves iron ones; though the gold *ring* was ſometimes alſo allowed the people, and Severus granted it to his common ſoldiers. Auguſtus allowed it the liberti or freedmen; and though Nero made a regulation to the contrary, yet it was ſoon ſet aſide.

A ſecond kind of *rings* were the *annuli ſponſalitii*, *wedding-rings*. Some carry the origin of this cuſtom as far back as the Hebrews, on the authority of a text in Exodus xxxv. 22. Leo of Modena, however, maintains, that the ancient Hebrews did not uſe any nuptial *ring*. Selden, in his Uxor Ebraica, lib. ii. chap. xiv. owns, that they gave a *ring* in the marriage, but that it was only in lieu of a piece of money of the ſame value which had uſed to have been given before. The Greeks and Romans did the ſame, and from them the Chriſtians took it up very early, as appears from Tertullian, and in ſome ancient liturgies, where we find the form of bleſſing the nuptial *ring*.

The third kind of *rings* were thoſe uſed as ſeals, called *cerographi* or *cirographi*; an account whereof ſee under the article Seal.

Richard biſhop of Saliſbury, in his Conſtitutions, anno 1217, forbids the putting of *ruſh-rings*, or any the like matter, on women's fingers, in order to the debauching them more readily; and he inſinuates the reaſon of his prohibition, that there were ſome people weak enough to believe, that what was thus done in jeſt was a real marriage.

De Breveil, in his Antiquities of Paris, ſays, it was an ancient cuſtom to uſe a *ruſh-ring* in the nuptials of ſuch as had had an affair together before their marriage.

Ring, in *Angling*, an inſtrument intended to free the hook when accidentally entangled among weeds. See Angling.

Ring, in *Aſtronomy*. The *ring of Saturn* is a thin, broad, opake, circular arch, encompaſſing the body of that planet, like the horizon of an artificial globe, without touching it, and appearing double, when ſeen through a good teleſcope.

The diſcovery hereof is owing to M. Huygens, who, after frequent obſervation of Saturn, perceived two lucid points, or Ansæ, ariſing out from the body in a right line.

Hence, as in ſubſequent obſervations he always found the ſame appearance, he concluded that Saturn was encompaſſed with a permanent *ring*; and accordingly produced his new ſyſtem of Saturn in 1659.

However Galilæo firſt diſcovered that the figure of Saturn was not round. Huygens makes the ſpace between the globe of Saturn and the *ring* equal to, or rather bigger than, the breadth of the *ring*; and the greateſt diameter of the *ring*, in proportion to that of the globe, as 9 to 4. But Mr. Pound, by an excellent micrometer applied to the Huygenian glaſs of 123 feet, determined this proportion, more exactly, to be as 7 to 3.

The plane of the *ring* is inclined to the plane of the ecliptic in an angle of thirty degrees, and it is about twenty-one thouſand miles in breadth, which is alſo its diſtance from Saturn on all ſides. The *ring*, probably, turns about its axis; becauſe, when it is almoſt edgewiſe to us, it appears ſomewhat thicker on one ſide of the planet than on the other; and the thickeſt edge has been ſeen on different ſides at different times. The ſun ſhines almoſt fifteen of our years together on one ſide of Saturn's *ring* without ſetting, and as long on the other in its turn; ſo that the *ring* is viſible to the inhabitants of that planet for almoſt fifteen of our years, and as long inviſible, by turns, if its axis has no inclination to its *ring*; but if the axis of the planet be inclined to the *ring*, e. gr. about thirty degrees, the *ring* will appear and diſappear once every natural day to all the inhabitants within thirty degrees

grees of the equator, on both ſides, frequently eclipſing the ſun in a Saturnian day. Moreover, if Saturn's axis be ſo inclined to his *ring*, it is perpendicular to his orbit; and thereby the inconvenience of different ſeaſons to that planet is avoided.

This *ring*, ſeen from Saturn, appears like a large luminous arch in the heavens, as if it did not belong to the planet. When we ſee the *ring* moſt open, its ſhadow upon the planet is broadeſt; and from that time the ſhadow grows narrower, as the *ring* appears to do to us; until, by Saturn's annual motion, the ſun comes to the plane of the *ring*, or even with its edge; which, being then directed towards us, becomes inviſible, on account of its thinneſs.

The phenomena of Saturn's *ring* are illuſtrated by a view of *fig.* 22. *Tab. Aſtronomy.* Let S be the ſun, ABCDEFGH Saturn's orbit, and IKLMNO the earth's orbit. Both Saturn and the earth move according to the order of the letters; and when Saturn is at A, his *ring* is turned edgewiſe to the ſun S, and he is then ſeen from the earth as if he had loſt his *ring*, let the earth be in any part of its orbit whatever, except between N and O; for whilſt it deſcribes that ſpace, Saturn is apparently ſo near the ſun as to be hid in his beams. As Saturn goes from A to C, his *ring* appears more and more open to the earth; at C the *ring* appears moſt open of all; and ſeems to grow narrower and narrower as Saturn goes from C to E; and when he comes to E, the *ring* is again turned edgewiſe both to the ſun and earth: and as neither of its ſides is illuminated, it is inviſible to us, becauſe its edge is too thin to be perceptible; and Saturn appears again as if he had loſt his *ring*. But as he goes from E to G, his *ring* opens more and more to our view on the under ſide; and ſeems juſt as open at G as it was at C; and may be ſeen in the night-time from the earth in any part of its orbit, except about M, when the ſun hides the planet from our view. As Saturn goes from G to A, his *ring* turns more and more edgewiſe to us, and, therefore, it ſeems to grow narrower and narrower; and at A it diſappears as before. Hence, while Saturn goes from A to E, the ſun ſhines on the upper ſide of his *ring*, and the under ſide is dark; and whilſt he goes from E to A the ſun ſhines on the under ſide of his *ring*, and the upper ſide is dark. The *ring* diſappears twice in every annual revolution of Saturn, viz. when he is in the 19th degree of Piſces and of Virgo, and when Saturn is in the middle between theſe points, or in the 19th degree either of Gemini or of Sagittarius, his *ring* appears moſt open to us; and then its longeſt diameter is to its ſhorteſt, as 9 to 4. Ferguſon's Aſtr. ſect. 204.

Kepler, in his Epitom. Aſtron. Copern. and after him Dr. Halley, in his Enquiry into the Cauſes of the Variation of the Needle, Phil. Tranſ. N° 195. ſuppoſe our earth may be compoſed of ſeveral cruſts or ſhells, one within another, and concentric to each other. If this be the caſe, it is poſſible the *ring* of Saturn may be the fragment or remaining ruin of his formerly exterior ſhell, the reſt of which is broken or fallen down upon the body of the planet.

Ring is alſo the name of an inſtrument uſed in navigation for taking the altitudes of the ſun, &c.

It is uſually of braſs, about nine inches diameter, ſuſpended by a little ſwivel, 45° from the point whereof is a perforation, which is the centre of a quadrant of 90° divided in the inner concave ſurface.

To uſe it, they hold it up by the ſwivel, and turn it to the ſun, till the ſun-beams, falling through the hole, make a ſpot among the degrees, which marks the altitude required.

This inſtrument is preferred to the aſtrolabe, becauſe the diviſions are here larger than on the aſtrolabe.

Ring is alſo uſed for the ſound or tone of a BELL.

The *ringing* of bells, though now a recreation chiefly of the lower claſs of people, is a very curious exerciſe. As for the tolling of a bell, this is nothing more than the producing of a ſound by the ſtroke of the clapper againſt the ſide of a bell, the bell itſelf being in a pendant poſition, and at reſt. In *ringing*, the bell, by means of a wheel and rope, is elevated to a perpendicular; in its motion to this ſituation, the clapper ſtrikes forcibly on one ſide, and in its return downwards, on the other ſide of the bell, producing at each ſtroke a ſound. The muſic of bells is altogether melody; but the pleaſure ariſing from it conſiſts in the variety of interchanges, and the various ſucceſſion and general predominance of the conſonances in the ſounds produced.

The practice of *ringing* bells in change is ſaid to be peculiar to this country, which for this reaſon is called the *ringing* iſland; but the antiquity of it is not eaſily aſcertained. There are in London ſeveral ſocieties of ringers, particularly one known by the name of the College Youths. Merſennus has ſaid nothing of the *ringing* of bells in changes; and Kircher has only calculated the poſſible combinations ariſing from a given number. See ALTERNATIONS.

In England the practice of *ringing* is reduced to a ſcience; and peals have been compoſed which bear the names of the inventors. Some of the moſt celebrated peals now known were compoſed about fifty years ago, by Mr. Patrick, ſo well known as the maker of barometers.

For the method of *ringing* in the Low Countries, ſee CARILLONS.

Rings *of colours*, in *Optics*, a phenomenon firſt obſerved in thin plates of various ſubſtances, by Mr. Boyle, and Dr. Hooke, but afterwards more fully explained by Sir Iſaac Newton. Mr. Boyle having exhibited a variety of colours in colourleſs liquors, by ſhaking them till they roſe in bubbles, as well as in bubbles of ſoap and water, and alſo in turpentine, procured glaſs blown ſo thin as to exhibit ſimilar colours; and he obſerves, that a feather of a proper ſhape and ſize, and alſo a black ribband held at a proper diſtance between his eye and the ſun, ſhewed a variety of little rainbows, as he calls them, with very vivid colours. Boyle's Works by Shaw, vol. ii. p. 70.

Dr. Hooke, about nine years after the publication of Mr. Boyle's Treatiſe on Colours, exhibited the coloured bubble of ſoap and water, and obſerved, that though at firſt it appeared white and clear, yet as the film of water became thinner, there appeared upon it all the colours of the rainbow. He alſo deſcribed the beautiful colours that appear in thin plates of Muſcovy glaſs; which appeared, through the microſcope, to be ranged in *rings* ſurrounding the white ſpecks or flaws in them, and with the ſame order of colours as thoſe of the rainbow, and which were often repeated ten times. He alſo took two thin pieces of glaſs, ground plane and poliſhed, and putting them one upon another, preſſed them till there began to appear a red coloured ſpot in the middle; and preſſing them cloſer, he obſerved ſeveral *rings* of colours encompaſſing the firſt place, till, at laſt, all the colours diſappeared out of the middle of the circles, and the central ſpot appeared white. The firſt colour that appeared was red, then yellow, then green, then blue, then purple, then red again; yellow, green, blue, and purple; and again in the ſame order, ſo that he ſometimes counted nine or ten of theſe circles, the red immediately next to the purple; and the laſt colour that appeared before the white was blue; ſo that it began with red, and ended with purple. Theſe *rings*, he ſays, would change their places, by changing the poſition of the eye, ſo that, the glaſſes remaining the ſame, that part which was red in one poſition of the eye, was blue in a ſecond, green in the third, &c. Birch's Hiſt. of the Royal Society, vol. iii. p. 54.

Sir Iſaac Newton, having demonſtrated that every different colour conſiſts of rays which have a different and ſpecific degree of refrangibility, and that natural bodies appear of this or that colour, according to their diſpoſition to reflect this or that ſpecies of rays (ſee COLOUR), purſued the hint ſuggeſted by the experiments of Dr. Hooke, already recited, and caſually noticed by himſelf, with regard to thin tranſparent ſubſtances. Upon compreſſing two priſms hard together, in order to make their ſides touch one another, he obſerved, that in the place of contact they were perfectly tranſparent, which appeared like a dark ſpot, and when it was looked through, it ſeemed like a hole in that air, which was formed into a thin plate, by being impreſſed between the glaſſes. When this plate of air, by turning the priſms about their common axis, became ſo little inclined to the incident rays, that ſome of them began to be tranſmitted, there aroſe in it many ſlender arcs of colours, which increaſed, as the motion of the priſms was continued, and bended more and more about the tranſparent ſpot, till they were completed into circles, or *rings*, ſurrounding it; and afterwards they became continually more and more contracted.

By another experiment with two object glaſſes, he was enabled to obſerve diſtinctly the order and quality of the colours from the central ſpot, to a very conſiderable diſtance. Next to the pellucid central ſpot, made by the contact of the glaſſes, ſucceeded blue, white, yellow, and red. The next circuit immediately ſurrounding theſe conſiſted of violet, blue, green, yellow, and red. The third circle of colours was purple, blue, green, yellow, and red. The fourth circle conſiſted of green and red. All the ſucceeding colours became more and more imperfect and dilute, till, after three or four revolutions, they ended in perfect whiteneſs.

In order to determine the thickneſs of the plate of air, by which he ſuppoſed the colours were produced, he meaſured the diameters of the firſt ſix circles, at their moſt lucid parts, and found their ſquares to be in the arithmetical progreſſion of the odd numbers 1, 3, 5, 7, 9, 11; and hence he concluded, that the intervals of the glaſſes at theſe circles muſt be in the ſame progreſſion. He alſo meaſured the diameters of the dark or faint *rings* between the more lucid colours, and found their ſquares to be in the arithmetical progreſſion of the even numbers 2, 4, 6, 8, 10, 12; and he concluded, after an accurate menſuration, that the thickneſs of the air at the darkeſt part of the firſt dark *ring*, made by perpendicular rays, to be in the neareſt round numbers $\frac{1}{89000}$ part of an inch, half of which, multiplied by the progreſſion 1, 3, 5, 7, 9, 11, &c. gives the thickneſs of the air at the moſt luminous parts of all the brighteſt *rings*, their arithmetical means being its thickneſs at the darkeſt parts of all the dark ones. In examining the under ſide of the thin plate, in order to obſerve what light was tranſmitted, he found that the central ſpot was white, and the order of the colours was yellowiſh red; black, violet, blue, white, yellow, red; violet, blue, green, yellow, red, &c. but theſe colours were very faint and dilute, except when the light was tranſmitted very obliquely through the glaſſes. When he put water between the glaſſes, and meaſured the *rings* again, he found the proportion of their diameters to the diameters of the like circles made by air, to be about 7 to 8; ſo that the intervals of the glaſſes, at ſimilar circles, cauſed by water and air, were about 3 to 4.

When theſe *rings* were examined in a darkened room, by the coloured light of a priſm caſt on a ſheet of white paper, they became more diſtinct, and viſible to a far greater number than in the open air. He ſometimes ſaw more than twenty of them, whereas in the open air he could not diſcern above eight or nine.

From other curious obſervations on theſe *rings*, made by different kinds of light thrown upon them, he inferred, that the thickneſſes of the air between the glaſſes, where the *rings* are ſucceſſively made, by the limits of the ſeven colours, red, orange, yellow, green, blue, indigo, and violet, in order, are one to another as the cube roots of the ſquares of the eight lengths of a chord, which ſound the notes in an octave, *ſol*, *la*, *fa*, *ſol*, *la*, *mi*, *fa*, *ſol*; that is, as the cube roots of the ſquares of the numbers 1, $\frac{8}{9}$, $\frac{5}{6}$, $\frac{3}{4}$, $\frac{2}{8}$, $\frac{3}{5}$, $\frac{9}{16}$, $\frac{1}{2}$. Theſe *rings* appeared of that priſmatic colour, with which they were illuminated; and by projecting the priſmatic colours immediately upon the glaſſes, he found that the light, which fell on the dark ſpaces between the coloured *rings*, was tranſmitted through the glaſſes without any change of colour. From this circumſtance he thought that the origin of theſe *rings* is manifeſt; becauſe the air between the glaſſes is diſpoſed, according to its various thickneſs, in ſome places to reflect, and in others to tranſmit the light of any particular colour, and in the ſame place to reflect that of one colour, where it tranſmits that of another.

In examining the phenomena of colours made by a denſer medium ſurrounded by a rarer, ſuch as thoſe which appear in plates of Muſcovy glaſs, bubbles of ſoap and water, &c. the colours were found to be much more vivid than the others, which were made with a rarer medium ſurrounded by a denſer. From the preceding phenomena it is an obvious deduction, that the tranſparent parts of bodies, according to their ſeveral ſeries, reflect rays of one colour, and tranſmit thoſe of another; on the ſame account that thin plates, or bubbles, reflect or tranſmit thoſe rays; and this Newton ſuppoſed to be the reaſon of all their colours. Hence alſo he has inferred, that the ſize of thoſe compotent parts of natural bodies that affect the light, may be conjectured by their colours. See COLOUR and REFLECTION.

Sir Iſaac Newton, purſuing his diſcoveries concerning the colours of thin ſubſtances, found that the ſame were alſo produced by plates of a conſiderable thickneſs, diviſible into leſſer thickneſſes. The *rings* formed in both caſes have the ſame origin, with this difference, that thoſe of the thin plates are made by the alternate reflexions and tranſmiſſions of the rays at the ſecond ſurface of the plate, after one paſſage through it; but that, in the caſe of a glaſs ſpeculum, concave on one ſide, and convex on the other, and quickſilvered over on the convex ſide, the rays go through the plate, and return before they are alternately reflected and tranſmitted. Newton's Optics, p. 169, &c. or Newton's Opera, Horſley's edit. vol. iv. p. 121, &c. p. 184, &c.

The abbé Mazeas, in his experiments on the *rings* of colours that appear in thin plates, has diſcovered ſeveral important circumſtances attending them, which were overlooked by the ſagacious Newton, and which tend to invalidate his theory for explaining them. In rubbing the flat ſide of an object-glaſs againſt another piece of flat and ſmooth glaſs, he found that they adhered very firmly together after this friction, and that the ſame colours were exhibited between theſe plane glaſſes, which Newton had obſerved between the convex object glaſs of a teleſcope, and another that was plane; and that the colours were in proportion to their adheſion. When the ſurfaces of pieces of glaſs, that are tranſparent and well poliſhed, are equally preſſed, a reſiſtance will be perceived; and wherever this is felt, two or three very fine curve lines will be diſcovered, ſome of a pale red, and others of a faint green. If the friction be continued, the red and green lines increaſe in number at the place of contact; the colours being ſometimes mixed without any order, and ſometimes diſpoſed in a regular manner; in which caſe the coloured lines are generally concentric circles, or ovals, more or leſs elongated, as the ſurfaces are more or leſs united. When the colours are formed, the glaſſes adhere with conſiderable force; but if the glaſſes be ſeparated ſuddenly, the colours will appear immediately upon their being put together, without the leaſt friction. Beginning with the ſlighteſt touch, and increaſing the preſſure by inſenſible degrees, there firſt appears an oval plate of a faint red, and in the centre of it a ſpot of light green, which enlarges by the preſſure, and becomes a green oval, with a red ſpot in the centre; and this enlarging in its turn, diſcovers a green ſpot in its centre. Thus the red and green ſucceed one another in turns, aſſuming different ſhades, and having other colours mixed with them. The greateſt difference between theſe colours exhibited between plane ſurfaces, and thoſe by curve ones, is, that, in the former caſe, preſſure alone will not produce them, except in the caſe above mentioned. In rubbing together two priſms, with very ſmall refracting angles, which were joined ſo as to form a parallelepiped, the colours appeared with a ſurpriſing luſtre at the places of contact, and differently coloured ovals appeared. In the centre there was a black ſpot, bordered by a deep purple; next to this appeared violet, blue, orange, red tinged with purple, light green, and faint purple. The other *rings* appeared to the naked eye to conſiſt of nothing but faint reds and greens. When theſe coloured glaſſes were ſuſpended over the flame of a candle, the colours diſappeared ſuddenly, though they ſtill adhered; but being ſuffered to cool, the colours returned to their former places, in the ſame order as before. At firſt the abbé Mazeas had no doubt but that theſe colours were owing to a thin plate of air between the glaſſes, to which Newton has aſcribed them; but the remarkable difference in the circumſtances attending thoſe produced by the flat plates, and thoſe produced by the object glaſſes of Newton, convinced him that the air was not the cauſe of this appearance. The colours of the flat plates vaniſhed at the approach of flame, but thoſe of the object glaſſes did not. Nor was this difference owing to the plane glaſſes being leſs compreſſed than the convex ones; for though the former were compreſſed ever ſo much by a pair of forceps, it did not in the leaſt hinder the effect of the flame. Afterwards he put both the plane glaſſes and the convex ones into the receiver of an air-pump, ſuſpending the former by a thread, and keeping the latter compreſſed by two ſtrings; but he obſerved no change in the colours of either of them, in the moſt perfect vacuum that he could make. Suſpecting ſtill that the air adhered to the ſurface of the glaſſes, ſo as not to be ſeparated from them by the force of the pump, he had recourſe to other experiments, which rendered it ſtill more improbable that the air ſhould be the cauſe of theſe colours. Having laid the coloured plates, after warming them gradually, on burning coals; and thus, when they were nearly red, rubbing them together, he obſerved the ſame coloured circles and ovals as before. When he ceaſed to preſs upon them, the colours ſeemed to vaniſh; but they returned, as he renewed the friction. In order to determine whether the colours were owing to the thickneſs of ſome matter interpoſed between the glaſſes, he rubbed them together with ſuet and other ſoft ſubſtances between them; yet his endeavours to produce the colours had no effect. However, by continuing the friction with ſome degree of violence, he obſerved, that a candle appeared through them encompaſſed with two or three concentric greens, and with a lively red inclining to yellow, and a green like that of an emerald; and at length the *rings* aſſumed the colours of blue, yellow, and violet. The abbé was confirmed in his opinion that there muſt be ſome error in Newton's hypotheſis, by conſidering that, according to his meaſures, the colours of the plates varied with the difference of a millionth part of an inch; whereas he was ſatiſfied that there muſt have been much greater differences in the diſtance between his glaſſes, when the colours remained unchanged. From other experiments he concluded, that the plate of water introduced between the glaſſes was not the cauſe of their colours, as Newton apprehended; and that the coloured *rings* could not be owing

ing to the compreſſion of the glaſſes. After all he adds, that the theory of light, thus reflected from thin plates, is too delicate a ſubject to be completely aſcertained by a ſmall number of obſervations. Berlin Mem. for 1752, or Memoires Preſentes, vol. ii. p. 28—43.

M. du Tour repeated the experiments of Abbé Mazeas, and added ſome obſervations of his own. Mem. Preſ. vol. iv. p. 288.

M. Muſchenbroeck is alſo of opinion, that the colours of thin plates do not depend upon the air; but as to the cauſe of them, he acknowledges that he could not ſatisfy himſelf about it. Introd. ad Phil. Nat. vol. ii. p. 738. See on this ſubject Prieſtley's Hiſt. of Light, &c. per. 6. ſect. 5. p. 498, &c.

For an account of the *rings* of colours produced by electrical exploſions, ſee Colours *of natural bodies*, Circular *ſpots*, and Fairy *circles*.

Rings *of flies*, in *Natural Hiſtory*, the ſeveral rounds, or circular portions, of which the bodies of theſe and other inſects are compoſed.

In the fly kind theſe are cruſtaceous or cartilaginous, and conſequently of a matter little capable of extenſion; many actions of theſe inſects require, however, that their bodies, or a part at leaſt of their bodies, ſhould be able to inflate or diſtend, and contract their ſize occaſionally. Were every ring of the body one entire ſcale, or ſhelly ſubſtance, theſe changes could not be eaſily effected; nature has therefore ſo provided, that the tender bodies of theſe little creatures are ſufficiently defended, and yet all the neceſſary motions may be performed.

Ring, *baſe*. See Base.

Ring-*bolt*, in a *Ship*, is an iron bolt with a eye at one end, in which is fitted a circular *ring*, and uſed for various purpoſes; particularly for hooking the tackles, by which the cannon of a ſhip is managed and ſecured.

Ring-*bone*, among *Farriers*, &c. a hard callous ſubſtance, growing in the hollow circle of the little paſtern of a horſe above the coronet.

It ſometimes goes quite round, like a *ring*; whence its name; ſometimes it is hereditary, derived from the ſtallion or mare; but it oftener comes by accident, as from a ſtrain, blow of a horſe, &c.

Ring, *corniche*. See Corniche.

Ring *dial*. See Dial.

Ring *dove*. See Dove.

Ring *fairy*. See Fairy.

Ring-*head*, an engine uſed in ſtretching of cloth.

Ring, *natal*. See Natal.

Ring *ouzel*. See Ouzel.

Ring, *reinforce*. See Reinforce.

Ring-*ropes*, in a *Ship*, ſhort pieces of rope, tied occaſionally to the *ring-bolts* of the deck, to faſten the cable more ſecurely, when the ſhip rides in a tempeſt, or turbulent ſea, or rapid current. They are uſed more particularly in veering away the cable gradually in thoſe circumſtances, in order to freſhen the hauſe.

Ring-*ſcalpel*. We have a deſcription and figure of a *ring-ſcalpel*, for aſſiſting the delivery of women in child-birth, by Dr. Thomas Simſon, in the Medical Eſſays of Edinburgh, vol. v. art 39.

Ring-*tail*, in *Ornithology*, the Engliſh name for the *ſubbuteo*, or *pygargus accipiter*; which has been generally ſuppoſed to be the female of the hen-harrier; but males have lately been found of this ſpecies.

The *ring-tail* is a moderately large bird. It has a ſort of *ring*, or chain of feathers, round the back part of its head, reaching to its chin on each ſide, which ſtand erect, and are brown in the middle, and of a reddiſh white at the edges, and make a ſort of crown, which ſurrounds the head; on the top of the head and cheeks the feathers are duſky, bordered with ruſt colour; under each eye is a white ſpot; the back is duſky, the rump white, with oblong yellowiſh ſpots on each ſhaft; the tail is long, and its tip white; the breaſt and belly are of a yellowiſh brown, marked with oblong duſky ſpots; its legs are yellow, and the inſide of its mouth is black; it feeds on ſmall birds, and its eggs are of a reddiſh hue, with very little clear white appearing in them. Theſe birds fly higher than the hen-harrier, and ſometimes perch on trees.

Ring-*tail eagle*. See *White-tailed* Eagle.

Ring-*tail*, in a *Ship*, a ſmall triangular ſail, extended on a little maſt, which is occaſionally erected for that purpoſe on the top of a ſhip's ſtern. The lower part of this ſail is ſtretched out by a boom, which projects from the ſtern horizontally. This ſail is only uſed in light and favourable winds, particularly in the Atlantic ocean. Falconer.

Ring-*tail* is alſo a name given to a ſort of ſtudding ſail, hoiſted beyond the after-edge or ſkirt of thoſe main-ſails which are extended by a boom and gaff; as in all ſloops, brigs, and ſchooners; and it is of the ſame depth with that part of the main-ſail upon which it borders.

Ring, *trunnion*. See Trunnion.

Ring-*walk*, among *Hunters*, a round walk. See Hunting.

Ring-*worm*, *ſerpigo*, in *Medicine*, a kind of herpes, called alſo a tetter.

It conſiſts of a number of very ſmall puſtules, riſing cloſe to each other, ſometimes in a circular form, with great pain and itching. It never comes to digeſtion, and is not cured without difficulty; for after it appears to have been quite extinguiſhed, it frequently breaks forth again at certain ſeaſons of the year. The common people uſe to cure it, by rubbing it with ink; but where the diſeaſe is fixed, ſome univerſals ſhould be firſt applied.

RIONDO, in *Ichthyology*, a name uſed by ſome for the fiſh more commonly called aper, a ſmall fiſh, of the ſhape of the faber or doree, caught in the Mediterranean.

RIOT, in *Law*, the forcible doing of an unlawful thing, of a private nature, by three or more perſons aſſembled together for that purpoſe; either with or without a common cauſe or quarrel: as if they beat a man; or hunt and kill game in another's park, chaſe, warren, or liberty; or do any other unlawful act with force and violence; or even do a lawful act, as removing a nuſance, in a violent and tumultuous manner.

The word is formed from the Latin *riota*, of *arietare*, to run at each other as rams do. Though, from an ancient Gauliſh verſion of the Bible, quoted by Skinner, *riot* ſhould rather ſeem originally to ſignify luxury and exceſs; whence our law *riot* might proceed; becauſe theſe are frequently attended with quarrels.

For the difference between a *riot*, rout, and unlawful aſſembly, ſee Rout and Unlawful *aſſembly*.

The puniſhment of *riots* and routs, where a number of perſons from three to eleven are concerned, is, by the common law, fine and impriſonment only; to which, in very enormous caſes, the pillory has been ſometimes ſuperadded. And by the ſtat. 13 Hen. IV. cap 7. any two juſtices, together with the ſheriff or under-ſheriff of the county, may come with the posse *comitatus*, if need be, and ſuppreſs any ſuch *riot*, aſſembly, or rout, and arreſt the rioters, and record upon the ſpot the nature and circumſtances of the whole tranſaction, which record alone ſhall be a ſufficient conviction of the offenders; and it is held that any battery, wounding, or killing the rioters, that may happen in ſuppreſſing the *riot*, is juſtifiable. The riotous aſſembling of twelve perſons or more, and not diſperſing upon proclamation, was firſt made high treaſon by ſtat. 3 & 4 Edw. IV. cap. 5. but repealed by ſtat. 1 Mar. cap. 1. Nevertheleſs the offence was made a ſingle felony by 1 Mar. ſtat. 2. cap. 12. and by 1 Eliz. cap. 16. with whom the law expired However, it was revived, in order to ſupport the execution of the act of ſettlement, and made perpetual by 1 Geo. I. cap. 5. which enacts, that if any twelve perſons are unlawfully aſſembled to the diſturbance of the peace, and any one juſtice of the peace, ſheriff, under-ſheriff, or mayor of a town, ſhall think proper to command them by proclamation to diſperſe, if they contemn his orders, and continue together for an hour afterwards, ſuch contempt ſhall be felony without benefit of clergy. And farther, if the reading of the proclamation be by force oppoſed, or the reader be in any manner wilfully hindered from the reading of it, ſuch oppoſers and hinderers are felons, without benefit of clergy; and all perſons to whom ſuch proclamation ought to have been made, and knowing of ſuch hindrance, and not diſperſing, are felons without benefit of clergy. And the act indemnifies the peace officers, and their aſſiſtants, if they kill any of the mob in endeavouring to diſperſe them. Moreover, if any perſons, ſo riotouſly aſſembled, begin, even before proclamation, to pull down any church, chapel, meeting-houſe, dwelling-houſe, or out-houſes, they ſhall be felons, without benefit of clergy. Blackſt. Comm. book iv. chap. xi.

RIPENERS, in *Medicine*, a ſort of topical remedies called alſo *drawers*, *digeſtives*, *maturantia*, *ſuppuratives*, &c. See Maturation.

RIPENING *of fruit*, in *Gardening*, may be forwarded ſeveral ways. The method practiſed in the Levant, for maturing the domeſtic fig-tree, has been already mentioned; alſo the great uſe of hot-beds, for bringing to maturity many exotic plants, which could not be otherwiſe effected in cold climates. See Caprification, Hot-*beds*, and Forcing.

RIPIENO, in the *Italian Muſic*, is uſed in pieces of muſic in parts, to diſtinguiſh thoſe that play to fill up, from thoſe that play throughout the piece.

There are, ſays Mr. Broſſard, two kinds of the *ripieno*; one plays the part of the little chorus exactly, and does not, therefore, increaſe the harmony or number of parts. What is to be played by all the muſicians is marked with the words *tutti* or *omnes*. This ſort of *ripieno* is found in almoſt all compoſitions. The other ſort is much better, a different part being played, whereby the number of parts is increaſed, and the harmony made fuller. Thus in pieces where in ſtrictneſs two trebles, and baſs, and thorough baſe, are ſufficient, becauſe theſe parts are diſpoſed in ſuch a manner, as that their harmony is complete when played all together; yet, in order to render the piece more perfect, and to give it more grandeur, a counter-tenor, tenor, and often two violins, are added, whoſe parts are entirely different from the other; and the harmony then has ſeven parts inſtead of three, and is conſequently more complete and full. The parts thus added are properly called *ripieni*.

RIPIERS, *ripiarii*, in our *Old Writers*, thoſe that bring fiſh from the ſea coaſt to the inner parts of the land.

They were thus called a *fiſcelia, qua in devehendis piſcibus utuntur*, *Anglice*, a rip.

RIPOSTE, in the *Manege*, is the vindictive motion of a horſe that anſwers the ſpur with the kick of his foot.

RIPPERS, in the *Wire-works*, are the people who attend in the mills, take the prepared ſmall rods of iron, and work at the barrels where they are drawn into wire.

RIPPLING, in *Sea-Language*, a broken and interrupted noiſe, produced by a current on or near the ſea-coaſt.

Rippling *of flax* is the operation of taking off the ſeed from the FLAX, by drawing it through a *ripple*, or large comb.

RISCUS, among the Romans, ſometimes ſignifies a cheſt or trunk covered with ſkins; ſometimes it is uſed for a hamper, made of twigs or ruſhes to hold lint; and ſometimes for a hollow place in the wall of a houſe, uſed likewiſe for holding lint, or the like.

RISENTITO, in the *Italian Muſic*, a briſk, lively, or expreſſive manner of playing.

RISIBILITY, the faculty of LAUGHTER.

Riſibility is commonly ſuppoſed an attribute peculiar to man; as being the only creature capable of judging what is ridiculous.

Some philoſophers go ſo far as to aſſert, that the degree of judgment is always ſeen in that of laughter; fools always either have too little or too much of it.

Authors do not agree as to the peculiar mechaniſm in man, whereby laughter is raiſed. It is uſually attributed to the communication between the plexus nervoſus, and the diaphragmatic nerves.

RISIGALLUM, in the *Materia Medica*. See REALGAR.

RISING, in *Aſtronomy*, the appearance of the ſun, a ſtar, or other luminary, above the horizon, which before was hid beneath it.

By reaſon of the REFRACTION of the atmoſphere, the heavenly bodies always *riſe* before their time; i. e. they are ſeen above the horizon, while they really are below it.

There are three poetical kinds of *riſing* of the ſtars. See ACRONYCHAL, COSMICAL, and HELIACAL.

To find the riſing, &c. *of the ſun and ſtars by the globe*, ſee GLOBE.

Rising-*line*, in a *Ship*, a name given by ſhipwrights to an incurvated line, which is drawn on the plane of elevation, to determine the height of the ends of all the floor-timbers throughout the ſhip's length, and which accordingly aſcertains the figure of the bottom, with regard to ſharpneſs and flatneſs. Falconer.

RISK, or RISQUE, the hazard or chance of a loſs, damage, &c.

There is a great *riſk* run in letting goods go upon credit to great lords, wives not authorized by their huſbands, and young people not yet arrived at the age of majority.

Skinner derives the word from the Spaniſh *riſco*, *ſteep*; Covarruvias, from *rigeo*. In the barbarous Greek, they ſay, ῥιζικαρω, for *periclitor*, *I hazard*; and ῥιζικον, for *lot* or *chance*; which words, as well as *riſque*, Skinner thinks, may be deduced from ῥιπτω, for αναῤῥιπτω τον κυϐον, *I caſt the dye*.

To prevent any *riſk* in invoices of merchandizes by ſea, it is uſual to inſure them.

The *riſk* of merchandizes commences from the time they are carried aboard. In matters of inſurance, it is a maxim, that all is never to be *riſked* on one bottom, or in the ſame veſſel; to denote, that aſſurers muſt act with diſcretion in the ſigning of policies, and not hazard too much on each veſſel; there being more to be expected from ſeveral than from one.

RISORIUS *novus*, in *Anatomy*, a name given by Santorini to a muſcle, formed of that part of the *quadratus genæ*, which ariſes from the cheek.

RISVIGLIATO, in the *Italian Muſic*, is uſed to ſignify, that after having played or ſung a doleful and lamenting ſtrain, a gay and lively air is to follow.

RISUS. See LAUGHTER.

Risus *caninus* is a kind of laughter wherein the lips are contracted, ſo as to ſhew all the teeth.

Risus *Sardonius*, Sardonian laughter, is a forced, ſpiteful laughter; or a laughter that does not go beyond the teeth.

The phraſe is by ſome ſaid to be founded on this, that in Sardinia there is a venomous plant, which occaſions ſuch a contraction of the muſcles of the face in perſons it kills, that they ſeem to die laughing in this manner.

RITE, *ritus*, in *School Divinity*, denotes the particular manner or form of celebrating or performing the religious ceremonies, which obtains in this or that place.

The eaſtern people, Armenians, &c. celebrate divine ſervice according to the Greek *rite*. The weſtern world follow the Latin *rite*; or that of the Roman church.

The Engliſh obſerve the *rite* of the church of England, preſcribed in the book of Common Prayer, &c.

RITHER, or RIDER, in *Mining*, is a ſtone or thin clift that lies in the vein; the ore ſometimes runs on both ſides it. Sometimes the *rither* is ſo thick, that it parts the vein, and makes one vein two.

RITORNELLO, or REFRET, in *Muſic*, the burden of a ſong, or a repetition of the firſt or other verſes of the ſong, at the end of each ſtanza or couplet.

The word is Italian, and ſignifies properly a *little return*, or a ſhort repetition, ſuch as that of an echo, or of the laſt words of a ſong; eſpecially when the repetition is made after a voice, by one or more inſtruments.

But cuſtom has extended the uſe of the word to all ſymphonies, played before the voices begin, and which ſerve by way of prelude or introduction to what follows.

In the partitions or ſcore of the Italian Muſic, we frequently find the *ritornellos* ſignified by the words *ſi ſuona*, to ſhew that the organ, ſpinnet, or the like, are to repeat what the voice has been ſinging.

RITUAL, *rituale*, a church-book, directing the order and manner of the ceremonies to be obſerved in celebrating divine ſervice in a particular church, dioceſe, religious order, or the like.

The ancient heathens had, likewiſe, their *rituals*, or *rituales libri*; thoſe of the Hetrurians were much famed. See ARUSPICI *Libri*.

Theſe books contained the rites and ceremonies to be obſerved in the building a city, in the conſecrating a temple or an altar, in ſacrificing, and deifying, in dividing the curiæ, tribes, centuries, and, in general, in all their religious ceremonies.

There are ſeveral paſſages in Cato's books, De Re Ruſtica, which may give us ſome idea of the *rituals* of the ancients.

RIVAGE, *rivagium*, a toll anciently paid to the king on ſome rivers, for the paſſage of boats or veſſels therein.

RIVAL, *rivalis*, a term of relation applied to two perſons who have the ſame pretenſion.

It is properly uſed for a competitor, in love; and figuratively for an antagoniſt in any other purſuit. The intrigues of comedies and romances uſually turn on the jealouſies of *rivals*, who diſpute for the ſame miſtreſs.

The lawyers derive the word from the Latin *rivus*, *ſtream*, *quod ab eodem rivo aquam hauriant*.

Donatus ſuppoſes it to have been formed hence, that beaſts coming to drink at the ſame brook, or fountain, frequently quarrel.

Cælius ſays, that *rivales* were originally ſuch whoſe fields were parted by a brook or rivulet, the courſe whereof being liable to be varied ſeveral ways, occaſioned frequent diſputes and law-ſuits.

RIVER, *fluvius*, or *flumen*, in *Geography*, a ſtream or current of freſh water, flowing in a bed or channel, from a ſource or ſpring, into the ſea.

If the ſtream be not large enough to bear boats, or ſmall veſſels, loaden, it is properly called in Engliſh, by the diminutive, *rivulet* or *brook*; by the Latins *rivus*; and by the French *riviere*. If it will only bear ſuch veſſels, the Latins call it *amnis*. If it be conſiderable enough to carry larger veſſels, it is called by the general name *river*; by the Latins *fluvius*, and *flumen*; and by the French *fleuve*; between all which the difference is only as to greater and leſs.

Some will have none to be properly *rivers*, except thoſe which bear the ſame name from their ſource to their mouth.

Others, none but thoſe which empty themſelves immediately into the ſea; and not into any other river.

Rivulets have their riſe, ſometimes from great rains, or great quantities of thawed ſnow; eſpecially in mountainous places; as in the long ridges of Africa, India, Sumatra, &c. But the generality of *rivulets* ariſe from ſprings.

Rivers themſelves all ariſe either from the confluence of ſeveral *rivulets*, or from lakes; nor is there any great *river*, ſuch as the Rhine, Elbe, &c. known to flow from a ſingle ſpring.

The Volga, e. gr. conſiſts of above two hundred *rivulets*, all flowing into it, before it reach the Caſpian ; and the Danube receives as many.

The Rhine and the Po receive each above a hundred others, great and ſmall ; and the river of the Amazons receives into its large bed a prodigious number, ſome of which are five or ſix hundred leagues in length, and are of ſuch a depth and breadth as render them principal *rivers*,

Pliny, indeed, and Cardan, ſay, that the Nile receives none ; but the later travellers into Abyſſinia aſſure us of the contrary.

The Rhine, Rhone, Danube, Boryſthenes, &c. ariſe originally from ſprings in the mountains ; and the Nile, the Volga, the great *river* of St. Laurence, &c. from lakes.

It has been held by many, that all ſprings and *rivers* owe their origin to rains and dews ; but there are ſome ſprings which cannot be accounted for on this principle, though others very well may. The intermitting ſprings, which flow violently in rainy ſeaſons, and are dry in ſummer, are probably owing to rains ; but there are ſome ſprings which diſcharge more water annually than all that falls in rains and dews in the neighbouring country. The great perennial ſpring at Willowbrig in Staffordſhire is of this kind, and that of the Sorgue in France is much more eminently ſo ; the *river* of that name being, according to Gaſſendus, navigable up to the very ſprings which are its ſource.

But if ſuch ſprings as theſe diſcharge too great a quantity of water for the ſupply of rains and dews, how is it poſſible, that ſuch ſmall ſupplies of water as theſe can afford the conſtant currents of the larger *rivers?* The Volga alone, according to Ricciolus, pours forth as much water in a year's time into the Caſpian ſea, as would ſuffice to drown the ſurface of the whole earth. The *river* of St. Laurence, in America, pours forth nearly as much as this. If either of theſe *rivers* alone do, as has been affirmed, from calculations, diſcharge annually as much water as falls in the ſame time in rains and miſts upon the ſurface of the whole earth ; from whence are all the reſt to be ſupplied, according to the ſyſtem of their all being made by rains*; and particularly where is left the ſupply for the Rio de la Plata ; which Ricciolus affirms to be larger than the Nile, the Ganges, and the Euphrates, put together? its mouth being ninety miles wide, and running with that violence into the ſea, that it makes it freſh for two hundred miles together. Theſe, and the other *rivers* of the ſeveral parts of the globe, upon a very moderate calculation, diſcharge at leaſt five hundred times as much water into the ſea, as falls upon the whole ſurface of the earth, in rains, miſts, dews, ſnows, &c. in a like ſpace of time.

As it is evident, therefore, that theſe cannot be ſupplied by rains, ſo neither is it poſſible that the ſeveral hot ſprings and the ſalt ſprings can be ſupplied that way: the origin of ſprings alſo in places where there falls little or no rain, and where the conſervatories muſt needs be too ſmall to contain a ſupply, are great proofs that rain and miſts are not the origin of ſprings, at leaſt not in all places. The iſles of Mago, Rotunda, and the Strophades, and the rock whereon the Maiden Tower ſtands in the Thracian Boſphorus, cannot be ſupplied with, or retain a ſufficiency of rain water to ſupply conſtant ſprings, yet ſuch are always found running there.

It cannot be otherwiſe but that there are ſubterranean communications between the ſea and the ſources of fountains, *rivers*, and the larger ſprings, by which theſe are ſupplied ; and there are certainly charybdes which ſwallow the ſea for theſe purpoſes ; and when theſe happen to be ſtopped, the largeſt *rivers* have been dried up, and wholly ceaſed to run for a conſiderable time: this we have accounts in hiſtory has happened to the Thames, the Trent, and Medway, in England ; the Elve, the Motala, and Gulſpang, in Sweden, and other *rivers* in other countries. If, on the other hand, theſe charybdes happen to be too open, freſh water ſprings depending upon them will become ſalt. This we have inſtances of in hiſtory alſo ; and even ſo old a writer as Pliny has ſaid, that this once happened in Caria near Neptune's Temple. Plot. de Origine Fontium. See EVAPORATION and SPRING.

RIVERS, *phenomena and variations of*. *Rivers* are found ſubject to great alterations, at different ſeaſons of the year, day, &c. from frequent rains, and melted ſnow. Thus in Peru and Chili many of the *rivers* are almoſt inſenſible in the night-time, and only flow by day, as being then augmented by the diſſolution of the ſnow on the mountains Andes. Thus the Volga abounds in water in May and June, ſo as to cover the ſand-banks, &c. which all the reſt of the year lie bare, ſo as ſcarce to allow a paſſage to the loaden ſhips. Thus alſo the Nile, Ganges, Indus, &c. are frequently ſo increaſed as to overflow ; and that either in the winter, from rain, or in the ſummer, from the melting of the ſnow. Some *rivers* bury themſelves under-ground in the middle of their courſe, and break out again in other places, like new *rivers*. Thus the Niger, which ſome coſmographers derive by a ſubterraneous channel from the Nile, becauſe it ſwells at the ſame time with the Nile, without any other apparent cauſe of its ſwelling : the Niger itſelf, meeting the mountains of Nubia, is hidden under them, and riſes again on the weſtern ſide of thoſe mountains. Thus alſo the Tigris is loſt in the mountain Taurus, &c.

Ariſtotle, and the poets, mention ſeveral ſuch *rivers* about Arcadia : Alpheus, a *river* of Arcadia, is particularly famed. This, being ſwallowed up in the ground, is ſuppoſed, by the Greek authors, to continue its progreſs under the earth, and under the bottom of the ſea, into Sicily ; where, breaking up near Syracuſe, it forms the *river* Arethuſa. The great reaſon of this opinion was, that, every fifth ſummer, the *river* Arethuſa, in Sicily, caſt up the dung of cattle about the time of the celebration of the Olympic games in Achaia, when the dung of victims was uſed to be caſt into the Alpheus.

Some *rivers* empty themſelves into the ſea by one mouth, ſome by ſeveral. Thus, the Danube opens into the Euxine ſea by ſeven mouths ; the Nile by ſeven ; and the Volga by at leaſt ſeventy. The cauſe of this variety of mouths Varenius attributes principally to banks of ſand, &c. formed therein ; which, gradually increaſing, form iſlands, whereby the channel is divided into ſeveral branches. Indeed, the ancients tell us, that the Nile formerly only emptied itſelf at one mouth, called the *oſtium Canopicum* ; and add, that the other ſix are adventitious, or artificial.

The channels of *rivers*, except ſuch as were formed at the creation, Varenius endeavours to prove to be all artificial, and dug by men. His reaſons are, that, when a new ſpring breaks forth, the water does not make itſelf a channel, but ſpreads over the adjacent land ; ſo that the people have been neceſſitated to cut it a channel, to ſecure their grounds ; and that a great number of channels of *rivers* are certainly known, from hiſtory, to have been dug by men, &c.

As to the queſtion, whether thoſe *rivers* which run into others, have made themſelves that way by their own motion, or have been turned thither in canals cut by men? he takes the latter to be the more probable ; and concludes the ſame of the arms, or branches, of *rivers*, and of the turns whereby iſlands are formed in the Tanais, Volga, &c.

To the queſtion, why we have no ſalt *rivers*, when there are ſo many ſalt ſprings? he anſwers, that it is becauſe men, having no occaſion for ſalt water, have not dug channels to conduct the water of ſalt ſprings ; ſalt being procurable at leſs expence.

The water of moſt *rivers* carries with it particles of metals, minerals, ſands, or oily and fat bodies, &c. Thus, ſome *rivers* bring ſands intermixed with grains of gold ; of which kind is, 1. A *river* in Japan. 2. Another in the iſland Lequeo, near Javon. 3. A rivulet in Africa, called Arroe, breaking out of the foundation of the mountains of the Moon, wherein there are golden mines. 4. A *river* in Guinea, where the negroes ſeparate the gold-duſt from the ſand, and ſell it to the Europeans, who traffick thither for that very purpoſe. 5. In ſome rivulets near the city of Mexico, there are grains of gold taken up, eſpecially after rain ; which is alſo to be underſtood of all the other *rivers*, none of which yield any thing conſiderable, except in rainy ſeaſons. 6. In Peru, Sumatra, Cuba, Hiſpaniola, and Guinea. Laſtly there are ſeveral brooks in the countries about the alps, eſpecially Tirol, out of the ſediment of whoſe waters gold is drawn, though there be no grains conſpicuous therein. Add to this, that the Rhine alſo, in many places, affords a golden mud.

As to *rivers* that bring grains or particles of ſilver, iron, copper, lead, &c. we find no mention of them in authors, though, doubtleſs, there are great numbers of each ; and many of the medicinal effects of mineral waters are, doubtleſs, owing to particles of theſe kinds.

We muſt not here omit a water in Germany, which is ordinarily ſuppoſed to change iron into copper. The truth is, there is no real converſion of the metal ; all that is done is, that the cuprine and vitriolic particles in the water corrode the iron ; and, detaching parts thereof by means of the motion of the water, coppery particles ſucceed in their room.

From this variety in the mixture of *river*-water reſult various qualities, different ſpecific gravities, different colours, &c.

Some *rivers*, at certain ſeaſons of the year, ſwell ſo as to overflow their banks, and drown the neighbouring lands. Of theſe the moſt eminent is the Nile, which riſes ſo as to cover all Egypt, except the hills. The inundation begins about the ſeventeenth day of June, and increaſes for the ſpace of forty days, and decreaſes for as many; during which period, the cities of Egypt, which are all built on hills, appear as ſo many iſlands.

To theſe inundations Egypt owes all its fertility; the heavens there affording no rain, or at leaſt none in any reſpect conſiderable. Hence, as the inundation is great or ſmall, Egypt, for that year, is fruitful or barren.

The ancient Greeks, &c. were miſtaken as to the cauſe of this inundation, nobody, in thoſe days, having travelled up to the ſource of the river; but the modern Engliſh and Portugueſe traders into Congo, Angola, Monomotapa, &c. have let us into the ſecret. From them we learn, that the ſpring or ſource, of the Nile, is in a large lake called Zaire, round which are a great number of huge mountains, called the Mountains of the Moon. Now, as theſe lie in the ſouthern hemiſphere, their winter will be at the time of our ſummer; but on account of their nearneſs to the equator (being only 10° diſtant from it), they never feel any notable cold: hence it is, that inſtead of ſnow in the winter, they have rain every day at leaſt two hours before, and two hours after noon. In effect, the tops of theſe mountains are always covered with clouds; and the rains are, at the proper ſeaſon, almoſt continual. Hence torrents are conſtantly guſhing down from the mountains, all ending in the lake of Zaire; whence they flow into the channel of the Nile, and other *rivers* ariſing from the ſame lake; as the Cuamar, the Zaire, &c. and hence the inundation of the Nile. See NILOMETER.

The other *rivers*, which have any notable ſtated inundations, are the Niger Gambia, which overflows at the ſame time with the Nile. Leo Africanus ſays, it begins on the fifteenth day of June, increaſes for forty days, and decreaſes as long. The Zaire, a *river* of Congo, proceeding from the ſame lake with the Nile, and therefore affected in the ſame manner; the Rio de la Plata, in Braſil, which, Maffeus obſerves, overflows at the ſame time with the Nile; the Ganges; and the Indus; both which laſt overflow June, July, and Auguſt; at which times the natives ſave great quantites of the water in ponds, to ſerve them the reſt of the year; ſeveral *rivers* flowing out of the lake Chiamay into the bay of Bengal, which overflow in September, October, and November: theſe all bring a very great fertility with them to the ground; the *river* Macoa, in Camboia; the *river* Parana, or Paranguaſa, which ſome will have to be the ſame with the Silver *river*; ſeveral *rivers* in Coromandelia, a part of India, which overflow in the rainy months, from the great quantity of water iſſuing from the mountain Gatis; the Euphrates, which overflows Meſopotamia certain days in the year; and, laſtly, the *river* Sus, in Numidia.

The *rivers* moſt celebrated for their length, breadth, ſwiftneſs of current, &c. are, the Nile, which runs almoſt in a ſtraight courſe two thouſand five hundred and twenty geographical miles; the Niger, which runs two thouſand four hundred miles; the Ganges, twelve hundred miles; the Ob, ſixteen hundred miles; the Jeniſcea in Aſia, about the ſame length with the Ob; the *river* Orellana, in America, ſixty miles broad at its mouth, and five thouſand miles long; the Rio de la Plata, eighty miles broad at the mouth; the Omarannan, another *river* of Braſil; and the great *river* of St. Laurence, near two thouſand five hundred miles long.

RIVER, in *Phyſics*, denotes a ſtream of water running by its own gravity, from the more elevated parts of the earth towards thoſe which are more depreſſed, in a natural bed or channel open above. Such as A E, *Tab.* VI. *Hydroſtatics*, *fig.* 60.

If this channel is artificial, it is called a canal; of which there are two kinds, viz. that whoſe channel is every where open, without ſluices, called an artificial *river*, and that whoſe water is kept up or let off by means of ſluices, which is properly a CANAL.

RIVERS, *laws of the motion of*. The modern philoſophers endeavour to reduce the motion and flux of *rivers* to preciſe laws; and, with this view, they have applied geometry and mechanics to this ſubject; ſo that the doctrine of *rivers* is become a part of the new philoſophy.

The Italian authors have diſtinguiſhed themſelves herein, and it is chiefly to them we are indebted for the improvement; particularly S. Guglielmini, who, in his treatiſe Della Natura de Fiumi, has abundance of new obſervations and diſcoveries relating to it.

Rivers, he obſerves, uſually have their ſources in mountains, or elevations of ground; and it is in their deſcent from theſe that they acquire the velocity, or acceleration, which maintains their future current. In proportion as they advance farther, this velocity diminiſhes, on account of the continual friction of the water againſt the bottom and ſides of the channel, of the various obſtacles they meet with in their progreſs, and of their arriving, at length, in plains, where the deſcent is leſs; and their inclination to the horizon, of conſequence, greater. Thus the Reno, a *river* of Italy, which gave occaſion, in ſome meaſure, to theſe ſpeculations, is found, near its mouth, to have ſcarce a deſcent of fifty-two ſeconds.

If the acquired velocity be quite ſpent, through the many obſtacles, ſo that the current becomes horizontal, there will then nothing remain to propagate the motion, and continue the ſtream, but the depth, or the perpendicular preſſure of the water, which is always proportional to the depth. And, happily for us, this reſource increaſes, as the occaſion for it increaſes; for, in proportion as the water loſes of the velocity acquired by the deſcent, it riſes and augments in depth.

It appears from the laws of motion pertaining to bodies moved on inclined planes, that when water flows freely upon an inclined bed, it acquires a velocity, which is always as the ſquare root of the quantity of declivity of the bed. But in an horizontal bed, opened by ſluices or otherwiſe, at one or both ends, the water flows out by its gravity alone; and the flowing is quicker or ſlower in a direct ratio of the reſpective heights of the water, by reaſon of the weight of the ſuperior waters upon the inferior. Hence it follows, firſt, that as much as the declivity of the bed or channel of a *river* is greater, ſo much alſo will the velocity of the flowing waters be proportionably increaſed.

Secondly, As much as the water in an horizontal bed is deeper, ſo much will the velocity of the current be increaſed; and this velocity will diminiſh in proportion to the decreaſing depths of the water in the bed.

Thirdly, Abſtracting from the reſiſtance cauſed by the bottom and ſides of the bed, as much nearer as the water is to the bottom, ſo much will its motion be accelerated; not only becauſe the inferior waters are more compreſſed by the ſuperior in proportion to their greater depth; but alſo becauſe the inferior ones have a greater declivity than the ſuperior, by reaſon of their greater depth in the bed, where they are more depreſſed with reſpect to the elevation of their common ſource or ſpring.

The upper parts of the water of a *river*, and thoſe at a diſtance from the banks, may continue to flow, from the ſingle cauſe, or principle, of declivity, how ſmall ſoever it be; for, not being detained by one obſtacle, the minuteſt difference of level will have its effect; but the lower parts, which roll along the bottom, will ſcarce be ſenſible of ſo ſmall a declivity; and will only have what motion they receive from the preſſion of the ſuperincumbent waters.

The natural viſcidity and coheſion of the particles of water, and that implication, as it were, which they ſeem to have with one another, make the lower, which are moved by means of the depth, carry along with them the upper, which in an horizontal channel, would have no motion at all: or, in a channel very little inclined, next to none; ſo that the lower, in this caſe, communicate to the upper a part of the motion they have received from the preſſure of it. Hence, from the preſſure, it frequently happens that the greateſt velocity of a *river* is about the middle of its depth, or that point which is the fartheſt poſſible from the ſurface of the water, and from the bottom and ſides of the bed; ſuch middle parts having the advantage of being preſſed with half the depth of the *river*, and of being free, at the ſame time, from the friction of the bottom; whereas, on the contrary, the leaſt velocity of the water is at the bottom and ſides of the bed, becauſe there the reſiſtance reſulting from friction is the greateſt, which is communicated to the other parts of the ſection of the *river*, in an inverſe duplicate proportion of the diſtances from the bottom and ſides combined together.

To find whether the water of a *river*, almoſt horizontal, flows by means of the velocity acquired in its deſcent, or by the preſſure of its depth, ſet up an obſtacle perpendicular to it; if the water riſe and ſwell immediately againſt ſuch obſtacle, it runs in virtue of its fall; or, if it ſtop a little while firſt, in virtue of its preſſion.

Rivers, according to this author, almoſt always make their own beds. If the bottom have originally been a large declivity, the water in conſequence hereof falling with a great deal of force, will have ſwept away the moſt elevated parts of the ſoil, and carrying them lower down, will gradually render the bottom horizontal; where the ſtream is ſwifteſt, there will the earth be moſt dug up; and, conſequently, there the greateſt cavity will be made.

The water having made its bed horizontal becomes ſo itſelf, and conſequently rakes with the leſs force againſt the bottom, till at length that force becomes only equal to the reſiſtance of the bottom. The bottom is now arrived at a ſtate of permanency, at leaſt for a conſiderable time; and the longer, according to the quality of the ſoil, clay and chalk reſiſting longer than ſand or mud.

On the other hand, the water is continually gnawing and eating off the brims of its channel, and this with the more force, as, by the direction of its ſtream, it impinges more perpendicularly againſt them. By this means it has a continual tendency to render them parallel to its own courſe; and when it has arrived as near that as poſſible, it ceaſes to have any effect that way. At the ſame time that it has thus rectified its edges, it has enlarged its own bed; that is, it has loſt of its depth, and conſequently of its force and preſſure: this it continues to do till there is an equilibrium between the force of the water and the reſiſtance of its banks, upon which they will remain without farther mutation. And it is evident, from experience, that theſe equilibriums are all real, inaſmuch as we find that *rivers* only dig and widen to a certain pitch.

The very reverſe of all theſe things does alſo on ſome occaſions happen. *Rivers*, whoſe waters are thick and muddy, raiſe their bed, by letting part of the heterogeneous matters contained in them fall to the bottom: they alſo contract their banks, by a continual appoſition of the ſame matter, in bruſhing over them. This matter, being thrown aſide far from the ſtream of water, might even ſerve, by reaſon of the obſcureneſs of the motion, to form new banks.

Now theſe oppoſite effects ſeem almoſt always to concur, and are differently combined, according to the circumſtances, whence it is very difficult to judge of the reſult; yet muſt this combination be known very accurately, before any meaſures can be taken about *rivers*, eſpecially as to the diverting of their courſes. The Lamona, which emptied itſelf into the Po, being turned another way, to make it diſcharge itſelf into the Adriatic, was ſo altered, and its force ſo far diminiſhed, now that its waters were left to themſelves, that it raiſed its bed a great height, by continual depoſitions of mud, till it became much higher than the Po in its utmoſt accretions, and needed very high banks, or dykes, to keep it from overflowing.

If various cauſes of reſiſtance to the motion of flowing waters did not exiſt, ſuch as the attraction and continual friction of the bottom and ſides, the inequalities in both, the windings and angles that occur in their courſe, and the diminution of their declivity the farther they recede from their ſprings, the velocity of their currents would be accelerated to twelve, fifteen, and, in ſome caſes, even to twenty times more than it is at preſent in the ſame *rivers*, whereby they would become abſolutely unnavigable.

A little *river* may be received into a large one, without either augmenting its width or depth. This ſeeming paradox ariſes hence, that the addition of the little *river* may only go towards moving the waters, before at reſt near the banks of the large one, and thus augmenting the velocity of the ſtream, in the ſame proportion as it does that of the quantity of water. Thus the Venetian branch of the Po ſwallowed up the Farrareſe branch, and that of Panaro, without any inlargement of its own dimenſions. And the ſame may be concluded proportionally of all other acceſſions to *rivers*, and, in the general, of all new augmentations of water.

A *river* offering to enter into another, either perpendicularly or in an oppoſite direction, will be diverted by degrees from that direction, and obliged to make itſelf a new and more favourable bed towards the mouth.

The union of two *rivers* into one makes the whole flow the ſwifter, becauſe, in lieu of the friction of four ſhores, they have only two to ſurmount; and that the ſtream, being farther diſtant from the banks, goes on with the leſs interruption; beſides, that a greater quantity of water, moving with a greater velocity, digs deeper in the bed, and of courſe retrenches of its former width. Hence alſo it is that *rivers*, by being united, take up leſs ſpace on the ſurface of the earth, and are more advantageous to low grounds, which diſcharge their ſuperfluous moiſture into them, and have likewiſe leſs occaſion for dykes to prevent their overflowing.

Theſe advantages are ſo conſiderable, that S. Guglielmini thinks them worthy of nature's having had a view to them in her contriving to make the confluences of *rivers* ſo frequent as we find them.

To determine more preciſely the general laws of the motion of rivers, it may be obſerved, 1. That a *river* is ſaid to remain in the *ſame ſtate*, or to be in a *permanent ſtate*, when it flows uniformly, ſo as to be always at the ſame height in the ſame place. 2. That a plane, which, cutting a *river*, is perpendicular to the bottom, and to the direction of the ſtream of water, and whoſe limits are thoſe of the water itſelf, which runs off in that place, as *p o n q*, is called the *ſection of a river*. See *Tab. Hydroſtat. fig.* 60.

Hence, when a *river* is terminated by flat ſides, parallel to each other, and perpendicular to the horizon, and the bottom alſo is a plane, either horizontal or inclined, the ſection of the *river* with theſe three planes makes right angles, and is a parallelogram.

Now, in every *river* that is in a permanent ſtate, the ſame quantity of water flows in the ſame time through every ſection; for, unleſs there be in every place as great a ſupply of water, as what runs from it, the *river* will not remain in the ſame ſtate. This will hold good, whatever be the irregularity of the bed, or channel; from which, in other reſpects, ſeveral changes in the motion of the *river* may ariſe; for example, a greater friction, in proportion to the inequality of the channel. Hence it appears, that where the ſection of the *river* is greater, the velocity of the flowing water is leſs; and where the ſection is leſs, the velocity is greater; and, conſequently, the ſections of the bed, the mean velocities, the times of flowing, and the quantity which flows, are univerſally in a combined ratio together; and this combination is called the *momentum* of *a river*, which momentum of the ſame flowing water is univerſally equal. Hence may be deduced the principles for calculating the quantity of diminution of the water in a lake, pond, or veſſel, by any determinate flowings whatſoever; for as the ſurface of the lake, &c. is to the ſection of the current which carries off the waters, ſo is the mean velocity of the current in this ſection to the decreaſe of waters in the lake, &c. and *vice verſa*.

The irregularities in the motion of a *river* may be infinitely varied, nor can any rules be given to ſettle them. To aſcertain their general courſe, all irregularities muſt be ſet aſide, only the general tenor, or flux, be conſidered.

Suppoſe then the water to run in a regular channel, without any ſenſible friction, and that the channel is terminated with plane ſides, parallel to one another, and vertical; and alſo, that the bottom is a plane, and inclined to the horizon. Let AE be the channel into which the water runs from a greater receptacle or head, and let the water always remain of the ſame depth at the head, ſo that the *river* may be in a permanent ſtate; the water here deſcends along an inclined plane, and is accelerated; whereby, becauſe the ſame quantity of water flows through every ſection, the depth of the water, as you recede from the head of the *river*, is continually diminiſhed, and its ſurface will acquire the figure *i q s*.

To determine the velocity of the water in different places, ſuppoſe the aperture of the channel ADCB to be ſhut up with a plane; if there be a hole made in the plane, water will ſpout the faſter through the hole, as the hole is more diſtant from the ſurface of the water *b i*; and the water will have the ſame celerity that a body falling from the ſurface of the water to the depth of the hole below it would acquire; all which regularly ariſes from the preſſure of the ſuperincumbent water. There is the ſame preſſure, that is, the ſame moving force, when the obſtacle at AC is taken away, upon which every particle of water enters into the channel with the celerity a body would acquire in falling from the ſurface of the water to the depth of the particle. This particle is moved along in an inclined plane in the channel, with an accelerated motion; and that in the ſame manner as if falling vertically, it had continued its motion to the ſame depth below the ſurface of the water in the head of the *river*.

So if you draw the horizontal line *i t*, the particle at *r* will have the ſame celerity as a body falling the length *i* C, and running down C *r*, can acquire; which is the celerity acquired by the body in falling down *t r*. Therefore the celerity of a particle may be every where meaſured, by drawing from it a perpendicular to the horizontal plane, which is conceived to run along the ſurface of the water in the head of the *river*: and the velocity which a body acquires in falling down that perpendicular, will be the celerity of the particle; which is greater the longer the perpendicular is. From any point, as *r*, draw *r s* perpendicular to the bottom of the *river*: this will meaſure the height or depth of the *river*. Since *r s* is inclined to the horizon, if from the ſeveral points of that line you draw perpendiculars to *i t*, they will be ſhorter, the more diſtant they are from *r*, and the ſhorteſt of them will alſo be *s v*; therefore the celerities of the particles in the line *r s* are ſo much the leſs, the nearer they are to the ſurface of the *river*, and the lower water is moved faſter than the upper water.

Yet the celerities of thoſe waters, as the *river* runs on, continually approach nearer and nearer to an equality; for the ſquares of thoſe celerities are as *r t* to *s v*, the difference of which lines, as you recede from the head of the *river*, is continually leſſened, becauſe of the depth $r s$, which is alſo continually diminiſhed, as the lines themſelves are lengthened. Now, as this obtains in the ſquares, it will much more obtain in the celerities themſelves; whoſe difference, therefore, is diminiſhed as they increaſe.

If the inclination of the bottom be changed up to the head of the *river*, ſo as to become $y Z$, and a greater quantity of water flow into the channel, it will be deeper every where in the *river*, but the celerity of the water will not be changed. For this celerity does not depend on the depth of the water in the *river*, but on the diſtance of the moved particle from the horizontal plane of the ſurface at the head continued over the ſaid particle, which diſtance is meaſured by the perpendicular $r t$, or $s v$; but theſe lines are not changed by the afflux of water, provided the water remain at the ſame height in the baſon or head.

Suppoſe the upper part of the channel ſtopped by an obſtacle, as X, which deſcends a little way below the ſurface of the water; here the whole water which comes cannot run through, therefore it muſt riſe; but the celerity of the water below this cataract is not increaſed; and the water that comes on is continually heaped up, ſo that at laſt it muſt riſe ſo as to flow over the obſtacle, or the banks of the *river*. If the banks be raiſed, and the obſtacle be continued, the height of the water would riſe above the line $i t$: but, before that, the celerity of the water cannot be increaſed; in which caſe the height of all the water in the head will be increaſed; for, as we ſuppoſe the river in a permanent ſtate, there muſt continually be as great a ſupply of water to the head as there runs from it down the channel; but if leſs water runs down, the height muſt neceſſarily be increaſed in the head till the celerity of the water, flowing under the obſtacle, be increaſed to ſuch degree, that the ſame quantity of water ſhall run under the obſtacle, as uſed to run in the open channel before.

The beſt and moſt ſimple method of meaſuring the velocity of the current of a *river* or canal, is the following. Take a cylindrical piece of dry, light wood, and of a length ſomething leſs than the depth of the water in the *river*; round one end of it, let there be ſuſpended as many ſmall weights as may be neceſſary to keep up the cylinder in a perpendicular ſituation in the water, and in ſuch a manner that the other end of it may juſt appear above the ſurface of the water. Fix to the centre of that end which appears above water, a ſmall and ſtraight rod, preciſely in the direction of the cylinder's axis; to the end, that when the inſtrument is ſuſpended in the water, the deviations of the rod from a perpendicularity to the ſurface of it, may indicate which end of the cylinder advances the faſteſt, whereby may be diſcovered the different velocities of the water at different depths; for if the rod inclines forwards, according to the direction of the current, it is a proof that the ſurface of the water has the greateſt velocity; but if it inclines back, it ſhews that the ſwifteſt current is at the bottom; if it remains perpendicular, it is a ſign that the velocities at the ſurface and bottom are equal.

This inſtrument being placed in the current of a *river* or canal, receives all the percuſſions of the water throughout the whole depth, and will have an equal velocity with that of the whole current *from the ſurface to the bottom* at the place where it is put in, and by that means may be found, both with eaſe and exactneſs, the mean velocity of that part of the *river* for any determinate diſtance and time.

But to obtain the mean velocity of the whole ſection of the *river*, the inſtrument muſt be put ſucceſſively both in the middle and towards the ſides, becauſe the velocities at thoſe places are often very different from each other. Having by this means found the *difference of time required for the currents to run over an equal ſpace*; or, *the different diſtances run over in equal times, the mean proportional* of all theſe trials, which is found by dividing the common ſum of them all by the number of trials, *will be the mean velocity of the* river *or canal.*

If it be required to find the velocity of the current only at the ſurface, or at the middle, or at the bottom, a ſphere of wood, of ſuch a weight as will remain ſuſpended in equilibrium with the water, at the ſurface or depth which we want to meaſure, will be better for the purpoſe than a cylinder, becauſe it is only affected by the water of that ſole part of the current where it remains ſuſpended.

It is very eaſy to guide both the cylinder and the globe in that part which we want to meaſure, by means of two threads or ſmall chords, which two perſons muſt hold and direct, one on each ſide the *river*; taking care at the ſame time neither to retard nor accelerate the motion of the inſtrument.

It follows from what has been ſaid in the preceding part of this article, that the deeper the waters are in their bed in proportion to its breadth, the more their motion is accelerated; ſo that their velocity increaſes in an inverſe ratio of the breadth of the bed, and alſo of the magnitude of the ſection; whence, in order to augment the velocity of water in a *river* or canal, without augmenting the declivity of the bed, we muſt increaſe the depth and diminiſh the breadth of its bed; but to diminiſh the velocity of water in a *river* or canal, we muſt, on the contrary, increaſe the breadth and diminiſh the depth of its bed. Theſe principles are conſonant to obſervation; and it is well known, that the velocity of flowing waters depends much more on the quantity and depth of the water, and on the compreſſion of the upper parts on the lower, than on the declivity of the bed; and, therefore, the declivity of a *river* muſt be made much greater in the beginning than toward the end of its courſe; where it ſhould be almoſt inſenſible. If the depth or volume of water in a *river* or canal is conſiderable, it will ſuffice, in the part next the mouth, to allow one foot perpendicular of declivity through ſix, eight, or even, according to Dechales (De Fontibus & Fluviis, prop. 49.) ten thouſand feet in horizontal extent; at moſt it muſt not be above one in ſix or ſeven thouſand. From hence the quantity of declivity in equal ſpaces muſt ſlowly and gradually increaſe as far as the current is to be made fit for navigation; but in ſuch a manner, as that at this upper end there may not be above one foot of perpendicular declivity in four thouſand feet of horizontal extent.

We ſhall cloſe this article with a remark of M. de Buffon, who ſays, that people accuſtomed to *rivers* can eaſily foretell when there is going to be a ſudden increaſe of water in the bed from floods produced by ſudden falls of rain in the higher countries through which the *rivers* paſs. This they perceive by a particular motion in the water, which they expreſs by ſaying, that the *river's* bottom moves; that is, the water at the bottom of a channel runs off faſter than uſual; and this increaſe of motion at the bottom of a *river* always announces a ſudden increaſe of water coming down the ſtream. Nor, ſays he, is their opinion ill-grounded; becauſe the motion and weight of the waters coming down, though not yet arrived, muſt act upon the waters in the lower parts of the *river*, and communicate by impulſation part of their motion to them, within a certain diſtance.

See on the ſubject of this article an elaborate treatiſe on *rivers* and canals by Mr. Mann, who has availed himſelf of the obſervations of Guglielmini, and moſt other writers, in Phil. Tranſ. vol. lxix. part ii. art. 37, p. 555, &c.

RIVER, *New*. See CANAL, and COMPANY.

By the ſtatute of Weſtm. 2. cap. 47. the king may grant commiſſions for perſons to take care of *rivers*, and the fiſhery therein; and the lord mayor of London is to have the conſervation in breaches and ground overflown as far as the water ebbs and flows in the *river* Thames. 4. Hen. VII. cap. 15. Perſons annoying the *river* Thames, making ſhelves there, caſting dung therein, or taking away ſtakes, boards, timber work, &c. of the banks, incur a forfeiture of 5*l.* ſtat. 27 Hen. VIII. cap. 18. Commiſſioners were appointed to prevent exactions of the occupiers of locks, wears, &c. upon the *river* Thames, weſtward from the city of London, to Cricklade in the county of Wilts, and for aſcertaining the rates of water-carriages on the ſaid *river*, by ſtat. 6 & 7 W. III. and this ſtatute is revived with authority for the commiſſioners to make orders and conſtitutions to be obſerved, under penalties, &c. 3 Geo. II. cap. 11.

By ſtatutes 6 Geo. II. cap. 37. 8 Geo. II. cap 20. and 10 Geo. II. cap. 32. it is made felony, without benefit of clergy, maliciouſly to cut down any *river* or ſea-bank, whereby lands may be deſtroyed, and to deſtroy ſluices or locks upon navigable *rivers*. See NUSANCE.

RIVER *horſe*, in *Zoology*. See HIPPOPOTAMUS.

RIVET, in the *Manege*, is the extremity of the nail that reſts or leans upon the horn when you ſhoe a horſe.

RIVINA, in *Botany*. Its characters are theſe: the empalement of the flower is permanent, compoſed of four oval, concave, coloured leaves; the flower has no petals; it has eight ſtamina, which are longer than the empalement, terminated by ſmall oval ſummits, and a large roundiſh germen, ſupporting a ſhort ſtyle, crowned by an obtuſe ſtigma; the germen afterward turns to a roundiſh berry, ſitting in the empalement, including one hard ſeed. There are two ſpecies, natives of the Weſt Indies. Miller.

In the Linnæan ſyſtem this is a genus of the *tetrandria monogynia* claſs, with a permanent corolla, and compoſed of four petals, no calyx, the fruit a ſingle-ſeeded berry; and he enumerates four ſpecies. But Miller ſays, that this genus is totally different from the plants to which

Plumier applied the title *Rivina*, in honour of the celebrated botaniſt Rivinus.

RIVOLGIMENTO, in the Italian *Muſic*, is the placing a treble or upper part in the place of the baſs, or any low part, or *vice verſa*. This often happens in double counterpoint, where the treble ſerves for the baſs, or the baſs for the treble; and that in ſuch a manner, that the harmony, though different, remains as correct after this change, as it was in the natural order of the parts.

RIVULET, a diminutive of RIVER.

RIXDOLLAR, or RIXDALLER, a ſilver coin, ſtruck in ſeveral ſtates and free cities in Germany, as alſo in Flanders, Poland, Denmark, Sweden, &c.

There is but little difference between the *rixdollar* and the *dollar*, another ſilver coin ſtruck in Germany, each being nearly equal to the French crown of three livres, or the Spaniſh piece of eight, or 4*s*. 6*d*. ſterling.

The *rixdollar* is one of the moſt current and univerſal coins in the world. It is uſed equally in the commerce of the Levant, the North, Muſcovy, and the Eaſt Indies. See COIN.

RIZIUM, in *Botany*, a name given by the ancients to a peculiar kind of red root brought from Syria, and uſed by the Grecian women to paint their cheeks red.

The Latin writers, who have mentioned this, have called it *radicula*; and Pliny, who has more than once mentioned it, calls it *herba lanaria*, or *radix lanaria*. This, however, is a very great error, confounding it with the *ſtruthium* of the Greeks. It is probable, that the *rizium* was no other than the ANCHUSA, or *alkanet root*, which grows very plentifully in the countries from whence the Greeks had their *rizium*, and which will anſwer all the purpoſes for which they uſed it.

ROACH, in *Ichthyology*, the Engliſh name of a well known fiſh, called by the generality of authors the *rutilus* and *rubiculus*, by ſome the *rubellio*. It is a ſpecies of the *cyprinus*, according to the new ſyſtem of Artedi, and the *cyprinus rutilus* of Linnæus. It has been deemed, though without much reaſon, remarkable for its livelineſs and vivacity; whence the proverb, *ſound as a roach*.

In ſome parts of the world this fiſh will only live in ſtanding waters; with us it equally thrives in ponds and in deep ſtill rivers, and is remarkable for its numerous progeny; a pond being much ſooner ſtocked with this than with any other fiſh.

ROACH *fiſhing*. See FISHING.

ROACHING *of alum*, one of the laſt proceſſes uſed in the *alum* making, and is what renders it fit for the market.

After the *alum* liquor has been left four days in the cooler, and is ſufficiently ſhot, they drain it out; and taking out the *alum*, they waſh it in a ciſtern of *alum* water ſo ſtrong, that it can ſcarce take up any more of that ſalt, but only cleanſes it of its accidental foulneſſes. After this waſhing the *alum* is put into large pans, and a quantity of water added to it. It is ſet over the fire to melt in this water and boil a little; then it is ſcooped into a great caſk, where it is ſuffered to ſtand about ten days; and it is then fit for the market under the name of *roach alum*, or *roached alum*; the liquor let out of the cooler is boiled up again, and ſhoots more *alum*. See ALUM.

ROAD, *via*, an open way or paſſage, forming a commodious communication between one place and another.

The Romans, of all people, took the moſt pains in their *roads*; the labour and expence they were at to render them ſpacious, ſtraight, ſmooth, and agreeable, to the very extremities of their empire, are incredible.

Uſually, they ſtrengthened the ground by ramming it, laying it with flints, pebbles, or ſand; ſometimes by a lining of maſonry, rubbiſh, bricks, potſhreds, &c. bound together with mortar.

F. Meneſtrier obſerves, that in ſome places in the Lyonnois he has found huge cluſters of flints cemented with lime, reaching ten or twelve feet deep, and making a maſs as hard and compact as marble itſelf; and which, after reſiſting the injuries of time for ſixteen hundred years, is ſtill ſcarce penetrable by all the force of hammers, mattocks, &c. and yet the flints it conſiſts of, are not bigger than eggs.

Sometimes they even paved their *roads*, regularly, with large ſquare free-ſtones: ſuch are the Appian and Flaminian ways, &c.

The *roads* paved of very hard ſtones, they uſually called *viæ ferreæ*, either becauſe they reſembled iron, or becauſe they reſiſted the iron of the horſes feet, chariots, &c.

Roads are either *natural* or *artificial*, *terreſtrial*, or *aquatic*, *public* or *private*.

ROAD, *natural*, is that which has been frequented for a long ſucceſſion of time, and ſubſiſts with little expence by reaſon of its diſpoſition, &c.

ROAD, *artificial*, is that made by labour of the hand, either of earth or maſonry; and, in the making whereof, ſeveral difficulties were to be ſurmounted; ſuch are moſt of thoſe along the banks of rivers, and through marſhes, lakes, &c.

ROADS, *terreſtrial* or *land*, are not only thoſe made upon the ground, but alſo thoſe formed of earth heaped up in manner of a bank, and ſuſtained by ſpurs, buttreſſes, and counterforts.

ROAD, *aquatic*, is a *road* made in the waters, whether current, as thoſe of rivers, &c. or ſtagnant, as banks and cauſeways, or over moraſſes, &c.

Under this denomination are alſo comprehended navigable rivers, and artificial canals. See CANAL.

ROAD, *public*, or *grand road*, is any common *road*, whether ſtraight or acroſs, military or royal, &c. *Private road* is that made for the convenience of ſome particular houſe, &c. See HIGHWAY.

ROADS, *military*, ſo called among the Romans, were grand *roads* appointed for the marching of their armies into the provinces of the empire, for the aſſiſtance of their allies, &c.

The principal of theſe *roads*, in England, are Watling-ſtreet, Ikenild-ſtreet, Foſs-way, and Erminage-ſtreet. See WAY.

ROADS, *double*, among the Romans, were *roads* for carriages, having two pavements or cauſeways, the one for thoſe going one way; the other, for thoſe returning the other, to prevent claſhing, ſtopping, and confuſion.

Theſe two ways were ſeparated from each other by a bank raiſed in the middle, paved with bricks, for the convenience of foot people, with borders and mounting ſtones from ſpace to ſpace, and military columns to mark the diſtance. Such was the *road* from Rome to Oſtia, called *Via Portuenſis*.

ROAD, *ſubterraneous*, is that dug in a rock with a chiſſel, and left vaulted. Such is that of Puzzuoli, near Naples, which is near half a league long; and is fifteen feet broad, and as many high.

Strabo ſays, it was made by one Cocceius, a relation probably of Nerva; but it has ſince been widened by Alphonſus, king of Arragon and Naples, and made ſtraight by the viceroys. There is another of the ſame kind in the ſame kingdom, between Baiæ and Cumæ, called, the Grotto of Virgil, becauſe mentioned by that poet in the ſixth book of his Æneid.

ROAD, in *Navigation*, denotes a place of anchorage at ſome diſtance from ſhore, and ſheltered from the winds, where veſſels uſually moor to wait for a wind or tide proper to carry them into harbour, or to ſet ſail.

When the bottom is clear of rocks, and the hold firm, and the place well covered from the wind, the *road* is ſaid to be good. An open *road* is one which has but little land on any ſide.

The *roads* within his majeſty's dominions, are free to all merchant veſſels, either of his ſubjects or allies. Captains and maſters of ſhips who are forced by ſtorms, &c. to cut their cables, and leave their anchors in the *roads*, are obliged to fix up marks or buoys, on pain of forfeiture of their anchors, &c.

The maſters of ſhips, coming to moor in a *road*, muſt caſt anchor at ſuch diſtance as that the cables, &c. may not mix, on pain of anſwering the damages. When there are ſeveral veſſels in the ſame *road*, the outermoſt to the ſeaward is obliged to keep a light in his lantern in the night-time, to appriſe veſſels coming in from ſea. See PORT.

ROAD, *cock*. See COCK-*road*.

ROAD-*gooſe*, in *Zoology*, the name of a ſmall ſpecies of wild gooſe. See GOOSE.

ROADER, among *Sailors*, a ſhip that rides at anchor in a road.

ROAN, in the *Manege*. A *roan* horſe is one of a bay, ſorrel or black colour, with grey or white ſpots interſperſed very thick: when this party-coloured coat is accompanied with a black head and black extremities, he is called a *roan* with a black-a-moor's head. And if the ſame mixture is predominant upon a deep ſorrel, it is called claret-*roan*.

ROANE-*tree*, in *Botany*. See SERVICE-*tree*.

ROASTING *of meat*. See DRESSING *of meats*.

ROASTING, in *Metallurgy*, is the ſeparation of volatile bodies, from thoſe which are more fixed by the combined action of air and fire; and is generally the firſt proceſs in the ſeparation of metals from their ores; it differs from ſublimation only in this, that in this operation the volatile parts are diſſipated, when reſolved into vapours; whereas in that they are preſerved.

Sulphur and arſenic are in this manner collected and preſerved in the *roaſting* of many ores; and ſublimation made, as it were, occaſionally in the proceſs.

The ſeparation of the volatile parts of bodies from the more fixed, is, however, in many caſes very difficult, and much nicety is required in the conducting this operation;

ration: this is the caſe, for inſtance, when the whole compound body melts in almoſt the ſame degree of fire that is neceſſary to raiſe, and diſſipate the volatile parts in the air; in ſuch caſes, care muſt be taken, firſt previouſly to pound a little the body to be *roaſted*, that its ſurface contiguous to the air may be increaſed in extent. A gentle fire is alſo neceſſary on ſuch occaſions, and a very free acceſs of the air, which is the vehicle of theſe vapours. When the body in the *roaſting* grows on theſe occaſions into large lumps or clods, the ſurface of it muſt be reſtored to the neceſſary extent, by repeated poundings; for it is neceſſary above all things, that the matter be kept extended and recent, and never collected into a heap.

Bodies the moſt refractory in the fire, are always the moſt eaſily *roaſted*; for a great fire may be conſequently kept up to ſuch, nor need the operation be repeated ſo often. Care muſt always be taken, however, that while the volatile bodies are diſſipating in the fire, they do not carry up with them ſomething from the fixed ones alſo; for this is a diſadvantegeous accident, and too often happens, eſpecially when a fire too violent is uſed in the beginning of the operation; to prevent this, it is ſometimes neceſſary to add ſome fixing body to the maſs. Cramer's Art. of Aſſaying, p. 189.

The buſineſs of *roaſting* ores, as now uſually practiſed, is ſubject to many inconveniencies, which may be moſt of them eaſily remedied, and the whole buſineſs reduced to a few eaſy rules. 1. The *roaſting* of ores ſhould be always performed without addition, when the ores are rich, or of themſelves merely of a metallic nature. But the additions of quick lime, pot-aſhes, iron-filings, and the like, are neceſſary, when arſenical, antimonial, and ſulphureous matters, are found to be mixed with the ores. 2. The fire is to be ſo regulated from the firſt, that only the lighter or more volatile ſulphureous or arſenic fumes may fly off, otherwiſe the more metallic part would likewiſe go, and without ſome contrivance to catch it, would be loſt. The ore muſt, however, always feel the force of an open flame, otherwiſe the ſulphur, arſenic, &c. will never be thoroughly diſlodged. 3. The more theſe immature ſubſtances abound in ore, the gentler the fire ſhould be at firſt; and when the greater part of the ſulphureous matter is thus exhaled, the fire is then to be quickened. 4. Where ſuch additions are uſed as are not metalline, as lime, mud, pot-aſh, &c. they ought always to be ſeparated afterwards from the matter before the fuſion, by waſhing. Shaw's Lectures, p. 251. See IRON and SMELTING.

ROB, in *Pharmacy*, the inſpiſſated juice of any ſubſtance, uſually boiled up to the conſiſtence of honey.

There are *robs* made of quinces, ſloes, cherries, mulberries, elderberries, barberries, gooſberries, and other fruits, for various diſeaſes. The juice of grapes, thus prepared, is more particularly called *rob*, or *ſapa ſimplex*; this is almoſt of the conſiſtence of honey.

When only one third of the humidity is boiled away, it is called *defrutum*; and when only boiled to the conſiſtence of a ſoft electary, a *reſin*.

The word *rob* is pure Arabic; and ſignifies originally a juice dried in the ſun, or over the fire, that it may keep the longer without damage.

Sometimes it alſo denotes a compoſition of ſome juice made up with honey or ſugar, in which ſenſe it is confounded with loche or lohoe.

The *rob* is a form now much out of uſe, though there are ſeveral directed in the college diſpenſatory; as *robs* of black cherries, of ſloes, of quinces, &c. The *rob* of elder is now moſt uſed.

It is poſſible that great improvements might be made, by introducing the uſe of this form among the malt-diſtillers. The great inconvenience attending that art being, that the malt being of a large bulk, in proportion to its ſaccharine part, and requiring a larger proportion of water to extract that ſaccharine part, many large veſſels, ſuch as maſh-tubs, coolers, fermenting backs, &c. are neceſſary; and the neceſſary labour on the ſubject is increaſed, and the commodity rendered dearer. The remedy of this ſhould ſeem the introducing a new art ſubſervient to that of the malt diſtiller, and confining itſelf to the boiling down of malt-wort to a *rob*, ſo as to ſupply the malt-ſtiller with his ſubject, in the ſame manner as the fine-ſtillers are ſupplied with treacle from the ſugar-baker. By this means the buſineſs of the malt-ſtiller would be reduced to a great degree of ſimplicity, and the ſpirit produced would be alſo much finer than at preſent, becauſe the ſubject would come tolerably refined to his hands, and purged of its groſs, mealy, and huſky matter, which yields a diſagreeable oil in diſtillation, and is alſo apt to burn to the ſtill, and ſpoil the ſpirit. It is poſſible that a ſpirit purer and finer than that from treacle might this way be procured from malt prudently managed. Shaw's Lect. p. 219.

ROBALO, in *Ichthyology*, a name by which ſome have called the CAMURI.

ROBBERY, ROBBERIA, or ROBERIA, in *Law*, a felonious and forcible taking away another man's goods or money, from his perſon, preſence, or eſtate, by putting him in fear, &c.

A mere attempt to rob was held to be felony, ſo late as Henry the Fourth's time; and afterwards it was only a miſdemeanor, and puniſhable with fine and impriſonment, till the ſtat. 7 Geo. II. cap. 21. which makes it a felony tranſportable for ſeven years. If the thief, having once taken a purſe, returns it, ſtill it is a *robbery*. The previous putting in fear is the criterion that diſtinguiſhes *robbery* from other *larcenies*; and yet this putting in fear does not imply any great degree of terror or affright in the party robbed; it is ſufficient, that ſo much force, or threatening by word or geſture, be uſed, as might create an apprehenſion of danger, or oblige a man to part with his property without or againſt his conſent.

This is ſometimes alſo called *violent theft*, and its puniſhment, be the value of the thing taken ever ſo ſmall, is death.

This ſpecies of LARCENY is debarred of the benefit of clergy by 23 Hen. VIII. cap. 1. and other ſubſequent ſtatutes; not indeed in general, but only when committed in or near the king's highway. A *robbery*, therefore, in a diſtant field or foot-path was not puniſhed with death, but was open to the benefit of clergy, till the ſtat. 3 and 4 W. and M. cap. 9. which takes away clergy from *robbery* wherefoever committed.

The word is ſaid to have taken its riſe hence, that anciently, *robbers* only took away the *robes* or cloaths from travellers. Though lord Coke, in the third of his inſtitutes, takes the name to have had its riſe from Robin Hood, who lived under Richard I. in the borders of England and Scotland, by *robbery*, burning houſes, rape, and ſpoil. Hence, alſo,

Robers-men, or *roberds-men*, mentioned in ſeveral ſtatutes for great thieves.

ROBBING. See HOUSE-*robbing*.

ROBBINS, or ROBANDS, i. e. *rope-bands*, in a *Ship*, ſmall lines, or braided cordage, which make the upper edges of the great ſails faſt to their reſpective yards, being reeved into eyelet-holes in the head of the ſail under the head-rope for that purpoſe. They are generally of a ſufficient length to paſs two or three times about the ſaid yard. The word is, *make faſt the robbins*; for at ſea they do not ſay *tie*, but *make faſt*.

ROBE, *roba*. See GOWN.

ROBES, *maſter of the*, is an officer of the houſhold, with an appointment of 500*l.* a year, who has the ordering of all his majeſty's *robes*. See MASTER *of the wardrobe*.

He has ſeveral officers under him, as a clerk of the *robes*, a yeoman, three grooms, a page, a bruſher, furrier, ſempſtreſs, laundreſs, ſtarcher, and ſtanding wardrobe keepers at St. James's, Windſor-caſtle, Hampton-court, &c. There is alſo in the eſtabliſhment of his majeſty's houſhold a miſtreſs of the *robes*, with an appointment of 500*l.* a-year, and two keepers of the *robes*. See WARDROBE.

ROBERDSMEN. See ROBBERY.

ROBERT, *herb*, in *Botany*. See GERANIUM.

ROBERVALLIAN *lines*, a name given to certain lines, uſed for the transformation of figures: thus called from their inventor M. de Roberval.

Theſe lines bound ſpaces infinitely extended in length, which are nevertheleſs equal to other ſpaces terminated on all ſides.

The abbot Gallois, in the Memoirs of the Royal Academy, Anno 1693, obſerves, that the method of transforming figures, explained at the latter end of M. de Roberval's Treatiſe of Indiviſibles, is the ſame with that ſince publiſhed by Mr. James Gregory, in his Univerſal Geometry, and afterwards by Barrow in his Lectiones Geometricæ; and that, by a letter of Torricelli, it appears, that Roberval was the inventor of this manner of transforming figures, by means of certain lines, which Torricelli therefore called *Robervallian lines*.

He adds, that it is highly probable, that J. Gregory firſt learned the method in the journey he made to Padua in 1668, the method itſelf having been known in Italy from the year 1646, though the book was not publiſhed till the year 1692.

This account Dr. David Gregory has endeavoured to refute, in vindication of his brother. His anſwer is inſerted in the Phil. Tranſact. an. 1694, and the abbot has rejoined in the French Memoirs of the Academy, an. 1703.

ROBIA *herba*, in *Botany*, a name given by Paulus Ægineta, and many others, to a plant uſed in dying.

The near reſemblance of the name to the word *rubia*, has made many conclude that it was the *rubia*, or madder, which they have meant by it; but they have taken care in their writings to diſtinguiſh it from that plant, and it is plainly the *geniſtella tinctoria*, or dyer's weed, that they meant by the *robia herba*. They ſay it was uſed to dye yellow, and that it was alſo a cuſtom to ſtain the hair with it.

Theſe are the properties recorded of the *cymene* and *æcomenium* of the Greeks, and the *lutum*, or *lutea herba* of the Latins, which were names of the *geniſtella tinctoria*. Pliny ſays, that the *lutum* had leaves like flax, and flowers like broom, which is exactly the caſe with the *geniſtella tinctoria*, but by no means agrees with the glaſtum or woad.

ROBIGALIA, or RUBIGALIA, in *Antiquity*. See RUBIGALIA.

ROBIN, or, as it is more uſually called, ROBIN *red-breaſt*, *rubecula*, in *Ornithology*. See RED-*breaſt*.

ROBIN, *ragged*, in *Botany*. See CAMPION.

ROBIN, *wake*. See WAKE *robin*.

ROBINIA, in *Botany*. See *Falſe* ACACIA.

ROBORANTIA, in *Medicine*, *ſtrengtheners*; or ſuch medicines as ſtrengthen the parts, and give new vigour to the conſtitution.

ROBUR *Carolinum*, in *Aſtronomy*. See ROYAL *oak*.

ROCAMBOLES, a mild ſort of GARLICK, by ſome called Spaniſh garlic; being much of the nature of ſhalot; and well known in cookery, in quality of a ſauce.

ROCELLA, a kind of fucus or ſea-wrack, found in the Mediterranean, and other ſeas, and in ſome places uſed by the dyers for a purple colour, and called by the botanical writers, in general, *alga tinctoria*. See ARCHIL.

ROCHELLE *ſalt*. See RUPELLENSIS *ſal*.

ROCHET, or ROCKET, a lawn garment, worn by biſhops and abbots, reſembling a ſurplice, except in this, that the ſleeves are gathered at the wriſts; whereas the ſurplice is quite open.

Menage derives the word from the Latin *rochettus*, a diminutive of *rocchus*; uſed in writers of the lower Latin for *tunica*, and formed originally from the German *rok*.

The regular canons of St. Auguſtine alſo wear *rochets* under their copes.

ROCHETS alſo denote the mantles worn on days of ceremony, by the peers ſitting in the Engliſh parliament.

Thoſe of viſcounts have two bands, or borders, and a half; thoſe of earls, three; thoſe of marquiſes, three and a half; and thoſe of dukes, four.

ROCHET, the name given to a fiſh, otherwiſe called *cuculus*, and *red-gurnard*. See GURNARD.

ROCHETTA, in the *Glaſs Trade*, another name for POLVERINE. See POT-*aſhes*.

ROCK, *rupes*, a large maſs or block of hard ſtone, firmly fixed in the ground.

The word is formed of the Greek ῥωξ, *rima*, *cleft*, *chink*, and ῥωξ, from ῥηγνυμι, *I break*, whence ῥαχια, *a ſtony ſhore*. *Rocks* are generally ſuppoſed great enemies to vegetation, and the people of Scotland have been diverted from cultivating many of their beſt lands, from the obſervation that they had a rocky bottom. This is, however, but a vulgar error among them, for *rocks* of a proper kind and properly diſpoſed, as very many of theirs are, fertilize and are beneficial to the land, not hurtful.

In many parts of England, we ſee gardens, the moſt beautiful that can be imagined, both in regard to flowers and excellent plants, on a ſoil where the bottom is a hard *rock*, and the earthy covering not more than a foot or thereabouts in depth. In ſome of theſe, all the diſadvantages the Scots complain of take place, and yet the gardens are fruitful, many of them having lofty hills on the ſouth ſide, the declivity due north, and the *rock* perfectly bare next the walls on the north ſide.

The north ſides of theſe hills in this very aſpect, only with the *rock* covered with two or three feet of earth, make very good hop-gardens, producing a vaſt quantity of a very valuable commodity, at a ſmall expence; and it is remarkable, that thoſe gardens, which ſtand in this expoſure, inſtead of being ſubject to particular evils, often eſcape thoſe blaſts, and other miſchiefs, which affect the plantations, of the ſame kind, on the ſouth ſide of the hills. It might be a very valuable article of trade, if the bleak hills of Scotland, or thoſe of ſome of our northern plantations in America, could be made thus fruitful, in ſo uſeful a commodity, and there ſeems only the want of a proper trial.

Another extremely valuable plant, that might be raiſed on theſe barren rocky places, as they are generally ſuppoſed to be, is flax, in places where the deſcent is too ſteep for ploughing in the common way. It has been proved, that a hand-plough with a ſtem of aſh of about ſeven feet long, and a plate on each ſide near the end to turn the turf, a coulter to be let out ſhorter or longer to four or five inches depth, to cut the earth up, as deep as it lies upon the *rock*, and an iron wheel, may be managed with eaſe and conveniency by two people, and will prepare ground for producing large crops of the fineſt flax. The beſt ſort of flax-ſeed, of Flanders, ſown on this ſort of ground, ſucceeds ſo well, that if brought into general uſe, it might give the only advantage that is at preſent wanting to the Scotch holland manufactory, and make it excel that of all the world beſide. The northern American colonies might alſo furniſh us with the ſame ſort of flax, raiſed at a ſmaller expence than almoſt any other vegetable commodity, and coming to a ſure market, and at a very conſiderable price.

Agriculture, in Scotland, is too much neglected, to the great impoveriſhing of the country, and the diſtreſs of a numerous poor, for whom it would find conſtant employment. It is not yet known whether many of the moſt valuable plants, for medicinal and mechanic uſes, will not proſper as well there, as where there are immenſe ſums made by the raiſing of them: and the owners of lands would do well in this ſcheme to try the effect of liquorice, madder, woad, and the like plants, on their grounds. Wherever the ground is deep enough, it is pretty certain that madder and liquorice would flouriſh, and the laſt of theſe needs ſo little culture that if once planted, it may almoſt be left to itſelf. The rocky bottoms of lands not too bleak, may alſo ſucceed very well with ſaffron, which is one of the moſt profitable plants that can be cultivated. Philoſ. Tranſ. Nº 109.

There are various ways of breaking *rocks* with wood, gunpowder, &c.

We have roads, grottos, labyrinths, &c. dug through *rocks*.

ROCK *alum*. See ALUM.

ROCK-*cryſtal*, or *cryſtal of the rock*, is that ſuppoſed to be formed by a congelation of the lapidific juice, which trickles down in *rocks* and caverns. See CRYSTAL.

ROCK-*fiſh*, a common Engliſh name for the *gobius marinus*, or ſea-gudgeon. See GOGET.

ROCK *germander*, in *Botany*, a ſpecies of *veronica*. See SPEEDWELL.

ROCK-*oil*. See PETROLEUM.

ROCK-*ouzel*, in *Ornithology*. See *Ring* OUZEL, and AMZEL.

ROCK-*roſe*, in *Botany*. See ROSE.

ROCK-*ſalt*. See SALT.

ROCKET, in *Pyrotechny*, an artificial firework, conſiſting of a cylindrical caſe of paper, filled with a compoſition of certain combuſtible ingredients; which being tied to a ſtick, mounts into the air to a conſiderable height, and there burſts.

The *rocket* has a great part in all fire-works of entertainment, being not only uſed ſingly, but ſometimes alſo as an ingredient in others.

Beſides the *rocket* here defined, which is properly called the *ſky-rocket*, there is another, which from the ſphere it moves in, in the water, is denominated *water-rocket*. The mechaniſm, preparation, &c. of each whereof, we ſhall here deſcribe.

ROCKETS, *ſky*, *method of making*. 1. A concave cylindrical mould, or frame, AB (*Tab.* III. *Miſcellany*, *fig.* 39.) is turned, of hard wood, with a baſe BD, and a capital HC, uſually adorned with architectonical moulding.—The cylinder is to be open at both ends, and its dimenſions, for *rockets* of various ſizes, as in the following article. When large, it is ſometimes alſo made of braſs or tin; and when ſmall, of bone.

2. Of the ſame matter with the cylinder, is prepared a quadra, or foot, E; in the middle whereof is turned an hemiſphere G, conſiderably leſs than that of the cavity of the frame; making the cap or head of another cylinder IK, and reaching up within the caſe; where it is kept ſteady by a pin LM.

Authors do not agree about the proportions. Simienowitz preſcribes thoſe that follow. If the diameter of the aperture HN be equal to that of a leaden ball of a pound, or at moſt two pounds weight; the height of the cylinder, with the baſe and capital HE, will be ſeven diameters, and the height of the quadra FE, $1\frac{1}{3}$; the altitude of the cylinder KI, 1; the diameter IN, $\frac{19}{20}$; the diameter of the hemiſphere G, $\frac{2}{3}$ IN; the height of the capital HC, 1. The ſame author adds, that he finds, by abundant experience, that if the diameter of the aperture be divided into 100 parts, according to the different weight of the leaden balls, to whoſe diameter it is equal, the following numbers, being multiplied by 7, give the height HE.

Weight of Leaden Ball.	Subſeptuple of Altitude HE.	Weight of Leaden Ball.	Subſeptuple of Altitude HE.
1	100	20	86
2	98	30	82
4	96	40	78
6	94	50	75
10	91	70	67
15	88	100	57

The mould being ready, a wooden cylinder, or mould, A B (*fig.* 40.) is provided, whoſe diameter is ¾ of the aperture of the frame, and its length equal to the height of the ſame; to which is fixed a haſt or hilt A D. About this mould is a thick ſtrong paper rolled, till ſuch time as it fill the cavity of the frame. This done, where the haſt is joined to the cylinder, as at A, it is choked, i. e. firmly bound round with fine pack-thread, ſo as to conſtringe or ſtreighten the cavity thereof. The part thus choked or bound up F G (*fig.* 41.) is to be equal to the hemiſphere G (*fig.* 39.)

The caſe is now taken off the mould, and put into the cavity of the frame, (*fig.* 39.) the choke G F upon the hemiſphere; and, in this diſpoſition, is filled with a compoſition deſcribed in the following article, rammed ſtrongly in by means of a wooden cylinder, or rammer, fitting the cavity, and a mallet.

When filled, a paper cap of a conical form is glued over the end of the caſe filled laſt; and the ſpace left a-top is filled with whole gunpowder, to the height of about one diameter; then the *rocket* is bound or choked, in E, as before in G.

Laſtly, the *rocket* is bored, as is repreſented in A L (*fig.* 41.); care being taken to do this in the middle. Some, indeed, bore the *rocket* as they fill it, by thruſting a long, ſharp ſpike through the lower baſis, and drawing it out again when the *rocket* is full: but it is beſt not to bore till the *rocket* be uſed. The boring is to go two-thirds of the height of the *rocket*, abating one diameter of the cavity. The diameter of the bore in G is to be ¼ of the diameter of the cylinder; and in L ⅛ of the lower diameter.

To make the *rocket* mount ſtrait up, it is tied faſt to the end of a long ſlender ſtick M N, eight times as long as the *rocket*; in ſuch manner as that, when poiſed on the finger near the touch-hole F, the ſtick (which is uſually made biggeſt at this end, and ſloping gently to the other) may preponderate, though very little. The *rocket*, thus prepared, is hung at freedom, and lighted with portfire.

Note. Some, inſtead of a ſtick to make the *rocket* mount, furniſh it with two wings, as M N (*fig.* 42.), which have the ſame effect: and inſtead of paper, ſome make the caſes of wood covered with leather; others, of a thin iron plate; and ſome, inſtead of a wooden ſtick, uſe an iron wire, with a plumbet at the end of it.

The compoſition wherewith *rockets* are filled, conſiſts of the three following ingredients; viz. ſalt-petre, charcoal, and ſulphur, all well ground: but the proportions of theſe are various, for *rockets* of various ſizes; as in the following table: noting, that in ſmall *rockets* gunpowder-duſt is added.

Compoſitions for ROCKETS *of various ſizes.*

Weight of *Rocket.*	Salt-pet.	Sul-phur.	Char-coal.	Gunpowder-duſt.
℔	℔	℔	℔	
100 or 60	30	10	20	
50 30	30	7	18	
20 18	42	12	26	
15 12	23	8	16	
10 9	62	9	20	
9 6	35	5	10	
5 4	64	8	16	
3 2	60	2	15	
1		2	6	32
ounces.	oun.	oun.	oun.	ounces.
9	4	1	2	9
6	12	1½	4	15
3	2	½	1	12
1			2	15

Note. Several *rockets* being diſpoſed round the circumference of a wheel, whether circular or polygonous, the head of the one applied to the tail of another, and the wheel put in motion, as one *rocket* is ſpent another will take fire, and the wheel be continued in its rotation.

As an additional ornament to *rockets*, it is uſual to furniſh them either with ſtars, or with ſerpents, or ſparks, which take fire when the *rocket* burſts; and ſometimes little *rockets* are incloſed in great ones: theſe are to take fire when the great one is at its greateſt height.

ROCKETS, *ſtars for, to make.* Mix three pounds of ſaltpetre with eleven ounces of ſulphur, three ounces of beaten gunpowder, and one of antimony. Moiſten the maſs with gum-water, and form them into little balls of the ſize of filberts, drying them well, either in the ſun, or an oven. When dry, incloſe a number of them in the conical cap of the *rocket*.

ROCKET, *a water, method of making.* Make a *rocket* A B after the uſual manner, excepting in the number of chokes, expreſſed in *fig.* 43. Let its diameter be equal to that of a leaden ball of two or three inches diameter, and let it be bored to a third part of its height. Incloſe the *rocket* in a hollow paper cylinder, which ſmear over with melted pitch, or wax, that it may reſiſt the moiſture.

Note, the weight of the *rocket* is to be ſo proportioned to that of the water, that the whole clinder may be immerged. Some, inſtead of a cylinder, uſe a truncated cone, or even a ſpheroid; and ſome hang a weight to the end at which it is lighted. Wolfii Elem. Math. tom. iv. p. 212, &c.

Dr. Pemberton, in his Chemiſtry, p. 209, &c. has given the following conciſe account of *rockets.* A *rocket* (he ſays) is a hollow cylinder, uſually made of paper, of a thickneſs equal to about one-ſixth of its diameter within, and filled with gun-powder, or ſome like compoſition. If a *rocket* be make of great bigneſs, intended for a ſignal in war or ſuch like uſe, its caſe may be made of a more ſolid material.

Near one end the caſe of the *rocket* is drawn in, till its diameter be reduced to one half of the whole internal diameter. This place is uſually called the choke. The moſt approved length of the caſe, from the choke, is about ſix times its internal diameter, to be filled with gun-powder; if the *rocket* be ſmall, beat into fine duſt, and rammed in with as even ſtrokes as can be, that the powder be uniformly compreſſed. In great *rockets*, the charge is uſually a little weakened by adding to the gunpowder a ſmall portion of charcoal and of ſulphur.

To the end of the *rocket* is added a cylindrical cavity, not above half the length of the *rocket* from its choke in height, and of ſuch a diameter, that, together with the materials put into it, it may not exceed the weight of the reſt of the *rocket*. Theſe materials, beſides ſome corn powder to burſt the caſe, conſiſt of ſome compoſition, that may give the appearance of ſtars, a ſhower of fire, or the like.

Theſe fiery ſhowers may be made of ſaw-duſt, boiled in water, ſtrongly impregnated with nitre, and while wet rolled among gun-powder in duſt; or by gun-powder mixed with melted brimſtone, and, when cold, groſly beaten.

Theſe ſtars are a mixture of gun-powder, nitre, ſulphur, antimony, camphor, and the like combuſtible materials, moiſtened with a ſolution of ſome gum, thereby to form pellets of a convenient ſize. Theſe pellets are to be covered over with thread, well ſoaked in a ſtrong ſolution of nitre, and while wet rolled in gun-powder. To charge the *rocket* with larger balls, any of the foreſaid ingredients (whereof nitre, in a ſufficient quantity, muſt always be one) may be mixed with turpentine, melted pitch, or roſin, and tow ſteeped in it. This way larger balls may be formed, which ſhould be covered over with thread, prepared as juſt now deſcribed.

It is neceſſary for giving the *rocket* a ſufficient degree of motion, that the powder within the *rocket* be bored with a tapering cavity from the choke. At the choke this cavity muſt be as wide as the choke itſelf, at the farther end it need not be more than one half that width. The length of this bore muſt be but one inner diameter of the *rocket* ſhort of the whole height, to which the *rocket* is rammed. The uſe of this bore is to increaſe the ſurface, that takes fire at once; that a greater body of fire may iſſue out of the mouth of the *rocket.* For from the vehemence with which the fire iſſues out, the *rocket* receives its motion. *Rockets* are uſed in all fire-works, that have motion, except ſuch as are thrown into the air after the manner of bombs. When the *rocket* is deſigned to mount upwards, a ſtick, eight or nine times the length of the *rocket*, is tied to it, ſufficient to poize the *rocket* at an inch or two from its mouth.

ROCKETS, *ſky, theory of the flight of.* Mariotte takes the riſe of *rockets* to be owing to the impulſe or reſiſtance of the air againſt the flame. Dr. Deſaguliers accounts for it otherwiſe.

Conceive the *rocket* to have no vent at the choke, and to be ſet on fire in the conical bore; the conſequence would be, either that the *rocket* would burſt in the weakeſt place, or that, if all its parts were equally ſtrong, and able to ſuſtain the impulſe of the flame, the *rocket* would burn out immoveable. Now, as the force of the flame is equable, ſuppoſe its action downwards, or that upwards, ſufficient to lift forty pounds; as theſe forces are equal, but their directions contrary, they will deſtroy each other's action.

Imagine then the *rocket* opened at the choke; by this means the action of the flame downwards is taken away, and there remains a force equal to forty pounds acting upwards, to carry up the *rocket*, and the ſtick it is tied to. Accordingly, we find, that, if the compoſition of the *rocket* be very weak, ſo as not to give an impulſe greater than the weight of the *rocket* and ſtick, it does not riſe at all; or, if the compoſition be ſlow, ſo that a ſmall part of it only kindles at firſt, the *rocket* will not riſe.

The ſtick ſerves to keep it perpendicular; for if the *rocket* ſhould begin to tumble, moving round a point in the choke, as being the common centre of gravity of *rocket* and ſtick, there would be ſo much friction againſt the air, by the ſtick between the centre and the point, and the point would beat againſt the air, with ſo much velocity, that the re-action of the medium would reſtore it to its perpendicularity. When the compoſition is burnt out, and the impulſe upwards is ceaſed, the common centre of gravity is brought lower towards the middle of the ſtick; by which means the velocity of the point of the ſtick is decreaſed, and that of the point of the *rocket* is increaſed; ſo that the whole will tumble down, with the *rocket* end foremoſt.

All the while the *rocket* burns, the common centre of gravity is ſhifting and getting downwards, and ſtill the faſter and the lower as the ſtick is lighter; ſo that it ſometimes begins to tumble before it be burnt out: but when, the ſtick being a little too heavy, the weight of the *rocket* bears a leſs proportion to that of the ſtick, the common centre of gravity will not get ſo low, but that the *rocket* will riſe ſtrait, though not ſo faſt.

Mr. Robins, conſidering the great uſe that may be made of *rockets*, in determining the poſition of diſtant places, and in giving ſignals for naval and military purpoſes, procured ſome, with a view of aſcertaining the height to which they riſe, and the diſtance at which they may be ſeen. The greateſt part of them did not riſe to above 400 yards, one to about 500, and one to 600 yards nearly. The greateſt diſtance at which theſe were obſerved, was from 35 to 38 miles. Others were fired at a different time; one of which roſe to 690 yards; and it was obſerved, that the largeſt, which were about 2½ inches in diameter, roſe the higheſt. In ſome ſubſequent experiments, conducted by Mr. Da Coſta, Mr. Banks, &c. it was found that of two *rockets*, of about 3½ inches diameter, one roſe to about 833, and the other to 915 yards. In another trial, a *rocket* of 4 inches diameter roſe to 1190 yards. In other experiments, a *rocket* of 1½ inch roſe to 743 yards; one of two inches to 659; one of 2½ inches to 880; another of the ſame ſize to 1071; one of 3 inches to 1254; one of 3½ inches to 1109; and one of four inches roſe to near 700 yards, and, turning, fell to the ground before it went out. Beſides theſe, there was one of the *rockets* of 24 inches in diameter, which roſe to 784 yards, and another of the ſame ſize to 833 yards. From theſe experiments it is inferred, that *rockets* from 2½ to 3½ inches in diameter are ſufficient to anſwer all the purpoſes for which they are intended; and they may be made to riſe to a height, and to afford a light capable of being ſeen to conſiderably greater diſtances than thoſe juſt mentioned. The manufacture of large *rockets* is expenſive; and they are more uncertain than thoſe of a ſmaller ſize. Phil. Tranſ. vol. xlvi. p. 578, &c. or Robins's Math. Tracts, vol. i. p. 317, &c.

To prevent miſchief from the fall of the *rocket*-ſticks, which are ſometimes very heavy, they now bore the ſticks of large *rockets*, and fill them with powder, that they may ſhiver in the air before they fall. See FIRE-*works*.

ROCKET, *eruca*, in *Botany*; its characters are theſe: the flower has a four-leaved empalement; it hath four oblong petals, placed in form of a croſs; it hath ſix ſtamina, four of which are a little longer than the empalement, the other two are ſhorter; it hath an oblong taper germen, which afterwards becomes a taper cornered pod, with two cells, filled with roundiſh ſeeds.—There are two ſpecies. Miller.

Linnæus makes the *eruca* a ſpecies of BRASSICA.

The leaves of both the garden and the wild *rocket* are accounted good aperients and antiſcorbutics, but rarely uſed. The ſeeds of *rocket* agree with thoſe of muſtard, but are inferior to them in medicinal virtue.

ROCKET, *baſtard*, *reſeda*, in *Botany*, a genus of the *dodecandria trigynia* claſs. Its characters are theſe: the empalement of the flower is of one leaf, cut into ſeveral parts, almoſt to the bottom, and is permanent; the petals of the flower are unequal, and generally trifid, and have a honey gland on their baſe, of the length of the empalement; the honey glands are plain, erect, and produced from the upper ſide of the receptacle, between the ſtamina and the place of the upper petal, joining with the baſe of the petals, dilating from the ſides; it hath fifteen or ſixteen ſhort ſtamina, terminated by erect obtuſe ſummits, and a gibbous germen, ſitting upon very ſhort ſtyles, crowned by a ſingle ſtigma; the germen afterwards becomes a gibbous angular capſule of one cell, with an aperture between the ſtyles, filled with kidney-ſhaped ſeeds, faſtened to the angles of the capſule. Miller enumerates eight, and Linnæus eleven ſpecies.

The DYER's *weed*, or WELD, is a ſpecies of the *reſeda*.

ROCKET, *corn*, *ſea*, or *ſquare-podded* ROCKET, a diſtinct genus of plants, called by Tournefort *erucago*, and by Linnæus BUNIAS.

ROCKET, *garden*, a name by which the *heſperis* of botaniſts is ſometimes called. See *Dame's* VIOLET.

ROCKET, *water*, *marſh*, or *winter*, the name of a ſpecies of *ſiſymbrium*. See *Water* CRESSES.

ROCKET is alſo uſed for a habit. See ROCHET.

ROCOU. See ROUCOU.

ROD, *virga*, *virge*, a wand, or long ſlender ſtick, or ſtaff. See VERGE.

ROD is alſo uſed for a land-meaſure of 16½ feet: the ſame with PERCH and POLE.

ROD, in *Gauging*. See GAUGING-*rod*.

ROD, in the *Manege*, called in French *gaule*, is a ſwitch, held by the horſeman, in his right hand, partly to repreſent a ſword, and partly to conduct the horſe, and ſecond the effects of the hand and heels.

ROD, *golden*, or *Aaron's*, in *Botany*. See GOLDEN-*rod*.

ROD, *ſhepherd's*. See TEAZEL.

ROD, *golden*, *tree*. See BOSEA.

ROD-*knights*, in *Ancient Cuſtoms*. See RED-MANS.

ROD, *black*. See BLACK-*rod*, and USHER.

ROD, *Ezekiel's*. See EZEKIEL.

ROD, *fiſhing*. See FISHING.

ROD, *Rhineland*. RHINELAND.

ROE of a fiſh is that part which contains the ſpawn or ſeed thereof.

That of the male fiſh is uſually diſtinguiſhed by the name of *ſoft roe*, or milt; that of the female by *hard roe*, or ſpawn.

The ſoft *roe*, when ſqueezed, yields a liquor reſembling milk; whence its name *milt*; the French call it expreſly *milk*, *lait*.

M. Petit found 342144 ovula, or little eggs, in the hard *roe* of a carp, eighteen inches long.

Leewenhoeck, tom. i. p. 216, only found 211629 eggs in a carp; but four times the number in a cod: and, p. 188. he ſays, that a common cod contains 9344000 eggs; and that the eggs of a fiſh of one year old are as big as thoſe of a fiſh of twenty five years old. Mem. Acad. R. Scien. an. 1733. p. 290. See MILT and *Fecundity of* FISH.

ROE is alſo one of the beaſts of chaſe.

ROE-*buck*, the Engliſh name of the *cervus* with ramoſe, cylindric, and erect horns. It is the ſmalleſt of the deer-kind, and has been called *capreolus* and *caprea*, though without the leaſt reſemblance of the goat-kind. Se *Roe* DEER.

The *roe-buck* is called a *hind* the firſt year; *gyrle* the ſecond; *henuſe* the third; *roe-buck of the firſt head* the fourth; and a *fair roe-buck* the fifth.

The *roe-buck* is a deer well known in Germany; and ſeems to have alſo been formerly found in England, though now the race be extinct.

ROE-*buck hunting*. See HUNTING.

ROELIA, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are, that the corolla is funnel-ſhaped, the ſtigma bifid, and the fruit a double-celled cylindric capſule. There are two ſpecies.

ROFFENSIS *textus*. See TEXTUS.

ROGA, ῥογα, in *Antiquity*, a donative, or preſent, which the Auguſti, or emperors, made to the ſenators, magiſtrates, and even the people; and the popes, or patriarchs, to their clergy.

The word is derived by ſome from the Latin *erogare*, *to give*, or *diſtribute*; according to others from *rogo*, *I aſk*; hence, ſay they, it is that St. Gregory the Great calls ſuch diſtributions *precaria*, as being to be demanded in order to be had. Others, again, derive it from the Greek ῥογος, ſometimes uſed for *corn*; becauſe it anciently conſiſted in corn, diſtributed among the populace, the ſoldiery, &c.

The emperors uſed to diſtribute theſe *rogæ* on the firſt day of the year, or on their birth-day, or on the *natalis dies* of the cities. The popes and patriarchs in Paſſion Week.

This cuſtom of *rogæ*, or largeſſes, was introduced by the tribunes of the people, to gain the populace more effectually over to their intereſt. The emperors at length took it up, and made ſuch diſtributions to the people, and even to the ſoldiery, who are hence called by the Greek writers of the middle age ῥογατορες.

Roga is alſo uſed for the ordinary pay of the ſoldiery.

ROGATIO, *rogation*, in the *Roman Juriſprudence*, a demand made by the conſuls, or the tribunes, of the Roman people, when a law was propoſed to be paſſed.

The demand was made in theſe terms: *Do you will and appoint that* (for inſtance) *war be declared againſt Philip?* This was the *rogatio*; and what the people returned in anſwer, as, *The Roman people do appoint war to be made againſt Philip*, was the *decretum*, *decree*, or *reſolve*.

The word *rogatio* is frequently alſo uſed for the decree itſelf, to diſtinguiſh it from a ſenatus-conſultum, or decree of the ſenate.

Frequently, alſo, *rogatio* is uſed in the ſame ſenſe with *law*; becauſe there never were any laws eſtabliſhed among the Romans, but what was done by this kind of *rogation*. Otherwiſe they were null.

ROGATION *Week*, the week immediately preceding Whitſunday; thus called from three faſts therein; viz. on the Monday, Tueſday, and Wedneſday, called alſo *Rogations*, or *Rogation-days*, becauſe of the extraordinary prayers, and proceſſions then made, for the fruits of the earth.

Dr. Godolphin ſays, the *Rogation* days derive their name from certain ordinances for abſtinence, or days of faſting, which the biſhop of Rome recommended to be obſerved by the Weſtern churches, before he aſſumed the power of compulſion; and which he, therefore, called by the gentle name of *Rogation*, the time of abſtinence being appointed by that ordinance, which was called *Rogatio*, and not *lex*, or *decretum*.

The firſt who appointed theſe *rogations* was St. Mamertus, biſhop of Vienne, who, in 474, aſſembled ſeveral biſhops, to implore the mercy of God by a faſt of three days, on occaſion of an incurſion then made into the country, by a great number of wild beaſts. Others ſay, it was firſt ſet on foot by the ſame Mamertus, in 463, on occaſion of ſome great public calamities.

His example was ſoon followed, firſt by the church of Clermont, in Auvergne, then by all their neighbours, and afterwards throughout all Gaul.

In 801, Leo III. confirmed this faſt, and made it univerſal.

ROGATORES, among the Romans, thoſe who in the *comitia centuriata* brought the cheſt into which the people threw the ballots, containing their votes.

ROGUE, in *Law*, an idle and ſturdy beggar, who, by ancient ſtatutes, for the firſt offence, is called a *rogue of the firſt degree*, and puniſhed by whipping, and boring through the griſtle of the right ear with a hot iron, an inch in compaſs; and, for the ſecond offence, is called a *rogue of the ſecond degree*, and ordered to be put to death as a felon, if he be above eighteen years of age.—For the deſcription and puniſhment of *rogues*, as they are eſtabliſhed by 17 Geo. II. cap. 5. ſee Vagabond.

Rogues *yarn* is a name given to a rope-yarn, which is placed in the middle of every ſtrand, in all cables and cordage in the king's ſervice. It differs from all the reſt, as being untarred and twiſted in a contrary manner, by which it is eaſily diſcovered. The uſe of this contrivance is to examine whether any cordage, ſuppoſed to be ſtolen or embezzled, has been formed for the king's ſervice. Falconer.

ROLL, in the *Manufactories*, ſomething wound and folded up in a cylindrical form.

Few ſtuffs are made in *rolls*, except ſattins, gauzes, and crapes, which are apt to break, and take plaits not eaſy to be got out, if folded otherwiſe. Ribbands, however, and laces, galloons, and paduas of all kinds, are thus *rolled*.

The ancients made all their books up in form of *rolls*, or little columns; and, in Cicero's time, the libraries conſiſted wholly of thoſe *rolls*. The dearneſs of parchment, and the cheapneſs of papyrus, whereof the *rolls* were made, was the reaſon that ſcarce any but paper *rolls* were uſed.

Voſſius ſays, they paſted ſeveral ſheets end to end, when filled on one ſide, and *rolled* them up together, beginning with the laſt, which they called *umbilicus*, and to which they faſtened an ivory or boxen ſtick, to ſuſtain the *roll*. To the other extremity they paſted a piece of parchment, to cover and preſerve it.

Theſe *rolls* were placed in the libraries perpendicularly to the horizon. The Jews ſtill preſerve the ancient uſage of *rolls* for the books they read in their ſynagogues.

Roll *of tobacco*, is tobacco in the leaf, twiſted in the mill, and wound twiſt over twiſt, about a ſtick, or roller.

The generality of tobacco in America is there ſold in *rolls* of various weights; and it is not till after its arrival in England, Spain, France, and Holland, that it is cut.—*Roll* tobacco is what is chiefly uſed, both for chewing and raſping. See Tobacco.

Roll, *rotulus*, in *Law*, denotes a ſchedule of paper or parchment, which may be wound up by the hand into the faſhion of a pipe.

Of theſe there are, in the exchequer, ſeveral kinds; viz. the great *wardrobe roll*, the *cofferer's roll*, the *ſubſidy-roll*, &c.

The word is formed from the French *rolle*, of the Latin *rotulus*; becauſe moſt inſtruments and expeditions in law were anciently written on papers, or parchments, ſewed or glued together, and thus rolled up: whence the word *enroll*, and the like.

Rolls *of parliament*, are the manuſcript regiſters of the proceedings of our ancient parliaments.

Before the uſe of printing, and till the reign of Henry VII. our ſtatutes were all ingroſſed in parchment, and (by virtue of the king's writ for that purpoſe) proclaimed openly in every county.

In theſe *rolls* we have alſo a great many deciſions of difficult points in law, which were frequently, in former times, referred to the deciſion of that high court.

Roll, *rider*, a ſchedule, or ſmall piece of parchment, frequently ſewed or added to ſome part of a *roll*, or record.

Noy obſerves, that the court ex officio may award a certiorari ad informandam conſcientiam; and that which is certified ſhall be annexed to the record, and called a *rider-roll*.

Roll is alſo uſed for a liſt of the names of ſeveral perſons of the ſame condition, or entered in the ſame engagement.

Roll, *court*. See Court-*roll*.

Roll, *muſter*. See Muster-*roll*.

Roll-*calling* is the calling over of the ſoldiers of a troop, or company, by their names, to ſee that they are all preſent.

Roll, *calves-head*, is a *roll* in the two Temples, wherein every bencher is taxed yearly at 2*s*. every barriſter at 1*s*. 6*d*. and every gentleman under the bar at 1*s*. to the cook, and other officers of the houſe, in conſideration of a dinner of calves heads, provided in Eaſter term.

Roll, *Ragman's*, or *Ragimund's* **Roll**, is a *roll* denominated from *Ragimund*, a papal legate in Scotland; who, calling before him all the people who held benefices in that kingdom, cauſed them, upon oath, to give in the value of their eſtates, according to which they were taxed in the court of Rome.

Rolls, or *office of* **Rolls**, in Chancery-lane, London, is an office appointed for the cuſtody of the *rolls* and records in Chancery.

The maſter of this office is the ſecond perſon in that court; and, in the abſence of the lord chancellor, he ſits as judge. See Master *of the rolls*.

This houſe, or office, was anciently called *Domus Converſorum*, as being appointed, by king Henry III. for the uſe of converted Jews; but their irregularities occaſioned king Edward III. to expel them thence: upon which, the place was deputed for the cuſtody of the *rolls*.

Rolls, *clerk of the*. See Clerk *of the rolls*.

Rolls, or **Roul**, among *Military Men*. See Roul.

Roll, *bead*. See Bead-*roll*.

Roll, *check*. See Check-*roll*.

Roll, *counter*. See Counter-*roll*.

Roll *of parchment*, properly denotes the quantity of ſixty ſkins.

Roll, in *Antiquity*. From the time of Anaſtaſius, we find in the hands of the emperors, on medals, a kind of narrow long *roll*, or ſachel; the meaning whereof has greatly puzzled the antiquaries.

Some imagine it to be a *roll* or bundle of papers, memoirs, petitions, &c. preſented occaſionally to princes, conſuls, and the like. Others take it to be a plaited handkerchief, which the perſons who preſided at the games caſt forth as a ſignal for their beginning. Others will have it a bag of duſt and aſhes, preſented the emperor at the ceremony of his coronation, and called AKAKIA, q. d. a means of preſerving innocence, by the remembrance of duſt, &c.

Roll, or **Roller**, is alſo a piece of wood, of a cylindrical form, uſed in the conſtruction of ſeveral machines, and in ſeveral works and manufactures; though ſometimes under other names.

It is on ſuch *rolls*, properly called *beams*, that the woollen, ſilken, and other threads are wound, whereof the weavers works conſiſt. For which end, each loom has uſually two, and that of the gauze-weavers three.

In the glaſs manufacture, they have a *running roll*, being a thick cylinder of caſt braſs, ſerving to conduct the melted glaſs to the end of the table whereon large looking-glaſſes are to be caſt.

The founders alſo uſe a *roller* to work the ſand which they uſe in making their moulds.

The preſſes called calenders, as ſerving to calender ſtuffs withal, conſiſt, among other eſſential parts, of two *rollers*.

It is alſo between two *rollers* that the waves are given to ſilks, mohairs, and other ſtuffs proper to be tabbied.

Prints, or impreſſions, from Copper-plates, are alſo taken by paſſing the plate and the paper between two *rollers*. See *Rolling-preſs* Printing.

Rolls, in *Coining*, are two iron inſtruments, of a cylindrical figure, which ſerve to draw or ſtretch out the plates of gold, ſilver, and other metals, whereof the planks or pieces are to be formed for the ſpecies.

Rolls, in *Printing*, are two large cylinders or barrels of wood faſtened in the middle of what they call the cradle or gallows of the preſs; and which, by means of a cord or girt paſſing over each, and a handle which gives motion to one of them, draw the carriage of the preſs backwards and forwards. See Printing.

Rolls, in the *Sugar Works*, are two large iron barrels, which ſerve to bruiſe the canes, and expreſs the juice. They are caſt hollow, and their cavities are filled up with wood, the cylinders of which are properly, the *rollers*.

Rolls, or **Rollers**, among *Carpenters*, *Maſons*. &c. are plain cylinders of wood, ſeven or eight inches in diameter, and three or four feet long; uſed for the removing of beams, huge ſtones, and other like burdens, which are cumberſome, but not exceedingly heavy.

Theſe *rollers* are placed, ſucceſſively, under the forepart of the maſſes to be removed; which, at the ſame time, are puſhed forward by levers, &c. applied behind.

Rolls, *endleſs*. When blocks of marble or other exceſſive heavy loads, are to be removed, they uſe what they called *endleſs rolls*.

Theſe, to give them the greater force, and prevent their burſting, are made of wood joined together by croſs-quarters; they are about double the length and thickneſs of the common *roller*, and, beſides, are girt with ſeveral large iron hoops at each end. At a foot's diſtance from the ends are four mortiſes, or rather only two, but pierced through and through, into which are put the ends of long levers which the workmen draw by ropes faſtened to the ends, ſtill changing the mortiſe, as the *roll* has made a quarter of a turn.

Roll-*rich ſtones*, in *Antiquity*, a ſeries of huge ſtones, ranged in a circle, near Morton in the Marſh, in Oxfordſhire. There are many fabulous traditions about them. Among the antiquaries, ſome take them to be a monument of a victory; others, a burying place; and others, a place for the coronation of the Daniſh kings.

Near Penros, in Cornwall, is a like monument.

ROLLER. See Roll.

Roller, in *Gunnery*, a round piece of wood of about nine inches diameter, and four feet long, which ſerves in moving mortars from one place to another, when near. This is done by raiſing the fore part of the bed ſo high that a *roller* may be laid under it; then puſhing the bed forwards, and laying another in its way, and another before that, and ſo on, the mortar is eaſily moved.

Roller, in *Huſbandry*, a large piece of wood, turning on its axis, and drawn over the ſurface of the ground, in order to break the ſmall clods, and render it ſmooth and even.

This inſtrument was formerly made with an even or uniform ſurface: but Mr. Randall was led by a hint, ſuggeſted in Mr. Ellis's Huſbandry, to conſtruct what he calls a ſpiky *roller*: the length of which was 7 feet, the diameters of the ends 18 inches, and the whole cylinder made of heart of oak. In the ſurface of the cylinder were fixed ſeveral rows of iron ſpikes, at the diſtance of four inches from one another in each row, the diſtance from row to row being about four inches. Theſe iron ſpikes are of the ſhape of ox harrow teeth, and ſix inches in length; three inches of which, towards the ſmaller end, are burnt into the wood, and the remaining three inches of the blunter end projecting beyond it. The weight of this whole machine, including that of the box annexed to it, and of the man employed in guiding it, was about a ton.

Mr. Randall obſerves, that wheels are needleſs appendages to this inſtrument.

The utillity of this kind of *roller*, eſpecially in land that is ſtiff and liable to clod, has been generally acknowledged. It is better adapted for the purpoſe of preparing the ſoil for ſeed, of burying it when ſown, and leaving the ground in a fine ſtate, of rolling the corn in the ſpring, and likewiſe of laying down lawns, or large pieces of graſs, that are required to be level, than thoſe which were formerly uſed for the various purpoſes of rolling. It will alſo ſerve to reduce the half-burnt turf of burn-baked land more expeditiouſly and effectually than any other method.

Mr. Young, in the third volume of his Tour to the Eaſtern Parts of England, mentions a *cutting roller*, which had been found better adapted to ſtiff clays even than this *ſpiky roller*. This was uſually about ſix feet eight inches long; the central cylinder on which the cutting wheels roll is about ſix inches, and the diameter of the wheels twenty inches; their cutting edges being of caſt iron. To this machine is annexed a trough, about ten inches deep, and twenty over; and the whole is to be loaded with additional weights, whenever the nature of the ſervice to which it is applied requires it.

Roller, in *Ornithology*, the common name of a bird of the mag-pie kind, called *garrulus argentoratenſis* by authors, and ſuſpected to be the ſame with the bird deſcribed by Geſner, under the name of the *blue crow*, *cornix cærulea*, and by Aldrovand under the name of *pica marina*. It is the *coracias garrula* of Linnæus. Its beak is black and long, ſomewhat crooked at the end, otherwiſe like that of the common mag-pie; its eyes are of a greyiſh hazle colour, and near them are two tubercles bare of feathers; its rump and part of its wing-feathers are of a fine blue, like the ultramarine colours, uſed in painting; the middle of its back is of a reddiſh brown and the head is of a bluiſh green, and its breaſt and belly are of a whitiſh blue, or dove-colour. It is brought to market in Italy, and ſome other places. It is remarkable for making a chattering noiſe, whence it has been called *garrulus*. See *Tab.* IV. *Birds*, N° 52.

Roller is alſo the name by which ſome call the *ampelis*, or *garrulus Bohemicus*.

This, in the Linnæan ſyſtem, is a ſpecies of the Ampelis.

It is of the ſize of the black-bird. Its head is creſted with a little pointed plume of feathers, and is of a fine gloſſy brown; from the baſe of the bill, which is ſhort, thick, and black, there paſſes to the hind part of the head, over each eye, a bar of black: its neck is very ſhort, and variegated with black, brown, and white; the throat is black, with a ſmall briſtly tuft in the middle; its breaſt is of a reddiſh brown, and its belly grey; its back is of a cheſnut brown, and its wing-feathers variegated with black and grey. What diſtinguiſhes this from all other birds are the horny appendages from the tips of ſeven of the ſecondary feathers, of the colour and gloſs of the beſt red wax: ſome have one more or one leſs.

It is thought to be peculiar to Bohemia, having been ſeldom found in any other country. The ſpecies appears annually about Edinburgh, in February, and feeds on the berries of the mountain aſh; and appears as far ſouth as Northumberland,

Theſe birds were once conſidered as the preſages of peſtilence.

The *roller* feeds on fruits, particularly grapes, whence its name; and is very voracious, and generally flies in large flocks together.

This bird is eaſily tamed, and is eſteemed delicious food. Ray and Pennant. See *Tab.* IV. *Birds*, N° 53.

Roller, in a ſhip, a cylindrical piece of timber, fixed either perpendicularly, or horizontally, above a ſhip's deck, ſo as to revolve about an axis. It is uſed to prevent the cables, hauſe, &c. from being chafed by the friction which their ſurfaces would otherwiſe encounter, from bearing againſt that part of the ſhip, where the *roller* is placed, whilſt they are drawn into the ſhip by mechanical powers.

Roller, in *Surgery*, a long and broad ligature, uſually of linen cloth, uſed for binding, ſurrounding, and containing, the parts of the human body, and keeping them in, or diſpoſing them, to a ſtate of health.

A *roller* conſiſts of two parts; the *body*, and the two extremities, which ſome call *heads* or *chiefs*, and others *tails*. There are ſingle-headed *rollers*, that is, ſuch as are rolled at one head only, double-headed *rollers*, &c.

Again; ſome are equally rolled and gathered together; as thoſe applied to fractures and diſlocated joints. Others are cut into ſeveral chiefs or heads; as thoſe for the head, chin, &c. Others are compoſed of ſeveral ſwaths, gathered and ſtitched together; as thoſe for the teſticles, &c. Some again are *broad*; as thoſe for the breaſt, belly, &c. Others narrow; as thoſe for lips, fingers, &c.

Guidon directs the *roller* for the ſhoulder to be ſix fingers broad; that for the thigh, five; for the leg, four; for the arm, three; and the finger, one. See Bandage.

ROLLING, *rotation*, in *Mechanics*, a kind of circular motion, wherein the moveable turns round its own axis, or centre, and continually applies new parts of its ſurface to the body it moves upon.

Such is that of a wheel, a ſphere, or the like. Such, particularly, are the motions of the earth, the planets, &c.

The motion of *rolling* is oppoſed to that of *ſliding*; wherein the ſame ſurface is continually applied to the plane it moves along.

It muſt be noted, that in a wheel it is only the circumference that properly rolls; the reſt proceeds in a compound angular kind of motion, and partly rolls, partly ſlides. The not diſtinguiſhing between which two, occaſioned the difficulty of that celebrated problem, the ROTA *Ariſtotelica*, *Ariſtotle's wheel*.

The friction of a body in *rolling*, or the reſiſtance made to it, by the roughneſs of the plane it moves on, is found to be much leſs than the friction in ſliding.

Hence the great uſe of wheels, rolls, &c. in machines; as much of the action as poſſible being laid thereon, to make the reſiſtance the leſſer.

For the laws of bodies *rolling* on inclined planes, ſee *Inclined* PLANE and DESCENT.

ROLLING *Carts*. See CARTS.

ROLLING-*preſs printing*. See PRINTING.

ROLLING, in *Sea Language*, the motion by which a ſhip rocks from ſide to ſide, like a cradle, occaſioned by the agitation of the waves. As this is a ſort of revolution about an imaginary axis, paſſing through the centre of gravity of a ſhip, it is plain that the nearer the centre of gravity is to the keel, the more violent will be the *rolling* motion; becauſe the centre, about which the vibrations are made, is placed ſo low in the bottom, that the reſiſtance, made by the keel, to the volume of water, which it diſplaces in *rolling*, bears very little proportion to the force of the vibration above the centre of gravity, the radius of which extends as high as the maſthead. But if the centre of gravity is placed higher above the keel, the radius of vibration will not only be diminiſhed, but an additional force to oppoſe the motion of *rolling* will be communicated to that part of the ſhip's bottom, which is below the centre of gravity. This motion may in ſome meaſure be prevented, by changing the quantity or diſpoſition of the ballaſt, and alſo by the conſtruction of the ſhip's bottom. Falconer.

ROLLING *tackle*, in a *Ship*, a pulley, or purchaſe, faſtened to that part of a ſail-yard, which is to the windward of the maſt, in order to confine the yard cloſe down to the leeward, when the ſail is furled. It is uſed to prevent the yard from having a great friction againſt the maſt in a high ſea, which would be equally pernicious to both. Falconer.

ROMAIN, in *Huſbandry*, the name of a plant, cultivated in the fields, in many parts of the world, particularly in France, and called, by our farmers *French vetches*, or *French tares*. It is an annual plant, but a very quick grower, and is extremely good food for cattle, particularly for horſes: they let theſe creatures feed on it all the former part of the ſummer, and then cut it for hay in Auguſt or September. Its ſhort continuance in the ground makes it leſs valuable than ſaint-foin and clover, but it has this advantage over them, that it will grow on poor ground.

ROMAN, ſomething belonging to the city of Rome.

ROMAN *monarchy*. See MONARCHY.

The *Roman* commonwealth laſted from the expulſion of the Tarquins to the battle of Pharſalia, 460 years; the *Roman* empire, from the battle of Pharſalia to the building of Conſtantinople, by Conſtantine, in the year 330, laſted 378 years; from the building of Conſtantinople to the taking it, by the Turks, in 1453, was a farther period of 1123 years.

A *Roman* citizen, at firſt, was only a citizen of Rome; at length, the right of citizenſhip was given to other cities and people, both in Italy, and the provinces. It was thus St. Paul was a *Roman* citizen, Acts xvi. 21, 37, 38. xxii. 25, 26, 27. xxiii. 26. the city of Tarſus, in Cilicia, a native of which he was, having the right of *Roman* citizens. See MUNICIPAL cities.

For the *Roman* ſenate, their magiſtracy, conſuls, ſoldiery, tribes, courts, names, weights, meaſures, coins, and other matters relating to the antiquities of that people, their policy, religion, law, cuſtoms, &c. ſee the reſpective articles in this work.

ROMAN *alum*. See *Roman* ALUM.

ROMAN *purple* now denotes the dignity of a cardinal.

ROMAN or ROMISH *church* is that whereof the pope is head; ſo called in oppoſition to the reformed churches. See PAPISTS, and POPERY. See alſo CHURCH and REFORMATION.

The *Roman* law is the CIVIL *law*, or the written law, as compiled by the emperor Juſtinian.

A ROMAN *charity*, among *Painters*, is a picture of a woman ſuckling an old man. *Roman* knight, &c. See KNIGHT, &c.

ROMANS, *king of the*, in *Our Age*, is a prince elected and deſigned ſucceſſor to the German empire.

ROMAN *games*, *ludi Romani*, were ſolemn games, held in ancient Rome, thus called by way of eminence, and on account of their antiquity, as having been inſtituted by Romulus.

They were ſometimes alſo called *magni ludi*, from the great pomp and expence thereof; and ſometimes CONSUALIA, becauſe performed in honour of the god Neptune, who was alſo called *Conſus*, in his quality of god of ſecret counſels.

They alſo bore the denomination of *ludi* CIRCENSES, becauſe held in the Circus.

This ſolemnity, Halicarnaſſeus obſerves, was originally inſtituted by Evander, in honour of Neptune, under the name of ʽΙππιος, whence the feſtival itſelf was called ʽΙππιοκρατια; and was afterwards renewed by Romulus, in honour of the ſame deity, only under another name.

For Romulus, needing the advice of a god, to counſel him in the deſign he had to furniſh his new citizens with wives, applied to the god of ſecret counſel himſelf, Conſus; proclaimed the Conſualia; and invited his neighbours all around to the firſt celebration thereof.—The conſequence was the rape of the Sabine women, who came to be ſpectators thereof.

The great ceremony, in theſe games, conſiſted in a cavalcade of horſes and aſſes, adorned with garlands; Neptune being reputed the firſt author of riding on horſeback.

Their horſes here were of two kinds; viz. πομπικοι, or ſuch as were merely led up and down for ſtate, and δρομικοι, which were for race and exerciſe.

The other diverſions were fencing, and that till one of the combatants was killed on the ſpot; fighting with beaſts, and with the cæſtus, or whirlbats; wreſtling, running, leaping, ſea-fights, horſe-races, chariot-races, &c. Theſe games, Livy tells us, were improved, and rendered much more magnificent, by Tarquinius Priſcus. Manutius ſays, they were held on the eve of the nones of September; i. e. on the 14th day of the month.

ROMAN *order*, in *Architecture*, is that more uſually called the COMPOSITE.

ROMAN *balance*, *ſtatera Romana*, the STEEL-YARD.

ROMAN *indiction*. See INDICTION.

ROMAN *year*, &c. See YEAR, &c.

ROMAN *language*, &c. See LATIN, &c.

ROMANCE, anciently ROMAUNT, and ROMANT, a fabulous relation of certain intrigues and adventures, in the way of love and gallantry, invented to entertain and inſtruct the readers.

M. Fontenelle calls *romances* poems in proſe; and Boſſu is not averſe to their being admitted as poetical pieces, though not written in verſe.

Setting aſide the verſification, it is certain an epic poem and a *romance* are almoſt the ſame thing. The juſt notion, therefore, of a *romance* is, that it is a diſcourſe invented with art, to pleaſe and improve the mind, and to form or mend the manners, by inſtructions, diſguiſed under the allegory of an action, or ſeries of actions, related in proſe, in a delightful and probable, yet ſurpriſing manner.

A juſt *romance* conſiſts of two parts: viz. a moral, as its foundation, and end; and a fable, or action, as the ſuperſtructure and means.

It muſt alſo have the manners; that is, the characters muſt be diſtinguiſhed, and the manners muſt be neceſſary; and it muſt have all the other qualities of poetical manners.

The incidents muſt be delightful, and, to that end, rightly diſpoſed and ſurpriſing. The ſentiments fall under the ſame rules as in the drama.

But the diction is allowed to be more lofty, and figurative; as being a narration, and not having terror or pity, but admiration, for its end.

A *romance* of chivalry, according to the definition of a late writer, is any fabulous narration, in verſe or proſe, in which the principal characters are knights, conducting themſelves, in their ſeveral ſituations and adventures, agreeably to the inſtitutions and cuſtoms of chivalry.

As compoſitions of this kind have a long time been little elſe but hiſtories of amorous adventures, and feats of knight-errantry, the origin of *romances* is referred to that of love-hiſtories: and accordingly Dearchus, a diſciple of Ariſtotle, who firſt wrote of thoſe matters, is uſually termed the original author of *romances*. Though Photius is of opinion, that Antonius Diogenes's book on the errors and amours of Dinias and Dercyllis gave birth to moſt of the works of this kind. Be this as it will, it is certain the ancients have had their *romances* as well as we. Such are the Amours of Rhodanis and Sinonides, deſcribed in iambics; ſuch are the *romance* of Leucippe and Clitophon, compoſed by Achilles Tatius, a Greek writer, afterwards a biſhop; ſuch are the Four Books of Incredible Things, written by Damaſcius; ſuch are the Ethiopics of Heliodorus, wherein he relates the amours of

Theagenes and Chariclea. Laſtly, under the ſame claſs may be ranked the Fables of Parthenius Nicenus, of Athenagoras, Theodorus Prodromus, Euſtathius, and Longus.

Indeed antiquity could ſcarce be reconciled to ſuch pieces, and always looked on them as abuſes. Photius, in his Bibliotheca, cod. lxxxvii. gives a frightful account of that of Tatius; and the Ethiopics of Heliodorus, though one of the modeſteſt and moſt reſerved pieces of the kind, met with very ſevere treatment. The author was biſhop of Tricca, in Theſſalia, in the fourth century. Nicephorus tells us, that a ſynod, conſidering the danger which might accrue to youth from reading his *romance*, authoriſed as it was by the dignity of its author, propoſed it to him, either to ſuppreſs his book, or renounce his biſhoprick; and that he choſe the latter. But this hiſtory is a little doubtful.

Be this as it will, Heliodorus has ſerved as a model to all the *romances* wrote ſince; and the marriage of Theagenes and Chariclea has produced a very numerous iſſue, even all the *romances* now extant in the world.

In imitation of the archbiſhop Turpinus, who paſſed for author of the *romance* of the Feats of Charlemagne and Orlando, a great number of hiſtories, of the like kind, were written in France, during the time of Philip the Fair; the authors whereof ſeemed to improve on each other, contending who ſhould go fartheſt in the merveilleux. Theſe books, being intended for polite people, were written in the court language of that age, which was called the *romans*, *romant*, or *romantic*; whence the books themſelves were called by thoſe names: and thus, by degrees, *romans*, &c. became the general name of all books of this kind; whence, at length, our *romance*.

To this purpoſe, Creſcimbeni, reciting the ſeveral opinions, reſpecting the name *romanzo*, derives it from the word *Roma*, and tells us, that it means that vulgar idiom, which, with colonies of Romans, paſſed into Provence, and elſewhere, and was eſteemed, even by the barbarians, who inhabited thoſe kingdoms, and called *Romano* and *Romanzo*; and in this they wrote the acts and atchievements of knights; which writings were, therefore, ſtyled *romanzi*, or *romances*.

Others derive the word from the Spaniſh *romanſero*, *I invent*; as intimating *romances* to be mere fictions. And hence it is that the ancient poets of Provence, who were the firſt great dealers in *romances*, are called TROUBADOURS, q. d. finders, or inventors.

Creſcimbeni remarks, that the Italians derived from Provence, not only the origin and art of writing *romances*, but alſo the very ſubjects on which they were founded; and though it is not preciſely known who were the *romance* writers of Provence, yet many of their *romances* are found in the Italian libraries; and, indeed, from ſuch a ſource of poetical fiction as the country of Provence appears to have been, nothing leſs could be expected than a vaſt profuſion of *romances*, and other works of invention. See PROVENÇAL *poets*.

It has been a received opinion, amongſt modern critics, that the fictions of *romance* were communicated to the Weſtern world by means of the Cruſades. Mr. Warton (in his Diſſertation on the Origin of romantic Fiction in Europe, prefixed to the Hiſtory of Engliſh Poetry), is of opinion, that they were introduced at a much earlier period by the Saracens, who came from Africa, and ſettled in Spain, about the beginning of the eighth century. From Spain, he imagines, they found an eaſy paſſage into France and Italy; and the cloſe connection which ſubſiſted for many centuries between the Welſh and their coloniſts the Armoricans, might have been the means of bringing them from France into this iſland.

In examining the hypotheſis of Dr. Percy and Mr. Mallet, who derive theſe fictions, in a lineal deſcent, from the ancient hiſtorical ſongs of the Gothic bards and ſcalds, he allows this opinion to be in ſome meaſure well founded, and that ſo far it is alſo reconcileable with his own ſyſtem.

The ſcaldic inventions, he ſays, had undoubtedly taken deep root in Europe, and prepared the way for the more eaſy admiſſion of the Arabian fabling, about the ninth century, by which they were, however, in a great meaſure ſuperſeded. As a proof of which he obſerves, that the inchantments of the Runic poetry are very different from thoſe in our *romances* of chivalry. The former chiefly deals in ſpells and charms, ſuch as would preſerve from poiſons, blunt the weapons of an enemy, procure victory, allay a tempeſt, cure bodily diſeaſes, or call the dead from their tombs, in uttering a form of myſterious words, or inſcribing Runic characters. The magicians of *romance* are chiefly employed in forming and conducting a train of deceptions. There is an air of barbaric horror in the incantations of the ſcaldic fablers: the magicians of *romance* often preſent viſions of pleaſure and delight; and, although not without their alarming terrors, ſometimes lead us through flowery foreſts, and raiſe up palaces glittering with gold and precious ſtones. The Runic magic is more like that of Canidia in Horace, the romantic reſembles that of Armida in Taſſo. The operations of the one are frequently but mere tricks, in compariſon of that ſublime ſolemnity of necromantic machinery which the other ſo awfully diſplays.

He adds, it is alſo remarkable, that in the earlier ſcaldic odes we find but few dragons, giants, and fairies. Theſe were introduced afterwards, and are the progeny of Arabian fancy. Nor, indeed, do theſe imaginary beings often occur in any of the compoſitions which preceded the introduction of that ſpecies of fabling.

That the ideas of chivalry, the appendage and the ſubſtance of *romance*, ſubſiſted among the Goths, our author readily allows, but not without certain limitations. It was under the feudal eſtabliſhments, which were ſoon afterwards erected in Europe, that it received new vigour, and was inveſted with the formalities of a regular inſtitution.

From the whole of his obſervations, the author deduces the following general concluſion.

Amid the gloom of ſuperſtition, in an age of the groſſeſt ignorance and credulity, a taſte for the wonders of oriental fiction was introduced by the Arabians into Europe, many countries of which were already ſeaſoned to a reception of its extravagancies, by means of the poetry of the Gothic ſcalds, who, perhaps, originally derived their ideas from the ſame fruitful region of invention. Theſe fictions, coinciding with the reigning manners, and perpetually kept up and improved in the tales of troubadours and minſtrels, ſeem to have centered, about the eleventh century, in the ideal hiſtories of Turpin and Geoffrey of Monmouth, which record the ſuppoſititious atchievements of Charlemagne and king Arthur, where they formed the ground-work of that ſpecies of fabulous narrative called *romance*. And from theſe beginnings, or cauſes, afterwards enlarged and enriched by kindred fancies, fetched from the Cruſades, that ſingular and capricious mode of imagination aroſe, which at length compoſed the marvellous machineries of the more ſublime Italian poets, and of their diſciple Spenſer.

The French, above all other nations, have applied themſelves to this kind of writing; whether it be owing to the natural taſte and genius of the people, or to the freedom, &c. wherewith they converſe with the women. They began chiefly with *romances* of chivalry: hence their Amadis, in twenty-four volumes; Palmerin D'Oliva, and of England; king Arthur, &c. whereof we have an agreeable critique in Don Quixote.

The later *romances* are much more polite; the beſt of which are the Aſtrea of D'Urfe; the Cyrus and Clelie of Mademoiſelle de Scuderi; the Caſſandre and Cleopatra of La Calprenede; Ariane, Francion; and the Adventures of Telemachus, by the late archbiſhop of Cambray, worth all the reſt.

The Germans, too, have their *romances*; eſpecially Hercules and Herculiſcus, the Aramena, Octavia, Arminius Otbert, &c.

The Italians have their Eromena, by Biondi; the works of Loredano, Marino, &c. The Spaniards, their Diana, and Don Quixote. The Engliſh, their Arcadia, &c. And in modern times, the number has been ſo great, that our circulating libraries are full of them.

The Argenis of Barclay is rather a ſatire than a *romance*.

ROMANS, ROMANT, ROMANIC, or ROMANCE, the polite language formerly ſpoke at the court of France; in contradiſtinction to the WALOON, or ancient Gauliſh, ſpoke by the common people.

The *Romans* having ſubdued the Gauls, introduced part of their language among them; and a mixture of half Latin, half Gauliſh, or Celtic, conſtituted the *Romans*; whereof the modern French is only an improvement.

Hence, to *enromance* was to write in *romance*, &c. See ROMANCE.

Covarruvias, a learned Spaniſh writer, obſerves, that the name *romance* is generical, and belongs alike to the Tuſcan, French, and Spaniſh; inaſmuch as all theſe were derived from the purity of the Latin tongue, which the Romans, being conquerors, introduced into theſe provinces, and which, at firſt, the nobles ſpoke and wrote. He farther ſays, that the Latin tongue, being admitted into Spain, was ſpoken as in Rome, and that there were men well ſkilled in it, who ſpoke and wrote it with greater refinement than the vulgar; but upon the irruption of the Goths it was remarkably corrupted: that which was before Roman was converted into *Romance*, which is equivalent to its being derived from the Romans. And it farther appears, that the name *Romance* was given to the Spaniſh language, to diſtinguiſh it from the Gothic.

Mr. Planta, in his elaborate account of the *Romanſh* language (Phil. Tranſ. vol. lxvi. part i. p. 129, &c.), which is now ſpoken in the moſt mountainous parts of the country of the Griſons, near the ſources of the Rhine and the En, informs us, that this language conſiſts of two principal dialects; which, though partaking of the ſame general name, differ ſo widely as to conſtitute in a manner two diſtinct languages. One dialect, he ſays, which is ſpoken in the Engadine, a valley extending from the ſource of the En to the frontiers of the Tyroleſe, is by the inhabitants called *Ladin*. And he obſerves, that the *Romanſh* has never been uſed in any regular compoſition in writing, till the ſixteenth century, nor affected by any foreign invaſion, or intimate connection: but that it is at preſent the identical language that was ſpoken two hundred years ago.

This learned writer obſerves, that notwithſtanding the variety of conjectures and controverſies, which have occurred with regard to the Gallic *Romance*, it is agreed on all hands, that the vocabulary of the Roman, and the idiom of the Celtic, have chiefly contributed to its formation; and therefore, that it partakes of a common origin with that of the Griſons. He adds, that there are inconteſtible proofs that this language was once univerſal through France, and that this, and not immediately the Latin, hath been the parent of the Provençal, and afterwards of the modern French, the Italian, and the Spaniſh.

From a compariſon of two *Romances*, as well as from the ſimilarity of their origin, Mr. Planta infers, that they are one and the ſame language.

However, whilſt the Griſons neglected to improve their language, or had no opportunity for this purpoſe, the taſte and fertile genius of the troubadours, foſtered by the countenance and elegance of the brilliant courts and ſplendid nobility of Provence, did not leave theirs long in the rude ſtate in which we find it in the ninth century. But the change being gradual, and almoſt imperceptible, the French hiſtorians have fixed no epocha for the tranſition of the *Romance* into the Provençal. Nevertheleſs it appears, that the former language had received no conſiderable alteration in the twelfth century, and it ſtill bore the ſame name. But after this æra, though the name occurs, the language diſtinguiſhed by it is very different from the *Romance* of the ninth century. Allowing, however, the univerſal uſe of the *Romance* all over France, till the twelfth century, and that what the writers of theſe times ſay of the Gallic is to be underſtood of the *Romance*, of which there is ſufficient evidence, it follows, ſays Mr. Planta, that the language introduced into England under Alfred, and afterwards more univerſally eſtabliſhed by Edward the Confeſſor, and William the Conqueror, muſt have been an emanation of the *Romance*, very near a-kin to that which is now ſpoken in the Alps.

According to Du-Cange, the *Romance* had alſo penetrated into Scotland before the twelfth century. The ſame corruption, or coaleſcence, which gave riſe to the Gallic *Romance*, and that of the Griſons, muſt alſo have produced, in Italy, a language much reſembling, if not perfectly ſimilar, to thoſe two idioms. It appears alſo, from what has been already ſaid, that the language of the Romans penetrated very early into Spain, and that the *Romance* was very common in that kindom. The univerſality of the *Romance* in the French dominions, during the eleventh century, accounts for its introduction into Paleſtine, and many other parts of the Levant, by Godfrey de Bouillon, and other adventurers, who engaged under him in the Cruſades.

This writer farther adds, that the heroic atchievements and gallantry of the knights of the Croſs gave riſe to a ſwarm of fabulous narrations, which, though not an invention of thoſe days, were yet, from the name of the language in which they were written, ever after diſtinguiſhed by the appellation of *Romances*. And he preſumes, that the *Romance* hath been preſerved ſo near its primitive ſtate, not only in the country of the Griſons, but in ſeveral other remote and unfrequented parts.

ROME *ſcot*. }
ROME *peny*. } See PETER-*pence*.

ROMNEY *marſh*. See RUMNEY *marſh*.

ROMPEE, or **ROMPU**, in *Heraldry*, is applied to ordinaries, that are repreſented as broken; and to chevrons whoſe upper points are cut off: as in *Tab*. II. *Herald. fig*. 83. He beareth a chevron *rompee*, between three mullets, argent, by the name of Sault.

ROMPION This kind of bell flower was formerly much eſteemed, in England, for the ſweet taſte of the roots, and univerſally cultivated in kitchen gardens; but we at preſent diſregard it, though the French continue to be very fond of it. The ſeeds are to be ſown in a bed of light dry earth in March, and in May the young plants will be of a ſize to remove, or they may be left where ſowed, only hoeing them up to four inches diſtance; and being kept clean from weeds, for the remaining part of the ſummer, they will be fit for eating in the ſucceeding winter.

RONDEL, in *Fortification*, a round TOWER, ſometimes erected at the foot of a baſtion.

RONDELETIA, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has a permanent empalement, ſitting upon the germen, cut into five acute points; it has one funnel-ſhaped petal, with a cylindrical tube, longer than the empalement, cut into five roundiſh ſegments at the brim, which are reflexed; it has five awl-ſhaped ſtamina, terminated by ſingle ſummits; the roundiſh germen is ſituated under the flower, ſupporting a ſlender ſtyle, the length of the tube, crowned by an obtuſe ſtigma; the germen afterwards becomes a roundiſh crowned capſule, with two cells, incloſing two or three angular ſeeds in each.—Miller enumerates two, and Linnæus four ſpecies, natives of the Eaſt and Weſt Indies.

RONDINE, in *Ichthyology*, a name by which ſome authors have called the *milvus*, or FLYING-*fiſh*.

RONDINE *peſce*, in *Ichthyology*, a name by which ſome have called the *hirundo piſcis*, or SWALLOW-*fiſh*, called by others *mugil alatus*.

ROOD, a quantity of land, equal to the fourth part of an acre; and containing forty ſquare perches, or poles.

In Scotland, the *rood* contains forty ſquare falls. See FALL.

ROOF, in *Architecture*, the uppermoſt part of a building; being that which forms the covering of the whole.

The *roof* contains the timber-work and its furniture of ſlate or tile, wherewith the houſe is covered, or that which ſerves it as a cover. Though carpenters uſually reſtrain *roof* to the timber-work only.

The form of a *roof* is various: ſometimes it is pointed, in which caſe the moſt beautiful proportion is to have its profile an equilateral triangle.

Sometimes it is ſquare, that is, the pitch or angle of the ridge is a right angle; which, therefore, is a mean proportion between the pointed and the flat form.

A flat *roof* is that in the form and proportions of a triangular pediment. This is chiefly practiſed in Italy, and the hot countries, where little ſnow falls.

Sometimes the *roof* is in the pinnacle form.

Sometimes it has a double ridge. Sometimes it is cut, or mutilated, that is, conſiſts of a true and a falſe *roof*, which is laid over the former: this laſt is particularly called a *manſard*, from its inventor M. Manſard, a famous French architect.

Sometimes, again, it is in form of a platform; as in moſt of the Eaſtern buildings.

Sometimes it is truncated; that is, inſtead of terminating in a ridge or angle, it is cut ſquare off at a certain height, and covered with a terrace, and ſometimes this alſo incompaſſed with a balluſtrade.

Sometimes it is in manner of a dome; that is, its plan is ſquare, and the contour circular.

Sometimes it is round, that is, the plan is round or oval, and the profile ſpherical.

Sometimes the baſe being very large, it is cut off to diminiſh its height, and covered with a terrace of lead, raiſed a little in the middle, with ſky-lights from ſpace to ſpace, to give light to ſome corridore, or other intermediate piece, which without ſuch an expedient would be too dark.

ROOF *trees*, or **RUFF**-*trees*, are the timbers, in a ſhip, which go from the half-deck to the fore-caſtle. See ROUGH-*tree*.

The term is alſo uſed for the upper timbers of any building; whence, in the northern counties, it is common to ſignify a whole family, by ſaying, all under ſuch-a-one's *roof-tree*.

ROOF, *falſe*. See FALSE.

ROOF, *hip*. See HIP *roof*.

ROOF, *Attic of a*. See ATTIC.

ROOF-*tyles*. See TYLE.

ROOK, in *Ornithology*, a well-known bird of the CROW-kind.

This is the CORVUS *frugilegus* in the Linnæan ſyſtem; the characters of which are, that it is black, with an aſhen-colour face, and a roundiſh tail.

The *rook* does not much differ in form from the carrion crow, but is larger in ſize. What diſtinguiſhes the *rook* from the crow is the bill; the noſtrils, chin, and ſides of that, and the mouth, being in old birds white, and bared of feathers, by often thruſting the bill into the ground, in ſearch of the *erucæ* of the dor-beetle. *Rooks* live together in large flocks; whereas crows go in pairs;

they begin to build their neſts in March; but after the breeding ſeaſon deſert their neſt-trees, and go elſewhere to rooſt, returning to them in Auguſt, and repairing their neſts in October.

Rooks are very deſtructive of corn, eſpecially of wheat; though they clear the ground of caterpillars, that do incredible damage by eating the roots of the corn, and on this account may be conſidered as the farmers friends. They ſearch out the lands when it is ſown, and watching them more carefully than the owners, they perceive when the ſeed firſt begins to ſhoot up its little blade; as this is the time of their feeding on it, they will not be at the pains of ſearching for it at random in the ſown land, for that is more trouble than ſo ſmall a grain will requite them for; but as ſoon as theſe blades appear, they are directed, without loſs of time or pains by them, to the places where the grains lie; and in three or four days time they will root up ſuch vaſt quantities of them, that a good crop is often thus deſtroyed in embryo. After a few days the wheat continuing to grow, its blades appear green above ground, and then the time of danger from theſe birds is over; for then the ſeeds are ſo far robbed of their mealy matter that they are of no value to that bird, and it will no longer give itſelf the trouble to deſtroy them.

The beſt remedy the farmer has, is to watch well the time of the corn's being in the condition in which they feed upon it; and as this laſts only a few days, he ſhould keep a boy conſtantly in pay to watch the field from day-break till the duſk of the evening. Every time they ſettle upon the ground, or fly over it, the boy is to hollow, and throw up a dead *rook* into the air; this will always make them riſe, and by degrees they will be ſo tired of this conſtant diſturbance, that they will ſeek out other places of preying, and will leave the ground even before the time of the corn's being unfit for them. The reaſon of their riſing at the toſſing up of their dead fellow-creature is, that they are birds extremely apprehenſive of danger, and they are always alarmed when one of their comrades riſes. They take this for the riſing of an out-bird, and all fly off at the ſignal. Tull's Horſehoeing Huſbandry.

ROOM, in *Building*. See **Building.**

Room, *cook*. See **Cook**-*room*.

Rooms, *flight of*. See **Fugue.**

Rooms in houſes might be warmed by the ſteam of boiling-water conveyed in pipes along their walls. See Phil. Tranſ. Nº 476, p. 370, ſeq.

This contrivance is a copper with a ſtill-head, and a lead or copper pipe fixed to this head, which conveys the hot ſteam of the boiling-water through the different *rooms* intended to be warmed.

Room, in a *Ship*, a place diſtinguiſhed by partitions, or bulk-heads, as the gun-*room*, bread-*room*, cook-*room*, powder-*room*, &c.

ROOMER, in the *Sea Language*. A ſhip is ſaid to be a *roomer*, when ſhe is larger than ordinary.

ROOT, *radix*, in *Botany*, that part of a plant which immediately imbibes the juices of the earth, and tranſmits them to the other parts, for their nutrition.

The *root* conſiſts of woody fibres, covered with bark, more or leſs thick. It ariſes from a little point in the ſeed, called the *radicle*.

It is no ſmall difficulty to conceive, how the *root* ſhould always get downwards, and turn up the ſtem perpendicularly; conſidering that in the ſowing of plants the *radicle* muſt frequently happen to be upwards, and the plumule downwards. See **Perpendicularity.**

The *root* is always found in the ground, in terreſtrial plants, except in a very few caſes: the ivy and cuſcuta being perhaps the only plant where part of the *root* lies bare.

The *root* in plants has been obſerved to do the office of the ſtomach in animals; that is, to make the firſt and principal digeſtion of the alimentary matter. Mr. Reneaume ſhews that the *root* does the office of all the parts in the belly of animals deſtined for nutrition; it being the *root* that receives the nouriſhment, that prepares it, digeſts it, and alters and changes it into ſap, to be afterwards diſtributed to all the parts of the plant. See **Plants.**

The ſmell, colour, and even taſte, ſhew how conſiderable an alteration the juices undergo in the *root*; ſo that the *root* may be laid down as the great principle of vegetation.

Plants growing at the bottom of the ſea have this peculiar to them, that they have no *roots*; at leaſt the parts which do the office of *roots* have nothing of the uſual figure of other *roots*. Theſe plants are uſually faſtened to ſome ſolid body; adhering to it by a very ſmooth poliſhed lamina, which does not ſend forth any fibre. Add to this, that the body to which they adhere, being frequently a rock or flint, appears very unfit to feed them, in caſe they had *roots*. M. Tournefort, therefore, conjectures that they are fed by a juice afforded them by the thick oily mud at the bottom of the ſea, which they receive by the pores or the exterior ſurface of this lamina; but it is more probable that they are all over *root*, and take in nouriſhment from the water at all parts.

Boerhaave obſerves, that the *root* may have any ſituation at pleaſure, with reſpect to the body of the plant; nor needs to be either loweſt or higheſt. Accordingly, in the aloe, coral, moſſes, &c. the *root* is frequently uppermoſt, and its growth downwards.

Roots are generally divided by botaniſts into

1. *Fibrous*, which ſend out only ſmall ſtrings from the bottom of the plant, diſtinct from each other. Such are thoſe of moſt ſpecies of graſs. See **Fibrose** *roots*.

2. More *thick and groſs*, which have a body thick and large, either branched out into ſubdiviſions, or elſe ſending out fibres from it all along.

Theſe laſt are either *carnous*, which again are either,

- 1 *Broad* and ſwelling, or
- 2 *Long* and ſlender, which are commonly harder and more woody.

Broad and ſwelling *roots* are either

- 1. *Bulbous*, which conſiſt but of one globe, or head, and ſend out fibres from the bottom (ſee **Bulb**), and are either.
  - *Squamous* and ſcaly, as thoſe of lilies, martagon, &c.
  - *Coated*, or *tunicated*, which are involved in ſkins or coats, as in the cepa, hyacinthus, allium, &c.
- 2. *Tuberous*, which are of a carnous, ſolid, and continued conſiſtence, and theſe either,
  - 1. *Simple*, with but one globe or head, as rapa, crocus, &c.
  - 2. *Manifold*, as aſphodelus, pæonia, &c.

Under this diviſion we may reckon the **testiculated, palmated, grumose, granulose,** and **tap**-*roots*.

Long roots are either.

- (1) *Sarmentous*, i. e. twiggy, or branching, which ſhoot or creep out tranſverſly, or in breadth: of theſe ſome are geniculated, knotty, or jointy; as thoſe of couch-graſs, mints, &c.
- (2) *Cauliformes*, i. e. ſtemmy or ſtalky, which ſhoot down deep directly, though often ſending out fibres and ſtrings from the great ſtem; which alſo itſelf is ſometimes divided or branched.

The *roots* of plants of all kinds have great numbers of fibres iſſuing horizontally from them on all ſides, and running a great way; but theſe ſeldom go deeper than about ten or twelve inches, the depth to which the earth is commonly ſtirred in agriculture by the plough-ſpade. Some plants have all their *roots*, even the large ones, directed horizontally, and ſpreading in this manner; but of the others, even thoſe which have tap-roots, or ſuch as run perpendicularly down into the earth, the greater part have viſible fibres running horizontally from them in great numbers, and even thoſe which ſeem to have none, are not truly without them, they being only more fine, and therefore leſs diſtinguiſhable by the eye.

The horizontal *roots* iſſuing from the main body of the *root* ſeem to the eye to be ſhort, and reach only a little way, but they in reality extend many times farther than they ſeem to do, often ſpreading to the diſtance of many yards, after their extreme fineneſs and earthy colour make them imperceptible to the eye.

Mr. Tull has made experiments of this kind, and found that a turnep, which is a plant whoſe root ſeems to have as few, and thoſe as ſhort, fibres growing from its main ſtem as any, yet has ſuch as when the ground about it is properly moved by digging, extend to the diſtance of ſix feet every way. The diſtance to which theſe fibres of the *roots* of plants extend, may be diſcovered by trials with ſalt; the common garden-plants will not live, if their *roots* reach to a place where there is ſalt; therefore if ſeveral plants of the ſame kind be planted in different parts of the ſame bed of earth, and a trench dug round each at different diſtances, and ſalt buried in this trench, it will be ſeen by the decaying of ſome of theſe plants, and the thriving of others, according to the diſtance at which the ſalt lies, which of them has reached it with their *roots*, and which have not; that is, which ſalt is placed at a diſtance to which the plants cannot extend their *roots*, and which is the fartheſt place to which they do. If a furrow be cut in the ground of the depth of nine inches, and at the diſtance of a yard from a turnep-*root*, that *root* will extend its horizontal fibres to this diſtance at the depth of ſix inches or thereabout from the ſurface; but when they are come thus far they will deſcend perpendicularly below the level of the bottom of the furrow; and when they have paſſed it, they will riſe to the level of the others on the oppoſite ſide, and extend to the diſtance of a yard beyond it. This could ſcarce be conceived of a plant which ſeems to have ſo few horizontal fibres as the turnep, but experiment has ſhewn it to be a certain fact.

This is not peculiar to the turnep; for all other plants do it on occaſion. The open mould being the natural ſoil for them to draw nouriſhment from, if they deſcend perpendicularly out of this to avoid expoſing themſelves to the open air where there is a cut or ditch, as ſoon as they have paſſed this, they always mount upwards again to enjoy the vegetable mould again at their proper depth: this is the reaſon of what ſeems ſo ſtrange a thing in the turnep-fibres as their riſing after they had paſſed the furrow.

The *roots* of a common thorn-hedge may be obſerved to run horizontally in their natural direction; and if they come to a ditch they will deſcend perpendicularly, till lower than its bottom, and then running acroſs it, they will immediately mount again toward the ſurface, and extend themſelves horizontally, at the depth of eight or ten inches, to a great diſtance; on opening the earth at five feet diſtance from the ditch, the *roots* will be found tolerably large, and none of them reaching deeper than the common mould, which ſeldom is above a ſpade deep.

Mr. Tull mentions a very extraordinary inſtance of the ſpreading of the *roots* of trees in that of a witch-elm: a chalk-pit contiguous to a barn, the area of which was about forty perch of ground, was made clean and ſwept, ſo that it could plainly be ſeen that there was no vegetable matter about it, any more than in the floor of the barn; ſtraw was thrown from thence into the pit for cattle to lie on, and about three years after the pit was cleanſed, the dung made in it being taken up; the bottom of the pit, and the top of the chalk, were at this time covered with *roots*, and theſe were found to come from a wich-elm, of no more than five or ſix yards in height, which was above five yards above the area of the pit, and eleven yards from it; ſo that in three years the *roots* of this tree had extended themſelves to eight times the length of the body of the tree, beyond the extremity of the old *roots*, at eleven yards diſtance from the bottom of the trench, whence the original *roots* proceed. The annual increaſe of the length of the *roots*, in this caſe, was about three times as much as the whole length of the tree.

The vegetable mould which lies uſually from the ſurface, to about a foot deep, being a proper place for the *roots* of trees, they will riſe into it, though the unſkilful hand of man plant them deeper. Thus in an orchard where the trees are ſet too deep, their *roots* all aſcend till they come to a proper ſcene of nouriſhment; but if the ground be moiſt, there is a diſadvantage in this; for the *roots* paſſing through a watery place are chilled, and the circulation retarded.

The uſe of digging the earth to a great diſtance every way from the *roots* of ſuch plants as are deſired to thrive well, is evident from this; for theſe tender *roots* which in an open mould will run to ſo many feet diſtance, are pinched up, and deſtroyed when they come into a hard and undug earth. The advantage of having clear ſpaces between plants cultivated for uſe, is alſo plain from this, ſince they all have *roots*, though imperceptible to us, which occupy thoſe ſpaces, and draw nouriſhment from them.

The ſtirring of the earth about the *roots* of plants has been a practice long uſed by our gardeners, who were well acquainted with the effects of it, though ignorant of its cauſe. The *roots* of plants ſend out horizontal fibres every way, and theſe ſend out fibrillæ on every ſide from them, which run through the whole upper ſtratum of vegetable mould. Every time this mould is ſtirred, a great number of theſe fibres and fibrillæ are broken off, and the conſequence of this is, that they increaſe in number, ſeveral new *roots* always ſhooting out in the place of one that was broken off; and as the number of *roots* is the great means of the ſupply of a plant, every time the earth is ſtirred, that number, and conſequently that ſupply, is increaſed.

There ſeems no danger of the plant's being ſurfeited by an over ſupply of nouriſhment this way; for we ſee nature has provided for a diſcharge of the abundant moiſture by the other *roots*, as we find by the water diſcharged into the earth in the trough. Tull's Horſehoeing Huſbandry.

The *roots* of plants may be reverſed and turned into branches; and *vice verſa*, the branches into *roots*. This is called *planting reverſe*. See PLANTING, and PLANTING-*reverſe*.

ROOTS, in *Medicine*. The principal *roots* uſed in the practice of phyſic, are rhubarb, rhaponticum, ſarſaparilla, ipecacuanha, jalap, zedoary, galangal, caſſumenar gentian, turmeric, liquorice, madder, &c. See RHUBARB, RHAPONTIC, SARSAPARILLA, IPECACUANHA &c.

There are ſeveral ways of preparing *roots* for medicinal uſe in the eaſtern nations, which ſtrongly alter them from their original form and appearance. An inſtance we have of this in the drug called SALEP, which is no other than the *root* of an orchis thus prepared.

Other *roots* they alſo prepare in the ſame manner, or ſomething like it; an inſtance of which we have in ſome of the oriental ginſeng, which is clear and pellucid as a reſin, and friable like one, retaining very little of the ſtructure or appearance of the *root*. Kempfer gives the method by which the people in the Eaſt do this, and it may be well worth trying on ſome of our own *roots*.

The Chineſe, this author informs us, give their ginſeng its colour and tranſparence in this manner. They macerate the freſh *root* for three days in cold rice-water, then expoſe it in cloſe veſſels to the vapour of the ſame water; after which they carefully and leiſurely dry it, and it becomes hard and brittle, of a browniſh red colour, and as tranſparent as a reſin.

All the ginſeng of China is not of this ſort; and it has been ſuppoſed by ſome, that ſuch as was ſo had aſſumed that appearance by age, as many of the more ſucculent *roots*, which have very ſmall fibres, will become much leſs opake when perfectly dry than they were at firſt; but experience ſhews that this is not the caſe; for many perſons have kept the oriental ginſeng a great many years, but it has never been known to aſſume that appearance. There is no doubt, however, but that if the Weſt Indian ginſeng were treated in this manner, it would equal the prepared ginſeng of the Eaſt; for the roots of ſome of our umbelliferous plants, particularly the ſkirret, may be made clear and tranſparent in this manner, by only boiling it in common water, and afterwards drying it in the open air. Mem. Acad. Scienc. Par. 1740.

ROOTS, *flower*. See FLOWER.

ROOT *of oſteocolla*, a word uſed to expreſs a ſort of ſoft and rotten matter, on which the OSTEOCOLLA of Germany is found in ſandy grounds.

The workmen ſeek after the oſteocolla by the direction of certain lumps of a white marley matter, which they find lying on the ſands; under this they always find a parcel of rotten vegetable matter, branching out from a main ſtem or trunk, at ten or twelve feet deep up to the ſurface; this rotten ſubſtance they call the *root of the oſteocolla*; and they obſerve, that where the matter they ſeek after is not found round it at the time of their digging, they need only mark the place, and dig again a year afterwards, and they will find it formed in a perfect manner. The oſteocolla found near Frankfort is all of this kind; and we find the holes in the centre of all the pieces through which this *root* had paſſed. It is ſo tender, that it uſually moulders away on the *oſteocolla* being expoſed to the air; but ſometimes they waſh it out. Phil. Tranſ. Nº 39.

It is not eaſy to conceive what this is, unleſs the remains of foſſile branches of trees; but even then it is as difficult to account for the formation of the oſteocolla about them, as there is none of it found concreted where they are not. We have a ſort of oſteocolla found with us in what we call *petrifying ſprings*; but as this is done in the water, it is eaſier to conceive how it becomes ſo pure, than how a ſoft and pappy ſubſtance, found in the midſt of a bed of ſand, comes not to have ſome ſand embodied in it.

ROOT, *Indian arrow*. See ARROW-*root*.

ROOT, *China*. See SMILAX.

ROOT, *falſe China*, a ſpecies of *ſenecio*. See GROUNDSEL.

ROOT, *fever*, a ſpecies of *trioſteum*. See *Falſe* IPECACUANHA.

ROOT, *hollow*, a ſpecies of ADOXA.

ROOT, *roſe*. See ROSE-*root*.

ROOT, *ſeminal*. See SEMINAL.

ROOT, *ſnake*. See SNAKE-*root*.

ROOT, *black*, or *wild ſnake*, of America, a ſpecies of *actæa*. See HERB *Chriſtopher*.

ROOT, *Dr. Witt's rattle-ſnake*, a ſpecies of *prenanthes*. See *Wild* LETTUCE.

ROOT, *ſenegaw rattle-ſnake*, a ſpecies of *polygala*. See MILK-*wort*.

ROOT, *ſweet*, a ſpecies of *glycirrhiza*. See LIQUORICE.

ROOT-*grafting*. See ENGRAFTING.

ROOT, in *Mathematics*, denotes a quantity which is multiplied by itſelf; or a quantity conſidered as the baſis or foundation of a higher power.

Thus if any number, as 2, be multiplied by itſelf, the product 4 is called the *ſquare*, or ſecond power of 2: and 2 itſelf, with regard to that power, is called the *root*; or particularly the SQUARE *root* of 4.

Since, as unity is to the ſquare *root*, ſo is the *root* to the ſquare; the *root* is a mean proportional between unity and the ſquare. Thus 1 : 2 : : 2 : 4.

If a ſquare number, as 4, be multiplied by its *root* 2, the product 8 is called the *cube*, or third power of 2; and with reſpect to this cubic number 8, the number 2 is called *root*; or particularly the *cube root*.

Since as unity is to the *root*, ſo is the *root* to the ſquare; and as unity is to the *root*, ſo is the ſquare to the cube: the *root* will be to the ſquare, as the ſquare to the cube; i. e. unity, the *root*, the ſquare, and the cube, are in continual proportion: thus 1 : 2 : : 4 : 8. And the *cube root* is the firſt of the two mean proportionals between unity and the cube.

Root, *to extract the*, out of a given number, or power, as 8, is the ſame thing as to find a number, as 2, which, being multiplied by itſelf a certain number of times, v. gr. twice, produces the given number, 8.

A *root*, whether ſquare or cubic or of any higher power, if it conſiſts of two parts, is called a *binomial root*, or ſimply a *binomial*; as 24, or 20 + 4.

If it conſiſts of three, a *trinomial*; as 245, or 240 + 5; or 100 + 140 + 5. If of more than three, it is called *multinomial*; as 2456, or 2450 + 6, or 2400 + 56, or 2000 + 456, or 2000 + 400 + 50 + 6. See Extraction *of roots*.

Root *of an equation*, in *Algebra*, denotes the value of the unknown quantity in an equation.

Thus, if the equation be $a^2 + b^2 = x^2$, the *root* of the equation is expreſſed thus, $x = \sqrt{a^2 + b^2}$.

The extraction of the *roots* of algebraic quantities, may be performed in a manner analogous to that uſed in arithmetic, for extracting the *roots* of numbers; and if the *root* cannot be accurately found, the proceſs may be continued indefinitely, which will give a ſeries. Thus the quantity $aa + xx$ being propoſed, its ſquare *root* thus extracted will be found to be $a + \frac{x^2}{2a} - \frac{x^4}{8a^3} + \frac{x^6}{16a^5} - \frac{5x^8}{128a^7} + \frac{7x^{10}}{256a^9} -$, &c. See Newton's Method of Fluxions and Inf. Series, p. 4. of Mr. Colſon's edition. See alſo Extraction *of roots*.

But the extraction of *roots* may be abbreviated by that great author's binomial *theorem*, which he thus expreſſes in his letter to Oldenburgh.

$$\overline{P+PQ}^{\frac{m}{n}} = P^{\frac{m}{n}} + \frac{m}{n}AQ + \frac{m-n}{2n}BQ + \frac{m-2n}{3n}CQ + \frac{m-3n}{4n}DQ +, \&c.$$

Where $P+PQ$ ſignifies the quantity whoſe *root*, or dimenſion, or *root* of any dimenſion, is to be inveſtigated; P is the firſt term of the quantity, Q the reſt of the terms divided by the firſt. And $\frac{m}{n}$ is the index of the dimenſion or power of $P+PQ$, whether that denomination be a whole number, a fraction, affirmative, or negative. Laſtly, A, B, C, D, &c. repreſent the terms of the *root* as they are found; that is, A ſtands for the firſt term $P^{\frac{m}{n}}$, B for the ſecond $\frac{m}{n}AQ$, &c. The uſe of the rule will appear by a few examples.

1. To find the ſquare *root* of $cc + xx$; that is, $\sqrt{cc+xx}$, or $\overline{cc+xx}^{\frac{1}{2}}$. Subſtituting cc for P, $\frac{xx}{cc}$ for Q, 1 for m, 2 for n, $\overline{cc}^{\frac{1}{2}} = c = P^{\frac{m}{n}} = A$, &c. we ſhall have $\overline{cc+xx}^{\frac{1}{2}} = c + \frac{x^2}{2c} - \frac{x^4}{8c^3} + \frac{x^6}{16c^5} -$, &c.

2. In like manner $\frac{N}{\sqrt[3]{y^3 - a^2y}}$, or $N \times \overline{y^3 - a^2y}^{-\frac{1}{3}}$ will be found equal to $N \times \overline{\frac{1}{y} + \frac{a^2}{3y^3} + \frac{2a^4}{9y^5} + \frac{14a^6}{81y^7}} +$, &c. For $P = y^3$, $Q = \frac{-aa}{yy}$, $m = -1$, $n = 3$, $A = P^{\frac{m}{n}} = y^{3 \times -\frac{1}{3}} = y^{-1} = \frac{1}{y}$. $B = \frac{m}{n}AQ = -\frac{1}{3} \times \frac{1}{y} \times -\frac{aa}{yy} = \frac{aa}{3y^3}$, &c.

3. Simple powers may be found in the ſame way. Thus, if $\overline{d+e}^5$, or $\overline{d+e}^{\frac{5}{1}}$ were required. Then by the rule, $P = d$, $Q = \frac{e}{d}$, $m = 5$, and $n = 1$. Hence, $A = P^{\frac{m}{n}} = d^5$, $B = \frac{m}{n}AQ = 5d^4e$, &c. $C = 10d^3e^2$, $D = 10d^2e^3$, $E = 5de^4$, $F = e^5$; and laſtly, $G = \frac{m-5n}{6n}FQ = 0$. Here the ſeries terminates, and therefore $\overline{d+e}^5 = d^5 + 5d^4e + 10d^3e^2 + 10d^2e^3 + 5de^4 + e^5$.

4. Diviſion may be performed by the ſame rule. Thus, if it were required to divide 1 by $d+e$. Then $\frac{1}{d+e} = \overline{d+e}^{-1} = \overline{d+e}^{-\frac{1}{1}}$. Hence, by the rule, $P = d$, $Q = \frac{e}{d}$, $m = -1$, $n = 1$, $A = P^{\frac{m}{n}} = d^{-\frac{1}{1}} = d^{-1} = \frac{1}{d}$, $B = \frac{m}{n}AQ = -1 \times \frac{1}{d} \times \frac{e}{d} = -\frac{e}{d^2}$, and $C = \frac{ee}{d^3}$, $D = -\frac{e^3}{d^4}$, &c. That is, $\frac{1}{d+e} = \frac{1}{d} - \frac{e}{d^2} + \frac{e^2}{d^3} - \frac{e^3}{d^4} +$, &c. See Newt. Epiſt. ad Oldenburgh, tom. iii. Oper. Wallis. Analyſ. per Quant. Series, &c. Lond. 1711. p. 23, ſeq. and Newtoni Opera, Horſley, vol. i. p. 285, &c.

The method of extracting the *roots* of numbers, mentioned under the head extraction is the ſame as that given long ago by Vieta, and is to be met with in almoſt all books of arithmetic and algebra. Monſ. de Lagney and Dr. Halley have given us much more expeditious methods. Dr. Halley's rules for the ſquare and cube are inſerted under approximation. We ſhall here inſert the doctor's rules, which extend to the ſeventh power, and may eaſily be continued at pleaſure, the law of the continuation being obvious.

$$\sqrt{aa \pm b} = \sqrt{aa \pm b}, \text{ or } a \pm \frac{ab}{2aa \pm \frac{1}{2}b}.$$

$$\sqrt[3]{a^3 \pm b} = \frac{1}{2}a + \sqrt{\frac{1}{4}aa \pm \frac{b}{3a}}, \text{ or, } a \pm \frac{ab}{3a^3 \pm b}.$$

$$\sqrt[4]{a^4 \pm b} = \frac{2}{3}a + \sqrt{\frac{1}{9}aa \pm \frac{b}{6aa}}, \text{ or, } a \pm \frac{ab}{4a^4 \pm \frac{1}{2}b}.$$

$$\sqrt[5]{a^5 \pm b} = \frac{3}{4}a + \sqrt{\frac{1}{16}aa \pm \frac{b}{10a^3}}, \text{ or, } a \pm \frac{ab}{5a^5 \pm 2b}.$$

$$\sqrt[6]{a^6 \pm b} = \frac{4}{5}a + \sqrt{\frac{1}{25}aa \pm \frac{b}{15a^4}}, \text{ or, } a \pm \frac{ab}{6a^6 \pm \frac{1}{2}b}.$$

$$\sqrt[7]{a^7 \pm b} = \frac{5}{6}a + \sqrt{\frac{1}{36}aa \pm \frac{b}{21a^5}}, \text{ or, } a \pm \frac{ab}{7a^7 \pm 3b}.$$

For the application of theſe formulæ or rules, obſerve, that a denotes the neareſt *root* to that of the propoſed number, whether greater or leſs than the true; and that b is the difference between this *root*, involved to the proper power, and the propoſed number. Thus, if it were propoſed to extract the cube-*root* of 231, the neareſt cube to it is 216, the *root* of which is $6 = a$, and the difference between 231 and 216 is $15 = b$. The *root* required will therefore be $= \frac{1}{2}a + \sqrt{\frac{1}{4}aa + \frac{b}{3a}} = 3 + \sqrt{9 + \frac{5}{6}} = 3 + \sqrt{9.8333} = 6.1358$. But this is only a firſt approximation. For a ſecond, ſuppoſe $6.1358 = a$; then its cube will be $= 231.000853894712$, which is greater than the truth, and the difference $0.000853894712 = b$. Therefore the *root* $= \frac{1}{2}a + \sqrt{\frac{1}{4}aa - \frac{b}{3a}} = 3.0679 + \sqrt{9.41201041 - \frac{0.000853894712}{18.4074}} = 6.135792439661958978$, true to the eighteenth figure, which Dr. Halley aſſures us he computed within an hour. By this example the method of working may be ſufficiently clear, and the uſe of the double ſign ± is obvious. When a is leſs than the truth, then $a^3 + b$ repreſents the given number; but when a is greater than the truth, the propoſed number will be repreſented by $a^3 - b$. In the firſt caſe, the *root* is $\frac{1}{2}a + \sqrt{\frac{1}{4}aa + \frac{b}{3a}}$, or $a + \frac{ab}{3a^3 + b}$, and in the ſecond caſe it is $\frac{1}{2}a + \sqrt{\frac{1}{4}a^2 - \frac{b}{3a}}$, or $a - \frac{ab}{3a^3 - b}$.

Dr. Halley juſtly obſerves, that the irrational formula, $\frac{1}{2}a + \sqrt{\frac{1}{4}aa \pm \frac{b}{3a}}$ is preferable to the rational, $a + \frac{ab}{3a^3 \pm b}$; becauſe the extraction of the ſquare-*root* is much eaſier than a diviſion by ſo great a diviſor, as $3a^3 \pm b$.

Theſe rules give at leaſt triple the figures of the *root* at every new operation. Thus, in the foregoing example, by the firſt operation, we had five figures, viz. 6.1358 for the *root*; and at the ſecond, we had the *root* true to eighteen places.

Monſ. de Lagney publiſhed a rule for the furſolid *root*, or fifth power, which quintuplicates the figures of the *roots*, at leaſt. The rule is this:

$$\sqrt[5]{a^5 \pm b} = \frac{1}{2}a + \sqrt{\sqrt{\frac{1}{4}a^4 \pm \frac{b}{5a}} - \frac{1}{4}aa}.$$

See Phil. Tranſ. Nº 210, or Lowthorp's Abridgment, vol. i. cap. 1. ſect. 20. p. 81. Maclaurin's Algebra, p. 242. Simpſon's Algebra, p. 155. Where various general theorems for approximation to the *roots* of pure powers are given. See alſo EQUATION, and REDUCTION *of equations*.

For common uſe, theſe extractions may be moſt commodiouſly performed by logarithms; dividing the logarithm of the power by the index of the required *root*, that is, two for the ſquare, three for the cube, &c. the quotient is the logarithm of the *root*; which may therefore be found by the tables.

In ſome books we have tables of ſquare and cube numbers, by which the neareſt ſquare or cube to any propoſed number, within the limits of the table, may be found by inſpection. Preſtet has given a table of this kind in his Elemens des Mathematiques.

For the *roots* of adfected equations, ſee EQUATION, and REDUCTION *of equations*.

ROOT, *cube*, in *Algebra*. Obſerve, that the *cube-root* of any quantity A^3 may be A, or $\frac{-1+\sqrt{-3}}{2} \times A$, or $\frac{-1-\sqrt{-3}}{2} \times A$. This follows from what is ſhewn under UNITY, that the *cube-roots* of unity or 1 are 1, $\frac{-1+\sqrt{-3}}{2}$, $\frac{-1-\sqrt{-3}}{2}$. Hence the *cube roots* of A^3, or of $1 \times A^3$, will be as above mentioned. Maclaurin's Algebra, p. 226, where he ſhews the uſe of ſuch expreſſions.

ROOT, *falſe*. See FALSE.

ROOT, *impoſſible*, is not only the ſquare *root* of a negative quantity, but any other *root* denominated by any even number. Thus $\sqrt[4]{-1}$, $\sqrt[6]{-1}$, $\sqrt[8]{-1}$, or in general $\sqrt[2m]{-1}$, $\sqrt[2m]{-x}$, are all *impoſſible roots*, or quantities. Some call them imaginary *roots* or quantities. See FALSE *root*.

ROOT, *real*. See FALSE *root*.

ROOT, *reſidual*. See RESIDUAL.

ROOTS *of equations, extraction of the*. See EXTRACTION; and REDUCTION *of equations*, and ROOT *of an equation*, ſupra.

ROOTS, *radices*, in *Grammar*, are the primitive words of a language, whence others are compounded or derived.

Thus the Latin *fluo* is the *root* of *fluctus*, *fluxio*, *flumen*, *fluvialis*, *influxus*, *refluens*, *fluctifer*, *fluctiſonus*, *fluctivagus*, &c. Thus alſo the Greek ϑεος, is the *root* of αθεος, ενθεος, ενθουσιασμος, &c.

And thus alſo, though in a leſs proper ſenſe, the Daniſh *rood* is the *root* of the Engliſh word *root*; the Latin *radix* the *root* of the French *racine*, as *rodo* is the *root* of *radix*; and perhaps ῥαδιος, the *root* of *rado*.

The Greek and Hebrew tongues are learnt by *roots*. Of dictionaries, ſome are in alphabetical order, others are diſpoſed by *roots*, as Scapula, Faber's Theſaurus, and the firſt edition of the Dictionary of the French Academy. In the edition of 1718, this laſt is thrown into the uſual alphabetical order.

ROPALON, in *Botany*, a name given by ſome authors to the *nymphæa*, or *water*-LILY, and alſo to the *faba Ægyptia* of the river Nile.

ROPE, an aſſemblage of ſeveral twiſts or ſtrings of hemp, twiſted together by means of a wheel; of various uſes, as in binding, ſtaying, drawing, ſuſpending, &c.

When the *rope* is made very thick, it is called a *cable*; and, when very ſmall, a *cord*.

Though it be difficult to give a certain account of the forces required to bend *ropes* of different diameters, in making them go round bodies of different bigneſſes, yet to make no allowance for the loſs of motion ſuſtained thereby, would be as prejudicial to the practice of mechanics, as it would be to overlook the FRICTION of the parts of engines. The difficulty of aſcertaining this force ariſes from the different materials of which they are made, their different ſtiffneſs according as they are more or leſs twiſted; and ſometimes from the temperature of the air, as to moiſture and drineſs

Dr. Deſaguliers has computed the forces required to bend *ropes* of different diameters, ſtretched by different weights, round rollers of different bigneſſes. The reſult of his experiment is expreſſed in the following table.

Diameters of the *ropes* of three ſtrands, expreſſed in tenth parts of an inch	Weights ſtretching the *ropes*, expreſſed in lb. avoirdupois.	Reſiſtance about a roller of half an inch diameter, in oz. avoirdupois	Reſiſtance about a roller of one inch diameter, in oz. avoirdupois	Reſiſtance about a roller 1½ inch diameter, in oz. avoirdupois,
0.5	60lb.	225 oz.	112½ oz.	75 oz.
0.2	60	90	45	30
0.1	60	45	22½	15
0.5	40	150	75	50
0.2	40	60	30	20
0.1	40	30	15	10
0.5	20	75	37½	25
0.2	20	30	15	10
0.1	20	15	7½	*

On the whole, it has been found by experiments, that the difficulty of bending a *rope* round a roller decreaſes directly as the diameter of the roller increaſes, or is, inverſely, as the diameter of the roller. See Deſaguliers, Experim. Phil. vol. i. p. 233, &c. See CORDAGE.

A TABLE, ſhewing how many fathoms, feet, and inches of a *rope* of any ſize, under fourteen inches, makes a hundred weight, with the uſe of the table.

Inches	Fathoms	Feet	Inches	Inches	Fathoms	Feet	Inches	Inches	Fathoms	Feet	Inches	Inches	Fathoms	Feet	Inches
1	486	—	—	4¼	26	5	3	7½	8	4	—	10¾	4	1	8
1¼	313	13	—	4½	24	—	—	7¾	8	3	6	11	4	0	3
1½	216	—	—	4¾	21	3	—	8	7	3	6	11¼	3	5	7
1¾	159	3	—	5	19	3	—	8¼	7	0	8	11½	3	4	1
2	124	3	—	5¼	17	4	—	8½	6	4	3	11¾	3	3	3
2¼	96	2	—	5½	16	1	—	8¾	6	2	1	12	3	2	3
2½	77	3	—	5¾	14	4	6	9	6	0	0	12¼	3	2	1
2¾	65	4	—	6	13	3	—	9¼	5	4	0	12½	3	2	0
3	54	—	—	6¼	12	2	—	9½	5	2	0	12¾	2	7	8
3¼	45	5	2	6½	11	3	—	9¾	5	0	6	13	2	5	3
3½	39	3	—	6¾	10	4	—	10	4	5	0	13¼	2	4	9
3¾	34	3	9	7	9	5	6	10¼	4	4	1	13½	2	4	0
4	30	1	6	7¼	9	1	6	10½	4	2	2	13¾	2	3	6
												14	2	2	1

Suppoſe I want to know how much of 8 inch and ¼ *rope* will make a hundred weight? Find 8¼ under inches, and againſt it in the 6th column you find 7 0 8, which ſhews in a *rope* of 8¼, there will be 7 fathoms 8 inches required to make one hundred weight.

A TABLE, ſhewing the weight of any cable or *rope* of 120 fathoms in length, and for every ½ inch from 3 inches to 24 in circumference.

Inches	Cwts.	Qrs.	Inches	Cwts.	Qrs.	Inches	Cwts.	Qrs.	Inches	Cwts.	Qrs.	Inches	Cwts.	Qrs.
3	2	1	7½	14	0	12	36	0	16	64	0	20	100	0
3½	4	0	8	16	0	12½	39	0	16½	68	0	20½	105	0
4	4	1	8½	18	0	13	42	1	17	72	1	21	110	1
4½	5	0	9	20	1	13½	45	2	17½	76	2	21½	115	2
5	5	1	9½	22	2	14	49	0	18	81	0	22	121	0
5½	7	0	10	25	0	14½	52	2	18½	85	2	22½	126	2
6	9	0	10½	27	2	15	56	1	19	90	1	23	132	1
6½	10	2	11	30	1	15½	60	0	19½	95	0	23½	138	0
7	12	1	11½	33	0							24	144	0

The greateſt conſumption of *ropes* is in navigation, for the tackling of ſhips; where, though *ropes* include all ſorts of cordage, above one inch in circumference, yet there are ſeveral *ropes* particularly ſo denominated: as, the *entering-rope*, hung at the ladder to help people up; the *top-rope*; a *bolt-rope*, wherein the ſail is ſewed; *buoy-rope*, to which the buoy of the anchor hangs; *gueſt-rope*, to tow the long boat; the *keel-rope*; the *bucket-rope*; *rudder-rope*, to ſave the rudder, if it ſhould chance to be beaten off; *preventor-rope*, to ſave the yard, in caſe any part of the tyes ſhould be broken; *breaſt-rope*, to laſh the panels to the maſts; *guy-rope*, to keep the foremaſt forwards directly over the hatch-way; and *boat-rope*, by which the boat hangs, or is faſtened aſtern of the ſhip; *port-ropes*. See PORT-*ropes*.

Ropes are diſtinguiſhed by being either cable-laid, or hauſer-laid: the former are compoſed of nine ſtrands, viz. three great ſtrands, each of which is compoſed of three ſmaller ſtrands; and the latter is made with three ſtrands, each of which contains a certain number of *rope*-yarns, in proportion to the ſize of the *rope* required.

Ropes, *ſtanding*, in a *Ship*, the ſhrowds and ſtays are ſo called, becauſe they are not removed, unleſs to be eaſed or ſet taught.

Rope-*bands*. See Robbins.

Ropes, *drag*, in the *Artillery*, are thoſe by which the ſoldiers pull the guns backwards and forwards both in their exerciſe and in an engagement. They are of various lengths and dimenſions, as they are uſed for guns or howitzers of different weights.

Ropes, *foot*. See Foot-*ropes*.

Rope, *cord*, or *ſtrap*, in the *Manege*, is any of theſe tied round a pillar, to which the horſe is faſtened, when they begin to quicken, and ſupple, to teach him to fly from the ſhambrier, and not gallop faſtly or incompactly.

In thoſe maneges where there is no pillar, a man ſtands in the centre of the ground, and holds the end of the *rope*.

Ropes *of two pillars*, are the *ropes* or reins of a cavezon, uſed to a horſe that works between two pillars. See Pillar.

Rope-*dancer*. See Dancer, and Nusance.

Rope-*deck*. See Deck.

Rope-*yarn*, is the yarn of any *rope* untwiſted. It commonly conſiſts of cable-ends, which are worn out; and are called *junks of the cables*. It ſerves for many purpoſes among the ſailors.

Rope-yarn properly denotes the ſmalleſt and ſimpleſt part of any *rope*, being one of the threads of which a ſtrand is compoſed; ſo that the ſize of the latter, and of the rope into which it is twiſted, are determined by the number of *rope-yarns*.

ROQUET, in *Zoology*, the name of a ſpecies of American lizard, of ſmall ſize, and of a reddiſh brown colour, variegated with black and yellow ſpots. Its fore-legs are remarkably long for a creature of this kind; its eyes are particularly vivid and ſparkling, and its head is carried continually erect; and the creature is almoſt always in motion, hopping about like a bird, and it uſually carries its tail bent into a ſemicircle over the back. It is far from being ſhy or timorous, and is delighted at the ſight of men; when tired with play or with running, it will open its mouth and pant, and loll out its tongue as the dogs do.

RORIDULA, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are, that the corolla has five petals, the calyx is compoſed of five leaves, and the fruit is a three-valved capſule. There is only one ſpecies.

RORIFEROUS *duct*, q. d. *dew dropping-pipe*; a name given by ſome to the thoracic duct; from its flow manner of conveying, and, as it were, diſtilling, the chyle into the common ſtream of blood.

ROS, *dew*. See Dew.

Ros *ſolis*, in *Botany*. See Sun-*dew*.

Ros *vitrioli*, among *Chemiſts*, is ſometimes uſed for the firſt phlegm diſtilled from vitriol in balneo Mariæ.

ROSA, in *Botany*. See Rose.

Rosa *crucis*, in *Church Hiſtory*. See Rosycrucians.

Rosa *fatuina*, in *Botany*, a name given by ſome authors to the piony.

Rosa *Junonis*, in *Botany*, a name given by ſome authors to the lily.

ROSACEOUS *flower*, *roſaceus flos*, in *Botany*, a term uſed to expreſs ſuch flowers as are compoſed of ſeveral petals or leaves, diſpoſed in a ſort of circular form, like thoſe of the roſe: ſuch are the flowers of the piony, crowfoot, cinquefoil, &c. In this ſort of flowers the diſpoſition only of the leaves is regarded, their number being of no conſequence. It is very ſeldom that the number is two or four, except in the circæa and onagra. The moſt frequent number of leaves in theſe flowers is five, and ſuch as have four differ from the cruciform flowers, not only in their diſpoſition, but in this, that the number is in the ſame ſpecies indeterminately four, five, or ſix, as is the caſe in the clematitis, the capers, and the ſpecies of rue, whereas in the cruciform ones it is ever conſtant. See *Tab.* X. *of Botany*, *Claſs* 21.

ROSACLORUM, or, according to ſome authors *roſi-chiero*, a fine red uſed to enamel on gold with. It is prepared in this manner: take ten pounds of cryſtal-glaſs, put it into a pot, and when it is well melted, add to it, at twice, a pound of the beſt red-lead; ſtir the maſs well together, and afterwards caſt it into water. Repeat this proceſs three times, then when the matter is again in fuſion, mix with it five ounces of calcined braſs, and the ſame quantity of the deepeſt cinnabar; ſtir the whole well together, and let it ſettle three hours; then add of glaſs of tin three ounces, mix the whole, and it will be of a fine roſe-colour. Merret's Notes on Neri, p. 350.

ROSADE, a kind of liquor, prepared of pounded almonds and milk, mixed, with clarified ſugar.

ROSALIA, a name uſed by authors for the meaſles, or a diſeaſe very like the meaſles, conſiſting in a number of aſperities and protuberances of the ſkin, which ſoon die away.

ROSARBA, in *Botany*, the name of an imaginary plant, which has given great trouble to the commentators on the works of the ancients.

The Arabian writers, Avicenna, Serapion, and others, have mentioned two kinds of carob or ceration; the one eſculent, and endued with the virtue of a gentle purgative, the other an aſtringent.

This laſt they have diſtinguiſhed from the other by the name of the nabathæan pod or aljembut. They ſay, in their deſcriptions, that the aljembut is like the *roſarba*; ſo run the old tranſlations, but the true meaning of the original is *roſa vineæ*. This was a name given to the common wild acacia-tree, and the tree which produced the nabathæan pod, might be very well likened to this; it being, in reality, only a ſpecies of the acacia, and the ſuccus acaciæ, or inſpiſſated acacia juice of the ſhops; being, according to Iſidore, made oftentimes from the unripe fruit of this very ſpecies.

ROSARIA, among the Romans, a kind of perfumes, ſo called either from their being chiefly made of roſes, or becauſe they had a moſt exquiſite odour.

ROSARUM *acetum*. See Acetum.

ROSARY, in the Romiſh *Church*, a chaplet conſiſting of five or fifteen decads of beads, to direct the recitation of ſo many Ave Maria's, in honour of the Virgin.

Rosary alſo denotes a particular maſs or form of devotion addreſſed to the Virgin, to which the chaplet of that name is accommodated. It conſiſts of fifteen repetitions of the Lord's prayer, and an hundred and fifty ſalutations of the bleſſed Virgin; whilſt the *crown*, as it is called, according to the different opinions of the learned concerning the age of the Virgin, conſiſts of ſix or ſeven repetitions of the Lord's prayer, and ſix or ſeven times ten ſalutations or Ave Maria's.

Some attribute the inſtitution of the *roſary* to St. Dominic; but F. d'Achery ſhews it was in uſe the year 1100; ſo that St. Dominic could only make it more celebrated. Others attribute it to Paulus Libycus, and others to St. Benedict; others to the Chartreux; others to Venerable Bede; and, finally, others to Peter the Hermit. Thoſe who aſcribe it to St. Dominic, differ as to the particular time of its inſtitution; ſome referring it to the year 1208, when he preached againſt the Albigenſes; others will have him to have ſet it on foot in the courſe of his miſſions in Spain, before he paſſed into France.

Rosary, *order of the*, or of *our Lady of the* Rosary, is an order of knights, ſuppoſed by Schoonebeck, and the Jeſuit Bonanni, to have been inſtituted by St. Dominic, but by miſtake; for that ſaint never inſtituted any order under this name, and theſe authors apparently make a military order of an army of croiſes, who, under the command of the count de Montfort, fought againſt the Albigenſes.

The abbot Juſtiniani, and M. Hermant, will have this order to have been eſtabliſhed by an archbiſhop of Toledo, named Frederic, after St. Dominic's death; and to have borne for a badge a black and white croſs, in the middle whereof was repreſented our Lady, holding her little ſon in one hand, and in the other a *roſary*. F. Mendo adds, that they were obliged to rehearſe the *roſary* on certain days. After all, F. Helyot doubts whether or no ſuch an order in reality ever exiſted.

Rosary is a word frequently met with in the ancient hiſtories of Ireland, and uſed, to expreſs a peculiar ſort of baſe money coined abroad, in the form of the penny, current in that kingdom; but of ſo much baſer an alloy, that it was not worth quite half the real value of the penny. This and many other ſuch coins were decried, and it was made death to import any of them, by Edward the Firſt, in 1300.

ROSATA *aloe*. See Aloe.

ROSATUM *acetum*. See Acetum.

Rosatum *aromaticum*. See Aromaticum.

Rosatum *vinum*. See Vinum.

ROSBOTH, a word uſed by ſome authors to expreſs a ſoft excreſcence from any part.

ROSCOLÆ, a name given by ſome medical writers to the meaſles.

ROSE, *roſa*, in *Botany*, a genus of the *icoſandria polygynia* claſs. Its characters are theſe: the empalement of the flower is divided into five parts at the top, but the baſe is globular, and bell-ſhaped; the flower hath five oval heart-ſhaped petals inſerted in the empalement, and a great number of ſhort hair-like ſtamina, inſerted in the neck of the empalement terminated by three-cornered ſummits; it hath many germina ſituated in the bottom of the empalement, each having a ſhort hair ſtyle, inſerted in the ſides of the germina, crowned by obtuſe ſtigmas; the fleſhy baſe of the empalement afterward becomes a top-ſhaped coloured fruit with one cell, including many hairy oblong ſeeds, faſtened on each ſide to the empalement. Miller enumerates twenty-two ſpecies, including many varieties. Linnæus reckons fourteen ſpecies.

We have a vaſt variety of theſe beautiful flowers preſerved in our gardens; ſome few of which are natives of our own country, but the far greater number are of foreign origin. They are all propagated either by ſuckers, by layers, or by budding them on the other ſorts of *roſes*; the laſt method is but ſeldom practiſed, but is neceſſary for the finer ſorts which do not naturally ſhoot vigorouſly, and which produce few or no ſuckers. The beſt ſort of *roſe* for ſtocks is the Frankfort kind; the ſeaſon for doing it is in June, and there muſt be great care afterwards, that the ſtock produce no ſuckers at the bottom, for theſe would ſoon ſtarve the bud.

When *roſes* are to be propagated from ſuckers, they are to be taken off annually in October, and tranſplanted into nurſery-beds, or into the places where they are to remain. They always take root well the firſt year, but if ſuffered to remain on the ſtock longer, they grow woody, and often fail.

But the beſt method of obtaining vigorous plants, is, by laying down the ſhoots; this is to be done in autumn; and by the autumn following they will have taken root ſo well, that they may be taken off from the old plant, and removed to the places where they are to remain. Theſe may be tranſplanted any time from October to April, but the earlier the better.

Roſes, in general, delight in a rich moiſt ſoil, and an open ſituation, in which they will produce great quantity of flowers, and thoſe much more beautiful than when they are on a dry ſoil and ſhady ſituation.

All the pruning they require is to have their dead wood cut, and their ſuckers taken away every autumn; and if there are any very luxuriant branches they may be ſhortened, and the doing this will ſupply the other parts of the tree with freſh wood. Miller.

For the method of deſtroying inſects in *roſe*-trees, ſee PEACH.

The kinds of *roſes* chiefly uſed in medicine are the *red* and *damaſk roſes*. The *damaſk* are a good and ſafe gentle purgative for children, adminiſtered in infuſion, or by way of ſyrup. The doſe of the decoction, or ſtrong infuſion of the flowers, made into a ſyrup, with a proper quantity of ſugar, is a ſpoonful; but of the extract, obtained by inſpiſſating the decoction, from a ſcruple to a dram, is ſaid to be ſufficient for adults. The college of London directs the ſyrup to be made, by preſſing out the liquor remaining after the diſtillation of ſix pounds of damaſk roſes, and boiling it down to three pints; then, after it has ſettled for a night, adding five pounds of fine ſugar, and boiling the mixture to the weight of ſeven pounds and a half. A ſpoonful of this ſyrup appears to be equivalent to about three drams of the freſh flowers. The ſolutive matter of the flowers is combined alſo in the ſame manner, for the purpoſes of clyſters, with brown ſugar and honey; towards the end of the boiling down of the ſtrained decoction, an ounce of cummin ſeeds, bruiſed a little, and tied in a linen cloth, is added, and the liquor afterwards boiled with four pounds of brown ſugar, and two of honey. The *red* are aſtringent; but their aſtringency is greateſt before the flowers have opened, in which ſtate they are choſen for medicinal uſe, as a mild corroborant; the full blown flowers being probably as laxative as the former kind. The aſtringency of the buds is improved by haſty exſiccation in a gentle heat; by ſlow drying, both the aſtringency and colour are impaired. The freſh buds, clipt from the white heels, and beaten with thrice their weight of fine ſugar, form an agreeable conſerve; which is given in doſes of a dram or two, diſſolved in warm milk, in weakneſſes of the ſtomach, coughs, and phthiſical complaints. Mixtures of the *roſes*, with a larger proportion of ſugar, are made in the ſhops into lozenges; one part of the buds, clipt from the heels, and haſtily dried, and twelve parts of fine ſugar, are ſeparately reduced into powder, then mixed, and moiſtened with ſo much water as will render them of a due conſiſtence for being formed; or the conſerve is mixed with us much freſh ſugar as is ſufficient to bring it to a like conſiſtence; that is, about thrice its own weight.

A ſyrup is formed by infuſing ſix ounces of the dried *roſe*-buds in four pints, or four pints and a half of boiling water: and the infuſion is made into a ſyrup with ſix pounds of fine ſugar, or boiled to a ſyrupy conſiſtence with ſix or ſeven pounds of clarified honey: this ſyrup is chiefly valued for its gratefulneſs, and fine red colour; the mixture with honey is uſed as a mild, cooling detergent, particularly in gargariſms for inflammations, and ulcerations of the mouth and tonſils. The infuſions, acidulated with a little vitriolic acid, and ſweetened with ſugar, make a grateful, cooling, reſtringent julep, which is ſometimes preſcribed in hectic caſes and hæmorrhages, and ſometimes uſed as a gargariſm. The college of London orders two pints and a half of boiling water, mixed with a ſcruple of oil of vitriol, to be poured on half an ounce of the freſh buds, and an ounce and a half of fine ſugar to be diſſolved in the ſtrained infuſion. That of Edinburgh orders two pints of water, and half a dram of the acid, to half an ounce of the dry buds, and an ounce of ſugar. See INFUSION. Lewis's Mat. Med.

For the conſerve of the dog-*roſe*, ſee HIP.

It is a tradition among the ancients, that the god of love made a preſent to Harpocrates, the god of ſilence, of a beautiful *roſe*, the firſt that had been known, to engage him not to diſcover any of the private practices of his mother Venus. And hence it became a cuſtom to have a *roſe* placed in their rooms of mirth and entertainment, that under the aſſurance thereof they might be induced to lay aſide all conſtraint, and ſpeak what they pleaſed. Thus did the *roſe* become a ſymbol of ſilence; ſo that to be *ſub roſa*, *under the roſe*, denotes as much as to be out of danger of having any converſation divulged.

ROSE-WATER, a water drawn by diſtillation from damaſk *roſes*.

Six pounds of the freſh *roſes* ſtrongly impregnate, by diſtillation, a gallon or more of water ſtrongly with their fine flavour. On diſtilling large quantities, there ſeparates from the watery fluid a ſmall portion of a fragrant butyraceous oil, which liquifies by heat, and appears yellow, but concretes in the cold into a white maſs; an hundred pounds of the flowers afford ſcarcely half an ounce of the oil. The oil and water, uſed chiefly as perfumes and flavouring materials, are recommended by Hoffman as excellent cordials for raiſing the ſtrength and ſpirits, and allaying pain. They appear to be of a mild nature, and not liable to heat or irritate the conſtitution.

Roſe-water is, however, in great eſteem throughout the Eaſt, particularly in China and Perſia, where the trade thereof is very conſiderable. The *roſe*-leaves, remaining at the bottom of the ſtill, are kept under the name of *roſe* cakes for a perfume.

ROSE *bay*, in *Botany*. See OLEANDER.

ROSE, *campion*. See CAMPION.

ROSE, *China*, the name by which ſome call the *ketmia* of botaniſts. See *Syrian* MALLOW.

ROSE, *Chriſtmas*. See HELLEBORE.

ROSE, *corn*. See POPPY.

ROSE, *mountain-bay*, or *dwarf bay*, a name by which the CHAMÆRHODENDROS of botaniſts is ſometimes called. See KALMIA, and RHODODENDRON.

ROSE, *gelder*, a name ſometimes given to the *opulus*, or water-elder. See GELDER *roſe*.

ROSE, *Virginian gelder*. See SPIRÆA.

ROSE, *Martinico*. See *Syrian* MALLOW.

ROSE *of Jericho*, a name by which ſome call the *heſperis*. See *Dame's* VIOLET, and ANASTATICA.

ROSE *mallow*. See MALLOW.

ROSE, *South Sea*, a name ſometimes given to the *nerion* of botaniſts. See OLEANDER.

ROSE, *rock*, *ciſtus*, in *Botany*, a genus of the *polyandria monogynia* claſs. Its characters are theſe: the flower, which hath a five-leaved empalement, two of the middle alternate leaves being ſmaller than the other, has five large roundiſh petals, which ſpread open, and a large number of hairy ſtamina, which are ſhorter than the petals, and terminated by ſmall roundiſh ſummits; in the centre is ſituated a roundiſh germen, which becomes an oval, cloſe capſule, having in ſome five, and others ten cells, filled with ſmall roundiſh ſeeds. Miller enumerates eighteen ſpecies, which grow naturally in the ſouth of France, Spain, and Portugal; and Linnæus thirty-ſeven ſpecies.

The LADANUM is obtained from a ſpecies of *ciſtus*.

The ſeveral ſpecies of this beautiful ſhrub are to be propagated by ſowing their ſeeds on a gentle hot-bed, or on a warm border of common rich earth in March. When the plants are grown to be about an inch high, they ſhould be tranſplanted either into ſmall pots, or into a border of rich earth, placed at ſix inches diſtance. They will require ſome ſcreening from hard weather for the firſt winter, and muſt be watered at times. In the ſpring following, they muſt be very carefully removed, with as much as poſſible of their own earth about them, and be placed where they are to remain. They are very bad plants to remove when old.

They may alſo be propagated by cuttings, planting them in a rich bed in May or June, and ſhading them with mats, and watering them carefully for two months: they will by that time have taken root, and may be treated as the ſeedling plants of the ſame age. Miller.

ROSE-*root*, *rhodiola*, in *Botany*, a genus of the *dioecia octandria* claſs. Its characters are theſe: it hath male and female flowers in different plants; the male flowers have an empalement of one leaf, cut in four or five ſegments almoſt to the bottom; they have four obtuſe petals, and four nectariums, which are erect and ſhorter than the empalement, with eight awl-ſhaped ſtamina, which are longer than the petals, terminated by obtuſe ſummits; they have four oblong acute germina, without ſtyle or ſtigma, ſo are abortive; the female flowers have the ſame empalement as the male; they have four obtuſe petals, equal with the empalement, and have four nectariums like the male, with four oblong acute-pointed germina, ſitting upon an erect ſtyle, crowned by obtuſe ſtigmas; the germina afterwards become four horned capſules, compreſſed on their inner ſide, with roundiſh ſeeds. Miller reckons two, and Linnæus only one ſpecies.

ROSES, *eſſence of*. There is ſcarce a more valuable perfume in the world, than the eſſence of damaſk *roſes*, and ſcarce any thing is obtained from its ſubject with more difficulty, and in leſs quantity. All eſſences or eſſential oils are, while in the plant, contained in certain veſicles lodged in different parts, and of different ſtructure: theſe veſicles are in the *roſe* particularly ſmall and tender, and are placed very ſuperficially; the conſequence of this is, that there is originally but a very little of this eſſence in the flower, and this is the very ſubject that will be diſſipated and loſt when the flowers are gathered and thrown in a heap together, as they are ſucculent, and very quickly heat in lying together. To avoid all diſſipation and waſte of this choice eſſence, the *roſes* ſhould be thrown into the ſtill as ſoon as gathered, and diſtilled with very little water, and that in a balneum Mariæ; then the fire is to be continued ſo long as the flowers float ſeparate about in the water; but as ſoon as ever they form themſelves into a cake, and ſtick to the bottom, the diſtillation ſhould be finiſhed, as they then yield no more eſſence. With all theſe precautions, however, it is with great difficulty we can procure any eſſence of *roſes*. What we obtain by this diſtillation being chiefly a very odoriferous and fragrant water. In the warmer countries the ſame caution affords a larger quantity of oil, which may be ſeparated and preſerved under the name of the eſſence. In Italy, they make ſome quantity of it, but there it is very dear; a vaſt quantity of the flowers yielding only a very little eſſence, and that being thick and troubleſome in the procuring, as it every where ſticks to the veſſels.

It is to be obſerved, that the ſeaſon of the year as to wet or dry, makes a very great difference in the eſſential oils of all plants; they are always much finer in dry and hot ſeaſons, than in cold and moiſt: we find our *roſe*-water in England much finer, and more fragrant, though diſtilled in the ſame proportion, in hot and dry ſummers, than in cold and rainy ones; and Mr. Geoffroy gives an account that he ſucceeded, one very hot and dry year, in the making eſſence of *roſes* in France in the following manner.

As the *roſes* were brought to him freſh gathered, he turned them immediately into the ſtill; and drawing over the water into a glaſs matraſs, when it had ſtood by ſome time, and was perfectly cold, he diſcovered ſome of the eſſence fixed to the ſides of the matraſs, and the ſurface of the water covered with a thin reticular pellicle. All the contents of the matraſs were put to filter through a paper, ſupported by a fine linen cloth; and the filtrated water was added to new *roſes* for many ſucceeding diſtillations, the produce of which was all filtered through the ſame paper. After a long courſe of diſtillations, with freſh flowers every time, but ſtill with the ſame veſſels and the ſame water, there was found in the paper of the filtre a quantity of thick eſſence; this being carefully waſhed out of the paper, with a ſmall quantity of the moſt fragrant of the water, and afterwards ſeparated pure from its ſurface, was very white and extremely fragrant, and as thick as fine butter. This is not the only eſſential oil which naturally concretes into this firm ſtate; oil of aniſeed, though fluid when diſtilled, always concretes in the ſame manner on the firſt approach of cold; and another oil of this kind is that of the laurel, which is uſed in ſome places, though very improperly, to give the ſcent and taſte of bitter almonds, or apricot kernels, to foods of different kinds.

Monſieur Homberg has taught us how to gain a larger quantity of the eſſential oil of *roſes* than in the uſual diſtillation, by the previous addition of mineral acids, as the ſpirit of ſalt, vitriol, &c. thereto; which increaſe the fermentation, and joining with the oil, render it more liquid, and eaſier to be raiſed by heat. He adviſes a perfumer (who before ſcarce obtained an ounce of oil from a hundred weight of *roſes*) to ſteep his flowers, for fifteen days, in water made ſharp with the ſpirit of vitriol; by which means the perfumer, upon diſtillation, found his quantity of oil increaſed almoſt a third.

The perfumers keep the ſtructure of the veſſel they employ in this diſtillation a great ſecret. Mr. Homberg tells us, it is a large convenient ſtill, that opens in a tube at the top to receive the water, which muſt often be poured upon the *roſes*, to bring over the oil with it; this it does but very ſlowly, and ſo requires that its quantity be large; the ſtill alſo opens below, that the flowers, when they will yield no more oil, may be eaſily taken out; but the principal contrivance is the figure of the veſſel which receives the oil; this is made like an ordinary matraſs, from the lower part of the belly whereof comes a tube, as from an old-faſhioned cruet, and riſing to the bottom of the neck of the receiver, it bends outwards; ſo that though the veſſel uſually contains but two or three French pints, it conveniently receives and lets paſs many hundred pints of the *roſe*-water, without any neceſſity of being changed; for a change would loſe the ſmall quantity of the oil obtained. The water diſtilled runs through a pipe into a ſecond receiver: the oil being lighter than the water, floats upon its ſurface, and adheres to the neck of the veſſel, as high as the aperture of the little pipe, while the water runs from the bottom of the firſt receiver into the ſecond. See Mem. de l' Acad. des Sciences, 1700.

Mr. Homberg obſerves, that this ſtill may be uſeful to draw off any kind of precious eſſential oils.

ROSE-*fly*, in *Natural Hiſtory*, the name given by authors to a peculiar ſpecies of fly, found very frequent on *roſe*-buſhes, and produced out of a baſtard caterpillar, which feeds on the leaves of that tree.

The male of this fly has a long body, the female a ſhort and thick one; ſhe depoſits her eggs in ſmall holes, which ſhe makes in the bark of the young branches, and for this purpoſe is furniſhed with a very remarkable inſtrument, placed at the hinder part of the body, which is a kind of ſaw.

This is a four-winged fly, and is ſo common on *roſe*-buſhes, that it is ſcarce poſſible to miſs it in any of the ſummer months; and the parts of the branches where it has depoſited its eggs are ſo vitiated by it, that they alſo are eaſily known. They are uſually ſwelled to a greater bigneſs than either the part above or below them, and are uſually ſomewhat bent; they are often black on the under ſide, and among this blackneſs the holes made for the eggs, and often the eggs in them, may be ſeen. The head and breaſt of this fly are black; its wings alſo are edged with black, its body is yellow, and its legs yellow, with a few black ſpots.

If theſe flies be obſerved in a ſummer morning, as they are crawling on the branches of the *roſe*-tree, they will ſoon be found at work for the depoſiting of their eggs. Theſe creatures give us a very good opportunity of obſerving the manner in which they perform this, as they are of a very ſluggiſh diſpoſition, and will ſtand ſtill even to be taken between the fingers; ſo that when one of them is in a proper ſituation, it may be examined by bringing the eye near it, and by uſing the common magnifying glaſſes, without quitting its place or its work; and if there be leaves of the tree, or ſmall branches of it in the way, they may be removed without diſturbing the creature. Reaumur's Hiſt. Inſ. vol. ix. p. 145.

There is, beſides this ſpecies, another fly of the ſame genus, produced from a baſtard caterpillar of the *roſe*-tree, and of the ſame ſhape and ſtructure of parts with this, but different in colour. The head and breaſt of this fly are of a deep violet colour, the body is yellow, and the legs and wings are of a ſomewhat paler violet tinge. This creature alſo depoſits its eggs in holes, made in the branches of the *roſe*-tree, by means of a double ſaw, placed at the hinder part of the body; but, as the former ſpecies lays them in a ſingle ſtraight line, this diſpoſes them in a very beautiful and very regular manner in two rows.

ROSE-*galls*, in *Natural Hiſtory*, a name given by authors to certain unnatural productions of the *roſa ſylveſtris*, or dog-*roſe*, occaſioned by the bites of inſects. There are two kinds of theſe, the one very common, the other more rare.

The ſcarcer kind is uſually found on the young ſhoots, and on the heps, or fruit, and is of a woody ſubſtance, the other is hairy and ſpongy, and is found on the old branches. The woody kind uſually appears in the months of June and July, and is always found in cluſters. Theſe are compoſed of ten, twelve, or more galls of different ſizes and figures, ſome round, others oblong, ſome of the ſize of an olive, and others not larger than a pea. They are of the common ſubſtance of the white wood, or blea, of trees, and when ſituated on the fruit, they prevent its ripening, and make a very ſingular figure. They are of a reddiſh colour, and are uſually ſmooth and gloſſy, but ſometimes they are beſet with ſhort and fine prickles.

The hairy *roſe-gall* is too common, and too ſingular a figure to have eſcaped the obſervation of perſons in all ages; it has been introduced into medicine in many parts of the world, and is at this time preſcribed in Germany, when reduced to powder, in diarrhœas, dyſenteries, and other diſorders of the bowels, and to promote urine and break the ſtone.

Theſe *roſe-galls*, though they appear at firſt ſight compoſed of tufts of hair, are, however, in reality, made up of ſeveral ſmall galls, growing from a bud on the branch, and forming a cluſter on the part. They are of an oblong figure, and reſemble the ſhape of a plum-ſtone. Each of them is the habitation of a ſingle worm, each having one cell in the centre.

All theſe galls of the *roſe*-tree afford the ſame ſpecies of worms and flies. The proper inhabitants, however, are hardly to be diſtinguiſhed by the moſt curious obſerver from the great variety of ſpecies which are are found in them, all produced of the eggs of other flies, whoſe worms are of the carnivorous kind, and are lodged in the gall, not to feed on the juices of the tree, but on the fleſh of the proper inhabitant. When the parent-fly, who gives origin to the galls, has depoſited her eggs, and the tumor, in conſequence, begins to be formed, an enemy of this kind pierces the covering, and ſends in her offſpring to feed on the inhabitant. Theſe are flies of the ichneumon kind, and ſeveral ſpecies of them are of great beauty. All the flies deſcribed by authors as iſſuing out of this gall ſeem to have been of this kind: the proper inhabitant, being a ſmall black fly of no great beauty, is diſregarded, while the others have been particularly deſcribed.

Mentzelius has given an elegant account of a ſpecies whoſe back is of a fine blue, and its belly purple; and others have figured and deſcribed greeniſh and gold-coloured ones; but theſe are all ichneumons, all bred of devouring enemies which have fed on the proper inhabitants of the galls, and lived and transformed themſelves in their cells.

ROSES, *oil of*. See *Eſſence of* ROSES.

ROSE-*pink*. See PINK.

ROSE, *golden*, is a *roſe* which the pope bleſſes at maſs, on the firſt Sunday in Lent, while they ſing Lætare Jeruſalem; and which, after maſs, he carries in proceſſion; and then ſends as a preſent to ſome ſovereign prince.

ROSE, *the factions of the red and white*, are famous in our Engliſh hiſtories. They had their riſe in 1454, under Henry VI. between the houſes of York and Lancaſter, and ended in Henry VII. who united the two branches. The houſe of Lancaſter had for its badge a *red roſe*; that of York a *white* one.

ROSE-*wood*, *lignum rhodium*, or *aſpalathum*. See ASPALATH.

ROSE, in *Architecture* and *Sculpture*, an ornament cut in reſemblance of a *roſe*. See *Tab. Archit. fig.* 11.

It is chiefly uſed in friezes, corniches, and vaults of churches, and particularly in the middle of each face of the Corinthian ABACUS. And in the ſpaces between the modillions, under the plafonds of corniches.

ROSES, in *Heraldry*, is a DIFFERENCE denoting the ſeventh ſon of a family.

ROSE *nails*. See NAIL.

ROSE *diamond*. See DIAMOND.

ROSE *noble*, an ancient Engliſh gold coin, firſt ſtruck in the reign of Edward III. and then called the *penny of gold*; ſince called *roſe-noble*, becauſe ſtamped with a *roſe*. It was current at 6*s*. 8*d*. See MONEY.

ROSEA, a name given by ſome authors to the eryſipelas, or St. Anthony's fire.

ROSEMARY, *roſmarinus*, in *Botany*, a genus of the *diandria monogynia* claſs. Its characters are theſe: the flower has a tubulous empalement, compreſſed at the top, the mouth erect and divided into two lips, the upper lip entire, and the under bifid; it hath one petal, whoſe tube is longer than the empalement; the brim is ringent; the upper lip ſhort, erect, and divided into two parts, whoſe borders are reflexed; the lower lip is reflexed and cut into three parts; it hath two awl-ſhaped ſtamina, inclining towards the upper lip, terminated by ſingle ſummits, and a four-pointed germen, with a ſtyle, whoſe ſhape, length, and ſituation are the ſame with thoſe of the ſtamina, crowned by an acute ſtigma; the germen afterwards becomes four oval ſeeds, ſitting in the bottom of the empalement. Linnæus mentions only one, and Miller two ſpecies.

We have three or four varieties of this ſhrub in our gardens; they grow wild in the ſouth of France, and in Spain and Italy, on rocks near the ſea, where they multiply prodigiouſly. With us they grow the moſt vigorouſly on a moiſt rich ſoil, but they are much ſweeter ſcented when on a poor ſoil, and on ſuch they bear the ſeverity of our ſeaſons much better than where thy grow more freely.

They are all propagated by planting ſlips or cuttings of them in the ſpring of the year, on a bed of light freſh earth, and when they are rooted, they are to be removed into the places where they are to remain. The beſt ſeaſon for doing this is in the beginning of September; if they are planted later than this, they ſeldom live through the winter; therefore ſuch as are not tranſplanted at this time ſhould be left to the following ſpring, when March is a very good time for removing them; and, if this be done in ſhowery weather, they take root almoſt immediately. The plants are ſometimes killed in cold winters in our gardens, but when by accident they have rooted themſelves in an old wall, as is often the caſe, they ſtand all weathers unhurt, which is owing to their being ſtinted, and their roots dry.—Miller.

The flowers of *roſemary* are uſed on many occaſions, in medicine; they are cephalic, good in all nervous and hyſteric caſes, and are ingredients in many compoſitions of the ſhops; they are eſteemed of great ſervice in apoplexies, palſies, vertigoes, and epilepſies; they ſtrengthen the ſight, are good againſt a ſtinking breath; they are alſo preſcribed in obſtructions of the liver and ſpleen. The conſerve of the flowers, made by beating them with thrice their weight of ſugar, is an excellent thing to bring other medicines in theſe intentions into form, when they are intended to be given in boluſes and electaries: but the fragrance of the flowers being in a great meaſure deſtroyed by beating and bruiſing them, this conſerve has very little of the flavour of the *roſemary*.

The active matter of the flower reſides chiefly, if not wholly, in the cup, which, however, is weaker than the leaves or tops, though more pleaſant, and, therefore, generally preferred.

The HUNGARY *water*, ſo long famous in England, and elſewhere, is made of the flowers of *roſemary* diſtilled with rectified ſpirit of wine.

The leaves and tops of *roſemary*, diſtilled with water, yield a thin, light, pale-coloured eſſential oil, inclining a little to yellowiſh, or greeniſh, of great fragrancy, though not quite ſo agreeable as the *roſemary* itſelf. From one hundred pounds of the herb, in flower, were obtained eight ounces of oil: and the decoction, on being inſpiſſated, yields an unpleaſant, weak, bitteriſh extract. Tournefort obſerves, that thoſe ſorts of *roſemary*, which produce neither flowers nor ſeeds, and which have very hard ſhrubby ſtalks, and long narrow leaves, ſmell ſtrongly like camphor, and yield on diſtilling a large quantity, for the purpoſe of obtaining their oil, a portion alſo of real camphor.

ROSEMARY, *poet's*. See POET'S *caſſia*.

ROSEMARY, *Spaniſh*. See SPARROW-*wort*.

ROSEMARY, *wild*, *marſh ciſtus*, or *ledum*, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the empalement of the flower is indented in five parts; it hath five oval concave petals, ten ſlender ſtamina, and a roundiſh germen, which afterwards becomes a capſule with five cells, opening at the baſe in five parts, filled with ſmall, narrow, acute-pointed ſeeds.—We have but one ſpecies of this genus, which grows naturally upon moſſes and bogs, in many parts of Yorkſhire, Cheſhire, and Lancaſhire. Miller.

ROSEMARY, *leſſer wild*. See ANDROMEDA.

ROSICRUCIANS. See ROSYCRUSIANS.

ROSIN, *reſina*, in *Pharmacy*. See RESIN.

ROSIN is particularly uſed for a reſinous matter prepared from the juice of the pine-tree; in ordinary uſe for the making of ointment, plaſters, and for other purpoſes.

For the method of procuring it, ſee PINE, and TURPENTINE.

ROSLAND, in our old writers, heathy land, or ground full of ling: alſo watery and mooriſh land.

ROSMADIAN, a name uſed by the alchemiſts for what they call mercury of the philoſophers.

ROSMARUS, in *Zoology*, the name of an animal called alſo by ſome the ſea-horſe, and more uſually known by the name of MORSE.

ROSOLIS, or ROS-SOLIS, popularly, ROSA-SOLIS, *ſundew*, an agreeable ſpirituous liquor, formerly much in repute, chiefly taken after meals, by way of a dram, to aid digeſtion; being compoſed of burnt brandy, ſugar, cinamon, and milk-water, and ſometimes perfumed with a little muſk.

It had its name, becauſe anciently prepared wholly of the diſtilled water of the plant *ros ſolis* (ſee SUN-*dew*); but that plant was at length neglected in the compoſition.

The beſt was that of Turin. The French have now a particular kind not called *ros ſolis*, but *du roy*; becauſe uſed with good effect by Lewis XIV. It is compoſed of Spaniſh wine, wherein are infuſed aniſe, fennel, aneth, coriander, &c. for three weeks.

ROSOMACHA, or Rosomak, in *Zoology*, a name given by the Ruſſians to the GLUTTON. They are, ſays Olaus, taken by the hunters chiefly on account of their ſkins, which are much eſteemed by people of fortune for robes, as being variegated with very bright colours, reſembling flowers.

ROSPUS, a name uſed by ſome authors for the ſtrange fiſh called the *rana piſcatrix*, or frog-fiſh. See Sea-*devil*.

ROSSE, in *Ichthyology*, the name given by Bellonius to that kind of cyprinus of Artedi, which we call the ROACH.

ROST, in *Metallurgy*, a term uſed by the miners at Chremnitz to expreſs the ore of gold after it has been waſhed and powdered, and melted firſt with lime-ſtone, and afterwards burnt with charcoal alone. See Lech.

ROSTEN, in the *Materia Medica* of earlier ages, a name given to crab's eyes.

ROSTER, in *Military Language*, a plan, or table, by which the duty of officers, entire battalions, and ſquadrons, is regulated.

ROSTRA, in *Antiquity*, a part of the Roman forum, wherein orations, pleadings, funeral harangues, &c. were delivered.

The roſtrum was a kind of chapel, taken out of the forum, and furniſhed with a ſuggeſtum, or eminence, called more particularly the *roſtra*, where the orators ſtood to ſpeak.

It was adorned, or, as Livy ſays, built with the beaks of ſhips taken from the people of Antium, in a naval engagement; whence the name.

There were two kinds of *roſtra*; *roſtra vetera* and *roſtra nova*. The latter was erected by Auguſtus, and decorated with the prows of veſſels, which he took at the battle of Actium. The firſt were thoſe already deſcribed.

ROSTRALIS *corona*, *roſtral crown*, in *Antiquity*. See Crown.

Rostralis *columna*, *roſtral column*. See Column.

ROSTRATA, in *Zoology*. See Toucan.

ROSTRIFORMIS *proceſſus*, in *Anatomy*, the ſame as CORACOIDES.

ROSTRUM literally denotes the beak or BILL of a bird. This is a hard horny ſubſtance, conſiſting of an upper and under part, extending from the head, and anſwering to the mandibles in quadrupeds. Its edges are generally plain and ſharp, like the edge of a knife, or cultrated; ſometimes ſerrated, or jagged, or pectinated, or denticulated; but always deſtitute of real teeth immerſed in ſockets.

Hence the word is alſo figuratively applied to the beak, or fore-part of the head of a ſhip.

The *roſtrum*, or ſnout, in fiſhes, varies very much in figure, and ſerves as a conſiderable article of diſtinction. It is, 1. In ſome plagioplateous, or depreſſed, as in the pike, &c. 2. In ſome it is conic in ſhape, as in the oxyrynchus, &c. 3. In ſome it is extended into a long and ſharp point, as in the common ones. And, 4. In others it is triangular, or nearly ſo, as in the rays.

Rostrum is alſo uſed to ſignify an inſtrument wherewith paper is ruled for muſical compoſitions.

Rostrum, in *Chemiſtry*, ſignifies the noſe, or beak, of the common alembic, which conveys the liquor diſtilled into its receiver.

Rostrum is alſo a ſort of crooked ſciſſars, which the ſurgeons, in ſome caſes, make uſe of for the dilatation of wounds.

ROSYCRUCIANS, Rosicrucians, or *brothers of the* Rosy-cross, a name aſſumed by a ſect or cabal of hermetical philoſophers; who aroſe, as it has been ſaid, or at leaſt became firſt taken notice of, in Germany, in the beginning of the fourteenth century.

They bound themſelves together by a ſolemn ſecret, which they all ſwore inviolably to preſerve; and obliged themſelves, at their admiſſion into the order, to a ſtrict obſervance of certain eſtabliſhed rules.

They pretended to know all ſciences, and chiefly medicine: whereof they publiſhed themſelves the reſtorers. They pretended to be maſters of abundance of important ſecrets; and, among others, that of the philoſophers ſtone; all which they affirmed to have received by tradition from the ancient Egyptians, Chaldeans, the Magi, and Gymnoſophiſts.

Their chief was a German gentleman, called Chriſtian Roſencruz, educated in a monaſtery, where he learnt the languages. About the cloſe of the fourteenth century, he went to the Holy Land, where falling ſick, at Damaſcus, he conſulted the Arabs, and other eaſtern philoſophers, by whom he was ſuppoſed to be initiated into this wonderful art. At his return into Germany, he formed a ſociety, to whom he communicated the ſecrets he had brought with him out of the Eaſt, and finally died in 1484. The whole of this account is generally rejected as fabulous.

They have been diſtinguiſhed by ſeveral names, accommodated to the ſeveral branches of their doctrine.

Becauſe they pretend to protract the period of human life, by means of certain noſtrums, and even to reſtore youth, they were called *immortales*.

As they pretended to know all things, they have been called *illuminati*: and becauſe they have made no appearance for ſeveral years, but have kept altogether incognito, they have been called the *inviſible brothers*.

Their ſociety is frequently ſigned by the letters F. R. C. which ſome among them interpret *fratres roris cocti*; it being pretended, that the matter of the philoſophers ſtone is dew concocted, exalted, &c.

Some, who are no friends to free-maſonry, make the preſent flouriſhing ſociety of free-maſons a branch of *Roſicrucians*; or rather the *Roſicrucians* themſelves, under a new name or relation; viz. as retainers to building. And it is certain, there are ſome free-maſons who have all the characters of *Roſicrucians*; but how the æra and original of maſonry, as traced by Mr. Anderſon, and that of *Roſicrucianiſm*, here fixed from Naudæus, who has written expreſly on the ſubject, conſiſt, we leave others to judge.

Notwithſtanding the pretended antiquity of the *Roſicrucians*, it is probable that the alchemiſts, Paracelſiſts, or *fire-philoſophers*, who ſpread themſelves through almoſt all Europe, about the cloſe of the ſixteenth century, aſſumed, about this period, the obſcure and ambiguous title of *Roſicrucian* brethren, which commanded, at firſt, ſome degree of reſpect, as it ſeemed to be borrowed from the arms of Luther, which were a *croſs* placed upon a *roſe*.

But the denomination evidently appears to be derived from the ſcience of chemiſtry. It is not compounded, ſays Moſheim, as many imagine, of the two words *roſa* and *crux*, which ſignify *roſe* and *croſs*, but of the latter of theſe words, and the Latin word *ros*, which ſignifies *dew*. Of all natural bodies, dew was eſteemed the moſt powerful diſſolvent of gold: and the *croſs*, in the chemical language, is equivalent to *light*, becauſe the figure of a croſs + exhibits, at the ſame time, the three letters of which the word *lux*, or *light*, is compounded. Now *lux* is called, by this ſect, the ſeed or menſtruum of the red dragon, or, in other words, that groſs and corporeal light, which, when properly digeſted and modified, produces gold. Hence it follows, if this etymology be admitted, that a *Roſicrucian* philoſopher is one, who, by the intervention and aſſiſtance of the dew, ſeeks for light, or, in other words, the ſubſtance called the philoſophers ſtone.

The true meaning and energy of this denomination did not eſcape the penetration and ſagacity of Gaſſendi, as appears by his Examen Philoſophiæ Fluddanæ, ſect. 15. tom. iii. p. 261. And it was more fully explained by Renaudot, in his Conferences Publiques, tom. iv. p. 87.

At the head of theſe fanatics were Robert Fludd, an Engliſh phyſician, Jacob Behmen, and Michael Mayer. The common principles, which ſerve as a kind of centre of union to the *Roſicrucian* ſociety, are the following. They all maintain, that the diſſolution of bodies, by the power of fire, is the only way by which men can arrive at true wiſdom, and come to diſcern the firſt principles of things. They all acknowledge a certain analogy and harmony between the powers of nature and the doctrines of religion, and believe that the Deity governs the kingdom of grace by the ſame laws with which he rules the kingdom of nature; and hence they are led to uſe chemical denominations to expreſs the truths of religion. They all hold, that there is a ſort of divine energy, or ſoul, diffuſed through the frame of the univerſe, which ſome call the ARCHEUS, others the *univerſal ſpirit*, and which others mention under different appellations. They all talk in the moſt ſuperſtitious manner of what they call the ſignatures of things, of the power of the ſtars over all corporeal beings, and their particular influence upon the human race, of the efficacy of magic, and the various ranks and orders of demons. In fine, they all agree in throwing out the moſt crude incomprehenſible notions and ideas, in the moſt obſcure, quaint, and unuſual expreſſions. Moſh. Eccl. Hiſt. vol. iv. p. 266, &c. Eng. ed. 8vo. See Behmists and Theosophists.

ROT, a diſeaſe which, in moiſt years, is incident to ſheep, in the ſame ground where, in drier years, they are free from it; which yet ariſes, not only from the moiſture, but from a certain principle of putrefaction, both in the air, and the graſs.

The true cauſe of this diſorder is very imperfectly underſtood, if not altogether unknown. Many have ſatisfied themſelves with attributing it to moiſture in general; others have aſcribed it to the quick growth of graſs and herbs in wet places; a late writer conſiders it as an indubitable fact, that the inſects which are ſometimes found in the livers, &c. of ſheep, and which he deſcribes as reſembling the flat-fiſh called the plaiſe, are the cauſe of the *rot*; another writer conjectures that it is a diſorder of the liver, occaſioned by obſtructed and inſpiſſated bile; but amidſt this variety of opinion, nothing more can be inferred than that this is probably a putrid diſeaſe.

It is well known, that it is the greateſt of all the inconveniencies that attend the keeping of theſe uſeful animals. It is a very hard thing to prevent the *rot* if the year prove very wet, eſpecially in May or June. Salt-marſhes and lands where broom grows are the beſt places of preſervation for them. Sheep are ſometimes all cleared of the *rot* when not too far gone with it, only by removing them into broom-fields. Scurvy-graſs, muſtard, parſley, marſh-trefoil, and thyme, are alſo good for the prevention of it.

Some propoſe the giving ſheep half a handful of bay-ſalt, every month or oftener. A farmer is ſaid to have cured his whole flock of the *rot*, by giving each ſheep a handful of Spaniſh ſalt, five or ſix mornings ſucceſſively; and there is great probability that this may be of ſervice: but the rational way of attacking all diſorders in cattle, is by conſidering what are the cauſes of them. It will appear, upon enquiry, that wet ſeaſons are the general occaſions of the *rot* in ſheep, and therefore it would be adviſeable for the owners, when ſuch ſeaſons come on, to remove the animals into the drieſt paſtures they can, and then to feed them principally with dry ſweet hay, oats, bran, and the like, this would prevent the occaſion; and if they were already a little infected, ſome ſalt, given with their dry food, would be a happy means of curing them.

The two following receipts have been much recommended by thoſe who have tried them with ſucceſs. Steep ſome regulus of antimony in ale, adding to it ſome grains of paradiſe, and a little ſugar to ſweeten it.—Of this infuſion, two or three doſes, each doſe being ſomewhat leſs than a gill, are to be given to the infected ſheep, at the interval of two days.

Or, ſteep a handful of rue in a pail of water all night, and in the morning put in as much ſalt as will make it bear an egg. Let half a pint of this liquor be given to each ſheep, and repeated thrice, every other morning. A farmer, who kept four hundred ſheep, tried this remedy, in a general *rot*, and loſt none; though his neighbours loſt almoſt all theirs. Of twenty, to which this liquor was not adminiſtered, for the ſake of experiment, many were rotten.

The following receipt was preſented to the Royal Society, by Mr. Boyle, and is preſerved in their regiſter, vol. ii. p. 303. Some time before Allhollantide, the ſheep is to be blooded under the eye, and, if neceſſary, again in the ſpring; and, in October, his gums may be rubbed at three or four different times with Spaniſh ſalt. But the principal remedy conſiſts in this: that about Allhollantide, or ſomewhat ſooner, you take a ſmall handful of the forementioned ſalt, and making the ſheep hold up his head, compel him to ſwallow it, and keep him from drinking any thing for about an hour after.

ROTA, in *Mechanics*. See WHEEL.

ROTA *Ariſtotelica*, *Ariſtotle's wheel*, is the name of a celebrated problem in mechanics, founded on the motion of a wheel about its axis; thus called, becauſe firſt, that we know of, taken notice of by Ariſtotle.

The difficulty is this. While a circle makes a revolution on its centre, advancing at the ſame time in a right line along a plane, it deſcribes, on that plane, a right line, equal to its circumference. Now if this circle, which we may call the *deferent*, carry with it another ſmaller circle, concentric with it, and which has no motion but what it receives from the deferent; which is the caſe of the nave of a coach-wheel carried along by the wheel; this little circle, or nave, will deſcribe a line in the time of the revolution, equal, not to its own circumference, but to that of the wheel: becauſe its centre advances in a right line as faſt as that of the wheel does; as being in reality the ſame therewith.

The matter of fact is certain: but how it ſhould be, ſeems a myſtery. It is obvious, that the wheel, advancing during the revolution, muſt deſcribe a right line equal to its circumference; but how would the nave, which revolves like the wheel, deſcribe a right line ſo much greater than its circumference?

The ſolution Ariſtotle gives is no more than a good explication of the difficulty. Galileo, who next attempted it, has recourſe to an infinity of infinitely little vacuities in the right line deſcribed by the two circles; and imagines that the little circle never applies its circumference to thoſe vacuities; but in reality only applies it to a line equal to its own circumference; though it appears to have applied it to a much larger.

But it is evident, that this is all gratis dictum. The vacuities are imaginary; and why does not the great circle apply its circumference to them? Laſtly, the magnitude of theſe vacuities muſt be augmented or diminiſhed according to the different proportion of the two circles.

F. Tacquet will have it, that the little circle, making its rotation more ſlowly than the great one, does on that account deſcribe a line longer than its circumference; yet without applying any point of its circumference to more than one point of its baſe. But this is no more allowable than the former.

The attempts of ſo many great men proving vain, M. Dortous de Meyran, a French gentleman, had the good fortune to hit on a ſolution, which he ſent to the royal Academy of Sciences; where being examined by Meſſ. de Louville and Saulmon, appointed for that purpoſe, they made their report, that it was ſatisfactory. The ſolution is to this effect:

The wheel of a coach is only acted on, or drawn in a right line; its circular motion or rotation ariſes purely from the reſiſtance of the ground whereon it is applied. Now this reſiſtance is equal to the force wherewith the wheel is drawn in the right line, inaſmuch as it defeats that direction; of conſequence, the cauſes of the two motions, the one right, the other circular, are equal; and therefore their effects, i. e. the motions, are equal. And hence the wheel deſcribes a right line on the ground equal to its circumference.

As for the nave of the wheel, the caſe is otherwiſe. It is drawn in a right line by the ſame force as the wheel; but it only turns round becauſe the wheel turns, and can only turn with it, and at the ſame time therewith.

Hence it follows, that its circular velocity is leſs than that of the wheel in the ratio of the two circumferences; and therefore its circular motion is leſs than its rectilinear one.

Since then it neceſſarily deſcribes a right line equal to that of the wheel, it can only do it by ſliding, or what they call the motion of *rotation*; that is, a part of the circular nave cannot be applied to a part of a right line greater than itſelf but by ſliding along that part, and that more or leſs, as the part of the nave is leſs than that of the circle.

ROTA is alſo uſed for a particular court of juriſdiction in Rome, eſtabliſhed for taking cognizance of beneficiary matters, &c.

The *rota* conſiſts of twelve doctors choſen out of the four nations of Italy, France, Spain, and Germany; three of them being Romans, one a Florentine, one a Milaneſe, one of Bologna, one of Ferrara, one a Venetian, one a Frenchman, two Spaniards, and one a German, each having four clerks or notaries under him.

Their office is to judge of all beneficiary cauſes, both within Rome, and throughout the ſtate of the church, in caſe of appeal, and of all civil proceſſes which are for above five hundred crowns.

They are alſo called *chaplains* of the pope, as ſucceeding the ancient judges of the ſacred palace, who held their court in his chapel.

The denomination *rota*, *wheel*, ſome will have derived hence, that they officiate by rotation; others, becauſe the moſt important affairs of the Chriſtian world turn upon them. Du-Cange derives it from *rota porphyretica*, becauſe the pavement of the chamber where they formerly ſat was of porphyry, and faſhioned like a wheel.

ROTATED, *rotatus*, in *Botany*, the name of a ſort of flowers, ſo called from their ſhape, ſomewhat reſembling a wheel. Theſe are of the monopetalous kind, and are only a ſub-diſtinction of the INFUNDIBULIFORM flowers. *Tab.* VIII. *of Botany*, *Claſs* 2.

ROTATION, *rolling*, in *Mechanics*. See ROLLING.

ROTATION, in *Geometry*, the circumvolution of a ſurface round an immoveable line, called the *axis of rotation*.

By ſuch *rotation* of planes, the figures of certain regular ſolids are formed or generated.

The method of cubing ſolids, generated by ſuch *rotation*, is laid down by M. de Moivre, in his ſpecimen of the uſe of the doctrine of fluxions. For the fluxions of ſuch ſolids take the product of the fluxion of the abſciſſa, multiplied by the circular baſe; and ſuppoſe the ratio of a ſquare to the circle inſcribed, to be as $\frac{n}{1}$; the equation expreſſing the nature or property of any circle, whoſe diameter is *d*, is $yy=dx-xx$. Therefore $4\frac{dx\dot{x}-x^2\dot{x}}{n}$ is the fluxion of a portion of the ſphere, and conſequently the portion itſelf $4\frac{\frac{1}{2}x\,d\,x-\frac{1}{3}x^3}{n}$, and the circumſcribed cylinder is $4\frac{dxx-x^3}{n}$; therefore the portion of the ſphere is to the circumſcribed cylinder as $\frac{1}{2}d-\frac{1}{2}x$ to $d-x$. Phil. Tranſ, Nº 216.

For other inſtances of this kind, and a view of the application of the doctrine of fluxions, to finding the contents of ſolid bodies, ſee SOLIDITY. See alſo CENTROBARYC *method*.

ROTATION, *revolution*, in *Aſtronomy*. See REVOLUTION.

ROTATION, *diurnal*. See DIURNAL, and EARTH.

ROTATION, in *Anatomy*, the action of the *muſculi rotatores*; or the motion which they give to the parts they are fixed to.

There are two muſcles, the great and the little obliquus, uſed to perform the *rotation* of the eye. The obturator internus and externus effect the *rotation* of the thighs.

Mr. Winſlow has given an account of this, as well as of pronation, and other circulatory animal motions. See Mem. de l'Acad. des Sciences, 1729.

ROTATOR, in *Anatomy*, a name given to the oblique muſcles of the eye, called alſo from the direction of the fibres *circulares*, and from the effect of their action *amatorii*.

ROTCHET, an Engliſh name for the fiſh, called by authors *cuculus*, and more frequently by us the red *gurnard*.

ROTELE, in *Ichthyology*, a name by which ſome call the *rutilus latior*, or *rubellio fluviatilis*, more frequently known by the name of the *rud* or *finſcale*, a river fiſh, with red belly-fins and tail. See RUBELLIO.

ROTHALS, in *Ornithology*, a name given by Geſner, and ſome others, to the *pochard*, or *red-headed wigeon*; a bird diſtinguiſhed from all others of the duck-kind, by having no variegation in its wings. See POCHARD.

ROTHBEINLEN. See RED-*ſhank*.

ROTHER-*beaſts*, a word uſed in old ſtatutes, and ſtill in the northern parts of England, for any horned beaſts; as oxen, cows, ſteers, heifers, &c.

Whence *rother-ſoil*, in Herefordſhire, is taken for the dung or ſoil of ſuch cattle.

ROTHER-*nails*, are ſuch as have a very large head, and are uſed to faſten the rudder-irons in ſhips. See RUDDER.

ROTKNUSSEL, in *Ornithology*, a name by which the Germans call the *gallinula melampus* of Geſner. It is a bird ſomewhat approaching to the ſnipe-kind; its back is brown with a ſlight admixture of reddiſh, and ſome ſpots of a duſky colour; its wings are variegated with black and white, and its beak and legs are black. It is common in many parts of Germany.

ROTOLO, an Egyptian weight of twelve ounces, each ounce conſiſting of twelve drachms, and each drachm of ſixteen carats.

ROTONDO, *rotundo*, in *Architecture*, a popular term for any building that is round both within and withoutſide, whether it be a church, hall, a ſaloon, a veſtible, or the like.

The moſt celebrated *rotundo* of antiquity is the PANTHEON at Rome, dedicated to Cybele, and all the gods, by Agrippa, ſon-in-law of Auguſtus; but ſince conſecrated by pope Boniface IV. to the Virgin, and all the ſaints, under the title of Sta. Maria della *Rotondo*.

The chapel of the Eſcurial, which is the burying-place of the kings of Spain, is alſo a *rotondo*; and in imitation of that of Rome, is alſo called Pantheon.

ROTSCHWENTZEL, in *Ornithology*, the name of a bird deſcribed by Geſner, and ſome other authors, and ſeeming to be the ſame with our *ruticilla*, or RED-*ſtart*.

ROTSIMPA, in *Ichthyology*, a name given by the Swedes to a ſpecies of cottus, called by Jonſton and Schonveldt *ſcorpius marinus*. It is different from the *ſcorpæna* of the generality of writers, and is of the cottus kind. It is diſtinguiſhed by Artedi under the name of the *ſmooth cottus*, with many thorns upon the head, and with the upper jaw ſomewhat longer than the under one.

ROTTEN *ſtone*. See TRIPOLI.

ROTTENNESS, *putredo*. See PUTREFACTION.

ROTULA, in *Anatomy*. See PATELLA.

ROTULA, in *Natural Hiſtory*, the name of a genus of the *echini marini*, of the general claſs of the placentæ. The characters of the *rotulæ* are, that they are flat ſhells in form of a cake, compoſed of various flat pieces, and formed into a round, ſomething like that of a wheel, but wanting one or more parts of its outer ring, and radiated or dentated; their mouth is ſituated in the middle of the baſe, and the aperture of the anus in the third region of the axis, and marked with a cinquefoil flower at the ſummit. The great and obvious character is, however, the dentated edge. Of this genus there are two known ſpecies. See *Table of Teſtaceous Animals*, Nº 10.

ROTULA, in *Ichthyology*, is alſo a name given by ſome to the faber, or DOREE.

ROTULI *magni ingroſſator*. See INGROSSATOR.

ROTULORUM *cuſtos*. See CUSTOS.

ROTULUS, a *roll*. See ROLL.

ROTULUS *contrarientium*. The earl of Lancaſter taking part with the barons againſt king Edward II. it was not thought fit, in reſpect of their power, to call them rebels or traitors, but only *contrarients*; accordingly, we have a record of thoſe times called *rotulus contrarientium*.

ROTULUS *Wintoniæ*, an exact ſurvey of all England, by counties, hundreds, and tithings, made under king Alfred, not unlike that of *Domeſday*.

It was thus called, becauſe anciently kept at Wincheſter, among other records of the kingdom.

ROTUNDO. See ROTONDO.

ROTUNDUS, in *Anatomy*, a name given to ſeveral muſcles from the roundneſs of their body.

Such are the *rotundus major*, called alſo *teres major*, and the *rotundus minor*, called alſo *teres minor*, and *tranſverſalis*. See *Tab. Anat. (Myol.) fig.* 2. *n.* 13. *fig.* 6. *n.* 12, 13. *fig.* 7. *n.* 14. 34. and 35.

ROTUNDUS, *pronator radii*. See PRONATOR.

ROUAGE, *battery en*. See BATTERY.

ROUCOU, otherwiſe called *annotto* and *orlean*, is a red dye, formed in maſſes, from the pellicles of the ſeeds of an American tree. For this purpoſe the red ſeeds, cleared from the pods, are ſteeped in water for ſeven or eight days, or longer, till the liquor begins to ferment; then ſtirred and ſtamped with wooden paddles and beaters, to promote the ſeparation of the red ſkins; this proceſs is repeated ſeveral times, till the ſeeds are left white. The liquor, paſſed through cloſe cane ſieves, is pretty thick, of a deep red colour, and very ill ſmell. In boiling, it throws up its colouring matter to the ſurface, in form of ſerum, which is afterwards boiled down by itſelf to a due conſiſtence, and made up while ſoft into balls. That which is commonly met with among us is immoderately hard and dry, of a brown colour on the outſide, and a dull red within. Labat informs us, that the Indians prepare a dye of this ſort much ſuperior to that which is brought to us; of a bright ſhining red colour, almoſt equal to carmine. For this purpoſe, inſtead of ſteeping and fermenting the ſeeds in water, they rub them with the hands, previouſly dipt in oil, till the pellicles come off, and are reduced into a clear paſte, which is ſcraped off from the hands with a knife, and laid on a clean leaf, in the ſhade, to dry. De Laet, in his notes on Marcgrave's Natural Hiſtory of Braſil, mentions two kinds of *roucou* or annotto; one of a permanent crimſon colour, uſed as a *fucus*, and another which gives a colour inclining more to that of ſaffron. This laſt, which is our annotto, he ſuppoſes, to be a mixture of the firſt ſort with certain reſinous matters, and with the juice of the root of the tree. See ANNOTTO.

ROVER. See PIRATE.

ROVES, in *Ship-Building*, ſmall ſquare pieces of iron, with a hole punched in the middle, through which the nail goes, where it is clenched, and binds together the boards of pinnaces, yawls, &c.

ROUGE-*croix*, q. d. *red croſs*. See POURSUIVANTS.

ROUGE-*dragon*, q. d. *red dragon*. See POURSUIVANTS.

ROUGET, in *Ichthyology*, a name given by the French to the fiſh called the *lyra* and *capo* by authors. It is a ſpecies of the trigla, and is diſtinguiſhed by Artedi by the name of the *trigla* with the long bifid ſnout and tubulous noſtrils.

ROUGH-*tree*, a name given in merchant ſhips to any maſt, yard, or boom, placed as a rail or fence above the ſhip's ſide, from the quarter-deck to the fore-caſtle. See ROOF-*tree*.

It is, however, with more propriety, applied to any maſt, &c. which remains *rough* and unfiniſhed.

ROUGH, *roughneſs*, in *Mechanics*. See FRICTION, and RESISTANCE.

ROUGH *caſting*. See PLASTERING.

ROUGH *diamond*. See DIAMOND.

ROUGH *emerald*. See EMERALD.

ROUGH-*leaved plants*. See PLANT.

ROUGH *taſte*. See TASTE.

ROUGHING *cloth*. See CLOTH.

ROUGHINGS, a word uſed in many parts of the kingdom for the graſs which comes after mowing.

ROUL, ROLL, or ROWL, in the *Military Art*. Officers of the ſame rank, who mount the ſame guard, and take their turns in relieving one another, are ſaid to *roul* or *roll*.

ROULADE, in *Muſic*, a trilling or quavering.

ROUND, *rotundus*, in *Geometry*. See Circle, Globe, and Sphere.

Round, in *Anatomy*. See Rotundus.

Round, in *Muſic*. The Italians call b *round*, what we call a *flat*; and the French b *mol*, and b *ſquare*, what we call a *ſharp*. See Flat, and Sharp.

Round is alſo uſed in muſic, to denote a ſpecies of fugue. See Roundelay.

Round is alſo a military term, ſignifying a walk or turn which an officer, attended with ſome ſoldiers, takes in a garriſon, or fortified place, *around* the ramparts, in the night-time, to liſten if any thing be ſtirring without the works, and to ſee that the ſentinels are watchful, and do their duty, and all things are in good order.

In ſtrict garriſon the *rounds* go every half hour, that the rampart may be always furniſhed. The ſentinels are to challenge at a diſtance, and to reſt their arms as the *rounds* paſs, and let no one come near them.

When the *round* is near the corps de garde, the ſentry calls aloud, *Who comes there?* and when the anſwer is, *The rounds*, he ſays, *Stand*; then calls for the ſerjeant of the guard, who draws his ſword, and calls alſo, *Who comes there!* and when it is anſwered, *The rounds*, he that has the word, or the ſerjeant of the *round*, advances, and delivers it to the ſerjeant of the guard, who receives it with the ſpear of his halbert, pointed at the giver's breaſt. See Word.

Rounds, *way of the*. See Way.

Rounds, *counter*. See Counter-*round*.

Round, *quarter*. See Quarter-*round*.

Rounds, among *Maſons*, denote the broken pieces of ſtatues.

Round-*heads*. See Whig and Tory.

Round-*head nails*. See Nail.

Round-*houſe*, in a *Ship*, is a name given, in Eaſt Indiamen, and other large merchant-ſhips, to a cabin or apartment built in the after part of the quarter-deck, and having the poop for its roof. This apartment is uſually called the coach in our ſhips of war.

Round-*houſe* alſo denotes a kind of priſon, for the nightly watch to ſecure perſons in, till they can be carried before a magiſtrate. See Watch.

Round-*in*, or **Round**-*aft*, at *Sea*, a term belonging to the main and fore-ſail. When the wind largeth, they ſay, *Let riſe the main-tacks*, or *the fore-tacks! Hale aft the fore-ſheet to the cat-head*; *and the main-ſheet to the cub-bridge-head!* And when theſe ſheets are thus haled down, they keep them from flying up with the paſſarado rope. This work is called *rounding-in*, or *rounding-aft the ſail*.

Round *niche*, *roof*, *ſeam*, *ſhot*, *ſplice*, *table*, *top*. See the ſubſtantives.

Round, in the *Academies*, denotes a circular piste or tread.

To **Round** *a horſe*, is a general term for all ſorts of maneges, upon a volt, or circular tread.

Hence, to *round* a horſe upon a trot, gallop, &c. is to make him carry his ſhoulders and haunches roundly or compactly, upon a large or ſmaller circle, without traverſing or bearing to a ſide.

ROUNDELAY, or **Roundo**, a kind of ancient poem, thus called, according to Menage, from its form; and becauſe it ſtill turns back again to the firſt verſe, and thus goes round.

The word is formed from *round* and *lay*. The French call it *rondeau*. The Spaniards *gloſes*.

The common *roundelay* conſiſts of thirteen verſes, eight whereof are in one rhyme, and five in another. It is divided into couplets; at the end of the ſecond and third whereof, the beginning of the *roundelay* is repeated; and that, if poſſible, in an equivocal or punning ſenſe.

The *roundelay* is a popular poem among the French, but little known among us. Marot and Voiture have ſucceeded the beſt in it.

Rapin obſerves, that if the *roundelay* be not very exquiſite, it is intolerably bad. In all the ancient *roundelays*, Menage obſerves, that the verſe preceding has a complete ſenſe, and yet joins agreeably with that of the cloſe; without depending neceſſarily thereon. This rule, well obſerved, makes the *roundelay* more ingenious, and is one of the fineſſes of the poem.

Some of the ancient writers ſpeak of the *roundelay*, or *roundel*, as a kind of air appropriated to dancing; and in this ſenſe the term ſeems to indicate little more than dancing in a circle, with the hands joined.

ROUNDELET. See Rundlet.

ROUNDING, in *Sea-Language*, denotes certain old ropes wound firmly and cloſely about that part of a cable which lies in the hauſe, or under the ſhip's bow, or athwart the ſtem. It is uſed to prevent the ſurface of the cable from being chaſed or fretted in thoſe places.

Rounding-*in* generally implies the act of pulling upon any rope which paſſes through one or more blocks, in a direction merely horizontal; as *round-in* the weather-braces, &c. It ſeems to be derived from the circular motion of the rope about the ſheave or pulley, through which it paſſes.

Rounding-*up* is expreſſed of a tackle which hangs in a perpendicular poſition, without ſuſtaining or hoiſting any weighty body; in which caſe it is the operation of pulling the blocks cloſer to each other, by means of the rope which paſſes through them, to compoſe the tackle; and is oppoſed to over-hauling, by which the blocks are drawn farther aſunder.

ROUNDNESS, *rotundity*, in *Phyſics*. See Sphericity.

ROUNDO, or **Roundelay**, in *Muſic*, a kind of burden or ritornello; where the beginning of each couplet is repeated at the end thereof.

ROUP, in *Poultry*, is a filthy boil or ſwelling upon their rumps, known by the ſtaring, or turning back of the feathers.

The *roup*, if not ſoon remedied, will corrupt the whole body; to prevent which, the feathers are to be pulled away, the ſwelling laid open, and the matter preſſed out; after which the part is to be waſhed with ſalt and water, or brine.

ROUPIA, or **Rupee**. See Rupee.

ROUSE *up a hare*, among *Hunters*. See Hunting.

To **Rouse**, among *Falconers*, is when a hawk lifts up and ſhakes himſelf.

ROUSSIN, in the *Manege*, is a ſtrong well-knit, well-ſtowed horſe, ſuch as are commonly brought into France from Germany and Holland.

ROUSSING, in *Sea-Language*, is the act of pulling together upon a cable, hauſer, &c. without the aſſiſtance of tackles, capſterns, &c. It is particularly uſed in the exerciſe of removing a ſhip from one place to another, by means of ropes and anchors.

ROUT, *route*, a public road, highway, or courſe; eſpecially that which military forces take.

The word is French, *route*, formed from the Latin *rupta*, or *ruta*; or the French *roux*, an old word for *horſe*; or rather from the old Celtic *rout*, *road*.

Sanſon and Ogilby have made maps of the *routs* and poſt-roads of France and England. Soldiers are prohibited going out of their *routs*. *Routs* are frequently cut in parks, foreſts, &c. both for ornament, and for the conveniencies of hunting.

Some uſe *rout* for a path cut acroſs a wood; in oppoſition to *way*, which is a great road.

Rout, in *Navigation*. See Course.

Rout is alſo uſed for the defeat and flight of an army.

Rout, in *Law*, is an aſſembly or combination of three or more perſons, upon a common quarrel, going forcibly to commit an unlawful act; ſuch as breaking down fences upon a right claimed of common, or of way, though they do not actually perform it.

If they go, ride, or move forwards, after their meeting, thus making ſome advances towards the execution of their purpoſe, it is a *rout*, though they do not put their purpoſe in execution; if they do, it is a *riot*.

A *rout*, therefore, ſeems to be an unlawful aſſembly; and a riot the diſorderly fact committed thereby.

Two things, however, there are in common to *rout*, *riot*, and *unlawful aſſembly*: the one, that there be at leaſt, three perſons together; the other, that, being together, they diſturb the peace, either by words, ſhew of arms, turbulent geſture, or actual violence.

For the puniſhment incurred by *routs*, &c. ſee Riot.

Rout *of wolves*, among *Hunters*, denotes a herd of thoſe wild beaſts.

ROUTIER, in *Navigation*. See Waggoner.

ROWEL, among *Farriers*, a kind of iſſue, made by drawing a ſkain of ſilk, thread, hair, or the like, through the nape of the neck, or other part of a horſe; anſwering to what in ſurgery is called a *ſeton*.

The **Rowelling** *of horſes* is a method of cure frequently had recourſe to, in caſes of inward ſtrains, eſpecially about the ſhoulders or hips; as alſo for hard ſwellings not eaſy to be reſolved.

The operation is thus: a little ſlit being made through the ſkin, about a hand-breadth below the part aggrieved, big enough to put a ſwan's quill in; the ſkin is raiſed from the fleſh, the end of the quill put in, and the ſkin blowed from the fleſh upwards, and all over the ſhoulder.

Then the hole being ſtopped by the finger, the place blown is beaten with a hazel ſtick, and the wind ſpread with the hand all over, and then let go.

This done, a ſkain of horſe-hair, or red ſarſenet, half the thickneſs of the little finger, is put in a *rowelling* needle ſeven or eight inches long; the needle is put into the hole, and drawn through again ſix or ſeven inches higher; then the needle is drawn out, and the two ends of the *rowel* tied together; anointing it every day, as well as before the putting it in, with ſweet butter and hog's greaſe, and drawing it backwards and forwards in the ſkin, to make the putrid matter diſcharge itſelf more plentifully.

Others, diſliking theſe *rowels*, as making too great a ſore and ſcar, uſe the French *rowel*, which is a round piece of ſtiff leather, with a hole in the midſt, laying it flat between the fleſh and ſkin, the hole of the *rowel* juſt againſt that in the ſkin; ſewing it with a needle and thread drawn through the hole in the ſkin; cleaning it once in two or three days, and then anointing it afreſh.

Rowels *of a ſpur*. See Spur.

ROWING, is the action of impelling a boat or veſſel along the ſurface of the water by oars, which are managed in a direction nearly horizontal. See Oar, Boat, &c.

Rowing-*guard*. See Guard-*boat*.

ROWLE, in a *Ship*, is a round piece of wood or iron, wherein the whip goes, being made to turn about, that it may carry over the whip the eaſier from ſide to ſide.

ROW-LOCKS, among *Ship-Carpenters*, ſmall ſpaces left in the gunwale, where two thoals are let it, at ſuch a diſtance from each other, as to admit the oar, at the end of the loom, to lie on to row the boat.

In the ſides of the ſmalleſt veſſels of war, a number of little ſquare holes, called *row-ports*, are cut for this purpoſe, parallel to the ſurface of the water.

ROWS *of trees*. See Parallelism.

ROYAL, *regal*, ſomething relating to a king.

The word is French, formed from the Latin *regalis*, of *rex*, *king*.

In this ſenſe we ſay, the *royal family*, the *royal blood*, *royal line*, &c.

In England the prince and princeſs of Wales, the king's brothers, &c. are addreſſed under the title of *royal highneſs*. The ducheſs of Savoy is called *madame royale*.

Royals, in *Artillery*, are a kind of ſmall mortars, which carry a ſhell, whoſe diameter is five inches and a half. See Mortar.

Royal, in *Sea-Language*, is a name given to the higheſt ſail which is extended in any ſhip. It is ſpread immediately above the top-gallant-ſail, to whoſe yard-arms the lower corners of it are attached. This ſail is never uſed but in light and favourable breezes.

Royal *abbey*, denotes an abbey founded by a king, or by a prince who is ſucceeded by a king.

Royal *Academy of Sciences*, &c. See Academy, &c.

Royal *antler*, among *Hunters*, expreſſes the third branch of the horn of a hart or buck, that ſhoots out from the rear or main horn above the back-antler.

Royal *army*. See Army.

Royal *aſſent*, is that aſſent or approbation which the king gives to a thing done by others; as the election of a biſhop by dean and chapter, or by a bill paſſed in both houſes of parliament.

The *royal* aſſent in parliament being given, the bill is indorſed with theſe words, *Le roy le veut*; that is, *it pleaſes the king*. If he refuſes it, thus, *Le roy s'aviſera*, q. d. *the king will adviſe upon it*. See Parliament.

Royal *boroughs*. See Borough.

Royal *crown*, is that worn by kings. See Crown.

Royal *charter*. See Charter.

Royal *African Company*. See Company.

Royal *Exchange*, the burſe or meeting-place of the merchants in London.

It was firſt built in 1566, at the charge of ſir Thomas Greſham; and in a ſolemn manner, by herald with ſound of trumpet, in preſence of queen Elizabeth, proclaimed the *Royal Exchange*. Till that time the merchants met in Lombard-ſtreet.

It was built of brick; yet then eſteemed the moſt ſplendid burſe in Europe. A hundred years after its building, at the great fire, it was burnt down; but it was ſoon raiſed again in a ſtill more magnificent manner; the expence thereof amounting to 50,000*l*.

One half of this ſum was diſburſed by the chamber of London, the other by the company of mercers; who, to reimburſe themſelves, lett to hire a hundred and ninety ſhops above ſtairs, at twenty pounds each; which, with other ſhops, &c. on the ground, yielded a yearly rent of above four thouſand pounds; yet the ground it ſtands on does not exceed three fourths of an acre; whence it is obſerved to be much the richeſt ſpot of ground in the world.

It is built quadrangular, with walks around, wherein the merchants of the reſpective countries aſſociate themſelves. In the middle of the area, or court, is a fine marble ſtatue of king Charles II. in the habit of a Roman Cæſar, erected by the ſociety of merchant-adventurers; the workmanſhip of Grinlin Gibbons. Around are ranged the ſtatues of the ſeveral kings ſince the Norman Conqueſt.

Royal *fiſhes* are whales and ſturgeon, and ſome add porpoiſes too; which the king, by his prerogative, is to have, whenever caſt on ſhore, or wrecked, in all places of the realm; unleſs granted to ſubjects by expreſs words.

Royal *foot*, *fort*, *franchiſe*, *hoſpital*. See the ſubſtantives.

The Royal *oak*, was a fair-ſpreading tree at Boſcobel, in the pariſh of Donnington, in Staffordſhire, the boughs whereof were all covered with ivy; in the thick of which king Charles II. ſat in the day-time with colonel Careleſs, and in the night lodged in Boſcobel-houſe; ſo that they are miſtaken who ſpeak of it as an old hollow oak; it being then a gay flouriſhing tree, ſurrounded with many more. The poor remains hereof are now fenced in with a handſome wall, with this inſcription over the gate, in golden letters: FELICISSIMAM ARBOREM, QUAM IN ASYLUM POTENTISSIMI REGIS CAROLI II. DEUS OP. MAX. PER QUEM REGES REGNANT, HIC CRESCERE VOLUIT, &c. Phil. Tranſ. N° 310.

Royal *Oak*, *Robur Carolinum*, in *Aſtronomy*, one of the new ſouthern conſtellations, the ſtars of which, according to Sharp's Catalogue, annexed to the Britannic, are 12. The longitudes, latitudes, &c. are as follow:

Names and ſituations of the ſtars.	Signs.	Longitud.			Latitude			Magnitude.
		°	′	″	°	′	″	
At the root	♎	28	7	26	72	13	8	2
In the top of the trunk		25	18	30	62	7	34	3
Northern of the 4 in the firſt branches		14	0	16	59	53	4	5
Subſequent		18	17	26	58	54	43	4
Preceding		16	13	48	62	35	13	4
5.								
Middle		19	11	44	61	25	38	4
Northern of the two in the next branches	♏	0	39	44	56	46	47	4
Southern		7	6	58	58	29	37	5
Preceding of the 2 in the top of the head	♎	3	34	41	51	2	46	4
Subſequent		6	39	58	51	4	21	3
10.								
1ſt Informis at the trunk		19	3	21	67	28	33	4
2d	♏	3	32	15	67	21	18	4

Royal *officers*. See Officer.

Royal *parapet*, or *parapet of the rampart*, in *Fortification*, is a bank about three fathoms broad, and ſix feet high, placed upon the brink of the rampart, towards the country; to cover thoſe who defend the rampart.

Royal *poop*. See Poop.

Royal, *Port*. See Port *Royal*.

Royal *Society of England*, is an academy, or body, of perſons of eminent learning; inſtituted by king Charles II. for the promoting of natural knowledge.

This illuſtrious body had its original in an aſſembly of ingenious men, reſiding in London, who, being inquiſitive into natural, and the new and experimental philoſophy, agreed, about the year 1645, to meet weekly on a certain day, to diſcourſe upon ſuch ſubjects. Theſe meetings, it is ſaid, were ſuggeſted by Mr. Theodore Haak, a native of the Palatinate in Germany, and they were held ſometimes at Dr. Goddard's lodgings in Wood-ſtreet, ſometimes at a convenient place in Cheapſide, and ſometimes in or near Greſham College. This aſſembly ſeems to be that mentioned under the title of the *Inviſible*, or *Philoſophical College*, by Mr. Boyle, in ſome letters written in 1646 and 1647. About the years 1648 and 1649, the company, which formed theſe meetings, began to be divided: thoſe in London continued to meet there as before; and thoſe who were removed to Oxford occaſionally joined them. The latter, viz. Dr. Wilkins, Dr. Wallis, and Dr. Goddard, in connection with others, continuing their aſſemblies in Oxford, brought the ſtudy of natural and experimental philoſophy into faſhion there; meeting firſt in Dr. Petty's lodgings, afterwards at Dr. Wilkins's apartments in Wadham College, and, upon his removal, in the lodgings of the honourable Mr. Robert Boyle. The greateſt part of the Oxford ſociety coming to London about the year 1659, they met once or twice a week in term-time, at Greſham College, till they were diſperſed by the public diſtractions of that year, and the place of their meeting was made a quarter for ſoldiers. Upon the Reſtoration, in 1660, their meetings were revived, and attended with a larger concourſe of perſons, eminent for their character and learning.

They were at length taken notice of by the king, who was pleaſed to grant them an ample charter, dated the twenty-ſecond of April, 1663, whereby they were erected into a corporation, *conſiſting of a preſident, council, and fellows, for promoting natural knowledge*.

Their manner of electing fellows is by ballotting. Their council are in number twenty-one, including the preſident, vice-preſident, treaſurer, and two ſecretaries; eleven of which are continued for the next year, and ten more added to them; all choſen on St. Andrew's day.

Each member, at his admiſſion, ſubſcribes an engagement, that he will endeavour to promote the good of the ſociety; from which he may be freed at any time, by ſignifying to the preſident, that he deſires to withdraw.

The charges are five guineas paid to the treaſurer at admiſſion; and 13s. per quarter ſo long as the perſon continues a member: or, in lieu of the annual ſubſcription, a compoſition of twenty-ſix guineas in one payment.

Their deſign is, to "make faithful records of all the works of nature or art, which come within their reach; ſo that the preſent, as well as after ages, may be enabled to put a mark on errors which have been ſtrengthened by long preſcription; to reſtore truths that have been neglected; to puſh thoſe already known to more various uſes; to make the way more paſſable to what remains unrevealed," &c.

To this purpoſe they have made a great number of experiments and obſervations on moſt of the works of nature; eclipſes, comets, meteors, mines, plants, earthquakes, inundations, ſprings, damps, ſubterraneous fires, tides, currents, the magnet, &c. Alſo numbers of ſhort hiſtories of nature; arts, manufactures, uſeful engines, contrivances, &c. The ſervices they have been of to the public are very great. They have improved naval, civil, and military architecture; advanced the ſecurity and perfection of navigation; improved agriculture; and put not only this kingdom, but alſo Ireland, the plantations, &c. upon planting.

They have regiſtered experiments, hiſtories, relations, obſervations, &c. and reduced them into one common ſtock; and have, from time to time, publiſhed ſome of the moſt immediate uſe, under the title of Philoſophical Tranſactions, &c. and laid the reſt up in public regiſters, to be nakedly tranſmitted to poſterity, as a ſolid groundwork for future ſyſtems. See TRANSACTIONS.

They have a library adapted to their inſtitution; towards which Mr. Henry Howard, afterwerds duke of Norfolk, contributed the Norfolcian library, and which is, at this time, greatly increaſed by a continual ſeries of benefactions. The muſeum, or repoſitory, of natural and artificial rarities, given them by Daniel Colwal, eſq. and ſince enriched by many others, is now removed to the BritiſhMuſeum, and makes a part of that great repoſitory. Their motto is, *Nullius in verba*; and their place of aſſembling is Somerſet-place, in the Strand. Sir Godfrey Copley, bart. left five guineas to be given annually to the perſon who ſhould write the beſt paper in the year, under the head of experimental philoſophy. This reward, which is now changed to a gold medal, is the higheſt honour the ſociety can beſtow. It is conferred on St. Andrew's day.

ROYAL *Spaniſh Academy*. See ACADEMY.

ROYAL *ſugar*. See SUGAR.

ROYALTIES, *regalities*, the rights of the king; otherwiſe called the *king's prerogative*, and the *regalia*. See PREROGATIVE, and REGALIA.

Of theſe, ſome the king may grant to common perſons; others are inſeparable from the crown.

ROYENA, *African bladder-nut*, in *Botany*, a genus of the *decandria digynia* claſs. Its characters are theſe: the flower has a bellied, permanent empalement, whoſe mouth is obtuſe, and five-pointed; it has one petal, having a tube the length of the empalement, but the brim is divided into five parts, which turn back; it has ten ſhort ſtamina growing to the petal, terminated by oblong, erect, twin ſummits, and an oval hairy germen ſitting upon two ſtyles, a little longer than the ſtamina, crowned by ſingle ſummits; the empalement afterward turns to an oval capſule, with four furrows, having one cell, with four valves, containing four oblong triangular ſeeds. Miller reckons three, and Linnæus four ſpecies.

RUBBER *of pencil-ſtrokes*. See CAOUTCHOUC.

RUBEDO, in *Medicine*. See GUTTA *roſacea*.

RUBELLIO, in *Ichthyology*, a name given by ſome authors to a ſmall ſea-fiſh of a red colour, caught in the Mediterranean, and more uſually called by writers on theſe ſubjects the ERYTHRINUS.

RUBELLUS, in *Ichthyology*, a name given by ſome authors, to the common ROACH, and by others to the RUDD or finſcale.

RUBEOLA, in *Botany*. See CRUCIANELLA.

RUBETA, in *Zoology*. See TOAD.

RUBETRA, in *Ornithology*, a name by which Geſner and ſome others have called that ſpecies of the œnanthe, commonly known by the name of the STONE-*chatter*, *ſtone-ſmick*, or *moor-titling*.

RUBIA, a root, or drug, popularly called MADDER.

RUBICAN, in the *Manege*. A horſe is ſaid to be of a *rubican* colour, that is, a bay, ſorrel, or black, with a light grey or white upon the flanks, but ſo that this grey or white is not predominant there.

RUBICILLA *Americana*, in *Ornithology*, a name given by Mr. Ray to the GUIRATIRIGA, a Braſilian bird, of the bull-finch kind, very beautifully variegated with red, black, and grey.

RUBICULUS, in *Ichthyology*, a name given by Figulus and ſome others to that ſpecies of fiſh which we call the ROACH. It is of the cyprinus kind, and is diſtinguiſhed by Artedi under the name of the red-eyed cyprinus, with the tail and belly-fins red.

RUBIFYING, formed of *rubens*, *ruddy*, and *fio*, *I become*, in *Chemiſtry*, &c. the act of turning a thing red by force of fire, &c.

Red arſenic is common white arſenic *rubified* by a mixture of ſulphur and copper

RUBIGALIA, or ROBIGALIA, in *Antiquity*, a feaſt celebrated by the Romans, in honour of the god Rubigus, or the goddeſs Rubigo; to engage thoſe deities to preſerve the corn from blaſting and mildews.

The *Rubigalia* were inſtituted by Numa, in the eleventh year of his reign; and were held on the ſeventh of the calends of May, which is our twenty-fifth of April; being about the time when the blight or mildew, called by the Latins *rubigo*, uſes to attack the corn.

Varro fixes it to the time when the ſun enters the 16th degree of Taurus. Indeed the true time ſeems rather to have been on the 18th day before the equinox, and the true reaſon, becauſe then Canicula, or the Little Dog, ſets; which is eſteemed a malific conſtellation.

Hence they ſacrificed a dog to Rubigo: Ovid ſays, the entrails of a dog, and thoſe of a ſheep; Columella, only a ſucking puppy. Feſtus inſinuates, that the victim muſt alſo be red.

RUBIGO, or ROBIGO, a diſeaſe incident to corn, popularly called MILDEW.

The *rubigo* is a ſpecies of blight. See BLIGHT, and RUST *of corn*.

RUBIN *of antimony*; in *Chemiſtry*, a kind of LIVER *of antimony*, made with equal parts of nitre and crude antimony detonated together, to which is afterwards added an equal quantity of common ſalt. It is alſo called MAGNESIA *opalina*.

RUBRIC, *rubrica*, in the *Canon-Law*, denotes a title, or article, in certain ancient law-books; thus called, becauſe written, as the titles of the chapters in our ancient Bibles are, in red letters.

RUBRICS alſo denote the rules and directions given in the Liturgy; for the order and manner wherein the ſeveral parts of the office are to be performed.

They are called *rubrics* from the Latin *ruber*, *red*; becauſe formerly printed in red ink, to diſtinguiſh them from the reſt of the office, which was in black; as they ſtill are in the Roman miſſals, &c.

The great *rubric* for the celebration of Eaſter, preſcribed by the Nicene council, is to this purpoſe: Eaſter-day to be the Sunday which falls upon, or next after, the firſt full moon which immediately ſucceeds the vernal equinox.

Dr. Wallis has a particular diſcourſe on the ancient *rubrics* for the feaſt of Eaſter, in the Philoſ. Tranſactions.

RUBRICA. See REDDLE.

RUBUS, in *Botany*. See RASBERRY-*buſh*.

RUBUS, in *Ichthyology*, a name given by Joannes Cuba, Albertus, and ſome other writers, to the ſpecies of *ray*, uſually called the SKAITE, or *ſlaire*.

RUBY, *rubinus*, in *Natural Hiſtory*, a gem, the diſtinguiſhing character of which is, that it is of a red colour with an admixture of purple.

The *ruby*, in its moſt perfect ſtate, is a gem of very great beauty and value. It is often found perfectly pure, and free from all ſpots or blemiſhes; but it is much more frequently debaſed by them, and greatly brought down in its value, eſpecially in the larger ſpecimens. It is of very great hardneſs, equal to that of the ſapphire, and ſecond only to the diamond. It is various in ſize, but is leſs ſubject to variations in its ſhape than moſt of the other gems. It is moſt frequently found very ſmall; its common ſize being that of the heads of the larger ſort of pins; and when of this ſize it is very cheap; but it is alſo found of four, ſix, or ten carats; and ſometimes, though but very rarely, up to twenty, thirty, or forty; nay, we have accounts of ſome of more than a hundred. It is never found of an angular or cryſtalliform ſhape, but always of a pebble-like figure, often roundiſh, ſometimes oblong, and much larger at one end than the other, and in ſome ſort reſembling a pear, and is uſually more or leſs flatted on one ſide.

It is commonly ſo naturally bright and pure on the ſurface as to need no poliſhing; and it is worn in rings, and in the crowns of princes, in its rough or native ſtate. Its colour is red in very different degrees, from the deepeſt garnet colour to that of the paleſt red diamond, but it ever has with the red more or leſs of a purpliſh tinge: this is very plainly diſtinguiſhed in the deeper coloured ſpecimens, but in the pale ones is gradually leſs and leſs to be diſtinguiſhed in proportion to their degree of colour. Theſe are the diſtinguiſhing characters of the *ruby*, and by theſe it is eaſily known from the garnet; carbuncle, and other red gems.

As *rubies* are frequently found in gold mines, it is very probable that they receive their colour from that metal. See *Colours of* METALS.

Our jewellers are very nice, though not perfectly determinate, in their diſtinctions; knowing this gem, in its different degrees of colour, under three names; the firſt is ſimply the *ruby*: this is the name they give to it in its moſt perfect and ſtrongeſt coloured ſtate.

The ſecond is the *ſpinal ruby*. Under this name they know thoſe *rubies*, which are of a ſomewhat leſs deep and much leſs vivid colour than what they call the true *ruby*, or ſimply the *ruby*.

The third is the *balaſs ruby*, a name derived from Balakeia, the name of a country where the paler *rubies* are principally found. Under this name they expreſs a pale, yet very bright *ruby*, with a ſmaller admixture of the purple tinge than in the deeper coloured one, and ſomething reſembling the colour of the damaſk-roſe. This is of a conſiderable value, but leſs than the deeper, or, as they call it, the true *ruby*.

Beſide theſe, they know alſo two other ſtones, under the general name *rubies*, calling them the *rock ruby*, and the *rubacelle*. But theſe are not truly of the *ruby* kind; the firſt being a very beautiful ſpecies of garnet, and having a tinge of blue with its red; and the other a hyacinth, having a manifeſt caſt of yellow.

We have the true *rubies* only from the Eaſt Indies. In Europe there are not unfrequently found cryſtals tinged to the true colour of the *ruby*, but theſe ever want its luſtre and hardneſs. In the Eaſt Indies, the true *rubies* are often found almoſt colourleſs, and not unfrequently variegated with ſpots or ſtains of a pure blue, evidently the ſame with that of the ſapphire. Doubtleſs alſo the *ruby* is ſometimes found like the other gems, wholly deſtitute of colour; but in this caſe, as the hardneſs of the ſtone is the only thing that proves it to be of the gem claſs, both this, and all the other colourleſs ſpecimens of the gems, are confounded under the name of the colourleſs ſapphire; or, as our jewellers chooſe to ſpeak it, the white ſapphire. Hill's Hiſt. of Foſſ. p. 590, ſeq.

There are but two places in the Eaſt where the *ruby* is found; the kingdom of Pegu, and the iſle of Ceylon. The mine in Pegu, where it is found in greateſt plenty, is in the mountain Capelan, twelve days journey from Siren, the reſidence of the king of that country. The fineſt *rubies* brought hence do not exceed three or four carats; the king reſerving all the larger to himſelf.

In Ceylon the *rubies* are found in a river which deſcends from the mountains towards the middle of the iſland: ſome few are alſo found in the ground. The *rubies* of Ceylon are uſually brighter and more beautiful than thoſe of Pegu, but they are rare; the king of Ceylon prohibiting his people to gather them, or traffick with them.

There are, as ſome ſay, *rubies* alſo found in Europe, particularly in Bohemia and Hungary, eſpecially the former wherein is a mine of flints of divers ſizes; which, upon breaking, are ſometimes found to contain *rubies*, pretended to be as fine and hard as any of the Eaſtern ones.

The Greeks call the *ruby* *απυρωτος*, q. d. reſiſting the fire. The ancients, out of their credulity and ſuperſtition, attributed many virtues to the *ruby*; as, that it expels poiſons, cures the plague, abates luxury and incontinence, baniſhes ſorrow, &c.

It is ſaid the inhabitants of Pegu have the art of heightening the redneſs and brilliancy of *rubies*, by laying them in the fire, and giving them a proper degree of heat; but this ſeems a very erroneous account.

The *ruby* is formed in a ſtony ſubſtance, or bed, of a roſe-colour, called *mother of ruby*; it has not all its colour and luſtre at once, but comes to it by degrees. At firſt it is whitiſh; and, as it approaches to maturity, becomes red. Hence we have white *rubies*, others half-white, half-red, and others blue and red, called *ſapphire rubies*. When a *ruby* exceeds twenty carats, it may be called a CARBUNCLE; the name of an imaginary ſtone, whereof the ancients and moderns have given us ſo many deſcriptions.

They have ſeveral manners of counterfeiting *rubies*; and ſome have carried the imitation to that length, that the moſt able lapidaries, till they come to try the hardneſs, are ſometimes overſeen.

Fruetiere aſſures us very poſitively, that there have been *rubies* in France of two hundred and forty carats. Tavernier tells us, he ſaw one in the Indies of fifty carats, which he had a mind to have bought. He adds, that the king of France has finer and larger *rubies* than any in the poſſeſſion of the Great Mogul.

RUBY, *ſapphire*. See SAPPHIRE.

RUBY, *counterfeit*. See *Ruby* GLASS, and *Ruby* PASTE.

RUBY, in *Chemiſtry*, is a name given to ſeveral preparations of natural bodies, becauſe of their red colour: as **RUBY** *of arſenic*, &c. See REALGAR.

RUBY, in *Heraldry*, denotes the red colour wherewith the arms of noblemen are blazoned; being the ſame which in the arms of others, not noble, is called *gules*.

RUCTATION, *belching*, a ventoſity ariſing from indigeſtion, and diſcharging itſelf at the mouth, with a diſagreeable noiſe.

There are belches owing to repletion, and others to inanition, or emptineſs.

Quincy ſays, hypochondriac and hyſteric people are particularly liable to this diſorder. They are rather to be cured with proper ſtomachics than carminatives and hot liquors. Burnet recommends the iliac pills of Rhaſis againſt *ructation*.

RUDBECKIA, in *Botany*. See *Dwarf* SUNFLOWER.

RUDD, in *Ichthyology*. See RED-*eye*.

RUDDER, in *Navigation*, a piece of timber turning on hinges in the ſtern of a ſhip; and which oppoſing ſometimes one ſide to the water, and ſometimes another, turns or directs the veſſel this way or that. See *Tab. Ship. fig.* 2. *n.* 106.

The *rudder* becomes gradually broader, in proportion to its diſtance from the top, or to its depth under water. The back, or inner part of it, which joins to the ſtern-poſt, is diminiſhed into the form of a wedge through its whole length, ſo as that the *rudder* may be the more eaſily turned from one ſide to the other, where it makes an obtuſe angle with the keel. The hinges, which are bolted round the ſtern-poſt to the after extremity of the ſhip, are called *googings*, and are furniſhed with a large hole on the after-part of the ſtern-poſt. The other parts of the hinges, which are bolted to the back of the *rudder*, are called *pintles*, being ſtrong cylindrical pins, which enter into the googings, and reſt upon them. The length and thickneſs of the *rudder* are nearly equal to thoſe of the ſtern-poſt. The *rudder* is turned upon its hinges, by means of a long bar of timber, called the TILLER, the operation of which is directed by the tiller-rope, which in large veſſels is wound about a wheel. The power of the *rudder* is reducible to that of the lever, and the oblique action of the water upon it is to be determined by the reſolution of forces. As to the moſt advantageous angle made by the helm, with the line prolonged from the keel, geometricians have fixed it at 54° 44′. See MECHANICS. But it has been ſaid, that, in determining this angle, they have preſumed that the ſhip is as narrow at her floating line, or at the line deſcribed by the ſurface of the water round her bottom, as at the keel; whereas all veſſels increaſe in breadth from the keel upward to the extreme breadth, where the floating line, or the higheſt water-line, is terminated; and, therefore, the angle above ſtated is too large. For the *rudder* is impreſſed by the water, at the height of the floating line, more directly than at the keel, becauſe the fluid exactly follows the horizontal outlines of the bottom; ſo that a particular poſition of the helm might be ſuppoſed neceſſary for each different incidence which it encounters from the keel upwards. But as a middle poſition may be taken between all theſe points, it will be ſufficient to conſider the angle formed by the ſides of the ſhip, and her axis, or the middle line of her length, at the ſurface of the water, in order to determine afterwards the mean point, and the mean angle of incidence. The angle 54° 44′, it is ſaid, is too open, and very unfavourable to the ſhip's head-way, becauſe the water acts upon the *rudder* there with two great a ſine of incidence. as being equal to that of the angle which it makes with the line prolonged from the keel below; but above, the ſhock of the water is almoſt perpendicular to the *rudder*, becauſe of the breadth of the bottom. If then the *rudder* is only oppoſed to the fluid, by making an angle of 45° with the line prolonged from the keel, the impreſſion, by becoming weaker, will be leſs oppoſed to the ſhip's head-way, and the direction of the abſolute effort of the water upon the helm drawing nearer to the lateral perpendicular, will be placed more advantageouſly. To which it is added, that experience daily teſtifies, that a ſhip ſteers well, when the *rudder* makes the angle of 35°. L. Euler recommends an obliquity ſomewhat leſs than 54° 44′, for the greateſt action of the *rudder*, and eſtabliſhes this rule, that an obliquity of about 48° will, in general, produce the beſt effort. Bouguer Traite de la Manœuvre des Vaiſſeaux. Falconer's Marine Dict. art. *Helm*; and Euler's Complete Theory of the Conſtruction and Properties of Veſſels, tranſlated by Mr. Watſon, 1776, book ii. chap. vii. viii. ix.

A narrow *rudder* is beſt for a ſhip's ſailing, provided ſhe can feel it, that is, be guided and turned by it; for a broad *rudder* will hold much water when the helm is put over to any ſide; but if a ſhip have a fat quarter, ſo that the water cannot come quick and ſtrong to her *rudder*, ſhe will require a broad *rudder*.

The aftmoſt part of the *rudder* is called the *rake* of the *rudder*.

Rudder-*irons*, in a *Ship*, are the cheeks of that iron whereof the pintle is part, which is faſtened and nailed down about the rake of the *rudder*.

Rudder-*rope*, in a *Ship*. See Rope.

RUDDLE, *rubrica*. See Reddle

RUDDOCK, in *Ornithology*, an Engliſh name for the *rubecula*, more commonly known by the name of the red *breaſt*, or *robin red breaſt*.

RUDENTURE, in *Architecture*, the figure of a rope, or ſtaff, ſometimes plain, ſometimes carved; wherewith a third part of the flutings of columns are frequently filled up.

It it thus called from the Latin *rudens*, *cable*, whence ſome call it a *cabling*; and the columns, whoſe flutings are thus filled, they call *rudented*, or *cabled columns*.

There are alſo *rudentures* in relievo, laid on the naked of pilaſters, not fluted; an inſtance of which we have in the church of St. Sapienza at Rome.

RUDERATION, *ruderatio*, in *Building*, a term uſed by Vitruvius for the laying a pavement with pebbles, or little ſtones.

To perform the *ruderation*, it is neceſſary the ground be firſt well beaten, to make it firm, and to prevent its cracking. Then a ſtratum of little ſtones is laid, to be afterwards bound together with mortar, made of lime and ſand, called by Vitruvius *ſtatumen*.

If the ſand be new, its proportion to the lime may be as 3 to 1; but if dug out of old pavements, or walls, as 5 to 2.

Ruderation, Daviler obſerves, is alſo uſed by Vitruvius, lib. vii. cap. 1. for the coarſeſt and moſt artleſs kind of maſonry; where a wall is, as it were, cobbled up.

RUDIARIUS, in *Antiquity*, a veteran gladiator, who had got a diſcharge from the ſervice.

He was thus called, becauſe, as a mark of diſmiſſion, a rod was put into his hand, called rudis.

The *rudiarii* were alſo called *ſpectatores*.

RUDIMENTS, *rudimenta*, the firſt principles, or grounds, of any art or ſcience, called alſo the elements thereof.

RUDIS, a knotty, rugged ſtick, which the pretor, among the Romans, gave the gladiators, as a mark of their freedom and diſmiſſion.

The *rudis* ſeems to have been beſtowed both on ſlaves and freedmen; with this difference, that it procured for the former no more than a diſcharge from any farther performance in public, upon which they commonly turned *laniſtæ*, ſpending their time in training up young fencers; but the latter, who had hired themſelves out for theſe ſhews, were reſtored to a full enjoyment of their liberty. Kennet, Rom. Ant. p. 280.

Hence the Latin phraſe, *rude donare*, to make a gladiator free, to diſcharge him from fighting any more. They were hence called *rudiarii*, and had a cuſtom of hanging up their arms in the temple of Hercules, the patron of their profeſſion, and were never called out again without their conſent.

RUDMAS *day*, in our *Old Writers*, the feaſt of the *Holy Croſs*. There are two of thoſe feaſts, one on the third of May, being the Invention of the *Croſs*; and the other the fourteenth of September, called *Holy Rood-day*, and is the Exaltation of the Croſs.

The word is compounded of the Saxon *rode*, i. e. *crux*, and *maſs-day*, i. e. *feaſt-day*.

RUDOLPHINE *tables*. See Catalogue *of the ſtars*.

RUE, *ruta*, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the flower has a permanent empalement, cut into five parts; it has four or five oval petals, which are narrow at their baſe, and eight or ten awl-ſhaped ſpreading ſtamina, the length of the petals, crowned by erect ſummits; with a gibbous germen, having a croſs furrow, ſupporting an erect awl-ſhaped ſtyle, crowned by a ſingle ſtigma; the germen afterward becomes a gibbous capſule, with five lobes, and five cells opening in five parts at the top, filled with rough angular ſeeds. Miller reckons ſeven, and Linnæus four ſpecies.

We have ſeveral ſorts of *rue* in the gardens of the curious, but the common kind only is propagated for medicinal uſe. All the kinds may be propagated, either by cuttings in the manner of roſemary, or elſe by ſeeds. Theſe ſhould be ſown in the ſpring on a bed of light earth; and when the young plants come up, they ſhould be removed at about two inches high to the places where they are to remain.

All the ſorts of *rue* will live much longer, and are leſs liable to be injured by froſt in winter, when they grow in a poor, dry, rubbiſhy ſoil, than in good ground; for in rich, moiſt land, the plants grow very vigorouſly in ſummer, and are ſo replete with moiſture, that a ſmall froſt will kill their tender ſhoots; whereas in poor, dry ground, their growth will not be great, but their ſhoots will be hard and compact, and, therefore, more able to reſiſt the cold. Miller.

Rue is recommended as a powerful ſtimulant, aperient, antiſeptic, and poſſeſſing ſome degree of an antiſpaſmodic power; in crudities and indigeſtion, for preſerving againſt contagious diſeaſes, and the ill effects of corrupted air; in uterine obſtructions, and hyſteric complaints; and externally in diſcutient and antiſeptic fomentations. Among the common people, the leaves are ſometimes taken with treacle, on an empty ſtomach, as an anthelmintic. A conſerve, made by beating the freſh leaves with thrice their weight of fine ſugar, is the moſt commodious form for uſing the herb in ſubſtance. The virtues of *rue* are extracted both by water and ſpirit, but more perfectly by the latter. On inſpiſſating the ſpirituous tincture, very little of its flavour riſes with the menſtruum; moſt of the active parts of the *rue* being concentrated in the extract. In diſtillation with water, an eſſential oil ſeparates, which is of a yellowiſh or browniſh colour, a moderately acrid taſte, and penetrating ſmell: the decoction, inſpiſſated, yields a moderately warm, pungent, and bitteriſh extract. The ſeeds and capſules contain more oil than the leaves. Lewis.

Rue, *dog's*. See Fig-*wort*.

Rue, *goat's*, *galega*, in *Botany*. See Goat's *rue*.

Rue, *meadow*, *thalictrum*, in *Botany*, a genus of the *polyandria polygynia* claſs. Its characters are theſe: the flower has no empalement, but has four or five roundiſh, concave petals, which fall off ſoon, and a great number of broad ſtamina, which are compreſſed toward their tops, terminated by twin ſummits, with ſeveral very ſhort ſtyles ſitting ſingly upon roundiſh germina, crowned by thick ſtigmas; the germina afterward turn to ſo many keel-ſhaped capſules, collected in a head, each containing one oblong ſeed. Miller enumerates eleven, and Linnæus fourteen ſpecies.

The leaves of *meadow-rue*, mixed with other greens, are ſomewhat laxative, according to Dodonæus; but a decoction of the root is more ſo, and may be well ſubſtituted for rhubarb.

Rue, *wall*, or *white maidenhair*, *ruta muraria*, in *Botany*, a ſpecies of *aſplenium*. See Milt-*waſte*.

This plant is found growing out of the joints of old walls in various parts of England, where it is gathered for medicinal uſe; but as it cannot be cultivated in gardens ſo as to grow to advantage, it is needleſs to ſay more of it.

This is one of the five capillary herbs mentioned in the Diſpenſatory, and has the ſame virtues with the reſt of the maidenhairs: it is ſometimes uſed in pectoral decoctions and diuretic apozems.

Rue, *wild Aſſyrian*, *peganium*, in *Botany*, a genus of the *dodecandria monogynia* claſs. Its characters are theſe: the flower has a permanent empalement, compoſed of five narrow, erect leaves; it has five oblong, oval petals, which ſpread open, and fifteen awl-ſhaped ſtamina, about half the length of the petals, whoſe baſes ſpread into a nectarium under the germen, and are terminated by erect, oblong ſummits; it has a three-cornered roundiſh germen, elevated at the baſe of the flower, which afterward becomes a roundiſh, three-cornered capſule, having three cells filled with oval acute-pointed ſeeds. We have but one ſpecies. Linnæus reckons two.

Its virtues agree with the garden *rue*, but it is more acrimonious.

RUELLE, a French term, formerly introduced into our language, is a diminutive of *rue*, *ſtreet*, and ſignifies, literally, a *little ſtreet*.

Its uſe, among us, was for an alcove, or other genteel apartment, where the ladies receive viſits either in bed or up. The poets go reading their works from *ruelle* to *ruelle*, to beſpeak the approbation and intereſt of the ladies. The term, however, is now diſuſed.

RUELLIA, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the flower has a permanent empalement, cut into five narrow, acute ſegments at the top, which are erect; it has one petal, with a tube the length of the cup, which inclines at the neck; the brim ſpreads open, and is cut into five ſegments, the two upper being large and reflexed; it hath four ſtamina ſituated in the tube, connected in pairs, terminated by ſhort ſummits, and a roundiſh germen, ſupporting a ſlender ſtyle, crowned by a bifid ſtigma; the germen afterwards becomes a taper capſule, pointed at each end, having two cells, incloſing roundiſh, compreſſed ſeeds. Miller reckons four, and Linnæus thirteen ſpecies.

RUFF, or Ruffle, in *Military Language*, a beat on the drum. Lieutenant-generals have three *ruffles*, major-generals two, brigadiers and governors one, as they paſs by the regiment, guard, &c.

Ruff-*trees*. See Roof-*trees*.

RUFFE, in *Ichthyology*, the Engliſh name of the *cernua*, or ſmall gilded pearch, a fiſh common in our rivers, and much reſembling the pearch in figure, though of a more ſlender form.

The *ruffe* is called by the generality of authors *cernua fluviatilis*; and by ſome *chærus acerina* and *aſpredo*. It is called by Johnſon and Charleton alſo *ſcrollus*. Willughby, as well as theſe authors, has mentioned the *ſcrollus* as another ſpecies of fiſh; but it is proved, by obſervation, that they are evidently the ſame ſpecies. Artedi makes this fiſh a pearch, or *perca*; and accurately diſtinguiſhes it from the other fiſh of that genus by the name of the pearch, with only one fin on the back, and with a cavernous head. In the Linnæan ſyſtem it is the *perca* CERNUA. The teeth are ſmall, and diſpoſed in rows; it has one dorſal fin extending along the greateſt part of the back; the firſt rays are ſtrong, ſharp, and ſpiny; the others ſoft; the pectoral fins conſiſt of fifteen rays, the central of ſix, the anal of eight; the two firſt ſtrong and ſpiny; the tail is a little bifurcated; the body is covered with rough ſcales; the back and ſides are of a dirty green, the laſt inclining to yellow, and both ſpotted with black; the dorſal fin is ſpotted with black, and the tail marked with tranſverſe bars. It is found in ſeveral of the Engliſh ſtreams; being a gregarious fiſh, aſſembling in large ſhoals, and keeping in the deepeſt part of the water. Pennant.

This fiſh may be preſerved alive in glaſs jars with freſh water and be made very tame. It muſt be fed; for it cannot ſubſiſt on the animalcula of river-water as ſmall dace can.

No fiſh ſhews the circulation of the blood in a finer manner than *ruffes*, whoſe fins are exceeding tranſparent. Beſides, it is a creature vaſtly tenacious of life, and will live twenty or thirty minutes out of water, without receiving much damage. Phil. Tranſ. Nº 478. p. 26.

RUFFE, in *Ornithology*, the name of a male ſpecies of bird, the female of which is called *reeve*, and the Latin name for which is *avis pugnax*, or the fighting bird.

This ſpecies is the TRINGA *pugnax* of Linnæus.

The feathers of the males aſſume in ſeveral parts a variety of colours; but they are diſtinguiſhed by a very remarkable circle of long feathers, ſurrounding their necks; whence their name: on the back of their necks they have a tuſt of feathers, which ſpread wide on both ſides; theſe feathers around the neck are black in ſome birds; and in others white, yellow, or ferruginous; and they frequently differ in colour, even in the ſame bird; the coverts of the wings are brown or aſh-coloured; the feathers on the breaſt black or duſky; the four exterior feathers of the tail of a cinereous brown, and the four middle barred with black and brown; the bill is black towards the end, and red at the baſe; the legs are yellow. In moulting they loſe the neck-feathers, nor do they recover them till after their return in the following ſpring, when a ſet of ſmall pear-ſhaped yellow pimples break out on the face above the bill. The male birds of the firſt year want theſe marks: and the older they are, the more numerous are the pimples, and the fuller and longer the ruffs. The length of the male to the tip of the tail is one foot, the breadth two; of the *reeve* ten inches, the breadth nineteen; the weight of the former when juſt taken, is ſeven ounces and a half, and of the latter only four. The *reeves* never change their colour, which is pale brown; the back ſpotted with black, ſlightly edged with white; the tail brown; the middle feathers ſpotted with black; the breaſt and belly white; and the legs of a pale dull yellow. They come over to us in vaſt numbers early in ſpring, and diſappear about Michaelmas, building in ſome parts of Lincolnſhire, particularly in the fenny country about Croyland. They are found alſo in the iſle of Ely, and in the Eaſt Riding of Yorkſhire, and for about three weeks at Martin-mere, in Lancaſhire. The *reeves* lay four eggs, which are white, marked with large ruſty ſpots, in a tuft of graſs, the firſt week in May, and ſit about a month. Soon after their arrival, the males begin to *hill*, i. e. to collect on ſome dry bank, near a pool of water, in expectation of the females, who reſort to them. Each male keeps poſſeſſion of a ſmall piece of ground, which it runs round till the graſs is worn quite away, and nothing but a naked circle left; and when a female lights, the *ruffs* immediately fall to fighting. When a fowler diſcovers one of thoſe hills, he places his net at night, and at day-break reſorts to his ſtand; and at the firſt pull takes thoſe birds that are within reach; he then places his ſtales, or ſtuſt birds, to entice thoſe that are traverſing the fen. In this way a fowler will take forty or fifty dozen in a ſeaſon. When they firſt come over, there are many more males than females among them; but theſe are ſo continually fighting, that their number ſoon decreaſes below an equality. They are fed after they are taken with bread and milk, hemp-ſeed, and ſometimes boiled wheat; to which, if expedition is required, they add ſugar, and thus they become very fat. They are killed by cutting off the head with a pair of ſciſſars; and they diſcharge a great quantity of blood, conſidering their ſize. They are dreſſed like woodcocks, with their inteſtines; and when killed at the proper time, they are reckoned by the epicures very delicious. Ray and Pennant.

RUFFE is alſo the name of a particular ſpecies of pigeon, called by Moore the *columba cucullata rudis*.

It is in ſhape very like that ſpecies of pigeon called the *jacobine*, but is larger, and has a longer beak. The iris of the eye is ſometimes red, ſometimes pearl-coloured; the feathers of the hood and chain are much longer than the *jacobine*, though they do not come down ſo low to the ſhoulders of the wings, nor are they ſo compact and cloſe, but are apt to blow about with every little blaſt of wind, and fall more backward off the head, and lie in a rough confuſed manner.

It is a common thing to match the *jacobine* pigeon with this ſpecies, with intent to improve its chain by the length of the *ruffe*'s feathers; but the event is, that the pigeon is always worſe inſtead of better, being longer beaked, and looſer in its head and chain without any real advantage.

RUFTER-HOOD, among *Falconers*, a plain leathern hood, large and open behind, to be worn by a hawk, when ſhe is firſt drawn.

RUGGIOLA, a ſort of Spaniſh ſlate, ſerving in many places in the room of tiles and bricks. It is a flaky ſtone of the nature of ſome of our grey ſlates, and is cut out of a mountain near Cordova; a plate of this being well heated on both ſides, will retain its warmth for twenty-four hours.

The people of Cornwall and ſome parts of Yorkſhire uſe a ſtone, which is of a talcky nature, to warm themſelves when in bed, applying it at the feet of the bed. This they call the warming ſtone, from its uſe, and it will retain a ſenſible heat ſix or eight hours, after once moderately warming. Plot's Oxfordſhire, p. 258.

RUGOSE *leaf*, among *Botaniſts*. See LEAF.

RUININE *oil*, a name given by ſome authors to the oil of the PALMA *Chriſti*, which is very common in the Weſt Indies, and is uſed by the common people in lamps. It is a delicate, ſweet, and tranſparent oil, and has no peculiar operation in phyſic. They often give it in glyſters from one ſpoonful to three at a time, and it has only the effect of common oil; but the leaves of the plant are one of the grand medicines of the Negroes: bruiſed, and applied to the head, they are thought to be an almoſt infallible remedy for the head-ach, of whatever kind, or from whatever cauſe. See CASTOR-*oil*.

RUINS, a term particularly uſed for magnificent buildings, fallen to decay by length of time, and whereof there only remains a confuſed heap of materials.

Such are the *ruins* of the tower of Babel, of the tower of Belus, two days journey from Bagdat, in Syria, on the banks of the Euphrates; which are now no more than a heap of bricks, cemented with bitumen; and whereof we only perceive the plan to have been ſquare.

Such, alſo, are the *ruins* of a famous temple, or palace, near Schiras, in Perſia; which the antiquaries will have to have been built by Ahaſuerus; and which the Perſians now call Tchelminar, or Chelminar; q. d. the forty columns; becauſe there are ſo many columns remaining pretty entire, with the traces of others; a great quantity of baſſo relievos, and unknown characters, ſufficient to ſhew the magnificence of the antique architecture. The *ruins of* PALMYRA may alſo be reckoned in the claſs of famous *ruins*.

RUKKIA, in *Zoology*, a name given by ſome to a peculiar kind of ſquirrel, found in the iſland of Ceylon.

RULE, or RULER, *regula*, a very ſimple inſtrument, ordinarily of hard wood, thin, narrow, and ſtraight; ſerving to direct the drawing of right lines.

The *rule* is of principal uſe in all the mechanical arts. To prove whether or no it be juſt, draw a line by it on paper; then turn the *rule* about, the right end to the left, and apply the ſame edge this way to the line: if the edge now agree exactly with the line, the *ruler* is true.

Deſmarets has a fine poem on the amours of the *rule* and compaſs. The ſtone-cutters *rule* is uſually four feet long, and divided into feet and inches.

The maſons *rule* is twelve or fifteen feet long, and is applied under the level to regulate the courſes, to make the piedroits equal, &c.

RULE, *parallel*, or RULER. See PARALLEL.

RULE is alſo applied to certain inſtruments which have other conſiderable uſes beſides that of drawing lines. Such are the carpenters *joint-rule*, Everard's and Coggeſhal's *ſliding-rules*, &c.

RULE, *carpenters joint*, is an inſtrument uſually of box, twenty-four inches long, and one a half broad, each inch being ſubdivided into eight parts. On the ſame ſide with theſe diviſions is uſually added Gunter's line of numbers.

On the other ſide are the lines of timber and board-meaſure, the firſt beginning at $8\frac{1}{2}$, and continued to 36, near the other end; the latter is numbered from 7 to 36, four inches from the other end. *Tab.* III. *Surveying*, *fig.* 47.

The diviſion of the timber-line is formed from a conſideration, that 1728 inches make a ſolid foot, in the following manner: thus, 9 is ſo placed againſt one of the diviſions of inches, or parts on the other ſide of the *rule*, beginning from the right hand, that its ſquare, which is 81 inches, multiplied by that number of inches and parts, muſt make 1728 inches; which, dividing 1728 by 81, muſt be placed againſt $21\frac{1}{3}$ from the right hand; and 10 muſt be placed againſt $17\frac{28}{100}$ inches; becauſe 1728 divided by the ſquare of 10 or 100, gives $17\frac{28}{100}$, &c. But becauſe a ſquare whoſe ſide is 1, 2, &c. to 8 inches, requires more than 24 inches in length, as a multiplier, in order to produce 1728 inches; and ſince the length of the *rule* is only 24 inches, there is a table upon the left end of it, which ſupplies its defect of length. In this table the upper row of figures, viz. 1, 2, 3, 4, 5, 6, 7, 8, denotes inches, or the lengths of the ſides of ſquares; and the ſecond and third rows are the correſpondent feet and inches to make up a ſolid foot. It is made by dividing 144 inches by the ſquares of 1, 2, 3, 4, 5, 6, 7, 8.

The line of board meaſure is thus divided: ſuppoſe the diviſion 7 to be marked; divide 144, the number of inches in a ſquare foot, by 7, and the quotient will be $20\frac{4}{7}$ inches; whence the diviſion 7 muſt be againſt $20\frac{4}{7}$ inches on the other ſide of the *rule*. To mark the diviſion 8, divide 144 by 8, and the quotient, which is 18 inches, muſt be placed on the line of board-meaſure againſt 18 inches on the other ſide, &c. But becauſe the ſide of a long ſquare, that is, 1, 2, 3, 4, 5 inches, requires the other ſide to be more than 24 inches, the whole length of the *rule*; there is a table annexed, formed by dividing 144 inches by each of the numbers in the upper row, and then each of the quotients by 12, to reduce them into feet.

Rule, *uſe of the carpenters joint.* The application of the inches in meaſuring lengths, breadths, &c. is obvious. That of the Gunter's line, ſee under Gunter's *line.* The uſe of the other ſide is all we need here meddle with.

1. *The breadth of any ſurface, as board, glaſs, &c. being given, to find how much in length makes a ſquare foot.*—Find the number of inches the ſurface is broad, in the line of board-meaſure, and right againſt it, on the inches ſide, is the number of inches required. Thus, if the ſurface were 8 inches broad, 18 inches will be found to make a ſuperficial foot.

Or, more readily, thus. Apply the *rule* to the breadth of the board or glaſs, that end marked 36 being even with the edge; the other edge of the ſurface will ſhew the inches and quarters of inches which go to a ſquare foot.

To find the content of a given ſurface. Find the breadth, and how much makes one foot; then turn that over as many times as you can upon the length of the ſurface, and ſo many feet does the ſurface contain.

2. *Uſe of the table at the end of the board-meaſure.* If a ſurface be one inch broad, how many inches long will make a ſuperficial foot? Look in the upper row of figures for one inch, and under it, in the ſecond row, is 12 inches, the anſwer to the queſtion.

3. *Uſe of the line of timber-meaſure.* This reſembles the former; for, having learnt how much the piece is ſquare, look for that number on the line of timber-meaſure: the ſpace thence to the end of the *rule* is the length, which, at that breadth, makes a foot of timber. Thus, if the piece be 9 inches ſquare, the length neceſſary to make a ſolid foot of timber is $21\frac{1}{3}$ inches. If the timber be ſmall, and under 9 inches ſquare, ſeek the ſquare in the upper rank of the table, and immediately under it are the feet and inches that make a ſolid foot. Thus, if it be 7 inches ſquare, 2 feet 11 inches will be found to make a ſolid foot.

If the piece be not exactly ſquare, but broader at one end than another, the method is, to add the two together, and take half the ſum for the ſide of the ſquare. For round timber, the method is, to girt it round with a ſtring, and to allow the fourth part for the ſide of the ſquare. But this method is erroneous; for hereby you loſe above $\frac{1}{5}$ of the true ſolidity. See Timber.

Rule, *caliber.* See Caliber.

Rule, *Everard's ſliding.* }
Rule, *Coggeſhall's ſliding.* } See Sliding *rule.*

Rule, *regula*, alſo denotes a certain maxim, canon, or precept to be obſerved in any art or ſcience. Thus we ſay, the *rules* of grammar, of logic, of philoſophizing, &c.

School philoſophers diſtinguiſh two kinds of *rules*; viz. *theoretical*, or *rules of knowing*, which relate to the underſtanding, being of uſe in the diſcovery of truth; and *practical* or *rules of acting*, which relate to the will, and ſerve to direct it to what is good and right.

For the management and application of theſe two ſorts of *rules*, there are two diſtinct arts; viz. *logic*, and *ethics*.

Rules *of knowing*, *regulæ ſciendi*, are ſuch as direct and aſſiſt the mind, in perceiving, judging, and reaſoning.

Rules *of acting*, *regulæ agendi*, are thoſe whereby the mind is guided in her deſires, purſuits, &c.

Authors are extremely divided about the regard to be had to the rules *of poetry* fixed by the ancients, Ariſtotle, Horace, Longinus, &c. and admitted by the modern critics, as Boſſu, &c. ſome contending, that they muſt be inviolably obſerved; others pleading for liberty to ſet them aſide on occaſion. *Rules*, it is complained, are fetters; rank enemies to genius; and never religiouſly obſerved by any, but thoſe who have nothing in themſelves to depend on. Voiture frequently neglected all the *rules* of poetry, as a maſter who ſcorned to be confined by them.

The theatre has its particular *rules*, as the *rule* of twenty-four hours, the unities of action, time, and place, &c. If it be true, ſays Moliere, that plays conducted according to the *rules* do not pleaſe, but thoſe which are not, do, the *rules* muſt be naught. For myſelf, when a thing hits and diverts me, I do not enquire whether I have done amiſs, nor whether Ariſtotle's *rules* forbid me to laugh.

Rule *of philoſophizing.* See Philosophizing.

Rule, in *Arithmetic*, denotes a certain operation with figures, to find ſums or numbers unknown, and to facilitate computations, mercantile, aſtronomical, &c.

Each *rule* in arithmetic has its particular name, according to the uſe for which it is intended. The four firſt, which ſerve as the foundation of the whole art, are called *addition*, *ſubtraction*, *multiplication*, and *diviſion*. See Addition, &c.

From theſe ariſe ſeveral other *rules*; as the *rule of three*, or *of proportion*; called alſo *the golden rule*, and diſtinguiſhed into *direct* and *inverſe*, *ſimple* and *compound*. Alſo the *rule of five numbers.*—*Rule of fellowſhip*, *ſimple* and *with time.*—*Rule of alligation*, *medial* and *alternate.*—*Rule of exchange.*—*Rule of falſe poſition*, *ſingle* and *double*. To which add, *approximation*, *barter*, *combination*, *equation*, *exchange*, *extraction*, *involution*, *progreſſion*, *rebate*, *reduction*, &c. See Fellowship, &c.

Rule *of three*, or *of proportion*, commonly called the *golden rule*, is a *rule* which teaches how to find a fourth proportional number to three others given. See *Geometrical* Proportion.

As, if three degrees of the equator contain 70 leagues, how many do 360 degrees, the circumference of the earth, contain?

The *rule* is this: *Multiply the ſecond term* 70 *by the third* 360; *divide the product* 25,200 *by the firſt term* 3, *and the quotient* 8400 *is the fourth term required.*

The uſe of this *rule* is of vaſt extent, both in common life, and the ſciences; but has no place except where the proportion of the given numbers is known. Suppoſe, e. gr. a large veſſel full of water to empty itſelf by a little aperture; and ſuppoſe three gallons to flow out in two minutes, and it were required to know in what time a hundred gallons would be diſcharged? Here, indeed, are three terms given, and a fourth required; but as it is evident, from experience, that this water flows faſter at firſt than afterwards, the quantity of flowing water is not proportional to time; and, therefore, the queſtion does not come under the *rule of three.*

The things which come under commerce are proportionable to their prices, twice as much of any commodity always coſting twice as much money, &c. The price, therefore, of any quantity of a commodity being given, the price of any other quantity of the ſame, or the quantity of the commodity anſwering to any other given ſum, is found by the *rule of three*. E. gr. If 3 pounds coſt 17*s.* what will 30 pounds coſt? Since as 3 pounds are to 30 pounds, ſo is the value of the former 17*s.* to the value of the latter; the queſtion ſtands thus:

3 ℔ ——— 30 ℔ ——— 17*s.*
17
———
3)510(170*s.* —— 8*l.* 10*s.*

Again, if 3 pounds be bought for 17*s.* how many will 170*s.* buy? Since as 17*s.* is to 170*s.* ſo are 3 pounds to the pounds required; the number will be found thus:

17*s*.——————170*s*.——————3℔.
3
———
17)510(30℔.
51
———
00

If the given terms be heterogeneous, i. e. have broken numbers among them, they do not bear the ſame proportion to each other which the things they expreſs bear. They muſt therefore be reduced to homogeneous ones, or to the ſame denomination, as pounds into ſhillings, ſhillings into pence, &c. hours into minutes, &c.

E. gr. If 3 pounds and 4 ounces coſts 2*s*. 4*d*. what will 2 pounds coſt? The operation will be thus:

3℔. 4 oz.——————2℔.——————2*s*. 4*d*.
16 16 12
——— ——— ———
52 32 28
28
———
256
64
———
52)896(17*d*. $\frac{12}{52}$ of a penny.
52
———
376
364
———
12

In many caſes of commerce and accompts, we have more compendious ways of working queſtions that come under the *rule of three*, than by the *rule* itſelf; which, by reaſon of their expediting practice, are called PRACTICE, and conſtitute a particular *rule* of themſelves.

Rule *of three inverſe*, is where the natural order of the terms is inverted. As, if 100 workmen build a houſe in two years, in how long time will 200 workmen build the ſame?

This is uſually conſidered by the writers of arithmetic, and taught in the ſchools, as a particular *rule*; being wrought by multiplying the firſt term 100, by the ſecond 2, and dividing the product 200 by the third term 200, the quotient 1 is the number required.

But there is no neceſſity for making a particular *rule* for the matter; this coming naturally enough under the former, by only ranging the terms as the nature of the queſtion requires.

Thus it is evident, that as the number of men 200 is to 100, ſo is the ſpace 2 years, wherein 100 build the houſe, to the ſpace wherein 200 will build the ſame. For the leſs time the more hands are required. The queſtion then will ſtand thus:

200 M.——————100 M.——————2 Y.
2
———
200)200(1 year.

Nothing is more neceſſary than to place the terms in due order; for which purpoſe, firſt ſet down the quantity that is of the ſame kind with the quantity ſought; then conſider, from the nature of the queſtion, whether that which is given is greater or leſs than that which is ſought: if it be greater, place the greateſt of the other two quantities on the left hand; but if it be leſs, place the leaſt of the other two quantities on the left hand, and the other on the right; and proceed by multiplying the ſecond by the third, and dividing their product by the firſt. Accordingly the above queſtion will be thus ſtated:

200——2——100; and hence $\frac{2\times 100}{200} = 1$.

Rule *of five numbers*, or *compound rule of three*, is where two *rules* of three are required to be wrought, before the number ſought be found. As if 300*l*. in two years yield 30*l*. intereſt, how much will 1000*l*. yield in 12 years? Here the firſt thing to be done is, to find by the *rule of three* what intereſt 1000*l*. will give in 2 years; and then, by the ſame rule, what it will give in 12 years.

This, alſo, is conſidered by the writers, &c. of arithmetic, as a particular *rule*, but without any neceſſity; a double operation ſolving it better; as in this example:

300*l*.——————1000*l*.——————30*l*. int.
30
———
3|00)300|00(100 int.
2 Y.——————12——————100*l*.
12
———
2)1200(600 int.

But in queſtions of this kind, a ſingle *rule of three* may do the buſineſs: for 300*l*. give the ſame intereſt in two years which twice 300 gives in one year; and twelve times 1000*l*. give the ſame intereſt in one year that 1000 give in 12: omitting, therefore, the circumſtances of time, ſay, If twice 300 (that is 600) give 30*l*. intereſt (in one year) what will 12 times 1000 (that is, 12000) give (in one year)?

600——————12000——————30
30
———
600)3600|00(600

What is ſaid of this *rule* being more eaſily performed by two ſimple *rules of three*, is ſometimes true, but not always. In ſome caſes, not only five, but ſeven, or nine, terms may be given, from whence it is neceſſary to determine an eighth, or a tenth, which indeed might be performed by repeated applications of the ſimple *rule of three*, but not ſo expeditiouſly. Mr. Jones has therefore given a general *rule* by which all caſes of the *rule of three*, or of proportion, may be ſolved.

The *rule* is, 1. Set down the terms expreſſing the condition of the queſtion, in one line. 2. Under each conditional term ſet its correſponding one in another line. 3. Multiply the *producing terms* of one line, and the produced term of the other line continually, and take the reſult for a dividend. 4. Multiply the remaining terms continually, and let the product of them be a diviſor. 5. The quotient of this diviſion will be the term required.

By *producing terms* here, are meant, whatever neceſſarily and jointly produce any effect; as the cauſe and the time; length, breadth, and depth; buyer and his money; ſeller and his goods; all neceſſarily inſeparable in producing their ſeveral effects.

In a queſtion where a term is underſtood, and not expreſſed, that term may be expreſſed by unity.

Example. If 250*l*. ſerve ſix perſons for nine months; how long will 1000*l*. ſerve four perſons at the ſame rate? Here the term which expreſſes the condition are,

£. *P*. *M*.
250 : 6 : 9
correſponding terms 1000 : 4 : Q

Where Q is put to repreſent the term required.

Among the conditional terms, ſix perſons and nine months are producing, and 250*l*. is produced: among their correſponding terms four perſons and Q are producing, and 1000*l*. is produced.

But it being impoſſible to multiply the producing terms in the ſecond line, and the produced in the firſt, becauſe Q is unknown, therefore multiply the producing terms of the firſt line, by the produced in the ſecond, and divide by the product of the reſt.

Then will $Q = \frac{6\times 9\times 1000}{4\times 250} = 6\times 9 = 54$. See Mr. Dodſon's Anti-Logarithmic Canon, p. 38, ſeq.

But if the notion of producing and produced terms ſhould ſeem obſcure, thoſe who have a knowledge of the doctrine of compound ratios, will eaſily perceive that in the foregoing queſtion, Q is to 9 months in the compound ratio of four perſons to ſix perſons inverſely, and of 1000*l*. to 250*l*. directly, that is, $\frac{Q}{9} = \frac{6}{4} \times \frac{1000}{250}$, therefore $Q = \frac{6\times 9\times 1000}{4\times 250} = 54$, as before. And in like manner may other queſtions, relating to the compound rule of proportion, be ſtated and ſolved, however complex.

Rule, *central*. See CENTRAL.

Rule, in a monaſtic ſenſe, is a ſyſtem of laws, or conſtitutions, whereby religious houſes are eſtabliſhed and regulated; and which the religious make a vow to obſerve at their entrance.

The monaſtic *rules* are all to be approved of by the pope, in order to make them valid. The *rule* of St. Benedict is, by ſome authors, called the *holy rule*.

Thoſe of St. Bruno, and St. Francis, are, of all others, the moſt auſtere. See CARTHUSIANS.

When a religious cannot ſupport the auſterities of his *rule*, he ſues for a diſpenſation.

Rule, in the *Canon Law*. The **Rule**, *de veriſimili notitia*, *of probable notice*, in the Romiſh church, renders all proviſions to a benefice, vacant by death, null, if it appear, that, from the day of the deceaſe to the day of the date of the proviſions, or to the day when the courier arrives from Rome, there has not been time ſufficient for regular notice of the perſon's deceaſe to be conveyed to the pope.

Proviſions are even null, if it be proved the courier ſet out before the perſon was deceaſed. This *rule* is ſtrictly obſerved in France; in other countries the pope finds frequent occaſions to diſpenſe with it. See PROVISIONS.

Rule *of twenty days, regula viginti dierum.* By this *rule,* if an eccleſiaſtic reſign his benefice, to make the reſignation valid, the reſigner muſt ſurvive its admiſſion in the court of Rome twenty days. If he die before the expiration of the twenty days, the reſignation is void, and the benefice becomes vacant by death.

This *rule* does not hold of the proviſions of ordinary collators; nor of ſimple and pure reſignations into the hands of the ordinary; but only in caſe of proviſions of the pope, diſpatched on reſignations *in favorem.*

This *rule* anciently extended to ſuch as reſigned in time of health, as well as of ſickneſs. Pope Boniface reſtrained it to the latter; when it is commonly called *regula de infirmis reſignantibus.*

Rule *de publicondis.* By this *rule* the reſignee of a benefice, if he have a proviſion from the court of Rome, is obliged to publiſh the reſignation, and take poſſeſſion within ſix months; or, if he have it from the ordinary collator, within one month. Otherwiſe, if the reſigner die, the reſignation becomes null.

Rules *of court,* in *Law,* are certain orders made, from time to time, in the courts of law, which attornies are bound to obſerve, in order to avoid confuſion; and both the plaintiff and defendant are at their peril alſo bound to pay obedience to *rules* made in court relating to the cauſe depending between them. It is to be obſerved, that no court will make a *rule* for any thing that may be done in the ordinary courſe; and that if a rule be made, grounded upon an affidavit, the other ſide may move the court againſt it, in order to vacate the ſame and thereupon ſhall bring into court a copy of the affidavit and *rule.* On the breach and contempt of a *rule* of court an attachment lies; but it is not granted for diſobedience to a *rule* when the party has not been perſonally ſerved; nor for diſobeying a *rule* made by a judge in his chamber, which is not of force to ground a motion upon, unleſs the ſame be entered. A *rule* of court is granted every day the courts of Weſtminſter ſit, to priſoners of the king's bench, or Fleet priſons, to go at large about their private affairs.

Rules, *clerk of the.* See Clerk.

RULER, *parallel.* See Parallel *ruler.*

RUM, a ſpecies of brandy, or vinous ſpirit, drawn by diſtillation from ſugar-canes.

The word *rum* is the name it bears among the native Americans.

Rum is very hot and inflammable, and is in the ſame uſe among the natives of the ſugar-countries, as brandy among the French.

Rum differs from what we ſimply call ſugar-ſpirit, in that it contains more of the natural flavour or eſſential oil of the ſugar-cane; a great deal of raw juice and parts of the cane itſelf being often fermented in the liquor, or ſolution, of which the *rum* is prepared.

The unctuous or oily flavour of *rum* is often ſuppoſed to proceed from the large quantity of fat uſed in boiling the ſugar; which fat, indeed, if coarſe, will uſually give a ſtinking flavour to the ſpirit, in our diſtillations of the ſugar liquor, or waſh, from our refining ſugar-houſes; but this is nothing like the flavour of the *rum,* which is really the effect of the natural flavour of the cane. The method of making *rum* is this:

When a ſufficient ſtock of the materials is got together, they add water to them, and ferment them in the common method, though the fermentation is always carried on very ſlowly at firſt; becauſe at the beginning of the ſeaſon for making *rum* in the iſlands, they want yeaſt, or ſome other ferment, to make it work; but by degrees, after this, they procure a ſufficient quantity of the ferment, which riſes up as a head to the liquor in the operation, and thus they are able afterwards to ferment and make their *rum* with a great deal of expedition, and in large quantities.

When the waſh is fully fermented, or to a due degree of acidity, the diſtillation is carried on in the common way, and the ſpirit is made up proof; though ſometimes it is reduced to a much greater ſtrength, nearly approaching to that of alcohol or ſpirit of wine, and is then called double diſtilled *rum.* It might be eaſy to rectify the ſpirit, and bring it to much greater purity than we uſually find it to be of; for it brings over in the diſtillation a very large quantity of the oil; and this is often ſo diſagreeable, that the *rum* muſt be ſuffered to lie by a long time to mellow before it can be uſed; whereas, if well rectified, it would grow mellow much ſooner, and would have a much leſs potent flavour.

The beſt ſtate to keep *rum* in, both for exportation, and other uſes, is doubtleſs that of alcohol, or rectified ſpirit. In this manner it would be tranſported in one half the bulk it uſually is, and might be let down to the common proof ſtrength with water when neceſſary. For the common uſe of making punch, it would likewiſe ſerve much better in the ſtate of alcohol; as the taſte would be cleaner, and the ſtrength might always be regulated to a much greater exactneſs than in the ordinary way. The only uſe to which it would not ſo well ſerve in this ſtate, would be the common practice of adulteration among our diſtillers; for when they want to mix a large portion of cheaper ſpirit with the *rum,* their buſineſs is to have it of the proof ſtrength, and as full of the flavouring oil as they can, that it may drown the flavour of the ſpirits they mix with it, and extend its own. If the buſineſs of rectifying *rum* was more nicely managed, it ſeems a very practicable ſcheme to throw out ſo much of the oil, as to have it in the fine light ſtate of a clear ſpirit, but lightly impregnated with it; in this caſe it would very nearly reſemble arrac, as is proved by the mixing a very ſmall quantity of it with a taſteleſs ſpirit, in which caſe the whole bears a very near reſemblance to arrac in flavour.

Rum is uſually very much adulterated in England; ſome are ſo barefaced as to do it with malt-ſpirit; but when it is done with molaſſes-ſpirit, the taſtes of both are ſo nearly allied, that it is not eaſily diſcovered. The beſt method of judging of it is by ſetting fire to a little of it; and, when it has burnt away all the inflammable part, examining the phlegm both by the taſte and ſmell.—Shaw's Eſſay on Diſtillery.

For the duty, &c. on *Rum,* ſee *Foreign* Spirits.

RUMB, Rum, or Rhumb, in *Navigation.* See Rhumb.

Rumb-*line,* or *loxodromia.* See Rhumb-*line.*

RUMEN, the firſt ſtomach of animals which chew the cud, and which are hence called *ruminants.*

The food is tranſmitted into the *rumen* without any other alteration in the mouth, than being a little rolled and wrapped up together.

The *rumen,* or paunch, is much the largeſt of all the ſtomachs, as being to contain both the drink, and the whole crude maſs of aliment, which there lie and macerate together, to be thence remitted to the mouth, to be re-chewed and comminuted, in order to their farther digeſtion in the other ventricles. See Abomasus.

In the *rumen,* or firſt ventricle, of camels, are found divers ſacculi, which contain a conſiderable quantity of water; an admirable contrivance for the neceſſities of that animal, which living in dry countries, and feeding on dry hard food, would be in danger of periſhing but for theſe reſervoirs of liquor.

RUMEX, in *Botany.* See Dock.

RUMI, in the *Materia Medica,* a name given by Avicenna and Serapio to maſtic of the finer kind. They diſtinguiſh this drug into two ſorts; the one called by this name *rumi,* which was white and pure; the other called *cupti,* which was foul and blackiſh; the former came from the iſland of Chios, the latter from ſome parts of Ægypt.

RUMINANT, *ruminans,* in *Natural Hiſtory,* an animal which chews over-again what it has eat before: this is popularly called *chewing the cud.*

Joah. Con. Peyer has an expreſs treatiſe De *Ruminantibus* & *Ruminatione;* where he ſhews, that there are ſome animals which do really ruminate; ſuch are oxen, ſheep, deer, goats, camels, hares, and ſquirrels; whereas others only appear to ruminate, which he calls *ruminantia ſpuria;* of which number are moles, crickets, bees, beetles, crabs, mullets, and ſeveral other fiſhes.

This latter claſs, he adds, have the ſtomachs compoſed of muſcular fibres; by means whereof the food is ground up and down, much as in real *ruminants.*

Ruminants, Mr. Ray obſerves, are all quadrupedal, hairy, and viviparous; ſome with hollow and perpetual horns, others with deciduous ones. See Quadrupeds.

The horned *ruminants* have all four ſtomachs, appropriated to the office; viz. 1. The *κοιλια μεγαλη* of Ariſtotle, the *rumen, venter magnus,* or what we call the *paunch,* or *inward,* which receives the meat ſlightly chewed, retains it awhile, and then delivers it back again into the mouth, which is what we call the *cud,* to be re-chewed. 2. The *κεκρυφαλος,* or *reticulum,* which we call the *honeycomb,* from its internal coat being divided into cells like honeycombs. 3. The *εχινος,* which Mr. Ray thinks has been wrongly tranſlated *omaſus,* and which he chooſes to call the *echinus:* this being difficult to clear, our people throw it away, and call it the *manifold.* 4. The *ενυστρον* of Ariſtotle, by Gaza called the *abomaſus;* and, among us, the *maw.*

Again, all the horned *ruminant* animals want the *dentes primores,* or broad teeth in the upper jaw; and they afford that hard kind of fat called *ſuet, ſebum, στεαρ,* which is firmer, and leſs liquifiable in them than the adeps of other animals.

RUMINATION, *ruminatio,* an action peculiar to a claſs of animals called *ruminants,* whereby they return the food they have formerly ſwallowed, to be chewed over-again, and rendered more fit for chyle, by this ſecond grinding in the mouth.

Peyer defines *rumination*, a natural motion of the ſtomach, mouth, and other parts; by means of which, the food eaten at firſt, haſtily, is returned back again to the mouth; where it is re-chewed, and ſwallowed a ſecond time; and that much to the benefit of the animal.

Burnet, in his Theſaur. Med. gives ſeveral inſtances of men that ruminated, from Salmuth, Rhodius, &c. Dr. Slare, in the Philoſ. Tranſ. N° 193, gives us a freſher inſtance in one of our own countrymen, living at Briſtol. His account, as it is curious, and may let us ſee a little how it fares with ruminating animals, we ſhall here add.

“ He begins to chew his meat over again within a quarter of an hour after meals, if he drink with it; if not, ſomewhat later. His chewing after a full meal laſts about an hour and a half: and if he go to bed preſently after meals, he cannot ſleep till the uſual time of chewing be over. The victuals, upon the return, taſte ſomewhat more pleaſant than at the firſt. Bread, meat, cheeſe, and drink, return much of ſuch colours as they would be of, were they mixed together in a mortar. Liquids, as ſpoon-meat, return to his mouth in the ſame manner as dry and ſolid food. The victuals ſeem to him to lie heavy till they have paſſed the ſecond chewing; after that they paſs clean away. If he eat variety of things, that which paſſes down firſt, comes up again firſt. If the ruminating faculty chance to leave him, it ſignifies ſickneſs; and it is never well with him till it returns. He is about twenty years of age, and was always thus ſince he can remember. His father does the like, ſometimes; but only in ſmall quantities.

RUMMAGE, probably derived from the Saxon *raum*, *room*, or *ſpace*, in the *Sea Language*, ſignifies to clear a ſhip's hold, or to remove goods or luggage from one place to another.

RUMNEY or ROMNEY *marſh*, a tract of land, in the county of Kent, containing 24000 acres, governed by certain ancient and equitable laws of ſewers, compoſed by Henry de Bathe, a venerable judge in the reign of king Henry III. who granted a charter to this diſtrict, impowering twenty-four men, thereunto choſen, to make diſtreſſes equally upon all thoſe which have lands and tenements in the ſaid marſh, to repair the walls and water-gates of the ſame, againſt the dangers of the ſea. The commiſſioners of SEWERS, in other parts of England, may act according to the laws and cuſtoms of *Rumney marſh*, or otherwiſe, at their own diſcretion; ſubject to the diſcretionary reviſion of the court of king's bench.

RUMOUR, in *Law*. Spreading ſalſe *rumours* is criminal, and puniſhable at common law.

RUMP *of a bird*. See UROPIGIUM.

RUMPHIA, in *Botany*, the name of a plant which makes a diſtinct genus of the *triandria monogynia* claſs: the characters of which are, that the cup is a one-leaved perianthium, divided by three notches at the extremity, and is placed erect, and is plain; the flower is compoſed of three petals, which are all oblong, obtuſe, and equal in ſize; the ſtamina are three pointed filaments of the length of the flower; the antheræ are very ſmall; the piſtil has a roundiſh germen; the ſtyle is pointed, and of the ſame length with the ſtamina; and the ſtigma is three-cornered. The fruit is a ſkinny drupe of a turbinated form, and furrowed in three places. The ſeed is a whole nut of an oval figure, containing three cells; the nuts in each of theſe are three-cornered in ſhape.

RUN *of a ſhip*, ſo much of her hull as is always under water; growing thinner and lanker by degrees, from the floor-timber to the ſtern-poſts.

This is alſo called the *ſhip's way aftward*.

A ſhip is ſaid to have a *good run*, when it is long, and the water paſſes eaſily to her rudder, her tuck not lying too low, which is of great importance to her ſailing. If the water do not come ſtrongly to her rudder, by reaſon of her being built too broad below, ſhe cannot ſteer well; and a ſhip that cannot ſteer well, cannot keep a good wind, nor will have any freſh way through the ſea, but will always be falling to leeward.

And yet a ſhip with a large and good *run* loſes much ſtowage, becauſe it is made narrow below.

RUN, in the *Manege*. To *run* a horſe is to put him to his utmoſt ſpeed. Some uſe the word *running* for any kind of gallop.

RUNCARIA, in our old writers, ſignifies land full of brambles and briars. 1 Inſt. 5. The word comes from the Latin *runca*, *a weed*.

RUNCATION, a term uſed in the *Ancient Huſbandry* to expreſs the clearing away the weeds from among the corn, and other ſown plants. They uſed, when the corn or other plants were an inch or two high, to draw a ſort of rake or harrow over the ground indiſcriminately over the corn and weeds, and when this was done a perſon followed over all the field, and picked up all the weeds with the hand; the treading down the young corn, however, by this perſon's feet, and the injury done to it by the rake, were ſo great, that the crop always ſuffered greatly by it; and many of the Romans choſe to omit the uſe of the rake, or harrow, as a thing that did as much injury to the corn as to the weeds, and contented themſelves with the ſending a perſon to pick up the weeds without it.

This was a ſort of firſt hint to the horſehoeing huſbandry of the moderns, though ſo injudiciouſly managed, that it was of very little, if any uſe, in this its infancy.— But had theſe farmers been inſtructed to ſow their corn in rows, and then to uſe the rake or harrow, as we do the hoe, only between thoſe rows, they would then have had all the advantage of deſtroying weeds by it, and of ſtirring the earth, and no injury would have been done to the crop. See HUSBANDRY.

RUNDLES, or ROUNDLES, in *Heraldry*, the ſame as balls or PELLETS.

RUNDLET, RONLET, or ROUNDLET, a ſmall veſſel, containing an uncertain quantity of any liquor, from three to twenty gallons.

RUNGS, in a ſhip, the ſame with the floor or ground-timbers, being the timbers which conſtitute her floor, and are bolted to the keel, whoſe ends are called *rung-heads*; and more properly floor-heads.

RUNG-*heads*, in a ſhip, are made a little bending to direct the ſweep or mold of the *futtocks*, and naval-timbers: for here the lines, which make the compaſs and bearing of a ſhip, do begin.

RUNIC, a term applied to the language and letters of the ancient Goths, Danes, and other northern nations.

The word *rune*, according to Mallet, is derived from a word in the ancient Gothic language, ſignifying *to cut*: but Wormius, with greater probability, derives *rune* from either *ryn*, *a furrow*, or *ren*, *a gutter* or *channel*. As theſe characters were firſt cut in wood or ſtone, the reſemblance to a furrow, or channel, would eaſily ſuggeſt the appellation.

Some have been of opinion, that Gulphilas, or Ulphilas, a Gothic biſhop, about the year 370, was the firſt inventor of the *Runic character*: but Olaus Wormius ſhews at large, that Ulphilas could only be the firſt who taught it to foreigners; for that the *Runæ*, or characters themſelves, were older than he.

In reality, Ulphilas, according to other authors, was ſo far even from teaching the character, that he invented an alphabet of his own, on purpoſe to put the *Runic* characters, which had been made ſubſervient to the ſuperſtitions of heatheniſm, out of uſe. See GOTHIC *character*.

Many learned writers have adopted the opinion, firſt ſuggeſted by Dr. Hickes, that the *Runic* character was borrowed from the Roman: and they farther maintain, that it was not known in the North before the introduction of Chriſtianity. If it were allowed, that the *Runic* characters are borrowed from the Roman alphabet, it by no means follows that the Scandinavians had waited for the ſecret till the introduction of Chriſtianity among them: but it is juſtly obſerved, by Wormius, that they are as eaſily reducible to the Greek and Hebrew alphabets as to the Roman. An evident proof that the *Runic* were not derived from the Roman letters reſults, not only from their form, which has ſcarce any reſemblance to theſe, but from their number (being but 16), and their order and names, which have nothing in common with the Roman, Greek, or Gothic characters of Ulphilas. A comparative view of the *Runic* and Gothic in theſe reſpects may be ſeen in the Engliſh tranſlation of Mallet's Northern Antiquities, vol. i. p. 370. M. Mallet has ſufficiently ſhewn, that all the old chronicles and poems of the North univerſally agree in aſſigning to the *Runic* characters a very remote antiquity, and in attributing the invention of them to ODIN himſelf, whom their poets expreſsly call the inventor of the *Runes*. Beſides, inſtances occur of princes and pagan heroes, who made uſe of this character, in an age long before Chriſtianity had penetrated into the North.

In Blekingia, a province of Sweden, there is a road cut through a rock, on which are various *Runic* characters, ſaid to have been engraved there by king Harold Hyldetand, in honour of his father; and king Harold is ſaid to have aſcended the throne about the beginning of the ſeventh century. It is, therefore, extremely probable that Odin introduced the *Runic* characters into the North, intending by the introduction of letters and writing to acquire reſpect from the rude uncivilized inhabitants of Scandinavia; who would be ready enough to to conceive that there was ſomething divine or magical in them. Accordingly we find that they were actually employed for the pretended purpoſe of working prodigies.

The *Runic* characters were diſtinguiſhed into various kinds. The *noxious*, or *bitter Runes* were employed to bring various evils on their enemies; the *favourable* averted misfortunes; the *victorious* produced conqueſt to thoſe who uſed them; the *medicinal* were inſcribed on the leaves of trees for healing; others ſerved to diſpel melancholy thoughts, to prevent ſhipwreck, as antidotes againſt poiſon, as preſervatives againſt the reſentment of their enemies, and in order to render a miſtreſs favourable. Theſe various kinds differed only in the ceremonies obſerved in writing them, in the materials on which they were written, in the place where they were expoſed, in the manner in which the lines were drawn, whether in the form of a circle, a ſerpent, or a triangle, &c.

The *Runic* characters were alſo employed for more rational purpoſes: for writing epiſtles and epitaphs, and for various kinds of inſcriptions, which, the older they are, ſo much the better are they engraven. They are rarely written from the right hand to the left; but it is not uncommon to meet with the line running from the top to the bottom, after the manner of the Chineſe and other Indian nations; or from the top to the bottom, and then turning round to the left, and ſo up again to the place it begins at; or elſe from the left to the right, and ſo back to the left again, which was the manner of the early Greeks. The greater part of the ancient monuments, written in the *Runic* character, which are ſtill preſerved, are inſcriptions diſperſed here and there in the fields, and cut out on large ſtones or pieces of rock. They are alſo found in churches, and ſometimes in other buildings.

In the tenth and eleventh centuries the *Runic* gave way to the Roman character; till at length the miſſionaries ſucceeded in totally aboliſhing them, as tending to retain the people in their ancient ſuperſtitions. They are, however, ſtill retained among the mountaineers of one province in Sweden. Mallet's Northern Ant. vol. i. p. 359, &c.

It is ſuppoſed they were called *Runic* as being myſterious and ſcientifical, like the Egyptian hieroglyphics. See Wormius de Literatura *Runica*; and Hickes's Theſaurus of the ancient Northern Languages.

There are ſome *Runic* medals in the cloſets of the curious; and ſome modern Daniſh and Engliſh medals, the inſcriptions whereof are Latin, and the character *Runic*.

There is extant a coin of king Offa with a *Runic* inſcription, which ſeems to ſhew that this character had been uſed by the Saxons as well as their Scandinavian brethren.

There are alſo *Runic* inſcriptions in this iſland; one in Cumberland, and another in Scotland. See Hickes's Theſ. Ling. Sept.

In ſeveral parts of Sweden, ſtones may be met with, which were formerly ſet up as obeliſks in memory of the dead; and theſe monuments are marked with the ancient northern letters called *Runor*, or the *Runic* charecters. In ſome places the characters vary from the *Runic*, particularly in free-ſtones found in Helſingland, of which Mr. Celſius has given us a deſcription, with an explanation. See Philoſ. Tranſ. Nº 445. ſect. 3.

From theſe Helſingland inſcriptions an alphabet of ſixteen letters may be derived, which is very ſingular. In other alphabets different ſounds are generally denoted by different figures; but here the ſame character, according to the diverſity of its place and altitude between two parallels, denotes different ſounds.

But theſe characters, however different they may appear at the firſt ſight from the *Runic*, may eaſily be derived from them; or, *vice verſa*, the *Runic* may be derived from the *Helſingic*, if theſe be ſuppoſed the moſt ancient. The ſubtraction of a perpendicular line in the firſt caſe, or its addition in the latter, brings the two characters to a near reſemblance.

The inſcription, which Mr. Celſius conſiders, was publiſhed in Monſ. de la Motraye's Travels, but erroneouſly.

Runic *ſtaffs* were a kind of calendars or compendious almanacs uſed in the North, marked out by lines upon ſhort pieces of board or ſmooth ſticks; ſome of which bear the appearance of great antiquity. They were called, in the North, *rim-ſtocks* and *prim-ſtaffs*; and exhibited, by different lines or marks, the faſts and feſtivals, the golden number, Dominical letter, epact, &c. Dr. Plot, in his Hiſtory of Staffordſhire, p. 418, &c. deſcribes one of theſe inſtruments, under the name of a *clog*, and illuſtrates the conſtruction of it by a figure.— He obſerves, that this kind of almanac is a remain of the Daniſh government, and that it was ſtill in uſe amongſt the meaner ſort of people. Thoſe which he met with in Staffordſhire had only the prime and the immoveable feaſts upon them; whereas others of a more perfect kind, preſerved in the cabinets of the curious, have likewiſe the Dominical letters. And of thoſe imperfect ones there were two kinds: ſome public, of a larger ſize, which were commonly hung at one end of the mantle-tree of the chimney, for the uſe of the whoſe family, as Wormius informs us they diſpoſed of them in Denmark; and others private, of a ſmaller ſize, which they carried in their pockets. This chronological inſtrument is ſometimes, by an evident corruption, called *runſtock*.

RUNNER, in the *Sea Language*, a rope belonging to the garnet, and to the two bolt-tackles. It is reeved in a ſingle block, ſeized to the end of a pennant, and has at one end a nooſe to hitch into any thing, and at the other end a double block, into which is reeved the fall of the tackle, or the garnet; by which means it purchaſes more than the tackle or garnet could allow. See *Tab. Ship. fig.* 1. *n.* 39. 73. 82. 110.

To *overhale the runner* is to pull down the hooked end, and hitch it into the ſling.

RUNNET, or **Rennet**, an acid juice, found in the ſtomachs of calves that have fed on nothing but milk, and are killed before the digeſtion be perfected.

It alſo ſignifies the liquor made by ſteeping the ſtomach of a calf in hot water.

It is this *runnet* that is chiefly uſed to curdle or turn milk for cheeſe.

Its proper place is the abomaſus. The like matter is alſo ſaid to be found in goats and hares.

The longer the *runnet* is kept, the better it is. Though it readily coagulates milk; yet, if put into it when already coagulated, it diſſolves it.

If ſalt be put into the milk before the *runnet* be applied, it prevents its coagulation; but if the ſalt be put in afterwards, it hardens the coagulum.

Ariſtotle will have the *runnet* to be the proper ſubſtance of the milk; but he is miſtaken when he ſays it is found in all animals which give milk, eſpecially in all ruminants.

RUNNING, in *Antiquity*, made one of the exerciſes performed in the PENTATHLON, or quinquertium. See Race.

This exerciſe was in ſo great eſteem among the ancient Greeks, that ſuch as prepared themſelves for it, thought it worth their while to burn, or parch their ſpleen, becauſe it was believed to be a hindrance to them.

Indeed, all thoſe exerciſes, that conduced to fit men for war, were more eſpecially valued; and that ſwiftneſs was eſteemed ſuch in an eminent degree, appears from Homer's giving his hero the epithet of ϖοδας ωκυς Αχιλλευς.

Running *of the eyes*, in infants. See Infant.

Running-*fights*, at ſea. See Fights.

Running-*fire*. See Fire.

Running *out a warp*, in *Sea Language*, the act of carrying the end of a rope out from the ſhip in a boat, and faſtening it to ſome diſtant place, to remove the ſhip towards the ſaid place, or keep her ſteady while her anchors are lifted, &c.

Running-*rigging* denotes all that part of a ſhip's rigging which paſſes through the blocks, to dilate, contract, or traverſe the ſails.

Running *the gauntlet*, in *Military Language*. See Gantlope.

Running *of goods*, a clandeſtine landing of goods, without paying the legal cuſtoms or duties for the ſame.— See Smuggling.

Running-*ſaddle*. See Saddle.

Running-*thruſh*, or *fruſh*, in *Farriery*, denotes an impoſthume, that ſometimes gathers in a horſe's frog; or a ſcabby and ulcerous diſpoſition which ſometimes cauſes it to fall off. When this diſcharge is natural, the feet ſhould be kept merely clean. When an impoſthume appears, the ſafeſt courſe is to pare out the hard part of the frog, or that which appears rotten, and to waſh the bottom of the foot three times a day with old chamber-ley.— But if a horſe has been neglected, and there be a ſtrong flux to the part, it will be neceſſary, in order to prevent its degenerating into a canker, to bathe the thruſh with the following lotion, laying over the ulcer a little tow dipped in the ſame, and uſing the purges and diuretics recommended in the GREASE. Take ſpirit of wine and vinegar, of each two ounces; tincture of myrrh and aloes, one ounce; Ægyptiacum, half an ounce; and mix them together. See Bartlet.

RUNOR. See Runic.

RUNT, the name uſed, with the diſtinction of places, for ſeveral ſpecies of pigeons. Theſe are the Leghorn, the

Spaniſh, the Frieſland *runt*, &c. The *columba domeſtica Piſarum, Hiſpaniæ & Friſiæ*, of Moore.

The Leghorn *runt* is a ſtately large pigeon, ſeven inches or better in the legs, cloſe feathered and faſt fleſhed, extremely broad breaſted, and very ſhort in the back. He carries his tail, when he walks, ſomewhat turned up like a duck's; his neck is longer than any other pigeon's, and he carries it bending like a gooſe or ſwan; he is gooſe-headed, and his eye lies hollow in his head, with a thin ſkin round it, like that of the Dutch tumbler; his beak is very ſhort for ſo large a bird, and has a ſmall wattle on it, and the upper chap falls a little over. It is a very valuable pigeon, but is tender and requires care.

The Spaniſh *runt* is the longeſt bodied of all the pigeons; it is ſhort legged, and looſe feathered, and does not walk ſo upright as the Leghorn *runt*. Theſe are of a great variety of colours, but are apt to have accidents in ſitting, from their ſitting too heavy, and often breaking their eggs.

The Frieſland *runt* is a large pigeon, and has all its feathers reverted, or looking as if placed the wrong way.

The Roman *runt* is a pigeon of the ſame general make with the common kind, but ſo large and heavy that it can hardly fly.

The Smyrna *runt* is middle ſized, and is feather-footed, and that to ſuch a degree ſometimes, as to look as if there were wings upon the feet; the feathers of theſe are ſometimes four or five inches long, and often pull the eggs and young out of the neſts.

The common *runt* is the common blue pigeon, kept for the table, and known to every body. Moore's Columb. p. 42.

RUNT is alſo a name given to Canary-birds, when three years old. See CANARY-*bird*.

RUNT is likewiſe a name given to the ſmall black cattle brought out of Wales and Scotland.

RUPEE, ROUPIA, or **ROUPIAS**, a coin very current in the territories of the Great Mogul, and in ſeveral other parts of the Eaſt Indies. See COIN.

Rupees are ſtruck both of gold and ſilver, and both the one and the other have their diminutions, as *half-rupees*, *quarter-rupees*, &c.

The gold *rupee* is worth 1*s*. 6*d*. ſterling. The ſilver *rupee* is ſtruck in the Mogul's mints, with an inſcription of his name and titles, the year of his reign, and the place it was ſtruck at. It weighs from 7 dwt. 10½ gr. to 7 dwt. 11 gr. and has from 1 to 2 parts in 100 allay. 100,000 is one LACK, 100 lacks are one crore, and 100 crores are one anib.

The value of the ſilver *rupee* is various, according to its quality, and the place where it is coined. A general obſervation is, that the *rupees* are always current for more at the place where they are ſtruck than elſewhere; and the new *rupees* for more than the old ones. The reaſon of this laſt difference is, that the Indians, being very fond of ſilver, to ſave it, uſe, as ſoon as they have got a few *rupees* together, to hide them under-ground. To prevent which inconvenience, tending to drain the ſtate of current monies, the princes and rajas ſtrike new *rupees* every year, ſtill augmenting the value thereof, without any augmentation of the weight.

Beſides this difference of new and old *rupees*, the Indians make three other claſſes, the firſt called *rupees ſiceas*, which at Bengal are worth 2*s*. 11*d*. ſterling; the ſecond, *rupees of Surat*, worth 2*s*. 6*d*. ſterling: the third *rupees of Madras*, worth 2*s*. 5*d*. ſterling. All which is to be underſtood of the new *rupees*.

As to the old ones, thoſe of Madras are only current at 1*s*. 11*d*. ſterling; thoſe of Surat at 2*s*. and the ſiceas at 2*s*. 4*d*. Yet in other places the order and prices vary. At Surat, thoſe ſtruck there have the firſt place, the ſiceas the ſecond, and thoſe of Madras the third. Along the coaſt of Coromandel, the Madras has the firſt place, the ſiceas the ſecond, &c.

RUPELLENSIS *ſal*, *Rochelle ſalt*, in *Chemiſtry*, a name given to a peculiar ſalt, invented by M. Seignette, apothecary, at Rochelle, and extolled as a very valuable medicine.

The preparation of it was kept a great ſecret, till Meſſ. Boulduc and Geoffroy diſcovered and publiſhed its compoſition.

To prepare this ſalt, cryſtals of marine alkali are to be diſſolved in hot water, and into this liquor powdered cream of tartar is to be thrown. When the efferveſcence ceaſes, more cream of tartar is to be added, till the liquor is ſaturated; it is then to be filtered and evaporated; and very fine and large cryſtals may be obtained by cold, each of which is the half of a polygonous priſm cut in the direction of its axis.

The cryſtallization of this ſalt, according to M. Baumé, as well as of the vegetable ſalt, is much more eaſy and more beautiful, when the liquor, in which it is made, contains an exceſs of alkali, which does not prevent the ſalt from being exactly neutral, after it has been well drained.

The ſalt of Seignette has a ſaline taſte, moderately ſtrong, and diſagreeable. It retains much water in its cryſtallization, is ſoluble in a leſs quantity of hot water than of cold water, and becomes farinaceous in a dry air.

This ſalt is uſed only in medicine; being a good purgative, when taken from an ounce to an ounce and a half. It is diſſolved in pure water, or in ptiſans and mineral waters, to render them purgative. It is alſo given in ſmall doſes of one or two drachms, as an alterative, aperitive, and corrector of other purgatives. But, upon the whole, it does not differ much from ordinary ſoluble tartar. Chem. Dict.

RUPERT's *drops*, *lacrymæ Batavicæ*, a ſort of glaſs drops with long and ſlender tails, which burſt to pieces, on the breaking off thoſe tails in any parts, ſaid to have been invented by prince Rupert, and therefore called after his name.

The hiſtory of theſe drops is this: they were firſt brought into England by prince Rupert, out of Germany, and ſhewn to king Charles II. who communicated them to the Royal Society, at Greſham College; and a committee, appointed on this occaſion by the ſociety, gave the following account of them. They muſt be made of green-glaſs well refined, for till the metal, as the glaſs men call it, is perfectly refined, they never ſucceed if made of it; but always crack and break ſoon after they are dropped into the water.

The beſt way of making them is to take up ſome of the metal out of the pot upon the end of an iron rod, and immediately let it drop into cold water, and there lie till it is cold. If the metal be too hot when it is dropped into the water, the buſineſs does not ſucceed, but the drop froſts and cracks all over, and falls to pieces in the water, and every one that does not crack in the water, but lies in it whole till it is quite cool, is ſure to be good. There is great nicety in the hitting a due degree of heat in the metal, and the workmen who beſt know their buſineſs cannot promiſe before hand which ſhall ſucceed, but often two fail for one that hits right. Some of them froſt over the ſurface without falling to pieces, and others break into pieces before the red heat is quite over, and that with a ſmall noiſe; others break ſoon after the red heat is over and make a great noiſe, and ſome neither break nor crack till they ſeem to be quite cold; and others hold together while they are in the water, but fly to pieces with a ſmart noiſe when they are taken out of it; ſome do this on the inſtant, others an hour or two after, and others will keep ſeveral days, nay weeks, and at laſt to fall to pieces without being touched.

Theſe drops, thus formed, are ſo hard, that they will bear ſmart blows of a hammer without breaking; and yet if you grind the ſurface, or break off the tip of the tail, they will ſhatter, with a loud report, into powder, and in an exhauſted receiver, with greater impetuoſity than in the open air, and into a finer powder, exhibiting light, when the experiment is made in the dark. But if the drops are ground with powder of emery and oil, and annealed by the fire, they will eſcape breaking.

This ſurpriſing phenomenon is ſuppoſed to ariſe from hence; that while the glaſs is in fuſion, or in a melted ſtate, the particles of it are in a ſtate of repulſion; but being dropped into cold water it ſo condenſes the particles in the external parts of their ſuperficies, that they are thereby reduced within the power of each other's attraction, and by that means they form a ſort of hard caſe, which keeps confined the before mentioned particles in their repulſive ſtate; but when this outer caſe is broke by the breaking off the tail of the drop, the ſaid confined particles have then liberty to exert their force, which they do by burſting the body of the drop, and reducing it to a very peculiar form of powder. See a paper on the phenomena and explication of theſe glaſs-drops, by Dr. Le Cat, in the Philoſ. Tranſ. vol. xlvi. p. 175, &c.

RUPICAPRA, in *Zoology*, a ſpecies of GOAT. See CHAMOIS.

RUPITANI, a name given to the Donatiſts. See CAMPITÆ.

RUPPIA, in *Botany*, the name given by Linnæus to a genus of plants of the *tetrandria tetragynia* claſs, called by Micheli *bucca ferrea*. The characters are theſe: the cup is compoſed of a ſubulated ſpadix, ſtraight, and of a very ſimple ſtructure, which becomes a little bent when the fruit is ripe, and is doubly beſet with fructifications; there are no petals, nor any ſtamina, but a number of kidney-ſhaped antheræ placed on each ſide;

the piſtils are ſeveral ſlender capillary ſtyles, each bearing an oval germen, with a ſimple ſtigma; the fruit is an oval, pointed, thin capſule, or cortex, placed on the ſtyle, which becomes elongated; there are as many of theſe as there were piſtils on the plant, and each contains one roundiſh ſeed. There is only one ſpecies.

RUPTURE, in *Medicine*, called alſo *hernia*, and popularly *burſtenneſs*, is when the rim, thin film, or caul, which holds up the inteſtines, is broken, or over-ſtrained, or ſtretched, ſo as that the guts fall down either into the groin, ſcrotum, or elſewhere. See HERNIA.

According as the *rupture* happens into the abdomen, or inguen, or ſcrotum, it is called *exomphalus*, *hernia inguinalis*, or *hernia ſcroti*.

RUPTURE *wort*, *herniaria*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: the flower hath a coloured empalement of one leaf, cut into five parts, which ſpread open; it hath five ſmall ſtamina, ſituated in the diviſions of the empalement, and five others which are barren, placed alternately between them; in the centre is an oval germen, which afterward turns to a ſmall capſule, incloſed in the empalement, having one oval pointed ſeed. There are four ſpecies. This plant has been long celebrated for the virtues its name expreſſes in the curing of ruptures; but though the modern practice does not ſeem to allow all thoſe virtues to it, yet there is another caſe in which a German phyſician ſtrongly recommends it. It is in the diſorder of the eyes which is brought on by reading or writing by candle-light, or by examining nice objects, or very fine work. This diſtemperature ſeems to be properly a diminution of ſight, without any apparent cauſe, or viſible alteration in the eye, and is probably owing to a viſcid matter obſtructing the optic nerves, and preventing a ſupply of their proper fluid. The *herniaria*, being a gentle and mild attenuant, comes in admirably for the relief of this diſorder. Gruhlman De novo Caliginis Remedio.

The author gives many inſtances of the ſucceſs of this remedy, and mentions two methods of giving it; the one in powder, and the other in tincture: the former way is preferred, and the method is to gather the herb in its prime, and powder it after it has been dried in the ſhade; then to ſprinkle the quantity of a ſcruple of this powder on the bread and butter uſed for breakfaſt. If this is not liked, the tincture is to be made with ſpirit of wine, as ſtrong as the plant will make it, and forty drops are to be taken every morning and evening in any liquor.

The diſtemperature this is propoſed to cure is very common, yet this is almoſt the only thing that has been preſcribed by way of remedy, and deſerves to be fairly tried.

RURAL, or RUSTIC, formed of *rus*, *ruris*, *country*, ſomething that relates to the country.

RURAL *dean*, in the *Ancient Church*. See DEAN.

RUSCUS, in *Botany*. See BUTCHER'*s broom*.

RUSH, *juncus*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: it has a chaff opening, with two valves, an empalement, with ſix oblong pointed leaves; the flower hath no petals, but the coloured empalement is by ſome taken for petals; it hath ſix ſhort hair ſtamina, and a three-cornered germen, which afterward becomes a three-cornered capſule with one cell, opening with three valves, incloſing roundiſh ſeeds. Linnæus enumerates nineteen ſpecies, and Miller four: obſerving that there are many other ſpecies, which grow naturally in England, and are very troubleſome weeds in many paſtures, ſo are not worthy of being enumerated.

The beſt method of deſtroying *ruſhes* is to fork them up clean by the roots in July, and after having let them lie a fortnight or three weeks to dry, lay them in heaps and burn them gently, and the aſhes which theſe afford will be tolerable manure for the land; but in order to prevent their growing again, and to make the paſture good, the land ſhould be drained, otherwiſe there will be no deſtroying them entirely; but after it is well drained, if the roots are annually drawn up, and the ground kept duly rolled, they may be ſubdued. Miller.

RUSH, *flowering*, or *Water* GLADIOLE, *butomus*, in *Botany*, a genus of the *enneandria hexagynia* claſs. Its characters are theſe: the flowers grow in a ſingle umbel, and have ſix roundiſh concave petals, which are alternately ſmaller, and nine awl-ſhaped ſtamina, ſix of which ſurround the other; it hath ſix oblong pointed germina, which become ſix oblong pointed capſules, having one cell filled with oblong ſeeds. We have but one ſpecies. This plant is ſaid to be of an aperient and deobſtruent quality.

RUSH, *leſſer flowering*. See SCHEUCHZERIA.

RUSH, *round*, *black-headed*, *marſh*, or *bog*. See SCHOENUS.

RUSH, *ſweet*, *acorus*, in *Botany*. This plant grows naturally in deep, ſtanding waters, ſo is rarely admitted into gardens, for it will not thrive on dry land; but the roots are uſed in medicine.

Whoever has an inclination to propagate it, ſhould procure ſome roots from the places where it grows naturally, and plant them in ditches, or cloſe on the ſide of ponds, where they will thrive and increaſe greatly, if they are not diſturbed.

The roots, which only are uſed, are hot and dry, opening and attenuating, and good for the obſtructions of the liver and ſpleen, provoke urine and the menſes, help the colic, reſiſting putrefaction, are uſeful againſt peſtilential contagions and corrupt noxious air, are an ingredient in the theriaca and mithridate, and are outwardly uſed in ſweet bags and perfumes. See ACORUS.

RUSH-*graſs*, *ſcirpus*, in *Botany*, a genus of the *triandria monogynia* claſs. Its characters are, that it has a chaffy imbricated glume, has a calyx, no corolla, and a ſingle unbearded ſeed. There are twenty-eight ſpecies.

RUSHES, *petrified*. What is uſually called by this name is a kind of foſſile coral. But we have in England, alſo, another not uncommon ſubſtance, frequently called by the ſame name: this is an incruſtation of ſparry matter, in the form of a ſtony cruſt on the outſides of real *ruſhes*; though in this caſe, it is no real petrifaction, but only a covering of this ſtone-like matter.

Incruſtations and petrifactions are uſually confounded together, and the generality of people do not attend to the diſtinction, which is, that in a real petrifaction, the ſtony matter penetrates the very ſubſtance of the body, as is the caſe in the petrified wood of Ireland, and other places; whereas, in theſe incruſtations the ſubſtance itſelf remains unaltered within, and its outer part alone is covered with the ſtony ſubſtance; this is the caſe with what is called the petrified moſs at Scarborough, and in other parts of England, and this is the caſe in regard to what we call ſometimes petrified *ruſhes*.

RUSMA, in *Natural Hiſtory*, the name given by the eaſtern nations to the ſubſtance, called by the ancient Greeks SORY. It is properly an ore of vitriol, and is uſed as a depilatory, being mixed with lime.

Mr. Boyle tells us, he made a fine powder of equal parts of *ruſma* and quick-lime, and letting them ſoak a little time in water, they became a ſoft paſte, which he ſpread on the part he would free from hair; and after letting this paſte lie on about three minutes, he wiped it off with a wet cloth, and found the hair taken away by the roots, without any inconvenience to the part.—Orpiment and quick-lime is uſed in Europe for a depilarory. See HAIR.

RUSSET, a country word for a dark brown colour.

RUSSGANGENUM, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a yellow and braſs-like foſſile ſubſtance, found in many places there; it reſembles the marcaſites, only that on trial it is found to contain very little ſulphur: it is probably an ore of zink.

RUSSIA *company*. See COMPANY.

RUST *of corn*, or BLIGHT, in *Huſbandry*, the name given by our farmers to a diſeaſe in corn and other vegetables, in which their ſtalks and leaves ſeem burnt up, and appear of a ſort of *ruſt*-colour.

The ancients generally thought that it came from heaven, being ignorant of its true cauſe, which is want of nouriſhment in the earth. Virgil gives this up as an incurable diſtemper, and tells the farmer, that if his corn is blighted he muſt live upon acorns, not ſuppoſing that any remedy could be deviſed for ſuch a diſtemper. Theſe people in general having no true knowledge of the theory of huſbandry, had recourſe to magic, and uſed what they thought ſpells and enchantments on all occaſions. Cato, Varro, and even Columella, are full of theſe ridiculous devices. A better knowledge in the real nature of huſbandry has taught us to underſtand this matter in a very different manner, and to apply more efficacious remedies to it.

Wheat is blighted at ſeaſons, firſt in the bloſſom, and then its generation is prevented, many of the huſks being empty in the ear, and the rudiments of the grains not impregnated: ſecondly, wheat is blighted when the grains are brought to maturity; and in this caſe they become light, and are of little value for making of bread, having ſcarce any flour in them.

The firſt of theſe cannot happen in England from froſts, becauſe our wheat is not in flower till the month of June, but long and continued rains chill the bloſſoms, and in this manner prevent their fertility: this, however, does not often happen to us; theſe rains are not common at this ſeaſon of the year; and if they were, this country lying much of it open, the winds diſlodge theſe drops of water from the ears, and prevent the miſchief they would do there.

Lammas wheat does not retain theſe drops ſo long as the bearded or cone wheat; and, in conſequence of this, in the terrible blight in England in the year 1725, the bearded wheat received infinitely greater miſchief than the lammas wheat.

The ſecond kind of *blight* from light ears is, that which is more frequent, and more general with us; this brings the greateſt ſcarcity of wheat, and the cauſe of this is plainly want of nouriſhment of the grain, by whatever means that want is occaſioned. Several accidents kill the plants, or injure their health, and in that caſe the grains are not filled: lightning does great miſchief to the farmer in this kind, as is plain by the ſeveral black ſpots and patches in fields of corn, in years, when there has been more lightning than uſual. This is a diſaſter that muſt be quietly ſuffered, ſince it can be neither prevented nor remedied; but the other cauſes of *blights*, which are moſt general, and do the moſt damage, may be prevented in ſome meaſure at leaſt.

One great and common cauſe of the *blight* is, the lodging or falling of corn; in this caſe the ſtalks are broken near the ear, and the veſſels are hurt which ſhould carry up the nouriſhment to the ear. In this caſe, there can juſt juices enough paſs for the keeping the plant alive, and bringing it to its full height, but it is languid all the time, and the grains can never be filled with flour. The earlier in the ſeaſon this lodging of the ſtalks happens, the thinner and poorer the ears will be: hence it happens, that when dung and tillage have brought a wheat land into ſo good a ſtate, that in April or May it ſeems to promiſe the farmer five or ſix quarters of wheat, it ſhall be all deſtroyed by falling in June, and ſcarce yield him five buſhels, and this ſo thin and lank, that the expences of reaping and threſhing are more than its value. The wind is generally accuſed of the throwing down theſe ſtalks, but this does not ſeem to be truly the caſe; the wind may preſs upon the plants, but the cauſe of their giving way to it is a weakneſs in their ſtalks, and this ſeems owing either to the want of nouriſhment, or the want of air, or of the ſun's rays, and perhaps to the want of all three together. A rich acre will maintain a crop of five quarters ſtanding, while a poor acre will not be able to ſupport ſuch a crop as would have yielded only about three quarters, had it ſtood. This is a proof of want of due nouriſhment being one great cauſe of the falling. Air is neceſſary to the nouriſhment of all plants, wheat in particular requires a very free air. It ſucceeds beſt in open hilly places where the wind comes freely to it, and ſhakes off the drops of water from the leaves, as well as their own recrements; and it is plain, that a great quantity of the ſun's rays is neceſſary to keep wheat ſtrong; becauſe in the hotter countries it is not ſubject to fall as it is with us, and in other northern countries. There is another cauſe of the *blight*, which is the wheat's coming too late into bloſſom. It ſhould bloſſom in the beginning of June, becauſe there is not otherwiſe time during the hot weather for it to paſs through the different ſtages to the perfection of the grain.

The cauſes of the *blight* being thus known, the cure or prevention may be attempted by the farmer, on much more rational grounds than it was among the ancients. It is advantageous to haſten as much as poſſible the time of bloſſoming of the corn, and to protract as long as we can the ripening of the grain, that it may have ſufficient time to fill and ſwell. The earlieſt ſown wheat is generally obſerved to eſcape the *blight* beſt, and this is owing to its coming ſooneſt into bloſſom. The ancients uſed to let their ſheep feed upon the corn while young in the blade, by way of preventing it from lodging or falling afterwards: ſome of our own farmers uſe this method alſo; and, it is true, that the corn is prevented from falling by this; but the remedy is as bad as the diſeaſe, for the ſtalks are not made very ſtrong by this practice, but the ears lighter. They therefore do not weigh down and lodge the ſtalks indeed, but they are in ſome ſort blighted by this means, and the diſeaſe is cauſed by the means uſed to prevent it. This feeding the wheat with ſheep retards the time of its bloſſoming, and the only advantage of early ſowing is thus taken away by it: what grows after the eating of the ſheep is a ſort of latter crop, and is always weaker and later than the firſt. The longer the corn remains on the ground the more nouriſhment it requires from it; and in this unnatural remaining on the land, there is no proper ſupply provided.

The general remedy for all the caſes of the *blight* is the modern method of horſehoeing huſbandry. In this the hoe ſtirs up the ground as often as the farmer pleaſes, and every ſuch ſtirring gives new life and nouriſhment to the plant: this way a ſupply of food for the ear may be given, whenever it is neceſſary, and the wide intervals left for the hoe in the drilling of the wheat; for this ſort of huſbandry gives a free paſſage for the ſun and air to all of the plants.

The moſt general *blight* of all that happen in theſe cold countries is cauſed by inſects, which ſome think are brought in the air by an eaſt wind, accompanied by moiſture, a little before the grain is filling with that milky juice which hardens into flour. Theſe inſects depoſite their eggs within the outer ſkin or rind of the ſtalks; and when the young ones are hatched they feed on the parenchyma, and eat off many of the veſſels which ſhould convey this juice: then the ear is deprived of it, and muſt in conſequence be thin and poor, in proportion to the number of the veſſels eaten, and as the inſects happen to come earlier or later; for ſometimes they come ſo late, that the grains are ſufficiently filled with this milky juice before they have any power to hurt the veſſels.

In this caſe, though the ſtraw, when examined by the microſcope, appears to have its veſſels eaten and torn, and to be full of black ſpecks, which are cauſed by the ſame inſects, yet the grain is plump and full. This is one of the many caſes in which the early ſown wheat eſcapes the *blight*. It has been ſeen, that of the crop of wheat, in the ſame field, ſome of which has been ſown earlier and ſome later, though there has been no other difference in the whole, yet the early ſown wheat has been full eared, and the late ſown has been light eared; and both have had their ſtalks equally eaten and ſpotted by the inſects.

A proof that theſe miſchievous inſects are brought by the eaſt wind, is, that the corn on the eaſt ſide of hedges is often found *blighted*, and deſtroyed by them, while that on the weſt ſide of the ſame hedge is unhurt. Some ſuppoſe they are bred in the earth, and crawl up the ſtalks, becauſe ſome whole fields are ſubject to them, and others eſcape them wholly; but this is more probably owing to the difference of the ſituation of theſe fields, as they are more or leſs expoſed to the eaſt. Some wheat is more liable to be hurt by this inſect-*blight* than another, and the beſt remedy in this evil is to plant fields which are moſt expoſed to theſe *blights*, with ſuch wheat as is leaſt ſubject to be injured by them. The white cone, or bearded wheat, which has its ſtalk or ſtraw like a ruſh, not hollow, but full of pith, except near the lower part, where it is very thick and ſtrong, is very proper on this occaſion; it is probable, that this plant has ſap veſſels, that lie deeper, and ſo are not to be deſtroyed like thoſe of common wheat; the ſtalks of this are often found ſpotted with black, which ſhews that the inſects have been there, and yet the ears are found full, and the grains plump in them.

There is another kind of *blight*, called by the farmers *moor loor*: this is occaſioned by the earth's falling away from the roots of the wheat, and is cured by throwing up ſmall furrows againſt the rows in the drilling method. The horſehoeing huſbandry is beſt of all others calculated to prevent *blights*, and to cure them when they happen; but as there are ſome years when all wheat is *blighted*, even at theſe times the horſehoeing huſbandry has an advantage; for when the ſtalks fall they never lie abſolutely on the ground in this caſe, but the air has room to play between them; but the common ſown wheat has not this advantage. The ears in the *blighted* wheat of the drill kind are not ſo light nor poor as in others, but make the farmer ſome amends in the corn, though greatly leſs than in the common produce. Tull's Horſehoeing Huſbandry.

Corn is always more ſubject to *blights* after a wet ſummer than at any other ſeaſon; the reaſon ſeems, that the roots being continually drenched with water, the plant runs up to ſtalk, and has very little ear, and the corn in the ear is never large or full.

It is obſerved, that when the mildews riſe, or *blights* fall, they generally infeſt only one kind of grain, ſometimes wheat, ſometimes oats, and ſometimes barley only; and the ſame ſort of obſervation holds good in regard to fruit, ſometimes only apples are *blighted*, ſometimes only pears, ſometimes cherries, and ſo on. Mortimer's Huſbandry, tom. i. p. 305. See BLIGHT.

RUST *of a metal*, the flowers or calx thereof, procured by corroding and diſſolving its ſuperficial parts by ſome menſtruous fluid: or the earth of the metal decompoſed by the action of a proper menſtruum.

Water is the great inſtrument or agent in producing *ruſt*; the air apparently ruſts bodies, but it is only in virtue of the water it contains.

Hence in a dry air, metals remain a long time without contracting *ruſt*; and hence oils, and other fatty bodies, ſecure metals from *ruſt*; water being no menſtruum to oil, &c. and therefore not able to make its way through it. See IRON.

All metals are liable to *ruſt*; even gold itſelf, though generally held incapable thereof, grows ruſty, if expoſed to the fumes of ſea-ſalt.

The reaſon why gold is ſo rarely found to ruſt, is, that ſea-ſalt, which is the only ſalt that will prey upon it, is of a very fixed nature; and therefore little of its effluvia, or exhalations, are found floating in the air.

Ruſt is uſually ſuppoſed a corruption of the metal, but without much foundation; it is the very metal itſelf, only under another form; and accordingly we find, that *ruſt* of copper may again be turned into copper.

The *ruſt* of copper, called *ærugo*, makes what we call *verdegris*. Ceruſs is made of lead converted into *ruſt* by vinegar. Iron, in time, turns wholly into *ruſt*, unleſs preſerved from the air by paint or varniſh.

RUSTIC *gods*, *dii ruſtici*, in *Antiquity*, were the gods of the country, or thoſe who preſided over agriculture, &c. Varro invokes the twelve *dii conſentes*, as the principal among the *ruſtic* gods; viz. Jupiter, Tellus, the Sun, Moon, Ceres, Bacchus, Rubigus, Flora, Minerva, Venus, Lympha, and Good Luck. Beſides theſe twelve arch-*ruſtic* gods, there were an infinity of leſſer ones; as Pales, Vertumnus, Tutelina, Fulgor, Sterculius, Mellona, Jugatinus, Collinus, Vallonia, Terminus, Sylvanus, and Priapus. Struvius adds the Satyrs, Fauns, Sileni, Nymphs, and even Tritons; and gives the empire over all the *ruſtic* gods to the god Pan.

RUSTIC, in *Architecture*, expreſſes a manner of building in imitation of ſimple or coarſe nature, rather than according to the rules of art.

RUSTIC *faſti*. See FASTI.

RUSTIC *fountain*. See FOUNTAIN.

RUSTIC *freeze*. See FREEZE.

RUSTIC *quoins*, by Vitruvius called *lapides minantes*. See *Ruſtic* QUOIN.

RUSTIC *ſervices*. See SERVICE.

RUSTIC *work* is where the ſtones in the face, &c. of a building, inſtead of being ſmooth, are hatched or picked with the point of an inſtrument.

RUSTICS, *regular*, are thoſe in which the ſtones are chamfered off at the edges, and form angular or ſquare receſſes of about an inch deep at their jointings, or beds, and ends. See *Tab. Archit. fig.* 40. *let.* V.

RUSTIC *order* is an order decorated with *ruſtic* quoins, *ruſtic* work, &c.

Felibien ſays, it is properly where the ſeveral parts of the five orders are not exactly obſerved; but this confounds *ruſtic* with *Gothic*.

RUSTICULA, in *Ornithology*, a name by which Aldrovand and ſome other authors, have called the GODWIT, more commonly known by the name *ægocephalus*.

RUSTICULA *Braſilienſis*, in *Ornithology*, the name given by Mr. Ray, and ſome others, to the GUARAUNA, a water-bird of the Braſils, of the ſize of our ſnipe.

RUSTRE, in *Heraldry*, a bearing of a diamond ſhape, piereed through in the middle with a round hole.

RUT, in *Hunting*, &c. a term uſed for the venery or copulation of deer.

For the terms which obtain in reſpect of this and other beaſts of game, with the noiſe they make during the acts, ſee HUNTING.

The *rutting*-time with the hart begins about the middle of September, and holds two months: the older they are, the better, and the more beloved they are by the hinds, and the earlier they do go to *rut*. At this time they will turn head, and furiouſly make at any living creature. It is eaſy killing them at this time; their whole buſineſs being to ſcent and purſue the track of the females; ſcarce feeding at all. The young herd are forced to fly with great precipitancy when the hart comes in ſight of his mate. If there be any other of bulk, they will diſpute it very hotly with their horns. As the ſeaſon expires, they withdraw, and dig themſelves holes wherein to lie to aſſwage the ſtrong fervour of their luſt: when become a little ſweet, they return to their paſture, and live in herds.

The *rutting* or tourning time of the roe-buck begins in October, and laſts only twelve or fifteen days. This over, he caſts his horns.

After the hind is filled, ſhe keeps no more company with the male till ſhe be delivered. But the doe always accompanies her paramour till her time approaches, when ſhe retires for the ſafety of her young, which be would otherwiſe kill.

RUT is alſo uſed for the mark or track of a wheel in the road.

RUT *of the ſea* is where it daſhes againſt any thing.

RUTA *rue*, in *Botany*. See RUE.

RUTICILLA, in *Ornithology*. See RED-*ſtart*.

RUTICILLA, in the Linnæan ſyſtem of *Ornithology*, is a ſpecies of the *muſcicapa*, or FLY-*catcher*. This is a black bird, with the breaſt, and baſe of the primary and ſecondary wing feathers, and thoſe of the tail, yellow; and a yellow ſpot on the wings. This bird inhabits America.

RUTILUS, in *Ichthyology*. See ROACH.

RUTILUS *latior*, in *Ichthyology*, a name given by many authors to the fiſh called in Engliſh RUDD, or *finſcale* and more uſually in Latin *rubellio fluviatilis*. See RED-*eye*.

RUTTEE, a weight uſed in the Eaſt Indies, one hundred of which make eighty-eight caracts. See CARACT.

RUTULUS, in *Roman Antiquity*, the barrier of the cavea, or place where the wild beaſts uſed in amphitheatrical ſports were ſhut up. It was made of iron bars, which turned upon hinges, and all at once flew open with great ſwiftneſs.

RUTY-PUNDOC, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a peculiar ſpecies of yellow orpiment, which they find on the tops of the mountains there; and, after ſeveral calcinations, give internally in coughs and colds. The ancient Greeks uſed this orpiment in the ſame manner. We have of late run into an opinion of its being a fatal poiſon; but Dr. Boerhaave, in his Chemiſtry, affirms, on his own trials, that it is innocent and harmleſs. Theſe people, who have not the uſe of chemiſtry, give us a hint of the virtues of great numbers of our own foſſils, which are common alſo to their country. The ſelenitæ, fibroſe talcs, ſpars, and many other foſſils, which we wholly neglect, are in common uſe with them, and great cures are often performed by them.

RUYSCHIANA. See TUNICA.

RYAL. See RIAL.

RYDER, or RIDER, *to a bill*. See PARLIAMENT.

RYE, *ſecale*, in *Botany*, a genus of the *triandria digynia* claſs. Its characters are theſe: there are two flowers in each involucrum, they have two leaves which are oppoſite, narrow, erect, and ſharp-pointed; the petals have two leaves, the outer valve is rigid, bellied, acute-pointed, and compreſſed, the lower border is hairy, ending in a long awn, the inner is plain and ſpear-ſhaped; they have two oval erect nectariums, and three hair-like ſtamina, hanging without the flower, terminated by oblong forked ſummits, with a top-ſhaped germen ſupporting two reflexed hairy ſtyles, crowned by a ſingle ſtigma; the germen afterwards becomes an oblong almoſt cylindrical ſeed which ripens in the empalement. We have but one diſtinct ſpecies of this genus which is cultivated in England, though it is often ſuppoſed the two varieties, diſtinguiſhed by the farmers under the names of winter and ſpring *rye*, are eſſentially different; but from ſeveral years cultivating them on the ſame land, Mr. Miller could find no real difference between them.

Dr. Linnæus, who enumerates four ſpecies, entitles this *ſecale glumarum ciliis ſcabris*, *rye* with rough hairs to the awns.

The winter *rye* is that which is generally propagated by the farmers, and this ſort of grain ſucceeds very well on any ſort of dry land, even on the moſt barren gravel or ſand. The farmers ſow it about the beginning of September, after a ſummer's fallow, in the drieſt time they can. Two buſhels of ſeed are the quantity generally allowed to an acre of land; but if it be ground newly broken up, or if it be ſubject to worms, they then allow a peck more to the acre. A little ſprinkling of dung, or mud, upon *rye*-land, will greatly advance the crop, though it is laid but half the thickneſs that it is for other corn. Its produce is commonly about twenty buſhels upon an acre.

The farmer knows it is ripe when the ſtraw is yellow, the ear bends, and the grain feels hard. It is not apt to ſhed the ſeeds; and, therefore, if there be many weeds among the crop, it may be left lying upon the ground, or gravel, as they call it, eight or nine days after it is cut, before it is bound up, if the weeds are not dry ſooner: for otherwiſe, they will grow moiſt in the barn, and cauſe the whole to give, and not to thraſh well, and ſometimes they will make it muſty.

As it is a grain that will grow in the ear ſooner than any other if it be wet, care muſt be taken if rain falls after it is cut, to turn it as it lies on the ground every other day; and at the ſame time to keep the ears as far from the earth, and as much above the ſtubble as may be; this will prevent the miſchief. If it be pretty clear of weeds it may be houſed as ſoon as it is cut. If either this grain or wheat lodge upon the ground, it is beſt to cut them, even though they are not ripe; for the ſtalk being broken will yield no more nouriſhment to the ear.

The ſmall *rye* may be ſown in the ſpring, about the ſame time with oats; but in the wet ſeaſon it is apt to run much into ſtraw, and the grain is generally lighter than the other; and therefore this is only ſown upon ſuch lands, where the autumnal crops have miſcarried.

The general uſe of *rye* is for bread, either alone or mixed with wheat. And there is another very eſſential uſe to the farmer made of *rye*. April is the ſeaſon of the year when food is of all others the ſcarceſt for cattle, eſpecially for ſheep and lambs: on this account ſome ſplit the ridges of the wheat-ſtubble and ſow them with *rye*; they harrow this in, allowing about a buſhel to an acre: they feed the ſheep with this in April, and in May they plow it up for fallow. When this is intended, the *rye* ſhould be ſown early in autumn, that it may have ſtrength to furniſh early feed.

Rye alſo yields a ſtrong ſpirit when diſtilled.

In many parts of France there have been certain years, in which this grain, from no apparent cauſe, has proved noxious, and ſometimes even poiſonous. Mr. Perrault travelling through Sologne, was informed that the *rye* of that province was ſometimes ſo corrupted, that thoſe who eat of the bread that had much of the corrupted grain in it, were ſeized with gangrenes in different parts of the body, which were not preceded by any fever, inflammation, or any conſiderable pain; and that the gangrened parts uſually fell off after a time of themſelves, without the aſſiſtance of chirurgical inſtruments. The grains of *rye* thus degenerated, are black on the outſide, and tolerably white within; and when they are dry, they are harder and cloſer than the natural good grain: they have no ill taſte, but ſometimes they have a viſcous metallic like honey hanging to one end of them. They grow longer than the other grains in the ſame ear, and are found from one or two to ſeven or eight in the ſame ear. Some have ſuppoſed that theſe were not the proper ſeeds of the plant, but ſome other extraneous bodies that got in among them; but it is evident from a cloſe inſpection, that they are really the genuine ſeeds, only altered by ſome accident; the coats, and the ſurrow, and even the germen for the young plant, being entirely the ſame as in the natural ſeeds.

The places where the *rye* is found to degenerate in this manner, are all a dry and ſandy ſoil. In theſe places there is ſcarce any ſoil in which more or leſs of theſe large ſeeds are not found among the others, but where there are but few of them, the ill effects are not perceived. The ſeaſons when the degeneracy is greateſt, and the effects the worſt of all, are, when there have been exceſſive rains in the ſpring, and there come on exceſſive heats in the ſucceeding ſummer.

The bread which is made of the *rye* that holds ever ſo much of this bad corn, is not diſtinguiſhable from other *rye*-bread by the taſte, and ſeldom produces its ill effect, till ſome conſiderable time after it is taken. Beſide the gangrenes already mentioned, it not unfrequently brings on other bad conſequences, ſuch as drying up the milk of women who give ſuck, and occaſioning ſometimes malignant fevers, accompanied with drowſineſs, ravings, and other dangerous ſymptoms. The part uſually ſeized by the gangrene is the legs, and this often in a very frightful manner. The arms are the part moſt ſubject next; but all the other parts of the body are ſubject to it.

The firſt ſymptom of this approaching gangrene is a ſtupefaction and deadneſs in the part; after this there comes on ſome pain, though not violent, and the ſkin becomes livid; ſometimes the ſkin ſhews no mark of it, but the pain and ſwelling increaſe; and it is neceſſary to make an inciſion into the fleſh, to find the gangrened part. In the more deſperate caſes, the only remedy is, the taking off the part; and if this is neglected, the fleſh is all waſted, and the ſkin becomes black, and clings round the bones, and the gangrene appears again in the ſhoulders.

The poorer people are only ſubject to this diſeaſe; and, as they principally eat the *rye*-bread, and as thoſe years when there is moſt of this bad grain among the ears of *rye* produce moſt of theſe diſorders, it has been judged certain that the *rye* is the occaſion of it. It may deſerve enquiry, however, whether that grain may not be innocent of the miſchief, and its degeneracy and the diſtemperature attributed to it may not both be the effect of the ſame bad conſtitution of the air. If it proves, on enquiry, that only thoſe who eat of the *rye* are ſubject to the diſeaſe, it will ſeem a proof of its being really owing to it; and in this caſe the miſchief may be prevented by the ſifting the grain before it is ground, the degenerated grains being ſo long that they will all remain in the ſieve that lets the others through. The experiment has been made on the ſpot, by giving the flour of the corrupted grains alone to animals, and it is ſaid they have been killed by it. Philoſ. Tranſ. Nº 130.

RYE or REY *graſs*. See GRASS.

RYME. See RHYME.

RYNCHOPS, *ſkimmer*, or *cutwater*, in *Ornithology*, a genus of *anſeres*. Its characters are, that the bill is ſtraight, the upper mandible much ſhorter than the lower, which is truncated at the end; the noſtrils are linear and pervious, the tail is a little forked, and the birds of this genus have a ſmall back toe. Linnæus enumerates two ſpecies; one of which is blackiſh above, and below white, with its bill red at the baſe; and the other yellow, with a black bill, which Briſſon reckons a variety of the former. They are both inhabitants of America. The name *rynchops* is derived from ῥυγχος, *a bill*, and κοπτειν, *to cut*, becauſe the upper mandible is as it were cut. Pennant calls it *ſkimmer*, from the manner of its collecting its food, with its lower mandible, as it flies along the ſurface of the water.

RYPTICS, in *Medicine*. See RHYPTICS.

RYSAGON, in the *Materia Medica*, a name by which ſome authors have called the *caſſumunar root*.

S.

S. A conſonant, and the eighteenth letter of the alphabet, the ſound of which is formed by driving the breath through a narrow paſſage between the palate and the tongue elevated near it, together with a motion of the lower jaw and teeth towards the upper; the lips being a little way open, with ſuch a configuration of every part of the mouth and larynx as renders the voice ſomewhat hiſſing.

S is, therefore, accounted one of the three hiſſing conſonants; the other two being z and *j*. It is alſo held a ſemi-vowel, as forming a kind of imperfect ſound, without the aſſiſtance of any of the vowels.

It is the peculiar quality of *s*, that it may be ſounded before all conſonants, except *x* and z, in which *s* is compriſed, *x* being only *ks*, and z a hard or groſs *s*. This *s* is, therefore, termed by grammarians *ſuæ poteſtatis litera*. In the beginning of words it has invariably its natural and genuine ſound; in the middle it is ſometimes uttered with a ſtrong appulſe of the tongue to the palate, like z, as *roſe*, *buſy*, &c. and ſometimes it keeps its natural ſound, as *looſe*, *deſignation*, &c. In the end of monoſyllables, it is ſometimes *s*, as *this*; and ſometimes z, as *as*, and generally in verbs where *es* ſtands for *eth*, as *gives*. A ſingle *s* ſeldom ends any word, except the third perſon of verbs, as *loves*, the plural of nouns, as *trees*, the pronouns *this*, *his*, *ours*, *yours*, *us*, the adverb *thus*, and words derived from the Latin, as *rebus*: the cloſe being always either in *ſe*, as *houſe*, ar *ſs*, as *graſs*. It ſounds like z before *ion*, if a vowel goes before, as *intruſion*; and like *s*, if it follows a conſonant, as *converſion*. It ſounds like z before *e* mute, as *refuſe*, and before *y* final, as *roſy*. Johnſon.

Some of the ancients avoided all uſe of the *s* very ſtudiouſly; particularly Pindar, who has whole poems without once mentioning it. And hence alſo in Plautus, and ſome others of the Latin poets, we find it cut abruptly off, as in *dignu'*, *omnibu'*, &c. Others, on the contrary, affected the uſe of it every where, inſerting it where it was not wanted; as *Caſmenæ* for *Camenæ*, *duſmoſæ* for *dumoſæ*, *cæſna* for *cæna*, &c.

Of all other letters, the *s* is neareſt a kin to the *r*; whence it was frequently changed, on account of its diſagreeable ſound, into *r*. Thus the *Valerii*, *Furii*, &c. were at firſt called *Valeſii*, *Fuſii*, &c. and what we now call *ara*, *arena*, *carmen*, *feriæ*, *lares*, &c. were anciently wrote *aſa*, *aſena*, *caſmen*, *feſiæ*, *laſes*, &c. Add to this, that the Latin nouns now terminated in *or*, as *arbor*, *labor*, &c. all anciently ended in *s*; as *arbos*, *labos*, &c.

In the inflections of nouns, *s* is variouſly changed; ſometimes into *r*, as *flos*, *floris*; ſometimes into *n*, as *ſanguis ſanguinis*; ſometimes into *d*, as *pes pedis*; ſometimes into *t*, as *nepos nepotis*. On the contrary, in verbs, it is frequently put for other letters; for *b*, as in *jubeo juſſi*; for *c*, as in *parco parſi*; for *d*, as in *ludo luſi*; for *g*, as in *ſpargo*, *ſparſi*, &c.

The Latins alſo freqnently changed the Greek *s* into *l* as Αννιϐας, *Annibal*; into *d*, as μεσον, *medium*, &c. The double *s* was frequently changed into *x*, as πισσα, *pix*; and ſometimes even the ſingle one, as Αιας, *Ajax*.

The old and the new orthography of the French differ chiefly in the uſe of the *s*; the latter omitting it in writing, where it is not heard in the pronunciation, and the former retaining it: thus the followers of the one, particularly the Academy in their Dictionary, write *tempeſte*, *huiſtre*, *fluſte*; thoſe of the other, *tempête*, *huître*, *flûte*, &c.

S was a numerical letter among the ancients, ſignifying ſeven: according to the verſe,

S vera ſeptenos numeratos ſignificabit.

Among the Greeks, σ́ ſignified 200, and ͵σ denoted 200,000; the *ſigma* joined to *tau*, i. e. ϛ, denoted 6. The *ſamech* of the Hebrew ס denoted 50, and with two points above ס̈, it ſignified 50,000.

In abbreviations, S. ſtands for *ſocietas*, or *ſocius*; as, R. S. S. for *Regiæ Societatis Socius*, i. e. *fellow of the Royal Society*. In medicinal preſcriptions, S. A. ſignifies *ſecundum artem*, i. e. *according to the rules of art*; and in the notes of the ancients, S. ſtands for *ſextus*, *ſervius*, or *ſanctus*; S. S. *ſanctiſſimus*; S. P. for *ſpurius*; S. C. for *ſenatus conſultum*; S. D. for *ſalutem dicit*; S. P. D. for *ſalutem plurimam dicit*; S. P. Q. R. for *ſenatus populuſque Romanus*; S. S. S. for *ſtratum ſuper ſtratum*, i. e. *one layer above another alternately*; S. V. B. E. E. Q. V. for *ſi vales bene eſt ego quoque valeo*, a form uſed in Cicero's time, in the beginning of letters. Upon the French coins, S diſtinguiſhed thoſe that were ſtruck at Rheims.

S, in *Books of Navigation*, &c. ſignifies ſouth; S. E. ſouth-eaſt; S. W. ſouth-weſt; S. S. E. ſouth-ſouth-eaſt, &c. See COMPASS.

S, in the *Italian Muſic*, ſtands for SOLO.

SABÆANS, SABÆI, or SABIANS, the adherents to SABAISM; a ſect of idolaters, much ancienter than Moſes, and the Jewiſh law.

Hottinger ſets aſide the common derivation of *Sabæan* from צבא, *militia*, *hoſt*; and will not have it the name of a ſect of religion, but of a people in Arabia Felix, the deſcendants of *Saba*, grandſon of Cham. But the critics, to a man, conſpire againſt this opinion.

The word is ſometimes alſo written *Sabians*, *Sabaites*, *Zabæans*, *Zabians*, *Zabaites*, *Tſabæans*, *Tſabians*, and *Tſabaiſts*.

The *Sabæans* were very numerous throughout the Eaſt: in later times they have mixed ſomething of Chriſtianity with their ſuperſtition. They ſet a great value on the baptiſm of St. John; whence they have been alſo denominated CHRISTIANS *of St. John*. See HEMEROBAPTISTS.

Some, indeed, doubt whether the *Sabæans* be the ſame with the Chriſtians of St. John; but father Angelo de St. Joſeph, a Carmelite miſſionary, and Maracci, in his notes on the Alcoran, aſſert it expreſly. Be this as it will, Mahomet, in his Alcoran, and the Arabian authors ſince him, make frequent mention of them. Beidavius, in his comment on the Alcoran, repreſents them as a kind of mean between the Chriſtians and the Maguſians: who are the followers of the Magi, among the Perſians. He adds, that they pretend to be of the religion of Noah. Keſſæus notes, that they pretend to be in poſſeſſion of the books of Seth and Enoch; though they own none of the books of Scripture, except the book of Pſalms. See Mem. de l'Acad. des Inſcrip. & Belles Lett. tom. xii. p. 16, &c.

Some charge them with worſhipping the ſtars; and others, the angels or demons. Maimonides attributes both to them; as is obſerved under SABAISM.

Abu Joſeph Aſchæus and Keſſæus, place the *Sabæans* about Charran, or Charres, and Ghezira in Meſopotamia; which opinion is confirmed by this, that all their books are in the Chaldee tongue, though in a character very different from the Chaldee.

Sale, in his preliminary diſcourſe to the Koran, p. 14, &c. has given the following brief account of the tenets and worſhip of this ſect. They believe in the exiſtence of one God, though they alſo pay an adoration to the ſtars, or the angels and intelligences which they ſuppoſe reſide in them, and govern the world under the ſupeme Deity. They endeavour to perfect themſelves in the four intellectual virtues, and believe the ſouls of wicked men will be puniſhed for nine thouſand ages, but will afterwards be received to mercy. They are obliged to pray three times a-day, before ſun-riſe, before noon, and before ſun-ſet; and in praying they turn their faces, as ſome ſay, to the north; according to others, to the ſouth, to Mecca, or to the ſtar to which they pay their devotion. They have three faſts in the year; the firſt laſts thirty days, the ſecond nine days, and the laſt ſeven. They offer many ſacrifices, of which they eat no part, but wholly burn them. They abſtain from beans, garlic, and ſome other pulſe and vegetables. They go on pilgrimage to a place near the city of Harran or Charran, in Meſopotamia, where great numbers of them dwell; and they have alſo a great reſpect for the temple of Mecca, and the pyramids of Egypt; fancying theſe laſt to be the ſepulchres of Seth, and of Enoch and Sabi, his two ſons, whom they conſider as the firſt propagators of their religion; and at theſe ſtructures they ſacrifice a cock and black calf, and offer up incenſe. This is one of the religions, the practice of which Mahomet tolerated (on paying tribute), and the profeſſors of it are often included in that expreſſion of the Koran, *thoſe to whom the Scriptures have been given*, or, literally, *people of the Book*.

SABAISM, an ancient kind of idolatry; the firſt that ever entered into the world.

Sabaiſm conſiſted in the worſhip and adoration of the ſtars; or as the Scriptures call them צבא שמים *tſeba ſchamaim*, or *ſeba ſchamaim*, i. e. *hoſt*, or *militia of heaven*; whence ſome moderns have formed the word *Sabaiſm*, to denote the worſhip of the heavenly bodies, and that of *Sabæans* for the worſhippers. But as the Hebrew word, whence theſe are formed, is wrote with a צ *tſade*, which ſome expreſs in the modern tongues by an *s*, ſome by a *z*, others by *ts*, and others by *tz*; hence ariſe a great many different manners of writing the word among different authors; ſome, e. gr. writing *Sabæans*, others *Zabians*, or *Zabæans*, or *Zabæiſts*, as Buxtorf; others *Tſabians*, others *Tſabæans*, &c.

Maimonides makes frequent mention of this idolatry in his More Nevochim: it was very general, he obſerves, in the time of Moſes. Some of the retainers hereto taught, that God was the ſpirit of the ſphere, that is, the ſoul of the world. Abraham, he adds, was brought up in the doctrine of the *Sabæans*, who admitted no other gods but the ſtars, and who in their books, many of which have been tranſlated into Arabic, maintain expreſly, that the fixed ſtars and planets are inferior gods, and the ſun and moon the ſuperior ones. Abraham at length, he tells us, oppoſing theſe errors, firſt aſſerted the exiſtence of a Creator diſtinct from the ſun. The king of the Cuthæans clapt him up in priſon; but he ſtill perſiſting, that prince, from an apprehenſion of his diſturbing the ſtate by teaching a new religion, confiſcated his goods, and baniſhed him to the extremities of the Eaſt. This relation, he tells us, is found in a book, entitled, העבורה הנסטיב. The Religion of the Nabathæans.

He adds, that the *Sabæans*, to the adoration of the ſtars, joined a great reſpect for agriculture; they ſet a high value on cattle and ſheep; and taught, that it was unlawful to kill them. He even adds, that they worſhipped demons, under the form of goats, and that they eat the blood of animals (though they judged it unclean) merely becauſe they imagined it was the food of demons.

Hyde, in his Rel. Vet. Perſarum, maintains, that the ancient *Sabaiſm* was very different from Paganiſm. According to him, Shem and Elam were the firſt founders of this religion, which was afterwards corrupted, reformed by Abraham, perſecuted by Nimrod, and re-eſtabliſhed by Zoroaſter; and the worſhip which the Sabians paid to the ſun was ſubordinate and ſubſervient to that of the true God. The account given of it by Dr. Prideaux (Conn. vol. i. p. 249. &c.) is much to the ſame purpoſe. In tracing the riſe of the idolatry of the Sabians, which conſiſted in the worſhip of images, he obſerves that the true religion, which Noah taught his poſterity, was that which Abraham practiſed, and comprehended the worſhip of one God, the ſupreme creator and governor of all things, with hopes in his mercy, through a mediator. The notion of a mediator, he ſays, was very ancient and general; and under a conviction of the neceſſity of ſuch an appointment, mankind had recourſe to the ſun, moon, and ſtars, which they conceived to be the habitations of intelligences, of a middle nature between God and them, for this purpoſe. As the planets were of all the heavenly bodies the neareſt to them, and had the greateſt influence, as they generally apprehended, on this world, they made choice of them in the firſt place for their gods-mediators, to whom, as ſuch, they directed their worſhip. Here, he ſays, commenced all the idolatry that hath been practiſed in the world. They firſt worſhipped them *per ſacella*, that is, by their tabernacles, directing their worſhip towards the planets, in which they ſuppoſed the ſeveral intelligences reſided, and, in their abſence, by images; in which, after their conſecration, they thought theſe intelligences, or inferior deities, were as much preſent by their influence, as in the planets themſelves. To theſe images they gave the names of the planets, which they repreſented; and hence, he ſays, Saturn, Jupiter, Mars, Apollo, Mercury, Venus, and Diana, were firſt ranked in the polytheiſm of the ancients, becauſe theſe were their firſt gods. They then proceeded to the worſhip of deified men. See IDOLATRY.

This religion began among the Chaldæans; to which they were partly led by their knowledge in aſtronomy; and from this Abraham is ſaid to have ſeparated himſelf, when he left Chaldæa. From the Chaldæans it ſpread over all the Eaſt, where the profeſſors of it had the name of *Sabians*. From them it paſſed into Egypt, and thence to the Grecians, who propagated it to all the weſtern nations of the world. The remainder of this ſect ſtill ſubſiſts in the Eaſt under the ſame name, and their religion is a mixture of Chriſtianity, Judaiſm, Mahometaniſm, and Paganiſm. See SABÆANS, MENDÆANS, and HEMEROBAPTISTS.

SABAZIA, Σαϐαζια, among the Greeks, nocturnal myſteries in honour of Jupiter *Sabazius*, into which all that were initiated had a golden ſerpent put in at their breaſts, and taken out at the lower part of their garments, in memory of Jupiter's raviſhing Proſerpina in the form of a ſerpent.

There were alſo other feaſts and ſacrifices diſtinguiſhed by this appellation, in honour of Mithras, the deity of the Perſians, and of Bacchus, who was thus denominated by the Sabians, a people of Thrace.

SABBATARIANS, or *ſeventh day Baptiſts*, a ſect of Anabaptiſts; thus called, becauſe they obſerved the Jewiſh or Saturday-Sabbath, from a perſuaſion that it was never abrogated in the New Teſtament by the inſtitution of any other.

SABBATH, *Sabbatum*, the ſeventh day of the week, held as a feaſt among the Jews, in memory of God's reſting on the ſeventh day of the creation.

The word is pure Hebrew, שבת, and ſignifies *ceſſation*, or *reſt*. Philo calls it, *τȣ κοσμȣ γενεσια*, *the world's birthday*.

The *Sabbath* was appointed from the beginning, by God himſelf, Gen. ii. 2, 3. and by him it was ſet apart for the commemoration of the great work of the creation; and when it had fallen into neglect after the flood, it was re-eſtabliſhed by him, upon his ſettling the Jewiſh polity after the return out of Egypt.

It has been a ſubject of diſpute both among Jews and Chriſtians, whether the *Sabbath* was firſt inſtituted immediately after the creation, or whether the account in Gen. ii. 3. is to be underſtood proleptically of God's appointing the ſeventh day to be obſerved as a *Sabbath*, not at that time, but by the Iſraelites many ages afterwards. The advocates for the latter opinion, among whom are Limborch, Le Clerc, &c. alledge, that there is no mention of the *Sabbath* in the ſacred hiſtory till the time of Moſes, i. e. during the ſpace of about two thouſand five hundred years; and that when it is mentioned Exod. xvi. 23. it ſeems to be intimated that it was before unknown to the children of Iſrael. Ver. 25—27.

To the firſt argument it is replied, that the ſilence of Moſes cannot warrant our inferring that the *Sabbath* was not obſerved by the patriarchs; becauſe it is by no means probable that they had no ſtated time for reſt or devotion, or that they were left deſtitute of ſo ſalutary an inſtitution; beſides, it might be argued on the ſame principle, that the Jews did not obſerve the *Sabbath* from Moſes to David, ſince in the hiſtory of that period there is no mention of the day; and, moreover, no notice is taken of ſacrifices in the fifteen hundred years that elapſed between the birth of Seleg and the deluge, nor of the obſervance of circumciſion from the ſettlement of the Iſraelites in Canaan to the circumciſion of Chriſt, though there is no reaſon to queſtion that ſacrifices were offered in the former period, and circumciſion performed in the latter. The early diviſion of time by weeks of ſeven days, affords alſo a very ſtrong preſumption of the primitive inſtitution and obſervance of the *Sabbath*; and this method of dividing time prevailed even in thoſe heathen nations, who can be ſuppoſed to have had no knowledge of the law or hiſtory of Moſes. And we actually find that they accounted one day of the ſeven more ſacred than the reſt: thus Heſiod ſtyles the ſeventh day the illuſtrious light of the ſun,

> Εϐδοματη δ' αυθις λαμπρον φαος ηελιοιο.

And Homer ſays,

> Εϐδοματη δ' ηπειτα κατηλυθεν ιερον ημαρ.
>
> *Then came the ſeventh day, which is ſacred or holy.*

As to the ſecond argument above mentioned, Dr. Kennicott hath obſerved, that when the *Sabbath* is firſt mentioned in the time of Moſes, it is not ſpoken of as a novel inſtitution, but as one with which the people were well acquainted: "To-morrow is the holy *Sabbath* to the "Lord;" though, with reſpect to the manner of keeping the *Sabbath*, by a total ceſſation from labour, and the particular day on which it was to be kept by the Jews, it ſeems to have been a new inſtitution; otherwiſe, as to the day, there would have been no occaſion for its being ſo particularly marked out by Moſes, as the reaſon why there would be a double quantity of manna on the ſixth day; for it muſt have immediately occurred to the people, that it was intended for their proviſion on the *Sabbath*, if the next day had been the *Sabbath* in courſe. Beſides, if this day, which was the twenty-ſecond of the month, had been the *Sabbath*, according to the paradiſaical computation, the fifteenth muſt have been ſo too, and, therefore, would not have been ſpent in marching from Elim to Sin. Again, that the Jewiſh *Sabbath* was on a different day from the paradiſaical, is probable, becauſe it was appointed as a ſign between God and the children of Iſrael, by obſerving which they were to know or acknowledge Jehovah as their God. Accordingly, the Jewiſh *Sabbath* is declaredly inſtituted as a memorial of their deliverance out of the land of Egypt. Compare Exod. xx. 11. and Deut. v. 15. The learned Mr. Joſeph Mede farther conjectures, that the Jewiſh *Sabbath* was ordained to be obſerved on that day, when the deliverance of the Iſraelites was completed by the overthrow of the Egyptians in the Red Sea.

It is a very probable conjecture, that the day which the heathens in general conſecrated to the honour and worſhip of their chief god the Sun, was the ancient paradiſaical *Sabbath*; and, therefore, the reaſon for changing the day might be to take off the Iſraelites more effectually from concurring with the Gentiles in this idolatrous worſhip. It is a farther preſumption in favour of this change, that upon their migration out of Egypt, the beginning of the year was changed from the month Tizri to the oppoſite month Abib (Exod. xii. 2.), and the beginning of the day from the morning to the evening; and they were to compute their days, at leaſt their *Sabbaths*, from evening to evening. By this means the fifteenth day was changed into the fourteenth, and the ſeventh into the ſixth; and the change of the *Sabbath* made a change in the beginning of the week, which always commenced the next day after the *Sabbath*, which was ſtill the ſeventh day of the week, or the ſeventh in reſpect of the preceding ſix of labour, though not the ſeventh from the beginning of time. We may alſo obſerve, that the law of the *Sabbath* is limited, not only to the people of Iſrael, but to the duration of their ſtate and policy. Exod. xxxi. 16. Hence it has been concluded, that, by the ſecond change which took place under the Chriſtian diſpenſation, our *Sabbath*, which is the firſt day of the week, is the ſame with the primitive patriarchal *Sabbath*. Mede's Works, vol. i. p. 56, &c. Jennings's Jewiſh Ant. vol. i. book iii. chap. 3.

Leo of Modena informs us, that it is a received opinion among the modern Jews, that the ſouls of the damned ſuffer no torments on the *Sabbath*, and, therefore, they make it laſt as long as poſſible.

The Chriſtians alſo apply the word *Sabbath*, by extenſion, to the firſt day of the week, popularly called *Sunday*, or the *Lord's day*; as inſtituted by the apoſtles to take place of the Jewiſh *Sabbath*, and by us obſerved in remembrance, not of the creation, but of the work of redemption's being completed by our Saviour's reſurrection on that day.

Thoſe who diſpute the divine appointment of a Chriſtian *Sabbath*, yet allow the moral neceſſity thereof, as a wiſe deſignation of time for the recruiting of our bodies, and at the ſame time keeping up a ſenſe of the great benefits we have received from God, and a ſpiritual temper of mind. By allowing ſix days to labour, the poor has time to earn his bread, and the man of buſineſs has time to diſpatch his affairs. Had more time been allotted to labour and buſineſs, and none to reſt, our bodies would have been too much fatigued and waſted, and our minds too long engaged about worldly matters, ſo as to have forgotten divine things. Greedy people, without ſuch an injunction, would ſcarce have ſpared their own bodies, much leſs their ſervants, ſlaves, cattle, &c.

SABBATH-*breaking*. See SUNDAY.

The Jews had alſo their SABBATIC YEAR, which was every ſeventh year; wherein they were obliged to ſet their ſlaves at liberty, and to let their lands lie idle. See JUBILEE.

SABBATH is alſo uſed, by writers on divination, for a nocturnal aſſembly which witches are ſuppoſed to hold on Saturdays, where the devil appears in form of a goat, around whom they make ſeveral dances, and magic ceremonies, amply deſcribed in the books of Dæmonomania.

To prepare themſelves for this meeting, it is pretended, they take certain ſoporific drugs; after which they are ſaid to fly up the chimney, and to be ſpirited through the air to the *Sabbath* on a ſwitch. See Delrio Diſquiſ. Mag. lib. iv. qu. 16.

SABBATH *day's journey*, is a Jewiſh itinerary meaſure, fixed by critics to the ſpace of 750 paces, or 2000 Jewiſh cubits, or about two-thirds of an Engliſh mile.

SABBATIANS, *Sabbatiani*, in *Eccleſiaſtical Hiſtory*, a ſect thus called from *Sabbatius*, their leader, who lived under Diocleſian; he was firſt a Jew, then converted, and made a prieſt by Marcion; but he afterwards left the ſect of Marcionites, on account of the celebration of Eaſter, which he would have to be on the fourteenth day of the moon; whence he, and his adherents, were called alſo QUARTODECIMANS.

The *Sabbatians* are recorded by eccleſiaſtical hiſtorians, as having a great abhorrence of the left-hand; ſo as to make it a point of religion not to receive any thing with it. This cuſtom, which is now become a piece of manners among us, was then eſteemed ſo ſingular, that the *Sabbatians* were thence denominated *αριςεροι*, q. d. *ſiniſtri*, or *left-hand men*.

SABELLA, in *Natural Hiſtory*, a genus of the *teſtaceous worms*. Its animal is a NEREIS; and its covering is tubular, formed with ſand and broken ſhells, coherent by a glutinous cement. Linnæus enumerates ſeven ſpecies.

SABELLIANS, in *Eccleſiaſtical Hiſtory*, a ſect in the Eaſt, who reduced the three perſons in the Trinity to three ſtates or relations; or rather reduced the whole Trinity to the one perſon of the Father; making the Word and the Holy Spirit to be only virtues, emanations, or functions thereof.

Sabellius, their chief, firſt broached this doctrine, in the third century, about the year 255, in a city of Lybia, called Ptolemais. He taught, according to Epiphanius, that the ſame being is Father, Son, and Holy Ghoſt; ſo that there are only three denominations in one hypoſtaſis or ſubſiſtence; or, as in man, body, ſoul, and ſpirit. He ſays, that the *Sabellians* agreed with the NOETIANS, except in one thing, viz. that they ſaid, the Father did not ſuffer. Theodoret's account of Sabellius is, that he taught, the Father and the Son and the Holy Spirit to be one hypoſtaſis or ſubſiſtence, and one perſon with three names; that he ſpeaks of the ſame ſometimes as Father, ſometimes as Son, and ſometimes as Holy Ghoſt; and ſays, that in the Old Teſtament he delivered the law as Father, and in the New dwelt among men (or was incarnate) as the Son, and deſcended on the apoſtles, as the Holy Spirit. Auguſtin repeatedly ſays, that there was no difference in opinion between Noetus and Sabellius; and that the *Sabellians*, as well as the Noetians, taught the Father to have ſuffered; and that they were oftener called PATRIPASSIANS than *Sabellians*. Lardner's Credibility, vol. vi. p. 446, &c. p. 600, &c.

Epiphanius tells us, that the God of the *Sabellians*, whom they called the Father, reſembled the ſun, and was a mere ſubſtratum; whereof the Son was the illuminative virtue or quality, and the Holy Spirit the warming virtue.

The Word, they taught, was ſhot or darted forth like a divine ray, to accompliſh the work of redemption; and that being reaſcended to heaven, as the ray returns to its ſource, the warmth of the Father was communicated, after a like manner, to the apoſtles.

The council of Antioch, held by the Euſebians in 345, tells us, that, at Rome, thoſe were called *Patripaſſians*, who in the Eaſt were called *Sabellians*.

SABIANS. See SABÆANS.

SABINA, *ſavin*, in *Medicine*. See SAVIN.

SABINITES *lapis*, in *Natural Hiſtory*, a name given to a ſtone in which are preſerved the leaves of the common ſavin. See *Foſſile* PLANTS.

SABLE, in *Heraldry*, the black colour in the arms of gentlemen.

The name is borrowed from the little animal called *ſable*, which is of a black colour.

In thoſe of nobility, it is called *diamond*; and in the coats of ſovereign princes, *ſaturn*.

It is expreſſed in engraving by perpendicular and horizontal hatches drawn acroſs each other; as repreſented in *Tab. Herald*, *fig*. 27.

SABLE, in *Zoology*, the name of the animal whoſe fur is ſo much valued, and ſold under the ſame name. It is a creature of the weaſel kind, and called by authors *muſtela zibellina*, in ſize equal to that of the MARTIN, whoſe form it much reſembles; except that the tail of the martin is much longer than the hind legs, when extended, whereas that of the *ſable* is ſhorter. It has long whiſkers, rounded ears, large feet, white claws, long and buſhy tail, the colour of the hair being black at the tips, and cinereous at the bottom, chin cinereous, ſometimes white, yellow or ſpotted, the edges of the ears yellowiſh; the hair has ſometimes a tawny caſt; and ſometimes a ſnowy whiteneſs; for the colour varies. This animal inhabits Siberia, Kamtſchatka, and ſome of the Kurile iſles, that lie between Kamtſchatka and Japan. It is alſo found in North America. The *ſable* lives in holes in the earth, or beneath the roots of trees, and ſometimes forms neſts in the trees, and will ſkip with great agility from one tree to another. They caſt from three to five young at a time, the end of March or beginning of April, and ſuckle them for four or five weeks. They prey in ſummer, chiefly on hares; in winter, on birds; and in autumn, on hurtle-berries, cranberries, and the berries of the ſervice-tree. The hunters of *ſables* form themſelves into troops, from five to forty each; and put themſelves under the conduct of a leader: and being provided with boats and proviſions, together with a dog and net for every two men, they proceed to the hunting country, where they wait till the waters are frozen and the ſeaſon commences; they then penetrate into the woods, building huts and laying traps as they advance: and having provided as many ſkins as the ſeaſon will admit, they ſhare the booty and return home. The price of *ſables* varies from 1 to 10*l.* ſterling and above: fine and middling *ſable* ſkins are without bellies, and the coarſe ones are with them: the fineſt are ſold in pairs, perfectly ſimilar, and are dearer than ſingle ones of the ſame goodneſs. The blackeſt are reputed the beſt. They are in ſeaſon from November to February; for thoſe caught at any other time of the year are ſhort-haired. The more long hair a ſkin has, the blacker they are, and the more valuable is the fur. The beſt of all have none but long and black hairs. The gloſs vaniſhes in old furs, and the dyed *ſables* always loſe their gloſs: though the Chineſe have a method of dying them (unknown to the Ruſſians) ſo that the colour not only laſts, but the fur keeps its gloſs: the beſt *ſables* are, therefore, carried to Ruſſia, and the reſt go to China. White *ſables* are rare and bought only as curioſities: ſome are yellowiſh, and are bleached in the ſpring on the ſnow. The common *ſables* are ſcarcely better in hair and colour than the martin. The American fur is more gloſſy than that of the Siberian colour, and of a bright cheſnut colour, but of a coarſe quality. Pennant

Sable *mouſe*. See Mouse.

SABRE, formed from the German *ſabel*, which ſignifies the ſame, of the Sclavonic *ſabla*, a *ſword*, or *hanger*, a kind of cutting ſword, or ſcimitar, having a very broad, heavy blade; thick at the back, and a little crooked towards the point.

The Turks are very expert in the uſe of the *ſabre*, which is the weapon they ordinarily wear by their ſide, &c. With this, it is ſaid, they can cleave a man quite down, at a ſingle ſtroke.

SABURRÆ, *grits*, in *Natural Hiſtory*, the name of a genus of foſſils found in form of powder, and uſually confounded among the ſands, and called by the ſame name. Theſe are not compoſed like the genuine ſands of pure natural concretions, but are irregular particles, ſeeming to have been the fragments of other large bodies. They are not to be diſſolved or diſunited by water, but retain their figure in it, and do not cohere by means of it into a maſs. They are often very opake, and in many of the ſpecies will ferment with acids, and are often fouled with heterogene particles, taking in the coarſer, ſtony, mineral, and metalline particles, and are according to their colour divided into ſeveral kinds.

Of the white *ſaburræ* there are nine ſpecies; of the red *ſaburræ* we have nine ſpecies; of green *ſaburræ* there are two ſpecies; of yellow, one; and of black, ſix ſpecies. Hill's Foſſils, 569.

SAC, or Sak, Saca, or Sacha, in *Law*, an ancient privilege which a lord of a manor claims in his court, of holding plea in cauſes of debate ariſing from his tenants and vaſſals, and of impoſing and levying fines and amercements touching the ſame.

The word is Saxon, *ſac*, and literally ſignifies *cauſe*, *conteſt*, &c.

Raſtall defines *ſac* by the forfeiture or amercement itſelf.

SACA, in *Zoology*, a ſpecies of beautiful wild cat, found in Madagaſcar.

SACABURGH, Sacabere, or Sakebere, in our *Old Writers*, one that is robbed, or by theft deprived of his money or goods, and puts in ſurety to proſecute the thief with freſh ſuit; according to Selden, in his Titles of Honour, and Briton, cap. 15 & 29. with whom agrees Bracton (lib. iii. tract. 2. cap. 32. n. 2.) *Furtum vero manifeſtum eſt, ubi latro deprehenſus ſit ſeiſitus de aliquo latrocinio*, ſcil. Honhabend & Backberend & *inſecutus fuerit per aliquem cujus res illa fuerit, qui dicitur* ſacaburh, &c.

The word may come from the Saxon *ſac* or *ſacca*, i. e. *lis*, *cauſa*, *proſecutio*, and *burgh*, *pignus*, *hoc eſt furti ſymbolum*.

But ſir Edward Coke ſays, *ſacabere*, or *ſakebere*, is derived from *ſac* and *bere*, that is, *he that did bear the bag*. 8 Inſt. fol. 69.

SACÆA, Σακαια, in *Antiquity*, a feaſt which the ancient Babylonians, and other Orientals, held annually in honour of the deity Anaitis.

The *Sacæa* were in the Eaſt what the *Saturnalia* were at Rome, viz. a feaſt for the ſlaves. One of the ceremonies hereof, was to chooſe a priſoner condemned to death, and allow him all the pleaſures and gratifications he would wiſh before he was carried to execution.

SACADE, in the *Manege*, a jerk or violent check which the rider gives his horſe, by drawing both the reins very ſuddenly; it is uſed when the horſe bears too heavy on the hand, or obſtinately arms himſelf.

The *ſacade* is a kind of correction rarely to be uſed; for fear of ſpoiling the horſe's mouth.

SACCARII, among the Romans, were a company or fraternity of porters, who had the ſole privilege to carry all goods from the harbour to the warehouſes, none being allowed to employ their own ſlaves, and much leſs thoſe of others for that purpoſe.

SACCER. See Saker.

SACCHARUM. See Sugar.

Saccharum *Saturni*, in *Medicine*, is prepared by gently boiling cerusse with diſtilled vinegar, or in the ſtrong acid which remains after diſtilling the vinegar in a lead or glazed earthen veſſel, till the vinegar is ſweet; then pouring off the clear vinegar, and evaporating it to the conſiſtence of honey, and ſetting it to cryſtallize in a cool place; then exhaling the remaining liquor, and ſetting it to ſhoot again, &c. until no more ſalt will ſhoot. The ceruſſe ſhould be well powdered before the vinegar is put to it; and during the boiling it ſhould every now and then be ſtirred with a wooden ſpatula. If the heat is conſiderable in the boiling of the vinegar and lead together, the acid will be diſſipated before it can be fixed by its combination with the lead: the vinegar may be made hot, which will be ſufficient. When the ſolution is exhaled for cryſtallization, let a ſmall quantity of rectified ſpirit of wine be added to it, and the mixture ſuffered to cool gradually. The ſugar will then concrete into very large tranſparent cryſtals. See *Extract of* Lead.

This preparation of lead is recommended by ſome internally, in the quantity of a few grains, for dyſenteries, and obſtinate hæmorrhages; but the generality of the world condemn it, as containing all the poiſonous qualities of the metal it is made from in their higheſt degree.

Externally it has been long famous for its virtues in the eryſipelas, in inflammations of all kinds, and in embrocations. It is uſed alſo in ſmall quantities in collyriums for the eyes; it deterges, dries, and cicatriſes ulcers; and in gonorrhœas is mixed in injections with great ſucceſs.

It is well known that this ſalt made with the common vegetable or mineral acid, when diſtilled, will not give back the acid again, but only yields a water without any ſharp taſte, and an inflammable oil; but if it be made into the animal acid of piſmires, whether procured by diſtilling thoſe inſects freſh, or by throwing large quantities of them into water till it is ſufficiently impregnated, it will on diſtillation yield back the ſame proportion of acid of the ſame ſtrength. Phil. Tranſ. N° 68. See Tinctura *antiphthiſica*.

Saccharum *lactis*. See Milk.

SACCINI, in our *Old Writers*, monks ſo called, becauſe they wore a garment of goat's hair next to their ſkins. *Saccus* is applied to coarſe cloth made of ſuch hair.

SACCO *beneditto*. See Sanbenito.

SACCOPHORI, Σακκοφοροι, formed of σακκος, a *ſack*, and φερω, *I bear*, in *Eccleſiaſtical Hiſtory*, a ſect of ancient heretics, thus called, becauſe they always went clothed in ſackcloth, and affected a great deal of auſterity and penance.

We know but little of their tenets: in all probability they were the ſame with the Massalians.

The emperor Theodoſius made a law againſt the *Saccophori*, and Manichees.

SACCULUS, a diminutive of *ſaccus*; uſed in anatomy, to expreſs ſeveral parts of the body, bearing ſome reſemblance to bags: as

Sacculus *chyliferus*, or *roriferus*, a paſſage which makes the beginning of the thoracic duct; called alſo receptaculum *chyli*.

Sacculus *cordis*, the pericardium.

Sacculus *lacrymalis*, a little membranous bag, into which the *puncta* LACRYMALIA of the eye open; and which is, itſelf, the entrance of a canal, by which the liquor ſeparated in the glandula lacrymalis, is diſcharged into the cavity of the noſe. It is the ulceration of this *ſaccus* that makes the FISTULA *lacrymalis*.

Sacculi *adipoſi*, little cells or veſicles, in the membrana adipoſa, wherein the fat of the body is contained.

Sacculus *medicinalis*, denotes a topical medicine, applied to the ſide, ſtomach, or other pained part; conſiſting of herbs, or drugs incloſed in a linen bag.

Sacculus *medicinalis*, is alſo a name given to a bag of ingredients ſuſpended in a liquor, in making diet-drinks; called alſo *nodule*.

SACCUS *cum brochia*, in our *Old Writers*, a ſervice or tenure of finding a *ſack* and a *broach* to the king, for the uſe of his army.

Saccus *lactaus*, a name given by ſome anatomiſts to the RECEPTACULUM *chyli*.

SACELLUM, in Roman *Antiquity*, denoted a place ſacred to the gods, without a roof.

SACER, or **Sacer Dorsi**, in *Anatomy*, a muſcle ariſing from the hind-part of the os ſacrum, and running along under the longiſſimus dorſi. With its ſeveral tendons, it lays hold on the ſpine, and every tranſverſe proceſs of the loins, and the loweſt of the back. It aſſiſts in erecting the trunk.

Sacer *ignis*. See ERYSIPELAS.

Sacer *morbus*. See EPILEPSY.

Sacer, in *Ichthyology*, a name given by Gaza and ſome others to that ſpecies of the *labrus*, diſtinguiſhed by Artedi by the name of the red forked-tail *labrus*, and called by the generality of other authors the ANTHIAS *piſcis*.

SACERDOTAL, *ſacerdotalis*, formed from *ſacerdos*, *prieſt*, of *ſacer*, *holy*, ſomething belonging to the prieſthood.

Sacerdotal *benefices*, are ſuch as cannot be legally held by any but perſons in holy orders: ſuch are all cures of ſouls, biſhopricks, &c.

Sacerdotal *ornaments*, *the*, are thoſe wherewith the prieſts are clothed when they officiate, &c.

SACHETTUS, in *Ichthyology*, the name of a ſea-fiſh, much reſembling the common river perch in ſhape and colour, and having the ſame black obliquely tranſverſe lines on its ſides, and ſeeming the ſame with the CHANNADELLA of Bellonius, Rondeletius, and other authors. It is common in the Mediterranean, and is brought to market at Rome, Venice, and elſewhere, and accounted a very delicate and well taſted fiſh. See CHANE.

SACK *of wool*, is a determinate quantity, containing juſt twenty-ſix ſtone, and every ſtone fourteen pounds. 14 Ed. III. ſtat. 1. cap. 2.

In Scotland, a *ſack* is twenty-four ſtone; each ſtone containing ſixteen pounds.

A **Sack** *of cotton wool* is a quantity from a hundred and an half to four hundred weight.

Sacks *of earth*, *ſacs à terre*, in *Fortification*, are canvas bags full of earth, the largeſt about a cubic foot wide, and the leſſer ſomewhat more than half a foot.

They are alſo called *earth bags*, and *canvas bags*, and are uſed on ſeveral occaſions; particularly for making retrenchments in haſte to place on parapets, or the heads of the breaches, &c. or to repair them when beaten down.

They are of good uſe alſo, where the ground is rocky, and affords not earth to carry on the approaches, becauſe they can eaſily be brought on, and carried off. See SAND *bags*.

The ſame bags, on occaſion, are uſed to carry powder in, of which they hold about fifty pounds apiece.

SACBUT, a muſical inſtrument of the wind kind; being a kind of a trumpet, though different from the common trumpet both in form and ſize.

The *ſackbut* is very fit for playing baſs; and is contrived ſo as to be drawn out or ſhortened, according to the gravity or acuteneſs of the tones. The Italians call it *trombone*, the Latins *tuba ductilis*.

It takes aſunder into four pieces, or branches; and hath frequently a wreath in the middle; which is the ſame tube only twiſted twice, or making two circles in the middle of the inſtrument; by which means, it is brought down one-fourth lower than its natural tone. It has alſo two pieces or branches on the inſide, which do not appear, except when drawn out by means of an iron bar, and which lengthen it to the degree requiſite to hit the tone required.

The *ſacbut* is uſually eight feet long, without being drawn out, or without reckoning the circles. When extended to its full length, it is uſually fifteen feet. The wreath is two feet nine inches in circumference. It ſerves as baſs in all concerts of wind muſic.

There are *ſacbuts* of different ſizes, ſerving to execute different parts; particularly a ſmall one, called by the Italians *trombone picciolo*; and by the Germans, *cleine alt poſaune*, proper for a counter-tenor. The part aſſigned it is uſually called *trombone primo*, or I°. There is another large kind, called *trombone maggiore*, which may ſerve as a tenor, its part is uſually called *trombone ſecondo*, or II°. or 2°. There is a third ſtill bigger, called *trombone groſſo*; its part is called *trombone terzo*, or III°. or 3°. Laſtly, there is another, which exceeds all the reſt, and which is much heard in the muſic, eſpecially in the baſs; its part is called *trombone quarto*, or IV°. or 4to, or ſimply *trombone*. It has uſually the key of *F*, *ut*, *fa*, on the fourth line; though frequently alſo on the fifth line from the top, on account of the gravity or depth of the ſounds.

SACRA *arteria*, a branch of the aorta deſcendens, which deſcends through the middle of the os ſacrum to the pelvis. See AORTA, and ARTERY.

Sacra *fiſtula*, a name given by ſome to the cavity in which the ſpinal marrow is lodged, and by others to the ſpinal marrow itſelf.

Sacra *gentilitia*, among the Romans. Beſide the public feſtivals obſerved by the whole Roman people, and beſide the holy-days kept on birth-days, marriages, or any other perſonal account, there were likewiſe family feaſts celebrated annually by the deſcendants only of particular families.

They thought themſelves obliged to keep theſe with the utmoſt exactneſs and regularity, on pain of divine vengeance. Livy tells us, that a young man of the Fabian family, when the Capitol was beſieged by the Gauls, made his way through the enemy's army, in order to celebrate the yearly feſtival of his family, to the no ſmall aſtoniſhment both of the beſiegers and beſieged. Mem. Acad. Inſcript. vol. viii. p. 310.

Sacra *vena*, a vein ariſing from the os ſacrum, and terminating uſually in the iliac vein; ſometimes in the place where the two iliacs meet the aſcending aorta.

SACRAMENT, *ſacramentum*, in the general, denotes a ſign of a holy or ſacred thing.

The word is formed from the Latin *ſacramentum*, which ſignified an oath, particularly that which the ſoldiers took, to be true to their commanders; the words whereof, according to Polybius, were *obtemperaturus ſum & facturus quicquid mandabitur ab imperatoribus juxta vires*.

In this ſenſe, the word includes both the *ſacraments* of the law of nature, as ſound morality, the manner of offering the bread and wine practiſed by Melchiſedek, &c. and thoſe of the law of Moſes as the circumciſion, the paſchal lamb, purifications, order of prieſthood, &c.

Sacrament, with regard to the Chriſtian church, is defined, an outward and viſible ſign of an inward and ſpiritual grace annexed to the uſe thereof.

But ſome have objected againſt this definition, as obſcure; unleſs it ſuppoſes ſome divine influence of an extraordinary nature inſeparably annexed to the outward ſign; and if this be the meaning of it, they apprehend there is reaſon to queſtion, whether there be any *ſacrament* at all. Accordingly they have choſen to define *ſacraments* to be ordinances inſtituted by Chriſt, to be uſed by all Chriſtians as ſeals of the covenant of grace; or as tokens of their accepting the Goſpel covenant as well as of the divine acceptance. Or, the term *ſacrament*, originally ſignifying the oath which the Roman ſoldiers took to be faithful to their general (though it be no ſcripture term), is properly enough transferred to denote the affectionate zeal, and inviolable fidelity, which the followers of Jeſus, in baptiſm and the Lord's Supper, profeſs and promiſe to the captain of their ſalvation.

There are two objects in a *ſacrament*; the one a material ſign, the object of their ſenſes; the other the thing ſignified, which is the object of faith. Thus it has pleaſed God to give as it were a body or ſubſtance to ſpiritual myſteries, that our faith might have the aſſiſtance of ſenſible ſigns.

The *ſacrament* is the moſt ſolemn act of worſhip amongſt us, and by the rubric there muſt be three at leaſt to communicate, and a miniſter is not without lawful cauſe to deny it to any who ſhall devoutly and humbly deſire it; but notorious ſinners are not to be admitted to it till they have repented; nor thoſe who maliciouſly contend, until they are reconciled, &c. Alſo the *ſacrament* is not to be adminiſtered to ſuch who refuſe to kneel, or to be preſent at the prayers of the church, or to ſtrangers; for a miniſter is not obliged to give it to any but thoſe of his own pariſh; and the partakers of the holy *ſacrament* ought to ſignify their names to the curate at leaſt a day before it is adminiſtered. Can. 27. If a miniſter refuſes to give the *ſacrament* to any one being required by the biſhop, he is to certify the cauſe of ſuch refuſal; and a parſon refuſing to adminiſter the *ſacrament* to any, without juſt cauſe, is liable to be ſued in action of the caſe; becauſe a man may ſuſtain a temporal loſs by ſuch refuſal. By ſtatute no perſons ſhall be choſen into any office of magiſtracy, or place of truſt, &c. unleſs they receive the *ſacrament* according to the rites of the church of England, and deliver a certificate thereof to the court of king's bench, or quarter ſeſſions, under the hand of the miniſter, and prove it by witneſſes. 13, 14, & 25 Car. II. In every pariſh church the *ſacrament* is to be adminiſtered three times in the year (whereof the feaſt of Eaſter to be one), and every layman is bound to receive it thrice every year, &c. In colleges, and the halls of the univerſities, the *ſacraments* are to be adminiſtered the firſt and ſecond Sunday of every month; and in cathedral churches upon all principal feaſt days. Canon 21, 22, 23. The churchwardens, as well as the miniſter, are to take notice whether the pariſhioners come ſo often to the *ſacrament* as they ought; and on a churchwarden's preſenting a man for not receiving the *ſacrament*, he may be libelled in the eccleſiaſtical court and excommunicated, &c. Reviling the *ſacrament* of the Lord's ſupper is puniſhable by fine and impriſonment. 1 Edw. vi. c. 1. 1 Eliz. c. 1.

Roman catholics own ſeven *ſacraments*; viz. baptiſm, confirmation, the euchariſt, penance, extreme unction, ordination, and marriage. See each under its proper article. See POPERY.

The proteſtants admit of only two; viz. baptiſm and the euchariſt, or Lord's Supper.

The Romaniſts, however, call the euchariſt, by way of eminence, the *Holy Sacrament*. Thus, to expoſe the *Holy Sacrament*, is to lay a conſecrated HOST on the altar to be adored. The PROCESSION of the *Holy Sacrament* is that, wherein this hoſt is carried about the church, or about the town.

In a like ſenſe they ſay, the feaſt of the *Holy Sacrament*, the congregation of the *Holy Sacrament*.

SACRAMENT, *Congregation of the Holy*, a religious eſtabliſhment formed in France, whoſe founder was Autherius, biſhop of Bethlehem, and which, in 1644, received an order from Urban VIII. to have always a number of eccleſiaſtics ready to exerciſe their miniſtry among pagan nations, wherever the pope, or congregation *de propaganda*, ſhould appoint.

SACRAMENT, *Feſtival of the Holy*, or of the body of Chriſt, a feſtival obſerved in the Romiſh church, and eſtabliſhed in the following manner. A certain devout woman of Liege, whoſe name was Juliana, declared that ſhe had received a revelation from heaven, intimating to her, that it was the will of God that a peculiar feſtival ſhould be annually obſerved in honour of the *Holy Sacrament*, or rather of the real preſence of Chriſt's body in that ſacred inſtitution. This pretended viſion was ſupported by the biſhop of Liege, who, in 1246, publiſhed an order for the celebration of this feſtival through the whole province. Eve, one of Juliana's companions, after her death, prevailed with Urban IV. to publiſh, in 1264, a ſolemn edict, impoſing the obſervance of this feaſt on all Chriſtian churches; which was confirmed, in the pontificate of Clement V. by a council held at Vienna, in France, in 1311; and this contributed more to render the doctrine of tranſubſtantiation agreeable to the people than the decree of the council of the Lateran under Innocent III. or than all the exhortations of his ſucceſſors.

SACRAMENT was alſo uſed, in the Roman law, for a pledge or gage of money, which both the plaintiff and defendant, in a real action, laid down in court to be forfeited by him who ſhould loſe the cauſe.—This was particularly called, *ſacramento provocare, rogare, ſtipulari*, &c.

SACRAMENTARIANS, a general name given to all ſuch as have publiſhed, or held erroneous doctrines of the ſacrament of the Lord's Supper.

The term is chiefly applied among Roman catholics, by way of reproach, to the Lutherans, Calviniſts, and other Proteſtants.

SACRAMENTARY, *ſacramentarium*, an ancient church-book, comprehending all the prayers and ceremonies practiſed at the celebration of the ſacraments.

Pope Gelaſius was the firſt author of the *ſacramentarium*: it was afterwards reviſed, corrected, and abridged, by St. Gregory. It was the ſame with what the Greeks now call EUCHOLOGIUM.

SACRAMENTUM *Altaris*, denotes the ſacrifice of the maſs in Popiſh countries; and with us the Lord's ſupper.

SACRAMENTUM *Deciſionis*, denotes the voluntary and deciſive oath of the civil law; where one of the parties to the ſuit, not being able to prove his charge, offers to refer the deciſion of the cauſe to the oath of his adverſary; which the adverſary was bound to accept, or tender the ſame propoſal back again; otherwiſe the whole was taken as confeſſed by him.

SACRANUS *color*, a name given by ſome authors to purple, or very deep red.

SACRARIUM, among the Romans, a chapel in a private family. It differed from *lararium*, as being dedicated to ſome particular deity, and the *lararium* to the houſhold gods in general.

SACRE, or SAKER, in *Ornithology*, the name of a ſpecies of falcon, called by authors *falco ſacer*, and differently deſcribed by different authors, but by all agreed to be an extremely bold and active bird. The deſcription Mr. Ray has ſelected of it is this: it is a larger bird than the common falcon; its head is flat and of a greyiſh colour: its eyes large, and its beak bluiſh; its back and wings are brown; its breaſt white, and variegated with brown ſpots; its thighs are white within, and its tail is variegated with ſpots of the ſhape of a kidney; its wings are very long, and its legs and feet of a bluiſh colour. The yearling birds of this ſpecies are called *ſori*, and differ conſiderably in their plumage from thoſe of a more advanced age, having their legs paler, and their breaſts leſs ſpotted. It will ſeize upon the largeſt birds, and on young goats, &c. for food. Ray. See HAWK and HAWKING.

SACRED, *ſacer*, ſomething holy, or that is ſolemnly offered, and conſecrated to God with ceremonies, benedictions, unctions, &c.

Kings, prelates, and prieſts, are held *ſacred* perſons; abbots are only bleſſed.—The deaconhood, ſubdeaconhood, and prieſthood, are all *ſacred* orders, and are ſaid to impreſs a *ſacred* indelible character.

The cuſtom of conſecrating kings with holy oil is derived, according to Gutlingius, from the Hebrews; among whom, he agrees with Grotius, it was never uſed but to kings who had not an evident right by ſucceſſion. He adds, that the Chriſtian emperors never uſed it before Juſtin the younger; from whom he takes it to have paſſed to the Goths, &c.

SACRED, is alſo applied to things belonging to God, and the church.

Church-lands, ornaments, &c. are held *ſacred*.—The *ſacred* college is that of the cardinals.

SACRED *majeſty*, is applied to the emperor, and to the king of England; yet Loyſeau ſays it is blaſphemy. See MAJESTY.

The ancients held a place ſtruck with thunder as *ſacred*.

In the civil law, *ſacred* place chiefly denotes that, where a perſon deceaſed has been interred.

SACRED *elixir*. See ELIXIR.

SACRIFICE, *ſacrificium*, an offering made to God on an altar, by means of a regular miniſter, as an acknowledgment of his power, and a payment of homage.

Sacrifices (though the term is ſometimes uſed to comprehend all the offerings made to God, or in any way devoted to his ſervice and honour) differ from mere oblations, in this, that in a *ſacrifice* there is a real deſtruction or change of the thing offered; whereas an oblation is only a ſimple offering or gift, without any ſuch change at all: thus, all ſorts of tythes, and firſt fruits, and whatever of men's worldly ſubſtance is conſecrated to God, for the ſupport of his worſhip and the maintenance of his miniſters, are offerings or oblations: and theſe under the Jewiſh law, were either of living creatures or other things: but *ſacrifices* in the more peculiar ſenſe of the term, were of living creatures, of which five ſorts were preſcribed as allowed by the law, viz. bullocks, ſheep, goats, doves, and turtles: beaſts only were allowed in public *ſacrifices* and birds in private ones.

Divines divide *ſacrifices* into *bloody*, ſuch as thoſe of the old law; and *bloodleſs*, ſuch as thoſe of the new law.

They alſo divide them again into *impetratory*, which are thoſe offered to obtain ſome favour of God, or to thank him for ſome already received: and *propitiatory*, which are thoſe offered to obtain forgiveneſs of ſins.

The Phœnicians are uſually held to have been the firſt authors of *ſacrifices*: Porphyry, indeed, attributes the invention to the Egyptians; who, he ſays, firſt offered the firſt-fruits of their grounds to the gods; burning them upon an altar of turf. At length they came to burn perfumes; and, at laſt, he ſays, they ſacrificed animals; obſerving that they firſt eat ſome herbs or fruits regularly offered on the altars.—He adds, that libations were very frequent, before the *ſacrifices* of beaſts got footing.

Ovid obſerves, that the very names *victim* and *hoſtia* import, that they were not ſlain, till ſuch time as victories were obtained over enemies: indeed, while men lived on herbs and pulſe, it is no wonder they abſtained from *ſacrifices* of beaſts; ſince the law of *ſacrifices* required, that they ſhould eat ſome part thereof. In effect, it is ſuppoſed to be this that firſt introduced fleſh as a food, and made man a carnivorous animal.

The truth is, in all antiquity, both ſacred and profane, *ſacrifices* were ordinarily nothing elſe but holy banquets.

The ſcriptures furniſh us with a ſomewhat different account: Noah certainly *ſacrificed* animals at his coming out of the ark; and it is even ſuggeſted that Abel himſelf *ſacrificed* the beſt and fatteſt of his flocks; though Grotius thinks it more probable, he contented himſelf with making a mere oblation of his lambs, &c. to God, without *ſacrificing* them.

The origin of *ſacrifices* hath been a ſubject of conſiderable controverſy both among Jews and Chriſtians. Maimonides, R. Levi Ben Gerſon, and Abarbanel, among the former, Chryſoſtom, Spencer, Grotius, &c. among the latter, maintain, that *ſacrifices* were at firſt an human inſtitution; and it is ſaid, that, in order to prevent their being offered to idols, God introduced them into his ſervice, not that he approved them as good in themſelves, or as proper rites of worſhip. Thoſe, who apprehend that *ſacrifices* were originally of divine inſtitution, alledge, that Abel offered his *ſacrifice* by faith (Heb. xi. 4.) which muſt imply a divine promiſe connected with that rite, and a divine direction for the performance of it; (ſee alſo Gen. iv. 4.) that the paſchal lamb which was a real *ſacrifice*, was expreſsly inſtituted by God himſelf; and that the deity, who reſented and puniſhed will-worſhip in other caſes (Lev. x. 1, 2.) would not have approved of the patriarch's *ſacrificing* as he actually did, if he had not commanded it. The advocates for this opinion, therefore, ſuppoſe, that *ſacrifices* were firſt inſtituted by God himſelf, and injoined our firſt parents ſoon after the fall; from whom, and afterwards from Noah, they ſay, all nations received them by tradition. Thoſe, who apprehend that animal food was not uſed till after the flood, derive from hence an additional argument in favour of the very ancient uſe and probably divine inſtitution of *ſacrifices*: for the ſkins uſed for cloathing, (Gen. iii. 21.) they ſuppoſe, muſt have been obtained from beaſts ſlain for this purpoſe. Thoſe who wiſh to ſee this ſubject farther diſcuſſed may conſult Outram de Sacrificiis, lib. i. cap. 1, §. 3. 4.

In proceſs of time, inſtead of brute animals, which God had appointed, human *ſacrifices* were introduced, and the objects, as well as the ſubjects of *ſacrifice*, were altered; for the heathen nations *ſacrificed* to dæmons, and not to God. To Iſrael, therefore, the appointed guardians of the true religion in the world, God delivered a-new his law concerning *ſacrifices*, with the addition of ſuch particular rites as were beſt adapted to the ſituation of this people and the moſt likely to anſwer the purpoſe of their inſtitution. With regard to their ſignification and uſe, *ſacrifices* were diſtinguiſhed into four kinds, burnt-offerings, ſin-offerings, treſpaſs-offerings, and peace-offerings. *Sacrifices*, beſides their religious uſe, were intended, under the Jewiſh diſpenſation, for the ſupport of the ſtate and civil government. See PRIEST. But what was their preciſe deſign and uſe, in a moral and religious view, has been the ſubject of controverſy. Nevertheleſs it has been the more generally received opinion, that *ſacrifices*, both before and under the law of Moſes (when they are taken in the ſtrict ſenſe, and diſtinguiſhed from all other offerings that accompanied either prayers or thanks for particular bleſſings), were inſtituted by way of poſitive mulct and forfeiture, to render every breach of duty burthenſome and expenſive to the tranſgreſſor: in other words, that they were piacular and expiatory; thus reminding ſinners of their defect by the ſuffering and death of the victim, which they were required to offer, and typifying, as ſome ſay, and thus aſſiſting their faith in that promiſed *ſacrifice* of atonement, which the ſon of God was to offer in due time. Dr. Sykes, however, and many others, conſider all *ſacrifices* as federal rites, which implied men's entering into friendſhip with God; or if they had violated their friendſhip with him, then they denoted reconciliation, and a renewal of that friendſhip: of the former kind were thoſe *ſacrifices*, part of which was conſumed on the altar and part eat by the offerers; or of the latter, the whole burnt-offering or HOLOCAUST. But Dr. Sykes, &c. utterly rejects the notion of *ſacrifices* being vicarious and expiatory. Eſſ. on the Nature, Deſign, and Origin of *Sacrifices*, paſſim.

Macrobius tells us, that the Egyptians, long accuſtomed to bloodleſs *ſacrifices*, being at length obliged to admit the worſhip of Serapis and Saturn, to whom *victims* were to be *ſacrificed*, would not allow their temples to be built in the cities. Theſe *victims*, however, or bloody *ſacrifices*, at length obtained, in excluſion of almoſt all the reſt: the moſt uſual of theſe among the ancients, were bulls, oxen, cows, ſheep, and lambs, in regard theſe were the moſt ordinary food of man.

The manner of *ſacrificing* among the ancient Hebrews, is amply deſcribed in the book of Moſes. That in uſe among the Romans, was as follows.—In the choice of the victim, care was taken it were without blemiſh or imperfection, its tail not too ſmall at the end; the tongue not black, nor the ears cleft; and the bull, ſuch as had never been yoked. The victim being pitched upon, they gilt his forehead and horns, eſpecially if a bull, heifer, or cow. The head they alſo adorned with a woollen inſula, whence hung two rows of chaplets with twiſted ribbands; and on the middle of the body a kind of ſtole, pretty large, hung down on both ſides: the leſſer victims were only adorned with bundles of flowers and garlands, together with white tufts or wreaths.

The victims, thus made ready, were brought before the altar: the leſſer were not led in a ſtring, but driven to the place: the greater were conducted in a halter; if they made any ſtruggle, or refuſed to go, the reſiſtance was taken for an ill augury, and the *ſacrifice* was often ſet aſide.—The victim, thus brought before the altar, was examined very circumſpectly, to ſee if there were no defect in it: then the prieſt, being clad in his ſacerdotal habit, and accompanied with the ſacrificers and other attendants, and being waſhed and purified according to the ceremonies preſcribed, began the *ſacrifice*, with making a loud confeſſion of his unworthineſs, acknowledging himſelf guilty of divers ſins; for which he begged pardon of the gods, hoping they would be pleaſed to grant his requeſts.—The confeſſions were like thoſe of the Hebrews; with this difference, that the Pagans confeſſed the frailty of mankind, and owned their faults; the Jews confeſſed chiefly the greatneſs of God, accompanying it with hymns and muſical inſtruments.

The confeſſion over, the prieſt cried aloud, *Hoc age!* i. e. compoſe yourſelves, and mind your buſineſs; and preſently an uſher, holding a rod in his hand, called *commentaculum*, went through the temple, and made all thoſe withdraw, who were not initiated in the myſteries of religion, or ſuch as were excommunicated.

Sacrifices among the Greeks, were of four kinds, viz. 1. Free-will offerings, or ſuch as were paid in conſequence of a vow, χαριϛηρια and ευκταια; for a victory obtained, the firſt fruits offered by huſbandmen for a plentiful harveſt, and the like. 2. Propitiatory offerings, ιλαϛικα, to avert the anger of ſome offended deity, and ſuch were all *ſacrifices* uſed in expiation. 3. Petitionary *ſacrifices*, αιτητικα, for ſucceſs in any enterprize. 4. *Sacrifices* expreſsly commanded by ſome oracle or prophet, τα απο μαντειας.

The cuſtom of the Greeks, from whom the Romans borrowed theirs, was, that the prieſt coming to the altar, ſhould aſk aloud, Τις τι δε? Who is here? The people anſwered, Πολλοι και αγαθοι, Many good perſons: then the uſher went through the temple, crying, Εκας εκας εϛε, βεϐηλοι, that is, Out with the wicked. The Romans commonly uſed the words, *Nocentes, profani, abſcedite.*—All thoſe who were driven out of the temples among the Greeks, were comprehended under theſe general words, βεϐηλοι, αμυντοι, ακαθαροι. The profane being withdrawn, they cried, *Favete linguis*, or *animis*, and *Paſcite linguam*, to require ſilence and attention during the *ſacrifice*.

Theſe ceremonies ended, the chief *ſacrificer* being ſat down, and the reſt of them ſtanding, the magiſtrates or private perſon, who offered *ſacrifice*, came before him, and preſented him with the firſt fruits and victim, and ſometimes made a ſhort diſcourſe, by way of compliment: as we find Homer makes Ulyſſes do, when he preſented the high prieſt with Iphigenia to be *ſacrificed*.—As any perſon came to preſent his offering, he waſhed his hands in a place appointed in the temple for that purpoſe.

Laſtly, when the offering was made, the prieſt that officiated, perfumed the victim with incenſe, and ſprinkled it with the luſtral water; and having waſhed his hands, and got up again to the altar, he prayed to the god to whom he preſented the *ſacrifice*, with a loud voice, that he would accept of thoſe offerings, and be pleaſed with the victim he *ſacrificed* to him for the public good, and for ſuch and ſuch things in particular.—In the cloſe of the offertory and prayer, made by the prieſt to the gods, he came down the ſteps of the altar, and from the hand of one of his aſſiſtants, received the ſacred paſte, called *mola ſalſa*, made of barley or wheat flower, mixed with ſalt and water, which he threw upon the head of the victim, ſprinkling a little wine upon it, which was called *immolatio*.—Servius ſays, the prieſt ſcattered little bits of this paſte upon the head of the victim, and alſo on the altar where the ſacred fire burned, and on the knives, by way of conſecration.

He then took wine in a veſſel called *ſimpulum*, and having taſted it himſelf firſt, and made his aſſiſtants do the ſame, to ſhew that they partook of the *ſacrifice*, he poured between the horns of the victim, pronouncing theſe words of the conſecration, *Mactus hoc vino inferis eſto.* This done, he pulled off the hairs from between the horns, and threw them into the fire; and commanded the victimarius (who aſked him, *Agon?* Shall I ſtrike?) to knock down the victim with a blow on the head with a hammer or ax; upon which, another aſſiſtant, named *popa*, preſently thruſt a knife into its throat; whilſt a third received the blood, wherewith the prieſt ſprinkled the altar.

When the victim was ſlain, they flayed him, if it was not a burnt offering (for they then burned ſkin and all); they then took the fleſh of the head, and adorning it with garlands and flowers, faſtened it to the pillars of the temples, as well as the ſkins, as enſigns of religion; carrying them about in proceſſion in public calamities.—Not but that the prieſts oft wore the ſkins, and others went to ſleep upon them in the temple of Æſculapius and Faunus, that they might receive favourable reſponſes in their dreams, or be cured of their maladies. They then opened the victim's entrails, and after circumſpectly viewing them, to draw preſages therefrom, according to the art of the aruſpices, they floured them with meal, and ſprinkled them with wine, and made a preſent of them to the gods, *reddebant exta diis*, by throwing them into the fire in ſmall bits, boiled or parboiled; and hence the entrails were called *porricæ*.

The entrails being burned, and the other ceremonies finiſhed, they believed the gods to be ſatisfied; and that they could not fail to find the vows accompliſhed, which they expreſſed by the word *litare*, q. d. all is finiſhed, and well done; whereas *non litare*, on the contrary, intimated there was ſomething wanting to the perfection of the *ſacrifice*, and that the gods were not appeaſed.—The prieſt afterwards diſmiſſed the people with this form, *Ilicet*.

Hence it may be obſerved, that the ſacrifices conſiſted of four principal parts; the firſt called *libatio*, or the pouring a little wine upon the victim; the ſecond *immolatio*, when, after they had ſcattered the crumbs of ſalted paſte thereon, they killed it; the third *redditio*, when they offered the entrails to the gods; and the fourth *litatio*, when the *ſacrifice* was perfected, and accompliſhed without any fault. For a more particular account of the materials and rites of *ſacrifice*; ſee Potter's Archæol. Græc. tom. i. p. 209, &c.

SACRILEGE, *ſacrilegium*, the crime of profaning ſacred things, or things devoted to God; or of alienating to laymen, or common purpoſes, what was given to religious perſons, and pious uſes.

Our forefathers were ſo tender in this caſe, that, when the order of knights Templars was diſſolved, their lands, &c. were all given to the knights Hoſpitallers of Jeruſalem, for this reaſon, *Ne in pios uſus erogata, contra donatorum voluntatem, in alios uſus diſtraherentur.*

Church robbery, or a taking of things out of a holy place, is *ſacrilege*; as where a perſon ſteals any veſſels, ornaments, or goods of the church: and it is ſaid to be a robbery of God, at leaſt of what was dedicated to his ſervice. If any thing belonging to private perſons, left in a church, be ſtolen, it is only common theft, not *ſacrilege*: But the canon law determines that alſo to be *ſacrilege*; as likewiſe the ſtealing of a thing known to be conſecrated, in a place not conſecrated. By the civil law, *ſacrilege* is puniſhed with greater ſeverity than any other thefts; and the common law diſtinguiſhed this crime from other robberies, for it denied the benefit of the clergy to the offenders, which it did not do to other felons: but by ſtatute it is put upon a footing with other felonies by making it felony excluded of clergy, as moſt other felonies are.

All perſons not in holy orders, who ſhall be indicted whether in the ſame county where the fact was committed, or in a different county, of robbing any church, chapel, or other holy place, are excluded from their clergy, by 23 H. 8. c. 1. 25 H. 8. c. 3. 5. & 6 Ed. 6. c. 10. And all perſons in general are ouſted of their clergy for the felonious taking of any goods out of any pariſh church, or other church, or chapel, by the 1 Ed. 6. c. 12. But the word *robbing* being always taken to carry with it ſome force, it ſeems no *ſacrilege* is within theſe ſtatutes, which is not accompanied with the actual breaking of a church, &c. And the ſtatute 23 H. 8. is the only ſtatute which extends to acceſſaries to theſe robberies, except the offence amount to burglary; in which caſe acceſſaries before are ouſted of clergy, by 3 & 4 W. & M. c. 9.

SACRIMA, among the *Romans*, the new wine which was offered to Bacchus as an acknowledgment of his protecting and preſerving every thing that belonged to wine.

SACRISTA, or *ſacriſtan*, a church-officer, otherwiſe called SEXTON.

SACRISTY, *ſacriſtia*, a place or apartment in the church, where the veſſels, and other utenſils and ornaments of the church, are preſerved; and where the miniſters dreſs and undreſs themſelves before and after the ſervice.

The *ſacriſty* is alſo called in ancient authors, *ſecretarium*:—among us the VESTRY.

SACRO-COCCYGÆUS, in *Anatomy*, a name given by Winſlow to a muſcle now generally called ſimply the *coccygæus*; he calls it alſo *coccygæus poſterior*.

SACRO-LUMBARIS, or *ſacro-lumbus*, in *Anatomy*, a muſcle that ariſes fleſhy from the ſuperior part of the os ſacrum, the poſterior part of the ileum, and from all the ſpines and tranſverſe proceſſes of the vertebræ of the loins.—It gives a ſmall tendon to the poſterior part of each rib near its root, where a ſmall bundle of fleſhy fibres ariſes and unites with each aſcending tendon, to the third, fourth, fifth, and ſixth vertebræ of the neck.—See *Tab. Anat. (Myol.) fig.* 6. *n.* 30. 30. *fig.* 7. *n.* 16. 16.

It lies between the ſpine and poſterior part of all the ribs, and along the back of the regio lumbaris, all the way to the os ſacrum. Through all this ſpace it is cloſely accompanied by the longiſſimus dorſi, which lies between it and the ſpinal apophyſes of the vertebræ, a narrow fatty or cellular line running between them; it is fixed below by a broad thin tendinous aponeuroſis to the os ſacrum, and part of the criſta of the os ilium. From thence it runs upwards, and a little laterally over all the regio lumbaris; afterwards it runs up obliquely over all the ribs, ſometimes as high as the two or three loweſt vertebræ of the neck. The ſide next the longiſſimus dorſi is all this way very even; but that next the ribs is divided into ſeveral digitations, reſembling the branch of a palm tree. Theſe are fixed in the tranſverſe apophyſes of the neck, in the tuberoſity of the firſt rib, in the lower part of the angular impreſſions, in the following ribs, and near the extremity of the laſt.

This with the ſerratus poſticus inferior, and triangularis, help to contract the ribs in expiration. But they are but of ſmall force; and ſeem only to accelerate the motion of the ribs, which fall down chiefly by their own gravity, and the elaſticity of the ligaments, by which they are tied to the vertebræ.

SACRO-LUMBARIS *pars ſuperior*, in *Anatomy*, a name given by Cowper and ſome others, to a muſcle called by Winſlow TRANSVERSALIS *collateralis colli*, and by Albinus the *cervicalis deſcendens*.

SACRO-SCIATIC *ligaments*. Theſe are two in number, the one broad and external, the other ſmall, narrow, and internal. The broad, or external, *ſciatic* ligament is ſlightly faſtened to the inſide of the tuberoſity or criſta of the os ilium. It covers exteriorly the two poſterior ſpines of that bone, and continues to be inſerted along the anterior or exterior edges of the falſe tranſverſe apophyſes of the ſacrum. From thence this ligament diminiſhing in breadth, deſcends obliquely towards the tuberoſity of the os iſchium, and is inſerted immediately below the ſinus, which lies between that tuberoſity and the *ſciatic* ſpine. This inſertion is afterwards continued over the whole internal labium of the inferior portion of the os iſchium, and of the ramus of that bone, and the inferior portion of the ramus of the neighbouring os pubis. Through all this latter courſe of its inſertion, that is after its arrival at the tuberoſity of the iſchium, it produces a kind of ligamentary falx, one edge of which is fixed to the bones, the other lies looſe; and by this ſituation of the falx, it ſeems, together with the bones, a kind of deep channel or groove. The ſmall *ſacro-ſciatic*, or internal *ſciatic* ligament, adheres cloſely to the inſide of the poſterior portion of the former. It is fixed interiorly alſo to the edge of the inferior part of the fourth falſe tranſverſe apophyſis of the os ſacrum, and from thence all the way to the upper part of the os coccygis. From this inſertion it runs up a little obliquely to the ſpine of the iſchium, in a ſharp point and to the upper part of which it is fixed. During this courſe it croſſes the broad ligament, being cloſely united to the inſide thereof, and loſes but very little of its breadth. By theſe two ligaments two diſtinct openings are formed; a large one which is the ſuperior *ſciatic* ſinus, and a ſmall one with the inferior *ſciatic* notch. Winſlow.

SACRUM OS, in *Anatomy*. See Os *ſacrum*.

SACTIM, a word uſed by ſome of the chemical writers to expreſs vitriol.

SADAF, in the *Materia Medica*, a name given by the Arabian writers, ſometimes to the purpura or purple fiſh, and ſometimes to the purple fucus, with which the ancient Greek women uſed to ſtain their cheeks. This was the original of all painting, and the plant was the common purple ſea wracks. After this every thing was called fucus that was uſed by the women to paint their faces; and they had a fucus metallica made of white lead or ceruſs; and the purple roots of alcanet, &c. were called fuci.

SADAR, or *Alſadar*, the Arabian name of the medicinal *lotus*, deſcribed by Dioſcorides, and many others of the ancients. The fruit of this tree, called by Virgil the berries of the *acanthus*, is the *nabac* of the Arabian writers, though ſome would have it to be a kind of fig. Serapion evidently declares the *ſadar* and *acanthus* of Virgil, that is the *lotus cyreniaca* of Herodotus, and the *lotus* of Dioſcorides,

corides, to be one and the ſame plant. Bellonius has alſo deſcribed it under the name of *napeca*, a name probably derived from *nabac*, the appellation uſually given its fruit: he ſays it is an ever-green ſhrub, and was called by ſome of the Greek writers *œnoplia*. Proſper Alpinus, in his account of the Ægyptian plants, alſo deſcribes the *nabeca* as a thorny ſhrub; though authors have obſerved that there are two ſpecies of it, the one thorny and the other not. Leo Africanus, in his third book, mentions alſo the ſame tree; but he miſtakes the name, writing it *rabech* inſtead of *nabech*: he ſays it is a prickly tree, producing a fruit reſembling a cherry, but ſmaller, and of the taſte of the zizyphus. Theſe are the berries of the *acanthus* mentioned by Virgil.

SADDER, in *Modern Hiſtory*, a compendium of the ZEND in modern Perſian, containing an abſtract of the religious ſyſtem of the Perſees.

SADDLE, in the *Manege*, a kind of ſtuffed ſeat, laid on the back of a horſe, for the convenience of the rider.

The origin of the *ſaddle* is not well known: Gorop. Becanus attributes its invention to the Salii, a people among the ancient Franks; and hence, ſays he, came the Latin *ſella*, ſaddle.

It is certain the ancient Romans were unacquainted with the uſe either of *ſaddle* or ſtirrups; whence Galen obſerves in ſeveral places, that the Roman cavalry, in his time, were ſubject to ſeveral diſeaſes of the hips and legs, for want of having their feet ſuſtained on horſeback. And long before him, Hippocrates had noted, that the Scythians, who were much on horſeback, were frequently troubled with defluxions in their legs, becauſe of their hanging down.

The firſt time we hear of *ſaddles* among the Romans, was anno 340, when Conſtantius, endeavouring to deprive his brother Conſtantine of the empire, made head againſt his army, and entering the ſquadron where he himſelf was, threw him off his *ſaddle*, as we are informed by the hiſtorian Zonaras.—Before this time, they made uſe of ſquare pannels; ſuch as we ſee in the ſtatue of Antoninus in the Capitol.

The ſucceeding emperors made many regulations concerning horſes, and occaſionally take notice of *ſaddles*. In the Theodoſian code there is a reſcript, given by the emperors Valentinian, Theodoſius, and Arcadius, which preſcribes the exact weight of a *ſaddle*, confining it to 60 pounds, including the bridle.

The uſe of *ſaddles*, ſays Mr. Chambers, was firſt eſtabliſhed in England, by a law of Henry VII. whereby the nobility were obliged to ride on *ſaddles*.—But this aſſertion, as Mr. Berenger obſerves, is not countenanced by any act of parliament, or proclamation. It is much later that the Iriſh have taken to it.

There are various kinds of *ſaddles*; as the

SADDLE, *hunting*, which is compoſed of two bows, two bands, fore-bolſters, pannels, and *ſaddle*-ſtraps: and the great *ſaddle* has beſide theſe parts, corks, hind-bolſters, and a trouſſequin. The pommel is common to both. A horſeman that would ſit a horſe well, ought always to ſit on his twiſt, and never on his buttocks, which ought never to touch the *ſaddle*; and whatever diſorder the horſe commits, he ought never to move above the *ſaddle*.

SADDLE, *running*, a very ſmall one, with round ſkirts.

SADDLE, *Burford*, which has the ſeat and ſkirts plain.

SADDLE, *pad*, of which there are two kinds; the one made with burs before the ſeat, the other with bolſters under the thighs.

SADDLE, *French pad*, the burs whereof come round the ſeat.

SADDLE, *portmanteau*, furniſhed with a cantle behind the ſeat, to keep a carriage off the rider's back.

SADDLE, *war*, furniſhed with a cantle, and a bolſter, both behind and before.

SADDLE-*backed*, among *Horſemen*, a name given to a horſe, that is hard to fit with a *ſaddle*, his reins being low, and his head and neck raiſed, ſo as to require a *ſaddle* to be made on purpoſe for him.

SADDLE-*caſe*. See HOUSING.

SADDLE-*roll*. See TROUSSEQUIN.

SADDLE-*ſtraps* are ſmall leathern ſtraps, nailed to the bows of the *ſaddle*, which are uſed to hold the girths faſt to the *ſaddle*. See BOWS.

SADDLE-*galled* is when a horſe's back is hurt or fretted with the *ſaddle*.

It is to be cured by bathing the part with urine, or warm wine: when the ſore is large, they bathe it with aqua ſecunda, ſtrewing over it the powder of old ropes or flax, and conſuming the proud fleſh with vitriol, or colcothar.

Good horſes are often ſubject to *gall* upon their backs, and the utmoſt care ought to be taken to prevent or cure it. The beſt method of prevention is to take a hind's ſkin, well furniſhed with hair, and fit it neatly beneath the pannel of the *ſaddle*, ſo that the hairy ſide may be next the horſe; this does not harden by ſweat, but keeps the horſe from *galling*. This is alſo a method that ſhould never be omitted with horſes that are newly cured of ſuch a hurt, as it will prevent their falling into it again.

In long journies, and in horſes that are ſubject to *gall*, it is always proper to take off the *ſaddle* as ſoon as the horſe is brought in, and examine whether the back be at all preſſed, or pinched in any part: it will be well to re-examine it after an hour or two, to ſee what effect the ſtanding has had, for often the part hurt will not ſhew it at firſt, but will ſwell very violently afterwards. In this caſe, when the ſkin is not fretted, but a ſwelling comes on, a bag of coarſe cloth ſhould be filled with warm dung, and tied upon the ſwelling, which will not only prevent it from growing worſe, but will take it often quite do[illegible] or the ſwelling may be well rubbed wit[illegible]y, laying on a paper ſoaked in it. If the ſkin be broken, a mixture of red wine, and ſallad oil is a good remedy.

SADDLE, in the *Sea-Language*, a ſmall cleat or wooden block, hollowed on the upper and lower ſide, and nailed on the lower yard-arms, to retain the ſtudding-ſail booms in a firm and ſteady poſition. For this purpoſe the cavity on the lower part of the *ſaddle* conforms to the cylindrical ſurface of the yard to which it is attached; and in like manner, the hollow, on the upper ſide, anſwers to the figure of the boom, and ſerves as a channel, whereby it may be run out or in, along the yard, as occaſion requires. Falconer.

SADIR, a word uſed by ſome chemiſts to expreſs the ſcoria of any metal in fuſion.

SADLER. Under this title is carried on a very conſiderable trade, but in very different degrees. Their buſineſs is not only *ſaddle*-making, which is a curious as well as very ancient employ, but to complete ſome, and ſell all other neceſſaries for the *ſaddle*, nag, and horſeman. They were a company before the year 1190, but not incorporated till 1272. In the reign of king Edward I. the livery fine 10*l*. Their hall is near Foſter-lane, Cheapſide; and their court day, on the firſt Tueſday in the month. See COMPANY.

SADLER'*s Wells*, a well known place of entertainment in the neighbourhood of London. It derives its name from Mr. Sadler, who erected a muſic-ſhop near the ſpot, which was much frequented, before the Reformation, on account of the famous well, to the waters of which many extraordinary cures were aſcribed, and which was, therefore, deemed ſacred, and called holy well. The prieſts belonging to the priory of Clerkenwell uſed to attend there, and hence the people were led to believe, that the virtues of the water proceeded from the efficacy of their prayers.

Upon the Reformation the well was ſtopped up, on account of the ſuperſtitious uſe that was made of it; till, in 1683, Mr. Sadler found it covered with a carved arch of ſtone. After his deceaſe, one Francis Forcer, a muſician, became occupier of the wells and muſic houſe. His ſon ſucceeded him, and firſt exhibited in this place the diverſions of rope-dancing, tumbling, &c.

SADDUCES, or **SADDUCEES**, *Sadducæi*, a ſect among the ancient Jews, conſiſting of perſons of the greateſt quality and opulence, eſteemed as deiſts, or free-thinkers, rather than real Jews; though they aſſiſted at all the ceremonies of the worſhip in the temple.

St. Epiphanius will have the *Sadduces* to have taken their riſe from Doſitheus, a Samaritan ſectary; and Tertullian is of the ſame opinion. St. Jerom, and other writers add, that the *Sadduces* came near the Samaritans in many things; particularly in this, that they allowed no books of Scripture, but the five books of Moſes. The Jeſuit Serrarius has alſo embraced this opinion, as ſeeming to be ſupported by the authority of Joſephus. But Joſephus ſays only this, that they admitted all that was written, i. e. all the books of Scripture; intimating hereby, that they diſowned the unwritten traditions of the Phariſees. In effect, St. Epiphanius is forced to own, that the *Sadduces* were Jews, and not Samaritans; inaſmuch as they aſſiſted at the worſhip and ſacrifices of the temple at Jeruſalem; whereas the Samaritans ſacrificed on Mount Gerizzim.

Some authors aſcribe the origin of this ſect to one Sadoc, a diſciple of Antigonus Sochæus, preſident of the ſanhedrim, about 260 years before Chriſt, who frequently inculcated upon his ſcholars, that God is to be ſerved for his own ſake, and not out of view to any reward from him in the next world, as ſlaves ſerve their maſters merely for recompence. Sadoc, add they, putting a falſe interpretation on theſe words of his maſter, publiſhed, that there was no reward allotted to good actions done in this world. And hence aroſe the ſect of *Sadducees*, thus denominated from their leader Sadoc.—Though St. Epiphanius, and ſome modern writers after him, take the *Sadducees* to have been thus called from the Hebrew, צדק, *ſadec, juſt*, or *ſedec, juſtice*, in regard of the great juſtice and equity which they ſhewed in all their actions.

But this derivation neither ſuits the word *Sadducee*, nor the true character of the ſect; for ſo far were they from being eminently righteous, that they are commonly ſaid to be the moſt wicked and profligate of all the Jews; neither were they given to boaſt of their own righteouſneſs, as the Phariſees were.

It is certain they denied the reſurrection and the exiſtence of angels and ſpirits, (Matt. xxii. 23. Acts xxiii. 8.) and allowed of no happineſs but what is enjoyed in this life; believing, that every thing told of the other world had been artfully invented by the Phariſees.—Hence, alſo, they denied a divine providence, and attributed all things to free-will; in which they oppoſed the opinion of the PHARISEES, who admitted a kind of deſtiny, or fatality in all our actions; ſo that they were, upon the whole, Epicurean deiſts in all other reſpects, except that they acknowledged the world to have been created, and perhaps to be upheld and preſerved by God.

SADRE, a title given by the Perſians to the chief of the Mahometan religion. See CALIPH.

SÆPÆ, a name given by ſome medical writers to ſharp corroding puſtules.

SAFE-CONDUCT, *ſalvus conductus*, a ſecurity given by the prince under his great ſeal, and inrolled in chancery, to a ſtranger, for his quiet coming in and paſſing out of the realm.

The *ſafe-conduct* is granted to enemies, the paſſport to friends.

Paſſports under the king's ſign-manual, or licences from his ambaſſadors abroad, are now more uſual, and are allowed to be of equal validity with letters of *ſafe-conduct*.

For the violation of *ſafe-conduct*, &c. See PASSPORT.

Judges ſometimes give *ſafe-conducts* to delinquents, or priſoners, to enable them to act in their affairs.

SAFE-GUARD, *ſalva guardia*, in a *Law Senſe*, a protection given by the king to a perſon fearing the violence of ſome other, for ſeeking his right by courſe of law.

SAFE-GUARD, at *Sea*, denotes a rope which ſaves and ſecures any thing: for inſtance, that whereby perſons walk ſecurely over the bolt-ſprit.

SAFE-GUARD *of the helm*, is a rope which goes through the helm, and is faſtened to the futtocks of the ſhip.

SAFE-PLEDGE, *ſalvus plegius*, in *Law*, a ſecurity given for a man's appearance on a day aſſigned. See PLEDGE.

SAFFLOWER. See *Baſtard* SAFFRON.

SAFFLOWER is a name alſo erroneouſly given to a ſpecies of LAKE.

SAFFRON, *crocus*, in *Botany*, a genus of the *triandria monogynia* claſs. Its characters are theſe: it hath a ſpatha or ſheath of one leaf; the flower hath one petal, which is deeply cut into ſix oblong equal ſegments; and three ſtamina, which are ſhorter than the petal, terminated by arrow-pointed ſummits; the roundiſh germen is ſituated at the bottom of the tube, ſupporting a ſlender ſtyle, crowned by three twiſted ſtigmas which are ſawed: the germen afterwards becomes a roundiſh fruit with three cells, filled with roundiſh ſeeds. Miller enumerates four ſpecies, including many varieties. Linnæus mentions one ſpecies, with two varieties. See CROCUS.

The word is formed from the Arabic, *zapheran*, which ſignifies the ſame. Botaniſts call the plant crocus autumnalis ſativus.

The plant which produces the *ſaffron*, has a roundiſh bulbous root, as large as a ſmall nutmeg; it is a little compreſſed at the bottom, and is covered with a coarſe brown netted ſkin. From the upper part of the root come out the flowers, which, together with the young leaves, whoſe tops juſt appear, are cloſely wrapped about by a thin ſpatha, or ſheath, which parts within the ground, and opens on one ſide. The tube of the flower is very long, ariſing immediately from the bulb, without any footſtalk, and at the top is divided into ſix oval, obtuſe ſegments, which are equal, and of a purple blue colour. In the bottom of the tube is ſituated a roundiſh germen, ſupporting a ſlender ſtyle, which is not more than half the length of the petal, crowned with three oblong golden ſtigmas (which is the *ſaffron*); theſe ſpread aſunder each way; the ſtyle is attended by three ſtamina, whoſe baſes are inſerted in the tube of the petal, and riſe to the height of the ſtyle, where they are terminated by arrow-pointed ſummits. The plant flowers in October, and the leaves keep growing all the winter, but it never produces any ſeeds here. Miller.

See a figure and deſcription of the plant by Dr. Douglas, in Phil. Tranſ. Nº 380. p. 441. or Abr. vol. vii. p. 311. &c.

From the account which Dr. Douglas has given of the culture and management of *ſaffron* in that tract of ground, that lies between Saffron Walden, in Eſſex, and Cambridge, in a circle about ten miles diameter, where *ſaffron* has been longeſt cultivated, we ſhall extract the following particulars. This tract is an open level country with few incloſures; and it is the cuſtom to crop two years, and let the land lie fallow the third: *Saffron* is always planted upon fallow ground, and that is preferred, *cæteris paribus*, which has borne barley the year before. In chuſing the *ſaffron* grounds, which are generally between one and three acres, they prefer thoſe that are well expoſed, whoſe ſoil is neither poor nor a ſtiff clay, but a temperate dry mould, ſuch as commonly lies upon chalk and is of a hazel colour. In the beginning of April, they carefully plough it, drawing the furrows much cloſer and deeper than for any kind of corn; in May they well dung it, allowing to each acre between twenty and thirty loads, and plough it as before; about Midſummer they plough a third time, and between every pole in breadth leave a vacant furrow or trench: the fences are dead hedges or hurdles for keeping out cattle, and eſpecially hares, which would feed on the *ſaffron* leaves during winter. The time of planting the roots is commonly in July, and the only inſtrument uſed for this purpoſe is a narrow ſpade, called a ſpit-ſhovel. One man with his ſpit-ſhovel raiſes between three and four inches of earth, and throws it before him about ſix inches; the two perſons following him with *ſaffron*-heads, place them in the fartheſt end of the trench which he has made at the diſtance of about three inches from one another. As ſoon as the digger has gone over the breadth of the ridge once, he begins again at the other ſide, and digging as before, covers the roots laſt ſet, and makes room for the ſetters to place a new row, at the ſame diſtance from the firſt, as they are from one another. Thus they proceed, till a whole ridge, commonly one rod, is planted; and the only nicety in digging is to leave ſome part of the firſt ſtratum of earth untouched to lie under the roots, and in ſetting, to place the roots directly upon their bottoms. The quantity of roots planted in an acre is generally about one hundred and twenty-eight buſhels. When the roots begin to ſpire and are ready to ſhew themſelves above ground, the ground muſt be carefully pared with a ſharp hoe and the weeds raked into the furrows. When the *ſaffron* flowers appear, they are gathered as well before as after they are full blown; in doing which the whole flowers are pulled off and thrown into a baſket; and the beſt time for this work is the morning. Having carried them home and ſpread them on a table, they pick out the filaments, ſtyles or chives, together with a long portion of the ſtyles or ſtring to which they are joined; and throw away the reſt of the flower as uſeleſs. They employ every morning in gathering, and the reſt of the day in picking, till the whole crop is gathered. The next labour is drying the chives; for this purpoſe they are furniſhed with a kiln of a particular conſtruction, over which they lay a net-work of iron wire, or a hair-cloth, and over this five or ſix ſheets of white paper; upon which they ſpread the wet *ſaffron*, between two and three inches thick; they cover this with other ſheets of paper, over which they lay a coarſe blanket five or ſix times doubled, or a canvas pillow filled with ſtraw; and when the fire, which may be made of any fuel, though charcoal, which is the leaſt ſmoky, is the beſt, has been lighted for ſome time, they cover the whole with a board, having upon it a large weight. When the chives have been firſt ſweated by a pretty ſtrong heat, and dried for about an hour, they turn both the papers and *ſaffron* cakes, and cover them as before. Having continued the heat for another hour, they turn and cover the cakes as before; and then keeping a gentle fire, and turning the cakes every half hour, they will be thoroughly dry in about twenty-four-hours. When dry, the *ſaffron* is in perfection and fit for uſe. It is obſerved that about five pounds of wet *ſaffron* yield one pound of dry; and when the heads are planted very thick, two pounds of dried *ſaffron* may, at a medium, be allowed to an acre for a firſt crop, and twenty-four pounds for the two remaining crops. About the Midſummer after the third crop is gathered, the roots muſt be taken up and tranſplanted; in order to which they ſometimes plough the ground, and ſometimes uſe a forked kind of hoe, called a pattock, and then harrow it once or twice over, during which time a number of people are employed in gathering up the heads: theſe are thoroughly cleared, and then become fit to be planted in new ground, or to be kept for ſome time without injury.

There is no accident attending the culture of this valuable and uſeful plant, which the farmers ſo much dread as what they call the *rot* with us, and in French *la mort*. This is more common in the *ſaffron* fields of the Gatinois than in ours. Mr. Du Hamel, who undertook to give the Paris Academy ſome account of this malady of the plant obſerves, that no author has given any account of it; and that the people employed in the culture of the *ſaffron* know the terrible effects of it, without at all gueſſing at what may be its cauſe. It ſeems a ſort of contagion among the plants, ſpreading far and wide, and extending from one root as from a centre all over a whole field, if not ſtopped; the ſeaſon of its moſt fatal ſpreading is the ſpring, and the miſchief is found to be ſtopped from farther progreſs, by digging deep trenches at that time of the year between the ſound and the tainted parts of the field.

Mr. du Hamel, in inquiring into the ſtate of the roots or bulbs of the *ſaffron* in many fields where this diſorder reigned, found that the roots in the centre where the diſtemperature moſt raged, and thoſe at a middle diſtance from this part and the border of the field, and thoſe at the border, were all in three different ſtates, according to the degree of ſpreading of the infection. Thoſe in the middle where the infection began, were utterly deſtroyed, their ſeveral coats all ſhrivelled up and withered, their inner part reſembling only a dirty and rotten earth, and their ſuperficies being covered with ſeveral browniſh red glandulous bodies of the bigneſs of beans. Thoſe of the middle diſtance were found in a condition nearly allied to theſe; their integuments were flaccid, but not wholly withered; and there were ſome remains of the fleſhy bulb within; but this matter was a ſort of pulp, looking as if it had been boiled. It was eaſy to ſee from this, that theſe roots were ſpeedily approaching to the perfect ſtate of decay of the others; they were covered in the ſame manner on their outſides with glandulous ſubſtances, like thoſe of the middle roots, only that they ſeemed on theſe more plump, and well fed. At ſome diſtance from theſe he alſo obſerved a number of violet coloured threads, forming a ſort of network in the ground. The roots at the edges of the field were found in a yet much ſounder ſtate than any of the others; their bulbs ſeemed unhurt, and the membranes ſound and freſh, but they were in many places covered with reticular violet coloured filaments, and from ſome parts of theſe iſſued ſmall glandules, which ſeemed ready to grow into the ſame ſhape and ſize with thoſe on the decayed roots; though they, at this time, appeared only as ſo many purple ſpots lodged on the ſurface of the root or between its membranes. The earth all about theſe roots was alſo found to be full of theſe reticular violet-coloured threads. Theſe violet threads and their glandules being always found in the places where the rot was among the *ſaffron* roots, and never in any other place, it became very natural to ſuppoſe they had ſome conſiderable ſhare in the contagion; to examine, therefore, what they truly were, Mr. Du Hamel picked ſeveral of them out of the earth, and having waſhed them clean, he found that they were very like the truffle in appearance and in all their qualities; they are ſeldom larger than a hazel nut, and were covered with a ſort of ſoft down or velvety coat, and they had a muſhroom-like taſte, but with an earthy flavour. There were found ſome of them adhering to the bulbs of the *ſaffron*, and others two or three inches diſtant from them; the violet threads are of the thickneſs of a coarſe thread, and are covered with a velvety coat, in the ſame manner with the glandulous bodies; ſome of theſe extend themſelves from one to another between theſe glandules, while others ſpread themſelves over the ſurface of the bulb of the *ſaffron*, and pierced it in many directions quite to the centre: they take numerous anaſtomoſes and inoſculations in the body of the root, and have faſtened to them in ſeveral places little knots or ganglions, which ſeem only ſmall tufts of the cottony or velvety matter which covers them.

From the whole it ſeems very clear, that this is a paraſitical plant, which grows very quick in its glandules; and by means of theſe threads, or filaments ſucks its nutritious juices from the roots of the *ſaffron*, which it by that means deſtroys. It ſeems to grow in the ſame manner with the truffle, that is, it never appears above the ſurface of the earth, but is produced under ground, and there grows, and propagates its ſpecies. It ſpreads very faſt, and ſoon occupies a large compaſs of ground, continually furniſhing new glandules at the end of the filamentous roots, in the manner of the potatoe and ſome other roots. Thus the diſeaſe of the *ſaffron*, wherever it begins, ſpreads itſelf every way in a circular direction, and there is nothing to be ſeen on the ſurface of the earth, which can give any opportunity of gueſſing at its cauſe.

It remained now to enquire whether this plant was peculiar to fields of *ſaffron*; and whether it was brought thither with the *ſaffron*, or was there before: and another material queſtion was, whether it could draw its nouriſhment from any other plants, or muſt have it from *ſaffron* only. To try this, Mr. Du Hamel put ſome of the bulbs of the new plant into a pot of freſh earth, where he alſo planted ſome roots of *ſaffron*, of narciſſus, and of the common lily. Six months afterwards, examining the whole, he found the glandules had greatly increaſed in number, and had fed upon the lily roots as well as on the *ſaffron*; hence it appeared, that this was a real plant capable of increaſing itſelf, and not deſtined ſingly to that food; after this, digging up the earth in ſeveral places where *ſaffron* had never been planted, he found in ſome places the ſame paraſitical plant, faſtening itſelf to the roots of the anonis, and ſome other plants, and letting alone ſeveral others, ſuch as the ſenecio, &c. The roots of muſcari were alſo ſometimes found affected by it; and a certain diſtemperature, which the floriſts complain of in their tulip roots, ſeems to be owing to the ſame cauſe.

This miſchievous plant, however fatal it prove to the *ſaffron* fields, may, on the contrary, prove a real benefit in corn fields, by deſtroying many of the pernicious herbs which hurt the corn, as it preys only on thoſe which ſend their roots deep into the earth, never hurting thoſe which are ſuperficially fixed, as corn and the like are. The floriſt, however, is probably often as much injured by it as the *ſaffron* cultivator; and doubtleſs, whole beds of plants are often deſtroyed without the proprietor's knowing what to attribute the miſchief to. One misfortune attending this deſtroying plant, is, that the common culture of land which deſtroys other weeds, ſerves rather to promote its increaſe, ſince it delights in light dry earth, not in wet, or undug lands: it is poſſible, however, to ſtop its progreſs, by digging pretty deep between the ſound and the infected roots: of the laſt thoſe which are eaten to the heart can never recover again, but of thoſe which are only wounded ſuperficially there is ſome hope; ſince it is common for them to be cured by taking them up, peeling off their outer huſks, and drying them in the ſun. This ſeparates the worſt part of the deſtructive plant, and the reſt becomes ſoon dried and withered, and incapable of farther vegetation, while the root itſelf is uninjured, and when put into ground will ſhoot again. Mem. Acad. Par. 1728.

The beſt *ſaffron* in Europe is that of England, and may be diſtinguiſhed from the ſorts brought from abroad by its blades being broader: that brought from Spain is good for nothing; becauſe of the oil the Spaniards mix with it to make it keep.

It ſhould be choſen freſh, not above a year old, in cloſe cakes neither dry nor yet very moiſt, tough and firm in tearing, of a high fiery colour, ſtaining the hands on rubbing it, and of the ſame colour within, as on the outſide.

Saffron is uſed, both in food and medicine, to chear, fortify and reſolve. It is the greateſt cordial in medicine, ſo as when taken too freely, to occaſion immoderate mirth; and a ſure promoter of a diaphoreſis: and is ſuppoſed to be particularly ſerviceable in diſorders of the breaſt, in female obſtructions, and hyſteric depreſſions. It tinges the urine of a high colour; the doſe is commonly from two or three grains to ten or twelve; Geoffroy ſays, it may be ſafely extended to a ſcruple and more. *Saffron* gives out the whole of its virtue and colour to rectified ſpirit, proof ſpirit, wine, vinegar and water. The officinal preparations are, the *ſyrup* and *tincture* of SAFFRON. In diſtillation with water, a ſmall portion of a fragrant and very pungent eſſential oil may be collected, amounting, it is ſaid, to about a dram and a half from ſixteen ounces; the extract, obtained from rectified ſpirit, inſpiſſated only to the conſiſtence of oil, is recommended by Boerhaave as one of the higheſt cordials and exhilarants; the doſe is a few drops, which may be taken in a glaſs of rich wine. It diſſolves in wine and in water, as well as in ſpirit, and mingles with oils both expreſſed and diſtilled, appearing to be a ſubſtance of a peculiar nature. The ſpirit, diſtilled from *ſaffron*, is ſaid to have an advantage above moſt other cordial ſpirits, of diſpoſing the patient to ſweat. Lewis.

Saffron is alſo uſed by illuminers, to make a golden yellow colour.

The yellow tinge which this medicine is able to give to the fluids, is carried ſo far, that no juice eſcapes it. Amatus Luſitanus gives an account of a fœtus in a mother's womb, tinged yellow, by her taking very frequently medicines with *ſaffron* in them. This had been diſputed and diſbelieved by many; but an experiment made at Leipſic on a bitch big with puppies, reſtored the credit of Amatus: for on giving this creature *ſaffron* frequently among her food, the puppies had their fleſh and the whites of their eyes, when opened dyed yellow with it; though the chyle, in the lacteals, was not yellow but whitiſh. However it does not ſeem improper to verify the experiment farther.

SAFFRON, *baſtard*, or **SAFFLOWER**, *carthamus*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: it hath a flower compoſed of ſeveral hermaphrodite florets, included in one common ſcaly empalement; the florets are funnel-ſhaped cut into five equal ſegments at the top, theſe have five ſhort hairy ſtamina; in the centre is ſituated a ſhort germen which afterward becomes a ſingle, oblong, angular ſeed, incloſed in the empalement. There are eight ſpecies.

The quantity of *ſafflower* which is annually conſumed in England, is ſo great, as to make a very conſiderable article in trade, therefore might be very well worthy of the public attention: if this plant was introduced to Carolina, it might be there cultivated to as great advantage as in any part of the world, for there the ſeeds will conſtantly ripen; and as this country is furniſhed with it from the Mediterranean, where there is great danger of our navigation being interrupted, ſo it ſhould incite the inhabitants of the American ſtates, to make trial of as many of the vegetables, as there is a probability of ſucceeding there, as can be procured; which are of real uſe in any of the manufactories of this country. The ſeeds of this plant were ſent to Carolina in the year 1758, which have ſucceeded there; and more ſeeds may be eaſily procured from the American iſlands, and in one ſeaſon may be multiplied in ſo great quantity, as to furniſh a whole province. Miller.

Carthamus ſeeds are ſaid to be emetic and cathartic, but at preſent they are very little uſed. Its flowers are ſometimes uſed in medicine, but their chief uſe is in dying.

Saffron, *Indian.* See Turmeric.

Saffron, *meadow*, *colchicum*, in *Botany*; a genus of the *hexandria trigynia* claſs. Its characters are theſe: the flower has neither empalement nor ſpatha; it has one petal, riſing with an angular tube from the root, and is divided at the top into ſix oval concave ſegments, and ſix ſtamina with four valves; the germen is ſituated near the root, which becomes a capſule with three lobes, having a ſeam on the inſide, dividing it into three cells which contain ſeveral roundiſh rough ſeeds. Linnæus reckons three ſpecies, and Miller four, including ſeveral varieties.

The ſeveral ſpecies of this plant are very valuable in a flower-garden, as they are in their beauty in autumn, when moſt other plants are dead. The flowers come up, and are blown ſome time before the green leaves appear which makes ſome people call them naked ladies; the green leaves come up in winter, and in ſpring are extended to a great length; in May, theſe leaves begin to decay, and ſoon after this is a proper time to take up and tranſplant the roots. The roots ſhould be kept above ground till the middle of Auguſt, at which time, if they are not planted, they will produce their flowers as they lie out upon the ground. For the manner of planting the roots of this ſort of plants, ſee the article Tulip; and for that of raiſing them from ſeeds, for the ſake of producing varieties of the flower, ſee Iris.

The root of *colchicum* is ſuppoſed by ſome to be the hermodactyls of the ſhops: it is of a poiſonous quality, but is recommended for the gout, being externally applied. See Colchicum.

Saffron-*tree*, in *Natural Hiſtory*, the name of an Eaſt Indian ſhrub, which grows to about two feet high, having ſquare branches which are beſet with leaves in pairs. The pedicles of the flowers come from the alæ of the leaves, and are branched, each pedicle ſupporting about five flowers; theſe are of the ſhape of the jaſmine flowers, and are white above, and of the fine reddiſh yellow colour of *ſaffron* below. The flowers never open but in the night, and then do not perfectly expand themſelves, but all the petals remain in ſuch a poſition, that they can cloſe inſtantaneouſly on occaſion of the leaſt heat; they are placed each in a green cup, to which they are ſo ſlightly faſtened, that the leaſt motion makes them fall. They ſeldom ſtand more than four days, often not ſo long; the flowers have no ſmell, but are of a cordial virtue, approaching to that of *ſaffron.* Mem. Acad. Paris. 1699.

Saffron, *Syrup of.* This medicine is thus made: take fine *ſaffron* an ounce, cut it ſmall, and put it to infuſe in a pint of mountain-wine; let it ſtand three days without heat, then ſtrain off the wine; to which, after filtration, add twenty-five ounces of double-refined ſugar, melt the ſugar over a gentle heat, and then ſet it by for uſe.

Saffron, *Tincture of*, a preparation made as follows: take *ſaffron* an ounce, cut it ſmall, and pour on it in a matrals a pint of proof-ſpirit; let them ſtand together three days without heat, often ſhaking the veſſel, then filter off the tincture for uſe. Its doſe is from thirty drops to a drachm or more. It is good in all caſes where the *ſaffron* in ſubſtance is.

If the ſame quantity of wine be uſed inſtead of ſpirit, it is called *vinum crocatum*, *ſaffron*-wine.

Saffron, *Tincture of*, made by pouring hot water on the beſt Engliſh *ſaffron* in a veſſel, placed for ſome time in a heat almoſt equal to that of boiling water, and filtered through a linen cloth, is uſed as a yellow waſh with water colour: this tincture is a fine warm yellow, and when very ſtrong, makes a very proper ſhade for the gamboge or other light yellows that are bright; and it will ſtand as well as any of the vegetable tinctures.

Saffron is alſo a name given to ſeveral chemical preparations, from the reſemblance of their colour to that of the vegetable *ſaffron*, but more uſually called *croci.* See Crocus. Such are

Saffron *of Venus.* See Copper, and Venus.

Saffron *of Mars.* See Crocus *Martis.*

Saffron *of Gold.* See Aurum *fulminans.*

SAGADENON, a name given by the ancients to what they ſay was the very fineſt kind of opobalſamum, produced in Paleſtine and the country thereabout.

SAGAN, in *Scripture Hiſtory*, the ſuffragan or deputy of the Jewiſh high-prieſt; who according to ſome, was only to officiate for him, when he was rendered incapable of attending the ſervice through ſickneſs, or legal uncleanneſs, on the day of expiation; or, according to others, who was to aſſiſt the high-prieſt in the care of the affairs of the temple and the ſervice of the prieſts.

SAGAPENUM, Σαγαπηνον, a medicinal gum reſin, whoſe ſmell comes very near that of a pine; whence its name.

It flows by inciſion, from the trunk of a ferulaceous plant growing in Perſia: the beſt is in bright tranſparent tears of a ſtrong, pungent, porraceous ſmell: and the whiter and freer from dirt, the better. Sometimes it is found as white, both within and withoutſide, as milk; though this is very rare. See Fennel-*Giant.*

The *ſagapenum* is brought directly from Alexandria; either in diſtinct tears, or run together into large maſſes; outwardly of a yellow colour, but internally ſomewhat paler and clear like horn; growing ſoft on being handled, ſo as to ſtick to the fingers. It is ſometimes ſupplied in the ſhops by the larger and darker coloured maſſes of bdellium. It has a ſtrong diſagreeable ſmell reſembling that of the leek-kind, or a mixture of galbanum with a little aſſa fœtida; and a moderately hot biting taſte. It is one of the ſtrongeſt deobſtruent gums, and frequently preſcribed, either by itſelf or in conjunction with ammoniacum or galbanum, in hyſteric caſes, uterine obſtructions, aſthmas, and other diſorders. It may be commodiouſly taken in the form of pills, from two or three grains to a ſcruple or half a dram: in doſes of a dram, it looſens the belly. Lewis.

It is alſo uſed externally to aſſuage pains, and reſolve tumors.

SAGATHEE, in *Commerce*, a ſlight woollen ſtuff; being a kind of ſerge, or ratteen; ſometimes mixed with a little ſilk.—It is manufactured chiefly at Amiens; though we have our ſhare of it in England.

The word is formed from the French, *ſayette*, a diminutive of *ſaye*, *ſay.* See Say. The French name *ſayette* again is derived from that of the thread uſed herein, which is chiefly prepared and ſpun in Flanders, about Turcoing, &c. and called *fil de ſay tte.*

SAGDA, or **Psagda**, in *Natural Hiſtory*, the name of a ſtone deſcribed by Aldrovand, which he ſays is of a green colour, and has the property of attracting wood.

Pliny and the ancients give this name to a gem of a greeniſh colour, very much eſteemed at that time; and about the origin of which the ancients had many fabulous reports. Solinus tells us, that it is produced at the bottom of the ſea, and thence riſes up of itſelf as ſhips paſs over the place where it is, and fixes itſelf to their bottoms, and that it cannot be got off again without cutting away a part of the wood. This author has generally taken his accounts of things from Pliny; though he has been at the pains to diſguiſe them, in ſuch a manner, that they are often unintelligible. All that Pliny ſays on this occaſion, is, that the *ſagda* was of a green colour, and was found by the Chaldæans at the bottoms of their ſhips; even this, however is not very intelligible, unleſs they meant that the ſhips which traded to the Red Sea, and lay long in the harbours, and were ſometimes a-ground, picked up at their bottoms the ſtones which make up the ſhores, and ſome of theſe are of the jaſper-kind, and uſually green; at this rate it could not be a ſtone of any great value, nor do we indeed find any where that it was, except in Solinus.

It is to be obſerved, that the ancients called a certain ointment by the name *ſagda* as well as this ſtone; this ointment was green, and probably the ſtone had its name from the reſembling it in colour. This was a cuſtom common among the writers of early times; and they have the names of *libanotis*, *myrrhites*, *ſtactachates*, and *aromatites*, from the reſemblance which certain agates and jaſpers had to the drugs, &c. in common uſe among them.

SAGE, *ſalvia*, in *Botany*, a genus of the *diandria monogynia* claſs. Its characters are theſe: the empalement of the flower is tubulous, of one leaf, large at the mouth, where it is cut into four parts; the flower is of the lip kind, of one petal, the lower part is tubulous, the upper is large and compreſſed, the lower lip is broad and trifid; it has two ſhort ſtamina, which ſtand tranſverſe to the lip, and are fixed in the middle to the tube, to whoſe tops are fixed glands, upon the upper ſide of which ſit the ſummits; it has a four-pointed germen, ſupporting a long ſlender ſtyle, ſituated between the ſtamina, crowned by a bifid ſtigma; the germen afterward becomes four roundiſh ſeeds, which ripen in the empalement. Miller enumerates twelve ſpecies, including ſeveral varieties: and Linnæus reckons thirty-nine ſpecies. The ſeveral ſorts of *ſage* propagated either for the kitchen, or for medicine in our gardens, are to be produced by ſlips planted in the beginning of April, watering and ſhading them till they have taken root, and after that they ſhould be removed to a dry ſoil, where they may have the benefit of the ſun. Miller.

The common broad-leaved *ſage*; or, as we uſually call it, from the colour of ſome of the leaves, red-*ſage*, is a ſudorific and diuretic; it promotes the menſes, and is good in palſies, vertigoes, tremors, and catarrhs; and mixed with honey, it is ſaid to be one of the beſt known cures for the aphthæ and eroſions of the mouths of children.

This alone is uſed in the ſhops.—It makes an excellent gargariſm for ſore throats, when mixed with honey, and ſharpened with vinegar or any acid. Its decoction is very grateful and cooling, with the addition of a little lemon-juice. It is both detergent and abſorbent, and, as ſuch, finds place in diet-drinks, and medicated ales, intended for ſweeteners and cleanſers of the blood.

The ſmaller-leaved *ſage* generally ſold among us under the name of *ſage* of virtue, has the ſame qualities in a greater degree.

The Dutch are ſaid to dry and prepare this *ſage* like other teas, and carry it to the Indies as a very precious thing. They there find a good market for it; the Chineſe preferring it to the beſt of their Indian teas; and for every pound of *ſage* giving in exchange four pounds of their tea, which they ſell again very dear in Europe. Of both kinds the flowers are weaker and more grateful than the leaves; and the cup of the flower ſtronger, and obviouſly more reſinous than any other part. The leaves of ſage give out their virtue both to water and rectified ſpirit, moſt perfectly to the latter. To the former they impart a browniſh, to the latter a dark green tincture. The broad-leaved ſawed *ſage* called by the gardeners balſamic *ſage*, is preferred to all the others for making tea.

The ſchool of Salernum recommends *ſage* as a remedy in all diſeaſes: hence the verſe,

Cur moriatur homo, cui ſalvia creſcit in horto?

“Why ſhould a man die, while he has ſage in his garden?”

Sage when viewed with a microſcope, often appears covered all over with little ſpiders, which are ſeen moving about.—It yields by diſtillation, a very agreeable, aromatic eſſential oil, of ſome uſe in the ſhops.

There uſed to be a ſyrup, conſerve, and ſimple water of *ſage* kept in the ſhops; which are all diſuſed, and the dried herb only retained.

SAGE-*tree*, or *Jeruſalem* **SAGE**, *phlomis*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the flower hath a permanent empalement with an oblong tube, having five angles; it is of the lip kind; the tube is oblong, the upper lip is oval, forked, and inflexed: the under is cut into three ſegments, the middle one being large and obtuſe; it hath four ſtamina hid under the upper lip, two being longer than the other, and a germen divided into four parts, ſupporting a ſtyle the length of the ſtamina; the germen afterwards becomes four oblong cornered ſeeds ſitting in the empalement. Linnæus enumerates thirteen, and Miller fourteen ſpecies. All the ſpecies of this genus are ornamental plants, when properly diſpoſed in gardens: as they afford a ſucceſſion of flowers for two or three months, and their hoary downy leaves, intermixed with plants whoſe leaves are green, form an agreeable contraſt. The leaves of two of the ſpecies, viz. the ſhrubby Jeruſalem *ſage* with a broader and rounder *ſage*-leaf, and the ſame with a narrower and longer *ſage*-leaf, have been much recommended by ſome perſons to be uſed as tea for ſore throats. Miller.

SAGE-*apples*, a name given by naturaliſts to a ſort of ſoft gall, or protuberance, found frequently on the leaves and ſtalks of *ſage* in the eaſtern parts of the world, and much reſembling the ſoft gall of the oak-leaf, called the *oak-apple*. Theſe are both owing to the ſame cauſe, the puncture of an inſect of the fly-kind, which depoſits its eggs in the wound, and the worms or maggots hatched from thoſe eggs feed on the inſide of the gall, and occaſion a preternatural derivation of juices to the part, whence it ſwells and aſſumes this form. The leaves of many other plants are alſo liable to the ſame accident, particularly thoſe of ground-ivy, on which there grow eatable galls of this kind. The *ſage-apples* are ſo frequent in the Eaſt, that they are brought to market at Conſtantinople, and eaten as delicacies. See **GALLS**.

SAGE of *Jeruſalem, pulmonaria*, in *Botany*. See **LUNG** *Wort*.

SAGE, *Wild*, or *Wood* **SAGE**. See **GERMANDER**.

SAGE, *Indian Wild*, a ſpecies of **LANTANA**.

SAGENE, a Ruſſian meaſure equivalent to ſeven Engliſh feet. Five hundred *ſagenes* make a **WERST**.

SAGGING *to Leeward*, in *Sea Language*, denotes the movement by which a ſhip makes a conſiderable lee-way, or is driven far to leeward of the courſe in which ſhe apparently ſails. It is generally expreſſed of heavy ſailing veſſels, as oppoſed to keeping well to windward, or, in the ſea phraſe, holding a good wind.

SAGIMEN *vitri*, a name given by ſome of the chemiſts to any alkaline ſalt.

SAGINA, in the Linnæan ſyſtem of *Botany*, the name of a genus of plants of the *tetrandria tetragynia* claſs; the characters of which are theſe: the cup is a four-leaved perianthium remaining after the flower is fallen; the leaves being of an oval figure, hollow, and ſpread very open; the flower is compoſed of four oval obtuſe petals, ſhorter than the leaves of the cup, and ſpread wide open; the ſtamina are four capillary filaments, the antheræ are roundiſh; the germen of the piſtil is of a globoſe figure; the ſtyles are four in number, tapering in ſhape, and bent back; theſe are downy, and the ſtigmata are ſimple; the fruit is a capſule, of an oval figure, containing one cell, with four valves; the ſeeds are numerous and very ſmall, and are fixed to the receptacle. There are three ſpecies.

SAGITTA, in *Architecture*, the name ſometimes uſed for the key-piece of an arch.

SAGITTA, in *Aſtronomy*, the *Arrow* or *Dart*, a conſtellation of the northern hemiſphere near the Eagle. The ſtars in the conſtellation *Sagitta*, in Tycho's catalogue, are five, and as many in Ptolemy's and Hevelius's; in Mr. Flamſteed's catalogue they are eighteen; the longitudes, latitudes, &c. whereof, are as follow:

Names and ſituations of the ſtars.	Bayer's ch.	Signs.	Longit.			Lat. Nort.			Magn.
			°	′	″	°	′	″	
		♑	20	00	08	43	07	45	6
			21	45	45	38	31	25	6
			21	53	27	38	31	18	6
Preced. glyphis or nib tow. S.	ι		25	29	42	37	27	09	5
Preced. of three in the ſhaft	α		26	45	16	38	49	52	4
5.									
In the extremity of the nib	β		26	53	23	38	15	17	4
In the middle of the ſhaft	δ		29	04	40	38	56	52	4.5
Laſt of three in the ſhaft	ζ		29	43	47	39	27	05	6
		♒	0	35	41	38	48	23	6
			1	02	13	36	36	54	6
10.									
			1	34	53	36	39	43	6
In the point of the arrow	γ		2	42	58	39	13	3[illegible]	4
In the triangle under the point { north	χ		2	28	06	37	14	03	6
In the triangle under the point { ſouth	y		3	00	24	35	35	06	6
Middle and poſterior	z		3	33	10	36	35	02	6
15.									
Preced. of 3 following the point	η		4	46	28	39	18	22	6
Middle	θ		6	29	53	39	52	58	6
Laſt		♒	8	37	48	40	07	17	6

SAGITTA, in *Botany*, ſignifies the top of any ſmall twig, cyon, or graft of a tree.

SAGITTA, in *Geometry*, is a term which ſome writers uſe for the abſciſs of a curve.

SAGITTA, in *Trigonometry*, &c. is the ſame as the verſed ſine of any arch; and is ſo called by ſome writers becauſe it is like a dart, or arrow, ſtanding on the chord of the arch.

SAGITTAL, **SAGITTALIS SUTURA**, in *Anatomy*, the ſecond of the genuine *ſutures* of the cranium.—See *Tab. Anat. (Myol.) fig.* 1. *lit. f. fig.* 2. *lit. i.*

It reaches the whole length of the head; and has its name from the Latin, *ſagitta*, as being ſtraight, like an arrow. Whence it is alſo called *recta*, and ſometimes alſo *rhabdoides*.

SAGITTARIA, in *Botany*. See **ARROW**-*Head*.

SAGITTARIUM *alexipharmacum*, in the *Materia Medica*, the name of a root cultivated with great care in Jamaica, and ſuppoſed a remedy for the wounds of poiſonous arrows. The plant of which it is the root is the *canna Indica radice alba*. Sloane's Hiſt. i. p. 253. but its virtues have not yet brought it into uſe on this ſide the water.

SAGITTARIUS, in *Aſtronomy*, the *Archer*, one of the ſigns of the zodiac; the ninth in order.

The ſtars in the conſtellation *Sagittarius*, in Ptolemy's catalogue, are thirty-one; in Tycho's, fourteen; in Hevelius's, twenty-two; in the Britannic catalogue, ſixty-nine. The longitudes, latitudes, magnitudes, &c. whereof are as follow:

Names and ſituations of the ſtars.	Bayer's ch.	Signs	Longitud. ° ′ ″	Latitude. ° ′ ″	Magnitud.
		♐	19 23 10	2 39 52 N	6
			20 46 23	1 30 24 S	6
Inform. preced. the bow	p		22 55 1	4 22 42	6
Nebulous	b		25 38 16	0 19 45	6.7
	i		25 43 17	0 47 51	7
5.					
			26 0 18	6 20 22 N	7
Nebulous	a		26 19 47	0 47 50 S	6
			26 25 42	4 8 20 N	7
			26 33 35	0 52 24 S	7
That in the point of the arrow	γ		26 55 47	6 55 51	3
10.					
			26 51 44	0 18 36 N	7
			28 43 1	0 31 33 S	7
North in the top of the bow 1ſt	μ		28 54 10	2 22 54 N	4
			28 59 32	1 43 43	7
2d	μ		29 15 5	2 42 28	6
15.					
			29 15 26	3 2 42	7
			29 34 56	2 53 2	7
		♑	0 13 13	7 24 41 S	7
In the handle, of the left hand	δ		0 14 12	6 25 21	3
In the ſouthern part of the bow	ε		0 45 33	10 59 54	3
20.					
			1 38 55	2 48 39 N	6
In the north. part of the ſouth. bow	λ		1 59 55	2 4 1 S	4
			2 40 15	0 36 39	7
			3 15 52	0 45 42	7
			2 35 23	0 57 48	7
25.					
			5 16 0	0 41 20	6
Preceding the left ſhoulder	φ		5 50 42	3 54 35	5
			6 24 0	0 39 45 N	7
			7 19 56	2 39 12	6
			7 26 24	0 48 34	6
30.					
			7 45 55	1 1 30	6
1ſt of contig. ſtars in the eye	ν		8 9 4	0 9 12	5
			8 15 9	1 32 3	6
Bright one in the left ſhoulder			8 3 12	3 23 32 S	4.3
Subſeq. of contig. in the eye	ν		8 22 14	0 12 33 N	5
35.					
1ſt of three in the head	ξ		9 6 9	2 9 25	5
	ξ		9 8 52	1 42 12	6
That under the arm-pit	ζ		9 17 22	7 7 55 S	3
Middle of three in the head	ο		10 40 46	0 54 38 N	4
Midd. of 3 over the ribs in the ſhoulder	τ		10 30 10	5 1 12 S	4
40.					
Laſt of three in the head	π		11 56 44	1 28 59 N	4
Between the ſhoulders	ψ		12 43 6	2 52 55 S	5
South of 3 in the north part of the robe	d		14 2 22	3 17 59 N	6
Middle of the three	ς		15 8 20	4 15 43	5
	ς		15 6 17	3 48 43	6
45.					
North. of the three	υ		15 21 49	6 8 42	6
	χ		15 0 19	2 26 17 S	5
In the right ſhoulder	χ		15 2 43	2 21 5	5
	χ		15 7 46	1 54 36	0
			15 39 4	0 12 20 N	6
50.					
In the bend of right arm	b		17 24 12	3 1 53 S	6
	b		17 31 15	3 13 1	6
			18 28 4	1 54 4	6
	e		19 53 56	5 5 54 N	6
	c		20 20 29	5 11 26	6
55.					
South. of two in ſouth part of robe	f		20 36 41	1 27 2	6
			22 6 2	1 54 3	6
Firſt in the root of the tail at the north ſide of the quadrilat.	w		21 29 46	5 22 55 S	5
Firſt of ſouthern ſide	b		21 35 15	6 16 34	5
Second of north ſide	a		22 13 16	5 24 44	5
60.					
North of the ſecond in the ſouth part of robe	g		24 7 49	5 8 23	6
2d of ſouth ſide of quadrilat.	c		22 43 30	7 3 48	6
			25 27 19	6 44 32 N	6
			26 38 1	8 34 40	6
			26 29 27	7 31 45	6
65.					
In the joint of the fore leg	η	♐	29 51 38	13 17 45	3
South in the left	α	♑	11 57 16	22 26 50	4
North	α		11 54 44	22 5 48	4
In the fore left knee	β		12 44 39	18 19 51	4

SAGITTATED *Leaf*, in *Botany*; ſee LEAF.

SAGO, a medicinal ſubſtance brought from the Eaſt Indies, of conſiderable uſe in diet, as a nouriſher, and reſtorative.

Sago is a ſort of bread procured from a tree called *landan*, growing in the Moluccas.

This tree is a ſpecies of the PALM, which grows naturally in Japan, and upon rocky dry mountains in Malabar.

When the tree is felled, they cleave it into two in the middle, and take out the pith, which is even eatable when it comes freſh out of the tree. They pound this very ſmall in a mortar, till it is reduced into a kind of powder ſomewhat like meal. This done they put it in a ſearce made of the bark of the ſame tree, and place the ſearce over a ciſtern, pouring water upon it, and by this means ſeparating the pure part of the powder from the veins of wood, wherewith the pith abounds.

The flour, thus filtrated, they call *ſago*: they make it into cakes, and bake it in earthen furnaces; and this they do with ſo much expedition, that in three or four hours a man makes as much bread as will feed a hundred perſons a day.

The cakes are reduced into ſmall grains, which are the *ſago* of the ſhops. This ſubſtance commonly recommended as a reſtorative in phthiſes and emaciations, and for reſtraining fluxes, appears to be a light, moderately nutritious demulcent food; in which view it is by ſome directed as a proper aliment for young children, in preference to the more tenacious and leſs digeſtible preparations of wheat flour.

SAGOCHLAMYS, among the Romans, a ſort of garment that partly reſembled the SAGUM, and partly the CHLAMYS.

SAGOUIN, in *Zoology*, the name of a very beautiful ſmall ſpecies of monkey, deſcribed by Cluſius, and ſeeming the ſame with the CAGUI *minor* of Margrave, and the SIMIA *jacchus* of Linnæus.

Cluſius ſays it is of the ſize of a ſquirrel, and has the look of a lion about the head, and that it is a very tender and delicate little animal, and impatient of the ſlighteſt injury.

SAGREE, in *Ichthyology*. See GALEUS *ſpinax*.

SAGULUM, among the Romans, a little or ſhort SAGUM.

SAGUM, in *Antiquity*, a military garment worn by the Greeks, Romans, and Gauls, in manner of a cloak or caſſock; covering the ſhoulders and back as low as the hips; where it was faſtened to the cuiraſs.

It was uſually made of coarſe wool, and ſquare. They had one for the winter, and another lighter for ſummer.

SAHIRA, in the *Materia Medica*, a name given by Avicenna to the *miſy* of Dioſcorides and the Greeks. See MELANTERIA and MISY.

SAI, in *Zoology*, a name given to the capuchin MONKEY.

SAIC, one of the many names given by the ancients to quickſilver. See MERCURY.

SAICK, or SAIQUE, a Turkiſh veſſel, very proper for the carriage of merchandizes.

It has ſquare ſails on the middle maſt; without either mizen, top-gallant, or ſhrouds: only a main-maſt, with a main-top-maſt, both very high; with a boltſprit, and a little mizen-maſt.

The height of the main-maſt makes the *ſaicks* viſible at a great diſtance: their make renders it impoſſible for them to go with a ſide wind; but when they have the wind before them, nothing can outgo them. The generality of them carry no guns.

SAIGA, in *Zoology*. See GOAT.

SAIGNER, in *Fortification*, a French term, ſignifying to empty or drain.

Hence *ſaigner la foſſe* is to empty or drain the water out of the moat, by conveyances under-ground; that it may be paſſed over the more eaſily; by laying hurdles or ruſhes on the mud remaining.

SAIL, in *Navigation*, an aſſemblage of ſeveral breadths of canvas, or ſtrong hempen cloth, ſewed together, with a double ſeam, and edged round with a cord, extended on or between the maſts to receive the wind, and carry the veſſel along the water.

There are two kinds of *ſails*; the one quadrilateral, the other triangular; i. e. the ſurfaces of all *ſails* are contained either between four or three ſides. The former are either extended by yards, as the principal *ſails* of a ſhip; or by yards and booms, as the ſtudding *ſails*, drivers, ring-tails, and all thoſe *ſails* which are ſet occaſionally; or by gaffs and booms, as the main-*ſails* of ſloops and brigantines. The latter are ſometimes ſpread by a yard, as lateen *ſails*, and otherwiſe by a ſtay, as ſtay-*ſails*; or by the maſt, as ſhoulder-of-mutton-*ſails*; in all which caſes the formoſt leech or edge is attached to the ſaid yard, maſt, or ſtay, throughout its whole length.

The principal *ſails* of a ſhip are the courſes, or lower *ſails*, eils, *a*, (*Tab*. II. *Ship*, *fig*. 3.) the top-*ſails*, *b*, which are next in order above the courſes, and the top-gallant-*ſails*, *c*, which are expanded above the top-*ſails*. The courſes are the main-*ſail*, fore-*ſail*, and mizen, main-ſtay-*ſail*, fore-ſtay-*ſail*, and mizen-ſtay-*ſail*; but more particularly the three firſt. The main-ſtay-*ſail* is rarely uſed except in ſmall veſſels.

In all quadrangular *ſails* the upper edge is called the head; the ſides or ſkirts are called leeches; and the bottom or lower edge is called the foot. If the head is parallel to the foot, the two lower corners are denominated clues, and the upper corners earings.

In all triangular *ſails*, and in thoſe four-ſided *ſails*, wherein the head is not parallel to the foot, the foremoſt corner at the foot is called the tack, and the after-lower-corner the clue; the foremoſt perpendicular or ſloping edge is called the fore-leech, and the hindmoſt the after-leech. The heads of all four-ſided *ſails*, and the fore-leeches of lateen *ſails*, are attached to their reſpective yard or gaff by a number of ſmall cords called robands; and the extremities are tied to the yard-arms, or to the peek of the gaff, by earings.— The ſtay-*ſails* are extended upon ſtays between the maſts, on which they are drawn up or down occaſionally, as a curtain ſlides upon its rod, and their lower parts are ſtretched out by a tack and ſheet. The clues of a top-*ſail* are drawn out to the extremities of the lower yard by two large ropes called the top-ſail-ſheets; and the clues of the top-gallant-*ſails* are in like manner extended upon the top-*ſail*-yard-arms, as exhibited in the figure. The ſtudding *ſails* are ſet beyond the leeches or ſkirts of the main-*ſail* and fore-*ſail*, or of the top *ſails*, or top-gallant-*ſails* of a ſhip, their upper and lower edges are accordingly extended by poles run out beyond the extremities of the yards for this purpoſe. Thoſe *ſails*, however, are only ſet in favourable winds and moderate weather.

All *ſails* derive their name from the maſt, yard, or ſtay, upon which they are extended. Thus the principal *ſail* extended upon the main-maſts is called the main-*ſail*, *d*, *fig*. 4; the next above, which ſtands upon the main-top-maſt, is termed the main-top-*ſail*, *e*; and the higheſt, which is ſpread acroſs the main-top-gallant-maſt, is named the main-top-gallant-*ſail*, *f*. In the ſame manner, there is the fore-*ſail*, *g*; the fore-top-*ſail*, *h*; and the fore-top-gallant-*ſail*, *i*; the mizen, *k*; the mizen-top-*ſail*, *l*; and mizen-top-gallant-*ſail*, *m*. Thus alſo there is the main-ſtay-*ſail*, *o*; main-top-maſt-ſtay-*ſail*, *p*; and main-top-gallant-ſtay-*ſail*, *q*; with a middle-ſtay-*ſail*, which ſtands between the two laſt. All theſe ſtay-*ſails* are between the main and fore maſts. The ſtay-*ſails* between the main-maſt and mizen-maſt are the mizen-ſtay-*ſail*, *r*, and the mizen-top-maſt-ſtay-*ſail*, *s*; and ſometimes a mizen-top-gallant-ſtay-*ſail* above the latter. The ſtay *ſails* between the fore-maſt and bowſprit are the fore-ſtay-*ſail*, *t*; the fore-top-maſt-ſtay-*ſail*, *u*; and the jib, *x*. There are, beſides, two ſquare *ſails* extended by yards under the bowſprit, one of which is called the ſprit-*ſail*, *y*, and the other the ſprit-*ſail*-top-*ſail*, *z*.

The ſtudding-*ſails*, being extended upon the different yards of the main-maſt and fore-maſt, are likewiſe named according to their ſtations, the lower, top-maſt, or top-gallant-ſtudding-*ſails*. The ropes by which the lower yards of a ſhip are hoiſted up to their proper height are called the JEARS. In all other *ſails* the ropes employed for this purpoſe are called HALIARDS. The principal *ſails* are expanded by haliards, ſheets, and bow-lines, except the courſes, which are always ſtretched out below by a tack and ſheet. They are drawn up together or truſſed up, by bunt-lines, clue-lines, *d d*, *fig*. 3; leech-lines, *e e*; reef-tackles, *f f*; ſlab-line, *g g*; and ſpilling-lines. The bunt-lines and leech-lines, which paſs on the other ſide of the *ſail*, are expreſſed by dotted lines in the figure. The courſes, top-*ſails*, and top-gallant-*ſails*, are wheeled about the maſt, ſo as to ſuit the various directions of the wind, by braces. The higher ſtudding-*ſails*, and in general all the ſtay-*ſails*, are drawn down, ſo as to be furled or taken in by down-hauls.— Falconer. See *Tab. Ship. fig*. 1. *n*. 2. 17. 20. 44. 65. 67. 86. 107. 109. 126. 138.

SAILS, *after*, in a *Ship*, are thoſe that belong to the main-maſt and mizen. They keep the ſhip to windward. On which account ſhips ſailing on a quarter-wind require a head-*ſail* and an *after-ſail*; one to countermand the other.

SAIL, *netting*, in a *Ship*, is only a *ſail* laid over the nettings.

SAIL is alſo a name applied to any veſſel beheld at a diſtance under *ſail*.

SAIL, *to make*. See MAKE.

SAIL, *to ſet*, is to unfurl and expand the *ſails*, upon their reſpective yards and ſtays, in order to begin the action of ſailing.

SAIL, *to ſhorten*, is to reduce or take in part of the *ſails*, with an intention to diminiſh the ſhip's velocity.

SAIL, *to ſtrike*, is to lower it ſuddenly. This is particularly uſed in ſaluting or doing homage to a ſuperior force, or one whom the law of nations acknowledges as ſuperior in certain regions. Thus all foreign veſſels ſtrike to an Engliſh man of war in the Britiſh ſeas. See SALUTATION.

SAIL-*cloth*. For encouraging the manufacture of *ſail-cloth*, any perſon may import into this kingdom undreſſed flax, without paying any duty for the ſame, ſo as a due entry be made thereof at the cuſtom-houſe, &c. And no drawback is to be allowed on the exportation of foreign *ſail-cloth*: but an allowance ſhall be made of 1*d*. per ell for Britiſh *ſail-cloth* exported, &c. 4 Geo. II. cap. 27. All foreign *ſail-cloth* imported, for which duties are granted, ſhall be ſtamped, expreſſing from whence imported, &c. and the manufacturers of *ſail-cloth*, in this kingdom, are to affix to every piece, by them made, a ſtamp containing their names and places of abode, or expoſing it to ſale ſhall forfeit 10*l*. And if any perſons cut off or obliterate ſuch ſtamps, they incur a forfeiture of 5*l*. upon conviction before one or more juſtices, to be levied by diſtreſs, &c. Ships built on firſt ſetting out to ſea, to have one complete ſet of *ſails* manufactured here, on pain of 50*l*. And no *ſail-maker* may work up into *ſails* foreign *ſail*-cloth not ſtamped, under 20*l*. penalty.

SAILS alſo denote the vanes of wind-mills; or the arms or flights, whereby the wind has its effect on them.

Theſe are either horizontal or perpendicular. See WIND-MILL.

SAILS, in *Falconry*, denote the wings of a hawk.

SAILING, in a *general ſenſe*, denotes the movement by which a veſſel is wafted along the ſurface of the water, by the action of the wind upon her ſails.

For the method of regulating this movement by the proper adjuſtment of the ſails and rudder, ſee SAILING in a *more confined ſenſe*, *infra*.

SAILING is alſo uſed for the art, or act, of navigating; or of determining all the caſes of a ſhip's motion, by means of ſea-charts. And as theſe charts are conſtructed either on the ſuppoſition that the earth is a large extended flat ſurface, whence we obtain thoſe that are called plane charts, or on the ſuppoſition that the earth is a ſphere, whence we derive globular charts: *ſailing* may be diſtinguiſhed into two general kinds, viz. *plane*, or *plain*, and *globular ſailing*.

SAILING, *plain*, is that which is performed by means of a *plain* CHART; in which caſe, as is evident from the conſtruction of the chart, the meridians are conſidered as parallel lines, the parallels of latitude are at right angles to the meridians, the lengths of the degrees on the meridians, equator, and parallels of latitude, are every where equal; and the degrees of longitude are reckoned on the parallels of latitude, as well as on the equator. We ſhall here ſuppoſe, that the terms COURSE, DEPARTURE, DISTANCE, RHUMB *line*, &c. are underſtood. And obſerve, that if a ſhip ſails either due north or ſouth, ſhe ſails on a meridian, makes no departure, and her diſtance and difference of latitude are the ſame; and if a ſhip ſails either due eaſt or weſt, ſhe runs on a parallel of latitude, makes no difference of latitude, and her departure and diſtance are the ſame. See RIGHT *ſailing*.

It is to be obſerved farther, that the difference of latitude and departure always make the legs of a right-angled triangle, whoſe hypothenuſe is the diſtance the ſhip has ſailed. See PLAIN *ſailing*.

It is obvious from the conſideration of ſuch a triangle, that when the courſe is 45 degrees, or 4 points, the difference of latitude and departure are equal; when the courſe is leſs than 45 degrees, the difference of latitude is greater than the departure; but when the courſe is greater than 45 degrees, the departure is greater than the difference of latitude.

In *Tab*. II. *Navigation*, *fig*. 26, let the circle FHFH repreſent the horizon of the place A, whence the ſhip ſails; A C the rhumb on which ſhe ſails, whether it be in the N. E. or N. W. S. E. or S. W. quarters of the horizon; and C the place at which ſhe arrives: then H H repreſents the parallel of latitude from which ſhe ſailed, and C C the parallel of latitude at which ſhe arrives: ſo that A D is the difference of latitude, D C the departure, A C the diſtance ſailed, D A C the angle of the courſe, and D C A the complement of the courſe. From this conſtruction it appears, that the difference of latitude, departure, and diſtance, form the ſides of a right-angled triangle, whoſe angles are the courſe, its complement, and the right angle: and, therefore, if of theſe four things, viz. the courſe, diſtance, difference of latitude, and departure, any two of them be given, the reſt may be found by plane trigonometry.

For the ready working of any ſingle courſe, there is a table called a TRAVERSE *table*, uſually annexed to treatiſes of navigation; which is ſo contrived, that by finding in it the given courſe, and a diſtance not exceeding 100 miles, the difference of latitude and departure are had by inſpection. And this table will ſerve for greater diſtances, by taking their halves, thirds, fourths, &c. and doubling, trebling, quadrupling, &c. the difference of latitude and departure found to thoſe parts of the diſtance.

From the figure above referred to, in which A E, A F, or A H repreſent the radius of the tables, E B the ſine of the courſe, G F its tangent, and A G its ſecant, A B the ſine of the complement of the courſe, H I its tangent, and A I its ſecant, we may deduce all the proportions, or canons as they are uſually called by mariners, that can ariſe in *plain ſailing*; becauſe the triangles A D C and A B E, A D C and A F G are evidently ſimilar. Theſe proportions are exhibited in the following table.

Caſe.	Given.	Required.	Solutions.
1	∠ A, A C, i. e. courſe and diſtance.	A D, D C, i. e. diff. of lat. and departure.	A E : A B : : A C : A D, i. e. rad. : diſt. : : coſine of courſe : diff. of lat. A E : E B : : A C : D C, i. e. rad. : diſt. : : ſine of courſe : departure.
2	∠ A, A D, i. e. courſe and diff. of lat.	A C, D C, i. e. diſtance and departure.	A B : A E : : A D : A C, i. e. coſ. courſe : diff. lat. : : rad. : diſtance. A B : B E : : A D : D C, i. e. coſ. courſe : diff. lat. : : ſine courſe : departure.
3	∠ A, D C, i. e. courſe and departure.	A C, A D, i. e. diſtance and diff. of lat.	B E : A E : : D C : A C, i. e. ſine courſe : departure : : rad. : diſtance. B E : A B : : D C : A D, i. e. ſine courſe : departure : : coſ. courſe : diff. lat.
4	A D, A C, i. e. diſtance and diff. of lat.	∠ A, D C, i. e. courſe and departure.	A C : A D : : A E : A B, i. e. diſtance : rad. : : diff. lat. : coſ. courſe. A E : E B : : A C : D C, i. e. rad. : diſtance : : ſine courſe : departure.
5	A C, D C, i. e. diſtance and departure.	∠ A, A D, i. e. courſe and diff. of lat.	A C : D C : : A E : E B, i. e. diſtance : rad. : : departure : ſine courſe. A E : A B : : A C : A D, i. e. rad. : diſtance : : coſ. courſe : diff. lat.
6	A D, D C, i. e. diff. of lat. and departure.	∠ A, A C, i. e. courſe and diſtance.	A D : D C : : A F : F G, i. e. diff. lat. : departure : : rad. : tangent courſe. B E : A E : : D C : A C, i. e. ſine courſe : departure : : rad. : diſtance.

We ſhall now give ſome examples of the application of theſe canons to the ſolution of ſingle courſes.

Caſe 1. A ſhip from the latitude 47° 30′ N. has ſailed S. W. by S. 98 miles, what latitude is ſhe in, and what departure has ſhe made?

By the traverſe table. In the column of the courſe, viz. 3 points, againſt the diſtance 98, ſtand 81,5 miles for the diff. of lat. and 54,45 miles for the departure.

By conſtruction. Draw the meridian A D (*fig.* 27.) and make the quadrant A *m c p*. Make the arc *m c* equal to 3 points, and through *c* draw A B = 98 miles. Draw B D parallel to *p* A; and A D the diff. of lat. meaſures about 81½ miles, and B D the departure about 54,4 miles.

By computation. For the diff. of lat. rad. : diſt. : : coſ. courſe : diff. lat. i. e. 10,00000 : 1,99123 (log. of 98) : : 9,91985 (coſ. 33° 45′) : 1,01108 the log. of 81,48 miles. For the departure : rad. : diſt. : : ſin. courſe : departure, i. e. 10,00000 : 1,99123 : : 9,74474 (ſine of 33° 45′) : 1,73597 the log. of 54,45 miles.

By Gunter's ſcale. The extent from radius, or 8 points, to 3 points, on the line of ſine rhumbs, applied to the line of numbers, will reach from 98, in either interval, to 54,4. And the extent from 8 points to 5 points, among the rhumbs, reaches from 98 to 81,5 on the line of numbers.

Caſe 2. A ſhip has ſailed S. E. by S. from the lat. 47° 30′ N. to the lat. 46° 8′ N. What diſtance has ſhe run, and what departure has ſhe made?

By the traverſe table. The diff. of lat. is equal to 47° 30′ — 46° 8′ = 82′. Under the courſe or 3 points in the column of lat. find the neareſt number to 82, which is 82,3, and the correſponding departure is 55, and the diſtance 99 miles.

By conſtruction. Deſcribe the quadrant A *m c p* (*fig.* 28); make *m c* = 3 points, and produce A *m*, till A D becomes = 82 miles; draw D B parallel to A *p*, meeting the line A B drawn through *c* in B: and the diſtance A B meaſures about 99 miles, and the departure D B meaſures about 55 miles.

By computation. For the diſtance : coſ. courſe : diff. lat. : : rad. : diſt. i. e. 9,91985 (coſ. 33° 45′) : 1,91381 (log. of 82) : : 10,00000 : 1,99396 the log. of 98,62 miles. For the departure : coſ. courſe : diff. lat. : : ſine courſe : departure; i. e. 9,91985 : 1,91381 : : 9,74474 : 1,73871 the log. of 54,79 miles.

By Gunter's ſcale. The extent from 5 points to 8 points, in the line of ſine rhumbs, will reach, on the line of numbers, from 82 to 99. And the extent from 5 points to 3, on the ſine rhumbs, will reach from 82 to 55 on the line of numbers.

Caſe 3. A ſhip from lat. 47° 30′ N. ſailing N. W. by W. finds ſhe has made 82 miles of departure. What is her diſtance run, and what latitude is ſhe now in?

By the traverſe table. The courſe being 5 points, over that, in the column of departure, the neareſt number to 82 is 82,3; and the correſponding diff. of lat. is 55 miles, and the diſtance is 99 miles.

By conſtruction. Deſcribe the quadrantal arc A *m c p* (*fig* 29.); make *m c* = 5 points, and produce A *p*, till A *b* becomes = 82 miles; through *b* draw *b* B parallel to A *m*, meeting the line A B, drawn through *c*, in B; and through B draw B D, parallel to *b* A, meeting A *m* produced in D: then the diſtance A B meaſures about 99 miles, and the diff. of lat. A D meaſures about 55 miles.

By computation. For the diſtance : ſine of courſe : dep. : : rad : diſt. i. e. 9,91985 (ſine of 56° 15′) : 1,91381 (log. of 82) : : 10,00000 : 1,99396 the log. of 98,62, the diſtance. For the diff. of lat. ſine courſe : dep : : coſ. courſe : diff. lat. i. e. 9,91985 : 1,91381 : : 9,74474 (coſ. 56° 15′) : 1,73870 the log. of 54,79 the diff. of lat.

By Gunter's ſcale. The extent from 5 points to 8 points, on the line of ſine rhumbs, will reach, on the line of numbers, from 82 to 99. And the extent from 5 points to 3 points, on the line of ſine rhumbs, will reach from 82 to 55 on the line of numbers.

Caſe 4. A ſhip from lat. 47° 20′ N. ſails between the north and eaſt 98 miles, and is arrived in lat. 48° 42′ N. What courſe did ſhe ſteer, and what departure has ſhe made?

By the traverſe table. The diff. of lat. is 48° 42′ — 47° 20′ = 82′. Againſt the diſtance 98 ſtands the lat. 81,95 the neareſt to 82, and the correſponding departure is 53,73 miles, and the courſe is 33° 15′.

By conſtruction. Deſcribe the quadrant A *m c p* (*fig.* 30.); produce A *m*, till A D becomes = 82; through D draw D B parallel to A *p*, and with the diſtance 98 interſect D B in B: the departure will be found to meaſure 53 miles, and the courſe D A B is meaſured by the arc *m c* of about 33°.

By computation. For the courſe : diſt. : rad. : : diff. lat. : coſ. courſe, i. e. 1,99123 (log. of 98) : 10,00000 : : 1,91381 (log. of 82) : 9,92258 the coſine of 33° 13′. For the departure : rad. : diſt. : : ſine courſe : departure, i. e. 10,00000 : 1,99123 : : 9,73863 (ſine of 33° 13′) : 1,72986 log. of 53,69.

By Gunter's ſcale. The extent from 98 to 82, on the line of numbers, will reach, on the line of ſines, from 90 to about 57°. And the extent from 90° to 33°, on the line of ſines, will reach, on the line of numbers, from 98 to about 53 miles. Thus it appears that the courſe is N. 33° 15′ E. or N. E. by N. nearly, and the departure is 53,69 miles to the eaſtward.

Caſe 5. From lat. 50° 13′ N. a ſhip, in ſailing between the ſouth and eaſt 98 miles, makes her departure 82 miles. What courſe did ſhe keep, and what latitude is ſhe arrived at?

By the traverſe table. Againſt the diſtance 98 ſtands 81,95, in the column departure, the neareſt to 82, and here the diff. of lat. is 53,73 miles, and the courſe is 56° 45′.

By conſtruction. Deſcribe the quadrant A *m c p* (*fig.* 31); produce A *p* till A *b* = 82; and through *b* draw *b* B parallel to A *m*; from A, with the diſtance 98, cut *b* B in B; through B draw B D parallel to A *b*, meeting A *m* produced in D : and the diff. lat. A D meaſures about 53 miles, and the courſe D A B is meaſured by the arc *m c* of about 57°.

By computation. For the courſe : diſt. : rad. : : dep. : ſine courſe, i. e. 1,99123 : 10,00000 : : 1,91381 : 9,92258 ſine of 56° 47′. For the diff. lat. rad. : diſt. : : coſ. courſe : diff. lat. i. e. 10,00000 : 1,99123 : : 9,73863 : 1,72986 the log. of 53,69; ſo that that the lat. arrived at is 50° 13′ N. − 54′ = 49° 19′ N.

By Gunter's ſcale. The extent from 98 to 82, on the line of numbers, will reach on the line of ſines from 90° to about 57° : and the extent from 90° to 33°, on the line of ſines, will reach from 98 to about 53 miles on the line of numbers. So that the courſe is S. 56° 47′ E. or S. E. by E. nearly, and the latitude arrived in is 49° 19′ N.

Caſe 6. A ſhip from lat. 48° 32′ N. is arrived in lat. 49° 54′ N. and her departure is 54 miles W. What courſe did ſhe ſteer, and what the direct diſtance run?

By the traverſe table. The diff. lat. = 49° 54′ − 48° 32′ = 82 m. The numbers in the table neareſt to 82 and 54 are 81,95 and 53,73; and the diſtance anſwering to theſe is 98 miles, and the courſe is 33° 15′.

By conſtruction. Deſcribe the quadrant A *m c p* (*fig.* 32), and produce A *m*, till A D = 82; through D draw D B, parallel to A *p*, and = 54, and draw A B. Then the diſtance A B meaſures about 98 miles, and the courſe D A B is meaſured by the arc *m c* of about 33°.

By computation. For the courſe : diff. lat : dep. : : rad. : tang. courſe, i. e. 1,91381 (log. of 82) : 1,73239 (log. of 54.) : : 10,00000 : 9,81858 tang. of 33° 22′. For the diſtance : ſine courſe : dep. : : rad. : diſt. i. e. 9,74036 (ſine of 33° 22′) : 1,73239 : : 10,00000 : 1,99203 the log. of 98,18 miles.

By Gunter's ſcale. The extent from 82 to 54, on the line of numbers, will reach, on the line of tangents, from 45° to about 33°. And the extent from about 33° to 90°, on the line of ſines, will reach, on the line of numbers, from 54 m. to about 98 m. The courſe is, therefore, N. 33° 22′ W. or N. W. by N. nearly, and the diſtance 98,18 miles.

For the method of conſtructing and reſolving compound courſes. See TRAVERSE.

SAILING, *oblique.* In the preceding examples, the bearing and diſtances of places were determined by the ſolution of right-angled triangles: but at ſea there are many caſes in which only oblique poſitions can be obſerved; and, therefore, it may not be improper to give a few examples of the ſolution of ſuch caſes.

Ex. 1. Two ſhips, A and B (*Tab.* II. *Navigation*, *fig.* 33.) ſail from two iſlands, bearing the one from the other N. E. and S. W. their diſtance being 76 miles; A ſails S. by E. and B runs E. by S. at laſt they meet. How far has each ſailed?

Conſtruction. With the chord of 60° deſcribe a circle repreſenting the horizon of one of the places ſailed from; e. gr. of A, the northern; draw the meridian N S, and, at right angles to it, draw the parallel of latitude E W. In this circle lay off the S. W. rhumb S *o*, the S. by E. rhumb S *p*, and the E. by S. S *m*; through *o* draw A B equal to 76 miles; through B draw B C, parallel to A *m*, meeting A C drawn through *p*. Then A and B repreſent the places ſailed from; A C and B C the diſtances and courſes, when properly compared with the meridian, the ſhips had ſailed when they met at C: and theſe diſtances may be meaſured from the ſcale A B was taken from.

Computation. In the triangle A B C there are given one ſide A B, and all the angles, to find the other ſides.—Thus, ∠ A = 5 points = 56° 15′: for S *o* + S *p* = 5 points : ∠ B = 5 points = 56° 15′; for B C is parallel to A *m*; and ∠ B = B A *n* = 5 points; and ∠ C = C A *m* = 6 points = 67° 30′. Then by a well known theorem in TRIGONOMETRY, ſine of C : A B : : ſine of A : B C: i. e. ſine of 67° 30′ : 76 m. : : ſine of 56° 15′ : 68,4 m. And ſince the angle B = the angle A, A C = B C; conſequently A ſails S. by E. 68,4 miles, and B ſails E. by S. 68,4 miles.

Ex. 2. At noon a headland bore N. W. by W. then *ſailing* N. N. E. 5 miles an hour, we anchored at nine in the evening, in a creek, 18 leagues diſtant from the headland. Required its diſtance at noon, and bearing from the creek?

Conſtruction. Having deſcribed the horizon and drawn the meridian and parallel, in the meridian take any point A (*fig.* 34.) for the ſhip's place at firſt; draw the N. W. by W. and N. N. E. rhumbs, and parallel to them draw A B, A C. Make A C = 45 miles = 9 h. × 5 m. and from C with 54 m. (= 18 leag. × 3) cut A B in B: then B is the headland, and C the creek.

Computation. In the triangle A B C we have the ſide A C = 45 m. the ſide C B = 54 m. and ∠ A = 78° 45′ = 5 points for N. W. by W. + 2 points for N. N. E; whence B C : S. A : : A C : S. B, i. e. 54 : S. 78° 45′ : 45 : S. B = 54° 49′; and the angle C = 46° 26′; and in the ſame manner we ſhall have A B = 39,9 miles; conſequently ∠ *o a n* − ∠ *n a w* = ∠ *o a w* = 21° 4′, which taken from 90° leaves 68° 56′. Hence the headland's diſtance at noon is 39,9 miles, and its bearing from the creek is S. 68° 56′ W. or W. S. W. ¼ W. nearly.

Ex. 3. A merchant ſhip meeting with a ſhip of war, which had ſailed S. E. by E. 39 leagues from the latitude of 45° 30′ N. informed them, that ſhe had been plundered the day before, in the ſame latitude; and had ſince run 67 leagues on a direct courſe, between the ſouth and weſt; and that the pirates were cruiſing about the place where they robbed her. What courſe muſt the man of war ſteer to come up with them?—

Suppoſe A (*fig.* 35.) the place the man of war ſailed from, B the place where the merchant-man was robbed, C the place where they met; then the man of war muſt ſail along C B to meet the pirates, which courſe will be ſhewn by *c n* drawn parallel to C B. Here are two given ſides, and an angle oppoſed to one of them, to find the angle B oppoſite to the other ſide A C. C B : S. ∠ A : : A C : S. ∠ B : i. e. 67 leagues : S. 33° 45′ : : 30 leagues : S. 18° 52′; conſequently the courſe the man of war muſt ſteer is N. 71° 8′ E. for *n c* B = C B *c*, and 90° − *n c* B = N *c n*.

Ex. 4. Coming within ſight of two headlands, bearing north and ſouth of each other; the ſouthern one bore from the ſhip due eaſt, and the other N. E. by E. and after ſailing due eaſt 5 miles, the northern headland bore N. E. by N. ½ E. Required the diſtance of thoſe headlands from one another, and their diſtance from the ſhip at each time of ſetting them?

In the eaſt and weſt line take B A (*fig* 36) = 5 miles; draw the N. E. by E. and N. E. by N. ½ E. rhumbs B *n*, B D; through A draw A D, parallel to B *n*, meeting B D in D; draw D C perpendicular to A B produced. Then D and C are the headlands; A, B are the ſhip's places at the times of ſetting them; and A B the diſtance ſailed. The angle A = C B *n* = 3 points; the angle D B C = 4½ points; then A B D = 11½ points, A D B = 1½ point, and B D C = 3½ points. In the triangle A B D, having the ſide A B and all the angles given, find the ſides A D, B D: and in the right-angled triangle B C D, having the ſide B D and all the angles, it is eaſy to find the ſides B C, C D. A D will be = 13,31 m. B D = 9,565 m. B C = 6,07 m. and C D = 7,395 m.

Ex. 5. Having caſt anchor, I obſerved the bearings of a tower, a mill, and a light houſe, known to lie due eaſt and weſt of one another; the tower bore W. S. W. the mill S. W. by S. ½ W. and the light-houſe S. by W. ½ W. The diſtance of the tower from the mill is 5½ miles. How far are each of thoſe objects diſtant from the place where I anchored?

Draw the given rhumbs B *r*, B *o*, B *n*, (*fig.* 37.) make B A = 5½ miles; produce *o* B till it meets A D, drawn parallel to B *r*, in D C; draw D C parallel to B *n*; then D repreſents the ſhip's place, A the tower, B the mill, and C the light-houſe. The angles are found and the triangles ſolved, as in the laſt example; and we ſhall have D A = 9,021 m. D B = 4,466 m. and D C = 3,608 miles.

SAILING *to windward.* The doctrine of plane triangles is farther applicable to this method of *ſailing*; for the right underſtanding of which, it will be neceſſary to explain the terms that occur in this part of navigation, though moſt of them may be met with in their proper places in this work. See AFT, BEAM, LARBOARD, STARBOARD, &c.

It may be obſerved, in general, that when the wind is directly, or partly, againſt the ſhip's direct courſe to the place whither ſhe is bound, ſhe reaches her port by a kind of zigzag, or z like courſe; which is made by ſailing with the wind, firſt on one ſide of the ſhip, and then on the other ſide.

The windward or weather-ſide of a ſhip is that ſide on which the wind blows, the other being called the LEEWARD, or lee-ſide.

When a ſhip ſails the ſame way the wind blows, ſhe is ſaid to ſail before the wind, and the wind is ſaid to be *right aft*, or *right aſtern*; and her courſe is then 16 points from the wind. When a ſhip ſails with the wind blowing directly acroſs her, ſhe is ſaid to have the wind *on the* BEAM; and her courſe is 8 points from the wind. When the wind blows obliquely acroſs the ſhip, the wind is ſaid to be *abaft the beam*, or *afore the beam*, according as her courſe is more or leſs than 8 points from the wind. When a ſhip endeavours to ſail towards that point of the compaſs from whence the wind blows, ſhe is ſaid to *ſail on a wind*, or to PLY *to windward.* A veſſel *ſailing* as near as ſhe can to the point from whence the wind blows is ſaid to be CLOSE-HAULED: moſt ſhips will lie within about 6 points of the wind; but ſloops, and ſome other veſſels, will lie much nearer. When a ſhip ſails on a wind, the windward TACKS are always hauled forwards, and the leeward ſheets aft. The ſtarboard tacks are aboard when the ſtarboard ſide is to windward, and the larboard to leeward; and the larboard tacks are aboard when the larboard ſide is to windward, and the ſtarboard too leeward. In order to know how near the wind a ſhip will lie, obſerve the courſe ſhe goes on each tack, when ſhe is cloſe-hauled; then half the number of points between the two courſes will ſhew how near the wind that ſhip will lie.

The moſt common caſes in turning to windward may be conſtructed by the following precepts. Having drawn the meridian and parallel of latitude (or eaſt and weſt line) in a circle repreſenting the horizon of the place, mark in the circumference the place of the wind; draw the rhumb paſſing through the place bound to, and lay thereon the diſtance of that place from the centre. On each ſide of the wind, lay off in the circumference the points or degrees, ſhewing how near the wind the ſhip can lie; and draw theſe rhumbs: the firſt courſe will be on one of theſe rhumbs according to the tack the ſhip leads with; draw a line through the place bound to, parallel to the other rhumb, and meeting the firſt; and this will ſhew the courſe and diſtance on the other tack.

Ex. 1. The wind at north, and I am bound to a port 25 miles directly to windward, being on my ſtarboard tacks, and can lie within 6 points of the wind. What muſt be my courſe and diſtance on each of two tacks to reach my port?

The conſtruction being made as directed, N (*fig.* 38.) is the place of the wind, A the port bound to, and B the place where the ſhip is ſuppoſed to be, when the port is 25 miles to windward of her. As the ſhip leads with her ſtarboard tacks, i. e. has the wind blowing on her ſtarboard ſide, ſhe muſt firſt ſail along the line B C drawn parallel to the rhumb A *n*, which is 6 points from the wind; and where the other rhumb A *o*, 6 points alſo from the wind, being produced from A towards C, meets with B C in the point C, is the place where ſhe muſt tack about to reach her port within 6 points of the wind on her larboard tacks. Since B C is parallel to A *n*, the $\angle B = \angle NAn = 6$ points: and $BAC = NAo = 6$ points; hence $\angle C = 4$ points; and as $\angle B = BAC$, the ſide $BC = CA$; conſequently, as one ſide A B, and all the angles are given, we ſhall have ſine of C : A B : : ſine of B A C : B C, i. e. ſine of 45° : 25 m. : : ſine of 67° 30′ : 32,66. Hence it appears, that the ſhip muſt ſail on her ſtarboard tacks W. N. W. 32,66 miles, and her larboard tacks E. N. E. 32,66 miles.

Ex. 2. A privateer lying by with the wind at N. N. E. ſees a ſloop on her ſtarboard tacks, that had juſt doubled a point 18 miles to the W. by N. the ſloop run for her port within 6 points of the wind; the privateer gave chaſe at the rate of eight knots an hour, and in four hours came up with her. Required the ſloop's rate of ſailing, and alſo the courſes of both veſſels?

Draw B A (*fig.* 39.) to the E. by S. and equal to 18 miles; on A with 32 m. = 8 × 4, cut the rhumb B C, drawn 6 points from the wind, at *w*; then the privateer is firſt at A, ſees the ſloop at B, gives chaſe along the line A C, and takes the ſloop at C; and B *o*, drawn parallel to A C, ſhews the privateer's courſe from the north. Here are known 2 ſides, A B, A C, and the angle A B C = 13 points. Hence we may eaſily obtain the other parts of the triangle; and find that the ſloop ſails N. W. at the rate of 3,86 m. per hour $= \frac{BC}{4}$, and that the privateer's courſe is N. 63° 12′ W.

Ex. 3. A ſhip that can lie within 6 points of the wind, ſees a headland 21 miles to the N. E. which ſhe is to weather, in order to reach an iſland 9 miles to windward thereof, the wind being at eaſt. What courſe and how far muſt ſhe go on each tack, leading with the ſtarboard?

Draw B A (*fig.* 40) = 21 m. to the S. W. B C = 9 m. to the eaſt, join A C; draw A D and C D each 6 points from the wind: then A is the ſhip's place, B the headland, C the iſland, A D the run on the ſtarboard tacks, and D C that on the larboard. In the triangle A B C, we have B A, B C, and the angle A B C = 12 points; and can hence find the other angles, and A C. Then in the triangle A C D, the ſide A C, and all the angles are known (becauſe $\angle D = 4$ points, $DCA = DCB + BCA$, and $CAD = BAD + BAC$), and we may find A D, D C. On the ſtarboard the ſhip runs 30,19 miles on the N. N. E. rhumb, and on the larboard 23,12 miles on the S. S. E. rhumb.

SAILING, *current*, for an account of, ſee CURRENT.

SAILING, *globular*, is the method of eſtimating either the difference of latitude, difference of longitude, departure, courſe, or diſtance, from any two of them being known, upon principles deduced from the figure of the earth: and in this conſiſts the application and uſe of *Mercator's* CHART. See the principles of this method explained and demonſtrated under MERIDIONAL *parts*.

Globular ſailing, in the extenſive ſenſe here applied to the term, comprehends PARALLEL *ſailing*, MIDDLE *latitude ſailing*, and MERCATOR's *ſailing*; to which we may alſo add CIRCULAR *ſailing*. Of each of theſe we ſhall here give a brief account, with examples of their uſe.

SAILING, *parallel*, is the art of finding what diſtance a ſhip ſhould run due eaſt or weſt, in *ſailing* from the meridian of one place to that of another place, in any parallel of latitude: the method of performing which is by *ſailing* to the parallel of latitude the place is in, keeping a good account, ſo as to be certain whether the place is then to the eaſtward or weſtward; and alſo, if poſſible, to know the longitude arrived at: and then to run due weſt or eaſt, till the ſhip comes near the longitude of the given place; where ſhe is then ſure to make the port required.

The computations in *parallel ſailing* depend on the following rule: as radius, R, to the coſine of the latitude of any parallel, S, ſo are the miles of longitude between any two meridians, L, to the diſtance of thoſe meridians in that parallel, D. For the demonſtration of this rule, ſee MERIDIONAL *Parts*.

From the preceding proportion is eaſily deduced the following rule: as the coſine of one latitude, S, is to the coſine of another latitude, *s*, ſo is a given meridional diſtance in the firſt parallel, D, to the correſponding meridional diſtance in the ſecond parallel, *d*. Hence ariſe the following proportions:

$R : S :: L : D$
$S : R :: D : L$
$L : D :: R : S$
$S : s :: D : d$
$D : d :: S : s$

whereby all the caſes that can happen in this kind of *ſailing* are readily reſolved by the logarithms, and alſo by the following table, calculated for a difference of longitude of 1 degree, or 60 nautical miles of the equator, by the firſt rule.

Lat.	Miles.	Lat.	Miles.	Lat.	Miles.	Lat.	Miles.	Lat.	Miles.	Lat.	Miles.
1	59,99	16	57,67	31	51,43	46	41,68	61	29,09	76	14,51
2	59,96	17	57,38	32	50,88	47	40,92	62	28,17	77	13,50
3	59,92	18	57,06	33	50,32	48	40,15	63	27,24	78	12,48
4	59,85	19	56,73	34	49,74	49	39,36	64	26,30	79	11,45
5	59,77	20	56,38	35	49,15	50	38,57	65	25,36	80	10,42
6	59,67	21	56,01	36	48,54	51	37,76	66	24,41	81	9,38
7	59,56	22	55,63	37	47,92	52	36,94	67	23,44	82	8,35
8	59,42	23	55,23	38	47,28	53	36,11	68	22,48	83	7,32
9	59,26	24	54,81	39	46,63	54	35,27	69	21,50	84	6,28
10	59,09	25	54,38	40	45,96	55	34,41	70	20,52	85	5,23
11	58,89	26	53,93	41	45,28	56	33,55	71	19,53	86	4,18
12	58,69	27	53,46	42	44,59	57	32,68	72	18,54	87	3,14
13	58,46	28	52,97	43	43,88	58	31,79	73	17,54	88	2,09
14	58,22	29	52,47	44	43,16	59	30,90	74	16,54	89	1,05
15	57,95	30	51,96	45	42,43	60	30,00	75	15,53	90	0,00

See another table of this kind, allowing 69 miles 864 feet to one degree, under DEGREE.

As a ſpecimen of the manner of uſing this table; let the meridional diſtance correſponding to any number of degrees and minutes be required: take the difference of the meridional diſtances to the given degrees, and thoſe which are next greater; multiply this difference by the given minutes, and divide by 60; then the quotient, ſubtracted from the miles againſt the given degrees in the table, will leave the meridional diſtance required.—E. g. How many miles anſwer to a degree of longitude in the latitude of 48° 26′?

Lat. 48° 40,15 miles. } The difference is 0,79, which
Lat. 49° 39,36 miles. } multiplied by 26 gives 20,55;
and this divided by 60 gives 0,38; which taken from 40,15 leaves 39,77, the miles required.

Again, if it were required to find the correſponding degrees and minutes to a given meridional diſtance, intermediate to thoſe in the table; ſubtract the given meridional diſtance from the next greater, found in the table; multiply the remainder by 60; divide the product by the difference of the meridional diſtances next greater and leſs than the given one; then the quotient, annexed as minutes to the degrees of the next greater meridional diſtance, will give the degrees and minutes ſought.—E. g. In what latitude do 46,08 miles anſwer to one degree of longitude?

From 46,63, the miles correſponding to 39°,
take 46,08, the given miles,
The difference 0,55, multiplied by 60, gives 33; and this divided by 0,67, the difference between 39° and 40°, gives 49′: and, therefore, 39° 49′ is the latitude ſought. We ſhall here ſubjoin an example to each of the above proportions or canons.

Caſe 1. A ſhip in the lat. of 32° N. ſails thence due eaſt till her difference of longitude is 384 miles. Required the diſtance ſhe has run?

By conſtruction. From any point P (*fig.* 41.) with a radius of 90°, taken from the ſcale of natural ſines, deſcribe the arc EQ; draw the chord EQ equal to 384 miles taken from a ſcale of equal parts; and draw the radii PE, PQ. From the ſame point P, with a radius equal to the ſine of 58° (the complement of the lat.) taken from the natural ſines, deſcribe the arc AB; and draw the chord AB, whoſe meaſure is the diſtance ſought. In this figure P repreſents the north pole; the arc EQ the equator; the arc AB a parallel of latitude; the chord EQ is the difference of longitude; the chord AB is the meridional diſtance ſought; A is the place ſailed from; B the place arrived at; and the radii PE, PQ expreſs the meridians of the places ſo ſailed from and come to.

By computation. R : S : : L : D, i. e. 10,00000 : 9,92842 (coſ. of 32) : : 2,58433 : 2,51275 the log. of 325,6 the miles of diſtance run.

By the table. Find the miles anſwering to the given latitude: multiply them by the given difference of longitude; the quotient, divided by 60, will give the meridional diſtance ſought. To 32° degrees anſwers 50,88 miles, then 50,88 × 384 = 19537,92, which, divided by 60, gives 325,632, the meridional diſtance ſought.

Caſe 2. A ſhip from the lat. 53° 36′ N. long. 10° 18′ E. ſails due weſt 236 miles. Required her preſent longitude?

By conſtruction. From the point P (*fig.* 41.) with the ſine of 90°, and the coſine of 53° 36′, deſcribe the arcs EQ, CD; draw the chord CD = 236; through C and D draw the radii PE, PQ; then the chord EQ, being drawn, will be the difference of longitude.

By computation. S : R : : D : L : or PC : PE : : CD : EQ: i. e. 9,90574 (coſ. of 53° 36′): 10,00000 : : 2,37291 (log. of 236 m. the meridional diſtance): 2,59955 (the log. of 397,7) the difference of longitude: which, divided by 60, gives 6° 38′ W. and this ſubtracted from 10° 18′ E. gives the longitude required = 3° 40′ E.

By the table. Find the meridional diſtance to a degree of longitude in lat. 53° 36′, and make it a diviſor to the product of the given meridional diſtance by 60; and the quotient will be the difference of longitude ſought. Thus, the difference of the meridional diſtances to 53° and 54° is 0,85; which multiplied by 36′, and divided by 60′, gives 0,51; this taken from 36,11 the meridional diſtance to 53° leaves 35,6 for the meridional diſtance to 53° 36′: then $\frac{236 \times 60}{35,6} = 397,7$ the difference of longitude ſought.

Caſe 3. In what latitude do 384 miles of meridional diſtance anſwer to 500 miles of difference of longitude?

By conſtruction. From the point P (*fig.* 42.) with the ſine of 90°, deſcribe the arc EQ; draw the chord EQ = 500, and draw the radii PE, PQ; make EC = 384, draw CB parallel to EP; then the arc AB being deſcribed with the radius PB is the parallel of latitude ſought.

By computation. L : D : : R : S or EQ : AB : : PE : PA, i. e. 2,69897 : 2,58433 (log. of 384) : : 10,00000 : 9,88536, the coſine of 39° 49′, in which lat. 384 miles of meridional diſtance anſwers to 500 miles of longitude.

By the table. The given meridional diſtance 384, being multiplied by 60, and the product divided by the given diff. of long. 500 gives 46,08 the merid. diſt. to one degree of longitude in the latitude ſought: and the latitude will be found to be 39° 49′.

Caſe 4. From two ports in the lat. 32° 20′ N. diſtant 256 miles, two ſhips ſail directly north. How far are they diſtant from one another, when they come to the latitude 44° 30′ N.?

By conſtruction. From the point P (*fig.* 43.) with radii equal to the coſines of 32° 20′ and 44° 30′ deſcribe the arcs AB, DE; draw the chord AB = 256, and draw PA, PB; then will the chord DE be the diſtance ſought.

By computation. S : *s* : : D : *d*, or PA : PD : : AB : DE, i. e. 9,92683 (coſ. 32° 20′) : 9,85324 (coſ. 44° 30′) : : 2,40824 (log. of 256) : 2,33465 the log. of 216,1, the diſtance ſought.

By the table. The meridional diſtances, correſponding to 32° 20′ and 44° 30′ are 50,7 and 42,8; then the given meridional diſtance 256 × 42,8 = 1095,68, which divided by 50,7 gives 216,1, the meridional diſtance ſought.

Caſe 5. If two ſhips in the lat. 44° 30′ N. diſtant from one another 216 miles, ſhould both ſail hence directly ſouth, until their diſtance is 256 miles: what latitude are they come to?

By conſtruction. From P (*fig.* 44.) with a radius of the coſine of 44° 30′, deſcribe the arc DE, draw the chord DE = 216; and through D and E draw PA, PB; produce DE till DF = 256; through F draw FB parallel to PA meeting PB in B; then an arc deſcribed from P through B and A will be the parallel of latitude come to.

By computation. D : *d* : : S : *s* or DE : AB : : PD : PA, i. e. 2,33445 (log. of 216) : 2,40824 (log. of 256) : : 9,85324 (coſ. 44° 30′) : 9,92702, the coſine of 32° 17′, the latitude ſought.

By the table. To lat. 44° 30′ find the merid. diſt. 42,8; then $\frac{42,8 \times 256}{210} = 50,72$, which will be the merid. diſt. correſponding to 32° 17′, the latitude ſought.

Sailing, *middle latitude*, is a method of ſolving the ſeveral caſes of globular *ſailing*, by the principles of plane and parallel *ſailing* jointly: and it is founded on the ſuppoſition, that the departure is reckoned as a meridional diſtance in that latitude, which is a middle parallel between the latitude ſailed from, and the latitude come to. This method is not quite accurate; becauſe the arithmetical mean of the coſines of two diſtant latitudes is not the coſine of the arithmetical mean of thoſe latitudes; nor is the departure between two places on an oblique rhumb, equal to the diſtance between their meridians in a mean latitude: yet when the parallels of thoſe places are near the equator, or not far diſtant from one another, in any latitude, the error is inconſiderable.—The computations, in this method, depend on the following rules:

1. Add the latitude ſailed from to the latitude arrived at, and take half the ſum for the middle latitude.

2. As the coſine of the middle latitude, C, is to the radius, R, ſo is the departure, D, to the difference of longitude, L. See *Parallel* Sailing, and Meridional *parts*.

3. As the coſine of the middle latitude, C, is to the tangent of the courſe, T, ſo is the difference of latitude, P, to the difference of longitude, L: for, from rule 2. we obtain rad. × dep. = coſ. mid. lat. × diff. long. and, from caſe 6. of *plane* sailing, rad. × dep. = diff. lat. × tang. courſe: therefore, by equality and proportion, we ſhall have the rule. Hence ariſe the following proportions or canons.

$$\left.\begin{array}{l} C : R :: D : L \\ L : D :: R : C \\ R : C :: L : D \end{array}\right\} \begin{array}{l} C : T :: P : L \\ P : L :: C : T. \end{array}$$

Sailing, *Mercator's*, is the art of reſolving the ſeveral caſes of globular *ſailing*, by plane trigonometry, with the aſſiſtance of a table of meridional parts, or of logarithmic tangents. The computations are performed by the following rules.

1. As the merid. diff. of lat. M, is to the diff. of long. L, ſo is the radius, R, to the tangent of the courſe, T: whence we have alſo, R : T : : M : L and T : R : : L : M.

2. As the proper diff. of lat. P, is to the departure, D, ſo is the merid. diff. of lat. M, to the diff. of long. L: whence we have alſo, M : L : : P : D.

3. As the difference of the logarithmic tangents of $\frac{1}{2}$ colatitudes, G, is to the tangent of 51° 38′ 9″ N. ſo is a given diff. of long. L, to the tangent of the courſe, T: whence we have alſo, N : G : : T : L and T : L : : N : G.

The manner of working with the meridional parts and logarithmic tangents will appear from the two following caſes.

1. Let the latitudes of two places be given, and the meridional difference of latitude between them be required. By the meridional *parts*, when they are on the ſame ſide of the equator, ſay the difference; when on different ſides, the ſum of the meridional parts anſwering to each latitude, will give the meridional difference of latitude required.

By logarithmic tangents, when they are on the ſame ſide of the equator, ſay the difference of the logarithmic tangents, when on different ſides, the ſum of the logarithmic co-tangents, abating the index, of the half colatitudes, divided by 12,63, will give the meridional difference of latitude required.

2. Let the latitude of one place, and the meridional difference of latitude between that and another place be given; and the latitude of the other place be required. The ſum of the meridional parts of the given latitude, and the given meridional difference of latitude, when

they have like names, or their difference, when they have unlike names, found in the table of meridional parts, will give the latitude ſought. Or, multiply the given meridional difference of latitude by 12,63; and in the former caſe ſubtract, but in the latter caſe add, the product to the logarithmic tangent of the given half co-latitude, the degrees correſponding to the tangent of the remainder, or of the ſum being doubled, will give the co-latitude required.

The following example will ſerve to illuſtrate the application and uſe, both of middle latitude and Mercator's *ſailing*.

Ex. What is the courſe and diſtance from Cape Clear, in Ireland, lat. 51° 18′ N. long. 9° 50′ W. to the iſland of St. Mary, one of the Azores, lat. 37° 0′ N. and long. 22° 56′ W.?

By middle latitude ſailing. In this example the diff. of lat. = 14° 18′ = 858 min. and diff. of long. 13° 6′ = 786 min. ſum of the latitudes 88° 18′; middle lat. = 44° 9′; and co-mid. lat. 45° 51′.

By conſtruction. Draw the meridian A D (*fig.* 45.); deſcribe the quadrant A *m p* with the ſine of 90°, and the arc E F with the coſine of the middle latitude; make the chord *m* B equal to 786, the difference of longitude; draw A B cutting the arc E F in F, and draw the chord E F; make A D = 858, the difference of latitude; draw D C parallel to A *p* and equal to E F; and draw A C, which is the diſtance, and the angle D A C is the courſe.

By computation. For the courſe; P : L : : C : T, i. e. 2,93349 (log. of diff. lat. 858) : 2,89542 (log. of diff. long. 786) : : 9,85583 (coſ. of mid. lat. 44° 9′) : 9,81776 the tangent of 33° 19′, the courſe. For the diſtance: ſin. ∠C : A D : : R : A C, i. e. 9,92202 (coſ. of 33° 19′) : 2,93349 : : 10,00000 : 3,01147 the log. of 1027 the diſtance.

By the traverſe table. With the co. mid. lat. found among the degrees, and the diff. of long. or ſome part thereof (if too large) taken among the diſtances, find the departure, or ſome part thereof, in its column: obſerving to multiply this departure by the ſame number the diff. of long. was divided by. Then, with the diff. of lat. and dep. together, or their like parts, find the courſe among the degrees, and the diſtance in its column.

Let the diff. long. 786 be broken into parts, viz into 100 taken 7 times, and into 86: and as the co-mid. lat. is 45° 51′ = 45° $\frac{5}{6}$, proceed thus. The departures to 100 in the columns of 45° and 46° are 70,7 and 71,9; the diff. is 1,2; $\frac{5}{6}$ part thereof is 1,0; which added to 70,7 makes 71,7 for the dep. to 100; and for 700 it will be 501,9. Alſo the departures to 86 in the columns of 45° and 46° are 60,8 and 61,9; $\frac{5}{6}$ of their diff. is 0,9; and this with 60,8 makes 61,7 the departure to 86; and the whole departure = 563,6.

Now take $\frac{1}{20}$ of the diff. of lat. 858, and of the dep. 564, viz. 42,9 and 28,2; theſe will be found together under 33° 15′ for the courſe; and between 51 and 52 diſt. Suppoſe 51$\frac{1}{2}$; which taken 20 times gives 1030 for the diſtance.

By Mercator's ſailing.

Lat. Cape Clear, 51° 18 } Merid. Parts, 3597, Diff. Lat. 858 m.
Lat. St. Mary's 37° } ——— 2393, Diff. Long. 786 m.
Merid. Diff. Lat. 1204.

By conſtruction. Draw the meridian A B (*fig.* 46.) and deſcribe the quadrant A *m p*; make A D = 858 the proper diff. lat. and A B = 1204, the meridional diff. lat. draw D C, B E parallel to A *p*; make B E = 786 the diff. long. and draw A E. Then A is the place of Cape Clear, C that of St. Mary's, A C is the diſtance C D the departure, and the angle D A C is the courſe.

Computation by meridional parts. For the courſe; M : L : : R : T, i. e. 3,08063 (log. of 1204) : 2,89542 (log. of 786) : : 10,00000 : 9,81479, the tangent of 33° 8′, the courſe. For the diſtance; ſine of C : A D : : R : A C, i. e. 9,92293 (coſ. courſe) : 2,93349 (log. of 858) : : 10,00000 : 3,01056 the log. of 1024, the diſtance.

Computation by Logarithmic tangents.

Cape Clear's lat. 51° 18′ Co-lat. 38° 42′ $\frac{1}{2}$ Co-lat. 19° 21′.
St. Mary's lat. 37° 0′ Co-lat. 53° 0′ $\frac{1}{2}$ Co-lat. 26° 30′.
Log. Tang. of $\frac{1}{2}$ Co-lat. 26° 30′ = 9,69774
— — — — — 19° 21′ = 9,54552
Diff. = 1522,2 = G.

For the courſe; G : N : : L : T, i. e. 3,18240 (log. of 1522) : 10,10151 (log. tang. of 51° 38′ 9″) : : 2,89542 (log. of 786) : 9,81452 tang. of 33° 7′, the courſe. The diſtance will be the ſame as in the former computation; for the difference of near a minute in the courſe would not happen in working by tables containing more places.

By the traverſe table. Seek the merid. diff. lat. and diff. long. together, like diff. lat. and departure, and the courſe is given among the degrees. Then with the courſe and proper diff. lat. find the diſtance. Thus, taking $\frac{1}{20}$ of 1204 and 786, viz. 60,2 and 39,3; they will be found together under 33° 15′ for the courſe. And taking $\frac{1}{20}$ of the diff. lat. 858, viz. 42,9, and the courſe 33° 15′, we ſhall have about 51$\frac{1}{2}$ for the diſtance, which taken 20 times gives 1030, the diſtance.

SAILING *circular*, or *great circle*, is the art of finding what places a ſhip muſt go through and what courſes to ſteer, ſo that her tract ſhall be in the arc of a great circle, or nearly ſo, paſſing through the place ſailed from and that bound to. This method of ſailing has been propoſed, becauſe the ſhorteſt diſtance between two places on the ſphere is an arc of a great circle intercepted between them, and not the ſpiral or rhumb paſſing through them, unleſs that rhumb coincides with a great circle, which can only be on the meridian or on the equator. As the ſolutions of the caſes in Mercator's *ſailing* are performed by plane triangles, in this method of *ſailing* they are reſolved by the means of ſpheric triangles. A great variety of caſes might be here propoſed, but thoſe that are the moſt uſeful and moſt commonly recur pertain to the following problem.

Problem I. Given the latitudes and longitudes of two places on the earth, required their neareſt diſtance on the ſurface, together with the angles of poſition from either place to the other. This problem comprehends ſix caſes.

Caſe 1. When the 2 places lie under the ſame meridian; their difference of latitude will give their diſtance, and the poſition of one from the other will be directly north and ſouth.

Caſe 2. When the 2 places lie under the equator; their diſtance is equal to their difference of longitude, and the angle of poſition is a right angle, or the courſe from one to the other is due eaſt or weſt.

Caſe 3. When both places are in the ſame parallel of latitude. E. g. What is the leaſt diſtance between St. Mary's, in lat. 37° 0′ N. long. 22° 56′ W. and Cape Henry, lat. 37° and long. 76° 23′ W.?

Let P E S Q (*fig*, 47.) repreſent the meridian of St. Mary's, E Q the equator, P S the axis, P the north pole, and S the ſouth pole, and from P to A lay off the complement of the latitude of St. Mary's. From Q to C on the equator lay off the difference of longitude between the two places; and through P, C, S, deſcribe the circle P C S, which will be the meridian of Cape Henry, on which, from P to B, lay its co-latitude, by deſcribing the arc A *a*, about the pole P, at the diſtance of the co-latitude. Through the points A, B, D, deſcribe a great circle A B D. Then A repreſents St. Mary's, B Cape Henry, P A and P B their co-latitudes, the angle A P B, meaſured by the arc Q C, their difference of longitude; the arc A B their neareſt diſtance; the angle P A B the angle of poſition from A to B, and the angle P B A that of poſition from B to A. As the places have the ſame latitude, P A = P B, and P A B = P B A; and if the arc P I be deſcribed, making the angle A P I = 26° 43$\frac{1}{2}$′ = half the difference of longitude = I P B, P I will be perpendicular to A B, and biſect it. And in the triangle A I P, right-angled at I, we ſhall have the hypothenuſe A P = 53° and A P I = 26° 43$\frac{1}{2}$′, whence we can find the leg A I = half the diſtance ſought, and the angle P A I = the angle of poſition.

For the diſtance; rad. : ſin. hyp. P A : : ſine of A P I : ſine of A I, i. e. 10,00000 : 9,90235 (coſ. of 37°) : : 9,65292 (ſine of 26° 43$\frac{1}{2}$′) : 9,55527 ſine of 21° 3′, half the diſtance, which doubled gives 42° 6′ the whole diſtance A B; and this reduced to nautical miles is 2526, which is 35 miles leſs than 2561, the diſtance given by *parallel* SAILING.

For the angle of poſition; rad. : coſ. P A : tang. A P I : cotang. A, i. e. 10,00000 : 9,77946 (coſ. of co-lat. or ſin. lat. 37°) : : 9,76199 (tang. 26° 43$\frac{1}{2}$′) : 9,48145 cotang. of 73° 9′, the angle of poſition. Conſequently to ſail from A to B, or from B to A, the ſhip muſt firſt ſteer N. 73° 9′ W. or E. and then gradually increaſe her courſe till ſhe comes to I, where it will be due W. or E.; and from thence the courſe is to be gradually diminiſhed again till ſhe comes to the other port, where it will be 73° 9′, the ſame as ſhe ſet out with. How theſe courſes are to be altered will be ſhewn in Prob. II.

Caſe 4. When one place has latitude, and the other is under the equator: e. gr. what is the neareſt diſtance between the iſland of St. Thomas in lat. 0° 0′, and long. 1° 0′ E. and port St. Julian, in lat. 48° 51′ S. and long. 65° 10′ W.?

Let A (*fig.* 48.) repreſent St. Thomas, A C the meaſure of the angle A S C = 66° 10′ = diff. of long. about the ſouth pole S, at the diſtance of St. Julian's co-lat. deſcribe the arc *a a*, interſecting S C P, the meridian of St. Julian in B, and through A, B, E deſcribe a great circle; and AB is the diſtance ſought; and the angles of poſition are at A and B.

For the diſtance: in the triangle A C B, rad. : coſ. of either leg A C : : coſ. of the other C B : coſ. hyp. A B, i. e. 10,00000 : 9,60646 (coſ. of 66° 10′) : : 9,81825 (coſ. of 48 51′ = diff. of lat) : 9,42471, the coſ. of 74° 35′, the diſtance required; which is 4475 miles leſs by 57 miles than the diſtance found by *Mercator's* SAILING.

For the angle of poſition at A; rad. : ſin. A C : : cotang. CB : cotang. A, i. e. 10,00000 : 9,96129 (ſin. 66° 10′) : : 9,94146 (cotang. 48° 51′) : 9,90275, cotang. of 51° 22′, the angle at A.

For the angle at B; rad. : ſin. C B : : cotang. A C : cotang. B, i. e. 10,00000 : 9,87679 (ſin. 48° 51′) : : 9,64517 (cotang. 66 10′) : 9,52196, cotang. of 71° 36′, the angle at B. Hence it appears, that a ſhip ſailing from the iſland of St Thomas muſt firſt ſhape her courſe S. 51° 22′ W. and then by conſtantly altering her courſe towards the weſt, ſo as to arrive at port St. Julian, on a courſe S. 71° 36′ W. ſhe will have ſailed the ſhorteſt diſtance between thoſe places.

Caſe 5. When the latitudes of the given places are both north, or both ſouth: e. gr. what is the neareſt diſtance between the Lizard and the iſland of Bermudas, and alſo the angles of poſition at each place?

Lat. Lizard 49° 57′ N. and long. 5° 14′ W.
Lat. Bermudas 32° 25′ N. and long. 66° 38′ W.

Diff. long. 61° 24′.

Make P A (*fig.* 40.) = 57° 35′, the co-lat. of Bermudas; P *a* = 40° 3′, the co-lat. of the Lizard; and with the tangent of P *a* deſcribe the arc *a a*. With the ſecant of 61° 24′ arcs, deſcribed from P and S, give the centre of the circle PCS, the meridian of the Lizard, and its interſection with *a a* gives B, the place of the Lizard: the intercepted arc A B of the great circle deſcribed through A, B, and D, is the diſtance ſought, and the angles P A B, P B A, are the poſitions ſought.

For the diſtance; in the triangle A P B, rad. : coſ. A P B : : tang. P A : to tang. of a fourth arc M, i. e. 10,00000 : 9,68006 (coſ. 61° 24′) : : 10,19721 (tang. 57° 35′) : 9,87727, tang. of 37° 1′ = M, which, taken from the co-lat. of the Lizard, = 40° 3′ leaves a fifth arc 3° 2′ = N: then coſ. M : coſ. N : : coſ. of ſide firſt uſed, P A : coſ. ſine required A B, i. e. 9,90225 (coſ. 37° 1′) : 9,99939 (coſ. 3° 2′) : : 9,72922 (coſ. co-lat. or ſin. lat. 32° 25′) : 9,82636, coſ. 47° 54′, the required diſtance.

For the angle P B A; as this angle is oppoſite to the ſide uſed in the firſt proportion, thereſore the fourth and fifth arcs here uſed, are the ſame as above; ſin. N : ſin. M : : tang. A P B : tang. P B A, i. e. 8,72359 (ſin. 3° 2′) : 9,77963 (ſine of 37° 1′) : : 10,26343 (tang. of 61° 24′) : 11,31947, tang. of 87° 15′ = P B A.

For the angle P A B; ſin. P A : ſin. P B A : ſin B P : ſin. PAB, i. e. 9,92643 (ſin. 57° 35′) : 9,99950 (ſin. 87° 15′) : : 9,80852 (ſin. 43° 3′) : 9,88159, ſin. of 49° 35′ = PAB.

Hence, the ſhorteſt diſtance between the Lizard and Bermudas is 47° 54′ = 2874 ſea miles, leſs by 178 miles than the diſtance found by Mercator's ſailing. And a ſhip muſt ſail from the Lizard S. 87° 15′ W. and gradually leſſen the courſe ſo as to arrive at Bermudas on the rhumb bearing S. 49° 35′ W.; whereas the direct courſe from one to the other as found by Mercator's ſailing, is S. 69° 2′ W.

Caſe 6. When one of the given places has north latitude, and the other ſouth latitude; e. gr. what is the neareſt diſtance from the iſland of St. Helena to the iſland of Bermudas; and alſo the angles of poſition at each place?

Bermudas lat. 32° 25′ N. and long. 66° 38′ W.
St. Helena lat. 16° 0′ S. and long. 6° 15′ W.

Diff. Long. 60° 23′.

Make Q A (*fig*, 50.) = 16°, the lat. of St. Helena; with the tang of P *a* = 57° 35′, the co-lat. of Bermudas, deſcribe the arc *a a* about P; arcs deſcribed from P, S, with the ſecant of 60° 23′, will give the centre of the circle PCS, the meridian of Bermudas, and its interſection B with *a a*, is the place of Bermudas. Deſcribe a great circle through A, B, D, and the intercepted arc AB is the diſtance ſought, and the angles P A B, ABS, are the poſitions required.

For the diſtance AB; in the triangle ABP, rad. : coſ. P : : tang. P B : tang. of 4th arc M, i. e. 10,00000 : 9,69390 (coſ. 60° 23′) : : 10,19721 (tang. 57° 35′) : 9,89111, tang. of 37° 54′, which taken from 106° = St. Helena's N. polar diſtance, leaves a fifth arc = 68° 6′ = N. Then coſ. M : coſ. N : : coſ. P B : coſ. A B : i. e. 9,89712 (coſ. 37° 54′) : 9,57169 (coſ. 68° 6′) : : 9,72922 (ſin. 57° 35′) : 9,40379, coſ. of 75° 19′, the diſtance ſought.

For the angle of poſition P A B; ſin. N : ſine M : : tang. P : tang. A, i. e. 9,96747 (ſin. 68° 6′) : 9,78837 (ſin. 37° 54′) : : 10,24530 (tang. 60° 23′) : 10,06620, tang. of 49° 20′ = the angle P A B.

For the angle A B P; rad. : coſ. P : : tang. P A : tang. M, i. e. 10,00000 : 9,69390 (coſ. 60° 23′) : : 10,54250 (tang. 106°) : 10,23640, tang. of 59° 53′; but this fourth arc muſt be like P A, or obtuſe, and, therefore, the ſupplement of 59° 53′, or 120° 7′, is the fourth arc M; and the difference between this and P B is 62° 32′ for N, or the fifth arc. And ſin. N : ſin. M : : tang. P : tang. A B P, i. e. 9,94806 (ſin. 62° 32′) : 9,93702 (ſin. 120° 7′) : : 10,24530 (tang. 60° 23′) : 10,23426 tang. of 59° 45′; therefore, as the angle A B P ought to be obtuſe, it is the ſupplement of 59° 45′ = 120° 15′. A ſhip, in order to ſail from St. Helena to Bermudas, on the arc of a great circle, muſt firſt ſhape her courſe N. 49° 20′ W. and gradually deflect from the north, ſo as to arrive at Bermudas on a courſe N. 59° 45′ W. after having run 75° 19′ or 4519 ſea miles. The courſe by Mercator's *ſailing* is N. 50° 5′ W. and the diſtance 4527 miles.—Whence it appears, that when the places are one in N. lat. and the other in S. lat. there is but a ſmall difference between the reſults found by Mercator's and great circle *ſailing*; for near the equator the rhumb lines do not much differ from great circles.

From the ſolutions of the preceding caſes it appears, that to ſail on the arc of a great circle, the ſhip muſt continually alter her courſe: but as this is a difficulty too great to be admitted into the practice of navigation, it has been thought ſufficiently exact to effect this buſineſs by a kind of approximation, that is, by a method which nearly approaches to the *ſailing* on a great circle: upon this principle, that in ſmall arcs, the difference between the arc and its chord or tangent is ſo ſmall, that they may be taken for one another in any nautical operations: and, accordingly, it is ſuppoſed, that the great circles on the earth are made up of ſhort right lines, each of which is a ſegment of a rhumb line.

On this ſuppoſition the ſolution of the following problem is deduced.

Problem II. Having the latitudes and longitudes of the places ſailed from and bound to, given; to find the ſucceſſive latitudes on the arc of a great circle in thoſe places where the alteration in longitude ſhall be a given quantity; together with the courſes and diſtances between thoſe places.

1. Find the angle of poſition at each place, and their diſtance by one of the preceding caſes. 2. Find the greateſt latitude the great circle runs through, i. e. find the perpendicular from the pole to that circle; and alſo find the ſeveral angles at the pole, made by the given alterations of longitude between this perpendicular and the ſucceſſive meridians come to. 3. With this perpendicular and the polar angles ſeverally find as many correſponding latitudes, by ſaying, as rad. : tang. greateſt lat. : : coſ. 1ſt polar angle : tang. 1ſt lat. and : : coſ. 2d polar angle : tang. of 2d lat. &c. 4. Having the ſeveral latitudes paſſed through and the difference of longitude between each, find, by Mercator's *ſailing*, the courſes and diſtances between thoſe latitudes. And theſe are the ſeveral courſes and diſtances the ſhip muſt run, to keep nearly on the arc of a great circle. The ſmaller the alterations in longitude are taken, the nearer will this method approach the truth; but it is ſufficient to compute to every five degrees of difference of longitude; the length of an arc of five degrees, differing from its chord, or tangent, only by 0,0002.

As an example of this method of ſolution; a ſhip, being bound from the iſland of St. Mary to Cape Henry, propoſes to ſail as near the arc of a great circle as ſhe can by altering her courſe at every 5 degrees difference of longitude. Required the latitude at each time of altering the courſe, and alſo the courſes and diſtances between thoſe ſeveral latitudes?

Let the figure be deſcribed, and the computation made, as in Caſe 3. of Prob. I; the diſtance B A (*fig.* 51.) is found to be 42° 6′, and the ∠ A or ∠ B = 73° 9′, the angle of poſition. The triangle A P B being iſoſceles, the perpendicular P I falls in the middle of A B; and the latitudes, courſes, and diſtances being known in running the half BI, thoſe in the half IA will alſo be known. Let the points *a*, *b*, *c*, *d*, &c. be the places come to on each alteration of 5 degrees longitude; then will the arcs P *a*, P *b*, P *c*, P *d*, &c. be the reſpective co-latitudes of theſe places, and they are the hypothenuſes of the right-angled ſpheric triangles P I *a*, P I *b*, P I *c*, P I *d*, &c. In the triangle P I B, given P B = 53°, P B I = 73° 9′, to find P I, rad. : ſin. P B : : ſin. B : ſin. P I, i. e. 10,00000 : 9,90235 (ſin. of 53°) : : 9,98094 (ſin. 73° 9′) : 9,88329 ſine of 49° 51′ = P I. Now I P B = $\frac{53^\circ\ 27'}{2}$ = 26° 43½′; I P *a* = 21° 43½′; I P *b* = 16° 43½′; I P *c* = 11° 43½′; I P *d* = 6° 43½′: and theſe are the ſeveral polar angles.

	21° 43½'	16° 43½'	11° 43½'	6° 43½'
Then rad. —— ——	10,00000	10,00000	10,00000	10,00000
To co-tang. PI = 49° 51'	9,92612	9,92612	9,92612	9,92612
So coſine polar angle	9,96800	9,98123	9,99084	9,99700
To tang. lat. ——	9,89412	9,90735	9,91696	9,92312
Which are	38° 5'	38° 56'	39° 33'	39° 57'

The degrees and minutes ſet over each column are the polar angles uſed in that proportion, and the correſponding latitudes ſtand at bottom.

Hence it appears the ſhip muſt firſt ſail from the lat. 37° 0' N. to lat. 38° 5' N. thence to lat. 38° 56' N. thence to lat. 39° 33'; thence to lat. 39° 57' N. thence to lat. 40° 9' N. which is the greateſt latitude ſhe muſt go to; and from thence ſhe muſt proceed through the latitudes 39° 57', 39° 33', 38° 56', 38° 5', and ſo to 37° 0', the parallel ſhe ſet out from, and in which ſhe is to find Cape Henry. Now between theſe ſeveral latitudes, with the reſpective differences of longitude, find, by Mercator's *ſailing*, the courſes and diſtances. If the reſult of the ſeveral operations, in the queſtions of great circle *ſailing*, be entered in ſuch a table as the following, it will be found convenient to the operator.

Polar Angles.	Succeſſ. Longs.	Succeſſ. Lats.	Diff. Longs.	Diff. Lat.	Merid. Parts.	Merid D. Lat	Cour.	Diſt.
∠IPB 26° 43½'	22° 56'	37° 00'	300	65	2392,6	82,0	74,43	246,6
∠IP*a* 21 43½	27 56	38 05	300	51	2474,6	65,2	77,44	240,0
∠IP*b* 16 43½	32 56	38 56	300	37	2539,8	47,8	80,57	235,2
∠IP*c* 11 43½	37 56	39 33	300	24	2587,6	31,2	84,04	232,2
∠IP*d* 6 43½	42 56	39 57	403,5	12	2618,8	15,7	87,46	307,9
	49 39½	40 09			2634,5			1261,9

The column of diſtances being ſummed up amounts to 1261,9, which being doubled gives 2523,8 miles for the diſtance between St. Mary and Cape Henry; differing from the diſtance found in a great circle (*Caſe* 3. *Prob.* 1.) by 2,2 ſea miles. And the courſes the ſhip muſt ſteer are, firſt, N. 74° 43' W. then N. 77° 44' W. &c. on the courſes in the table, and to run the diſtances 246,6, &c miles correſponding to them.

The track of a ſhip, when directed nearly in the arc of a great circle, may be delineated on the Mercator's chart, by marking on it, by the help of the latitudes and longitudes, the ſucceſſive places where the ſhip is to alter her courſe; then thoſe places or points being joined by right lines will ſhew the path along which the ſhip is to ſail, under the propoſed circumſtances. See, on the ſubject of theſe articles, Robertſon's Elements of Navigation, vol. ii. paſſim.

Sailing, in a *more confined ſenſe*, is the art of conducting a veſſel from place to place, by the working or handling of her ſails and rudder: though what is done by means of this latter, is more properly called *ſteering*.

To bring *ſailing* to certain rules, M. Renau computes the force of the water, againſt the ſhip's rudder, ſtem, and ſide; and that of the wind againſt her ſails. In order to this, he, 1. conſiders all fluid bodies, as the air, water, &c. as compoſed of little particles, which when they act upon, or move againſt, any ſurface, do all move parallel to one another, or ſtrike againſt the ſurface after the ſame manner. 2. That the motion of any body, with regard to the ſurface on which it is to ſtrike, muſt be either perpendicular, parallel, or oblique. In the firſt caſe, the body ſtrikes with all its force, which will be greater or leſs, according as the body moves ſwifter or ſlower. In the ſecond caſe, the line of motion *a b* (*Tab.* II. *Navigation*, *fig.* 52) will not affect the ſurface at all, becauſe it is no way oppoſed to it; nor can the moving body ſtrike upon it, or touch it. In the third, if the line of motion, AD, be oblique to the ſurface, DC, ſo that the angle of the incidence be ADC, then the motion of the body in the line AD may be reſolved into two directions, viz. into AE, or BD, and into AB. But the direction or line of motion, AE, being parallel to the ſurface, DC, cannot affect it at all; ſo that the whole motion of the body, A, in that oblique manner of ſtriking on the ſurface, will be expounded by the perpendicular line, AB. And if DA be made the radius of a circle, whoſe centre is at D, BA will be the ſine of the angle of incidence, ADC.

Hence it is deduced, that the force of a particle of air, or water, as A, ſtriking againſt the ſurface, DC, which may repreſent, either a ſail, or the rudder of a ſhip, in the oblique direction, AD, will be to the perpendicular force thereof, as BA is to DA; that is, as the ſine of the angle of incidence is to the radius.

And ſince what is thus true of one particle, ſingly conſidered, will be true of all the particles of any fluid body collectively; it will follow, that the force of the air or water, ſtriking perpendicularly upon a ſail or rudder, to the force of the ſame, in any oblique impingency, will be as the ſquare of the radius to the ſquare of the ſine of the angle of incidence: and conſequently, that all oblique forces of the wind againſt the ſails, or of the water againſt the rudder, will be to one another as the ſquares of the ſines of the angles of incidence.

If the different degrees of velocities be conſidered, it will be found, that the forces will then be as the ſquares of the velocities of the moving air or water; that is, a wind that blows thrice as ſtrong, or moves thrice as ſwift, as another, will have nine times the force upon the ſail. And it being alſo indifferent, whether you conſider the motion of a ſolid in a fluid, whoſe particles are at reſt; or of thoſe particles moving all parallel againſt a ſolid that is at reſt; the reciprocal impreſſions being always the ſame; if a ſolid be moved with different velocities in the ſame fluid matter (as ſuppoſe water), the different reſiſtances which it will receive from that water, will be in the ſame proportion as the ſquares of the velocities of that body.

Let HM (*fig.* 53.) repreſent a ſhip, CD the poſition of the ſail, and AB the courſe of the wind blowing towards B. Draw BG perpendicular to the ſail, and GK perpendicular to the line of the keel produced HMK. By what is ſaid above, the ſail, CD, will be driven by the wind AB, according to the direction of the line BG. So that if ſhe could divide the water every way with the ſame facility, as ſhe doth with her head, the ſhip would go directly to the point, G, along the line, BG. And if HK repreſents her direct courſe, ſhe ſhould have got forward the length, BK, and ſideways ſhe would have gone the quantity, GK. But as her length is much greater than her breadth, ſo ſhe will divide the water, or make her way in it with more difficulty with her ſide, than with her head or ſtern; on which account, ſhe ſhall not run ſideways ſo far as KG, but will fall ſhort of it in proportion to the ſaid difficulty of dividing the water with her ſide, that is, if the reſiſtance ſhe finds in her paſſing through the water ſideways, be to that of paſſing lengthways, ſuppoſe, as ten to one, then will not the ſhip get ſideways above a tenth part of the line GK. Wherefore, if KG be found to GL in the ratio of the reſiſtance of the ſide to that of the ſtern, and the line BL be drawn; the ſhip will go to the point, L, along the line BL, in the ſame time as it would have gone to G, if it could have divided the water every way equally. This part, KL, is called the *drift*, or *lee-way* of a ſhip, and the angle, KBL, is her degrees of lee-way; as the angle, ABK, expreſſes how near the wind ſhe lies.

After this, the author proceeds to demonſtrate, that the beſt poſition or ſituation of a ſhip, ſo as ſhe may make the leaſt lee-way, but go windward as much as poſſible, is this: that, let the ſail have what ſituation it will, the ſhip be always in a line biſecting the complement of the wind's angle of incidence upon the ſail; that is, ſuppoſing the ſail in the poſition, BC (*fig.* 54.), the wind blowing from A to B, and, conſequently, the angle of the wind's incidence on the ſail ABC, and its complement CBE; then muſt the ſhip be put in the poſition BK, or move in the line BK, biſecting the angle CBE.

He ſhews farther, that the angle which the ſail ought to make with the wind, i. e. the angle, ABC, ought to be but 24 degrees; that being the moſt advantageous ſituation to go to windward, the moſt that is poſſible. And in order to bring this to bear in practice, he directs to put marks to the ſheets, braces, and bow-lines of the lower ſails, to know when they are in their beſt ſituation; and then, even in the night, when the marks of a brace, or of a ſheet, ſhall come to the cleat, one may be pretty well aſſured, that the ſail trims well.

To this might be added, many curious things from Borelli de Vi Percuſſionis, concerning the different directions given to a veſſel from the rudder, when *ſailing* with a wind, or floating without ſails in a current: in the former caſe, the head of the ſhip always coming to the rudder, and in the latter always flying off from it.

In order to illuſtrate, by examples, the various modes of *ſailing*,

ſailing, as they depend on the different degrees and ſituations of the wind, with regard to the courſe of the veſſel, the plan of a number of ſhips proceeding on various courſes is repreſented *Tab.* II. *Navigation*, *fig.* 55. which exhibits the 32 points of the compaſs, of which C is the centre; the direction of the wind, which is northerly, being expreſſed by the arrow.

It has been obſerved in the article CLOSE-HAULED, that a ſhip in that ſituation will ſail nearly within ſix points of the wind. Thus the ſhips B and *y* are cloſe-hauled, the former being on the larboard tack, ſteering E. N. E. and the latter on the ſtarboard tack, *ſailing* W. N. W. with their yards, *a b*, braced obliquely, as ſuitable to that manner of *ſailing*. The line of battle, on the larboard tack, would accordingly be expreſſed by CB, and on the ſtarboard by C*y*.

When a ſhip is neither cloſe-hauled, nor ſteering afore the wind, ſhe is in general ſaid to be *ſailing* large. The relation of the wind to her courſe is preciſely determined by the number of points between the latter and the courſe cloſe-hauled. Thus the ſhips *c* and *x* have the wind one point large, the former ſteering E. by N. and the latter W. by N. The yards remain almoſt in the ſame poſition as in B and *y*: the bowlines and ſheets of the ſails being only a little ſlackened.

The ſhips *d* and *u* have the wind two points large, the one ſteering E. and the other W. In this manner of *ſailing*, however, the wind is more particularly ſaid to be upon the beam, *perpendiculaire du vent*, as being at right angles with the keel, and coinciding with the poſition of the ſhip's beams. The yards are now more acroſs the ſhip, and the bowlines are caſt off, and the ſheets more relaxed; ſo that the effort of the wind being applied nearer to the line of the ſhip's courſe, her velocity is greatly augmented.

In *e* and *t* the ſhips have the wind three points large, or one point abaſt the beam, the courſe of the former being E. by S. and that of the latter W. by S. The ſheets are ſtill more flowing; the angle which the yards make with the keel farther diminiſhed; and the courſe accelerated in proportion.

The ſhips *f* and *ſ*, the firſt of which ſteers E. S. E. and the ſecond W. S. W. have the wind four points large, or two points abaſt the beam. In *g* and *r* the wind is five points large, or three points abaſt the beam, the former *ſailing* S. E. by E. and the latter S. W. by W. In both theſe ſituations the ſheets are ſtill farther ſlackened, and the yards laid yet more athwart the ſhip's length, in proportion as the wind approaches the quarter.

The ſhips *h* and *q*, ſteering S. E. and S. W. have the wind ſix points large, or more properly on the quarter; which is conſidered as the moſt favourable manner of *ſailing*, becauſe all the ſails co-operate to increaſe the ſhip's velocity: whereas, when the wind is right aſt, as in the ſhip *m*, it is evident, that the wind, in its paſſage to the foremoſt ſails, will be intercepted by thoſe which are farther aſt. When the wind is on the quarter, the fore-tack is brought to the cat-head; and the main-tack being caſt off, the weather-clue of the main-ſail is hoiſted up to the yard, in order to let the wind paſs freely to the fore-ſail; and the yards are diſpoſed ſo as to make an angle of about two points, or nearly 22°, with the keel.

The ſhips *i* and *p*, of which the former ſails S. E. by S. and the latter S. W. by S. are ſaid to have the wind three points on the larboard or ſtarboard quarter: and thoſe expreſſed by *k* and *o*, two points; as ſteering S. S. E. and S. S. W. in both which poſitions the yards make nearly an angle of 16°, or about a point and a half, with the ſhip's length.

When the wind is one point on the quarter, as in the ſhips *l* and *n*, whoſe courſes are S. by E. and S. by W. the ſituation of the yards and ſails is very little different from the laſt mentioned; the angle which they make with the keel being ſomewhat leſs than a point, and the ſtay-ſails being rendered of very little ſervice. The ſhip *m* ſails right afore the wind, or with the wind right aſt. In this poſition the yards are laid at right angles with the ſhip's length: the ſtay-ſails, being entirely uſeleſs, are hauled down: and the main-ſail is drawn up in the brails, that the fore-ſail may operate; a meaſure which conſiderably facilitates the ſteerage, or effort of the helm. As the wind is then intercepted, by the main-top-ſail and main-top-gallant-ſail, in its paſſage to the fore-top-ſail and fore-top-gallant-ſail, theſe latter are by conſequence entirely becalmed, and might therefore be furled, to prevent their being fretted by flapping againſt the maſt, but that their effort contributes greatly to prevent the ſhip from broaching-to, when ſhe deviates from her courſe to the right or left thereof.

Thus all the different methods of *ſailing* may be divided into four, viz. cloſe-hauled, large, quartering, and afore the wind; all which relate to the direction of the wind to the ſhip's courſe, and the arrangement of the ſails.— See DRIFT and LEEWAY.

SAILING, *order of*, denotes the general diſpoſition of a fleet of ſhips, when proceeding on a voyage or expedition.— See FLEET.

SAILOR, a perſon trained in the exerciſe of fixing the machinery of a ſhip, and managing her, either at ſea, or in a road or harbour. See MARINER.

SAIL-YARD. See YARD.

SAINT CUTHBERT'S BEADS, an Engliſh name for the TROCHITÆ and ENTROCHI, found in great abundance in the clay of Yorkſhire, and ſome other counties with us. They are truly the remains of parts of the arms of the *ſtella arboreſcens*, or branching *ſtar-fiſh*; but have been ſo far miſtaken, by authors, as to be ſuppoſed a ſort of rock-plants, or the parts of ſome unknown vegetable petrified.

SAINTFOIN, *onobrychis*, in *Botany*. Its characters are theſe: the empalement of the flower is permanent, cut into five parts at the top; the flower is of the butterfly kind; the ſtandard is oblong, reflexed, and indented at the top; the wings are oblong and erect; the keel is compreſſed, broad at the end, and bifid at the baſe; it has ten angular ſtamina, nine joined, and one ſeparate, and a narrow compreſſed germen, ſupporting an awl-ſhaped ſtyle, crowned by a ſingle ſtigma; the germen afterward becomes a compreſſed roundiſh pod, which opens with two valves, incloſing one kidney-ſhaped ſeed. There are four ſpecies. Miller.

Linnæus has joined this to the genus of HEDYSARUM.

The common *ſaintfoin* is a plant frequently uſed for the food of cattle, either freſh or dried; it is called *ſaintfoin*, i e. *holy hay*, or *wholeſome hay*, from its excellent nutritive quality. The ſtalks of the plant are commonly about two feet long, but they grow ſometimes to five or ſix feet, and it has tufts of red flowers of three, four, or five inches in length, which are ſucceeded by roundiſh, compreſſed, prickly pods, each having one kidney-ſhaped ſeed. It flowers in June, and the ſeeds are ripe in September; but the roots continue many years. There are two or three varieties of this, which differ only in the colour of their flowers.

This plant will make a forty times greater increaſe in poor ground than the common turf; and this is owing to its having a long perpendicular root, of that kind called *tap-roots*, which ſinks to a great depth to attract its nouriſhment. This root is frequently drawn out of the ground to the length of twelve or fourteen feet, but it is ſaid to be often thirty feet or more in length.

The farmers have a general opinion, that this plant never ſucceeds well in any land where there is not an under ſtratum of ſtone, chalk, or ſome other hard matter, to ſtop its running; but that otherwiſe it ſpends itſelf in root, and comes to nothing above ground. This, according to Mr. Tull, is a groſs error; becauſe it is certain, that the roots being to plants what the ſtomach and guts are to animals, the more and larger roots any plant has, the more nouriſhment it receives, and the better it thrives.

Saintfoin always ſucceeds where its roots run deep, and the beſt crops of all are produced upon lands where there is no hard inferior ſoil to obſtruct their paſſage. An inferior ſoil of clay may kill the plants, by retaining the water, and chilling and rotting their roots.

The long root of *ſaintfoin* has, near the ſurface, many horizontal roots iſſuing from it, which extend themſelves every way; there are of the ſame kind all the way down, as the roots go, but they become ſhorter and ſhorter all the way. Any dry land may be made to produce this valuable and uſeful plant, though it be ever ſo poor; but the richeſt and beſt land will produce the fineſt crops of it. In the iſle of Thanet, *ſaintfoin* thrives beſt on a thin coat of earth, with a chalky bottom; and it is obſerved, in general, that it will grow in any ſoil, except ſuch as is clayey, very damp and low; and that though the crop is in proportion to the goodneſs of the land, yet that which grows on poor land is reckoned moſt nouriſhing for cattle. The beſt way of ſowing it is by drilling; but the earth muſt be very well prepared, and the ſeed well ordered, or elſe very little of it will grow. The heads of theſe ſeeds are ſo large, and their necks ſo weak, that if they be much more than half an inch deep, they are not able to riſe through the incumbent mould; and if they are not covered they will be malted, as the farmers expreſs it; that is, they will ſend out their roots while they lie above ground, and be killed by the air; and whether the farmer plants bad ſeed that will not grow, or good ſeed that is buried or malted, the event will be the ſame: the ground will be underſtocked with plants. A buſhel of ſeed to an acre of land is full twenty ſeeds to each ſquare foot of land; but as there is ſome difference in the largeneſs of the ſeeds, there is no abſolute certainty as to this calculation. The worſt ſeaſons for planting it are the beginning of winter, and the drought of ſummer; the beſt is the beginning of the ſpring; and it is always ſtrongeſt when planted alone, and is not ſown together with corn, as is the practice of ſome farmers. If barley, oats, or any other corn, ſown with the *ſaintfoin*, happen to be lodged afterwards, it kills the young *ſaint-foin*. If it be planted with any other corn, it is beſt done by drilling in the horſehoeing way; in this caſe it is not much liable to be killed by the lodging of the corn, as the drilled corn ſeldom falls at all, and when it does, never falls ſo low as the ſown corn.

The quantity of ſeed to be drilled upon an acre of land will depend wholly upon the goodneſs of it; for there is ſome ſeed of which not one in ten will ſtrike, whereas in good ſeed not one in twenty will fail. The method of knowing the goodneſs is, by ſowing a certain number of the ſeeds, and ſeeing how many plants are produced by them. The external ſigns of the ſeed being good, are, that the huſk is of a bright colour, and the kernel plump, of a light grey or blue colour, and ſometimes of a ſhining black. The ſeed may be good, though the huſk be black, as that is ſometimes owing to the letting it receive the wet in the field, not to its being half rotted in the heap.

If the kernel be cut acroſs, and appear greeniſh and freſh, it is a certain ſign that it is good. If it be of a yellowiſh colour, and friable, and look thin and pitted, they are bad ſigns. The quantity of ſeeds allowed to the acre in the drill way, is much leſs than that by ſowing, and is to be computed according to the number of plants that are to be allowed in that ſpace, allowing for the common caſualties. It is not neceſſary to be exact in this calculation, or to ſay whether two, three, or four hundred plants, are to be allowed to a ſquare perch; neither is it poſſible to know before-hand the preciſe number of plants that may live out of thoſe that come up; for ſometimes the grub takes them when they have only the two firſt leaves, and the crop is greatly diminiſhed by this means. Four gallons of good ſeed to an acre of land will cover the land with plants when judiciouſly managed.

Single plants of *ſaintfoin* make the greateſt crops; but the farmers, in general, plant them ſo cloſe, that they ſtarve one another. The ſingle plants always run the deepeſt, and thoſe which do ſo will always draw moſt nouriſhment.

The farmer who expects to make a profit of this plant, muſt not expect a good crop the firſt year. Nothing is ſo injurious to *ſaintfoin* as its ſtanding too thick; if it be ſown ſo thick as to cover the ground the firſt ſummer, the plants will ſtarve one another for ever after; but if the owner will be content to place them ſo thinly as to have but a ſmall crop the firſt year, they will increaſe prodigiouſly, and every ſucceeding crop will be better and better. When *ſaintfoin* is well hoed, it will grow as much in a fortnight as it would otherwiſe do in ſix week;; and this quick growing is of advantage to it every way, not only making the plants larger, but of better nouriſhment to the cattle, whether they are eaten green, or made into hay.

The proper diſtance to drill this plant for the horſehoeing huſbandry is at double rows, with eight inch partitions between them, and thirty inch intervals between every two and two. Theſe intervals need only be hoed alternately, leaving every other interval for making the hay on. This method of hoeing is of vaſt advantage, and poor land by means of it will always produce two crops in a year. For hand-hoeing, the rows ſhould be drilled ſixteen inches aſunder, and the ſingle plants ſet at eight inches apart in the rows. When *ſaintfoin* is drilled without any intention of hoeing, the beſt way is to plant ſingle rows at eight inches diſtance, with no greater quantity of ſeed than when the rows are at ſixteen inches diſtance. The land is always to be perfectly cleared of graſs before the ſowing of the *ſaintfoin*, and the lumps of earth carefully broken. But no harrowing is to be allowed after it is drilled, for that would bury it; and it is not proper to roll it at all, unleſs for the ſake of barley, when they are ſown together; and when that is done, it ſhould be with a light roller, and in dry weather. This ſhould be done lengthwiſe of the rows, and as ſoon as it is drilled; if it be not done at this time, it is beſt to ſtay three weeks before it is done, that the necks of the young *ſaintfoin* may not be broken. One acre of drilled *ſaintfoin*, conſidering the difference of the quantity and goodneſs of the crop, is worth two acres of ſown *ſaintfoin* on the ſame land, though the expence of drilling be twenty times leſs than that of ſowing.

No cattle are to be ſuffered to come in the firſt winter upon the *ſaintfoin*, after the corn is cut, among which it was ſown. Their feet would injure it by treading the ground hard, as much as their mouths by cropping it, and it would never come to good. Sheep ſhould not be ſuffered to come at it even the following ſummer and winter. The firſt winter is the time to lay on manure after the corn is reaped off. Peat-aſhes, or the like, are very proper, and a ſmall quantity of them will do, as there are at this time no other plants to partake of the benefit, but the young crop has it all; and the young plants being thus made ſtrong at firſt, will continue ſo, and be long the better for it.

It is obſerved, however, that in the drilling and horſehoeing way there is no neceſſity for any manure at all. Some farmers ſow eight or ten buſhels of the ſeed of *ſaintfoin* to an acre along with the corn, with intent that it ſhould kill all the other weeds; but the conſequence is, that the plants ſtand cloſe and ſtarve one another, and are no bigger than where the plant grows wild on the hills in Calabria, where it is ſo ſmall and ſeemingly deſpicable a plant, that it ſeems a wonder that any body could be tempted to think of cultivating it; yet, when rightly managed, it ſeems capable of being as uſeful a plant as any in the world. Where theſe plants ſtand ſo thick they draw out all the nouriſhment from the ground in a few firſt years, and ſoon die, though manured ever ſo carefully. Six or ſeven years ſeem to be their greateſt duration; whereas, when the ſeed is drilled in, and the plants are horſehoed, they will be as ſtrong and vigorous as ever, at thirty years ſtanding.

Saintfoin ſucceeds beſt alſo in high grounds, which is a great advantage in the article of making it into hay, as it has greatly more advantage of the ſun, and is leſs liable to miſchief from wet, than graſs which grows in low grounds. On the high grounds the wind will dry more in an hour than it will in meadows that lie low in a whole day; and often the crops of *ſaintfoin* make very good hay in the ſame ſeaſons in which all the graſs hay is utterly ſpoiled. The ſun, on the high grounds, has alſo a more benign influence, and ſends off the dew there two hours earlier in the morning, and holds it up as much longer in the evening; by theſe advantages the *ſaintfoin* has more time to dry, and is made with half the expence of common hay.

All kinds of hay differ greatly in their goodneſs, according to the manner in which they are made; but the hay of *ſaintfoin* differs more than all.

There are properly four kinds of the *ſaintfoin* hay, differing according to the times of cutting them. Theſe are, firſt, the virgin hay; ſecondly, the bloſſomed hay; thirdly, the full grown hay; and, fourthly, the thraſhed hay. The firſt of theſe, or virgin hay of *ſaintfoin*, is the beſt of all, and, excepting lucerne, has not its equal in the world. The *ſaintfoin* for this hay muſt be cut before it begins to bloſſom; for when it ſtands till full blown, the moſt volatile, ſpirituous, and nutritive parts of its juice are ſpent on the generation; and this being done at once, the ſap is greatly depauperated, and the plant can never afterwards recover the ſtrength, vigour, and nutritive qualities, it had at that time. The exact time of cutting this is, when a few of the bloſſoms, which are forwarder than the reſt, are beginning to look red. *Saintfoin* cut in this ſtate, even though the weather prove bad, may be made up in ſmall ricks, and a chaff baſket drawn in the middle of each; this eaſy care will prevent it from firing; and though the colour be a little altered, it will be as good and nouriſhing as if made at the moſt favourable ſeaſon. Working ſtone-horſes have been kept fat the whole winter on this hay alone without corn; and they are ſo fond of it, that they will refuſe beans and oats mixed with chaff in the common way, for it.

Sheep will alſo be fattened in pens in winter with only this hay and water, better than with peaſe, oats, and the like; and if the hay be weighed to them, and the whole expence and profit computed, the clear profit will be found to amount to four pounds a ton. Theſe creatures make no waſte in this way of feeding, but eat up every morſel of the ſtalks, though ever ſo thick, for they are always brittle, and are as well taſted as the reſt. It is alſo eſteemed one of the beſt ſorts of food for other cattle; it yields much milk; and ſince its introduction into this country has occaſioned an increaſe in the number of our dairy-farms.

The bloſſom hay is very beautiful to the eye, and of a very ſweet ſmell, but it does not fatten the ſheep as the virgin hay does, nor can working horſes be kept fat upon this without an admixture of ſome corn.

The land ought to be well tilled for the virgin hay; for if it ſtand on a poor land, without much culture, it will not be above four or five inches long before it flowers, and will therefore yield but a poor quantity, and will ſpring up again but very ſlowly for another crop; but when on good land and well tilled, it will yield at this time two or three tons to an acre, and will ſpring up immediately very ſtrong for a ſecond crop. However, though ſome cut two crops of this hay in a year, the latter crop is ſeldom of much value; and as this practice weakens the roots, it is not recommended. After the firſt crop is removed, the roots will ſoon ſhoot again, and be fit for feeding.

This virgin hay is ſeldom ſold; it being worth a much greater price than the common, and being uſually kept by the farmer for his own uſe.

Beſide the advantage the farmer makes of this plant, as well for hay as for the feeding his cattle, there is a conſiderable profit to be made by ſelling the ſeed of it when properly managed.

The owner of a land of *ſaintfoin* has three chances for the making his hay; ſince this may be done either when it is in the leaf, or in the bloom, or when full grown. If the weather ſhould prove unfavourable all this time, he may ſtill reſerve the crop for ſeed, and for thraſhed hay, to his no ſmall advantage. The ordinary crop of ſeed from one acre is ſufficient to plant a hundred acres in the way of horſehoeing huſbandry; but as this is not yet univerſally practiſed, there is a ſufficient demand for what ſeed a few who practiſe it can ſpare.

But beſide the uſe of *ſaintfoin* ſeed in ſowing for new crops, it is alſo an excellent provender for horſes; and thoſe, in general, who have tried it, affirm, that one buſhel of it will go as far as a buſhel and a quarter of oats. When this ſeed is well cured it is extremely ſweet, and all ſorts of cattle are fond of it: hogs will eat it, and be fattened very well by it. But the goodneſs of the ſeed, and the remaining hay, out of which it is thraſhed, depends very much upon the manner of the managing them. When the thraſhed hay has been kept dry, it is found to be better food for horſes than common graſs hay; and when cut ſmall with an engine it is found as good as chaff for any cattle. It requires ſome ſkill to know the time at which the *ſaintfoin* ſhould be cut for ſeed. The ſeeds never ripen all at once. The flowers grow in ſpikes, and begin opening at the bottom, from thence gradually opening to the top. It will require ſeveral days before the whole ſucceſſion of flowers are blown, and the ſeed ripens in the ſame manner, ſo that the lower part of the ear has ripe ſeeds many days before the top; and, in conſequence, if the farmer ſtays till the top ſeeds are quite ripe, the lower ones will be all ſhed and loſt.

The moſt proper time to cut it is when the greateſt part of the ſeed is ripe, the top part beginning to be full, and the bottom full ripe. The kernel or ſeed is bluiſh, and the huſk browniſh when ripe. The ſeeds and huſks are green for ſome time after the flowers are fallen, and it is better to cut the plant while it is in this ſtate, than to let it ſtand too long; for the ſeeds will ripen and become bluiſh after cutting, which will be much better than the letting them be loſt by waiting till they ripen upon the ſtalks in bad weather.

The *ſaintfoin* for ſeed muſt never be cut in the heat of the day, for then it will dry too faſt as it falls, and much of the ſeed will be loſt. It is beſt for the mowers to begin at day-break, and to leave off as ſoon as the ſun has any power, going to work again in the cool of the evening. If the plant be dry at the time of cutting, it may be immediately made up into little cocks; but if not it muſt be made hay of only obſerving never to turn it while the ſun is hot upon it: unleſs there happen rain, it is ſcarce neceſſary to turn the ſwarths at all; and when this is done, it muſt be done very carefully, that the ears be not ſhaken.

There are two ways of thraſhing this plant; the one on the field, the other in the barn. The firſt can only be done in very fine weather, and while the ſun ſhines warmly upon the field. The middle of the day is the only time for this, and the method is to ſpread a large ſheet, and peg it down at the corners, and in this thraſh the plants from the cocks by ſmall parcels at a time. The ſtraw is to be ſeparated from the ſeed, and made up into ricks; and this is good food for horſes and other cattle, and the ſeed, &c. is to be collected, and afterwards winnowed, to ſeparate the chaff.

If the ſeed have been wetted in the time of thraſhing, or lying in the ear, it may be put up immediately; but if it have been thraſhed and winnowed dry, it will ferment and ſpoil if laid together too ſoon. The common way of managing is by ſpreading it in a malt-houſe, or on a barn floor; but in ſpite of this it will often heat and ſpoil; the beſt way of all is to ſpread a layer of ſtraw, and on this ſprinkle a layer of the ſeeds; then cover theſe with another layer of ſtraw, and this with more ſeeds, and ſo on, till the heap is raiſed ſix or ſeven feet high. The ſeed will thus be kept cool, and in ſpring it may be eaſily ſeparated from the ſtraw, and will be as freſh as if juſt thraſhed; if this be ſown, not one ſeed in twenty will fail of coming up. When the weather is not fine enough to give opportunity to the thraſhing the *ſaintfoin* in the field, it muſt be very carefully carried into the barn with ſheets at the bottom of the carts, otherwiſe a great quantity of the ſeed will be loſt in the way. Tull's Huſbandry, chap. xii. p. 90.

SAINTS, *ſancti*, in the Romiſh church, holy perſons deceaſed, and, ſince their deceaſe, canonized by the pope, after ſeveral informations and ceremonies.

One of the points wherein the Roman catholics and proteſtants differ, is, that the former addreſs, invoke, and ſupplicate *ſaints*, &c. to intercede for them; whereas the latter hold it ſufficient to propoſe their good examples for our imitation.

Cardinal Bellarmine, and other popiſh writers, have pleaded, that by praying to the *ſaints*, they only intend to expreſs a deſire of their interceſſion, and that their invocation of the *ſaints* terminates ultimately in God. Accordingly they have diſtinguiſhed two ſorts of worſhip, one called *latria*, appropriate to God, and another *dulia*, which, being of an inferior nature, is paid to angels and *ſaints*. However, many of their own writers have exploded this diſtinction, and others have owned that it is unſcriptural. There is another ſort of worſhip, which is of a higher degree than that paid to *ſaints* in common, and which is peculiar to the Virgin Mary: this they call *hyperdulia*.

After all, thoſe who read their books of devotion, their *Hours*, their *Offices*, their *Roſaries*, their *Breviaries*, and their *Miſſals*, will find many direct addreſſes to the *ſaints*, which are very different from thoſe prayers whoſe object is merely to ſupplicate their interceſſion. Beſides, the council of Trent, ſeſſ. 25. directs to apply to the *ſaints* for their help and aſſiſtance, as well as their prayers; and condemns all who think, that it is not good and profitable to offer prayers to *ſaints*, as chargeable with impious ſentiments. And the creed of pope Pius IV. expreſly inſiſts upon it as an article of faith, that the *ſaints* reigning together with Chriſt are to be invocated. As to the antiquity of this practice, the council of Trent, ſeſſ. 25. ſpeaks of it as the uſage of the apoſtolic and catholic church from the beginning of Chriſtianity. As to the doctrine of the interceſſion of *ſaints* and angels, there is not the leaſt intimation of it in the writings of the two firſt centuries; though it muſt be allowed to have been introduced in the next century, and that Origen and Cyprian expreſly favour this ſuperſtition. The worſhip of *ſaints* and angels is of a much later date; eſpecially as a ſtanding generally received doctrine of the church. For though Athanaſius was for worſhiping the *ſaints*, yet Cyril, who lived in the next century, ſays, we neither call the holy martyrs gods, nor are we uſed to worſhip them. St. Auſtin affirms, that neither *ſaints* nor angels will be worſhipped. Achbiſhop Uſher ſays, that as to the firſt four hundred years after Chriſt, for nine parts of that time, not one true teſtimony can be produced out of any father in favour of this doctrine; and cardinal Perron, Richlieu, and other learned writers among the Romaniſts, own, that the invocation of *ſaints* was not practiſed for the three firſt centuries. The firſt ſymptoms of this worſhip did not appear till towards the end of the fourth century, and it ſeems to have ſprung out of the regard which the Chriſtians at that time manifeſted to the memory of the martyrs. See RELICS. They frequented their tombs, and erected altars there, praying to God, and engaging themſelves to a ſtrict imitation of the virtues and piety of the departed martyrs; by degrees this veneration degenerated into praiſes and eulogiums of the *ſaints* themſelves, in which they uſed ſome apoſtrophes and rhetorical addreſſes; whence proceeded a ſuperſtitious regard to them, and, at length, a direct invocation and worſhip of them. Nor does it appear, that any public prayers to *ſaints* were eſtabliſhed till A. D. 788, by the ſecond council of Nice; and this council was condemned by another held at Francfort, A. D. 794; and the invocation of *ſaints* was likewiſe condemned by a former council held at Conſtantinople, A. D. 755, conſiſting of three hundred and eighty-eight biſhops. In the ſeventh century, Gregory expreſly ſays, that angels refuſed to be worſhipped ſince the appearance of Chriſt. See POPERY.

In order to convey ſome idea of the extravagance to which veneration for reputed *ſaints* hath arrived in the Romiſh church, we ſhall only mention one inſtance out of many that might be alledged. It is well known that there were three altars in the cathedral church of Canterbury, one erected to the honour of Chriſt, another to the Virgin Mary, and a third to St. Thomas a Becket; and the offerings at his ſhrine amounted to about 1000*l.* when thoſe to the Virgin did not amount to 5*l.* and thoſe to Chriſt were nothing; and Rapin informs us, that in one year, viz. A. D. 1420, there were no leſs than fifty thouſand foreigners who came in pilgrimages to pay their homage at this tomb.

The number of *ſaints*, allowed as ſuch, in the Romiſh church, is prodigious. Father Papebroche reckons ſeventeen or eighteen hundred to have died on the firſt of June, only. Indeed the croud of *ſaints*, wherewith their martyrologies are ſtocked, is ſcandalous, even to the more ſober of their own communion. Father Mabillon, in an expreſs diſſertation on the worſhip of unknown *ſaints*, obſerves, that honours are given to *ſaints*, who, perhaps, were not Chriſtians, and whoſe very names were never known. Hence, being under a neceſſity of giving them names, they are therefore called *baptiſed ſaints.* He adds, that they every day beſeech *ſaints* to intercede for them with God, when it is much doubted whether they themſelves be in heaven.

Father Papebroche and his aſſociates have been a long time employed in writing the lives and acts of the *ſaints*; they range them each on the day of the year wherein they died: for the firſt ſix months they have publiſhed twenty-four volumes in folio; and ſince Papebroche's death, in 1714, his ſucceſſors have publiſhed more.

SAKER, the name formerly uſed for a ſmall ſort of cannon, whereof there were three ſpecies; *extraordinary*, *ordinary*, and *leaſt ſized.*

Saker *extraordinary*, was about four inches diameter at the bore, 1800 pounds weight, 10 feet long; its load 5 pounds, ſhot 3 inches and half diameter, and ſomething more than 7 pounds and a quarter weight; its level range was eſtimated at 163 paces.

Saker *ordinary* was a ſize leſs, 3 inches 3 quarters bore, 9 feet long, 1500 weight; its charge, 4 pounds of powder; bullet's diameter 3 inches and a half; weight, 6 pounds; its level range was 160 paces.

Saker *of the leaſt ſize* was 3 inches and a half diameter at the bore, 1400 pounds weight, 8 feet long, its load near 3 pounds and a half; ſhot 4 pounds 3 quarters weight, and 3 inches and a quarter diameter. See Cannon and Gun.

Saker, in the *Manege*, the ſame with dock.

Saker, in *Ornithology*. See Sacre.

SAKRADAWENDRA is the name of one of the Cyloneſe deities, who commands and governs all the reſt, and formerly anſwered the prayers of his worſhippers; but according to the fabulous account which is given of him, the golden chair, on which he ſat, and the foot of which was made of wax, that was ſoftened by their prayers and tears, and ſunk downward, ſo that he could take notice of their requeſts and relieve them, being diſpoſed of among the poor, they no longer derive any benefit from him, or pay him any reverence. Phil. Tranſ. abr. vol. v. part ii. p. 182. See Budun.

SAL, *ſalt.* See Salt.

Sal *alkalinus.* See Alkaly.

Sal *armoniac*, or rather Ammoniac *ſalt*, in *Natural Hiſtory* and *Chemiſtry.* See *Sal* Ammoniac, under which article the reader will find a brief account of the nature and properties of this ſalt, and the method of preparing it.

Our chemiſts have divers ways of preparing a *ſal ammoniac*, in imitation of this. The common way is by putting one part of common ſalt to five of urine; to which ſome add half that quantity of ſoot; the whole being put in a veſſel, they raiſe from it, by ſublimation, a white, friable, farinaceous ſubſtance, which they call *ſal ammoniac.*

The *ſal ammoniac* of the moderns may be eaſily prepared in the following manner: take four ounces of common volatile *ſalt* of ox-bone, ſaturate it with ſtrong ſpirit of ſea ſalt, and evaporate the ſuperfluous moiſture, upon which there will be found a cake of true *ſal ammoniac* left behind.

Our own volcanos, or ſubterraneous fires, which we have in the coal countries, afford us *ſal ammoniac.* It is found ſticking to the ſides of the openings of theſe volcanos, in conſiderable thick cruſts, under other cruſts of ſublimed ſulphur. There is no foſſile *ſalt* in theſe places, nor any thing elſe, that can form *ſal ammoniac* in the common way we ſuppoſe it to be found in; but it appears truly that it proceeds only from the coal that feeds theſe fires. It is certain, that *ſal ammoniac* is ſometimes found on brick kilns, where nothing but coals and common brick clay are burnt; and as no one would ſuſpect it of being contained in the brick clay, there is here only the coal to afford it. The common coal ſlate of thoſe countries alſo contains alum, ſulphur, and *ſal ammoniac*; for alum may be drawn from it by the common operations; and when it is burnt, as it frequently is there for hardening the coal ways, both brimſtone and *ſal ammoniac* are found in the heaps in ſeveral places.

The *ſal ammoniac* found in the openings of the burning mountains, particularly mount Ætna, is evidently the ſame in all reſpects with ours; and even this alſo may, for aught we know, be formed of coals, of which the inacceſſible bowels of that mountain may contain great ſtores; though none have been found riſing near enough to the ſurface to be dug for uſe. Other bitumens alſo may poſſibly afford this *ſalt* on burning as well as coal, and it is not to be doubted but many ſuch are to be found in the earth thereabouts. The *ſalt* on the ſides of the mouths of mount Ætna is found in large and thick cakes, and in dry weather may be collected in vaſt quantities, and poſſibly a great part of what the Venetians ſell in other parts of Europe may be from theſe places. Either this *ſalt* or that of our own volcanos, may be uſed in all the proceſſes of chemiſtry, with the ſame ſucceſs as other *ſal ammoniac.* It is of itſelf grey and coarſe; but on mixing it with lime, and wetting them, a volatile ſpirit is raiſed; and on ſubliming a mixture of it with pot-aſh, a dry and white volatile *ſalt* is obtained. If ſome ſpirit of wine be added to the mixture of *ſal ammoniac* and pot-aſh, more of the volatile *ſalt* will be produced than any other way. Phil. Tranſ. Nº 130. See Ætna *ſalt.*

We are well aſſured that this *ſalt* is a concrete, the acid of which is that of ſea *ſalt*, and its alkali, a volatile urinous one; both of which are found in dung, burnt and raiſed into ſoot.

If there is occaſion to ſeparate the acid of ſea *ſalt* from *ſal ammoniac*, there need only be uſed the common vitriolic acid, which being well known to be ſtronger than that of ſea *ſalt*, it diveſts that acid of its alkali by its ſuperior power, and it becomes the baſis of a new concrete *ſalt* with this acid, while the acid of ſea *ſalt*, now freed and ſeparated, may be drawn off by pure diſtillation.

If, on the other hand, it were required to draw from *ſal ammoniac* its volatile alkali, the ſubſtances to be employed to this purpoſe are ſuch alkalies as act upon the acid of the ſea *ſalt*, abſorbing and retaining it; the volatile alkali becomes freed, and riſes with a very ſmall heat. This alkali, thus raiſed, appears in two different forms, the one a liquid, which is called ſpirit of *ſal ammoniac*, the other a dry one, which is called the ſublimed *ſalt* of *ſal ammoniac*; and though theſe are ſometimes obtained ſeparate, yet in ſome operations they are in part of the one and in part of the other kind. This is well explained by Mr. du Hamel in his courſe of experiments on this ſubſtance. Mem. Acad. Scien. Par. 1735. See *Properties of ſal* Ammoniac.

The ſpirit and *ſalt* of *ſal ammoniac* being the ſame matter in a dry and a liquid form; it is evident, that the liquid muſt of the two be moſt ſtriking to the noſe, becauſe the particles of the *ſalt* are more eaſily diſunited from this latter union; and the *ſalt*, in a dry form, is ſo very volatile, that it entirely evaporates when laid on a hot iron, however fixed the matter may have been, which it originally carried up with it. It appears very plain from this, that the union between this volatile body, and the particles of more fixed ones, which it carries up with it in ſublimation, and which are proper to give it the form of a dry concrete, is ſo intimate, that it will bear very ſevere trials and remain unaltered, and, indeed, that it is ſcarce poſſible at all to decompoſe it.

It is no indifferent matter what the additions are with which *ſal ammoniac* is diſtilled; they muſt, by no means, be either ſuch as contain a nitrous, or a vitriolic acid; the former of theſe meeting with the fatty and ſulphureous part of the *ſal ammoniac*, may cauſe a detonation and burſt the veſſels; and the other, which is yet much more dangerous, might diſengage a portion of the ſea *ſalt*, which would again mix with the volatile part with which it has now no buſineſs to be allied, and with the fatty matter it might form a very diſagreeably ſcented ſulphur. Bole contains a vitriolic acid, and is therefore to be rejected. Gypſum mixed with it gives a ſmoaking liquor, whoſe odour is inſupportable, and chalk and common pot-aſhes are the beſt of all additions.

The *ſal ammoniac*, which is prepared chiefly in Egypt, is brought to us, ſometimes in conical leaves, but moſt commonly in large round cakes, convex on one ſide, and concave on the other; appearing, when broken, of a needled texture, or compoſed of ſtriæ, running tranſverſly and parallel to one another: the internal part is generally pure, and of an almoſt tranſparent whiteneſs; the outſide for the moſt part foul, and of a yellowiſh grey, or blackiſh hue. It is purified, either by ſublimation, with a gradual fire, in an earthen cucurbit, having a blind head adapted to it; or perhaps more perfectly, by ſolution in water, filtration and cryſtallization. It diſſolves, in temperately warm weather, in about thrice its weight of water, and by the aſſiſtance of heat in a much ſmaller quantity, and cryſtallizes into long ſhining ſpicula, or thin fibrous plates, like feathers. This ſalt has a very ſharp, penetrating taſte. It is a powerful attenuant and deobſtruent; the liberal and continued uſe of it, according to Boerhaave, renders the blood ſo thin as to burſt through the veſſels, particularly thoſe of the lungs and the urinary organs. In doſes of half a drachm, or a drachm, diſſolved in water, if the patient is kept warm, it generally proves ſudorific; by moderate exerciſe, or walking in the open air, its action is determined to the kidneys; in larger doſes it looſens the belly.

The firſt who gave *ſal ammoniac* internally was Platerus; but its uſe in fevers was not then known; he only uſing it in aſthmas. In ſucceeding times it became known as a febrifuge. It is frequently uſed in this intention in Germany and Holland, and with great ſucceſs. The common doſe to a grown perſon is one drachm; the largeſt doſe, in caſes of the moſt robuſt conſtitutions, is two drachms. A perſon of eleven or twelve years old may take two ſcruples, and an infant of a year old may take fourteen grains. Its chief virtue is in intermittent fevers, in which it may be thus given. Let the doſe of *ſal ammoniac*, proportioned to the age and ſtrength of the patient, be diſſolved in an ounce of common water, or of any diſtilled water; and let the patient take it half an hour before the time that the fit is to come on. This is to be repeated in the ſame manner, before every fit, till the diſtemper is removed.

Though the great uſe of this medicine be in intermitting fevers, it is not, however, adapted only to thoſe, but may be of uſe in fevers of other kinds. The ſame doſe may be taken every five or ſix hours, drinking a baſon of ſage-tea after it. It very frequently ſucceeds ſo well, that one doſe of it carries off the diſeaſe, ſo that it never returns again; but if the firſt doſe does not ſucceed in this manner, a few others will. Two, three, or four doſes, almoſt always prove ſufficient. This medicine has no viſible effect upon the body, more than the ſudden removal of the ſickneſs; for it neither operates by vomit, nor by ſtool, nor by ſweat: its effect ſeems to be owing to the correcting and altering of the matter of the diſeaſe, not the evacuating it out of the body.

The bark is ſuperior to this *ſalt* in the cures of quartan agues, and indeed in other caſes it is more certain in the ſtopping a ſecond fit; but there is another advantage in this, which the bark greatly wants; this is the preventing relapſes. Theſe are very frequent after cures in the common way, but are ſcarce ever found to follow in caſes when this *ſalt* has been uſed.

Another advantage of this medicine is the ſmall quantity of the doſe, and the few doſes that are neceſſary to be taken for a cure; whereas every one knows how many large doſes of the bark are neceſſary, and that often at ſuch ſmall diſtances of time, in caſes, that it is often difficult to perſuade the patient to be cured at the expence of ſo nauſeous a load of medicines. Act. Erudit. 1717.

Dr. Lewis obſerves, that in many caſes, as an aperient, it is an excellent aſſiſtant to the bark, where that aſtringent drug would by itſelf produce dangerous obſtructions, or aggravate thoſe already formed. This ſalt is employed likewiſe externally as an antiſeptic, and in lotions and fomentations for œdomatous tumors; as alſo in gargariſms, for inflammations of the tonſils, and for attenuating and diſſolving thick mucus in the mouth and fauces. Saturated ſolutions of it are ſaid to conſume warts. See *Sal* AMMONIAC.

There are various preparations of this ſalt in the modern pharmacy; as,

SAL *ammoniac, ſublimate of*, is of like virtue as the purified.

SAL *ammoniac volatile*. See *Volatile Sal* AMMONIAC.

SAL *ammoniac, flowers of*, made of *ſal ammoniac*, with ſea-ſalt decrepitated. See FLOWERS *of ſal ammoniac*.

The virtues are much the ſame as the ſublimed *ſal ammoniac*.

Sometimes, inſtead of the ſea-ſalt, iron or ſteel is uſed; which makes what they call *martial flowers of ſal ammoniac*, of a very penetrating and deobſtruent nature, and recommended in all kinds of obſtructions, cachexies, jaundice, dropſies, &c.

SAL *ammoniac, ſpirit of*. Of this we have various kinds, which derive different denominations and properties from the different additional ingredients the ſalt is diſtilled with: as, *ſpirit of ſal ammoniac with tartar*; with *quicklime*; with *amber*; with *ſteel or iron*; *ſweet* ſpirit of *ſal ammoniac*; *acid* ſpirit of *ſal ammoniac*; diuretic ſpirit of *ſal ammoniac*, &c. See AMMONIAC.

SAL *Ægypti*, in *Natural Hiſtory*, a name given by Hippocrates, and many other of the old writers, to the NATRUM of the ancients, called alſo *nitrum* by ſome, though very different from our nitre. It had the name *natrum* from *Natrium*, or *Nitrium*, the name of a city of Egypt; and therefore this, as well as the name uſed by Hippocrates, ſtood for Egyptian ſalt. See NATRON.

SAL *aquarum*, in *Natural Hiſtory*, a name given by many of the ancient writers to the nitre of the ancients, or NATRON.

They had this ſalt principally from Egypt, and called it in their works the produce of the evaporated waters of the Nile; for this reaſon Hippocrates ſometimes calls it *ſal Ægypti*, and ſometimes *ſal in aquis creſcens, a ſalt growing in the water*.

SAL *catharticus amarus*, the bitter purging ſalt, commonly called EPSOM *ſalt*, which was firſt made by Dr. Grew by evaporating Epſom waters.

This ſalt is compoſed of the vitriolic acid and magneſia; diſtinguiſhable from that whoſe baſis is an alkali, by ſolutions of it being turned milky, and depoſiting their earth, on the addition of any alkaline ſalt. For a full doſe, eight or ten drachms of this ſalt may be diſſolved in a proper quantity of common water, or four or five drachms in a pint or quart of the purging waters; to which may be added a little tincture of cardamom ſeeds, or ſome other grateful aromatic. Theſe liquors, in ſmaller doſes, paſs farther into the habit, promote the ſecretions in general, and prove excellent aperients in ſundry chronical diſorders.

SAL *catharticus Glauberi*. See SAL *mirabile*.

SAL *circulatum*, in *Chemiſtry*, a term uſed by Paracelſus for a preparation of ſea-ſalt, of which he diſtinguiſhes two kinds, under the name of the *circulatum minus*, and *circulatum majus*. Theſe ſeem to have a great affinity with the famous alkaheſt, or univerſal ſolvent, ſo much talked of in the works of this author, and his ſucceſſor Van Helmont. Many ridiculous properties were attributed to it. See ALKAHEST.

SAL *communis*. See SALT.

SAL *de duobus*. See ARCANUM *duplicatum*, and *Vitriolated* TARTAR.

SAL *decrepitatum*. See *Common* SALT.

SAL *diureticus*, a form of medicine, of the nature of the *terra foliata tartari*, introduced into practice by the late college diſpenſatory. The method of preparing it is this: take of any alkaline fixed ſalt a pound, boil it in four or five pints of diſtilled vinegar, in a gentle heat. When the fermentation is over, pour on more diſtilled vinegar; and when the fermentation ariſing from this addition is over, pour on ſtill more, and proceed thus till the moiſture being nearly all evaporated, freſh vinegar being added will excite no more fermentation: this generally happens when about ten quarts have been uſed; then evaporate to a drineſs; the ſalt will be impure, and muſt be melted for a ſmall time, with a gentle heat, afterwards diſſolved in water, and filtered; if the melting has been rightly performed, the ſtrained liquor will be pellucid as water; then evaporate this in a gentle heat to a drineſs, and you will have a very white ſalt, ſoluble either in water or ſpirit of wine. This, as well as the regenerated TARTAR, are given in doſes of ten or twenty grains, as mild aperients; and to a drachm or two as purgatives and diuretics.

SAL *enixus*. See ENIXUM *ſal*.

SAL *gemmæ*. See *Foſſile* SALT.

SAL *Jamblici*. See JAMBLICI *ſal*.

SAL *lucidum*, in *Natural Hiſtory*, a name given by ſome to NITRE. Others uſe the phraſe to expreſs the nitre of the ancients, that is, the NATRON.

SAL *marinus*. See SALT.

SAL *marinus*, in *Ichthyography*, the name of a truttaceous fiſh of the umbla kind, and very much approaching to that ſpecies called the REUTELE; and by ſome ſuſpected not to be eſſentially different from that ſpecies. It is a very ſcarce fiſh, and is extremely valued for the table, but is never caught in any plenty, never keeping in ſhoals as many other fiſh, but living ſingly. It loves clear ſtony rivers of a ſharp current, and feeds on ſmall fiſh. Its moſt frequent ſize is of about a pound weight, and it very rarely exceeds twice that. Its tail and fins are very red; its ſides and belly reddiſh, and its back of a ſort of orange-colour or reddiſh yellow, having ſome yellow ſpots; its ſcales are moderately large, and do not eaſily fall off in rubbing.

The *ſal marinus* is diſtinguiſhed by Artedi by the name of the forked-tail ſalmon, with a yellowiſh back, and with yellowiſh ſpots.

SAL *marinus regeneratus*, in *Chemiſtry*, the name given to a ſea ſalt, produced by adding a fixed vegetable alkali to marine acid, or the acid ſpirit of ſalt drawn by diſtillation. The proceſs is thus: dilute four ounces of oil of tartar, with three times its weight of fair water; put this mixture into a tall glaſs body, and heat it, and drop into it any of the kinds of ſpirit of ſea ſalt, whether

Glauber's, or that prepared with bole; ſhake the veſſel now and then, and continue to drop in the acid till the alkaline liquor is ſated, and there riſes no more efferveſcence; filter the liquor, evaporate to a pellicle, and ſet it by to cryſtallize, and there will be procured cryſtals of perfect ſea ſalt, in all things agreeing with common ſalt.

This ſalt has been denominated the febrifugal ſalt of Sylvius; though it does not ſeem to deſerve the name. However, in proper doſes, it may as a purgative and antiſeptic, contribute to the cure of ſome fevers; qualities which it poſſeſſes in common with other neutral ſalts. But it is not now employed.

SAL *martis*, *ſalt of iron*, a chemical preparation, which is made as follows: mix together a quart of water and eight ounces of oil of vitriol; pour the oil of vitriol in by a little at a time; and having put this mixture into a glaſs veſſel, add to it filings of iron four ounces. When the ebullition is over, evaporate the liquor to a pellicle, and ſet it to ſhoot; there will be found a green vitriol or ſalt in fair cryſtals, which dry for uſe.

This ſalt is one of the moſt powerful preparations of iron; it opens obſtructions of all kinds, and ſtrengthens the viſcera; it is an excellent medicine in cachexies, obſtructions of the ſpleen and liver, and in ſuppreſſions of the menſes; it is alſo found good againſt worms.

The beſt manner of giving it is in ſolution, half an ounce in a quart of water, four ounces of which are a doſe; and if drank in the manner of the natural chalybeat waters, it will be found to exceed moſt of them in its good effects. See IRON, in *Medicine*.

SAL *microcoſmicus*. See PHOSPHORUS and URINE, and *Fuſible* SALT, &c.

SAL *mirabile*, or *Glauber's ſalt*, is compoſed of the vitriolic acid of the mineral alkali NATRON. It is uſually prepared by adding to ſea ſalt equal or half its weight of oil of vitriol, diluted with water, diſtilling off the marine acid, and diſſolving and cryſtallizing the reſiduum. Though this be a well known preparation, and the reſult of a mixture of a vitriolic acid with marine ſalt, and the world has ſuppoſed it could be no other way found than by ſuch an union made by art; yet Mr. Hellot has communicated to the Academy of Sciences of Paris, an account of its being found in vitriol alone, without the addition of any foreign matter.

The common green vitriol or copperas is well known to be made in England, by an union of the ſulphureous acid of the common pyrites, and iron. Old iron is thrown into large quantites of a ſolution of the pyrites, that it may be diſſolved, and the union produces a concrete in the form of a regular ſalt. This ſalt, we well know, contains a ſulphureous matter; whether that be obtained from the pyrites, or from the iron that enters its compoſition; ſince, in the diſtillation of its oil, there ever eſcapes a very ſtrong and penetrating ſcent of ſulphur through the junctures of the veſſels.

Mr. Lemery has ſhewn, that after a moderate diſtillation of green vitriol, a ſalt of the nature of alum may be drawn by a lixivium from the colcothar; and beſide this, Mr. Hellot has found in that colcothar a vitrifiable earth, and a genuine *Glauber's ſalt*. Mem. de l'Acad. Scien. Par. 1738.

Glauber's ſalt may be obtained from borax, by mixing oil of vitriol with it. Mix four ounces of borax with one ounce and one drachm of oil of vitriol; upon ſublimation, this gives the *ſal ſedativum* of Homberg, and the reſiduum, expoſed to a ſtrong fire, affords *Glauber's ſalt*. This operation may be ſhortened very much; for inſtead of ſublimation, the *ſalt* may be obtained by cryſtallization, in light foliated laminæ. This *ſalt*, whether prepared by ſublimation, or by cryſtallization, has the property of diſſolving in ſpirit of wine; and if the ſpirit of wine be ſet on fire, the flame is green. Spirit of wine has no effect on borax, and the oil of vitriol digeſted with it does dot make its flame green; therefore it is neceſſary, in order to give this greenneſs to the flame, that borax ſhould be united to an acid. Phil. Tranſ. Nº 436. p. 89.

And, in general, *Glauber's ſalt* may be obtained from all vitriolic ſalts with earthy or metallic baſes, by decompoſing them with ſoda; and alſo by burning ſulphur with common ſalt or ſoda.

Sal mirabile may likewiſe be obtained by the following proceſs; powder calcined kelp in an iron mortar, put it into a glazed earthen pan, and pour upon it boiling water, in the proportion of a quart to a pound; ſtir it about, and either filtrate or decant the clear liquor from the ſediment; put this liquor into a glazed earthen diſh, and having heated it over a gentle fire, pour in gradually oil of vitriol, diluted (viz. to every pound of oil allowing a point and a half of water) till no efferveſcence ariſes; and having thus gained the exact point of ſaturation, filtrate through paper, or let it ſtand to depurate, and decant the clear liquor; evaporate it to a pellicle, and ſet it by to cryſtallize. By the above proceſs, eight ounces and a half of the ſalt have been procured from a pound and a half of kelp; and ſomewhat leſs than two ounces of the oil of vitriol was found ſufficient for the ſaturation. Mr. Fergus, who deſcribes this proceſs, obſerves, that it may be alſo had from barilla inſtead of kelp, but not ſo cheap.

Glauber's *ſal mirabile* was long thought to be the produce of art only; but of late years, a natural *ſalt*, perfectly ſimilar to Glauber's, has been found in many places. We have a full account, by Mr. Boulduc, of a ſubſtance of this kind, which had been found near Grenoble in Dauphine. The ſame gentleman alſo found a *ſal mirabile* in the waters of Paſſy. The true Epſom *ſalt* deſcribed by Dr. Grew in 1696, is alſo either the ſame as Glauber's, or at leaſt Glauber's is the principal part of it. Stahl afterwards found a true *Glauber's ſalt* in the acidulæ, or ferruginous waters, and did not ſcruple placing this among the natural mineral ſalts. Hoffman alſo found a ſpring of very bitter and purgative mineral water, a pound of which contained two drachms of this ſalt. The cathartic ſalt, found near Madrid, is alſo of the ſame nature; and it may be obſerved in general that though it differs from Epſom ſalt, it is contained in ſea-water, and many mineral waters. See Hiſt. de l'Acad. Par. 1727. p. 29, 30. and the Memoirs of the ſame year, 4to. p. 375.

It is to be obſerved, that though Glauber made his *ſalt* known about the middle of the preceding century, yet Kunckel, in his Laborat. Chymic. aſſures us, it was known in the electoral houſe of Saxony a hundred years before. However this be, we owe the knowledge of it to Glauber, who called it *admirable*; and it ſoon acquired, and has ever ſince maintained the reputation of an excellent internal medicine in many caſes. Its medicinal qualities are nearly the ſame with thoſe of the SAL *catharticus amarus*, which frequently ſupplies its place in the ſhops.

SAL *muriaticus calcareus*, is a combination of the marine acid with calcareous earths, which forms a very pungent ſaline compound, that aſſumes with difficulty a cryſtalline form, deliquiates in the air, diſſolves not only in water but in rectified ſpirit of wine, and changes the colours of blue flowers of vegetables to a green. This ſalt is contained, in conſiderable quantity, in ſea water, and remains fluid after the cryſtallization of its other ſaline matters; and it is found alſo in many common waters, to which, like the calcareous nitre it communicates a greater or leſs degree of hardneſs and indiſpoſition to putrefy, according to its quantity. It is much more antiſeptic than the perfect marine ſalt, and is ſaid to be diuretic and lithontriptic. The medicine commonly ſold as a lithontriptic, under the name of *liquid-ſhell*, appears to be no other than a combination of this kind, conſiſting of calcined ſhells diſſolved in marine acid. Theſe combinations have been chiefly prepared, by mixing the calcareous earth with ſal ammoniac, and urging the mixture with gradual fire, till the volatile alkali of the ſal ammoniac is either diſſipated in the air, or collected by diſtillation, and only its acid left incorporated with the earth; and ſo much of the earth as is ſatiated with the acid, may be ſeparated from the reſt by elixation with water. Lewis.

SAL *nitrium*. See NATRON.

SAL *petræ*, or *nitri*. See SALT *petre*, and NITRE.

SAL *polychreſt of Seignette*, a ſoluble tartar made with *ſal kali*, inſtead of ſalt of tartar. Mr. Boulduc deſcribes this ſalt in the Mem. Acad. Scienc. 1731. See RUPELLENSIS *ſal*.

SAL *prunellæ*. See PRUNELLÆ, and CRYSTAL *mineral*.

SAL *Rupellenſis*. See RUPELLENSIS *ſal*.

SAL *ſedativus of Homberg*. This uſed to be made by diſſolving borax in water, into which oil of vitriol was poured, and then diſtilling this mixture, quieting ſalt was obtained. Mr. Geoffroy has lately taught us an eaſier way of preparing it; he evaporates the liquor to the proper conſiſtence, and then allows it to cryſtallize. See *Sedative* SALT.

SAL *tartari*. See TARTAR.

SAL *vegetabilis*, is obtained by diſſolving vegetable alkali in boiling water, in the proportion of a pound to a gallon, and then adding refined tartar, till a freſh addition occaſions no farther efferveſcence; the liquor is then filtered while hot, and either cryſtallized or evaporated to dryneſs.

SAL *volatile oleoſum* is the name of an aromatic volatile liquor firſt prepared by Sylvius de la Boe, and found a very notable medicine, chiefly, as a cephalic, and cordial.

It is made thus: to an ounce of volatile ſalt of ſal ammoniac, diſtilled with ſalt of tartar, and dulcified with ſpirit of wine, put a drachm and a half of ſome aromaſic oil, or eſſence, drawn from ſome generous aromatic vegetable; as cinnabar, cloves, roſemary, baum, &c. and when the ſpirit and oil are well ſtirred and incorporated together, draw off the volatile ſalt and ſpirit in a cucurbit. Some, inſtead of this, mix all the ingredients together at firſt; viz, the ſal ammoniac, ſal tartari, ſpirit of wine, and powder of cinnamon or cloves, with other aromatics, and diſtil off the volatile ſpirit and ſalt at once; but the former way is preferred.

The college of London orders a quart of the dulcified ſpirit of ſal ammoniac, two drachms of eſſential oil of nutmegs, the ſame quantity of eſſence of lemons, and half a drachm of oil of cloves, to be diſtilled together with a very gentle heat. That of Edinburgh directs an ounce and a half of oil of roſemary, an ounce of oil of amber, and half an ounce of eſſence of lemons, to be put to eight ounces of the volatile ſalt of ſal ammoniac, and a gallon and a half of French brandy, and near a gallon to be drawn off in the heat of a water bath.

Sal, in the *Hiſtory of Gems*, a term uſed by Pliny and the ancients, to ſignify a defect or flaw, which took off very much from the value of the gem. Martial having occaſion to mention this ſort of blemiſh in cryſtal, calls it *nitrum* inſtead of *ſal*.

Et turbata levi queſtus cryſtallina nitro.

The critics have ſometimes changed this word *nitro*, to *vitro*, and others have made the confuſion yet greater, by ſuppoſing that the poet did not mean rock cryſtal, but cryſtalline glaſs; but theſe are all errors. It is plain, by what Pliny and others have ſaid on the ſame ſubject, that the author means here the ſame that others do by the word *ſal*. This was a duſky and duſty foulneſs, ſeemingly compoſed of a quantity of ſaline particles, ſhooting into their forms within the body of the cryſtal. The gems in general were ſubject to this blemiſh; and we find, in particular, that the emerald was frequently debaſed by it.

It is found at this time, indeed, that cryſtal is much more ſubject to it than any of the gems; but as the Romans called all the green cryſtals found in the copper-mines of Cyprus by the names of emeralds, it is eaſy to conceive, that the emerald, as they underſtood the word, muſt be frequently ſubject to it. The poets uſing the word *nitrum* inſtead of *ſal*, is not wonderful; for the Greeks called common ſalt *halonitrum*, ſo that the words ſeem almoſt ſynonymous.

SALACIA, in *Zoology*, the name of a genus of inſects of the GYMNARTHRIA kind; the body of which is ovato-oblong, and the tentacula are numerous, and diſpoſed in little cluſters.

It is called by different authors *priapus marinus*, and *mentula marina*. See PRIAPE *de mer*.

SALACSAE, in *Natural Hiſtory*, a name given by the inhabitants of the Philippine iſlands to a kind of bird, by whoſe flight they pretend to divine the event of things. All the account we have of the bird is, that it is of a ſmall ſize, and is variouſly coloured, and has a long and large beak.

SALADINE, a tax impoſed in England and France, in the year 1188, to raiſe a fund for the croiſade undertook by Richard I. of England, and Philip Auguſtus of France, againſt Saladine, ſultan of Egypt, then going to beſiege Jeruſalem.

The *Saladine* tax was thus laid: that every perſon who did not enter himſelf a croiſee, was obliged to pay a tenth of his yearly revenue, and of the value of all his moveables, except his wearing-apparel, books, and arms.

The Cartuſians, Bernardines, and ſome other religious, were exempted from the *Saladine*.

SALAMANDER, in *Zoology*, a name given by authors to ſeveral ſpecies of the lizard kind, but the principal are two, the *ſalamandra aquatica*, and *ſalamandra terreſtris*. The *ſalamandra aquatica*, or *water ſalamander*, the *lacerta paluſtris* of Linnæus, is our common water-newt, or EFT, which is very common in fiſh-ponds, und other ſtanding waters, and is diſtinguiſhed from the reſt by the flatneſs of its tail.

The manner of propagation in theſe animals is very ſingular, and ſerves to illuſtrate the analogy between animal and vegetable nature.

The *ſalamandra terreſtris*, or land *ſalamander*, the *ſalamandra lacerta* of Linnæus, is a ſpecies of lizard very like the green kind, except that its head and its belly are thicker; its tail is ſhort, and its colour a fine black, marked with red ſpots, and of a bright, ſhining, and gloſſy appearance. It is very common in many mountainous places, in the ſouthern parts of Europe. It has a naked body, from the pores of which iſſue an oil, which is ſaid to be an excellent depilatory.

The difference between this and the water-kind is not only in colour, but in the ſhape alſo of the tail; which in this is round, not flat as in that; yet there are ſome who affirm, there is no ſpecific difference betwen the two, but that the water-kind, when it deſerts that element, and comes to live on ſhore, alters in colour, and becomes round at the tail.

The opinion of this creature's being able to remain unhurt in the fire for a long ſpace of time, is wholly falſe and fabulous.

The *ſalamander* is evidently a viviparous animal, yet it is ſuppoſed that the young are hatched from perfect eggs while in the body of the parent animal. See EFT.

Salamander'*s blood*, a term which chemiſts give to the red vapours, which, in diſtilling ſpirit of nitre, riſe towards the latter end, and fill the receiver with red clouds.

They are the moſt fixed, and the ſtrongeſt part of the ſpirit; nothing but nitre yields a red vapour in diſtillation.

SALAMANDRINO, in *Ichthyology*, a name given by the Italians to that ſpecies of ſalmon, which Salvian calls SAL-*marinus*.

SALAMGA, in *Natural Hiſtory*, the name given by the people of the Philippine iſlands to a ſpecies of ſea-ſwallow. This is the bird, whoſe neſts are ſo famous as an ingredient in ſoups.

SALANDRA, or **Salandria**. See CHELANDIUM.

SALAR, in *Ichthyology*, a name given by ſome authors to the TROUT.

Others apply the name to a young SALMON, while very ſmall.

SALARY, *ſalarium*, a ſtipend, or wages allowed any perſon in conſideration of his pains, induſtry, or ſervice, in another man's buſineſs.

SALAYASIR, in *Natural Hiſtory*, the name by which the people of the Philippine iſlands call that ſmall ſpecies of duck, which is ſo common thereabouts. This is an inhabitant of their lakes and marſhes, and is a perfect duck, and very beautifully coloured, but does not exceed the bigneſs of a man's fiſt.

SALE, *venditio*, in *Commerce*, is the transferring of the property of goods from one to another, upon valuable conſideration; and if a bargain is, that another ſhall give me 5*l*. for ſuch a thing, and he gives me EARNEST, which I accept, this is a perfect *ſale*. On *ſale* of goods, if earneſt be given to the ſeller, and part of them be taken away by the buyer, he muſt pay the reſidue of the money upon fetching away the reſt, becauſe no other time is appointed; and the earneſt given binds the bargain, and gives the buyer a right to demand the goods; but a demand without paying the money is void; and it has been held, that after the earneſt is taken, the ſeller cannot diſpoſe of the goods to another, unleſs there is ſome default in the buyer; therefore if he doth not take away the goods, and pay the money, the ſeller ought to require him ſo to do; and then if he doth not do it in convenient time, the bargain and *ſale* are diſſolved, and the ſeller may diſpoſe of them to any other perſon. A ſeller of a thing is to keep it a reaſonable time for delivery; but where no time is appointed for delivery of things ſold, or for payment of the money, it is generally implied that the delivery be made immediately, and payment on the delivery. Where one agrees for wares ſold, the buyer muſt not carry them away before they are paid for, except a day of payment is allowed him by the ſeller. It is ſaid a perfect bargain and *ſale* between parties will be good, though the ſeller knows of an execution that is againſt him, and doth ſell the goods, to prevent the falling of it upon them. A *ſale* may be of any living or dead goods in a FAIR OR MARKET, be they whoſe they will, or however the ſeller come by them, if made with the cautions required by law; but if one ſell my goods unduly, I may have them again. If a man affirms a thing ſold is of ſuch a value, when it is not, this is not actionable; but if he actually warrants it, at the time of the *ſale*, and not afterwards, it will bear an action, being part of the CONTRACT.

Sale *of diſtreſs*. See DISTRESS and REPLEVY.

SALEFUR, a name given by ſome of the chemiſts to garden SAFFRON.

SALEP, in the *Materia Medica*, the root of a ſpecies of ORCHIS.

The *orchis maſcula* of Linnæus is moſt valued, although the roots of ſome of the palmated ſorts, particularly of the *orchis latifolia*, are found to anſwer almoſt equally well. The *orchis* flouriſhed in various parts of Europe and Aſia, and grows in our country ſpontaneouſly, and in great abundance. It is much cultivated in the Eaſt, and the root of it forms a conſiderable part of the diet of the inhabitants of Turkey, Perſia, and Syria. The *ſalep*, which is brought from the eaſtern countries, is in oval pieces, of a yellowiſh white colour, ſomewhat clear and pellucid, very hard, and almoſt horny, of little or no ſmell, in taſte like gum tragacanth.

Salep ſhould be choſen clean, firm, and hard; it is very little liable either to decay, or ſophiſtication.

The people of the Eaſt are extremely fond of *ſalep*; they look upon it as one of the greateſt reſtoratives and provocatives to venery in the whole vegetable world.

That *ſalep* is the root of an *orchis*, no way differing from our common *orchis* in virtue, but owing its appearance to the manner of preparing it, and, conſequently, that *ſalep* may be prepared from the roots of *orchis* of our own growth, Mr. Geoffroy has proved in the following manner. He conſidered, that the method of curing one root in the eaſtern part of the world was probably the ſame with that uſed in all; and obſerving that Kæmpfer had deſcribed the manner in which the Chineſe prepare their ginſeng, to make it pellucid, which was by firſt ſteeping, or macerating it in water, and afterwards carefully drying it, he determined to attempt the curing of the roots of the common *orchis*, in a method not unlike that uſed with the ginſeng, in order to make *ſalep* of it. The *ſalep*, which we receive from Turkey, is a root of a white or reddiſh colour, according to its different age; and as we receive it, is always tranſparent. As to our own *orchis*, if we attempt to dry the roots in the common way, they never will appear at all like the *ſalep*, but will become ſhrivelled up and brown, and will always retain, or be ready to imbibe from a humid air, a great quantity of moiſture. To prepare theſe, in imitation of the *ſalep*, Mr. Geoffroy choſe the largeſt, plumpeſt, and faireſt roots he could find; theſe he nicely ſkinned, taking off the whole outer rind, then throwing them into cold water, he ſuffered them to macerate there ſome time; after this he ſlightly boiled them; and taking them out of the water, and draining them, he had them ſtrung upon threads, to be dried in a warm and dry air. When the roots were thoroughly dried, they were very tranſparent, and reſembled pieces of gum tragacanth, and continued dry and hard. The roots, thus prepared, may be kept long in a dry place, and will never attract humidity, or become mouldy and rotten; as they will always do in wet weather, if dried in the common way with their ſkins on.

The *orchis* roots thus prepared may be reduced to powder; this powder will diſſolve away in boiling water, and a ſcruple of it will make a baſon full of jelly, in the manner of the Turkiſh *ſalep*. This jelly is an admirable medicine in all the caſes, in which *ſalep* is preſcribed, and may be rendered agreeable by the addition of wine, ſugar, ſpice, &c. and the powder may be given with great ſucceſs in aſſes milk, for diſeaſes of the breaſt.

If the water, in which the roots have been boiled, be evaporated over a gentle fire in an earthen veſſel, there will remain an extract of a viſcous texture, and a very agreeable ſmell, reſembling that of a meadow of flowers when the wind blows over it.

Retzius, in the Swediſh Tranſactions for 1764, has improved upon Geoffroy's method; but Mr. Moult, of Rochdale, having publiſhed a new proceſs, which is recommended by the ingenious Dr. Percival, from his own knowledge of its ſucceſs, we ſhall here add an account of it; firſt premiſing, that the beſt time for gathering the roots is when the ſeed is formed, and the ſtalk ready to fall; becauſe the new bulb, of which the *ſalep* is made, is then arrived to its full maturity, and may be diſtinguiſhed from the old one, by a white bud ariſing from the top of it, which is the germ of the orchis of the ſucceeding year. The new root is to be waſhed in water, and the fine brown ſkin which covers it is to be ſeparated by means of a ſmall bruſh, or by dipping the root in hot water, and rubbing it with a coarſe linen cloth. When a ſufficient number of roots have been thus cleaned, they are to be ſpread on a tin plate, and placed in an oven heated to the uſual degree, where they are to remain ſix or ten minutes, in which time they will have loſt their milky whiteneſs, and acquired a tranſparency like horn, without any diminution of bulk. In this ſtate they are to be removed, to dry and harden in the air, which will require ſeveral days; or by uſing a very gentle heat, this operation may be finiſhed in a few hours. Mr. Moult obſerves, that his *ſalep* has a quality of thickening water, which is to that of fine flour nearly as two and a half to one, with this difference, that the jelly of *ſalep* powder is clear and tranſparent, whereas that of flour is turbid and white. Phil. Tranſ. vol. lix. p. 1, &c.

Dr. Percival informs us, that *ſalep* thus prepared may be afforded, in that part of England where labour bears a high value, at about eight pence or ten pence per pound, and that it might be ſold ſtill cheaper, if the orchis were cured without ſeparating from it the brown ſkin which covers it; whereas the foreign *ſalep* is ſold at five or ſix ſhillings per pound.

Salep is ſaid to contain the greateſt quantity of vegetable nouriſhment in the ſmalleſt bulk. The powder of it has been, therefore, propoſed to conſtitute part of the proviſions of a ſhip's company at ſea. This powder and portable ſoup, diſſolved in boiling water, form a rich, thick jelly; and an ounce of each, with two quarts of boiling water, will be ſufficient ſubſiſtence for a man a day; and as portable ſoup is ſold at half a crown a pound, and *ſalep*, cultivated in our own country, might be afforded at ten pence per pound, the day's ſubſiſtence would amount only to two pence half-penny. And this food, it is ſaid, would prove more nouriſhing than double the quantity of rice cakes, made by boiling rice in water. Beſides rice, as an aliment, is ſlow of fermentation, and a very weak corrector of putrefaction, and much inferior, as a wholeſome nouriſhment, to *ſalep*. *Salep* has alſo the ſingular property of concealing the taſte of ſalt water; and it has the property of retarding the acetous fermentation of milk. Dr. Percival propoſes *ſalep* as a very uſeful and profitable addition to bread.

The reſtorative, mucilaginous, and demulcent qualities of the orchis root, render it of conſiderable uſe in various diſeaſes. In the ſea-ſcurvy, it powerfully obtunds the acrimony of the fluids, and is eaſily aſſimilated into a mild and nutritious chyle. In diarrhœas and the dyſentery, it is highly ſerviceable, by ſheathing the internal coat of the inteſtines, by abating irritation, and gently correcting putrefaction. In the ſymptomatic fever, which ariſes from the abſorption of pus, from ulcers in the lungs, from wounds, or from amputation, *ſalep* uſed plentifully is an admirable demulcent, and well adapted to reſiſt the diſſolution of the craſis of the blood, incident to theſe caſes. By the ſame mucilaginous quality, it is equally efficacious in the ſtrangury and dyſury. It has alſo been found an uſeful aliment for patients afflicted with the ſtone or gravel. Percival's Eſſ. Med. and Exp. vol. ii.

SALET, Sallet, or Salade, in *War*, a light covering, or armour, for the head, anciently worn by the light horſe; only differing from the caſk in that it had no creſt, and was little more than a bare cap.

Nicod derives the word from *ſila*, which had the ſame ſignification among the Latins; others, from *ſaladinus*, alledging, that it was borrowed from the orientals; others, from the Italian *celeta*, as if the head were hid hereby; others, from the Spaniſh *celada*, *a little caſk*, &c.

SALIÆ, in *Antiquity*, Roman virgins, dreſſed after the manner of the Salii, who aſſiſted the pontiff in ſacrificing. Pitiſc. in voc.

SALIAN *dance*, in *Antiquity*. See Dance and Salii.

SALIANT, in *Fortification*, denotes *projecting*.

The word is formed from the French *ſaillant*, which ſignifies the ſame thing; of *ſailler*, *to project*, *advance outwards*; and that of the Latin *ſalire*, *to leap*.

There are two kinds of angles; the one *ſaliant*, which are thoſe that preſent their points outwards: the other *re-entring*, which have their points inwards. Inſtances of both kinds we have in tenailles and ſtar-works.

SALIC, or Salique *law*, *Lex* Salica, an ancient and fundamental law of the kingdom of France, uſually ſuppoſed to have been made by Pharamond, or at leaſt by Clovis; in virtue whereof males only are to inherit.

Some, as Poſtellus, will have it to have been called *Salic*, q. d. *Gallic*, becauſe peculiar to the Gauls. Cenal takes the reaſon to be, that the law was only ordained for the royal *ſalles*, or palaces. Claud. Seiſſel ſays, it was thus called, becauſe of the *ſalt* and the prudence with which it abounds; Fer. Montanus inſiſts, it was becauſe Pharamond was at firſt called *Salicus*; others, with the abbot Uſperg, derive its name from *Salogaſt*, Pharamond's principal miniſter; and others from the frequent repetition of the words *Si aliqua*, at the beginning of the articles. Genebrard ſays, it was called *Salic* for *Salomonic*, becauſe Solomon ſet the firſt example of it. Daviſon derives it from the German words *ſalts* and *lick*, q. d. *like to ſalt*. The moſt probable opinion is that which derives the word from the ancient Franks, who were called *Sali*, *Salici*, and *Salingi*, on account of the Sala, a river of ancient Germany. This is the ſentiment of Rhenanus and Æmilius, who are followed by ſeveral others; among the reſt, Menage, Paſquier, Borel, and Juncker. Bouteroue gives another plauſible origin of the word: he ſays, it comes from the word *ſalich*, which, in the old Teutonic language, ſignified *ſalutary*; and that the French in this law imitated the policy of the ancient Romans, who made ſalutary laws, which the magiſtrates were to have before them when they adminiſtered juſtice. This he confirms from a curious figure taken out of the Notitia Imperii, where the book is repreſented covered with gold, with this inſcription, *Leges ſalutares*.

Du Haillan, after a critical examination of the *Salic law*, declares it to have been an expedient of Philip the Long, in 1316, for the excluſion of the daughter of Louis Hutin from inheriting the crown. Father Daniel, on the other hand, maintains, that it is quoted by authors much more ancient than Philip the Long; and that Clovis is the real author of it. The opinion of Du Haillan has been confuted by Meſſrs. Vertot and de Foncemagne, in the Mem. de l'Acad. des Inſcript. tom. ii. p. 603, &c. and tom. viii. p. 490, &c. who trace the exiſtence of the *Salic* laws to the kings of the firſt and ſecond race. The ſtyle, which is ſcarce intelligible, and which is in a Latinized dialect, is a mark of its antiquity.

This law has not any particular regard to the crown of France: it only imports, in the general, that in *Salic* land no part of the inheritance ſhall fall to any female, but the whole to the male ſex. *De terra* Salica *nulla portio hæreditatis mulieri veniat; ſed ad virilem ſexum tota terræ hæreditas perveniat.* So that it is a popular error to ſuppoſe, that the *Salic law* was eſtabliſhed purely on account of the ſucceſſion of the crown; ſince it extends to private perſons as much as thoſe of the royal family.

Part of it ſeems to have been borrowed by our Henry I. in compiling his laws, cap. 89. *Qui hoc fecerit, ſecundum legem Salicam moriatur.*

By *Salic* lands, or inheritances, were anciently denoted all lands, by whatever tenure held, whether noble or baſe, from the ſucceſſion to which women were excluded by the *Salic law*; for they were by it admitted to inherit nothing but moveables and purchaſes, whenever there were any males. Indeed, M. Fenelon obſerves, that there were originally *Salic* lands, diſtinguiſhed from all others, and deſtined for the military people of the nation; and to theſe, it is ſuppoſed, the law was originally intended to be confined.

M. Eccard, a Hanoverian, is ſaid to have recovered an ancient MS. of this famous law, containing a third part thereof, much more ample than any yet diſcovered, with a very curious chronology of the ſame law, hitherto unknown.

SALICARIA, in *Botany*, a ſpecies of the *purple* LOOSE-*ſtrife*.

SALICARIA, in *Ornithology*, a name by which Geſner, and ſome others, have called a ſmall bird, very much reſembling the MUSCICAPA, or FLY-*catcher*, if not the ſame ſpecies.

It lives among the willows in wet places, and feeds on ſpiders, flies, and other inſects.

SALICASTRUM, a name by which Pliny, and ſome other botanical authors, have called the *ſolanum lignoſum*, the woody nightſhade, or bitter-ſweet. Ger. Emac. Ind. 2.

SALICHA, in the *Materia Medica*, a name given by ſome of the old writers to cinnamon. Avicenna and Serapion uſe it for the bark we call *caſſia lignea*, and the Greeks *hylocaſia*, when ſtripped clean from the wood.

SALICINEA, in the *Materia Medica*, a name uſed by Geſner, and ſome other authors, for the *nardus Celtica*, or Celtic ſpikenard.

SALICORNIA, in *Botany*. See SALT-*wort*.

SALIENS *punctum*. See PUNCTUM.

SALIENT, SALIANT, or SAILANT, in *Heraldry*, is applied to a lion, or other beaſt, when its fore-legs are raiſed in a leaping poſture.

A lion *ſalient* is that which is erected bend-ways; ſtanding ſo that his right fore-foot is in the dexter chief point, and his hinder left-foot in the ſiniſter baſe point of the eſcutcheon; by which it is diſtinguiſhed from RAMPANT.

SALII, in *Antiquity*, prieſts of Mars, whereof there were twelve inſtituted by Numa, for preſerving the brazen target which is ſaid to have fell down from heaven, in the eighth year of the reign of Numa, for the relief and ſafety of Rome, againſt a raging peſtilence; and alſo thoſe other eleven ſhields made ſo much to reſemble this that they could not be diſtinguiſhed from one another: they wore painted, parti-coloured garments, and high bonnets, with a ſteel cuiraſs on the breaſt.

They had their name *Salii* from *ſaltare, to dance*; becauſe, after aſſiſting at ſacrifices, they went dancing about the ſtreets with anicilia, or bucklers, in the left hand, and a rod in the right, ſtriking muſically on one another's bucklers with their rods, and ſinging hymns in honour of the gods. Their great feaſt was kept in the month of March, when they carried their ſacred charge about the city. They alſo carried about the ancilia whenever a juſt war had been proclaimed by order of the ſenate againſt any ſtate or people, ſuppoſing that by this means they ſecured the patronage and ſuccour of Mars.

There were two companies or colleges of the *Salii*; the ancient eſtabliſhed by Numa, called *Palatini*; the latter by Tullus Hoſtilius, called *Collini* and *Agonales*. Though Servius tells us, there were two kinds inſtituted by Numa the *Collini* and *Quirinales*; and two others by Tullus, the *Pavorii* and *Palorii*.

In ſinging, they uſed a peculiar ancient ſong, called *Saliare Carmen*; and after the ceremony they were entertained with a feaſt: whence *Saliares Epulæ*, and *Saliares Dapes*, paſſed into a proverb for good eating.

Their chief, called *præſul*, and *magiſter Saliorum*, was one of their number. It was he that led the band, and began the dance; the reſt imitating all his ſteps and motions. The whole company was called *Collegium Saliorum*.

Sext. Pompeius makes mention of *Salian maids*, *virgines Saliares*, hired for the purpoſe, and joined with the *Salii*, wearing a kind of military garb, called *paludaméntum*, with high round bonnets like the *Salii*, and like them, performing ſacrifice with the pontifices in the palaces of kings.

SALINE, a name given to a preparation of ſea-*ſalt*, procured from the froth of the ſea, hardened by the ſun in hot countries. It is called by ſome authors *pilatro de Levante*, and is uſed in glaſs making; and in the making the fine purple colour from cochineal, by boiling it in a ſmall quantity, with the bran and fœnugreek, of which the magiſtery is made for that purpoſe.

SALINE is alſo the name given by authors to ſprings of ſalt-water, called by us *ſalt-wells*, *ſalt-ſprings*, and *brine-pits*. Moſt parts of the world are found to have theſe; but thoſe of Franche Compté, in France, ſeem to be the moſt remarkable. The ſprings are ſituated in deep caves, and thoſe in the greater work are about four hundred feet in length, and fifty feet in breadth; into this work they deſcend by a ſtone ſtaircaſe of forty ſteps, and thence by a wooden one of twenty; at the bottom of theſe ſtairs is a cave with an arched roof. The firſt cave, or vault, is forty feet long, and thirty-two feet and a half broad, and in it are ſix ſprings of *ſalt* water, and two ſprings of freſh water; all which iſſue out of the ſame rock, in the ſpace of fourteen feet in length. From this cave they go into others, which are ſupported in the middle, each by a row of thick pillars, from which are carried double rows of arches. They then paſs through two gates into a ſpacious vault, thirty-five feet high, and ſupported, nigh the entrance, by four ſtrong pillars, placed in form of a ſquare. In the middle ſpace, between theſe pillars, is a baſon of a very conſiderable ſize, into which the *ſalt* water from ſeveral ſprings is collected; and in the ſame vault, beyond theſe pillars, are four others placed in a row, ſupporting different arches, of ſixty feet in length, and forty-eight feet in breadth; beyond which there is an irregular ſpace, ſixty-three feet long, in which are ſix or ſeven ſprings of *ſalt* water, and ten or twelve of freſh. The *ſalt* waters of theſe ſprings, and of the ſix ſprings before mentioned, are kept ſeparate from the freſh water, and are all conveyed through gutters to the baſon before mentioned. From this baſon they are drawn out by a wheel and buckets into four large ſtone baſons or reſervoirs, one of which holds fifteen thouſand hogſheads, and the other three together twenty-five thouſand hogſheads. From theſe reſervoirs they are to be drawn off, as occaſion requires, into ſmall ciſterns placed near the boiling-houſes; and the waters contained in the ſeveral baſons, as they are drawn from the ſprings, at different times, and are of different ſtrength, are mixed together before the boiling, in ſuch proportion, that each pound of the water yields three ounces of *ſalt*.

The water of the freſh ſprings is alſo collected in the caves into a freſh water baſon prepared to receive it, and raiſed by means of a crane to the level of a little brook, through which it runs away by a ſubterranean conduit. Brownrig of Salt, p. 94.

SALINE *principle*, a term uſed by the chemical writers, to expreſs a conſtituent part of ſeveral mixt bodies, on which their exiſtence in that form depends; and which, though always exiſtent in them, and always ſeparable by art, is yet not perceivable in many of them in the complex. See SALT.

The *ſaline principle* of vitriol is of the number of thoſe made by ſome a neceſſary principle of the exiſtence of that body, and by others ſuppoſed not to exiſt at all, otherwiſe than in the general form of that compound *ſalt*. But the exiſtence of it, in a ſeparate ſtate, is proved by this experiment: take four or five gallons of the ſtrong vitriolate water at the water-works, as it runs from the beds of pyrites to the great ciſtern; this is to be choſen, becauſe having yet undergone no operation but that of the air and water, it muſt needs be in the moſt ſimple and natural ſtate; diſtil from this about two-thirds of the inſipid water, let the glaſſes cool, and the water will then let fall a vitriol of a pale green colour, together with a large quantity of ochre or yellow earth. Evaporate away a third part of the remaining liquor, and more vitriol ſtill will be produced, of a paler colour than the former, and ſome yellow earth will alſo be thrown down, though leſs in quantity than before. After this has been repeated five times, inſtead of vitriol, a yellow *ſalt* will be obtained; and after that, on more evaporations,

tions, a white *ſalt* will be every time obtained, which will be extremely different from vitriol both in colour and taſte, being fiery and pungent, and partaking ſcarce at all of that acrid and nauſeous aſtringent taſte, which is ſo peculiar to vitriol. It is unctuous like *ſalt* of tartar, and cleanſing like ſoap, rendering the hands waſhed with it ſoft and ſupple; whereas the common vitriol makes them very harſh and rough; finally, this laſt *ſalt* diſſolved in water appears fatty and mucilaginous.

From five pounds and a half of the laſt lixivium, four pounds of this ſalt will be obtained, and half a pound of the liquamen will never congeal. It is remarkable, that this *ſaline* matter is the moſt ſoluble of all the ſorts, as the greateſt quantity of it may be kept fluid in the ſmalleſt quantity of water we know of in any experiment of this nature.

The liquamen remains thin, and is of an acrid and fiery taſte, ſcarce ſupportable on the tongue. See LIQUAMEN *pyriticum*.

The white ſalt, which is called the *ſaline principle* of vitriol, being put into a retort, and diſtilled in a ſand furnace, the far greater part of it comes over in form of a highly acid ſpirit, eſpecially that coming laſt in ſmall drops. This liquor being rectified in a tall glaſs body, a volatile ſulphureous liquor ariſes immediately on the application of the heat. The ſmell of this is ſo ſubtile and penetrating, that it is almoſt inſupportable, and yet it is clear as water, and inſipid to the taſte. This may be preſerved in its full perfection many years, only by keeping it cloſe ſtopped, not letting fall any ſediment. The remaining liquor is the common acid liquor of vitriol, and by diſtillation may be ſeparated into ſpirit of vitriol, and that heavy and corroſive liquor, commonly called oil of vitriol.

In alum, vitriol, and mineral ſulphur, the *ſaline principle*, which in each of them is by far the chief part, both in quantity and energy, has much the ſame nature and properties. In the laſt indeed it is clogged with ſulphur; for the true nature of common ſulphur is, that it is a vitriolic ſalt, the very ſame with that of common vitriol; and the ſulphureous parts, which give it that form and exiſtence which we expreſs by the word *ſulphur*, are leſs copious than could be imagined, compared with the *ſaline*, which are genuine vitriol, differing in nothing from the common vitriol, but that it contains a ſmaller admixture of terreſtrial and metalline parts. Phil. Tranſ. N° 123.

SALINE *earths*. The chemiſts under this, as a general head, reckon all thoſe *ſaline* and *earthy* ſubſtances, which are calcined or burnt in the fire; as all the kinds of lime, pot-aſhes, ſoot, and the like; theſe being ſo many mixtures of ſalt and *earth*; and all ſalts appearing to them, indeed, on a rigorous examination, to be only *earths* of different natures, which when reduced to a certain degree of ſubtilty or fineneſs of parts, ſo as permanently to diſſolve in water, are then emphatically denominated ſalts. Shaw's Lectures, p. 67.

SALINE *julep*. See JULEP.

SALINE *mixture*. See MIXTURE.

SALIVA, *ſpittle*, a thin, pellucid humour, ſeparated from the arterial blood by the glands about the mouth and fauces: and conveyed by proper ſalival ducts into the mouth, for ſeveral uſes.

It conſiſts of a great deal of water or phlegm, and a volatile ſalt, and, ſome add, a ſulphureous ſpirit.

The *ſaliva*, Boerhaave obſerves, is void both of taſte and ſmell; it does not harden by heat; it is more copious, fluid, ſharp, penetrating, and detergent, as a perſon has faſted longer; and it is ſeparated from the pure arterial blood.

The glands wherein the *ſaliva* is ſeparated from the blood, are uſually reduced to three pairs; viz. the two parotides; the two maxillary glands; and the two ſublinguales, or thoſe under the tongue; theſe are the largeſt, and furniſh the greateſt quantity of *ſaliva*; but there are others, which are leſs, and may be reckoned aſſiſtants to the former: ſuch are the molares, the buccales, labiales, linguales, uvulares, arytenoideæ, the thyroidæa, the amygdalæ, or almonds of the ears, and the palatinæ, or glands of the palate. See each under its proper article.

The great uſe of the *ſaliva* is, in maſticating and diluting the food, and making the firſt digeſtion thereof; the other uſes are, to moiſten the tongue, to render its motion more quick and eaſy; to lubricate the throat and œſophagus, in order to facilitate deglutition; to prevent thirſt; and to aſſiſt in the ſenſation of taſtes by diſſolving the ſalts.

Some imagine it to do the office of a menſtruum, by mixing the oily and aqueous parts of the food more intimately, diſſolving the ſaline parts, and procuring a fermentation in the ſtomach; but Dr. Drake will not allow it fit for that purpoſe. Were the *ſaliva*, ſays he, acrimonious enough for this, it would be impoſſible but it muſt offend the ſtomach; eſpecially, conſidering the quantities of it that many ſwallow even upon an empty ſtomach.

The fermentative power, aſcribed to the *ſaliva* by Boerhaave and Hoffman, has been ſufficiently aſcertained by the later experiments of ſir John Pringle and Dr. Macbride. The former, in the Appendix to his Obſervations on the Diſeaſes of the Army, has given the reſult of ſeveral experiments made to aſcertain the effects of the *ſaliva* in digeſtion.

By adding a ſmall portion of it to ſome raw beef, he remarked, that this mixture putrefied ſlower than another which had no *ſaliva* in it; from whence he infers its antiſeptic nature.

Another experiment, made to aſcertain the fermentative power of *ſaliva*, was this: he took two drachms of freſh meat, the ſame quantity of bread, and to theſe added as much *ſaliva* as he ſuppoſed neceſſary to digeſtion. This mixture being beat in a mortar, was put into a cloſe phial, and ſet in the furnace, where it remained about two days, with ſcarce any viſible fermentation; but on the third day this action became maniſeſt. The bread and fleſh were then found riſen in the water, a ſediment forming, and bubbles of air continually mounting. In ſhort, the fermentation was complete, being diſtinguiſhed by a vinous ſmell, as in ordinary working liquors. The action ccontinued about twice as long as when no *ſaliva* was uſed; it was likewiſe much more moderate, and generated air with little tumult. When the fermentation entirely ceaſed, the mixture had a pure acid taſte; and what was equally remarkable, had no putrid ſmell during the whole proceſs.

From theſe experiments the doctor concludes, that if the *ſaliva* is well prepared, is in a ſufficient quantity, and well mixed with the aliment, it is qualified for reſiſting putrefaction, preventing immoderate fermentation, flatulence, and acidity in the primæ viæ. But if the *ſaliva* is deficient, unſound, or not well mixed with what is ſwallowed, that the aliment may firſt putrefy, then grow acid, and in that action ferment ſtrongly, and generate much air in the ſtomach and bowels.

Accordingly, in ſurfeits, or upon ſwallowing without due maſtication: when meats are eat tough and fat, or with farinaceous ſubſtances unfermented; or, when by any accident the *ſaliva* is vitiated, too ſcanty, or not intimately mixed with the food, the fermentation becomes tumultuous, the ſtomach ſwells with air; and this extraordinary commotion being attended with an unuſual heat, brings on that uneaſineſs called the HEART-*burn*, and occaſions that exceſſive ſourneſs of the ſtomach, whereby the teeth are not only ſet on edge, but the throat excoriated. This laſt, however, only happens when the ſtomach is relaxed, or any wiſe diſabled from conveying the whole aliment into the inteſtines; for what is left having time to undergo a complete fermentation, is thereby changed into a harſh ſort of vinegar.

Since one great uſe of *ſaliva* is to moderate fermentation, it is probable, that ſuch ſubſtances as reſemble it moſt in this quality, will prove the beſt ſtomachics, whenever that humour fails. Of this claſs are acids, wine, ſpirits, and bitters; but as all theſe retard as well as moderate fermentation, they may be frequently leſs proper than ſome of the antiſcorbutics, as horſe-radiſh, muſtard, and garden ſcurvy-graſs, which, at the ſame time that they moderate, retard fermentation but little. As to aromatics, however aſſiſting they may be in digeſtion by their heat and ſtimulus, they promiſe leſs of a carminative quality than either the bitters or antiſcorbutics; in as much as they are more diſpoſed to increaſe than to moderate fermentation, and conſequently to produce air inſtead of ſuppreſſing it.

Dr. Macbride, in his Experimental Eſſays, eſſay firſt and ſecond, gives an account of ſeveral experiments in which fermentation was produced in different alimentary mixtures, by the addition of *ſaliva*, which diſcovered no ſigns of fermentation without it. See DIGESTION.

M. Gaſtaldy, in a theſis on the *ſaliva*, obſerves, that it takes its name from the ſalt it contains; which ſalt he will have to be partly a volatile acid, and partly alcalious. He adds, that it contains ſome oleaginous parts, and a little earth. By being compounded of ſo many different kinds of parts, it becomes a diſſolvent proper for all the different kinds of foods whereof we live. Its natural and laudable ſtate is, to be a little more viſcid than common water, and much leſs ſo than milk; and it is preſerved in this ſtate by the application of the ſpirits, and of the particles of air which inſinuate into it.

According to all appearance, the *ſaliva* is derived from the blood of the arteries: part of the arterial blood, brought to the ſalival glands, ſerves to feed them; another part is returned into the veins, and continues the circulation; and a third part, which is the ſerum, receiving a ſub-acid quality from them, is there converted into *ſaliva*.

Some authors have imagined, that the nervous juice contributed to the compoſition of the *ſaliva*; and the rather, becauſe larger and more numerous twigs of nerves are communicated to theſe glands than to moſt other parts, which yet have a more exquiſite feeling than theſe; but Dr. Nuck has refuted this opinion, by ſeveral experiments.

Too great an excretion of *ſaliva*, Boerhaave obſerves, diſorders the firſt digeſtion; and hence cauſes thirſt, dryneſs, a black bile, and, finally, conſumption, and atrophy. On the contrary, if no *ſaliva* be diſcharged into the mouth, or if only leſs than ordinary, it ſpoils both the manducation of the food, and its taſte, ſwallowing, and digeſtion; and, withal, occaſions thirſt.

SALIVAL, or SALIVARY *ducts*, in *Anatomy*, certain little lymphatic canals lately diſcovered; whereby the ſaliva falls into the mouth.

The *lower ſalival duct* comes from the maxillary glands, ſituated under the lower jaw, and terminated behind the dentes inciſores. It was firſt deſcribed by our Dr Wharton, in his treatiſe of the glands, in 1656, and is called *ductus ſalivalis Whartoni*.

The *upper ſalival duct* was diſcovered by Nicolas Steno, in 1660, and is diſtinguſſhed by the name of *ductus ſalivalis Stenonis*. It comes from the parotid glands; whence perforating the buccinator, it terminates near the third upper grinder.

Caſp. Bartholine, in 1682, diſcovered another *ſalival duct* coming from the glands, ſituate on the ſide of the tongue; and Rivinus, a phyſician of Leipſic, had mentioned it before, in a diſſertation printed in 1679.

Ant. Nuck, profeſſor at Leyden, diſcovered a fourth *ſalival duct*, ariſing from a gland ſituate in the orbit of the eye, between the muſculus abductor, and the upper part of the os jugale.

Theſe ducts are all double; there being one of each kind on either ſide. But it is pretended, the two laſt are only found in ſome brutes, and not in man.

Dr. Trew endeavours to ſhew, that the veſſels called *ſalival ducts*, by Coſchwitzius, are not truly *ſalival ducts*, but veins. Phil. Tranſ. N° 457. ſect. 7. p. 441.

As the demand of ſaliva is greateſt in maſtication, deglutition, talking, &c. the diſpoſition of the *ſalival ducts*, to favour the diſcharge on thoſe occaſions, is very remarkable: thus the ducts of the parotides paſs cloſe over the muſculi maſſeteres, and through the buccinatores; the *ſalival ducts* of the maxillary glands paſs cloſe under the mylohyoideus, where the ſublingual glands are placed; by means whereof, the intumeſcence of the maſſeters in chewing, accelerates the ſpittle in the parotid *ſalival ducts*, as the mylohyoideus does in the action of deglutition, by drawing the hyoides upwards. The agitation of the cheeks and lips is fully ſufficient to promote the diſcharge from the glands of the lips, &c

SALIVARIS, in *Botany*, a name given by ſome authors to the pellitory of Spain, or pyrethrum of the ſhops, from its quality of draining a large quantity of the ſaliva into the mouth by its great heat and acrimony.

SALIVATION, *ſalivatio*, in *Medicine*, a promoting of the flux of ſaliva, by means of medicines; chiefly by mercury.

The chief uſe of *ſalivation* is in diſeaſes belonging to the glands, and the membrana adipoſa, and principally in the cure of the venereal diſeaſe; though it is ſometimes alſo uſed in epidemic caſes.

The body is prepared for *ſalivation* by a copious and continued uſe of attenuating, diluting, ſoftening decoctions; as of ſcabious, pellitory, china, ſarſaparilla, ſaſſafras, and ſanders.

Salivation is either *partial*, or *univerſal*. By the firſt, only the humours of ſome part of the body are to be diſcharged; as in catarrhs, tooth-ach, &c. By the ſecond, the whole maſs of blood is to be purged.

The firſt is raiſed either by a ſlow continued chewing of ſome tenacious matter, as maſtich, wax, or myrrh; eſpecially if other ſharp things be mixed with them, as pyrethrum, ginger, or pepper; or by drawing in ſharp irritating vapours, as thoſe of tobacco, roſemary, thyme, marjoram, &c.

The latter is effected by the action of ſuch medicines as create ſome ſlight but conſtant nauſea; as ſtibium not quite fixed, nor yet quite emetic; a little common vitriol, &c. but chiefly by ſuch as diſſolve all the parts of the maſs of blood, turn them into lympha, and thus cauſe a ptyaliſm: ſuch are crude quickſilver, cinnabar, a ſolution of quickſilver in aqua fortis, white and red precipitate, turbith mineral, ſweet ſublimate of mercury, &c.

SALIVATION, *mercurial*, has been a very uſual method of cure; eſpecially in venereal, ſcrophulous, and hypochondriac caſes: in effect, it proves the ſureſt remedy, yet diſcovered, for the Gallic lues; though the diſcovery hereof, as that of moſt other remedies, was owing to chance. Jac. Carpi, a phyſician of Bologna, having read in Avicenna, and Meſve, two Arab authors, that mercury, applied externally, was proper for the lepra, and ſome kinds of puſtules, particularly the ſcabies or itch, had a mind to try it in a pocky itch: a *ſalivation* was, hereupon, unexpectedly raiſed, and the patient was unexpectedly cured, not only of his itch, but of his pox. The ſame method he afterwards uſed for the pox itſelf; and, meeting with great ſucceſs therein, others were induced to follow him; and thus it acquired a very general and diſtinguiſhed reputation. But this method has been of late leſs commonly uſed, becauſe the advantages of mercury have been obtained by uſing it as an alterative, without the trouble and danger which attend this mode of promoting an evacuation by it. However, venereal maladies of long ſtanding, and ſuch as have ariſen to a great height, or have affected the bones, require a full ptyaliſm. In theſe caſes, the diſeaſe has been ſubdued for a time by the alterative method, but afterwards broken out afreſh, and been completely cured by *ſalivation*; and, on the other hand, ſome cutaneous foulneſſes, after reſiſting *ſalivation*, have yielded to an alterative courſe.

There are two manners of applying mercury to raiſe a *ſalivation*; the one external, or in the way of unction, by mixing it up by ſome unguent, and then rubbing it on the joints, &c. This is, in general, beſt done by rubbing a proper quantity of the unguentum cœruleum every night, or every other night, on the thighs. The *ſalivation* ſhould be raiſed gradually, and ſubſide as ſlowly; the patient ſhould be prepared by a ſpare diet for a few days, by bleeding, and by uſing the warm bath two or three times, before the operation; and during the progreſs of it, his ſtrength ſhould be ſupported with plenty of light but nouriſhing diet; a pint of gruel, or a decoction of mallows and liquorice in milk and water, almond emulſion, and barley-water, with gum arabic diſſolved in it, may be repeatedly given every two or three hours; and if he is faint, he may take, occaſionally, a little wine whey, maced ale, or mulled wine. A woman that expects the menſes ſhould defer the operation, till they ſettle. The other method is internal, where the mercury is taken at the mouth.

In each caſe, the mercury inſinuates itſelf into the maſs of blood; and mixing with the venereal poiſon, the two bodies, thus locked together, are drawn, with the ſeroſity, into the ſalival glands, where they are ſeparated and diſcharged; as finding the pores of thoſe glands proportioned to their figures, and proper to receive them.

Dr. Quincy will have the internal to be much the ſafer and better method. The mineral globules, he thinks, being intimately combined with ſalts, in the preparations given inwardly, will, by the irritation thereof, be eaſily and fully thrown off by the ſecretory organs, till the blood is quite diſcharged of its load: whereas, in mercurial frictions, it is poſſible ſome of the heavy particles may be left lodged in the interſtices of the fibres, or cells of the bones. Add to this, that, by computing the proportion of mercury in all the doſes neceſſary to promote a ſpitting, internally, and the weight of the ſame mineral uſed when it is done by unction; the quantity uſed in the latter caſe far exceeds that in the former: conſequently, the ill effects apprehended from that dangerous medicine, muſt needs be more ſenſible in the one caſe than the other.

The external application, therefore, is only to be allowed of, where either the caſe requires the violence of ſuch a management; or outward ulcers and tumors require a particular cure by liniments. Thus Quincy.

For the beſt method of adminiſtering mercury, and its uſe, ſee MERCURY and VENEREAL *diſeaſe*.

But a learned French phyſician, M. Chicoyneau, chancellor of the univerſity of Montpelier, has done ſome diſcredit to the practice of *ſalivating* in any manner, and that in a little treatiſe; where he endeavours to prove, that the *ſalivation* itſelf contributes nothing to the cure, but is rather prejudicial thereto; that the ſalutary effects of the mercury are independent of any evacuation at all; and that it acts purely as a ſpecific. It is without reaſon, therefore, he urges, that venereal patients are put to the torture of a *ſalivation*; ſince the full effect of the medicine may be had, without carrying matters to that extremity. The *ſalivation* is only an accident to the cure; which is effectually obtained by a mercurial unguent rubbed on the joints in ſuch quantities, and at ſuch intervals, as not to raiſe any *ſalivation*. He ſupports the whole by the experience of forty or fifty cures, wrought in one year, by this new method. The ſame method, it ſeems, has been tried alſo in England, and with ſucceſs; as appears from a tranſlation of Chicoyneau's piece, ſince publiſhed, with notes, by an Engliſh phyſician.

It has been obſerved, that ill conſequences have reſulted from the ſudden ſtopping of *ſalivations*; for the removal of which Dr. Silveſter recommends a renewed *ſalivation*; either by pills with guaiacum, to be taken morning and evening, with one grain of calomel in each doſe, and to be waſhed down with a draught of warm decoction of the woods, or, in more obſtinate caſes, by rubbing a drachm of the ung. cær. fortius upon the legs and thighs twice a day, for three days, which is ſufficient to produce a gentle *ſalivation*. See a recital of the caſes to which this method was applied, in London Med. Obſ. and Inq. vol. iii. art. 24.

SALIX, in *Botany*. See WILLOW.

SALLET, or **SALLAD**, a diſh of eatable herbs, ordinarily accompanying roaſt meat; compoſed chiefly of crude freſh herbage, ſeaſoned with ſalt, oil, and vinegar.

Menage derives the word from the Latin *ſalata*, of *ſal*, *ſalt*; others from *ſalcedo*; Du-Cange from *ſalgama*, which is uſed in Auſonius and Columella in the ſame ſenſe.

Some add muſtard, hard eggs, and ſugar; others, pepper, and other ſpices, with orange-peel, ſaffron, &c.

The principal *ſallet-herbs*, and thoſe which ordinarily make the baſis of our Engliſh *ſallets*, are lettuce, celery, endive, creſſes, radiſh, and rape; along with which, by way of furniture, or additionals, are uſed purſlane, ſpinach, ſorrel, tarragon, burnet, corn-ſallet, and chervil.

The gardeners call ſome plants *ſmall-herbs*, in *ſallets*; theſe ſhould always be cut while in the ſeed-leaf: as creſſes, muſtard, radiſh, turnep, ſpinach, and lettuce; all which are raiſed from ſeeds ſown in drills, or lines, from the middle of February to the end of March, under glaſſes or frames; and thence to the middle of May, upon natural beds, warmly expoſed; and, during the ſummer heats, in more ſhady places; and afterwards, in September, as in March, &c. and laſtly, in the rigour of the winter, in hot-beds. If they chance to be frozen in very froſty weather, putting them in ſpring-water, two hours before they be uſed, recovers them.

SALLIUS *lapis*, a name by which Ludovicus Dulcis, and ſome other writers of his time, have miſcalled the *lapis ſamius* of the ancients. That author deſcribes it as being heavy, white, and brittle, and gives it the ſame virtues with the *lapis ſamius* of Pliny.

SALLOW, in *Botany*. See WILLOW.

SALLY, in *Architecture*, from the French *ſaillie*, is what we more uſually call *projecture*.

SALLY, in the *Military Art*, the ſecret iſſuing out of the beſieged from their town, or fort, and ſudden falling upon the beſiegers to cut them off, nail their cannon, hinder the progreſs of their approaches, deſtroy their works, &c.

We ſay, *to make a* ſally, *to repulſe a* ſally, &c.

To cut off a ſally, is to get between thoſe who made it and the town.

SALLY-*port*, in a *Fire Ship*, is a great opening in her ſide, made on purpoſe for the men to eſcape by, when they have grappled an enemy, and fired their train.

SALLY-*ports*, or *poſtern gates*, in *Fortification*, are thoſe under-ground paſſages, which lead from the inner works to the outward ones: ſuch as from the higher flank to the lower, or to the tenailles, or the communication from the middle of the curtin to the ravelin. In each place of arms there are two *ſally-ports*, z, z (*Tab.* VII. *Fortif. fig.* 41.) which are ten or twelve feet wide, for the troops to *ſally* out. In time of a ſiege they are ſhut up with barriers or gates. See POSTERN.

SALMO, *ſalmon*, in *Ichthyography*, is a genus of the *abdominales* in the Linnæan ſyſtem. In the Artedian ſyſtem of ichthyology, the characters of this genus of fiſhes are theſe: the branchioſtege membrane on each ſide contains eleven, twelve, or nineteen bones; the body of the fiſh is generally variegated with ſpots; the back fins are placed nearer the head than thoſe of the belly, and the teeth are large, and are placed in the jaws and palate, and on the tongue; to which we may add, from Linnæus, that the poſterior dorſal fin is adipoſe, and that the ventral fins have many rays.

The *ſalmo ſalar*, or *ſalmon*, is diſtinguiſhed from other fiſh of the truttaceous kind by theſe characters: it is of an oblong body, covered with very ſmall ſcales, a ſmall head, a ſharp noſe, and a forked tail; its back and ſides are grey, ſometimes ſpotted with black, ſometimes plain; the covers of the gills are ſubject to the ſame variety; the belly is ſilvery; its under jaw is bent upwards, and that ſometimes ſo much as to make itſelf a ſinus in the upper, by conſtant motion, and ſometimes to perforate it. It is ſaid that this curvature is loſt when the fiſh returns to ſea. The *ſalmon* is firſt produced from its parent's ſpawn in freſh rivers, thence it goes into the ſea to acquire its growth and feed; and at the time of its full growth, and in the ſeaſon for ſpawning, it removes into the freſh waters again. See *Salmon* FISHERY.

The *ſalmon* in the different ſtages of its life and growth has different names. The Latins called it when young *ſalar*, when of a middle growth *fario* or *fario*, and only when full grown *ſalmo*. In England the fiſhermen have names for it in every year of its growth. In the firſt it is called a *ſmelt*, in the ſecond a *ſprod*, in the third a *mort*, in the fourth a *fork-tail*, and in the fifth a *half-fiſh*; finally, in the ſixth it is called a *ſalmon*. This is the common agreement of our fiſhermen, though there are ſome who ſay the *ſalmon* comes much ſooner to its full growth.

The ſpecies of this genus enumerated by Artedi are ten. Gen. Piſc. p. 9. Linnæus enumerates twenty-nine ſpecies, diſtributing them into four claſſes, viz. the trouts with a variegated body, to which belong the *ſalmon*, *grey*, *ſalmon-trout*, *trout*, *charr*, &c. the ſmelts, with the dorſal and anal fins oppoſite; thoſe with teeth ſcarcely perceptible, as the *gwiniad*, *umber*, &c. and thoſe with only four branchioſtegous rays.

The *ſalmon* is a very peculiar kind of fiſh. It is bred in rivers, but goes every year from thence into the ſea; and at a certain ſeaſon of the ſame year it always returns up into the freſh water again; and what is remarkable, is, that ſo far as obſervation has been able to trace them at any time, the ſame ſhoals of *ſalmon* always return into the ſame river out of which they ſwam, not into any other; ſo that the people who live on the *ſalmon* fiſhery are not afraid for their rivers being cleared, by all the fiſh in them going down into the ſea, for they know that they will all return up to them again at a proper time. When the *ſalmon* has once entered a freſh river, he always ſwims up againſt the ſtream, and is, therefore, obſerved to ſwim as deep or as near the bottom as poſſible; and, on the contrary, when they are going down the ſame river into the ſea, they are always ſeen ſwimming near the ſurface. The reaſon of this is, that in going up they are to ſwim againſt the current, which always runs much ſwifter at the ſurface than deeper; and when they are going down, they get to the ſurface, where the force of the current alone is ſufficient to carry them, and they have little or no trouble in puſhing themſelves on. *Salmon* will often go a hundred leagues up in the large rivers, ſpringing with ſurpriſing agility over cataracts many feet high; but Mr. Pennant contradicts the vulgar opinion of their taking their tail in their mouth when they attempt to leap; and thus the people at this vaſt diſtance from the mouth have the pleaſure of taking a fiſh, that is in part of the ſea kind. It is alſo remarkable, that the rivers which moſt abound with *ſalmon* do not make the ſeas about their mouths any more abound with them than others; particularly the harbour of Breſt affords no *ſalmon*; though the river Chateaulin, which diſcharges itſelf into it, is the richeſt *ſalmon* river in France. Another ſingularity, in regard to the *ſalmon*, is their ſwimming up the rivers together in ſuch vaſt numbers. It is to be allowed, indeed, that herrings, mackrel, and many other fiſh, do in the ſame manner appear on the coaſts at certain ſeaſons in prodigious numbers. See FISH. The *ſalmons* do this, in order to propagate their ſpecies.

Salmon do not equally frequent all rivers, though they may ſeem to us equally proper for their reception. There are two rivers which open themſelves into the harbour of Breſt, very near one another; the one of theſe is famous for the quantity of *ſalmon* in it, and the great advantage of the fiſhery; the other never has any of theſe fiſh in it. It moſt probably is owing to their finding plenty of food, and proper places for the depoſiting their ſpawn in the one of thoſe rivers, and not in the other, that makes this regular choice.

Salmon are cured in this manner; they are firſt ſplit, and rubbed with fine ſalt; and after lying in pickle in great tubs or reſervoirs for ſix weeks, are packed up with layers of coarſe brown Spaniſh ſalt in caſks, ſix of which make a ton. Theſe are exported to Leghorn and Venice at the price of twelve or thirteen pounds per ton, but formerly from ſixteen to twenty-four pounds each. For a farther account of *ſalmon*, ſee *Salmon* FISHERY.

SALMO *Alpinus*. See CHARR.

SALMO *eperlanus*. See SMELT.

SALMO *eriox*. See GREY.

SALMO *fario*. See TROUT.

SALMO *lavaretus*. See GUINIAD.

SALMO *thymallus*. See GRAYLING.

SALMO *trutta*. See SALMON-*trout*.

SALMON-*peel*, the name of a fiſh found in great plenty in the rivers of Wales, agreeing in the colour of its fleſh, and perhaps in kind, with the common *ſalmon*.

SALMON-*ſewſe*, a name ſometimes uſed for the young fry of *ſalmon*.

SALMON-*pipe*, in our *Old Writers*, an engine to catch *ſalmon*, or ſuch like fiſh.

SALMON-*trout*, *ſalmo trutta* of Linnæus, in *Ichthyology*, the Engliſh name of the fiſh called *trutta lacuſtris*, by Geſner and other authors. It is alſo called *bull-trout* and *ſcurff*.

It is caught in lakes, in mountainous countries, and grows to a very conſiderable ſize, ſometimes to thirty, forty, or fifty pounds weight. It reſembles the *trout* in figure, but its belly is very flat, and has, as it were, a long ſurrow or cavity running the length of the belly. Its back and head are of a very beautiful bluiſh green colour; and the whole fiſh, eſpecially its back and the upper parts of its ſides, are marked with numerous black ſpots. Its back-fin is alſo ſpotted with black, and its ſcales are ſmall and ſilver-coloured. This ſpecies migrates, like the ſalmon, up ſeveral of our rivers, ſpawns, and returns to the ſea. The fleſh when boiled, is of a pale red, but well flavoured.

SALMULUS, in *Ichthyology*, the name of a ſmall fiſh of the truttaceous kind, called in Engliſh a *ſamlet*.

It ſeldom grows to more than ſeven inches in length. It is very like the common trout, but differs in theſe particulars. 1. Its head is narrower, the mouth leſs, and the body deeper. 2. It has fewer ſpots, and thoſe of a deader colour. 3. The pectoral fins have generally only one large black ſpot, attended ſometimes with a ſmall one; whereas the pectoral fins of the trout are more numerouſly marked. 4. The tail is more forked. 5. The ſpurious or fat fin on the back is never tipped with red; nor is the edge of the anal fin white. 6. The ſides under the lines are yellowiſh. And, 7thly, It has ſeveral bluiſh ſtreaks near the ſide lines; but theſe are ſometimes found in young trouts.

The *ſamlet* is the leaſt of the trout kind, and is frequent in the Wye, where it is called *ſkirling* or *laſpring*, in the upper part of the Severn, and the rivers that run into it, in the north of Egland, Wales, and the rivers of Scotland, where it is called *par*. It is alſo called BRANLIN and *fingery*. This fiſh is thought by many to be the fry of the ſalmon; but Mr. Pennant diſſents from this opinion, for the following reaſons; becauſe the ſalmon fry never continue in freſh water the whole year, but vaniſh with the firſt vernal flood that happens, which ſweeps them into the ſea; the growth of the ſalmon fry is ſo quick and conſiderable, as ſoon to exceed the bulk of the largeſt *ſamlet*; the ſalmon attains alſo a conſiderable bulk before it begins to breed; whereas the *ſamlets* are found, males and females, diſtinguiſhed by the milt and roe, of their common ſize; and they are found in the freſh waters at all times of the year; and even at ſeaſons when the ſalmon fry have gained a conſiderable ſize. They ſpawn in November and December, when thoſe of the Severn puſh up towards the head of that river, quitting the leſſer brooks, and return to them again when they have done. Britiſh Zool. vol. iii. p. 304.

SALON, or SALOON, in *Architecture*, a grand, lofty, ſpacious ſort of hall, vaulted at top, and uſually comprehending two ſtories, with two ranges of windows.

The *ſalon* is a grand room in the middle of a building, or at the head of the gallery, &c. Its faces, or ſides, are all to have a ſymmetry with each other; and as it uſually takes up the height of two ſtories, its ceiling, Daviler obſerves, ſhould be made with a moderate ſweep.

The *ſalon* is a ſtate-room: it is much uſed in the palaces in Italy, and from thence the mode came to us. Ambaſſadors, and other great viſitors, are uſually received in the *ſalon*.

It is ſometimes built ſquare, ſometimes round or oval, ſometimes octagonal, as at Marly, and ſometimes in other forms.

SALPA, *ſparus ſalpa* of Linnæus, in *Ichthyology*, the name of a fiſh caught in great plenty in the Mediterranean, and common in the markets of Italy and elſewhere. Its uſual ſize is about a foot in length, and it has a ſomewhat flatted, yet conſiderably thick body, and a ſtraight back; its ſides are variegated with a number of fine gold-coloured lines running longitudinally; the intermediate ſpaces between theſe toward the back are of a bluiſh green, toward the belly they are white; there are uſually eleven of theſe lines on each ſide; the mouth is extremely ſmall, and each jaw has only one row of teeth, which are thick and broad below, and terminate in a double point; it has only one back-fin, the anterior rays of which are prickly, the hinder ones ſoft; it generally keeps about the ſhores, and ſwims in large ſhoals. Though it be a very beautiful fiſh it is no very delicate taſted one, nor much regarded, the poorer ſort of people uſually buying it up. See *Tab.* IV. *of Fiſhes*, N° 44.

SALPUGA, in *Natural Hiſtory*, a name given by ſome of the Latin writers to the SOLIPUGA.

SALSAFY. See GOAT'*s beard*.

SALSIRORA, in *Botany*, a name uſed by ſome authors for the *ros ſolis*, or ſundew.

SALSOLA, in *Botany*. See KALI.

SALT, *ſal*, in *Chemiſtry*, a ſimple ſubſtance, which enters the compoſition of all bodies, and is held one of the five principles or elements thereof; and may always be extracted by fire.

Salt, Mr. Homberg obſerves, is an ingredient in all animal, vegetable, and mineral bodies, excepting, perhaps, ſome metals and ſtones. In vegetables, and animal bodies, that have undergone a fermentation, the *ſalt* riſes firſt in the alembic, then the phlegm: if the mixt have not undergone a fermentation, the *ſalt* riſes after the phlegm.

Salts are diſtinguiſhed, with regard to the manner of extracting them, &c. into *volatile*, *fixed*, and *eſſential*.

To theſe may be added an intermediate kind of *ſalt*, under the title of

SALTS, *mixed*, which are thoſe reſulting from a mixture of a *volatile*, with a *fixed ſalt*.

SALTS, again, are of different kinds, according to the different matters wherewith they are found mixed; ſome are mixed bodies themſelves and their mixture ſeparable by fire, and lixiviation. Such are, all eſſential *ſalts* of plants, and all foſſile *ſalts*, &c. but theſe are no proper chemical principles. There are others which we are ſenſible are mixed, and whoſe mixture we know pretty nearly, though we are not yet able to decompound them: theſe make the chemical principle *ſalt*; for our analyſis will not render them more ſimple; which is the character of a principle. And in this ſenſe *ſalt* is defined a matter diſſoluble by water, and unchangeable by fire; to which ſome add, of a pungent taſte. There are three kinds or claſſes of *ſalts*, which come under this definition; two whereof are *volatile*, and the third *fixed*. The *volatile* ones are acid *ſalts* and urinous *ſalts*; the *fixed* are thoſe drawn by a lixivium, after calcination, and called *lixivious ſalts*. Nature produces none of theſe *ſalts* ſimple and unmixed; but we eaſily extract them, by art, from the mixts wherein ſhe has placed them.

Salts are defined, by Dr. Hill, to be ſolid foſſile bodies, friable, pellucid, not inflammable, but fuſible by fire, and congealing again in the cold; ſoluble in water, ſo as to diſappear in it, naturally concreting into regularly figured cryſtals, and impreſſing a ſenſation of acrimony on the tongue.

Theſe are the characters and qualities common to all *ſalts*, and to no other bodies; and theſe they always manifeſt when pure and freed from heterogeneous ſubſtances; but in the ſtate in which they are naturally found in the earth, though they have that in their taſte alone which may ſufficiently diſtinguiſh them, yet they do not exhibit all their genuine characters: ſome of them being found ſolid and pure, either within the earth or on its ſurface, but commonly without their proper form; others embodied in earths and ſtones, as the particles of metals in their ores; and others in a fluid ſtate ſuſpended in waters.

Of the foſſils of this claſs, nature therefore affords us three diſtinct orders, and under thoſe they are diſtinguiſhable into five genera. The *ſalts* of the firſt order are thoſe found native and pure, either in the earth or without its ſurface, and exhibiting all other natural characters, though often without their proper form. Of the ſecond are thoſe found not native, but in form of ores, never pure, but diſtinguiſhable by their taſte, and immerſed in and blended with the conſtituent matter of earths and ſtones in extremely ſmall particles. And of the third are thoſe naturally found ſuſpended in waters, and in a fluid form, but ready to aſſume their proper figures on the evaporation of a part of that water. Of the firſt of theſe orders are the common *alimentary ſalt* or *muria*, and the NATRUM or *nitre* of the ancients. Of the ſecond are ALUM and NITRUM; and of the third are BORAX and HALCRYPTIUM, an alkaline *ſalt* hid in the chalybeate waters. Hill's Hiſt of Foſſ. p. 380.

In examining the eſſential properties of thoſe ſubſtances that are called ſaline, and to which the denomination of *ſalts*, in a general ſenſe, is applied, it is found that they affect the taſte, are ſoluble in water, and poſſeſs all the principal qualities, as gravity and fixity, in an intermediate degree betwixt thoſe of water and of pure earth. Some ſubſtances of a ſaline nature poſſeſs theſe properties in ſo inconſiderable and weak a degree, that they are ſcarce diſcoverable; but in other ſubſtances they are ſo ſtrong, as to allow of being more or leſs communicated to ſuch as have of themſelves no ſaline qualities, by combining the former with the latter.—Theſe two kinds of ſubſtances ſhould be carefully diſtinguiſhed; and, for this purpoſe, we may conſider all thoſe ſubſtances as eſſentially ſaline, which have not only the characteriſtic properties of *ſalts*, as taſte and perfect miſcibility with water, in an eminent degree, but which alſo, when diſengaged, can communicate theſe properties, at leaſt in part, to the other ſubſtances, which have them not, by combining with theſe latter; from which when afterwards ſeparated, they reſume their former ſtate, and peculiar ſaline characters. The ſlighteſt view even of thoſe ſubſtances that are eſſentially ſaline is ſufficient to ſhew, that they poſſeſs the ſaline properties in very different degrees: and hence the greateſt chemiſts, and particularly Stahl, have been led to conclude, that the number of ſubſtances truly and eſſentially ſaline is very ſmall; and even that only one ſaline principle exiſts, which, by the intimate union it is capable of contracting with ſeveral other ſubſtances, conſtitutes a certain number of matters which poſſeſs the ſaline properties in a degree ſufficiently ſtrong to preſerve theſe properties, more or leſs, in their ſeveral combinations with other matters that are not ſaline, and to recover them entirely when ſeparated from theſe combinations: ſo that as they do not themſelves undergo any decompoſition, and as they always appear again with the ſame properties after having been combined and ſeparated, they ſeem to be ſimple matters, eſſentially ſaline, although they really are compounds of ſeveral bodies, not ſaline, united intimately with only one ſaline principle, which is univerſal and always the ſame. In order to diſcover which is the moſt ſimple of all ſaline ſubſtances, and, conſequently, the principle of all others, the moſt certain method is to compare together the ſeveral ſaline ſubſtances, and to conſider that as the moſt ſimple of all, which poſſeſſes the ſaline properties in the moſt eminent degree, and which alſo appears, upon all occaſions, to be leaſt ſuſceptible of decompoſition or alteration. According to this method of inveſtigation, all *neutral ſalts* muſt be excluded; for theſe may be decompoſed, and many of them appear to be compounded of two ſimple ſaline ſubſtances, viz. the acid and the alkali; which are not in general ſo eaſily altered as neutral *ſalts*.—Purſuing the enquiry upon the ſame principles, and comparing together the ſaline properties of the pureſt and ſtrongeſt acids and alkalis, it will be found, that the ſaline properties are ſtronger and more diſtinct in acids than alkalis, becauſe the former are more active, more diſſolving, more adhering to the bodies diſſolved, more deliqueſcent, &c. and alſo, that alkalis, fixed and volatile, appear to be more ſuſceptible of alteration and decompoſition than acids. The ſtrongeſt and ſimpleſt ſaline matter muſt, therefore, be ſought for among acids. In a ſimilar examination of acids, we ſhall perceive, that thoſe which are truly vegetable and animal, that is, in the combination of which oil enters, are infinitely more weak and ſuſceptible of alteration than acids deprived of all oil, which are called mineral acids; of which the vitriolic will be eaſily diſcovered to be the ſtrongeſt and moſt unalterable, and, conſequently, of all bodies, which have ſaline properties, the pureſt, ſimpleſt, and the moſt ſenſibly and eſſentially a *ſalt*.

From this reaſoning the moſt celebrated chemiſts have agreed in conſidering this acid as the pureſt and ſimpleſt of all ſaline matters; and the illuſtrious Stahl carries this notion farther. From his writings, and the whole of his doctrine, we may infer, firſt, that he conſiders the vitriolic acid as the only ſubſtance eſſentially ſaline; as the only ſaline principle, which, by uniting more or leſs intimately with other ſubſtances that are not ſaline, is capable of forming an innumerable multitude of the other ſaline matters, which nature and art furniſh: and, ſecondly, that this ſaline principle is a ſecondary principle, compoſed only of the intimate union of two primary principles, water and earth. In examining the proofs upon which this admirable theory is founded, although it has a great appearance of truth by its conſiſtency with the principles of chemiſtry, and with many phenomena; yet, ſays the ingenious author of the Dictionary of Chemiſtry, art. SALT, it is not ſupported by a ſufficient number of facts and experiments to aſcertain its truth. However both the preceding principles acquire from the various facts alledged in ſupport of them, a great degree of probability, though not amounting to a complete demonſtration. For a ſummary of theſe we muſt refer to the Chemical Dictionary, *ubi ſupra*.

Subſtances eſſentially ſaline may be diſtributed into three claſſes, viz. I. ACIDS, II. ALKALIS, III. NEUTRAL *ſalts with baſis of alkali*.

To the firſt claſs belong, 1. the ſimpleſt and ſtrongeſt acids, called mineral acids, which are vitriolic acid, called alſo univerſal acid, or ſaline principle; nitrous acid, commonly called ſpirit of nitre, or aqua fortis; and marine acid, called alſo ſpirit of *ſalt*; and acid of common *ſalt*. See the ſeveral articles.

2. The acids leſs ſimple and leſs ſtrong than the mineral acids, which are thoſe that have entered into the combinations of vegetables and animals, and that are united to a certain quantity of oil more or leſs attenuated: theſe are cryſtalized eſſential acid *ſalts*, ſuch as cryſtals of TARTAR; the acid of VINEGAR; the unfermented acids of ſharp fruits and plants, as of gooſeberries, citrons, ſorrel, &c. the acids and acid ſpirit obtained in the diſtillation of vegetables, of their extracts, eſſential *ſalts*, oils, balſams, and reſins, called EMPYREUMATIC acids; the acids obtained from animal ſubſtances, ſuch as the acid obtained in the diſtillation of ants, flies and other inſects, and that obtained in the diſtillation of butter or of fat; and the PHOSPHORIC acid.

The ſecond claſs comprehends alkalis, or ſaline alkaline ſubſtances, which are the fixed alkali or common *ſalt*, called alſo mineral or foſſil alkali, marine alkali, cryſtals and *ſalt* of ſoda, vegetable or common fixed alkalis, called alſo *ſalt* of TARTAR, and volatile alkali. See ALKALI.

To the third claſs belong the NEUTRAL *ſalts*; including, 1. the vitriolic *ſalts*, formed by a combination of the vitriolic acid with different ſubſtances. See SAL *mirabile*, ARCANUM *duplicatum*, *Sal* AMMONIAC, SELENITES, ALUM, and VITRIOL.

2. The nitrous *ſalts*, reſulting from combining the nitrous acid with various ſubſtances. See NITRE.

3. Marine *ſalts*, formed by the marine acid. See *Common* SALT, *Sal* AMMONIAC, PLUMBUM *corneum*, MERCURY, *Butter of* ANTIMONY.

4. Tartareous *ſalts*, formed by the combination of the acid of tartar, or of other concrete vegetable acids analogous to it, with the ſeveral ſubſtances capable of uniting with theſe acids. See *Soluble* TARTAR, and RUPELLENSIS *ſal*.

5. Acetous *ſalts*, including all *ſalts* formed by the acid of vinegar. See *Regenerated* TARTAR, *Spiritus* MINDERERI, CRYSTALS *of* VENUS or VERDEGRISE, and *Salt of* LEAD.

6. Vegetable *ſalts*, compoſed of the acid juices, concrete *ſalts*, and natural or unfermented acids of vegetables, with the ſeveral ſubſtances capable of uniting with them; none of which *ſalts* are yet known.

7. Empyreumatic *ſalts*, which are vegetable, formed with the acids obtained by the diſtillation of vegetable matters, furniſhing acid ſpirits, or concrete acids; or animal, compoſed with acids obtained from the diſtillation of animal matters, as acids of inſects, butter, and fat.

8. Phoſphoric *ſalts*, produced by combining the acid of phoſphorus of urine with alkaline, earthy, and metallic ſubſtances. See *Fuſible* SALT and PHOSPHORUS.

9. *Salts* of borax, formed by combining the ſedative *ſalt* with ſeveral ſubſtances. See BORAX.

And, 10. arſenical *ſalts*, produced by combining arſenic with various ſubſtances. See ARSENIC and *Neutral arſenical* SALT.

We ſhall now recite the principal *ſalts* in alphabetical order.

SALTS, *acid*. See ACID and SALT *ſupra*.

SALT, *Ætna*. See ÆTNA *ſalt*.

SALT *alembroth*, a ſaline matter compoſed of corroſive ſublimate and of ſal ammoniac, mixed in equal parts or different proportions, and formerly uſed as a powerful ſolvent of metals, and even of gold. See ALEMBROTH.

SALT, *alimentary*. See *Common* SALT.

SALTS, *alkaline*. See ALKALI and SALT *ſupra*.

SALT *of amber*. See AMBER.

SALTS, *ammoniacal*. See *Sal* AMMONIAC and SAL *Ammoniac*.

SALTS *arſenical*. See *Neutral arſenical* SALT, and SALT *ſupra*.

SALT, *bay*. See *Common* SALT.

SALT, *brine*. See *Common* SALT.

SALT, *cathartic*. See SAL *catharticus*.

SALT, *common*, is a perfectly neutral *ſalt*, compoſed of a peculiar acid, denominated from it the *marine* ACID, and the marine, or mineral foſſile fixed alkali. This kind of *ſalt*, in its popular ſenſe, denotes a ſort of ſaline cryſtallization, or a ſharp, pungent, detergent, and aſtringent ſubſtance, uſed to ſeaſon fleſh, fiſh, butter, hides, and other things that are to be kept; as alſo to give a reliſh to meats, &c. It is uſually called *common* or *culinary*, or *alimentary ſalt*, in contradiſtinction to the chemical *ſalt*. In order to arrange the matter that has occurred to us on this ſubject in ſome order, we ſhall recite the different kinds of *ſalt*, the method of preparing it, its principal properties and uſes, and the laws relating to it.

SALT, *common*, *different kinds of*. Mineralogical writers have diſtinguiſhed common *ſalt*, with reference to the general ſources from which it is moſt copiouſly derived, into three different ſorts, viz. *foſſile* or *rock ſalt*, *ſea* or *marine ſalt*, and *ſpring ſalt*, or that drawn from briny ſprings and wells.

Mines of foſſile or rock *ſalt* are found in Poland, Hungary, Germany, Italy, Spain, England, and other countries in Europe.

The greateſt and beſt part of ſea-*ſalt* is made in France, though not a little in England. As for *ſalt*-ſprings, there are conſiderable ones in Cheſhire, Worceſterſhire, Staffordſhire, Hampſhire, Northumberland, Franche

Comté, Lorrain, Tyrol, and ſeveral other places. Chemiſts can alſo extract *common ſalt* from every vegetable or animal.

Foſſile or *rock ſalt* is called alſo *ſal gemmæ*, from its tranſparence and reſemblance of gems. By *rock ſalt*, or *ſal rupium*, the ancient chemiſts meant *ſalt* adhering to the rocks above high-water mark, being there lodged by the ſpray of the ſea, evaporated by the heat of the ſun; which is the pureſt *ſalt* of all for chemical uſes, and is to be had off the rocks of Sicily, and ſeveral iſlands in the Weſt Indies. But by rock *ſalt*, in this place, we mean that which is found in large beds within the bowels of the earth, ſometimes cryſtallized, but more frequently in irregular maſſes of red, yellow, or blue colour, and which hath undergone no artificial preparation. This *ſalt* was entirely unknown to the ancients: Pliny, however, gives ſome curious things about *ſalts* in Nat. Hiſt. lib. xxx. cap. 7. which we ſhould have tranſcribed, could we perſuade ourſelves of their truth. We ſhall here content ourſelves with what well warranted relations we could get of the *ſalt* mines of Wilizka in Poland, thoſe in Upper Hungary, and thoſe in the mountains of Catalonia, which make a very conſiderable article of commerce in thoſe three ſtates; *ſalt* being tranſported thence to the ſeveral neighbouring nations, which cannot be conveniently ſupplied with ſea *ſalt*.

The Poliſh mines, in the village of Wilizka, five leagues from Cracow, were firſt diſcovered in 1251. Their depth and capacity are ſurpriſing. Within them is found a kind of ſubterraneous republic, which has its polity, laws, families, &c. and even public roads, and carriages, horſes, &c. being kept here to draw the *ſalt* to the mouth of the quarry, where it is taken up by engines. Theſe horſes, when they are once down, never ſee the light again; but the men take frequent occaſions of breathing the village air. When a traveller is arrived at the bottom of this ſtrange abyſs, where ſo many people are interred alive, and where ſo many are even born, and have never ſtirred out, he is ſurpriſed with a long ſeries of lofty vaults, ſuſtained by huge pilaſters cut with the chiſſel, and which being themſelves all of rock *ſalt*, appear, by the light of flambeaux, which are inceſſantly burning, as ſo many cryſtals, or precious ſtones of various colours, caſting a luſtre which the eye can ſcarce bear.

The rocks of *ſalt* are hewn in form of huge cylinders; the workmen uſing hammers, pick-axes, and chiſſels, much as in our ſtone quarries, to ſeparate the ſeveral banks. As ſoon as the maſſive pieces are got out of the quarry, they break them into fragments fit to be thrown into the mill, where they are ground, and reduced into a coarſe farina, or flour, which ſerves all the uſes of ſea *ſalt*.

In the *ſalt* mines of Wilizka, there are two kinds of *ſal gemmæ*; the one harder and more tranſparent, and the cryſtallization whereof appears more perfect than that of the other: this is the real *ſal gemmæ* of the druggiſts and dyers. It cuts like cryſtal, and is frequently uſed for toys, chaplets, little vaſes, &c. the other is leſs compact, and fit only for kitchen uſes.

One of the chief wonders of the place is, that through theſe mountains of *ſalt*, and along the middle of the mine, there runs a rivulet of freſh water, ſufficient to ſupply the inhabitants.

The *ſalt* mines in the Upper Hungary are in every reſpect as extraordinary. They are found on the mountains, two miles from Eperies, a city in the county of Sarax, on the river Tarhz. The depth is a hundred and eighty fathoms.

The mineral runs in huge veins, ſo that pieces are ſometimes dug not leſs than a hundred thouſand weight; which, however, are afterwards reduced into ſquare pieces, two feet long and a foot thick, for the conveniency of drawing them out of the mine. When out, they are broken farther, and put to the mill to be ground. The colour of the *ſalt*, while in the maſs, is a little browniſh; and yet when ground, it becomes as white as if it had been refined. Some of theſe maſſes are found as hard and tranſparent as cryſtal; ſome white, yellow, blue, &c. fit for various works, whereon they engrave as on precious ſtones. The mine is cold and moiſt; whence there ariſes ſome difficulty in reducing the *ſalt* into powder. Of the water drawn out of it, and boiled, is made a blackiſh *ſalt*, which fattens cattle.

The *ſalt* mines of Catalonia are found in the mountains of the duchy of Cardona, and belong to the grandees of that name.

They form a ſolid mountain of rock *ſalt*, between four and five hundred feet in height, and a league in circuit; and deſcending to a depth below the ſurface not known. This prodigious mountain of *ſalt*, which has no mixture of other matter with it, is eſteemed ſo ſingular an appearance, that it is thought to militate very much againſt the opinion of thoſe who would derive the origin of all the beds of rock *ſalt*, which are found under the ſurface of the earth, from the evaporation of *ſalt* water, left in ſubterraneous caverns, either at the deluge, or upon ſome local commotions of the globe. It is the opinion of the country people there, that the *ſalt* grows again, and is re-produced, after ſeveral years, in the ſame places whence it had been dug. But the naturaliſts will ſcarce allow of ſuch a re-production. Many think, however, that it vegetates, or grows, ſometimes: M. Tourneſort, by the ſpecimens he had of it in his cabinet, thought this plain.

The *ſalt* is of four kinds, white, bay, red, and brilliant. The firſt is almoſt like *common ſalt*, only that it is not granulated. The ſecond, of an iron and ſlate colour, has moſt of the qualities of the firſt. The third, of a conſerve roſe colour, only differing from the reſt by the mixture of ſome bole, or earth, which gives it this colour. The fourth is a brilliant *ſalt*, tranſparent as cryſtal, which is the proper *ſal gemmæ* of the druggiſts. Of this kind there is ſome blue, and ſome green, orange, red, &c. but they all become white by grinding.

Theſe four kinds of *ſalts* are found over each other in diſtinct ſtrata or beds. The commerce hereof is very conſiderable. The Engliſh, &c. when trade is prohibited with France, furniſh themſelves hence.

Sal gemmæ is to be choſen in large, bright, tranſparent pieces, eaſy to break, and dividing into little ſquare grains. It grows red hot in the fire, like iron; but diſſolves eaſily in air: the druggiſts waſh it, to give it the greater luſtre; but they take care to wipe it dry again ſpeedily.

The mines of rock *ſalt*, near Northwich, in Cheſhire, were firſt diſcovered in the year 1670, as they were boring for coal. It lay there thirty-three or thirty-four yards from the ſurface, and there iſſued from it a vigorous ſharp brine, ſtronger than any of the Cheſhire *ſalt* ſprings before known afforded. The Northwich *rock-ſalt* mines are ſaid to be ſuperior to thoſe near Cracow, with reſpect to the quantity of *ſalt* which is annually raiſed. One pit has yielded at a medium four thouſand tons of *ſalt* in a year, which is about two-thirds of the quantity raiſed every year in the Poliſh mines. Since the time of the firſt diſcovery, many other mines of it have been found in the ſame county, and a great many are now worked by a company of proprietors, and yield vaſt quantities of *ſalt*; but this is eſteemed unfit for domeſtic uſes in its natural ſtate, and for that reaſon the proprietors uſe the method practiſed in Poland, Hungary, and many other places on the coarſer rock *ſalt*, that is, the refining it, by diſſolving it in weak brine, and then boiling it into *ſalt* again; this is done with great quantities on the ſpot; and beſides this, great quantities are carried in the rough ſtate to Liverpool, and there refined with the water of the river Merſey at full ſea, or elſe ſhipped at Liverpool, and thence tranſported to other parts of England, and Ireland, where it is wrought into *ſalt* with ſea water.

The rock *ſalt* refined upon the ſpot is alſo exported to Ireland; and, in times of war, to America, where they cannot have bay *ſalt*.

The works where they refine the rock *ſalt* are called refineries, and the rock *ſalt* is broken ſmall and put into leaden ciſterns, where it is diſſolved cold in ſea water. When the ſolution has ſtood a day and night to ſettle, it is drawn off from the ſediment into the *ſalt* pan, and refined into *ſalt* in the ſame manner that common brine is boiled up. The ſame additions are uſed in clarifying it, and the ſcratch or calcarious matter falling from it, forms a cruſt as in the other works. The brine left in the pans after the *ſalt* is taken out is not thrown away, but is added to the next quantity put into the pan, and ſo on to the end of the works.

We may here obſerve, that though the Northwich rock *ſalt* is never uſed at our tables in its crude ſtate, and its application to the pickling or curing of fleſh, or fiſh, or preſerving any proviſions, without being previouſly refined into white *ſalt*, is prohibited under a penalty of 40*s*. for every pound of rock *ſalt* ſo applied; yet the pure tranſparent maſſes of it might, probably, be uſed by us with our food, without any ſort of danger or inconvenience; for we know, that rock *ſalt* is ſo uſed, without being refined, both in Poland and in Spain.

The iſland of Tſongming, in the Eaſt Indies, affords the moſt remarkable kind of foſſile or native dry *ſalt* in the world. The country is there, in general, very fruitful, but in certain parts of the iſland there are ſpots of ground, of ſeveral acres, which appear wholly barren, yielding not the leaſt appearance of any thing vegetable upon them.

Theſe ſpots of ground taſte very *ſalt*, and abound in *ſalt* in ſuch a manner, that they ſupply not only the whole iſland, but a great part of the neighbouring continent. When the people ſee the earth become dry, and covered with white ſpangles, which are pieces of *ſalt*, they dig it up about a foot deep, and carry it away to the work places, where they put it into large wooden veſſels of four or five inches deep, and many feet broad, ſet a little ſlanting. They pour water upon it in theſe. When it has ſtood a proper time they let it out, and add more, till all the *ſalt* is diſſolved; then they boil this water in the common way, and extract the *ſalt* from it. It is very remarkable, that the ſame pieces of land, which produce vegetables one year, will produce this *ſalt* another; and, on the contrary, the *ſalt* parts will ſome ſeaſons produce vegetables. The *ſalt* work there is a thing of great advantage to the inhabitants, and all the poor are, in the ſeaſon, employed in it; the men in collecting and wetting the earth, and the women in boiling up the water, which they attend as carefully as the men.

Marine or *ſea ſalt* is that *ſalt* which is made from ſea water, thickened by repeated evaporation, and at length cryſtallized. Of ſea *ſalt* there are two kinds, viz. bay *ſalt* and white *ſalt*. See *infra*.

Brine or *ſpring ſalt* is a name given to that ſort of common *ſalt* which is not made from ſea water, but from the water of *ſalt* wells and ſprings. Great quantities of this *ſalt* are made in moſt of the inland countries, as in Germany, Switzerland, Hungary, and in ſome parts of France and England.

In Somerſetſhire, Cumberland, Weſtmoreland, Durham, and Yorkſhire, there are many *ſalt* ſprings, but they are either too weakly impregnated, or ſituated where fuel is ſcarce, and for theſe and other reaſons are not worked; but in other parts of England there are many rich and valuable *ſalt* ſprings, which are worked to a great advantage: of theſe ſome are ſituated in Staffordſhire, a great many in Lancaſhire, but the chief are thoſe at Droitwich in Worceſterſhire, and Northwich in Cheſhire; about which laſt place there are many rich mines of foſſile *ſalt*, above and beneath the beds of which the *ſalt* ſprings are uſually found.

At Nantwich, in the laſt county, there are alſo ſome *ſalt* wells, which have been of very long ſtanding, being ſuppoſed by many to have been worked in the time of the Romans. The brine of theſe ſprings is found to differ very greatly in its ſtrength and qualities; ſome yielding much more *ſalt* than others, and the *ſalt* extracted from ſome of them being found improper for many uſes, for which that of others ſerves very well.

The brine of Barton and Northwich is almoſt fully ſaturated with *ſalt*, a pound of it yielding, as ſome have ſaid, 6 ounces of *ſalt*; but this cannot be ſtrictly true; for, allowing that 16 ounces of water can diſſolve 6 ounces of *ſalt*, and no more, it muſt follow, that no brine ſpring can yield 6 ounces of *ſalt* from a pint of the brine; becauſe 16 ounces of water, impregnated with 6 ounces of *ſalt*, conſtitute a ſaturated brine, weighing 22 ounces: and, therefore, by the rule of proportion, if 22 ounces of brine contain 6 ounces of *ſalt*, 16 ounces of brine will contain $4\frac{4}{11}$ ounces of *ſalt*. Hence we may infer, that the ſtrongeſt brine ſprings will not yield much above one quarter of their weight of *ſalt*. Accordingly, Dr. Leigh (Hiſt. of Lancaſhire, p. 43.) informs us, that ſome of the ſtrongeſt ſprings at Northwich yielded 7 or 8 ounces of *ſalt* from a quart of brine; but a quart of brine weighs conſiderably more than 32 ounces, the weight of a quart of water: ſo that the Northwich ſprings, from this account, do not yield a quarter of their weight.

The brine of Droitwich, Upwich, and Middlewich, contains about one fourth *ſalt*; ſome of the ſprings at Nantwich yield a ſixth part *ſalt*; and thoſe of Weſton, in Staffordſhire, afford only one ninth part. In England, we ſeldom boil weaker brine than the laſt; but in Germany, and ſome other places, where *ſalt* is ſcarce, they work ſprings, whoſe water is not higher impregnated than the common ſea water, containing about $\frac{4}{30}$ *ſalt*.

Here we may obſerve, that ſea water, brine ſprings, and rock *ſalt*, generally contain, beſides *common ſalt*, various other earthy and ſaline ingredients, ſuch as calcareous earth, magneſia, Epſom *ſalts*, ſelenites, Glauber's *ſalt*, fixed alkali uncombined with any acid, &c. Theſe ſubſtances are foreign to the nature of the *ſalt*, and injure its quality; and hence it muſt appear, that *common ſalt* may have very different properties, according to the quality of the water from which it is made, or the ſkill of the *ſalt*-maker in ſeparating theſe heterogeneous ſubſtances from it.

Alimentary or *common ſalt* may alſo be diſtinguiſhed into various kinds, according to the various ways of preparing it.

Hence we have, 1. *Bay ſalt*, prepared by evaporation, by the heat of the ſun. This *ſalt* is of two kinds: the firſt drawn from ſea water, as is practiſed in France, Spain, and Portugal, and many other hot countries; the other from the water of *ſalt* ſprings, or lakes, as in the Cape Verd iſlands, in the iſland of Tortuga, Turks iſland, and many parts of America. The firſt kind, in time of peace, is imported into Great Britain in large quantities. America, and its fiſheries, are commonly ſupplied with the latter.

The ſeveral kinds of bay *ſalt* made in the different parts of the world are found to differ greatly from one another in ſeveral particulars; as, 1. in the ſize of the cryſtals, which is owing to the heat of the ſun, and the time it lies in the pits. The French cream of *ſalt*, and the blown *ſalt* of the iſle of May, are fine and ſmall grained. The Portugal *ſalt* is larger grained than that of France; and that of Tortuga is larger than either. 2. In purity: as all bay *ſalt* has ſome mud, ſlime, or the like, in the making, and ſome kinds are mixed with the bittern *ſalt*, or what is called Epſom *ſalt*. 3. They are all more white while dry, and more pellucid when moiſt; and they differ in colour, according to the earth which makes the bottoms of the pits. Thus ſome of the French bay *ſalt* is grey, ſome reddiſh, and ſome white, according as a blue clay has lined the pits, or a red, or white one. 4. Some kinds of bay *ſalt* are more apt to contract a moiſture from the air than others; an imperfection to which the common ſorts of marine *ſalt* are much more ſubject: this is ſometimes owing to the ſmallneſs of the grain, and ſometimes to a mixture of a calcareous or alkaline *ſalt* with it, or to a combination of earth with marine acid. And, 5. ſome kinds have an agreeable ſmell in large heaps; ſuch are the Portugal, and the Hampſhire bay *ſalts*; and this ſeems owing to the ſea water they were made from, having a bituminous matter in it. 6. It differs greatly in taſte, according to the various foreign mixtures it contains; and it will often alter in taſte, and other qualities, by long keeping. Thus the *ſalt* of Peccais is ſo bitter, when new made, as not to be eatable, but after keeping a while it becomes very pleaſant. This is owing to its containing at firſt a large portion of the bittern *ſalt*, or Epſom *ſalt*, which liquifies in keeping, and, running off in form of a fluid, leaves the reſt of a good taſte. In general bay *ſalt* is much fitter for uſe after it has been kept ſome time in a dry place, than when it is firſt made.

2. *Marine ſalt* boiled, which is extracted from ſea water by coction.

3. *Brine ſalt*, or fountain *ſalt*, prepared by boiling from natural brine, whether of ponds and fountains, or of lakes and rivers.

4. *White ſalt*, prepared from ſea water, or any other kind of *ſalt* water, firſt heightened into a ſtrong brine by the heat of the ſun, and operation of the air.

5. *White ſalt*, prepared from a ſtrong brine, or lixivium, drawn from earth, ſtones, or ſands, ſtrongly impregnated with common *ſalt*.

6. Refined *rock ſalt*, which is boiled from a ſolution of foſſile *ſalt* in *ſalt* water, or in freſh.

And, 7. *Salt upon ſalt*, which is made from bay *ſalt* diſſolved in ſea water, or other water, and boiled to a white *ſalt*.

All theſe kinds, except the firſt, are comprehended by Dr. Brownrigg under the general denomination of *white ſalt*.

SALT, *common, method of preparing*. The art of refining rock *ſalt* was firſt communicated to the Cheſhire *ſalt*-boilers by Dr. Leigh. See *Rock ſalt* ſupra.

Bay *ſalt* is prepared in the moſt ſimple and eaſy manner, when the water of the ponds and lakes impregnated with *ſalt* is totally exhaled by the force of the ſun and air, and the *ſalt* is left concreted into a hard cruſt at the bottom.

We have many natural *ſalt marſhes*, or *ſalinæ*, as they are called, of this kind, in ſeveral parts of the world, where *ſalt* is produced without any art or labour of man. Pliny, Alonſo Barba, Shaw, and other writers, give accounts of large briny lakes, which are evaporated to a perfect dryneſs in ſummer time; when the inhabitants cut and carry away as much *ſalt* as they have occaſion for. Lakes of this kind are found in the Podolian deſert, near the river Boryſthenes, on the Ruſſian frontiers towards Crim Tartary, in the kingdom of Algiers, and in other countries.

Mr. Maſſon, in his botanical travels from the Cape of Good Hope (Philoſ. Tranſ. vol. lxvi. part i. p. 297) met with ſuch a lake, called Zwart Kop's *Salt*-pan, ſeveral miles diſtant from the ſea, and ſituated upon an eminence. In the rainy ſeaſon it is filled with freſh water, which, by the ſaltneſs of the ground, ſoon becomes ſtrongly impregnated with ſaline particles; and when the ſummer's heat exhales the freſh water, the bottom of the lake is covered with a cruſt of pure *ſalt*, two or three feet thick. The lake is about three miles round, and ſurrounded by a riſing ground.

In thoſe countries, however, where this manufacture of *ſalt* is not naturally performed, it may be effected by art; and *ſalinæ* or *ſalt marſhes* may be conſtructed for this purpoſe. This is annually done to great advantage in France, where the chief coaſts for bay *ſalt* are thoſe of Bretagne, Saintonge, and the Pays d'Aunis.

In order to make a ſaline or *ſalt* marſh, a low plat of ground muſt be choſen adjoining to the ſea, and diſtant from the mouths of large rivers, and this muſt be near ſome convenient harbour for veſſels. The ground muſt be free from freſh water ſprings, and out of the reach of land floods, and, if poſſible, ſhould have a clayey bottom; and, finally, it muſt be well defended from the ſea, either by natural or artificial banks of earth of a proper ſtrength and thickneſs.

The ground thus choſen muſt be hollowed out to three ponds or receptacles. The firſt, into which the ſea water is uſually admitted, may be called the reſervoir; the ſecond receptacle, which is to be divided into three diſtinct ponds, communicating with each other by narrow paſſages, and containing brine of different degrees of ſtrength, may be called the brine-ponds; and the third receptacle is to be furniſhed with an entrance, between which and the brine-ponds there is to run a long narrow and winding channel; the reſt of it is to be divided into ſmall and ſhallow pits, containing a very ſtrongly ſaturated brine, which in them is to be converted into *ſalt*, and they may, therefore, very properly be called the *ſalt* pits.

The firſt receptacle or reſervoir muſt have a communication with the ſea by a ditch, defended on each ſide by walls of brick or ſtone, and made of ſuch a depth, that by it all the water of the reſervoir and other parts of the *ſalt* marſhes may be able to run out at low water, and by it alſo the ſea may be admitted into it at high tide. So that at neap tides the marſh may be filled with ſea water to the depth of ten inches in the reſervoir; and, conſequently, at higher tides, to the depth of two feet, when there is occaſion to overflow the marſh, as is always to be done in the winter ſeaſon, when there is no *ſalt* to be made; for by this means, the wood work is kept from decay, and the clay bottom from injuries by froſt. The ditch between the reſervoir and ſea muſt have a flood-gate, by which the ſea water may be admitted, retained, or let out, as occaſion may require.

The ſeveral ponds or receptacles muſt not have all their bottoms upon the ſame level, but muſt be made of unequal depths, ſo that the firſt receptacle or reſervoir may be eight inches and a half deeper than the *ſalt* pits in the third receptacle. The three brine ponds alſo ſituated between the reſervoir and the *ſalt* pits muſt be of unequal depths. The next adjoining to the reſervoir muſt be the deepeſt, and that which is nigheſt the *ſalt* pits the ſhalloweſt, but all of them muſt be ſhallower than the reſervoir; and the three receptacles being thus conſtructed, the water ſtanding at the ſame height in them all, and forming with its ſurface one continued plain, will be ten inches deep in the reſervoir, when only an inch and a half in the *ſalt* pits.

The length and breadth of the brine ponds and reſervoirs are to be at diſcretion; but it is beſt to err in making them too large, and in general they ought to be ſo large as to furniſh the *ſalt* pits with a conſtant ſupply of brine, fully ſaturated with *ſalt*; and for this purpoſe, it is neceſſary to have them of different dimenſions, in different countries according to the degree of heat.

The bottoms of the reſervoir or brine ponds are to be lined with any kind of lean and tough clay, or earth, that will hold water; and the French uſe a red, or blue clay, to be had in the neighbouring grounds. With them the blue always ſucceeds better than the red, which colours the *ſalt* much more; but in order to have a perfectly pure *ſalt* from this kind of manufacture, the bottom ſhould be lined with ſome clean cement, which will hold water perfectly, and will not be eaſily broken up.

The ſaline or marſh being thus conſtructed, the ſaltmen, at the proper ſeaſon of the year, which is from the middle of May to the end of Auguſt, open the flood-gate when the tide is out, and drain off all the ſtagnating water: when this is done, they repair the bottom of the marſh in ſeveral places, where it is found neceſſary, and cleanſe the ſeveral receptacles from mud and dirt: after this they admit the ſea water at the next high tide, till it floats the whole marſh, and ſtands at about ten inches high in the reſervoir. In a day or two moſt of the water in the *ſalt* pits is exhaled, and what remains is a very ſtrong brine, they then let in more ſea water at the two or three following tides; and ſo take care to admit as much freſh water into the marſh, as has been waſted in vapour by the heat, conſtantly raiſing it to the height of ten inches in the reſervoir, and conſtantly to an inch and half in the *ſalt* pits; and when the weather is extremely hot, or there are ſharp drying winds, they fill them ſomething higher than this.

All the parts of the marſh are thus ſupplied with water out of the reſervoir, but the ſea water, which is let into the reſervoir, is not confuſedly let into the other water or brine of the ponds and *ſalt* pits; for as the ſeveral parts of the work communicate only by narrow channels, it is provided, that the *ſalt* water flowing out of the reſervoir never returns to it again, but gently flows along till it arrives at the ſecond brine pond, and from that to the third, being forced forward by the ſea water received from time to time in the reſervoir. During this ſlow courſe, the watery fluid always flies off in great quantity by exhalation, and the brine is continually preparing for cryſtallization as it flows along gently, growing all the way ſtronger and ſtronger, as it approaches the *ſalt* pits; ſo that when it at length enters theſe pits, it is fully ſaturated with *ſalt*; and particular care is taken to guard the entrance of the *ſalt* pits by a long and narrow channel, by which means the ſtrong brine contained in theſe pits is prevented from returning back, and mixing with the weaker brine in the brine ponds; care is alſo taken, that the ſtrong brine in the *ſalt* pits is ſpread out very thin, and expoſed to the ſun and air with a large ſurface, by which means the water more quickly exhales from it, and the *ſalt* is left concreted in the cryſtals. Theſe cryſtals, or *ſalt*, the workmen in France draw out every day, and diſpoſe them at length together in a pyramidal heap, which they cover over at the top with thatch or ſtraw, and ſo preſerve them from the injuries of weather. Thus at a ſmall expence and trouble a *ſalt* is prepared, which is found very fit for all domeſtic uſes; and France is furniſhed with a very profitable article for exportation into other countries.

The *ſalt* thus made is of different colours, according to the colour of the clay employed in making the pits.—That of the French is brown, whence the denomination of *bay ſalt*, and it is uſually ſold without farther preparation; though in ſome places they make it into *white ſalt* by refining it in large flat cauldrons. In a favourable ſeaſon, the French are ſaid to be able to make enough of bay *ſalt* in a fortnight, to ſupply their home conſumption for a year, and the wants of other nations, who purchaſe from them much more than is conſumed in France.

The greateſt difficulty which attends the making of bay *ſalt* in Great Britain ariſes from the heat of our ſummer not being ſufficiently ſtrong to evaporate a great quantity of ſea water in a ſmall portion of time. But Dr. Brownrigg has ſufficiently evinced the practicability of our imitating the French in their manner of procuring bay *ſalt*. It is well known, that in Hampſhire, and ſome other counties, they have a method of heightening the ſea water into a ſtrong brine, by expoſing it to the ſun in large pits, much after the manner in which bay *ſalt* is made; and ſo much of the ſea water is, by this means, naturally evaporated, that though they boil the remainder with Newcaſtle coal, yet they can afford their *ſalt* at a leſs price than the Newcaſtle *ſalt*-boilers can afford theirs; though the ſea water is, probably, equally impregnated with *ſalt* at both places.

The works in which the ſea water is heightened into brine are called ſunworks or outworks. Theſe are conſtructed on a flat down or ouzy beach: within a mole which is raiſed, if neceſſary, to keep out the ſea, there is a large reſervoir, or feeding pond, communicating with the ſea by a ſluice, and adjoining to this reſervoir a long trench, parallel to which there are ſeveral ſquare ponds, called brine pots, nine or ſometimes twelve placed in a row, and parallel to this two other rows of the ſame kind; beyond the third row, there is a row of larger ponds, three in number, called ſun pans, with each of which three or four of the brine pits in the third row communicate by narrow openings; and theſe often communicate with a larger pond, called the common ſun pan, from which the brine flows into large covered ciſterns (made very tight of brick and clay), adjoining to the boiling-houſe. The bottoms of the ponds are in ſeveral places formed of an ouzy mud, well trodden and laid ſmooth; and in the brine pits and ſun pans covered with ſea ſand. The bottoms of all the pits form an inclined plane, higheſt at the reſervoirs, and loweſt at the common ſun pan. The partitions between the ponds are of mud and earth, about two feet broad, with little openings, by which the pits communicate with one another. The ſea water, received at full ſea, into the reſervoir, is thence let out, as occaſion requires, into the trench, and from the trench into the firſt row of brine pits; and when they are duly filled, the openings between them and the trench are cloſed with mud. The water, after ſtanding for ſome time in theſe pits, is let out into the ſecond row; and after a certain time, according to the degree of evaporation, into the third row of pits; thoſe of the firſt row being again filled; and thus they are filled and emptied alternately. When the brine is ſufficiently evaporated, in the third row of brine pits, it is ſuffered to flow into the common ſun pan, where its weight is examined by glaſs hydrometers; and being found of due ſtrength, it is drawn from thence into the ciſterns, where it remains till they are ready for boiling it. The ſea water, thus carried through the whole work, is called a courſe of brine; and, in hot weather, it acquires its proper ſtrength in twenty-four hours; but, if ſhowers approach, it is drawn into the ciſtern before it is brought to its full ſtrength. In this courſe the *ſalt* water ſtands deepeſt in the pits of the firſt row, and is gradually ſhallower in the others, till it arrives at the ſun pan, where it is ſhalloweſt. and in the common ſun pan it is ſomewhat deeper, being about ſix or ſeven inches deep. After this manner, if the ſeaſon proves favourable, they make as much brine as keeps them boiling till near Chriſtmas; after which they repair their pans and furnaces, and prepare their Epſom *ſalt* from the bittern, and begin again to make brine about April.

The pans in which they boil the *ſalt*, at Lymington, are of lead, of a ſquare form, and ſmaller than thoſe uſed for boiling ſea water into *ſalt*. They have uſually four of theſe in a ſaltern, placed in a row, with a furnace to each of them. The chimnies are carried up by the ſide of the wall, which divides the boiling houſe from the fire houſe; and the ſmoke is conveyed from each furnace into theſe chimnies by two flues, one on each ſide of the mouth of the furnace. To each of theſe flues is fitted a regiſter or plate of iron, placed horizontally, which may be drawn out or thruſt in over the flue, ſo as to cloſe it, and prevent the ſmoke from aſcending through it, and by means of theſe regiſters and vent holes, and doors to the mouths of the furnaces and aſh pits, they are able to regulate the fires in the exacteſt manner, and damp them while the *ſalt* is graining, or ſmother them quite out, if they find occaſion. In the boiling houſe they have a chimney to convey off the vapours from each pan; which is a ſquare funnel of boards. There is only one long walk in the boiling houſe, on the ſide of the pans oppoſite to the mouths of the furnaces, and between this walk and the wall are placed large wooden troughs, with ſeveral little holes at their bottoms; into which troughs the *ſalt*, when drawn out of the pans, is put to be drained from the bittern. Below theſe troughs others are placed to receive the bittern; and in them ſeveral ſticks are fixed erect, to which the CAT-*ſalt* adheres in large cryſtals. Such is the general conſtruction of the Lymington ſalterns.

The proceſs of boiling *ſalt* is much the ſame here as at the brine works: except that at theſe works they uſe no clarifying mixtures; they boil the brine violently, till a thin ſkin of *ſalt* appears on its ſurface, when the brine is ſaid to begin to *yew*, and then damp the fire, and carefully ſkim off this ſkin, and alſo take out the calcareous earth, and caſt it away. This earth they ſuffer to ſettle to the bottom of the pan, without collecting it into ſcratch pans, as at moſt other works, and rake it to the ſide, and thence draw it out. To the brine, cleared from the ſcratch, they add butter and other ſeaſonings; and afterwards proceed to grain the *ſalt* with moderate fires, commonly reducing three pans full of brine into *ſalt* in twenty-four hours. When the *ſalt* hath remained in the troughs ſix or ſeven hours, it is taken out; and without any other preparation laid up in the ſtorehouſes for ſale. A *ſalt* boiler, with an aſſiſtant, attends four pans, and alſo prepares the brine in the outworks.

The artificial method of promoting the evaporation of ſea water, and the preſerving the brine, in the Engliſh *ſalt* pits from being diluted with rain, propoſed by Dr. Brownrigg, is as follows. A number of *ſalt* pits ſhould be made in a row in the marſh, from eaſt to weſt, and their bottoms lined with plaiſter, or ſome ſtrong cement, that will not eaſily break up; and by this caution, the *ſalt* may be drawn white and pure like the Portugal kind, not grey like the French. Over each pit covers ſhould be made of thin boards, or rather of canvas painted white, and ſtretched on frames of wood, and theſe ſhould be fixed to ſtrong poſts, erected on the north ſide of the pits, and contrived to be eaſily drawn back to them, in the manner of draw-bridges. Theſe covers, thus fixed, may be let down over the pits, in the manner of a ſhed or penthouſe, in rainy weather, to keep the brine from being diluted with freſh water; and in dry weather they may be raiſed almoſt to a perpendicular, but inclining a little towards the ſouth, ſo as to form a wall with a ſouth aſpect; and thus they would ſerve for a double uſe, being a covering to the pits in rainy weather, and reflectors of the ſun's heat in dry weather. The reflection of ſo large a body of the ſun's rays, in the courſe of a bright day, would greatly promote the evaporation of the brine; and the hinges, on which the reflectors turn, being placed at ten inches from the ground, when the reflectors ſtand upright, there will be a ſpace under them, through which the air will continually flow in a briſk current, and this will greatly promote the evaporation of the water.

The paſſages of communication between the pits muſt be narrow and winding, and muſt be wholly ſtopped up in wet weather, that no freſh water run into the brine. This channel ſhould be covered alſo with boards, and, at the entrance of the pits, there muſt not be a pond, as is the cuſtom in France, but only a narrow covered trench, running parallel with the ſide of the pits, which is oppoſite to the reflectors; and the pond, which forms the entrance of the pits in the French *ſalt* marſhes, muſt in theſe be detached from them, and inſtead of it, there muſt be formed a fourth brine pond, communicating with the third by a long and narrow channel.

If theſe contrivances ſhould be reduced to practice in England, the *ſalt* will probably cryſtallize much faſter there than in the French marſhes, and the brine may be kept as deep, and even deeper than in the French pits; and a ſhower of rain will only retard the work for the ſmall time in which it is falling: whereas, in the French works, it throws them back three or four days, as no *ſalt* can be formed till all the water it brought be evaporated.

Four ciſterns may be dug adjoining to the brine pits, to admit the brine in the *ſalt* ponds, when the weather is very rainy; and as to the *ſalt* water in the reſervoir, if it ſhould be found neceſſary to preſerve it from rain in ciſterns, when ſo much rain falls as to make it freſher than ſea water, it may be let out, and ſea water admitted in its place. And in order to promote the evaporation, and to make the *ſalt* water in the reſervoir fitter to ſupply the firſt brine pond with brine of a due ſtrength it may be proper, by means of a ſmall fire-engine, continually to force up the *ſalt*-water in the reſervoir, as often as occaſion requires, and by means of a diverger, fitted to the engine, to make it deſcend again into the reſervoir like a ſhower of rain; by which means, the evaporation of the watery vapours will be greatly promoted after much the ſame manner as is practiſed at ſeveral of the *ſalt* works in Germany, where the brine is very weak.

Thus by augmenting the force of the ſun's heat, and of the air, by promoting the evaporation of the watery vapours, and preventing the brine from being diluted with rain, it is very probable that, during the ſummer ſeaſon, double the quantity of *ſalt* might be prepared at an Engliſh work with theſe contrivances, that is now uſually prepared at a French *ſalt* marſh of equal magnitude.

Beſides theſe methods of managing ſea water, it is certain, that very large quantities of bay *ſalt* might be prepared in England with great eaſe, from the natural brine of *ſalt* ſprings, and from the common foſſile or rock *ſalt* of Cheſhire, diſſolved in weak brine, or in ſea water. Upon the whole, the bay *ſalt* might thus be made here at a moderate price, and in ſufficient quantities to ſupply both the nation itſelf, and all our colonies.

Dr. Watſon, in his Chemical Eſſays, vol. ii. p. 58, having found, by experiment, that, in a ſummer day of ſixteen hours, three gallons of water may be diſperſed into the air, by a warm ſun and a briſk wind, from the ſurface of a linen cloth, equal to one ſquare yard, ſuggeſts a method of manufacturing bay *ſalt*, by wetting and drying alternately any number of ſquare yards of courſe cloth: and he obſerves, that one labourer, aſſiſted by proper mechanical contrivances, might be equal to the daily management of a thouſand yards, or more. By this plan in favourable weather there would be daily evaporated twenty-four thouſand pounds of water, which, ſuppoſing ſea water to contain one thirty-ſecond part of its weight of *ſalt*, would give ſeven hundred and fifty pounds of *ſalt*.

He adds, that thoſe who have ſeen the artifice of ſtrengthening brine, which is practiſed in Franche Comté, and other places, by making it drip through faggots, in order to increaſe the evaporation, by increaſing the ſurface of the water, which is expoſed to the air, will not be ſurpriſed at this method of evaporating water.

Marine ſalt is prepared by boiling ſea water. This *ſalt* is only made in countries where great quantity of fuel can be had at a very low price, or where the ſun has not force enough; and is therefore made in few counties of England, except on thoſe parts of the Britiſh coaſt which moſt abound in pit coal. This has thence got the name of *Newcaſtle ſalt*, and is exported to Denmark and Norway, and ſome other countries, as well as ſent to London and other parts of England.

The moſt convenient works for the making this *ſalt* are conſtructed in the following manner. The ſaltern is erected at ſome convenient place near the ſhore; it is a long and low building, conſiſting of two parts, one called the fore-houſe, and the other the pan-houſe or boiling-houſe. The fore houſe ſerves to receive the fuel, and cover the workmen; and in the boiling-houſe are placed the furnace, and the pan in which the *ſalt* is made. And in ſome places they have two pans, one at each end of the building, and the fuel and place for the workmen are in the middle. The furnace opens into the fore-houſe by two mouths, and from theſe is carried up a wall to prevent the aſhes from flying to the *ſalt* pans, and in this is a door of communication between the two houſes.

The body of the furnace conſiſts of two chambers, divided from one another by a brickwork, called the *mid-feather*, which from a broad baſe terminates in a high edge nigh the top of the furnace, and by means of ſhort pillars of caſt iron fixed upon it, ſupports the *ſalt* pan.— The pans are oblong and ſhallow, the common meaſure being fifteen feet in length, twelve feet in breadth, and ſixteen inches in depth; they are commonly made of plates of iron joined together with nails, and the joints filled with a ſtrong cement; and the bottom of the pan is prevented from bending down, or changing its figure, by hooks faſtened to ſtrong iron bars which are placed acroſs it.

Between the ſides of the pan and the walls of the boiling houſe there runs a walk, five or ſix feet broad, where the workmen ſtand to draw out the *ſalt*. The roofs are wood, and are faſtened with pegs of wood, nails mouldering away into ruſt in a few months.

Not far diſtant from the ſaltern on the ſea ſhore, between full ſea and low water mark, they make a little pond in the rocks, or with ſtones in the ſand; this they call a *lump*, and from this pond they lay a pipe; through which, when the ſea is in, the water runs into a well adjoining to the ſaltern, and by this well they pump it into troughs, by which it is conveyed into their ſhip or ciſtern, in which it is ſtored up till they have occaſion to uſe it.

The ciſtern is built cloſe to the ſaltern, and may be placed moſt conveniently between the boiling-houſes on the back ſide of the fore-houſe. It is made either of wood, brick, or clay, and ſhould be covered with a ſhed, that the *ſalt* water in it may not be weakened by rains, and ſhould be placed ſo high that the water may conveniently run out of it into the pans. When the ſea water has ſtood in the ciſtern till the mud and ſand are ſettled from it, it is drawn off into the *ſalt* pan; and at the four corners of the *ſalt* pan, where it is ſupported by the brick work and conſequently the flame does not touch its bottom, there are placed four ſmaller leaden pans and ſcratch pans, which, for a *ſalt* pan of fifteen feet, are uſually about a foot and half long and a foot broad, and three inches deep. Theſe have a bow or circular handle of iron, by which they may be drawn out with a hook when the liquor in the pan is boiling.

The *ſalt* pan being filled with ſea water, a ſtrong fire of pit coal is lighted in the furnace, and then, for a pan which contains about fourteen hundred gallons, the *ſalt* boiler takes the whites of three eggs, and incorporates them all with two or three gallons of ſea water, which he pours into the *ſalt* pan, while the water contained therein is only lukewarm, and mixes this with the reſt by ſtirring it about with a rake. In many places they uſe inſtead of eggs the blood of ſheep or oxen to clarify the ſea water, and in Scotland they do not give themſelves the trouble of clarifying it at all. As the water heats, there ariſes a black frothy ſcum upon it, which is to be taken off with wooden ſkimmers. After this the water appears perfectly clear, and by boiling it briſkly about four hours, a pan loaded in the common way, that is about fifteen inches deep, will begin to form cryſtals upon its ſurface. The pan is then filled up a ſecond time with freſh ſea water, and about the time when it is half filled, the ſcratch pans are taken out and emptied of a white powder, ſeeming a kind of calcareous earth, which ſeparates itſelf from the ſea water during its boiling, before the *ſalt* begins to ſhoot. When theſe have been emptied they are again put into their places, where they are afterwards filled again. This powder, being violently agitated by the boiling liquor, does not ſubſide till it comes to the corners of the pan where the motion of the maſs is ſmaller, and it there falls into theſe pans placed on purpoſe to receive it. The ſecond filling of the pan is boiled down after clarifying in the ſame manner as the firſt, and ſo a third, and a fourth; but in the evaporation of the fourth, when the cryſtals begin to form themſelves, they ſlacken the fire, and only keep the liquor ſimmering: in this heat they keep it all the while that the *ſalt* is granulating, which is nine or ten hours. The granules or cryſtals all fall to the bottom of the pan; and when the water is almoſt all evaporated, and the *ſalt* lies nearly dry at the bottom, they rake it all altogether into a long heap on one ſide of the pan, where it lies a while to drain from the brine, and then is put into barrows and carried to the ſtore-houſe, and delivered into the cuſtody of his majeſty's officers. In this matter the whole proceſs is uſually performed in twenty-four hours, the *ſalt* being commonly drawn out every morning. This is the method in moſt of our *ſalt* works, but in ſome they fill the pan ſeven times before they boil up the *ſalt*, and ſo take it out but once in two days, or five times in a fortnight. In the common way of four boilings, a pan of the uſual ſize, containing one thouſand three hundred gallons, they draw from fifteen to twenty buſhels of *ſalt* every day, each buſhel weighing fifty-ſix pounds.

When the *ſalt* is carried into the ſtore-houſe, it is put into *drabs*, which are partitions, like ſtalls for horſes, lined at three ſides, and the bottom with boards, and having a ſliding board on the foreſide to draw up on occaſion. The bottoms are made ſhelving, being higheſt at the back, and gradually inclining forward; by this means the brine remaining among the *ſalt*, eaſily ſeparates and runs from it, and the *ſalt* in three or four days becomes ſufficiently dry. In ſome places they uſe cribs and barrows, which are long and conic wicker baſkets for this purpoſe, and in ſome places wooden troughs with holes in the bottom. The ſaline liquor which remains from the making of *ſalt*, is what is called BITTERN.

The ſides of the pans in which the *ſalt* is made are ſoon cruſted over with the ſame ſort of matter, formed into cakes or cruſts, that falls in powder into the ſcratch pans; this the workmen call ſtone ſcratch; this they are obliged to cleanſe the pans of it once in a week or ten days, otherwiſe they will be burnt. In England they do this with iron picks, but at Hall in Saxony they have a much better method; for they then take out the pans, and turning them bottom upwards, burn ſtraw under them, by which means the matter of the cruſt looſens itſelf, and after this it falls off on being ſtruck with a mallet or hammer.

In Lancaſhire, and ſome other parts of England, ſea *ſalt* is made in this manner: they pare off, in dry weather, in ſummer, the ſurface of the flats, which are covered at full ſea, and bare when the tide is out. When they have procured heaps of this they put it into troughs, and pour freſh water on it; this waſhes off the *ſalt* that hung about the ſand, and is received ſo impregnated into veſſels ſet underneath the troughs. So long as this liquor is ſtrong enough to bear an egg, they put on more water; when an egg ſinks in it they throw the ſand out of the troughs, and put in freſh from the heaps. The water thus impregnated with *ſalt* they boil in leaden pans, and evaporate to a dryneſs, the *ſalt* remaining behind.

Brine or *fountain ſalt* is prepared from the water of *ſalt* wells and ſprings.

The ancient methods of boiling brine into *ſalt*, in Cheſhire and Worceſterſhire, are accurately deſcribed in the Tranſactions of the Royal Society; and the method, formerly uſed in Staffordſhire, is delivered in Dr. Plott's hiſtory of that county; but the method, now generally uſed in England, is this.

The brine being received from the well into a large ciſtern, is thence received, as occaſion requires, into the *ſalt* pan. Theſe pans are of the ſame form with thoſe uſed in the boiling of ſea *ſalt*, and uſually hold about eight hundred gallons: in ſome places theſe are made of iron, and in others of lead. When the brine is put into the pan, a little blood is mixed with it, in order to clarify it, and leaden pans are placed at the corners to receive the ſcratch, or calcareous earth, that ſeparates from them in the boiling. An ounce of blood is ſufficient for eight hundred gallons of brine. In ſome places they clarify their brine with whites of eggs. As ſoon as it is boiled, it is carefully ſkimmed, and afterwards it is ſuffered to boil very briſkly for ſome time, till the *ſalt* is granulated; after this the ſcratch is ſeparated, and the fire ſlackened, till the whole *ſalt* is formed.

When they have ſeparated the ſcratch, and the *ſalt* is ready to cryſtallize, they put into the pan ſeveral ſorts of ſeaſoning, as they call them, ſuch as ale, butter, and the like, which they ſuppoſe correct the bad qualities of the brine, and make the *ſalt* of a ſmaller grain. After this they boil it very gently, and when as much *ſalt* is formed, as will fill two or three of their wicker baſkets, they rake it up to the ſides of the pan, and fill it into the baſkets, placing them over the leach trough, that the brine may drain into it from the *ſalt*. The ſalt taken out, they call a draught of *ſalt*, and the operation, a clearing of the pan.

In this manner they draw the *ſalt*, and clear the pan five or ſix times during each proceſs, leaving at laſt only a few quarts of brine at the bottom of the pan. The baſkets, into which they put the *ſalt* out of the pan, are called alſo *barrows*: they uſually contain about a buſhel of *ſalt*, and are of a conic figure, open at the baſe. The whole proceſs of working a pan of brine uſually laſts about twenty-four hours. After the *ſalt* has drained an hour or two in the baſkets, it is removed into the hot-houſe over the furnace, where it remains four or five hours to be thoroughly dried, and is then taken out of the baſkets, and laid up for ſale. In all the Engliſh *ſalt* works, the leach brine, which is what remains in the pan after the *ſalt* is cryſtallized, and what drains from the *ſalt* in the baſkets, is not thrown away, as it is in Germany, but is added to the pan next to be boiled. And beſide the *ſalt* made in this manner, they have, at moſt of the Engliſh *ſalt* works, a different kind, which they call *ſhivery ſalt*. This is of a larger and firmer grain than that prepared in the common way, and is ſtronger, being formed by a milder heat, and therefore more fit for preſerving meat. When they would make this *ſalt*, they fill the pans on Saturday night, and then, as they draw out no *ſalt* on Sundays, there is a very moderate fire kept up all that day, and on Monday morning all the *ſalt* is taken out at one draught, having had time to form itſelf into larger cryſtals than ordinary, as it is eight and forty hours inſtead of four and twenty in forming.

They have alſo another kind of *ſalt*, made up in form of ſugar-loaves in ſmall wicker baſkets, which is thence called *loaf-ſalt*, or *baſket-ſalt*. This is the whiteſt, drieſt, and fineſt grained of any *ſalt*, and is therefore greatly eſteemed at table. In preparing this *ſalt* they uſe ſome reſin and other additions, to break the grain and render it very ſmall; others alſo, to this purpoſe, boil it the more briſkly, and ſtir it briſkly all the while. But in Cheſhire, where the beſt baſket *ſalt* is made, they uſe no particular proceſs about it, but only take the ſecond and third draughts of every pan, which always are the pureſt *ſalt*; and they do not ſuffer theſe to lie ſo long in the pan, as when they make *ſalt* of a larger grain, but take it out before it can form large cryſtals: by this means they have it of a fine ſmall grain, and they then preſs it hard down into the wicker baſkets, and when dried in the ſtove, they let it remain in the baſkets for ſale.

Not long ſince, Mr. Lowndes publiſhed a method of greatly improving the Engliſh brine *ſalt*, ſo as to make it at leaſt equal to the French bay *ſalt*.

The method is this. Let a brine pan, containing about eight hundred gallons of liquor, be filled with brine to within an inch of the top; then make and light the fire, and, when the brine is juſt lukewarm, put in either an ounce of blood from the butchers, or the whites of two eggs. Let the pan boil with all poſſible violence, and as the ſcum riſes take it off. When the freſh or watery part is pretty well decreaſed, throw into the pan the third part of a pint of new ale, or the ſame quantity of the grounds of any malt liquor. When the brine begins to grain, add to it the quantity of a ſmall nut of freſh butter, and when the liquor has ſtood half an hour longer, draw out the *ſalt*. By this time the fire will be greatly abated, and ſo will the heat of the liquor; let no more fuel be thrown on the fire, but let the brine gently cool, till a perſon can juſt bear to put his hand into it; keep it in that degree of heat as nearly as poſſible, and when it has worked for ſome time, and is beginning to grain, throw in the quantity of a ſmall nutmeg of freſh butter, and about two minutes after that ſcatter throughout the pan, as equal as may be, an ounce and three quarters of common alum, pulverized very fine; then inſtantly, with the common iron ſcrape-pan, ſtir the brine very briſkly in every part of the pan for about a minute; then let the pan ſettle, and conſtantly feed the fire, ſo that the brine may never be quite ſcalding hot, yet always a great deal more than lukewarm; let the pan ſtand working thus for about three days and nights, and then draw it, or take out the *ſalt*. The brine remaining will, by this time, be ſo cold, that it will not work at all, therefore freſh coals muſt be thrown upon the fire, and the brine muſt boil for about half an hour, but not near ſo violently as before the firſt drawing; then with the uſual inſtrument take out ſuch *ſalt* as is beginning to fall, and put it apart; then let the pan ſettle and cool. When the brine becomes no hotter than one can juſt put one's hand into it, proceed as before, and let the quantity of alum not exceed an ounce and a quarter, and about eight and forty hours after draw the pan, and take out all the *ſalt*.—Lowndes's Brine Salt improved.

This is Mr. Lowndes's proceſs; except that he afterwards directs cinders to be chiefly uſed in preparing the fires, the better to preſerve an equal heat, and by that means alſo he propoſes ſaving a conſiderable expence, aſſerting, that at preſent cinders are ſo little valued in Cheſhire, as to be thrown out into the highways. Mr. Lowndes adds, that, in a pan of the ſize before mentioned, there may be prepared, at each proceſs, ſixteen hundred pounds weight of *ſalt* from the beſt brine in Cheſhire, and one thouſand and ſixty-ſix pounds from the ordinary brine of that country. This, as the proceſs continues five days, is a little more than five buſhels and a half of *ſalt* a day from the beſt brine, and a little more than four buſhels a day from the ordinary kind.

The *ſalt* boilers, and particularly thoſe who prepare brine *ſalt*, have long been accuſtomed to make uſe of various ſubſtances, which they call additions or ſeaſonings, and mix them with the brine while its boiling; either when they firſt obſerve the *ſalt* begin to form, or elſe afterwards during the time of granulation. The intention of theſe additions is to make the *ſalt* grain better, or more quickly form into cryſtals, to make it of a ſmall fine grain, to make it of a large firm and hard grain, and leſs apt to imbibe the moiſture of the air, to render it more pure, and to make it ſtronger and fitter for preſerving proviſions.

The additions commonly uſed for theſe purpoſes are wheat-flour and reſin, in order to give the *ſalt* a ſmall grain; butter and tallow, to make the brine cryſtallize more readily; new ale, ſtale beer, bottoms or lees of ale and beer, wine lees, and alum. Wine lees, new ale, ſtale ale, and the lees of ale and beer are now generally rejected by the marine *ſalt* boilers; except in the Weſt of England, where the briners, who uſe them, affirm that they raiſe a large grain, and make their *ſalt* more hard and firm, and ſome ſay that they make it cryſtallize more readily.

Hoffman prefers the ſtrongeſt ale; and Plot aſſures us, that it makes the *ſalt* of a larger or ſmaller grain, according to the degree of its ſtaleneſs. Dr. Brownrigg apprehends, that the only good effects which fermented liquors can have, as an addition, are owing to their acid ſpirit, which may correct the alkaline *ſalts* of the brine, and thus render the common *ſalt* more dry and hard, and leſs apt to diſſolve in moiſt air. For correcting the alkaline quality of the brine, if any additions are thought neceſſary, he recommends ſtale ale or Rheniſh wine; or perhaps malt vinegar would anſwer the ſame purpoſe. Alum and butter were long uſed in Cheſhire, but the uſe of the former has been diſcontinued. Mr. Lowndes introduced it, with a view of correcting the flakyneſs and ſoftneſs of brine *ſalt*: but Dr. Brownrigg is of opinion, that alum cannot anſwer theſe purpoſes, and that it is not neceſſary; for, he ſays, that the grains of common *ſalt* will always be ſufficiently hard, and of their natural figure, large ſize, and undeliquiable, if formed by a gentle heat, and perfectly free from heterogeneous mixtures: and he imagines, that the goodneſs of Mr. Lowndes's *ſalt* is not owing to the alum, but to the gentle heat uſed in the preparation of it. The addition recommended by the Dutch will appear in the ſequel of this article.

We may obſerve, that bay *ſalt* aud boiled *ſalt* have reſpective different qualities, according as they are prepared at different places: and there are two general cauſes of this diverſity; one reſpects the manner of preparing the *ſalt*, the other reſpects the quality of the water from which the *ſalt* is prepared. When ſea water or brine is boiled into *ſalt*, a portion of the acid, which is one of its conſtituent parts, is diſperſed; and a greater or leſs portion is diſperſed, according as the *ſalt* has been formed with a greater or leſs degree of heat. We have an inſtance of this, both in bay *ſalt* compared with boiled *ſalt*, and in the different ſorts of the latter, when compared with each other.

Bay *ſalt*, which is prepared from ſea water, by the mild heat of the ſun, is generally eſteemed much ſtronger than the white *ſalt*, which is prepared likewiſe from ſea water, by boiling the water. Hence this *ſalt* is not only weaker, but more diſpoſed to deliquiate in the air; both which imperfections are ſaid to be corrected by a ſmall addition of freſh acid, when the *ſalt* begins to concrete. Hence alſo diſtilled *ſea* WATER is manifeſtly impregnated with acid, ſo as to be unfit for drinking, or for the common purpoſes of life; unleſs a little chalk, vegetable aſhes, or other like ſubſtances, be added in the diſtillation, to abſorb and keep down the acid extricated by the heat; by which means the diſtilled fluid proves perfectly ſweet.

White ſalt is prepared by boiling either the natural brine of ſea water, or *ſalt* ponds and ſprings, whence are obtained the marine *ſalt* and brine *ſalt*, or the ſtronger brine produced by artificial means, viz. by previous evaporation, or ſolution of foſſile *ſalt*, or the impregnation of common *ſalt* drawn from earths, ſands, or ſtones. Of this *ſalt* two very different kinds are required; the one for the uſe of the table, and the other as a condiment for proviſions. Its whiteneſs, dryneſs, and the ſmallneſs of its grains, are the properties which chiefly recommend the firſt kind, and its ſtrength and purity the latter.

Dr. Brownrigg has propoſed a method of improving the preparation of both kinds, founded on the following principles; viz. 1. That in the common proceſſes for making white *ſalt*, the *ſalt* is deprived of a conſiderable part of its acid ſpirit, by the violent boiling uſed in its preparation; whence it is rendered leſs fit for preſerving fiſh, fleſh, and other proviſions, than it would be if prepared with a more gentle heat. 2. That moſt kinds of white *ſalt* are rendered impure by the mixture of various heterogeneous ſubſtances, which render it leſs proper for preſerving proviſions than it would be if ſeparated from them.

In order to obtain a *ſalt* of this kind, free from all impurities, and in no reſpect weakened by a diſſipation of its acid ſpirit, let the ſea water (if that be uſed) be heightened into a ſtrong brine by the ſun, after the method practiſed in Hampſhire, and other parts of England, or in a *ſalt* marſh conſtructed after the French manner.

For this purpoſe a ſaltern muſt be erected, adjoining to the *ſalt* marſh, and a large boiler, or *ſalt* pan, made of iron, placed in it. The bottom of the pan may be of a ſquare figure, forty feet on each ſide, and its depth may be eighteen inches; or it may be made of a cylindrical form, forty feet in diameter, and eighteen inches deep, like thoſe uſed in Holland. The furnace over which the pan is erected may have four mouths, made on the oppoſite ſides at equal diſtances, for the convenience of receiving fuel. The fire may be made on a hearth; and within the furnace muſt be erected proper pillars of brick or mid-feathers; and, if neceſſary, ſtrong poſts and croſs bars of iron, to ſupport the bottom of the *ſalt* pan. There muſt be alſo four funnels, for conveying away the ſmoke, at equal diſtances, between the mouths of the furnace. If the pan be ſquare, the funnels may be carried up at its four corners, and the mouths may be under the middle of its four ſides. To the mouths muſt be fitted cloſe doors, and the funnels muſt be furniſhed with regiſters, for regulating the fire. When this apparatus is provided, let the *ſalt* pan be filled with ſtrong brine, drawn from the ciſtern, and well cleared from its muddy ſediment. Then kindle a fire, and mix a ſufficient quantity of whites of eggs with the brine, in order to clarify it; let the brine boil gently at firſt, and let it be well ſkimmed. When this is done, diminiſh the fire, and apply a moderate heat, ſufficient to keep the brine of a ſcalding heat.

When the *ſalt* begins to grain, rake out the ſcratch, which will be found at the bottom of the pan. When the brine is thus fully depurated, in order to correct its alcaline quality, a proper quantity of ſour whey may be added to it; the brine being kept of a ſcalding heat, while the *ſalt* is graining or forming into cryſtals; and when moſt of it is cryſtallized, and lies in the pan almoſt dry on its ſurface, the fire muſt be damped by ſhutting the doors of the furnace and regiſters; and the *ſalt* muſt be drawn from the liquor to the ſides of the pan, and put into drabs, or proper veſſels, till the bitter liquor is drained from it, and then it will be fit to be uſed in the ſecond proceſs of refining.

In this way may be prepared a ſea *ſalt* ſtronger, and of a much firmer and larger grain than any kind of common white *ſalt* made by the ordinary methods; and alſo a *ſalt* for the table, better in quality and cheaper than that prepared by the common methods. However, it is neceſſary to obſerve, that the ſalt which is required of a fair grain, ſhould be granulated with quicker fires, and drawn out of the pan before it hath lain long enough to form itſelf into large cryſtals, ſo that it may be taken out at five or ſix draughts during the proceſs. The ſecond or third draughts will be the beſt *ſalt*, being moſt free from ſcratch, and the *ſalts* of the bittern. After the ſame manner, a good kind of white *ſalt* may be extracted from natural brine, and likewiſe from a ſolution of rock *ſalt* in weak brine or ſea water.

In the ſecond proceſs of refining, a ſufficient quantity of the white *ſalt*, prepared as above directed, ſhould be put into a large ciſtern, made of wood, or bricks and clay; and to this ſhould be added as much pure river water, as will be ſufficient to reduce it to ſtrong brine, almoſt fully ſaturated with *ſalt*; when the *ſalt* is diſſolved, and the brine has remained unmoved, a ſcum will ariſe which muſt be taken off, and a ſediment will fall to the bottom. Let the clear brine be drawn out of the ciſtern into a *ſalt* pan, ſuch as has already been deſcribed in the firſt proceſs, well cleanſed from bittern; let a fire be kindled in the furnace, and the heat be ſo gentle, that the watery part of the brine may be ſlowly evaporated without any of the ſaline ſpirit; for this purpoſe the heat ſhould be regular, and leſs than the heat of boiling water; but the degree which *ſalt* can endure without any diſſipation of its acid ſpirit, is beſt known by experience, and may be adjuſted by the regiſters, &c. When the evaporation is ſo far advanced, that little ſaline cryſtals begin to appear on the ſurface of the brine, then may be added to it a ſufficient quantity of the acid muriatic ſpirit (in the proportion of about one, two, or three drops of the ſpirit to a gallon of the brine) ſo that neither the acid, nor the alcaline principle of the *ſalt* may be predominant. When this is done, the evaporation muſt be continued until the ſurface of the *ſalt* in the pan is almoſt dry. The doors of the furnace and regiſters muſt then be cloſed, and the fire ſmothered out, and the *ſalt*, which will be found in large clear cryſtals, muſt be raked to the ſides of the pan, and having drained there a little while, be taken out, and put in proper veſſels to drain farther from the ſuperfluous brine, and it will be then fit for ſale.

The ſtrong brine which remains in the pan after the refined *ſalt* is drawn out, and the brine that drains from it, ought not to be mixed with the ſolution intended to be made into refined *ſalt*, but will ſerve to mix with the brine, to be boiled up in the firſt proceſs, into common white *ſalt*. See on the ſubject of this article Brownrigg's Art of making Common Salt, 8vo. 1748. paſſim.

SALT, *white ſea, method of making*. The *white ſalt* of Normandy is not made by refining the *bay ſalt*, but has this colour naturally when taken out of the pits. To make it they gather a muddy ſand on the flats of the ſhore, which the riſing tide has covered and impregnated with its waters for ſeven or eight days. This ſand being removed into pits for the purpoſe, diſcharges itſelf by degrees of all its water, which filtrates through ſome ſtraw, wherewith the opening of the pit is filled, and trickles into veſſels ſet on purpoſe to receive it. Of this water it is that they make their *ſalt*.

Their furnaces are of earth, and their boilers of lead: each furnace boils four leads. When the water wherewith they have filled the leads begins to boil, they take off the ſcum, which ariſes in abundance; and in proportion as it diminiſhes, throw in freſh water, which they continue to ſkim, as before. When it thickens, they keep it continually ſtirring, with a crooked ſtick or laddle; and when the grain is formed, they take it off the fire to purify it.

The purifying is performed by letting it ſtand in large oſier baſkets; where it drains itſelf of certain humidities that remained. When dry, it is laid in heaps, and thence is carried into the magazines.

The commerce of *ſalt* brings an immenſe profit to France, though more to the king than to the makers and ſellers: the duty is one fourth part of the price the *ſalt* is ſold at. The Engliſh and Dutch, and (when they are at war with France) the Swedes and Danes, take off moſt of the *ſalts* of the Comte Nantois; paying for it, *communibus annis*, from 20 to 35 livres the load. That of Guerande is preferred, by the Engliſh and Iriſh, to all the reſt, as the beſt. Yet that of Borneuf, though browner, and heavier, is moſt uſed in France, as alſo throughout the Baltic; particularly in Poland, where, beſides the ordinary uſes, it ſerves in tilling the ground; being found to warm it, and prevent little vermin from gnawing the grain.

The Engliſh and Dutch have often ſtriven hard, in times of war, to do without the French *ſalts*; and to that end have endeavoured to take *ſalts* from the Spaniards and Portugueſe; but there is a diſagreeable ſharpneſs and ſeroſity natural to them, which renders them very unfit for the ſalting of fleſh, fiſh, &c. To remove this, they boil them with ſea-water, and a little French *ſalt*, which they procure by means of neutral nations, which not only ſoftens them, but increaſes their quantity by one third. But it ſhould ſeem their refining does not ſucceed to their wiſh, by the eagerneſs wherewith they return to the *ſalts* of Bretagne, &c. as ſoon as any treaty has opened the commerce.

SALT *upon ſalt*, a kind of common *ſalt*, prepared by the Dutch, of great uſe in preſerving herrings and other fiſh, and to which they principally owe their advantages in the herring trade. The Dutch prepare two kinds of refined *ſalt*, one of a ſmall grain, intended for the uſe of the table, and called butter *ſalt*. They export large quantities of this to the countries upon the Rhine, and into other parts of Germany. The other kind is a very ſtrong and pure *ſalt*, and is of the largeſt grain of any boiled *ſalt* now made: this laſt they call the St. Ubes or Liſbon *ſalt*, from its reſemblance to the pure bay *ſalt* made in thoſe places.

The *ſalt*, which they refine, is altogether marine bay *ſalt*, and they chiefly have it from France and Spain; but they find, by experience, that any one kind of bay *ſalt* does not anſwer their purpoſes, ſo well as two or more kinds; they therefore frequently mix three parts of Cadiz *ſalt* with one part of that of Souſton, which is of great ſtrength, but very dirty, and of a green colour, and does not coſt above half the price of the Spaniſh *ſalt*; for diſſolving the bay *ſalt*, they uſe ſea-water, which they bring in lighters to Dort and Rotterdam from below the Brill or Helvoet; out of theſe lighters it is craned into cellars, and is thus impregnated with bay *ſalt* to a certain degree of ſtrength, which they determine by hydrometers made for that purpoſe. After the heavy droſs of the *ſalt* is ſubſided to the bottom of the cellar, the clear brine is pumped up into the *ſalt* pan through a mat, which retains the light ſcum, ſtraws, or other impurities, which floated on the ſurface of it. Theſe *ſalt* pans are of iron, of a round figure, and commonly forty feet in diameter, and eighteen inches deep. Theſe pans are placed over a hearth furnace, and the only fuel they uſe in the boiling the *ſalt* is dry turf. The fire is kept up ſo high, that the liquor boils briſkly all the time, and if any ſcum ariſes, they carefully take it off, but they uſe no clarifying mixtures. A little before the *ſalt* begins to granulate, they add to the pan, a lump of butter of the bigneſs of a walnut, and half a pint of ſour whey, which has ſtood at leaſt half a year. This acid whey, called *azy*, unites itſelf with the uncombined fixed alkali contained in the *ſalt*, and thus prevents it from adhering to the common *ſalt* as it cryſtallizes. Any other mild acid might probably anſwer the ſame purpoſe.—When theſe things are perfectly mixed in by a good ſtirring, they ſhut the doors and windows of the houſe, that no air can blow in cold, and the houſe is kept thus hot all the time that the *ſalt* is forming. This method is not new, or peculiar to the Dutch works, for Agricola deſcribes an aparatus of boards, to keep the cold air out of the *ſalt* pan all the time that the *ſalt* is forming; and the Germans uſe it, in many places, at this time.

It is out of this ſame brine, and by the ſame proceſs, that they make the table *ſalt* and the ſtrong *ſalt*; only towards the end of the proceſs they make this difference; if the pan is to be wrought into table *ſalt*, the brine is kept gently ſimmering during the whole operation, and all is finiſhed in twenty-four hours; but if it be to be made into a ſtrong *ſalt*, they ſlacken the fire to ſuch a degree, that the operation takes up three days. In both caſes they let the *ſalt* remain in the pan till the whole is finiſhed; they then rake it out with wooden rakes, and after it has drained a-while in wooden drabs, it is fit for uſe. The mother brine, of which there always remains a large quantity in the pan after the ſtrong *ſalt* is made, as alſo the drainings of the drabs where the *ſalt* is put, is reſerved to be boiled up into table *ſalt*; but the mother brine of the table *ſalt* becomes more ſharp and bitter after every proceſs, and is finally thrown away.

SALT, *common, principal properties and uſes of.* That *ſalt* is eſteemed the beſt for curing proviſions, and for preſerving them the longeſt time, which is the ſtrongeſt and pureſt. This may be known by the following properties. It is uſually concreted into large grains or cryſtals, which are firm and hard, and with reſpect to thoſe of other kinds of common *ſalt*, the moſt ſolid and ponderous. It is not diſpoſed to grow moiſt in a moderately dry air, to which it has been expoſed for a conſiderable time; its colour is white and ſomewhat diaphanous; it hath no ſmell; its taſte is truly muriatic, and more ſharp and pungent than that of other kinds of common *ſalt*. The *ſalts* which approach neareſt to this degree of perfection are the beſt kinds of bay *ſalt* and the ſtrong Dutch refined *ſalt*.

With regard to *alimentary ſalt* in general, we may obſerve, that though it appears to us under various forms, it is immediately diſtinguiſhed by applying it to the tongue, and its always aſſuming the ſame figures after a regular cryſtallization. Its cryſtals are cubes, ſeveral of which unite together into the form of hollow truncated pyramids.

Common *ſalt* diſſolves in water, and cold water diſſolves nearly the ſame quantity as hot boiling water, nor does it concrete again in the cold, like the other neutral *ſalts*, as long as the evaporation of the fluid is prevented; but writers are not agreed about the proportion of *ſalt* diſſolved in water. Some ſay, that it diſſolves in leſs than thrice its weight of boiling water; others ſay, that it requires three times and one-ſeventh its own quantity of water; and others again ſay, that four parts of water to one of *ſalt* are required, for a perfect ſolution. Theſe differences may be eaſily accounted for by the different *ſalts* that may have been uſed. Boerhaave is of opinion, that 16 ounces of water will not diſſolve quite 5 ounces of *rock ſalt*; Spielmann, with whom Neumann agrees, thinks that they will diſſolve $6\frac{2}{3}$ ounces; Eller ſays, that 7 ounces of *foſſile ſalt* may be diſſolved in 16 ounces of water; and Hoffmann aſſures us, that 16 ounces of water will not diſſolve above 6 ounces of *common ſalt*. Dr. Watſon's experiments confirm that of Hoffmann; for he obſerves, that he never could diſſolve quite 6 ounces of *rock ſalt* in 16 ounces of water. The *ſea* WATER, in different parts of the world, is very differently ſated with *ſalt*; that of ſome parts containing twice as much as others. The ſea-water which ſurrounds the coaſts of Great Britain, is ſaid to hold ſeldom more than one thirtieth, or leſs than one fiftieth part of *common ſalt*. When water is impregnated with any *ſalt*, as much as it can bear, it will ſtill diſſolve a quantity of another *ſalt*, whoſe particles are of different figures, proper to inſinuate into the remaining vacuities of the water: thus, after *common ſalt* will no longer diſſolve in it, alum will; and after alum, *ſalt*-petre, then *ſal* ammoniac, &c.

Although *common ſalt* is very cryſtallizable, and exactly neutral, it very readily becomes moiſt when expoſed to humid air, and muſt, therefore, be kept in dry places.—This *ſalt* contracts an union with *common ſalt* with a calcarious baſis, and, conſequently, all the *ſalt* obtained either from ſea water, or *ſalt* fountains, contains a certain quantity of this *ſalt* with earthy baſis, the white earth of which will precipitate by adding fixed alkali to a ſolution of *common ſalt* in pure water. In order to obtain a very pure *common ſalt*, it is neceſſary to diſſolve it in water, filtrate it, and add a ſolution of cryſtals of ſoda, or marine alkali, till no more white cloud is formed by the addition; then filtrate the liquor again, and evaporate it.

The cryſtals of *common ſalt*, expoſed to the fire, crackle and burſt, and thus form the *ſal decrepitatum*, ſoon after melt, and, when cooled, fix in form of a white and almoſt opake maſs. This *ſalt* is abſolutely unalterable by fire, even when it has been heated ſtrongly, together with inflammable matters; a property which reſults from the ſlight diſpoſition which its acid has to combine with phlogiſton, as the experiments of Meſſrs. Duhamel and Margraaf have demonſtrated. However, though it be fixed in the fire to a certain degree, yet, when it is expoſed to a violent fire with free acceſs of air, it exhales in vapours, and attaches itſelf, in white flowers, to bodies, leſs hot than itſelf. Chemiſts know no other acid but vitriolic and nitrous acids, and ſedative *ſalt*, which can decompoſe *common ſalt* by diſengaging its acid.

Common ſalt is of all ſaline ſubſtances the moſt neceſſary and uſeful. Its acid and alkali are employed in many chemical operations in the arts; it is an important ingredient in the fuſion of GLASS, which it whitens and purifies; it facilitates the fuſion and precipitation of the metallic parts of minerals in eſſays, and perfectly covers them; axd its peculiar uſe in preſerving meats, &c. ſeaſoned with it, or ſteeped in ſolutions of it, and in improving the taſte of aliments, is univerſally known. In the application of *ſalt* to this important purpoſe, it retards and prevents the putrefaction of almoſt all our aliments, without producing any ſuch change upon them, even when preſerved a long time, as to render them altogether unfit for nouriſhment. And though ſalted animal foods are generally accounted one of the principal cauſes of the ſcurvy at ſea, this is owing not to the *ſalt* itſelf being prejudicial, but to its being incapable of preſerving the animal ſubjects, for a length of time, in a perfectly uncorrupted ſtate. Pure ſea *ſalt*, and ſea water, are rather ſalubrious than hurtful, both in the true SCURVY, and in impurities of the blood and humours in general.

Hoffmann obſerves, that an ounce of the *ſalt*, diſſolved in a proper quantity of water, occaſions commonly ſix ſtools or more, without uneaſineſs; that this *ſalt* checks the operation of emetics, and carries them off by ſtool; that in glyſters it is more effectual, though uſed only in the quantity of a dram, than any of the purgatives; and that where other glyſters fail of opening the belly, a ſolution of *common ſalt* produces effect.

With regard to the antiſeptic property of *common ſalt*, it is proved by the experiments of ſir John Pringle, Dr. Macbride, and M. Gardane, in his Eſſay towards a Hiſtory of Putrefaction, that, though when mixed with animal ſubſtances in a large proportion, it preſerves them from putrefaction, yet when a ſmall quantity of it is employed, it conſiderably accelerates putrefaction. Whence it appears, that ſmall quantities of *common ſalt*, ſuch as are taken with food, facilitate digeſtion, which is a kind of incipient putrefaction, and ſerve at the ſame time as a mild ſtimulus to the ſtomach itſelf: and, therefore, *common ſalt* is not only agreeable and uſeful, but alſo ſalutary, at leaſt to all conſtitutions, in which the digeſtion is too remote from putrefaction, as in thoſe which are properly called crudities; though different temperaments may differ much in this reſpect. *Common ſalt* is obſerved to differ from other ſaline ſubſtances, in occaſioning drought and tending, not to cool, but rather to heat the body. Lewis's Mat. Med. and Dict. Chem. Eng. ed. art. *Common* SALT. See SPIRIT *of ſalt*, and *Marine* ACID.

Common ſalt is alſo uſeful as a manure, by contributing to fertilize the ſoil; though in the more early ages of the world it was regarded as a ſymbol of extreme ſterility. And we read of princes, who, in token of their indignation, ſowed grounds with *ſalt* to render them barren. See Judges, ix. 45. Deut. xxix. 23. Zephan. ii. 9.

Virgil, Georg. lib. ii. reprobates a *ſalt* ſoil as occaſioning the degeneration of fruit-trees, and admitting no melioration from ploughing.

Pliny, ſpeaking of foſſile *ſalt*, affirms, that every place in which it is found, is barren, and unfit for vegetation. And Plutarch obſerves, that the Egyptians believed *ſalt* to be the ſpittle or foam of the giant Typhon, the great enemy of their gods; and hence, he adds, they held it in the greateſt abhorrence.

In later times, however, *ſalt* is frequently uſed as a manure with great ſucceſs. It has been the cuſtom, ever ſince the time of Henry III. at leaſt, for the farmers on the Corniſh coaſt to manure their land with ſea-ſand, in which ſea *ſalt* is ſo copiouſly mixed, that in many places it is uſed to be extracted from a ley made of ſand. When the ſand has been long expoſed to the air, it proves leſs uſeful and enriching, which ſome have attributed to its having been deprived of a good part of its *ſalt* by the dews and rains. This practice of manuring lands with ſea-ſand has, within theſe few years, been introduced with advantage, in other parts of Great Britain. The Cheſhire farmers purchaſe no inconſiderable quantity of refuſe *ſalt* from the *ſalt* boilers: they mix it with dung, and it makes an excellent manure. At Northwich alone, there were ſold, a few years ago, near 3000 tons of it in one year, for the uſe of the farmers in that and other counties.

In Cheſhire, and other counties, they make a great uſe of the water of their *ſalt* ſprings, as a manure for their lands. They let out the water of theſe ſprings for a certain time upon the lands, after there has been rain, and by this means the quantity of ſalt they contain is ſo blended with the rain-water, that it is too weak to hurt the corn or graſs, and yet ſtrong enough to kill worms and other vermin, and to improve vegetation.

On the other hand, when the ſoil abounds with ruſhes and weeds, it is cuſtomary in Cheſhire to lay a quantity of rock *ſalt* upon it, as it is found utterly to deſtroy every vegetable. And Mr. Tull, obſerving that common ſea *ſalt* is deſtructive to almoſt all plants, except thoſe which naturally grow in the ſea water, or on the ſhores, invented a method of determining how far the horizontal ROOTS of plants run, by burying *ſalt* at a diſtance from them.

From the above obſervation it ſhould ſeem, that *ſalt*, when uſed in ſmall quantities, is a good manure, and, when in large ones, a real poiſon to vegetables.

Some of the African and Arabian deſerts are thought to be barren by their having too much *ſalt* in them; whilſt many parts of Barbary are reckoned to be peculiarly fruitful, from their containing a leſs quantity of it. As *ſalt*, in ſmall quantities, is known to accelerate the putrefaction of animal ſubſtances, and when in larger, to retard it, and thus is uſeful in aſſiſting the organs of digeſtion in man and other carnivorous animals, as we have already obſerved, *ſalt* applied in like manner, as a manure, may be found very beneficial; not from its entering as an aliment into the ſubſtance of vegetables, ſince there are many experiments tending to prove that no kind of *ſalt* can of itſelf become the *food of* PLANTS; but from its efficacy in reducing weeds, dried herbage, dead roots, &c. into a putrid oily maſs; the fructifying virtue of oily compoſts being now generally acknowledged: but when it is uſed in a larger proportion, by preſerving theſe matters from corruption, and drying up or hardening the fibrous capillaries of the roots, ſo that they become unfit for ſucking in nutriment, the fertility of the ground is diminiſhed, or wholly deſtroyed.

As to the fertility of lands overflowed by ſea water, it may be partly owing to the ſlime and mud left by it, and partly to the *ſalt* contained in it, which, being in a ſmall quantity, may contribute to the putrefaction of the effete vegetable roots, and the conſequent production of an oily compoſt.

There are no lands that fatten cattle ſooner than thoſe paſture grounds which are thus, at times, overflowed by *ſalt*-water; ſuch, e. g. are the paſtures at Erith, near the Thames, which are ſometimes overflowed at ſpring tides. Some farmers have tried the ſcattering of *ſalt* over their corn fields, as ſoon as ſown, in the quantity of two buſhels to an acre, with good ſucceſs: and this quantity may be productive of all the advantages which ariſe from the occaſional overflowing of high tides and natural *ſalt* ſprings.

SALT, *common, duties on, and laws relating to* The duties upon *ſalt* are under the management of a diſtinct office, called the *ſalt-office*, eſtabliſhed in 1694, ſubject to the direction of five commiſſioners, at an annual ſalary of 500*l.* each, who have, by ſtatute 1 Anne, cap. 21. the ſame powers, and muſt obſerve the ſame regulations as thoſe of other exciſes. To this office belong alſo a comptroller, with an annual ſalary of 350*l.* deputy and clerks, a treaſurer, who has for himſelf and clerks 430*l.* *per annum*, his deputy and clerk, a ſecretary at 200*l.* *per annum*, aſſiſtant ſecretary and clerk, an accomptant general at 200*l.* *per annum*, and clerk, ſolicitor at 150*l.* *per annum*, correſpondent at 100*l.* *per annum*, and clerk, chief accomptant and clerk of ſecurities at 180*l.* *per annum*, two accomptants and aſſiſtant clerks, houſekeeper at 100*l.* a year, ſtorekeeper and clerk of the charity and diaries, collector of London port, aſſiſtant ſearcher, two ſurveyors, &c.

By 5 W. cap. 7. a duty is laid on home *ſalt* of $1\frac{1}{2}$*d.* a gallon; which, by 7 & 8 W. cap. 31. is extended to all *ſalt* made from rock *ſalt*, *ſalt* refined, and *ſalt* made from *ſalt*. And by 9 & 10 W. cap. 44. a farther duty is impoſed on all ſuch *ſalt* of $3\frac{1}{2}$ *d.* a gallon: the ſame amounting in the whole to 3*s.* 4*d.* a buſhel: *ſalt* being eſtimated at 56 lb. to the buſhel. Theſe duties were repealed by 3 Geo. II. cap. 20. but were revived by 5 Geo. II. cap. 6. for three years, continued from time to time, and made perpetual by 26 Geo. II. cap. 3.

By 5 W. cap. 7. there ſhall be paid for every gallon of foreign *ſalt* imported 3*d.* over and above other duties; and by 9 & 10 W. cap. 44. an additional duty is laid of 7*d.* a gallon: the ſame amounting in the whole to 6*s.* 8*d.* a buſhel: the gallon to be rated after 8 gallons to the buſhel Wincheſter meaſure; and 84 lb. of foreign *ſalt* ſhall be deemed a buſhel. 1 Anne, ſtat. i. cap. 21.

By 9 Anne, cap. 23. a farther duty, over and above the duty on home *ſalt*, of 9*s.* a ton, is laid on all rock *ſalt* exported to Ireland; and rock *ſalt* ſhall be aſcertained as to payment of the duties, at 65 lb. weight to the buſhel.

By 20 Geo. III. cap. 34. an additional duty upon *ſalt* is charged, as follows: viz. for every gallon of *ſalt* imported, not being the product or manufacture of Great Britain, the ſum of $2\frac{1}{2}$*d.* for every gallon of *ſalt* and rock *ſalt*, made at any *ſalt* works or taken out of any pit in England, $1\frac{1}{4}$*d.* for every buſhel of *ſalt*, made at any *ſalt* works or taken out of any pit, in Scotland, 3*d.* and for every buſhel of *ſalt* imported from Scotland into England, 7*d.* By 8 Geo. III. cap. 25. foul *ſalt*, produced in the manufacturing of white *ſalt*, not fit to be applied to the curing of proviſions, but which may be beneficial to agriculture, ſhall be charged only with a duty of 4*d.* in a buſhel. The duties on foreign *ſalt* ſhall be paid by the importer, on entry, and before landing; who, on giving ſecurity to the collector, ſhall be allowed ſix months for payment, or at the rate of 10*l.* *per cent. per annum*, upon paying ready money. 9 & 10 W. cap. 44. Farther time is allowed, if the ſalt imported amounts to more than 40 buſhels, under certain reſtrictions, by 5 Anne, cap. 29. No foreign *ſalt* ſhall be imported in any ſhip of leſs burthen than 40 tons, on pain of forfeiting the *ſalt*, and double its value, 3 Geo. II. cap. 20. and *ſalt* that is landed before payment of the duty is forfeited, and alſo 10*s.* a buſhel; and every perſon aſſiſting therein ſhall forfeit 100*l.* Obſtructing an officer ſearching a ſhip incurs a forfeiture of 40*l.* 5. Geo. cap. 18. Importing or landing Britiſh *ſalt* in England incurs a forfeiture of the ſame, and alſo of the ſhip and tackle; and every perſon aſſiſting forfeits 20*l.* or is liable to ſix months impriſonment: which regulation is alſo extended to *ſalt* ſhipped for exportation, and put on ſhore again or taken out of the veſſel. 1, 2 & 3 Ann. cap. 14. 5 Geo. cap. 18. The duties on rock *ſalt* refined into white *ſalt* ſhall be allowed, 10 & 11 W. cap. 22. but no rock *ſalt* ſhall be refined, or made into white *ſalt*, in any place, except within ten miles of the pit, &c. on pain of 40*s.* a buſhel. 1 Ann. ſtat. 1. cap. 21. By the ſame act every maker of *ſalt*, refiner of rock *ſalt*, and proprietor of any *ſalt* works or pits, who ſhall ſet up or uſe any *ſalt* work, pit, pan, ſtorehouſe, warehouſe, &c. for making, laying, refining, or keeping of *ſalt*, without giving notice at the next *ſalt* office, ſhall forfeit 40*l.* and the officers ſhall be allowed to enter and ſurvey, under a forfeiture of 40*l.* and obſtructing the officer in his duty incurs a forfeiture of 20*l.* Nor ſhall any *ſalt* be delivered from any works or pits without notice to the officer, on pain of forfeiting the ſame, 10*s.* a buſhel, and 20*l.* 5 W. cap. 7. 9 & 10 W.

cap. 44. Any officer neglecting or violating his duty incurs a forfeiture of double the value of the *ſalt*, clandeſtinely conveyed away and landed, and alſo 10*s.* a buſhel. 5 Geo. III. cap. 43. *Salt* ſhall be weighed before removal, in the preſence of the *ſalt* officer, or the proprietor ſhall forfeit 20*l.* and double value. 10 & 11 W. cap. 22. Upon entry of *ſalt*, made or imported, the officer ſhall give a warrant, impowering the removal of it, on paying or ſecuring the duty in nine months; but any perſon, paying ready money, ſhall be allowed at the rate of 10 *per cent. per annum.* 5 W. cap. 7. 5 Ann. cap. 29. The duties on rock *ſalt* ſhall be paid, or ſecurity given to pay in twelve months, on pain of double value of the duties; or if they are paid within two days after the charge is made, 10*l. per cent. per annum* ſhall be allowed. Officers may ſeize *ſalt* carried before entry, without a permit, which, if not claimed within ten days, ſhall be forfeited and ſold; but if it be claimed without evidence of entry and warrant for removing it, it ſhall be forfeited: and every perſon, who ſhall carry it before entry and warrant, ſhall forfeit double the value, and 10*s.* a buſhel. 5 W. cap. 7. 9 & 10 W. cap. 44. and by 5 Ann. cap. 21, the officer may ſeize and ſecure the offender. By 2 & 3 Ann. cap. 14. he that ſhall carry *ſalt* without a permit ſhall forfeit 20*l.* Permits ſhall be delivered gratis by the *ſalt* officers. 7 & 8 W. cap. 31. And ſight of theſe may be demanded. 5 Geo. III. cap. 43. The lord mayor, and aldermen, in London, and the juſtices of the peace, in the county, at their general ſeſſions, may ſet and publiſh in writing the prices of *ſalt*, and alter the ſame as occaſion requires; and perſons refuſing to ſell at ſuch price, or ſelling at a higher price, ſhall forfeit 5*l.* half to the king, and half to the informer. 7 & 8 W. cap. 31. No perſon dealing in *ſalt*, ſhall ſell it otherwiſe than by weight, after the rate of 56 ℔. to the buſhel, on pain of 5*l.* to the informer. 9 & 10 W. cap. 6. Nor ſhall any perſon buy *ſalt* otherwiſe than by weight, on pain of 10*s.* a buſhel. 1 Ann. ſtat i. cap. 21. No *ſalt* ſhall be carried coaſt-wiſe before the duty is paid or ſecured, 5 W. cap. 7. It ſhall be weighed when put on board, and a permit given, on pain of forfeiture of 10*s.* a buſhel. 10 & 11 W. cap. 22. And the cocquet, ſigned by the *ſalt* officer, ſhall expreſs the quantity. 1 Ann. ſtat. i. cap. 11. Allowance ſhall be made for waſte, at the rate of three buſhels for forty of white *ſalt*, and one buſhel and a half for forty of rock *ſalt*. 5 Ann. cap. 29. 6 Ann. cap. 12. The officer at the unlading port may demand a ſight of the permit, and weigh the *ſalt* upon unlading; and if it weighs more than the permit expreſſes, the ſurpluſage ſhall be forfeited. There ſhall be a drawback of the duties on *ſalt* exported; beſides an allowance of four buſhels for forty of white *ſalt*, and two buſhels for forty of rock *ſalt* exported to Ireland, on account of the waſte of carriage; but if any ſuch be relanded, without entry and payment of duties, the offender ſhall forfeit double value, and 10*s.* a buſhel, and the other penalties for foreign *ſalt* landed unentered. 5 W. cap. 7. 9 & 10 W. cap. 44. 10 & 11 W. cap. 22. 5 Ann. cap. 29. The curers of fiſh for exportation may import foreign *ſalt* or take from the pit or work Britiſh *ſalt*, or rock *ſalt* refined, without duty, except the cuſtoms on importation, entering the quantity, and an account of the ſame being kept by the officer. 5 Geo. cap. 18. For the various regulations relating to this buſineſs, we muſt refer alſo to 8 Geo. cap. 16. 11 Geo. cap. 30. 8 Geo. II. cap. 12. 19 Geo. III. cap. 52. By 5 Ann. cap. 29. there ſhall be allowed five ſhillings for every barrel of ſalted beef or pork exported for ſale; but if ſuch beef or pork be relanded, it ſhall be forfeited, and 40*s.* a buſhel. By 1 Ann. ſtat. i. cap. 21. No perſon ſhall uſe any brine before it is boiled into *ſalt*, or any rock *ſalt* before it is refined, for pickling or curing fleſh or fiſh, on pain of 40*s.* for every gallon of brine, or pound of rock *ſalt*. See Burn's Juſtice, art. EXCISE.

There is a cuſtom duty in the city of London, called *granage*, payable to the lord mayor, &c. for *ſalt* brought to the port of London, being the twentieth part.

SALTS, *cryſtallizable*, in *Chemiſtry*, diſtinguiſh and comprehend all ſaline matters ſuſceptible of cryſtallization; in contradiſtinction to *fluor* SALTS.

SALT *of colcothar* is a white ſaline matter, obtained by lixiviating COLCOTHAR.

SALTS, *deliqueſcent*, a denomination comprehending all ſaline matters, which may be obtained by cryſtallization, or drying in a concrete form, but which, when expoſed to the air, imbibe its moiſture, and loſe their concrete cryſtallized form, deliquiating into a liquor by means of this moiſture. See DELIQUESCENCE.

SALT, *diuretic.* See SAL *diureticus.*

SALT *of England*, is a name given to a very rectified, concrete, volatile alkali, obtained from ſilk; and alſo to the concrete volatile alkali obtained from ſal ammoniac.

SALT, *Epſom.* See EPSOM and SAL *mirabile.*

SALTS, *eſſential*, include all concrete ſaline matters which preſerve the ſmell, taſte, and all other principal qualities of bodies from which they were obtained, which bodies are only vegetable or animal. The uſual method of preparing them is by evaporating, to almoſt the conſiſtence of a ſyrup, the liquors containing the *eſſential ſalt*, viz. the expreſſed and depurated juices and ſtrong decoctions, and by keeping them in a cold place. From many of theſe liquors, ſaline matters or cryſtals are depoſited upon the ſides of the containing veſſels after a conſiderable time, and after they have undergone a kind of fermentation. Theſe cryſtals, which are always very red, may be purified by diſſolving them in water, filtrating, evaporating, and cryſtallizing. Theſe mineral *ſalts* are extraneous to the vegetables and animals from which they are obtained; and are procured in the ſame ſtate in which they were introduced. The beſt known of theſe *eſſential ſalts* is TARTAR.

SALTS, *fixed*, a name given by many chemiſts to the *ſalts* obtained from the aſhes of plants, which, not having been diſſipated by fire, ought to be conſidered as fixed, in compariſon of the other ſaline matters of theſe plants, which evaporate during their deflagration. As the ſaline ſubſtances remaining in the aſhes of vegetables are entirely or chiefly alkaline, the name of *fixed ſalt* has become ſynonymous with that of *fixed* ALKALI. But other ſaline ſubſtances, as moſt neutral *ſalts*, which have not baſes of volatile alkali, are nearly as fixed as fixed alkali.

Mr. Homberg has given, in the Memoirs of the Paris Academy, for 1714, a very curious paper on the ſubject of volatilizing the *fixed ſalts* of plants. He obſerves, that the *fixed ſalt* of any plant is a ſaline matter, which has already loſt in the fire all, or the greater part at leaſt, of the volatile matter contained in the plant it is obtained from, as its phlegm, acid ſpirit, urinous ſpirit, its eſſential oil, and urinous *ſalt*; and that its figure is in ſome degree that of a ſpunge, the pores of which being always open, are ever ready to receive again ſuch ſorts of volatile ſubſtances as the fire has before driven off from them: and that art may in ſuch a manner add theſe its deprived parts to it again, that the concrete ſhall loſe its fixity, and become volatile, as the whole was in a great meaſure before. The whole of this operation conſiſts in adding to the lixivial *ſalt* one or more of thoſe volatile ſubſtances, the loſs of which gave its preſent form. Theſe are to be introduced into the *ſalt* by repeated cohobations, which are to be continued till ſo much volatile matter is added to the fixt, that the whole becomes volatile together; the naturally volatile particles being mixed in ſuch proportion, as to be able to carry up the fixed in vapour with them. The ſeveral volatile ſubſtances of plants are of different kinds, and conſequently require different operations, to make them mix with the *ſalt*. Tartar may very well ſerve as a general inſtance in this caſe, and the manner of introducing into its *fixed ſalt* thoſe principles, of which the fire before diveſted it, and by this means rendering it volatile, may ſerve as a ſpecimen of the manner of doing it in all the reſt; but as *ſalt* of tartar, and all other fixed vegetable alkaline *ſalts*, however well purified, always contain a great deal of earth, the ſeveral volatiles employed act differently on this, according to their ſeveral natures; ſome carrying it all up in vapour, others carrying only a part of it, and leaving at the bottom of the veſſel more or leſs of an earthy matter, inſipid to the taſte, and wholly diveſted of its alkaline *ſalt*; every particle of which, even in this caſe, has been volatilized, and raiſed by fire.

The alkaline *ſalt*, thus volatilized, appears alſo, according to the different ſubſtances employed, in very different forms; ſometimes in that of a *ſaline* liquor, ſometimes in an acid, and ſometimes in an urinous ſpirit; ſometimes alſo it becomes changed into a volatile *ſal ſalſus*, ſometimes into an acrid and fetid *ſalt*, and, finally, ſometimes into a volatile aromatic one. The firſt matter which fire drives out of tartar, or any other vegetable ſubſtance, is its phlegm: this being mere water, one would think at firſt ſhould be little able to change ſo fixed a ſubſtance as *ſalt* of tartar into a volatile one; but when we farther conſider the great power of water, when put in action by the fire, and that this agent is the cauſe of ſome of the greateſt changes that happen in animal and vegetable bodies, and perhaps of every thing of this kind that paſſes in our earth, we ſhall not wonder that it may be made, by the help of fire, one of the agents capable of raiſing, or volatilizing a part at leaſt of *ſalt* of tartar; but as phlegm is the leaſt active of all the principles which chemiſtry ſeparates from bodies, or at leaſt acts upon the others the moſt ſlowly, and with the leaſt violence, the method of volatilizing part of *ſalt* of tartar by means of this, muſt naturally be more tedious than by any of the other principles; yet it is to be done with time by this, as well as by the other.

The thing that put Mr. Homberg upon this courſe of experiments was, as he candidly acknowledges, an accident. He was diſpleaſed with the Venice ſoap, with which he ſhaved himſelf; and endeavouring to mend it, he cut it into thin ſlices, and after drying it three months in the ſhade, he powdered it in a mortar, and wetted it into a paſte again with oil of lavender and ſpirit of wine; and in continuing his trials to this purpoſe, he at length found part of the *ſalt* of the ſoap become volatile.

It is very well known that ſoap is made of the *ſalt* of kali, or pot-aſhes, and oil. On the event of this experiment Mr. Homberg proceeded to judge, according to the known rules of chemiſtry, that oil, of which the volatile *ſalts* are generally ſuppoſed to borrow their volatility, being intimately mixed with the fixed alkaline *ſalts*, as here with that of the kali, might render them all volatile, as in this inſtance; for that in this ſtate they were no longer alkalis, their pores being now not open, but filled to the utmoſt with the particles of oil. All oils contain alſo an acid, and that acid being mixed with the alkali *ſalt*, the whole on this muſt ceaſe to be an alkali, and become a middle, or neutral *ſalt*, ſuch as common ſea-*ſalt*; but then as the acid is not, in this caſe, joined to the alkali, but by the means of oil, and accompanied with oil, this new found neutral *ſalt* muſt neceſſarily be of an oily, or a ſulphureous nature.

In carrying on this idea, and trying by chemical experiments all the objects it offered, Mr. Homberg, in fine, found, that in order to volatilize the *fixed ſalts* of vegetables, it was neceſſary to begin, by converting them into ſoap; then to wait for the ſhooting of certain cryſtals, or bright points, which would appear upon the ſurface, and that theſe cryſtals were a neutral *ſalt*, volatilized of itſelf by the mere operation of nature: after this the matter is to be moiſtened with a new liquor, and then ſet upon the fire, and that thus there would be a new appearance of volatilized *fixed ſalt*; and the repeating this proceſs ſeveral times, affords always, at length, a very large proportion of the *fixed ſalt*, no longer ſuch, but truly volatilized. The choice of a proper liquor for the wetting the matter, is a thing of no ſmall conſequence. Water is, of all others, the leaſt proper, and oil appears the moſt ſo; and of the different oils, thoſe drawn by diſtillation are much more effectual than the common expreſſed ones. The great reaſon of this is, that the liquor ought not only to be the moſt volatile that may be, but it muſt be alſo ſuch, as will moſt intimately unite with *ſalt*. Spirit of wine is very excellent for the purpoſe, but would be much more ſo, did it not want this laſt quality. Mr. Homberg, by various trials, carried at length this attempt to ſo great a height, that he was able to volatilize nearly one half of *ſalt* of tartar, or of any other volatile *ſalt*. The new *ſalt* often appears in a dry form, the oil, which is employed in the making it, preſerving it from the effect of humid vapours, which would otherwiſe have reſolved it into a liquor.

Salt *foſſile*. See *Common* Salt.

Salts, *fluor*, diſtinguiſh and include all ſaline ſubſtances, which cannot by any method be rendered ſolid; ſuch are nitrous and marine acids, volatile alkali altered by quicklime, and ſome others.

Salt, *fuſible*, *of urine*, called alſo *native* or *eſſential ſalt of urine*, *phoſphoric ſalt*, and *microcoſmic ſalt*, is a neutral *ſalt*, compoſed of phoſphoric acid, ſaturated with an alkali fixed or volatile.

It is beſt prepared from putrefied humane urine; but it may be prepared from freſh. A quantity of the urine of ſound beer-drinking men being putrefied in a moderate heat, and then ſlowly boiled in glazed earthen veſſels to the conſiſtence of a ſyrup; if this liquor be placed in a cellar or cool place, in about four weeks time, or ſooner in winter, cryſtals of a peculiar figure will be formed. But theſe, being impure, muſt again be diſſolved in a ſufficient quantity of water, and filtered as hot as poſſible through grey paper, and the ſolution again put in a cool place, where, in a few days, cryſtals will again be formed much cleaner than the former. Theſe being ſeparated from the liquor and dried, the operations of ſolution, filtration, and cryſtallization, muſt be reiterated twice or thrice, till the *ſalt* becomes perfectly white and without ſmell.

Mr. Margraff ſays, that a hundred, or a hundred and twenty meaſures of urine, give about three or four ounces of this *ſalt*, which always cryſtallizes firſt, and is eaſily diſtinguiſhed from that which appears afterwards in cryſtals of a long and cubical form.

This *ſalt* is ammoniacal, but of a peculiar nature. It is a ſaline acid body. By diſtillation an urinous volatile ſpirit firſt riſes. The reſiduum may be reduced by a violent fire into a pellucid white tranſparent maſs like glaſs, of a very fixed nature, and from which neither acid nor any thing elſe can be ſeparated, without the addition of ſome other matter.

This vitreous ſubſtance may be entirely diſſolved in two or three parts of diſtilled water, and is thereby changed into a tranſparent liquor, ſomewhat thick, not unlike the concentrated oil of vitriol, and having the properties of all acids, ſuch as fermenting with volatile and fixed alkalies, forming neutral *ſalts* with them, precipitating bodies diſſolved in alkaline menſtruums, and diſſolving alkaline earth. It does not diſſolve gold nor ſilver; and copper, tin, and lead little, but iron very ſtrongly. It extracts a red colour from *cobaltum pro cæruleo*, in German, *blau farben-kobolde*, the mineral by which glaſs is tinged blue.

But this *ſalt* in its dry ſtate attracts metals with much more vigour, and with them produces ſeveral remarkable and ſingular phenomena; for all which, as alſo for the relation their *ſalt* bears to acid, alkaline, and neutral *ſalts*, we refer to the learned author, who has alſo examined its effects on ſeveral ſolutions of terreſtrial bodies. One moſt eminent property is, that mixed with the inflammable part of ſoot, and diſſolved in a cloſe veſſel, it produces a phoſphorus. An ounce of this *ſalt of urine*, thus ſeparated from its urinous part, and exactly mixed with half an ounce of ſoot, affords in this way a dram of the beſt PHOSPHORUS. The reſiduum did not produce any when tried.

The learned author does not pretend to determine exactly the true origin of this *ſalt*; he thinks its acid may come into the human body from vegetable aliments. He has obſerved elſewhere, that creſſes, muſtard, rocket, and even corn, expoſed to a very violent fire, produce a phoſphorus. Hence he thinks this acid muſt be mixed with thoſe ſubſtances; and the like may happen in other vegetables. He thinks this conjecture ſtrengthened, becauſe urine in ſummer, when people eat moſt vegetables, always produces this *ſalt* in the greateſt quantity.—Margraff in Mem. de l'Acad. de Berlin, 1746. See alſo Miſcel. Berol. tom. vii. p. 341.

Mr. Pott obſerves, that the figure of *fuſible ſalts* varies much according to the heat, evaporation, and different mode of cryſtallization; and that it aſſumes the ſhape of moſt others, as of ſaltpetre, vitriol, ſal ammoniac, Glauber's *ſalt*, &c. but that it is generally in ſhining, octogonal, priſmatic cryſtals. The taſte of this *ſalt* is cool, reſembling that of borax, to which it is in other reſpects ſimilar. When put on the fire in a crucible, it froths, ſwells, and melts. When melted upon a bit of charcoal, by means of a blow-pipe, it forms a round drop. The cryſtals of the ſecond cryſtallization do alſo melt upon charcoal, when they are pure, but when cold they have a milky colour. They do not, like the cryſtals of the firſt cryſtallization, form phoſphorus with phlogiſton. They effloreſce in the air, and are hot to the taſte, in both which inſtances they alſo differ from the firſt cryſtals.

Salt, *foſſile*. See *Common* Salt.

Salt *of glaſs*, called alſo *glaſs-gall*, is a kind of ſaline ſcum or maſs, found in glaſs-houſe pots upon the ſurface of the melted glaſs. It conſiſts of neutral *ſalts*, as common *ſalt*, vitriolated tartar, and others, which are contained in the ſoda and pot-aſh employed in the compoſition of glaſs, and which not being themſelves ſuſceptible of vitrification, are ſeparated from the glaſs during the fuſion, and collected together upon the ſurface, becauſe they are ſpecifically lighter.

Salt, *Glauber's*. See Sal *mirabile*.

Salts *of count Lagarais*, a name by which the French and ſome other nations call a preparation of vegetable bodies, invented by the gentleman whoſe name it bears, but very improperly called by him a *ſalt*.

The hiſtory of theſe preparations is this: in the year 1731, the count de Lagarais ſhewed the French king ſome powders, which proved to be very uſeful in medicine, and which he called the *eſſential ſalts of certain plants*. The method of making theſe was long kept a ſecret, but at length, the diſcoverer publiſhing it to the world, it appeared that they were made by means of water only, agitated in a violent and continued manner in a cloſe veſſel with an inſtrument reſembling a chocolate mill. Mr. Langelot had before attempted a reſolution of this kind of vegetable, and other ſubſtances, by means of water and motion, but his was done by grinding them with a ſmall quantity of water at a time; whereas this of the count's is by powdering the ingredients, mixing them with a large quantity of water, and breaking them to pieces by a continued motion of this ſort of mill made with four vanes, or flaps of thin wood, which was kept for ſix or eight hours in a continual motion, by means of a larger wheel, ſuch as the lapidaries poliſh ſtones with.

There is no doubt but that the inſtrument, uſed by the count, is of very great uſe, and that the reſult of the operation is a very valuable form of medicine; but it is not a *ſalt*, but an extremely fine extract, containing the gummy, reſinous, and ſaline parts of the body, and in a form capable of being reduced to powder, and eaſily adminiſtered, as it contains the virtues of the plant it is made from, in an extremely ſmall compaſs, and is capable of ready ſolution in aqueous fluids. It is certainly a form of medicine worthy to be brought into practice, and muſt be a very proper way of adminiſtering the more bulky medicines to children, and perſons of tender conſtitutions.

To give a proper view of the nature of theſe preparations, and their difference from the extracts made in the common manner, it may be proper to enter, in ſome degree into the manner of preparing the two forms. The common extracts of the ſhops are made either from the juices of ſucculent plants, as houſeleek, purſlain, or the like; or from a ſtrong decoction of the other drier plants in common water, which, when ſeparated from the coarſer parts by ſubſidence, filtration, or the like means, are evaporated over a balneum Mariæ to the conſiſtence of a thick honey.

There will, in proceſs of time, an eſſential *ſalt* ſeparate itſelf from theſe extracts, and many plants have, in the decoctions, a large quantity of a fine ſubſtance, which will never be made to paſs the filter: and the extracts, made by this means, contain the oil, the gummy and reſinous parts of the plants, and the eſſential *ſalts*, though this is but in a very inconſiderable quantity. Theſe are the common extracts of plants.

The method of making thoſe extracts, called *count Lagarais's ſalts*, is this. They chooſe a glaſs veſſel, capable of holding ſix or ſeven pints, and having a wide mouth; into this they put an ounce of bark, ſena, guaiacum, or whatever other vegetable they are to make the extract of, firſt reduced to a coarſe powder. They pour on this two pints and a half of rain water, or diſtilled water, and then taking the veſſel to the place where the mill is fixed, they raiſe it ſo high, that the body of the mill is in the middle of the liquor; then they cover the top of the veſſel with a wet bladder, that the froth may not be thrown over, and then turning the large wheel, they make the mill move round very ſwiftly in the liquor for ſix or ſeven hours together; after this they let the liquor ſettle for an hour or two, till only the finer parts of the body remain ſuſpended in it, and then pour it off into a number of flat China or ſtone-ware diſhes, putting only a ſmall quantity into each diſh, and theſe they ſet in the ſun, or over a balneum Mariæ prepared on purpoſe; for ſhould they attempt the evaporation in a ſand heat, the ſmall quantity of extract in each diſh would be burned. When the whole is evaporated to a dryneſs, there remains on the whole inner ſurface of the diſhes a thin cruſt of an extract, which is to be ſeparated by ſcraping it off with a piece of ſtiff paper, and reſerved for uſe. This always breaks up in ſmall ſcales, which have a very ſhining ſurface on that part where they adhered to the diſhes, and it ſeems that this has given occaſion to ſome to believe, that they were particles of real *ſalt*.

There is no doubt but this method of procuring a powerful extract might be of great uſe, in regard to all thoſe ſubſtances which water can have power to penetrate; but it is not eaſy to give credit to its being able to make the like valuable medicines from the metals, though that has been pretended. Gold and ſilver are pretended to be operated on in a powerful manner by it, but there ſeems a fallacy in this, ſince even iron itſelf, which is much more penetrable by water than thoſe metals, yields but little virtue to it; two ounces of the filings of this metal yielding, with the utmoſt care and accuracy, only about four grains of a white earthy matter, which is alſo much more likely to be a part of the water than of the metal.

The *ſalts of the metals*, as the count called them, which were prepared by this means, were always ſuſpected to hold ſome *ſaline* quality, which they owed to the *menſtruum*, which, whatever was pretended, was not ſimple water, and a ſtrict examination of them always diſcovered a marine *ſalt* among them. It is true, indeed, that according to Langelot's method of grinding, ſome leaves of gold were reduced, by the addition of a very ſmall quantity of water, into a liquor, from which, on diſtillation, a few red drops were ſeparated; but it is to be obſerved, that as Langelot's method is the grinding the ſubſtance with great vehemence, and for a long time, in an iron mortar, with a peſtle of the ſame metal, there is reaſon to ſuſpect, that what was found to come forth in red drops was a ſolution of iron, not of gold, as was pretended by thoſe who firſt prepared them.

It is not to be doubted, but the method of evaporation of count Lagarais's medicines is of great uſe, ſince no other can ſo well retain the finer parts of the medicines. Mr. Geoffroy tried it on roſes, violets, and ſome other flowers, and found great reaſon to wiſh that all the medicinal extracts could be prepared in the ſame manner; but the method is impracticable, when medicines are to be prepared for general uſe; for though the mills might be made to be moved in great numbers at once, by a current of water, and ſo this part of the work performed with tolerable eaſe, yet the evaporations, in ſuch quantities, could by no means be made in any tolerable room, or time, and they muſt be evaporated as ſoon as made, ſince they very quickly turn ſour, and loſe all the virtues. Mem. de l'Acad. Scienc. Par. 1739. See EXTRACT.

SALT *of lead*. See *Salt of* LEAD, and SACCHARUM *Saturni*.

SALTS, *lixivial*, a general name given to all ſaline ſubſtances obtained by lixiviation of aſhes, but particularly applied to *fixed* ALKALI.

It may appear very natural, from conſidering the common method of making *lixivial ſalts*, that they ſhould be all of them one and the ſame ſubſtance; and as the greater part of them agree perfectly, not only in taſte, ſmell, and colour, but even in their effects, in the niceſt chemical operations, in which it appears wholly the ſame thing, whether one or another of them be employed; many, even of the moſt celebrated chemiſts, have poſitively declared that they are all the ſame, and Kunckel has poſitively aſſerted this on many repeated experiments, allowing them no other difference than that ſome contain more, ſome leſs earth; and this he affirms not be owing to the different ſpecies of the plant, but to certain accidents in the burning.

This account, however ſpecious, is not true; for though there are many of the *lixivial ſalts* procured from different plants, which, on many trials, appear alike, yet there are ſome that greatly differ from the common kinds; as that of tamariſk, which wants the greateſt of all their characters, in that it is no alkali, but a true *ſal ſalſus*; and beſide this, there are probably many other as remarkable differences in others, which happen not yet to have been obſerved. Mr. Bourdelin, of the Paris Academy, having obſerved, that among the lixivial *ſalts* ſome were much more, ſome much leſs alkaline, and this laſt mentioned kind not at all, determined to ſearch minutely into their differences in this reſpect. In this attempt he tried the produce of a great number of different fruits and flowers of plants, many of which gave *lixivial ſalts*, conſiderably different from one another; but nothing more ſtrengthened his opinion of the eſſential differences of ſome of them, than the *ſalt* of guaiacum, which proved to be little more an alkali than the *ſalt* of tamariſk, and which he is of opinion may be prepared in ſuch a manner, as not to prove at all alkaline. Mem. de de l'Acad. Par. 1728. See LIXIVIOUS.

The opinion of the fixed *ſalts*, drawn by elixiviation from all plants, being the ſame, having greatly prevailed, Mr. Gmelin, of the Peterſburgh academy, went through a multitude of experiments with the *ſalts*, made carefully from a great number of different plants, on a number of different liquors; ſome mineral acids, others ſolutions and impregnations of different ſubſtances; and by theſe he found that they had very different qualities, beſide their differing greatly in the degree of their alkaline power, which had been looked upon as their eſſential character.

He obſerves, that theſe *ſalts* are not to be obtained pure by any means, except a violent and repeated calcination; and that this is not the method uſed with the ſeveral *ſalts* made for medicinal uſe, and conſequently that they are all impure. The additional matter, which makes theſe *ſalts* impure, is either an earthy, an oily, an acid, or a volatile alkaline ſubſtance, according as the plant, while recent, abounded with one or the other of thoſe principles, or as their mutual connections with one another were more or leſs ſtrong in each. As therefore the ſeveral ſpecies of plants are well known to abound with different principles, it muſt neceſſarily follow that the *lixivial ſalts*, obtained from them in the common way, muſt differ in their nature and properties, as the acid abounds in one, the volatile alkali in another, and the earth or oil in a third.

This difference unqueſtionably owes its origin to the nature of the different plants; but, beſides this, it muſt be allowed, that there are ſeveral accidents by which the *ſalt* may alſo be rendered of a different nature, or at leaſt its natural diverſity from others may be increaſed, and ſet in a ſtronger light. The different manner of burning the plant will occaſion a great change in the *ſalt* it yields, and two different *ſalts* will be obtained, if one half of the ſame quantity of aſhes be lixiviated with hot water, and the other half with cold. This has been fully proved by Stahl, in his Fundamenta Chemica.

Theſe are only accidental differences in the ſame *ſalt*; what Mr. Gmelin takes upon him to prove by experiment, is, that there are more real differences between the *ſalts* of various plants, and thoſe wholly dependent on the nature of thoſe plants, than had been before ſuſpected.

That the *ſalts* of plants may be fairly compared together, it is neceſſary that they ſhould all be made in the ſame manner; the fire ſhould, in all the proceſſes, be raiſed to the ſame degree, and the time of the plants remaining in it ſhould be alſo aſcertained, and the lixivium from each be prepared in the ſame uniform manner: thus the volatile parts of one plant will be no farther evaporated than of another, and the lixivia will contain an equal ſhare of the principles of the ſeveral plants, proportioned to their ſeveral natures; for, it is a certain fact, that if the lixivium of the ſame aſhes be made in part with hot water, and in part with cold, the *ſalt* obtained from that made with the hot water, will contain more of the earthy and oily parts of the plant than that made with the cold.

The method of making a fixt *lixivial ſalt* of a plant, ſo as to retain as much as may be of the virtues of the plant, is this. Let the plant continue on fire without breaking out into flame, and let the fire be continued till it fall into aſhes, but no longer, leſt ſome of the volatile parts be driven off, which might have been preſerved. Cold water, and not hot, ſhould be uſed to make the lixivium, that the ſalt may appear in its proper form; and as the water of wells, rivers, and other places, differ greatly from one another, the water uſed for this purpoſe ſhould be ſuch, as has been previouſly diſtilled two or three times over, and ſo rendered perfectly pure, and kept in glaſs-veſſels, not in earthen, leaden, or wooden ones, leſt it contract ſome adventitious particles. Now if the lixiviums of plants, made with all theſe cautions, are found to differ from one another, there is no room to doubt but that the *ſalts* of thoſe plants are really different one from another.

This evidently appeared from the labours of a Swediſh chemiſt, whoſe papers fell into Mr. Gmelin's hands, and who had with all this care and caution prepared the *ſalts* of a number of plants; a copious table of the different effects of which, in different mixtures, is added to Mr. Gmelin's account: but not only the *ſalts*, but the very aſhes of different plants, prepared in the ſame exact manner, are found to differ obviouſly to the ſenſes. The aſhes of mugwort, ſmall centaury, chervil, and dill, are of a browniſh grey; goats-beard and lungwort afford white aſhes; thoſe of ſanicle are whitiſh; thoſe of Roman wormwood, of a greeniſh grey; thoſe of rue, agrimony, and ſaxifrage, brown; thoſe of tanſy, of a duſky green; thoſe of dodder, of a fine green; eyebright, ſouthernwood, common wormwood, and ſcabious, afford them grey; ſcurvygraſs, of a whitiſh grey; hyſſop, yarrow, and ſowbane, of a duſky grey; melilot and oak-leaves, as alſo plantain, colts-foot, pinetops, and fumitory, of a duſky brown; pennyroyal, of a pale brown, with ſome ſpots of white; elder-flowers, ſage, and mother of thyme, afford yellow aſhes; thoſe of ſtrawberry leaves are of a pale brimſtone colour; thoſe of catmint, of a duſky red; of prunella, brick coloured; of honeyſuckle, blue; of fern, blackiſh; and thoſe of St. John's wort, feverfew, origanum, and pimpernel, are all of a deep black.

The quantity of aſhes, produced from an equal weight of different plants, is very different, ſome yielding a ſeventh part of their weight, others but a twelfth or thirteenth, and ſome particular plants much leſs than this; St. John's wort in particular yields but a twenty-eighth part, and fern but a twenty-fourth.

The lixiviums made from theſe different aſhes were ſome colourleſs from the beginning, others at firſt were bluiſh, greeniſh, or of other colours, but theſe tinges all went off after a few days, and the liquor became limpid.

The lixiviums of the ſeveral plants are very differently acrid to the taſte, though made exactly in the ſame manner and proportion, and thoſe of ſome plants are not acrid at all; that of ſtrawberry leaves has ſcarce any taſte; that of the barba capræ, inſtead of an acrid taſte, has a ſweet one; and the lixivium of mother of thyme has no taſte, by which it can be diſtinguiſhed from fair water: the lixiviums of pimpernel, dill, and ſtrawberry leaves, have a ſulphureous ſmell; thoſe of moſt other plants are wholly ſcentleſs. Act. Petropol. vol. iv. p. 28.

SALTS *of metals.* See METAL.

SALT *of milk.* See MILK.

SALT, *microcoſmic.* See *Fuſible* SALT *of urine.*

SALT, *mineral.* It has been for many ages a conſtant opinion among the chemiſts, that minerals contain no volatile *ſalt*. Mr. Homberg, however, found the means of preparing an acid mineral *ſalt*, in a dry form and volatile. This would diſſolve in ſpirit of wine, and that ſolution being thrown on marble, fermented, and diſſolved it in the manner of aqua fortis.

It is univerſally known that many mineral ſubſtances contain an acid, and that this is eaſily raiſed in diſtillation, and therefore is very volatile; but as this could never before be ſeparated, otherwiſe than in a liquid form, they eſteemed it ſomething of a peculiar nature, and called it an acid mineral ſpirit, baniſhing the word *ſalt* from its name. But Mr. Homberg found, that if the acid ſpirit of any mineral was ſo embarraſſed in the particles of ſome metal, as that it ceaſed to be fluid, that metal was always conſiderably increaſed in weight by it; and that if afterwards all the acid which had been added to it were again ſeparated from it, there would remain a volatile *ſalt* in a dry form, and that this *ſalt*, if diſſolved in ſpirit of wine, or in common water, made an acid liquor, which would diſſolve all alkalies with an ebullition. From this, he ſays, it is plain, that the minerals have a volatile *ſalt*, as well as the animals or plants; which laſt were alſo long ſuppoſed to want it, and the volatile *ſalt* ſuppoſed peculiar to the animal kidgdom: from this alſo it very plainly appears, that the acid ſpirits of minerals, as they are called, are in reality no other than theſe volatile *ſalts* diſſolved in their own phlegm.

The method of procuring this *ſalt* may be ſeen in the following inſtance. Take two ounces of fine ſilver, diſſolve it in five ounces of ſpirit of nitre; pour this ſolution, while hot, into a pint of river water, in which there has been before diſſolved as much ſea *ſalt* as it can contain, the ſilver will precipitate itſelf in form of white ſcales. Waſh this precipitate till it is inſipid to the taſte, and then dry it; it will, when perfectly dried, weigh two ounces and a half.

After this calcine in an iron veſſel, over a ſtrong fire, two or three pounds of fine tin, in which there is no mixture of any other metal. Take of this calx of tin well dried an ounce and half; mix this carefully with the two ounces and half of the calx of ſilver, perfectly dry alſo; put the mixture into a matraſs, of which two-thirds ſhall remain empty; expoſe this matraſs to the naked fire, with its neck turned downwards, there will run into the neck of the matraſs a black matter, which will immediately fix itſelf into a hard ſtone of a brown colour; this will weigh about an ounce and half; this ſtone is the calx of tin diſſolved by the acids, which remain in the calx of ſilver; and the caput mortuum, at the bottom of the matraſs, will be found to be the ſilver now diveſted of thoſe *ſalts*, which it had carried off with it from its diſſolvent in the precipitation. This may be run into a maſs by the copel, and no part of it will be loſt.

Beat this brown ſtone to powder; let the powder be perfectly dry; then put it into a double veſſel; ſublime it according to art; and the reſult of the operation will be half an ounce of a volatile *ſalt*; this is to be rectified by re-ſubliming it two or three times over a very gentle fire, and it will then be a volatile and mineral *ſalt*, perfectly dry, of a fine white colour, and tranſparent. The caput mortuum of this ſublimation is the calx of tin. Mem. Acad. Par. 1692.

SALT *of mineral waters.* See HALCRYPTIUM.

SALT, *muriatic calcareous.* See SAL *muriaticus calcareus.*

SALTS, *neutral.* See NEUTRAL, and the diſtribution of ſaline ſubſtances at the beginning of the article SALT.

SALT, *neutral arſenical*, is a combination of arſenic with fixed alkali to the point of ſaturation. M. Macquer firſt diſcovered this combination, and began an account of its properties in the Memoirs of the Royal Academy for 1746 and 1748. His method of making this *ſalt* is, by mixing together equal parts of very white cryſtalline arſenic and purified nitre, and by diſtilling this mixture in a retort with a graduated heat, in the uſual manner, till the retort is red-hot, and no more vapours of nitrous acid ariſe. In the retort there remains a ſaline maſs, white, compact, and fixed; from which, after ſolution in hot water, filtration, evaporation, and cryſtallization, may be obtained beautiful, quadrangular, priſmatic cryſtals, terminated at each end by a quadrangular pyramid, the ſides of which correſpond with thoſe of the priſm. This new *ſalt* is preciſely neutral, and exhibits no marks of an alkaline quality. It is infinitely more ſoluble in water than pure arſenic, and diſſolves in a leſs quantity of hot than of cold water. It is eaſily fuſible by fire, and remains fuſed and tranſparent like glaſs, without being alkaliſed, if it has not touched any inflammable matter; for it may be eaſily decompoſed by phlogiſton, which unites with the arſenic, ſeparates it from the alkali, and is ſublimed. This *ſalt* cannot be decompoſed by any pure mineral acid, becauſe arſenic ſeems to have a greater affinity with fixed alkali than acids have; but when theſe acids are united with metallic matters, they can eaſily decompoſe the neutral arſenical *ſalt*, even by the humid way; ſo that a ſolution of this *ſalt*, added to a ſolution of metals, occaſions a precipitate, compoſed of the arſenic and metal, while the acid of the metallic ſolution combines with the fixed alkali of the neutral, arſenical *ſalt*, and forms another neutral *ſalt*. Dict. Chemiſtry, art. *Salt*.

SALT, *pine*. See PINE.

SALTS *of plants*. See PLANT.

SALT *of Rochelle*, or of *Saignette*. See RUPELLENSIS *ſal*.

SALT, *ſea*. See *Common* SALT.

SALT, *ſedative*, a name given by the modern chemiſts to a *ſalt* obtained from borax, by means of acids, of the virtues of which they boaſt much. Thoſe who firſt deſcribed it, gave the proceſs for making it in a very enigmatical manner; and their ſucceſſors invented many different ways of preparing it. The truth is, that all mixtures of borax with the vitriolic acids furniſh us with a *ſedative ſalt*, as do all the mixtures of borax with ſpirit of nitre, or of ſea *ſalt*.

Becher firſt gave the enigmatic account of it, which Homberg traced to its origin, and found the way of making it with the vitriolic, as Lemery did with the other acids. This *ſalt* is formed by ſublimation, and is a congeries of ſaline flowers, not a little approaching to flowers of benjamin. Theſe flowers are ſo light and fine, that they ſwim upon water, and require a great quantity of water to diſſolve them, and much more of cold than of boiling water; and, therefore, it may be cryſtallized by cold, and even by evaporation alone.

The *ſedative ſalt* is a perfect *ſal ſalſus*. It makes no alteration in the colour of the juice of violets, and has no ſenſible effect on the ſolution of corroſive ſublimate, or on a ſolution of mercury in ſpirit of nitre for a long time; but it finally precipitates a yellow powder from it, as the borax does. There is this difference, however, between this precipitate, and that formed by crude borax, that the powder precipitated by the *ſedative ſalt*, does not, as the other, become white on waſhing with large quantities of water. Theſe experiments ſhew this *ſalt* to be wholly analogous to tartarum vitriolatum, or to the Glauber's *ſalts* in its effects.

When the compoſition of which this *ſalt* is to be made is placed on the fire, there ariſe different liquors before the *ſalt* appears; the firſt is a phlegm of a fattiſh complexion, and with the ſmell of ſoap; this is ſucceeded by a turbid white liquor, along with which there ariſe ſome of the firſt flowers. This makes a ſolution of mercury in ſpirit of nitre muddy after ſome time, and finally precipitates from it a ſmall quantity of a white powder. After this all the *ſalt* or flowers aſcend; theſe flowers, diſſolved in warm water, recryſtallize themſelves in it when cold, aſſuming the ſame form with that they had in the flowers, except that the combinations of particles are more denſe and heavy.

The uſual method of making this *ſalt* by ſublimation, has been this. Take a glaſs retort, with a large neck; put into it four ounces of borax in fine powder, and pour on this half an ounce of common water, to wet it into a ſort of a ſoft paſte; then add to this an ounce and two drachms of concentrated oil of vitriol; place the retort in a reverberatory furnace, and give at firſt a ſmall fire, which raiſe by degrees till the retort is red-hot: there will paſs over into the receiver about an ounce of aqueous matter; and after this the flowers, or *ſedative ſalt*, will riſe with a little more humidity; hence ſome part of the flowers will be diſſolved in the liquor, and run over into the recipient, but the greater quantity will remain in form of a dry ſublimation in the neck of the retort; they will finally ſtop up the whole orifice of the neck, and what ariſes after this uſually forms a circle of a ſort of gloſſy *ſalt*, about their baſes, out of which the flowers ſeem to ſhoot.

They are compoſed of multitudes of fine thin blades, or flakes, and are eaſily bruſhed out of the neck of the retort with a feather; the gloſſy circle at the bottom of them may be diſſolved in water, and recryſtallized, and by this means all the *ſalt* will be procured.

Mr. Geoffroy the younger has given, in the Memoirs of the Paris Academy, in 1732, an account of a way of making this *ſalt* by ſolution and cryſtallization alone, without the trouble of diſtilling; he has alſo ſummed up the ſeveral other ways of making it with blue and white vitriol, but the method here mentioned is that by which the chemiſts now make it.

Geoffroy's method by cryſtallization is as follows: take four ounces of borax, and one ounce one drachm of the moſt concentrated oil of vitriol; put the borax into a glaſs retort, pour in it half an ounce of common water after the oil of vitriol, and expoſe the mixture to a fire gradually increaſed: after the phlegm has paſſed off, and even while it is paſſing, there ariſe flowers, or a volatile *ſalt*, in beautiful foliated laminæ, ſome of which always melt by the heat of the fire: after the operation is over, the fineſt of the flowers are to be carefully gathered, and theſe are what ſtick to the neck of the retort. Thoſe that are grey, are to be thrown upon the remaining maſs, this maſs is to be diſſolved in water, filtrated and evaporated gradually; ſometimes, even without evaporation, the ſhining talcous laminæ are to be ſeen in the liquor; after twenty-four hours ſtanding, the water is to be poured off from theſe laminæ, which are to be waſhed with freſh water, and then dried carefully in a warm place. If theſe cryſtals do not calcine in the place where they are put to dry, nor in the ſun's heat, it is a ſign there is nothing cryſtallized but the *ſal neutrum*; if they do calcine, it is a proof that there is ſome Glauber's *ſalt* formed of the borax and the vitriolic, and cryſtallized in the maſs. This ſedative *ſalt*, obtained by cryſtallization, does not differ eſſentially from that which is ſublimed, only that the cryſtals or laminæ of the latter are more ſeparated and detached than thoſe of the former. This *ſalt* when once it has loſt its water by drying, cannot be raiſed into vapours by the moſt violent fire, in which it remains fixed, and melts into a vitreous matter, as borax does. Hence it appears, that it is a ſaline compound, the principles of which are ſtrictly united, and ſeparable with great difficulty. This truth has been illuſtrated by numerous and accurate experiments on the ſubject, by M. Bourdelin, related in the Memoirs of the Academy for the years 1753 and 1755.

M. Cadet has alſo publiſhed in the Memoirs for 1766, an account of experiments on this *ſalt*.

Homberg, the inventor of *ſedative ſalt*, believed that he diſcovered in it a ſedative, antiſpaſmodic, and even narcotic quality, and thence called it the narcotic *ſalt* of vitriol; it was, therefore, generally employed in convulſive diſeaſes; but its ſedative powers have not been well aſcertained.

SALT *of ſoda*, a name given to the marine or mineral alkali obtained from the aſhes of *ſoda*, and of other maritime plants. See KALI.

SALT, *ſpirit of*. See *Marine* ACID.

SALT *of Stahl*, *ſulphureous*, a neutral *ſalt*, compoſed of volatile *ſulphureous* acid, combined to the point of ſaturation with fixed vegetable alkali. This *ſalt* may be made either by ſaturating fixed alkali with volatile *ſulphureous* acid, made in a cracked retort, in *Stahl*'s manner, or by expoſing linen, ſoaked in liquid fixed alkali, to the vapours of ſulphur ſlowly burning. In the latter method, the linen dries, becomes ſtiff, and ſhines with many ſmall needle-like cryſtals, which are the *ſulphureous ſalts*. This has a more pungent taſte than vitriolated tartar, is more ſoluble in water, and is cryſtallizable by cold. It may be decompoſed by any acid, and its ſulphureous acid expelled from it: and it is perpetually changing, from the conſtant diſſipation of its phlogiſton.

SALT *of Sylvius, febrifugal*. See SAL *Marinus regeneratus*.

SALTS *of Tachenius*, are impure fixed alkalis, obtained from the aſhes of vegetables, burnt by ſuffocating their flame, and leaving no more communication with the air, than is ſufficient for the burning of their moſt diſengaged inflammable parts. The dried plant, in this proceſs, is put in an iron pot, ſo heated, that its bottom may be red, and continually ſtirred, when a thick fume, and at length a flame, will riſe from it. A lid muſt then be put on the pot, ſo looſely, that the ſmoke may eſcape but the flame be extinguiſhed, and this lid muſt be occaſionally removed for the convenience of ſtirring the plant. When it is thus reduced to aſhes, the aſhes muſt be lixiviated with boiling water; and when the lixivium has been evaporated to dryneſs, a ſaline matter, more or leſs reddiſh, will remain, which is Tachenius's fixed *ſalt*, and ſhould be kept in a bottle. See the proceſs deſcribed at large by Boerhaave, Chem. part ii. p. 28, &c. In this way of burning plants, the fixed alkali is phlogiſticated, rendered ſemi-ſaponaceous, and mixed with all the neutral *ſalts* contained in the plants.

SALT *of tartar*, the fixed alkali of TARTAR; or this name is given to fixed vegetable alkali in general.

SALT, *vegetable*. See *Soluble* TARTAR.

SALT *of vinegar*, is a name given to *vitriolated* TARTAR, impregnated with very ſtrong *radical* VINEGAR.

SALT, *vitreous*, a term uſed by ſome modern chemiſts for a kind of *ſalt*, which till of late wanted a name, and which is found in, and ſeparable from the fixed alkaline *ſalts* of vegetables.

It is bitter, hard, fixed, and not alkaline, and of a cryſtalline, or gloſſy appearance.

The method preſcribed by Boerhaave for the procuring it with the moſt eaſe, is this: put ſix pounds of the beſt poſt-aſhes into a clean glaſs, add thereto twenty pints of cold rain water; ſtir them together with a ſtick, and ſuffer the whole to reſt. When the aſhes are thoroughly diſſolved, gently decant the clear lixivium, and there will be found at the bottom, mixed with the fæces, a number of ſmall greyiſh granules, of a bitter taſte, and of an almoſt glaſſy brittleneſs and hardneſs; theſe are the *ſalt* required, and contain no alkaline quality. But to obtain it in greater purity, diſſolve ſix pounds of pot-aſhes in four times their weight of water; filter the lixivium while hot, and make it perfectly clear, then put it into a glaſs veſſel, ready heated and moiſtened, and ſuffer it to ſtand; a duſky cruſt will ſoon begin to ſhoot to the bottom and ſides of the glaſs, and will gradually become thicker and thicker; at length, when no more appears to ſhoot, pour off the liquor, and there will remain behind a *ſalt* like the former, but purer, and in larger quantity; if the remaining lixivium be boiled a little, and ſet to cryſtallize again, it will afford a ſmall quantity more of this *ſalt*, but after this it will yield no more, whence there ſeems to be only a certain and determinate quantity of this *ſalt* contained in the alkali. If this *ſalt* be put into a veſſel of rain water and ſhook about, it does not diſſolve, only the alkali waſhes off, and the *ſalt* remains purer than before; after this it is to be gently dried and kept. Boerh. Chem. p. ii. p. 42.

It is well known among the chemiſts, that genuine fixed alkaline *ſalts* can hardly be cryſtallized; and though ſome have produced this *ſalt* as a cryſtallized alkali, the fallacy of the pretext is evident, ſince this appears on trial to be no alkali at all; and it remains not leſs difficult than before to cryſtallize pure alkali, though a *ſalt* different in its nature from it, may be cryſtallized in a certain quantity from among it.

This *vitreous ſalt* never runs ſpontaneouſly in the air, nor does it eaſily diſſolve in cold water; when boiled, it requires a large proportion of water to diſſolve it, and as ſoon as cold, it eaſily ſeparates itſelf from it again; it is laſtingly bitter to the taſte, and crackles very much when thrown into the fire; it is neither acid nor alkaline, nor approaches in its nature to any other *ſalt* hitherto known, but ſeems neareſt of all others to reſemble ſandiver. This may ſuggeſt a query, whether the fire in producing the fixed alkali, does not at the ſame time produce this *ſalt* from vegetables; and whether by combining the ſand and alkali together in glaſs-making, the fire does not again ſeparate and throw up this *ſalt* in ſandiver. Something of this kind ſeems to be the caſe, and a cloſe inquiry on theſe principles may ſhew us why tartar, in the ſtate of an alkali, does not afford this *ſalt*; for tartar proceeds from a ſubtile liquor, intimately fermented in all its parts. There yet remains the trying this *ſalt* on various bodies, by means of fire, to give a true knowledge of its nature, which is at preſent too little known. This is to be obſerved, however, that it differs ſo much from the alkali, in which it is contained, that the careful chemiſt, before he makes uſe of that alkali in any nice proceſs, or experiment, ought carefully to ſeparate this neutral *ſalt* from it. Boerhaave's Chem. part ii. p. 100.

SALT, *volatile*, a name commmonly given to *volatile*, concrete alkaline *ſalts*, as *volatile ſal* AMMONIAC, and *volatile ſalt* of *harts*-HORN. See alſo *Volatile Salt of* AMBER.

SALTS, *urinous*, a term ſynonimous with alkaline *ſalts*.

SALT *of ſteel*, a name given to ſeveral combinations of iron with acids; hence *Riverius*'s *ſalt of ſteel* is a martial vitriol, made with iron, vitriolic acid, and ſpirit of wine.

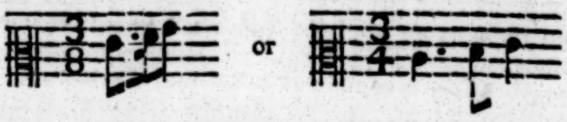
SALTS *microſcopically examined*. Mr. Leewenhoeck has opened a very extenſive field for microſcopic obſervations, in the evaporation of certain fluids, in which *ſalts* of various plants, and other ſubſtances of the like kind, had been diſſolved.

The fixed *ſalts*, in general, are ſaid by chemiſts to admit of no cryſtallization at all; but this curious obſerver found, that, on being evaporated in ſmall quantities before the microſcope, they each would ſhoot into extremely minute, but regular cryſtals, and thoſe often of various forms in the ſame *ſalt*; but that theſe varieties were only of a certain number, and that no other *ſalt*, but that to which they belonged, had them all in the ſame regular manner.

The ſophiſtications of *ſalts*, too common among our chemiſts, may be diſcovered by this means, and many other advantages may be obtained from it, as well as great amuſement, in the obſervation of the variety and beauty of the figures.

The moſt agreeable way of examining theſe *ſalts*, is by the ſolar microſcope; but the moſt accurate and fitteſt for making deductions from, is that by the common double microſcope. The way is to diſſolve a ſmall quantity of *ſalt*, of any kind, in water, and add to this about one fourth part of ſpirit of wine; this renders the whole a much leſs fit menſtruum for keeping the *ſalt* in ſolution, and conſequently it much more readily concretes from among it. A large drop of this liquor is to be laid on the ſurface of a thin and clear piece of glaſs, ſuch as may conveniently be laid upon the ſtand for receiving objects in this microſcope; then this glaſs is to be held till gently heated over a clear fire, and when it begins to evaporate, the glaſs is to be placed under the microſcope, and about a third magnifier uſed to examine it. The *ſalts* will ſoon be ſeen beginning to ſhoot, and will form themſelves under the eye into very beautiful figures; ſome reſembling branches of trees, others ruins and fortifications, and the like; but what are moſt to be depended upon, as eſſential to the *ſalt*, are certain little ſingle ſhoots, reſembling cryſtals; theſe are determinate in their figure, the others more vague and uncertain. Theſe will always be produced the ſame from the ſame *ſalt*, the others ſcarce twice from even the different drops of the ſame ſolution, alike in all reſpects. Phil. Tranſ. N° 172, p. 1075. See *Table of* MICROSCOPIC *objects*.

SALTARELLA, or SALTARELLO, in the *Italian Muſic*, is applied to triple time, the firſt note of which is pointed thus:



Airs in this kind of movement are ſaid to be in *ſaltarello*. Such are the Venetian orlanos, ſicilianas, ſome jigs, and other gay dances.

SALTATIO *mimicorum*, in *Antiquity*. See DANCE.

SALTIER, SALTEER, or SALTIRE, in *Heraldry*, an honourable ordinary, in form of St. Andrew's croſs; anciently called the *croſs of Burgundy*.

The *ſaltier* may be ſaid to be compoſed of a bend dexter and ſiniſter, croſſing each other in the centre of the eſcutcheon. See *Tab. Herald fig.* 35.

Its ordinary breadth, when alone, is one fifth of the field; but if charged one third.

It is ſometimes borne alaiſé, and ſometimes in number, placed in different parts of the field: ſometimes charged, countercharged with the field, accompanied, raguled, engrailed, indented, quarterly-quartered, &c.

The *ſaltier* was entirely a piece of the knight's harneſs; being faſtened to the ſaddle, and ſerving him for a ſtirrup to mount upon; and hence it had its name *ſaltier*, by the French *ſautoir*, from *ſauter, to leap*. It was made of ſilk cord, or ſome other kind of cord, covered with ſome rich ſtuff.

Others will have it, that the original *ſaltier* was a kind of paliſade, ſerving to fence parks, woods, &c. where wild beaſts were incloſed. Though Spelman ſays, it was an inſtrument for the taking them, thus called, *quod ſit in uſu in ſaltu*.

Laſtly, others aſſure us, that *ſaltier* was anciently the figure of an engine, which being full of pins, was uſed in the ſcaling of the walls of a beſieged place: whence its origin from *ſauter*, as it helped the ſoldiers to leap over the wall.

SALTING-*boxes*, in *Artillery*, are boxes for holding mealed powder, to ſprinkle the fuzes of ſhells, that they may take fire from the blaſt of the powder in the chamber; but as the fuze takes fire without this operation with mealed powder, *ſalting-boxes* are become almoſt uſeleſs.

SALTNESS, *ſalſedo*, the quality of ſomething that is impregnated with ſalt; or that yields a ſaline taſte.

The *ſaltneſs* of the ſea, lakes, &c. is a thing that has long perplexed the philoſophers to account for.

Kircher, after having conſulted thirty-three authors upon the ſubject, remarks, that the fluctuations of the ocean itſelf are ſcarcely more various than the opinions of men concerning the origin of its ſaline impregnation.

Some, with Ariſtotle (lib. ii. cap. 7. Meteor.) have even taken it to be the effect of the dry, aduſt, and even ſaline exhalations, which the ſun raiſes from the earth, and the winds, and which rains diſcharge into the ſea: and hence, ſay they, it is that the ſea is found more brackiſh near the ſurface than towards the bottom.

Others contend, that the ſun being continually extracting the pureſt and ſubtileſt parts from the water; the coarſer parts remaining, being exalted and concocted by this heat, acquire, by little and little, their degree of *ſaltneſs*.

Others, as father Bouhours and Nollet, will have it, that the Creator gave the waters of the ocean their *ſaltneſs* at the beginning, not only to prevent their corruption, but alſo to enable them to bear greater burdens. This opinion was advanced by Bernardine Gomeſius, about two hundred years ago, in an ingenious treatiſe upon *ſalt*. Gomeſ. de *Sale*, lib. i. cap. 24.

Bernier ſeems to be nearer the matter, when he aſcribes the *ſaltneſs* of the ocean to the foſſile or mineral ſalts brought into it by ſubterranean currents, and diſſolved in the water.

The count de Marſigli obſerves, that, in Provence, the bottom of the ſea is wholly ſtony, and is nothing but a continuation of the mountains of the Cevennes; being even found to conſiſt of ſeveral ſtrata; among which are ſalt and pitcoal: and hence he derives the *ſaltneſs* and bitterneſs of the ſea-water.

Thoſe who have adopted this opinion, and who aſcribe the *ſaltneſs* of the ſea to thoſe beds of rock ſalt, which they ſuppoſe to be ſituated at its bottom, obſerve, that, without ſuch a permanent ſaline principle, the ſea would long ſince have become inſipid from the freſh water poured into it by an infinity of rivers. But upon this hypotheſis it may reaſonably be inquired, why the waters of the ocean are not perfectly ſaturated with ſalt, if they have ever ſince the creation been exerting their diſſolving powers upon ſuch permanent maſſes of rock ſalt as are thought to be ſituated at the bottom. Beſides, the patrons of this opinion found their reaſoning upon a miſtake, when they alledge that, if there were no mines of rock ſalt in the bed of the ocean, its waters would have been long ago converted into freſh waters by the rivers diſcharged into it: for ſuppoſing that the rivers themſelves contained no ſalt, and that they returned into the ſea, in any given time, the ſame quantity of water, which in the ſame time is raiſed from it by evaporation, the *ſaltneſs* would remain preciſely the ſame for ever. But neither of theſe ſuppoſitions is true; for the rivers do convey into the ocean ſome portion of ſalt every day, and they do not, in any given time, return into the ocean ſo much water as in the ſame time is ſeparated from it; and upon both theſe accounts, the *ſaltneſs* of the ſea, ſo far from being diminiſhed, ought conſtantly to be increaſed, from the rivers poured into it.

Dr. Halley, in an expreſs diſcourſe of the *ſaltneſs* of the ocean, in the Philoſophical Tranſactions, N° 344, or Abr. vol. v. part ii. p. 216, obſerves, that all the lakes in the world are ſaline, ſome more, ſome leſs ſo, than the ocean, which, in this caſe, may be eſteemed a great lake itſelf: and that all the vapours exhaled by the ſun from lakes are perfectly freſh: ſo that all the ſaline particles brought in by the waters which have paſſed over ſalt mines remain behind, while the freſh evaporate. Hence it is evident their *ſaltneſs* muſt be continually augmented.

Now if this be the true reaſon of the *ſaltneſs* of lakes, it is probable the *ſaltneſs* of the ocean itſelf ariſes from the ſame cauſe: and hence we are furniſhed with a method of eſtimating the age of the world, by obſerving the increaſe of *ſaltneſs* in the waters of lakes; and computing in how long time the ocean might, at that rate, arrive at its preſent *ſaltneſs*.

The principle upon which this opinion is founded, cannot become the ſubject of accurate calculation; rivers may have formerly carried more or leſs ſalt into the ſea than they do at preſent; and the quantities contained at preſent in different rivers are ſo various, that any general poſition, with reſpect to the proportion of ſalt obſervable in river water, will be liable to many exceptions from particular caſes; but that the cauſe here aſſigned of the *ſaltneſs* of the ſea, is not adequate to the effect, may appear probable from the following obſervation, ſuggeſted by the ingenious Dr. Watſon. Sea water, at a medium, taken from obſervations made in different climates, may be ſuppoſed to contain about one thirtieth of its weight of common ſalt; but all the rivers in the world could not have conveyed into the ſea one five hundredth part of the weight of the ſea, though we ſuppoſe, that they have daily, ever ſince the creation, carried into the ſea and left there, the ſame quantity of ſalt, which they do at preſent daily depoſite in it: nor, admitting, what ſome eminent philoſophers have endeavoured to prove, that all the rivers in the world flowing into the bed of the ſea, with a continuance of their preſent ſtores, would take up at leaſt eight hundred years to fill it to its preſent height (Buffon's Hiſt. Nat. vol. i. p. 356), and ſuppoſing the ocean to have been originally freſh, and to have daily loſt by evaporation as much water as it daily received from the influx of the rivers, then muſt eight hundred years have elapſed before the freſh water of the ocean could have been changed into river water, or acquired that proportion of ſalt with which river water is impregnated. River water may, in general, be ſuppoſed to contain one four thouſandth part of its weight of ſea ſalt; upon this hypotheſis, the ocean, at the expiration of eight hundred years from the creation, would have contained one four thouſandth part of its weight of ſea ſalt, and at the expiration of eight times eight hundred years, it would have contained eight four-thouſandth parts, or one five hundredth part of its weight of ſalt; but eight times eight hundred years carry us back to an æra antecedent to the creation of the world.

The honourable Mr. Boyle (Works, vol. iii. p. 381.) unites, as it were, the two preceding hypotheſes, and takes the *ſaltneſs* of the ſea to be ſupplied, not only from rocks and other maſſes of ſalt, which at the beginning were, or in ſome countries may yet be found, either at the bottom of the ſea, or at the ſides where the water can reach them; but alſo from the ſalt which the rivers, rains, and other waters diſſolve in their paſſage through divers parts of the earth, and at length carry with them into the ſea. Buffon, and moſt modern philoſophers, acquieſce in this opinion. There is another opinion concerning the ſaline impregnation of the ſea, which deſerves to be mentioned, viz. that ſea ſalt is conſtantly and abundantly generated, both on the ſurface of the earth, and in the boſom of the ocean.

The degree, as well as the cauſe, of the *ſaltneſs* of the ſea, has been the ſubject of inveſtigation and experiment; whence we have reaſon to believe, that this varies in different latitudes, and even in the ſame latitudes at different times.

From ſome experiments mentioned in a voyage towards the north pole, in 1773, by capt. Phipps (now lord Mulgrave), p. 143, it appears, that the ſea water et the Nore contained not quite $\frac{1}{36}$ of ſalt; at the back of Yarmouth Sands not quite $\frac{1}{32}$; off Flamborough-head, rather more than $\frac{1}{29}$; off Shetland, rather leſs than $\frac{1}{29}$; lat. 74° at ſea $\frac{1}{29}$; lat 78°, leſs than $\frac{1}{28}$; lat. 80°, near the ice, not quite $\frac{1}{30}$; lat. 80.30°, under the ice, not quite $\frac{1}{28}$; lat. 68.46°, rather more than $\frac{1}{28}$; lat. 65°, at ſea, rather leſs than $\frac{1}{28}$.

Dr. Hales obtained only $\frac{1}{27}$ from water taken up in the Mediterranean, and $\frac{1}{25}$ from water taken up at the Nore. Dr. Rutty obtained $\frac{1}{23}$ from water taken up in lat. 65°; $\frac{1}{28}$ from water taken up near Dublin; and $\frac{1}{30}$ from water taken up at Dungarvan; and Dr. Lucas got $\frac{1}{23}$ from ſea water taken up at Harwich.

We learn from ſome experiments formerly made in a voyage from England to Bombay in the Eaſt Indies, that the weight of the ſea water was the greateſt, not preciſely at the equator, but where the ſun was vertical, and conſequently, in ſimilar circumſtances, where the heat was greateſt. The greateſt weight of a definitive quantity of ſea water, obſerved in ſailing from 28° N. lat. to the Cape of Good-Hope, which is about 34½° S. lat. in the months of May, June, and July, was at St. Jago iſland N. lat. 15°, and the leaſt at Teneriffe iſland, 28° N. lat. The proportional weights of equal bulk of Thames water, Teneriffe ſea water, and St. Jago ſea waters were 1000.1022 and 1184; whence, by comparing theſe numbers with a table in the Phil. Tranſ. for 1770. p. 349, exhibiting the comparative weight of equal bulks of ſimple water, and of water impregnated with different portions of ſea ſalt, it may be conjectured, that the Teneriffe ſea water contained about $\frac{1}{32}$ of ſalt, and the St. Jago water above $\frac{1}{4}$ of its weight of ſalt, ſo that it was nearly, if not fully, ſaturated.

The difference in the *ſaltneſs* of the ſea in different places, may be owing to the variable quantity of vapours exhaling from it, to the quantity of freſh water received into certain parts of it in rains, or from the mouths of rivers, to beds of foſſil ſalt ſituated at the bottom of the ocean, or to the ſalt water of ſprings and rivers, which are diſcharged into it in certain places.

Dr. Watſon mentions the following eaſy method of eſtimating the quantity of ſalt contained in ſea water: take a clean towel, or any other piece of cloth, dry it well in the ſun or before the fire, then weigh it accurately, and note down its weight; dip it in the ſea water, and, when taken out, wring it a little till it will not drip when hung up to dry; weigh it in this wet ſtate, then dry it, and when it is perfectly dry weigh it again. The exceſs of the weight of the wetted cloth above its original weight, is the weight of the ſea water imbibed by the cloth; and the exceſs of the weight of the cloth, after being dry, above its original weight, is the weight of the ſalt retained by the cloth; and by comparing this weight with the weight of the ſea water imbibed by the cloth, we obtain the proportion of ſalt contained in that ſpecies of ſea water. But in making this or any other experiment with the ſame view, it is neceſſary to obſerve the ſtate of the weather before the experiment is made, becauſe the quantity of ſalt contained in the water near the ſurface may be influenced, either by the antecedent moiſture, or the antecedent heat of the atmoſphere.

It has been already obſerved, at the beginning of this article, that Ariſtotle, and others after him, have ſuppoſed, that the upper parts of the ſea are ſalter, and alſo warmer, than the lower; but modern philoſophers have differed in their accounts of the *ſaltneſs* of the ſea at different depths. There have been various contrivances for raiſing the ſea water, in order to determine its *ſaltneſs* and temperature. See *Bucket Sea* GAGE and *Sea* WATER.

The *ſaltneſs* of ſea water raiſed from different depths has been determined, either by weighing equal bulks of it, or by evaporating equal meaſures of it, and weighing the ſalt remaining after the water has been wholly diſſipated. Mr. Boyle (ſee his Obſervations on the *Saltneſs* of the Sea) purſuing the former method, found, that equal bulks of water taken up in the Engliſh Channel at the ſurface, and at the depth of fifteen fathoms, were equally heavy; and thence concludes that the ſuperficial water was as ſalt as that at a great depth. On the other hand, count Marſigli (Hiſt. Phyſ. de la Mer) obtained, by evaporating the water, only a thirty-ſecond part of its weight of ſalt from water, taken up in the ſurface of the ſea of the gulf of Lyons; whilſt that taken up at the ſame time and place, from a great depth, gave him a twenty-ninth part of its weight of ſalt; and he thence infers, the greater *ſaltneſs* of the ſea at the bottom than at its ſurface, a concluſion which has been ſupported by experiments made in the gulf of Bothnia, and by captain Ellis at Cape Monte on the coaſt of Africa, mentioned in Philoſophical Tranſactions, vol. xlvii. p. 213.

It has been obſerved, however, that in other places, the water is more ſalt near the ſurface than at greater depths. From the experiments relating to this ſubject, made on occaſion of the voyage to the north pole, we learn, that equal quantities of water, taken up in the open ſea off Shetland, 60°, N. lat. at the ſurface, and at the depth of ſixty-five fathoms, yielded by evaporation equal quantities of ſalt, viz. $\frac{1}{29}$ of their weight nearly. In N. lat. 65°, water taken from the ſurface gave nearly $\frac{1}{28}$ of its weight of ſalt, whilſt an equal weight taken up from the depth of 683 fathoms, in the ſame place, gave only $\frac{1}{32}$. The different reſults obtained from theſe ſeveral experiments may be accounted for by ſome circumſtances which attended them, without conteſting the accuracy of any of them.

It is well known, that the Rhone diſcharges much freſh water into the gulf of Lyons, which being lighter than ſea water, will not readily mix with it, and, therefore, the ſuperficial water, being moſt diluted, will contain, bulk for bulk, leſs ſalt than that which is at a greater depth. The gulf of Bothnia receives many rivers, and therefore, its ſurface may be more diluted with freſh water, than its middle or bottom. But the water of the Engliſh Channel has a communication with the German ocean, on one ſide, and with the Atlantic on the other; and, conſequently, is ſubject to a conſtant agitation, which will cauſe the freſh water, poured into it by the Thames, Medway, &c. to be uniformly diffuſed through all its parts, ſo as to render it equally ſalt at all depths. In other places, where the ſuperficial water appears to be more ſalt than that at different depths, the ſupply of freſh water may be inconſiderable, and the evaporation by the ſun's heat may be great. And the difference of evaporation, at different ſeaſons of the year, will account for the various reſults of experiments made at ſuch ſeaſons. After all, the fact of the ſea's being ſalter at the ſurface than at the bottom, requires the confirmation of repeated experiments; ſince it is known that the heavier water of the ſurface muſt gradually ſink and mix itſelf with the lighter and aſcending water below it. See Brownrigg's Art of making common Salt, 1748, 8vo. p. 83, &c. Watſon's Chem. Eſſ. vol. ii. eſſ. iv. p. 93, &c.

SALTO, in the *Italian Muſic*. See LEAP.

SALTPETRE, *ſal petræ*. See NITRE. See alſo NATRON.

SALTS, or SAULTS, in the *Manege*, denote the leaps, or high airs and vaults of a horſe; from the French *ſaut*, of the Latin *ſaltus*, *a leap*, *dance*, &c.

A ſtep and a halt, is a high air, wherein the horſe riſing makes a curvet between two *ſalts*, or caprioles; ſo as to mount before, and fling back with his hind feet.

Two ſteps and a ſalt are a motion compoſed of two curvets, ending with a capriole.

SALT-SILVER is a denomination given to one penny paid at the feaſt of St. Martin, by the tenants of ſome manors as a commutation for the ſervice of carrying their lord's *ſalt*, from market to his larder.

SALTUARIUS, in *Antiquity*, an officer, or ſervant, among the Romans, who had the care and cuſtody of a country-houſe, with lands and woods, and who was to look to the fruit, the fences, &c.

In Nehemiah, chap. ii. 8. mention is made of an officer of this kind; *cuſtos ſaltus regis*, which the Engliſh tranſlators interpret, *keeper of the king's foreſt*; but he was more, having not only the keeping of a foreſt, but of a houſe with a foreſt; *ſaltus* being here uſed as *horti*, for a houſe of pleaſure, becauſe gardens are the principal part. In the laws of the Lombards, *ſaltuarius* is an officer who has the guard of the frontiers.

SALTUM. *Ordination per* SALTUM. See ORDINATION.

SALTUS, in *Law-books*, a high thick wood.

SALT-WORT, or *jointed glaſs-wort*, *ſalicornia*, in *Botany*, a genus of the *monandria monogynia* claſs. Its characters are theſe: the flower hath a rugged, ſwelling, four-cornered empalement, which is permanent; it has no petal, and only one ſtamen, of the length of the empalement, crowned by an oblong twin ſummit, and an oblong oval germen, ſupporting a ſingle ſtyle, crowned by a bifid ſtigma; the germen afterwards becomes a ſingle ſeed, incloſed in the ſwelling empalement. Linnæus enumerates five, and Miller two ſpecies. See KALI and KELP.

SALT-WORT, *black*. See GLAUX.

SALVADORA, in *Botany*, a genus of the *tetrandria monogynia* claſs: its characters are; that the empalement is divided into four ſegments; it has no corolla; the fruit is a ſingle-ſeeded berry, and the ſeed is furniſhed with a coat. There is one ſpecies.

SALVAGE *money*, is a recompence allowed both by the ſtatute and civil law, to ſuch perſons as have aſſiſted in ſaving merchandizes, ſhips, &c. from periſhing in wrecks, or by pirates or enemies. This uſually was a tenth part of the value of the things ſaved.

By the ſtat 2 Edw. III. c. 13. if any ſhip be loſt on the ſhore, and the goods come to land (ſo as it be not legal wreck), they ſhall preſently be delivered to the merchants, they paying only a reaſonable reward, called *ſalvage*, to thoſe that preſerved them. Alſo, by the common law, if any perſons (other than the ſheriff) take any goods ſo caſt on the ſhore, which are not legal wreck, the owners might have a commiſſion to enquire or find them out, and compel them to make reſtitution. And, by ſtat. 12 Anne ſt. 2. c. 18. confirmed by 4 Geo. I. c. 12. in order to aſſiſt the diſtreſſed, and prevent the ſcandalous illegal practices on ſome of our ſea coaſts, it is enacted, that all head officers and others, of towns near the ſea, ſhall, upon application made to them, ſummon as many hands as are neceſſary, and ſend them to the relief of any ſhip in diſtreſs, on forfeiture of 100*l*; and, in caſe of aſſiſtance given, *ſalvage* ſhall be paid by the owners, to be aſſeſſed by three neighbouring juſtices. See WRECK.

SALVATELLA, in *Anatomy*, a famous branch of the axillary vein, paſſing over the back of the hand, between the ring-finger and the little-finger.

Several phyſicians, in imitation of the Arabs, recommend bleeding in the *ſalvatella*, as proper in tertian and quartan agues, and in moſt hypochondriac diſeaſes.

SALVE *regina*, among the Romaniſts, the name of a Latin prayer, addreſſed to the Virgin, and ſung after complines; as alſo upon the point of executing a criminal. Durandus ſays, it was compoſed by Peter biſhop of Composteila — The cuſtom of ſinging the *ſalve regina*, at the cloſe of the office, was begun by order of St. Dominic, and firſt, in the congregation of Dominicans at Bologna, about 1237. Gregory IX. firſt appointed it to be general. St. Barnard added the concluſion, *O dulcis! O pia*, &c.

SALVE, *lip*. See POMATUM.

SALVER, a flat diſh, commonly of ſilver, or other precious metal, uſed to ſet glaſſes on to ſerve wines, and other liquors.

The French call it *ſous coupe*, *under-cup*. The Italians uſe to preſent a *ſalver*, with ſeveral kinds of wines, with this compliment, *ſi non e buono, fatte lo: if it be not good, make it ſo.*

SALVIA, in *Botany*. See SAGE and CLARY.

SALUSANDRIA, in *Botany*, a name given by ſome authors to the nigella, called in Engliſh *gith*, or FENNEL-*flower*.

SALUTATION, the act or ceremony of ſaluting, greeting, or paying reſpect or reverence to any one.

Salutatio, among the *Romans*, was daily homage paid by clients and inferiors to their ſuperiors.

Among the great the ATRIUM was the place appointed for this purpoſe, but among people of middling condition the VESTIBULUM only.

This practice of *ſalutation* was not confined to the city, but took place in the army likewiſe; it being uſual for the private ſoldiers to go very early in the morning to *ſalute* their centurion, who at their head proceeded to *ſalute* the tribune, and then the tribune with the reſt went and *ſaluted* the imperator, or commander in chief.

The women too had their crowds of *ſaluters* attending them every morning.

The manner of receiving thoſe who came to pay their reſpects, was to receive thoſe of the better ſort with a kiſs, and the poorer ſort had a ſmall entertainment given them, and were even feaſted by ſuch as wanted to be thought more liberal than ordinary.

There is a great variety in the forms of *ſalutation:* we *ſalute* God by adorations, prayers, *&c.* kings by genuflexion, &c. In England, we ſalute one another by uncovering the head, inclining the body, *&c.* The orientals *ſalute* by uncovering their feet, laying their hands on their breaſt, &c. The pope makes no reverence to any mortal but the emperor of Germany, to whom he ſtoops a very little, when he admits him to kiſs his mouth.

It was believed by the ancients, that the ſtatue of Memnon, in a temple of Egypt, *ſaluted* the ſun every morning at his riſing; the cheat conſiſted in this, that the ſtatue being hollow, when the warmth of the morning began to rarify the including air, it was driven out through a narrow duct in the mouth, this made a gentle murmur, which the prieſts interpreted a *ſalutation.*

In the *Army,* the *ſalute* is performed by a diſcharge of artillery, or ſmall arms, or both. The colours likewiſe *ſalute* royal perſonages, and generals commanding in chief, which is done by lowering the point to the ground. In the field, when a regiment is to be reviewed by the king, or his general, the drums beat a march as he paſſes along the line, and the officers *ſalute* one after another, bowing their half pikes or ſwords to the ground, then recover, and take off their hats. The enſigns *ſalute* all together by lowering their colours.

At ſea, this ceremony is variouſly performed, according to the circumſtances, rank, or ſituation of the parties. It conſiſts in firing a certain number of cannon, or vollies of ſmall arms, in ſtriking the colours or top-ſails, and in one or more general ſhouts of the whole ſhip's crew, mounted in the maſts or rigging for that purpoſe.

Ships always *ſalute* with an odd number of guns; galleys with an even one. A veſſel under the wind of another is always obliged to *ſalute* firſt.

To *ſalute with muſquets,* is to fire one, two, or three volleys, which is a method of *ſalutation* that ſometimes precedes that of the cannon, and is chiefly uſed on occaſion of feaſts.

After the cannon, they ſometimes alſo *ſalute* or hail with the voice, that is, a joint ſhout of all the ſhip's company three times, which *ſalutation* alſo occaſionally obtains where they carry no guns, or do not care to diſcharge any.

Saluting with the flag is performed two ways, either by holding it cloſe to the ſtaff, ſo as it cannot flutter; or by ſtriking it ſo as it cannot be ſeen at all, which is the moſt reſpectful *ſalutation.*

Saluting with the ſails, is performed by hovering the top-ſails half-way of the maſts. Only thoſe veſſels which carry no guns *ſalute* with the ſails.

When there are ſeveral ſhips of war together, the commander alone *ſalutes.*

Father Fournier has an expreſs treatiſe of ſea *ſalutes* and ſignals. See SIGNAL.

The principal regulations with regard to *ſalutes* in the royal navy are as follow.

When a flag officer *ſalutes* the admiral and commander in chief of the fleet, he is to give him fifteen guns; but when captains *ſalute* him, they are to give him ſeventeen guns. The admiral or commander in chief of the fleet is to return two guns leſs to flag-officers, and four leſs to captains. Flag-officers *ſaluting* their ſuperior or ſenior officer, are to give him thirteen guns. Flag-officers are to return an equal number of guns to flag-officers bearing their flags on the ſame maſt, and two guns leſs to the reſt, as alſo to captains.

When a captain *ſalutes* an admiral of the white or blue, he is to give him fifteen guns; but to vice and rear admirals, thirteen guns. When a flag-officer is ſaluted by two or more of his majeſty's ſhips, he is not to return the *ſalute* till all have finiſhed, and then to do it with ſuch a reaſonable number of guns as he ſhall judge proper. In caſe of the meeting of two ſquadrons, the two chiefs only are to exchange *ſalutes.* And if ſingle ſhips meet a ſquadron conſiſting of more than one flag, the principal flag only is to be *ſaluted.* No *ſalutes* ſhall be repeated by the ſame ſhips, unleſs there has been a ſeparation of ſix months at leaſt.

None of his majeſty's ſhips of war, commanded only by captains, ſhall give or receive *ſalutes* from one another, in whatſoever part of the world they meet.

A flag officer commanding in chief ſhall be *ſaluted,* upon his firſt hoiſting his flag, by all the ſhips preſent, with ſuch a number of guns as is allowed by the firſt, third, or fifth articles.

When any of his majeſty's ſhips ſhall meet with any ſhip or ſhips belonging to any foreign prince or ſtate within his majeſty's ſeas, (which extend to Cape Finiſtere) it is expected, that the ſaid foreign ſhips do ſtrike their top-ſail, and take in their flag, in acknowledgment of his majeſty's ſovereignty in thoſe ſeas: and if any ſhall refuſe or offer to reſiſt, it is enjoined to all flag-officers and commanders to uſe their utmoſt endeavours to compel them thereto, and not ſuffer any diſhonour to be done to his majeſty. And if any of his majeſty's ſubjects ſhall ſo much forget their duty, as to omit ſtriking their top-ſail in paſſing by his majeſty's ſhips, the name of the ſhip and maſter, and from whence, and whither bound, together with affidavits of the fact, are to be ſent up to the ſecretary of the admiralty, in order to their being proceeded againſt in the admiralty-court. And it is to be obſerved, that in his majeſty's ſeas, his majeſty's ſhips are in no wiſe to ſtrike to any; and that in other parts, no ſhip of his majeſty's is to ſtrike her flag or top-ſail to any foreigner, unleſs ſuch foreign ſhip ſhall have firſt ſtruck, or at the ſame time ſtrike her flag or top-ſail to his majeſty's ſhip.

The flag-officers and commanders of his majeſty's ſhips are to be careful to maintain his majeſty's honour upon all occaſions, giving protection to his ſubjects, and endeavouring what in them lies to ſecure and encourage them in their lawful commerce; and they are not to injure in any manner, the ſubjects of his majeſty's friends and allies.

If a foreign admiral meets with any of his majeſty's ſhips, and *ſalutes* them, he ſhall receive gun for gun. If he be a vice-admiral, the admiral ſhall anſwer with two guns leſs. If a rear-admiral, the admiral and vice-admiral ſhall return two leſs. But if the ſhip be commanded by a captain only, the flag-officers ſhall give two guns leſs, and captains an equal number.

When any of his majeſty's ſhips come to an anchor in a foreign port or road, within cannon-ſhot of its forts, the captain may *ſalute* the place with ſuch a number of guns as have been cuſtomary, upon good aſſurance of having the like number returned, but not otherwiſe. But if the ſhip bears a flag, the flag-officer ſhall firſt carefully inform himſelf how flags of like rank, belonging to other crowned heads, have given or returned *ſalutes,* and to inſiſt upon the ſame terms of reſpect.

It is allowed to the commanders of his majeſty's ſhips in foreign parts, to *ſalute* the perſons of any admirals, commanders in chief, or captains of ſhips of war of foreign nations, and foreign noblemen or ſtrangers of quality, as alſo the factories of the king's ſubjects, coming on board to viſit the ſhip; and the number of guns is left to the commander, as ſhall be ſuitable to the occaſion, and the quality of the perſons viſiting; but he is nevertheleſs to remain accountable for any exceſſes in the abuſe of this liberty. If the ſhip viſited be in company with other ſhips of war, the captain is not to make uſe of the civilities allowed in the preceding article, but with leave and conſent of the commander in chief, or the ſenior captain.

Merchant ſhips, whether foreigners, or belonging to his majeſty's ſubjects, *ſaluting* the admiral of the fleet, ſhall be anſwered by ſix guns leſs; when they *ſalute* any other flag ſhips they ſhall be anſwered by four guns leſs; and if they *ſalute* men of war commanded by captains, they ſhall be anſwered by two guns leſs. If ſeveral merchant ſhips ſalute in company, no return is to be made till all have finiſhed, and then by ſuch a number of guns as ſhall be thought proper; but though the merchant ſhips ſhould anſwer, there ſhall be no ſecond return.

None of his majeſty's ſhips of war ſhall *ſalute* any of his majeſty's forts or caſtles in Great Britain or Ireland, on any pretence whatſoever. Regulations and Inſtructions for the Sea Service.

Angelical SALUTATION, is an addreſs which the Romaniſts make to the Virgin, containing the formula wherein the angel ſaluted her, when he acquainted her with the myſtery of the incarnation.

SALUTATORIUM, in *Nunneries,* a place where the nuns receive the ſalutation of thoſe that come to ſee them.

Salutatorium is alſo uſed for the veſtry, or place where the biſhop was dreſſed, and received the ſalutation of viſitants before divine ſervice.

SALUTE, an ancient name of a coin made by king Henry V. after his conqueſt in France, on which the arms of France and England were ſtamped and quartered.

SALUTIGERULI, among the Romans, were ſervants chiefly employed by the women in carrying ſalutations to one another.

SALUTIS *elixir.* See ELIXIR *Salutis.*

SALZ, SULZ, SALTZ, or SULTZ, a ſort of brine or pickle made of ſalt, diſſolved by the coldneſs or moiſture of a cellar.

SAMALUM, in *Botany,* a name by which Pliny and ſome other authors have called the *pulſatilla,* or paſque-flower.

SAMANEANS, in *Antiquity*, a kind of MAGI, or philoſophers, erroneouſly confounded by ſome with the Brahmins, who, proceeding from Ariana, a province of Perſia, and the neighbouring countries, ſpread themſelves in India, and taught new doctrines. According to ſome writers, the Brahmins, before their arrival, were in the higheſt period of their glory, they were the only oracles of India, and their principal reſidence was on the banks of the Ganges, and in the adjacent mountains; while the *Samaneans* were ſettled towards the Indus. Others ſay, that the Brahmins derived all their knowledge from the *Samaneans*, before whoſe arrival it would be difficult to prove that the Brahmins were the religious teachers of the Indians. The moſt celebrated and ancient of the *Samanean* doctors was Boutta, or Budda, who was born 683 years before Chriſt. His diſciples honoured him as a god; and his doctrine, which conſiſted chiefly in the tranſmigration of ſouls, and in the worſhip of cows, was adopted not only in India, but alſo in Japan, China, Siam, and Tartary. It was propagated, according to M. de Sainte Croix, in Thibet, in the VIIIth century, and ſucceeded there the ancient religion of Zamolxis. The *Samaneans*, or Buddiſts, were entirely deſtroyed in India by the jealous rage of the Brahmins, whoſe abſurd practices and fables they affected to treat with contempt; but ſeveral of their books are ſtill reſpectably preſerved on the coaſts of Malabar; and, moreover, we are told, that ſeveral of the Brahmin orders have adopted their manner of living, and openly profeſs the greateſt part of their doctrines. L'Ezour Vedam, ou Ancien Comment. du Vedam, publiſhed by M. de S. Croix, Paris, 1779. See BRACHMANS.

SAMARITANS, an ancient ſect among the Jews; ſtill ſubſiſting in ſome parts of the Levant, under the ſame name.

Its origin was in the time of Rehoboam; under whoſe reign, a diviſion was made of the people of Iſrael into two diſtinct kingdoms. One of theſe kingdoms, called Judah, conſiſted of ſuch as adhered to Rehoboam, and the houſe of David; the other retained the ancient name of Iſraelites, under the command of Jeroboam.—The capital of the ſtate of theſe latter was Samaria; and hence it was that they were denominated *Samaritans*.

Some affirm that Salmanazar, king of Aſſyria, having conquered Samaria, led the whole people captive into the remoteſt parts of his empire; and filled their place with colonies of Babylonians, Cutheans, and other idolaters. Theſe finding themſelves daily deſtroyed by wild beaſts, it is ſaid, deſired an Iſraelitiſh prieſt to inſtruct them in the ancient laws and cuſtoms of the land they inhabited. This was granted them; and they thenceforth ceaſed to be incommoded with any beaſts.—However, with the law of Moſes, they ſtill retained ſomewhat of their ancient idolatry. The rabbins ſay, they adored the figure of a dove on mount Gerizim.

Upon the return of the Jews from the Babyloniſh captivity, and the rebuilding of Jeruſalem and the temple, the religion of the *Samaritans* received another alteration on the following occaſion. One of the ſons of Jehoiada the high-prieſt, whom Joſephus calls Manaſſeh, married the daughter of Sanballat the Horonite; but the law of God having forbidden the intermarriages of the Iſraelites with any other nation, Nehemiah ſet himſelf to reform this corruption, which had ſpread into many Jewiſh families, and obliged all that had taken ſtrange wives immediately to part with them. Nehem. xiii. 23—30. Manaſſeh, unwilling to ſurrender his wife, fled to Samaria; and many others in the ſame circumſtances, and with ſimilar diſpoſition, went and ſettled under the protection of Sanballat, governor of Samaria. From that time the worſhip of the *Samaritans* came much nearer to that of the Jews, and they afterwards obtained leave of Alexander the Great to build a temple in Mount Gerizim, near the city of Samaria, in imitation of the temple at Jeruſalem, where they practiſed the ſame forms of worſhip.

Notwithſtanding the charge above mentioned, it is certain, the modern *Samaritans* are far from idolatry; ſome of the moſt learned among the Jewiſh doctors own, that they obſerve the law of Moſes more rigidly than the Jews themſelves—They have a Hebrew copy of the Pentateuch, differing in ſome reſpects from that of the Jews; and written in different characters, commonly called *Samaritan* characters; which Origen, Jerom, and other fathers and critics, ancient and modern, take to be the primitive character of the ancient Hebrews; though others maintain the contrary. The point of preference, as to purity, antiquity, &c. of the two Pentateuchs, is alſo much diſputed by the modern critics.

Origen, Jerom, and Epiphanius inform us, that the *Samaritans* rejected all the ſacred writings except the five books of Moſes.

The *Samaritans* are now few in number; though it is not very long, ſince they pretended to have prieſts deſcended directly from Abraham. They were chiefly found at Gaza, Neapolis (the ancient Sichem), Damaſcus, Cairo, &c. They had a temple, or chapel, on Mount Gerizim, where they performed their ſacrifices.

Joſeph Scaliger, being curious to know their uſages, wrote to the *Samaritans* of Egypt, and to the high-prieſt of the whole ſect, who reſided at Neapolis. They returned two anſwers, dated in the year 998, of the Hegira of Mahomet. Theſe anſwers never came to the hands of Scaliger. They are now in the French king's library, and have been tranſlated into Latin by father Morin, prieſt of the Oratory; and printed in the collection of letters of that father in England, 1682, under the title of *Antiquitates Eccleſiæ Orientalis*. M. Simon has inſerted a French tranſlation, in the firſt edition of *Ceremonies & Coûtumes des Juifs*, by way of ſupplement to Leo de Modena.

In the firſt of theſe anſwers, written in the name of the aſſembly of Iſrael, in Egypt, they declare, that they celebrate the paſſover every year, on the fourteenth day of the firſt month, on mount Gerizim; and that he who then did the office of high-prieſt, was called Eleazar, a deſcendant of Phinehas, ſon of Aaron.—At preſent they have no high-prieſt. In the ſecond anſwer, which is in the name of the high-prieſt Eleazar, and the ſynagogue of Sichem, they declare, that they keep the ſabbath in all the rigour wherewith it is enjoined in the book of Exodus; none among them ſtirring out of doors but to the ſynagogue. They add that on that night they do not lie with their wives; that they begin the feaſt of the paſſover with the ſacrifice appointed for that purpoſe in Exodus; that they ſacrifice nowhere elſe but on mount Gerizim; that they obſerve the feaſts of harveſt, the expiation, the tabernacles, &c. They add farther, that they never defer circumciſion beyond the eighth day; never marry their nieces, as the Jews do; have but one wife; and, in fine, do nothing but what is commanded in the law: whereas the Jews frequently abandon the law to follow the inventions of their rabbins.

At the time when they wrote to Scaliger, they reckoned one hundred and twenty-two high-prieſts; affirmed that the Jews had no high-prieſts of the race of Phinehas; and, that the Jews belyed them, in calling them Cutheans; for that they are deſcended from the tribe of Joſeph by Ephraim. The truth is, the Jews impoſe abundance of things on the *Samaritans*: they frequently confound them with the Sadducees, as if they were infected with their errors.—Rabbi Benjamin, who lived in the XIIth century, confirms the beſt part of what we have ſaid of the *Samaritans*: he obſerves, they had prieſts of the tribe of Aaron, and who never married with any but thoſe of the ſame tribe: that they ſacrificed on mount Gerizim, where they had an altar of ſtone, raiſed by the Iſraelites after paſſing over Jordan. He adds, that they are of the tribe of Ephraim; that they change their habit to go to the ſynagogue, and waſh before they put it on.

SAMARITAN *characters*, or *letters*. See LETTER, and HEBREW.

SAMARITAN *medals*.—In the cabinets of antiquaries we find ſome medals, uſually called *Samaritan medals*; the inſcriptions and legends whereof are Hebrew; but the character different from the Hebrew of our Bibles, which is the ſquare Hebrew, or Chaldee: and it is hence, viz. from the character, not from their being ſtruck by the *Samaritans*, that they are denominated *Samaritan*.

Theſe medals have been infinitely canvaſſed by the critics, both Jewiſh and Chriſtian, particularly rabbi Alaſcher, rabbi Bartenora, rabbi Azarias, rabbi Moſes, father Kircher, Villalpandus, Waſerus, Coringius, Hottinger, Father Morin, Walton, Hardouin, Spanheim, &c.

The learned Jeſuit Souciet, in an expreſs diſſertation on the *Samaritan medals*, rejects all Hebrew medals, whoſe inſcriptions are in Chaldee characters, as ſpurious; and allows of none to be genuine but the *Samaritan*.—Of theſe there are four kinds.

The firſt bear expreſly the name of *Simon*, and the ſubject for which they were ſtruck, viz. the deliverance of Jeruſalem. The ſecond kind have not the name *Simon*, but only the deliverance of Sion, or Jeruſalem. The third kind have neither Simon, nor the deliverance of Sion; but only the epochas, firſt year, ſecond year, &c. The fourth claſs have neither any inſcriptions, nor any thing whence once may judge of the time when they were ſtruck.

The three firſt kinds were certainly ſtruck after the return from the Babyloniſh captivity, and in the time of

Simon Maccabeus, after Jeruſalem had been freed from the yoke of the Greeks. But though ſtruck after the captivity, father Souciet obſerves, their character ſhews itſelf to be that of the ancient Hebrew, which was uſed before the captivity, and the uſe whereof was loſt by the people, during their ſojourn in Babylon and Chaldæa; but was again reſtored after their return, on the ſame footing as before. He adds, that the inſcriptions are pure Hebrew, ſuch as it was ſpoken before the captivity; that the character, therefore, is the true ancient Hebrew character: that it was the cuſtom to write each language in its proper character: that if they had departed from this rule, they had doubtleſs uſed the new character they brought with them from Babylon: that there could be no other reaſon, but that of ſettling all things on the ſame foundation they were on before the deſtruction of Jeruſalem, that could have induced them to uſe this character on their coins. And, laſtly, that theſe medals were not ſtruck by the *Samaritans*, but by the Jews, and in Jeruſalem.

F. Souciet is very full on all theſe points, and, to the proofs drawn from medals, he adds two others foreign thereto: the firſt drawn from the reſemblance of the Greek letters, introduced by Cadmus the Phœnician, with this Hebrew character, which was the ſame with that of the Phœnicians, as the language of thoſe people was the ſame with that of the Hebrews. The ſecond drawn from ſeveral various readings in the Scriptures, which cannot be well accounted for otherwiſe than by ſuppoſing, that the books written before the captivity, were in the ſame characters with theſe medals, and which ſhew, that it is the conformity which certain letters have in that character, that has deceived the copyiſts.

From the whole, he concludes, that this character of the medals is the true ancient Hebrew character; and, that to judge of the various readings of the Hebrew text, and the differences of the ancient Greek and Latin tranſlations, either from themſelves, or from the Hebrew text, recourſe muſt be had to this character.

SAMARITAN *Chronology*. See *Sacred* CHRONOLOGY.

SAMARITAN *Pentateuch*. See PENTATEUCH.

SAMARRA, a garment worn by thoſe condemned by the Romiſh inquiſition to be burnt; ſuch are impenitents, and thoſe who confeſs themſelves guilty of hereſy, but repent, and renounce their errors before the execution.

It is a kind of frock, made of ſackcloth, of a ſaffron colour, and painted with flames pointing downwards; ſometimes the unhappy ſufferer's picture is drawn to the life on it, and ſometimes devils are painted on it, dragging, as it were, the perſon along with them to hell; on their frock there is likewiſe put the croſs St. Andrew, of a red colour on the back and heart; it is otherwiſe called *ſambenito*, or *bleſſed ſackcloth*, and *ſamaretta*.

SAMBAK, or ZAMBAK, in *Botany*, a name uſed by ſome authors for the jaſmine, or common white jeſſamy. Chabræus, p. 112.

SAMBENITO. See SAMARRA.

SAMBUCUS, an ancient muſical inſtrument of the wind-kind, reſembling a kind of flute; probably thus called becauſe made of the ſtalks of the elder, which the Latins call *ſambucus*.

SAMBUCUS was alſo the name of an ancient engine of war, uſed by Marcellus in beſieging the city of Syracuſe.

It was ſo big, that Plutarch, in the life of that general, obſerves, two ſhips were required to carry it.

SAMBUCUS, in *Botany*. See ELDER-*Tree*.

SAMEL *Bricks*. See BRICK.

SAMIA *terra*, in the *Materia Medica*, an earth of the MARLE kind, found in the iſland of Samos, and much uſed both in medicine and in the pottery of the ancients.

It is of two kinds, a white dull-looking one, called the *collyrium Samium*, and a browniſh and glittering one, called the *aſter Samius*.

The *collyrium Samium* is ſtill to be found in the place from whence they had it, and from whence it has its name; and is a very fine and pure earth, of a cloſe, equal, and regular texture, and yet remarkably light. It is of a fine bright white colour, and of a ſmooth, even, and gloſſy ſurface. It is ſoft to the touch, adheres firmly to the tongue, it is eaſily broken between the fingers, and does not at all ſtain the hands; but drawn along a rough ſurface, leaves a fine clean white line. It melts ſlowly in the mouth, and does not ferment with acids. Theſe are the characters by which it is to be diſtinguiſhed from the white earths: to which may be added its manner of lying in the earth; which is not, as that of moſt of the other earths, in a continual ſtratum, or bed, but in the perpendicular fiſſures, and horizontal cavities in the ſtrata of ſtone, in the manner of the European earths, called the *medullæ ſaxorum*, but in ſubſtance very different from them all.

The other kind of *Samian* earth, called *aſter Samius*, is ſtill found in the place from whence they had it, and lies in the ſame manner in which they have deſcribed it, in a horizontal cavity between two rocks.

It is a looſe, lax, and crumbly earth, of a mixed colour, between a duſky white and a pale brown, and all over ſpangled with ſmall glittering particles. It is of a looſe and incoherent ſtructure, but uſually breaks away into flat pieces, and ſeems ſomewhat of an obſcurely laminated make. It is of a dry duſty ſurface, falls to pieces very readily between the fingers, and though it duſts the hands, does not at all ſtain them. It melts very readily in the mouth, and when thrown into water parts immediately, with a hiſſing noiſe, into a number of flaky pieces, and from thence moulders into a looſe powder. It makes no effervescence with acid menſtrua, and when its glittering particles are ſeparated, and ſtrictly examined, they are found to be ſo many thin flakes of that ſpecies of foſſils, called *ſelenites*.

This, as well as the other ſpecies, or *collyrium*, was prepared by calcination and waſhing, and uſed by the ancient phyſicians internally in fluxes and hæmorrhages, and externally in inflammations. Theſe were alſo ſome of the moſt valued earths in the Roman pottery. Hill's Hiſt. of Foſſ. p. 38, &c.

There is alſo a SAMIAN *ſtone*, λιθος Σαμιος, taken out of the mines in the ſame iſland.—It is white, and ſticks to the tongue when applied to it: it is held aſtringent, and cooling; and is alſo uſed by the goldſmiths to burniſh their gold, and give it a greater luſtre.

SAMIARII, among the *Romans*, were a kind of furbiſhers, who, with Samian earth, poliſhed the arms of the prætorian ſoldiers and emperor's life-guards.

SAMLET, in *Ichthyology*. See SALMULUS.

SAMNITES, in *Antiquity*, an order of GLADIATORS armed by the Campanians after the faſhion of the country of the *Samnites*. They wore a ſhield broad at the top, to defend the breaſts and ſhoulders, and growing more narrow toward the bottom, that it might be moved with the greater convenience; they had alſo a ſort of belt coming over their breaſts, a greave on their left foot, and a creſted helmet on their heads. Livy, lib. ix.

SAMOLUS, *round-leaved water-pimpernel*, in *Botany*, a genus of the *pentandria monogynia* claſs; its characters are, that the empalement of the flower is permanent, erect, and cut into five ſegments; it has one petal, with a ſhort ſpreading tube, the brim is plain, obtuſe, and cut into five parts; it has five ſhort ſtamina placed between each ſegment of the petal, terminated by ſummits which join together; the germen is ſituated under the flower, ſupporting a ſlender ſtyle, crowned by a headed ſtigma; it afterwards becomes an oval capſule, with one cell, cut half through into five valves filled with ſmall oval ſeeds. There is only one ſpecies.

SAMOSATENIANS, *Samoſateni*, a ſect of ancient Antitrinitarians, thus called from their leader, Paulus Samoſatenus, biſhop of Antioch, under the emperors Aurelian and Probus.

They are alſo called by St. Auguſtine *Pauliani*, and by the fathers of the council of Nice, Παυλιανιζοντες. See PAULIANISTS.

St. Epiphanius will have the *Samoſatenians* to be real Jews, without any thing more than the name of Chriſtians: adding, that they uſe the ſame arguments againſt the myſtery of the Trinity that the Jews do; pleading againſt it, with them, on pretence of maintaining the unity of the Godhead: though they do not obſerve the ceremonies of the law.

SAMP, in America, a name given to a ſort of bread made of the MAIZE, or Indian corn.

They firſt water the corn for about half an hour, and then beat it in a mortar, or grind it in a hand-mill; they then ſift out the flower, and winnow the huſks from it; they then mix this into a thin paſte with water, and bake it in flat loaves, which they call *ſamp*-loaves, or *ſamp*-bread.

Beſide this they have another diſh prepared of this corn, which they eſteem a great delicacy, and call by the name of *ſamp*, without the addition of loaf or bread. To make this, they only bruiſe or grind the corn to the ſize of rice, and then winnowing away the huſks, they boil it gently till it is thoroughly tender, and then add to it milk and butter and ſugar: this is not only a very wholſome, but a very pleaſant diſh. It was the firſt diet of our planters when newly ſettled there, and is ſtill in uſe, as an innocent food in ſickneſs as well as health.

The Indians, who feed on this ſort of food, are found never to be ſubject to the ſtone, and to eſcape ſeveral other painful diſeaſes.

The Engliſh have found a way of making a very good ſort of beer of the grain of this Indian corn: they do this either by uſing the bread made of it, or elſe by malting it as we do our own corn. When they make the beer of the maize-bread, they break or cut it into lumps as big as a man's fiſt; they maſh theſe in the ſame manner that we do malt, and boil up the wort in the ſame manner, either with or without hops. Phil. Tranſ. Nº 142.

SAMPHORÆ, among the *Ancients*, were horſes marked with the letter Σ on their legs.

SAMPHIRE, *Crithmum*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it is a plant with an umbelliferous flower; the great umbel is hemiſpherical, and compoſed of many ſmaller of the ſame figure; the involucrum of the general umbel is compoſed of ſeveral ſpear-ſhaped leaves; thoſe of the particular umbels have very narrow leaves of the length of the umbel; the general umbel is uniform; the flowers have five oval inflexed petals, which are almoſt equal, and five ſtamina of the length of the petals, terminated by roundiſh ſummits; the germen is ſituated under the flower, ſupporting two reflexed ſtyles, crowned by obtuſe ſtigmas; the germen afterward becomes an oval compreſſed fruit, dividing into two parts, each having one compreſſed, elliptical, furrowed ſeed. There are two ſpecies.

The *ſamphire* which grows upon rocks by the ſea in many parts of England, is with difficulty propagated in gardens, nor will it grow ſo vigorous with any culture, as it does upon rocks; but if the plants are planted on a moiſt gravelly ſoil, they will thrive tolerably well, and may be preſerved ſome years; it may be propagated either by ſeeds or parting of the roots. Miller.

Samphire is more made uſe of as a pickle, being a very agreeable one, than for any medicinal purpoſes. However, it is ſtrengthening to the ſtomach, procures an appetite, provokes urine, opens obſtructions of the bowels, and is good for the jaundice. Miller's Bot. Off.

It is farther recommended as a diſſolvent of the ſtone, and a promoter of the menſes. James.

SAMPHIRE, *golden*, a ſpecies of the *inula*. See ELECAMPANE.

SAMPHIRE, *prickly*, a ſpecies of the *echinophora*. See *Prickly* PARSNEP.

SAMPSEANS, *Sampſæi*, ancient ſectaries; the ſame, according to St. Epiphanius, with the ELCESAITES.

The *Sampſeans* were not properly either Jews, Chriſtians, or Gentiles; though they took their name from the Hebrew, *ſemes*, *ſun*; as if they adored the ſun.

They acknowledged one only God, waſhed themſelves often, and were attached, in almoſt every thing, to the religion of the Jews.—Many among them abſtained wholly from eating of fleſh.

Scaliger, after Epiphanius, will have the *Sampſeans* to be the ſame with *Eſſeni*. In effect, the *Elceſaites*, *Sampſeans*, *Maſſalians*, and *Eſſeni*, appear to be no more than ſo many different names for the ſame ſect; unleſs, perhaps, the firſt added ſomething to the opinions of the laſt.

SAMPSUCHUS, a word generally uſed as a name of the common ſweet-marjoram. This is as old a cuſtom as Dioſcorides; for that author expreſsly ſays, that the plant *ſampſuchus* was called *amaracus* by the Cyzenians, and ſome others whom he names, and ſeems to make them proper ſynonyms of the ſame plant, yet afterwards mentioning the oils, called *oleum ſampſuchinum*, and *oleum amaracinum*, he declares them to be different medicines.

This might ſeem to imply a falſe text, either by the error of the tranſcribers or printers, in one of the places, but thoſe who are verſed in the writings of Dioſcorides, will not infer ſo much; for there are too many inſtances of this ſort of contradiction in his works. It appears, however, from the moſt ancient writers of all, that the *amaracus* and *ſampſuchus* were originally the names of different plants.

SAMPUNIA, a pneumatic inſtrument of muſic among the ancient Hebrews, like our common BAG-*pipe*.

SAMPSON's *poſt*, in *Naval Language*, a ſort of pillar erected in a ſhip's hold, between the lower deck and the keelſon, under the edge of a hatchway, and furniſhed with ſeveral notches, that ſerve as ſteps to mount or deſcend as occaſion requires. This poſt being firmly driven into its place, not only ſerves to ſupport the beam, and fortify the veſſel in that place, but alſo to prevent the cargo, or the materials contained in the hold, from ſhifting to the oppoſite ſide, by the rolling of the ſhip in a heavy turbulent ſea.

SAMYDA, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the flower has a rough bell-ſhaped empalement of one leaf, which is cut at the brim into five points; it has no petal, but has fifteen ſhort awl-ſhaped ſtamina, inſerted in the empalement, terminated by oval ſummits; and a hairy globular germen, ſupporting a cylindrical ſtyle, crowned by a headed ſtigma; the germen afterward becomes an oval berry with four furrows, having four cells, including many kidney-ſhaped ſeeds, immerſed in the oval receptacle. Linnæus enumerates five, and Miller two ſpecies, which grow naturally in the Weſt Indies.

SANALIA, a name given by ſome authors to thoſe tumors, commonly called MELICERES.

SANAMUNDA, in *Botany*, a name uſed by ſome authors for the ſea heath-ſpurge, or empetrum of the ſhops, a plant of the thymelæa kind.

In the *Materia Medica*, however, according to moſt catalogues, the *ſanamunda* is appropriated to be the name of the heath-ſpurge, another plant of the thymelæa kind, different from the ſea ſort.

SANATES, among the Romans, an appellation given to thoſe people in the neighbourhood of Rome, who having revolted, ſoon ſubmitted themſelves again; on which account they had equal privileges with the other citizens, there being a law in the Twelve Tables ordaining *ut idem juris* ſanatibus *quod foretibus ſit*.

SANATODOS, in *Natural Hiſtory*, a name given by the people of Sicily to the ſpungy excreſcence found on the ſtalk of the dog-roſe, and more uſually called the *bedeguar*. This they greatly eſteem in all venomous bites, and uſe it in fine powder, both internally and externally, in many parts of that country. They uſe no other remedy for the bite of a viper: the wound is ſcarified, and ſome of the powder is ſprinkled on, and large doſes of it are alſo given internally in ſtrong wine.

In the bite of a mad dog they apply it to the wound, ſoftened into a ſort of poultice with oil, or with ſtrong wine; and they give it in repeated doſes internally in broths, and other weak fluids. They give it alſo in continual fevers, and in many other caſes, particularly in the colic. It is ſaid, that a ſingle doſe of a dram of it, in red wine, takes off all the pain of the colic in an hour.

There ſeems a very old opinion on the ſide of this medicine, in the cure of a bite from a mad dog; for Pliny tells us, that the root of the wild-roſe, from the ſtalks of which this ſubſtance grows, was revealed in a dream for the curing this terrible diſeaſe. People, who have found out ſome one virtue in a plant, are generally ready to attribute a great many more to it; but though too much may be ſaid in praiſe of the virtues of this ſubſtance, by the people of that part of the world, it is well worth trying whether it does not contain ſome of them, as it is a thing very common among us, and eaſily had in any quantities.

SAN BENITO, or SACO BENITO. See SAMARRA.

SANCTIFICATION, the act of *ſanctifying*, or making a thing holy, and ſeparate to God.

The reformed divines define *ſanctification* an act of God's grace, whereby a man is renewed inwardly, his deſires and affections are alienated from the world, and the man put in a courſe of dying to ſin, and living to righteouſneſs.

The *ſanctifying of the ſabbath*, among the Jews, is of divine right or inſtitution.—By *ſanctifying* the ſabbath, is meant, the ſpending it in prayer, praiſe, &c. not in worldly concerns.

The firſt petition in the Lord's Prayer is, *Hallowed*, i. e. *ſanctified be thy name:* by which is meant, let thy name be ever accompanied with bleſſing and praiſe.

SANCTION, *ſanctio*, the authority given to a judicial act; or that, whereby it becomes legal and authentic.

The word is formed from the Latin *ſancire*, *to eſtabliſh*.

The royal aſſent gives the *ſanction* of ſtatutes, to all bills in parliament that have paſſed each houſe.

SANCTION of *a law*. See LAW.

SANCTION, *pragmatical*. See PRAGMATIC.

SANCTI VITI *Chorea*. See VITUS's *Dance*.

SANCTORIAN *tables*, are uſed to ſignify ſuch regiſters as exhibit the quantities of perſpiration, its proportion to ſtool or urine, &c. We have ſuch tables from the obſervations of Dr. Lining, at Charles-Town, South-Carolina. See Phil. Tranſ. Nº 470, and 475.

SANCTUARIUM, in *Eccleſiaſtical Writers*, the ſame with BRANDEUM.

SANCTUARY, among the *Jews*, was the holieſt and moſt retired part of the temple of Jeruſalem; wherein was preſerved the ark of the covenant; and into which nobody was allowed to enter but the high-prieſt, and that only once a-year, to intercede for the people.

The *ſanctuary*, called alſo *ſanctum ſanctorum*, or *holy of holies*, is ſuppoſed to be a type or figure of heaven, and of Jeſus Chriſt the true high-prieſt, who is aſcended thither to make interceſſion for us.

Some will have it, that the whole temple was called the *ſanctuary:* and that the *ſanctum ſanctorum*, where the ark was kept, was only a little chapel or oratory therein.

To try or examine a thing by the *weight of the* SANCTUARY, is to examine it by a juſt and equal ſcale; becauſe, among the Jews, it was the cuſtom for the prieſts to keep ſtone weights, to ſerve as ſtandards for regulating all weights by; though theſe did not differ from the royal or profane weights.

Sanctuary, in *our ancient cuſtoms*, denotes an aſylum, or place privileged by the prince, for the ſafeguard of men's lives, who were guilty of capital crimes.

In Scotland they call the *ſanctuary*, *girtholl*, or *gyrthol*.

The Saxons alſo called it *frodmortel* and *fridſtoll*.

Till Henry the VIIIth, all our churches and church-yards were *ſanctuaries*; and protected perſons accuſed of any crime (except treaſon, wherein the crown, and ſacrilege, wherein the church, was too nearly concerned) who fled to them; and who within forty days after went in ſackcloth, and confeſſed themſelves guilty before the coroner, and declared all the particular circumſtances of the offence; and who thereupon took the oath in that caſe provided, viz. that they abjured the realm, and would depart from thence forthwith, at the firſt port that ſhould be aſſigned them, and would never return without leave from the king: by this means they ſaved their lives, if they obſerved the conditions of the oath, by going with a croſs in their hands, and with all convenient ſpeed, to the port aſſigned, and embarking; for, if, during theſe forty days privilege of *ſanctuary*, or in the road to the ſea ſide, they were apprehended and arraigned in any court for this felony, they might plead the privilege of *ſanctuary*, and had a right to be remanded, if taken out againſt their will. But by this abjuration their blood was attainted, and they forfeited all their goods and chattels. During this time, if any layman expelled them, he was excommunicated; if a clerk, he was made irregular; but after forty days no man might relieve them.

The immunity of theſe privileged places was very much abridged by the ſtatutes 27 Hen. VIII. cap. 19. and 32 Hen. VIII. cap. 12. And now, by the ſtatute 21 Jac. I. cap. 20. all privilege of *ſanctuary*, and abjuration conſequent thereupon, is utterly taken away and aboliſhed.

St. John's of Beverley had an eminent *ſanctuary*, called by the Saxons, *a ſeat of peace*: ſo had St. Martin's le Grand, in London. Rippon had the like granted by Whitlaſe, king of the Mercians: ſo had St. Burien's in Cornwall, granted by king Athelſtan, anno 936; and Weſtminſter had the like, granted by Edward the Confeſſor.

Sanctuary is alſo uſed in the Romiſh church, for the chancel, or that part of the church wherein the altar is placed, incompaſſed with a rail or baluſtrade.

SANCTUM SANCTORUM. See Sanctuary.

SANDS, *arenæ*, in *Natural Hiſtory*, a genus of foſſils, the characters of which are, that they are found in minute concretions, forming together a kind of powder, the genuine particles of which are all of a tendency to one determinate ſhape, and appear regular, though more or leſs complete concretions; not to be diſſolved or diſunited by water, or formed into a coherent maſs by means of it, but retaining their figure in it; tranſparent, vitrifiable by extreme heat, and not diſſoluble in, nor efferveſcing with acids.

Sand is compoſed of ſmall ſtony matter; and, therefore, the kinds of *ſand* are as numerous as the kinds of ſtones But in *Natural Hiſtory* and *Chemiſtry*, by *ſand* is underſtood a matter of the nature of vitrifiable earths.

The moſt general diſtinction of *ſands* is taken from the places whence they are drawn; viz. *pit-ſand*, *river-ſand*, and *ſea-ſand*.

The uſe of *ſand* in building is as an ingredient in Mortar. —For this purpoſe, *pit-ſand* is of all others the beſt; and of *pit-ſand*, the whiteſt is always the worſt. Of *river-ſand*, that found in the falls of waters is beſt, becauſe moſt purged: and *ſea-ſand* is the worſt.

Pit-ſand, as being fat and tough, is moſt uſed in walls and vaults.—*River-ſand* ſerves beſt for rough caſting.

All *ſand* is good in its kind, if, when ſqueezed and handled, it crackles; and if, being put on a white cloth, it neither ſtains, nor makes it foul.—That ſand is naught, which, mixed with water, makes it dirty and muddy, and which has been long in the air; for ſuch will retain much earth, and rotten humour.—Hence, ſome maſons waſh their *ſand* before they uſe it.

The *ſand* of Puzzuolo, de Lorme obſerves, is the beſt in the world; eſpecially for maritime buildings. See Pozzolana.

Sands are ſubject to be variouſly blended and intermixed either with homogene or heterogene particles, particularly with flakes of talc; and according to theſe, and their different colours, are to be ſubdivided into ſeveral kinds.

1. *White ſands*; ſuch as are pure and free from heterogene particles, and ſuch as are mixed with ſandy and heterogeneous particles of other colours.
2. *Red*, or *reddiſh ſands*, both pure and impure.
3. *Yellow ſands*, pure and impure, which are very numerous.
4. *Brown ſands*; diſtinguiſhed in the ſame manner.
5. *Black ſands*; of which there are two ſpecies, viz. a fine ſhining greyiſh black *ſand* found in Italy, and a fine ſhining reddiſh black *ſand* peculiar to America.
6. *Green ſands*; of which there is only one known ſpecies, viz. a coarſe variegated duſky green *ſand*, common in Virginia. Hill's Hiſt. of Foſſils, p. 568.

Some diſtinguiſh *a male ſand*, which is of a deeper colour than another ſort in the ſame banks or beds, called *female ſand*.

The *ſand* whereof Glass is made, is white and gritty, and full of little ſparkling grains.

The *ſand* uſed by founders is foſſile: it is properly a yellow fat earth, whereof they make their moulds, for the caſting of ſmall work; whence it is they ſay, Casting *in ſand*.

The plumbers alſo uſe *ſand* to mould ſeveral of their works, particularly large ſheets. To prepare the *ſand* for theſe ſheets, they wet it lightly; then ſtir and work it with a ſtick; and then beat and plane it. See Plumbery.

Sands may be divided into *ſharp* and *ſoft*.

Sharp, or *rag ſand*, is that compoſed of ſmall tranſparent pebbles, naturally found in the mountains.

Of this, again, there is ſome *fine* and white, or grey, reddiſh, or brown; and others *coarſe*, either of a grizzly, or brown colour.

Soft, or *ſmooth ſand*, is that mixed with flat particles from lime-ſtone, or with micæ of glittering particles, either ſilver-like, as the *ſea-ſand* about the Scilly iſlands; or gold-like, as in Cleveland.

It is remarkable that *ſand*, though it appear a very hard, denſe, and indiſſoluble body, yet is contained inviſibly in the brine, or ſalt water of our ſalt ſprings; and even on the ſhooting of the ſalt after evaporation, there ſtill remain the particles of it in the clear pellucid ſalt; and this, though wholly ſoluble in water, yet when a brine, made by ſuch a ſolution, is boiled, depoſits as much of the *ſand* as the common brine of the pits, or ſea water.

Some have ſuppoſed that the *ſand* was generated during the time of the boiling of the liquor, but the more careful examiners think otherwiſe; it appearing to them, that the particles of this *ſand* may be ſeen in the brine, by the help of a microſcope, before the boiling, in form of rectangular oblong plates, ſome nearly ſquare; theſe are ſo ſmall, as readily to paſs the ſtrainer with the water; and appearing as numerous in it after as before the ſtraining, ſhew that they are no more to be withheld by ſuch means, than the ſalt.

The pores of the fineſt ſtrainers, examined by the microſcope, appear twenty times bigger than theſe plates, or particles of the *ſand*, and therefore it is not to be wondered at that they let them through. There requires, therefore, no more to the formation of the *ſand*, than the coaleſcing of ſeveral of theſe particles into one larger granule, and ſo on; and this is very likely to be done by means of the evaporation of the fluid which kept them ſeparate, and of the motion given to them in boiling, which naturally and neceſſarily brought them into the ſpheres of their own mutual attractions, at a time when their attraction with the fluid they ſwam in, was alſo much diminiſhed with its quantity. See farther Philoſ. Tranſ. N° 140.

Sand ſeems to have been the firſt ſubſtance added to proper ſalts for making of glaſs. Joſephus, Tacitus, Strabo, Pliny, Agricola, &c. all mention this, and tell us of the ſtores from which the *ſand* for this uſe was brought, being inexhauſtible. See Glass.

Common *ſand* is a very good addition by way of manure to all ſorts of clay-lands, it warms them, and makes them more open and looſe. The beſt *ſand* for the farmer's uſe is that which is waſhed by rains from roads or hills, or that which is taken from the beds of rivers; the common *ſand* that is dug in pits never anſwers nearly ſo well. *Sand* mixed with dung is much better than laid on alone: and a very fine manure is made by covering the bottom of the ſheep-folds with ſeveral loads of *ſand* every week, which are to be taken away, and laid on cold ſtiff land, impregnated as they are with the dung and the urine of the ſheep.

Beſide clay land, there is another ſort of ground very improveable by *ſand*; this is that ſort of black ſoggy land on which buſhes and ſedge grow naturally, and which they cut into turf in ſome places. Six hundred load of *ſand* being laid upon an acre of this land, according to the Cheſhire meaſure, which is near double the ſtatute acre, meliorate it ſo much, that without ploughing, it will yield good crops of oats or tares, though before it would have produced ſcarce any thing. If, after this crop is taken off, the land be well dunged, and laid down for graſs, it will yield a large crop of ſweet hay.

Once *ſanding* this land will improve it for a vaſt number of years, and it will yield two crops of hay in the year, if there be weather to make it in: Some land in Cheſhire has been, by this means, rendered of twelve times its former value to the owner. The bogs of Ireland, when drained, have been rendered very fruitful land, by mixing *ſand* in this manner among the earth of which they conſiſt. Add to this, that in all theſe boggy lands, the burning them, or firing their own turf upon them, is alſo a great advantage. The common peat, or turf aſhes, mixed with the *ſand* for theſe purpoſes, add greatly to its virtue.

Sea *ſand*, which is thrown up in creeks and other places, is by much the richeſt of all *ſand* for manuring the earth; partly its ſaltneſs, and partly the fat and unctuous filth that is mixed among it, give it this great virtue. In the weſtern parts of England, that lie upon the ſea coaſts, they make very great advantages of it. The fragments of ſea ſhells alſo, which are always in great abundance in this *ſand*, add to its virtues; and it is always the more eſteemed by the farmers, the more of theſe fragments there are among it.

The ſea *ſand* uſed as manure in different parts of the kingdom is of three kinds: that about Plymouth, and on other of the ſouthern coaſts, is of a blue grey colour like aſhes, which is probably owing to the ſhells of muſcles, and other fiſh of that or the like colour, being broken and mixed among it in great quantity. Weſtward, near the Land's-end, the ſea *ſand* is very white, and about the iſles of Scilly it is very gliſtering, with ſmall particles of talc; on the coaſts of the North Sea the *ſand* is yellowiſh, brown, or reddiſh, and contains ſo great a quantity of fragments of cockle-ſhells, that it ſeems to be chiefly compoſed of them. That ſea *ſand* is accounted beſt which is of a reddiſh colour; the next in value to this is the bluiſh, and the white is the worſt of all. Sea *ſand* is beſt when taken up from under the water, or from *ſand* banks which are covered by every tide.

The ſmall grained *ſand* is moſt ſudden in its operation, and is therefore beſt for the tenant, who is only to take three or four crops; but the coarſe or large grained *ſand* is much better for the landlord, as its effects continue many years.

Where the *ſand* is dredged out of the ſea, it is uſually twice as dear as where it is taken from the *ſand* banks. When the land has been well manured with the large *ſand*, they take four crops of corn from it, and then lay it down for paſture for ſix or ſeven years before they plough it again. The graſs is ſo good, that they commonly mow it for hay the firſt year; it always abounds very much with the white flowered clover. If the graſs grows but ſhort, it is the farmer's intereſt to feed his cattle upon it, and it will turn to as good account this way, being very ſweet and rich, and making the cattle fat, and the cows yield a very large quantity of milk. Mortimer's Huſbandry. See MANURING *of ground* and *Common* SALT.

Indian SAND. The ſubſtance commonly called *Indian ſand*, is famous for anſwering to the magnet. It is brought into ſeveral parts of Europe, and is ſaid to be gathered on the ſea ſhore in Perſia. After it is gathered, it is boiled in water to waſh away the impurities it may contain; and when dried is ſent abroad in form of a black powder, conſiſting of grains of different ſizes. Some of theſe grains are very rough in every part of their ſurface, and others have one ſide only rough, the others perfectly ſmooth and gloſſy. Their figure is very irregular, and reſembles that of the grains of common *ſand*; only the grains of this *Indian ſand* are uſually ſmaller than thoſe of our common *ſands*.

Theſe little lumps have neither taſte nor ſmell, and are ſo friable, that they are eaſily reduced to an impalpable powder by rubbing. Some of the particles are ſtrongly attracted by the loadſtone, and others are ſo inactive as to be ſcarce at all affected by it. Thoſe particles, which are of the deepeſt duſky black, are moſt of all affected by the loadſtone; thoſe which are not affected by it, ſeem rather of the colour of lead, of a bluiſh black and ſhining; theſe are in the greateſt quantity, and the others are ſelected from among theſe by the loadſtone.

There are ſeveral parts of the world which afford this *ſand*, but with ſome difference in the figure of its grains and their magnetic virtue. Beſide Perſia, it is found on the ſhores of Virginia; another ſort of it is found about Italy, and very common at Leghorn; this is very magnetic. There are two ſorts of it found in the river Eber in Haſſia, of which one is like the Italian, but the other conſiſts of large grains, almoſt as big as hempſeed, but having very little virtue. A very ſtrong ſort is found in Dalmatia, near old Raguſa; and probably future enquiries will ſhew, that there are yet many more kinds of it, differing in ſtrength and ſize. Phil. Tranſ. N° 432. p. 301. See MAGNET.

SAND is alſo applied to thoſe dry, crumbling earths, which, wanting fatneſs to bind them together, the wind eaſily breaks into duſt and carries them away. In this ſenſe it is that travellers tell us, the caravans in Africa are frequently loſt, and buried under clouds of *ſand*, torn up by whirlwinds; and ſometimes heaped into mountains. The deſerts of Lybia are mere *ſands*, and hence their ſterility.

SAND-*bags*, in the *Military Art*, are bags of earth or *ſand*, uſed in *fortification*. See SACKS *of Earth*.

The ſmaller *ſand-bags* hold about half a cubical foot of earth, and ſerve to be placed upon the ſuperior talus of the parapet, to cover thoſe that are behind, who fire through the embraſures, or intervals, which are left betwixt them.

SAND *box-tree*, in *Botany*. See *Sand* BOX-TREE.

SAND-*eel*. See AMMODYTES.

SAND-*flood*, a term uſed by the people of Suffolk, and ſome other parts of England, to expreſs a miſchief to which they are ſubject, by having their lands covered with vaſt quantities of *ſand*, rolling in upon them like a deluge of water.

Mr. Wright, a ſufferer by one of theſe deluges, gives a very good account of them in the Philoſophical Tranſactions. In the neighbourhood of the plains ſubject to this miſchief, there are always hills which are made up of *ſand*, and only covered with a thin turf. The plains themſelves, which are inevitably ruined by the deluge of this dry ſort, are alſo ſandy; having only the ſame ſort of thin turf on them, though capable of producing very good crops, and ſtanding all common accidents.

When violent winds break through the turf that covers theſe hills, the *ſand* lying looſe and naked, is ſoon carried down upon the plains, where it covers and buries the graſs, and in a very little time eats through the light turf, and mixing itſelf with the *ſand* underneath, becomes one bed of this dry matter never to be covered with a turf again. A large body of *ſand* being thus got together, nothing ſtops its progreſs, but it at every ſtorm rolls over more and more ground, ſo that in a few years it extends itſelf a vaſt way; eſpecially where the ground over which it paſſes is of the ſame ſandy nature, and only covered with a thin turf.

In ſome parts of Suffolk, the ground encourages this change ſo greatly, that a bed of *ſand* broke looſe from a neighbouring hill, and covering only a few acres, perhaps eight or ten, will before it has travelled four miles forward, which it does in a ſmall courſe of years, deluge a thouſand acres. It travels down hill faſter than any way elſe, but will not be ſtopped by aſcent, but will move up the ſteepeſt hill, only that it requires more time. The making of fences in the common way to keep it out is vain; it runs through the hedges, and flies over the tops of the banks, and when it reaches a village in its courſe, will bury the cottages, unleſs preſerved at more charge than they are worth. It will in a very little time beat up to the eaves of a houſe of the low kind, that are uſually built in country villages, and has often weight enough to break down walls in its paſſage. The beſt way of ſtopping its progreſs is, by hedges of furze, planted over one another as they become levelled; theſe, if well kept up, will by degrees ſtop or divert the progreſs; and ſome who have tried this with reſolution, after they have had the ſand raiſed twenty feet high, have found it ſtop its increaſe; and then having manured this adventitious ſoil with dung, found it as good ground as that which made the ſurface before.

About Thetford, the villages were wholly deſtroyed by this about ninety years ago, and the branch of the river Ouſe, called then Thetford river, ſo blocked up by it, that very ſmall veſſels could only go up it, where very large ones uſed before. The river has been of great ſervice in ſtopping its progreſs into Norfolk, where otherwiſe its courſe would have carried it, and its vaſt ſpreading ſideways in proportion of its going forward, would have made it bury vaſt quantities of land in a very few years.

The moſt probable conjecture, as to the cauſe of this ſtrange ſort of deluge in theſe parts of England, is, that this portion of the county of Suffolk lies eaſt north-eaſt of a part of the great level of the fens, and is by this expoſed to very impetuous winds, which acquire more than ordinary force, by their paſſing through ſo large a tract of country uninterrupted, the ſtorms ſeem to be one great cauſe of the miſchief, and the ſandy nature of the ſoil the other. There are old ſtories in the country, of ſuits at law commenced among the farmers, for grounds blown out of the owner's poſſeſſion; but the people who gain this ſort of wandering land are the greateſt ſufferers. A little *ſand* ſprinkled by the winds over a tract of land, where there is a bed of *ſand* under the turf, ſoon eats through that obſtacle; and what was at firſt only a thin coat of *ſand*, becomes then a deep plain of it, capable of being blown away to the depth of eight, ten, twenty, or more feet, and is carried over every thing in its progreſs before the winds, when once taken up by them. Phil. Tranſ. N° 37.

Sand-*gavel*, a payment due to the lord of the manor of Rodley, in the county of Glouceſter, for liberty granted to the tenants to dig *ſand* for their common uſe.

Sand *land*. See Soil.

Sand *piper*, in *Ornithology*, a name given by Mr. Pennant to the tringa of Linnæus; becauſe moſt of the ſpecies belonging to this genus are converſant about ſhores, and their note is whiſtling or piping.

Sand *ſnake*. See Ammodytes.

Sand *ſwallow*, in *Ornithology*. See Swallow.

SANDAL, *ſandalium*, σανδαλιον, in *Antiquity*, a rich kind of ſlipper, worn on the feet, made of gold, ſilk, or other precious ſtuff, uſed by the Roman and Greek ladies; conſiſting of a ſole, with a hollow at one extreme to embrace the ancle, but leaving the upper part of the foot bare.

Terence ſpeaks of this *ſandal*, *Utinam tibi commitigari videam* ſandalio *caput: I wiſh ſhe would break your head with her* ſandal.

Apollo was ſometimes called *Sandaliarius*, *ſandal-maker*; the reaſon of which appellation has given great perplexity to the critics. Some derive it from a ſtreet called *Sandaliarius*, chiefly inhabited by *ſandal-makers*, wherein that god had a temple; but others, with more probability, derive the name of the ſtreet from that of the god, and take Apollo to have been thus called from his effeminate dreſs, as if he wore women's *ſandals*.

Sandal is alſo uſed for the ſhoe or ſlipper worn by the pope, and other Romiſh prelates, &c when they officiate; being ſuch as is ſuppoſed to have been worn by St. Bartholomew.

Alcuin obſerves, that there was ſome difference between the *ſandals* of biſhops, prieſts, and deacons, Monks were not allowed to wear *ſandals*, except in travelling; as is obſerved by Du-Cange, Salmaſius, &c.

Sandal is alſo the name of a ſort of ſlipper ſtill worn by ſeveral congregations of reformed monks.

It conſiſts of no more than a mere leathern ſole, faſtened with latches or buckles, all the reſt of the foot being left bare.

The Capuchins wear *ſandals*, the Recollects, clogs; the former are of leather, the latter of wood.

Sandal-*bricks*. See Brick.

SANDALIGERULI, among the *Ancients*, ſervants whoſe buſineſs it was to carry their maſters or miſtreſſes *ſandals*.

SANDAPELONES, among the Romans, a kind of porters who were employed in carrying the bier called *ſandapila*. Ptiſc. in voc.

SANDAPILA, among the Romans, a ſort of bier uſed for carrying out the bodies of people of low circumſtances.

It was not a bed, but a kind of wooden cheſt, made of a few boards nailed together, and was uſually burnt along with the body.

SANDARACH, in the works of ſome of the ancients, a name by which the yellow matter collected on the legs of bees is called; others of them called it *erithace*, and ſome *ambroſia*. We uſually eſteem this to be wax; but the experiments of Reaumur, and others, evidently prove, that it is not real wax; though it contains the matter of which wax is to be made: it is only the farina of flowers, collected into lumps, and probably ſerves the bees as food; and after it has afforded them nouriſhment, ſuffers ſome change in their bowels, by which it is converted into the ſubſtance we call wax. See Pain *d'abeille*.

Sandarach, *ſandaracha*, in *Natural Hiſtory*, &c. a native mineral; or a preparation of orpiment, made by fuſing it by a cloſe fire into a red friable maſs. See Orpiment.

Sandaracha is the ſame with what is by ſome otherwiſe called realgar.

It is ſometimes alſo called *ſandaracha Græcorum*, in oppoſition to the gum *ſandarach*. Some diſtinguiſh two ſorts of Grecian *ſandarach*: the *natural*, which is the firſt above deſcribed; and the *factitious*, which is only ceruſe exalted by the fire, and burnt into a kind of minium. Both the one and the other are poiſons.

Sandarach, *gum*, or **Sandaracha** *Arabum*, a reſinous juice ouſing out of the trunk and thick branches of the great juniper-tree, in the warmer climates, and particularly on the coaſts of Africa, by inciſions made in the heats of the ſummer.

This juice concretes into ſemipellucid, pale yellowiſh tears or globes, reſembling maſtich, but larger: the reſin, thus formed, has a light agreeable ſmell, but no conſiderable taſte; it diſſolves in rectified ſpirit, and in oils both expreſſed and diſtilled; but being nearly a pure reſin, yields little or nothing to watery liquors.

The ſmall or common juniper yields very little *ſandarach*: but its fruit yields oils, waters, ſalts, ſpirits, and extracts of ſome repute in medicine.

The *gum ſandarach* is an ingredient in varniſh, and hence has been called *vernix*. With this, melted in oil of turpentine, is made the factitious varniſh now uſed by painters and cabinet-makers. It is alſo reduced into an impalpable powder, called pounce, uſed to prevent paper from imbibing ink.

Gum ſandarach has been ſometimes given internally in diarrhœas and hæmorrhages, its doſe being from ten grains to half a drachm. It is alſo ſometimes preſcribed in gonorrhœas and the fluor albus; but it has been chiefly employed externally in corroborant, nervine, traumatic applications. With us it is hardly ever uſed for any medicinal purpoſes.

The beſt is in fine white tears, free of duſt: the Engliſh, Swedes, &c. drive a conſiderable trade therewith.

Some will have it that the gum of the Juniper is not the right *ſandarach*, but that of the oxycedrus, or leſſer cedar.

SANDARESUS, in *Natural Hiſtory*, a gem, the chief property of which, according to Pliny, is its being pellucid, and containing in its ſubſtance a kind of gold-coloured globules; which are likewiſe tranſparent, when ſeen betwixt one and the fire.

SANDARUS, in the *Materia Medica*, the original name of the gum, which later ages have, by corruption of the name, called *ſandarax*, or *ſandaracha*. The latter name is peculiarly improper, as it confounds this innocent gum with a poiſonous mineral of the arſenic or orpiment kind.

The Arabians are not eaſily to be underſtood in what they ſay of this gum. Some deſcribe it as a diſtinct gum from all others, and ſay that it reſembled amber in its colour and properties. This ſeems to expreſs properly what we at this time call *ſandaracha*, which has much of the appearance of yellow reſin, and therefore cannot be wholly unlike amber; but as this gum was uſed in varniſh, and ſeveral other gums were alſo uſed for the ſame purpoſe, theſe writers, according to their uſual cuſtom of attributing the ſame name to different things, which had the ſame properties, have ſometimes called the *cancamum* by this name, and ſometimes amber. Gum lacca has often been called alſo by this name by theſe authors; and the context only can clear up what is meant, when either the word *ſandarus* or *cancamum*, or *vernix*, is uſed.

SANDASTER, in *Natural Hiſtory*, a kind of gem mentioned by Pliny, with gold-coloured globules in it that ſhone like ſtars, and were in number and diſpoſition not unlike the ſeven ſtars.

SANDEMANIANS, in *Eccleſiaſtical Hiſtory*, a modern ſect that originated in Scotland about the year 1728; where it is at this time diſtinguiſhed by the name of *Glaſſites*, after its founder Mr. John Glaſs, who was a miniſter of the eſtabliſhed church in that kingdom; but being charged with a deſign of ſubverting the national covenant, and ſapping the foundation of all national eſtabliſhments by the kirk judicatory, was expelled by the ſynod from the church of Scotland. His ſentiments are fully explained in a tract publiſhed at that time, intitled, "The Teſtimony of the King of Martyrs," and preſerved in the firſt volume of his works. In conſequence of Mr. Glaſs's expulſion, his adherents formed themſelves into churches, conformable in their inſtitution and diſcipline to what they apprehended to be the plan of the firſt churches recorded in the New Teſtament. Soon after the year 1755, Mr. Robert Sandeman, an elder in one of theſe churches in Scotland, publiſhed a ſeries of letters addreſſed to Mr. Hervey, occaſioned by his Theron and Aſpaſio, in which he endeavours to ſhew, that his notion of faith is contradictory to the Scripture account of it, and could only ſerve to lead men, profeſſedly holding the doctrines commonly called Calviniſtic, to eſtabliſh their own righteouſneſs upon their frames, inward feelings, and various acts of faith. In theſe letters Mr. Sandeman attempts to prove, that faith is neither more nor leſs than a ſimple aſſent to the divine teſtimony concerning Jeſus Chriſt, recorded in the New Teſtament; and he maintains, that the word faith, or belief, is conſtantly uſed by the apoſtles to ſignify what is denoted by it in common diſcourſe, viz. a perſuaſion of the truth of any propoſition, and that there is no difference between believing any common teſtimony, and believing the apoſtolic teſtimony, except that which reſults from the nature of the teſtimony itſelf. This led the way to a controverſy, among thoſe who were called Calviniſts, concerning the nature of juſtifying faith; and thoſe who adopted Mr. Sandeman's notion of it, and who took the denomination of *Sandemanians*, formed themſelves into church order, in ſtrict fellowſhip with the churches of Scotland, but holding no kind of communion with other churches. The chief opinions and practices in which this ſect differs from other Chriſtians, are, their weekly adminiſtration of the Lord's Supper; their love-feaſts, of which every member is not only allowed but required to partake, and which conſiſt of their dining together at each other's houſes in the interval between the morning and afternoon ſervice; their kiſs of charity uſed on this occaſion, at the admiſſion of a new member, and at other times, when they deem it to be neceſſary or proper; their weekly collection before the Lord's Supper for the ſupport of the poor, and defraying other expences; mutual exhortation; abſtinence from blood and things ſtrangled; waſhing each other's feet, the precept concerning which, as well as other precepts, they underſtand literally; community of goods ſo far as that every one is to conſider all that he has in his poſſeſſion and power as liable to the calls of the poor and church, and the unlawfulneſs of laying up treaſures on earth, by ſetting them apart for any diſtant, future, and uncertain uſe. They allow of public and private diverſions ſo far as they are not connected with circumſtances really ſinful; but apprehending a lot to be ſacred, diſapprove of playing at cards, dice, &c. They maintain a plurality of elders, paſtors, or biſhops, in each church, and the neceſſity of the preſence of two elders in every act of diſcipline, and at the adminiſtration of the Lord's Supper. In the choice of theſe elders, want of learning, and engagements in trade, &c. are no ſufficient objection; but ſecond marriages diſqualify for the office; and they are ordained by prayer and faſting, impoſition of hands, and giving the right hand of fellowſhip. In their diſcipline they are ſtrict and ſevere, and think themſelves obliged to ſeparate from the communion and worſhip of all ſuch religious ſocieties as appear to them not to profeſs the ſimple truth for their only ground of hope, and who do not walk in obedience to it. We ſhall only add, that in every church tranſaction, they eſteem unanimity to be abſolutely neceſſary. From this abſtract of the account which they have publiſhed of their tenets and practices, it does not ſeem to be probable that their number ſhould be very conſiderable.

SANDERLING, or CURWILLET, in *Ornithology*, is the CHARADRIUS *calidris* of Linnæus; its body is of a more ſlender form than that of others of the ſame genus, its bill is an inch long, weak and black; the head and hind part of the neck are aſh-coloured, and marked with oblong black ſtreaks, the back and ſcapulars are of a browniſh grey, edged with duſky white; the whole under ſide of the body is white, ſlightly clouded in ſome places with brown; the tail conſiſts of twelve ſharp-pointed feathers of a deep aſh colour, and the legs are black. This ſpecies is found, in large flocks, on the Corniſh ſhores.

SANDEVER, or SANDIVER, called alſo the *gall* and the AXUNGIA *of glaſs*, is the recrement of glaſs; or the ſcum that ariſes from the aſhes of the herb kali, uſed in the making of glaſs.

This is ſaid to contain the vitrolic acid, which Tachenius ſuppoſes to proceed from the flints uſed in the compoſition of *glaſs*. It is uſed as a flux in eſſays of ores, and in the fuſion of filings of gold or ſilver, in the ſame manner as borax is. It is alſo ſaid to increaſe the malleability of metals.

Some alſo uſe *ſandever* for the kali, or glaſs-wort itſelf.

It is reported by many authors of great credit, that this ſalt, in its genuine form, and no way differing from ſuch as is ſeparated from glaſs, is thrown out in great abundance in the eruptions of the burning mountains, and lies about in lumps of a ſpungy texture and great ſize, or in ſmaller ſolid ones among the ſciarri and aſhes thrown out at thoſe times. The more firm and ſolid pieces are the moſt pure, and are generally of a fine white; the others not unfrequently are tinged bluiſh or yellow, and have ſometimes ſome of the melted matter of the ſciarri blended among the maſs, and filling up ſome of the cavities. In the catalogue of the ſpecimens of ſubſtances thrown out of Mount Ætna in one of its eruptions, and ſent as a preſent to the Royal Society, we find mention of ſeveral pieces of *ſandiver*, but without any particular deſcription. Phil. Tranſ. Nº 53.

SAND-HEAT, or SAND-BATH, denotes one of the chemiſts fires; conſiſting of hot ſand, wherein herbs, flowers, &c. are infuſed in a cucurbit.

The *ſand-heat* is eſteemed gentle, digeſtive, and alterative of many bodies.

SANDIVER. See SANDEVER.

SANDYX, a kind of minium, made of ceruſſe, or rather lead, calcined and rubefied; called alſo *factitious ſandarach*.

It is of little uſe in painting; the real minium, or red lead, to which it is ſubſtituted, making a much better, brighter, and more durable colour.

Though the generality of authors have taken this to be only a name for the fine red colour, ſome have plainly uſed it for a bluiſh-green. Strabo tells us, that the colour uſed by painters in his time, and called *armenium pictorium*, was of a bluiſh-green colour, and that it was called *ſandycis metallum* by ſome. Thus the word *zarnich* was made to expreſs the ſame two things with the addition of the yellow orpiment; and Avicenna deſcribes them altogether, telling us, that *zarnich* is yellow, red, or green. The two firſt of theſe colours are natural to zarnich, as the name of orpiment; and there is, indeed, a greeniſh zarnich now alſo known in the world, but that was unknown in his times; and we find that he meant the *lapis armenus* by the *green zarnich*.

SANE *memory*, i. e. perfect and ſound memory to do any lawful act.

SANGUIFICATION, in the *Animal Oeconomy*, the action whereby the chyle is converted into BLOOD.

Sanguification ſucceeds CHYLIFICATION, and is followed by NUTRITION.

Sanguification is thus effected: the chyle, having paſſed the lacteals of the ſeveral kinds, is delivered into the blood at the ſubclavian; whence the two humours paſs together to the right ventricle of the heart, where being yet more intimately mixed, they circulate together through the whole body; till, after ſeveral circulations and depurations at the ſeveral colatures and ſtrainers of the body, they become aſſimilated, or, as the chemiſts call it, *cohobated*, ſo as only to make one uniform compound maſs, which appears to be nothing elſe but chyle altered by the artifice of nature, and exalted into blood. In effect, it does not appear, that any thing extraneous is mixed with the circulating liquor but chyle, excepting what was before ſeparated from it for particular occaſions; unleſs perhaps it ſhould receive ſome portion of air in the lungs, which is a point long diſputed, and yet ſcarce aſcertained.

Indeed, that there is a quantity of air mixed with the blood, and circulating with it, is granted; but whether this be any more than what was at firſt contained in the bodies whereof the chyle was formed, is much doubted: the principal arguments for it are, the neceſſity for reſpiration, and the florid colour the blood receives in the lungs, and firſt ſhews in the pulmonary vein. But the firſt is ſatisfactorily accounted for another way. See RESPIRATION.

The latter is chiefly ſupported by this experiment, that blood drawn by veneſection, and ſuffered to coagulate, upon turning up, the bottom, which before was blackiſh, being now expoſed to the air, acquires a florid colour, like that we obſerve in the blood of the pulmonary vein.

The ancients were in great perplexity about the ſeat of *ſanguification*, or the place where, and the inſtrument whereby it is effected; whether in the heart, or the liver, or the lungs; but, according to the doctrine of the moderns, the heart, liver, veſſels, &c. contribute no otherwiſe to the changing of the chyle into blood than the ſun does to the changing of the muſt into wine.

The ancients accounted for *ſanguification* from a plaſtic power. In the laſt century, when chemiſtry was introduced, *ſanguification*, and almoſt every thing elſe, were to be effected by a ferment; and the phyſicians of thoſe times were very ſolicitous as to the particular officina where this ferment was prepared and kept. Some would have it the liver, others the ſpleen, &c. but the very notion of it is now exploded.

Of *ſanguification* we may admit two degrees; the firſt amounting to no more than a confuſion, or ſuch an intimate mixture of parts, as ſuffices ſo to confound the different coloured liquors, as that the whiteneſs of the chyle ſhall be loſt or drowned in the redneſs of the blood, ſo as never more to appear in its own ſhape and colour. This we ſuppoſe may be effected by repeated circulations alone; though how many circulations are neceſſary thereto, it is difficult to determine.

The ſecond degree of *ſanguification* is, when the parts of the chyle are ſo exalted, or comminuted and ſubtilized, as to loſe all tendency to coagulatory ſeparation, ſuch as they have in chyle and milk.

To theſe two degrees may be added a third, wherein the fibres and filaments of the crude blood are ſo broken and blended with the ſerum, as not to be again ſeparable from them. This is a morbid *ſanguification*, ſuch as happens in fevers, &c. attended with a bloody ſweat, purple ſpots, &c. All theſe degrees of *ſanguification*, Dr. Drake makes no doubt, are procured by reiterated circulations, wherein as well the inteſtine, as the progreſſive motion, conſpires to the mixing and comminuting of the adventitious parts. Doubtleſs they have their ſtated period, wherein they are in perfection; though where preciſely to fix it, we do not know.

SANGUINARIA, *bloodwort*, a name given by many botanical authors to the *lapathum ſanguineum*, or bloody-dock, from the red veins in its leaves; and by ſome to the *cornu cervinum*, or buckſhorn-plantain, from its ſuppoſed virtues.

SANGUINARIA, in *Botany*. See PUCCOON.

SANGUINE, *bloody*, or a thing abounding in BLOOD.

SANGUINE *temperament*, or *conſtitution*, is that where blood and heat predominate.

Sanguine conſtitutions require a frequent uſe of phlebotomy.

Sanguine people are uſually obſerved to be briſk, bold, daring, and even preſumptuous. Hence *ſanguine* hopes, i. e. ſtrong, aſſured, &c. hopes.

SANGUINE, in *Heraldry*, the colour uſually called *murrey*; being made of red lake, tinged with a little Spaniſh brown. It is repreſented in engraving, by tranverſe hatches like purpure; and is moſtly uſed in the coats of knights of the Bath.

When borne by nobles, it is rather called *ſardonyx*; and in the coats of ſovereign princes, *dragon's tail.*

SANGUINE *ſtone*, *lapis* SANGUINALIS, a kind of JASPER, brought from New Spain, of a dark-brown colour, marked with ſpots of a blood-red.

It ſeems to be only an accidental HELIOTROPE, differing from the common heliotropes, that are brought from the Eaſt Indies, merely in being coarſer, and leſs tranſparent.

The Indians cut it in form of a heart, and uſe it in hæmorrhages, immoderate menſes, and other fluxes of blood. The patient applies it by graſping it in his right hand, having firſt dipt it in water. It is ſometimes alſo hung on the part whence the blood flows.

SANGUINEA, a name given by ſome of the chemiſts to NITRE.

SANGUINEOUS *fever*, a term uſed by the medical writers to expreſs a kind of fever, in which there is always a plethora, or fullneſs of blood, which nature is attempting to leſſen by means of this accelerated motion of it, either by forming ſome hæmorrhage, or by throwing a part of it off in form of ſweat. It is very obvious to reaſon, therefore, that bleeding is the firſt thing neceſſary in theſe fevers. The continent fevers, ſuch as the ephemera and ſynocha, are of this kind. Junker's Conſp. Med. p. 252. See FEVER.

SANGUINEROLA, in *Ichthyology*, a name given by the Italians to the *phoxinus*, or MINOW. Artedi makes this a ſpecies of cyprinus.

It has the Italian name from the blood-red colour which diſplays itſelf under its belly.

SANGUINEUS, in *Botany*, a name given by ſome of the ancients to the birch-tree, from the deep reddiſh black colour of its twigs. Pliny calls it *ſanguineus frutex*, and not underſtanding that it was the ſame with the birch, mentions the name of that tree immediately after it, as if different from it. The Italians ſtill call the birch *ſanguino*; and ſome authors, from the redneſs of the twigs of ſome ſpecies of the alaternus, have called that ſhrub the *ſanguineus albus*. Some have ſuppoſed that this name was uſed to expreſs the birch-tree alſo, but erroneouſly; for though the bark of the body of that tree is ſometimes white, there was no reaſon for adding that epithet to the word *ſanguineus*, which not being uſed for any other tree, could need no diſtinction. The Romans, and many other nations, uſed this tree as we do, for the puniſhment of children's faults; and it is poſſible that the name *ſanguineus* might be given it on this occaſion. Pliny, lib. xvi. cap. 36.

SANGUIPURGIUM, a name given by ſome authors to a ſlight ſpecies of fever, which was judged ſalutary, and only ſerving to purge and cleanſe the blood.

SANGUIS, in *Medicine*, &c. See BLOOD.

SANGUIS, in our *Ancient Cuſtoms*, denotes a right or power, which the chief lord of the fee anciently had to judge and determine caſes where blood was ſhed. *De murderia & raptu, de igne, de* ſanguine, *&c.* Monaſt.

SANGUIS *draconis herba*, in *Botany*, a name by which ſome authors call the *lapathum ſanguineum*, or bloody-dock.

SANGUINEM *emere*, was an obligation which the inhabitants of ſome manors, as that of Grendon, were under, to buy and redeem their villain blood, or tenure, and make themſelves free men.

SANGUIS *caprinus*, or *hircinus*, the blood of the he-goat, either wild or tame. This uſed to be prepared, with great precaution, to be uſed in medicine, and was ſuppoſed by many to have very extraordinary qualities.

The principal precautions are theſe: the goat is not to exceed four or five years of age; it is to be fed a conſiderable time with aromatic herbs, and eſpecially thoſe of the ſaxifrage kind; the blood to be drawn out of the throat, or the teſticles, by cutting them; but neither what comes firſt, nor laſt, is to be uſed, the former being too full of humidity, and the latter too thick; the operation to be only performed in July, and the blood put into earthen veſſels, and dried either in the ſun, or the ſhade; and, laſtly, bottled up, to be uſed occaſionally.

Among other ſpecific virtues attributed to goat's blood, the two moſt conſiderable are, that, as they ſay, it cures the pleuriſy without bleeding, and that it diſſolves the ſtone in the bladder, by taking it in vehicles proper for thoſe diſeaſes. To be good, it is to be very hard, and difficult to pulverize.

SANGUIS *draconis*, in *Pharmacy*. See DRAGON'S BLOOD.

SANGUISORBA, *burnet*, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are theſe: the empalement of the flower is compoſed of two ſhort leaves, placed oppoſite; the flower hath one petal, cut into four obtuſe ſegments, which join at their baſe; it has four ſtamina of the length of the petal, terminated by ſmall roundiſh ſummits, and a four-cornered germen ſituated between the empalement and petal, ſupporting a ſhort ſlender ſtyle, crowned by an obtuſe ſtigma; the germen afterwards turns to a ſmall capſule with two cells, filled with ſmall ſeeds. Linnæus reckons three, and Miller four ſpecies. The firſt ſpecies, or greater burnet, with oval ſpikes, grows naturally in moiſt meadows in various parts of England; the ſecond ſpecies, with cylindric ſpikes, in Piedmont; the third, with round compact ſpikes, in Spain; and the fourth, with the longeſt ſpikes, or the greateſt Canada burnet, in North America. All theſe ſorts are hardy perennial plants, and will thrive in almoſt any ſoil or ſituation. They may be propagated either by ſowing their ſeeds, or parting of their roots, in autumn. For other ſpecies of burnet, ſee POTERIUM.

SANGUISUGA, in *Zoology*, a name by which ſome authors expreſs the *hirudo*, or LEECH.

SANGUISUGUM, a name given by ſome barbarous authors to a diſorder of the heart, ſuppoſed to ariſe from its retaining an abundant quantity of blood.

SANHEDRIN, or SANHEDRIM, *Synedrium*, among the ancient Jews, the ſupreme council, or court of judicature, of that republic; wherein were diſpatched all the great affairs both of religion and policy.

The word is derived from the Greek *συνεδριον*, *a council, aſſembly*, or company of people ſitting together; from *συν*, *con*, *together*, and *εδρα*, *ſeat.*

Many of the learned agree, that it was inſtituted by Moſes, Numbers, chap. xi. and conſiſted at firſt of ſeventy perſons, all inſpired of the Holy Ghoſt, who judged finally of all cauſes and affairs; and that they ſubſiſted, without intermiſſion, from Moſes to Eſdras. Others will have it, that the council of ſeventy elders, eſtabliſhed by Moſes, Numb. chap. xi. was temporary, and did not hold after his death; adding, that we find no ſign of any ſuch perpetual and infallible tribunal throughout the whole Old Teſtament; and that the *ſanhedrim* was firſt ſet up in the time of the Maccabees.

The Jews, however, contend ſtrenuouſly for the antiquity of their great *ſanhedrim*; M. Simon ſtrengthens and defends their proofs, and M. le Clerc attacks them. Be the origin and eſtabliſhment of the *ſanhedrim* how it will, it is certain it was ſubſiſting in the time of our Saviour; that it was held at Jeruſalem; and that the deciſion of all the moſt important affairs among the Jews belonged to it. The preſident of this aſſembly was called *Naſi.*

There were ſeveral inferior *ſanhedrim* in Paleſtine, all depending on the great *ſanhedrim* at Jeruſalem. The inferior *ſanhedrim* conſiſted each of twenty-three perſons; and there was one in each city and town. Some ſay, that to have a right to hold a *ſanhedrim*, it was requiſite there were one hundred and twenty inhabitants in the place. Where the inhabitants came ſhort of the number of one hundred and twenty, they only eſtabliſhed three judges.

Into the great as well as the inferior *ſanhedrim* were admitted prieſts, levites, and laymen of all the tribes, provided they were of noble extraction, rich, wiſe, without any blemiſh of body, and, as was pretended, expert in magic; which laſt was eſteemed a neceſſary qualification: very old people, and eunuchs, were excluded.

In each *ſanhedrim* there were two ſcribes; the one to write down the ſuffrages of thoſe who were for condemnation; the other to take down the ſuffrages of thoſe who were for abſolution.

Selden has a learned work on the ſubject of the Jewiſh *ſanhedrim*, De *Synedriis*, printed at London in 1635, in three volumes, quarto.

SANICLE, *ſanicula*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it is a plant with an umbellated flower; the univerſal umbel hath but few rays; the involucrum is ſituated but half round on the outſide: the partial umbels have many cluſtered rays, and their involucrums ſurround them on every ſide; the flowers have five compreſſed petals, which are bifid, and turn inward; they have five erect ſtamina, which are twice the length of the petals, terminated by roundiſh ſummits, and a briſtly germen ſituated under the flower, ſupporting two awl-ſhaped ſtyles, which are reflexed; the germen afterward becomes a rough, oval, pointed fruit, dividing into two parts, each containing one ſeed. There is but one ſpecies of this plant in the Engliſh gardens, which is perennial and evergreen, grows wild in woods, on hilly grounds, and flowers in May. Linnæus enumerates three ſpecies

The medical writers all agree in celebrating this plant as one of the greateſt vulneraries we have of our own growth. They recommend it as a mild reſtringent, internally and externally, for healing freſh wounds and eroſions; and many go ſo far as to talk of fiſtulas having been cured by injecting a decoction of it; but the modern practice of ſurgery has fallen upon very different methods of practice in theſe caſes, from their predeceſſors, and in conſequence of that, the whole tribe of vulnerary herbs is diſregarded.

SANICLE, *baſtard American, mitella*, in *Botany*, a genus of the *decandria digynia* claſs. Its characters are theſe: the flower has a bell-ſhaped empalement of one leaf, cut into five parts; it has five petals, which are inſerted in the empalement, as are alſo ten awl-ſhaped ſtamina, which are ſhorter than the petals; it has a roundiſh bifid germen, with ſcarcely any ſtyle; the empalement becomes an oval capſule with one cell, opening with two valves, filled with ſmall ſeeds. There are two ſpecies, the one a native of North America, the other of the northern parts of Aſia.

SANICLE, *bear's ear, cortuſa*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has one wheel-ſhaped petal, cut into five parts at the brim, having five prominent tubercles at the baſe; it has five ſhort, obtuſe ſtamina; and in the centre is fixed an oval germen, which afterward becomes an oval, oblong, pointed capſule, having two longitudinal furrows, and one cell, opening with two valves, and filled with ſmall, oblong ſeeds. There are two ſpecies. Miller.

It grows in mountainous places, and the leaves promote expectoration.

SANICLE, *water*. See HERB *bennet*.

SANICLE, *Yorkſhire*. See BUTTER-*wort*, and PINGUICULA.

SANIDIUM, in *Natural Hiſtory*, the name of a genus of foſſils, of the claſs of the ſelenitæ, but neither of the rhomboidal nor columnar kinds, nor any other way diſtinguiſhable by its external figure, being made up of ſeveral plain flat plates.

The word is derived from the Greek σανιδιον, *tabella*, a flat thin plate or table, and expreſſes a body made up only of ſuch plates. And the ſelenitæ of this genus are of no determinate form, nor conſiſt of any regular number of planes or angles, but are merely flat, broad, and thin plates or tables, compoſed of other yet thinner plates, like the talcs, but diſtinguiſhed from thoſe bodies by this, that theſe plates are made up of arrangements of ſlender fibres, diſpoſed obliquely, but in uninterrupted lines acroſs the body.

The ſelenitæ having been always eſteemed (when meant of this claſs of bodies, for ſome have applied the word to certain ſpars and other ſubſtances) regularly figured foſſils: this genus has been overlooked by authors, and the ſpecimens of it which occurred, looked on as bodies of a different claſs, as ſpars or talcs. Their not fermenting with acids, however, determines them not to be ſpars; and their obliquely ſtriated ſtructure, their want of elaſticity, and their readily calcining in the fire, diſtinguiſh them from the talcs, and ſhew them to be true and genuine ſelenitæ.

Of this genus there are only two known ſpecies, the one colourleſs and pellucid, the other whitiſh and opake. The firſt is found pretty frequently about Oxford, as alſo in Northamptonſhire, Yorkſhire, and other counties; the other is very common in all parts of Germany, and is found alſo in Leiceſterſhire, and ſome other parts of England, but with us it is not common. Hill's Hiſt. of Foſſ. p. 144, 145.

SANIES, in *Medicine*, a thin, limpid, ſerous matter, iſſuing out of wounds and ulcers; by the Greeks called ιχωρ.

Galen compares it to whey; it differs from *pus*, which is thicker and whiter.

SANIS, Σανις, among the Greeks, a kind of puniſhment, inflicted by binding the malefactor faſt to a piece of wood.

SANKIRA, in *Botany*, a name given by ſome authors to the plant, of which the China-root, uſed in medicine, is the root.

SANS *pareille*, in *Conchyliology*, the name of a particular ſpecies of BUCCINUM, which has its mouth opening a contrary way to that of all other buccina. This is a ſingle ſpecies among the recent buccina; but we find more than one kind with this peculiarity among the foſſile ſhells, and that in great abundance in many places in England.

SANTALUM, in the *Materia Medica*. See SAUNDERS.

SANTALUM, in *Botany*, the name of a genus of plants of the *octandria monogynia* claſs; the characters of which are theſe: the perianthium is a narrow rim, ſtanding on the germen of the piſtil, and rightly indented into four ſegments; the flour is monopetalous, and of the campanulated kind; its edge is divided into five acute ſegments; the ſtamina are eight filaments; they ſtand on the upper part of the tube of the flower, and are alternately one ſhorter than another; the antheræ are ſimple; the germen of the piſtil is turbinated; the ſtyle is of the length of the ſtamina, and the ſtigma is ſimple; the fruit is a berry. There is only one ſpecies.

SANTEO, in *Botany*, a name given by the people of Guinea to a herb, which they eſteem remarkably good in all diſeaſes of the eyes, the herb being boiled in water, and the eyes waſhed with it. The leaves of this grow in pairs, oppoſite one to another, and have no foot-ſtalk. The joints, or ſettings on of the leaves, are blackiſh, and they are of the ſize and ſhape of thoſe of the laurel.

SANTOLINA, in *Botany*. See LAVENDER-*cotton*.

SANTONICUM *ſemen*, in the *Materia Medica*. See CHOUAN.

SANTSI, in *Botany*, a name given by the Chineſe to a plant, famous among them for its medicinal virtues.

It is deſcribed by the writers, who have been on the ſpot, in ſo remarkable a manner, that it cannot eaſily be miſtaken, provided their deſcriptions are juſt. They tell us that it grows wild on the mountains in ſome of the provinces of China, and that each root of it uſually ſends up eight ſtalks, the middle one greatly higher than the reſt.

They have no branches, and have each only three leaves at the top, and the middle ſtalk bears cluſters of flowers. The root they ſay is four inches thick, and puſhes out ſeveral ſide-branches of the thickneſs of a finger. The bark of theſe roots is rough and brown, and their internal part ſoft and yellow.

The ſmall roots only are uſed in medicine, the great ones being ſeldom found. The plant flowers in the month of July, and the ſpring ſeaſon is accounted the beſt for taking up the roots.

The way of multiplying the plant is to cut the great root into ſlices tranſverſly, and plant theſe an inch deep in a good ſoil; they will ſoon ſhoot up the natural number of branches, and in three years the plant will grow to its utmoſt perfection.

The great uſe of the plant is in hæmorrhages, in which caſe it is ſaid to be almoſt infallible.

SAP, in ſpeaking of plants, denotes *juice*.

The word is formed from the Saxon *ſæpe*, which ſignifies the ſame; and that, according to Mylius, from the Greek οπος, *ſuccus*, *juice*. Whence alſo the Latin *ſapa*, uſed for an inſpiſſated juice. See ROB.

SAP, *circulation of the*. See CIRCULATION *of the ſap*.

SAP, *courſe of the*, a term uſed by gardeners and nurſerymen to expreſs the current of the *ſap* in trees.

This has been generally ſuppoſed to run in an equable and even manner; but Mr. Fairchild has ſhewn, that it has an irregular, and even contrary motion to its firſt courſe.

This is a diſcovery of more real uſe in gardening than might at firſt thought be imagined; ſince this accurate experimenter obſerves, that by means of it he could render barren trees fruitful, and decaying trees healthful, and render the ſyſtem of gardening much better in itſelf, and more uſeful to the public.

The laureola grafted on the mezereon, and the evergreen oak of Virginia upon the common Engliſh oak; both theſe hold their leaves all the winter, and are in good ſtate and flouriſhing, though grafted on trees which drop their leaves in winter. This plainly ſhews, that the juices riſe upwards in winter, even in thoſe trees which drop their leaves, otherwiſe theſe grafted evergreens muſt have ſtarved at that ſeaſon.

If all the variety of foreign oaks were to be grafted on the Engliſh oak, it would make the timber more firm and laſting than it is, when raiſed from foreign acorns; for as the crab-ſtock makes the wood of the apple more firm and laſting than that of the apple-ſtock, and the peaches and almonds budded on plums, are more laſting than thoſe on peach-ſtalks; ſo, by the contrary rule, all firm timber grafted on ſpungy ſtocks, would be made worſe than it would be on its own bottom; as if the Engliſh elm were grafted upon the Dutch elm, it would partake ſo much of the nature of the ſtock, as to be a ſpungy wood, and not fit for the uſes it is uſually put to.

In grafting the New England cedar, or juniper, upon the Virginia cedar, this experimenter found at the branch which was grafted, being left ſeveral inches below the grafting, that part continued growing, as well as the upper part above the grafting. The viburnum was another ſubject of his experiments: on bending down the top of this tree, and burying its upper branches in the earth, theſe became roots, and the proper roots were by degrees removed out of the ground as theſe took place. All the roots became branches, and finally the tree became inverted, and grew as well as in its natural ſtate.

A pear tree being inarched upon two pear ſtocks, continued in a flouriſhing ſtate, even when the root was raiſed out of the ground, and it received no nouriſhment, but from the two inarched branches. This tree, after it had ſtood ſome years in this condition, puſhed out new ſuckers from the root; which proves, that the branches are as uſeful to ſupply the root with nouriſhment, as that is to ſupply the branches; and hence it is no wonder that ſo many trees miſcarry in planting, when there are no branches left on the head. Phil. Tranſ. Nº 384. p. 127.

SAP, *procurement of the, for œconomical uſes.* See TAPPING.

SAP, SAPP, in *Building.* To *ſap* a wall, &c. is to dig or open a trench in the ground at the foot of a wall, &c. ſo as to bring it down all at once for want of ſupport.

To *ſap*, according to Daviler, is to undermine a work with hammers, pickaxes, mattocks, &c. viz. a bank, or hillock, by propping it up, digging underneath it, and then burning the props or ſtays; or a rock by digging a mine underneath it.

To demoliſh the thick, firm walls of old caſtles, &c. *ſapping* is much the readieſt way.

SAP, in the *Military Art*, denotes a work carried on under cover of gabions and faſcines on the flank, and mantlets or ſtuffed gabions on the front, to gain the deſcent of a ditch, counterſcarp, or the like.

It is performed by digging a deep trench, deſcending by ſteps from top to bottom, under corridor, carrying it as far as the bottom of the ditch, when that is dry; or as far as the ſurface of the water, when wet.

When the covert-way is well defended by muſqueteers, the beſiegers make their way down into it by *ſapping.* See *Tab. Fortif. fig.* 21. *n.* 5. When they are got near the foot of the glacis, the trench is carried on directly forward; the workmen covering themſelves with blinds, woolpacks, ſand-bags, and mantelets upon wheels. They alſo make epaulements, or traverſes, on each ſide, to lodge a good body of men.

The *ſap* is uſually made five or ſix fathoms from the ſaliant angle of the glacis, where the men are only covered ſideways: for which reaſon they lay planks over-head with hurdles, and earth above them.

When they have forced the enemy to quit the covert-way, the pioneers immediately with ſand-bags, woolpacks, or other fences, make a lodgment, and cover themſelves, as well as they can, from the fire of the oppoſite baſtion.

Theſe are ſeveral ſorts of *ſaps*; as the ſingle, which has only a ſingle parapet; the double, having one on each ſide; the flying, made with gabions, &c.

SAP-*faggots* are a kind of faſcines, about three feet in length.

SAP-*green* is a yellow green prepared from the juice of buckthorn-berries, and uſed in water-painting. See BUCKTHORN, and *Colours from* FRUITS.

SAPA, among the Romans, new wine boiled to the third part of its firſt quantity.

SAPHENA, in *Anatomy*, a vein, which, ariſing over the malleolus internus, and running up along the leg, and the inner part of the thigh, diſcharges itſelf, near the groin, into the crural vein. See *Tab. Anat.* (*Angeiol.*) *fig.* 6. *n.* 44.

It is this vein, they uſually open when they bleed in the foot, for ſuppreſſions of the menſes.

It has its name, probably, from σαφης, *manifeſtus*, as lying plain in ſight.

SAPHETA, in *Architecture*, is the board over the top of a window, placed parallel and oppoſite to the window-ſtool at the bottom.

SAPIENTIÆ *dentes*, the two laſt or inmoſt of the dentes molares of the upper jaw, one on each ſide; thus called, becauſe they appear not till perſons are grown.

SAPIENTIAL, *ſapientialis*, an epithet applied to certain books of Scripture, calculated for our inſtruction and improvement in prudence, or moral wiſdom; they are thus called in contradiſtinction to the hiſtorical and prophetical books.

The *ſapiential* books are Proverbs, Canticles, Eccleſiaſtes, the Pſalms, and Job; though ſome reckon this laſt among the hiſtorical books.

SAPINDUS, in *Botany.* See SOAP-*berry tree.*

SAPINUS, in *Botany*, a name given by ſome of the modern botanical writers to the fir-tree. This does not ſeem, however, to have been the tree ſo called by the ancients. Some of thoſe writers have plainly deſcribed the pine-tree under this name, and Pliny makes it the denomination of the pitch-tree, ſuch as was manured in his time.

The word *ſapinus* ſeems to be only a contraction of *ſapapinus*, a name given by the Latins to the domeſtic or cultivated pine, from the vaſt quantity of juice or ſap it contained. They had a way of expreſſing the juice, called by the word *ſapa*; and Theophraſtus has, for the ſame reaſon, called the domeſtic pine by the name *orrus*, ὀῤῥος, a word ſignifying *juice* or *ſap*. This was the pine-tree which bore the pine-nuts uſed in medicine and in foods; and Pliny, who calls it the *manured pitch-tree*, plainly errs, becauſe that tree cannot bear eſculent nuts, or anſwer to the reſt of the deſcription.

SAPLING, among *Gardeners*, a name by which they call any young tree that is full of *ſap*.

SAPO *amygdalinus*, *almond ſoap*, a new form of medicine got much into uſe of late in nephritic caſes, and made to ſupply the place of the common hard *ſoap* for internal uſes, in a more determinate manner for the phyſician, and a more cleanly one for the patient.

It is thus made. Take any quantity of freſh oil of almonds, and thrice its quantity of ſoap lees; digeſt them together in ſuch a heat as will make them but juſt boil; within a few hours the oil and lees will be united, and the liquor will ſoon after become ropy, and ſomething tranſparent, and will cool in the conſiſtence of a jelly; then throw in ſea ſalt till the boiling liquor has loſt its ropineſs; continue the boiling till drops of the liquor being received upon a tile, the water is ſeen to ſeparate freely from the coagulated ſoap; then take away the fire, and the ſoap will riſe to the top of the water; whence it is taken off before it grows cold, and put into a wooden mould or frame, with a cloth bottom. Being afterwards ſeparated from the mould, it is ſet by till it has acquired a due conſiſtence.

SAPONACEA *terra*, in *Natural Hiſtory*, a term uſed by ſome to expreſs a kind of native alkali *ſalt*, of the nature of the nitre, or natron, of the ancients, which is found on the ſurface of the eath, mixed with dirt, &c. in the neighbourhood of Smyrna, and thence called by ſome *Smyrna earth.* See FLOS *Aſiæ.*

It is found principally in two places near Duraclea, a large open village, about ſix leagues to the eaſtward of Smyrna; and in a very flat plain, about a league weſtward from the river Hermus. It is at firſt gathering a fine whitiſh ſalt, which of itſelf boils up, as it were, out of the ground. It is always gathered before ſun-riſe, and only in mornings in which there falls no dew; ſo that a ſtock ſufficient for the whole year muſt be laid in during the ſummer months. It comes up in ſome places an inch or two above the ſurface of the ground; but when the ſun riſes upon it, it dries and falls down again. The earth producing it lies low in both places, and in winter is waſhy. It is thinly covered with graſs.

It may be ſuſpected, at firſt ſight, that the neighbouring ſea impregnates this earth about Hermus; but the ground which produces it, and lies about Duraclea, is ſo far from the ſea, that it overthrows this ſpeculation; though every morning in ſummer the earth be ſwept clean of this *ſalt*, the next morning always produces a new crop.

Dr. Smyth, who made experiments upon this *ſalt*, informs us, that three hundred drachms of it being put into a retort, and this ſet in a ſand-heat with a very ſtrong fire for twelve hours, yielded between five and ſix ounces of an inſipid phlegm, of no other ſmell but ſuch as, in all ſuch operations, ariſes from the fire. It appeared from this, that the matter contained no volatile *ſalt.* After this the quantity of two hundred drachms, calcined in a German crucible, were diſſolved in water. This compoſition of earth and water, boiled into a lixivium, made five hundred drachms, after it had boiled three hours, and the foul ſcum had been continually taken off during that time, and been filtrated; the cloſe liquor being then evaporated to a dryneſs, there remained a pure white fixed alkaline *ſalt*, of the nature of pot-aſh.

The people of the place make ſoap with this earth in the following manner: they mix three fourths of this earth with one fourth of lime, and then pour boiling water upon this mixture; they ſtir this with a ſtick, and there ariſes to the top a thick browniſh ſubſtance, which they ſcum off; they ſave this in veſſels by itſelf. They uſe both this and the clear liquor in making ſoap, but this is much ſtronger than the liquor. They put fifty quintals of oil into a larger copper boiling veſſel, and kindling a large fire under it, they let the oil boil a little, and then throw in by little and little firſt the ſcum of the ley, and afterwards

wards the liquor itſelf; though ſometimes they uſe only the one, or only the other. They continue adding more and more of theſe, till the oil acquires the conſiſtence of ſoap, which is often ſeveral days. The fire muſt be all this time kept up very ſtrong. The ſcum of the ley, and the ſtronger part of the ley itſelf, mix with the oil in the boiling, and the weaker part unmixing itſelf, ſinks to the bottom, and is let out by a cock prepared for that purpoſe. This is not thrown away, but is let run upon freſh lime and earth, to make a ley for future uſe; and when the ſoap is perfectly made, it is laded out, and put upon a brick or lime floor to harden.

The common proportion in the making the ſoap is two loads of earth, five quintals each, to fifty quintals of oil, and the produce is between ſeventy and eighty quintals of ſoap. The earth is bought at a dollar a load, and the ſoap at ſix and a half a quintal. There are employed annually, in making ſoap at Smyrna, at leaſt ten thouſand quintals of oil. The bringing the ſoap earth to Smyrna employs a thouſand camels, or fifteen hundred, for eight months of the year, the four ſummer months being too hot for camels to travel in. A common ſoap-houſe produces, at a medium, a thouſand dollars a year clear profit. Phil. Tranſ. Nº 220, p. 230.

SAPONARIA. in the *Materia Medica*, a name given at different times to ſeveral plants, which had in ſome ſort the properties of ſoap. See SOAP-*wort*.

The *ſtruthium* of the Greeks, and *herba lunaria* of the Romans, having ſomewhat of this property, and being uſed in cleaning of the wool, ſeveral authors have explained it by the word *ſaponaria*; but this is leaving us as much in the dark, as to the plant, as we were before, not at all aſcertaining which, if any of the plants at one time or other ſo called, was to be underſtood as being the ſame with the *ſtruthium*.

The Greeks have many times called hyſſop by the name *ſaponaria*; others have given the ſame name to the anagallis, or pimpernel; and others to ſeveral different plants, which they ſuppoſed to have the effects of ſoap, or of nitre in cleanſing of things.

None of the plants, however, that we have under the name *ſaponaria*, will at all agree with the *ſtruthium*, or *herba lunaria*, which was a thiſtle; and the very Arabians ſeem uot to have known it, but have erroneouſly ſuppoſed their candiſi to be it.

SAPONARIA *terra*, in *Mineralogy*, a name given by ſome authors to the common FULLERS earth.

SAPONARIA *terra alba*, in *Natural Hiſtory*, a name given by ſome authors to the common tobacco-pipe-clay.

They called the common fullers earth alſo *ſaponaria terra* and diſtinguiſh it from this by the epithet *purpuraſcens*; though it has no ſuch colour as purple about it. See CIMOLIA.

SAPONARIUM *lixivium*. See LIXIVIUM *ſaponarium*.

SAPONEA, a name given by authors to a pectoral medicine, made of oil of ſweet almonds and ſugar, mixed with the diſtilled water of violets.

SAPOTA, *achras*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the flower has a permanent empalement, compoſed of ſix oval, acute-pointed leaves; it is ovated, divided into ſix ſegments, and has ſix ſhort ſtamina the length of the tube, terminated by arrow-pointed ſummits, with an oval germen ſupporting a ſhort ſtyle, crowned by an obtuſe ſtigma; the germen becomes an oval, ſucculent fruit, divided into ten cells, and incloſing one or two oval hard nuts, or ſtones. Miller enumerates two, and Linnæus three ſpecies.

The name of *ſapota* is what theſe fruits are called by the natives of America, to which ſome add the appellation of mammee; but there is no other name given to theſe fruits by the Engliſh, ſince they have ſettled in the Weſt Indies.

The firſt of theſe trees is common about Panama, and ſome other places in the Spaniſh Weſt Indies, but is not to be found in any of the Engliſh ſettlements in America.

The ſecond ſort is very common in Jamaica, Barbadoes, and moſt of the iſlands in the Weſt Indies, where the trees are planted in gardens for their fruit, which is by many perſons greatly eſteemed. Miller.

SAPP. See SAP.

SAPPADILLA, in *Botany*. See *Star* APPLE.

SAPPAN, in the *Materia Medica*, a name uſed by ſome authors for the wood of the *arbor Campechiana*, or logwood, uſed in dying.

SAPPERS, are ſoldiers belonging to the royal artillery, who are employed in forming the *ſaps*.

A brigade of *ſappers* generally conſiſts of eight men, which form two equal parties; whilſt one party is advancing the *ſap*, the other furniſhes the neceſſary materials; and thus they alternately relieve each other.

SAPPHIC, in *Poetry*, a kind of verſe much uſed by the Greeks and Latins; and ſo denominated from the inventreſs *Sappho*.

The *Sapphic* verſe conſiſts of eleven ſyllables, or five feet; whereof the firſt, fourth, and fifth, are trochees, the ſecond a ſpondee, and the third a dactyl, as in

Integer vitæ, ſceleriſque purus,
Non eget Mauri jaculis nec arcu. HOR

Three verſes of this kind, cloſed with an Adonic verſe, conſiſting of a dactyl and ſpondee, uſually make a ſtrophe. Though we have ſome choruſſes in the ancient tragic poets, containing a much greater number of *Sapphics* ſucceſſively. They generally run rough, unleſs they have the cæſure after the ſecond foot.

SAPPHIRE, in *Natural Hiſtory*, the name given by the moderns to a beautiful pellucid gem of a blue colour. This is, however, extremely different from the ſtone the ancients knew under the name of the *ſapphire*; for that was no pellucid gem, but an opake ſtone of a very deep blue, veined with white, and ſpotted with ſmall gold-coloured ſpangles, in form of ſtars, and was only a more beautiful kind of their *cyanus*, which was the ſtone we call *lapis lazuli*.

The deſcriptions all the authors of antiquity give of the ſtone they called the *ſapphire*, plainly evince this; and hence authors of a later date have too haſtily concluded, that our *ſapphire* was wholly unknown to them; but this ſeems a very improbable conjecture; and a ſtrict enquiry into their writings will ſhew that they have very well deſcribed our *ſapphire* under the name of the *ſky blue beryl*, or *beryllus aëroides*; and as it had among them no peculiar generical name, it could not have been better named than thus; as the beryl is plainly that of all the gems to which the *ſapphire* moſt approaches, and its colour is in the fineſt ſpecimens a pure ſky blue.

It is in its moſt perfect ſtate a very elegant and valuable gem, and is ſecond only to the diamond in luſtre, hardneſs, and price. It is met with of various ſizes, but ſeldom ſo very ſmall as many of the other gems, and has been ſometimes found up to three quarters of an inch in diameter. Its more uſual ſtandard is between a ſeventh and a ſixth of an inch. It is various in figure, being ſometimes found in the pebble, and ſometimes in the cryſtal form. Its moſt uſual appearance is in ſmall, irregularly rounded, or oblong flattiſh ſtones, covered with no cruſt, and looking of a bright blue, but without the luſtre and fine poliſh of the native ruby. It is ſometimes alſo found in beautiful hexangular cryſtals, terminated by hexangular pyramids of a fine blue throughout, and naturally of a high poliſh. Sometimes alſo theſe ſprigs are only coloured at their points, and ſometimes they are wholly colourleſs.

The proper and only colour of the gem is blue; in ſome ſpecimens this is a fine deep colour, like that of the cleareſt ſky; and in others it varies into paleneſs in ſhades of all degrees, between that and the pure brightneſs and water of cryſtal, without the leaſt tinge of colour, but with a ſuperior brightneſs, that eaſily diſtinguiſhes it at ſight from cryſtal, it more than any ſtone approaching to the nature of the diamond; and in ſome it has a duſky whiteneſs, like that of milk: this laſt colour might be ſuppoſed owing to a mixture of a fine white earthy matter, but that it has been found that different mixtures of pellucid liquors, ſolutions of copper, and of different ſalts, are capable of producing the ſame colour.

It ſeems very clear from a multitude of experiments, that this gem, in its pureſt and fineſt ſtate, owes its beautiful blue to copper; and the ſame metal being found capable of giving this milky look with a caſt of blue, the general opinion of the laſt mentioned milky-looking ſtone being a true *ſapphire*, ſeems perfectly right.

The pebble *ſapphires* are always finer than the cryſtalliform ones; and moſt of the fine colourleſs *ſapphires*, which our jewellers commonly, but very improperly, call white *ſapphires*, as they have not the leaſt tinge of whiteneſs in them, but are abſolutely colourleſs as the pureſt waters, are of the pebble, not of the ſprig kind.

The *ſapphire* is of very different degrees of hardneſs and brightneſs in different parts of the world, and conſequently of very different value.

The ancients uſed to diſtinguiſh the *ſapphire*, as they did all the other precious ſtones, into the male and female kind, according to the deeper or paler colour; and our jewellers, according to their cuſtom of dividing the gems into ſeveral kinds, according to their different accidents of purity, beauty, &c. make four kinds of *ſapphire*.

The fineſt *ſapphires* in the world are thoſe brought from the kingdom of Pegu in the Eaſt Indies, where ſome are found perfectly colourleſs as cryſtal, and others of all ſhades of blue, up to the violet colour, but never with the leaſt tinge of purple, or any other colour but true blue: theſe are all found in the pebble form. We have other very fine *ſapphires*, both of the pebble and cryſtalliform kind, from Biſnagar, Conanor, Calicut, and the iſland of Ceylon: theſe are of all the ſhades of colour; and in Ceylon there are ſometimes found a ſort of baſtard gems, part red and part blue, ſeeming of a mixt nature between the *ſapphire* and the ruby.

The occidental *ſapphires* are from Sileſia, Bohemia, and many other parts of Europe, and are often very beautiful ſtones; but are greatly inferior, both in luſtre and hardneſs to the oriental.

Many people value the *ſapphire* beyond the ruby, and give it the ſecond place among precious ſtones, viz. that next the diamond: others give that place to the ruby. A *ſapphire* is unfuſible by fire; but being heated to a certain degree between two crucibles luted together, loſes all its blue, and becomes perfectly colourleſs; ſo as to deceive even the jewellers themſelves, and paſs for a diamond.

Our druggiſts ſell two kinds of *ſapphires* uſed in the confection of hyacinth; the one red, the other blackiſh. The laſt, by reaſon of the deep tincture they give that medicine, are very improperly uſed there: the former are little reddiſh ſtones, of the ſize of pin heads, very hard, and difficult to pulverize.

Some rank the cat's eye, *oculus cati*, in the number of *ſapphires*. This is a gem remarkable for a fine diverſity of colours, as well as for its hardneſs, which bears a poliſh equal with that of the true *ſapphire*.

The chemiſts make ſeveral preparations of *ſapphire*; as a ſalt, a tincture, an eſſence, a water, an oil, &c. and there are few diſeaſes but they pretend themſelves able to cure by remedies compoſed thereof.

The method of making the counterfeit *ſapphires* in paſte is this. Take of cryſtal prepared, two ounces; minium, or common red lead, ſix ounces; zaffer prepared, five grains; manganeſe prepared, ſeven grains; mix all the powders perfectly together, and put them into a crucible; cover it with a ſtrong lute, and put the whole into a potters kiln, to ſtand in the hotteſt place for twenty-four hours; it will be of a moſt beautiful deep *ſapphire* colour. Blue paſtes of two other degrees of blue are alſo made in the following manner. For a ſky blue, take cryſtal prepared, two ounces; red lead, ſix ounces; prepared zaffer, twenty-one grains; mix all well together, and bake them as before. For a deep violet blue, take cryſtal, two ounces; red lead, four ounces, and four grains of painters blue ſmalt; mix all, and bake together in the kiln.

Theſe both make good blues, but much inferior to the firſt proceſs. Neri's Art of Glaſs, p. 132. See PASTE.

SAPPHIRE-*colour*. To give this elegant and beautiful blue to glaſs, the workers in the glaſs-houſe uſe the following method. Take a hundred weight of rochetta-frit, and add to it a pound of prepared zaffer, and to this an ounce of manganeſe; mix all well together, and put them into the furnace to melt and purify, and when it is become perfectly pure and fine, work it into veſſels, &c. This ſmall quantity of manganeſe, with the zaffer, gives a moſt beautiful violet blue. Neri's Art of Glaſs, p. 93. See *Blue* GLASS.

SAPPHIRE-*rubies* are certain precious ſtones, between blue and red; which, in effect, are nothing but rubies, whoſe colour is mixed with blue.

SAPPHIRINA *aqua*, the *blue eye-water*, is thus made. Pour a pint of ſtrong and freſh lime water into a copper veſſel; and add to it a drachm of crude ſal ammoniac, and throw in ſome filings or ſmall pieces of copper, it ſoon acquires a beautiful blue colour, and is not only uſed as an eye-water, but alſo to deterge old ulcers; and ſometimes is mixed with other things in injections for gonorrhœas.

SAPPHIRO-ACHATES. See AGAT.

SAPPHIRO-RUBINUS, in *Natural Hiſtory*, a name given by ſome modern writers on gems to a ſtone, partly a ſapphire and partly a ruby; or, more properly ſpeaking, a ſapphire tinged in ſome part with the ruby colour, while the reſt remains blue. The Indians call this NILACUNDI.

SARABAITES, *Sarabaitæ*, a name anciently given by the Egyptians to vagabond and ſtrolling monks, who travelled through various cities and provinces, and gained a maintenance by fictitious miracles, by ſelling relics to the multitude, and other ſimilar frauds.

The word is derived from the Hebrew סרב *ſarab*, *to rebel.*

St. Benedict gives a frightful idea of theſe *Sarabaites* in the firſt chapter of his rule. Caſſian does not ſpeak a whit more favourably of them in his fourteenth conference; nor St. Jerom in his letter to Euſtochium.

Caſſian calls them, *Renuitæ*; *quia jugum regularis diſciplinæ renuunt.*

SARABAND, a muſical compoſition in triple time; being, in reality, no more than a minuet, whoſe motions are ſlow and ſerious.

Saraband is alſo a dance to the ſame meaſure, uſually terminating when the hand riſes; whereby it is diſtinguiſhed from the courant, which ends, when the hand that beats time, falls.

The *ſaraband* is ſaid to be derived originally from the Saracens, as well as the CHACONE. It had its name, according to ſome authors, from a comedian called Sarabande, who firſt danced it in France. Others derive the name from the Spaniſh *ſarac, a ball.* It is uſually danced to the ſound of the guitar, or caſtanettes.

SARABARA, among the *Ancients*, a Mediſh or Babyloniſh garment, which reached only to the knees.

SARACA, in *Botany*, a genus of the *diadelphia pentandria* claſs. Its characters are, that it has no calyx; that the corolla is funnel-ſhaped and quadrifid, and that the fruit is a pedicillated pod. There is only one ſpecies.

SARACEN's *conſound*, in *Botany*. See GOLDEN *rod*.

SARACEN's *conſound, true*. See GROUNDSEL.

SARACHINUS, in *Ichthyology*, a name given by Charleton and others, to the fiſh called by the generality of authors the *thriſſa*, by us the SHAD, or mother of the herrings.

Authors have given names to the herring kinds, according to their different growth and ſize, and multiplied the ſpecies much beyond what they ought to be. Artedi obſerves, that the *agonus* and *ſarachinus* are only herrings of different growth, and that the *alauſa minor* of authors is the ſame with the *agonus*. See CLUPEA.

SARACUS, in *Ichthyology*, a name given by ſome authors to a ſpecies of ſea-fiſh of the herring kind, more uſually called *agonus*, and by many ſuſpected to have no eſſential difference from the *alauſa* or ſhad, but to be the ſame fiſh in another ſtate.

SARAX, in *Botany*, a name given by ſome authors to the whole claſs of the ferns.

SARCASM, *ſarcaſmus*, in *Rhetoric*, a keen, bitter irony, whereby the orator ſcoffs and inſults his adverſary.

Such was that of the Jews to our Saviour: *Thou, who deſtroyeſt the temple, and raiſeſt it in three days, ſave thyſelf*, &c. And again, *He ſaved others, himſelf he cannot ſave*. Or that of Turnus to a Trojan ſlain by him, in Virgil:

> *En agros, &, quam bello, Trojane, petiſti,*
> *Heſperiam metire jacens! Hæc præmia, qui me*
> *Ferro auſi tentare, ferunt: ſic mœnia condunt!*

SARCITES, the *fleſh ſtone*, in *Natural Hiſtory*, a name given by ſome authors to the cornelian, from its being of the colour of fleſh, as it is very exactly in ſome pieces.

SARCITES, or **SUARITES**, is alſo a ſtone ſuppoſed to be found in the belly of a lizard; it ſeems to have been a ſpecies of pale cornelian. Pliny mentions it, but gives no deſcription of it.

SARCITES, the *fleſh ſtone*, is alſo a name given by ſome authors to a ſpecies of ſtone, whoſe fibres were ſuppoſed to repreſent thoſe of beef. It was of a black colour, and firm texture.

SARCLIN-*time*, is the time or ſeaſon when huſbandmen weed their corn.

SARCOCELE, Σαρκοκηλη, formed from σαρξ, *caro*, *fleſh*, and κηλη, *tumor*, in *Surgery*, a fleſhy, ſcirrhous excreſcence, very hard, yet not very painful; riſing up by little and little about the teſticles, or on the inner membrane of the ſcrotum.

Sometimes, indeed, it is painful; in which caſe there is danger of its degenerating into a cancer.

The *ſarcocele* conſiſts primarily in an enlargement, induration, and obſtruction of the vaſcular part of the teſticle; but this alteration is attended, in different people, with ſuch a variety of circumſtances and appearances as to occaſion many diſtinctions of this diſeaſe. If the body of the teſticle, though enlarged and indurated to ſome degree, be perfectly equal in its ſurface, and void of pain, has no appearance of fluid in its tunica vaginalis, and produces very little uneaſineſs, except what is occaſioned by its mere weight, it is uſually called a *ſimple ſarcocele*, or an indolent ſcirrhus. If the teſtis be enlarged and hardened, and there be, at the ſame time, a palpable accumulation of fluid in the vaginal coat, the diſeaſe has by many been named a *hydro-ſarcocele*. If the lower part of the ſpermatical veſſels and the epididymis were enlarged, hard, and knotty, they ſuppoſed it to be a fungous or morbid accretion, and called it the *caro adnata ad vaſa*. If the teſticle itſelf was unequal in its ſurface, but not painful, they diſtinguiſhed it by the title of *caro adnata ad teſtem*. If it was tolerably equal, not very painful, nor frequently ſo, but at the ſame time hard and large, they gave it the appellation of an *occult*, or *benign cancer*. If it was ulcerated, ſubject to frequent acute pain, to hæmorrhage, &c. it was known by the name of a *malignant*, or *confirmed cancer*. Theſe ſeveral diſtinctions refer only to different ſtages of the ſame diſeaſe, and depend on various accidental circumſtances; ſuch as age, habit, manner of living, &c. There is hardly any diſeaſe ſubject to greater variety than this in its firſt appearance, and the changes it undergoes. Sometimes its firſt appearance is a mere ſimple enlargement and induration of the body of the teſticle, without pain, inequality of ſurface, or any ſenſible inconvenience, except that which is owing to its weight; and in this ſtate it has remained for a conſiderable time, without any material alteration. Sometimes, on the other hand, it ſuddenly becomes unequal and knotty, and is attended with very acute pains, darting up to the loins and back, but without burſting through the integuments. At other times it makes its way through all the membranes which envelope the teſticle, and either produces a large, foul, ſtinking, phagedenic ulcer, with hard edges, or thruſts forth a painful, gleeting fungus, ſubject to frequent hæmorrhage. Sometimes it appears under the form of the *hydro-ſarcocele*; ſometimes there is no fluid in the cavity of the tunica vaginalis; but the body of the teſticle itſelf is formed into cells, containing either a turbid kind of water, a bloody ſanies, or a purulent fetid matter. Sometimes the diſorder ſeems to be merely local, that is, confined to the teſticle, not proceeding from a tainted habit, nor accompanied with diſeaſed viſcera, but occaſioned by an external injury. At other times, a pallid, leaden countenance, indigeſtion, frequent nauſea, colic pains, ſudden purgings, &c. indicate a vitiated habit, and diſeaſed viſcera. Its progreſs from the teſtis upward toward the proceſs, which is its moſt common courſe, is alſo very uncertain; the diſeaſe occupying the teſticle only, without affecting the ſpermatic proceſs, in ſome ſubjects, for a conſiderable time; while, in others, it totally ſpoils the teſticle very ſoon, and almoſt as ſoon ſeizes on the ſpermatic chord.

There are various cauſes to which this diſeaſe has been aſcribed; but the moſt common, though equally groundleſs with many others, are the HERNIA *humoralis*, and the HYDROCELE of the vaginal tunic.

It uſually owes its origin to ſome external cauſe, as a blow, a bruiſe, or contuſion. Such accidents occaſion the nutritious juices to ſtop, and to be collected in great quantities in the relaxed or compreſſed pores of thoſe parts; by which means is formed that kind of tumor called *ſarcocele*, and by ſome *hernia carnoſa*. It has been frequently owing to venereal complaints, and a cancerous habit.

It is a very troubleſome and obſtinate diſeaſe, and is frequently incurable by any other means than caſtration, or cutting out of the teſticle. But great ſkill is neceſſary to determine the preciſe nature and ſeat of the diſeaſe, and the proper time and manner of performing this operation. In the true *venereal ſarcocele*, or indurated teſtis, the diſeaſe ought always to be eradicated from the habit before any attempt be made locally. It ſhould be carefully obſerved, that the method of treating the venereal induration, which is moſt frequently ſucceſsful, will prove extemely prejudicial in the ſcirrhous hardneſs. By mercury, judiciouſly adminiſtered, the venereal patient's diſeaſe may be removed, and his health reſtored; but a ſcirrhus, or cancer, is uſually exaſperated by it, and a mercurial courſe occaſions a loſs of time, which is not always retrievable. In caſes where the teſticle is enlarged and indurated, but the diſeaſe is not degenerated into a proper ſcirrhus, a coarſe of medicine may not only give relief, but effect a cure. Mr. Warner, in the treatment of ſuch caſes, began with giving his patient ſome mercurial purges; after he had taken two or three doſes of this phyſic, he put him into a courſe of the extractum cicutæ, beginning with ſmall quantities of this medicine, and gradually increaſing it. With the cicuta he joined the decoctum corticis; ordering, at the ſame time, the tumor to be twice a day fomented with a ſtrong decoction of the leaves of the cicuta boiled in water, and afterwards to be covered with a cataplaſm of the ſame leaves mixed with the decoction, and ſoftened with oil. Having purſued this method, in a particular caſe which he recites, the tumor of the teſticle was removed; and there remained only a ſmall degree of induration and enlargement of the epididymis, which were perfectly diſperſed by wearing a plaſter compoſed of mercury, ſoap, and gum ammoniacum. But when there is no probability of leſſening the tumor, either by local applications or internal remedies, but on the contrary, it is found to increaſe; and more eſpecially when by neglect it becomes cancerous, the only relief which the caſe admits of is the extirpation of the part. However, it behoves every practitioner to be well acquainted, not only with ſuch circumſtances as render caſtration practicable and adviſeable, but with thoſe which prohibit ſuch attempt. Theſe, Mr. Pott obſerves, are of two kinds; and relate either to the general habit of the patient, and the diſorder and indiſpoſitions of ſome of the viſcera, or to the ſtate of the teſticle and ſpermatic chord. Whenever there are manifeſt ſymptoms of a truly diſeaſed ſtate of any of the principal viſcera, the ſucceſs of the operation becomes very doubtful; more eſpecially if there be reaſon to conclude, that a cancerous virus is the real cauſe of them. The ſtate of the mere teſtis can hardly ever be any objection to the operation; the ſole object of conſideration is the ſpermatic chord: if this be in a natural ſtate, and free from diſeaſe, the operation not only may, but ought to be performed, whatever be the condition of the teſticle; but if the ſpermatic chord be really diſeaſed, the operation ought not to be attempted. When the ſpermatic veſſels are not only turgid and full, but firm and hard; when the membrane, which inveſts and connects them, has loſt its natural ſoftneſs and cellular texture, and has contracted ſuch a ſtate, and ſuch adheſions, as not only greatly to exceed its natural ſize, but to become unequal, knotty, and painful, upon being handled, and this ſtate has poſſeſſed all that part of the chord, which is between the opening in the oblique muſcle and the teſticle, no prudent, judicious, or humane perſon, will attempt the operation: nevertheleſs, every enlargement of the ſpermatic chord is not of this kind, nor by any means ſufficient to prohibit or prevent the operation. Theſe alterations or enlargements ariſe from two cauſes, viz. a varicoſe dilatation of the ſpermatic vein, and a collection, or collections, of fluid in the membrane inveſting and enveloping the ſaid veſſels; and they are particularly deſcribed by Mr. Pott.

The operation of caſtration, deſcribed by this excellent writer, is performed as follows; the patient, being laid on a table of convenient height, the integuments covering the ſpermatic veſſels in the groin are to be divided. This inciſion ſhould be begun, as nearly as can be, oppoſite to the opening in the abdominal muſcle, and ſhould be continued a good way down the ſcrotum. The ſpermatic chord, thus laid bare, is to be freed from its ſurrounding membranous connections; and then the operator, with his finger and thumb, ſeparating the blood-veſſels from the vas deferens, muſt paſs a needle, armed with a ligature between them; and having tied the former only, muſt cut through or divide the whole chord, at a quarter or half an inch diſtance from the ſaid ligature, according as the ſtate of the proceſs and teſticle will admit. He is then, with the ſame knife, to diſſect the teſticle out from its connections with the ſcrotum; the looſe texture of the dartos, the previous ſeparation of the teſticle from the ſpermatic veſſels, and the help of an aſſiſtant to hold up the lips of the wound, will enable him to do this with very little pain to the patient, and great facility to himſelf. If any conſiderable artery bleeds, either in the ſcrotum or in the dartos, it muſt be reſtrained by ligature; and when that is done, the void ſpace, in which the teſticle was, is to be very lightly filled with ſoft dry lint, which lint ſhould be ſuffered to remain, until it be perfectly looſened by the ſuppuration from every part of the ſore; and thus the ſore will be found clean, and well digeſted, and require no other dreſſing afterward than mere dry lint; which, from this time, ſhould be applied in ſuch quantity and manner, as to give nature an oportunity of contracting and healing the wound as faſt as ſhe can; in both which ſhe may be conſiderably aſſiſted by the judicious exhibition of the bark. See remarks on this method of operation, compared with M. Le Dran's, and a recital of caſes, &c. in Pott's Chirurgical Works, vol. ii. ſect. xii. p. 429, &c. 1779 See alſo Warner's Account of the Teſticles, p. 76, &c.

SARCOCOLLA, Σαρκοκολλα, a gum-reſin ouſing out of an oriental vegetable, either with or without inciſions

It has been the opinion of many writers of the middle ages, that this was the gum of the peach-tree. The origin of this opinion may be traced to Dioſcorides, who, treating of *ſarcocolla*, ſays, that it is the gum of a Perſian tree. The words *Perſian-tree* and *peach-tree* are the ſame both in Greek and Latin; and hence, what he ſaid of a tree growing in Perſia, has been attributed to the peach-tree; and this gum, ſo very different from the gum of that tree, has been ſuppoſed to flow from it.

Neither authors, nor merchants, are agreed as to the place where it grows: ſome ſay it is in Perſia; others, in Arabia Deſerta. It comes either in grains, or in tears of different colours; ſometimes white, ſometimes yellow, and ſometimes red; but the whiteſt are preferred, as being the freſheſt.

The taſte is bitter, accompanied with ſomewhat of a diſagreeable ſweetneſs. It ſoftens in the mouth, bubbles, and catches flame from a candle, diſſolves almoſt wholly in water, and the greateſt part of it in rectified ſpirit. It is eſteemed warm and drying; it is ſaid, internally to act as a ſlow and dangerous purgative; but externally to be very good for conſolidating and healing wounds; whence its name, from the Greek σαρξ, *fleſh*, and κολλα, *glue*.

It is ſometimes alſo uſed, diſſolved in breaſt-milk, in collyria, to ſtop defluxions, and take off ſpecks in the eye.

SARCO-EPIPLOCELE, a term uſed by the old medical writers, to expreſs a compound rupture, conſiſting of a deſcent of the *epiploon* and a *ſarcocele*; or a rupture of the indurated *epiploon*, whether umbilical or ſcrotal.

SARCOLOGY, in *Anatomy*, a diſcourſe on the FLESH, or the ſoft parts of the human body.

Anatomy is divided into two principal parts; *oſteology* and *ſarcology*. The firſt whereof treats of the bones and cartilages; the ſecond of the fleſh, and ſoft parts.

SARCOMA, Σαρκωμα, in *Surgery*, a fleſhy, fungous excreſcence, ariſing in the noſtrils, or other parts; nearly reſembling a polypus.

The *ſarcoma* chiefly differs from the polypus, as the latter grows from the part by ſeveral roots; the former by one continued root, or without any roots at all.

Every polypus is a *ſarcoma*; but not *vice verſa*. The *ſarcoma* frequently degenerates into a polypus.

The *ſarcoma narium*, by ſome called alſo *hyperſarcoma narium*, is the ſame with what is commonly called the *polypus narium*, a caruncle of various ſize and conſiſtence in the noſtril. Theſe caruncles are uſually ſoft, extenſive, and capable of elongation, but ſometimes they are hard and rigid. They are ſometimes pale, ſometimes red, and are generally ſmall in their beginnings, and advance but gradually; though ſome of them grow ſo faſt, as to hang down out of the noſe in three or four days time. They are uſually not attended with pain; but ſome of them are hard, livid, very painful, and have a tendency to become cancerous. Some are wholly concealed in the noſe, others hang down to the lips, and others, though contained in the noſe, yet diſtend it greatly. Some are of an even ſurface, and others like a cluſter; ſome deſcend backward through the apertures by which we draw breath through the noſe into the fauces; and grow ſo big there as to be viſible behind the uvula, and occaſion difficulty of ſpeaking and ſwallowing, and ſometimes almoſt ſtrangle the patient.

They have uſually but one root, though ſometimes ſeveral, and are uſually formed in and from the pituitary membrane; and the diſorder ſeems to be really no other than a morbid diſpoſition of the ſpongy production and glands of this membrane. The *ſarcoma* and *polypus*, though diſorders of the ſame kind, may however be properly enough made two ſpecies; the *polypus* being ſoft, and hanging by a ſlender root, like the ſtalk of a fig; and the *ſarcoma* of a more fleſhy conſiſtence, and adhering by a large, firm, and immoveable baſis.

Theſe diſorders come ſometimes from internal cauſes, ſometimes from external injuries, and too often prove cancerous, or are attended with a ſpina ventoſa, or caries of the bones of the noſe. They may be ſometimes removed by cauſtics; but the extirpating them with a knife is the ſhorteſt, ſafeſt, and moſt eligible method. Heiſter.

SARCOMA *of the eyes*, a fleſhy excreſcence or tubercle formed on the inner ſurface of the eye-lids. Theſe tubercles, in their beginnings, are uſually ſmall; but they, by degrees, advance often to a very conſiderable bulk. Some of theſe are of ſmooth ſurfaces, others rough and unequal, like a raſberry or mulberry.

They are always to be cured by extirpation, getting them out by a hook, a pair of plyers, or a needle and thread, and then cutting them out to the roots with ſciſſars; the wound ſhould be ſuffered to bleed a while, and afterwards waſhed with a collyrium made of aloes, tutty, and ſugar of lead, mixed in roſe-water, till it is perfectly healed. Some uſe the cauſtic to theſe tumors, but the ſciſſars are more ſafe, and leſs painful. Heiſter.

SARCOMPHALUM, Σαρκομφαλον, formed from σαρξ, *fleſh*, and ομφαλος, *navel*, in *Surgery*, &c. a fleſhy excreſcence of the navel; the cure of which is ſometimes attempted by emollient and reſolving remedies; but if theſe prove ineffectual, extirpation will be neceſſary.

SARCOPHAGUS, Σαρκοφαγος, in *Antiquity*, a ſort of ſtone coffin, or grave, wherein the ancients laid thoſe they had not a mind to burn.

The word, as derived from the Greek, literally ſignifies *fleſh-eater*; becauſe, at firſt, they uſed a ſort of ſtones for the making of theſe tombs, which quickly conſumed the bodies. The quarries from whence they dug them were near a city of Troas, named Aſſum. They had the faculty to waſte away a body to nothing, ſave the teeth, in forty days.

This ſtone reſembled a reddiſh pumice-ſtone, and had a ſaltiſh taſte; they alſo made veſſels of it to cure the gout, into which they put their feet, not ſuffering them to continue there too long. See *Aſſius* LAPIS.

SARCOTHLASMA, formed of σαρξ, *fleſh*, and θλαω, *I bruiſe*, a term uſed by the old phyſicians to expreſs a bruiſe on the fleſh.

SARCOTICS, Σαρκωτικα, formed from σαρξ, *fleſh*, in *Surgery*, remedies proper to fill up wounds and ulcers with new fleſh; the ſame as incarnatives. Such are ſarcocolla, dragon's blood, frankincenſe, &c. See INCARNATIVE, and EPULOTIC.

SARCULATION, a term uſed in the *Ancient Huſbandry*, to expreſs a ſort of hoeing, which they uſed among their peaſe and beans, and ſometimes among their corn.

The *ſarculum* was a ſort of narrow and long hoe, with which they rooted up the weeds among plants growing irregularly. We have the ſame kind of inſtrument in uſe at this time in ſome places for hoeing between the plants of flax; but one way of ſowing, in rows, at preſent, has prevented the neceſſity of having recourſe to ſo inconvenient and troubleſome an inſtrument in other caſes.

SARCULATURA, in our *Old Writers*, weeding of corn; whence *una ſarculatura* was the tenant's ſervice of one day's weeding for the lord. *Tenet in bondagio & debet unam* ſarculaturam, &c.

SARDA, in *Natural Hiſtory*. See CORNELIAN.

SARDA, in *Ichthyology*, a name by which ſome call the fiſh, more uſually known by the name of PELAMYS, or *pelamys ſarda*; a fiſh reſembling a young tunny, but having larger and longer teeth, and no ſcales.

SARDACHATES, in the *Natural Hiſtory of the Ancients*, the name of a ſpecies of agate, found frequently at this time on the ſhores of rivers in the Eaſt Indies, and ſeeming to contain an admixture of the matter of the common red cornelian, is very excellently characterized by the name the ancients gave it.

It is a very elegant and beautiful ſpecies, and is often found of a conſiderable ſize. It is of a pale, whitiſh ground, and has no veins or other variegations, except a multitude of minute ſpots, of a pale red, and of the matter of the red cornelian; theſe are ſcattered very ſparingly in ſome parts of the maſs, but in others they are ſo cluſtered together, as to make ſmall clouds of an elegant red. It is very hard, and is capable of an elegant poliſh. Our lapidaries do not much eſteem it, but in ſome other places it is wrought into toys, which are much eſteemed.

SARDANUS, in *Ichthyology*, the name of a fiſh of the harengiform kind, caught in the Mediterranean, and common in the markets of Rome and Venice. Its body is broader than that of the pilchard, and its back green; and the line which runs along the belly is much leſs rough than in that fiſh. It is indeed eaſy to diſtinguiſh it from the pilchard, but not ſo eaſy to ſhew in what it differs from the common herring more than in ſize. It ſeems very probable, that it is no diſtinct ſpecies of fiſh; but that the herring, like the pilchard, is always ſmaller in the Mediterranean than the ocean. Willughby.

SARDAR, in the Turkiſh *Military Orders*, the title of an officer choſen from among the caias of the janizaries on ſome particular occaſion; ſuch as to head a detachment ſent to war, or on any other occaſion.

The word is of Perſian origin, and is derived from *ſar*, which in that language ſignifies a *head* or *chief*.

This officer is a colonel of a detached body; he is attended in his expedition by his deputy, and two ſecretaries, and his office expires at his return from the buſineſs he was diſpatched on.

SARDELLA, in *Ichthyology*, a name by which ſome have called the pilchard of the Mediterranean ſea, ſuppoſing it different in ſpecies from that of the ocean, but it ſeems in reality to be no other than the common PILCHARD, only not growing ſo large there as in the ocean.

SARDIAN, *Sardoin*, or *Lapis* SARDIUS, a precious ſtone, of a blood colour, ſemi tranſparent; the ſame with what we otherwiſe call a *cornelian*.

The moſt beautiful *Sardians* are thoſe brought from about Babylon: thoſe of Sardinia, whence they take their name, are in the ſecond claſs. There are others, and thoſe no contemptible ones, found near St. Mauro, in Albania; and other, very ſmall ones, about the Rhine, in Bohemia, Sileſia, &c. To give them the greater luſtre, it is uſual, in ſetting them, to lay ſilver leaf underneath. The *Sardian* is moſt uſed for ſeals, as graving eaſily, yet taking a fine poliſh.

The author of the book falſly aſcribed to Albertus Magnus, attributes ſeveral wonderful virtues to this ſtone. See CORNELIAN.

SARDINA, in *Ichthyology*, a name by which many have diſtinguiſhed a fiſh of the harengiform kind, which is in reality, however, no other than a ſmall pilchard, the pilchard growing to a larger ſize in the ocean than in the Mediterranean.

SARDOA, SARDOUM, or SARDONIA *herba*, ſo called from its growing plentifully in Sardinia, in *Botany*, a name given by the ancients to the water-crowfoot, with jagged leaves, called alſo *apiaſtrum* and *ranunculus apii folio*, from its leaves reſembling in ſome degree thoſe of the ſmallage. This has been in all ages characterized as a poiſon; nor will the cattle touch it, though a ſucculent and well-looking herb; but Pliny has found means to confound this with baum, under the name of apiaſtrum, which he ſays is fed on by the bees in Italy, but is very well known to be a dangerous poiſon in Sardinia.

SARDONIAN *laughter*. See RISUS *Sardonius*.

SARDONYX, in *Natural Hiſtory*, the name of a genus of the ſemi-pellucid gems, which are conſiderably tranſparent, of the true onyx ſtructure, either zoned or tabulated, and are compoſed of the true matter of the onyx, variegated with zones of that of the red or yellow carnelian.

Of this genus there are four known ſpecies. 1. The thin-zoned red *ſardonyx*, or whitiſh onyx, with thin, ſnow white, and red ſtones; this is one of the moſt beautiful of the ſemi-pellucid gems. It is only found in the Eaſt Indies, and is greatly valued among our lapidaries.

The ſecond ſpecies is the broad-veined red *ſardonyx*, or horny onyx, with red punctuated zones. This is a beautiful ſtone, though greatly inferior to the former kind. This is found in New Spain, and in ſome parts of Europe, and is ſometimes wrought into ſnuff-boxes, counters for cards, or other toys; but is very little eſteemed.

The third ſpeices is the yellow-leaved *ſardonyx*, which, as its veins are as truly of the matter of the yellow carnelian, as thoſe of the former ſpecies are of the red, is certainly entitled as much as they to the name of *ſardonyx*.

It is found in many parts of the world, but is no where common, it being rare to meet with two ſpecimens of it together. Arabia, Armenia, Perſia, China, and New Spain, have all been known, at times, to produce it. In Italy it is very much valued, but with us it is hardly known.

The fourth ſpecies is the orange-coloured *ſardonyx*, or the bluiſh white onyx, with orange-coloured and whitiſh zones. This is a very ſingular ſpecies, and is not without its beauty, though greatly inferior to the former. It is found in Egypt, Arabia, and the Eaſt Indies, and not unfrequently in Germany; but the European is greatly inferior to the oriental.

Theſe are all the genuine *ſardonyxes*; but the ſtone called *ſardonyx*, in Pliny's time, being properly a CAMÆA, not a *ſardonyx*, belongs to that claſs. Hill's Hiſt. of Foſſ. p. 497.

SARFAR, a name given by ſome of the chemiſts to iron.

SARFE, in *Ichthyology*. See RED-*eye*.

SARGAZO, or SARGASO, in *Botany*, a name for the plant commonly called *ſea lentils*; a ſmall ſea-plant found among the rocks, and ſometimes at open ſea, and ſuppoſed to be a good diuretic.

SARGO, the name uſed by Aguſtino Scilla, in his book of Petrifactions, for the name of one of thoſe kinds of ſea-fiſh, in the hinder part of whoſe jaws are found thoſe round *dentes molares*, or grinder teeth, which, when found in a petrified ſtate, are called *bufonitæ*, or toad-ſtones.

It is very certain, that by *ſargo* Scilla means no other fiſh than the *ſargus*; yet Mr. Willughby ſays, that the *ſargus* has none of theſe round grinders, or *tubercula oſſea*, as he calls them, and makes this one of the characters by which the *ſargus* is to be diſtinguiſhed from the ſparus and ſcarus, and other fiſhes of that tribe.

It is probable that Scilla, who wrote more expreſly on theſe ſubjects diſſected his *ſargus* with too much accuracy, to be miſtaken in this material part of it; and it is poſſible that Mr. Willughby, though a very accurate writer, might overlook theſe teeth in the hinder part of the jaw of a fiſh which he was only deſcribing in the common way, and had no peculiar reaſon for examining in ſo nice a manner juſt in this part. Phil. Tranſ. N° 219. p. 195.

SARGUS, in *Ichthyology*, the name of a fiſh well known, and much eſteemed among the ancients, and not uncommon at this time in the markets of Rome, Venice, &c. being caught in the Mediterranean and Adriatic in conſiderable quantities. See *Tab.* IV. *of Fiſh*, N° 45.

It ſomething reſembles the ſparus in figure, but its noſe is longer and more pointed, and turns up a little, and its fore-teeth are ſhaped like two human teeth, which ſtand in the ſame part of the mouth. It has no tubercles in the hinder part of the jaws, as the ſparus has; and its whole body is variegated with brown traverſe rings, reſembling the variegations of the pearch, and has only one fin on the back, the anterior rays of which are prickly, the hinder ones not at all ſo. Willughby and Geſner.

SARGUS, in *Ichthyology*, is alſo the name of a river fiſh, called by others *gardon*, *ſardus*, and *cephalus*, and by many ſuppoſed to be no way eſſentially different from our common roach.

It is a river fiſh, very much reſembling the chub in its general figure, and the ſize of its ſcales, but it has a ſmaller head, and a ſomewhat broader body than that fiſh; its back is bluiſh, its neck greeniſh, and its belly white; it has no teeth; its eyes are yellow, and it is uſually leſs fat than the chub.

It is a very briſk and lively fiſh, and is a ſort of emblem of health among the French, and uſed proverbially as ſuch in the ſame manner as the roach among us. We ſay of a healthy man, *he is as ſound as a roach*; they, *he is as ſound as a gardon*. It is common in the rivers of France, Italy, and Germany, and is eſteemed but a moderately fine fiſh for the table. Willughby.

SARIGOY, in *Zoology*, a name by which ſome call the creature we know by the name of the OPOSSUM.

SARIO, in *Ichthyology*, a term uſed by ſome authors for the ſalmon when in the middle ſtage of its growth, when it is paſt its younger ſtate, in which it is properly called a *ſalar*, and is not yet arrived at what is properly called a SALMON.

SARISSA, in *Antiquity*, a very long ſpear uſed by the Macedonians. Ælian ſays, that by the ancient uſage they ought to be ſixteen cubits in length; but that in fact they were but fourteen, two cubits being allowed for the handle, and the other twelve to cover their bodies.

SARKA *princeps*, one of the Hebrew ACCENTS, ſometimes denoting a comma, and marked over a letter thus (~).

SARMATICA *lues*, a name given by ſome authors to the PLICA *Polonica*.

SARMENIUS *lapis*, a name given by the writers of the middle ages to a ſtone ſaid to be uſed in the poliſhing of gold, and to have virtues in medicine alſo; ſuch as preventing abortion, and the like.

It ſeems to have been only a corrupt way of ſpelling *ſamius lapis*, a ſtone to which Pliny has attributed the ſame virtue.

SARMENTOUS *ſtalk*. See STALK.

SARONIA, Σαρωνια, among the Greeks, a feſtival kept in honour of Diana, ſurnamed *Saronia*, from Saro, the third king of Træzene, by whom a temple was erected, and this feſtival inſtituted to her.

SAROS, Σαρος, in *Chronology*, a period of two hundred and twenty-three lunar months. Suidas in voc. Σαρος. Mem. Acad. Inſcr. tom. viii. p. 283.

The etymology of the word is ſaid to be Chaldean, ſignifying reſtitution, or return of eclipſes; that is, conjunctions of the ſun and moon in nearly the ſame place of the ecliptic.

The *ſaros* was a cycle like to that of *meto*. See CYCLE *of the moon*.

SAROSEL, in the *Glaſs Trade*, the name of the room into which the mouth of the leer opens, and in which the glaſs veſſels are placed, when taken out of the leer.

The men who attend to do this are called the *ſarole* men.

SAROTHRA, *baſtard gentian*, in *Botany*, a genus of the *pentandria trigynia* claſs. Its characters are, that the calyx is divided into five ſegments; the corolla has five petals, and the fruit is a ſingle-celled, three-valved, coloured capſule. There is only one ſpecies.

SARPA, in *Ichthyology*, the name by which the SALPA, a very beautiful fiſh of the Mediterranean, is known in the Italian markets.

SARPICULA, among the Romans, a term uſed by the old Roman writers to ſignify a pruning-hook.

SARPLAR *of wool*, a quantity of wool, otherwiſe called a pocket, or half ſack; a SACK containing eighty tod, a tod two ſtone, and a ſtone fourteen pounds.

In Scotland it is termed *ſarpliath*, and contains eighty ſtone.

SARPOLE, a name given to the fiſh called by authors SALPA.

SARRACENA, in *Botany*. See *Hollow-leaved ſea* LAVENDER.

SARRASIN, or SARRAZIN, in *Fortification*, a kind of PORT-CULLICE, otherwiſe called a HERSE, which is hung with ropes over the gates of a town or fortreſs, and let fall in caſe of a ſurprize.

SARRITION, *ſarritio*, in Roman authors, the term uſed to expreſs what we call hoeing in huſbandry, or ſomething analogous to it; that is, a way of ſtirring up the earth about young plants, and deſtroying the weeds that would grow among them. When the plants had been ſome time come up, they ſtirred the land with wooden rakes or harrows, and then went over the fields, and pulled up the weeds by hand.

They uſed two kinds of *ſarrition*; the one was intended only to move the ground, and was done lengthways of the furrows; the other was to cover up the young plants, that they might grow the more ſtrong and vigorous; and was performed by ſtirring up the earth croſs-ways of the furrows.

It is an error in the tranſlators of the ancients, to render the word *ſarritio* by *hoeing*, without giving any farther explication of it; for the ancients truly hoed their vineyards in an exact ſenſe of the word, but not their corn; neither did they plant their corn in rows, without which they could not give it their vineyard hoeing. This ſarculation was uſed only among ſmall quantities of ſown corn, and is yet in uſe for flax; for the ſarculum, which is a ſort of very narrow hoe, is ſtill uſed among the plants of flax growing irregularly, but this is too tedious and expenſive ever to have place in whole fields of corn.

If the ancients hoed their crops of corn ſtanding irregularly, as ſown at random, they muſt have made very mad work of it, ſince they were at no pains to ſow in rows, and hoe between them with their bidens, which was an inſtrument with which they tilled many of their vineyards, and which entered the ground as deep as the plough, and was a much better inſtrument than the Engliſh hoe, which is very ill calculated for the office its principal buſineſs lies in, which is ſtirring the ground. Tull's Horſehoeing Huſbandry.

SARSAPARILLA, SALSAPARILLA, or SARSA, a medicinal plant, being the root of a ſpecies of *rough bindweed*, or SMILAX, growing in New Spain, Peru, &c. chiefly uſed in decoctions and potions, for the venereal diſeaſe; being eſteemed a great abſorbent and ſweetener; and, on that ſcore, ſometimes taken as a tea.

Its root, which is the part in uſe, divides itſelf into a great number of filaments, ſix or ſeven feet long; of the thickneſs of a quill; it is browniſh withoutſide, and white within, only marked with two red ſtreaks. Its branches creep on the earth, along the trunks of trees, &c. as the ivy does.

To be good, it muſt be very dry, its filaments long, eaſy to cleave; and, in cleaving, they muſt not yield any duſt; when boiled in water, it muſt give it a reddiſh tincture. Some phyſicians much doubt the medicinal virtue of this root; as it does not diſcover much, either in taſte, ſmell, or tincture.

Sarſaparilla was firſt brought into Europe by the Spaniards, about the year 1563, with the character of a ſpecific for the cure of the lues venerea, which made its appearance a little before that time. The method of preparing it by the Spaniards and Indians of South America is as follows: they macerate an ounce of the root in almoſt four pints of water for twenty-four hours, and boil it away to one-half. They give of the expreſſed decoction half a pint twice a day, four hours before their meals, in bed, covered with cloaths, where they ſweat two hours, mixing a ſufficient quantity of the fine powder of the root with each doſe of the decoction. They purge them every tenth day. The reputation of this medicine declined, after its introduction into Europe; though it appears from experience, that, in many caſes, ſtrong decoctions of it, drank plentifully, and duly continued, are of very conſiderable ſervice for promoting perſpiration, and ſweetening or purifying the blood and humours. In the London Medical Obſervations, vol. i. art. 16. there are ſeveral inſtances of its efficacy in venereal maladies, as an aſſiſtant to mercury, or when mercury had preceded its uſe. It frequently and ſpeedily anſwered after mercurial unctions, and long continued courſes of ſtrong decoctions of guaiacum, had failed. Three ounces of the root are boiled in three quarts of river water, till the liquor, when ſtrained, amounts to about one quart, which is taken at three or four doſes, either warm or cold, every twenty-four hours. Dr. Harris ſays, that infants who have received the infection from the nurſe, though full of puſtules and ulcers, and ſometimes troubled with nocturnal pains, are cured by *ſarſaparilla* without mercurials. He directs the powder of the root to be mixed with their food.

There is another kind of *ſarſa*, the filaments of whoſe root are thicker, growing in the iſland Marignan, on the coaſt of Braſil: this is not eſteemed ſo good as the former.

There is a third kind brought from Muſcovy, whoſe roots are ſtill bigger, but good for nothing.

SARTORIUS, in *Anatomy*, the *taylor's muſcle*; a muſcle thus called, becauſe ſerving to throw one leg acroſs the other. It is alſo called LONGUS *tibiæ*, and *faſcialis*; and is an antagoniſt to the poplitæus. See *Tab. Anat.* (*Myol.*) *fig.* 1. *n.* 49. *fig.* 2. *n.* 38.

This is the longeſt muſcle of the human body; it is flat, and about two fingers in breadth, ſituated obliquely along the inſide of the thigh. It is fixed above by a very ſhort tendon, in the lower part of the anterior ſuperior ſpine of the os ilium, before the muſculus faſciæ latæ. The beginning of its body lies in the notch, between the two anterior ſpines of that bone. From thence it runs down obliquely over the vaſtus internus, and other muſcles that lie near it, all the way to the inſide of the knee, where it terminates in a ſmall tendon, which grows broader near its extremity, and is inſerted obliquely, and a little tranſverſly, in the forepart of the inſide of the head of the tibia, near the ſpine or tuberoſity of that bone, immediately above the inſertion of the gracilis interior.

The fleſhy body of this muſcle is encloſed in a vagina made by the faſcia lata; its fibres in general are longitudinal, and when its lower tendon turns obliquely over toward the head of the tibia, it ſeems to be braced down, and ſecured in its place, by a tendinous frænum or vagina. Winſlow.

SASHES, in *Military Language*, are badges of diſtinction, worn by officers, either round the waiſt, or over the ſhoulders. They are made of crimſon ſilk.

SASSAFRAS, in *Botany*, a ſpecies of the *laurus* or BAY-*tree*.

The wood of this tree, which is very common in moſt parts of North America, is yellowiſh and odoriferous, of a briſk aromatic ſcent, ſomewhat reſembling fennel. The natives call it *pavama*; the Spaniards and French call it *cinnamon-wood*; becauſe, at the conqueſt of that country, under Ferdinand Soto, in 1558, they imagined this to have been the true cinnamon-tree.

The lignum *ſaſſafras*, and chiefly its bark, wherein its principal virtue is ſuppoſed to reſide, as it does alſo in the ſmaller twigs more than in the larger pieces, was formerly ſold at an incredible price, to be uſed with ſarſaparilla and China-root, in the cure of the venereal diſeaſe. It is very drying and hot, though not quite ſo much as the guaiacum.

It is ſomewhat come into faſhion in families, as a common tea, which the ſhavings of it make agreeable enough; but the ſcandal of being good in venereal caſes is a detriment to it, and prevents much good being done by it. Chooſe that covered with a thick bark, reddiſh, and rough, of a ſharp taſte, and a ſtrong aromatic ſmell. It gives out its virtues, together with a reddiſh colour, totally to ſpirit, and leſs perfectly to water. Diſtilled with water, it yields a fragrant eſſential oil (ſee OIL *of ſaſſafras*), of a penetrating pungent taſte, the heavieſt of all eſſential oils, and ſo ponderous as to ſink in water; limpid and colourleſs when newly diſtilled; by age growing yellowiſh, and at length of a reddiſh brown colour; the remaining decoction, inſpiſſated, yields a bitteriſh, ſubaſtringent extract. The inſpiſſated extract, obtained from rectified ſpirit, diſtilled from the tincture made in that menſtruum, retains, along with the bitterneſs and ſubaſtringency, nearly all the aromatic matter of the root. *Saſſafras* is uſed as a mild corroborant, diaphoretic, and ſweetener, in ſcorbutic, venereal, cachectic, and catarrhal diſorders. For theſe purpoſes, both the volatile and the fixt parts, the diſtilled oil, and the watery extract, have been given with ſucceſs: the ſpirituous tincture, or extract, which contain both, appear to be the moſt elegant preparations. Infuſions of the cortical or woody part, raſped or ſhaved, in water, are apt, by their fragrance, on firſt taking them, to affect the head; but this inconvenience, to which neither the watery nor ſpirituous extract are ſubject, is commonly remedied by continued uſe. Lewis's Mat. Med.

SASSE, in ſome of our ſtatutes, denotes a kind of weir, with flood-gates, commonly uſed in navigable rivers, for the damming and looſing the ſtream of water, as occaſion requires, for the better paſſing of boats and barges to and from places.

This, in the weſt of England, is called a *lock*, in the river Lee a *turnpike*, and in other places a *ſluice*.

SASSOROLLA, in *Ornithology*, the name of a peculiar ſpecies of pigeon, called by ſome *columba rupicola*, or the rock pigeon.

It is of the ſhape of the common pigeon, but ſmaller, and has red legs, and a grey variegated back. It ſeems the ſame with the LIVIA of other authors.

SATAN, in *Sacred Criticiſm*, a Hebrew word, which ſignifies an adverſary, perſecutor, or accuſer. See DEVIL.

SATELLITE, *ſatelles*, *guard*, a perſon attending on another, either for his ſafety, or to be ready to execute his pleaſure.

Among the eaſtern emperors, *ſatellite* originally expreſſed the dignity, or office, of captain of the life-guard.

The term was afterwards applied to the vaſſals of lords; and afterwards to ſuch as held fees, called *ſergeanties*. See SERGEANTY.

SATELLITES, in *Aſtronomy*, certain ſecondary planets, moving round the other planets, as the moon does round the earth; they are thus called, becauſe always found attending them, from riſing to ſetting, and making the tour of the ſun together with them.

The *ſatellites* move round their primary planets, as their centres, by the ſame laws as thoſe primary ones do round their centre the ſun. For the phyſical cauſe of their motions, ſee Gravity. See alſo *Secondary* Planets.

The words moon and *ſatellite* are ſometimes uſed indiſferently; and thus we ſay, either Jupiter's moons, or Jupiter's *ſatellites*; but, ordinarily, we diſtinguiſh; reſtraining the term *moon* to the earth's *ſatellite*; and *ſatellite* to the little moons more lately diſcovered about Jupiter and Saturn, by the aſſiſtance of the teleſcope, which is neceſſary to render them viſible.

We do not know of any *ſatellites* beſides thoſe juſt mentioned; what farther diſcoveries may be made by improving the magnifying powers of teleſcopes, it is impoſſible to ſay.

Satellites *of Jupiter* are four little ſecondary planets, performing their revolutions about Jupiter, as that planet does round about the ſun.

Simon Marius, mathematician of the elector of Brandenburg, about the end of November 1609, obſerved three little ſtars moving round Jupiter's body, and proceeding along with him; and in January 1610, he found a fourth. In January 1610, Galileo alſo oberved the ſame in Italy, and the ſame year publiſhed his obſervations; from which time commenced the obſervation of the circumjovial *ſatellites*.

Galileo, in honour of his patron, firſt called them *aſtra Medicæa*, Medicæan ſtars; Marius, the firſt diſcoverer, called that next Jupiter *Mercurius Jovialis*, Jupiter's Mercury; the ſecond, *Venus Jovialis*, Jupiter's Venus; the third, *Jupiter Jovialis*; and the fourth, *Saturnus Jovialis*, Jupiter's Saturn.

Indeed, Antony Maria Schyrlæus de Rheita, a Capuchin of Cologne, imagined, that, beſides the four known *ſatellites* of Jupiter, he had diſcovered five more, on the 29th of December, anno 1642, and, in honour of Urban VIII. the pope then reigning, he denominated them *Sidera Urbanoctaviana*. But, upon Nauda's communicating the obſervation to Gaſſendus, who had obſerved Jupiter on the ſame day, he ſoon perceived, that the monk had miſtaken five fixed ſtars, in the effuſion of the water of Aquarius, marked in Tycho's catalogue 24, 25, 26, 27, and 28, for *ſatellites* of Jupiter; whence it is no wonder they ſhould appear to the diſcoverer to move a contrary way to that of the reſt; viz. from weſt to eaſt. See Epiſt. Gaſſend. ad Gab. Naud. de Novem Stellis circa Jovem viſis.

Satellites, *phenomena and nature of Jupiter's*. See *Nature of the* Planets, art. 6, 7, 8.

Satellites, *periodical times and diſtances of Jupiter's*. The periods, or revolutions, of Jupiter's *ſatellites*, are found from their conjunctions with Jupiter; after the ſame manner as thoſe of the primary planets are found from their oppoſitions to the ſun.

As in the primary planets, with regard to the ſun, ſo in the *ſatellites*, with regard to their primaries, the ſquares of the periodical times are in a triplicate ratio of their diſtances from their centres reſpectively.

To determine the diſtance by obſervation, they meaſure them with a micrometer, in ſemidiameters of Jupiter.

By the lateſt and moſt exact obſervations, the periodical times and diſtances of theſe *ſatellites* are as follow:

Satellites	Periodical times				Diſtances in ſemidiameters of Jupiter.
1	1^d	18^h	27′	34″	5,667
2	3	13	13	42	9,017
3	7	3	42	36	14,384
4	16	16	32	09	25,299

Hence, ſuppoſing the ſemidiameter of Jupiter to be 47000 miles (ſee Planet), the diſtance of the firſt *ſatellite* from the centre of Jupiter will be 266,000 miles; that of the ſecond, 423,000 miles; that of the third, 676,000 miles; and that of the fourth, 1,189,000 miles.

The angles under which the orbits of Jupiter's *ſatellites* are ſeen from the earth, at its mean diſtance from Jupiter, are as follow: the firſt, 3′ 55″; the ſecond, 6′ 14″; the third, 9′ 58″; and the fourth, 17′ 30″.

Satellites, *eclipſes of Jupiter's*. See Eclipse, Jupiter, Light, Longitude, &c.

Satellites *of Saturn* are five little ſtars revolving about Saturn.

One of theſe *ſatellites*, viz. the fourth, reckoning from Saturn, was diſcovered by M. Huygens, anno 1655, March the 25th, by means of a teleſcope twelve feet long; and the other four, at different times, by M. Caſſini; viz. thoſe two next Saturn, in March 1684, by help of Campani's glaſſes, of one hundred, and one hundred and thirty-ſix feet; the third in December 1672, by a teleſcope of Campani's, of thirty-five feet; and the fifth in October 1671, by a teleſcope of ſeventeen feet. Moſt, perhaps all, of the phenomena obſerved of Jupiter's *ſatellites*, are alſo found exhibited by thoſe of Saturn. Thus they are found ſometimes bigger, and ſometimes leſs: the fifth is ſometimes, alſo, ſound eclipſed, &c. And hence there is no doubt but they are of the ſame nature, &c. See *Nature of the* Planets.

The periodical times and diſtances of the Satellites *of Saturn*, are exhibited in the following table.

Satellites	Periodical times				Diſtances in ſemidiameters of Saturn's ring.	Diſtances in ſemidiameters of Saturn, according to Caſſini.
1	1^d	21^h	18′	27″	2,10	4 3/8
2	2	17	41	22	2,69	5½
3	4	12	25	12	3,75	8
4	15	22	41	14	8,70	18
5	79	07	48	00	25,35	54

Hence, the diſtance of *Saturn's* ring from Saturn, and its breadth being equal to 42,000 miles, and the ſemidiameter of Saturn (ſee Planet) being 39,000, and, therefore, the ſemidiameter of the ring being 81,000 miles, the diſtance of the firſt *ſatellite* from the centre of Saturn will be 170,000 miles; that of the ſecond, 217,000 miles; that of the third, 303,000 miles; that of the fourth, 704,000 miles; and that of the fifth, 2,050,000 miles.

The great diſtance between the fourth and fifth *ſatellite*, gave occaſion to Huygens to ſuſpect that there might be ſome intermediate one; or elſe, that the fifth might have ſome other *ſatellite* moving round it, as its centre.

Dr. Halley, in the Philoſophical Tranſactions (N° 145, or Abr. vol. i. p. 371), gives us a correction of the theory of the motions of the fourth or Huygenian *ſatellite*. Its true period he makes 15 days, 22 hours, 41 minutes, 6 ſeconds; its diurnal motion 22° 34′ 38″ 18‴; its diſtance from the centre of Saturn, 4 diameters of the ring; which Mr. Pound, with his micrometer applied to the Huygenian teleſcope, found to be 8,7 ſemidiameters; and its orbit to be little or nothing diſtant from that of the ring, interſecting the orbit of Saturn under an angle of 23½ degrees. See Saturn.

SATIRE, in *Literature*, a term which ſignifies all manner of diſcourſe wherein any perſon is reprehended; but more particularly a poem, wherein men's follies and vices are wittily expoſed, in order to their reformation.

Satire, *proper*, is diſtinguiſhed by the generality of the reflections from a lampoon, which is aimed at a particular perſon; but they are frequently confounded.

The origin of the word has been the occaſion of conſiderable diſpute among the critics. The common opinion ſupported by Scaliger, Heinſius, and Voſſius, deduces it from the Greek Σατυροι, *Satyrs*, a ſort of Sylvan deities, by the Romans called *Fauni*, to whoſe petulancy and wantonneſs this ſort of compoſition is ſuppoſed to bear ſome reſemblance. On which footing *ſatire* is conſidered as a poem of a wanton and licentious nature, which like the *Satyrs*, turns things upſide down to find occaſion for cenſure and ridicule.

Caſaubon, on the contrary, followed by Spanheim and Dacier, derives the Roman *ſatyr* from the Latin *ſatur*, uſed for *plenum*, *full*, a thing to which nothing is wanting; whence came *ſatura*, written alſo *ſatira*, which, being an adjective, refers to a ſubſtantive underſtood, viz. *lanx*; *ſatura lanx* being the name of a baſon filled with all manner of fruits, which the Romans offered yearly to Ceres and Bacchus as their firſt fruits.

The word *ſatura* was afterwards applied to other mixtures, and at length transferred to works of genius; thus *leges ſaturæ* denoted laws conſiſting of many heads or titles. Upon the whole, it is inferred, that the *ſatirical* pieces of the poets were ſo called, as being various and miſcellaneous compoſitions; on this principle it is urged, that the word ſhould be written in Latin with an *u* or *i*, and in Engliſh only with an *i*, whereas thoſe who write it with a *y*, do it on the ſuppoſition that the ſylvan *Satyri* gave name to this compoſition, which Caſaubon endeavours to diſprove by ſhewing, that from *ſatyrus* muſt be formed *ſatyrico*, and not *ſatyra*, and by explaining the great difference between the Greek *ſatyric* poems and the Roman *ſatire*.

However, ſatirical poetry, according to Scaliger, may be naturally enough deduced from the wantonneſs of the *ſatyrs*; and this opinion is confirmed by conſidering that Σαλυριϛης is rendered in ancient gloſſes by *ludio*, and *ſatirical* by *ludicrous*, *ſportive*, *&c.* Thus Seneca's *ſatire* is called *ludus*, and Horace and Perſius uſe *ludere* for *ſcribere ſatyras*.

Satire bears a near affinity to raillery, ridicule, lampoon, libel, &c. and ſtands oppoſed to panegyric. The reaſon why *ſatires* generally pleaſe, and panegyrics tire the readers, ſeems to be, becauſe the former are commonly true, and the latter falſe.

Horace calls his two books of *Satires*, indifferently either *ſermones* or *ſatyræ*, two words which at firſt ſight preſent very different ideas.

The chief ſatiriſts among the ancients are, Horace, Juvenal, and Perſius; among the moderns, Regnier, and Boileau in French; and Dryden, Oldham, Rocheſter, Buckingham Wycherley, Pope, Young, &c. among the Engliſh.

A *ſatire* ought to be lively, pleaſant, moral, and full of variety; in theſe reſpects Juvenal and Horace excelled, though their *ſatires* ought not to be read without caution. Among the qualifications requiſite in a *ſatiriſt*, one of the moſt eſſential is good-nature, all the ſentiments which are beautiful in this way of writing muſt proceed from that quality in the author. Good-nature produces that diſdain of all baſeneſs, vice, and folly, which prompts the poet to expreſs himſelf with ſmartneſs againſt the errors of men, but without any bitterneſs towards their perſons. It is this quality which keeps the mind in equanimity, and never lets an offence unſeaſonably throw a man out of his character.

In all the writings of Horace and Juvenal, there is not one ill-natured expreſſion; not one ſentence of ſeverity, which does not apparently proceed from the contrary diſpoſition. Tatler, N° 242.

Satire may be divided with regard to the meaſure, and kind of verſe, as well as the manner of the poem, and the character, into narrative, dramatic, mixed, &c.

Narrative, is a ſimple narration or recital of abuſes in the poet's own perſon. Such is the firſt of Juvenal.

Dramatic, is that wherein ſeveral perſons diſcourſe together, whether they be nameleſs, as in the firſt of Perſius, or have names, as of Catius and Damaſippus.

Mixt, is a compound of both the former; as that fine one of Horace, *Ibam forte via ſacra*.

Grave, and animated, which inveigh with warmth and earneſtneſs againſt corruption, and vice in every ſhape: as thoſe of Juvenal and Perſius.

Sportive, and lighter, which ſeem to play with men's follies, but in playing omit no opportunity of making them feel the laſh. Such are thoſe of Horace, which are hence ſaid to be *ſermoni propiora*.

The *grave* ſort brandiſhes a naked ſword; the *ſportive* preſents a thyrſus, like that of the ancient *Satyrs* ſurrounded with vine leaves, with which it ſtabs unawares. The heat of the former ſometimes degenerates into fury and indignation; and the calmneſs of the latter ſometimes ſinks into mere raillery; but between the two extremes are many intermediate ſpecies and degrees. The former, eſpecially when dictated by paſſion, is much the eaſieſt; nothing is more difficult than to make people of taſte laugh, even at the expence of others. The attainment of this muſt be the fruit of genius and talents rather than of rules; perhaps it may be unneceſſary to explain either, ſince vanity, ſelf-love, and even malice are maſters, more than ſufficient for a poet, who wants not wit and judgment. Thus Juvenal, *ſi natura negat, facit indignatio verſum*; and Boileau, *La colere ſuffit & vaut un Apollon*.

In peruſing the writings of the two leaders of the two ſorts of *ſatire* laſt mentioned, it may not be unneceſſary to conſider, that they lived in very different times: Horace was intimate with a prince of the greateſt goodneſs and humanity, and his court was formed after his example; and, therefore, the faults which the poet notices, were little inconſiſtencies in behaviour, falſe pretences to politeneſs, or impertinent affectations of what men were not fit for; vices of a coarſer ſort could not come under his conſideration, or enter the palace of Auguſtus.

Juvenal, on the other hand, lived under Domitian, in whoſe reign every thing great and noble was baniſhed from the habitations of men in power; therefore, he attacks vice as it paſſes by in triumph, not as it breaks into converſation. The fall of empire, contempt of glory, and a general degeneracy of manners, are before his eyes in all his writings. In the days of Auguſtus, to have talked like Juvenal had been madneſs, or in thoſe of Domitian like Horace. Morality and virtue are every where recommended in Horace, as became a man in a polite court, from the beauty, propriety, and convenience of purſuing them; vice and corruption are attacked by Juvenal in a ſtyle, which denotes, that he fears he ſhall not be heard, unleſs he calls to them in their own language, with a barefaced mention of the villanies and obſcenities of his contemporaries. Tatler, N° 242.

The Italians divide *ſatire* into *ſerious*, as that in common uſe; and *jocoſe*, *giocoſa*, which they alſo call *berneſca*, and we *burleſque*.

Their chief *ſatiriſts* in the ſerious way are Dante (whom they particularly call *principe ſatirico)*, Arioſto, Aretine, Ercole Bentivoglio, Luigi Alamanni, Jacobo Soldani, Lorenzo Azzolino, Salvator Roſa, Lun. Adimari, and Benedetto Menzini. Thoſe who have excelled in the jocoſe kind are, Franceſco Berni (the inventor of it), Mauro, Firenzuola, Caſa, Coppetta Varchi Laſca, Caporali, &c.

Satire is divided into *general*, which is levelled at common abuſes wherein numbers are equally intereſted; and *perſonal*, which points out and expoſes particular characters, more properly called *lampoon*. This laſt, as it affects men's reputation, on which their intereſt greatly depends, is ſcarce diſtinguiſhable from defamation and ſcandal.

To this laſt claſs belong moſt of thoſe which bear the title of *anti*; as the Anti-Baillet of Menage, with which M. Baillet was ſo ſtung, that he compoſed a treatiſe expreſs on perſonal *ſatires*, which bear the title *anti*; to ſhew the immorality and unlawfulneſs of them, and their contrariety to the precepts of the Goſpel.

It is farther objected to this kind of *ſatire*, that a public detection, far from producing the effect it is deſigned for, reformation, is apt to drive men to deſperation, and harden them in their courſe. The excellent author of the Treatiſe of the Government of the Tongue, ſpeaking of uncharitable truths, ſays, a diſcovery of this kind ſerves not to reclaim, but only to enrage the offender, and precipitate him into farther degrees of ill. Modeſty, and fear of ſhame, is one of thoſe natural reſtraints which the wiſdom of heaven has put on mankind; and he, who once ſtumbles, may yet, by a check of that bridle, recover himſelf again. But when, by a public detection, he is fallen under that infamy he feared, he will be then apt to diſcard all caution, and to think he owes himſelf the utmoſt pleaſures of vice at the price of his reputation. Nay, perhaps, he advances farther, and ſets up for a reverſed ſort of fame, by being eminently wicked; thus he, who before was but a clandeſtine diſciple, becomes a doctor of impiety. Doubtleſs it was this ſort of reaſoning that induced our wiſe legiſlators lately to repeal the law which put the brand of infamy in the face of felons. In effect, where crimes are enormous, the delinquent deſerves little pity, yet the reporter may deſerve leſs. Vide Tatl. N° 74—76.

SATIRE, *Greek*. Caſaubon makes a diſtinction between the ſatirical poetry of the Greeks, and the *ſatire* of the Romans, which he maintains was peculiar to themſelves; in which alſo he ſeems to be juſtified by Quintilian. Inſt. Or. lib x. cap. 1.

For a like reaſon Horace, *Sat*. I. lib. ii. v. 62. calls *ſatire*, *Græcis intactum carmen*, a ſort of poetry unknown to the Greeks. Spanheim, in his fine preface to the Cæſars of the emperor Julian, has ſhewn five or ſix eſſential differences between thoſe two poems. The Greeks chiefly reprehended vice, &c. in their dramas, though they had alſo a ſort of narrative poems called *ſilli*, like the Roman and our *ſatires*. Theſe *ſilli* were cutting or ſarcaſtic poems, as may be eaſily ſeen by the fragments of Timon's ſilli, with this difference, that the Greek ſilli were parodies from one end to the other, which cannot be ſaid of the Roman *ſatire*; or, if we find ſometimes a parody in them, it is what the poet did not deſign, and conſequently the parody does not make the eſſence of *ſatire*, as it does that of the *ſilli*.

Scaliger, notwithſtanding all this, followed by ſome of the lateſt and beſt critics, ſcruples not to derive the ſatirical poetry of the Latins from that of the Greeks. According to theſe authors, *ſatire*, in its origin, was a ſort of interlude in tragedy, wherein goat-footed *Satyrs* were introduced to alleviate the diſtreſs, and with their jeers and humour diverſify the ſolemnity of the tragic ſcene; much like the mimes in comedy, and the feſcennines in the Atellan ſports.

At firſt, it was only in the tragedies exhibited in the feaſts of Bacchus, that *Satyrs*, the ſuppoſed companions and prieſts of that god, were introduced, but afterwards they made a part in the ſolemnities of the other deities. So that *ſatire*, in its firſt inſtitution, was wholly dramatic. Vide Scalig. Poet. lib. i. cap. 11 and 12.

SATIRE, *Roman*. Dacier, after Cauſaubon, traces the inſtitution of the Roman *ſatire* very minutely, and diſtinguiſhes three ſpecies or ſtates of it; the firſt *dramatic*, the ſecond *narrative*, the third that called the *Varronean*, or *Menippean ſatire*.

The ancient Romans had been without any ſcenical entertainments for almoſt four hundred years, till chance and merriment, in one of their feſtivals, gave riſe to the Saturnine and Feſcennine verſes, which, for ſome years, ſupplied the place of theatrical performances. Theſe verſes were rude, and without any meaſure, being extemporary, and the productions of a ſavage people, who had no other inſtructors than the fumes of wine. Accordingly they were ſtuffed with groſs railleries, and accompanied with various geſticulations and dances. An idea of them may be formed by conceiving a knot of country fellows dancing in an hobbling manner, toſſing about their home-ſpun jokes, and expoſing each other's failings. Thus Horace, Epiſt. I. lib. ii.

Feſcennina per hunc inventa licentia morem
Verſibus alternis opprobria ruſtica fudit.

The ancient Roman *ſatires*, therefore, were a ſort of innocent farces, where the ſpectators and actors were indifferently rallied. And thus they continued till the time of Livius Andronicus, who firſt attempted to write plays in imitation of the Greeks. This new entertainment, appearing more noble and perfect, drew crowds of ſpectators, which occaſioned the *ſatires* to be neglected for ſome time, but they were afterwards reſumed, and tacked to the ends of comedies, much like the modern farces. They were annexed more peculiarly to the Atellan pieces, and, on this occaſion, they changed their name *ſatires* for that of *exodia*, which they ever after retained.

After Livius Andronicus, Ennius, having obſerved the eagerneſs of the Romans for *ſatire*, imagined that poems not accommodated to the theatre, but retaining the gall, raillery, and pleaſantry, of the theatrical *ſatire*, would not fail of ſucceſs. Accordingly, he wrote diſcourſes under the title of *ſatires*, in which he took the liberty of mixing ſeveral ſorts of verſe together, as hexameters with iambic trimeters, and trochaic tetrameters. In theſe pieces were found the ſame variety, raillery, alluſions, fables, and even dialogue, in a word, every thing that conſtituted the character and beauty of the firſt *ſatires*, except the dancing and muſic. Pacuvius ſucceeded, who alſo wrote *ſatires* in imitation of his uncle, or, grandfather Ennius. When Pacuvius was in his prime, Lucilius was born, who alſo compoſed *ſatires*, ſomewhat of a new turn, endeavouring to imitate that character of the ancient Greek comedy, of which the Romans had but an imperfect image in their own *ſatires*. This ſeems to be what Horace meant, when he ſaid, *Satir*. I. lib. ii.

———————*Quid? cum eſt Lucilius auſus*
Primus in hunc operis componere carmina morem.

He could not mean, that the Romans had no *ſatires* before Lucilius, ſince that poet was preceded by Ennius and Pacuvius, whom he imitated. Horace's deſign was only to hint, that Lucilius's manner and turn were new; that he had embelliſhed this poem, inſomuch that he might be looked upon as its firſt author. But, in fact, Lucilius only added to it a little more politeneſs and ſalt, without any other alteration. And though, like Ennius, he did not mix together ſeveral ſorts of verſe in the ſame piece, yet he compoſed different poems, ſome of which were entirely hexameter, others iambic, and others trochaic, as appears from his fragments.

The third kind of *ſatire* was the *Varronian* or *Menippean*, ſo called from its author Varro, the moſt learned of the Romans, and becauſe in this he imitated the manner of Menippus the Gadarenian, a Cynic philoſopher.

This *ſatire* was not only a miſcellany of different ſorts of verſe, but was alſo interlarded with proſe, and mixed up Greek and Latin. Seneca's poem on the death of Claudius, Petronius's Satyricon, Lucian's Dialogues, the Golden Aſs of Apuleius, and the Cæſars of the emperor Julian, are ſo many *ſatires* in the Varronian taſte. To the ſame head may alſo be referred the Catholicon of Spain, the Moriæ Encomium of Eraſmus, the Don Quixote of Cervantes, the Advertiſements from Parnaſſus of Boccalini, the Tale of a Tub by Dr. S. &c. V. Dacier Diſcours ſur la Satire, in Mem. de Liter. de l'Acad. R. des Inſcr. tom. iii. p. 246, ſeq. And in the preface to his verſion of Horace's *Satires*. V. Rapin Reflex. ſur la Poet. en Partic. § 28. Oeuv. Diverſ. tom. ii. p. 205, ſeqq.

SATIRICAL, ſomething relating to, or that partakes of the nature of *ſatire*.

We have *ſatirical* poets; *ſatirical* preachers, as South; *ſatirical* hiſtorians, as Burnet and Mezeray; *ſatirical* philoſophers, as Apuleius and Montaigne. In the heathen theology, we find a *ſatirical* god, viz. Momus: Homer, in his Therſites, gives the character of a *ſatirical* courtier. The Dutch have been often charged with *ſatirical* prints and medals, which have ſometimes coſt them dear. *Satirical* poetry had its origin at Athens, though its perfection be owing to the Romans. According to father Mourgues, and Bianchini, it was at firſt a ſort of tragedy acted at the feaſt of Bacchus, wherein Satyrs were introduced converſing with heroes. Burette rather takes it for a ſort of paſtoral farce tacked to the ends of tragedies. One of the chief ornaments of it was a wild, groteſque ſort of dance performed by Satyrs, and called *ſicinnis*. See DANCING.

The *ſatirical* ſhews of the Greeks were abſolute maſquerades; the actors herein were diſguiſed variouſly, ſome in the habits of Satyrs, Sileni, Centaurs, Mænades, and other of Bacchus's crew; while others perſonated giants, cyclopes, monſters, and even beaſts; the whole making a medley more romantic and extravagant than any thing on the modern ſtage, unleſs perhaps ſome of our late groteſque pantomime entertainments. The only piece of the kind now extant is the ΚΥΚΛΩΨ of Euripides.

SATIRIC *fountain*. See FOUNTAIN.

SATIRST, a writer of SATIRE.

SATISDATIO, or STIPULATIO, in the *Roman Law*, anſwers to our BAIL *above*, and was mutally given by each litigant party to the other; by the plaintiff, that he would proſecute his ſuit, and pay the coſts if he loſt his cauſe, in like manner as our law ſtill requires nominal pledges of proſecution from the plaintiff; and by the defendant, that he would continue in court and abide the ſentence of the judge, much like our ſpecial bail with this difference, that the fide juſſores were there abſolutely bound judicatum ſolvere, to ſee coſts and condemnation paid at all events; as our ſpecial bail may be diſcharged by ſurrendering the defendant into cuſtody, within the time ordered by law; for which purpoſe they are at all times intitled to a warrant to apprehend him.

SATISFACIENDUM, *Capias ad*. See CAPIAS.

SATISFACTION, in *Law*, is uſed for the giving of recompence for an injury done; or the payment of money due on bond, judgment, &c. In which laſt it muſt be entered on record.

SATISFACTION, or *atonement*, in *Theology*, is defined to be, that which being done or ſuffered either by an offending creature himſelf, or by another perſon for him, ſhall ſecure the honour of the divine government, in beſtowing upon the offender pardon and happineſs. This ſenſe of the word *ſatisfaction* is greeable to the uſe of the word in the Roman law, where it ſignifies to content a perſon aggrieved, and is put for ſome valuable conſideration, ſubſtituted inſtead of what is a proper payment, and conſiſtent with a remiſſion of that debt or offence, for which ſuppoſed *ſatisfaction* is made. In this ſenſe Chriſt is ſaid by many divines to have made *ſatisfaction* for the ſins of the penitent and ſincerely obedient. See EXPIATION, PROPITIATION, and SACRIFICE.

SATISFACTION, in a *Popiſh ſenſe*. See PENANCE and POPERY.

SATRAPA, or SATRAPES, in *Antiquity*, a governor of a province among the ancient Perſians.

King Darius uſually walked attended by his principal lords and *ſatrapæ*. Q. Curtius. The kingdom of Perſia was divided into *ſatrapes*, or juriſdictions of *ſatrapæ*.

The word is originally Perſian, ſignifying ſtrictly, admiral, or commander of a naval army; but it was afterwards applied indifferently to all governors of provinces. In which ſenſe it was alſo borrowed by the Greeks, who uſed the word σατραπης in the ſame ſignification.

We alſo meet with the word in ſome ancient Engliſh charters of king Ethelred, where the lords, who ſign next after the dukes, take the title of *ſatrapes* of the king. Du-Cange takes the word here to ſignify miniſters of the king.

SATTIN, or SATIN, a kind of ſilken ſtuff, very ſmooth and ſhining, the warp whereof is very fine, and ſtands out; the woof coarſer, and hidden underneath; on which depends that gloſs and beauty which give it its price.

The word comes from the French *ſatin*; which Menage derives farther from the Latin *ſeta*, *a briſtle* or *hair*; others from the Hebrew *ſadin*, or from the old French *ſade* and *ſadinet*, *handſome*, *genteel*.

There are ſome *ſattins* quite plain, others wrought, ſome flowering with gold or ſilk, others ſtriped, &c. All the varieties in the fabric of *ſattins* are made by uſing new warps, or woofs. The fineſt *ſattins* are generally ſaid to be thoſe of Florence and Genoa, yet the French will not allow thoſe of Lyons any thing inferior thereto. The *ſattins* of Bruges have their warp of ſilk, and their woof of thread.

Indian *ſattins*, or *ſattins* of China, are ſilken ſtuffs, much like thoſe manufactured in Europe. Of theſe, ſome are plain, either white, or of other colours; others worked either with gold or ſilk, flowered, damaſked, ſtriped, &c. They are moſtly valued becauſe of their cleaning and bleaching eaſily, without loſing any thing of their luſtre. In other reſpects they are inferior to thoſe of Europe.

F. le Comte obſerves, that the Chineſe prepare their *ſattins* in oil, to give them the greater luſtre; but this makes the duſt liable to hang to them.

Sattin *flower*, and *white ſattin*, in *Botany*. See HONESTY.

SATTINET, or Sattinade, a very ſlight, thin ſort of ſattin, chiefly uſed by the ladies for ſummer night-gowns &c. and ordinarily ſtriped. The word is a diminutive of ſattin.

SATURANTIA is ſometimes uſed in the ſame ſenſe as ABSORBENTS.

SATURATION, in *Chemiſtry*, is the impregnation of an acid with an alkali, or *vice verſa*, till either will receive no more, and the mixture becomes neutral. The term is more generally applied to any menſtruum that is capable of diſſolving any ſubſtance, or of abſorbing and uniting with any fluid; thus the air is ſaid to be *ſaturated* with water, when it can diſſolve and retain no more, &c. and the limit of its capacity of ſolution is called the *point of ſaturation*. This is different in different ſubſtances that tend to unite with each other. See AFFINITY.

SATURDAY, the ſeventh or laſt day of the WEEK, ſo called, as ſome have ſuppoſed, from the idol Seater, worſhipped on this day by the ancient Saxons, and thought to be the ſame as the Saturn of the Latins. *Saturday* anſwers to the Jewiſh SABBATH.

Saturday *ſlop*, a ſpace of time, in which, of old, it was not lawful to take ſalmons in the North, viz. from even-ſong on *Saturday*, till ſun-riſing on Monday.

SATUREIA, in *Botany*. See SAVORY.

SATURN, in *Aſtronomy*, one of the primary planets; being that which is fartheſt from the earth, and the ſun; and whoſe motion is the floweſt, if we except the *Georgium* SIDUS, as it is now called, lately diſcovered by Dr. Herſchel. It is thus characterized, ♄.

Saturn ſhines but with a feeble light, by reaſon of its diſtance; on which account alſo, though the biggeſt of all the planets, it appears the ſmalleſt.

For the apparent diameter, relative diſtance, and excentricity of the orbit of *Saturn*, ſee DIAMETER, DISTANCE, and EXCENTRICITY.

For the real diameter of *Saturn*, its content, period, diſtance from the ſun, inclination of its orbit, quantity of matter, denſity, &c. ſee PLANETS.

Dr. Halley obſerves, in the preface to his catalogue of the ſouthern ſtars, that he has found *Saturn* to have a ſlower motion than is aſſigned him in the tables: this irregularity is abundantly rectified in his own tables.

It has been doubted whether or no *Saturn*, like the other planets, revolves on his axis: it does not appear from any aſtronomical obſervation, that he does; and there is one circumſtance that ſhould ſeem to argue the contrary; viz. that whereas the earth, and other planets, which we know do revolve on their axes, have their equatorial diameter greater than their polar, nothing like this is obſerved in *Saturn*.

However, if we argue from analogy, it is moſt probable that this planet alſo, as well as the others, revolves upon its axis; although, becauſe it has no viſible ſpots upon its body, whereby to determine this revolution, the length of his days and nights, and the poſition of his axis, are unknown to us.

The diſtance of *Saturn* from the ſun being $9\frac{1}{2}$ times greater than that of the earth from the ſame, it is found, that the apparent diameter of the ſun, ſeen from him, will not exceed three minutes; which is near thrice the diameter of Venus. The ſun's diſk, therefore, to an inhabitant of *Saturn*, will appear 90 times leſs than it does to us, and both its light and heat will be diminiſhed in the ſame proportion.

Hence ſome have concluded that *Saturn*, as well as Jupiter, whoſe light and heat are only $\frac{1}{28}$ part of ours, are entirely unfit for rational inhabitants. But that their light is not ſo weak as we imagine is evident from their brightneſs in the night-time. Beſides, allowing the ſun's LIGHT to be 45000 times as ſtrong, with reſpect to us, as the light of the moon when full, the ſun will afford 500 times as much light to *Saturn* as the full moon does to us, and 1600 times as much to Jupiter. So that theſe two planets, even without any moons, would be much more enlightened than we at firſt imagine; and by having ſo many they may be very comfortable places of reſidence. Their heat ſo far as it depends on the force of the ſun's rays, is certainly much leſs than ours; to which no doubt the bodies of their inhabitants are as well adapted as ours are to the ſeaſons we enjoy. And if we conſider that Jupiter never has any winter, even at his poles, which probably is alſo the caſe with *Saturn*, the cold cannot be ſo intenſe on theſe two planets as is generally imagined. To this we may add, that there may be ſomething in the nature of their mould warmer than in that of our earth; and we find that all our heat does not depend on the rays of the ſun; for if it did, we ſhould always have the ſame months equally hot or cold at their annual return, which is very far from being the caſe.

To ſuch eyes as ours, unaſſiſted by inſtruments, Jupiter is the only planet that can be ſeen from *Saturn*; and *Saturn* the only planet that can be ſeen from Jupiter.

The phaſes of *Saturn* are very various and extraordinary, and long perplexed the aſtronomers, who could not divine the meaning of ſuch irregularity: thus Hevelius obſerved him to be ſometimes *monoſpherical*, ſometimes *triſpherical*, *ſpherico-anſated*, *elliptico-anſated*, and *ſpherico-cuſpidated*. But Huygens plainly ſhews, that all theſe monſtrous appearances are owing to the imperfection of the teleſcopes that author had uſed. Huygens, upon obſerving him very attentively with much better glaſſes, reduced all their phaſes to three principal ones; viz. *round*, *brachiated*, and *anſated*.

One thing *Saturn* has peculiar to himſelf; viz. his ring: for the phenomena, &c. of which, ſee RING.

Saturn performs his courſe round the ſun attended with five ſatellites, or ſecondary planets: the periods, diſtances, &c. whereof, ſee under SATELLITES.

Saturn, in *Chemiſtry*, ſignifies LEAD; in regard that metal is ſuppoſed to lie immediately under the influence of this planet.

Saturn, in *Heraldry*, denotes the black colour in the coats of arms of ſovereign princes; anſwering to diamond in the coats of noblemen, and ſable in thoſe of gentlemen.

Saturn, in *Mythology*, one of the terreſtrial gods; the ſon of Uranus and Veſta, or Cœlum and Terra. He is repreſented under the figure of a decrepid old man in fetters with a long beard, and hoary head; bearing in his right hand a pruning hook or ſcythe, and in his left a child, which he is about to devour. According to the Roman fable, *Saturn* being dethroned by Jupiter, took refuge in Italy, called from him *Saturnia*, where he introduced ſeveral parts of agriculture, particularly the art of pruning and managing their vines, and civilized the people, uniting them to one another in chains of braſs, i. e. by braſs money, which he invented.

The age in which *Saturn* lived was called the *golden* AGE, becauſe it was pretended by the poets that the earth brought forth its fruits without the labour of tillage, that all things were common, and that univerſal harmony prevailed. Virgil has given a beautiful deſcription of this age in his eighth Æneid, and in the firſt book of his Georgics.

The name *Saturn* is derived by ſome *a ſatu*, from ſowing; becauſe he is ſaid to have firſt taught the art of ſowing, and tilling the ground, in Italy, and was therefore eſteemed the god of huſbandry, and called by the Romans *Stercutius*, becauſe he firſt manured the earth with dung; and on this account he is painted with a ſickle. By others his name is derived *a ſaturando*, from that fulneſs which is the effect of his bounty; as his wife was called Ops, becauſe ſhe helps the hungry. Others aſcribe the name to his being ſatisfied with the years that he devours; Saturn and Time being the ſame. Thus Cicero, de Nat. Deorum, *quod ipſe ſaturetur annis quos ipſe devorat*. Others again derive the name from *ſator νου*, becauſe he is the former of the mind.

A diſtinguiſhing character of *Saturn* among the ancients was that of preſiding over time; with which the name Χρονος, given him by the Greeks, more particularly agrees. On this account *Saturn* is repreſented as devouring his children, and caſting them up again; as bound in fetters, and furniſhed with wings, to denote both the ſlowneſs and ſwiftneſs of time; and as furniſhed with a ſcythe.

Rome, and ſeveral other cities of Italy, dedicated temples to *Saturn*, and paid him religious worſhip.

According to Bochart, in his Phaleg. lib. i. cap. 1. *Saturn* and Noah were the ſame.

SATURNALIA, in *Antiquity*, feaſts celebrated among the Romans, in honour of the god Saturn.

The *Saturnalia*, called in the Greek language Χρονια, were inſtituted either by Tullus, king of the Romans, or, according to Livy, by Sempronius and Minutius, the conſuls. Till the time of Julius Cæſar they were finiſhed in one day, viz. the 19th of December; but then they began to be celebrated in three days, and afterwards in four or five, by order of Caligula; and ſome ſay, that they have laſted ſeven days, and when theſe days were added to the feaſt, the firſt day of celebrating it was the 17th of December.

During this ſolemnity the ſlaves were reputed maſters; they were allowed to ſay any thing; and, in fine, they were ſerved at table by the maſters themſelves. Every thing ran into debauchery and diſſoluteneſs, and nothing was heard or ſeen in the city of Rome, but the din, riot, and diſorder of a people wholly abandoned to joy and pleaſure.

M. Dacier obſerves, that the *Saturnalia* were not only celebrated in honour of Saturn, but alſo to keep up the remembrance of the golden age, when all the world was on a level.

On occaſion of this feaſt, preſents were ſent from friends to one another; no war was to be proclaimed, and no offender executed; the ſchools obſerved holy-day; and the ſenate did not ſit.

The *Saturnalia* were not only obſerved at Rome, but alſo in Greece; and were in reality, much older than Rome itſelf. Some aſcribe their inſtitution to the Pelaſgi, who were caſt upon the iſland of Delos; others to Hercules; and others to Janus. Goropius Becanus makes Noah the author of them. Orig. lib. iv. Voſſius goes ſtill higher, and will have it, that the Saturn, in honour of whom this feaſt was inſtituted, was Adam.

SATURNI *extractum.* See *Extract of* LEAD.

SATURNI, *ſaccharum.* See SACCHARUM.

SATURNIAN, *ſaturnius*, in *Ancient Poetry*, a kind of IAMBIC verſe uſed in ſatirical writings: it conſiſted of ſix feet and a ſyllable over, and thence called *trimeter hypercatalectus.*

SATURNILLIANS. See SATURNINIANS.

SATURNINE, or SATURNIAN, a term applied to perſons of dark, ſullen, melancholic complexions; as being ſuppoſed under the predominancy of Saturn, or at whoſe births Saturn was the aſcendant.

SATURNINE *tincture, tinctura ſaturnina.* See TINCTURE.

SATURNINE *water.* See *Water of* LEAD.

SATURNINIANS, or SATURNILLIANS, a ſect of ancient Gnoſtics; thus called from their chief Saturnillus, or Saturninus, a diſciple of Menander, the famous Gnoſtic. See MENANDRIANS.

Saturnillus taught the ſame errors with his maſter, in Syria, about the cloſe of the ſecond century; and drew after him many diſciples, by the pompous appearance of an extraordinary virtue. He held the doctrine of two principles, from whence proceeded all things; the one a wiſe and benevolent deity; and the other, matter, a principle eſſentially evil, and which he ſuppoſed under the ſuperintendance of a certain intelligence of a malignant nature. The world and its firſt inhabitants were (according to the ſyſtem of this raving philoſopher) created by ſeven angels, which preſided over the ſeven planets. This work was carried on without the knowledge of the benevolent deity, and in oppoſition to the will of the material principle. The former, however, beheld it with approbation, and honoured it with ſeveral marks of his beneficence. He endowed with rational ſouls the beings, who inhabited this new ſyſtem, to whom their creators had imparted nothing more than the mere animal life; and having divided the world into ſeven parts, he diſtributed them among the ſeven angelic architects, one of whom was the god of the Jews; and reſerved to himſelf the ſupreme empire over all. To theſe creatures, whom the benevolent principle had endowed with reaſonable ſouls, and with diſpoſitions that led to goodneſs and virtue, the evil being, to maintain his empire, added another kind, whom he formed of a wicked and malignant character; and hence the difference we ſee among men. When the creators of the world fell from their allegiance to the ſupreme deity, God ſent from heaven, into our globe, a reſtorer of order, whoſe name was Chriſt. This divine conqueror came cloathed with a corporeal appearance, but not with a real body; he came to deſtroy the empire of the material principle, and to point out to virtuous ſouls the way by which they muſt return to God. This way is beſet with difficulties and ſufferings; ſince thoſe ſouls, who propoſe returning to the ſupreme being, after the diſſolution of this mortal body, muſt abſtain from wine, fleſh, wedlock, and, in ſhort, from every thing that tends to ſenſual gratification, or even bodily refreſhment. Moſheim's Eccl. Hiſt. vol. I. p. 176, Eng. ed. 8vo. 1758.

SATYR, *Satyrus*, Σατυρος, in the *Heathen Theology*, a fabulous kind of ſemigod; who, with the Fauns and Sylvans, preſided over groves and foreſts, under the direction of PAN.

The word is uſually derived from *ſathe*, σαθη, which, in the ancient Greek, ſignifies the *virile member*; theſe deities being ſuppoſed much addicted to laſciviouſneſs, and hence called *laſcivi Satyri.*

The *Satyrs* were painted half men and half goats: the upper part was human, excepting horns on the head; and the lower brutal, with the tail and legs of a goat; the whole covered with hair. See ORANG-OUTANG.

The poets uſually confound the *Satyrs*, SYLVANS, SILENI, FAUNS, and PANES.

Nonnus, in his Dionyſiaca, makes the *Satyrs* the offſpring of Mercury and a Doric nymph, called Ypthima, and gives us the names of ſeveral; viz. Pæminius, Thyaſus, Hypſichorus, Oriſtas, Apæus, Phlegræus, Lycon, &c.

Memnon, in his book againſt the tyrants of Heraclea, derives the *Satyrs* from Bacchus, and a Naiad, called Nicæa.

Satyrs made part of the dramatis perſonæ in the ancient Greek tragedies, which gave riſe to a new ſpecies of poetry, called *ſatirical.* See SATIRE.

SATYRIASIS, σατυριασις, in *Medicine*, is a violent deſire of venery, attended with a tenſion and rigidity of the pudendum, occaſioned by a morbous diſpoſition of the body.

It takes its name, as ſome will have it, from the relation it bears to Satyrs, who, according to ancient fable, are a kind of demons, extremely addicted to wine and venery: or, as others ſay, from the herb ſatyrion, which has an extraordinary power of exciting venereal deſires.

Antecedent cauſes of this diſorder are medicines taken as provocatives to venery; which are acrimonious, incentive, or prejudicial to the nerves. Or the diſeaſe may be occaſioned by an intemperate and unſeaſonable indulgence in venery. It is an affection common to both ſexes. See PRIAPISM.

SATYRION, *ſatyrium, lizard flower*, in *Botany*, a genus of the *gynandria diandria* claſs. Its characters are theſe: it has a ſingle ſtalk, and the flowers have no empalement, but ſit upon the germen; they have five oblong oval petals, three outer and two inner, joined in a helmet, and a one-leaved nectarium, ſituated on the ſide between the diviſion of the petals; the upper lip is ſhort and erect, the under plain and hanging downward, their baſe repreſents the hinder part of a ſcrotum; they have two ſhort ſlender ſtamina, ſitting upon the pointal, having oval ſummits, with double cells ſhut up in the upper lip of the nectarium; it has an oblong twiſted germen, ſitting under the flower, having a ſhort ſtyle growing on the upper lip of the nectarium: crowned by an obtuſe compreſſed ſtigma; the germen becomes an oblong capſule with one cell, having three keels and three cells, opening under the keels three ways, and filled with ſmall ſeeds. Miller enumerates four, and Linnæus eight ſpecies.

The root is called by this name, becauſe of its fancied promotion of luſt.

Dioſcorides diſtinguiſheth this from the ORCHIS; but Mr. Dale makes it the ſame. It paſſes for a great cordial and reſtorer; but its ſhape, reſembling the human teſticles, ſeems to be the chief foundation of the opinion of its virtues.

SAVADILLOS. See *Yellow* LOUSE-*wort.*

SAVAGES, or SALVAGES, wild, barbarous people, without any fixed habitation, religion, law, or policy.

The word is formed from the Italian *ſalvagio*, of *ſalvaticus*, *ſelvaticus*, or *ſilvaticus*; which we find uſed in the barbarous Latin for *ſilveſtris*, belonging to the woods.

A great part of America is peopled with *ſavages.* Many, ſome ſay, moſt of the *ſavages* are ANTHROPOPHAGI.

SAVANT. See SCAVANT.

SAUCE, *white.* See WHITE.

SAUCE, *alone*, in *Botany.* See *Hedge* MUSTARD.

SAUCIDGE. See SAUSAGE.

SAUCISSE, *ſauſage*, in the *Military Art*, a long train of powder ſewed up in a roll of pitched cloth, and ſometimes of leather, about two inches in diameter; ſerving to ſet fire to mines or caiſſons. It is uſually placed in a wooden pipe, called an *auget*, to prevent its growing damp.

The length of the *ſauciſſe* is to extend from the chamber of the mine to the place where the engineer ſtands to ſpring it. There are uſually two *ſauciſſes* to every mine; that if one ſhould fail, the other may take effect.

SAUCISSON, French, ſignifying literally a *big ſauſage*, in *Fortification*, a kind of faggot, made of thick branches of trees, or of the trunks of ſhrubs, bound together; whoſe uſe is to cover the men, and to ſerve as epaulements;

ments; and alſo to repair breaches, ſtop paſſages, make traverſes over a wet ditch, &c.

The *ſauciſſon* differs from a *faſcine*, which is only made of ſmall branches; and by its being bound at both ends, and in the middle.

Anciently, they made the *ſauciſſon* forty-ſix feet long, and fifteen feet thick; ſince, it is uſually twenty-three feet long, and twelve thick; bound ſtrongly together with three bands ſtrengthened with iron.

SAUEL, in *Ichthyology*, a name given by the Portugueſe to a kind of fiſh, very frequent on the coaſts of China, which by the natives is called *xiyu*. In the months of April and May vaſt numbers of them are taken in the river Kiang, near Nanking: during which time one of the moſt honourable of the emperor's eunuchs takes care to have ſeveral ſhips filled with theſe fiſh; which being put into the ſhips alive, are buried, as it were, in ice provided for that purpoſe, and in this manner preſerved for the ſummer's proviſion of the emperor. The ſhips made uſe of to carry theſe fiſh to the emperor's court at Pekin, are of the neateſt kind, and richly adorned; and all other veſſels are obliged to make way for them.

SAVELIN, in *Ichthyology*, the name of a truttaceous fiſh of the umbla or umbra kind, caught in the Danube, and in ſome other large rivers. Its back is black: its ſides ſpotted with yellow ſpots; and its belly and the belly-fins are yellow; the ſcales are very ſmall, and on the head there is a very remarkable ſeries of ſpotted lines running into a ſingular figure, and ſurrounding the eyes, and running afterwards to the angle of the gills; the upper jaw is much longer than the lower. Its moſt frequent ſize is about a foot in length, but it ſometimes comes up to ſix or eight pounds in weight. It is a very fine taſted fiſh. Willughby.

SAVER DE FAULT, in *Law*, ſignifies to excuſe a fault: as when a man, having made default in court, comes afterwards and alleges good cauſe why he did it; as impriſonment at the time, or the like. See DEFAULT.

SAVIN, *ſabina*, in *Medicine*, is a famous hyſteric and attenuant; it promotes the diſcharges by urine; but its great effect is the promoting the menſes, which it will do more forcibly than ſafely, if not under very careful management.

It is kept in the ſhops as an ingredient in many compoſitions, but it is very rarely uſed in extemporaneous preſcription.

The eſſential oil, obtained by diſtilling the leaves and tops with water, is accounted one of the moſt potent emmenagogues, and it is likewiſe a ſtrong diuretic.

Savin is a ſpecies of JUNIPER, which is a native of ſome of the ſouthern parts of Europe, and raiſed with us in gardens.

SAVIN, *Indian*. See BAUHINIA.

SAVIOUR. *Order of St.* SAVIOUR. See BRIGITTINS.

By the conſtitutions of this order, it is principally appointed for women, who are to pay a particular honour and ſervice to the Virgin. The monks are only to afford them the ſpiritual aſſiſtances they may need, to adminiſter them the ſacraments, &c.

The number of nuns is fixed to ſixty in each monaſtery, and that of monks to thirteen, according to the number of apoſtles, whereof St. Paul makes the thirteenth.—Four of them are to be deacons, to repreſent the four doctors of the church, and eight converts; the whole number making ſeventy-two, the number of the diſciples of our Saviour.

Setting aſide theſe circumſtances, and the habit, this order is under the rule of St. Auguſtin.

It was approved of by Urban V. and ſeveral ſucceeding popes. In 1603, Clement VIII. made ſome alterations in it, on account of the double monaſteries which then began to be built in Flanders, &c.

SAULTS. See SALT.

SAUNDERS. See SANTALUM.

There are three different woods brought under this name from the Eaſt Indies in large billets, and ſaid to be the produce chiefly of the iſland Timor, in the Indian ocean.

The *yellow ſaunders* is of a pale yellowiſh or browniſh colour, cloſe even grain, pleaſant ſmell, and bitteriſh, aromatic, pungent taſte. Diſtilled with water it yields a fragrant eſſential oil, thickening in the cold to the conſiſtence of a balſam, and approaching in ſmell to ambergris, or a mixture of ambergris and roſes. Rectified ſpirit extracts, by digeſtion, conſiderably more than water, and yields a rich yellow tincture. This wood, though generally diſregarded, except occaſionally as a perfume, ſeems to have a good claim to the corroborant virtues aſcribed to it by Hoffman and others.

The *white ſaunders* is of a paler whitiſh colour; and, being far weaker than the other, promiſes little medicinal virtue, and has been long neglected.

The *red ſaunders* is of a dull red, almoſt blackiſh, colour on the outſide, and deep brighter red within; its fibres are occaſionally curled, as in knots. This, though recommended as an aſtringent and corroborant, appears to have very little virtue. Its principal uſe is as a colouring drug. To watery liquors it communicates only a yellowiſh tinge, but to rectified ſpirit a fine deep red.—Lewis's Mat. Med.

SAVOR, or SAVOUR, *ſapor*. See TASTE.

SAVORY, *ſatureja*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the flower has an erect, tubulated, ſtriated empalement of one leaf, indented at the brim in five points; and has one ringent petal, whoſe tube is cylindrical and ſhorter than the empalement; the chaps are ſingle, the upper lip erect and obtuſe, having an acute indenture at the point, the under lip is ſpreading, and divided into three equal parts; it has four briſtly ſtamina, two of which are almoſt the length of the upper lip, the other two ſhorter, terminated by ſummits which touch each other; it has a four-pointed germen, ſupporting a briſtly ſtyle, and crowned by two briſtly ſtigmas; the germen becomes four ſeeds, which ripen in the empalement. There are nine ſpecies, two of which are well known under the names of *ſummer ſavory*, and *winter ſavory*.

The leaves of *ſavory* are a warm aromatic, of a grateful ſmell, and a penetrating pungent taſte. They give out the whole of their active matter to rectified ſpirit, with a dark green tincture; to water they give a reddiſh colour and conſiderable ſmell, but little taſte. In diſtillation, with water, they yield a ſmall quantity of a fragrant eſſential oil, very pungent, ſubtle, and volatile.

The extract obtained from diſtillation with rectified ſpirit ſmells agreeably, and has a warm pungent, aromatic taſte.

Winter *ſavory* is much uſed in the kitchens. Miller's Bot. Off.

SAVOY, in *Botany*, a variety of the common white CABBAGE.

SAURITES, a ſtone mentioned by Pliny, and ſuppoſed, by the ancients, to be found in the belly of a lizard. It ſeems to have been a kind of cornelian of a pale fleſh-colour.

SAURURUS, in *Botany*. See LIZARD's *tail*.

SAURUS, in *Ichthyography*, a name given by ſome authors to the *lacertus* or longer gar-fiſh, called *aguglia imperiale* by the Italians, and the *girrock* by the Engliſh fiſhermen.

SAURUS, the *lizard-fiſh*, is alſo a name given by Salvian, and ſome other writers, to a fiſh of the cuculus kind, reſembling the mackrel in figure and taſte, and more uſually called TRACHURUS.

SAUSAGE, or SAUCIDGE, a term of ſome ſignificancy in commerce, denoting a popular food, prepared of ſome crude meat, uſually either pork or veal ſhred ſmall, ſeaſoned, and put up in a ſkin, in manner of a pudding. The word comes immediately from the French *ſauciſſe*, which ſignifies the ſame, formed of the Italian *ſalciccia*, and that, according to Salmaſius, from the Latin *ſalciſium*, written for *ſalſum*, *ſalted*.

The moſt eſteemed confection of this kind is the Bologna *ſauſage*, which is much thicker than the common one, and is made with much ſucceſs in ſome cities in Italy, particularly Bologna, Venice, &c. whence great quantities are exported to other places.

It is made of raw pork, well beaten in a mortar, with a quantity of garlick, pepper in the grain, and other ſpices: the Italians are furniſhed with a great part of the ſkins or guts for their *ſauſages* from England: the quantities of that commodity yearly exported are greater than one would imagine.

SAUSAGE, in *War*. See SAUCISSE.

SAUSTRA *beady*, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a kind of foſſil, to which they attribute great virtues in medicine.

Before it is given internally, it undergoes a hundred calcinations, and ſeveral preparations with the juices of herbs. When the operation is over, they ſay it will cure a thouſand diſeaſes. It has its name from thence, the word *ſauſtra* ſignifying with them *a thouſand*.

It is a talcy ſtone, and in its native ſtate is of a reddiſh colour.

SAUT, in the *Manege*. See SALTS.

SAUVAGESIA, in *Botany*, the name of a genus of plants of the *pentandria monogynia* claſs, the characters of which are theſe: the perianthium is compoſed of five acute and lanceolated leaves, and remains after the flower is fallen; the flower conſiſts of five plane, erect, obtuſe, emarginated petals, which are longer than the leaves of the cup; the ſtamina are numerous capillary filaments, but half the length of the flower; the antheræ are ſimple; the germen of the piſtil is buried in the cup; the ſtyle is ſimple and ſhort; the ſtigmata are ſix, they are of an oblong figure, and of the length of the ſtyle; the fruit is a covered oval capſule, conſiſting of one cell; the ſpatha and capſule open horizontally along the middle; the ſeeds are ſmall and numerous. There is only one ſpecies.

SAW, *ſerra*, an inſtrument ſerving to divide into pieces divers ſolid matters, as wood, ſtone, marble, ivory, &c. The *ſaw* is one of the moſt uſeful machines, in the mechanic arts, ever invented. The fable, which is perhaps founded on ſome ſurer tradition, attributes the invention thereof to Icarus, who, vying with his father Dædalus, enriched the riſing arts with ſeveral diſcoveries. It is added, he took the firſt hint from the ſpine or backbone of a flat-fiſh, ſuch as the ſoal. The *ſaw* is made of ſteel, with teeth; but thoſe differently filed, and turned, according to the uſe it is deſigned for. There is alſo a kind of *ſaws* without teeth, uſed in the ſawing of marbles, and other ſtones.

The beſt *ſaws* are of tempered ſteel, ground bright and ſmooth: thoſe of iron are only hammer-hardened: hence, the firſt, beſides their being ſtiffer, are likewiſe found ſmoother, than the laſt. They are known to be well hammered by the ſtiff bending of the blade; and well or evenly ground, by the bending into a bow.

The edge, wherein the teeth are, is always thicker than the back, in regard the back is to follow the edge. The teeth are cut and ſharpened by a triangular file; firſt fixing the blade of the *ſaw* in a whetting block.

When filed, the teeth are to be *ſet*, that is, to be turned alternately aſkew, or out of the right line, to make the wider kerf or fiſſure, that the back may follow the better. This is done by putting an inſtrument, called a *ſaw-wriſt*, between every other two teeth, and giving it a little wrench, which turns one of the teeth a little toward you, and the other a little from you. The teeth are always ſet ranker for coarſe cheap ſtuff, than for hard and fine; becauſe the ranker the tooth is ſet, the more ſtuff is loſt in the kerf; and if the ſtuff be hard, the greater is the labour of ſawing it.

The workmen, who make the greateſt uſe of the *ſaw*, are the ſawyers, carpenters, joiners, eboniſts, ſtone-cutters, carvers, ſculptors, &c. The lapidaries too have their *ſaw*, as well as the workers in moſaic; but theſe bear little reſemblance to the common *ſaws*.

But of all mechanics there are none have ſo many *ſaws* as the joiners; nor of ſo many different kinds. The chief are as follow:

Pit-ſaw, a large two-handed *ſaw*, uſed to ſaw timber in pits. It is ſet rank for coarſe ſtuff, ſo as to make a kerf or fiſſure of almoſt a quarter of an inch; but for finer ſtuff it is ſet finer.

Whip-ſaw, which is likewiſe two-handed, uſed to ſaw ſuch large pieces of ſtuff as the *hand-ſaw* will not eaſily reach.

Hand-ſaw is made for a ſingle man's uſe; of which there are various kinds; as the

Bow or *frame-ſaw*, furniſhed with cheeks: by the twiſted cord and tongue in the middle of the *ſaw*, the upper ends are occaſionally drawn cloſe together, and the lower ſet farther apart.

Tenon-ſaw: this, being very thin, has a back to keep it from bending.

Compaſs-ſaw: this is very ſmall, and its teeth uſually not ſet. Its uſe is to cut a round, or any other compaſs kerf: hence, the edge is made broad, and the back thin, that it may have a compaſs to turn in.

The ſurgeons likewiſe uſe a *ſaw*, to cut off bones. It is to be very ſmall, and light, in order to be managed with the more eaſe and freedom: the blade exceedingly fine, and the teeth exquiſitely ſharpened, to make its way more gently, and yet with more expedition, in amputations of limbs.

The *ſaw* is alſo a gardener's inſtrument, uſed in the pruning of trees, &c. It is chiefly applied in the cutting of old, dry, and conſequently hard woods, whether roots or branches, which might ſpoil the pruning-knife; and branches, which the knife could not well take off at one ſtroke.

Except on theſe occaſions, Quintiney always preſers the knife to the *ſaw*.

Saws on being imported pay the following duties; viz. whip *ſaws* each $11\frac{55}{100}d.$ drawback on exportation $10\frac{12\frac{1}{2}}{100}d.$ hand *ſaws* the dozen 1*s.* $3\frac{40}{100}d.$ drawback on exportation 1*s.* $1\frac{1}{2}d.$ tenon *ſaws* the dozen 2*s.* $6\frac{80}{100}d.$ drawback on exportation 2*s.* 3*d.* beſide the uſual duties on iron.

SAW-*fiſh*, in *Ichthyology*, the Engliſh name for the fiſh called by authors the *priſtis ſerra piſcis*, and *ſqualus priſtis* of Linnæus. It has theſe names from the form of its ſnout, which reſembles a large-toothed *ſaw*. According to the new ſyſtem of Artedi, this is a ſpecies of ſqualus, and is diſtinguiſhed from the other ſpecies of the ſame genus, by the name of the ſqualus, with a long, pointed, and flatted ſnout, dentated on each ſide. See *Tab.* IV. *of Fiſh*, N° 46.

This fiſh, from its large ſize, is generally reckoned a kind of whale, but erroneouſly; for it is truly of the ſame genus with the galei or hound fiſh. It is aſh-coloured on the back, and white on the belly; its head is of a heart-like ſhape, and flatted; its mouth is placed far below the end of the ſnout, and in the upper part of the head, as in the zygæna; its lips are rough and ſharp like a file, but it has no other teeth; its head is terminated by a long and flat bony ſubſtance, furniſhed on each ſide with jaggs or points, like deep teeth of a ſaw; there are from twenty to thirty of theſe teeth on each ſide; the body is round, and grows ſmall towards the tail. The ſword of this fiſh is ſometimes five feet long. It is found in the weſtern ocean.

SAW-*wort*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: the flowers are compoſed of many hermaphrodite florets, contained in one common cylindrical empalement, the ſcales of which are ſpear-ſhaped, ending in acute points; the hermaphrodite florets are equal, funnel-ſhaped, and of one petal; the tube is inflexed, the brim is bellied, and cut into five points; they have each five ſhort hair-like ſtamina, terminated by cylindrical ſummits, and an oval germen ſupporting a ſlender ſtyle, crowned by two oblong reflexed ſtigmas; the germen afterwards turns to a vertical oval ſingle ſeed, crowned with down, which ripens in the empalement. Miller enumerates twelve, and Linnæus fifteen ſpecies.

The common *ſaw-wort* grows in woods and meadows, and flowers in July. It is eſteemed vulnerary, and is ſaid to mundify ulcers, and to promote the generation of fleſh in them, to mitigate the pains of the hæmorrhoids, and to cure an inteſtinal rupture. The herb and root are recommended in caſe of bruiſes in falls from eminences. James.

It ſeems very expreſsly proved by Dioſcorides, Pliny, Antonius Muſa, and ſeveral other of the ancients, that the *betonica*, or as they ſometimes wrote it, *vettonica*, was our *ſerratula*. They mention its growing in woods, and having leaves deeply ſinuated, or cut in, and indented all about the edges, and ſay it grew in wet ſhady places. All this agrees very well with our cut-leaved *ſerratula*, and with the *betonica*, or *vettonica*, of the ancients. Apuleius confounds the *brittanica antiquorum* with the *betonica*, and ſays that it has large leaves like the dock.

SAWING, the application of the ſaw, in dividing of timber, &c. into boards, &c.

There are windmills and water-mills which do the office of *ſawing* wood, with infinitely more expedition and eaſe than is performed by the hand. They conſiſt of ſeveral parallel ſaws, which are made to riſe and fall perpendicularly, by means of one of the grand principles of motion. A very few hands are here needed, viz. only to puſh forward the pieces of timber, which are laid on rollers, or ſuſpended by ropes, in proportion as the *ſawing* advances. Theſe mills are frequently uſed abroad; and have been alſo introduced in England; but the parliament in conſideration of this, that they would ſpoil the ſawyers trade, and ruin great numbers of families, thought fit to ſuppreſs them.

The mechaniſm of a *ſawing* mill may be reduced to three principal things; the firſt, that the ſaw be drawn up and down as long as is neceſſary, by a motion communicated by water to the wheel; the ſecond, that the pieces of timber to be cut into boards be advanced by an uniform motion to receive the ſtrokes of the ſaw, for here the wood is to meet the ſaw, and not the ſaw to follow the wood, therefore the motion of the wood and that of the ſaw ought immediately to depend the one on the other; the third, that when the ſaw has cut through the whole length of the piece, the whole machine ſtops of itſelf, and remains immoveable, for fear, leſt having no obſtacle to ſurmount, the force of the water ſhould turn the wheel with too great rapidity, and break ſome part of the machine.

M. Felibien mentions a kind of long ſaws, invented by one Miſſon, inſpector of the marble quarries in the Pyreneans; by means whereof ſtones are ſawed even in the rock itſelf, whence they are taken. He adds, that ſome of them were made twenty-three feet long; but does not deſcribe either their form or application: he only ſays, they are of iron, and without teeth.

SAXIFRAGE, *ſaxiſraga*, compounded of *ſaxum*, *ſtone*, and *frango*, *I break*, in *Botany*, a genus of the *decandria digynia* claſs. Its characters are theſe: the flower hath a ſhort permanent acute empalement, of one leaf, cut into five parts; it has five plain petals, longer than the empalement, and ten awl-ſhaped ſtamina, terminated by roundiſh ſummits, with a roundiſh acute-pointed germen, ſitting upon two ſtyles, crowned by obtuſe ſtigmas; the germen afterwards becomes an oval capſule, with two horns opening between their tops, filled with ſmall ſeeds. Miller enumerates twelve, and Linnæus thirty-ſix ſpecies.

The leaves of the common white *ſaxifrage* are round, indented, ſucculent, and ſhining, like thoſe of ivy; in the middle of the leaves there riſe ſtalks, about a foot high, which, at their extremities, bear little white flowers, conſiſting of five leaves, diſpoſed in form of a roſe. Its ſeed, which is very ſmall, is incloſed in the capſule, which is a roundiſh pod. Its root divides itſelf into ſeveral fibres, at the bottom whereof are found little reddiſh tubercles, like coriander ſeed.

Theſe are the grains that are commonly called the ſeed of the *ſaxifrage*, and are the part uſed in medicine.—The beſt manner of adminiſtration is, to take them infuſed in white wine, or in a decoction in common water.

In the materia medica we have two very different plants deſcribed under the name of *ſaxifrage*; ſo that the writers on theſe ſubjects ſeem often ſtrangely to contradict one another in their deſcriptions, when they are really deſcribing two perfectly different plants.

The one is the *ſaxifraga antiquorum.* This is a low plant, ſomewhat reſembling thyme, and its ſeed is of an agreeable ſmell, and warm and acrid taſte. The other is the common white meadow *ſaxifrage*, a plant of ſix or eight inches high, with roundiſh leaves and large white flowers. The root of this ſpecies is granuloſe, or made up of a number of ſmall knobs, and theſe are in moſt places uſed in the ſhops under the name of *ſaxifrage* ſeeds.

The ſeeds as well as the leaves and roots of *ſaxifrage* were once in great eſteem, as aperients and diuretics, in obſtructions of the menſes, ſtranguries, and nephritic caſes, whence the name; but they have of late loſt their credit.

It may be obſerved, however, that we are not proper judges of what might have been the virtues of an acrid ſeed, while we uſe in its ſtead an inſipid root.

SAXIFRAGE, *burnet, pimpinella*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it has an umbellated flower, the principal umbel compoſed of many rays or ſmaller umbels, neither of which have any involucrums, the greater umbel is uniform; the flowers have five heart-ſhaped inflexed petals, nearly equal, and five ſtamina longer than the petals, terminated by roundiſh ſummits, the germen is ſituated under the flower, ſupporting two ſhort ſtyles, crowned by obtuſe ſtigmas; the germen becomes an oblong oval fruit, divided in two parts, containing two oblong ſeeds, plain on the inſide, convex on the other, and furrowed. Miller enumerates ſeven, and Linnæus five ſpecies, of which the common ANISE is one.

The roots of the greater *burnet ſaxifrage* with a white umbel have a hot and pungent, but not very durable, taſte; their virtue is extracted partially by water, and completely by rectified ſpirit. When large quantities are diſtilled with water, there ſeparates from the water a ſmall portion of a yellowiſh eſſential oil, extremely acrid and fiery. The leaves and ſeeds of the plants have likewiſe a conſiderable acrimony; the leaves leſs than the ſeeds, and both leſs than the roots. This pungent root is in great eſteem among the Germans, as a warm ſtimulating reſolvent, aperient, diaphoretic, &c. in weakneſs of the ſtomach from viſcid phlegm, infarctions of the breaſt, tumors and obſtructions of the glands, impurities of the blood, and, in general, whatever tenacious humours are to be attenuated, or the fluid ſecretions promoted. It is an uſeful ingredient in our officinal compound arum powder; and it is alſo employed as a maſticatory for ſtimulating the ſalival glands, and in gargariſm for diſſolving viſcid mucus in the fauces. Lewis Mat. Med.

SAXIFRAGE, *golden, chryſoſplenium*, in *Botany*, a genus of the *decandria digynia* claſs. Its characters are theſe: the empalement is divided into four or five parts, which ſpread open, are coloured, and permanent; the flower has no petals, but eight or ten ſtamina, which are ſhort, erect, and ſtand oppoſite to the angles of the empalement; the germen is immerſed in the empalement, which afterward becomes a capſule with two beaks, opening with two valves, and filled with ſmall ſeeds.—There are two ſpecies, which grow wild in many parts of England.

SAXIFRAGE, *meadow*, a ſpecies of *peucedanum*. See *Hog's* FENNEL.

SAXIFRAGE, *red, ſaxifraga rubra*, a name given by ſome botanic authors to the *filipendula*, or DROPWORT.

SAXIFRAGE, *yellow, ſaxifraga lutea*, a name given by Fuchſius, and ſome other authors, to the common MELILOT.

SAXON, or the SAXON *language*. See ENGLISH.

SAXON *blue*. See BLUE.

SAXON *green*, in *Dying*. See GREEN.

SAXON *verſion*. See BIBLE.

SAY, or SAYE, in *Commerce*, a kind of ſerge; or a very light croſſed ſtuff, all wool; much uſed abroad for linings, and by the religious for ſhirts; and with us, by the quakers, for aprons, for which purpoſe it is uſually dyed green.

There are very conſiderable manufactures hereof at Sudbury, near Colcheſter; alſo at Ypres, Houdſcot, &c. in Flanders, &c. Thoſe made in England are chiefly exported to Portugal and Leghorn.

SAYACU, in *Ornithology*, the name of a Braſilian bird, of the ſize of our chaffinch, and all over of a greyiſh green colour, and very beautifully bright and ſhining in the back and wings. Its beak is black, as are alſo its eyes.

SAYAN, in *Natural Hiſtory*, a name given by ſome to a ſpecies of ſea-ſwallow. This is the bird whoſe neſts are ſo famous an ingredient in ſoups.

SCAB. *Crown* SCAB, in the *Manege*. See CROWN *ſcab*.

SCABBARD, in the *Manege*, is the ſkin that ſerves for a ſheath or caſe to a horſe's yard.

SCABBED *head*, in *Medicine*. See TINEA.

SCABBED *heels*, or *fruſh*, in the *Manege*, is an eating putrefaction upon a horſe's fruſh, which is very hard to cure, and has a noiſome ſmell.

SCABELLUM, in the *Ancient Architecture*, a kind of pedeſtal, uſually ſquare, ſometimes polygonous, very high and ſlender, commonly terminating in a kind of ſheath or ſcabbard, or profiled in manner of a baluſter. Its uſe is to ſupport buſtos, or other relievos, &c.

SCABIES, in *Medicine*. See ITCH.

SCABIOUS, *ſcabioſa*, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are theſe: the common empalement is compoſed of many leaves containing many flowers; it has ſeveral ſeries of leaves ſurrounding the receptacle, upon which they ſit, the inner are gradually ſmaller; the flowers have a double empalement, and ſit upon the germen, the outer is ſhort, membranaceous, folded and permanent, the inner is divided into five awl-ſhaped capillary ſegments; the florets have one erect tubulous petal, cut into four or five parts at the brim; they have four weak, awl-ſhaped, hairy-like ſtamina, terminated by oblong proſtrate ſummits; the germen is ſituated under the receptacle of the florets, ſupporting a ſlender ſtyle, crowned by an obtuſe ſtigma, which is obliquely indented; it afterward becomes an oblong oval ſeed ſitting in the common empalement, and crowned by the cup of the flower. Miller enumerates nineteen, and Linnæus twenty-ſix ſpecies.

The muſk *ſcabious*, and other garden kinds are propagated by ſowing their ſeeds in May or the beginning of June, and the next year they will be very ſtrong, flowering from June to September, and producing ripe ſeeds, which they will not do if ſown early in the ſpring, and ſo made to flower the ſame year. The ſeeds are to be ſown on ſhady borders, and at Michaelmas the young plants are to be removed to the places where they are to remain. They are very hardy, and ſeldom periſh, till after they have ripened their ſeeds.

The common *ſcabious* of our corn-fields has been accounted a great alexipharmic and pectoral; and made an ingredient in ptiſans, and infuſions given in coughs and all diſorders of the lungs, and recommended greatly by authors in pleuriſies, quinzies, coughs, aſthmas, and conſumptions. Some have recommended it in malignant fevers, and even in the plague.

It has been alſo uſed externally, either in a ſtrong decoction, or elſe boiled into an ointment with lard, in the itch, and many other diſorders of the ſkin; whence it has its names, viz. from *ſcabies, itch*; and upon which account it is often met with in decoctions, and ſometimes in a ſyrup, among ſuch things as are called ſweeteners: but it ſeems now, in a great meaſure, to have loſt its credit and uſe.

SCABIOUS, *ſheep's*. See JASIONE.

SCABRITA, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are, that the corolla has a ſingle petal, and is ſalver-ſhaped; the ſeeds are two, and emarginated; and the calyx is truncated. There is only one ſpecies.

SCABROUS *leaf*, among *Botaniſts*. See LEAF.

SCABROUS *ſtalk*. See STALK.

SCAD, the Engliſh name of a fiſh, reſembling the mackrel in ſhape, called by writers the *trachurus*. See *Horſe* MACKREL.

SCÆNANTH, or **SCHÆNANTH**, in the *Materia Medica*, the dried ſtalk of a plant brought to us from Arabia.

This plant is called, by the generality of botaniſts, *juncus odoratus*, and *aromaticus*; but Linnæus gives it the name of ISCHÆMUM, under which head its botanical characters are deſcribed.

The ſtalk is uſually eight or ten inches in length, ſometimes conſiderably more; it is ſmooth and gloſſy on the ſurface, and about the thickneſs of a wheat ſtraw, but much more rigid and firm. It is round, jointed, and not ſolid, but has a cavity in it filled with a central pith, like that of our common ruſhes. Its colour is yellowiſh at the baſe, or toward the root, but toward the top it is purpliſh or greeniſh; it is very light, yet conſiderably hard, and is of a fragrant aromatic ſmell, in which we may diſcover ſomething of a mixed ſcent, between that of the roſe and penny-royal. Its taſte is acrid and bitteriſh, but not unpleaſant.

It ſhould be choſen freſh, ſound, and clean, not duſty, or decayed, of a good ſmell and ſtrong acrid taſte.

The word *ſchænanth*, ſignifying the flower of the ruſh, might naturally lead us to ſuppoſe, that what we now receive under that name, is not the drug that was ſo called by the ancient Greeks and Romans, and ſome have very vigorouſly ſupported this opinion. But on enquiry into the Grecian materia medica, we find that none of their *ſchænanth* had flowers on it any more than ours.

The ancients uſed the whole plant in medicine, ſtalk, leaves, and flowers; its virtue reſided pretty equally in every part of it, as is manifeſt from every part's poſſeſſing the ſame ſmell and taſte, and having the ſame pungency in the mouth.

They preſcribe it as a deobſtruent and promoter of the menſes: but at preſent it is never heard of in extemporaneous preſcription, only kept as an ingredient in ſome compoſitions. Hill's Hiſt. Mat. Med.

SCAFFOLD, a timber work, raiſed in manner of an amphitheatre, to place ſpectators upon for the commodious viewing of ſome ſhew or ceremony.

Some derive the word from the German *ſchawhaus*, which ſignifies the ſame, compounded of *ſchawen, to look, view*, and *haus, houſe*. Guyet derives it from the Italian *catafalco*, which ſignifies the ſame thing. Du-Cange, from *eſchafaudus*, a word in the corrupt Latin, ſignifying a *tribunal*, or *pulpit*: he adds, that it might come originally from *cata*, a wooden machine uſed to carry earth to fill up ditches, and carry over the ſoldiers to the attack; whence the Italians formed their *catafalco*, the old French their *chafaut*, the monks their *ſcaffaldus*, and finally the Engliſh their *ſcaffold*.

SCAFFOLD is alſo uſed for a little ſtage, or theatre raiſed in ſome public place, to execute criminals upon, either by beheading, or breaking upon the wheel.

SCAFFOLD, or **SCAFFOLDING**, is alſo uſed for an aſſemblage of planks and boards, ſuſtained by treſſes, or by pieces of wood fixed in the wall, whereon maſons, ſculptors, painters, &c. ſtand to work in high places, cielings, &c.

SCAGLIOLA is an imitation of marble of any ſort, with reſpect to which the artiſt ſucceeds in an aſtoniſhing degree with the moſt beautiful marbles, ſuch as Sienna, jaſper, brocatello, and porphyry: it is hard, and when finiſhed bears a very fine poliſh. It is laid on brick in the manner of ſtucco, and worked off with iron tools. The Pantheon, in Oxford-ſtreet, has all its columns formed of this material, and, when firſt done, they appear as well as the original marble, and, without accident, laſt for a great number of years, without any material diminution of their beauty.

SCALA, in *Anatomy*. The cochlea, or inner cavity of the ear, is divided by a ſeptum into two canals, called *ſcalæ*: whereof the one, looking towards the tympanum, is called the *ſcala tympani*; the other, having a communication with the veſtibulum, is called the *ſcala veſtibuli*. See COCHLEA, EAR, TYMPANUM, and VESTIBULUM.

SCALA, in the *Ancient Architecture*, denotes what in the modern we call a STAIR-CASE.

SCALÆ *gemoniæ*. See GEMONIÆ.

SCALADO, or **SCALADE**. See ESCALADE, and *Scaling* LADDERS.

SCALARE, in *Natural Hiſtory*, a name given by Rumphius to a peculiar ſpecies of TURBO, or *ſcrew ſhell*; the ſeveral wreaths of which having an opening between them form an open ſpiral.

SCALD. See BURN.

SCALD *and burns, liniment for*. See LINIMENT.

SCALD *head*, in *Medicine*. See TINEA.

SCALDS, in the *Hiſtory of Literature*, a name given by the ancient inhabitants of the northern countries to their poets; in whoſe writings their hiſtory is recorded.

SCALE, a mathematical inſtrument, conſiſting of one or more lines drawn on wood, metal or other matter, divided into equal or unequal parts, of great uſe in laying down diſtances in proportion, or in meaſuring diſtances already laid down.

There are ſcales of ſeveral kinds, accommodated to the ſeveral uſes; the principal are, the *plain ſcale*, the *diagonal ſcale*, *Gunter's ſcale*, and the *plotting ſcale*.

SCALE, *plain* or *plane*, a mathematical inſtrument of very extenſive application and uſe. The lines generally drawn upon it are the following: viz.

		marked
1.	Lines of Equal Parts	E. P.
2.	—— Chords	Cho.
3.	—— Rhumbs	Ru.
4.	—— Sines	Sin.
5.	—— Tangents	Tan.
6.	—— Secants	Sec.
7.	—— Half-Tangents	S. T.
8.	—— Longitude	Long.
9.	—— Latitude	Lat.
10.	—— Hours	Ho.
11.	—— Inclinations	In. Mer.

1. The lines of equal parts are of two ſorts, viz. ſimply divided, and diagonally divided. The firſt of theſe are formed by drawing three lines parallel to one another, at unequal diſtances, (ſee *Tab.* IV. *Geometry*, *fig.* 98.) and of any convenient length. Divide this length into any number of equal parts that may be thought neceſſary, allowing a certain number of theſe parts to an inch, ſuch as 2, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4, $4\frac{1}{2}$, &c. which diviſions are diſtinguiſhed by lines, croſſing the three parallels. Divide the left hand diviſion into ten equal parts, diſtinguiſhed by lines croſſing only the lower parallels, but let the fifth diviſion be ſomewhat longer than the others. And it may be convenient to divide the ſame left hand diviſion into twelve equal parts, laid down upon the upper parallel line, having the third, ſixth, and ninth diviſions diſtinguiſhed by longer ſtrokes than the reſt, of which that at the ſixth is longeſt. There are, uſually, ſeveral of theſe ſimply divided *ſcales* put on rulers one above the other, with numbers on the left hand, ſhewing, in each *ſcale*, into how many equal parts an inch is divided, ſuch as 20, 25, 30, 35, 40, 45, &c. which are ſeverally uſed, as the ſize of the plan to be expreſſed may require.

The uſe of theſe lines of equal parts is to lay down any line expreſſed by a number of two places or denominations, whether decimally, or duodecimally divided; as leagues, miles, chains, poles, yards, feet, inches, &c. and their tenth or twelfth parts: thus, if each diviſion be reckoned 1, as 1 league, mile, &c. then each of the ſubdiviſions will expreſs $\frac{1}{10}$ part thereof; and if each of the large diviſions be called 10, then each ſmall one will be 1; and if the large diviſions be 100, then each ſmall one will be 10, &c. Conſequently, to lay off a line $8\frac{7}{10}$, 87, or 870 parts, as leagues, miles, &c. ſet one point of the compaſſes on the eighth of the large diviſions, counting from the left hand towards the right, and extend the other point to the ſeventh of the ſmall diviſions, counting from the right hand, towards the left, then are the compaſſes open to expreſs a line of $8\frac{7}{10}$, 87, or 870 leagues, miles, &c. bearing ſuch a proportion in the plan, as the line meaſured does to the thing repreſented.

If a length of feet and inches were to be expreſſed, the ſame large diviſions may repreſent the feet, but the inches muſt be taken from the upper part of the firſt diviſion, which is divided into twelve equal parts; e. gr. for a line of 7 feet 5 inches, ſet one point of the compaſſes on the fifth diviſion among the 12, counting from the right hand to the left, and extend the other to ſeven among the large diviſions; and that diſtance laid down in the plan ſhall expreſs a line of 7 feet 5 inches.

The ſecond or diagonal diviſions are formed by drawing eleven lines parallel and at equal diſtances (*fig.* 99): divide the upper of theſe lines into ſuch a number of equal parts, as the *ſcale* to be expreſſed is deſigned to contain, and from each of theſe diviſions draw perpendiculars through the eleven parallels; ſubdivide the firſt of theſe diviſions into ten equal parts, both in the upper and lower lines; then each of theſe ſubdiviſions may be alſo ſubdivided into ten equal parts, by drawing diagonal lines, viz. from the tenth below to the ninth above, from the ninth below to the eighth above, from the eighth below to the ſeventh above, &c. till from the firſt below to the 0th above: ſo that by theſe means one of the primary diviſions on the *ſcale* will be divided into a hundred equal parts.

There are generally two diagonal *ſcales* laid on the ſame plane or face of the ruler, one being commonly half the other. The uſe of the diagonal *ſcale* is much the ſame with the ſimple *ſcale*, except that in this a line may be taken of three denominations. From the conſtruction it is plain, that, if each of the primary diviſions repreſents 1, each of the firſt ſubdiviſions will expreſs $\frac{1}{10}$ of 1; and each of the ſecond ſubdiviſions (taken on the diagonal lines, counting from the top downwards) will expreſs $\frac{1}{10}$ of the former ſubdiviſions, or a hundredth of the primary diviſions; and if each of the primary diviſions expreſs 10, then each of the firſt ſubdiviſions will expreſs 1, and each of the ſecond $\frac{1}{10}$: and if each of the primary diviſions repreſent 100, then each of the firſt ſubdiviſions will be 10, and each of the ſecond will be 1, &c. Conſequently, to lay down a line, whoſe length is expreſſed by 347, $34\frac{7}{10}$, or $3\frac{47}{100}$ leagues, miles, chains, &c. on the diagonal line, joined to the fourth of the firſt ſubdiviſions, count ſeven downwards, reckoning the diſtance of each parallel 1, and there ſet one point of the compaſſes, and extend the other till it falls on the interſection of the third primary diviſion with the ſame parallel in which the other foot reſts, and the compaſſes will then be opened to expreſs a line of 347, $34\frac{7}{10}$, or $3\frac{47}{100}$, &c.

In order to deſcribe the remaining lines of the plane *ſcale*, deſcribe a circumference with any convenient radius (*fig.* 100), and draw the diameters A B, D E, at right angles to each other; continue B A at pleaſure towards F; through D draw D G parallel to B F; and draw the chords B D, B E, A D, A E. Circumſcribe the circle with the ſquare H M N, whoſe ſides H M, M N, ſhall be parallel to A B, E D.

2. For the line of chords, divide the arc A D into ninety equal parts; mark the tenth diviſions with the figures 10, 20, 30, 40, 50, 60, 70, 80, 90; on D, as a centre, with the compaſſes, transfer the ſeveral diviſions of the quadrantal arc to the chord A D, which, marked with the correſponding figures, will become a line of chords. One of the obvious uſes of the line of chords is to lay down a propoſed angle, or to meaſure an angle already laid down.

3. For the line of rhumbs, divide the arc B E into eight equal parts, marking them with the figures 1, 2, 3, 4, 5, 6, 7, 8; and divide each of thoſe parts into quarters: on B, as a centre, transfer the diviſions of the arc to the chord B E, which, marked with the correſponding figures, will be a line of rhumbs: the uſe of which is to delineate or meaſure a ſhip's courſe.

4. For the line of ſines, through each of the diviſions of the arc A D, draw right lines parallel to the radius A C; and C D will be divided into a line of ſines, which are to be numbered from C to D for the right ſines, and from D to C for the verſed ſines, which may be continued to 180° by laying the diviſions of the radius C D from C to E.

5. For the line of tangents, lay a ruler on C, and the ſeveral diviſions of the arc A D, and it will interſect the line D G, which will become a line of tangents, and is to be numbered from D to G with 10, 20, 30, 40, &c.

6. For the line of ſecants, transfer the diſtances from the centre C to the diviſions on the line of tangents to the line A F, from the centre C, and theſe will give the diviſions of the line of ſecants, which muſt be numbered from A towards F, with 10, 20, 30, &c.

7. For the line of half-tangents, lay a ruler on E, and the ſeveral diviſions of the arc A D, which will interſect the radius C A in the diviſions of the half-tangents: mark theſe with the correſponding figures of the arc A D. The ſemi-tangents on the plane *ſcale* are generally continued as far as the length of the ruler on which they are laid will admit. The diviſions beyond 90° are found by dividing the arc A E like the arc A D, and laying a ruler by E, and thoſe diviſions of the arc A E; and the diviſions of the ſemi-tangents above 90° will be obtained on the line C A continued.

The uſes of the *ſcales* of ſines, tangents, ſecants, and half-tangents, are to find the poles and centres of the ſeveral circles repreſented in the *orthographical* and *ſtereographical* PROJECTION of the ſphere.

8. For the line of longitude, divide A H into ſixty equal parts; through each of theſe diviſions parallels to the radius A C will interſect the arc A E in as many points. From E, as a centre, the diviſions of the arc E A, being transferred to the chord E A, will give the diviſions of the line of longitude. If this line be put on the *ſcale*, cloſe to the line of chords, both inverted, ſo that 60° in the *ſcale* of longitude be againſt 0° in the chords, &c. and any degree of latitude be counted on the chords, we ſhall have, oppoſite to it, in the line of longitude, the miles contained in one degree of longitude, in that latitude: the meaſure of one degree under the equator being ſixty geographical miles. However tables anſwer this purpoſe much better. See DEGREE, and *Parallel* SAILING.

9. For the line of latitude, lay a ruler on A, and the ſeveral diviſions of the ſines on C D, and it will interſect the arc B D in as many points; on B, as a centre, transfer the interſections of the arc B D to the right line B D; number the diviſions from B to D with 10, 20, 30, &c. to 90, and B D will be a line of latitude.

10. For the line of hours, biſect the quadrantal arcs B D, B E, in *a*, *b*; divide the quadrantal arc *a b* into ſix equal parts (giving 15° for each hour), and each of theſe into four others, which give the quarters. A ruler on C, and the ſeveral diviſions of the arc *a b*, will interſect the line M N in the hour, &c. points, which are to be marked as in the figure.

11. For the line of inclinations of meridians, biſect the arc E A in *c*; divide the quadrantal arc *b c* into ninety equal parts; lay a ruler on C, and the ſeveral diviſions of the arc *b c*, and the interſections of the line H M will be the diviſions of a line of inclinations of meridians. The lines of latitude, hours, and inclinations of meridians are applicable to the practice of DIALLING. Robertſon's Deſcrip. and Uſe of Math. Inſt. ſect. 8. ed. 2. See PLOTTING *ſcale*.

SCALE, *decimal, Gunter's, plotting, proportional,* and *reducing*. See the ſeveral articles.

SCALE, in *Geography* and *Architecture*, a line divided into equal parts, placed at the bottom of a map or draught, to ſerve as a common meaſure to all the parts of the building, or all the diſtances and places of the map.

In maps of large tracts, as kingdoms and provinces, &c. the *ſcale* uſually conſiſts of miles; whence it becomes denominated *a ſcale of miles*.

In more particular maps, as thoſe of manors, &c. the *ſcale* is uſually of chains, ſubdivided into poles or links.

The *ſcales* uſed in draughts of buildings uſually conſiſt of modules, feet, inches, palms, fathoms, or the like.

To find the diſtance between two towns, &c. in a map, the interval is taken in the compaſſes, and ſet off in the *ſcale*; and the number of diviſions it includes gives the diſtance. The ſame method ſerves to find the height of a ſtory, or other part in a deſign.

SCALE, *front*, in *Perſpective*, is a right line in the draught, parallel to the horizontal line; divided into equal parts, repreſenting feet, inches, &c.

SCALE, *flying*, is a right line in the draught, tending to the point of view, and divided into unequal parts, repreſenting feet, inches, &c.

SCALE, *ſcala*, in *Muſic*, is a denomination given to the arrangement of the ſix ſyllables, invented by Guido Aretino, *ut re mi fa ſol la*; called alſo GAMMUT.

It bears the name *ſcale*, q. d. ladder, becauſe it repreſents a kind of ladder, by means whereof the voice riſes to acute, or deſcends to grave; each of the ſix ſyllables being, as it were, one ſtep of the ladder.

SCALE is alſo uſed for a ſeries of ſounds riſing or falling towards acuteneſs or gravity, from any given pitch of tune to the greateſt diſtance that is fit or practicable, through ſuch intermediate degrees as to make the ſucceſſion moſt agreeable and perfect, and in which we have all the harmonical intervals moſt commodiouſly divided.

The *ſcale* is otherwiſe called an *univerſal ſyſtem*, as including all the particular ſyſtems belonging to muſic.—See SYSTEM.

SCALE *of muſic, origin and conſtruction of the.* Every concord, or harmonical interval, is reſolvable into a certain number of degrees or parts; the octave, for inſtance, into three greater tones, two leſs tones, and two ſemitones; the greater ſixth, into two greater tones, two leſs tones, and one ſemi-tone; the leſs ſixth, into two greater tones, one leſs tone, and two ſemi-tones; the fifth, into two greater tones, one leſs tone, and one ſemi-tone; the fourth, into one greater tone, one leſs tone, and one ſemi-tone; the greater third, into one greater tone, and one leſs tone; and the leſs third into one greater tone, and one leſs tone. It is true, there are varieties of other intervals or degrees, beſides greater tone, leſs tones, and ſemitones, into which the concords may be divided; but theſe three are preferred to all the reſt, and theſe alone are in uſe. For the reaſon whereof, ſee TONE.

Farther, it is not any order, or progreſſion, of theſe degrees, that will produce melody: a number, for inſtance, of greater tones will make no muſic, becauſe no number of them is equal to any concord; and the ſame is true of the other degrees: there is a neceſſity, therefore, of mixing the degrees to make muſic; and the mixture muſt be ſuch, as that no two of the ſame kind are ever placed next each other.

A natural and agreeable order of theſe degrees Mr. Malcolm gives us in the following diviſion of the interval of an octave, wherein (as all the leſſer concords are contained in the greater) the diviſions of all the other ſimple concords are contained. Under the ſeries are the degrees between each term, and the next. In the firſt ſeries, the progreſſion is by the greater third, in the latter by the leſs third.

	great 2d	gr. 3d	4th	5th	6th.	7th	8th
1 :	$\frac{8}{9}$:	$\frac{4}{5}$:	$\frac{3}{4}$:	$\frac{2}{3}$:	$\frac{3}{5}$:	$\frac{8}{15}$:	$\frac{1}{2}$
Key or fund.	great tone.	leſs tone.	ſemi-tone.	great tone.	leſs tone.	great tone.	ſemi-tone.

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	great ſecond.						
1 :	$\frac{8}{9}$:	$\frac{5}{6}$:	$\frac{3}{4}$:	$\frac{2}{3}$:	$\frac{5}{8}$:	$\frac{5}{9}$:	$\frac{1}{2}$
key or fund.	great tone.	ſemi-tone.	leſs tone.	great tone.	ſemi-tone.	great tone.	leſs tone.

Now, the ſyſtem of octave containing all the original concords; and the compound concords being only the ſums of octave, and ſome leſs concord; it is evident, that if we would have the ſeries of degrees continued beyond octave, they are to be continued in the ſame order through a ſecond as through the firſt octave, and ſo on through a third or fourth octave, &c. and ſuch a ſeries is what we call the *ſcale of muſic*.

Of this there are two different ſpecies, according as the leſs or greater 3d, or the leſs or greater 6th, are taken in; for both can never ſtand together in relation to the ſame key or fundamental, ſo as to make an harmonical *ſcale*. But if, by either of theſe ways, we aſcend from a fundamental or given ſound, to an octave, the ſucceſſion will be melodious, though the two make two different ſpecies of melody. Indeed, every note is diſcord with regard to the next, but each of them is concord to the fundamental, except the 2d and 7th.

In continuing the ſeries, there are two ways of compounding the names of the ſimple interval with the octave: thus, a greater or leſs tone or ſemi-tone above an octave, or two octaves, &c. or to call them by the number of degrees from the fundamental, as 9th, 10th &c.

In the two *ſcales* above, the ſeveral terms of the *ſcale* are expreſſed by the proportionable ſections of a line, repreſented by 1, the key or fundamental of the ſeries. If we would have the ſeries expreſſed in whole numbers, they will ſtand as follows, in each whereof the greateſt number expreſſes the longeſt chord, and the other numbers the reſt in order; ſo that if any number of chords be in theſe proportions of length, they will expreſs the true degrees and intervals of the *ſcale* of muſic, as contained in an octave concinnouſly divided in the two different ſpecies above mentioned.

540 :	480 :	432 :	405 :	360 :	324 :	288 :	270
great tone.	leſs tone.	ſemi-tone.	great tone.	leſs tone.	great tone.	ſemi-tone.	

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216 :	192 :	180 :	162 :	144 :	135 :	120 :	108
great tone.	ſemi-tone.	leſs tone.	great tone.	ſemi-tone.	great tone.	leſs tone.	

This *ſcale* the ancients called the *diatonic ſcale*, becauſe proceeding by tones and ſemi-tones.

The moderns call it, ſimply, *the ſcale*, as being the only one now in uſe; and ſometimes, *the natural ſcale*, becauſe its degrees, and their order, are the moſt agreeable and concinnous, and are preferable, by the conſent both of ſenſe and reaſon, to all other diviſions ever inſtituted. Thoſe others, are the *chromatic* and *enharmonic ſcales*, which, with *diatonic*, made the three *ſcales* or *genera* of melody of the ancients.

Many have been the diſputes among ancient and modern muſicians, about the conſtitution of muſical *ſcales*. Some of the ancients, with Euclid, will have it compoſed of tones major and limmas, ſo that the ſeven intervals of an octave would be thus expreſſed $\frac{9}{8}$, $\frac{256}{243}$ $\frac{9}{8}$, $\frac{9}{8}$. $\frac{256}{243}$, $\frac{9}{8}$, $\frac{9}{8}$. Some modern authors have from hence inferred the imperfection of the Greek muſic. They alledge, we here find the ditonus, or an interval equal to two tones major expreſſed by $\frac{81}{64}$, inſtead of the true third major expreſſed by $\frac{5}{4}$. As there can be no queſtion of the beauty and elegance of the latter, the former therefore muſt be out of tune by a whole comma, which is very ſhocking to the ear. In like manner, the trihemitone of the ancients falls ſhort of the third minor by a comma; which is alſo the deficiency of their hemi-tone, or limma, from the true ſemi-tone major, ſo eſſential to good melody. All which errors would make their *ſcale* appear much out of tune to us. A late learned author (Dr. Pepuſch, Philoſophical Tranſactions, N° 48, p. 268) ſays he readily grants the objection, but adds, that ſuch a *ſcale* alſo appeared out of tune to the ancients themſelves, ſince they expreſly tell us, that the intervals leſs than the diateſſaron, or fourth, as alſo the intervals between the fifth and octave, were diſſonant, and diſagreeable to the ear. Their *ſcale* here mentioned, and called by ſome *ſcala maxima*, was not intended to form the voice to ſing accurately, but was deſigned to repreſent the ſyſtem of their modes and tones, and give the true fourths and fifths of every key a compoſer might chooſe. Now if, inſtead of tones major and limmas, we take the tones major and minor, with the ſemi-tone major, as the moderns contend we ſhould, we ſhall have a good *ſcale* indeed, but a *ſcale* adapted only to the concinnous conſtitution of one key; and whenever we proceed from that into another, we find ſome fourth or fifth erroneous by a comma. This the ancients did not admit of. If to diminiſh ſuch errors, we introduce a temperature, we ſhall have nothing in tune but the octave; ſo that this *ſcale* of the ancients was not deſtitute of reaſon, and no good argument againſt the accuracy of their practice can from thence be formed.

The names of the notes of the Greek *ſcale*, ſee under DIAGRAM.

The deſign of the *ſcale of muſic* is, to ſhew how a voice may riſe and fall leſs than any harmonical interval, and thereby move from the one extreme of any interval to the other, in the moſt agreeable ſucceſſion of ſounds. The *ſcale*, therefore, is a ſyſtem exhibiting the whole principles of muſic, which are either harmonical intervals (commonly called *concords*), or concinnous intervals; the firſt are the eſſential principles, the others are ſubſervient to them, to make the greater variety.

Accordingly, in the *ſcale*, we have all the concords, with their concinnous degrees, ſo placed, as to make the moſt perfect ſucceſſion of ſounds from any given fundamental or key, which is ſuppoſed to be repreſented by 1. It is not to be ſuppoſed, that the voice is never to move up and down by any other more immediate diſtances than thoſe of the concinnous degrees; for though that be the moſt uſual movement, yet to move by harmonical diſtances, as concords, at once, is not excluded, but is even abſolutely neceſſary. In reality, the degrees were only invented for variety's ſake, and that we might not always move up and down by harmonic intervals, though thoſe are the moſt perfect, the others deriving all their agreeableneſs from their ſubſerviency to them.

Add that, beſides the harmonical and concinnous intervals, which are the immediate principles of muſic, and are directly applied in practice; there are other diſcord relations, which happen unavoidably in muſic, in a kind of accidental and indirect manner; for, in the ſucceſſion of the ſeveral notes in the *ſcale*, there are to be conſidered not only the relations of thoſe that ſucceed others immediately, but alſo of thoſe betwixt which other notes intervene. Now the immediate ſucceſſion may be conducted ſo as to produce good melody, and yet among the diſtant notes there may be very groſs diſcords, that would not be allowed in immediate ſucceſſion, much leſs in conſonance. Thus in the firſt ſeries, or *ſcale* above delivered, though the progreſſion be melodious, as the terms refer to one common fundamental; yet are there ſeveral diſcords among the mutual relations of the terms; *e. gr.* from 4th to 7th is 32 : 45; and from the greater 2d to the greater 6th is 27 : 40; and from the greater 2d to 4th is 27 : 32, which are all diſcords; and the ſame will happen in the ſecond ſeries.

From what we have obſerved here, and under the article KEY, it appears, that the *ſcale* ſuppoſes no determinate pitch of tune; but that being aſſigned to any key, it marks out the tune of all the reſt with relation to it; it alſo ſhews what notes can be naturally joined to any key, and thereby teaches the juſt and natural limitations of melody; and when the ſong is carried through ſeveral keys, yet it is ſtill the ſame natural *ſcale*, only applied to different fundamentals. If a ſeries of ſounds be fixed to the relations of the *ſcale*, it will be found exceedingly defective, but this imperfection is not any defect in the *ſcale*, but follows accidentally from its being confined to this condition, which is foreign to the nature and office of the *ſcale* of muſic.

This is the caſe in muſical inſtruments, and in this conſiſts their great deficiency; for, ſuppoſe a ſeries of ſound, as thoſe of an organ or harpſichord, fixed in the order of this *ſcale*, and the loweſt taken at any pitch of tune, it is evident, 1. That we can proceed from any note, only by one particular order of degrees; ſince from every note of the *ſcale* to its octave, is contained a different order of the tones and ſemi-tones. Hence, 2. we cannot find any interval required from any note upwards or downwards, ſince the intervals from every note to every other are alſo limited. And hence, 3. a ſong may be contrived, that beginning at a particular note of the inſtrument, all the intervals or other notes, ſhall be found exactly on the inſtrument, or in the fixed ſeries; yet, were the ſong, though perfectly diatonic, begun in any other note, it could not proceed.

In effect, it is demonſtrable, that there can be no ſuch thing as a perfect *ſcale* fixed on inſtruments, *i. e.* no ſuch *ſcale*, as, from any note upwards or downwards, ſhall contain any harmonical or concinnous interval required.

The only remedy for this defect of inſtruments whoſe notes are fixed, muſt be by inſerting other notes and degrees betwixt thoſe of the diatonic ſeries. Hence ſome authors ſpeak of dividing the octave into 16, 18, 20, 24, 26, 31, and other number of degrees; but it is eaſy to conceive, how hard it muſt be to perform on ſuch an inſtrument.

The beſt of it is, we have a remedy on eaſier terms for a *ſcale* proceeding by twelve degrees, that is, thirteen notes, including the extremes, to an octave, renders our inſtruments ſo perfect, that we have little reaſon to complain. This, then, is the preſent *ſcale* for inſtruments, viz. between the extremes of every tone of the natural *ſcale* is put a note, which divides it into two unequal parts called *ſemi-tones*, whence the whole may be called the *ſemitonic ſcale*, as containing twelve ſemitones betwixt thirteen notes within the compaſs of an octave.

And to preſerve the diatonic ſeries diſtinct, theſe inſerted notes take either the name of the natural note next below, with the mark ✱ called a *ſharp*, or the name of the natural note next above, with this mark b called a *flat*. Malcolm's Treat. of Muſic ch. 8, 9, 10.

For the *ſcale* of ſemi-tones, ſee Semitonic *ſcale*.

For Guido's *ſcale*, commonly called the *gammut*, ſee Gammut.

For the *ſcale* of the ancients, commonly called the *diagram*, ſee Diagram.

Scale, *differential*, is uſed for the *ſcale* of relation ſubtracted from unity. See Series.

Scale *of relation*, in *Algebra*, an expreſſion denoting the relation of the terms of recurring ſeries to each other. See Series.

Scale-*hour*. See Hour.

Scales, in *Natural Hiſtory*. What the naturaliſts underſtand by *ſcales*, are certain flat and ſemi-pellucid bodies, common to the fiſh, the ſerpent, and the lizard kind; conſiſting of a ſubſtance ſomewhat analogous to that of the horns and hoofs of other animals, as is found by cutting and burning them, and by their ſmell.

The *ſcales* in fiſhes are of ſo many different kinds and ſhapes, that they afford, in many caſes, very good characters for the diſtinction of the ſpecies. The differences of theſe parts of fiſh ariſe from their number, ſituation, figure, and proportion, and ſome other qualities peculiar to a few of them.

Their differences, in regard to number, are theſe: there are none on ſeveral kinds of fiſh, as on the petromyza, the dolphin, and the whales. Upon ſome other fiſhes they are but very few in number, as on the conger, the eel, the clariæ, &c. and they are on others found in vaſtly great numbers, and placed in cluſters one over another, as in the pearch, ſalmon, &c.

In regard to their ſituation they differ in theſe particulars. 1. On ſome fiſh they are placed extremely thick and cloſe upon one another. 2. In others they ſtand in imbricated rows. The eſoces give us an example of the firſt, and the cyprini, in general, of the ſecond kind. And, 3. In ſome they are ſcattered, and at ſuch diſtances, that they do not touch one another, as in the congers, the eels, the clariæ, &c. Their differences in figure are not leſs evident than thoſe in poſition. 1. Some are roundiſh, as thoſe of the clupeæ and ſalmons. 2. Some are oval, or of an oblong round figure, as thoſe of the gadi. 3. In ſome fiſh they are ſtraight on one ſide, and rounded on the others, as in the pearch and mullet. The proper deſcription of theſe is, that they have a rectilinear baſe and rounded ſides.

Their differences in proportion are theſe; they are either in regard to one another, or to the *ſcales* of other fiſhes, or according to our ſenſes, in regard to the ſize of the fiſh, either very large, great, ſmall, middling, or extremely minute. Theſe are words which give a ſort of uſeful idea in the deſcription, though they are far from being determinate or regular in their ſignifications.

As to the other peculiar qualities of the *ſcales* of fiſhes, they are in ſome ſoft and ſmooth, as in the ſalmon and cyprini; and in others hard and rough, and, as it were, a little prickly; of this ſort are the *ſcales* of the pearch, the capriſcus, and ſome of the pleuronecti. Artedi, Ichthyol.

Scales of fiſhes make a ſet of very curious objects for the microſcope; they are formed with a ſurpriſing beauty and regularity, and in the different kinds exhibit almoſt an endleſs variety in their figure and contexture.

Theſe *ſcales* are not ſuppoſed to be ſhed every year, nor during the whole life of the fiſh, but to have an annual addition of a new *ſcale* growing over and extending every way beyond the edges of the former, in proportion to the fiſh's growth, ſomewhat in the manner as the wood of trees increaſes annually, by the addition of a new circle next the bark. And as the age of a tree may be known by the number of ringlets its trunk is made up of, ſo in fiſhes, the number of plates compoſing their *ſcales* denotes to us their age.

Mr. Leewenhoeck took ſome *ſcales* from an extremely large carp, forty-two inches and a half long, Rhineland meaſure, which were as broad as a dollar, theſe he macerated in water, to make them cut the eaſier, and then cutting obliquely through one of them, beginning with the firſt formed, or very little ſhell in the center, he by his microſcope plainly diſtinguiſhed forty lamellæ, or *ſcales*, glewed, as it were, to one another, whence he concluded the fiſh to be forty years old.

It is generally imagined that an eel has no *ſcales*, but if the ſlime be wiped clean away, and the ſkin then examined by a microſcope, it is found covered with extremely ſmall *ſcales*, ranged in a very orderly and pretty manner; and probably very few fiſhes, except ſuch as have ſhells, are truly free from *ſcales*.

The way of preparing *ſcales* for the microſcope is to take them off carefully with a pair of nippers, waſh them very clean, and then place them between the leaves of a book to make them dry flat, and when thoroughly dry, they are to be put between two ſlips of talc. The ſnake, viper, and eſt afford alſo a very beautiful and very different ſeries of *ſcales* from thoſe of fiſhes. Baker's Microſcop. p. 237. Leewenhoeck's Arc. Nat. tom. iii. p. 214.

SCALENE, Scalenum, or Scalenous *triangle*, in *Geometry*, a triangle, whoſe ſides and angles are all unequal.

The word is formed from the Greek σκαληνος, which ſignifies oblique, unequal, &c.

A cylinder or cone, whoſe axis is inclined to its baſe, is alſo ſaid to be *ſcalenous*.

SCALENUS, or Scalenum, in *Anatomy*, a name given to three pair of muſcles, from their form; all of them ſerving to draw the ribs upwards, in conjunction with the ſerratus ſuperior poſticus, &c. See Tab. Anat. (Myol.) fig. 2. n. 5. fig. 1. n. 16.

The ancients call them only two in number, afterwards they were divided into ſix, three lying on each ſide, but uſually there are only two on each ſide, one lying upon the other.

Scalenus *primus* ſprings fleſhy from the tranſverſe proceſſes of the ſecond, third, and fourth vertebræ of the neck, where deſcending laterally, it is inſerted into the firſt rib, which it helps to draw upwards.

Scalenus *ſecundus* ariſes from the ſame proceſſes, as likewiſe from thoſe of the fifth vertebra of the neck, and is inſerted into the ſecond rib, and ſometimes into the third.

Scalenus *tertius* ariſes from the ſame proceſſes with the former, and from thoſe of the ſixth vertebra of the neck, and is inſerted into the firſt rib.

The vertebral inſertions of the *ſcaleni* vary, being ſometimes confounded with each other, and ſometimes with thoſe of the neighbouring muſcles. Winſlow's Anatomy, p. 220.

Scalenus *lateralis*, in *Anatomy*, a name given by Albinus to a muſcle, called by Cowper and others *ſcalenus ſecundus*, and by Winſlow, and the French anatomiſts, *portion anterieur du ſeconde ſcalene*. Morgagni calls it *ſcaleni pars a coſta ſecunda enata*; and Fallopius deſcibes it under the name of *octavi thoracis muſculi pars quæ inſeritur in ſecundum*.

Scalenus *medius*, in *Anatomy*, a name given by Albinus to a muſcle called the ſecond *ſcalenus* by Douglas, and the third *ſcalenus* by Cowper. The French call it by the name given by Winſlow, *la portion ou branche poſterieur du premier ſcalene*; and Veſalius has deſcribed it under the name of *pars tertii et quarti dorſum moventium*.

Scalenus *minimus*, in *Anatomy*, a name given by Albinus to a very ſmall muſcle, which other writers on this ſubject have omitted to deſcribe, and which the author acknowledges to be ſometimes wanting.

It is very ſmall, and ariſes from the upper edge of the firſt rib, and has two caudæ; the one of which is inſerted into the lower part of the ſpine, and the other a little higher. It often wants one, and ſometimes the other, or latter of theſe two caudæ, and is of the ſame uſe with the other *ſcalenus*.

Scalenus *poſticus*, in *Anatomy*, a determinate name given by Albinus to one of the *ſcaleni*, too much confounded by other authors with the reſt of the muſcles of that name, as they are in general with one another.

This is the muſcle deſcribed by Fallopius under the name of the *nonus thoracis muſculus*, and by Morgagni under the name of the *ſcaleni pars a ſecunda coſta enata*. The French call it *la portion poſterieur du ſecond ſcalene*.

SCALING *the guns*, denotes the act of cleaning the inſide of a ſhip's cannon, by the exploſion of a ſmall quantity of powder, which effectually blows out any dirt or ſcales of iron which may adhere to the interior ſurface.

SCALING *ladders*. See LADDERS.

SCALLION, or ESCALLION, a ſort of onion which never forms any bulb at the root, but is uſed green in ſpring, before the other ſorts ſown in July are large enough.

This is however very ſcarce in London, the gardeners uſually ſelling in its place the ſhoots of ſuch decayed common onions, as have ſprouted in the houſe. Theſe they plant in a bed early in the ſpring, and they ſoon grow large enough for uſe when they pull them out; and taking off all the old outer coat of the roots, they lay them in bunches, and ſell them in the market for *ſcallions*.

The true *ſcallion* is eaſily propagated by parting the roots in autumn, and planting them three or four together in a hole at ſix inches diſtance. Theſe will grow in any ſoil or ſituation, and will multiply very quickly, and in a very great abundance, and their being hardy enough to endure the ſevereſt winter, and fit for uſe ſo early in ſpring, makes them worthy a place in all kitchen gardens.

SCALLOP. See PECTEN. This ſhell-fiſh, whoſe animal is a *tethys*, grows to a large ſize, is found in ſeparate beds, dredged up, pickled and barrelled for ſale. The anatomy of this fiſh lets us greatly into the knowledge of the ſtructure of the parts of other bivalve ſhell-fiſh.

The *ſcallop* is compoſed of two ſhells, which, as in many others, are one concave, and the other plane or flat. The cardo, or hinge, is lightly bent from the concave-ſhell, and thence carried over a part of the plane-ſhell, in the middle, and all the way between, it is firmly connected to a cartilage. In the middle of the length of the cardo there is placed another ſhort, black, and very ſtrong cardo.

It is eaſy to ſee, from hence, to what is owing that remarkable ſtrong power, which this creature has of ſhutting and opening its ſhell; and it is very poſſible, that by means of ſo ſtrong an apparatus of tendons or ligaments as it has in this part, it may be able to move the plane-ſhell in ſo ſwift and regular, as well as forcible and eaſy a manner, that it may uſe it in moving from place to place; and poſſibly it may make a ſort of wing of it, to beat againſt the water, as the pinion of a bird does againſt the air: and what the ancients have ſo frequently ſaid of its moving about in a very ſwift manner, from place to place, may be true, though we have been wanting in later obſervations to ſee it.

For a more particular examination into the ſtructure of this fiſh; See Philoſ. Tranſ. N° 299. p. 567.

SCALLOP *tyles*. See TYLES.

SCALMUS, among the *Romans*, a block or round piece of wood in a boat, to which the oars were tied with a thong of leather called *ſtrappus*.

Scalmus was alſo uſed to denote the boat, a part being taken for the whole.

SCALPEL, SCALPELLUM, in *Surgery*, a kind of knife chiefly uſed in diſſections, but which may be occaſionally uſed in many other operations, as in amputations, and to cut off the fleſh and membranes that are between the two bones of an arm or leg, before the bones be ſawed off.

There are two kinds of *ſcalpels*; the firſt cuts on both ſides, and is fixed in an ebony or ivory handle, which, being very flat and thin at the extremity, ſerves to part the membranous and fibrous parts in anatomical preparations.

The other has a back, that is, it only cuts on one ſide: this is crooked, and is very commodious for ſtripping the fleſh off the bones in embalming, making ſkeletons, &c. Scultetus, in his Arſenal, deſcribes ſeveral other kinds of *ſcalpels*, as a deceitful *ſcalpel*, thus called, becauſe it deceives the patient by hiding its blade. It was much uſed by the ancients, in opening and dilating of ſinuſes, but as it is apt to deceive the ſurgeon himſelf, and is, beſides, very ſlow, it is better uſing a common one. A *ſcalpel*, ſharp on both ſides, for ſetons. A little crooked *ſcalpel* for ſeparating the coherence of the eyelids. A ſharp double-cutting *ſcalpel*, with a bone handle, for the cutting of an ægilops. *Scalpels* like ſcolopomachærions, &c. And even the ſcolopomachærion itſelf is a kind of *ſcalpel*.

SCALPER, SCALPRUM, or SCALPING-*iron*, a ſurgeon's inſtrument wherewith to raſp and ſcrape foul, carious bones.

SCALPING, in *Military Hiſtory*, a barbarous cuſtom in practice among the Indian warriors, of taking off the tops of the ſcalps of the enemies ſculls with their hair on; theſe are preſerved as trophies of victory, and thoſe who bring them are rewarded by their chiefs, in proportion to their number.

SCALPRA *dentalia*, inſtruments uſed by the ſurgeons to take off thoſe black, livid, or yellow cruſts, which infeſt the teeth, and not only looſen and deſtroy them, but taint the breath.

According to the varieties of the occaſion, the ſurgeon has theſe inſtruments of various ſhapes and ſizes; ſome are pointed and narrow at the end, others are broader pointed, and have edges; others are hooked, or falciform, but theſe are uſually, for convenience of carriage, all adapted to one handle.

The manner of uſing them is to begin near the gums, ſupporting the blade with the left hand, and ſcraping all along the tooth, till the cruſt is taken off, taking care not to wound the gums, or diſplace the teeth. *Heiſter*.

SCALPTOR *ani*, in *Anatomy*. See LATISSIMUS *Dorſi*.

SCAMILLI *impares*, in the *Ancient Architecture*, a term much contended about among the critics, though, in effect, it ſignifies no more than certain zoccoes or blocks, ſerving to raiſe the reſt of the members of an order, column, ſtatue, or the like, and to prevent their being loſt to the eye, which may chance to be placed below the level, or below the projecture of ſome of the ornaments thereof.

Theſe *ſcamilli* are well enough repreſented by the pedeſtals of ſtatues. See PEDESTAL.

SCAMMA, Σκαμμα, among the *Greeks*, the mark in leaping, or throwing quoits; ſo called, from its being made by digging up the earth.

SCAMMATHA, or SHEMATTA, שמתא, in the *Jewiſh cuſtoms*, a kind of excommunication, and the moſt terrible of all in uſe among that people. Some pretend that this was proclaimed by the ſound of four hundred trumpets, and that a perſon, ſo excommunicated, was never to be received again into the congregation, and that it was even lawful to put him to death; and they derive the term from שם, *there*, and מתה *death*, to which they ſuppoſe the expreſſion of St. John to allude, *there is a ſin unto death*; others derive it from שם *name*, אתא *comes* or *approaches*, and ſuppoſe that it anſwers to the *maranatha* of St. Paul, 1 Cor. xvi. 22. and refer it to a tradition among the Jews, derived from Enoch, and recorded Jude ver. 14. See NIDDUI.

SCAMMONY, *Scammonium*, in *Pharmacy*, an inſpiſſated, gummy reſinous juice, of the root of a plant of the ſame name, growing in Syria, particularly about Aleppo and St. John de Acre, and which being hardy, will thrive in the open air in England on any ſoil. It is a ſpecies of bindweed. See CONVOLVULUS.

This milky juice flows from an inciſion made in the root, and on ſtanding concretes into ſolid maſſes.

The beſt *ſcammony* is brought from Aleppo, in light ſpongy maſſes, eaſily friable, gloſſy, of different ſhades of colour, from grey, or yellowiſh, to white almoſt to black; when reduced to powder, of a browniſh white colour. That ſhould be choſen which crumbles moſt eaſily betwixt the fingers, becomes inſtantly white on the contact of watery moiſture, and leaves little or no fæces on being diſſolved. Its colour in the maſs affords no criterion of its purity or goodneſs.

The *ſcammony* of Smyrna, and that of the Eaſt Indies, are leſs valued; the firſt as being more heavy, hard, and black, full of ſand and other impurities; the latter, though light, friable, &c. is in reality only a compoſition of common roſin with ſome other violent purgatives. Pomet aſſerts, that both theſe kinds are rather poiſons than remedies.

Scammony has a ſlight unpleaſant ſmell, and a weak bitteriſh ſubacid taſte. It conſiſts of about equal parts of reſinous and gummy matter, and hence diſſolves almoſt totally in a mixture of equal parts of rectified ſpirit and water, i. e. in proof ſpirit. Rectified ſpirit takes up the reſin with ſome part of the gum: if the tincture be inſpiſſated a little, and then mixed with water, the gum continues diſſolved, and the pure reſin precipitates. This gummy reſin is one of the ſtrong ſtimulating cathartics, more kindly in operation, and, therefore, more generally uſed than moſt of the other ſubſtances of this claſs; the doſe is from two or three grains to twelve.

Many ill qualities have been aſcribed to it which it does not poſſeſs, and many correctives have been deviſed which it does not need. See DIAGRYDIUM.

In cold, indolent, ſerous habits, *ſcammony* itſelf procures generally a plentiful evacuation, with great eaſe and ſafety; in inflammatory caſes, and with the more irritable diſpoſitions, it is dangerous, but not otherwiſe ſo than the reſt of the ſtrong purgatives. By the ſmallneſs of the doſe of this medicine, its eaſy ſolubility, and its having little taſte, it is fitted for being commodiouſly taken in almoſt any form. In the ſhops we have *ſcammony* POWDER, and an ELECTARY *è ſcammonio*.

Agreeable purging troches are prepared by grinding together three drams of *ſcammony*, four drams of cryſtals of tartar, four drops of oil of cinnamon, and eight ounces of fine ſugar, and moiſtening the mixture with as much roſe water as will render it of a due conſiſtence for being formed; each tablet is made to weigh about a dram, and conſequently contains 2½ grains of *ſcammony*. One of the moſt elegant liquid preparations, is a ſolution of the *ſcammony* in a ſtrong infuſion or decoction of liquorice, poured off from the fæces, and aromatiſed with ſome grateful diſtilled water, or aromatic tincture, as thoſe of cardamom ſeeds. The dried root of the plant, as well as the juice, may deſerve notice; as Dr. Ruſſel relates, that a decoction of half an ounce of the root procured five ſtools, without gripes, ſickneſs, or any uneaſineſs; and that the decoctions are entirely without ſmell, and in taſte rather ſweetiſh than diſagreeable. Neither the ſtalks, leaves, flowers, nor ſeeds ſeemed to have any purgative virtue. Lewis's Mat. Med. Med. Obſerv. vol. i. p. 13, &c.

The *ſcammony* now in uſe, muſt be very different from that of the ancients, at leaſt in the preparation; becauſe the ancients gave it in much greater doſes: hence Fallopius conjectures the modern *ſcammony* to be adulterated with juice of tithymal.

Some give the name of American *ſcammony* to mechoacan.

SCAMMONIA MONSPELIACA, *Montpelier ſcammony*, a name given by ſome botanical writers to a ſpecies of periploca, diſtinguiſhed by Mr. Tournefort by the name of *periploca Monſpeliaca foliis rotundioribus*. This, in the Linnæan ſyſtem, is a ſpecies of *cynanchum*. See *Baſtard* DOG's-*bane*.

SCAMPIUSA, in *Botany*, a name uſed by Myrepſus, and others for a plant, which they greatly recommend in the itch, and other cutaneous diſorders. This was probably a corruption of *ſcabioſa*.

SCANDAL, in the *popular language*, is ſome action, or opinion, contrary to good manners, or to the general ſenſe of a people.

Scandal alſo denotes a diſadvantageous rumour, or report, or an action whereby one is affronted in public.

For the legal puniſhment of *ſcandal*. See SCANDALUM *Magnatum*.

SCANDAL, *ſtone of*, *lapis ſcandali*, or *vituperii*, a ſtone raiſed in the great portal of the Capitol in Rome, whereon was engraven the figure of a lion, upon which bankrupts or ceſſionaries being ſeated bare-breeched, cried with a loud voice, *cedo bonis*, *I ſurrender my effects*; when, ſquatting their breech violently three times on the ſtone, they were acquitted.

It was called the *ſtone of ſcandal*, becauſe thenceforward the ceſſionary became inteſtable, and incapable of giving any evidence.

Julius Cæſar introduced this form of ſurrender, after abrogating that article of the laws of the Twelve Tables, which allowed their creditors to cut their inſolvent debtors in pieces, and take each his member, or at leaſt to make a ſlave of him.

SCANDALUM *magnatum*, in *Law*, denotes a ſcandal or wrong done to any high perſonage of the land, as peers, prelates, judges, or other great officers, by falſe or ſlanderous news or tales, whereby any debate or diſcord between them and the commons, or any ſcandal to their perſons might ariſe.

This offence has alſo given name to a writ granted to recover damages thereupon.

Slanders of this kind, though they be ſuch as would not be actionable in the caſe of common perſons, amount to an atrocious injury, which is redreſſed by an action on the caſe founded on many ancient ſtatutes, viz. Weſtm. 1. 3 Edw. I. c. 34. 2 Rich. II. c. 5. 12 Rich. II. c. 11. as well on behalf of the crown, to inflict the puniſhment of impriſonment on the ſlanderer, as on behalf of the party, to recover damages for the injury ſuſtained. Words alſo tending to ſcandalize a magiſtrate, or perſon in a public truſt, are reputed more highly injurious than when ſpoken of a private man. It is ſaid that formerly no actions were brought for words, unleſs the *ſlander* was ſuch, as, if true, would endanger the life of the object of it. But it is now held, that for ſcandalous words, that may endanger a man in law, by impeaching him of ſome heinous crime, exclude him from ſociety by charging him with having an infectious diſeaſe, impair his trade, by calling a tradeſman a bankrupt, a phyſician a quack, or a lawyer a knave, or affect a peer of the realm, a magiſtrate, or one in public truſt, an action on the caſe may be had, without proving any particular damage to have happened, but merely upon the probability that it might happen. However, actions for words muſt be brought within two years after the injury committed. With regard to words not apparently, and upon the face of them injurious, the plaintiff muſt aver ſome particular damage to have happened, which is called laying his action with a *per quod*. But mere ſcurrility, or opprobrious words, which neither in themſelves import, nor are in fact attended with any injurious effects, will not ſupport an action. Words of heat and paſſion, as to call a man a rogue and raſcal, if productive of no ill conſequence, and not of any of the dangerous ſpecies before mentioned, are not actionable; neither are words ſpoken in a friendly manner, as by way of advice, admonition, or concern, without any tincture or circumſtance of ill-will; for in both theſe caſes they are not maliciouſly ſpoken, which is part of the definition of *ſlander*; neither are any reflecting words made uſe of in legal proceedings, and pertinent to the cauſe in hand, a ſufficient ground of action for *ſlander*. Alſo, if the defendant be able to juſtify and prove the words to be true, no action will lie, even though ſpecial damage hath enſued; for then it is no *ſlander* or falſe tale. In this caſe, though there may be damage ſufficient accruing from it, yet, if the fact be true, it is *damnum abſque injuria*; and where there is no injury the law gives no remedy. Blackſtone's Comment. vol. iii. p. 124.

SCANDIACA, in *Botany*, a name given by ſome authors to the white flowered *lamium*, called ARCHANGEL by others.

SCANDIX, in *Botany*. See SHEPHERD's *Needle*.

SCANDULÆ, in *ancient Houſe-building*, ſhingles, or flat pieces of wood, uſed by the Romans inſtead of tiles to cover houſes. This, according to Cornelius Nepos, was the only covering uſed in Rome till the war with Pyrrhus, or 470th year of the city.

SCANDULARII, among the *Romans*, mechanics who prepared the ſcandulæ uſed in covering houſes, who were exempted from all public ſervices.

SCANELLO, in the *Italian Muſic*, is uſed for the BRIDGE in violins and other inſtruments. It is the ſame with *ponticello* and MAGAS.

SCANNING, *ſcanſio*, formed of *ſcandere*, *to climb*, in *Poetry*, the meaſuring of a verſe, to ſee what number of feet and ſyllables it contains, and whether or no the quantities, that is, the long and ſhort ſyllables be duly obſerved.

The term is chiefly uſed with regard to Greek and Latin verſes; the quantities not being well ſettled and obſerved in the verſes of the modern languages.

Hexameters are *ſcanned* one way, iambics another, ſapphics another.

SCANSOR, in *Ichthyology*, a name given by Geſner to the fiſh called by the generality of writers LUPUS *piſcis*.

SCANTLING, a meaſure, ſize, or ſtandard, whereby the dimenſions, &c. of things are to be determined.

The word is formed from the French, *eſchantillon*, a pattern or ſpecimen.

The term *ſcantling* is particularly applied to the dimenſions of any piece of timber, with regard to its breadth and thickneſs.

SCANTON, a word uſed by ſome to expreſs the fetid ſmell of wine.

SCAPE-*goat*, in the *Jewiſh Antiquities*, the goat which was ſet at liberty on the day of ſolemn expiation. For the ceremonies on this occaſion, ſee Levit. xvi. 5, 6, &c.

Some ſay that a piece of ſcarlet cloth, in form of a tongue, was tied on the forehead of the *ſcape-goat*. Hofm. Lex. univ. in voc. Lingua.

Many have been the diſputes among the interpreters concerning the meaning of the word *ſcape-goat*, or rather of עזאזל *azazel*, for which *ſcape-goat* is put in our verſion of the Bible.

Spencer, who is followed by Witſius, Cocceius, Altingius, Meyer and others, is of opinion that *Azazel* is a proper name, ſignifying the devil, or evil dæmon, who was worſhipped by the heathens, particularly by the Egyptians, under the form of a goat. See his reaſons in his book De Leg. Hebr. Ritual. Diſſert. viii. Among other things he obſerves, that the ancient Jews uſed to ſubſtitute the name *ſamael* for *Azazel*, and many of them have ventured to affirm, that at the feaſt of expiation they were obliged to offer a gift to *ſamael* to obtain his favour. Thus alſo the *goat*, ſent into the wilderneſs to Azazel, was underſtood to be a gift or oblation. Some Chriſtians have been of the ſame opinion. But Spencer thinks that the genuine reaſons of the ceremony were, 1. That the *goat* loaded with the ſins of the people, and ſent to Azazel, might be a ſymbolical repreſentation of the miſerable condition of ſinners. 2. God ſent the *goat* thus loaded to the evil dæmons, to ſhew that they were impure, thereby to deter the people from any converſation or familiarity with them. 3. That the *goat* ſent to Azazel ſufficiently expiating all evils, the Iſraelites might the more willingly abſtain from the expiatory ſacrifices of the Gentiles.

However, though it be allowed with Spencer, that the *goat*, which he ſays, was ſent to *Azazel*, or *the devil*, was not to be conſidered as a proper ſacrifice to him, but merely as being delivered into his power, and given up to his diſpoſal; yet this ſeems to have been a rite, which might ſo eaſily have been interpreted into an encouragement of dæmon worſhip, that we can ſcarce admit it to have been a divine inſtitution.

Le Clerc is of opinion, that *Azazel* was the name of a place, either a mountain or cliff, to which the *goat* was led, and from thence, as the rabbies ſay, it was caſt down and killed; but no ſuch place has been ſpecified, except a mountain near Mount Sinai, mentioned by an anonymous writer of very little credit, which muſt have been too far diſtant for the *ſcape-goat* to have been conducted thither from Jeruſalem.

The moſt common opinion is, that *Azazel* is a name given to the *goat* itſelf, on account of its being let go, as being derived from עז *gnez* or *az, goat*, and אזל *azel, he hath gone away*. Thus it was underſtood by our tranſlators, who render it *ſcape-goat*; the Septuagint likewiſe render it αποπομπαιος, and the Vulgate *emiſſarius*. Thoſe who adopt this opinion obſerve, that as the ſacrifice-goat was typical of the expiation of ſin by the ſacrifice of Chriſt, the *ſcape-goat*, which was to have the ſins of the people confeſſed over him, and as it were put upon him, and then to be ſent away alive into ſome deſart place, where they would ſee him no more, was intended to ſignify the effect of the expiation, namely the removing of guilt, inſomuch that it ſhould never more be charged on the once pardoned ſinner. Jenn. Jew. Antiq. vol. ii. p. 268, &c.

SCAPEMENT, in *Clockwork*, a general term for the manner of communicating the impulſe of the wheels to the pendulum: the ordinary *ſcapements* conſiſt of the ſwing-wheel and pallets only, but modern improvements have added other levers or detents, chiefly for the purpoſes of diminiſhing friction, or for detaching the pendulum from the preſſure of the wheels during part of the time of its vibration. Notwithſtanding the very great importance of the *ſcapement* to the performance of clocks, no material improvement was made in it from the firſt application of the pendulum to clocks to the days of Mr. George Graham; nothing more was attempted before his time, than to apply the impulſe of the ſpring-wheel, in ſuch manner as was attended with the leaſt friction, and would give the greateſt motion to the pendulum. Dr. Halley diſcovered, by ſome experiments made at the Royal Obſervatory in Greenwich, that by adding more weight to his clock, the pendulum was made to vibrate larger arcs, and the clock went faſter; by diminiſhing the weight of the clock, the vibrations of the pendulum became ſhorter, and the clock went ſlower; the reſult of theſe experiments being diametrically oppoſite to what ought to be expected from the theory of the pendulum, probably firſt rouſed the attention of Mr. Graham, and led him to ſuch farther trials as convinced him, that this ſeeming paradox was occaſioned by the retrograde motion, which was given to the ſwing-wheel by every conſtruction of *ſcapement* that was at that time in uſe; and his great ſagacity ſoon produced a remedy for this defect, by conſtructing a *ſcapement* which prevented all recoil of the wheels, and reſtored to clock pendulum, wholly in theory, and nearly in practice, all its natural properties in its detached ſimple ſtate: this *ſcapement* was named by its celebrated inventor *the dead beat*, and its great ſuperiority was ſo univerſally acknowledged, that it was ſoon generally introduced into uſe, and yet continues in univerſal eſteem; the importance of the *ſcapement* to the accurate going of clocks, was by this improvement rendered ſo unqueſtionable, that artiſts of the firſt rate all over Europe, were forward in producing each his particular conſtruction, as may be ſeen in the works of Thiout l'Aineé M. J. A. Lepaute M. le Roy, M. Ferdinand Bertoud, and Mr. Cumming's Elements of Clock and Watch-work, in which we have a minute deſcription of ſeveral new and ingenious conſtructions of *ſcapements*, with an inveſtigation of the principles on which their claim to merit is founded; and a comparative view of the advantages or defects of the ſeveral conſtructions. Beſides the *ſcapements* deſcribed in the above works, many curious conſtructions have been produced by eminent artiſts who have not publiſhed any account of them, nor of the motives which have induced each to prefer his favourite conſtruction: Mr. Harriſon, Mr. Hindley of York, Mr. Ellicot, Mr. Mudge, Mr. Arnold, Mr. Whitehurſt, and many other ingenious artiſts of this country, have made *ſcapements* of new and peculiar conſtructions, of which we are unable, for the above reaſon, to give any farther account than that thoſe of Mr. Harriſon and Mr. Headley had ſcarce any friction, with a certain mode and quantity of recoil; thoſe of all the other gentlemen, we believe, have been on the principle of the dead beat, with ſuch other improvements as they ſeverally judged moſt conducive to a good performance.

SCAPHA, in *Anatomy*, is uſed to expreſs the external circumference of the ear.

It is in ſurgery uſed to expreſs a BANDAGE for the head.

SCAPHEPHORI, Σκαφηφοροι, among the *Athenians*, an appellation given to the ſtrangers reſiding among them, becauſe they were obliged, at the feſtival Panathenæ, to carry little ſhips, called *ſcaphæ*, σκαφαι, which were a ſign of their foreign extraction.

SCAPHISM, *ſcaphiſmus*, formed of σκαφος, *digging*, of σκαπτω, *I dig, hollow*, in *Antiquity*, a kind of torture or puniſhment formerly in uſe among the Perſians. It conſiſted in locking the criminal cloſe up within the trunk of a tree bored to the dimenſions of his body, only with five holes for his head, arms, and legs, to come through. In this ſtate he was expoſed to the ſun, and the parts thus appearing were anointed with honey and milk, to invite the waſps and flies.

To increaſe the torment, they forced the criminal alſo to eat abundantly, till his excrements cloſe pent up in the wood, rotted his body. Some authors obſerve that perſons ordinarily lived forty days in this condition.

The invention is aſcribed to Pariſatis, queen of Perſia, and mother of Artaxerxes Mnemon, and the young Cyrus. It is added, ſhe firſt ordered it to be practiſed on the perſon who brought the tidings of the death of Cyrus.

SCAPHIUM, among the *Romans*, a cup of an oblong form, ſomewhat reſembling that of a boat, whence alſo it had its name.

Scaphium likewiſe ſignifies a kind of dial, which, beſide the hours, ſhewed alſo the ſolſtices and equinoxes.

SCAPHOIDES, Σκαφοειδης, in *Anatomy*, a bone of the wriſt and alſo of the foot, called alſo NAVICULARE.

The word is formed of σκαφη, *a boat*, or *bark*; of σκάπτω, *I hollow*, becauſe boats were originally made of trunks of trees hollowed, as are ſtill the canoes of ſeveral ſavages, and ειδος, *form*.

The *ſcaphoides carpi*, has a convex ſide next the radius, by which it is articulated with the baſis of that bone, and with a tubercle, which is one of the four eminences on the concave ſide of the carpus. Toward the thumb it has two half ſides, one large one for the os trapezium, and the other a ſmall one for the os trapezoides. It has likewiſe a hollow ſide for the os magnum, and a ſmall ſemilunar ſide for the os lunare. Its inner and outer ſurfaces are rough. Winſlow.

SCAPHOIDES *tarſi* lies before the aſtragalus. It has two cartilaginous ſides, an oval circumference, and a tuberoſity. Its thickneſs is inconſiderable when compared with its other dimenſions, and it lies as it were on its ſide, before the aſtragalus. The concave ſide is poſterior, and is articulated with the anterior convex ſide of the aſtragalus. The anterior convex ſide is divided by two ſmall lines into three planes, for the articulation of the three oſſa cuneiformia. The circumference forms an oval, which contracts by ſmall degrees, and terminates in an obtuſe point; one ſide of this circumference is more convex and rough than the other, and the inequalities in it ſerve for the inſertion of ligaments. The point of the oval ends in a tuberoſity, marked with a muſcular impreſſion. In the natural ſituation of this bone, the moſt convex ſide is uppermoſt, the other loweſt, and the tuberoſity turned inward and downward. By this ſituation, and the difference of the ſides, it is eaſy to diſtinguiſh the os naviculare of the right foot from that of the left. The ſmall, or inferior convexity of the circumference has, near the tuberoſity, a ſuperficial notch, and on the oppoſite ſide a ſmall cartilaginous ſurface, and a ſmall tubercle for its articulation with the os cuboides, and the inſertion of ligaments. Winſlow.

For the cartilages of this bone. See FOOT.

SCAPULA, in *Anatomy*, *omoplata*, or *ſhoulder-blade*; a large, broad bone, repreſenting a ſcalenous triangle, ſituated on each ſide of the upper and back-part of the thorax, from about the firſt rib down to the ſeventh. See *Tab. Anat. (Oſteol.) fig.* 7. *n.* 6, 6.

The ſubſtance of the *ſcapula* is thin, but ſolid and firm; its outſide is ſomewhat convex, and its inſide concave; its upper edge is called *coſta ſuperior*, and its lower *coſta inferior*:

inferior; its broad end is called its *baſis*, which, with the two edges, make the upper and lower angles.

The *ſcapulæ* have each three proceſſes, of which the firſt runs all along the middle of their outſide, and is called their *ſpine*. *Fig.* 3. *n.* 4, 4. & *fig.* 7. *n.* 7, 7. That end of the ſpine, which receives the extremity of the clavicula, is called *acromium*. The ſecond proceſs is a little lower than the acromium; it is ſhort and ſharp, like a crow's bill, therefore called *coracoides*; theſe two proceſſes are tied to one another by a ſtrong ligament, which ſerves to keep the head of the humerus in the cavity of the third proceſs, which is called *cervix*. This proceſs is the extremity of the *ſcapula*, which is oppoſite to its baſis. It has a round ſinus, ſurrounded about its brim with a cartilage, which receives the head of the humerus.

The neck of the *ſcapula* is the largeſt of its three angles, and ought more juſtly to be called a head with a very ſhort neck, and a ſuperficial, or glenoide cavity in the top of it, which is lined with a cartilage, and of an oval figure, but pointed at the upper part, and rounded at the lower; and is much deeper in the natural ſtate, than when viewed in the ſkeleton. In the natural ſituation of the *ſcapula* this cavity is turned obliquely forward, and not directly outward. Between the edge of this cavity and the contracted part which is the true neck, ſome inequalities are obſervable, which are the remains of the ſymphyſis of oſſification. Above and below the glenoide cavity are two ſmall rough marks, or impreſſions, the loweſt of which extends itſelf a little over the neigbouring coſta. Theſe may be termed the muſcular impreſſions of the neck of the *ſcapula*. In the neck, ſpine, baſis, inferior coſta, and coracoide proceſs of the *ſcapula*, there is a diploe; the reſt of the bone is tranſparent, thin, and almoſt without any middle cellular ſubſtance. The *ſcapula* is articulated with the clavicle by the acromion, and with the os humeri by the glenoide cavity: it is likewiſe joined to a trunk by a fleſhy ſymphyſis, or ſyſſarcoſis. It ſerves to facilitate the motions of the arm, to give inſertion to a great many muſcles, and as a ſhield to defend the back part of the thorax. The motions and different ſituations of the ſhoulder in men depend chiefly on the *ſcapula*. The clavicle is puſhed or pulled in different directions by the other bone, and entirely follows its motion, ſerving in ſome circumſtances to regulate or limit them. When we raiſe the ſhoulder, it is the acromium which riſes, and while the ſuperior angle deſcends, the inferior angle is removed to a greater diſtance from the ſpina dorſi. When the ſhoulder is depreſſed, the acromium falls down more or leſs, the ſuperior angle riſes in proportion, and the inferior angle is brought nearer the vertebræ. The ſhoulder can ſcarcely be brought forward, or toward the foreſide of the thorax, without being proportionably raiſed, nor drawn back, without more or leſs depreſſing it. All theſe different attitudes are regulated by the clavicula, the angle which it naturally makes with the *ſcapula* being leſſened, in raiſing the ſhoulder, or in bringing it more forward; and increaſed, when the ſhoulder is depreſſed, or drawn backward. In moſt of the motions performed by the *ſcapula*, this bone turns more or leſs upon its own plane, in two contrary directions. In the firſt caſe, the acromium, together with the humeral extremity of the clavicula, is removed to a greater diſtance from the ribs, and in the ſecond it is brought nearer to the ribs. Winſlow.

SCAPULA, *fracture of the*. The *ſcapula* is uſually fractured either near its acromion, or head, where it joins the clavicle, or in ſome more diſtant part. If the fracture happens in the proceſs of the acromion, the reduction will be eaſily made, by lifting up the arm to relax the deltoide muſcle, and puſhing the arm evenly upwards, making the fractured parts meet together with the fingers; notwithſtanding their reduction is ſo eaſy, they eaſily ſlip away again from any ſlight cauſe, and ſo are difficultly agglutinated. They are in particular very eaſily ſeparated by the weight and motion of the arm, and by the contraction of the deltoide muſcle; inſomuch that there is ſcarce ever an inſtance of a fractured acromion being ſo perfectly cured, as to admit afterwards of a free motion of the arm upwards: all means muſt, however, be uſed to endeavour to keep the replaced bones in their proper ſituation. A compreſs, wet with ſpirit of wine, is to be applied to the fracture; a ball is to be put under the arm-pit to ſupport it; the whole is to be bound up with the bandage commonly called *ſpica*, and the arm is to be ſuſpended in a ſaſh or ſling hung about the neck. But if the neck of the *ſcapula*, which lies under the acromion, or its acetabulum, ſhould be fractured, which is a caſe that indeed very ſeldom happens, and when it does is very difficult to diſcover, it is a hundred to one but from the vicinity of the articulation, the tendons, muſcles, ligaments, nerves, and large veins and arteries, there will follow a ſtiffneſs and loſs of motion in the joint; great inflammation is alſo to be expected, and abſceſſes with the worſt ſymptoms, and ſometimes death itſelf.

SCAPULA, *cartilages and ligaments of the*. See SHOULDER.

SCAPULAM *antrorſum agens*, in *Anatomy*, a name given by Veſalius, and ſome of his followers, to the muſcle generally known under the name of the SERRATUS *anticus*. He has alſo, in another part of his work, called it *primus ſcapulam moventium*. Riolanus has called it the *ſerratus minor*, and ſeveral other authors the *ſecundus ſcapulæ*.

SCAPULAM *attollens*, in *Anatomy*, a name given by Spigelius to a muſcle, which he alſo calls *muſculus patientiæ*. It is the LEVATOR *ſcapulæ* of Albinus and Cowper.

SCAPULAM *moventium ſecundus*, in *Anatomy*, the name given by Veſalius to a muſcle, called by Winſlow and ſome others the *trapezia*, and by Albinus the *cucullaris*. Cowper calls it the TRAPEZIUS, or *cucullaris*.

SCAPULAR, *ſcapularis*, in *Anatomy*, an epithet given to two arteries, and as many veins, of the body.

The SCAPULARIS *interna & externa*, or inner and outer *ſcapular* arteries, ariſe out of the ſubclavian, and are ſpread over the *ſcapulæ*.

SCAPULARY *veins, the inner and outer*, diſcharge themſelves into the axillary, or vein of the arm-pits.

SCAPULAR, or SCAPULARY, alſo denotes part of the habit of ſeveral orders of religious, worn over the gown, as a badge of peculiar veneration for the Virgin.

The word is formed from the French *ſcapulaire*, which ſignifies the ſame; and that from the Latin *ſcapula*, the ſhoulder-blade.

The *ſcapular* conſiſts of two narrow breadths, or ſlips, of cloth, covering the back and the breaſts, and hanging down to the feet of the profeſſed religious, and to the knees of the lay brothers, &c.

There is alſo a *Friery*, or *Fraternity of the* SCAPULAR, conſiſting of lay-brothers, who profeſs a particular devotion to the Virgin; and who, in honour of her, wear a little *ſcapular*, in manner of a bracelet, or otherwiſe, for repreſenting the great one. They are obliged to certain prayers, and to obſerve certain rules, in their manner of life.

SCAPUS, in *Architecture*, the FUST, or ſhaſt of a column.

SCAPUS, among *Botaniſts*, a peculiar kind of STALK, which ſupports the parts of fructification of a plant. It does not grow from any part of the main ſtalk, but riſes immediately from the root.

SCAR. See ESCHAR.

SCARABÆUS, the *beetle*. This is an extremely numerous genus of inſects, belonging, in the Linnæan ſyſtem, to the order of *coleoptera*, diſtinguiſhed by clavated and fiſſile antennæ, and by the fore-legs being generally dentated. Linnæus diſtributes them into ſuch as have a horned thorax; ſuch as have an unarmed thorax, and horned head; and ſuch whoſe feet have no claws, with an unarmed head and thorax. He enumerates and deſcribes eighty-ſeven different ſpecies.

In order to have a diſtinct idea of the differences of the ſpecies, they are arranged by Liſter into a ſort of method. The firſt general diſtinction is into thoſe which live on land, and thoſe which live in the water; of each of which there is a very great number. Thoſe *beetles* which live on land have ſome of them antennæ laminated at the end, others have them ſharp-pointed. The outer wings, or caſes of the wings, in ſome are perfect, in others they ſeem mutilated. Some have the antennæ inſerted into a ſort of promuſcis. Theſe were called by the ancients *gurguliones*, and in ſome there is only one juncture in this, in the middle; in others, ſeveral near the end. See GURGULIO. Some have a ſharp-pointed inſtrument at their head; theſe are called *cimices*. See CIMEX.

Of the water *beetles* there are two principal kinds, one ſort living in ſalt water, the other in freſh.

Of thoſe *beetles*, the extremity of whoſe antennæ are formed like a comb, there are ten ſpecies mentioned by Mr. Ray.

1. The great reddiſh *beetle* with the tail bending downwards, known among us under the name of the *chaffer*. This is too well known to need a deſcription; it is common among trees and buſhes at the end of May, and ſeems particularly fond of the maple. 2. The greyiſh yellow woolly *beetle*. This ſeems nearly allied to the former ſpecies, but is but about half as big. Theſe are very common about the ſouthern parts of England in the month of June; they fly about elms in vaſt ſwarms; they are very rare in the northern counties. 3. The greeniſh black *beetle* with reddiſh brown caſes of the

wings. This is of the ſize of a horſe-bean, and is found among roſe-trees in May. 4. The great purpliſh black *beetle* with ſerrated legs. This is one of our largeſt *beetles*, and is very common on heaths, and in other places, in the month of March; it flies about in the evening, and makes a great noiſe; it is uſually infeſted with a great number of yellow lice, and is thence called the *louſy beetle*. 5. The large black *beetle* with two yellow undulated faſciæ on the caſes of the wings. This is ſometimes found without the faſciæ; it ſometimes flies, but rarely. It is found about human dung, and probably feeds on it, for it has always a very ſtrong ſcent of it. 6. The green *beetle* with red caſes for the wings. This is about the ſize of a horſe-bean, and is found in woods in the month of June. 7. The ſmall *beetle*, called the *lady-bird*. 8. The *lady-bird* with only two large black ſpots, one on each of the caſes of the wings. This is common among buſhes in the beginning of June. 9. The yellow *beetle* with black ſpots. This is much ſmaller than the *lady-bird*; its colour is a pale yellow, or lemon colour, and it has four black ſpots, of an oblong ſquare figure, on the caſes of the wings. 10. The reddiſh *beetle* with two ſpots on the ſhoulders, and ſeven white marks on each of the caſes of the wings. This is about the ſize of the common lady-bird, and is found in June near rivers, among the ruſhes, and in cyperus graſſes. Ray's Hiſt. Inſect. p. 384.

Of thoſe beetles which have antennæ terminating in ſlender points, there is a great number of ſpecies, which may be ſubdivided into ſome other general claſſes: ſome of them have whole and perfect caſes to their wings, and have long horns; theſe are by ſome called *capricorn-beetles*; of theſe there are ſeveral ſpecies. See *Capricorn* BEETLE.

The ſix ſpecies enumerated by Liſter, are theſe. 1. The great ſweet-ſmelling *capricorn*, called by ſome authors *cerambyx*, and by others the *muſk beetle*. This is one of the moſt beautiful of the Engliſh beetles; the male is much ſmaller than the female, and is of a mixed colour of purple and gold; the female is more of a green colour; the horns of the males alſo conſiſt of longer joints, and in both ſexes the horns hang over the back, and are longer than the whole body. It is found among old willows, and often in the very wood; it is moſt frequent in the month of July. It makes a mournful ſound when taken, and Mouffet obſerves that it loſes its perfumed ſmell when dead; but Liſter obſerves farther, that this ſmell is only found in it at the time of copulation. 2. The ſmall gilded *capricorn*; this is of a true gold colour, but in ſome lights has a caſt of purple and of green. It is found very frequently among reeds by the banks of rivers. 3. The yellow *capricorn*, with a large black ſpot on each of the caſes of the wings; this is found among the dry hay in April. 4. The yellow legged *beetle*, with a black body, variegated with yellow ſtreaks. This is found in gardens among the kitchen herbs, principally in the month of May. 5. The black *capricorn*, with the caſes of the wings yellow at the top, and white at the bottom, with ſome other white marks about them; this is found in the meadows in the month of May. 6. The green *capricorn*; this is of the ſize, ſhape, and colour of the cantharides; it is found in May, in woods. Ray's Hiſt. Inſect. p. 386.

Some *beetles* are covered with a very hard cruſt, and have ſcarce any wings underneath it. Theſe are generally very ſlow creepers, and of theſe we have in England three ſpecies.

1. The ſhort purpliſh black *beetle* with gibbous ſhoulders. This ſeems to be the ſame with the *cat-beetle*, or *ſcarabæus feliformis* of Mouffet, and others. This is not unfrequently found on heaths in March, and at that time is often found in coitu. The male is conſiderably ſmaller than the female. This creature feeds on the yellow gallium, and when fatigued will caſt out at its mouth a yellowiſh liquor, which is of a pungent taſte like pepper.
2. The ſlow ſtinking black *beetle*, called the *blatta fœtida* by Pliny and others. This is of a deep duſky black colour, not at all gloſſy or ſhining. This is common in cellars, and other damp places, in the month of April.
3. The great purpliſh *beetle* with a caſt of green. This is common in gardens, and in April is always infeſted with a great number of lice.

Some *beetles* which have wings very rarely uſe them, but run very ſwiftly along the ground; of theſe we have two ſpecies common among us.

1. The black *beetle* with ſulcated wings. This is a very common inſect, and is frequent in path-ways in April.
2. The black *beetle* with ſtriated wings, and with yellow legs and horns. This is alſo common in path-ways in ſummer.

All theſe *beetles* have the antennæ laminated at the ends.

Of the other kind, which have them go off to a ſlender and taper point, there are alſo many kinds: of theſe ſome have only ſhort caſes for their wings, as if they had been cut off near the root. The general characters of this claſs of *beetles* are, that they have oblong and ſlender bodies, and have two appendages, forming a kind of fork at the tail. Of this kind are the common ear-wig, or forficula, and the ſtaphylinus, which is a large and long black *beetle*, with a ſharp fork at its tail, and with a naked body. It is of a deep and duſky black, not at all gloſſy; it has very large yellow wings, folded under the ſmall thecæ on the back; it turns up its tail in a threatening poſture when attempted to be caught, and throws out a ſort of white bladders at it; it runs very nimbly, and is a very voracious creature, feeding on the other *beetles*, or on any inſects it can catch.

Some *beetles* are all over ſoft, and have no membranaceous wings. The bodies of theſe *beetles* ſeem covered with a cruſtaceous ſubſtance, but it is ſoft, and yields to the preſſure of the finger like a bladder; theſe all eat herbaceous or vegetable food; we have two ſpecies of them.

1. The oil *beetle*, a bluiſh black ſhining *beetle*, called *proſcarabæus* by Mouffet. This is found in meadows in great abundance, and feeds on leaves of ſome of the ſpecies of ranunculus. 2. The ſhort-legged, black, ſmooth *beetle*. This has ſcarce any antennæ, and when tired, rolls itſelf up into a round ball. This is found in May feeding on the aparine, or common cleavers; but Liſter ſuſpects whether this be not a worm ſtate of ſome *beetle*, rather than a perfect *beetle*.

Some *beetles* have long heads, ſhaped like the trunks of other inſects, and in theſe the horns are lodged: theſe were called by the ancients *gurguliones*. Ray's Hiſt. Inſect. p. 391. See GURGULIO.

Some *beetles* have a forceps at the head, indented on each ſide in the manner of a ſaw. Of this kind we have only one known ſpecies in England; this is the green *beetle* with ten white ſpots on the caſes of the wings. This is found in June in the northern parts of England. It is a very voracious animal, deſtroying great numbers of other inſects, particularly caterpillars.

Some *beetles* have a very remarkable property of leaping, and this of a very peculiar kind; for they do not leap, like other inſects, by means of their hinder legs, but by means of their breaſt. There are ſome general marks by which this genus of *beetles* may be diſtinguiſhed from others: theſe are, 1. They are always of an oblong and flatted figure. 2. Their head is always joined in a very nice manner to the ſhoulders. 3. Their legs are extremely ſhort and ſlender.

Of this kind of *beetles* we have in England only two known ſpecies.

1. The cheſnut-coloured leaping *beetle*. This is found frequently in corn-fields, and elſewhere. 2. The greeniſh black *beetle* with horns pectinated on one ſide. This is a ſcarce ſpecies, but is found in dry places in March. Ray's Hiſt. Inſect. p. 387.

SCARABÆUS *tardipes*, the *ſlow beetle*. We have a very ſingular account of the longevity of this animal, given by Mr. Baker from his own obſervation; which lived two years and a half without any viſible food or drink. It ſeems probable that it received ſufficient nouriſhment from the particles floating in the air; and it is poſſible that lizards, ſnakes, &c. when they live ſo long without any viſible food, are ſupplied in the ſame manner.

We know that the Egyptians had a very high veneration for the *beetle*. This appears not only by the account hiſtorians give of its being one of their deities, but by the many images we find of it among their antiquities. As theſe were a wiſe and learned people, we cannot ſuppoſe they would, without ſome reaſon, pay ſo much regard to ſo contemptible an animal as this appears to be; and it is very poſſible they might have diſcovered this property of its living in this manner without food, and thence eſteem it a ſymbol of the deity. It is not known how long Mr. Baker's *beetle* would have lived in this manner with him; for it at length got away, while a careleſs ſervant took up the glaſs to wipe it. Phil. Tranſ. N° 457, 447.

SCARABÆUS *vorax*, the *cankerworm*. This laſt term is uſed in the tranſlation of our Bibles to ſignify a very deſtructive inſect, of the nature of the locuſt, and uſually mentioned as its companion. The Septuagint gives it the name βρȣχος, *bruchus*, a name ſignifying an animal which makes a great noiſe, as this inſect does both in eating and in flying. We generally underſtand by this word a reptile, but it certainly means no other than that ſort of *beetle* which we call the *cockchaffer*, or *dor*; a flying inſect, very remarkable for the humming noiſe it makes with its wings when in motion, and which, when it is found in ſwarms ſitting upon the hedges, makes a continual noiſe in eating, like the ſawing of wood. This creature deſerves very well to be placed with the locuſt, as a deſtroyer of the fruits of the earth.

In another part of the Old Teſtament, the ſame word *bruchus* is tranſlated *locuſt*, or *beetle*; and this explains the rationale of that odd clauſe in the Jewiſh law, where Moſes tells the Iſraelites, "theſe ye may eat of: every flying creeping thing that goeth upon all four, which have legs above their feet to leap withal upon the earth; even theſe of them ye may eat: the locuſt after his kind, and the bald locuſt after his kind, and the *beetle* after his kind, and the graſhopper after his kind."

It has appeared very ſtrange to many, that among the pure and clean foods, the *beetle*, and ſuch other dry and naſty reptiles, ſhould be recommended in Scripture as wholeſome food for man; but there appears reaſon on the ſide of this when thoroughly conſidered. It is very evident that neither the Jews, nor any other people would eat ſuch inſects as theſe, while any thing better was to be had; but as they had lived in a country often viſited by locuſts and theſe *cockchaffers*, which might at ſome time eat up all the fruits of the earth, then in the want of theſe the prophet tells them they might eat up the devourers themſelves, and yet be clean. So alſo it appears that we are to underſtand what we are told of St. John the Baptiſt, that he fed on locuſts and wild honey; for it was in the deſert that he eat theſe, where no other food was to be had.

The poor people of Ireland have taught us, that the prophet adviſed his people to a wholeſome food in this text; for ſome years ago, when the county of Galway, and other neighbouring parts, were ſo infeſted with this vermin, that the whole face of the country was deſtroyed by them, and the trees ſtripped of their leaves and fruits, as much as in the depth of winter; the poor people wanting other food, eat the vermin themſelves that had done the miſchief; and the *cockchaffers*, which are doubtleſs what is meant by Moſes under the name of the *beetle*, as they are truly of the *beetle* kind, were found to be a very good and wholeſome food.

It is very probable alſo that this kind of *beetle*, ſo famous for devouring the fruits of the earth, is that kind to which the Egyptians paid divine honours, and for which they had ſuch high veneration, that they frequently engraved its figure on their obeliſks; though the antiquaries give a very different account of it, ſuppoſing that the *beetle* was held ſacred by them, as being an hieroglyphical repreſentation of the ſun. This ſeems a very forced conjecture; whereas nothing can be ſuppoſed more natural, than that a nation, addicted to polytheiſm, as the Egyptians were, and in a country frequently ſuffering great miſchief and ſcarcity from ſwarms of devouring inſects, ſhould, from a ſtrong ſenſe and fear of evil to come, give ſacred worſhip to the viſible authors of their ſufferings, in hopes to render them more propitious for the future. The ſame Egyptians, we very well know, worſhipped the other great deſtroyer of their country, the crocodile; and the Romans, a much more civilized people, built a temple to the diſeaſe which raged moſt among them, the fever.

The ignorant people among the Iriſh, when the vaſt ſwarms of theſe *beetles* firſt appeared among them, were of the ſame turn, and rather reverenced than deſtroyed them; ſaying, that they were the ghoſts of their dead friends killed at the battle of Aghrim, who were come in this form to peſter and annoy their heretical enemies, the Engliſh proteſtants. They even thought that the Engliſh families ſuffered more by them than the Iriſh; but this was only becauſe the grounds of the former were better improved, and the creatures found plenty of better food there. Phil. Tranſ. Nº 234.

Scarabæus, in *Ichthyology*, a name given by Gaza to that ſpecies of *ſparus*, which is called by others the cantharus.

SCARBOROUGH *water*. The water of this medicinal ſpring has been the ſubject of great conteſts and diſputes among the phyſical people; all allowing it conſiderable virtues, but ſome attributing to them one ingredient, others to another. Dr. Witty alledges that its material principles are alum, nitre, and vitriol of iron; but though this author declares, that theſe principles are all to be ſeparated out of it, Dr. Tonſtall, on the other hand, affirms, that it has no vitriol of iron in it, but a ſtone powder and a clay, leaving ſand at the bottom of the veſſel; and therefore that it is apt to breed the ſtone, and is bad in the gout, jaundice, and all other diſeaſes, where indurations of the parts, or ſtony concretions in the body, are the cauſe; and this author ſeems to ſpeak very experimentally, when he alledges that he never had any ſymptoms of the ſtone till he drank the *Scarborough water*, but acquired that diſeaſe during the courſe of it.

Alum-ſtone diſſolved in water is always found to yield a purple tincture with galls, and thereore the colouring an infuſion of this or other vegetable ſubſtances by the *Scarborough water*, which is by all allowed to contain this ſtone, is no proof of any vitriol of iron being contained in it, other than ſuch a ſmall portion of it as is always found in this alum-ſtone. All waters, which have diſſolved iron, will yield vitriol as a ſalt from that metal, on evaporation. The cliffs about Scarborough yield abundance of ſalt in ſhoots and efferveſcences, plainly owing to the waters of the ſpring; yet all theſe are nitro-aluminous, none of them at all vitriolic. If the *Scarborough-water* is ſet by for ſome days, after it is taken freſh from the ſpring, it precipitates a ſediment; which being examined, is found not to be of a ferruginous nature, but a mere glebe of alum.

Upon the whole, the virtues of alum and vitriol are ſo far different, that it muſt be eaſy to ſee to which of the two ſalts the water partakes moſt of, by its virtues; but as to the ſtony matter, which the one of theſe diſputants calls an inſipid clay, and the other a ſandy ſtone, it is no other than ſpar, which is contained in all water; and which has been in general ſo far from being accuſed of breeding the ſtone in the bladder, that the general conſent of mankind has ſeemed to eſteem it a cure for that diſorder. The ſpar, in the form of the lapis Judaicus and oſtracites, and the very waters which are ſo impregnated with it as to encruſt every thing with it that is put into them, are given for the cure of this diſeaſe. Phil. Tranſ. Nº 85.

The waters of *Scarborough* are chalybeate and purging. Of theſe there are two wells, both impregnated with the ſame principles, in different proportions; though the purging well is the moſt celebrated, and the water of this is uſually called the *Scarborough-water*. When theſe waters are poured out of one glaſs into another, they throw up a number of air-bubbles; and if they are ſhook for ſome time in a phial cloſe ſtopped, and the phial be ſuddenly opened before the commotion ceaſes, they diſplode an elaſtic vapour, with an audible noiſe, which ſhews that they abound in fixed air. At the fountain they have a briſk, pungent, chalybeate taſte; but the purging water taſtes bitteriſh, which is not uſually the caſe with the chalybeate one. They loſe their chalybeate virtues by expoſure, and by keeping; but the purging water the ſooneſt. They both putrefy by keeping; but in time recover their ſweetneſs. Four or five half pints of the purging water drank within an hour, give two or three eaſy motions, and raiſe the ſpirits. The like quantity of the chalybeate purges leſs, but exhilarates more, and paſſes off chiefly by urine. Theſe waters have been found beneficial in hectic fevers, weakneſſes of the ſtomach, and indigeſtion; in relaxations of the ſyſtem; in nervous, hyſteric, and hypochondriacal diſorders; in the green ſickneſs, ſcurvy, rheumatiſm, and aſthmatic complaints; in gleets, the fluor albus, and other preternatural evacuations, and in habitual coſtiveneſs. Elliot on Mineral Waters, p. 187.

SCARE-*crow*, in *Ornithology*, the name of a bird of the *larus*, or ſea-gull kind, called by authors *larus niger*, or the black gull, and by the Germans *brandvogel* and *meyvogel*. This is the sterna *fiſſipes* of Linnæus. It is a very long-winged bird, and of the ſize of the common blackbird; the head, neck, breaſt, and belly, as far as the vent, are black; beyond it, white; the male has a white ſpot under its chin; the back and wings are of a deep aſh-colour; the tail is ſhort and forked; its legs are ſhort and red. It is common about the ſea coaſts, and feeds on inſects and ſmall fiſh. It is a well taſted bird. Theſe birds frequent freſh waters; breed on their banks, and lay three ſmall eggs of a deep olive colour, much ſpotted with black. They are found, during ſpring and ſummer, in vaſt numbers in the fens of Lincolnſhire, where they make an inceſſant noiſe. Birds of this ſpecies are alſo ſeen very remote from land. Pennant.

SCARFED, in the *Sea Carpenter's Language*, is the ſame as pieced, or faſtened or joined in, and denotes a particular method of uniting two pieces of timber together by the extremities.

When two pieces of timber are joined together, ſo that the end of one goes over the end of the other, being tapered ſo that the one may be let into the other, and become even, they are ſaid to be *ſcarfed*: ſuch are the heel-pieces. But when the ends of the two pieces are cut ſquare, and put together, they are ſaid to butt to one another; and when another piece is laid upon and faſtened to both, as is the caſe in all the frame-timbers, this is called *ſcarfing* the timber; and half the piece which faſtens the two timbers together, is reckoned the length of the *ſcarf*. Murray on Ship-Building, p. 192.

SCARIFICATION, *ſcarificatio*, in *Surgery*, an operation whereby ſeveral inciſions are made in the ſkin, with a lancet, or other inſtrument proper for that purpoſe.

Salmaſius will have us write *ſcarifacio*, not *ſcarificatio*;

becauſe the word is derived from the Greek σκαριφος. See his notes on Solinus, p. 519. where he thus corrects the reading of Pliny, lib. xvii. F. Hardouin lets the old reading *ſcarificatio* ſtand, though he owns the MSS. have it *ſcariphatio*; but adds, that Theod. Priſcian writes *ſcarificatio*.

Scarification is chiefly practiſed after cupping.

It acts by ſtimulating and evacuating.

SCARIFICATOR, a chirurgical inſtrument, uſed in *ſcarification*.

The *ſcarificator* is made in form of a box, wherein are fitted ten, twelve, or ſixteen lancets, all perfectly in the ſame plane; which being, as it were, cocked, by means of a ſpring, are all diſcharged at the ſame time, by pulling a kind of trigger, and driven equally within the ſkin. Till of late, they uſed little ſharp cutting wheels, inſtead of lancets.

The uſe of the *ſcarificator* is to evacuate the blood, and other humours, ſpread under the ſkin, by making a great number of apertures, or outlets, therein; which, being thus all ſtruck at once, gives much leſs pain than when ſtruck ſucceſſively. See CUPPING.

SCARLET, in *Dying*, one of the ſix kinds of good reds. See RED, COLOUR, and DYING.

Menage derives the word from the barbarous Latin *ſcarleta*, or *ſcarletum*; which he deduces farther from the German *ſcharlach*, or the Flemiſh *ſcarlaken*; whence the Engliſh have formed *ſcarlet*, the Italians *ſcarlato*, and the French their *eſcarlate*. Others derive it from the Celtic *ſcuarlera*. Dalechampius will have it called *ſcarlatum*, by corruption, for *caſculiatum*, a barbarous word introduced into Spain; others fetch it from the Arabic *yxquerlate*.

There are two kinds of *ſcarlet*; the one given with KERMES, or *ſcarlet-grain*; the other with COCHINEAL. See BOW-*dye*.

SCARLET *cardinal's flower*, in *Botany*. See CARDINAL's *flower*.

SCARLET *lychnis*, in *Botany*. See CAMPION.

SCARLET *oak*. See OAK.

SCARLETINA *febris*. See *Scarlet* FEVER.

SCARP, in *Fortification*, the interior ſlope of the ditch of a place; that is, the ſlope of that ſide of a ditch which is next to the place, and faces the champaign.

The *ſcarp* commences from the liziere, or foot of the rampart. The *ſcarp* is oppoſite to the *counterſcarp*, which is the other ſide of the ditch.

SCARP is alſo a term in *Heraldry*, probably derived from the French *eſcharpe*, ſignifying the ſcarf which military commanders wear for ornament.

It is borne ſomething like a battoon ſiniſter; but is broader, and is continued out to the edges of the field; whereas the battoon is cut off at each end. He beareth argent a *ſcarp* azure. See *Tab. Herald. fig.* 44.

SCARUS, in *Ichthyology*, the name of a ſea-fiſh, being, in the Linnæan ſyſtem, a ſpecies of the LABRUS, of which there have been ſeveral remarkable things aſſerted by the ancients, ſome with and ſome without any foundation; as that it ruminates, or chews the cud like our oxen, &c. This Ariſtotle, Pliny, Oppian, and others, affirm, but none of them of their own perſonal knowledge; they ſeem to have had it by hearſay, or elſe, as authors often do, to have taken it from one another; for the thing is not true in fact.

It has been ſaid alſo to be the only fiſh which feeds on herbs; and it is ſo far true that it does feed on them, and that few other fiſh, but not that no other feed in the ſame manner. It has been reported alſo that this is the only fiſh that ſleeps. Geſner would perſuade us, that not only this, but many other fiſh, alſo ſleep. But this does not ſeem to be the fact; for this race of animals have no eye-brows, nor any membrane to cloſe and cover their eyes with, as other creatures have, which nature has allowed ſleep to.

The later naturaliſts have deſcribed three ſpecies of this fiſh: Rondeletius two, the *ſcarus onias*, and *ſcarus varius*; and Bellonius one, which is different from both theſe, and ſeems to have been the very fiſh the ancients knew by this name.

The *ſcarus onias* is a ſea-fiſh, found among rocks and near the ſhores. Its ſcales are large and very thin, and its back of a blackiſh blue; its belly of a fine white, and is of an oblong and rounded ſhape; its teeth are broad, not pointed, and reſemble thoſe of the human jaws; its eyes alſo are large, and its head over the eyes of a fine ſtrong and clear blue.

The *ſcarus varius* is of the ſhape and figure of the former, but its eyes and its belly are of a purple colour; its tail is of a fine clear and ſtrong blue, and the reſt of its body is of a greeniſh or bluiſh black; its ſcales are ſpotted and ſpeckled with duſky ſpots; its mouth is moderately large, and its teeth broad in the upper jaw, and ſomewhat pointed in the under; from the head to the tail, all along the ridge of the back, there runs a row of ſhort ſpines, which are connected at their bottoms by a membrane; and in the middle of the belly there are ſeveral purple ſpots. It is a very beautiful fiſh. Rondelet. de Piſc. lib. v. cap. 3.

The *ſcarus Bellonii*, which differs from both theſe, and ſeems to be the ſame fiſh which the ancients called by this name, is of a mixed bluiſh and red colour; its ſcales are broad and thin, and it has two tranſverſe protuberances near the ſides of the tail; its body is rounded, but not very long; its teeth are ſtrong and obtuſe, and well fitted for their office, which is the tearing off the tough ſea-herbs from the rocks, and chewing them for food; its mouth is but ſmall, and it has only one fin on the back, which is prickly; its uſual ſize is about five or ſix inches in length; it is accounted a very delicate fiſh, but is inſipid, unleſs eaten with the guts, and all that they contain. The liver and ſtomach of this fiſh, with its contents, are cooked up by the Greeks into a very delicate diſh; the epicures among them not regarding the reſt of the fiſh. Bellonius, de Piſc. p. 126.

SCARY, in *Huſbandry*, a term uſed by the farmers for a barren land, which has a poor or thin ſward, or coat of graſs, upon it.

SCATARELLO, in *Ornithology*, the name of a ſmall bird of the ficedula kind, of a greyiſh brown on the back, and a pale yellow on the breaſt and belly; its legs are black. It ſeems nearly allied to the BECCIFAGO.

SCATCH-*mouth*, in the *Manege*, a bit-mouth, differing from a canon-mouth in this, that the canon is round, whereas a *ſcatch* is more upon the oval. That part of the *ſcatch-mouth* that joins the bit-mouth to the branch, is likewiſe different; a canon being ſtayed upon the branch by a fonceau, and a *ſcatch* by a chaperon, which ſurrounds the banquet. The effect of the *ſcatch-mouth* is ſomewhat greater than that of the canon mouth, and keeps the mouth more in ſubjection. Commonly ſnaffles are *ſcatch-mouths*.

SCATEA, a word uſed by Paracelſus for a ſomewhat hard fabulous concretion in the urine.

SCAVAGE, SCHEVAGE, SCHEWAGE, or SHEWAGE, in our *Ancient Cuſtoms*, a kind of toll, or cuſtom exacted by mayors, ſheriffs, &c. of merchant-ſtrangers, for wares ſhewed, or offered to ſale, within their liberties. This cuſtom is prohibited by ſtat. 19 Hen. VII. cap. 7. though the city of London ſtill retains the benefit of it.

SCAVANT, *ſavant*, a term purely French, ſignifying *learned*. It is little uſed, except in the phraſe *Journal des Sçavans*, denoting a journal of the works of the learned, publiſhed monthly at Paris; being the firſt work of that kind, and that from which all the reſt have had their riſe.

Menage derives the word from the Latin *ſapere, to be wiſe*; and, on that footing, he will have it written *ſavant*; others from *ſcire, to know*; and, for that reaſon, write it *ſçavant*. The latter etymology and orthography are followed by the academy; though all the ancient MSS. have it *ſavant*, *ſavoir*, &c.

SCAVEL *ſpitter*, denotes a ſmall ſpade, ſhod only half way, and uſed in digging clay.

SCAVENGERS, two officers choſen yearly in each pariſh in London, and the ſuburbs, by the conſtables, churchwardens, and other inhabitants, whoſe buſineſs it is to hire perſons called *rakers*, with carts, to cleanſe the ſtreets, and carry away the dirt and filth thereof, under a penalty of 40*s*.

The word is derived from the Saxon *ſcaefda*; or Dutch *ſchaven, to ſcrape*, or *ſhave away*.

All perſons within the weekly bills are to ſweep the ſtreets before their doors every Wedneſday and Saturday, on pain of forfeiting 3*s*. 4*d*. and perſons laying dirt or aſhes before their houſes, incur a forfeiture of 5*s*. For defraying the expences of *ſcavengers*; conſtables, churchwardens, &c. may make a tax, being allowed by two juſtices of the peace, not exceeding 4*d*. in the pound. Perſons who refuſe to take upon them the office of *ſcavenger*, forfeit 10*l*. 14 Car. II. cap. 2. 2 W. & M. c. 2. Perſons authorized by 22 & 23 Car. II. may order ſuch parts of London ſtreets, &c. as lie before vacant houſes, to be paved and amended, and impoſe aſſeſſments on the owners; and ſuch authorized perſons may direct poſts to be ſet up in all paſſages within the city, to preſerve foot paths, and make aſſeſſments for that purpoſe. 10 Geo. II. c. 22. By 1 Geo. I. c. 48. juſtices of peace in their quarter-ſeſſions may appoint *ſcavengers*, and order the repairing and cleanſing of ſtreets in any city or market-town, and appoint perſons to make aſſeſſments, ſo as not to exceed 6*d*. per pound per annum.

The *ſcavengers* are much the ſame with what were anciently called *ſtreet-wards.* The Germans call them *dreckſimons*, ſrom one Simon, a famed *ſcavenger* of Marpurg.

SCAULEZ, in *Ichthyography*, the name of a fiſh common on the Mediterranean ſhores, and called by authors HEPSETUS and *anguella*.

SCAUP *duck*. See DUCK.

SCAZONE, in *Ichthyology*, a name given by Salvian and others to the fiſh which we call the *pricked-dog*, or *hound*, and the generality of authors the GALEUS *ſpinax*. It is a ſpecies of ſqualus, diſtinguiſhed by the roundneſs of the body, and having no pinna ani.

SCEAT, among the Saxons, a ſmall coin equal to four farthings.

SCELAZIUS, in *Zoology*, the name by which Dr. Hill has called a genus of animalcules with viſible legs.

It is common in ditch-water, and is leſs quick in its motions than moſt other animalcules.

SCELETON, in *Anatomy*. See SKELETON.

SCELOTYRBE, Σκελοτυρϐη, compounded of *σκελος*, *leg*, and *τυρϐη*, *tumult*, or *uproar*, weakneſs and pains in the legs, generally attending ſcorbutic habits.

Scelotyrbe is alſo uſed for the SCURVY itſelf; and ſometimes applied to medicines contrived againſt ſuch diſorders.

SCEMI, in *Botany*, a name given by ſome authors to the *carob*, or ſweet pipe-tree.

SCENE, *ſcena*, in its primary ſenſe, denoted a theatre, or place, where dramatic pieces, and other public ſhews, were repreſented.

The word is originally Greek, *σκηνη* ſignifying a *tent*, *hut*, *booth*, or the like, where dramatic pieces were anciently performed.

The original *ſcene* for acting of plays was as ſimple as the repreſentations themſelves; it conſiſted only of a plain plat of ground, proper for the occaſion, which was in ſome degree ſhaded by the neighbouring trees, whoſe branches were made to meet together, and their vacancies ſupplied with boards, ſticks, and the like, to complete the ſhelter; and theſe were ſometimes covered with ſkins, ſometimes only with the branches of other trees newly cut down, and full of leaves.

Thus Virgil, in his Æneid:

Tum ſylvis ſcena *coruſcis*
Deſuper horrentique atrum nemus imminet umbrâ.

Upon which Servius remarks, Scena *apud antiquos parietem non habuit.*

So Ovid:

Primus ſollicitos feciſti, Romule, ludos
Cum juvit viduos rapta Sabina viros.
Tunc neque marmoreo pendebant vela theatro
Nec fuerant liquido pulpita rubra croco.
Illic quas tulerant nemoroſa palatia frondes
Simpliciter poſitæ ſcena *ſine arte fuit.*

Thus alſo Caſſiodorus derives the word *ſcene*, from the cloſe ſhade of the grove, where, in the ſpring-time, the ancient ſhepherds uſed to ſing and play.

It does not appear that the ancient poets were at all acquainted with the modern way of changing the *ſcenes*, in reſpect of the different parts of the play, but all was performed in the ſame place.

The firſt things repreſented in theſe new theatres were what they called *mimi*. Theſe were a very coarſe ſort of poems, repreſenting, in obſcene and indecent language, the vices and indecent actions of the principal people of the time. Sophrones and Xenarchus ſeem to have been the firſt writers of this ſort of comedy, and they uſed ſometimes proſe, ſometimes verſe, in theſe compoſitions.

After the licentious things, thus repreſented, had given great offence to the magiſtracy, the poets hands were tied up from writing at all, and the actors in theſe *ſcenes* were forbid to ſpeak. Hence aroſe a new way of entertaining the ſpectators, which we ſtill continue, under the name *pantomime*, the ſame by which they expreſſed it. In this all was repreſented in dumb ſhew, and the geſtures and motions of the limbs were all they had to repreſent the actions of others by.

This ſort of public diverſion ſeems to have been in faſhion in the days of Ariſtotle, and to have been continued long afterwards. Salmaſius is of opinion, that Pylades was the firſt who ſeparated the pantomime and dancing from the plays, where the actors ſpoke. But this ſeems an error in that great critic; for they ſeem, by what hiſtories we have left of them, to have been repreſented ſingly long before that time, Pylades living in the time of Auguſtus Cæſar.

Poetry and dancing were early ſuppoſed to have ſome relation to one another; the firſt was called a *ſpeaking dance*, and the latter a *dumb poem*; a name afterwards, and not till long afterwards, given to a picture. Thus they were introduced on the ſame *ſcenes*, as things naturally connected together.

SCENE was afterwards more particularly uſed for the decorations of a ſtage, or theatre.

The ancients, we are informed by Vitruvius, had three ſorts of *ſcenes*, or ſcenical decorations, in their theatres. That in common uſe was a ſpacious front, or range, of building, adorned with columns and ſtatues; in which were three large openings, through which other buildings appeared in perſpective; viz. a palace, for tragedies; houſes and ſtreets, for comedies; and foreſts, for paſtorals.

Theſe decorations were either *verſatile*, i. e. they turned on pivots, as deſcribed by Vitruvius; or *ductile*, i. e. ſliding along grooves, as thoſe in our theatres. And as this or that ſide, or repreſentation, was turned towards the ſpectators, the *ſcene* was called a *tragic*, *comic*, or a *paſtoral ſcene*. See ſeveral curious remarks on the ancient *ſcene* in M. Perrault's notes on Vitruvius, lib. v. cap. 6. See PLAYHOUSE.

SCENE is alſo uſed for the place repreſented, or that where the action is conceived to have paſſed.

One of the grand laws of the drama is, to obſerve the unity of the *ſcene*; which we more uſually call the *unity of place*.

In effect, to keep cloſe to nature and probability, the *ſcene* ſhould never be ſhifted from place to place, in the courſe of the play. The ancients were pretty ſevere in this reſpect, particularly Terence; in ſome of his plays, the *ſcene* never ſhifts at all, but the whole is tranſacted before the door of an old man's houſe, whither, with inimitable art, he brings all his actors, occaſionally.

The French, too, are very ſtrict in this reſpect; but the Engliſh plead for a diſpenſation from the rule; which they think confines them to too narrow bounds, and precludes them from that variety of adventures and intrigues, without which an Engliſh audience will never be ſatisfied.

However, the more judicious and accurate of our own writers are very moderate in the uſe of this licence, and take care not to deviate too far from probability, by ſhifting the *ſcene*, between the acts, much farther than the perſons concerned may be ſuppoſed to have gone in the interval. Hence they ſeldom carry the *ſcene* out of the ſame town; though others, who own no ſubjection to the ancient rules, take larger liberties: with ſome of theſe, it is nothing, when a fancied *ſcene* is in view, to ſkip from Covent-Garden to Peru. The great Shakſpeare is exceedingly faulty in this reſpect, in almoſt all his plays.

SCENE is alſo a part, or diviſion, of a dramatic poem, determined by a new actor's entering.

Plays are divided into *acts*, and acts are ſubdivided into *ſcenes*.

In moſt of our printed plays a new *ſcene* is never expreſſed to begin, but when the place is ſuppoſed to be changed, by ſhifting, or drawing, the moveable *ſcene*; but this muſt be eſteemed an overſight, ſince, on our ſtage, the *ſcene* is, properly, the perſons preſent at, or concerned in, the action on the ſtage at ſuch time. Whenever, therefore, a new actor appears, or an old one diſappears, the action is changed into other hands; and, therefore, a new *ſcene* then commences.

It is one of the laws of the ſtage, that the *ſcenes* be well connected; that is, that one ſucceed another, in ſuch manner, as that the ſtage is never quite empty, till the end of the act.

The ancients did not allow of above three perſons on the ſtage at the ſame time, excepting in the choruſes, where the number was not limited; but the moderns have but little regard to this reſtriction.

SCENIC *Games*, *Ludi* SCENICI, among the *Ancients*, were entertainments exhibited on the *ſcena*, or theatre; including what we now call *plays*, of all kinds, with dancing, and other theatrical performances.

The Romans were almoſt four hundred years without any *ſcenic games* at all. Livy obſerves, that they were firſt inſtituted in the year of Rome 392, under the conſulate of C. Sulpitius Peticus, and C. Licinius Stolo. But the critics have obſerved a miſtake here in Livy; the conſulate of thoſe perſons falling in the year 389, which, therefore, is held the æra of the introduction of the *ſcenic games*.

At firſt, ſome actors for theſe diverſions were ſent for out of Hetruria; who, without reciting any thing, danced about to the ſound of inſtruments; ſo that thus far was no more than a ball, or rather what the French call a *ballet*. At length they began to rehearſe verſe; and SATIRE was introduced, adorned with compoſitions of muſic, and accompanied with dances. At length, Livius

Andronicus, about the year of Rome 514, introduced the entertainments of tragedy and comedy.

Thus, by degrees, growing more and more perfect, their *ſcenical* ſhews were at laſt repreſented with a juſtneſs and magnificence beyond any thing the world elſewhere ever ſaw. The fathers, in their writings, cry out loudly againſt the *ſcenical games*.

SCENOGRAPHY, formed from *σκηνη*, *ſcene*, and *γραφη*, *deſcription*, in *Perſpective*, a repreſentation of a body on a perſpective plane; or a deſcription thereof in all its dimenſions, ſuch as it appears to the eye.

The ichnography of a building, &c. repreſents the plan, or ground-work, of the building; the orthography the front, or one of the ſides; and the *ſcenography* the whole building, front, ſides, height, and all, raiſed on the geometrical plan.

To exhibit the SCENOGRAPHY *of any body.* 1. Lay down the baſis, ground-plot, or plan, of the body, in the perſpective ichnography, according to the method laid down under the article PERSPECTIVE. 2. Upon the ſeveral points of the plan raiſe the perſpective heights: thus will the *ſcenography* of the body be completed, excepting that a proper ſhade is to be added. The method of raiſing the heights is as follows.

On any point given, as C (*Tab.* IV. *Perſpective, fig.* 59.) to raiſe a perſpective altitude, anſwerable to an objective altitude P Q. On the terreſtrial line raiſe a perpendicular P Q, equal to the given objective altitude. From P and Q, to any point, as T, draw right lines, P T and Q T. From the given point C draw a right line C K, parallel to the terreſtrial line D E, meeting the right line Q T, in K. In the point K, upon the line K C, erect a perpendicular I K. This I K is the *ſcenographic* altitude required. See PERSPECTIVE, art. XXI.

The application of this general method of drawing the *ſcenography* of a body, is not ſo obvious, in every caſe, but that it may be neceſſary to illuſtrate it a little by a few examples.

To exhibit the SCENOGRAPHY *of a cube, viewed by an angle.* 1. As the baſis of a cube viewed by an angle, ſtanding on a geometrical plane, is a ſquare viewed by an angle; draw a ſquare, viewed angular-wiſe. 2. Raiſe the ſide H I (*fig.* 60.) of the ſquare perpendicularly on any point of the terreſtrial line D E; and to any point, as V, of the horizontal line H R, draw the right lines V I and V H. 3. From the angles *d*, *b*, and *c*, draw *c* 1, *d* 2, &c. parallel to the terreſtrial line D E. 4. From the points 1 and 2, raiſe L 1, and M 2, perpendicular to the ſame. Laſtly, ſince H I is the height to be raiſed in *a*, L 1 in *c* and *b*, and M 2 in *d*; in *a* raiſe the line *f a* perpendicular to *a* E; in *b* and *c*, raiſe *b g* and *c e* perpendicular to *b c* 1; and, laſtly, raiſe *d h* perpendicular to *d* 2, and make $af = HI$, $bg = ce = L\,1$, and $hd = M\,2$: if, then, the points *g*, *h*, *e*, *f*, be connected by right lines, the *ſcenography* will be complete.

Otherwiſe: let A B (*fig.* 61.) be the breadth of either of the ſix equal ſquare ſides of the cube A G, O the place of the obſerver, almoſt even with the edge C D of the cube, S the point of ſight, S P the horizon parallel to A D, and P (S P being made equal to S O) the point of diſtance. Make A B C D a true ſquare, draw B S and C S to the point of ſight, and B P to the point of diſtance, interſecting C S in G; then draw F G parallel to B C, and the uppermoſt perſpective ſquare ſide B F G C of the cube, will be finiſhed. Draw D S to the point of ſight, and A P to the point of diſtance, interſecting D S in I; then draw G I parallel to C D; and, if the cube be opaque, as if wood or metal, all the outlines of it will be finiſhed, and then it may be ſhaded as in the figure. But if you want a perſpective view of a tranſparent glaſs cube, all the ſides of which will be ſeen; draw A H toward the point of ſight, F H parallel to B A, and H I parallel to A D; then A H I D will be the ſpuare baſe of the cube, perſpectively parallel to the top B F G C; A B F H will be the ſquare ſide of the cube, parallel to C G I D, and F G I H will be the ſquare ſide parallel to A B C D.

Having the repreſentation of one cube, that will be ſufficient for any number of the ſame ſize, provided that they all ſtand in the ſame line, or at the ſame diſtance from the bottom of the picture. If the cube were above the horizontal line, the repreſentation of it is found in the ſame manner.

Again: to exhibit the repreſentation of a cube with the feweſt poſſible lines, within the picture. Divide the bottom and one ſide of the picture (*fig.* 62.) into any number of equal parts, which may be conſidered as feet; let the propoſed repreſentation be ſix feet from the bottom of the picture, and four feet in diameter; and let C H or C L be half the diſtance of the eye, and C the centre of the picture.

From *r* draw a line to C; from *q* produce one to H, cutting *r* C in *v*, from *v* draw a parallel line; then a line from *p* to H, which gives *t v* for the bottom of the cube. Upon the line *t v* make the ſquare, and biſect the upper ſide in *s*; from *x* produce a line to C; and another from *s* to H, which gives the corner *i*; whence the repreſentation may be completed.

Mr. Kirby has propoſed the following univerſal rules for exhibiting the true perſpective repreſentations of any objects, and applied them to a variety of elegant drawings in architecture, &c.

Rule I. To determine the perſpective length of any given line *a b* (*fig.* 63.) parallel to the horizontal line, and to divide it ſo as that it may repreſent any number of equal or unequal parts. Divide the bottom A B of the picture into any given number (e. gr. ten) of equal parts, and let this be a ſcale for adjuſting the proportions of ſuch objects as are to be drawn upon the picture. Let *a* be one end of the line propoſed, and from *a* draw at pleaſure the parallel *a b*. From any point, as 1 on the ſcale, draw a line through *a*, to cut the horizontal line in P. Let the ſpace between 1 and 3 be the real length of the propoſed line on the ſcale, and from 3 draw a line to P, cutting *a b* in *b*, and *a b* will repreſent a length equal to the ſpace 13. In order to divide *a b* into any number of equal or unequal parts, mark on the ſcale the given proportion, and from thence draw lines to P, which will interſect *a b* in the points propoſed.

If *a b* be a perſpective line given, and its length be required. Draw a line from any point in the horizontal line through the ends of *a b* to the ſcale, and theſe will ſhew its length. Then *a b* repreſents ſix parts, as feet, &c. according to the nature of the deſign.

Rule II. To cut off a part *a b* (*fig.* 64.) of the line *a* C, that vaniſhes into the centre of the picture, ſo as to repreſent any given length, and to obtain any number of perſpective diviſions upon it. From C ſet off the width I K of the picture to L, for the diſtance of the eye. From L to any point, as 2, on the ſcale, draw L 2 cutting *a* C in *b*, and *a b* will repreſent the length *a* 2. In the ſame manner, lines drawn from any diviſions on the ſcale to L, will cut *a* C ſo as to give the perſpective of ſuch diviſions.

Rule III. To cut off a part *a b* (*fig.* 65.) of the line *a* H, that vaniſhes into one of the points of diſtance H; and to divide it. Divide the diſtance C H or C L into five equal parts, and make the dot at P *h* two parts one fourteenth from C. From any diviſion on the ſcale, as 1, draw a line to P *h*, cutting *a* H in *b*; then will *a b* repreſent the length *a* 1. To divide *a b*, ſet off the real lengths of thoſe parts on the ſcale, and draw lines to P *h*, which will cut *a b* in the propoſed points.

For the line *a c*, which vaniſhes into the point of diſtance L: make the dot at P *l* the ſame diſtance from C as P *h* is from C. From P *l* draw a line to any point, 2, and *a c* will be the perſpective of *a* 2, &c. The firſt of theſe rules is adapted to the ſides of ſuch objects or buildings as directly front, or are even with the eye; the ſecond to thoſe which run directly from the eye; and the third to ſuch as are viewed angle-ways, and in ſuch a manner that both ſides have an equal degree of obliquity. Mr. Kirby has added a fourth rule; for which, being only wanted occaſionally, we ſhall refer to his Perſpective of Architecture, &c. p. 5.

For the application of the firſt and ſecond of the preceding rules, in drawing the repreſentations of ſquares and circles, ſee PERSPECTIVE. art. VI and XI.

For the farther uſe of theſe rules: *Let it be required to put a parallel cube of two feet ſquare, and placed at the bottom of the picture in perſpective.* Draw the front ſide *a b* 1 3 (*fig.* 66.) and lines from *b*, *a*, 3 to C; then from 5 draw a line to H, and from *c* the perpendicular *c d*, and from *d* another parallel, as in the figure. Let the ſame figure be placed at the diſtance of one foot within the picture. A line drawn from 6 to L will give the corner *f*, by Rule II. Draw a line from 5 to C, and the parallel *f e*; make $fg = fe$, and draw the front ſide *f i k g*; a line drawn from *e* to L gives the point *h*; from *h* draw the perpendicular *h* 1, and from 1 another parallel.

To exhibit the perſpective of ſeveral cubes placed behind one another. Draw the front ſide A *a b* 2 (*fig.* 67.) from *a*, *b*, 2, draw lines to C, and complete the firſt cube as above. Again, draw a line from 4 to C, and the parallel *c d*; then from *d* draw a line to H, which gives a ſpace to repreſent the breadth of one cube; from *g* draw the parallel *g h*, and a line from *h* to H will give the breadth of another cube; from *g* and *n* draw perpendiculars cutting *b* C, and from theſe interſections draw the parallels for the top.

For obtaining the ſame number of cubes on the oppoſite ſide: upon 8 B draw the front ſide; from 8, and the two upper corners, draw lines to C; and from the ſeveral corners of the cubes already drawn, produce parallels, as *c m*, interſecting 8 C; from theſe interſections draw perpendiculars for the ſides, and then the parallels for the tops, &c.

To find the perſpective appearance of an oblique cube two feet ſquare; the neareſt corner being one foot from the bottom of the picture. Find by Rule II. the corner *a* (*fig.* 68.) by the firſt, the length *a b*; by the third, the depth at *a c*; and draw the parallel *c d*, which gives the other ſide *a d*. From *c*, *a*, *d*, draw the perpendiculars *c f*, *a e*, *d g*; and $a e = a b$; then from *e* draw lines to H and L; and from *f* and *g* lines to H and L.

To exhibit ſeveral oblique cubes behind one another, both to the right and left. Draw the firſt cube from the point 5 (*fig.* 69.); draw lines from 5 to H and L; and a line drawn from 7 to P *l* gives the ſide 5 *b*; draw the parallel *b c* and the perpendiculars for the upright edges; and make 5 *a* equal to 57, and draw lines from *a* to H and L, and from *d* to L, and from *e* to H, which completes one cube. Let the ſpaces between the cubes be three feet; draw a line from 8 to L, and another from *b*, and then the parallel *b f*, of three feet; and a line from *f* to P *l* gives *b g* to repreſent *b f*, by Rule III. From 7 draw a line to L, and from *g* the parallel *g h*, which repreſents two feet, or the breadth of one cube; then from *h* draw a line to P *l*, which gives the ſide *g i*; and draw a line from *g* to H, and from *c* to L, which will give the other ſide *g m*. Again, from *g*, *m*, *i* draw perpendiculars; and then interſections with the lines drawn from the top of the firſt cube to L, will determine the height of two ſides; and by drawing other lines to H, as *n* H, we ſhall complete another cube; and ſo on. The figures on the right hand ſide are found from thoſe which are already drawn by means of parallel lines.

N. B. The repreſentation of the cube prepares the way for the projection of all the regular ſolids; and we have, therefore, been more diffuſe in illuſtrating the method of doing it.

To exhibit the SCENOGRAPHY *of a hollow quinquangular priſm.* 1. Since the baſe of a hollow quinquangular priſm, ſtanding on a geometrical plane, is a pentagon, with a limb, or breadth, of a certain dimenſion, find the appearance of this pentagon on a table, or plane. See PERSPECTIVE.

2. On any point, as H, of the terreſtrial line D E (*fig.* 70.) raiſe a perpendicular H I, equal to the objective altitude; and to any point, as V, of the horizontal line H R, draw the lines H V and I V. 3. From the ſeveral angles *a*, *b*, *d*, *e*, *c*, of the perſpective ichnography, both the internal and external ones, draw lines, as *b* 2, *d* 3, &c. parallel to the terreſtrial line; and from the points 1, 2, 3, raiſe perpendiculars to the ſame, as L 1, M 2, *m* 2, N 3, *n* 3. If theſe, then, be raiſed in the correſpondent points of the ichnography, as in the ſecond article, the *ſcenography* will be complete.

Another method of repreſenting a priſm. Let *a b* (*fig.* 62.) be the width of the bottom; from C draw lines through *a*, *b*, in order to obtain the real width of the line *a b*, viz. five feet; at the point *n* erect the perpendicular *n m*, and make it equal to the real height of the priſm, viz. four feet; draw the front ſide *a b d f*. Make an equilateral triangle A B E, whoſe ſides are each equal to *a b*; biſect this triangle by the line D E, and divide D E into two equal parts in F; biſect alſo *f d* in *c*; and draw *c* C; then take D F, and ſet it from *c* to *l*, and draw *l* L, interſecting *c* C in *e*; laſtly, draw *f e* and *d e*, which complete the figure.

To exhibit the SCENOGRAPHY *of a cylinder.* 1. Since the baſe of a cylinder, ſtanding on a geometrical plane, is a circle, ſeek the appearance of a circle. In the points *a*, *b*, *d*, *f*, *g*, *h*, *e*, *c* (*Tab.* II. *fig.* 34.) raiſe the apparent altitudes, as in the preceding articles. If, now, their upper lines be connected by curve lines, as in the baſe *a*, *b*, *d*, *f*, *g*, *h*, *e*, *c*, the *ſcenography* of the cylinder will be complete.

It is evident, that thoſe lines are to be omitted, both in the plan, and in the elevation, which are not expoſed to the eye; though they are not to be diſregarded from the beginning, as being neceſſary for the finding of other lines. E. gr. in the *ſcenography* of the cube, viewed angle-wiſe, the lines *b d* and *d c* (*Tab.* IV. *fig.* 60.) in the baſe, and *d h* in the elevation, are hidden from the eye, and are therefore omitted in the deſcription. But ſince the upper point *h* is not to be found, unleſs the point *d* be had in the ichnography; nor can the lines *g h* and *h c* be drawn without the height *d h*; the appearance of the point *d* is as neceſſary to be determined in the operation, as the height *h d*.

Another method. Let the propoſed cylinder (*fig.* 71.) be four feet in diameter, ſix feet high, and three feet from the bottom of the picture: and let the centre be in the line 3 C. Find the point *c*, by Rule II. above, and the diameter *a b* by Rule I. With this diameter find the perſpective of a circle. See PERSPECTIVE, art. XI. Divide *a b* into four feet, by Rule I. From *c* draw the perpendicular *c m*; then take one foot from *a b*, and from *c* ſet it ſix times to *m*; through *m* draw the parallel *k l*, and make it equal to the lower diameter *a b*; with *k l* find the perſpective of another circle, and from the outer part of each oval draw lines, as *a l*, *b k*, which will complete the propoſed repreſentation.

For two cylinders behind one another. Let the centres *c* and *m* (*fig.* 72.) of the cylinders be in the line 9 C, and let each be two feet in diameter, and five feet high; let the centre of the firſt cylinder be only one foot from the bottom of the picture, but that of the other ſix feet. By Rule I. and II. we may obtain the centre *c*, and the diameter *a b* of the firſt cylinder, and the whole operation is the ſame as in the laſt caſe. By the ſame rules we find alſo the centre *m*, and diameter *l n* of the fartheſt cylinder; and by drawing a line from *f* to C, we ſhall have the height of it.

To exhibit the SCENOGRAPHY *of a pyramid ſtanding on its baſe.* Suppoſe, e. gr. it were required to delineate a quadrangular pyramid, viewed by an angle. 1. Since the baſe of ſuch a pyramid is a ſquare ſeen by an angle, draw ſuch a ſquare. 2. To find the vertex of the pyramid, i. e. a perpendicular let fall from the vertex to the baſe, draw diagonals mutually interſecting each other in *c* (*fig.* 73.). 3. On any point, as H, of the terreſtrial line D E, raiſe the altitude of the pyramid H I; and, drawing the right lines H V, and I V, to a point of the horizontal line H R, produce the diagonal *d b*, till it meet the line V H in *h*. Laſtly, from *h* draw *h i* parallel to H I. This, being raiſed on the point *e*, will give the vertex of the pyramid K; conſequently, the lines *d* K, K *a*, and K *b*, will be determined at the ſame time.

After the like manner is the *ſcenography* of a cone delineated.

Another method. Let A D (*fig.* 74.) be the breadth of either of the four ſides of the pyramid A T C D at its baſe A B C D, and M T its perpendicular height. Let O be the place of the obſerver, S his point of ſight, S E his horizon, parallel to A D, and perpendicular to O S; and let the proper point of diſtance be taken in S E, produced toward the left hand, as far from S as O is from S. Draw A S and D S to the point of ſight, and D L to the point of diſtance, interſecting A S in the point B. Then from B draw B C parallel to A D, and A B C D ſhall be the perſpective ſquare baſe of the pyramid. Draw the diagonal A C interſecting the other diagonal B D at M, and this point of interſection ſhall be the centre of the ſquare baſe. Draw M T perpendicular to A D, and equal to the intended height of the pyramid; then draw the ſtraight lines A T, C T, and D T; and the outlines of the pyramid, as viewed from O, will be finiſhed; and the whole may be ſo ſhaded as to give it the appearance of a ſolid body. If the obſerver had ſtood at *o*, he could have only ſeen the ſide A T D of the pyramid; and two is the greateſt number of ſides that he could ſee from any other place of the ground.

To exhibit the SCENOGRAPHY *of a truncated pyramid.* Suppoſe the truncated pyramid quinquangular. 1. Then, if from the ſeveral angles of the upper baſe be conceived perpendiculars let fall to the lower baſe, we ſhall have a pentagon, with another inſcribed therein, whoſe ſides are parallel to thoſe of the former: this coincides with a pentagon, furniſhed with a rim, or breadth, &c. and may, therefore, be delineated in the ſame manner. 2. Raiſing the altitude of the truncated pyramid I H (*fig.* 75.) determine the *ſcenographic* altitudes to be raiſed in the points *a*, *b*, *c*, *d*, *e*. If, now, the higher points, *f*, *g*, *h*, *i*, *k*, be connected by right lines, and the lines *l k*, *f m*, *g n*, be drawn, the *ſcenography* will be complete. By drawing two concentric circles in a geometrical plane, and doing every thing elſe as in this problem, the *ſcenography* of a truncated cone will be drawn.

To put two equal figures in perſpective, one of which ſhall be directly over the other, at any given diſtance from it, and both of them parallel to the plane of the horizon. Let A B C D (*fig.* 76.) be a perſpective ſquare on a horizontal plane, S being the point of ſight, S P the horizon, parallel to A D, and P the point of diſtance. Suppoſe A D, the breadth of the ſquare, to be three feet, and that ſuch another ſquare, E F G H, is to be placed directly above it, parallel to it, and two feet from it. Make A E and D H perpendicular to A D, and two-thirds of its length; draw E H, which will be equal and parallel to A D; then draw E S and H S to the point of ſight S, and E P to the point of diſtance P, interſecting H S in the point G; then draw F G parallel to E H, and you will have two perſpective ſquares, A B C D, and E F G H, equal and parallel to one another, the latter directly above the former, and two feet diſtant from it. By this method ſhelves may be drawn parallel to one another, at any diſtance from each other, in proportion to their length.

To repreſent a double croſs in perſpective. Let A B C D, and E F G H (*fig.* 77.) be two perſpective ſquares, equal and parallel to one another, drawn by the laſt operation, whoſe diſtance is equal to the given height of the upright part of the croſs; S being the point of ſight, and P the point of diſtance, in the horizon P S, taken parallel to A D. Draw AE, D H, and C G; then A E H D, and D H G C, ſhall be the two viſible ſides of the upright part of the croſs; of which the length A E is here made equal to three times the breadth E H. Divide D H into three equal parts, HI, I K, and K D. Through theſe points of diviſion, at I and K, draw M O and P R parallel to A D; and make the parts MN, I O, P Q, K R, each equal to H I; then draw M P and O R parallel to D H. From M and O, draw M S and O S to the point of ſight S; and from the point of diſtance P draw P N cutting M S in T; from T draw T U parallel to M O, and meeting O S in U; and you will have the uppermoſt ſurface M T U O of one of the croſs pieces of the figure. From R, draw R S to the point of ſight S; and from U, draw U V parallel to O R; and O U V R ſhall be the perſpective ſquare end next the eye of that croſs-part. Draw P M*x* (as long as you pleaſe) from the point of diſtance P, through the corner M; lay a ruler to N and S, and draw XN from the line P *x*: then lay the ruler to I and S, and draw Y Z S. Draw X Y parallel to M O, and make X W and Y B equal and perpendicular to X Y; then draw WB parallel to X Y, and W X Y B ſhall be the ſquare viſible end of the other croſs-part of the figure. Draw B K toward the point of ſight S; and from U draw U P to the point of diſtance P, interſecting Y S in Z; then, from the interſection Z, draw Z *a* parallel to MO, and Z *b* parallel to H D, and the whole delineation will be finiſhed. This done, ſhade the whole, as in *fig*. 78. and you will have a true perſpective repreſentation of a double croſs.

To exhibit the SCENOGRAPHY *of walls, columns,* &c. *or to raiſe them on the pavement.* 1. Suppoſe a pavement A F H I (*fig*. 79.) repreſented in a plan, together with the baſes of the columns, &c. if there be any. 2. Upon the terreſtrial line ſet off the thickneſs of the wall B A, and 1, 3. 3. Upon A and B, as alſo upon 3 and 1, raiſe perpendiculars A D and B C, as alſo 3, 6, and 1, 7. 4. Connect the points D and 6 with the principal point V, by the right lines D V, and 6 V. 5. Upon F and H raiſe perpendiculars F E, and H G. Thus will all the walls be delineated.

Now to raiſe the pillars, &c. there needs nothing but, from their ſeveral baſes (whether ſquare or circular) projected on the perſpective plan, to raiſe indefinite perpendiculars; and on the fundamental line, where interſected by the radius F A paſſing through the baſe, raiſe the true altitude A D; for D V being drawn as before, the *ſcenographical* altitudes will be determined.

SCENOGRAPHY *of a door in building, to exhibit the.* Suppoſe a door required to be delineated in a wall D E F A: 1. Upon the fundamental line ſet off its diſtance A N from the angle A, together with the breadths of the poſts N I and L M, and the breadth of the door itſelf L I. 2. To the point of diſtance K, from the ſeveral points N, I, L, M, draw right lines K N, K I, K L, K M, which will determine the breadth of the door *l i*, and the breadths of the poſts *i n* and *m l*. 3. From A to O ſet off the height of the door A O, and from A to P the height of the poſts A P. 4. Join O and P with the principal point by the right lines P V and O V. 5. Then from *n*, *i*, *l*, *m*, raiſe perpendiculars, the middle ones whereof are cut by the right line O V in *o*, and the extremes by the right line V P in *p*. Thus will the door be delineated, with its poſts.

If the door were to have been exhibited in the wall E F G H, the method would be nearly the ſame. For, 1. Upon the terreſtrial line, ſet off the diſtance of the door from the angle, and thence alſo the breadth of the door R T. 2. From R and T draw right lines to the principal point V, which give the breadth *r t* in the perſpective plan. From *r* and *t* raiſe indefinite perpendiculars to F H. 4 From A to O ſet off the true weight A O. Laſtly, from O to the principal point V, draw the right line O V, interſecting E F in *z*, and make *r r* and *t t* equal to F *z*. Thus is the door *r r*, *t t*, drawn; and the poſts are eaſily added, as before.

SCENOGRAPHY *of windows in a wall, to exhibit the.* When you know how to repreſent doors, you will find no difficulty in adding windows; all that is here farther required being to ſet off the height of the window from the bottom of the ground. The whole operation is as follows: 1. From 1 to 2 ſet off the thickneſs of the wall at the window; from 3 to 4 its diſtance from the angle 3; and from 4 to 5 its breadth. 2. From 4 and 5 to the point of diſtance L, draw the right lines L 5 and L 4, which will give the perſpective breadth 10, 9 of the window. 3. From 10 and 9 raiſe lines perpendicular to the pavement, i. e. draw indefinite parallels to 6, 3. 4. From 3 to 11 ſet off the diſtance of the window from the pavement 3, 11; and from 11 to 12 its height 11, 12. Laſtly, from 11 and 12, to the principal point V, draw lines V 11, and V 12; which, interſecting the perpendiculars 10, 13, and 9, 14, in 13 and 14, as alſo in 15 and 16, will exhibit the appearance of the window.

From theſe examples, which are all no more than applications of the firſt grand or general rule, it will be eaſily perceived what method to take to delineate any other thing, and at any height from the pavement.

Thoſe who wiſh to ſee the practice of perſpective largely illuſtrated, and applied to a great variety of caſes, may conſult the ſecond book of Kirby's Perſpective, fol. 1768. and Kirby's Architecture, fol. 1761.

For a mechanical method of exhibiting the *ſcenography* of any object, ſee DESIGNING.

SCENOGRAPHY is alſo uſed for SCENE-PAINTING, and denotes the art of painting upon ſeveral planes or ſcenes, at different diſtances, and in various poſitions with reſpect to the eye, in ſuch a manner that all thoſe different ſcenes, when ſeen from one certain determinate point, may correſpond with each other, and repreſent one entire view of the deſign without breaks or confuſion, as if it were one continued picture.

The deſign of ſcene-painting is not only to decorate the theatre, but to make that part of it, which lies beyond the ſtage, appear much longer than it really is. This is effected by raiſing the floor to a certain angle, by ſloping the cieling, and by raiſing the ſcenes in ſuch a manner, that the floor, cieling, and ſcenes, ſhall be part of a hollow pyramid, which, if continued, would meet in a point; and after having diminiſhed each ſcene in its due proportion, then by drawing thereupon the intended deſign, by the common rules of perſpective; ſo that every ſcene, when put into its proper place, ſhall appear as a part of the general deſign. On this ſubject, ſee Pozzo's Perſpective, 1709. fol. Hamilton's Stereography, in 2 vol. fol. 1738. And, for an abſtract, Kirby's Perſpective, book ii. cap. 7.

SCENOPEGIA, σκηνοπηγια, formed of σκηνη, *ſcene, tabernacle, tent*, and πηγνυμι, *figo*, *I fix*, the third grand feſtival among the Jews, at which all their males were to attend at the national altar, more uſually called *feaſt of tabernacles*, inſtituted after the people of Iſrael were in poſſeſſion of the land of Canaan, in memory of their having dwelt under tents in the wilderneſs.

The *ſcenopegia* was held for ſeven days ſucceſſively, commencing on the fifteenth of September, i. e. on the fifteenth day of the month Tiſri, the firſt of the civil and ſeventh of the eccleſiaſtical year. To theſe ſeven days there was alſo added an eighth day which was much the moſt ſolemn; both on account of the conflux of perſons, and of the extraordinary tokens they all gave of their joy. This eighth day was properly the feaſt of ingathering, on which they were to give thanks for their whole harveſt. However, the feaſt of tabernacles, and that of ingathering, though properly diſtinct, are ſometimes ſpoken of as one feaſt, and the name of either indifferently applied to the other.

It it of this eighth day St. John muſt be underſtood to ſpeak, when he tells us, our Saviour was at the feaſt of tabernacles on the laſt and great day.

The rabbies inform us, that there pertained to this feaſt a peculiar ceremony of drawing water out of the pool of Siloam, and pouring of it, mixed with wine, on the ſacrifice, as it lay on the altar. This they are ſaid to have done with ſuch expreſſions of joy, that it became a common proverb, "He that never ſaw the rejoicing of drawing water, never ſaw rejoicing in all his life." To this ceremony our Saviour is ſuppoſed to refer, John vii. 37, 38.

It is the practice of the modern Jews to tie together one branch of palm, three branches of myrtle, and one of willow; and with this in their right hands, and a branch of citron with its fruit in the left, to make a proceſſion, during the ſeven days of the feaſt, in their ſynagogues, round their reading deſks, as their anceſtors did round the walls of Jericho, in token of the expected downfal of their enemies. They alſo turn about with theſe branches to the four cardinal points, and ſhake or puſh them every way, to drive the devil from them. While they are making this proceſſion, they ſing Hoſannah; whence this feaſt is called Hoſannah.

When the Holy Scripture ſays abſolutely *the feaſt*, it is uſually to be underſtood of the *ſcenopegia*.

SCENT. Some animal carcaſes, buried with lime, though ten feet under ground, have been obſerved to give ſo ſtrong a *ſcent*, as to attract dogs to the place.

SCENT-*bags*, in *Natural Hiſtory*, a name given by Tyſon to thoſe peculiar pouches, or bags, which certain animals, as the civet-cat and muſk-animal, have for the receiving the matter of their perfume. Theſe bags are common to more animals than is generally ſuppoſed, and in all have much the ſame qualities, the matter they contain being in moſt of them fetid and diſagreeable, while contained in the bag, and only becoming ſweet and pleaſant when dried, or taken at leaſt from the animal, and ſmelt in ſmall quantities. The weaſel and polecat, with us, have bags of this kind, and the famous bag or pouch of the opoſſum is of the nature of theſe, though it ſerves alſo to the other great purpoſe of receiving and ſheltering the young in time of danger. It contains, like the reſt, a tough and viſcous matter, which ouzes out of the glands, and is of a very offenſive ſmell, while the creature lives; but as ſoon as it is taken out and dried, the ſmell changes into a fine perfume. The gland of the aper moſchiferus, as Tyſon calls it, is of this kind, containing a glutinous humour of a very offenſive ſmell when freſh, but when dried becoming ſweet and perfumed as muſk. Philoſ. Tranſ. N° 239. p. 125.

SCEPASTRA, the name of a kind of bandage for the head, deſcribed by Galen.

SCEPTER, *ſceptrum*, a royal ſtaff, or batoon borne, on ſolemn occaſions, by kings, as a badge of their command and authority.

Nicod derives the word from the Greek σκηπτρον, which he ſays originally ſignified *a javelin*, which the ancient kings uſually bore as a badge of their authority; in regard that inſtrument was in very great veneration among the heathens. But σκηπτρον does not properly ſignify a javelin, but *a ſtaff to reſt upon*, from σκηπτω, *innitor, I lean upon*. Accordingly, in the ſimplicity of the earlier ages of the world, the *ſcepters* of kings were no other than long walking-ſtaves: and Ovid, in ſpeaking of Jupiter, deſcribes him as reſting on his *ſceptre*. Met. i. v. 178.

The *ſcepter* is an enſign of royalty of greater antiquity than the crown. The Greek tragic and other poets put *ſcepters* in the hands of the moſt ancient kings they ever introduce.

Juſtin obſerves, that the *ſcepter*, in its original, was an *haſta*, or ſpear. He adds, that in the moſt remote antiquity, men adored the *haſtæ*, or *ſcepters*, as immortal gods; and that it was upon this account, that, even in his time, they ſtill furniſhed the gods with *ſcepters*.—Neptune's *ſceptre* is his trident.

Tarquin the Elder was the firſt who aſſumed the *ſcepter* among the Romans.

Le Gender tells us, that in the firſt race of the French kings, the *ſcepter* was a golden rod, almoſt always of the ſame height with the king who bore it, and crooked at one end like a crozier. Frequently, inſtead of a *ſcepter*, kings are ſeen on medals with a palm in their hand.

SCEPTICISM, the doctrine and opinions of the ſceptics; called alſo *Pyrrhoniſm*, from the name of its author.

The term ſceptic, in its original Greek, σκεπτικος, properly ſignifies *conſiderative*, and *inquiſitive*; or a man who is ever weighing the reaſons one ſide and the other, without ever deciding between them. It is formed from the verb σκεπτομαι, *I conſider, look about, deliberate*.

The ancient *ſcepticiſm* conſiſted in doubting of every thing, in affirming nothing at all, and in keeping the judgment in ſuſpenſe on every ſubject. Sextus Empiricus makes *ſepticiſm* to conſiſt in a faculty of oppoſing all appearances, of making all, even contrary things, equally probable, and of proceeding, firſt to an εποχη, or ſuſpenſe of mind, and then to entire undiſturbedneſs or tranquillity.

Hence, theſe great maxims of theirs: Ου μαλλον τουτο η εκεινο, *this no more than that*: Παντι λογω λογος, &c. *every reaſon has another againſt it*: and Ουδεν οριζω, *I determine nothing*.

The proper character then of *ſcepticiſm*, is an ακαταληψια, *neutrality*, or ſuch a diſpoſition of mind as does not, upon any occaſion, incline to any thing more than the contrary thing.

This heſitancy of the ſceptics is well deſcribed by Ariſtocles, in Euſeb. de Prepar. Evan. All things are equally indifferent, uncertain, and undeterminate: neither our ſenſes, nor our opinions, give us either truth or falſhood; therefore neither the one, nor the other, are to be credited, but all things to be left on a level, without admitting any opinion, inclination, or motion of the mind at all. It is added, that the ſceptics carried this ſuſpenſe of theirs ſo far, as even to deny that any thing is either good or evil, juſt or unjuſt, true or falſe; or that any thing is this, more than that.

It is from this acatalepſia of the ſceptics that Deſcartes ſeems to have borrowed his great principle of doubting of all things; as is owned by many of his followers. It muſt be confeſſed, indeed, that there is ſome difference between the doubting of the ſceptics, and that of the Carteſians. In phyſical matters, it is true, there does not ſeem a great deal of difference; and Deſcartes, in that reſpect, may, without much injuſtice, be deemed a ſceptic; but this may be ſaid in his favour, that the great Socrates was ſo far a ſceptic himſelf; phyſical and ſenſible things, he held, were all dubious, and at beſt but probable.

The origin of *ſcepticiſm* is ſomewhat obſcure. Pyrrho, who lived under Alexander the Great, and made the tour of India in his retinue, is uſually reputed its author; whence the words PYRRHONIANS and *ſceptics* are ordinarily uſed indifferently.

It muſt be owned, however, that the great dogma of the ſceptics had been countenanced, and even cultivated, before Pyrrho, by Democritus, Heraclitus, &c. Sextus Empiricus ſays expreſly, that all that Pyrrho did, was to improve, illuſtrate, and enforce the dogma, and form the retainers thereof into a ſect.

Democritus's philoſophy was near akin to *ſcepticiſm*; for upon his obſerving, that honey ſeemed ſweet to ſome and bitter to others, he concluded, that it was neither ſweet nor bitter, and thereupon pronounced, ου μαλλον, *non magis*, which is pure *ſcepticiſm*. Yet the ſame Sextus adds, that Democritus was no ſceptic.

Though Plato argues very ſtrenuouſly againſt the acatalepſy of the ſceptics; yet it is certain that dogma received a great part of its encouragement from Socrates's ſchool, and from Plato's academy. Nay, it was a great controverſy among the ancients, whether Plato himſelf were a ſceptic or a dogmatiſt. Indeed Plato's deciſive way of ſpeaking, in many caſes, ſeems to leave no great room for ſuch a doubt; but it is certain, his followers, of the new academy, founded by Arceſilas, gave much into this way; and *nihil ſcitu* was held by them a principle.

Plato refutes the great principle of the ſceptics thus: when you ſay, that all things are incomprehenſible, do you comprehend or conceive that they are thus incomprehenſible, or do you not? if you do, then ſomething is comprehenſible; if you do not, there is no reaſon we ſhould believe you, ſince you do not comprehend your own aſſertion.

Sextus Empiricus obſerves, that Socrates himſelf had a tincture of *ſcepticiſm*: ſome even make him the author of it, from that cuſtomary ſaying of his, *I know nothing but this, that I know nothing*. If this were the origin of *ſcepticiſm*, it muſt be owned, it was mightily improved afterwards, before Metrodorus ſaid, *I know nothing, not even this, that I know nothing*. The ſame Sextus, however, adds, that Plato, introducing his maſter in his gymnaſtic dialogues, diſputing with the ſophiſts, makes him act the part of a ſceptic.

SCEPTICS, *ſceptici*, a ſect of ancient philoſophers, founded or improved by Pyrrho. Their diſtinguiſhing tenet was, that all things are uncertain and incomprehenſible; contraries equally true; and that the mind is never to aſſent to any thing, but to keep up an abſolute heſitancy or indifference.

Laertius notes, that the followers of Pyrrho had various denominations: from their maſter, they were called *Pyrrhonians*; from their dogma, *Aporetici*, that is doubters, of απορειν, *to doubt*; from their ſuſpenſion and heſitation, *Ephectici*, of επεχειν, *to ſtay, to keep back*; and from their never getting beyond the ſearch of truth, *Zetetici, ſeekers*.

SCHADIDA *calli*, in *Botany*, a name given by ſome authors to the plant which affords the euphorbium of the ſhops.

SCHÆNANTH, *ſchænanthus*, in *Botany*, the ſame with ISCHÆMUM. See SCÆNANTH.

SCHÆNICLOS, in *Ornithology*, the name of a bird, which, by the deſcription of Bellonius, ſeems to be the ſame with that called by the French *alouette de mer*, the *ſea-lark*, and by us the STINT.

SCHAFFILT, in *Ornithology*, the name of a very ſmall owl, not larger than the thruſh, called NOCTUA *minor* by authors.

Its eyes are very bright, and of a yellow colour; its ears very large; its feet are feathered to the toes, and the ſoles of its feet are yellow. It is caught in the woods in Germany.

SCHAKARILLA, or SCHACARILLA, in the *Materia Medica*, a name given by ſome authors to the medicinal bark called *cortex thuris*, and *cortex eleutherii* by others. Montani, Exot. p. 8.

SCHAPHAN, in *Jewiſh Antiquity*, the name of an animal declared unclean by the law of Moſes.

Interpreters do not agree in their explanation of this word.

SCHAR-PENY, SCHARN-PENY, or SCHORN-PENY. It appears, from our old books, that ſome cuſtomary tenants were obliged to pen up their cattle at night in the pound, or yard, of their lord, for the benefit of their dung, or *ſcearn*, as the Saxons called it. In defect of this they were to pay a ſmall compenſation; which was hence called *ſchar-peny*.

SCHASIS, a word uſed by ſome of the writers in ſurgery to expreſs SCARIFICATION.

SCHEAT, or SEAT, in *Aſtronomy*, a fixed ſtar of the ſecond magnitude, in the juncture of the leg with the left ſhoulder of PEGASUS.

Some call it *Scheat Alpheras*, and ſome *Scheat Pegaſi*.

SCHEAT, or, as it is ſometimes written, SCHEAD, or *ſhcart*, a name given by many to the jentling, a fiſh of the chub-kind, caught in the Danube, and moſt of the larger rivers in Germany, and called by Geſner and Aldrovand *capito cæruleus*.

This is the *glanus* of Pliny, and the other old Roman authors, and is diſtinguiſhed by Artedi by the name of the *ſilurus* with four beards near the mouth. This is its character in which it differs from the *lake*, another fiſh of this kind; which, though a genuine ſpecies of *ſilurus*, has only one beard.

SCHEDULE, *ſchedula*, a ſcroll of paper, or parchment, annexed to a will, leaſe, or other deed; containing an inventory of goods, or ſome other matter, omitted in the body of the deed.

The word is a diminutive of the Latin *ſcheda*, or Greek σχηδη, *a leaf*, or *piece of paper*.

SCHEIK, a name given by the Turks to the prelates of the Mahometan religion, who pretend to be the legitimate ſucceſſors of Mahomet. Their chief reſides at Mecca.

SCHEITER'*s fortification*. See FORTIFICATION.

SCHELDAL, the name of a ſilver coin, current in Denmark, and ſome parts of Germany.

SCHELLENT, in *Ornithology*, the name of a ſpecies of duck, found about the ſea coaſts, of the ſize of the common duck, and differing from the *capo roſſo* in this, that it is twice as large, and the eyes have yellow iriſes; though agreeing with it in the colour of the head, which is of a reddiſh brown. Its neck is grey, and its back is of a blackiſh grey; its throat, breaſt, and belly white, but near the anus there is a tranſverſe brown line. The long feathers of the wings are black and white, and the tail of a blackiſh grey.

SCHELLEY, in *Ichthyology*, a name given in ſome counties of England to the fiſh known among authors by the name of *ferra*. See GUINIAD.

SCHEMATISM, σχηματισμὸς. See FIGURE and TROPE.

SCHEME, formed from σχεμα, *habitus*, a draught, or repreſentation, of any geometrical or aſtronomical figure, or problem, by lines ſenſible to the eye; or of the celeſtial bodies in their proper places for any moment.

SCHEME, *ſchema*, σχημα, in the *Ancient Muſic*, is uſed for the varieties ariſing from the different poſitions of tones and ſemitones in a conſonance.

SCHEME *arches*. See ARCH.

SCHERIF, a title which the Arabians give to a Mahometan prince, who is the ſovereign of Mecca, in ſubordination to the ſultan. See SHERIF.

SCHETES was formerly a term for uſury; and the commons prayed that order might be taken againſt this horrible vice, practiſed by the clergy as well as the laity. Rot. Parl. 14 Ric. II.

SCHETIC *diſeaſes*, a term uſed by old writers in medicine to expreſs ſuch diſeaſes as were not deeply rooted in the conſtitution, but might be eaſily removed.

SCHEVAGE. See SCAVAGE.

SCHEUCHZERIA, *leſſer flowering ruſh*, in *Botany*, the name of a genus of plants of the *hexandria trigynia* claſs; the characters of which are theſe: the perianthium is divided into ſix oblong, acute, reflex, and expanded leaves, remaining with the fruit; there is no flower of petals; the ſtamina are ſix very ſhort and flaccid capillary filaments; the antheræ are erect and obtuſe, very long and of a compreſſed figure; the germina of the piſtils are three in number, they are of the ſize of the cup, and of an oval compreſſed figure, though there be no ſtyle; the ſtigmata are oblong, and obtuſe on the upper part, they grow on the outſide to the germina; the fruit conſiſts of as many capſules as the piſtil had germina; they are of a roundiſh figure, inflated, and compreſſed, and each compoſed of two valves; the ſeeds are ſingle and oblong.

The number of the germina and capſules vary, from three up to ſix; the three ſeem, however, the moſt natural ſtate of the flower, and are the moſt frequent.—There is only one ſpecies.

SCHILUS, in *Ichthyology*, a name given by many to the fiſh called by the generality of authors LUCIOPERCA, or the pike-fiſh.

SCHINELÆON, a word uſed by the ancients to expreſs an oil of maſtich, or oil in which maſtich was diſſolved.

SCHINUS, in *Botany*. See *Indian* MASTICH.

SCHIPPER. See SHIPPER.

SCIREMOTE, or SCYREMOT. See SCYREMOT.

SCHIRROSIS, a name given to a diſorder of the eye, ariſing from the violence of a long continued inflammation, when the fleſh increaſes in bulk, and aſſumes a livid colour.

SCHIRRUS. See SCIRRHUS.

SCHIRRUS *of the teſticle*, &c. See SARCOCELE.

SCHISM, *Schiſma*, formed from σχισμα, *cleft*, *fiſſure*, in the general, ſignifies *diviſion*, or *ſeparation*; but it is chiefly uſed in ſpeaking of ſeparations happening through diverſity of opinions among people of the ſame religion and faith.

Thus, we ſay, the *ſchiſm* of the ten tribes of Iſrael, from the two tribes of Judah and Benjamin; the *ſchiſm* of the Perſians, from the Turks, and other Mahometans, &c. Among eccleſiaſtical authors, the *great ſchiſm of the Weſt* is that which happened in the times of Urban VI. and Clement VII. who were both advanced to the papacy at the ſame time, the latter reſiding at Avignon in France, and the former at Rome, which divided the church for forty or fifty years; the cauſe of Clement being eſpouſed by France and Spain, Scotland, Sicily, and Cyprus, while the reſt of Europe acknowledged Urban to be the true vicar of Chriſt; and was at length ended by the election of Martin V. at the council of Conſtance, ſummoned to meet in the year 1414.

The Romaniſts number thirty-four *ſchiſms* in their church. They beſtow the name *Engliſh ſchiſm* on the reformation of religion in this kingdom. Thoſe of the church of England, again, apply the term *ſchiſm* to the ſeparation of the nonconformiſts; viz. the Preſbyterians, Independents, and Anabaptiſts, who contend for a farther reformation.

Some call the ſeparation of the Proteſtants from the church of Rome a *paſſive ſchiſm*; becauſe that church cut them off from her communion.

The word *ſchiſm* is uſed, in Scripture, in an indifferent ſenſe; and, therefore, the lawfulneſs or unlawfulneſs of it is entirely to be determined by circumſtances. In our own language, indeed, common uſe has affixed to the term an idea of guilt and reproach: but in this ſenſe there can be no ſuch thing as *ſchiſm*, except in caſes where there is an obligation to unity and communion: ſo that in order to define the nature of it juſtly, we muſt find out ſome centre of union, which is common to all Chriſtians. This muſt be either uniformity of ſentiment in matters of ſpeculative belief, or in external modes of worſhip and diſcipline, which, in the nature of things, is impoſſible: or, if it be unreaſonable to expect either of theſe, the only centre of unity that remains is charity and mutual forbearance, notwithſtanding leſſer differences, where there is an aſſent to all the neceſſary principles of Chriſtian faith, and the profeſſion of Chriſtianity is proved to be ſincere by a regular and virtuous life. However numerous the differences that ſubſiſt among Chriſtians, as long as mutual charity is preſerved, there cannot be the guilt of *ſchiſm*. Alienation of affection, and a turbulent excommunicating ſpirit, are the eſſence of *ſchiſm*, and not mere difference of opinion; not the uſe of different ceremonies, or of no ceremonies at all; or joining ourſelves to any particular religious communion: for, according to St. Paul, who in ſeveral paſſages, blames the Corinthians for diviſions, or *ſchiſms*, among themſelves in the ſame community, this crime may be committed where there is no ſeparation from a particular church; and, conſequently, they that differ uncharitably, whether they belong all to one, or form diſtinct worſhipping aſſemblies (and they alone), are *ſchiſmatics*.

SCHISM, *Greek*. See *Greek* CHURCH.

SCHISM *bill*, the name of an act paſſed in the reign of queen Anne, which reſtrained Proteſtant diſſenters from educating their own children, and forbad all tutors or ſchoolmaſters being preſent at any conventicle, or diſſenting place of worſhip. The queen died on the day when this act was to have taken place (Aug. 1ſt, 1714), and the *ſchiſm bill* was repealed in the fifth year of Geo. I.

SCHISMA, in *Muſic*. Some, as Graſſineau, make this interval equal to half a comma, and ſay that eighteen of them are required to make a complete tone, reckoning nine commas to a tone. But all this is inaccurate. See INTERVAL.

It is alſo uſed by ſome for the difference between the tones major and minor, called by others a comma. See COMMA.

SCHISTON. See Allumen *ſcagliolæ.*

SCHISTUS. See Slate.

SCHIT-ELU, in *Botany*, a name given by ſome authors to the plant which produces the ſeed called *ſeſamum* in the ſhops.

SCHLEMMEN, a term uſed by the ſmalt-makers to expreſs the ſubſtance of the ſmalt after fuſion, when it is ſeparated from the *eſchel*; that is, a ſort of grey aſhes which adhere to it, and is ready for powdering for uſe.

SCHMIDELIA, in *Botany*, a genus of the *octandria digynia* claſs. Its characters are, that the calyx conſiſts of two leaves, the corolla of four petals, that the germina have little foot-ſtaſks, and are longer than the flower. There is only one ſpecies.

SCHNOT-*fiſh*, a name by which ſome call the haſela or haſler, a freſh water fiſh, approaching to the mullet or chub kinds, and at ſome ſeaſons eſteemed a very delicate diſh. See Hasela.

SCHŒNANTH, or Schænanth. See Scænanth.

SCHOENAS, among the ancients, a land meaſure containing two paraſangs, or ſixty ſtadia, according to Herodotus, which makes ſeven and a half of our miles. But Pliny computes it at five miles, or fifty ſtadia. See Parasang and Stadium.

SCHOENOBATES, σχοινοϐατης, formed from σχοινος, *a rope, and.* βαινω, *I walk*, a name which the ancient Greeks gave to their rope dancers, by the Romans called *funambuli*.

The *ſchoenobates* were ſlaves, whoſe maſters made money of them by entertaining the people with their feats of activity. Mercurialis, de Arte Gymnaſtica, lib. iii. gives us five figures of *ſchoenobates*, engraven after ancient ſtones. See *Rope* Dancer.

SCHOENUS, *baſtard cypreſs*, in *Botany*, a genus of the *triandria monogynia* claſs. Its characters are, that the calyx conſiſts of chaffy glumes, which are ſingle-valved, and folded over one another, it has no corolla, and a ſingle roundiſh ſeed between the glumes. There are twelve ſpecies, among the graſſes, diſtributed by Linnæus into thoſe that have a round and a three-ſided ſtalk.

SCHOLARES, an eccleſiaſtic order, inſtituted by Innocent III. in the council of Lateran.

SCHOLARUM *domeſticus.* See Domesticus.

SCHOLASTIC, σχολαϛικος, ſomething belonging to the ſchools, or that is taught in ſchools. See School.

Scholaſtic, ſcholaſticus, was a long time a title of honour, at firſt only given to ſuch as diſtinguiſhed themſelves by their eloquence in declaiming, &c.

After Nero, the appellation *ſcholaſticus* was alſo given to the advocates; and, among others, to Socrates and Euſebius, the eccleſiaſtical hiſtorians, who were both advocates at Conſtantinople. Conſtant. Harmenopulus alſo bore it, in the twelfth century; with ſeveral others.

Afterwards *ſcholaſticus* became reſtrained to ſuch as had the government of the eccleſiaſtical ſchools, eſtabliſhed under the firſt race of French kings, who inſtructed the clerks of each church, firſt in the humanities, then in the theology, and the liturgy. Theſe were alſo called *primiciers eſcolaſtres*, and *theologaux:* and, if the church were ſituated in a city, the *ſcholaſticus* was called the *chancellor*.

Among the Greeks, *ſcholaſticus*, σχοχαϛικος, was alſo the name of an office, or dignity, anſwering to our *divine*, or *theologue*. Indeed, Genebrard obſerves, it was only properly applied to people of general learning and fine parts; and who were well known to the world in that character.

Thus St. Jerom mentions, that Serapion was ſurnamed *Scholaſticus*, by reaſon of the delicacy of his wit. Walafrid. Strabo calls the poet Prudentius *Scholaſticus:* and Fortunatus was called *Scholaſticiſſimus*.

Scholastic *divinity* is that part or ſpecies of divinity which clears and diſcuſſes queſtions, by reaſon and arguments.

In which ſenſe, it ſtands, in ſome meaſure, oppoſed to *poſitive* divinity; which is founded on the authority of fathers, councils, &c.

The *ſchool divinity*, like Plato's ſchool, has had its three ſeveral ages, or periods: the *ancient*, the *middle*, and the *new*.

The ancient began under Lanfranc, archbiſhop of Canterbury, or more properly under Abelard and Peter Lombard, his diſciple, the maſter of ſentences, a work which appeared in 1172, and held almoſt 100 years; ending under Albertus Magnus, who was born in 1193.

The followers of Lombard were called *ſententiarii* as well as *ſcholaſtici*.

This was ſucceeded by the middle *ſchool divinity*, which commenced in the year 1220, under Albertus, who was ſucceeded by his diſciple Thomas Aquinas; during which time the Peripatetic philoſophy was raiſed to its utmoſt reputation. See Realists.

The third age began under Durandus, who ſet himſelf up againſt Thomas, the chief of the middle age. After his time people's wits became more and more ſubtile; and the ſchool began to be wholly taken up in frivolous queſtions. They diſputed, with great heat, about mere formalities; and even raiſed phantoms on purpoſe to combat withal.

The *ſchool divinity* is now fallen into the loweſt contempt; and is ſcarce regarded any where, but in ſome of the univerſities, where they are ſtill obliged by their charters to teach it.

SCHOLIAST, σχολιαϛης, *commentator*, a grammarian who writes *ſcholia*, that is, notes, gloſſes, &c. upon ancient authors, who have written in the learned languages.

SCHOLIUM, ϛχολιον, a note, annotation, or remark, occaſionally made on ſome paſſage, propoſition, or the like.

The term is much uſed in geometry, and other parts of mathematics; where, after demonſtrating a propoſition, it is frequent to point out how it might be done ſome other way; or to give ſome advice or precaution, in order to prevent miſtakes; or add ſome particular uſe or application thereof.

Wolfius has given us abundance of curious and uſeful arts and methods, and a good part of the modern philoſophy, the deſcription of mathematical inſtruments, &c. all by way of *ſcholia* to the reſpective propoſitions in his Elementa Matheſeos.

SCHOOL, *ſchola*, a public place, wherein the languages, humanities, or other arts and ſciences, are taught.

The word is formed from the Latin *ſchola*, which, according to Du-Cange, ſignifies diſcipline and correction. He adds, that it was anciently uſed, in the general, for all places where ſeveral perſons met together, either to ſtudy, to converſe, or do any other matter. Accordingly, there were *ſcholæ palatinæ*, being the ſeveral poſts wherein the emperor's guards were placed; *ſchola ſcutariorum, ſchola gentilium*, &c. At length the term paſſed alſo to civil magiſtrates; and, accordingly, in the code we meet with *ſchola chartulariorum, ſchola agentium*, &c. and even to eccleſiaſtics, as *ſchola cantorum, ſchola ſacerdotum*, &c.

Thus we ſay a grammar-*ſchool*, a writing-*ſchool*, a *ſchool* of natural philoſophy, &c.

School is alſo uſed for a whole faculty, univerſity, or ſect, as Plato's *ſchool*, the *ſchool* of Epicurus, the *ſchool* of Paris, &c. The *ſchool* of Tiberias was famous among the ancient Jews; and it is to this we owe the Maſſora, and Maſſoretes.

School, in *Painting*, is uſed as a term to diſtinguiſh the different manners of places and perſons.

Thus, we ſay, the Roman *ſchool*, the Venetian *ſchool*, the Flemiſh *ſchool*, &c. Raphael's *ſchool*, Titian's *ſchool*, Da Vinci's *ſchool*, &c. meaning their diſciples, pupils, &c.

School *of Athens* is the name of a celebrated piece of Raphael, now in the Vatican. It contains a great number of figures, repreſenting philoſophers, mathematicians, and other perſons engaged in the arts and ſciences.

Several authors have written of this painting, and given different explications thereof. Vaſari will have it to be the agreement of philoſophy and aſtronomy with theology.

The engravers, by the inſcription they add at the bottom of the print thereof, ſhew, that they take it for a painting of St. Paul preaching at Athens. An Auguſtine of Venice, takes the philoſopher, who is writing, for St. Mark; and him at his knees, for the angel Gabriel. M. de Piles rejects all theſe explications of the *ſchool of Athens*, and eſpecially the laſt; his opinion is, that it is nothing more than an image of philoſophy, which Raphael here repreſents under all the philoſophers he has painted.

In behalf of the Venetian engravers it may be ſaid, that they do not pretend to explain the painting, but have only copied ſuch of the figures as they thought proper to repreſent St. Mark, Gabriel, &c.

School, or *ſchooling*, in the *Manege*, is uſed to ſignify the leſſen and labour both of the horſe and horſeman.

A *ſchool pace*, or *gate*, denotes the ſame with Ecoute.

SCHOOLMASTER. No perſon ſhall keep a *ſchoolmaſter*, who does not conſtantly go to church, or is not allowed by the ordinary, on pain of 10*l.* a month, and the *ſchoolmaſter* ſhall be diſabled, and ſuffer a year's impriſonment, ſtat. 23 Eliz. cap. 1.

Recusants are not to be *ſchoolmaſters* in any public grammar ſchool, nor any other, unleſs the perſons be licenced by the biſhop, under the penalty of forfeiting 40*s*, a day. 1 Jac. I. c. 4.

By 17 Car. II. cap. 2. no perſon ſhall be *ſchoolmaſter*, or take any boarders to be inſtructed by himſelf, or by any other, without taking an oath of allegiance therein mentioned, on pain of 40*l*.

Every *ſchoolmaſter* keeping any public or private ſchool, and every tutor in any private family, ſhall ſubſcribe the declaration, that he will conform to the liturgy of the church of England as by law eſtabliſhed, and be licenſed by the ordinary, or he ſhall for the firſt offence ſuffer three months impriſonment; for the ſecond and every other offence, be impriſoned three months and forfeit 5*l.* &c. 13 & 14 Car. II. c. 4.

For the exemption relating to Popiſh *ſchoolmaſters*, provided by 18 Geo. III. c. 66. See PAPISTS.

By 19 Geo. III. c. 44. no diſſenting miniſter, nor any other proteſtant diſſenting from the church of England, who ſhall take the oaths, and ſubſcribe the declaration againſt popery, and the other declaration enjoined by that act (ſee TOLERATION) ſhall be proſecuted in any court whatſoever, for teaching and inſtructing youth as a tutor or *ſchoolmaſter*: provided, that this ſhall not extend to the enabling any perſon, diſſenting from the church of England, to hold the *maſterſhip* of any college, or *ſchool* of royal foundation, or of any other endowed college or *ſchool* for the education of youth, unleſs the ſame ſhall have been founded ſince the firſt year of king William and queen Mary, for the immediate uſe and benefit of proteſtant diſſenters.

SCHOOL *philoſophy*, *theology*, &c. the ſame with SCHOLASTIC.

SCHOOLS, *charity*. See CHARITY.

SCHOONER, in *Sea Language*, a ſmall veſſel with two maſts, whoſe main-ſail and fore-ſail are ſuſpended from gaffs, reaching from the maſt towards the ſtern, and ſtretched out below by booms, whoſe foremoſt ends are hooked to an iron, which claſps the maſt, ſo as to turn therein as upon an axis, when the after-ends are ſwung from one ſide of the veſſel to the other.

SCHOOUBIAH, a ſect among the Muſſulmen, whoſe diſtinguiſhing tenet it is, that the Sonnites are not at all preferable to the Shiites, or Rafadhites, *i. e.* the orthodox to the heterodox, but that both the one and the other are equally true believers.

The *Schooubiah*, therefore, ſhould be, properly, the latitudinarians in Mahometaniſm, yet are they not regarded by either party, as much better than gentiles or heathens, as their name in that language imports.

There are abundance among the Muſſulmen, who give into this ſect, only ſecretly; Mahometaniſm, like all other falſe religions, being an avowed enemy to toleration.

SCHORN-PENY. See SCHAR-PENY.

SCHRAITSER, in *Ichthyology*, the name of a fiſh very common in the Danube, and in many things reſembling our ruff, or ſmall gilded pearch.

Its common ſize is about three inches in length; its tail is forked, and its back-fin is ſupported by thirty rays or nerves, eighteen of which are rigid and prickly, and thoſe which ſtand behind them ſoft and flexile. The upper jaw has a membrane ſomewhat like a lip, which hangs from it, and the coverings of the gills terminate in a ſpine or prickle. The membrane of the back-fin is variegated with black ſpots, and its general colour is ſomewhat paler than that of the pearch. It is a very well taſted fiſh.

SCHREBERA, in *Botany*, a genus of the *pentandria digynia* claſs: its characters are, that the calyx is divided into five ſegments, and that the corolla is funnel-ſhaped. There is only one ſpecies.

SCHWALBEA, in *Botany*, the name of a genus of plants, of the *didynamia angioſpermia* claſs; the characters of which are theſe: the perianthium conſiſts of one leaf, and is of a very ſingular figure, being tubular, inflated, and ſtriated on the ſurface, and terminated by an oblique mouth, lightly divided into four ſegments; the upper ſegment is ſmalleſt of all, the two ſide ones are longer, and the bottom one is longer and broader than theſe, and is emarginated; the flower conſiſts of one leaf, and is of the labiated kind; the tube is of the length of the cup, and the limb erect; the upper lip is erect, hollow, and undivided; the lower lip is of the ſame ſize, but is divided into three obtuſe and equal ſegments; the ſtamina are four capillary filaments, of the length of the flower, but two of them are a little ſhorter than the others; the antheræ are incumbent; the germen of the piſtil is round. The ſtyle is of the length and figure of the ſtamina, and is placed in the ſame ſituation; the ſtigma is thick and crooked; the ſeed is ſingle, roundiſh, and ſmall. There is only one ſpecies.

SCHWENKIA, in *Botany*, a genus of the *diandria monogynia* claſs: its characters are, that the corolla is ſubequal, with a plicated glandulous opening, that the ſtamina are three and ſterile, and the fruit is a double-celled polyſpermous capſule. There is only one ſpecies.

SCIADEPHORI, σκιαδηφοροι, formed of σκιαδεια, an *umbrella*, and φερω, *I carry*, among the *Athenians*, an appellation given to the ſtranger women reſiding in Athens, becauſe they were obliged, at the feſtival Panathenæa, to carry umbrellas to defend the free women from the weather.

SCIÆNA, in the *Linnæan Syſtem of Ichthyology*, the name of a diſtinct genus of fiſhes, of the order of *thoracici*, the characters of which are, that the opercula of the gills are ſcaly, that it has ſix branchioſtegous rays, and a groove in the back to receive the dorſal fin. Of this genus are the *umbra*, &c.

The characters of this genus, according to the Artedian ſyſtem, are theſe: the whole head, and the coverings of the gills are ſcaly, and one of the laminæ of theſe coverings is ſerrated at the edge; the body is compreſſed and broad; the back is acute; and the teeth are only in the jaws and fauces, the palate and tongue being bare: there is only one fin on the back, but it is bifid, being ſo deeply divided at the middle, that it ſeems to make two; the tail is not forked, but even at the end; the appendices of the pylorus are ſeven or eight in number. There are five ſpecies found in the Mediterranean.

The name *ſciæna* is of Grecian origin, derived from the word σκια, *a ſhadow*. The fiſh had this name from its being of a duſky or ſhadowy colour.

SCIAGRAPHY, or SCIOGRAPHY, the profile, or ſection, of a building, to ſhew the inſide thereof.

SCIAGRAPHY, formed of σκια, *ſhadow*, and γραφω, *I deſcribe*, in *Aſtronomy*, &c. is a term ſome authors uſe for the art of finding the hour of the day or night, by the ſhadow of the ſun, moon, ſtars, &c. See DIAL.

SCIAMACHIA, formed of σκια, and μαχω, *I fight*, the fighting with a perſon's own ſhadow, a ſort of exerciſe preſcribed by the ancient phyſicians, in which the motion of the arms, and other parts of the body, were of very great ſervice in many chronic caſes.

SCIAMANTIA, SCIAMANCY, or SCIOMANCY, formed from σκια, *ſhadow*, uſed metaphorically for the ſoul, and μαντεια, *divination*, a kind of divination, otherwiſe called *pſychomancy*. *Sciamancy*, among the ancients, was the art of raiſing and calling up the manes or ſouls of deceaſed perſons, to give intelligence of things to come. The witch who conjured up the ſoul of Samuel, to foretel Saul the event of the battle he was about to give, did it by *ſciamancy*.

SCIAPODES. See SCIOPODÆ.

SCIARRI, in *Natural Hiſtory*, the matter which runs down in burning torrents from the craters of mount Ætna.

This matter, when cold and hard, is hewed and employed at Catania, and other places. It is chiefly uſed for the baſements and quoinage of buildings. It probably contains mineral and metallic particles, being a ponderous, hard, grey ſtone. Philoſ. Tranſ. N° 481. p. 327, 328. See STONE.

Some of the *ſciarri* are coarſe, and others fine and poliſhed on the ſurface; ſome of them are black, others reddiſh, and others of the colour of iron; and many of them have coverings of pure ſulphur over the whole ſurface, or a part of it. Some very fine and ſmooth ones, reſembling iron, but very light, are found in, or near the mouths of the eruption, and ſome very hard and heavy, and of a mixed nature, ſeeming to be the reſult of many ſorts of minerals melted together. Theſe latter, when the mountains have poured out ſtreams of fire, always remain in the places, and are the ſubſtance that was on fire cooled again.

At the time of the moſt terrible eruptions of this kind, theſe heaps of *ſciarri*, which ſometimes appear to be ſolid rocks of metalline matter, are only a ſort of covered arches, under which the melted matter yet continues liquid and running, and burſts out at times, in the ſeveral parts of their ſides or ſurfaces. The general appearance of a train of theſe *ſciarri*, left after the eruption of ſuch a rivulet of fire, is much like that of the Thames, or ſome other ſuch large river, in the time of a ſevere froſt, the rocks of *ſciarri* riſing above the general ſurface, like the clods of ice in that ſcene; the colour only differing, the great quantities of the *ſciarri*, in theſe places, being of a deep bluiſh hue.

It is remarkable, that the ſubſtance of theſe *ſciarri*, even while melted and running in ſtreams down the hill, is ſo firm and ſolid, that no weight will ſink into it, nor any inſtrument make its way through the ſurface, any more than a ſolid maſs of cold metal. It has been ſuppoſed by ſome, that the flowing water concreted into the common pumice ſtone, but that is a vulgar error, the pumice being a wholly different ſubſtance. Philoſ. Tranſ. N° 46.

SCIATHERICA, a name given to DIALLING.

SCIATHERICUM *teleſcopium*, a horizontal dial with a teleſcope, adapted for obſerving the true time, both by day and night, to regulate and adjuſt pendulum-clocks, watches, and other time-keepers. It is the invention of the ingenious Mr. Molyneux, who has publiſhed a book with this title, containing an accurate deſcription of this inſtrument, its uſes, and application.

SCIATIC *artery*, in *Anatomy*, is a branch of the *hypogaſtric* artery, which gives ſome branches to the muſculus pyriformis, the quadrigemini, the os ſacrum, &c. and to the inner ſide of the os iſchium. It likewiſe detaches a branch, which runs under the muſculus quadratus, to the articulation of the os femoris. It paſſes obliquely over the *ſciatic* nerve, and as they both go through the great poſterior ſinus of the os ilium, it detaches ſmall arteries, which are diſtributed to the inner ſubſtance of that nerve. Afterwards it runs up in a radiated manner, on the outſide of the os ilium, and is diſtributed to the inner ſubſtance of that bone, and to the muſculi glutæi, eſpecially to the medius and minimus.

SCIATIC *vein*, in *Anatomy*, a branch of the CRURAL vein, which runs down on the ſide of the trunk; covering the crural artery, almoſt as low as the ham, where it is again united to the trunk by an anaſtomoſis, and ſometimes it is continued ſeparate a little way down on the leg. It has its name from the *ſciatic* nerve which it accompanies.

SCIATIC *nerve*. See NERVE.

SCIATICA, in *Medicine*, the GOUT, or rather RHEUMATISM, in the hip and thigh. This is a very tedious and obſtinate pain. Dr. Tiſſot has ſucceeded in removing it by the application of ſeven or eight cupping-glaſſes on the tormented part: he adds, that bliſters, and other ſtimulating plaſters, have often contributed to the cure, though leſs effectual than cupping; that a plaſter of quick lime and honey blended together, has cured inveterate *ſciaticas*; and that a ſeton has alſo been ſucceſsfully made in the lower part of the thigh. Tiſſot's Advice, &c. 2d ed. p. 189.

Dr. Fothergill, conſidering that the LUMBAGO and *ſciatica* are pains deeply ſeated in the moſt fleſhy parts of the human body, to which it is extremely difficult to convey the efficacy of any medicine entire, whether given internally or applied without, and that mercurials, of all the medicines we are acquainted with, moſt certainly pervade the inmoſt receſſes of the muſcular and tendinous parts, and remove diſeaſes which are known to reſide in them, recommends the uſe of calomel in caſes of this kind. His method of adminiſtering it in the *ſciatica* is as follows:

℞ Calom. levig. gr. x. Conſerv. roſ. q. ſ. f. pil. x. non deaur. Capiat j. omni nocti ſuperbibendo hauſt. ſeq.

℞ Aq. alexit. ſimp. ℥i. ſs. Aq. alexit. ſpir. ʒi. ſs. Vin. antimon. gut. xxx. Tinct. Theb. gut. xxv. Syr. ſimp. ʒi. m.

This proceſs he hath found of ſingular ſervice, after various other medicines and operations, recommended for the cure of this complaint, had been uſed to very little purpoſe. If the pain does not abate by the time this quantity is taken, he increaſes the doſe of calomel to two grains one night, one the next, and thus proceeds alternately; when the pain abates, the anodyne and antimonial are gradually leſſened, perhaps omitted every other night, or wholly dropped. He ſays, that he has ſeldom met with a genuine *ſciatica*, which has not yielded to this proceſs in the ſpace of a few weeks, and has as ſeldom returned. Lond. Med. Obſerv. vol. iv. p. 74, &c.

Dr. Dawſon prefers giving to perſons, of robuſt habits, mercurials once or twice a week, as Dr. Radcliffe, Mead, &c. uſed to do, in pretty large doſes, joined with the more draſtic purgatives, and on the intermediate days ſuch medicines as are in common uſe, among which, he ſays, the guaiacum is certainly not the leaſt efficacious. Caſes in the Acute Rheumatiſm, &c. 5th ed. p. 99.

SCIATICA *creſſes*, in *Botany*. See CRESSES and DITTANDER.

SCIE.—*Feuille de* SCIE. See FEUILLE *de ſcie*.

SCIENCE, formed from *ſcientia*, of *ſcire*, *to know*; in *Philoſophy*, a clear and certain knowledge of any thing, founded on ſelf-evident principles, or demonſtration.

In this ſenſe, *doubting* is oppoſed to *ſcience*; and opinion is the middle between the two.

The ſceptics profeſs to deny, that we have any ſuch thing as *ſcience*; that is, any clear or certain notices of any thing capable of producing abſolute conviction.

SCIENCE *of conditionals*. See CONDITIONALS.

SCIENCE is more particularly uſed for a formed ſyſtem of any branch of knowledge, comprehending the doctrine, reaſon, and theory, of the thing, without any immediate application thereof to any uſes or offices of life.

In this ſenſe, the word is uſed in oppoſition to *art*.

Indeed the preciſe notion of an art, and *ſcience*, and their juſt adequate diſtinction, do not ſeem to be yet well fixed. See the PREFACE to this Work. See alſo ART.

As to the number and diviſion of the *ſciences*, Mr. Locke limits them thus; all that can fall within the compaſs of human underſtanding, is, firſt, either the nature of things, their relations, and their manner of operation: or, ſecondly, that which man ought himſelf to do as a voluntary and rational agent, for the attainment of any end, eſpecially of happineſs: or, thirdly, the ways and means whereby the knowledge of both of theſe is attained and communicated: whereupon, *ſcience* may be properly divided into theſe three ſorts.

Firſt, the knowledge of things, their conſtitutions, properties, and operations, whether material or immaterial. This, in a little more enlarged ſenſe of the word, may be called φυσικη, or *natural philoſophy*. The end of this is bare ſpeculative truth, and whatſoever can afford the mind of man any ſuch, falls under this branch, whether it be God himſelf, angels, ſpirits, bodies, or any of their affections, as number, figure, &c.

Secondly, ϖρακτικη, the ſkill of right applying our own powers and actions for the attainment of things good and uſeful. The moſt conſiderable under this head, is ETHICS, which is the ſeeking out thoſe rules and meaſures of human actions, which lead to happineſs, and the means to practiſe them. The end of this is not bare ſpeculation, but right, and a conduct ſuitable thereto.

Thirdly, σημειωτικη, or the doctrine of ſigns. The moſt uſual being words, this is aptly enough termed *logic*; the buſineſs whereof is to conſider the nature of thoſe ſigns which the mind makes uſe of for the underſtanding of things, or conveying its knowledge to others. Things are repreſented to the mind by ideas, and men's ideas are communicated to one another by articulate ſounds or words. The conſideration then of ideas and words, as the great inſtruments of knowledge, makes no deſpicable part of their contemplation, who would take a view of human knowledge in the whole extent of it.

This ſeems the firſt, and moſt general, as well as the moſt natural diviſion of the objects of our underſtanding: for a man can employ his thoughts about nothing, but either the contemplation of things themſelves for the diſcovery of truth; or about the things in his own power, which are his actions, for the attainment of his own ends, or the ſigns the mind makes uſe of, both in the one and the other, and the right ordering of them, for its clearer information. All which three, viz. things as they are in themſelves knowable, actions, as they depend on us in order to happineſs, and the right uſe of ſigns in order to knowledge, being *toto cælo* different, they ſeem to be the three great provinces of the intellectual world, wholly ſeparate and diſtinct one from another.

SCIENCES, *academy of*. See ACADEMY.

SCIENTIA *media*, in *Theology*. See MOLINISTS.

SCIENTIFIC, or SCIENTIFICAL, ſomething relating to the pure, ſublimer ſciences; or that abounds in ſcience, or knowledge.

A work, a method, &c. is ſaid to be *ſcientifical*, when it is founded on the pure reaſon of things, or conducted wholly on the principles thereof.

In which ſenſe the word ſtands oppoſed to narrative, arbitrary, opinionative, poſitive, tentative, &c.

SCIERIA, Σκιερια, in *Antiquity*, a feſtival in honour of Bacchus, kept in Arcadia.

It was ſo called, becauſe that God's image was expoſed *ὑ'πο τῆ σκιάδι*, *i. e.* under an umbrella. At this time the women were beaten with ſcourges, in the ſame manner with the Spartan boys at the altar of Diana Orthia, which they underwent in obedience to a command of the Delphian oracle.

SCILLA, in *Botany*. See SQUILL.

SCILLITICUM *vinum*. See SQUILL.

SCILLONEORTE, Σκιλλων Ἑορτη, in *Antiquity*, the feſtival of ſea-onions. It was obſerved in Sicily. The chief part of it was a combat, wherein youths beat one another with ſea-onions. He that obtained the victory was rewarded by the gymnaſiarch with a bull.

SCIMPODIUM, Σκιμποδιον, among the *Ancients*, a ſmall couch or bed, on which one perſon only could reſt at a time. It was on the *ſcimpodium* that the Romans uſed to lay themſelves when weary or indiſpoſed.

The *ſcimpodium* was ſometimes uſed inſtead of the LECTICA, to carry both men and women, not only through the city, but likewiſe in journies into the country.

SCINCUS, the *ſkink*, in *Zoology*, the name of a ſpecies of lizard, called alſo by ſome the land crocodile, *crocodilus terreſtris*, and well known in the druggiſts ſhops as an ingredient in ſeveral compoſitions.

It reſembles the ſmaller ſort of lizards, being uſually about ſix inches long, and its uſual thickneſs is that of a man's thumb. It is of a ſilvery greyiſh colour, ſcaly, and has a rounded tail; its head is of an oblong figure; its noſe ſharp; and its feet, as it were, alated, having five toes each, armed with very ſharp claws. It is very common in Egypt and Arabia.

The dried fleſh of the *ſcincus* is greatly commended, as poſſeſſing all the virtues of that of vipers, but in a more exalted degree. It is ſaid to be a diuretic, alexipharmic, and uſed in leprous diſorders, and to do wonders as a reſtorative, and provocative to venery. For this laſt purpoſe the belly is preferred to any other part of it, but there appears no reaſon for this in the dried animal. The people of Egypt cut the fleſh to pieces, and boil it down to a ſtrong broth or jelly, in which form it may do ſome ſervice, though it fails with us. The only uſe made of it at preſent in the ſhops, is as an ingredient in ſome of the old compoſitions.

SCINDALMOS, a word uſed by the ancients to expreſs a fiſſure of the cranium, or of any other part.

SCINTILLA *veneris*, a term uſed by Paracelſus to expreſs a reſolution of the limbs, or deprivation of motion from a venereal cauſe.

SCIOGRAPHY. See SCIAGRAPHY.

SCIOMANTIA. See SCIAMANTIA.

SCIOPODÆ, in *Hiſtory*, the name given by Pliny, and other of the old writers, to a nation of people which they place in Æthiopia, on the burning ſands; and who, they ſay, when too hot, lie down upon their bellies, and ſhadow themſelves from the ſun by lifting up their feet, which are very large and broad, againſt it. Theſe are ſome of the *gentes mirabilis figuræ* of Pliny, and are worthy to ſtand among the MONOCOLI, and other ſuch monſters.

SCIPIO, in *Ancient Hiſtory*, a name given by the Romans. to a baton, or ſceptre of ivory, borne by the conſuls as a token of their dignity. Under the republic, it was no more than a rod without any additional ornaments. Under the emperors, and principally thoſe of Conſtantinople, it was ſurmounted with an eagle, and terminated by a buſt, which repreſented the reigning emperor.

SCIOPTIC, a ſphere or globe of wood, with a circular hole or perforation, wherein a lens is placed. It is ſo fitted, that, like the eye of an animal, it may be turned round every way, to be uſed in making experiments of the darkened room.

SCIRA, Σκειϱα, a feſtival among the Athenians, otherwiſe called SCIRROPHORIA.

SCIRE FACIAS, a judicial writ, moſt commonly uſed to call a man to ſhew cauſe to the court whence it iſſues, why execution of a judgment paſſed ſhould not be made out.

This writ is not granted, till a year and a day be elapſed after a judgment given.

Scire facias, upon a fine, lies only after a year and a day after the fine levied. Otherwiſe, it is the ſame with the writ of HABERE *facias ſeiſinam*.

There are alſo writs of *ſcire facias* againſt bail to an action, compelling his appearance; *ad audiendum errores*, or *writs of error*; in detinue, after judgment, for delivery of goods; to remove an uſurper's clerk incumbent; upon a recognizance in chancery for extending lands, &c. to repeal letters patent and grants; to repeal the grants of offices, for conditions broken, non-attendance, &c. and in appeal of murder. See Blackſt. Com. vol. iii. p. 416. 413. 248. 261. 421.

SCIRONA, a word uſed by ſome of the ancients to expreſs the autumnal dews.

SCIRPUS, the *ruſh*, in the *Linnæan Syſtem of Botany*. See RUSH-*graſs*.

SCIRRHUS, or SCHIRRHUS, Σκιῤῥος, formed of σκιϱος, *a piece of marble*, whence σκιῤῥοω, *to harden*, in *Medicine* and *Surgery*, a hard, indolent tumor, formed gradually in the ſoft, glandulous parts of the body; ſometimes internal, and ſometimes external.

When a gland of the conglobate, or conglomerate kind has for ſome time been enlarged and indurated; and ſuch enlargement and induration are not attended with pain or inflammation, or a duſky livid-coloured complexion of the integuments; or a diſtenſion and contorted form of the veins; or with any, or at moſt with a ſmall degree of inequality of ſurface; ſuch a diſeaſed ſtate of the parts, from their freedom from diſcolouration, their exemption from pain, their equality of ſurface, their peculiar hardneſs, and ſtony reſiſtance to the touch, is uſually denominated a *ſcirrhus*; but when a *ſcirrhous* tumor is accompanied with all, or moſt of theſe appearances, the diſeaſe is then called a CANCER.

There are two kinds of *ſcirrhuſes*, the one only beginning, and frequently painful when preſſed by the fingers, the other confirmed and ſenſeleſs.

The *ſcirrhus* ariſes from a thick, viſcid, and probably gritty matter, detained and indurated in the pores, and other minute paſſages of the parts affected.

The ſeat of a *ſcirrhus* is very various and uncertain; for this diſorder is not confined to the internal parts alone, to wit, to the liver, ſpleen, lungs, meſentery, pancreas, and in ſemales to the uterus; but it frequently happens alſo to the external parts, as to the lips, tongue, tonſils, fauces palate, gums, neck, mammæ, axillæ, inguina, penis, and teſticles, and that generally after inflammations of thoſe parts, though it ſometimes alſo appears without any INFLAMMATION, eſpecially in perſons of a heavy phlegmatic habit.

This diſeaſe, the matter of which is an inſpiſſated lymph, is often owing to ſuppreſſed evacuations; hence it proves ſo frequently fatal to women of a groſs habit, about the time when the menſtrual flux ceaſes. It may likewiſe be occaſioned by exceſſive grief, fear, anger, religious melancholy, or any of the depreſſing paſſions. It may alſo be occaſioned by the long continued uſe of food that is too hard of digeſtion, or of an acid nature; by barrenneſs, celibacy, indolence, cold, blows, friction, preſſure, &c. Sometimes the diſeaſe is owing to an hereditary diſpoſition.

As ſoon as the *ſcirrhus* is formed, the immediate conſequence is, that the indurated part becomes unfit to perform the functions allotted by nature to it, and the neighbouring parts ſuffer preſſure, and become impeded in the performance of their ſeveral functions. It is therefore no wonder that they are found ſubject, in theſe caſes, to inflammations, ulcerations, cancers, gangrenes, tabes, ſtiffneſs, immobility, and the like, according to the nature of the injured part.

The more inveterate the *ſcirrhus* is, the greater will be the difficulty of the cure. When this diſorder happens to young people, and ſuch as are of a good habit of body, it is much more ſafe and tractable, than when it happens to older infirm perſons. When there is any thing venereal in the caſe, the difficulty is yet the greater.

The *ſcirrhus* is of the more or leſs conſequence, according to the nature of the part it is ſeated in; and internal ones are always more dangerous, for this reaſon, than the external.

While a *ſcirrhus* continues free from pain, there is little danger from it, but when it becomes painful or ulcerated, it generally threatens a cancer. The cure of theſe diſorders is always difficult and uncertain, but in young robuſt habits ſometimes the knife and corroſives will effect it.

When the *ſcirrhus* is of long ſtanding, and in old people, great care muſt be taken how it is meddled with, leſt, while under treatment, it ſhould become cancerous. On the other hand, when the *ſcirrhus* is but newly formed, and in a benign ſtate, and you have no ſigns of vehement pain or hardneſs, or of itching and heat, where the patient is otherwiſe of a good habit of body, external and internal remedies are to be employed at once, to endeavour to ſet the confined fluids at liberty. The internal remedies, found of moſt ſervice on theſe occaſions, are the decoctions of the woods, digeſtive tinctures, or mild mercurials, giving between whiles relaxing medicines, to reſolve the inſpiſſated humours.

In regard to the external remedies, plaſters made of the warm gums, as ammoniacum, galbanum, ſagapenum, and the reſt, either alone or mixed together, and aſſiſted ſometimes by the powder of bryony-root, or of the birthwort, are uſed.

Mercurials ſerve greatly to this purpoſe, and the following compoſition is alſo excellent as a plaſter on theſe occaſions. Take galbanum and opopanax of each an ounce, ammoniacum and bdellium of each two ounces, oil of olives two pounds, yellow wax half a pound, powder of long and round birthwort, lapis calaminaris, myrrh and frankincenſe, of each one ounce, Venice turpentine four ounces, melt them all into a plaſter.

Next to plaſters, cataplaſms are found highly ſerviceable in theſe caſes, one of the beſt of which is made in the following manner. Take white briony-root, four ounces; round birthwort and angelica, of each an ounce; leaves of ſavin, rue, ſcordium, wormwood, and camomile-flowers, of each one handful; melilot, elder, marſhmallows, and centaury, of each half a handful; let theſe be boiled together in a ſufficient quantity of water to the proper conſiſtence for a cataplaſm, adding, toward the end of the boiling, three ounces of galbanum, diſſolved in the yolk of an egg, two ounces of linſeed-meal, and as much as is neceſſary of linſeed-oil.

It is to be applied warm, and often renewed, and a fomentation made from the ſame ingredients, boiled in vinegar, is often found alſo of great uſe.

Inſtead of theſe remedies ſome highly extol the uſe of acid vapours on this occaſion; ſometimes the ſteam of boiling vinegar is ordered to be received on the part, and that either of plain vinegar, or of ſuch as has been medicated by infuſions of rue, lavender-flowers, or other ſuch ingredients, or of the Venice treacle. Some ſprinkle vinegars of theſe kinds over a hot ſtove, and receive the vapour through a funnel; others adviſe the burning of common brimſtone, and holding the part over the fume; and others are fond of fumigations of cinnabar. Great care muſt be taken in theſe caſes not to raiſe too large a fume, nor to keep the patient over it too long, and he muſt be adviſed not to admit it into his noſe or mouth, for all theſe ſteams are injurious to the lungs; and in the laſt caſe, the quantity of mercury raiſed in vapour from the cinnabar may often be enough to raiſe a ſalivation.

Mercurial medicines are alſo found to perform wonders in theſe caſes, either adminiſtered in the beginning, or after all other remedies have failed. When a *ſcirrhous* tumor is firſt diſcovered, the diet of the patient ſhould be light and nouriſhing, and he ſhould avoid all ſtrong liquors, and high ſeaſoned or ſalted proviſions; and take twice or thrice a week a doſe of the common purging mercurial pill, and a pint of the decoction of the woods or ſarſaparilla may be drank daily.

Beſide giving mercurials internally, an excellent mercurial ointment may be made, by mixing quickſilver firſt with a ſmall quantity of Venice turpentine, and afterwards with a much larger of hog's lard, by rubbing them together in a glaſs or marble mortar. The *ſcirrhus* ſhould be anointed two or three times a day with this, covering it with a common mercurial plaſter; and to prevent this method from raiſing a ſalivation, ſome purging medicine, as the extract of Rudius, or jalap, is to be given in ſmall doſes every fourth or fifth day.

But if all theſe methods prove unſucceſsful, and the *ſcirrhus* is free and moveable, and its ſituation threatens no danger from the neighbourhood of any conſiderable veſſels, and if the patient's ſtrength ſhould be judged ſufficient to undergo the operation, the aſſiſtance of the knife muſt be called in, and the *ſcirrhus* cut out, to prevent its growing cancerous. When the *ſcirrhus* is thus taken out, the wound is to be dreſſed and healed with the common vulnerary balſams; but when the *ſcirrhus* is fixed, knotty, uneven, and deeply rooted; where the patient is of a bad habit of body, is ſubject to form *ſcirrhuſes* from an hereditary taint, or has formed ſeveral already; and laſtly, where the ſituation of the diſorder is ſuch, that, from the vicinity of conſiderable veins and arteries, there is danger of bringing on an hæmorrhage, which may prove fatal, then all attempts to cure, whether by the knife, by digeſtives, or by corroſive medicines, are to be neglected; for this kind of *ſcirrhus* is almoſt always attended with very violent pains, and all that can be done is to attempt to alleviate thoſe pains, and prevent a cancer. Heiſter. See CANCERS, *to prevent*.

SCIRRHUS *hepatis*, in *Medicine*, a diſeaſe conſiſting in an indurated tumor of the liver, occaſioned by a ſtagnation of the humours which grow thick there, from an exhalation of their more fluid and ſubtle parts.

This differs from the *infarctus* HEPATIS, not only in degree, but in its ſymptoms, for it almoſt always is attended with a hectic, or with œdemato-hydropic ſwellings.

Signs of it. Theſe are a tumor and hardneſs in the right hypochondrium, or region of the liver, always evident to the patient, and often ſenſibly perceived by any body elſe, on touching the part. To this are to be added dull tenſive pains, and a ſenſe of a weight hanging there, and uſually aſthmatic ſymptoms, and a dry cough. It becomes painful to lie on the left, or oppoſite ſide; and with theſe a hectic comes on, with a waſting of the upper parts, and a ſwelling of the inferior ones; firſt of the feet, but afterwards upwards to the belly, which finally becomes very obſtinate, and truly aſcitic. The urine in this caſe is ſmall in quantity, and of a deep orange colour, and thick conſiſtence. It has uſually a mucid ſediment, and ſometimes a thick one of a roſe-colour.

Cauſes of it. Theſe are uſually either an omiſſion of artificial diſcharges of the blood, by habitual bleedings at ſpring and autumn, or a ſuppreſſion of the natural ones, by the menſes or hæmorrhoidal veſſels; an improper treatment of intermittent fevers with aſtringents, of quartans with large quantities of bark, and of acute fevers with too cooling a regimen, or a violent quantity of the volatile ſalts, or a condenſation of the humours in a ſimple infarction, by means of cold external applications. The ſtopping hæmorrhages, which nature had brought on for her relief in plethoras, have alſo been ſometimes known to occaſion a *ſcirrhus* of the liver, as have alſo external injuries by blows, falls, and the like.

Prognoſtics. A recent *ſcirrhus* of the liver admits of a cure, but this not without great difficulty, and in a more confirmed one there is very little hope. This tumor has a continual tendency to corruption, either by ſphacelation, or by an inflammatory ſuppuration; neither of which can happen ſucceſsfully, for the firſt muſt occaſion inſtantaneous death, and the latter exulceration, and a ſucceeding fatal hectic. A *ſcirrhus* of the liver often follows, and ſometimes precedes a jaundice of the moſt violent kind.

Method of treating it. The bowels are firſt to be cleanſed and relaxed by a clyſter, made of a decoction of mallows, camomile flowers, mullein, and fennel ſeed; after this, bleeding in the foot is to be ordered, and then the nitrous and other reſolvent medicines are to be given, ſuch as tartar of vitriol, and the like. After this medicated wines ſhould be drank as the common drink, prepared with bryony and arum roots, centaury, hyſſop, and maidenhair leaves, ſaſſafras, ſena, black hellebore, and rhubarb; and externally, plaſters of the reſolvent and ſtrengthening kinds are to be applied. But after all directions for the treatment, it is to be acknowledged, that an obdurate and inveterate *ſcirrhus* admits of no remedy. Juncker's Conſp. Med. p. 210.

SCIRRHUS *of the teſticle*. See SARCOCELE.

SCIRRONES, a name given to a ſort of ſmall lice breeding under the ſkin.

SCIRROPHORIA, Σκιρροφορια, in *Antiquity*, an anniverſary ſolemnity at Athens, upon the twelfth day of the month *Scirrophorion*. For its origin and ceremonies, ſee Potter. Archæol. Græc. lib. ii. cap. 20. tom. i. 430.

SCIRROPHORION, Σκιρροφοριων, in *Ancient Chronology*, the twelfth and laſt month of the Athenian year. It contained twenty-nine days, and anſwered to the latter part of our May and beginning of June.

It had its name from the feaſt *Scirrophoria*, kept in it.

SCISSIMA, in *Botany*, a name given by ſome authors to the beech-tree.

SCISSORS. Mr. Monro has given us the figure and deſcription of a pair of *ſciſſors*, the blades of which are crooked on the flat ſides. Theſe *ſciſſors* are very uſeful for taking off excreſcences from hollow parts, or for cutting in curve lines, which the common *ſciſſors* cannot eaſily be applied to. Med. Eſſ. Edinb. vol. v. art. 41.

SCITE. See SITE.

SCIURUS. See SQUIRREL.

SCLAREA, in *Botany*. See CLARY.

SCLAVONIC, the language of the Sclavi, an ancient people of Scythia Europæa, who, about the year 518, quitting their native country, ravaged Greece, and eſtabliſhed the kingdoms of Poland and Moravia, and at laſt ſettled in Illyria, which thence took the name of *Sclavonia*.

The *Sclavonic* is held, after the Arabic, the moſt extenſive language in the world; it is ſpoken from the Adriatic to the North Sea, and from the Caſpian to the Baltic, by a great variety of people, who are all the deſcendants of the ancient Sclavi, viz. the Poles, Muſcovites, Bulgarians, Carinthians, Bohemians, Hungarians, Pruſſians, Suabians, &c. each of whom, however, have their particular dialect, only the *Sclavonic* is the common mother of their ſeveral languages, viz. the Poliſh, Ruſſian, Hungarian, &c.

By a Latin chronicle of the Sclavi, compoſed by Helmond, a prieſt of Boſow, and Arnold, abbot of Lubec, and corrected by M. Leibnitz, it appears that the Sclavi anciently inhabited the coaſts of the Baltic Sea, and were divided into the eaſtern and weſtern; in the latter whereof were the Ruſſians, Poles, Bohemians, &c. and in the former the Vandals.

Dom. Maur. Orbini Rauſer, abbot of the order of Malta, in an Italian hiſtory of the Sclavi, intitled, Il Regno de gli Sclavi, printed in 1601, will have them to be originally of Finland, in Scandinivia. Laur. Pribero, a Dalmatian, in an expreſs diſcourſe on the origin of the Sclavi, maintains them to be originally of Thrace, and the ſame with the Thracians, the poſterity of Thiras, who was the ſeventh ſon of Japhet. Theod. Polycarpowitz, in a Greek, Latin, and *Sclavonic* dictionary, printed at Moſcow in 1704, obſerves, that the word *Sclava*, whence *Sclavonic* is formed, ſignifies in their language, *glory*.

SCLERANTHUS, *German knot-graſs*, or *knawel*, in *Botany*, a genus of the *decandria digynia* claſs: its characters are, that the calyx is ſingle-leaved, that it has no corolla, and two ſeeds incloſed in the calyx. There are three ſpecies.

SCLERIA, formed of σκληρος, *hard*, a word uſed by medical writers to expreſs a hardneſs of the inner part of the eye-lids.

SCLEROPHTHALMIA, σκληροφθαλμια, a kind of OPHTHALMIA, wherein the eye is dry, hard, red, and painful, and the eye-brows likewiſe, ſo as not to be opened after ſleep without great pain.

SCLEROTICA, formed from σκληρος, *hard*, whence alſo *ſclerotic*, in *Anatomy*, one of the common membranes of the eye, ſituate between the adnata and the uvea: it is very firm and opaque, behind, but tranſparent before. Though, in ſtrictneſs it is only the hind part that is called *ſclerotica*, the fore-part being properly called the CORNEA.

The *ſclerotica* is a ſegment of a larger ſpheroid than the cornea. See EYE.

The *ſclerotica*, called alſo *cornea opaca*, and the *cornea lucida*, are, in reality, one and the ſame coat, though differently circumſtanced as to ſize, ſituation, texture, and uſe. The *ſclerotica* is a large, firm, thick, hard opaque membrane, compoſed of ſeveral ſtrata cloſely united; and it is extended from the external circumference of the cornea to the optic nerve, and forms much the greater part of the globe of the eye externally. The *ſclerotica* and the cornea compoſe the caſe in which all the internal coats of the eye, and its humours, are contained. The *ſclerotica*, on its poſterior part, is perforated obliquely in five or ſix different places by thoſe branches of the internal carotid artery, that are beſtowed upon the internal coats of the eye and its humours, which veſſels are called by Nuck *aqueducts*. See AQUEOUS *Humour*.

SCLEROTICS, medicines proper to harden and conſolidate the fleſh, &c of the parts they are applied to.

Such are purſlain, houſe-leek, flea-wort, garden nightſhade, &c.

SCNIPS, in *Natural Hiſtory*, a name given by authors to the ſmall ſpecies of gnat, always found about the oak-tree, feeding on the juices of its leaves, which it ſucks by means of its ſharp trunk.

It is ſuppoſed by ſome to be hatched of the ſmall oblong white worm, that inhabits the oak apples.

SCOBS, a word uſed by ſome authors to expreſs the raſpings of ivory, hartſhorn, or other hard ſubſtances. Some alſo have uſed it to expreſs the ſcoriæ of metals; and ſome as a name for the *cineres clavellati*, or *pot-aſhes*, uſed in ſoap and glaſs-making.

SCODEGHINO, a name given by chirurgical authors to a peculiar ſpecies of inciſion knife, deſcribed by Scultetus, and uſed by Rouſſet in performing the Cæſarean operation.

SCODINEMA, a word uſed by ſome medical writers to expreſs a heavineſs of the head.

SCOLDS. The puniſhment allotted by our laws for *ſcolds*, or *ſcolding* women, is, to be ſet in a trebucket, commonly called a *ducking-ſtool*, though properly a CUCKING-*ſtool*, which in the Saxon language ſignifies a *ſcolding-ſtool*, placed over ſome deep water, into which they are to be let down, and plunged thrice under water, to cool their heat and choler.

SCOLECIA, in the *Materia Medica* of the ancients, a name given to a kind of verdigriſe.

Of this there were two ſpecies, the one found native in the earth, the other fictitious.

The latter kind was prepared by rubbing a quantity of vinegar in a braſs mortar, with a braſs peſtle, till it became thick and ropy; when it was in this condition, a ſmall quantity of alum and ſea-ſalt, or nitre, were added to it, and it was ſet in the ſun in the heat of the dog-days. It was to ſtand thus till it became ropy, thick, and of a green colonr; and then being drawn out into long threads, and dried, it had the reſemblance of worms in ſhape, and thence had its name.

SCOLION, among the *Ancients*, a kind of Bacchanal ſong uſed at entertainments.

SCOLIOSIS, a word uſed by Hippocrates to expreſs a diſtortion of the ſpine ſideways.

SCOLOPAX, in *Ornithology*, a genus of the *grallæ* in the Linnæan ſyſtem: the characters of which are, that the beak is roundiſh, obtuſe at the end, and longer than the head; the noſtrils are linear; the face covered with feathers; and the feet furniſhed with four toes, the hinder one conſiſting of ſeveral joints. Linnæus enumerates eighteen ſpecies, among which are the GUARAUNA, the CURLEW, WIMBREL, LIMOSA, SNIPE, GODWIT, WOODCOCK, &c.

SCOLOPAX, in *Ichthyology*. See TRUMPET-*fiſh*.

SCOLOPENDRA, in *Zoology*, an inſect of a very ſlender and long body, very ſmooth, and of a yellowiſh or reddiſh colour, furniſhed with a vaſt number of legs, and having two long antennæ, and a bifid tail.

It is uſed by ſome as a depilatory, being boiled in wine.

The *ſcolopendra* is, in the Linnæan ſyſtem, a genus of the order of *aptera*. Its characters are, that it has as many feet on each ſide as its body hath ſegments, that the antennæ are ſetaceous, that it has two articulated palpi, and that its body is depreſſed. Linnæus enumerates eleven ſpecies.

There is a ſpecies of this animal, which naturally ſhines in the dark in the manner of a glow-worm, but with a fainter and more general light. Every part of the body of this animal will emit ſparks, if preſſed in the dark. It is covered with a ſoft down, or ſhort and fine hair, much reſembling in texture the downy matter which grows on the back of coltsfoot leaves.

Among this hair on the ſides there are ſet a vaſt number of long and ſharp prickles; they are about the ſame length with the hair, but they are as ſtiff as a hog's briſtle, and are very ſharp at the points, and of a black colour; there are ſeveral hundreds of theſe on the two ſides. The tail or ſmaller end terminates, on the back, in two bright ſcales; and this in the anus; at which the creature voids its excrements. It has no horns, no eyes, nor any other of the common organs of inſects heads. The mouth is wide, and placed under the belly-part, which is ſmooth, flat, and irregularly variegated with brown ſpots. The legs are placed in two rows, each of the whole length of the body; they begin from the angle of the mouth on each ſide, and are continued to the tip of the tail: thoſe ſtanding near the mouth are longer than the others, which gradually decreaſe till they are very ſhort at the tail; the longeſt are about a quarter of an inch in length, and the ſhorteſt not a ſixth of that length. The whole number of legs is ſeventy-two, thirty-ſix ſtanding on each ſide. From within the body, through the middle of each leg, there paſſes a cluſter of three or four prickles; thoſe are larger or ſmaller, according to the ſize of the leg, and vary alſo in number, the longeſt legs having moſt of them; they give ſtrength and firmneſs to the legs, ſerving them in the place of bones, and iſſuing out beyond the end of the leg, in the way of claws: they ſerve the creature for the laying faſt hold of any thing it pleaſes. On each ſide of the upper, or back part of the animal, there are alſo placed a number of ſoft, flat, and ſmooth fins; theſe ſtand near the legs, and are placed face to face in ſuch a manner, that each foot has its correſponding fin. The fins are exactly of the ſame number with the legs, and like them are largeſt towards the head, and go off gradually tapering towards the tail. Theſe ſerve the creature to ſwim in the water, as the others ſerve it as a reptile to crawl upon the ground at the bottom. The fins on each ſide are fringed with the ſame changeable coloured hair that the ſtripes on the back are.

On opening of the body there appears a muſcular organization, elegantly contrived for the working ſo great a number of legs and fins. This appears in form of one large and broad red muſcular congeries, and from this there are propagated on each ſide thirty-ſix pair of rays, or oblong and ſlender muſcles, every pair ſerving for the motion of one leg and one fin. Theſe are very diſtinctly viſible, and repreſent the ſpine and ribs in ſome fiſh. Philoſ. Tranſ. Nº 225.

Mr. Maloet relates the hiſtory of a man, who for three years had a violent pain at the lower part of the forehead, near the root of the noſe; at length he felt an itching, and afterwards ſomething moving within his noſtril, which he brought away with his finger: it was a worm of the centiped kind, an inch and a half long, which run ſwiftly. It lived five or ſix days among tobacco. The patient was free of his pain ever after.

Mr. Littre mentioned a like caſe, in 1708, of a larger centiped voided at the noſe, after it had thrown the woman, in whoſe frontal ſinus it was, into convulſions, and had almoſt taken away her reaſon. Hiſt. Acad. Scienc. 1733.

SCOLOPENDRA *marina*, a name given by Dr. Molyneux to a new ſpecies of ſea animal, of the centiped *ſcolopendra* kind. See *Tab. of Microſcopical Objects*, *Claſs* 1.

This remarkable inſect, taken in the Iriſh ſeas, is evidently the ſame animal deſcribed by Oligerus Jacobæus, in the Acta Medica Haffnenſia, under the name of *vermis aureus*, or *erucæ marinæ ſpecies rarior*. Philſ. Tranſ. Nº 224.

Dr. Peyſſonel deſcribes a marine *ſcolopendra* of very ſmall bulk, and ſquare figure, whoſe body and head were formed of eighty rings, and which had a power of occaſionally throwing out its inteſtines. The four ſides of this animal were armed with prickles, and every ring had four bundles of them, which are ſometimes ſpread out like fans: thoſe under the body ſerved the inſect as feet. Theſe *ſcolopendræ*, being placed upon the fingers, thruſt a great number of their prickles into the ſkin, and cauſed a ſharp pain, reſembling the effect of fire, of ſome continuance. Phil. Tranſ. vol. li. art. 6.

Scolopendra *ſcutata*, in *Natural Hiſtory*, the name of an animal of the inſect kind, found in the year 1736, by Klein, in Pruſſia, and at the ſame time by Mr. Brown, in ſome parts of Kent.

It was met with in Pruſſia in vaſt abundance, in the places where they take cray-fiſh, and having not been met with there before, ſurpriſed the people employed in that fiſhery ſo much, that they brought home many of them.

In Kent, its appearance was attended with greater ſingularity. Mr. Brown found it in a pond on Bexby Common, where the country people had obſerved vaſt numbers of them for or five ſix weeks before. This pond was quite dry on the 24th of June that year, but being filled by the thunder ſhower on the 25th of the ſame month, the pond was obſerved to ſwarm with them in two days, by a farmer watering his cows there; and what is very obſervable is, that there appears no channel into this pond, that could convey them from any other place.

The creature is about an inch and a half in length, and ſomewhat leſs than an inch in breadth, and though ſo ſmall, yet bears a great reſemblance, in many of its parts, to the great Molucca crab, called by ſome the *buckler-crab*. When the back is viewed, it is ſeen to be covered with a caſe or ſhield, ſo that it in ſome meaſure reſembles a tortoiſe, only it is remarkably gibbous, or prominent all along the middle of the back, and has a triangular opening in the ſhell near the tail. On the head it has two ſhort horns, ſtanding in the common place of the antennæ. When the caſe or ſhell is taken off, the rings on the body are found to be about thirty in number. The legs are very extraordinary; they are forty-two on each ſide; the twenty that ſtand next the head are nearly of the ſame ſize, but then they grow gradually ſmaller towards the tail The feet conſiſt each of five membranaceous claws; theſe are flat, and have a ſtiff rib in the middle, and are beſet at the edges with hairs, in the manner of the legs of a crab. The whole ſtructure of the legs ſeem calculated for ſwimming, rather than walking. Philoſ. Tranſ. N° 447. p. 151.

SCOLOPENDRITES *lapis*, in *Natural Hiſtory*, a name given by ſome authors to a ſpecies of the *lapis ſyringoides*, or pipe-ſtone, the tubules of which they ſuppoſed to reſemble the figure of the body of the ſcolopendra.

SCOLOPOMACHÆRION, σκολοπομαχαιριων, in *Surgery*, a kind of ſcalpel, thus called, by the Greeks, from its reſembling a woodcock's bill.

Its uſe is to open and dilate narrow wounds of the breaſt, abſceſſes, &c. Aquapendente recommends it for tapping in dropſies.

It is uſually furniſhed with a little button at the point, that it may be uſed to open wounds of the breaſt without danger of wounding the lungs.

SCOLYMUS, in *Botany*. See *Golden* Thistle.

SCOMBER, in the Linnæan ſyſtem of *Ichthyology*, is a diſtinct genus of the *thoracic* order. The characters of which are, that the head is compreſſed, that it has ſeven branchioſtegous rays, and that it has ſeveral ſmall fins between the dorſal fin and the tail. The ſpecies of this genus are the *ſcomber* or MACKREL, the *pelamis*, *thynnus*, *cordyla*, *glaucus*, *trachurus*, *hippos*, *chryſurus*, *amia*, and *pelagicus*. In the Artedian ſyſtem, the characters of this genus are theſe: the branchioſtege membrane on each ſide contains ſeven ſlender bones, the upper one of which is nearly covered by the covering of the gills; the tail is very forked, in the form of a creſcent; there are one or more eminences on each ſide towards the tail; the fins are either only two on the back, or elſe beſide theſe, there are ſeveral other ſmall and ſhort ones, running all the way to the tail, as well on the upper as the under part of the body; the appendices to the pylorus are very numerous. The ſpecies of this genus are four, viz. the *ſcomber* or common mackrel, the tunny-fiſh, the horſe-mackrel, the amia of Salvian, and the glaucus primus of Willughby and Rondeletius.

SCONCES, ſmall forts, built for the defence of ſome paſs, river, or other place.

Some *ſconces* are made regular, of four, five, or ſix baſtions; others are of ſmaller dimenſions, fit for paſſes, or rivers; and others for the field. See Fort.

SCOOP, in *Sea Language*, a ſmall hollowed piece of wood, uſed to throw water out of a boat into the ſea, uſually called bailing the boat.

SCOPARIA, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are, that the calyx is wheel-ſhaped, and divided into four ſegments; and the fruit a ſingle-celled, double-valved, polyſpermous capſule. There are two ſpecies.

SCOPELISMUS, σκοπελισμος, an audacious crime practiſed by ſome villains among the Arabians.

It conſiſted in placing a certain number of ſtones upon the farm or field of perſons theſe miſcreants had a pique at; which ſtones ſerved as a denunciation of utter deſtruction to thoſe, who for the future ſhould attempt to till the ground on which they were laid. And ſuch terror attended this malevolent and clandeſtine threatening, that none ever ventured to till ſuch fields.

SCOPER-HOLES, or Scuper-Holes, in a *Ship*. See Scuppers.

SCORBUTUS, or Scorbutum. See Scurvy.

SCORCHING *fennel*. See Thapsia.

SCORDIUM. See Germander.

SCORE, in *Muſic*, denotes *partition*, or the original draught of the whole compoſition, wherein the ſeveral parts, viz. treble, ſecond treble, baſs, &c. are diſtinctly *ſcored*, and marked.

SCORIA, in *Metallurgy*, the recrements of metals in fuſion, or, more determinately ſpeaking, the maſs, or part of the maſs, of a melted metal, converted by the action of the fire into a body, which when cold is brittle, fixed, not diſſoluble in water, but melts again when expoſed to the fire, and is properly a kind of glaſs.

Some authors call by this name that ſaline maſs, which is produced by melting ores and metals together with ſaline, and reducing fluxes. But the word *ſcoria* is not properly to be underſtood of all this maſs, but only of the vitrified particles which are lodged between, and adhere to the ſmall maſſes of the ſalts, and which may be ſeparated from them by water.

SCORIFICATION, in *Metallurgy*, is the art of reducing a body either entirely, or in part, into ſcoria.

It is uſed by metallurgiſts, in order that any metal, impriſoned in a ſolid body, may, on account of its weight, deſcend and ſeparate itſelf therefrom, and finally if that be required, by itſelf either wholly or in part converted into ſcoriæ.

All fixed bodies are ſubject to this alteration, not totally excepting even gold and ſilver. There are alſo, among the volatile bodies, ſome that may be fixed, and which aſſume the form of ſcoriæ, by adding fixed bodies to them.

It is often proper to make this *ſcorification* in a veſſel that may abſorb the ſcoriæ, and retain only the metallic part of the maſs under trial. In this caſe the operation is called COPPELLING, and veſſels made of aſhes, called *teſts* and *coppels*, ſerve for this purpoſe. It is evident in theſe proceſſes, that a great attenuation of the ſcoriæ is neceſſary, that they may be able to paſs through the veſſel; nor is there any fitter body to promote this operation than lead, which, by its undergoing itſelf a like attenuation in the fire, diſpoſes other bodies to be reduced into a ſubtle ſcoria for the ſame attenuation.

SCORITH, a word uſed by the chemical writers to expreſs ſulphur.

SCORPÆNA, in *Ichthyology*, the name of a genus of fiſh, of the acanthopterygious kind, in the Artedian ſyſtem, and the thoracic order in the Linnæan; the characters of which are theſe: the branchioſtege membrane on each ſide contains ſeven bones; the head is large, and very prickly; there is only one back-fin, and that is lower in the middle than elſewhere; the body grows ſmall toward the tail; they eyes are placed near one another, and are covered with the common ſkin; there are teeth in the jaws, palate, and fauces; and the appendices to the pylorus are eight or nine.

The ſpecies of this genus are three; viz. the *porcus*, *ſcrofa*, and *horrida*.

According to Mr. Willughby, the *ſcorpæna* is a fiſh of the anguilliform kind, called by the people of Cornwall FATHER *laſher*.

Scorpæna is alſo the name of a fiſh caught in many parts of the Mediterranean. It ſeldom grows to more than a pound weight. Its body is of a long, not flatted form, and is moderately thick. Its head is extremely large, and is armed with prickles, and it grows gradually leſs from thence to the tail.

The prickles about the head are accounted venomous, and the fiſhermen uſually cut them off as ſoon as the fiſh is caught. Its tail is not forked, but rounded at the end. The belly and belly-fins are reddiſh.

SCORPIACA, the name of an antidote recommended by Galen againſt the ſtinging of ſcorpions.

SCORPIO, the *ſcorpion*, in *Zoology*. See Scorpion.

Scorpio, *ſcorpion*, in *Aſtronomy*, the eighth ſign of the zodiac, denoted by the character ♏.

The ſtars in *Scorpio*, in Ptolemy's catalogue, are 24; in that of Tycho, 10; in that of Hevelius, 20; in that of Mr. Flamſteed and Mr. Sharp, 44. The longitudes, latitudes, magnitudes, &c. whereof, are as follow:

Names and ſituations of the ſtars.	Bayer's ch.	Signs.	Longitud.	Latitude	Magn.
			° ′ ″	° ′ ″	
In the firſt ſouth foot	*b*	♏	26 48 50	5 26 33 A	6
Subſeq. in the firſt foot	A		27 18 08	4 54 13 A	5
Contiguous to this	A		27 30 49	4 46 19 A	7
That preced. ſouth of forehead			27 55 46	5 43 48 A	6
In third ſouth foot	*g*		28 48 52	8 33 25 A	4
5					
South of 3 in the forehead	π		28 37 25	5 25 46 A	3
Middle of the forehead	δ		28 15 50	1 56 31 A	3
North of the forehead	β		28 52 56	1 03 09 B	2
North } of the contiguous ones	ω		29 21 35	0 16 05 B	5
South } under nort. ſtar of fore.	ω		29 32 09	0 05 56 B	5
10					
			28 01 11	8 04 40 B	6
Preced. in the laſt ſouth foot	*c*	♐	2 00 35	7 07 03 A	6
Contiguous thereto northward	*c*		1 55 59	6 38 22 A	6
Moſt north and following forehead	ν		0 20 11	1 40 50 B	4
	χ	♏	28 35 7	10 54 30 B	5
15					
			28 19 54	12 29 24 B	6
			29 23 11	9 15 16 B	6
Subſequent in laſt ſouth foot			29 09 23	12 46 39 B	4
That over the other prec. heart		♐	3 07 35	2 37 10 A	6
The preced. heart northward	σ		3 29 24	3 59 04 A	5
20					
Scorpion's heart, called *antares*	α		5 26 04	4 31 26 A	1
That over the heart			5 25 12	3 11 30 A	5.6
That following the heart to ſouth	τ		7 07 56	6 24 23 A	4
Inform. between Opiuchus's leg.			6 59 26	4 28 18 B	6
			9 12 54	3 05 10 A	6
25					
In the firſt ring of the tail	ε		11 03 32	11 39 49 A	3
More north and poſt. to this			12 22 01	10 29 56 A	6
			13 12 55	1 21 50 B	6
			15 28 15	3 53 47 A	6
			15 55 15	3 20 08 A	6
30					
			16 12 46	3 29 39 A	6.7
			17 00 27	1 42 28 A	6.7
			17 43 57	0 59 54 A	7
Preced. of two in the ſting	υ		19 41 16	13 57 14 A	4
Subſequent			20 15 10	13 44 20 A	3
35					
In the firſt joint of the back	μ		12 15 14	15 24 59	3
Nebulous of the third joint	ζ		13 8 40	19 5 5	N
Contiguous to the preced.			13 20 12	19 37 17	4
In the fourth joint	η		16 53 4	20 8 53	4
In the fifth	θ		21 44 57	19 37 36	2
40					
In the ſixth	ι		23 40 19	16 41 41	3.4
In the ſeventh	κ		22 37 29	15 36 38	4
Informis near the tail			24 7 30	13 37 15	4
Between the tail and the bow			24 55 24	11 24 34	4

Scorpio, in *Botany*, a name by which ſome of the old authors have called the *geniſta ſpinoſa*, or common furze buſh. Ger. Emac. Ind. 2.

SCORPIOIDES, in *Ichthyology*, the name of a fiſh of the gottorugine kind, but differing in colour, being of a faint green, variegated with black ſpots; and in either wanting the eye fins, or elſe having them extremely minute. See Gottorugine.

Scorpioides, in *Botany*. See Caterpillars.

SCORPION, *ſcorpio*, in *Zoology*, a genus of inſects of the order of *aptera:* the characters of which are, that it has eight legs, and a pair of claws at the head; eight eyes, three on each ſide of the thorax, and two in the back; two claw-like feelers; a long jointed tail, terminated by a bent pointed weapon; and two pectines, or kinds of combs, between the breaſt and the abdomen. Linnæus enumerates ſix ſpecies.

The opinions of authors are very different as to the ſting of the *ſcorpion*; ſome aſſerting that there is an opening in it, through which a poiſonous liquor is thrown into the wound made by it, as is the caſe in the tooth of the viper, &c. and others affirming that there is no ſuch opening.

Galen affirms that there is none, but moſt of the writers of the middle ages aſſert that there is. But the whole is ſet in the cleareſt light by ſignior Redi, who took the pains of examining microſcopically the ſtings of *ſcorpions*, brought alive from Tunis, Egypt, and Italy, and found in all the trials, which he made with ſeveral of them, a ſmall drop of white liquor upon the ſting. And Mr. Leewenhoek diſcovered an opening on each ſide of the ſting of this creature, for the emiſſion of the poiſon, which he ſuppoſes is not diſcharged till the ſting is buried in the wound. Baker's Microſcope, p. 213.

Mr. de Maupertuis having cauſed *ſcorpions* to bite ſeveral animals, of which very few died, or ſuffered any more than the pain of the ſting, is of opinion, that oil of *ſcorpions*, and other vulgar antidotes to the poiſon of theſe animals, have rather got their reputation from the innocence of the ſting of theſe creatures than from any conſiderable virtue in the medicines. Mem. de l'Acad. Science. 1731.

Scorpion, *water*, *ſcorpio paluſtris*, a name given to a very remarkable ſpecies of water-inſect. It is a very thin and light little creature, yet it is but a very ſlow mover. Its head is very ſmall, and is hard to the touch, and of a paler brown than the reſt of the body; and this is terminated by a very fine and ſharp hollow proboſcis, of the ſame colour and texture.

The eyes are ſmall, but prominent, and very hard and black; the ſhoulders are broad and flat, of the ſame colour with the head, and wrinkled on the ſurface; the triangular ſpot between the wings is black and ſhining; the body is of a bright red-lead colour on the back, and of a faint duſky brown on the belly, and compoſed of ſix joints, covered with a ſort of ſcales; the outer wings are hard and firm, and of a dark muddy brown; the inner wings are of a duſky white, varied with a red-lead colour; the two fore-legs are broader and thicker than the reſt, and end in ſhort blunt claws; the hinder pair are the longeſt, and both theſe and the middle ones terminate in a ſharp claw: they are all of a pale brown, and ſomewhat tranſparent; the tail is long and ſtraight, compoſed of two ſlender briſtles of a pale brown.

It lives among the weeds in clear ſtanding waters, and is continually watching for its prey. It feeds on other inſects, and is particularly fond of the *cicada aquatica*, or worm of the great libella. It ſeizes its prey with the fore legs, and holds it faſt in them while the proboſcis pierces into the body, and ſucks the juices. See *Tab. of Inſects*, N° 8.

Scorpion *fly*, in *Natural Hiſtory*, a name given by Mouffet, and other writers, to a kind of fly, remarkable for carrying the end of its tail turned up in the form of the *ſcorpion*'s ſting.

Its diſtinguiſhing characters are theſe: its roſtrum, or trunk, is of a cylindric figure, and of a horny ſtructure; and its tail furniſhed with a weapon of the cheliform kind.

There are two very beautiful ſpecies of theſe. The one has ſilvery wings, variegated with three tranſverſe ſtreaks of black towards the ends; the head is black; and the breaſt, ſhoulders, and feet, whitiſh; the reſt of the body is black; the tail, which repreſents a ſting, has five joints, three of which are red, and the others black; the end of the tail alſo is forked, and the forks black, and turned up like the ſting of a *ſcorpion*.

The other reſembles this in many reſpects; but the end of the tail is thicker, and the forks blunter; the head is dunniſh, the mouth long, and each wing variegated with ſix black ſpots, of a large ſize.

Scorpion, *ſcorpio*, is alſo the name of an ancient military engine, uſed chiefly in the defence of walls, &c.

Marcellinus deſcribes the *ſcorpio*, as conſiſting of two beams bound together by ropes. From the middle of the two, roſe a third beam, ſo diſpoſed, as to be pulled up and let down at pleaſure; and on the top of this were faſtened iron hooks, where was hung a ſling, either of iron or hemp; and under the third beam lay a piece of hair-cloth full of chaff, tied with cords.

To uſe the engine, a round ſtone was put into the ſling, and four perſons on each ſide, looſening the beams bound by the ropes, drew back the erect beam to the hook: when, the engineer ſtanding on an eminence, giving a ſtroke with a hammer on the cord to which the beam was faſtened with its hook, ſet it at liberty; ſo that hitting againſt the ſoft hair-cloth, it ſtruck out the ſtone with a vaſt force.

It had its name *ſcorpio*, becauſe when the long beam or tiller was erected, it had a ſharp top, in manner of a ſting. More modern times have given it the name *onager*, *wild aſs*, becauſe that animal, when hunted, flings back ſtones.

Scorpion, *graſs*. See Caterpillars.

Scorpion *graſs*, *mouſe-ear*. See Mouse-*ear*.

Scorpion *ſena*. See Sena.

Scorpion's *thorn*. See Furze.

SCORPIURUS. See Caterpillars.

SCORPIUS *marinus*, in *Ichthyology*. See Father-*laſher*.

SCORTIUM, among the Romans, a meaſure of capacity of a round form, which uſed always to be heaped.

SCORTUM. See Scrotum.

SCORZONERA, in *Botany*. See Viper's *graſs*.

SCOT, Scotta, or Scottus, a cuſtomary contribution laid upon all ſubjects, according to their ability.

Whoever are aſſeſſed to any contribution, though not by equal portions, are ſaid to pay *ſcot* and *lot*.

Aſſeſſments by commiſſioners of ſewers are called *ſcots*.

SCOT, *church* and *ſoul*. See CHURCH and SOUL-*ſcot*.

SCOTAL, or SCOTALE, is uſed where any officer of a foreſt keeps an ale-houſe within the foreſt, by colour of his office cauſing people to come to his houſe, and there ſpend their money, for fear of his diſpleaſure. We find it mentioned in the Charter of the Foreſt, cap. 8. *Nullus foreſtarius faciat* ſcotallas, *vel garbas colligat, vel aliquam collectam faciat*, &c. Manwood, 216.

The word is compounded of *ſcot* and *ale*, and by tranſpoſition of the words, is otherwiſe called *aleſhot*.

SCOTER, in *Ornithology*, the name of a ſpecies of duck, *anas nigra*, called alſo in ſome places the *black-diver*.

It is nearly of the ſize of the common duck, but of a rounder body, and is all over of a deep ſhining and beautiful black. It is very common on the ſhores of Lancaſhire, and ſome other counties. It lives only about ſalt waters, and is a very great diver. This bird is the *macreuſe* of the French, and allowed in the Romiſh church to be eaten in Lent.

SCOTIA, in *Architecture*, a ſemicircular cavity or channel between the tores, in the baſis of columns. See *Tab. Arch. fig.* 4.

The *ſcotia* is a concave, dark moulding; whence its name, viz. from σκοτος, *obſcurity, darkneſs*.

The *ſcotia* has an effect juſt oppoſite to that of the quarter-round. Our workmen frequently call it the *caſement*.

It is alſo called TROCHILUS, partly from its form.

In the Ionic and Corinthian baſe there are two *ſcotias*, the upper whereof is the ſmaller.

According to Felibien, the CAVETTO is a fourth part of the *ſcotia*.

SCOTINUS, in *Botany*, the name of a ſhrub called by the Latins *cotinus*, and *cotinus coriaria*, to diſtinguiſh it from the *cotinus*, κοτινος, of the Greeks, which was the *oleaſter*, or wild olive.

The Italians call the *cotinus coriaria*, ſometimes *ſcotinus*, and ſometimes *ſcotanus*; the latter word ſeems an erronenus way of writing the former, which is only the Roman name of the ſame tree, with an *ſ* put before the firſt letter; and this is very common with the Italians, in their adopting Latin words.

SCOTISTS, a ſect of ſchool divines and philoſophers; thus called from their founder, J. Duns Scotus, a Scottiſh, or, as others ſay, an Iriſh Cordelier; who, in the fourteenth century, maintained the *immaculate* CONCEPTION of the Virgin, or that ſhe was born without original ſin; in oppoſition to Thomas Aquinas, and the Thomiſts.

As to philoſophy, the *Scotiſts* were, like the Thomiſts, Peripatetics; only diſtinguiſhed by this, that in each being, as many different qualities as it had, ſo many different formalities did they diſtinguiſh; all diſtinct from the body itſelf, and making, as it were, ſo many different entities; only theſe were metaphyſical, and, as it were, ſuperadded to the being.

The *Scotiſts* and Thomiſts likewiſe diſagreed about the nature of the divine co-operation with the human will, the meaſure of divine grace that is neceſſary to ſalvation, and other abſtruſe and minute queſtions, which it is needleſs to enumerate.

SCOTODINOS, a term uſed by medical writers to expreſs a vertigo, or dizzineſs of the head, attended with a dimneſs of ſight.

SCOTOMIA, or SCOTOMA, in *Medicine*, a dizzineſs or ſwimming in the head, wherein the animal ſpirits are ſo whirled about, that external objects ſeem to go round. See VERTIGO.

SCOTTA, or SCOTTUS. See SCOT.

To SCOUR *a line*, in the *Military Language*, is to flank it ſo as to ſee directly along it; that a muſket-ball, entering at one end, may fly to the other, leaving no place of ſecurity.

SCOURINGS, among *Farriers*, ſuch gentle purges as preſerve horſes from noxious humours.

SCOUTS, in *Military Language*, are generally horſemen ſent out before, and on the wings of, an army, at the diſtance of a mile or two, to diſcover the enemy, and give the general an account of what they obſerve.

SCRAPER, an inſtrument uſed in mezzotinto engraving, formed much in the manner of a knife, except that the edge is ſtraight till near the point, and there ſlopes off at an angle from both ſides; the lines of which ſlopes meeting, form another angle of the point; but the ſlope on one ſide is much longer than that of the other.

SCRAPING *in mezzotinto*. See MEZZOTINTO.

SCRAPING, in *Naval Language*, is the act of ſhaving off the dirty ſurface of the plank, in a ſhip's ſide or decks, particularly after a voyage, or when the ſeams have been covered with a new compoſition of melted pitch or roſin. The inſtrument with which this is performed is called a *ſcraper*.

SCRATCH, in the language of the ſalt-workers of our country, the name of a calcareous, earthy, or ſtony ſubſtance, which ſeparates from ſea-water in boiling it for ſalt.

This forms a thick cruſt in a few days on the ſides and bottoms of the pans, which they are forced to be at the pains of taking off once in a week or ten days, otherwiſe the pans burn away, and are deſtroyed. See SALT.

This is no other than the ſame ſubſtance which cruſts over the inſides of our tea-kettles, and is truly a ſpar, ſuſtained more or leſs in all water, and ſeparable from it by boiling. The ſhells of ſea-fiſh have great affinity in their ſubſtance and nature with this, both being powerful alkalis, and both eaſily calcining into lime.

The *magneſia alba*, ſo celebrated in Germany for its mild purgative and alkaline virtues, ſeems very nearly allied to this earth; and it is probable, according to Hoffman, that the purging virtues of many ſprings are owing to the quantities they contain of this ſubſtance.

SCRATCH-*pans*, in the Engliſh *Salt-Works*, a name given to certain leaden pans, which are uſually made about a foot and a half long, a foot broad, and three inches deep, and have a bow, or circular handle of iron, by which they may be drawn out with a hook, when the liquor in the pan is boiling. See SALT.

The uſe of theſe pans is to receive the *ſcratch*; and theſe pans being placed at the corners of the ſalt-pan, where the heat is leaſt violent, catch it as it ſubſides there.

SCRATCHES, among *Farriers*, a diſtemper incident to horſes, conſiſting of dry ſcabs, chops, or rifts, that breed between the heel and the paſtern joint.

There are various kinds of *ſcratches*, diſtinguiſhed by various names, as crepances, rats-tails, mules, kibes, pains, &c. which are all ſo many ſpecies of the ſame malady, engendered from ſome hot humours falling on the legs, or from the fumes of the beaſt's own dung lying under his heels, or near them, or for want of rubbing his heels, eſpecially after a journey, from over hard riding, &c.

The diſorder begins firſt with dry ſcabs in the paſtern joint, in ſeveral forms. It is known by the ſtaring, dividing, and curling of the hair on the part. For the cure of this diſorder, ſee GREASE.

In order to prevent it, the heels ſhould be kept ſupple with currier's dubbing, which is made of oil and tallow; by uſing this precaution before exerciſe, and waſhing the heels with warm water when the horſe comes in, the *ſcratches* will be prevented.

SCRATCH-WORK, *ſgraffiata*, a way of painting in freſco, by preparing a black ground, on which is laid a white plaſter; which white being taken off with an iron bodkin, the black appears through the holes, and ſerves for ſhadows.

This kind of work is laſting; but being very rough, it is unpleaſant to the ſight. It is chiefly uſed to embelliſh the fronts of palaces, and other magnificent buildings.

SCREAMER, *palamedea* of Linnæus, in *Ornithology*, a genus of *grallæ*; the characters of which are, that the bill is conic, the upper mandible being hooked; the feet are cloven, and have four toes. Pennant calls this the *ſcreamer*, on account of the violent noiſe it makes. There are two ſpecies, which inhabit South America. See ANHIMA and CARIAMA.

SCREEN, an inſtrument for keeping off the wind, or the heat of the fire.

SCREEN is alſo uſed for a frame of laths to ſift earth, ſand, gravel, &c.

SCREEN likewiſe denotes a wire-frame for ſeparating of corn from duſt, ſand, cockle, &c.

SCREW, or SCRUE, *cochlea*, in *Mechanics*, one of the ſix mechanical powers; chiefly uſed in preſſing or ſqueezing bodies cloſe, though ſometimes alſo in raiſing weights. See MECHANICAL *powers*.

The *ſcrew* is a right cylinder, as AB (*Tab* VI. *Mechanics*, *fig.* 105.) furrowed ſpiral-wiſe: it is generated by the equable motion of a right line FG, (*fig.* 106.) around the ſurface of a cylinder; while, at the ſame time, the point I deſcends equably from F towards G. Or, it may be conceived to be made by cutting a piece of paper into the form of an inclined plane, or half wedge, and then coiling it round a cylinder. If the furrowed ſurface be convex, the *ſcrew* is ſaid to be *male*; if concave, it is *female*.

Where motion is to be generated, the male and female *ſcrew* are always joined; that is, whenever the *ſcrew* is to be uſed as a ſimple engine, or mechanical power. When joined with an axis in peritrochio, there is no occaſion for a female; but in that caſe it becomes part of a compound engine.

The *ſcrew* cannot properly be called a ſimple machine, becauſe it is never uſed without the application of a lever, or winch, to aſſiſt in turning it.

Screw, *doctrine of the.* 1. If, as the compaſs, deſcribed by the power in one turn of the *ſcrew*, is to the interval or diſtance between any two immediate threads, or ſpiral windings, as B I (meaſured according to the length of the *ſcrew)*, ſo is the weight or reſiſtance to the power; then the power and the reſiſtance will be equivalent one to the other; and, conſequently, the power being increaſed, ſo as to counteract the friction of the *ſcrew*, which is very conſiderable, will overcome the reſiſtance. For it is evident, that in one turn of the *ſcrew*, the weight is ſo much lifted up, or the reſiſtance ſo much moved, or the thing to be preſſed is ſqueezed ſo much cloſer together, as is the diſtance between two immediate ſpirals; and in the ſame time, the power is ſo much moved, as is the compaſs deſcribed by the ſaid power in one turn of the *ſcrew*. Wherefore the velocity of the weight (or whatſoever anſwers thereto) will be to the velocity of the power, as is the ſaid diſtance between the ſpirals to the compaſs deſcribed by the power, in one revolution or turning round of the *ſcrew*; ſo that the gaining in power is here recompenſed by the loſs in time.

2. As the diſtance between two threads, B I, is leſs; the power required to overcome the ſaid reſiſtance is leſs; therefore the finer the thread, the eaſier the motion.

3. If the male *ſcrew* be turned in the female, at reſt, a leſs power will be required to overcome the reſiſtance, as the lever or ſcytala, C D (*fig.* 107.) is the longer.

4. The diſtance of the power from the centre of the *ſcrew*, C D, the diſtance of the two threads I K, and the power to be applied in D, being given, to determine the reſiſtance it will overcome: or, the reſiſtance being given, to find the power neceſſary to overcome it.

Find the periphery of a circle deſcribed by the radius C D; then to the diſtance between the two threads, the periphery juſt found, and the given power; or, to the periphery found, the diſtance of the two threads I K, and the given reſiſtance, find a fourth proportional. This, in the former caſe, will be the reſiſtance that will be overcome by the given power; and in the latter, the power neceſſary to overcome the reſiſtance.

E. gr. Suppoſe the diſtance between the two threads, 3, the diſtance of the power from the centre of the *ſcrew* C D, 25, and the power 30 pounds; the periphery of the circle to be deſcribed by the power, will be found 157. Therefore, as 3 : 157 : : 30 : 1570, the weight to which the reſiſtance is equal.

5. The reſiſtance to be overcome by a given power being given; to determine the diameter of the *ſcrew*, the diſtance of two threads I K, and the length of the ſcytala or handle; the diſtance of the threads, and the diameter of the *ſcrew*, may be aſſumed at pleaſure, if the male be to be turned in the female by a handle. Then, as the given power is to the reſiſtance it is to overcome, ſo is the diſtance of the threads to a fourth number, which will be the periphery to be deſcribed by the handle C D, in a turn of the *ſcrew*. The ſemidiameter of this periphery, therefore, being ſought, we have the length of the handle C D. But if the female *ſcrew* be to be turned about the male, without any handle; then the periphery and ſemidiameter found will be very nearly thoſe of the *ſcrew* required.

E. gr. Suppoſe the weight 6000, the power 100, and the diſtance of the threads 2 lines; for the periphery to be paſſed over by the power, ſay 100 : 6000 : : 2 : 120; the ſemidiameter of which periphery being $\frac{1}{3}$ of 120=40 lines, will be the length of the handle, if any be uſed; otherwiſe the ſide of the female *ſcrew* muſt be 40 lines. Mr. Hunter has deſcribed a new method of applying the *ſcrew* with advantage in particular caſes, in Phil. Tranſ. vol. lxxi. part i. p. 58, &c.

Screw, *endleſs.* If a *ſcrew* be ſo fitted as to turn a dented wheel D F (*fig.* 108.) it is called an *endleſs*, or *perpetual ſcrew*; becauſe it may be turned for ever, without coming at an end. From the ſcheme, it is evident enough, that while the *ſcrew* turns once round, the wheel only advances the diſtance of one tooth.

Screw, *doctrine of the endleſs.* 1. If the power applied to the lever, or handle of an *endleſs ſcrew* A B, be to the weight, in a ratio compounded of the periphery of the axis of the wheel E H, to the periphery deſcribed by the power, in turning the handle, and of the revolutions of the wheel D F, to the revolutions of the *ſcrew* C B, the power will be equivalent to the weight.

Hence, 1. As the motion of the wheel is exceedingly ſlow, a ſmall power may raiſe a vaſt weight, by means of an *endleſs ſcrew*; for this reaſon, the great uſe of the *endleſs ſcrew* is, either where a great weight is to be raiſed through a little ſpace; or, where a very ſlow, gentle motion is required. On which account it is very uſeful in clocks and watches.

2. The number of teeth, the diſtance of the power from the centre of the *ſcrew* A B, the radius of the axis H E, and the power, being given; to find the weight it will raiſe.

Multiply the diſtance of the power from the centre of the *ſcrew* A B, into the number of teeth: the product is the ſpace of the power paſſed through, in the time the weight paſſes through a ſpace equal to the periphery of the axis. Find a fourth proportional to the radius of the axis, the ſpace of the power now found, and the power. This will be the weight which the power is able to ſuſtain. Thus, if A B = 3, the radius of the axis H E = 1; the power 100 pounds, number of teeth of the wheel D F 48; the weight will be found 14,400; whence it appears, that the *endleſs ſcrew* exceeds all others in increaſing the force of a power.

A machine for ſhewing the power of the *ſcrew*, may be contrived in the following manner. Let the wheel C (*fig.* 109.) have a *ſcrew a b* on its axis, working in the teeth of the wheel D, which we may ſuppoſe to be forty-eight in number. It is plain, that for every revolution of the wheel C, and *ſcrew a b*, by the winch A, the wheel D will be moved one tooth by the *ſcrew*; and, therefore, in forty-eight revolutions of the winch, the wheel D will be turned once round. Then, if the circumference of a circle, deſcribed by the handle of the winch, be equal to the circumference of a groove *e* round the wheel D, the velocity of the handle will be forty-eight times as great as the velocity of any given point in the groove. Conſequently, if a line G goes round the groove *e*, and has a weight of forty-eight pounds hung to it below the pedeſtal E F, a power equal to one pound at the handle will balance and ſupport the weight. To prove this by experiment, let the circumferences of the grooves of the wheels C and D be equal to one another; and then if a weight H of one pound be ſuſpended by a line going round the groove of the wheel C, it will balance a weight of forty-eight pounds hanging by the line G; and a ſmall addition to the weight H will cauſe it to deſcend, and ſo raiſe up the other weight. If the line G, inſtead of going round the groove *e* of the wheel D, goes round its axle I, the power of the machine will be as much increaſed, as the circumference of the groove *e* exceeds the circumference of the axle; and if we ſuppoſe it to be ſix times, then one pound at H will balance ſix times 48, or 288 pounds hung to the line on the axle; and hence the power or advantage of this machine will be as 288 to 1; i. e. a man, who by his natural ſtrength could lift a hundred weight, will be able to raiſe 288 hundred, or $14\frac{8}{20}$ ton weight by this engine. Ferguſon's Mech. edit. 4to. p. 44.

Screw, *Archimedes's*, or the *ſpiral pump*, is a machine for the raiſing of water, firſt invented by Archimedes.

Its ſtructure and uſe will be underſtood by the following deſcription of it. A B C D (*Tab.* VI. *Hydraulics*, *fig.* 61.) is a wheel, which is turned round, according to the order of the letters, by the fall of water E F, which need not be more than three feet. The axle G of the wheel is elevated ſo as to make an angle of about 44° with the horizon; and on the top of that axle is a wheel H, which turns ſuch another wheel I of the ſame number of teeth; the axle K of this laſt wheel being parallel to the axle G of the two former wheels. The axle G is cut into a double-threaded *ſcrew* (as in *fig.* 62.) exactly reſembling the *ſcrew* on the axis of the fly of a common jack, which muſt be (what is called) a right-handed *ſcrew*, like the wood *ſcrews*, if the firſt wheel turns in the direction A B C D; but muſt be a left-handed *ſcrew*, if the ſtream turns the wheel the contrary way; and the *ſcrew* on the axle G muſt be cut in a contrary way to that on the axle K, becauſe theſe axles turn in contrary directions. Theſe *ſcrews* muſt be covered cloſe over with boards, like thoſe of a cylindrical caſk; and then they will be ſpiral tubes. Or, they may be made of tubes of ſtiff leather, and wrapt round the axles in ſhallow grooves cut therein, as in *fig.* 63. The lower end of the axle G turns conſtantly in the ſtream that turns the wheel, and the lower ends of the ſpiral tubes are open into the water. So that, as the wheel and axle are turned round, the water riſes in the ſpiral tubes, and runs out at L through the holes M, N, as they come about below the axle. Theſe holes, of which there may be any number, as four or ſix, are in a broad cloſe ring on the top of the axle, into which ring the water is delivered from the upper open ends of the *ſcrew* tubes, and falls into the open box N. The lower end of the axle K turns on a gudgeon, in the water in N; and the ſpiral tubes in that axle take up the water from N, and deliver it into another ſuch box under the top of K; on which there may be ſuch another wheel as I, to turn a third axle by ſuch a wheel upon it. And in this manner water may be raiſed to any given height, when there is a ſtream ſufficient for that purpoſe to act on the broad float-boards of the firſt wheel. Ferguſon's Mechanics, Supplement, p. 22.

Screw, in the *Manege*. See Splent.

Screw-*ſhell*, the Engliſh name of the turbo.

Screw-*tree*, in *Botany*. See Helicteres.

SCRIBE, *Scriba*, ספר *ſopher*, derived from ספר *ſaphar*, *numeravit*, whence ספר *ſepher*, *liber*, a principal officer in the Jewiſh law, whoſe buſineſs was to write, and interpret Scripture.

The *Scribes*, according to the etymological meaning of the term, were perſons employed about books, writings, numbers, or accounts; in tranſcribing, reading, explaining, &c.

We find no mention of *Scribes*, in the Old Teſtament, before Ezra, chap. vii. 6. whence ſome learned men have concluded, that the office was brought from Chaldæa and Aſſyria, and firſt eſtabliſhed by the Jews after their return from the Babyloniſh captivity. However, Ezra's being called a *Scribe*, which was a general title given to men of literature, will not prove the office of eccleſiaſtical *Scribes*, as it occurs in our Saviour's time, to have been ſo ancient. It probably grew up by degrees, after the ſpirit of prophecy ceaſed among the Jews; for when they had no prophet to reſolve their doubts about doctrine or worſhip, they fell into diſputes, and ſplit into ſects and parties; which made an order of men neceſſary, whoſe proper buſineſs it ſhould be to ſtudy the law, that they might explain and teach it to the people.

The *Scribes* were in great credit and eſteem among the Jews, and had even the precedency of the prieſts and ſacrificers.

The *Scribes* are referred by moſt authors to two general claſſes; viz. *civil*, and *eccleſiaſtical Scribes*: the former were employed about any kind of civil writings or records, and the latter were ſuch as addicted themſelves to ſtudying, tranſcribing, and explaining the holy Scriptures. Of the *civil Scribes* there were various ranks and degrees, from the common ſcrivener, or public notary or ſchoolmaſter, to the principal ſecretary of ſtate. As for the *eccleſiaſtical Scribes*, they were the learned of the nation, who expounded the law, and taught it to the people; and they are, therefore, ſometimes called *νομοδιδασκαλοι*, *doctors of the law*, or *νομικοι*, *lawyers*. Compare Matt. xxii. 35. with Mark xii. 28. Theſe *Scribes*, who were generally Phariſees, were the preaching clergy among the Jews; and whilſt the prieſts attended the ſacrifices, they inſtructed the people. Joſ. Scaliger endeavours to eſtabliſh a diſtinction between the *Scribes* of the people, referred to by Herod, Matt. ii. 4. and the *Scribes of the law*. The former he conſiders as a ſort of public notaries, who were employed in ſecular buſineſs; the latter as preachers and expounders of the law. But the phraſe, *Scribes of the law*, no where occurs in Scripture; and the *Scribes of the people*, whom Herod conſulted, were applied to, on account of their ſkill in explaining Scripture prophecies. Matt. xvii. 10. And they were probably called *Scribes* of the people, becauſe they were the ſtated and ordinary teachers of the people. Mark i. 22. Camero obſerves, that a key was delivered to each *Scribe*, as a badge of his office, when he firſt entered upon it, to which our Saviour may be ſuppoſed to allude, Luke xi. 52.

Scribe, *ſcriba*, was alſo the title of an officer, among the Romans, who wrote decrees, or acts, and made out authentic copies thereof.

Every magiſtrate had his *ſcriba*, or ſecretary; ſo that there were *ſcribæ edilitii*, *prætorii*, *quæſtorii*, &c.

The *ſcribæ* were not admitted to the management of the principal offices of the republic, unleſs they relinquiſhed their profeſſion.

In the time of the emperors, they were alſo called *notarii*; becauſe they made uſe of abbreviations, and ſhort notes, in writing.

SCRIBING, in *Joinery*, &c. a term uſed, when one ſide of a piece of ſtuff being to be fitted to the ſide of ſome other piece, which laſt is not regular; to make the two join cloſe together all the way, they *ſcribe* it.

That is, they lay the piece of ſtuff to be *ſcribed* cloſe to the other piece they intend to *ſcribe* to, and open their compaſſes to the greateſt diſtance the two pieces any where ſtand from each other; then, bearing one of the legs againſt the ſide to be *ſcribed* to, with the other point they draw a line on the ſtuff to be *ſcribed*. Thus have they a line on the irregular piece parallel to the edge of the regular one; and if the ſtuff be wrought away exactly to the line, when the two pieces are put together, they will ſeem a joint.

SCRIPTORIUS *calamus*. See Calamus.

SCRIPTULUM, among the Romans, the twenty-fourth part of an ounce, and equal to two *oboli*. See Obolus.

SCRIPTULUS, a word uſed by ſome inſtead of *ſcrupulus*, a ſcruple, or weight of twenty grains.

SCRIPTURARY, among the Jews. See Caraites.

SCRIPTURE, or Scriptures. See Bible.

Scripture, *canon of*. See Canon.

Scripture, *ſcoffing &c. at*, is puniſhable by fine and impriſonment. See Blasphemy.

SCRIVENER, one who lends money out at intereſt; it is alſo uſed for one who draws contracts.

Scriveners are mentioned in the ſtatute againſt uſury and exceſſive intereſt of money. 12. Ann. cap. 6. If a *ſcrivener* is entruſted with a bond, he may reeeive the intereſt; and if he fails, the obligee ſhall bear the loſs; and ſo it is if he receive the principal, and deliver up the bond; for being entruſted with the ſecurity itſelf, it ſhall be preſumed he is entruſted with the power to receive the principal and intereſt; and the giving up the bond on payment of the money is a diſcharge thereof; but if a *ſcrivener* be entruſted with a mortgage-deed, he hath only authority to receive the intereſt, not the principal; the giving up the deed in this caſe not being ſufficient to reſtore the eſtate, but there muſt be a reconveyance, &c. Decreed in Chan. Hill. 7 Ann. 1 Salk. 157.

SCROBICULUS *cordis*, the ſame as anticardium.

SCROFANELLO, in *Ichthyology*, a name by which ſome have called a ſmall fiſh of the Mediterranean, more uſually known by the name of the scorpæna.

SCROLL, in *Heraldry*, is the ornament placed under the eſcutcheon, containing a motto or ſhort ſentence, alluding ſometimes to the bearings, or the bearer's name; ſometimes expreſſing ſomewhat divine or heroic; ſometimes enigmatical, &c. It is often placed by the French and Scotch above the atchievement; which, according to Sir. J. Mackenzie, is right, when the motto relates to the creſt; otherwiſe it ſhould be annexed to the eſcutcheon. Thoſe of the order of knighthood are generally placed round ſhields. See Escroll.

SCROPHULÆ, formed, by diminution, from *ſcropha*, *ſow*, in *Medicine*, ſcirrhous tumors, ariſing uſually about the neck, and ſometimes on other glandulous parts; called alſo *ſtrumæ*, and popularly the *king's evil*, or ſimply, the evil.

SCROPHULARIA, in *Botany*. See Figwort.

SCROTUM, or Scortum, in *Anatomy*, the common capſula or membrane wherein the teſticles are contained; thus called from its reſembling a pouch or purſe of leather, called by the ancients *ſcortea*.

The *ſcrotum* is compoſed of the cuticle, ſituated on its external ſurface; the cutis, which lies under the cuticle, and between both which is ſpread the rete mucoſum; the membrana cellularis, which is a thin covering of a looſe and hollow texture, void of fat, adjoining the internal ſurface of the cutis; and under this membrane, a thin, muſcular, or fleſhy body, called dartos. Immediately under the expanſion of the dartos, there is diſcovered a ſecond cellular membrane, more conſiderable than the other, and communicating with it. Upon the external ſurface of the *ſcrotum* is a prominent line or ridge, called *raphe*, or the *ſeam* of the *ſcrotum*, which is continued in a perpendicular or longitudinal direction from the anus to the extremity of the penis, on its inferior part, and divides the external ſurface of the *ſcrotum* into two nearly equal portions.

The *ſcrotum* conſiſts of two diſtinct bags, one for each teſticle, and its immediate coats, formed by a duplicature of the dartos muſcle, and ſituated on each ſide of the raphe. Theſe bags are laterally connected by the intervention of a cellular membrane; and the union of the ſides of the dartos conſtitutes the partition, denominated *ſeptum ſcroti*, which is connected, on its inferior part, with the internal ſurface of the cutis under the raphe; and on its ſuperior part with the internal and external ſurface of the urethra, after having been expanded upwards betwixt the tunica vaginalis of each teſticle.

The uſe of the *ſcrotum* is to ſuſtain the teſticles, to prevent their colliſion, as alſo their falling too low, and to promote the corrugation of the *ſcrotum*.

Many authors have given accounts of the diſtemperatures of this part, of various kinds, impeding the intent of the propagation of the ſpecies: but one of the moſt remarkable of theſe, is the exceſſive growth of that part, as well in length as in breadth and thickneſs. See *Tumors of the* Testicles.

Scrotum, *hernia of the*. See Oscheocele, and Hernia *inguinalis*.

Scrotum *cordis*, the ſame as pericardium.

SCROWLS, or Scrolls, in *Architecture*. See Volute.

SCRUE. See Screw.

SCRUPI, in *Natural Hiſtory*, the name of a claſs of foſſils, formed in detached maſſes, without any cruſts; of no determinate figure, or regular ſtructure; and compoſed of a cryſtalline or ſparry matter, debaſed by an admixture of earth, in various proportions.

Under this claſs are comprehended, 1. The TELAUGIA. 2. The PETRIDIA. 3. The LITHOZUGIA. 4. The *jaſpides*, or JASPERS.

All theſe genera ſtrike fire with ſteel, only ſome more readily than others.

SCRUPLE, SCRUPULUS, SCRUPULUM, or SCRIPULUM, the leaſt of the weights uſed by the ancients, which, amongſt the Romans, was the twenty-fourth part of an ounce, or the third part of a drachm.

Scruple is ſtill a weight among us, containing the third part of a drachm, or twenty grains.

Among goldſmiths the *ſcruple* is twenty-four grains.

Scruple, in *Chronology*. The Chaldee *ſcruple* is $\frac{1}{1080}$ part of an hour, called, by the Hebrews, *helakin*. Theſe *ſcruples* are much uſed by the Jews, Arabs, and other eaſtern people, in computations of time.

Scruples, in *Aſtronomy*. *Scruples eclipſed*, that part of the moon's diameter which enters the ſhadow expreſſed in the ſame meaſure wherein the apparent diameter of the moon is expreſſed. See DIGIT.

Scruples *of half duration*, an arch of the moon's orbit, which the moon's centre deſcribes from the beginning of an eclipſe to its middle.

Scruples *of immerſion*, or *incidence*, an arch of the moon's orbit, which her centre deſcribes from the beginning of the eclipſe, to the time when its centre falls into the ſhadow. See IMMERSION.

Scruples *of emerſion*, an arch of the moon's orbit, which her centre deſcribes in the time from the firſt emerſion of the moon's limb, to the end of the eclipſe.

SCRUTATORES, among the Romans, certain officers, or ſervants, whoſe buſineſs it was to ſearch every body that came to ſalute the emperor, in order to diſcover if they had any kind of arms concealed about them. They were firſt inſtituted under the emperor Claudius.

SCRUTINY, *ſcrutinium*, in *Antiquity*, an examination, or probation, practiſed in the laſt week of Lent, on the catechumens, who were to receive baptiſm on the Eaſter-day.

The *ſcrutiny* was performed with a great many ceremonies: exorciſms and prayers were made over the heads of the catechumens. On Palm Sunday, the Lord's Prayer and Creed were given them; which they were afterwards made to rehearſe.

The proceſs was called *ſcrutinium*, *ſcrutiny*; becauſe hereby the hearts of the catechumens were ſcrutinized, or ſearched, that the prieſts might underſtand who were fit to be admitted to baptiſm.

This cuſtom was more in uſe in the church of Rome than any where elſe; though it appears, by ſome miſſals, to have been likewiſe uſed, though much later, in the Gallican church. It is ſuppoſed to have ceaſed about the year 860. Some traces of this practice ſtill remain at Vienne, in Dauphine, and at Liege.

Scrutiny is alſo uſed in the *Canon Law*, for a ticket, or little paper billet, wherein, at elections, the electors write their votes privately, ſo as it may not be known for whom they vote.

Scrutiny, among us, is chiefly uſed for a ſtrict peruſal and examination of the ſeveral votes haſtily taken at an election; in order to find out any irregularities committed therein, by unqualified voters, &c.

SCRUTORE, or SCRUTOIR (from the French *eſcritoire*) a kind of cabinet, with a door or lid opening downwards, for conveniency of writing on, &c.

SCRY, in *Falconry*, denotes a large flock of fowl.

SCUDDING, in *Sea-Language*, denotes the movement by which a ſhip is carried precipitately before a tempeſt. This expedient is never attempted in a contrary wind, unleſs when the condition of the ſhip renders her incapable of ſuſtaining the mutual efforts of the waves and wind any longer on her ſide, without being expoſed to the moſt imminent danger. A ſhip *ſcuds* either with a ſail extended on her fore-maſt, or if the ſtorm is exceſſive, without any ſail, which in the ſea-phraſe is called *ſcudding under bare poles*. In ſloops and ſchooners, and other ſmall veſſels, the ſail employed for this purpoſe is called the ſquare-ſail. In large ſhips, it is either the fore-ſail, at large, reefed, or with its gooſe-wings extended, according to the degree of the tempeſt: or it is the fore-top-ſail cloſe reefed, and lowered on the cap; which laſt is particularly uſed when the ſea runs ſo high as to becalm the fore-ſail occaſionally; a circumſtance which expoſes the ſhip to the danger of *broaching-to*. The principal hazards incident to *ſcudding* are generally a pooping ſea, the difficulty of ſteering, which expoſes the veſſel perpetually to the riſk of broaching-to, and the want of ſufficient ſea-room. Falconer.

SCULION, in *Ichthyology*, the name given by Ariſtotle, and many others of the ancient writers, to the fiſh called by later authors *catulus*, and CATULUS *major*, and in England the BOUNCE.

SCULK, amongſt *Hunters*, denotes a company; as, a *ſculk* of foxes.

SCULL. See SKULL.

Scull *cap*, in *Botany*. See SKULL *cap*.

SCULPONEÆ, among the Romans, a kind of ſhoes worn by ſlaves of both ſexes. Theſe ſhoes were only blocks of wood made hollow, like the French *ſabots*.

SCULPTURE, *ſculptura*, the art of cutting or carving wood, ſtone, or other matter, and forming various figures or repreſentations therein; as alſo of faſhioning wax, earth, plaſter, &c. to ſerve as models, or moulds, for the caſting of metalline figures.

Sculpture, in its latitude, includes both the art of working en creux, properly called ENGRAVING; and of working in relievo, which is what we more ſtrictly call *ſculpture*.

The antiquity of this art is paſt doubt; as the ſacred writings, the moſt ancient and authentic monuments we have of the earlieſt ages, mention it in ſeveral places, witneſs Laban's idols ſtolen away by Rachael, and the golden calf which the Iſralites ſet up in the deſert, &c. But it is very difficult to fix the original of the art, and the firſt artiſts, from profane authors; what we read thereof being greatly intermixed with fables, after the manner and taſte of thoſe ages.

Some make a potter of Sicyon, named Dibutades, the firſt ſculptor: others ſay the art had its origin in the iſle of Samos, where one Ideocus, and after him Theodorus, performed works of this kind, long before Dibutades's time. It is added, that Demaratus, father of Tarquin the Elder, firſt brought it into Italy upon his retiring thither; and that by means of Eucirapus and Eutygrammus, two excellent workmen herein, who communicated it chiefly to the Tuſcans; among whom it was afterwards cultivated with great ſucceſs. They add, that Tarquin ſent for Taurianus, one of the moſt eminent among them, to Rome, to make a ſtatue of Jupiter, &c. of baked earth, for the frontiſpiece of the temple of that deity.

Soon after this time, there were many ſculptors, both in Greece and Italy, who wrought altogether in earth: ſome of the moſt noted were, Chalcoſthenes, an Athenian, who made himſelf and his houſe famous by the great number of earthen figures he adorned it with; and Demophilus and Gorſanus, two painters, who enriched the temple of Ceres with great variety of painting, and earthen images. In effect, all the firſt ſtatues of the heathen deities were either of earth or wood; and it was not ſo much any frailty of that matter, or unfitneſs for the purpoſe, as the riches and luxury of the people, that firſt induced them to make images of marble, and other more precious ſtones.

Indeed, how rich ſoever the matter were, whereon they wrought, yet they ſtill firſt uſed earth, to form models thereof; and to this day, whether they be for cutting marble ſtatues with the chiſſel, or for caſting them in metal, they never undertake the one, or the other, without firſt making a perfect model thereof in earth, wax, plaſters, &c. Whence, doubtleſs, aroſe the obſervation of Praxiteles, that the art of moulding earthen figures was the natural mother of that of making marble and metalline ones; which laſt never appeared in perfection, till about three hundred years after the building of Rome; though the firſt was at its height long before.

Phidias of Athens, who came next, ſurpaſſed all his predeceſſors, both in marble, in ivory, and in metals; and about the ſame time appeared ſeveral others, who carried *ſculpture* to the higheſt perfection it ever arrived at; particularly Polycletus at Sicyon; and after him Myron; Lyſippus, who alone was allowed the honour of caſting Alexander's image in braſs; Praxiteles and Scopas, who made thoſe excellent figures, now before the pope's palace at Montecavallo; Briaxis, Timotheus, and Leochares, who, with Scopas, wrought at the famous tomb of Mauſolus, king of Caria; Cephiſſodotus, Canachus, Dædalus, Buthieus, Niceratus, Euphranor, Theodorus, Xenocrates, Pyromachus, Stratonicus, Antigonus, who wrote on the ſubject of his art; the famous authors of the Laocoon, viz. Agaſander, Polydore, and Athenodorus, and many others, the names of ſome whereof have paſſed to poſterity; while thoſe of others have periſhed with their works; for though the number of ſtatues in Aſia, Greece, and Italy, was ſo immenſe, that in Rome alone, as we are informed, there were more than there were living perſons, yet we have but few now left, at leaſt very few of the fineſt.

When Marcus Scaurus was ædile, his office obliging him to provide what was requiſite towards the public rejoicings, he adorned the ſtately theatre which he erected with three thouſand brazen ſtatutes; and though L.

Mummius, and Lucullus, brought away a great number out of Aſia and Greece, yet there were ſtill above three thouſand remaining in Rhodes, as many at Athens, and more at Delphi.

But what was moſt extraordinary, was the bigneſs of the figures, which thoſe ancient artiſts had the courage to undertake. Amongſt thoſe Lucullus brought to Rome, there was one of Apollo, thirty cubits high; the Coloſſus of Rhodes, made by Cares of Lyndos, the diſciple of Lyſippus, far exceeded this; Nero's ſtatue, made by Xenodorus, after that of Mercury, was alſo of an extraordinary ſize, being an hundred and ten feet high.

Sculpture, however, which, as we learn from Pauſanias, was brought to the higheſt perfection between the fifty-ſecond or fifty-third Olympiad, and the eighty-third, i. e. in about a hundred and twenty years from Dædalus to Phidias, continued in this ſtate no longer than to the time of Alexander the Great, during the period of about a hundred and ten years; and it then began inſenſibly to decline; not but that there were ſtill ſome fine pieces of workmanſhip made both in Greece and Italy, though not performed with ſo good a fancy, and ſuch exquiſite beauty, as ſome of the former works. Beſides that the Greek ſtatues are moſt eſteemed for the workmanſhip, there is a ſpecial difference between them, and thoſe of the Romans, as the greater part of the firſt are naked, like thoſe who wreſtle, or perform ſome other bodily exerciſe, wherein the youth of thoſe times placed all their glory: whereas the others are clad and armed, and particularly have the toga on, which was the greateſt mark of honour amongſt the Romans.

Although the arts had lain dead for many centuries, they no ſooner felt the genial warmth of protection in the generoſity of Lorenzo de Medicis, Leo X, Coſmo, grand duke of Tuſcany, &c. than they ſtarted into being, like a man awoke from ſleep, and appeared in their maturity, as it were, inſtantaneouſly. The truth of this remark will appear in an enumeration of ſome of the chief productions of ſeveral eminent modern artiſts. Lorenzo Ghiberti produced the fine gates of St. John the Baptiſt at Florence; Donatelli executed the group of Judith and Holofernes in the great ſquare of that city, and a bas-relief in the church of St. Croce; Michael Angelo formed the ſtatue of Moſes in St. Peter's de Vinculis, at Rome, a Bacchus in the gallery of Florence, and ſome figures on the monuments of the ſepulchral chapel in that place; John of Bologna produced the rape of the Sabines in the great ſquare at Florence, the large fountain in the great ſquare at Bologna, and the fine horſe at the Pont Neuf, at Paris; Roſconi and Algardi formed many ſtatues and monuments of popes, &c. in St. Peter's, and the latter executed a large bas-relief in the ſame church, repreſenting Leo I. going out to meet king Attila, whereby he ſaved the city of Rome from deſtruction, about the year 450; to Bernini we are indebted for the chair of St. Peter, ſupported by the four fathers of the church; the monuments of the popes Urban VIII. and Alexander VII. and the large fountain in the Piazza Navona; and to Francis Queſnoy, ſurnamed the Flemiſh, for a beautiful ſtatue of Chriſt, another of Suſanna, and a fine one of St. Andrew, in St. Peter's; the reputation of this artiſt for boys is unparalleled both among the ancients and moderns.

In France, the principal artiſts in *ſculpture* have been Jean Goujoin, contemporary with Michael Angelo, who formed the fountain in the Rue St. Denis, at Paris, ſome fine caryatides in the Louvre, and the *ſculptures* at the gate of St. Anthony; Puget, celebrated on account of the *ſculptures* at the gate of the town-houſe at Marſeilles, the ſtatue of St. Sebaſtian, at Genoa, and that of Milo, at Verſailles; and Girardon, for the monument of cardinal Richlieu, at the Sorbonne; the equeſtrian ſtatue of Louis XIV. at Paris, and the rape of Proſerpine, at Verſailles. For theſe laſt ſculptors we are indebted to the munificence of Louis XIV.

We are not without ſome excellent ſpecimens of *ſculpture* in England. The ſtatues of Phrenzy and Melancholy on the piers before Bethlehem hoſpital, deſerve to be ranked among the firſt performances in this art: they were executed, in the reign of Charles II. by Cibber, the father of the poet-laureat of that name. There is alſo a moſt elegant ſtatue of king Edward VI. in bronze, which ſtands in one of the courts of St. Thomas's hoſpital, in Southwark, by Sckeemaker; and one of Sir Iſaac Newton, at Cambridge, by Roubiliac. Weſtminſter abbey is the moſt famous repoſitory of *ſculpture* in England; but the figures that are here preſerved loſe much of their effect, by being crouded together, without any orderly arrangement: the monument of the duke of Argyle, and one of Mrs. Nightingale, both by Roubiliac, and Dr. Chamberlain's, by Sckeemaker, ſeem to ſtand higheſt in the public opinion.

It is probable that *ſculpture* is more ancient than painting; and if we examine the ſtyle of ancient painting there is reaſon to conclude, that *ſculpture* ſtood firſt in the public eſteem: as the ancient painters have evidently imitated the ſtatuaries, even to their diſadvantage; ſince their works have not that freedom of ſtyle, more eſpecially with reſpect to their compoſition and drapery, which the pencil might eaſily acquire to a greater degree than that of the chiſſel; but as this is univerſally the caſe, it cannot be attributed to any thing elſe beſides the higher eſtimation of the works on which they formed themſelves. Which is the moſt difficult art has been a queſtion often agitated. Painting has the greateſt number of requiſites, but at the ſame time her expedients are the moſt numerous; and, therefore, we may venture to affirm, that, whenever *ſculpture* pleaſes equally with a painting, the ſculptor is certainly the greateſt artiſt. *Sculpture* has indeed had the honour of giving law to all the ſchools of deſign, both ancient and modern, with reſpect to purity of form. The reaſon, perhaps, is, that being diveſted of thoſe meretricious ornaments by which painting is enabled to ſeduce its admirers, it is happily forced to ſeek for its effect in the higher excellencies of the art: hence elevation in the idea, as well as purity and grandeur in the forms, are found in greater perfection in *ſculpture* than in painting. Beſides, whatever may be the original principles which direct our feelings in the approbation of intrinſic beauty, they are, without doubt, very much under the influence of aſſociation. Cuſtom and habit will neceſſarily give a falſe bias to our judgment: it is, therefore, natural, and in ſome meaſure reaſonable, that thoſe arts which are temporaneous, ſhould adapt themſelves to the changes of faſhion, &c. But *ſculpture*, by its durability, and conſequent application to works of perpetuity, is obliged to acquire and maintain the eſſential principles of beauty and grandeur, that its effect on the mind may be preſerved through the various changes of mental taſte. It is conceived, that it will ſcarcely admit of a queſtion, whether the ancients or moderns have moſt excelled in this art; the palm having been ſo univerſally adjudged to the former. To determine in what proportion they are ſuperior is too difficult an attempt. Wherever there is a real ſuperiority in any art or ſcience, it will in time be diſcovered; but the world, ever fond of exceſs, never ſtops at the point of true judgment, but dreſſes out its favourite object with the ornaments of fancy, ſo that even every blemiſh becomes a beauty. This it has done by ancient *ſculpture* to ſuch a degree as not to form its judgment of *that* by any rules, but to form an opinion of *rules* by the example. As long as this is the caſe, modern art can never have a fair compariſon with the ancient. This partiality to the ancients is ſo ſtrong as to prevent almoſt all diſcrimination; and is the ſole reaſon, why many antiques, that now ſtand as patterns of beauty in the judgment of moſt connoiſſeurs, are not diſcovered to be copies. This is not more important than it is eaſy to be perceived by a judicious eye; for wherever there is a grandeur or elegance to an eminent degree in the idea and general compoſition of a ſtatue, and when the execution of the parts (called by artiſts the treating of the parts) betrays a want of taſte and feeling, there is the greateſt reaſon to conclude, that the ſtatue is a copy, though we were ever ſo certain of its antiquity. And ſurely if evidence of a picture's being a copy proportionably diminiſhes its value, the ſame rule of judgment may be no leſs properly applied to a ſtatue. Modern and ancient art can never, therefore, be fairly compared, till both are made to ſubmit to the determination of reaſon and nature. It may be obſerved, that the ancients have chiefly confined themſelves to the ſublime and beautiful; and whenever a pathetic ſubject has come before them, they have ſacrificed expreſſion to beauty. The famous group of Niobe is one inſtance of this kind; and, therefore, however, great our partiality to the ancients may be, none can heſitate to affirm, that, whenever the moderns ſhall unite great expreſſion with great beauty, they will wreſt the palm out of their hands.

The Editor is indebted for the preceding ingenious remarks to Mr. Bacon, an artiſt of very diſtinguiſhed eminence in his profeſſion.

SCULPTURE, *to perform any thing in the way of*, they begin with making a model of earth, or wax. For earthen models, they uſe but few inſtruments; their hands and fingers do almoſt the whole. For waxen models, to a pound of wax they put half a pound of colophony; ſome add turpentine, melting the whole with oil of olive; and ſome add a little vermilion, or other matter, to give it a colour. This is wrought and moulded with the fingers, like the earth.

For **SCULPTURE** *in wood*, which we properly call CARVING, the firſt thing required is, to chooſe a wood proper for the particular kind of work. If it be any thing large, and require a great deal of ſtrength and ſolidity, the hardeſt and moſt durable wood is to be choſen, as oak or cheſnut; for ſmaller works they uſe pear-tree, and ſervice-tree. But as theſe woods are very hard, for little delicate works they uſe ſofter woods, only cloſe, and of a fine grain: ſuch is the linden-tree, which the chiſſel is found to cut more eaſily, and cleanlily, than any other wood.

As to ſtatues, we find the ancients have made them of almoſt all kinds of wood: at Sicyon was an image of Apollo in box; at Epheſus, that of Diana was in cedar. As theſe two kinds of wood are very hard, and even held incorruptible, eſpecially cedar, Pliny obſerves, they were judged particularly ſuitable for the repreſentations of the deities. In a temple on mount Cyllenius, dedicated to Mercury, was an image of that god formed of the wood of the lemon-tree: others there were of the palm-tree, olive-tree, ebony, and even of the vine.

For large works, if it be only ſingle figures, it is better they conſiſt of ſeveral pieces, than of a ſingle one, on account of the liableneſs of the latter to warp; for every large piece may probably not be dried to the heart, however it may appear withoutſide. Obſerve, alſo, that the wood will not be ſo fit for working, till after it hath been cut at leaſt ten years.

Sculpture *in marble and ſtone.* In this work, the firſt thing they do is, out of a great block or marble to ſaw another of the ſize required; which is performed with a ſmooth ſteel ſaw, without teeth, caſting water and ſand thereon, from time to time; then they faſhion it, by taking off what is ſuperfluous, with a ſteel point, and a heavy hammer of ſoft iron; after this, bringing it near the meaſure required, they reduce it ſtill nearer with another finer point; they then uſe a flat cutting inſtrument, having notches in its edge, or teeth; and then a chiſſel to take off the ſcratches the former has left; till, at length, taking raſps of different degrees of fineneſs, by degrees they bring their work into a condition for poliſhing. To poliſh, or make the parts ſmooth and ſleek, they uſe pumice-ſtone and ſmalt; then tripoli; and when a ſtill greater luſtre is required, they uſe burnt ſtraw.

When any conſiderable work is undertaken, as a ſtatue, baſſo relievo, or the like, they make a model beforehand, of clay; but as this ſhrinks in drying, and eaſily cracks and breaks, they only uſe it to make a mould of plaſter, or ſtucco, wherein they caſt a figure of the ſame matter, which ſerves them thenceforth for a model, and by which they adjuſt all their meaſures and proportions. To proceed the more regularly; on the head of the model they place an immoveable circle, divided into degrees, with a moveable ruler, or index, faſtened in the centre of the circle, and divided likewiſe into equal parts. From the end of the ruler hangs a thread with a plummet, which ſerves to take all the points to be transferred thence to the block of marble, from whoſe top hangs another plummet like that of the model. See *Tab.* III. *Miſcel. fig.* 44.

Indeed there are ſome excellent ſculptors who diſapprove of this method; urging, that the ſmalleſt motion of the model changes their meaſures; for which reaſon they rather chuſe to take all their meaſures with the compaſſes.

For the caſting of ſtatues, or figures of metal, and the moulding of ſtatues, &c. *of ſtucco, plaſter,* &c. See Statue, Stuc, and Plaster. See alſo Bronze and Foundery.

SCUM, or Spume, *ſpuma,* a light excrement ariſing from liquors when briſkly ſtirred; called alſo *foam* or FROTH.

Scum is alſo uſed for the impurities which a liquor by boiling caſts up to the ſurface; and alſo for thoſe taken from off metals when in fuſion; theſe are alſo called SCORIA.

Scum *of lead,* is a kind of recrement, of various colours, procured from melted lead.

Scum *of ſilver,* is what we commonly call LITHARGE of ſilver.

Scum *of nitre.* See Nitre.

Scum *of ſalt.* See Salt.

Scum, *ſugar of the.* See Sugar.

SCUMA, a word uſed by ſome of the chemiſts for *ſquama,* the ſcales of any metal, and particularly applied to the flakes flying off from hot iron under the hammer.

SCUPPERS, in a *Ship,* are certain channels cut through the water-ways and ſides of a ſhip, at proper diſtances, and lined with plated lead, in order to carry the water off from the deck into the ſea. The *ſcuppers* of the lower deck of a ſhip of war are uſually furniſhed with a leathern pipe, called the *ſcupper-hoſe,* which hangs downward from the mouth or opening of the *ſcupper.* The intent of this is to prevent the water from entering when the ſhip inclines under a weight of ſail. Falconer.

Scupper *nails.* See Nails.

SCURFF, in *Ichthyology,* an Engliſh name for a ſpecies of ſalmon, called alſo in ſome places the *bull-trout.* It never grows to any great ſize, and differs plainly from the ſalmon of the common kind in this, that its tail is even, and not forked; its head is ſhort and thick, and its fleſh is leſs red than that of moſt of the ſalmon kind. See Salmon-*trout.*

SCURRA, in *Ornithology,* a name by which the ancients have called the *monedula,* or common JACKDAW.

SCURVOGEL, in *Ornithology,* the name of an American bird, called by ſome the *nhender-apoa,* and by the Braſilians *jabiruguacu.*

It is of the crane kind, or nearly approaching to that genus. Linnæus has made a diſtinct genus of it under the title of MYCTERIA. The beak is large, long, and acute; both the mandibles bend upwards; the upper mandible is triangular, and the lower has three corners; the noſtrils are linear, and it has no tongue; the feet are furniſhed with four toes; in the ſummit of the head this bird has a ſort of bony crown, of a mixed greyiſh and whitiſh colour; the neck is of a conſiderable length, and both that and the head are deſtitute of feathers, and are only covered by a naked ſquamoſe ſkin; it is about the ſize of the ſtork, and has a ſhort black tail; all the reſt of the feathers are white, except that the long wing-feathers are blackiſh, with ſomewhat of a purpliſh gloſs. When the ſkin is taken of, it is dreſſed ſeveral ways, and is a very delicately taſted bird. See *Tab.* III. of *Birds,* Nº 35.

SCURVY, *ſcorbutus,* in *Medicine,* a diſorder of the putrid kind; the cauſe and cure and which have been lately the ſubject of very ſucceſsful inveſtigation. This is the ſame diſtemper which Pliny, (Nat. Hiſt. lib. xxv. ſect 6.) from the ulcers in the mouth and legs, calls *ſtomocace,* and *ſceletyrbe*; aſcribing it to the drinking of bad waters; and recommending, as a remedy for it, our hydrolapathum, or water-dock. Hippocrates (De Int. Affect. § 34. and De Aerib. Aquis, & Locis, § 10.) long before his time, deſcribed it as a diſeaſe of the ſpleen, owing chiefly to cold, raw, and turbid waters.

This diſorder prevails chiefly in cold northern countries, eſpecially in low damp ſituations, abounding with fens, marſhes, and ſtagnating water. Some writers, obſerving that it rages moſt among the inhabitants of northern climates, and particularly about the Baltic ſea, have erroneouſly aſcribed it to the coldneſs of the air, which checks perſpiration; but the true cauſes are their living on ſalted meat, their want of greens and fruit in the winter, and of fermented liquor, and their dwelling in damp, foul, and ill-aired houſes. And that this is the cauſe we may infer from the ſtate of the Laplanders, and others, who know nothing of the *ſcurvy,* though they live in as high a latitude; becauſe they eat no putrid and ſalted meats, but uſe through the winter the freſh fleſh of their rein-deer. We may obſerve in general, that ſedentary people of a dull melancholy diſpoſition, are moſt ſubject to this diſeaſe; and that it has been moſt powerful and fatal to ſailors in long voyages.

The *ſea-ſcurvy* has been ſo much more violent and deſtructive than the diſorder that has been diſtinguiſhed by the denomination of *ſcurvy* on the land, as to have led ſome writers to conſider them as two diſorders, of different kinds; but others have attributed their different ſymptoms merely to the various degrees of their malignity. Sir John Pringle obſerves, that the diſtemper commonly, but erroneouſly, in this country called the *ſcurvy,* belongs to a claſs of diſeaſes totally different from the *ſea-ſcurvy,* and ſo far, he ſays, is the commonly received opinion, that there are few conſtitutions altogether free from a ſcorbutic taint from being true, that, unleſs among ſailors, and others in like circumſtances with them, more particularly with reſpect to thoſe who uſe a ſalt and putrid diet, and eſpecially if they live in foul air and uncleanlineſs, he apprehends, there are few diſorders leſs frequent.

Scurvy, *cauſes of the.* As the *ſcurvy* was found to be moſt violent at ſea, the cauſe of it was generally ſought for in ſome apprehended noxious quality of the ſea air; but Sir John Pringle long ago obſerved, that even in the longeſt voyages, cleanlineſs, ventilation, and freſh proviſion were effectual preſervatives; and that upon the ſea-coſt, free from marſhes, the inhabitants, who frequently breathed the air from the ſea, were not liable to this diſeaſe. Accordingly, he agreed with others in aſcribing the *ſcurvy* to a ſeptic reſolution; that is, a beginning corruption of the whole habit, ſimilar to that of every animal ſubſtance when deprived of life; and this hypotheſis was verified by an examination of the ſymptoms in the ſcorbutic ſick, and by the appearances in their bodies after death. Hsving diſcovered the putrefying quality of *ſea*-SALT, he was naturally led to attribute the *ſcurvy* partly to the long uſe of ſalted meats. He was confirmed in this opinion, by conſidering, that though the Laplanders are generally exempt from this diſorder, yet in thoſe provinces which border on Lapland, where the inhabitants eat ſalted meats, they are as much troubled with the *ſcurvy* as in any other country. It has, indeed, been aſſerted, that men living on ſhore will be affected with the *ſcurvy*, though they have never been confined to ſalted meat; but of this he has known no inſtance, except in thoſe who breathed a marſhy air, or which was otherwiſe putrid, and who wanted exerciſe, fruits, and the common herbs. Under ſuch circumſtances it muſt be owned, that the humours will corrupt in the ſame manner, though not in the ſame degree, with thoſe of ſeamen. Whatever, therefore, contributes to produce or promote the putrefactive diatheſis, in which the peculiar and diſtinguiſhing nature of this diſeaſe conſiſts, may be juſtly conſidered as the remoter cauſe of it. Thus, it has been found to proceed from a ſuppreſſion of the cuſtomary evacuations, from grief, fear, and other depreſſing paſſions; from an hereditary taint, in which caſe a ſmall additional cauſe will excite it; from a neglect of cleanlineſs, bad clothing, want of proper exerciſe, confined air, unwholeſome food, long uſe of mercury, or any diſeaſe which greatly weakens the body, or vitiates the humours.

According to Dr. Lind, the principal and main prediſpoſing cauſe of the *ſcurvy* is too great a degree of moiſture in the atmoſphere; and the uſe of ſalt diet, bad water, or foul air, can only be reckoned as ſecondary cauſes, which will not of themſelves produce the diſeaſe. Dr. Macbride, in conformity to the modern theory of PUTREFACTION, maintains, that as dead bodies become putrid from the loſs of their *fixed* AIR, the immediate cauſe of putrefaction in living bodies may be the detachment of too large a proportion of their fixed air; and from the ſymptoms that occur in the *ſcurvy*, and other highly putrid diſeaſes, he infers, that the air is actually detached from the blood in theſe terrible caſes. The known cauſes, likewiſe, of that degree of putrefaction, which often takes place in the living body, confirm this opinion. To this purpoſe he obſerves, that a long continuance in an over moiſt atmoſphere is known to bring on the putrefactive diatheſis; becauſe ſuch an atmoſphere may admit the eſcape of the aerial part of the perſpirable matter, which is the lighteſt and moſt fugitive, whilſt it will not allow the aqueous, ſaline, earthy and phlogiſtic, or oily principles, to be exhaled; and theſe, deprived of their air, are in a putrefactive ſtate, and may become ferments to the remaining maſs of fluids. This account of the effect of ſurrounding moiſture is farther confirmed by attending to the methods of preſerving health, which experience preſcribes; ſuch as keeping the body well clothed with ſuch kind of apparel as will moſt readily abſorb the watery part of the perſpirable matter which the atmoſphere cannot abſorb; uſing ſuch a courſe of diet as will afford the animal fluids more than uſual ſupplies of air, to make up for the extraordinary waſte; ſuch as recent vegetables, ſugar, and aromatics; eating ſparingly of animal food, which yields a ſmall proportion of air; and abſtaining from the immoderate uſe of ardent ſpirits and fermented liquors, which check the alimentary fermentation, and hinder the free extrication of air from the ſubſtances that are conſumed. On the ſame principle of the ſeparation of the air from the conſtituent particles of the blood, Dr. Macbride accounts for the putrefactive effects of that circulatory motion of the fluids, which is occaſioned by too violent exerciſe, or by a fever, and for the ſolution of the texture of the fluids by mercury, and many of the poiſons. The modern methods, recited in the ſequel of this article, of preventing or curing the *ſcurvy*, and ſimilar diſeaſes, are alledged as farther evidence of the truth of his general hypotheſis.

SCURVY, *ſymptoms of the*. This diſeaſe is accompanied with ſuch a variety of ſymptoms, diſcovering themſelves at once in the ſeveral parts of the body, that it is not improperly called by Willis a legion of diſeaſes. And Boerhaave ſays, that it produces pleuritic, colic, nephritic, hepatic pains; various fevers, as hot, malignant, and intermitting; dyſenteries, faintings, anxieties, dropſies, conſumptions, convulſions, palſies, and fluxes of blood; and, in a word, that it may be ſaid to contain the ſeeds and origin of almoſt all diſtempers. The moſt common ſymptoms are unuſual wearineſs, heavineſs, and difficulty of breathing, eſpecially after motion; ſwelling and rottenneſs of the gums, which are apt to bleed on the ſlighteſt touch; and this change of the gums, Dr. Lind conſiders as the pathognomonic ſymptom of the diſeaſe; ſtinking breath; frequent bleeding at the noſe; difficulty of walking; itching and aching of the limbs; a diſcolouring of the ſkin with dark, and occaſionally darkiſh blue ſpots; ſometimes a ſwelling, and ſometimes falling away of the legs, in which there are livid, yellow, or violet-coloured ſpots; ſwelling of the body and of the face, which is generally of a pale or leaden colour; and in the progreſs of the diſeaſe, looſeneſs of the teeth; hæmorrhages from different parts of the body; foul, obſtinate ulcers; pains in various parts of the body, eſpecially about the heart; dry, ſcaly eruptions, all over the body; great obſtructions of the liver or ſpleen, or both; extreme coſtiveneſs, and ſtoppage of urine. At laſt, a waſting or hectic fever comes on; and the diſeaſe terminates in a dyſentery, diarrhæa, dropſy, palſy, fainting fits, or mortification of ſome of the bowels. In lord Anſon's Voyage, it is related, that the malignity of this diſeaſe, with which his men were afflicted, was ſo great, that the ſcars of wounds which had been healed for many years were forced open, and the callus of broken bones, which had been completely formed for a long time, was diſſolved, and the fracture ſeemed as if it never had been conſolidated. John Woodall, an old Engliſh ſurgeon, who hath given a very accurate deſcription of the *ſcurvy*, obſerves, that many of thoſe which have been opened after death, had their livers entirely rotted; others have had them ſwoln to an exceſſive bulk; in ſome the ſpleen had been exceedingly ſwelled; others have been full of water; and others have had the lungs putrefied, and have been offenſive even whilſt they have lived. See LEPROSY.

Method of cure. This diſeaſe can be removed by no other way than by a proper attention to diet, air, and exerciſe. A perſon that has been uſed to breathe a cold, damp, confined air, ſhould be removed to an air that is moderately warm, dry, and open. Sedentary perſons ſhould uſe daily exerciſe in the open air; and thoſe who labour under depreſſing paſſions ſhould be diverted by chearful company, and other amuſements. When the *ſcurvy* has been brought on by a long uſe of ſalted proviſions, the proper medicine is a diet conſiſting chiefly of freſh vegetables, as oranges, apples, lemons, limes, tamarinds, water-creſſes, *ſcurvy*-graſs, &c. The continued uſe of theſe with milk, pot-herbs, new bread, and freſh beer or cyder, will generally remove a *ſcurvy* that is not far advanced. Pickled or preſerved vegetables may be ſubſtituted in the room of freſh ones, when the latter cannot be obtained; and in the want of theſe, ſome writers recommend the chemical acids, and direct the patient's food and drink to be ſharpened with cream of tartar, elixir of vitriol, vinegar, and the ſpirit of ſea-ſalt. A courſe of this kind, however, will rather prevent than cure the *ſcurvy*; and it is of great importance that ſailors in long voyages ſhould be provided with plenty of the articles above enumerated. If they were furniſhed with a good ſtore of fruits, greens, cyder, &c. the ſhips were well ventilated, and proper regard were paid to cleanlineſs and warmth, they would ſeldom ſuffer from the *ſcurvy* or putrid fevers, which have in many caſes been ſo fatal. Dr. Buchan obſerves, that he has ſeen extraordinary effects in the land *ſcurvy* from a milk diet; and that the moſt proper drink is whey or butter-milk; but when theſe cannot be had, ſound cyder or perry may be uſed. Wort, as we ſhall more particularly ſhew, has been much recommended; as well as the decoction of the tops of the ſpruce-fir, in the quantity of a pint twice a day. See CHOWDER-*beer*.

The biſhop of Cloyne extols TAR-*water*, as of itſelf, when regularly and copiouſly uſed, an effectual remedy for the *ſcurvy*. Decoctions of any of the mild mucilaginous vegetables, as ſarſaparilla, marſhmallow roots, &c. infuſions of the bitter plants, ſuch as ground-ivy, the leſſer centaury, marſh trefoil, &c. and all kinds of ſallad, as ſpinage, lettuce, parſley, celery, endive, radiſh, dandelion, &c. have been found beneficial.

Scorbutic complaints of long ſtanding have been conſiderably relieved by the uſe of a decoction of the roots of herba Britannica, or water-dock, which is uſually made by boiling a pound of the freſh root in ſix pints of water, till about one third of the water be conſumed: the doſe is from half a pint to a whole pint every day. Patients who have been very deplorably reduced by the *land-ſcurvy*, have been greatly relieved both by drinking the *Harrowgate* ſulphur WATER, and by bathing in it. The chalybeate water may be alſo uſed with advantage. A ſlight degree of *ſcurvy*, eſpecially when it affects only the gums, may be removed by often ſucking the juice of a bitter orange or lemon; our own ſorrel may anſwer the ſame purpoſe. Dr. Hulme informs us, that the cortex, joined to the acid juices, has been uſed at ſea with great ſucceſs. The method of Mr. Hodgkin, a ſurgeon in the royal navy, who firſt introduced this practice, is to give a drachm of the cortex in powder, with an ounce of le-tion of orange juice, three times a day; and night and morning the ſwelled limbs are to be bathed in vinegar. This courſe is to be perſiſted in till the ſcorbutic ſymptoms diſappear; the belly being always kept open by gentle laxatives. In caſes where the cortex in powder was found to diſagree with the patients, Dr. Hulme uſed, inſtead of the powder, a tincture, which was made by digeſting two ounces and a half of the cortex, and half an ounce of myrrh, in a pint of brandy. The uſual doſe was half an ounce of the tincture mixed with an ounce of the acid juice.

With regard to the *modus operandi*, or efficacy of the means that have been made uſe of either for preventing or curing the *ſcurvy*, Sir John Pringle remarks, that though they may vary in form, and in their manner of operating, yet they all ſome way or other contribute towards preventing or correcting putrefaction, whether of the air in the cloſer parts of a ſhip, of the meats, of the water, of the cloaths and bedding, or of the body itſelf. And Dr. Macbride, laying down as an incontrovertible poſition, that the genuine putrid *ſcurvy* has never been known to yield to any other medicines than to ſuch as are compoſed of freſh vegetables, and obſerving that the acid and alcaleſcent, the mild and the acrid, the ſweet and the bitter, cure the *ſcurvy*, infers, that this virtue muſt be owing to ſome property which they all poſſeſs in common; which property is this; viz. that when mixed with any animal ſubſtance, and placed in the proper degree of heat, they preſently run into fermentation; and in the courſe of that fermentation throw off a ſubtile vapour or ſpirit of ſurpriſing activity, called fixed air, endowed with a power of reſtoring ſweetneſs to putrid animal fluids. The theory, which makes the cure of the *ſcurvy* to depend on a change produced in the diſeaſed fluids, in conſequence of the fermentation of the freſh vegetables in the ſtomach and bowels, it is ſaid, was firſt taught by Dr. Cullen. In confirmation of this theory, Dr. Macbride obſerves, that the recovery of people in the very laſt ſtage of the *ſcurvy* is brought about in a ſurpriſingly ſhort ſpace of time; provided the patients are but fully ſupplied with freſh vegetables; and this ſudden change muſt be effected by that ſubtile and active ſpirit, diſcharged by fermentation in the bowels, which ſeems to be the only thing capable of pervading in ſo ſhort a time the moſt intimate receſſes of the whole vaſcular ſyſtem, and of totally changing the corrupted nature of the entire maſs of fluids. He adds, that the liquors which have completed their firſt ſtage of fermentation, and thereby loſt much of their fixed air, though they are found uſeful as preſervatives, will none of them cure the diſeaſe. Cyder, he ſays, which appears to have a greater degree of antiſcorbutic virtue than any of the common fermented liquors, is generally ſtopped ſooner in its career of fermentation, and on that account contains the more fixed air; and he farther urges, that acids, both mineral and vegetable, and ardent ſpirits, which contain little fixed air in themſelves, and check the alimentary fermentation, are found to be, the firſt, uſeleſs and inſignificant, and, the ſecond, extremely hurtful, in this diſeaſe. Dr. Lind has alſo obſerved, that experience abundantly evinces the inefficacy of ſpir. ſalis, elixir vitrioli, and vinegar, for preventing, and much leſs for curing the *ſcurvy*. Before the power of fixed air in ſubduing putrefaction was known, the efficacy of fruits, greens, and fermented liquors, was commonly aſcribed to the acid in their compoſition; and Sir John Pringle ſuppoſes, that the acid does concur in producing that effect. And though mineral acids, which contain little or no fixed air, have been uſed in the *ſcurvy* with little ſucceſs, he apprehends that in the unſucceſsful trials they have never been ſufficiently diluted; for it is eaſy to conceive, that in the ſmall quantity of water the elixir of vitriol, e. gr. is commonly given, that auſtere acid can ſcarcely get beyond the firſt paſſages; conſidering the delicate ſenſibility of the mouths of the lacteals, which muſt force them to contract and exclude ſo pungent a liquor. He, therefore, propoſes to uſe, in a deficiency of other remedies at ſea, diſtilled water, acidulated with the ſpirit of ſea-ſalt, in the proportion of only ten drops to a quart, or with the weaker ſpirit of vitriol thirteen drops to the ſame meaſure; and to give thoſe that are threatened with the *ſcurvy* at leaſt three quarts of this liquor daily.

Dr. Macbride, having ſufficiently proved that the air produced by alimentary fermentation was endowed with a power of correcting putrefaction, and having found this fluid to be fixed air, concluded, that whatever ſubſtance, proper for food, abounded with it, and which could be conveniently carried to ſea, would afford one of the ſureſt remedies againſt the *ſcurvy*. Beer, e. gr. had always been eſteemed one of the beſt antiſcorbutics; and it has been a conſtant obſervation, that in long cruiſes and diſtant voyages, the *ſcurvy* is never ſeen whilſt the ſmall beer holds out at a full allowance; but that when it is all expended, the diſtemper ſoon prevails. Dr. Macbride judging that beer derived all its fixed air from the malt of which it was made, inferred, that malt itſelf was preferable in long voyages, as it took up leſs room than the brewed liquor, and would keep longer ſound. Freſh wort, he ſays, or infuſion of malt, is a liquor ſimilar to the recent juices of the ſweet vegetables; fermenting readily like them, and being preciſely of the ſame mild, ſaponaceous, and aperient nature. This theory has been ſince amply verified by experience. The method in which he propoſes to give the wort is to boil it up into a panada, with the ſea-biſcuit, and ſome of the dried fruits that are uſually carried to ſea; then let the ſcorbutic patients make at leaſt two meals a day on this palatable meſs, and let them drink a quart or more, if it ſhall be found to agree, of the freſh infuſion, in the courſe of the twenty-four hours. When it gripes and immoderately purges, the doſe muſt be leſſened, and ſome drops of the acid elixir of vitriol may be given with it, in order to check the too great tendency to fermentation, and to make it ſit eaſy on the ſtomach. And it is not only in the *ſcurvy*, but likewiſe in acute putrid diſeaſes, that he expects the wort will be found of ſingular ſervice.

The wort is to be prepared in the following manner: take one meaſure (e. gr. a quart) of the ground malt, and pour on it three meaſures of boiling water; ſtir them well, and let the mixture ſtand, cloſe covered up, for three or four hours; after which, ſtrain off the liquor. In hot weather, it muſt be brewed freſh every day. When malt cannot be procured, Dr. Macbride recommends that melaſſes, honey, or ſugar, may be tried, diſſolved in a due proportion of water (about four to one), and given in ſuch manner as may be found moſt agreeable and convenient to the patients. The artificial PYRMONT-*water* has been much recommended, as an excellent antiſcorbutic. Wine likewiſe abounds with fixed air, in a degree perhaps greater than any vegetable ſubſtance. The Ruſſians make uſe of a liquor called QUAS with great ſucceſs in this intention; and the kind of food called SOOINS has been alſo found beneficial.

The modern theory, with regard to the cauſe, prevention, and cure of the *ſcurvy*, has been lately illuſtrated and verified in circumſtances of peculiar advantage by captain Cook, who, with a company of a hundred and eighteen men, performed a voyage of three years and eighteen days throughout all the climates from 52° N. to 71° S. with the loſs of only one man by ſickneſs. The method he purſued, as communicated to the Royal Society (Phil. Tranſ. vol. lxvi. part ii. art. 22.) was in general as follows. Of the malt, with which he was largely provided, he made ſweet wort, and gave it not only to thoſe men who had manifeſt ſymptoms of the *ſcurvy*, but to ſuch as were judged to be moſt liable to it, in a quantity which ſometimes amounted to three quarts in the twenty-four hours. This, he ſays, is one of the beſt antiſcorbutic medicines yet found out; and though it will not cure the *ſcurvy* in an advanced ſtate at ſea, it will, with proper attention to other things, prevent its making any conſiderable progreſs for a long time. The malt, according to captain Cook's account, held out ſufficiently good for two years; and though after that time it was conſiderably decayed, yet the ſurgeon found it ſtill uſeful, when he employed a larger proportion of it to make the infuſion.

The next article of very extenſive uſe was *ſour* KROUT, which he found to be highly antiſcorbutic, and not to ſpoil by keeping. Of this a pound was ſerved to each man, when at ſea, twice a week, or oftener, if neceſſary. Another eſſential article was *portable* SOUP, of which an ounce to each man was boiled with their peaſe three days in the week, or with freſh vegetables, when they could be obtained, and wheat or oatmeal, every morning for breakfaſt, and with dried peaſe and freſh vegetables for dinner. He was alſo provided with rob of lemons and oranges, with ſugar inſtead of oil, and wheat inſtead of much oatmeal. He alſo adopted certain regulations of the moſt beneficial kind. He put his people at three watches, inſtead of two, which is the uſual practice at ſea: by this means they were not ſo much expoſed to the weather as if they had been at watch and watch; and they had generally dry clothes to ſhift themſelves when they happened to get wet. Care was alſo taken to preſerve the men from wet, and the other injuries of the weather: in the torrid zone, he ſhaded them from the ſcorching ſun by an awning over his deck; and in his courſe under the antarctic circle, he had a coat provided for each man, of a ſubſtantial woollen ſtuff, with the addition of a hood for covering their heads. He was alſo particularly careful in guarding againſt putrefaction, treſaction, by keeping clean the perſons, the clothes, the bedding, and births of the ſailors. He was not ſatisfied with ordering upon deck the hammocks and bedding every day that was fair, which was the common practice, but took care that every bundle ſhould be unlaſhed, and ſo ſpread out that every part of it might be expoſed to the air. Equal pains were taken to keep the ſhip clean and dry between decks. Once or twice a week ſhe was aired with fires; and when this could not be done, ſhe was ſmoked with gunpowder, moiſtened with vinegar or water. He had alſo frequently a fire made in an iron pot at the bottom of the well, which greatly purified the air in the lower parts of the ſhip. Thus the foul air was expelled, and the freſh air admitted; and the acid ſteams of the wood, in burning, acted as an antiſeptic, and corrected the corrupted air that remained. Theſe portable fires ſerved alſo to dry up the moiſture, eſpecially in thoſe places where there was the leaſt circulation of air; in aid of which men were employed in rubbing hard, with canvaſs or oakum, every part of the inſide of the ſhip that was damp and acceſſible. He truſted chiefly to fire for purifying his decks, and made no great account of vinegar: however, future navigators ſhould not neglect this acid, which will ſerve at leaſt for a wholeſome variety in the ſeaſoning of ſalted meats, and may be ſometimes ſucceſsfully uſed as a medicine, eſpecially in ſprinkling the births of the ſick. Captain Cook was alſo provided with the WIND-*ſails*, which at times he found very ſerviceable; and perhaps Dr. Hales's VENTILATORS would have anſwered the purpoſe better. He alſo uſed every poſſible and proper precaution for procuring a liberal ſupply of freſh water, which is of incredible importance. With this view he was furniſhed with an apparatus for diſtilling ſea water; he never failed to take in freſh water wherever it could be procured; and thoſe large maſſes of ice, among which he ſteered his courſe, melted into water that was not only freſh, but ſoft, and very wholeſome.

Mr. Patten, the ingenious ſurgeon who accompanied captain Cook in this voyage, obſerves in his Journal, that wort is the beſt remedy hitherto found out for the cure of the *ſea-ſcurvy*; and expreſſes his conviction, from what he has ſeen the wort perform, and from its mode of operation, that, if aided by portable ſoup, ſour krout, ſugar, ſago, and currants, the *ſcurvy*, that maritime peſtilence, will ſeldom or never make its alarming appearance among the ſhip's crew, on the longeſt voyages; proper care with regard to cleanlineſs and proviſions being obſerved. Mead on the *Scurvy*. Appendix to Pringle's Diſeaſes of the Army. Macbride's Exper. Eſſays, paſſim. Lind on the *Scurvy*. Pringle's Diſcourſe on occaſion of preſenting captain Cook with Sir Godfrey Copley's medal, in his Life, &c. by Kippis, p. 143, &c.

Mr. Henry, in his Account of a Method of preſerving Water at Sea, p. 24. propoſes to improve the efficacy of the malt decoction, by impregnating it, in the manner deſcribed under PYRMONT *water*, with fixed air. And he is of opinion, that the decoction ſo impregnated, and incloſed in veſſels for a few days, would ferment, and furniſh an uſeful and not unpleaſant kind of beer.

M. Poupart, in the Memoirs of the French Academy, gives us a very accurate hiſtory of a particular kind of *ſcurvy*, very frequent in Paris in the year 1699. The ſymptoms and conſequence of this new *ſcurvy* were very extraordinary; and ſoon determined M. Poupart to conclude it to be ſomewhat like that cruel plague wherewith the Athenians were ſo long and ſo dreadfully haraſſed; yet was it a true *ſcurvy*, and the perſons attacked with it had the uſual ſcorbutic ſymptoms.

SCURVY-*graſs*, *cochlearia*, in *Botany*, a genus of the *tetradynamia ſiliculoſa* claſs. Its characters are theſe: the empalement of the flower is compoſed of four oval, concave leaves; the flower has four petals, placed in form of a croſs, and ſix ſtamina, four of which are longer than the other two, terminated by obtuſe, compreſſed ſummits; the germen is heart-ſhaped, ſupporting a ſhort ſingle ſtyle, crowned by an obtuſe ſtigma, and becomes a gibbous, heart-ſhaped, compreſſed pod, faſtened to the ſtyle, having two cells, in each of which are lodged four roundiſh ſeeds. Miller enumerates ſix, and Linnæus eight ſpecies.

Scurvy-graſs is an annual plant, grows wild in ſeveral parts of England, particularly about the ſea-coaſts and ſalt-marſhes, is commonly cultivated in gardens for medicinal uſe, and flowers in April. The freſh leaves have an ungrateful ſmell, and a penetrating acrid taſte; the flowers and ſeeds are alſo pungent, but leſs ſo than the leaves. The active matter of this plant is extracted by maceration both in watery and ſpirituous menſtrua, and the moſt conſiderable part of it is of a very volatile kind. The freſh leaves beaten into a conſerve, with thrice their weight of fine ſugar, may be kept in a cloſe veſſel, without much diminution of their virtue, for years. The principal virtue of this plant reſides in an eſſential oil, ſeparable by diſtillation with water; this oil is ſo ponderous as to ſink in water, but very volatile, ſubtile, and penetrating. One drop of it, diſſolved in ſpirit, or received on ſugar, communicates to a quart of wine, or other liquor, the ſmell and taſte of *ſcurvy-graſs*. It riſes in diſtillation with rectified ſpirit as well as water. *Scurvy-graſs* is a powerful antiſeptic, attenuant, and aperient; it manifeſtly promotes the ſenſible excretions, particularly urine, without much heat or irritation. It is one of the capital antiſcorbutic herbs, and has been uſed in conjunction, generally, with mild vegetable acids, as orange-juice, ſorrel, &c.

The *ſcurvy*, however, is a diſeaſe ſo various, that the ſame medicine cannot be good for all the kinds. Accordingly *ſcurvy-graſs* proves hurtful, where the *ſcurvy* is attended with a redneſs in the face, palpitations of the heart, frequent feveriſh heats, head-achs, purgings, and the like; in all which, acrid medicines of any kind do harm. It is of ſervice alſo in paralytic and cachectic indiſpoſitions, and in long-continued wandering-rheumatic pains, unaccompanied with a fever, called by Sydenham the ſcorbutic RHEUMATISM. With this view he preſcribes ſixteen parts of freſh-made conſerve of garden *ſcurvy-graſs*, eight of conſerve of wood-ſorrel, and ſix of the compound powder of arum root (inſtead of which powder may be ſubſtituted an equal quantity or more of freſh arum root, mixed with as much powdered gum arabic) made up with ſyrup of orange-peel into an electary; of which two drams are to be taken thrice a day for a month, along with ſome ounces of a diſtilled water, impregnated with *ſcurvy-graſs*, mint, nutmegs, &c. Lewis.

SCURVY-*graſs*, *Scotch*. See SOLDANEL.

SCUT, among *Sportſmen*, the tail of a hare or rabbit.

SCUTAGE, *ſcutagium*, in *Ancient Cuſtoms*. See ESCUAGE.

SCUTARIUS, among the Romans, beſides its ordinary ſignification of a ſhield-maker, was uſed to denote one of the emperor's life-guards, becauſe their whole body was covered with armour.

SCUTCHEON. See ESCUTCHEON.

SCUTCHEON-*grafting*. See ENGRAFTING.

SCUTE, a French gold coin of 3*s*. 4*d*. in the reign of king Henry V. And Catherine, queen of England, had an aſſurance made her of ſundry caſtles, manors, lands, &c. valued at the ſum of forty thouſand *ſcutes*, every two whereof were worth a noble.

SCUTELLARIA, in *Botany*, a name given to a ſpecies of *caſſida*. See SKULL *cap*.

SCUTELLUM, or ESCUTCHEON, in the *Hiſtory of Inſects*, is the poſterior part of the thorax; it is frequently triangular, and appears to be ſeparated from the thorax by its intervening ſuture, as in moſt of the COLEOPTERA.

SCUTHINON, in *Botany*, a name given by the ancient Greeks to a yellow wood, called alſo *thapſum*, *chryſoxylon*, and *Scythicum lignum*. It was of a beautiful yellow colour, and was uſed in dying and in colouring the hair yellow, which was the favourite colour of that time.

The ſame authors have ſometimes alſo called it *cythinon*, or *cuthinon*: this is only the former word with the initial *ſ* taken away, as it was common with them to do in regard to many words; thus they called the ſmilax *milax*, the ſmaragdus *maragdus*, and ſo of many more.

SCUTIFORME *os*, in *Anatomy*, the chief bone of the knee, called alſo PATELLA, *mola*, &c.

SCUTIFORMIS *cartilago*, in *Anatomy*, one of the cartilages of the LARYNX, the broadeſt and biggeſt of them all: it was thus called by the Latins, becauſe in form of a ſhield, or ſquare buckler; and by the Greeks *thyroides*. It is alſo by ſome called the *anterior cartilage*, becauſe ſituate in the fore-part.

It is gibbous withoutſide, and hollow within: ſometimes double, chiefly in women, in whom it does not advance ſo far forward as in men.

SCUTTLES, in a *Ship*, are ſquare holes cut in the deck, big enough to let in the body of a man; ſerving to let people down into any room below, upon occaſion, or from deck to deck.

They are generally before the main-maſt, before the knight in the fore-caſtle; in the gun-room, to go down to the ſtern-ſheets; in the round-houſe, to go down into the captain's cabin, when forced by the enemy in a fight aloft.

There are alſo ſome ſmaller *ſcuttles*, which have gratings over them; and all of them have covers to them, that men may not tumble in, in the night.

SCUTTLE is alſo a denomination given to thoſe little windows, and long holes, which are cut out in cabins to let in light.

Scuttle-*hatch*, in a *Ship*, the little hatch that covers the *ſcuttle*.

SCUTTLING, in *Sea-Language*, the act of cutting large holes through the bottom or ſides of a ſhip either when ſhe is ſtranded or overſet, and continues to float on the ſurface. It is commonly deſigned for taking out the whole or part of the cargo, proviſions, ſtores, &c. with all poſſible expedition.

SCUTUM *Sobieſki, Sobieſki's Shield*, in *Aſtronomy*, a conſtellation formed by Hevelius; the ſtars of which in his Catalogue are ſeven: four of theſe are enumerated in the AQUILA in the Britannic Catalogue.

Scutum, in *Natural Hiſtory*, the name of a genus of the *echini marini*; the characters of which are, that it is a ſhell of an irregular figure, which on the lower part repreſents, in ſome meaſure, a ſhield; on the ſuperficies it has the ſhape of a five-leaved flower; its mouth is in the middle of the baſe, and the aperture for the anus at the edge. See *Tab. of Teſtaceous Animals*, N° 6 and 7.

Of this genus of the echini there are two kinds, the angular and the oval.

Of the firſt of theſe kinds, the angular *ſcuta*, there are only two known ſpecies: the firſt a lower flattiſh kind, and the ſecond a more elevated one.

Of the ſecond, or the oval *ſcuta*, there are three known ſpecies, Klein's Echinod. p. 28.

Scutum, in *Pharmacy*, a name given to a ſolid ſtomachic topic, whether made in form of a bag, with medicinal ingredients ſewed in it, or of a plaſter. It is always faſhioned into the ſhape of a ſhield. The plaſters, for this purpoſe, were uſed to be made of the warm ſtomachic gums, and the bags were filled with the warm aromatic powders; and they were worn to warm and ſtrengthen the ſtomach, correct a cold intemperature, and promote digeſtion, and prevent vomiting. The patella, or kneepan, is alſo ſometimes called by anatomiſts *ſcutum*.

SCYBALA, a term uſed by the ancient phyſicians to expreſs the excrements of the inteſtines, hardened into lumps while in the body.

SCYBELITES, a term uſed by the ancients to expreſs a ſort of muſt, or juice of the grapes, which diſtilled from them ſpontaneouſly without preſſing.

SCYLACION, a word by which the ancients expreſſed the fleſh of puppies, which they recommended as of great ſervice in many chronic caſes.

SCYLDWIT, in our *Old Writers*, a mulct or fine for any fault.

It comes from the Saxon *ſcilde*, i. e. *delictum*, and *wite*, i. e. *pœna*.

SCYLLÆA, in the Linnæan ſyſtem, is a genus of the *molluſca* claſs of worms; the characters of which are, that the body is oblong and compreſſed, and the back longitudinally canaliculated; the mouth is a round opening, and it has three pair of tentacula, like arms under the body. There is one ſpecies, called by ſome writers the SEA-*hare*, which is found in the floating fucus of the ſea.

SCYMNUS, in *Ichthyology*, a name uſed by Ælian, Appian, and many other of the old Greek writers, for the fiſh called *ſculion* by Ariſtotle. This is a ſpecies of the SQUALUS, called by Artedi and others the *ſqualus* with the pinna ani placed in the midſt between the anus and tail; the *catulus vulgaris*, and *catulus major* of authors.

SCYPHUS, among the Romans, a very large kind of drinking cup. The *ſcyphus* was called the cup of Hercules, as that of Bacchus, *liberi patris*, was named CANTHARUS.

SCYRA, in our *Old Writers*, a fine impoſed on ſuch as neglected to attend the *ſcyregemot court*, which all tenants were bound to do.

SCYREGEMOT, or **Scyremot**, in *Ancient Cuſtoms*, a county-court held twice every year by the biſhop of the dioceſe, and the ealdorman, or ſheriff; wherein both the ecleſiaſtical and temporal laws were given in charge to the county.

In the time of Canutus the *ſcyregemot* was held thrice every year. Edward the Confeſſor appointed it to be held twelve times in the year.

SCYRIUM *marmor*, a name given by the ancients ſometimes to a white, and ſometims to a yellowiſh marble, both uſed in the public buildings of the Romans, but ſeldom in ſtatuary, not being capable of a high poliſh.

SCYTALA, in *Mechanics*, a term which ſome writers uſe for a kind of radius, or ſpoke, ſtanding out from the axis of a machine, as a handle or lever, to turn it round, and work it by.

Scytala *Laconica*, in *Antiquity*, a ſtratagem, or device, of the Lacedæmonians, for the ſecret writing of letters to their correſpondents; ſo that if they ſhould chance to be intercepted, nobody might be able to read them.

To this end they had two wooden rollers, or cylinders, perfectly alike, and equal; one whereof was kept in the city, the other by the perſon to whom the letter was directed. For the letter, a ſkin of very thin parchment was wrapped round the roller, and thereon was the matter written; which done, it was taken off, and ſent away to the party, who, upon putting it in the ſame manner upon his roller, found the lines and words in the very ſame diſpoſition, as when they were firſt written.

This expedient they ſet a very high value on; though, in truth, artleſs and groſs enough: the moderns have improved vaſtly on this method of writing. See CIPHER.

SCYTALE, in *Zoology*, the name given by the ancients to a ſpecies of ſerpent, which was very long and thin, and equally big all along the body, ſo that the tail was not eaſily diſtinguiſhed from the head.

Linnæus mentions two animals under this title; one, a ſpecies of anguis or SNAKE, and the other a ſpecies of the BOA.

SCYTHÆ, Σκυθαι, among the Athenians, a deſignation ſometimes given to the officers, more uſually called LEXIARCHI.

They had the name *Scythæ*, becauſe they were often natives of Scythia who were choſen *lexiarchi*, as being brawny and ſturdy fellows.

SCYTHARION, in *Botany*, a name given by the ancient Greek writers to a tree, whoſe wood was of a fine yellow colour, and was uſed in thoſe early times to dye things yellow; it was called alſo *Scythicum lignum*, from its country, and CHRYSOXYLON, or golden wood, from its fine yellow colour. It has been ſuppoſed that this was the ſame with the *cotinus coriaria* of the Romans; but this is an erroneous conjecture, ſince the wood of this tree dyed a yellow colour, and that a browniſh red, or a clear and pure red, according as the infuſion was made more or leſs ſtrong. This *ſcytharion*, therefore, could not be the ſame with the *cotinus*, but it certainly is the ſame with the *thapſum* of the Greeks.

SCYTHIAN, a word uſed very often in the old Greek writers on the materia medica, to diſtinguiſh the peculiar ſort of gum or other drug, brought from that place. The *Scythian* and Indian drugs have been by many ſuppoſed different kinds of the ſame medicine; but this is an error; for it appears very obvious, on comparing the writings of Galen, Aëtius, Ægineta, and other of the later writers among the Greeks, with thoſe of Dioſcorides, Theophraſtus, and the other old ones, that the words *Scythian* and Indian mean the ſame thing, and that what the old writers have called Indian, theſe have called *Scythian*.

The meaning of this is, that thoſe things were called *Scythian*, which were brought from the country of Indoſcythia, or that part of *Scythia* which lay at the oſtia of the river Indus; but it is to be obſerved, that though the later Greek writers mean this by their term *Scythian*, yet the word is uſed in a very different ſenſe by the Arabians, Avicenna, Serapio, and others; and that whereever they mention a drug under the name of *Scythian*, they mean that it comes from the northern parts of *Scythia*, on the confines of Europe. Theſe authors having underſtood of this *Scythia*, what the Greek writers have ſaid of the other, have made no ſmall errors in regard to the hiſtory of drugs, having given bdellium, and many other gums, the produce of only the *Scythia* of the Greek medical writers, to the frozen *Scythia*, before mentioned.

SCYTHICUM *lignum*, in *Botany*, a name given by the ancients to a tree called alſo SCYTHARION by the later writers of the Greeks.

SE, *felo de*. See FELO.

Se, *per*. See PER *ſe*.

SEA, *mare*, in *Geography*, is frequently uſed for that vaſt tract of water encompaſſing the whole earth, more properly called OCEAN.

For the cauſe of the ſaltneſs of the ſea, ſee SALTNESS.

Sea is more properly uſed for a particular part or diviſion of the ocean, denominated from the countries it waſhes, or from other circumſtances.

Thus we ſay, the *Iriſh ſea*, the *Mediterranean ſea*, the *Baltic ſea*, the *Red ſea*, &c.

Till the time of the emperor Juſtinian, the *ſea* was common and open to all men; whence it is that the Roman laws grant an action againſt a perſon who ſhall prevent or moleſt another in the free navigation or fiſhing therein.

The emperor Leo, in his fifty-ſixth novel, firſt allowed ſuch as were in poſſeſſion of the lands, the ſole privilege of fiſhing before their reſpective territories, excluſive of all others; he even gave a particular commiſſion to certain perſons, to divide the Thracian Boſphorus among them.

From that time, the ſovereign princes have been endeavouring to appropriate the *ſea*, and to withdraw it from the public uſe. The republic of Venice pretends to be ſo far miſtreſs in her gulf, that there is a formal marriage every year between that ſignory and the Adriatic.

In theſe laſt ages, the Engliſh have particularly claimed the empire of the *ſea* in the Channel, and even that of all the *ſeas* encompaſſing the three kingdoms of England, Scotland, and Ireland, and that as far as the ſhores of the neighbouring ſtates. In conſequence of which pretenſion it is, that children born on theſe *ſeas* are declared natural Engliſhmen, as much as if born on Engliſh ground. The juſtice of this pretenſion is ſtrenuouſly argued between Grotius and Selden, in the *Mare liberum*, and *Mare clauſum*.

The term *ſea* is variouſly applied by ſailors, to a ſingle wave, to the agitation produced by a multitude of waves in a tempeſt, or to their particular progreſs or direction. Thus they ſay, a heavy *ſea* broke over our quarter; or, we ſhipped a heavy *ſea*; there is a great *ſea* in the offing; the *ſea* ſets to the ſouthward. Hence a ſhip is ſaid to head the *ſea*, when her courſe is oppoſed to the ſetting or direction of the ſurges. A *long ſea* implies an uniform and ſteady motion of long and extenſive waves; on the contrary a *ſhort ſea*, is when they run irregularly, broken, and interrupted, ſo as frequently to burſt over a veſſel's ſide or quarter.

Sea, *general motion of the*. Mr. Daſſie of Paris, in a work publiſhed about eighty years ago, has been at great pains to prove that the *ſea* has a general motion, independent of winds and tides, and of more conſequence in navigation than is uſually ſuppoſed. He affirms that this motion is from eaſt to weſt, inclining toward the north, when the ſun has paſſed the equinoctial northward, and that during the time the ſun is in the northern ſigns; but the contrary way, after the ſun has paſſed the ſaid equinoctial ſouthward; adding, that when this general motion is changed, the diurnal flux is changed alſo; whence it happens, that in ſeveral places the tides come in during one part of the year, and go out during the other, as on the coaſts of Norway, in the Indies, at Goa, Cochinchina, &c. where, while the ſun is in the ſummer ſigns, the *ſea* runs to the ſhore; when in the winter ſigns, from it. On the moſt ſouthern coaſts of Tonquin and China, for the ſix ſummer months, the diurnal courſe runs from the north with the ocean; but the ſun having repaſſed the line toward the ſouth, the courſe declines alſo ſouthward. Philoſoph. Tranſact. N° 135.

Sea, *baſon of the*, *fundus maris*, a term uſed by geographers, and other writers, to expreſs the bottom of the *ſea* in general.

Mr. Boyle has publiſhed a treatiſe on this ſubject, in which he has given an account of its irregularities and various depths, founded on the obſervations communicated to him by mariners.

The ingenious count Marſigli has, ſince his time, given us a much fuller account of this part of the globe, moſtly from his own experiments in many places, particularly along the coaſts of Provence and Languedoc.

The entire baſon of the *ſea* is of ſuch immenſe extent, and covered in many places with ſuch an unfathomable depth of water, that it is not to be expected that it can be traced in every part; but as the whole may be gueſſed at, from ſome part of it, and as its general figure is of no conſequence in a ſearch of this kind, the obſervations of this curious author are of great value, in forming a judgment of the whole.

The materials, which compoſe the bottom of the *ſea*, may very rationally be ſuppoſed, in ſome degree, to influence the taſte of its waters; and Marſigli has made many experiments to prove, that foſſile coal, and other bituminous ſubſtances, which are found in plenty at the bottom of the *ſea*, may communicate in great part its bitterneſs to it. See Saltness.

We are not, however, to judge haſtily, that there are not ſo many beds of theſe at the bottom of the *ſea*, as would be neceſſary for ſuch a purpoſe, or to judge too haſtily againſt the exiſtence of any other ſubſtances there, becauſe we do not find proofs of them by the plummet, which in ſounding brings up other ſubſtances, and not theſe; for the true bottom of the *ſea* is very often covered and obſcured from us by another accidental bottom, formed of various ſubſtances mingled together, and often covering it to a conſiderable depth.

The entire gulf of Lyons, ſituated between Cape Quiez in Rouſillon, and Cape Croiſit in Provence, forms a bank above the ſurface of the water at the ſhore, of the exact and perfect figure of an arch; and within this there is formed another ſuch arch, making the bottom of the *ſea* in that place for a very great way from ſhore, which is of different depths in various places, but uſually between ſixty and ſeventy fathom. See *Sea*-SHORE.

It is a general rule among ſailors, and is found to hold true in a great many inſtances, that the more the ſhores of any place are ſteep and high, forming perpendicular cliffs, the more deep the *ſea* is below; and that on the contrary, level ſhores denote ſhallow *ſeas*. Thus the deepeſt part of the Meditterranean is generally allowed to be under the height of Malta. The obſervation of the ſtrata of earth, and other foſſils, on and near the ſhores, may ſerve to form a very good judgment as to the materials which are found in its bottom.

The veins of ſalt and of bitumen doubtleſs run on the ſame, and in the ſame order in which we ſee them at land; and the ſtrata of rocks, that ſerve to ſupport the earth of hills and elevated places on ſhore, ſerve alſo, in the ſame continued chain, to ſupport the immenſe quantity of water in the baſon of the *ſea*. It is probable alſo, that the veins of metals, and of other mineral ſubſtances, which are found in the neighbouring earth, are in the ſame manner continued into the depths of the *ſea*. The particles of metals in this caſe, are probably carried off into deep water, and ſunk among the ſofter matter of the bottom, but ſome of the lighter minerals ſeem to have given colour to thoſe beautiful cruſts, which are found upon many *ſea* plants, and which loſe their luſtre in the drying. The ſubterranean rivers, and currents of water, make great changes in what would be the natural ſurface of the bottom of the *ſea*, where they ariſe, each having a peculiar baſon of its own. We are informed by numerous inſtances of ſubterranean currents, and as we ſee them break out in rivers on the ſurface of the earth in ſome parts, ſo in others we may be well aſſured that they break up the bottom of the *ſea*, and empty their freſh waters into the ſalt maſs.

In this caſe, the ruſhing up continually of ſuch a body of water makes a roundiſh cavity, and its running ſome one way, lengthens and carries on that cavity, till by degrees it is loſt, as the freſh water by degrees becomes blended with the ſalt. Thus every river that ariſes in the bottom of the *ſea*, alters the form of its ſurface, and makes a baſon for itſelf, in which it runs a conſiderable way. Many *ſeas* near the ſhore, and when the water is tolerably clear, ſhew the traces of theſe currents to the naked eye from the ſurface, and the water taken up from them is found more or leſs freſh.

The coral fiſheries have given us occaſion to obſerve, that there are many, and thoſe very large caverns, or hollows in the bottom of the *ſea*, eſpecially when it is rocky; and that the like caverns are ſometimes found in the perpendicular rocks, which form the ſteep ſides of thoſe fiſheries. Theſe caverns are often of great depths, as well as extent, and have ſometimes wide mouths, equal to their largeſt diameter in any part, but ſometimes they have only narrow entrances into large and ſpacious hollows. It is the common opinion of the people about the place, that theſe caverns are prepared by nature for the circulating of the *ſea* water; but that operation, however neceſſary, may be performed as well without, as with theſe caverns, and they ſeem in reality to be only accidental.

We daily meet with immenſe hollows and caverns, naturally made in rocky mountains; and as this part of the bottom of the *ſea* is almoſt all rock, and its ſides of the ſame nature, it is no wonder that the ſame accidents ſhould happen, and like hollows be found, though with no particular intent of Providence in their uſe. Nay there is this farther reaſon to expect them in the rocks buried under the *ſea* than in thoſe in hills, that the latter are in a ſtate of reſt and quiet, whereas the former are in continual reach of water, which will inſinuate itſelf into every crack or crevice nature has left in them, and may be eaſily ſuppoſed to have burrowed its way in a ſmall hole made by nature, till it has formed of it a very large one.

From ſuch obſervations he infers, that the baſon of the *ſea* was at the creation, or at its ſecond formation after the univerſal deluge, covered with, or compoſed of the ſame ſubſtances, as the ſurface of the reſt of the earth is, that is of rocks, clay, and ſand, and other ſuch ſubſtances. Over theſe there is an artificial bottom formed of muddy tartarous incruſtations, dead weeds, broken ſhells, and other bodies of the ſame kind, cemented together into a firm maſs or cruſt; and in thoſe places where this cruſt has never been formed, or where it has been broken, the bottom of the *ſea* is of the ſame nature with the ſtrata of the earth.

The bottom of the *ſea* is covered with a variety of matters, ſuch as could not be imagined by any but thoſe who have examined into it, eſpecially in deep water, where the ſurface only is diſturbed by tides and ſtorms, the lower part, and conſequently its bed at the bottom, remaining for ages perhaps undiſturbed. The ſoundings, when the plummet firſt touches ground on approaching the ſhores, gives ſome ideas of this. The bottom of the plummet is hollowed, and in that hollow there is placed a lump of tallow; this being the bottom of the lead, is what firſt touches the ground, and the ſoft nature of this fat receives into it ſome part of thoſe ſubſtances, which it meets with at the bottom: this matter, thus brought up, is ſometimes pure ſand, ſometimes a ſort of ſand made of the fragment of ſhells, beat to a ſort of powder, ſometimes it is made of a like powder of the ſeveral ſorts of corals, and ſometimes it is compoſed of fragments of rocks; but beſide theſe appearances, which are natural enough, and are what might very well be expected, it brings up ſubſtances which are of the moſt beautiful colours.

Things of as fine a ſcarlet, vermillion, purple, &c. as the fineſt paint could make them, and as yellow as a ſolution of gamboge, are common; and ſometimes, though not ſo frequently, the matter brought up is blue, green, or of a pure ſnowy whiteneſs. Theſe coloured matters ſometimes ſeem to have made up the whole bottom or maſs of the ſurface, but more uſually they have been formed upon other things, as upon the mud, or upon larger pieces of ſhells, corals, and the like, in the manner of tartarous cruſts, and thoſe in ſome degree reſembling the cruſtaceous coats of ſome of the *ſea* plants. The colours of theſe ſubſtances are not merely ſuperficial and tranſient, but many of them are ſo real and permanent, that they may be received into white wax melted, and poured upon them, or kept in fuſion about them; and when thus examined, they ſeem as if a proper care might make them of great value, as paints of the finer kinds, where little is to be uſed.

The ſame coloured matters that thus coat the ſubſtances, found at the bottom of the *ſea* in theſe places, are alſo ſometimes found extended over the ſurface of marine ſubſtances of the harder kind, which are found in deep water. They are always, in this caſe, in a ſort of liquid form, being lodged within, or embodied among a ſort of jelly or glue of a tranſparent ſubſtance, which in theſe caſes perfectly coats over the whole. In this ſtate it gives the naturaliſt, who is preſent at the fiſhing up his treaſures, a tranſient proſpect of a very elegant kind, but this vaniſhes while he admires it. A piece of coral, or other hard ſubſtance, thus coated over, appears, as it riſes to the ſurface of the water, of a delicate green, blue, or purple; but when taken above water it is found that this fine colour is only in the coat of glue or jelly which covers the ſubſtance; as ſoon as this is wiped off, the colour is carried away with it, and the coral ſhews its own native tinge; and it is to no purpoſe to attempt the preſerving it, by ſuffering this glue to dry upon the coral, for the colour flies away by degrees, as the moiſture evaporates, and the coral, &c. whatever it be, is only ſo much the leſs beautiful, than it naturally would have been, as it is covered with a dry yellowiſh dirty looking horny matter. Theſe are beauties in the ſubmarine productions, therefore, which can be only ſeen by thoſe who venture out in order to take them up.

The ſmall quantities of theſe elegant colours, which we thus find ſpread over the ſurfaces of marine bodies, as we approach deep water, may give a rational idea of what we ſhould find, were we able to examine the bottoms of the *ſea* in its deep and unfathomable receſſes It is eaſy to conceive, that in theſe places we ſhould find great quantities of the moſt beautiful ſubſtances. Marſigli, Hiſt. Phyſ. de la Mer.

Dr. Donati, in an Italian work, containing an eſſay towards a natural hiſtory of the Adriatic *ſea*, printed at Venice in 1750, has recited many curious obſervations on this ſubject, and which confirm the above account of Marſigli: having careſully examined the ſoil and productions of the various countries that ſurround the Adriatic *ſea*, and compared them with thoſe which he took up from the bottom of the *ſea*, he found that there is very little difference between the former and the latter. At the bottom of the water there are mountains, plains, vallies, and caverns, ſimilar to thoſe upon land. The ſoil conſiſts of different ſtrata placed one upon another, and for the moſt part parallel and correſpondent to thoſe of the rocks, iſlands, and neighbouring continents. They contain ſtones of different ſorts, minerals, metals, various putrified bodies, pumice-ſtone and lavas formed by volcanos.

The adjacent countries, as well as the bottom of the Adriatic *ſea*, conſiſt of a maſs of a whitiſh marble, of an uniform grain, and of almoſt an equal hardneſs; and this marble, in many places under both the earth and *ſea*, is intercepted by ſeveral other kinds of marble, and covered by a great variety of bodies, ſuch as gravel, ſand, and earths more or leſs fat. To this variety of ſoils, he aſcribes the varieties obſerved with reſpect to the nature and quantity of plants and animals found at the bottom of the *ſea*. One of the objects, which moſt excited his attention, was a cruſt, which he diſcovered under the water, compoſed of cruſtaceous and teſtaceous bodies, and beds of polypes of different kinds, confuſedly blended with earth, ſand, and gravel; the different marine bodies, which form this cruſt, are found at the depth of a foot or more, entirely petrified and reduced into marble; theſe, he ſuppoſes, are naturally placed under the *ſea* when it covers them, and not by means of volcanos and earthquakes, as ſome have conjectured. On this account, he imagines, that the bottom of the *ſea* is conſtantly riſing higher and higher, with which other obvious cauſes of increaſe concur; and from this riſing of the bottom of the ſea, that of the level of the water naturally reſults; in proof of which this writer recites a great number of facts. Philoſoph. Tranſ. vol. xlix. p. 585, &c.

Sea, *Dead*. Dr. Perry made ſeveral experiments on the water of the *Dead Sea*, in order to find what particles it contained. Upon infuſing ſome ſcrapings of galls in it, it becomes of a bright purple colour, but that not till it has ſtood a conſiderable time. On adding oil of tartar *per deliquium* to it, it becomes turbid, and looks as if globules of fat were fluctuating in it; this unctuous matter, upon its long ſtanding in repoſe, comes together in form of a ſediment at the bottom. On pouring ſpirit of vitriol into it, it depoſits a milk-white greaſy ſediment, which, after ſtanding twelve hours, occupies about one-fifth part of the liquor. On putting a ſmall quantity of ſaccharum ſaturni to it, it depoſits a ſmall quantity of a greyiſh powder: being ſeverally and ſeparately mixed with a ſolution of ſublimate, with ſpirit of ſal ammoniac, and with ſugar of violets, it neither ferments nor depoſits any ſediment, nor changes colour, except with the ſugar of violets, with which it becomes green.

It is highly ſaturated with ſalt, ſo that it is to common water in ſpecific gravity, as five to four; and it has ſo acrid and ſtyptic a taſte, that on being held in the mouth, it conſtringes it in the manner of alum.

It appears, that this water is impregnated with a ſort of an acrid and alkaline nature, and a matter partly of a ſulphureous, partly of a bituminous nature. Philoſ. Tranſ. N° 462. p. 50.

Sea, *luminouſneſs of the*, is a phenomenon that has been taken notice of by many nautical and philoſophical writers. Mr. Boyle, after reciting ſeveral circumſtances attending this appearance, aſcribes it to ſome coſmical law, or cuſtom of the terreſtrial globe, or at leaſt of the planetary vortex.

Father Bourzes, in his voyage to the Indies, in 1704, took particular notice of this phenomenon, and very minutely deſcribes it, without aſſigning the true cauſe. See an abſtract of his account under the article Fire.

The Abbé Nollet was long of opinion, that the light of the *ſea* proceeded from electricity, and others have had recourſe to the ſame hypotheſis. M. Bayon, in his Memoires pour ſervir à l'Hiſtoire de Cayenne, &c. Paris, 1778, informs us, that, having made a great number of experiments, in different ſeaſons, in order to find out the true cauſe of this phenomenon, he always found, that the luminous points in the ſurface of the *ſea* were produced merely by friction.

However, there have been two hypotheſes, which have moſt generally been received, for the ſolution of this phenomenon; one of which aſcribes it to the ſhining of luminous inſects or animalcules, and the other to the light proceeding from the putrefaction of animal ſubſtances. The Abbé Nollet, who at firſt conſidered the *luminouſneſs* of the *ſea* as an electrical phenomenon, having had an opportunity of aſcertaining the circumſtances of it, when he was at Venice in 1749, relinquiſhed his former opinion, and concluded that it was occaſioned either by the luminous aſpect, or by ſome liquor or effluvia of an inſect which he particularly deſcribes; but does not altogether exclude other cauſes, and eſpecially the ſpawn or fry of fiſh.

The ſame hypotheſis had alſo occurred to M. Vianelli, profeſſor of medicine in Chioggia near Venice; and both he and M. Grizellini, a phyſician in Venice, have given drawings of inſects from which they imagined this light to proceed.

A ſimilar conjecture is propoſed by a correſpondent of Dr. Franklin, in a letter read at the Royal Society in 1756; the writer of which apprehends, that this appearance may be cauſed by a great number of little animals, floating on the ſurface of the ſea, which, on being diſturbed, might, by expanding their fins, or otherwiſe moving themſelves, expoſe ſuch a part of their bodies as exhibits a luminous appearance, ſomewhat in the manner of a glow-worm, or fire-fly; that theſe animals may be more numerous in ſome places than others, and, therefore, that the appearance above mentioned, being fainter and ſtronger in different places, might be owing to this cauſe; and that certain circumſtances of weather, &c. might invite them to the ſurface, on which, in a calm, they might ſport themſelves and glow, or in ſtorms, being forced up, make the ſame appearance.

Mr. Foſter, in his account of a voyage round the world with captain Cook, in the years 1772, 1773, 1774, and 1775, deſcribing this phenomenon as a kind of blaze of the *ſea*, and having attentively examined ſome of the illumined water, expreſſes his conviction, that the appearance was occaſioned by innumerable minute animals of a round ſhape, moving through the water in all directions. One of theſe luminous ſparks, which ſtuck to his finger while he was ſtirring his water with his hand, was examined by the common magnifier of Mr. Ramſden's improved microſcope, and was found to be globular, tranſparent like a gelatinous ſubſtance, and ſomewhat browniſh; by means of the greateſt magnifier, the orifice of a little tube was diſcovered, which entered the body of the animal; within which were four or five inteſtinal bags connected with the tube. He imagines that theſe animalcules may be the young fry of ſome ſpecies of meduſa, or blubber, and conſiders them as poſſeſſed of the power of ſhining, or of withholding their light at pleaſure.

M. Dagelet, a French aſtronomer, ſailing into the bay of Antongil, in the iſland of Madagaſcar, obſerved a prodigious quantity of fry, which covered the *ſea* above a mile in lengh, and which he at firſt took for banks of ſand on account of their colour; they exhaled a diſagreeable odour, and the ſea had appeared with uncommon ſplendor ſome days before. On another occaſion, having perceived the *ſea* to be remarkably luminous in the road of the Cape of Good-Hope, during a perfect calm, he remarked that the oars of the canoes produced a whitiſh and pearly kind of luſtre: when he took in his hand the ſhining water, he diſcerned in it, for ſome minutes, globules of light as large as the heads of pins; upon preſſing theſe, they ſeemed to be a ſoft and thin pulp, and ſome days after the ſea was covered, near the coaſts, with whole banks of theſe little fiſh in innumerable multitudes.

M. Dagelet, in his return from the terra Auſtralis in 1774, brought with him ſeveral kinds of worms, which ſhine in water when it is ſet in motion; and Mr. Rigaud affirms, that the luminous ſurface of the ſea, from the port of Breſt to the Antilles, contains an immenſe quantity of ſmall, round, ſhining polypuſes.

M. le Roi, after giving much attention to this phenomenon, concludes that it is not occaſioned by any ſhining inſects, eſpecially as, after carefully examining with a microſcope ſome of the luminous points, he found them to have no appearance of any animal; and he alſo found, that the mixture of a little ſpirit of wine with water juſt drawn from the *ſea*, would give the appearance of a great number of little ſparks, which would continue viſible longer than thoſe in the ocean: the ſame effect was produced by all the acids, and various other liquors. M. le Roi is far from aſſerting that there are no luminous inſects in the ſea; for he allows that the Abbé Nollet and M. Vianelli had found them; but he is ſatisfied that the *ſea* is luminous chiefly on ſome other account, though he does not ſo much as offer a conjecture with reſpect to the true cauſe,

Other writers, equally diſſatisfied with the hypotheſis of luminous inſects, for explaining the phenomenon, which is the ſubject of this article, have aſcribed it to ſome ſubſtance of the phoſphorus kind, ariſing from putrefaction.

The obſervations of F. Bourzes, above referred to, render it very probable, that the *luminouſneſs* of the *ſea* ariſes from ſlimy and other putreſcent matter with which it abounds, though he does not mention the tendency to putrefaction, as a circumſtance of any conſequence to the appearance.

The correſpondent of Dr. Franklin, part of whoſe letter has been already recited, obſerves, that ſeveral gentlemen have been of opinion, that the ſeparated particles of putrid, animal, and other bodies, floating on the ſurface of the *ſea*, might cauſe this appearance, for putrid fiſh, &c. will cauſe it; and the *ſea* animals which have died, and other bodies putrified therein ſince the creation, might afford a ſufficient quantity of theſe particles to cover a conſiderable portion of the ſurface of the *ſea*; which particles being differently diſperſed, might account for the different degrees of light in this appearance; but he adds, this account ſeems liable to an obvious objection, viz. that as putrid fiſh, &c. make a luminous appearance without being moved or diſturbed, it might be expected that the ſuppoſed putrid particles on the ſurface of the *ſea* ſhould always appear luminous, when there is not a greater light, and, conſequently, that the whole ſurface of the *ſea* covered with thoſe particles, ſhould always, in dark nights, appear luminous, without being diſturbed, which, he ſays, is contrary to fact. Franklin's Experiments and Obſervations, p. 274, &c.

This difficulty is, in a great meaſure, removed by the experiments of Mr. Canton, recited in the Philoſophical Tranſactions, vol. lix. p. 446, &c. which have the advantage of being eaſily made, and leave no room for doubt, that the *luminouſneſs* of the *ſea* is principally owing to putrefaction. Having put a freſh whiting into a gallon of *ſea* water, neither the whiting, nor the water when agitated, gave any light; Fahrenheit's thermometer, placed in the cellar where the pan was placed, ſtanding at 54°; the following evening, that part of the fiſh which was even with the ſurface of the water was luminous, but the water itſelf was dark; however, on drawing through it the end of a ſtick, the water appeared luminous behind the ſtick all the way, but gave light only where it was diſturbed: when all the water was ſtirred, the whole became luminous, and appeared like milk, yielding a conſiderable degree of light to the ſides of the pan, which it continued to do for ſome time after it was at reſt. The water was moſt luminous when the fiſh had been in it about twenty-eight hours, but would give no light by being ſtirred after it had been in it three days. He then put a gallon of freſh water into one pan, and an equal quantity of *ſea* water into another, and into each pan he put a freſh herring, of about three ounces; the next night the whole ſurface of the *ſea* water was luminous without being ſtirred, but much more ſo when put in motion, and the upper part of the herring, which was conſiderably below the ſurface of the water, was alſo very bright; while at the ſame time, the freſh water, and the fiſh that was in it, were quite dark. There were ſeveral very bright luminous ſpots on different parts of the ſurface of the *ſea* water, and the whole, when viewed by the light of a candle, ſeemed covered with a greaſy ſcum. The third night the light of the *ſea* water, while at reſt, was very little, if at all, leſs than before; but when ſtirred, its light was ſo great as to diſcover the time by a watch, and the fiſh in it appeared as a dark ſubſtance. After this its light was evidently decreaſing, but was not quite gone before the ſeventh night; the freſh water and the fiſh in it were perfectly dark during the whole time. The thermometer was generally above 60°. Having made artificial *ſea* water, determined by an hydrometer to be of the ſame ſpecific gravity with the *ſea* water, by adding four ounces avoirdupois of ſalt to ſeven pints of water, wine meaſure, he put into a gallon of this water a ſmall herring; and another into a gallon of water, in which two pounds of ſalt had been diſſolved. The next evening, the whole ſurface of the artificial *ſea* water was luminous without being ſtirred, but gave much more light when it was diſturbed, and exhibited the ſame appearances with the real *ſea* water in the preceding experiment; while the other water, which was almoſt as ſalt as it could be made, never gave any light. The herring which was taken out of it the ſeventh night, and waſhed from its ſalt, was found firm and ſweet; but the other herring was very ſoft and putrid, much more ſo than that which had been kept as long in freſh water.

If a herring, in warm weather, be put into ten gallons of artificial *ſea* water, inſtead of one, the water, Mr. Canton ſays, will ſtill become luminous, but its light will not be ſo ſtrong.

Theſe experiments confirm an obervation of ſir John Pringle, that the quantity of ſalt contained in *ſea* water haſtens putrefaction; but ſince that preciſe quantity of ſalt which promotes putrefaction the moſt, is leſs than that which is found in *ſea* water, it is probable, Mr. Canton obſerves, that if the *ſea* were leſs ſalt, it would be more luminous. See PUTREFACTION.

Mr. Canton obſerved, as Mr. Ant. Martin Swed Abhand. vol. xxiii. p. 225. had done, that ſeveral kinds of river fiſh could not be made to give light, in the ſame circumſtances in which any *ſea* fiſh became luminous. He ſays, however, that a piece of carp made the water very luminous, though the outſide or ſcaly part of it did not ſhine at all.

SEA-*adder*, an Engliſh name for a *ſea* fiſh of the acus kind, called by Willughby the *acus lumbriciformis*.

It is a ſmall fiſh of a cylindric ſhape, without ſcales, and of a greeniſh brown colour, with ſome admixture of a reddiſh yellow.

Their ſnout is long and hollow, and the mouth opens upwards at its end; the eyes are ſmall, and their iris red; the gills are four on each ſide, but are covered by a membrane, and the whole body divided into rings like the common earth-worm: it is uſually about three or four inches long, and of the thickneſs of a gooſe-quill; it has but one fin, which is ſituated on the back. The anus is much nearer the head than the tail, and under the ſnout there is always a fleſhy tubercle.

The fiſh is common on the coaſt of Cornwall. See *Sea*-ADDER. Willoughby.

SEA *army*. See *Naval* ARMY.

SEA *aſtrolabe*. See ASTROLABE.

SEA *banks*. See BANK. Malicious deſtroying *ſea banks*, whereby lands may be overflowed, is made felony without benefit of clergy by 6 Geo. II. c. 25. and 10 Geo. II. c. 32.

SEA *bear*, in *Zoology*, the PHOCA *urſina* of Linnæus, called alſo by ſome writers the *ſea cat*, and by Pennant the *urſine ſeal*, inhabits together with the *ſea* lion and manati, from June to September, the iſles that are ſcattered in the *ſeas* between Kamſchatka and America, in order to copulate, and bring forth their young in full ſecurity. In September, they quit their ſtation in a very emaciated ſtate; ſome returning to the Aſiatic, and others to the American ſhores, but, like the *ſea* otters, they are confined to thoſe *ſeas* between lat. 50° and 56°. Theſe animals are alſo common about New Zealand, Staten-iſland, New Georgia, and the Falkland Iſlands.

The *urſine ſeals* lead, during the three months of ſummer, a very indolent life; they are confined for ſeveral weeks to the ſame ſpot, ſleep the greateſt part of their time, eat nothing, and are totally inactive, the employment of the females in ſuckling their young excepted. They live in families, each male having from eight to fifty females, which he guards with jealouſy; and though they lie by thouſands on the ſhores, each family conſiſting ſometimes of one hundred and twenty, keeps itſelf ſeparate from the reſt.

The old animals, which are deſerted by the females, live apart, and are exceedingly ſplenetic and quarrelſome, very fierce, and ſo attached to their old haunts, that they would die ſooner than quit them; in defending theſe, diſcord is ſometimes ſpread through the whole ſhore. The other males are alſo very iraſcible, and the cauſes of their diſputes are generally ſuch as theſe; an attempt to ſeduce any of their females, the intruſion of one upon the ſtation of another, and interference in their mutual quarrels. Their battles are ſevere and bloody, and when they terminate, the combatants throw themſelves into the *ſea*, to waſh away the blood.

The males are very fond of their young, of which the female generally brings but one at a time, and never more than two; but they are very tyrannical towards the females, which, on the other hand, are very fawning and ſubmiſſive.

The *ſea bears* ſwim very ſwiftly, at the rate of ſeven miles an hour; when wounded, will ſeize on the boat, bear it away with impetuoſity, and ſometimes ſink it. They can continue a long time under water. When they want to climb the rocks, they faſten with the fore-paws, and draw themſelves up. They are very tenacious of life, and will live for a fortnight after receiving ſuch wounds as would immediately deſtroy any other animal.

The males of this ſpecies are much larger than the females; their bodies are of a conical form, thick before and tapering to the tail; the length of a large one is eight feet, the greateſt circumference five feet, and near the tail twenty inches; the weight 800 ℔; the noſe projects like that of a pug dog, but the head riſes ſuddenly; the noſtrils are oval, divided by a ſeptum; the lips thick, and in the inſide red and ſerrated; the whiſkers long and white; the teeth, which are thirty-ſix in number, lock into each other when the mouth is cloſed; the tongue bifid; the eyes are large and prominent, and capable of being covered at pleaſure with a fleſhy membrane; the ears are ſmall and ſharp pointed; the length of the fore-legs is twenty-four inches; the feet are formed with toes, but covered with a naked ſkin, ſo as entirely to appear a ſhapeleſs maſs; the hind legs are twenty-two inches long, and fixed to the body behind, but capable of being brought forward, and the feet are divided into five toes; the tail is only two inches long; the hair is long and rough, under which is a ſoft down of a bay colour; the general colour of theſe animals is black, but the hairs of the old ones are tipt with grey. The females are cinereous. The ſkins of the young, cut out of the bellies of their dams, are uſeful for cloathing.

The fat and fleſh of the old males is very nauſeous, but the fleſh of the females reſembles lamb, and the young ones roaſted are as good as ſucking-pigs. Pennant's Hiſt. Quad. vol. ii. p. 526, &c.

SEA *biſket*. See BISKET.

SEA *boat*, in *Naval Language*, a veſſel that bears the *ſea* firmly, without labouring heavily, or ſtraining her maſts and rigging.

SEA *breaches*, a term uſed by the farmers to expreſs the overflowing of their low lands near the *ſea* by the *ſea* water.

Sea ſalt, moderately uſed, is a great improvement to all lands, but too much of it kills all ſorts of vegetables, except ſuch as nature has intended to live among it. See SALT.

The *ſea* breaking in upon lands thus, injures them greatly. The owner is to ſtop the breach by which it entered with all poſſible diligence, and then trenches and drains muſt be cut through all parts of the land, to carry the ſalt water into ſome one low place, from which it may be emptied by means of an engine; or if it be ſmall in quantity, it may be laded out by hand over the bank; or if yet leſs, the ſun and winds may dry it away; but in either caſe, the place where it was ſuffered to reſt muſt be covered with a large quantity of freſh earth, to take off from the too great ſaltneſs of the other; and the whole land ſhould be ploughed for three or four years, to let in the rains and air to freſhen it.

SEA *bream*, in *Ichthyology*, the Engliſh name for the fiſh called by the generality of authors the PAGRUS and *phagrus*. According to the new ſyſtem of Artedi, it is a ſpecies of the *ſpari*, and is diſtinguiſhed by the name of the *red ſparus*, with the ſkin carried into a ſinus at the roots of the back-fins, and the pinna ani.

SEA *buckthorn*, *hippophae*, in *Botany*, a genus of the *dioecia tetrandria* claſs; its characters are theſe: it is male and female in different plants; the male flowers have an empalement of one leaf, cut into two parts; they have no petals, but have four ſhort ſtamina; the female flowers have no petals, but a one-leaved empalement, which is oval and bifid at the brim; theſe have no ſtamina, but in the centre is ſituated a ſmall roundiſh germen, which turns to a globular berry with one cell, incloſing one roundiſh ſeed. There are two ſpecies, the one a native of our *ſea* banks, and the other of North America.

SEA *calf*, PHOCA *vitulina*, in the Linnæan ſyſtem of *Zoology*, is the common *ſeal*, with large black eyes, large whiſkers, oblong noſtrils, flat head and noſe, tongue forked at the end, two canine teeth in each jaw, ſix cutting teeth in the upper jaw, four in the lower, no external ears, body covered with thick ſhort hair, ſhort tail, and toes furniſhed with ſtrong ſharp claws; its uſual length is from five to ſix feet; the colour various; duſky, brinded, or ſpotted with white or yellow. This ſpecies inhabits moſt quarters of the globe, but is found in greateſt number towards the north and ſouth; they ſwarm near the arctic circle, and the lower parts of South America, in both oceans near the ſouthern end of Terra del Fuego, and among the floating ice as low as lat. 60° 21′ S.

They are alſo found in the Caſpian *ſea*, in the lake Aral, and lakes Baikal and Oron, which are freſh waters, but theſe are leſs, and more fat than thoſe of the ſalt water. Seals bring forth two young at a time in autumn, which are for a ſhort time white and woolly, and ſuckle them till they are ſix or ſeven weeks old in rocks or caverns, when they take to ſea; as they cannot remain long under water, they frequently riſe to take breath, and often float on the waves.

In ſummer they ſleep on rocks or ſand banks; if ſurpriſed, they plunge into the *ſea*, and when at a diſtance fling up the ſand with their hind feet, and make a piteous moaning, as they ſcramble along, and if they are overtaken, vigorouſly defend themſelves with their feet and teeth; they are ſoon killed by a ſlight blow on the noſe, otherwiſe they will ſurvive many wounds.

Theſe animals ſwim with great ſtrength and ſpeed, and in their own element ſport without fear about ſhips and boats, which, ſays Mr. Pennant, may have given riſe to the fable of *ſea*-nymphs and ſyrens. They are gentle and docile; they feed on all ſorts of fiſh; are themſelves good food, and eat by voyagers: they are killed for the ſake of the oil made from their fat, of which a young *ſeal* will yield eight gallons; their ſkins are uſeful in making waiſtcoats, covers for trunks and other conveniencies; and they are the wealth of the Greenlanders, ſupplying them with every neceſſary of life.

We have a draught of this animal in the Philoſophical Tranſactions, No. 469, by Dr. Parſons, who obſerves, that Aldrovandus, Johnſton, Rondeletius, and Geſner, have made ſeveral miſtakes in the figure of this creature, ſo as to convey no juſt idea of it.

Upon diſſecting one of theſe animals, the ſtomach, inteſtines, bladder, kidneys, ureter, diaphragm, lungs, great blood veſſels, and pudenda, were like thoſe of a cow; the hairs of the whiſkers were very horny and clear; the ſpleen was two feet long, four inches broad, and very thin; the liver conſiſted of ſix lobes, each hanging as long and as lank as the ſpleen, with a very ſmall gall-bladder. The beaſt was long and flabby in its contexture in general, having a large foramen ovale, and very great columnæ carnoſæ. In the lower ſtomach were about four pounds weight of flinty pebbles, all ſharp and angular, as if the animal choſe them of that form for cutting the food. The uterus was of the horned kind, each of the cornua being thicker than the body or duct leading to them: the ovaria were very large, being granulated on the ſurface with the ova, under a very thin membrane; and the opening into the tubes leading to the cornua is a great hole.

The authors who have treated on this animal, are Ariſtotle, Pliny, Aldrovandus, Rondeletius, Geſner, Wolfgangius, and Johnſton.

This animal is viviparous, and ſuckles its young by the mamillæ like quadrupeds; and its fleſh is carnous and muſcular. That diſſected by Dr. Parſons was ſeven feet and an half long, though very young, having ſcarce any teeth, and having four holes regularly placed about the navel, which in time became papillæ. See a deſcription of other ſpecies of *ſeal*, with figures, by Dr. Parſons in Philoſ. Tranſ. vol. xlvii. p. 109, &c. and Pennant's Hiſt. Quad. vol. ii. p. 518, &c.

Sea *chart*. See Chart.

Sea *coaſt*. See Coast.

Sea *compaſs*. See Compass.

Sea-*cow*, in *Zoology*, the Engliſh name of the *manati*, a ſpecies of fiſh ſo different from all the other cetaceous tribe, to which it properly belongs, that Artedi, in his new ſyſtem of ichthyology, allots it a peculiar generical name, which is *trichecus*: in the Linnæan ſyſtem it is the TRICHECUS *manatus*. This ſpecies has thick lips, very ſmall eyes, two ſmall orifices in the place of ears; neck ſhort, and thicker than the head; the greateſt thickneſs of the body is about the ſhoulders, from which it grows gradually ſmaller to the tail, which lies horizontally, being broad, and thickeſt in the middle, and growing thinner to the edges, and quite round. The feet are placed at the ſhoulders; beneath the ſkins are bones for five complete toes, and externally are three or four nails flat and rounded; near the baſe of each foot in the female is a teat; the ſkin is very thick and hard, having a few hairs ſcattered over it, whence the name *trichechus*, formed of ϑϱιζ, *hair*, and ιχθυς, *a fiſh*.

Thoſe animals of this ſpecies, that were meaſured by Dampier in the Weſt Indies, were ten or twelve feet long; their tail twenty inches in length, fourteen in breadth, and four or five thick in the middle, and two at the edges; and the largeſt of them weighed twelve hundred pounds; but ſome have been mentioned, the length of which has been ſixteen feet and a half, and even twenty feet.

According to Dampier, thoſe which inhabit freſh waters are much leſs than the others: they inhabit the rivers of Africa, from that of Senegal to the Cape of Goodhope, and abound in certain parts of the eaſtern coaſts and rivers of South America, about the Bay of Honduras, ſome of the greater Antilles, the rivers of Oronoque and of the Amazons.

They ſometimes live in the *ſea*, and often near the mouth of ſome river, into which they come once or twice in twenty-four hours, for the ſake of feeding on the marine plants, and they are fonder of brackiſh or ſweet water than of the ſalt; and delight in ſhallow water near low land, and in places ſecure from ſurges, and where the tides run gently. They are ſaid to frolic and leap at ſome times out of the water to a great height. Their fleſh and fat are white, ſweet, and ſalubrious; and the tail of a young female is much eſteemed, and a ſuckling roaſted highly delicious. The thicker part of the ſkin, cut firſt into lengths of two or three feet, ſerves for whips, &c. and becomes tough, when dried, as wood.

Theſe animals are taken by a harpoon ſtuck in the end of a ſtaff, which the Indians uſe with great dexterity. If a female with a young one is ſtruck, ſhe takes it under its fins or feet, and ſhews, in extremity, the greateſt affection for its offspring; and the young one never forſakes its captured parent, but becomes a ſure prey to the harpooner.

This animal is called by Herrera *taurus marinus*, or the *ſea-bull*, and by other the *tachas* and *la donna*. The French call it *lamantin*, or *namentin*, and the Portugueſe *pezze mouller*.

It may ſeem ſtrange, that ſo ill ſhaped a creature as this ſhould have given riſe to the ſtories of the ſyrens and mermaids, the *ſea*-men and *ſea*-women, yet there is great reaſon to believe, that all the fabulous accounts of theſe monſters, are owing to the ſeeing this animal, and the common ſeal, raiſe their head and ſhoulders above the water. See Sea-*man*.

Mr. Pennant has deſcribed an animal of this ſpecies, which he calls the whale tailed manati, and which the Ruſſians diſtinguiſh by the name of the *morſkaia korowa*, or *ſea-cow*. This animal, whoſe feet are merely pectoral fins, and ſerve only for ſwimming, brings forth in the water, and, like the whale, ſuckles its young in that element; like the whale, it has no voice, and like that animal, has an horizontal broad tail, without even the rudiments of hind feet. It inhabits the *ſeas* about Bering's and the other Aleutian iſlands, between Kamtſchatka and America.

In calm weather theſe animals ſwim in great droves near the mouths of rivers; when hurt, they ſwim out to the *ſea*, but ſoon return again. They live in families near one another, each conſiſting of a male, female, a half grown young one, and a very ſmall one; the females oblige the young to ſwim before them, while the other old ones ſurround, and, as it were, guard them on all ſides. The affection between the male and female is very great, for if ſhe is attacked, he will defend her to the utmoſt, and if ſhe is killed, will follow her carcaſe to the very ſhore, and ſwim for ſome days near the place where it was landed.

They copulate in the ſpring, in the ſame manner as the human kind, eſpecially in calm weather, towards the evening; the female ſwims gently about, the male purſues, till tired with wantoning, ſhe flings herſelf on her back, and admits his embraces: the leonine and urſine ſeals copulate after the ſame manner on ſhore. Steller ſays, they go with young above a year, and bring forth one at a time, which they ſuckle by two teats, placed between the breaſt. They are very voracious and gluttonous, and feed not only on the fuci that grow in the *ſea*, but ſuch as are flung on the edges of the ſhore; and when they are filled, they fall aſleep on their backs. Their back and ſides are generally above water, and as their ſkin is infeſted with a ſpecies of louſe peculiar to themſelves, numbers of gulls are continually perching on their backs to pick out the inſects.

They continue in the Kamtſchatkan and American *ſeas* the whole ſummer, but in winter are very lean. They are taken by harpoons faſtened to a ſtrong cord, but after they are ſtruck, it requires the united force of thirty men to draw them on ſhore. When one is ſtruck, its companions repair to its help, ſome will endeavour to overturn the boat, by getting under it; others will preſs down the rope, in order to break it, and others ſtrike at the harpoons with their tails, with a view of getting it out, in which artifice they ſometimes ſucceed. Their noiſe is like the ſnorting of a horſe, which is occaſioned by hard breathing. They are of an enormous ſize, ſome being twenty-eight feet long, and eight thouſand pound in weight: the head is ſmall, oblong, and almoſt ſquare; the noſtrils filled with ſhort briſtles, the lips double, and the mouth, near the junction of the jaws, full of white tubular briſtles, which ſerve to prevent the food from running out with the water; the lips are alſo furniſhed with briſtles, which ſerve inſtead of teeth to cut the roots of the *ſea* plants; in the mouth there are no teeth, only two flat white bones, one above and another below in each jaw, with undulated ſurfaces, which anſwer the purpoſe of grinders. The eyes are ſmall; inſtead of ears there are two ſmall orifices; the tongue is pointed and ſmall, the neck is thick, and the head always hangs down. Near the ſhoulders the circumference of the body is twelve feet, about the belly twenty, near the tail four feet eight inches; the head is thirty-one inches, and the neck near ſeven feet; which dimenſions render the animal extremely deformed. Near the ſhoulders are two feet or fins, two feet two inches long, without fingers or nails; the tail is thick, ſtrong and horizontal, ending in a ſtiff black fin, ſlightly forked. The ſkin is thick and black, and full of inequalities, and ſo hard as ſcarcely to be cut with an ax, without hair; beneath the ſkin is a thick blubber, which taſtes like oil of almonds. The fleſh is coarſer than beef, and will not ſoon putrefy. The young ones taſte like veal: the ſkin is uſed for ſhoes, and for covering the ſides of boats. Pennant's Hiſt. Quad. vol. ii. p. 536, &c.

The *ſea-cow* of the gulf of St. Lawrence weighs from fifteen hundred to two thouſand pounds, and produces from one to two barrels of oil, which is boiled out of a fat ſubſtance that lies between the ſkin and the fleſh; it carries its young about nine months, and ſeldom brings forth more than one at a time. The ſkin is cut into ſlices of two or three inches wide, and exported to America for carriage traces, and to England for glue. The teeth afford an inferior ſort of ivory, which very ſoon turns yellow. Philoſoph. Tranſ. vol. lxv. part. 2. p. 249, &c.

Sea-*crow*, in *Ornithology*, a name given by the common people of many counties of England to the pewit.

Sea-*devil*, in *Ichthyology*, an Engliſh name for the *rana piſcatrix* or lophius *piſcatorius*, of Linnæus; a very remarkable ſpecies of fiſh, of a middle nature between the cartilaginous and bony fiſhes. In ſhape and figure it reſembles a tadpole: its head is extremely large, being equal, or more than ſo, to the reſt of the body, and of a circular figure: the opening of its mouth is ſurpriſingly great, and its lower jaw is above a finger longer than the upper; both jaws, but particularly the under one, are armed with a great number of long and ſharp teeth, which are ſet in cluſters, and not in regular rows, and they are all moveable inwards: with the lower jaw and the external cluſters of the teeth of the upper jaw, this fiſh holds faſt its prey, whilſt with another cartilaginous jaw, whoſe teeth correſpond with an inner cluſter of teeth in the upper, he chews and tears his prey; neither the under jaw, nor external row of the upper, having any ſhare in the maſtication at all.

The back is flat, and of a bluiſh green colour, mottled with a few white ſpots: the eyes are pearly in the iris, and a tranſverſe ſtreak of white is drawn acroſs the pupil. In the upper part of the head, at half a finger's breadth diſtance from the angle of the upper jaw, are placed two briſtles, the fore one is ſix fingers long, the hinder one four; and in the middle of his back, lower down, are three more, which ſerve in the place of fins. Over the upper jaw there are, on each ſide, two ſharp thorns, and there are thorny tubercles all about the eyes; and on the midle of the back, not far from the tail, there is a fin with ten rays: the tail is not forked, but the rays are branched, and all ſtand out a little beyond the fin, and are hooked. In the under part of the body, juſt under the throat, there are two fins like a mole's feet, each compoſed of five rays or fingers: there are two others on the edge of the body, and the extremity of all theſe, as alſo of the tail, is black.

The bronchial holes are three on each ſide, which are ſituated deep in the mouth, and open into marſupia or ſacculi on the ſide of the head, the ſides of which are the branchioſtegæ, having ſeveral long ſlender cartilaginous bones, running longitudinally for their ſupport, analogous to the branchioſtegal bones of other fiſhes; and theſe ſacks, Dr. Parſons conjectures, may anſwer two ends, firſt, to form the membranæ branchioſtegæ; and, ſecondly, to make a convenient receptacle for the young till they are able to ſhift for themſelves. If this end, he ſays, was not to be anſwered, the branchiæ might have been terminated near their origin in the mouth, as in other fiſhes. If this fiſh does not bring forth its young perfect, Dr. Parſons thinks there can be no uſe aſſigned for theſe ſacks; but if they are viviparous, then the young may probably be harboured in them, being capable of crawling into them, as we may ſee by the pectoral webs on the under ſide; beſides, as theſe fiſhes crawl on the bottoms of ſhoal places, watching and alluring their prey, the young muſt be protected by the parent, till they are able to provide for themſelves, which may probably be when they grow too large to enter into theſe marſupiæ.

This fiſh has either no noſtrils, or elſe they are hid within the head, and has a ſort of membranous rim running all round the commiſſures of its ſides and belly. Its fleſh, when boiled, taſtes like that of the frog. See *Tab.* IV. *of Fiſh*, N° 47, Willughby's Hiſt. Piſc. p. 85, Phil. Tranſ. vol. xlvi. p. 126, &c.

Sea-*dragon*, in *Ichthyology*. See Draco *marinus*.

Sea-*drags*, among *Mariners*, are ſuch things as hang over the ſhip in the *ſea*, as ſhirts, coats, and even the boat, &c. when towed.

Sea-*eagle*, *aquila marina*, in *Ichthyology*, a ſpecies of the raia, with a ſmooth body and a long ſerrated ſpine on a finny tail. See *Sea*-Eagle and *Tab. Fiſh*, fig. 1.

Sea-*eel*. See Eel, and *Tab. Fiſh. fig.* 11.

Sea *egg*, or *ſea apple*, the name of the roundiſh *centronia*, with crooked or feſciculated ſpines. See Centronia.

Sea *fans* and *ſea feathers*. Seee Gorgonia.

Sea-*faring*, denotes the condition of a mariner.

Sea-*fight*. See Engagement and Signal.

Sea-*fox*, an Engliſh name for a fiſh of the ſqualus kind, called alſo the *ſea-ape*; both names being given on occaſion of the length of its tail in proportion to the body. The old Greek writers have called it *alopæcia*, and the later *vulpes marina*, and *ſimia marina*, whence the names *ſea-fox*, and *ſea-ape*. See *Sea*-fox.

Sea-*gage*. See Altitude and Gage.

Sea-*gate*, at *Sea*, when two ſhips are aboard one another, by means of a wave or billow, the ſeamen ſay, they lie aboard one another in a *ſea-gate*.

Sea-*gudgeon*, an Engliſh name given to the fiſh called by the generality of writers *gobius niger*, and the *gobius marinus*. Artedi, who has made a genus of the *gobii*, excludes the common *gudgeon*, or *gobio fluviatilis*, from it, but he admits this fiſh as a genuine ſpecies of it. Athenæus tells us of three kinds of *gudgeons*, the black, the yellow, and the white. This ſeems to have been very plainly the black *gudgeon* of that author. Salvian, in his figure of this fiſh, has given three fins on the back, but it really has only two. See Goget.

Sea-*hare*, in the *Hiſtory of Inſects*, the name of the *lernea*; a ſpecies of the scyllæa.

Sea-*hen*, in *Ornithology*, a name given by ſome to the lommia, a web-footed bird, common on our coaſts, and called the *guillemot*, or *kiddow*.

Sea-*holly*. See Eryngo.

Sea-*horſe*, in *Ichthyology*, the Engliſh name of the *hippocampus*, a ſpecies of the *acus*, according to the older writers, and one of the *ſyngnathi* of Artedi. For the characters ſee Hippocampus. *Tab.* II. *Fiſh*, fig. 13. The many idle tales reported of this vaſt amphibious creature, ſuch as his method of bleeding himſelf when diſtempered, his vomiting fire when enraged, and the like, have made people, in almoſt all ages, deſirous of ſeeing the animal. The Romans were fond of exhibiting it in their ſhews of wild beaſts, and the deſcription Pliny gave of it from thence, was all the world knew of the creature for many ages. That author's account, however, of its feeding on graſs on the banks of the Nile, no way agrees with the teeth we find its mouth furniſhed with.

The ſkeletons of theſe animals, as rare as they are with us at preſent in their recent ſtate, yet are found not unfrequently, in part at leaſt, buried under ground, and that at great depths. The bones of the head are different from thoſe of any other known animal, and when found in ſome parts of France, had always puzzled the wits of the naturaliſts there, who had in vain compared them with thoſe of oxen, horſes, &c. but at length one of the heads of theſe animals being ſent over to France, cleared up the whole difficulty. The two jaws of this weighed forty-five pounds, and were two feet long, a foot deep, and a foot and half wide.

It is eaſy to conceive from this, that the accounts we have of the ſize of the animal are not fabulous, theſe bones correſponding very well with them. Mem. Acad. Par. 1724.

Sea-horſe is alſo a name ſometimes, but improperly, given to the river-*horſe*, or hippopotamus.

Sea-horſe, is alſo a name given to that ſpecies of ſeal called walrus.

Sea-*lark*. See *Sea* Lark.

Sea-*laws*. See *Laws* of Oleron, and Uses and Customs of the *Sea*.

Sea-*leech*, See Hirudella Marina.

Sea-*lion*, *phoca leonina* of Linnæus, in *Zoology*, is a ſpecies of ſeal, which inhabits the *ſeas* about New Zealand, the iſland of Juan Fernandez, the Falkland Iſlands, and that of New Georgia. The animals of this ſpecies are ſeen in great numbers in June and July, the breeding ſeaſon, on the iſland of Juan Fernandez, wither they reſort in order to ſuckle their young on ſhore, and where they continue till September: they bring forth two at a time; and during this ſeaſon, the female is very fierce. They arrive on the breeding iſlands very fat and full of blood, and their blubber has been found a foot thick; one of them has been known to yield a butt of oil, and the blood has filled two hogſheads.

Lord Anſon's people eat the fleſh, calling it beef by way of diſtinction from that of the common ſeal, which they called lamb. The old animals, except at the breeding ſeaſon, are very timid; and to prevent ſurpriſe, each herd places a centinel, who gives certain ſignals at the appearance of danger; they aſſociate in families, like the *ſea-bears*, and are equally jealous of their miſtreſſes. They are of a lethargic nature, and fond of wallowing upon one another in miry places; they grunt like hogs, and ſnort like horſes.

During the breeding ſeaſon they abſtain from food, and become very lean; at other times they feed on fiſh and the ſmaller ſeals. The male has a projecting ſnout, hanging five or ſix inches below the lower jaw; the upper part conſiſts of a looſe wrinkled ſkin, which the animal when angry has the power of blowing up, ſo as to give the noſe an arched appearance; the feet are ſhort and duſky, having five toes on each, furniſhed with nails; the hind-feet appear like laciniated fins; the eyes and the whiſkers are large; the hair on the body is ſhort and of a dun colour; that on the neck a little longer, and the ſkin very thick. The length of an old male is twenty feet, and the greateſt circumference fifteen. The noſe of the female is blunt and tuberous at the top; the noſtrils wide; the mouth breaking very little into the jaws; two ſmall cutting teeth below: two ſmall and two large above; two canine teeth, remote from the preceding, five grinders in each jaw, and all the teeth conic; the eyes oblique and ſmall; no auricles; the fore-legs twenty inches long; the toes furniſhed with oblong flat nails; the hind parts, inſtead of legs, divided into two great bifurcated fins; no tail; and the whole covered with ſhort ruſt-coloured hair. The length from the noſe to the end of the fins is four yards, and the greateſt circumference two and a half. Pennant's Hiſt. of Quad. vol. ii. p. 531. See *Tab.* V. *Quadrupeds*, Nº 55.

Sea-*louſe*, *pediculus marinus*, a name given to the Molucca crab.

Sea-*lungs*, in the *Hiſtory of Inſects*, the Engliſh name of a ſpecies of MEDUSA.

Sea-*man*. We have many accounts, even from authors of credit, of ſomething reſembling the human figure ſeen at *ſea*, and fancy has carried them to ſuch a height, that the truth of the deſcription is loſt in moſt of them. The ſyrens, which we have accounts of even in Bartholin, and the *ſea-man*, or *homo marinus*, as it was called, ſeen and deſcribed by Barchewitz, give the greateſt credit to the ſtory; but writers are ſo fond of telling marvellous things, that great allowances are to be made in the reading.

The general deſcription of the *ſea-man* is, that from the navel downwards the whole is only a ſhapeleſs lump of fleſh, without any the leaſt mark, either of limbs, fins, or tail. On the breaſt there ſtand two pectoral fins, which are each compoſed of five bones or rays, reſembling the human hand, and connected together by a membrane like the toes of a duck, or ſome other water fowl's foot.

Theſe fins are what have the appearance of ſomething human, and when ſeen about the boſom of a white bellied fiſh, may be taken for hands with ſhort arms, and the reſemblance of a head is eaſily fancied. Theſe fins are not peculiar to any one kind of fiſh, but the manati or *ſea*-cow, the rana piſcatrix or lophius, and many others have them. It is probable from moſt of the accounts we have, that the manati, or *ſea*-cow, is the creature, which being ſeen raiſing its head above water at a diſtance, and extending theſe pectoral fins, which are what it ſwims with, has given riſe to the idea of the upper part of a human figure.

As to the deſcription of a ſhapeleſs lump of fleſh making up the lower part of the animal, it ſeems too contrary to the courſe of nature in all other *ſea*-animals, to have any foundation in reality, and probably was only the invention of the deſcriber, to make out what he did not ſee above water.

It is true, that Barchewitz takes great pains to prove that the *ſea-man*, or *homo marinus*, he deſcribes, was a wholly different creature from the *ſea*-cow; but his deſcription of it carries too little the air of any thing in nature, to meet with an eaſy credit.

It is wonderful, that ſo judicious a writer as Artedi ſhould give any faith to the exiſtence of ſo ſtrange a fiſh as this, but he mentions it with a great air of diſtruſt, and wiſhes a more perfect hiſtory of it, if it any where exiſts.

The public are often impoſed upon by cheats, who ſhew different things under the name of *ſea-men*, mermaids, and ſyrens; but if we may judge of the generality of theſe creatures, thus ſhewn, by the lateſt inſtance among us, they are very wretched counterfeits indeed. This creature was ſaid to be a young mermaid taken on the Acapulca ſhore, and maintained its credit ſo well in London, as to afford the proprietor a comfortable ſubſiſtence for ten months among us, though no other than a human fœtus of about eight months, with a hydrocephalus head, and with the two legs growing together, and covered by one common membrane: the toes of this fœtus were beat out into a reſemblance of fins.

Sea-*mark*, a point, and conſpicuous place diſtinguiſhed at *ſea*. See Land-*mark*, Beacon, and Buoy.

Sea-*moſs*. See Coralline and Conferva.

Sea-*mouſe*, in the *Hiſtory of Inſects*, the Engliſh name of the APHRODITA.

Sea-*nettle*. See Nettle.

Sea-*oak*. See Wreck and Fucus.

Sea-*officer*. See Officer.

Sea-*onion*. See Squill.

Sea-*otter*. See Otter, and *Tab.* V. *Quadrupeds*, No. 56.

Sea-*owl*, in *Ichthyology*, a name given by many to that fiſh which we more uſually call the *lump-fiſh*, the *lumpus* of Willughby, &c. and the *cyclopterus* of Artedi.

Sea-*pearch*. See Pearch.

Sea-*pen*. See *Sea*-PEN.

Sea-*pheaſant*, in *Ornithology*, the name of a bird of the duck kind, but differing from all the other ſpecies in the ſhape of its tail, which has two long feathers ſtanding out beyond the reſt, and terminating in a point. It is called more generally the *cracker*. See *Pin-tail* Duck.

Sea-*pie*, in *Ornithology*. See Pica *marina*.

Sea-*plants*, a denomination comprehending thoſe marine productions which are formed by inſects, and which properly belong to the animal kingdom; however, they ſo much reſemble vegetables in their form, that they have been long taken for plants, called by this name, and claſſed under the vegetable kingdom.

Count Marſigli, who was at indefatigable pains to collect the various *ſea-plants* of ſeveral places, divides all theſe productions, which he referred to the rank of vegetables, into three claſſes. The firſt claſs contains the ſoft or herbaceous ones; ſuch are the algæ, called *ſea*-WRECKS, the FUCUSES, or *ſea-oaks*, the *ſea-moſſes*, or CONFERVÆ, and the different ſpecies of SPUNGES: the ſecond claſs comprehends thoſe that are ligneous, or of a woody hardneſs, which were called LITHOPHYTA by the ancients, as if their hardneſs approached to that of ſtones; theſe, Marſigli ſays, conſiſt of two ſubſtances, a cortical and an internal; the cortical part, while in the *ſea*, is ſoft, but in drying becomes as hard as chalk, and eaſily crumbles between the fingers; the internal ſubſtance ſeems more of the nature of horn than of wood; when burnt, it throws out a ſpume, or froth, like that which horns or feathers of animals yield in the fire, and their ſmell in burning is of the ſame kind; the branches of theſe are very pliable, bending in the manner of whalebone, and giving the ſame reſiſtance to a knife in cutting. The third claſs comprehends thoſe plants which are of the hardneſs of ſtone, and which ſhould properly be called the *lithophyta*: theſe are the ſeveral ſpecies of CORAL, MADREPORA, and the like.

Marſigli endeavours to explain the differences of theſe ſeveral ſubſtances, and to account for the manner of their receiving nouriſhment, agreeably to the ſyſtem which prevailed in his time, and which appropriated them to the claſs of vegetables. Marſigli, Hiſt. Phyſ. de la Mer. Mem. de l'Acad. Par. 1710.

By later experiments and obſervations, it has been ſufficiently demonſtrated by M. Peyſſonnel, Bernard de Juſſieu, Donati, &c. that thoſe marine ſubſtances, which Marſigli thought to be plants, are the work and habitation of animals. See on this ſubject the articles Coral and Corallines.

Dr. Liſter apprehends, that thoſe ſubſtances, which in his time were thought to be *ſea-plants*, ſerve to render a great deal of the *ſea* water freſh, and give it in miſts to the clouds, whence it again falls on the earth. This is eaſily proved by experiment thus; if a quantity of *ſea* water be put into a long glaſs body, and into it there be put a large and vigorous *ſea-plant*, ſuch as the common *ſea*-wreck, and the head placed on the glaſs, and a receiver fitted for it without cutting the joints, there will daily diſtil into the receiver, without giving any fire below, a clear and ſweet water, freſh and potable, and without any diſagreeable or unwholeſome quality. The quantity is but ſmall that is obtained this way, but it is evident, that in the ſame manner a very immenſe quantity of the *ſea* water is every hour made freſh, and raiſed up into the air from the infinite number of plants that grow in it. Dr. Liſter even thinks that the tropic winds, which blow conſtantly one way, may be owing to this ſort of cauſe. Philoſ. Tranſ. Nº 156. See TROPIC *winds*.

Sea-*quadrant*. See Back-*ſtaff* and Quadrant.

Sea-*ſalt*. See Salt.

Sea-*room*, denotes a ſufficient diſtance from the coaſt, as well as from any rock and ſhallows, whereby a ſhip may drive or ſcud without danger of ſhipwreck.

Sea-*ſand*. See Sand and *Common* Salt.

Sea-*ſcorpion*. See Father Lasher.

Sea-*ſerpent*. See *Sea*-SNAKE.

Sea-*ſickneſs* is ſaid to be prevented by drinking *ſea* water mixed with wine.

Sea-*ſun-crown*, *American*. See American, &c.

Sea-*ſwallow*, the name of a bird of the *larus*, or gull kind, called by authors *ſterna*, and common on our coaſts. See *Sea*-SWALLOW.

Sea-*turtle dove*. See *Sea-turtle* Dove.

Sea-*water*, that briny bitteriſh fluid, which conſtitutes the *ſea*. See Water.

Sea-*weed*. See Fucus.

Sea-*worms*. See Worms.

Sea-*wreck*. See Wreck.

Sea-*yoke*. See Yoke.

Sea, *head*. See Head *ſea*.

Sea, *high*. See High.

Sea, *lie under the*. See Lying.

Sea, *pacific*. See Pacific.

Sea, *reflux of the*. See Reflux.

SEA, *trough of the*. See TROUGH.

SEA, *under the*. See UNDER.

SEAH, in *Jewiſh Antiquity*, a meaſure of capacity containing ſix CABS.

SEAL, *ſigillum*, a puncheon, or piece of metal, or other matter, uſually either round or oval, whereon are engraven the arms, device, &c. of ſome prince, ſtate, community, magiſtrate, or private perſon, often with a legend or inſcription; the impreſſion whereof in wax ſerves to make acts, inſtruments, &c. authentic.

The king's great *ſeal*, is that whereby all patents, commiſſions, warrants, &c. coming from the king are ſealed: this conſiſts of two impreſſions, one being the *ſeal* itſelf, with the effigies of the king ſtamped upon it; the other has an impreſſion of the king's arms in the figure of a target, for matters of ſmaller moment, as certificates, &c. that are uſually pleaded *ſub pede ſigilli*.

The keeping hereof is in the hands of the lord high chancellor, who is hence alſo denominated *lord keeper*.

This office of lord CHANCELLOR, or lord KEEPER, whoſe authority by 5 Eliz. c. 18. is declared to be exactly the ſame, is with us at this day created by the mere delivery of the king's great *ſeal* into his cuſtody, without writ or patent.

The king's PRIVY-*ſeal* is a *ſeal* uſually firſt ſet to grants that are to paſs the great *ſeal*. See PATENTS.

The uſe of *ſeals* is very ancient, an inſtance of which occurs in Daniel, chap. vi. 17, but ſeals are ſtill older than this; for Jezebel, in 1 Kings, chap. xxi. *ſeals* the orders ſhe ſent for Naboth's death with the king's ring. See alſo Jerem. xxxii. 10. &c.

In effect, as the ancient *ſeals* were all engraven on the collets, ſtones, &c. of rings, and as the original uſe of rings, it is aſſerted, was only to be in readineſs for the ſealing of acts, inſtruments, &c. *ſeals* ſhould ſeem as ancient as rings themſelves.

Theſe ſealing rings, called *annuli ſignatorii*, *ſigillares*, *cirographi* or *cerographi*, it is ſaid in ancient authors, were firſt invented by the Lacedæmonians, who, not content to ſhut their cheſts, armories, &c. with keys, added *ſeals* to them; and to this end, at firſt they made uſe of worm-eaten wood, the impreſſions whereof they took on wax, or ſoft earth; but they at length found the art of engraving figures, or rings, the impreſſions of which they took in the ſame manner. This, however, muſt be granted, that even in Moſes's time, the art of engraving, not only on metals, but alſo on precious ſtones, was known.

Indeed, it does not appear, that the ring had any other uſe among the primitive Jews beſides ornament: but at length it was uſed to ſeal inſtruments, contracts, diplomas, letters, &c. inſtances whereof we have in the firſt book of Kings xxi. 8. Eſther viii. 10. Xenophon. Hellen. lib. I. Quint. Curt. lib. vi. Juſt. lib. xliii. cap. iii. where we learn, the keeping of the emperor's *ſeal* was become a particular office; Lucian adds, that Alexander gave his *ſeal* to Perdiccas, thereby appointing him his ſucceſſor.

Pliny obſerves, that in his time there were no *ſeals* uſed any where but in the Roman empire; at Rome he tells us, they were become of abſolute neceſſity, inſomuch that a teſtament was null without the teſtator's *ſeal*, and the *ſeals* of ſeven witneſſes; but it does not appear that the Romans had any ſuch things as public *ſeals*; nor that their edicts and contracts were *ſealed*, not even in the times of the emperors.

In France the cuſtom anciently was, inſtead of ſigning their inſtruments, &c. only to *ſeal* them; as appears from an infinity of ancient charters, which are not ſigned at all; the reaſon whereof was, that in thoſe days very few people were able to write; ſcarce any body, indeed, could read and write but clerks; and the cuſtom continued when learning made its way among them, though the reaſon for doing it had ceaſed.

In England, the firſt ſealed charter we find extant, is that of Edward the Confeſſor, upon his founding of Weſtminſter Abbey; yet, we read of *ſeals* in the MS. hiſtory of king Offa.

And ſir Edward Coke relies on an inſtance of king Edwyn's making uſe of a *ſeal* about an hundred years before the Conqueſt; though ſome have doubted the authenticity of this charter; becauſe it is certain that *ſealing* was not then in common uſe.

Before the time of William the Conqueror, the Engliſh did not *ſeal* with wax, but only made a golden croſs on the parchment, and ſometimes an impreſſion on a piece of lead, which hung to the grant with a ſilken ſtring, and was deemed an abundant authorizing of the grant itſelf, without either ſigning or witneſſes.

This practice of affixing the ſign of the croſs proceeded from their inability to write; which is honeſtly avowed by Caedwalla, a Saxon king, at the end of one of his charters: *propria manu pro ignorantia literarum ſignum ſanctæ crucis expreſſi et ſubſcripſi.*

The ſame circumſtance is related concerning the emperor Juſtin in the Eaſt, and Theodoric, king of the Goths in Italy.

The colour of the wax wherewith William's grants were *ſealed*, was uſually green, to ſignify that the act continued for ever freſh, and of force. The uſual impreſſion on all laymen's *ſeals*, till the year 1218, was a man on horſeback, with a ſword in his hand; afterwards, they began to engrave their COATS of *arms* on their *ſeals*: only the archbiſhops and biſhops, by a decree of cardinal Otto, who was legate here in 1237, were to bear in their *ſeals* their title, office, dignity, and even their proper names.

Du Cheſne obſerves, that none below the dignity of a knight had any right to a pendant *ſeal*, called *authenticum*.

The emperors long *ſealed* all their acts of importance with a golden *ſeal*; and the golden bull of Charles IV. for the election of an emperor, takes its name from the gold *ſeal* hanging to it, which is called *bull*.

The pope has two kinds of *ſeals*: the firſt uſed in apoſtolical briefs, and private letters, &c. called the *fiſherman's ring*. This is a very large ring, wherein is repreſented St. Peter drawing his net full of fiſhes.

The other is uſed in bulls, repreſenting St. Peter's head on the right, that of St. Paul on the left, with a croſs between the two; on the reverſe are ſometimes the pope's name and arms.

The impreſſions of the firſt *ſeal* are taken in red wax; but thoſe of the ſecond, always in lead.

Theod. Hopink, a German lawyer, has furniſhed the world with a learned and curious work on the ſubject of *ſeals*, printed in 1642, at Nurembergh, in quarto, under the title, de Sigillorum priſco & novo Jure, Tractatus Practicus, &c. We have another work of the like kind by Heineccius, in folio, printed at Frankfort, and Leipſic, in 1709, under the title, de Veteribus Germanorum aliarumque Nationum Sigillis, eorumque Uſu & Præſtantia, Syntagma Hiſtoricum.

SEAL, *hermetical*. See HERMETICAL.

SEAL, in *Zoology*. See SEA-*bear* and SEA-*calf*.

SEAL is alſo uſed for the wax or lead, and the impreſſion thereon, fixed to the thing *ſealed*.

The manufacturers *ſeal* frequently applied to their ſtuffs, &c. is to be lead. That of knights, by the French law, is to be of hard wax; that of agents, of ſoft wax.

Some *ſeals* are ſtamped on the paper or parchment itſelf, others hung by ſilken ſtrings.

The French *ſeal* their edicts with green wax; arrets with yellow wax; expedients for Dauphiné with red wax. And the letters of the French academy are *ſealed* with blue wax. See WAX.

SEAL, *lady's* SEAL, in *Botany*, a ſpecies of BRYONY.

SEAL, *Solomon's*, in *Botany*. See LILY *of the Valley*.

SEALER, an officer in chancery, appointed by the lord chancellor, or keeper of the great ſeal, to ſeal the writs and inſtruments there made in his preſence.

SEALING, in *Architecture*, the fixing a piece of wood or iron in a wall, with plaiſter, morter, cement, lead, or other ſolid binding.

For ſtaples, hinges, and joints, plaſter is very proper.

SEALING *wax*. See WAX.

SEAM or SEME *of corn*, is a meaſure of eight buſhels.

SEAMS, or SEYMS, in *horſes*, certain clefts in their quarters, occaſioned by the dryneſs of the foot, or by riding upon hard ground.

SEAM *of glaſs*, is the quantity of one hundred and twenty pounds, or twenty-four ſtone, each five pounds weight.

The *ſeam* of wood, is a horſe-load.

SEAM, *monk's*. See MONK.

SEAMS *of a ſhip*, are places where her planks meet and join together; they are always filled with a quantity of oakum, and covered with hot pitch to prevent the entrance of the water. There is alſo a kind of peculiar *ſeam* in the ſowing of ſails, which they call a *monk's ſeam*.

SEAMS *of a ſail*, are, of two ſorts, *monk's ſeam*, and *round-ſeam*. See MONKS, &c.

SEAM, *round*, of a ſail, is ſo called, becauſe round like the common *ſeam*.

SEAMEN. See MARINERS and NAVY.

SEARCE. See SIEVE.

SEARCH-*warrant*, in *Law*, a kind of *general warrant* iſſued by juſtices of peace, for ſearching all ſuſpected places for ſtolen goods; and there is a precedent in Dalton, requiring the conſtable to *ſearch* all ſuch ſuſpected places, as he and the party complaining ſhall think convenient; but ſuch practice is condemned by lord Hale, Mr. Hawkins, and the beſt authorities. However, in caſe of a complaint, and oath made of goods ſtolen, and that the party ſuſpects that goods are in ſuch houſe, and ſhews the cauſe of ſuch ſuſpicion, the juſtice may grant a *warrant* to *ſearch* in thoſe ſuſpected places mentioned in his *warrant*, and to attach the goods, and the party in whoſe cuſtody they are found, and bring them before him or ſome other juſtice, to give an account how he came by them, and to abide ſuch order as to law ſhall appertain; which *warrant* ſhould be directed to the conſtable, or other public officer, who may enter a ſuſpected houſe, and make *ſearch*.

SEARCHER, an officer in the cuſtoms, whoſe buſineſs it is to *ſearch* and examine ſhips outward bound, if they have any prohibited or uncuſtomed goods on board, &c. 12 Car. II. There are alſo *ſearchers* of leather, &c. See ALNAGER.

SEARCHER, in *Artillery*, is an iron ſocket with branches, from four to eight in number, a little bent outwards, with ſmall points at their ends; to this ſocket is fixed a wooden handle, from eight to twelve feet long, of about an inch and a quarter diameter. This *ſearcher* is introduced into the gun after it has been fired and turned round, in order to diſcover the cavities within; and after their diſtances are marked on the outſide with chalk, they make uſe of another *ſearcher* that has only one point, about which a mixture of wax and tallow is put, to take the impreſſion of the holes; and if there are any a quarter of an inch deep, or of any conſiderable length, the gun is rejected as unſerviceable to the government. The gun is thus proved and *ſearched* twice.

SEAR-CLOTH, or CERE-CLOTH. The word *ſear-cloth* is ſuppoſed to be a corruption of *cere-cloth*, and to be derived originally from the Greek κηρος, *wax*.

In *Surgery*, it denotes a form of external remedy, ſomewhat harder than an unguent, yet ſofter than an emplaſter, though it is frequently uſed both for the one and the other.

The *ſear-cloth* is always ſuppoſed to have wax in its compoſition, which diſtinguiſhes, and even denominates it. In effect, when a liniment or unguent has enough wax in it, it does not differ from a *ſear-cloth*.

Sear-cloths are a kind of ſubſtitutes to friction, and are ſometimes uſed for other purpoſes: the beſt are compounded of reſolvent drugs, as ſaffron, myrrh, and aloes, incorporated with wax and gums, as galbanum, gum ammoniac, and ſagapenum; the whole tempered with wine.

SEASE, SEASIN, or SEASING, in a *Ship*. See SEIZE.

SEASONING *of timber*. See TIMBER.

SEASONINGS, in the Weſt Indies, a kind of aguiſh diſtemper, which foreigners are much ſubject to at their firſt coming.

SEASONS, in *Coſmography*, certain portions or quarters of the year, diſtinguiſhed by the ſigns which the ſun then enters, or by the meridian altitudes of the ſun; conſequent on which, are different temperatures of the air, different works in tillage, &c.

The word is formed from the French *ſaiſon*, which Menage derives from the Latin *ſtatio*, whence the Italians have formed *ſtagione*: Nicod derives it from *ſatio*, *tempus ſationis*, *ſowing time*.

The year is divided into four *ſeaſons*, ſpring, ſummer, autumn, and winter. The beginnings and endings of each whereof ſee under its proper article.

It is to be obſerved, the *ſeaſons* anciently began differently from what they now do: witneſs the old verſes,

> *Dat Clemens hyemem*; *dat Petrus ver cathedratus*:
> *Æſtuat Urbanus*; *autumnat Bartholomæus*.

SEAT, in *Aſtronomy*. See SCHEAT.

SEAT, in the *Manege*, is the poſture or ſituation of a horſeman upon the ſaddle.

To *ſeat* a horſe upon his haunches or hip. See PUT.

SEAZE. See SEIZE.

SEBACEÆ *glandulæ*. See GLANDS.

SEBAR, or CEBAR, in the *Materia Medica*, a name by which the Arabians call the *lignum aloes*, or *aloe-wood*, a perfumed aromatic drug.

SEBAT, in *Chronology*, the fifth month of the civil year of the Hebrews, and the eleventh of the eccleſiaſtical year, anſwering to part of our January and part of February.

SEBEL, an Arabian name for the diſorder of the eye, uſually called a PANNUS.

SEBESTEN, SEBESTENA, *myxa*, in *Pharmacy*, &c. the fruit of a ſpecies of CORDIA, reſembling a little plum or prune; which, when ripe, is of a deep red colour, bordering on black; very ſweet, and the fleſh, or pulp, glutinous or ſticky.

The Syrians make a kind of glue, or birdlime, of the *ſebeſtens*, called *birdlime of Alexandria*. The fruit has been eſteemed pectoral, cooling, and emollient; though it is now diſcarded by the colleges both of London and Edinburgh.

The ſtone within it is triangular: it brought its name from Arabia, whence Pliny obſerves it came in his time into Italy.

SEBESTENA, in *Botany*, the name given by Dillenius to a genus of plants called CORDIA by Plumier, and under that name characteriſed by Linnæus.

SEBUÆI, a ſect among the ancient Samaritans, whom St. Epiphanius accuſes of changing the time expreſſed in the law for the celebration of the great annual feaſts of the Jews.

Serrarius conjectures, that they were thus called from their celebrating the feaſt of the paſſover on the ſeventh month, called by the Hebrews *ſeba*, *ſeventh*. Druſius rather takes them to have been denominated from *Sebaia*, the leader of a ſect among the Samaritans. Scaliger derives the name from the Hebrew, *ſebua*, *week*, becauſe of their celebrating every ſecond day of the ſeven weeks, between Eaſter and Whitſuntide.

SEBURAI, *Seburæi*, a name which the Jews give to ſuch of their rabbins or doctors as lived and taught ſome time after the finiſhing of the Talmud.

The word is derived from סבר, *ſaber*, *I think*: whence סברא, *ſabura*, *opinion*, *ſentiment*: and thence סבראי, *ſeburi*, or *ſeburai*, *opiniative*.

The reaſon of this appellation, ſay the rabbins, is, that the Talmud being finiſhed, publiſhed, and received in all the ſchools and ſynagogues, theſe doctors had nothing to do but to diſpute for, and againſt, the Talmud, and its deciſions. Others ſay, it was becauſe their ſentiments were not received as laws or deciſions, as thoſe of the Miſchnic and Gemaric doctors were; but were held as mere opinions. Others, as the author of Schalſcheleth Hakkabala, or *chain of tradition*, tell us, that the perſecution the Jews underwent in thoſe times not allowing them to teach quietly in their academies, they only propoſed their opinion in the compoſition of the Miſchna.

The firſt and chief of the *Seburai* was R. Joſi, who began to teach in the year 787, of the æra of contracts; which, according to R. David Gautz, falls on the year of the world 4236, and who, according to R. Abraham, was thirty-eight years preſident of the Jewiſh academy.

The æra of contracts is the ſame with that of the *Seleucidæ*, the 787th year whereof falls on the year of Chriſt 476, which, of conſequence, is the æra of the origin of the *Seburai*, whoſe reign did not hold long; Buxtorf ſays, not above ſixty years; R. Abraham, and others, ſay not fifty. The laſt of them was R. Simona. They were ſucceeded by the Gaons or Geonim.

SECACUL, in the *Materia Medica of the Ancients*, a name given by Avicenna, Serapion, and others, to a root which was like ginger, and was brought from the Eaſt Indies, and uſed as a provocative to venery.

The interpreters of their works have rendered this word *iringo*, and hence ſome have ſuppoſed that our eryngium, or eryngo, was the root meant by it: but this does not appear to be the caſe on a ſtrict enquiry, and there is ſome reaſon to believe that the famous root, at this time called *ginſeng*, was what they meant.

SECALE, in *Botany*. See RYE.

SECAMONE, in *Botany*, a name by which the Ægyptians call a ſpecies of periploca common there, and diſtinguiſhed by Mr. Tournefort by the name of *periploca foliis oblongis anguſtioribus*, the long narrow-leaved periploca. See *Virginian* SILK.

SECANT, in *Geometry*, a line that cuts another, or divides it into two parts. See LINE, &c.

Thus the line A M (*Tab.* IV. *Geometry*, *fig.* 101.) is a *ſecant* of the circle A E D, &c. as it cuts the circle in B.

It is demonſtrated by geometers: 1. That if ſeveral *ſecants* M A, M N, M E, &c. be drawn from the ſame point M, that paſſing through the centre, M A, is the greateſt; and the reſt are all ſo much the leſs, as they are more remote from the centre. On the contrary, the portions thereof without the circle M D, M O, M B, are ſo much the greater, as they are farther from the centre. The leaſt is that of M A, which paſſes through the centre.

2. That if two *ſecants*, M A and M E, be drawn from the ſame point M, the *ſecant* M A will be to M E as M D to M B: or $ME \times MD = MA \times MB =$ the ſquare of a tangent to the circle drawn from the point of concurrence M.

SECANT, in *Trigonometry*, denotes a right line, drawn from the centre of a circle, which, cutting the circumference, proceeds till it meets with a tangent, to the ſame circle. Thus the line F C (*Tab.* *Trigonometry*, *fig.* 2.), drawn from the centre C till it meets the tangent E F, is called a *ſecant*; and particularly, the *ſecant of the arch* A E, to which E F is tangent.

The *ſecant* of the arch AH, which is the complement of the former arch to a quadrant, is called the *co-ſecant*, or *ſecant of the complement*.

The ſine of an arch, AD, being given, to find the *ſecant* thereof FC, the rule is, as the co-ſine DC is to the whole ſine, ſo is the whole ſine, or radius, AC, to the *ſecaut* CF: or the *ſecant* is a third proportional to the coſine and radius. See SINE.

To find the logarithm of the *ſecant* of any arch, the ſine of the complement of the arch being given, multiply the logarithm of the whole ſine by two, and from the product ſubtract the logarithm of the ſine complement; the remainder is the logarithm of the *ſecant*. The reaſon of which operation is obvious; becauſe $\frac{EC^2}{DC} =$ to CF; and, therefore, from the nature of LOGARITHMS, twice the log. of EC — the log. of DC = the log. of CF.

SECANTS, *line of*. See SECTOR.

SECESPITA, among the Romans, a knife with a round ivory handle, adorned with gold and ſilver, which the flamens and prieſts uſed at ſacrifices.

SECIUM, among the Romans, a term uſed to ſignify every thing the prieſts cut with the knife *ſeceſpita*, as the *libum*, *placenta*, &c.

SECK, *rent*. See RENT *ſec*.

SECLIA, a name by which ſome authors have called wormwood.

SECOMIÆ, in *Natural Hiſtory*, the name of a genus of foſſils, of the claſs of the *ſeptariæ*; the characters of which are, that they are bodies of a duſky hue, divided by ſepta, or partitions of a ſparry matter, into ſeveral more or leſs regular portions, of a moderately firm texture, not giving fire with ſteel, but fermenting with acid menſtrua, and eaſily calcining.

The *ſeptariæ* of this genus are, of all others, the moſt common, and are what have been known by the little expreſſive, or miſtaken names of the *waxen vein*, or *ludus Helmontii*. We have many ſpecies of theſe bodies common among us. Of the whitiſh or browniſh kinds we have thirteen; of the yellowiſh, five; and of the ferruginous ones, four.

SECOND, in *Anatomy*. See SECUNDI *generis*.

SECOND, in *Geometry*, *Aſtronomy*, &c. the ſixtieth part of a prime, or minute; either in the diviſion of circles, or in the meaſure of time.

A degree, or an hour, are each divided into ſixty minutes, marked thus ′; a minute is ſubdivided into ſixty *ſeconds*, marked thus ″; a *ſecond* into ſixty-thirds, marked thus ‴, &c.

We ſometimes ſay a *ſecond minute*, a *third minute*, &c. but more uſually, ſimplv, *ſecond*, *third*, &c.

A PENDULUM, three feet three inches and two-tenths of an inch long, vibrates *ſeconds*, according to ſir Jonas Moor's reduction of Huygen's three feet eight lines and a half of Paris meaſure to Engliſh meaſure.

SECOND, in *Muſic*, denotes one of the muſical intervals; being only the diſtance between any ſound, and the next ſound, whether higher or lower.

As in the compaſs of a tone there are reckoned nine ſenſibly different ſounds, which form thoſe little intervals, called *commas*; one might in ſtrictneſs ſay there are eight kinds of *ſounds*.

There are three kinds of *ſeconds* occurring in practice, the leſſer, the greater, and the ſuperfluous *ſecond*; to which, if the enharmonic genus were reſtored, we might add the diminiſhed *ſecond*. The leſſer *ſecond* is the ſemitone major, and is nearly equal to $5\frac{1}{5}$ commas. The greater *ſecond* is the tone, which being either major or minor, there muſt alſo be two great *ſeconds*; one nearly equal to $8\frac{1}{2}$ commas, and the other to $9\frac{1}{2}$ commas: but practitioners uſually confound theſe two. The ſuperfluous *ſecond* is a tone major, and ſemi-tone major; the other ſuperfluous *ſecond*, ariſing from the tone minor and ſemi-tone minor, is not in uſe. Laſtly, the diminiſhed *ſecond* is a ſemi-tone minor leſs than the leſſer *ſecond*; that is, equal to the dieſis enharmonica. Thus between E and F, or between A and B, would be a diminiſhed *ſecond*, as alſo between G ſharp and A. This laſt has been practiſed by Mr. Handel, in the oratorio of Sampſon, in the ſecond part of the ſong, Retnrn, return, O God of Hoſts. See INTERVAL.

Some authors, as Ozanam, call the ſemi-tone minor by the name of *diminiſhed ſecond*; but this is contrary to the analogy in like caſes, where diminiſhed is uſually applied to intervals a ſemi-tone minor leſs than a true diatonic interval. Thus the diminiſhed ſeventh is a ſemi-tone minor leſs than the flat ſeventh, or ſeventh minor.

SECOND, *diminiſhed*, in *Muſic*. See DIMINISHED *ſecond*.

SECOND *de l'oreille*, in *Anatomy*, a name given by Vieuſſens and others to a muſcle of the EAR, called by Cowper and others *ſtapidaceous*, and *ſtapedis muſculus*; and by Albinus *ſtapedium*. Winſlow calls it *le muſcle de l'eſtrier*.

SECOND *captain*. See CAPTAIN.

SECOND *cauſe*. See CAUSE and EFFICIENT.

SECOND *deliverance*, *ſecunda deliberatione*, a judicial writ that lies after nonſuit of the plaintiff in replevin, and a *returno habendo* of the cattle replevied, adjudged to him that diſtrained them; commanding the ſheriff to replevy the ſame cattle again, upon ſecurity given by the plaintiff in the replevin for the redelivery of them, if the diſtreſs be juſtified. It is a *ſecond* writ of replevin, &c. F. N. B. 68.

SECOND *flank*, *notion*, *order of curves*, *rate*. See the ſubſtantives.

SECOND *ſight*, an odd qualification, which many of the inhabitants of the Weſtern Iſlands of Scotland are ſaid to be poſſeſſed of. The thing is atteſted by many credible authors (among whom is Mr. Martin, author of the natural hiſtory of theſe iſlands, and a member of the Royal Society); and, notwithſtanding the ſtrangeneſs of it, many have ſtedfaſtly believed it.

The *ſecond ſight* is ſaid to be a faculty of ſeeing things to come, or things done at a great diſtance, repreſented to the imagination as if actually viſible and preſent.

Thus, if a man be dying, or about to die, his image, it is pretended, ſhall appear diſtinctly in its natural ſhape, in a ſhroud, with other funeral apparatus, to a *ſecond-ſighted* perſon, who, perhaps, never ſaw his face before: immediately after which, the perſon ſo ſeen certainly dies.

The quality of *ſecond ſightedneſs*, they ſay, is not hereditary; the perſon who has it cannot exert it at pleaſure; nor can he prevent it, or communicate it to another; but it comes on him involuntarily, and exerciſes itſelf on him arbitrarily; and often, eſpecially in the younger *ſecond* ſeers, to their great trouble and terror.

There are a great number of circumſtances ſaid to attend theſe viſions; by obſervation whereof, the particular circumſtances, as to time, place, &c. of the death of the perſon, &c. are learnt. The method of judging of them, or interpreting them, grows into a kind of art; which is very different in different perſons. *Second ſightedneſs* is held a diſcredit in the country; ſo that none, they ſay, will counterfeit it; but that many conceal and diſſemble it. See Johnſon's Journey to the Weſtern Iſlands of Scotland, p. 248, &c.

SECOND *ſurcharge*, *writ of*, in *Law*. See SURCHARGE.

SECOND *terms*, in *Algebra*, thoſe where the unknown quantity has a degree of power leſs than it has in the term where it is raiſed to the higheſt.

The art of throwing theſe *ſecond terms* out of an equation; that is, of forming a new equation, where they have no place, is one of the moſt ingenious and uſeful inventions in all algebra.

SECOND *tithe*. See TITHE.

SECONDARY, or SECUNDARY, an officer who acts as ſecond, or next to the chief officer.

Such are the *ſecondaries* of the courts of king's bench and common pleas; the *ſecondories* of the compters, who are next the ſheriffs of London in each of the two compters; two *ſecondaries* of the pipe; *ſecondaries* to the remembrancers, &c.

Secondary is more frequently uſed in an adjective ſenſe, by way of oppoſition to PRIMARY, or principal.

SECONDARY *actors*. See ACTOR.

SECONDARY *affections*. See AFFECTION.

SECONDARY *circles of the ecliptic*, are circles of longitude of the ſtars; or circles which, paſſing through the poles of the ecliptic, are at right angles to the ecliptic. See CIRCLES *of latitude*.

By the help of theſe, all points in the heavens are referred to the ecliptic; that is, any ſtar, planet, or other phenomenon, is underſtood to be in that point of the ecliptic, which is cut by the *ſecondary* ſemicircle, which paſſes through ſuch ſtar, or phenomenon.

If two ſtars be thus referred to the ſame point of the ecliptic, they are ſaid to be in conjunction; if in oppoſite points, they are ſaid to be in oppoſition; if they be referred to two points at a quadrant's diſtance, they are ſaid to be in a quartile aſpect; if the points differ a ſixth part of the ecliptic, they are ſaid to be in ſextile aſpect.

In the general, all circles which interſect one of the ſix greater circles of the ſphere at right angles, may be called *ſecondary circles*. As the azimuth or vertical circles in reſpect of the horizon, &c. the meridian in reſpect of the equator, &c.

SECONDARY *collateral points*. See COLLATERAL.

SECONDARY *conveyances*, in *Law*. See DERIVATIVE.

SECONDARY *dials*. See DIAL.

SECONDARY *fever* is that which ariſes after a criſis, or the diſcharge of ſome morbid matter: as after the declenſion of the ſmall-pox, or meaſles. See FEVER, *Small*-POX, &c.

SECONDARY *motion*. See MOTION.

SECONDARY *place*. See PLACE.

SECONDARY *planets*, thoſe moving round other planets as the centres of their motion, and along with them round the ſun. See PLANET.

SECONDARY *qualities*, *rainbow*. See the ſubſtantives.

SECONDARY *uſe*, in *Law*. See USE.

SECONDINE. See SECUNDINE.

SECRETARIUM, among the Romans, a recluſe room, where the judges conſidered the cauſes that had been litigated before them, and came to a reſolution what ſentence they were to pronounce from the tribunal. It was moſt uſually ſeparated from the tribunal by a veil.

SECRETARY, an officer, who, by order of his maſter, writes letters, diſpatches, and other inſtruments, which he renders authentic by his ſignature.

Of theſe there are ſeveral kinds, as *ſecretary of ſtate*, *ſecretary of war*, *ſecretary of the treaſury*, *ſecretary of the admiralty*, *ſecretary of the lord-chancellor*, &c.

SECRETARIES *of ſtate*, are officers attending the king, for the receipt and diſpatch of letters, grants, petitions, and many of the moſt important affairs of the kingdom, both foreign and domeſtic.

The king's *ſecretaries* were anciently called the king's *clerks* and *notaries*, *regi a commentariis*. As for the name *ſecretary*, it was at firſt applied to ſuch as, being always near the king's perſon, received his commands, and were called *clerks of the ſecret*; whence was afterwards formed the word *ſecretary*, *regi a ſecretis*: and as the great lords began to give their clerks alſo the quality of *ſecretaries*, thoſe who attended the king were called, by way of diſtinction, *ſecretaries of the commands*, *regi a mandatis*. This continued till the reign of our Henry VIII. 1559; when, at a treaty of peace between the French and Spaniards, the former obſerved, that the Spaniſh miniſters, who treated for Philip II. called themſelves *ſecretaries of ſtate*: upon which, the French *ſecretaires de commandements*, out of emulation, aſſumed the ſame title; which thence paſſed alſo into England.

Till the reign of king Henry VIII. there was only one *ſecretary of ſtate*; but then, buſineſs increaſing, that prince appointed a ſecond *ſecretary*: both were of equal power and authority, and both ſtyled *principal ſecretaries of ſtate*. Before queen Elizabeth's time, the *ſecretaries* did not ſit at the council board; but that princeſs admitted them to the place of privy counſellors, which honour they have held ever ſince; and a council is never, or at leaſt very ſeldom, held without one of them. On the union of England and Scotland, queen Anne added a third *ſecretary*, on account of the great increaſe of buſineſs, which, as to Britain, was equally and diſtinctly managed by all the three, although the laſt was frequently ſtyled *ſecretary of ſtate for North Britain*. We had alſo lately a *ſecretary of ſtate* for the American department. But both theſe offices are now aboliſhed, and there remain two *ſecretaries*, who have, under their management and direction, the moſt conſiderable affairs of the nation, and are obliged to a conſtant attendance on the king: they receive and diſpatch whatever comes to their hands, be it for the crown, the church, the army, private grants, pardons, diſpenſations, &c. as likewiſe petitions to the ſovereign; which, when read, are returned to the *ſecretaries* for anſwer: all which they diſpatch, according to the king's command and direction.

The correſpondence with all parts of Great Britain is managed by either of the two *ſecretaries* without diſtinction; but in reſpect to foreign affairs, all the nations which have any intercourſe or buſineſs with Great Britain are divided into two provinces or departments, the ſouthern and the northern; each *ſecretary* receiving all letters and addreſſes from, and making all diſpatches to, the ſeveral princes and ſtates comprehended in his province.

Ireland and the plantations are under the direction of the elder *ſecretary*, who has the ſouthern province.

Each of theſe two *principal ſecretaries* has two *under-ſecretaries* and one chief clerk, beſides a number of other clerks and officers, wholly depending upon them.

Our *ſecretaries of ſtate* are allowed power to commit perſons for treaſon, and other offences againſt the ſtate, in order to bring them to their trial. Some have ſaid that this power is incident to their office; and others, that they derive it in virtue of their being named in the commiſſions of the peace for every county in England and Wales.

The *ſecretaries of ſtate* have the cuſtody of that ſeal, properly called the *ſignet*, and the direction of the ſignet office; wherein there are four clerks employed, who prepare ſuch things as are to paſs the ſignet, in order to the privy or great-ſeal. All grants, ſigned by the king, are returned hither, which, tranſcribed, are carried to one of the principal *ſecretaries of ſtate*, and ſealed, and then called ſignets; which, being directed to the lord privy-ſeal, are his warrant.

On the *ſecretaries of ſtate* is likewiſe dependent another office, called the PAPER-*office*; wherein all public writings, papers, matters of ſtate, &c. are preſerved.

All the *under-ſecretaries* and clerks are in the choice of the *ſecretary of ſtate*, without reſerve to any perſon: the *under-ſecretaries* receive orders and directions from them, for writing diſpatches, foreign or domeſtic, which they give to the chief clerk, who diſtributes them to the under-clerks.

SECRETARY *of an embaſſy*, is a perſon attending an ambaſſador, for the writing of diſpatches relating to the negotiation.

There is a great difference between the *ſecretary of the embaſſy*, and the ambaſſador's *ſecretary*: the laſt is a domeſtic, or menial of the ambaſſador's; the firſt a ſervant, or miniſter, of the prince.

SECRETION, *ſecretio*, in *Medicine*, the act whereby the ſeveral juices, or humours, in the animal body, are ſeparated from the blood, by means of the glands.

In the bodies of animals, we obſerve a great number of juices of different natures; viz. the blood, lympha, ſaliva, ſtomach-liquor, inteſtinal juices, pancreatic juice, bile, urine, &c. Now the blood is the general ſource of all; and from it they are ſecerned by particular organs, called *glands*.

The manner wherein this *ſecretion* is effected, has been much inquired into in theſe laſt ages; though not with the greateſt ſucceſs. The ancient phyſicians, indeed, contented themſelves to aſſert certain particular virtues, or faculties, inherent in the ſeveral viſcera, whereby they were determined to ſeparate one liquor, rather than another, without troubling themſelves much about the manner wherein this was done: but the moderns, according to the genius of their philoſophy, muſt have this point cleared, and the modus of *ſecretion* rendered intelligible. Hence, as the exceeding ſmallneſs of theſe organs prevented any regular ſearch, they have imagined various manners of explaining it.

Some, full of the effects they have obſerved from the fermentation, maintain, that there are ferments in the ſeveral parts; by aid whereof, certain kinds of particles, mixed in the blood, are ſeparated therefrom; after the ſame manner as we ſee in muſt, or new wine, from which, while fermenting, certain parts are detached, in form of froth. But this opinion has ſo many inconveniences with which to grapple, that it is almoſt univerſally abandoned.

Others conſider the glands as a kind of ſieves; whoſe holes having different figures, will only let paſs certain particles, or molecules, whoſe figures reſemble thoſe of the holes. But the falſity of this hypotheſis was ſoon found out; and it was thought ſufficient to fix ſome proportion between the diameters of the pores, and that of the molecules that were to paſs through them, to account why very ſubtil parts ſhould paſs through the glands, through which the coarſer could not paſs. Yet this opinion was not found perfectly ſatisfactory; for, on this ſuppoſition, the moſt ſubtil parts of the blood muſt paſs in ſuch quantity through the largeſt pores, that there would not be enough left to furniſh the little ones with what they needed: and, for the ſame reaſon, thoſe parts, whoſe pores are biggeſt, ought to furniſh liquors much fuller of ſubtil parts than thoſe whoſe pores are ſmaller; which yet is contrary to experience. For the ſeroſity ſeparated in the kidneys, under the name of *urine*, conſiſts of parts much ſubtiler, and ſmaller, than the bile ſeparated in the liver: why, then, does not this ſeroſity eſcape in the liver, the pores whereof muſt be much greater than thoſe of the kidneys?

This inconvenience many naturaliſts being aware of, it has made them have recourſe to *imbibition* (if the word may be allowed us, for want of a better). They maintain then, that, beſides the different diameters of the pores, it is required, that the ſeveral parts be already imbued, or moiſtened, with a liquor like to that they are to filtre. This opinion is rather the reſult of reaſon than of experiment; and the maintainers hereof, well pleaſed they had ſomething to ſatisfy their reaſon, never troubled themſelves whether it were true, or not, till Mr. Winſlow adopted it.

Dr. Keill, whoſe theory prevails moſt in England, accounts for *ſecretion* from the joint conſideration of the different diameters of the veſſels, the different velocity of the blood, the different angles the ducts make with the arteries, and the different attraction of the different parts under all theſe different circumſtances.

His theory may be reduced to the following heads:

1. Different juices may be ſeparated from the common maſs of blood, by means of the different diameters of the orifices of the ſecretory ducts. For all particles,

whoſe diameters are leſs than thoſe of the ducts, will paſs through them; ſo that any matter may be evacuated by any of the glands, provided the diameters of its particles be made leſſer than thoſe of the ſecretory duct, either by a comminution of the matter to be ſeparated, or by an enlargement of the ſeparating paſſage.

2. By the different angle which the ſecretory duct makes with the trunk of the artery. For all fluids preſs the ſides of the containing veſſels in a direction perpendicular to its ſides; which is evident in the pulſation of the arteries, it being to that preſſure that the pulſation is wholly owing. It is likewiſe evident, that the blood is urged forward by the force of the heart; ſo that the motion of *ſecretion* is compounded of both theſe motions. Now the lateral preſſure is greater when the direct velocity is ſo, but yet not in proportion to ſuch velocity: for the lateral preſſure is conſiderable, even when the fluid is at reſt; being then in proportion to the ſpecific gravity of the fluid: and in a fluid like the blood in the arteries, which is thrown in a right direction, or a direction parallel to the axis of the veſſel, the lateral preſſure will be in a proportion compounded of both: from whence it will follow, that if two particles of equal diameters, but of unequal ſpecific gravities, arrive, with the ſame velocity, at an orifice capable of admitting them, yet they will not both enter it and paſs, becauſe their motion of direction will be different, ſo that the diverſity of the angles which the ducts make with the trunk of the artery, is altogether neceſſary to account for all the poſſible diverſity of ſecerned fluids even ſuppoſing their diameters and figures to be the ſame.

3. By the different velocities with which the blood arrives at the orifices of the ſecretory ducts. For ſince the ſecretions are made in a fluid form; no poſſible reaſons can be aſſigned, why ſome *animals* have a ſoft looſe texture of the ſolid parts, and why one part of the body is of an eaſily ſeparated texture, and others of a firmer, but this different velocity of the blood at the orifices of the ſecretory ducts, whereby the particles ſecerned for nouriſhment, and accretion, are drove or impacted into the vacuola that receive them, with a greater or leſs force; it being difficult to imagine that ſuch a diverſity in texture can altogether proceed from the different ſolidities and contacts of the conſtituent parts.

But, even in this, there is ſomething arbitrary, and conjectural: beſides, the reaſoning is carried to ſuch a length, that in a thing, the principles whereof are ſo obſcure, the parts or organs ſo imperfectly known, and the whole proceſs carried on out of ſight, the mind can ſcarce ſafely acquieſce in it.

Mr. Winſlow of the Royal Academy of Sciences at Paris, ſeems to have taken a better courſe for the diſcovery of this important action of *ſecretion:* he does not take up with conjectural principles, nor draw a plauſible ſcheme of reaſoning therefrom through the dark; but applies himſelf to experiment, and inveſtigates, in nature herſelf, and the ſtructure of the parts, the manner *ſecretion* is performed in. From a ſtrict examination of the ſeveral kinds of glands, both in men and other animals, he finds, with ſome other anatomiſts, that the glands are only bundles or plexuſes of veſſels: but the veſſels peculiar to the glands, and which conſtitute the principal part thereof, Mr. Winſlow firſt diſcovered to be tubes, furniſhed, on the inſide, with a kind of down or lanugo, or rather with a very fine, ſpongeous tiſſue, which fills the whole cavity of thoſe veſſels like a pith, or marrow. This he finds in all the glands of all animals. In different glands it appears of different colours; and this different colour is even found in the different glands of fœtuſes themſelves.

The gland then is, or at leaſt its main part is, a compound of theſe downy or ſpongeous veſſels, which, from their office, we will call *ſecretory veſſels*, or *ducts*; and which frequently do, almoſt of themſelves, form what we call a *gland*, or *glandulous body:* though, beſides theſe veſſels, we uſually remark four other kinds; viz. arteries, veins, excretory ducts, and nerves. The *ſecretory* ducts we diſtinguiſh from the excretory ones, in that the former, by the peculiar texture of their down, ſerve to ſeparate a particular liquor; and that the latter only ſerve to receive the liquor thus ſecreted, and to carry it to the place it is deſtined for. For a more particular account of the ſtructure and organization of the glands, ſee GLAND.

For the manner wherein the glands act, in ſeparating the ſeveral liquors from the body, Mr. Winſlow lays it down thus: it is a thing well known by phyſicians, and chemiſts, that a piece of brown paper, which is only an aſſemblage of ſmall fibres impacted cloſe to each other, having once imbibed oil, or water, will never let any other liquor paſs through it, but of the ſame kind with what it is impregnated with; all others it ſtops. And the like is obſerved of a wick of cotton, or other matter; which, having firſt imbibed its fill of oil, or water, and being then dipped, at one end, in a veſſel full of oil and water together; the wick, that had imbibed the oil, will only raiſe and diſtil oil: and that with water, only water. Now, in the *ſecretory* ducts of the glands, we find a parallel ſtructure; an aſſemblage or plexus of fine threads or filaments bound cloſe together, much as in brown paper or cotton wick; only differently diſpoſed: this plexus, then, having once imbibed a certain juice, will not let paſs any of the liquors which arrive at the orifices of theſe ducts, but that which it had firſt imbibed. The cauſe of this phenomenon is doubtleſs to be referred to the great principle of attraction, which is found ſtronger between the homogeneous than the heterogeneous parts of the ſame fluid.

As the blood, then, is not an homogeneous liquor, but a compound of an infinity of different parts or molecules, ſome oily, others mucilaginous, aqueous, ſaline, ſubtil, groſs, &c. in its motion along the arteries of the gland, it becomes divided into all the little ramifications thereof; by which means, its velocity is exceedingly abated, and its molecules are obliged to go off, one by one, through the narrow paſſage of the artery into the vein; and, of conſequence, to paſs over the orifices of the *ſecretory* ducts of the glands, whoſe down is already tinged with a juice of a certain nature: ſuch of the molecules, therefore, as are found of the ſame nature with the juice they meet with at the entrance of the *ſecretory* duct, join themſelves to them, and enter the ducts driven on by others that follow them. Thus they paſs, ſucceſſively, through the whole veſſel, and, at length, go out of it into the excretory duct; while the reſt, which are of a different kind, run over the orifice of the *ſecretory* veſſel, without ever mixing with the juice thereof; and thus, arrriving in the vein, they are carried back to the heart.

All that remains is, to explain how theſe parts ſhould have firſt imbibed the particular juices neceſſary for their reſpective *ſecretions:* how, for inſtance, the bile ſhould come to be ſeparated in the liver, for the firſt time, preferably to any other liquor? To this Mr. Winſlow anſwers, that, having obſerved the glands of the ſmalleſt fœtus to be coloured much as in adults, it appears highly probable, they had been imbued with the juices they were to filtrate, at the firſt formation of the animal, or at the ſame time when the ſolid parts of the fabric themſelves were framed.

SECT, *ſecta*, a collective term, comprehending all ſuch as follow the doctrines, or opinions, of ſome famous divine, or philoſopher, &c.

The *ſects* of philoſophers among the ancients, particularly in Greece, were numerous: as the Pyrrhonians, Platoniſts, Epicureans, Stoics, Peripatetics, Academics, &c. See each under its proper article.

At preſent, the *ſects* of philoſophy are chiefly reducible to three; viz. the Carteſians, Peripatetics, and Newtonians. See CARTESIAN, &c.

In theology, the *ſects* are much more numerous; yet the ancients had many legions, now extinct; as Manichees, Gnoſtics, Montaniſts, &c.

The principal now on foot are the Lutherans, Calviniſts, Anabaptiſts, Arians, Socinians, and Arminians. The riſe, progreſs, and fate, with the diſtinguiſhing characters and opinions of each, ſee under LUTHERAN, CALVINIST, &c.

SECT, *Ionic.* See IONIC.

SECT, *Italic.* See ITALIC.

SECTA, in *Law.* See SUIT.

SECTA, *hundred.* See HUNDRED *ſuit.*

SECTA *ad curiam*, a writ which lieth againſt him who refuſeth to perform his ſuit to the county court, or court baron.

SECTA *curia.* See SUIT *of court.*

SECTA *facienda per illam quæ habet æniciam partem*, a writ to compel the heir that hath the elder's part among co-heirs, to perform ſervice for all the coparceners.

SECTA *faldæ.* See FALDAGE.

SECTA *ad juſtitiam faciendam*, is a ſervice which a man is bound to perform by his fee.

SECTA *molendini*, a writ lying where a man by uſage, time out of mind, &c. has ground his corn at the mill of a certain perſon, and afterward goes to another mill with his corn, thereby withdrawing his ſuit to the former. And this writ lies eſpecially for the lord againſt his tenants, who hold of him to do ſuit at his mill. This is now generally turned into an action of the caſe.

SECTA *regalis*, a ſuit by which all perſons were bound twice in a year to attend the ſheriff's tourn, and was called *regalis*, becauſe the ſheriff's tourn was the king's leet; wherein the people were to be obliged by oath to bear true allegiance to the king, &c.

SECTA *unica tantum facienda pro pluribus hæreditatibus*, a

Writ that lies for an heir who is diſtrained by the lord to do more ſuits than one, in reſpect of the land of divers heirs deſcended to him.

SECTILIA, among the Romans, pavements laid with ſtones cut into various forms. Suetonius diſtinguiſhes them from thoſe that were teſſelated.

SECTINEUS, a ſmall, flat, and pretty long muſcle, broad at the upper part, and narrow at the lower; ſituated obliquely between the os pubis, and the upper part of the os femoris.

It is commonly a ſingle muſcle, but is ſometimes found double. It is fixed above by fleſhy fibres to all the ſharp ridge, or criſta, of the os pubis, and to a ſmall part of the oblong notch, or depreſſion, on the foreſide of the criſta, in which the upper extremity of this muſcle is lodged; and thence it runs down obliquely towards the little trochanter, under, and a little behind which it is inſerted obliquely by a flat tendon, between the ſuperior inſertion of the vaſtus internus, and inferior inſertion of the triceps ſecundus, with which it is united. Winſlow.

SECTIO *Cæſarea*. See CÆSARIAN *ſection*.

SECTION, *ſectio*, formed from *ſeco*, *I cut*, a part of a thing divided; or the diviſion itſelf.

Such, particularly, are the ſubdiviſions of chapters, by others called *paragraphs*, and ſometimes *articles*. The mark of a *ſection* is §.

The ancients neglected to divide their books into chapters, and *ſections*: that was a taſk left for future editors and critics.

SECTION, in *Geometry*, denotes a ſide or ſurface appearing of a body, or figure, cut by another; or the place wherein lines, planes, &c. cut each other.

The common *ſection* of two planes is always a right line; being the line ſuppoſed to be drawn by the one plane in its cutting or entering the other.

If a ſphere be cut in any manner, the plane of the *ſection* will be a circle, whoſe centre is in the diameter of the ſphere.

The *ſections* of the cone are four; viz. a circle, parabola, hyperbola, and ellipſis. See each under its proper article. See alſo CONE.

SECTIONS, *conic*. See CONIC *ſection*.

SECTION, *axis of a conic*. See AXIS.

SECTION, *centre of a conic*. See CENTER.

SECTION, *diameter of a conic*. See DIAMETER.

SECTION, *tangent of a conic*. See TANGENT.

SECTIONS, *following*, *ſectiones ſequentes*, in *Conics*, may be thus conceived: ſuppoſe two right lines, as A B, C D (*Tab. Conics*, *fig.* 5.) mutually interſecting one another in E, which point E is ſuppoſed to be the common centre of the oppoſite hyperbolic *ſections* F, G, H, I, and whoſe common aſymptotes, the propoſed lines A B, C D, alſo are. In this caſe, the *ſections* G, F, and H, I, are called *ſectiones ſequentes*; becauſe they are placed following one another in the contiguous angles of two interſecting right lines.

If the determinate diameter H, G, of one of the *ſectiones ſequentes* (which is coincident with the ſuppoſed indeterminate diameter of its oppoſite) be equal to the vertical tangent K L, applied between the aſymptotes in the point G, of the diameter G F; then Apollonius calls ſuch *ſections*, *conjugate ſections*. See *Geneſis of the hyperbola*, under CONIC *ſections*.

SECTIONS, *oppoſite*. See OPPOSITE.

SECTIONS, *ſimilar*. See SIMILAR.

SECTION *of a building* denotes its PROFILE, or a delineation of its heights and depths raiſed on the plan; as if the fabric was cut aſunder to diſcover the inſide.

SECTION, *horizontal*. See ICHNOGRAPHY.

SECTIS *non faciendis*, a writ brought by a woman, who for her dower, &c. ought not to perform ſuit of court.

SECTOR, in *Geometry*, a part of a circle comprehended between the radii and the arch.

Thus the mixt triangle A C D (*Tab.* IV. *Geometry*, *fig.* 102.) comprehended between the radii A C and C D, and the arch A D, is a *ſector of the circle*.

It is demonſtrated by geometricians, that the *ſector* of a circle, as A C D, is equal to a triangle, whoſe baſe is the arch A D, and its altitude the radius A C.

If from the common centre of two concentric circles be drawn two radii to the periphery of the outer, the two arches included between the radii will have the the ſame ratio to their peripheries; and the two *ſectors*, the ſame ratio to the areas of their circles.

To find the area of a *ſector* D C E; the radius of the circle C D, and the arch D E, being given. To 100,314, and the radius D C, find a fourth proportional number; this will be the ſemiperiphery [illegible]hen to 180 degrees, the given arch D E, and the ſemiperiphery juſt found, find another fourth proportional; this will give the arch D E in the ſame meaſure in which the radius D C is given: laſtly, multiply the arch D E into the ſemiradius, and the product is the area of the *ſector*.

SECTOR alſo denotes a mathematical inſtrument, of great uſe in finding the proportion between quantities of the ſame kind: as between lines and lines, ſurfaces and ſurfaces, &c. whence the French call it the *compaſs of proportion*.

The great advantage of the *ſector* above the common ſcales, &c. is, that it is made ſo as to fit all radiuſes, and all ſcales. By the lines of chords, ſines, &c. on the *ſector*, we have lines of chords, ſines, &c. to any radius betwixt the length and breadth of the *ſector* when open.

The *ſector* is founded on the fourth propoſition of the ſixth book of Euclid; where it is demonſtrated, that ſimilar triangles have their homologous ſides proportional. An idea of the theory of its conſtruction may be conceived thus. Let the lines A B, A C (*Tab.* IV. *Geometry*, *fig.* 103.) repreſent the legs of the *ſector*; and A D, A E, two equal ſections from the centre: if, now, the points C B and D E be connected, the lines C B and D E will be parallel; therefore the triangles A D E, A C B, will be ſimilar; and, conſequently, the ſides A D, D E, A B, and B C, proportional; that is, as A D : D E :: A B : B C: whence, if A D be the half, third, or fourth part of A B; D E will be a half, third or fourth part of C B: and the ſame holds of all the reſt.

If, therefore, A D be the chord, ſine, or tangent, of any number of degrees to the radius A B; D E will be the ſame to the radius B C.

SECTOR, *deſcription of the*. The inſtrument conſiſts of two rulers, or legs, of braſs or ivory, or any other matter, repreſenting the radii, moveable round an axis or joint, the middle of which expreſſes the centre; whence ſeveral ſcales are drawn on the faces of the rulers. See *Tab.* IV. *Geometry*, *fig.* 104.

The ſcales generally put on *ſectors* may be diſtinguiſhed into ſingle and double. The ſingle ſcales are ſuch as are commonly put upon plain ſcales: the double ſcales are thoſe which proceed from the centre; each ſcale is laid twice on the ſame face of the inſtrument, viz. once on each leg; from theſe ſcales, dimenſions or diſtances are to be taken, when the legs of the inſtrument are in an angular poſition.

The ſcale commonly put upon the beſt *ſectors* are

Single	1	a line of	Inches, each inch divided into 8 and 10 parts.		
	2		Decimals, containing 100 parts.		
	3		Chords,	marked	Cho.
	4		Sines,		Sin.
	5		Tangents,		Tang.
	6		Rhumbs,		Rum.
	7		Latitude,		Lat.
	8		Hours,		Hou.
	9		Longitude,		Lon.
	10		Inclin. Merid.		In. Mer.
	11		the Logarithms of Numbers,		Num.
	12		Sines,		Sin.
	13		Verſed ſines,		V. Sin.
	14		Tangents,		Tan.
Double.	1	a line of	Lines, or of equal parts,	marked	Lin.
	2		Chords,		Cho.
	3		Sines,		Sin.
	4		Tangents to 45°		Tan.
	5		Secants,		Sec.
	6		Tangents to above 45°		Tan.
	7		Polygons,		Pol.

The manner in which theſe ſcales are diſpoſed of on the *ſector*, is beſt ſeen in the figure.

The ſcales of lines, chords, ſines, tangents, rhumbs, latitudes, hours, longitude, incl. merid. may be uſed, whether the inſtrument is ſhut or open, each of theſe ſcales being contained on one of the legs only. The ſcales of inches, decimals, log. numbers, log. ſines, log. verſed ſines, and log. tangents, are to be uſed with the *ſector* quite opened, part of each ſcale lying on both legs.

The double ſcales of lines, chords, ſines, and lower tangents, or tangents under 45 degrees, are all of the ſame radius or length; they begin at the centre of the inſtrument, and are terminated near the other extremity of each leg; viz. the lines at the diviſion 10, the chords at 60, the ſines at 90, and the tangents at 45; the remainder of the tangents, or thoſe above 45°, are on other ſcales beginning at ¼ of the length of the former, counted from the centre, where they are marked with 45, and run to about 76 degrees.

The ſecants alſo begin at the ſame diſtance from the centre, where they are marked with 10, and are from thence continued to as many degrees as the length of the *ſector* will allow, which is about 75°.

The angles made by the double ſcales of lines, of chords, of ſines, and of tangents to 45 degrees, are always equal. And the angles made by the ſcales of upper tangents, and of ſecants, are alſo equal; and ſometimes theſe angles are made equal to thoſe made by the other double ſcales.

The ſcales of polygons are put near the inner edge of the legs, their beginning is not ſo far removed from the centre, as the 60 on the chords is. Where theſe ſcales begin, they are marked with 4, and from thence are figured backwards, or towards the centre, to 12.

From this diſpoſition of the double ſcales, it is plain, that thoſe angles which were equal to each other, while the legs of the *ſector* were cloſe, will ſtill continue to be equal, although the *ſector* be opened to any diſtance it will admit of.

The ſcale of inches is laid cloſe to the edge of the *ſector*, and ſometimes on the edge; and contains as many inches as the inſtrument will receive when opened: each inch being uſually divided into eight, and alſo into ten equal parts. The decimal ſcale lies next to this: it is of the length of the *ſector*, when opened, and is divided into ten equal parts, or primary diviſions, and each of theſe into ten other equal parts; ſo that the whole is divided into a hundred equal parts: and if the *ſector* admits of it, each of the ſubdiviſions is divided into two, four or five parts; and by this decimal ſcale, all the other ſcales, that are taken from tables, may be laid down. The length of a *ſector* is uſually underſtood when it is ſhut; and, therefore, a *ſector* of ſix inches makes a ruler of twelve inches when opened; and a foot *ſector* is two feet long when quite opened. The ſcales of chords, rhumbs, ſines, tangents, hours, latitudes, longitudes, and inclinations of meridians, are ſuch as are deſcribed under *Plane* SCALE.

The ſcale of logarithmic or artificial numbers, called *Gunter's ſcale*, or GUNTER'*s line*, is a ſcale expreſſing the logarithms of common numbers, taken in their natural order.

For the conſtruction of this ſcale, and alſo of thoſe of logarithmic ſines, logarithmic tangents, and logarithmic verſed ſines, ſee GUNTER'*s line*, and GUNTER'*s ſcale*.

We ſhall here obſerve, that all theſe ſcales ſhould have one common termination to one end of each ſcale, i. e the 10 on the numbers, the 90 on the ſines, the 0 on the verſed ſines, and the 45 on the tangents, ſhould be oppoſite to each other: the other end of each of the ſcales of ſines, verſed ſines, and tangents, will run out beyond the beginning (marked 1) of the numbers; nearly oppoſite to which will be the diviſions repreſenting 35 minutes on the ſines and tangents, and $168\frac{1}{2}$ degrees, on the verſed ſines.

The double ſcales are conſtructed in the following manner. The line of lines is only a ſcale of equal parts, whoſe length is adapted to that of the legs of the *ſector*: thus, in the ſix-inch *ſector*, the length is about $5\frac{1}{4}$ inches. The length of this ſcale is divided into primary diviſions; each of theſe into ten equal ſecondary parts; and each ſecondary diviſion into four equal parts. The accuracy of the diviſion may be determined by taking between the compaſſes any number of equal parts from this line, and applying that diſtance to all the parts of the line; and if the ſame number of diviſions be contained between the points of the compaſſes in every application, the ſcale may be received as perfect. The line of ſines is conſtructed by making the whole length of this ſcale equal to that of the line of lines; and from this line taking off ſeverally the parts expreſſed by the numbers in the tables of the natural ſines, correſponding to the degrees, or to the degrees and minutes, intended to be laid upon the ſcale: and then by laying down theſe ſeveral diſtances on the ſcale, beginning from the centre. In ſcales of this length, it is cuſtomary to lay down diviſions, expreſſing every 15 minutes, from 0 degree to 60 degrees; between 60 and 80 degrees, every half degree is expreſſed; then every degree to 85; and the next is 90 degrees. The length of the ſcale of tangents is equal to that of the line of lines, and the ſeveral diviſions upon it (to 45 degrees) are laid down from the tables and line of lines, in the ſame manner as the former; obſerving to uſe the natural tangents in the tables. The ſcale of upper tangents is laid down, by taking $\frac{1}{4}$ of ſuch of the natural tabular tangents above 45 degrees, as are intended to be put upon the ſcale. The beginning of this ſcale, at 45 degrees, though the poſition of it on the *ſector* reſpects the centre of the inſtrument, is diſtant from the centre $\frac{1}{4}$ of the length or radius of the lower tangents.

The diſtance of the beginning of the ſcale of ſecants from the centre, and the manner of laying it down are the ſame as thoſe of the upper tangents; except that in this the tabular ſecants are to be uſed.

For the ſcale of chords; its length is to be made equal to that of the ſines; and the diviſions, which are twice the length of the ſines of half the degrees and minutes, counted from the centre, expreſs every 15 minutes from 0 degrees to 60 degrees, to be laid down as in the ſcale of ſines.

The ſcale of polygons uſually comprehends the ſides of the polygons from ſix to twelve ſides incluſive. The diviſions are laid down by taking the lengths of the chords of the angles at the centre of each polygon, and laying them down from the centre of the inſtrument. When the polygons of four and five ſides are alſo introduced, this line is conſtructed from a ſcale of chords, where the length of 90 degrees is equal to that of 60 degrees of the double ſcale of chords on the *ſector*. Inſtead of ſome of the double ſcales above deſcribed, there are found other ſcales on the old *ſectors*, and alſo on ſome of the French ones, ſuch as ſcales of ſuperficies, of ſolids, of inſcribed bodies, of metals, &c. but theſe are left out to make room for others of more general uſe. See CALIBER.

In deſcribing the uſe of the *ſector*, the terms *lateral diſtance* and *tranſverſe diſtance*, often occur. By the former is meant the diſtance taken with the compaſſes on one of the ſcales only, beginning at the centre of the *ſector*; and by the latter, the diſtance taken between any two correſponding diviſions of the ſcales of the ſame name, the legs of the *ſector* being in an angular poſition: but in taking theſe tranſverſe diſtances, it is to be obſerved, that each of the ſeveral ſcales hath three parallel lines, acroſs which the diviſions of the ſcale are marked, and that the points of the compaſſes muſt be always ſet on the inſide line, or that line next the inner edge of the leg, which is the only line, in each ſcale, which runs to the centre.

For the uſe of the logarithmic ſcale of numbers, ſee GUNTER'*s line*.

SECTOR, *uſe of the line of lines on the*. 1. To divide a given line into any number of equal parts; e. g. 9. Make the length of the given line, or ſome known part thereof, a tranſverſe diſtance to 9 and 9: then will the tranſverſe diſtance of 1 and 1 be the $\frac{1}{9}$ part thereof; or ſuch a ſubmultiple of the $\frac{1}{9}$ part, as was taken of the given line: or the $\frac{1}{9}$ part will be the difference between the given line, and the tranſverſe diſtance of 8 and 8. Hence, 2 To make a ſcale of a given length, to contain a given number of equal parts; e. g. let the ſcale to the map of a ſurvey be 6 inches long, and contain 140 poles, and let it be required to open the *ſector*, ſo that a correſponding ſcale may be taken from the line of lines. Make the tranſverſe diſtance 7 and 7 (or 70 and 70, viz. $\frac{140}{2}$) equal to 3 inches ($=\frac{6}{2}$); and this poſition of the line of lines will produce the given ſcale.

3. To divide a given line (e. g. of five inches) into any aſſigned proportion, as of 4 to 5. Make 5 inches, the length of the given line, a tranſverſe diſtance to 9 and 9, the ſum of the propoſed parts; and the tranſverſe diſtances of the aſſigned numbers, 4 and 5 will be the parts required.

4. To 2 given lines, viz. 2 and 6, to find a third proportional. Take between the compaſſes the lateral diſtance of the ſecond term, viz. 6; ſet one point on the diviſion expreſſing the firſt term, viz. 2, on one leg, and open the legs of the *ſector* till the other point will fall on the correſponding diviſion on the other leg: keeping the legs of the *ſector* in this poſition, take the tranſverſe diſtance of the ſecond term, viz. 6, and this diſtance is the third term required, which diſtance, meaſured laterally from the centre, will give 18, the number required: for 2 : 6 : : 6 : 18. Otherwiſe, take the diſtance 2 laterally, and apply it tranſverſely to 6 and 6, the *ſector* being properly opened: then the tranſverſe diſtance at 2 and 2, being taken with the compaſſes, and applied laterally from the centre of the *ſector* on the ſcale of lines, will give the third term, when the proportion is decreaſing: for 6 : 2 : : 2 : $\frac{2}{3}$. If the legs of the *ſector* will not open ſo far as to let the lateral diſtance of the ſecond term fall between the diviſions expreſſing the firſt term; then take $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, or any aliquot part of the ſecond term, that will conveniently fall within the opening of the *ſector*, and make ſuch part the tranſverſe diſtance of the firſt term: then, if the tranſverſe diſtance of the ſecond term be multiplied by the denominator of the part taken of the ſecond term, the product will give the third term.

5. To 3 given lines, viz. 3, 7, and 10, to find a fourth proportional. Open the legs of the *ſector*, till the tranſverſe diſtance of the firſt term, 3, be equal to the lateral diſtance of the ſecond term, 7, or to ſome part thereof; then will the tranſverſe diſtance of the third term, 10, give the fourth term, $23\frac{1}{3}$, required; or ſuch a ſubmultiple thereof as was taken of the ſecond term; for 3 : 7 : : 10 : $23\frac{1}{3}$. Otherwiſe, ſet the lateral diſtance 7

tranſverſely from 10 to 10, opening the *ſector* accordingly; and the tranſverſe diſtance at 3 and 3 applied laterally will give $2\frac{1}{10}$; for 10 : 7 :: 3 : $2\frac{1}{10}$.

6. To diminiſh a line of 4 inches, in the proportion of 8 to 7. Open the *ſector* till the tranſverſe diſtance of 8 and 8 be equal to the lateral diſtance of 7: mark the point, where 4 inches, as a lateral diſtance, taken from the centre, reaches; and the tranſverſe diſtance, taken at that point, will be the line required. If the line ſhould be too long for the legs of the *ſector*, take $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$, &c. part of the given line for the lateral diſtance, and the correſponding tranſverſe diſtance, taken twice, thrice, or four times, &c. will be the line required.

7. To open the *ſector* ſo, that the 2 ſcales of lines ſhall make a right angle. Take the lateral diſtance from the centre to the diviſion marked 5, between the points of the compaſſes, and ſet one foot in the diviſion marked 4 on one of the ſcales of lines, and open the legs of the *ſector* till the other foot falls on the diviſion marked 3, on the other ſcale of lines; and then will thoſe ſcales ſtand at right angles to one another; for the lines 3, 4, 5, or any of their multiples, conſtitute a right angled triangle.

8. To 2 right lines given, e. g. 40 and 90, to find a mean proportional. Set the 2 ſcales of lines at right angles; find the half ſum of the given lines, viz. 65, and the half difference, viz. 25; and take with the compaſſes, the lateral diſtance of the half ſum, 65, and apply one foot to the half difference, 25, the other foot tranſverſely will reach to 60, the mean proportional required; for 40 : 60 :: 60 : 90.

Sector, *uſe of the ſcale of chords on the.* 1. To open the *ſector* ſo that the two ſcales of chords may make an angle of any number of degrees, e. g. 40. Take the diſtance from the joint to 40, the number of degrees propoſed on the ſcale of chords; open the *ſector* till the tranſverſe diſtance from 60 to 60, on each leg, be equal to the aforeſaid lateral diſtance of 40: then do the ſcales of chords make the angle required.

2. The *ſector* being opened, to find the degrees of its aperture. Take the extent from 60 to 60, and lay it off on the ſcale of chords from the centre: the number, where it terminates, ſhews the degrees of its opening. By applying ſights on the ſcale of chords, the *ſector* may be uſed to take angles, as a ſurveying inſtrument.

3. To protract or lay down an angle, of any given number of degrees. 1. Let the number of degrees be leſs than 60, viz. 46. At any opening of the *ſector*, take the tranſverſe diſtance of 60 and 60 on the chords; and with this opening deſcribe an arc: take the tranſverſe diſtance of the given number of degrees 46, and lay this diſtance on the arc deſcribed, marking its extremities: from the centre of the arc, through theſe extremities, draw two lines, and they will contain the angle required. 2. When the degrees given are more than 60, viz. 148. Deſcribe the arc as before; take the tranſverſe diſtance of $\frac{1}{2}$ or $\frac{1}{3}$ of the given degrees, 148, e. g. $\frac{1}{3} = 49\frac{1}{3}$ degrees: lay this diſtance on the arc thrice; and from the centre draw two lines to the extremities of the arc thus determined, and they will contain the required angle. N. B. If the radius of the arc or circle is to be of a given length, then make the tranſverſe diſtance of 60 and 60 equal to that aſſigned length.

4. To find the degrees which a given angle contains. About the vertex deſcribe an arc, and open the *ſector* till the diſtance from 60 to 60, on each leg, be equal to the radius of the circle; then taking the chord of the arc between the compaſſes, and carrying it on the legs of the *ſector*, ſee what equal number, on each leg, the points of the compaſſes fall on: this is the quantity of degrees the given angle contains.

5. To take an arc, of any quantity, from off the circumference of a circle. Open the *ſector* till the diſtance from 60 to 60 be equal to the radius of the given circle; then take the extent of the chord of the number of degrees, on each leg of the *ſector*, and lay it off on the circumference of the given circle. By this uſe, may any regular polygon be inſcribed in a given circle, as well as by the line of polygons: e. g. in a circle whoſe diameter is given to deſcribe a regular polygon of 24 ſides. Make the given diameter a tranſverſe diſtance from 60 to 60 on the ſcales of chords; divide 360 by 24, and take the tranſverſe diſtance of 15 and 15, the quotient, and this will be the chord of the twenty-fourth part of the circumference. In order to prevent errors, where the diſtance is to be repeated ſeveral times, it will be beſt to proceed thus: with the chord of 60 degrees divide the circumference into 6 equal parts; in every diviſion of 60 degrees lay down, firſt, the chord of 15 degrees, and next the chord of 30 degrees, and then the chord of 45 degrees, beginning always at the ſame point. Thus the error in taking diſtances will not be multiplied into any of the diviſions following the firſt.

Sector, *uſe of the line of polygons on the.* 1. In a given circle to inſcribe a regular polygon, e. g. an octagon. Open the legs of the *ſector*, till the tranſverſe diſtance of 6 and 6 be equal to the given diameter, then will the tranſverſe diſtance of 8 and 8 be the ſide of an octagon, which may be inſcribed in the given circle. In like manner may any other polygon, the number of whoſe ſides does not exceed 12, be inſcribed in a given circle.

2. On a given line to deſcribe a regular polygon, e. g. a pentagon. Make the given line a tranſverſe diſtance to 5 and 5: at that opening of the *ſector*, take the tranſverſe diſtance of 6 and 6; and with this radius, on the extremities of the line, as centres, deſcribe arcs interſecting each other; and on the point of interſection, as a centre, with the ſame radius, deſcribe a circumference paſſing through the extremities of the given line; and in this circle may the pentagon, whoſe ſide is given, be inſcribed. By a like proceſs may any other polygon, of not more than 12 ſides, be deſcribed on a given line.

3. On a right line, to deſcribe an iſoſceles triangle, having the angles at the baſe double that at the vertex. Open the *ſector* till the ends of the given line fall on 10 and 10 on each leg; then take the diſtance from 6 to 6; this will be the length of the two equal ſides of the triangle.

Sector, *uſe of the ſcales of ſines, tangents, and ſecants on the.* By the ſeveral lines diſpoſed on the *ſector*, we have ſcales to ſeveral radiuſes: ſo that, 1. having a length, or radius, given, not exceeding the length of the *ſector* when opened, we find the chord, ſine, &c. thereto: e. g. ſuppoſe the chord, ſine, or tangent, of 10 degrees to a radius of 3 inches required. Make 3 inches the aperture, or tranſverſe diſtance, between 60 and 60 on the ſcales of chords of the two legs; then will the ſame extent reach from 45 to 45 on the ſcale of tangents, and from 90 to 90 on the ſcale of ſines on the other ſide; ſo that to whatever radius the line of chords is ſet, to the ſame are all the others ſet. In this diſpoſition, therefore, if the aperture, or tranſverſe diſtance, between 10 and 10, on the ſcales of chords, be taken with the compaſſes, it will give the chord of 10 degrees; if the tranſverſe diſtance of 10 and 10 be in like manner taken, on the ſcales of ſines, it will be the ſine of 10 degrees: laſtly, if the tranſverſe diſtance of 10 and 10 be in like manner taken on the ſcales of tangents, it gives the tangent of 10 degrees to the ſame radius.

2. If the chord, or tangent, of 70 degrees were required. for the chord, the tranſverſe diſtance of half the arc, viz. 35, muſt be taken, as before; which diſtance, being repeated twice, gives the chord of 70 degrees. To find the tangent of 70 degrees, to the ſame radius, the ſcale of upper tangents muſt be uſed, the other only reaching to 45: making, therefore, 3 inches the tranſverſe diſtance between 45 and 45 at the beginning of that ſcale; the extent between 70 and 70 degrees, on the ſame, will be the tangent of 70 degrees to 3 inches radius.

3. To find the ſecant of an arc, make the given radius the tranſverſe diſtance between 0 and 0 on the line of ſecants; then will the tranſverſe diſtance of 10 and 10, or 70 and 70, on the ſaid lines, give the ſecant of 10 degrees, or 70 degrees.

The ſcales of upper tangents and ſecants do not run quite to 76 degrees; but thoſe of a greater number of degrees may be ſound by the *ſector* in the following manner. Thus, the tangent of any number of degrees may be taken from the *ſector* at once; if the radius of the circle can be made a tranſverſe diſtance to the complement of thoſe degrees on the lower tangent. E. g. To find the tangent of 78 degrees to a radius of 2 inches. Make 2 inches a tranſverſe diſtance to 12 degrees on the lower tangents: then the tranſverſe diſtance of 45 degrees will be the tangent of 78 degrees. In like manner the ſecant of any number of degrees may be taken from the ſines, if the radius of the circle can be made a tranſverſe diſtance to the coſine of thoſe degrees. Thus making 2 inches a tranſverſe diſtance to the ſine of 12 degrees, then the tranſverſe diſtance of 90 and 90 will be the ſecant of 78 degrees. Hence it will be eaſy to find the degrees anſwering to a given line, expreſſing the length of a tangent or ſecant, which is too long to be meaſured on thoſe ſcales, when the *ſector* is ſet to the given radius. Thus, for a tangent, make the given line a tranſverſe diſtance to 45 and 45 on the lower tangents; then take the given radius, and apply it to the lower tangents: and the degrees, where it becomes a tranſverſe diſtance, give the cotangent of the degrees anſwering to the given line. And for a ſecant, make the given line a tranſverſe diſtance to 90 and 90 on the ſines: then the degrees anſwering to the given radius applied as a tranſverſe diſtance on the ſines, will be the coſine of the degrees anſwering to the given ſecant line.

4. If the converſe of any of theſe things were required,

that is, if the radius be required, to which a given line is the ſine, tangent, or ſecant: it is but making the given line, if a chord, the tranſverſe diſtance on the line of chords, between 10 and 10, and then the *ſector* will ſtand at the radius required: that is, the aperture between 60 and 60, on the ſaid line, is the radius.

If the given line were a ſine, tangent, or ſecant, it is but making it the tranſverſe diſtance of the given number of degrees: then will the diſtance of 90 and 90 on the ſines, of 45 and 45 on the lower tangents near the end of the *ſector*, and of 45 and 45 on the upper tangents towards the centre of the *ſector*, and of 0 and 0 on the ſecants, be the radius.

5. If the radius, and any line repreſenting a ſine, tangent, or ſecant, be given, the degrees correſponding to that line may be found by ſetting the *ſector* to the given radius, according as a ſine, tangent, or ſecant, is concerned; taking the given line between the compaſſes, applying the two feet tranſverſely to the ſcale concerned, and ſliding the feet along till they both reſt on like diviſions on both legs: and the diviſions will ſhew the degrees and parts correſponding to the given line.

For the method of determining the degrees anſwering to any tangent, or ſecant, that cannot be thus meaſured, ſee above.

6. To find the length of a verſed ſine to a given number of degrees, and a given radius. Make the tranſverſe diſtance of 90 and 90 in the ſines equal to the given radius; take the tranſverſe diſtance of the ſine complement of the given degrees; if the given degrees are leſs than 90, the difference, but if greater, the ſum of the ſine complement and radius gives the verſed ſine.

7. To open the legs of the *ſector* ſo that the correſponding double ſcales of lines, chords, ſines, tangents, may make, each of them, a right angle. On the lines, make the lateral diſtance 10, a diſtance between 8 on one leg, and 6 on the other leg; on the ſines, make the lateral diſtance 90 a tranſverſe diſtance from 45 to 45, or from 40 to 50, or from 30 to 60, or from the ſine of any degrees to their complement: or, on the ſines, make the lateral diſtance of 45 a tranſverſe diſtance between 30 and 30.

Sector *in trigonometry, uſe of the.* 1. The baſe and perpendicular of a right-angled triangle being given, to find the hypothenuſe. Suppoſe the baſe A C (*Tab. Trigonometry, fig.* 4.) 40 miles, and the perpendicular A B 30; open the *ſector* till the two ſcales of lines make a right angle: then, for the baſe, take 40 parts on the ſcale of lines on one leg; and, for the perpendicular, take 30 on the ſame ſcale on the other leg: then the extent from 40 on the one to 30 on the other, taken in the compaſſes, will be the length of the hypothenuſe; which line, applied to the ſcale of lines, will be found 50 miles.

2. The perpendicular A B of a right-angled triangle A B C being given, 30, and the angle B C A 37 degrees; to find the hypothenuſe B C. Take the given ſide A B, and ſet it over, on each ſide, on the ſine of the given angle A C B: then the parallel diſtance of 90 and 90 or radius, will be the hypothenuſe B C; which will meaſure 50 on the ſcale of lines.

3. The hypothenuſe and baſe being given, to find the perpendicular. Open the *ſector* till the two ſcales of lines be at right angles; then lay off the given baſe on one of thoſe ſcales from the centre; take the hypothenuſe in your compaſſes, and ſetting one foot in the term of the given baſe, let the other fall on the ſcale of lines on the other leg: the diſtance from the centre to the point where the compaſſes fall will be the length of the perpendicular.

4. The hypothenuſe being given, and the angle A C B; to find the perpendicular. Make the given hypothenuſe a parallel radius, i. e. make it the extent from 90 to 90 on the ſcales of ſines; then will the parallel ſine of the angle A C B be the length of the ſide A B.

5. The baſe and perpendicular A B given, to find the angle B C A. Lay off the baſe A C, on both ſides the *ſector*, from the centre, and note its extent; then take the given perpendicular, and to it open the *ſector* in the terms of the baſe: the parallel radius will be the tangent of B C A.

6. In any right-lined triangle, two ſides being given, with the included angle; to find the third ſide. Suppoſe the ſide A C (*fig.* 5.) 20, the ſide B C 30, and the included angle A C B 110 degrees; open the *ſector* till the two ſcales of lines make an angle equal to the given angle, viz. 110 degrees; lay off the given ſides of the triangle, from the centre of the *ſector*, on each of the ſcales of lines: the extent between their extremes is the length of the ſide A B ſought.

7. The angles C A B and A C B given, and the ſide C B; to find the baſe A B. Take the given ſide C B, and turn it into the parallel ſine of its oppoſite angle C A B; and then the parallel ſine of the angle A C B will be the length of the baſe A B.

8. The three angles of a triangle being given; to find the proportion of the ſides. Take the lateral ſines of the ſeveral angles, and meaſure them in the ſcale of lines; the numbers anſwering thereto give the proportion of the ſides.

9. The three ſides being given, to find the angle A C B. Lay the ſides A C, C B, along the ſcales of lines, from the centre, and ſet over the ſide A B in their terms: ſo is the *ſector* opened, in theſe lines, to the quantity of the angle A C B.

10. The hypothenuſe A C (*fig.* 6.) of a right-angled ſpherical triangle A B C, given, e. g. 43 degrees, and the angle C A B 20 degrees; to find the ſide C B. The rule is, as radius is to the ſine of the given hypothenuſe 43 degrees, ſo is the ſine of the given angle 20 degrees to the ſine of the perpendicular C B. Take then 20 degrees from the centre, along the ſcale of ſines, in your compaſſes, and ſet the extent from 90 to 90, on the two legs; and the parallel ſine of 43 degrees, the given hypothenuſe, will, when meaſured from the centre on the ſcale of ſines, give 13° 30′, the ſide required.

11. The perpendicular B C, and the hypothenuſe A C given, to find the baſe A B. As the ſine complement of the perpendicular B C is to radius, ſo is the ſine complement of the hpothenuſe to the ſine complement of the baſe. Therefore make the radius a parallel ſine of the complement of the given perpendicular, e. gr. 76° 30′; then the parallel ſine of the complement of the hypothenuſe, e. gr. 47°, meaſured along the ſcale of ſines, will be found 49° 25′, the complement of the baſe required; conſequently the baſe itſelf will be 40° 35′.

Sector, *in geometry, &c. particular uſes of the.* 1. To make a regular polygon, whoſe area ſhall be of any given magnitude. Let the figure required be a pentagon, whoſe ſuperficial area is 125 feet; extract the ſquare root of $\frac{1}{5}$ of 125, it will be found 5. Make a ſquare, whoſe ſide is 5 feet; and, by the line of polygons, as already directed, make the iſoſceles triangle C G D (*Tab.* IV, *Geom. fig.* 105.) ſo as that C G being the ſemidiameter of a circle, C D may be the ſide of a regular pentagon inſcribed therein; then let fall the perpendicular G E. Then continuing the lines E G and E C, make E F equal to the ſide of the ſquare before made; and from the point F, draw the right line F H parallel to G C; then a mean proportional between G E and E F will be equal to half the ſide of the polygon ſought, which, doubled, will give the whole ſide. The ſide of the pentagon thus had, the pentagon itſelf may be deſcribed, as above directed.

2. A circle being given, to find a ſquare equal to it. Divide the diameter into fourteen equal parts, by the ſcale of lines, as above directed; then will 12.4 of thoſe parts, found by the ſame line, be the ſide of the ſquare ſought.

3. A ſquare being given, to find the diameter of a circle equal to it. Divide the ſide of the ſquare into eleven equal parts, by means of the ſcale of lines; and continue that ſide to 12.4 parts; this will be the diameter of the circle required.

4. To find the ſide of a ſquare equal to an ellipſis, whoſe tranſverſe and conjugate diameters are given. Find a mean proportional between the tranſverſe and conjugate diameters; which being divided into fourteen equal parts, $12\frac{4}{10}$ thereof will be the ſide of the ſquare required.

5. To deſcribe an ellipſis in any given ratio of its diameter, the area whereof ſhall be equal to a given ſquare. Suppoſe the proportion of the tranſverſe and conjugate diameters be required, as 2 to 1; divide the ſide of the given ſquare into eleven equal parts: then, as 2 is to 1, ſo is $11 \times 14 = 154$ to a fourth number; the ſquare root whereof is the conjugate diameter ſought. Then, as 1 to 2, ſo is the conjugate diameter to the tranſverſe. Now,

6. To deſcribe an ellipſis, by having the tranſverſe and conjugate diameters given. Let the two diameters A B, C D, biſect each other at right angles in E (*Tab.* IV. *Geometry, fig.* 106.) Make A E a tranſverſe diameter to 90 and 90 on the ſines; and take the tranſverſe diſtances of 10°, 20°, 30°, 40°, 50°, 60°, 70°, 80°, ſucceſſively, and apply thoſe diſtances to A E from E towards A, as at the points 1, 2, 3, 4, 5, 6, 7, 8; and through thoſe points draw lines parallel to E C; make E C a tranſverſe diſtance to 90 and 90 on the ſines; take the tranſverſe diſtances of 80°, 70°, 60°, 50°, 40°, 30°, 20°, 10°, ſucceſſively, and apply thoſe diſtances to the parallel lines from 1 to 1, 2 to 2, 3 to 3, 4 to 4, 5 to 5, 6 to 6, 7 to 7, 8 to 8, and ſo many points will be obtained, through which the curve of the ellipſis is to paſs.

The ſame work being done in all the four quadrants, the elliptical curve may be completed. In the conſtruction of ſolar eclipſes, inſtead of uſing the ſines to every ten degrees, the ſines belonging to the degrees and minutes, correſponding to the hours and quarter hours, are to be uſed.

7. To deſcribe a parabola whoſe parameter ſhall be equal to a given line. Draw a line to repreſent the axis, in which make A B (*fig.* 107.) equal to half the given parameter; divide A B like a line of ſines into every ten degrees, as at the points 10, 20, 30, 40, 50, &c. and through theſe points draw lines at right angles to the axis A B. Make the lines A *a*, 10 *b*, 20 *c*, 30 *d*, 40 *e*, &c. reſpectively equal to the chords of 90°, 80°, 70°, 60°, 50°, &c. to the radius A B, and the points *a*, *b*, *c*, *d*, *e*, &c. will be in the curve of a parabola; and a ſmooth curve line drawn through thoſe points, and the vertex B, will repreſent the parabolic curve required.

N. B. As the chords on the *ſector* run no farther than 60, thoſe of 70, 80, and 90, may be found by taking the tranſverſe diſtance of the ſines of 35°, 40°, 45°, to the radius A B, and applying thoſe diſtances twice along the lines 20 *c*, 10 *b*, &c.

8. To deſcribe an hyperbola, the vertex A, and aſymptotes B H, B I, being given (*fig.* 108.) The aſymptotes BH, BI, being drawn, the line B A biſecting the angle IBH, and the vertex A taken, draw A I, A C, parallel to B H, B I. Make A C a tranſverſe diſtance to 45 and 45, on the upper tangents, and apply to the aſymptotes from B ſo many of the upper tangents taken tranſverſly as may be thought convenient, as B D 50°, B E 55°, B F 60°, B G 65°, B H 70°, &c. and draw D *d*, E *e*, &c. parallel to A C. Make A C a tranſverſe diſtance to 45 and 45, on the lower tangents; take the tranſverſe diſtances of the co-tangents before uſed, and lay them on thoſe parallel lines: thus, make $D d = 40°$, $E e = 35°$, $F f = 30°$, $G g = 25°$, $H h = 20°$, &c. and through the points A, *d*, *e*, *f*, *g*, *h*, &c. draw a curve line, which will be the hyperbola required.

Sector *in Surveying, uſe of the.* The bearings of three places, as A, B, C (*Tab.* III. *Surveying*, *fig.* 48.) to each other, i. e. the angles A B C, B C A, and C A B, being given; and the diſtance of each, from a fourth ſtanding among them, as D, i. e. B D, D C, and A D, being given; to find the diſtances of the ſeveral places A, B, C, from each other, i. e. to find the lengths of the ſides A B, B C, A C. Having drawn the triangle E F G (*fig.* 49.) ſimilar to A B C, divide the ſide E G in H, ſo that E H may be to H G, as A D to D C, after the manner already directed: and after the like manner muſt E F be divided in I, ſo that E I may be to I F as A D to D B. Then continuing the ſides E G, E F, ſay, as E H − H G is to H G, ſo is E H + H G to G K; and as E I − I F is to I F, ſo let E I + I F be to F M; which proportions are eaſily wrought by the ſcales of lines on the *ſector*. This done, biſect H K and I M, in the points L, N; and about the ſaid points as centres with the diſtances L H and I N, deſcribe two circles interſecting each other, in the point O; to which, from the angles E, F, G, draw the right lines E O, F O, and O G, which will have the ſame proportion to each other, as the lines A D, B D, D C. Now, if the lines E O, F O, and G O, be equal to the given lines A D, B D, D C, the diſtances E F, F G, and E G, will be the diſtances of the places required. But if E O, O F, O G, be leſs than A D, D B, D C, continue them till P O, O R, and O Q, be equal to them; then the points P, Q, R, being joined, the diſtances P R, R Q, and P Q, will be the diſtances of the places ſought. Laſtly, if the lines E O, O F, O G, be greater than A D, D B, D C, cut off from them lines equal to A D, B D, D C, and join the points of ſection by three right lines; the lengths of the ſaid three right lines will be the diſtances of the three places ſought.

Note, if E H be equal to H G, or E I to I F, the centres L and N will be infinitely diſtant from H and I; that is, in the points H and I there muſt be perpendiculars raiſed to the ſides E F, E G, inſtead of circles, till they interſect each other; but if E H be leſs than H G, the centre L will fall on the other ſide of the baſe continued; and the ſame is to be underſtood of E I, I F.

The *ſector* is of eſpecial uſe for facilitating the projection of the ſphere, both orthographic and ſtereographic.

See on the conſtruction and uſe of the *ſector*, Bion's Conſtruction, &c. of Mathematical Inſtruments, by Stone, p. 54, &c. edit. 1. and Robertſon's Treatiſe of Mathematical Inſtruments, &c. p. 30, &c. edit. 2.

Sector *of a ſphere.* The *ſector of a ſphere*, generated by the revolution of the *ſector* of a circle C A E (*Tab.* IV. *Geometry*, *fig.* 109.) about the radius A C, is equal to a cone, whoſe baſe is equal to the portion of the ſpherical ſurface generated by the arch A E, or to the circle deſcribed with the radius A E, and whoſe height is equal to C A the radius of the ſphere. Arch. de Sphær. et Cyl. Maclaurin's Fluxions, Introd. p. 15.

Sector, *aſtronomical*, an inſtrument invented by Mr. George Graham for finding the difference in right aſcenſion and declination between two objects, whoſe diſtance is too great to be obſerved through a fixed teleſcope, by means of a micrometer. This inſtrument (*Tab.* IV. *Aſtronomy*, *fig.* 88.) conſiſts of a braſs plate, called the *ſector*, formed like a T, having the ſhank C D as a radius about two feet and a half long, and two inches broad at the end D, and an inch and a half at C; and the croſs-piece A B, as an arch, about ſix inches long, and one and a half broad; upon which, with a radius of thirty inches, is deſcribed an arch of ten degrees, each degree being divided into as ſmall parts as are convenient. Round a ſmall cylinder C, containing the centre of this arch, and fixed in the ſhank, moves a plate of braſs, to which is fixed a teleſcope C E, having its line of collimation parallel to the plane of the *ſector*, and paſſing over the centre C of the arch A B, and the index of a Vernier's dividing plate, whoſe length, being equal to ſixteen quarters of a degree, is divided into fifteen equal parts, fixed to the eye eud of the teleſcope, and made to ſlide along the arch; which motion is performed by a long ſcrew, G, at the back of the arch, communicating with the Vernier through a ſlit cut in the braſs, parallel to the divided arch. Round the centre F of a circular braſs plate *a b c*, of five inches diameter, moves a braſs croſs K L M N, having the oppoſite ends O and P of one bar turned up perpendicularly about three inches, to ſerve as ſupporters to the *ſector*, and ſcrewed to the back of its radius: ſo that the plane of the *ſector* is parallel to the plane of the circular plate, and can revolve round the centre of that plate in this parallel poſition. A ſquare iron axis H I F, eighteen inches long, is ſcrewed flat to the back of the circular plate along one of its diameters, ſo that the axis is parallel to the plane of the *ſector*. The whole inſtrument is ſupported on a proper pedeſtal, ſo that the ſaid axis ſhall be parallel to the earth's axis, and proper contrivances are annexed to fix it in any poſition. The inſtrument, thus ſupported, can revolve round its axis H I, parallel to the earth's axis, with a motion like that of the ſtars, the plane of the *ſector* being always parallel to the plane of ſome hour-circle, and conſequently every point of the teleſcope deſcribing a parallel of declination; and if the *ſector* be turned round the joint F of the circular plate, its graduated arch may be brought parallel to an hour circle; and conſequently any two ſtars, whoſe difference of declination does not exceed the degrees in that arch, will paſs over it.

To obſerve their paſſage, direct the teleſcope to the preceding ſtar, and fix the plane of the *ſector* a little to the weſtward of it; move the teleſcope by the ſcrew G, and obſerve, at the tranſit of each over the croſs wires, the time ſhewn by the clock, and alſo the diviſion upon the arch A B, ſhewn by the index; then is the difference of the arches the difference of the declination; and that of the times ſhews the difference of the right aſcenſion of thoſe ſtars. For a more particular deſcription of this inſtrument, ſee Smith's Optics, book iii. chap. 9.

SECULAR, ſomething that is *temporal:* in which ſenſe, the word ſtands oppoſite to *eccleſiaſtical.*

Thus we ſay, *ſecular power*, *ſecular* ARM, *ſecular* JURISDICTION, &c.

Secular is more peculiarly uſed for a perſon who lives at liberty in the world; not ſhut up in a monaſtery, nor bound by vows, nor ſubjected to the particular rules of any religious community.

In which ſenſe the word ſtands oppoſed to REGULAR.

The Romiſh clergy is divided into *regular* and *ſecular.*

The *regulars* pretend, that their ſtate is much more perfect than that of the *ſeculars*. *Secular* prieſts may hold abbeys and priories both ſimple and conventual, though not regularly, but only *in commendam.*

It is a maxim, in their canon-law, *ſecularia ſecularibus*, i. e. *ſecular* benefices are only to be given to *ſecular* perſons; regular only to regular.

Secular *corporation.* See Corporation.

Secular *games*, *ludi* Seculares, in *Antiquity*, were ſolemn games held among the Romans, once in an age; or, in a period deemed the extent of the longeſt life of man, called by the Greeks *αιων*, and by the Latins *ſeculum.*

The *ſecular games* were alſo called *Terentine games*, *ludi Terentini*, either becauſe Manius Valerius Terentinus gave occaſion to their inſtitution; for having been warned, in a dream, to dig in the ground in a place near the Campus Martius, called *Terentum*, he there found an altar inſcribed to Dis, or Pluto, and Proſerpine: upon which, as had been foretold him in his dream, three of his children born blind, obtained their ſight; and he, in gratitude, performed ſacrifices on the ſame altar, for three days and three nights ſucceſſively. Or, finally, by reaſon here was an altar of Pluto buried deep underground, becauſe the water of the Tyber *terram tereret*, eat into the ground in this place.

The *ſecular games* laſted three days, and as many nights; during which time ſacrifices were performed, theatrical ſhews exhibited, with combats, ſports, &c. in the Circus.

Their origin and inſtitution are delivered at length by Val. Maximus; the occaſion thereof, according to this writer, was to ſtop the progreſs of a plague. The firſt who had them celebrated at Rome, was Valerius Publicola, the firſt conſul created after the expulſion of the kings, in the year of Rome 245. The ceremonies to be obſerved therein were found preſcribed in one of the books of the Sibyls; in which was contained a prophecy to this effect; viz. that if the Romans at the beginning of every age ſhould hold ſolemn games in the Campus Martius to the honour of Pluto, Proſerpine, Juno, Apollo, Diana, Ceres, and the Parcæ, their city ſhould ever flouriſh, and all nations be ſubjected to their dominion. Accordingly, they were very ready to obey the oracle, and in all the ceremonies uſed on this occaſion conformed to its directions.

At the time of the celebration of the *ſecular games*, heralds were ſent to invite all the world to a ſolemnity which nobody had ever yet ſeen, nor was ever to ſee again.

They were introduced with extraordinary preparation, under the direction of the quindecemviri; who diſtributed to the people flambeaux and ſulphur, and wheat and other grain, for an offering. On the firſt day after they had offered ſacrifices to the above named deities at the Capitol, they returned to the Campus Martius, where they had aſſembled, and held ſports to the honour of Apollo and Diana. On the ſecond day, at the hour appointed by the oracle, the noble matrons went to the Capitol to ſing hymns to Jupiter; and on the third day of the feaſt, twenty-ſeven boys, and as many girls, ſung in the temple of Palatine Apollo hymns and verſes in Greek and Latin, to recommend the city to the protection of thoſe deities, whom they particularly honoured by their ſacrifices.

Authors are not agreed as to the number of years wherein theſe games returned; partly becauſe the quality of an age or *ſeculum*, among the ancients, is not known; and partly on other accounts: ſome will have it, that they were held once every hundred years: and that the *ſeculum*, or age, was our century. This Varro and Livy ſeem to expreſs in very plain terms; yet others will have it, that *ſeculum* comprehended a hundred and ten years; and that the *ſecular games* only returned in that period, that is, at the beginning of every 111th year; which opinion is countenanced by Horace, in his *Secular Poem*, ver. 21.

Be this as it will, it is certain they ſometimes did not ſtay for the 111th, nor even for the 100th year, for the celebration of theſe games. The firſt were held A. U. C. 245, or 298: the ſecond, A. 305, or 408; the third, A. 518; the fourth, either A. 605, or 608, or 628. Auguſtus held them in the year of Rome 736, and Claudius again in the year of Rome 800, and of Chriſt 38, viz. ſixty-four years after the former; and Domitian, again, in ſtill leſs time; viz. in the year of Rome 841, or of Chriſt 79, at which Tacitus aſſiſted in quality of quindecimvir, as he himſelf tells us, Annal. lib. xi. cap. 11. and this was the ſeventh time that Rome had ſeen them from their firſt inſtitution. The emperor Severus exhibited them the eighth time, that is, a hundred and ten years after thoſe of Domitian. Zoſimus ſays, theſe were the laſt; but he is miſtaken, for in the year of Rome 1000, that is, fifty years after thoſe of Severus, the emperor Philip had them celebrated with greater magnificence than had ever been known. Thoſe that were celebrated by permiſſion of the emperor Honorius, after having received the news of the victory of Stilicon over Alaric, were the laſt recorded in hiſtory. Zoſimus aſcribes the decline of the empire to the neglect of theſe games among the Romans. We find them repreſented on many medals.

Secular *poem*. See Seculare *carmen*.

Secular *year*, the ſame with Jubilee.

SECULARE *carmen*, Secular *poem*, a poem ſung, or rehearſed, at the secular *games*.

Of this kind we have a very fine piece among the works of Horace; it is a ſapphic ode, which uſually comes at the end of his epodes. In ſome editions, the twenty-firſt ode of the firſt book is alſo called *Carmen Seculare*.

SECULARIZATION, the action of *ſecularizing*, or of converting a regular perſon, place, or benefice, into a ſecular one.

Almoſt all the cathedral churches were anciently regular, i. e. the canons were to be religious; but they have been ſince ſecularized.

For the *ſecularization* of a regular church there is required the authority of the pope, that of the prince, the biſhop of the place, the patron, and even the conſent of the people. And in France all this muſt be confirmed by parliament.

Religious, that want to be releaſed from their vows, obtain briefs of *ſecularization* from the pope.

SECULUM, in *Antiquity*. See Age, and Secular *games*.

SECUNDA *aqua*, among *Chemiſts*, &c. See Aqua *ſecunda*.

Secunda *ſuper oneratione paſturæ*. See Surcharge.

SECUNDANS, in *Mathematics*, an infinite ſeries of numbers, beginning from nothing, and proceeding as the ſquares of numbers in arithmetical progreſſion, as 0, 1, 4, 9, 16, 25, 36, 49, 64, &c.

SECUNDARY, or Secondary. See Secondary.

SECUNDI *generis*, in *Anatomy*, a diſtinction among the lacteal veſſels. There are two kinds of lacteals; viz. *primary*, or thoſe of the firſt kind, *primi generis*; and *ſecundi generis*, *ſecondary*, or of the ſecond kind.

The firſt carry the chyle from the inteſtines into glands diſperſed in great numbers throughout the meſentery. The ſecond carry it from theſe glands, after its being diluted there with lympha, into the common receptacle. See Lacteals.

Secundi *internodii pollicis extenſor*. See Extensor.

SECUNDIANS, in *Eccleſiaſtical Hiſtory*, a ſect of Valentinians in the ſecond century, whoſe chief, Secundus, one of the principal followers of Valentine, maintained the doctrine of two eternal principles, viz. light and darkneſs, from whence aroſe the good and the evil that are obſervable in the univerſe.

SECUNDINE, or Secundines, *ſecundinæ*, in *Medicine*, the ſeveral coats or membranes wherein the fœtus is wrapped up in the mother's momb; as the chorion and amnios, with the placenta, &c. See *Tab. Anat.* (*Splanch.*) *fig.* 16. *litt*, *b b*. They are thus called, becauſe they come out in the ſecond place, i. e. after the child, in delivery. The good women and midwives call them the After-*birth*, as being eſteemed a ſecond burden, whereof the mother is freed. Others call them the *delivery*, becauſe when theſe are out, the woman is reckoned to be perfectly delivered.

The *ſecundine* muſt never be left in the matrix; it is a foreign body, which would deſtroy the mother; it is dangerous even to have the leaſt piece of it left behind. The aſſiſtance of a ſkilful hand is, in many caſes, neceſſary to the getting them out; and this is to be done with great care and ſpeed, before the uterus cloſes itſelf upon them, otherwiſe they occaſion terrible hæmorrhages, faintings, and often inflammatory and putrid fevers.

The patient herſelf may greatly promote the expulſion of theſe, by any forcible emotion of the body, as by a forced cough, or by ſneezing; the midwife at the ſame time is gently to pull them by the navel-ſtring, but this muſt be done very cautiouſly, for fear of its breaking. If this fails, the cautious introducing the hand often ſets all right, or the uſe of gently pellent medicines may be called in; and to theſe may be added broths, with ſaffron in them, and by the uſe of common clyſters great good is often done; but if after all this care, there yet remain ſome fragments of them behind, there uſually ariſes a fever within twelve hours; and in this caſe the utmoſt care muſt be taken to prevent putrefaction, and expel the remains of them. To theſe purpoſes medicines prepared with myrrh, amber, ſaffron, and the cortex eleutherii, are of the greateſt ſervice; and to theſe may be added occaſionally the colliquating and attemperating ſalts, ſuch as tartarum vitriolatum and nitre. Juncker's Conſp. Med. p. 723. See Delivery.

Notwithſtanding the great danger that uſually attends the leaving any part of this behind at the time of delivery, there are inſtances of ſome perſons lucky enough to eſcape; the ſubſtances left behind remaining uncorrupted, till the time of its being afterwards diſcharged.

Kerkring gives us an inſtance of this, which fell under his own knowledge. A woman had a large portion of it left behind, where it remained four months, and at the end of that time was diſcharged uncorrupted, and without any hurt to the perſon. Kerkring's Spicileg. Anat.

Hippocrates obſerves, that twins have always the ſame *ſecundine*.

Dr. Grew, in his Anatomy of Plants, applies the term *ſecundine* to the fourth and laſt coat or cover of ſeeds; becauſe this performs nearly the ſame office in plants, that the membranes, inveſting the fœtus, do in animals. And indeed Pliny, Columella, Apuleius, &c. have uſed *ſecundine* in the ſame ſenſe.

SECUNDO. *Propoſitio de* SECUNDO *adjacente.* See PROPOSITION.

SECUNDUS *mallei*, in *Anatomy*, a name given by Duverney, and ſome others, to one of the muſcles of the ear. It is the *internus auris* of Cowper and others, and is moſt properly named by Albinus *tenſor tympani*.

SECUNDUS *oculum movens*, in *Anatomy*, a name given by Veſalius to that muſcle of the eye, called by Riolanus and others *ſuperbus*, and *elevator oculi*, and by Albinus the *ſubductor*, one of his four muſculi recti of the eye.

SECUNDUS *peronæus*. See PERONÆUS.

SECUNDUS *ſcalenus*. See SCALENUS.

SECURIDACA, in *Botany*. See *Hatchet* VETCH.

SECURITATE *pacis*, a writ which lies for one who is threatened with death or danger, againſt the perſon who ſo threatens him. It is taken out of chancery, directed to the ſheriff. See PEACE and SURETY.

SECURITATEM *inveniendi quod ſe non divertat ad partes exteras ſine licentia regis*, an ancient writ lying for the king againſt any of his ſubjects, to ſtay them from going out of this kingdom into foreign parts; the ground whereof is, that every man is bound to ſerve and defend the commonwealth, as the king ſhall think fit.

SECURUM, *ſi te fuerit*, in *Law*. See SI *te fuerit*.

SECUTOR, among the Romans, moſt commonly ſignified an attendant upon great men.

SECUTORES, in *Antiquity*, a kind of GLADIATORS among the Romans, who fought againſt the retiarii.

The word is formed from the verb *ſequi, to follow*; becauſe the *ſecutores* uſed to purſue the RETIARII, when they failed to caſt their net, and fled to put in order.

The *ſecutores* were armed with a ſword and a buckler, to keep off the net, or nooſe, of their antagoniſts; and they wore a caſk on their head. Some confounded the *ſecutores* with myrmillones, becauſe both had nearly the ſame weapons.

SECUTORES was alſo the name given to ſuch gladiators as took the place of thoſe killed in the combat; or, who fought the conqueror. This poſt was uſually taken by lot.

In ancient inſcriptions we alſo met with *ſecutor tribuni*, *ſecutor ducis*, *ſecutor Cæſaris*, &c. who were officers attending the tribunes and generals; perhaps like our aids de camp.

SEDAB, in *Botany*, a name given by the Arabian phyſicians to the wild, or mountain rue, a plant common in Syria, Greece, and other places. Avicenna ſuppoſes the gum, which he calls *gentum*, or *jentum*, to be produced from this plant, but very erroneouſly, that gum being obtained from the roots of the thapſia, or deadly carrot.

SEDAN *chair* is a covered vehicle for carrying a ſingle perſon, ſuſpended by two poles, and born by two men, hence denominated chairmen. They were firſt introduced in London in 1634, when ſir Sanders Duncomb obtained the ſole privilge to uſe, let, and hire a number of the ſaid covered chairs, for fourteen years.

SEDATIVUM *ſal*. See *Sedative* SALT.

SE DEFENDENDO, a plea for him who is charged with the death of another; alleging, that he was forced to do what he did, in his own defence, the other ſo aſſaulting him, that had he not done as he did, he muſt have been in danger of his own life. See SELF-*defence*, HOMICIDE, and MANSLAUGHTER.

SEDEM *attollens*, in *Anatomy*, a name given by Veſalius and others to the muſcle, now more generally known by the name of LEVATOR *ani*.

SEDENTARIUM *os*, a name given by ſome anatomical writers to the protuberance of the os coxendicis, on which the whole weight of the body reſts in ſitting.

SEDER OLAM, in *Philology*, a Hebrew term, literally ſignifying, *order of the world*; being the title of two chronicles in that language.

They are both very ſhort, though the one more ſo than the other; for which reaſon the one is called *ſeder olam rabba*, that is, the *great ſeder olam*; and the other, *ſeder olam zuta*, i. e. *little ſeder olam*.

SEDER OLAM, *the great*, commences at the creation of the world, and comes down as low as the war of the pſeudo-meſſiah Barchochabas, under Adrian, fifty-two years after the deſtruction of the temple of Jeruſalem; and, of conſequencs to the hundred and twenty-ſecond year of Chriſt. It is almoſt all taken from the Scripture, excepting the end. It is the work of R. Joſa, ſon of Hhelpeta of Tſippora, who lived in the ſecond century, about the year 130, and was maſter of the famous R. Juda Hakkadoſch, the compiler of the Miſchna.

SEDER OLAM, *the leſſer*, is an abridgment of the former, brought down as far as Mar Sutra, who lived four hundred and fifty years after the deſtruction of the temple, or five hundred and twenty-two years after Chriſt. F. Morin, continually bent upon diminiſhing the antiquity of the principal books of the Jews, endeavours to prove this to have been written about the year of Chriſt 1124, as indeed it is expreſſed in the beginning; but R. Dav. Gantz has overthrown this opinion in his Tſemahh David, and ſhewn, that the date, in the beginning, is an interpolation.

Theſe two chronologies were firſt printed at Mantua, in 1514, quarto; again, at Baſil, by Frobenius, in 1580, octavo; at Venice, in 1545, quarto; and at Paris, with a Latin verſion of Genebrard, in duodecimo. They have been ſince reprinted at Amſterdam, in 1711.

SEDGE, in *Botany*. See IRIS *lutea paluſtris*.

SEDIMENT, formed from the Latin *ſedimentum*, which Matthias Sylvaticus derives *à diuturna ſede*, the ſettlement or dregs of any thing; or that groſs, heavy part of a fluid body which, upon reſiſting, ſinks to the bottom of the veſſel.

Some phyſicians have found means to diſcover much of the nature of the diſeaſe, from the *ſediment* of the urine.

Dr. Woodward maintains, that, at the deluge, the whole terreſtrial globe was diſſolved into one uniform maſs; and that the new world, ariſing thence, was perfectly ſpherical, and without any inequalities, conſiſting of ſeveral ſtrata, which the earthy *ſediment* gradually produced, as it drained.

SEDINA, in the *Materia Medica*, a word uſed by ſome writers to expreſs dragon's blood.

SEDITION, among *Civilians*, is uſed for an irregular commotion of the people, or an aſſembly of a number of citizens without lawful authority, tending to diſturb the peace and order of the ſociety.

This offence is of different kinds: ſome *ſeditions* more immediately threatening the ſupreme power, and the ſubverſion of the preſent conſtitution of the ſtate; others tending only towards the redreſs of private grievances. Among the Romans, therefore, it was variouſly puniſhed, according as its end and tendency threatened greater miſchief. See lib. i. Cod. de *Seditioſis*, and Math. de Crimin. lib. ii. n. 5. de Læſa Majeſtate. In the puniſhment, the authors and ringleaders were juſtly diſtinguiſhed from thoſe who, with leſs wicked intention, joined, and made part of the multitude.

The ſame diſtinction holds in the law of England, and in that of Scotland. Some kinds of *ſedition* in England amount to high treaſon, and come within the ſtat. 25 Edw. III. as levying war againſt the king. And ſeveral *ſeditions* are mentioned in the Scottiſh acts of parliament as treaſonable. Bayne's Crim. Law of Scotland, p. 33, 34.

The law of Scotland makes riotous and tumultuous aſſemblies a ſpecies of *ſedition*. But the law there, as well as in England, is now chiefly regulated by the riot act, made 1 Geo. I. only it is to be obſerved, that the proper officers in Scotland to make the proclamation thereby enacted, are ſheriffs, ſtewards, and bailies of regalities, or their deputies; magiſtrates of royal boroughs, and all other inferior judges and magiſtrates; high and petty conſtables, or other officers of the peace, in any county, ſtewartry, city, or town. And in that part of the iſland the puniſhment of the offence is death, and confiſcation of moveables: in England it is felony. See RIOT.

SEDMA, a word uſed by ſome as a name for the *lapis hæmatites*.

SEDUM *majus*. See HOUSE-*leek*.

SEDUM, *leſſer houſe-leek*, in *Botany*, a genus of the *decandria pentagynia* claſs. Its characters are theſe: the empalement of the flower is cut into five parts; the flower has five plain, ſpear-ſhaped petals, which ſpread open, and five nectaria, with ſmall ſingle ſcales, indented at the top, and inſerted at their baſe to the outſide of the germen, which becomes five erect ſpreading capſules, filled with ſmall ſeeds. Miller enumerates eighteen, and Linnæus nineteen ſpecies.

SEDR, or SEDRE, the high prieſt of the ſect of Ali, among the Perſians.

The *ſedr* is appointed by the emperor of Perſia, who uſually confers the dignity on his neareſt relation.

The juriſdiction of the *ſedr* extends over all effects deſtined for pious purpoſes, over all moſques, hoſpitals, colleges, ſepulchres, and monaſteries. He diſpoſes of all eccleſiaſtical employments, and nominates all the ſuperiors of religious houſes. His deciſions, in matters of religion, are received as ſo many infallible oracles; he judges of all criminal matters, in his own houſe, without appeal; and is, without contradiction, the ſecond perſon in the empire.

The *ſedr*, however, has not any indelible character, but frequently quits his poſt for another purely ſecular one. His authority is balanced by that of the mudſitchid, or firſt theologue of the empire.

SEED, *ſemen*, a matter prepared by nature, for the reproduction of the ſpecies, both in men, animals, and plants.

Some naturaliſts add, that even ſtones, minerals, and metals themſelves, have each their proper *ſeed* in their mines, and are produced and perpetuated thereby.

Seed, *ſemen*, in the *Animal Oeconomy*, is a white, liquid matter, or humour, the thickeſt of any in the body, ſeparated from the blood in the teſticles, and reſerved in proper veſſels, to be the means of generation. By chemical analyſis it is found to conſiſt almoſt entirely of oil, and volatile ſalts, blended together by the mediation of a little phlegm. Its activity Dr. Drake takes to be derived from the ſalts wherewith it abounds, far more than any other animal liquor.

The parts concerned in the preparation of the *ſeed* are the ſpermatic arteries, which bring the blood to be ſecreted into the teſticles; the teſticles, and paraſtatæ, where the ſecretion itſelf is chiefly effected; the vaſa deferentia, which convey the ſecreted matter out of the teſticles; and the veſiculæ ſeminales, which receive and preſerve it to be emitted in coition. See Testicle, &c.

The blood received, in ſmall quantities, into the ſpermatic arteries, and there, by the particular ſtructure of the parts, much diminiſhed of its velocity, is yet farther retarded about the corpus pyramidale, or varicoſum; and its redder and thicker parts carried off by canals opening into the veins. Thus rendered paler and ſlower, it is received into the winding receſſes of the teſticles, where, almoſt ſtagnating, it aſſumes an aſh-colour, and is farther prepared, thickened, &c. in the ductus Highmorianus, whence it is ſlowly driven into the epididymidæ, or paraſtatæ: it is then farther prepared and elaborated in the folds and complications thereof, and, at length, creeps ſlowly into the vaſa deferentia, or ejaculatoria. Theſe conſiſt, at their beginnings, of a thicker, fungous matter, and are very narrow; but growing ſenſibly wider, and then again narrower, in the winding meanders hereof the humour is collected, its motion abated, it is farther elaborated and concocted, and at laſt driven into the veſiculæ ſeminales; in the various cells and meatuſes whereof it is received, laid up, fixed, thickened, whitened, and raiſed to its laſt perfection; in which ſtate it is called *ſeed*.

It is obſervable, that no humour in the body is generated ſo ſlowly, or meets with ſo many means to retard it, or to elaborate and concoct it, when at reſt, as the *ſeed*. Some imagine that, in its whole retarded progreſs, beſides what is apparent, there is ſomething ſtill added to it from the minute nervous veſicles; and ſomething taken away, by the various lymphatics, and diſcharged thereby into the venous veſicles of the corpus pyramidale, and the little veins of the veſiculæ ſeminales, and thence into the humours of the whole body. Boerhaave takes both the one and the other to be very probable.

The *ſeed*, or humour, thus formed in the teſticles, paraſtatæ, vaſa deferentia, and veſiculæ ſeminales, being, while freſh, diluted with a little warm water, and viewed with a good microſcope, ſeems to conſiſt of innumerable little, oblong, living, nimble, animalcula, floating in the other part of this humour. This is ſaid to be always obſerved in the *ſeed* of all men, quadrupeds, birds, fiſhes, amphibious animals, and inſects.

Upon comparing this with the bulk, figure, place, change, &c. of the carina of the chick deſcribed by Malpighi, and with the known law of nature obſerved in the generation of frogs, it appears highly probable, that the animalcula of the male *ſeed* contain the rudiments, or ſtamina, of the future human body; and the more ſo, ſince, whenever the teſticles, or this humour, are wanting, there is always ſterility on the ſide of the male.

M. Leewenhoeck, the firſt diſcoverer of theſe animalcula, and many after him, make no ſcruple to call them true *fœtuſes*, or little men; and ſome have even pretended to diſcover ſomewhat of the human figure therein. But Verheyen, and others after him, deny the exiſtence of any ſuch animalcula; maintaining, that it is only the inteſtine motion of the parts of the *ſeed*, maintained by the warmth thereof, that exhibits this appearance, which fanciful perſons have improved into friſking animalcula; and urging, in confirmation hereof, that no ſooner is the warmth gone, than all appearance of animals ceaſes. But notwithſtanding this, the doctrine of the animalcula in ſemine has been very generally received. See Generation.

Againſt this ſyſtem it has been lately objected, that thoſe corpuſcles, which Leewenhoeck diſcovered in the male ſperm, are by no means animalcules, having proper and voluntary motion, but mere inert particles diffuſed through the male ſperm, like ſo many oily particles ſwimming in a fluid, as clearly obſerved with good microſcopes; that if they were really animalcules, to be metamorphoſed in the ovula, they muſt neceſſarily have their own two tunics; and by caſting thoſe tunics ſucceſſively after one another, they muſt be changed, firſt, from the ſtate of a larva or grub, into the ſtate of a pupa, nympha, chryſalis, or aurelia, and next into a complete animal; but the amnion and chorion of the fœtus derive their origin from the egg, and not from thoſe animalcules, as they are called; that the Author of nature always acts in the moſt compendious way, and that it is hardly credible, that he ſhould form ſo many myriads of animalcules for the ſake of one only; and ſuppoſing that thoſe corpuſcles were really animalcules, they muſt have their animalcules by which they were produced, and theſe laſt others, and ſo on, without end, which is alledged to be exceedingly abſurd; that the ſecundines are from the yolk, and that the yolk is found in an egg not fecundated, and, therefore, if we ſhould aſcribe the rudiments of the fœtus to the male ſperm, then the umbilical cord, with its membranes, would be totally diſtinct from the yolk, and by that means not have the ſame common tunic with the yolk, which we know to be falſe. Hence it is argued, that we are ſtill in total ignorance as to the manner in which generation, or the fecundation of the ovula, is effected. Hunter's Evelyn's Sylva, p. 435.

Some admit of four ſeveral kinds of *ſeed*: the *ſeed* of the teſticles, that of the veſiculæ ſeminales, that of the proſtates, and that of the glands of the penis. The two firſt, which we have deſcribed as one and the ſame humour, only in different ſtages, thoſe authors take to be different, as not being able to find any ſtrict communication between the deferentia and the veſiculæ; but that communication is fully ſhewn by Dr. Drake, ſo that nothing more is neceſſary to ſhew theſe *ſeeds* to be the ſame. The liquor of the proſtates, and that of the glands of the penis are generally allowed not to be any true *ſeed*, no more than that emitted by women; nor is there any good reaſon why either of them ſhould be called ſo, as their appearance is very different, and as other ſufficient uſes are aſſigned for them; viz. to line and lubricate the parts, that the ſeed, urine, &c. may paſs more freely, and without adhering.

The ſeminal liquor, however, ſuch as is emitted for uſe, is a mixture of ſeveral fluids, poured at the ſame time into the common canal of the urethra, either from the glands that have ſecreted them, or the reſervoirs that have kept them. M. du Verney obſerves, that, in different ſpecies, the number and ſtructure of theſe organs are different. In man, the principal are, the veſiculæ ſeminales, and the proſtates, beſides what was diſcovered by Mr. Cowper; viz. a number of new glandulous bodies on each ſide the urethra, whoſe excretory ducts open into the urethra, towards the root of the penis. M. du Verney has found, that the ſame are likewiſe in moſt other animals, and placed in the ſame manner.

It is controverted, whether or no the liquor filtrated hereby be neceſſary to generation? M. du Verney thinks it is; and his chief reaſon is, that, in animals that have been caſtrated, theſe glands as well as all the other ſources of generation, are found dried up, and decayed. M. Littre objects to this, that the veſiculæ ſeminales, and proſtates, having little cells, where their filtrated liquor is depoſited, it is eaſily conceived, that their humours may wait ſome time for an occaſion of being emitted; but that theſe new proſtates, or glands, of Mr. Cowper, having no ſuch reſervoirs, their liquor muſt ouſe out into the cavity of the urethra, in proportion as it is ſeparated, and be deſtined for ſome continual, not for any momentary or occaſional uſe. He adds, that, as the excretory ducts of theſe glands traverſe the ſpongious body of the urethra, for two inches, before they penetrate into its cavity, and that in the ſole moments when the liquor ſhould be diſcharged, to aſſiſt in generation, that ſpongious body is extremely dilated, and its ſides in a ſtate of compreſſion; and the liquor muſt be then leſs diſpoſed to a diſcharge than ever.

For the fate of the *ſeed*, when lodged in the uterus, ſee Conception, and Generation *of man*.

Seed, in *Botany*, is the laſt product of a plant, whereby the ſpecies is propagated.

According to the definition of Linnæus, the *ſeed* is a deciduous part of the vegetable, the rudiment of a new one, quickened for vegetation by the ſprinkling of the pollen. It is furniſhed with ſap, and covered with a coat or tunic, in form of a bladder. The parts of which it conſiſts are the *corculum*, which is the firſt principle of a new plant within the *ſeed*; the *plumula*, or ſcaly part of the corculum, which aſcends; the *roſtellum*, or plain part of the corculum, which deſcends; the *cotyledon*, or ſide lobe of the *ſeed*, of a porous ſubſtance, and periſhable; the *hilum*, which is an external mark or ſcar on the *ſeed*, where it was faſtened within the fruit; the *arillus*, or proper exterior coat or tunic of the *ſeed*, which falls off of itſelf; the *coronula*, which is either the calyx of a floret, adhering to the *ſeed*, and aſſiſting it to fly, or *pappus*, a down, which is a feathery or hairy crown, anſwering the ſame end, and connected with the *ſeed* by a *ſtipes*, or trunk, denoting the thread on which the down is raiſed and ſupported; and the *ala*, or wing. which is a membrane affixed to the *ſeed*, and ſerving to diſperſe it.

The *ſeed* is frequently the fruit of the plant, as is the caſe in many herbs.

Sometimes it is only a part incloſed in the fruit; and that in form either of grain, kernel, or berry.

The *ſeed* is the natural offspring of the flower, and that for whoſe production all the parts of the flower ſeem intended; ſo that when this is once well formed, the ſeveral parts of the flower dwindle and diſappear. See Lee on Bot. p. 15.

It is produced from the farina of the apices, let fall on the head of the piſtil, and thence forwarded to an uterus at the bottom thereof, which uſually is divided into ſeveral cells; where, coming to receive the nutritious juice of the plant, it is firſt ſoftened, then ſwelled, and increaſed both in matter and bulk, and at length comes to its ſtate of maturity. For the farther explication of the conſtituent parts of a *ſeed*, the body or placenta of a bean, with its germ, radicle, umbilical cord, and ramifications, is repreſented *Tab. Nat. Hiſt. fig.* 12. *a* is the germ; *b* the body or placenta, with the umbilical cord and ramifications; *e*, the radicle. The placenta, or ſeed-leaves of a turnip, with its radicle and germ, are exhibited in *fig.* 13. *a* is the germ; *b* the placenta; *c* the radicle. *Fig.* 14. repreſents the germ of a grain of wheat, with its root and capſule, containing the milky juice for the nouriſhment of the tender plant; *a* is the origin of the crown; *b* the pipe of communication between the firſt roots and the crown; and *c* the grain, with its firſt roots. For a farther account of the principles and progreſs of vegetation, ſee *Theory of* VEGETATION, and *Generation of* PLANTS.

That the whole plant is contained in the *ſeed*, is an opinion as old as Empedocles; and it is ſtill the prevailing doctrine among the generality of naturaliſts. Experience, the microſcope, and the modern philoſophy, give it great countenance. In effect, by the uſe of good microſcopes, we diſcover, in the *ſeed*, ſeveral of the parts of the future tree, only in miniature; particularly a little root called the *radicle*, and the ſtem called the *plumule*.

In Malpighi's life, we have a debate between him and ſignor Triumphetti, provoſt of the phyſic garden at Rome, whether the whole plant be actually contained in the *ſeed?* The affirmative is maintained by Malpighi, with cogent arguments; among which is this one, that in a kidney-bean, before ſown, the eye, aſſiſted with a microſcope, eaſily diſcovers leaves, a bud, and even the knots or implantations of the leaves on the ſtem. The ſtem itſelf alſo is very conſpicuous, and plainly conſiſts of woody fibres, and ſerieſes of little utricles. And whereas ſignor Triumphetti had objected, that by poverty, tranſplantation, &c. ſeveral plants degenerated into others, particularly wheat into tares, and tares again into wheat: in anſwer to this, which is one of the ſtrongeſt objections againſt that opinion, Malpighi replies, that he is not fully ſatisfied as to the truth of the objection; for that both himſelf, and his friends, making the experiment, no metamorphoſis of the wheat ſucceeded; but, granting the metamorphoſis, it is the ſoil, or the air, or the culture, that is in the fault. Now, from a morbid and monſtrous condition of nature, there is no inferring her genuine and permanent ſtate.

To the ſame effect Mr. Leewenhoeck, after a nice obſervation of an orange kernel, which he had made to germinate in his pocket, &c. concludes, "Thus we ſee "how ſmall a particle, no bigger than a coarſe ſand, is "increaſed," &c. A plain demonſtration, that the plant, and all that belongs to it, was actually in the *ſeed*; viz. the body, root, &c. Dr. Derham adds, that of all the *ſeeds* he has viewed, except the maple, this plant appears the plaineſt to the naked eye in the nux vomica.

The fecundity of plants, in the production of *ſeeds*, is very ſurpriſing; inſtances of which are recited under FECUNDITY, and *Propagation of* PLANTS.

Several ſpecies of plants have been long ſuppoſed to be deſtitute of *ſeeds*, in regard no obſervation, no microſcope, no anatomy, had diſcovered any thing like them; ſuch are the capillaries, the ſeveral kinds of fuci, ſea-plants, moſſes &c. But the happy induſtry of the preſent age has diſcovered the *ſeeds* of ſome of them, and has left us out of all doubt, that the reſt, which are properly plants, are not without the ſame. See *Generation of* PLANTS.

The exterior form, and even the internal ſtructure, of the generality of vegetable *ſeeds*, have been ſuppoſed by ſome ſo much alike in the ſeveral kinds, and of ſo little curioſity and beauty in the whole, that they have been little regarded by the curious; but when nearly examined with the help of microſcopes, they are found to be worthy of a greater attention: thoſe which appear moſt like to one another, when viewed by the naked eye, often proving as different, when thus examined, in their ſeveral forms and characters, as the different genera of any other bodies of the creation. If their external forms carry all this variety and beauty about them, their internal ſtructure, when laid open by different ſections, appears yet more admirable.

The *ſeed* of the muſk ſcabious is amazing in its ſhape and ſtructure: it reſembles in figure an octagonal vaſe, with a ſcalloped brim; the whole is bell-faſhioned, having ribs or diviſions, which run down from the mouth of the vaſe, and thence becoming narrower, form the bottom. Between theſe ribs, down to the beginning of the narrow part, it is clear, though not wholly tranſparent, and from thence to the bottom the ribs are hairy. This vaſe contains a *ſeed*, which is like a peſtle ſtanding in a mortar. The peſtle ſtands looſe in an octagonal caſe, but the narrowneſs of the mouth of this vaſe hinders the peſtle's being drawn out, becauſe its extremity within is rounded, and thicker than any other part of it. From its upper end there ariſe five ſpiculated ariſtæ, or awns, whoſe little thorns are directed upwards, and are thereby prepared to cauſe the *ſeed* to recede from any thing that might injure it on being touched The baſon, from which theſe ariſtæ ariſe, is of a fine green colour, and they are of an elegant ſhining brown.

The *ſeed* of the angelica is one of the moſt fragrant in its ſmell in the world. When the outer huſk of this *ſeed* is pulled off, the nucleus appears of a browniſh colour, and of an elliptical ſhape. By the help of the microſcope we ſoon diſcover what it is that produces this charming ſmell; this is a fine amber-coloured gum, which appears laid in ridges, diſpoſed alternately with others of a browniſh colour, longitudinally, all over the *ſeed*, and on the flat ſide there is a white part, which is a ſort of theca, which receives a very minute ſtylus from the pedicle that ſupports it.

The medicinal *ſeed*, commonly known in the ſhops under the name of *grain of paradiſe*, is one that promiſes very little from its external appearance, being only a brown *ſeed* of an irregular ſurface, with many flats and angles, and having an apex like the mouth of a purſe when drawn together with a ſtring; from this unpromiſing aſpect, however, there ariſes a very wonderful appearance on diſſection. In a longitudinal ſection we ſee firſt the edge of the brown cortex; next within that appears a black pitchy ſubſtance, and within that a very white matter, lodged in a radiated ſrom: this reſembles a fine white ſalt, and is probably a mixture of a volatile ſalt, and a farinaceous matter. Its radiated diſpoſition, and extremely pungent taſte, favour alſo this opinion. But there is in this *ſeed* a yet far more curious particular than theſe; the centre of every *ſeed* is occupied by a ſmall piece of perfect camphor: this is, in all reſpects, the ſame with the common camphor ſold in the ſhops, and is always of the figure of a vinegar cruet, having a round large bottom, and a long and narrow neck. This is invariably the appearance in every *ſeed*, and that not only in this, but in other ſeeds of the ſame kind.

The ſeed of the great maple, which we commonly, but improperly, call the *ſycamore-tree*, conſiſts of a pod and its wing; two of theſe grow upon a pedicle with the pods together, which makes them reſemble the body of an inſect with its expanded wings. The wings are finely vaſculated, and the pods are winged with a fine white down, reſembling ſilk: this contains a round compact pellet, covered with a brown membrane, that ſticks very cloſely to it. When this is pulled off, inſtead of diſcerning a kernel, as in other *ſeeds*, there appears an entire green plant, folded up in a moſt ſurpriſing manner. The pedicle of this is about two eighths of an inch long, and its ſeminal leaves of about ſix eighths each; between theſe the germina of the next pair of leaves are plainly viſible to the naked eye, but with a microſcope they are ſeen with the greateſt beauty and perfection. See *Tab. of Microſcopical Objects, Claſs* 2.

Theſe, and a number of ſuch other beauties in this part of the creation, are deſcribed at large by Dr. Parſons in his work, entitled, A Microſcopic Theatre of *Seeds*, to which we refer for the reſt. Phil. Tranſ. N° 474. p. 187.

Moſt kinds of *ſeeds* ſhould be prepared for a microſcopical examination, by ſteeping them in warm water till their coats are ſeparated, and their ſeminal leaves may be opened without laceration. But *ſeeds*, while dry, and without any preparation, are of almoſt infinite variety of ſhape, and afford a number of pleaſing objects for the microſcope.

Seeds, *echinate*. See Echinate.

Seeds, *naked*. See Naked.

Seeds, *winged*. See Winged.

Seeds, in *Gardening* and *Agriculture*. Mr. Bradley obſerves, that the *ſeeds* of plants, though exceedingly good, will degenerate from the mother plant, if they be ſown on the ſame ground whence they were gathered; ſo that there is a great neceſſity for a yearly change of *ſeeds* of foreſt-trees, as acorns, maſts, &c. If the place be too cold to ſow them when gathered in Auguſt, they may be kept barrelled, or potted up, in moiſt ſand or earth, *ſtratum ſuper ſtratum*, during the winter; at the end of which time they are found ſprouted, and, if gently ſown, will be as forward as if they had been ſown in autumn, beſides their miſſing the vermin, to which the winter *ſeed* is much expoſed.

It is ſurpriſing, ſays Mr. Miller, how many ſorts of *ſeeds* will continue good for ſeveral years, and retain their growing faculty; whereas many others will not grow when they are more than one year old; which he apprehends is owing, in a great meaſure, to their abounding more or leſs with oil, as alſo to the nature of the oil, whether it is of a cold or hot quality, and the texture of their outward covering; e. gr. the ſeeds of cucumbers, melons, and gourds, will continue good eight or ten years; thoſe of radiſh, turnep, rape, &c. for three or four years; but thoſe of parſley, carrot, parſneps, and moſt other umbelliferous plants, loſe their growing faculty often in one year, and ſeldom remain good longer that two years. He farther obſerves, that all ſorts of *ſeeds* are preſerved beſt in their pods or huſks, eſpecially if they are not ſeparated from the placenta, to which they are faſtened by an umbilical cord, through which they received their nouriſhment in their embryo ſtate. See *Theory of* Vegetation.

He alſo adviſes thoſe who would preſerve their *ſeeds* good to gather them in dry weather, to hang them up in bags in a dry room, and in a moderate temperature of warmth; and thoſe who would ſend *ſeeds* to a diſtant country ſhould gather them when fully ripe, preſerve them in their pods, and in packing them up, take care that they are not ſhut up too cloſely from the air. The anointing of *ſeeds*, or covering them over with fat or oil, is altogether improper. He adds, that the earth, which is the natural nurſe of all *ſeeds*, will preſerve them much longer than any other body; provided they are buried ſo deep as to be beyond the influence of ſun and ſhowers whereby they are prevented from vegetating. With proper precautions, and with a zeal in any degree reſembling that of the late Dr. Solander, of Mr. Blake, who had formed a plan of procuring the *ſeeds* of all the vegetables produced in China, which are uſed in medicine, manufactures, or food, or are in any way ſerviceable to mankind, and to forward to Europe not only ſuch *ſeeds*, but the plants producing them (ſee Kippis's edit. of Biog. Brit. art. Blake), and of ſir Joſeph Banks; we might obtain a great variety of curious and uſeful plants now uncultivated in this country.

The *ſeed* of fruit trees, it is ſaid, ſhould not be choſen from thoſe that are the moſt fruitful, ſo much as from the moſt ſolid and fair; nor are we to covet the largeſt acorns, but the moſt weighty, clean, and bright. Porous, inſipid, mild ſorts of *ſeeds*, are to be ſown as ſoon as ripe; hot, bitter *ſeeds*, ought to be kept a year before they are ſown. See Seminary.

The ſhape and weight of *ſeeds* direct how they are to be ſet; moſt of them, when they fall, lie on one ſide, with the ſmall end towards the earth; which ſhews that poſture to be beſt to ſet any ſtone or nut in: if they be heavy, ſow them the deeper. Acorns, peaches, &c. are to be ſown two or three inches deep. See Semination

There is a common method of trying the goodneſs of many ſorts of *ſeed*, which is by putting them in water; and thoſe which ſink to the bottom are eſteemed good, but thoſe that ſwim on the ſurface are rejected. This rule, Mr. Miller obſerves, is not univerſal; for having ſaved the *ſeeds* of melons which floated on the ſurface of water, they were waſhed from the pulp, and keeping them two years, they grew very well; but the melons they produced were not ſo thick fleſhed as thoſe which he obtained from heavy *ſeeds* of the ſame melon. The lightneſs of many ſorts of *ſeeds* he aſcribes to their not having been ſufficiently impregnated by the farina fœcundans; and, therefore, care ſhould be taken that this operation be properly performed, by not excluding plants that are in flower from the external air, or even by aſſiſting nature in conveying the farina of the male flowers to thoſe of the female. Miller's Gard. Dictionary, art. *Seed*.

Seed, *change of*, a term uſed by the farmers to expreſs the common, and, as they ſuppoſe, neceſſary cuſtom, of changing among one another the *ſeed* of their lands, as wheat, and the like; it being a received opinion, that the *ſeed* produced on one land will grow better on another than on that which produced it, though the ſame ſpecies of plant be ſown.

Seeds, in their natural climate, do not degenerate, unleſs culture has improved them; they then indeed are liable, upon omiſſion of that culture, to return to their natural ſtate again. Whatever benefit ariſes to the farmer from the changing the *ſeed* of the ſame ſpecies, is from cauſes which are themſelves the effects of different climates, ſuch as heat and moiſture, which may vary very much in the ſame neighbourhood.

Laurembergius has carried this notion of degeneracy and change from the ſoil, ſo far as to affirm that wheat will, in ſome places, degenerate into rye; and in other places, rye will be exalted into wheat by the ſoil; but thoſe who are acquainted with botany know, that a horſe might as ſoon be changed into a bull by feeding in an improper paſture, as one plant degenerate into another by fault of the ſoil. Tull's Huſbandry, p. 116.

Seeds, *ſteeping of*, in prolific liquors, is a practice that has occaſionally prevailed, and it is not of modern invention. The Romans, who were good huſbandmen, have left us ſeveral receipts for ſteeping of grain, in order to increaſe the powers of vegetation. In England, France, Italy, and in all countries where agriculture has been attended to, a variety of liquors have been recommended for this purpoſe. The practice is founded on a preſumption, that, by filling the veſſels of the grain with nouriſhing liquors, the germ, with its roots, would be invigorated. On this ſubject Dr. Hunter obſerves, that all his experiments demonſtrate, that ſteeps have no inherent virtue; having ſown more than once the ſame *ſeed*, ſteeped and unſteeped, all other circumſtances being alike, he never found the leaſt difference in the growth of the crop. When, indeed, the light *ſeeds* are ſkimmed off, as in the operation of brining, the crop will be improved, and diſeaſes prevented; but theſe advantages proceed from the goodneſs of the grain ſown, and not from any prolific virtue of the ſteep. In this opinion many rational farmers, determined by their own experience, concur. Duhamel ſpeaks in the ſtrongeſt terms againſt the practice of ſteeping, ſo far as it ſuppoſes an impregnation of vegetative particles. Dr. Hunter, having ſprouted all kinds of grain in a variety of ſteeps, aſſures the farmer, that the radicle and germ never appeared ſo vigorous and healthy, as when ſprouted by elementary water; whence it appears, that the *ſeed* requires no aſſiſtance.

Upon the whole he concludes, that, as no invigorating or fructifying liquor, however pompouſly introduced, has ever ſtood the teſt of fair and correct experiment, it may be laid down as an eſtabliſhed truth, that plump *ſeeds*, clear of weeds, and land well prepared to receive it, will ſeldom diſappoint the expectations of the farmer, and upon theſe he ſhould rely for the goodneſs of his crop. Hunter's Evelyn's Silva, p. 15, &c.

Seeds, in *Pharmacy*, &c. The medicinal *ſeeds*, eſpecially thoſe imported from the Indies, Levant, &c. are ſeverally deſcribed under their reſpective articles; which ſee. Among thoſe uſed with us, the principal are, the four *greater hot*, and the four *greater cold ſeeds*, as they are called. The firſt are thoſe of aniſe, fennel, cumin, and carraway; the latter, thoſe of gourd, citrul, melon, and cucumber.

The chief uſe of the four cold *ſeeds* is, for the making of emulſions, cool refreſhing drinks, paſtes for the hands, and oils uſed by the ladies for the complexion.

Seed, *amber*, *aniſe*, *lac*, *line*, *muſtard*, *worm*. See the reſpective articles.

Seed *of pearl*. See Pearl.

SEEDLINGS, among *Gardeners*, denote ſuch roots of gilliflowers, &c. as come from *ſeed* ſown. Alſo the young tender ſhoots of any plants that are newly ſown.

SEEDY, in the *Brandy Trade*, a term uſed by the dealers to expreſs a fault that is found in ſeveral parcels of French brandy, and which renders them unſaleable. The French ſuppoſe that theſe brandies obtain the flavour, which they expreſs by this name, from the weeds which grew among the vines, from whence the wine, of which this brandy was made, was preſſed.

However it be, the thing is evident, and the taſte not of any one kind; but ſome pieces of brandy ſhall taſte ſtrongly of anniſeed, ſome of carraway ſeed, and ſome of other of the ſtrong flavoured ſeeds of plants, principally of the umbelliferous kind; ſo that it ſhall be rather taken for anniſeed, carraway, or ſome other water, than for brandy.

The proprietor of ſuch brandies is always at great trouble to get them off, and uſually is reduced to the neceſſity of mixing them in ſmall quantities with pieces of other brandies, ſo as to drown and conceal the taſte; and where he has not opportunities of doing this, is obliged to ſell them on very diſadvantageous terms.

The buſineſs of rectification of ſpirits is very little underſtood abroad, though much practiſed with us; and a man in France or Holland, who could take off this taſte from theſe brandies, might get great advantages by it. There is no doubt but that the ſame means, which we uſe to rectify malt ſpirits, that is to clear it of its nauſeous and ſtinking oil, which always ariſes with it in the firſt diſtillation, would alſo ſerve to purify theſe brandies, and by leaving the extraneous oils behind, render them as well taſted as any others; ſince there is no queſtion, but that the oil of malt, which is a principle of the ſame ingredient with the ſpirit, is more firmly united to it than theſe flavouring oils in the brandy, which are not the produce of the grape, but of ſome foreign matter only accidentally mixed with it. See BRANDY and SPIRITS.

It is a miſtake to imagine, that all the brandies made in France are ſo fine as thoſe which we meet with on the quays of London; on the contrary, there are many hundred pieces made every year, which are as badly flavoured as our coarſeſt malt ſpirit. But the caſe is this, they ſend the beſt brandies, and the beſt wines to England, where they can get the beſt prices for them. In Holland, on the contrary, the mart of goods of all ſorts, it is ſometimes difficult to ſelect one piece of good brandy out of fifty, the general run of them being either *ſeedy*, or muſty, oily, or otherwiſe infected with ſome unnatural and diſagreeable flavour; and theſe are the ſorts which in France they deſpair of curing by re-diſtillation, or bring to the ſtate of three fifths, or *trois cinques*, as they expreſs their ſtronger brandies. Shaw's Eſſay on Diſtillery.

SEEING, the act of perceiving objects by the organ of SIGHT; or, it is the ſenſe we have of external objects, by means of the eye.

For the apparatus, or diſpoſition of the parts neceſſary to *ſeeing*, ſee EYE. For the manner wherein *ſeeing* is performed, and the laws thereof, ſee VISION.

Our beſt anatomiſts differ greatly as to the cauſe why we do not *ſee* double with the two eyes. Galen, and others after him, aſcribe it to a coalition, or decuſſation of the optic nerve, behind the os ſphenoides. But whether they decuſſate or coaleſce, or only barely touch one another, is not ſo well agreed.

The Bartholines and Veſalius ſay expreſly, they are united by a perfect confuſion of their ſubſtance; Dr. Gibſon allows them to be united by the cloſeſt conjunction, but not by a confuſion of their fibres.

Alhazen, an Arabian philoſopher of the 12th century, accounts for ſingle viſion by two eyes, by ſuppoſing that when two correſponding parts of the retina are affected, the mind perceives but one image.

Deſcartes, and others, account for the effect another way; viz. by ſuppoſing that the fibrillæ conſtituting the medullary part of thoſe nerves, being ſpread in the retina of each eye, have each of them correſponding parts in the brain; ſo that when any of thoſe fibrillæ are ſtruck by any part of any image, the correſponding parts of the brain are affected thereby.

Somewhat like which is the opinion of Dr. Briggs, who takes the optic nerves of each eye to conſiſt of homologous fibres, having their riſe in the thalamus nervorum opticorum, and being thence continued to both the retinæ, which are compoſed of them; and farther, that thoſe fibrillæ have the ſame paralleliſm, tenſion, &c. in both eyes; conſequently, when an image is painted on the ſame correſponding, ſympathizing parts of each retina, the ſame effects are produced, the ſame notice carried to the thalamus, and ſo imparted to the ſoul. Hence is that double viſion enſuing upon an interruption of the paralleliſm of the eyes; as when one eye is depreſſed by the finger, or their ſymphony is interrupted by diſeaſe: but Dr. Briggs maintains, that it is but in few ſubjects there is any decuſſation; and in none any conjunction more than mere contact.

Dr. Briggs's notion is by no means conſonant to facts, and is attended with many improbable circumſtances.

It was the opinion of ſir Iſaac Newton, and of many others, that objects appear ſingle, becauſe the two optic nerves unite before they reach the brain. But Dr. Porterfield ſhews, from the obſervation of ſeveral anatomiſts, that the optic nerves do not mix, or confound their ſubſtance, being only united by a cloſe coheſion; and objects have appeared ſingle, where the optic nerves were found to be disjoined. To account for this phenomenon, this ingenious writer ſuppoſes, that, by an original law in our natures, we imagine an object to be ſituated ſomewhere in a right line drawn from the picture of it upon the retina, through the centre of the pupil; conſequently, the ſame object appearing to both eyes to be in the ſame place, the mind cannot diſtinguiſh it into two.

In anſwer to an objection to this hypotheſis, from objects appearing double when one eye is diſtorted, he ſays, the mind miſtakes the poſition of the eye, imagining, that it had moved in a manner correſponding to the other, in which caſe the concluſion would have been juſt: in this he ſeems to have recourſe to the power of habit, though he diſclaims that hypotheſis. This principle, however, has been thought ſufficient to account for this appearance.

Originally, every object making two pictures, one in each eye, is imagined to be double; but, by degrees, we find that when two correſponding parts of the retina are impreſſed, the object is but one; but if thoſe correſponding parts be changed by the diſtortion of one of the eyes, the object muſt again appear double as at the firſt. This ſeems to be verified by Mr. Cheſelden, who informs us that a gentleman, who, from a blow on his head, had one eye diſtorted, found every object to appear double, but by degrees the moſt familiar ones came to appear ſingle again, and in time all objects did ſo without amendment of the diſtortion. A ſimilar caſe is mentioned by Dr. Smith.

On the other hand, Dr. Reid is of opinion, that the correſpondence of the centres of two eyes, on which ſingle viſion depends, does not ariſe from cuſtom, but from ſome natural conſtitution of the eye and of the mind.

M. du Tour adopts an opinion, long before ſuggeſted by Gaſſendi, that the mind attends to no more than the image made in one eye at a time; in ſupport of which he produces ſeveral curious experiments; but as M. Buffon obſerves, it is a ſufficient anſwer to this hypotheſis, that we ſee more diſtinctly with two eyes than with one; and that when a round object is near us, we plainly ſee more of the ſurface in one caſe than in the other.

With reſpect to ſingle viſion with two eyes, Dr. Hartley obſerves, that it deſerves particular attention, that the optic nerves of men, and ſuch other animals as look the ſame way with both eyes, unite in the ſella turcica in a ganglion, or little brain, as it may be called, peculiar to themſelves, and that the aſſociations between ſynchronous impreſſions on the two retinas muſt be made ſooner, and cemented ſtronger on this account; and that they ought to have a much greater power over one another's images, than in any other part of the body. And thus an impreſſion made on the right eye alone by a ſingle object, may propagate itſelf into the left, and there raiſe up an image almoſt equal in vividneſs to itſelf; and, conſequently, when we *ſee* with one eye only, we may, however, have pictures in both eyes.

It is a common obſervation, ſays Dr. Smith, that objects ſeen with both eyes appear more vivid, and ſtronger than they do to a ſingle eye, eſpecially when both of them are equally good. Porterfield on the Eye, vol. ii. p. 285. 315. Smith's Optics, Remarks, p. 31. Reid's Inquiry, p. 267. Mem. Preſentes, p. 514. Acad. Par. 1747. M. p. 334. Hartley on Man, vol. i. p. 207. Prieſtley's Hiſt of Light and Colours, p. 663, &c.

Whence it is that we *ſee* objects erect, when it is certain, that the images thereof are painted invertedly on the retina, is another difficulty in the theory of *ſeeing*. Deſcartes accounts for it hence, that the notice, which the ſoul takes of the object, does not depend on any image, nor on any action coming from the object, but merely on the ſituation of the minute parts of the brain, whence the nerves ariſe. E. gr. the ſituation of a capillament of the optic nerve correſponds to a certain part of the brain, which occaſions the ſoul to ſee all thoſe places lying in a right line therewith.

But Mr. Molyneux gives us another account; the eye, he obſerves, is only the organ, or inſtrument; it is the ſoul that *ſees*. To inquire, then, how the ſoul perceives the object erect by an inverted image, is to inquire into the ſoul's faculties. Again, imagine that the eye receives an impulſe on its lower part, by a ray from the upper part of an object, muſt not the viſive faculty be hereby directed to conſider this ſtroke as coming from the top, rather than the bottom of the object; and, conſequently, be determined to conclude it the repreſentation of the top?

Upon theſe principles, we are to conſider, that inverted is only a relative term, and that there is a very great difference between the real object, and the means or image whereby we perceive it. When all the parts of a diſtant proſpect are painted upon the retina (ſuppoſing that to be the ſeat of viſion), they are all right with reſpect to one another, as well as the parts of the proſpect itſelf; and we can only judge of an object being inverted, when it is turned reverſe to its natural poſition with reſpect to other objects which we *ſee* and compare it with.

The eye or viſive faculty (ſays Molyneux) takes no notice of the internal ſurface of its own parts, but uſes them as an inſtrument only, contrived by nature for the exerciſe of ſuch a faculty. If we lay hold of an upright ſtick in the dark, we can tell which is the upper or lower part of it, by moving our hand upwards or downward; and very well know, that we cannot feel the upper end by moving our hand downwards. Juſt ſo, we find by experience and habit, that upon directing our eyes towards a tall object, we cannot *ſee* its top by turning our eyes downward, nor its foot by turning our eyes upward; but muſt trace the object the ſame way by the eye to ſee it from head to foot, as we do by the hand to feel; and as the judgment is informed by the motion of the hand in one caſe, ſo it is alſo by the motion of the eye in the other. Molyneux's Dioptr. p. 105, &c. Muſchenbroeck's Int. ad Phil. Nat. vol. ii. p. 762. Ferguſon's Lectures, p. 132. See SIGHT, VISIBLE, &c.

Seeing *faith*. See FAITH.

SEELING. A horſe is ſaid to *ſeel*, when he begins to have white eyebrows; that is, when there grows on that part about the breadth of a farthing of white hairs, mixed with thoſe of his natural colour, which is a mark of old age.

It is ſaid a horſe never *ſeels* till he is fourteen years old, and always does before he is ſixteen. The light-ſorrel and black ſooner *ſeel* than any other.

Horſe-jockeys uſually pull out thoſe hairs with pincers: but if there be ſo many, that it cannot be done without making the horſe look bald and ugly, then they colour their eye-brows, that they may not appear old.

Seeling, in *Falconry*, is the running a thread through the eye-lids of a hawk, when firſt taken, to make her endure the hood the better.

Seeling, at *Sea*, is uſed in the ſame ſenſe nearly with heeling: when a ſhip lies down conſtantly, or ſteadily, on one ſide, the ſeamen ſay ſhe *heels*; and they call it *ſeeling*, when ſhe tumbles on one ſide violently, and ſuddenly, by reaſon of the ſea forſaking her, as they call it, i. e. the waves leaving her for a time in a bowling ſea. When a ſhip thus tumbles to leeward, they call it *leeſeel*; and in this there is not much danger, even in a ſtorm, becauſe the ſea will preſently right her up again; but if ſhe rowls or *ſeels* to windward, there is fear of her coming over too ſhort or ſuddenly, and ſo by having the ſea break right into her, be either foundered, or elſe have ſome of her upper works carried away.

SEEM, or SEME. See SEAM.

SEGGARS, in the *Manufacture* of porcelain and pottery, are caſes formed of coarſer clays, but which are capable of ſuſtaining the required heat without fuſion; in which different kinds of earthen ware are baked. See PORCELAIN and POTTERY.

SEGMENT *of a circle*, in *Geometry*, a part of a circle, comprehended between an arch and the chord thereof: or, it is a part of a circle comprehended between a right line leſs than a ſemi-diameter, and part of the circumference.

Thus the portion AFBA (*Tab.* IV. *Geometry*, *fig.* 110.) comprehended between the arch AFB, and the chord AB, is a *ſegment* of the circle ABFD, &c. ſo is alſo ADBA a *ſegment* comprehended between the arch ADB and the chord AB.

As it is evident every *ſegment* of a circle muſt either be greater or leſs than a ſemicircle, the greater part of the circle cut off by a chord, i. e. the part greater than a ſemicircle, is called the *greater ſegment*, as AFB; and the leſſer part, or the part leſs than a ſemicircle, the *leſſer ſegment*, as ADB, &c.

The angle which the chord AB makes with a tangent LB, is called the ANGLE *of a ſegment*.

Some alſo call the two mixed angles comprehended between the two extremes of the chord and the arch, *angles of the ſegment*; but thoſe are in reality the ſame with thoſe of the chord and tangent.

Segment, *angle in the*. See ANGLE.

Segments, *ſimilar*. See SIMILAR.

The height of a *ſegment* DE, and half its baſe, or chord, AE, being given, to find the area of the *ſegment*. Find the diameter of the circle. On this deſcribe a circle, and draw the baſe of the *ſegment* AB; draw the radii AC, BC; and find the number of degrees of the arch ADB. From the diameter had, and its ratio to the periphery, find the periphery itſelf; and from the ratio of the periphery to the arch ADB, and the periphery itſelf, find the length of the arch ADB. This done, find the area of the SECTOR ADBCA: and that of the triangle ACB. Laſtly, ſubtract the triangle from the ſector, and the remainder is the area of the *ſegment*.

If the area of the greater *ſegment* BFA were required, the triangle ACB muſt be added to the ſectors ACF and BCF.

Segment *of a ſphere*, is a part of a ſphere terminated by a portion of its ſurface, and a plane which cuts it off, paſſing ſomewhere out of the centre. This is more properly called a *ſection of a ſphere*.

The baſe of ſuch a *ſegment*, it is evident, is always a circle whoſe centre is in the axis of the ſphere.

The ſolid content of a *ſegment* of a ſphere is found, by multiplying the ſurface of the whole ſphere by the altitude of the *ſegment*, and then dividing the product by the diameter of the ſphere, and to the quotient adding the area of the baſe of the *ſegment*: or, if it be leſs than a hemiſphere, thus; take the altitude of the *ſegment* from the radius of the ſphere, and by the difference multiply the area of the baſe of the *ſegment*, and ſubtract this product, from that which will ariſe by multiplying the ſemi-axis of the ſphere into the convex ſurface of the *ſegment*; then divide the remainder by 3, and the quotient is the ſolidity ſought:

The latter method ſuppoſes the axis of the ſphere to be given; if not, it may be found thus; let the altitude of the *ſegment* be called a, and its ſemidiameter, s, then will $a : s :: s : \frac{ss}{a}$; add $\frac{ss}{a}$ to a, and that ſhall give the axis ſought. See FRUSTUM.

Segment, *reſiſtance of a*. See RESISTANCE.

Segment is ſometimes alſo extended to the parts of ellipſes, and other curvilinear figures.

Segments, *line of*. On GUNTER'S SECTOR there are uſually two lines, called *lines of ſegments*; they are numbered with 5, 6, 7, 8, 9, 10, and lie between the lines of ſines, and thoſe of ſuperficies. They repreſent the diameter of a circle, ſo divided into one hundred parts, as that a right line drawn through thoſe parts, and normal to the diameter, ſhall cut the circle into two *ſegments*, of which the greater ſhall have that proportion to the whole circle, which the parts cut have to one hundred.

Segment-*leaves*, a denomination given by botaniſts to thoſe leaves that are cut and divided into many ſhreds, or ſlices, as fennel, &c.

SEGMENTUM, among the *Romans*, an ornament of lace uſed by the women on their ſhoulders, which, according to ſome, reſemble our ſhoulder-knots.

Segmenta were likewiſe a kind of teſſelated or Moſaic pavements, made up of pieces of various ſhapes and colours, but which had an uniform and regular arrangement.

SEGMOIDAL *valves*, in *Anatomy*, are little valves of the pulmonary artery; thus called from their reſembling ſegments of circles but more uſually called SEMILUNAR *valves*.

SEGREANT is the *heralds* word for a gryphon, when drawn in a leaping poſture, and diſplaying his wings, as if ready to fly.

SEGOLTA *rex*, one of the Hebrew ACCENTS, uſually anſwering to our ſemicolon, and marked with three points over a letter thus (∴), or (∵).

SEGUE, in the *Italian Muſic*, is often found before *aria*, *alleluja*, *amen*, *&c.* to ſhew that thoſe portions or parts are to be ſung immediately after the laſt note of that part over which it is writ. But if theſe words *ſe piace*, or *ad libitum*, are joined therewith, it ſignifies that theſe portions may be ſung or not at pleaſure.

SEGUENZA, in the *Italian Muſic*, a kind of hymn ſung in the Roman church, generally in proſe. The *ſeguenze* are often ſung after the gradual, immediately before the Goſpel, and ſometimes in the veſpers before the Magnificat. They were formerly more uſed than at preſent.

The Romiſh church has retained three *ſeguenze*, called *le tre ſeguenze dell' anno*. They are *Lauda Sion ſalvatorem*, &c. *Victimæ paſchali laudes*, &c. *Veni ſancte Spiritus*, &c. Theſe are ſung to muſic in many places. There is alſo one called *Dies iræ*, *Dies illa*, in the funeral ſervice, which is admirably well ſet, and on which Legrenzi, Lully, and others, have made excellent compoſitions.

SEGUIERIA, in *Botany*, a genus of the *polyandria monogynia* claſs. Its characters are theſe: the calyx is pentaphyllous, it has no corolla, and the fruit is a monoſpermous capſule, terminated by a large wing, and ſmall lateral wings. There is only one ſpecies.

SEJANT is a term uſed in *Heraldry*, when a lion, or other beaſt, is drawn in an eſcutcheon, ſitting like a cat, with his fore-feet ſtraight.

SEIKS, q. d. *diſciples*, in *Modern Hiſtory*, a ſect of Hindoſtan, thus called, becauſe they are followers of a certain philoſopher of Thibet, who taught the idea of a common-wealth, and the pure doctrine of deiſm, without any mixture of either the Mahomedan or Hindoo ſuperſtitions. They made their firſt appearance about the commencement of this century, but were rather reckoned then a particular ſect than a nation. Since the empire began to decline, they have prodigiouſly increaſed their numbers by admitting proſelytes of all religions, without any other ceremony than an oath, which they tender to them, to oppoſe monarchy.

SEIGNEUR, or Seignor, *lord*. See Sire, Sieur, Monseigneur, Lord, &c.

SEIGNIORY, *dominium*, in our *Law*, is uſed for a manor or lordſhip.

SEIGNORAGE, or Seignourage, a right or due belonging to a ſeigneur, or lord.

Seignorage is particularly uſed for a duty belonging to the prince for the coining of money, called alſo coinage, and in the baſer Latin *monetagium*.

This duty is not always the ſame, but changes according to the pleaſure of the prince, and the occaſions of ſtate. It is in ſome meaſure for the diſcharge of this duty that alloy was invented; that is the mixture of other metals with gold and ſilver.

Under our ancient kings, for every pound of gold brought in the maſs to be coined, the king's duty was five ſhillings; one ſhilling, and ſometimes eighteen pence, whereof went to the maſter of the mint. Under Edward III. the *ſeignorage* of every pound weight of ſilver was eighteen penny-weight, which was then equivalent to a ſhilling. Under Henry V. the king's *ſeignorage* for every pound of ſilver was fifteen-pence. At preſent, the king claims no *ſeignorage* at all, but the ſubject has his money coined at the public expence; nor has the king any advantage therefrom, but what he has by the alloy.

In France, under Philip Auguſtus, the *ſeignorage* was one third of the profit made by coining: St. Louis fixed it at one ſixteenth part of the value of the money coined: king John, at three livres the mark of gold: Charles VII. by reaſon of the diſtreſſed ſtate of his finances, raiſed it to three fourths of the value; Louis XIII. fixed it at ſix livres the mark, or eight ounces of gold, and ten ſols the mark of ſilver. Louis XIV. took away the right of *ſeignorage* in 1679, though it was re-eſtabliſhed in 1689, on the foot of ſeven livres ten ſols the mark of gold, and twelve ſols ſix deniers the mark of ſilver.

It muſt be obſerved, that for the levying of this duty of *ſeignorage*, the juſt value of the money is augmented by the value of the duty.

SEIM, in *Agriculture*, a term uſed by the farmers of Cornwall to expreſs a certain determinate quantity of ſea-ſand, which they uſe as manure to their lands.

They dredge this up on the ſea coaſts, and carry it as far towards the lands, where it is to be uſed, as they can by water. At the landing place the farmers bring a train of horſes to receive it, each horſe carrying a *ſeim*, that is a ſack of it, containing thirteen gallons. The land carriage of this ſand, in Cornwall alone, is ſuppoſed to coſt thirty-two thouſand pounds annually; and yet the farmers find abundant encouragement to continue the uſe of it, becauſe it is ſo rich a manure.

SEISACHTHEIA, Σεισαχθεια, in *Antiquity*, a public ſacrifice at Athens, in memory of Solon's ordinance, whereby the debts of poor people were either entirely remitted, or at leaſt the intereſt due upon them leſſened, and the creditors hindered from ſeizing upon the perſons of their debtors, as had been cuſtomary before that time.

The word ſignifies the ſhaking off a burden.

SEISIN, Seisina, in *Law*, ſignifies *poſſeſſion*. In this ſenſe we ſay, primer *ſeiſin*, for the firſt poſſeſſion, &c.

Seiſin is twofold, *ſeiſin in fact*, and *ſeiſin in law*.

Seisin *in fact*, is when an actual and corporal poſſeſſion is taken.

Seisin *in law* is, when ſomething is done, which the law accounted a *ſeiſin*, as an inrollment.

This in law gives a right to lands and tenements, though the owner be by wrong diſſeiſed of them. He who hath an hour's poſſeſſion quietly taken, hath *ſeiſſin de droit, & de claime*, whereof no man may diſſeiſe him by his own force or ſubtlety, without proceſs of law. See Disseisin.

The civilians call the latter *civilem poſſeſſionem*, and the former *naturalem*.

Seisin, *livery of*. See Livery.

SEISINA *habenda, quia rex habuit annum, diem et vaſtum*, in *Law*, a writ that lies for delivery of *ſeiſin* to the lord of lands or tenements, after the king, in right of his prerogative, hath had the year, day, and waſte, on a felony committed.

SEISINAM *habere facias*. See Habere.

SEISOR. See Disseisor.

SEITAN, a name given by Avicenna, and other of the Arabian writers, to a ſpecies of prickly tree, often recommended in their preſcriptions.

The word is ſometimes alſo written *ſetan*, *ſiten*, *ſetah*, or *ſetim*.

Pliny mentions this as a wood remarkably durable. He ſays it grew moſt plentifully in Egypt, and that it remained uncorrupted in waters. It is called by him, and others of the old Latin writers, *ſpina nigra*, the *black thorn*; and the durable nature of our common ſloe-tree, or black thorn, growing in our hedges, has tempted ſome to believe it to be the ſame with the *ſeten*, or *ſpina nigra* of the ancients; but this is overthrown by the common account of Pliny, and others, of ſhips being built of this wood, the ſmall ſize of our black thorn rendering it wholly impoſſible to put it to ſuch uſes.

Theodotion is to be underſtood of this wood, when he ſpeaks of the *ſetah*, or *acanthina*.

It is plain from Avicenna, that this *ſetan*, or *ſeitan*, is no other than that ſpecies of *acacia*, which, from its producing our gum arabic, is called *the gum arabic tree*.

SEIZE, Seaze, or Seise, in the *Sea Language*, is to make faſt, or bind, particulary to faſten two ropes together with a ſmall line or cord, which is called *ſeizing*.

The *ſeizing*, *ſeaſing*, or *ſeaſen of a boat*, is a rope tied to a ring, or little chain, in the foreſhip of the boat, by which means it is faſtened to the ſide of the ſhip.

SEIZING, in *Falconry*, is when an hawk gripes her prey, or any thing elſe, faſt between her claws.

SEIZURE, in *Commerce*, an arreſt of ſome merchandize, moveable, or other matter, either in conſequence of ſome law, or of ſome expreſs order of the ſovereign.

Contraband goods, thoſe fraudently entered, or landed without entering at all, or landed at wrong places, are ſubject to *ſeizure*.

In *ſeizures* among us, one half goes to the *ſeizor*, or informer, and the other half to the king. In France, half the painted linens, &c. ſeized, uſed to be burnt, and the other half ſent abroad, but in 1715, by an arret of council, the whole was ordered to be burnt.

SEL, in the *Materia Medica* of the ancients, a name given to the fruit of an Indian plant, reſembling the cucumber in its manner of growth, but bearing a fruit like a piſtachia-nut.

There are three of theſe fruits mentioned by the Arabian writers, the bel, fel, and *ſel*.

They tell us expreſly that the bel and fel, as alſo the fruit *ſel*, were not the fruit of a tree, but of a plant, and that of the creeping kind. It is very probable, that the other fel of Avicenna is the root of the *nymphæa Indica*, which he mentions in the chapter of *nenuphar*, as poſſeſſing the ſame virtues which he attributes to this ſort of fel, that is the ſame with thoſe of mandrake.

SELAGINOIDES, in *Botany*, the name of a genus of moſſes in the arrangement of Dillenius, a ſpecies of lycopodium; the characters of which are theſe: the capſules are produced in the alæ of the leaves, in the manner of thoſe in the ſelago, but they are of a different form, being tricoccous, and ſometimes quadricoccous, and opening, when mature, into ſo many valves. See *Tab.* XIV. *Botany*, Nº 16.

Of this genus of moſs we have only one known ſpecies, which is the prickly *ſelaginoides*, commonly called *ſeeding mountain moſs*. This is found in the mountainous parts of Yorkſhire and in Wales, and loves rocky and moiſt places.

SELAGO, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the flower has a permanent empalement of one leaf, cut into five parts at the top; the flower is of one petal, and has a very ſmall tube; the brim is ſpreading, and cut into five parts, the two upper ſegments being the leaſt. It has four hair-like ſtamina the length of the petal, to which they are inſerted, two of them longer than the other, terminated by ſingle ſummits; and a roundiſh germen ſupporting a ſingle ſtyle, crowned by an acute ſtigma. The germen afterward becomes a ſingle ſeed, wrapped up in the petal of the flower. Miller mentions only one ſpecies, which is a native of the Cape of Good Hope; Linnæus enumerates ten ſpecies.

Selago is alſo the name of a ſpecies of lycopodium in the Linnæan ſyſtem; but of a genus of moſſes in the diſtribution of Dillenius; the characters of which are theſe: the capſules are produced in the alæ of the leaves, and are either reniform, or globular, and have neither pedicle, operculum, nor calyptra, like the capſules of the other moſſes; they have only one cavity, and part into two valves when ripe; to this it may be added, that the plants are all rigid and ſhrubby, and the ſtalks as well as roots are dichotomous. See *Tab.* XIV. *of Botany*, Nº 13.

Dillenius enumerates five ſpecies. Hiſt. M. p. 436.

SELAH, in *Scripture Criticiſm*, a word which occurs no leſs than ſeventy times in the Hebrew text in the Pſalms, and which has occaſioned great difficulty to the critics. The Septuagint renders it διαψαλμα, q. d. a pauſe in ſinging: and this, it muſt be owned, was greatly wanted before the Pſalms were divided into verſes.

SELANION, in *Botany*, a name by which ſome authors have called the common *crocus vernus*, or the garden ſpring-flower we call the *crocus*.

SELATUS, one of the many names by which the chemical writers have called *quickſilver*.

SELECTI *judices*, in the *Roman Republic*, were perſons appointed by the prætor with the mutual conſent of contending parties, and bearing in many reſpects a remarkable reſemblance to our juries; for they were firſt returned by the prætor, then their names were drawn by lot, till a certain number was completed; then the parties were allowed their challenges; next they ſtruck what we call a tales; and, laſtly, the judges, like our JURY, were ſworn.

SELENÆ, Σεληναι, in *Antiquity*, a kind of cakes uſed in ſacrifices, and ſo called from their being broad and horned, in imitation to the new moon.

SELENDERS, in the *Manege*, are chops or mangy ſores in the bending of a horſe's hough, as the MALANDERS are in the knees.

SELENEUSIACA *terra*, *earth of Seleneuſia*, in the *Materia Medica of the Ancients*, a light fungous earth called by later naturaliſts AGARICUS *mineralis*, and when found in form of powder, or in a diſcontinuous ſtate, *lac lunæ*.

It is an earth common enough, wherever there are ſtone quarries, all over the world; but the fineſt ever met with is that from Sicily, the place where the ancient Seleneuſia, or Selinus ſtood, and from whence the ancient phyſicians had it. Some of them have called it the *creta Seleneuſiaca*; but all their deſcriptions agree in proving it to be this very earth now found there. Dioſcorides and Galen mention its remarkable diffuſibility in water, and Pliny mentions its melting in a kind of juice, or ſmooth homogene ſubſtance with it; properties ſo very applicable to this earth, and ſo little ſo to any other, as to leave no doubt of their having been originally applied to the very ſame ſubſtance.

The ancients gave it internally as an aſtringent; but its principal uſe was external, as a coſmetic among the ladies. And Dr. Plot recommends our lac lunæ, on perſonal experience, for the ſame purpoſes.

SELENIACON, a name for a kind of amulet worn for the epilepſy.

SELENITES, in *Natural Hiſtory*, the name of a large claſs of foſſils, the characters of which are theſe; they are bodies compoſed of ſlender and ſcarce viſible filaments, arranged into fine even and thin flakes; and thoſe diſpoſed into regular figures, in the ſeveral different genera, approaching to a rhomboide, or hexangular column, or a rectangled parallelogram; fiſſile, like the talcs, but that not only in a horizontal, but alſo in a perpendicular direction: they are flexile in a ſmall degree, but not at all elaſtic; they do not ferment with acid menſtrua, but readily calcine in the fire. See *Tab. of Foſſils, Claſs* 2.

Of this claſs there are ſeven orders of bodies, and under thoſe ten genera: the *ſelenitæ* of the firſt order are thoſe compoſed of horizontal plates, and approaching to a rhomboidal form: of the ſecond are thoſe compoſed of horizontal plates, arranged into a columnar and angular form: of the third are thoſe whoſe filaments are ſcarce viſibly arranged into plates, but which, in the whole maſſes, appear rather of a ſtriated than of a tabulated ſtructure: of the fourth are thoſe which are flat, but of no determinately angular figure: of the fifth are thoſe formed of plates, perpendicularly arranged: of the ſixth, are thoſe formed of congeries of plates, arranged into the figure of a ſtar: and of the ſeventh are thoſe of a complex and indeterminate figure.

Of the firſt of theſe orders are three genera. 1. The LEPTODECARHOMBES. 2. The PACHODECARHOMBES. 3. The TETRADECARHOMBES.

Of the ſecond order there are alſo three genera. 1. The ISCHNAMBLUCES. 2. The ISAMBLUCES. 3. The OXUCIÆ.

Of the third order there is only one known genus, the INAMBLUCIA.

Of the fourth order there is alſo only one known genus, the SANIDIA.

Of the fifth order there is alſo only one known genus, the CATHETOLIPES.

Of the ſixth order there are two genera. 1. The LEPASTRA. 2. The TRICHESTRA.

Of the ſeventh order there is only one genus, the SYMPLEXIA.

The ſtructure of the *ſelenitæ* of all the genera of the firſt order is exactly alike; they are all compoſed of a great number of broad flakes or plates, in a great meaſure externally reſembling the flakes of the foliaceous talcs: theſe are of the length and breadth of the whole maſs; the top and bottom being each only one ſuch plate, and thoſe between them, in like manner, each complete and ſingle, and the body may always be eaſily and evenly ſplit, according to the direction of theſe flakes. Theſe differ, however, extremely from the talcs, for they are each compoſed of a number of parallel threads or filaments, which are uſually diſpoſed parallelly to the ſides of the body, though ſometimes parallelly to its ends. In many of the ſpecies they are alſo divided by parallel lines, placed at a conſiderable diſtance from each other, and the plates in ſplitting often break at theſe lines; add to this, that they are not elaſtic, and that they readily calcine. The ſtructure of thoſe of the ſecond order is the ſame with that of the firſt; but that in many of the ſpecimens of them, the filaments, of which the plates are compoſed, run in two directions, and meet in an obtuſe angle, and in the middle there is generally ſeen in this caſe a ſtraight line, running the whole length of the column, and ſmall parcels of clay inſinuating themſelves into this crack, repreſent in it the figure of an ear of graſs ſo naturally, as to have deceived many into a belief that there was really an ear of graſs there. The other orders conſiſting only of ſingle genera, the ſtructure of each is explained under a generical name. Hill's Hiſt. of Foſſ. p. 121.

SELENITES is alſo a name given by the modern chemiſts to a ſort of neutral ſalt, formed by the union of vitriolic acid with any calcareous earth. Nature furniſhes us with a very large quantity of *ſelenitic* matters: chemiſts agree that all gypſums, or plaiſter ſtones, alabaſters, and gypſeous ſpars are nothing elſe but *ſelenites*; and theſe ſubſtances abound within and upon the earth.

Selenites may be alſo artificially compoſed, by combining vitriolic acid to the point of ſaturation with calcareous earth; for which purpoſe the earth muſt be finely pulverized, the acid much diluted with water, and more earth added than is neceſſary for the ſaturation; or it may be made by ſaturating lime-water gradually with weak vitriolic acid, or by pouring this acid into a ſolution of nitrous or marine ſalts, with calcareous baſes. This ſalt is, of all the known neutral ſalts, the leaſt ſoluble by water; ſeven or eight hundred parts of water being neceſſary to diſſolve one part of *ſelenites*: by a ſlow evaporation it cryſtallizes and forms thin laminæ; when expoſed to a moderate fire, it is reduced to a white powder. With a great fire it is not fuſible alone, but more eaſily fuſible than pure calcareous earth, by the addition of fluxes, as ſand, and clay, and vitrifying ſalts.

It reſiſts the greateſt heat without loſing its acid; it cannot be decompoſed by phlogiſton, by alkalis fixed or volatile, and by metallic ſolutions in nitrous acid, by means of a double affinity.

Moſt waters of wells or rivers contain *ſelenites* diſſolved in them, which may be diſcovered by adding to them the ſolution of mercury, as it forms a precipitate of turbith mineral. Chem. Dict. Art. *Selenites*.

SELENOGRAPHY, formed from σεληνη, *moon*, and γραφη, *deſcription*, a branch of coſmography, which deſcribes the moon, and all the parts and appearances thereof, as geography does thoſe of the earth.

Since the invention of the teleſcope, *ſelenography* is very much improved.

We have now diſtinct names for moſt of the regions, mountains, &c. viſible in the moon's body. Hevelius, a celebrated aſtronomer, who was a burgher-maſter of Dantzick, and who publiſhed the firſt *ſelenography*, named the ſeveral places of the moon from thoſe of the earth; and Ricciolus named them afterwards, from the names of the celebrated aſtronomers and philoſophers. Thus, what the one calls *mons Porphyrites*, the other calls *Ariſtarchus*. What the one calls *Ætna*, *Sinai*, *Athos*, *Apenninus*, &c. the other calls *Copernicus*, *Poſidonius*, *Tycho*, *Gaſſendus*, &c. See MOON.

At the royal obſervatory at Paris, they continue to make *ſelenographic* maps. And M. Caſſini has publiſhed a work called *Inſtructions Seleniques*.

SELEUCIANS, SELEUCIANI, a ſect of ancient heretics, called alſo HERMIANI.

Seleucus and Hermias taught, that God was corporeal; that the elementary matter was co-eternal with him; and that the human ſoul was formed by the angels of fire and air. They alſo denied, that Jeſus Chriſt ſat at the right hand of God; aſſerting that he had quitted the right, and had removed his throne into the ſun.

SELEUCIDÆ, in *Chronology*; æra of the *Seleucidæ*, or the Syro-Macedonian æra, is a computation of time, commencing from the eſtabliſhment of the *Seleucidæ*, a race of Greek kings, who reigned as ſucceſſors of Alexander the Great, in Syria, as the Ptolemies did in Egypt.

This æra we find expreſſed in the book of Maccabees, and on a great number of Greek medals ſtruck by the cities of Syria, &c.

The rabbins and Jews call it, the *æra of contracts*, becauſe

cauſe, being then ſubject to the kings of Syria, they were obliged to follow their method of computing in all contracts.

The Arabs call it *therick dilcarnain*, æra of two horns, which ſome ſay ſignifies the æra of Alexander the Great; by reaſon that prince bore two rams horns on medals, in imitation of Jupiter Ammon, whoſe ſon he would needs be; but others underſtand it much better of the two kingdoms of Syria and Egypt, which were now cloven or divided, and of one ſingle empire parted into two monarchies.

The grand point is to know the year wherein the ſeparation was made; or, which is the ſame thing, when Seleucus Nicanor, one of Alexander's captains, and the firſt of the *Seleucidæ*, eſtabliſhed his throne in Syria.

Without detailing the various ſentiments of various authors, it may ſuffice to obſerve, that, according to the beſt accounts, the firſt year of this æra falls in the year 311, before Chriſt, which was twelve years after Alexander's death. See EPOCHA.

SELF-*abuſe*. See *Self*-POLLUTION.

SELF-*defence*, in *Law*. With regard to the defence of one's ſelf, or the mutual and reciprocal defence of ſuch as ſtand in the relations of huſband and wife, parent and child, maſter and ſervant, it is obſerved, that, in theſe caſes, if the party himſelf, or any of theſe his relations, be forcibly attacked in his perſon or property, it is lawful for him to repel force by force; and the breach of the peace, which happens, is chargeable upon him only who began the affray.

Self-defence, therefore, as it is juſtly called the primary law of nature, ſo it is not, nor can it be in fact, taken away by the law of ſociety.

In the Engliſh law, particularly, it is held an excuſe for breaches of the peace, nay, even for HOMICIDE itſelf; but care muſt be taken, that the reſiſtance does not exceed the bounds of mere defence and prevention, for then the defender would himſelf become an aggreſſor. Blackſt. Com. vol. iii. p. 4.

SELF-*examination*. See EXAMINATION.

SELF-*heal*, *prunella*, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the flower has a permanent empalement of one leaf divided into two lips; the upper lip broad, plain, and ſlightly indented in three parts; the flower is of the lip kind, having one petal with a ſhort tube and oblong chaps; the upper-lip is entire and concave, the under-lip reflexed, obtuſe, and trifid; the middle ſegment is broad and indented at the point; it has four awl-ſhaped ſtamina, two long and two ſhorter; and four germina ſupporting a ſlender ſtyle, crowned by an indented ſtigma: the germina become four ſeeds incloſed in the empalement.

Miller enumerates ten, and Linnæus four ſpecies.

The greater *ſelf-heal*, with an undivided leaf, grows wild in paſture grounds, and flowers in June and July. It is reckoned among the vulnerary plants, and is accounted ſerviceable in all ſorts of wounds and putrid ulcers. It is reſtringent, and good for inward bleedings, and making bloody water; and is much uſed in gargles, for ulcers in the mouth, throat, or gums, either in juice, or in a ſtrong decoction.

Its virtues do not appear to be very great; its auſtere or bitteriſh taſte is more ſenſible in the flowery tops than in the leaves; though the latter are generally directed for medicinal uſe.

Self-heal is alſo a name given to SANICLE.

SELF-*love*, in *Ethics*, is that principle, or paſſion, which leads a man to deſire and purſue his own happineſs. It is contradiſtinguiſhed from BENEVOLENCE.

SELF-*opens*, a term uſed by the miners in the North of England to expreſs certain natural cavities, or chambers, which are frequently met with, ſome near the ſurface, ſome at very great depths, ſome ſmall, and others very large.

Theſe are of various figures, and often run into ſtrange ſinuſes. Dr. Liſter, in accounting for the origin of EARTHQUAKES, ſuppoſes the whole cruſt of the earth to be more or leſs hollowed in this manner; which he alſo argues for, from the ſtreams of waters which ariſe in large quantities from the ſides of mountains, and muſt have communication with theſe *ſelf-opens*, and ſupplies from them.

Theſe natural hollows the doctor thinks to be the means of continuing, and propagating earthquakes; the firſt cauſe of which he aſcribes to the breath of the pyrites, which he alſo ſays is the pyrites itſelf *tota ſubſtantia*. This he obſerves takes fire of itſelf, on being expoſed to the air in our ſight, and may do ſo, from various other cauſes under-ground. The ſulphureous ſmell of the air and waters before and after earthquakes, in the places where they happen, ſeems a proof that they owe their origin to ſome ſuch ſulphureous matter as this ſtone; and the rolling and deſultory noiſe of an earthquake ſeems alſo to ſhew that it is not expanded every way at once, but is propagated through a chain of theſe ſubterranean hollows.

It is not neceſſary that we ſhould ſuppoſe a continued chain of them, from the place where the earthquake begins to be felt to the ſpot where it ends; but if there are many of them irregularly ſcattered about the earth, the force of the exploſion will be ſufficient to burſt through the ſolid parts between, and open a paſſage from one to the other, which may continue open no longer than the force continues, and after the ſhock is over, cloſe together again, ſo as to leave no trace where it was.

Our miners not only find the natural caverns, but they alſo find them often full of what they call *fire* DAMPS, which are inflammable vapours, of the very nature of thoſe which he ſuppoſes to occaſion earthquakes; and when fired make the ſame exploſions, and cauſe the ſame effects in a certain degree. Theſe ſometimes require a candle, or other actual fire, to come in contact, in order to kindle them; but ſometimes they are found kindled of themſelves, and flaming on the ſurface of the waters, in the bottoms of the pits, or at the fiſſures of the coal. Phil. Tranſ. Nº 157.

SELI, in *Botany*, a word formed by an abbreviation of the word SESELI, and ſignifying the ſame plant.

SELICHA, a name given by the Arabians to a kind of CINNAMON.

SELIGONION, in *Botany*, a name by which ſome authors have called piony.

SELINUM, in *Botany*. See *Milky*-PARSLEY.

SELION *of land*, *ſelio terræ*, is derived from the French, *ſeillon*, which ſignifies *a ridge of land*, or ground ariſing between two furrows, and contains no certain quantity, but ſometimes more and ſometimes leſs. Therefore Crompton ſays, that a *ſelion of land* cannot be in demand, becauſe it is a thing uncertain.

SELKIE, the name in Zetland for a ſeal. Many of theſe are found in that iſland.

SELL, in *Building*, is of two kinds, viz. ground-*ſell*, which denotes the loweſt piece of timber in a timber building, and that whereon the whole ſuperſtructure is raiſed. See GROUND *Plates*.

SELL, *window*, called alſo *window-ſoil*, is the bottom piece in a window frame.

SELL-*bed*, in *Mining*, a term uſed in ſome parts of England to expreſs ſome particularly rich parts of the vein of ore.

In Cornwall they ſometimes find the tin-ore ſo pure, that it requires only bruiſing to dreſs it, without the waſhing and ſeparation by grates, launders, and the like means: they call theſe collections of ore the *ſell-beds* of tin; and it is obſerved, that theſe never have any ſtrings iſſuing from them, as the other lands have. Philoſ. Tranſ. Nº 69.

SELLA, among the *Romans*, a chair in which the old and infirm were carried by ſervants through the city, and in journeys. Sometimes the phyſicians preſcribed it as an exerciſe. See LECTICA.

SELLA *curulis*, among the Romans. See CURULE *chair*.

SELLA, *equina*, *Turcica*, or *ſphenoides*, is a name given to the four apophyſes of the os ſphenoides, or cuneiforme, in the brain; in regard of their forming a reſemblance of a ſaddle, which the Latins call *ſella*.

They are ſometimes alſo called by the Greek name *clinoides*. Herein is contained the pituitory gland, and in ſome beaſts, the *rete mirabile*.

SELLIGA, in the *Materia Medica*, a name by which ſome authors have called the *narda Celta*, or Celtic ſpikenard of the ſhops.

SELLI, Σελλοι, in *Antiquity*, an appellation given to thoſe who firſt delivered oracles. Theſe, according to Strabo and Euſtathius, were men, and the name *ſelli* is ſaid to come from *Sellæ*, a town in Epirus, or from the river called by Homer *Selleis*.

SELTZER-*water*, the name of a mineral water of Germany, which ariſes near Neider Seltzer, or Lower Seltzer, about ten miles from Francfort on the Mayne, and which is now uſed in England and many other countries.

This water iſſues forth at the ſpring with great rapidity, is remarkably clear and bright, and on pouring it from one bottle into another, diſcharges abundance of air-bubbles.

That which is imported at London is brought over in ſtone-bottles, cloſely corked and cemented, containing about three Engliſh pints each, by which means this water, as long as the common air is excluded, will retain many of its excellent qualities for ſeveral months; but this caution is ſo neceſſary, that if too large an empty ſpace is left even in the neck of a bottle, it ſoon loſes in a great degree that briſk, ſmart, pungent taſte, which principally characteriſes its excellence, and is more liable to be injured by keeping than any other mineral water.

Hoſman, in conſequence of an analyſis of this water, obſerves, that an immediate effervescence enſues on mixing any acid with it, and eſpecially with Rheniſh wine and ſugar, in which caſe the emotion is attended with a noiſe, and the liquor becomes milky; but mixed with Rheniſh wine alone, it becomes turbid, and acquires a brown colour with a reddiſh caſt; that the taſte of this water is not ſo penetrating and ſubacid as that of moſt other mineral waters, but has a flavour reſembling that of a diluted ſolution of a lixivial ſalt: that, with an addition of powder of galls, it does not become purple, nor blacken the ſtools of thoſe who drink it; that, on adding oil of tartar, it becomes milky without any precipitation: that a quart of this water gently evaporated yields a drachm and twelve grains of a ſaline matter, which, diſſolved and filtrated, yields, on a ſecond evaporation, two ſcruples of a pure alkaline ſalt; and that this ſalt diſſolved in water, and added to a ſolution of corroſive ſublimate, precipitates a yellow powder or turbith mineral, and mixed with an infuſion of rhubarb, gives it a reddiſh colour, and mixed with ſal ammoniac, emits a pungent ſmell: that a quart of this water, ſaturated with ſpirit of vitriol, and gently evaporated, affords a drachm and a half of ſalt, not diſtinguiſhable from vitriolated tartar: that no medicinal water is ſo apt to ſpoil and be-corrupted by keeping, and that if it be ſet for a day or two in an open veſſel, it wholly loſes its natural flavour, and taſtes only like water in which oil of tartar had been mixed.

From all theſe obſervations he infers, that this water abounds with an alkaline ſalt in a much greater quantity than any of the other known mineral waters, without ſeeming to contain any particles of the ferruginous earth and bitter purging ſalt, which are the common ingredients of the other mineral waters: on this account, he adds, that it does not purge, but generally goes off by urine. Hoffman recommends it as one of the mildeſt and moſt innocent of all the mineral waters, and obſerves that it may be taken by perſons of the weakeſt conſtitution.

From the experiments of Dr. Brockleſby on *Seltzer-water*, we learn, that upon dropping twelve drops of very highly coloured ſyrup of violets into a wine-glaſs of it, the ſyrup ſeemed firſt to manifeſt a purple hue, but upon their intimate union, the whole changed into a beautiful green: that the ſame quantity of oil of tartar per deliquium dropped into a glaſs of ſparkling, freſh, clear water, quickly turned the whole milky, and after ſtanding, a fine pearl-coloured powder fell to the ſides and bottom of the glaſs; on adding an equal number of drops of pure dephlegmated ſpirit of vitriol to a glaſs of this water, a light cloud was ſeen ſuſpended towards the middle of the glaſs, and numerous air-bubbles roſe from all parts of the water, and the ſparkling might be renewed by adding one or more drops of the acid, and ſhaking the glaſs; and the like ebullition was more readily produced by a ſolution of ſugar and Rheniſh wine, or vinegar with the ſame: and the ſame appearances were exhibited by dropping any vegetable or mineral acids into this water, as are obſerved when alkalis and acids are mixed together: a volatile cauſtic alkali, in half an hour after it had been dropped into this water, produced at firſt a cloud and afterwards a precipitation. Lixivium ſaponarium ſo far decompoſed a glaſs of *Seltzer-water*, that a cloud inſtantly appeared in the middle of it, and the air-bubbles emerging from the lower part of it were greedily abſorbed by the cauſtic alkali, which is known to imbibe fixed air, whenever it comes into contact with it. This water, ſays Dr. Brockleſby, poured into a glaſs, ſeparates more air-bubbles than any other water which he had tried, and continues longer to do ſo in the open air, but its ſparkling may be renewed by adding any ſubacid vegetable, and a little ſugar, as ſharp cyder and Rheniſh wine and ſugar; but, he adds, that the beſt *Seltzer-water* here will not perfectly curdle milk, nor lather with ſoap, and that with powder of gall-nuts no farther change of colour appeared than in pure water. By evaporating twenty-four ounces of the beſt *Seltzer-water*, he obtained thirty-ſix grains of a ſaline reſiduum; and the greateſt quantity he could ever get from a pint, wine meaſure, was leſs than thirty grains.

Ten drops of ſtrong ſpirits of vitriol, poured on as many grains of ſalt of *Seltzer-water*, cauſed great and inſtant ebullition, and ſuffocating ſteam, which tinged blackiſh a ſilver ſpoon held in them, and gave to its poliſhed ſurface a bitter taſte.

Having diſſolved ſixty-ſix grains of pure white ſalt, obtained from this water, in diſtilled water, and filtrated it, he thereby obtained ſeven grains of a calcareous earth, perfectly ſoluble in all weak acids; but by ſeveral different modes of trial he was led to conclude, that this water contains no ferruginous principle.

Finding that the ſalts and earths contained in *Seltzer-water*, are too inconſiderable both in quantity and quality to promiſe any very material medicinal effects, he proceeded to inveſtigate what might be aſcribed to the great quantity of fixed air, which this water conſtantly diſcharges, in a heat not exceeding that of the human body; and the reſult was, that the factitious air yielded by a bottle full of water, containing exactly fourteen ounces ſeven drachms, in a heat never exceeding 116° by Fahrenheit's ſcale, amounted to a quantity which occupied a ſpace, that required two ounces two and a half drachms of water to fill it; or, allowing two hundred and ſixty-five grains of common water for a cubic inch, the whole water amounted to twenty-ſeven cubic inches, and that which would fill the ſpace occupied by the air four ounces and one-fifth; and ſo large a quantity of interſticial air, he ſays, was generated in a heat not incompatible with life in any part of the world, as the fever heats in all climates teſtify, and leſs than the heat which is often experienced without inſtantaneous prejudice in ſome tropical climates.

However, this generated air ſoon began to be re-abſorbed into the body of the water, and in about eight hours, the ſpace occupied by the remaining air did not exceed one fifth of what it had formerly done.

From another experiment with the ſalt of *Seltzer-water*, he found, that this ſeems to have let go much the greateſt part of its fixed air, and probably thereby loſt moſt of the virtues inherent in the pure freſh water itſelf.

From ſuch experiments Dr. Brockleſby infers, that *Seltzer* mineral water contains, beſides the mere elementary water, a very ſmall quantity of calcareous earth, and a much greater portion of a native mineral alkali, together with ſome acid retained a while within the water, but which either evaporates into the open air, or elſe is ſoon combined with the mineral alkali: and he thinks it probable, that the active virtues of this water depend more on this elaſtic matter, or fixed air, which it contains in ſuch uncommon abundance beyond other mineral waters, than in any combination of its ſaline and earthy contents, which are found in ſuch ſmall quantities as to be incapable of any material ſervice, though this water is known to be exceedingly beneficial.

This account of the analyſis of *Seltzer-water* is cloſed with the hiſtory of ſome medical caſes, in which the uſe of this water completed a cure, after a great variety of other remedies had proved inſufficient.

The operation of this water, as Hoffman obſerves, is chiefly by urine, for it has no purgative virtues. It corrects acidities, renders the blood and juices more fluid, and promotes a briſk and free circulation; and, therefore, it is good in obſtructions of the glands, and againſt groſs and viſcid humours. It is of great uſe in the gravel and ſtone, and other diſorders of the kidnies and bladder.

It is alſo excellent in gouty and rheumatic complaints, eſpecially when mixed with milk, or improved by the addition of Rheniſh wine and a little ſugar. It is drank with great ſucceſs in ſcorbutic, cutaneous, and putrid diſorders. It relieves the heart-burn, and is an excellent ſtomachic. On account of its diuretic quality, it is ſerviceable in dropſical complaints; and mixed with aſſes milk, it is much recommended in conſumptive caſes, and in diſorders of the lungs: with or without milk, it is in great eſteem in nervous diſorders; and alſo in hypochondriacal and hyſteric complaints, and in obſtructions of the menſes, accompanying the uſe of it with proper exerciſe.

It is alſo adminiſtered with ſucceſs in purging and fluxes ariſing from acidity in the bowels; and it is ſaid, if drank by nurſes, to render their milk more wholeſome and nouriſhing, and to prevent it from turning ſour on the ſtomachs of children. See on the ſubject of this article Hoffman. Oper. vol. v. p. 144. London Med. Obſerv. vol. iv. p. 7, &c. Elliot's Account of the Principal Mineral Waters, p. 194, &c.

SELTZER-*water*, *artificial*, may be prepared by adding one ſcruple of magneſia alba, ſix ſcruples of foſſil alkali, and four ſcruples of common ſalt to each gallon of water, and ſaturating the water with fixed air, in the manner directed under PYRMONT-*water*.

SELVAGE, in *Sea Language*, a ſort of hank or ſkein of rope-yarn tied together at ſeveral diſtances. It is uſed to faſten round any rope, as a ſhroud or ſtay, ſo that a tackle may be hooked in it, to extend the ſaid ſhroud or ſtay, which is called *ſetting it up*.

SEMAMPLEXICAULE *leaf*. See LEAF.

SEMBELLA, among the Romans, a ſmall ſilver coin, equal in value and weight to half the LIBELLA.

SEMBIANI, SEMBIANS, a ſect of ancient heretics, denominated from their leader, *Sembius*, or *Sembianus*, who condemned all uſe of wine, as evil of itſelf; perſuaded his followers, that the wine was a production of Satan, and the earth; denied the reſurrection of the dead, and rejected moſt of the books of the Old Teſtament. Jovet.

SEMBRADOR, an engine, invented by Don Joſ. de Lucatello, for the evenly ſowing of ſeeds, deſcribed in the Philoſophical Tranſactions, under the title of the *Spaniſh Sembrador.*

The perfection of agriculture is allowed to conſiſt much in ſetting plants at proportional diſtances, and giving ſufficient depth to the roots, that they may ſpread, and receive their neceſſary nouriſhment; yet there is very little care taken in the practice of this important part of huſbandry, but all ſorts of grains are ſown by handfuls caſt at random, by which means four parts in five of the ſeed are loſt. To remedy this inconvenience, the *ſembrador*, or ſower, is invented, which being faſtened to the plough, the whole buſineſs of plowing, ſowing, and harrowing, is done at once; the ſeedman's trouble is ſaved, and the grain ſpread at equal diſtances, and equally deep at the bottom of the furrow.

An experiment hereof was made before the emperor Leopold in the fields of Luxemburgh in Auſtria, where the land uſually yields four or five fold; but the crop from the ground ſowed by this inſtrument was ſixty-fold, as appears by a certificate of the emperor's officer appointed to ſee the experiment; ſigned, Vienna, Auguſt 1. 1663.

A figure of the *ſembrador* we have in the Tranſactions, N° 60. by the earl of Caſtlemain. See *Drill*-PLOUGH.

SEME, or SEEME. See SEAM.

SEMEIOSIS, Σημειωσις, in *Medicine.* See SEMEIOTICA.

SEMEIOTICA, Σημειωτικη, formed from σημειον, *ſign*, *ſymptom*, that part of medicine, which conſiders the ſigns or indications of health and diſeaſes; and enables the phyſicians to judge what is, was, or will be, the ſtate, degree, order, and effect, of health or ſickneſs. See NOSOLOGY.

SEMELE, in *Mythology*, the mother of BACCHUS.

SEMEN *ſanctum*, or *ſantonicum.* See WORM-*ſeed.*

SEMENTINÆ *feriæ*, in *Antiquity*, feaſts held annually among the Romans, to obtain of the gods a plentiful harveſt.

They were celebrated in the temple of Tellus, or the *earth*, where ſolemn ſacrifices were offered to Tellus and Ceres.

The time of the celebration was about ſeed-time, uſually in the month of January; for Macrobius obſerves, they were moveable feaſts. They had their name from *ſemen*, *ſeed.*

SEMETS, SUMMETS, or SUMMITS, in *Botany*, are uſed by Dr. Grew, and others, for the APICES of the attire of plants.

SEMI, a word borrowed from the Latin, ſignifying *half*; but only uſed in compoſition with other words, as in the following articles.

The French, inſtead of *ſemi*, frequently uſe *demi*, the Greeks *hemi.*

In muſic, *ſemi* has three ſeveral uſages: firſt, when prefixed to the name of a note, it expreſſes a diminution of half its value, as in *ſemi-breve*, &c.

Secondly, when added to the name of an interval, it expreſſes a diminution, not of half, but of a leſſer ſemitone, or four commas, in the whole compaſs, as in *ſemi*-diapente, &c.

Thirdly, it ſometimes alſo ſignifies an imperfection: thus, *ſemi-circulo* or *circolo mezzo*, ſignifies an imperfect circle, which is the mark of imperfect time, that is of double time: whereas the circle, being a character of perfection, marks triple time.

SEMI-ARIANS, in *Eccleſiaſtical Hiſtory*, a branch of the ancient Arians, conſiſting, according to Epiphanius, of ſuch as, in appearance, condemned the errors of that hereſiarch, but yet acquieſced in ſome of the principles thereof, only palliating and hiding them under ſofter and more moderate terms.

It is true, they ſeparated from the Arian faction; but yet could never be brought to acknowledge that the Son was homoouſios, that is, conſubſtantial, or of the ſame ſubſtance with the Father; they would only allow him to be homoiouſios, that is, of a like ſubſtance with the Father, or ſimilar to the Father in his eſſence, not by nature, but by a peculiar privilege. See HOMOOUSIOS, &c.

Though, as to expreſſion, they only differed from the orthodox by a ſingle letter, yet were they, in effect, in the opinion of the Arians, as they placed the Son in the rank of creatures. It did not avail the teaching, that there was no other creature of the ſame claſs with him, ſince by denying him conſubſtantial with God, they effectually precluded him from being truly God.

Yet ſome, even among the orthodox, uſe the word homoiouſios, in ſpeaking of the Son; applying ſuch an idea to it, as it ſeems is conſiſtent with orthodoxy.

But the name *Semi-Arians* is alſo given by the ſecond general council, to another branch of Arians, who believed orthodoxly of the Father and Son, but denied the deity of the Holy Ghoſt; thus rejecting that part of the Arian ſyſtem relating to the Son, but ſtifly retaining that which related to the Holy Ghoſt.

As the zeal of the Arians was chiefly levelled againſt the ſecond perſon in the Trinity, that of the *Semi-Arians* was bent againſt the third; whence, as the former were ſometimes called Χριςομαχοι, the latter were denominated Πνευματομαχοι.

Macedonius biſhop of Conſtantinople made an innovation in this ſect in 360, and gave riſe to a new branch of Macedonian *Semi-Arians*, or Pneumatomachi; who allowed the Son not to be ομοουσιος, of the *ſame ſubſtance*, but ομοιος, of *like ſubſtance* with the Father; and at the ſame time openly aſſerted the Holy Ghoſt to be a creature. This hereſy was condemned by the eleventh general council held at Conſtantinople in the year 381. See MACEDONIANS.

SEMI-BREVE, in *Muſic*, a note, or meaſure of time, comprehending the ſpace of two minims, or four crotchets, or half a breve.

The *ſemi-breve* is accounted one meaſure of time, or the integer in fractions and multiples whereof the time of the other notes is expreſſed. Thus the minim is expreſſed by $\frac{1}{2}$; a crochet by $\frac{1}{4}$, &c. i. e. by $\frac{1}{4}$ of a meaſure or *ſemi breve.* A breve by 2; and a long by 4, that is, by 4 meaſures or *ſemi-breves.*

The character of the *ſemi-breve* is O.

SEMICIRCLE, in *Geometry*, a figure comprehended between the diameter of a circle, and half the circumference.

Two *ſemicircles* can only cut each other in one point.

SEMICIRCLE is alſo an inſtrument in *Surveying*, ſometimes called the *graphometer.*

It conſiſts of a *ſemicircular* limb, as FIG, (*Tab.* III. *Surveying fig.* 50.) divided into one hundred and eighty degrees, and ſometimes ſubdivided diagonally or otherwiſe into minutes. This limb is ſubtended by a diameter FG, at the extremities whereof are erected two ſights. In the centre of the *ſemicircle*, or the middle of the diameter, is fixed a box and needle. On the ſame centre is fitted an alidade, or moveable index, carrying two other ſights, as H, I. And the whole is mounted on a ſtaff, with a ball and ſocket.

The *ſemicircle*, then, is nothing elſe but half a theodolite; with this only difference, that whereas the limb of the theodolite, being an entire circle, takes in all the 360° ſucceſſively; in the *ſemicircle* the degrees only going from 1 to 180, it is uſual to have the remaining 180°, or thoſe from 180° to 360°, graduated in another line on the limb within the former.

To take an angle with a ſemicircle. Place the inſtrument in ſuch manner, as that the radius CG may hang over one leg of the angle to be meaſured, and the centre C over the vertex of the ſame. The firſt is done by looking through the ſights F and G at the extremities of the diameter, to a mark fixed up in one extremity of the leg; the latter is had by letting fall a plummet from the centre of the inſtrument. This done turn the moveable index HI on its centre towards the other leg of the angle, till through the ſights fixed in it, you ſee a mark in the extremity of the leg. Then the degree, which the index cuts on the limb, is the quantity of the angle.

For farther uſes of the *ſemicircle*, they are the ſame with thoſe of the THEODOLITE.

SEMICIRCULAR *arches.* See ARCH.

SEMICIRCULARES *canales.* See CANALES.

SEMICIRCULARIS *palpebrarum muſculus*, in *Anatomy*, a name given by Spigelius, and ſome others, to one of the muſcles of the face, called by Albinus and Winſlow the *muſculus* ORBICULARIS *palpebrarum.*

SEMICOLON, in *Grammar*, one of the points or ſtops, uſed to diſtinguiſh the ſeveral members of a ſentence from each other.

The mark or character of the *ſemicolon* is (;). It has its name, as having a ſomewhat leſs effect than a colon, or as demanding a ſhorter pauſe.

The uſe of the *ſemicolon*, the grammarians generally ſay, is to mark a ſenſe leſs complete than the colon, and more complete than the comma, but this only conveys a very obſcure idea. In effect, the preciſe office of the *ſemicolon*, or that office which diſtinguiſhes it from the colon, is a thing very little known in the world. Our beſt authors ſeem to uſe them promiſcuouſly. See COLON.

Dr. Ward, formerly profeſſor at Greſham, is perhaps the firſt who ſettled a juſt uſe of the *ſemicolon.* His poſition is, that the *ſemicolon* is properly uſed to diſtinguiſh the conjunct members of ſentences. Now by a conjunct member of a ſentence, he means, ſuch an one as contains at leaſt two ſimple members.

Whenever, then, a ſentence can be divided into ſeveral members of the ſame degree, which are again diviſible into other ſimple members, the former are to be ſeparated by a *ſemicolon*.

E. gr. If fortune bear a great ſway over him, who has nicely ſtated and concerted every circumſtance of an affair; we muſt not commit every thing, without reſerve, to fortune, leſt ſhe have too great a hold of us.

But though the proper uſe of the *ſemicolon* be to diſtinguiſh conjunct members, it is not neceſſary that all the members divided hereby be conjunct. For upon dividing a ſentence into great and equal parts, if one of them be conjunct, all thoſe other parts of the ſame degree are to be diſtinguiſhed by a *ſemicolon*. Thus, whoever is overtaken with poverty; the ſame will find, that coldneſs, contempt, injuries, &c. are not far behind. Hither likewiſe may be referred ſuch ſentences, where the whole going before, the parts follow: as, the parts of rhetoric are four; invention, diſpoſition, elocution, and pronunciation.

According to biſhop Lowth, a member of a ſentence, whether ſimple or compounded, that requires a greater pauſe than a comma, yet does not of itſelf make a complete ſentence, but is followed by ſomething cloſely depending on it, may be diſtinguiſhed by a *ſemicolon*. E. gr. But as this paſſion for admiration, when it works according to reaſon, improves the beautiful part of our ſpecies in every thing that is laudable; ſo nothing is more deſtructive to them, when it is governed by vanity and folly. Here the whole ſentence is divided into two parts by the *ſemicolon*; each of which parts is a compounded member, divided into its ſimple members by the COMMA.

SEMICON, a muſical inſtrument among the Greeks, which had thirty-five ſtrings.

SEMICROMA, *ſextuple of.* See SEXTUPLE.

SEMI-CUBICAL *parabola*, a curve of the ſecond order, wherein the cubes of the ordinates are as the ſquares of the abſciſſes. Its equation is $ax^2 = y^3$.

SEMICUPIUM, a half bath, wherein the patient is only placed up to the navel. See INSESSUS.

SEMIDIAMETER, a right line drawn from the centre of a circle or ſphere, to its circumference; the ſame with what we otherwiſe call a *radius*.

The diſtances, diameters, &c. of the heavenly bodies, are uſually eſtimated by aſtronomers in *ſemidiameters* of the earth.

To find the *ſemidiameters* of the primary planets in *ſemidiameters* of the earth. The ſun's true *ſemidiameter* is 111,25 *ſemidiameters* of the earth; and the ratio of the diameters of the primary planets to that of the ſun, is as follows; viz. that of the ſun being 10,000, that of Mercury will be $34\frac{1}{10}$, that of Venus $103\frac{1}{2}$, that of the Earth $104\frac{1}{2}$, that of the Moon $28\frac{1}{2}$, that of Mars $58\frac{1}{8}$, that of Jupiter $1061\frac{2}{7}$, and that of Saturn, $878\frac{1}{9}$; and therefore, their *ſemidiameters* are eaſily found by the rule of three. Thus, for the *ſemidiameter* of Saturn, ſay, 10000 : 111,25 : : 878,11, &c. : 9,7689, &c.; for that of Jupiter, 10000 : 111,25 : : 1061,66, &c. : 11,81; for that of Mars, 10000 : 111,25 : : 58,16, &c. : ,647; for that of Venus, 10000 : 111,25 : : 103,5 : 1,15, &c. and for that of Mercury, 10000 : 111,25 : : 36,1 : ,379, &c. For the more exact proportions and values of the *ſemidiameters* of the planets, ſee PLANETS. For their apparent *ſemidiameters*, ſee DIAMETER.

SEMI-DIAPENTE, in *Muſic*, a defective fifth, called uſually by the Italians, *falſa quinta*, and by us a *falſe fifth*.

SEMI-DIAPASON, in *Muſic*, a defective octave; or an octave diminiſhed by a leſſer ſemitone, or four commas. See DIAPASON.

SEMI-DIATESSARON, in *Muſic*, a defective fourth, called, properly, a *falſe* FOURTH.

SEMI-DITONE, *diapaſon*. See DIAPASON.

SEMI-DITONE, *dis-diapaſon*. See DIS-DIAPASON.

SEMI-DITONUS, in *Muſic*, is uſed by ſome writers, as Salinas, for the third minor.

SEMI DOUBLE, in the Romiſh *Breviary*, a term applied to ſuch offices and feſtivals as are celebrated with leſs ſolemnity than the double ones; but yet with more than the ſingle ones.

The *ſemi-double* office has double veſpers, and nine leſſons at matins; but the anthems are not redoubled. It is performed on Sundays, on the octaves, and on the feaſts marked for *ſemi-double* in the calendar.

SEMIFISTULAR *flowers*. See FLOWERS.

SEMIFLOSCULOUS, in *Botany*, a term uſed to expreſs the flowers of a certain claſs of plants, of which the dandelion, hawkweed, and the like, are kinds.

This ſort of flower conſiſts of a number of *ſemifloſculi*, which are diſpoſed into one or more circles, and all comprehended in the ſame cup, which often becomes inverted as the flower ripens. Theſe *ſemifloſcules* are petals, hollow in their lower part, but in their upper half are flat, and continued in the ſhape of a tongue. Theſe are often ſeparated from each other by intermediate leaves, and are placed upon the embryo fruit, from which there ſtands out a ſlender capillament, divided at the end into two parts; often carried beyond the vagina, ſupported by five props. The embryos are placed in the thalamus, or bottom of the cup, and finally become ſeeds, ſometimes winged with down, ſometimes naked, ſometimes coronated, and ſometimes foliated. See *Tab.* IX. *of Botany, Claſs* 13. Tourn. Inſt. p. 467.

SEMI-INTEROSSEUS *indicis*, in *Anatomy*, a ſmall, ſhort, flat, fleſhy muſcle, very like the antithenar, or internal *ſemi-interoſſeus* of the thumb. It is ſituated obliquely on one ſide of that of the thumb, between the firſt phalanx thereof, and the firſt metacarpal bone. It is fixed by one end to the outſide of the baſis of the firſt phalanx of the thumb, and a little to that bone of the carpus, by which this phalanx is ſupported; and by the other end it is fixed near the head of the firſt phalanx of the index, on that ſide next the thumb. It lies almoſt parallel to the antithenar, croſſing it a little; this muſcle lying on the convex ſide of the hand, and the antithenar on the concave. Winſlow.

SEMI-JUDAIZERS, in *Eccleſiaſtical Hiſtory*, a ſect of Socinians, conſiſting of the diſciples and friends of Francis Davides, ſuperintendant of the Socinian churches in Tranſylvania; who, in conſequence of his adherence to the opinions he had adopted, was thrown into priſon by Chriſtopher Bathori, prince of Tranſylvania, where he died, in the year 1579, in an advanced age. The moſt eminent of his followers were Jacob Palæologus, of the iſle of Chio, who was burnt at Rome in the year 1585; Chriſtian Francken, who had diſputed in perſon with Socinus; and John Somer, who was maſter of the academy of Clauſenburg. The followers of Davides were called *Semi-Judaizers* by the Socinian writers, according to Moſheim, by way of reproach; but others maintain, that it was grounded on their ſentiments, and that it was deſigned to expreſs the partial preference they gave to the Law of Moſes above the Goſpel of Chriſt. The words of Chriſt, as Davides aſſerts, and thoſe of his apoſtles, are to be tried by the doctrine of Moſes and the prophets, which ought to be to us the ſole rule of life and religious worſhip. He alſo maintains, that there is no difference between the old covenant eſtabliſhed by Moſes, and the new confirmed by Chriſt, in doctrine or in promiſes; and that they differ merely in this circumſtance, that under the former there was the miniſtry of the letter, and under the latter that of the ſpirit; and, therefore, the one has not abrogated or changed the other: ſo far from it, that the new covenant exiſted only till the deſtruction of Jeruſalem, and will have no farther influence till the time of Chriſt's worldly government over Iſrael in the city of Jeruſalem, which is to be rebuilt. In the mean time, Chriſt is not really the Chriſt or king of God's people, but only by deſignation; the Chriſt predicted by the prophet, and promiſed by God, having no other than an earthly kindom, which Jeſus was appointed to take poſſeſſion of; but being ſlain by the Jews, contrary to the divine purpoſe, he was tranſlated into a ſecure and quieſcent ſtate. In this ſtate he is not any more to be called God, as he was by virtue of his office during his abode on earth, becauſe his office hath ceaſed; nor is he entitled to any adoration and worſhip, as Socinus thought, nor to any other kind of reverence, except obedience to his precepts, and faith in his doctrine; nor is he employed under the diſtinguiſhing appellation of prieſt and interceſſor, both which offices terminated at his death. See the propoſitions drawn up by Fauſtus Socinus, and preſented to C. Bathori, in Socin. Op. tom. ii. p. 801—803, or Toulmin's Life of Socinus, p. 453, &c.

SEMILUNAR *valves*, in *Anatomy*, are three little valves or membranes, of a *ſemilunar* figure, placed in the orifice of the pulmonary artery; to prevent the relapſe of the blood into the heart at the time of its dilatation. See *Tab Anat.* (*Angeiol.*) *fig.* 1. *lit. a.*

SEMILUNARES *cochleæ*, in *Natural Hiſtory*, the name of a genus of ſea-ſnails, ſo called, from their having ſemicircular mouths. See *Tab. of Foſſils, Claſs* 9. and *Tab. of Shells*, Nº 6.

The characters of the genus are theſe. They are univalve ſhells of a compact body, with a flat ſemicircular, and often dentated mouth; the columella, or inner lip, running diametrically acroſs it in a ſtraight line. Some of the ſpecies have exerted apices, and ſome depreſſed; theſe are nearly globoſe ſhells, and the turban is never much produced, but lies flat or level with the bottom. There are many diſtinctive and ſpecific characters in the ſeveral ſpecies of this genus, which arrange together conſiderable numbers of the ſpecies under each. Thus the *neritæ*, which are of this genus, are ſome of them umbilicated, and others have teeth and a kind of gums. The *ſnail* kinds, diſtinctly ſo called, that fall under this genus, are very different from the *neritæ*, in that they have no teeth, no gum, and no palate. The term *ſemilunares cochleæ* was invented by Rumphius to expreſs their mouths, being of the ſhape of half a circle.

The *neritæ* generally inhabit caverns in the ſides of rocks, and uſually ſtick faſt to the ſtone. Bonani, Recreat. Ment. et Ocul. p. 56. Aldrovand. de Teſtac. lib. iii. cap. 8. Plin. lib. ix. cap. 33.

All the ſpecies of the *ſemilunar* ſhells have few convolutions, and have the extremity of the voluta ſmall, and uſually ſtanding a little out.

The ſpecies of the *ſemilunar cochleæ* are theſe, as arranged under the two general diviſions of dentated *neritæ*, and umbilicated *cochleæ*; viz. the dentated *nerita*, commonly called the gum-ſhell; the bloody-tooth *nerita*; the ox-palate *nerita*; the ſtriated and punctulated *nerita*; the canaliculated, the furrowed, the thruſh, and the partridge *nerita*.

Of the *neritæ* which have no teeth, we have ten ſpecies; viz. the jaſper with a long beak; the jaſper with an operculum; the lemon-coloured pea; the yellow pea; the prickly; the reticulated; that variegated with black ſpots; the red and white faſciated; the lightly ſtriated green; and the undulated *nerita*.

Of the umbilicated ſnails we have nine ſpecies; viz. the long umbilicated; that with an exerted apex; that with a depreſſed apex; teſticulated; the hermit; the umbonated; the ſmall nipple; the heavy white; and the orange-coloured *cochlea*. Hiſt. Natural. Eclairc. part ii. p. 256.

SEMIMEMBRANOSUS, in *Anatomy*, a long thin muſcle, partly tendinous, and ſituated on the backſide of the thigh, a little towards the inſide.

It is fixed above by a ſtrong broad tendon, or long aponeuroſis, in the irregular obtuſe, prominent line, which goes from the acetabulum to the tuberoſity of the iſchium, a little above the inſertion of the ſeminervoſus, and between thoſe of the gemellus inferior, and quadratus; mixing ſome fibres with the triceps tertius. From thence it runs down fleſhy, in an oblique direction, behind the inner condyle of the os femoris; below which it terminates in a thick tendon, which is inſerted in the poſterior and interior ſide of the inner condyle of the tibia, by three ſhort branches; the firſt or uppermoſt of which, goes a little toward the inſide, the ſecond more backward, and the third lower down. Before it is inſerted, it ſends off ſometimes an aponeuroſis, like that of the biceps. Winſlow.

SEMI-METALS. See METALS.

SEMINAL, *ſeminalis*, in *Medicine*, ſpermatic, or ſomething belonging to the ſemen or ſeed.

SEMINAL-*leaves*, thoſe ſoft, plain, and undivided leaves, that firſt ſhoot forth from the greateſt part of all ſown ſeeds, and are different from thoſe of the ſucceeding plant in figure, texture, and all other reſpects. See SEED, and VEGETATION.

SEMINAL-*root*, in *Natural Hiſtory*, a name given by Grew to that part of the ſeeds of plants, which may otherwiſe be called the inner body of the ſeed: this is diſtributed through the parenchyma of the ſeed, but is wholly different from it; and diſtinguiſhed by Dr. Grew from the radicle, which becomes the plant-root in its future growth.

The parenchyma of the ſeed is, in ſome degree, that to the *ſeminal-root*, which the mould or earth is to the plant-root, or radicle; and the *ſeminal-root* is to the plant-root, what the plant-root is to the trunk.

SEMINALIS, in *Botany*, a name by which ſome authors have called horſetail.

SEMINARY, a place appointed for the inſtruction of young perſons deſtined for the miniſtry, in the duties, ceremonies, and offices thereof; firſt inſtituted, as Thomaſſin tells us, by St. Auguſtine.

Of theſe *ſeminaries* there are many abroad, furniſhed with halls for the aſſemblies of the exercitants, and little chambers, or cells, where each perſon retires, ſtudies, and prays, apart. Such is the *ſeminary* of St. Sulpitius at Paris.

The council of Trent decrees, that children exceeding twelve years of age be taken, brought up, and inſtructed in common, to qualify them for the eccleſiaſtical ſtate; and that there be a *ſeminary* of ſuch belonging to each cathedral, under the direction of the biſhop.

In France, the eſtabliſhment of *ſeminaries* is ſomewhat different from the decree of the council: none are taken in but young people ready to ſtudy theology, and to be ordained; ſo that the *ſeminaries* are a kind of houſes of probation where the vocation of clerks is examined, and they are prepared to receive orders. And by an edict of 1749, no *ſeminary* can be eſtabliſhed without letters patent from the king.

For the ſubſiſtence of theſe *ſeminaries*, there are ſeveral unions of benefices, or elſe the clergy of the dioceſe are obliged to contribute to maintain them.

Pope Pius IV. having eſtabliſhed a *ſeminary* at Rome, in conſequence of the decree of the council of Trent; by advice of the cardinals, it was given to the Jeſuits, who have made very good uſe thereof.

SEMINARY, among the canons of St Auguſtine, is uſed for a kind of college, or ſchool, where penſioners are kept, and inſtructed in the claſſical, and other learning; and this among us is the popular ſenſe of the word.

The houſes of the ſociety *de propaganda fide*, eſtabliſhed for the preparing of eccleſiaſtics for miſſions among infidels and heretics, are alſo called *ſeminaries*. The principal whereof is that at Rome, called the *apoſtolical college*, *apoſtolical ſeminary*, *paſtoral ſeminary*, *ſeminary of the propaganda*, &c.

SEMINARY, in *Gardening*, the term uſed for the ſeed plot, or place allotted for raiſing plants from ſeed, and keeping them till they are fit to be removed into the garden, or nurſery.

When the *ſeminary* is intended for trees, it muſt be proportioned to the quantity of ſeeds ſown, and of a ſoil adapted to the generality of the trees intended to be raiſed in it. The land ſhould be good, and the ſituation warm, and well defended, and as near the NURSERY as poſſible. A fertile mead, or rich paſture, lowly ſituated, will be very proper for the purpoſe. In preparing the *ſeminary*, let the ground be double dug, working the ſward to the bottom, which operation may be performed in winter. In the ſpring, the weeds muſt be conſtantly kept down; and about Midſummer, if the ſoil is not naturally very rich, ſome rotten dung ſhould be ſpread over the ſurface of the ground, which ſhould be then trenched, or double dug afreſh. From Midſummer till September the ground muſt be kept clean from weeds; and juſt before the ſeeds are committed to it, it ſhould be double dug afreſh; at which time the parts muſt be wholly incorporated. When this is done, the ground muſt be levelled, and the beds laid out for the different purpoſes wanted; reſerving ſuch a portion of it as will be wanted for the reception of thoſe ſeeds which are to be ſown in the ſpring.

The *ſeminary* muſt be divided into different apartments, for the different ſorts of ſeeds, according to their nature; thoſe ſeeds that are ſown in autumn being ſown in a part by themſelves; thoſe in the ſpring in another. Thoſe ſeeds, which remain till the ſecond ſpring before they come up, ſhould be all ſown in beds contiguous to each other; and thoſe, which often continue three years, muſt be ſown by themſelves. When the plants produced in any of the apartments are taken off for the nurſery, the ground ſhould be double dug, and lie fallow the following ſummer, manuring it with rotten dung, and double digging it about Midſummer, as before. In autumn it will be ready to be ſown afreſh, which ſhould be done with ſeeds of a different nature from thoſe by which it was before occupied. The *ſeminary* ſhould be well fenced and guarded. The *ſeminary* which is moſt in uſe, is for the ſupply of the flower-garden, and this is the place where flowers are to be raiſed from their ſeeds, to procure varieties, or, as the floriſts expreſs it, new flowers; as alſo for the ſowing of all the biennial plants, to ſucceed thoſe which decay in the flower-garden.

This *ſeminary* ſhould always be ſituated at ſome diſtance from the houſe, and be walled or palled round, and kept under lock and key, to keep out dogs, &c. and to prevent a great deal of damage, that is frequently done by thoſe who are not acquainted with gardening, before they are aware of it. The ſeveral directions, for the management of the *ſeminary*, are to be ſeen under the names of the ſeveral plants intended to be raiſed in it.

SEMINATION, *ſeminatio*, in *Natural Hiſtory*, &c. the act of ſowing or ſhedding ſeed; particularly that of vegetables.

As ſoon as the ſeed is ripe, Dr. Grew oberves, nature takes ſeveral methods for its being duly ſown; not only by the opening of the uterus, but in the make of the ſeed itſelf. Thus, the ſeeds of many plants which affect a peculiar ſoil or ſeat, as arum, poppy, &c. are heavy and ſmall enough, without farther care, to fall directly down to the ground. Others, that are large, and light enough to be expoſed to the wind, are often furniſhed with one or more hooks to ſtay them from ſtraying too far from their proper place: thus, the ſeeds of avens have each a ſingle hook; thoſe of agrimony and gooſe-graſs, many; both the former loving a warm bank, and the laſt a hedge, for its ſupport.

On the contrary, many ſeeds are furniſhed with wings, or feathers, partly with the help of the wind to carry them, when ripe, off the plant, as thoſe of aſh, &c. and partly to enable them to make their flight more or leſs abroad, that they may not, by falling together, come up too thick; and that if one ſhould miſs a proper ſoil or bed, another may hit. So the kernels of pines have wings, though ſhort ones, whereby they do not fly in the air, but only flutter on the ground. But thoſe of typha, dandelion, and moſt of the pappous kind, have numerous long feathers, by which they are wafted about every way.

Others are ſown by being laid in ſpringy elaſtic caſes, which, when they crack and buſt, dart their ſeed out to convenient diſtances: thus, wood-ſorrel having a running root, nature ſees fit to ſow the ſeed at ſome diſtance, the doing of which is effected by a white, ſturdy, tendinous cover, which, beginning to dry, burſts open on one ſide in an inſtant, and is violently turned inſide outwards. The ſeed of harts-tongue, and codded arſe-ſmart, is alſo flung or ſhot away, by means of a ſpring, wound or girt round the ſeed-caſe. When the ſpring is become tenſe enough, it ſuddenly breaks the caſe into two halves, like little cups, and ſo flings out the ſeed.

Divers notable means of *ſemination* are obſerved by authors: a quantity of fern-ſeed, Mr. Ray tells us, laid in a lump, on a paper, the ſeminal veſiculæ are heard to crackle, burſt, and, by a microſcope, the ſeeds are ſeen to be projected to a conſiderable diſtance from each other.

Dr. Sloane obſerves, that the gentinella flore cœruleo, requiring wet weather to be ſown in, as ſoon as the leaſt drop of rain touches the end of the ſeed-veſſels, with a ſmart noiſe, and a ſudden leap, opens itſelf, and, with a ſpring, ſcatters its ſeed.

The plants of the cardamine family throw their pods open, and dart out their ſeed, upon a ſlight touch of the hand. Nay Mr. Ray adds, that the pods of the cardamine impatiens not only burſt upon the ſlighteſt touch, but even by an approach of the hand to touch them, without any real contact.

Other plants ſow their ſeeds by inviting birds, by their agreeable taſte and ſmell, to feed on them, ſwallow them, and carry them about; thereby alſo fertilizing them, by paſſing through their bodies. In ſuch manner is miſſeltoe uſually ſown and propagated.

SEMINERVOSUS, in *Anatomy*, a name given by Riolan, and ſome others, to a muſcle of the thigh, more generally known by the name of the *ſemitendinoſus*. The French in general, however, call it *le demi nerveux*. Cowper call it *ſeminervoſus ſeu ſemitendinoſus*; and Albinus ſeems to claim the merit of aſcertaining its true name of *ſemitendinoſus*.

It is a long muſcle, half fleſhy and half tendinous, or like a nerve. It is ſituated a little obliquely, on the poſterior and inner part of the thigh. It is fixed above to the poſterior part of the tuberoſity of the iſchium, immediately before, and a little more inward than the biceps. It is afterwards fixed by fleſhy fibres to the tendons of the biceps, for about the breadth of three fingers, much in the ſame manner as the coraco-brachialis is fixed to the biceps of the arm. From thence it runs down fleſhy towards the lower part of the inſide of the thigh, having a ſort of tendinous interſection in the inner part of its fleſhy portion. Having reached below the middle of the thigh, it terminates in a ſmall, long, round tendon, which runs down to the inſide of the knee, beſide that of the gracilis, where it expands in breadth. It is inſerted in the inſide of the upper part of the tibia, about two or three fingers breadth below the tuberoſity of the ſpine, immediately under the tendon of the gracilis internus, with which it communicates. It has the ſame oblique form with the gracilis and ſartorius, and ſends off a like kind of aponeuroſis. Winſlow.

SEMINIUM, a term uſed by the writers on foſſils to expreſs a ſort of firſt principle, from which the ſeveral figured ſtones, or, as they are more uſually called, the extraneous foſſils, are ſuppoſed to have their origin.

The generality of the learned world, at this time, ſuppoſed theſe to be the remains of real ſhells, &c. brought from the ſea to the places where they are now found, at the time of the univerſal deluge. See *Formed* STONES, and *Adventitious* FOSSILS.

But thoſe who diſſent from this ſyſtem pretend, that theſe foſſil bodies, though they exactly repreſent ſhells, &c. yet never were in the ſea at all, but that their minute firſt principles, or, to uſe their own term, their *ſeminia*, have been carried from the ſea, through ſubterranean paſſages, to the places where we now find the complete ſhells, &c. into which they have grown. Langius, who has written expreſly on this ſubject, though he has candidly collected all that has been ſaid in favour of the diluvian ſyſtem, by the abettors of it, yet is not convinced by thoſe arguments, but rather inclines to the other ſide of the queſtion, or the riſe of ſuch foſſils from *ſeminia*.

Theſe foſſile ſhells are uſually found throughout of one and the ſame ſubſtance, and that the moſt different imaginable from the ſubſtance of the living creatures which they repreſent; and often, though found in pairs, and perfectly cloſed on all ſides, yet when broken they are found full of the ſubſtance of the ſtone in which they lie, and the armature of ſeveral kinds of them, particularly of many of the cornua ammonis, is ſuppoſed to plead greatly in favour of this hypotheſis; as it is not of the nature of, or at all owing to the ſubſtance of the matrix, in which they lie, or of the matter of which they are formed, and is therefore to ariſe ſolely from the nature of the *ſeminium*, from which they are formed.

The immenſe number of the ſea-ſhells, as they are called, thus found foſſile, is alſo thought to argue much on this ſide of the queſtion; as the favourers of this hypotheſis ſuppoſe that the ſea could not, at any one time, have given up ſuch numbers as the earth is ſtocked with, though there are no limits to the numbers ſuppoſed to be raiſed from *ſeminia*; and the immenſe columns of black marble found in Ireland, and found of ſuch regular joints, are brought as a proof of the poſſibility of ſuch a formation of foſſils as this from *ſeminia*, which they ſuppoſe muſt have given origin to thoſe pillars.

SEMIORBICULARIS *labiorum*, a name given by Winſlow, and others, to the muſcle called by Albinus *orbicularis oris*, and by others *conſtrictor*, and *ſphincter labiorum*.

SEMI-ORDINATES, in *Geometry*, the halves of the ordinates or applicates. See ORDINATE.

SEMI-PARABOLA, in *Geometry*, a curve defined by the equation, $ax^{m-1} = y^m$; as $ax^2 = y^3$, $ax^3 = y^4$.

In *ſemi-parabolas* $y^m : v^m \; (:: ax^{m-1} : az^{m-1}) :: x^{m-1} : z^{m-1}$, or the powers of the *ſemi-ordinates* are as the powers of the abſciſſes one degree lower; e gr. in cubical *ſemi-parabolas*, the cubes of the ordinates y^3 and $v3$ are as the ſquares of the abſciſſes x^2 and z^2.

SEMIPELAGIANS, in *Eccleſiaſtical Hiſtory*, a name anciently, and even at this day, given to ſuch as retain ſome tincture of Pelagianiſm.

St. Proſper, in a letter to St. Auguſtine, calls them *reliquias Pelagii*.

Many learned men, principally among the Gauls, who could not come into St. Auguſtine's doctrine of grace, &c. were accuſed of *Semipelagianiſm*; they were alſo called *Maſſilians*, or *prieſts of Marſeilles*, in regard their errors had their firſt riſe in that city.

Caſſian, who had been a deacon of Conſtantinople, and was afterwards a prieſt at Marſeilles, was the chief of theſe *Semipelagians*. And about the year 430 ſeveral other perſons embarked in the undertaking of fixing upon a kind of mean between the opinions of Pelagius and thoſe of Auguſtine, and formed this new ſect.

The leading principles of the *Semipelagians* were the five following. 1. That God did not diſpenſe his grace to one more than another in conſequence of predeſtination, i. e. an eternal and abſolute decree, but was willing to ſave all men, if they complied with the terms of his Goſpel. 2. That Chriſt died for all men. 3. That the grace purchaſed by Chriſt, and neceſſary to ſalvation, was offered to all men. 4. That man, before he received grace, was capable of faith and holy deſires. 5. That man was born free, and was conſequently capable of reſiſting the influences of grace, or of complying with its ſuggeſtion. The *Semipelagians* were very numerous; and the doctrine of Caſſian, though variouſly explained, was received in the greateſt part of the monaſtic ſchools in Gaul, from whence it ſpread itſelf far and wide through the European provinces. As to the Greeks, and other eaſtern Chriſtians, they had embraced the *Semipelagian* doctrine before Caſſian, and ſtill adhere firmly to it. In the ſixth century, the controverſy between the *Semipelagians*, and the diſciples of Auguſtin, prevailed much, and continued to divide the weſtern churches. Moſheim's Eccl. Hiſt. vol. i. p. 425, &c.

SEMI-PERIOD, in *Grammar*, a mark of diſtinction recommended by Dr. Ward, but not admitted by other grammarians. It is greater than the colon, and ſuppoſed to anſwer the ſame purpoſe between the colon and period as the ſemicolon does between the comma and colon. It is uſed to terminate a perfect ſentence, when a new ſentence ariſing out of the preceding is annexed to it; and he diſtinguiſhes it by beginning the new ſentence with a ſmall letter. But the colon and ſemicolon, differently applied, ſuperſede the neceſſity of this new diſtinction.

SEMI-PORCELLANÆ, in the *Hiſtory of Shells*. See SHELLS.

SEMIPREBEND. See PREBEND.

SEMIPROOF, an imperfect PROOF.

In the French law, the depoſition of a ſingle evidence only makes a *ſemiproof*.

The teſtament of a perſon deceaſed is deemed a *ſemiproof*.

In enormous caſes, the *ſemiproof* frequently determines them to try the torture.

SEMIQUARTILE, or SEMIQUADRATE, is an ASPECT of the planets, when diſtant from each other 45 degrees, or one ſign and a half.

SEMIQUAVER, in *Muſic*. See QUAVER.

SEMIQUINTILE is an ASPECT of the planets, when at the diſtance of 36 degrees from one another.

SEMIREVERBERATORY *fire*, in *Chemiſtry*, a term uſed to expreſs ſuch a reverberatory fire, in which the flame is only beaten back upon the bottom of the veſſel.

SEMIS, among the Romans, the half of the AS.

SEMISEXTILE, or SEMISEXTUS, or S. S. an aſpect of two planets, wherein they are diſtant from each other one twelfth part of a circle, or 30 degrees.

The *ſemiſextile* was added to the ancient aſpects by Kepler; and, as he ſays, from meteorological obſervations.

SEMISICILICUS, a word uſed by ſome pharmaceutic writers to expreſs a drachm.

SEMISIDERATUS, a word uſed by ſome for a perſon ſtruck with a hemiplegia.

SEMI-SOSPIRO, in the *Italian Muſic*, a little pauſe, of the eighth part of a bar in common time.

SEMI-SPINALIS, in *Anatomy*, a muſcle, called alſo *tranſverſo-ſpinalis dorſi*. It is a fleſhy maſs, which from all the ſpinal and tranſverſe apophyſes of the back and loins, is extended in diſtinct faſciculi over the vertebræ themſelves.

It is made up, like that of the neck, of ſeveral oblique converging muſcles, the uppermoſt of which is fixed below to the third tranſverſe apophyſis of the back, and above to the firſt ſpinal apophyſis. The loweſt is fixed below to the third tranſverſe apophyſis of the loins, and above the laſt ſpinal apophyſis of the back. They are divided by anatomiſts into the external, which are firſt diſcovered, and the internal, which lie immediately on the vertebræ. The external, from the firſt vertebra to the ſeventh incluſively, appear to be longer than the internal, which are covered by them. Winſlow.

SEMI-SPINALIS *colli*, in *Anatomy*, a muſcle, called alſo *tranſverſo-ſpinalis colli*, and taking into its compoſition all that fleſhy maſs, which lies between the tranſverſe and ſpinal apophyſes, from the ſecond vertebra of the neck to the middle of the back, under the ſplenius and complexus major.

It is compoſed of ſeveral oblique converging muſcles, which may be divided into external and internal, of which the external are the longeſt. Theſe are fixed below to the tranſverſe apophyſes of the ſixth, ſeventh, eighth, or ninth vertebræ of the back, by tendinous extremities, which as they aſcend become fleſhy, and mix with each other. Their ſuperior inſertions in the neck are ſix in number, whereof the firſt which is tendinous, is in the ſeventh ſpinal apophyſis, and the others, which are fleſhy, are in the five next ſpinal apophyſes. The internal are ſhorter, and more oblique than the external, and are partly covered by them. They are fixed, by their lower extremities, to the tranſverſe apophyſes of the three or four upper vertebræ of the back, and to the oblique apophyſes of the four or five lower vertebræ of the neck, and by their other extremities they are inſerted in the ſix ſpinal apophyſes of the neck. Some of theſe internal muſcles are very ſhort, lying wholly between the ſpinal apophyſes, and the oblique or tranſverſe apophyſes next them. Winſlow.

SEMISPINATUS, in *Anatomy*, a name given by Riolanus, and ſome others, to the muſcle, more generally known by the name of *longiſſimus* DORSI.

SEMITA *luminoſa*, a name given to a kind of lucid tract in the heavens, which, a little before the vernal equinox, or after the autumnal, may be ſeen about ſix o'clock at night, extending from the weſtern edge of the horizon, up towards the Pleiades.

The phenomenon has been taken notice of by Caſſini and Fatio, who both evince, that this light comes diffuſed from both ſides of the ſun. Its brightneſs is much the ſame with that of the via lactea, or the tail of a comet: it is ſeen plaineſt with us about the beginning of October, or the latter end of February.

Facio conjectures, that the bodies, or rather the congeries or aggregate of bodies, which occaſions this light, conforms to the ſun like a lens; and takes it to have ever been the ſame; but Caſſini thinks it ariſes from a vaſt number of ſmall planets, which encompaſs the ſun, and give this light by reflection; eſteeming it alſo not to have exiſted long before he obſerved it. See ZODIACAL *light*.

SEMITALES, among the Romans, a name given to the gods, who were the protectors of roads.

SEMITEINTS. See TEINTS.

SEMITONE, in *Muſic*, one of the degrees, or concinnous intervals, of concords.

There are three degrees, or leſs intervals, by which a ſound can move upwards and downwards ſucceſſively from one extreme of any concord to the other, and yet produce true melody; and by means whereof, ſeveral voices and inſtruments are capable of the neceſſary variety in paſſing from concord to concord. Theſe degrees are the greater and leſs tone, and the *ſemitone*. The ratio of the firſt is 8 : 9; that of the ſecond 9 : 10.

The ratio of the *ſemitone* is 15 : 16; its compaſs is five commas; which interval is called a *ſemitone*, not that it is geometrically the half of either of the tones, for it is more; but becauſe it comes ſomewhat near it. It is alſo called the *natural ſemitone*, and the *greater ſemitone*, becauſe greater than the part it leaves behind, or its complement to a tone, which is four commas. The Italians alſo call it *ſeconda minore*, or a leſſer SECOND.

There are ſeveral ſpecies of *ſemitones*; but thoſe that uſually occur in practice are of two kinds, diſtinguiſhed by the addition of greater and leſs. The firſt is expreſſed by the ratio of 16 to 15, or $\frac{16}{15}$; and the ſecond by 25 to 24, or $\frac{25}{24}$. The octave contains ten *ſemitones major*, and two dieſes, nearly; for the meaſure of the octave being expreſſed by the logarithm 1,000000, the *ſemitone major* will be meaſured by 0,093109; and the octave contains ſeventeen *ſemitones minor*, nearly. If the meaſure of the octave be the logarithm 1,000000, the meaſure of the *ſemitone minor* will be 0,058894. Theſe two differ by a whole enharmonic DIESIS; which is an interval practicable by the voice, and was much in uſe among the ancients, and not unknown even among the modern practitioners. Euler, Tent. Nov. Theor. Muſ. p. 107. See INTERVAL.

Theſe *ſemitones* are called *fictitious notes*; and, with reſpect to the natural ones, are expreſſed by characters called *flats* and *ſharps*.

Their uſe is to remedy the defects of inſtruments, which, having their ſounds fixed, cannot always be made to anſwer to the diatonic ſcale.

By means of theſe we have a new kind of ſcale, called the

SEMITONIC *ſcale*, or the *ſcale of ſemitones*; a ſcale or ſyſtem of muſic, conſiſting of 12 degrees, or 13 notes, in the octave, being an improvement on the natural or diatonic ſcale, by inſerting between each two notes thereof, another note, which divides the interval or tone into two unequal parts, called *ſemitone*.

The uſe of this ſcale is for inſtruments that have fixed ſounds, as the organ, harpſichord, &c. which are exceedingly defective on the foot of the natural or diatonic ſcale. For the degrees of the ſcale being unequal, from every note to its octave there is a different order of degrees; ſo that from any note we cannot find any interval in a ſeries of fixed ſounds; which yet is neceſſary, that all the notes of a piece of muſic, carried through ſeveral keys, may be found in their juſt tune, or that the ſame ſong may be begun indifferently at any note, as may be neceſſary for accommodating ſome inſtrument to others, or to the human voice, when they are to accompany each other in uniſon.

The diatonic ſcale, beginning at the loweſt note, being firſt ſettled on an inſtrument, and the notes thereof diſtinguiſhed by their names *a*, *b*, *c*, *d*, *e*, *f*, *g*; the inſerted notes, or *ſemitones*. are called *fictitious notes*, and take the name or letter below with a ※, as *c* ※, called *c ſharp*; ſignifying that it is a *ſemitone* higher than the ſound of *c* in the natural ſeries; or this mark ♭, called a *flat*, with the name of the note above, ſignifying it to be a *ſemitone* lower.

Now $\frac{15}{16}$ and $\frac{128}{135}$ being the two *ſemitones* the greater tone is divided into; and $\frac{15}{16}$ and $\frac{24}{25}$, the *ſemitones* the leſs tone is divided into; the whole octave will ſtand as in the following ſcheme, where the ratios of each term to the next are written fraction-wiſe between them below.

Scale of SEMITONES.

c.	*c*※.	*d.*	*d*※.	*e.*	*f.*	*f*※.	*g.*	*g*※.	*a*♭.	*b.*	*cc*
$\frac{15}{16}$	$\frac{128}{135}$	$\frac{15}{16}$	$\frac{24}{25}$	$\frac{15}{16}$	$\frac{128}{135}$	$\frac{15}{16}$	$\frac{15}{16}$	$\frac{24}{25}$	$\frac{15}{16}$	$\frac{128}{135}$	$\frac{15}{16}$

For the names of the intervals in this ſcale, it may be conſidered, that as the notes added to the natural ſcale are not deſigned to alter the ſpecies of melody, but leave it ſtill diatonic, and only correct ſome defects ariſing from ſomething foreign to the office of the ſcale of muſic, viz. the fixing and limiting the ſounds; we ſee the reaſon why the names of the natural ſcale are continued, only making a diſtinction of each into a greater and leſs. Thus an interval of one *ſemitone* is called a *leſs ſecond*;

of two *ſemitones*, a *greater ſecond*; of three *ſemitones*, a *leſs third*; of four, a *greater third*, &c.

A ſecond kind of *ſemitonic ſcale* we have from another diviſion of the octave into *ſemitones*; which is performed by taking an harmonical mean between the extremes of the greater and leſs tone of the natural ſcale; which divides it into two *ſemitones* nearly equal. Thus, the greater tone 8 : 9 is divided into two *ſemitones*, which are 16 : 17, and 17 : 18; where 16 : 17 : 18, is an arithmetical diviſion, the numbers repreſenting the lengths of the chords; but if they repreſent the vibrations, the lengths of the chords are reciprocal; viz. as $1 : \frac{16}{17} : \frac{8}{9}$; which puts the greater *ſemitones* $\frac{16}{17}$ next the lower part of the tone, and the leſſer $\frac{17}{18}$ next the upper, which is the property of the harmonical diviſion. And after the ſame manner the leſs tone 9 : 10 is divided into the two *ſemitones* 18 : 19, and 19 : 20; and the whole octave ſtands thus:

c.	*c✱.*	*d.*	*d✱.*	*e.*	*f.*	*f✱*	*g.*	*g✱*	*a.*	♭.	*b c*
$\frac{16}{17}$	$\frac{17}{18}$	$\frac{18}{19}$	$\frac{19}{20}$	$\frac{15}{16}$	$\frac{16}{17}$	$\frac{17}{18}$	$\frac{18}{19}$	$\frac{19}{20}$	$\frac{16}{17}$	$\frac{17}{18}$	$\frac{15}{16}$

This ſcale, Mr. Salmon tells us, in the Philoſophical Tranſactions, he made an experiment of, before the Royal Society, on chords, exactly in theſe proportions, which yielded a perfect concert with other inſtruments, touched by the beſt hands. Mr. Malcolm adds, that, having calculated the ratios thereof, for his own ſatisfaction, he found more of them falſe than in the preceding ſcale; but then their errors were conſiderably leſs, which made amends. Malcolm's Muſic, chap. x. § 2.

SEMIVULPA, in *Zoology*, a name by which Geſner, and ſome others, have called the OPOSSUM.

SEMODIUS, among the Romans, a meaſure equal to half the MODIUS, or the ſixth part of the AMPHORA.

SEMONES, among the *Ancients*, a claſs of gods that were of a middle nature between the celeſtial and terreſtrial gods. Juſtin Martyr has miſtaken one of theſe for Simon Magus. Mem. de l'Acad. des Inſcrip. vol. i. p. 270.

SEMPERVIVUM, in *Botany*. See HOUSELEEK.

SEMYDA, in *Botany*, the name of a tree, mentioned by Theophraſtus, and by ſome ſuppoſed to be the ſame with the *betula*, or birch-tree, but very erroneouſly.

SENA, SENNA, in *Medicine*, a purgative leaf much uſed in draughts and compoſitions of that intention.

The ſhrub which bears it is a ſpecies of CASSIA, cultivated in ſeveral parts of the Levant, and grows five or ſix feet high; it puts forth woody branches, furniſhed with oblong leaves; its flowers are yellow; its fruit is a greeniſh flat pod, containing ſeveral lodges or cells of ſeeds, reſembling grape-ſtones. Theſe pods ſome phyſicians prefer to the leaves themſelves.

There is alſo a kind of *ſena* growing about Florence; but it is inferior to that of the Levant, as is owned by the Italians themſelves. Father Plumier mentions alſo a third kind growing in the Antilles iſlands.

M. Lemery diſtinguiſhes three ſorts of *ſena* of the Levant: the firſt brought from Seyda, called *ſena of apalto*, that is *cuſtom ſena*, by reaſon of the cuſtom paid the grand ſignior, for the privilege of exporting it; the ſecond comes from Tripoli; the third is called *ſena of Mocha*.

The beſt of theſe kinds is the firſt, which Pomet directs us to chuſe in narrow leaves, of a moderate ſize, ſhaped like the end of a ſpear point, of a pale green colour, a pungent ſmell, ſoft to the touch, &c.

The *ſena* of Tripoli holds the ſecond rank in goodneſs: its difference from that of Seyda conſiſts in its colour, which is green; its ſmell, which is very weak; and in a certain harſhneſs, or roughneſs, which it diſcovers upon the touch. Beſides theſe three kinds of *ſena*, and their pods, the druggiſts ſell the duſt found at the bottom of the bales, which is a very poor commodity, and yet much better than what they call the *ſmall ſena*, which comes with it in the bales, by way of package, and which many hold to be a plant of no virtue, put in by chance, or, at beſt, to increaſe the weight.

The beſt *ſena*, ordinarily found in our ſhops, is that which is brought from Alexandria in Egypt; it is of a lively yellowiſh green colour, oblong, ſomewhat oval-figured, ſharp-pointed at the ends, about a quarter of an inch broad, and not a full inch in length; the brightneſs of its colour and quickneſs of its taſte are alſo indications of its goodneſs; for when it has loſt its ſcent, and grows duſky, it is good for little. The inferior ſorts, brought from Tripoli, and other places, may be diſtinguiſhed by their being narrower, longer, and ſharper pointed; or larger, broader, and round pointed, with ſmall prominent veins; or large, obtuſe, and of a freſh green colour, without any yellow caſt.

Sena is a moderately ſtrong, and, in general, a ſafe cathartic. Geoffroy ſpecifies hæmorrhages, inflammations of all kinds, and diſorders of the breaſt, as being almoſt the only exceptions to its uſe. The doſe, in ſubſtance, is from a ſcruple to a dram; in infuſion, from one dram to three or four. It gives out its virtue both to watery and ſpirituous menſtrua; communicating to water and proof ſpirit a browniſh colour, and to rectified ſpirit, a fine green. The two inconveniencies, attending the uſe of this medicine, are its being liable, in moſt conſtitutions, to occaſion gripes, and its being accompanied with an ill flavour, which is apt to nauſeate the ſtomach and palate. The firſt may be greatly obviated by dilution; the latter by aromatic and other additions; e. gr. cinnamon, or a dram or two of its diſtilled water.

Several compoſitions of this kind are prepared in the ſhops, ſufficiently palatable, and which operate for the moſt part with eaſe and mildneſs. Thus, ſix drams of tamarinds, and two of cryſtals of tartar, are boiled in a pint and a half of water, till half a pint is waſted, and the ſtrained liquor poured boiling hot upon one, two, or three drams of *ſena*. After maceration for four hours, the ſtrained infuſion is ſweetened with an ounce of ſyrup of violets, and flavoured with half an ounce of ſimple cinnamon water. Or, three drams of *ſena* are infuſed in a quarter of a pint of boiling water, for four hours, or till the liquor has grown cold; with the addition of a ſcruple of ginger; or with half a dram of leſſer cardamom ſeeds, huſked, and three-fourths of a dram of cryſtals of tartar; which laſt are previouſly boiled in the water till diſſolved; or with two drams of freſh lemon-peel, and two drams, by meaſure, of lemon juice. This laſt form is the moſt agreeable, which the committee of the London College has been able to contrive, for the exhibition of *ſena*, to thoſe who are much offended with its flavour. Some macerate the *ſena* for a night in cold water, which comes ſufficiently impregnated with its purgative virtue, without extracting ſo much as boiling water does of the nauſeous matter: if the liquor, poured off from the *ſena*, be boiled a little by itſelf, great part of its ill flavour will be diſſipated; and the remains of its offenſiveneſs may be covered by infuſing in it ſome bohea tea. By continuing the coction for a conſiderable time, the purgative virtue of the *ſena* will be diminiſhed; for, as Dr. Lewis obſerves, the inſpiſſated watery extracts are ſcarcely found to purge ſo much as one fourth of the infuſion or decoction they were made from, or ſo much as an equal weight of the leaves in ſubſtance. Lewis's Mat. Med.

However, ſome have highly extolled Mr. Geoffroy's dry EXTRACT, which is made of a very ſtrong infuſion, evaporated to a dry and pulveriſable ſubſtance: this, they ſay, is eaſily taken, of no ill taſte, and operates in a very ſmall quantity, one third part containing the virtue of the whole, or nearly ſo; the niceſt calculations ſhewing, that twenty-four grains of the extract, ſome part of which may be ſuppoſed to be earth, or other accidental or uſeleſs matter, poſſeſs the virtues of a dram in ſubſtance. Mem. de l'Acad. des Scienc. Paris, 1738.

The officinal ſpirituous tinctures of *ſena* are prepared by digeſtion, with or without heat, in proof ſpirit. See TINCTURA *ſenæ*.

Sena is a principal ingredient in LENITIVE *electary*.

Rulandus imagined there was a ſudorific quality in *ſena*; and accordingly ordered it in ſome compoſitions of that intention.

SENA, *baſtard*. See CASSIA.

SENA, *bladder*, *colutea*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the flower, which has a permanent, bell-ſhaped empalement, of one leaf, indented in five parts, is of the butterfly kind, and the ſtandard, wings, and keel, vary in their figure in different ſpecies; it hath ten ſtamina, nine of which are joined, and the other ſtands ſeparate, which are terminated by ſingle ſummits; in the centre is ſituated an oblong, compreſſed germen, which becomes a broad, ſwelling pod, with one cell, including ſeveral kidney-ſhaped ſeeds. Linnæus enumerates three, and Miller ſeven ſpecies.

SENA, *podded*. See CORONILLA.

SENA, *ſcorpion*, *emerus*, in *Botany*. Its characters are theſe: the flower has an empalement of one leaf, divided in five parts; the flower is of the butterfly kind, the ſtandard narrow, and ſhorter than the wings, over which it is arched; the wings are large and concave, and the keel heart-ſhaped and reflexed; it hath ten ſtamina, and in the empalement is ſituated an oblong, ſlender germen, which becomes a taper, cylindrical pod, ſwelling in thoſe parts where the ſeed is lodged. There are three ſpecies. Miller.

This, in the Linnæan ſyſtem, is a ſpecies of CORONILLA. The leaves of this plant are uſed, but Boerhaave is unacquainted with any medicinal virtue in them. Ruppius writes, that the common people ſubſtitute the leaves inſtead of thoſe of *ſena*; and Buxhaum tells, us, that old women who pretend to medicine, call it *ſenes blatter*, and uſe it inſtead of *ſena* leaves.

SENATE, *ſenatus*, an aſſembly or council of ſenators; that is, of the principal inhabitants of a ſtate, who have a ſhare in the government.

Such were the *ſenates* of Rome, of Carthage, &c. among the ancients; and ſuch are the *ſenates* of Venice, of Genoa, &c. among the moderns.

The *ſenate* of ancient Rome was, of all others, the moſt celebrated, during the ſplendor of the republic. Cicero, in his oration for Milo, defines it, *templum ſanctitatis, amplitudinis, mentis, conſiliique publici Romani, caput orbis, ara ſociorum, portuſque omnium gentium*. The Roman *ſenate* exerciſed no contentious juriſdiction: it appointed judges either out of the *ſenate*, or among the knights; but it never ſtooped to judge any proceſſes in a body. The *ſenate* concerted matters of war; appointed who ſhould command the armies; ſent governors into the provinces; took order, and diſpoſed of the revenues of the commonwealth. Yet did not the whole ſovereign power reſide in the *ſenate*; it could not alone elect magiſtrates, make laws, nor decide of war and peace; but in all theſe caſes, the ſenators were to conſult the people. Under the emperors, when the *ſenate* became deſpoiled of moſt of its other offices, they began to hear cauſes. For thoſe of leſs conſequence they appointed particular judges; the reſt, principally criminal cauſes, they reſerved for their own cognizance, to be judged by them in a body, and that frequently in the emperor's preſence. This was put in their way to keep their heads from ſtate affairs. Nero farther committed to the *ſenate* the judgment of all appeals; but this did not hold long; nor do we find any footſteps thereof any where but in the ſixty-ſecond Novel.

With regard to the juriſdiction of the *ſenate*, Dr. Middleton obſerves, that the ſupreme power at home was in the collective body of the people; yet where haſte, perhaps, or ſecrecy was required, and where the determinations of the *ſenate* were ſo juſt and equitable, that the conſent of the people might be preſumed, and taken for granted, the *ſenate* would naturally omit the trouble of calling them from their private affairs to an unneceſſary attendance on the public; till by repeated omiſſions of this kind, began at firſt in trivial matters, and proceeding inſenſibly to more ſerious, they acquired a ſpecial juriſdiction and cognizance in many points of great importance, to the excluſion even of the people; who yet, by the laws and conſtitution of the government, had the abſolute dominion over all. For example:

1. They aſſumed to themſelves the guardianſhip and ſuperintendance of the public religion; ſo that no new god could be introduced, nor altar erected, nor the Sibylline books conſulted, without their expreſs order.
2. They held it as their prerogative, to ſettle the number and condition of the foreign provinces, that were annually aſſigned to the magiſtrates, and to declare which of them ſhould be conſular, and which prætorian provinces.
3. They had the diſtribution of the public treaſure, and all the expences of the government; the appointment of ſtipends to their generals, with the number of their lieutenants and their troops, and the proviſions and clothing of their armies.
4. They nominated all ambaſſadors ſent from Rome, out of their own body, and received and diſmiſſed all who came from foreign ſtates, with ſuch anſwers as they thought proper.
5. They had the right of decreeing all ſupplications, or public thankſgivings, for victories obtained, and of conferring the honour of an ovation, or triumph, with the title of emperor, on their victorious generals.
6. It was their province to enquire into public crimes or treaſons, either in Rome, or the other parts of Italy; and to hear and determine all diſputes among the allied and dependent cities.
7. They exerciſed a power, not only of interpreting the laws, but abſolving men from the obligation of them, and even of abrogating them.
8. In the caſe of civil diſſenſions, or dangerous tumults within the city, they could arm the conſuls by a vote with abſolute power, to deſtroy and put to death, without the formality of trial, all ſuch citizens as were concerned in exciting them.
9. They had a power to prorogue, or poſtpone the aſſemblies of the people, to decree the title of king to any prince whom they pleaſed; thanks and praiſe to thoſe who had deſerved them; pardon and reward to enemies, or the diſcoverers of any treaſon; to declare any one an enemy by a vote; and to preſcribe a general change of habit to the city, in caſes of any imminent danger or calamity.

The tribunes ſoon ſnatched from them that original right, which they had enjoyed from the very foundation of the city, of being the authors, or firſt movers of every thing, which was to be enacted by the people, and excluded them from any ſhare or influence in the aſſemblies of their tribes; and though in the other aſſemblies of the curiæ and the centuries, they ſeemed to have reſerved to them their ancient right, yet it was reduced to a mere form, without any real force; for inſtead of being what they had always been, the authors of each particular act that was to be propoſed to the people's deliberation, they were obliged, by a ſpecial law, to authorize every aſſembly of the people, and whatever ſhould be determined in it, even before they had proceeded to any vote. And C. Gracchus afterwards, in his famous tribunate, uſed to boaſt that he had demoliſhed the *ſenate* at once, by transferring to the equeſtrian order the right of judicature in all criminal cauſes, which the *ſenate* had poſſeſſed from the time of the kings.

It has been a queſtion among the learned, how ſenators were created, and how the vacancies of the *ſenate* in old Rome were ſupplied.

Dr. Middleton is of opinion, that the conſtant and regular ſupply of the *ſenate* was from the annual magiſtrates; who, by virtue of their ſeveral offices, acquired an immediate right to ſit and vote in that aſſembly. The uſual gradation of theſe offices was that of quæſtor, tribune of the people, ædile, prætor, and conſul; which every candidate, in the ordinary forms of the conſtitution, was obliged to take in their order, with this exception only, that he might forego either the tribunate, or the ædileſhip, at his own choice, without a neceſſity of paſſing through them both. See QUÆSTOR, TRIBUNE &c.

But though theſe offices gave both an immediate right, and actual entrance into the *ſenate*, yet the ſenatorian character was not eſteemed complete, till the new ſenators had been enrolled by the cenſors at the next luſtrum, or general review of all the orders of the city, which was generally held every five years. Yet this enrolment was but a matter of form, which could not be denied to any of them, except for ſome legal incapacity, or the notoriety of ſome crime, or infamy upon their characters; for which the ſame cenſors could expel, or deprive, any other ſenator, of what rank or ſtanding ſoever. See CENSOR.

It has been the opinion of ſome, that under the kings of Rome the choice and nomination of all the ſenators depended wholly on the will of the prince, without any right in the people, either direct or indirect; and that the conſuls, who ſucceeded to the kingly power, enjoyed the ſame prerogative, till the creation of the cenſors, who ever after poſſeſſed the ſole and abſolute right of making and unmaking ſenators. But Dr. Middleton is of opinion, that the kings, the conſuls, and the cenſors, acted in this affair but miniſterially, and ſubordinately to the ſupreme will of the people, in whom the proper and abſolute power of creating ſenators always reſided. And the doctor aſſures us, upon the ſtricteſt ſearch into the ſtate of the preſent queſtion, as it ſtood under the kingly government, he cannot but conclude, from the expreſs teſtimony of the beſt hiſtorians, the concurrence of ſimilar facts, and the probability of the thing itſelf, that the right of chuſing ſenators was originally and conſtitutionally veſted in the people. Middleton of Rom. Sen. p. 36.

But lord Hervey, who ſeems to have ſtudied the Roman hiſtory with care and attention, is of a different opinion. The *ſenate*, at its firſt eſtabliſhment (notwithſtanding the judicial and legiſlative power it afterwards acquired) was nothing more than the king's council. In this light not only Feſtus, Eutropius, and Livy, repreſent the *ſenate*, but even Dionyſius himſelf. It is therefore highly probable, his lordſhip ſays, that each member of this council was merely, as Livy and Plutarch relate, the choice of the king, and not, as Dionyſius reports, elected by the people. Nor is there the leaſt ground to imagine, he tells us, from any author whatever, except Dionyſius, that during the whole regal government, the people had, directly or indirectly, actually or virtually, any ſhare or concern at all in the choice of the ſenators. The firſt inſtitution, in a word, every augmentation, and every ſupply on vacancies, he ſuppoſes to have depended entirely on the will and authority of the kings. Nor does he, like Monſieur Vertot, imagine the reaſon why Dionyſius had reported otherwiſe, proceeded from his republican ſpirit, but from what every body who reads him muſt find in his manner of deſcribing every inſtitution, law, or cuſtom, among the Romans, viz. an affectation of tracing its origin from ſome ſimilar practice in the Grecian ſtates, in order, from his partiality to that country, to give Greece the honour of having furniſhed the ſketch of every plan, on which the Roman government was framed, and the Roman greatneſs raiſed.

Soon after the expulſion of Tarquin, and the eſtabliſhment of the conſular government, the *ſenate*, which, by many condemnations to death, or exile, the laſt king had reduced to leſs than half its complement, was filled up to its former number of three hundred; this ſupply, according to every hiſtorian, was made out of the plebeians; and in all probability, his lordſhip ſays, by the ſole power of the conſuls, ſince no author relates otherwiſe, and all authors agree that the conſulate power at firſt differed from the regal powers in no particulars but that of being annual, inſtead of perpetual, and divided between two perſons, inſtead of being veſted in a ſingle one.

Till the time of the cenſors then, lord Hervey tells us, there is not the leaſt reaſon to imagine, that the people had any hand in promoting any man to the ſenatorial rank. From the time that the people were allowed to chuſe the annual magiſtrates out of their own body, till the time the commonwealth fell into confuſion, which ended, as confuſion generally does, with a total loſs of liberty, the only difficulty in accounting for the filling up of the *ſenate*, his lordſhip ſays, is to reconcile the right of the annual magiſtrates to enter the *ſenate*, with the power of the cenſors. And this, he thinks, may be done by diſtinguiſhing between *a right to vote in the ſenate*, and *being a ſenator*, which were two different privileges, and quite diſtinct honours. The firſt was obtained by virtue of exerciſing any public office, from the quæſtorſhip to the conſulſhip; and was conſequently conveyed by the people; whereas the laſt was a dignity conferrable only by the cenſors. Feſtus ſays, that thoſe who held any public office in the ſtate, and by virtue of that office voted in the *ſenate*, were nevertheleſs no ſenators till made ſo by the cenſors. And Aulus Gellius, in his chapter upon the *Pedarii Senatores*, ſays the ſame thing.

Theſe two claſſes were always diſtinguiſhed even in the edict that convoked the *ſenate*; the form of the edict, as may be ſeen in many writers, being *to convene the ſenators, and all thoſe who had a right to vote in the ſenate.*

Nor was the difference, according to Aulus Gellius, between the voters in the *ſenate*, and the confirmed ſenators, ſo uneſſential, as it may at firſt appear; for thoſe, who had only a right to vote in the *ſenate*, and were not enrolled ſenators, had no right to ſpeak there, and could only paſs in ſilence to one ſide or the other, when a diviſion was made on the point in debate. Whereas an enrolled ſenator had a right, when he gave his vote, to ſpeak as long as he pleaſed, and on what he thought fit; a privilege, which amounted to a power of ſtopping all proceedings for that day, and was often ſo uſed.

From the ſtory of Fabius Maximus and Craſſus, related by Valerius Maximus, book ii. chap. 2. there appears to have been another very eſſential difference between a ſenator, and a voter in the *ſenate*; for by that ſtory one muſt imagine that thoſe who were enrolled ſenators, had not only the ſole right of debating any queſtion that came into the *ſenate*, but were like a ſecret committee, or cabinet council, who previouſly weighed every propoſal that was to be made in a general *ſenate*, and determined whether it ſhould be brought in or not.

The power of taking cognizance of the manners of every Roman citizen, was firſt annexed to the cenſorſhip, when the office itſelf was disjoined from that of the conſulſhip, in the three hundred and eleventh year of Rome, as may be ſeen in Livy, book iv. chap. 8. But the power of chuſing the new ſenators was not transferred from the conſuls to the cenſors till near a hundred years afterwards, in the tribuneſhip of Ovinius; and it was then given to the cenſors by the people, to revenge the breach of the Licinian law (which law ordained that one of the conſuls ſhould always be choſen out of the plebeians) for both the conſuls being that year patricians, and one of the cenſors that year, for the firſt time, being a plebeian, the tribune Ovinius put the people upon this expedient to do themſelves juſtice, and mortify the nobility.

When the annual magiſtrates were not ſufficient to ſupply the vacancies in the ſenate, the cenſors choſe whom they pleaſed. And that the annual magiſtrates were ſeldom enough to ſupply the vacancies, may eaſily be concluded, when one conſiders how few they were, and how many vacancies muſt be made in ſo large a body as three hundred men, by natural deaths, the change of perpetual war, and the purgations made by the reforming authority of the cenſors.

The filling up of the *ſenate* then from the Ovinian tribuneſhip till the time of the Gracchi, lord Hervey thinks, depended entirely on the cenſors; for though he allows that the annual magiſtrates, at the expiration of their office, had a ſort of claim and pretenſion to be put on the roll of ſenators, by the cenſors; yet as the cenſors, under the pretence of reformation, had an uncontroulable power to remove ſenators already enrolled, ſo on the ſame pretence they could, if they pleaſed, refuſe to enroll, and even without giving any reaſon; ſince their manner both of expelling or admitting ſenators was merely by omitting or inſerting a name in the ceremony of calling over the roll.

Though the cenſorſhip, therefore, at its original inſtitution by Servius Tullius, was nothing more than the office of numbering the people, and taking the valuation of their eſtates, and an office annexed firſt to the royal authority, and afterward to the conſular power; yet when it was detached from the conſular power, and erected into a ſeparate office, with the power of filling up the *ſenate* annexed; from that time, as the cognizance of the manners of every citizen of Rome was alſo in their department, his lordſhip looks upon the cenſors to have been full as abſolute in the city and the civil government, with regard to all promotions and degradations, from the *ſenate* down to the loweſt tribe, curia, or century, as the conſuls were in the camp and the military government.

Ever after the time of the Gracchi, the ſtate was either in ſuch confuſion, or ſuch abſolute ſlavery, that his lordſhips thinks there was no regular method at all obſerved in filling up the *ſenate*, or any juſtice in purging it. Whoever had the ſovereign power in his hand, under what title ſoever he ſeized or poſſeſſed it, modelled the *ſenate* by the introduction of new members, or the expulſion of old ones, juſt as he thought fit.

Dr. Middleton politely acknowledges, that the hypotheſis of lord Hervey has the advantage of his own, and will be thought the more ſolid or plauſible by the generality of readers. See Letters between Lord Hervey and Dr. Middleton, concerning the Roman *Senate*; publiſhed by Dr. Knowles, quarto, 1778.

The magiſtrates who had the power of aſſembling the *ſenate* were the dictator, the conſuls, the prætors, the tribunes of the commons, and the interrex. Yet upon extraordinary occaſions the ſame privilege was allowed to the tribuni militum, inveſted with conſular power, and to the decemviri, created for regulating the laws; and to other magiſtrates choſen upon ſome unuſual occaſion.

In the early ages of the republic, when the precincts of the city were ſmall, the ſenators were perſonally ſummoned by an apparitor; and ſometimes by a public crier, when their affairs required immediate diſpatch; but the uſual way of calling them, in later days, was by an edict appointing the time and place, and publiſhed ſeveral days before, that the notice might be more public. Theſe edicts were commonly underſtood to reach no farther than to thoſe who were reſident in Rome, or near it; yet when any extraordinary affair was in agitation, they ſeem to have been publiſhed alſo in the other cities of Italy. If any ſenator refuſed, or neglected to obey this ſummons, the conſul could oblige him to give ſurety for the payment of a certain fine, if the reaſons of his abſence ſhould not be allowed. But from ſixty years of age they were not liable to that penalty, nor obliged to any attendance but what was voluntary.

The *ſenate* could not regularly be aſſembled in any private or profane place, but always in one ſet apart, and ſolemnly conſecrated to that uſe by the rites of augury.

The *ſenate* frequently met in certain curiæ. See CURIA. But their meetings were more commonly held in certain temples, dedicated to particular deities: as in that of Jupiter, Apollo, Mars, Vulcan, Caſtor, Bellona; of Concord, Faith, Virtue, the Earth, &c.

Theſe temples, on account of the uſe which the *ſenate* made of them, were called likewiſe *curiæ*; as well as the proper curiæ, or *ſenate* houſes, on account of their ſolemn dedication, are frequently called temples.

On two ſpecial occaſions the *ſenate* was always held without the gates of Rome, either in the temple of Bellona, or of Apollo. 1ſt For the reception of foreign ambaſſadors, and eſpecially of thoſe who came from enemies, who were not permitted to enter the city. 2dly, To give audience, and tranſact buſineſs with their own generals, who were never allowed to come within the walls as long as their commiſſion ſubſiſted, and they had the actual command of an army.

The *ſenate* met always of courſe on the firſt of January, for the inauguration of the new conſuls, who entered into their office on that day.

The month of February, generally ſpeaking, was reſerved entire by old cuſtom to the *ſenate*, for the particular purpoſes of giving audience to foreign ambaſſadors.

In all months, univerſally, there were three days, which ſeem to have been more eſpecially deſtined to the *ſenate*, the kalends, nones, and ides, from the frequent examples found in hiſtory, of its being convened on thoſe days. But Auguſtus enacted afterwards, that the *ſenate* ſhould not meet regularly, or of courſe, except on two days only of each month, the kalends and ides.

On their days of meeting, they could not enter upon any buſineſs before the ſun was riſen, nor finiſh any after it was ſet; every thing tranſacted by them, before or after that time, was null and void, and the author of it liable to cenſure. Whence it became a ſtanding rule, that nothing new ſhould be moved after four o'clock in the afternoon.

The *ſenate*, as has been ſhown above, was compoſed of all the principal magiſtrates of the city, and of all who had borne the ſame offices before them: and conſiſted therefore of ſeveral degrees and orders of men, who had each a different rank in it, according to the dignity of the character which he ſuſtained in the republic. At the head of the *ſenate* ſat the dictator and conſuls, in chairs of ſtate. Manutius thinks that the other magiſtrates ſat next to the conſular chair, each according to his rank; the prætors, cenſors, ædiles, tribunes, quæſtors. But Dr. Middleton rather thinks that the conſular ſenators, who, in all ages of the republic, were the leaders and firſt ſpeakers in the *ſenate*, uſed to ſit next in order to the conſuls; and after them the prætors, and all who were of prætorian dignity, or had been prætors; then the ædiles, the tribunes, and the quæſtors, on diſtinct benches; and on the ſame bench with each, all who had borne the ſame offices; but the curule magiſtrates, as the prætors and ædiles, were perhaps diſtinguiſhed, at the head of their ſeveral benches, by ſeats ſomewhat raiſed, or ſeparated at leaſt from the reſt, in the form of our ſettees, or of that *longa cathedra*, which Juvenal mentions, to denote the curule dignity.

All the private ſenators ſat on different benches, and in a different order of precedency, according to the dignity of the magiſtracies which they had ſeverally borne. Firſt the conſulars, then the prætorians, ædilitians, tribunitians, and quæſtorians; in which order, and by which titles, they are all enumerated by Cicero. And as this was their order in ſitting, ſo it was the ſame alſo in delivering their opinions when it came to their turn. Cic. Phil. 13. 14.

The *ſenate* being aſſembled, the conſuls, or the magiſtrate, by whoſe authority they were ſummoned, having firſt taken the auſpices, and performed the uſual office of religion, by ſacrifice and prayer, uſed to open to them the reaſons of their being called together, and propoſe the ſubject of that day's deliberation; in which all things divine, or relating to the worſhip of the gods, were diſpatched preferably to any other buſineſs. When the conſul had moved any point, with intent to have it debated and carried into a decree, and had ſpoken upon it himſelf as long as he thought proper, he proceeded to aſk the opinions of the other ſenators, ſeverally in their name, and in their proper order, beginning always with the conſulars, and going on to the prætorians, &c. It was the practice originally to aſk the **PRINCE** *of the ſenate* the firſt; but that was ſoon laid aſide, and the compliment transferred to any other ancient conſular, diſtinguiſhed by his integrity and ſuperior abilities; till, in the later ages of the republic, it became an eſtabliſhed cuſtom to pay that reſpect to relations, or particular friends, or to thoſe who were likely to give an opinion the moſt favourable to their own views and ſentiments on the queſtion propoſed. But whatever order the conſuls obſerved, in aſking opinions on the firſt of January, when they entered into their office, they generally purſued the ſame through the reſt of the year. Julius Cæſar indeed broke through this rule; for though he had aſked Craſſus the firſt, from the beginning of his conſulſhip; yet, upon the marriage of his daughter with Pompey, he gave that priority to his ſon-in-law, for which, however, he made an apology to the *ſenate*.

This honour of being aſked in an extraordinary manner, and preferably to all others of the ſame rank, though of ſuperior age or nobility, ſeems to have been ſeldom carried farther than to four or five diſtinguiſhed perſons of conſular dignity; and the reſt were afterwards aſked according to their ſeniority. And this method, as has been ſaid, was obſerved generally throughout the year, till the election of the future conſuls, which was commonly held about the month of Auguſt; from which time, it was the conſtant cuſtom to aſk the opinions of the conſuls elect, preferably to all others, till they entered into their office, on the firſt day of January following.

As the conſuls elect had this preference given in ſpeaking before all the conſulars, ſo the prætors, and tribunes elect, ſeem to have had the ſame, before the reſt of their particular orders.

None were allowed to ſpeak till it came to their turn, excepting the magiſtrates, who ſeem to have had a right of ſpeaking on all occaſions, whenever they thought fit; and for that reaſon, perhaps, were not particularly aſked, or called upon by the conſuls.

If in the debate ſeveral different opinions had been offered, and each ſupported by a number of ſenators, the conſul, in the cloſe of it, uſed to recite them all, that the *ſenate* might paſs a vote ſeparately upon each; but in this he gave what preference he thought fit to that opinion which he moſt favoured, and ſometimes even ſuppreſſed ſuch of them, as he wholly diſapproved.

In caſes, however, where there appeared to be no difficulty or oppoſition, decrees were ſometimes made, without any opinion being aſked or delivered upon them.

When any queſtion was put to the vote, it was determined always by a diviſion, or ſeparation of the oppoſite parties, to the different parts of the *ſenate* houſe; the conſul, or preſiding magiſtrate, having firſt given order for it in this form: *Let thoſe, who are of ſuch an opinion, paſs over to that ſide; thoſe, who think differently, to this.*

What the majority of them approved, was drawn up into a decree, or *ſenatus-conſultum*, which was generally conceived in words prepared and dictated by the firſt mover of the queſtion, or the principal ſpeaker in favour of it; who, after he had ſpoken what he thought ſufficient to recommend it to the *ſenate*, uſed to conclude his ſpeech, by ſumming up his opinion in the form of ſuch a decree, as he deſired to obtain. Which decree, when confirmed by the *ſenate*, was always ſigned and atteſted by a number of ſenators, who choſe to attend through the whole proceſs of it, for the ſake of adding their names to it, as a teſtimony of their particular approbation of the thing, as well as of reſpect to the perſon, by whoſe authority, or in whoſe favour it was drawn.

When the *ſenate* appeared to be diſpoſed, and ready to paſs a decree, it was in the power of any one of the ten tribunes of the people to intercede, that is, to over-rule it. See INTERCESSION.

In all caſes, where the determinations of the *ſenate* were over-ruled by the negative of a tribune, of which there are numberleſs inſtances, if the *ſenate* was unanimous, or generally inclined to the decree ſo inhibited, they uſually paſſed a vote to the ſame purpoſe, and in the ſame words, which was called *ſenatus auctoritas, an authority* or *judgment of the ſenate*, and was entered into their journals. But this had no other force than to teſtify the judgment of the *ſenate* on that particular queſtion, and to throw the odium of obſtructing an uſeful act on the tribune who hindered it.

In order to deter any magiſtrate from acting factiouſly and arbitrarily, in affairs of importance, they often made it part of the decree, which they were going to enact, that if any one attempted to obſtruct it, he ſhould be deemed to act againſt the intereſt of the republic. Yet this clauſe had ſeldom any effect on the hardy tribunes, who uſed to apply their negative in defiance of it as freely as on any other indifferent occaſion.

The factions, and leaders of parties, had ſeveral arts of obſtructing, or poſtponing a decree, by many pretexts, and impediments which they could throw in its way. Sometimes they alledged ſcruples of religion, that the auſpices were not favourable, or not rightly taken; which, if confirmed by the augurs, put a ſtop to the buſineſs for that day. At other times, they urged ſome pretended admonition from the Sibylline books, which were then to be conſulted and interpreted to a ſenſe, that ſerved their purpoſe. But the moſt common method was to waſte the day, by ſpeaking for two or three hours ſucceſſively, ſo as to leave no time to finiſh the affair in that meeting: yet when ſome of the more turbulent magiſtrates were groſly abuſing this right, againſt the general inclination of the aſſembly, the ſenators were ſometimes ſo impatient as to ſilence them, as it were, by force, and to diſturb them in ſuch a manner, by their clamour and hiſſing, as to oblige them to deſiſt.

The decrees of the *ſenate* were uſually publiſhed, and openly read to the people ſoon after they were paſſed; and an authentic copy of them was always depoſited in the public treaſury of the city, or otherwiſe they were not conſidered as legal or valid.

As to the force of theſe decrees, it is difficult to define preciſely what it was. It is certain that they were not conſidered as laws, but ſeem to have been deſigned originally as the ground-work, or preparatory ſtep to a law, with a ſort of proviſional force, till a law of the ſame tenor ſhould be enacted in form by the people; for in all ages of the republic, no law was ever made, but by the general ſuffrage of the people.

Even under the kings, the collective body of the people was the real ſovereign of Rome, and the dernier reſort in all caſes. But their power, though ſupreme and final, was yet qualified by this check, that they could not regularly enact any thing, which had not been previouſly conſidered and approved of by the *ſenate*. This indeed continued to be the general way of proceeding in all quiet and regular times, from the beginning of the republic to the end of it; and the conſtant ſtyle of the old writers, in their accounts of the public tranſactions, is, that the *ſenate* voted or decreed, and the people commanded ſuch and ſuch an act. Middleton, ubi ſupra, and the authorities cited by him.

Senate *of four hundred*, an ancient *ſenate* of Athens, when the city was divided into four tribes, each of which choſe a hundred men. This laſted till Solon inſtituted the *ſenate* of five hundred, after the city was divided into five tribes.

Senate *of Venice*. See Pregadi.

SENATOR, a member of a ſenate.

There were two orders, or degrees, among the Roman nobility; that of the *ſenators*, and that of the *knights*: after theſe two, came the people. The firſt hundred *ſenators* were appointed by Romulus, and called *patres*, *fathers*. Upon the union with the Sabines, Romulus, or as others ſay, Tullus, added a ſecond hundred, called *patres majorum gentium*: this diſtinguiſhed them from a third hundred added by the elder Tarquin, and called *patres minorum gentium, fathers of the lower rank*.

In ancient Rome, the number of *ſenators* is commonly ſuppoſed to have been limited to three hundred, from the time of the kings to that of the Gracchi. But this muſt not be taken too ſtrictly. The ſenate generally had that number, or thereabout, and upon any remarkable deficiency, was filled up again to that complement by an extraordinary creation. But as the number of the public magiſtrates increaſed with the increaſe of their conqueſts and dominions, ſo the number of the ſenate, which was ſupplied of courſe by thoſe magiſtrates, muſt be liable alſo to ſome variation. To what number Sylla increaſed them is not abſolutely certain; but in Cicero's time they were not leſs than four hundred and fifteen, as appears by his letter to Atticus, lib. i. ep. 14.

In the time of Gracchus they were ſix hundred; during the civil wars they were reduced to three hundred. Julius Cæſar augmented that number to nine hundred; the triumvirs to above a thouſand; and Auguſtus reduced them to ſix hundred, according to Dion Caſſius; and to three hundred, according to Suetonius. For the choice of *ſenators* belonged at firſt to the kings, then to the conſuls, then to the cenſors, who in their cenſus or ſurvey every fifth year, appointed new *ſenators* in lieu of thoſe dead or degraded; but at length it fell to the emperors. See Senate.

Though, for a long time, none were raiſed to the dignity of *ſenators*, but thoſe moſt conſpicuous for their prudence, &c. yet ſome regard was afterwards had to their eſtate, leſt their dignity ſhould become debaſed by poverty. To hold the *ſenatorial* dignity, a yearly revenue of eight hundred thouſand ſeſterces was required, which amounts to between ſix and ſeven thouſand pounds of our money. Half as much was required for the qualification of the knights. The *ſenators* who ſunk below this revenue, were diſcarded, and expunged out of the liſt by the cenſor: and this was increaſed by Auguſtus to twelve hundred thouſand.

This qualification muſt not be taken, as it is by ſome, for an annual income, but the whole eſtate of a *ſenator*, real and perſonal, as eſtimated by the ſurvey and valuation of the cenſors.

This proportion of wealth may ſeem perhaps too low, and unequal to the high rank and dignity of a Roman *ſenator*, but it muſt be conſidered only as the loweſt to which they could be reduced; for whenever they ſunk below it, they forfeited their ſeats in the ſenate.

In ancient Rome, a certain age was required for a *ſenator*, as is often intimated by the old writers, though none of them have expreſly ſignified what it was. The legal age for entering into the military ſervice was ſettled, by Servius Tullius, at ſeventeen years; and they were obliged, as Polybius tells us, to ſerve ten years in the wars, before they could pretend to any civil magiſtracy. This fixes the proper age of ſuing for the quæſtorſhip, or the firſt ſtep of honour, to the twenty-eighth year; and as this office gave an admiſſion into the ſenate, ſo the generality of the learned ſeem to have given the ſame date to the *ſenatorian* age. Some writers, indeed, on the authority of Dion Caſſius, have imagined it to be twenty-five years; not reflecting that Dion mentions it there as a regulation only propoſed to Auguſtus by his favourite Mæcenas. Dr. Middleton takes the quæſtorian age, which was the ſame with the *ſenatorian*, to have been thirty years complete.

The laws concerning the age of magiſtrates were not very ancient: and were made to check the forward ambition of the nobles, and to put all the citizens upon a level in the purſuit of honours. And Livy tells us, that L. Villius, a tribune of the people, was the firſt who introduced them, A. U. 573, and acquired by it the ſurname of Annalis. Middlet. of Rom. Sen. p. 99.

The *ſenators* were ordinarily choſen from among the knights, or from among ſuch as had borne the principal offices. At firſt the magiſtrates were taken wholly from among the *ſenators*; whence Tacitus calls the ſenate, the *ſeminary of all dignities*: but after the people had been admitted to magiſtratures, *ſenators* were taken from among ſuch as had diſcharged thoſe offices, though before plebeians.

There was ſome law ſubſiſting from the earlieſt times, concerning the extraction and deſcent of *ſenators*, enjoining that it ſhould always be ingenuous; and as their morals were to be clear from all vice, ſo their birth likewiſe from any ſtain of baſe blood. In conſequence of which, when Appius Claudius, in his cenſorſhip, attempted to introduce the grandſons of freed ſlaves into the ſenate, they were all immediately turned out again.

Theſe are ſome of the laws by which the cenſors were obliged to act, in the enrollment of the new, or the omiſſion of old *ſenators*; and when we read of any left out, without any intimation of their crime, it might probably be for the want of one or other of theſe legal, or cuſtomary qualifications.

It was from the *ſenatorian* order alone, that all ambaſſadors were choſen and ſent to foreign ſtates; and when they had occaſion to travel abroad, even on their private affairs, they uſually obtained from the ſenate the privilege of a free legation, as it was called; which gave them a right to be treated every where with the honours of an ambaſſador, and to be furniſhed on the road with a certain proportion of proviſions and neceſſaries, for themſelves and their attendants; and as long as they reſided in the Roman provinces, the governors uſed to aſſign them a number of lictors, or mace-bearers, to march before them in ſtate, as before the magiſtrates in Rome. And if they had any law-ſuit, or cauſe of property depending in thoſe provinces, they ſeem to have had a right to require it to be remitted to Rome.

At home, likewiſe, they were diſtinguiſhed by peculiar honours and privileges; for at the public ſhews and plays they had particular ſeats ſet apart, and appropriated to them, in the moſt commodious part of the theatre; and on all ſolemn feſtivals, when ſacrifices were offered to Jupiter by the magiſtrates, they had the ſole right of feaſting publicly in the Capitol, in habits of ceremony, or ſuch as were proper to the offices which they had borne in the city.

The peculiar ornament of the *ſenatorian* tunic was the *latus clavus* (ſee Laticlavium), as it was called, being a broad ſtripe of purple ſewed upon the fore part of it, and running down the middle of the breaſt, which was the proper diſtinction between them and the knights, who wore a much narrower ſtripe of the ſame colour, and in the ſame manner. The faſhion alſo of their ſhoes was peculiar, and different from that of the reſt of the city: this difference appeared in the colour, ſhape, and ornament of the ſhoes. The colour of them was black, while others wore them of any colour perhaps, agreeable to their ſeveral fancies; the form of them was ſomewhat like to a ſhort boot, reaching up to the middle of the leg, as they are ſometimes ſeen in ancient ſtatues and baſ-reliefs; and the proper ornament of them was a half moon ſewed, or faſtened npon the fore-part of them, near the ancle.

Conſuls, prætors, ædiles, tribunes, &c. during the year of their magiſtracy, always wore the *prætexta*, or a gown bordered round with a ſtripe of purple. In which habit alſo, as has been ſignified above, all the reſt of the ſenate, who had already borne thoſe offices, uſed to aſſiſt at the public feſtivals and ſolemnities.

The *ſenators* carried their children with them to the ſenate, to inform them betimes of affairs of ſtate; though theſe children had not admittance till ſeventeen years of age.

Some make a diſtinction among the *ſenators*; and ſay, that beſides the *ſenators* who were allowed to ſpeak, and were aſked their opinions, there were others, who, without ſpeaking, or being ever aſked their judgment, were only to follow the opinion of thoſe they thought the moſt reaſonable, and were hence called *pedarii*. A. Gellius gives us another notion of the pedarii, and ſays, thoſe were thus called, who, having never borne the office of curule magiſtrate, were obliged to go to the ſenate on foot.

They had the name *ſenators*, q. d. *old men*, given them in imitation of the Greeks, who called their ſenate γερουσια. So when the Athenians aſſembled the people to conſult about the affairs of the public, the officers ſummoned none but ſuch as were at leaſt fifty years old. The Egyptians and Perſians followed the ſame example, after the Hebrews; and the Lacedæmonians and Carthaginians received none but ſuch as were ſixty years of age. See Conscript.

As to other matters, relating to Roman *ſenators*, ſee the article Senate, ſupra.

SENATUS *auctoritas*. See Senate.

SENATUS-CONSULTUM, a vote, or reſolution, of the Roman ſenate, pronounced on ſome queſtion, or point of law, propoſed to it. See Senate.

The *ſenatus-conſulta* made a part of the Roman law: when paſſed, they were depoſited in the temple of Ceres, under the cuſtody of the ædiles; and at laſt they were carried, by the cenſor, to the temple of Liberty, and put up in an armory called *tabularia*.

Julius Capitolinus ſpeaks of a ſort of *ſenatus-conſulta tacita*, which, he ſays, were made in reference to affairs of great moment and ſecreſy by the ſenators themſelves, without the privity of the public officers, under an oath of ſecrecy, till their deſigns ſhould be affected.

SEND, is uſed by ſeamen, when a ſhip, either at an anchor, or under ſail, falls with her head, or ſtern, deep into the trough of the ſea, i. e. into a hollow made between two waves, or billows. They ſay ſhe *ſends* much that way, whether it be a-head or a-ſtern.

SENDAL, in our *Old Writers*, a kind of thin fine ſilk, mentioned in the ſtat. 2 Rich. II. cap. 1.

SENECIO, *groundſel*, in *Botany*. See GROUNDSEL.

SENECTA *anguium*, the exuviæ, or ſloughs of ſerpents. The ſnakes caſt their whole ſkin, and with it were ſuppoſed to caſt off their age, and be born anew; whence the name of theſe caſt ſkins. A decoction, or infuſion of theſe, is recommended by medical writers againſt pains of the ears and eyes; and ſome ſuperſtitious people recommended it to women, to tye about their waiſts, to prevent miſcarriages, and about their thighs, in time of labour to haſten delivery.

SENEGA. See GUM *ſenega*.

SENEKA *rattleſnake-root*. This is a root lately brought into uſe among us, and which ſeems to deſerve very great regard. It is the root of a ſpecies of *polygala*, or MILKWORT, diſtinguiſhed by Gronovius, in his Flora Virginica, under the name of the erect *polygala*, with a ſimple ſtalk, with oval leaves, pointed at the end, and with an erect cluſter of flowers. We generally call it the *rattleſnake-root*, and the French, from the place whence it comes, *Seneka*. The plant is a native of Virginia, Penſylvania, and Maryland, and is cultivated in ſome of our gardens.

The root is perennial; the thickneſs of it is generally about that of a man's little finger. It is four or five inches, or more, in length, and is variouſly contorted and twiſted, and divides into many branches, furniſhed with ſmall fibres, and with a membranaceous rim running all along it. It is yellowiſh on the outſide, and white within; very acrid, and ſomewhat bitter to the taſte, and has ſomewhat of an aromatic flavour. From this root ariſe numerous ſtalks, all ſimple, and without branches; ſome lie on the ground, others ſtand erect. Theſe are ten or twelve inches high, when full grown. The leaves ſtand alternately on the ſtalks, and the flowers are white, and perfectly like thoſe of our own kinds of polygala. This root is of no remarkable ſmell, but has a peculiar kind of ſubtile, pungent, penetrating taſte. Its virtue is extracted both by water and ſpirit.

Dr. Tennent, who brought over a vaſt quantity of this root from America ſome years ago, and took great pains to introduce it into practice, praiſes it very largely as a diuretic, a diaphoretic, and an alexipharmic, and a very powerful attenuant and reſolvent. He ſays it will ſometimes vomit and purge.

The Senegaw Indians firſt taught the uſe of it to the Europeans; they eſteem it a ſovereign remedy againſt the bite of the *rattleſnake*; and Dr. Tennent aſſures us that he ſaw two perſons, who had been bitten by this creature in the month of July, when its poiſon is moſt fatal, perfectly reſtored to health by it. The powder, or a decoction of the root, is taken internally; and either the powder or cataplaſms made with it applied to the wound.

He afterwards gave it in pleuriſies and peripneumonies with great ſucceſs, and in all other caſes where the blood is inſpiſſated. The effect of this medicine was found to be, that it made the ſizy blood fluid, procured a plentiful ſpitting, increaſed perſpiration and urine, and ſometimes purged or vomited. If the firſt doſes of it provoke a vomiting, it is not at all the worſe, except in caſes in which the patient is very weak; and in ſuch this effect is eaſily prevented, by giving ſome of the teſtaceous powders with it.

In pleuriſies it is beſt to take away ten ounces of blood, before the entering on the uſe of the medicine; in other caſes no precaution is required, but it is to be given in powder, or tincture, in white wine, particularly Madeira wine; and the ordinary drink, during the uſe of it ſhould be marſhmallow tea.

This medicine may be given either in powder or decoction; but Dr. Tennent prefers the decoction, having obſerved it to give relief ſooner than the powder does. The doſe of the powder is thirty-five grains, and he gives at once three ſpoonfuls of the decoction, prepared by boiling three ounces of the root bruiſed in a quart of water to near the half. The doſe is repeated every ſix hours. He is alſo fond of this root in the rheumatiſm, dropſy, and gout, in which laſt diſeaſe, he ſays, he has given it with ſucceſs. See his Letter concerning the *Seneka*, or *rattle-ſnake root*.

Meſſrs. Lemery, Du Hamel, and Juſſieu, vouch for the good effects of the *Seneka-root* in pleuriſies, and other inflammatory diſeaſes. Mem. de l'Acad. des Scienc. 1739.

SENEMBI, in *Zoology*, the name of a ſpecies of Braſilian lizard, more commonly known by the name IGUANA.

SENESCHAL, *ſeneſcallus*, a name anciently uſed for a ſteward or MAJORDOMO; formed from the German *ſind*, *houſe* or *family*, and *ſcalc*, *ſervant*.

Thus the *ſeneſchal* of a lord, or a baron, is his ſteward or bailiff, who holds his courts, and manages his demeſne lands; and the *ſub-ſeneſchal*, his under-ſteward.

High ſeneſchal of England is the high ſteward of England; *high ſeneſchal del hotel du roi*, is the ſteward of the king's houſehold.

The ancients uſed the term *ſeneſcallus* indifferently with that of *dapifer*; whence we are ſure it ſignifies *ſteward*.

SENESCHALLO *et mareſhallo quod non teneant placita de libero tenemento*, a writ directed to the ſteward and marſhal of England, inhibiting them to take cognizance of an action in their court that concerns freehold.

SENGREEN, in *Botany*. See HOUSELEEK.

SENNA. See SENA.

SENNIT (of *ſeven* and *knit*), a ſort of flat, braided cordage, formed by platting five or ſeven rope-yarns together. This is beaten ſmooth and flat with a hammer, and ſerves to keep the ropes to which it is applied from galling.

SENOPLE. See SINOPLE.

SENORIÆ, in *Botany*, a name by which ſome authors have called the bonona-tree, or *muſa fructu breviore*.

SENSATION, the act of perceiving external objects, by means of the organs of ſenſe.

To conceive the manner wherein *ſenſation* is effected; obſerve, that all the organs conſiſt of little filaments, or nerves which have their origin in the middle of the brain, are diffuſed thence throughout all the members which have any ſenſe, and terminate in the exterior parts of the body; that when we are in health, and awake, one end of theſe nerves cannot be agitated or ſhaken, without ſhaking the other; becauſe they are always a little ſtretched; as is the caſe of an extended chord, one part of which cannot be ſtirred without a like motion of all the reſt. Obſerve, farther, that theſe nerves may be agitated two ways; either at the end out of the brain, or at that in the brain. If they be agitated from without, by the action of objects, and their agitation be not communicated as far as the brain, as frequently happens in ſleep, when the nerves are in a ſtate of relaxation; the ſoul does not then receive any new *ſenſation*. But if the nerves happen to be agitated on the brain, by the flux of the animal ſpirits, or any other cauſe; the ſoul perceives ſomething, though the parts of thoſe nerves, that are out of the brain, diffuſed through the ſeveral parts of the body, remain at perfect reſt: as likewiſe is frequently the caſe in ſleep.

Laſtly, obſerve, that experience tells us, we may ſometimes feel pain, as if in parts of the body that have been entirely cut off; by reaſon the fibres in the brain, correſponding to them, being agitated in the ſame manner as if they were really hurt, the ſoul feels a real pain in thoſe imaginary parts.

All theſe things ſeem to ſhew, that the ſoul reſides immediately in that part of the brain wherein the nerves of all the organs of ſenſe terminate: we mean, that it is there it perceives all the changes that happen with regard to the objects that cauſe them, or that have been uſed to cauſe them; and that it only perceives what paſſes out of this part, by the mediation of the fibres terminating in it.

Theſe things premiſed, it will not be difficult to explain how *ſenſation* is performed, the manner whereof may be conceived from what follows: when the point of a needle, for inſtance, is thruſt againſt the hand, that point ſtirs and ſeparates the fibres of the fleſh; which fibres are extended from that place to the brain, and when we are awake, are in ſuch a degree of tenſion, as that they cannot be ſtirred without ſhaking alſo the fibres of the brain. If then the motion of the fibres of the hand be gentle, that of the fibres of the brain will be ſo too; and if the firſt be violent enough to break any thing in the hand, the laſt will be ſtronger and more violent in proportion. In like manner, if the hand be held to the fire, the little particles of the fuel it throws off in great numbers, and with a great deal of violence, ſtriking againſt theſe fibres, and communicating a part of their agitation thereto; if the action be moderate, that of the extremities of the fibres of the brain, correſponding to thoſe of the hand, will be moderate likewiſe: if it be violent enough to ſeparate any of the parts of the hand, as it happens in burning, the motion of the fibres in the brain will be proportionably more violent. This is what befalls the body when objects ſtrike upon it. We are now to conſider how the mind is affected.

The mind, we have obſerved, reſides principally, if we may be allowed to ſay ſo, in that part of the brain, where all the fibres of the nerves terminate. It attends here, as its ſenſory, or office, to look to the preſervation of all the parts of the body; and, of conſequence, it muſt be here advertiſed of all the changes that happen, and muſt be able to diſtinguiſh between thoſe agreeable to the conſtitution of the body, and thoſe hurtful thereto. Any other abſolute knowledge, without a relation to the body, were uſeleſs. Thus, though all the changes in our fibres do, in reality, conſiſt in motions, which ordinarily only differ as to more and leſs; it is neceſſary the ſoul ſhould conſider them as changes eſſentially different; for though in themſelves they differ but very little, yet, with regard to preſervation of the body, they are to be looked on as eſſentially different.

The motion, for inſtance, which cauſes pain, frequently differs exceedingly little from that which occaſions a pleaſing titillation: it is not neceſſary, that there ſhould be an eſſential difference between theſe two motions; but it is neceſſary there be an eſſential difference between the pain and the tickling, which thoſe two motions occaſion in the ſoul; for the agitation of the fibres, which accompanies the titillation, informs the ſoul of the good ſtate of the body, that it is able to reſiſt the impreſſion of the objects, and that it need not apprehend its being hurt; but the motion which occaſions pain, being ſomewhat more violent, is capable of breaking ſome of the fibres of the body; wherefore it is neceſſary the ſoul be advertiſed hereof by ſome diſagreeable *ſenſation*, that it may provide againſt it.

Thus though all the motions which paſs in the body only differ in themſelves, as to more or leſs; yet when conſidered with regard to the preſervation of life, they may be ſaid to be eſſentially different: for this reaſon it is, that the ſoul does not perceive the ſhakes or motions themſelves, which objects excite in the fibres of the fleſh: it would be uſeleſs to perceive them; and ſhe would never be able, thence, to learn whether the objects were capable of doing hurt or good. But ſhe perceives herſelf affected with *ſenſations*, which differ eſſentially, and which, ſhewing preciſely the qualities of the objects, as they regard the body, make her perceive diſtinctly, whether or no thoſe objects are capable of hurting it.

In effect, from a ſtrict examination of the ſeveral ſenſes, it appears, that ſenſible objects act no otherwiſe upon the body, for the producing of *ſenſation*, than by exciting a change in the extreme ſurface of the fibres of the nerves; the quality of which change depends on the figure, bulk, hardneſs, and motion, of the object; ſo that, according to all appearance, the moſt different objects, which ſhould agree in theſe four circumſtances, would produce the ſame *ſenſation*.

From the various texture of the object, the diverſity of the nerve affected, the different fabric of the organ of ſenſe, the different place in the medulla of the brain where the nerve ariſes, and the different degree of motion wherewith the action of the object is applied, there ariſe various *ſenſations* and ideas in the mind; none of which repreſent any thing in the action of the object, or in the paſſion of the organ. And yet the ſame action of the ſame object, on the ſame organ, always produces the ſame *ſenſation* or idea; and the ſame ideas neceſſarily follow the ſame diſpoſition of the ſame ſenſible organ, in the ſame manner as if the idea perceived were the natural and neceſſary effect of the action on the organ. See IDEA.

SENSE, a faculty of the ſoul, whereby it perceives external objects, by means of ſome action or impreſſion made on certain parts of the body, called *organs of ſenſe*, and propagated by them to the ſenſory.

Some uſe the word *ſenſe* in a greater latitude; and define it a faculty whereby the ſoul perceives ideas or images of objects, either conveyed to it from without, by the impreſſion of objects themſelves, or excited within by ſome effort of the ſoul on the ſenſory itſelf.

Under this notion, *ſenſe* becomes diſtinguiſhable into two kinds, *external* and *internal*; correſponding to the two ſeveral manners wherein the images of the objects perceived are occaſioned, and preſented to the mind, viz. either immediately from without, or from within; that is, either by what we commonly call the *five external ſenſes*, hearing, ſeeing, &c. or by the *internal* ones, imagination, memory, and attention; to which ſome alſo add hunger and thirſt.

But as theſe *internal ſenſes* are not ordinarily conſidered in the notion of *ſenſes*, nor implied under the word *ſenſe*, but are thus only denominated by analogy; we ſhall wave them to be farther conſidered under their reſpective articles, IMAGINATION, MEMORY, &c.

SENSES, *external*, or ſimply, *the* SENSES, in their general ſignification, are the means whereby the ſoul apprehends, or takes cognizance of, external objects; the means, we mean, both on the part of the mind, and on that of the body.

The means, on the part of the mind, are in all caſes the ſame; it being one and the ſame faculty, whereby we ſee, hear, &c. The means, on the part of the body, are different; as different as are the objects we are concerned to perceive; for the being and well-being of the animal being the end nature had in view in giving him any perception of external bodies; by this the meaſure and manner of that perception are regulated; and we have ſo many ways of perceiving ſo many things, as the relation we bear to external bodies renders neceſſary for the preſervation, &c. of our being.

Hence thoſe ſeveral organs of *ſenſe*, called *eye*, *ear*, *noſe*, *palate*, and the univerſal one *cutis*; each of which is ſo diſpoſed as to give ſome repreſentation and report to the mind, of the ſtate of external things, the nearneſs, convenience, hurtfulneſs, and other habitudes; and each of them a different one, according to the degree and immediateneſs, &c. of the danger, or conveniency. And hence the ſeveral exerciſes of thoſe organs, hearing, ſeeing, ſmelling, taſting, and feeling.

A late excellent author, Dr. Hutcheſon, gives us a more ingenious, extenſive, and philoſophical notion of *ſenſe*. On his principle, *ſenſe* is defined, a power of perception, or, a power of perceiving ideas; at leaſt if what is abſolutely paſſive may be properly called a power.

On ſome occaſions, inſtead of power, he chuſes to call it, a determination of the mind to receive ideas. And the ideas thus perceived, or raiſed in the mind, he calls *ſenſations*.

Senſe, he conſiders, either as natural or moral; and the natural, either as external or internal: though the diſtribution is chiefly founded on the common ways of conceiving; for, in reality, they appear to be all natural and neceſſary: ſome reaſons, however, for the diſtinction, will be ſhewn under the ſeveral articles thereof.

SENSES, *external*, then, are powers of perceiving ideas, upon the preſence of external objects. On ſuch occaſions, we find the mind is merely paſſive, and has not power directly to prevent the perception, or idea, or to vary it at its reception; as long as the body is continued in a ſtate fit to be acted upon by the external object.

When two perceptions are entirely different from each other, or agree in nothing but the general idea of ſenſation; the powers of receiving thoſe different perceptions are called *different ſenſes*. Thus, ſeeing and hearing denote the different powers of receiving the ideas of colours and ſounds. And though colours, as well as ſounds, have vaſt differences amongſt themſelves; yet is there a greater agreement among the moſt oppoſite colours, than between any colour and a ſound; and hence all colours are deemed perceptions of the ſame *ſenſe*.

All the ſeveral *ſenſes* ſeem to have their diſtinct organs, except feeling, which is, in ſome degree, diffuſed over the whole body. Inquiry into the Original of our Ideas of Beauty and Virtue, p. 2. 8vo. 1726.

In another place the ſame writer defines the *external ſenſes* to be thoſe determinations of nature by which certain perceptions conſtantly ariſe in the mind, when certain impreſſions are made upon the organs of the body, or motions raiſed in them. Some of theſe perceptions are received ſolely by one *ſenſe*; others may be received by two or more. Of the former claſs are theſe five ſorts; viz. colours, ſounds, taſtes, ſmells, cold, or heat. Some ingenious authors reckon more: theſe we may call the proper ideas of ſenſation. Syſtem of Moral Philoſophy, vol. i. p. 4.

SENSES, *internal*, are powers or determinations of the mind to be pleaſed with certain forms and ideas, which occur to our obſervation, in objects perceived by the external *ſenſes*. Of theſe there are two different ſpecies, diſtinguiſhed by the different objects of pleaſure, viz. pleaſurable or beautiful forms of natural things, and pleaſurable or beautiful actions, or characters of rational agents: whence the internal *ſenſes* become diviſible into natural and moral; though what others call the *internal natural ſenſe*, our author calls ſimply, and by way of eminence, the *internal ſenſe*.

In reflecting on our external *ſenſes*, we plainly ſee, that our perceptions of pleaſure and pain do not depend directly on our will. Objects do not pleaſe us according as we incline they ſhould: the preſence of ſome objects neceſſarily pleaſes us, and the preſence of others as neceſſarily diſpleaſes us; nor can we by our will, any otherwiſe procure pleaſure, or avoid pain, than by procuring the former kind of objects, and avoiding the latter. By the very frame of our nature, the one is made the occaſion of delight, and the other of diſſatisfaction. In effect, our ſenſitive perceptions are pleaſant, and painful, immediately, and without any knowledge of the cauſe of this pleaſure and pain, or of the manner how they excite it, or are occaſions of it, or without our ſeeing to what farther advantage, or detriment, the uſe of ſuch objects might tend. Nor would the moſt accurate knowledge of theſe things vary either the pleaſure, or the pain, of the perception: however it might give a rational pleaſure, diſtinct from the ſenſible; or might raiſe a diſtinct joy, from proſpect of farther advantage in the object, or another averſion, from apprehenſion of evil. There is ſcarce any object which our minds are employed about, but is conſtituted the neceſſary occaſion of ſome pleaſure or pain. Thus, we ſhall find ourſelves pleaſed with a regular form, a piece of architecture, or painting, a compoſition of notes, a theorem, an action, an affection, a character; and we are conſcious, that this pleaſure naturally ariſes from the contemplation of the idea then preſent to the mind, with all its circumſtances, though ſome of thoſe ideas have nothing of what we call ſenſible perception in them; and in thoſe which have, the pleaſure ariſes from ſome uniformity, order, arrangement, and imitation; and not from the ſimple ideas of colour, or ſound, or mode of extenſion, ſeparately conſidered.

It ſeems hence to follow, that when inſtruction, education, or prejudice of any kind, raiſe any deſire or averſion towards an object; this deſire, or averſion, is founded on an opinion of ſome perfection, or deficiency, in thoſe qualities, for perception whereof we have the proper *ſenſes*. Thus, if beauty be deſired by one who has not the *ſenſe* of ſight; the deſire muſt be raiſed by ſome apprehended regularity of figure, ſweetneſs of voice, ſmoothneſs, ſoftneſs, or ſome other quality, perceivable by the other *ſenſes*, without relation to the ideas of colour.

The only pleaſure of *ſenſe*, which our philoſophers ſeem to conſider, is that which accompanies the ſimple ideas of ſenſation; but there are vaſtly greater pleaſures in thoſe complex ideas of objects, which obtain the names of beautiful and harmonious. The power, then, whereby we receive ideas of beauty and harmony, has all the characters of a *ſenſe*. It is no matter, whether we call theſe ideas of beauty and harmony, perceptions of the external *ſenſes* of ſeeing and hearing, or not: we ſhould rather chooſe to call theſe ideas an *internal ſenſe*, were it only for the convenience of diſtinguiſhing them from other ſenſations of ſeeing and hearing, which men may have without perception of beauty and harmony. Hutcheſon's Inquiry, &c. Preface, and p. 3, &c.

For the general manner wherein our *ſenſes* act, or, more properly, the manner wherein we become *ſenſible*, that is, perceive external objects, ſee Sensation.

For the particular *ſenſes*, or, more properly, the particular manners wherein we become ſenſible, by the particular organs of *ſenſe*, ſee Hearing, Seeing, Smelling, &c.

For the ſeveral organs *ſenſe*, miniſtering to the ſeveral manners of ſenſation, ſee Eye, Ear, Nose, &c.

Pliny obſerves, that of all the *ſenſes*, feeling and taſting are thoſe which man enjoys in the greateſt perfection. As to ſeeing, he ſays, he is excelled by the eagle, &c. as to ſmelling, by the vulture, &c. and as to hearing, by the mole, even when hid under-ground.

The *ſenſes* have been ſometimes found greatly ſharpened and improved by diſeaſes; Mr. Boyle mentions a gentleman, who, during a diſtemper he had in his eyes, had his organs of ſight brought to be ſo ſenſible, that when he waked in the night, he could, for a while, plainly ſee and diſtinguiſh colours, and other objects; and the ſame author gives an inſtance of another perſon, who, after getting half-fuddled with claret, if he waked in the night, could ſee for ſome time to read a moderate print.

Grimaldi tells us, that ſome women of Megara were able by their eyes alone to diſtinguiſh between eggs laid by black hens, and thoſe by white ones. Grimald. de Lum. & Col.

In the Philoſophical Tranſactions, Nº 312, we have an account of Dan. Fraſer, who continued deaf and dumb from his birth to the ſeventeenth year of his age; when, upon recovering from a fever, he perceived an uneaſy motion in his brain, after which he began to hear, and by degrees to ſpeak.

Sense, *moral*, is a determination of the mind to be pleaſed with the contemplation of thoſe affections, actions, or characters, of rational agents, which we call *good* or *virtuous*.

This moral *ſenſe* of beauty in actions and affections, may appear ſtrange at firſt view: ſome of our moraliſts themſelves are offended at it in lord Shafteſbury, as being accuſtomed to deduce every approbation, or averſion, from rational views of intereſt. Our gentlemen of good taſte can tell us of a great many *ſenſes*, taſtes, and reliſhes, for beauty, harmony, imitation in painting and poetry; and may we not find, too, in mankind a reliſh for a beauty in characters, in manners? The truth is, human nature does not ſeem to have been left quite indifferent in the affair of virtue, to form to itſelf obſervations concerning the advantage or diſadvantage of actions, and accordingly to regulate its conduct. The weakneſs of our reaſon, and the avocations ariſing from the infirmities and neceſſities of our nature, are ſo great, that very few of mankind could have framed thoſe long deductions of reaſon, which may ſhew ſome actions to be, in the whole, advantageous, and their contraries pernicious. The Author of nature has much better furniſhed us for a virtuous conduct than our moraliſts ſeem to imagine; by almoſt as quick and powerful inſtructions, as we have for the preſervation of our bodies: he has made virtue a lovely form, to excite our purſuit of it; and has given us ſtrong affections, to be the ſprings of each virtuous action. Hutcheſon's Inquiry, &c. ubi ſupra. Eſſay on the Nature and Conduct of the Paſſions, p. 5, &c. See Virtue.

Sense, *public*, is defined by the ſame author to be our determination to be pleaſed with the happineſs of others, and to be uneaſy at their miſery. This, he ſays, is found in ſome degree in all men, and was ſometimes called *κοινονοημοσυνη*, or *ſenſus communis*, by ſome of the ancients.

Sense, *common*, is a term that has been variouſly uſed both by ancient and modern writers. With ſome it has been ſynonymous with *public ſenſe*; with others it has denoted prudence; in certain inſtances it has been confounded with ſome of the powers of taſte; and, accordingly, thoſe who commit egregious blunders with regard to decorum, ſaying and doing what is offenſive to their company, and inconſiſtent with their own character, have been charged with a defect in *common ſenſe*. Some men are diſtinguiſhed by an uncommon acuteneſs in diſcovering the characters of others; and this talent has been ſometimes called *common ſenſe*: ſimilar to which is that uſe of the term, which makes it to ſignify that experience and knowledge of life which is acquired by living in ſociety. Hor. lib. i. ſat. 3. lin. 66. To this meaning Quintilian refers, ſpeaking of the advantages of a public education: *Senſum ipſum qui communis dicitur, ubi diſcet, cum ſe a congreſſu, qui non hominibus ſolum, ſed mutis quoque animalibus naturalis eſt, ſegregarit?* Lib. i. cap. 2.

But the term *common ſenſe* hath in modern times been uſed to ſignify that power of the mind which perceives truth, or commands belief, not by progreſſive argumentation, but by an inſtantaneous, inſtinctive, and irreſiſtible impulſe; derived neither from education nor from habit, but from nature; acting independently of our will, whenever its object is preſented, according to an eſtabliſhed law, and, therefore, called *ſenſe*; and acting in a ſimilar manner upon all, or at leaſt upon a great majority of mankind, and, therefore, called *common ſenſe*. The firſt among the moderns, who took notice of this principle as one of the ſprings of our knowledge, was Buſſier, a French philoſopher of the preſent century, in a book entitled Traité des Premières Veritez; and this doctrine hath lately, in our own country, been illuſtrated and maintained by Dr. Reid, Beattie, Oſwald, and Campbell.

In order to evince, that there is a real and eſſential difference between this faculty and that of reaſon, it is obſerved, that we are conſcious, from internal feeling, that the energy of underſtanding, which perceives intuitive truth, is different from that other energy which unites a concluſion with a firſt principle, by a gradual chain of intermediate relations; that we cannot diſcern any neceſſary connexion between reaſon and *common ſenſe*; that the one is more in our power than the other; the faculty of reaſoning being improveable by culture, whereas *common ſenſe*, like other inſtincts, arrives at maturity with almoſt no care of ours, and it is impoſſible to teach *common ſenſe* to one who wants it; though this, like other inſtincts, may languiſh for want of exerciſe; and that a diſtinction, ſimilar to that which is here maintained, is acknowledged by the vulgar, who ſpeak of mother-wit as ſomething different from the deductions of reaſon, and the refinements of ſcience. All ſound reaſoning, it is ſaid, muſt ultimately reſt on the principles of *common ſenſe*; that is, on principles intuitively certain, or intuitively probable; and, conſequently, *common ſenſe* is the ultimate judge of truth, to which reaſon muſt continually act in ſubordination. Thus the advocates for this faculty, as an original and diſtinct power of the human mind, aſſign to it a very extenſive empire, and an authority that is ſupreme and abſolute. And they have proceeded ſo far as to ſubſtitute, in the room of Mr. Locke's abstraction, this faculty as the characteriſtic of rationality. To this they refer the evidence of mathematical truth, of external and internal *ſenſe*, of memory, of reaſoning from the effect to the cauſe, of probable or experimental reaſoning, of analogical reaſoning, of faith in teſtimony, and, indeed, of all primary truths. To *common ſenſe*, therefore, all truth muſt be conformable: this, they ſay, is its fixed and invariable ſtandard. And whatever contradicts *common ſenſe*, or is inconſiſtent with that ſtandard, though ſupported by arguments that are deemed unanſwerable, and by names that are celebrated by all the critics, academies, and potentates on earth, is not truth, but falſhood. In a word, the dictates of *common ſenſe* are, in reſpect to human knowledge in general, what the axioms of geometry are in reſpect to mathematics: on the ſuppoſition that theſe axioms are falſe or dubious, all mathematical reaſoning falls to the ground; and on the ſuppoſition that the dictates of *common ſenſe* are erroneous or deceitful, all truth, virtue, and ſcience, are vain. And hence it appears, that, according to this ſyſtem, *common ſenſe* is not only the teſt of truth, but the ſtandard of moral obligation.

Dr. Prieſtley, in his attack upon this ſyſtem, has charged the abettors of it with an unneceſſary innovation in the received uſe of a term; as no perſon ever denied that there are ſelf-evident truths, and that theſe muſt be aſſumed as the foundation of all reaſoning. But they alſo recommend particular poſitions as axioms, not as being founded on the perception of the agreement or diſagreement of any ideas, which is the great doctrine of Mr. Locke, and which makes truth to depend upon the neceſſary nature of things, to be abſolute, unchangeable, and everlaſting; but merely ſome unaccountable inſtinctive perſuaſions, depending upon the arbitrary conſtitution of our nature, which makes all truth to be a thing that is relative to ourſelves only, and conſequently to be infinitely vague and precarious. This ſyſtem, he ſays, admits of no appeal to reaſon, properly conſidered, which any perſon might be at liberty to examine and diſcuſs; but, on the contrary, every man is taught to think himſelf authorized to pronounce deciſively upon every queſtion, according to his preſent feeling and perſuaſion; under the notion of its being ſomething original, inſtinctive, ultimate, and uncontrovertible; though, if ſtrictly analyſed, it might appear to be a mere prejudice, the offspring of miſtake. Some of the maxims which they have adopted as ſelf-evident truths, and which they have multiplied without neceſſity, are ſo far from being ſelf-evident, that, in the judgment of many ſober and candid enquirers after truth, they are not true, but capable of a ſatisfactory refutation.

At the ſame time, ſince no man can pretend to any natural right to fix the principles of faith for another, they teach unbelievers, and by their example authorize them, to reject the principles of religion by the ſame ſummary and ſuperficial proceſs, as what appear to them to be, at firſt ſight, too abſurd and ridiculous to be admitted as true and divine.

Dr. Prieſtley apprehends, that the inconveniences above mentioned, may attend even the calling of that faculty by which we diſcern truth by the name of *ſenſe*. By this term, philoſophers in general have denominated thoſe faculties, in conſequence of which we are liable to feelings relative to ourſelves only, and from which they have not pretended to draw any concluſions concerning the nature of things; whereas truth is a thing not relative, but abſolute and real, independent of any relation to this or that particular being, or this or that order of beings. Beſides, if the determinations of this new principle of *common ſenſe* be ſo inſtantaneous, irreſiſtible, and infallible, as Dr. Reid, Dr. Beattie, and Dr. Oſwald repreſent, how can we account for all the error there is in the world? Not to add, that this ſyſtem, in its practical influence, tends to prevent the exerciſe of free and unreſtricted enquiry, with regard either to truth or duty; and to promote, in many caſes, the extravagancies of credulity, enthuſiaſm, and myſticiſm. Dr. Prieſtley alſo obſerves, that Dr. Price (in his Review of the Principal Queſtions and Difficulties in Morals. 8vo.) though unnoticed by the writers above cited, by maintaining that the underſtanding is the ſource of many of our moſt important ſimple ideas (ſee Idea), has ſecured all the flattering advantages of the new doctrine of *common ſenſe*, without the capital inconveniences attending it. Like this ſyſtem, his ſcheme cuts off, if it be admitted, all objections to primary moral truths, reſting them on a ſimple appeal to the faculty of intuition; and refuſing to reaſon upon a ſubject, which is maintained to be as evident as the truth of the geometrical axiom, that if equal things be taken from equal things, the remainders will be equal.

If the ideas of moral right and wrong, &c. be perceived by a *ſenſe*, it depends upon our arbitrary conſtitution, that we conceive of them as we do, or whether we perceive them at all; and we have no method whatever of inveſtigating, whether they have any foundation in the abſolute nature of things: whereas by making moral ideas the object of the underſtanding as ſuch, the principles of morality become part of the ſyſtem of neceſſary, eternal, and unalterable truth, perceived by the divine Being as by ourſelves, but altogether independent of his will, as well as of all other beings and things whatſoever; as much ſo as the truth of the axiom above mentioned, or of the propoſition, that two and two make four.

It is added, that theſe writers ſeem even to have borrowed their language, as well as their ideas from Dr. Price, who alſo uſes the term *common ſenſe*, though applied in a different manner. Reid's Enquiry into the Human Mind, on the Principles of *Common Senſe*. 8vo. ed. 2. 1765. Beattie's Eſſay on the Nature and Immutability of Truth. 8vo. ed. 2. 1771. Oſwald's Appeal to Common *Senſe* in behalf of Religion, 8vo. ed. 2. 1768. Campbell's Philoſophy of Rhetoric. 8vo. 1776, vol. i. p. 109, &c. Prieſtley's Examination of Reid, Beattie, and Oſwald, &c. 8vo. 1774. For a farther account of this ſyſtem, ſee Abstraction and Idea.

SENSIBILITY *of the animal fibres*. See Irritability.

SENSIBLE *horizon*, *point*, and *qualities*. See the ſubſtantives.

Sensitive *fluid*. Some have imagined a *ſenſitive fluid* as the principle that preſerves animals from corruption, and to which we owe our ſenſation and motion. This animal fluid paſſes in the proper nervous tubes to the organs of motion; but is contained in the fibrous coats of the nerves to become an organ of ſenſation. This *ſenſitive fluid* is, according to Mr. Le Cat, capable of thinking, and is ſo modified by the ganglions, that what is lodged in each part, is capable of being impreſſed by the object proper to each organ. And from the doctrine concerning this animal fluid, he endeavours to account for moſt operations, which are generally ſaid to depend on the ſoul. Med. Eſſ. Edinb. Abridg. vol. ii. p. 481.

But all theſe attempts to account for ſenſation and thought, from the properties of matter, ſeem to be very deſperate undertakings, not to ſay abſurd.

Sensitive or *ſenſible ſoul*, the ſoul of brutes, or that which man is ſuppoſed to have in common with brutes. See Brute.

It is thus called, either as intimating its utmoſt faculty to be that of ſenſation; or, perhaps, becauſe it is ſuppoſed to be material, and to come under our ſenſes.

Lord Bacon aſſerts, that the *ſenſible* or brute *ſoul* is plainly no more than a corporeal ſubſtance, attenuated by heat, and thus rendered inviſible; or a kind of aura or vapour, partly of an aerial, and partly of a fiery nature, endued with the ſoftneſs of air, to be fit to receive impreſſions, and with the vigour of fire to communicate its action; fed partly with oily matters, and partly with aqueous ones incloſed in the body, and, in the more perfect animals, principally in the head, moving along the nerves, and reſtored and repaired by the ſpirituous blood of the arteries. Bac. de Augment. Scient. lib. v. See Life.

Sensitive *plant*, *mimoſa*, in *Botany*, a genus of the *polygamia monoecia claſs*. Its characters are theſe: the empalement of the flower is ſmall, indented in five parts at the top; the flowers are male and hermaphrodite, included in each head; the male flowers have ten, but the other have ſeldom more than five hairy ſtamina, a ſhort ſlender ſtyle, crowned by a truncated ſtigma; the germen afterward turns to a jointed pod, with ſeveral tranſverſe partitions, incloſing compreſſed roundiſh ſeeds.

Miller enumerates ten, and Linnæus forty-ſix ſpecies.

The ten ſpecies enumerated by Miller are natives of America, and ſo were unknown to the other parts of the world till that was diſcovered; and a few years ago Mr. Miller ſent ſome of the ſeeds of theſe plants to China, which ſucceeded, and occaſioned great admiration in all who ſaw the plants.

There is no particular management which theſe plants require, different from others of the ſame warm countries; the great care muſt be to keep them in a proper temperature of heat, and not to give them too much water, eſpecially in cool weather; nor ſhould they be kept too dry, for many of the ſorts require frequent waterings, as they naturally grow in moiſt places: there ſhould alſo be care taken that they do not root into the tan-bed. Miller.

The *ſenſitive plant* is ſufficiently known to the world for its remarkable property of receding from the touch, and giving ſigns, as it were, of animal life. Philoſophers in general have, however, contented themſelves with admiring the fact, without giving themſelves any trouble about the cauſe.

Mr. Hook, indeed, has made ſome conjectures about it; but the greateſt light that has been given into the thing, is from the inquiries which Meſſrs. du Fay and du Hamel, gentlemen of the Academy of Sciences at Paris, concerted together, and afterwards made ſeparately on different ſhrubs, or at different times, that each might be able to correct the errors of the other.

Botanic writers mention many kinds of *ſenſitive plants*, ſome of which contract at a touch, others with heat, others with cold. The truth is, many, if not moſt, vegetables expand their flowers, down, &c. in warm ſunſhiny weather, and again cloſe them towards even, or in rain, &c. eſpecially at the beginning of flowering, or after the flowers are fallen, whilſt the ſeed is yet young and tender; as is very evident in the down of dandelion, &c. and in the flower of the pimpernel, the opening and ſhutting whereof are the countryman's weather-wiſer; whereby, Gerard ſays, he foretels what weather ſhall follow the next day; for if the flowers be cloſe ſhut up, it betokens rain and foul weather; if they be ſpread abroad, fair weather.

The ſtructure of the *ſenſitive plant* is this: from the large ſtems, or main branches of the whole, there part off ſeveral other leſſer ones, and from theſe there go off others ſtill leſs, which, by way of diſtinction, may be called the ribs of the leaves, as they ſerve to ſupport a number of leaves arranged on each ſide, and ſtanding on ſhort pedicles in pairs, over againſt one other. Several other plants have this ſort of compound leaves, as the caſſia, colutea, and the like; and all theſe ſhut their leaves together at night, and open them again in the morning, in the ſame manner as the *ſenſitive plant* does. This periodical opening and ſhutting of the leaves is therefore common to many plants, not peculiar to the *ſenſitive plant*; but the marvel in this is, that beſide having this motion periodical and regular, it is to be brought on at other times, and by accidents, there requiring no more than the touching the *plant* to make it cloſe its leaves at any time of the day, which it ſoon afterwards naturally opens again. This is peculiar to this *plant*, and reſembles the action of an animal which had been injured or frighted. A cloſe obſervation alſo of the manner in which this is performed, will give many hints towards the finding its cauſe.

It is a very difficult thing to touch the leaf of a vigorous *ſenſitive plant* ſo lightly, as not to make it cloſe: its ſenſation is extremely delicate, and its large rib or nerve, which runs along its middle, is as it were a hinge, on which the two halves of the leaf move when they turn upon being touched, till they ſtand erect, and by that means meet one another.

The ſlighteſt touch imaginable gives this motion to the ſide of the leaf which is touched, which is communicated immediately to the other ſide, or half, and they move together; and if the touch have been a very little rougher, the oppoſite leaf on the ſame rib receives the impreſſion, and cloſes up in the ſame manner with that which was actually touched.

Nor is this all, for when the two ſides of each of theſe leaves move upwards, the pedicle of each half moves upwards at the ſame time, and by this means they in ſome meaſure approach towards each other, and make the angles of their pedicles with the main rib, or ſtalk of the compoſite leaf, leſs than before; and the total motion of each leaf is compoſed of theſe two motions.

If the touch be ſtill rougher, the whole arrangement of leaves on the ſame rib feels its influence on each ſide, and all cloſe in the ſame manner with the ſingle pair in the precedent inſtance; and if the touch be yet ſtronger than this, the rib itſelf feels it, and attempts to cloſe in its way; moving itſelf upwards towards the branch from which it is produced, juſt as the ſingle pedicles of the leaves did towards it: and if the touch be yet more hard and rough, the very branches have the ſenſation propagated to them, and apply themſelves to the main ſtem, or trunk of the ſhrub, as the ſimple leaves did before to their rib, and that rib to the branch; ſo that the whole *plant* in this ſtate forms itſelf from a very complexly branched figure, into a ſort of ſtraight cylindric one. That motion which has, of all others, the greateſt effect upon this *plant*, is a ſhaking one.

Theſe three motions of the *plant* are performed by means of three diſtinct and ſenſible articulations; the firſt that of the ſingle leaf to its pedicle, the ſecond that of the pedicle to its branch, the third that of the branch to the trunk. The primary motion of all which, is the cloſing of the two halves of the leaf upon their rib, which ought alſo to be performed in a ſimilar manner, and by a ſimilar articulation; this, however, is much leſs viſible than the others.

Theſe motions are wholly independent on one another, as may be proved by experiment. It ſhould appear, that if the ſtalks are moved, and collapſe toward the branches, or theſe towards the trunk, that the leaves, whoſe motion is uſually primary to theſe, ſhould be affected alſo; yet experiment proves, that it is poſſible to touch the branches in ſuch a manner, as to affect them only, and make them apply themſelves to the trunk, while the leaves feel nothing of the touch; but this cannot be, unleſs the branches are ſo diſpoſed, as that they can fall to the trunk without ſuffering their leaves to touch any other part of the *plant* in their paſſage, becauſe, if they do, they immediately become affected.

Winds and heavy rains cauſe the *ſenſitive plants* to ſhut up their leaves, while eaſy ſhowers do not at all affect them: it is plain hence, that the agitation of the *plant* by the wind, and the ſtrokes given by the large and haſty drops of rain, are what cauſe the contraction.

By whatever accident the *plant* has been made to cloſe its leaves, it always regularly opens them again afterwards. This, however, requires different times, according to ſeveral circumſtances, as the time of the day, the ſeaſon of the year, and the more and leſs vigorous and healthy ſtate of the *plant*; ſometimes this is done in ten minutes, ſometimes it requires half an hour: and the manner is not leſs different than the time, for ſometimes the leaves unfold themſelves firſt, and ſometimes the branches, whereas ſometimes all is done at once, and the whole *plant* ſeems in motion at a time.

In endeavouring to account for the motions of this *plant*, the gentlemen above named have conjectured that they are performed by means of a ſort of very nice and fine hinges, which communicate one with another by means of very minute and ſlender cords, which occaſion them to act as we ſee when the *plant* is ſufficiently diſturbed, and theſe cords ſhaken; and what gives a ſtrong probability to this conjecture is, that the decayed and dying leaves of the *plant* perform this motion as regularly and vigorouſly, as thoſe which are freſh and full of juice.

It ſeems plain, that while the juices are evaporating, and the parenchymatous ſubſtance of the leaves drying up, theſe more ſolid parts, the lines and cordages, retain their figure; and, conſequently, if it is by means of theſe that the motion is always performed, it will be as well performed in theſe as in the freſher leaves, which could not be the caſe were it owing to the juices.

The natural opening and ſhutting of the leaves of this *plant* at night and morning, are not ſo fixed but that they are variable alſo, according to circumſtances of place, temperature, &c.

In the month of Auguſt, a *ſenſitive plant* was carried in a pot out of its uſual place into a dark cave, the motion that it received in the carriage ſhut up its leaves, and they did not open till twenty-four hours afterwards; at this time they became moderately open, but were afterwards ſubject to no changes at night or morning, but remained three days and nights with their leaves in the ſame moderately open ſtate. At the end of this time they were brought out again in the air, and then recovered their natural periodical motions, ſhutting every night and opening every morning, as naturally and as ſtrongly, as if it had not been in this forced ſtate; and while in the cave, it was obſerved to be very little leſs affected with the touch than when abroad in the open air.

Repeated experiments have proved, that it is not the light of the day that opens the leaves of this *plant*, nor the darkneſs of the night that cloſes them; neither is it the alternate warmth of the day and cold of the night, that have this effect, ſince it ſhuts in nights which are much warmer than the days often are in which it opens; and the increaſing the heat of the place in which it is kept, and marking the increaſe or decreaſe on the thermometer, have been found to have not the leaſt effect, as to its ſooner or later opening or ſhutting its leaves.

The moſt probable conjecture ſeems, that it is not great heat, or great cold, ſuch as it can bear, that bring on this effect, but the ſudden change from one to the other, and this is confirmed by this experiment, that if one of theſe *plants* be raiſed under a glaſs bell, or caſe, and the bell or covering be taken off, it immediate cloſes, even though it be in the middle of the day; and this is alſo obſerved, that the more open or expoſed the *plant* ſtands, the more ſtrong and lively are its ſhutting and opening; and that they are moſt obſervable in ſummer, and much leſs ſo when it is kept in a cloſe ſtove in winter.

The great heats of ſummer, when there is open ſunſhine at noon, affect the *plant* in ſome degree like cold, cauſing it to ſhut up its leaves a little, but never in any very great degree. The *plant*, however, is leaſt of all affected about nine o' clock in the morning, and that is conſequently the propereſt time to make experiments on it.

A branch of the *ſenſitive plant* cut off, and laid by, retains yet its property of ſhutting up and opening in the morning for ſome days; and it holds it longer if kept with one end in water than if left to dry more ſuddenly.

The leaves only of the *ſenſitive plant* ſhut up in the night, not the branches; and if it be touched at this time, the branches are affected in the ſame manner as in the day, ſhutting up, or approaching to the ſtalk or trunk, in the ſame manner, and often with more force. It is of no conſequence what the ſubſtance is with which the *plant* is touched, it anſwers alike to all; but there may be obſerved a little ſpot, diſtinguiſhable by its paler colour in the articulations of its leaves, where the greateſt and niceſt ſenſibility is evidently placed.

The *ſenſitive plant* plunged into water immediately cloſes its leaves, which is partly owing to the touch, partly to the coldneſs of the water; afterwards the leaves expand again, and if they are then touched, cloſe again as before, as if in the open air, only that they do it with leſs force.

If the end of one of the leaves be burning with the flame of a candle, or by a burning glaſs, or touching it with hot iron, it cloſes up in a moment, and the oppoſite leaf does the ſame, and after that the whole ſeries of leaves on each of the rib, then the rib itſelf, then the branch, all do the ſame, if the burning has been in a ſufficient degree. This proves that there is a very nice communication between all the parts of the *plant*, by means of which the burning, which only is applied to the extremity of one leaf, diffuſes its influence through ever part of the ſhrub.

If a drop of aqua fortis be carefully laid upon a leaf of the *ſenſitive plant*, ſo as not to ſhake it in the leaſt, the leaf does not begin to move till the acid liquor corrodes the ſubſtance of it; but at that time, not only that particular leaf, but all the leaves placed on the ſame rib, cloſe themſelves up. The vapour of burning ſulphur has alſo this effect on many leaves at once, according as they are more or leſs expoſed to it; but a bottle of very acrid and ſulphureous ſpirit of vitriol, placed under the branches unſtopped, produces no ſuch effect.

The wetting the leaves with ſpirit of wine has been obſerved alſo to have no effect, nor the rubbing oil of almonds over them; though this laſt application deſtroys many *plants*.

A branch of the *plant* was cut away longitudinally, till only a third part of the ſubſtance remained, yet it communicated the effects of the touch, in the ſame manner as before, to thoſe branches which aroſe lower on the ſhrub. The tranſpiration of the *plant* being retarded, is of no effect as to its periodical opening and cloſing; for one kept under a cloſe glaſs bell ſhuts and opens as regularly night and morning, as when it ſtands in an open green-houſe. A branch of it put into the exhauſted receiver of an air pump, is found to have its force of opening and cloſing up much impaired, but not wholly taken off. Mem. de l'Acad. des Scienc. Par. 1736.

Dr. Hill, notwithſtanding the experiments and obſervations above recited, conſiders the phenomenon of the *ſenſitive plant* as the effect of light, and in an expreſs diſſertation on this ſubject, endeavours to account for it from this principle; aſcribing that other phenomenon, which is called the *ſleep of* PLANTS, to the abſence of light. Hill's Sleep of Plants, and the Cauſe of Motion in the *Senſitive Plant* explained, 12mo.

A ſatisfactory explication of this phenomenon ſeems to be ſtill among the deſiderata of ſcience.

Mr. Ellis has lately deſcribed a *ſenſitive plant*, which is a native of the ſwamps in North Carolina, called *dionæa muſcipula*, or *Venus's fly-trap*, and which, from his account of it, appears to be the moſt animated of the whole *ſenſitive* tribe of vegetables. Its ſenſibility exiſts in its leaves, each of which exhibits, in miniature, the figure of a rat-trap with teeth cloſing on every fly or other inſect that is tempted to taſte the ſweet liquor which is ſuppoſed to be ſecreted in certain minute red glands that cover its inner ſurface; but before it has had time to taſte it, the lobes of the leaves riſe up, and incloſe and graſp the invader, and he is ſoon deprived of his life by the action of three ſmall erect ſpines, fixed near the middle of each lobe; nor do the leaves open again while the dead animal continues there. The ſame effect is produced by a ſtraw or pin.

Mr. Ellis conjectures, that in the conſtruction and motive powers of this plant, nature may have had ſome view to its nouriſhment, by forming the upper joint of each leaf like a machine to catch food, and by having laid a bait upon the middle of it, to entice the unhappy inſect that becomes its prey. But, perhaps, it may be equally probable, that nature has armed and animated this plant for the preſervation of its juices againſt the depredation of inſects. Ellis's Directions for bringing over Seeds and Plants, &c. 1770.

SENSITIVE *plant, baſtard*. See ÆSCHYNOMENE.

SENSORY, SENSORIUM *commune*, the ſeat of the common ſenſe, or that part or place where the ſenſible ſoul is ſuppoſed more immediately to reſide.

The *ſenſory* is ſuppoſed to be that part of the brain wherein the nerves, from all the organs of ſenſe, terminate; which is generally allowed to be about the beginning of the medulla oblongata: Des Cartes will have it in the conarion or pineal gland.

Sir Iſaac Newton deſcribes the *ſenſory* of animals as the place to which the ſenſible ſpecies of things are carried through the nerves and brain, that they may be there perceived by their immediate preſence to the ſoul. The organs of ſenſe are not intended for enabling the ſoul to perceive the ſpecies of things in its *ſenſory*: but only for conveying them thither.

The ſame great author conſiders the univerſe as the *ſenſory* of the godhead.

SENTENCE, in *Law, doom*; a judgment paſſed in court by the judge upon ſome proceſs either civil or criminal.

Sentences are either *definitive*, which put an end to the ſuit and controverſy, and regard the principal matter in queſtion; or *interlocutory*, which determine only ſome incidental matter; *contradictory*, &c.

There are *ſentences* of abſolution, excommunication, &c.

Superior judges may either confirm or annul the *ſentences* of inferior ones.

Every *ſentence* muſt be in writing, on a double ſix-penny ſtamp, and it muſt be pronounced in the preſence of both parties; otherwiſe *ſentence* given in abſence of one of the parties is void.

SENTENCES, *three conformable, tres ſententiæ conformes*: in the Romiſh *Eccleſiaſtical Law*, it is allowed to appeal three times; ſo that there muſt be *three conformable ſentences* before the deciſions of the judges can take effect. The firſt degree of juriſdiction is in the biſhop's official; from him an appeal lies to the metropolitan, and from the metropolitan to the primate, or immediately to the pope. If the appeal come from the metropolitan to the pope, the pope is obliged to delegate judges *in partibus*: and then if the three *ſentences* paſſed in theſe three ſtages be *conformable*, there is no farther appeal; but if one of them annul another, new judges are to be required of the pope for a fourth *ſentence*; and thus they ſometimes proceed to a ſixth or ſeventh *ſentence*.

This number of juriſdictions is found infinitely prejudicial to the public, and vexatious to private perſons.

SENTENCE, in *Grammar*, denotes a period, or a ſet of words comprehending ſome perfect ſenſe or ſentiment of mind.

Every *ſentence* comprehends at leaſt two words.

Mr. Harris, in his Hermes, p. 17, &c. conſidering that the leading powers of the ſoul are thoſe of perception and volition, obſerves, that every *ſentence*, in its reference to theſe powers, will be either a *ſentence* of aſſertion, or a *ſentence* of volition: and he deſcribes it as a compound quantity of ſound ſignificant, of which certain parts are themſelves alſo ſignificant. Thus he diſtinguiſhes a *ſentence* from a WORD, which is a ſound ſignificant of which no part is of itſelf ſignificant.

The buſineſs of pointing is, to diſtinguiſh the ſeveral parts and members of *ſentences*, ſo as to render the ſenſe thereof the cleareſt, apteſt, and fulleſt poſſible. See PUNCTUATION.

In every *ſentence* there are two parts neceſſarily required; a noun for the ſubject, and a definite verb; whatever is found more than theſe two, affects one of them, either immediately, or by the intervention of ſome other, whereby the firſt is affected.

Again, every *ſentence* is either ſimple or conjunct: a *ſimple ſentence* is that conſiſting of one ſingle ſubject, and one finite verb. A *conjunct* or compounded *ſentence* contains ſeveral ſubjects, and finite verbs, either expreſly or implicitly; or it conſiſts of two or more ſimple *ſentences* connected together.

A ſimple *ſentence* needs no point or diſtinction, only a period to cloſe it; as, *A good man loves virtue for itſelf.* In ſuch a *ſentence*, the ſeveral adjuncts affect either the ſubject, or the verb, in a different manner. Thus the word *good* expreſſes the quality of the ſubject, *virtue* the object of the action, and, *for itſelf*, the end thereof. Now none of theſe adjuncts can be ſeparated from the reſt of the *ſentence*; for if one be, why ſhould not all the reſt? And if all be, the *ſentence* will be minced into almoſt as many parts as there are words.

But if ſeveral adjuncts be attributed in the ſame manner either to the ſubject, or the verb; the *ſentence* becomes conjunct, and is to be divided into parts.

In every conjunct *ſentence*, as many ſubjects, or as many finite verbs, as there are, either expreſſed or implied, ſo many diſtinctions may there be. Thus *My hopes, fears, joys, pains, all centre in you*; and thus Cicero, *Catilina abiit, exceſſit, evaſit, erupit*. The reaſon of which pointing is obvious; for as many ſubjects or finite verbs as there are in a *ſentence*, ſo many members does it really contain; whenever, therefore, there occur more nouns, than verbs, or contrariwiſe, they are to be conceived as equal; ſince, as every ſubject requires its verb, ſo every verb requires its ſubject, wherewith it may agree, excepting, perhaps, in ſome figurative expreſſions.

Indeed there are ſome other kinds of *ſentences* which may be ranked amongſt the conjunct kind, particularly the abſolute *ablative*, as it is called. Thus, *Phyſicians, the diſeaſe once diſcovered, think the cure half wrought*; where the words, *diſeaſe once diſcovered*, are equivalent to, *when the cauſe of the diſeaſe is diſcovered.*—So alſo in nouns added by appoſition, as, *The Scots, an hardy people, endured it all*; ſo alſo in vocative caſes and interjections, as, *This, my friend, you muſt allow me*: and, *What, for heaven's ſake! would he be at?*

The caſe is much the ſame, when ſeveral adjuncts affect either the ſubject of the *ſentence* or the verb in the ſame manner, or at leaſt ſomething whereby one of them is affected, as *A good, wiſe, learned man is an ornament to the commonwealth*: where the ſeveral adjectives, denoting ſo many qualities of the ſubject, are to be ſeparated from one another. Again, when I ſay, *Your voice, countenance, geſture, terrified him*, the ſeveral nominative caſes denote ſo many modes of the verb, which are likewiſe to be diſtinguiſhed from each other. The caſe is the ſame in adverbs, as, *He behaved himſelf modeſtly, prudently, virtuouſly.* In the firſt example, the adjuncts immediately affect the ſubject; in the third, the verb; in the following one, another adjunct, as, *I ſaw a man loaden with age, ſickneſs, wounds.*

Now, as many ſuch adjuncts as there are, ſo many ſeveral members does the *ſentence* contain; which are to be diſtinguiſhed from each other, as much as ſeveral ſubjects, or finite verbs; and that this is the caſe in all conjunct *ſentences*, appears hence, that all theſe adjuncts, whether they be verbs or nouns, &c. will admit of a conjunction copulative, whereby they may be joined together. And, wherever there is a copulative, or room for it, there a new member of a *ſentence* begins. For the other partitions, &c. of *ſentences*, ſee COLON, SEMICOLON, and PERIOD.

SENTENCE is alſo uſed, in *Rhetoric* and *Poetry*, for a ſhort pithy remark, or reflection, containing ſome ſentiment of uſe in the conduct of life.

Such are, *Diſcite juſtitiam moniti, & non temnere divos*; or, *A teneris aſſueſcere multum eſt*, &c.

Sentences, father Boſſu obſerves, render poems uſeful; and beſides, add I know not what luſtre and ſpirit, which pleaſes. But there is no virtue which is not accompanied with ſome dangerous vice. Too many *ſentences* give a poem too philoſophical an air, and ſink it into a kind of gravity; this is leſs fit for the majeſty of a poem, than the ſtudy of a learned man, and the quaintneſs of a dogmatiſt. Such thoughts not only contain, but inſpire a certain calm wiſdom, which is directly oppoſite to the paſſions, and cools them both in the hearers and in the ſpeaker. Laſtly, the affectation of ſpeaking *ſentences* leads a perſon to trifling and impertinent ones, inſtances whereof we have in abundance in Seneca's tragedies. Petronius recommends it to authors to diſguiſe their *ſentences*, that they may not ſtand glaring above the thread or ground of the diſcourſe.

SENTIMENTS, in *Poetry*, and particularly dramatic, are the thoughts which the ſeveral perſons expreſs, whether they relate to matters of opinion, paſſion, buſineſs, or the like.

The manners form the tragic action, and the *ſentiments* explain it, diſcovering its cauſes, motives, &c. The *ſentiments* are to the manners, what thoſe are to the fable. In the *ſentiments*, regard is to be had to nature and probability; a madman, for inſtance, muſt ſpeak as a madman; a lover as a lover; a hero as a hero. The *ſentiments*, in great meaſure, are to ſuſtain the character.

The word *ſentiment*, in its true and old Engliſh ſenſe, ſignifies, *a formed opinion, notion, or principle*; but of late years, it has been much uſed by ſome writers to denote an internal impulſe of paſſion, affection, fancy, or intellect, which is to be conſidered rather as the cauſe or occaſion of our forming an opinion than as the real opinion itſelf.

SENTINEL, CENTRY, or *ſentry*, in *War*, a private ſoldier placed in ſome poſt to watch any approach of the enemy, to prevent ſurprizes, and to ſtop ſuch as would paſs without orders, or without diſcovering who they are. They are placed before the arms of all guards, at the tents and doors of general officers, colonels of regiments, &c.

The word is modern; it is not long ſince they ſaid, *To be on the ſcout*, in the ſame ſenſe as we now ſay, *To ſtand ſentry*, &c. Menage derives the word *a ſentiendo*, from *perceiving*.

Sentinel perdue, is a *ſentinel* placed at ſome very advanced and dangerous poſt, whence it is odds that he never returns. See PERDUE.

The *ſentinel's* word, when he challenges is, *Who is there? Qui vive*, or *Qui va la! Stand! Demure la!*

SEPARABLE *modes*. See MODE.

SEPARATE *affection*. See AFFECTION.

SEPARATE, *penultimate of the*. See PENULTIMATE.

SEPARATION, in *Navigation*, the ſame with what we more uſually call DEPARTURE.

SEPARATION *of man and wife*. See DIVORCE.

SEPARATION, *waters of*. See WATER.

SEPARATISTS, a religious ſect in England, ſo denominated from their ſetting up a *ſeparate* church, in oppoſition to that eſtabliſhed by law. See DISSENTERS, &c.

At preſent *ſeparatiſts* is rather the name of a collection of ſects than of any particular one; but nearer their original, there was that agreement among them, that one name ſerved them all.

Their diviſion into PRESBYTERIANS, ANABAPTISTS, INDEPENDENTS, &c. is a more modern thing.

The *ſeparatiſts*, Hornius tells us, Hiſt. Eccl. are ſuch as under Edward VI. Elizabeth, and James I. refuſed to conform to the church of England, and who were firſt called PURITANS, then *ſeparatiſts*, and laſtly, NONCONFORMISTS.

The firſt leader of the *ſeparatiſts* was Bolton, who, upon quitting the party he had formed, was ſucceeded by Robert Brown, from whom the *ſeparatiſts* were called BROWNISTS.

SEPARATRIX, in *Arithmetic*, denotes the point, or comma, which ſeparates and diſtinguiſhes decimals from integers; thus, 465,32 or 465.32.

SEPHALITES. See MOATAZALITES.

SEPHIROS, a word uſed by Paracelſus and his followers, to expreſs a ſort of dry and hard impoſthume, or kind of ſpurious ſcirrhus.

SEPHIROTH, a Hebrew word ſignifying *brightneſſes*; and the cabaliſts give the name of *ſephiroth* to the moſt ſecret parts of their ſcience.

SEPIACE, in the *Italian Muſic*, ſignifies that the part it is joined to, may be repeated or not, at pleaſure.

SEPIA, in the *Linnæan Syſtem*, a genus of the MOLLUSCA *worms*, comprehending five ſpecies. The characters of this genus are, that it has eight arms placed round the mouth, with ſmall concave diſcs on their inſides, and often two long tentacula; the mouth is formed like a horny beak; the eyes are placed beneath the tentacula; the body is fleſhy, with a ſheath for the breaſt, and a tube at the baſe of the breaſt. See CUTTLE-*fiſh*, and CUTTLE-*bone*.

SEPS, in *Zoology*, the name of a very peculiar animal of the lizard or LACERTA kind, but ſeeming as if of a middle nature between that genus and the ſnakes, and appearing rather a ſerpent with feet than a lizard. See *Tab. of Serpents*, Nº 31.

It is a ſmall ſpecies; its body is rounded, and its back variegated with longitudinal lines of black; its eyes are black; it has ears, and a ſmall and very ſlender tail. What appears moſt ſingular in it is, that it has four legs, with feet divided into toes; the firſt pair are placed very near the head, the other by the anus; the ſcales are laid in a reticulated manner, they are of an oblong figure, approaching to a rhomboides, and laid longitudinally; its belly is white, with a ſlight caſt of blue, and it has noſtrils near the end of the ſnout. Columna took five living young ones out of the body of one of this ſpecies, ſome of which were included in membranes, and others looſe, as is the caſe in the fœtus found in the viper.

The bite of the *ſeps* is ſaid to occaſion an inſtant putrefaction of the fleſh of the whole body.

SEPTA, in *Antiquity*, were incloſures, or rails made of boards, through which perſons went in to give their votes in the aſſemblies of the Romans.

The word alſo ſignifies diviſions, and, in that ſenſe, is uſed to expreſs the plates of ſpar, which ſeparate or divide the tali of the LUDUS *Helmontii*, thence called by Dr. Hill, SEPTARIÆ.

SEPTANA, a word uſed by the ancient phyſicians for a ſeptenary fever, or one that performs its regular period in ſeven days.

SEPTARIÆ, in *Natural Hiſtory*, the name of a large claſs of FOSSILS, called by ſome LUDUS *Helmontii*, and by others the *waxen veins*. They are defined to be foſſile bodies not inflammable, nor ſoluble in water, naturally found in looſe detached maſſes of a moderately firm texture and duſky hue, divided by ſeveral *ſepta*, or thin partitions, and compoſed of a ſparry matter greatly debaſed by earth, not giving fire with ſteel, fermenting with acids, and in great part diſſolved by them, and calcining in a moderate fire.

Of this claſs there are two diſtinct orders of bodies, and under thoſe ſix genera. The *ſeptariæ* of the firſt order are thoſe which are uſually found in large maſſes of ſimple uniform conſtruction, but divided by large *ſepta*, either into larger or more irregular portions, or into ſmaller and more equal ones, called *talc*.

Thoſe of the ſecond order are ſuch as are uſually found in ſmaller maſſes of a cruſtated ſtructure, formed by various incruſtations round a central nucleus, and divided by very thin *ſepta*.

SEPTAS, in *Botany*, a genus of the *heptandria heptagynia* claſs. Its characters are, that the empalement is divided into ſeven ſegments; that the flower has ſeven petals; that it has ſeven germina, which become ſo many polyſpermous capſules. There only is one ſpecies.

SEPTEMBER, the ninth month of the year, reckoned from January, and the ſeventh from March, whence its name, viz. from *ſeptimus*, *ſeventh*.

The Roman ſenate would have given this month the name of *Tiberius*, but that emperor oppoſed it; the emperor Domitian gave it his own name *Germanicus*; the ſenate under Antoninus Pius gave it that of *Antoninus*; Commodus gave it his ſurname *Herculeus*, and the emperor Tacitus his own name *Tacitus*. But theſe appellations are all gone into diſuſe.

SEPTEMVIR, in *Antiquity*. See QUINQUEVIR.

The Germans ſometimes uſe the word *ſeptemvirate*, for the ſeven electors of the empire. See ELECTOR.

SEPTENTRIO, or SEPTENTRIONES, in *Aſtronomy*, a northern conſtellation of ſtars, more uſually called URSA *Minor*, or the *Little Bear*; and by the people *Charles's Wain:* though the ſeven ſtars in the *Great Bear* have been of late ſo denominated.

The word is formed from the Latin *ſeptem*, *ſeven*; and *triones*, *bullocks*, which, in the ancient conſtellation, were yoked to the plough.

SEPTENTRIO, in *Coſmography*, the ſame with *north*; thus called from the ancient conſtellation *Septentrio*, one of whoſe ſtars is the pole-ſtar. Hence alſo

SEPTENTRIONAL, SEPTENTRIONALIS, ſomething belonging to the *north*; as *ſeptentrional ſigns*, *ſeptentrional parallels*, &c. are thoſe on the northern ſide of the equator.

SEPTERION, Σεπτηριον, in *Antiquity*, a Delphic feſtival, celebrated every ninth year, in memory of Apollo's victory over Python. The chief part of the ſolemnity was a repreſentation of Python purſued by Apollo.

SEPTFOIL, in *Botany*. See TORMENTIL.

SEPTICS, among *Phyſicians*, an appellation given to all ſuch ſubſtances as promote PUTREFACTION.

From the many curious experiments made by Dr. Pringle to aſcertain the *ſeptic* and *antiſeptic* virtues of natural bodies, it appears that there are very few ſubſtances of a truly *ſeptic* nature. Thoſe commonly reputed ſuch by authors, as the alkaline and volatile ſalts, he found to be no wiſe *ſeptic*. However, he diſcovered ſome, where it ſeemed leaſt likely to find any ſuch quality; theſe were chalk, common ſalt, and teſtaceous powders. He mixed twenty grains of crab's eyes, prepared with ſix drams of ox's gall, and an equal quantity of water. Into another phial he put an equal quantity of gall and water, but no crab's eyes. Both theſe mixtures being placed in the furnace, the putrefaction began much ſooner, where the powder was, than in the other phial. On making a like experiment with chalk, its *ſeptic* virtue was found to be much greater than that of the crab's eyes: nay, what the doctor had never met with before, in a mixture of two drams of fleſh, with two ounces of water and thirty grains of prepared chalk, the fleſh was reſolved into a perfect mucus in a few days.

To try whether the teſtaceous powders would alſo diſſolve vegetable ſubſtances, the doctor mixed them with barley and water, and compared this mixture with another of barley and water alone. After a long maceration by a fire, the plain water was found to ſwell the barley, and turn mucilaginous and ſour; but that with the powder kept the grain to its natural ſize, and though it ſoftened it, yet made no mucilage, and remained ſweet.

Nothing could be more unexpected, than to find ſeaſalt a haſtener of putrefaction; but the fact is this: one dram of ſalt preſerves two drams of freſh beef in two ounces of water, above thirty hours uncorrupted, in a heat equal to that of the human body; or, which is the ſame thing, this quantity of ſalt keeps fleſh ſweet twenty hours longer than pure water; but then half a dram of ſalt does not preſerve it above two hours longer. Twenty-five grains have little or no antiſeptic virtue, and ten, fifteen, or even twenty grains, manifeſtly both haſten and heighten the corruption. The quantity which had the moſt putrefying quality, was found to be about ten grains to the above proportion of fleſh and water.

Many inferences might be drawn from this experiment: one is, that ſince ſalt is never taken in aliment beyond the proportion of the corrupting qualities, it would appear that it is ſubſervient to digeſtion, chiefly by its *ſeptic* virtue, that is, by ſoftening and reſolving meats; an action very different from what is commonly believed.

It is to be obſerved, that the above experiments were made with the ſalt kept for domeſtic uſes. See Pringle's Obſerv. on the Diſeaſes of the Army, p. 348, ſeq. See SALT and SCURVY.

From ſome experiments of Mr. Canton, it appears likewiſe, that the quantity of ſalt contained in ſea-water, haſtens putrefaction; but ſince that preciſe quantity of ſalt which promotes putrefaction the moſt, is leſs than that which is found in ſea-water, he concludes it probable, that if the ſea were leſs ſalt, it would be more luminous. See *Luminouſneſs of the* SEA.

SEPTIER, or SETIER, a French meaſure, differing according to the ſpecies of the things meaſured. For liquors, the *ſeptier* is the ſame thing with the chopine or half pint.

For dry meaſure, the *ſeptier* is very different in different places, and different commodities; as not being any veſſel of meaſure, but only an eſtimation of ſeveral other meaſures.

At Paris the *ſeptier* of wheat conſiſts of two mines, the mine of two minots, and the minot of three buſhels.

The *ſeptier* of oats is double that of wheat. See MEASURE.

SEPTIMONTIUM, among the Romans, a feſtival celebrated in December on all the ſeven hills of Rome; whence alſo it had this name, being otherwiſe called AGONALIA.

SEPTIZON, SEPTIZONIUM, in the *Ancient Architecture*, a term almoſt appropriated to a famous mauſoleum of the family of the Antonines, which, Aur. Victor tells us, was built in the tenth region of the city of Rome, being a large inſulated building, with ſeven ſtages or ſtories of columns.

The plan was ſquare, and the upper ſtories of columns, falling back much, rendered the pile of a pyramidical form, terminated atop with the ſtatue of the emperor Septimius Severus, who built it.

It had its name *ſeptizon*, *ſeptizonium*, from *ſeptem* and *zona*, q. d. ſeven zones or girdles, by reaſon of its being girt with ſeven rows of columns.

Hiſtorians make mention of another *ſeptizon*, more ancient than that of Severus, built near the Thermæ of Antoninus.

SEPTUAGESIMA, in the *Calendar*, denotes the third Sunday before Lent, or before quadrageſima; and quinquageſima is the next before quadrageſima, then ſexageſima, and *ſeptuageſima:* theſe were all days appropriated by the church to acts of penance and mortification, by way of preparing for the devotion of the lent enſuing.

It is ſuppoſed by ſome to take its name from its being about ſeventy days before Eaſter: pope Teleſphorus firſt made it a feaſt-day, and appointed lent to commence from it.

The laws of king Canutus ordained a vacation from judicature, from *ſeptuageſima* to *quindena paſchæ*. See QUINQUAGESIMA. From *ſeptuageſima* to the octaves after Eaſter, marriage is forbidden by the canon law.

SEPTUAGINT, LXX, or the SEVENTY, a term famous among divines and critics, for a verſion of the Old Teſtament out of Hebrew into Greek, ſaid to have been performed by ſeventy-two Jewiſh interpreters, in obedience to an order of Ptolemy Philadelphus.

The ancients, till Jerom's time, univerſally believed, that the *Seventy* were inſpired perſons, not mere tranſlators, grounding their belief on a fabulous hiſtory of this verſion given by Ariſteas; who tells us, that the high-prieſt Eleazar choſe ſix doctors out of each tribe for this office, which made the number of ſeventy-two; and that theſe being ſhut up each in his ſeveral cell, each tranſlated the whole; and without ſeeing what any of the reſt had done, they were found to agree to a letter.

The learned Dr. Hody, De Bibliorum Textibus Originalibus, &c. who ſeems to have ſtudied the origin of the Greek verſion more accurately than any critic before him, has laboured very ſucceſsfully in detecting the falſe ſtory of Ariſteas; and he has likewiſe proved, that this verſion was made by the Jews living at Alexandria, for the uſe of themſelves and many thouſands of their brethren, who were then ſettled in Egypt, and who, living among the Greeks, generally uſed the Greek language. And he has alſo proved, that the whole Hebrew Bible was not tranſlated into Greek at once, but that different parts were tranſlated at different times: that the Pentateuch was tranſlated firſt, about 285 years before Chriſt; that only the Pentateuch was read in the ſynagogues till about 170 years before Chriſt, when Antiochus Epiphanes, their cruel perſecutor, forbad them to recite any part of the law; that ſoon after this prohibition, the Jews tranſlated into Greek Iſaiah, and the following prophets, for the uſe of the temple at Heliopolis and the Alexandrian ſynagogues; and that the other books were tranſlated afterwards, with different degrees of ſkill and care, at various times, and by various perſons. See alſo on this ſubject Prideaux's Connect. vol. iii. p. 38, &c. See Alexandrian *Copy* and *Greek* Bible.

Septuagint, *chronology of the*, or Seventy, is an account of the years of the world, very different from what is found in the Hebrew text, and the Vulgate; making the world 1466 years older than it is found in theſe latter.

The critics are much divided as to the point of preference. Baronius prefers the account of the *Seventy*; and Iſ. Voſſius makes an apology for it. The two lateſt and moſt ſtrenuous advocates in this diſpute, are father Pezron, a Bernardine, and father le Quien, a Dominican; the firſt of whom defends the chronology of the *Septuagint*, and the latter that of the Hebrew text. See *Sacred* Chronology.

SEPTUM, in *Anatomy*, a term literally ſignifying an incloſure or partition, applied to ſeveral parts of the body, which ſerve to ſeparate one part from another.

Septum *lucidum*, or *pellucidum*, is a partition ſeparating the two upper ventricles of the BRAIN, thus called as being tranſparent.

Septum *medium*, or *cordis*, is a ſeparation between the two ventricles of the HEART. It is about a finger thick, fleſhy, and of the ſame ſubſtance with the heart itſelf, conſiſting of muſcular fibres, which aſſiſt it in its motions. Some have imagined it to be preforated with a great number of holes, but miſtakenly.

Septum *tranſverſum* is the ſeparation of the two bellies or ventres, called alſo DIAPHRAGM.

Septum *narium*, the partition of the NOSTRILS. See Nose.

Septum *bulbi* divides the bulb of the URETHRA lengthwiſe.

Septum *gallinaginis*. See Caput *Gallinaginis*.

Septum *clitoridis*, a membranous partition running all along between the two corpora cavernoſa of the CLITORIS, from the glans to its divarication at the os pubis.

Septum *ſcroti*. See Scrotum.

SEPULCHRAL, Sepulchralis, ſomething belonging to ſepulchres or tombs.

Sepulchral *column*. See Column.

Sepulchral *inſcriptions*, are the ſureſt monuments we have of antiquity.

Sepulchral *lamps*. See Lamp.

Sepulchral, or Sepulchralis, is alſo the appellation of a ſect; thus called from their ſuppoſed principal error, which was that by the word *hell*, whither the Scripture tells us Jeſus Chriſt deſcended after his death, they underſtood no more than his grave or ſepulchre. See Hell.

Sepulchralis *pecunia*. See Pecunia.

SEPULCHRE, Sepulchrum, a tomb, or place deſtined for the interment of the dead.

The term is chiefly uſed in ſpeaking of the burying-places of the ancients; thoſe of the moderns we uſually call TOMBS.

Beſides the uſual *ſepulchres* for the interment, either of the whole body, or of the aſhes of the body burnt, the ancients had a peculiar kind, called *cenotaphia*, being empty *ſepulchres* made in honour of ſome perſons, who, perhaps, had no burial at all; from a ſuperſtitious opinion, that the ſouls of thoſe who wanted burial, wandered a hundred years before they were admitted to paſs into the Elyſian fields. See Burial and Cenotaph.

The PYRAMIDS are ſuppoſed to have been built as *ſepulchres* for the kings of Egypt. And the OBELISKS had generally the ſame intention.

Sepulchres were held ſacred and inviolable, and the care taken thereof was deemed a religious duty, grounded on the fear of God, and the belief of the ſoul's immortality. Thoſe who ſearched or violated them, have been odious to all nations, and always ſeverely puniſhed.

The Egyptians called their *ſepulchres*, *eternal houſes*, in contradiſtinction to their houſes and palaces, which they called *inns*; by reaſon of the ſhort ſojourn we have in the one, in compariſon of our long ſtay in the other.

The eaſtern pilgrimages are all made with deſign to viſit the holy *ſepulchre*, that is, the tomb of Jeſus Chriſt. Nobody enters here but bare-footed, and with abundance of ceremonies. The Turks exact twenty-four crowns of each pilgrim, whom devotion carries to the holy *ſepulchre*.

Sepulchre, St. or the *Holy Sepulchre*, gives the denomination to an order of regular canons, anciently inſtituted in Jeruſalem, in honour of the holy *ſepulchre*.

They aſcribe their inſtitution to Godfrey of Boulogne, who, they ſay, upon his taking Jeruſalem in the year 1099, placed canons in the patriarchal church of the Holy *Sepulchre*, which indeed is true, but then they were not regulars. In effect it was Arnoul, who, of archdeacon of the church of Jeruſalem, got himſelf elected patriarch thereof, that, in 1114, firſt obliged his canons to live in community, and to follow the rule of St. Auguſtine.

From the Holy Land numbers of theſe canons were brought into Europe, particularly into France by Louis the Younger; into England by king Henry; into Poland by Jaxa, a Poliſh gentleman; and into Flanders by the counts thereof.

But the order was afterwards ſuppreſſed by Innocent VIII. and its effects given to that of our lady of Bethlehem, which itſelf ceaſing, they were beſtowed in 1484, on that of the knights of St. John of Jeruſalem; but the ſuppreſſion did not take place in Poland, nor in ſeveral provinces of Germany, where they ſtill ſubſiſt: their general is in Poland; their habit, father Helyot obſerves, has been different in different places.

Sepulchre, St. or the *Holy Sepulchre*, is alſo the name of a military order, eſtabliſhed in Paleſtine, as ſome ſay, by Godfrey of Boulogne, but according to others, by his ſucceſſor, Baldwin.

However, it is certain, there were none but canons in the church of St. *Sepulchre*, till the year 1114; and it is no more than probable, the knights were only inſtituted upon the ruins of the canons, four hundred years after, and that by pope Alexander VI. in order to excite rich and noble perſons to viſit the holy places, by giving them the title of *Knights of the Holy Sepulchre*, and to this end, inſtituting an order under that name, whereof he reſerved the quality of maſter to himſelf and his ſucceſſors.

Leo X. and Clement VII. granted to the guardian of the religious of St. Francis, in the Holy Land, the power of making theſe knights; which power, firſt granted *viva voce*, was afterwards confirmed by a bull of Pius IV. In 1558, the knights of this order in Flanders, choſe Philip II. king of Spain, their maſter, and afterwards his ſon; but the grand-maſter of the order of Malta prevailed on him to reſign; and when afterwards the duke Nevers aſſumed the ſame quality in France, the ſame grand-maſter, by his intereſt and credit, procured a like renunciation of him, and a confirmation of the union of this order to that of Malta.

SEPULCHRI *pretium*. See Pretium.

SEQUATUR *ſub ſuo periculo*, a writ that lies when a *ſummons ad warrantizandum* is awarded, and the ſheriff returns that the party hath nothing whereby he may be ſummoned; then goes forth an *alias* and a *pluries*; and if he comes not on the *pluries*, this writ ſhall iſſue.

SEQUEL, Sequela, in *Logic*, a conſequence drawn from ſome preceding propoſition.

As if I ſay, *The human ſoul is immaterial, and therefore immortal*, the laſt member of the ſentence is a *ſequel* of the firſt.

SEQUENCE, French, from *ſequor*, *I follow*, in *Gaming*, a ſeries or ſet of cards immediately following each other in the ſame ſuit or colour.

We ſay, a *ſequence* of four cards, of five, &c. At piquet, theſe are called tierces, quarts, quints, &c.

SEQUESTRATION, Sequestratio, in *Common Law*, the act of ſeparating a thing in controverſy, from the poſſeſſion of both parties, till the right be determined by courſe of law.

This is of two ſorts, *voluntary* and *neceſſary*.

Sequestration, *voluntary*, is that which is done by conſent of both parties.

Sequestration, *neceſſary*, is that which the judge doth by his authority, whether the parties will or not.

Sequestration, in the *Civil Law*, is the act of the ordinary, diſpoſing of the goods and chattels of one deceaſed, whoſe eſtate no man will meddle with.

A widow is alſo ſaid to *ſequeſter*, when ſhe diſclaims having any thing to do with the eſtate of her deceaſed huſband.

Among the Romaniſts, in queſtions of marriage, where the wife complains of impotency in the huſband, ſhe is to be *ſequeſtered* into a convent, or into the hands of matrons, till the proceſs be determined.

Sequestration is alſo uſed for the act of gathering the fruits of a benefice void, to the uſe of the next incumbent.

Sometimes a benefice is kept under *ſequeſtration* for many years, when it is of ſo ſmall value, that no clergyman fit to ſerve the cure, will be at the charge of taking it by inſtitution; in which caſe the *ſequeſtration* is committed either to the curate alone, or to the curate and church-wardens jointly. Sometimes the profits of a living in controverſy, either by the conſent of the parties, or the judge's authority, are *ſequeſtered* and placed for ſafety in a third hand, till the ſuit is determined, a miniſter being appointed by the judge to ſerve the cure, and allowed a certain ſalary out of the profits. Sometimes the profits of a living are *ſequeſtered* for neglect of duty, for dilapidations, or for ſatisfying the debts of the incumbent.

In the time of the civil wars, *ſequeſtration* was uſed for a ſeizing of the eſtates of delinquents, for the uſe of the commonwealth.

SEQUESTRATION, in *Chancery*, is a commiſſion uſually directed to ſeven perſons therein named, empowering them to ſeize the defendant's perſonal eſtate, and the profits of his real, and to detain them, ſubject to the order of the court. It iſſues on the return of the ſerjeant at arms, wherein it is certified, that the defendant had ſecreted himſelf.

Sequeſtrations were firſt introduced by ſir Nicholas Bacon, lord keeper, in the reign of queen Elizabeth; before which the court found ſome difficulty in enforcing its proceſs and decrees: and they do not ſeem to be in the nature of proceſs to bring in the defendant, but only intended to enforce the performance of the court's decree.

SEQUESTRATION, in *London*, is made upon an action of debt: in which caſe, the action being entered, the officer goes to the ſhop or warehouſe of the defendant, when there is nobody within, and puts a padlock upon the door, &c. uſing theſe words, "I do *ſequeſter* this "warehouſe, and the goods and merchandiſes therein of "the defendant in the action, to the uſe of the plaintiff," &c. and having put on his ſeal, makes return thereof to the compter; and after four court days the plaintiff may have judgment to open the doors, and appraiſe the goods by a ſerjeant, who takes a bill of appraiſement, having two freemen to appraiſe them, for which they are to be ſworn at the next court holden for that compter; and then the officer puts his hand to the bill of appraiſement, and the court giveth judgment. However, the defendant in the action may put in bail before ſatisfaction, and ſo diſſolve the *ſequeſtration*; and after ſatisfaction may put in bail *ad diſprobandum debitum*, &c.

SEQUESTRATION, *ſequeſtratio*, in *Chemiſtry*, a term uſed by ſome writers to expreſs ſeparation.

SEQUESTRO *habendo*, in *Law*, a writ judicial for the diſcharging a *ſequeſtration* of the profits of a church-benefice granted by the biſhop at the king's commandment, thereby to compel the parſon to appear at the ſuit of another. The parſon, upon his appearance, may have this writ for the releaſe of the *ſequeſtration*.

SEQUIN, ZECAIN, ZECCHINO, a gold coin ſtruck at Venice, and in ſeveral parts of the grand ſignor's ſtates, particularly Cairo; which laſt are called *Turkiſh ſequins*, or *cherifs*. See COIN.

Ablancourt derives the word from *Cizicum*, or *Ciziceni-cum*; as ſuppoſing the *ſequin* firſt ſtruck at Cizicum: Menage, from the Italian *zecchino* of *zecca*, the name of the mint at Venice.

At Conſtantinople, the ducats ſtruck in ſeveral parts of Germany are called *Hungarian ſequins*.

The value of theſe *ſequins* is different; thoſe of Venice exceeding thoſe of Turky and Germany, by one fifteenth. In the Eaſt-Indies the difference is ſtill more ſenſible, the Venetian *ſequin* being current for four rupees, and ſix peſſas, or 9*s*. 4*d*. ſterling; and the Turkiſh *ſequin*, only for four rupees, or 9*s*. See STANDARD.

SERACH, in the *Turkiſh Military Orders*, an officer who holds the ſtirrup of the caia of the janizaries in charge, attends him when he goes out on horſeback, and ſerves him as a meſſenger on all occaſions. After this office he has the title of *chous*, and after he has paſſed through this, he has the ſame office under the aga of the janizaries. Pococke's Egypt, p. 168.

SERAGLIO, formed of the Turkiſh word *ſarai*, which is borrowed from the Perſian *ſeraw*, ſignifying *a houſe*, among the Levantines denotes the palace of a prince or lord.

At Conſtantinople they ſay, the *ſeraglio* of the ambaſſador of England, of France, &c.

The *ſeraglio* is uſed, by way of eminence, for the palace of the grand ſeignor at Conſtantinople, where he keeps his court, and where his concubines are lodged, and where the youth are trained up for the chief poſts of the empire.

It is a triangle about three Italian miles round, wholly within the city, at the end of the promontory Chryſoceras, now called the *Seraglio* Point. The buildings run back to the top of the hill, and from thence are gardens, that reach to the edge of the ſea. It is incloſed with a very high and ſtrong wall, upon which there are ſeveral watch towers: and it has many gates, ſome of which open towards the ſea-ſide, and the reſt into the city: but the chief gate is one of the latter, which is conſtantly guarded by a company of capoochees, or porters; and in the night it is well guarded towards the ſea. The outward appearance, du Loir tells us, is not beautiful, in regard the architecture is irregular, being cantoned out into ſeparate edifices and apartments, in manner of pavilions and domes. No ſtranger, it is ſaid, has ever yet been admitted to the inmoſt parts of the *ſeraglio*. See SULTANA.

The old *ſeraglio* is the place where the emperor's old miſtreſſes, and the ſultanas that have belonged to the deceaſed grand ſeignors, are kept.

Balzac obſerves, that the *ſeraglio* at Conſtantinople is only a copy of that which Solomon anciently built at Jeruſalem, for his wives and concubines. For a particular deſcription of the *ſeraglio*, ſee Greaves's Works, vol. ii. p. 591, &c.

SERANGODES, a word uſed originally as an epithet for the pumice-ſtone, and expreſſing cavernous, ſpungy, or full of holes. It has been hence applied to ſinuous ulcers, and to all ſorts of things that are cavernous, or of a ſpungy texture.

SERAGE, in *Ornithology*, an Engliſh name for a bird of the larus, or gull-kind, more uſually called the *ſea*-SWALLOW, and by authors STERNA.

SERAPH, or SERAPHIM, in the *Hierarchy of Angels*, a ſpirit ſuppoſed to be of the firſt or higheſt rank.

The *ſeraphs*, or rather *ſeraphim*, make that claſs of angels, ſuppoſed to be the moſt inflamed with divine love, by their nearer and more immediate attendance on the throne, and to communicate their heat to the inferior, and remoter orders: hence their name, which is formed from the Hebrew root שרף, *to burn*, *inflame*.

SERAPH is alſo ſaid to be the name of a Turkiſh gold coin, worth about 5*s*. ſterling.

SERAPHIC, ſomething belonging to the ſeraphim.

Mr. Boyle has a treatiſe of *ſeraphic* love, i. e. of *divine* love, or the love of God.

In the ſchools, St. Bonaventure is called the *Seraphic Doctor*, from his abundant zeal and fervor.

St. Francis, founder of the Cordeliers and Franciſcans, is called the *Seraphic Father*, in memory of a viſion he ſaw on mount Alverna.

SERAPHIM. See SERAPH.

SERAPIAS, in *Botany*. See *Baſtard* HELEBORE.

SERAPIAS, in the *Materia Medica*, the officinal name of the dried root, called SALEP.

SERAPIS, in *Mythology*, an Egyptian deity, who was worſhipped under various names and attributes, as the tutelary god of Egypt in general, and as the patron of ſeveral of their principal cities.

Tacitus informs us, that he was worſhipped as a kind of univerſal deity that repreſented Eſculapius, Oſiris, Jupiter, and Pluto; and he was ſometimes taken for Jupiter Ammon, the Sun, and Neptune: and the honours that were rendered to him at Alexandria, were more ſolemn and extraordinary than thoſe of any other place.

Learned writers have differed in opinion as to the time of the introduction of this deity into Egypt: ſome have ſuppoſed that he was known and worſhipped in this country long before the time of the firſt Ptolemy, and that he was the ſame with their APIS; *ſerapis* being no other than *Apis* εν Σορω, i. e. *Apis in his coffin*. Accordingly, they ſay, that while the ſacred bull, which the Egyptians worſhipped for their great god, was alive, he was called *Apis*, and that when he was dead and buried in his coffin, he was called *Serapis*, that is, *Apis in ſoro*, and thus they derive his name by corruption from *ſoro-apis*: and ſome have even imagined, that the patriarch Joſeph was worſhipped under this title; but to this etymology it has been objected, that as the Ptolemies firſt brought the Greek language into Egypt, if *Serapis* had been an ancient god worſhipped in that country before the Ptolemies reigned there, his name could not have had a Greek etymology.

According to the learned Mr. Bryant, *ſar* ſignified any thing noble; and OSIRIS, the great huſbandman, who had been expoſed in an ark, was ſtyled *ſar-apis*, which ſignifies *illuſtris genitor*, the great father of mankind. But, he obſerves, that there was likewiſe the term *ſor*, from whence came the σορος of the Greeks, which ſignified *a bier* or *coffin*, and alſo a *place of interment*. Hence the temple where the dead *Apis* was depoſited, had the name of *Sor-apis*, rendered inaccurately *ſarapis*.

Plutarch, who did not know this diſtinction, fancied that ſome people in Egypt, would not allow *ſorapis* to have been a god: the diſpute was about the ſound of a word: no Egyptian could deny the divinity of the god *Serapis*, but *Sor-apis* had another meaning; and this was the term in debate. Upon the whole, he concludes, that the dæmon, or deified man was *Sar-apis*, and that *ſor-apis* was the tomb of Apis. Analyſis of Ancient Mythology, vol. ii. p. 428.

Others have maintained, that *Serapis* was not originally an Egyptian deity anciently worſhipped in that country, but an adventitious god brought thither from abroad. The ancient place of his ſtation, according to Polybius, was on the coaſt of the Propontis, on the Thracian ſide, over againſt Hieras; and there Jaſon, when he went on the Argonautic expedition, ſacrificed to him. Thence his image was brought to Sinope in Pontus; and from Sinope, Ptolemy, the firſt of that name, in obedience, as it is ſaid, to a ſupernatural direction, brought it to Alexandria, and ſet it up in one of the ſuburbs of that city, called *Rhacotis*, where it was worſhipped by the name of *Serapis*: and this new god had in that place, ſoon after, a very famous temple erected to him, called the *Serapeum*. This temple, ſays Ammianus Marcellinus, did, in the magnificence and ornaments of its buildings, exceed all other edifices in the world, next that of the Capitol at Rome.

And this, ſay the advocates of this opinion, was the firſt time that this deity was either worſhipped or known in Egypt.

Ptolemy found great difficulty in obtaining this image, but the inhabitants of Sinope being oppreſſed with a grievous famine, were relieved by Ptolemy with a fleet of corn, and in return they conſented to part with the image of their God.

The ſtatue of *Serapis*, according to Macrobius, was of a human form, with a baſket or buſhel on his head reſembling plenty, and referring, as ſome ſay, to the hiſtory of Joſeph's ſupplying the Egyptians with corn; or, according to others, to the relief of Sinope by Ptolemy; his right hand leaned on the head of a ſerpent, whoſe body was wound round a figure with three heads, of a dog, a lion, and a wolf; in his left hand he held a meaſure of a cubit length, as it were to take the height of the waters of the Nile.

We ſhall here add, that Osiris was variouſly repreſented, ſometimes by a ſceptre and eye, to expreſs his power and providence; at other times by the image of a hawk, becauſe of its ſharp ſight, ſwiftneſs, and other qualities; and in later times in a human form, in a poſture not very decent, ſignifying his generative and nutritive faculty: but the greateſt adoration was paid to his living image, the bull.

The image of Isis was uſually in the form of a woman, with cow's horns on her head, repreſenting the appearance of the moon in her increaſe and decreaſe, and holding the ſiſtrum (a kind of cymbal) in her right hand, and a pitcher in her left; the former ſignifying the perpetual motion there is in nature, and the other the fecundity of the Nile. But ſometimes ſhe was repreſented as Cybele, having her body full of breaſts, to expreſs her nouriſhing of all things.

It is obſerved, that when *Serapis* was introduced into Egypt, at the period above mentioned, as writers have inferred from the ſilence of Herodotus, and of other authors who wrote before the times of the Ptolemies, he brought in with him among the Egyptians a new way of worſhip: for till the time of the Ptolemies, the Egyptians never offered any bloody ſacrifices to their gods, but worſhipped them merely with their prayers and frankincenſe; but the tyranny of theſe princes having forced upon them the worſhip of two foreign gods, viz. Saturn and *Serapis*, they in this worſhip firſt introduced the uſe of bloody ſacrifices among that people. And ſo averſe were the Egyptians to this mode of worſhip, that they would never ſuffer any temple to be built to either of theſe gods, within any of the walls of their cities, but they were always erected in their ſuburbs: and they ſeem to be only Egyptians of the Greek original who conformed to this practice, and not thoſe of the old race. See Exod. viii. 26, 27. Prid. Conn. vol. iii. p. 15, &c.

The famous temple of *Serapis* at Alexandria was deſtroyed by order of Theodoſius; and the celebrated ſtatue of this deity was broken in pieces, and its limbs carried firſt in triumph by the Chriſtians through the city, and then thrown into a fierce fire, kindled for that purpoſe in the amphitheatre. As the Egyptians aſcribed the overflowing of the Nile, to which was owing the fertility of their country, to the benign influence of their god *Serapis*, they concluded, that, now he was deſtroyed, the river would no longer overflow, and that a general famine would enſue; but when they obſerved, on the contrary, that the Nile ſwelled to a greater height than had been known in the memory of man, and thereby produced an immenſe plenty of all kinds of proviſions, many of the pagans renouncing the worſhip of idols, adored the God of the Chriſtians. Ancient Univ. Hiſt. vol. vi. p. 417.

The figure of *Serapis* is found on many ancient medals.

SERASS, in *Ornithology*, a bird of the ſame genus with the *colum*, which comes yearly to Surat in the Eaſt Indies, from mount Caucaſus, and diſtinguiſhed by a plication of the aſperia arteria; which is deſigned to anſwer ſimilar purpoſes with that of the COLUM.

SERBAJEE, in the *Eaſtern Military Orders*, is a captain in the horſe in the ſervice of the grand ſeignor.

SEREIL *feathers of a hawk*, the ſame which anſwer to pinions in any other fowls.

SERE, in *Falconry*, the yellow between the beak and eyes of a hawk.

SERENADE, SERENATA, a kind of concert given in the night-time by a lover, at his miſtreſs's door, or under her window.

Sometimes it conſiſts wholly of inſtrumental muſic; ſometimes voices are added, and the pieces compoſed or played on theſe occaſions, are alſo called *ſerenades*.

We do not know whence the word ſhould be derived, unleſs from the French *ſerein*, the *dew* falling in the night-time.

SERENA *gutta*, in *Medicine*, the ſame as AMAUROSIS. See Gutta *ſerena*.

SERENE, Serenus, a quality or title of honour given to certain princes, and chief magiſtrates of republics.

The king of England is ſtyled, *the moſt ſerene*; the ſame term is alſo applied to the doge of Venice. The pope and the ſacred college, writing to the emperor, to kings, or the doge, give them no other title but that of *moſt ſerene*. Indeed the Venetians ſet the title of *ſerenity* above that of highneſs.

In 1646, Wicquefort obſerves, there was a claſhing between the courts of France and Vienna, becauſe the emperor refuſed the king of France any other title than that of *ſerene*. Biſhops alſo were anciently addreſſed under the title of *ſerene*.

The kings of France of the firſt and ſecond race, ſpeaking of themſelves, uſe no other quality but *notre ſerenité*.

The emperor gives no other title to the king of England, nor even to any other king, excepting the king of Franee. The king of Poland, and other kings give it to the electors. The emperor, writing to the electors, or other princes of the empire, only uſes the term *dilection*; but in treating with them he uſes *electoral ſerenity* to the electors, and *ducal ſerenity* to the other princes.

SERGE, in *Commerce*, a woollen quilted ſtuff, manufactured on a loom with four treddles, after the manner of rateens, and other ſtuffs that have the whale.

The goodneſs of *ſerges* is known by the quilting, as that of cloths by the ſpinning.

Of *ſerges* there are various kinds, denominated either from the different qualities thereof, or from the places where they are wrought. The moſt conſiderable is the London *ſerge*, now highly valued abroad, particularly in France, where a manufacture is carried on with good ſucceſs, under the title of *ſerge façon de Londres*.

Serges, *manufacture of London*. For wool, the longeſt is choſen for the warp, and the ſhorteſt for the woof. Before either kind is uſed, it is firſt ſcoured, by putting it in a copper of liquor, ſomewhat more than lukewarm, compoſed of three parts of fair water, and one of urine. After having ſtayed long enough therein for the liquor to diſſolve, and take off the greaſe, &c. it is ſtirred briſkly about with a wooden peel; taken out of the liquor, drained, and waſhed in a running water, dried in the ſhade, beaten with ſticks on a wooden rack, to drive out the coarſer duſt and filth, and then picked clean with the hands. Thus far prepared, it is greaſed with oil of olives, and the longeſt part, deſtined for the warp, is combed with large combs, heated in a little furnace for the purpoſe. To clear off the oil again, the wool is put in a liquor compoſed of hot water, with ſoap melted therein: whence being taken out, wrung, and dried, it is ſpun on the wheel.

As to the ſhorter wool, intended for the woof, it is only carded on the knee with ſmall cards, and then ſpun on the wheel, without being ſcoured of its oil. Note, the thread for the warp is always to be ſpun much finer, and better twiſted than that of the woof.

The wool both for the warp and the woof being ſpun, and the thread divided into ſkains, that of the woof is put on ſpools (unleſs it have been ſpun upon them) fit for the cavity or eye of the ſhuttle; and that for the warp is wound on a kind of wooden bobins to fit it for warping. When warped it is ſtiffened with a kind of ſize, whereof that made of the ſhreds of parchment is held the beſt; and when dry is put on the loom.

When mounted on the loom, the workman raiſing and falling the threads (which are paſſed through a reed), by means of four treddles placed underneath the loom, which he makes to act tranſverſely, equally and alternately, one after another, with his feet, in proportion as the threads are raiſed and lowered, throws the ſhuttle acroſs from one ſide to the other; and each time that the ſhuttle is thrown, and the thread of the woof is croſſed between thoſe of the warp, ſtrikes it with the frame to which the reed is faſtened, through thoſe teeth the threads of the warp paſs; and this ſtroke he repeats twice or thrice, or even more, till he judges the croſſing of the *ſerge* ſufficiently cloſe: thus he proceeds till the warp is all filled with woof.

The *ſerge* now taken off the loom is carried to the fuller, who fulls, or ſcours it in the trough of his mill, with a kind of fat earth, called fullers earth, firſt purged of all ſtones and filth. After three or four hours ſcouring, the fullers earth is waſhed out in fair water, brought by little and little into the trough, out of which it is taken when all the earth is cleared; then, with a kind of iron pincers, or plyers, they pull off all the knots, ends, ſtraws, &c. ſticking out on the ſurface on either ſide; and then returning it to the fulling trough, where it is worked with water ſomewhat more than lukewarm, with ſoap diſſolved therein for near two hours: it is then waſhed out till ſuch time as the water becomes quite clear, and there be no ſigns of ſoap left; then it is taken out of the trough, the knots, &c. again pulled off, and then put on the tenter to dry, taking care as faſt as it dries to ſtretch it out both in length and breadth till it be brought to its juſt dimenſions. When well dried, it is taken off the tenter, and dyed, ſhorn, and preſſed.

SERGEANT, or **Serjeant**, a term *in our Law*, applied to ſundry offices. *Serjeant at law*, or *of the coif*, is the higheſt degree taken in the common law, as that of doctor is in the civil law.

The firſt mention which judge Blackſtone has met with of *ſerjeants*, or countors, is in the ſtat. of Weſt. 1. 3 Edw. I. c. 29. But M. Paris, in his life of John II. abbot of St. Alban's, which he wrote in 1255, 39 Hen. III. ſpeaks of advocates at the common law, or countors *(quos banci narratores vulgariter appellamus)* as of an order of men well known; and the antiquity of the coif appears from the ſame author's Hiſt. of England, A. D. 1259. *Serjeants* were anciently called *ſervientes ad legem*, and *ſervientes narratores*: Mr. Selden adds, that they were alſo called *doctores legis*; though others are of opinion that the judges are more properly the *doctores legis*, and *ſerjeants*, the bachelors of law.

Spelman obſerves, that however a *ſerjeant* may be richer than all the doctors of the Commons, yet a doctor is ſuperior in degree to a *ſerjeant*, for the very name of a doctor is magiſterial, but that of a *ſerjeant* miniſterial. Hence, the doctors are ſeated and covered when they plead, but the *ſerjeants* ſtand uncovered at the bar, excepting for their coif.

As theſe are ſuppoſed the moſt learned and experienced, there is one court appropriated for them to plead in by themſelves, which is the Common Pleas, where the common law of England is moſt ſtrictly obſerved: but they are not prohibited pleading in other courts, and all judges, who, by cuſtom, muſt firſt be *ſerjeants*, call them *brothers*.

Serjeants at law are bound by a ſolemn oath to do their duty to their clients.

They are called by the king's mandate, or writ, directed to them, commanding them to take upon them that degree, by a day aſſigned. See Barrister.

Out of theſe, ſome are made the king's *ſerjeants* to plead for him in all cauſes, eſpecially in caſes of treaſon; and one is uſually appointed, called *premier ſerjeant*. See Precedence.

Serjeants *at arms*, are officers appointed to attend the perſon of the king, to arreſt traitors, and perſons of quality offending, and to attend the lord high ſteward when he ſits in judgment on any traitor, &c.

Of theſe by ſtatute (13 Rich. II. cap. 6.) there are not to be above thirty in the realm. There are now nine at court, at 100*l.* *per annum* ſalary each: they are called the *king's ſerjeants at arms*, to diſtinguiſh them from others: they are created with great ceremony, the perſon kneeling before the king, his majeſty lays the mace on his right ſhoulder, and ſays *Riſe up ſerjeant at arms, and eſquire for ever*. They have, beſides, a patent for the office, which they hold for life.

They have their attendance in the preſence-chamber, where the band of gentlemen-penſioners wait; and receiving the king at the door, they carry the maces before him to the chapel door, whilſt the band of penſioners ſtand foremoſt, and make a lane for the king, as they alſo do when the king goes to the houſe of lords.

There are four other *ſerjeants at arms*, created in the ſame manner; one who attends the lord chancellor; a ſecond, the lord treaſurer; a third, the ſpeaker of the houſe of commons; and a fourth, the lord mayor of London on ſolemn occaſions.

They have a conſiderable ſhare of the fees of honour, and travelling charges allowed them when in waiting, viz. five ſhillings per day when the court is within ten miles of London, and ten ſhillings when twenty miles from London. The places are in the lord chamberlain's gift.

There are alſo *ſerjeants* of the mace of an inferior kind, who attend the mayor, or other head officer of a corporation.

Serjeant, *common*, an officer in the city of London, who attends the lord mayor and court of aldermen on court days, and is in council with them on all occaſions, within and without the precincts, or liberties of the city. He was to take care of orphans eſtates, either by taking account of them, or to ſign their indentures, before their paſſing the lord mayor and court of aldermen: and he was likewiſe to let and manage the orphans eſtates, according to his judgment to their beſt advantage. See Recorder.

Serjeants *of the houſhold*, are officers who execute ſeveral functions within the king's houſhold, mentioned in the ſtat. 33 Hen. VIII. c. 12.

Serjeant, or *ſergeant*, in *War*, is a non-commiſſioned or inferior officer in a company of foot, or troop of dragoons; armed with an halberd, and appointed to ſee diſcipline obſerved, to teach the ſoldiers their exerciſe and other duty. He receives the orders from the adjutant, which he communicates to his officers.

Each company has generally two *ſerjeants*.

Serjeant-*major*. See Major.

SERJEANTY, or **Sergeanty**, in *Law*, a ſervice anciently due to the king for lands held of him, and which could not be due to any other lord.

It is divided into *grand* and *petit ſerjeanty*.

Serjeanty, *grand*, is where one holds land of the king by ſervice which he ought to do in his own perſon, as to bear the king's banner or ſpear, aſſiſt at his coronation, or do ſome office in his court.

It was in moſt other reſpects like knight-*ſervice*, only he was not bound to pay aid or eſcuage; and when tenant by knight-ſervice paid five pounds for a relief on every knight's fee, tenant by *grand ſerjeantry* paid one year's value of his land, whether it were much or little.

Serjeanty, *petit*, is where a man holds land of the king to yield him yearly ſome ſmall thing towards his wars, as a ſword, dagger, bow, ſpurs, &c. in the manner of rent.

Coke, on Littleton, tells us, that ſir Richard Rockeſly held lands at Seaton, by *grand ſerjeanty*, to be *vantrarius regis*, i. e. the king's fore-footman, when he went into Gaſcogne, till he had worn out a pair of ſhoes of the price of four pence.

By the ſtatute 12 Car. II. all tenures of any honours, manors, lands, &c. are turned into free and common ſocage: but the honorary ſervices of *grand ſerjeanty* are thereby continued.

SERIANA, in *Botany*, a name given by Plumier to a genus of plants, the ſame in its generical characters with his *cururu*; both which are compriſed by Linnæus under one genus, with the new name Paullinia.

SERICH, the name of a ſeed uſed in the food of the Egyptian *Coptics*. It is produced by an herb called *ſimſim*, and is pounded and put into oil. In this they dip their bread, which is always new, being baked as often as they eat, in ſmall flat cakes: theſe they eat dipped in this oil with raw onions, or elſe they break the cakes to pieces, and put them into a ſyrup of ſugar, made when the canes are green. Pococke's Egypt, p. 183.

SERICUM, *ſilk*. See Silk.

Sericum is alſo a name given by ſeveral chemical writers to the flowers of zinc raiſed by ſublimation in an inclined open crucible. Theſe flowers are not reducible into zinc again, and are of a fibroſe texture, and a beautiful bright white colour. This has made them be called alſo the *philoſophic cotton*, and others have named them the aqua *ſicca philoſophorum*.

SERIES, a continual ſucceſſion of things in the ſame order, and which have ſome relation or connection with each other.

Medals are formed into *ſuites* or *ſerieſes*, both with regard to the metal and to the ſubject. The different metals of medals conſtitute three different *ſerieſes* in the cabinets of the curious, we mean, as to the order and arrangement of the ſeveral metals.

The gold *ſeries*, for inſtance, of imperials, amounts to about one thouſand or twelve hundred; that of ſilver may amount to three thouſand; and that of copper, in all the three ſizes, great, middle, and ſmall, to ſix or ſeven thouſand. Of theſe, the *ſeries* of middle copper is the moſt complete, and moſt eaſily formed, as it may be brought down to the fall of the empire in the Weſt, and the time of the Palæologi in the Eaſt.

With regard to the ſubject, the *ſerieſes* of medals are uſually formed from the ſide called the *head*: in the firſt claſs, is diſpoſed the *ſerieſes* of kings; in the ſecond, that of Greek and Latin critics: in the third, the Roman conſular families; in the fourth, the imperial: in the fifth, the deities; and to theſe may be added a ſixth *ſeries*, conſiſting of medals of illuſtrious perſons.

There are alſo *ſerieſes* of modern medals: that of the popes only commences from Martin V. in 1430. From that time we have a *ſeries* of papal medals tolerably complete, to the number of five or ſix hundred.

We might likewiſe have a *ſeries* of emperors from Charlemagne, provided the current coins were admitted; but, in practice, they commonly commence with Frederic II. in 1463.

The *ſeries* of kings of France is moſt numerous and moſt conſiderable of all the modern kings. See **Medals**.

Series, in *Algebra*, denotes a rank or progreſſion of quantities, increaſing or decreaſing in ſome conſtant ratio, which, in its progreſs, approaching ſtill nearer and nearer to ſome ſought value, and the terms continually decreaſing, is called a *converging ſeries*; and, if infinitely continued, becomes equal to that quantity; whence its uſual appellation of *infinite ſeries*.

Thus, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$, $\frac{1}{64}$, &c. make a *ſeries*, which always converges, or approaches to the value of 1, and, infinitely continued, becomes equal to it.

The doctrine and uſe of *infinite ſerieſes*, one of the greateſt improvements of the preſent age, we owe to Nic. Mercator, of Holſtein, who, however, ſeems to have taken the firſt hint of it from Dr. Wallis's arithmetic of *infinites*.

It takes place principally in the quadratures of curves; where, as we frequently fall upon quantities, which cannot be expreſſed by any preciſe definite numbers, ſuch as is the ratio of the diameter of a circle to the circumference, we are glad to expreſs them by a *ſeries*, which, infinitely continued, is the value of the quantity required.

Series, *nature, origin, and uſe of infinite.* Though arithmetic furniſhes us with very adequate and intelligible expreſſions for all rational numbers, yet it is very defective as to irrational ones; which are infinitely more numerous than the other, there being, for inſtance, an infinity of them between 1 and 2. Were it now required to find a mean proportional between 1 and 2 in rational numbers, which alone are clearly intelligible (the root of 2 being certainly a very obſcure idea), we could ſtill approach nearer and nearer to the juſt value of the quantity required, but without ever arriving at it: thus, if for the mean proportional between 1 and 2, or the root of 2, we firſt put 1, it is evident we have not put enough; if we add $\frac{1}{2}$ we put too much, for the ſquare of $1 + \frac{1}{2}$ is greater than 2. If then we take away $\frac{1}{8}$, we ſhall find we have taken away too much, and if we return $\frac{1}{16}$, the whole will be too great; thus we may proceed, without ever coming to the juſt quantity ſought. Theſe numbers thus found, and thoſe found after the ſame manner to infinity, being diſpoſed in their natural order, make what we call an *infinite ſeries*.

Sometimes the *ſerieſes* do not proceed by alternate additions and ſubtractions, but by ſimple additions, or by an infinity of ſubtractions, according to the poſition of the firſt term. In all theſe *infinite ſerieſes* it is viſible, that as all the terms are only equal to a finite magnitude, they muſt be ſtill decreaſing; and it is even convenient that they be ſo as much as poſſible, that one may take only a certain number of the firſt terms for the magnitude ſought, and neglect all the reſt.

But irrational numbers are not the only numbers, that are expreſſed in rational ones by *infinite ſerieſes*. Rational numbers themſelves may be expreſſed in the ſame manner: 1, for inſtance, being equal to the *ſeries* $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, &c. but there is this difference between them, that whereas irrational numbers can only be expreſſed in rational numbers by ſuch *ſeries*, rational ones need no ſuch expreſſion.

Among *infinite ſerieſes*, there are ſome whoſe terms only make a finite ſum; ſuch is the geometrical progreſſion $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, &c. and, in general, all geometrical decreaſing progreſſions: in others, the terms make an infinite ſum; ſuch is the harmonical progreſſion $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, &c. It is not that there are more terms in the harmonical than in the geometrical progreſſion, though the latter has no term which is not in the former, and wants ſeveral which the former has; ſuch a difference would only render the two infinite ſums unequal, and that of the harmonical progreſſion the greateſt; the cauſe lies deeper.

From the received notion of infinite diviſibility, it follows, that any finite thing, e. gr. a foot, is a compound both of finite and infinite; finite, as it is a foot; infinite, as it contains an infinity of parts, into which it is diviſible. If theſe infinite parts be conceived, as ſeparated from one another, they will make an *infinite ſeries*; and yet their ſum will only be a foot, only no terms are to be here put, but ſuch as may, diſtinct from each other, be parts of the ſame finite whole: now this is the caſe in the geometrical, decreaſing *ſeries* $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, &c. for it is evident, that if you firſt take $\frac{1}{2}$ of a foot, then $\frac{1}{2}$ of what remains, or $\frac{1}{4}$ of a foot, then $\frac{1}{2}$ of what remains, or $\frac{1}{8}$ of a foot; you may proceed to infinity, ſtill taking new decreaſing halves, all diſtinct from each other, and which all together only make a foot.

In this example, we not only take no parts but what were in the whole diſtinct from each other; but we take all that were there; whence it comes to paſs, that their ſum makes the preciſe whole again: but, were we to follow the geometrical progreſſion $\frac{1}{3}$, $\frac{1}{9}$, $\frac{1}{27}$, &c. that is, at firſt, take $\frac{1}{3}$ of a foot, and from what remains $\frac{1}{9}$ of a foot, and from what ſtill remains $\frac{1}{7}$ of a foot, &c. it is true, we ſhould take no parts but what were diſtinct from each other in the foot; but we ſhould not take all the parts that were there, ſince we only take the ſeveral thirds, which are leſs than the halves; of conſequence, all theſe decreaſing thirds, though infinite in number, could not make the whole; and it is even demonſtrated, that they would only make half. In like manner, all the fourths decreaſing to infinity, would only make one-third, and all the hundredths only the ninety-ninth part: ſo that the ſum of the terms of an *infinite ſeries* decreaſing geometrically, is not only always finite, but may even be leſs than any finite quantity that can be aſſigned.

If an infinite decreaſing *ſeries* expreſs parts which cannot ſubſiſt in the whole, diſtinctly from each other; but ſuch, as to take their values, we muſt ſuppoſe the ſame quantity taken ſeveral times in the ſame whole, then will the ſum of theſe parts make more than a whole, nay, infinitely more; that is, the *ſeries* will be infinite, if the ſame quantity be taken an infinity of times. Thus, in the harmonical progreſſion $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. if we take $\frac{1}{2}$ of a foot, or 6 inches, then $\frac{1}{3}$, or 4 inches, it is evident we cannot take farther $\frac{1}{4}$ of a foot, or 3 inches, without taking 1 inch more than was left in the foot. Since then the whole is already exhauſted by the three firſt terms, we can take no more of the following terms, without taking ſomething already taken: and, ſince thoſe terms are infinite in number, it is very poſſible, that the ſame finite quantity may be repeated an infinite number of times, which will make the ſum of the *ſeries* infinite.

We ſay, poſſible; for though of two infinite *ſerieſes*, the one may make a finite ſum, and the other an infinite one; it is true, that there may be ſuch a *ſeries*, where the finites having exhauſted the whole, the following ones, though infinite in number, ſhall only make a finite ſum; and, in effect, ſince it is demonſtrated, by the laws of geometrical progreſſion, that there are *ſerieſes*, whoſe ſums are leſs than the whole, nay infinitely leſs; it follows, that there muſt likewiſe be *ſerieſes*, which make infinitely more.

There are two farther remarks neceſſary to be made on *ſerieſes* in general. 1. That there are ſome, wherein, after a certain number of terms, all the other terms, though infinite in number, become each a cypher.—Now, it is evident, that the ſum of theſe *ſerieſes* is finite, and eaſily found; they having only an appearance of infinity.

2. That the ſame magnitude may be expreſſed by different *ſerieſes*; and may be expreſſed both by a *ſeries* whoſe ſum may be found, and by another whoſe ſum cannot be found.

Geometry does not labour under the ſame difficulty as arithmetic: it expreſſes irrational numbers exactly in lines, and needs not have recourſe to infinite *ſerieſes*. Thus, the diagonal of a ſquare, whoſe ſide is 1, is known to be the ſquare root of 2: but, in ſome other caſes, geometry itſelf is under the like embarraſſment; there being ſome right lines, which cannot be expreſſed otherwiſe than by an infinite *ſeries* of ſmaller lines, whoſe ſum cannot be found: of which kind are the right lines equal to curves; ſo that in ſeeking, for inſtance, a right line equal to the circumference of a circle, we find, that the diameter being 1, the line ſought will be $\frac{4}{1} - \frac{4}{3} + \frac{4}{5} - \frac{4}{7} + \frac{4}{9}$, &c.

As to the finding of an infinite *ſeries* to expreſs quantities ſought, Mercator, the firſt inventor of the method, did it by diviſion; but ſir Iſaac Newton and M. Leibnitz have improved the doctrine very conſiderably; the firſt finding his *ſeries* by the extraction of roots, and the ſecond by another *ſeries* pre-ſuppoſed.

The notion of a *ſeries* given above is however rather too limited, when confined to ranks or progreſſions of quantities increaſing or decreaſing in ſome conſtant ratio: for the term *ſeries* is indifferently uſed whether the terms of any number of quantities following each other have a conſtant ratio, or even relation or not. And, ſtrictly ſpeaking a *ſeries* of quantities increaſing or decreaſing in a conſtant ratio is no more than what is commonly called a geometric progreſſion.

The doctrine of *ſerieſes* is of extenſive uſe in mathematics, and has been carried far; though not ſo far as could be wiſhed. It would far exceed the limits of our deſign to enter into a detail of the diſcoveries relating to this ſubject. Something, however, ſhould be added to what has been ſaid above, to give a notion of the principal kinds of *ſeries*, and the method of notation uſed in treating of them.

A *ſeries* being propoſed, one of the principal queſtions concerning it, is to find the law of its continuation. For this no univerſal rule can be given; but it often happens, that the terms of the *ſeries* taken two and two, three and three, or in greater numbers, have an obvious and ſimple relation, by which the *ſeries* may be determined and produced indefinitely. Thus, if unity be divided by $1-x$, the quotient will be a geometrical progreſſion, any term of which will be to the next antecedent term as x to 1. And by this property the *ſeries* $1+x+x^2+x^3+$, &c. may be diſtinguiſhed from any other, and produced *ad infinitum*. In like manner, in other caſes of diviſion, other *ſerieſes* will ariſe, the terms of which will have a conſtant relation to each other, and this relation recurring always throughout the *ſeries*, they have been called recurring *ſerieſes* by M. de Moivre, who firſt conſidered them, and applied them to the ſolution of ſeveral intricate problems. See *Recurring* SERIES, *infra*.

In many caſes, the relation of the terms of a *ſeries* is not conſtant, as it is in thoſe ariſing from diviſion. Yet this relation often varies according to a certain law obvious upon inſpection. Thus in the *ſeries* $1+\frac{2}{3}x+\frac{8}{15}x^2+\frac{16}{35}x^3+\frac{128}{315}x^4+$, &c. The terms may be continued indefinitely by the continued multiplication of theſe fractions $\frac{2}{3}$, $\frac{4}{5}$, $\frac{6}{7}$, $\frac{8}{9}$, &c. And the following *ſeries*, $1+\frac{1}{6}x+\frac{3}{40}x^2+\frac{5}{128}x^3+\frac{35}{1152}x^4+$, &c. may be continued by the multiplication of the fractions $\frac{1\times 1}{2\times 3}$, $\frac{3\times 3}{4\times 5}$, $\frac{5\times 5}{6\times 7}$, $\frac{7\times 7}{8\times 9}$, &c.

Serieſes of this kind may be defined by *differential equations*. The equation defining a *ſeries* is that which aſſigns the relation of the terms generally by their diſtances from the beginning. To do this Mr. Stirling conceives the terms of the *ſeries* to be placed as ſo many ordinates on a right line given by poſition, and he, for the ſake of ſimplicity, takes unity as the common interval of theſe ordinates. The initial terms of the *ſeries* he denotes by the initial letters of the alphabet, A, B, C, D, &c. A being the firſt, B the ſecond, C the third, &c. And he denotes any term in general, by the letter T, and the reſt following it in order, T′, T″, T‴, T⁗, &c. He denotes the diſtance of the term T from any given term, or from any given intermediate point between two terms, by the indeterminate quantity z: ſo that the diſtances of the terms T′, T″, T‴, &c. from the ſaid term or point, will be $z+1$, $z+2$, $z+3$, &c. for the increment of the abſciſs is the common interval of the ordinates, or terms of the *ſeries* applied to the abſciſs.

Theſe things being premiſed, let this *ſeries* be propoſed, 1, $\frac{1}{2}x$, $\frac{3}{8}x^2$, $\frac{5}{16}x^3$, $\frac{35}{128}x^4$, $\frac{63}{256}x^5$, &c. in which the relations of the terms are $B=\frac{1}{2}Ax$, $C=\frac{3}{4}Bx$, $D=\frac{5}{6}Cx$, $E=\frac{7}{8}Dx$, &c. The relation in general will be defined by the equation, $T'=\frac{z+\frac{1}{2}}{z+1}Tx$, where z denotes the diſtance of T from the firſt term of the *ſeries*. For by ſubſtituting 0, 1, 2, 3, 4, &c. ſucceſſively in the place of z, the relations of the terms of the propoſed *ſeries* will ariſe. In like manner, if z be the diſtance of T from the ſecond term of the *ſeries*, the equation will be $T'=\frac{z+\frac{3}{2}}{z+2}Tx$, as will appear by ſubſtituting the numbers -1, 0, 1, 2, 3, 4, &c. ſucceſſively for z. Or, if the indeterminate z denotes the place of the term T in the *ſeries*, its ſucceſſive values will be 1, 2, 3, 4, &c. and the equation will be $T'=\frac{z-\frac{1}{2}}{z}Tx$.

It appears, therefore, that innumerable differential equations may define one and the ſame *ſeries*, according to the different points from whence the origin of the abſciſs z is taken. And, on the contrary, the ſame equation defines innumerable different *ſerieſes* by taking different ſucceſſive values of z. For in the equation $T'=\frac{z-\frac{1}{2}}{z}Tx$, which defines the *ſeries* above mentioned, when 1, 2, 3, 4, &c. are the ſucceſſive values of the abſciſſæ; if $1\frac{1}{2}$, $2\frac{1}{2}$, $3\frac{1}{2}$, $4\frac{1}{2}$, &c. be ſucceſſively ſubſtituted for z, the relations of the terms ariſing will be $B=\frac{2}{3}Ax$, $C=\frac{4}{5}Bx$, $D=\frac{6}{7}Cx$, &c. from whence the *ſeries* A, $\frac{2}{3}Ax$, $\frac{8}{15}Ax^2$, $\frac{16}{35}Ax^3$, $\frac{128}{315}Bx^4$, &c. will ariſe, which is different from the former. But the equation will always determine the *ſeries* from the given values of the abſciſs and of the firſt term, when the equation includes but two terms of the *ſeries*, as in the laſt example, where the firſt term being given, all will be given. But when the equation includes three terms, two muſt be given; and three muſt be given when it includes four, and ſo forth.

If the *ſeries* x, $\frac{1}{6}x^3$, $\frac{3}{40}x^5$, $\frac{5}{112}x^7$, $\frac{35}{1152}x^9$, &c. be propoſed, where the relations of the terms are, $B=\frac{1\times 1}{2\times 3}Ax^2$, $C=\frac{3\times 3}{4\times 5}Bx^2$, $D=\frac{5\times 5}{6\times 7}Cx^2$, &c. the equation defining this *ſeries* will be $T'=\frac{\overline{2z-1}\times\overline{2z-1}}{2z\times\overline{2z-1}}Tx^2$, or $T'=\frac{4zz-4z+1}{4zz+2z}Tx^2$, where the ſucceſſive values of z are 1, 2, 3, 4, &c. See Mr. Stirling's Methodus Differentialis, in the introduction.

This may ſuffice to convey a notion of theſe differential equations, defining the nature of *ſerieſes*. But as to the application of theſe equations in finding the ſums of *ſerieſes* it would require a treatiſe to explain it. We muſt therefore refer the curious to that excellent one juſt quoted, as alſo to M. de Moivre's Miſcellanea Analytica; and ſeveral curious papers by Mr. Euler in the Acta Petropolitana.

A *ſeries* often converges ſo ſlowly as to be of no uſe in practice. Thus, if it were required to find the ſum of the *ſeries* $\frac{1}{1.2}+\frac{1}{3.4}+\frac{1}{5.6}+\frac{1}{7.8}+\frac{1}{9.10}+$, &c. which lord Brounker found for the quadrature of the hyperbola true to 9 figures, by the mere addition of the terms of the *ſeries*; Mr. Stirling computes that it would be neceſſary to add a thouſand millions of terms for that purpoſe; for which the life of man would be too ſhort. But by that gentleman's method the ſum of the *ſeries* may be found by a very moderate computation. See Meth. Diff. p. 26, ſeq.

SERIES, *to find a, expreſſing a quantity ſought, by diviſion.* Suppoſe a *ſeries* required to expreſs the quotient of b divided by $a+c$. Divide the dividend by the diviſor, as in common arithmetic; continuing the diviſion till the quotient ſhew the order of the progreſſion, or the law, according to which the terms proceed to infinity; ſtill obſerving the rules of ſubtraction, multiplication, and diviſion, about the changing of the ſigns. The proceſs carried on the quotient will be found $\frac{b}{a}-\frac{bc}{a^2}+\frac{bc^2}{a^3}-\frac{bc^3}{a^4}$ &c. in infinitum.

Theſe four or five terms thus found, both the quotient and manner of the diviſion ſhew, that the quotient conſiſts of an infinite *ſeries* of terms, whoſe numerators are the powers of c, whoſe exponents differ from the number of the order by unity, whoſe denominators are the powers of a, and their exponents equal to the number of the order of the terms. E. g. In the third term, the power of c is the ſecond in the numerator; and the power of a is the third in the denominator.

Hence, firſt, if $b=1$, and $a=1$, ſubſtituting this value for that, we have, in that quotient $1-c+c^2-c^3$ &c. to infinity. Wherefore, $\frac{1}{1+2}=1-c+c^2-c^3$, &c. in infinitum.

If then, ſecondly, the terms in the quotient continually decreaſe, the *ſeries* will be a quotient as near the truth as poſſible. E. g. If $b=1$, $c=1$, and $a=2$; theſe values ſuſtituted in the general *ſeries*, or the diviſion performed as in the general example; we ſhall find $\frac{1}{3}=\frac{1}{2+1}=\frac{1}{2}-\frac{1}{4}+\frac{1}{8}-\frac{1}{16}+\frac{1}{32}-\frac{1}{64}+\frac{1}{128}$, &c. Suppoſe, then, the *ſeries* to be broken off in the fourth term; there will be a deficiency; but it will be leſs than $\frac{1}{32}$. If it be broken off in the ſixth, there will be a deficiency, but that leſs than $\frac{1}{128}$. The farther, therefore, the *ſeries* is continued, the nearer it approaches to truth, but it never arrives at it.

After the like manner we find $\frac{1}{4}=\frac{1}{3+1}=\frac{1}{3}-\frac{1}{9}+\frac{1}{27}-\frac{1}{81}+\frac{1}{243}$, &c. in infinitum: $\frac{1}{5}=\frac{1}{4+1}=\frac{1}{4}-\frac{1}{16}+\frac{1}{64}-\frac{1}{256}$, &c. in infinitum: $\frac{1}{6}=\frac{1}{5+1}=\frac{1}{5}-\frac{1}{25}+\frac{1}{125}-\frac{1}{625}$, &c. in infinitum. This is a conſtant law, whereby all fractions, whoſe numerator is unity, may be expreſſed by infinite *ſerieſes*; thoſe *ſerieſes* being all geometrical progreſſions, decreaſing in ſuch manner, as that the numerator is always unity; and denominator of the firſt term, which is alſo the exponent of the ratio, differs by unity from the denominator of the fraction to be reſolved.

If the terms of the quotient be continually increaſing, the *ſeries* recedes ſo much the farther from the quotient as it is continued longer; nor does it ever become equal to the quotient, unleſs it be terminated, and have the laſt remainder added under its ſign. E. g. Suppoſe $\frac{1}{3} = \frac{1}{1+2}$; the quotient will be found $1 - 2 + 4 - 8 + 16 - 64 + 128$, &c. One term, 1, exceeds $\frac{1}{3}$ by an exceſs of $\frac{2}{3}$; two terms come ſhort by $\frac{4}{3}$; three terms exceed by $\frac{8}{3}$; four fall ſhort by $\frac{16}{3}$, &c. If the *ſeries* be ſuppoſed to terminate in -8; then will $\frac{1}{1+2} = 1 - 2 + 4 - 8 + \frac{16}{3}$. But $1 - 2 + 4 - 8 = -5 = -\frac{15}{3}$. Therefore, $\frac{1}{1+2} = \frac{16}{3} - \frac{15}{3} = \frac{1}{3}$. Suppoſe the general *ſeries* to terminate in $-c^3$, then will $\frac{1}{1+c} = 1 - c + c^2 - c^3 + \frac{c^4}{1+c} = \frac{1 + c - c - c^2 + c^2 + c^3 - {}^3c - c^4 + c^4}{1+c} = \frac{1}{1+c}$.

SERIES, *circular*, is uſed for a *ſeries* whoſe ſum depends on the quadrature of the circle. Such is the *ſeries* $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} -$ &c. De Moivre, Miſc. Analyt. p. 111. or the ſum of the *ſeries* $1 + \frac{1}{4} + \frac{1}{9} + \frac{1}{16} + \frac{1}{25} +$ &c. continued ad infinitum, according to Mr. Euler's diſcovery.

SERIES, *determinate*, a *ſeries*, the terms of which proceed by the powers of a determinate quantity. If that determinate quantity be unity, the *ſeries* is ſaid to be determined by unity. De Moivre, Miſc. Analyt. p. 111.

SERIES, *diverging*, a *ſeries*, the terms of which continually increaſe, or whoſe denominators increaſe in a greater proportion than their numerators. The contrary to this is a *converging ſeries*. See SERIES *ſupra*.

SERIES, *form of a*, in *Algebra*, is uſed for that affection of an indeterminate *ſeries*, ſuch as,

$Ax^n + Bx^{n+r} + Cx^{n+2r} + Dx^{n+3r}$, &c. which ariſes from the different values of the indices of x.

Thus if $n = 1$, and $r = 1$. the *ſeries* will aſſume the *form*

$Ax + Bx^2 + Cx^3 + Dx^4 +$, &c.

If $n = 1$, and $r = 2$, the *form* will be,

$Ax + Bx^3 + Cx^5 + Dx^7 +$, &c.

If $n = \frac{1}{2}$, and $r = 1$, the *form* is,

$Ax^{\frac{1}{2}} + Bx^{\frac{3}{2}} + Cx^{\frac{5}{2}} + Dx^{\frac{7}{2}} +$, &c,

Again, if $n = 0$, and $x = -1$, the *form* of the *ſeries* will be,

$A + Bx^{-1} + Cx^{-2} + Dx^{-3} +$, &c.

When the value of a quantity cannot be found exactly, it is of uſe in algebra, as well as in common arithmetic, to ſeek an approximated value of that quantity ſufficient for practice. Thus in arithmetic, as the true value of the ſquare root of 2 cannot be aſſigned, a decimal fraction is found to a ſufficient degree of exactneſs in any particular caſe. And this decimal fraction is in reality no more than an infinite *ſeries* of fractions converging or approximating to the true value of the root required For the expreſſion $\sqrt{2} = 1.41421356$, &c. is equivalent to this $\sqrt{2} = 1 + \frac{4}{10} + \frac{1}{100} + \frac{4}{1000} + \frac{2}{10000} + \frac{1}{100000}$ +, &c. Or ſuppoſing $x = \frac{1}{10}$,

$$\sqrt{2} = 1 + \frac{4}{x} + \frac{1}{xx} + \frac{4}{x3} + \frac{2}{x^4} + \frac{1}{x^5} +, \text{ \&c.}$$

$$= 1 + 4x^{-1} + x^{-2} + 4x^{-3} + 2x^{-4} + x^{-5} +, \text{ \&c.}$$

which laſt *ſeries* is a particular caſe of the general indeterminate *ſeries* $Ax^n + Bx^{n+r} + Cx^{n+2r}$ +, &c. when $n = 0$, $r = -1$, and the coefficient $A = 1$, $B = 4$, $C = 1$, $D = 4$, $E = 2$, &c.

But the application of the notion of approximations in numbers, to ſpecies, or to algebra, is not ſo obvious. Sir Iſaac Newton, with his uſual ſagacity, took the hint, proſecuted it, and thereby diſcovered general methods in the doctrines of infinite *ſeries*, which before him had only been treated in a particular manner, though with great acuteneſs, by Dr. Wallis and a few others. See Newton's Method of Fluxions and Infinite *Series*, with Mr. Colſon's Comment; as alſo the Analyſis per Æquationes Numero Terminorum Infinitas, publiſhed by Mr. Jones, in 1711, and ſince tranſlated and explained by Mr. Stewart, together with ſir Iſaac's Quadrature of Curves, Lond. 1745, quarto. To theſe may be added Mr. Maclaurin's Algebra, part II. chap. x. p. 244. and Cramer's Analyſe des Lignes Courbes Algebraiques, chap. vii. p. 148.

Among the various methods for determining the value of a quantity by a converging *ſeries*, that ſeems, on many occaſions, preferable to the reſt, which conſiſts in aſſuming an indeterminate *ſeries* equal to the quantity, the value of which is ſought, and afterwards determining the values of the terms of this aſſumed *ſeries*.

For inſtance, ſuppoſe a logarithm being given, it were required to find its number.

Let the number be $= 1 + x$, and the given logarithm $= z$. Then, by the nature of LOGARITHMS and FLUXIONS, $\dot{z} = \frac{\dot{x}}{1+x}$, and $\dot{z} + x\dot{z} = \dot{x}$. Suppoſe $x = Az + Bz^2 + Cz^3 + Dz^4 +$, &c. conſequently, $\dot{x} = A\dot{z} + 2Bz\dot{z} + 3Cz^2\dot{z} + 4Dz^3\dot{z} +$, &c. $= \dot{z} + x\dot{z} = \dot{z} + Az\dot{z} + Bz^2\dot{z} + Cz^3\dot{z} + Dz^4\dot{z} +$, &c. Now if the correſponding terms of theſe two equal *ſeriſes* (each being $= \dot{x}$) be compared, we ſhall have $A = 1$, $B = \frac{1}{2}$, $C = \frac{1}{6}$, $D = \frac{1}{24}$, &c. which values being ſubſtituted in the *ſeries* $Az + Bz^2 + Cz^3 +$, &c. give $x = z + \frac{1}{2}z^2 + \frac{1}{6}z^3 + \frac{1}{24}z^4 + \frac{1}{120}z^5 + \frac{1}{720}z^6 +$, &c. $= z + \frac{1}{1.2}z^2 + \frac{1}{1.2.3}z^3 + \frac{1}{1.2.3.4}z^4 + \frac{1}{1.2.3.4.5}z^5 +$ &c. And conſequently $1 + x$, the number ſought, will be $= 1 + z + \frac{1}{1.2}z^2 +$, &c.

But the indeterminate *ſeries* $Az + Bzz + Cz^3 +$, &c. was here arbitrarily aſſumed, and will not ſucceed in all caſes

For inſtance, if from an arc given it were required to find the tangent. Let $x =$ tangent, $v =$ arc, the radius $= 1$. Then, from the nature of the circle, we ſhall have $\frac{\dot{x}}{1+xx} = \dot{v}$, or $\dot{x} = \dot{v} + xx\dot{v}$. Now if to find the value of x we ſuppoſe $x = Av + Bv^2 + Cv^3 +$, &c. and operate as before, we ſhall find all the coefficients B, D, F, of the even powers of v, each $= 0$. Therefore the *ſeries* aſſumed is not of a proper form. But ſuppoſing $x = Av + Bv^3 + Cv^5 + Dv^7 +$, &c. we ſhall find $A = 1$, $B = \frac{1}{3}$, $C = \frac{2}{15}$, $D = \frac{17}{315} +$, &c. and conſequently $x = v + \frac{1}{3}v^3 + \frac{2}{15}v^5 + \frac{17}{315}v^7 +$, &c. Now to find a proper indeterminate *ſeries* in all caſes, tentatively, would often be very laborious, and often an impracticable work. Mathematicians have therefore endeavoured to find out a general rule for this purpoſe. But, till lately, the method has been but imperfectly underſtood and delivered. Moſt authors, indeed, have explained the manner of finding the coefficients A, B, C, D, &c. of the inderminate *ſeries* $Ax^n + Bx^{n+r} + Cx^{n+2r} +$ &c. which is eaſy; but the values of n and r, wherein the main difficulty lies, have been aſſigned by many, as if they were ſelf-evident, or at leaſt diſcoverable by an eaſy trial or two, as in the laſt example. Sir Iſaac Newton himſelf has ſhewn the method of determining the number n, by his rule for finding the firſt term of a converging *ſeries*, by the application of his parallelogram and ruler. For the particulars of this method, ſee the authors above cited. See PARALLELOGRAM.

Dr. Taylor in his Methodus incrementorum, inveſtigates the number r; but, according to Mr. Stirling, the rule given by the doctor fails ſometimes. Lineæ Tert. Ordin. Newtonian. p. 28.

Mr. Stirling found a correction of Dr. Taylor's rule, but ſays he cannot affirm it to be univerſal, having only found it by chance.

S'Graveſande obſerves, that though he thinks Mr. Stirling's rule never leads into error, yet that it is not perfect. See s'Graveſande, De Determin. Form. Seriei Infinit. printed at the end of his Matheſeos Univerſalis Elementa, Lugd. Bat. 1727.

This learned profeſſor has endeavoured to rectify the rule. But Mr. Cramer has ſhewn it to be ſtill defective in ſeveral reſpects; and he himſelf to avoid the inconveniences to which the methods of thoſe who wrote before him are ſubject, has aſcended to the firſt principles of the method of infinite *ſeries*, and has entered into a more exact and inſtructive detail of the whole method, than is to be met with elſewhere; for which, and for many other reaſons, his treatiſe deſerves to be particularly recommended to beginners.

But it muſt be obſerved, that in determining the value of a quantity by a converging *ſeries*, it is not always neceſſary to have recourſe to an indeterminate *ſeries*: for it is ſometimes more expeditious to find it by common diviſion, or by extraction of roots. See Newton, Meth. of Flux. and Inf. Series, above cited.

Thus, if it were required to find the arc of a circle from its given tangent, that is, to find the value of v in the fluxional equation, $\dot{v} = \frac{\dot{x}}{1+xx}$ by an infinite *ſeries*: divide $\dot{x}$ by $1 + xx$, the quotient will be the *ſeries* $\dot{x} - x^2\dot{x} + x^4\dot{x} - x^6\dot{x} +$, &c. And taking the fluents of each term, we ſhall have $v = x - \frac{1}{3}x^3 + \frac{1}{5}x^5 - \frac{1}{7}x^7 +$, &c. which is the *ſeries* often uſed for the quadrature of the circle. If $x = 1$, that is, if x be the tangent of 45°, then will $v = x - \frac{1}{3}x^3 + \frac{1}{5}x^5 - \frac{1}{7}x^7$, &c. which is the *ſeries* often uſed for the quadrature of the circle. If $x = 1$, that is, if x be the tangent of 45°, then will $v = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} +$, &c. $=$ the length of an arc of 45°, that is $\frac{1}{8}$ of the circumference of a circle, whoſe radius $= 1$; or ' of the circumference, if the diameter = 1. Conſequently, if 1 be the ſquare of the diameter, $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+$, &c. = the area of the circle; becauſe $\frac{1}{4}$ of the circumference multiplied by the diameter, gives the area of the circle. And this is Leibnitz's *ſeries*, and alſo James Gregory's.

SERIES, *harmonical*. See HARMONICAL.

SERIES, *hyperbolic*, is uſed for a ſeries whoſe ſum depends upon the quadrature of the hyperbola. Such is the *ſeries* $\frac{1}{1}+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+$, &c. De Moivre, Miſc. Analyt. p. 111.

SERIES, *interpolation of a*. See INTERPOLATION.

SERIES, *interſcendent*. See INTERSCENDENT.

SERIES, *mixt*, that *ſeries* whoſe ſum depends partly on the quadrature of the circle, and partly on that of the hyperbola. De Moivre, Miſc. Analyt. p. 111.

SERIES, *recurring*, is uſed for a *ſeries* which is ſo conſtituted, that having taken at pleaſure any number of its terms, each following term ſhall be related to the ſame number of preceding terms according to a conſtant law of relation.

Thus in the following *ſeries*,

A B C D E F

$1+2x+3xx+10x^3+34x^4+97x^5+$, &c.

in which the terms being reſpectively repreſented by the capitals A, B, C, D, &c. we ſhall have

$$D=3Cx-2Bxx+5Ax^3$$
$$E=3Dx-2Cxx+5Bx^3$$
$$F=3Ex-2Dxx+5Cx^3, \text{ \&c.}$$

Where it is evident, that the law of relation between D and E is the ſame as between E and F, each being formed in the ſame manner from the three terms which precede it in the *ſeries*.

The quantities $3x-2xx+5x^3$ taken together and connected with their proper ſigns give what M. de Moivre calls the *index*, or the *ſcale of relation*. Sometimes the bare coefficients $3-2+5$ are called the ſcale of relation. And this ſcale of relation ſubtracted from unity is called the *differential ſcale*. Thus in the foregoing *ſeries* the ſcale of relation being $3x-2xx+5x^3$, the differential ſcale will be $1-3x+2xx-5x^3$.

On the ſubject of recurring *ſeries*, ſee M. de Moivre's Miſcellan. Analytic. p. 27, ſeq. and p. 72, ſeq. as alſo his Doctrine of Chances, 3d edit. p. 220, ſeq. and Mr. Euler's Analyſ. Infinit. tom. i. p. 175, ſeq.

A recurring *ſeries*, with its ſcale of relation being given, the ſum of that *ſeries* continued in infinitum will alſo be given. For inſtance, ſuppoſe a *ſeries* $a+bx+cxx+dx^3+ex^4+$, &c. where the relation of the coefficient of any term to the coefficients of any two preceding terms may be expreſſed by $f-g$; that is, $e=fd-gc$; and $d=fc-gb$, &c. Then will the ſum of the *ſeries*, continued in infinitum, be,

$$\frac{a+bx \atop -fax}{1-fx+gxx}$$

To facilitate the intelligence of this rule by a particular example, aſſume any *ſeries* whereof the two firſt coefficients are given, ſuch as 2 and 5, and ſuppoſe f and g to be reſpectively 2 and 1; then we ſhall have the following *ſeries*, $2+5x+8xx+11x^3+14x^4+18x^5+$ &c.

And the ſum $=\frac{2+5x-4x}{1-2x+xx}=\frac{2+x}{\overline{1-x}^{2}}$.

For the proof, divide 1 by $\overline{1-x}^{2}$

$1-2x+xx)\ 1\ (1+2x+3xx+4x^3+$ &c. which

multiplied by $2+x$

$2+4x+6xx+8x^3+$ &c.

gives $+\ x+2xx+3x^3+$ &c.

the product $=2+5x+8xx+11x^3+$ &c. = the given *ſeries*.

Analogous rules might be derived for more complex caſes; and M. de Moivre's general rule is,

1. Take as many terms of the *ſeries* as there are parts in the ſcale of relation. 2. Subtract the ſcale of relation from unity, the remainder is the differential ſcale. 3. Multiply the terms taken in the *ſeries* by the differential ſcale, beginning at unity, and ſo proceeding orderly, remembering to leave out what would naturally be extended beyond the laſt of the terms taken. Then will the product be the numerator, and the differential ſcale will be the denominator of the fraction expreſſing the ſum required.

But we muſt here obſerve, that when the ſum of a recurring *ſeries* extended ad infinitum is found by M. de Moivre's rule, it ought to be ſuppoſed, that the *ſeries* converges indefinitely, that is, that the terms may become leſs than any aſſigned quantity. For, if the *ſeries* diverges, that is, if its terms continually increaſe, *it* is not true, that the rule gives the ſum. For the ſum in ſuch caſes is infinite, or greater than any given quantity, whereas the ſum exhibited by the rule will often be finite. The rule therefore in this caſe only gives a fraction, the reduction of which into a *ſeries* gives the propoſed *ſeries*. Thus $\frac{1}{\overline{1-x}^{2}}$ reduced to an infinite *ſeries* gives the recurring *ſeries* $1+2x+3xx+$ &c. whoſe ſcale of relation is $2-1$, and its ſum by the rule will be $\frac{a+bx-fax}{1-fx+gxx}=\frac{1+2x-2x}{1-2x+xx}=\frac{1}{\overline{1-x}^{2}}$ = the quantity from which the *ſeries* aroſe. But this quantity cannot in all caſes be deemed equal to the infinite *ſeries* $1+2x+2xx$, &c. For ſtop where you will, there will always be a ſupplement required to make the product of the quotient by the diviſor equal to the dividend. When the *ſeries*, indeed, converges infinitely, the ſupplement diminiſhing continually, it becomes leſs than any aſſigned quantity, and is therefore without error, reputed nothing; but in a diverging *ſeries*, this ſupplement becomes indefinitely great, and the *ſeries* deviates indefinitely from the truth. See Mr. Colſon's Comment on ſir Iſaac Newton's Method of Fluxions and Infinite *Series*, p. 152. Mr. Stirling's Method. Differentialis, p. 36. Bernouilli, de Serieb. Infinit. p. 249. Cramer. Analyſe des Lignes Courbes, p. 174.

A recurring *ſeries* being given, the ſum of any number of the terms of that *ſeries* may be found. This is prob. iii. p. 73. Miſcel. Analyt. and prop. v. p. 223. of the Doctrine of Chances. One ſolution of the ſimpleſt caſe will be ſufficient to give an idea of the method there uſed.

Let there be a geometric progreſſion $a+ax+ax^2+ax^3+$ &c. it is required to find the ſum of a number n of its terms. Then will the laſt term be ax^{n-1}. Suppoſe the progreſſion continued ad infinitum, and we ſhall have two infinite progreſſions, the firſt beginning with a, and the ſecond with ax^{n}. Now the difference of the ſum of theſe two muſt be the ſum of the number n of terms. By the rule, the ſum of the firſt infinite progreſſion will be $\frac{a}{1-x}$; and the ſum of the ſecond will be $\frac{ax^{n}}{1-x}$. But $\frac{a}{1-x}-\frac{ax^{n}}{1-x}=\frac{a-ax^{n}}{1-x}$, which will therefore be the ſum of a number n of terms.

This quantity $\frac{a-ax^{n}}{1-x}$ is equal to $\frac{ax^{n}-a}{x-1}$, which laſt expreſſion, calling $ax^{n-1}=l$, will be equivalent to this, $\frac{lx-a}{x-1}$, which is the common rule for finding the ſum of any geometric progreſſion of which a, the firſt term; x, the ratio; and l, the laſt term are given.

The *ſeries* reſulting from the diviſion of unity by $\overline{1-x}^{p}$ or $\frac{1}{\overline{1-x}^{p}}=\overline{1-x}^{-p}$, is $1+px+p\times\frac{p+1}{2}xx+p\times\frac{p+1}{2}\times\frac{p+2}{3}x^3+$ &c. And the ſum of any number of terms expreſſed by n of this *ſeries* will be $\frac{\overline{1-x}^{n}}{\overline{1-x}^{p}}-$

$$\frac{nx^{n}}{\overline{1-x}^{p-1}}-\frac{\frac{n}{1}\times\frac{n+1}{2}}{\overline{1-x}^{p-2}}x^{n}-\frac{\frac{n}{1}\times\frac{n+1}{2}\times\frac{n+2}{3}}{\overline{1-x}^{p-3}}x^{n}-$$

&c. which is to be continued till the number of terms $=p$. See Miſcel. Analyt. p. 167. Doctrine of Chances, p. 224.

This theorem is of uſe in finding the ſums of progreſſions of figurate numbers, and others.

Suppoſe, for inſtance, it were required to find the ſum of any number n of terms of the geometric progreſſion $1+x+xx+x^3+$ &c. generated by $\frac{1}{1-x}$. Here $p=1$. And the ſum will conſequently be $=\frac{\overline{1-x}^{n}}{\overline{1-x}^{p}}=\frac{1-x^{n}}{1-z}$.

Again, if the ſum of a number n of terms of the *ſeries* $1+2x+3xx+4x^3+$ &c. were required. The *ſeries* is generated from $\frac{1}{\overline{1-x}^{2}}$. Then $p=2$. And the ſum $=\frac{1-x^{n}}{\overline{1-x}^{2}}-\frac{nx^{n}}{1-x}$. Suppoſe $x=1$, then will the ſum be $\frac{nn+n}{2}=n\times\frac{n+1}{2}$ whſch is the ſum of the arithmetical progreſſion $1+2+3+4+$ &c. continued to the number n of terms. But it is to be obſerved, that it requires a particular artifice to derive this ſum from the general rule: for at firſt ſight the ſum appears under this form $\frac{1-1}{1-1^{2}}\ \frac{n}{1-1}$ which determines nothing. See Miſc. Analyt. loc. cit.

In like manner, the ſum of a number n of terms of the *ſeries* of triangular numbers will be found to be $n \times \frac{n+1}{2} \times \frac{n+2}{3}$, as in Miſcel. Analyt. p. 168.

By the like methods the ſum of any number of ſquares cubes, &c. of the natural *ſeries* of numbers may be found. Which may alſo be done by ſir Iſaac Newton's DIFFERENTIAL *method*.

3. In a recurring *ſeries* any term may be obtained whoſe place is aſſigned. For after having taken ſo many terms of the *ſeries* as there are terms in the ſcale of relation, the *ſeries* may be protracted till it reach the place aſſigned. But if that place be very diſtant from the beginning of the *ſeries*, the continuation of the terms will prove laborious: other methods have therefore been contrived. See Miſcel. Analyt. p. 33, ſeq. and Doct. of Chances, p. 224, ſeq.

Theſe queſtions have been reſolved in many caſes, beſides thoſe of recurring *ſeries*. But as there is no univerſal method for the quadrature of curves, neither is there one for the ſummation of *ſeries*; there being a great analogy between theſe things, and ſimilar difficulties ariſing in both. See the authors before cited.

The inveſtigation of Mr. Daniel Bernouilli's method for finding the roots of algebraic equations, which is inſerted in the article EQUATION, depends upon the doctrine of recurring ſeries. See Euler, Analyſis Infinitorum, tom. i. p. 276, ſeq.

In general, algebraic quantities may be expreſſed by a *ſeries* either by diviſion or by the extraction of roots, in a method analagous to that uſed in arithmetic for expreſſing vulgar fractions and roots by decimals. And the conſideration of this analogy ſeems to have given riſe to ſir Iſaac Newton's doctrine of infinite *ſeries*. See his Method of Fluxions and Infinite *Series* in the beginning.

But the ſame great author had alſo another method of throwing the quantities into an infinite *ſeries*, by means of a general form aſſumed for that purpoſe. See *Form of a* SERIES, *ſupra*.

SERIES, *reverſion of*. See REVERSION *of ſeries*.

SERIES, *ſummable*, is uſed when the ſum of the terms of a *ſeries* may be found. Such is the *ſeries* $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} +$, &c. the ſum of which is ſaid to be equal to unity, or, to ſpeak more accurately, the limit of whoſe ſum is unity.

An indefinite number of ſummable infinite *ſerieſes* may be found: ſuch are, for inſtance, all infinite recurring *ſerieſes*, when converging, and many others, for which Meſſieurs de Moivre, Bernouilli, Stirling, Euler, and Maclaurin may be conſulted. Miſcel. Analyt. p. 110, ſeq. De Serieb. Infinit. paſſim. Method. Different. p. 34, ſeq. Acta Petropolit. paſſim. Fluxions, art. 350, ſeq. See PROGRESSION.

The ſums, or rather the limit of the ſums of infinite *ſerieſes* of fractions, have been one of the principal objects of the modern method of computation; and theſe ſums may often be found. Thus the ſum of $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+$, &c. ad infinitum; or rather, the limit to which this ſum may approach nearer than by a given difference is 1. So likewiſe the limit of the ſum $\frac{1}{3}+\frac{1}{9}+\frac{1}{27}+\frac{1}{81}+$, &c. is $\frac{1}{2}$. And theſe, and the like ſums of geometric progreſſions may be readily found, by applying the common rule for determining the ſum of geometric progreſſions from the firſt and laſt terms and the ratio given. For in theſe converging infinite geometric progreſſions, the laſt term muſt be conſidered as 0; ſo that the ſums of the antecedents of theſe progreſſions are conſidered as the ſum itſelf, becauſe they differ from the ſum of the progreſſion by leſs than any aſſigned quantity; but in every geometric progreſſion the ſum of the antecedents is to the ſum of the conſequents, as one antecedent to one conſequent. Hence calling the ſum S, the firſt term a and the ratio r, we ſhall have $S : S - a :: a : ar :: 1 : r$. Therefore $SR = S - a$, or $S = \frac{a}{1-r}$. Thus if $a = \frac{1}{2}$, and $r = \frac{1}{2}$, S will be $= \frac{1}{2}$ divided by $\frac{1}{2}$, or 1. And if $a = \frac{1}{3}$, and $r = \frac{1}{3}$, S will be $= \frac{1}{3}$ divided by $\frac{2}{3}$, or $\frac{1}{2}$: and ſo of the reſt.

But the *ſerieſes* of fractions that occur in the ſolution of problems are rarely reducible to geometric progreſſions; nor can any general rule, in caſes ſo infinitely various, be given. The art here, as in moſt other caſes, is only to be acquired by examples, and by a careful obſervation of the arts uſed by great authors in the inveſtigation of the *ſerieſes* of fractions they have conſidered. And the general methods of infinite *ſeries* which have been carried ſo far by M. de Moivre, Mr. Stirling, and Mr. Euler, are often found neceſſary to determine the ſum of a very ſimple *ſeries* of fractions.—Miſc. Analyt. paſſim. Method. Differentialis. Analyſ. Infinitorum, & Act. Petropol. paſſim.

The ſum of a *ſeries* of fractions decreaſing continually is not always finite, but ſometimes infinite, that is, no limit can be aſſigned but what may be exceeded by the ſum of a certain number of the terms of the *ſeries*. This is the caſe of the *ſeries* $\frac{1}{1}+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}$, &c. called the harmonic *ſeries*, the ſum of which (as has been ſaid under the article PROGRESSION) exceeds any given number, and the analogy of this progreſſion with the ſpace comprehended between the Apollonian hyperbola and its aſymptote, ſhews this. But the ſame may be ſhown independently of the hyperbola from the nature of progreſſions. See Jac. Bernouilli, de Seriebus Infinit.

The foundation of Mr. Bernouilli's demonſtration is, that a number of terms, beginning from any part of the *ſeries*, may be found, the ſum of which ſhall always exceed unity, and conſequently the number of terms of the *ſeries* being ſuppoſed infinite, as many partial ſums as we pleaſe, each exceeding unity, may thus be taken out of the *ſeries*, which therefore may be continued till it exceed any given number.

But if the denominators of this harmonic *ſeries*, $\frac{1}{1}, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}$, &c. be ſquared, that is, if we form the *ſeries* $\frac{1}{1}, \frac{1}{4}, \frac{1}{9}$, &c. the common numerator of which is 1, and the denominators of which are the ſquares of the natural numbers 1, 2, 3, 4, &c. the ſum of this *ſeries* of fractions will not only be limited, as was ſaid under the head PROGRESSION; but this ſum will be preciſely equal to the ſixth part of the number, which expreſſes the ratio of the ſquare of the circumference of a circle to the ſquare of its diameter. That is, if the circumference be 3.14159, &c. and the diameter 1, then will $\frac{1}{1}+\frac{1}{4}+\frac{1}{9}+\frac{1}{16}+\frac{1}{25}+$, &c. $= \frac{\overline{3.14159, \&c.}^{\,2}}{6}$. This propoſition was firſt diſcovered by Mr. Euler, and his inveſtigation may be ſeen in the Acta Petropolit. vol. vii. Mr. Maclaurin has ſince obſerved, that this may eaſily be deduced from his Fluxions, art. 822. Philoſ. Tranſ. N° 469.

It would require a treatiſe to enumerate the various kinds of *ſerieſes* of fractions which may be ſummed. Sometimes the ſum or limit of the infinite *ſeries* cannot be aſſigned, either becauſe it is infinite, as in the harmonic *ſeries* $\frac{1}{1}+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}$, &c. or although this ſum be finite, as in the *ſeries* $\frac{1}{1}+\frac{1}{4}+\frac{1}{9}+\frac{1}{16}+$, &c. yet its ſum cannot be aſſigned in finite terms, or by the quadrature of the circle, or hyperbola, which was the caſe of this *ſeries* before Mr. Euler's diſcovery; but yet the ſum of any given number of the terms of the *ſeries* may be expeditiouſly found, and the whole ſum may be aſſigned by approximation, independently of the circle. See Stirling, Method. Different. and De Moivre, Miſcel. Anal.

Beſides the *ſerieſes* of fractions, the ſums of which converge to a certain quantity, there ſometimes occur *ſerieſes* of fractions which converge by a continual multiplication. Of this kind is the *ſeries* found by Dr. Wallis, for the quadrature of the circle, which he expreſſes thus, $\square = \frac{3\times3\times5\times5\times7\times7\times9\times9\times\ \&c.}{2\times4\times4\times6\times6\times8\times8\times10\times\ \&c.}$ where $\square$ ſignifies the ratio of the ſquare of the diameter to the area of the circle. Hence the denominator of this fraction, continued ad infinitum, is to its numerator as the circle is to the ſquare of its diameter. It may be obſerved, that this *ſeries* is equivalent to $\frac{3\times3}{8}\times\frac{5\times5}{24}\times\frac{7\times7}{48}\times$, &c. or to $\frac{3^2}{3^2-1}\times\frac{5^2}{5^2-1}\times\frac{7^2}{7^2-1}\times$, &c. that is, the product of the ſquares of all the odd numbers 3, 5, 7, 9, &c. is to the product of the ſame ſquares ſeverally diminiſhed by unity, as the ſquare of the diameter is to the area of the circle. Arithmet. Infinit. prop. cxci. Oper. vol. i. p. 469. Id. Oper. vol. ii. p. 819.

Theſe products of fractions, and the like quantities ariſing from the continued multiplication of certain factors, have been particularly conſidered by Mr. Euler, in his Analyſis Infinit. vol. i. chap. xv. p. 221, ſeq.

Mr. Maſeres has given a method of finding, by the help of ſir Iſaac Newton's binomial theorem, a near value of the very ſlowly converging infinite *ſeries*, $x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \frac{x^5}{5}$, &c. when x is very nearly equal to 1;

for which ſee Philoſophical Tranſactions, vol. lxviii. part ii. art. 41. See a new method of inveſtigating the ſums of infinite *ſeries*, by Mr. Vince, in Philoſ. Tranſ. vol. lxxii. part. ii. art. 25.

To find an infinite *ſeries* by extracting of roots, and to find an infinite *ſeries* by a preſuppoſed *ſeries*, ſee QUADRATURE *of the Circle*.

To extract the roots of an infinite *ſeries*, ſee EXTRACTION *of roots*.

SERIES, *tranſcendental*. See TRANSCENDENTAL.

SERINUS, in *Ornithology*, the name of a ſmall bird; a ſpecies of the FRINGILLA in the Linnæan ſyſtem, common in Germany and Italy, and called by the Auſtrians *haerngril*, or *hirngryl*. See *Tab.* III. *of Birds*, N° 37.

Its back is of a reddiſh brown, and its head yellow; the colour being deeper in the male, and paler in the female; the rump is of a beautiful yellowiſh green, as is alſo the breaſt; the belly is white, and the ſides have ſome oblong blackiſh ſpots; the tail, and long feathers of the wings are black, and a little greeniſh at their extremities; the beak is very thick, ſtrong, and ſhort, and is very ſharp at the point. It is kept in cages, and ſings very ſweetly.

SERIOLA, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs: its characters are, that the receptacle is paleaceous, the calyx ſimple, with a ſoft down. There are four ſpecies.

SERIPHIUM, in *Botany*, a genus of the *ſyngeneſia monogamia* claſs. Its characters are, that the calyx is imbricated; the corolla regular, and has one petal; the ſeed is ſingle and oblong. There are four ſpecies.

SERMOCINATION, *ſermocinatio*, in *Rhetoric*, denotes diſcourſe in general, whether held by a perſon alone, or in company, and is the ſame with what is otheriſe called DIALOGISM.

SERMOLOGUS, SERMOLOGUE, an eccleſiaſtical book compoſed of ſermons, or homilies of popes, and other perſons of eminence and ſanctity, formerly read at the feaſts of the Confeſſors, the Purification, All Saints, and on every day from Chriſtmas to the octave of the Epiphany. See HOMILY.

SERMON, a diſcourſe delivered in public, for the purpoſe of religious inſtruction and improvement.

SERMON, *funeral*. See FUNERAL.

SERMONES, the title which Horace gives his Satires. See SATIRE.

Critics are divided about the reaſon of the name; the opinion of father Boſſu ſeems beſt grounded. A mere obſervance of feet and meaſure, ſuch as we find in Terence, Plautus, and in Horace's Satires, he thinks is not ſufficient to conſtitute verſe, to determine the work to be poetical, or to diſtinguiſh it from proſe; unleſs it have ſome farther air, or character of poetry; ſomewhat of the fable or the ſublime.

Hence he judges it is, that Horace calls his Satires *proſe*, or *ſermones*: his Odes have quite another air, and are therefore called *poems*, *carmina*.

SERMONIUM, in *old Records*, a kind of interlude or hiſtorical play, which the inferior orders of clergy, aſſiſted by boys, &c. uſed at times to act in the body of the church, ſuitable to the ſolemnity of ſome feſtival or high proceſſion day.

This is ſuppoſed to have been the origin of the modern drama.

SERMOUNTAIN, in *Botany*, a ſpecies of the LASERWORT in the Linnæan ſyſtem, and, according to others, of the *ſeſeli*, or *wild* SPIGNEL, which grows wild in ſome of the ſouthern parts of Europe, is raiſed with us in gardens, and flowers in June.

The ſeeds of this plant, are the part directed for uſe in our pharmacopœias, and the roots appear to be uſeful aromatics, though not regarded in practice; of an agreeable ſmell, and a warm glowing ſweetiſh taſte; the roots have the greateſt warmth and pungency; the ſeeds the greateſt ſweetneſs, and the moſt pleaſant flavour. A ſpirituous extract of the ſeeds is a very elegant aromatic ſweet. Lewis. See SFSELI *Seed*.

SERON *of almonds*, is the quantity of two hundred weight; of aniſe-ſeed, it is from three to four hundred; of Caſtile ſoap, from two hundred and a half to three hundred and three quarters.

SEROSITY, in *Medicine*, an aqueous liquor, or lympha, found in the blood, and other humours.

Degori defines it, a ſharp, bilious juice, approaching nearly to the nature of blood, but which being extravaſated, does not coagulate like the blood.

Diſorders of the ſpleen are attended with *ſeroſities*; the kidneys help to purge off *ſeroſities*.

SERPEGER, in the *Manege*, was uſed to denote the riding a horſe in the ſerpentine way, or in a tread with waved turnings like the poſture of a ſerpent's body; but is now become obſolete.

SERPENS, in *Aſtronomy*, a conſtellation in the northern hemiſphere, called more particularly *Serpens Ophiuchi*. The ſtars in the conſtellation *Serpens*, in Ptolemy's catalogue, are 18; in Tycho's, 13; in Hevelius's, 22; and in the Britannic catalogue, 64. The longitudes, latitudes, magnitudes, &c. whereof are as follow:

Names and ſituations of the ſtars.	Bayer's Char.	Signs.	Longitud.			Latitude N.			Magnitude.
			°	′	″	°	′	″	
		♏	7	38	45	16	00	52	7
			8	42	0	16	21	35	7
			10	33	31	22	11	0	6.7
Inform. preceding the neck and head of the *Serpent*			12	04	08	17	50	23	6
			12	30	00	19	27	6	6
5.									
			13	17	04	18	32	06	6
			10	01	04	29	59	11	7
			14	26	37	17	01	48	7
			9	57	20	32	58	55	6
			14	45	18	20	07	02	6
10.									
			16	49	57	17	27	54	6
Firſt of three under the jaw	τ		11	29	35	34	01	52	7
That in firſt bend of the neck	δ		14	00	35	28	54	23	3
Preced. in 2d bend of the neck	A		17	35	18	18	17	38	6
			11	53	17	35	48	40	6
15.									
			14	36	44	27	30	55	7
			13	1	5	33	24	19	6.7
Middle under the jaw	τ		12	40	0	34	23	28	6
Third and ſubſequent	τ		13	57	54	34	36	12	6
1ſt from the root of the neck	χ		15	12	31	31	34	09	6
20.									
Preced in the □ of the head, or in extrem. of the cheek	ι		12	51	05	38	08	21	5
			13	23	17	36	59	54	6
Preced of 2 before the 2d bend	ψ		18	42	50	21	45	03	6
The lucid one of the neck	α		17	43	22	25	31	56	2
Poſterior in the ſecond bend	A		20	19	46	17	39	25	6
25.									
That following the lucida to north by Tycho, reckoned the 16 oph.			14	36	34	36	02	33	6
	λ		18	04	56	26	34	53	4
South. of □ in root of neck	β		15	37	03	34	21	30	3
			15	45	20	34	27	50	5.6
			21	31	46	15	51	00	6
30.									
A ſmall one under that	υ		16	21	06	33	09	36	6
Behind 2d bend before oph. hand	μ		21	37	08	16	16	11	4
			15	40	53	35	34	04	6
Subſequent before the 2d bend	ω		20	27	05	21	47	38	6
In mouth, in middle of □ of head	κ		15	26	47	37	08	50	4
35.									
Subſequent behind the 2d bend	*b*		21	57	13	16	41	49	6
That fol. the lucida to the ſouth	ε		19	59	22	24	02	05	3
Nor. againſt the noſtrils in the □ of the head	*S*		15	11	21	40	01	39	4.3
			18	16	18	32	41	18	6
			19	58	18	28	15	34	7
40.									
In temples, 1 ſubſequent of □	γ		18	23	04	35	19	32	3
			26	10	04	11	29	32	6
			23	20	10	25	15	42	6
That without the head to north	π		17	48	23	42	28	52	4
			23	11	47	30	15	25	6
45.									
			23	16	17	30	28	14	6
			23	45	56	28	58	44	7
			22	29	59	37	03	33	6
			23	34	07	34	04	40	6
That following preced. oph. hand	σ		29	05	54	22	16	02	5
50.									
			27	14	49	35	12	25	6
		♐	11	07	23	9	44	45	6
1ſt of 3, behind oph. hind thigh	ν		15	57	39	10	18	11	4
Theſe 3 Tycho ranks am. thoſe of oph.			16	12	46	10	08	59	6
South of 2 following this	ξ		10	13	23	7	59	05	4
55.									
North of theſe	ο		21	07	9	10	33	51	5
In laſt bend, behind oph. hand	ζ		25	47	32	19	47	52	3
Laſt but one of the tail	η	♑	1	31	03	20	31	56	3
Of three ſmall ones following that north	*d*		3	6	51	23	29	53	6
ſouth	*c*		3	38	38	21	17	24	6
60.									
Middle ſubſequent			4	19	14	22	14	31	6
			11	31	28	29	19	27	6
In extremity of the tail			11	26	15	26	54	41	3
Small one adjacent to this		♑	11	31	48	25	13	45	6

SERPENTS, in the Linnæan ſyſtem of *Zoology*, an order of animals, belonging to the claſs of *amphibia*, and comprehending ſix genera, viz. the *crotalus*, or *rattle*-SNAKE; the BOA, or *ſerpent*, including ten ſpecies; the COLUBER, or VIPER; the ANGUIS, or SNAKE; the AMPHISBÆNA, or *annulated ſnake*, the body and tail of which are compoſed of annular ſegments; and the *cæcilia*, or *tentaculated ſnake*, the body and tail of which are wrinkled, without ſcales, and the upper lip furniſhed with two feelers; and including two ſpecies.

The characters of *ſerpents*, according to Linnæus, are theſe; that they are amphibious animals, breathing through the mouth by means of lungs only, and deſtitute of feet, fins, and ears.

Mr. Ray alſo defines *ſerpents* to be creatures breathing by means of lungs, having only one ventricle in the heart, having no feet, and having a long body, covered with ſcales. To which he adds, that in cold ſeaſons they can bear hunger a long time. The greater part of the *ſerpent* claſs are poiſonous, and dangerous in their bite, leaving a miſchievous liquor in the wound made by their tooth, which mixing by this means immediately with the blood, is of fatal conſequence; though the whole creature may be eaten with ſafety, or even the poiſonous liquor, which does this miſchief in the wound, taſted without hurt.

Notwithſtanding that *ſerpents* reſpire by means of lungs, they do not take in and diſcharge their breath by ſuch ſhort intervals as other animals, but what they have once inſpired will ſerve them a long time; for as they are of a cold nature, and their naturally neceſſary vital warmth very ſmall, they do not require ſuch a conſtant renewed ſupply of that pabulum of vital heat, as thoſe which have more of it; and as with us they lie half the year torpid, and half dead, their vital warmth at that time, like fire ſmothered under aſhes, barely exiſts, and needs perhaps no more air than what the creature took in at one inſpiration, before its laying itſelf down for the ſeaſon, which ſerves it till the life-renewing ſpring returns.

Serpents, according to Mr. Ray, may be divided into the poiſonous and the harmleſs, the firſt having long dentes exerti, with poiſonous liquors contained at their bottom, which on biting they diſcharge into the wound; the others wanting theſe teeth, and this poiſon.

They may alſo be divided in regard to their generation, into the oviparous and viviparous; but this is a leſs firmly founded diſtinction than may be ſuppoſed, ſince all *ſerpents* are truly and properly produced of eggs; and the only difference is, that ſome depoſit their eggs in dung-hills, and the like places, to be hatched by accidental heat; while others retain thoſe eggs to be hatched in their own bodies, aad ſo bring forth living young ones. Of the firſt kind is rhe common ſnake, of the latter the viper. Ray's Syn. Quad. et *Serp*. p. 284. See *Tab. of Serpents*.

SERPENS *bubalinus*. Mr. Cleyer has given a very remarkable account in the German Ephemerides, of the prodigious ſize, and voracious appetite of this *ſerpent*, and its manner of feeding.

This gentleman aſſures us, that they grow to the length of twenty-five feet, and are ſurpriſingly daring in attacking large creatures for prey; their neck, he obſerves, is ſo ſmall in proportion to the creatures they ſeize, that it is a wonder that they can ſwallow them whole, which yet experience ſhews they certainly do, having no power of tearing them to pieces. This gentleman ſaw a complete ſtag taken out of the belly of one of theſe *ſnakes*, with all its limbs remaining on; and at another time a wild goat, which had been ſwallowed in the ſame manner; and from another a complete porcupine, a very troubleſome morſel; and there was once an inſtance in the Molucca iſlands, of a woman big with child, being thus ſucked down whole by one of theſe creatures. Ray's Syn. An. p. 333.

The method of their managing their prey is this: when thoroughly lank, lean, and hungry, the *ſnake* lies in wait for any thing it can ſeize; he darts out upon the prey, and ſeizing it with his mouth, winds his body round that of the creature; and this he is able to do with ſuch force, that he will often in twiſting himſelf firmly round the creature, break the bones within its ſkin. This he continues, and at the ſame time is biting with his terrible mouth all the tender parts of the creature, till he has deſtroyed it; or if it be an animal too ſtrong to be killed by theſe ſimple folds, it will drag it to ſome neighbouring tree, and tying it faſt againſt that, draws its body ſo forcibly round it, as to cruſh all its bones to pieces: the part it uſually ſeizes with its teeth, at the ſame time, is the creature's noſe, which he bites ſo forcibly, as not only to ſtop the breath, but to occaſion a diſcharge of blood, which helps to forward its deſtruction.

But the moſt ſingular attack ever known to have been made by this creature, is that recorded by the ſame author, of its ſeizing a buffalo; which it deſtroyed in the manner above deſcribed, though it was a long time about it, and was obliged to have recourſe to the method of tying it up to a tree, againſt which it broke its bones ſeverally, with a noiſe that was heard to a great diſtance.—When the creature had thus deſtroyed its prey, it continued breaking of the bones, till there was not one left whole in the body, and the whole reſembled a ſhapeleſs maſs of matter.

The jaws and throat of this, and of the other *ſerpent*-kind, though ſmall and narrow, are prodigiouſly extenſible, and made ſo by nature for the ſwallowing theſe morſels. The *ſerpent*, when the prey lay in this ſtate before it, licked it all over, and covered it thick with its ſaliva, and that ſo regularly, that the whole carcaſe looked as if daubed over with glue: this done, it opened its jaws to a monſtrous extent, and ſucked in the head of the prey, and continuing inceſſantly ſucking, at length drew down the whole body.

This is a work of time, and very often two or three days are employed in it; and when the animal is thus got down, the *ſerpent* is ſwelled up with it, and is no longer in a ſtate of offending, or even of defending itſelf, or ſo much as running away; and the people of the places where this ſpecies is common, well knows this, and find it an eaſy thing to deſtroy them in this ſtate, and are very happy when they catch one, as their fleſh is a very delicate food. Ephem. Germ. Ann. 12. Obſ.

SERPENT *cucumber*, in *Botany*. See TRICHOSANTHES.

SERPENS *hypnoticus*. See HYPNOTICUS.

SERPENS *marinus*. See *Sea* SNAKE.

SERPENS *rubeſcens*, the *red ſerpent-fiſh*, in *Ichthyography*, the name of a fiſh, properly of the tænia-kind.

It reſembles the common ſnake in figure, and is of a fine ſtrong red in colour, and marked with oblique lines all down the ſides, and long ones from the gills to the tail, one on each ſide; its mouth is but ſmall, and its teeth ſharp and ſerrated; and it has all over its back a number of fine capillaments, ſet at diſtances from one another, even to the tail, and the ſame on the belly; its tail ends in a ſingle fin.

SERPENS *terrenus*, the *earth-ſerpent*, a name given by ſome of the chemical writers to NITRE. It was originally given to the nitre of the ancients, a ſalt very different from that which we call nitre, but it has ſince been applied alſo to that ſalt.

SERPENT-*ſtones*. See SNAKE-*ſtones*.

SERPENT'S-*tongue*, in *Botany*, a genus of the *cryptogamia filices* claſs; comprehending five ſpecies. See ADDER'S-*tongue*.

SERPENTS-*tongues*. The iſland of Malta abounds with *gloſſopetræ*, or the petrified teeth of ſharks, which from their reſemblance to a tongue, are by the vulgar ſuppoſed to be the tongues of *ſerpents* turned into ſtone by ſome miracle of St. Paul, when he was there. This iſland abounds not only with theſe, but with bufonitæ, and vaſt numbers of other remains of ſea productions.

Auguſtino Scilla, who has written at large on the foſſils of this iſland, gives a very rational account of their being the real remains of animals, which, according to his ſyſtem, it is no way wonderful to find there.

In regard to the iſland of Malta, which ſo abounds with them at this time, he ſuppoſes that long ſince the time of the creation, and even without the aſſiſtance of the general deluge, it may have been formed out of the ſea, and that it appears plainly to have been at firſt no other than a maſs of ſoft mud, with an immenſe number of ſea-ſhells, teeth of fiſhes, and other remains of ſea animals mingled among it; and that theſe ſubſiding as low as they could among that thickening matter, have made the iſland what we now find it, that is, a heap of earth with theſe things in vaſt quantities buried in it, and at different depths. Philoſ. Tranſ. N° 219, p. 182.

And though there are found among theſe teeth, &c. in the iſland of Malta, great quantities of ſhells, of ſuch ſpecies, as are not natives of thoſe ſeas, this is no objection to the opinion; ſince it is well known, that the winds when violent, as they probably were about the time of the formation of that iſland, will bring ſuch light bodies as ſhells a vaſt way in water.

The mountains of Sicily afford ſome few *gloſſopetræ*, or *ſnakes-tongues*, but they are few in number, and worſe prepared than thoſe of the iſland of Malta; which is probably owing to the high ground of thoſe mountains being leſs likely to receive the refuſe of the ſea, and its ſoil, which is ſandy, being leſs fitted to preſerve them when there than the marl, of which the iſland of Malta conſiſts.

The *echini marini*, or *ſea-eggs*, and their ſpecies, which are very frequent among the *ſerpents-tongues* of Malta, all lie upon the ſurface of the ground, or near it; whereas the *gloſſopetræ* lie deeper, though at no great depth. This is a plain effect of all theſe things having been really animal

mal bodies, and having floated in the mud, of which that iſland was formed; for in this it could not be otherwiſe, but that the *gloſſopetræ*, or *ſerpents-tongues*, being heavy, would ſubſide in the water, while the light ſhells of theſe other animals would float on, or near the ſurface.

Whenever the *gloſſopetræ* are taken carefully up out of the earth in Malta, the marl or earth, which ſerved for their bed, is found to contain all their minuteſt traces and lineaments, like wax from a ſeal. This is a proof that the marl was as ſoft as melted wax when they were put into it, and that they were of the full ſize and growth when placed there, not having grown, or had any increaſe in that place.

The apophyſes, or proceſſes in the *gloſſopetræ*, are alſo a ſtrong proof of their being no other than real ſharks-teeth, ſince they exactly anſwer to thoſe in the teeth of recent ſharks, by which every tooth is received or inſerted into its neighbour in the jaw. Nay, whereas ſharks-teeth are mortiſed into one another in ſuch a manner, that a man may eaſily tell which belongs to each ſide, which lie near the throat, and which near the front of the mouth; and whereas, in a ſhark's mouth, the teeth on the left ſide will not fit on the right, nor thoſe above ſerve below, but that on ſeeing a recent tooth, a perſon of judgment will be able to ſay what part of the mouth it belonged to; ſo in the foſſile ſhark's teeth, or *gloſſopetræ*, there is not any one which may not be referred to the particular part of the mouth of the living animal, and could have belonged to no other. Auguſtino Scilla, de Petrifac. See Glossopetra.

Serpent, a muſical inſtrument, ſerving as a baſs to the cornet, or *ſmall ſhawm*, to ſuſtain a chorus of ſingers in a large edifice. It has its name *ſerpent* from its figure, as conſiſting of ſeveral folds or wreaths, which ſerve to reduce its length, which would otherwiſe be ſix or ſeven feet.

It is uſually covered with leather, and conſiſts of three parts, a mouth-piece, a neck, and a tail. It has ſix holes, by means whereof it takes in the compaſs of two octaves.

Merſennus, who has particularly deſcribed this inſtrument, mentions ſome peculiar properties of it, e. g. that the ſound of it is ſtrong enough to drown twenty robuſt voices, being animated merely by the breath of a boy, and yet the ſound of it may be attempered to the ſoftneſs of the ſweeteſt voice. Another peculiarity of this inſtrument is, that great as the diſtance between the third and fourth hole appears, yet whether the third hole be open or ſhut, the difference is but a tone.

For a figure of this inſtrument, ſee *Tab. Muſic, fig.* 12.

Serpent, in *Mythology*, was a very common ſymbol of the ſun, and he is repreſented biting his tail, and with his body formed into a circle, in order to indicate the ordinary courſe of this luminary; and under this form it was an emblem of time and eternity.

The *ſerpent* was alſo the ſymbol of medicine, and of the gods which preſided over it, as of Apollo and Æſculapius: and this animal was the object of very ancient and general worſhip, under various appellations and characters. In moſt of the ancient rites we find ſome alluſion to the *ſerpent*, under the ſeveral titles of Ob, Ops, Python, &c.

The idolatry is alluded to by Moſes, Lev. xx. 27. The woman at Endor who had a familiar ſpirit, is called *Oub*, or *Ob*, and it is interpreted Pythoniſſa: the place where ſhe reſided, ſays the learned Mr. Bryant, ſeems to have been named from the worſhip then inſtituted; for Endor is compounded of *En-ador*; and ſignifies *fons pythonis*, the *fountain of light*, the oracle of the god Ador; which oracle was probably founded by the Canaanites, and had never been totally ſuppreſſed. His pillar was alſo called *Abbadir*, or *Abadir*, compounded of *ab* and *adir*, and meaning the *ſerpent* deity *Addir*, the ſame as *Adorus*.

In the orgies of Bacchus, the perſons who partook of the ceremony, uſed to carry *ſerpents* in their hands, and with horrid ſcreams call upon Eva! Eva!

Eva being, according to the writer juſt mentioned, the ſame as epha, or opha, which the Greeks rendered *ophis*, and by it denoted a *ſerpent*.

Theſe ceremonies, and this ſymbolic worſhip began among the Magi, who were the ſons of Chus; and by them they were propagated in various parts. Wherever the Amonians founded any places of worſhip, and introduced their rites, there was generally ſome ſtory of a *ſerpent*. There was a legend about a *ſerpent* at Colchis, at Thebes, and at Delphi; and likewiſe in other places. The Greeks called Apollo himſelf *Python*, which is the ſame as *Oupis*, *Opis*, or *Oub*.

In Egypt there was a *ſerpent* named *Thermuthis*, which was looked upon as very ſacred; and the natives are ſaid to have made uſe of it as a royal tiara, with which they ornamented the ſtatues of Iſis. The Kings of Egypt wore high bonnets, terminating in a round ball, and ſurrounded with figures of aſps; and the prieſts likewiſe had the repreſentation of *ſerpents* upon their bonnets.

Abadon, or Abaddon, mentioned in the Revelations xx. 2. is ſuppoſed by Mr. Bryant, to have been the name of the Ophite god, with whoſe worſhip the world had been ſo long infected. This worſhip began among the people of Chaldea, who built the city of Ophis upon the Tigris, and were greatly addicted to divination, and to the worſhip of the *ſerpent*. From Chaldea the worſhip paſſed into Egypt, where the *Serpent* deity was called *Canoph*, *Can-eph*, and *C'neph*; it alſo had the name of *Ob* or *Oub*, and was the ſame as the *Baſiliſcus*, or *royal Serpent*, the ſame as the *Thermuthis*, and made uſe of by way of ornament to the ſtatues of their gods. The chief deity of Egypt is ſaid to have been Vulcan, who was ſtyled *Opas*; he was the ſame as Osiris, the *Sun*, and hence was often called *Ob-el*, or *Pytho ſol*; and there were pillars ſacred to him, with curious hieroglyphical inſcriptions, bearing the ſame name, whence among the Greeks, who copied from the Egyptians, every thing gradually tapering to a point was ſtyled *obelos*, or *obeliſcus*.

As the worſhip of the *ſerpent* began among the ſons of Chus, Mr. Bryant conjectures, that from thence they were denominated *Ethiopians* and *Aithiopians*, from *Ath-ope*, or *Ath-opes*, the god whom they worſhipped, and not from their complexion: the Ethiopes brought theſe rites into Greece, and called the iſland where they firſt eſtabliſhed them, *Ellopia*, *Solis Serpentis inſula*, the ſame with *Eubœa*, or *Oubaia*, *i. e.* the *Serpent-iſland*.

The ſame learned writer diſcovers traces of the *ſerpent* worſhip among the Hyperboreans, at Rhodes, named Ophiuſa, in Phrygia, and upon the Helleſpont, in the iſland Cyprus, in Crete, among the Athenians, in the name of *Cecrops*, among the natives of Thebes in Bœotia, among the Lacedæmonians, in Italy, in Syria, &c. and in the names of many places, as well as of the people where the Ophites ſettled. One of the moſt early hereſies introduced into the Chriſtian church was that of the Ophitæ. Bryant's Analyſis of Ancient Myth. vol. i. p. 47, &c. p. 473, &c.

SERPENTARIA, a medicinal plant, called by the ancients *piſtolochia*, and *dracunculus*; by us popularly *ſnake-root*, and ſometimes *ſerpentary*. See Snake-*root*.

SERPENTARIUS, in *Aſtronomy*, a conſtellation of the northern hemiſphere, called alſo *Ophiuchus*, and anciently *Æſculapius*.

The ſtars in the conſtellation *Serpentarius*, in Ptolemy's catalogue are 29; in Tycho's, 15; in Hevelius's, 40; in the Britannic catalogue, they are 74. The longitudes, latitudes, magnitudes, &c. whereof, are as follow:

Names and ſituations of the ſtars.	Bayer's char.	Signs.	Longitud.			Latitude.			Magnitude.
			°	′	″	°	′	″	
North in the preced. hand	δ	♏	27	58	15	17	17	15N	3
South and ſubſequent	ε		29	10	45	16	28	20N	3.4
North in the preceding knee	υ	♐	0	58	20	13	00	18N	5
South in the preceding leg	ψ		3	14	18	1	36	09N	5
Under the ſole of preced. foot	g		4	07	58	1	42	35 S	5
5		♏	28	53	05	26	22	14N	6
Middle in the preceding leg	χ	♐	3	40	25	3	16	32N	6
North of theſe	φ		4	21	26	5	14	41N	4
In preceding heel	ω		5	19	53	0	28	40N	5
In the cubitus of preced. arm	λ		1	15	38	23	35	38N	4
10			1	03	21	27	08	34N	6
			3	23	19	19	34	17N	6
South in preceding knee	ζ		4	53	55	11	25	27N	3
			4	17	45	23	12	34N	6
			8	45	56	0	45	20 S	6
15			5	20	03	23	11	30N	6
			4	12	41	30	41	18N	6
			9	45	21	2	07	05 S	7
			5	38	12	24	17	04N	6
			8	03	05	11	38	00N	5.6
20			6	54	17	23	35	16N	6
			10	47	13	0	51	43 S	7
			8	42	16	16	22	01N	6
			11	13	03	0	37	15 S	7
Preceding of 2 in fore ſhoulder	ι		6	17	51	32	32	16N	4
25			11	08	21	2	11	00 S	4
Subſequent	κ		7	30	12	31	52	20N	6
		♑	12	49	55	2	51	17 S	6
			11	56	42	3	55	50N	6
			10	09	17	18	25	21N	6

Names and ſituations of the ſtars.	Bayer's ch.	Signs.	Longitud.			Latitude			Magnitude.
			°	′	″	°	′	″	
30			13	00	15	2	46	40 S	6
			8	12	21	36	42	00N	6
			8	38	08	36	15	20N	6
			8	42	45	36	13	35N	6
Againſt the hind knee	η		13	38	46	7	13	53N	3
35	A		15	42	14	3	24	09N	6
In the toes of the hind foot			11	36	21	33	29	37N	6
			16	12	47	3	29	39 S	6.7
In the back of the hind foot	S		16	06	17	1	08	53 S	6
			16	33	55	2	04	43N	4
40			14	25	04	22	38	32N	6
	θ		17	03	11	1	47	47 S	4.3
			17	33	05	4	54	47 S	4.5
	B		17	59	54	0	54	03 S	5.4
			18	31	16	6	34	12 S	6
45			14	23	27	37	21	14N	6
			17	28	40	10	44	52N	6
			15	11	14	36	02	45N	6
In the middle of the back	σ		16	15	52	27	20	39N	6
	e		19	00	57	0	31	20N	7
50 Poſterior in the heel	e		19	09	15	0	38	23 S	5
			19	57	38	1	19	59N	6
			18	11	12	32	54	27N	5
			17	53	59	36	28	22N	5
	α		18	05	32	35	53	16N	2
55			18	06	51	36	27	27N	6
In the cubitus of hind arm	μ		20	14	37	5	15	51N	6
Laſt of thoſe that follow the foot			21	48	44	1	44	45N	6
			22	35	09	1	36	01N	6
North of 2 in poſter. ſhoulder	β		21	00	44	27	58	00N	3
60			21	22	46	26	01	24N	6
South in the hind ſhoulder	γ		22	18	32	26	09	20N	3
			24	31	30	1	24	08 S	5
South in the hind hand	ν		25	25	16	13	42	45N	4
			25	46	01	5	28	51N	7
65 Of three informes behind the poſterior ſhoulder, north	n		25	44	33	27	51	03N	4.5
middle	o		25	51	19	26	24	31N	4
ſouth	K		26	09	17	24	47	07N	4
North in the poſterior hand	τ		26	27	23	15	17	31N	5
That foll. middle informis	ρ		27	09	16	26	03	54N	4
70 North of thoſe foll. the head	S		27	47	41	32	11	53N	6
South and bright. of thoſe	S		27	49	43	33	01	25N	6
After 4 informes following the ſhould., preced.	q		28	21	39	27	26	14N	6
ſubſeq.	r		1	29	49	26	44	36N	6

SERPENTINE *verſes*, are ſuch as begin and end with the ſame word. As,

Ambo florentes ætatibus, Arcades ambo.

Serpentine, in *Chemiſtry*, a WORM, or pipe of copper, or pewter, twiſted into a ſpiral, and aſcending from the bottom of the alembic to the capital, and ſerving in the diſtillation of rectified ſpirit of wine.

Serpentine *marble* or *ſtone*, a kind of marble called by the ancients *ophites*, from the Greek οφις, *ſerpent*, as being ſpeckled like a ſerpent's ſkin.

The ground of the *ſerpentine* is uſually blackiſh, but it is beſet with green and yellowiſh ſtains, ſtreaks, &c. being withal exceeding hard.

The ſcarceneſs of the *ſerpentine* is ſuch as only allows it to be uſed by way of incruſtation. The largeſt pieces we know of, are ſome tables in the compartiments of the Attic of the Pantheon; and two columns in the church of St. Laurence in Lucina at Rome.

There is alſo a kind of *ſerpentine* brought from Germany, uſed to make veſſels of, but not in building. See OPHITES.

Serpentine, in the *Manege*. A horſe is ſaid to have a *ſerpentine* tongue, if it is always friſking and moving, and ſometimes paſſing over the bit, inſtead of keeping in the void ſpace, called the liberty of the tongue.

Serpentine *column*. See COLUMN.

SERPI, *grotta del*. See GROTTA.

SERPICULA, in *Botany*, a genus of the *monoecia tetrandria* claſs. Its characters are: that it has male and female flowers; the calyx of the former is quadridentate, and the corolla has four petals; the calyx of the latter is quadripartite; and the pericarpium is a nut covered with a whitiſh down. There is one ſpecies.

SERPIGO, in *Surgery*, a kind of herpes, popularly called a *tetter* or RINGWORM.

SERPYLLIUM, in *Botany*. See THYME.

SERRA *piſcis*, in *Ichthyology*, a name given by many authors to the *priſtis*, or SAW-*fiſh*.

Serra is alſo a name given by Pliny to a ſpecies of the baliſtes, called by the generality of writers *ſcolopax*. It is diſtinguiſhed by Artedi by the name of the *baliſtes*, with two ſpines in the place of the belly-fins, and one behind the anus. See TRUMPET-*fiſh*.

SERRATA, a name given by ſome of the Roman authors to the plant which the Gauls, according to Pliny, had named *betonica*, and which the Greeks called *ceſtrum pſuchrotrophon*, and *priorites*. This was evidently the ſame plant with our *ſerratula*, or ſaw-wort; but beſide this there was another plant called by this name, and which, according to Pliny, was the *chamædrys* or *germander* of the Greeks.

Dioſcorides ſays nothing of the chamædrys, but that its leaves were ſmall. And it is much more probable, that the world ſhould take the idea of a ſaw from the leaves of the ſerratula than from thoſe of this plant, they being much leſs nicely denticulated than thoſe. So that thoſe who have been influenced by Pliny, to ſuppoſe the *germander* and *ſerrata* of the ancients to be the ſame plant, are in the wrong, though they have the countenance of this ſo generally reputed authentic author for it.

SERRATE *flies*, in *Natural Hiſtory*, a name given by authors to certain flies, diſtinguiſhed from all the other kinds by their having a weapon reſembling a double ſaw, placed at the hinder part of the body; this ſerves ſeveral ſpecies of them to make holes in the branches of trees, in which they depoſit their eggs; but there are ſome of them which do not ſeem to make any uſe of this curious inſtrument, though they have it. See ROSE-*fly*.

The *fly* of this kind that lays its eggs on the gooſeberry-buſh, depoſits them only on the ſurface of the middle rib of the leaf; and the oſier-fly, which is one of this genus, produced from a baſtard caterpillar of the oſier, lays its eggs on the intermediate ſurface of the leaves between the ribs.

There appears to be no uſe made of this curious inſtrument in the depoſiting of theſe eggs, ſince they are only laid in rows upon the leaves, and fixed to them by means of a viſcous fluid which covers them. It is a very remarkable property in the eggs of this genus of *flies*, that they grow much larger after they are laid. This is obſervable in the eggs of the common roſe-fly, which are at firſt buried in the wood, and by their growth force out the ſurface into tumors of an oval figure; but in theſe of the oſier-fly it is moſt beautifully ſeen, and the whole growth of the fœtus in them is clearly ſeen, on examining them at different times of their growth, which may be eaſily done without diſturbing them, as they lie naked on the ſurface of the leaf.

There ſeems a plain proof that the egg receives ſome ſort of benefit, and that a very eſſential one to its preſervation, from the juices of the plant on which it is depoſited, ſince, if thoſe leaves be pulled off from the plant, and left to dry, the eggs always dry up with them, and periſh; whereas, if the ends of theſe leaves be put into water, and the leaf be by that means preſerved freſh and juicy, the creature hatches from it as well as if it was left upon the tree. Reaumur's Hiſt. Inſ. vol. ix. p. 164.

SERRATED *leaf*, in *Botany*. See LEAF.

SERRATULA, *ſaw-wort*, in *Botany*, a name given to ſeveral ſpecies of *jacea*. See SAW-*wort*.

SERRATUS, in *Anatomy*, a name given to ſeveral muſcles, from their reſemblance, in ſhape, to a ſaw. Such are the

Serratus *anticus minor*, called alſo PECTORALIS *minor*, which ariſes thin and fleſhy from the ſecond, third, fourth, and fifth ſuperior ribs, and aſcending obliquely, is inſerted into the proceſſus coracoides of the ſcapula. This muſcle aſſiſts the rhomboides and angularis, as moderators of the action of the trapezius and *ſerratus major*, in turning the point of the acromium upward, the ſuperior angle downward, and the inferior angle forward. It is likewiſe an aſſiſtant to the rhomboides and angularis, in returning the ſcapular to its natural ſituation, when the trapezius and *ſerratus major* ceaſe to act, by drawing downward the apophyſis coracoides in which it is inſerted. Some have improperly reckoned it among the muſcles employed in reſpiration; but as the *ſerratus major*, which principally keeps the ſhoulder in a fixed poſition, is partly inſerted in the ſame ribs, and in this action muſt keep them depreſſed, it will be impoſſible for this muſcle to raiſe them. Winſlow. See *Tab. Anat. (Myol.) fig.* 2. *n.* 10.

Serratus *anticus major*, comes from the whole baſis of the ſcapula, and is inſerted into the ſeven true ribs, and often in one or two of the falſe ribs, by ſo many diſtinct portions or digitations, repreſenting the teeth of a ſaw. See *Tab. Anat. (Myol.) fig.* 7. *n.* 15. 15. *fig.* 1. *n.* 42. *fig.* 2. *n.* 26.

This muſcle is broad, thick, and pretty fleſhy, and lies on the lateral part of the thorax, between the ribs and ſcapula, by which it is covered. The figure is that of an irregular ſquare.

Though the digitations of this muſcle give it a radiated appearance from the ſcapula to the ribs, yet theſe radii do not all lie in that diſpoſition, which at firſt ſight one would be apt to imagine. The muſcle is made up of two planes, one great, the other ſmall; the ſmall plane looks like a diſtinct narrow muſcle, cloſely adhering to the ſuperior edge of the great plane. It is fixed by one extremity under the ſuperior angle of the ſcapula, and by the other to the firſt rib by a ſmall inſertion, and to the ſecond rib by a broad one.

This plane is eaſily ſeen by turning the ſcapula forward, having firſt ſeparated the rhomboides; but when it is turned back, the pectoralis minor being firſt cut off, this plane does not appear, being covered and hid by the broad one. The broad plane may be divided into two portions, one ſuperior, the other inferior, adhering to each other at their edges.

The ſuperior portion is thin, and takes up about three-quarters of the baſis of the ſcapula, reckoning from the ſuperior angle; from thence it contracts by ſmall degrees, and forms two digitations very like theſe of the ſmall plane, which they cover by their inſertions in the two firſt true ribs, or in the ſecond and third, and ſometimes in all the three. The inferior portion is fixed in the lower quarter of the baſis ſcapulæ, from whence it expands itſelf by ſix or ſeven very long fleſhy digitations, which decreaſe in breadth as they deſcend, and are inſerted in the manner before mentioned, in the ſix or ſeven ribs which follow the two firſt. The *ſerratus major* ſerves to raiſe the ſhoulder, or top of the ſcapula, bring it forward and hinder it from ſinking. Winſlow.

SERRATUS *poſticus ſuperior*, is a flat thin muſcle, ſituated on the upper part of the back. It is fixed on one ſide by a broad aponeuroſis, to the lower part of the poſterior cervical ligament, and to the ſpinal apophyſis of the two laſt vertebræ of the neck, and two parts of the back; from thence it runs down a little obliquely forward, and is inſerted by broad fleſhy digitations, in the poſterior part of the ſecond, third, fourth, and ſometimes of the fifth true ribs, near their angles; but ſometimes it has no inſertion in the ſecond rib. It is covered by the rhomboides, and cloſely united with it. See *Tab. Anat. (Myol.) fig.* 7. *n.* 31.

SERRATUS *poſticus inferior*, is a flat thin muſcle, lying on the lower part of the back; it is fixed in the laſt ſpinal apophyſis of the back and in the three firſt of the loins by a broad aponeuroſis; from thence it runs up a little obliquely, and is fixed by fleſhy broad digitations in the laſt four falſe ribs. Its inſertion in the loweſt rib is near the cartilage, and in the other three near their angles. It is covered by the latiſſimus dorſi, to which it adheres very cloſely, and it covers the ſacro-lumbaris, and longiſſimus dorſi.

The uſe of theſe muſcles is to enlarge the cavity of the thorax in one direction, and to contract it in the other; for the *ſerratus poſticus ſuperior* is diſpoſed to move upwards, the three or four upper ribs next the firſt; and the *ſerratus poſticus inferior* is ſtill better diſpoſed for depreſſing the laſt three or four falſe ribs. Winſlow.

SERTA, *garlands*, among the *Ancients*. See GARLAND.

SERTULA *campana*, in *Botany*, a name given by ſome authors to melilot.

SERTULARIA, in *Natural Hiſtory*, the name of a genus of *zoophytes*, in the claſs of worms. The characters of this genus of bodies, according to Linnæus are, that they have the flowers of the *hydra*, and that their ſtem is radicated, fibroſe, and articulated; and that the joints are uniflorous. This genus comprehends forty-two different ſpecies of CORALLINES.

SERVAGE. See SERVICE.

SERVAL, in *Zoology*. See CATUS *pardus*.

SERVANT, SERVUS, a term of relation, ſignifying a perſon who owes and pays a limited obedience for a certain time to another, in quality of maſter.

The firſt ſort of *ſervants*, acknowledged by the laws of England, are *menial ſervants*; ſo called from being *intra moenia*, or *domeſtics*. The contract between them and their maſters ariſes upon the hiring: if the hiring be general, without any particular time limited, the law conſtrues it to be hiring for a year; but the contract may be made for any larger or ſmaller term. All ſingle men between twelve years of age and ſixty, and married ones under thirty years of age; and all ſingle women between twelve and forty, not having any viſible livelihood, are compellable by two juſtices to go out to ſervice in huſbandry, or certain ſpecific trades, for the promotion of honeſt induſtry: and no maſter can put away his *ſervant*, or *ſervant* leave his maſter after being ſo retained, either before or at the end of his term, without a quarter's warning, unleſs upon reaſonable cauſe, to be allowed by a juſtice of the peace; but they may part by conſent, or make a ſpecial bargain.

Another ſpecies of *ſervants* are called APPRENTICES: a third ſort are labourers. See LABOUR.

And there is a fourth ſpecies, if they may be called *ſervants*, being rather in a ſuperior capacity of ſervice; ſuch as ſtewards, factors, and bailiffs, whom, however, the law conſiders as *ſervants pro tempore*, with regard to ſuch of their acts as affect their maſter's or employer's property.

A maſter may by law correct his apprentice, or *ſervant*, for negligence, or other miſbehaviour, provided it be done with moderation; though if the maſter's wife beats him, it is good cauſe of departure: but if any *ſervant*, workman, or labourer aſſaults his maſter or dame, he ſhall ſuffer one year's impriſonment, and other open corporal puniſhment, not extending to life or limb. 5 Eliz. c. 4.

By ſervice all *ſervants* and labourers, except apprentices, become intitled to wages, according to their agreement, if menial *ſervants*; or according to the appointment of the ſheriff or ſeſſion, if labourers or *ſervants* in huſbandry.

A maſter may maintain, i. e. abet or aſſiſt his *ſervant* in any action at law againſt a ſtranger; he may alſo bring an action againſt any man for beating or maiming his *ſervant*, aſſigning his damage by the loſs of ſervice, and proving the loſs upon the trial: he may likewiſe juſtify an aſſault in defence of his *ſervant*, and a *ſervant* in defence of his maſter: and if any perſon hire or retain my *ſervant*, being in my ſervice, I may have an action for damages againſt both the new maſter and the *ſervant*, or either of them; but if the maſter did not know that he is my *ſervant*, no action lies, unleſs he afterwards refuſe to reſtore him upon information and demand.

As for thoſe things which a *ſervant* may do in behalf of his maſter, they ſeem to be grounded on this principle, that the maſter is anſwerable for the act of his *ſervant*, if done by his command, either expreſly given or implied; therefore, if the *ſervant* commit a treſpaſs by the command or encouragement of his maſter, the maſter ſhall be guilty of it: if any inn-keeper's *ſervants* rob his gueſts, the maſter is bound to reſtitution; and if the drawer at a tavern ſells a man bad wine, whereby his health is injured, he may bring an action againſt the maſter. In the ſame manner, whatever a *ſervant* is permitted to do in the uſual courſe of his buſineſs, is equivalent to a general command; if I pay money to a banker's *ſervant*, the banker is anſwerable for it; if a ſteward lets leaſe of a farm without the owner's knowledge, the owner muſt ſtand to the bargain: a wife, friend, or relation, that uſe to tranſact buſineſs for a man, are *quoad hoc* his *ſervants*, and the principal muſt anſwer for their conduct. Farther, if a *ſervant*, by his negligence, does any damage to a ſtranger, the maſter ſhall anſwer for his neglect: if a ſmith's *ſervant* lames a horſe while he is ſhoeing him, an action lies againſt the maſter and not againſt the *ſervant*. A maſter is chargeable if any of his family layeth or carrieth any thing out of his houſe into the ſtreet, or common high way, to the damage of an individual, or the common nuſance of his majeſty's liege people. In caſe of fire the *ſervant* is accountable. Blackſt. Com. book i. p. 425, &c. See LARCENY.

The Romans, beſides their ſlaves, whom they alſo called *ſervi*, had another kind of *ſervants*, whom they called *nexi* and *addicti*, who were ſuch as being in debt, were delivered up to their creditors by the prætor, to work out the debt, after which they were again at liberty.

The pope, out of his wonderful humility, calls himſelf in his bulls, *the ſervant of the ſervants of God, ſervus ſervorum Dei*. The firſt who uſed the appellation, as Diaconus tells us, were pope Damaſus and Gregory the Great, which laſt is ſaid to have uſed it to check by his modeſty, the arrogance of John, patriarch of Conſtantinople, who took the title of *œcumenical*—Du-Cange adds, that the title *ſervant* has been aſſumed by ſome biſhops, by ſome kings, and ſome monks.

SERVE, in the *Sea Language*; to *ſerve* a rope, is to lay ſpun yarn, rope yarn, ſennit, a leather, a piece of canvas, or the like upon it, which is rolled faſt round about the rope, to keep it from fretting or galling in any place.

SERVETISTS, in *Eccleſiaſtical Hiſtory*, a ſect ſaid to be the diſciples or followers of Michael Servetus, the ringleader of the anti-trinitarians of theſe laſt ages.

Servetus, who was diſtinguiſhed by his genius, learning, eloquence, reſolution, and piety, was born at Villa Nueva, in the kingdom of Arragon, and after a variety of adventures ſettled at Vienne in Dauphiné, where he applied himſelf with ſucceſs to the practice of phyſic. See CIRCULATION *of the Blood*.

Having eſcaped from priſon at Vienne, he paſſed through Switzerland, in order to ſeek refuge in Italy, when Calvin cauſed him to be apprehended at Geneva, in the year 1553, and had an accuſation of blaſphemy brought againſt him before the council. The iſſue of this accuſation was fatal to *Servetus*, who, adhering reſolutely for the opinions he had embraced, was, by a public ſentence of the court, declared an obſtinate heretic, and in conſequence thereof condemned to the flames.

It is impoſſible (ſays the tranſlator of Moſheim's Eccl.

Hiſt.) to juſtify the conduct of Calvin in the caſe of *Servetus*, whoſe death will be an indelible reproach upon the character of that great and eminent reformer. The only thing that can be alledged, not to efface, but to diminiſh his crime is, that it was no eaſy matter for him to diveſt himſelf at once of that perſecuting ſpirit, which had been ſo long nouriſhed or ſtrengthened by the popiſh religion in which he was educated.

Servetus, in reality, had not any diſciples, as being burnt, together with his books, before his dogmas had time to take root. But the name *Servetiſts* has been given to ſome of the modern Anti-trinitarians, becauſe they follow the footſteps he had marked out.

However, thoſe who were denominated *Servetiſts* or *Servetians*, by the theological writers of the ſixteenth century, not only differed from *Servetus* in many points of doctrine, but alſo varied widely from him in his doctrine of the Trinity, which was the peculiar and diſtinguiſhing point of his theological ſyſtem.

Sixtus Senenſis calls the Anabaptiſts *Servetiſts*, and ſeems to uſe the two terms indifferently. The truth is, in many things, the ancient Anabaptiſts of Swiſſerland, &c. coincided in opinion with Servetus.

As the books that he wrote againſt the Trinity are very rare, his real ſentiments are but little known: M. Simon, who had a copy of the firſt edition, delivers them at large in his critical hiſtory.

Though Servetus uſes many of the ſame arguments againſt the Trinity as the Arians, yet he profeſſes himſelf very far from their ſentiments. He alſo oppoſes the Socinians in ſome things; and declares his diſſent from the opinions of Paulus Samoſatenus; though Sandius miſtakenly charges him with having the ſame ſentiments.

In effect, he does not ſeem to have had any fixed regular ſyſtem of religion, at leaſt not in the firſt edition of his book againſt the Trinity, publiſhed in 1531, under the title, De Trinitatis Erroribus Libri ſeptem, per Michaelem Servetum, alias Reves, ab Arragonia Hiſpanum.

The year following he publiſhed his dialogues on the myſtery of the Trinity. In the preface to which laſt work, he declares himſelf diſſatiſfied therewith. It was on this account he undertook another on the ſame ſubject, of much greater extent, which did not appear till the year 1553, a little before his death, under the title of Chriſtianiſmi Reſtitutio.

Thoſe of Geneva, having ſeized the copies of this edition, had it burnt; nor were there above two or three that eſcaped; one of which was kept at Baſil, where the book was printed, but is now in the college library at Dublin.

It was put to the preſs ſecretly in England, but being diſcovered, the impreſſion was ſeized and deſtroyed.

Servetus, according to Moſheim's account, conceived that the genuine doctrine of Chriſt had been entirely loſt, even before the council of Nice; and he was, moreover, of opinion, that it had never been delivered with a ſufficient degree of preciſion in any period of the church. To theſe extravagant aſſertions he added another ſtill more ſo, even that he himſelf had received a commiſſion from above to reveal anew this divine doctrine, and to explain it to mankind. His notions with reſpect to the Supreme Being, and a Trinity of perſons in the Godhead, were very obſcure and chimerical, and amounted in general to the following propoſitions: that the Deity, before the creation of the world, had produced within himſelf two perſonal repreſentations or manners of exiſtence, which were to be the medium of intercourſe between him and mortals, and by whom, conſequently, he was to reveal his will, and to diſplay his mercy and beneficence to the children of men: that theſe two repreſentatives were the Word and the Holy Ghoſt: that the former was united to the man Chriſt, who was born of the virgin Mary, by an omnipotent act of the Divine Will; and that, on this account, Chriſt might be properly called *God*: that the Holy Spirit directed the courſe, and animated the whole ſyſtem of nature, and more eſpecially produced in the minds of men wiſe counſels, virtuous propenſities, and divine feelings; and, finally, that theſe two repreſentations were to ceaſe after the deſtruction of this terreſtrial globe, and to be abſorbed into the ſubſtance of the Deity, from whence they had been formed.

Servetus, however, did not always explain his ſyſtem in the ſame manner, nor avoid inconſiſtencies, contradictions, and ambiguities; ſo that it is extremely difficult to learn his true ſentiments. His ſyſtem of morality agreed in many circumſtances with that of the Anabaptiſts, whom he alſo imitated in cenſuring with the utmoſt ſeverity the cuſtom of infant-baptiſm. Eccl. Hiſt. vol. iv. p. 170, &c. ed. 8vo. 1768.

SERVICE, or SERVAGE, *ſervitium*, in *Law*, a duty which the tenant by reaſon of his fee, owes to the lord.

This, in pure, proper, and original feuds, was only twofold: to follow, or to do ſuit to, the lord in his courts in time of peace; and in his armies, or warlike retinue, when neceſſity called him to the field.

Ancient law-books make ſeveral diviſions of *ſervice*; viz. into *perſonal*, *real*, and *mixt*; *military* and *baſe*, *intrinſic* and *extrinſic*, &c. But, ſince the ſtatute 12 Car. II. whereby all tenures are turned into free and common ſocage, much of that learning is ſet aſide. Yet it may not be amiſs to mention how the ſeveral kinds of *ſervice* are deſcribed in our ancient law-books.

SERVICE, *perſonal*, is that to be performed by the perſon. Such is that due from a ſlave to his maſter.

SERVICE, *real*, is either *urbane* or *ruſtic*; which two kinds differ, not in the place, but the thing. The firſt is that due from a building or houſe, in whatever place ſituate, whether in city or in country; as keeping a drain, a viſta, or the like.

SERVICES, *ruſtic*, are thoſe due for grounds where there is no building; ſuch is the right of paſſage through ways, &c.

SERVICE, *mixt*, is that due from the perſon, by reaſon of the thing, as an uſufruit, &c.

Our ancient law-books tell us of lands held of the king, by the tenant's letting a fart before the king on New Year's Day; others, by furniſhing the king with whores whenever he travelled that way; others, by bringing the king a meſs of pottage at his coronation-feaſt, &c.

There are alſo *natural* SERVICES. For inſtance, if a man cannot gather the produce of his lands without paſſing through his neighbour's grounds, the neighbour is obliged to allow a paſſage, as a *natural ſervice*.

SERVICE, *forenſic* or *extrinſic*, *ſervitium forenſicum*, &c. was a *ſervice* which did not belong to the chief lord, but to the king.

It was called *forenſic* and *extrinſic*, becauſe done *foris*, out of doors; and *extra ſervitium*. We meet with ſeveral grants, in the Monaſticon, of all liberties, with the appurtenances, *ſalvo forenſi ſervitio*.

SERVICE, *intrinſic*, *ſervitium intrinſecum*, that due to the chief lord alone, from his vaſſals within his manor.

SERVICE, *frank*, *ſervitium liberum*, a *ſervice* done by the feudatory tenants, who were called *liberi homines*, and diſtinct from vaſſals: as was likewiſe their *ſervice*; for they were not bound to any baſe *ſervices*, as to plow the lord's lands, &c. but only to find a man and horſe to attend the lord into the army or court.

SERVICE, *baſe*. See VILLENAGE.

SERVICE, *bord*. See BORDAGE.

SERVICE, *foreign*, *honorary*, *knights*, *rent*. See the adjectives.

SERVICE, *heriot*. See HERIOT.

SERVICE, *ovelty of*. See OVELTY.

SERVICE, *ſuit of*. See SUIT.

SERVICE, *choral*, in *Church Hiſtory*, denotes that part of religious worſhip which conſiſts in chanting and SINGING. The advocates for the high antiquity of ſinging, as a part of church muſic, urge the authority of St. Paul in its favour: Epheſ. chap. v. ver. 19. and Coloſſ. chap. iii. ver. 16. On the authority of which paſſages it is aſſerted, that ſongs and hymns were, from the eſtabliſhment of the church, ſung in the aſſemblies of the faithful; and it appears, from undoubted teſtimony, that ſinging, which was practiſed as a ſacred rite among the Egyptians and Hebrews, at a very early period, and which likewiſe conſtituted a conſiderable part of the religious ceremonies of the Greeks and Romans, made a part of the religious worſhip of Chriſtians, not only before churches were built, and their religion eſtabliſhed by law, but from the firſt profeſſion of Chriſtianity. However, the æra from whence others have dated the introduction of muſic into the ſervice of the church, is that period, during which Leontius governed the church of Antioch, i. e. between the year of Chriſt 347 and 356. See ANTIPHONY.

From Antioch the practice ſoon ſpread through the other churches of the Eaſt; and in a few ages after its firſt introduction into the divine *ſervice*, it not only received the ſanction of public authority, but thoſe were forbid to join in it who were ignorant of muſic. A canon to this purpoſe was made by the council of Laodicea, which was held about the year 372; and Zonanas informs us, that theſe canonical ſingers were reckoned a part of the clergy. Singing was introduced into the weſtern churches by St. Ambroſe, about the year 374, who was the inſtitutor of the AMBROSIAN *chant*, eſtabliſhed at Milan about the year 386; and Euſebius, lib. ii. cap. 17. tells us, that a regular choir, and method of ſinging the *ſervice*, were firſt eſtabliſhed, and hymns uſed in the church at Antioch, during the reign of Conſtantine; and that St. Ambroſe, who had long reſided there, had his melodies thence. This was, about two hundred and thirty years afterwards, amended by pope Gregory the Great, who eſtabliſhed the *Gregorian* CHANT; a plain, uniſonous kind of melody, which he thought conſiſtent with the gravity and dignity of the *ſervice* to which it was to be applied. This prevails in the Roman church even at this day: it is known in Italy by the name of canto fermo; in France, by that of plain chant; and in Germany, and moſt other countries, by that of the cantus Gregorianus. Although no ſatisfactory account has been given of the ſpecific difference between the Ambroſian and Gregorian chants, yet all writers on this ſubject agree in ſaying, that St. Ambroſe only uſed the four authentic modes, and that the four plagal were afterwards added by St. Gregory. Each of theſe had the ſame final, or key-note, as its relative authentic; from which there is no other difference than that the melodies in the four authentic, or principal modes, are generally confined within the compaſs of the eight notes *above* the key-note, and thoſe in the four plagal, or relative modes, within the compaſs of the eight notes *below* the fifth of the key. See MODE

Eccleſiaſtical writers ſeem unanimous in allowing, that pope Gregory, who began his pontificate in 590, collected the muſical fragments of ſuch ancient pſalms and hymns as the firſt fathers of the church had approved and recommended to the firſt Chriſtians; and that he ſelected, methodized, and arranged them in the order which was long continued at Rome, and ſoon adopted by the chief part of the weſtern church. Gregory is alſo ſaid to have baniſhed from the church the CANTO *figurato*, as too light and diſſolute; and it is added, that his own CHANT was called *canto fermo*, from its gravity and ſimplicity.

It has been long a received opinion, that the eccleſiaſtical tones were taken from the reformed modes of Ptolemy; but Dr. Burney obſerves, that it is difficult to diſcover any connection between them, except in their names; for their number, upon examination, is not the ſame; thoſe of Ptolemy being ſeven, the eccleſiaſtical eight; and, indeed, the Greek names given to the eccleſiaſtical modes do not agree with thoſe of Ptolemy in the ſingle inſtance of key, but with thoſe of higher antiquity. From the time of Gregory to that of Guido, there was no other diſtinction of keys than that of authentic and plagal; nor were any ſemitones uſed but thoſe from E to F, B to C, and occaſionally A to B *b*.

With reſpect to the muſic of the primitive church, it may be obſerved, that, though it conſiſted in the ſinging of pſalms and hymns, yet it was performed in many different ways; ſometimes the pſalms were ſung by one perſon alone, whilſt the reſt attended in ſilence; ſometimes they were ſung by the whole aſſembly; ſometimes alternately, the congregation being divided into ſeparate choirs; and ſometimes by one perſon, who repeated the firſt part of the verſe, the reſt joining in the cloſe of it. Of the four different methods of ſinging now recited, the ſecond and third were properly diſtinguiſhed by the names of SYMPHONY and ANTIPHONY; and the latter was ſometimes called *reſponſaria*, in which women were allowed to join. St. Ignatius, who, according to Socrates, lib. vi. cap 8. converſed with the apoſtles, is generally ſuppoſed to have been the firſt who ſuggeſted to the primitive Chriſtians in the Eaſt the method of ſinging hymns and pſalms alternately, or in dialogue; and the cuſtom ſoon prevailed in every place where Chriſtianity was eſtabliſhed; though Theodoret, in his hiſtory, lib. ii. cap. 24. tells us, that this manner of ſinging was firſt practiſed at Antioch. It likewiſe appears, that almoſt from the time when muſic was firſt introduced into the *ſervice* of the church, it was of two kinds, and conſiſted in a gentle inflection of the voice, which they termed plain ſong, and a more elaborate and artificial kind of muſic, adapted to the hymns and ſolemn offices contained in its ritual; and this diſtinction has been maintained even to the preſent day.

Although we find a very early diſtinction made between the manner of ſinging the hymns and chanting the pſalms, it is, however, the opinion of the learned Martini, that the muſic of the firſt five or ſix ages of the church conſiſted chiefly in a plain and ſimple chant of uniſons and octaves, of which many fragments are ſtill remaining in the canto fermo of the Romiſh miſſals. For with reſpect to muſic in parts, as it does not appear, in theſe early ages, that either the Greeks or Romans were in poſſeſſion of HARMONY or COUNTERPOINT, which has been generally aſcribed to Guido, a monk of Arezzo, in Tuſcany, about the year 1022, though others have traced the origin of it to the eighth century, it is in vain to ſeek it in the church. The choral muſic, which had its riſe in the church of Antioch, and from thence ſpread through Greece, Italy, France, Spain, and Germany, was brought into Britain by the ſingers who accompanied Auſtin the monk, when he came over, in the year 596, charged with a commiſſion to convert the inhabitants of this country to Chriſtianity. Bede tells us, than when Auſtin, and the companions of his miſſion, had their firſt audience of king Ethelbert, in the iſle of Thanet, they approached him in proceſſion, ſinging litanies, and that afterwards, when they entered the city of Canterbury, they ſung a litany, and at the end of it, Allelujah. But though this was the firſt time the Anglo-Saxons had heard the Gregorian chant, yet Bede likewiſe tells us, that our Britiſh anceſtors had been inſtructed in the rites and ceremonies of the Gallican church by St. Germanus, and heard him ſing Allelujah many years before the arrival of St. Auſtin. In 680, John, præcentor of St. Peter's in Rome, was ſent over by pope Agatho to inſtruct the monks of Weremouth in the art of ſinging; and he was prevailed upon to open ſchools for teaching muſic in other places of Northumberland. Benedict Biſcop, the preceptor of Bede, Adrian the monk, and many others, contributed to diſſeminate the knowledge of the Roman chant. At length the ſucceſſors of St. Gregory, and of Auſtin his miſſionary, having eſtabliſhed a ſchool for eccleſiaſtical muſic at Canterbury, the reſt of the iſland was furniſhed with maſters from that ſeminary. The choral *ſervice* was firſt introduced in the cathedral church of Canterbury, and, till the arrival of Theodore, and his ſettlement in that ſee, the practice of it ſeems to have been confined to the churches of Kent; but after that, it ſpread over the whole kingdom; and we meet with records of very ample endowments for the ſupport of this part of public worſhip. This mode of religious worſhip prevailed in all the European churches till the time of the Reformation: the firſt deviation from it is that which followed the reformation by Luther, who, being himſelf a lover of muſic, formed a liturgy, which was a muſical ſervice, contained in a work, entitled, Pſalmodia, h. e. Cantica ſacra Veteris Eccleſiæ ſelecta, printed at Norimberg, in 1553, and at Wittemberg, in 1561. But Calvin, in his eſtabliſhment of a church at Geneva, reduced the whole of divine ſervice to prayer, preaching, and ſinging; the latter of which he reſtrained. He excluded the offices of the antiphon, hymn, and motet, of the Romiſh *ſervice*, with that artificial and elaborate muſic to which they were ſung; and adopted only that plain metrical pſalmody, which is now in general uſe among the reformed churches, and in the parochial churches of our own country. For this purpoſe he made uſe of Marot's verſion of the Pſalms, and employed a muſician to ſet them to eaſy tunes only of one part. In 1553, he divided the Pſalms into pauſes or ſmall portions, and appointed them to be ſung in churches. Soon after they were bound up with the Geneva catechiſm, from which time the Catholics, who had been accuſtomed to ſing them, were forbid the uſe of them, under a ſevere penalty. Soon after the reformation commenced in England, complaints were made by many of the dignified clergy, and others, of the intricacy and difficulty of the church muſic of thoſe times: in conſequence of which it was once propoſed, that organs and curious ſinging ſhould be removed from our churches. Latimer, in his dioceſe of Worceſter, went ſtill farther, and iſſued injunctions to the prior and convent of St. Mary, forbidding in their *ſervice* all manner of ſinging. In the reign of Edward VI. a commiſſion was granted to eight biſhops, eight divines, eight civilians, and eight common lawyers, to compile a body of ſuch eccleſiaſtical laws as ſhould in future be obſerved throughout the realm. The reſult of this compilation was a work, firſt publiſhed by Fox the Martyrologiſt, in 1571, and afterwards in 1640, under the title of Reformatio Legum Eccleſiaſticarum. Theſe thirty-two commiſſioners, inſtead of reprobating church muſic, merely condemned figurate and operoſe muſic, or that kind of ſinging which abounded with fugues, reſponſive paſſages, and a commixture of various and intricate proportions; which, whether extemporary or written, is by muſicians termed deſcant. However, notwithſtanding the objections againſt choral muſic, and the practice of ſome of the reformed churches, the compilers of the Engliſh liturgy, in 1548, and the king himſelf, determined to retain muſical *ſervice*. Accordingly the ſtatute 2 & 3 Edw. VI. cap. 1. though it contains no formal obligation on the clergy, or others, to uſe or join in either vocal or inſtrumental muſic in the common prayer, does clearly recognize the practice of ſinging; and in leſs than two years after the compiling of king Edward's liturgy, a formula was compoſed, which continues, with ſcarce any variation, to be the rule for choral *ſervice* even at this day. The author of this work was John Marbecke, or Marbeike; and it was printed by Richard Grafton, in 1550, under the title of The Book of Common Prayer, noted. Queen Mary laboured to re-eſtabliſh the Romiſh choral *ſervice*; but the acceſſion of Elizabeth was followed by the act of uniformity; in conſequence of which, and of the queen's injunctions, the Book of Common Prayer, noted by Marbecke, was conſidered as the general formula of choral *ſervice.* In 1560, another muſical *ſervice,* with ſome additions and improvements, was printed by John Day; and in 1565, another collection of Offices, with muſical notes. Many objections were urged by Cartwright, and other Puritans, againſt the form and manner of cathedral *ſervice,* to which Hooker replied, in his Eccleſiaſtical Polity. In 1664, the ſtatutes of Edward VI. and Elizabeth, for uniformity in the common prayer, were repealed; and the DIRECTORY for public worſhip, which allows only of the ſinging of pſalms, eſtabliſhed. But upon the reſtoration of Charles II. choral *ſervice* was again revived, and has ſince uniformly continued. See on this ſubject Hawkins's Hiſt. of Muſic, vol. i. p. 404. vol. ii. p. 264. vol. iii. p. 58—468, &c. vol. iv. p. 44—347. Burney's Hiſt. Muſic, vol. ii. chap. i: paſſim.

Service-*tree, ſorbus,* in *Botany,* a genus of the *icoſandria trigynia* claſs. Its characters are theſe: the flower has a ſpreading, concave, permanent empalement, indented in five parts; it has five roundiſh, concave petals, which are inſerted in the empalement, and about twenty awl-ſhaped ſtamina, which are alſo inſerted in the empalement, terminated by roundiſh ſummits; the germen is ſituated under the flower, ſupporting three ſlender ſtyles, crowned by erect-headed ſtigmas; it afterward becomes a ſoft, umbilicated fruit, or berry, incloſing three or four oblong, cartilaginous ſeeds. Miller reckons two, and Linnæus three ſpecies.

The firſt ſort, or that with winged leaves, which are ſmooth on both ſides, grows naturally in many parts of England, but in the ſouthern countries they are ſeldom ſeen of any great magnitude; for the trees are commonly cut down, and reduced to underwood; but in the North of England and Wales, where they are permitted to grow, there are trees of a very large ſize.

The flowers are produced in large bunches, almoſt in form of umbels, at the end of the branches; they are compoſed of five ſpreading, concave petals, ſhaped like thoſe of the pear-tree, but ſmaller; theſe appear in May, and are ſucceeded by roundiſh berries, growing in large bunches, which have a depreſſed navel on the top, and turn red in autumn, when they ripen.

This tree is cultivated in the nurſery gardens, and ſold as a flowering ſhrub; if they were permitted to grow, they would riſe to a great height, and have large ſtems. The leaves of this tree make a pretty variety when they are mixed with others, during the time of their flowering, and alſo in autumn. The fruit alſo makes an agreeable appearance, but the blackbirds and thruſhes are ſo fond of it, that in thoſe places where there is plenty of theſe birds, the fruit will not be allowed to thoroughly ripen. However, as it is a good food for theſe ſongſters, where perſons are deſirous of drawing them about their habitations, the planting a quantity of theſe trees will attract them.

The ſecond ſort, with winged leaves, woolly on their under ſide, grows naturally in the warm parts of Europe, where it riſes to a great height, and becomes a large tree, but in England there are few of any large ſize. In the ſouth of France, and in Italy, the fruit is ſerved up to the table in their deſerts, but in England they have not been much eſteemed, which has occaſioned their being ſo little cultivated here.

The ſeveral varieties of this tree differ in the number of their ſeeds, in the ſame manner as pears, apples, quinces, and medlars; ſome of them having but three ſeeds in each fruit, and others four or five; ſo that, although one of the characters of this genus is, that the fruit has but three ſeeds, yet that muſt be underſtood to be of the wild ſort, in which there are ſeldom more; but thoſe of the cultivated kind are as uncertain as the fruit of apples and pears. Both theſe ſorts may be propagated by ſowing their ſeeds, ſoon after their fruit is ripe, in pots, ſheltering them in a frame in winter, and plunging the pots in a moderate hot-bed in the ſpring, and in dry weather watering them: here they ſhould remain till the middle of October, and then removed to a warm light ſpot of ground, where they ſhould be planted in rows two feet aſunder, and a foot diſtant in the rows. After continuing in this nurſery three or four years, they ſhould be tranſplanted in October, or in the ſpring, juſt before they begin to ſhoot, into a warm ſoil, defended from cold winds, where they are to remain.

The wood of the wild *ſervice-tree* is much commended by the wheelwright for being all heart; and it is of good uſe for huſbandman's tools, goads, &c. It is very white and ſmooth, and ſo will poliſh pretty well. There is another ſort, with variegated leaves, which may be propagated by layers, or by being budden on the plain ſort, in a moiſt ſtrong ſoil; but they will grow in the moſt expoſed places, being extremely hardy, which renders them worthy of care, ſince they will thrive where few other trees will ſucceed. Miller.

The fruit of the *ſervice-tree* is uſed, and is reckoned to be very reſtringent and uſeful for all kinds of fluxes; but when ripe, not altogether ſo binding. But as it is ſeldom to be met with in our markets, therefore, for a ſuccedaneum, we uſe the *ſorbus terminalis.*

Service, *wild, cratægus.* in *Botany,* a genus of the *icoſandria digynia* claſs. Its characters are theſe: the flower hath a permanent empalement of one leaf, cut into five concave ſegments, which ſpread open; it hath five roundiſh, concave petals, and many ſtamina, with roundiſh ſummits, inſerted into the empalement; the germen is ſituated under the flower, ſupporting two ſlender ſtyles, crowned by roundiſh ſtigmas, and becomes an oval berry, including two oblong hard ſeeds. Miller reckons four, and Linnæus nine ſpecies.

The firſt ſort, with oval leaves, unequally ſawed, and woody on their outſide, grows naturally on the chalky hills in Kent, Surry, and Suſſex, and other parts of England, to the height of thirty or forty feet, and divides upward into many branches. It may be propagated by ſeeds, ſown ſoon after they are ripe; or if they are kept till the ſpring, they remain one year in the ground before the plants appear; or by layers, laid in the young wood, in which caſe they are two years before they have ſufficient roots to tranſplant. The wood is white and hard, and is often uſed for the coggs of mills, and other purpoſes, which require a rough hard timber.

The ſecond ſort, with heart-ſhaped ſeptangular leaves, whoſe lower lobes ſpread aſunder, grows naturally in many parts of England, and is chiefly found upon ſtrong ſoils, riſing to the height of forty or fifty feet, with a large trunk and ſpreading branches. The wood of this tree, which may be propagated like the former, except that the ſoil ſhould be ſtronger, is hard and very white, and uſed by millwrights, &c. The fruit is annually ſold in the London markets in autumn, and has an agreeable acid flavour.

The third ſort, with oval, oblong, ſawed leaves, green on both ſides, grows naturally on the mountainous parts of Italy, flowers in May, and the fruit ripens in autumn, and may be propagated like the firſt ſort. It is hardy with reſpect to cold, but rare in England.

The fourth ſort, called the Virginian wild *ſervice,* with an arbutus leaf, grows naturally in moſt parts of North America. This is generally propagated, by ſeeds, among flowering ſhrubs of the ſame growth. Miller.

SERVIENTES *virgatores.* See VIRGATORES.

SERVING *the rigging,* in *Sea-Language.* See MALLET.

SERVITES, an order of religious ſo denominated from their vowing a peculiar attachment to the ſervice of the Virgin.

The order was founded by ſeven Florentine merchants, who, about the year 1233, began to live in community on mount Senar, two leagues from Florence. In 1239, they received from the biſhop the rule of St. Auguſtine, with a black habit, in lieu of a grey one, which they had worn before. In 1251, Bonfilio Monaldi, one of the ſeven, from being ſimple prior of mount Senar, was named general.

This order was approved of by the council of Lateran, and again by cardinal Raynerius, legate of pope Innocent IV. who put it under the protection of the holy ſee. The ſucceeding popes have granted it a great many favours. It is become famous in Italy, by the hiſtory of the council of Trent, of F. Paolo, a Venetian, who was a religious *Servite.* M. Hermant gives this order the name of the *Annunciate,* doubtleſs from this miſtake, that in ſome cities of Italy they are called *religious of the Annunciate,* becauſe in thoſe cities their church is dedicated under that name. F. Archang. Giani derives the name *Servites,* ſervants of the holy Virgin, from hence; that when they appeared for the firſt time in the black habit given them by the biſhop, the ſucking children, as they ſay, cried out, *Behold the ſervants of the Virgin.* There are alſo nuns of this order.

SERVITIA, *per quæ.* See PER QUÆ.

SERVITIIS *acquietandis,* a writ judicial that lies for a man diſtrained for ſervices to one, when he owes and performs them to another, for the acquittal of ſuch ſervices.

Servitiis *conſuctudinibus.* See CONSUETUDINIBUS.

SERVITOR, in the Univerſity of Oxford, a ſcholar or ſtudent, who attends and waits on another for his maintenance there.

Servitors *of bills,* denote ſuch ſervants or meſſengers of the marſhal of the king's bench, as were ſent abroad with bills or writs, to ſummon men to that court. They are now commonly called TIP-*ſtaves.*

SERVITUDE, the condition of a ſervant, or rather ſlave. Under the declenſion of the Roman empire, a new kind of *ſervitude* was introduced, different from that of the ancient Romans: it conſiſted in leaving the lands of ſubjugated nations to the firſt owners, upon condition of certain rents, and ſervile offices, to be paid in acknowledgment. Hence the names of *ſervi* CENSITI, ASCRIPTITII, and ADDICTI *glebæ*; ſome whereof were taxable at the reaſonable diſcretion of the lord; others at a certain rate agreed on; and others were mainmortable, who, having no legitimate children, could not make a will to above the value of five pence, the lord being heir of all the reſt; and others were prohibited marrying, or going to live out of the lordſhip. Moſt of which ſervices ſtill ſubſiſt in one province or other of France; though they are all aboliſhed in England. Such, however, was the original of our tenures, &c. See SLAVE.

SERULA, in *Ornithology*, the name of a web-footed ſea-bird, a kind of MERGUS, very common about Venice, and called by Mr. Ray *mergus cirratus fuſcus*, the brown creſted, or leſſer-toothed diver, and ſuppoſed to be the *anas longiroſtra*, or long-beaked duck of Geſner. This is the red-breaſted *merganſer* of Pennant.

It is very nearly of the ſize of the duck; its head and throat are of a fine changeable black and green; on the firſt there is a long pendent creſt of the ſame colour; the upper part of the neck and of the breaſt, and the whole belly, white; the lower part of the breaſt ferruginous, ſpotted with black; the upper part of the back black; near the ſetting on of the wings ſome white feathers, edged and tipt with black; the exterior ſcapular black; the interior white; lower part of the back, the coverts of the tail, and feathers on the ſides, under the wings, and over the thighs, grey, marked with waving lines of black; covers on the ridges of the wings duſky, ſucceeded by a broad bar of white; the quill-feathers duſky, the tail is ſhort and brown, and the legs orange-coloured; the head and upper part of the neck of the female are of a deep ruſt colour; the creſt ſhort, the throat white, and diſtinguiſhed by ſome other varieties of colour from the male. Theſe birds breed in the northern parts of Great Britain. Pennant.

SERUM, a thin, tranſparent, watery liquor, ſomewhat ſaltiſh, which makes a conſiderable part in the maſs of blood.

The blood conſiſts of two kinds of parts; the *cruor*, or red part; and the *ſerum*, or wheyiſh, limpid part.

Mr. Boyle, and ſome others, have taken the *ſerum* to be more ponderous than the *cruor*; but Dr. Jurin, in the Philoſophical Tranſactions, from repeated experiments, aſſures us of the contrary.

The *ſerum* has till of late been confounded with the lympha; which is carried by the arteries throughout the ſeveral parts of the body; whence it returns partly in the veins, and partly in the lymphatic veſſels; but Dr. Hewſon has evinced the difference between them.

There have been inſtances, in which the blood has been found to contain, with its coagulum, a ſubſtance, very different from what we uſually underſtand by the word *ſerum*. Dr. Stuart has given an account of a man in an inflammatory fever, from whoſe arm eight ounces of blood were taken, which when it had ſtood ſome time, afforded, inſtead of *ſerum*, half its quantity of a white liquor, like milk, ſwimming on the coagulum. This had no ſmell at firſt; but being kept for obſervation, after ſix days it contracted a ſmell like that of rotten eggs; and after ſtanding three weeks more, it neither altered its conſiſtence nor ſmell.

If this liquor was chyle, then is chyle a ſubſtance very different from milk, milk being apt to turn ſour, and become thick by keeping, and never contracting the ſmell of rotten eggs, as this liquor did. Whether it be not chyle turned putrid, and brought near to purulency by a long circulation in the blood-veſſels, without being converted into blood, through ſome defect in the ſanguification, is a queſtion not eaſily decided. Five days after this, being blooded again, the blood was found of the common kind, the *ſerum* being a thin pellucid water as uſual. Phil. Tranſ. Nº 442, p. 290.

For an account of Dr. Hewſon's experiments and obſervations, ſee *Analyſis of the* BLOOD, CRASSAMENTUM, and particularly *Coagulable* LYMPH.

The uſe of the *ſerum* is to nouriſh the parts of the body, and to render the chyle and blood more fluid.

Urine and ſweat are nothing but *ſerum* drained of their nutritious parts, by repeated circulations, and ſecreted from the blood in the glands of the kidneys and ſkin.

The redundancy and other vices in the *ſerum*, are the cauſe of various diſeaſes.

SERUM *aluminoſum*, *alum-whey*, a form of medicine preſcribed in the late London Pharmacopœia, made of a pint of milk boiled to whey with a quarter of an ounce of alum.

SERWOY, in *Natural Hiſtory*, a name given by Theodore de Bry, and others, to the animal called by us the OPOSSUM, and by the natives of Braſil the CARIGUEYA.

SESAMION, a word uſed by the ancients to expreſs a preparation of the *ſeſamum*, or oily grain. It was a cake made of ſeſamum, honey, and oil.

SESAMOIDEA *oſſa*, in *Anatomy*, ſeveral very ſmall BONES, placed between the joints of the fingers and toes, to fortify them, and prevent diſlocations.

They have their name from their reſemblance, in figure and ſize, to a grain of ſeſamum; from *ſeſamum*, and ειδος, *form*. They are for the moſt part very ſmall, and affixed chiefly to ligaments, and only two of them are large enough to be commonly preſerved in ſkeletons: theſe reſemble a large flat oval pearl, and are hollowed on one ſide.

They are of about the third of an inch in length, and are half as broad as long. They are connected very near each other, by a ſmall ſhort ligament, to the baſis of the firſt phalanx of the great-toe, ſo as to ſlide on each ſide of the middle eminence of the double pulley, in the firſt metatarſal bone, like two ſmall patellæ. Though theſe are generally faſtened in ſkeletons to the firſt bone of the metatarſus, they nevertheleſs belong only to the firſt phalanx of the great-toe, as the patella belongs not to the os femoris, but to the tibia. Winſlow.

SESAMOIDES, in *Botany*, a ſpecies of *reſeda*. See *Baſtard* ROCKET.

SESAMUM, *oily grain*, in *Botany*. See OILY *grain*.

SESAMUM, in *Botany*, is alſo a name given by ſome authors to the *myagrum*, or GOLD *of pleaſure*.

SESELI, in *Botany*. See *Wild* SPIGNEL.

Tournefort has referred the ſpecies of *ſeſeli* to the genus of FENNEL, *fœniculum*, from which, however, they greatly differ, in regard to their involucra.

SESELI-*ſeed*, in the *Materia Medica*, the name of the ſeed of a plant, called alſo by ſome *libanotis*, and growing three or four feet high, with leaves like fennel, but of a paler green. It is a native of warm climates. The *ſeed* ought to be choſen moderately large, of a longiſh ſhape, heavy, clean, and of a greeniſh colour, freſh, and of a grateful ſmell. It affords, by diſtillation, a very large quantity of an eſſential oil, and is hot and dry. It incides, opens, and diſcuſſes, and is cephalic, neurotic, pectoral, and nephritic. It is good againſt epilepſies, apoplexies, vertigos, and all diſorders of the head and nerves. Lemery's Dict. of Drugs.

The ſeeds of the *ſeſeli Creticum*, or HART-WORT *of Crete*, are diuretic, uterine, and good in all diſorders of the breaſt and lungs. They are given in ſuppreſſions of urine, and of the menſes, and in all kinds of flatulencies; and are, among the German phyſicians, a common ingredient in medicines, intended to promote expectoration.

The ſeed of the French hart-wort, or *ſeſeli Maſſilienſe*, has been eſteemed of great virtue in diſeaſes of the head and nerves, in convulſions and epilepſies, and in weakneſs of the ſight. It is alſo given in electaries, intended againſt all diſorders of the breaſt and lungs, in coughs, catarrhs, and aſthmas, and in obſtructions of the liver. Some have recommended it ſingly, as a medicine of great efficacy againſt obſtructions of the menſes; and Schroder tells us, that it has the credit of being an antidote to the poiſon of hemlock.

The common hart-wort is poſſeſſed of the ſame ſort of virtues with the other two, but its ſeed is more warm and acrid than that of either of them. It is eſteemed a very efficacious remedy in obſtructions of the menſes, and in all diſorders ariſing from indigeſtion, crudities, and flatulencies. See SERMOUNTAIN.

SESELI *pratenſe*. See SAXIFRAGE.

SESERINUS, in *Ichthyology*, a name given by Rondeletius, and ſome other authors, to a broad and ſhort ſea-fiſh, ſeeming the ſame with the *lampuga* of Italian fiſhermen; and deſcribed by authors in general, and by this very author in another place, under the name of STROMATEUS.

SESQUI, a Latin particle, ſignifying a whole and a half; which, joined with *altera*, *terza*, *quarta*, &c. is much uſed in the Italian muſic, to expreſs a kind of ratios; particularly ſeveral ſpecies of triples.

The ratio expreſſed by *ſeſqui*, is the ſecond ratio of the inequality, called alſo *ſuper-particular ratio*; and is, when the greater term contains the leſs, once, and ſome certain part, over; as 3 : 2; where the firſt term contains the ſecond one, and unity over; which is a quota part of two.

Now, if this part remaining be juſt half the leſs term, the ratio is called *ſeſqui-altera*: if the remaining part be a third part of the leſſer term, as 4 : 3, the ratio is called *ſeſqui-tertia*, or *ſeſqui-terza*: if the fourth part, as 5 : 4, the ratio is called *ſeſqui-quarta*; and thus to infinity, ſtill adding to *ſeſqui* the ordinal number of the ſmaller term. In Engliſh we ſometimes ſay, *ſeſqui-alteral*, or *ſeſqui-alterate*, *ſeſqui-third*, *ſeſqui-fourth*, &c.

As to the kinds of triples expreſſed by the particle *ſeſqui*, they are theſe:

SESQUI-ALTERATE, *the greater perfect*, which is a triple where the breve is three meaſures, or ſemi-breves, and that without having any point or dot annexed to it.

SESQUI-ALTERATE, *greater imperfect*, which is where the breve, when pointed, contains three meaſures, and without any point, two.

SESQUI-ALTERATE, *leſſer perfect*, which is where the ſemibreve contains three meaſures, and that without any point.

SESQUI-ALTERATE, *leſſer imperfect*, a triple, where the ſemi-breve, with a point, contains three meaſures, and two without.

According to Buontempi, one may likewiſe call the triples $\frac{6}{4}$ and $\frac{12}{8}$, *ſeſqui-alterates.*

SESQUI-OCTAVE, is a kind of triple, marked $C\frac{9}{8}$, called by the Italians, *nonupla di crome*, where there are 9 quavers in every meaſure or bar, in lieu of 8.

SESQUI-QUARTA, *dupla*, is a kind of triple, marked $C\frac{9}{4}$, called by the Italians, *nonupla di ſememinime*, where there are 9 crochets in each meaſure, inſtead of 4; that is, three crochets to each time.

SESQUI-ALTERATE, in *Geometry* and *Arithmetic*, is a ratio between two lines, two numbers, or the like, where one of them contains the other once, with the addition of a half.

Thus 6 and 9 are in a *ſeſqui-alterate* ratio; ſince 9 contains 6 once, and 3 which is half of ſix, over; and 20 and 30 are in the ſame; as 30 contains 20, and half 20 or 10.

SESQUIDITONE, in *Muſic*, a concord, reſulting from the ſounds of two ſtrings, whoſe vibrations, in equal times, are to each other in the ratio of 5 to 6. See DITONE and INTERVAL.

SESQUIDUPLICATE *ratio*, is when of two terms, the greater contains the leſs twice, and half the leſs remains; as 15 and 6; 50 and 20.

SESQUIQUADRATE, an aſpect, or poſition of the planets, when at the diſtance of four ſigns and a half, or 135 degrees, from each other.

SESQUIQUINTILE, an aſpect of the planets, when 108 degrees diſtant from each other.

SESQUITERTIONAL *proportion*. When any number or quantity contains another once and one third, they are *ſeſquitertional proportions*.

SESSILE *roots*, among *Botaniſts*, ſuch tuberous roots as adhere to the baſe of the ſtalk. See ROOT.

SESSILE *leaf*, among *Botaniſts*. See LEAF.

SESSION, *ſeſſio*, denotes each ſitting, or aſſembly, of a council.

In quoting councils, we ſay, in ſuch a *ſeſſion*, ſuch a canon, &c.

SESSION *of parliament*, is a ſeaſon, or ſpace, from its meeting to its prorogation, or diſſolution. See PARLIAMENT.

SESSION, in *Law*, denotes a ſitting of juſtices in court, upon their commiſſion. As, the *ſeſſion of* OYER *and terminer*, of GAOL*-delivery*, &c. See ASSISES, JUSTICES *of aſſiſe*, JUSTICES *of gaol-delivery*, JUSTICES *of oyer*, &c.

SESSIONS *of Wales, great*. See COURTS *of Wales*.

Quarter-ſeſſions, called *general-ſeſſions*, or *open ſeſſions*, ſtand oppoſite to *eſpecial*, otherwiſe called *petty ſeſſions*, which are procured upon ſome ſpecial occaſion, for the more ſpeedy diſpatch of juſtice. See QUARTER-*ſeſſions.*

Statute-ſeſſions, are thoſe kept by the high-conſtable of a hundred, for the placing of ſervants, &c. See STATUTE.

SESSIONS *for weights and meaſures*. In London, four juſtices from among the mayor, recorder, and aldermen (of whom the mayor or recorder is to be one), may hold a *ſeſſions* to enquire into offences of ſelling by falſe weights and meaſures, contrary to the ſtatutes; and to receive indictments, puniſh offenders, &c. Char. K. Cha. I.

SESSION, *the court of*, otherwiſe called the *college of juſtice*, is the ſupreme court in Scotland for all civil cauſes. It conſiſts of one conſtant preſident, who has an annual ſalary of 1300*l.* and fourteen other judges, at 700*l.* per annum, each, who are lords by their office, which they hold by patent *quamdiu ſe bene geſſerint*. The lord high chancellor preſides here when preſent. The king names ſeveral other extraordinary lords, who ſit, but are not obliged to attendance, becauſe they have no ſalaries; but they may vote among the reſt.

The court ſits from the firſt of November, old ſtyle, to the laſt of February, and from the firſt of June to the laſt of July, all incluſive; which holds of all the inferior courts or judicatories in Scotland. In time of *ſeſſion*, or term, they ſit from nine o'clock to twelve in the forenoon, every day in the week but Sunday and Monday; ſometimes they ſit in the afternoon, to end concluded cauſes, or to hear ſuch long debates as the forenoon was too ſhort to hear, which gives a great diſpatch to cauſes that come before them. The lords, both ordinary and extraordinary, when in the inner houſe, ſit on a ſemicircular bench in their robes; where the advocates debate their clients cauſes before them. There are ſix principal clerks belonging to this court. Nine of the lords make a quorum in the inner houſe, otherwiſe they cannot vote in any caſe, except ſuch as are referred to one or more of the whole lords; and one of the ordinary lords (the preſident being always excepted) is weekly appointed judge in the outer houſe, for diſcuſſing of ordinary actions, and has ſix under-clerks to attend him. He meddles with no extraordinary caſes, except where it is remitted to him by all the lords to be diſcuſſed in the outer houſe for diſpatch.

That the lords may have time to read informations, petitions, &c. and the ſuitors be eaſed of the trouble of going with them to their houſes, every lord has a box ſtanding upon a table in the waiting room in the inner houſe from two to four o'clock in the afternoon, every day; wherein all who have papers to offer, may put them by a ſlit in the cover. Each of the principal clerks have alſo a box, and parties muſt put their bills, anſwers, or informations of cauſes to be reported, into the clerk of the proceſs's box.

The rolls of the court bring in all cauſes in their due order. Cauſes of the greateſt conſequence are at firſt adviſed by the whole lords in the inner houſe. Other cauſes are called of courſe before an ordinary in the outer houſe, who decides the controverſy, if clear, without farther trouble or expence; and, in caſe of difficulty, takes ſome little time to adviſe it himſelf, or to adviſe with the whole lords upon it. And if any of the parties think themſelves wronged by the ſentence of the ordinary, they may complain to the lords, and get their anſwer upon a bill.

An appeal lies from this court to the houſe of lords.

The *lords of ſeſſion* were firſt appointed by James I. of Scotland, who ſelected, among the eſtates of parliament, a certain number of perſons, and diſtinguiſhed them by this appellation. They were empowered to hold courts for determining civil cauſes three times-year, and forty days at a time, in whatever place he pleaſed to name. James IV. on pretence of remedying the inconveniences ariſing from the ſhort terms of the *court of ſeſſions*, appointed other judges, called *lords of daily council*. The *ſeſſion* was an ambulatory court, and met ſeldom: the *daily council* was fixed, and ſat conſtantly at Edinburgh; and though not compoſed of members of parliament, the ſame powers, which the lords of *ſeſſion* enjoyed, were veſted in it. At laſt, James V. erected the new court that ſtill ſubſiſts, and which he called the *college of juſtice*, the judges or ſenators of which were called *lords of council* and *ſeſſion*. Robertſon's Hiſt. of Scotland, 1776, 8vo. vol. i. p. 40.

SESSIONS, *kirk*. See KIRK.

SESTERCE, *ſeſtertius*, a ſilver coin, in uſe among the ancient Romans, called alſo ſimply *nummus*, and ſometimes *nummus ſeſtertius*.

The *ſeſterce* was the fourth part of the denarius, and originally contained two aſſes and a half.

The *ſeſterce* was at firſt denoted by LLS; the two L's ſignifying two libræ, and the S half. But the librarii, afterwards converting the two L's into an H, expreſſed the *ſeſterce* by HS.

The word *ſeſtertius* was firſt introduced by way of abbreviation for *ſemiſtertius*, which ſignifies two, and a half of a third, or, literally, only half a third; for in expreſſing half a third, it was underſtood that there were two before.

Some authors make two kinds of *ſeſterces*; the *leſs*, called *ſeſtertius*, in the maſculine gender; and the great one, called *ſeſtertium*, in the neuter: the firſt, that we have already deſcribed; the latter containing a thouſand of the other. Others will have any ſuch diſtinction of great and little *ſeſterces* unknown to the Romans: *ſeſtertius*, ſay they, was an adjective, and ſignified *as ſeſtertius*, or two aſſes and a half; and when uſed plurally, as in *quinquaginta ſeſtertium*, or *ſeſtertia*, it was only by way of abbreviation, and there was always underſtood *centena*, *millia*, &c.

This matter has been accurately ſtated by Mr. Raper, in the following manner. The ſubſtantive to which *ſeſtertius* referred is either as, or pondus; and *ſeſtertius as* is two *aſſes* and a half; *ſeſtertium pondus*, two pondera and a half, or two hundred and fifty denarii. When the denarius paſſed for ten aſſes, the *ſeſterce* of two aſſes and a half was a quarter of it; and the Romans continued to keep their accounts in theſe *ſeſterces* long after the denarius paſſed for ſixteen aſſes; till, growing rich, they found it more convenient to reckon by quarters of the denarius, which they called *nummi*, and uſed the words *nummus* and *ſeſtertius* indifferently, as ſynonymous terms, and ſometimes both together, as *ſeſtertius nummus*; in which caſe, the word *ſeſtertius*, having loſt its original ſignification, was uſed as a ſubſtantive; for *ſeſtertius nummus* was not two nummi and a half, but a ſingle nummus of four aſſes. They called any ſum under two thouſand *ſeſterces* ſo many *ſeſtertii* in the maſculine gender; two thouſand *ſeſterces* they called *duo* or *bina ſeſtertia*, in the neuter; ſo many quarters making five hundred denarii, which was twice the *ſeſtertium*; and they ſaid *dena*, *vicena*, &c. *ſeſtertia*, till the ſum amounted to a thouſand *ſeſtertia*, which was a million of *ſeſterces*. But, to avoid ambiguity, they did not uſe the neuter *ſeſtertium* in the ſingular number, when the whole ſum amounted to no more than a thouſand *ſeſterces*, or one *ſeſtertium*. They called a million of *ſeſterces*, decies nummûm, or decies *ſeſtertiûm*, for decies centena millia nummorum, or *ſeſtertiorum* (in the maſculine gender), omitting centena millia, for the ſake of brevity. They likewiſe called the ſame ſum decies *ſeſtertium* (in the neuter gender) for decies centies *ſeſtertium*, omitting *centies* for the ſame reaſon; or ſimply decies, omitting *centena millia ſeſtertiûm*, or *centies ſeſtertium*; and with the numeral adverbs, *decies*, *vicies*, *centies*, *millies*, and the like, either *centena millia*, or *centies*, was always underſtood. Theſe were their moſt uſual forms of expreſſion; though for *bina*, *dena*, *vicena ſeſtertia*, they frequently ſaid *bina*, *dena*, *vicena millia nummûm*. If the conſular denarius contained ſixty troy grains of fine ſilver, it was worth ſomewhat more than eight pence farthing and a half ſterling; and the as, of ſixteen to the denarius, a little more than a halfpenny. To reduce the ancient *ſeſterces* of two aſſes and a half, when the denarius paſſed for ſixteen, to pounds ſterling, multiply the given number by 5454, and cut off ſix figures on the right hand for decimals. To reduce *nummi ſeſtertii*, or quarters of the denarius, to pounds ſterling; if the given ſum be conſular money, multiply it by 8727, and cut off ſix figures on the right hand for decimals; but for imperial money, diminiſh the ſaid product by one eighth of itſelf. Phil. Tranſ. vol. lxi. part ii. art. 48. See DENARIUS and DRACHM.

To be qualified for a Roman knight, an eſtate of four hundred thouſand *ſeſterces* was required; and for a ſenator, of eight hundred thouſand.

Authors alſo mention a copper *ſeſterce*, worth about one-third of a penny Engliſh.

SESTERCE, *ſeſtertius*, was alſo uſed, in *Antiquity*, for a thing containing two wholes and a half of another: as *as* was taken for any whole, or integer.

SESTUPLO, in *Muſic*. See SEXTUPLE.

SESUVIUM, in *Botany*, a genus of the *icoſandria trigynia* claſs. Its characters are theſe: the calyx is coloured, and divided into five ſegments; it has no petal; the fruit is an ovated capſule, which has three cells, and is polyſpermous. There is only one ſpecies.

SET-*off*, in *Law*, is an act, whereby the defendant acknowledges the juſtice of the plaintiff's demand on the one hand; but, on the other, ſets up a demand of his own, to counterbalance that of the plaintiff, either in the whole, or in part: as, if the plaintiff ſues for ten pounds due on a note of hand, the defendant may *ſet-off* nine pounds due to himſelf for merchandize ſold to the plaintiff; and, in caſe he pleads ſuch *ſet-off*, muſt pay the remaining balance into court. This anſwers very nearly to the COMPENSATIO, or ſtoppage, of the civil law, and depends upon the ſtatutes 2 Geo. II. cap. 22. and 8 Geo. II. cap 24.

SET-*bolts*, in a *Ship*. See BOLTS.

To SET *ſail*. See SAIL, and SETTING.

SETACEUS *vermis*, in *Natural Hiſtory*, a name given by Dr. Liſter to that long and ſlender water-worm, which ſo much reſembles a horſe-hair, that it has been ſuppoſed by the vulgar to be an animated hair of that creature. Theſe creatures, ſuppoſed to be living hairs, are a peculiar ſort of inſects, which are bred and nouriſhed within the bodies of other inſects, as the worms of the ichneumon-flies are in the bodies of the caterpillars. See AMPHISBÆNA *aquatica*.

SETAH, in *Botany*, a name uſed by the oldeſt writers for the acacia. It is an original Hebrew word, and is explained by the lexicographers, by a thorn growing in the deſert. It is rendered by Theodotion *acantha*, one of the names of the acacia.

SETHIANS, or SETHEDIANS, SETHIANI, or SETHINIANI, a branch of the ancient GNOSTICS: thus called, becauſe of their pretending to deduce their origin from Seth, ſon of Adam, whom they called Jeſus and Chriſt; from an opinion, that Seth and Jeſus were the ſame perſon, who came down from heaven at two ſeveral times.

As the *Sethians* had the ſame philoſophy with the other Gnoſtics, they had numerous other fables in their ſyſtem. They pretended to have ſeveral books of the ancient patriarchs; particularly, ſeven of their great maſter Seth; beſides one of Abraham, which was full of manifeſt falſities, which yet they called *Apocalypſe*, or *Revelation*. The book called the *Little Geneſis*, anciently very common in the churches of the Eaſt, was borrowed from them. From this book they learned the name of Seth's wife, who, they ſay, was called *Horæa*. Some imagine, they borrowed a great many of their fictions from the Helleniſt Jews.

SETICAUDÆ, in *Natural Hiſtory*, a term uſed to expreſs ſuch flies as have one or more hairs growing out at their tails. There are many ſpecies of theſe, diſtinguiſhed by their having one, two, or three hairs.

SETIER. See SEPTIER.

SETON, *ſetaceum*, in *Surgery*, &c. a kind of topical remedy, like a cautery, or an iſſue, to divert defluxions from the eyes, &c. by making a wound in the ſkin of the hind part of the neck, which is kept ſuppurating, by means of a little ſkain of ſilk, or cotton, paſſed through it.

Setons are alſo ſometimes applied to ſuch as are apt to fall into epileptic fits. They are of more efficacy than a common iſſue, but are preſcribed with much the ſame intention.

The like operation is frequently practiſed on horſes, &c. and called, by the farriers, *rowelling*.

Setons evacuate with a gentle pain; ſhake the nerves, diſcharge ſerum, and give vent to repletions and coacervations of humours.

SETON *needle*. See *Tab. Surgery*, *fig.* 12.

SETS, a term uſed by the farmers to expreſs the young plants of the white thorn, and other ſhrubs, which they uſe to raiſe their quick, or quick-*ſet* hedges.

The white thorn is the beſt of all trees for this purpoſe, and under proper regulations, its *ſets* ſeldom fail of anſwering the farmers utmoſt expectations.

SETSE, in *Botany*, the name of a Chineſe tree, called alſo *chitſe*, and much eſteemed by the people of that country for its beauty, and for the goodneſs of its fruit. In the provinces of Cantong and Honan there are whole plains covered with theſe trees, many of which grow to the ſize of our walnut-tree. The fruit ripens every where in the Eaſt, where the tree grows, but it is of a much more delicious flavour in ſome places than in others. The leaves are of the colour and ſhape of thoſe of the walnut-tree, only that they are more round at the ends. The fruit is ſometimes round, ſometimes pointed at one end, ſometimes oval, ſometimes flat, and not unfrequently compoſed of two pieces, as it were, and reſembling two apples, cut and joined together. The rind is always green, never changing yellow or red, and the fruit keeps its freſhneſs all the winter. They are about the ſize of the orange, and the ſkin is very tender and thin, and the fruit has a mixed taſte of the ſharp and the luſcious. It is very wholeſome and good.

SETTEE, in *Sea Language*, a veſſel, very common in the Mediterranean, with one deck, and a very long and ſharp prow. They carry, ſome two maſts, ſome three, without top-maſts. They have generally two maſts, equipped with triangular ſails, commonly called lateen ſails. The leaſt of them are of ſixty tons burden. They ſerve to tranſport cannon, and proviſions for ſhips of war, and the like. Theſe veſſels are peculiar to the Mediterranean ſea, and are uſually navigated by Italians, Greeks, or Mahometans.

SETTER, among *Farmers*. To *ſetter*, is to cut the dewlap of an ox, or cow, and into the wound to put the root of the helleboraſter; whereby an iſſue is made, for ill humours to vent themſelves.

SETTER-*wort*, in *Botany*. See HELLEBORE.

SETTING, in *Aſtronomy*, the withdrawing of a ſtar or planet; or its ſinking below the horizon.

Aſtronomers and poets make three different kinds of *ſetting* of the ſtars: COSMICAL, ACRONICHAL, and HELIACAL.

To find the times of the *ſetting* of the ſun and ſtars, ſee GLOBE.

SETTING, in *Sea Language*, denotes the act of obſerving the ſituation of any diſtant object by the compaſs, in order to diſcover the angle which it makes with the neareſt meridian. See BEARING.

Thus, to *ſet the land*, or *the ſun*, by *the compaſs*, is to obſerve how the land bears on any point of the compaſs, or on what point of the compaſs the ſun is. Alſo, when two ſhips ſail in ſight of each other, to mark on what point the chaſed bears, is termed, *ſetting the chaſe by the compaſs*.

SETTING alſo ſignifies the direction of the wind, current, or ſea, particularly of the two latter: as, the tide, which *ſets*

ſets to the ſouth, is oppoſed to a ſwelling ſea *ſetting* to the north-weſt.

SETTING, when applied to the ſails, is the looſening and expanding of them, ſo as to move a ſhip along the water, after ſhe had been ſome time at reſt; or to accelerate her velocity when ſhe is already moving, and perhaps give a new direction to her motion. The term is uſed in contradiſtinction to taking-in of the ſails, as looſing or heaving out, is oppoſed to furling or ſtowing them. Falconer.

SETTING, in the *Language of Sportſmen*, a term uſed to expreſs a manner of attacking partridges, in order to the taking of them, by means of a dog peculiarly trained to that purpoſe. The *ſetting*-dog generally uſed is a long land-ſpaniel, taught by nature to hunt partridges more than any other game, and in his untaught ſtate running over the fields, in ſearch of them, with an alacrity that is truly wonderful; yet by art this creature is brought under ſuch excellent command, that he will, in the midſt of his higheſt career, attend to the leaſt hem from his maſter, and ſtand ſtill to look in his face, and take his orders by the ſlighteſt ſignals; and when he is ſo near his game, that it is almoſt in his mouth, he will ſtand ſtill, or lie down on his belly, till his maſter arrive, and he receives his directions.

The *ſetting*-dog being taken to the haunt of the partridges, is to be caſt off, and ſent to range; but he muſt be made to keep near the ſportſman, and not to run wildly on, but to beat all the ground regularly. On being reproved for ranging too wildly and too far, he will keep cloſe the whole day, and at times look up in his maſter's face, to know if he does right or wrong. If in the dog's ranging he ſtop of a ſudden, the ſportſman is to make up to him, and as there is certainly game before him, he muſt be ordered to advance; if he refuſes this, and look back and ſhake his tail, it is a ſignal that they are cloſe before him, and the ſportſman is then to take a circumference, and look with a careleſs eye before the dog's noſe to ſee where they are, and how they lie; then going up, and ſtaking down one end of the net, he is to command the dog to lie ſtill, and to draw the net gently over the birds; then making in with a noiſe, he is to ſpring them, and they will be entangled and taken as they riſe. It is a rule with fair ſportſmen, when they take a covey in this manner, always to let the cock and hen go.

SETTING, among *Cock-Maſters*, is the placing of a cock that has fought ſo that he cannot ſtand, beak to beak againſt the other cock, and if he does not ſtrike, the battle is won.

SETTING-*down*, in *Falconry*, is when a hawk is put into mew.

SETTING-*dog*, one trained up to find out and diſcover to the ſportſman whereabout fowls are. See SPANIEL and DOG.

SETTING-*up*, in *Sea Languoge*, the act of extending the ſhrouds, ſtays, and back-ſtays, to ſecure the maſts, by the application of mechanical powers, or tackles, &c. See DEAD-EYE, LANIARD, &c.

SETTING *of bricks*. See BRICKS.

SETTING *of wheat*, in *Agriculture*, is a method of cultivating wheat, which was, probably, firſt ſuggeſted by planting grains in a garden from mere curioſity, and firſt attempted on a larger ſcale by a farmer near Norwich, about the year 1768. His example was followed by ſome of his neighbours, and particularly by one of the largeſt occupiers of land in the county of Norforlk, who *ſet* fifty-ſeven acres in one year. His ſucceſs, from the viſible ſuperiority of his crop both in quantity and quality, was ſo great, that the following autumn he *ſet* three hundred acres, and has contiuued the practice ever ſince. The method of *ſetting* was generally introduced, in conſequence of this experiment, among the intelligent farmers, in a very large diſtrict of land. And it has been obſerved, in recommendation of it, that, although the *ſet* crops appear very thin during the autumn and winter, the plants tiller and ſpread prodigiouſly in the ſpring. The ears are indiſputably larger, without any dwarfiſh or ſmall corn; the grain is of a larger fathom, and ſpecifically heavier per buſhel, than when ſown. It furniſhes employment for aged perſons and children, at a ſeaſon when they have little elſe to do; it ſaves to the farmer ſix pecks of ſeed wheat in every acre; the expence is already reduced to about ſix ſhillings an acre; and a drill-plough has been invented, by which one man may *ſet* an acre a day.

The lands on which this method particularly ſucceeds, are either after a clover ſtubble, or thoſe on which trefoil and graſs ſeed were ſown the ſpring before the laſt, and on which cattle have occaſionally paſtured during the ſummer. Theſe grounds, after the uſual manuring, are once turned over by the plough in an extended flag or turf, at ten inches wide; along which a man, who is called a dibler, with two *ſetting* irons, ſomewhat bigger than ram-rods, but conſiderably bigger at the lower end, and pointed at the extremity, ſteps backwards along the turf, and makes the holes about four inches aſunder every way, and an inch deep. Into theſe holes, the droppers (women and children) drop two grains, which are quite ſufficient. After this, a gate, buſhed with thorns, is drawn by one horſe over the land, and cloſes up the holes. By this mode, three pecks of grain are ſufficient for an acre; and being immediately buried, it is equally removed from vermin, or the power of froſt. The regularity of its riſing affords the beſt opportunity of keeping it clear from weeds, by weeding or hand-hoeing.

SETTLEMENT, *act of*, in *Britiſh Hiſtory*, a name given to the ſtatute 12 & 13 W. III. cap. 2. whereby the crown was limited to his preſent majeſty's illuſtrious houſe; and ſome new proviſions were added, at the ſame fortunate æra, for better ſecuring our religion, laws, and liberties; which the ſtatute declares to be the birthright of the people of England, according to the ancient doctrine of the common law. See *Right of* CROWN.

SETTLEMENT, *marriage*. See MARRIAGE.

SETTLEMENT *of the poor*. See POOR.

SETTLING *a deck*, at *Sea*, a term for taking a deck lower than it was at firſt.

SETTLING *the land*, denotes ſinking it lower, by ſailing farther out to ſeaward, and is uſed in the ſame ſenſe with *laying the* LAND.

SETTS *for ſaws*, inſtruments for ſetting their teeth when out of order.

SETWELL, in *Botany*, a name ſometimes uſed for a ſpecies of VALERIAN.

SEVENTH, *ſeptima*, in *Muſic*, an interval, called by the Greeks *heptachordon*; whereof there are four kinds.

The firſt, the *defective* or DIMINISHED *ſeventh*, conſiſting of three tones, and three greater ſemitones, as from *ut* ſharp to *ſi* flat: its ratio is 128 to 75.

The ſecond, called by Zarlini, and the Italians, *ſemiditono con diapente*, or *ſettimo minore*, is compoſed diatonically of ſeven degrees, and ſix intervals, four whereof are tones, and the reſt greater ſemitones, as from *de* to *ut*; and chromatically of ten ſemitones, ſix whereof are greater, and four leſs: it takes its form from the ratio *quadripartiens quintas*, 9 to 5.

The third, called by the Italians, *il ditono con diapente*, or *ſettimo magiore*, is compoſed diatonically, like the former, of ſeven degrees, and ſix intervals, ſix whereof are full tones, and a ſingle one a greater ſemitone; ſo that only one greater ſemitone is wanting of the octave: as from *ut* to *ſi*; and chromatically of eleven ſemitones, ſix whereof are greater, and five leſſer. It takes its origin from the ratio of 15 to 8.

The fourth, is *redundant ſeventh*, compoſed of five tones, a greater ſemitone, and a leſſer, as from *ſi* flat to *a* ſharp: ſo that it only wants a comma of an octave; that is, ſo much as it wants to render its ſecond ſemitone a greater. Hence many confound it with the octave itſelf; maintaining, with good reaſon, that only the three firſt *ſevenths* can be of any uſe.

In thorough baſſes the *ſeventh*, whether double, ſimple, major, or minor, is marked by a figure of 7; but if it be accidentally flat, or minor, thus, ♭ 7, or 7 ♭. If ſharp, major, thus, ※ 7, or 7 ※. Again, if when it is naturally minor, it be marked with a flat, it muſt be diminiſhed. See FUNDAMENTAL.

SEVENTH *pair of nerves*. See NERVE.

SEVERAL *tail*, or INHERITANCE, in *Law*. See INHERITANCE.

SEVERAL *tenancy*, *tenura ſeparalis*, a plea, or exception taken to a writ that is laid againſt two perſons as joint tenants, who are *ſeveral*.

SEVERALTY, *eſtates in*. He that holds lands or tenements in *ſeveralty*, or is ſole tenant of them, is he who holds them in his own right only, without any other perſon being connected with him in point of intereſt, during his eſtate therein.

SEVERANCE, in *Law*, the *ſingling* or *ſevering* two or more that join, or are joined, in the ſame writ, or action.

As if two join in a writ, *de libertate probanda*, and the one be afterwards nonſuited; here *ſeverance* is permitted, ſo as, notwithſtanding the nonſuit of the one, the other may ſeverally proceed.

There is alſo *ſeverance of the tenants* in aſſiſe; when one, two, or more diſſeiſees appear upon the writ, and not the other. And *ſeverance in debt*, where two executors are named plaintiffs, and the one refuſes to proſecute. We alſo meet with *ſeverance of ſummons*, *ſeverance in attaints*, &c.

An eſtate in joint-tenancy may be *ſevered* and deſtroyed, by deſtroying any of its unities. 1. That of time, which reſpects only the original commencement of the joint eſtate,

eſtate, cannot indeed (being now paſt) be effected by any ſubſequent tranſaction. But, 2. The joint-tenants eſtate may be deſtroyed, without any alienation, by merely diſuniting their poſſeſſion. 3. The jointure may be deſtroyed, by deſtroying the unity of title. And 4. By deſtroying the unity of intereſt. Blackſt. Comm. book ii. p. 185, &c.

Severance *of corn*. The cutting and carrying it from off the ground; and ſometimes the ſetting out the tythes from the reſt of the corn, is called *ſeverance*.

SEVERIANS, *Severiani*. There were two ſects of heretics thus called: the firſt, who are as old as the beginning of the third century, were an impure branch of Gnoſtics; thus called from their chief *Severus*.

The ſecond, by ſome called *Severites*, were a ſect of Monophyſites, or Eutychians; their leader, Severus, was preferred to the ſee of Antioch in 513, where he did his utmoſt to ſet aſide the council of Chalcedon.

SEVIL, in the *Manege*. The *ſevil* of the branches of a bridle is a nail turned round like a ring, with a large head, made faſt in the lower part of the branch, called *gargouille*. See Banquet.

SEVIR, among the Romans, an officer who, according to Pitiſcus, commanded a whole wing of horſe; though others make him only the commander of a troop, *turmis*, a diviſion, anſwering to our regiments.

Seviri, were alſo magiſtrates in the colonies, ſo called, from their being ſix in number.

SEW, in the *Sea Language*. When a ſhip at low water comes to lie on the ground, and to lie dry, they ſay ſhe is *ſewed*; and if ſhe be not quite left dry, they ſay ſhe *ſews* to ſuch a part.

SEWEL, among *Sportſmen*, denotes any thing that is ſet or hung up, to keep a deer out of any place.

Sewel-*coronde*, a name given by the natives of Ceylon to a ſpecies of cinnamon, which, when chewed, is of a mucilaginous nature, like the caſſia: this dries well, and is very firm and hard, and has the appearance of a very fine cinnamon; but it has very little taſte, and a diſagreeable ſmell. The natives take advantage of the handſome appearance of this kind of cinnamon, and are very apt to mix it with the good kind, to the great detriment of the buyer. Phil. Tranſ. N° 409.

SEWER, formed from the French *eſcuyer*, *eſquire*, *gentleman*, or *uſher*, in the *Houſhold*, an officer who comes in before the meat of a king, or nobleman, to place and range it on the table. Of theſe officers there are four in the king's houſhold, and eight, called *ſewers* of the great chamber.

Sewers, in *Building*, are ſhores, conduits, or conveyances, for the ſuillage and filth of a houſe.

For the diſpoſition of theſe, according to the directions of ſir Henry Wotton, ſee *Parts of a* Building.

Sewers, *clerk of the*. See Clerk.

Sewers, *commiſſion of*. See Commission.

SEWIN, in *Ichthyology*. See Grey.

SEX, *ſexus*, ſomething in the body, which diſtinguiſhes male from female.

The number of perſons, of the two *ſexes*, are exceedingly well balanced; ſo that every man may have his wife, and every woman her huſband.

Hermaphrodites have the apparent marks of both *ſexes*.

It is expreſly forbidden by the law of Moſes, to diſguiſe the *ſex*.

SEXAGENARY, *ſexagenarius*, ſomething relating to the number ſixty: more particularly, a perſon arrived at the age of ſixty years.

Some caſuiſts diſpenſe with *ſexagenarians* for not faſting: the Papian law prohibits *ſexagenarii* from marriage; becauſe at that age the blood and humours are frozen.

Sexagenary *arithmetic*. See Sexagesimal.

Sexagenary *tables*, are tables of proportional parts, ſhewing the product of two *ſexagenaries* that are to be multiplied; or the quotient of two to be divided.

SEXAGESIMA, the ſecond Sunday before Lent, or the next to Shrove Sunday; ſo called, as being about the ſixtieth day before Eaſter.

Sexageſima is that which follows Septuageſima, and precedes Quinquageſima.

SEXAGESIMAL, or Sexagenary *arithmetic*, a method of computation, proceeding by ſixties.

Such is that uſed in the diviſion of a degree into ſixty minutes; of the minute, into ſixty ſeconds; of the ſecond, into ſixty thirds, &c. See Arithmetic.

SEXAGESIMALS, or Sexagesimal *fractions*, are fractions, whoſe denominators proceed in a ſexagecuple ratio; that is, a prime, or the firſt minute $= \frac{1}{60}$; a ſecond $= \frac{1}{3600}$; a third $= \frac{1}{216000}$.

Anciently, there were no other than *ſexageſimals* uſed in aſtronomical operations, and they are ſtill retained in many caſes; though decimal arithmetic is now much uſed in aſtronomical calculations.

In theſe fractions, which ſome alſo call *aſtronomical fractions*, the denominator being always 60, or a multiple thereof, is uſually omitted, and the numerator only written down: thus, 4°, $59'$, $32''$, $50'''$, $16''''$, is to be read, 4 degrees, 59 minutes, 32 ſeconds of a degree, or 60th parts of a minute, 50 thirds, 16 fourths, &c.

SEXANGLE, in *Geometry*, a figure having ſix ſides, and conſequently ſix angles.

SEXTANS, *ſextant*, a *ſixth* part of certain things.

The Romans divided their *as*, which was a pound of braſs, into twelve ounces: the ounce was called *uncia*, from *unum*; and two ounces *ſextants*, as being the *ſixth* part of a pound. See As.

Sextans was alſo a meaſure which contained two ounces of liquor, or two cyathi. Hence,

Sextantes, Caliſte, duos infundi Falerni.

Sextans, the *Sextant*, in *Aſtronomy*, a conſtellation of the ſouthern hemiſphere, made by Hevelius out of unformed ſtars. In Hevelius's Catalogue it contains 11, but in the Britannic Catalogue 41 ſtars; the longitudes, latitudes, &c. of which are as follow:

Situation of the ſtars.	Signs.	Longitud.			Latitude			Magnitude
		°	′	″	°	′	″	
At the cylinder of the *Sextant*	♌	19	59	3	6	59	30	5
In the ſide, ſouth, ſuperior		21	0	44	8	56	56	5
		27	30	1	19	10	57	6
		23	58	17	8	14	5	6
		28	9	[illegible]	19	14	20	6
5								
		27	10	14	16	14	25	6
		25	1	4	9	52	53	6
In the ſide, ſouth, inferior		28	57	20	19	43	16	6
		4	36	8	7	22	14	6
		23	47	5	3	25	19	6
10								
		24	23	47	3	51	31	5.6
		26	8	41	7	24	41	6
		27	35	45	8	7	37	6
		27	21	37	5	38	35	6
In the middle of *Sextant*		29	46	47	11	8	24	4
15								
		28	45	7	4	53	59	6
In the limb, preceding	♍	3	19	24	18	25	3	6
		3	33	37	18	20	37	6
At the upper ſide of *Sextant*		28	4	50	5	6	3	6
	♍	3	48	38	17	8	28	6
20								
		1	9	26	17	39	29	6
In the limb following		5	3	1	17	24	10	6
		1	53	18	7	29	[illegible]	5
		3	37	56	10	13	42	6
		4	50	58	13	10	16	6
25								
		4	23	35	9	56	26	6
		5	43	53	13	9	32	6
		5	15	35	11	33	30	5
		5	23	29	10	26	35	5
		5	11	2	9	19	47	5
30								
		4	12	21	6	42	41	6
Between the *Sextant* and ♌ *m*, inferior		3	38	53	4	14	36	6
Superior		8	11	16	9	18	26	6
		6	28	48	4	15	27	6
		6	11	46	3	6	33	6
35								
		7	27	0	5	2	42	6
		6	10	48	1	21	41	6
		6	29	33	1	15	59	6
		12	48	42	15	18	38	7
		10	54	52	10	40	35	6
40								
Following the *Sextant*, before *Crater*		13	5	35	15	3	55	6

SEXTANT, in *Mathematics*, denotes the *ſixth* part of a circle, or an arch comprehending ſixty degrees.

Sextant is more particularly uſed for an aſtronomical inſtrument, made like a quadrant; excepting that its limb only comprehends ſixty degrees.

The uſe and application of the *ſextant* is the ſame with that of the Quadrant.

In the obſervatories of Greenwich and Pekin, there are very large and fine *ſextants*.

SEXTARIUS, an ancient Roman meaſure, containing two cotylæ, or two heminæ. See Cotyla.

SEXTERY-*lands*, are lands given to a church, &c. for maintenance of the ſexton.

SEXTILE, *ſextilis*, the poſition or aſpect of two planets, when at ſixty degrees diſtance; or at the diſtance of two ſigns from one another. It is marked thus (✶). See Aspect.

SEXTILIS, in *Chronology*. See AUGUST.

SEXTON, a church-officer, thus called by corruption of the Latin *ſacriſta*, or Saxon *ſegerſtone*, which denotes the ſame. His office is to take care of the veſſels, veſtments, &c. belonging to the church; and to attend the miniſter, churchwarden, &c. at church. He is uſually choſen by the parſon only.

Sextons, as well as PARISH *clerks*, are regarded by the common law as perſons who have freehold in their offices; and, therefore, though they may be puniſhed, yet they cannot be deprived, by eccleſiaſtical cenſures.

The office of *ſexton in the pope's chapel*, is appropriated to the order of the hermits of St. Auguſtine. He is generally a biſhop, though ſometimes the pope only gives a biſhoprick, *in partibus*, to him on whom he confers the poſt. He takes the title of *prefect of the pope's ſacriſty*, and has the keeping the veſſels of gold and ſilver, the relics, &c.

When the pope ſays maſs, the *ſexton* always taſtes the bread and wine firſt. If it be in private he ſays maſs, his holineſs, of two wafers, gives him one to eat; and, if in public, the cardinal, who aſſiſts the pope in quality of deacon, of three wafers, gives him two to eat. When the pope is deſperately ſick, he adminiſters to him the ſacrament of extreme unction, &c. and enters the conclave, in quality of firſt concclaviſt.

SEXTULA, a word uſed by ſome pharmaceutic writers to expreſs the ſixth part of an ounce, that is, four ſcruples, or one drachm and one ſcruple.

SEXTUPLE, *Seſtuplo*, in *Muſic*, denotes a mixed ſort of TRIPLE time, which is beaten in double time.

This the Italians call *ſeſtuplo*; the French ſometimes call it *ſixth time, meſure a ſix temps*; though improperly: according to M. Broſſard, it ought rather to be denominated *triple binary* time.

Authors uſually make mention of three ſpecies hereof; to which M. Broſſard adds two more; viz.

SEXTUPLE *of the ſemibreve*, by the French called *triple* of 6 for 1, as being denoted by thoſe two numbers $\frac{6}{1}$; or becauſe here are required ſix ſemibreves to a meaſure, in lieu of one, viz. three riſing, and three falling.

SEXTUPLE *of the minim*, called by the French triple of 6 for 2; as being denoted by $\frac{6}{2}$, which ſhew, that ſix minims are here required to a meaſure, inſtead of 2.

SEXTUPLE *of the crotchet*, called by the French triple of 6 for 4, becauſe denoted by C $\frac{6}{4}$, or $\frac{4}{6}$, which ſhew, that there muſt be 6 crotchets to a meaſure, in lieu of 4.

SEXTUPLE *of the chroma*, by the French called triple of 6 for 8, as being denoted by $\frac{6}{8}$; which ſhew, that 6 quavers here make the meaſure or ſemibreve, inſtead of 8.

SEXTUPLE *of the ſemichroma*, or triple of 6 for 16; ſo called, becauſe denoted by $\frac{6}{16}$, which ſhews, that 6 quavers are here required to a meaſure, inſtead of 16.

SEXTUS, *ſixth*, in the *Canon Law*, denotes a collection of decretals, made by pope Boniface VIII. uſually thus called from the title, which is *Liber Sextus*; as if it were a *ſixth* book added to the five books of decretals, collected by Gregory IX.

The *ſextus* is a collection of papal conſtitutions, publiſhed after the collections of Gregory IX. containing thoſe of the ſame Gregory, Innocent IV. Alexander IV. Urban IV. Clement IV. Gregory X. Nicolas III. and Boniface VIII. by whoſe order the compilation was made. The perſons employed in making of it were Will. de Mandegot, archbiſhop of Ambrun; and Berenger, biſhop of Beziers; and Richard, of Sienna. See CANON-*law*.

SEXTUS *oculi*, in *Anatomy*, a name given by Fallopius to one of the muſcles of the eye, called by Albinus, and others, the OBLIQUUS *oculi inferior*, and by ſome the *obliquus oculi brevis*.

SEXTUS *thoracis*, in *Anatomy*, a name given by Fallopius, and others, to a muſcle, now generally known by the name of the *triangularis ſterni*.

SEXUAL *ſyſtem*, in *Botany*, denotes that ſyſtem, which is founded on a diſcovery, that there is in vegetables, as well as in animals, a diſtinction of the ſexes; or that plants propagate themſelves by means of male and female organs, either growing upon the ſame tree, or upon different trees of the ſame ſpecies. This ſyſtem is ſuggeſted and confirmed by the analogy obſervable between the eggs of animals and the ſeed of plants, both ſerving equally to the ſame end; viz. that of propagating a ſimilar race; and by the remarks which have been made, that when the ſeed of the female plant is not impregnated with the prolific powder of the male, it bears no fruit; inſomuch that as often as the communication between the *ſexual* parts of plants has been intercepted, which is the cauſe of their fecundity, they have always proved barren. The authors of this ſyſtem, after exactly anatomizing all the parts of the plant, aſſign to each a name, founded on its uſe and analogy to the parts of an animal. Thus, as to the male organs, the filaments are the ſpermatic veſſels, the antheræ the teſticles, and the duſt of the antheræ correſpond to the ſperm and ſeminal animalcules; and as to the female, the ſtigma is the external part of the female organ, which receives the duſt; the ſtyle anſwers to the vagina; the germ to the ovary; and the pericarpium, or fecundated ovary, to the womb. See *Generation of* PLANTS, and VEGETATION.

The *ſexual* ſyſtem was not wholly unknown to the ancients, though their knowledge of it was very imperfect. Accordingly we find in the account given by Herodotus (lib. i.) of the country about Babylon, where PALM-*trees* abounded, that it was a cuſtom with the natives, in their culture of theſe plants, to aſſiſt the operations of nature, by gathering the flowers of the male trees, and carrying them to the female. By this means they ſecured the ripening of the fruit; which might elſe, on account of unfavourable ſeaſons, or the want of a proper intermixture of the trees of each ſex, have been precarious, or at leaſt not to have been expected in equal quantities. The ancients had alſo ſimilar notions concerning the fig. Theophraſtus (Hiſt. Plant. lib. iii. cap. 9.) obſerves, that the characteriſtic and univerſal difference among trees is that of their gender, whether male or female. And Ariſtotle (De Plantis, lib. i. cap. 2.) ſays, that we ought not to fancy, that the intermingling of ſexes in plants is the ſame as among animals. However, there ſeems to have been a difference of opinion among the ancients as to the manner in which plants ſhould be allowed to have a difference of ſex. Some apprehended that the two ſexes exiſted ſeparately; and others thought that they were united in the ſame individual. Empedocles thought, that plants were androgynous or hermaphroditical, or that they were a compoſition of both ſexes. Ariſtotle expreſſes his doubt upon this head. Empedocles (vide Ariſt. de Generat. Anim. lib. i. cap. 23.) called plants oviparous; for the ſeed or egg, according to his account, is the fruit of the generative faculty, one part of which ſerves to form the plant, and the other to nouriſh the germ and root; and in animals of different ſexes, we ſee that nature, when they would procreate, impels them to unite, and like plants to become one; that from this combination of two, there may ſpring up another animal.

As to the manner in which fruits were impregnated, the ancients were not ignorant that it was by means of the prolific duſt contained in the flower of the male; and they remarked, that the fruits of trees never come to maturity till they had been cheriſhed with that duſt. Upon this ſubject Ariſtotle ſays (De Plant. lib. i. cap. 6.) that if one ſhakes the duſt of a branch of the male palm-tree over the female, her fruits will quickly ripen; and that when the wind ſheds this duſt of the male upon the female, her fruits ripen apace, juſt as if a branch of the male had been ſuſpended over her. And Theophraſtus (Hiſt. Plant. lib. ii. cap. 9) obſerves, that they bring the male to the female palm, in order to make her produce fruit. The manner in which they proceed, ſays he, is this. When the male is in flower, they ſelect a branch abounding with that downy duſt which reſides in the flower, and ſhake this over the fruit of the female. This operation prevents the fruit from becoming abortive, and brings it ſoon to perfect maturity. Pliny alſo informs us (Nat. Hiſt. tom. i. lib. xiii. c. 7.) that naturaliſts admit the diſtinction of ſex, not only in trees, but in herbs, and in all plants. Yet this is no where more obſervable, he adds, than in palms, the females of which never propagate but when they are fecundated by the duſt of the male. He calls the female palms, deprived of male aſſiſtance, barren widows. He compares the conjunction of theſe plants to that of animals; and ſays, that to generate fruit, the female needs only the aſperſion of the duſt or down of the flowers of the male.

Zaluzianſcki ſeems to have been the firſt among the moderns who clearly diſtinguiſhed from one another the male, the female, and the hermaphroditical plants. About a hundred years after him, ſir Thomas Millington, and Dr. Grew, communicated to the Royal Society their obſervations on the impregnating duſt of the ſtamina. Grew's Anatomy of Plants, publiſhed in 1682.

Camerarius, towards the end of the laſt century, obſerved, that upon plucking off the ſtamina of ſome male plants, the buds that ought to have produced fruit came not to maturity. Malpighi, Geoffroy, and Vaillant, have alſo carefully conſidered the fecundating duſt; the latter of whom ſeems to have been the firſt eye-witneſs of this ſecret of nature, the admirable operation that paſſes in the flowers of plants, between the organs of different ſexes. Many authors afterwards applied themſelves to improve this ſyſtem; the principal of whom were Morland, Logan, Van Royen, Bradley, Gotliel, Ludwigius, Blair, Wolfius, Verdrees, and Monro. But Linnæus had the honour of completing this ſyſtem, by reducing all trees and plants to particular claſſes, diſtinguiſhed by the number of their ſtamina, or male organs. See Dutens's Inquiry into the Origin of the Diſcoveries attributed to the Moderns, 1769, chap. vii. Phil. Tranſ vol. xlvii. art. 25.

The *ſexual* hypotheſis, on its firſt appearance, was received with all that caution which becomes an enlightened age; and nature was traced experimentally through all her variations, before it was univerſally aſſented to. Tournefort refuſed to give it a place in his ſyſtem; and Pontedera, though he had carefully examined it, treated it as chimerical. The learned Dr. Alſton, profeſſor of botany in the univerſity of Edinburgh, violently oppoſed it; but the proofs which Dr. Linnæus has given amongſt the aphoriſms of his Fundamenta Botanica, and farther illuſtrated in his Philoſophia Botanica, are ſo clear, that the mind does not heſitate a moment in pronouncing animal and vegetable conception to be the ſame; but with this difference, that in animals fruition is voluntary, but in vegetables neceſſary and mechanical. The impregnation of the female palm by the farina of the male, related by M. Mylius, in his letter to Dr. Watſon (Phil. Tranſ. vol. xlvii. art. 25.) eſtabliſhes the fact atteſted by the ancients concerning the palm-tree; and as the fructification in other vegetables, though it may differ in particular circumſtances, has nevertheleſs a general conformity to that of the palm-tree, with reſpect to the parts ſuppoſed to be the organs of generation, which are diſcoverable either on the ſame or in a ſeparate flower, we may, from this ſingle experiment, deduce an argument by analogy for the confirmation of the whole *ſexual* hypotheſis. Beſides, a very ſtriking proof of the analogy between plants and animals may be drawn from obſervations made in their infant ſtates, at which early period they ſeem nouriſhed and protected in a ſimilar manner. Thoſe who deſire farther ſatisfaction, may ſee the ſeveral demonſtrations collected, and methodically connected, in the Sponſalia Plantarum of J. Guſtavus Walkbloom, publiſhed in the Amœnitates Academicæ, at Leyden, in 1749. See *Generation of* PLANTS, *Food of* PLANTS, and VEGETATION.

For a diſtinct view of the arrangement formed upon the Linnæan ſyſtem, ſee FRUCTIFICATION.

SEXUALISTÆ, among *Botanical Authors*. See BOTANY, FRUCTIFICATION, and SEXUAL.

SEXUNX, in *Pharmacy*, the weight of ſix ounces, or half a pound troy.

SEYGAR, in the *Materia Medica*, a name uſed by ſome authors for the nutmeg.

SEYMS, among *Farriers*. See SEAMS.

SGRAFFIT, *ſgraffiata*, in *Painting*. See SCRATCH-WORK.

SHACK, in *Ancient Cuſtoms*, a liberty of winter-paſturage.

In the counties of Norfolk and Suffolk, the lord of the manor has *ſhack*, i. e. a liberty of feeding his ſheep at pleaſure, in his tenants lands, during the ſix winter months.

In Norfolk, *ſhack* alſo extends to the common for hogs, in all men's grounds, from the end of harveſt, till ſeed-time. Whence, to go *a ſhack*, is to feed at large.

SHACKLES, aboard a *Ship*, are thoſe oblong iron rings, bigger at one end than at the other, with which the ports are ſhut faſt, by thruſting the wooden bar of the port through them. There is alſo a ſort of *ſhackles* to lift the hatches up with, of a like figure, but ſmaller. They are faſtened at the corners of the hatches.

SHAD, *alauſa*, in *Ichthyology*, the name of a ſea-fiſh of the herring-kind, called alſo the *mother of herrings*, and by ſome authors *clupea* and *triſſa*, by the ancients *trichis*, or *trichias*, and the *clupea aloſa* of Linnæus. See *Tab.* IV. *of Fiſh*, N° 39.

It very much reſembles the herring in its general form, but it is flatter and broader, and grows to a cubit long, and four inches broad. The head ſlopes down conſiderably from the back, which at the beginning is very convex, and rather ſharp; the body from thence grows gradually leſs towards the tail; the under jaw is rather longer than the upper; the teeth very minute; the dorſal fin is placed very near the centre, is ſmall, and the middle rays are the longeſt; the pectoral and ventral fins are ſmall; the tail very forked; the belly exremely ſharp, and ſtrongly ſerrated; the back is of a duſky blue; above the gills begins a line of dark ſpots, which mark the upper part of the back on each ſide; the number of theſe ſpots is different in different fiſh, from four to ten.

It is very common in many ſeas, and in ſome of our large rivers, which lie near the ſea. They run up theſe in great numbers, and are then very fat; they afterwards become lean, and then go down to the ſea again. They uſually ſwim in large ſhoals together.

In Great Britain the Severn affords the *ſhad* in higher perfection than any other river; where it firſt appears in May, but in very warm ſeaſons in April, and continues about two months. The *ſhad*, at its firſt appearance, eſpecially near Glouceſter, is eſteemed a very delicate fiſh, and ſells dearer than ſalmon. The London fiſhmongers diſtinguiſh it from that of the Thames, by the French name of *aloſe*. Whether they ſpawn in the Severn and Wye is not determined, as their fry has not yet been aſcertained. The old fiſh come from the ſea in full roe. The fiſhermen erroneouſly imagine that the bleak, which appears in multitudes near Glouceſter, in July and Auguſt, are the fry of the *ſhad*. Many of theſe are taken in thoſe months only, but none of the emaciated *ſhad* are ever caught in their return. The Thames *ſhad* does not frequent that river till the month of July, and is eſteemed a very inſipid coarſe fiſh. About the ſame time, the *twaite*, a variety of the *ſhad*, makes its appearance near Glouceſter, and is taken in great numbers in the Severn, but held in as great diſrepute as the *ſhad* of the Thames. The true *ſhad* weighs ſometimes eight pounds, but their general ſize is from four to five. The twaite, on the contrary, weighs from half a pound to two pounds, which it never exceeds. The twaite differs from a ſmall *ſhad* only in having one or more round black ſpots on the ſides; if only one, it is always near the gill, but commonly there are three or four, placed one under the other. Pennant.

No *ſhad* is to be taken in the Thames or Medway, except from May 10 to June 30. 30 Geo. II. cap. 21.

SHADDOCK, in *Botany*, the name given to a ſpecies of ORANGE.

SHADOW, *ſhade*, in *Optics*, a certain ſpace deprived of light, or where the light is weakened by the interpoſition of ſome opake body before the luminary.

The doctrine of *ſhadows* makes a conſiderable article in optics, aſtronomy, and geography; and is the general foundation of dialling.

As nothing is ſeen but by light, a mere *ſhadow* is inviſible; when, therefore, we ſay, we ſee a ſhadow, we mean partly, that we ſee bodies placed in the *ſhadow*, and illuminated by light, reflected from collateral bodies; and partly, that we ſee the confines of the light.

If the opake body, that projects the *ſhadow*, be perpendicular to the horizon, and the plane it is projected on be horizontal, the *ſhadow* is called a right *ſhadow*. Such are the *ſhadows* of men, trees, buildings, mountains, &c. If the opake body, be placed parallel to the horizon, the *ſhadow* is called a *verſed ſhadow*; as the arms of a man ſtretched out, &c.

SHADOWS *from opake bodies, laws of the projection of.* 1. Every opake body projects a *ſhadow* in the ſame direction with the rays of light; that is, towards the part oppoſite to the light. Hence, as either the luminary or the body changes place, the *ſhadow* likewiſe changes its place.

2. Every opake body projects as many *ſhadows*, as there are luminaries to enlighten it.

3. As the light of the luminary is more intenſe, the *ſhadow* is the deeper. Hence, the intenſity of the *ſhadow* is meaſured by the degrees of light that ſpace is deprived of. In reality, the *ſhadow* itſelf is not deeper, but it appears ſo, becauſe the ſurrounding bodies are more intenſely illuminated.

4. If a luminous ſphere be equal to an opake one, which it illumines, the *ſhadow* this latter projects, will be a cylinder; and, of conſequence, will be propagated ſtill equal to itſelf, at whatever diſtance it extends; ſo that, if it be cut in any place, the plane of the ſection will be a circle equal to a great circle of the opake ſphere.

5. If the luminous ſphere be greater than the opake one, the *ſhadow* will be conical. If, therefore, the *ſhadow* be cut by a plane parallel to the baſe, the plane of the ſection will be a circle; and that ſo much the leſs as it is at a greater diſtance from the baſe.

6. If the luminous ſphere be leſs than the opake one, the *ſhadow* will be a truncated cone: conſequently it grows ſtill wider and wider; and therefore, if cut by a plane parallel to its baſe, that plane will be a circle ſo much the greater as it is farther from the baſe.

7. To find the length of the *ſhadow*, or the axis of the ſhady cone, projected by a leſs opake ſphere, illumined by a larger; the ſemidiameters of the two, as CG, and IM (*Tab. Optics*, *fig.* 12.) and the diſtances between their centres GM, being given.

Draw FM parallel to CH; then will $IM = CF$; and therefore FG will be the difference of the ſemidiameters GC and IM. Conſequently, as FG, the difference of the ſemidiameters, is to GM, the diſtance of the centres; ſo is CF, or IM, the diameter of the opake ſphere, to MH, the diſtance of the vertex of the ſhady cone, from the centre of the opake ſphere. If, then, the ratio of PM to MH be very ſmall; ſo that MH and PH do not differ very conſiderably, HM may be taken for the axis of the ſhadowy

dowy cone: otherwiſe the part P M muſt be ſubtracted from it, to find which, ſeek the arch L K, which is the meaſure of the angle L M K, or M H I, and this angle is one of the angles of the right-angled triangle M H I, the ſides of which, M I and M H, are known; for this, ſubtracted from a quadrant, leaves the arch I Q, which is the meaſure of the angle I M P. Since then, in the triangle M I P, which is rectangular at P, beſides the angle I M Q, we have the ſide I M; the ſide M P is eaſily found by plain trigonometry.

E. gr. If the ſemidiameter of the earth be $MI = 1$; the ſemidiameter of the ſun will be $= 117$; and therefore $GF = 111$; and of conſequence $MH = 217$; ſince then M P is found by calculation to bear a very ſmall ratio to M H; for the angle $MIP = KML$, may be taken equal to the apparent ſemidiameter of the ſun, becauſe of the ſun's great diſtance, and its conſiderable magnitude, in proportion to the globe M; and, therefore, M P : M I : : ſine of 16′ : radius, i. e. : : 217 : 1, nearly; and as M H is about 217 times M I, P M may be neglected, and P H may be taken to be 217 ſemidiameters of the earth. See ECLIPSE *of the moon*.

Hence, as the ratio of the diſtance of the opake body, from the luminous body G M, to the length of the *ſhadow* M H, is conſtant; if the diſtance be diminiſhed, the length of the *ſhadow* muſt be diminiſhed likewiſe. Conſequently, the *ſhadow* continually decreaſes as the opake body approaches the luminary.

8. To find the length of the *ſhadow* projected by an opake body T S (*fig.* 13.); the altitude of the luminary, e. gr. of the ſun above the horizon, viz. the angle S V T, and that of the body, being given. Since, in the rectangled triangle S T V, which is rectangular at T, we have given the angle V, and the ſide T S; the length of the *ſhadow* T V is had by trigonometry.

Thus, ſuppoſe the altitude of the ſun 37° 45′, and the altitude of a tower 178 feet; T V will be found 230 feet nearly.

9. The length of the *ſhadow* T V, and the height of the opake body T S, being given; to find the altitude of the ſun above the horizon.

Since, in the rectangled triangle S T V, rectangular at T, the ſides T V and T S are given; the angle V is found thus: as the length of the *ſhadow* T V, is to the altitude of the opake body T S, ſo is the whole ſine to the tangent of the ſun's altitude above the horizon. Thus, if T S be 30 feet, and T V 45, T V S will be found 41° 49′.

10. If the altitude of the luminary, e. gr. the ſun above the horizon T V S, be 45°, the length of the *ſhadow* T V is equal to the height of the opake body, the triangle in this caſe being iſoſceles.

11. The length of the *ſhadows* T Z and T V of the ſame opake body T S, in different altitudes of the luminary, are as the cotangents of theſe altitudes.

Hence, as the cotangent of a greater angle is leſs than that of a leſs angle; as the luminary riſes higher, the *ſhadow* decreaſes; whence it is, that the meridian *ſhadows* are longer in winter than in ſummer.

12. To meaſure the altitude of any object, e. gr. a tower AB (*fig.* 14.) by means of its *ſhadow* projected on an horizontal plane.

At the extremity of the *ſhadow* of the tower C, fix a ſtick, and meaſure the length of the *ſhadow* A C; fix another ſtick in the ground of a known altitude D E, and meaſure the length of the *ſhadow* thereof E F. Then as E F is to A C, ſo is D E to A B. If, therefore, A C be 45 yards, E D 5 yards, and E F 7 yards; A B will be $32\frac{1}{7}$ yards.

13. The right *ſhadow* is to the height of the opake body, as the coſine of the height of the luminary to the ſine.

14. The altitude of the luminary being the ſame in both caſes, the opake body A C (*fig.* 15.) will be to the verſed *ſhadow* A D, as the right *ſhadow* E B, to its opake body D B. Hence, 1. The opake body is to its verſed *ſhadow*, as the coſine of the altitude of the luminary to its ſine; conſequently the verſed *ſhadow* A D is its to opake body A C, as the ſine of the altitude of the luminary to its coſine. 2. If $DB = AC$; then will D B be a mean proportional between E B and A D; that is, the length of the opake body is a mean proportional between its right *ſhadow* and verſed *ſhadow*, under the ſame altitude of the luminary. 3. When the angle C is 45°, the ſine and coſine are equal; and, therefore, the verſed *ſhadow* is equal to the length of the opake body.

15. A right ſine is to a verſed ſine of the ſame opake body, under the ſame altitude of the luminary, in a duplicate ratio of the coſine to the ſine of the altitude of the luminary.

Right and verſed *ſhadows* are of conſiderable uſe in meaſuring; as by their means we can commodiouſly enough meaſure altitudes, both acceſſible and inacceſſible, and that too when the body does not project any *ſhadow*. The right *ſhadows* we uſe, when the *ſhadow* does not exceed the altitude; and the verſed *ſhadows*, when the *ſhadow* is greater than the altitude. On this footing is made an inſtrument called the *quadrat*, or *line of ſhadows*; by means whereof the ratios of the right and verſed *ſhadow* of any object, at any altitude, are determined. This inſtrument is uſually added on the face of the quadrant. Its deſcription and uſe, ſee under QUADRAT, and ALTITUDE.

SHADOW, in *Geography*. The inhabitants of the globe are divided, with reſpect to their *ſhadows*, into ASCII, AMPHISCII, HETEROSCII, and PERICII.

SHADOW, in *Painting*, denotes an imitation of a real *ſhadow*, effected by gradually heightening and darkening the colours of ſuch figures as by their diſpoſition cannot receive any direct rays from the luminary ſuppoſed to enlighten the piece. The management of the *ſhadows* and lights makes what painters call the *clair-obſcure*: the laws whereof ſee under the article CLAIR-OBSCURE.

SHADOW, in *Perſpective*. The appearance of an opake body, and a luminous one, whoſe rays diverge (e. gr. a candle, lamp, &c.) being given; to find the juſt appearance of the *ſhadow*, according to the laws of perſpective. The method is this: from the luminous body, which is here conſidered as a point, let fall a perpendicular to the perſpective plane or table; i. e. find the appearance of a point upon which a perpendicular, drawn from the middle of the luminary, falls on the perſpective plane; and from the ſeveral angles, or raiſed points of the body, let fall perpendiculars to the plane. Theſe points, whereon the perpendiculars fall, connect by right lines, with the point upon which the perpendicular let fall from the luminary, falls; and continue the lines to the ſide oppoſite to the luminary. Laſtly, through the raiſed points, draw lines through the centre of the luminary, interſecting the former; the points of interſection are the terms or bounds of the *ſhadow*.

E. gr. Suppoſe it required to project the appearance of the *ſhadow* of a priſm, A B C F E D (*Tab.* IV. *Perſpective*, *fig.* 80.) ſcenographically delineated: ſince A D, B E, and C F, are perpendicular to the plane, and L M is likewiſe perpendicular to the ſame (for the luminary is given, if its altitude L M be given), draw the right lines G M and H M, through the points D and E. Through the raiſed points A and B, draw the right lines G L and H L, interſecting the former in G and H. Since the *ſhadow* of the right line A D terminates in G; and the *ſhadow* of the right line B E in H: and the *ſhadows* of all the other lines, conceived in the given priſm, are comprehended within theſe terms; G D E H will be the appearance of the *ſhadow* projected by the priſm.

If the *ſhadows* of objects be made by the light of the ſun, the ſituation of that luminary, with reſpect to the picture, muſt be determined; and this is done by the help of the following conſiderations. By reaſon of the immenſe diſtance of the ſun, it muſt always be ſuppoſed to be in, or over ſome point in the horizontal line, in which the ground plane, when extended to an infinite diſtance is conceived to vaniſh; and the particular point in the horizontal line muſt be determined from the number of degrees by which the ſun is ſituated to the right or left hand of the perpendicular that goes through the point of ſight; in the ſame manner as the vaniſhing point of a right line upon the ground plane, that is oblique to the ground line, is found. E. gr. If the ſun be thirty degrees to the left hand of it, let the angle D E H (*fig.* 81.) be equal to 30°, and H will be that point in the horizontal line, over which the ſun may be ſuppoſed to be perpendicular; and nothing is wanting to fix its preciſe place above the horizon, but to know its altitude, which is laid down in the ſame manner as the vaniſhing point of a line that is elevated above the ground plane. Thus, if the ſun be 35° high, make $HI = HE$, and, raiſing the perpendicular H K, make the angle $HIK = 35°$, and K will be the ſun's place.

Let it be required to draw the *ſhadow* of any object made by the ſun in this ſituation; and ſuppoſe K to be the place of the candle L, in *fig.* 80. and H to be M, the point upon the ground plane that is perpendicularly under it; the proceſs will be exactly the ſame as in that example. Thus, to draw the *ſhadow* of the ſolid X (*fig.* 82.) the place of the ſun being at K; draw H *a*, and interſecting it by K *b* in *c*, we have the place of the *ſhadow* of *b*; and joining *a c*, we have the *ſhadow* of the perpendicular line *a b*. In like manner find *d*, the *ſhadow* of *f*, at the top of the line *e f*; and alſo *g*, the *ſhadow* of the vertex of the line *b i*. Then joining theſe points, we have the *ſhadow* of the whole object X; for it is evident, from the poſition of it, that the *ſhadow* of any other line in the figure muſt fall within that of theſe. When, as in this example, the place of the ſun is fixed above the horizontal line, it is evident, that the *ſhadows* will be projected as falling towards the ſpectator, and that they will always be larger than the objects.

To draw the *ſhadows* which are made by the ſun, having the ſame degree of elevation *behind* the ſpectator, which will make the *ſhadows* fall nearer the horizontal line, and leſs than the objects; the perpendicular from H (*fig.* 81.) muſt be let fall to L, and the angle HIL muſt be the ſame as HIK, in the former caſe; and then, if the point L be made uſe of inſtead of K; as theſe points are ſituated on the contrary ſides of the horizontal line, the *ſhadows* of objects will be repreſented as they would be made by the ſun placed on the back of the ſpectator; and this poſition of *ſhadows* is generally thought more agreeable in a picture than the other. To find, in this manner, the *ſhadow* of the line ab, in the ſolid X (*fig.* 83.) draw Ha to the foot of it, and Lb to the top, interſecting each other in c, the place of the *ſhadow*. Find, in the ſame manner, where the *ſhadow* of the line ef, behind the body, would fall, and join that point and c, by a line which cuts the ſide of the figure in d, where only the *ſhadow* begins to be viſible. Thus, joining a, c, and d, the *ſhadow* of the ſolid, X, is completed.

In both theſe caſes the ſun is ſuppoſed to be ſituated either *before* or *behind* the picture. If it be *in the plane* of the picture, it is evident that its place muſt be in the horizontal line, at an infinite diſtance from the point of ſight; conſequently all lines proceeding from it may be ſuppoſed parallel to one another. To draw the *ſhadows* of objects made by the ſun in this ſituation, draw lines parallel to the horizontal line from the foot of the object, and interſect them by lines making angles with the horizontal line equal to the ſun's altitude. This practice is very eaſy by means of the drawing board and ſquare. Then, in order to draw the *ſhadow* of a ſolid X (*fig.* 84.) with the ruler of the ſquare parallel to the ground line, draw ac; and fixing the moveable tranſverſe of the ruler in the angle of the ſun's elevation, draw the line bc, which gives c for the place of the *ſhadow* of b. In the ſame manner alſo find d, the place of the *ſhadow* of e; and joining the points d, c, we obtain the *ſhadow* of the whole figure; though it is ſo ſituated, that part of it is hid by the object. If there be ever ſo many lines, the *ſhadows* of which are to be found, once fixing of the ruler ſerves for them all. It is merely neceſſary to ſlide the ruler along the drawing-board, till it comes to the points, from which the lines are to be drawn, both for the lines that are parallel to the horizon, and thoſe that interſect them. To draw the *ſhadow* of the ſolid Y (*fig.* 84.) which lies oblique both to the horizon and to the ground plane, draw ac from the foot of the line ab, parallel to the horizon; and fixing the moveable tranſverſe of the ruler, ſo as to make an angle equal to the ſun's altitude, draw bc. In the ſame manner find g, the *ſhadow* of f; and drawing gc, and joining cd, the place where the neareſt extremity of the ſolid touches the ground, we may complete the outline of the whole *ſhadow*; for the *ſhadows* of all the other lines muſt fall within theſe.

We may obſerve, that it makes no difference in the *ſhadow*, whatever be the height or ſhape of objects, provided their tops, and every part of them, be in the ſame right lines proceeding from the luminous body.

As for thoſe *ſhadows* that are intercepted by other objects, it may be obſerved, that when the *ſhadow* of a line falls upon any object, it muſt neceſſarily take the form of that object. If it fall upon another plane, it will be a right line; and if upon a globe, or cylinder, it will be circular. If the body intercepting it be a plane, whatever be the ſituation of it, the *ſhadow* falling upon it might be found by producing that plane, till it intercepted the perpendicular let fall upon it from the luminous body; for then a line drawn from that point would determine the *ſhadow*, juſt as if no other plane had been concerned. But the appearance of all theſe *ſhadows* may be drawn with leſs trouble, by firſt drawing it through theſe interpoſed objects, as if they had not been in the way, and then making the *ſhadow* to aſcend perpendicularly up every perpendicular plane, and obliquely on thoſe that are ſituated obliquely, in the manner deſcribed by Dr. Prieſtley, *ubi infra*.

Here we may obſerve in general, that ſince the *ſhadows* of all objects which are caſt upon the ground, will vaniſh into the horizontal line; ſo, for the ſame reaſon, the vaniſhing points of all *ſhadows*, which are caſt upon any inclined, or other plane, will be ſomewhere in the vaniſhing line of that plane.

When objects are not ſuppoſed to be viewed by the light of the ſun, or of a candle, but only in the light of a cloudy day, or in a room into which the ſun does not ſhine, there is no ſenſible *ſhadow* of the upper part of the object, and the lower part only makes the neighbouring parts of the ground, on which it ſtands, a little darker than the reſt. This imperfect obſcure kind of *ſhadow* is eaſily made, being nothing more than a ſhade on the ground, oppoſite to the ſide on which the light is ſuppoſed to come; and it may be continued to a greater or leſs diſtance, according to the ſuppoſed brightneſs of the light by which it is made. It is in this manner (in order to ſave trouble, and ſometimes to prevent confuſion) that the *ſhadows* in moſt drawings are made. See on the ſubject of this article Prieſtley's Treatiſe on Perſpective, part ii. p. 73, &c. and Taylor's Method of Perſpective, by Kirby, book ii. chap. 4.

Shadows, *geneſis of curves by*. See Curve.

Shadows, *blue*. See Blueness.

SHAFT, in *Building*. The *ſhaft of a column* is the body thereof; thus called from its ſtraightneſs; but by architects more frequently the *fuſt*. See *Tab. Archit. fig.* 22, 25, 26, 28, 32. See the dimenſions under Column.

Shaft is alſo uſed for the ſpire of a church-ſteeple. And for the ſhank or tunnel of a chimney.

Shaft *of a mine*, is the hollow entrance or paſſage into a mine, ſunk or dug to come at the ore.

In the tin-mines, after this is ſunk about a fathom, they leave a little, long, ſquare place, which is called a shamble.

Shafts are ſunk ſome ten, ſome twenty fathoms deep into the earth, more or leſs. Of theſe *ſhafts*, there is the landing or working *ſhaft*, where they bring up the work or ore to the ſurface; but if it be worked by a horſe engine or whim, it is called a whim-*ſhaft*; and where the water is drawn out of the mine, it is indifferently named an engine-*ſhaft*, or the rod-*ſhaft*. See Mine.

SHAGGE, or Shag, in *Ornithology*, a name by which we call a water-fowl common on the northern coaſts, and called by Mr. Ray *corvus aquaticus minor*, or the leſſer cormorant, being properly a bird of the cormorant kind, or the *pelecanus graculus* of Linnæus.

It is ſomewhat larger than the common duck, and weighs about four pounds; its beak is ſtraight and ſlender, and is not flatted, but roundiſh; it is four inches long, and is hooked at the end; its mouth opens very wide, and its eyes are ſmall; the head is adorned with a creſt, two inches long, pointing backward; the whole plumage of the upper part of this bird is of a fine and very ſhining green, the edges of the feathers a purpliſh black; but the lower part of the back, head, and neck, wholly green; the belly duſky, and the legs black. It builds in trees as the commmon cormorant, ſwims with the head erect, and is very difficult to be ſhot; becauſe, when it ſees the flaſh of a gun, it pops under water, and does not riſe but at a conſiderable diſtance.

SHAGREEN, or Chagreen, derived from the Tartar *ſoghrè*, a kind of grained leather, chiefly uſed in the covers of caſes, books, &c. It is very cloſe and ſolid, and covered over with little roundiſh grains, or papillæ. It is brought from Conſtantinople, Tunis, Tripoli, Algiers, and ſome parts of Poland.

There is a diſpute among authors, what the animal is whence the *ſhagreen* is prepared? Rauwolf aſſures us, it is the onager, which, according to him and Bellonius, is a kind of wild aſs. Vide Ray, Synopſ. An. Quad. p. 63.

It is added, that it is only the hard part of the ſkin which is uſed for this purpoſe. Or, it is that part of the ſkin that grows about the rump; that of horſes is ſaid to be equally good. There are large manufactures of it at Aſtracan, and in all Perſia. Borel ſays, it is the ſkin of a ſea-calf; others, of a kind of fiſh, called by the Turks *ſhagrain*, whoſe ſkin is covered with grains; and thoſe ſo hard, that they will raſp and poliſh wood.

There is alſo a ſort of *ſhagreen*, which was formerly made of the ſkin of the ſquatina: in Engliſh, the monk or angel-fiſh, but now of that of the greater dog-fiſh. Vide Willughby Ichth. p. 80.

Shagreen, *manner of preparing*. The ſkin, being juſt flayed off, is ſtretched out, covered over with muſtard ſeed, and the ſeed bruiſed on it; and thus it is expoſed to the weather for ſome days, and then tanned.

The beſt is that brought from Conſtantinople, of a browniſh colour; the white is the worſt. It is extremely hard; yet, when ſteeped in water, it becomes very ſoft and pliable; whence it is of great uſe among caſe-makers. It takes any colour that is given it, red, green, yellow, or black. It is frequently counterfeited by morocco, formed like *ſhagreen*: but this laſt is diſtinguiſhed by its peeling off, which the firſt does not.

SHAKE, in *Muſic*. See Gruppo and Trill.

SHAKER-*pigeon*, a kind of pigeons, of which there are two ſorts, the broad-tailed, and the narrow-tailed.

The firſt is the fineſt, and moſt valued. It has a beautiful long thin neck, which bends like the neck of a ſwan, leaning towards the back. It has a full breaſt, a very ſhort back, and a tail conſiſting of a great number of feathers, ſeldom leſs than four and twenty, which it ſpreads in an elegant manner, like the tail of a turkey cock, and bends it up ſo, that it meets the head. It is commonly all white, but ſometimes is red, yellow, or blue-pied. The longer the neck of this bird is, the more it is valued.

The ſecond, or narrow-tailed *ſhaker*, has a ſhorter and thicker neck, and a longer back. It is eſteemed by many a different ſpecies, but ſeems only a mixed breed with ſome other pigeon. They are called *ſhakers*, from a tremulous motion which they have with their necks, when courting.

SHAKLES, on board *Ship*. See SHACKLES.

SHAKY, or SHAKEN, among *Builders*, an appellation given to timber which is cracked either with the heat of the ſun, or the drought of the wind.

SHALE, in *Natural Hiſtory*, a black ſlaty ſubſtance, or a clay hardened into a ſtony conſiſtence, and ſo much impregnated with bitumen, that it becomes ſomewhat like a coal. The acid emitted from *ſhale*, during its calcination, uniting itſelf to the argillaceous earth of the *ſhale*, forms alum. About a hundred and twenty tons of calcined *ſhale* will make one ton of alum. The *ſhale*, after being calcined, is ſteeped in water, by which means the alum, which is formed during the calcination of the *ſhale*, is diſſolved: this diſſolved alum undergoes various operations, before it is formed into the alum of the ſhops. Watſon's Chem. Eſſ. vol. ii. p. 315. See ALUM.

This kind of ſlate forms large ſtrata in Derbyſhire; and that which lies near the ſurface of the earth is of a ſofter and more ſhivery texture than that which lies deeper. It is alſo found in large ſtrata, generally above the coal, in moſt coal counties of this kingdom. Dr. Short informs us, that the *ſhale* waſtes the lead ore near it, by its ſtrong acid; and that it corrodes and deſtroys all minerals near it, except iron or coal, of whoſe vitriol it partakes.

SHALLOP, SHALLOOP, or SLOOP, is a ſmall light veſſel, with only a ſmall main-maſt, and fore-maſt, and lug-ſails, to hale up, and let down, on occaſion.

Shalloops are commonly good ſailers; and are therefore often uſed as tenders upon men of war.

SHALLOT. See ESCHALLOT.

SHALLOW. See SHOAL.

SHAMADE, in *War*. See CHAMADE.

SHAMBLE, or SHAMMEL, in *Mining*, a term uſed to expreſs a ſort of nich, or landing place, left at certain diſtances in the adits of mines, and formed by a ſtage of boards. The method of digging the tin mines in Devonſhire, and ſome parts of Cornwall, is this; they ſink their way in ſuch a breadth as is ſufficient for them to ſtand and work, and at every fathom they leave a ſquare place vacant, to which the ore is to be thrown up with ſhovels as it is dug. This they do from caſt to caſt; that is, as far as a man can conveniently throw up the ore with his ſhovel. Thus the ore, as it is dug by the beelmen, is thrown up by the ſhovellers, who follow them from *ſhamble* to *ſhamble*, till it comes to the top of the mine. This, however, is but an inconvenient way, and the uſe of theſe *ſhambles* is generally ſupplied by a winder at the opening of the mine, which manages two buckets, the one of which is ſent down empty, while the other is ſent up full; and one man employed below to load, and another to empty. Phil. Tranſ. N° 69. See DIGGING.

SHAMBRIER, in the *Manege*, is a long thong of leather, made faſt to the end of a cane, in order to animate a horſe, and puniſh him, if he refuſes to obey the rider.

SHAME, in *Ethics*. See PASSION.

SHAMMY, or CHAMMY, CHAMOIS, a kind of leather, either dreſſed in oil, or tanned; much eſteemed for its ſoftneſs, pliancy, &c.

It is prepared from the ſkin of the CHAMOIS, or *ſhamois*, a kind of rupicapra, or wild goat, called alſo *iſard*, inhabiting the mountains of Dauphiny, Savoy, Piedmont, and the Pyrenees.

Beſides the ſoftneſs and warmth of the leather, it has the faculty of bearing ſoap without damage; which renders it very uſeful on many accounts.

In France, &c. ſome wear the ſkin raw, without any preparation. *Shammy* leather is uſed for the purifying of mercury; which is done by paſſing it through the pores of this ſkin, which are very cloſe.

The true *chamois leather* is counterfeited with common goat, kid, and even with ſheep-ſkins; the practice of which makes a particular profeſſion, called by the French *chamoiſure*. The laſt, though the leaſt eſteemed, is yet ſo popular, and ſuch vaſt quantities of it are prepared, eſpecially about Orleans, Marſeilles, and Thoulouſe, that it may not be amiſs to give the method of preparation.

Manner of SHAMOISING, *or of preparing ſheep, goat, or kid-ſkins in oil, in imitation of* SHAMMY. The ſkins, being waſhed, drained, and ſmeared over with quick-lime on the fleſhy ſide, are folded in two lengthwiſe, the wool outwards, and laid on heaps, and ſo left to ferment eight days; or, if they had been left to dry after flaying, then fifteen days.

Then they are waſhed out, drained, and half dried; laid on a wooden leg, or horſe, the wool ſtripped off with a round ſtaff for that purpoſe, and laid in a weak pit, the lime whereof had been uſed before, and has loſt the greateſt part of its force.

After twenty-four hours they are taken out, and left to drain twenty-four more; they are then put in another ſtronger pit. This done, they are taken out, drained, and put in again, by turns; which begins to diſpoſe them to take oil; and this practice they continue for ſix weeks in ſummer, or three months in winter: at the end whereof they are waſhed out, laid on the wooden leg, and the ſurface of the ſkin on the wool-ſide peeled off, to render them the ſofter; then made into parcels, ſteeped a night in the river, in winter more, ſtretched ſix or ſeven over one another, on the wooden leg, and the knife paſſed ſtrongly on the fleſh-ſide, to take off any thing ſuperfluous, and render the ſkin ſmooth.

Then they are ſteeped, as before, in the river, and the ſame operation is repeated on the wool ſide; they are then thrown into a tub of water, with bran in it, which is brewed among the ſkins till the greateſt part ſticks to them, and then ſeparated into diſtinct tubs, till they ſwell, and riſe of themſelves above the water.

By this means the remains of the lime are cleared out; they are then wrung out, hung up to dry on ropes, and ſent to the mill, with the quantity of oil neceſſary to ſcour them: the beſt oil is that of ſtock-fiſh.

Here they are firſt thrown in bundles into the river, for twelve hours, then laid in the mill-trough, and fulled without oil till they be well ſoftened; then oiled with the hand, one by one, and thus formed into parcels of four ſkins each; which are milled and dried on cords a ſecond time; then a third; and then oiled again, and dried.

This proceſs is repeated as often as neceſſity requires; when done, if there be any moiſture remaining, they are dried in a ſtove, and made up into parcels wrapped up in wool: after ſome time they are opened to the air, but wrapped up again as before, till ſuch time as the oil ſeems to have loſt all its force, which it ordinarily does in twenty-four hours.

The ſkins are then returned from the mill to the *chamoiſer*, to be ſcoured, which is done by putting them in a lixivium of wood-aſhes, working and beating them in it with poles, and leaving them to ſteep, till the ley hath had its effect; then they are wrung out, ſteeped in another lixivium, wrung again; and this is repeated till all the greaſe and oil be purged out. When this is done, they are half-dried, and paſſed over a ſharp-edged iron inſtrument, placed perpendicular in a block, which opens, ſoftens, and makes them gentle: laſtly, they are thoroughly dried, and paſſed over the ſame inſtrument again; which finiſhes the preparation, and leaves them in form of *ſhammy*.

Kid and goat-ſkins are *ſhamoiſed* in the ſame manner as thoſe of ſheep, excepting that the hair is taken off without the uſe of any lime; and that when brought from the mill, they undergo a particular preparation, called *ramalling*; the moſt delicate and difficult of all the others. It conſiſts in this, that, as ſoon as brought from the mill, they are ſteeped in a fit lixivium, taken out, ſtretched on a round wooden leg, and the hair is ſcraped off with the knife; this makes them ſmooth, and, in working, to caſt a kind of fine knap. The difficulty is in ſcraping them evenly.

SHANK *of an anchor*, on board a ſhip. See ANCHOR.

SHANK, in the *Manege*, is that part of a horſe's fore-leg, which lies between the knee and the fetlock, or paſtern-joint.

SHANK, or *Shank-painter*, in a *Ship*, is a ſhort chain faſtened under the foremaſt-ſhrouds, by a bolt, to the ſhip's ſides, having at the other end a rope faſtened to it. On this *ſhank-painter* the whole weight of the aft part of the anchor reſts, when it lies by the ſhip's ſide. The rope, by which it is haled up, is made faſt about a timber-head. See PAINTER.

SHANKER, in *Medicine*. See CHANCRE.

SHANSCRIT, SAMSCRIT, SAMSCRETAM, or HANSCRIT *language*, is the original language of the *Hindoos* or GENTOOS, in which their SHASTAH, or *Shaſter* is written, &c.

This language is very copious and nervous; but the ſtyle of the beſt authors wonderfully conciſe. It far exceeds the Greek and Arabic in the variety of its etymology, and, like them, has a prodigious number of derivatives from each primary root. The grammatical rules are alſo numerous and difficult, though there are not many anomalies. It has ſeven declenſions of nouns, which are all uſed in the ſingular, dual, and plural number, and differently formed, as they terminate with a conſonant, and with a long or ſhort vowel; and alſo as they are of different genders. The *Shanſcrit* alphabet contains fifty letters; and it is one boaſt of the Bramins, that it exceeds all other alphabets in this reſpect. But when we conſider that of their thirty-four conſonants, nearly half are combined ſounds, and that ſix of their vowels are merely the correſpondent long ones to as many which are ſhort, the advantage ſeems to be little more than imaginary. The *Shanſcrit* character, uſed in Upper Hindoſtan, is ſaid to be the ſame original letter that was firſt delivered to the people by Brihma, and is called Diewnagur, or the language of angels; whereas the character uſed by the Bramins of Bengal is by no means ſo ancient, and is evidently a corruption of the former. In the four beids, which conſtitute the original and ſacred text of the great Hindoo creator and legiſlator Brihma, the length of the vowels is expreſſed by a muſical note or ſign placed over every word; and in reading the beids, theſe diſtinctions of tone and time muſt be nicely obſerved; ſo that they produce all the effect of a laboured recitative. It is remarkable, that the Jews in their ſynagogues chant the Pentateuch in the ſame kind of melody, and it is ſuppoſed that this uſage has deſcended to them from the remoteſt ages. Some writers have erroneouſly aſſerted, that the four beids are in verſe; whereas they are written in a kind of meaſured proſe; and they are now ſcarce intelligible to the moſt learned pundits or lawyers; they are alſo ſcarce, and difficult to be found. However, comments have been written upon them from the earlieſt periods; of which one of the moſt ancient and approved was compoſed by Biſeſht Mahamomè, or the Moſt Wiſe, a great writer and prophet, who is ſaid to have lived in the ſuttee jogue, or firſt age of the world. See Halhed's Preface to his tranſlation of the Code of Gentoo Laws, printed in 1776.

To SHAPE *the courſe*, in *Sea Language*, is to direct or appoint the track of a ſhip, in order to proſecute a voyage.

SHARE, the name of that part of the plough, which cuts the ground, and the wood to which it is fixed. The extremity of the iron forwards is called the point of the *ſhare*, and the end of the wood behind is called its tail.

The length of the whole *ſhare*, from point to tail, ſhould be three feet nine inches; at the top of the iron it has an upright piece, called the *fin*, and near the iron, at the other end, there is an oblong ſquared hollow, called the *ſocket*; the uſe of which is to receive the bottom of the ſheat. Near the tail is a thin plate of iron, well rivetted to the wood; by means of this plate the tail of the *ſhare* is held firmly to the hinder ſheat of the plough by a ſmall iron pin, with a ſcrew at the end, and a nut ſcrewed on it, on the inner or right ſide of the ſheat.

The point of the *ſhare* is that part in which it does not run up into the fin: this point is generally made of three inches and a half in length, and ſhould be flat underneath, and round at the top, and the lower part of it muſt be of hard ſteel. The edge of the fin ſhould alſo be well ſteeled, and ſhould make an acute angle with the *ſhare*.

The ſocket is a ſort of mortiſe; it ſhould be a foot long, and about two inches deep: the fore end of it muſt not be perpendicular, but oblique, conformable to the end of the ſheat which enters into it. The upper edge of the fore part muſt be always made to bear againſt the ſheat; but if this end of the ſocket ſhould not be quite ſo oblique as the ſheat, it may be helped, by paring off a ſmall part of the wood at the point. Tull's Huſbandry, p. 140. See PLOUGH.

SHARK, in the Linnæan ſyſtem of *Ichthyology*, is a ſpecies of the SQUALUS. Pennant makes it a diſtinct genus, the characters of which are theſe: the body is ſlender, and grows leſs towards the tail; it has two fins on the back; a rough ſkin; five apertures on the ſides of the neck; the mouth generally placed far beneath the end of the noſe; and the upper part of the tail longer than the lower. We know two different fiſh under the ſame name of *ſhark*, with the addition of their colour, blue and white.

The blue *ſhark* is that ſpecies of ſqualus, called *glaucus*, and *galeus glaucus*, by authors, and diſtinguiſhed by Artedi by the name of the *ſqualus* with a triangular dent, or furrow, in the extremity of the back, and with no foramina about the eyes. It is of a fine deep blue colour on the back, and of a bright ſilver white on the belly; the ſkin is ſmoother than that of the white *ſhark*, and the noſe long pointed, and ſomewhat flatted, and extending far beyond the mouth; the noſtrils are long, and placed tranſverſely; the tail is bifid, and one portion of it is much larger than the other; it is very voracious of human fleſh, and will follow cloſe under the ſhore if there be depth enough, and a man is walking there. It is ſometimes found on the Engliſh ſhores, and has been caught on the Cornwall coaſt, during the pilchard ſeaſon, with large iron hooks, made on purpoſe. Ælian informs us, that this fiſh will permit the ſmall brood, when in danger, to ſwim down its throat, and take ſhelter in its belly; and the fact has been confirmed by Rondeletius. Mr. Pennant apprehends, that this care of their young is not peculiar to this ſpecies, but common to the whole genus of *ſhark*. See *Tab.* IV. *of Fiſh*, N° 48.

The other is the *lamia*, or *canis carcharias* of authors, the *ſqualus carcharias* of Linnæus, commonly called by us ſimply *the ſhark*. This is diſtinguiſhed by Artedi by the name of the *ſqualus* with a flat back, and with numerous teeth, ſerrated at the edges.

The white *ſhark*, or *lamia*, is a very dreadful and voracious fiſh, the largeſt of all the *ſharks*. They have been ſeen of four thouſand weight, with throats capable of ſwallowing a luſty man whole; nay, men have been found whole in them when opened. Some have, for this reaſon, imagined this, and not the whale, to have been the fiſh in whoſe belly the prophet Jonah lay. Swimmers very often periſh by them; ſometimes loſing an arm or leg, and ſometimes being bit quite aſunder, and ſerving only for two morſels for this ravenous animal. Its teeth are very ſharp and terrible; they are diſpoſed in ſix rows, and are all triangular, and notched like a ſaw on their edges; theſe are, in the whole, a hundred and forty-four in number, and are placed in various directions; their number is not exactly determinate; theſe teeth, when the fiſh is in a ſtate of repoſe, lie quite flat in the mouth, but when he ſeizes his prey, he has power of erecting them, by the help of a ſet of muſcles that join them to the jaw; the mouth is placed far beneath; on which account theſe fiſhes, as well as the reſt of the kind, are ſaid to be obliged to turn on their backs to ſeize their prey; which is an obſervation as ancient as the days of Pliny; its back is ſhort and broad, in compariſon of the other fiſh of this kind, and its tail, which is of a ſemilunar form, compoſed of two fins of a cubit in length each. This fiſh has ſurpriſing ſtrength in its tail, and can ſtrike with great force; ſo that the ſailors inſtantly cut it off with an ax, as ſoon as they draw one on board. The pectoral fins are very large, which enable it to ſwim with great ſwiftneſs; the colour of the whole body and fins is a light aſh; its ſkin is rough, and its eyes large and round. It is found both in the Ocean and in the Mediterranean, and is of all fiſh the moſt voracious of human fleſh. See *Tab. Fiſh*, N° 3.

It has its name from the Greek λαιμος, a *voracious feeder*, or *glutton*. The foſſile bodies, called GLOSSOPETRÆ, or SERPENTS *tongues*, and ſuppoſed to be real ſtones, are the teeth of this fiſh.

SHARK, *baſking*, *ſqualus maximus* of Linnæus, the name given by Mr. Pennant to a fiſh which inhabits the northern ſeas, as high as the arctic circle, and which was taken for a ſpecies of whale, till he pointed out the branchial orifices in the ſides, and the perpendicular ſite of the tail. This ſpecies has been long known to the inhabitants of the ſouth and weſt of Ireland and Scotland, and thoſe of Caernarvonſhire and Angleſea; they quit the bays of theſe Welch counties about Michaelmas, and the frith of Clyde, and the Hebrides, about the latter end of July. They have nothing of the fierce and voracious nature of the *ſhark* kind, but are ſo tame as to ſuffer themſelves to be ſtroked; lying motionleſs on the ſurface of the water, commonly on their bellies, but ſometimes on their backs, as if to ſun themſelves; whence they are called *baſking ſharks*. Their food ſeems to conſiſt entirely of ſea-plants. Linnæus ſays they feed on meduſæ. At certain times they are ſeen ſporting on the waves, and leaping with great agility ſeveral feet out of the water; they ſwim deliberately, with the dorſal fins above water; their length is from three to twelve yards, and they are ſometimes longer; their form is ſlender; the upper jaw much longer than the lower, and blunt at the end; the mouth placed beneath, and each jaw furniſhed with numbers of ſmall teeth; thoſe before being much bent, and thoſe more remote in the jaws being conic, and ſharp-pointed; on the ſides of the neck there are five large tranſverſe apertures to the gills; on the back two fins; the firſt very large, nearer the head than the middle; the other ſmall, and ſituated near the tail; on the lower part there are five others, viz. two pectoral fins, two ventral fins, and a ſmall anal fin; near theſe, the male has two genitals, as in other *ſharks*; and between theſe fins was ſituated the pudendum of the female; the tail very large, having the upper part much longer than the lower; the colour of the upper part of the body a deep leaden, and the belly white; the ſkin rough, like ſhagreen, but leſs ſo on the belly than on the back; withinſide the mouth, towards the throat, was a very ſhort ſort of whalebone; the liver is of a great ſize, that of the female being the largeſt, and is melted into a pure and ſweet oil, fit for lamps, and much uſed by the people, who take it to cure bruiſes, burns, and rheumatic complaints. A large fiſh will yield eight barrels of oil. Theſe fiſhes are viviparous, a young one, a foot in length, having been found in the belly of one of them. When they are ſtruck with a harpoon, and wounded, they fling up their tails, and plunge headlong to the bottom, coiling the rope round them, and attempting to diſengage themſelves from the harpoon, by rolling on the ground. They ſwim away with ſuch rapidity and violence, that there has been an inſtance of a veſſel of ſeventy tons having been towed away againſt a freſh gale; and they will employ the fiſhers for twelve, and ſometimes twenty-four hours, before they are ſubdued. Pennant's Britiſh Zoology, vol. iii. p. 101, &c.

SHARK, *hammer-headed*, *ſqualus zygæna*, a fiſh of the *ſhark* kind, called alſo the BALANCE *fiſh*. See *Tab.* IV. *of Fiſh*, N° 49.

It is an extremely ſingular and remarkable fiſh, and differs not only from all the other *ſharks*, but from all the fiſh in the world, in the figure of its head: this is not placed, as in all other fiſhes, longitudinally, or in a line with the body, but is ſet on tranſverſely, as the head of a hammer or mallet upon the handle. This is ſemicircular at the front, and runs to ſo thin and ſharp an edge that as the fiſh ſwims forward with violence, it may cut other fiſhes, and is terminated at each end by an eye; theſe are very large, and ſo placed, that they more conveniently look down than either upward or ſideway. In the farther part of the forehead alſo, near the eyes, on each ſide there is a large oblong foramen, ſerving either for hearing or ſmelling, or perhaps for both; the mouth is very large, and placed under the head, and armed with four rows of extremely ſharp and ſtrong teeth, flat, and ſerrated at their edges; the tail is compoſed of two fins, one vaſtly larger than the other; the body is rounded and very long, and is not covered with ſcales, but a thick ſkin; the back is aſh-coloured, and the belly white. Rondelet. de Aquat. p. 549.

It is caught in the Mediterranean, and ſometimes in different parts of the Ocean. Some authors have called it *zygæna*, and others *libella*; which laſt anſwers to the Engliſh name of the BALANCE *fiſh*.

SHARK *picked*. See GALEUS *acanthias*.

SHARK, *long-tailed*. See *Sea* FOX.

SHARK, *ſpotted*, *ſqualus canicula* of Linnæus. See CATULUS.

SHARK, *leſſer ſpotted*, called the morgay, or *rough hound-fiſh*, *ſqualus catulus* of Linnæus. See CATULUS, HOUND-*fiſh*, and MORGAY.

SHARK, *ſmooth*, *ſqualus muſtelus* of Linnæus. See GALEUS *lævis*.

SHARK, called the TOPE, *ſqualus galeus* of Linnæus. See CANIS *galeus*.

SHARK, called the *angel* or *monk-fiſh*, *ſqualus ſquatina* of Linnæus. See ANGEL, and MONK-*fiſh*.

SHARP, in *Muſic*, a kind of artificial note or character (thus formed, ✻): this, being prefixed to a note, ſhews that it is to be ſung or played a ſemitone, or half a note higher than the natural note would have been. When a *ſharp* is placed at the beginning of a ſtave or movement, it ſhews, that all notes that are placed on the ſame line, or ſpace, throughout, are to be raiſed half a tone above their natural pitch, unleſs a natural intervene. When a *ſharp* occurs accidentally, it only affects as many notes as follow it on the ſame line or ſpace, without a natural, in the compaſs of a bar.

When the ſemitone takes the name of the natural note next above it, it is marked with a character called a *flat*. It is indifferent, in the main, which of the two be uſed, though there are ſometimes particular reaſons for the one rather than the other.

The uſe of flats and *ſharps* is by way of remedy to the deficiencies of the fixed ſcales of inſtruments.

SHARP *third* in *Muſic*, the third major. See INTERVAL.

SHARP *the bow-line*, in *Sea Language*. See BOWLING.

SHARP *nails*. See NAIL.

SHARPING *corn*, a cuſtomary preſent of corn, which, at every Chriſtmas, the farmers in ſome parts of England make to their ſmith, for ſharpening their ploughing-irons, harrow-tines, &c.

SHARPLING, in *Ichthyology*, the Engliſh name of the GASTEROSTEUS. See STICKLE-*back*.

SHASTAH, or SHASTER, the name of a ſacred book, in high eſtimation among the idolaters of Hindoſtan, containing all the dogmas of the religion of the Brahmins, and all the ceremonies of their worſhip, and ſerving as a commentary on the VIEDAM.

The term *Shaſter* denotes *ſcience* or *ſyſtem*; and is applied to other works of aſtronomy and philoſophy, which have no relation to the religion of the Indians. None but the Brahmins and rajahs of India are allowed to read the Viedam; the prieſts of the BANIANS, called *ſhuderers*, may read the *Shaſter*; and the people, in general, are allowed to read only the Paran or Pouran, which is a commentary on the *Shaſter*.

The *Shaſter* is divided into three parts; the firſt containing the moral law of the Indians; the ſecond, the rites and ceremonies of their religion; and the third, the diſtribution of the people into tribes or claſſes, with the duties pertaining to each claſs.

The principal precepts of morality contained in the firſt part of the *Shaſter*, are the following: that no animal be killed, becauſe the Indians attribute ſouls to brute animals as well as to mankind; that they neither hear nor ſpeak evil, nor drink wine, nor eat fleſh, nor touch any thing that is unclean; that they obſerve the feaſts, prayers, and waſhings, which their law preſcribes; that they tell no lies, nor are guilty of deceit in trade; that they neither oppreſs nor offer violence to one another; that they celebrate the ſolemn feaſts and faſts, and appropriate certain hours of ordinary ſleep to cultivate a diſpoſition for prayer; and that they do not ſteal, or deſfraud one another.

The ceremonies contained in the ſecond part of the *Shaſter*, are ſuch as theſe; that they waſh often in the rivers, hereby obtaining the pardon of their ſins; that they mark their forehead with red, in token of their relation to the Deity; that they preſent offerings and prayers under certain trees, ſet apart for this purpoſe; that they pray in the temple, make oblations to their pagodas, or idols, ſing hymns, and make proceſſions, &c. that they practiſe pilgrimages to diſtant rivers, and eſpecially to the Ganges, there to waſh themſelves, and make offerings; that they make vows to particular ſaints, according to their reſpective departments; that they render homage to the Deity, at the firſt ſight of the ſun; that they pay their reſpect to the ſun and moon, which are the two eyes of the Deity; and that they treat with particular veneration thoſe animals, that are deemed more pure than others, as the cow, buffalo, &c. becauſe the ſouls of men have tranſmigrated into theſe animals.

The third part of the *Shaſter* records the diſtribution of the people into four claſſes: the firſt being that of the Bramins, or prieſts, appointed to inſtruct the people: the ſecond, that of the Kutteris, or nobles, who are the magiſtrates: the third, that of the Shudderis, or merchants: and the fourth, that of the mechanics. Each perſon is required to remain in the claſs in which he was born, and to purſue the occupation aſſigned to him by the *Shaſter*. According to the Bramins, the *Shaſter* was imparted by God himſelf to Brahma, and by him to the Bramins, who communicated the contents of it to the people. Encyclopedie.

Modern writers have given us very different accounts of the antiquity and importance of the *Shaſter*. Mr. Holwell, who had made a conſiderable progreſs in the tranſlation of this book, apprehends, that the mythology, as well as the coſmogony of the Egyptians, Greeks, and Romans, were borrowed from the doctrines of the Bramins, contained in it, even to the copying of their exteriors of worſhip, and the diſtribution of their idols, though groſly multilated and adulterate. With reſpect to the VIEDAM and *Shaſtah*, or ſcriptures of the Gentoos, this writer informs ns, that *Viedam*, in the Malabar language, ſignifies the ſame as *Shaſtah* in the Samſcrit; and that the firſt book is followed by the Gentoos of the Malabar and Coromandel coaſts, and alſo of the iſland of Ceylon. The *Shaſtah* is followed by the Gentoos of the provinces of Bengal, and by all the Gentoos of the reſt of India, commonly called India Proper, along the courſe of the rivers Ganges and Jumna to the Indus. Both theſe books, he ſays, contain the inſtitutes of their reſpective religion and worſhip, as well as the hiſtory of their ancient rajahs and princes; often couched under allegory and fable: their antiquity is contended for by the partiſans of each; but he thinks, that the ſimilitude of their names, idols, and great part of their worſhip, leaves little room to doubt, nay plainly evinces, that both theſe ſcriptures were originally one. He adds, if we compare the great purity and chaſte manners of the *Shaſtah*, with the great abſurdities and impurities of the Viedam, we need not heſitate to pronounce the latter a corruption of the former.

With regard to the high original of theſe ſcriptures, the account of the Bramins is chiefly as follows. Brahma, q. d. Mighty Spirit, about four thouſand eight hundred and ſixty-ſix years ago, aſſumed the form of man, and the government of Indoſtan. He tranſlated the divine law (deſigned for the reſtoration of mankind, who had offended in a pre-exiſtent ſtate, and who are now in the laſt ſcene of probation, to the dignity from which they were degraded) out of the language of angels into the well known *Samſcrit* language, and called his tranſlation the *Chartah Bhade Shaſtah* of Birmah, or the Six Scriptures of Divine Words of the Mighty Spirit. He appointed the Bramins, deriving their name from him, to preach the word of God; and the doctrines of the *Shaſtah* were accordingly preached in their original purity a thouſand years. About this time there was publiſhed a paraphraſe on the *Chartah Bhade*: and about five hundred years afterwards, a ſecond expoſition, called the *Aughtorrah Bhade Shaſta*, or eighteen Books of Divine Words, written in a character compounded of the common Indoſtan, and the Samſcrit. This innovation produced a ſchiſm among the Gentoos; on which occaſion, it is ſaid thoſe of Coromandel and Malabar formed a ſcripture of their own, which they pretended to be found on the *Chartah Bhade* of Birmah, and called it the Viedam of Birmah, or Divine Words of the Mighty Spirit. The original *Chartah Bhade* was thrown aſide, and at length wholly unknown, except to a few families, who can ſtill read and expound it in the Samſcrit character. With the eſtabliſhment of the *Aughtorrah Bhade*, and *Viedam*, which, according to the Gentoo account, is three thouſand three hundred and ſixty-ſix years ago, their polytheiſm commenced; and the principles of religion became ſo obſcure, and their ceremonies ſo numerous, that every head of a family was obliged to keep a Bramin, as a guide both in faith and practice. Mr. Holwell is of opinion, that the *Chartah Bhade*, or original ſcriptures, are not copied from any other ſyſtem of theology, promulgated to, or obtruded upon mankind. The Gentoos do not attribute them to Zoróaſter; and Mr. Holwell ſuppoſes, that both Zoroaſter and Pythagoras viſited Indoſtan, not to inſtruct, but to be inſtructed.

From the account of Mr. Dow, we learn, that the books which contain the religion and philoſophy of the Hindoos, are diſtinguiſhed by the name of Bedas; that they are four in number, and, like the ſacred writings of other nations, ſaid to be penned by the divinity. Beda, he ſays, in the Shanſcrit language, literally ſignifies *ſcience*; and theſe books treat not only of religion and moral duties, but of every branch of philoſophic knowledge. The Bramins maintain, that the Bedas are the divine laws, which Brimha, at the creation of the world, delivered for the inſtruction of mankind; but they affirm, that their meaning was perverted in the firſt age by the ignorance and wickedneſs of ſome princes, whom they repreſent as evil ſpirits, who then haunted the earth. The firſt credible account we have of the Bedahs is, that about the commencement of the callug, of which æra the year 1768 was the 4886th year, they were written, or rather collected, by a great philoſopher, and reputed prophet, called Beaſs Muni, or Beaſs the Inſpired.

The Hindoos, ſays Mr. Dow, are divided into two great religious ſects: the followers of the doctrine of Bedang, which is the original *Shaſter*, or commentary upon the Bedas; and thoſe who adhere to the principles of the *Neadirſen*. The original *Shaſter* is called Bedang, aud is a commentary upon the Bedas. This, he ſays, is erroneouſly called, in Europe, the Viedam. It is aſcribed to Beaſs Muni, and ſaid to have been reviſed ſome years after by one Serrider Swami, ſince which it has been reckoned ſacred, and not ſubject to any farther alterations. Almoſt all the Hindoos of the Decan, and thoſe of the Malabar and Coromandel coaſts, are of this ſect. The followers of the *Bedang Shaſter* do not allow that any phyſical evil exiſts; they maintain that God created all things perfectly good, but that man, being a free agent, may be guilty of moral evil, which may be injurious to himſelf, but can be of no detriment to the general ſyſtem of nature. God, they ſay, being perfectly benevolent, never puniſhed the wicked otherwiſe than by the pain and affliction which are the natural conſequences of evil actions; and hell, therefore, is no other than a conſciouſneſs of of evil.

The *Neadirſen Shaſter* is ſaid to have been written by a philoſopher, called Goutam, near four thouſand years ago. The Bramins, from Mr. Dow's account of their ſacred books, appear to believe invariably in the unity, eternity, omniſcience, and omnipotence of God; and the polytheiſm of which they have been accuſed is no more than a ſymbolical worſhip of the divine attributes, which they divide into three claſſes. Under the name of Brimha, they worſhip the wiſdom and creative power of God; under the appellation of Biſhen, his providential and preſerving quality; and under that of Shibah, that attribute which tends to deſtroy.

According to M. de Sainte Croix, the *Shaſta*, however extolled in Europe, with reſpect to its antiquity, is poſterior to the Viedam, being no more than the explication of it. Holwell's Intereſting Hiſtorical Events, &c. 8vo. Dow's Hiſtory of Hindoſtan, 4to. 1768. L'Ezour Vedam, &c. by M. de Sainte Croix, 12mo. Paris, 1779. See GENTOOS, SHANSCRIT, and VIEDAM.

SHAVE *graſs*, in *Botany*: See HORSE-*tail*.

SHAVING-*irons*, among *Gardeners*, tools to keep a garden free from weeds, otherwiſe called *edging-irons*.

SHAUL, an article of female dreſs, much prized in the Eaſt, and now well known in England. As the *ſhauls* all come from Caſſemire, or Cachemir, it was generally concluded, that the materials from which they were fabricated was of the growth of that country. It was ſaid to be the hair of a particular goat, and the fine underhair from a camel's breaſt; but we now certainly know that it is the produce of a Thibet SHEEP. Bernier relates, that in his time, *ſhauls* made for the great omrahs of the Thibetian wool, coſt a hundred and fifty roupees; whereas thoſe made of the wool of the country never coſt more than fifty.

SHAW, in our *old Writers*, a grove of trees, or a wood.

SHAW *fowl*, an artificial fowl made for fowlers to ſhoot at.

SHEADING, a riding, tything, or diviſion, in iſle of Man; the whole iſland being divided into ſix *ſheadings*, in every one of which is a coroner, or chief conſtable, appointed by the delivery of a rod at the annual convention.

SHEAR *off*, in the *Sea Language*. See SHEERING.

SHEAR-*water*, in *Ornithology*, the *procellaria puffinus* of Linnæus, and called by ſome writers *avis* DIOMEDIS is, a bird about fifteen inches long, and thirty-one inches broad; the bill is an inch and three quarters long; the noſtrils tubular; the head, and whole upper ſide of the body, wings, tail, and, thighs, are of a ſooty blackneſs; the under ſide, from chin to tail, and inner coverts of the wings, white; the legs weak, and compreſſed ſideways; duſky behind, and whitiſh before.

Theſe birds are found in the Calf of Man, whither they reſort in February; taking poſſeſſion of the rabbit-burrows, and then diſappearing till April; the young which are fit to be taken in the beginning of Auguſt, are killed in great numbers, ſalted, and barrelled: and when boiled, eaten with potatoes. They quit the Iſle the latter end of Auguſt, or beginning of September; and there is reaſon to imagine, that, like the ſtorm-finch, they are diſperſed over the whole Atlantic ocean. In the Orkney iſles this ſpecies, called the *lyre*, is much valued for food, and for its feathers. They are taken and ſalted in Auguſt for winter proviſion. Pennant.

SHEARING. The beſt time for *ſhearing* ſheep is about the middle, or the latter end of Jnne, becauſe it is good for them to ſweat in the wool before it is cut. They muſt be very well waſhed before the *ſhearing*, for this is a great addition to the price of the wool: after the waſhing, let them go three or four days in a clean dry ground. When they are cut, the ſhearer muſt be very careful not to wound their ſkins, becauſe this gives occaſion to the flies to teaze the poor creatures in a terrible manner. Some *ſhear* their lambs, the firſt year eſpecially, behind; but before the doing of this they ought to be carefully tagged, as it is called; that is, their tails and thighs behind ſhould be well cleared of wool, that the dung may not hang there, which would elſe make them ſore, and ſubject them to the flies, which would blow them, and make them full of maggots.

In Glouceſterſhire they houſe their ſheep every night, and litter them with clean ſtraw. Their dung makes this a very good manure for the land, and the wool of the ſheep is rendered ſo much finer by it, that the farmers have a double advantage from the practice.

In Middleſex, and about London, they have Way-hill ſheep: theſe come from Hampſhire, Wiltſhire, &c. and lamb very early, before Chriſtmas.

SHEARING, in the *Woollen-Manufacture*. See SHEERING.

SHEAT, or **SHEET**, a name by which ſome call a young hog.

SHEAT-*fiſh*, in *Ichthyology*. See SILURUS.

SHEAT *of a plough*, a word uſed by our farmers to expreſs a part of a plough, paſſing through the beam, and faſtened to the ſhare. The *ſheat*, or, as it is ſometimes called, the *fore-ſheat* (there being another timber behind it, called the *hinder-ſheat*), ſhould be ſeven inches wide, and is faſtened to the beam by the retch, a piece of iron with two legs, and by a wedge driven with it, into the hole in the beam. The angle made by the *ſheat*, with the beam of the plough, ſhould be forty-two, or forty three degrees. See PLOUGH.

SHEAT, or **SHEATS**, in a *Ship*. See SHEET.

If the main-ſail-*ſheats* are haled aft, it is in order to make a ſhip keep by a wind, but when the fore-*ſheats* are haled aft, it is that the ſhip may fall off from the wind; and if ſhe will not do it readily, they then hale the fore-ſail, by the *ſheat*, flat in, as near the ſhip's ſides, as they can; and this they call *flatting in the fore-ſail*. When they ſay, *eaſe the ſheat*, they mean veer it, or let it go out gently; but when the word is, *let fly the ſheat*, they mean let it go all at once, and run out as faſt as it can; and then the ſail will hang looſe, and hold no wind. The ſeamen ſay, when they would have the *ſheats* of the main or fore-ſail haled aft, *tally the ſheats*. In a very great gale, or guſt of wind, there is another rope bent to the clews of the main-ſail and fore-ſail, above the *ſheat-block*, to ſuccour and eaſe the *ſheat*, and this they call a *falſe ſheat*.

SHEATS, in a ſhip, alſo, are thoſe planks under water which come along her run, and are cloſed into the ſtern-poſt: ſo alſo that part within board, in the run of the ſhip, is called the *ſtern-ſheats*.

SHEAT, *falſe*. See SHEATS.

SHEAT, *overhale the*, in the *Sea-Language*, a word of command to hale upon the ſtanding part of the *ſheat*.

SHEAT-*anchor*, in a ſhip. See ANCHOR.

SHEATHING *of a ſhip* is the caſing that part of her hull which is to be under water with ſomething to keep the worms from eating into her planks.

It is uſually done by laying tar and hair, mixed together, all over the old plank, and then nailing on thin new boards. But this hinders a ſhip's ſailing; and therefore of late, ſome have been ſheathed with milled lead, which is much ſmoother, and conſequently better for ſailing; and alſo more cheap and durable than the other way. It was firſt invented by ſir Philip Howard, and major Watſon.

The *ſheathing* with copper is a ſtill later invention, and anſwers better than any other.

It is very well worth the trying what the new ſtone pitch will do in this caſe; if it will defend from the worm, as perhaps it may, a ſhip might be paid with it cheaper than with the crown pitch; and it will not crack nor ſcale off, as that will do, but keeps always ſoft and ſmooth. It has been found to continue on thirteen months, and to remain very black and ſoft all the time.

SHEAVE, in *Mechanics*, a ſolid cylindrical wheel, fixed in a channel, and moveable about an axis, as being uſed to raiſe or increaſe the mechanical powers applied to remove any body.

SHEBAT, in *Chronology*, the eleventh month of the Jewiſh eccleſiaſtical year, anſwering to part of our January and February.

SHECHINAH, in the *Jewiſh Hiſtory*, the name of that miraculous light, or viſible glory, which was a ſymbol of the ſpecial preſence of the Deity. This *ſhechinah*, after it had conducted the Iſraelites through the wilderneſs, had its more ſtated reſidence in the tabernacle and the temple. See ARK *of the covenant*.

For a farther account of this miraculous phenomenon, the reader may conſult part ii. chap. 2, of Mr. Lowman's Rationale of the Hebrew Ritual.

Toland, in his Tetradymus, has attempted to prove, that this appearance had nothing miraculous in it, but was only a kind of beacon, uſed by the Iſraelites for their direction in their journey.

SHEEP, *ovis*, in the Linnæan ſyſtem of *Zoology*, makes a diſtinct genus of animals, of the order of the *pecora*. The characters by which the creatures of this genus are diſtinguiſhed from the reſt of that order, are theſe: their horns are hollow, bent backward, wreathed and crooked, and ſcabrous, not ſmooth on their outſide. They have eight cutting teeth in the lower jaw, but none in the upper, and no canine teeth.

The wool of theſe animals is only a congeries of very long and ſlender hairs, oddly twiſted and contorted, and variouſly interwoven with one another. This is a clothing peculiar to the *ſheep* kind, ſo far as is yet known, no other animal having been ſeen to poſſeſs it. It is not, however, the cloathing of all the ſpecies of *ſheep*, ſome of the diſtant nations having ſhort hair, like that of the goat.

Linnæus enumerates three ſpecies, viz. the *ovis aries*, or *ram ſheep*; the *ovis Guineenſis*, or *Guinea ſheep*; and the *ovis ſtrepſiceros*, or *Cretan ſheep*. According to Mr. Pennant, the laſt two are varieties.

The firſt ſpecies comprehends ſeveral varieties; ſuch are the *ovis ruſtica*, or common *ſheep*, with large horns, twiſting ſpirally and outwardly; the *ovis Anglica*, or hornleſs *ſheep*, with the tail and ſcrotum hanging down to the knees, this is common in many parts of England; the *ovis Hiſpanica*, or Spaniſh *ſheep*; the *ovis polycerata*, or many-horned *ſheep*, having uſually three horns, ſometimes four, and even five (this ſort of *ſheep* is very common in Ireland, in Siberia, and other parts of the North); the *ovis Africana*, or African *ſheep*, of Ray, which has ſhort hair like that of the goat (theſe are often brought into England, and ſeem in no reſpect different from ours, except in their covering); and the *ovis laticauda* or *Arabica*, or the broad-tailed *ſheep*, which is common in Syria, Barbary, and Æthiopia. The tails of theſe are ſo long as to trail upon the ground, and the ſhepherds are obliged to put boards with ſmall wheels under them, to keep them from galling. They are eſteemed a great delicacy, being of a ſubſtance between fat and marrow, and are eaten with the lean of the mutton. Some of theſe tails weigh fifty pounds each. The ſhort thick-tailed *ſheep* are common among the Tartars. The broad-tailed *ſheep* are found in the kingdom of Thibet; and their fleeces, in fineneſs, beauty, and length, are equal even to thoſe of Caramania. The Cachemirians engroſs this article, and have factors in all parts of Thibet, for buying up the wool, which they work up into SHAULS, ſuperior in elegance to thoſe that are woven from the fleeces of their own country; and this manufacture is a conſiderable ſource of wealth.

Both the broad tailed and long-tailed varieties were known to the ancients.

There is another variety, called the fat-rumped *ſheep*, without tails, with arched noſes, wattles, pendulous ears, and curled horns like the common *ſheep*. The wool is coarſe, long, and in flocks; the legs ſlender; and the head black; the ears of the ſame colour, with a bed of white, in the middle; the wool is generally white, ſometimes black, reddiſh, and even ſpotted; the buttocks appear like two hemiſpheres, quite naked and ſmooth, and compoſed only of ſuet, whence Dr. Pallas calls this variety *ovis ſteatopyges*. Theſe *ſheep* grow large, even to two hundred pounds weight, of which the poſteriors weigh forty. Their bleating is ſhort and deep, reſembling that of a calf. They abound in all the deſerts of Tartary, from the Volga to the Irtis, and the Altaic chain, inſomuch that 150,000 have been ſold annually at the Orenburg fairs. They are very prolific, and uſually bring two at a time, often three.

The *ſecond* ſpecies of Linnæus is the *ovis Guineenſis*, or African *ſheep*, commonly called the *Angola ſheep*. This ſpecies is long-legged and tall; the hinder part of the head is more prominent than that of our *ſheep*; and its ears hang down; the horns are ſmall and bending down to the eyes; and the neck adorned with a large mane; the hair of the reſt of the body is ſhort; and it has wattles on the neck. The Portugueſe call theſe *ſheep* cabritto: their fleſh is very bad food.

The *third* ſpecies is the *ovis ſtrepſiceros*, or Cretan *ſheep*, with horns quite erect, twiſted like a ſcrew, and beautifully furrowed on their outſide. This *ſheep* is common in Hungary, and large flocks are found on Mount Ida, in Crete. Ray and Pennant.

SHEEP, *wild*. See MUSIMON.

SHEEP, *bearded*. See TRAGELAPHUS.

The *ſheep* is in its nature a harmleſs and timid animal; it reſiſts by butting with its horns, and threatens by ſtamping with its foot; it generally brings one at a time, ſometimes two, rarely three, and goes about five months with young. It is ſubject to many diſeaſes, proceeding from inſects which depoſit their eggs in various parts of the animal, or from being kept in wet paſtures, for as the ſheep requires but little drink, it is naturally fond of a dry paſture. The dropſy, vertigo, phthiſic, jaundice, and worms in the liver, annually make great havock among our flocks. For the firſt diſeaſe, the ſhepherd finds a remedy by turning the infected into fields of broom. When the eggs depoſited by inſects in the frontal ſinuſes of the *ſheep* (ſee SHEEP-*noſe-worms*) turn into maggots, they become very painful, and cauſe thoſe violent agitations to which this animal is ſubject. The French ſhepherds make a common practice of eaſing the *ſheep* by trepanning and taking out the maggot: a practice ſometimes uſed by the Engliſh ſhepherds but not always with the ſame ſucceſs. The *ſheep* is alſo troubled with a kind of tick and louſe, which magpies and ſtarlings help to eaſe it of by lighting on its back, and picking off the inſects. The uſe of SALT is ſaid to preſerve *ſheep* from the ROT.

In Spain, the firſt thing the ſhepherd does when the flock returns from the ſouth to the ſummer downs, is to give them as much ſalt as they can eat: every owner allowing his flock of one thouſand *ſheep* one hundred aroves, or twenty-five quintals of ſalt which the flock eats in about five months.

The *ſheep* is an animal kept at the leaſt expence of any to the farmer, and will thrive upon almoſt any ground, and for this reaſon many prefer them before the larger cattle.

Beſides the fleece, there is ſcarce any part of this animal that is not uſeful. The fleſh is a delicate and wholeſome food. The ſkin dreſſed forms different parts of our apparel, and is uſed for covers of books. The entrails, properly prepared and twiſted, ſerve for ſtrings for various muſical inſtruments. The bones calcined form materials for teſts for the refiner. The milk is thicker than that of cows, and conſequently yields a greater quantity of butter and cheeſe. And the dung is a rich manure.

In Spain, there are two kinds of *ſheep*: the coarſe-wooled *ſheep*, which always remain in their native country, and are houſed every night in winter; and the fine-wooled *ſheep*, which are always in the open air, and travel every ſummer from the cool mountains of the northern parts of Spain, to feed in winter on the ſouthern warm plains of Andaluſia, Mancha, and Eſtramadura. Of theſe latter, it appears from accurate computations, that there are about five millions, and that the wool and fleſh of a flock of 10,000 *ſheep* produce yearly about twenty-four reals a-head, or about the value of twelve Engliſh ſix-pences, one of which belongs to the owner, three to the king, and the other eight are allowed for the expences of paſture, tythes, ſhepherds, dogs, ſalt, ſhearing, &c.

Ten thouſand *ſheep* form a flock, which is divided into ten tribes, under the management of one perſon, who has abſolute dominion over fifty ſhepherds and fifty dogs.

The beſt ſort of *ſheep* for fine wool are thoſe bred in Herefordſhire, Devonſhire, and Worceſterſhire, but they are ſmall, and black faced, and bear but a ſmall quantity.

Warwick, Leiceſterſhire, Buckingham, and Northamptonſhire, breed a large-boned *ſheep*, of the beſt ſhape and deepeſt wool we have good.

The marſhes of Lincolnſhire breed a very large kind of *ſheep*, but their wool is not good, unleſs the breed be mended by bringing in *ſheep* of other counties among them, which is a ſcheme of late very profitably followed there. In this county, it is no uncommon thing to give fifty guineas for a ram, and a guinea for the admiſſion of an ewe to one of theſe valuable males, or twenty guineas for the uſe of it for a certain number of ewes during one ſeaſon. Suffolk, alſo, breeds a very valuable kind of *ſheep*.

The northern counties in general breed *ſheep* with long, but hairy wool: however the wool which is taken from the neck and ſhoulders of the Yorkſhire *ſheep* is uſed for mixing with Spaniſh wool, in ſome of their fineſt cloths.

Wales bears a ſmall hardy kind of *ſheep*, which has the beſt taſted fleſh, but the worſt wool of all. Nevertheleſs it is of more extenſive uſe than the fineſt Segovian fleeces: for the benefit of the flannel manufacture is univerſally known.

The *ſheep* of Ireland vary like thoſe of Great Britain: thoſe of the ſouth and eaſt being large and their fleſh rank: thoſe of the north and the mountainous parts ſmall and their fleſh ſweet. The fleeces in the ſame manner differ in degrees of value.

Scotland breeds a ſmall kind, and their fleeces are coarſe.

The farmer ſhould always buy his *ſheep* from a worſe land than his own, and they ſhould be big boned, and have a long greaſy wool, curling cloſe and well. Theſe *ſheep* always breed the fineſt wool, and are alſo the moſt approved of, by the butcher, for ſale in the market.

For the choice of *ſheep* to breed, the ram muſt be young, and his ſkin of the ſame colour with his wool, for the lambs will be of the ſame colour with his ſkin. He ſhould have a large long body; a broad forehead, round, and well riſing; large eyes; and ſtraight and ſhort noſtrils. The polled *ſheep*, that is, thoſe which have no horns, are found to be the beſt breeders. The ewe ſhould have a broad back; a large bending neck; ſmall, but ſhort, clean, and nimble legs; and a thick deep wool covering her all over.

To know whether they be ſound or not, the farmer ſhould examine the wool, that none of it be wanting, and ſee that the gums be red, the teeth white and even, and the briſket-ſkin red, the wool firm, the breath ſweet, and the feet not hot. Two years old is the beſt time for beginning to breed, and their firſt lambs ſhould not be kept too long, to weaken them by ſuckling, but be ſold as ſoon as conveniently may be. They will breed advantageouſly till they are ſeven years old.

The farmers have a method of knowing the age of a *ſheep*, as a horſe's is known, by the mouth. When a *ſheep* is one ſhear, as they expreſs it, it has two broad teeth before; when it is two ſhear, it will have four; when three, ſix; and when four, eight: after this their mouths begin to break.

The difference of land makes a very great difference in the *ſheep*. The fat paſtures breed ſtraight tall *ſheep*, and the barren hills and downs breed ſquare ſhort ones; woods and mountains breed tall and ſlender *ſheep*, but the beſt of all are thoſe bred upon new ploughed-land, and dry grounds. On the contrary, all wet and moiſt lands are bad for *ſheep*, eſpecially ſuch as are ſubject to be overflowed, and to have ſand and dirt left on them. The ſalt marſhes are, however, an exception to this general rule, for their ſaltneſs makes amends for their moiſture; any thing of ſalt, by reaſon of its drying quality, being of great advantage to *ſheep*.

As to the time of putting the rams to the ewes, the farmer muſt conſider at what time of the ſpring his graſs will be fit to maintain them and their lambs, and whether he has turneps to do it till the graſs comes; for very often both the ewes and lambs are deſtroyed by the want of food; or if this does not happen, if the lambs are only ſtunted in their growth by it, it is an accident that they never recover. The ewe goes twenty weeks with lamb, and according to this it is eaſy to calculate the proper time. The beſt time for them to yean is in April, unleſs the owner has very forward graſs, or turneps, or the *ſheep* are field-*ſheep*: where you have not incloſures to keep them in, then it may be proper they ſhould yean in January, that the lambs may be ſtrong by May-day, and be able to follow the dam over the fallows and water-furrows; but then the lambs that come ſo early muſt have a great deal of care taken of them, and ſo indeed ſhould all other lambs at their firſt falling, elſe, while they are weak, the crows and magpies will peck their eyes out.

When the *ſheep* are turned into fields of wheat or rye to feed, it muſt not be too rank firſt, for if it be, it generally throws them into ſcourings. Ewes that are big ſhould be kept but bare, for it is very dangerous to them to be fat at the time of their bringing forth their young. They may be well fed indeed, like cows, a fortnight beforehand, to put them in heart. Mortimer's Huſbandry, p. 243.

The feeding *ſheep* with turneps is one great advantage to the farmers, from the crops they raiſe of them: they ſoon fatten upon them, but there is ſome difficulty in getting them to feed on them: the old ones always refuſe them at firſt, and will ſometimes faſt three or four days, till almoſt famiſhed, but the young lambs fall to at once.

The common way, in ſome places, of turning a flock of *ſheep* at large into a field of turneps, is very diſadvantageous, for they will thus deſtroy as many in a fortnight as would keep them a whole winter. There are three other ways of feeding them on this food, all of which have their ſeveral advantages.

The firſt way is to divide the land by hurdles, and allow the *ſheep* to come upon ſuch a portion only at a time as they can eat in one day, and ſo advance the hurdles farther into the ground, daily, till all be eaten. This is infinitely better than the former random method, but they never eat them clean even this way, but leave the bottoms and outſides ſcooped in the ground: the people pull up theſe, indeed, with iron crooks, and lay them before the *ſheep* again, but they are commonly ſo fouled with the creatures dung and urine, and with the dirt from their feet, that they do not care for them; they eat but little of them, and what they do does not nouriſh them like the freſh roots.

The ſecond way is by incloſing the *ſheep* in hurdles, as in the former; but in this they pull up all the turneps they ſuppoſe the *ſheep* can eat in one day, and daily remove the hurdles over the ground, whence they have pulled up the turneps: by this means there is no waſte, and leſs expence, for a perſon may in two hours pull up all thoſe turneps; the remaining ſhells of which would have employed three or four labourers a day to get up with their crooks out of the ground trodden hard by the feet of the *ſheep*; and the worſt is, that as in the method of pulling up firſt, the turneps are eat up clean, in this way, by the hook, they are waſted, the *ſheep* do not eat any great part of them, and when the ground comes to be tilled afterwards for a crop of corn, the fragments of the turneps are ſeen in ſuch quantities on the ſurface, that half the crop at leaſt ſeems to have been waſted.

The third manner is to pull up the turneps, and remove them in a cart or waggon to ſome other place, ſpreading them on a freſh place every day; by this method the *ſheep* will eat them up clean, both root and leaves. The great advantage of this method is when there is a land not far off which wants dung more than that where the turneps grew, which perhaps is alſo too wet for the *ſheep* in winter, and then the turneps will, by the too great moiſture and dirt of the ſoil, ſometimes ſpoil the *ſheep*, and give them the rot. Yet ſuch ground will often bring forth more, and larger turneps than dry land, and when they are carried off, and eaten by the *ſheep* on ploughed land, in dry weather, and on green ſward in wet weather, the *ſheep* will ſucceed much the better; and the moiſt ſoil, where the turneps grew, not being trodden by the *ſheep*, will be much fitter for a crop of corn, than if they had been fed with turneps on it. The expence of hurdles, and the trouble of moving them, are ſaved in this caſe, which will counterbalance at leaſt the expence of pulling the turneps, and carrying them to the places where they are to be eaten. They muſt always be carried off for oxen.—Tull's Horſehoeing Huſbandry.

Sheep, *folding of*, a term uſed by our farmers to expreſs the keeping theſe creatures on their arable lands, within folds made of hurdles, which they remove about, ſo that when the *ſheep* have dunged one place, they are ſet upon another.

This is a very great advantage to the land; the dung of theſe creatures being a very rich manure. It ought only to be done in ſummer time and in good weather, for the folding them in bad weather is apt to give them the rot. Care muſt be taken that they are only driven into theſe folds over night, and let out again in the morning, half an hour after ſun-riſe, into places where there is good food; for being hungry at this time they will eat whatever comes next them. Many *ſheep* are ruined by this practice in moiſt ground, and ſome farmers, who think all folding very bad for *ſheep*, only ſtick up ſloping ſtakes in ſuch parts of the land as they would have dunged, and never fold the *ſheep* at all, but truſt to their coming to theſe ſtakes to rub themſelves for the dunging the ground, as they conſtantly void their dung and urine at that time. Mortimer.

Sheep, *compoſition for marking*. Dr. Lewis recommends for this purpoſe melted tallow, with ſo much charcoal, in fine powder, ſtirred into it as is ſufficient to make it of a full black colour, and of a thick conſiſtence. This mixture, being applied warm, with a marking iron, on pieces of flannel, quickly fixed or hardened, bore moderate rubbing, reſiſted the ſun and rain, and yet could be waſhed out freely, with ſoap, or ley, or ſtale urine. In order to render it ſtill more durable, and prevent its being rubbed off, with the tallow may be melted an eighth, ſixth, or fourth of its weight of tar, which will readily waſh out along with it from the wool. Lewis's Com. Phil. Techn. p. 361.

Sheep's *dung*. This is one of the beſt manures we know. It ſucceeds better upon cold clayey lands than any other dung whatever: but as it is not ſo conveniently to be collected as the dung of larger animals, it is commonly conveyed to the land it is intended for, by folding the *ſheep* upon it. The urine, as well as the dung, is thus given to the land, and is of very great advantage: but the farmer always ſhould plough in this ſort of manure as ſoon as he can, for the ſun ſoon robs it of a great part of its virtue.

In Northamptonſhire they begin to fold the *ſheep* upon the lands that they would dung by them after the month of July, and the drier the lands are the later they fold them.

In Flanders they make many thouſand loads of manure annually from their *ſheep*; they cover the bottom of the folds conſiderably deep with ſome light and ſpungy earth, and when this has received the dung and urine of the animals for ſeven or eight days, they remove it, and lay freſh in its place: the earth, thus impregnated, becomes an excellent improvement to land, and they raiſe large crops by means of it, in places where very little could be expected without it.

In England, we have a contrivance like this, which is the covering the bottoms of the folds deep with ſand, and changing it once a week, or thereabouts. This is a kind of manure finely calculated for clayey lands, both the ſand, and this peculiar kind of dung, being appropriated things for it. Mortimer. See Dung.

Sheep-*noſe-worms*, in *Natural Hiſtory*, a ſpecies of fly-worm, found in the noſes of *ſheep*, goats, and ſtags, and produced there from the egg of a large two-winged fly. The frontal ſinuſes above the noſe in *ſheep*, and other animals, are the places where theſe worms live, and attain their full growth. Theſe ſinuſes are always full of a ſoft white matter, which furniſhes theſe worms with a proper nouriſhment, and are ſufficiently large for their habitation; and when they have here acquired their deſtined growth, in which they are fit to undergo their changes for the fly-ſtate, they leave their old habitation, and, falling to the earth, bury themſelves there; and when theſe are hatched into flies, the female, when ſhe has been impregnated by the male, knows that the noſe of a *ſheep*, or other animal, is the only place for her to depoſit her eggs, in order to their coming to maturity. Mr. Valliſnieri, to whom the world owes ſo many diſcoveries in the inſect claſs, is the firſt who has given any true account of the origin of theſe worms. But though their true hiſtory had been, till that time, unknown, the creatures themſelves were very early diſcovered, and many ages ſince were eſteemed great medicines in epilepſies.

The fly, produced from this worm, has all the time of its life a very lazy diſpoſition, and does not like to make any uſe either of its legs or wings. Its head and corcelet together are about as long as its body, which is compoſed of five rings, ſtreaked on the back; a pale yellow and brown are there diſpoſed in irregular ſpots; the belly is of the ſame colours, but they are there more regularly diſpoſed, for the brown here makes three lines, one in the middle, and one on each ſide, and all the intermediate ſpaces are yellow; the wings are nearly of the ſame length with the body, and are a little inclined in their poſition, ſo as to lie upon the body, they do not, however, cover it, but a naked ſpace is left between them; the ailerons, or petty wings which are found under each of the wings, are of a whitiſh colour, and perfectly cover the balancers, ſo that they are not to be ſeen without lifting up theſe.

The fly will live two months after it is firſt produced, but will take no nouriſhment of any kind; and poſſibly it may be of the ſame nature with the butterflies, which never take any food during the whole time of their living in that ſtate. Reaumur. Hiſt. Inſ. vol. iv. p. 552, &c.

Sheep-*ſcabious*, in *Botany*. See Jasione.

Sheep-*ſhank*, in *Sea Language*, is a ſort of knot, or hitch, caſt on a rope, to ſhorten it as occaſion requires; particularly to increaſe the ſweep or length of a tackle, by contracting its runner. By this contrivance the body, to which the tackle is applied, may be hoiſted much higher, or removed much farther, in a ſhorter time. Falconer.

Sheep-*ſtealing* is now made felony without benefit of clergy. See Cattle.

By an ancient ſtatute, no perſon ſhall keep, at one time, above two thouſand *ſheep*; but lambs are not to be accounted *ſheep* till they are a year old. 25 Hen. VIII. cap. 13. Perſons exporting *ſheep* ſhall forfeit them, and 20s. for every *ſheep*. &c. 12 Car. II. cap. 32. And perſons in the counties of Kent and Suſſex, within ten miles of the ſea, are to give an account, in writing, after *ſheep*-ſhearing, of the number of fleeces, to the next officer of the cuſtoms, &c. 9 & 10 W. III. cap. 40. See Wool.

SHEER, in reference to a ſhip, denotes the longitudinal curve of her deck or ſides.

SHEERS, aboard a ſhip, a name given to an engine uſed to hoiſt or diſplace the lower maſts of a ſhip.

The *ſheers* employed for this purpoſe, in the royal navy, are compoſed of ſeveral long maſts, whoſe heels reſt upon the ſide of the hulk, and having their heads declining outward from the perpendicular, ſo as to hang over the veſſel whoſe maſts are to be fixed or diſplaced. The tackles, which extend from the head of the maſt to the *ſheer*-heads, are intended to pull in the latter toward the maſt-head, particularly when they are charged with the weight of a maſt after it is raiſed out of any ſhip, which is performed by ſtrong tackles, depending from the *ſheer*-heads. The effort of theſe tackles is produced by two capſterns, fixed on the deck for this purpoſe.

In merchant ſhips this machine is compoſed of two maſts, or props, erected in the ſame veſſel wherein the maſt is to be planted, or from whence it is to be removed. The lower ends of theſe props reſt on the oppoſite ſides of the deck, and their upper parts are faſtened acroſs, ſo as that a tackle, which hangs from the interſection, may be almoſt perpendicularly above the ſtation of the maſt, to which the mechanical powers are applied. Theſe *ſheers* are ſecured by ſtays, which extend forward and aft to the oppoſite extremities of the veſſel. Falconer.

Sheer-*hooks*, or **Shear**-*hooks*, are large iron hooks, uſed when a ſhip deſigns to board another.

Sheer-*rail*. See Rail.

Sheer-*water*, in *Ornithology*. See Shear-*water*.

SHEERING, or **Shearing**, in the *Woollen Manufactures*, the clothworker or ſheerman's craft, or office; or the cutting off, with large ſheers, the too long and ſuperfluous knap, or ſhag, found on the ſurface of woollen ſtuff, fuſtians, cottons, &c. in order to make them more ſmooth and even.

Stuffs are ſhorn more or fewer times, according to their quality and fineneſs.

Some uſe the phraſe *ſheering of hats*, for the paſſing of hats made of wool over the flame of a clear fire made of ſtraw, or ſpray, to take off the long hairs: others call this *flaming*, and others *ſinging*. Other hats, as caſtors, ſemicaſtors, &c. are ſhorn, by rubbing them over with pumice ſtone. See Hat.

Sheering, or **Shearing**, is alſo a *Sea Term*, for the motion of a ſhip, when ſhe deviates from the line of the courſe, either to the right or left, ſo as to form a crooked and irregular path through the water, either by reaſon that ſhe is not ſteered ſteadily, or on account of the ſwift running of the tide, &c. in which caſe ſhe is ſaid to ſheer, or go a *ſheering*. Hence to *ſheer off*, is to remove to a greater diſtance.

When ſhe lies at anchor, near port, &c. by reaſon of the ſwift-running of the tide-gate, &c. ſhe is often ſaid to be in danger of *ſheering home her anchor*, or *ſheering aſhore*. See Chest *rope*.

SHEET, in the *Manege*. See Caparason.

Sheet, in *Sea Language*, a rope faſtened to one or both the lower corners of a ſail, to extend and retain it in a particular ſtation. When a ſhip ſails with a lateral wind, the lower corner of the main and fore-ſail are faſtened by a tack and a *ſheet*; the former being to windward, and the latter to leeward; the tack, however, is entirely diſuſed with a ſtern wind, whereas the *ſail* is never ſpread without the aſſiſtance of one or both of the *ſheets*. The ſtay-ſails and ſtudding-ſails have only one tack, and one *ſheet* each: the ſtay-ſail tacks are always faſtened forward, and the *ſheet* drawn aft; but the ſtudding-ſail tack draws the under clue of the ſail to the extremity of the boom, whereas the *ſheet* is employed to extend the inmoſt. Falconer. See Sheats.

Sheet, *to hale home the*. See Home.

Sheet-*anchor*. See Anchor.

Sheet-*nails*. See Nail.

SHEIK, in the *Oriental Cuſtoms*, the perſon who has the care of the moſques in Egypt: his duty is the ſame as that of the imams at Conſtantinople. There are more or fewer of theſe to every moſque, according to its ſize or revenues. One of theſe is head over the reſt, and anſwers to a pariſh-prieſt with us, and has under him, in large moſques, the readers and people who cry out to go to prayers; but in ſmall moſques the *ſheik* is obliged to do all this himſelf. In ſuch it is their buſineſs to open the moſque, to cry to prayers, and to begin their ſhort devotions at the head of the congregation, who ſtand rank and file in great order, and make all their motions together. Every Friday the *ſheik* makes an harangue to his congregation. Pococke's Egypt, p. 171.

Sheik-*bellet*, the name of an officer in the Oriental nations.

In Egypt the *ſheik-bellet* is the head of a city, and is appointed by the paſha. The buſineſs of this officer is to take care that no innovation be made, which may be prejudicial to the Porte, and that they ſend no orders which may hurt the liberties of the people. But all his authority depends on his credit and intereſt, not his office: for the government of Egypt is of ſuch a kind, that often the people of the leaſt power by their poſts have the greateſt influence; and a caia of the janizaries, or Arabs, and ſometimes one of their meaneſt officers, an oda-baſha, finds means, by his parts, and abilities, to govern all things. Pococke's Egypt, p. 161.

SHEKEL, **Shekle**, **Sheckle**, **Siclus**, an ancient Hebrew coin, equal to four Attic drachmas, to four Roman denarii, or 2*s*. 9½*d* ſterling. See Denarius.

In the Bible, the *ſhekel* is ſometimes alſo rendered *ſolidus*, and ſometimes *ſtater*.

The Jewiſh doctors are in great doubt about the weight of the *ſhekel*; and it is only by conjecture, and by the weight of the modern *ſhekel*, that the ancient one is judged equal to four Attic drachmas.

Father Souciet has deſcribed ſeveral of theſe *ſhekels* in his diſſertation on the Hebrew medals. By the way he obſerves, that the third and fourth parts of a *ſhekel*, deſcribed by Waſerus, de Ant. Num. Heb. are counterfeits of that author.

The Hebrew *ſhekel*, according to F. Merſenne, weighs 268 grains, and is compoſed of 20 oboli, each obolus weighing 16 grains of wheat. This, he ſays, is the juſt weight, as he found by weighing one in the French king's cabinet. He adds, that ſuch as come ſhort of this weight have been filed or clipped. Biſhop Cumberland tells us, he has weighed ſeveral, and always found them near the weight of a Roman ſemuncia, or half ounce.

Some are of opinion, that the Hebrews had two kinds of *ſhekels*: the *common*, or *profane ſhekel*, called *didrachma*; and the *ſhekel of the ſanctuary*; which laſt they will have to be double the former. By this expedient they think we may get clear of ſome difficulties occurring in Scripture, where things are mentioned as of incredible weight; particularly that paſſage where it is ſaid, that every time Abſalom cut off his hair, the weight whereof uſed to incommode him, he cut off the weight of two hundred *ſhekels*.

But Villalpandus will not hear of ſuch a diſtinction; nor do biſhop Cumberland, M. Morin, Greaves, &c. take the opinion to have any foundation. The *profane ſhekel*, or *ſhekel* of four drachmas, they agree, was the ſame with the *ſacred ſhekel*; and it was only called by this laſt name, becauſe the ſtandard thereof was kept in the ſanctuary by the prieſts.

Greaves apprehends, that the τριακοντα αργυρια, or 30 pieces of ſilver, which were given to Judas, as the reward of his treaſon, were 30 *ſhekels*. Some modern writers, he ſays, imagine they were 30 denarii, and others, that they were *triginta libræ*, or *triginta talenta*: Greaves's Works, vol. i. p. 257, note *n*.

It is maintained by ſeveral, that the Jews had alſo a gold *ſhekel*, *ſiclus aureus*, of the ſame weight with the ſilver one; and valued at 1*l*. 16*s*. 6*d*. ſterling.

The *ſhekel* is ſuppoſed to have been firſt ſtruck in the deſert, on the footing of 100 to the Attic mina, weighing 160 grains of wheat, and current for 10 geratis, or oboli; but that afterwards they were ſtruck of double that weight.

Some will have the *ſhekel* to be the oldeſt piece of money in the world, as being in uſe in Abraham's time; but this was not coined, or ſtamped, nor had any other value beſides its intrinſic worth.

Xenophon mentions *ſhekels* as current in Arabia; and Du-Cange ſpeaks of others ſtruck and current in England.

SHELDAFLE, a name uſed in ſeveral parts of the kingdom for the chaffinch.

SHELF, a term uſed by the miners in many parts of England, to expreſs a diſtinction of the inner ſtructure of the earth, ſo little known to philoſophers, that they have no word to expreſs it by. Theſe workmen ſometimes alſo expreſs it by the term *faſt ground*, or *faſt country*. What they mean by this, is, that part of the earth, which they find lying even, and in an orderly manner, and evidently having attained its primitive form and ſituation, unmoved by the waters of the general deluge, while the circumjacent, and upper ſtrata, have plainly been removed, and toſſed about.

It is evident to reaſon, that there muſt have been a very violent concuſſion of the ſuperficial part of the earth, in the time of its being covered by the waters of the deluge; and experience as much evinces this as reaſon. Before this concuſſion it appears probable, that the uppermoſt ſurface of mineral veins, or loads, did in moſt places lie even with the then ſurface of the earth. The remains of this ſurface, found at different depths in digging, the miners expreſs by the word *ſhelf*.

In this concuſſion of the waters covering the whole earth, its natural ſurface, together with the uppermoſt ſurface of thoſe mineral veins, were then in many places looſened, and torn off; and the earth, and with it the mineral nodules, called *ſhoad-ſtones*, were carried down with the deſcending waters from hills into the adjacent valleys, and ſometimes into the ſtreams of rivers, by which they were waſhed to yet greater diſtances from their original place. On this depends the method of training mines. Phil. Tranſ. Nº 69. See Training.

SHELL, *teſta*, in *Natural Hiſtory*, a hard calcareous cruſt, ſerving to cover and incloſe a kind of animal, hence called Testaceous.

Shells, *formation of*. Naturaliſts have been generally miſtaken as to the manner of the formation of *ſhells*. The animal and its *ſhell* have been always ſuppoſed to ariſe wholly from the egg; but M. Reaumur has ſhewn the ſuppoſition to be falſe. He has found, by certain experiments, that the *ſhells* of garden-ſnails are formed of a matter which perſpires from their bodies, and hardens and condenſes in the air.

It is certain that all animals perſpire, and are encompaſſed with a kind of cloud, or atmoſphere, which exhales from them, and, in all probability, aſſumes, pretty nearly, their external figure. Snails have nothing peculiar in this reſpect, unleſs that the atmoſphere of their perſpiration condenſes and hardens about them, and forms a viſible cover, whereof the body is the mould, or model, whereas that of other animals is evaporated and loſt in the air. This difference ariſes from the different ſubſtance perſpired; that coming from ſnails being viſcous and ſtony. This is no ſuppoſition, but a matter of fact, which M. Reaumur has well proved by experiments.

On this principle, though the *ſhell* ſerve the animal as an univerſal bone, yet it does not grow like a bone, nor like any of the other parts, by nutrition; that is, by a juice circulating within itſelf; but by an external addition of parts laid one over another; as is commonly ſuppoſed the manner of the growth of ſtones.

But to conſider the thing more particularly, it is to be remembered, that the ſnail's head is always at the aperture of the *ſhell*, and its tail in the tip or point of the *ſhell*; and that its body is naturally turned into a ſpiral form; the different ſpires or circumvolutions whereof are in different planes. This ſuppoſed, take the ſnail juſt hatched; as the matter it perſpires petrifies around it, there muſt be firſt formed a little cover, proportioned to the bigneſs of its body; and, as its body is yet too little to make a circumvolution of a ſpiral, at leaſt a whole one, this cover will only be the centre, or, at moſt, the firſt beginning of a little circle of a ſpiral. But the animal grows: if, then, it ceaſed to perſpire, it is evident all that is added to its body would remain naked; but as it continues to perſpire, it makes itſelf a cover in proportion as it needs it. Thus is an entire circumvolution of a ſpiral formed; and thus is a ſecond and a third; and ſtill every new ſpire is bigger than the laſt; in regard the animal grows in thickneſs at the ſame time as it grows in length. When the animal ceaſes to grow, yet it does not ceaſe to perſpire; and, accordingly, the *ſhell* continues to grow thicker, though not longer. See this ſubject farther traced in Mem. Acad. Par. 1709.

The durable hardneſs and excellent poliſh of many of the *ſhells* of ſea fiſhes, and that even in the thinneſt and tendereſt kinds, is a thing very amazing. In the ruins of the abbey of St. Edmondſbury, which is built of a kind of ſtone compoſed of grit, or ſand, interſperſed with an infinite variety of very minute *ſhells*, principally of the ſmall ſmooth cockle kind, Mr. Collinſon obſerved, that the ſtone having ſuffered greatly by the injuries of the air, the grit or ſand of which it was compoſed had diſunited and mouldered away, while the ſmalleſt of theſe *ſhells* ſtood the ſame injurious accidents unaltered, and were found ſtanding forth in the utmoſt perfection, and with all their beautiful natural poliſh; yet theſe are as thin and tender *ſhells* as almoſt any of the ſame ſize that we know of.

It is poſſible, indeed, that theſe *ſhells* might have been altered in their nature, by the inſinuation of ſtony matter into their pores, as is a common caſe in *ſhells* lodged in ſtone; but thoſe, here mentioned, did not ſeem to have undergone any ſuch alteration; and it is very certain, that many of the like thin and tender *ſhells* are found preſerved through a long ſeries of ages, in places where they have been in the way of no ſuch alterations from the inſinuation of ſtony matter into their pores, and out of which they are taken fair and beautiful, and with all their natural poliſh, though not at all hardened in the time. Of this kind are the *ſhells* of the tender buccinums, and other thin kinds, found buried in earth, in the ſtrata of marle, clay, or loam, and even in chalk. As hard as theſe *ſhells* naturally are, they do not, however, preſerve the fiſh, which inhabit them, from becoming the food of others, which ſeem to have no organs with which to break them. It is common to ſee the ſoal-fiſh with its belly prominent and hard, as if well filled with ſpawn, and yet when opened to find no ſpawn at all; but the prominence and hardneſs are occaſioned by the ſtomach and guts being filled with *ſhell*-fiſh, which the creature had ſwallowed whole, as food, without having any power of breaking or deſtroying them. A ſmall ſpecies of pectunculus, or cockle, is the fiſh that the ſoal uſually feeds upon; and when the guts are taken out of this fiſh, they often reſemble ſo many ſtrings of necklaces, from the continued ſeries of theſe *ſhells* which appear prominent in them. When theſe *ſhells* are taken out, many of them are uſually found in part diſſolved, and many entire and unaltered.

Shell-fiſh are well known to be the food of ſome other fiſhes of the larger kinds, particularly the ſea-porcupine, and a kind of the wray-fiſh, are known principally to feed upon them; but theſe fiſh are provided by nature with ſuitable apparatus fitted for the grinding or reducing them into a ſtate more proper for digeſtion; their jaws being furniſhed with bony ſubſtances, extending to the palate and under part of the mouth, which are capable of reducing much ſtronger *ſhells* than theſe into an abſolute pulp. The ſoal-fiſh has no apparatus of this kind, and neither its jaws nor ſtomach are furniſhed with any thing capable of wearing them to pieces by attrition; but what appears to be the caſe, is, that nature has furniſhed this creature with a menſtruum in the body capable of digeſting them. Philoſ. Tranſ. N° 473, p. 39.

The crab, like the lobſter, &c. caſts its *ſhell* once every year. Againſt this extraordinary event, the creature always chooſes a cloſe and well ſecured retreat, in the cavities of rocks, or under great ſtones; there they creep in, and wait till all the parts are by degrees diſengaged, which is effected by withdrawing their legs from their old *ſhells*, and leaving them and the upper part of their body-*ſhell* behind. In this naked ſtate they make a very ſtrange appearance, being a mere ill-ſhapen lump of fleſhy matter, covered with a ſort of jelly; this by degrees hardens into a *ſhell*, a degree larger than the old one caſt off.

Shells, *ſyſtems of*. *Shells*, *conchæ*, and *cochleæ*, make a conſiderable article in the cabinets of the curious; and the ſtudy of them, as well as of the animals they contain, is a branch of natural hiſtory, which writers on this ſubject have denominated *conchology* and *conchyliology*.— In Aldrovand, Geſner, and Fabius Columna, we have all that the ancients have ſaid on the ſubject of *ſhells*.— The firſt writer among the moderns, who wrote profeſſedly on this ſubject, is Buonanni, who printed an Italian work, intitled Ricreazione dell' Occhio, &c. at Rome, in 1681. A Latin tranſlation of this work, with additions, was publiſhed, by the author, in 1684. However J. Daniel Major, a phyſician, of Kiel, in Holſtein, was the firſt who formed a method of *ſhells*, publiſhed in his edition of Columna's Opuſculum de Purpura, with Annotations, in 1675.

In the year 1678, Dr. Liſter publiſhed his Hiſt. Anim. Angliæ, in which he deſcribes the Engliſh *ſhells*, and illuſtrates them with figures: but his more valuable work on this ſubject is his Hiſtoria Conchyliorum, publiſhed in folio, at different times, from 1685 to 1692. In enumerating and repreſenting the various kinds of *ſhells*, he diſtributes them into four claſſes. Under the firſt claſs he ranges the terreſtrial or land *ſhells*; in the ſecond, the freſh-water *ſhells*, both thoſe called *turbinata* and the *bivalvia*; in the third, he diſpoſes all the ſea *ſhells*, the *bivalvia* and *multivalvia*; and in the fourth, he diſtributes into ſeveral claſſes thoſe ſea *ſhells* called *turbinata*.

Rumphius, in his Rarity Chamber of Amboyna, fol. printed firſt, in Dutch, at Amſterdam, in 1705, again in 1711, and again in 1745; and printed, in German, at Vienna, in 1766, adopts the three diviſions of the ſimple and turbinated univalves, and the bivalves; blending the multivalves with the other diviſions.

Langius, a phyſician, of Lucerne, in Switzerland, publiſhed, in 1722, a new and eaſy method of *ſhells*, diſpoſed in their proper claſſes, genera, and ſpecies. He follows the general diſtribution of Rumphius.

The next writer of any note, not to mention Breynius, de Polythalamis, printed at Dantzick, in 1732, nor Plancus, de Conchis Ariminenſibus minus notis, printed at Venice, in 1739, is M. d'Argenville, who publiſhed la Conchyliologie, at Paris, in 1742, and again in 1757. This author, of whoſe work and ſyſtem we ſhall here ſubjoin a particular account, has prefixed a preliminary diſcourſe on the formation of *ſhells*, the different methods of arrangement, the manner of cleaning them, and their uſes; and alſo on foſſil *ſhells*, and their origin; and an account of the principal muſea of Natural Hiſtory now in being. The other part of his work contains a hiſtory of *ſhells*, ranged in their reſpective claſſes, with proper tables, characters, indexes, and remarks: the whole illuſtrated by a number of plates.

M. d'Argenville throws aſide the vulgar diſtinction of *ſhells*, into the ſea, freſh-water, and land kinds, and very judiciouſly arranges all under the ſame claſs, which have the ſame general characters.

Shells, he obſerves, are all naturally to be arranged under three principal claſſes; theſe will contain all the ſpecies, and are afterwards to be divided into a number of families, or genera, and under theſe the ſeveral ſpecies regularly recounted; and at the end of each deſcription, the varieties may be added.

The firſt general claſs of *ſhells* contains thoſe which are found all of one piece, or have only one *ſhell*, not a pair. Theſe have been called by the Greeks *monothyræ*, and by the Latin authors *univalvia*, *univalves*.

The ſecond general claſs contains thoſe *ſhells* which are of two pieces, called *bivalves*, ſuch as oyſters, cockles, and the like. See *Tab. of Shells*, paſſim.

The third claſs contains thoſe which are compoſed of more than two pieces. Theſe are called *multivalves*; and of this kind are the pholas and balanus.

This method takes in the freſh-water *ſhells*, as well as thoſe of the ſea; and as thoſe hitherto known are all of one or other of the firſt claſſes, their ſeveral ſpecies will be compriſed among, or after the ſea *ſhells* of each of thoſe claſſes.

The land *ſhells* are of two kinds, the recent and the foſſile; the firſt kind, as far as hitherto known, are all univalves, and the latter are of all the three claſſes.

As each of theſe general claſſes contains a very great number of ſpecies, it may ſeem difficult to enter on this ſtudy, from the multiplicity of the bodies; but method renders all this eaſy, and it is no way difficult, in the following manner, to find of what claſs, what family, and what genus any given *ſhell* is, from a bare inſpection. The *ſhell* is firſt to be examined, to ſee whether it is compoſed of one, two, or more pieces. If it is found to conſiſt only of one piece, it is known thence to belong to the claſs of univalves; if of two, to the bivalves; and if of more, to the multivalves. When it is thus referred to its proper claſs, its family and genus will be found by farther examination of its general form, and the ſhape of its mouth, or aperture.

SHELLS, *univalve*, are thoſe which conſiſt only of one piece, not of two or more joined together. Of theſe univalve *ſhells* nature affords a very great variety; ſo that they are aptly diſtributed by this writer into fifteen diſtinct genera, or families. Theſe are, 1. The *patellæ*, or limpets. 2. The *patella plana*, called alſo *auris marina*, the ear-*ſhell*. 3. The *canales*, or *tubuli marini*, the ſea-tubes. 4. The *lunares cochleæ*, or round-mouthed ſnails. 5. The *cochleæ ſemilunares*, or ſnails with ſemicircular mouths. 6. The *cochleæ ore depreſſo*, or flat-mouthed ſnails. 7. The *naviculæ*, or boat-*ſhells*, commonly called *nautili*, or *nautilus*. 8. The *buccina*, or trumpet-*ſhells*. 9. The *turbines*. 10. The *volutæ*. 11. The *rhombi*. 12. The *murices*. 13. The *purpuræ*. 14. The *conchæ globoſæ*. And, 15. the *porcellanæ*. Each of which ſee under its proper head.

As ſoon as a given *ſhell* is found to be univalve, the genera of that claſs are to be uſed in compariſon with it, in order to ſee to which of them it belongs. If it has no turn or twiſt, but forms one ſimple figure, approaching to a cone, and pointed at the top, in the manner of the common limpet, or patella, it is known to be of the family of the *patellæ*; the character of which is to have only one valve, and that fixed in its natural ſtate to a ſtone, or other hard body, and of a flatted ſhape, though elevated into a ſort of point in the middle. If the *ſhell* be not conic, but extremely flat, and ſomewhat of the ſhape of a man's ear, it is of the ſecond family of the *aures marinæ*, diſtinguiſhed by the epithet *planæ*, flat or plane. If it forms a tube or pipe, it is of the nature of the common *tubuli marini*, and is of that family. If, on the other hand, it reſembles a ſort of veſſel or boat, it is of the *nautilus* claſs, and belongs to the *naviculæ*.

Theſe are the diſtinctions, if it be plain, and without turnings; but if it hath ſeveral twiſts, or wreaths, its aperture, commonly called the mouth, is to be examined, for this forms, in this caſe, the generical character. If the mouth be exactly round, the *ſhell* is of that family of the *cochleæ*, or ſnails, called by the ancients *lunares*. If it be of a ſemicircular figure, it is of that family of ſnails called *ſemilunares*; under which family are compriſed the *neritæ*, as one genus.

If the *ſhell* approaches to a conic figure, and grows larger at the baſe, and has a flatted or oval mouth, it is of a ſeventh order of *cochleæ*, or ſnails, diſtinguiſhed by the title *cochleæ ore depreſſo*.

If the *ſhell* hath the exterior figure of a trumpet, and has a large tail, it belongs to the family of the *buccina*; of which, however, it is to be remarked, that there are ſome ſpecies which have not long tails: in this diſtinction we alſo have recourſe to the mouth, which is larger than that of the murex, leſs long, and its lower part is formed into a crooked beak. Theſe are the eſſential characters which diſtinguiſh this family of *ſhells*; a family, concerning which there is great confuſion among authors.

If the baſe of the *ſhell* be ſmall, and the whole diminiſh gradually in ſize from this to the end, which is pointed, then the *ſhell* is of the family of the *turbines*. If a *ſhell* forms a cone, or cornet, there is no occaſion to look at the mouth, this figure alone determines it to be a *voluta*; and if one of its extremities is nearly as large as the other, it is then a rhombus. This genus of *ſhells* has been called *cylindri*, by the Latins, and *rouleaux*, by the French. When this rhombus, or cylinder, has a pointed baſe, frequently ornamented alſo with ſeveral ſmall eminences; and when its middle is large, and is in the ſame manner ſurrounded with tubercles, and its head is elongated by ſeveral turns, and its mouth of an oblong figure, and furniſhed with teeth; and when, as is often the caſe, there is an excreſcence of the plate that covers the mouth, called by authors an *ala*, or wing, this *ſhell* muſt be placed among the family of the *murex*, or, as the French call it, the *rocher*.

The *purpura* is diſtinctly not a ſynonymous term with the precedent, but expreſſes ſuch a *ſhell* which, inſtead of being furniſhed with points, is cut and curled from top to bottom, in the manner of leaves of our curled cabbages, or of the endive raiſed for ſallads. The body in this genus is alſo more compact, and more detached from the other parts than in the other genera of this kind, and the mouth is uſually ſmall and round, and the tail long and crooked, furniſhed with long points, and hollowed within in form of a pipe.

If the *ſhell* is round, it belongs to that family of *ſhell* fiſh, called, from their figure, *globoſæ*, and in French *tonneaux*. It is to be obſerved, however, that all *ſhells*, which appear at firſt ſight of a rounded figure, are not to be placed at once in this family; for the helmet *ſhell*, for inſtance, which appears roundiſh, though ſomewhat triangular, is not to be ſuppoſed of this family, but is a murex. The ſummit of the head, and the little tuberoſities, on this occaſion, give the eſſential character, and point out its proper genus: for the *ſhells* of the globoſe kind are truly of a ſpherical figure; they are inflatted in the middle, have no tubercles on the head, and have a large and hollowed mouth, but no teeth.

The laſt family of the univalves is the porcelain, or *concha veneris*, a genus ſo well known, that it needs no particular deſcription. Sometimes at the ſummit of this *ſhell* there is a ſmall ſpiral, and ſometimes its opening is not exactly in the middle. Some are light and thin, others very thick and hard: but theſe are only varieties of the ſame genus, the proper family of the *ſhell* being always thus determined by the mouth.

SHELLS, *bivalve*. The former are all the genera of the *ſhells* compoſed of one piece, and thence called univalves: and as any given *ſhell* may, by the characters given of each, be eaſily referred to that to which it belongs, ſo, in regard to the bivalves, the taſk is not more arduous, when entered on upon the ſame principles; and it is the eaſier in this reſpect, that the families of this claſs are much leſs numerous than thoſe of the other, theſe being only ſix. The firſt genus, or family, of the bivalves, is that of the *oyſter*, *oſtrea*. The variety in this one genus is almoſt infinite, and is extremely agreeable. Some are echinated ſo as to repreſent the echini; others have excreſcences of parts in undulatory, or jagged forms, repreſenting the ears of animals, or the comb of a cock; and others form themſelves into very remarkable figures, by adhering and growing to trees, ſtones, corals, or other ſubſtances, either naturally growing in the ſea, or ſuch as have accidently fallen into it.—Sometimes alſo, the upper *ſhell* in an oyſter is ſmaller and flatter than the under one. Theſe, however, are all trifling varieties, and the *ſhells* are ſtill of the oyſter kind.

When the bivalve *ſhell*, under examination, differs from the oyſter kind, in being more elevated in the middle, and equally convex, or nearly ſo, in both *ſhells*, then it belongs to the family under the name of *chamæ*. Theſe differ alſo from oyſters, in that they are more ſmooth on the ſurface, and they often do not cloſe ſo evenly and regularly at the mouth, whence ſome have called them *conchylia ore patulo, et hianti*.

The third family is that of the *muſcles*. Theſe are all of the general ſhape of the common muſcle, and are thence eaſily known. It is to be obſerved, however, that ſome of them are equal at both ends; theſe are called *tellinæ*: and ſome others are extremely long at one end, and broad and ſhort at the other: theſe are called *pinnæ marinæ*.

The fourth genus, or family, is the cordiform kind, called in French *cœurs*. The eſſential character of this family is, that the *ſhells* are of a roundiſh elevated figure, and that they have no ears, as the pectens have, and they always repreſent the figure of a heart, in whatever view they are taken; though this is ſometimes of a triangular figure. Moſt of the ſpecies of this family, as well as of the following one of the pectens, are ſtriated.

The fifth family of the bivalves is that of the *pectens*, or ſcollop *ſhells*. Among theſe, ſome have two ears at the head of the *ſhell*; others have only one ear; and others have none at all. Some ſpecies are deeply furrowed, and others are full of protuberances. The general character of the pectens is to have the upper *ſhell* plain, and the under one ſomewhat hollow; and the ears are alſo a very obvious character in thoſe that have them.

The ſixth and laſt family of the bivalves is the *ſolen*, or razor-fiſh, called by the French *manche de couteau*. Theſe are very eaſily known by their figure, which reſembles that of a knife haft, and therefore need no other mark of diſtinction.

SHELLS, *multivalve*. Theſe are not leſs eaſily diſtinguiſhed than the other two general claſſes, into their ſeparate families. Of theſe alſo there are ſix families. The firſt is that of the *echini marini*, called in Engliſh *ſea-eggs*, by the French *ourſins*, *boutons*, and *heriſſons de mer*. Theſe carry a very obvious diſtinction, in their being covered with ſpines or prickles; and if we meet with them in a ſtate when they are fallen off, they are ſtill eaſily known by the marks of their inſertion. This, and their general figure, which is alike in all, and in all unlike to all other ſpecies, is ſuch a diſtinction as cannot ſuffer them to be miſtaken.

The ſecond family of theſe, is that of the *vermiculi marini*, particularly characteriſed in the ſpecies called the *ſea-organ*. Theſe are uſually of a beautiful red colour, and are of a very elegant ſtructure. They generally are found in very large cluſters, and are eaſily diſtinguiſhed from all other genera.

The third family of the multivalves conſiſts of the *balani marini*,

marini, called by the French *glands de mer*. Theſe are all ſo like one another, that they are eaſily known from all the other genera, by their all reſembling the common balanus, a *ſhell* too well known to need deſcription.

The fourth family is that of the *pollicipedes*, or, as the French call them, the *pouſſepieds*. Theſe are ſo eaſily known by their perfect reſemblance to one another, that there needs no other character than referring to their figure in the plate of *ſhells*.

The fifth family of the multivalves is that of the *conchæ anatiferæ*. Theſe were once ſuppoſed to produce a bird of the gooſe kind; and theſe are all ſo like to one another, that the referring to the figure of the common ſpecies, in the general plate, will ſhew the characters of all the ſpecies.

Finally, the ſixth genus of the multivalves is that of the *pholas*. Theſe *ſhells* are eaſily diſtinguiſhed by their figure, which is uſually oblong, and their colour, which is ſimply white in all the ſpecies. Theſe *ſhells* are often found encloſed in ſtone in the ſea, and ſome of them are compoſed of five valves.

By theſe characters it will be eaſy for an utter ſtranger to theſe ſtudies, to refer any *ſhell*, he occaſionally meets with, to its proper claſs and family. When this is done, it will be eaſy to obſerve the leſſer differences, which, though not ſufficient to conſtitute different families, or genera, yet very well diſtinguiſh different ſpecies of the ſame genus or family; and by comparing theſe with the names of the ſeveral ſpecies, to be found enumerated under the head treated of, in the name of that genus or family to which the *ſhell* is found to belong, it will be ſoon diſcerned whether, and which of theſe ſpecies it is of, or whether agreeing with none of thoſe names it is a new ſpecies. In order to enquire into theſe ſpecific differences, it is neceſſary attentively to conſider the exterior parts of the *ſhell*, its figure, its mouth, its volutions, its alæ, and its ſmoothneſs or roughneſs, and its two extremities, the end of the clavicle, and the mouth. After the exterior parts have been thus examined, the interior ones muſt be taken into conſideration, as the length and hollow of the mouth, and whether it be furniſhed with teeth, or with ridges; and whether it have a chamber or a tongue within.

In regard to bivalves, when the ſpecies are to be diſtinguiſhed, we muſt obſerve whether the two valves are equal or unequal in ſhape and ſize; whether one is, or is not more elevated than the other; and whether thoſe valves are ſmooth, or are covered with wrinkles and tuberoſities, or points; whether they have or have not ears; and whether their ſtriæ are charged with points, or tubercles, or are plain and ſmooth on the ſurface; and, finally, whether they are longitudinal, or tranſverſe, and whether the ends of the *ſhells* are even, or are terminated by a point, or beak.

The inſides are next to be obſerved, to find whether the *ſhells* naturally cloſe evenly and exactly, or whether they remain naturally open; and whether the fiſh is affixed to them by a ſingle ligament, as is the common caſe, or by ſix regular muſcles, as the ſea muſcle does.

The mouth of a *ſhell* generally diſtinguiſhes it from others, but there are ſome ſpecies in which recourſe muſt be had to the other external parts of the *ſhell*: and we are not to be puzzled, on finding in the ſame family ſome ſmall differences in the figure of the mouth, as its being longer in one ſpecies, and wider in another; the one ſpecies having a tail, and the other not; the one having a ſummit elevated very high, the other flatted at the top; or, laſtly, the one being ſmooth, and the other covered with tubercles, do not prevent both from being of the ſame family, when the general characters are the ſame. Theſe then only diſtinguiſh the ſpecies and genera of the ſame family, which are to be placed one after another in the deſcriptions of it.

The ſpecies are diſtinguiſhed, when, the generical characters being the ſame, one *ſhell* is umbilicated, another is not; one ſmooth, another rough, and ſo on. The varieties of the ſeveral *ſhells* which are very numerous, and have by many been taken for real ſpecies, are diſtinguiſhed by leſs eſſential differences; ſuch as the ſize, the length, and the thickneſs of the *ſhell*, the difference of the colours, and the depth or ſlightneſs of the furrows.

It may not be amiſs to explain all this in ſome one family of *ſhells*, in which there are many different genera, ſpecies, and varieties. When the buccinum, for example, has a long or ſhort mouth; when its clavicle, or pyramid, is long, or is flatted; or when its beak is ſtraight, or crooked; theſe are the marks of genera, being very great and eſſential characters, and each of them belonging in common to a great numer of *ſhells*, which are to be called ſpecies, and are to be diſtinguiſhed from one another only by ſome epithet, expreſſive of their ſlighter differences. Thus, if the ſurface is ſmooth, it is called *buccinum læve*; if rough, *buccinum tuberoſum*; if it imitate a ſpindle, it is called *fuſus*; if it be of the figure of a tower, it is called *turris*; and if of a tiara, it is called *mitra papalis*. The varieties are after this diſtinguiſhed by their proper epithets; the white, red, or yellow, are ſo called, and the large and ſmall diſtinguiſhed by theſe words added to their name; and in this manner are all the claſſes to be ſubdivided.

In the examination of the freſh-water *ſhells*, the ſame method is to be obſerved, and the ſame characters enquired into; but theſe are a much leſs numerous ſeries of *ſhells*; we know of only ſeven families of the freſh-water univalves, and there are only three families of bivalves, and not one of the multivalve claſs, ſo far as is yet known. See FLUVIATILES *cochleæ*.

The land *ſhells* are alſo to be diſtinguiſhed by the very ſame terms. The living land *ſhells* conſtitute but a very few genera, and the foſſile ones being remains of marine bodies, are the ſame with the ſpecies found at ſea; only there are many ſpecies, and ſome whole genera of theſe, which we never find recent, or living at preſent: theſe are probably the inhabitants of the deep ſeas, and therefore never can come within our ſight at preſent. The univerſal deluge, which ſo overturned the whole face of the earth, might eaſily bring things from the deepeſt ſeas into our way, and bury them in the hearts of yet ſoft and unformed rocks, and leave them there as laſting memorials of that dreadful cataſtrophe. All theſe, however, are ſo nearly allied to the ſeveral genera of the ſame families found recent, that it is eaſy to reduce them to their proper places. Hiſt. Natur. Eclair. part ii. p. 126, ſeq.

There are alſo many kinds of ſhelly animals which live on land, not in the ſea water, or in the freſh rivers or ponds. Of theſe we have ſeveral very elegant ſpecies.

Gualtieri, in his Index Teſtarum Conchyliorum, &c. fol. publiſhed at Florence, in 1742, arranges *ſhells* into five claſſes: the firſt comprehending land and river *ſhells*; the ſecond, ſea *ſhells* that are ſimple and not turbinated; the third, the cochleæ marinæ, or all the turbinated univalves; the fourth, bivalves; and the fifth, the multivalves, among which he places the echini. Tournefort's arrangement of *ſhells* into the univalves, bivalves, and multivalves, is contained in this work.

Klein's ſyſtem of *ſhells*, intitled Tentamen Methodi Oſtracologicæ, &c. was printed at Leyden, in 1753.

Geve, of Hamburgh, publiſhed a work on *ſhells*, in German and French, intitled the Monthly Pleaſure of *Shells* and Sea Productions, with illuminated Plates, at Hamburgh, in 1755, 4to.

F. Valentyn publiſhed a treatiſe on *ſhells*, and other marine bodies, of Amboyna, &c. in Dutch, at Amſterdam, in 1754, fol.

Adanſon, in his Hiſt. Natur. du Senegal, Paris, 1757, 4to. ranges all the *ſhells* he exhibits by the animals themſelves, and ſubjoins ten tables of affinities of univalves, or of the *ſhells* themſelves, founded on the ſix following parts; the ſpires, the top, the opening or mouth, the operculum or cover, the pearlineſs of the ſubſtance of the *ſhell*, and its perioſteum or epidermis. He likewiſe gives ſeven tables of affinities, taken from the parts of the animals; as the horns, eyes, mouth, &c. and from theſe tables forms his arrangement.

Seba's Theſauri Rerum Naturalium Deſcriptio, printed at Amſterdam, in 1758, fol. contains many valuable plates of *ſhells*.

Regenſus puliſhed a Recueil de Coquillages, &c. at Copenhagen, in 1758, fol.

Martini's Cabinet of *Shells* was printed at Nuremberg, in 1768, 4to. the ſecond part was publiſhed in 1769, and the third in 1771; but the work is not yet completed.

Linnæus, in the ſeveral editions of his Syſtema Naturæ, has methodized the teſtaceous animals, particularly in his laſt and twelfth edition, publiſhed at Stockholm, in 1767, 8vo. He begins with the multivalves, then proceeds to the bivalves, and ends with the univalves. He has fourteen families of the turbinated univalves, and five of the ſimple or non-turbinated.

M. Davila, in his Catalogue Syſtematique & Raiſonné des Curioſités de ſon Cabinet, printed at Paris, in 1767, 8vo. arranges his *ſhells* on M. d'Argenville's ſyſtem, with ſome uſeful alterations.

M. Meuſchen, envoy from ſeveral German courts to the Hague, has lately publiſhed a ſyſtematic catalogue of *ſhells*. Thoſe who wiſh to be farther informed concerning the merits of different publications on this ſubject may conſult Da Coſta's Elements of Conchology, 8vo. 1776. This author has formed a ſyſtem of arrangement, of which it will be proper to give ſome account. He begins with fixing ſome eſſential characters by which ſhells may be divided into families or claſſes, genera, and ſpecies. Theſe characters muſt be formed from the chief parts of the ſhells, the differences of which in ſize, ſhape, ſituation, &c. will enable us to form the ſeveral ſubdiviſions: e. g. univalves have the five following eſſential characters for the claſſes, or families, viz. ſimple or not turbinated, with a ſingle continued cavity, turbinated and chambered, or with many cavities, the total ſhape, and the aperture or mouth of the *ſhell*. The ſubordinate characters for the genera and ſpecies of univalves are five, viz. the number of ſpires or wreaths, operculated or not operculated, the nature of the ſhelly ſubſtance, whether opake, horny, pearly, &c. the epidermis and the head, and end or tip.

Mr. Da Coſta, rejecting the diviſion of *ſhells* into land, river, and ſea *ſhells*, diſtributes all teſtaceous animals into the three uſual general diviſions of univalves, bivalves, and multivalves: and all thoſe bodies which agree in one fixed character he refers to the ſame claſs; whilſt the affinities or differences of theſe bodies to each other in ſuch parts as are not to be reckoned principal, conſtitute the ſubordinate genera and ſpecies. Accordingly he fixes on the aperture or mouth of the *ſhell* as the diſtinguiſhing character of the turbinated univalves; on the hinges for the bivalves; and the number of valves for the multivalves. The ſimple figure, the chambered ſtructure, or the latent whirls of the revolved *ſhells*, which are thoſe univalves that are not characterized by the mouth, ſuch as the limpets, ammonia, and cowries, are made the diſtinguiſhing characters of theſe families. The figure or ſhape, the turban or clavicle, the work on the *ſhell*, and other leſs eſſential particulars, ſuch as the thickneſs or thinneſs of the *ſhell*, the epidermis, and the nature of the ſubſtance, are conſidered as the ſecondary characters of genera or ſpecies.

The firſt *claſs of univalves* comprehends four general ſubdiviſions, or orders. 1. The ſimple univalves, or thoſe not turbinated, or little if at all ſpiral. This part contains four families, viz. the limpets, or *patellæ*; the *aures marinæ*, which are ſlightly ſpiral; the *vermiculi*, or worm *ſhells*; and the *dentalia*.

The *firſt* family of the limpets is again ſubdivided into three genera, viz. the whole, or entire, that are not perforated at the top; the chambered; and the pierced, or perforated, or maſks, which have their tops perforated with a hole quite through the *ſhell*. The firſt genus, he obſerves, is very numerous; the ſecond has alſo many ſpecies; but the third genus has few ſpecies. Europe, he ſays, affords few ſpecies. The fineſt and largeſt are brought from the Eaſt Indies. Africa, eſpecially about the Cape of Good Hope, produces many fine ones. America has many of the chambered and ſmaller kinds; and ſome large and fine limpets have been lately brought from the Streights of Magellan, and the South Sea. The foſſil limpets are very ſcarce. See LIMPET.

The *ſecond* family is the *haliotis*, *aures marinæ*, or ſea ears. See EAR-*ſhell*.

Of this family there are few ſpecies, and this author obſerves that he has never known a ſingle inſtance of a haliotis being found foſſil.

The *third* family is the *vermiculi*, or worm-*ſhells*. See VERMICULUS *marinus*.

The *fourth* family is the *dentalia*, which are ſimple tubular *ſhells*, of a regular, determinate, curved, conical ſhape, and open at both ends. This family has very few ſpecies. See DENTALIS.

2. The concamerated or chambered univalves have many regular and nearly equidiſtant cells, or chambers, and a pipe, or ſiphunculus, that opens into, and communicates from chamber to chamber. This ſecond part, which is the *fifth* family, contains ſix genera: one of which, viz. the *orthoceratites*, is of a ſimple figure: four genera, as the *lituitæ* or croziers, *turbines polythalami*, *ammonia*, and *ammonoidæ*, are all turbinated; and the other genus, or *nautilus*, is revolved. Of theſe ſix genera there are only two, viz. the *lituitæ* and *nautilus*, that are known recent, and therefore the others muſt be arranged by the help of the foſſil kingdom. Thoſe of the firſt genus, or *orthoceros*, are ſimple, ſtraight, conical *ſhells*, gradually tapering from a broad end to a ſharp-pointed top, like a ſtraight horn, whence their name. They are chambered from bottom to top, and have a ſiphunculus, or pipe of communication, from chamber to chamber.— Mr. Da Coſta divides this genus into two ſections, viz. thoſe that have the ſiphunculus placed on or near the edge, and thoſe that have it near the centre.

The ſecond genus, or *lituus*, exactly reſembles a biſhop's crozier in ſhape, for it has a long cylindric ſtem, one end of which turns in a ſpiral manner, but the ſpires are few, ſeparated, and receding from each other. This genus was firſt formed by Breynius, and it is a very rare foſſil. See LITUUS.

The third genus, or *turbo polythalamus* ſive *concameratus*, firſt propoſed by Da Coſta, is a turbinated or ſpiral *ſhell* of a lengthened ſhape, exactly like a buccinum in appearance, but chambered, and the diaphragms or partitions are cut and jagged, like the foliaceous ſutures of the ammonia. Seh POLYTHALAMIUM and TUBULI *concamerati*.

The fourth genus is the *cornua ammonis* or *ammonia*. The *ſhells* of this genus are perfect helices, the ſpires lying between two flats or levels. The ſpires are cylindric, and connected with each other; they gradually diminiſh or taper from the circumference to the centre, ſo that by the gradual tapering of the ſpires to the centre, the centres of both flats are concaves: the inner ſtructure is chambered, but the diaphragms or partitions of the chambers are not roundiſh, and with an even edge, but jagged into proceſſes, or appendages, which, laid together, cloſe into one another, and form a beautiful leaf-work, called by foſſilogiſts the foliaceous ſutures of the ammonites.

The foſſil ammonia or ammonitæ are found in great abundance, in moſt parts of the world, from the ſize of a pea, through all the gradations of bulk, to above a yard in diameter, and proportionably thick. The ſpecific character for the arrangement of the ammonitæ is taken by Da Coſta from the work on the back of their ſpires, according to which he divides them into eight ſections, viz. thoſe whoſe backs are quite ſmooth aud plain; thoſe whoſe backs are ſtriated, ſulcated, or ribbed; thoſe that have a plain prominent ridge along the back; thoſe with a plain prominent ridge between two furrows: thoſe with a prominent ridge, not plain, but wreathed or twiſted like a rope; thoſe with a plain furrow, or channel, along the back; thoſe whoſe backs are ſtudded, or ſpiked; and thoſe whoſe backs are deeply notched, or toothed, like a ſaw. See CORNU *ammonis*.

The fifth genus, or *ammonoides*, reſembles the ammonitæ in all reſpects, except ſhape: for theſe bodies are quite globoſe, like nautili, and not flat like ammonitæ: the outer ſpire alone makes above one half of the body, and all the other ſpires are very ſmall and taper into a concavity, ſo that the centre is deeply hollowed or umbilicated.

The ſixth genus, or *nautili*, are revolved *ſhells*, or thoſe whoſe ſpires never appear externally, but are very latent within the body of the *ſhell*. They are of a chambered ſtructure, the partitions of the cells or chambers being concavo-convex roundiſh plates. The paper nautilus, ſays Da Coſta, though claſſed by moſt authors as a nautilus, is a diſtinct genus, as it is not of a chambered ſtructure. The ſpecies of nautili are few. Authors make two ſorts of the Eaſt Indian or pearly kind, viz. the umbilicated and non-umbilicated. The animal of this *ſhell* is ſaid to inhabit only the uppermoſt or open chamber, which is much larger than the others: the reſt remain empty, except that the pipe, or ſiphunculus, which communicates from chamber to chamber, is filled with an appendage or tail of the animal, like a gut or ſtring. This ſiphunculus is a dilatable tube, under the command of the animal: when it is flatted, like the ſwimming bladder of a fiſh, it renders the nautilus buoyant; when it is contracted, the fiſh and *ſhell* ſink, and juſt to ſuch a degree as the preſent occaſions of the animal require. See NAUTILUS.

3. The third ſubdiviſion or order of univalves comprehends revolved *ſhells*, or thoſe *ſhells* whoſe ſpires are latent within the body, and do not in any manner appear externally; ſo that they have no clavicle or turban. This third part, contains three *families*, viz. the *nuces* or *bullæ*, the *ſemi-porcellanæ*, aed *cypreæ* or *porcellanæ*.

Accordingly the *ſixth* family, is the *nuces* or *bullæ*, comconly called the pewit's eggs or dipping ſnails, and the dippers or ſea-nuts. Theſe are generally of an oval ſhape, and umbilicated at the bottom; the mouth very wide, eſpecially at the top, and narrowing to a great degree downwards; the lip thin, ſharp, and naked, or without any border or other work, and with a ſmall facing or lip on the upper part of the mouth.

The *ſeventh* family is the *ſemi-porcellanæ*, or *ſhells* reſembling the cypreæ, or cowries, in their appearance; but their aperture is more open, neither are the lips dentated. Linnæus makes a genus of theſe which he calls *bulla*, including under the ſame title the preceding genus of nuces. Davila makes them a genus of cowries, and others rank them as cowries. The ſpecies of this genus are not numerous: but among them the weaver's ſhuttle, the poached egg, and ſome others, are eſteemed rare and curious *ſhells*.

The *eighth* family is the CYPRÆA or *porcellana*, the cowry. The ſhells of this family are generally ſemi-oval, whoſe flat part is the mouth. The ſpires of the cowries make their revolutions within the body of the *ſhell*; their aperture is on the flat ſide, being a narrow opening of the *ſhell*; the lips are near to one another, broad, turning inwards, and toothed; the two ends or extremes on the upper part are very prominent: at one extreme it has a wry gutter, or opening, like the mouth of a ſoal or other flat fiſh; the other extreme has alſo a gutter, but it is ſtraight or perpendicular; and on its ſide, in ſome kinds, there is another protuberance, like a ſmall rude clavicle, or turban. The particular character of this family is the deep toothing on the inner edges of the lip, which diſtinguiſhes it from the ſemi-porcellanæ. Linnæus has adhered to this character; but Grew, Liſter, Argenville, Gualtieri, and others, not regarding it, have confounded them all together. The cowries are extremely numerous, and moſt of the ſpecies very beautiful in colour and poliſh. They have this elegant poliſh, even from the ſea, naturally, or without the aid of art: and if they were not common *ſhells* would be probably as highly valued as the volutes, or any other. They ſeem to be littoral *ſhells*, and are found at the Moluccas, the Maldives, Madagaſcar, the Weſt India iſlands, &c. and rarely found foſſil. See PORCELAIN *ſhell.*

4. The fourth ſubdiviſion or order includes the turbinated or ſpiral univalves, which are *ſhells* whoſe ſpires are external, and ſhew themſelves on the outer part of the *ſhell*, in that part which is called the clavicle, or turban, which is either produced ſhort or flat, according to the ſeveral genera or ſpecies.

The *ninth* family under this claſs is the CYMBIUM, or paper NAUTILUS: the *ſhells* of this family, in their external ſhape, reſemble a ſhip or boat, whoſe upper part or head is narrow, turns ſpirally, and is like the ſtern; the reſt of it widens to the other end, is quite hollow, forms an horizontal aperture, and lies lower than the ſtern or ſpiral end. The ſpecies are not above three or four; and thoſe known are browniſh or whitiſh, and almoſt as thin as paper, whence they have obtained the name of paper nautili. Linnæus makes this a diſtinct genus, under the denomination of ARGONAUTA. This family is the true ſailer; the nautilus or pompilus of the Greeks and Latins, and which our celebrated Engliſh poet refers to,

> "Learn of the little Nautilus to ſail;"

for it has not yet been ſatisfactorily proved, that the other kind or pearly nautilus ever ſails or navigates his *ſhell*. Theſe *ſhells* are found in many parts of the Mediterranean, and alſo in the Eaſt Indies. The fiſh inhabiting the *ſhell* is of the polypus kind, and according to the account of it by M. Argenville, in his Zoomorphoſe, p. 29, its head is of a moderate ſize, with two large eyes; it has eight arms or legs of a ſoft fleſhy ſubſtance, thicker towards the body, and connected by a ſlight membrane; they are of a ſilvery colour, ſet with ſuckers or knobs on the ſides, flatted like oars, and ſerving for ſwimming; and with theſe he ſeems to row or ſteer his veſſel: the ſix foremoſt are ſhort, and he balances himſelf and extends them as he ſwims; the two hinder ones, longer than the others, he plunges in the ſea to ſerve as a rudder, and theſe hold up the ſkin or membrane, which he uſes as a ſail to ply the wind. Thus equipped, he navigates in calm weather: when fearful of danger, he retires within the *ſhell*, by which action it gains water and ſinks to the bottom: he often pumps the water out, and often quits the ſhell, which floating empty is carried by the waves and daſhed to pieces on the rocks.

The *tenth* family is the ear-ſnails, or *auris cochlea*, called alſo the Venus-ear. Theſe *ſhells*, in their ſhape, ſo much reſemble the ſea-ears, that moſt authors have ranked them in that family, and called them non-perforated ſea-ears. Liſter and Gualtieri rank them as cochleæ; and Linnæus places them in a genus which he calls *helix*. Da Coſta defines them to be *ſhells* ſo open as to reſemble ſea-ears, but not perforated with a row of holes. They have a broad ledge along one ſide, which projects over the cavity, and turbinates into one ſingle flat ſpire, quite even or level with the bottom of the *ſhell*. This ſpire is alſo very wide, and extends to near the middle of the bottom or under part. There are few *ſhells* of this family.

The *eleventh* family is the *cylindri*, cylinders or olives. See CYLINDRUS.

Linnæus ranks theſe *ſhells* in his genus of voluta by the name of cylindroideæ. Da Coſta divides the family into two genera, viz. *cylindri emarginati*, or ſuch whoſe edge is quite even and ſharp, and *cylindri marginati*, or ſuch whoſe edge is not ſharp and ſmooth, but has a very thick border, which turns over into a very prominent ledge on the back, like to the helm[illegible] The ſpecies of this family are many and very beautiful *ſhells.*

The *twelfth* family of the univalves is the VOLUTA, or *volute*.

The *thirteenth* family is called *globoſæ*, or tuns, and the *ſhells* of this family are defined to be generally of a globoſe ſhape, the body being much ſwelled or rounded, whence they derive their name; they have ſhort turbans; the mouth is extremely wide, and very large; the upper part of it ends in a wry channel, like a ſoal's mouth, which is very ſhort and turns backward. None have a pillar or columella lip; though in ſome, as the Perſian crowns and melons, the columella or pillar itſelf is wrinkled or plaited. The *ſhells* comprehended under this family are the tuns, partridges, figs, harps, Perſian crowns and melons. This family, though not very numerous, contains ſome very beautiful and curious *ſhells*.

The *fourteenth* family is the *caſſides*, or helmets; which are defined to be ſemi-globoſe *ſhells*, with the back very convex and round, and the under or mouth part flat: they have alſo almoſt flat, or at leaſt very ſhort, clavicles, or turbans; the mouth is long, rather narrow, and ends at top in a gutter, which turns very large, ſtrong, and wry on the back; the lip is always ſtrongly and thickly toothed, and riſes into a high thick border or ledge on the upper part or back, and the pillar is generally ſtrongly toothed and ridged, or ſet with ſmall aſperities. Liſter and Linnæus rank theſe *ſhells* among the buccina. They are not very numerous; but ſome of them are extremely large and heavy.

The *fifteenth* family is the *trochi*, or tops. See TROCHUS.

The *ſixteenth* family is the *cochleæ*, or ſnails; the character of which is a round or nearly round mouth, perfectly bordered, circumſcribed, or defined. Da Coſta divides this family into five genera, viz. nerits, or ſnails, with ſemicircular mouths (ſee *Cochleæ* SEMILUNARES); helices, or round-mouthed ſnails, whoſe ſpires lie horizontal, or between two levels, of which genus there are many curious ſpecies; ſnails with a ſhort or flat turban, to which belong the common land ſnails, and many others; ſnails with a lengthened clavicle, or turban, which may be called TURBO (ſee *Cochlea* LUNARIS); and the cochleæ ſtrombiformes, or ſnails, whoſe turbans are extremely long and ſlender, of which genus there are not many ſpecies.

The *ſeventeenth* family is the *buccina*, or whelks, which are *ſhells* whoſe mouth is an oblong and very lengthened oval, the upper part whereof is produced into a gutter, or ſlight beak: accordingly Da Coſta divides this family into ſix genera, viz. 1. The *buccina canaliculata*, or guttered whelks, whoſe upper part of the mouth ends in an almoſt ſtraight anb ſomewhat prolonged gutter, and which have their inner or columella lip always extremely ſmooth. The ſpecies of this genus are very numerous. 2. *Buccina recurviroſtra*, or wry-mouthed whelks, whoſe mouth is, as it were, cut ſhort at top; for the gutter or beak does not extend ſtraight forward from the upper part of the mouth, but bends or falls on the back in a wry manner, exactly like the mouth of a ſoal, or other flat fiſh. The ſpecies of this genus are very numerous. 3. *Buccina roſtrata* or *longiroſtra*, or beaked whelks, which have a very lengthened beak, ſuch as the purpuræ, tower of Babel, crane and many other rare and curious ſpecies. 4. *Buccina umbilicata*, or umbilicated whelks, which have a perpendicular hollow, or navel, by the ſide of the columella, or pillar-lip, on the firſt or body whirl. Of this genus there are but few ſpecies. 5. *Buccina columella dentata*, or *plicata*, or whelks with a wrinkled or plaited pillar. 6. *Strombi*, or needles, which are buccina with a very long and taper clavicle or turban, and a wry mouth turning on the back, and in ſome ſpecies of ſuch a length as to be like a ſpur. The genus of ſtrombi is pretty numerous. See TRUMPET-*ſhell.*

The *eighteenth* family is the *murices*, whoſe fixed or eſſential character is an oblong and equally narrow mouth lengthways, which runs into a ſhort gutter or top; and they are always thorny or ſpiked, or rough, all over the ſurface, like the ſpikes or aſperities of rugged rocks, whence the Latin name murex, the Engliſh rocks, and the French rochers. See MUREX.

Da Coſta ſubdivides this family into four genera, viz. murex, rocks, or thoſe *ſhells* that have long and equally narrow mouth, and are externally very rugged, whoſe clavicle or turban is generally ſhort and almoſt flat, and the pillar wrinkled or plaited; of which there are many ſpecies, ſome being very large and heavy: the rhombi, or *ſhells* whoſe ſubordinate character is that they have always a rhombic ſhape or contour; of which there are not many ſpecies, but ſome are large and heavy: the alatæ, or winged *ſhells*, whoſe lip is expanded outwards, like a flap, or wing, which are ranked by Linnæus under the genus of STROMBUS; of this genus there are many fine and beautiful ſpecies: and the aporrhaidæ, or winged *ſhells*, whoſe edges are ſet with ſtrong ſpikes or proceſſes like fingers, as the ſpiders, devil's claws, &c. The ſpecies are few, but fine *ſhells*.

It is obſerved, with regard to univalves, that on account of the beauty of their colours and ſtructure they are the choiceſt object of collectors, and bear a higher value than bivalves or multivalves; for few of the latter ever fetch above five or ſix guineas, while numbers of the volutes, and other univalves, are worth ten, twenty, or thirty guineas, and ſometimes more.

II. The ſecond diviſion or claſs of *ſhells* comprehends the *bivalves*, which are double *ſhells* compoſed of two pieces, or parts, which by means of proper connection by hinges, play on each other, ſo as to open, ſhut, and perform all other functions neceſſary to the œconomy of the animals whoſe habitations they are.

Da Coſta diſtributes bivalves, of which there are no land *ſhells*, and few in freſh water, into three orders, which are as follow. 1. The firſt order includes thoſe *ſhells* that have unequal valves, and ſhut cloſe; of which there are four families.

The *firſt* family is the *pectens* or eſcallops, the eſſential character of which is a trigonal ſinus, and an elaſtic cartilage for its hinge in the centre of the top of the *ſhell:* the ſubordinate characters are their being eared, and that the top runs into a perfectly ſtraight line, gradually widening thence to a round bottom. Linnæus makes the pectens a genus of oyſters. Gualtieri makes different genera of thoſe with equal, and thoſe with unequal valves; calling the former pecten, and the latter concha pectinata; and the eſcallops with unequal, or ſingle ears, he calls pectunculi. The ſpecies are numerous, ſome of which are curious and very beautiful, as the ducal mantle, the compaſs or ſole, the duck's foot or coral, eſcallop, &c. The eſcallops leap or raiſe themſelves up by forcing their under valve againſt the body whereon they lie. See PECTEN.

The *ſecond* family is the *ſpondyli*. See SPONDYLUS.

The *third* family is the *oſtreum*, or OYSTER; the hinge of which has not any teeth, but proceſſes of a large inarticulate gutter, running along the length of the top of the *ſhell*, in both *ſhells* alike, and covered and filled with a ſtrong cartilage. The ſpecies of this family are very numerous, ſome of which are curious and beautiful, and bear a large price; as the hammer oyſter, the cockſcombs, &c. Linnæus ranks the eſcallops with the oyſter. Argenville and others reduce the ſpondylas to this family; while Liſter, &c. rank the hammer oyſter and ſome others as eſcallops. The chief of the foſſile oyſters are the gryphitæ; of which there are ſeveral ſpecies.—See GRYPHITES.

The *fourth* family is the *anomiæ*, which conſiſts of ſeveral foſſil ſpecies; not more than three or four recent from the ſea. They are called by Columna CONCHÆ *rariores anomiæ*. Woodward was the firſt who ranged the anomiæ from the foſſile *ſhells*. Gualtieri has made a particular genus of them under the denomination of TEREBRATULA. Linnæus has made them a diſtinct genus under the name of ANOMIÆ; mixing the recent with the foſſil kinds, and defining them to be *ſhells* with unequal valves, one valve being flattiſh, the other convex, the beak perforated, and the hinge inarticulate or toothleſs. Davila conſiders them as a genus of oyſters, and defines them as *ſhells*, whoſe beak or top of the under valve is perforated, and riſes curved up on the upper valve. Da Coſta deſcribes the anomiæ as bivalves, with unequal valves, and never eared; the beak of the largeſt or inferior valve is greatly produced, and riſes or moves over the beak of the ſmaller or upper valve, and is pierced or perforated through like a tube; the valves are connected together in ſome ſpecies by an inarticulate or toothleſs, and in others by a multarticulate or manytoothed hinge, which conſtitute two genera; the former are thoſe in which the hinge of the under valve is a large ſinus or cavity, the corners whereof form two prominences or joints; and the upper valve is indented into it by a correſponding prominence to its cavity, and by two ſmall hollows, anſwering to the two joints; the latter are thoſe whoſe hinge lies on a long ſtraight line and is ſet with many teeth, exactly like the Noah's arks. He apprehends that the animals inhabiting theſe *ſhells* ſeldom open them, as moſt others do, to take their food; but nouriſh themſelves through the tube, or perforated beak only.

2. The ſecond order of bivalves comprehends thoſe *ſhells* that have equal valves, and ſhut cloſe; ſuch as the cockles, tellens, muſcles, &c. Da Coſta diſtributes this order into three ſections, viz. the multarticulate, articulate and inarticulate. The *firſt* ſection includes the lepto-polyginglymi, or multarticulate *ſhells*, with a great number of teeth on the hinges, of which there are three families.

The *fifth* family of bivalves is the *pectinoideæ*, or *ſhells* with equal valves, generally very flat: the hinge lies on a ſtraight line like the eſcallop, but is ſet with ſeveral parallel and ſtraight ridges or intermediate furrows, and the ſides are diſſimilar. There are few ſpecies of this family.

The *ſixth* family is the *pectunculi lepto-polyginglymi*, or multarticulate cockles: the *ſhells* of this family reſemble the cockles in all reſpects except the hinge, which in theſe is furniſhed with a great number of teeth, and in thoſe with few. There are not many ſpecies. Linnæus places them in his genus of ARCA.

The *ſeventh* family is the *arcæ*, arks or boats, which have their hinges on a ſtraight line, and are of a ſomewhat ſquariſh figure or oblong, as the Noah's arks and ſquare cockles. Argenville places theſe in his fourth family of heart cockles. Davila makes them a diſtinct genus of his fourth family, and calls them *arks*. Gualtieri forms a genus of them by the name of *concha rhomboidalis*. Linnæus and Meuſchen rank them as a diſtinct genus, and call them ARCA. This family has not many ſpecies.

The *ſecond* ſection comprehends all bivalves with equal valves that are not eared, and have few teeth upon their hinge. There are three families.

The *eighth* family of pectunculi, or cockles, is characteriſed by a curved or ſemilunar hinge, ſet with from two to four ſtrong teeth, and may be divided into three genera, viz. 1. The *pectunculi* or cockles, or chamæ of ſome late authors, which are convex or flattiſh *ſhells* of a roundiſh ſhape, and with ſimilar or diſſimilar ſides, whoſe beaks are not very prominent, and turn much upwards towards the hinge.

This genus is numerous. Argenville, Davila, and Meuſchen call them *cames:* Gualtieri calls them CHAMÆ, and Linnæus diſperſes them into ſeveral of his genera.

2. The *cordiformes*, or heart cockles, whoſe beaks are very prominent, and curve up greatly towards the hinge, thereby forming a figure perfectly like a heart. This genus is pretty numerous. Gualtieri places them among his conchæ cordiformes, and they are ranked by Linnæus in his cardium genus. See CARDIA and HEART-*ſhells*.

3. The *truncati*, or flat-ſided cockles; the ſpecies of which are not numerous.

The *ninth* family is the TELLINÆ.

The *tenth* family is the *placentæ*, which are *ſhells* with equal valves, whoſe hinge lies quite within the *ſhell*, and one valve conſiſts of two ſtraight linear ridges, pretty prominent, and laid obliquely to each other, ſo as to meet at one end in a very acute angle: and the other valve has two correſpondent furrows. Of this family, formed by Da Coſta, there are two ſpecies, viz. the Chineſe glaſs, or pellucid oyſter, and the Poliſh ſaddle.

The *third* ſection includes the inarticulate bivalves, or thoſe that have no teeth on their hinge, of which there are two families.

The *eleventh* family is the *margaritiferæ*, or pearl oyſters, which are eared *ſhells* with equal valves, whoſe hinge is merely a gutter or ſlight furrow, without a ſingle tooth. The ſpecies are few, ſuch as the mother of pearl, or pearl oyſter, the ſwallow, &c.

Rumphius, Davila, and Meuſchen rank theſe as oyſters: Woodward forms a genus which he calls *margaritiferæ*, and Gualtieri places the pearl *ſhells* in one genus, under the name of *inæquilateræ*, the ſwallow in another genus, called *conchæ aliſormes*. See PEARL.

The *twelfth* family is the *muſcles*, which are generally very convex, of a long and narrow ſhape, and the hinge is a mere ſlight furrow without any tooth, and ſituated, not at the top of the *ſhell*, but a little way down one of the ſides. The ſpecies are not many. See MUSCLE.

3. The third order of bivalves comprehends the *conchæ biantes*, whoſe *ſhells* never ſhut cloſe, but are always open or gaping in ſome part. This part conſtitutes the *thirteenth* family, and conſiſts of four genera, viz.

1. The *tridacnæ*, or baſon conques, which are *ſhells* of equal valves and diſſimilar ſides, in hinge and appearance reſembling the heart cockles, but on the longeſt ſide from the back to nearly the extreme margin the two *ſhells* do not cloſe, but leave a large heart-like opening, the lips whereof are broad, and turn up on the edges; of this there are few ſpecies, which are the largeſt and heavieſt of all the bivalves, ſome weighing from three hundred and a half to ſix or ſeven hundred weight.

2. The *chamæ*, purrs, or gapers, which have a broad, thick, and large tooth for their hinge, and are, as it were, abruptly cut off on one ſide, which ſide is always open or gaping, as the valves cannot ſhut cloſe at that part. There are few ſpecies of this genus. See CHAMA.

3. The *ſolenes*, ſheaths or razor *ſhells*, which are very broad, though extremely ſhort, open at both ends, and the hinge has teeth placed quite at one end. There are few ſpecies. See SOLEN.

4. The *pinnæ*, ſea wings or hams, which are *ſhells* of a ſomewhat triangular ſhape, widening from a pointed or narrow top to a very broad end, which is always open; the hinge is inarticulate, and placed on one ſide. The ſpecies are few. See PINNA.

III. The third general diviſion or claſs of *ſhells* comprehends the *multivalves*, or thoſe that are made up of many valves or pieces. In this diviſion there are three families.

The *fourteenth* family is the *pholas*, or piddocks, the *ſhells* of which are trivalves, and have two large valves, with a ſmall valve placed between them, near the hinge. The hinge turns up on the outer part of the *ſhell*, and under it, within the *ſhell*, is a long curved tooth or ſpur. The ſpecies of this family are very few. See PHOLAS.

The *fifteenth* family is the *anatiferæ*, or barnacles, which are quinquevalve *ſhells*, and made up of two large valves, with two ſmall ones beneath them, and a long narrow ſpur-like valve which connects them, and runs lengthwiſe. Of this family there are but few ſpecies. See BARNACLE, and *Concha* ANATIFERA.

The *ſixteenth* family of *ſhells* is the *balani* or acorns, which are made of many valves lying parallel to each other, and in a perpendicular poſition, contrary to the poſition of all other valves, which lie horizontally. The top is open, and the fiſh performs its neceſſary functions by that aperture, for the valves never open or ſeparate, as they have no hinges.

The balani are always found fixed by their under part to *ſhells*, ſtones, and other ſolid bodies. There are few ſpecies. See BALANI. See Da Coſta's Elements of Conchology, with ſeven plates, 8vo. 1776, and his Britiſh Conchology in French and Engliſh, illuſtrated with figures, 4to. 1778, in which he has deſcribed eighty-ſix ſpecies of Britiſh univalves.

Mr. Pennant, in the fourth volume of his Britiſh Zoology, has treated of the Britiſh conchology.

SHELLS, *collecting and cleaning of*. It is moſt adviſeable in collecting *ſhells*, whenever it can be done, to get thoſe which have in them the living animals, becauſe we ſhall thus obtain the natural hiſtory of the animals, and the *ſhells* themſelves in their natural beauty, and the full glow of their colours. *Shells* ſhould be alſo procured from the deeper parts of their reſorts, and immediately after ſtorms on the ſea beaches and ſhores, becauſe, by being much expoſed to the ſun, their colours fade, and they are liable to other accidents that injure them. In order to kill the fiſh that inhabits them, Mr. Da Coſta adviſes to give them a quick dip in boiling water, and when they are cooled to lay them in cold water till they are cleaned; and in this operation they ſhould not be touched with aqua fortis, or any other acid, not expoſed to the heat of the fire and ſun. See *Poliſhing of* SHELLS.

SHELLS, *figures and colours*, &c. *of*. It is obſerved, that river *ſhells* have not ſo agreeable or diverſified a colour as the land and ſea *ſhells*; but the variety in the figure, colours, and other characters of ſea *ſhells*, is almoſt infinite. The number of diſtinct ſpecies we find in the cabinets of the curious is very great, and doubtleſs the deep bottoms of the ſea, and the yet unſearched ſhores, contain multitudes more, yet unknown to us. Even the ſame ſpecies differ in ſome degree in almoſt every individual ſo that it is rare to find any two *ſhells* which are alike in all reſpects. Bonan. Recreat. Ment. et Ocul. p. 49.

This wonderful variety, however, is not all the produce of one ſea, or one country; the different parts of the world afford us their different beauties. Bonani obſerves that the moſt beautiful *ſhells* we are acquainted with come from the Eaſt-Indies, and from the Red Sea. This is in ſome degree countenanced by what is found to this day; from the general obſervations of the curious, it ſeems that the ſun, by the great heat that it gives to the countries near the line, exalts the colours of the *ſhells* produced there, and gives them a luſtre and brilliancy, that thoſe of colder climates always want, and it may be, that the waters of thoſe vaſt ſeas, which are not ſubject to be weakened by freſh rivers, give a nouriſhment to the fiſh, that may add to the brilliancy of their *ſhells*.

The ſhores of Aſia furniſh us with the pearl oyſters and ſcallops in great perfection. About Amboyna are found the moſt beautiful ſpecimens of the cabbage-*ſhell*, the arroſoir, the ducal mantle, and the coral oyſters, or echinated oyſters. Here alſo are found a great variety of extremely beautiful muſcles, tellinæ, and volutæ; ſome fine buccinums, and the *ſhell* called the *Ethiopian crown*, in its greateſt perfection.

The dolia, the murices, and the caſſandræ, are alſo found on theſe coaſts in great beauty. Many elegant ſnails and ſcrew-*ſhells* are alſo brought from thence; and finally the ſerapion and ſpider-*ſhells*. Hiſt. Nat. Eclairc. p. 168.

The Maldive and Philippine iſlands, Bengal, and the coaſt of Malabar, abound with the moſt elegant of all the ſpecies of ſnails, and furniſh many other kinds of *ſhells* in great abundance and perfection.

China abounds in the fineſt ſpecies of porcelain *ſhells*, and has alſo a great variety of beautiful ſnails.

Japan furniſhes us with all the thicker and larger bivalves; and the iſle of Cyprus is famous above all other parts of the world, for the beauty and variety of the patella, or limpet, found there.

America affords many very elegant *ſhells*, but neither in ſo great abundance nor beauty as the ſhores of Aſia.

Panama is famous for the cylinders or rhombi, and we have beſide, from the ſame place, ſome good porcelains, and a very fine ſpecies of dolium, or *concha globoſa*, called from this place the *Panama purple ſhell*. One of the moſt beautiful of the cylinders is alſo known among our naturaliſts under the name of the *Panama ſhell*.

About Braſil, and in the Gulf of Mexico, there are found murices and dolia of extreme beauty, and alſo a great variety of porcelains, purpuræ, pectens, neritæ, bucardiæ, or heart-*ſhells*, and elegant limpets.

The iſle of Cayenne affords one of the moſt beautiful of the buccinum kind, and the Midas ear is found principally about this place.

Jamaica, and the iſland of Barbadoes, have their ſhores covered with porcelains, chamæ, and buccina; and at St. Domingo there are found almoſt all the ſame ſpecies of *ſhells* that we have from the Eaſt Indies, only they are leſs beautiful, aud the colours more pale and dead. The pearl oyſter is found alſo on this coaſt, but ſmaller than in the Perſian Gulf. At Martinico there are found in general the ſame *ſhells* as at St. Domingo, but yet leſs beautiful.

About Canada are found the violet chamæ, and the lakes of that country abound with muſcles of a very elegant pale blue and pale red colours; ſome ſpecies of theſe are remarkably light and thin; others are very thick and heavy.

The Great Bank of Newfoundland is very barren in *ſhells*: the principal kinds found there are muſcles of ſeveral ſpecies, ſome of which are of conſiderable beauty.

About Carthagena there are many mother of pearl *ſhells*, but they are not of ſo brilliant colours as thoſe of the Perſian Gulf.

The iſland of Magellan, at the ſouthern point of America, furniſhes us with a very remarkable ſpecies of muſcle, called by its name; and ſeveral very elegant ſpecies of limpets are found there, particularly the pyramidal.

In Africa, on the coaſt of Guinea, there is a prodigious quantity of that ſmall ſpecies of porcelain, which is uſed there as money; and there is another ſpecies of porcelain on the ſame coaſt, which is all over white; the women make bracelets of theſe, and the people of the Levant adorn their hair with them.

The coaſt of Zanguebar is very rich in *ſhells*: we find there a vaſt variety of the large porcelains, many of them of great beauty; and the *nux maris*, or ſea nut, is very frequent there. Beſide theſe, and many other *ſhells*, there are found on this coaſt all the ſpecies of nautili, many of which are very beautiful.

The Canary Iſles are found to abound with a vaſt variety of the murices, and ſome other good *ſhells*; and we have from Madeira great variety of the echini, or ſea eggs, different from thoſe of the European ſeas. Several ſpecies of muſcles are alſo common there, and the auris marina is no where more abundant.

The Red Sea is beyond all other parts of the world abundant of *ſhells*, ſcarce any kind is wanting there; but what we principally have from thence are the purpuræ, porcelains, and echini marini.

The Mediterranean and northern ocean contain a great variety of *ſhells*, and many of very remarkable elegance and beauty; they are upon the whole, however, greatly inferior to thoſe of the Eaſt Indies. The Mediterranean abounds much more in *ſhells* than the Ocean.

The Gulf of Tarentum affords great variety of purpuræ, of porcelains, nautili, and elegant oyſters; the coaſts of Naples and Sardinia afford alſo the ſame, and with them a vaſt number of the ſolens of all the known ſpecies.

The iſland of Sicily is famous for a very elegant kind of oyſter, which is white all over; pinnæ marinæ and porcelains are alſo found in great plenty there, with tellinæ and chamæ of many ſpecies, and a great variety of other beautiful *ſhells*.

Corſica is famous beyond all other places, for vaſt quantities of the pinnæ marinæ, and many other very beautiful *ſhells* are found there. Liſter, Hiſt. Conchyl.

About Syracuſe are found the gondola *ſhell*, the alated murex, and a great variety of elegant ſnails, with ſome of the dolia and neritæ.

The Adriatic ſea, or Gulf of Venice, is leſs furniſhed with *ſhells* than almoſt any of the ſeas thereabout. Muſcles and oyſters of ſeveral ſpecies are however found there, and ſome of the cordiformes or heart *ſhells*; there are alſo ſome tellinæ. About Ancona there are found vaſt numbers of the pholades buried in ſtone, and the aures marinæ are particularly frequent about Puzzoli. Bonani. Recreat. Ment. et Ocul.

The ports of Marſeilles, Toulon, and Antibes, are full of pinnæ marinæ, muſcles, tellinæ, and chamæ. The coaſts of Bretagne afford great numbers of the conchæ anatiferæ and pouſſepieds; they are found on old rotten boards, on ſea ſubſtances, and among cluſters of ſpunges. The other ports of France, as Rochelle, Dunkirk, Breſt, St. Maloes, and others, furniſh oyſters, excellent for the table, but of the common kind, and of no beauty in their *ſhells*; great numbers of muſcles are alſo found there; and the common tellinæ, the onion-peel oyſters, the ſolens, and conchæ anatiferæ, are alſo frequent there. At Granville, in Lower Normandy, there are found very beautiful pectens, and ſome of the cordiforms, or heart *ſhells*. Our own Engliſh coaſts are not the leaſt fruitful in *ſhells*, though they do not produce ſuch elegantly painted ones as the Indies.

About Plymouth are found oyſters, muſcles, and ſolens, in great abundance; and there, and on moſt of our other ſhores, are numbers of the aures marinæ and dentalia, with pectens, which are very excellent food; and many elegant ſpecies of the chamæ and tellinæ are fiſhed up in the ſea about Scarborough, and other places.

Ireland affords us great numbers of muſcles, and ſome very elegant ſcallop *ſhells* in great abundance, and the pholades are frequent on moſt of our ſhores. We have alſo great variety of the buccina and cochleæ, ſome volutæ; and on the Guernſey coaſt a peculiarly beautiful ſnail, called thence the *Guernſey-ſnail*.

The coaſts of Spain and Portugal afford much the ſame ſpecies of *ſhells* with the Eaſt Indies, but they are of much fainter colours, and greatly inferior in beauty. Hiſt. Nat. Eclairc. p. 172.

There are, according to Tavernier and others, ſome rivers in Bavaria, in which there are found pearls of a fine water. About Cadiz there are found very large pinnæ marinæ, and ſome fine buccina. The iſles of Majorca and Minorca afford a great variety of extremely elegant *ſhells*. The pinnæ marinæ are alſo very numerous there, and their ſilk is wrought into gloves, ſtockings, and other things. The Baltic affords a great many beautiful ſpecies, but particularly an orange-coloured pecten, or ſcallop *ſhell*, which is not found in any other part of the world.

The freſh water *ſhells* are found much more frequently, and in much greater plenty than the ſea kinds; there is ſcarce a pond, a ditch, or a river of freſh water, in any part of the world, in which there are not found vaſt numbers of theſe *ſhells* with the fiſh living in them. All theſe *ſhells* are ſmall, and they are of very little beauty, being uſually of a plain greyiſh or browniſh colour. Our ditches afford us chamæ, buccina, neritæ and ſome patellæ; but the Nile, and ſome other rivers, furniſhed the ancients with a ſpecies of tellina, which was large and eatable, and ſo much ſuperior to the common ſea tellina in flavour, that it is commonly known by the name of *tellina regia*, the *royal tellina*.

We have a ſmall ſpecies of buccinum common in our freſh waters, which is very elegant, and always has its operculum in the manner of the larger buccina; a ſmall kind of muſcle is alſo very common, which is ſo extremely thin and tender, that it can hardly be handled without breaking to pieces.

The large freſh water muſcle, commonly called in England the *horſe-muſcle*, is too well known to need a deſcription, and the ſize of this gives it a difference from all other freſh water *ſhells*.

Shells, *poliſhing of*. This is an art of no long ſtanding in the world, in its preſent perfection; and as the love of ſea-*ſhells* is become ſo common among us, it may not be diſagreeable to the reader to find ſome inſtructions in executing ſo pleaſing a method of adding to their natural beauty, the rules for which are at preſent ſo little known, though the effect of them be ſo much eſteemed.

Among the immenſe variety of *ſhells*, which we are acquainted with, ſome are taken out of the ſea, or found on its ſhores in all their perfection and beauty; their colours being all ſpread by nature upon the ſurface, and their natural poliſh ſuperior to any thing that art could give. Where nature is in herſelf thus perfect, it were madneſs to attempt to add any thing to her charms; but in others, where the beauties are latent and covered with a coarſer outer ſkin, art is to be called in, and the outer veil being taken off, all the internal beauties appear.

Among the *ſhells* which are found naturally poliſhed are the porcelains, or cowries, the caſſanders, the dolia, or conchæ globoſæ or tuns, ſome buccina, the volutes, and the cylinders, or olives, or, as they are generally though improperly called, the rhombi; excepting only two or three, as the tiara, the plume, and the butter-tub-rhombus; where there is an unpromiſing film on the ſurface, hiding a very great ſhare of beauty within. Though the generality of the *ſhells* of theſe genera are taken out of the ſea in all their beauty, and in their utmoſt natural poliſh, there are ſeveral other genera, in which all, or moſt of the ſpecies, are taken up naturally rough and foul, and covered with an epidermis, or coarſe outer ſkin, which is in many rough and downy, or hairy. The tellinæ, the muſcles, the cochleæ, and many others, are of this kind. The more nice collectors, as naturaliſts, inſiſt upon having all their *ſhells* in their native and genuine appearance, as they are found when living at ſea: but the ladies who make collections hate the diſagreeable outſides, and will have all ſuch poliſhed. It would be very adviſeable, however, for both kinds of collectors to have the ſame *ſhells* in different ſpecimens, both rough and poliſhed: the naturaliſt would by this means, beſides knowing the outſide of the *ſhell*, be better acquainted with its internal characters than he otherwiſe could be, and the lady would have a pleaſure in comparing the beauties of the *ſhell*, in its wrought ſtate, to its coarſe appearance as nature gives it. How many elegancies in this part of the creation muſt be wholly loſt to us, if it were not for the aſſiſtance of an art of this kind! Many *ſhells* in their native ſtate are like rough diamonds, and we can form no juſt idea of their beauties till they have been poliſhed and wrought into form.

Though the art of poliſhing *ſhells* is a very valuable one, yet it is very dangerous to the *ſhells*; for without the utmoſt care, the means uſed to poliſh and beautify a *ſhell* often wholly deſtroy it. When a *ſhell* is to be poliſhed, the firſt thing to be examined is whether it have naturally a ſmooth ſurface, or be covered with tubercles or prominences.

A *ſhell* which has a ſmooth ſurface, and a natural dull poliſh, need only be rubbed with the hand, or with a piece of chamoy leather, with ſome tripoli, or fine rotten ſtone, and will become of a perfectly bright and fine poliſh. Emery is not to be uſed on this occaſion, becauſe it wears away too much of the *ſhell*. This operation requires the hand of an experienced perſon, that knows how ſuperficial the work muſt be, and where he is to ſtop; for in many of theſe *ſhells* the lines are only on the ſurface, and the wearing away ever ſo little of the *ſhell* defaces them. A *ſhell* that is rough, foul, and cruſty, or covered with a tartarous coat, muſt be left a whole day ſteeping in hot water: when it has imbibed a large quantity of this, it is to be rubbed with rough emery on a ſtick, or with the blade of a knife, in order to get off the coat. After this it may be dipped in diluted aqua fortis, ſpirit of ſalt, or any other acid; and after remaining a few moments in it, be again plunged into common water. This will greatly add to the ſpeed of the work. After this it is to be well rubbed with linen cloths impregnated with common ſoap; and when by theſe ſeveral means it is made perfectly clean, the poliſhing is to be finiſhed with fine emery and a hair-bruſh. If after this the *ſhell* when dry appears not to have ſo good a poliſh as was deſired, it muſt be rubbed over with a ſolution of gum arabic; and this will add greatly to its gloſs, without doing it any ſort of injury. The gum water muſt not be too thick, and then it gives no ſenſible coat, only heightening the colours. The white of an egg anſwers this purpoſe alſo very well; but it is ſubject to turn yellow. If the *ſhell* has an epidermis, which will by no means admit the poliſhing of it, it is to be dipped ſeveral times in diluted aqua fortis, that this may be eaten off; and then the *ſhell* is to be poliſhed in the uſual way with putty, fine emery, or tripoli, on the hair of a fine bruſh. When it is only a pellicle that hides the colours, the *ſhells* muſt be ſteeped in hot water, and after that the ſkin worked off by degrees with an old file. This is the caſe with ſeveral of the cylinders, which have not the natural poliſh of the reſt.

When a *ſhell* is covered with a thick and fatty epidermis, as is the caſe with ſeveral of the muſcles and tellinæ: in this caſe aqua fortis will do no ſervice, as it will not touch the ſkin; then a rough bruſh and coarſe emery are to be uſed; and if this does not ſucceed, ſeal-ſkin, or, as the workmen call it, *fiſh-ſkin* and *pummice-ſtone*, are to be employed.

When a *ſhell* has a thick cruſt, which will not give way to any of theſe means, the only way left is to plunge it ſeveral times into ſtrong aqua fortis, till the ſtubborn cruſt is wholly eroded. The limpets, auris marina, the helmet-ſhells, and ſeveral other ſpecies of this kind, muſt have this ſort of management; but as the deſign is to ſhew the hidden beauties under the cruſt, and not to deſtroy the natural beauty and poliſh of the inſide of the *ſhell*, the method of uſing the aqua fortis muſt be this: a long piece of wax muſt be provided, and one end of it made perfectly to cover the whole mouth of the *ſhell*; the other end will then ſerve as a handle, and the mouth being ſtopped by the wax, the liquor cannot get into the inſide to ſpoil it; then there muſt be placed on a table a veſſel full of aqua fortis, and another full of common water.

The *ſhell* is to be plunged into the aqua fortis; and after remaining a few minutes in it, is to be taken out, and plunged into the common water. The progreſs the aqua fortis makes in eroding the ſurface is thus to be carefully obſerved every time it is taken out: the point of the *ſhell*, and any other tender parts, are to be covered with wax, to prevent the aqua fortis from eating them away; and if there be any worm-holes, they alſo muſt be ſtopped up with wax, otherwiſe the aqua fortis would ſoon eat through in thoſe places. When the repeated dippings into the aqua fortis ſhew that the coat is ſufficiently eaten away, then the *ſhell* is to be wrought carefully with fine emery and a bruſh; and when it is poliſhed as high as can be by this means, it muſt be wiped clean, and rubbed over with gum-water, or the white of an egg. In this ſort of work the operator muſt always have the caution to wear gloves, otherwiſe the leaſt touch of the aqua fortis will burn the fingers and turn them yellow; and often, if it be not regarded, will eat off the ſkin and the nails.

Theſe are the methods to be uſed with *ſhells*, which require but a moderate quantity of the ſurface to be taken off; but there are others which require to have a larger quantity taken off, and to be uncovered deeper: this is called entirely ſcaling a *ſhell*. This is done by means of an horizontal wheel of lead or tin, impregnated with rough emery; and the *ſhell* is wrought down in the ſame manner in which ſtones are wrought by the lapidary. Nothing is more difficult, however, than the performing this work with nicety: very often *ſhells* are cut down too far by it, and wholly ſpoiled; and to avoid this, a coarſe vein muſt be often left ſtanding in ſome place, and taken down afterwards with the file, when the cutting it down at the wheel would have ſpoiled the adjacent parts.

After the *ſhell* is thus cut down to a proper degree, it is to be poliſhed with fine emery, tripoli, or rotten ſtone, with a wooden wheel turned by the ſame machine as the leaden one, or by the common method of working with the hand with the ſame ingredients, when a *ſhell* is full of tubercles, or protuberances, which muſt be preſerved. It is then impoſſible to uſe the wheel; and if the common way of dipping into aqua fortis be attempted, the tubercles being harder than the reſt of the *ſhell*, will be eat through before the reſt is ſufficiently ſcaled, and the *ſhell* will be ſpoiled: in this caſe induſtry and patience are the only means of effecting a poliſh. A camel's hair pencil muſt be dipped in aqua fortis, and with this the intermediate parts of the *ſhell* muſt be wetted, leaving the protuberances dry: this is to be often repeated, and after a few moments the *ſhell* is always to be plunged into water to ſtop the eroſion of the acid, which would otherwiſe eat too deep, and deſtroy the beauty of the *ſhell*. When this has ſufficiently taken off the foulneſs of the *ſhell*, it is to be poliſhed with emery of the fineſt kind, or with tripoli, by means of a ſmall ſtick, or the common poliſhing ſtone uſed by the goldſmiths may be uſed. This is a very tedious and troubleſome thing, eſpecially when the echinated oyſters and murices, and ſome other ſuch *ſhells* are to be wrought; and what is worſt of all is, that when all this labour has been employed, the buſineſs is not well done; for there ſtill remain ſeveral places which could not be reached by any inſtrument; ſo that the *ſhell* muſt neceſſarily be rubbed over with gum-water, or the white of an egg afterwards, in order to bring out the colours and give a gloſs; in ſome caſes it is even neceſſary to give a coat of varniſh.

Theſe are the means uſed by artiſts to brighten the colours, and add to the beauty of *ſhells*; and the changes produced by poliſhing in this manner are ſo great, that the *ſhell* is often not to be known afterwards for the ſame it was; and hence we hear of new *ſhells* in the cabinets of collectors, which have no real exiſtence as ſeparate ſpecies, but are the poliſhed appearance of others well known. To caution the reader againſt errors of this kind, it may be proper to add the moſt remarkable ſpecies thus uſually altered.

The *onyx-ſhell*, or volute, called by us the purple or violet-tip, which in its natural ſtate is of a ſimple pale brown, when it is wrought ſlightly, or poliſhed with juſt the ſuperficies taken off, is of a fine bright yellow; and when it is eat away deeper, it appears of a fine milk-white, with the lower part bluiſh: it is in this ſtate that it is called the *onyx-ſhell*, and it is preſerved in many cabinets in its rough ſtate, and in its yellow appearance as a different ſpecies of *ſhells*.

The *violet-ſhell*, ſo common among the curious, is a ſpecies of porcelain, or common cowry, which does not appear in that elegance till it has been poliſhed; and the common auris marina ſhews itſelf in two or three different forms, as it is more or leſs deeply wrought. In its rough ſtate it is duſky and coarſe, of a pale brown on the outſide, and pearly within; when it is eaten down a little way below the ſurface, it ſhews variegations of black and green, and when ſtill farther eroded, it appears of a fine pearly hue within and without.

The nautilus, when it is poliſhed down, appears all over of a fine pearly colour, but when it is eaten away but to a ſmall depth, it appears of a fine yellowiſh colour, with duſky hairs. The burgau, when entirely cleared of its coat, is of the moſt beautiful pearl-colour; but when only ſlightly eroded, it appears of a variegated mixture of green and red; whence it has been called the *parroquet-ſhell*. The common *helmet-ſhell*, when wrought, is of the colour of the fineſt agate; and the muſcles, in general, though very plain *ſhells*, in their common appearance, become very beautiful when poliſhed, and ſhew large veins of the moſt elegant colours. The Perſian *ſhell*, in its natural ſtate, is all over white, and covered with tubercles; but when it has been ground down on a wheel, and poliſhed, it appears of a grey colour, with ſpots and veins of a very bright and highly poliſhed white. The limpets in general become very different when poliſhed, moſt of them ſhewing very elegant colours; among theſe the *tortoiſe-ſhell* limpet is the principal; it does not appear at all of that colour or tranſparence till it has been wrought.

That elegant ſpecies of *ſhell* called the junquil-chama, which has deceived ſo many judges of theſe things into an opinion of its being a new ſpecies, is only a white *chama* with a reticulated ſurface; but when this is poliſhed, it loſes at once its reticular work and its colour, and becomes perfectly ſmooth, and of a fine bright yellow; and the violet-coloured *chama* of New England, when worked down and poliſhed, is of a fine milk-white, with a great number of blue veins, diſpoſed like the variegations in agates.

The aſſes *ear-ſhell*, when poliſhed, after working it down with the file, becomes extremely gloſſy, and obtains a fine roſe-colour all about the mouth. Theſe are ſome of the moſt frequent among an endleſs variety of changes wrought on *ſhells* by poliſhing; and we find there are many of the very greateſt beauties of this part of the creation which muſt have been loſt but for this method of ſearching deep in the ſubſtance of the *ſhell* for them. The Dutch are very fond of *ſhells*, and are very nice in their manner of working them: they are under no reſtraint, however, in their works, but uſe the moſt violent methods, ſo as often to deſtroy all the beauty of the *ſhell*. They file them down on all ſides, and often take them to the wheel, when it muſt deſtroy the very characters of the ſpecies. Nor do they ſtop at this, but, determined to have beauty at any rate, they are for improving upon nature, and frequently add ſome lines and colours with a pencil, afterwards covering them with a fine coat of varniſh; ſo that they ſeem the natural lineations of the ſhell: the Dutch cabinets are by this means made very beautiful, but they are by no means to be regarded as inſtructors in natural hiſtory. There are ſome artificers of this nation who have a way of covering *ſhells* all over with a different tinge from that which nature gives them; and the curious are often deceived by theſe tricks into the purchaſing them as new ſpecies.

There is another kind of work beſtowed on certain ſpecies of *ſhells*, particularly the nautilus; this is the engraving on it lines and circles, and figures of ſtars, and other things: this is too obvious a work of art to ſuffer any one to ſuppoſe it natural. Buonani has figured ſeveral of theſe wrought *ſhells* at the end of his work; but it it is miſerably throwing away labour to do them; the *ſhells* are ſpoiled as objects of natural hiſtory by it, and the engraving is ſeldom worth any thing. They are principally done in the Eaſt Indies.

Shells are ſubject to ſeveral imperfections; ſome of theſe are natural, and others accidental: the natural ones are the effect of age, or ſickneſs in the fiſh. The greateſt miſchief happens to *ſhells* by the fiſh dying in them. The curious in theſe things pretend to be always able to diſtinguiſh a *ſhell* taken up with the fiſh alive, from one found on the ſhores: they call the firſt a living, the ſecond a dead *ſhell*, and ſay that the colours are always much the fainteſt in the dead *ſhells*. When the *ſhells* have lain long dead on the ſhores, they are ſubject to many injuries, of which the being eaten by ſea-worms is not the leaſt: age renders the fineſt *ſhells* livid or dead in their colours.

The fineſt *ſhells* are thoſe which are fiſhed up at ſea, not found on the ſhores. The other natural defects of *ſhells* are their having morbid cavities, or protuberances, in parts where there ſhould be none. When the *ſhell* is valuable, theſe faults may be hid, and much added to the beauty of the ſpecimen, without at all injuring it as an object of natural hiſtory, which ſhould always be the great end of collecting theſe things. The cavities may be filled up with maſtic, diſſolved in ſpirit of wine, or with iſinglaſs; theſe ſubſtances muſt be either coloured to the tinge of the *ſhell*, or elſe a pencil dipped in water-colours muſt finiſh them up to the reſemblance of the reſt, and then the whole *ſhell* being rubbed over with gum-water, or with the white of an egg, ſcarce any eye can perceive the artifice: the ſame ſubſtances may alſo be uſed to repair the battered edge of a *ſhell*, provided the pieces chipped off be not too large. And when the excreſcences of a *ſhell* are faulty, they are to be taken down with a fine file. If the lip of a *ſhell* be ſo battered that it will not admit of repairing by any cement, the whole muſt be filed down to an evenneſs, or ground on the wheel.

SHELLS, *foſſil.* *Shells* are frequently found under-ground, in places far remote from the ſea, in mines, and even on the tops of mountains; but how they ſhould come thither is a thing the naturaliſts are greatly divided about. The moſt uſual and eaſy opinion is, that thoſe parts have been formerly ſea, or, at leaſt, have been overflown thereby; and many even go back as far as the grand deluge for this. Others take theſe to be the natural places of their birth or formation, ſome of them being found little other than crude clay, others of the ſame texture with the rock whereto they grow, though others ſeem of as abſolute a *ſhelly* ſubſtance as any in the ſea. In effect, they ſay, theſe may be only ſo many different gradations of nature, which can as well produce *ſhells* in mines as in the ſea, there being no want of ſaline or earthy particles for the purpoſe; nor is there any great difference between ſome ſorts of ſpars and ſea *ſhells*.

Dr. Liſter judges, that the *ſhells* found in ſtone quarries were never any part of an animal, and gives this reaſon for it, that quarries of different ſtone yield quite different ſpecies of *ſhells*; different not only from one another, but from any thing in nature beſides, which either ſea or land does yield. This opinion has been ſince proved erroneous, and all theſe bodies to have been really once parts of living animals. See FOSSILS, *adventitious*, MARINE *remains* and *formed* STONES.

Of theſe *ſhells*, ſome are found remaining almoſt entirely in their native ſtate, but others are variouſly altered by being impregnated with particles of ſtone, and of other foſſils; in the place of others there is found mere ſtone or ſpar, or other native mineral body, expreſſing all their lineaments in the greateſt nicety, as having been formed wholly from them, the *ſhell* having been firſt depoſited in ſome ſolid matrix, and thence diſſolved by very ſlow degrees, and this matter left in its place, on the cavities of ſtone and other ſolid ſubſtances, out of which *ſhells* had been diſſolved and waſhed away, being afterwards filled up leſs ſlowly with theſe different ſubſtances, whether ſpar or whatever elſe: theſe ſubſtances, ſo filling the cavities, can neceſſarily be of no other form than that of the *ſhell*, to the abſence of which the cavity was owing, though all the nicer lineaments may not be ſo exactly expreſſed. Beſide theſe, we have alſo in many places maſſes of ſtone formed within various *ſhells*; and theſe having been received into the cavities of the *ſhells* while they were perfectly fluid, and having therefore nicely filled all their cavities, muſt retain the perfect figures of the internal part of the *ſhell*, when the *ſhell* itſelf ſhould be worn away, or periſhed from their outſide.

The various ſpecies we find of theſe are in many genera as numerous as the known recent ones; and as we have in our own iſland not only the *ſhells* of our own ſhores, but thoſe of many other very diſtant ones, ſo we have alſo many ſpecies, and thoſe in great numbers, which are in their recent ſtate, the inhabitants of other yet unknown or unſearched ſeas and ſhores.

The cockles, muſcles, oyſters, and the other common bivalves of our own ſeas are very abundant; but we have alſo an amazing number of the nautilus kind, particularly of the nautilus græcorum, which though a *ſhell* not found living in our own, or any neighbouring ſeas, yet is found buried in all our clay-pits about London and elſewhere; and the moſt frequent of all foſſil *ſhells* in ſome of our counties, are the conchæ anomiæ, which yet we know not of in any part of the world in their recent ſtate. Of this ſort alſo are the cornua ammonis and the gryphitæ, with ſeveral of the echinitæ and others.

The exact ſimilitude of the known *ſhells* recent and foſſil in their ſeveral kinds, will by no means ſuffer us to believe, that theſe, though not yet known to us in their living ſtate, are, as ſome have idly thought, a ſort of luſus naturæ.

It is certain, that of the many known ſhores, very few, not even thoſe of our own iſland, have been yet carefully ſearched for the *ſhell*-fiſh that inhabit them; and as we ſee in the nautilus græcorum an inſtance of *ſhells* being brought from very diſtant parts of the world to be buried here, we cannot wonder, that yet unknown ſhores, or the unknown bottoms of deep ſeas, ſhould have furniſhed us with many unknown *ſhell*-fiſh, which may have been brought with the reſt; whether that were at the time of the general deluge, or the effect of any other cataſtrophe of a like kind, or by whatever other means to be left in the yet unhardened matter of our ſtony and clayey ſtrata. Hill's Hiſt. of Foſſ. p. 616.

Foſſil *ſhells* are found to be of great uſe in manuring land. See MANURING.

They are much uſed in France for this purpoſe; and Mr. Reaumur treats of their effects in fertilizing the earth very fully, concluding his uſeful account of theſe ſubſtances by obſerving, that it is much more eaſy to account for the manner of their acting upon land, than for the manner of their coming where they are found. It has been the favourite ſyſtem of our Dr. Woodward, that all theſe *ſhells* were the remains of the univerſal deluge, which having overflowed the whole earth, might eaſily leave them in all places; but Mr. Reaumur has much more rationally accounted for their coming to thoſe parts of France, where they are found at this time in ſuch vaſt abundance, by carefully tracing the courſe of the beds of them ſo far as known there, and eaſily proving that all that extent of country, under which they are found, may have been once overflowed by the ſea without a deluge; it being the very track that a large body of waters, let in at one part of the kingdom, muſt have taken, in order to getting out at another. Mem. de l'Acad. Par. 1720.

SHELL, *Arabian*, a name given by ſome to a ſpecies of porcelain *ſhell*, not becauſe it is found on the coaſt of Arabia, but becauſe its lines and variegations are ſuppoſed to repreſent the figures of Arabic characters.

SHELL, *aurora*, in *Natural Hiſtory*, a very remarkable ſpecies of *ſhell*-fiſh, found in cabinets of the curious. It is of the figure of a bird, having a head, wings, and tail, and is of a flame-colour; it owes much of its beauty, however, to art and accident; the *ſhell* is an oyſter of a peculiar variation of figure from the common one; the head of the bird is the cardo or hinge; the wings are the body of the *ſhells*; and the tail is a peculiar proceſs like that of the MARTEAU, only ſingle.

It is naturally of a duſky brown on the outſide, and pearly within, but when its rough coat is taken off, it appears of this beautiful flame-colour.

SHELL, *caterpillar*. See TURBO.

SHELL, *centre*, in *Natural Hiſtory*, a name given to the balanus marinus, a kind of ſea *ſhell* of the multivalve kind, with an open mouth, frequently found fixed to the bottoms of ſhips, and other things covered with ſea water. See BALANI and SHELLS.

SHELL, *chalice*, or *cup*-SHELL, a ſpecies of the balanus. See BALANI.

SHELL, *China-letter*, in *Natural Hiſtory*, a name given by many to that ſpecies of chama, uſually called by authors the *chama Arabica*. It is of a pale browniſh ground, and is variegated with a great number of black lines, which are as ſlender as the ſtrokes of a pen, and are of ſuch odd figures, that they repreſent ſome of the Arabic, or as others fancy, Chineſe characters. See CHAMA.

SHELL, *crown imperial*, a ſpecies of the VOLUTA.

SHELL, *dog-tooth*, a ſpecies of DENTALIS.

SHELL, *ear*. See EAR.

SHELL, *guinea*, the Engliſh name for a very beautiful variegated ſpecies of VOLUTA, called by the French *la ſpeculation*.

SHELL, *heart*. See HEART.

SHELL, *helmet*, in *Natural Hiſtory*, the name of a kind of MUREX, of which there are ſeveral ſpecies. They all approach ſomewhat toward a triangular figure, and are free from any long ſpines. See *Syſtems of* SHELLS.

SHELL, *leopard*, in *Natural Hiſtory*, the Engliſh name of the pardus, a kind of VOLUTA, ſo called from its ſpots reſembling thoſe of a leopard. There are three kinds of this, one ſpotted with black, another with yellow, and another with red.

SHELL, *leveret*, in *Natural Hiſtory*, a name given by many to a ſpecies of PORCELAIN-*ſhell*, reſembling a young hare in colour.

SHELL, *lightning*, in *Natural Hiſtory*, a name given by ſome authors to a ſpecies of MUREX with variegations on its body, reſembling the pictures we commonly ſee of flaſhes of lightning.

SHELL, *map*, in *Natural Hiſtory*, the name given by ſome to a peculiar ſpecies of PORCELAIN-*ſhell*, the figures on which repreſent the lines on a map.

SHELL, *needle*. See CENTRONIA and NEEDLE.

SHELL, *Noah's ark*. See NOAH.

SHELL, *oyſter*. See OYSTER.

SHELL, *old wife*, the name given by ſome to that ſpecies of chama, which the French alſo have called VIELLE *ridée*.

SHELL, *onion*, a ſpecies of OYSTER.

SHELL, *pipe*. See ENTALIUM.

SHELL, *ſaddle*, in *Natural Hiſtory*, the name of a ſpecies of OYSTER, which in ſome degree repreſents a ſaddle in its ſhape.

SHELL, *St. James's*, in *Natural Hiſtory*, a name given by writers on *ſhells* to a very beautiful ſpecies of variegated PECTEN.

SHELL, *St. Michael's*, in *Natural Hiſtory*, a name given by authors to a ſpecies of PECTEN, or ſcallop-*ſhell*. It is of a bright yellow colour.

SHELL, *ſcorpion*, in *Natural Hiſtory*, the name of a ſpecies of MUREX, very much approaching to the nature of the ſpider *ſhell*. This is a common *ſhell* in cabinets; it is of a yellow colour, and very deeply ridged, and full of tubercles; there ariſe from the lip of the *ſhell* five large ſpines, or, as they are uſually called, fingers, and two others, which are very much bent, the one from the head, the other from the tail: theſe are very elegantly radiated with white, and a fine violet colour on the lips.

SHELL, *ſcrew*. See TURBO.

SHELL, *ſmall-pox*, in *Natural Hiſtory*, a name given to a remarkable kind of concha venerea, or PORCELAIN-*ſhell*, the protuberances on the ſurface of which are ſuppoſed to repreſent the puſtules of the ſmall-pox. There are two ſpecies of this *ſhell*, the one white, with flattiſh protuberances, the other greeniſh, with more elevated ones.

SHELL-*ſnake*, in *Natural Hiſtory*, the name given by many to that beautiful ſpecies of PORCELAIN-*ſhell*, the ſpots of which repreſent thoſe of a ſnake's ſkin.

SHELL, *ſpider*, the name of a kind of MUREX. See ARANEA.

SHELL, *ſtrawberry*, in *Natural Hiſtory*, a name given by collectors of *ſhells* to a very beautiful ſpecies of cordiformis, ſpotted with ſmall round red ſpots.

SHELL, *ſwallow*, in *Natural Hiſtory*, the name given by authors to a ſpecies of OYSTER, which in ſome degree repreſents the figure of a ſmall bird flying.

SHELL, *ſwan*. See CIGNE.

SHELL, *tiger*, in *Natural Hiſtory*, the name of a ſpecies of PORCELAIN, or concha venerea, ſuppoſed to repreſent the ſpots on a tyger's ſkin.

SHELL, *toe*. See POLLICIPES.

SHELL, *tortoiſe*. See TORTOISE.

SHELL, *trumpet*. See TRUMPET.

SHELL, *turban*. See TURBAN.

SHELL, *turnep*. This is a ſpecies of ſea *ſhell*, by others called the *radiſh ſhell*; it is exactly of the ſhape of a turnep, and is of the DOLIUM or concha globoſa kind. Thoſe who have called it the *radiſh-ſhell*, allude to the great black round rooted radiſh, not to our common radiſh.

SHELL, *turtle*, the names of two ſpecies of *ſhells*. See MUREX and VOLUTA.

SHELL-*apple*, in *Ornithology*, an Engliſh name for the loxia, or CROSSBILL, given from his manner of ſplitting an apple, and feeding on the kernels, leaving the *ſhell* of the pulp untouched.

SHELL-*drake*, in *Ornithology*, a common Engliſh name for the TADORNA.

SHELL *fiſh*. Theſe animals are in general oviparous, very few inſtances having been found of ſuch as are viviparous. Among the oviparous kinds, anatomiſts have found that ſome ſpecies are of different ſexes in the different individuals of the ſame ſpecies, but others are hermaphrodites, every one being in itſelf both male and female: in both caſes their increaſe is very numerous, and ſcarce inferior to that of plants, or of the moſt fruitful of the inſect claſs. The eggs are very ſmall, and are hung together in a ſort of cluſters by means of a glutinous humour, which is always placed about them, and is of the nature of the jelly of frogs ſpawn; by means of this they are not only kept together in the parcel, but the whole cluſter is faſtened to the rocks, *ſhells*, or other ſolid ſubſtances, and thus they are preſerved from being driven on ſhore by the waves, and left where they cannot ſucceed.

SHELL-*gall-inſect*, an inſect of the GALL-*inſect* claſs, ſomewhat reſembling thoſe which are called the boat-faſhioned ones, but differing in this, that as the two ends of that ſpecies are not very different in form, in this kind one of the ends is ſharp and pointed in compariſon with the other.

It has its name of *ſhell-inſect*, from the reſemblance it bears to a muſcle *ſhell*; as it is, in its whole form, not unlike one of the two *ſhells*, in which the common ſea muſcle is incloſed, but the pointed end of this *inſect* is much more extended in length than the ſmaller end of this *ſhell*.

This ſpecies is extremely ſmall, and may be eaſily miſtaken for the minute caſe, out of which ſome ſmall inſect has eſcaped; or in another ſtate, for the neſt in which ſome ſmall inſect had depoſited its eggs; but if the aſſiſtance of the microſcope be called in, they will eaſily be diſcovered to be true *gall inſects*, even as ſoon as they are hatched from the eggs. This ſpecies at its full growth, is ſo ſmall, that it requires good eyes to diſcover it: it is brown, very ſmooth, and poliſhed on the ſurface, and much of the colour of the bark of ſome trees; it has uſually an edge of a cottony matter, viſible where its ſides touch the tree, and its eggs are always depoſited on a fine cottony bed; the young ones are white, flat, and have two ſmall horns, and ſix legs; in this ſtate they are known to be of the *gall inſect* claſs, not by their likeneſs to their parent, but to the young *gall-inſects* of other ſpecies. They march about very briſkly for ſome time after they are hatched, and after that fix themſelves, and then begin to grow, and by degrees alter their form, till they at length are of the ſame ſhape with their parent. Reaumur, Hiſt. Inſ tom. iv. p. 69, 70.

SHELL-*ſand*, a name given by the farmers, in ſome parts of England, to the fragments of *ſhells* found on the ſea ſhores, and ground to a ſort of powder, ſo that they reſemble ſand. See MANURING.

There is alſo another kind, uſed as this is, in ſome parts of Cornwall, and compoſed of fragments of a ſort of tender white coral. This is found principally about Falmouth, and is called by the ſame name of *ſhell-ſand*, though very improperly. All the kinds are of great uſe in agriculture, but they are differently eſteemed by the farmers, as they are more or leſs rich, which they know by their colours: the reddiſh kind is eſteemed moſt of all; next to this the blue is judged the beſt, and after this the white. Such as is dredged up from under the water, is always found better, than ſuch as is found dry on the ſhores; and ſuch as is entirely compoſed of *ſhells* is to be choſen, rather than ſuch as has fragments of ſtone among it, which is a very common caſe. See SAND.

SHELL-*toothed*, in the *Manege*, an appellation given to a horſe that from five years old to old age, naturally, and without any artifice, bears mark in all its foreteeth, and there ſtill keeps that hollow place with the black mark, which is called in French *germe de feve*, i. e. *the eye of a bean*, inſomuch, that at twelve or fifteen he appears with the mark of a horſe that is not yet ſix; for in the nippers of other horſes, the hollow place is filled, and the mark diſappears towards the ſixth year, by reaſon of the wearing of the tooth. About the ſame age it is half worn out in the middling teeth, and towards the eighth year it diſappears in the corner teeth: but after a *ſhell-toothed* horſe has marked, he marks ſtill equally in the nippers, the middling, and the corner teeth; which proceeds from this, that having harder teeth than other horſes, his teeth do not wear, and ſo he does not loſe the black ſpot.

Among the Poliſh, Hungarian, and Croatian horſes, we find a great many of them hollow-toothed, and generally the mares are more apt to be ſo than the horſes.

SHELLS, *littoral*. See LITTORAL.

SHELL-*gold*. See GOLD.

SHELL-*ſilver*. See SILVER.

SHELL-*fiſh*, a collective name for all fiſhes naturally incloſed in *ſhells*.

SHELL, in *Artillery*. See BOMB and MORTAR.

SHELLS, *meſſage*, are howitz-*ſhells*, within which are incloſed a letter, or other papers: the furze-hole is ſtopped up with wood or cork, and the *ſhells* are fired into a garriſon or camp.

SHELL *of a block*, in *Mechanics*, is the outer frame or caſe, wherein the ſheave or wheel is contained, and traverſes about its axis.

SHELTERS, *horizontal*. See HORIZONTAL.

SHELTIE, the name of a ſmall, but ſtrong kind of horſe, found in the iſland of Zetland, commonly called *Shetland*. In the country, the price of one of theſe horſes is about a guinea.

SHELVES, in *Sea Language*, a general name given to any dangerous ſhallows, ſand banks, or rocks; lying immediately under the ſurface of the water, ſo as to intercept any ſhip in her paſſage, and endanger her deſtruction.

SHEPHERD, in *Rural Affairs*, one who looks after ſheep.

SHEPHERD's *dog*, a variety of the common DOG, uſed in guarding flocks, or driving herds of cattle.

SHEPHERD *kings*, in *Ancient Hiſtory*. See DISPERSION *of Mankind*.

SHEPHERD's *needle*, or *Venus's comb*, *ſcandix*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it hath an umbelliferous flower; the general umbel is long, and hath few rays; the particular umbels have many; the general umbel has no involucrum; the particular have a five-leaved one, the length of the umbels; the general umbel is deformed, and has hermaphrodite florets in the diſk, and female in the rays: the flowers have five inflexed heart-ſhaped petals: the inner are ſmall, and the outer large; and five ſlender ſtamina, terminated by roundiſh ſummits, with an oblong germen ſupporting two permanent ſtyles, crowned by obtuſe ſtigmas: the germen afterward turns to a long fruit, divided in two parts, each having one furrowed ſeed, convex on one ſide, and plain on the other. Miller enumerates ſix, and Linnæus nine ſpecies.

There have been ſome inſtances of the ill effects of this plant, when taken inwardly; ſome who have taken this herb in ſoups, by miſtaking it for garden chervil, have narrowly eſcaped with their lives.

SHEPHERD's *pouch*, *burſa paſtoris*, in *Botany*, a common weed in moſt parts of England, which propagates itſelf ſo faſt by ſeeds, as not to be eaſily cleared where they are permitted to ſhed; for ſo faſt do the ſeed ripen, and the plants come up, that there are commonly four or five generations of them in a year; they cannot, therefore, be too carefully rooted out of a garden. In the Linnæan ſyſtem, this is a ſpecies of the THLASPI.

This is an officinal plant; its juice has been reputed aſtringent and vulnerary, and as ſuch is uſed againſt hæmorrhages, dyſenteries, diarrhœas, &c.

The country people apply it to cuts and freſh wounds, and ſome hold it of great virtue when made up into a cataplaſm, and applied to the wriſts againſt tertians and quartans; but Dr. Lewis obſerves, that he could perceive no pungency or aſtringency, either in the leaves of this plant, or in the extracts made by water and rectified ſpirit, and that a decoction of them ſtrike no degree of blackneſs with ſolution of chalybeate vitriol. Hence, he infers, that there ſeems to be no foundation for the ſtrong ſtyptic virtues, for which this herb has been generally recommended by writers in the materia medica, or for the acrid inflammatory power, which ſome (probably miſled by its botanic affinity with muſtard, and ſome other acrid vegetables) have aſcribed to it. Lewis's Mat. Med.

SHEPHERD's *ſtaff*, or *ſhepherd's rod*. See TEAZLE.

SHERARDIA, in *Botany*. See *Little field* MADDER.

SHERARDIA is alſo a name given by Pontedera to the genus of plants, called by Linnæus GALENIA.

SHERBET, or SHERBIT, a compound drink, firſt brought into England from Turkey and Perſia, conſiſting of fair water, lemon-juice, ſugar, amber, and other ingredients.

Another kind of it is made of violets, honey, juice of raiſins, &c.

The word *ſherbet*, in the Perſian language, ſignifies *pleaſant liquor*.

SHERIF, in the *Egyptian Orders*, the relations of Mahomet, the ſame tribe of perſons called EMIR by the Turks.

The word is Perſian, and ſignifies *great* or *noble*; and theſe perſons have the privilege of being exempt from appearing before any judge but their own head; and if any of the military orders are obliged to puniſh them for any miſdemeanor, they firſt take off their green turban, in reſpect to their character; and the ſame is done even when they are puniſhed by their own magiſtrate. See SCHERIF.

SHERIFF, or SHIRE-REVE, an officer in each county of England, of very great antiquity; his name being derived from the two Saxon words *ſcire*, *province* or *ſhire*; or rather from *ſciran*, *to divide*, and *gereſa*, *grave*, *reve*, or *perfect*; the *ſheriff* being denominated from the firſt diviſion of the kingdom into counties.

He is called in Latin *vice-comes*, as being the deputy of the earl or comes, to whom the cuſtody of the ſhire is ſaid to have been committed at the firſt diviſion of this kingdom into counties; but the earls being afterwards unable, by reaſon of their high employments, and attendance on the king's perſon, to tranſact the buſineſs of the county, the labour was committed to the *ſheriff*; who now performs all the king's buſineſs in the county; and though he be ſtill called *vice-comes*, yet he is entirely independent of, and not ſubject to the earl: the king, by his letters patent, committing *cuſtodiam comitatus* to the *ſheriff*.

Sheriffs were formerly choſen by the inhabitants of the ſeveral counties; in confirmation of which, it was ordained by 28 Edw. I. c. 8. that the people ſhould have election of *ſheriffs* in every ſhire, where the ſhrievalty is not of inheritance; for anciently in ſome counties the *ſheriffs* were hereditary, as judge Blackſtone apprehends, they were in Scotland, till the ſtatute 20 Geo. II. c. 43. and ſtill continue in the county of Weſtmoreland to this day: the city of London having alſo the inheritance of the ſhrievalty of Middleſex veſted in their body by charter. This election, ſays the ſame author, was, in all probability, not abſolutely veſted in the commons, but required the royal approbation. For in the Gothic conſtitution, the judges of their county courts (which office is executed by our *ſheriff*) were elected by the people, but confirmed by the king: and the form of their election was thus managed; the people, or *incolæ territorii*, choſe twelve electors, and they nominated three perſons, *ex quibus rex unum confirmabat*. But, with us in England, theſe popular elections growing tumultuous, were put an end to by the ſtatute 9 Edw. II. ſt. 2. which enacted, that the *ſheriffs* ſhould from thenceforth be aſſigned by the chancellor, treaſurer, and the judges, as being perſons in whom the ſame truſt might with confidence be repoſed. By ſtatutes 14 Edw. III. cap. 7. 23 Hen. VI. c. 8. and 21 Hen. VIII. c. 20. the chancellor, treaſurer, preſident of the king's council, chief juſtices, and chief baron, are to make this election on the morrow of All Souls in the exchequer: and the king's letters patent, appointing the new *ſheriffs*, uſed commonly to bear date the ſixth day of November. 12 Edw. IV. c. 1.

And the cuſtom now is, which has obtained ſince the time of Henry the Sixth, that all the judges, together with the other great officers, meet in the exchequer chamber on the morrow of All Souls yearly (which day is now altered to the morrow of St. Martin, by the laſt act for abbreviating Michaelmas term), and then and there propoſe three perſons to the king, who afterwards appoints one of them to be *ſheriff*.

This cuſtom of the twelve judges propoſing three perſons, ſeems borrowed from the Gothic conſtitution before-mentioned; with this difference, that among the Goths the twelve nominees were firſt elected by the people themſelves: which uſage of ours was probably founded upon ſome ſtatute, though not now to be found among our printed laws. But notwithſtanding an unanimous reſolution of all the judges of England to this purpoſe, entered in the council book of 3 March, 34 Hen. VI. and the ſtatute 34 and 35 Hen. VIII. cap. 26. ſect. 61. which expreſly recognizes this to be the law of the land; ſome of our writers have affirmed, that the king, by his prerogative, may name whom he pleaſes to be *ſheriff*, whether choſen by the judges or no. This is grounded on a very particular caſe in the fifth year of queen Elizabeth, when, by reaſon of the plague, there was no Michaelmas term kept at Weſtminſter, ſo that the judges could not meet there in *craſtino animarum*, to nominate the *ſheriff*; whereupon the queen named them herſelf, without ſuch previous aſſembly, appointing for the moſt part one of the two remaining in the laſt year's liſt. And this caſe, ſo circumſtanced, is the only authority in our books for making theſe extraordinary *ſheriffs*.

However, it muſt be acknowledged, that the practice of occaſionally naming what are called POCKET-*ſheriffs*, by the ſole authority of the crown, hath uniformly continued to the reign of his preſent majeſty, Geo. III. in which, ſays Blackſtone, few, if any, inſtances have occurred.

By four ſeveral ſtatutes it is enacted, that no one ſhall be *ſheriff*, except he have ſufficient land within the ſhire to anſwer the king and the people in any manner of complaint. 9 Edw. II. ſt. 2. 4 Edw. III. c. 9. 5. Edw. III. c. 4. 14 & 14 Car. II. c. 21.

It has been judged, that an attorney is exempted from the office of *ſheriff*, by reaſon of his attendance on the courts of Weſtminſter.

By 2 Geo. III. c. 20. no perſon, during the time he is acting as a militia officer, ſhall be obliged to ſerve the office of *ſheriff*.

Proteſtant diſſenters, who are exempted by the TOLERATION act, from the obligation of complying with the requiſition of the CORPORATION act, and who can plead their non-compliance as a reaſonable and ſufficient excuſe, are not compellable to ſerve this office, nor of courſe to pay any fine for refuſal. See Furneaux's Letters to Blackſtone, ed 2. and particularly the Appendix, containing lord Mansfield's ſpeech in the houſe of lords 1767, on the cauſe between the city of London and the diſſenters, when the houſe affirmed the unanimous judgment of the commiſſioners delegates, who delivered their opinions *ſeriatim* on the 5th of July, 1762, after hearing counſel ſeveral days.

By a by law of the city of London, no freeman choſen *ſheriff*, &c. ſhall be excuſed, unleſs he voluntarily ſwears he is not worth 10,000*l.* &c. and if he refuſes to take the office, he incurs a forfeiture of 400*l.*

The *ſheriff*, before he exerciſes any part of his office, and before his patent is made out, is to give ſecurity in the king's remembrancer's office in the exchequer, under penalty of 100*l.* for the payment of his proffers, and all other profits of the ſheriffwick; he muſt alſo take the oaths of allegiance and abjuration, and all, except the *ſheriffs* of Wales and Cheſter, an oath appointed by 3 Geo. I. cap. 15. ſect. 18. for the due execution of their office. This oath may be adminiſtered in purſuance of a writ of *dedimus poteſtatem.*

Sheriffs, by virtue of ſeveral old ſtatutes, are to continue in their office no longer than one year; and yet it hath been ſaid, that a *ſheriff* may be appointed *durante bene placito*, or during the king's pleaſure, and ſo is the form of the royal writ; therefore, till a new *ſheriff* be named, his office cannot be determined, unleſs by his own death, or the demiſe of the king.

And by 1 Ann. ſt. 1. c. 8. all officers appointed by the preceding king may hold their offices for ſix months after the king's demiſe, unleſs ſooner diſplaced by the ſucceſſor.

We may farther obſerve, that by 1 Rich. II. cap. 11. no man, that has ſerved the office of *ſheriff* for one year, can be compelled to ſerve the ſame again within three years after.

The power and duty of a *ſheriff* are thoſe that belong to him as a judge, as the keeper of the king's peace, as a miniſterial officer of the ſuperior courts of juſtice, or as the king's bailiff.

In his judicial capacity, he is to hear and determine all cauſes of forty ſhillings value and under, in his *county*-COURT; and he has alſo a judicial power in divers other civil caſes. He is likewiſe to decide the elections of knights of the ſhire (ſubject to the controul of the houſe of commons), of coroners, and of verderors; to judge of the qualification of voters, and to return ſuch as he ſhall determine to be duly elected, but incapable of being elected himſelf for the county, &c. of which he is returning officer.

As the keeper of the king's peace, both by common law and ſpecial commiſſion, he is the firſt man in the county, and ſuperior in rank to any nobleman therein, during his office. He may apprehend and commit to priſon all perſons who break the peace, or attempt to break it; and may bind any one in a recognizance to keep the peace. He may, and is bound, *ex officio*, to purſue and take all traitors, murderers, felons, and other miſdoers, and commit them to gaol for ſafe cuſtody. He is alſo to defend his county againſt any of the king's enemies when they come into the land; and for this purpoſe, as well as for keeping the peace and purſuing felons, he may raiſe the *poſſe comitatus*.

However, by the expreſs directions of the great charter, the *ſheriff*, together with the conſtable, coroner, and certain other officers of the king, are forbidden to hold any pleas of the crown, or, in other words, to try any criminal offence; for it would be highly unbecoming, that the executioners of juſtice ſhould be alſo the judges; ſhould impoſe as well as levy fines and amercements; ſhould one day condemn a man to death, and perſonally execute him the next.

Neither may he act as an ordinary juſtice of the peace during the time of his office, for this would be equally inconſiſtent, he being in many reſpects the ſervant of the juſtices.

In his miniſterial capacity, the *ſheriff* is bound to execute all proceſs iſſuing from the king's courts of juſtice. In the commencement of civil cauſes, he is to ſerve the writ, to arreſt, and to take bail; when the cauſe comes to trial, he muſt ſummon and return the jury; when it is determined, he muſt ſee the judgment of the court carried into execution. In criminal matters, he alſo arreſts and impriſons; he returns the jury; he has the cuſtody of the delinquent; and he executes the ſentence of the court, though it extend to death itſelf.

As the king's bailiff, it is the *ſheriff's* buſineſs to preſerve the rights of the king within his bailiwick; for ſo his county is frequently called in the writs. He muſt ſeize to the king's uſe all lands devolved to the crown by attainder, or eſcheat; muſt levy all fines and forfeitures; muſt ſeize and keep all waifs, wrecks, eſtrays, and the like, unleſs they be granted to ſome ſubject; and muſt alſo collect the king's rents within his bailiwick, if commanded by proceſs from the exchequer.

To execute theſe various offices, the *ſheriff* has under him many inferior officers, an under-*ſheriff*, bailiffs, and gaolers, who muſt neither buy, ſell, nor farm their offices, on forfeiture of 500*l.* 3 Geo. I. cap. 15.

The under-*ſheriff* uſually performs all the duties of office, few excepted, with regard to which the perſonal preſence of the high *ſheriff* is neceſſary. But no under-*ſheriff* ſhall abide in his office above one year by 42 Edw. III. c. 9. and if he does, by 23 Hen. VI. c. 8. he forfeits 200*l.* and no under-*ſheriff* or *ſheriff's* officer, ſhall practiſe as an attorney, during the time he continues in ſuch office, by 1 Hen. V. c. 4. But theſe regulations are evaded, by practiſing in the names of other attornies, and putting in them deputies by way of nominal under-*ſheriffs*.

The under-*ſheriff*, before he enter upon his office, is to be ſworn, by 27 Eliz. c 12. And by 3 Geo. I. c. 15. ſect. 19. it is enacted, that all under-*ſheriffs* of any counties in South Britain, except the counties in Wales, and the county palatine of Cheſter, ſhall take an oath for the due execution of their office. Blackſt. Com. b. i. p. 341, &c.

SHERIFF's *court.* See *County* COURT and *Mayor's* COURTS.

SHERIFF's *tourn*, or *turn*. See TURN.

SHERIFF, *appoſal of.* See APPOSAL.

SHERIFFS, *iſſues on.* See ISSUES.

SHEW-*box for prints.* See CAMERA.

SHEWIN, or SEWIN, in *Ichthyology*. See GREY.

SHEWAGE. See SCAVAGE.

SHIDES. See SHINGLES.

SHIELD, an ancient weapon of defence, in form of a light buckler, borne on the arm to fend off lances, darts, &c.

The form of the *ſhield* is repreſented by the eſcutcheon in coats of arms.

The *ſhield* was that part of the ancient armour on which the perſons of diſtinction in the field of battle always had their arms painted; and moſt of the words uſed at this time to expreſs the ſpace that holds the arms of families, are derived from the Latin name for a *ſhield*, *ſcutum*. The French *eſcu*, and *eſcuſſion*, and the Engliſh word, *eſcutcheon*, or, as we commonly ſpeak it, *ſcutcheon*, is evidently from this origin; and the Italian *ſcudo* ſignifies both the *ſhield* of arms, and that uſed in war.

The Latin name *clypeus*, for the ſame thing, ſeems alſo to be derived from the Greek word γλυφειν, *to engrave*; and it had this name from the ſeveral figures engraved on it, as marks of diſtinction of the perſon who wore it.

The *ſhield* in war, among the Greeks and Romans, was not only uſeful in the defence of the body, but it was alſo a token, or badge of honour to the wearer, and he who returned from battle without it, was always treated with infamy afterwards.

People have at all times thought this honourable piece of the armour the propereſt place to engrave, or figure on the ſigns of dignity of the poſſeſſor of it; and hence, when arms came to be painted for families in after-times, the heralds always choſe to repreſent them upon the figure of a *ſhield*, but with ſeveral exterior additions and ornaments; as the helmet, ſupporters, and the reſt.

The form of the *ſhield* has not only been found different in various nations, but even the people of the ſame nation, at different times, have varied its form extremely; and among ſeveral people there have been *ſhields*, of ſeveral forms and ſizes in uſe, at the ſame period of time, and ſuited to different occaſions.

The moſt ancient and univerſal form of *ſhields*, in the earlier ages, ſeems to have been the triangular. This we ſee inſtances of in all the monuments and gems of antiquity: our own moſt early monuments ſhew it to have been the moſt antique ſhape alſo with us, and the heralds have found it the moſt convenient for their purpoſes, when they had any odd number of figures to repreſent; as if three, then two in the broad bottom part, and one in the narrow upper end, it held them very well; or if five, they ſtood as conveniently, as three below, and two above. The other form of a *ſhield*, now univerſally uſed, is ſquare, rounded and pointed at the bottom: this is taken from the figure of the Samnitic *ſhield*, uſed by the Romans, and ſince copied very generally by the Engliſh, French, and Germans.

The Spaniards and Portugueſe have the like general form of *ſhields*, but they are round at the bottom without the point; and the Germans, beſide the Samnite *ſhield*, have two others pretty much in uſe: theſe are, 1. The bulging *ſhield*, diſtinguiſhed by its ſwelling or bulging out at the flanks; and, 2. The indented *ſhield*, or *ſhield* chancree, which has a number of notches and indentings all round its ſides. The uſe of the ancient *ſhield* of this form was, that the notches ſerved to reſt the lance upon, that it might be firm while it gave the thruſt; but this form being leſs proper for the receiving armorial figures, the two former have been much more uſed in the heraldry of that nation.

Beſide this different form of the *ſhields* in heraldry, we find them alſo often diſtinguiſhed by their different poſitions, ſome of them ſtanding erect, and others ſlanting various ways, and in different degrees; this the heralds expreſs by the word *pendant*, *hanging*, they ſeeming to be hung up not by the centre, but by the right or left corner. The French call theſe *ecu pendant*, and the common antique triangular ones *ecu ancien*. The Italians call this *ſcuto pendente*; and the reaſon given for exhibiting the *ſhield* in theſe figures in heraldry is, that in the ancient tilts and tournaments, they who were to juſt at theſe military exerciſes, were obliged to hang up their *ſhields* with their armories, or coats of arms on them, out at the windows and balconies of the houſes near the place; or upon trees, pavilions, or the barriers of the ground, if the exerciſe was to be performed in the field. Thoſe who were to fight on foot, according to Columbier, had their *ſhields* hung up by the right corner, and thoſe who were to fight on horſeback, had theirs hung up by the left. This poſition of the *ſhields* in heraldry, is called *couche* by ſome writers, though by the generality *pendant*.

It was very frequent in all parts of Europe, in arms given between the eleventh and fourteenth centuries; but it is to be obſerved, that the hanging by the left corner, as it was the token of the owner's being to fight on horſeback, ſo it was eſteemed the moſt honourable and noble ſituation; and all the pendant *ſhields* of the ſons of the royal family of Scotland and England, and of our nobility, at that time, are thus hanging from the left corner.

The hanging from this corner was a token of the owner's being of noble birth, and having fought in the tournaments before; but no ſovereign ever had a *ſhield* pendant any way, but always erect, as they never formally entered the liſts of the tournament.

The Italians generally have their *ſhields* of arms of an oval form; this ſeems to be done in imitation of thoſe of the popes, and other dignified clergy; but their herald, Petro Sancto, ſeems to regret the uſe of this figure of the *ſhield*, as an innovation brought in by the painters and engravers, as moſt convenient for holding the figures, but derogatory to the honour of the poſſeſſor, as not repreſenting either antiquity, or honours won in war, but rather the honours of ſome citizen, or perſon of learning. Some have carried it ſo far, as to ſay that thoſe, who either have no ancient title to nobility, or have ſullied it by any unworthy action, cannot any longer wear their arms in *ſhields* properly figured, but were obliged to have them painted in an oval or round *ſhield*.

In Flanders, where this author lived, the round and oval *ſhields* are in the diſrepute he ſpeaks of; but in Italy, beſide the popes and dignified prelates, many of the firſt families of the laity have them.

The ſecular princes, in many other countries, alſo retain this form of the *ſhield*, as the moſt ancient, and truly expreſſive of the Roman clypeus. Niſbet's Heraldry, p. 12. Componille, Herald.

SHIELD, in *Heraldry*, denotes the ESCUTCHEON, or field, whereon the bearings of the armory are placed.

SHIELDRAKE. See TADORNA.

SHIFTED, in *Sea Language*, denotes the ſtate of a ſhip's ballaſt or cargo, when it is ſhaken from one ſide to the other, either by the violence of her rolling in a turbulent ſea, or by an extraordinary inclination to one ſide when under a great preſſure of ſail.

SHIFTED, as expreſſed of the wind, implies *altered*.

SHIFTERS, on *board a man of war*, certain men who are employed by the cooks to ſhift and change the water in which the fleſh or fiſh is put, and laid for ſome time, in order to fit it for the kettle.

SHIFTING *a tackle*, in *Sea Language*, the act of removing the blocks of a tackle to a greater diſtance from each other, on the object to which they are applied, in order to give a greater ſcope or extent to their purchaſe. This operation is otherwiſe called FLEETING.

SHIFTING *the helm*, denotes the alteration of its poſition, by puſhing it towards the oppoſite ſide of the ſhip.

SHIFTING *the voyal*, ſignifies changing its poſition on the capſtern, from the right to the left, and *vice verſa*.

SHIITES. See SONNA.

SHILLING, an Engliſh ſilver coin, equal to twelve pence, or the twentieth part of a pound.

Freherus derives the Saxon *ſcilling*, whence our *ſhilling*, from a corruption of *ſiliqua*; proving the derivation by ſeveral texts of law, and, among others, by the twenty-ſixth law, *De annuis legatis*. Skinner deduces it from the Saxon *ſcild*, *ſhield*, by reaſon of the eſcutcheon of arms thereon.

Biſhop Hooper derives it from the Arabic *ſchecle*, ſignifying a *weight*; but others, with greater probability, deduce it from the Latin *ſicilicus*, which ſignified in that language, *a quarter of an ounce*, or the forty-eighth part of a Roman pound. In confirmation of this etymology, it is alledged, that the *ſhilling* kept its original ſignification, and bore the ſame proportion to the Saxon pound as ſicilicus did to the Roman and the Greek, being exactly the forty-eighth part of the Saxon pound; a diſcovery which we owe to Mr. Lambarde. Explicatio Rerum & Verborum in Legg. Sax. voc. Libra.

However, the Saxon laws reckon the pound in the round number at fifty *ſhillings*, but they really coined out of it only forty-eight; the value of the *ſhilling* was five pence; but it was reduced to four pence above a century before the Conqueſt; for ſeveral of the Saxon laws made in Athelſtan's reign, oblige us to take this eſtimate. Thus it continued to the Norman times, as one of the Conqueror's laws (Legg. Sax. p. 221.) ſufficiently aſcertains; and it ſeems to have been the common coin by which the Engliſh payments were adjuſted. After the Conqueſt, the French *ſolidus* of twelve pence, which was in uſe among the Normans, was called by the Engliſh name of *ſhilling*; and the Saxon *ſhilling* of four pence took a Norman name, and was called the *groat*, or great coin, becauſe it was the largeſt Engliſh coin then known in England.

It has been the opinion of the biſhops Fleetwood and Gibſon, and of the antiquaries in general, that though the method of reckoning by pounds, marks, and *ſhillings*, as well as by pence and farthings, had been in conſtant uſe even from the Saxon times, long before the Norman Conqueſt, there never was ſuch a coin in England as either a pound or a mark, nor any *ſhilling*, till the year 1504 or 1505; but in the twentieth year of king Henry VII. (A.D. 1505) a few ſilver *ſhillings*, or twelve-pences, were coined, being about one-half the ſize of the modern *ſhillings*, or forty out of a pound weight of ſilver, which were fair and broad pieces. Theſe, however, it is ſaid, have long ſince been ſolely confined to the cabinets of collectors.

Mr. Clarke combats this opinion, alledging, that ſome coins mentioned by Mr. Folkes, under Edw. I. were probably Saxon *ſhillings* new minted, and that archbiſhop Aelfric (Gram. Saxon. p. 52, at the end of Somner's Saxon Diction.) expreſly ſays, that the Saxons had three names for their money, viz. mancuſes, *ſhillings*, and pennies. He alſo urges the different value of the Saxon *ſhilling* at different times, and its uniform proportion to the pound, as an argument, that their *ſhilling* was a coin; and the teſtimony of the Saxon goſpels, in which the word we have tranſlated *pieces of ſilver*, is rendered *ſhillings*, which, he ſays, they would hardly have done, if there had been no ſuch coin as a *ſhilling* then in uſe. Accordingly, the Saxons expreſſed their *ſhilling* in Latin by *ſiclus* and *argenteus*.

He farther adds, that the Saxon *ſhilling* was never expreſſed by *ſolidus*, till after the Norman ſettlements in England: and howſoever it altered during the long period that elapſed from the Conqueſt to the time of Henry VII. it was the moſt conſtant denomination of money in all payments, though it was then only a ſpecies of account, or the twentieth part of the pound ſterling: and when it was again revived as a coin, it leſſened gradually as the pound ſterling leſſened, from the twenty-eighth of Edw. III. to the forty-third of Elizabeth. Clerke on Coins, &c. p. 120. 152. 155. 200 376.

In the year 1560, there was a peculiar ſort of *ſhilling* ſtruck in Ireland, of the value of nine pence Engliſh, which paſſed in Ireland for twelve pence. The motto on the reverſe of theſe is, *poſui Deum adjutorem meum*.

Eighty-two of theſe *ſhillings*, according to Malynes, went to the pound; they, therefore, weighed twenty grains one-fourth each, which is ſomewhat heavier in proportion than the Engliſh *ſhilling* of that time, ſixty-two whereof went to the pound, each weighing ninety-two grains ſeven-eighths; and the Iriſh *ſhilling* being valued at the Tower at nine pence Engliſh, that is, one-fourth part leſs than the Engliſh *ſhilling*, it ſhould, therefore, proportionably weigh one-fourth part leſs, and its full weight be ſomewhat more than ſixty-two grains; but ſome of them found at this time, though much worn, weighed ſixty-nine grains. In the year 1598, five different pieces of money of this kind were ſtruck in England for the ſervice of the kingdom of Ireland.

Theſe were *ſhillings* to be current in Ireland as twelve pence each; half *ſhillings* to be current at ſix pence, and quarter *ſhillings* at three pence.

Pennies and halfpennies were alſo ſtruck of the ſame kind, and ſent over for the payment of the army in Ireland. The money thus coined was of a very baſe mixture of copper and ſilver; and two years after there were more pieces of the ſame kinds ſtruck for the ſame ſervice, which were ſtill worſe; the former being three ounces of ſilver to nine ounces of copper; and theſe latter only two ounces eighteen pennyweights, to nine ounces two pennyweights of the alloy Simon's Iriſh Coins.

The Dutch, Flemiſh, and Germans, have likewiſe their *ſhilling*, called *ſchelin*, *ſchilling*, *ſcalin*, &c. but theſe, not being of the ſame weight or fineneſs with the Engliſh *ſhilling*, are not current at the ſame value.

The Engliſh *ſhilling* is worth about twenty-three French ſols; thoſe of Holland and Germany about eleven ſols and an half; thoſe of Flanders about nine. The Dutch *ſhillings* are alſo called *ſols de gros*, becauſe equal to twelve gros. The Danes have copper *ſhillings*, worth about one fourth of a farthing ſterling. See Coin.

SHINGLES, or Shides, in *Building*, ſmall pieces of wood, or quartered oaken boards, ſawed to a certain ſcantling, or more uſually cleſt to about an inch thick at one end, and made like wedges, four or five inches broad, and eight or nine inches long. They are uſed in covering, eſpecially for churches and ſteeples, inſtead of tiles or ſlates.

This covering is dear; yet where tiles, &c. are very ſcarce, and a light cover is required, it is preferable to thatch. If made of good oak, and cleft, not ſawed, and well ſeaſoned, *ſhingles* make a ſure, light, and durable covering.

The building is firſt to be covered all over with boards, and the *ſhingles* then nailed thereon.

Shingles, in *Medicine*, a kind of herpes, called alſo the *miliary herpes*.

It conſiſts of innumerable little puſtules breaking out in various parts of the body, viz. the neck, breaſt, loins, thighs, &c. The place affected is ſomewhat inflamed, and the patient is a little feveriſh.

White puſtules finally ariſe and ſuppurate, and are ſucceeded by little round ſcabs reſembling millet ſeeds.

It is to be attacked with diſcutients, and the higher puſtules are to be cut off with ſciſſars, and a cerate of oil and wax is then to be applied.

Wiſeman obſerves, that the *ſhingles* come near the nature of a pſora: and are, therefore, to be cured with mercurial cathartics.

SHINGLING, in the *Iron Works*, in many parts of England, is the operation of hammering the ſow, or caſt iron, into blooms. The tongs, uſed for holding the iron in this operation, are called *ſhingling-tongs*, and the iron to be thus wrought is called a loop.

SHIP, a general name for all great veſſels with ſails, fit for navigation on the ſea; but in ſea language, the term is more particularly applied to a veſſel furniſhed with three maſts, each of which is compoſed of a lower maſt, top-maſt, and top-gallant-maſt, with the uſual machinery thereto belonging.

To give the reader an idea of the ſeveral parts and members of a *ſhip*, both internal and external, with their reſpective denominations in the ſea language (the principal whereof are explained in the reſpective places of this Dictionary), we here give him two draughts; the one, a ſection of the body of a firſt rate, to ſhew its conſtruction, the diſpoſition of its inſide, &c. The other, the ſame *ſhip* entire, with the ſails, rigging, &c. See *Tab. Ship. fig.* 1 and 2.

The ſieur Aubin defines a *ſhip*, a timber building, conſiſting of various parts and pieces, nailed and pinned together with iron and wood, in ſuch form, as to be fit to float, and to be conducted by wind and ſails from ſea to ſea.

In order to give our readers ſome idea of the conſtruction and conſtituent parts of a *ſhip*, it may be proper to obſerve, that naval architecture comprehends three principal objects, viz. 1. To give the *ſhip* ſuch an exterior form or figure, as may be beſt adapted to the ſervice for which ſhe is deſigned. 2. To find the proper figures of all the pieces of timber that compoſe a *ſhip*, and to unite them together into a compact frame; and, 3. To provide ſuitable accommodations for the officers and crew, as well as for the cargo, furniture, proviſions, artillery, and ammunition.

The exterior figure of a *ſhip* includes the bottom or *quick work*, or the hold, which is the part that is under water when the ſhip is laden, and the upper works, called the *dead work*, which is uſually above the water when the ſhip is laden.

In order to give a proper figure to the bottom, all the qualities which are neceſſary to render a *ſhip* fit for the ſervice for which ſhe is deſigned ſhould be conſidered; accordingly, a *ſhip* of war ſhould be able to ſail ſwiftly, and carry her lower tier of guns ſufficiently, e. g. four or five feet out of the water: a merchant *ſhip* ought to contain a large cargo of goods, and be navigated with few hands; and both ſhould be able to carry ſail firmly, ſteer well, drive little to leeward, and ſuſtain the ſhocks of the ſea without being violently ſtrained.

It is uſual among *ſhip*-wrights to delineate three ſeveral draughts; for the more eaſy explication of which, it will be proper to introduce an account of the ſeveral pieces, or parts of which they are compoſed, and to repreſent them in the order of their diſpoſition. See *Tab.* II. *Ship, fig.* 5.

In this figure are exhibited A, A, &c. the pieces which compoſe the keel, to be ſeverally bolted together and clinched: B the ſtern-poſt, which is tenanted into the keel, and connected to it by a knee G; it ſupports the rudder, and unites the ſides of the *ſhip* abaft: C, the ſtern, which is compoſed of two pieces ſcarfed together; this is an arching piece of timber into which the ſhip's ſides are united forwards: D, the beams, which are uſed to ſupport the decks, and confine the ſides to their proper diſtance: E, the falſe poſt, which ſerves to augment the breadth of the ſtern poſt, being alſo tenanted into the keel: F, the knees which connect the beams to the ſides: G, the knee of the ſtern-poſt, which unites it to the keel: H, the apron, in two pieces; it is ſayed on the inſide of the ſtem, to ſupport the ſcarf thereof; for which reaſon the ſcarf of the former muſt be at ſome diſtance from that of the latter: I, the ſtemſon, in two pieces, to re-inforce the ſcarf of the apron: K, the wing tranſom, which is fayed acroſs the ſtern-poſt, and bolted to the head of it, having its two ends let into the faſhion pieces: L, the deck tranſom, parallel to the wing tranſom, and ſecured in the ſame manner: M, N, the lower tranſoms: O, the faſhion-piece on one ſide; the keel of which is connected with the ſtern-poſt, and the head ſecured to the wing tranſom: P, the top timbers, or upper parts of the faſhion-pieces: Q, the ſleepers, which faſten the tranſoms to the *ſhip*'s ſide: R, the breaſt hooks, in the hold, which are fayed acroſs the ſtem to ſtrengthen the fore part of the *ſhip*: S, the breaſt hooks of the deck, which are placed immediately above the former, and uſed for the ſame purpoſes: T, the rudder, which is joined to the ſtern-poſt by hinges, and ſerves to direct the *ſhip*'s courſe: U, the floor timbers, laid acroſs the keel, to which they are firmly bolted: V, the lower futtocks; W, the top timbers, which are all united to the floor timbers, forming a frame that reaches from the keel to the top of the ſide: X, the pieces which compoſe the kelſon; they are ſcarfed together like the keel-pieces, and placed over the middle of the floor timbers, upon each of which they are ſcored about an inch and a half, as exhibited by the notches: Y, the ſeveral pieces of the knee of the head, the lower part of which is fayed to the ſtem; the keel being ſcarfed to the fore foot: Z, the cheeks of the head or knees, which connect the head to the bows on each ſide: &, the ſtandard of the head which faſtens it to the ſtem: *a*, the cat-heads, one of which lies on each bow, projecting outwards like the arm of a crane; they are uſed to draw the anchors up to the top of the ſide, without injuring the bow: *b*, the bits, to which the cable is faſtened when the ſhip rides at anchor; *c*, the falſe poſt in two pieces, fayed to the fore part of the ſtern-poſt: *d*, the ſide counter-timbers, which terminate the *ſhip* abaft within the quarter gallery: *e e*, two pieces of dead wood, one afore, and another abaft, fayed on the keel.

The *firſt* draught is the *plane of elevation* or ſheer draught, e. g. of a ſixty gun *ſhip*, *fig*. 6. which repreſents the whole length of the *ſhip*, according to a ſide view, perpendicular to the keel. The ſame letters are annexed to the ſame objects, as in the preceding explanation of the pieces, when they occur in both figures; accordingly, A A is the keel, whoſe upper edge is prolonged by the dotted line *p*, *q*, upon the extremities of which are erected perpendiculars, that determine the height of the wing tranſom K, and length of the gun-deck K C: A B the ſtern-poſt, A C the ſtem, D D the quarter-gallery with its windows; E F the quarter pieces, which limit the ſtern on each ſide; F the taffarel, or upper piece of the ſtern; F G the profile of the ſtern with its galleries; H the gun ports; I the channels, with their dead eyes and chain plates; K the wing tranſom; K G the counter; L B the deck tranſom; M, N, O, the firſt, ſecond, and third tranſoms, of which O K is the third or loweſt; *m o* L P, the direction of the faſhion-piece, having its breadth canted aft towards the ſtern; Q R the main ſkeeds for hoiſting in the boats clear of the *ſhip*'s ſide; LQZ the main-wale, with its ſheer afore and abaft; D R X the channel wales, parallel to the main wale; S U S the ſheer rail, parallel to the wales; T *t* the rudder; A *t* F the rake of the ſtern; V W V the waiſt rail; P *i i* the drift rails abaft, and *i a* the drift rails forward; T U C the water line; XX the rails of the head; Y the knee of the head or cut water; Z Z the cheeks of the head; a, a, the cat-head; M⊕C the riſing line of the floor; *ku*C the cutting down line, which limits the thickneſs of all the floor timbers, and likewiſe the height of the dead wood afore and abaft; ⊕*u*UW the mid-*ſhip* frame; *a*, *b*, *c*, *d*, *e*, *f*, *g*, *h*, the frames or timbers in the fore body of the *ſhip*, i. e. before the mid-*ſhip* frame; 1, 2, 3, 4, 5, 6, 7, 8, 9, the timbers in the after body, which are erected abaſt the mid-*ſhip* frame.

In this projection, the eye is ſuppoſed to view the *ſhip*'s ſide in a line perpendicular to the plane of elevation, and, therefore, the convexity will vaniſh: and the frames will be repreſented by ſtraight lines, except the faſhion piece abaft, and the knuckle timber forward.

The plane of elevation determines the length and depth of the keel; the difference of the draughts of water; the length and projection, or rake, of the ſtern and ſtern-poſt; the poſition of the mid-*ſhip* frame upon the keel, together with that of the principal frames afore and abaft; the load water line, the wales, the dimenſions and ſituations of the gun-ports, the projection of the rails of the head and ſtern gallery, with the ſtations of the maſts and channels.

The *ſecond* draught is the *plane of projection*, or vertical plane of the timbers, in which the *ſhip* is exhibited according to an end view, and ſtripped of her planks, ſo as to preſent the outlines of the principal timbers, and the projection of their frames, in relation to each other, appears. See *fig*. 7.

This plane is ſuppoſed to cut the keel at right angles in the place where the *ſhip* is broadeſt; for as all *ſhips* are broader near the middle of their length than towards the extremities, it is evident that the timbers are more extended in proportion. The moſt capacious of theſe repreſents what is called the mid-*ſhip* frame; and upon the area of this frame is delineated the projection of all the others.

Thus the plane of projection limits the different breadths of a *ſhip* in various points of her length, and exhibits the outline of the timbers reſpectively to each other, as they are erected upon the keel. Accordingly, this draught ought to preſent a variety of ſections of the *ſhip* in different places of her length, and always perpendicular to the ſurface of the water; ſo that the eye of the obſerver, when placed in what may be called the axis of the *ſhip*, may perceive the ſeveral ſections at one glance, i. e. when looking full on the ſtem from before the ſhip, he ſhall diſcover the fore timbers: and when looking from behind, directly on the ſtern, he ſhall percieve the form of the after timbers. To form a juſt idea of this plane, therefore, we ſhould ſuppoſe a *ſhip* reſting upon the ſtocks, in the ſame poſition as when afloat upon the water. Thus a variety of black vertical lines may be drawn at equal diſtances upon the bottom, which is white, to form different outlines of a *ſhip*, correſponding to the timbers within.

It is to be obſerved, that the faſhion of the inferior timbers muſt conform to the figure of the mid *ſhip* frame, which is placed in the fulleſt part of the *ſhip*; and as the planes of all the other timbers diminiſh in a certain progreſſion as they approach the ſtem and ſtern, they are properly delineated on the plane of the mid-*ſhip* frame, which alſo repreſents the depth of the keel and length of the mid-*ſhip* beam; as the two ſides of a *ſhip* ought to be exactly alike, it is ſufficient to repreſent the ſections of the fore part of a *ſhip* on the left ſide, and thoſe in the after part on the right ſide, ſo as to perceive all the ſections, as well afore as abaft, upon one plane. See *fig*. 7. in which A is the keel; B C the line which expreſſes the upper edge of the keel, from which the height of each timber, and the height of its different breadths are meaſured: B D and C E, perpendiculars raiſed on the line B C, to limit the *ſhip*'s extreme breadth and height amid-*ſhips*: A F, a perpendicular erected from the middle of the keel to biſect the line of the *ſhip*'s breadth: F∗9, the half breadth line of the aftmoſt top timber; and the ſeven lines parallel to and immediately under this, on the right ſide of the line A F, are all top timber half-breadths, abaft the mid-*ſhip* frame, the loweſt of which coincides with the horizontal line D E; and the parallel lines oppoſite to theſe, on the left ſide of A F, repreſent the top timber half-breadths in the fore body, or the half-breadths of the top timbers before the mid-*ſhip* frame: G, H, I, Q, R, S, T, the radii of the breadth-ſweeps abaft the mid *ſhip* frame; thoſe of the breadth-ſweeps in the fore body, or before the mid-*ſhip* frame, are directly oppoſite, on the right ſide: ⊕A⊕, the mid-*ſhip* frame, from the extreme breadth downwards: 1, 2, 3, 4, 5, 6, 7, 8, 9, the outlines of timbers abaft the mid-*ſhip* frame in different parts of their height: *a*, *b*, *c*, *d*, *e*, *f*, *g*, *h*, the outlines of the timbers before the mid-*ſhip* frame, in different parts of their height, *h* being the foremoſt, or knuckle timber: K *i*, the wing tranſom, whoſe ends reſt upon the faſhion-piece L, the deck tranſom, parallel to and under the wing tranſom: M N O, the lower tranſoms, of which O *k* is the third and loweſt: *m k* P, the dotted line, which expreſſes the figure of the faſhion-piece, without being canted aft: P, the upper part, or top timber of the faſhion-piece: *n*, *o*, *p*, *q*, *r*, *ſ*, the radii of the floor ſweeps, abaft the mid-*ſhip* frame, thoſe before it being on the oppoſite ſide of the line A F, to which they are all parallel: 1ſt R^{d}. 2d R^{d}. 3d R^{d}. 4th R^{d}. the diagonal ribbands abaft the mid-*ſhips*: and *t*, *u*, *x*, *y*, the ſame ribbands expreſſed in the fore-body.

Here it may be obſerved, that the various methods by which the curves of the timbers are deſcribed upon the plane of the mid-*ſhip* frame, are equally mechanical and arbitrary. In the latter ſenſe, they are calculated to make a *ſhip* fuller or narrower, according to the ſervice for which ſhe is deſigned; and in the former, they are drawn according to thoſe rules which the artiſt has been implicitly taught to follow, or which his fancy or judgment has eſteemed the moſt accurate and convenient. They are generally compoſed of ſeveral arches of a circle, united together by moulds framed for that purpoſe: the radii of thoſe arches, therefore, are of different lengths, according to the breadth of the *ſhip* in the place where ſuch arches are ſwept; and they are expreſſed on the plane of projection either by horizontal or perpendicular lines: the radii of the breadth ſweeps being always in the former, and the radii of the floor ſweeps in the latter direction. Theſe two arches are joined by a third, which coincides with both, without interſecting either. The curve of the top timber is either formed by a mould, which correſponds to the arch of the breadth-ſweep, or by another ſweep, whoſe centre and radius are without the plane of projection.

The breadth of the *ſhip* at every top timber is limited by an horizontal line drawn on the floor plane, called the *half-breadth* of the top timbers. The extreme breadth is alſo determined by another horizontal line on the floor plane, and the lines of half-breadth are thus mutually transferable from the projection and floor planes to each other.

The neceſſary data by which the curves of the timbers are delineated, are the perpendicular height from the keel, the main or principal breadth, and the top timber breadth; for as a ſhip is much broader near the middle of her length than towards the ends, ſo ſhe is broader in the middle of her height than above and below; and this latter difference of breadth is continued through every point of her length. The main breadth of each frame of timber is, therefore, the *ſhip*'s breadth, nearly in the middle of her height in that part; and the top timber breadth is the line of her breadth near the upper ends of each timber.

The *third* draught is called the *horizontal plane*, which ſerves to convey a diſtinct idea of the horizontal curves by means of water lines traced upon it; in this draught, the curves of the tranſoms, called the *round-aft*, are alſo marked, and ſometimes the breadth and thickneſs of the timbers.

The horizontal or floor plane, is that upon which the whole frame is erected, and will be more clearly underſtood by deſcribing the water lines and ribbands of which it is compoſed.

When a *ſhip* floats upon the water, her upper works will be evidently ſeparated from the bottom by the ſurface of the water, which will accordingly deſcribe an imaginary horizontal line upon the bottom from the ſtem to the ſtern-poſt. The higheſt of thoſe lines is termed the *load water line*, which is ſuppoſed to be drawn by the ſurface of the water on the upper part of the bottom, when ſhe is ſufficiently laden for a ſea voyage. If the ſhip is lightened of any part of her lading, and preſerves the ſame difference in her draught of water at the two ends, or, which amounts to the ſame, if ſhe is lightened ſo as to preſerve the ſame equilibrium of the keel with regard to the ſurface of the water; it is evident, that ſhe will riſe higher out of the water, the ſurface of which will mark a ſecond water line parallel to the firſt, but nearer the keel in proportion to the number of feet which the *ſhip* has riſen. Then by lightening a *ſhip* gradually, and at the ſame time preſerving the direction of her keel, or the angle which the keel makes with the ſurface of the water, a variety of WATER *lines* may be drawn parallel to each other.

The RIBBANDS are narrow and flexible planks placed on the bottom at different heights, ſo as to form a ſort of mould for ſtationing the inferior timbers between the principal ones. They differ from the water lines inaſmuch as the latter have only one curve, which is horizontal, whereas the ribbands, beſides their horizontal one, have a vertical curve; the horizontal curve is expreſſed upon the floor-plane, and the vertical curve is exhibited in the plane of elevation.

The horizontal plane, beſides the water lines and ribbands, contains alſo the main and top timber breadth lines, or the longitudinal lines, by which the main breadth and top timber breadth are limited in every point of the *ſhip*'s length. The horizontal curves of the tranſoms and harpins are alſo repreſented therein, together with the planes of the principal timbers; the cant of the faſhion-piece, the length of the rake afore and abaft, the projection of the cat-heads, and the curve of the upper rail of the head, to which curves of the lower ones are uſually parallel. See *fig.* 8. in which B A C is the line of the *ſhip's* length, paſſing through the middle of the ſtem and ſtern-poſt; B the upper end of the ſtern-poſt; C the upper end of the ſtem; B F the length of the rake abaft; D W X, the top timber breadth line, or the line which limits the breadth of each top timber: D F the breadth of the aftmoſt timber at the taffarel: B K, the wing tranſom: B L I, the horizontal curve of the deck tranſom: M M, the horizontal curve, or round aft of the firſt tranſom: M N, the horizontal curve of the ſecond tranſom, prolonged into a water line N 8 7: *k* O, the horizontal curve of the third tranſom, which is alſo prolonged into another water line O, *n*, U, *p*, Q: *m* O P, the plane of the faſhion-piece as canted aft: ⊕ W U, the plane of the mid-*ſhip* frame: *a*, *b*, *c*, *d*, *e*, *f*, *h*, the planes of the timbers before the mid-*ſhip* frame: 1, 2, 3, 4, 5, 6, 7, 8, 9, the planes of the timber abaft the mid-*ſhip* frame: XX, the figure of the upper rail of the head: CY, the projection of the knee of the head, and a a the projection of the cat-head.

Such are the principal draughts uſed in the conſtruction of a *ſhip*, which reciprocally correſpond with each other in the dimenſions of length, breadth, and depth: thus, the plane of elevation is exactly of the ſame length with the horizontal or floor plane. The ſeveral breadths of the timbers in the floor plane, and that of the projection, are immediately transferrable; and the real height of the timbers in the projection, exactly conforms to their height in the elevation: e. g. let it be required to transfer the height of the wing tranſom from the elevation to the projection; extend the compaſſes from the point K in the elevation down to the dotted line, prolonged from the upper edge of the keel, and ſetting the other foot in the point *p*, then will the line K *p* be the perpendicular height of the wing tranſom; transfer this from the middle of the line B A C, in the projection, to the point K in the perpendicular A F, then will A K be the height of the wing tranſom in the plane of projection; and thus the height of all the tranſoms may be laid down from the former upon the latter.

Again, let it be required to transfer the main breadth of the mid-*ſhip* frame from the projection to the horizontal plane; ſet one foot of the compaſſes in the point ⊕ on the perpendicular C E, and extend the other along the main breadth ſweep ⊕ G, till it touches the perpendicular A F parallel to C E; lay this diſtance upon the horizontal plane from the point *u* in the line of the *ſhip's* length B A C, along the plane of the mid-*ſhip* frame to the point ⊕: ſo ſhall the line ⊕ W U be the breadth of the mid-*ſhip* frame to the horizontal plane. Thus alſo the top timber breadth, or the diſtance of each top timber from the middle of the *ſhip's* breadth, may be in the ſame manner transferred, by extending the compaſſes from the line B A C, in the horizontal plane, to the top timber breadth line, upon any particular timber, as 1, 2, 3, &c. which will give its proper dimenſions thereon. In the ſame manner the breadths of all the timbers may be laid from the projection to the horizontal plane, and *vice verſa*, from that to the projection: and the height of each timber may alſo be transferred from the elevation to the projection, &c.

In veſſels of war, the general dimenſions are eſtabliſhed by authority of officers appointed by the government to ſuperintend the building of *ſhips*. In the merchants ſervice, the extreme breadth, length of the keel, depth in the hold, height between decks, and in the waſte, are agreed on by contract; and from theſe dimenſions the ſhipwright is to form a draught ſuitable to the trade for which the *ſhip* is deſigned.

In projecting the draught of a veſſel of war, the firſt article to be conſidered is her length; and as all *ſhips* are much longer above than below, it is neceſſary to diſtinguiſh the preciſe part of her height from which her length is taken, which is uſually the lower gun-deck, or the load water line. In this draught it will be particularly neceſſary to leave ſufficient diſtance between the ports.

The next object is to eſtabliſh the breadth of the mid-*ſhip* beam; thoſe who would diminiſh the breadth, alledge, that a narrow veſſel meets with leſs reſiſtance in paſſing through the water; that by increaſing the length ſhe will drive leſs to leeward; that the water lines will be more conveniently formed to divide the water; that a long and narrow *ſhip* will require leſs ſail to advance ſwiftly; that her maſts will be lower, and her rigging lighter, &c. Thoſe, on the contrary, who would enlarge the breadth, pretend, that this form is better fitted to preſerve a good battery of guns; that there will be more room to work the guns conveniently; that by carrying more ſail, the *ſhip* will be enabled to run faſter, or that this quality will at leaſt overbalance the advantage which the others have of more eaſily dividing the water; that, broader at the load water line, they will admit of being very narrow in the floor, particularly toward the extremities; and that a broad veſſel will more readily riſe upon the wave than a narrow one.

Notwithſtanding this difference of opinion about proportioning the breadth to the length, it is moſt uſual to conform to the dimenſions of *ſhips* of the ſame rate. After the dimenſions of the breadth and length are determined, the depth of the hold muſt be fixed, which is generally half the breadth; but the form of the body ſhould be conſidered on this occaſion, for a flat floor will require leſs depth in the hold than a ſharp one. The diſtance between the decks muſt be alſo ſettled. We may then proceed to fix the length of the keel, by which we ſhall be enabled to judge of the rake of the ſtem and ſtern-poſt.

The rake is known to be the projection of the *ſhip* at the height of the ſtem and ſtern-poſt, beyond the ends of the keel afore and abaft, or the angle by which the length is increaſed as the fabrick riſes. To theſe we may alſo add, the height of the ſtem and wing tranſom.

After theſe dimenſions are ſettled, the timbers may be conſidered which form the ſides of the *ſhip*; a frame of timbers, which appear to be one continued piece, is compoſed of one floor timber U, *fig.* 5. whoſe arms branch outward on both ſides of the *ſhip*; two or three futtocks V V, and a top timber W. The futtocks are connected to the upper arms of the floor timbers on each ſide of the *ſhip*, and ſerve to prolong the timber in a vertical direction: and the top timbers are placed at the upper part of the futtocks for the ſame purpoſe. All theſe being united, and ſecured by croſs bars, form a circular incloſure, which is called a frame of timbers; and as a *ſhip* is much broader at the middle than at the extremities, the arms of the floor timber will form a very obtuſe angle at the extreme breadth; but this angle decreaſes in proportion to the diſtance of the timbers from the mid-*ſhip* frame, ſo that the foremaſt and aftmoſt ones will form a very acute angle; floor timbers of the latter ſort are uſually called *crutches*.

Shipwrights differ much in determining the ſtation of the mid-*ſhip* frame, ſome placing it at the middle of the *ſhip's* length, and others farther forward. They who place it before the middle, alledge, that if a *ſhip* is full forward, ſhe will meet with no reſiſtance after ſhe has opened a column of water; and that the water ſo diſplaced will eaſily unite abaft, and by that means force the *ſhip* forward, beſides having more power on the rudder, in proportion to its diſtance from the centre of gravity; this alſo comes nearer to the form of fiſhes, which ſhould ſeem moſt advantageous for dividing the fluid.

When the riſing of the mid-*ſhip* floor timber is determined, we may then proceed to deſcribe the riſing line of the floor on the ſtern-poſt abaft, and on the ſtem afore.

The height of the lower deck is the next thing to be conſidered: it is determined in the middle by the depth of the hold; and ſome builders make it no higher than the ſtem, but they raiſe it abaft as much above its height in the middle, as the load water mark, or draught of water abaft, exceeds that afore. With regard to the height between decks, it is altogether arbitrary, and muſt be determined by the rate of the *ſhip*, and the ſervice for which ſhe is deſtined.

It is alſo neceſſary to give the ſheer of the wales a proper hanging, becauſe the beauty and statelineſs of a *ſhip* greatly depend upon their figure and curve, which, if properly drawn, will make her appear airy and graceful on the water.

With reſpect to the upper works of a *ſhip*, called the *dead work*, it may be obſerved, that here the *ſhip* muſt be narrower, ſo that all the weight lying above the load water line will thereby be brought nearer the middle of the breadth, and of courſe the *ſhip* will be leſs ſtrained by the working of her guns, &c. But although ſome advantages are acquired by diminiſhing the breadth above water, ſhe muſt not be narrowed too much, as there muſt be ſufficient room left on the upper deck for the guns to recoil.

The ſecurity of the maſts ſhould likewiſe be remembered, which requires ſufficient breadth to ſpread the ſhrouds; a deficiency of this ſort may, however, be in ſome meaſure ſupplied by enlarging the breadth of the channels.

Having given a general account of the theory of *ſhip*-building, we ſhall now briefly trace the progreſs of the work itſelf.

During the conſtruction of a *ſhip*, ſhe is ſupported in the dock, or upon a wharf, by a number of ſolid blocks of timber placed at equal diſtances from, and parallel to each other, in which ſituation ſhe is ſaid to be on the ſtocks. The firſt piece of timber laid upon the block is generally the keel, though in ſome of the royal dock yards they have lately begun with the floor timbers, the keel having been found often apt to rot during the long period of building a *ſhip* of war. The pieces of the keel, ſee (*Tab.* II. *Ship. fig.* 5.) are ſcarfed together and bolted, forming one entire piece AA, which conſtitutes the length of the veſſel below : at one extremity of the keel is erected the STEM; which being incurvated nearly into a circular arch, or compaſſing ſo as to project outwards at the upper end, forms what is called the RAKE forward. At the other extremity of the keel is elevated the STERN-*poſt*, the heel of which is let into a mortiſe in the keel, and its upper end hangs outwards, making an obtuſe angle with the keel, which projection is called the RAKE abaft. The ſtern-poſt, which ought to ſupport the ſtern, contains the iron work, or hinges of the rudder, which are called GOGGINGS, and unites the lower part of the *ſhip's* ſides abaft. Towards the upper end of the ſtern poſt, and at right angles with its length, is fixed the middle of the *wing*-TRANSOM, where it is firmly bolted ; under this, and parallel to it, is placed the deck-tranſom, upon which the after end of the lower deck is ſupported. Parallel to the deck tranſom, and under it another piece is fixed to the ſtern-poſt, called the *firſt tranſom*, all of which ſerve to connect the ſtern-poſt to the faſhion-pieces. Two more tranſoms, called the *ſecond* and *third*, are alſo placed under theſe, being likewiſe attached to the faſhion-pieces, into which the extremities of all the tranſoms are let. The faſhion-pieces are formed like the other timbers of the *ſhip*, and have their heels reſting on the upper part of the kelſon, at the after extremities of the floor ribbands.

All theſe pieces, viz. the tranſoms, the faſhion-pieces, and their top timbers being ſtrongly united into one frame, are elevated upon the ſtern-poſt, and the whole forms the ſtructure of the ſtern, upon which the galleries and windows, with their ornaments, are afterwards built.

The ſtem and ſtern-poſt being thus elevated upon the keel, to which they are ſecurely connected by knees and arched pieces of timber bolted to both ; and the keel being raiſed at its two extremities by pieces of dead wood, the mid-*ſhip* floor timber is placed acroſs the keel, to which it is bolted through the middle. The floor timbers before and abaft the mid-*ſhip* frame are then ſtationed in their proper places upon the keel ; after which the kelſon, which, like the keel, is compoſed of ſeveral pieces ſcarfed together, is fixed acroſs the middle of the floor timbers, to which it is attached by bolts driven through the keel, and clinched on the upper part of the kelſon : the futtocks are then raiſed upon the floor timbers, and the HAWSE-*pieces* erected upon the CANT timbers in the fore part of the *ſhip*. The top timbers, on each ſide, are next attached to the head of the futtocks, as above explained.

The frames of the principal timbers, being thus completed, are ſupported by RIBBANDS.

The ribs of the *ſhip* being now ſtationed, they proceed to fix on the planks, of which the WALES are the principal, being much thicker and ſtronger than the reſt. The harpins, which may be conſidered as a continuation of the wales at their fore ends, are fixed acroſs the hawſe-pieces, and ſurround the fore part of the *ſhip* ; the planks that incloſe the *ſhip*'s ſides are then brought about the timbers ; and the CLAMPS, which are of eqnal thickneſs with the wales fixed oppoſite to the wales within the *ſhip :* theſe are uſed to ſupport the end of the beams, and accordingly ſtretch from one end of the *ſhip* to the other.

The thick ſtuff, or ſtrong planks of the bottom within board, are then placed oppoſite to the ſeveral ſcarfs of the timbers, to reinforce them throughout the *ſhip*'s length. The planks employed to line the *ſhip*, called the *ceiling*, or FOOT-*waling*, are next fixed in the intervals between the thick ſtuff of the hold : the beams are afterwards laid acroſs the *ſhip* to ſupport the decks, and are connected to the ſide by lodging and hanging knees. The *cable*-BITS being next erected, the CARLINGS and LEDGES are diſpoſed between the beams to ſtrengthen the deck. The WATER-*ways* are then laid on the ends of the beams throughout the *ſhip*'s length, and the SPIRKETTING fixed cloſe above them.

The upper deck is then planked, and the STRING placed under the gunnel or planſheer in the waiſt. They proceed next to plank the quarter-deck and forecaſtle, and to fix the PARTNERS of the maſts and capſterns with the COAMINGS of the hatches ; the BREAST-*hooks* are then bolted acroſs the ſtem and bow within-board, the ſtep of the foremaſt placed on the kelſon, and the riders fayed on the inſide of the timbers to reinforce the ſides in different places of the *ſhip*'s length. The POINTERS, if any, are afterwards fixed acroſs the hold diagonally to ſupport the beams, and the CROTCHES ſtationed in the after-hold to unite the half timbers.

The ſteps of the main-maſt and capſterns are next placed ; the planks of the lower decks and orlop laid ; the NAVEL-*hoods* fayed on the hawſe-holes ; and the knee of the head or cutwater connected to the ſtem : the figure of the head is then erected, and the TRAIL-*board* and cheeks fixed on the ſides of the knee.

The TAFFAREL and quarter pieces, which terminate the *ſhip* abaft, the former above, and the latter on each ſide, are then diſpoſed ; and the ſtern and quarter-galleries framed and ſupported by their brackets. The pumps with their well are next fixed in the hold ; the LIMBER-*boards* laid on each ſide of the kelſon, and the GARBOARD *ſtrake* fixed on the *ſhip's* bottom next to the keel without. The hull being thus fabricated, they proceed to ſeparate the apartments by bulk-heads or partitions ; to frame the port-lids ; to fix the cat-heads and cheſs-trees ; to form the hatchways and ſcuttles, and fit them with proper covers or gratings. They next fix the ladders in the different hatchways, and build the manger on the lower deck, to carry off the water that runs in at the hawſe-holes when the *ſhip* rides at anchor in a ſea. The bread room and magazines are then lined, and the gunnel, rails, and gangways, fixed on the upper part of the *ſhip*. The cleats, kevels, and ranges, by which the ropes are faſtened, are afterwards bolted or nailed to the ſides in different places. The rudder, being fitted with its irons, is next hung to the ſtern-poſt ; and the tiller or bar, by which it is managed, let into its upper end : the SCUPPERS are then placed in holes cut through the *ſhip's* ſides, and the ſtandards bolted to the beams and ſides above the decks to which they belong : the poop-lanthorns are laſt fixed upon their cranes over the ſtern, and the bilge-ways, or cradles, placed under the bottom, to conduct the *ſhip* ſteadily into the water whilſt launching. See on this ſubject Murray's *Ship*-Building, &c. p. 130—186 Monceau's Elements of Naval Architecture, abridged by Murray. Murray's Supplement, &c. and Falconer's Marine Dictionary, art. *Naval* ARCHITECTURE and *Ship* BUILDING.

The invention of *ſhips* is very ancient, and, at the ſame time, very uncertain. Mythologiſts attribute it to Dædalus, and pretend that the wings he invented to ſave himſelf withal from the labyrinth of Crete, were nothing but ſails, which he firſt gave to veſſels, and wherewith he eluded the vigilance and purſuit of Minos. Others give the honour to Janus, on the credit of ſome ancient Greek or Latin coins, on one ſide whereof is repreſented his double face, and on the reverſe a *ſhip*. Laſtly, others look on Noah to have been the firſt *ſhip*-builder.

The moſt celebrated *ſhips* of antiquity are, that of Ptolemy Philopater, which is ſaid to have been two hundred and eighty cubits (i. e four hundred and twenty feet) long, thirty-eight broad, and forty-eight high : it carried four thouſand rowers, four hundred ſailors, and three thouſand ſoldiers. That which the ſame prince made to ſail on the Nile, we are told, was three hundred and twelve feet long, forty-five feet broad, with a maſt one hundred and twenty feet high. Yet theſe were nothing in compariſon with Hiero's *ſhip*, built under the direction of Archimedes, on the ſtructure whereof, Moſchion, as we are told by Snellius, wrote a whole volume. There was wood enough employed in it to make ſixty gallies. It had all the variety of apartments of a palace : banqueting-rooms, galleries, gardens, fiſh-ponds, ſtables, mills, baths, a temple of Venus, &c. It was incompaſſed with an iron rampart, and eight towers, with walls and bulwarks, furniſhed with machines of war, particularly one, which threw a ſtone of three hundred pounds, or a dart twelve cubits long, the ſpace of half a mile ; with many other particulars related by Athenæus. Deipnoſophiſt. lib. v. p. 204, &c. ed. Cauſab. Ludg. 1657.

The veſſels which are uſually comprehended under the general name of *ſhip*, beſides thoſe of the line of battle, are galleons, frigates, hag-boats, differing from frigate-built *ſhips* in the figure of the ſtern, which has a great reſemblance to that of the cat, as being in a middle degree between both, cats, barks, pinks, and fly-boats, all of which are defined in their proper places.

Ships of war are diſtinguiſhed from each other by their ſeveral ranks or claſſes. See RATE.

SHIP *of the line* is uſually applied to all men of war mounting ſixty guns and upwards; of late, however, our fifty-gun *ſhips* have been formed ſufficiently ſtrong to carry the ſame metal as thoſe of ſixty, and accordingly may fall into the line in caſes of neceſſity. See LINE *of Battle*.

SHIP, *armed*. See ARM.

SHIP, *fire*. See FIRE-*ſhip*.

SHIP, *guard*, is a veſſel of war appointed to ſuperintend the marine affairs in a harbour or river, and to ſee that the *ſhips* which are not commiſſioned, have their proper watch kept duly, by ſending her GUARD-*boats* around them every night ; ſhe is alſo to receive ſeamen who are impreſſed in time of war.

Ship, *hoſpital*, a veſſel fitted up to attend on a fleet of men of war, and receive their ſick and wounded; for which purpoſe her decks ſhould be high, and her ports ſufficiently large; her cables ought alſo to run upon the upper deck, to the end that the beds or cradles may be more commodiouſly placed between decks, and admit a free paſſage of the air, to diſperſe that which is offenſive or corrupted. Falconer.

Ship, *leeward*. See Leeward.

Ship, *merchant*, a veſſel employed in commerce, to carry commodities of various ſorts from one port to another. The largeſt *merchant ſhips* are thoſe employed by the different European companies of merchants who trade to the Eaſt-Indies; they are in general ſomewhat larger than our forty gun ſhips, and mounted with twenty cannon on their upper deck, which are nine pounders, and ſix on their quarter deck, which are ſix pounders. Falconer.

Ship *of war, private*. See Privateers.

Ship, *ſtore*, a veſſel employed to carry artillery or naval ſtores for the uſe of a fleet, fortreſs, or garriſon.

Ship, *tranſport*. See Transport *ſhip*.

Ships, for the moſt convenient form of, or that wherein they ſhall meet with the leaſt reſiſtance from the water, ſee Vessel and Resistance.

It is highly neceſſary to the health of ſeamen, that *ſhips* ſhould be cleared of foul air; for it has been found by frequent experience, that air ſhut up, and confined in a cloſe place, without a ſucceſſion and freſh ſupply of it, becomes unwholeſome, and unfit for the uſe of life. This is more ſenſibly ſo, if any ſtagnating water be pent up with it. But it grows ſtill worſe, if ſuch an air as this is made uſe of in reſpiration; that is, becomes moiſter and hotter, and phlogiſticated, by paſſing and repaſſing through the lungs.

Theſe bad effects in different degrees, according to the different manner in which air is incloſed, are obſerved in many caſes, particularly in deep wells, and caverns of the earth; in priſons or cloſe houſes, where people are ſhut up with heat and naſtineſs; but moſt of all in large *ſhips*, in which, with the ſtench of water in the hold, many men being crowded up in thoſe quarters; all the mentioned circumſtances concur in producing greater miſchiefs than would follow from any of them ſingly.

Mr. Sutton did, therefore, a few years ago propoſe, in order to clear the holds of *ſhips* of the bad air they contain, that the fire-place and aſh-place of the copper or boiler ſhould be both cloſed up with ſubſtantial and tight iron doors; and that a copper or leaden pipe, of ſufficient ſize, ſhould be laid from the hold into the aſh-place, for the draught of air to come in that way to feed the fire. And thus, from the natural elaſticity of the air, it ſeems plain, that there will be from the hold a conſtant diſcharge of the air therein contained; and, conſequently, that the air ſo diſcharged muſt be as conſtantly ſupplied by freſh air below the hatches, or ſuch other communications as are open into the hold; whereby the ſame muſt be continually made freſh, and its air rendered more wholeſome, and fit for reſpiration. And if into this principal pipe, ſo laid into the hold, other pipes are let in, communicating reſpectively either with the well or lower decks, it muſt follow, that part of the air conſumed (or injured) in feeding the fire muſt be reſpectively drawn out of ſuch places, to which the communication ſhall be ſo made. Philoſ. Tranſ. N° 462. p. 42, 43.

The mixture uſed for covering the bottom and ſides of *ſhips* is made of one part of tallow, of one part of brimſtone, and of three parts nearly of roſin. The tallow and roſin are melted together, and the brimſtone is ſtirred into them; one hundred and forty pounds of brimſtone will ſerve for a veſſel of one hundred and forty tons. See Pay.

To prevent *ſhips*, whoſe bottoms are worm-eaten, from leaking, this method has been propoſed. Calk well the inſide planks or lining, then fill the vacant ſpaces between the timbers, and the out and inſide planks with boiling pitch or roſin, ſo high as the main gun-deck. The pitch being put in very hot, will run into the ſmalleſt cranny, and make the *ſhip* as tight as a bottle. There will be no room left for vermin, as rats, &c. and the pitch will ſerve for other uſes when taken out, therefore the expence will be but ſmall. Phil. Tranſ. N° 476. p. 372.

For the laws relating to *Ships*, &c. ſee *Act of Engliſh* Navigation. See alſo Fraight, Mariners, and Navy.

Ship; *bulk, burden, captain, clerk, company, corporal, flag, grounding, maſter, mine, regiſter, rigging, run, ſheathing, ſquadron, ſtay, ſteward, warp, waſhing, way, weather*, in reference to a *ſhip*, ſee the reſpective articles.

Ship, *to*, in *Sea Language*, is uſed either actively, as to embark any perſon, or put any thing aboard *ſhip*; or paſſively to receive any thing into a *ſhip*, as we ſhipped a heavy ſea.

To ſhip, alſo implies to fix any thing in its place, as *to ſhip* the oars; to *ſhip* the ſwivel guns, i. e. to fix them in their ſockets, &c.

Ship *of pleaſure*, among the *Ancients*. See Thalamegus.

Ship, in the *Salt Works*, is a large ciſtern, out of which the ſalt pans are ſupplied for boiling.

This ciſtern is built cloſe to the ſaltern, and is made either of wood, brick, or clay; and it ought always to be covered with a ſhed, that the ſea water, contained in it, may be kept clean from ſoot, and other impurities, and not mixed with freſh water in rains; and it muſt be always placed ſo high, that the water may eaſily run out of it into the pans, to ſupply them for boiling.

Ship *guns*. See *Great* Guns.

The following table ſhews the dimenſions of *ſhip guns*, ſettled in 1753.

Braſs *Ship* Guns.						Iron *Ship* Guns.					
Caliber.	Length.		Weight.			Caliber.	Length		Weight.		
	F.	Inch.	C.	qr.	lb.		F.	Inch.	C.	qr.	lb.
42	9	6	61	2	10	42	10	0	55	1	12
32	9	5	55	2	7	32	9	6	53	3	23
24	9	5	51	1	12	24	9	5	48	0	0
18	9	0	48	1	0	18	9	0	41	1	8
12	9	0	29	0	0	12	9	0	32	3	3
9	8	5	26	0	0	9	8	5	23	2	2
6	8	0	10	0	0	6	7	0	17	1	14
3	6	5	11	0	0	4	6	0	12	2	13
						3	4	6	7	1	7

SHIP-MONEY, an impoſition which was anciently charged upon the ports, towns, cities, boroughs, and counties of the realm; by writs commonly called *ſhip-writs*, under the great ſeal of England, for the providing and furniſhing certain ſhips for the king's ſervice.

This impoſition was revived by king Charles I. in the years 1635 and 1636; by the ſtat. 17 Car. I. it was declared to be contrary to the laws and ſtatutes of the realm, claim of right, liberty of the ſubject, &c.

SHIPPER, Skipper, or *ſchipper*, a Dutch term, ſignifying the maſter of a ſhip.

We alſo uſe the word, popularly, for any common ſeamen.

SHIPPING denotes a multitude of veſſels.

SHIP-SHAPE, in *Sea Language*, denotes the faſhion of a ſhip, or the manner of an expert ſailor; thus, they ſay, the maſt is not rigged *ſhip-ſhape*, and trim your ſails *ſhip-ſhape*.

SHIPWRECK. See Wreck.

SHIRE, Scyra, originally Saxon, *ſcir*, or *ſcire*, formed from *ſcyran, to divide*: a part or portion of the land, called alſo a county.

Shire-*clerk*, he that keeps the county court; and his office is ſo incident to that of the ſheriff, that the king cannot grant it away.

Shire-*man*, was anciently the judge of the *ſhire*, by whom trials for land, &c. were determined.

Shire-*mote*, in our *old Writers*, an aſſembly of the county or *ſhire* at the aſſizes, &c See Scyregemot.

Shire-*reve*. See Sheriff.

Shire, *knights of the*. See Knight.

SHIVERS, in a *ſhip*, the ſeamen's terms for thoſe little round wheels, in which the rope of a pully or block runs. They turn with the rope, and have pieces of braſs in their centres, which they call the *cocks*, with holes in them, into which the pin of the block goes, and on which they turn.

Theſe *ſhivers* are uſually of wood, but ſome are of braſs, as thoſe in the heels of the top-maſts. See Sheave.

SHIVERY *ſalt*, a name given by the ſalt-workers to a ſort of ſalt, very little different from the common brine ſalt. See Salt.

SHOAD, in *Mining*, a term for a train of metalline ſtones mixed with earth, ſometimes lying near the ſurface, ſometimes at conſiderable depths, but always ſerving to the miners as a proof that the load or vein of the metal is thereabout. The deeper the *ſhoad* lies, the nearer the vein is.

Shoad-*ſtones*, a term uſed by the miners of Cornwall, and other parts of this kingdom, to expreſs ſuch looſe maſſes of ſtone, as are uſually found about the entrances into mines, ſometimes running in a ſtraight courſe, from the load or vein of ore to the ſurface of the earth.

Theſe are ſtones of the common kinds, appearing to have been pieces broken from the ſtrata, or larger maſſes, but they uſually contain mundic, or marcaſitic matter, and more or leſs of the ore to be found in the mine. They appear to have been at ſome time rolled about in water, their corners being broken off, and their ſurface ſmoothed and rounded.

The antimony mines in Cornwall are always eaſily diſcovered by the *ſhoad-ſtones*, theſe uſually lying up to the ſurface, or very nearly ſo; and the matter of the *ſtone* being a white ſpar, or debaſed cryſtal, in which the native colour of the ore, which is a ſhining bluiſh black, eaſily diſcovers itſelf in ſtreaks and threads.

Shoad-ſtones are of ſo many kinds, and of ſuch various appearances, that it is not eaſy to deſcribe or know them: but the miners, to whom they are of greateſt uſe in the tracing, or ſearching after new mines, diſtinguiſh them from other ſtones by their weight; for if very ponderous, though they look ever ſo much like common ſtones, there is great reaſon to ſuſpect, that they contain ſome metal. Another mark of them is their being ſpungy and porous; this is a ſign of eſpecial uſe in the tin countries, for the tin *ſhoad-ſtones* are often ſo porous and ſpungy, that they reſemble large bodies thoroughly calcined. There are many other appearances of tin *ſhoads*, the very hardeſt and firmeſt *ſtones* often containing this metal.

When the miners in tracing a *ſhoad* up hill, meet with ſuch odd ſtones and earths, that they know not well what to make of them, they have recourſe to vanning, that is, they calcine and powder the ſtone, clay, or whatever elſe is ſuppoſed to contain the metal; and then waſhing it in an inſtrument, prepared for that purpoſe, and called a *vanning ſhovel*, they find the earthy matter waſhed away, and of the remainder, the ſtony, or gravelly matter lies behind, and the metalline matter at the point of the ſhovel. If the perſon who performs this operation has any judgment, he eaſily diſcovers not only what the metal is that is contained in the *ſhoad*, but alſo will make a very probable gueſs at what quantity the mine is likely to yield of it in proportion to the ore. Phil. Tranſ. N° 69. Pryce's Mineralogia, p. 124, &c.

SHOAL, in the *Sea-phraſe*, is the ſame as *ſhallow*, and is applied to flats in the water.

They ſay it is *good ſhoaling*, when a ſhip ſailing towards ſhore, they find by her ſounding, it grows ſhallower and ſhallower by degrees, and not too ſuddenly; for then the ſhip goes in ſafety.

SHOAR, or Shore, a prop, or counterfort, ſet up to ſupport any thing of weight which leans on one ſide. See Buttress.

SHOE, a covering for the foot, uſually of leather.

Its ſtructure, though the object of a particular art, is too popular to need explaining.

Its hiſtory is more obſcure. Bened. Baudoin, a *ſhoemaker* by profeſſion, has a learned treatiſe of the ancient *ſhoe*, De Solea Veterum, where the origin, matter, form, &c. thereof are particularly inquired into.

Baudoin maintains, that God, in giving Adam ſkins of beaſts to clothe him, did not leave him to go bare-footed, but gave him *ſhoes* of the ſame matter; that, after raw ſkins, men came to make their *ſhoes* of ruſhes, broom, paper, flax, ſilk, wood, iron, ſilver, and gold: ſo different has their matter been. Nor was their form more ſtable, with regard either to the ſhape, colour, or ornaments; they have been ſquare. high, low, long, and quite even, cut, carved, &c. Pliny, lib. vii. c. 56. tells us, that one Tychius of Bœotia, was the firſt who uſed *ſhoes*.

M. Nilant, in his remarks on Baudoin, obſerves, that he quotes Xenophon wrongly, to ſhew that even in his time they ſtill wore *ſhoes* of raw ſkins.

Xenophon relates, that the ten thouſand Greeks, who had followed the young Cyrus, wanting *ſhoes* in their retreat, were forced to cover their feet with raw ſkins, which occaſioned them great inconveniencies.

Nilant will not even allow, that the *ſhoes* of the country people, called *carbatinæ*, and *peroneæ*, were of crude ſkin, without any preparation.

The patricians, among the Romans, wore an ivory creſcent on their *ſhoes*: Heliogabalus had his *ſhoes* covered over with a very white linen, in conformity to the prieſts of the ſun, for whom he profeſſed a very high veneration; this kind of *ſhoe* was called οὐδῶν, *udo*, or *odo*. Caligula wore *ſhoes* enriched with precious ſtones. The Indians, like the Egyptians, wore *ſhoes* made of the bark of the papyrus. The Turks always put off their *ſhoes*, and leave them at the doors of the moſques.

Shoemakers are to make their ſhoes of ſufficient leather, or forfeit 3*s*. 4*d*. 1 Jac. I. c. 22. and journeymen *ſhoemakers* embezzling leather ſhall make ſatisfaction for damage, or be ordered by juſtices to be whipped, &c. Perſons buying or receiving ſuch leather, are to make reaſonable recompence, to be levied by diſtreſs, &c. and ſearch is to be made after the ſame: alſo leaving their work undertaken, or neglecting it, to be ſent to the houſe of correction for a month. 9 Geo. I. cap. 27 13 Geo. II. c. 8. See Leather,

Shoe, in the *Manege*. A horſe-*ſhoe* is a piece of flat iron, with two branches or wings, which being commonly forged according to the form of the hoof for which it is deſigned, is made round at the toe, and open at the heel.

A *ſhoe* for all feet, is one that is cut at the toe into two equal parts, which is joined by a riveted nail, upon which they are moveable in ſuch a manner, that the *ſhoe* is enlarged or contracted leſs or more at pleaſure, in order to make it fit all ſorts and ſizes of feet. See Horse-*ſhoe*.

To *ſhoe* a horſe after the form of a lunette, a patin, &c. See Lunette, Patin, &c.

Berenger obſerves, that the ancients did not *ſhoe* their horſes, that is to ſay, they did not nail upon their hoofs any pieces of iron, or of other metal, in the form of the modern *horſe ſhoes*; but when they intended to defend them from any thing that might annoy them in travelling, they faſtened upon their feet, by means of ſtraps and ligatures, a ſort of ſandal, ſtocking, or what we call boots. Theſe were made of ſedges twiſted together like a mat, or elſe of leather, and were ſometimes ſtrengthened with plates of iron, and adorned by the rich and oſtentatious with ſilver and gold, as in the inſtances of Nero and Poppæa.

It does not appear in what æra, or in what country, the modern art of *ſhoeing* took its riſe. The earlieſt proof which the above mentioned writer has met with is the *ſhoe* ſaid to have belonged to the horſe of Childeric, who lived in the year 481, and is preſerved in Montfaucon's Antiquities of France. It perfectly reſembles the *ſhoe* now in uſe. Bereng. Horſemanſhip, vol. i. p. 234.

Shoe *of gold*. See *Hiſtory of* Gold.

Shoe, *horſe*, in *Fortification*. See Horse-*ſhoe*.

Shoe, *horſe*, *head*. See Horse-*ſhoe head*.

Shoe *of the anchor*, in *Sea Language*, a ſmall block of wood, convex on the back, and having a ſmall hole ſufficient to contain the point of the anchor fluke on the fore ſide. It is uſed to prevent the anchor from tearing or wounding the planks on the ſhip's bow, when aſcending or deſcending; for which purpoſe the *ſhoe* ſlides up and down along the bow, between the fluke of the anchor and the planks, as being preſſed cloſe to the latter by the weight of the former. Falconer.

Shoe, *to*, *an anchor*. See *Shoeing the* Anchor.

Shoe-*houſing*. See Housing.

SHOOT, in the *Sea Language*. They ſay the ballaſt *ſhoots*, when it runs over from one ſide to another.

SHOOTING. See Gunnery and Projectile.

Shooting *of bombs*. See Bomb.

Shooting *with air*. See Wind-Gun.

Shooting, *malicious*, in *Law*. See Mahim.

Shooting *of ſalts*. It is to be obſerved, that the figures ariſing from the *ſhooting* of diſſolved ſalts are not conſtantly the ſame, but vary according to different circumſtances, ſuch as when they happen to *ſhoot* more or leſs haſtily, or in different proportions of liquor. See Salt.

SHOOTS, *hot*. See Hot.

Shoot, *water*. See Water.

SHOP-LIFTER, a perſon who, on pretence of buying goods or otherwiſe, takes an opportunity to ſteal them; and if the goods amount to the value of five ſhillings, though no perſon be in the ſhop, he is guilty of felony without benefit of clergy, by 10 & 11 Will. III. c. 23.

SHORE, or *common ſhore*, a corruption of *ſewer*. See Sewers.

Shore, among *Builders*, &c. See Shoar.

Shore, *ſea*, is a general name for the ſea coaſt of any country. A bold *ſhore*, is a coaſt which is ſteep and abrupt, ſo as to admit the cloſeſt approach of ſhipping without expoſing them to the danger of being ſtranded.

The *ſhores* of the ſea are divided, by count Marſigli, into three portions, according to which all his deſcriptions, in his account of the *baſon of the* sea, are given. The firſt part of the *ſhore* is that tract of land to which the ſea juſt reaches in ſtorms and high tides, but which it never covers; the ſecond part of the *ſhore* is that which is covered in high tides and ſtorms, but is dry at other times; and the third is the deſcent from this, which is always covered with water.

The *firſt* part is only a continuation of the continent, and ſuffers no alteration from the neighbourhood of the ſea, except that it is rendered fit for the growth of ſome plants, and wholly unfit for that of others, by the ſaline ſteams and impregnations; and it is ſcarce to be conceived by any but thoſe who have obſerved it, how far in land the effects of the ſea reach, ſo as to make the earth proper for plants, which will not grow without this influence, there being ſeveral plants frequently found on high hills and dry places, at three, four, and more miles from the ſea, which yet would not grow, unleſs in the neighbourhood of it, nor will ever be found elſewhere.

The *ſecond* part or portion of the *ſhores* is much more affected by the ſea than the former, being frequently waſhed and beaten by it. Its productions are rendered ſalt by the water, and it is covered with ſand, or with the fragments of ſhells in form of ſand, and in ſome places with a tartarous matter depoſited from the water, and the colour of this whole extent of ground is uſually duſky and dull, eſpecially where there are rocks and ſtones, and theſe are covered with a ſlimy matter.

The *third* part of the *ſhores* is more affected by the ſea than either of the others, and is covered with an uniform cruſt of the true nature of the bottom of the ſea, except that plants and animals have their reſidence in it, and the decayed parts of theſe alter it a little.

SHORLING *and morling*, in our *Old Writers*, words uſed to diſtinguiſh fells of ſheep; *ſhorling*, being the fells after the fleeces are ſhorn off the ſheeps back; and *morling*, the fells flead off after they die or are killed: in ſome parts of England they underſtand by a *ſhorling*, a ſheep whoſe fleece is ſhorn off; and by a *morling*, a ſheep that dies.

SHORN *velvet*. See VELVET.

SHORT *accent*, in *Grammar*. See ACCENT.

SHORT *ſails*, in a *man of war*, are the ſame with *fighting ſails*, being the fore-ſail, main-ſail, and fore-top-ſail, which are all that are uſed in fight, leſt the reſt ſhould be fired and ſpoiled; beſides the trouble of managing them when a ſhip gives chaſe to another.

If a chaſe ſhews a diſpoſition to fight, they ſay, the chaſe *ſtrips into her ſhort ſails*, i. e. puts out her colours in the poop, her flag at the main top, and her ſtreamers, or pendants, at the yards arms; furls her ſprit-ſail, peeks her mizen, and flings her main yard.

SHORTEN, *to, ſail*. See SAIL.

SHORT-*jointed*, in the *Manege*. A horſe is ſaid to be *ſhort-jointed*, that has a ſhort paſtern; when this joint, or the paſtern, is too ſhort, the horſe is ſubject to have his fore-legs from the knee to the cornet all in a ſtraight line. Commonly your *ſhort-jointed* horſes do not manege ſo well as the *long-jointed*; but out of the manege the *ſhort-jointed* are the beſt for travel or fatigue.

SHORT-SIGHTEDNESS, *myopia*, a defect in the conformation of the eye, wherein the cryſtalline, &c. being too convex, the rays reflected from different objects are refracted too much, and made to converge too faſt, ſo as to unite before they reach the retina, by which means viſion is rendered dim and confuſed. See MYOPS.

A learned author thinks it probable, that out of ſo great a number of *ſhort-ſighted* perſons as are daily to be met with, few are born ſo. For it generally grows upon young people at the age of twenty or twenty-five, and therefore might poſſibly be prevented by uſing their eyes while young to all ſorts of conformations, that is, by often looking through glaſſes of all ſorts of figures, and by reading, writing, or working with ſpectacles of ſeveral degrees of convexity; for whatever be the powers by which the eye conforms itſelf to diſtinct viſion, they may poſſibly grow weak, or loſe their extent one way or other, for want of variety of exerciſe. It ſeems an opinion without foundation, to think that ſuch an exerciſe of the eyes can anywiſe injure them, provided due care be taken to avoid looking at objects that are too bright.

Short-ſightedneſs may come by accidents; of this we have a remarkable inſtance, mentioned by Dr. Briggs in his Ophthalmographia, of a perſon upwards of ſeventy years old, who had uſed ſpectacles for ten years, and yet by catching cold, he ſuddenly became ſo *ſhort-ſighted*, that he could not diſtinguiſh objects three feet off, and after the cold and defluxion were cured, he continued to read the ſmalleſt print without ſpectacles for many years.

Dr. Smith mentions a young gentleman, who became *ſhort-ſighted* immediately after coming out of a cold bath, in which he did not totally immerſe himſelf, and has ever ſince uſed a concave glaſs for many years.

It is commonly thought that *ſhort-ſightedneſs* wears off in old age, on account of the eye becoming flatter, but the learned doctor queſtions whether this be matter of fact, or hypotheſis only.

It is remarkable, that *ſhort-ſighted* perſons commonly write a ſmall hand, and love a ſmall print, becauſe they can ſee more of it at a view. That it is cuſtomary with them not to look at the perſon they converſe with, becauſe they cannot well ſee the motion of his eyes and features, and are therefore attentive to his words only. That they ſee more diſtinctly, and ſomewhat farther off by a ſtrong light than by a weak one; becauſe a ſtrong light cauſes a contraction of the pupil, and conſequently of the pencils, both here and at the retina, which leſſens their mixture, and conſequently the apparent confuſion; and, therefore, to ſee more diſtinctly, they almoſt cloſe their eye-lids, for which reaſon they were anciently called *myopes*. Smith's Optics, vol. ii. Rem. p. 10, &c.

Dr. Jurin obſerves, that perſons who are much, and long accuſtomed to view objects at ſmall diſtances, as ſtudents in general, watchmakers, gravers, painters in miniature, &c. ſee better at ſmall diſtances, and not ſo well at great diſtances as the reſt of mankind. The reaſon is, that in the eye, as well as in other parts, the muſcles, by conſtant exerciſe, are enabled to contract themſelves with more ſtrength, and by diſuſe are brought to leſs ſtrength. Hence, in the perſons before mentioned, the greater muſcular ring of the uvea contracts more eaſily and ſtrongly, and the cornea more readily obeys the contraction of the ring, whence they ſee better at ſmall diſtances. And the cornea, by being thus often and long bent into a greater convexity, does by degrees loſe ſomething of its elaſticity ſo as not to return to its natural elaſticity, when the muſcular ring ceaſes to act upon it. This is one cauſe of their not ſeeing ſo well at great diſtances: alſo the ligamentum ciliare, being ſeldom employed to leſſen the convexity of the capſula, does by degrees become leſs capable of performing that office: and the capſula being ſeldom drawn out, and put into tenſion, muſt loſe ſomething of its diſtenſile quality, ſo as leſs eaſily to comply with the action of the ligament. And this is another cauſe of their not ſeeing ſo well at great diſtances. Jurin, Eſſay on diſt. and indiſt. Viſion.

The ordinary remedy for *ſhort-ſightedneſs* is a concave lens, held before the eye, which, making the rays diverge, or at leaſt diminiſhing much of their convergency, makes amends for the too great convexity of the cryſtalline.

Dr. Hooke ſuggeſts another remedy. Finding that many *ſhort-ſighted* perſons are but little helped by concaves, he recommends a convex glaſs, placed between the object and the eye, by means whereof, the object may be made to appear at any diſtance from the eye; and, conſequently, all objects may be thereby made to appear at any diſtance from the eye, ſo that the *ſhort-ſighted* eye ſhall contemplate the picture of the object in the ſame manner as if the object itſelf were in the place. It is true, the image will appear inverted, but we have expedients to remedy this too; for in reading, there needs nothing but to hold the book up-ſide down. To write, the beſt way, in this caſe, will be, for the perſon to learn to do it up-ſide down. For diſtant objects, the doctor aſſerts, from his own experience, that, with a little practice in contemplating inverted objects, one gets as good an idea of them as if ſeen in their natural poſture.

SHORTFORD, q. d. *fore-cloſe*, an ancient cuſtom in the city of Exeter, when the lord of the fee cannot be anſwered rent due to him out of his tenement, and no diſtreſs can be levied for the ſame. The lord is then to come to the tenement, and there take a ſtone, or ſome other dead thing off the tenement, and bring it before the mayor and bailiff, and thus he muſt do ſeven quarter days ſucceſſively, and if on the ſeventh quarter-day the lord is not ſatisfied his rent and arrears, then the tenement ſhall be adjudged to the lord to hold the ſame a year and a day; and forthwith proclamation is to be made in the court, that if any man claims any title to the ſaid tenement, he muſt appear within the year and day next following, and ſatisfy the lord of the ſaid rent and arrears: but if no appearance be made, and the rent not paid, the lord comes again to the court, and prays that, according to the cuſtom, the ſaid tenement be adjudged to him in his demeſne as of fee, which is done accordingly, ſo that the lord hath from thenceforth the ſaid tenement, with the appurtenances, to him and his heirs.

SHOT, in the *Military Art*, includes all ſorts of ball or bullets for fire arms, from the cannon to the piſtol. See BULLET, CANNON, &c.

Thoſe for cannon are of iron; thoſe for muſkets and piſtols are of lead.

SHOT, for ordnance, eſpecially in the ſea ſervice, are of ſeveral ſorts: as,

SHOT, *round*, balls or globes of iron fitted to the bore of the piece.

SHOT, *bar*, is formed of two bullets, or rather half bullets, joined together by an iron bar, ſerving to cut down maſts, ſails, &c.

SHOT, *caſe, chain, grape, langrel, random, ſtar, and trundle*, ſee the reſpective articles; ſee alſo *Fire*-ARMS.

SHOT, for fowling, is otherwiſe called *hail*, by reaſon of its figure and ſize.

The method of caſting it is as follows: the lead being melted, ſtirred, and ſkimmed, a quantity of powdered yellow orpiment is ſtrewed in it, as much as will lie on a ſhilling, to twelve or fifteen pounds of lead; the whole being well ſtirred, the orpiment will flame.

To judge whether there be orpiment enough in, a little of the lead is dropped into a glaſs of water, and if the drops prove round, and without tails, there is orpiment enough, and the degree of heat is as it ſhould be.

This done, a copper-plate hollow in the middle, and three inches in diameter, bored through with thirty or forty ſmall holes, according to the ſize of the *ſhot*, is placed on an iron frame, over a tub of water, four inches above the water; the hollow part is to be very thin; on this plate are laid burning coals, to keep the melted lead in fuſion. The lead is now poured gently, with a ladle, on the middle of the plate, and it will make its way through the holes in the bottom of the plate, into the water in round drops.

Great care is taken to keep the lead on the plate in its proper degree of heat; if too cold, it will ſtop the holes; and if too hot, the drops will crack and fly.

The *ſhot*, thus made, are dried over a gentle fire, always ſtirring them that thev do not melt; this done, the greater are ſeparated from the ſmaller by paſſing them through ſieves for that purpoſe.

SHOT, *freſh*, See FRESH *ſhot*.

SHOT, *hip*. See HIP *ſhot*.

SHOT, *water*. See WATER *ſhot*.

SHOT *of a cable*, on *ſhip-board*, is the ſplicing of two cables together, that a ſhip may ride ſafe in deep waters and in great roads, for a ſhip will ride eaſier by one *ſhot of a cable*, than by three ſhort cables out a-head.

SHOT-FLAGON, a ſort of *flagon* ſomewhat bigger than ordinary, which in ſome counties, particularly Derbyſhire, it is the cuſtom for the hoſt to ſerve his gueſts in, after they have drank above a ſhilling.

SHOTTEN *herrings*. See HERRING.

SHOTTEN, *Blood*. See BLOOD-*ſhotten*.

SHOVELER, in *Ornithology*. See *Broad-beaked* DUCK.

SHOULDER-BLADE, a bone of the ſhoulder, of a triangular figure, covering the hind part of the ribs, called by anatomiſts the SCAPULA and *omoplata*.

SHOULDER, *cartilages of the*, in *Anatomy*. The ſcapula, in many ſubjects, has a ſmall cartilaginous border along its whole baſis, which in children is remarkable enough, but in grown perſons it diſappears. The glenoide cavity of this bone is covered with a cartilage, which is thicker toward the circumference than in the middle, and a little raiſed above the edge of the bone. The ſmall cartilaginous ſurface of the acromion is thicker in freſh bones than it appears in a dried ſkeleton, and is a little convex.

The ſmall triangular ſurface, at the extremity of the ſpine of the ſcapula, near the baſis, is covered with a very thin, ſmooth, cartilaginous lamina, but this being tranſparent, does not appear very white.

There are no other cartilages but theſe uſually found in the ſcapula in freſh ſubjects, notwithſtanding that in ſkeletons of prepared bones, ſeveral places beſide ſeem to have been cartilaginous; theſe, however, are owing only to the dried remains of ligaments and tendons. Winſlow's Anatomy, p. 137.

SHOULDER, *ligaments of the*. The articulation of the acromium, with the extremity of the clavicle, is ſtrengthened all round by the ſeveral ſmall but ſtrong ligaments, which go directly from one bone to the other. Theſe ligaments lie very near one another, and withal are ſo tightly braced over the joint, as to hide it altogether: they appear indeed more like a cartilaginous covering than a ligamentary texture; and the internal ſurface of theſe ligaments is lined with the capſula of the joint. When the ſmall inter-articular cartilage is found in this joint, its whole circumference is ever found connected to theſe ligaments. The articulation of the clavicle with the ſternum is ſuſtained by ſeveral ligaments, fixed by one end round the pectoral extremity of the clavicle, and inſerted at the other in the ſternum. There is alſo a long narrow ſtrong ligament, which goes from one clavicle to the other, behind the furca of the ſternum: this is fixed to the internal angle of the contiguous extremities of the bones, and may be properly called the *inter-clavicular ligament*. The neck of the ſcapula, at a ſmall diſtance from the edge of the glenoide cavity, gives inſertion to the capſula ligament, or mucilaginous bag, and to the articular ligaments of the joint of the ſcapula and os humeri.

And beſides theſe articular ligaments of the ſcapula, there are three ligamentary cords fixed to the tuberoſity of the coracoide apophyſis; two of which, by their other extremities, are inſe rtedin the oblique eminence on the lower ſide of the humeral extremity of the clavicle, the third under the acromium. There is alſo a thin flat broad ligament, reaching between the criſta of the ſpine of the ſcapula, and the edge of the inferior coſta. Winſlow's Anatomy, p. 138.

SHOULDER-*bone*, in *Anatomy*. See HUMERUS.

SHOULDER, in the *Manege*, is the joint of a horſe's four quarters, that joins the end of the *ſhoulder*-blade with the extremity of the fore-thigh.

SHOULDER *of a branch*, is that part of it which begins at the lower part of the arch of the banquet, overagainſt the middle of the fonceau, or chaperon, and forms another arch under the banquet. The *ſhoulder of a branch* caſts a greater, or leſſer circumference, according as it is deſigned to fortify or weaken the branch. See BRIDLE, BANQUET, and BRANCHES.

SHOULDER-*pegged horſes*, called in French *chevillees*, are ſuch as have their *ſhoulders* gourdy, ſtiff, and almoſt without motion. A horſe charged with *ſhoulders*, is one that has thick, fleſhy, and heavy *ſhoulders*.

SHOULDER *of a baſtion*, in *Fortification*, is where the face and the flank meet.

SHOULDERING, in *Fortification*. See EPAULEMENT.

SHOULDERING-PIECE, in *Building*. See BRACKET.

SHOULDER-KNOTS. See EPAULETTES.

SHOULDER-PITCHT, in *Farriery*, is a diſeaſe in a horſe, when the pitch or point of the ſhoulder is diſplaced, which makes the horſe halt downright.

SHOULDER-SPLAIT, or SHOULDER-TORN, is a hurt which befalls a horſe by ſome dangerous ſlip, whereby the ſhoulder is parted from the breaſt.

SHOULDER-WRENCH is a ſtrain in the ſhoulder.

SHOUT, *clamor*, in *Antiquity*, was frequently uſed on eccleſiaſtical, civil, and military occaſions, as a ſign of approbation, and ſometimes of indignation. Thus as Cicero, in an aſſembly of the people, was expoſing the arrogance of L. Anthony, who had had the impudence to cauſe himſelf to be inſcribed the patron of the Romans, the people on hearing this raiſed a *ſhout* to ſhew their indignation.

In the ancient military diſcipline, *ſhouts* were uſed, 1. upon occaſion of the general's making a ſpeech, or harangue to the army from his tribunal: this they did in token of their approving what had been propoſed. 2. Before an engagement, in order to encourage and ſpirit their own men, and fill the enemy with dread.

This is a practice of great antiquity, beſides which, it wants not the authority of reaſon to ſupport it, for as mankind are endowed with two ſenſes, hearing and ſeeing, by which fear is raiſed in the mind, it may be proper to make uſe of the ear as well as the eye for that purpoſe.

Shouts were alſo raiſed in the ancient theatre, when what was acted pleaſed the ſpectators. See ACCLAMATION.

It was uſual for thoſe preſent at the burning of the dead to raiſe a great *ſhout*, and call the dead perſon by his name before they ſet fire to the pile. See BURIAL.

SHOWER, a cloud reſolved into rain, and diſcharged on a certain tract of ground.

In *Natural Hiſtory* we meet with abundance of inſtances of extraordinary and preternatural *ſhowers*; as *ſhowers of blood*, mentioned by Gaſſendus and others; a *brimſtone ſhower*, mentioned by Wormius; *ſhowers of frogs*, mentiond by Pliny, and even by Dr. Plott; a *ſhower of millet ſeed* in Sileſia, mentioned in the Ephem. German. *ſhowers of aſhes*, frequent in the Archipelago; a *ſhower of wheat*, in Wiltſhire; a *ſhower of whitings*, mentioned in Philoſoph. Tranſact. The natural reaſons of many whereof may be ſeen under RAIN.

SHREW, or SHREW-*mouſe*, in *Zoology*, the common name of the creature called by authors *mus araneus*, and SOREX *araneus* of Linnæus. It is an animal of a mixt brown and reddiſh tawny colour; the belly is white; its tail is about one inch and a half long, and covered with ſhort hairs; its body is about two inches and a half in length; and its eyes black and very ſmall, they are indeed little larger than thoſe of the mole, and do not exceed the ſize of the head of the ſmalleſt pin, it is no wonder therefore that the creature is almoſt blind; the noſe long and ſlender; the ears ſhort and rounded; the teeth are very ſmall, and differ in their ſhape and ſituation from thoſe of all other creatures in the world; and ſeem as if nature had in one creature made a ſort of mixture of the teeth of the *mouſe* and the ſnake kind.

It has two long fore-teeth, as all the *mouſe* kind have; but theſe are not ſingle as in *mice*, but have two or three other ſmall and ſharp teeth growing out of them: theſe, to an accurate obſerver, might either be wholly unſeen, or taken for diſtinct teeth; and the anterior long teeth are not ſeparated from the reſt by any gap or ſpace, as in the *mouſe* kind, but make one continued ſeries with the others. The upper-jaw in this creature is longer than the under, and the teeth are ſharp and ſerrated, ſome with two, ſome with three points, and theſe ſo ſmall, that they might eaſily not be ſeen, but that the tips of them are reddiſh. Their whole number is twenty-eight.

It is very common in many parts of the world, and is met with in almoſt all our dry grounds, in old walls and holes in the earth; near hay ricks, dunghills, and neceſſary houſes; it lives on corn, inſects, and any filth; the cats will kill it, but never attempt to eat it. It brings four or five young at a time.

Its whole body has a fetid and offenſive ſmell. The ancients erroneouſly believed it was injurious to the cattle. There ſeems to be an annual mortality of theſe animals in the month of Auguſt, numbers being then ſound dead in the paths.

It is diſtinguiſhed at firſt ſight from the common *mouſe*, in that it is ſmaller; its noſe longer, and like a hog's; it has five toes on the hinder as well as the fore feet; its eyes are extremely ſmall; its ears very ſhort; its claws are long and whitiſh; and its feet ſhort. Ray and Pennant.

SHREW-*mouſe*, *water*, *ſorex fodiens* of Pallas, is much larger than the common *ſhrew*; its length from noſe to tail being three ¾ inches; its tail two inches; the upper part of the body and the head are of a black colour; the throat, breaſt, and belly of a light aſh-colour; and beneath the tail there is a triangular duſky ſpot.

This animal inhabits Europe and Siberia; was loſt in England till the year 1768, when it was diſcovered in the Lincolnſhire fens; it burrows in the banks near the water, and is ſaid to ſwim under water: it is called in ſome places the *blind mouſe*, on account of the ſmallneſs of its eyes; and it chirrups like a graſshopper. Pennant.

SHRIKE, in *Ornithology*, an Engliſh name for the *lanius excubitor* of Linnæus, or BUTCHER-*bird*.

SHRIKE, *red-backed*, or *lanius collurio* of Linnæus. See FLUSHER.

SHRIMP, in *Natural Hiſtory*, is the CANCER *grangon* of Linnæus, with long ſlender feelers, and between them two projecting laminæ; claws with a ſingle-hooked moveable fang; three pair of legs; ſeven joints in the tail; the middle caudal fin ſubulated; the four others rounded and fringed, with a ſpine on the exterior ſide of each of the outmoſt.

This ſhell-fiſh inhabits the ſandy ſhores of Britain in vaſt quantities, and is reckoned the moſt delicious of the genus. Some writers have claſſed it under the genus of SQUILLA.

The white *ſhrimp*, or *cancer ſquilla*, has a ſnout like the prawn, but deeper and thinner, and feelers longer in proportion to the bulk; the ſubcaudal under fins rather larger. It inhabits the coaſt of Kent.

By 30 Geo. II. c. 21. white *ſhrimps* in the river Thames and Medway are only to be taken from Bartholomew day to Good-Friday; and red *ſhrimps* in the river Medway only from April 25 to July 1.

SHRIMP, *freſh water*. See SQUILLA.

SHRINE, formed from *ſcrinium*, *a deſk*, or *cabinet*, a caſe to hold the RELICS of ſome ſaint.

SHRITE, in *Ornithology*. See MISSEL-*bird*.

SHROUD, from the Saxon *ſhroud*, a *ſhelter* or *cover*, is uſed to denote the dreſs of the dead. This is required by ſtatute to be made of ſheep's wool only. See BURIAL.

If any one, in taking up a dead body, ſteals the *ſhroud*, the property of which remains in the executor, or the perſon who was at the charge of the funeral, it is felony.

SHROUDS, in *Sea Language*. See SHROWDS.

SHROVE-TIDE, the time immediately before Lent; thus called by our anceſtors, becauſe employed in *ſhriving*, that is, in confeſſing their ſins to the prieſt, in order to a more devout keeping the enſuing Lent faſt.

Shrove-Tueſday is the day next before the firſt of Lent.

SHROWDING *of trees*, the cutting or lopping off the top branches; this is only practiſed to trees that are not fit for timber, but deſigned for fuel, or ſome other preſent uſe.

Such trees the huſbandmen find much preferable to coppice, as they need no fence to ſecure them, becauſe ſtanding in no danger of the browzings and rubbings of cattle, which too have the benefit of grazing under them.

As for the time of *ſhrowding*, it is not to be practiſed till the trees have ſtood three or four years; and then it muſt be done either at the beginning of the ſpring, or the end of autumn.

The harder ſort are not to be lopped above once in ten or twelve years, and that at any time in the winter. The pithy and ſoft woods are beſt *ſhrowded* in the ſpring. The ſtumps left ſhould always be cut aſlope, and ſmooth, in order to caſt the water off, and prevent its ſinking in, and rotting the tree.

SHROWDS, or SHROUDS, are great ropes in a ſhip, which go up on both ſides of all maſts, except the bowſprit.

The *ſhrowds* are always divided into pairs, i. e. one piece of rope is doubled and the two parts faſtened together at a ſmall diſtance from the middle, ſo as to leave a ſort of nooſe or collar to fix upon the maſt-head.

They are faſtened below by chains to the ſhip's ſides, and aloſt, over the head of the maſt; their pennants, fore-tackle, and ſwiſters, being firſt put under them: and they are ſerved there, to prevent their galling the maſt. The top-maſt *ſhrowds* are faſtened to the PUTTOCKS, by plates of iron, and by what they call *deadmen's eyes*, and laniers alſo, as the others are. See *Tab. Ship*, *fig.* 1. *n.* 4. 12. 23. 41. 52. 62. 84. 104. and 135.

The *ſhrowds*, as well as the ſails, are denominated from the maſt to which they belong. Thus they are the main, fore, and mizen *ſhrowds*, the main-top-maſt, fore-top-maſt, or mizen-top-maſt *ſhrowds*, and main top-gallant, fore-top-gallant, or mizen-top-gallant *ſhrowds*.

The number of *ſhrowds* by which a maſt is ſuſtained, as well as the ſize of the rope of which they are formed, is always in proportion to the ſize of the maſt, and the weight of the ſail it is intended to carry. The two fore-maſt *ſhrowds*, on the ſtarboard and larboard ſide of the ſhip, are always fitted firſt upon the maſt head; and then the ſecond on the ſtarboard, and the ſecond on the larboard, and ſo on till the whole number is fixed.

The intention of this arrangement is to brace the yards with greater facility, when the ſails are cloſe hauled, which could not be performed without great difficulty, if the fore-maſt *ſhrowds* were laſt fitted on the maſt-head, becauſe the angle which they would make with the maſt would then be greatly increaſed. Falconer.

The terms are, *eaſe the ſhrowds*; that is, ſlacken them.

Set taught the ſhrowds; that is, ſet them faſter.

SHROWDS, *futtock*. See PUTTOCKS.

SHRUB, *frutex*, a little, low, dwarf tree, or a woody vegetable, of a ſize leſs than a tree; and which, inſtead of one ſingle ſtem, frequently from the ſame root, puts forth ſeveral ſets or ſtems. See PLANT and TREE.

Such are privet, phillyrea, holly, box, honeyſuckle, &c.

Shrubs and trees put forth in autumn a kind of buttons, or gems, in the axis of the leaves; theſe buttons are as ſo many little ova, which, coming to expand by the warmth of the following ſpring, open into leaves and flowers. By this, together with the height, ſome diſtinguiſh *ſhrubs* from the *ſuffrutices*, or *under-ſhrubs*, which are low buſhes, that do not put forth any of theſe buttons; as ſage, thyme, &c.

The two *hardieſt ſhrubs* we are poſſeſſed of are the ivy and box; theſe ſtand the ſeverity of our ſharpeſt winters unhurt while other *ſhrubs* periſh, and trees have their ſolid bodies ſplit and torn to pieces. In the hard winter of the year 1683, theſe two *ſhrubs* ſuffered no injury any where; though the yews and hollies, which are generally ſuppoſed very hardy, were this winter in ſome places killed, and in others ſtripped of their leaves, and damaged in their bark. Furze-buſhes were found to be ſomewhat hardier than theſe, but they ſometimes periſhed, at leaſt down to the root. The broom ſeemed to occupy the next ſtep of hardineſs beyond theſe; this lived where the others died; and where even this died, the juniper *ſhrubs* were ſometimes found unhurt. This laſt is the only *ſhrub* that approaches to the hardineſs of the box and ivy, but even this does not quite come up to them; for while they ſuffer nothing in whatever manner they are expoſed, the juniper, though it bears cold well under the ſhelter of other trees, yet cannot bear the viciſſitudes of heat and cold; inſomuch that ſome juniper *ſhrubs* were found half dead, and half vigorous; that ſide which faced the mid-day ſun, having periſhed by the ſucceſſive thawings and freezings of its ſap; while that which was not expoſed to the viciſſitudes of heat, had bore the cold perfectly well. Such *ſhrubs* as are not hardy enough to defy the winter, but appear half-dead in the ſpring, may often be recovered by Mr. Evelyn's method of beating the branches with a ſlender hazel-wand, to ſtrike off the withered leaves and buds, and giving a free paſſage to the air to the internal parts. Where this fails, the method is to cut them down to the quick; and if no part of the trunk appears in a growing condition, they muſt be taken off down to the level of the ground. Phil. Tranſ. Nº 165.

SHRUBS, *ſtealing of*. See LARCENY.

Wilfully ſpoiling or deſtroying them is a ſpecies of that *malicious* MISCHIEF, which ſubjects the offender to pecuniary penalties for the firſt two offences, and for the third, if it be committed in the day-time, and even be the firſt at night, to the guilt of felony, and tranſportation for ſeven years. 6 Geo. III. cap. 36. & 48.

SHUT *in land*. See LAND.

SHUTTLE, in the *Manufactures*, an inſtrument uſed by the weavers, which, with a thread it contains, either of woollen, ſilk, flax, or other matter, ſerves to form the woofs of ſtuffs, cloths, linens, ribbands, &c. by throwing the *ſhuttle* alternately from left to right, and from right to left, acroſs between the threads of the warp, which are ſtretched out lengthways on the loom.

In the middle of the *ſhuttle* is a kind of cavity, called the *eye* or *chamber* of the *ſhuttle*; wherein is incloſed the ſpoul, which is a part of the thread deſtined for the woof; and this is wound on a little tube of paper, ruſh, or other matter.

The ribband weaver's *ſhuttle* is very different from that of moſt other weavers, though it ſerves for the ſame purpoſe: it is of box, ſix or ſeven inches long, one broad, and as much deep; ſhod with iron at both ends, which terminate in points, and are a little crooked, the one towards the right, and the other towards the left, repreſenting the figure of an ∽ horizontally placed.

SHWAN-*pan*, the name of a Chineſe inſtrument, compoſed of a number of wires, with beads upon them, which they move backwards and forwards, and which ſerves to aſſiſt them in their computations. See ABACUS.

SI, in *Muſic*, a ſeventh note, added in the laſt century to the ſix ancient notes invented by Guido Aretin, *ut*, *re*, *mi*, *fa*, *ſol*, *la*, *ſi*; by means whereof, the embarraſs of the ancient gamut is avoided.

The original introduction of this ſyllable is attributed by Merſennus, and other writers, to one Le Maire, a French muſician, who laboured for thirty years to bring it into practice; but he was no ſooner dead than all the muſicians of his country made uſe of it. However, it has been the more general opinion, that the ſyllable *ſi* was introduced into the ſcale by Ericius Puteanus of Dort, who lived about the year 1580. M. Bourdelot aſcribes the introduction of this ſyllable into the ſcale to a Cordelier, about the year 1675; and he adds, on the teſtimony of the abbé de la Louette, that it was invented, or a ſecond time brought into practice, by one Metru, a famous ſinging-maſter at Paris, about the year 1676; and Bonet inclines to think, that the honour of the invention might be due to the Cordelier, but that the merit of reviving it is to be aſcribed to Metru. Bourdelot inſinuates, that though the uſe of the ſyllable *ſi* is much approved of by the French muſicians, yet in Italy they diſdain to make uſe of it, as being the invention of a Frenchman. Hawkins's Hiſt. of Muſic, vol. i. p. 435. See SOL-FA-ING.

SI *action*, in *Law*, the concluſion of a plea to the action, when the defendant demands judgment, if the plaintiff ought to have his action, &c.

SIAGONAGRA, a name given by ſome medical writers to the gout in the jaws.

SIALISMUS, formed from σιαλον, *ſaliva*, a word uſed by the ancients to expreſs a diſcharge of ſaliva, brought on by the holding hot things in the mouth; and by us for a ſalivation by mercury.

SIALOCHI, a term uſed by the ancients to expreſs ſuch perſons as had a plentiful diſcharge of ſaliva, by whatever means. Hippocrates uſes it for a perſon having a quinſey, who diſcharges a very large quantity of ſaliva. Others expreſs by it perſons, whoſe mouths naturally abound with a bitter ſaliva; and others, ſuch perſons as, from having a very large tongue, ſpit into people's faces while talking with them.

SIALOGOGUES, formed from σιαλον, and αγω, *I draw away*, a term uſed by medical writers to expreſs ſuch medicines as promote a copious diſcharge of the ſaliva, ſuch as pellitory of Spain, and all the other hot and acrid vegetables; and mercury, the moſt powerful of all.

SIANKE, or SYNKE, in *Natural Hiſtory*, a name given by the people of ſome parts of the Eaſt Indies to the caryophyllus, or clove-ſpice. The people of the Moluccas, according to Garcias, call it *chanque*, which is only a ſmall difference of pronunciation. The Turks and Perſians call the ſame ſpice *calaſur*.

SIBBALDIA, in *Botany*, a genus of the *pentandria pentagynia* claſs. Its characters are, that the calyx is divided into ten ſegments; it has five petals inſerted in the calyx, the ſtyles proceed from the ſide of the germen, and it has five ſeeds. There are two ſpecies.

SIBTHORPIA, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are, that the calyx is quindentated; the limb of the corolla even; and the fruit a compreſſed, orbicular, bilocular capſule. There are three ſpecies.

SIBYLS, *Sibyllæ*, ſuppoſed to be formed of the two Greek words, σιȣ, for Θεȣ, *Dei*, and βȣλη, *counſel*, in *Antiquity*, virgin-propheteſſes, or maids ſuppoſed to be divinely inſpired; and who, in the height of their enthuſiaſm, gave oracles, and foretold things to come.

Authors do not agree about the number of the *Sibyls*. Capella reckons but two, viz. Erophyle of Troy, called *Sibylla Phrygia*; and Sinuachia of Erythræ, called *Sibylla Erythræa*. Solinus mentions three; viz. Cumæa, Delphica, and Erythræa. Ælian makes their number four, and Varro increaſes it to ten, denominating them from the places of their birth; the Perſian, Libyan, Delphic, Cumæan, Erythræan, Samian, Cuman, Helleſpontic or Troiad, Phrygian, and Tiburtine. Of theſe, the moſt celebrated are, the Erythræan, Delphic, and Cumæan *Sibyls*.

Some modern authors, without regarding the authority of Varro, or that of the other ancients, are for uniting all the *Sibyls* in one; ſo that, according to them, different names were given to one and the ſame *Sibyl* from the different places where ſhe uttered her oracles. She firſt publiſhed her predictions in the city of Erythræa, the place of her nativity; then rambled about the world, and cloſed her life at Cumæ, in Italy. Dr. Hyde (De Relig. Perſar.), ſhocked at the contradictions and fabulous adventures with which the pagans filled the hiſtory of the *Sibyls*, accounts for them in the following manner. He obſerves in the conſtellation Virgo a bright ſtar, which the Perſians called Sambula; and remarks, that the Perſians who were fond of judiciary aſtrology, looked on the ſign of the Virgin as having a greater power than all the other celeſtial bodies, for diſcovering future events. The Greeks, having learnt the ſciences of the eaſtern nations, ſoon adopted theſe trifling opinions, and, agreeably to their genius, embelliſhed them with their fictions. Their poets ſoon invented a *Sibyl* virgin, in alluſion to the term *Sambula*, carried her into ſeveral countries, and made her act the part of a propheteſs. So that, according to this eminent writer, whatever has been ſaid both by the ancients and moderns of the *Sibyls* and their prophecies, is entirely fabulous.

The *Sibylline* oracles were held in great veneration by the more credulous among the ancients; but they were much ſuſpected by many of the more knowing. The books wherein they were written, were kept by the Romans with infinite care; and nothing of moment was undertaken without conſulting them. Tarquin firſt committed them to the cuſtody of two patrician prieſts, inſtituted for that purpoſe. See DUUMVIRI *ſacrorum*.

Theſe books were carefully kept till the civil wars of Sylla and Marius; when the Capitol being accidentally ſet on fire, and burnt down to the ground, theſe books were burnt with it. This happened in the year before Chriſt 83. But the Capitol being again rebuilt about ſeven years after this period, the ſenate determined to reſtore the *Sibylline* oracles; and having procured many that were ſaid to be of this kind, laid them up in the Capitol, in order to ſupply the place and office of thoſe that were loſt. However, the books thus obtained had been diſperſed in the hands of many, and were, therefore, by being thus vulgarly known, unfit for the uſe which the Romans propoſed to make of them. On this account a law was paſſed, which required the ſurrender of them, and prohibited any from retaining copies of them, under pain of death. Auguſtus, when he aſſumed the high-prieſthood of Rome, revived this law, and deſtroyed a great multitude of copies which were brought in. Tiberius cauſed many more to be burnt, and preſerved only thoſe which were found more worthy of approbation for that ſervice of the ſtate for which they were originally intended; and to theſe, as long as Rome remained heathen, they had conſtant recourſe; till at length Honorius the emperor, A. D. 399, iſſued an order for deſtroying them; in purſuance of which Stilico burnt all theſe prophetic writings, and demoliſhed the temple of Apollo, in which they were repoſited. Nevertheleſs, there is ſtill preſerved, in eight books of Greek verſe, a collection of oracles, pretended to be the *Sibylline*. Dr. Cave, who is well ſatisfied that this collection is a forgery, ſuppoſes that a large part of it was compoſed in the time of Adrian, about the year 130; that others were added in the time of the Antonines, and the whole work completed in the reign of Commodus. Dr. Prideaux ſays, that this collection muſt have been made between the year of our Lord 138, and the year 167. It could not be earlier, for mention is made of the next ſucceſſor of Adrian, i. e. Antoninus Pius, who did not ſucceed him till the year 138; and it could not be later, becauſe Juſtin Martyr in his writings often quotes it, and appeals to it; and he did not outlive the year 167. Fabricius ſuppoſes, that this collection does not contain all the *Sibylline oracles* which were uſed by the ancient fathers; and that the moſt ancient Chriſtian writers, who have quoted the *Sibylline oracles*, had only a part of the collection which is tranſmitted down to us. Some of the fathers, not apprized of the impoſition, have often cited the books of the *Sibyls* in favour of the Chriſtian religion; and hence Celſus takes occaſion to call the Chriſtians *Sibylliſts*. See farther on this ſubject Prideaux's Conn. vol. iv. p. 885, &c. Lardner's Credib. of the Goſpel Hiſt. vol. iv. book i. chap. 29.

SICCHASIA, a word uſed by ſome writers to expreſs that uneaſineſs at the ſtomach, and loathing of food, which women are often afflicted with in their pregnancy.

SICCINNIS, in *Antiquity*, a mixed kind of DANCE.

SICERA, in the *Jewiſh Antiquities*. The Helleniſt Jews give this name to any inebriating liquor. St. Chryſoſtom, Theodoret, and Theophilus of Antioch, who were Syrians, and who therefore ought to know the ſignification and nature of *ſicera*, aſſures us, that it properly ſignifies palm-wine.

Pliny acknowledges, that the wine of the palm-tree was very well known through all the Eaſt, and that it was made by taking a buſhel of the dates of the palm-tree, and throwing them into three gallons of water; then ſqueezing out the juice, it would intoxicate like wine.

The wine of the palm-tree is white; when it is drank new, it has the taſte of the cocoa, and is ſweet as honey: when it is kept longer, it grows ſtrong, and intoxicates. After long keeping, it becomes vinegar.

SICILIAN *meaſures*, *ſilk*, and *veſpers*. See the ſubſtantives.

Sicilian, in *Muſic*, denotes a kind of gay ſprightly air, or dance, probably invented in Sicily, ſomewhat of the nature of an Engliſh jig; uſually marked with the characters $\frac{6}{8}$, or $\frac{12}{8}$. It conſiſts of two ſtrains, the firſt of four, and the ſecond of eight bars, or meaſures.

SICILIANA, in *Botany*, a name given by Dodonæus, and ſome other authors, to the great androſæmum, called *tutſan*, and *park-leaves*.

SICILICUM, the name of a weight in uſe among the ancients, which ſome ſay was equal to three drachms of our weight; others ſay only to two.

SICK *herrings*. See HERRING.

Sick, *iron*. See IRON *ſick*.

SICKLE-*fiſh*. See FALX.

Sickle-wort, in *Botany*. See CORONILLA.

SICKNESS. See DISEASE.

Sickness, *green*. See CHLOROSIS.

Sickness, *ſweating*. See SWEATING *ſickneſs*.

Sickness, *falling*. See EPILEPSY.

SICUB, or **Sicap**, in *Natural Hiſtory*, a name given by the inhabitants of the Philippine iſlands to a ſpecies of hawk, of the bigneſs of their common hawk, or banoy, which is ſomewhat larger than our ſparrow-hawk. This bird is very elegantly variegated all over its body with yellow, white, and black. See LAVIN.

SICUS, in *Ichthyology*, a name uſed by ſome authors to expreſs that ſpecies of coregonus, called by the generality of authors ALBULA *nobilis*. This, in the Linnæan ſyſtem, is a ſpecies of *ſalmo*.

SICUT *alias*, a writ ſent out in the ſecond place, where the firſt was not executed.

It is thus called from its beginning, which is in this form: *Georgius*, *D. G.* &c. *Vicecomiti Heref. ſalutem. Præcipimus ſalutem tibi* (ſicut alias) *præcipem'*, &c.

SICYANA. See *Gourd* WORM.

SICYONE, a word uſed by Hippocrates to expreſs colocynth, and by others for a ſpecies of hard-ſhelled gourd, in the ſhape of a pear, and by ſome for a cupping-glaſs.

SICYONEUM *oleum*, a word uſed by the ancients to expreſs a medicinal oil, of which there was among them three kinds in uſe. The firſt was called *ſicyoneum ſimplex*. This was compoſed of two ounces of the root of the wild cucumber, boiled ſeveral hours in a pint of oil. The ſecond ſort was called the *compound ſicyoneum*, and was made of the root of the ſame plant, with many other ingredients. The third was another compound kind, made not with an infuſion of the root, but with the juice of the fruit of the wild cucumber.

SICYONII, among the Romans, were ſhoes of a more delicate form, and better ornamented than ordinary, and chiefly worn by the ladies and their gallants.

SICYOS, in *Botany*. See *Single-ſeeded* CUCUMBER.

SIDA, in *Botany*. See *Indian* MALLOW.

SIDE, *latus*, in *Geometry*. The *ſide of a figure* is a line making part of the periphery of any ſuperficial FIGURE.

In triangles, the *ſides* are alſo called *legs*. In a right-angled triangle, the two *ſides*, including the right angle, are called *catheti*; and the third the *hypothenuſe*.

Side *of a polygonal number* is the number of the terms of the arithmetical progreſſion that are ſummed up. See POLYGONAL *number*.

Side *of power* is what we otherwiſe call the ROOT, or *radix*.

Sides *of horn-works*, *crown-works*, *double tenailles*, and the like *out-works*, are the ramparts and parapets which incloſe them on the right and left, from the gorge to the head.

Side, *right*, in *Conics*. See LATUS *rectum*.

Side, *tranſverſe*, in *Conics*. See LATUS *tranſverſum*.

Sides *of a ſhip*, are diſtinguiſhed into the *ſtarboard* and *larboard*; that is, into the right and left-hand-*ſide*, when ſtanding with the face towards the head of the veſſel. See STARBOARD and LARBOARD.

Side, *broad*, in the *Sea Language*, is to fire all the guns on one *ſide* of the ſhip.

Side-*wind*, at *Sea*. See WIND.

Side-*grafting*. See ENGRAFTING.

Side-*lays* is a term made uſe of, by huntſmen, when dogs are placed in the way, to be let ſlip at a deer, as he paſſes by.

Side-*ſaddle flower*. See *Hollow-leaved ſea* LAVENDER.

SIDERATION, *ſideratio*, in *Surgery*, a MORTIFICATION of ſome part of the body; called alſo *ſphacelus*, and *necroſis*.

Sideration is alſo uſed for a being ſuddenly benumbed, and deprived of the uſe of one's limbs, ſenſes, &c. which the common people call being *planet-ſtruck*.

Sideration alſo denotes the blaſting or blighting of trees, plants, &c. by eaſtern winds, exceſſive heat, drought, or the like cauſes. See BLIGHT.

SIDERIA, in *Natural Hiſtory*, the name of a genus of cryſtal.

The word is derived from the Greek σιδηρος, *iron*, and is uſed to expreſs cryſtals altered in their figure by particles of that metal. Theſe are of a rhomboidal form, compoſed only of ſix planes.

Of this genus there are four known ſpecies. 1. A colourleſs, pellucid, and thin one, found in conſiderable quantities among the iron ores of the foreſt of Dean in Glouceſterſhire, and in other the like places. 2. A dull, thick, and brown one, not uncommon in the ſame places with the former. And, 3. A black and very gloſſy kind, a foſſil of very great beauty, found in the ſame place with the others, as alſo in Leiceſterſhire and Suſſex. See *Tab. of Foſſils*, *Claſs* 3. Hill's Hiſt. of Foſſ. p. 197.

SIDERIAL *year*. See YEAR.

Siderial *day*, is the time in which any ſtar revolves from the meridian to the meridian again; viz. 23 hours, 56 minutes, 4 ſeconds, 6 thirds, of mean ſolar time. There are 366 *ſiderial* days in a year, or in the time of 365 diurnal revolutions of the ſun. The firſt column of the following table is the number of revolutions of the ſtars; the others next are the times in which theſe revolutions are made, as ſhewn by a well regulated clock; and thoſe on the right hand ſhew the daily accelerations of the ſtars, that is, how much any ſtar gains upon the time ſhewn by ſuch a clock, in each revolution.

Revolutions of the ſtars	Times in which theſe revolutions are made						Accelerations of the ſtars.				
	Days	Hours	Min.	Sec.	Thirds	Fourths	Hours	Min.	Sec.	Thirds	Fourths
1	0	23	56	4	6	0	0	3	55	54	0
2	1	23	52	8	12	1	0	7	51	47	59
3	2	23	48	12	18	1	0	11	47	41	59
4	3	23	44	16	24	2	0	15	43	35	58
5	4	23	40	20	30	2	0	19	39	29	58
6	5	23	36	24	36	3	0	23	35	23	57
7	6	23	32	28	42	3	0	27	31	17	57
8	7	23	28	32	48	4	0	31	27	11	56
9	8	23	24	36	54	4	0	35	23	5	56
10	9	23	20	41	0	5	0	39	18	59	55
11	10	23	16	45	6	5	0	43	14	53	55
12	11	23	12	49	12	6	0	47	10	47	54
13	12	23	8	53	18	6	0	51	6	41	54
14	13	23	4	57	24	7	0	55	2	35	53
15	14	23	1	1	30	7	0	58	58	29	53
16	15	22	57	5	36	8	1	2	54	23	52
17	16	22	53	9	42	8	1	6	50	17	52
18	17	22	49	13	48	9	1	10	46	11	51
19	18	22	45	17	54	9	1	14	42	5	51
20	19	22	41	22	0	10	1	18	37	59	50
21	20	22	37	26	6	10	1	22	33	53	50
22	21	22	33	30	12	11	1	26	29	47	49
23	22	22	29	34	18	11	1	30	25	41	49
24	23	22	25	38	24	12	1	34	21	35	48
25	24	22	21	42	30	12	1	38	17	29	48
26	25	22	17	46	36	13	1	42	13	23	47
27	26	22	13	50	42	13	1	46	9	17	47
28	27	22	9	54	48	14	1	50	5	11	46
29	28	22	5	58	54	14	1	54	1	5	46
30	29	22	2	3	0	15	1	57	56	59	45
40	39	21	22	44	0	19	2	37	15	59	41
50	49	20	43	25	0	24	3	16	34	59	36
100	99	17	26	50	0	48	6	33	9	59	12
200	199	10	53	40	1	37	13	6	19	58	23
300	299	4	20	30	2	25	19	39	29	57	35
360	359	0	24	36	2	54	23	35	23	57	6
365	364	0	4	56	32	56	23	55	3	27	4
366	365	0	1	0	38	57	23	58	59	21	3

This table will not differ the 279936000000th part of a ſecond of time from the truth in a whole year.

If the equinoctial points were at reſt in the heavens, there would be exactly 366 revolutions of the ſtars from the meridian to the meridian again in 365 days. But the equinoctial points go backward, with reſpect to the ſtars, at the rate of fifty ſeconds of a degree in a Julian year; which cauſeth the ſtars to have an apparent progreſſive motion eaſtward fifty ſeconds in that time. And, as the ſun's mean motion in the ecliptic is only 11 ſigns 29 degrees 48 min. 40 ſec. 15 thirds, in 365 days, it is plain, that at the end of that time he will be 14 min. 19 ſec. 45 thirds ſhort of that point of the ecliptic from which he ſet out at the beginning; and the ſtars will be advanced 50 ſeconds of a degree with reſpect to that point.

Conſequently, if the ſun's centre be on the meridian with any ſtar on any given day of the year, that ſtar will be $14' 19'' 45''' + 50''$, or $15' 9'' 45'''$ eaſt of the ſun's centre, on the 365th day afterward, when the ſun's centre is on the meridian; and therefore that ſtar will not come to the meridian on that day till the ſun's centre has paſſed it by 1 min. 0 ſec. 38 thirds, 57 fourths of mean ſolar time; for the ſun takes ſo much time to go through an arc of $15' 9'' 45'''$; and then, in 365 days 0 h. 1 min. 0 ſec. 38 thirds, 57 fourths, the ſtar will have juſt completed its 366th revolution to the meridian.

This table was calculated by Mr. Ferguſon; and it is the only table of the kind in which the receſſion of the equinoctial points has been taken into the calculation.

SIDERITES, a name which ſome authors give the loadſtone. See MAGNET.

SIDERITIS, in *Botany*. See IRON-*wort*.

SIDEROCHITA, in *Natural Hiſtory*, a claſs of cruſtated ferrugineous bodies, of a moderately firm and compact texture, compoſed of ferrugineous mixed with earthy matter, and formed of repeated incruſtations, making ſo many coats or cruſts round a ſofter or harder nucleus, or round looſe earths, or an aqueous fluid. See FOSSILS.

Under this claſs are comprehended the *empherepyra*, *heteropyra*, *geodes*, and *enhydri*. See EMPHEREPYRA, &c.

SIDEROXYLUM, in *Botany*. See IRON *wood*.

SIDES-MEN, properly called *ſynods-men*, or *queſt-men*, perſons who, in larger pariſhes, are appointed to aſſiſt the church-wardens in inquiring into the manners of inordinate livers, and in preſenting offenders at viſitations.

SIDEROMANTIA, Σιδηρομαντεια, in *Antiquity*, a kind of divination performed with a red-hot iron, upon which they laid an odd number of ſtraws, and obſerved what figures, bendings, ſparklings, &c. they made in burning.

SIDEWAYS, in the *Manege*. To ride a horſe *ſideways*, is to paſſage him, or make him go upon two treads, one of which is marked by his ſhoulders, and the other by his haunches.

SIDUS, *Georgium*, in *Aſtronomy*, a new primary planet, diſcovered by William Herſchel, eſq. of Bath, in the year 1781; for which he obtained from the Royal Society the honorary recompence of ſir Godfrey Copley's medal, and ſo called in honour of his majeſty king George III. who has taken Mr. Herſchel under his patronage, and granted to him an annual ſalary. The editor has been favoured with the following account of this planet from the ingenious diſcoverer. From many calculations of our beſt aſtronomers and mathematicians, ſays Mr. Herſchel, I have collected the following particulars, as moſt to be depended upon.

Place of the node - -	$2^s\ 11^d\ 49'\ 30''$
Inclination of the orbit -	$43'\ 35''$
Place of the perihelion -	$172^d\ 13'\ 17''$
Time of the perihelion paſſage	Sep. 7, 1799
Eccentricity of the orbit -	,82034
Half the greater axis	19,07904
Revolution -	83,3364 ſiderial years.

From my own obſervations on this planet's apparent diameter, which I have found cannot well be leſs than 4″, nor indeed much greater, we infer that its real diameter is to that of the earth as 4,454 to 1; and hence it appears to be of a very conſiderable bulk, and except Saturn and Jupiter, by far the largeſt of the remaining planets. Its light is of a bluiſh-white colour, and in brilliancy between that of the Moon and of Venus. With a teleſcope which magnifies about three hundred times, it appears to have a very well defined viſible diſk; but with inſtruments of a ſmall power, it can hardly be diſtinguiſhed from a fixed ſtar of between the ſixth and ſeventh magnitude. In a very fine clear night, when the moon is abſent, it may alſo be ſeen by the naked eye.

SIEGE, in *War*, the encampment of an army around a place, with deſign to take it, either in the way of diſtreſs and famine, by making lines all around it, to prevent any relief from without; or by main force, as by digging trenches, and making formal attacks.

The word is French, and ſignifies, literally, *ſeat*; alluding to the army's taking its ſeat before a town, till the reduction of the place.

The moſt celebrated *ſieges* of antiquity are thoſe of Troy, Tyre, Alexandria, and Numantium; and, among the moderns, thoſe of Oſtend, Candia, Grave, Bergen-op-zoom, Gibraltar, &c. See LINE, in *Fortification*.

SIEGE, *to raiſe a*, is to give over the attack of a place, quit the works thrown up againſt it, and the poſts formed about it.

SIEGE, *to turn a*, into a blockade. See BLOCKADE.

SIEVE, or SEARCE, an inſtrument ſerving to ſeparate the fine from the coarſe parts of powders, liquors and the like; or to cleanſe pulſe from duſt, light grains, &c.

It is made of a rim of wood, the circle, or ſpace, whereof, is filled with a plexus of ſilk, tiffany, hair, linen, wire, or even thin ſlices of wood.

The *ſieves* which have large holes, are ſometimes alſo called *riddles*: ſuch is the coal or lime *ſieve*, the garden *ſieve*, &c.

When drugs apt to evaporate, are to be paſſed through the *ſieve*, it is uſual to have it covered with a lid.

SIEUR, a title of honour, or quality, among the French; chiefly uſed among the lawyers, and in public acts, and other writings of that kind.

The title *ſieur* is alſo given by a ſuperior to an inferior, in his letters, and other private writings.

In this ſenſe, authors ſometimes uſe it, by way of modeſty, in ſpeaking of themſelves: thus, at the heads of books, we ſee Traduction du *ſieur* d'Ablancourt; Oeuvres du *ſieur* d'Eſpreaux, &c.

SIEUR is alſo a term expreſſing *ſeigneury*, or lordſhip: as *ecuyer* or *ſieur* of ſuch a place.

SIGAH-*guſh*, or SIYAH-*ghuſh*, or *black-ear*, in *Zoology*, the name of a Perſian animal, of the *felis* or cat-kind, and no way differing from the lynx, but in that it has no ſpots; it has a lengthened face, and ſmall head; its ears have the fine velvety black pencil of hairs at the top, which are the diſtinguiſhing character of the lynx; the inſide and bottom of the ears are white; the noſe white, the eyes ſmall, the upper part of the body of a very pale reddiſh brown, the tail darker, and about half the length of the body; the belly and breaſt whitiſh; the limbs ſtrong, and pretty long, the hind-part of each marked with black. This animal inhabits Perſia, India, and Barbary; and is uſed in the chace of leſſer quadrupeds, and the larger ſort of birds, which they artfully ſurpriſe and ſeize; it is ſaid to attend upon the lion, and to feed on the remains of its prey. It is fierce when provoked. Pennant's Hiſt. Quadr. vol. ii. p. 283. Phil. Tranſ. vol. li. part ii. p. 648, &c. See *Tab.* V. *Quadrupeds*, N° 57.

SIGESBECKIA, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. Its characters are theſe: the proper involucrum of the flower is compoſed of five linear, taper, obtuſe leaves, which open beyond the petal, and is permanent; the common cover is five-leaved, fitting cloſe; the leaves are oval, concave, equal, and diſpoſed in ſeveral ſeries, and between each leaf is contained a floret; the flower is compoſed of hermaphrodite florets in the diſk, and the border or ray is made up of female half florets, which are tongue-ſhaped; the hermaphrodite florets are funnel-ſhaped, cut in five parts at the brim; theſe have five ſhort ſtamina, with tubulous ſummits joined together, and an oblong, incurved germen, as large as the empalement, ſupporting a ſlender ſtyle, crowned by a bifid ſtigma; the germen turns to an oblong, four-cornered, blunt ſeed; the female half florets have a ſhort, broad, tongue-ſhaped petal, indented in three parts; theſe have a germen, ſtyle, and ſtigma, like the hermaphrodite floret, but have no ſtamina, and are ſucceeded by ſingle ſeeds, like the other. Miller mentions one ſpecies of this genus, which is a troubleſome weed in the Eaſt Indies. Linnæus mentions two ſpecies.

SIGHING, an effort of nature, by which the lungs are put into greater motion, and more dilated, ſo that the blood paſſes more freely, and in greater quantity, to the left auricle, and thence to the ventricle. Hence we learn, ſays Dr. Hales, how *ſighing* increaſes the force of the blood, and conſequently proportionably chears and relieves nature, when oppreſſed by its too ſlow motion, which is the caſe of thoſe who are dejected and ſad. Hales's Statical Eſſ. vol. ii. p. 6.

SIGHT, the exerciſe, or act of the ſenſe of ſeeing.

Our *ſight*, the nobleſt and moſt uſeful of all our ſenſes, father Malebranche ſhews, deceives us in abundance of inſtances; nay, almoſt in all: particularly with regard to the magnitude and extent of things; their figures, motions, &c. Our eyes do not ſhew any thing leſs than a mite: half a mite is nothing, if we believe their report. A mite is only a mathematical point, with regard to it; and we cannot divide it, without annihilating it. In effect, our *ſight* does not repreſent extenſion, ſuch as it is in itſelf; but only the relation and proportion it has to our body. Hence, as half a mite has no relation to our bodies, and that it cannot either preſerve or deſtroy us, our *ſight* hides it entirely. Were our eyes made like microſcopes, or were we ourſelves as ſmall as mites, we ſhould judge very differently of the magnitude of bodies.

It may be added, that our own eyes are really no other than a kind of natural ſpectacles; that their humours do the ſame office as the lens in ſpectacles; and that, according to the figure of the cryſtalline, and its diſtance from the retina, objects are ſeen very differently by us; inſomuch that we are not ſure, that there are any two perſons in the world who ſee them equally big. It is even very rare, that the ſame perſon ſees the ſame object equally big with both eyes; as both eyes are very ſeldom perfectly alike: on the contrary, we generally ſee things bigger with the left than the right eye; of which we have ſome very good obſervations in the journal of the learned at Rome, for the year 1669. See VISION.

The Acta Leipſienſia give us an account of a man, who received a ſmart ſtroke on the pupil of one of his eyes from the end of a fiddle-ſtring, which broke while he was tuning the inſtrument, and chanced to fly that way. Some cooling things were applied to the eye, and a bandage uſed to ſhade it from the light; but at midnight the patient chancing to wake in the dark, found that he could ſee with that eye, though not with the other: this continued a long time, and on trial he found that he could read a ſmall print at midnight with this eye, but could ſcarce diſtinguiſh any thing with it in a bright and clear day.

We have, in the ſame collections, an account of a man, who, after the cure of a confirmed pox, ſaw every object double for a long time. Act. Leipſ. 1690.

It is a very common, and a very juſt obſervation, that children do not ſee any thing clearly when new-born; and if their eyes be then examined, they are found to want that brilliancy which they afterwards acquire; and finally, when any object is preſented to their view, they at firſt turn their eyes about in ſuch a manner, that it is evident they either do not ſee at all, or at beſt but very imperfectly and obſcurely.

This imperfection may either be owing to a fault in ſome one of the humours, or in their capſules; or, finally, in the retina, or complexly in them all together. It is impoſſible to diſcover whether there be any imperfection in the retina in this ſtate of life, that membrane being ever, in new-born infants, tender and ſoft like a jelly: if it be in any of the other parts that the imperfection lies, it muſt be either in their nature, or extent. Mr. Petit, of the Academy of Sciences at Paris, determined to inquire thoroughly into the cauſe of this, was at the pains of diſſecting the eyes of ſeveral infants which had died ſoon after their birth, and in three fourths of them he found the vitreous, the cryſtalline, and the capſule, all greatly deficient in their tranſparence. The uvea appeared alſo more opake than in adults, and the pupil over large; and that there was either none, or, at the utmoſt, very little of the aqueous humour; and in thoſe eyes, where the humours had not this opacity, they were all, as were alſo the membranes, of a reddiſh colour; and this was obſerved in fœtuſes of ſeven and nine months old.

The cornea in theſe eyes was alſo remarkably thick, which is, in general, found to be the caſe in the eyes of all fœtuſes. The thickneſs and opacity in theſe corneæ gradually diminiſh in time, and that ſoon; ſo that the eyes of children appear much brighter at two or three months old, than when new-born. The aqueous humour ſeems alſo, in moſt fœtuſes, to be wholly wanting; and where it is found, is ever greatly in an under proportion to the other humours.

It therefore appears that the dimneſs and imperfection of *ſight*, in new-born infants, is owing to the over-thickneſs of the cornea, and to the too ſmall portion of the aqueous or watery humour. It appears plainly alſo, from experience, that the eye is not able, in infants, to bear the light, till the pupil is greatly contracted; as is the caſe alſo, though in a leſs degree, in adults; and it is very probable, that the extreme ſoftneſs of the retina in this ſtate may make every ray of light affect it much more plainly than when grown more firm.

Mr. Petit having continued his examinations of the eyes of infants, up to the age of five or ſix weeks, found in all his diſſections, that the cornea daily grew more and more convex and gloſſy; and this may be rationally concluded to be owing to the daily increaſe of the aqueous humour, which muſt, by that accretion, throw it out into a greater convexity, and make it daily more and more thin and tranſparent. The uvea alſo acquires a greater extenſion, and its fibres become more moveable; whence the pupil acquires a power of enlarging or contracting itſelf, at the approach or abſence of light, with much more eaſe and readineſs than it could before. The humours thus all become capable of letting in a larger quantity of light; the retina is at the ſame time every day gaining new firmneſs, and the pupil becomes capable of an eaſy dilatation, or reſtriction, for the letting in occaſionally a greater or leſs number of rays, and the refractions are perfected by the augmentation of the aqueous humour. It is plain, therefore, that the clearneſs of viſion muſt every day increaſe. All this change comes on in infants only by time; and it may be judged of, as to its ſtate, by inſpection, by the brilliancy and convexity of the cornea, and by the manner of their turning their eyes towards objects ſet before them; and this time is not certain, or limited, but differs greatly in different children, ſome being able to ſee clearly at the end of a month, others not till after many months.

At the time that this gentleman was diſſecting the eyes of human fœtuſes and infants, he alſo curiouſly obſerved the eyes of young quadrupeds. The puppy, when newly brought forth, has always its eyes opake; the kitten, on the contrary, has them clear, and every way like thoſe of adults of the ſame ſpecies. In fœtuſes of other quadrupeds, the lamb has its cornea a little turbid and opake; the calf and the pig have them more or leſs opake, but the calf ſo moſt of all. Mem. de l'Acad. Par. 1727.

SIGHT, *ſhort*. See MYOPS, and SHORT-SIGHTEDNESS.

SIGHT, *ſecond*. See SECOND *ſight*.

SIGHT, *point of*. See POINT *of view*.

SIGHT, *line of*. See COLLIMATION.

SIGHTS, in *Mathematics*, denote two thin pieces of braſs, raiſed perpendicularly on the two extremes of an alidade or index of a theodolite, circumferentor, or other like inſtrument; each whereof has an aperture or ſlit up the middle, through which the viſual rays paſs to the eye, and diſtant objects are ſeen. Their uſe is, for the juſt direction of the index to the line of the object.

Sometimes the ſlits or apertures have glaſſes or lenſes fitted into them; in which caſe, they are called *teleſcopic ſights*, by way of diſtinction from the former; which, in reſpect hereof, are denominated *plain ſights*.

Mr. Flamſteed and Dr. Hooke abſolutely explode the uſe of *plain ſights* in aſtronomical obſervations. The errors in Tycho's latitudes of the ſtars Mr. Flamſteed aſcribes wholly to his uſing *plain ſights*; and ſuſpects, that Hevelius, uſing the ſame kind of *ſights*, muſt fall into the like errors. Hevelius, on the contrary, in a paper in the Philoſophical Tranſactions, vindicates the uſe of *plain ſights*, and prefers them to *teleſcopic* ones: the main objection he makes to the latter is, that no obſervation can be ſafely taken with them, without firſt examining and rectifying them; in which examination, many and groſs miſtakes are liable to be committed. To which he adds, that in ſextants, octants, azimuth quadrants, &c. he does not ſee how ſuch examination can be made, at all times, without much loſs of time.

SIGILLARIA, a ſolemn feaſt held among the ancient Romans; thus called from a cuſtom which obtained therein, of ſending little preſents from one to another, conſiſting of ſeals, little figures, and ſculptures, made of gold, ſilver, braſs, or even earthen ware, and of devoting them to Saturn, as an atonement for themſelves and their friends.

The *Sigillaria* followed immediately after the Saturnalia, and held two days; which, with the five days of the SATURNALIA, made a ſolemnity of ſeven days.

Some derive the origin of *ſigils* and figures, in this ſolemnity, from the argei, or ruſhen figures of men, thrown annually into the Tiber, from the Pons Sublicius, by the Veſtals, on the ides of March. Vide Macrob. Saturn. lib. i. cap. 7. 10, & 11. See alſo ARGEA.

SIGILLATA *terra*, a name given to ſeveral kinds of medicinal earths marked with ſeals, to expreſs their being genuine. The principal is the LEMNIAN *earth*: this is a kind of earth, or bole, dug in the iſle of Lemnos, and thence alſo called *Lemnian* earth; of conſiderable uſe in medicine.

It was anciently found in a mountain, in the neighbourhood of the city Hephæſtia, where Diana's prieſts went, at certain times, with great ceremony, to dig it up. After a little preparation, they made it up into troches, and ſealed them with Diana's ſeal; whence the appellation of *ſigillata*, *ſealed*.

SIGILLUM, a SEAL, or SIGNET.

SIGILLUM *Mariæ*, *lady's ſeal*, in *Botany*, a name by which ſome authors have called the *bryonia nigra*, or black BRYONY, a climbing plant, common in hedges.

SIGMA, among the Romans, the ſame with the STIBADIUM.

SIGMOIDES, a word uſed by medical writers to expreſs any thing that is in the ſhape of the letter ſigma. The valves of the heart have this epithet applied to them; the coracoide proceſs of the ſcapula is alſo expreſſed by the ſame word; the ſemicircular cavity of the cubit, at the articulation of the fore-arm with the humerus, is ſometimes alſo called the *ſigmoidal cavity*; and the cartilages of the *ſigmoide circles* of the *aſpera arteria*, or windpipe, have their denomination from the ſame circumſtance.

SIGN, *ſignum*, a ſenſible mark, or character, denoting ſomething abſent, or inviſible.

Anciently the monks, in all religious houſes, were not allowed to ſpeak, nor to expreſs their minds, otherwiſe than by *ſigns*, which they learned in their noviciate. C. Rhodiginus and Porta have written of the ancient *ſigns* and cyphers uſed in ſpeaking and writing.

SIGN, in *Algebra*, denotes a ſymbol, or CHARACTER.

SIGNS, *like*, *negative*, and *radical*. See the adjectives.

SIGN, in *Medicine*, denotes ſome appearances in the body, diſtinguiſhable by the ſenſes; whence, by juſt reaſoning is inferred the preſence, nature, ſtate, event of health, a diſeaſe, or death.

Thoſe which denote the preſent condition of a body, whether ſick or well, dying or the like, are called *diagnoſtic ſigns*. Thoſe which foretel the future ſtate thereof, are called *prognoſtic ſigns*.

That *ſign* which is peculiar to the diſeaſe, and inſeparable from it, as ariſing from the nature thereof, is called a *pathognomonic ſign*.

As all *ſigns* are effects produced by the cauſe of the diſeaſe, the diſeaſe itſelf, and its ſymptoms; they uſually note the preſent condition of the matter which firſt produced the diſeaſe, and even of that produced by the diſeaſe: on which footing, the *ſigns* are all reducible to theſe three claſſes, viz. *ſigns* of the crudity and coction of the diſeaſe; of its event, whether in health, ſickneſs, or death; and of its ſecretion and excretion; which laſt *ſigns* are called *critical* ones.

SIGN, *antecedent*. See ANTECEDENT.

SIGN, in *Aſtronomy*, a twelfth part of the ecliptic, or zodiac; or a portion, containing thirty degrees thereof.

The zodiac was divided, by the ancients, into twelve ſegments, called *ſigns*; commencing from the point of interſection of the ecliptic and equinoctial; which *ſigns* they denominated from the twelve conſtellations, which, in Hipparchus's time, poſſeſſed thoſe ſegments. But the conſtellations have ſince ſo changed their places, by the preceſſion of the equinox, that Aries is now got out of the *ſign* called *Aries*, into Taurus, Taurus into Gemini, &c.

The names of the twelve *ſigns*, and their order, are as follow: *Aries*, *Taurus*, *Gemini*, *Cancer*, *Leo*, *Virgo*, *Libra*, *Scorpio*, *Sagittarius*, *Capricornus*, *Aquarius*, *Piſces*; each of which, with the ſtars thereof, ſee under its proper article, ARIES, TAURUS, &c.

The *ſigns* are diſtinguiſhed, with regard to the ſeaſon of the year when the ſun is in them, into *vernal*, *æſtival*, *autumnal*, and *brumal*.

SIGNS, *the vernal*, or *ſpring*, are, Aries, Taurus, Gemini.

SIGNS, *the æſtival*, or *ſummer*, are, Cancer, Leo, and Virgo.

SIGNS, *the autumnal*, are, Libra, Scorpio, and Sagittarius.

SIGNS, *the brumal*, or *winter*, are, Capricornus, Aquarius, and Piſces.

The *vernal* and *ſummer ſigns* are alſo called *northern ſigns*. And the *autumnal* and *brumal ſigns*, *ſouthern ſigns*.

SIGNS, *aſcending*. See ASCENDING.

SIGNS, *fixed*. See FIXED.

SIGNS, *maſculine*. See MASCULINE.

SIGN *manual*, the ſetting one's hand and ſeal to a writing. See SIGNATURE.

The expreſſion is uſed when any bill or writing is ſigned under the hand of the king, &c. Counterfeiting the *ſign manual*, privy ſignet, or privy ſeal, is treaſon. 1 Mar. ſtat. 2. cap. 6. See PATENTS.

Among the Saxons, before the invention of ſeals, a + was a common *ſign*, or *ſignum*, prefixed to the names of moſt ſubſcribing witneſſes in charters, and other deeds; as + *ſignum Roberti Epiſcop. Lond.* &c. See SEAL.

SIGNA, *ſtandards*, among the Romans, were of different ſorts; on ſome of them the image of the emperor was repreſented, and they that carried them were called *imaginiferi*; others had a hand ſtretched out, as a ſymbol of concord; and theſe enſign-bearers were called *ſigniferi*; ſome had a ſilver eagle, the bearers of which were called *aquiliferi*; others had a dragon with a ſilver head, and the reſt of his body of taffety, which was blown by the wind as if it had been a real dragon, and the bearers of this enſign were called *draconarii*; laſtly, the emperor's enſign was called *labarum*, and thoſe that carried it *labariferi*, which they carried out when he went in perſon to the field; it was of a purple colour, beſet with gold fringe, and adorned with precious ſtones.

All theſe enſigns were ſuſtained with a half-pike, ſharp at the end, that it might be the more eaſily fixed in the ground.

SIGNAL, a certain ſign agreed upon for the conveying of intelligence to places to which the voice cannot reach.

Signals are given for the beginning of a battle, or an attack; uſually with drums and trumpets: at ſea, they are given by cannon or muſquet-ſhot, by lights, ſails, flags, &c.

All *ſignals* may be reduced into three different kinds; viz. thoſe which are made by the ſound of particular inſtruments, as the trumpet, horn, or fiſe; to which may be added, ſtriking the bell, or beating the drum; thoſe which are made by diſplaying pendants, enſigns, and flags, of different colours; or by lowering or altering the poſition of the ſails; and thoſe which are executed by rockets of different kinds; by firing cannon or ſmall arms; by artificial fire-works; and by lanthorns.

The *ſignals* by the drum, made uſe of in military EXERCISE, inſtead of the word of command, are as follow: a ſhort roll, q. d. to caution; a flam, to perform any diſtinct operation; to arms, to form the line or battalion; the march, to advance, except when intended for a ſalute; the quick march, to advance quick; the point of war, to march and charge; the retreat, to retreat; drum ceaſing, to halt; two ſhort rolls, to perform the flank-firing; the dragoon march, to open the battalion; the grenadier march, to form the column; the troop, to double diviſions; the long roll, to form the ſquare; the grenadier march, to reduce the ſquare to the column; the preparative, to make ready and fire; the general, to ceaſe firing; two long rolls, to bring or lodge the colours.

Signals have been in uſe in all ages: the ancients, who had no regular couriers, or poſts, made uſe thereof to convey intelligence of what paſſed at a great diſtance; for which purpoſe, they placed ſentinels on the eminences, from ſpace to ſpace; ſome mention whereof we find made by Homer himſelf, Iliad Θ. v. 553, &c. Odyſſ. Ξ. v. 261. Thoſe people, thus diſpoſed, lighted fires, or flambeaux, in the night-time. In the Agamemnon of Æſchylus, that prince, at his departure for Troy, promiſes Clytemneſtra, that, the very day the city ſhould be taken, he would apprize her of his victory by fires, lighted expreſs. He keeps his word, and tidings are brought the princeſs, that Troy is taken, and that Agamemnon's *ſignals* are ſeen.

Frontinus obſerves, they were in uſe among the Arabs; and Bonaventura Vulcanius, in his ſcholia on Ariſtotle's book De Mundo, adds, that, while the Moors were maſters of the greateſt part of Spain, they built on the tops of the mountains, an infinity of turrets, or watch-houſes, called, in the Arabic, *atalayas*, a word the Spaniards ſtill retain; whence, by fires, they could immediately alarm the whole kingdom. Indeed the cuſtom was much more ancient than the Moors in Spain. Q. Curtius obſerves, it was very frequent among the Aſiatics, in the time of Alexander: Livy and Cæſar, alſo, both mention it as uſed among the Romans. Polydore Virgil ſhews it of great antiquity in England; and Boethius adds, that, in ſeveral places in England, there were the remains of huge poles that have ſerved for this purpoſe.

SIGNALS *at ſea*, are ſigns made by the admiral, or commander in chief of a ſquadron of ſhips, either in the day, or by night, whether for ſailing, for fighting, or for the better ſecurity of the merchant ſhips under their convoy. See ENGAGEMENT.

Theſe *ſignals* are very numerous, and important; being all appointed and determined by order of the lord high admiral, and lords of the admiralty, and communicated in the inſtructions ſent to the commander of every ſhip of the fleet, or ſquadron, before their putting out to ſea. It is by the combination of *ſignals*, previouſly known, that the admiral conveys orders to his fleet; every ſquadron, every diviſion, and every ſhip of which has its particular *ſignal*. The inſtruction may, therefore, occaſionally be given to the whole fleet, or to any of its ſquadrons, to any diviſion of thoſe ſquadrons, or to any ſhip of thoſe diviſions. Hence the *ſignal* of command may at the ſame time be diſplayed for three diviſions, and for three ſhips of each diviſion; or for three ſhips in each ſquadron, and for only nine ſhips in the whole fleet. For, the general *ſignal* of the fleet being ſhewn, if a particular pendant be alſo thrown out from ſome remarkable place on the ſame maſt with the general *ſignal*, it will communicate intelligence to nine ſhips that wear the ſame pendant.

The preparatory *ſignal* given by the admiral to the whole, or any part of his fleet, is immediately anſwered by thoſe to whom it is directed; by ſhewing the ſame *ſignal*, to teſtify that they are ready to execute his orders. Having obſerved their anſwers, he will ſhew the *ſignal* which is to direct their operations: as, to chaſe, to form the line, to begin the engagement, to board, to double upon the enemy, to rally or return to action, to diſcontinue the fight, to retreat and ſave themſelves. The dexterity of working the ſhips in a fleet depends on the preciſe moment

ment of executing theſe orders, and on the general harmony of their movements: a circumſtance which evinces the utility of a *ſignal* of preparation.

As the extent of the line of battle, and the fire and ſmoke of the action, or other circumſtances in navigation, will often prevent the admiral's *ſignals* from being ſeen throughout the fleet, they are always repeated by the officers next in command; by ſhips appointed to repeat *ſignals*; and, finally, by the ſhip or ſhips for which they are intended. The ſhips that repeat the *ſignals*, beſides the chiefs of ſquadrons or diviſions, are uſually frigates lying to windward or leeward of the line. Theſe ſhould be extremely vigilant to obſerve and repeat the *ſignals*, whether they are to tranſmit the orders of the commanders in chief, or his ſeconds, to any part of the fleet; or to report the fortunate or diſtreſsful ſituation of any part thereof. By this means, all the ſhips from the van to the rear will, unleſs diſabled, be ready at a moment's warning to put the admiral's deſign in execution. To preſerve order in the repetition of *ſignals*, and to favour their communication, without embarraſſment, from the commander in chief to the ſhip for which they are deſigned, the commanders of the ſquadrons repeat after the admiral; the chiefs of the diviſions, according to their order in the line, after the commanders of the ſquadrons; and the particular ſhips, after the chiefs of the diviſions; and thoſe, in return, after the particular ſhips, *vice verſa*, when the object is to convey any intelligence from the latter to the admiral.

Beſides the *ſignals* above mentioned, there are others for different ranks of officers; as for captains, lieutenants, maſters, &c. or for any of thoſe officers of a peculiar ſhip. Falconer.

SIGNALS *by day*. When the commander in chief would have them prepare for ſailing, he firſt looſes his fore-top-ſail, and then the whole fleet are to do the ſame. When he would have them unmoor, he looſes his main-top-ſail, and fires a gun, which, in the royal navy, is to be anſwered by every flag-ſhip. When he would have them weigh, he looſes his fore-top-ſail, and fires a gun, and ſometimes hauls home his ſheets; the gun is to be anſwered by every flag-ſhip, and every ſhip is to get to ſail as ſoon as it can. If with the leeward-ſide, the ſtern-moſt ſhip is to weigh firſt. When he would have the weather-moſt and head-moſt ſhips to tack firſt, he hoiſts the union-flag at the fore-top-maſt-head, and fires a gun, which each flag-ſhip anſwers; but if he would have the ſtern-moſt and leeward-moſt ſhips to tack firſt, he hoiſts the union-flag at the mizen-top-maſt-head, and fires a gun; and when he would have all the whole fleet tack, he hoiſts an union, both on the fore and mizen-top-maſt-heads, and fires a gun. When, in bad weather, he would have them wear, and bring to the other tack, he hoiſts a pendant on the enſign-ſtaff, and fires a gun; and then the leeward-moſt and ſtern-moſt ſhips are to wear firſt, and bring on the other tack, and lie by, or go on with an eaſy ſail, till he comes a-head; every flag is to anſwer with the ſame *ſignal*. If they are lying by, or ſailing by a wind, and the admiral would have them bear up and ſail before the wind, he hoiſts his enſign, and fires a gun, which the flags are to anſwer; and then the leeward-moſt ſhips are to bear up firſt, and to give room for the weather-moſt to wear, and ſail before the wind, with an eaſy ſail, till the admiral comes a-head. But if it ſhould happen, when the admiral hath occaſion to wear and ſail before the wind, that both jack and enſign be abroad, he will haul down the jack, before he fires the gun to wear, and keep it down till the fleet is before the wind. When they are ſailing before the wind, and he would have them bring to, with the ſtarboard tacks aboard, he hoiſts a red flag at the flag-ſtaff, on the mizen-top-maſt-head, and fires a gun. But if they are to bring to, with the larboard tack, he hoiſts a blue flag at the ſame place, and fires a gun, and every ſhip is to anſwer the gun. When any ſhip diſcovers land, he is to hoiſt his jack and enſign, and keep it abroad, till the admiral or commander in chief anſwer him, by hoiſting his; on ſight of which, he is to haul down his enſign. If any diſcovers danger, he is to tack and bear up from it, and to hang his jack abroad from the main-top-maſt croſs-trees, and to fire two guns; but if he ſhould ſtrike or ſtick faſt, then, beſides the ſame *ſignal* with his jack, he is to keep firing, till he ſees all the fleet obſerve him, and endeavour to avoid the danger. When any ſees a ſhip or ſhips more than the fleet, he is to put abroad his enſign, and there keep it, till the admiral's is out, and then to lower it, as often as he ſees ſhips, and ſtand in with them, that ſo the admiral may know which way they are, and how many; but if he be at ſuch a diſtance, that the enſign cannot well be diſcovered, he is then to lay his head toward the ſhip or ſhips ſo deſcried, and to brail up his low ſails, and continue hoiſting and lowering his top-ſails, and making a waft with his top-gallant ſails, till he is perceived by the admiral. When the admiral would have the vice-admiral, or him that commands in the ſecond poſt of the fleet, to ſend out ſhips to chaſe, he hoiſts a flag, ſtriped white and red on the flag-ſtaff, at the fore-top-maſt-head, and fires a gun. But if he would have the rear-admiral do ſo, he then hoiſts the ſame *ſignal* on the flag-ſtaff at the mizen-top-maſt-head, and fires a gun. When the admiral would have any ſhip to chaſe to windward, he makes a *ſignal* for ſpeaking with the captain, and he hoiſts a red flag in the mizen ſhrouds, and fires a gun; but if to chaſe to leeward, a blue flag; and the ſame *ſignal* is made by the flag, in whoſe diviſion that ſhip is. When he would have them give over chaſe, he hoiſts a white flag on his flag-ſtaff at the fore-top-maſt-head, and fires a gun; which *ſignal* is to be made alſo by that flag-ſhip which is neareſt the ſhip that gives chaſe, till the chaſing ſhip ſees the *ſignal*. In caſe of ſpringing a leak, or any other diſaſter, that diſables their ſhip from keeping company, they are to haul up their courſes, and fire two guns. When any ſhip would ſpeak with the admiral, he muſt ſpread an Engliſh enſign, from the head of his main, or fore-top-maſt, downwards on the ſhrouds, lowering his main, or fore-top-ſail, and continue firing guns, till the admiral obſerve him; and if any ſhip perceive this, and judgeth the admiral doth not, that ſhip muſt make the ſame *ſignal*, and make the beſt of his way to acquaint the admiral therewith, who ſhall anſwer by firing one gun. When the admiral would have the fleet to prepare to anchor, he hoiſts an enſign, ſtriped red, blue, and white, on the enſign-ſtaff, and fires a gun; and every flag-ſhip makes the ſame *ſignal*. If he would have the fleet moor, he hoiſts his mizen-top-ſail, with the clew-lines hauled up, and fires a gun. If he would have the fleet cut or ſlip, he looſes both his top-ſails, and fires two guns; and then the leeward-ſhips are to cut or ſlip firſt, to give room to the weather-moſt to come to ſail. So if he would have any particular ſhip to cut or ſlip, and to chaſe to windward, he makes the *ſignal* for ſpeaking with that ſhip, hoiſts a red flag in the mizen-ſhrowds, and fires a gun; but if a ſhip is to chaſe to leeward, he hoiſts a blue flag as before. If he would have the fleet exerciſe their ſmall arms, he hoiſts a red flag on the enſign-ſtaff, and fires a gun; but if the great guns, then he puts up the pendant over the red flag.

SIGNALS *by night*, to be obſerved at an anchor, weighing anchor, and ſailing, are as follow. When the admiral would have the fleet to unmoor, and ride ſhort, he hangs out three lights, over one another in the main-top-maſt-ſhrowds, over the conſtant light in the main-top, and fires two guns, which are to be anſwered by the flag-ſhips; and each private ſhip hangs out a light in the mizen-ſhrowds. Note, that all guns, fired for *ſignals* in the night, muſt be fired on the ſame ſide, that they may make no alteration in the ſound. When he would have them weigh, he hangs a light in the main-top-maſt-ſhrowds, and fires a gun, which is to be anſwered by all the flags; and every private ſhip muſt hang out a light in his mizen-ſhrowd. When he would have them tack, he hoiſts two flags on the enſign-ſtaff, over one another, above the conſtant light in his poop, and fires a gun, which is to be anſwered by all the flags; and every private ſhip is to hang out a light extraordinary, which is not to be taken in, till the admiral takes in his. After the *ſignal* is made, the leeward-moſt and ſtern-moſt ſhips muſt tack as faſt as they can, and the ſtern-moſt flag-ſhip, after he is about on the other tack, is to lead the fleet, and him they are to follow, to avoid running through one another in the dark. When he is upon a wind, and would have the fleet veer, and bring to on the other tack, he hoiſts up one light at the mizen-peek, and fires three guns; which is to be anſwered by all the flag-ſhips, and every private ſhip muſt anſwer, with one light at the mizen-peek. The ſtern-moſt and leeward-moſt ſhips are to bear up ſo ſoon as the *ſignal* is made. When he would have them, in blowing weather, to lie a-try, ſhort, or a-hull, or with the head-ſails braced to the maſt, he will form lights of equal height, and fire five guns, which are to be anſwered by the flag-ſhips, and then every private ſhip muſt ſhew four lights; and after this, if he would have them to make ſail, he then fires ten guns, which are to be anſwered by all the flags, and then the head-moſt and weather-moſt ſhips are to make ſail firſt. When the fleet is ſailing large, or before the wind, and the admiral would have them bring to, and lie by, with their ſtarboard tacks aboard, he puts out four lights in the fore-ſhrowds, and fires ſix guns; but if with the larboard tacks aboard, he fires eight guns, which are to be anſwered by the flag-ſhips; and every private ſhip muſt ſhew four lights. The wind-moſt ſhips muſt bring to firſt. Whenever the admiral alters his courſe, he fires one gun, without altering his lights, which is to be anſwered by all the flag-ſhips. If any ſhip hath occaſion to lie ſhort, or by, after the fleet hath made ſail, he is to fire one gun, and ſhew three lights in his mizen-ſhrowds. When any one firſt diſcovers land, or danger, he is to ſhew as many lights as he can, to fire one gun, and to tack, or bear away from it; and, if any one happen to ſpring a leak, or any be diſabled from keeping company with the fleet, he hangs out two lights of equal height, and fires guns till he is relieved by ſome ſhip of the fleet. If any one diſcovers a fleet, he is to fire guns, make falſe fires, put one light out on the main-top, three on the poop, to ſteer after them, and to continue firing of guns, unleſs the admiral call him off, by ſteering another courſe, and fire two or three guns, for then he muſt follow the admiral. When the admiral anchors, he fires two guns, a ſmall ſpace of time one from the other, which are to be anſwered by the flag-ſhips, and every private ſhip muſt ſhew two lights. When the admiral would have the fleet to moor, he puts a light on each top-maſt-head, and fires a gun, which is to be anſwered by the flag-ſhips, and every private ſhip is to ſhew one light. If he would have them lower their yards and top-maſts, he hoiſts one light upon his enſign-ſtaff, and fires one gun; which is to be anſwered by the flag-ſhips; and every private ſhip muſt ſhew one light. And when he would have them hoiſt their yards and top maſts, he puts out two lights, one under the other, in the mizen-top-maſt-ſhrowds, and fires one gun, which is to be anſwered by the flag-ſhips, and each private ſhip muſt ſhew one light in the mizen-ſhrowds. If any ſtrange ſhip be diſcovered coming into the fleet, the next ſhip is to endeavour to ſpeak with her, and bring her to an anchor, and not ſuffer her to paſs through the fleet. And if any one diſcovers a fleet, and it blow ſo hard, that he cannot come to give the admiral timely notice, he is to hang out a great number of lights, and to continue firing gun after gun, till the admiral anſwers him with one. When the admiral would have the fleet to cut or ſlip, he hangs out four lights, one at each main-yard-arm, and at each fore-yard-arm, and fires two guns; which are to be anſwered by the flag-ſhips; and every private ſhip is to ſhew one light.

SIGNALS *uſed when a ſhip ſails in a fog.* If the admiral would have them weigh, he fires ten guns; which every flag-ſhip is to anſwer. To make them tack, he fires four guns, which are to be anſwered by the flag-ſhips; and then the leeward-moſt and ſtern-moſt ſhips muſt tack firſt, and after they are about, to go with the ſame ſail they tacked with, and not to lie by, expecting the admiral to come a-head; and this is to avoid the danger of running through one another in thick weather.

When the admiral brings to, and lies with his head-ſails to the maſt; if with the ſtarboard tack aboard, he fires ſix guns, but if with the larboard tack, he fires eight guns, which the flag-ſhips are to anſwer. And after this, if he makes ſail, he fires ten guns, which the flag-ſhips muſt anſwer, and then the head-moſt and weather-moſt ſhips are to make ſail firſt. If it grow thick and foggy weather, the admiral will continue ſailing, with the ſame ſail ſet, that he had before it grew foggy, and will fire a gun every hour, which the flag-ſhips muſt anſwer, and the private ſhips muſt anſwer, by firing of muſquets, beating of drums, and ringing of bells. But if he be forced to make either more or leſs ſail than he had, when the fog began, he will fire a gun every half-hour, that the fleet may diſcern, whether they come up with the admiral, or fall aſtern of him; and the flags and private ſhips are to anſwer, as before. If any one diſcovers danger, which he can avoid, by tacking and ſtanding from it, he is to make the *ſignal* for tacking in a fog; but if he ſhould chance to ſtrike, and ſtick faſt, he is to fire gun after gun, till he thinks the reſt have avoided the danger. When the admiral would have the fleet to anchor, he fires two guns, which the flags are to anſwer; and after he hath been half an hour at an anchor, he will fire two guns more, to be anſwered by the flags as before; that all the fleet may know it.

SIGNALS *for calling officers on board the admiral.* When the admiral puts aboard an union-flag in the mizen-ſhrowds, and fires a gun, all the captains are to come aboard him; and if, with the ſame *ſignal*, there be alſo a waft made with the enſign, then the lieutenant of each ſhip is to come on board. If an enſign be put aboard in the ſame place, all the maſters of the ſhips of war are to come on board the admiral. If a ſtandard on the flag-ſtaff be hoiſted at the mizen-top-maſt-head, and a gun fired, then all the flag-officers are to come aboard the admiral. If the Engliſh flags only, then a ſtandard in the mizen-ſhrowds, and fire a gun: if the flags, and land general officers, then the admiral puts aboard a ſtandard at mizen-top-maſt-head, and a pendant at mizen-peek, and fires a gun. If a red flag be hoiſted in the mizen-ſhrowds, and a gun fired, then the captains of his own ſquadron are to come aboard the admiral; and if, with the ſame *ſignal*, there be alſo a waft with the enſign, the lieutenant of each ſhip muſt come aboard. If he hoiſts a white flag, as before, then the vice-admiral, or he that commands in the ſecond poſt, and all the captains of his ſquadron, are to go on board the admiral; if a blue flag, &c. then the rear-admiral, and the captains of his ſquadron, muſt come aboard, and if a waft, as before, the lieutenants. When a ſtandard is hoiſted on the enſign-ſtaff, and a gun fired, the vice and rear admirals muſt come on board the admiral's ſhip. When the admiral would ſpeak with the captains of his own diviſion, he will hoiſt a pendant on the mizen-peek, and fire a gun; and if with the lieutenants, a waft is made with the enſign, and the ſame *ſignal*; for whenever he would ſpeak with the lieutenants of any particular ſhip, he makes the *ſignal* for the captain, and a waft alſo with the enſign. When the admiral would have all the tenders in the fleet come under his ſtern, and ſpeak with him, he hoiſts a flag, yellow and white, at the mizen-peek, and fires a gun. But if he would ſpeak with any particular ſhip's tender, he makes a *ſignal* for ſpeaking with the captain ſhe tends upon, and a waft with the jack. If all the pinnaces and barges are to come on board, manned and armed, the *ſignal* is a pendant on the flag-ſtaff, hoiſted on the fore-top-maſt-head, and a gun fired; and if he would have them chaſe any ſhip, veſſel, or boat in view, he hoiſts the pendant and fires two guns. The *ſignal* for the long boats to come on board him, manned and armed, is the pendant hoiſted on the flag ſtaff, and the mizen-top-maſt-head, and a gun fired; and if he would have them chaſe any ſhip, veſſel, or boat, in open view, without coming on board him, he hoiſts the pendant, as aforeſaid, and fires two guns. When the admiral would have all the boats in the fleet to come on board him, manned and armed, he hoiſts a pendant on the flag-ſtaff, both on the fore-top-maſt, and mizen-top-maſt-head, and fires one gun; but if he would have them chaſe, he hoiſts his pendants, as before, and fires two guns. When the admiral would ſpeak with the victualler, or his agent, he puts an Engliſh enſign in the mizen-top-maſt-ſhrowds; and when with him that hath the charge of the gunner's ſtores, he will ſpread an enſign at his main-top-ſail-yard-arm.

SIGNALS *for managing a ſea-fight.* When the admiral would have the fleet form a line of battle, one ſhip a head of another, he hoiſts an union-flag at the mizen-peek, and fires a gun; and every flag-ſhip does the like. But when they are to form a line of battle, one a-breaſt of another, he hoiſts a pendant with the union-flag, &c. When he would have the admiral of the white, or him that commands in the ſecond poſt, to tack, and endeavour to gain the wind of the enemy, he ſpreads a white flag under the flag at the main-top-maſt-head, and fires a gun; and when he would have the vice-admiral of the blue do ſo, he doth the ſame with the blue flag. If he would have the vice-admiral of the red do ſo, he ſpreads a red flag from the cap, on the fore-top-maſt-head, downward on the back-ſtay; if the vice-admiral of the blue, he ſpreads a blue flag, &c. and fires a gun. If he would have the rear-admiral of the red do ſo, he hoiſts a red flag at the flag-ſtaff, at the mizen-top-maſt-head; if the rear-admiral of the white, a white flag; if the rear-admiral of the blue, a blue flag, and under it a pendant of the ſame colour, with a gun. If he be to leeward of the fleet, or any part of it, and he would have them bear down into his wake or grain, he hoiſts a blue flag at the mizen-peek, and fires a gun. If he would be to leeward of the enemy and his fleet, or any part of it be to leeward of him, in order to bring theſe ſhips into the line, he bears down with a blue flag at the mizen-peek, under the union-flag (which is the *ſignal* for battle), and fires a gun; and then thoſe ſhips, that are to leeward of him, muſt endeavour to get into his wake or grain, according to their ſtation in the line of battle. When the fleet is ſailing before the wind, and he would have him, who commands in the ſecond poſt, and the ſhip of the ſtarboard quarter, to clap by the wind, and come to the ſtarboard tack, he hoiſts a red flag at the mizen-top-maſt-head; but a blue one, if he would have ſhips of the larboard quarter come to the larboard tack, with a gun. If the van are to tack firſt, he ſpreads the union-flag at the flag-ſtaff, on the fore-top-maſt-head, and fires a gun, if the red flag be not abroad; but if it be, then he lowers the fore-top-ſails a little; and the union-flag is ſpread from the cap of the fore-top-maſt downwards; and every flag-ſhip doth the ſame. If the rear be to tack firſt, he hoiſts the union-flag on the flag-ſtaff, at the mizen-top-maſt-head, and fires a gun; which all the flag-ſhips are to anſwer. If all the flag-ſhips are to come into his wake or grain, he hoiſts a red flag at his mizen-peek, and fires a gun; and all the flag-ſhips muſt do the ſame. If he would have him that commands in the ſecond poſt of his ſquadron to make more ſail (though he himſelf ſhorten ſail), he hoiſts a white-flag on the enſign-ſtaff. But if he that commands in the third poſt be to do ſo, he hoiſts a blue flag, and fires a gun, and all the flag-ſhips muſt make the ſame *ſignal*. Whenever he hoiſts a red flag on the flag-ſtaff at the fore-top-maſt-head, and fires a gun, every ſhip in the fleet muſt uſe their utmoſt endeavour to engage the enemy, in the order preſcribed them. When he hoiſts a white-flag at his mizen-peek, and fires a gun; then all the ſmall frigates of his ſquadron, that are not of the line of battle, are to come under the ſtern. If the fleet be ſailing by a wind in the line of battle, and the admiral would have them brace their head-ſails to the maſt, he hoiſts up a yellow-flag, on the flag-ſtaff, at the mizen-top-maſt-head, and fires a gun; which the flag-ſhips are to anſwer; and then the ſhips in the rear muſt brace firſt. After this, if he would have them fall their head-ſails, and ſtand on, he hoiſts a yellow flag on the flag-ſtaff of the fore-top-maſt-head, and fires a gun, which the flag-ſhips muſt anſwer, and then the ſhips in the van muſt fall firſt, and ſtand on. If when this *ſignal* is made, the red flag at the fore-top-maſt-head be abroad, he ſpreads the yellow flag under the red. If the fleets being near one another, the admiral would have all the ſhips to tack together, the ſooner to lie in a poſture to engage the enemy; he hoiſts an union-flag on the flag-ſtaves at the fore and mizen top-maſt-heads, and fires a gun; and all the flag-ſhips are to do the ſame. The fleet being in a line of battle, if he would have the ſhip that leads the van, hoiſt, lower, ſet, or haul up any of his ſails, he ſpreads a yellow flag, under that at his main-top-maſt-head, and fires a gun, which *ſignal* the flag ſhips are to anſwer; and the admiral will hoiſt, lower, ſet, or haul up the ſail, which he would have the ſhip that leads the van do; which is to be anſwered by the flag-ſhips of the fleet. When the enemies run, and he would have the whole fleet follow them, he makes all the ſail he can after them himſelf, takes down the *ſignal* for the line of battle, and fires two guns out of his fore-chaſe, which the flag-ſhips anſwer; and then every ſhip is to endeavour to come up with and board the enemy. When he would have the chaſe given over, he hoiſts a white flag at the fore-top-maſt-head, and fires a gun. If he would have the red ſquadron draw into a line of battle, one abreaſt of another, he puts abroad a flag, ſtriped red and white, on the flag-ſtaff at the main-top-maſt-head, with a pendant under it, and fires a gun: if the white or ſecond ſquadron is to do ſo, the flag is ſtriped red, white, and blue: if the blue or third ſquadron is to do ſo, the flag is a Genoeſe enſign and pendant: but if they are to draw into a line of battle, one a-head of another, the ſame *ſignals* are made with a pendant. If they are to draw into the line of battle one a-ſtern of another, with a large wind, and he would have the leaders go with the ſtarboard tacks, aboard by the wind; he hoiſts a red and white flag at the mizen-peek, and fires a gun: but if they ſhould go with the larboard tacks aboard, by the wind, he hoiſts a Genoeſe flag at the ſame place; which *ſignals*, like others, muſt be anſwered by the flag-ſhips.

SIGNATORES, among the Romans, witneſſes who ſealed wills and marriage contracts.

SIGNATURE, *ſignatura*, *ſigning*, a ſubſcription, or putting of one's name at the bottom of an act, or deed, in one's own hand writing.

Anciently, when very few people could write, they diſpenſed with the uſe of *ſignatures*; and contented themſelves with the party's SEAL. See DEED.

SIGNATURE *of the court of Rome* is a ſupplication anſwered by the pope, whereby he grants a favour, diſpenſation, or collation to a benefice, by putting the *fiat* at the bottom thereof, in his own hand; or the *conceſſum eſt* written in his preſence. This *ſignature*, at the bottom of the ſupplication, gives name to the whole inſtrument.

The *ſignature* contains the clauſes, derogations, and diſpenſations, wherewith the pope grants the favour, or the benefice, with a commiſſion for the execution thereof, either in forma dignum, or in gracious form.

A *ſignature* of the pope's own hand, whereby he anſwers, *Fiat ut petitur*, is preferred to another anſwered by the prefect, in his preſence, in theſe words, *Conceſſum uti petitur in præſentia D. N. papæ*. Sometimes in *ſignatures*, with the *fiat*, the pope adds, *proprio motu*; which clauſe gives them ſtill farther force.

There are three kinds of *ſignatures*; one in *forma gratioſa*, diſpatched on an atteſtation of the ordinary; another in *forma dignum antiqua*, diſpatched for canonicates; the third in *forma dignum noviſſima*, which is a kind of ſecond *ſignature*, or executorial letter, granted where, upon the ordinary's failing to execute the firſt, within thirty days, the neareſt other ordinary is enjoined to execute it.

SIGNATURE, in *Printing*, denotes a mark at the bottom of each ſheet to regulate the gathering and binding of the book; and to ſhew the order and number of the ſheets, in collating, to ſee if the book is perfect.

The *ſignatures* conſiſt of the capital letters of the alphabet. If there be more ſheets than letters in the alphabet, to the capital letter they add a ſmall one of the ſame ſort; i. e. a little a after a great A, &c. which they repeat as often as is neceſſary.

SIGNATURE, *ſignatura*, is alſo uſed, by ſome naturaliſts, for the reſemblance a vegetable or mineral bears to any part of the human body: this is, by ſome fantaſtical people, ſuppoſed to afford an indication of its virtues and uſe.

SIGNET, one of the king's ſeals, uſed for ſealing his private letters, and ſigning all grants which paſs his majeſty's hand by bill. Forging it is treaſon. See SIGN *manual*.

The *ſignet* is always in the cuſtody of the king's ſecretaries; on whom attend four clerks of the *ſignet-office*. See SECRETARY and CLERK.

SIGNIFER, among the Romans, an enſign-bearer, or the perſon who carries the ſtandard, on which was repreſented a hand ſtretched out. See SIGNA.

SIGNIFICATION, the ſenſe or meaning of a ſign, word, phraſe, emblem, device, or the like; that is, the thing denoted, by ſuch ſign, word, figure, &c.

We are almoſt perfectly at a loſs as to the *ſignification* of the hieroglyphic characters of the ancients.

SIGNIFICATION, in *Law*, is the notification of an act, &c. made to the oppoſite party, by a copy, &c. thereof, given and atteſted by a proper officer.

Some *ſignifications* are to be made to the perſon himſelf; or at leaſt at his houſe: for others, it is enough that they be made to the party's attorney, or agent.

SIGNIFICAVIT. See EXCOMMUNICATO *capiendo*.

SIGNING. See SIGNATURE, and COUNTER-*ſigning*.

SIGNINUM, among the Romans, a kind of pavement much eſteemed: it was made of powdered ſhells mixed with lime.

SIGNUM *pugnæ*, the ſignal of battle, among the Romans, was a coat of arms, of a purple colour, ſet upon the general's pavilion.

SIGUETTE, in the *Manege*, is a caveſſon of iron, with teeth or notches, that is, a ſemicircle of hollow and vaulted iron, with teeth like a ſaw, conſiſting of two or three pieces joined with hinges, and mounted with a head-ſtall and two ropes, as if they were the caveſſons that in former times were wont to be put upon the noſe of a fiery ſtiff-headed horſe, in order to keep him in ſubjection.

There is a ſort of *ſiguette*, that is, a round iron all of one piece, ſewed under the noſe-band of the bridle, that it may not be in view. This *ſiguette* we employ with a martingale, when a horſe beats upon the hand.

SIL, in *Natural Hiſtory*, a name given by the ancients to a red ochre, of which they had three diſtinct kinds, the *ſil ſyricum*, *ſil atticum*, and *ſil marmoroſum*; all of which are to be had at this time, and all very valuable paints.

SIL *ſyricum* is a ſubſtance well known among the painters of the preſent age, though not by name, being the red ochre, commonly uſed for a purple colour in their coarſer works; though it is capable of yielding by proper management, a colour fit for their fineſt. It is very heavy, and of a fine ſtrong red with ſome tendency to purple, of a looſe friable texture, and very rough and duſty ſurface. It adheres firmly to the tongue, is ſomewhat ſoft to the touch, crumbles eaſily to pieces between the fingers, and ſtains the hands very much. It melts freely in the mouth, and has a ſtrongly aſtringent taſte. It burns to a much paler colour, and makes no efferveſcence with aqua fortis. Theſe are the characters by which this is diſtinguiſhed from all the other red earths. It is dug in many parts of England, and is ſent to London in great quantities. Hill's Hiſt. of Foſſ. p. 57.

SIL *atticum* is the purple ochre, called of later times ALMAGRA.

SIL *marmoroſum* is alſo a ſubſtance in ſome degree known in the world at this time. It ſometimes falls into the hands of our painters, who call it Indian ſtone red, but it has many other valuable qualities extremely worth enquiring into. It is the hardeſt and drieſt of all the ochres, and while in the ſtratum appears abſolutely ſtony, forming thin, flat, regular ſtrata, and is ſo hard that it is not to be dug without the pick-ax; it is alſo of an obſcurely and irregular laminated ſtructure, and naturally breaks into flat pieces. It is of a fine purpliſh red, and very heavy, and contains a multitude of fragments of a fine lead-ore which are bright and bluiſh, and make a very pretty appearance, and beſide theſe has always among it a ſmall quantity of pure native cinnabar: both theſe ſubſtances are ſo nicely mixed with it, that it is ſcarce poſſible to break off a piece of an inch ſquare from any part of the ſtrata that has not more or leſs of both in it. It is of a duſty ſurface, and rough to the touch, and adheres very firmly to the tongue, and ſtains the hands. It is of a very auſtere and aſtringent taſte, and makes no efferveſcence with acids. There are conſiderable ſtrata of it on the borders of China, and it is much uſed as a paint in the Eaſt Indies. There is ſome of it at times brought over to us, but not enough to make it a regularly marketable commodity. Beſide its uſe as a paint, it is worth enquiring into on account of the cinnabar it contains; three ounces of it having yielded, on trial, two drachms and a ſcruple of pure quickſilver. Hill's Hiſt. of Foſſ. p. 62.

SILACH, a word uſed by medical authors for a diſorder of the eye-lid, conſiſting in a preternatural thickneſs of it, or a ſwelling without inflammation.

SILATUM, a word uſed by the ancient Romans to expreſs a morning's draught of wine. This was uſually of a wine medicated with the plant ſili, or ſeſeli, and thence had its name It has alway been the cuſtom to medicate the morning draughts of any ſtrong liquor; we do it with wormwood, or the common bitter tincture; the Indians with ginger.

SILAUM, in *Botany*, a name uſed by ſome authors for the *ſaxifraga pratenſis*, or common meadow ſaxifrage.

SILENE, in *Botany*. See *Viſcous* CAMPION.

SILENTIARY, *ſilentiarius*, an officer among the ancient Roman ſlaves; being, according to ſome authors, a ſlave placed over the reſt, to prevent any noiſe and uproar, and to keep them ſilent.

Seneca, in his Epiſtles, mentioning the great care taken to keep the ſlaves mute, has given occaſion to Lipſius, Pompa, and ſome others, to ſuppoſe, that the *ſilentiary* was eſtabliſhed in his time: but others, as Pignorius, think no ſuch concluſion can be drawn from Seneca's words; nor any thing, but that they were, even then, very ſevere in preventing any noiſe among the ſlaves. As to the name and office of the *ſilentiary*, it was not eſtabliſhed till about the time of Salvian; who is the firſt author that mentions it.

There were alſo *ſilentiarii* eſtabliſhed in the emperor's court, called *quietis miniſtri*, and *ſilentiarii palatii*; and honoured with the farther titles of *clariſſimi*, *ſpectabiles*, *devotiſſimi*, and in Greek ϑαυμασιωτατοι, q. d. *moſt admirable*.

There were a great number of theſe; but only thirty ordinarily officiated, who were divided into three bands, each whereof had its *decurio*. The council of Chalcedon call the body of *ſilentiaries*, *ſchola devotiſſimorum ſilentiariorum*.

SILENI, in *Antiquity*, a ſort of heathen demigods, the ſame with SATYRS, which were called *Sileni* when they came to be advanced in age.

Yet was there one principal *Silenus*, elder than any of the reſt. Diod. Siculus ſays, he was the maſter, or tutor, of Bacchus, whom he diſciplined nobly, and followed him to the wars. He quotes an ancient poet, named Thymœtas, who relates, that the *Sileni* aſſiſted Bacchus in the war he waged againſt the Titans; adding, that the firſt *Silenus* reigned in an iſland made by the river Triton, in Lybia.

He is repreſented as having a long tail hanging behind; which is likewiſe an attribute of all his poſterity. The poets always mount him on an aſs. He is alſo repreſented as diſtinguiſhed for his ſkill in muſic. He is ſaid, not only to have invented muſical inſtruments, but to have had the courage, like Marſyas, to challenge even Apollo himſelf to a trial of ſkill.

Nonnus makes *Silenus* a ſon of Tellus; and gives him three ſons, Aſtræus, Maron, and Lenæus. Servius, on Virgil's Eclogue, makes *Silenus* the ſon of Mercury; others, the ſon of Pan, and a nymph; others will have him born of the drops of the blood of Cœlus, the father of Saturn.

Bochart, in his Canaan, will have *Silenus* to take his name from שלה; or שילו, *Silo*, the name of the Meſſiah; whence שילן, *Silan*. He alſo adds, that all that is attributed to this imaginary deity is taken from what the prophets have foretold of Jeſus Chriſt. Thus, whereas it is ſaid, the Meſſiah ſhall be the inſtructor of the people; *Silenus* is made the preceptor of Bacchus. Becauſe it was ſaid, that our Saviour ſhould bind his aſs to the vine, and his colt to the young vine; *Silenus* is made to ride on an aſs. Becauſe our Saviour waſhed his garments in blood, as thoſe that trod the vine-preſs; *Silenus* was made to preſide over thoſe who preſſed the vintage. Becauſe it is added, his eyes were red by reaſon of wine; *Silenus* was made always fuddled. Bochart, however, advances all this with a great deal of diſtruſt, as he has reaſon, it having no warrant: he adds, that the devil invented the fable of *Silenus*, to turn the myſteries of our religion into ridicule. But the ſenſe which he has given to the words *rubent oculi ex vino, & dentes ejus ex lacte albeſcunt*, is very forced and unnatural; as if the words ſignified any thing more, in the propriety of the Hebrew tongue, than, his eyes are redder than wine, his teeth whiter than milk. We may add, that nobody, before Bochart, neither Chriſtian nor idolater, ever ſaw any thing of Jeſus Chriſt in the fable of *Silenus*.

SILER, in *Botany*, a name given by the Latin writers of the later ages to the plant called by others *ſeſeli*, an umbelliferous herb, growing in mountainous places. See SERMOUNTAIN.

The ancient Roman authors, however, mean a very different thing by the word *ſiler*, a ſhrub growing in watery places, and having twigs very ductile and tough, and fit for baſket-work, or any other uſe of that kind.—The poets having often mentioned it, and always with the epithets of *molle* and *lentum*, *ſoft* and *tough*.

The error of confounding ſo different a plant as the *ſeſeli*, with this ſhrub, ariſes from the unhappy cuſtom of abbreviation, ſo common among the old Greeks: inſtead of *ſeſeli* they wrote the word ſometimes only *ſeli*, and *ſile*: thence it was eaſy for people, leſs acquainted with botanical diſtinctions, to add an *r* at the end, to reduce the word, which they did not know, to one that they did; and thus grew *ſiler* as a name for *ſeſeli*. Hippocrates calls the ſeſeli *ſili*; and Pliny both *ſili* and *ſeli*.

SILESIACA *terra*. See TERRA.

SILEX. See FLINT.

SILI, in *Botany*, a name given by the old Greeks to a plant called alſo SESELI.

SILICERNIUM, among the Romans, a funeral ſupper, which is otherwiſe called *exequium*.

SILICULA, in *Botany*, a name given by ſome authors to fœnugreek.

SILILICON, in *Botany*, a name given by ſome of the old Latin writers to the carob tree, *ſiliqua dulcis*. The Latins borrowed this name from the Greek *xyloglycon* ξυλόγλυκον, the ſweet, or ſweet-fruited tree.

Iſidore miſpels the word *ſililicon*, and making it only *ſilicon*, ſuppoſes it to be a barbarous way of ſpelling the word *ſiliqua*; but the evident derivation of the genuine word from the Greek ſhews his error both as to the word itſelf, and the origin of it.

SILIQUA, κεράτιον, among the ancients, the third part of an OBOLUS, or, what comes to the ſame, the ſixth part of a SCRUPLE.

SILIQUA *nabathæa*. See NABATHÆA *ſiliqua*.

SILIQUA, in *Botany*, the ſeed-veſſel, huſk, pod, or ſhell of a plant of the leguminous kind. Whence *ſiliquous plants* are thoſe which produce *ſiliquæ*, or ſeed pods.

SILIQUA, in *Botany*. See CAROB.

SILIQUASTRUM, in *Botany*. See JUDAS *tree*.

SILIQUASTRUM, in *Natural Hiſtory*, the name given by Mr. Lhuyd, and others, to the bony palates of fiſhes, when found foſſile. See ICHTHYPERIA.

SILIQUATICUM, among the Romans, a cuſtom or toll paid for merchandize. This the Greeks called *ceratiſmus*.

SILK, *ſericum*, a very ſoft, fine, bright, delicate thread; the work of an inſect, called *bombyx*, or the SILK-*worm*. The ancients were but little acquainted with the uſe and manufacture of *ſilk*; they took it for the work of a ſort of ſpider, or beetle, who ſpun it out of its entrails, and wound it with its feet about the little branches of trees. This inſect they called *ſer*, from *Seres*, a people in Scythia, whom we now call the Chineſe, who, as they thought, bred it; whence the *ſilk* itſelf they called *ſericum*. But this *ſer* of theirs has very little affinity with our *ſilk-worm*, *bombyx*: the former living five years; but the latter dying annually, enveloped in a yellowiſh bag or ball, which, wound out into little threads, makes what we call *ſilk*.

It was in the iſle of Cos, that the art of manufacturing *ſilk* was firſt invented: and Pamphila, daughter of Platis, is honoured as the inventreſs. The diſcovery was not long unknown to the Romans. *Silk* was brought them from *Serica*, where the worm was a native. But ſo far were they from profiting by the diſcovery, that they could not be induced to believe ſo fine a thread ſhould be the work of a worm; and thereupon formed a thouſand chimerical conjectures of their own.

Silk was a very ſcarce commodity among them for many ages: it was even ſold weight for weight with gold; inſomuch that Vopiſcus tells us, the emperor Aurelian, who died A. D. 275, refuſed the empreſs, his wife, a ſuit of *ſilk*, which ſhe ſolicited of him with much earneſtneſs, merely on account of its dearneſs.

Others, however, with greater probability, aſſert that it was known at Rome ſo early as the reign of Tiberius, about A. D. 17.

Galen, who lived about the year of our Lord, 173, ſpeaks of the rarity of *ſilk*, being no where but at Rome, and only among the rich.

Heliogabalus, the emperor, who died A. D. 220, is ſaid by ſome to be the firſt perſon who wore a holoſericum, i. e. a garment of all *ſilk*.

The Greeks of Alexander the Great's army are ſaid to have been the firſt who brought wrought *ſilk* from Perſia, into Greece, about 323 years before Chriſt; but the manufacture of it was confined to Berytus and Tyre, in Phœnicia, whence it was diſperſed over the Weſt.

At length, two monks, coming from the Indies to Conſtantinople, in 555, under the encouragement of the emperor Juſtinian, brought with them great quantities of *ſilk*-worms, with inſtructions for the hatching of their eggs, rearing and feeding the worms, and drawing out the *ſilk*, and ſpinning and working it. Upon this, manufactures were ſet up at Athens, Thebes, and Corinth.

The Venetians, ſoon after this time, commencing a commerce with the Greek empire, ſupplied all the weſtern part of Europe, with *ſilks* for many centuries; though ſundry kinds of modern *ſilk* manufactures were unknown in thoſe times, ſuch as damaſks, velvets, ſattins, &c.

About the year 1130, Roger II. king of Sicily, eſtabliſhed a *ſilk* manufactory at Palermo, and another in Calabria; managed by workmen, who were a part of the plunder brought from Athens, Corinth, &c. whereof that prince made a conqueſt in his expedition to the Holy Land. By degrees, Mezeray adds, the reſt of Italy and Spain learned, from the Sicilians and Calabrians, the management of the *ſilk*-worms, and the working of *ſilk*: and at length the French got it by right of neighbourhood, a little before the reign of Francis I. and began to imitate them.

Thuanus, indeed, in contradiction to moſt other writers, makes this manufacture of *ſilk* to be introduced into Sicily two hundred years later, by Robert the Wiſe, king of Sicily, and count of Provence.

It appears, by 33 Hen. VI. cap. 5. that there was a company of *ſilk*-women, in England, ſo early as the year 1455; but theſe were probably employed in needleworks of *ſilk* and thread: and we find that various ſorts of ſmall haberdaſhery of *ſilk* were manufactured here in 1482: but Italy ſupplied England, and all other parts, with the broad manufacture, till the year 1489. In Spain, indeed, the culture and manufacture of *ſilk* ſeem to have been introduced in an early period by the Moors, particularly in Murcia, Cordova, and Granada. The *ſilk* manufactures of this laſt town were very flouriſhing, when it was taken by Ferdinand, &c. at the cloſe of the fifteenth century.

In 1521, the French, being ſupplied with workmen from Milan, commenced a *ſilk* manufacture; but it was long after this time before they could obtain raw *ſilk* from the worms: and, even in the year 1547, *ſilk* was ſcarce and dear in France; and Henry II. is ſaid to have been the firſt who wore a pair of *ſilk* knit STOCKINGS; though the firſt invention originally came from Spain, whence *ſilk* ſtockings were brought over to Henry VIII. and Edward VI. After the civil wars in France, the plantations of mulberry trees were greatly encouraged by Henry IV. and his ſucceſſors: and the produce of *ſilk* is at this day very conſiderable.

The great advantage which the new manufacture afforded, made our king James I. very earneſt for its being introduced into England: accordingly, it was recommended ſeveral times from the throne, and in the moſt earneſt terms, particularly in the year 1608, to plant mulberry trees, &c. for the propagation of *ſilk*-worms; but unhappily without effect; though from the various experiments we meet with in the Philoſophical Tranſactions, and other places, it appears that the *ſilk*-worm thrives and works as well, in all reſpects, in England, as in any other part of Europe.

However, towards the latter end of this king's reign, i. e. about the year 1620, the broad-*ſilk* manufacture was introduced into this country, and proſecuted with great vigour and advantage. In 1629, the *ſilk* manufacture was become ſo conſiderable in London, that the *ſilk-throwſters* of the city, and parts adjacent, were incorporated under the name of maſter, wardens, &c. of the *ſilk-throwſters*; and in 1661, this company of *ſilk-throwſters* employed above forty thouſand perſons. The revocation of the edict of NANTES, in 1685, contributed in a great degree to promote the *ſilk* manufacture in this kingdom: as did alſo the invention of the *ſilk* throwing machine at Derby, in 1719: for an account of which, ſee WINDING *of ſilk*.

So high in reputation was the Engliſh *ſilk* manufacture, that even in Italy, as Keyſler (Travels, vol. i. p. 289,) informs us, in 1730, the Engliſh *ſilks* bore a higher price than the Italian.

The *ſilk* worm is an inſect not more remarkable for the precious matter it furniſhes for divers ſtuffs, than for the many forms it aſſumes, before and after its being inveloped in the rich cod or ball which it weaves for itſelf. From a ſmall egg about the ſize of a pin's head, which is its firſt ſtate, it becomes a pretty big worm, or caterpillar, of a whitiſh colour, inclining to yellow. In this ſtate it feeds on mulberry-leaves, till, being come to maturity, it winds itſelf up in a ſilken bag, or caſe, about the ſize and ſhape of a pigeon's egg; and becomes metamorphoſed into an aurelia: in this ſtate it remains without any ſigns of life, or motion; till at length it awakes, to become a butterfly; after making itſelf a paſſage out of its ſilken ſepulchre: and, at laſt, dying indeed, it prepares itſelf, by an egg, which it caſts, for a new life; which the warmth of the ſummer weather aſſiſts it in reſuming.

As ſoon as the *ſilk*-worm, or caterpillar, is arrived at the ſize and ſtrength neceſſary for beginning his cod, he makes his web: for it is thus they call that ſlight tiſſue, which is the beginning and ground of this admirable work. This is his firſt day's employment. On the ſecond, he forms his folliculus, or ball, and covers himſelf almoſt over with *ſilk*. The third day, he is quite hid; and the following days he employs himſelf in thickening and ſtrengthening his ball: always working from one ſingle end, which he never breaks by his own fault; and which is ſo fine, and ſo long, that thoſe who have examined it attentively, think they ſpeak within compaſs, when they affirm, that each ball contains *ſilk* enough to reach the length of ſix Engliſh miles.

In ten days time, the ball is in its perfection; and it is now to be taken down from the branches of the mulberry-tree, where the worms have hung it. But this buſineſs requires a great deal of attention; for there are ſome worms more lazy than others; and it is very dangerous waiting till they make themſelves a paſſage, which uſually happens about the fifteenth day.

The firſt, fineſt, and ſtrongeſt balls are kept for the breed; the reſt are carefully wound: if there be no more than can be well wound at once, they lay them for ſome time in an oven, moderately hot, or elſe expoſe them, for ſeveral days ſucceſſively, to the greateſt heats of the ſun, in order to kill the inſect; which without this precaution, would not fail to open itſelf a way to go and uſe thoſe new wings abroad, which it has acquired within. Ordinarily, they only wind the more perfect balls.— Thoſe that are double, or too weak, or too coarſe, are laid aſide; not as altogether uſeleſs, but that, being improper for winding, they are reſerved to be drawn out into ſkains. The balls are of different colours; the moſt common are yellow, orange-colour, Iſabella, or fleſh-colour. There are ſome alſo of a ſea-green; others of a ſulphur-colour, and others white: but there is no neceſſity for ſeparating the colours and ſhades to wind them apart; as all theſe colours are to be loſt in the future ſcouring and preparing of the *ſilk*.

SILK, *to wind the, from off the balls.* Two machines are neceſſary; the one a furnace, with its copper; the other a reel, or frame, to draw the *ſilk*. The winder, ſeated near the furnace, throws into the copper of water, over the furnace, (firſt heated to a certain degree, which cuſtom alone can teach), a handful or two of balls, which have been firſt well purged of all their looſe furry ſubſtance. He then ſtirs the whole very briſkly about with birchen rods, bound and cut like bruſhes; and when the heat and agitation have detached the ends of the *ſilk* of the pods, which are very apt to catch on the rods, he draws them forth; and joining ten or twelve, or even fourteen of them together, he forms them into threads, according to the bigneſs required to the works they are deſtined for: eight ends ſufficing for ribbands; and velvets, &c. requiring no leſs than fourteen. The ends, thus joined into two or three threads, are firſt paſſed into the holes of three iron rods, in the fore part of the reel, then upon the bobbins or pullies, and at laſt they are drawn out of the reel itſelf, and there faſtened; each to an end of an arm or branch of the reel. Thus diſpoſed, the workman giving motion to the reel, by turning the handle, guides his threads; ſubſtitutes new ones, when any of them break, or any of the balls are wound out; ſtrengthens them when neceſſary, by adding others; and finally he takes away the balls wound out, or that have been pierced, and are full of water. In this manner, two workmen will ſpin and reel three pounds of *ſilk* in a day; which is greater diſpatch than is made by the ſpinning-wheel, or diſtaff. Indeed, all *ſilks* cannot be ſpun and reeled in this manner; either becauſe the balls have been perforated by the *ſilk*-worms themſelves; or becauſe they are double, or too weak to bear the water; or becauſe they are coarſe, &c. Of all theſe together, they make a particular kind of *ſilk*, called *floretta*; which being carded, or even ſpun on the diſtaff, or the wheel, in the condition it comes from the ball, makes a tolerable *ſilk*.

When *ſilk* is reeled from the cocoons, the thread is ſmeared with the natural gum of the *ſilk*, ſoftened by the heat of the water, out of which it is reeled. If the ſeveral rounds of this thread, as it falls on the reel, touch one another in their whole extent, it is then ſo glued together, as not to admit of being wound off, without tearing and breaking. This inconvenience is, in the *ſilk* countries, denominated the vitrage, and many contrivances have been ſuggeſted in order to prevent it. For this purpoſe, or in order to change the poſition of the *ſilk* thread, that it might not always fall on the ſame part of the reel, this machine was furniſhed with a guide-ſtick, which received a progreſſive and regreſſive motion, by means of two wheels, the one fixed to the axle of the reel, and communicating its motion to the other, by means of a band. Notwithſtanding the inconveniences that attend all thoſe reels which uſe a band, yet, being eaſily made, they are commonly uſed in moſt *ſilk* countries. The Piedmonteſe, however, peculiarly attentive to the *ſilk* manufacture, made ſeveral uſeful improvements in the conſtruction of the reel. They firſt ſuppreſſed the old method of reeling the *ſilk* over a bobbin, which was found to give it a flat form, and, in its ſtead, ſubſtituted the method of the croiſſure, which renders it round and compact. They then applied themſelves to correct the imperfections of the guide-ſtick, and to eſtabliſh proper proportions between the wheels which gave it motion. They afterwards laid aſide the uſe of the band, and ſupplied its place with four wheels, having a determined number of teeth, whoſe revolutions, being uniform, gave the guide-ſticka proper motion for preventing the vitrage; and thus they have been able to give that perfection to their raw *ſilk*, which fits it to be thrown into organzine or warp, and to raiſe the value of each pound of *ſilk* reeled in this manner to one third more than it would have had if reeled otherways.

The French, deſirous of making raw *ſilk* fit for organzine among themſelves, which they uſed to have from Piedmont, applied themſelves wholly, and with conſiderable ſucceſs, to the improvement of the band-reel. But although the Piedmonteſe reel is free from the inconvenience of all thoſe reels which uſe a band, it is liable to objections, which have obſtructed the common uſe of it; the chief of which are, that four-toothed wheels are more difficult to be made than two plain-grooved ones, and that being made only of wood, they are eaſily broken. Mr. Samuel Pullein, with a view of making this reel more ſimple, and more familiar to the common people, conſtructed a reel, which, without any additional mechaniſm, performs the works of the Piedmonteſe reel, and uſes but two wheels with teeth inſtead of four wheels. In his conſtruction, he has introduced a new proportion between the wheels, ſo that the *ſilk* thread will not be laid in the ſame place on the reel, till after the winding of near ſix hundred yards; by which means, the thread having time to dry, all vitrage is avoided; whereas thoſe in common uſe do not reel above one hundred and fifty yards till the thread is laid in the ſame place. He has alſo added to his reel an improved method of making the double croiſſure as eaſily as the Piedmonteſe make the ſingle one, which gives a conſiderable perfection to the *ſilk*. This reel is repreſented in *Tab*. III. *Miſcellany*, *fig*. 45. At A is exhibited the manner in which a winch D, fixed in the arbre Q A, which paſſes through a nich in an upright ſupporter R, is made to anſwer the ſame purpoſe as the two wheels with teeth, which are uſed in the Piedmonteſe reel, and by a more ſimple mechaniſm to move the guide-ſtick F to the ſame advantage as with the wheels. The double croiſſure, repreſented at large in *fig*. 46, is made by means of the croſs B, called the ſwivel-croſs, which is formed of a common lath. At *b b* are fixed two little ivory or braſs wheels, with ſmooth acute-angled grooves in them, to receive the threads which come from the two ſtop-wires *b b*. One end of the ſwivel-croſs K is ſomewhat broad, and reſts upon the guide-ſtick F, directly in the middle between the two guide-wires *c c*. Here it moves and plays freely on a pin fixed in the guide-ſtick, the pin paſſing through the nich *m*. The other end of the ſwivel M contains the ſtop-wires *b b*, and is fixed to the end of the rod O, which projects from the front bench of the reel, by means of a piece of packthread, paſſing through a hole in the ſwivel and in the piece O, and being fixed to a peg P, which turns in the under part of the piece O, is drawn to a proper degree of tenſion to allow the ſwivel to obey all the motions of the guide-ſtick. The double croiſſure is formed in the following manner: the two *ſilk* threads are paſſed through the two ſtop-wires *b b*, and through the two guide-wires *c c*, and ſo are faſtened to the reel. Then either of the two threads is taken in that part of it which lies between the ſtop-wire and guide-wire, and turned two or three times round the other thread; and then each thread is placed in the groove of the pulley at *b b*; taking care to place each in the groove of that pulley, which lies on the ſide of its own ſtop-wire. The threads will then appear in the ſituation repreſented in the figure twiſted round one another in the two points *o* and *p*. The ſwivel-croſs is ſhewn at B (*fig*. 45.) in its true proportion and ſituation, when the reel is ready to work. Phil. Tranſ. vol. li. art. 4, p. 21, &c. The *ſilk* reel has been lately much improved by M. Vaucanſon. See Mem. Acad. Sc. 1770.

As to the balls, after opening them with ſciſſars, and taking out the inſects (which are of ſome uſe for the feeding of poultry) they are ſteeped three or four days in troughs, the water whereof is changed every day to prevent their ſtinking. When they are well ſoftened by this ſcouring, and cleared of that gummy matter the worm had lined the inſide with, and which renders it impenetrable to the water, they boil them half an hour in a ley of aſhes, very clear and well ſtrained: and after waſhing them out in the river, and drying them in the ſun, they card and ſpin them on the wheel, &c. and thus make another kind of floretta, ſomewhat inferior to the former.

Silk being properly an animal fluid hardened by the air, is uſually much mended or depraved in its nature and qualities, according to the nouriſhment the worm receives from a good or bad leaf; a great deal, therefore, depends on the goodneſs or badneſs of the ſpring of the year, in the value of the *ſilk* produced. A warm ſpring is beſt, and it ſhould be moderately moiſt; not overmuch ſo, becauſe too great a fall of rain is always found to rot the leaves. Southerly winds are alſo to be feared, becauſe they burſt the worm; and northerly ones, when ſtrong, uſually ſpoil the leaves. All theſe being deſtructive, either of the animals themſelves, or of their food, very juſt preſages may be formed upon them of the produce of the enſuing year.

When theſe miſchiefs do not happen, but the ſpring is favourable, the people have little to do but to watch the feeding of the worms, and about Midſummer they are to begin to draw the *ſilk* from its cocoon, to ſee what it yields, and judge of its increaſe or ſcarcity, and eſtimate its goodneſs and perfections; the principal of which are, that it proves clean, light, and ſtrong.

Great uſe may be made of theſe obſervations, provided the management be good. It requires great care to hatch the eggs, and when hatched, there muſt be a careful eye over the worms, even to the time of drawing off the *ſilk*. If the ſeaſon foretells a ſcarcity, the buſineſs of the prudent manager is to buy up all the old *ſilk* he can procure, and keep as much of the other as he can, to be employed in the beſt fabrics, that ſo they may not be obliged to hazard all the good at the price of the worſt; but when the ſeaſon proves favourable, they collect the new for the beſt fabrics, and compare it with the old, to ſee whether it be of a better quality, before they venture to determine their prices.

The goodneſs of *ſilk* is beſt diſtinguiſhed by its lightneſs, that being its moſt eſſential quality; this every one knows carries a very great profit with it, being bought by weight, and ſold by meaſure, at the firſt hand, after the collectors. The organzine *ſilk* is the beſt of any made in the country of Piedmont, and two threads are equal in fineneſs, that is, in ſmoothneſs, thickneſs, and length, for the thread of the firſt twiſt. For the ſecond it matters not whether the ſingle thread be ſtrong before the two are joined, unleſs to ſee whether the firſt twiſt prove well. It is neceſſary that the *ſilk* be clean, and it is to be obſerved, that the ſtraw-coloured is generally the lighteſt, and the white the heavieſt of all. The ſkains ſhould be even, and all of an equality, which ſhews that they were wrought together, otherwiſe we may with juſtice ſuſpect that it is refuſe *ſilk*, and cannot be equally drawn out and ſpun, for one thread will be ſhorter than the other, which is labour and loſs.

It will alſo be requiſite to ſearch the bale more than once, and take from out of the parcels a ſkain to make an eſſay; for unleſs it be known by trial what one buys, there is the greateſt danger of being cheated in this commodity. To make an eſtimate, and know the lightneſs, fix the eſſay upon one eighth of a portee, or hand of *ſilk* of a hundred and ten aunes or ells of Lyons in length, and ſee what it makes of aunes by the eighth part. The ſkain, which is of eighty threads, muſt be multiplied by a hundred and ten aunes of Lyons, and from this number muſt be deducted one-eighth; as for example, 110 by 80 makes 8800, the eighth part of which is 1100; and this is the eighth part of a portee, or hand of *ſilk*. Now to calculate what theſe 1100 aunes weigh, which is the eighth part of a portee, or of 110 aunes of Lyons, it will be proper to take a ſkain out of the parcels, which you take from out of the bale which you judge may contain, at leaſt, 1100 aunes, to make the one eighth part of a portee, which portee muſt be divided on two bobbins, half on each; then fix the two bobbins on the centre, or beam, and from thence paſs it through the comb hurdiſſoir, viz. 550 from the two bobbins will make 1100, which will be one eighth part of what you deſire to know. This done, you cut off your *ſilk*, and carry it to put on the hurdiſſoir, then weigh it, and multiply the weight by eight, it will weigh juſt as much as a portee of one hundred and ten aunes of Lyons, which is the general rule for calculating. When they draw the *ſilk* out by this means, one may learn to adjuſt the weight. There are *ſilks* of Piedmont which are very light and clean, and are to be preferred before any on the ſale: the portee of *ſilk* of the lighteſt weighs near twenty-four pennyweights, and from this it ariſes in gravity to twenty-five, and twenty-ſix pennyweights the portee, and ſometimes to twenty-ſeven and twenty-eight; but even theſe weights may be diſpenſed with, provided that the other qualities be good, that is, that it be well wrought, even and clean. When the *ſilk* is more than twenty-eight pennyweights the portee, it muſt always be proportionably cheaper. Philoſ. Tranſact. Nº 252. p. 186.

The ſeveral preparations which *ſilks* undergo, to fit them to be uſed in the manufacture of ſilken ſtuffs, are the ſpinning, reeling, milling, bleaching, and dying. The two firſt we have already ſpoken of, as they are concerned in drawing the *ſilk* from off the balls. As to the ſpinning and reeling of raw *ſilks* off the balls, ſuch as they are brought hither from Italy, the Levant, &c. the firſt is chiefly performed on the ſpinning-wheel; and the latter, either on hand-reels, or on reels mounted on machines, which ſerve to reel ſeveral ſkains at the ſame time. As to the milling, they uſe a mill compoſed of ſeveral pieces, which may mill two or three hundred bobbins at once, and make them into as many ſkains. See MILLING. For the bleaching and dying, ſee BLEACHING and DYING.

Silk is diſtinguiſhed by different names according to its different ſtates. Thus,

SILK, *raw*, is that taken from the ball, without fire, and wound without any coction: ſuch as is moſt, if not all, that is brought into England from the Levant: i. e. from Perſia by the way of Turkey, from Bengal in India, and from China. The raw *ſilk* is commonly worked up into two ſorts, called *organzine* and *tram*: the former is made by giving a throw or twiſt to each thread of raw *ſilk* ſingly, and then doubling two of theſe twiſted threads together, and twiſting them ſmartly together: this forms the warp or length of a piece when manufactured. The tram, or ſhoot, which makes the breadth of the piece, is formed by twiſting two or more threads of raw *ſilk* ſlack. The waſted *ſilk*, or refuſe in reeling, &c. is collected, carded, and ſpun, and called *floſs ſilk*: this is doubled and thrown, and often made into a cheap ſort of *ſilk* ſtockings, which are very ſtrong and durable.

In the French *ſilk*-works, the greateſt part of this raw *ſilk* paſſes for little better than a kind of fine floretta; yet, when ſpun, it makes a bright thread, and ſerves for the manufacture of ſtuffs of moderate value and luſtre. But the raw *ſilks* of the Levant, whence moſt of ours come, are exceeding fine and beautiful. The difference ariſes hence, that, in France, the beſt balls are ſpun and wound in boiling water, and only the refuſe made into raw *ſilk*; whereas, in the Levant, there is no ſuch thing as ſpinning or winding on the fire, but the *ſilks* are all ſent in bales, or packs, as they are drawn from off the balls; ſo that they are only diſtinguiſhed by their quality of fine, middling, and coarſe.

SILK, *boiled*, is that which has been boiled in water, to facilitate the ſpinning and winding. This is the fineſt of all the ſorts of *ſilk* manufactured in France, and is ſeldom uſed but in the richeſt ſtuffs; as velvets, taffaties, damaſks, brocades, &c.

There is alſo another kind of boiled *ſilk*, which is prepared by boiling, to be milled; and which cannot receive that preparation, without being firſt paſſed through hot water. By the laws of France, it is prohibited to mix raw with boiled *ſilk*; both as ſuch a practice ſpoils the dying, and as the raw *ſilk* corrupts and cuts the boiled.

SILKS, *throwed or twiſted*, are ſuch as, beſides their ſpinning and winding, have received their milling or throwing. This they receive in a different degree, as they are paſſed oftener or ſeldomer over the mill: properly, however, throwed *ſilks* are thoſe wherein the threads are pretty thick-throwed, and twiſted ſeveral times. The thrown *ſilk* comes to us chiefly from Leghorn, Genoa, Naples, and Meſſina.

SILKS, *ſlack*, are ſuch as are not twiſted, but are prepared, and dyed, for tapeſtry, and other works with the needle.

SILK, *Eaſtern or Eaſt Indian*. That popularly thus called is not the work of the *ſilk*-worms, but comes from a plant that produces it, in pods, much like thoſe of the cotton-tree. The matter this pod contains is extremely white, fine, and moderately gloſſy: it ſpins eaſily, and is made into a kind of *ſilk*, that enters the manufacture of ſeveral Indian and Chineſe ſtuffs.

SILKS, *French*. It is only in the moſt ſouthern provinces of France that *ſilk* is cultivated, mulberry-trees planted, and worms bred. The principal places are Languedoc, Dauphiné, Provence, Avignon, Savoy, and Lyons. This laſt place, indeed, furniſhes very few *ſilks* of its own growth; but it is the great ſtaple whence the merchants of Paris, and the other cities, are to fetch them. At leaſt, they are obliged to have them paſs through Lyons, if they bring them from other places, either by land or ſea. There have been computed to enter Lyons, *communibus annis*, ſix thouſand bales; the bale valued at one hundred and ſixty pounds weight; of which ſix thouſand bales, there are one thouſand four hundred from the Levant, one thouſand ſix hundred from Sicily, one thouſand five hundred from Italy, three hundred from Spain, and one thouſand two hundred from Languedoc, Provence, and Dauphiné.

At the time when the manufactures of Lyons were in their proſperity, there were reckoned to be eighteen thouſand looms employed in the *ſilk* manufacture; but in 1698, there were not reckoned four thouſand. However, this manufacture has revived of late, and a great part of Europe has been ſupplied from hence with brocade and rich *ſilks*. The decay has not been leſs notable at Tours: they had formerly there eight hundred mills for winding and preparing the *ſilks*; eight thouſand looms to weave them; and forty thouſand perſons employed in the preparation and manufacturing thereof; but theſe have been reduced to ſeventy mills, twelve hundred looms, and about four thouſand perſons.

SILKS, *Sicilian*. The commerce of the *ſilks* of Sicily is very conſiderable: and the Florentines, Genoeſe, and Lucceſe, are the people who chiefly make it. Great quantities are yearly brought thence, eſpecially from Meſſina: part whereof they uſe in their own manufactures, and ſell the reſt to their neighbours, the French, &c. with profit. The Italians have this advantage, eſpecially the Genoeſe, over other people, that, having large eſtabliſhments in the iſland, they are reputed as natives, and pay no duty for the export.

Part of the Sicilian *ſilks* are raw, the reſt are ſpun and milled; of which laſt kind, thoſe of St. Lucia and Meſſina are the moſt valued. The raw unwrought *ſilks* are always ſold for ready money: the others, ſometimes, in exchange for other goods.

SILKS, *Italian*. The *ſilks* brought from Italy are partly wrought, and partly raw and unwrought. Milan, Parma, Lucca, and Modena, furniſh none but the latter kind; Genoa moſt of the former; Bologna affords both kinds. The fineſt Italian wrought *ſilk* comes from Piedmont, Novi, Bergamo, and Bologna: and is imported into England from the ports of Nice, Genoa, and Leghorn.

The *ſilk* we have from Italy is generally thrown, and ſerves for warp for our manufactures; and the greater part we import from Piedmont, at an annual expence of no leſs than 200,000*l.* and in general at the price of 20*s.* for every pound. And the king of Sardinia, it is ſaid, hath prohibited the exportation of raw *ſilk* out of his dominions; though the markets are open in other parts of Italy.

SILKS, *Spaniſh*, are all raw; and are ſpun, milled, &c. in England, according to the ſeveral works they are to be uſed in.

SILKS, *Turkey*, are all raw. One advantage we have in the commerce of the Levant, in *ſilks*, wanting in thoſe of Sicily, is, that the latter are confined to a particular ſeaſon of the year; whereas the former are bought at all times. They are brought from Aleppo, Tripoli, Sayda, and from the iſle of Cyprus, Candia, &c. But the principal place of commerce, eſpecially for the *ſilks* of Perſia, is Smyrna. The *ſilks* are brought hither in caravans, from the month of January to September. The caravans in January are loaden with the fineſt *ſilks*; thoſe of February and March bring indifferent ones; the reſt, the coarſeſt. They all come from the ſeveral provinces of Perſia, chiefly thoſe of Ghilan and Shirvan, and the city of Schamachia, ſituate near the edge of the Caſpian ſea; from which three places, a Dutch author aſſures us, there have not come leſs than thirty thouſand bales of *ſilk* in a year. Ghilan produces the beſt and greateſt quantities of *ſilk*; next to this comes Shirvan and Erivan, then Mazanderan, and laſtly Aſtrabad; but the latter is much inferior, ſerving only for a manufacture mixed with cotton; that of Mazanderan and Aſtrabad is ſeldom or ever exported.

Arduel,

Ardeuil, or Ardebil, another city of Perſia, not far diſtant from theſe *ſilk* countries, is the place where *ſilks* are laid up, and whence the caravans ſet out for Smyrna, Aleppo, Scanderoon, and Conſtantinople; and it is this city, with Schamachia, that have always been eſteemed the centre of the *ſilk* trade; which has been ſeveral times attempted to be removed from Smyrna, and the Mediterranean, in favour of Archangel, and the White-ſea, by carrying them acroſs Muſcovy, by the Volga and Dwina, two rivers that traverſe the principal provinces of that vaſt empire.

This new courſe of the Perſian *ſilks* into Europe was firſt propoſed by Paolo Centurio, a Genoeſe, to the czar Baſil, under the pontificate of Leo X. The French had the ſame deſign in 1628. The duke of Holſtein, in 1633, ſent ambaſſadors to the court of Perſia, purely with the ſame view: and, in 1668, the czar Alexis Michael attempted the thing himſelf; but he was diſappointed by the rebellion of the Coſſacks, and the ſurprize of Aſtracan.

In 1688, the commerce of Perſian *ſilks* had like to have been removed from Smyrna, by an earthquake, which almoſt overturned the whole city; and, doubtleſs, the removal had been effected, but for the vigorous means uſed by the Turks to prevent it. Smyrna, however, ſtill remains in her ancient poſſeſſion; and the ſeveral nations of Europe continue every year to ſend their fleets, to fetch away the *ſilks*; and matters are like to remain ſo, unleſs the conqueſts made by the late czar, along the Caſpian ſea, enable his ſucceſſors, as it is certain he himſelf had ſuch a thing in view, to put this trade into another channel.

Silks, *China*, *Japan, and Indian*. Several provinces of China are ſo fertile in mulberry-trees, and their climate is ſo agreeable to the nature of *ſilk*-worms, that the quantity of *ſilk* there produced is incredible: the ſingle province of Tchehiang might ſupply all China, and even a great part of Europe, with this commodity. The *ſilks* of this province are the moſt eſteemed, though thoſe of Nankin and Canton be excellent.

The *ſilk* trade is the principal in China, and that which employs the moſt hands: but the European merchants, who deal in it, eſpecially in wrought *ſilks*, are to be careful of the ſpinning. &c. the waſte being uſually very great, as the French Eaſt India company have found to their coſt.

In the year 1750, an act of parliament was paſſed for repealing the duties payable on China raw *ſilk* imported into this kingdom, by the Eaſt India company, and entitling ſuch *ſilk*, upon exportation to the ſame drawbacks and allowances with the raw *ſilk* of the produce of Italy. And another act was paſſed in 1753, for the farther encouragement of the Britiſh *ſilk* manufacture.

Japan would not afford fewer *ſilks* than China; but that the Japaneſe, a barbarous and diſtruſtful people, have interdicted all commerce with ſtrangers, eſpecially with Europeans, excepting with the Dutch; who are ſaid to be admitted on certain impious terms, related by Tavernier, but which we muſt own we cannot credit. The Dutch have endeavoured to vindicate themſelves from theſe by the pens of ſeveral famous writers.

The *ſilks* of the ſtates of the Great Mogul are brought in great quantities from Caſſem-bazaar, a midland place, whence they are conveyed by a canal of fifteen leagues into the Ganges, by which they are forwarded fifteen leagues farther, to the mouth of the famous river of Indoſtan. The *ſilk* of Caſſem-bazaar is yellowiſh; as are alſo thoſe of Perſia and Sicily; there being none, that we know of, naturally white, but that of Paleſtine. The Indians, however, whiten this with a ley, made of the aſhes of a tree, called *Adam's fig-tree*; but as this tree is pretty ſcarce, and they have not yet found any other that will ſerve in its place, the Europeans are forced to take the greateſt part of their *ſilks* in their native yellow. Caſſem-bazaar alone is computed to furniſh every year twenty-two thouſand bales of *ſilk*, each bale weighing one hundred pounds; of which the Dutch are ſaid to export ſeven thouſand bales annually.

Great quantities of both raw and wrought *ſilk* are furniſhed by other parts of Bengal, and by ſeveral provinces of Indoſtan, which partly ſupply the natives, and afford a very conſiderable exportation to Europe. Several thouſand bales of raw *ſilk* are annually imported from Bengal and China; ſome of which is, in this ſtate, uſed for making princeſs ſtuffs, but the greater part is prepared for the manufacturers by the *ſilk*-throwſters. The duty on thrown *ſilk* imported is 5*s.* 1*d.* $\frac{1}{20}$; and the duty on raw *ſilk*, whether of the growth of Italy, Turkey, or India, is 1*s.* 4*d.* $\frac{1}{2}$ per pound.

The quantity of Bengal and China raw *ſilk* imported in 1783, was 3636 Bengal bales, each bale weighing about 150 great pounds, and 1390 China bales, at about 145 ſmall pounds *per* bale.

Silk, in *Chemiſtry* and *Medicine*. Raw *ſilk*, which is a ſubſtance of no remarkable ſmell or taſte, yet contains a ſurpriſing quantity of a volatile ſalt. Fifteen ounces of raw *ſilk* cut ſmall, and put into a retort, when diſtilled with a gentle fire will yield two ounces and two drachms of a dry volatile ſalt; whereas fifteen ounces of hartſhorn, a ſubſtance uſually ſuppoſed to contain more volatile ſalt than any other ſubſtance, except ſal ammoniac, yields only half an ounce and half a drachm: from the ſame quantity of *ſilk* there may alſo be drawn three ounces and an half of volatile ſpirit; whereas, from the like quantity of hartſhorn, the quantity of ſpirit exceeds this, being four ounces and a half. But we are to conſider, that there requires but a ſmall proportion of volatile ſalt to be diſſolved in phlegm, to make it what they call a volatile ſpirit; and that upon the whole there is no doubt, but that the *ſilk* contains greatly, the larger portion of ſalt. The caput mortuum, from this quantity of hartſhorn, weighed nine ounces and two drams; whereas, that from the *ſilk* was only five ounces and five drams: whence it is plain, that the hartſhorn contains greatly more earth in the ſame quantity, and conſequently leſs active principles.

It has generally been agreed, that the ſpirit of hartſhorn is no other than a phlegm, impregnated with a volatile ſalt, and an extremely penetrating ſulphur: this is proved by the following experiment. If ſpirit of wine be poured upon ſpirit of ſal ammoniac, or ſpirit of *ſilk*, there is immediately produced a large quantity of a ſaline concretion; and when the ſpirit of *ſilk* is uſed, this concretion is manifeſtly compoſed of conſiderably large and ſeparate granules of ſalt; whereas, in caſe the ſpirit of ſal ammoniac has been uſed, the concretion is perfectly fine, and of an even texture, and it is not eaſy to ſay, at firſt ſight, whether it be ſaline, or ſulphureous: this is what has been called by authors *oſſa Helmontii*. It is proved, however, to be wholly ſaline, on adding water to it, ſince that readily diſſolves it. The ſulphur contained in theſe volatile ſpirits manifeſts itſelf ſufficiently by its ſmell.

The ſpirit of raw *ſilk* rectified with ſome eſſential oil, is the medicine commonly known by the name of GUTTÆ *Anglicanæ*, or Engliſh drops.

Silk, *ſpider*. Within a few years the ſecret has been found in France, of procuring and preparing *ſilk* from the webs of ſpiders; and the uſing it in ſeveral manufactures has been attempted. This diſcovery is owing to M. Bon, in 1710, who publiſhed a diſſertation on the ſubject; whence what follows is extracted.

Spiders are uſually diſtinguiſhed, either with regard to their colour, as into black, brown, yellow, white, &c. or with regard to the number, or arrangement, of their eyes; ſome having ſix, others eight, others ten. But with regard to the *ſilk* ſpiders, M. Bon reduces them all to two kinds; thoſe with long legs, and thoſe with ſhort: which laſt are thoſe which furniſh the fineſt raw *ſilk*.

The *ſilk* ſpider makes a *ſilk* every whit as beautiful, gloſſy, and ſtrong, as the *ſilk*-worm: it ſpins it from the anus, around which are five papillæ, or ſmall nipples, and behind theſe, two others; all muſculous; and furniſhed with ſphincters. Theſe nipples ſerve as ſo many wire-drawing irons, to form and mould a viſcous liquor, which, when dried in the air, after being drawn through them, makes the *ſilk*. Each of theſe nipples, M. Reaumur obſerves, conſiſts of a number of leſs and inſenſible ones; which one may be convinced of, by preſſing a ſpider's belly between the fingers, to oblige the liquor to flow into the nipples; for by this means, applying the finger againſt the anus, ſeveral diſtinct threads will be drawn out through the ſeveral perforations of each nipple. The threads are too fine to be counted with any certainty; but M. Reaumur reckons each larger nipple may ſend forth a great many.

Hence we ſee, how the ſpiders make their threads bigger or ſmaller: for as, before they begin to ſpin, they always apply more or fewer of theſe nipples againſt the body whence the web is begun; or as they apply each more or leſs ſtrongly; ſo, as more or fewer of the minuter nipples come to take, the thread, thus ſpun, will be a compound of more or fewer of the ſingle threads. Indeed, as the threads come from the anus, all joined together, they appear to be ſingle; but M. Bon has diſtinguiſhed one of the ſingle ones to conſiſt of fifteen or twenty diſtinct threads.

The threads are of two kinds; the firſt is weak, and only ſerves for that kind of web wherewith they catch flies. The ſecond is much ſtronger, and ſerves to wrap up their eggs in; which, by this means, are ſheltered from the cold, as well as from inſects, which might otherwiſe gnaw and deſtroy them. Theſe threads they wind very looſely round the eggs, reſembling the balls or bags of *ſilk*-worms, that have been prepared and looſened for the diſtaff.

The ſpider bags are of a grey colour when new; but they turn blackiſh when long expoſed to the air: indeed, one might find other ſpiders bags of other colours, and which would afford a better *ſilk*; but their ſcarcity would render the experiment difficult: for which reaſon we confine ourſelves to the bags of the moſt common ſpiders, which are the ſhort-legged kind. Theſe always find out ſome place ſecure from the wind and rain, to make their bags; as hollow trees, the corners of windows, or vaults, or under the eaves of houſes.

By collecting a quantity of theſe bags, a new *ſilk* is made, inferior in nothing to the common *ſilk*. It takes all kinds of dyes, and may be made into all kinds of ſtuffs. M. Bon had ſtockings and gloves made of it, which he preſented to the Academy; and others to our Royal Society.

For the manner of preparing the bags to get the *ſilk*, it is thus: after having gathered twelve or thirteen ounces of theſe bags, M. Bon had them well beaten for ſome time, with the hand, and a ſtick, to get out all the duſt; he then waſhed them in lukewarm water, till they left the water very clean: after this, he laid them to ſteep, in a large veſſel, with ſoap, and ſalt-petre, and gum arabic. The whole was left to boil, over a gentle fire, for three hours. The bags were next waſhed in warm water, to get out the ſoap; and after all, laid to dry ſome days, to fit them for carding; which was performed by the common *ſilk*-carders, but with cards much finer than ordinary. By this means, he had a *ſilk*, of a very particular aſh-colour, which was eaſily ſpun; and the thread ſpun from it was both ſtronger and finer than that of common *ſilk*; which ſhews, that all ſorts of works may be made of it: nor is there any reaſon to fear, but it will ſtand any trials of the loom, after having paſſed that of the ſtocking-weavers.

The only difficulty, now, is in procuring a ſufficient quantity of ſpider bags to make any conſiderable work of it: which, M. Bon obſerves, would be no difficulty at all, had we but the art of breeding them, as we do *ſilk*-worms; for they multiply much more; every ſpider laying ſix or ſeven hundred eggs, whereas the *ſilk*-worms do not lay above one hundred: yet are theſe laſt ſo tender, &c. that one half die without making any bags, or are hindered by ſome little accident, from making them: whereas the ſpiders hatch of themſelves, without any care, in the months of Auguſt and September, in fifteen or ſixteen days after they are laid; the old ſpiders that lay them dying ſoon after. The young ones thus bred live ten or twelve months without eating, and continue in their bags without growing, till the hot weather, putting their viſcid juices in motion, induces them to come forth, ſpin, and run about to ſeek food.

Were a way, therefore, found of breeding young ſpiders in rooms, they would, doubtleſs, furniſh a much greater quantity of bags than *ſilk*-worms do. For of ſeven or eight hundred young ſpiders, which M. Bon kept, ſcarce one died in a year; whereas of one hundred *ſilk*-worms, not forty lived to make their bags. M. Bon, having ordered all the ſhort-legged ſpiders that could be found in the months of Auguſt and September, to be brought to him, ſhut them up in paper coffins, and pots; covering the pots with papers, which he pricked full of pinholes, as well as the coffins, to give them air. He fed them with flies, and found, ſome time afterwards, that the greateſt part of them had made their bags. The ſame ingenious perſon found, that ſpiders bags, with regard to their weight, afford much more *ſilk* than thoſe of the *ſilk*-worms: as a proof hereof, he obſerves, that thirteen ounces yield near four ounces of clear *ſilk*, two ounces whereof will make a pair of ſtockings; whereas ſtockings of common *ſilk* weigh ſeven or eight ounces.

Nor is there any venom in the *ſilk*, or even in the ſpider, as many have imagined. M. Bon has been bit by them ſeveral times, without any manner of harm; and as for the *ſilk*, it is uſed with very good ſucceſs, to ſtop bleeding, and cure wounds, the natural gluten thereof acting as a kind of balſam. It likewiſe yields, by diſtillation, ſeveral ſpecific medicines particularly great quantities of ſpirit, and volatile ſalt, which being prepared after the ſame manner as that drawn from the bags of *ſilk*-worms, in making the guttæ Anglicanæ, or Engliſh drops, at one time ſo famous all over Europe, may ſerve to make other drops of greater efficacy, which M. Bon calls drops of Montpelier, and adviſes to be uſed in all ſleepy diſeaſes.

M. Reaumur, being appointed by the Royal Academy, to make a farther enquiry into this new *ſilk* work, has raiſed ſeveral objections and difficulties againſt it; which are found in the Memoirs of the Academy for the year 1710. The ſum of what he has urged amounts to this. The natural fierceneſs of the ſpiders renders them unfit to be bred and be kept together: four or five thouſand being diſtributed into cells, fifty in ſome, one or two hundred in others, the big ones ſoon killed and eat the leſs, ſo that, in a ſhort time, there were ſcarce left one or two in each cell; and to this inclination of mutually eating one another, M. Reaumur aſcribes the ſcarcity of ſpiders, conſidering the vaſt number of eggs they lay. But this is not all: he even affirms, that the ſpider's bag is inferoir to that of the *ſilk*-worm, both in luſtre and ſtrength; and that it produces leſs matter to be manufactured. The thread of the ſpider's web, he ſays, only bears a weight of two grains without breaking; and that of the bag bears thirty-ſix. The latter, therefore, in all probability, is eighteen times thicker than the former, yet it is weaker than that of the *ſilk*-worm, which bears a weight of two drachms and a half. So that five threads of the ſpider's bag muſt be put together to equal one thread of the *ſilk*-worm's bag.

Now it is impoſſible theſe ſhould be applied ſo juſtly over one another, as not to leave little vacant ſpaces between them, whence the light will not be reflected; and of conſequence, a thread, thus compounded, muſt fall ſhort of the luſtre of a ſolid thread. Add to this, that the ſpider's thread cannot be wound off, as that of the *ſilk*-worm may, but muſt of neceſſity, be carded; by which means, being torn in pieces, its evenneſs, which contributes much to its luſtre, is deſtroyed. In effect, this want of luſtre was taken notice of by M. de la Hire, when the ſtockings were preſented to the academy.

Again, ſpiders furniſh much leſs *ſilk* than the worms: the largeſt bags of theſe latter weigh four grains; the ſmaller three grains; ſo that 2304 worms produce a pound of *ſilk*. The ſpider bags do not weigh above one grain: yet when cleared of their duſt and filth, they loſe two thirds of their weight. The work of twelve ſpiders, therefore, only equals that of one *ſilk*-worm; and a pound of *ſilk* will require at leaſt 27648 ſpiders. But as the bags are wholly the work of the females, who ſpin them to depoſit their eggs in, there muſt be kept 55296 ſpiders to yield a pound of *ſilk*. Yet will this only hold of the beſt ſpiders; thoſe large ones ordinarily ſeen in gardens, &c. ſcarce yielding a twelfth part of the *ſilk* of the others. 280 of theſe, he ſhews, would not yield more than one *ſilk*-worm; 663552 of them would ſcarce yield a pound.

SILK-*graſs*, a name uſed for two very different genera of plants, the ALOE, and DOG's *bane*.

SILK-*machine*. See WINDING *of ſilk*.

SILK-*tail*, or *Bohemian chatterer*, in *Ornithology*. See ROLLER.

SILK, *Virginian*, *periploca*, in *Botany*, a genus of the *pentandria digynia* claſs; the characters of which are theſe: the flower hath a ſmall permanent empalement cut into five points; the flower has one plain petal, cut into five narrow ſegments, indented at their points, with a ſmall nectarium going round the centre of the petal, and five incurved filaments, which are not ſo long as the petal, and five ſhort ſtamina, terminated by erect ſummits, which join in a head. It has a ſmall bifid germen, with ſcarce any ſtyle, crowned by two ſimple ſtigmas; the germen afterwards becomes two oblong bellied capſules, with one cell, filled with ſeeds, crowned with down, lying over each other like the ſcales of fiſh. Linnæus enumerates four, and Miller ſeven ſpecies.

SILK-*worm*, *bombyx*. This inſect, which is a ſpecies of the PHALÆNA, conſiſts of eleven rings, and each of theſe of a great number of other ſmaller ones, joined to each other; and the head, which terminates theſe rings, is furniſhed with two jaws, which work and cut the food, not by a perpendicular but a lateral action.

The humours found in the body of this creature, all ſeem approaching to the nature of the *ſilk* which it ſpins, for on being rubbed in the hands, they leave a hard or ſolid cruſt behind them. Under the ſkin there is always found a mucous roſy-coloured membrane, enveloping the animal, and ſuppoſed to be the new ſkin in which it is to appear, on throwing off the old one. The heart of this creature reaches from the head to the tail, running the whole length of the body; it is, indeed, rather a ſeries of many hearts connected together than one: the motion of ſyſtole and diaſtole is very evident in this whole chain of hearts; and it is an elegant ſight to obſerve the manner of the vital fluid's paſſing from one of them to the other. The ſtomach of this animal is as long as the heart, reaching, like it, from one end of the body to the other: this large receptacle for food, and the ſudden paſſage of it through the animal, are very good reaſons for its great voracity.

In the ſides of the belly, all about the ventricle, there are depoſited a vaſt number of veſſels, which contain the *ſilky* juice; theſe run with various windings and meanders to the mouth, and are ſo diſpoſed, that the creatures can diſcharge their contents at pleaſure at the mouth; and according to the nature of the juices that they are ſupplied with, furniſh different ſorts of *ſilk* from them, all the fluid contents of theſe veſſels hardening in the air into that ſort of thread, that we find the web, or balls of this creature conſiſt of.

Theſe creatures never are offended at any ſtench of whatever kind, but they always feel a ſouthern wind, and an extremely hot air always makes them ſick. Malpighi de Bombyce.

SILK-*worm, chryſalis of the.* See AURELIA.

SILLON, in *Fortification,* an elevation of earth, made in the middle of the moat, to fortify it, when too broad.

The *ſillon* is more uſually denominated an ENVELOPE.

SILPHA, in the Linnæan ſyſtem of *Natural Hiſtory,* a genus of the *coleoptera* order of inſects; the characters of which are, that the antennæ become thicker toward the extremity, the elytra marginated, the head prominent, the thorax flattiſh and marginated. Linnæus enumerates thirty-five ſpecies.

SILPHIUM, in *Botany.* See *Baſtard* CHRYSANTHEMUM.

SILVER, called alſo *Luna* by chemiſts, a white rich metal; being the fineſt, pureſt, moſt ductile, and moſt precious, of all metals, except gold.

The *ſpecific* GRAVITY *of ſilver* is nearly eleven times greater than that of water; and its proportion to that of gold is as 5 to 9. The tenacity of its parts is about one half leſs than that of gold: a *ſilver* wire, in diameter, one-tenth of an inch, ſupporting only a weight of 270 pounds without breaking. It is ſomewhat ſonorous, and harder than gold, as Juncker obſerves, and fuſible with a leſs degree of heat than gold, according to Cramer.

It ſeems to be as fixed and indeſtructible as gold: nevertheleſs Juncker affirms, that it may be changed into a vitreſcent calx by a long reverberation; i. e. by reducing it into very fine parts and expoſing it to the action of the ſtrongeſt heat it can ſuſtain without fuſion, with the contact of free air.

Silver contracts no ruſt, nor does it admit any change of its colour and brilliancy from the combined action of air and water: however its ſurface is apt to tarniſh, and even to become black, by the contact of the phlogiſton of ſeveral inflammable matters, or of their exhalations; becauſe it has the property of impregnating itſelf with the inflammable principle, even in the cold, to a greater degree than any other metal. The effect of the vapour of putrefied urine, &c. in rendering *ſilver* ſuperficially yellow, and like gold, has been the occaſion of many abuſes with regard to wire and laces: for preventing which ſeveral edicts have been iſſued in France.

Stahl informs us, that *ſilver,* by being treated in a certain manner, with certain ſubſtances, of which nitre is the principal, may be tinged throughout of a golden colour.

Silver is ſoluble, with greater or leſs facility, in all acids. The vitriolic and marine acids are not without difficulty combined with *ſilver* in its metallic ſtate, and particular management is neceſſary for this purpoſe. The vitriolic acid, in order to diſſolve *ſilver* directly, muſt be much concentrated, and very hot, and therefore diſtillation is neceſſary: and the marine acid cannot attack *ſilver* directly; but when it is very much dephlegmated, and, as it were in a dry ſtate, conſiderably hot, and reduced to vapour, as by the royal cement in concentrated parting. But there are much more ſimple and convenient methods by which *ſilver* may be combined with the above mentioned acids.

Nitrous acid, that is very pure and moderately ſtrong, diſſolves *ſilver* in its metallic ſtate, with the greateſt facility. The ſolution is made ſpontaneouſly, without heat, or with a very gentle heat at firſt; and thus the acid may be ſaturated with *ſilver.* If the *ſilver,* thus diſſolved, be allayed with copper, the ſolution will be green; if it contain no copper, the ſolution will be at firſt greeniſh, and at laſt become quite white. As ſoon as the acid begins to make an impreſſion on the metal, its ſurface becomes black; and this change of colour is owing to the phlogiſton of the acid. The ſolution of *ſilver,* by nitrous acid, is more acrid and corroſive than pure nitrous acid: it corrodes all vegetable and animal ſubſtances, and ſtains the ſkin of an indelible black colour, reſulting from the union of the phlogiſton of the corroded matters with the *ſilver* of the ſolution. Of this ſolution are formed CRYSTALS *of ſilver,* and the cauſtic called LAPIS *infernalis.*

Although *ſilver* is more eaſily ſoluble in nitrous acid than in vitriolic and marine acids, we are not thence to conclude that this metal has a greater affinity with the former than with the two latter. On the contrary, theſe two acids are capable of ſeparating it from the nitrous acid, after this has diſſolved it. If vitriolic acid be poured into a ſolution of *ſilver* in nitrous acid, not too much diluted with water, the liquor will immediately become turbid, and there appears a white precipitate, which is a new combination of the *ſilver* that quitted the nitrous acid to unite with the vitriolic, and to form with it a new ſalt with a metallic baſis, which may properly be called *vitriol of ſilver,* or *lunar vitriol,* and which actually cryſtallizes in the inſtant of precipitation. The ſolution of any ſalt containing this acid, added to a ſolution of *ſilver* in nitrous acid, will produce the ſame effect.

Marine acid, whether engaged in any baſis, or diſengaged, produces in the ſolution of *ſilver* by the nitrous acid the ſame effect as the vitriolic acid; and forms a new compound, which is a marine ſalt with baſis of *ſilver,* called LUNA *cornea.*

Silver, as well as all other metals, may be ſeparated from any acid by abſorbent earths, or by fixed and volatile alkalis; and when afterwards fuſed, it recovers its original properties, and is generally very pure.

Sulphur diſſolves *ſilver* by fuſion, and forms with it a blackiſh maſs, which has almoſt the colour and conſiſtence of lead. This is called *ſulphurated ſilver*; and the combination is made by laying *ſilver* and ſulphur alternately upon each other in ſeveral ſtrata in a crucible, and heating it by degrees till the whole be fuſed. The ſulphur may be ſeparated from the *ſilver* by the mere action of the fire, continued during a certain time, with acceſs of air.

Chemiſts have made frequent attempts to diſſolve *ſilver* in vegetable acids, but with little ſucceſs, according to Mr. Margraaf; who ſays that he himſelf, at laſt, ſucceeded in the attempt.

The chief art required is to find a proper precipitate of *ſilver.* Mr. Margraaf's is formed by precipitating a ſolution of *ſilver,* in the beſt ſpirit of nitre, with that ſalt of urine, which he ſays is the baſis of phoſphorus. See SALT *fuſible of urine.*

This precipitate reduced to a fine powder, and digeſted in a ſand heat with diſtilled vinegar, well concentrated by freezing, will in part be diſſolved thereby.

But if this precipitation of the *ſilver* be made with ſalt of tartar, and then dried and pulverized, a conſiderable quantity of it may be diſſolved in diſtilled vinegar, in juice of lemons, in Rheniſh wine, and in other vegetable acids. The like may be done with MERCURY. Mem. de l'Acad. de Berlin, 1741.

Silver is found within the earth in different ſtates. A very ſmall quantity of it is, in its natural and malleable ſtate, allayed with copper and gold: and is then called *virgin* or *native ſilver:* this is found in form of plates, fibres, or grains, or cryſtallized; and it lies commonly in quartz, flints, ſpar, ſlate, cobalt, and in *ſilver* ores; it is ſometimes alſo enveloped in a thin ſtony cruſt: but *ſilver* is generally found in a mineral ſtate, that is, united and incorporated with heterogeneous matters, ſuch as other metallic ſubſtances, and the mineraliſing ſubſtances, viz. ſulphur and arſenic. *Silver* is capable of being allayed with all metals, and forms with them different compounds. Chem. Dict. art. *Silver.*

For the affinities of *ſilver,* ſee tables under AFFINITY.

There are *ſilver* mines in all the four quarters of the world. Europe has its ſhare: nor is our own iſland quite deſtitute thereof, thought it has none yet diſcovered of much value.

Although we have no *ſilver* mines, properly ſpeaking, in Great Britain, we have plenty of lead, from which *ſilver* is, in ſome places, extracted with conſiderable advantage. Cicero, indeed, tells his friend Atticus, that there was not a ſcruple of *ſilver* in the whole iſland (Epiſt. ad Att. lib. iv. ep. 17. and lib. vii. ep. 7.); but ſo imperfect was the knowledge which the Romans had of this country in his time, that his account cannot be much relied on.

We are certain, that about fifty or ſixty years afterwards, both gold and *ſilver* were reckoned by Strabo (lib. iv. p. 305.) amongſt the products of Britain; and, therefore, if the Britons did not underſtand the art of extracting it from lead at the firſt invaſion of the Romans, they ſoon learned it from their conquerors; and this becomes more probable, if it be admitted, that *ſilver* was coined in Britain in the time of Auguſtus.

Liſter (de Fontibus, cap. ii. ſect. 9, 10.) long ago obſerved, that all the Engliſh lead contained *ſilver*; and he ſpeaks of having proved, by his own experiments, the exiſtence of *ſilver* in the lead of at leaſt thirty different mines, nor has any perſon ſince his time found lead wholly free from *ſilver.*

The Derbyſhire lead has been ſaid to contain two grains of *ſilver* in a pound of lead; and, it is ſaid, that there are ſome lead ores in Great Britain, which, though very poor in lead, contain between three and four hundred ounces of *ſilver* in a ton of the lead. *Silver* has formerly been extracted from lead in many places in this iſland. In the reign of Edward I. near ſixteen hundred pounds weight was obtained in the courſe of three years from a mine in Devonſhire: and the lead mines in Cardiganſhire have at different periods afforded great quantities of *ſilver:* ſir Hugh Middleton is ſaid to have cleared from them two thouſand pounds a month, and thus to have been enabled to undertake the great work of bringing the New River from Ware to London. Theſe ſame mines yielded, in the time of the great rebellion, eighty ounces of *ſilver* out of every ton of lead, and part of the king's army was paid with this *ſilver*, which was minted at Shrewſbury.

In the year 1704, near three thouſand ounces of this Welch bullion were minted at one time at the Tower; and there were two places in Craven, in the Weſt Riding of Yorkſhire, mentioned by Webſter in his Hiſtory of Metals, publiſhed in 1671, one of which afforded ore which yielded about the value of ſixty-ſeven pounds of *ſilver* in a ton; and the other belonged to one Pudſey, who is ſuppoſed to have coined the *ſilver* he got out of his mine; whence the name of Pudſey's ſhillings, which obtains in that country.

There is not at preſent any place in Derbyſhire where *ſilver* is extracted from lead. The ore of the lead mine in Patterdale, near Keſwick, which is poor in lead, yields between fifty and ſixty ounces of *ſilver* from a ton of the lead.

There are ſeveral ſmelting-houſes at Holywell in Flintſhire, where *ſilver* is extracted from lead: Mr. Pennant has given the following account of the quantity of *ſilver* extracted at one of the largeſt of theſe houſes in the courſe of ſix years.

Years.		Ounces.	Years.		Ounces.
1754	-	12160	1774	-	5693
1755	-	1276	1775	-	6704
1756	-	7341	1776		4347

This *ſilver* is chiefly ſold to the manufacturers at Birmingham and Sheffield. Much *ſilver* is alſo extracted from lead in Northumberland. Watſon's Chem. Eſſ. vol. iii. eſſ. 9.

The mines of Peru, and ſome other parts of America, are much the richeſt, and moſt abundant; they appeared almoſt inexhauſtible; particularly thoſe of Potoſi, which, although decayed, continue to be dug with conſiderable advantage, with this only difference, that the veins which were formerly almoſt in the ſurface of that famous mountain, are now ſunk to prodigious depths, the workmen going into them by a painful deſcent of four or five hundred ſteps. Many millions of Indians have periſhed in them; and prodigious numbers continue to be deſtroyed there yearly.

The ores, or mineral ſtones they dig, are not all of the ſame quality, conſiſtence, or colour: ſome are white or aſh-coloured, ſpotted with red or blue, and called *plata blancha*: others are black, and called *plomo ronco*: theſe laſt are the richeſt, and the eaſieſt wrought; no mercury being here needed; nor any thing but to put them in the fire: where the lead burning away, leaves the *ſilver* pure. The Indians, who, till the arrival of the Spaniards, knew nothing of the uſe of mercury, melted none but of this kind of mineral. The *roſſicler* is another black mineral, diſtinguiſhed by whetting and rubbing it againſt iron, which turns it red. It is very rich, and the metal it yields is of the beſt ſort. The *zorocke* is like talc, and looks as if ſilvered; though it does not yield much metal. The *paco* is of a yellow red, very ſoft, and found almoſt broken in pieces: it is not rich. The *cobriſſo* is green, and ſomewhat friable. Though the *ſilver* of this be viſible, yet it is exceeding difficultly drawn from it, by reaſon of the copper wherewith it is intermixed. Laſtly, the *arannea*, ſo called on account of its reſemblance to a ſpider's web, which is only found in Potoſi, and that only in the mine of Cotamiſo, conſiſts of threads of pure *ſilver*, interwoven like a *ſilver* lace that has been burnt to get out the ſilk. The *ſilver* veins, of what quality ſoever, are uſually richer in the middle than towards the extremes: but the richeſt places are thoſe where the veins interſect. It is reckoned a great addition to the richneſs of a mine to be near a river, for the advantage of mills to grind the ore.

At Lipes and Potoſi, for inſtance, the caxon of ore muſt yield ten marks to defray expences; whereas, at Tarama, there need not above five.

The moſt uſual way of ſeparating the *ſilver* from the ore is by what they call *pineas*. See PINEA.

Sometimes, however, they uſe nothing but fire frequently repeated; or aqua fortis.

What render the working of theſe mines exceedingly dangerous, are the exhalatious ariſing from them; which are even felt on the outſide; and making an impreſſion on animals grazing in the neighbourhood; but in the inſide, they ſtupefy the miners, none of them can bear ſo poiſonous an air above a day together. Sometimes it is ſo fatal, that it kills on the ſpot; and obliges them to ſtop up the veins again, whence it exhales. The mines of Potoſi are much the leaſt ſubject to them; and yet, without the herb paraguay, the infuſion whereof is taken by the miners, as we do that of tea, thoſe mines muſt be ſoon abandoned.

Though the mines of Potoſi and Lipes ſtill keep up their reputation, yet there are ſeveral diſcovered, within theſe few years, that exceed them much in richneſs: ſuch are the mines of Oruro, eight leagues from Arica, and thoſe of Ollachea, near Cuſco, opened in 1712. It is remarkable that moſt of the mines in America are found in cold and barren places.

Three principal proper ores of *ſilver* are known, which are very rich but very rare. Theſe are,

1. The *vitreous ſilver ore*, which is either in form of plates, or fibres, or cryſtallized, or without any determinate figure: it has nearly the colour, ſoftneſs, and fuſibility of lead, and contains *ſilver* mineraliſed by ſulphur alone. This ore may be imitated by adding about five parts of ſulphur to one of melted *ſilver*, or by expoſing a plate of *ſilver* red hot to the fumes of burning ſulphur.

2. The *corneous ſilver ore*, which has various colours; being white, pearly, brown, yellow, greeniſh, or reddiſh. It is foliated and ſemi-tranſparent; ſomewhat ductile, and fuſible with the flame of a candle; when heated, it emits, according to Wallerius, a ſulphureous and blue flame, and, according to Cramer, alſo a ſmall quantity of an arſenical fume. Wallerius ſays, that it contains two thirds of *ſilver*, mineraliſed by a conſiderable quantity of ſulphur, and a ſmall quantity of arſenic. Lehman thinks, that it is *ſilver* united with a little arſenic. But Cronſtedt ſays, that it is a luna cornea. This ore is rare.

3. The *red ſilver ore*, or roſiclare, which is plated or ſolid, or cryſtallized, and frequently ſemi-tranſparent. Its colour is various, from a dark grey to a deep red, according to the proportions of the arſenic and ſulphur, by which it is mineraliſed. It crackles and breaks in the fire, exhales an arſenical fume, and is readily fuſed: it is generally found in quartz, ſpar, cryſtal, and hornblend. This ore contains a little iron, and affords two thirds its weight of *ſilver*.

Beſides theſe three ores, there are others which contain *ſilver* mixed with other metals; ſuch as the *grey ſilver ore*, which contains copper and *ſilver* mineraliſed by arſenic and ſulphur: the *white ſilver ore*, which is an arſenical pyrites containing *ſilver*: the *black ſilver ore*, which contains ſulphur, arſenic, copper, iron, ſometimes lead, and about a fourth part of *ſilver*, according to Wallerius: the *plumoſe ſilver ore*, which is white or black, ſtriated like plume-alum, or ore of antimony, and is *ſilver* mineraliſed by ſulphur, arſenic, and antimony; the *pech blend*, in which *ſilver*, gold, and zinc are mineraliſed by ſulphur, probably by intervention of iron: and *ſilver* is frequently found in galena; ſometimes in martial pyrites; in the red ore of arſenic; in various ores of copper, lead, tin, iron, and eſpecially cobalt; in blends; in yellow or red earths; in black and blue baſalts, and alſo in ſtrata of ſtones: the *liquid ſilver ore*, or *guhr* of *ſilver*, which is a grey or whitiſh liquid maſs, which contains, as Wallerius ſays, either native *ſilver*, or ſome fluid ſubſtance capable of producing it: and moreover, Mr. Von Juſti pretends that he has found *ſilver* mineralized by an alkaline ſubſtance: and Henckel alſo leads us to infer, that by treating calcareous earth, or certain clays with pyrites, *ſilver* may be obtained.

The largeſt piece of *ſilver ore* we have account of any where, is at this time preſerved in the king of Denmark's Muſeum of Curioſities at Copenhagen; this was dug in the mines of Norway, and weighs five hundred and ſixty pounds. It is five feet ſix inches long, and meaſures four feet about; it is valued at five thouſand crowns.

There is in the ſame place another alſo, which was dug in the ſame mine, valued at three thouſand two hundred and ſeventy crowns.

Theſe are both ſo very rich, that they ſeem at leaſt three parts *ſilver*, and the metal appears in very elegant forms in them, and ariſes up out of their ſurface in form of ſmall trees and buſhes.

There are alſo ſeveral pieces of pure native, or virgin-*ſilver* there, all of which repreſent trees or plants.

In order to extract *ſilver* from ſeveral kinds of ores, different operations are neceſſary. *Native ſilver* is ſeparated from its adhering earths and ſtones by AMALGAMATION with mercury, as in the manner directed for the ſeparation of GOLD; or by fuſion with lead, from which it may be afterwards ſeparated by cupellation. See COPPELLING.

Pure ores, or thoſe which are not much conpounded with other metals, ſeldom require a previous calcination, but being bruiſed and cleanſed from extraneous matter, may be fuſed directly, and incorporated with a quantity of lead, unleſs they contain a large portion of ſulphur and arſenic, in which caſe calcination may be uſeful. The lead employed muſt be in a calcined or vitrified ſtate, which, being mixed with the ore, and gradually reduced by the phlogiſton of the charcoal added to it, may be more effectually united with the *ſilver* of the ore, than if lead itſelf had been added, which would have two quickly precipitated to the bottom of the containing veſſel. The *ſilver* is to be afterwards ſeparated from the lead by cupellation.

Galenical ores, in which the *ſilver* is mixed with much galena, or ore of lead, mineraliſed with ſulphur, eſpecially thoſe in which pyrites is intermixed, require a calcination, which ought to be performed in an oven, or reverberating furnace. They are then to be fuſed together with ſome inflammable matter, as charcoal, by which the lead is revived, and together with the *ſilver* is precipitated.

Pyritous ores, in which the *ſilver* is mixed with the martial pyrites, muſt be firſt melted, ſo as to form a matt. If the ſulphur is not ſufficient for this kind of fuſion, more ſulphurated pyrites may be added. This matt contains beſides ſulphur and *ſilver*, alſo various metals, as lead, iron, and ſometines cobalt. The matt muſt be expoſed to repeated calcinations till the ſulphur is diſſipated: by theſe calcinations moſt of the iron is deſtroyed. The calcined matt is to be fuſed with litharge, and the *ſilver* incorporated with the revived lead, from which and from the other imperfect metals with which it may be mixed, it muſt afterwards be ſeparated by cupellation.

The *ſilver* contained in cupreous ores may be obtained, either by ſeparating it from the copper, after this has been extracted along with the *ſilver* in the uſual manner, from the ore, or by precipitating it immediately from the other matters of the ore. The *ſilver* may be ſeparated from the copper, either by adding lead, and ſcorifying the imperfect metals; or by *eliquation*, i. e. by mixing the maſs of copper and *ſilver* with a quantity of lead, and applying ſuch a heat as ſhall be juſt ſufficient to make the lead eliquate from the copper, together with the *ſilver*, which being more ſtrongly diſpoſed to unite with the lead than with the copper, is thus incorporated with the former metal, and ſeparated from the latter.

The method by precipitation is, to form the ore, previouſly bruiſed and cleanſed, into a matt; to fuſe the matt with a ſtrong heat; and when the ſcoria has been removed, and the heat is diminiſhed, to add to it ſome clean galena, litharge, and granulated lead. When the fire has been raiſed, and the additions well incorporated with the matt, let ſome caſt or filed iron be thrown into the liquid maſs, which being more diſpoſed than lead is to unite with ſulphur, will ſeparate and precipitate the latter metal, and along with it the *ſilver* or gold contained in the matt.

This method was introduced by Scheffer, and is practiſed at Adelfors in Smoland. In this work, the proportion of the ſeveral materials is four quintals of matt, two quintals of black copper, containing ſome lead with the perfect metal, one quintal of galena, one quintal of litharge, a fifth part of a quintal of granulated lead, and an equal quantity of caſt iron.

The *ſilver* in this, and in all inſtances, where it is united with lead, is to be afterwards ſeparated from the lead by cupellation. Chem. Dict. Art. *Ores* and *Smelting*.

The following proceſſes for extracting the *ſilver* of ores are given by Cramer.

The method of precipitating *ſilver* out of an eaſily fuſible *ore*, is this: pound the *ore* very fine in an iron mortar, and for an aſſay weigh one docimaſtical centner of it, and eight centners of granulated lead; pour into a new teſt about half the lead, ſtir it about with a finger, and ſpread it over the cavity of the teſt; put upon this lead the pounded *ore*, and then cover it with the remainder of the lead; put the teſt, thus loaded, under the muffle of an aſſay furnace, and in the hinder part of it make the fire, and increaſe it to a conſiderable high degree The *ore* will ſoon be raiſed out of the melted lead, and ſwim upon it; a little after it will grow clammy, melt and be thrown towards the border of the teſt; then the ſurface of the lead will appear clear in the middle of the teſt, and will ſmoak and boil; the fire muſt now be made a little leſs, till the boiling ceaſes for a quarter of an hour, and made violent again, and the ſurface of the lead will then diminiſh by degrees, and be covered with a maſs of ſcoriæ. At this time have at hand an iron hook ready heated, and with this ſtir all the matter from the ſides into the middle of the teſt; if the matter, adhering to the hook from the ſtirring, melts quickly again, and the extremity of the hook, when cold, is found covered with a ſhining cruſt, the ſcorification is perfected; but if the ſcoriæ ſeel clammy while ſtirred, and adhere in quantity to the hook, and are of a rough ſurface, the ſcorification is not perfect, but the matter adhering to the hook muſt be ſtruck off with a hammer, and beat to powder, and returned into the teſt, and the fire continued till the ſcorification is perfected; then take out the teſt, and pour the whole contents into a mould, heated and greaſed with tallow.

This is the firſt proceſs, and this uſually takes up three quarters of an hour: the *ſilver* is now in form of a regulus, and muſt be ſeparated by the coppel in the uſual way. See Regulus.

Some of the *ores* of *ſilver* are rendered very refractory in the working, by means of a mixture of unmetallic earths, from which no art can waſh them clean. The method to procure the *ſilver* from theſe by an aſſay is this: powder the *ore* very fine, and to a docimaſtical centner of it add an equal quantity of glaſs of lead finely pulveriſed; mix theſe thoroughly together; put this powder, when well mixed, into a teſt, with twelve centners of granulated lead, and put the teſt under a muffle in a furnace, make a ſtrong fire, till the lead boils well; when it is in this ſtate, diminiſh the fire a little, and keep it in this weaker ſtate for ſome time, then increaſe it again to a great ſtrength, till the lead is reduced to ſcoriæ, and the *ſilver* is ſeen pure in the teſt; or elſe when the ſcorification is perfected, take out the matter together, and putting it into a coppel with more granulated lead, ſeparate the *ſilver* in a bead. Sometimes a refractory *ore* of this kind cannot be thus ſufficiently diſſolved, but a maſs, which has the clammineſs of pitch, ſwims upon the ſurface of the regulus, and upon the ſcoriæ that are in part ſubdued; in this caſe diminiſh the fire, and touch this clammy maſs with a ſmall cold iron hook, to which it will immediately ſtick; take it all carefully off, reduce it to fine powder, and mixing it with more glaſs of lead in powder, put it back into the teſt, then continue the ſcorification till it is perfected: but always obſerve, that the ſcoriæ of theſe refractory *ores* muſt be examined, to ſee if ſome of the regulus does not remain among them, for ſometimes the ſcoriæ, by their clammineſs, will retain part of the metal; if this appears to be the caſe, powder the ſcoriæ very fine, and the metal will be diſcovered and ſeparated, as it cannot be reduced to a fine powder. The *ſilver* is ſeparated from this regulus by cupellation.

Mundic is a very common thing in *ſilver ores*, eſpecially in the leſs rich ones, and gives great trouble in working the metal. The method of ſeparating the *ſilver* from an ore, rendered refractory by this admixture, is thus: break the ore into a rough powder, and put a centner of it into a teſt for an aſſay; put upon this another teſt by way of a cover, and put it under the muffle in a furnace; when the muffle is near red hot, increaſe the fire by degrees, there will be a crackling noiſe, which being ended, take away the upper teſt, for when the veſſels have been red hot about a minute, the ore ceaſes to ſplit; leave the ore under the muffle, till the arſenic and ſulphur are in a great meaſure evaporated, which will be known by the ceſſation of the ſmoke from the ore, and of the ſmell of garlic, or the acid; then take out the teſt, and leave it in a place not too cold, that it may cool leiſurely of itſelf; take the roaſted ore clean out of the teſt, powder it very fine, and mix with it an equal quantity of glaſs of lead in fine powder; and finally, ſcorify the maſs in the ſame, or in a new teſt, if that was cracked, till the *ſilver* appear in the form of a bright bead in the middle, after it has ſtood a minute or two; after this take it out of the fire, and when cold take out, and weigh the pure *ſilver*. Cramer's Art of Aſſaying, p. 205—221.

Silver may alſo be precipitated from its ore by cupellation only (ſee COPPELLING), and alſo by ſcorification in a crucible: the proceſſes are deſcribed by Cramer ubi ſupra.

Alonſo Barba tells us, that the original method of extracting *ſilver* from the ore, in the mines of Potoſi, was only by quickſilver, but this was very difficult in many caſes. Thoſe ores which partake of copperas, which are very numerous there, will not bear quickſilver, but conſume and ſcatter it, breaking its particles, and rendering them unfit for the purpoſes they were intended for, of taking up the *ſilver* contained in the ORE. Burning the ore was another method heretofore uſed with too little caution, and great loſſes were ſuſtained by it.

The grinding the ore is always proper, and the finer it is ground, the better it will always ſucceed.

Alonſo Barba alſo greatly recommends boiling the ores, in which the quickſilver is uſed, as of great advantage. The burning of ores is of no ſervice but to render the ſtony matter more friable; but when there is marcaſite among the ore, that is never without loſs, which is often very great. Alonſo Barba de Metall.

When any quantity of this metal is contained in iron, it may, according to the rules of aſſaying, be precipitated from it by ſcorification, by the aſſiſtance either of ſtrong acid menſtrua, or of crude antimony; the latter method is the eaſier, and is performed thus: put one centner of the iron, reduced to very fine filings, and two centners of crude antimony, into a ſmall crucible; cloſe it with a tile, and ſet it in a ſtrong fire, that it may melt; when it has been in a perfect ſtate of fuſion for ſix or eight minutes, take it out, and let it cool, break the crucible, and you will find a maſs, compoſed of ſcoria at top, and a regulus underneath; throw away the ſcoria, and powder the regulus, mix it in with twelve centners of granulated lead, and ſcorify it in a continual, but not over-ſtrong fire, till the lead is ſeen covered all over its ſurface with ſcoriæ; then take it out, and pour the maſs into a mould: the regulus ſhould now be tough, and of a light lead-colour, both within and without; if it be blackiſh and brittle, it muſt be returned into the teſt, and ſcorified again, and when brought to its proper ſtate, and the antimony all conſumed, let it be put into the coppel; and when the bead of *ſilver* is produced pure, ſubtract from its weight the before-known quantity of the *ſilver* contained in the lead uſed in the proceſs, and the reſt is the weight of the *ſilver* obtained from the iron. Cramer's Art of Aſſaying, p. 223.

Silver, after it hath been ſeparated from its ore, is farther purified from the allay of other deſtructive metals by treating it with lead or with nitre. The former method is generally uſed by refiners, and is called *cupellation*, or *refining*.

The moſt commodious and regular manner, ſays Cramer, of purifying *ſilver* is this; put a large teſt, incloſed in an iron ring, into a furnace; when the teſt has been red-hot about half an hour, put into it the *ſilver* to be purified, wrapt up in pieces of cloth or paper, and divided into ſmall portions; then fill the orifice of the furnace with burning coals, and blow with a pair of hand-bellows till the *ſilver* is in fuſion; then add, at ſeveral times, ſome lead, reduced to globules of a determined weight; continue adding lead, and keep the fire in ſuch a degree, as is juſt ſufficient to keep the metal in fuſion, and continue thus, till the *ſilver* is rendered quite pure. This may be partly gueſſed by the before made trial of its degree of impurity on the touch-ſtone, and by the quantity of lead, judged neceſſary for the operation, having been conſumed: and farther known, by trial of it on a wire thruſt into it while in fuſion, and the examining what is found adhering to it when it is taken out. When the operation is finiſhed, pour water in a ſmall ſtream on the *ſilver* to make it grow ſolid, and taking it out of the teſt, clean it from all impurities that may adhere to its ſurface with a bruſh made of ſmall braſs wire. Art of Aſſaying, p. 204. 208.

The method of extracting *ſilver* from lead, and of refining *ſilver* by means of lead, depends upon the different eſſential properties of the two metals. Thus, lead, when melted in the open air, is eaſily deprived of its inflammable principle, ſo as to loſe its metallic appearance, and to burn away into a kind of earth; whereas, *ſilver* does not burn away, nor loſe its metallic appearance when expoſed to the action of the ſtrongeſt fires, in the open air. Hence, when a maſs of metal, conſiſting of lead and *ſilver*, is melted in the open air, the lead will be burned to aſhes, and the *ſilver* remaining unaltered, it is eaſy to underſtand how the *ſilver* may be extracted from the lead; for being heavier than the aſhes of the lead, and incapable of mixing with them, it will ſink to the bottom of the veſſel in which the maſs is melted.

Iron, tin, and copper reſemble lead, in being convertible into a kind of aſhes, when expoſed to the action of air and fire, and gold reſembles *ſilver*, in not undergoing any change from ſuch action: hence, either gold or *ſilver*, or a maſs conſiſting of both, may be purified from any or all of theſe metals, by the mere operation of fuſion: for theſe metals will riſe to the top of the veſſel, in which the fuſion is made, in the form of earth or droſs, leaving the gold or *ſilver* pure at the bottom.

Lead, when reduced to an earth, by being burned in the open air, may, in a ſtronger degree of heat, be converted into a yellowiſh glaſs, which has the property of greatly contributing to the eaſy vitrification of all earthy ſubſtances: hence, when gold or *ſilver* is mixed with iron, copper, or tin, it is uſual to add to the mixed maſs a quantity of lead, in order to accelerate the purification, for the lead will be converted into glaſs, and this glaſs will vitrify all the extraneous ſubſtances with which the gold or *ſilver* is polluted, without exerting the leaſt action upon the precious metals themſelves. The veſſel in which the maſs of *ſilver* and lead is melted, is of ſhallow form, that a large ſurface of the melted maſs may be expoſed to the air; it is uſually made of four meaſures of the aſhes of calcined bones, and of one meaſure of unwaſhed fern aſhes, and called a TEST. This veſſel is very porous, but not in ſuch a degree as to imbibe the metal, whilſt it continues in the form of a metal; but as the earth, into which the lead is ſoon reduced by the action of the fire, becomes melted, the teſt imbibes a portion of it in that liquid ſtate, the other portion being driven off from the ſurface of the melted maſs, by the blaſt of a bellows. The liquid, half vitrified earth of lead, which is thus driven off, concretes into hard maſſes of a ſcaly texture, called LITHARGE, which is at firſt whitiſh, and with greater heat red: the colour of the litharge being influenced by that of the other metals, which may happen to be mixed with the maſs of lead and *ſilver*. When the ſurface of the melted maſs becomes white, and throws up more litharge, the operation is finiſhed; but as the remaining *ſilver* is not quite pure, ſince it contains a ſmall portion of lead, from which the degree of heat requiſite for melting the mixed maſs cannot readily free it, it is taken to a refining furnace, and rendered quite pure, at leaſt from lead, by cupellation. This proceſs conſiſts in melting the *ſilver* obtained from the firſt operation in a veſſel made of the ſame materials as the teſt, called a *cupel* or COPPEL. This being expoſed to a ſtronger heat than the teſt, the lead which had eſcaped the action of the fire on the teſt, is now driven out from the *ſilver*, and being converted into litharge, is abſorbed by the cupel, and by this means the *ſilver* is purified from every metal except gold. This operation is called *refining*.

M. Macquer in Chem. Dict. Art. *Refining*, aſſerts, that the refining of gold and *ſilver*, merely by the action of fire, was the only method anciently known: upon which Dr. Watſon remarks, that without inſiſting on the paſſage that occurs in Jerem. vi. 29. there is in Diodorus Siculus (lib. iii. p. 183—189.) a very minute deſcription of the manner of working ſome gold mines in the confines of Egypt and Arabia, and that amongſt other particulars, he takes notice of their melting the mineral in conjunction with a little tin, ſome ſmall portion of ſalt, and a lump of lead. Strabo (Geo. lib. ii. p. 221.) quotes Polybius as ſpeaking of a *ſilver* ore, which, after being five times waſhed, was melted with lead, and became pure *ſilver*.

Pliny alſo had probably an alluſion to the uſe of lead in refining *ſilver*, when he ſays, that a *ſilver* ore in the form of an earth could not be melted, except in conjunction with lead or the ore of lead. Hiſt. Nat. lib. xxxiii. c. 6. See Dict. Chem. Art. *Refining*, and Watſon's Chem. Eſſ. vol. iii. p. 321, &c.

The way of purifying *ſilver* by means of nitre is this: reduce the *ſilver* to grains, or ſmall thin plates, put it into a crucible, and add one quarter part of nitre well dried, an eighth part of pot-aſh, and a little common glaſs, all powdered, and filling two thirds of the crucible: put upon this crucible another of a ſmaller ſize inverted, having a hole as big as a pea in its bottom; lute the joint of the two crucibles, and place them in a wind-furnace, put charcoal about them as high as the rim of the lower crucible, but no higher, then light the fire at top, and increaſe it till the veſſels are middlingly red-hot, then with a pair of tongs hold a burning coal directly over the hole in the upper crucible, but at the diſtance of one finger: if you ſee a ſudden clear light produced near and about the coal, together with a crackling noiſe, this ſhews that the fire has the right degree of ſtrength; but if it does not appear at all, or but very faintly, the fire muſt be increaſed: but if, on the contrary, you hear a violent blaſt of air from the hole, and a loud crackling noiſe, without holding the coal over, the fire is then too fierce, and muſt be diminiſhed, otherwiſe you will not only loſe a large quantity of *ſilver*, but very often the veſſels will burſt.

When this is perfectly over, increaſe the fire ſo far, as to be able to melt *ſilver* without any addition; then take out the veſſels, and when they are cooled break the under one, and you will find the regulus of *ſilver* at the bottom, and an alkaline ſcoria, commonly green at the top. If the *ſilver* is not yet thoroughly purified, put it into another crucible, and this open into a wind-furnace, throwing upon it a little nitre, and as ſoon as it melts, pour it into a mould for ingots; thus will it be purified from every thing but gold.

This operation is founded on a property which nitre has of effectually calcining all imperfect metals, by burning their phlogiſton, and alſo upon a property of calcined metals, by which they cannot be united with others in their metallic ſtate.

M. Homberg finding the operations of refining *ſilver* with lead, and alſo with nitre, to be tedious and troubleſome,

bleſome, endeavoured to ſhorten the operation; which he effected with good ſucceſs. His method is, to calcine the *ſilver* with half its weight of common ſulphur; and after melting the whole together, to caſt a quantity of ſteel filings upon it at ſeveral times: upon this, the ſulphur quits the *ſilver*, and joins itſelf to the iron, and both with the other impurities are converted into ſcoria, which ſwims on the *ſilver*; and the metal itſelf is found pure at the bottom of the crucible.

The ASSAY of *ſilver* is alſo made by the coppel, in the ſame manner as the refining by lead. If the *ſilver*, after this aſſay, preſerve its weight, it is STANDARD; if it loſe, the grains or pennyweights of its diminution are accounted.

The operations above recited, are founded, in general, upon the deſtructibility of imperfect metals, and on the indeſtructibility of *ſilver*, which is a perfect metal; but as gold is an indeſtructible metal, all the purifications of *ſilver*, which are only effected by the deſtruction of metals allayed within it, are inſufficient to ſeparate it from gold; recourſe muſt, therefore, be had to other operations, for the ſeparation of theſe two metals from each other; and theſe operations are founded upon the property which *ſilver* has of being ſoluble, by many menſtrua which do not act upon gold: theſe menſtrua are nitrous acid, marine acid, and ſulphur. See PARTING.

SILVER, in *Chemiſtry*, and *Medicine*, is called *luna*, the moon; and has been much extolled for its virtues by chemical writers. But crude *ſilver*, however comminuted or attenuated, has not been obſerved to produce any medical effect. It is not ſoluble in any of the fluids of the animal or vegetable kingdom.

Several preparations have been made from *ſilver*; particularly a

SILVER *pill*, or *pilula lunaris*, which is a chemical preparation of *ſilver*, formerly highly commended as an anthelmintic, and as a purgative remedy for dropſies, and in many other inveterate ulcerous diſeaſes.

The method of making it is this: diſſolve an ounce of pure nitre in diſtilled water, then diſſolve an ounce of cryſtals of *ſilver* made in the common way, with pure *ſilver* and aqua fortis, in three times the weight of water, ſo that the ſolution may be perfectly limpid; mix the two ſolutions together, they will become a clear homogene liquor; evaporate this to a pellicle, and cryſtals reſembling nitre will ſhoot; pour off the remaining nitre as before, and the remaining nitre will ſhoot with the *ſilver*, in form of cryſtals, again, upon a ſecond evaporation: let theſe cryſtals be dried upon a paper, and then placed in a glaſs-veſſel in a very gentle heat, enough to make them ſmoak, but not run; ſtir it with a piece of glaſs all the time, and keep it over the fire, till no more fumes ariſe; thus the acid ſpirits will be driven off, and the *ſilver* remain of a very bitter taſte, and purging quality. It muſt be kept in a dry cloſe veſſel.

This diſcovery has been made to ſerve to many other purpoſes, beſides its uſes in medicine, and has furniſhed the diſhoneſt pretenders to alchemy with one of their moſt cunning methods of deceit. They have been able, by this means, to conceal *ſilver* in nitre, and that in a very large proportion, as in one tenth part of the whole quantity; and this nitre being projected in an equal quantity on melted lead, gives an increaſe of one tenth part in *ſilver*, which remaining upon the teſt, will deceive the ignorant, as if a tenth part of the lead were converted into pure *ſilver*. People who are upon their guard may, however, diſcover the cheat, by diſſolving the pretended nitre in ten times its weight of water, and putting a poliſhed plate of copper into the ſolution; for every particle of the *ſilver* will then be precipitated out of the liquor upon the copper, and to the bottom of the veſſel.

The medicinal uſe is this: the dried maſs, conſiſting of the ſalts of *ſilver* and nitre, is to be reduced to a fine powder: this powder, applied to ulcers, acts in the manner of the lapis infernalis, or *ſilver*-cauſtic, only much milder: but for internal uſe, the quantity of two grains of it is to be ground to a fine powder, with ſix grains of loaf ſugar, in a glaſs mortar; this is to be then mixed with ten grains of the crumb of bread, and formed into nine pills: theſe are to taken by a grown perſon upon an empty ſtomach, drinking after them four or ſix ounces of hot water, ſweetened with honey. It purges gently, and brings away a liquid matter like water, often unperceived by the patient. It is ſaid to kill worms, and perform great things in many obſtinate ulcerous diſorders. It purges without griping, but it muſt not be uſed too freely, nor in too large a doſe, for it always proves weakening, and in ſome degree corroſive on the ſtomach; but this inconvenience is greatly alleviated by rob of juniper. Boerh. Chem. part. ii. p. 297. However, with this aſſiſtance, it is at beſt a dangerous medicine, and as ſuch is deſervedly excluded from practice. Lewis.

SILVER, *tincture of*, is made by diſſolving thin *ſilver* plates, or *ſilver* ſhot, in ſpirit of nitre; and pouring the diſſolution into another veſſel full of ſalt water. By this means, the *ſilver* is immediately precipitated in a very white powder, which they waſh ſeveral times in ſpring water. This powder they put into a matraſs; and pour rectified ſpirit of wine, and volatile ſalt of urine upon it. The whole is left to digeſt in a moderate heat for fifteen days; during which, the ſpirit of wine aſſumes a beautiful ſky-blue colour, and becomes an ingredient in ſeveral medicines. This is alſo called *potable ſilver, argentum potabile.*

Silver is likewiſe converted into cryſtals, by means of the ſame ſpirit of nitre; and this is called *vitriol of ſilver.*

The LAPIS *infernalis argenteus* is nothing but the cryſtals of *ſilver* melted with a gentle heat in a crucible; and then poured into iron moulds. See CAUSTIC, *lunar.*

SILVER *ale.* See ALE.

SILVER *buſh*, in *Botany*, a ſpecies of anthyllis. See BARBA *Jovis*, and LADY's *finger.*

SILVER *coin.* See COIN, and MONEY.

SILVER, *green* and *herring.* See the ſeveral articles.

SILVER, *inflammable*, a chemical preparation of the lapis infernalis made by a ſmall heat. The proceſs is this: take an ignited piece of Dutch turf, after it ceaſes to ſmoak; place it with its upper flat ſurface parallel to the horizon; make a little cavity in the middle, and therein put a drachm of dry lapis infernalis; it will immediately melt and glow, and finally it will take flame, and hiſs and ſhine like nitre: after the flame ceaſes, pure *ſilver* will be found in the hollow, as much in quantity as was uſed in making ſo much lapis infernalis.

This curious experiment ſhews the phyſical manner in which acids do but ſuperficially adhere to *ſilver*; and the manner wherein acids operate, when united to metals, while ſurrounding their metallic maſs, they arm the ponderous principles thereof with ſpiculæ: it ſhews alſo the immutability of *ſilver* diſſolved in an acid, and the various ways in which it may be concealed, yet ſtill have its action: it alſo ſhews the difference of potable *ſilver*, while exiſting in a ſaline form, by means of an adhering acid, from that potable *ſilver* of the adepts, where the principles of *ſilver* are ſuppoſed converted into a fluid, that will mix with the juices of the body, and cannot be reduced to *ſilver* again; but the great thing to be here obſerved is, that the acid ſpirit of nitre, adhering in a ſolid maſs of *ſilver*, is, in this ſtate, as inflammable, on coming in contact with an ignited combuſtible body, as crude nitre itſelf: this ſeems to happen with *ſilver* alone, which is unchangeable with ſpirit of nitre. Hence alſo we ſee one way, by which *ſilver* may be obtained pure from other adhering matters, by bare burning: the acid here acts neither upon the mercurial part of the *ſilver*, nor on its fixing ſulphur. Boerh. Chem. part ii. p. 297.

SILVER, *king's.* See KING's *ſilver.*

SILVER-*leaf* is that which the gold-beaters have reduced into fine thin leaves, to be uſed by gilders, &c. See GOLD-*leaf.*

SILVER, *quick.* See MERCURY.

SILVER, *rep.* See REP *ſilver.*

SILVER, *ſalt.* See SALT *ſilver.*

SILVER, *ſhell*, is made of the ſhreads of *ſilver* leaves, or of the leaves themſelves: and uſed in painting and ſilvering certain works. It is prepared after the ſame manner as ſhell gold. See GOLD.

SILVER, *ſlough.* See SLOUGH *ſilver.*

SILVER, *ſmoke.* See SMOKE *ſilver.*

SILVER-*tree*, *protea*, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are theſe: the flowers are collected in an oval head; they have one common imbricated ſcaly perianthium; the flower is of one petal, having a tube the length of the empalement; the brim is cut into four parts, which ſpread open, and are equal; it has four briſtly ſtamina, the length of the petal, terminated by incumbent ſummits, and a roundiſh germen, with an erect briſtly ſtyle, crowned by an obtuſe ſtigma; the germen afterward turns to a roundiſh naked ſeed, ſitting in a diſtinct cell of the cone. There are three ſpecies.

Theſe plants are natives of the country near the Cape of Good Hope, in Africa, where there is a great number of ſpecies. In the catalogue of the Leyden garden, there are upward of twenty ſorts enumerated; not that they have them growing there, but they have good drawings of them, which were made in the country, where they are natives. Miller.

SILVER-*weed*, in *Botany*, a ſpecies of POTENTILLA.

Silver, *white-hart*. See **White-hart** *ſilver*.

Silver *wire*, is *ſilver* drawn through the holes of a wire-drawing iron, and by this means reduced to the fineneſs of a thread or hair. The manner of drawing it, ſee under the article **Gold** *wire*. See alſo **Wire**, and **Drawing**.

SILVERING, the covering of any work with ſilver leaf or powder.

This may be performed on the ſame ſubſtances, and by ſimilar methods with gilding. But as works of this kind are liable to tarniſh and ſpeckle, they are ſeldom uſed. Wherever, therefore, *ſilvering* is admitted, a ſtrong varniſh, formed of ſome of the compoſitions of maſtic, ſandarac, the gums animi or copal, and white roſin, ought to be put over it.

The varniſh recommended in *ſilvering* leather may be applied to other purpoſes. See **Lacquer**.

The *ſilver* powder, called **Argentum** *muſivum*, may be either tempered, in the manner of the ſhell-gold, with gum water, or rubbed over a ground properly ſized; and it will take a very good poliſh from the dog's tooth or burniſhers; and hold its colour much better with a ſlight coat of varniſh over it, than any true *ſilver* powder or leaf.

The ſizes for *ſilvering* ought not to be mixed, as in the caſe of gold, with yellow, or bole armoniac, but with ſome white ſubſtance, whoſe effect may prevent any ſmall failures in covering the ground with the ſilver from being ſeen. This may be done with flake white, or white lead, when the ſizes formed of oil are uſed; but whiting, or tobacco-pipe clay, with a little lamp black added to it, is the proper matter in the burniſh ſize for *ſilvering*, or wherever the glover's or parchment ſize is uſed.

It is uſual to ſilver metals, wood, paper, &c. which is performed either by fire, oil, or ſize. Metal gilders ſilver by the fire, painter-gilders all the other ways. See **Gilding**.

This is a ſpecies of **gilding**, and may be done thus: take as much aqua fortis as you think there is occaſion for; put it into a glaſs, which ſet in warm aſhes; then put in your quantity of ſilver, after having beaten it very thin, and cut it into little ſhreds. When the ſilver is diſſolved, take it off the aſhes; and, mixing that liquid with as much white tartar as will make it like paſte; rub with this mixture the metal you want to ſilver.

Copper, braſs, or any other metal may be thus made, to appear like ſilver itſelf.

Braſs may be *ſilvered* by diſſolving fine ſilver in aqua fortis, in a broad bottomed veſſel of glaſs, or glazed earth, and the aqua fortis being afterwards evaporated, water is poured upon the remaining calx. This water muſt alſo be evaporated, and the operation repeated as often as there is occaſion; the fire being increaſed towards the latter end, ſo as to leave a perfectly dry and white calx, which will be thus tolerably freed from the aqua fortis. Of this calx take one part, and an equal meaſure, not weight, of common ſalt, and of the cryſtals of tartar, and mix them together into a fine powder; then having firſt plunged the ſcowered braſs into fair water, rub ſome of the powder upon it with your wet fingers, till the cavities of its ſurface be ſufficiently filled therewith. Laſtly, waſh the metal well in water, and give it a gloſs by rubbing it hard with a dry cloth.

This waſhing, Mr. Boyle obſerves, is expeditious, cheap, requires no quickſilver, and may be made to laſt ſome years, and is eaſily renewable when it begins to wear. See his Works abr. vol. i. p. 151.

Copper, braſs, ſteel, or iron may be *ſilvered*, ſo as not to come off, unleſs made red hot, in the following manner. Take urine which is made in the morning, cover it, and let it ſtand a whole month, and it will ferment; put it afterwards into an earthen pot, and let it boil; ſkim it, and when the third part is evaporated, take to two pints of urine, one ounce of tartar, and one ounce of galiz-ſtone; mix them all together, and let them boil once up. When you would *ſilver* any metal, rub it well with brick duſt on a wet woollen rag, till it is clean and fine, then put it twenty-four hours in the prepared urine; afterwards dry it, and where you deſign to *ſilver*, rub it over with quickſilver, which muſt be laid on thin with the iron ſpatula that has alſo lain two hours in urine. The quickſilver, thus laid on, muſt be then rubbed on with a ſoft woollen rag, and it will make a fine *ſilvering*.

Braſs may be *ſilvered*, by boiling it with filings of good pewter and white tartar, in equal quantities. There are ſeveral other methods of *ſilvering*, for which ſee Smith's Laboratory, p 37, ſeq. alſo Handmaid to the Arts, vol. i. p. 471, &c. See **Luna** *cornea*. See **Gilding** *of metals*.

Silvering *of leather*. See **Lacquer** and *Japanner's* **Gilding**.

The proceeding in *ſilvering* the leather is in all reſpects the ſame as when it is to have the appearance of gilding, except that, inſtead of the yellow varniſh, a clear colourleſs one is to be uſed, where the appearance of ſilver is to be preſerved.

The moſt common varniſh for this purpoſe is only parchment ſize, made warm, and laid on with a ſpunge. However, the more hard and tranſparent the varniſhes are, and the more they are of a reſinous nature, the more brilliant and white, and the more durable will be the *ſilvery* and poliſhed appearance of the *ſilvered* leather. Some inſtead of the parchment ſize uſe that made of iſinglaſs.

Silvering *of looking-glaſſes*, and *ſpherical ſpecula*. See **Looking**-*glaſs*, and **Foliating** *of looking-glaſſes*.

Silvering *of paper*. See *Chineſe* **Paper**.

SILVESTRE GRANUM, or **Coccus Silvestris**, a term uſed by ſome authors to expreſs the **coccus** *polonicus*; and by others, for a coarſe or bad kind of cochineal, produced in the province of Guatimala in New Spain; it is by ſome ſuppoſed to be the ſeed of a plant, but is, in reality, an inſect, as the true cochineal is, only that the ſcarlet colour it yields is greatly inferior to the other. See **Cochineal**.

SILURUS, in *Ichthyology*, the name of a very large fiſh, commonly called in Engliſh the *ſheat-fiſh*.

It is caught in the Viſtula, and other large rivers, and grows to an immenſe ſize, ſome having been caught of more than an hundred weight, and of ſixteen feet long, and ſometimes conſiderably larger than that. It reſembles the eel in colour, but the belly is variegated with black, white, and duſky ſpots; the body is without ſcales, and is covered with a mucous ſubſtance; the head is flat, ſhort, and broad; the opening of the mouth extremely large; the body down to the fundament is thick and cylindric, but the bottom of the belly is flat, and from the anus to the tail it is broader and flat; its eyes are large, and have two antennæ, or ſlender excreſcences before them; and four beards hang from the lower jaw; the gills are four on a ſide; it has only one ſmall fin upon the back, and the tail is not forked; its fleſh is much eſteemed for food, and is dreſſed for the table as the eel. It is a very voracious fiſh, and much dreaded whenever it comes among the ſmaller fry.

Geſner mentions two other ſpecies of it, one flatted toward the tail, and the other of a mixed green and yellow colour, and having two beards on the upper jaw, and three on the under: he only calls theſe *ſiluri ſecunda*, and *tertia ſpecies*. Willughby, Hiſt. Piſc. p. 128. See *Black* **Fish**.

The name is of Grecian origin, and is derived from the words *σειν, to move or ſhake*, and *ουρα, a tail*. It is given to this fiſh, from its remarkable quality of being almoſt continually moving its tail in the water.

In the Linnæan ſyſtem, the *ſilurus* is a genus of the order of *abdominales*. Its characters are, that the body is naked; that the mouth is furniſhed with ſeveral cirri, ſomewhat filiform; that the branchical membrane conſiſts of a number of rays from four to fourteen; and that the firſt ray of the dorſal and pectoral fins is ſpinoſe and dentated backwards.

Linnæus enumerates twenty-one ſpecies. Piſo ſays of the ſheat-fiſh or callichthys, that in dry ſeaſons this fiſh travels over ſmall tracts of land in ſearch of freſh water.

Silurus is alſo a name given by ſome authors to the ſturgeon, called by others *accipenſer*, but by the generality of writers **sturio**.

SIMA, or **Cyma**, in *Architecture*, a term uſed by Wolfius, and ſome other writers, for what we otherwiſe call **cymatium**, or *ſimatium*.

SIMARONA, a name given by the Spaniards in America to a ſpecies of vanilla, called alſo *baſtard-vanilla*. The pods of this kind are every way ſmaller than thoſe of the true kind, and have very little liquor or pulp in them when broken, and contain very few ſeeds. Theſe are greatly inferior to the true kind, having ſcarce any ſmell. It is not yet certainly known, whether this ſpecies be the fruit of a different kind of vanilla-plant from the common, or whether it be the fruit gathered at a different ſeaſon, or from a plant growing in a different ſoil. See **Vanilla**.

SIMAROUBA, in *Botany*, is the bark of a tree, brought from Guiana in long pieces, of a yellowiſh white colour; light, tough, and of a fibrous texture.

The bark of this plant is very ſucceſsful in the cure of dyſenterics, as Mr. Juſſieu aſſures us from his experience. It is a thick yellow bark, of an aſtringent bitteriſh taſte, and reſembling, as it is ſaid, the *macer* of the ancients: it was firſt brought into Europe from America in 1713; but of the tree which produces it we have no certain account.

This medicine is more ſucceſsful in decoctions than in ſubſtance: the decoction is prepared by boiling two drams of the bark in a quart of water, to the conſumption of one third: this quantity is divided into four doſes, and taken warm at intervals of three hours: thus uſed, the pain abated in one day, and when continued for a ſhort time, it completed the cure, without producing any nauſea or diſturbance. Juſſieu obſerves, that it is not accompanied with the ill effects of aſtringents; that it leſſens ſpaſmodic and hyſteric ſymptoms; and that it anſwers beſt in fluxes of the ſeroſe, bilious, bloody, and mucous kind, ſupported by a convulſive motion of the inteſtines, where there is no fever, where the functions of the ſtomach are unhurt, and in teneſmi. Mem. de l' Acad. Scien. de Paris, 1729.

Dr. Degner likewiſe made uſe of this bark in the ſame form with good ſucceſs, after proper evacuations, in an epidemic putrid dyſentery, which raged at Nimeguen during the ſummer and autumn of 1736. Act. Nat. Curioſ. vol. v. append.

SIMARUM *muſculus*, in *Anatomy*, a name given by ſome of the old writers to a muſcle, called by the moderns the SERRATUS *magnus*.

SIMATIUM, or SIMAISE, in *Architecture*. See CYMATIUM.

Simatium and *cymatium* are generally confounded together, yet they ought to be diſtinguiſhed; the latter being the genus, and the former the ſpecies.

Simatium of *ſima*, camous, according to Felibien, is the laſt and uppermoſt member of grand corniches, called particularly the great *doucine*, or *gula recta*; and by the Greeks, *epititheta*.

In the antique buildings, the *ſimatium*, at the top of the Doric corniche, is generally in form of a cavetto, or ſemi-ſcotia; as we ſee particularly in the theatre of Marcellus. This ſome modern architects have imitated; but, in the Ionic order, the *ſimatium* is always a doucine. The *ſimatium*, or *doucine*, then, is diſtinguiſhed from the other kinds of *cymatia*, by its being camous or flatnoſed.

SIMBALATH, in the *Materia Medica*, a name given by Avicenna and others to the ſpikenard, or *nardus Indica*.

The exact interpretation of the word is *ſpicigera*, and Avicenna, under this general name, diſtinguiſhes it into ſeveral kinds; the firſt he calls *alnardin*, or *nardin*. It has been ſuppoſed by ſome that he means the Indian ſpikenard by this word, but, on the contrary, it appears plainly that he means the Celtic nard; he calls it the *nardus Romani orbis*, and ſays that it is of European growth. After this he mentions the Aſiatic nards of ſeveral kinds, which are only the Indian ſpikenard, growing in different places, and ſuch as uſed to be brought thence in different degrees of perfection.

SIMELIUM, a Latin term, uſed by ſome to ſignify a table, with ranges of little cavities therein, for the diſpoſing of medals in chronological order.

The word is but ill written; it ſhould rather be *cimelium*, as being formed of the Greek κειμηλιον, *curioſities*, or *a cabinet of precious things*.

We more uſually ſay, a cabinet of medals, than a *ſimelium*.

SIMIA, the *ape* or *monkey*, in *Zoology*, is made by Linnæus a diſtinct genus of animals, belonging to the order of *primates*, and claſs of *mammalia*. The characters of which are, that they have four cutting teeth in each jaw, which are near each other; that the canine teeth are ſingle, longer, and ſeparate; that the grinders are obtuſe. Linnæus enumerates thirty-three ſpecies.

This genus belongs to the ſection of anthropomorphous digitated quadrupeds, in Mr. Pennant's ſyſtem, of which he gives the following characters: they have four cutting teeth in each jaw, and two canine: each of the feet is formed like hands, generally with flat nails, and, except in one inſtance, have four fingers and a thumb, with eye-brows above and below.

This race of animals, which is very numerous, is almoſt confined to the torrid zone; they fill the woods of Africa, from Senegal to the Cape, and from thence to Æthiopia; a ſingle ſpecies is found beyond that line, in the province of Barbary: they are found in all parts of India, and its iſlands; in Cochin-China, in the ſouth of China, and in Japan; and one kind is met with in Arabia; they ſwarm in the foreſts of South America, from the Iſthmus of Darien as far as Paraguay.

Theſe animals are lively and full of frolic, chatter, and grimace: from the ſtructure of their members, they have many actions in common with the human kind: moſt of them are fierce and untameable; ſome are of a milder nature, and will ſhew a degree of attachment, but in general they are miſchievous, filthy, laſcivious, and thieving; they feed on fruits, leaves, and inſects; inhabit woods, and live in trees; are in general gregarious, and go in large companies: the different ſpecies never mix with each other, but always keep apart: they leap with great activity from tree to tree, even when loaded with their young, which cling to them: they are the prey of leopards, and other animals of the feline race, and alſo of ſerpents, which purſue them to the ſummits of the trees and ſwallow them entire: they are not carnivorous, but for the ſake of miſchief, will rob the neſts of birds of the eggs and young; and it is obſerved, that in thoſe countries where apes moſt abound, the feathered tribe diſcover ſingular ſagacity in fixing their neſts beyond the reach of theſe invaders.

Mr. Ray firſt diſtributed the animals of this genus into three claſſes, viz. the *ſimiæ* or *apes*, ſuch as wanted tails; the *cercopitheci*, or *monkies*, ſuch as had tails; and *papiones*, or *baboons*, thoſe with ſhort tails.

From Ray, Linnæus formed his method, which was followed by M. de Buffon, who made a farther ſub-diviſion of the long-tailed apes, or true monkies, into ſuch which had prehenſile tails, and ſuch which had not. The true apes, or *ſimiæ veterum*, having no tail; comprehended in the Linnæan ſyſtem three ſpecies, viz. the *ſimia ſatyrus*, or ORANG-*outang*, the *ſimia ſylvanus*, or *pygmy*, with a flattiſh face; ears like thoſe of a man, body of the ſize of a cat; colour above of an olive brown, and beneath yellowiſh; nails flat; buttocks naked, and ſitting upright; theſe animals inhabit Africa, feed on fruits, and are very fond of inſects, particularly of ants; aſſemble in troops, fly when attacked by wild beaſts, and when overtaken face their purſuers, and often eſcape by flinging the ſand of the deſart in their eyes: and the *ſimia inuus*, or *Barbary ape*, which has a long face, reſembling that of a dog; long and ſtrong canine teeth; ears like the human; flat nails, bare buttocks, the upper part of the body of a dirty greeniſh brown colour, and the belly of a dull pale yellow. This animal, which grows to above the length of four feet, inhabits many parts of India, Arabia, and all parts of Africa, except Egypt, and a ſmall number is found on the hill of Gibraltar, which breed there. Theſe apes are very ill-natured, miſchievous and fierce, agreeing with the character of the ancient *cynocephali*: they are often exhibited to play tricks; aſſemble in great troops in India, and will attack women going to market and rob them of their proviſions. The females carry their young in their arms, and will leap from tree to tree with them.

The *papiones*, or *baboons*, with ſhort tails, comprehend in the Linnæan ſyſtem, the three following ſpecies, viz. the *ſimia nemeſtrina*, or *pig-tailed baboon*, with a pointed face, hazel eyes, a few black hairs above and beneath the mouth, naked face, of a ſwarthy redneſs; ears like the human, crown of the head duſky; hair on the limbs and body brown, inclining to aſh-colour, and paleſt on the belly; black fingers, flat and long nails, thumbs on the hind feet very long, connected to the neareſt toe by a broad membrane; tail about four inches long, like a pig's, and almoſt naked; and length from head to tail twenty-two inches. This animal inhabits the iſles of Sumatra and Japan, and, being very docile, is taught ſeveral tricks, and exhibited by mountebanks.

The *ſimia apedia*, or *little baboon*, with a roundiſh head, projecting mouth, roundiſh and naked ears, thumb not remote from the fingers, narrow and compreſſed nails, thoſe of the thumbs rounded, the colour of the hair yellowiſh, tipt with black; the face brown, with a few ſcattered hairs; tail not an inch long, buttocks covered with hairs, and about the ſize of a ſquirrel or cat. This is a lively ſpecies and inhabits India. And the *ſimia ſphinx*, or *great baboon*, with hazel irides, ſmall and naked ears, canine and very thick face; the middle of the face and forehead naked, and of a bright vermilion colour, as is alſo the top of the noſe, which is truncated at its termination like that of a hog; the ſides of the noſe broadly ribbed, and of a fine violet hue; the opening of the mouth very ſmall; the cheeks, throat, and goat-like beard yellow; the hair on the forehead very long, black, turning back, and forming a kind of pointed creſt; the head, arms, and legs, covered with ſhort hair, yellow and black intermixed; the breaſt with long whitiſh yellow hairs, and the ſhoulders with long brown hair; the nails flat, feet and hands black, the tail four inches long, and very hairy; the buttocks bare, red and filthy, but the ſpace about them of a very elegant purple colour, which reaches to the inſide of the upper part of the thighs. This animal inhabits the hotter parts of Africa.

To this diviſion Mr. Pennant adds the *ſimia maimon* of Linnæus, and ſeveral other ſpecies; and to another claſs of *baboons* with *longer tails*, he refers Linnæus's *ſimia hamadryas*, or the *dog-faced baboon*, which inhabits the hotteſt parts of Africa and Aſia, and is very fierce in its nature, and laſcivious in its manners; the *ſimia veter* and *ſimia ſilenus*, and ſome other ſpecies not enumerated by Linnæus. See PAPIO.

The *cercopitheci*, or *monkies*, with long tails, comprehend in the Linnæan diſtribution twenty-ſeven ſpecies, viz.

the *ſimia maimon, hamadryas, veter, ſilenus, faunus, belzebul, ſeniculus, paniſcus, cynomolgus, cynocephalus, diana, ſabæa, cephus, trepida, aygula, pithecia, nictitans, jacchus, œdipus, roſalia, midas, fatuellus, apella, capucina, ſciurea, morta*, and *ſyrichta*; for the deſcription of which the reader is referred to Linnæus's Syſtema Naturæ, tom. i. p. 35, &c. and for a more particular account to Pennant's Hiſt. of Quadrupeds, vol. i. p. 179—211. ed. 4to. 1781. See CERCOPITHECUS and MONKEY.

SIMIA *marina*, the *ſea-ape*, in *Ichthyology*, a name uſed by Bellonius, and ſome other authors, for the fiſh called *vulpes marina*, a kind of ſhark, remarkable for its long tail, from which probably it had both one and the other of theſe names. See *Sea*-FOX.

SIMICON, in *Antiquity*, an ancient muſical inſtrument of the ſtringed kind, with thirty-five ſtrings. Mem. de l'Acad. Inſcript. vol. v. p. 168.

SIMILAR, in *Arithmetic* and *Geometry*, the ſame with *like*. Thoſe things are ſaid to be *ſimilar*, or *like*, which cannot be diſtinguiſhed but by their compreſence; that is either by immediately applying the one to the other, or ſome other third to them both. So that there is nothing found in one of the *ſimilar* things, but is equally found in the other.

Thus, if you note all the things in A, which may be diſcerned and conceived, without aſſuming any other; and in like manner, note all the things in B, which may be thus conceived, and A be *ſimilar* to B; all things in A will be the ſame with thoſe in B.

Since a quantity cannot be underſtood otherwiſe, than by aſſuming ſome other quantity to refer it to; *ſimilar* things, notwithſtanding their ſimilitude, may differ in quantity; and ſince, in *ſimilar* things, there is nothing wherein they differ, beſide the quantity; quantity itſelf is the internal difference of *ſimilar* things.

In mathematics, *ſimilar* parts, as A a, have the ſame ratio to their wholes B b; and if the wholes have the ſame ratio to the parts, the parts are *ſimilar*. *Similar* parts A a are to each other as their wholes B b. See PART.

SIMILAR *angles* are alſo equal angles. See SOLID *angle*.

SIMILAR *rectangles* are thoſe which have their ſides about the angles proportional.

Hence, 1°, all ſquares muſt be *ſimilar rectangles*. 2°, All *ſimilar rectangles* are to each other as the ſquares of their homologous ſides.

SIMILAR *triangles*, are ſuch as have all their three angles reſpectively equal to each other, and the ſides about the equal angles proportional. See TRIANGLE.

Hence, 1°, Since, in all triangles mutually equiangular, the correſponding ſides containing the equal angles are proportional, equiangular triangles are *ſimilar* to each other. And if two triangles have their ſides reſpectively proportional, thoſe triangles are equiangular.

2°, All *ſimilar triangles* are to each other, as the ſquares of their homologous ſides.

In *ſimilar triangles*, and parallelograms, the altitudes are proportional to the homologous ſides, and the baſes are cut proportionably by thoſe ſides.

SIMILAR *polygons* are thoſe, whoſe angles are ſeverally equal, and the ſides about thoſe angles proportional.

And the like of other *ſimilar* rectilinear figures.

Hence, all *ſimilar polygons* are, to each other, as the ſquares of the homologous ſides.

In all *ſimilar* figures, the homologous angles are equal, and the homologous ſides proportional. All regular figures, and *ſimilar* irregular ones, are in a duplicate ratio of their homologous ſides. Circles, and *ſimilar* figures, inſcribed in them, are, to each other, as the ſquares of the diameters.

SIMILAR *arches*. See ARCH.

SIMILAR *curves*, in *Geometry*. The *ſimilarity* of curvilinear figures may be derived from that of rectilinear figures, that are always *ſimilarly* deſcribed in them; or, we may comprehend all ſorts of *ſimilar* figures, planes, or ſolids, in this general definition: figures are *ſimilar*, when they may be ſuppoſed to be placed in ſuch a manner, that any right line being drawn from any determined point to the terms that bound them, the parts of the right line, intercepted betwixt that point and thoſe terms, are always in one conſtant ratio to each other. Thus the figures A S D, *a* S *d* (*Tab.* IV. *Geometry*, *fig.* 111.) are *ſimilar*, when any line S P being drawn always from the ſame point S, meeting A D in P, and *a d* in *p*, the ratio of S P to S *p* is invariable. It is manifeſt, that the rectilinear inſcribed figures *a p d* S, A P D S, are *ſimilar* in this caſe, according to the definition of ſuch figures given in Euclid's Elements, book vi. See Maclaurin's Fluxions, art. 122.

When the *ſimilar* figures are in the ſituation here deſcribed, they are alſo *ſimilarly* ſituated, and all their homologous lines are either placed upon one another, or parallel.

SIMILAR *ſegments of circles* are ſuch as contain equal angles. See SEGMENT.

SIMILAR *conic ſections* are thoſe where the ordinates to a diameter in one are proportional to the correſpondent ordinates to the *ſimilar* diameter in the other; and where the parts of *ſimilar* diameters between the vertices and ordinates in each ſection are *ſimilar*.

The ſame definition alſo agrees to *ſimilar* ſegments of conic ſections.

SIMILAR *diameters of two conic ſections*. When the diameters in two conic ſections make the ſame angles with their ordinates, they are ſometimes ſaid to be *ſimilar*.

SIMILAR *ſolids*. See LIKE *ſolid figures*.

SIMILAR *bodies*, in *Natural Philoſophy*, ſuch as have their particles of the ſame kind or nature one with another.

SIMILAR *plain numbers* are thoſe which may be ranged into *ſimilar* rectangles, i. e. into rectangles, whoſe ſides are proportional: as 6 multiplied by 2, and 12 by 4, the product of one whereof is 12, and the other 48, are *ſimilar numbers*.

SIMILAR *ſolid numbers* are thoſe, whoſe little cubes may be ſo ranged, as to make *ſimilar* and rectangular parallelepipeds.

SIMILAR *animals*. We have a treatiſe by Dr Martin, wherein he treats of the laws and proportions of the motions and forces of the ſolids and fluids of animals, of however different magnitudes, which are ſuppoſed of *ſimilar* make and conſtitution. See Tractat. de Similibus Animalibus.

SIMILAR *diſeaſe*, in *Medicine*, denotes a diſeaſe of ſome ſimple, ſolid part of the body. As of a fibre, with regard to its tenſion, or flaccidity; of a membrane; a nervous canal, or the like. See DISEASE.

SIMILAR *parts*, in *Anatomy*, are thoſe parts of the body, which at firſt ſight, appear to conſiſt of like parts, or parts of the ſame nature, texture, and formation.

Of theſe we uſually reckon ten, viz. the bones, cartilages, ligaments, membranes, fibres, nerves, arteries, veins, fleſh, and ſkin; each of which ſee under its proper article.

Dr. Grew, in his anatomy of plants, obſerves, that theſe have likewiſe their *ſimilar* and organical parts.

SIMILE, or SIMILITUDE, in *Rhetoric*, a compariſon of two things, which, though different in other reſpects, yet agree in ſome one. As, *He ſhall be like a tree planted by the water ſide*, &c. ſo that in every *ſimilitude* three things are requiſite; two things that are compared together; and a third, in which the likeneſs or *ſimilitude* between them conſiſts.

The difference between a *ſimile* and a *compariſon*, conſiſts in this, that *ſimile* properly belongs to what we call the quality of the thing, and the compariſon to the quantity.

And the difference between a metaphor and *ſimilitude* conſiſts in this, that a metaphor has not thoſe ſigns of compariſon which are expreſſed in a *ſimilitude*. See METAPHOR and PARABLE.

SIMILITUDE, in *Arithmetic*, *Geometry*, &c. denotes the relation of two things ſimilar to each other, or which are only diſtinguiſhable by com-preſence.

The notion of *ſimilitude*, which now makes ſome figure in geometry, &c. is owing to M. Leibnitz; it will be rendered eaſy by the following inſtance. Suppoſe two watches perfectly alike, the one belonging to Caius, the other to Gracchus. If, now, Caius pull out his watch in preſence of Gracchus; the latter will be ſurpriſed, and fancy it his own; but he will perceive it different from his own, upon pulling out his own; that is Gracchus diſtinguiſhes Caius's watch from his own by their com-preſence; or, by applying the one immediately to the other.

Euclid, and after him moſt other authors, demonſtrate every thing in geometry from the ſole principle of congruity. Wolfius, in lieu hereof, ſubſtitutes that of *ſimilitude*; which, he tells us, was communicated to him by M. Leibnitz, and which he finds of very conſiderable uſe in geometry, as ſerving to demonſtrate many things directly, which are only demonſtrable from the principle of congruity by an ambages.

SIMILOR is a name given to an allay of red copper and zinc, made in the beſt proportions to imitate the colour of gold. See GOLD-*coloured metal*.

SIMITAR, or SCIMITAR, in *War*, a crooked or falcated ſword, with a convex edge; not now uſed.

SIMON, in *Ichthyology*, a name by which ſome authors have called the *dolphin*. It is affirmed, that this fiſh loves the name, and will come to a perſon who calls him by it; but this, though recorded by authors of credit, meets with no faith among the judicious readers.

SIMONIACAL is applied to a perſon guilty of ſimony; that is of purchaſing a benefice, or other ſacred matter, with money.

SIMONIANS, a ſect of ancient heretics, the firſt that ever diſturbed Chriſtianity; if they might be ſaid to do ſo, who were little more than mere philoſophers, and chiefly made profeſſion of magic.

Simon Magus, ſo often mentioned in the Acts, was their leader, and died under the emperor Nero; St. Peter ſtill ſurviving; ſo that Clemens Alexandrinus is miſtaken, when he makes Simon poſterior to Marcion.

This impious man, ſays Moſheim, is not to be ranked among the number of thoſe who corrupted with their errors the purity or ſimplicity of the Chriſtian doctrine, nor is he to be conſidered as the parent and chief of the heretical tribe; but he is rather to be placed in the number of thoſe who were enemies to the progreſs and advancement of Chriſtianity. For it is manifeſt from all the records we have concerning him, that after his defection from the Chriſtians, in conſequence of the ſevere rebuke which he received from the apoſtle Peter, he retained not the leaſt attachment to Chriſt, but oppoſed himſelf openly to the divine Saviour, and aſſumed to himſelf blaſphemouſly the title of the *ſupreme power of God.* Orig. adv. Celſum. lib. v. p. 272. ed. Spenceri.

Simon was by birth a Samaritan, or a Jew; when he had ſtudied philoſophy at Alexandria, he made a public profeſſion of magic, and perſuaded the Samaritans, by fictitious miracles, that he had received from God the power of commanding and reſtraining thoſe evil beings by which mankind were tormented. As for his doctrines, Moſheim adds, that he was, without doubt, in the claſs of thoſe philoſophers, who not only maintained the eternity of matter, but alſo the exiſtence of an evil being, who preſided, and thus ſhared the empire of the univerſe with the ſupreme and beneficent mind; and he, probably, embraced the opinion of thoſe who held, that matter, moved from eternity by an intrinſic and neceſſary activity, had by its innate force produced, at a certain period of time, from its own ſubſtance, the evil principle which now exerciſes dominion over it with his numerous train of attendants. From this pernicious doctrine, the other errors attributed to him concerning fate, the indifference of human actions, the impurity of the human body, the power of magic, and ſimilar extravagancies, flow naturally, as from their true and genuine ſource.

This magician farther pretended, that in his perſon reſided the greateſt and moſt powerful of the divine æons; that another æon of the female ſex, the mother of all human ſouls, dwelt in the perſon of his miſtreſs Helena, and that he came, by the command of God, upon earth, to aboliſh the empire of thoſe that had formed this material world, and to deliver Helena from their power and dominion. Moſh. Eccl. Hiſt. vol. i. p. 115. 8vo. ed. See GNOSTICS.

SIMONY, SIMONIA, the crime of trafficking with ſacred things; particularly the corrupt preſentation of any one to an eccleſiaſtical benefice for money, gift, or reward.

The word is borrowed from Simon Magus, who is mentioned in the Acts of the Apoſtles, as offering to buy the power of working miracles with money: though the purchaſing of holy orders ſeems to approach nearer to his offence.

By the Engliſh canons, anno 1229, *ſimony* is not only committed by an agreement for money in hand, or to be paid yearly; but by any other profit or emolument; any reward, gift, or benefit, directly or indirectly; or by reaſon of any promiſe, grant, bond, &c. and this, either in the acceptance of a living, or in an exchange or RESIGNATION.

Simony was by the canon law a very grievous crime; and it is ſo much the more odious, becauſe, as ſir Edward Coke obſerves, it is ever accompanied with perjury; for the preſentee is ſworn to have committed no *ſimony*. However, it was not an offence puniſhable in a criminal way at the common law; it being thought ſufficient to leave the clerk to eccleſiaſtical cenſures: but many acts of parliament have been made to reſtrain it by means of civil forfeitures. Thus the ſtatute 31 Eliz. c. 6. enacts, that if any patron, for money, or any other corrupt conſideration or promiſe, directly or indirectly given, ſhall preſent, admit, inſtitute, induct, inſtal, or collate any perſon to an eccleſiaſtical benefice or dignity, ſuch preſentation ſhall be void, and the preſentee be rendered incapable of ever enjoying the ſame benefice, and the crown ſhall preſent to it for that turn only: moreover, both the giver and taker ſhall forfeit two years value of the benefice or dignity; one moiety to the king, and the other to any one who will ſue for the ſame. If perſons alſo corruptly reſign or exchange their benefices, both the giver and taker ſhall, in like manner, forfeit double the value of the money, or other corrupt conſideration.

Farther, by the ſtatute 12 Ann. ſtat. 2. c. 12. if any perſon, for money or profit, ſhall procure, in his own name, or the name of any other, the next preſentation to any living eccleſiaſtical, and ſhall be preſented thereupon, this is declared to be a ſimoniacal contract, and the party is ſubjected to all the eccleſiaſtical penalties of *ſimony*, is diſabled from holding the benefice, and the preſentation devolves to the crown.

In the conſtruction of theſe ſtatutes, theſe points, ſays judge Blackſtone, ſeem to be clearly ſettled.

1. That to purchaſe a preſentation, the living being actually vacant, is open and notorious *ſimony*.

2. That for a clerk to bargain for the next preſentation, the incumbent being ſick and about to die, was *ſimony*, even before the ſtatute of queen Anne; and now, by that ſtatute, to purchaſe, either in his own name or another's the next preſentation, and be thereupon preſented at any future time to the living, is direct and palpable *ſimony*.

But, 3. It is held that for a father to purchaſe ſuch a preſentation, in order to provide for his ſon, is not *ſimony*; the ſon not being concerned in the bargain, and the father being by nature bound to make a proviſion for him.

4. That if a ſimoniacal contract be made with the patron, the clerk not being privy thereto, the preſentation for that turn ſhall indeed devolve to the crown, as a puniſhment of the guilty patron; but the clerk who is innocent, does not incur any diſability or forfeiture.

5. That bonds given to pay money to charitable uſes, on receiving a preſentation to a living, are not ſimoniacal, provided the patron or his relations be not benefited thereby; for this is no corrupt conſideration, moving to the patron.

6. That bonds of reſignation in caſe of non-reſidence, or taking any other living, are not ſimoniacal, there being no corrupt conſideration therein, but ſuch as is only for the good of the public. So alſo bonds to reſign, when the patron's ſon comes to canonical age, are legal; upon the reaſon before given, that the father is bound to provide for his ſon.

7. Laſtly, general bonds to reſign at the patron's requeſt, are held to be legal; for they may poſſibly be given for one of the legal conſiderations before mentioned, and where there is a poſſibility that the tranſaction may be fair, the law will not ſuppoſe it iniquitous without proof; but if the party can prove the contract to have been a corrupt one, ſuch proof will be admitted, in order to ſhew the bond ſimoniacal, and therefore void. Neither will the patron be ſuffered to make an ill uſe of ſuch a general bond of reſignation; as by extorting a compoſition for tithes, procuring an annuity for his relations, or by demanding a reſignation wantonly, and without good cauſe, ſuch as is approved by the law; as for the benefit of his own ſon, or on account of non-reſidence, plurality of livings, or groſs immorality in the incumbent. Blackſt. Com. b. ii. p. 279, &c.

SIMONY is alſo committed by buying or ſelling the ſacrament, baptiſm, ordination, or abſolution; as well as by the nomination and collation to a benefice, a place in a monaſtery, or the like.

By 31 Eliz. cap. 6. perſons who ſhall corruptly ordain or licenſe any miniſter, or procure him to be ordained or licenſed, ſhall incur a forfeiture of 40*l.* and the miniſter himſelf of 10*l.* beſides an incapacity to hold any eccleſiaſtical preferment for ſeven years afterwards. See PRESENTATION.

Some have pretended it to be ſufficient to avoid the charge of *ſimony*, if only the ordination were gratuitous, though the revenues were bought and ſold as a temporal thing. But the canons of ſeveral councils have condemned this ſubtile diſtinction; ſince the revenues are attached to an eccleſiaſtical office purely ſpiritual.

Caſuiſts diſtinguiſh three kinds of *ſimony*; viz.

SIMONY, *mental*, is that which is reſtricted to the mere will and inclination, without ever breaking forth into act. As when a preſent is made to a collator, without taking any notice, that we expect a benefice from him. This kind of *ſimony* is only puniſhable in *foro conſcientiæ.*

SIMONY, *conventional*, is where there is an expreſs act, and a formal bargain, though it never come to an execution.

SIMONY, *real*, is where the convention is executed on both ſides; which laſt is the moſt criminal of all. The canonical penalty of *ſimony* is depoſition in a clerk, and excommunication in a layman.

It is a maxim among the Romiſh canoniſts, that there is no *ſimony* in the court of Rome; becauſe the pope acts there as an abſolute ſovereign; they alſo ſay, that reſignations *in favorem* are not to be admitted but by the pope, as favouring a little of *ſimony*. On theſe occaſions, however, the parties always ſwear, that there had been no deceit, colluſion, *ſimony*, or other illegal covenant.

Peter Damian diſtinguiſhes three kinds of *ſimony*: that *of money*, that *of the tongue*, and that *of ſervices*.

Simony *of money*, or *per munus a manu*, is where money is really paid down for a benefice: he adds, that the ſame is likewiſe committed, by expending money to live at court to obtain a benefice.

Simony *of the tongue*, or *per munus a lingua*, conſiſts in flattering the collator, or making one's ſelf agreeable by complaiſance and commendation.

Simony *of ſervices*, or *per munus ab obſequio*, conſiſts in the doing them good offices to obtain a benefice.

It was agreed by all the juſtices, Trin. oct. Jac. primi, that if the patron preſented any perſon to a benefice with cure, for money; ſuch preſentation, &c. is void, though the preſentee were not privy to it; and the ſtatute gives the preſentation to the king; but this is now repealed.

SIMPLA *nobla*, in *Botany*. See Phyllis.

SIMPLARY, *ſimplaris*, in *Antiquity*, a Roman ſoldier, who had only ſingle pay. Thus called, in oppoſition to the *duplares*, or ſuch as had double pay.

SIMPLE, *ſimplex*, ſomething not mixed, or compounded; in which ſenſe it ſtands oppoſed to COMPOUND.

The ELEMENTS are *ſimple* bodies, from the compoſition whereof all mixed bodies reſult.

Simple *equation*, *fraction*, and *ſurd*, in *Algebra*. See the ſubſtantives.

Simple *quantities*, in *Algebra*, are thoſe which conſiſt of one term only; as $+ a$, $- a b$, or $+ a b c$; accordingly they are oppoſed to COMPOUND *quantities*.

Simple *glands*, in *Anatomy*. See Glands.

Simple *anomaly* and *excentricity*, in *Aſtronomy*. See the ſubſtantives.

Simple, in *Botany*, is a general name given to all herbs and plants; as having each its particular virtue, whereby it becomes a *ſimple* remedy.

The *ſimples* brought from the Levant, and the Eaſt Indies, were not known among us till about the year 1200.

Simple *flowers*, and *leaf*. See the ſubſtantives.

Simple *fencing*. See Fencing.

Simple *flank* and *tenaille*, in *Fortification*. See the ſubſtantives.

In *Geometry*, we ſay, the moſt *ſimple* demonſtrations are the beſt.

In *Grammar*, we have *ſimple* WORDS, or PRIMITIVES; and compounds, which have ſome particle added to them.

In *Juriſprudence*, they ſay, a *ſimple* donation, in oppoſition to a mutual or reciprocal one: a *ſimple* ſale, in oppoſition to that made with a reſervation of the faculty of redemption; and *ſimple* homage, in oppoſition to liege homage.

Simple *average*, *benefice*, *charter*, *church*, *depoſit*, *eſtate*, *fee*, *force*, *larceny*, *reſignation*, and *vaſſalage*. See the ſubſtantives.

Simple *contract*, *debts by*, are ſuch, where the contract upon which the obligation ariſes is neither aſcertained by matter of record, nor yet by deed or ſpecial inſtrument, but by mere oral evidence, or by notes unſealed, which are capable of a more eaſy proof, and (therefore only) better than a verbal promiſe.

Simple *affection*, *form*, *modes*, *neceſſity*, *oppoſition*, and *propoſition*, in *Logic* and *Metaphyſics*. See the ſubſtantives.

Simple *machine*, *motion*, *pendulum*, and *wheel*, in *Mechanics*. See the ſubſtantives.

The *ſimpleſt* machines are always the moſt eſteemed.

Simple, in *Muſic*, is chiefly uſed in oppoſition to *double*; ſometimes to a compound of ſeveral parts, or figures of different values, &c.

Simple *cadence* is that where the notes are all equal through all the parts.

Simple *concords* are thoſe wherein we hear at leaſt two notes in conſonance; as a third and a fifth; and, of conſequence, at leaſt three parts. This is either done immediately, and is called the *harmonical triad*, or in a more remote manner, that is, when the ſounds, that are not baſs, are one or two octaves higher. This diſtance has no ill effect in the third, but in the fifth it has; and, generally ſpeaking, the nearer, or more immediate, the concords are, the better. See Concord.

They alſo ſay C *ſimple*, or plain, in oppoſition to C accented.

Simple *counterpoint*, *dieſis*, *fugue*, *harmony*, *interval*, *ſounds*, and *triple*. See the ſubſtantives.

Simple *foſſils*, in *Natural Hiſtory*. See Fossils.

Simple *viſion*, in *Optics*. See Vision.

In *Pharmacy*, there are *ſimple* remedies, and compounds; the former of which are uſually preferable to the latter.

Simple *diachylon*, *diacodium*, *diamorum*, *diaprunum*, *dropax*, *fomentations*, *hydromel*, *mixture*, *oxymel*, and *waters*. See the ſubſtantives.

Simple *taſte*, in *Phyſiology*. See Taste.

Simple *hiſtory* and *ſtyle*, in *Rhetoric*. See the ſubſtantives.

Simple *fracture* and *ulcer*, in *Surgery*. See the ſubſtantives.

SIMPLER's *joy*, in *Botany*. See Vervain.

SIMPLICITY, in *Ethics*. See Sincerity.

SIMPLIFYING, in *Eccleſiaſtical Matters*, is the taking away of a cure of ſouls from a benefice, and diſpenſing the beneficiary from reſidence.

Several benefices which have been *ſimplified*, now require reſidence; and many others, which required reſidence, have been *ſimplified*.

Some uſe the word in a more extenſive ſignification; viz. for the ſhortening a relation, &c. or retrenching every thing not preciſely neceſſary. When the matter of fact ſhall be *ſimplified*, and ſtripped of its vain circumſtances, the court will ſee, &c.

SIMPLOCE, in *Rhetoric*, a figure which comprehends both the ANAPHORA and EPISTROPHE. In this figure the ſeveral members begin and end with the ſame word. Thus St. Paul: *Are they Hebrews? So am I? Are they Iſraelites? So am I? Are they the ſeed of Abraham? So am I.* 2 Cor. xi. 22.

SIMPLUDIARIA, in *Antiquity*, a kind of funeral honours paid to the deceaſed at their obſequies.

The word is formed from the Latin *ſimplex*, and *ludus*; whence *ſimpludiaria*, or *ſimpliludaria*, q. d. *ſimple games*.

Some will have *ſimpludiaria* to be the funerals at which games were exhibited: ſuch is the ſentiment of Paulus Diaconus. Feſtus ſays, they were thoſe, in the games whereof nothing was ſeen but dancers and leapers, called *corvitores*; who, according to M. Dacier, were perſons who run along the maſts and yards of veſſels or boats, called *corbes*.

In other reſpects, thoſe two authors agree as to the kind of funerals called *ſimpludiaria*; viz. that they were oppoſite to thoſe called *indictiva*; wherein, beſides the dancers and leapers obſerved in the *ſimpludiaria*, there were deſultores, or people who vaulted on horſes; or, perhaps, horſe-races, wherein the cavaliers leaped from horſe to horſe at full ſpeed.

SIMPULUM, among the Romans, a veſſel with a long handle, and made like a cruet. It was uſed in ſacrifices and libations, for taking a very little wine at a time.

SIMULACRUM, among the Romans. See Idol, and Idolatry.

SIMULATION, in *Ethics*, is making a thing appear which does not exiſt; and thus it is diſtinguiſhed from DISSIMULATION, which is keeping that which exiſts from appearing.

SIMUS, in *Ichthyology*, the name uſed by ſome authors for the NASUS, or naſe, a fiſh common in the large rivers in Germany, and ſomewhat reſembling our chub, and in ſome reſpects our common rudd.

SIN, denotes want of conformity to the law of God in the things which that law requires, or the tranſgreſſion of that law in thoſe things which it forbids; and under this definition are comprehended both the *ſins* of omiſſion and *ſins* of commiſſion.

Plato defines *ſin* to be ſomething void, both of number and meaſure: by way of contradiction to virtue, which he makes to conſiſt in muſical numbers, &c. See Virtue, and Rhythmus.

Agreeable hereto, Suarez obſerves, that an action becomes ſinful, by its wanting a due commenſuration; for as every thing meaſured refers to ſome rule, from which if it deviate, it becomes incommenſurate; and as the rule of man's will is the law of God; ſo, &c. Suarez adds, that all evil actions are prohibited by ſome divine law; and that this is required to the perfection of the divine providence.

Simplicius, and, after him, the ſchoolmen, aſſert, that evil is not any poſitive thing, contrary to good; but a mere defect and accident.

Sins are diſtinguiſhed into *original*, and *actual*.

Sin, *original*, has been divided by ſome divines into *inherent* and *imputed*: the former term is uſed to denote that corruption or degeneracy of nature, which is propagated by the laws of generation from the firſt man to all his offſpring, and by reaſon of which man is utterly indiſpoſed, diſabled, and made oppoſite unto all that is ſpiritually good, and that continually. Hence, it is ſaid, proceed all actual tranſgreſſions The general cauſe and ground of this propagation of a ſinful nature, are referred originally to men's common intereſt in the guilt or condemnation of Adam's firſt *ſin*; but the manner in which this hereditary corruption is conveyed, is not particularly explained, though ſome have ſuppoſed that it may reſult from the conſtitution of the body, and the dependence of the mind upon it.

Father Mallebranche accounts for it from natural cauſes thus: men at this day retain, in the brain, all the traces and impreſſions of their firſt parents. For all animals produce their like, and with like traces in the brain; whence it is that animals of the ſame kind have the ſame ſympathies and antipathies, and do the ſame things on the ſame occaſions; and our firſt parents, after their tranſgreſſion, received ſuch deep traces in the brain, by the impreſſion of ſenſible objects, that it was very poſſible they might communicate them to their children.

Now, as it is neceſſary, according to the order eſtabliſhed by nature, that the thoughts of the ſoul be conformable to the traces in the brain; it may be ſaid, that as ſoon as we are formed in the womb, we are infected with the corruption of our parents: for having traces in the brain like thoſe of the perſons who gave us being; it is neceſſary we have the ſame thoughts, and the ſame inclinations, with regard to ſenſible objects. Thus, of courſe, we muſt be born with concupiſcence, and *original ſin.* With concupiſcence, if that be nothing but the natural effort the traces of the brain make on the mind to attach it to ſenſible things; and with *original ſin*, if that be nothing but the prevalency of concupiſcence; nothing, in reality, but theſe effects conſidered as victorious, and as maſters of the mind and heart of the child.

Imputed original ſin denotes that guilt or obligation to puniſhment, to which all the poſterity of Adam are ſubject, by the imputation of his tranſgreſſion. This is called the guilt of Adam's firſt *ſin*, in which the ſinfulneſs of that ſtate into which man fell, is ſaid partly to conſiſt; and it is denominated *original ſin*, in order to diſtinguiſh it from *actual ſin*, or perſonal guilt. This doctrine of imputed guilt has been explained and vindicated by ſuppoſing a covenant made with Adam, as a public perſon, not for himſelf only, but for his poſterity, in conſequence of which he became the federal head, ſurety, or repreſentative of all mankind; and they deſcending from him by ordinary generation, ſinned in him, and fell with him, in his firſt tranſgreſſion. It has been debated, how far the imputation of Adam's *ſin* reaches: ſome have maintained, that it extends to final condemnation, and eternal miſery: others have ſuggeſted, that the *ſin* of Adam has ſubjected his poſterity to an utter extinction of being; ſo that all who die in their infancy fall into a ſtate of annihilation, excepting thoſe who are the ſeed of God's people, who by virtue of the bleſſings of the covenant made with Abraham, and the promiſe to the ſeed of the righteous, ſhall, through the grace and power of Chriſt, obtain a part in a happy reſurrection, in which other infants ſhall have no ſhare.

The Romiſh caſuiſts diſtinguiſh *actual ſins* into *mortal*; which are ſuch as make us loſe the grace of God; and *venial*, which alone are pardoned, as being only *ſins* of infirmity, not of malice. See POPERY.

Divines are not yet agreed what the *ſin* againſt the Holy Ghoſt is. See BLASPHEMY *againſt the Holy Ghoſt*.

SIN, *philoſophical*, according to the doctrine of the Jeſuits, is an action, or courſe of action, that is repugnant to the dictates of reaſon, and yet not offenſive to the Deity.

SINAI, *Knights of*. See CATHARINE.

SINAPIS, in *Botany*. See MUSTARD.

SINAPI *Perſicum*, *Perſian muſtard*, a name by which ſome botanical authors have called the thlaſpi, or TREACLE *muſtard*.

SINAPISIS, a word uſed by ſome writers as a name for Armenian bole.

SINAPISTRUM, in *Botany*. See CLEOME.

SINAPISM, σιναπισμος, formed from *ſinapi*, or σιναπι, *muſtard-ſeed*, in *Pharmacy*, an external medicine, in form of a cataplaſm; compoſed chiefly of MUSTARD-*ſeed* pulverized, and mixed up with the pulp of figs; or with briony, garlick, onion, naſturtium, euphorbium, ranunculus roots, or the like.

Sinapiſms excite a redneſs, heat, itching, tumor, and ſometimes a bliſter, on the place they are applied to.

They were anciently in great requeſt, and ſtill continue in uſe for inveterate diſeaſes of the head, long-continued defluxions, &c.

SINASBARIUM, in *Botany*, a name given by ſome authors to the *ſyſimbrium*, or water-mint, common in all our ditches and watery places.

SINCERITY, in *Ethics*, is that excellent habitude and temper of mind, which gives to virtue its reality, and makes it to be what it appears. *Simplicity*, called by the Greeks απλοτης, is included in this virtue, but does not expreſs the whole of it; ſo that it is neceſſary to add αληθεια, *truth*: of which two the firſt ſtands in oppoſition to what is mixed and adulterated; the other to what is counterfeit. *Sincerity* has reſpect to two ſorts of objects; perſons and things. Of the firſt kind are God; other men, and every man's ſelf. *Sincerity*, with regard to God, ſignifies, that the form of religion is accompanied with the power of it, and that piety and obedience are ſubſtantial and unaffected; proceeding from principles, right in themſelves, and uniform in their influence. *Sincerity*, as it regards men, implies an honeſty and openneſs in our dealings with them, extending to the ſprings and motions of our actions, as well as the actions themſelves; to our words and our thoughts. *Sincerity*, with relation to a man's ſelf, is oppoſed to ſelf-deception. As to things, truth and goodneſs are the principal objects of *ſincerity*. The extremes of this virtue are over-frankneſs and hypocriſy. Grove's Syſtem of Moral Philoſophy, vol. ii. chap. 3.

SINCIPUT, or SYNCIPUT, is the fore-part of the head, reaching from the forehead to the coronal ſuture. See *Tab. Anat.* (*Oſteol.*) *fig.* 2. *lit. a. fig.* 7. *n.* 1.

SINDON, in *Surgery*, a little round piece of linen, or ſilk, or lint, uſed in dreſſing the wound after TREPANNING. The firſt thing uſually done after the operation of trepanning is, to pour a few drops of white balſam on the dura mater; then a ſpoonful of mel roſatum being warmed with a little balſam, a *ſindon* is dipped into it, of fine linen cloth: this is immediately applied upon the dura mater; and being greater than the hole in the ſkull, its circumference is thruſt all round between the cranium and the membrane; then pledgets of lint are applied, and the hole is quite ſtopped therewith. The next morning, when the dreſſing is taken off, the brain is never left bare a moment; but as ſoon as the former *ſindon* and lint are removed, new ones are clapped on in their room.

SINE, or *Right* SINE, in *Trigonometry*, a right line drawn from one extremity of an arch, perpendicular to the radius drawn from the other extremity: or, the *ſine* is half the chord of twice the arch.

Thus the line A D (*Tab. Trigonom. fig.* 3.) which is half the chord A B of the double arch A E B, is the right *ſine*; or, ſimply, the *ſine* of the arch A E

SINE, *whole*, *ſinus totus*, is the *ſine* of the quadrant HE, or of 90 degrees; that is, the whole *ſine* is the ſame with the RADIUS H C.

SINE, *verſed*, is a part E D of the whole *ſine* or radius intercepted between the right *ſine* A D and the arch AE.

It is demonſtrated, 1. That, the right *ſine* A D being perpendicular to the radius E C, all *ſines* drawn to the ſame radius are parallel to each other.

2. Since the arch AE is the meaſure of the angle ACE and A I the meaſure of the contiguous angle ACI, and the quadrant H E the meaſure of the right angle; AD is alſo the right *ſine*, and ED the verſed *ſine* of the angles A C E and ACI; and the whole *ſine* is the *ſine* of the right angle.

3. Two angles contiguous, as ACE and ACI, have the ſame *ſine*.

4. The *ſines* of obtuſe angles are the ſame with thoſe of their complements to two right angles: or the *ſine* of any angle, and the *ſine* of its ſupplement, are the ſame; or the *ſines* of arches leſs than 90°, ſerve equally for arches as much greater than 90°; i. e. the *ſines* of 80° and 100°, of 60° and 120°, &c. are reſpectively equal.

5. All *ſines* of ſimilar arches have the ſame ratio to their radii.

6. In every triangle the ſides are as the *ſines* of the oppoſite angles.

SINE-*complement*, or CO-SINE, is the *ſine* of an arch AE which is the complement of another arch A H, to a quadrant.

Thus alſo the *ſine* of the arch AH is called the *ſine-complement* of the arch AE. And it is plain, that the *verſed ſine* and *co-ſine*, taken together, are equal to the radius.

The SINE BC (*fig.* 11.) *and the verſed* ſine AB, *being given in common meaſure, not in parts of the radius, to find the arch* F C *in degrees.* Find the ſemidiameter A D: then in the triangle D B C, beſides the right angle B, by the ſides BC and DC we find the angle ADC, which ſhews the number of degrees in the arch AC; the double whereof is the arch FC. This problem is of uſe in finding the ſegment of a circle. See SEGMENT.

SINES, *line of*, a line on the ſector, Gunter's ſcale, &c. the deſcription and uſe whereof ſee under the articles SECTOR, and GUNTER's *ſcale*.

In eſtimating the quantity of *ſines*, &c. we aſſume radius for unity; and determine the quantity of the *ſines*, tangents, and ſecants, in fractions thereof. From Ptolemy's Almageſt we learn, that the ancients divided the radius into ſixty parts; which they called degrees, and thence determined the chords in minutes, ſeconds, and thirds; that is, in ſexageſimal fractions of the radius, which they likewiſe uſed in the reſolution of triangles.

The *ſines*, or half chords, for aught that appears, were firſt uſed by the Saracens.

Regiomontanus, at firſt, with the ancients, divided the radius into ſixty degrees; and determined the *ſines* of the ſeveral degrees in decimal fractions thereof. But he afterwards found it would be more commodious to aſſume radius for 1; and thus introduced the preſent method into trigonometry.

In the common tables of *ſines* and tangents, the radius is conceived divided into 10000000 parts; beyond which we never go in determining the quantity of the *ſines* and tangents. Hence, as the ſide of an hexagon ſubtends the ſixth part of a circle, and is equal to radius, the *ſine* of 30° is half the radius, or 5000000.

1. *The* Sine AD *being given, to find the* ſine complement. From the ſquare of the radius AC ſubtract the ſquare of the *ſine* AD; the remainder will be the ſquare of the *ſine-complement* DC or AG: whence, the ſquare root being extracted, we have the *ſine-complement*. E. gr. Suppoſing AC 10000000, and AD 5000000, AG will be found 8660254, the *ſine* of 60°.

2. *The* Sine AD *of the arch* AE *being given; to find the* ſine *of the half arch, or half of* AE. Find the Chord of the arch AE; for half of this is its *ſine*. Thus ſuppoſing AG and AD, as in the preceding problem: we ſhall find the *ſine* of half the arch AE, or the *ſine* of 15° = 2588190.

3. *The* Sine DG *of the arch* DF *being given, to find the* ſine DE, *of the double arch* DB (*fig.* 7.) Since the angles at E and G are right angles, and the angle B is common to each triangle BCG, and DEB, we ſhall have BC : CG :: BD : DE: wherefore CG being found by the firſt problem, and BD being double of DG, DE is found by the rule of proportion.

4. *The* Sines FG *and* DE (*fig.* 8.) *of the arches* FA *and* DA, *whoſe difference* DF *is not greater than* 45 *minutes, being given; to find any intermediate* ſine, *as* IL. To the difference FD of the arches, whoſe *ſines* are given, the difference of the arch AI, whoſe *ſine* is required, and AF, viz. IF, and the difference of the given *ſines* DH, find a fourth proportional: this, added to the leſs given *ſine* FG, the aggregate will be the *ſine* required.

5. *To find the* Sine *of* 45 *degrees.* Let HI (*fig.* 3.) be a quadrant of a circle; then will HCI be a right angle; conſequently the triangle rectangular; therefore $HI^2 = HC^2 + CI^2 = 2HC^2$: wherefore, ſince HC the whole *ſine* is 10000000; if from $2HC^2$, 200000000000000, be extracted the ſquare root 14142136; we ſhall have the chord HI, whoſe half 7071068, is the *ſine* of 45° required.

6. *The ſide of a pentagon being given,* (ſee Polygon), *the* ſine *of* 36° *may be eaſily found.* For the *ſine* of 36° is equal to half 11755706, i. e. = 5877853.

7. *The* Sine *of a minute, or* 60″, FG (*fig.* 8.) *being given, to find the* ſine *of one or more ſeconds* MN. Since the arches AM and AF are very ſmall, AMF may be taken for a right line, without any ſenſible error in the decimal fractions of the radius wherein the *ſine* is expreſſed; that is, the arches AM and AF may be taken proportional to their chords. Wherefore, ſince MN is parallel to FG, we ſhall have AF : FG :: AM : MN; therefore AF, FG, and AM, being given, MN is eaſily had.

Sines, *to conſtruct a canon of.* The *ſines* of 30° 15° 45° and 36° (which we have already ſhewn how to find) being had; we can thence conſtruct a canon of all the *ſines* to every minute, or every ſecond. For from the *ſine* of 36° we find thoſe of 18° 9° 4° 30′, and 2° 15′, by the ſecond problem: the *ſines* of 54° 72° 81° 85° 30′, and 87° 45′, &c. by the firſt problem.

Again, from the *ſine* of 45°, find the *ſine* of 22° 30′ 11° 15′, &c. From the *ſine* of 30°, and the *ſine* of 54°, find the *ſine* of 12°. From the *ſine* of 12°, find the *ſines* of 6° 3° 1° 30′ 45′ 78° 84°, &c. From the *ſine* of 15°, find the *ſine* of 7° 30′ 3° 45′, &c. till you have 120 *ſines* ſucceeding each other orderly, at an interval of 45 minutes. Between theſe, find the intermediate *ſines* by the fourth problem: thus will the canon be complete.

From the Sine of an arch given, to find the tangent and ſecant. See Tangent, Secant, and ſequel of this article.

To find the logarithm of a given Sine, called the *artificial ſine*, ſee Logarithm. Wolſii Element. Math. vol. i. p. 214, &c.

There are various other methods of conſtructing the triangular or trigonometrical canon. We ſhall here ſubjoin the following, as the moſt ſimple and eaſy. But it will be neceſſary to premiſe the three ſubſequent propoſitions.

1. *The* Sine EF *of an arch* AE (*fig.* 9.) *being given, to find its coſine* CF, *verſed* ſine AF, *tangent* AT, *cotangent* DH, *ſecant* CT, *and coſecant* CH. The *coſine* CF is evidently $= \sqrt{CE^2 - EF^2}$, and the verſed *ſine* = CE or CA − CF. And the triangles CFE, CAT, and CDH being ſimilar, we ſhall have CF : FE :: CA : AT; or the tangent will be a fourth proportional to the *coſine*, the *ſine*, and radius; and CF : CE (CA) :: CA : CT, whence the ſecant is a third proportional to the *coſine* and radius; and EF : CF :: CD : DH, or the cotangent is a fourth proportional to the *ſine*, *coſine*, and radius; and EF : EC (CD) :: CD : DH, or the coſecant is a third proportional to the *ſine* and radius. Moreover, becauſe AT : AC :: CD (AC) : DH, the rectangle of the tangent and cotangent is equal to the ſquare of the radius, and, therefore, the tangent of half a right angle, being equal to its cotangent, is equal to the radius; and the cotangents of any two different arches (repreſented by P and Q), are to one another inverſely as their tangents; for tang. P × cotang. P = rad.^{2} = tang. Q × cotang. Q: therefore cotang. P : cotang. Q :: tang. Q : tang. P, or cotang. P : tang. Q :: cotang. Q : tang. P.

2. *If there be three equidifferent arches* AB, AC, AD, (*fig.* 10.) *we ſhall have radius to the coſine of their common difference* BC, *or* CD, *as the* ſine CF *of the mean to half the ſum of the* ſines BE + DG *of the two extremes; and as radius to the* ſine *of the common difference, ſo is the coſine of the mean to half the difference of the* ſines *of the two extremes.* For let BD be drawn, interſecting OC in *m*; alſo draw *mn* parallel to CF, and BH and *mv* parallel to AO. The arches BC and CD being equal, OC is perpendicular to BD, and biſects it; and, therefore, B*m* or D*m* will be the *ſine* of BC or DC, and O*m* its *coſine*. Moreover, *mn*, being an arithmetical mean between the *ſines* BE, DG of the two extremes (becauſe B*m* = D*m*) is, therefore, equal to half their ſum, and D*v* equal to half their difference. But the triangles OCF, O*mn*, and D*vm*, being ſimilar, we ſhall have OC : O*m* :: CF : *mn*, and OC : D*m* :: FO : D*v*. Whence $mn\left(\frac{DG+BE}{2}\right)=\frac{Om\times CF}{OC}$, and $Dv\left(\frac{DG-BE}{2}\right)=\frac{Dm\times FO}{OC}$, and conſequently $DG+BE=\frac{2Om\times CF}{OC}$ and $DG-BE=\frac{2Dm\times FO}{OC}$. And, moreover, if the mean arch AC be 60°, OF its *coſine* will be = *ſine* 30° = $\frac{1}{2}$ chord 60° = $\frac{1}{2}$ OC; conſequently DG − BE will, in this caſe, be barely = D*m*, and DG = D*m* + BE. Hence it follows, 1. That if the *ſine* of the mean of three equidifferent arches (radius being unity) be multiplied by twice the *coſine* of the common difference, and the *ſine* of either extreme be ſubtracted from the product, the remainder will be the *ſine* of the other extreme. And, 2. The *ſine* of any arch above 60° is equal to the *ſine* of another arch, as much below 60°, together with the *ſine* of its exceſs above 60°.

3. *To find the* Sine *of a very ſmall arch,* e. gr. of 15′. The chords of very ſmall arches being to each other nearly as the arches themſelves, we ſhall have $\frac{1}{384}$th of the ſemiperiphery : $\frac{1}{360}$th (:: 360 : 384) :: ,00818121, the chord of $\frac{1}{384}$th : ,008726624, the chord of $\frac{1}{360}$th of the ſemiperiphery, or half a degree, whoſe half or ,004363312, is the *ſine* of 15′, very nearly; and, therefore, 15′ : 1′ :: ,004363312 : ,000290888, the *ſine* of the arch of 1′ nearly.

Upon the foregoing principles the canon may be eaſily conſtructed. For, the *ſine* of 1′ being ,0002908882, its ſquare is ,00000008461594, which, ſubtracted from the ſquare of the radius 1, leaves ,99999991538406, whoſe ſquare root ,9999999577, is the *coſine* of 1′, or the *ſine* of 89° 59′. Now having the *ſine* and *coſine* of 1′, the other *ſines* may be found in the following manner. Let the *coſine* of 1′ be called C, and we ſhall have by prop. 2. ſupra,

2C × *ſine* 1′ — *ſine* 0′ = *ſine* 2′ = ,0005817764
2C × *ſine* 2′ — *ſine* 1′ = *ſine* 3′ = ,0008726645
2C × *ſine* 3′ — *ſine* 2′ = *ſine* 4′ = ,0011635526
2C × *ſine* 4′ — *ſine* 3′ = *ſine* 5′ = ,0014544406
2C × *ſine* 5′ — *ſine* 4′ = *ſine* 6′ = ,0017453283, &c.

Thus are the *ſines* of 7′, 8′, 9′, &c. ſucceſſively derived from each other. The *ſines* of every degree and minute, up to 60°, being thus found; thoſe of above 60° will be had by addition only, by prop. 2. ſupra; and the *ſines* being all known, the tangents and ſecants will likewiſe become known by prop. 1. ſupra. If all theſe numbers be multiplied by the radius of any table (radius being here ſuppoſed unity), we ſhall have the natural *ſines*, tangents, &c. of ſuch a table. It will be ſufficient to compute the *ſine* of every fifth minute only by the preceding method; becauſe the ſines of all the intermediate arches may be had from them, by taking the proportional parts of the differences ſo near as to give the firſt ſix places true in each number. E. gr. 2C 5′ × *ſine* 5′ —

ſine 0′ = *ſine* 10′; ſubtract the *ſine* 5′ from that of 10′; add $\frac{1}{5}$ of the remainder to the *ſine* 5′, for the *ſine* of 6′, to which add the ſame $\frac{1}{5}$th for the *ſine* of 7′, &c. to 10′. Again, 2 C 5′ × *ſine* 10′ − *ſine* 5′ = *ſine* 15′, &c. Simpſon's Trigonometry, p. 10, &c. Robertſon's Elem. Navig. book iii. § 2.

The tables now chiefly uſed in trigonometrical computations, exhibit the logarithms of thoſe numbers, which expreſs the lengths of the *ſines*, tangents, &c. which, in order to diſtinguiſh them from the natural ones, are called logarithmic or artificial *ſines*, tangents, &c. A table of this kind, the uſe of which often occurs in the courſe of this work, is here annexed. The *ſines*, tangents, &c. of any arch are eaſily found, by ſeeking the degree at the top, if the arch be leſs than 45°, and the minutes at the ſide, beginning from the top, and by ſeeking the degree, &c. at the bottom, if the arch is greater than 45°. If a given logarithmic *ſine*, or tangent, falls between thoſe in the tables, then the correſponding degrees and minutes may be reckoned $\frac{1}{4}$, $\frac{1}{3}$, or $\frac{1}{2}$, &c. minutes more than thoſe belonging to the neareſt leſs logarithm in the tables, according as its difference from the given one is $\frac{1}{4}$, or $\frac{1}{3}$, or $\frac{1}{2}$, &c. of the difference between the logarithm next greater and next leſs than the given log. See Sherwin's Mathematical Tables, which contain both the natural and artificial *ſines*, &c. and Gardiner's Tables of Logarithms, &c. in which the logarithms of the *ſines* are computed to every ſecond in the firſt ſeventy-two minutes of the quadrant.

A Logarithmic Canon, or TABLE of Artificial *Sines* and Tangents; the Radius 10,0000000.

Minut.	0 Degree				
	Sine	Sine Complem.	Tang.	Tangent Complem.	
0	0,0000000	10,0000000	0,0000000	Infinite	60
1	6,4637261	9,9999999	6,4637261	13,5362739	59
2	6,7647561	9,9999999	6,7647562	13,2352438	58
3	6,9408473	9,9999998	6,9408475	13,0591525	57
4	7,0657860	9,9999997	7,0657863	12,9342137	56
5	7,1626960	9,9999995	7,1626964	12,8373036	55
6	7,2418771	9,9999993	7,2418778	12,7581222	54
7	7,3088239	9,9999991	7,3088248	12,6911752	53
8	7,3668157	9,9999988	7,3668169	12,6331831	52
9	7,4179681	9,9999985	7,4179696	12,5820304	51
10	7,4637255	9,9999982	7,4637173	12,5362727	50
11	7,5051181	9,9999978	7,5051203	12,4948797	49
12	7,5429065	9,9999974	7,5429091	12,4570909	48
13	7,5776684	9,9999969	7,5776715	12,4223284	47
14	7,6098530	9,9999964	7,6098566	12,3901434	46
15	7,6398160	9,9999959	7,6398201	12,3601799	45
16	7,6678445	9,9999953	7,6678492	12,3321508	44
17	7,6941733	9,9999947	7,6941786	12,3058214	43
18	7,7189966	9,9999940	7,7190026	12,2709974	42
19	7,7424775	9,9999934	7,7424841	12,2575159	41
20	7,7647537	9,9999927	7,7647610	12,2352390	40
21	7,7859427	9,9999919	7,7859508	12,2140492	39
22	7,8061458	9,9999911	7,8061547	12,1938453	38
23	7,8254507	9,9999903	7,8254604	12,1745396	37
24	7,8439338	9,9999894	7,8439444	12,1560556	36
25	7,8616623	9,9999885	7,8616738	12,1383262	35
26	7,8786953	9,9999876	7,8787077	12,1212923	34
27	7,8960854	9,9999866	7,8950988	12,1049012	33
28	7,9108793	9,9999856	7,9108938	12,0891062	32
29	7,9261190	9,9999845	7,9261344	12,0738656	31
30	7,9408419	9,9999835	7,9408584	12,0591416	30
31	7,9550819	9,9999823	7,9550996	12,0449004	29
32	7,9688698	9,9999812	7,9688886	12,0311114	28
33	7,9822334	9,9999800	7,9822534	12,0177466	27
34	7,9951980	9,9999788	7,9952192	12,0047808	26
35	8,0077867	9,9999775	8,0078092	11,9911908	25
36	8,0200207	9,9999762	8,0200445	11,9799555	24
37	8,0319195	9,9999748	8,0319446	11,9680554	23
38	8,0435009	9,9999735	8,0435274	11,9564726	22
39	8,0547814	9,9999721	8,0548094	11,9451906	21
40	8,0657763	9,9999706	8,0658057	11,9341943	20
41	8,0764997	9,9999691	8,0765306	11,9234694	19
42	8,0869646	9,9999676	8,0869970	11,9130030	18
43	8,0971832	9,9999660	8,0972172	11,9027828	17
44	8,1071669	9,9999644	8,1072025	11,8927975	16
45	8,1169262	9,9999628	8,1169634	11,8830366	15
46	8,1264710	9,9999611	8,1265099	11,8734901	14
47	8,1358104	9,9999594	8,1358510	11,8641490	13
48	8,1449532	9,9999577	8,1449956	11,8550044	12
49	8,1539075	9,9999559	8,1539516	11,8460484	11
50	8,1626808	9,9999541	8,1627267	11,8372733	10
51	8,1712804	9,9999522	8,1713282	11,8286718	9
52	8,1797129	9,9999503	8,1797626	11,8202374	8
53	8,1879848	9,9999484	8,1880364	11,8119636	7
54	8,1961020	9,9999464	8,1961556	11,8038444	6
55	8,2040703	9,9999444	8,2041259	11,7958741	5
56	8,2118949	9,9999424	8,2119526	11,7880474	4
57	8,2195811	9,9999403	8,2196408	11,7803592	3
58	8,2271335	9,9999382	8,2271953	11,7728047	2
59	8,2345568	9,9999360	8,2346208	11,7653792	1
60	8,2418553	9,9999338	8,2419215	11,7580785	0
	Sine Complem.	Sine	Tangent Complem.	Tang.	Minut.
	89 Degrees				

Minut.	1 Degree				
	Sine	Sine Complem.	Tang.	Tangent Complem.	
0	8,2418553	9,9999338	8,2419215	11,7580785	60
1	8,2490332	9,9999316	8,2491015	11,7508985	59
2	8,2560943	9,9999294	8,2561649	11,7438351	58
3	8,2630424	9,9999271	8,2631153	11,7368847	57
4	8,2698810	9,9999247	8,2699563	11,7300437	56
5	8,2766136	9,9999254	8,2766912	11,7233088	55
6	8,2832434	9,9999200	8,2833234	11,7166766	54
7	8,2897734	9,9999175	8,2898559	11,7101441	53
8	8,2962067	9,9999150	8,2962917	11,7037083	52
9	8,3025460	9,9999125	8,3026335	11,6973665	51
10	8,3087911	9,9999100	8,3088842	11,6911158	50
11	8,3149536	9,9999074	8,3150462	11,6849538	49
12	8,3210269	9,9999047	8,3211221	11,6788779	48
13	8,3270163	9,9999021	8,3271143	11,6728857	47
14	8,3329243	9,9998994	8,3330249	11,6669751	46
15	8,3387529	9,9998966	8,3388563	11,6611437	45
16	8,3445043	9,9998939	8,3446105	11,6553895	44
17	8,3501805	9,9998911	8,3502895	11,6497105	43
18	8,3557835	9,9998882	8,3558953	11,6441047	42
19	8,3613150	9,9998853	8,3614297	11,6385703	41
20	8,3667769	9,9998824	8,3668945	11,6331055	40
21	8,3721710	9,9998794	8,3722915	11,6277085	39
22	8,3774988	9,9998764	8,3776223	11,6223777	38
23	8,3827620	9,9998734	8,3828886	11,6171114	37
24	8,3879622	9,9998703	8,3880918	11,6119082	36
25	8,3931008	9,9998672	8,3932336	11,6067664	35
26	8,3981793	9,9998641	8,3983152	11,6016848	34
27	8,4031990	9,9998609	8,4033381	11,5966619	33
28	8,4081614	9,9998577	8,4083037	11,5916963	32
29	8,4130676	9,9998544	8,4132132	11,5867868	31
30	8,4179190	9,9998512	8,4180679	11,5819321	30
31	8,4227168	9,9998478	8,4228690	11,5771310	29
32	8,4274621	9,9998445	8,4276176	11,5723824	28
33	8,4321561	9,9998411	8,4323150	11,5676850	27
34	8,4367999	9,9998376	8,4369622	11,5630378	26
35	8,4413944	9,9998342	8,4415603	11,5584397	25
36	8,4459409	9,9998306	8,4461103	11,5538897	24
37	8,4504402	9,9998271	8,4506131	11,5493869	23
38	8,4548934	9,9998235	8,4550699	11,5449301	22
39	8,4593013	9,9998199	8,4594814	11,5405186	21
40	8,4636649	9,9998162	8,4638486	11,5361514	20
41	8,4679850	9,9998125	8,4681725	11,5318275	19
42	8,4722626	9,9998088	8,4724538	11,5275462	18
43	8,4764984	9,9998050	8,4766933	11,5233067	17
44	8,4806932	9,9998012	8,4808920	11,5191080	16
45	8,4848479	9,9997974	8,4850505	11,5149495	15
46	8,4889632	9,9997935	8,4891696	11,5108304	14
47	8,4930398	9,9997896	8,4932502	11,5067498	13
48	8,4970784	9,9997856	8,4972928	11,5027072	12
49	8,5010798	9,9997817	8,5012982	11,4987018	11
50	8,5050447	9,9997776	8,5052671	11,4947329	10
51	8,5089736	9,9997736	8,5092001	11,4907999	9
52	8,5128673	9,9997695	8,5130978	11,4869022	8
53	8,5167264	9,9997653	8,5169610	11,4830387	7
54	8,5205514	9,9997612	8,5207902	11,4792098	6
55	8,5243430	9,9697570	8,5245860	11,4754149	5
56	8,5281017	9,9997527	8,5283490	11,4716510	4
57	8,5318281	9,9997484	8,5320797	11,4679203	3
58	8,5355228	9,9997441	8,5357787	11,4642213	2
59	8,5391863	9,9997398	8,5394466	11,4605534	1
60	8,5428192	9,9997354	8,5430838	11,4569162	0
	Sine Complem.	Sine	Tangent Complem.	Tang.	Minut.
	88 Degrees				

2 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	8,5428192	9,9997354	8,5430838	11,4569162	60
1	8,5464218	9,9997309	8,5466909	11,4533091	59
2	8,5499948	9,9997265	8,5502683	11,4497317	58
3	8,5535386	9,9997220	8,5538166	11,4461834	57
4	8,5570536	9,9997174	8,5573362	11,4426638	56
5	8,5605404	9,9997128	8,5608276	11,4391724	55
6	8,5639994	9,9997082	8,5642912	11,4357088	54
7	8,5674310	9,9997036	8,5677275	11,4322725	53
8	8,5708357	9,9996989	8,5711368	11,4288632	52
9	8,5742139	9,9996942	8,5745197	11,4254803	51
10	8,5775660	9,9996894	8,5778766	11,4221234	50
11	8,5808923	9,9996846	8,5812077	11,4187923	49
12	8,5841933	9,9996798	8,5845136	11,4154864	48
13	8,5874694	9,9996749	8,5877945	11,4122055	47
14	8,5907209	9,9996700	8,5910509	11,4089491	46
15	8,5939483	9,9996650	8,5942832	11,4057168	45
16	8,5971517	9,9996601	8,5974917	11,4025083	44
17	8,6003317	9,9996550	8,6006767	11,3993233	43
18	8,6034886	9,9996500	8,6038386	11,3961614	42
19	8,6066226	9,9996449	8,6069777	11,3930223	41
20	8,6097341	9,9996398	8,6100943	11,3899057	40
21	8,6128235	9,9996346	8,6131889	11,3868111	39
22	8,6158910	9,9996294	8,6162616	11,3837384	38
23	8,6189369	9,9996242	8,6193127	11,3806873	37
24	8,6219616	9,9996189	8,6223427	11,3776573	36
25	8,6249653	9,9996136	8,6253518	11,3746482	35
26	8,6279484	9,9996082	8,6283402	11,3716598	34
27	8,6309111	9,9996028	8,6313083	11,3686917	33
28	8,6338537	9,9995974	8,6342563	11,3657437	32
29	8,6367764	9,9995919	8,6371845	11,3628155	31
30	8,6396796	9,9995865	8,6400931	11,3599059	30
31	8,6425634	9,9995809	8,6429825	11,3570175	29
32	8,6454282	9,9995753	8,6458528	11,3541472	28
33	8,6482742	9,9995697	8,6487044	11,3512956	27
34	8,6511016	9,9995641	8,6515375	11,3484625	26
35	8,6539107	9,9995584	8,6543522	11,3456478	25
36	8,6567017	9,9995527	8,6571490	11,3428510	24
37	8,6594748	9,9995469	8,6599279	11,3400721	23
38	8,6622303	9,9995411	8,6626891	11,3373109	22
39	8,6649684	9,9995353	8,6654331	11,3345669	21
40	8,6676893	9,9995297	8,6681598	11,3318402	20
41	8,6703932	9,9995236	8,6708697	11,3291303	19
42	8,6730804	9,9995176	8,6735628	11,3264372	18
43	8,6757510	9,9995116	8,6762393	11,3237607	17
44	8,6784052	9,9995056	8,6788996	11,3211004	16
45	8,6810433	9,9994996	8,6815437	11,3184563	15
46	8,6836654	9,9994935	8,6841719	11,3158281	14
47	8,6862718	9,9994874	8,6867844	11,3132156	13
48	8,6888625	9,9994812	8,6893813	11,3106187	12
49	8,6914379	9,9994750	8,6919629	11,3080371	11
50	8,6939985	9,9994688	8,6945292	11,3054708	10
51	8,6965431	9,9994625	8,6970806	11,3029194	9
52	8,6990734	9,9994562	8,6996172	11,3003828	8
53	8,7015889	9,9994498	8,7021390	11,2978610	7
54	8,7040899	9,9994435	8,7046465	11,2953535	6
55	8,7065766	9,9994370	8,7071395	11,2928605	5
56	8,7090490	9,9994306	8,7096185	11,2903815	4
57	8,7115075	9,0994241	8,7120384	11,2879616	3
58	8,7139520	9,9994176	8,7145345	11,2854655	2
59	8,7163829	9,9994110	8,7169719	11,2830281	1
60	8,7188002	9,9994044	8,7193958	11,2806042	0
	Sine Comp	Sine	Tang.Comp	Tang.	Min

87 Degrees

3 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	8,7188002	9,9994044	8,7193958	11,2806042	60
1	8,7212040	9,9993978	8,7218063	11,2781937	59
2	8,7235946	9,9993911	8,7242035	11,2757965	58
3	8,7259721	9,9993844	8,7265877	11,2734123	57
4	8,7283366	9,9993776	8,7289589	11,2710411	56
5	8,7306882	9,9993708	8,7313174	11,2686826	55
6	8,7330272	9,9993640	8,7336631	11,2663369	54
7	8,7353535	9,9993572	8,7359964	11,2640036	53
8	8,7376675	9,9993503	8,7383172	11,2616828	52
9	8,7399698	9,9993433	8,7406258	11,2593742	51
10	8,7422586	9,9993364	8,7429222	11,2570778	50
11	8,7445360	9,9993293	8,7452067	11,2547933	49
12	8,7468015	9,9993223	8,7474792	11,2525208	48
13	8,7490553	9,9993152	8,7497400	11,2502600	47
14	8,7512973	9,9993081	8,7519892	11,2480108	46
15	8,7535278	9,9993009	8,7542269	11,2457731	45
16	8,7557469	9,9992938	8,7564531	11,2435469	44
17	8,7579546	9,9992865	8,7586681	11,2413319	43
18	8,7601512	9,9992793	8,7608719	11,2391281	42
19	8,7623366	9,9992720	8,7630647	11,2369353	41
20	8,7645111	9,9992646	8,7652465	11,2347535	40
21	8,7666747	9,9992572	8,7674175	11,2325825	39
22	8,7688275	9,9992498	8,7695777	11,2304223	38
23	8,7709697	9,9992424	8,7717274	11,2282726	37
24	8,7731014	9,9992349	8,7738665	11,2261335	36
25	8,7752226	9,9992274	8,7759952	11,2240048	35
26	8,7773334	9,9992198	8,7781136	11,2218864	34
27	8,7794340	9,9992122	8,7802218	11,2197782	33
28	8,7815244	9,9992046	8,7823199	11,2176801	32
29	8,7836048	9,9991969	8,7844079	11,2155921	31
30	8,7856753	9,9991892	8,7864861	11,2135139	30
31	8,7877359	9,9991815	8,7885544	11,2114456	29
32	8,7897867	9,9991737	8,7906130	11,2093870	28
33	8,7918278	9,9991659	8,7926620	11,2073380	27
34	8,7938594	9,9991580	8,7947014	11,2052986	26
35	8,7958814	9,9991501	8,7967313	11,2032687	25
36	8,7978941	9,9991422	8,7987519	11,2012481	24
37	8,7998974	9,9991342	8,8007632	11,1992368	23
38	8,8018915	9,9991262	8,8027653	11,1972347	22
39	8,8038764	9,9991182	8,8047583	11,1952417	21
40	8,8058523	9,9991101	8,8067422	11,1932578	20
41	8,8078192	9,9991020	8,8087172	11,1912828	19
42	8,8097772	9,9990938	8,8106834	11,1893166	18
43	8,8117264	9,9990856	8,8126407	11,1873593	17
44	8,8136668	9,9990774	8,8145894	11,1854106	16
45	8,8155985	9,9990691	8,8165294	11,1834706	15
46	8,8175217	9,9990608	8,8184608	11,1815392	14
47	8,8194363	9,9990525	8,8203838	11,1796162	13
48	8,8213425	9,9990441	8,8222984	11,1777016	12
49	8,8232404	9,9990357	8,8242046	11,1757954	11
50	8,8251299	9,9990273	8,8261026	11,1738974	10
51	8,8270112	9,9990188	8,8279924	11,1720076	9
52	8,8288844	9,9990103	8,8298741	11,1701259	8
53	8,8307495	9,9990017	8,8317478	11,1682522	7
54	8,8326066	9,9989931	8,8336134	11,1663866	6
55	8,8344557	9,9989845	8,8354712	11,1645288	5
56	8,8362969	9,9989758	8,8373211	11,1626789	4
57	8,8381304	9,9989671	8,8391633	11,1608367	3
58	8,8399561	9,9989584	8,8409977	11,1590023	2
59	8,8417741	9,9989496	8,8428245	11,1571755	1
60	8,8435845	9,9989408	8,8446437	11,1553563	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

86 Degrees

4 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	8,8435845	9,9989408	8,8446437	11,1553563	60
1	8,8453874	9,9989319	8,8464554	11,1535446	59
2	8,8471827	9,9989230	8,8482597	11,1517403	58
3	8,8489707	9,9989141	8,8500566	11,1499435	57
4	8,8507512	9,9989052	8,8518461	11,1481539	56
5	8,8525245	9,9988962	8,8536283	11,1463717	55
6	8,8542905	9,9988871	8,8554039	11,1445966	54
7	8,8560493	9,9988780	8,8571713	11,1428287	53
8	8,8578010	9,9988689	8,8589321	11,1410679	52
9	8,8595457	9,9988598	8,8606859	11,1393141	51
10	8,8612833	9,9988506	8,8624327	11,1375673	50
11	8,8630139	9,9988414	8,8641725	11,1358275	49
12	8,8647376	9,9988321	8,8659055	11,1340945	48
13	8,8664545	9,9988228	8,8676317	11,1323683	47
14	8,8681646	9,9988135	8,8693511	11,1306489	46
15	8,8698680	9,9988041	8,8710638	11,1289362	45
16	8,8715646	9,9987947	8,8727699	11,1272301	44
17	8,8732546	9,9987853	8,8744694	11,1255306	43
18	8,8749381	9,9987758	8,8761623	11,1238377	42
19	8,8766150	9,9987663	8,8778487	11,1221513	41
20	8,8782854	9,9987567	8,8795286	11,1204714	40
21	8,8799493	9,9987471	8,8812022	11,1187978	39
22	8,8816069	9,9987375	8,8828694	11,1171306	38
23	8,8832581	9,9987278	8,8845303	11,1154697	37
24	8,8849031	9,9987181	8,8861850	11,1138150	36
25	8,8865418	9,9987084	8,8878334	11,1121666	35
26	8,8881743	9,9986986	8,8894757	11,1105243	34
27	8,8898007	9,9986888	8,8911119	11,1088881	33
28	8,8914209	9,9986790	8,8927420	11,1072580	32
29	8,8930351	9,9986691	8,8943660	11,1056340	31
30	8,8946433	9,9986591	8,8959842	11,1040158	30
	Sine Comp	Sine	Tang.Comp.	Tang.	Min.

85 Degrees

4 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
30	8,8946433	9,9986591	8,8959842	11,1040158	30
31	8,8962455	9,9986492	8,8975963	11,1024037	29
32	8,8978418	9,9986392	8,8992026	11,1007974	28
33	8,8994322	9,9986292	8,9008030	11,0991970	27
34	8,9010168	9,9986191	8,9023977	11,0976023	26
35	8,9025955	9,9986090	8,9039866	11,0960134	25
36	8,9041685	9,9985988	8,9055697	11,0944303	24
37	8,9057358	9,9985886	8,9071472	11,0928528	23
38	8,9072975	9,9985784	8,9087190	11,0912810	22
39	8,9088535	9,9985682	8,9102853	11,0897147	21
40	8,9104039	9,9985579	8,9118460	11,0881540	20
41	8,9119487	9,9985475	8,9134012	11,0865988	19
42	8,9134881	9,9985372	8,9149509	11,0850491	18
43	8,9150219	9,9985268	8,9164952	11,0835048	17
44	8,9165504	9,9985163	8,9180340	11,0819660	16
45	8,0180734	9,9985058	8,9195675	11,0804325	15
46	8,9195911	9,9984953	8,9210957	11,0789043	14
47	8,9211034	9,9984848	8,9226186	11,0773814	13
48	8,9226105	9,9984742	8,9241363	11,0758637	12
49	8,9241123	9,9984636	8,9256487	11,0743513	11
50	8,9256089	9,9984529	8,9271560	11,0728440	10
51	8,9271003	9,9984422	8,9286581	11,0713419	9
52	8,9285866	9,9984315	8,9301552	11,0698448	8
53	8,9300678	9,9984207	8,9316471	11,0683529	7
54	8,9315439	9,9984099	8,9331340	11,0668660	6
55	8,9330150	9,9983990	8,9346160	11,0653840	5
56	8,9344811	9,9983881	8,9360929	11,0639071	4
57	8,9359422	9,9983772	8,9375650	11,0624350	3
58	8,9373983	9,9983663	8,9390321	11,0609679	2
59	8,9388496	9,9983553	8,9404944	11,0595056	1
60	8,9402960	9,9983442	8,9419518	11,0580482	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

85 Degrees

5 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	8.9402960	9.9983442	8.9419518	11.0580482	60
1	8.9417576	9.9983332	8.9434044	11.0565956	59
2	8.9431743	9.9983220	8.9448523	11.0551477	58
3	8.9446063	9.9983109	8.9462954	11.0537046	57
4	8.9460335	9.9982997	8.9477338	11.0522662	56
5	8.9474561	9.9982885	8.9491676	11.0508324	55
6	8.9488739	9.9982772	8.9505967	11.0494033	54
7	8.9502871	9.9982660	8.9520211	11.0479789	53
8	8.9516957	9.9982546	8.9534410	11.0465590	52
9	8.9530996	9.9982433	8.9548564	11.0451436	51
10	8.9544991	9.9982318	8.9562672	11.0437328	50
11	8.9558940	9.9982204	8.9576735	11.0423265	49
12	8.9572843	9.9982089	8.9590754	11.0409246	48
13	8.9586703	9.9981974	8.9604728	11.0396272	47
14	8.9600517	9.9981859	8.9618659	11.0381341	46
15	8.9614288	9.9981743	8.9632545	11.0367455	45
16	8.9628014	9.9981629	8.9646386	11.0353614	44
17	8.9641697	9.9981510	8.9660188	11.0339812	43
18	8.9655337	9.9981393	8.9673944	11.0326056	42
19	8.9668934	9.9981275	8.9687658	11.0312342	41
20	8.9682487	9.9981158	8.9701330	11.0298670	40
21	8.9695999	9.9981040	8.9714959	11.0285041	39
22	8.9709468	9.9980921	8.9728547	11.0271453	38
23	8.9722895	9.9980802	8.9742092	11.0257908	37
24	8.9736280	9.9980683	8.9755597	11.0244403	36
25	8.9749624	9.9980563	8.9769060	11.0230940	35
26	8.9762926	9.9980443	8.9782483	11.0217517	34
27	8.9776188	9.9980323	8.9795865	11.0204135	33
28	8.9789408	9.9980202	8.9809206	11.0190794	32
29	8.9802589	9.9980081	8.9822507	11.0177493	31
30	8.9815729	9.9979960	8.9835769	11.0164231	30
31	8.9828829	9.9979838	8.9848991	11.0151009	29
32	8.9841889	9.9979716	8.9862173	11.0137827	28
33	8.9854910	9.9979593	8.9875317	11.0124683	27
34	8.9867891	9.9979470	8.9888421	11.0111579	26
35	8.9880834	9.9979347	8.9901487	11.0098513	25
36	8.9893737	9.9979223	8.9914514	11.0085486	24
37	8.9906602	9.9979099	8.9927503	11.0072497	23
38	8.9919429	9.9978975	8.9940454	11.0059546	22
39	8.9932217	9.9978850	8.9953367	11.0046633	21
40	8.9944968	9.9978725	8.9966243	11.0033757	20
41	8.9957681	9.9978599	8.9979081	11.0020919	19
42	8.9970356	9.9978473	8.9991883	11.0008117	18
43	8.9982994	9.9978347	9.0004647	10.9995353	17
44	8.9995595	9.9978220	9.0017375	10.9982625	16
45	9.0008160	9.9978093	9.0030066	10.9969934	15
46	9.0020687	9.9977966	9.0042721	10.9957279	14
47	9.0033179	9.9977838	9.0055340	10.9944660	13
48	9.0045634	9.9977710	9.0067924	10.9932076	12
49	9.0058053	9.9977582	9.0080471	10.9919529	11
50	9.0070436	9.9977453	9.0092984	10.9907016	10
51	9.0082784	9.9977323	9.0105461	10.9894539	9
52	9.0095096	9.9977194	9.0117903	10.9882097	8
53	9.0107374	9.9977064	9.0130310	10.9869690	7
54	9.0119616	9.9976933	9.0142682	10.9857318	6
55	9.0131823	9.9976802	9.0155021	10.9844979	5
56	9.0143996	9.9976672	9.0167325	10.9832675	4
57	9.0156135	9.9976540	9.0179594	10.9820406	3
58	9.0168239	9.9976408	9.0191831	10.9808169	2
59	9.0180309	9.9976276	9.0204033	10.9795967	1
60	9.0192346	9.9976143	9.0216202	10.9783798	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

84 Degrees

6 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.0192346	9.9976143	9.0216202	10.9783798	60
1	9.0204348	9.9976011	9.0228338	10.9771662	59
2	9.0216318	9.9975877	9.0240441	10.9759559	58
3	9.0228254	9.9975743	9.0252510	10.9747490	57
4	9.0240157	9.9975609	9.0264548	10.9735452	56
5	9.0252027	9.9975475	9.0276552	10.9723448	55
6	9.0263865	9.9975340	9.0288524	10.9711476	54
7	9.0275669	9.9975205	9.0300464	10.9699536	53
8	9.0287442	9.9975069	9.0312373	10.9687627	52
9	9.0299182	9.9974933	9.0324249	10.9675751	51
10	9.0310890	9.9974797	9.0336093	10.9663907	50
11	9.0322567	9.9974660	9.0347906	10.9652094	49
12	9.0334212	9.9974523	9.0359688	10.9640312	48
13	9.0345825	9.9974386	9.0371439	10.9628561	47
14	9.0357407	9.9974248	9.0383159	10.9616841	46
15	9.0368958	9.9974110	9.0394848	10.9605152	45
16	9.0380477	9.9973971	9.0406506	10.9593494	44
17	9.0391966	9.9973833	9.0418134	10.9581866	43
18	9.0403424	9.9973693	9.0429731	10.9570269	42
19	9.0414852	9.9973554	9.0441299	10.9558701	41
20	9.0426249	9.9973414	9.0452836	10.9547164	40
21	9.0437617	9.9973273	9.0464343	10.9535657	39
22	9.0448954	9.9973132	9.0475821	10.9524179	38
23	9.0460261	9.9972991	9.0487270	10.9512730	37
24	9.0471538	9.9972850	9.0498689	10.9501311	36
25	9.0482786	9.9972708	9.0510078	10.9489922	35
26	9.0494005	9.9972566	9.0521439	10.9478561	34
27	9.0505194	9.9972423	9.0532771	10.9467229	33
28	9.0516354	9.9972280	9.0544074	10.9455926	32
29	9.0527485	9.9972137	9.0555349	10.9444651	31
30	9.0538588	9.9971993	9.0566595	10.9433405	30
31	9.0549661	9.9971849	9.0577813	10.9422187	29
32	9.0560706	9.9971704	9.0589002	10.9410998	28
33	9.0571723	9.9971559	9.0600164	10 9399836	27
34	9.0582711	9.9971414	9.0611297	10.9388703	26
35	9.0593671	9.9971268	9.0622403	10.9377597	25
36	9.0604604	9.9971122	9.0633482	10.9366518	24
37	9.0615509	9.9970976	9.0644533	10.9355467	23
38	9.0626386	9.9970829	9.0655556	10.9344444	22
39	9.0637235	9.9970682	9.0666553	0.9333447	21
40	9.0648057	9.9970535	9.0677522	10.9322478	20
41	9.0658852	9.9970387	9.0688465	10.9311535	19
42	9.0669619	9.9970238	9.0699381	10.9300619	18
43	9.0680360	9.9970090	9.0710270	10.9289730	17
44	9.0691074	9.9969941	9.0721133	10.9278867	16
45	9.0701761	9.9969792	9.0731969	10.9268031	15
46	9.0712421	9.9969642	9.0742779	10.9257221	14
47	9.0723055	9.9969492	9.0753563	10.9246437	13
48	9.0733663	9.9969342	9.0764321	10.9235679	12
49	9.0744244	9.9969191	9.0775053	10.9224947	11
50	9.0754799	9.9969040	.0785760	10.9214240	10
51	9.0765329	9.9968888	9.0796441	10.9203559	9
52	9.0775832	9.9968736	9.0807096	10.9192904	8
53	9.0786310	9.9968584	9.0817726	10.9182274	7
54	9.0796762	9.9968431	9.0828331	10.9171669	6
55	9.0807189	9.9968278	9.0838911	10.9161089	5
56	9.0817590	9.9968125	9.0849466	10.9150534	4
57	9.0827966	9.9967971	9.0859996	10.9140004	3
58	9.0838317	9.9967817	9.0870501	10.9129499	2
59	9.0848643	9.9967662	9.0880981	10.9119019	1
60	9.0858945	9.9967507	9.0891438	10.9108562	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

83 Degrees

7 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.0858945	9.9967507	9.0891438	10.9108562	60
1	9.0869221	9.9967352	9.0901869	10.9098131	59
2	9.0879473	9.9967196	9.0912277	10.9087723	58
3	9.0889700	9.9967040	9.0922660	0.9077340	57
4	9.0899903	9.9966884	9.0933020	10.9066980	56
5	9.0910082	9.9966727	9.0943355	10.9056645	55
6	9.0920237	9.9966570	9.0953667	10.9046333	54
7	9.0930367	9.9966412	9.0963955	10.9036045	53
8	9.0940474	9.9966254	9.0974219	10.9025781	52
9	9.0950556	9.9966096	9.0984460	10.9015540	51
10	9.0960615	9.9965937	9.0994678	10.9005322	50
11	9.0970651	9.9965778	9.1004872	10.8995128	49
12	9.0980662	9.9965619	9.1015044	10.8984956	48
13	9.0990651	9.9965459	9.1025192	10.8974808	47
14	9.1000616	9.9965299	9.1035317	10.8964683	46
15	9.1010558	9.9965138	9.1045410	10.8954580	45
16	9.1020477	9.9964977	9.1055500	10.8944500	44
17	9.1030373	9.9964816	9.1065557	10.8934443	43
18	9.1040246	9.9964655	9.1075591	10.8924409	42
19	9.1050096	9.9964493	9.1085604	10.8914366	41
20	9.1059924	9.9964330	9.1095594	10.8904406	40
21	9.1069729	9.9964167	9.1105562	10.8894438	39
22	9.1079512	9.9964004	9.1115508	10.8884492	38
23	9.1089272	9.9963841	9.1125431	10.8874569	37
24	9.1099010	9.9963677	9.1135333	10.8864667	36
25	9.1108726	9.9963513	9.1145213	10.8854787	35
26	9.1118420	9.9963348	9.1155072	10.8844928	34
27	9.1128092	9.9963183	9.1164909	10.8835091	33
28	9.1137742	9.9963018	9.1174724	10.8825276	32
29	9.1147370	9.9962852	9.1184518	10.8815482	31
30	9.1156977	9.9962686	9.1194291	10.8805709	30
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

82 Degrees

7 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
30	9.1156977	9.9962686	9.1194291	10.8805709	30
31	9.1166562	9.9962519	9.1204043	10.8795957	29
32	9.1176125	9.9962352	9.1213773	10.8786227	28
33	9.1185667	9.9962185	9.1223482	10.8776518	27
34	9.1195188	9.9962017	9.1233171	10.8766829	26
35	9.1204688	9.9961849	9.1242839	10.8757161	25
36	9.1214167	9.9961681	9.1252486	10.8747514	24
37	9.1223624	9.9961512	9.1262112	10.8737888	23
38	9.1233061	9.9961343	9.1271718	10.8728282	22
39	9.1242477	9.9961174	9.1281303	10.8718697	21
40	9.1251872	9.9961004	9.1290868	10.8709132	20
41	9.1261246	9.9960834	9.1300413	10.8699587	19
42	9.1270000	9.9960663	9.1309937	10.8690063	18
43	9.1279934	9.9960492	9.1319442	10.8680558	17
44	9.1289247	9.9960321	9.1328926	10.8671074	16
45	9.1298539	9.9960149	9.1338391	10.8661609	15
46	9.1307812	9.9959977	9.1347835	10.8652165	14
47	9.1317064	9.9959804	9.1357260	10.8642740	13
48	9.1326297	9.9959631	9.1366665	10.8633335	12
49	9.1335509	9.9959458	9.1376051	10.8623949	11
50	9.1344702	9.9959284	9.1385417	10.8614583	10
51	9.1353875	9.9959111	9.1394764	10.8605236	9
52	9.1363028	9.9958936	9.1404092	10.8595908	8
53	9.1372161	9.9958761	9.1413400	10.8586600	7
54	9.1381275	9.9958586	9.1422689	10.8577311	6
55	9.1390370	9.9958411	9.1431959	10.8568041	5
56	9.1399445	9.9958235	9.1441210	10.8558790	4
57	9.1408501	9.9958059	9.1450442	10.8549558	3
58	9.1417537	9.9957882	9.1459655	10.8540345	2
59	9.1426555	9.9957705	9.1468850	10.8531150	1
60	9.1435553	9.9957528	9.1478025	10.8521975	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

82 Degrees

8 Degrees.

Min.	Sine	Sine Comp.	Tang.	Tang. Comp	
0	9.1435553	9.9957528	9.1478025	10.8521975	60
1	9.1444532	9.9957350	9.1487182	10.8512818	59
2	9.1453495	9.9957172	9.1496321	10.8503679	58
3	9.1462435	9.9956993	9.1505441	10.8494559	57
4	9.1471358	9.9956815	9.1514543	10.8485457	56
5	9.1480262	9.9956635	9.1523627	10.8476373	55
6	9.1489148	9.9956456	9.1532692	10.8467308	54
7	9.1498015	9.9956276	9.1541739	10.8458261	53
8	9.1506864	9.9956095	9.1550769	10.8449231	52
9	9.1515694	9.9955915	9.1559780	10.8440220	51
10	9.1524507	9.9955734	9.1568773	10.8431227	50
11	9.1533301	9.9955552	9.1577748	10.8422252	49
12	9.1542076	9.9955370	9.1586706	10.8413294	48
13	9.1550834	9.9955188	9.1595646	10.8404354	47
14	9.1559574	9.9955005	9.1604569	10.8395431	46
15	9.1568296	9.9954822	9.1613473	10.8386527	45
16	9.1577000	9.9954639	9.1622361	10.8377639	44
17	9.1585686	9.9954455	9.1631231	10.8368769	43
18	9.1594354	9.9954271	9.1640083	10.8359917	42
19	9.1603005	9.9954087	9.1648919	10.8351081	41
20	9.1611639	9.9953902	9.1657737	10.8342263	40
21	9.1620254	9.9953717	9.1666538	10.8333462	39
22	9.1628853	9.9953531	9.1675322	10.8324678	38
23	9.1637434	9.9953345	9.1684089	10.8315911	37
24	9.1645998	9.9953159	9.1692839	10.8307161	36
25	9.1654544	9.9952972	9.1701572	10.8298428	35
26	9.1663074	9.9952785	9.1710289	10.8289711	34
27	9.167158	9.9952597	9.1718989	10.8281011	33
28	9.1680081	9.9952409	9.1727672	10.8272328	32
29	9.1688559	9.9952221	9.1736338	10.8263662	31
30	9.1697021	9.9952033	9.1744988	10.8255012	30
31	9.1705465	9.9951844	9.1753622	10.8246378	29
32	9.1713893	9.9951654	9.1762239	10.8237761	28
33	9.1722305	9.9951464	9.1770840	10.8229260	27
34	9.1730699	9.9951274	9.1779425	10.8220575	26
35	9.1739077	9.9951084	9.1787993	10.8212007	25
36	9.1747439	9.9950893	9.1796546	10.8203454	24
37	9.1755784	9.9950702	9.1805082	10.8194918	23
38	9.1764112	9.9950510	9.1813602	10.8186398	22
39	9.1772425	9.9950318	9.1822106	10.8177894	21
40	9.1780721	9.9950126	9.1830595	10.8169405	20
41	9.1789001	9.9949933	9.1839068	10.8160932	19
42	9.1797265	9.9949740	9.1847525	10.8152475	18
43	9.1805512	9.9949546	9.1855966	10.8144034	17
44	9.1813744	9.9949352	9.1864392	10.8135608	16
45	9.1821960	9.9949158	9.1872802	10.8127198	15
46	9.1830160	9.9948964	9.1881196	10.8118804	14
47	9.1838344	9.9948769	9.1889575	10.8110425	13
48	9.1846512	9.9948573	9.1897939	10.8102061	12
49	9.1854665	9.9948377	9.1906287	10.8093713	11
50	9.1862802	9.9948181	9.1914621	10.8085379	10
51	9.1870923	9.9947985	9.1922939	10.8077061	9
52	9.1879029	9.9947788	9.1931241	10.8068759	8
53	9.1887120	9.9947591	9.1939529	10.8060471	7
54	9.1895195	9.9947393	9.1947802	10.8052198	6
55	9.1903254	9.9947195	9.1956059	10.8043941	5
56	9.1911299	9.9946997	9.1964302	10.8035698	4
57	9.1919328	9.9946798	9.1972530	10.8027470	3
58	9.1927342	9.9946599	9.1980743	10.8019257	2
59	9.1935341	9.9946399	9.1988941	10.8011059	1
60	9.1943324	9.9946199	9.1997125	10.8002875	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

81 Degrees

9 Degrees.

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.1943324	9.9946199	9.1997125	10.8002875	60
1	9.1951293	9.9945999	9.2005294	10.7994706	59
2	9.1959247	9.9945798	9.2013449	10.7986551	58
3	9.1967186	9.9945597	9.2021588	10.7978412	57
4	9.1975110	9.9945396	9.2029714	10.7970286	56
5	9.1983019	9.9945194	9.2037825	10.7962175	55
6	9.1990913	9.9944992	9.2045922	10.7954078	54
7	9.1998793	9.9944789	9.2054004	10.7945996	53
8	9.2006658	9.9944587	9.2062072	10.7937928	52
9	9.2014509	9.9944383	9.2070126	10.7929874	51
10	9.2022345	9.9944180	9.2078165	10.7921835	50
11	9.2030167	9.9943975	9.2086191	10.7913809	49
12	9.2037974	9.9943771	9.2094203	10.7905797	48
13	9.2045766	9.9943566	9.2102200	10.7897800	47
14	9.2053545	9.9943361	9.2110184	10.7889816	46
15	9.2061309	9.9943156	9.2118153	10.7881847	45
16	9.2069059	9.9942950	9.2120109	10.7873891	44
17	9.2076795	9.9942743	9.2134051	10.7865949	43
18	9.2084516	9.9942537	9.2141980	10.7858020	42
19	9.2092224	9.9942330	9.2149894	10.7850106	41
20	9.2099917	9.9942122	9.2157795	10.7842205	40
21	9.2107597	9.9941914	9.2165683	10.7834317	39
22	9.2115263	9.9941706	9.2173556	10.7826444	38
23	9.2122914	9.9941498	9.2181417	10.7818583	37
24	9.2130552	9.9941289	9.2189264	10.7810736	36
25	9.2138176	9.9941079	9.2197097	10.7802903	35
26	9.2145787	9.9940870	9.2204917	10.7795083	34
27	9.2153384	9.9940659	9.2212724	10.7787276	33
28	9.2160967	9.9940449	9.2220518	10.7779482	32
29	9.2168536	9.9940238	9.2228298	10.7771702	31
30	9.2176092	9.9940027	9.2236065	10.7763935	30
31	9.2183635	9.9939815	9.2243819	10.7750181	29
32	9.2191164	9.9939603	9.2251561	10.7748439	28
33	9.2198680	9.9939391	9.2259289	10.7740711	27
34	9.2206182	9.9939178	9.2267004	10.7732996	26
35	9.2213671	9.9938965	9.2274706	10.7725294	25
36	9.2221147	9.9938752	9.2282395	10.7717605	24
37	9.2228609	9.9938538	9.2290071	10.7709919	23
38	9.2236059	9.9938324	9.2297735	10.7702265	22
39	9.2243495	9.9938109	9.2305386	10.7694614	21
40	9.2250918	9.9937894	9.2313024	10.7686976	20
41	9.2258328	9.9937679	9.2320650	10.7679350	19
42	9.2265725	9.9937463	9.2328262	10.7671738	18
43	9.2273110	9.9937247	9.2335863	10.7664137	17
44	9.2280481	9.9937030	9.2343451	10.7656549	16
45	9.2287839	9.9936813	9.2351026	10.7648974	15
46	9.2295185	9.9936596	9.2358598	10.7641411	14
47	9.2302518	9.9936378	9.2366139	10.7633861	13
48	9.2309838	9.9936160	9.2373678	10.7626322	12
49	9.2317145	9.9935942	9.2381203	10.7618797	11
50	9.2324440	9.9935723	9.2388717	10.7611283	10
51	9.2331722	9.9935504	9.2396218	10.7603782	9
52	9.2338992	9.9935285	9.2403708	10.7596292	8
53	9.2346249	9.9935065	9.2411185	10.7588815	7
54	9.2353494	9.9934844	9.2418650	10.7581350	6
55	9.2360726	9.9934624	9.2426103	10.7573897	5
56	9.2367946	9.9934403	9.2433543	10.7566457	4
57	9.2375153	9.9934181	9.2440972	10.7559028	3
58	9.2382349	9.9933959	9.2448389	10.7551611	2
59	9.2389532	9.9933737	9.2455794	10.7544206	1
60	9.2396702	9.9933515	9.2460188	10.7536812	0
	Sine Comp.	Sine	Tang Comp.	Tang.	Min.

80 Degrees

10 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.2396702	9.9933515	9.2463188	10.7536812	60
1	9.2403861	9.9933292	9.2470569	10.7539431	59
2	9.2411007	9.9933068	9.2477939	10.7522061	58
3	9.2418141	9.9932845	9.2485297	10.7514703	57
4	9.2425264	9.9932621	9.2492643	10.7507357	56
5	9.2432374	9.9932396	9.2499978	10.7500022	55
6	9.2449472	9.9932171	9.2507301	10.7492699	54
7	9.2446558	9.9931946	9.2514612	10.7445388	53
8	9.2453632	9.9931720	9.2521912	10.7478088	52
9	9.2460695	9.9931494	9.2519200	10.7470800	51
10	9.2467746	9.9931268	9.2536477	10.7463523	50
11	9.2474784	9.9931041	9.2543743	10.7456257	49
12	9.2481811	9.9930814	9.2550997	10.7449003	48
13	9.2488827	9.993058	9.2558240	10.7441760	47
14	9.2495830	9.9930359	9.2565472	10.7434528	46
15	9.2502822	9.9930131	9.2572692	10.7427308	45
16	9.2509803	9.9929902	9.2579901	10.7420099	44
17	9.2516772	9.9929673	9.2587099	10.7412901	43
18	9.2523729	9.9929444	9.2594285	10.7405715	42
19	9.2530675	9.9929214	9.2601451	10.7398539	41
20	9.2537609	9.9928984	9.2608625	10.7391375	40
21	9.2544532	9.9928753	9.2615779	10.7384221	39
22	9.2551444	9.9928522	9.2622921	10.7377079	38
23	9.2558344	9.9928291	9.2630053	10.7369947	37
24	9.2565233	9.9928059	9.2637173	10.7362827	36
25	9.2572110	9.9927827	9.2644283	10.7355717	35
26	9.2578977	9.9927595	9.2651382	10.7348618	34
27	9.2585832	9.9927362	9.2658470	10.7341530	33
28	9.2592676	9.9927129	9.2665547	10.7334453	32
29	9.2599509	9.9926895	9.2672613	10.7327387	31
30	9.2606330	9.9926661	9.2679669	10.7320331	30
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

79 Degrees

10 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
30	9.2606330	9.9926661	9.2679669	10.7320331	30
31	9.2613141	9.9926427	9.2686714	10.7313286	29
32	9.2619941	9.9926192	9.2693749	10.7306251	28
33	9.2626729	9.9925957	9.2700772	10.7299228	27
34	9.2633507	9.9925722	9.2707786	10.7292214	26
35	9.2640274	9.9925486	9.2714788	10.7285212	25
37	9.2647030	9.9925250	9.2721780	10.7278220	24
36	9.2653775	9.9925013	9.2728762	10.7271238	23
38	9.2660509	9.9924776	9.2785733	10.7264267	22
39	9.2667232	9.9924539	9.2742694	10.7257306	21
40	9.2673945	9.9924301	9.2749644	10.7250356	20
41	9.2680647	9.9924063	9.2756584	10.7243416	19
42	9.2687338	9.9923824	9.2763514	10.7236486	18
43	9.2694019	9.9923585	9.2770434	10.7229566	17
44	9.2700689	9.9923346	9.2777343	10.7226257	16
45	9.2707348	9.9923106	9.2784242	10.7215758	15
46	9.2713997	9.9922866	9.2791131	10.7208869	14
47	9.2720635	9.9922626	9.2798009	10.7201991	13
48	9.2727263	9.9922385	9.2804878	10.7195122	12
49	9.273388	9.9922144	9.2811736	10.7188264	11
50	9.2740487	9.9921902	9.2818585	10.7181415	10
51	9.2747083	9.9921660	9.2825423	10.7174577	9
52	9.2753669	9.9921418	9.2832251	10.7167749	8
53	9.2760245	9.9921175	9.2839070	10.7160930	7
54	9.2766811	9.9920932	9.2845878	10.7154122	6
55	9.2773366	9.9920689	9.2852677	10.7147323	5
56	9.2779911	9.9920455	9.2859466	10.7140534	4
57	9.2786445	9.9920201	9.2866245	10.7133755	3
58	9.2792970	9.9919956	9.2873014	10.7126986	2
59	9.2799484	9.9919711	9.2879773	10.7120227	1
60	9.2805988	9.9919466	9.2886523	10.7113477	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

79 Degrees

11 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.2805988	9.9919466	9.2886523	10.7113477	60
1	9.2812483	9.9919220	9.2893263	10.7106737	59
2	9.2818967	9.9918974	9.2899993	10.7100007	58
3	9.2825441	9.9918727	9.2906713	10.7093287	57
4	9.2831905	9.9918480	9.2913424	10.7086576	56
5	9.2838359	9.9918233	9.2920126	10.7079874	55
6	9.2844803	9.9917986	9.2926817	10.7073183	54
7	9.2851237	9.9917737	9.2933500	10.7066500	53
8	9.2857661	9.9917489	9.2940172	10.7059828	52
9	9.2864076	9.9917240	9.2946836	10.7053164	51
10	9.2870480	9.9916991	9.2953489	10.7046511	50
11	9.2876875	9.9916741	9.2960134	10.7039866	49
12	9.2883260	9.9916492	9.2966769	10.7033231	48
13	9.2889636	9.9916241	9.2973395	10.7026605	47
14	9.2896001	9.9915990	9.2980011	10.7019989	46
15	9.2902357	9.9915739	9.2986618	10.7013382	45
16	9.2908704	9.9915488	9.2993216	10.7006784	44
17	9.2915040	9.9915236	9.2999804	10.7000196	43
18	9.2921367	9.9914984	9.3006383	10.6993617	42
19	9.2927685	9.9914731	9.3012954	10.6987046	41
20	9.2933993	9.9914478	9.3019514	10.6980486	40
21	9.2940291	9.9914225	9.3026066	10.6973934	39
22	9.2946580	9.9913917	9.3032609	10.6967391	38
23	9.2952859	9.9913717	9.3039143	10.6960857	37
24	9.2959129	9.9913462	9.3045667	10.6954333	36
25	9.2965390	9.9913207	9.3052183	10.6947817	35
26	9.2971641	9.9912952	9.3058689	10.6941311	34
27	9.2977883	9.9912696	9.3065187	10.6934813	33
28	9.2984116	9.9912440	9.3071675	10.6928325	32
29	9.2990339	9.9912184	9.3078155	10.6921845	31
30	9.2996553	9.9911927	9.3084626	10.6915374	30
31	9.3002758	9.9911670	9.3091088	10.6908912	29
32	9.3008953	9.99114 2	9.3097541	10.6902459	28
33	9.3015140	9.9911154	9.3103985	10.6896015	27
34	9.3021317	9.9910896	9.3110421	10.6889579	26
35	9.3027485	9.9910637	9.3116848	10.6883152	25
36	9.3033644	9.9910378	9.3123266	10.6876734	24
37	9.3039794	9.9910119	9.3129675	10.6870325	23
38	9.3045934	9.9909859	9.3136076	10.6863924	22
39	9.3052066	9.9909598	9.3142468	10.6857532	21
40	9.3058189	9.9909338	9.3148851	10.6851149	20
41	9.3064303	9.9909077	9.3155226	10.6844774	19
42	9.3070407	9.9908815	9.3161592	10.6838408	18
43	9.3076503	9.9908553	9.3167950	10.6832050	17
44	9.3082590	9.9908291	9.3174299	10.6825701	16
45	9.3088668	9.9908029	9.3180640	10.6819360	15
46	9.3094737	9.9907766	9.3186972	10.6813028	14
47	9.3100798	9.9907502	9.3193295	10.6806705	13
48	9.3106849	9.9907239	9.3199611	10.6800389	12
49	9.3112892	9.9906974	9.3205918	10.6794082	11
50	9.3118926	9.9906710	9.3212216	10.6787784	10
51	9.3124951	9.9906445	9.3218506	10.6781494	9
52	9.3130968	9.9906180	9.3224788	10.6775212	8
53	9.3136976	9.9905914	9.3231061	10.6768939	7
54	9.3142975	9.9905648	9.3237327	10.6762673	6
55	9.3148965	9.9905 8	9.3243584	10.6759416	5
56	9.3154947	9.9905115	9.3249832	10.6750168	4
57	9.3160921	9.9904848	9.3256073	10.6734927	3
58	9.3166885	9.9904580	9.3262305	10.6737695	2
59	9.3172842	9.9904312	9.3268529	10.6731471	1
60	9.3178789	9.9904044	9.3274745	10.6725255	0
	Sine Comp.	Sine	Tang. Comp.	Tang.	Min.

78 Degrees

12 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.3178789	9.9904044	9.3274745	10.6725255	60
1	9.3184728	9.9903775	9.3280953	10.6719047	59
2	9.3190659	9.9903506	9.3287 53	10.6712847	58
3	9.3196581	9.9903237	9.3293345	10.6706655	57
4	9.3202495	9.9902967	9.3299528	10.6700472	56
5	9.3208400	9.9902697	9.3305704	10.6694996	55
6	9.3214297	9.9902426	9.3311872	10.6088128	54
7	9.3220186	9.9902155	9.3318031	10.6681969	53
8	.3226066	9.9901883	9.3324183	10.6675817	52
9	9.3231938	9.9901612	9.3330327	10.6669673	51
10	9.3237802	9.9901339	9.3336463	10. 6 3537	50
11	9.3243657	9.9901067	9.3342591	10.6657409	49
12	9.3249505	9.9900794	9.3348711	10.6651289	48
13	9.3255344	9.9900521	9.3354823	10.6645177	47
14	9.3261174	9.9900247	9.3360927	10.663907	46
15	9.3266997	9.9899973	9.3367024	10.6632976	45
16	9.3272811	9.9899698	9.3373113	10.6026887	44
17	9.3278617	9.9899423	9.3379194	10.6620806	43
18	9.3284416	9.9899148	9.3385267	10.6614733	42
19	9.3290206	9.9898873	9.3391333	10.6608667	41
20	9.3295988	9.9898597	9.3397391	10.6602609	40
21	9.3301761	9.9898320	9.3403441	10.6596559	39
22	9.3307527	9.9898043	9.3409484	10.6590516	38
23	9.3313285	9.9897766	9.3415519	10.6584481	37
24	9.3319035	9.9897489	9.3421546	10.6578454	36
2	9.3324777	9.9897211	9.3427566	10.6572434	35
26	9.3330511	9.9896932	9.3433578	10.6566422	34
27	9.3336237	9.9896654	9.3439583	10.6560417	33
28	9.3341955	9.9896374	9.3445580	10.6554420	32
29	9.3347665	9.9896095	9.3451570	10.6548430	31
30	9.3353368	9.9895815	9.3457552	10.6542448	30
31	9.3359062	9.9895535	9.3463527	10.6536473	29
32	9.3364749	9.9895254	9.3469494	10.6530506	28
33	9.3370428	9.9894973	9.3475454	10.6524546	27
34	9.3376099	9.9894692	9.3481407	10.6518593	26
35	9.3381762	9.9894410	9.3487352	10.6512648	25
36	9.3387418	9.9894128	9.3493290	10.6506710	24
37	9.3393065	9.9893845	9.3499220	10.6500780	23
38	9.3398706	9.9893562	9.3505143	10.6494857	22
39	9.3404338	9.9893279	9.3511059	10.6488941	21
40	9.3409963	9.9892995	9.3516968	10.6483032	20
41	9.3415580	9.9892711	9.3522869	10.6477131	19
42	9.3421190	9.9892427	9.3528763	10.6471237	18
43	9.3426792	9.9892142	9.3534650	10.6465350	17
44	9.3432386	9.9891856	9.3540530	10.6459470	16
45	9.3437973	9.9891571	9.3546402	10.6453598	15
46	9.3443552	9.9891285	9.3552267	10.6447733	14
47	9.3449124	9.9890998	9.3558126	10.6441874	13
48	9.3454688	9.9890711	9.3563977	10.6436023	12
49	9.3460245	9.9890424	9.3 6 821	0.6430179	11
50	9.3465794	9.9890137	9.3575658	10.6424342	10
51	9.3471336	9.9889849	9.3581487	10.6418513	9
52	9.3476870	9.9889560	9.3587310	0.6412690	8
53	9.3482397	9.9889271	9.3593126	10.6406874	7
54	9.3487917	9.9888982	9.3598935	10.6401065	6
55	9.3493429	9.9888693	9.3604736	10.6395264	5
56	9.3498934	9.988840	9.3610531	10.6389469	4
57	9.3504432	9.9888113	9.3616319	10.6383681	3
58	9.3509922	9.9887822	9.3622100	10.6377900	2
59	9.3515405	9.9887531	9.3627874	10.6372126	1
6	9.3520880	9.9887239	9.3633641	10.6366359	0
	Sine Comp.	Sine	Tang. Comp.	Tang.	Min.

77 Degrees

13 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.3520880	9.9887239	9.3633641	10.6366359	60
1	9.3526349	9.9886947	9.3639401	10.6360599	59
2	9.3531810	9.9886655	9.3645155	10.6354845	58
3	9.3537264	9.9886363	9.3650901	10.6349099	57
4	9.3542710	9.9886070	9.3656641	10.6343359	56
5	9.3548150	9.9885776	9.3662374	10.6337626	55
6	9.3553582	9.9885482	9.3668100	10.6331900	54
7	9.3559007	9.9885188	9.3673819	10.6326181	53
8	9.3564426	9.9884894	9.3679532	10.6320468	52
9	9.3569836	9.9884599	9.3685238	10.6314762	51
10	9.3575240	9.9884303	9.3690937	10.6309063	50
11	9.3580637	9.9884008	9.3696629	10.6303371	49
12	9.3586027	9.9883712	9.3702315	10.6297685	48
13	9.3591409	9.9883415	9.3707994	10.6292006	47
14	9.3596785	9.9883118	9.3713667	10.6286333	46
15	9.3602154	9.9882821	9.3719333	10.6280667	45
16	9.3607515	9.9882523	9.3724992	10.6275008	44
17	9.3612870	9.988222	9.3730645	10.6269355	43
18	9.3618217	9.9881927	9.3736291	10.6263709	42
19	9.3623558	9.9881628	9.3741930	10.6258070	41
20	9.3628892	9.9881329	9.3747563	10 6252437	40
21	9.3634219	9.988 029	9.3753190	10.6246810	39
22	9.3639539	9.9880729	9.3758810	10.6241190	38
23	9.3644852	9.9880429	9.3764423	10.6235577	37
24	9.3650158	9.9880128	9.3770030	10.6229970	36
25	9.3655458	9.9874827	9.3775631	10.6224369	35
26	9.3660750	9.9879525	9.3 81225	10.6218775	34
27	9.3666036	9.9879223	9.3786813	10.6213187	33
28	9.3671315	9.9878921	9.3792394	10.6207606	32
29	9.3676587	9.9878618	9.3797969	10.6202031	31
30	9.3681853	9.9878315	9.3803537	10.6196463	30
	Sine Comp.	Sine	Tang. Comp.	Tang.	Min.

76 Degrees

13 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
30	9.3681853	9.9878315	9.3803537	10.6196463	30
31	9.3687111	9.9878012	9.3809100	10.6190900	29
32	9.3692363	9.9877708	9.3814655	10.6185345	28
33	9.3697608	9.9877404	9.3820205	10.6179795	27
34	9.3702847	9.9877099	9.3825748	10.6174252	26
35	9.3708079	9.9876794	9.3831285	10.6168715	25
36	9.3713304	9.9876488	9.3836816	10.6163184	24
37	9.3718523	9.9876183	9.3842340	10.6157660	23
38	9.3723735	9.9875876	9.3847858	10.6152142	22
39	9.3728940	9.9875570	9.3853370	10.6146630	21
40	9.3734139	9.9875263	9.3858876	10.6141124	20
41	9.3739331	9.9874955	9.3864376	10.6135624	19
42	9.3744517	9.9874648	9.3869869	10.6130131	18
43	9.3749696	9.9874339	9.3875356	10.6124664	17
44	9.3754868	9.9874631	9.3880837	10 6119163	16
45	9.3760034	9.9873722	9.3886312	10.6115688	15
46	9.3765194	9.98 3413	9.3891781	10.6108219	14
47	9.3770347	9.9873103	9.3897244	10.6102756	13
48	9.3775493	9.9872793	9.3902700	10.6097300	12
49	9.3780633	9.9 72482	9.3908151	10.6091849	11
50	9.3785757	9.9872171	9.3913595	10.6086405	10
51	9.3790894	9.9871860	9.3919034	10.6080966	9
52	9.3796015	9.9871549	9.3924466	10.6075534	8
53	9.3801129	9.9871236	9.3929893	10.6070107	7
54	9.3806237	9.9870924	9.3935313	10.6064687	6
55	9.3811339	9.9870611	9.3940727	10.6059273	5
56	9.3816434	9.9870298	9.3946136	10.60 3864	4
57	9.3821523	9.9869984	9.3951538	10.6048462	3
58	9.3826605	9.9869670	9.3956935	10.6043065	2
59	9.3831682	9.9869356	9.3962326	10.6037674	1
60	9.3836752	9.9869041	9.3967711	10.6032289	0
	Sine Comp.	Sine	Tang. Comp.	Tang.	Min.

76 Degrees

14 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.3836752	9.9869041	9.3967711	10.6032289	60
1	9.3841815	9.9868726	9.3973089	10.6026911	59
2	9.3846873	9.9868410	9.3978463	10.6021537	58
3	9.3851924	9.9868094	9.3983830	10.6016170	57
4	9.3856969	9.9867778	9.3989191	10.6010809	56
5	9.3862008	9.9867461	9.3994547	10.6005453	55
6	9.3867040	9.9867144	9.3999896	10.6000104	54
7	9.3872067	9.9866827	9.4005240	10.5994760	53
8	9.3877087	9.9866509	9.4010578	10.5989422	52
9	9.3882101	9.9866191	9.4015910	10.5984090	51
10	9.3887109	9.9865872	9.4021237	10.5978763	50
11	9.3892111	9.9865553	9.4026558	10.5973442	49
12	9.3897106	9.9865233	9.4031873	10.5968127	48
13	9.3902096	9.9864913	9.4037182	10.5962818	47
14	9.3907079	9.9864593	9.4042486	10.5957514	46
15	9.3912057	9.9864273	9.4047784	10.5952216	45
16	9.3917028	9.9863952	9.4053076	10.5946924	44
17	9.3921993	9.9863630	9.4058363	10.5941637	43
18	9.3926952	9.9863308	9.4063644	10.5936356	42
19	9.3931905	9.9862986	9.4068919	10.5931081	41
20	9.3936852	9.9862663	9.4074189	10.5925811	40
21	9.3941794	9.9862340	9.4079453	10.5920547	39
22	9.3946729	9.9862017	9.4084712	10.5915288	38
23	9.3951658	9.9861693	9.4089965	10.5910035	37
24	9.3956581	9.9861369	9.4095212	10.5904788	36
25	9.3961499	9.9861045	9.4100454	10.5899546	35
26	9.3966410	9.9860720	9.4105690	10.5894310	34
27	9.3971315	9.9860394	9.4110921	10.5889079	33
28	9.3976215	9.9860069	9.4116146	10.5883854	32
29	9.3981109	9.9859742	9.4121366	10.5878634	31
30	9.3985996	9.9859416	9.4126581	10.5873419	30
31	9.3990878	9.9859089	9.4131789	10.5868211	29
32	9.3995754	9.9858762	9.4136993	10.5863007	28
33	9.4000625	9.9858434	9.4142191	10.5857809	27
34	9.4005489	9.9858106	9.4147383	10.5852617	26
35	9.4010348	9.9857777	9.4152570	10.5847430	25
36	9.4015201	9.9857449	9.4157752	10.5842248	24
37	9.4020048	9.9857119	9.4162928	10.5837072	23
38	9.4024889	9.9856790	9.4168099	10.5831901	22
39	9.4029734	9.9856460	9.4173265	10.5826735	21
40	9.4034554	9.9856129	9.4178425	10.5821575	20
41	9.4039373	9.9855798	9.4183580	10.5816420	19
42	9.4044196	9.9855467	9.4188729	10.5811271	18
43	9.4049009	9.9855135	9.4193874	10.5806126	17
44	9.4053816	9.9854803	9.4199013	10.5800987	16
45	9.4058617	9.9854471	9.4204146	10.5795854	15
46	9.4063413	9.9854138	9.4209275	10.5790725	14
47	9.4068203	9.9853805	9.4214398	10.5785602	13
48	9.4072987	9.9853471	9.4219515	10.5780485	12
49	9.4077766	9.9853138	9.4224628	10.5775372	11
50	9.4082539	9.9852803	9.4229735	10.5770265	10
51	9.4087306	9.9852468	9.4234838	10.5765162	9
52	9.4092068	9.9852133	9.4239935	10.5760065	8
53	9.4096824	9.9851798	9.4245026	10.5754974	7
54	9.4101575	9.9851462	9.4250113	10.5749887	6
55	9.4106320	9.9851125	9.4255194	10.5744806	5
56	9.411105	9.9850789	9.4260271	10.5739729	4
57	9.4115793	9.9850452	9.4265342	10.5734658	3
58	9.4120522	9.9850114	9.4270408	10.5729592	2
59	9.4125245	9.9849776	9.4275469	10.5724531	1
60	9.4129962	9.9849438	9.4280525	10.5719475	0
	Sine Comp.	Sine	Tang. Comp.	Tang.	Min.

75 Degrees

15 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.4129962	9.9849438	9.4280525	10.5719475	60
1	9.4134674	9.9849099	9.4285575	10.5714425	59
2	9.4139381	9.9848760	9.4290621	10.5709379	58
3	9.4144082	9.9848420	9.4295661	10.5704339	57
4	9.4148778	9.9848081	9.4300697	10.5699303	56
5	9.4153468	9.9847740	9.4305727	10.5694273	55
6	9.4158152	9.9847400	9.4310753	10.5689247	54
7	9.4162832	9.9847059	9.4315773	10.5684127	53
8	9.4165506	9.9846717	9.4320789	10.5679211	52
9	9.4172174	9.9846375	9.4325799	10.5674201	51
10	9.4176837	9.9846033	9.4330804	10.5669196	50
11	9.4181495	9.9845690	9.4335805	10.5664195	49
12	9.4186148	9.9845347	9.4340800	10.5659200	48
13	9.4190795	9.9845004	9.4345791	10.5654209	47
14	9.4195436	9.9844660	9.4350776	10.5649224	46
15	9.4200073	9.9844316	9.4355757	10.5644243	45
16	9.4204704	9.9843971	9.4360733	10.5639267	44
17	9.4209330	9.9843626	9.4365704	10.5634296	43
18	9.4213950	9.9843281	9.4370670	10.5629330	42
19	9.4218566	9.9842935	9.4375631	10.5624369	41
20	9.4223176	9.9842589	9.4380587	10.5619413	40
21	9.4227780	9.9842242	9.4385538	10.5614462	39
22	9.4232380	9.9841895	9.4390485	10.5609515	38
23	9.4236974	9.9841548	9.4395426	10.5604574	37
24	9.4241563	9.9841200	9.4400363	10.5599637	36
25	9.4246147	9.9840852	9.4405295	10.5594705	35
26	9.4250726	9.9840503	9.4410222	10.5589778	34
27	9.4255299	9.9840154	9.4415145	10.5584855	33
28	9.4259867	9.9839805	9.4420062	10.5579938	32
29	9.4264430	9.9839455	9.4424975	10.5575025	31
30	9.4268988	9.9839105	9.4429883	10.5570117	30
31	9.4273541	9.9838755	9.4434786	10.5565214	29
32	9.4278089	9.9838404	9.4439685	10.5560315	28
33	9.4282631	9.9838052	9.4444579	10.5555421	27
34	9.4287169	9.9837701	9.4449468	10.5550532	26
35	9.4291701	9.9837348	9.4454352	10.5545648	25
36	9.4296228	9.9836996	9.4459232	10.5540768	24
37	9.4300750	9.9836643	9.4464107	10.5535893	23
38	9.4305267	9.9836290	9.4468978	10.5531022	22
39	9.4309779	9.9835936	9.4473843	10.5526157	21
40	9.4314286	9.9835582	9.4478704	10.5521296	20
41	9.4318787	9.9835227	9.4483561	10.5516439	19
42	9.4323285	9.9834872	9.4488413	10.5511587	18
43	9.4327777	9.9834517	9.4493260	10.5506740	17
44	9.4332264	9.9834161	9.4498102	10.5501898	16
45	9.4336746	9.9833805	9.4502940	10.5497060	15
46	9.4341223	9.9833449	9.4507774	10.5492220	14
47	9.4345694	9.9833094	9.4512602	10.5487398	13
48	9.4350161	9.9832735	9.4517427	10.5482573	12
49	9.4354623	9.9832377	9.4522246	10.5477754	11
50	9.4359080	9.9832019	9.4527061	10.5472939	10
51	9.4363532	9.9831661	9.4531872	10.5468128	9
52	9.4367980	9.9831302	9.4536678	10.5463522	8
53	9.4372422	9.9830942	9.4541479	10.5458521	7
54	9.4376859	9.9830583	9.4546276	10.5453724	6
55	9.4381292	9.9830223	9.4551069	10.5448931	5
56	9.4385719	9.9829862	9.4555857	10.5444143	4
57	9.4390142	9.9829501	9.4560641	10.5439359	3
58	9.4394560	9.9829140	9.4565420	10.5434580	2
59	9.4398973	9.9828778	9.4570194	10.5429806	1
60	9.4403381	9.9828416	9.4574964	10.5425036	0
	Sine Comp.	Sine	Tang. Comp.	Tang.	Min.

74 Degrees

16 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.4403381	9.9828416	9.4574964	10.5425036	60
1	9.4407784	9.9828054	9.4579370	10.5420270	59
2	9.4412182	9.9827691	9.4584491	10.5415509	58
3	9.4416576	9.9827328	9.4589248	10.5410752	57
4	9.4420965	9.9826964	9.4594001	10.5405999	56
5	9.4425349	9.9826600	9.4598749	10.5401251	55
6	9.4429728	9.9826236	9.4603492	10.5396508	54
7	9.4434103	9.9825871	9.4608232	10.5391768	53
8	9.4438472	9.9825506	9.4612967	10.5387033	52
9	9.4442837	9.9825140	9.4617697	10.5382303	51
10	9.4447197	9.9824774	9.4622423	10.5377577	50
11	9.4451553	9.9824408	9.4627145	10.5372855	49
12	9.4455904	9.9824041	9.4631863	10.5368137	48
13	9.4460250	9.9823674	9.4636576	19.5363424	47
14	9.4464591	9.9823306	9.4641285	10.5358715	46
15	9.4468927	9.9822938	9.4645990	10.5354010	45
16	9.4473250	9.9822569	9.4650690	10.5349310	44
17	9.4477586	9.9822201	9.4655386	10.5344614	43
18	9.4481909	9.9821831	9.4660078	10.5339922	42
19	9.4486227	9.9821462	9.4664765	10.5335235	41
20	9.4490540	9.9821092	9.4669448	10.5330552	40
21	9.4494849	9.9820721	9.4674127	10.5325873	39
22	9.4499153	9.9820351	9.4678802	10.5321198	38
23	9.4503452	9.9819979	9.4683473	10.5316527	37
24	9.4507747	9.9819608	9.4688139	10.5311861	36
25	9.4512037	9.9819236	9.4692801	10.5307199	35
26	9.4516322	9.9818863	9.4697459	10.5302541	34
27	9.4520603	9.9818490	9.4702112	10.5297888	33
28	9.4524879	9.9818117	9.4706762	10.5293238	32
29	9.4529151	9.9817744	9.4711407	10.5288593	31
30	9.4533418	9.9817370	9.4716048	10.5283952	30
	Sine Comp.	Sine	Tang. Comp.	Tang.	Min.

73 Degrees

16 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
30	9.4533418	9.9817370	9.4716048	10.5283952	30
31	9.4537681	9.9816995	9.4720685	10.5279315	29
32	9.4541939	9.9816620	9.4725318	10.5274682	28
33	9.4546192	9.9816245	9.4729947	10.5270053	27
34	9.4550441	9.9815870	9.4734571	10.5265429	26
35	9.4554686	9.9815494	9.4739192	10.5260808	25
36	9.4558926	9.9815117	9.4743808	10.5256192	24
37	9.4563161	9.9814740	9.4748421	10.5251579	23
38	9.4567392	9.9814363	9.4753029	10.5246971	22
39	9.4571618	9.9813986	9.4757633	10.5242367	21
40	9.4575840	9.9813608	9.4762233	10.5237767	20
41	9.4580058	9.9813229	9.4766829	10.5233171	19
42	9.4584271	9.9812850	9.4771421	10.5228579	18
43	9.4588480	9.9812471	9.4776009	10.5223991	17
44	9.4592684	9.9812091	9.4780592	10.5219408	16
45	9.4596884	9.9811711	9.4785172	10.5214828	15
46	9.4601079	9.9811331	9.4789748	10.5210252	14
47	9.4605270	9.9810950	9.4794319	10.5205681	13
48	9.4609456	9.9810569	9.4798887	10.5201113	12
49	9.4613638	9.9810187	9.4803451	10.5196549	11
50	9.4617816	9.9809805	9.4808011	10.5191989	10
51	9.4621989	9.9809423	9.4812566	10.5187434	9
52	9.4626158	9.9809040	9.4817118	10.5182882	8
53	9.4630323	9.9808657	9.4821666	10.5178334	7
54	9.4634483	9.9808273	9.4826210	10.5173790	6
55	9.4638639	9.9807889	9.4830750	10.5169250	5
56	9.4642790	9.9807505	9.4835286	10.5164714	4
57	9.4646928	9.9807120	9.4839818	10.5160182	3
58	9.4651081	9.9806735	9.4844346	10.5155654	2
59	9.4655219	9.9806349	9.4848870	10.5151130	1
60	9.4659353	9.9805963	9.4853390	10.5146610	0
	Sine Comp.	Sine	Tang. Comp.	Tang.	Min.

73 Degrees

17 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9,4659353	9,9805963	9,4853390	10,5146610	60
1	9,4663483	9,9805577	9,4857907	10,5143093	59
2	9,4667600	9,9805190	9,4862419	10,5137581	58
3	9,4671730	9,9804803	9,4866928	10,5133072	57
4	9,4675848	9,9804415	9,4871433	10,5128567	56
5	9,4679960	9,9804027	9,4875933	10,5124067	55
6	9,4684069	9,9803639	9,4880430	10,5119570	54
7	9,4688173	9,9803250	9,4884924	10,5115076	53
8	9,4692273	9,9802860	9,4889413	10,5110587	52
9	9,4696369	9,9802471	9,4893898	10,5106102	51
10	9,4700461	9,9802081	9,4898380	10,5101620	50
11	9,4704548	9,9801690	9,4902858	10,5097142	49
12	9,4708631	9,9801299	9,4907332	10,5092668	48
13	9,4712710	9,9800908	9,4911802	10,5088198	47
14	9,4716785	9,9800516	9,4916269	10,5083731	46
15	9,4720856	9,9800124	9,4920731	10,5079269	45
16	9,4724922	9,9799732	9,4925190	10,5074810	44
17	9,4728985	9,9799339	9,4929646	10,5070354	43
18	9,4733043	9,9798946	9,4934097	10,5065903	42
19	9,4737097	9,9798552	9,4938545	10,5061455	41
20	9,4741146	9,9798158	9,4942988	10,5057012	40
21	9,4745192	9,9797764	9,4947429	10,5052571	39
22	9,4749234	9,9797369	9,4951865	10,5048135	38
23	9,4753271	9,9796793	9,4956298	10,5043702	37
24	9,4757304	9,9796578	9,4960727	10,5039273	36
25	9,4761334	9,9796182	9,4965152	10,5034848	35
26	9,4765359	9,9795785	9,4969574	10,5030426	34
27	9,4769381	9,9795388	9,4973991	10,5026009	33
28	9,4773396	9,9794991	9,4978406	10,5021594	32
29	9,4777409	9,9794593	9,4982816	10,5017184	31
30	9,4781418	9,9794195	9,4987223	10,5012777	30
31	9,4785423	9,9793796	9,4991626	10,5008374	29
32	9,4789423	9,9793398	9,4996026	10,5003974	28
33	9,4793420	9,9792998	9,5000422	10,4999578	27
34	9,4797412	9,9792599	9,5004814	10,4995136	26
35	9,4801401	9,9792198	9,5009203	10,4990797	25
36	9,4805385	9,9791798	9,5013588	10,4986412	24
37	9,4809366	9,9791397	9,5017969	10,4982031	23
38	9,4813342	9,9790996	9,5022347	10,4977653	22
39	9,4817315	9,9790594	9,5026721	10,4973279	21
40	9,4821282	9,9790191	9,5031092	10,4968908	20
41	9,4825248	9,9789789	9,5035459	10,4964541	19
42	9,4829208	9,9789386	9,5039822	10,4960178	18
43	9,4833165	9,9788983	9,5044182	10,4955818	17
44	9,4837117	9,9788579	9,5048538	10,4951462	16
45	9,4841066	9,9788175	9,5052891	10,4947109	15
46	9,4845010	9,9787770	9,5057240	10,4942760	14
47	9,4848951	9,9787365	9,5061586	10,4938414	13
48	9,4852888	9,9786960	9,5065928	10,4934072	12
49	9,4856820	9,9786554	9,5070267	10,4929733	11
50	9,4860749	9,9786148	9,5074602	10,4925398	10
51	9,4864674	9,9785741	9,5078933	10,4921067	9
52	9,4868595	9,9785334	9,5083261	10,4916739	8
53	9,4872512	9,9784927	9,5087586	10,4912414	7
54	9,4876426	9,9784519	9,509190	10,4908093	6
55	9,4880335	9,9784111	9,5096224	10,4903776	5
56	9,4884240	9,9783702	9,5100539	10,4899461	4
57	9,4888142	9,9783293	9,5104849	10,4895151	3
58	9,4892040	9,9782883	9,5109156	10,4890844	2
59	9,4895934	9,9782474	9,5113460	10,4886540	1
60	9,4899824	9,9782063	9,5117760	10,4882240	0
	Sine Comp.	Sine	Tang.Comp	Tang.	Min.

72 Degrees

18 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9,4899824	9,9782062	9,5117760	10,4882240	60
1	9,4903710	9,9781653	9,5122057	10,4877943	59
2	9,4907592	9,9781241	9,5126351	10,4873649	58
3	9,4911471	9,9780830	9,5130641	10,4869359	57
4	9,4915345	9,9780418	9,5134927	10,4865073	56
5	9,4919216	9,978 006	9,5139210	10,4860790	55
6	9,4923083	9,9779593	9,5143490	10,4856510	54
7	9,4926946	9,9779180	9,5147766	10,4852234	53
8	9,4930806	9,9778766	9,5152039	10,4847961	52
9	9,4934661	9,9778353	9,5156309	10,4843691	51
10	9,4938513	9,9777938	9,5160575	10,4839425	50
11	9,4942361	9,9777523	9,5164838	10,4835162	49
12	9,4946205	9,9777108	9,5169097	10,4820903	48
13	9,4950046	9,9776693	9,5173353	10,4826647	47
14	9,4953883	9,9776277	9,5177606	10,4822394	46
15	9,4957716	9,9775860	9,5181855	10,4818145	45
16	9,4961545	9,9775444	9,5186101	10,4813899	44
17	9,4965370	9,9775026	9,5190344	10,4809656	43
18	9,4969192	9,9774609	9,5194583	10,4805417	42
19	9,4973010	9,9774191	9,5198819	10,4801181	41
20	9,4976824	9,9773772	9,5203052	10,4796948	40
21	9,4980635	9,9773354	9,5207282	10,4792718	39
22	9,4984442	9,9772934	9,5211508	10,4788492	38
23	9,4988245	9,9772515	9,5215730	10,4784270	37
24	9,4992045	9,9772095	9,5219950	10,4780050	36
25	9,4995840	9,9771674	9,5224166	10,4775834	35
26	9,4999633	9,9771253	9,5228379	10,4771621	34
27	9,5003421	9,9770832	9,5232589	10,4767411	33
28	9,5007206	9,9770410	9,5236795	10,4763205	32
29	9,5010987	9,9769988	9,5240999	10,4759001	31
30	9,5014764	9,9769566	9,5245199	10,4754801	30
31	9,5018538	9,9769143	9,5249395	10,4750605	29
32	9,5022308	9,9768720	9,5253589	10,4746411	28
33	9,5026075	9,9768296	9,5257779	10,4742221	27
34	9,5029838	9,9767872	9,5261966	10,4738034	26
35	9,5033597	9,9767447	9,5266150	10,4733850	25
36	9,5037353	9,9767022	9,5270331	10,4729669	24
37	9,5041105	9,9766597	,5274508	10,4725492	23
38	9,5044853	9,9766171	,5278682	10,4721318	22
39	9,5048598	9,9765745	9,5282853	10,4717147	21
40	9,5052339	,9765318	9,5287021	10,4712979	20
41	9,5056077	9,9764891	9,5291186	10,4708814	19
42	9,5059811	9,9764464	9,5295347	10,4704653	18
43	9,5063542	9,9764036	9,5299505	10,4700495	17
44	9,5067268	9,9763608	9,5303661	10,4696339	16
45	9,5070992	9,9763179	9,5307813	0,4692187	15
46	9,5074712	9,9762750	9,5311961	10,4688039	14
47	9,5078428	9,9762321	9,5316107	10,4683893	13
48	9,5082141	9,9761891	9,5320250	10,4679750	12
49	9,5085850	9,9761461	9,5324389	10,4675611	11
50	9,5089556	9,9761030	9,5328526	10,4671474	10
51	9,5093258	9,9760599	9,5332659	0,4667341	9
52	9,5096956	9,9760167	9,5336789	10,4663211	8
53	9,5100651	9,9759736	9,5340916	10,4659084	7
54	9,5104343	9,9759303	9,5345040	10,4654960	6
55	9,5108031	9,9758871	,5349161	10,4650839	5
56	9,5111716	9,9758437	9,5353278	10,4646722	4
57	9,5115397	9,9758004	9,5357393	10,4642607	3
58	9,5119074	9,9757570	9,5361505	10,4638495	2
59	9,5122749	9,9757135	9,5365613	10,4634387	1
60	9,5126419	9,97567 1	9,5369719	10,4630281	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

71 Degrees

19 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9,5126419	9,9756710	9,5369718	10,4630282	60
1	9,5130086	9,9756265	9,5373821	10,4626129	59
2	9,5133750	9,9755830	9,5377920	10,4621080	58
3	9,5137410	9,9755394	9,5382017	10,4617983	57
4	9,5141067	9,9754957	9,5386110	10,4613890	56
5	9,5144721	9,9754521	9,5390200	10,4609800	55
6	9,5148371	9,9754083	9,5394287	10,4605713	54
7	9,5152017	9,9753646	9,5398371	10,4601629	53
8	9,5155660	9,9753208	9,5402453	10,4597547	52
9	9,5159300	9,9752769	9,5406531	10,4593469	51
10	9,5162936	9,9752330	9,5410606	10,4589394	50
11	9,5166569	9,9751891	9,5414678	10,4585322	49
12	9,5170198	9,9751451	9,5418747	10,4581253	48
13	9,5173824	9,9751011	9,5422813	10,4577187	47
14	9,5177447	9,9750570	9,5426877	10,4573123	46
15	9,5181066	9,9750129	9,5430937	10,4569063	45
16	9,5184682	9,9749688	9,5434994	10,4565006	44
17	9,5188295	9,9749246	9,5439048	10,4560952	43
18	9,5191904	9,9748804	9,5443100	10,4556900	42
19	9,5195510	9,9747361	9,5447148	10,4552852	41
20	9,5199112	9,9747018	9,5451193	10,4548807	40
21	9,5202711	9,9747475	9,5455236	10,4544764	39
22	9,5206307	9,9747031	9,5459276	10,4540724	38
23	9,5209899	9,974658	9,5463312	10,4536688	37
24	9,5213488	9,9746142	9,5467346	10,4532654	36
25	9,5217074	9,9745697	9,5471377	10,4528623	35
26	9,5220656	9,9745252	9,5475405	10,4524595	34
27	9,5224235	9,9744806	9,5479430	10,4520570	33
28	9,5227811	9,9744359	9,5483452	10,4516548	32
29	9,5231383	9,9743913	9,5487471	10,4512529	31
30	9,5234359	9,9743466	9,5491487	10,4508513	30
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

70 Degrees

19 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
30	9,5234953	9,9743466	9,5491487	10,4508513	30
31	9,5238518	9,9743018	9,5495500	10,4504500	29
32	9,5242081	9,9742570	9,5499511	10,4500489	28
33	9,5245640	9,9742122	9,5503519	10,4496481	27
34	9,5249196	9,9741673	9,5507523	10,4492477	26
35	9,5252749	9,9741224	9,5511525	10,4488475	25
36	9,5256298	9,9740774	9,5515524	10,4484476	24
37	9,5259844	9,9740324	9,5519521	10,4480479	23
38	9,5263387	9,9739873	9,5523514	10,4476486	22
39	9,5266927	9,9739422	9,5527504	10,4472496	21
40	9,5270463	9,9738971	9,5531492	10,4468508	20
41	9,5273097	9,9738519	9,5535477	10,4464523	19
42	9,5277526	9,9738067	9,5539459	10,4460541	18
43	9,5281053	9,9737615	9,5543438	10,4456562	17
44	9,5284577	9,9737162	9,5547415	10,4452585	16
45	9,5288097	9,9736709	9,5551388	10,4448612	15
46	9,5291614	9,9736255	9,5555359	10,4444641	14
47	9,5295128	9,9735801	9,5559327	10,4440673	13
48	9,5298638	9,9735346	9,5563292	10,4436708	12
49	9,5302146	9,9734891	9,5567255	10,4432745	11
50	9,5305650	9,9734435	9,5571214	10,4428786	10
51	9,5309151	9,9733980	9,5575171	10,4424829	9
52	9,5312649	9,9733523	9,5579125	10,4420875	8
53	9,5316143	9,9733067	9,5583077	10,4416923	7
54	9,5319635	9,9732610	9,5587025	10,4412975	6
55	9,5323123	9,9732152	9,5590971	10,4409029	5
56	9,5326608	9,9731694	9,5594914	10,4405086	4
57	9,5330090	9,9731236	9,5598854	10,4401146	3
58	9,5333569	9,9730777	9,5602792	10,4397208	2
59	9,5337044	9,9730318	9,5606727	10,4393273	1
60	9,5340517	9,9739858	9,5610659	10,4389341	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

70 Degrees

20 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.5340517	9.9729858	9.5610659	10.4389341	60
1	9.5343986	9.9729398	9.5614588	10.4385412	59
2	9.5347452	9.9728938	9.5618515	10.4381485	58
3	9.5350915	9.9728477	9.5622439	10.4377561	57
4	9.5354375	9.9728016	9.5626360	10.4373640	56
5	9.5357832	9.9727554	9.5630278	10.4369722	55
6	9.5361286	9.9727092	9.5634194	10.4365806	54
7	9.5364737	9.9726629	9.5638107	10.4361893	53
8	9.5368884	9.9726166	9.5642018	10.4357982	52
9	9.5371628	9.9725703	9.5645925	10.4354075	51
10	9.5375069	9.9725239	9.5649831	10.4350169	50
11	9.5378508	9.9724775	9.5653733	10.4346267	49
12	9.5381943	9.9724310	9.5657633	10.4342367	48
13	9.5385375	9.9723845	9.5661530	10.4338470	47
14	9.5388804	9.9723380	9.5665424	10.4334576	46
15	9.5392230	9.9722914	9.5669316	10.4330684	45
16	9.5395653	9.9722448	9.5673205	10.4326795	44
17	9.5399073	9.9721981	9.5677091	10.4322909	43
18	9.5402489	9.9721514	9.5680975	10.4319025	42
19	9.5405903	9.9721047	9.5684856	10.4315144	41
20	9.5409314	9.9720579	9.5688735	10.4311265	40
21	9.5412721	9.9720110	9.5692611	10.4307389	39
22	9.5416126	9.9719642	9.5696484	10.4303516	38
23	9.5419527	9.9719172	9.5700355	10.4299645	37
24	9.5422926	9.9718703	9.5704223	10.4295777	36
25	9.5426321	9.9718233	9.5708088	10.4291912	35
26	9.5429713	9.9717762	9.5711951	10.4288049	34
27	9.5433103	9.9717291	9.5715811	10.4284189	33
28	9.5436489	9.9716820	9.5719669	10.4280331	32
29	9.5439873	9.9716348	9.5723524	10.4276476	31
30	9.5443523	9.9715876	9.5727377	10.4272623	30
31	9.5446630	9.9715404	9.5731227	10.4268773	29
32	9.5450005	9.9714931	9.5735074	10.4264926	28
33	9.5453376	9.9714457	9.5738919	10.4261081	27
34	9.5456745	9.9713984	9.5742761	10.4257239	26
35	9.5460110	9.9713509	9.5746601	10.4253399	25
36	9.5463472	9.9713035	9.5750438	10.4249562	24
37	9.5466832	9.9712560	9.5754272	10.4245728	23
38	9.5470189	9.9712084	9.5758104	10.4241896	22
39	9.5473542	9.9711608	9.5761934	10.4238066	21
40	9.5476893	9.9711132	9.5765761	10.4234239	20
41	9.548024	9.9710655	9.5769595	10.4230415	19
42	9.5483585	9.9710178	9.5773407	10.4226593	18
43	9.5486927	9.9709701	9.5777226	10.4222774	17
44	9.5490266	9.9709223	9.5781043	10.4218957	16
45	9.5493602	9.9708744	9.5784858	10.4215142	15
46	9.5496925	9.9708265	9.5788669	10.4211331	14
47	9.5500265	9.9707786	9.5792479	10.4207521	13
48	9.5503592	9.9707306	9.5796286	10.4203714	12
49	9.5506916	9.9706826	9.5800090	10.4199910	11
50	9.5510237	9.9706346	9.5803892	10.4196108	10
51	9.5513556	9.9705865	9.5807691	10.4192309	9
52	9.5516871	9.9705383	9.5811488	10.4188512	8
53	9.5520183	9.9704902	9.5815282	10.4184718	7
54	9.5523494	9.9704419	9.5819074	10.4180926	6
55	9.5526801	9.9703937	9.5822864	10.4177136	5
56	9.5530105	9.9703454	9.5826651	10.4173349	4
57	9.5533406	9.9702970	9.5830435	10.4169565	3
58	9.5536704	9.9702486	9.5834217	10.4165783	2
59	9.5539999	9.9702002	9.5837997	10.4162003	1
60	9.5543292	9.9701517	9.5841774	10.4158226	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

69 Degrees

21 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.5543292	9.9701517	9.5841774	10.4158226	60
1	9.5546581	9.9701032	9.5845549	10.4154451	59
2	9.5549868	9.9700547	9.5849321	10.4150679	58
3	9.5553152	9.9700061	9.5853091	10.4146909	57
4	9.5556433	9.9699574	9.5856859	10.4143141	56
5	9.5559711	9.9699087	9.5860624	10.4139376	55
6	9.5562987	9.9698600	9.5864386	10.4135614	54
7	9.5566259	9.9698112	9.5868147	10.4131853	53
8	9.5569529	9.9697624	9.5871904	10.4128096	52
9	9.5572796	9.9697136	9.5875660	10.4124340	51
10	9.5576060	9.9696647	9.5879413	10.4120587	50
11	9.5579321	9.9696158	9.5883163	10.4116837	49
12	9.5582579	9.9695668	9.5886912	10.4113088	48
13	9.5585835	9.9695177	9.5890657	10.4109343	47
14	9.5589088	9.9694687	9.5894401	10.4105599	46
15	9.5592338	9.9694196	9.5898142	10.4101858	45
16	9.5595585	9.9693704	9.5901881	10.4098119	44
17	9.5598829	9.9693212	9.5905617	10.4094383	43
18	9.5602071	9.9692720	9.5909351	10.4090649	42
19	9.5605310	9.9692227	9.5913082	10.4086918	41
20	9.5608546	9.9691734	9.5916812	10.4083188	40
21	9.5611779	9.9691241	9.5920539	10.4079461	39
22	9.5615010	9.9690746	9.5924263	10.4075737	38
23	9.5618237	9.9690252	9.5927985	10.4072015	37
24	9.5621462	9.9689757	9.5931705	10.4068295	36
25	9.5624685	9.9689262	9.5935423	10.4064577	35
26	9.5627904	9.9688766	9.5939138	10.4060862	34
27	9.5631121	9.9688270	9.5942851	10.4057149	33
28	9.5634335	9.9687773	9.5946561	10.4053439	32
29	9.5637546	9.9687276	9.5950269	10.4049731	31
30	9.5640754	9.9686779	9.5953975	10.4046025	30
31	9.5643960	9.9686281	9.5957679	10.4042321	29
32	9.5647163	9.9685783	9.5951380	10.4038620	28
33	9.5650363	9.9685284	9.5965079	10.4034921	27
34	9.5653561	9.9684785	9.5968776	10.4031224	26
35	9.5656756	9.9684286	9.5972470	10.4027530	25
36	9.5659948	9.9683786	9.5976162	10.4023838	24
37	9.5663137	9.9683285	9.5979852	10.4020148	23
38	9.5666324	9.9682784	9.5983540	10.4016460	22
39	9.5669508	9.9682283	9.5987225	10.4012775	21
40	9.5672689	9.9681781	9.5990908	10.4009092	20
41	9.5675868	9.9681279	9.5994588	10.4005412	19
42	9.5679044	9.9680777	9.5998267	10.4001733	18
43	9.5682217	9.9680274	9.6001943	10.3998057	17
44	9.5685387	9.9679771	9.6005617	10.3994383	16
45	9.5688555	9.9679267	9.6009289	10.3990711	15
46	9.5691721	9.9678763	9.6012958	10.3987042	14
47	9.5694883	9.9678258	9.6016625	10.3983375	13
48	9.5698043	9.9677753	9.6020290	10.3979710	12
49	9.5701200	9.9677247	9.6023953	10.3976047	11
50	9.5704355	9.9676741	9.6027613	10.3972387	10
51	9.5707506	9.9676235	9.6031271	10.3968729	9
52	9.5710656	9.9675728	9.6034927	10.3965073	8
53	9.5713802	9.9675221	9.6038581	10.3961419	7
54	9.5716946	9.9674713	9.6042233	10.3957767	6
55	9.5720087	9.9674205	9.6045882	10.3954118	5
56	9.5723226	9.9673697	9.6049529	10.3950471	4
57	9.5726362	9.9673188	9.6053174	10.3946826	3
58	9.5729495	9.9672679	9.6056817	10.3943183	2
59	9.5732626	9.9672169	9.6060457	10.3939543	1
60	9.5735754	9.9671659	9.6064096	10.3935904	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

68 Degrees

22 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang.Comp.	
0	9.5735754	9.9671659	9.6064096	10.3935904	60
1	9.5738880	9.9671148	9.6067732	10.3932268	59
2	9.5742003	9.9670637	9.6071366	10.3928634	58
3	9.5745123	9.9670125	9.6074997	10.3925003	57
4	9.5748240	9.9669614	9.6078627	10.3921373	56
5	9.5751356	9.9669101	9.6082254	10.3917746	55
6	9.5754468	9.9668588	9.6085880	10.3914120	54
7	9.5757578	9.9668075	9.6089503	10.3910497	53
8	9.5760685	9.9667562	9.6093124	10.3906876	52
9	9.5763790	9.9667048	9.6096742	10.3903258	51
10	9.5766892	9.9666533	9.6100359	10.3899641	50
11	9.5769991	9.9666018	9.6103973	10.3896027	49
12	9.5773088	9.9665503	9.6107586	10.3892414	48
13	9.5776183	9.9664986	9.6111196	10.3888804	47
14	9.5779275	9.9664471	9.6114804	10.3885196	46
15	9.5782364	9.9663954	9.6118409	10.3881591	45
16	9.5785450	9.9663437	9.6122013	10.3877987	44
17	9.5788535	9.9662920	9.6125615	10.3874385	43
18	9.5791616	9.9662402	9.6129214	10.3870786	42
19	9.5794695	9.9661884	9.6132812	10.3867188	41
20	9.5797772	9.9661365	9.6136407	10.3863593	40
21	9.5800845	9.9660846	9.6140000	10.3860000	39
22	9.5803917	9.9660326	9.6143591	10.3856409	38
23	9.5806986	9.9659806	9.6147180	10.3852820	37
24	9.5810052	9.9659285	9.6150766	10.3849234	36
25	9.5813116	9.9658764	9.6154351	10.3845649	35
26	9.5816177	9.9658243	9.6157934	10.3842066	34
27	9.5819236	9.9657721	9.6161514	10.3838486	33
28	9.5822292	9.9657199	9.6165093	10.3834907	32
29	9.5825345	9.9656677	9.6168669	10.3831331	31
30	9.5828397	9.9656153	9.6172243	10.3827757	30
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

67 Degrees

22 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
30	9.5828397	9.9656153	9.6172243	10.3827757	30
31	9.5831445	9.9655630	9.6175815	10.3824185	29
32	9.5834491	9.9655106	9.6179385	10.3820615	28
33	9.5837535	9.9654582	9.6182953	10.3817047	27
34	9.5840576	9.9654057	9.6186519	10.3813481	26
35	9.5843615	9.9653532	9.6190083	10.3809917	25
36	9.5846651	9.9653006	9.6193645	10.3806355	24
37	9.5849685	9.9652480	9.6197205	10.3802795	23
38	9.5852716	9.9651953	9.6200762	10.3799238	22
39	9.5855745	9.9651426	9.6204318	10.3795682	21
40	9.5858771	9.9650899	9.6207872	10.3792128	20
41	9.5861795	9.9650371	9.6211423	10.3788577	19
42	9.5864816	9.9649843	9.6214974	10.3785026	18
43	9.5867835	9.9649314	9.6218520	10.3781480	17
44	9.5870851	9.9648785	9.6222066	10.3777934	16
45	9.5873865	9.9648256	9.6225609	10.3774391	15
46	9.5876876	9.9647726	9.6229150	10.3770850	14
47	9.5879885	9.9647195	9.6232690	10.3767310	13
48	9.5882892	9.9646665	9.6236227	10.3763773	12
49	9.5885896	9.9646133	9.6239763	10.3760237	11
50	9.5888897	9.9645602	9.6243296	10.3756704	10
51	9.5891897	9.9645069	9.6246827	10.3753173	9
52	9.5894893	9.9644537	9.6250356	10.3749644	8
53	9.5897888	9.9644004	9.6253884	10.3746116	7
54	9.5900880	9.9643470	9.6257409	10.3742591	6
55	9.5903869	9.9642937	9.6260932	10.3739068	5
56	9.5906856	9.9642402	9.6264454	10.3735546	4
57	9.5909841	9.9641868	9.6267973	10.3732027	3
58	9.5912823	9.9641332	9.6271491	10.3728509	2
59	9.5915803	9.9640797	9.6275006	10.3724994	1
60	9.5918780	9.9640261	9.6278519	10.3721481	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

67 Degrees

23 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9,5918780	9,9640261	9,6278519	10,3721481	60
1	9,5921755	9,9639724	9,6282031	10,3717969	59
2	9,5924728	9,9639187	9,6285540	10,3714460	58
3	9,5927698	9,9638650	9,6289048	10,3710952	57
4	9,5930666	9,9638112	9,6292553	10,3707447	56
5	9,5933631	9,9637574	9,6296057	10,3703943	55
6	9,5936594	9,9637036	9,6299558	10,3700442	54
7	9,5939555	9,9636496	9,6303058	10,3696942	53
8	9,5942513	9,9635957	9,6306556	10,3693444	52
9	9,5945469	9,9635417	9,6310052	10,3689948	51
10	9,5948422	9,9634877	9,6313545	10,3686455	50
11	9,5951373	9,9634336	9,6317037	10,3682963	49
12	9,5954322	9,9633795	9,6320527	10,3679473	48
13	9,5957268	9,9633253	9,6324015	10,3675985	47
14	9,5960212	9,9632711	9,6327501	10,3672499	46
15	9,5963154	9,9632168	9,6330985	10,3669015	45
16	9,5966093	9,9631625	9,6334468	10,3665532	44
17	9,5969030	9,9631082	9,6337948	10,3662052	43
18	9,5971965	9,9630538	9,6341426	10,3658574	42
19	9,5974897	9,9629994	9,6344903	10,3655097	41
20	9,5977827	9,9629449	9,6348378	10,3651622	40
21	9,5980754	9,9628904	9,6351850	10,3648150	39
22	9,5983679	9,9628358	9,6355321	10,3644679	38
23	9,5986602	9,9627812	9,6358790	10,3641210	37
24	9,5989523	9,9627266	9,6362257	10,3637743	36
25	9,5992441	9,9626719	9,6365722	10,3634278	35
26	9,5995357	9,9626172	9,6369185	10,3630815	34
27	9,5998271	9,9625624	9,6372646	10,3627354	33
28	9,6001181	9,9625076	9,6376106	10,3623894	32
29	9,6004090	9,9624527	9,6379563	10,3620437	31
30	9,6006997	9,9623978	9,6383019	10,3616981	30
31	9,6009901	9,9623428	9,6386473	10,361352	29
32	9,6012803	9,9622878	9,6389925	10,3610075	28
33	9,6015703	9,9622328	9,6393375	10,3606625	27
34	9,6018600	9,9621777	9,6396823	10,3603177	26
35	9,6021495	9,9621226	9,6400269	10,3599731	25
36	9,6024388	9,9620674	9,6403714	10,3596286	24
37	9,6027278	9,9620122	9,6407156	10,3592844	23
38	9,6030166	9,9619569	9,6410597	10,3589403	22
39	9,6033052	9,9619016	9,6414036	10,3585964	21
40	9,6035936	9,9618463	9,6417473	10,3582527	20
41	9,6038817	9,9617909	9,6420908	10,3579092	19
42	9,6041696	9,9617355	9,6424342	10,3575658	18
43	9,6044573	9,9616800	9,6427773	10,3572227	17
44	9,6047448	9,9616245	9,6431203	10,3568797	16
45	9,6050320	9,9615689	9,6434631	10,3565369	15
46	9,6053190	9,9615133	9,6448057	10,3561943	14
47	9,6056057	9,9614576	9,6441481	10,3558519	13
48	9,6058923	9,9614020	9,6444903	10,3550597	12
49	9,6061786	9,9613463	9,6448324	10,3551676	11
50	9,6064647	9,9612904	9,6451743	10,3548257	10
51	9,6067506	9,9612346	9,6455160	10,3544840	9
52	9,6070362	9,9611787	9,6458575	10,3541425	8
53	9,6073216	9,9611228	9,6461988	10,3538012	7
54	9,6076068	9,9610668	9,6465400	10,3534600	6
55	9,6078918	9,9610108	9,6468810	10,3531190	5
56	9,6081765	9,9609548	9,6472217	10,3527783	4
57	9,6084611	9,9608987	9,6475624	10,3524376	3
58	9,6087454	9,9608426	9,6479028	10,3520972	2
59	9,6090294	9,9607864	9,6482431	10,3517569	1
60	9,6093133	9,9607302	9,6485831	10,3514169	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

66 Degrees

24 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp	
0	9,6093133	9,9607302	9,6485831	10,3514169	60
1	9,6095969	9,9606739	9,6489230	10,3510770	59
2	9,6098803	9,9606176	9,6492628	10,3507372	58
3	9,6101635	9,9605612	9,6496023	10,3503977	57
4	9,6104465	9,9605048	9,6499417	10,3500583	56
5	9,6107293	9,9604484	9,6502809	10,3497191	55
6	9,6110118	9,9603919	9,6506199	10,3493801	54
7	9,6112941	9,9603354	9,6509587	10,3490413	53
8	9,6115762	9,9602788	9,6512974	10,3487026	52
9	9,6118580	9,9602222	9,6516359	10,348 364	51
10	9,6121397	9,9601655	9,6519742	10,3480258	50
11	9,6124211	9,9601088	9,6523123	10,3476877	49
12	9,6127023	9,9600520	9,6526503	10,347349	48
13	9,6129833	9,9599952	9,6529881	10,3470119	47
14	9,6132641	9,9599384	9,6533257	10,3466743	46
15	9,9135446	9,9598815	9,6536631	10,3463369	45
16	9,6138250	9,9598246	9,6540004	10,3459996	44
17	9,6141051	9,9597676	9,6543375	10,3456625	43
18	9,6143850	9,9597106	9,6546744	10,3453256	42
19	9,6146647	9,9596535	9,6550112	10,3449888	41
20	9,6149441	9,9595964	9,6553477	10,3446523	40
21	9,6152234	9,9595393	9,6556841	10,3443159	39
22	9,6155024	9,9594821	9,6560204	10,3439796	38
23	9,6157812	9,9594248	9,6563564	10,3436436	37
24	9,6160598	9,9593675	9,6566923	10,3433077	36
25	9,6163382	9,9593102	9,6570280	10,3429720	35
26	9,6166164	9,9592528	9,6573636	10,3426364	34
27	9,6168944	9,9591954	9,6576989	10,3423011	33
28	9,6171721	9,9591380	9,6580341	10,3419659	32
29	9,6174496	9,9590805	9,6583692	10,3416308	31
30	9,6177270	9,9590229	9,6587041	10,3412960	30
31	9,6180041	9,9589653	9,6590387	10,34 9613	29
32	9,6 82809	9,9589077	9,6593733	10,340 267	28
33	9,6185576	9,9588500	9,6597076	10,3402924	27
34	9,6188341	9,9587923	9,6600418	10,3399582	26
35	9,6191103	9,9587345	9,6603758	10,3396242	25
36	9,6193864	9,9586767	9,6607097	10,3392903	24
37	9,6196622	9,9586188	9,6610434	10,3389566	23
38	9,6199378	9,9585609	9,6613769	10,3386231	22
39	9,6202132	9,9585030	9,6617103	10,3382897	21
40	9,6204884	9,9584450	9,6620434	10,3379566	20
41	9,6207634	9,9583869	9,6623765	10,3376235	19
42	9,6210382	9,9583288	9,6627093	10,3372907	18
43	9,6213127	9,9582707	9,6630420	10,3369580	17
44	9,621587	9,9582125	9,6633745	10,3366255	16
45	9,6218612	9,9581543	9,6637069	10,3362931	15
46	9,6221351	9,9580961	9,6640391	10,3359609	14
47	9,6224088	9,9580378	9,6643711	10,3356289	13
48	9,6226824	9,9579794	9,6647030	10,3352970	12
49	9,6229557	9,9579210	9,6650346	10 3349 54	11
50	9,6232287	9,9578626	9,6653562	10,3346338	10
5	9,6235016	9,9578041	9,6656975	10,3343025	9
52	9,6237743	9,9577456	9,6660288	10,3339712	8
53	9,6240467	9,9576870	9,6663598	10,3336402	7
54	9,6243190	9,9576284	9,6666907	10,3333093	6
55	9,6245911	9,9575697	9,6670214	10,3329786	5
56	9,6248629	9,9575110	9,6673519	10,3326481	4
57	9,6251346	9,9574522	9,6670823	10,3323177	3
58	9,6254060	9,9573934	9,6680126	10,3319874	2
59	9,6256772	9,9573346	9,6683426	10,3316574	1
60	9,6259483	9,9572757	9,6686725	10,3313275	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

65 Degrees

25 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp	
0	9,6259483	9,9572757	9,6686725	10,3313275	60
1	9,6262191	9,9572168	9,6690023	10,3309977	59
2	9,6264897	9,9571578	9,6693319	10,3306681	58
3	9,6267601	9,9570988	9,6696613	10,3303387	57
4	9,6270303	9,9570397	9,6699906	10,3300094	56
5	9,6273003	9,9569806	9,6703197	10,3296803	55
6	9,6275701	9,9569215	9,6706486	10,3293514	54
7	9,6278397	9,9568623	9,6709774	10,3290226	53
8	9,6281090	9,9568030	9,6713060	10,3286940	52
9	9,6283782	9,9567437	9,6716345	10,3283655	51
10	9,6286472	9,9566844	9,6719628	10,3280372	50
11	9,6289160	9,9566250	9,6722910	10,3277090	49
12	9,6291845	9,9565656	9,6726190	10,3273810	48
13	9,6294529	9,9565061	9,6729468	10,3270532	47
14	9,6297211	9,9564466	9,6732745	10,3267255	46
15	9,6299890	9,9563870	9,6736020	10,3263980	45
16	9,6302568	9,9563274	9,6739294	10,3260706	44
17	9,6305243	9,9562678	9,6742566	10,3257434	43
18	9,6307917	9,9562081	9,6745836	10,3254164	42
19	9,6310589	9,9561483	9,6749105	10,3250895	41
20	9,6313258	9,9560886	9,6752372	10,3247628	40
21	9,6315926	9,9560287	9,6755638	10,3244362	39
22	9,6318591	9,9559689	9,6758903	10,3241097	38
23	9,6321255	9,9559089	9,6762165	10,3237835	37
24	9,6323916	9,9558490	9,6765426	10,3234574	36
25	9,6326576	9,9557890	9,6768686	10,3231314	35
26	9,6329233	9,9557289	9,6771944	10,3228056	34
27	9,6331889	9,9556688	9,6775201	10,3224799	33
28	9,6334542	9,9556087	9,6778456	10,3221544	32
29	9,6337194	9,9555485	9,6781709	10,3218291	31
30	9,6339844	9,9554882	9,6784961	10,3215039	30
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

64 Degrees

25 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp	
30	9,6339844	9,9554882	9,6784961	10,3215039	30
31	9,6342491	9,9554280	9,6788211	10,3211789	29
32	9,6345137	9,9553676	9,6791460	10,3208540	28
33	9,6347780	9,9553073	9,6794708	10,3205292	27
34	9,6350422	9,9552469	9,6797953	10,3202047	26
35	9,6353062	9,9551864	9,6801 88	10,3198802	25
36	9,6355699	9,9551259	9,6804440	10,3195560	24
37	9,6358335	9,9550653	9,6807682	10,3192318	23
38	9,6360969	9,9550047	9,6810921	10,3189079	22
39	9,6363601	9,9549441	9,6814160	10,3185840	21
40	9,6366231	9,9548834	9,6817396	10,3182604	20
41	9,6368859	9,9548227	9,6820632	10,3179368	19
42	9,6371484	9,9547619	9,6823865	10,3176135	18
43	9,6374108	9,9547011	9,6827098	10,3172902	17
44	9,6376731	9,9546402	9,6830328	10,3169672	16
45	9,6379351	9,9545793	9,6833557	10,3166443	15
46	9,6381969	9,9545184	9,6836785	10,3163215	14
47	9,6384585	9,9544574	9,6840011	10,3159989	13
48	9,6387199	9,9543963	9,6843236	10,3156764	12
49	9,6389812	9,9543352	9,6846459	10,3153541	11
50	9,6392422	9,9542741	9,6849681	10,3150319	10
51	9,6395030	9,9542129	9,6852901	10,3147099	9
52	9,6397637	9,9541517	9,6856120	10,3143880	8
53	9,6400241	9,9540904	9,6859338	10,3140662	7
54	9,6402844	9,9540291	9,6862553	10,3137447	6
55	9,6405445	9,9539677	9,6865768	10,3134232	5
56	9,6408044	9,9539063	9,6868981	10,3131019	4
57	9,6410640	9,9538448	9,6872192	10,3127808	3
58	9,6413235	9,9537833	9,6875402	10,3124598	2
59	9,6415828	9,9537218	9,6878611	10,3121389	1
60	9,6418420	9,9536602	9,6881818	10,3118182	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

64 Degrees

26 Degrees

Min.	Sine	Sine Comp	Tang.	Tang Comp.	
0	9.6418420	9.9536602	9.6881818	10.3118182	60
1	9.6421009	9.9535985	9.6885023	10.3114977	59
2	9.6423596	9.9535369	9.6888227	10.3111773	8
3	9.6426182	9.9534751	9.6891430	10.3108570	57
4	9.6428765	9.9534134	9.6894631	10.3105369	56
5	9.6431347	9.9533515	9.6897831	10.3102169	55
6	9.6433926	9.9532897	9.6901030	10.3098970	54
7	9.6436504	9.9532278	9.6904226	10.3095774	53
8	9.6439080	9.9531658	9.6907422	10.3092578	52
9	9.6441654	9.9531038	9.6910616	10.3089384	51
10	9.6444226	9.9530418	9.6913809	10.3086191	50
11	9.6446796	9.9529797	9.6917000	10.3083000	49
12	9.6449365	9.9529175	9.6920189	10.3079811	48
13	9.6451931	9.9528553	9.6923378	10.3076622	47
14	9.6454496	9.9527931	9.6926565	10.3073435	46
15	9.6457058	9.9527308	9.6929750	10.3070250	45
16	9.6459619	9.9526685	9.6932934	10.3067066	44
17	9.6462178	9.9526061	9.6936117	10.3063883	43
18	9.6464735	9.9525437	9.6939298	10.3060702	42
19	9.6467290	9.9524813	9.6942478	10.3057522	41
20	9.6469844	9.9524188	9.6945656	10.3054344	40
21	9.6472395	9.9523562	9.6948833	10.3051167	39
22	9.6474945	9.9522936	9.6952099	10.3047991	38
23	9.6477492	9.9522310	9.6955183	10.3044817	37
24	9.6480038	9.9521683	9.6958355	10.3041645	36
25	9.6482582	9.9521055	9.6961527	10.3038473	35
26	9.6485124	9.9520428	9.6964697	10.3035303	34
27	9.6487665	9.9519799	9.6967865	10.3032135	33
28	9.6490203	9.9519171	9.6971032	10.3028968	32
29	9.6492740	9.9518541	9.6974198	10.3025802	31
30	9.6495274	9.9517912	9.6977363	10.3022637	30
31	9.6497807	9.9517282	9.6980526	10.3019474	29
32	9.6500338	9.9516651	9.6983687	10.3016313	28
33	9.6502868	9.9516020	9.6986847	10.3013153	27
34	9.6505395	9.9515389	9.6990006	10.3009994	26
35	9.6507920	9.9514757	9.6993164	10.3006836	25
36	9.6510444	9.9514124	9.6996320	10.3003680	24
37	9.6512966	9.9513492	9.6999474	10.3000526	23
38	9.6515486	9.9512858	9.7002628	10.2997372	22
39	9.6518004	9.9512224	9.7005780	10.2994220	21
40	9.6520521	9.9511590	9.7008930	10.2991070	20
41	9.6523035	9.9510956	9.7012080	10.2987920	19
42	9.6525548	9.9510320	9.7015227	10.2984773	18
43	9.6528059	9.9509685	9.7018374	10.2981626	17
44	9.6530568	9.9509049	9.7021519	10.2978481	16
45	9.6533075	9.9508412	9.7024663	10.2975337	15
46	9.6535581	9.9507775	9.7027805	10.2972195	14
47	9.6538084	9.9507138	9.7030946	10.2969054	13
48	9.6540586	9.9506500	9.7034086	10.2965914	12
49	9.6543086	9.9505861	9.7037225	10.2962775	11
50	9.6545584	9.9505223	9.7040362	10.2959638	10
51	9.6548081	9.9504583	9.7043497	10.2956503	9
52	9.6550575	9.9503944	9.7046632	10.2953368	8
53	9.6553068	9.9503303	9.7049765	10.2950235	7
54	9.6555559	9.9502663	9.7052897	10.2947103	6
55	9.6558048	9.9502022	9.7056027	10.2943973	5
56	9.6560530	9.9501380	9.7059156	10.2940844	4
57	9.6563021	9.9500738	9.7062284	10.2937716	3
58	9.6565505	9.9500095	9.7065410	10.2934590	2
59	9.6567987	9.9499452	9.7068535	10.2931465	1
60	9.6570468	9.9498809	9.7071659	10.2928341	0
	Sine Comp.	Sine	Tang Comp.	Tang.	Min.

63 Degrees

27 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.6570468	9.9498809	9.7071659	10.2928341	60
1	9.6572946	9.9498165	9.7074781	10.2925219	59
2	9.6575423	9.9497521	9.7077902	10.2922098	58
3	9.6577898	9.9496876	9.7071022	10.2918978	57
4	9.6580371	9.9496230	9.7084141	10.2915859	56
5	9.6582842	9.9495585	9.7087258	10.2912752	55
6	9.6585312	9.9494938	9.7090374	10.2909626	54
7	9.6587780	9.9494292	9.7093488	10.2906512	53
8	9.6590246	9.9493645	9.7096601	10.2903399	52
9	9.6592710	9.9492997	9.7099713	10.2900287	51
10	9.6595173	9.9492349	9.7102824	10.2897176	50
11	9.6597634	9.9491700	9.7105933	10.2894067	49
12	9.6600093	9.9491051	9.7109041	10.2890959	48
13	9.6602550	9.9490402	9.7112148	10.2887852	47
14	9.6605005	9.9489752	9.7115254	10.2884746	46
15	9.6607459	9.9489101	9.7118358	10.2881642	45
16	9.6609911	9.9488450	9.7121461	10.2878539	44
17	9.6612361	9.9487799	9.7124562	10.2875438	43
18	9.6614810	9.9487147	9.7127662	10.2872338	42
19	9.6617257	9.9486495	9.7130761	10.2869239	41
20	9.6619702	9.9485842	9.7133859	10.2866141	40
21	9.6622145	9.9485189	9.7136956	10.2863044	39
22	9.6624586	9.9484535	9.7140051	10.2859949	38
23	9.6627026	9.9483881	9.7143145	10.2856855	37
24	9.6629464	9.9483227	9.7146237	10.2853763	36
25	9.6631900	9.9482572	9.7149329	10.2850671	35
26	9.6634335	9.9481916	9.7152419	10.2847581	34
27	9.6636768	9.9481260	9.7155508	10.2844492	33
28	9.6639199	9.9480604	9.7158595	10.2841405	32
29	9.6641628	9.9479947	9.7161682	10.2838318	31
30	9.6644056	9.9479289	9.7164767	10.2835233	30
31	9.6646482	9.9478631	9.7167851	10.2832149	29
32	9.6648906	9.9477973	9.7170933	10.2829067	28
33	9.6651329	9.9477314	9.7174014	10.2825986	27
34	9.6653749	9.9476655	9.7177094	10.2822906	26
35	9.6656168	9.9475995	9.7180173	10.2819827	25
36	9.6658586	9.9475335	9.7183251	10.2816749	24
37	9.6661001	9.9474674	9.7186327	10.2813673	23
38	9.6663415	9.9474013	9.7189402	10.2810598	22
39	9.6665828	9.9473352	9.7192476	10.2807524	21
40	9.6668238	9.9472689	9.7195549	10.2804451	20
41	9.6670647	9.9472027	9.7198620	10.2801380	19
42	9.6673054	9.9471364	9.7201690	10.2798310	18
43	9.6675459	9.9470700	9.7204759	10.2795241	17
44	9.6677863	9.9470036	9.7207827	10.2792173	16
45	9.6680265	9.9469372	9.7210893	10.2789107	15
46	9.6682665	9.9468707	9.7213958	10.2786042	14
47	9.6685064	9.9468042	9.7217022	10.2782978	13
48	9.6687461	9.9467376	9.7220085	10.2779915	12
49	9.6689856	9.9466710	9.7223147	10.2776853	11
50	9.6692250	9.9466013	9.7226207	10.2773793	10
51	9.6694642	9.9465376	9.7229266	10.2770734	9
52	9.6697032	9.9464708	9.7232324	10.2767676	8
53	9.6699420	9.9464040	9.7235381	10.2764619	7
54	9.6701807	9.9463371	9.7238436	10.2761564	6
55	9.6704192	9.9462702	9.7241490	10.2758510	5
56	9.6706576	9.9462032	9.7244543	10.2755457	4
57	9.6708958	9.9461362	9.7247595	10.2752405	3
58	9.6711338	9.9460692	9.7250646	10.2749354	2
59	9.6713716	9.9460021	9.7253695	10.2746305	1
60	9.6716093	9.9459349	9.7256744	10.2743256	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

62 Degrees

28 Degrees

Min.	Sine	Sine Comp.	Tang	Tang. Comp.	
0	9.6716093	9.9459349	9.7256744	10.2743256	60
1	9.6718468	9.9458677	9.7259791	10.2740209	59
2	9.6720841	9.9458005	9.7262837	10.2737163	58
3	9.6723213	9.9457332	9.7265881	10.2734119	57
4	9.6725583	9.9456659	9.7268925	10.2731075	56
5	9.6727952	9.9455985	9.7271967	10.2728033	55
6	9.6730319	9.9455310	9.7275008	10.2724992	54
7	9.6732684	9.9454636	9.7278048	10.2721952	53
8	9.6735047	9.9453960	9.7281087	10.2718913	52
9	9.6737409	9.9453285	9.7284124	10.2715876	51
10	9.6739769	9.9452609	9.7287161	10.2712839	50
11	9.6742128	9.9451932	9.7290196	10.2709804	49
12	9.6744485	9.9451255	9.7293230	10.2706770	48
13	9.6746840	9.9450577	9.7296263	10.2703737	47
14	9.6749194	9.9449899	9.7299295	10.2700705	46
15	9.6751546	9.9449220	9.7302325	10.2697675	45
16	9.6753896	9.9448541	9.7305354	10.2694646	44
17	9.6756245	9.9447862	9.7308383	10.2691617	43
18	9.6758592	9.9447182	9.7311410	10.2688590	42
19	9.6760937	9.9446501	9.7314436	10.2685564	41
20	9.6763281	9.9445821	9.7317460	10.2682540	40
21	9.6765623	9.9445139	9.7320484	10.2679516	39
22	9.6767963	9.9444457	9.7323506	10.2676494	38
23	9.6770302	9.9443775	9.7326527	10.2673473	37
24	9.6772640	9.9143092	9.7329547	10.2670453	36
25	9.6774975	9.9142409	9.7332566	10.2667434	35
26	9.6777309	9.9441725	9.7335584	10.2664416	34
27	9.6779642	9.9441041	9.7338601	10.2661399	33
28	9.6781972	9.9440356	9.7341616	10.2658384	32
29	9.6784301	9.9439671	9.7344631	10.2655369	31
30	9.6786629	9.9438985	9.7347644	10.2652356	30
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

61 Degrees

28 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
30	9.6786629	9.9438985	9.7347644	10.2652356	30
31	9.6788955	9.9438299	9.7350656	10.2640344	29
32	9.6791279	9.9437612	9.7353667	10.2646333	28
33	9.6793602	9.9436925	9.7356677	10.2643323	27
34	9.6795923	9.9436238	9.7359685	10.2640315	26
35	9.6798243	9.9435549	9.7362693	10.2637307	25
36	9.6800560	9.9434861	9.7365699	10.2634301	24
37	9.6802877	9.9434172	9.7368705	10.2631295	23
38	9.6805191	9.9433482	9.7371709	10.2628291	22
39	9.6807504	9.9432792	9.7374712	10.2625288	21
40	9.6809816	9.9432102	9.7377714	10.2622286	20
41	9.6812126	9.9431411	9.7380715	10.2619285	19
42	9.6814434	9.9430720	9.7383714	10.2616286	18
43	9.6816741	9.9430028	9.7386713	10.2613287	17
44	9.6819046	9.9429335	9.7389710	10.2610290	16
45	9.6821349	9.9428643	9.7392707	10.2607293	15
46	9.6823651	9.9427949	9.7395702	10.2604298	14
47	9.6825952	9.9427255	9.7398696	10.2601304	13
48	9.6828250	9.9426561	9.7401689	10.2598311	12
49	9.6830548	9.9425866	9.7404681	10.2595319	11
50	9.6832843	9.9425171	9.7407672	10.2592328	10
51	9.6835137	9.9424476	9.7410662	10.2589338	9
52	9.6837430	9.9423779	9.7413650	10.2586350	8
53	9.6839720	9.9423083	9.7416638	10.2583362	7
54	9.6842010	9.9422386	9.7419624	10.2580376	6
55	9.6844297	9.9421688	9.7422609	10.2577391	5
56	9.6846583	9.9420990	9.7425594	10.2574406	4
57	9.6848868	9.9420291	9.7428577	10.2571423	3
58	9.6851151	9.9419592	9.7431559	10.2568441	2
59	9.6854432	9.9418893	9.7434540	10.2565460	1
60	9.6855712	9.9418193	9.7437520	10.2562480	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

61 Degrees

29 Degrees.

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.6855712	9.9418193	9.7437520	10.2562480	60
1	9.6857991	9.9417492	9.7440499	10.2559501	59
2	9.6860267	9.9416791	9.7443476	10.2556524	58
3	9.6862542	9.9416090	9.7446453	10.2553547	57
4	9.6864816	9.9415388	9.7449428	10.2550572	56
5	9.6867088	9.9414685	9.7452403	10.2547597	55
6	9.6869359	9.9413982	9.7455376	10.2544624	54
7	9.6871628	9.9413279	9.7458349	10.2541651	53
8	9.6873895	9.9412575	9.7461320	10.2538680	52
9	9.6876161	9.9411871	9.7464290	10.2535710	51
10	9.6878425	9.9411166	9.7467259	10.2532741	50
11	9.6880688	9.9410461	9.7470227	10.2529773	49
12	9.6882949	9.9409755	9.7473194	10.2526806	48
13	9.6885209	9.9409048	9.7476160	10.2523840	47
14	9.6887467	9.9408342	9.7479125	10.2520875	46
15	9.6889723	9.9407634	9.7482089	10.2517911	45
16	9.6891978	9.9406927	9.7485052	10.2514948	44
17	9.6894232	9.9406219	9.7488013	10.2511987	43
18	9.6896484	9.9405510	9.7490974	10.2509026	42
19	9.6898734	9.9404801	9.7493934	10.2506066	41
20	9.6900983	9.9404091	9.7496892	10.2503108	40
21	9.6903231	9.9403381	9.7499850	10.2500150	39
22	9.6905476	9.9402670	9.7502806	10.2497194	38
23	9.6907721	9.9401959	9.7505762	10.2494238	37
24	9.6909964	9.9401248	9.7508716	10.2491284	36
25	9.6912205	9.9400535	9.7511669	10.2488331	35
26	9.6914445	9.9399823	9.7514622	10.2485378	34
27	9.6916683	9.9399110	9.7517573	10.2482427	33
28	9.6918919	9.9398396	9.7520523	10.2479477	32
29	9.6921155	9.9397682	9.7523472	10.2476528	31
30	9.6923388	9.9396968	9.7526420	0.2473580	30
31	9.6925620	9.9396253	9.7529368	10.2470632	29
32	9.6927851	9.9395537	9.7532314	10.2467686	28
33	9.6930080	9.9394821	9.7535259	10.2464741	27
34	9.6932308	9.9394105	9.7538203	10.2461797	26
35	9.6934534	9.9393388	9.7541146	10.2458854	25
36	9.6936758	9.9392671	9.7544088	10.2455912	24
37	9.6938981	9.9391953	9.7547029	10.2452971	23
38	9.6941203	9.9391234	9.7549969	10.2450031	22
39	9.6943423	9.9390515	9.7552908	10.2447092	21
40	9.6945642	9.9389796	9.7555846	10.2444154	20
41	9.6947859	9.9389076	9.7558783	10.2441217	19
42	9.6950074	9.9388356	9.7561718	10.2438282	18
43	9.6952288	9.9387635	9.7564653	10.2435347	17
44	9.6954501	9.9386914	9.7567587	10.2432413	16
45	9.6956712	9.9386192	9.7570520	10.2429480	15
46	9.6958922	9.9385470	9.7573452	10.2426548	14
47	9.6961130	9.9384747	9.7576383	10.2423617	13
48	9.6963336	9.9384024	9.7579313	10.2420687	12
49	9.6965541	9.9383300	9.7582242	10.2417758	11
50	9.6967745	9.9382576	9.7585170	10.2414830	10
51	9.6969947	9.9381851	9.7588096	10.2411904	9
52	9.6972148	9.9381126	9.7591022	10.2408978	8
53	9.6974347	9.9380400	9.7593947	10.2406053	7
54	9.6976545	9.9379674	9.7596871	10.2403129	6
55	9.6978741	9.9378947	9.7599794	10.2400206	5
56	9.6980936	9.9378220	9.7602716	10.2397284	4
57	9.6983129	9.9377492	9.7605637	10.2394363	3
58	9.6985321	9.9376764	9.7608557	10.2391443	2
59	9.6987511	9.9376035	9.7611476	10.2388524	1
60	9.6989700	9.9375306	9.7614394	10.2385606	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

60 Degrees

30 Degrees.

Min.	Sine	Sine Comp	Tang.	Tang. Comp.	
0	9.6989700	9.9375306	9.7614394	10.2385606	60
1	9.6991887	9.9374577	9.7617311	10.2382689	59
2	9.6994073	9.9373847	9.7620227	10.2379773	58
3	9.6996258	9.9376116	9.7623142	10.2376858	57
4	9.6998441	9.9372385	9.7626056	10.2373944	56
5	9.7000622	9.9371653	9.7628969	10.2371031	55
6	9.7002802	9.9370921	9.7631881	10.2368119	54
7	9.7004981	9.9370189	9.7634792	10.2365208	53
8	9.7007158	9.9369456	9.7637702	10.2362298	52
9	9.7009334	9.9368722	9.7640612	10.2359388	51
10	9.7011508	9.9367988	9.7643520	10.2356480	50
11	9.7013681	9.9367254	9.7646427	10.2353573	49
12	9.7015852	9.9366519	9.7649334	10.2350666	48
13	9.7018022	9.9365783	9.7652239	10.2347761	47
14	9.7020190	9.9365047	9.7655143	10.2344857	46
15	9.7022357	9.9364311	9.7658047	10.2341953	45
16	9.7024523	9.9363574	9.7660949	10.2339051	44
17	9.7026687	9.9362836	9.7663851	10.2336149	43
18	9.7028849	9.9362098	9.7666751	10.2333249	42
19	9.7031011	9.9361360	9.7669651	10.2330349	41
20	9.7033170	9.9360621	9.7672550	10.2327450	40
21	9.7035329	9.9359881	9.7675448	10.2324552	39
22	9.7037486	9.9359141	9.7678344	10.2321656	38
23	9.7039641	9.9358401	9.7681240	10.2318760	37
24	9.7041795	9.9357660	9.7684135	0.2315865	36
25	9.7043947	9.9356918	9.7687029	10.2312971	35
26	9.7046099	9.9356177	9.7689922	10.2310078	34
27	9.7048248	9.9355434	9.7692814	10.2307186	33
28	9.7050397	9.9354691	9.7695705	10.2304295	32
29	9.7052543	9.9353948	9.7698596	10.2301404	31
30	9.7054689	9.9353204	9.7701485	10.2298515	30
31	9.7056833	9.9352459	9.7704373	10.2295627	29
32	9.7058975	9.9351715	9.7707261	10.2292739	28
33	9.7061116	9.9350969	9.7710147	10.2289853	27
34	9.7063256	9.9350223	9.7713033	10.2286957	26
35	9.7065394	9.9349477	9.7715917	10.2284083	25
36	9.7067531	9.9348730	9.7718801	10.2281199	24
37	9.7069667	9.9347983	9.7721684	10.2278316	23
38	9.7071801	9.9347235	9.7724566	10.2275434	22
39	9.7073933	9.9346486	9.7727447	10.2272553	21
40	9.7076064	9.9345738	9.7730327	10.2269673	20
41	9.7078194	9.9344988	9.7733206	10.2266794	19
42	9.7080323	9.9344238	9.7736084	10.2263916	18
43	9.7082450	9.9343488	9.7738961	10.2261039	17
44	9.7084575	9.9342737	9.7741838	10.2258162	16
45	9.7086699	9.9341986	9.7744713	10.2255287	15
46	9.7088822	9.9341234	9.7747588	10.2252412	14
47	9.7090943	9.9340482	9.7750462	10.2249538	13
48	9.7093063	9.9339729	9.7753334	10.2246666	12
49	9.7095182	9.9338976	9.7756206	10.2243794	11
50	9.7097299	9.9338222	9.7759077	10.2240923	10
51	9.7099415	9.9337467	9.7761947	10.2238053	9
52	9.7101529	9.9336713	9.7764816	10.2235184	8
53	9.7103642	9.9335957	9.7767685	10.2232315	7
54	9.7105753	9.9335201	9.7770552	10.2229448	6
55	9.7107863	9.9334445	9.7773418	10.2226582	5
56	9.7109972	9.9333688	9.7776284	10.2223716	4
57	9.7112080	9.9332931	9.7779149	10.2220851	3
58	9.7114186	9.9332173	9.7782012	10.2217988	2
59	9.7116290	9.9331415	9.7784875	10.2215125	1
60	9.7118393	9.9330656	9.7787737	10.2212263	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

59 Degrees

31 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.7118393	9.9330656	9.7787737	10.2212263	60
1	9.7120495	9.9329897	9.7790599	10.2209401	59
2	9.7122596	9.9329137	9.7793459	10.2206541	58
3	9.7124695	9.9328376	9.7796318	10.2203682	57
4	9.7126792	9.9327616	9.7799177	10.2200823	56
5	9.7128889	9.9326854	9.7802034	10.2197966	55
6	9.7130983	9.9326092	9.7804891	10.2195109	54
7	9.7133077	9.9325330	9.7807747	10.2192253	53
8	9.7135169	9.9324567	9.7810602	10.2189398	52
9	9.7137260	9.9323804	9.7813456	10.2186544	51
10	9.7139349	9.9323040	9.7816309	10.2183691	50
11	9.7141437	9.9322276	9.7819162	10.2180838	49
12	9.7143524	9.9321511	9.7822013	10.2177987	48
13	9.7145609	9.9320746	9.7824864	10.2175136	47
14	9.7147693	9.9319980	9.7827713	10.2172287	46
15	9.7149776	9.9319213	9.7830562	10.2169438	45
16	9.7151857	9.9318447	9.7833410	10.2166590	44
17	9.7153937	9.9317679	9.7836258	10.2163742	43
18	9.7156015	9.9316911	9.7839104	10.2160896	42
19	9.7158092	9.9316143	9.7841949	10.2158051	41
20	9.7160168	9.9315374	9.7844794	10.2155206	40
21	9.7162243	9.9314605	9.7847638	10.2152362	39
22	9.7164316	9.9313835	9.7850481	10.2149519	38
23	9.7166387	9.9313065	9.7853323	10.2146677	37
24	9.7168458	9.9312294	9.7856164	10.2143836	36
25	9.7170526	9.9311522	9.7859004	10.2140996	35
26	9.7172594	9.9310750	9.7861844	10.2138156	34
27	9.7174660	9.9309978	9.7864682	10.2135318	33
28	9.7176725	9.9309205	9.7867520	10.2132480	32
29	9.7178789	9.9308432	9.7870357	10.2129643	31
30	9.7180851	9.9307658	9.7873193	10.2126807	30
	Sine Comp.	Sine	Tang Comp.	Tang.	Min.

58 Degrees

31 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
30	9.7180851	9.9307658	9,7873193	10.2126807	30
31	9.7182912	9.9306883	9.7876028	10.2123972	29
32	9.7184971	9.9306109	9.7878863	10.2121137	28
33	9.7187030	9.9305333	9.7881696	10.2118304	27
34	9.7189086	9.9304557	9.7884529	10.2115471	26
35	9.7191142	9.9303781	9.7887361	10.2112639	25
36	9.7193196	9.9303004	9.7890192	10.2109808	24
37	9.7195249	9.9302226	9.7893023	10.2106977	23
38	9.7197300	9.9301448	9.7895852	10.2104148	22
39	9.7199350	9.9300670	9.7898681	10.2101319	21
40	9.7201399	9.9299891	9.7901508	10.2098492	20
41	9.7203447	9.9299112	9.7904335	10.2095665	19
42	9.7205493	9.9298332	9.7907161	10.2092839	18
43	9.7207538	9.9297551	9.7909987	10.2090013	17
44	9.7209581	9.9296770	9.7912811	10.2087189	16
45	9.7211623	9.9295989	9.7915635	10.2084365	15
46	9.7213664	9.9295207	9.7918458	10.2081542	14
47	9.7215704	9.9294424	9.7921280	10.2078720	13
48	9.7217742	9.9293641	9.7924101	10.2075899	12
49	9.7219779	9.9292857	9.7926921	10.2073079	11
50	9.7221814	9.9292073	9.7929741	10.2070259	10
51	9.7223848	9.9291289	9.7932560	10.2067440	9
52	9.7225881	9.9290504	9.7935378	10.2064622	8
53	9.7227913	9.9289718	9.7938195	10.2061805	7
54	9.7229943	9.9288932	9.7941011	10.2058989	6
55	9.7231972	9.9288145	9.7943827	10.2056173	5
56	9.7234000	9.9287358	9.7946641	10.2053359	4
57	9.7236026	9.9286571	9.7949455	10.2050545	3
58	9.7238051	9.9285783	9.7952268	10.2047732	2
59	9.7240075	9.9284994	9.7955081	10.2044919	1
60	9.7242097	9.9284205	9.7957892	10.2042108	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

58 Degrees

32 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.7242097	9.9284205	9.7957892	10.2042108	60
1	9.7244118	9.9283415	9.7960703	10.2039297	59
2	9.7246138	9.9282625	9.7963513	10.2036487	58
3	9.7248156	9.9281834	9.7966322	10.2033678	57
4	9.7250174	9.9281043	9.7969130	10.2030870	56
5	9.7252189	9.9280251	9.7971938	10.2028062	55
6	9.7254204	9.9279459	9.7974745	10.2025255	54
7	9.7256217	9.9278666	9.7977551	10.2022449	53
8	9.7258229	9.9277873	9.7980356	10.2019644	52
9	9.7260240	9.9277079	.7983160	10.2016840	51
10	9.7262249	9.9276285	9.7985964	10.2014036	50
11	9.7264257	9.9275490	9.7988767	10.2011233	49
12	9.7266264	9.9274695	9.7991569	10.2008431	48
13	9.7268269	9.9273899	9.7994370	10.2005630	47
14	9.7270273	9.9273103	9.7997170	10.2002830	46
15	9.7272276	9.9272306	9.7999970	10.2000030	45
16	9.7274278	9.9271509	9.8002769	10.1997231	44
17	9.7276278	9.9270711	9.8005567	10.1994433	43
18	9.7278277	9.9269913	9.8008365	10.1991635	42
19	9.7280275	9.9269114	9.8011161	10.1988839	41
20	9.7282271	9.9268314	9.8013957	10.1986043	40
21	9.7284267	9.9267514	9.8016752	10.1983248	39
22	9.7286260	9.9266714	9.8019546	10.1980454	38
23	9.7288253	9.9265913	9.8022340	10.1977660	37
24	9.7290244	9.9265112	9.8025133	10.1974867	36
25	9.7292234	9.9264310	9.8027925	10.1972075	35
26	9.7294223	9.9263507	9.8030716	10.1969284	34
27	9.7296211	9.9262704	9.8033506	10.1966494	33
28	9.7298197	9.9261901	9.8036296	10.1963704	32
29	9.7300182	9.9261096	9.8039085	10.1960915	31
30	9.7302167	9.9260292	9.8041873	10.1958127	30
31	9.7304148	9.9259487	9.8044661	10.1955339	29
32	9.7306129	9.9258681	9.8047447	10.1952553	28
33	9.7308109	9.9257875	9.8050233	10.1949767	27
34	9.7310087	9.9257069	9.8053019	10.1946981	26
35	9.7312064	9.9256261	9.8055803	10.1944197	25
36	9.7314040	9.9255454	9.8058587	10.1941413	24
37	9.7316015	9.9254646	9.8061370	10.1938630	23
38	9.7317989	9.9253837	9.8064152	10.1935848	22
39	9.7319961	9.9253028	9.8066933	10.1933067	21
40	9.7321932	9.9252218	9.8069714	10.1930286	20
41	9.7323902	9.9251408	9.8072494	10.1927506	19
42	9.7325870	9.9250597	9.8075273	10.1924727	18
43	9.7327837	9.9249786	9.8078052	10.1921948	17
44	9.7329803	9.9248974	9.8080829	10.1919171	16
45	9.7331768	9.9248161	9.8083606	10.1916394	15
46	9.7333731	9.9247349	9.8086383	10.1913617	14
47	9.7335693	9.9246535	9.8089158	10.1910842	13
48	9.7337654	9.9245721	9.8091933	10.1908067	12
49	9.7339614	9.9244907	9.8094707	10.1905293	11
50	9.7341572	9.9244092	9.8097480	10.1902520	10
51	9.7343529	9.9243277	9.8100253	10.1899747	9
52	9.7345485	9.9242461	9.8103025	10.1896975	8
53	9.7347440	9.9241644	9.8105796	10.1894204	7
54	9.7349393	9.9240827	9.8108566	10.1891434	6
55	9.7351345	9.9240010	9.8111336	10.1888664	5
56	9.7353296	9.9239191	9.8114105	10.1885895	4
57	9.7355246	9.9238373	9.8116873	10.1883127	3
58	9.7357195	9.9237554	9.8119641	10.1880359	2
59	9.7359142	9.9236734	9.8122408	10.1877592	1
60	9.7361088	9.9235914	9.8125174	10.1874826	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

57 Degrees

33 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.7361088	9.9235914	9.8125174	10.1874826	60
1	9.7363032	9.9235093	9.8127939	10.1872061	59
2	9.7364976	9.9234272	9.8130704	10.1869296	58
3	9.7366918	9.9233450	9.8133468	10.1866532	57
4	9.7368859	9.9232628	9.8136231	10.1863769	56
5	9.7370799	9.9231805	9.8138993	10.1861007	55
6	9.7372737	9.9230982	9.8141755	10.1858245	54
7	9.7374675	9.9230158	9.8144516	10.1855484	53
8	9.7376611	9.9229334	9.8147277	10.1852723	52
9	9.7378546	9.9228509	9.8150036	10.1849964	51
10	9.7380479	9.9227684	9.8152795	10.1847205	50
11	9.7382412	9.9226858	9.8155554	10.1844446	49
12	9.7384343	9.9226032	9.8158311	10.1841689	48
13	9.7386273	9.9225205	9.8161068	10.1838932	47
14	9.7388201	9.9224377	9.8163824	10.1836176	46
15	9.7390129	9.9223549	9.8166580	10.1833420	45
16	9.7392055	9.9222721	9.8169335	10.1830665	44
17	9.7393980	9.9221891	9.8172089	10.1827911	43
18	9.7395904	9.9221062	9.8174842	10.1825158	42
19	9.7397827	9.9220232	9.8177595	10.1822405	41
20	9.7399748	9.9219401	9.8180347	10.1819653	40
21	9.7401668	9.9218570	9.8183098	10.1816902	39
22	9.7403587	9.9217738	9.8185849	10.1814151	38
23	9.7405505	9.9216906	9.8188599	10.1811401	37
24	9.7407421	9.9216073	9.8191348	10.1808652	36
25	9.7409337	9.9215240	9.8194096	10.1805904	35
26	9.7411251	9.9214406	9.8196844	10.1803156	34
27	9.7413164	9.9213572	9.8199592	10.1800408	33
28	9.7415075	9.9212737	9.8202338	10.1797662	32
29	9.7416986	9.9211902	9.8205084	10.1794916	31
30	9.7418895	9.9211066	9.8207829	10.1792171	30
31	9.7420803	9.9210229	9.8210574	10.1789426	29
32	9.7422710	9.9209393	9.8213317	10.1786683	28
33	9.7424616	9.9208555	9.8216060	10.1783940	27
34	9.7426520	9.9207717	9.8218803	10.1781197	26
35	9.7428423	9.9206878	9.8221545	10.1778455	25
36	9.7430325	9.9206039	9.8224286	10.1775714	24
37	9.7432226	9.9205200	9.8227026	10.1772974	23
38	9.7434126	9.9204360	9.8229766	10.1770234	22
39	9.7436024	9.9203519	9.8232505	10.1767495	21
40	9.7437921	9.9202678	9.8235244	10.1764756	20
41	9.7439817	9.9201836	9.8237981	10.1762019	19
42	9.7441712	9.9200994	9.8240719	10.1759281	18
43	9.7443606	9.9200151	9.8243455	10.1756545	17
44	9.7445498	9.9199308	9.8246191	10.1753809	16
45	9.7447390	9.9198464	9.8248926	10.1751074	15
46	9.7449280	9.9197619	9.8251660	10.1748340	14
47	9.7451169	9.9196775	9.8254394	10.1745606	13
48	9.7453056	9.9195929	9.8257127	10.1742873	12
49	9.7454943	9.9195083	9.8259860	10.1740140	11
50	9.7456828	9.9194237	9.8262592	10.1737408	10
51	9.7458712	9.9193390	9.8265323	10.1734677	9
52	9.7460595	9.9192542	9.8268053	10.1731947	8
53	9.7462477	9.9191694	9.8270783	10.1729217	7
54	9.7464358	9.9190845	9.8273513	10.1726487	6
55	9.7466237	9.9189996	9.8276241	10.1723759	5
56	9.7468115	9.9189146	9.8278969	10.1721031	4
57	9.7469992	9.9188296	9.8281696	10.1718304	3
58	9.7471868	9.9187445	9.8284423	10.1715577	2
59	9.7473743	9.9186594	9.8287149	10.1712851	1
60	9.7475617	9.9185742	9.8289874	10.1710126	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

56 Degrees

34 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.7475617	9.9185742	9.8289874	10.1710126	60
1	9.7477489	9.9184890	9.8292599	10.1707401	59
2	9.7479360	9.9184037	9.8295323	10.1704677	58
3	9.7481230	9.9183183	9.8298047	10.1701953	57
4	9.7483099	9.9182329	9.8300769	10.1699231	56
5	9.7484967	9.9181475	9.8303492	10.1696508	55
6	9.7486833	9.9180620	9.8306213	10.1693787	54
7	9.7488698	9.9179764	9.8308934	10.1691066	53
8	9.7490562	9.9178908	9.8311654	10.1688346	52
9	9.7492425	9.9178051	9.8314374	10.1685626	51
10	9.7494287	9.9177194	9.8317093	10.1682907	50
11	9.7496148	9.9176336	9.8319811	10.1680189	49
12	9.7498007	9.9175478	9.8322529	10.1677471	48
13	9.7499866	9.9174619	9.8325246	10.1674754	47
14	9.7501723	9.9173760	9.8327963	10.1672037	46
15	9.7503579	9.9172900	9.8330679	10.1669321	45
16	9.7505434	9.9172040	9.8333394	10.1666606	44
17	9.7507287	9.9171179	9.8336109	10.1663891	43
18	9.7509140	9.9170317	9.8338823	10.1661177	42
19	9.7510991	9.9169455	9.8341536	10.1658464	41
20	9.7512842	9.9168593	9.8344249	10.1655751	40
21	9.7514691	9.9167730	9.8346961	10.1653039	39
22	9.7516528	9.9166866	9.8349673	10.1650327	38
23	9.7518385	9.9166002	9.8352384	10.1647616	37
24	9.7520231	9.9165137	9.8355094	10.1614906	36
25	9.7522075	9.9164272	9.8357804	10.1642196	35
26	9.7523919	9.9163406	9.8360513	10.1639487	34
27	9.7525761	9.9162539	9.8363221	10.1636779	33
28	9.7527602	9.9161673	9.8365929	10.1634071	32
29	9.7529442	9.9160805	9.8368636	10.1631364	31
30	9.7531280	9.9159937	9.8371343	10.1628657	30
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

55 Degrees

34 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
30	9.7531280	9.9159937	9.8371343	10.1628657	30
31	9.7533118	9.9159069	9.8374049	10.1625951	29
32	9.7534954	9.9158200	9.8376755	10.1623245	28
33	9.7536790	9.9157330	9.8379460	10.1620540	27
34	9.7538624	9.9156460	9.8382164	10.1617836	26
35	9.7540457	9.9155589	9.8384867	10.1615133	25
36	9.7542288	9.9154718	9.8387571	10.1612429	24
37	9.7544119	9.9153846	9.8390273	10.1609727	23
38	9.7545949	9.9152974	9.8392975	10.1607025	22
39	9.7547777	9.9152101	9.8395676	10.1604324	21
40	9.7549604	9.9151228	9.8398377	10.1601623	20
41	9.7551431	9.9150354	9.8401077	10.1598923	19
42	9.7553256	9.9149749	9.8403776	10.1596224	18
43	9.7555080	9.9148604	9.8406475	10.1593525	17
44	9.7556902	9.9147729	9.8409174	10.1590826	16
45	9.7558724	9.9146852	9.8411871	10.1588129	15
46	9.7560544	9.9145976	9.8414569	10.1585431	14
47	9.7562364	9.9145099	9.8417265	10.1582735	13
48	9.7564182	9.9144221	9.8419961	10.1580039	12
49	9.7565999	9.9143342	9.8422657	10.1577343	11
50	9.7567815	9.9142464	9.8425351	10.1574649	10
51	9.7569630	9.9141584	9.8428046	10.1571954	9
52	9.7571444	9.9140704	9.8430739	10.1569261	8
53	9.7573256	9.9139824	9.8433432	10.1566568	7
54	9.7575068	9.9138943	9.8436125	10.1563875	6
55	9.7576878	9.9138061	9.8438817	10.1561183	5
56	9.7578687	9.9137179	9.8441508	10.1558492	4
57	9.7580495	9.9136296	9.8444199	10.1555801	3
58	9.7582302	9.9135413	9.8446889	10.1553111	2
59	9.7584108	9.9134530	9.8449579	10.1550421	1
60	9.7585913	9.9133645	9.8453268	10.1547732	0
	Sine Comp.	Sine	Tang Comp.	Tang.	Min.

55 Degrees

35 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9,7585913	9,9133645	9,8452268	10,1547732	60
1	9,7587717	9,9132760	9,8454956	10,1545044	59
2	9,7589519	9,9131875	9,8457644	10,1542356	58
3	9,7591321	9,9130989	9,8460332	10,1539668	57
4	9,7593121	9,9130102	9,8463018	10,1536982	56
5	9,7594920	9,9129215	9,8465705	10,1534295	55
6	9,7596718	9,9128328	9,8468390	10,1531610	54
7	9,7598515	9,9127440	9,8471075	10,1528925	53
8	9,7600311	9,9126551	9,8473760	10,1526240	52
9	9,7602106	9,9125662	9,8476444	10,1523556	51
10	9,7603899	9,9124772	9,8479127	10,1520873	50
11	9,7605692	9,9123882	9,8481810	10,1518190	49
12	9,7607483	9,9122991	9,8484492	10,1515508	48
13	9,7609274	9,9122099	9,8487174	10,1512826	47
14	9,7611063	9,9121207	9,8489855	10,1510145	46
15	9,7612851	9,9120315	9,8492536	10,1507464	45
16	9,7614638	9,9119422	9,8495216	10,1504784	44
17	9,7616424	9,9118528	9,8497896	10,1502104	43
18	9,7618208	9,9117634	9,8500575	10,1499425	42
19	9,7619992	9,9116739	9,8503253	10,1496747	41
20	9,7621775	9,9115844	9,8505931	10,1494069	40
21	9,7623556	9,9114948	9,8508608	10,1491392	39
22	9,7625337	9,9114051	9,8511285	10,1488715	38
23	9,7627116	9,9113155	9,8513961	10,1486039	37
24	9,7628894	9,9112257	9,8516637	10,1483363	36
25	9,7630671	9,9111359	9,8519312	10,1480688	35
26	9,7632447	9,9110460	9,8521987	10,1478013	34
27	9,7634222	9,9109561	9,8524661	10,1475339	33
28	9,7635996	9,9108661	9,8527335	10,1472665	32
29	9,7637769	9,9107761	9,8530008	10,1469992	31
30	9,7639540	9,9106860	9,8532680	10,1467320	30
31	9,7641311	9,9105959	9,8535352	10,1464648	29
32	9,7643080	9,9105057	9,8538023	10,1461977	28
33	9,7644849	9,9104155	9,8540694	10,1459306	27
34	9,7646616	9,9103251	9,8543365	10,1456635	26
35	9,7648382	9,9102348	9,8546034	10,1453966	25
36	9,7650147	9,9101444	9,8548704	10,1451296	24
37	9,7651911	9,9100539	9,8551372	10,1448628	23
38	9,7653674	9,9099634	9,8554041	10,1445959	22
39	9,7655436	9,9098728	9,8556708	10,1443292	21
40	9,7657197	9,9097821	9,8559376	10,1440624	20
41	9,7658957	9,9096915	9,8562042	10,1437958	19
42	9,7660715	9,9096007	9,8564708	10,1435292	18
43	9,7662473	9,9095099	9,8567374	10,1432626	17
44	9,7664229	9,9094190	9,8570039	10,1429961	16
45	9,7665985	9,9093281	9,8572704	10,1427296	15
46	9,7667739	9,9092371	9,8575368	10,1424632	14
47	9,7669492	9,9091461	9,8578031	10,1421969	13
48	9,7671244	9,9090550	9,8580694	10,1419306	12
49	9,7672996	9,9089639	9,8583357	10,1416643	11
50	9,7674746	9,9088727	9,8586019	10,1413981	10
51	9,7676494	9,9087814	9,8588680	10,1411320	9
52	9,7678242	9,9086901	9,8591341	10,1408659	8
53	9,7679989	9,9085988	9,8594002	10,1405998	7
54	9,7681735	9,9085073	9,8596661	10,1403339	6
55	9,7683480	9,9084159	9,8599321	10,1400679	5
56	9,7685223	9,9083243	9,8601980	10,1398020	4
57	9,7686966	9,9082327	9,8604638	10,1395362	3
58	9,7688707	9,9081411	9,8607296	10,1392704	2
59	9,7690448	9,9080494	9,8609954	10,1390046	1
60	9,7692187	9,9079576	9,8612610	10,1387390	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

54 Degrees

36 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9,7692187	9,9079576	9,8612610	10,1387390	60
1	9,7693925	9,9078658	9,8615267	10,1384733	59
2	9,7695662	9,9077740	9,8617923	10,1382077	58
3	9,7697398	9,9076820	9,8620578	10,1379422	57
4	9,7699134	9,9075901	9,8623233	10,1376767	56
5	9,7700868	9,9074980	9,8625887	10,1374113	55
6	9,7702601	9,9074059	9,8628541	10,1371459	54
7	9,7704332	9,9073138	9,8631195	10,1368805	53
8	9,7706063	9,9072216	9,8633848	10,1366152	52
9	9,7707793	9,9071293	9,8636500	10,1363500	51
10	9,7709522	9,9070370	9,8639152	10,1360848	50
11	9,7711249	9,9069446	9,8641803	10,1358197	49
12	9,7712976	9,9068522	9,8644454	10,1355546	48
13	9,7714702	9,9067597	9,8647105	10,1352895	47
14	9,7716426	9,9066671	9,8649755	10,1350245	46
15	9,7718150	9,9065745	9,8652404	10,1347596	45
16	9,7719872	9,9064819	9,8655053	10,1344947	44
17	9,7721591	9,9063892	9,8657702	10,1342298	43
18	9,7723314	9,9062964	9,8660350	10,1339650	42
19	9,7725033	9,9062036	9,8662997	10,1337003	41
20	9,7726751	9,9061107	9,8665644	10,1334356	40
21	9,7728468	9,9060177	9,8668291	10,1331709	39
22	9,7730185	9,9059247	9,8670937	10,1329063	38
23	9,7731900	9,9058317	9,8673583	10,1326417	37
24	9,7733614	9,9057386	9,8676228	10,1323772	36
25	9,7735327	9,9056454	9,8678873	10,1321127	35
26	9,7737039	9,9055522	9,8681517	10,1318483	34
27	9,7738749	9,9054589	9,8684160	10,1315840	33
28	9,7740459	9,9053656	9,8686804	10,1313196	32
29	9,7742168	9,9052722	9,8689446	10,1310554	31
30	9,7743876	9,9051787	9,8692089	10,1307911	30
31	9,7745583	9,9050852	9,8694731	10,1305269	29
32	9,7747288	9,9049916	9,8697372	10,1302628	28
33	9,7748993	9,9048980	9,8700013	10,1299987	27
34	9,7750697	9,9048043	9,8702653	10,1297347	26
35	9,7752399	9,9017106	9,8705293	10,1294707	25
36	9,7754101	9,9046168	9,8707933	10,1292067	24
37	9,7755801	9,9045230	9,8710572	10,1289428	23
38	9,7757501	9,9044291	9,8713210	10,1286790	22
39	9,7759199	9,9043351	9,8715848	10,1284152	21
40	9,7760897	9,9042411	9,8718486	10,1281514	20
41	9,7762593	9,9041470	9,8721123	10,1278877	19
42	9,7764289	9,9040529	9,8723760	10,1276240	18
43	9,7765983	9,9039587	9,8726396	10,1273604	17
44	9,7767676	9,9038644	9,8729032	10,1270968	16
45	9,7769369	9,9037701	9,8731668	10,1268332	15
46	9,7771060	9,9036757	9,8734302	10,1265698	14
47	9,7772750	9,9035813	9,8736937	10,1263063	13
48	9,7774439	9,9034868	9,8739571	10,1260429	12
49	9,7776128	9,9033923	9,8742204	10,1257796	11
50	9,7777815	9,9032977	9,8744838	10,1255162	10
51	9,7779501	9,9032031	9,8747470	10,1252530	9
52	9,7781186	9,9031084	9,8750102	10,1249898	8
53	9,7782870	9,9030136	9,8752734	10,1247266	7
54	9,7784553	9,9029188	9,8755365	10,1244635	6
55	9,7786235	9,9028239	9,8757996	10,1242004	5
56	9,7787916	9,9027289	9,8760627	10,1239373	4
57	9,7789596	9,9026339	9,8763257	10,1236743	3
58	9,7791275	9,9025389	9,8765886	10,1234114	2
59	9,7792953	9,9024438	9,8768515	10,1231485	1
60	9,7794630	9,9023486	9,8771144	10,1228856	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

53 Degrees

37 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9,7794630	9,9023486	9,8771144	10,1228856	60
1	9,7796306	9,9022534	9,8773772	10,1226228	59
2	9,7797981	9,9021581	9,8776400	10,1223600	58
3	9,7799655	9,9020628	9,8779027	10,1220973	57
4	9,7801328	9,9019674	9,8781654	10,1218346	56
5	9,7803000	9,9018719	9,8784281	10,1215719	55
6	9,7804671	9,9017764	9,8786907	10,1213093	54
7	9,7806341	9,9016808	9,8789533	10,1210467	53
8	9,7808010	9,9015852	9,8792158	10,1207842	52
9	9,7809677	9,9014895	9,8794782	10,1205218	51
10	9,7811344	9,9013938	9,8797407	10,1202593	50
11	9,7813010	9,9012980	9,8800031	10,1199969	49
12	9,7814675	9,9012021	9,8802654	10,1197346	48
13	9,7816339	9,9011062	9,8805277	10,1194723	47
14	9,7818002	9,9010102	9,8807900	10,1192100	46
15	9,7819664	9,9009142	9,8810522	10,1189478	45
16	9,7821324	9,9008181	9,8813144	10,1186856	44
17	9,7822984	9,9007219	9,8815765	10,1184235	43
18	9,7824643	9,9006257	9,8818386	10,1181614	42
19	9,7826301	9,9005294	9,8821007	10,1178993	41
20	9,7827958	9,9004331	9,8823627	10,1176373	40
21	9,7829614	9,9003367	9,8826246	10,1173754	39
22	9,7831268	9,9002403	9,8828866	10,1171134	38
23	9,7832922	9,9001438	9,8831484	10,1168516	37
24	9,7834575	9,9000472	9,8834103	10,1165897	36
25	9,7836227	9,8999506	9,8836721	10,1163279	35
26	9,7837878	9,8998539	9,8839338	10,1160662	34
27	9,7839528	9,8997572	9,8841956	10,1158044	33
28	9,7841177	9,8996604	9,8844572	10,1155428	32
29	9,7842824	9,8995636	9,8847189	10,1152811	31
30	9,7844471	9,8994667	9,8849805	10,1150195	30
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

52 Degrees

37 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
30	9,7844471	9,8994667	9,8849805	10,1150195	30
31	9,7846117	9,8993697	9,8852420	10,1147580	29
32	9,7847762	9,8992727	9,8855035	10,1144965	28
33	9,7849406	9,8991756	9,8857650	10,1142350	27
34	9,7851049	9,8990784	9,8860264	10,1139736	26
35	9,7852691	9,8989812	9,8862878	10,1137122	25
36	9,7854332	9,8988840	9,8865492	10,1134508	24
37	9,7855972	9,8987867	9,8868105	10,1131895	23
38	9,7857611	9,8986893	9,8870718	10,1129282	22
39	9,7859249	9,8985919	9,8873330	10,1126670	21
40	9,7860886	9,8984944	9,8875942	10,1124058	20
41	9,7862522	9,8983968	9,8878554	10,1121446	19
42	9,7864157	9,8982992	9,8881165	10,1118835	18
43	9,7865791	9,8982015	9,8883775	10,1116225	17
44	9,7867424	9,8981038	9,8886386	10,1113614	16
45	9,7869056	9,8980060	9,8888996	10,1111004	15
46	9,7870687	9,8979082	9,8891605	10,1108395	14
47	9,7872317	9,8978103	9,8894214	10,1105786	13
48	9,7873946	9,8977123	9,8896823	10,1103177	12
49	9,7875574	9,8976143	9,8899432	10,1100568	11
50	9,7877202	9,8975162	9,8902040	10,1097960	10
51	9,7878828	9,8974181	9,8904647	10,1095353	9
52	9,7880453	9,8973199	9,8907254	10,1092746	8
53	9,7882077	9,8972216	9,8909861	10,1090139	7
54	9,7883701	9,8971233	9,8912468	10,1087532	6
55	9,7885323	9,8970249	9,8915074	10,1084926	5
56	9,7886944	9,8969265	9,8917679	10,1082321	4
57	9,7888565	9,8968280	9,8920285	10,1079715	3
58	9,7890184	9,8967294	9,8922890	10,1077110	2
59	9,7891802	9,8966308	9,8925494	10,1074506	1
60	9,7893420	9,8965321	9,8928098	10,1071902	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

52 Degrees

38 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.7893420	9.8965321	9.8928098	10.1071902	60
1	9.7895036	9.8964334	9.8930702	10.1069298	59
2	9.7896652	9.8963346	9.8933306	10.1066694	58
3	9.7898266	9.8962358	9.8935909	10.1064091	57
4	9.7899880	9.8961369	9.8938511	10.1061489	56
5	9.7901493	9.8960379	9.8941114	10.1058886	55
6	9.7903104	9.8959389	9.8943715	10.1056285	54
7	9.7904715	9.8958398	9.8946317	10.1053683	53
8	9.7906325	9.8957406	9.8948918	10.1051082	52
9	9.7907933	9.8956414	9.8951519	10.1048481	51
10	9.7909541	9.8955422	9.8954119	10.1045881	50
11	9.7911148	9.8954429	9.8956719	10.1043281	49
12	9.7912754	9.8953435	9.8959319	10.1040681	48
13	9.7914359	9.8952440	9.8961918	10.1038082	47
14	9.7915963	9.8951445	9.8964517	10.1035483	46
15	9.7917566	9.8950450	9.8967116	10.1032884	45
16	9.7919168	9.8949453	9.8969714	10.1030286	44
17	9.7920769	9.8948457	9.8972312	10.1027688	43
18	9.7922369	9.8947459	9.8974910	10.1025090	42
19	9.7923968	9.8946461	9.8977507	10.1022493	41
20	9.7925566	9.8945463	9.8980104	10.1019896	40
21	9.7927163	9.8944463	9.8982700	10.1017300	39
22	9.7928760	9.8943464	9.8985296	10.1014704	38
23	9.7930355	9.8942463	9.8987892	10.1012108	37
24	9.7931949	9.8941462	9.8990487	10.1009513	36
25	9.7933543	9.8940461	9.8993082	10.1006918	35
26	9.7935135	9.8939458	9.8995677	10.1004323	34
27	9.7936727	9.8938456	9.8998271	10.1001729	33
28	9.7938317	9.8937452	9.9000865	10.0999135	32
29	9.7939907	9.8936448	9.9003459	10.0996541	31
30	9.7941496	9.8935444	9.9006052	10.0993948	30
31	9.7943083	9.8934439	9.9008645	10.0991355	29
32	9.7944670	9.8933433	9.9011237	10.0988763	28
33	9.7946256	9.8932426	9.9013830	10.0986170	27
34	9.7947841	9.8931419	9.9016422	10.0983578	26
35	9.7949425	9.8930412	9.9019013	10.0980987	25
36	9.7951008	9.8929404	9.9021604	10.0978396	24
37	9.7952590	9.8928395	9.9024195	10.0975805	23
38	9.7954171	9.8927385	9.9026786	10.0973214	22
39	9.7955751	9.8926375	9.9029376	10.0970624	21
40	9.7957330	9.8925365	9.9031966	10.0968034	20
41	9.7958909	9.8924354	9.9034555	10.0965445	19
42	9.7960486	9.8923342	9.9037144	10.0962856	18
43	9.7962062	9.8922329	9.9039733	10.0960267	17
44	9.7963638	9.8921316	9.9042321	10.0957679	16
45	9.7965212	9.8920303	9.9044910	10.0955090	15
46	9.7966786	9.8919289	9.9047497	10.0952503	14
47	9.7968359	9.8918274	9.9050085	10.0949915	13
48	9.7969930	9.8917258	9.9052672	10.0947328	12
49	9.7971501	9.8916242	9.9055259	10.0944741	11
50	9.7973071	9.8915226	9.9057845	10.0042155	10
51	9.7974640	9.8914208	9.9060431	10.0939569	9
52	9.7976208	9.8913191	9.9063017	10.0936983	8
53	9.7977775	9.8912172	9.9065603	10.0934397	7
54	9.7979341	9.8911153	9.9068188	10.0931812	6
55	9.7980906	9.8910133	9.9070773	10.0920227	5
56	9.7982470	9.8909113	9.9073357	10.0926643	4
57	9.7984034	9.8908092	9.9075941	10.0924059	3
58	9.7985596	9.8907071	9.9078525	10.0921475	2
59	9.7987158	9.8906049	9.9081109	10.0918891	1
60	9.7988718	9.8905026	9.9083692	10.0916308	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

51 Degrees

39 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.7988718	9.8905026	9.9083692	10.0916308	60
1	9.7990270	9.8904003	9.9086275	10.0913725	59
2	9.7991836	9.8902979	9.9088858	10.0911142	58
3	9.7993394	9.8901954	9.9091410	10.0908560	57
4	9.7994951	9.8900929	9.9094022	10.0905978	56
5	9.7996507	9.8899903	9.9096603	10.0903397	55
6	9.7998062	9.8898877	9.9099185	10.0900815	54
7	9.7999616	9.8897850	9.9101766	10.0898234	53
8	9.8001169	9.8896822	9.9104347	10.0895653	52
9	9.8002721	9.8895794	9.9106927	10.0893073	51
10	9.8004272	9.8894765	9.9109507	10.0890493	50
11	9.8005823	9.8893736	9.9112087	10.0887913	49
12	9.8007372	9.8892706	9.9114666	10.0885334	48
13	9.8008921	9.8891675	9.9117245	10.0882755	47
14	9.8010468	9.8890644	9.9119824	10.0880176	46
15	9.8012015	9.8889612	9.9122403	10.0877597	45
16	9.8013561	9.8888580	9.9124981	10.0875019	44
17	9.8015106	9.8887547	9.9127559	10.0872441	43
18	9.8016649	9.8886513	9.9130137	10.0869863	42
19	9.8018192	9.8885479	9.9132714	10.0867286	41
20	9.8019735	9.8884444	9.9135291	10.0864709	40
21	9.8021276	9.8883408	9.9137868	10.0862132	39
22	9.8022816	9.8882372	9.9140444	10.0859556	38
23	9.8024355	9.8881335	9.9143020	10.0856980	37
24	9.8025894	9.8880298	9.9145596	10.0854404	36
25	9.8027431	9.8879260	9.9148171	10.0851829	35
26	9.8028968	9.8878221	9.9150747	10.0849253	34
27	9.8030504	9.8877182	9.9153322	10.0846678	33
28	9.8032038	9.8876142	9.9155896	10.0844104	32
29	9.8033572	9.8875102	9.9158471	10.0841529	31
30	9.8035105	9.8874061	9.9161045	10.0838955	30
31	9.8036637	9.8873019	9.9163618	10.0836382	29
32	9.8038168	9.8871977	9.9166192	10.0833808	28
33	9.8039699	9.8870934	9.9168765	10.0831235	27
34	9.8041228	9.8869890	9.9171338	10.0828662	26
35	9.8042757	9.8868846	9.9173911	10.0826089	25
36	9.8044284	9.8867801	9.9176483	10.0823517	24
37	9.8045811	9.8866756	9.9179055	10.0820945	23
38	9.8047336	9.8865710	9.9181627	10.0818373	22
39	9.8048861	9.8864663	9.9184198	10.0815802	21
40	9.8050385	9.8863616	9.9186769	10.0813231	20
41	9.8051908	9.8862568	9.9189340	10.0810660	19
42	9.8053430	9.8861519	9.9191911	10.0808089	18
43	9.8054951	9.8860470	9.9194481	10.0805519	17
44	9.8056472	9.8859420	9.9197051	10.0802949	16
45	9.8057991	9.8858370	9.9199621	10.0800379	15
46	9.8059510	9.8857319	9.9202191	10.0797809	14
47	9.8061027	9.8856267	9.9204760	10.0795240	13
48	9.8062544	9.8855215	9.9207329	10.0792671	12
49	9.8064060	9.8854162	9.9209898	10.0790102	11
50	9.8065575	9.8853109	9.9212466	10.0787534	10
51	9.8067089	9.8852055	9.9215034	10.0784966	9
52	9.8068602	9.8851000	9.9217602	10.0782398	8
53	9.8070114	9.8849945	9.9220170	10.0779830	7
54	9.8071626	9.8848889	9.9222737	10.0777263	6
55	9.8073136	9.8847832	9.9225304	10.0774696	5
56	9.8074646	9.8846775	9.9227871	10.0772129	4
57	9.8076154	9.8845717	9.9230437	10.0769563	3
58	9.8077662	9.8844659	9.9233004	10.0766996	2
59	9.8079169	9.8843599	9.9235570	10.0764830	1
60	9.8080675	9.8842540	9.9238135	10.0761465	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

50 Degrees

40 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.8080675	9.8842540	9.9238135	10.0761805	60
1	9.8082180	9.8841479	9.9240701	10.0759299	59
2	9.8083684	9.8840418	9.9243266	10.0756734	58
3	9.8085188	9.8839357	9.9245831	10.0754169	57
4	9.8086690	9.8838294	9.9248396	10.0751604	56
5	9.8088192	9.8837232	9.9250960	10.0749040	55
6	9.8089692	9.8836168	9.9253524	10.0746476	54
7	9.8091192	9.8835104	9.9256088	10.0743912	53
8	9.8092691	9.8834039	9.9258652	10.0741348	52
9	9.8094189	9.8832974	9.9261215	10.0738785	51
10	9.8095686	9.8831908	9.9263778	10.0736222	50
11	9.8097182	9.8830841	9.9266341	10.0733659	49
12	9.8098678	9.8829774	9.9268904	10.0731096	48
13	9.8100172	9.8828706	9.9271466	10.0728534	47
14	9.8101666	9.8827638	9.9274028	10.0725972	46
15	9.8103159	9.8826568	9.9276590	10.0623410	45
16	9.8104650	9.8825499	9.9279152	10.0720848	44
17	9.8106141	9.8824428	9.9281713	10.0718287	43
18	9.8107631	9.8823357	9.9284274	10.0715720	42
19	9.8109121	9.8822285	9.9286835	10.0713165	41
20	9.8110609	9.8821213	9.9289396	10.0710604	40
21	9.8112096	9.8820140	9.9291956	10.0708044	39
22	9.8113583	9.8819067	9.9294516	10.0705484	38
23	9.8115069	9.8817992	9.9297076	10.0702924	37
24	9.8116554	9.8816918	9.9299636	10.0700364	36
25	9.8118038	9.8815842	9.9302195	10.0697805	35
26	9.8119521	9.8814760	9.9304755	10.0695245	34
27	9.8121003	9.8813689	9.9307314	10.0692686	33
28	9.8122484	9.8812612	9.9309872	10.0690128	32
29	9.8123965	9.8811534	9.9312431	10.0687569	31
30	9.8125444	9.8810455	9.9314989	10.0685011	30
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

49 Degrees

40 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang.Comp.	
30	9.8125444	9.8810455	9.9314989	10.0685011	30
31	9.8126923	9.8809376	9.9317547	10.0682453	29
32	9.8128401	9.8808296	9.9320105	10.0679895	28
33	9.8129878	9.8807215	9.9322662	10.0677338	27
34	9.8131354	9.8806134	9.9325220	10.0674780	26
35	9.8132829	9.8805052	9.9327777	10.0672223	25
36	9.8134303	9.8803970	9.9330334	10.0669666	24
37	9.8135777	9.8802887	9.9333890	10.0667110	23
38	9.8137250	9.8801803	9.9335446	10.0664554	22
39	9.8138721	9.8800719	9.9338003	10.0661997	21
40	9.8140192	9.8799634	9.9340559	10.0659441	20
41	9.8141662	9.8798548	9.9343114	10.0656886	19
42	9.8143131	9.8797462	9.9345670	10.0654330	18
43	9.8144600	9.8796375	9.9348225	10.0651775	17
44	9.8146067	9.8795287	9.9350780	10.0649220	16
45	9.8147534	9.8794199	9.9353335	10.0646665	15
46	9.8148999	9.8793110	9.9355889	10.0644111	14
47	9.8150464	9.8792021	9.9358444	10.0641556	13
48	9.8151928	9.8790930	9.9360998	10.0639002	12
49	9.8153391	9.8789840	9.9363552	10.0636448	11
50	9.8154854	9.8788748	9.9366105	10.0633895	10
51	9.8156315	9.8787656	9.9368659	10.0631341	9
52	9.8157776	9.8786563	9.9371212	10.0628788	8
53	9.8159235	9.8785470	9.9373765	10.0626235	7
54	9.8160694	9.8784376	9.9376318	10.0623682	6
55	9.8162152	9.8783281	9.9378871	10.0621129	5
56	9.8163609	9.8782186	9.9381423	10.0618577	4
57	9.8165066	9.8781090	9.9383975	10.0616025	3
58	9.8166521	9.8779994	9.9386527	10.0613473	2
59	9.8167975	9.8778896	9.9389079	10.0610921	1
60	9.8169429	9.8777799	9.9391631	10.0608369	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.

49 Degrees

41 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.8169429	9.8777799	9.9391631	10.0608369	60
1	9.8170882	9.8776700	9.9394182	10.0605818	59
2	9.8172334	9.8775601	9.9396733	10.0603267	8
3	9.8173785	9.8774500	9.9399284	10.0600716	57
4	9.8175235	9.8773401	9.9401835	10.0598165	56
5	9.8176685	9.8772300	9.9404385	10.0595615	55
6	9.8178133	9.8771198	9.9406936	10.0593064	54
7	9.8179581	9.8770096	9.9409486	10.0590514	53
8	9.8181028	9.8768993	9.9412036	10.0587964	52
9	9.8182474	9.8767889	9.9414585	10.0585415	51
10	9.8183919	9.8766785	9.9417135	10.0582865	50
11	9.8185364	9.8765680	9.9419684	10.0580316	49
12	9.8186807	9.8764574	9.9422233	10.0577767	48
13	9.8188250	9.8763468	9.9424782	10.0575218	47
14	9.8189692	9.8762361	9.9427331	10.0572669	46
15	9.8191133	9.8761253	9.9429879	10.0570121	45
16	9.8192573	9.8760145	9.9432428	10.0567572	44
17	9.8194012	9.8759036	9.9434976	10.0565024	43
18	9.8195450	9.8757927	9.9437524	10.0562476	42
19	9.8196888	9.8756816	9.9440072	10.0559928	41
20	9.8198325	9.8755706	9.9442619	10.0557381	40
21	9.8199761	9.8754594	9.9445166	10.0554834	39
22	9.8201196	9.8753482	9.9447714	10.0552286	38
23	9.8202630	9.8752369	9.9450261	10.0549739	37
24	9.8204063	9.8751256	9.9452807	10.0547193	36
25	9.8205496	9.8750142	9.9455354	10.0544646	35
26	9.8206927	9.8749027	9.9457900	10.0542100	34
27	9.8208358	9.8747912	9.9460447	10.0539553	33
28	9.8209788	9.8746795	9.9462993	10.0537007	32
29	9.8211217	9.8745679	9.9465539	10.0534461	31
30	9.8212646	9.8744561	9.9468084	10.0531916	30
31	9.8214073	9.8743443	9.9470630	10.0529370	29
32	9.8215500	9.8742325	9.9473175	10.0526825	28
33	9.8216926	9.8741205	9.9475720	10.0524280	27
34	9.8218351	9.8740085	9.9478265	10.0521735	26
35	9.8219775	9.8738965	9.9480810	10.0519190	25
36	9.8221198	9.8737844	9.9483355	10.0516645	24
37	9.8222621	9.8733722	9.9485899	10.0514101	23
38	9.8224042	9.8735599	9.9488443	10.0511557	22
39	9.8225463	9.8734476	9.9490987	10.0509013	21
40	9.8226883	9.8733352	9.9493531	10.0506469	20
41	9.8228302	9.8732227	9.9496075	10.0503925	19
42	9.8229721	9.8731102	9.9498619	10.0501381	18
43	9.8231138	9.8729976	9.9501162	10.0498838	17
44	9.8232555	9.8728849	9.9503705	10.0496295	16
45	9.8233971	9.8727722	9.9506248	10.0493752	15
46	9.8235386	9.8726594	9.9508791	10.0491209	14
47	9.8236800	9.8725466	9.9511334	10.0488666	13
48	9.8238213	9.8724337	9.9513876	10.0486124	12
49	9.8239626	9.8723207	9.9516419	10.0483581	11
50	9.8241037	9.8722076	9.9518961	10.0481039	10
51	9.8242448	9.8720945	9.9521503	10.0478497	9
52	9.8243858	9.8719813	9.9524045	10.0475955	8
53	9.8245267	9.8718681	9.9526587	10.0473413	7
54	9.8246676	9.8717548	9.9529128	10.0470872	6
55	9.8248083	9.8716414	9.9531670	10.0468330	5
56	9.8249490	9.8715279	9.9534211	10.0465789	4
57	9.8250896	9.8714144	9.9536752	10.0463248	3
58	9.8252301	9.8713008	9.9539293	10.0460707	2
59	9.8253705	9.8711872	9.9541834	10.0458166	1
60	9.8255109	9.8710735	9.9544374	10.0455626	0
	Sine Comp.	Sine	Tang. Comp.	Tang.	Min.

48 Degrees

42 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.8255109	9.8710735	9.9544374	10.0455626	60
1	9.8256512	9.8709597	9.9546915	10.0453085	59
2	9.8257913	9.8708458	9.9549455	10.0450545	58
3	9.8259314	9.8707319	9.9551995	10.0448005	57
4	9.8260715	9.8706179	9.9554535	10.0445465	56
5	9.8262114	9.8705039	9.9557075	10.0442925	55
6	9.8263512	9.8703898	9.9559615	10.0440385	54
7	9.8264910	9.8702756	9.9562154	10.0437846	53
8	9.8266307	9.8701613	9.9564964	10.0435306	52
9	9.8267703	9.8700470	9.9567233	10.0432767	51
10	9.8269098	9.8699326	9.9569772	10.0430228	50
11	9.8270493	9.8698182	9.9572311	10.0427689	49
12	9.8271887	9.8697037	9.9574850	10.0425150	48
13	9.8273279	9.8695891	9.9577389	10.0422611	47
14	9.8274671	9.8694744	9.9579927	10.0420073	46
15	9.8276063	9.8693597	9.9582465	10.0417535	45
16	9.8277453	9.8692449	9.9585004	10.0414996	44
17	9.8278843	9.8691301	9.9587542	10.0412458	43
18	9.8280231	9.8690152	9.9590080	10.0409920	42
19	9.8281619	9.8689002	9.9592618	10.0407382	41
20	9.8283006	9.8687851	9.9595155	10.0404845	40
21	9.8284393	9.8686700	9.9597693	10.0402307	39
22	9.8285779	9.8685548	9.9600230	10.0399770	38
23	9.8287163	9.8684396	9.9602767	10.0397233	37
24	9.8288547	9.8683242	9.9605305	10.0394695	36
25	9.8289930	9.8682088	9.9607842	10.0392158	35
26	9.8291312	9.8680934	9.9610378	10.0389622	34
27	9.8292691	9.8679779	9.9612915	10.0387085	33
28	9.8294075	9.8678623	9.9615452	10.0384548	32
29	9.8295454	9.8677466	9.9617988	10.0382012	31
30	9.8296833	9.8676309	9.9620525	10.0379475	30
31	9.8298212	9.8675151	9.9623061	10.0376939	29
32	9.8299589	9.8673992	9.9625597	10.0374403	28
33	9.8300966	9.8672833	9.9628133	10.0371867	27
34	9.8302342	9.8671673	9.9630669	10.0369331	26
35	9.8303717	9.8670512	9.9633204	10.0366796	25
36	9.8305091	9.8669351	9.9635740	10.0364260	24
37	9.8306464	9.8668189	9.9638275	10.0361725	23
38	9.8307837	9.8667026	9.9640811	10.0359189	22
39	9.8309209	9.8665863	9.9643346	10.0356654	21
40	9.8310580	9.8664690	9.9645881	10.0354119	20
41	9.8311950	9.8663534	9.9648416	10.0351584	19
42	9.8313320	9.8662369	9.9650951	10.0349049	18
43	9.8314688	9.8661203	9.9653486	10.0346514	17
44	9.8316056	9.8660036	9.9656020	10.0343980	16
45	9.8317423	9.8658868	9.9658555	10.0341445	15
46	9.8318789	9.8657700	9.9661089	10.0338911	14
47	9.8320155	9.8656531	9.9663623	10.0336377	13
48	9.8321519	9.8655362	9.9666157	10.0333843	12
49	9.8322883	9.8654192	9.9668692	10.0331308	11
50	9.8324246	9.8653021	9.9671225	10.0328775	10
51	9.8325609	9.8651849	9.9673759	10.0326241	9
52	9.8326970	9.8650677	9.9676293	10.0323707	8
53	9.8328331	9.8649504	9.9678827	10.0321173	7
54	9.8329691	9.8648331	9.9681360	10.0318640	6
55	9.8331050	9.8617156	9.9683893	10.0316107	5
56	9.8332408	9.8645981	9.9686427	10.0313573	4
57	9.8333766	9.8644806	9.9688960	10.0311040	3
58	9.8335122	9.8643629	9.9691493	10.0308507	2
59	9.8336478	9.8642452	9.9694026	10.0305974	1
60	9.8337833	9.8641275	9.9696559	10.0303441	0
	Sine Comp.	Sine	Tang. Comp.	Tang.	Min.

47 Degrees

43 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
0	9.8337833	9.8641275	9.9696559	10.0303441	60
1	9.8339186	9.8640096	9.9699091	10.0300909	59
2	9.8340541	9.8638917	9.9701624	10.0298376	58
3	9.8341894	9.8637737	9.9704157	10.0295843	57
4	9.8343246	9.8636557	9.9706689	10.0293311	56
5	9.8344597	9.8635376	9.9709221	10.0290779	55
6	9.8345948	9.8634194	9.9711754	10.0288246	54
7	9.8347297	9.8633011	9.9714286	10.0285714	53
8	9.8348646	9.8631828	9.9716818	10.0283182	52
9	9.8349994	9.8630644	9.9719350	10.0280650	51
10	9.8351341	9.8629460	9.9721882	10.0278118	50
11	9.8352688	9.8628274	9.9724413	10.0275587	49
12	9.8354033	9.8627088	9.9726945	10.0273055	48
13	9.8355378	9.8625902	9.9729477	10.0270523	47
14	9.8356722	9.8624714	9.9732008	10.0267992	46
15	9.8358066	9.8623526	9.9734539	10.0265461	45
16	9.8359408	9.8622338	9.9737071	10.0262929	44
17	9.8360750	9.8621148	9.9739602	10.0260398	43
18	9.8362091	9.8619958	9.9742133	10.0257867	42
19	9.8363431	9.8618767	9.9744664	10.0255336	41
20	9.8364771	9.8617576	9.9747195	10.0252805	40
21	9.8366109	9.8616383	9.9749726	10.0250274	39
22	9.8367447	9.8615190	9.9752257	10.0247743	38
23	9.8368784	9.8613997	9.9754787	10.0245213	37
24	9.8370121	9.8612803	9.9757318	10.0242682	36
25	9.8371456	9.8611608	9.9759849	10.0240151	35
26	9.8372791	9.8610412	9.9762379	10.0237621	34
27	9.8374125	9.8609215	9.9764909	10.0235091	33
28	9.8375458	9.8608018	9.9767440	10.0232560	32
29	9.8376790	9.8606821	9.9769970	10.0230030	31
30	9.8378122	9.8605622	9.9772500	10.0227500	30
	Sine Comp.	Sine	Tang Comp.	Tang.	Min.

46 Degrees

43 Degrees

Min.	Sine	Sine Comp.	Tang.	Tang. Comp.	
30	9.8378122	9.8605622	9.9772500	10.0227500	30
31	9.8379453	9.8604423	9.9775030	10.0224970	29
32	9.8380783	9.8603223	9.9777560	10.0222440	28
33	9.8382112	9.8602022	9.9780090	10.0219910	27
34	9.8383441	9.8600821	9.9782620	10.0217380	26
35	9.8384769	9.8599619	9.9785149	10.0214851	25
36	9.8386096	9.8598416	9.9787679	10.0212321	24
37	9.8387422	9.8597213	9.9790209	10.0209791	23
38	9.8388747	9.8596009	9.9792738	10.0207262	22
39	9.8390072	9.8594804	9.9795268	10.0204732	21
40	9.8391396	9.8593599	9.9797797	10.0202203	20
41	9.8392719	9.8592393	9.9800326	10.0199674	19
42	9.8394041	9.8591186	9.9802856	10.0197144	18
43	9.8395363	9.8589978	9.9805385	10.0194615	17
44	9.8396684	9.8588770	9.9807914	10.0192086	16
45	9.8398004	9.8587561	9.9810443	10.0189557	15
46	9.8399323	9.8586351	9.9812972	10.0187028	14
47	9.8400642	9.8585141	9.9815501	10.0184499	13
48	9.8401959	9.8583929	9.9818030	10.0181970	12
49	9.8403276	9.8582718	9.9820559	10.0179441	11
50	9.8404593	9.8581505	9.9823087	10.0176913	10
51	9.8405908	9.8580292	9.9825616	10.0174384	9
52	9.8407223	9.8579078	9.9828145	10.0171855	8
53	9.8408537	9.8577863	9.9830673	10.0169327	7
54	9.8409850	9.8576648	9.9833202	10.0166798	6
55	9.8411162	9.8575432	9.9835[illegible]30	10.0164270	5
56	9.8412474	9.8574215	9.9838259	10.0161741	4
57	9.8413785	9.8572998	9.9840787	10.0159213	3
58	9.8415095	9.8571779	9.9843315	10.0156685	2
59	9.8416404	9.8570561	9.9845844	10.0154156	1
60	9.8417713	9.8579341	9.9848372	10.0151628	0
	Sine Comp.	Sine	Tang. Comp.	Tang.	Min.

46 Degrees

Min.	44 Degrees				
	Sine	Sine Comp.	Tang.	Tang.Comp.	
0	9.8417713	9.8569349	9.9848372	10.0151628	60
1	9.8419021	9.8568121	9.9850900	10.0149100	59
2	9.8420328	9.8566900	9.9853428	10.0146752	58
3	9.8421634	9.8565678	9.9855956	10.0144044	57
4	9.8422939	9.8564455	9.9858484	10.0141516	56
5	9.8424244	9.8563232	9.9861012	10.0138988	55
6	9.8425546	9.8562008	9.9863540	10.0136460	54
7	9.8426851	9.8560784	9.9866068	10.0133932	53
8	9.8428154	9.8559558	9.9868596	10.0131404	52
9	9.8429456	9.8558332	9.9871123	10.0128877	51
10	9.8430757	9.8557106	9.9873651	10.0126349	50
11	9.8432057	9.8555878	9.9876179	10.0123821	49
12	9.8433356	9.8554650	9.9878706	10.0121294	48
13	9.8434655	9.8553421	9.9881234	10.0118766	47
14	9.8435953	9.8552192	9.9883761	10.0116239	46
15	9.8437250	9.8550961	9.9886289	10.0113711	45
16	9.8438547	9.8549730	9.9888816	10.0111184	44
17	9.8439842	9.8548499	9.9891344	10.0108656	43
18	9.8441137	9.8547266	9.9893871	10.0106129	42
19	9.8442423	9.8546033	9.9896399	10.0103601	41
20	9.8443725	9.8544799	9.9898926	10.0101074	40
21	9.8445018	9.8543564	9.9901453	10.0098547	39
22	9.8446310	9.8542329	9.9903981	10.0096010	38
23	9.8447601	9.8541093	9.9906508	10.0093492	37
24	9.8448891	9.8539856	9.9909035	10.0090965	36
25	9.8450181	9.8538619	9.9911562	10.0088438	35
26	9.8451470	9.8537381	9.9914089	10.0085911	34
27	9.8452758	9.8536142	9.9916616	10.0083384	33
28	9.8454045	9.8534902	9.9919143	10.0080857	32
29	9.8455332	9.8533662	9.9921670	10.0078330	31
30	9.8456618	9.8532421	9.9924197	10.0075803	30
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.
	45 Degrees				

Min.	44 Degrees				
	Sine	Sine Comp.	Tang.	Tang. Comp	
30	9.8456618	9.8532421	9.9924197	10.007580	30
31	9.8457903	9.8531179	9.9926724	10.0073276	29
32	9.8459188	9.8529936	9.9929251	10.0070749	28
33	9.8460471	9.8528693	9.9931778	10.0068222	27
34	9.8461754	9.8527449	9.9934305	10.0065695	26
35	9.8463036	9.8526204	9.9936832	10.0063168	25
36	9.8464318	9.8524959	9.9939359	10.0060641	24
37	9.8465599	9.8523713	9.9941886	10.0058114	23
38	9.8466879	9.8522466	9.9944413	10.0055587	22
39	9.8468158	9.8521218	9.9946940	10.0053060	21
40	9.8469436	9.8519970	9.9949466	10.0050534	20
41	9.8470714	9.8518721	9.9951993	10.0048007	19
42	9.8471991	9.8517471	9.9954520	10.0045480	18
43	9.8473267	9.8516220	9.9957047	10.0042953	17
44	9.8474543	9.8514969	9.9959573	10.0040427	16
45	9.8475817	9.8513717	9.9962100	10.0037900	15
46	9.8477091	9.8512465	9.9964627	10.0035373	14
47	9.8478365	9.8511211	9.9967154	10.0032846	13
48	9.8479637	9.8509957	9.9969680	10.0030320	12
49	9.8480909	9.8508702	9.9972207	10.0025793	11
50	9.8482180	9.8507446	9.9974734	10.0025266	10
51	9.8483450	9.8506190	9.9977260	10.0022740	9
52	9.8484720	9.8504933	9.9979787	10.0020213	8
53	9.8485989	9.8503673	9.9982314	10.0017686	7
54	9.8487257	9.8502417	9.9984840	10.0015160	6
55	9.8488524	9.8501157	9.9987367	10.0012633	5
56	9.8489791	9.8499897	9.9989893	10.0010107	4
57	9.8491057	9.8498637	9.9992420	10.0007580	3
58	9.8492322	9.8497375	9.9994947	10.0005053	2
59	9.8493586	9.8496113	9.9997473	10.0002527	1
60	9.8494850	9.8494850	10.0000000	10.0000000	0
	Sine Comp.	Sine	Tang.Comp.	Tang.	Min.
	45 Degrees				

Sine *of incidence*, in *Catoptrics* and *Dioptrics*, is uſed for the *ſine* of the angle of INCIDENCE.

Sine *of reflection*, in *Catoptrics*, is uſed for the *ſine* of the angle of REFLECTION.

Sine *of refraction*, in *Dioptrics*, is uſed for the *ſine* of the angle of REFRACTION.

Sine *aſſenſu capituli*, in *Law*, a writ that lies where a biſhop, dean, prebendary, or maſter of an hoſpital, aliens the lands holden in right of his biſhoprick, deanery, houſe, &c. without the aſſent of the chapter or fraternity; in which caſe his ſucceſſor ſhall have this writ.

SINE-CURES are eccleſiaſtical benefices, without cure of ſouls.

No church where there is but one incumbent can properly be a *ſine-cure:* and, though the church being down, or the pariſh being become deſtitute of pariſhioners, the incumbent may be thereby neceſſarily acquitted from the actual performance of public duty, yet he is ſtill under an obligation to do it, whenever a church ſhall be built, and there are a competent number of inhabitants; and, in the mean while, if the church be preſentative, as moſt ſuch churches are, the incumbent is inſtituted into the cure of ſouls. Such benefices are rather depopulations than *ſine-cures*; and it will be proper for the new incumbent to read the thirty-nine articles, and the liturgy, in the church-yard, &c. and to do whatever other incumbents uſually do.

But a rectory, or portion of it, may properly be a *ſine-cure*, if there be a vicar under the rector, endowed and charged with the cure; in which caſe it does not come within the ſtatute of *pluralities*, 21 Hen. VIII. c. 13.

Here, therefore, no diſpenſation is neceſſary to hold the *ſine-cure* with a former living; nor need the incumbent read the articles, or divine ſervice, as required by 13 Eliz. c. 12. which extends only to a benefice with cure.

A *ſine-cure* donative wants no inſtitution and induction, but one preſentative muſt have both, eſpecially if it conſiſt in glebe and tithes, and not in a portion of money; but the inſtitution muſt not run *in curam animarum*, but *in rectoriam, ſive portionem rectoriæ de* A. B. &c.

By the above mentioned ſtatute 21 Hen. VIII. not only prebends, and rectories with vicarages endowed, but deaneries, and archdeaconries, are declared to be benefices *without cure*.

SINE DIE, in *Law*; when judgment is given againſt the plaintiff, he is ſaid to be *in miſericordia pro falſo clamore ſuo*; and for the defendant, it is ſaid, *eat inde ſine die*; i. e. he is diſmiſſed the court.

The phraſe is alſo uſed in parliament, for the adjournment of any debate, without fixing the day when it ſhall come on again; which is looked upon as a genteeler diſmiſſion of the thing in queſtion.

SINEW properly denotes what we call a *nerve*; though, in common ſpeech, it is rather uſed for a *tendon*.

Sinew, in the *Manege*; to *unſinew* a horſe, called in French, *enerver*, is to cut the two tendons on the ſide of the head, about five inches under the eyes; which two join in one at the tip, or the end of the noſe, in order to perform its motion. This tendon at the tip of the noſe is likewiſe cut. We *unſinew*, in order to dry the head, and make it ſmaller.

Sinew-*ſhrunk*, is ſaid of a horſe that is over-rid, and ſo worn down with fatigue, that he becomes gaunt-bellied, through a ſtiffneſs and contraction of the two *ſinews* that are under his belly.

Sinew-*ſprung*, is a violent attaint, or over-reach, in which a horſe ſtrikes the toe of his hinder feet againſt the *ſinew* of the fore-legs.

SINF, in the *Materia Medica* of the ancients, a word uſed to expreſs the ſame as *agallochum*, or lignum aloes.

SINGERS, in the *Jewiſh Antiquities*. See Chantor.

SINGING, the act of making divers inflexions of the voice, agreeable to the ear, and correſpondent to the notes of a ſong, or piece of melody.

The Greek muſicians, ſays Dr Smith in his Harmonics, p. 3. note *c*, rightly deſcribe the difference between the manner of *ſinging* and that of talking. They conſidered two motions in the voice; the one continued, and uſed in talking; the other diſcrete, and uſed in *ſinging*. In the continued motion, the voice never reſts at any certain pitch, but waves up and down by inſenſible degrees; and in the diſcrete motion it does the contrary, frequently reſting or ſtaying at certain places, and leaping from one to another by ſenſible intervals. Euclid's Introductio Harmonica, p. 2. In the former caſe, the vibrations of the air are continually accelerated, and retarded by turns, and by very ſmall degrees, and in the latter by large ones.

The firſt thing done, in learning to *ſing*, is to raiſe a ſcale of notes, by tones and ſemitones, to an octave; and deſcend again by the ſame notes; and then to riſe and fall by greater intervals, as a 3d, 4th, and 5th, and to do all this by notes of different pitch.

Then theſe notes are repreſented by lines and ſpaces, to which the ſyllables *fa*, *ſol*, *la*, *mi*, are applied, and the pupil is taught to name each line and ſpace thereby; whence this practice is uſually called *ſol-fa-ing*. The nature, reaſon, defects, &c. whereof, ſee under the article Sol-fa-ing.

For the hiſtory of *ſinging*, as a part of religious worſhip, ſee *Choral* Service.

Singing *of birds*. See Song *of birds*.

SINGLE, among *Sportſmen*, the tail of any of the deer kind.

Single *bond* or *obligation*, *ſimplex obligatio*, in *Law*, is a deed, whereby the obligor obliges himſelf, his heirs, executors, and adminiſtrators, to pay a certain ſum of money to another at a day appointed. See Obligation.

Single *caſt*, in *Huſbandry*, a term uſed by farmers for that ſort of ſowing, that diſperſes the neceſſary quantity of corn at one bout.

Single, *echo*, *fine*, *poſition*, *propoſition*, *rafters*, *tenaille*, and *voucher*, ſee the ſubſtantives.

SINGLES. See Petty *ſingles*.

SINGULAR *number*, in *Grammar*, the firſt manner of declining nouns, and conjugating verbs; uſed when we only ſpeak of a ſingle perſon or thing. See Number.

Singular *Hiſtory*. See History.

Singular *propoſition*. See Proposition.

SINGULATOR, among the Romans, a horſeman who rode with one horſe only.

SINGULTUS, in *Medicine*, a convulſive motion of the midriff, commonly called the hickup.

SINICAL *quadrant*. See Quadrant.

SINISTER, ſomething on, or towards the left hand.

Hence ſome derive the word *ſiniſter*, *a ſinendo*, becauſe the gods, by ſuch auguries, permit us to proceed in our deſigns.

Sinister is alſo uſed among us for unlucky; though, in the ſacred rites of divination, the Romans uſed it in an oppoſite ſenſe. Thus *avis ſiniſtra*, or a bird on the left hand, was eſteemed a happy omen; whence, in the law of the Twelve Tables, *Ave ſiniſtra populi magiſter eſto.*

Sinister, in *Heraldry*. The *ſiniſter* ſide of an escutcheon, is the ſide anſwering to the right hand of the perſon who looks at it.

Sinister *chief* and *baſe*. See Escutcheon.

Sinister *bend*. See Bend.

Sinister *aſpect*, among *Aſtrologers*, is an appearance of two planets, happening according to the ſucceſſion of the ſigns; as Saturn in Aries, and Mars in the ſame degree of Gemini.

SINISTRI, a ſect of ancient heretics, thus called, becauſe they held the left hand in abhorrence, and made it a point of religion not to receive any thing therewith.

What in us is a piece of civility, in them was a ſuperſtition. Balſamon obſerves, that they were likewiſe called Sabbatians and Novatians.

SINKING *of the earth*. See Absorptions *of the earth*.

Sinking *fund*. See Fund.

SINKOO, in the *Materia Medica*, a name given by ſome authors to the lignum aloes, or agallochum, uſed in medicine.

SINNET, aboard a *ſhip*. See Sennit.

SI NON OMNES, a writ on aſſociation of juſtices, whereby, if all in commiſſion cannot meet at the day aſſigned, it is permitted, that two or more of them may finiſh the buſineſs.

SINOPER, or Sinopis, in *Natural Hiſtory*, See Sinopica *terra*.

SINOPICA *terra*, in *Natural Hiſtory*, the name of a red earth, of the ochre-kind, called alſo *rubrica ſinopica*, and by ſome authors *ſinopis*.

It is a very cloſe, compact, and weighty earth, of a fine glowing purple colour, but in ſome ſpecimens much deeper than in others, and in ſome degenerates into paleneſs; but, even in its worſt condition, the colour is very fine. It is of a pure texture, but not very hard, and of an even but duſty ſurface. It adheres firmly to the tongue, is perfectly fine and ſmooth to the touch, does not crumble eaſily between the fingers, and ſtains the hands. It melts very ſlowly in the mouth, and is perfectly pure and fine, and of a very auſtere aſtringent taſte, and ferments very violently with aqua fortis. In the fire it acquires a great hardneſs, but does not change colour.

It was dug in Cappadocia, and carried for ſale to the city Sinope, whence it had its name. It is now found in plenty in the New Jerſeys, in America, and is called by the people there *blood-ſtone*, from its ſtaining the hands to a blood-colour, and may probably be had in many other places; and this deſerves thoroughly enquiring into, ſince there ſeems not one among the earths more worthy notice. Its fine texture and body, with its high florid colour, muſt make it very valuable to painters, and its powerful aſtringency equally ſo in medicine.

The ancients were well acquainted with it in fluxes and hæmorrhages, and experience ſhews it poſſeſſes the ſame virtues at this time. The deepeſt coloured is ever the moſt aſtringent. Hill's Hiſt. of Foſſ. p. 60.

SINOPLE, or Senople, in *Heraldry*, denotes *vert*, or the green colour in armories: thus called by the ancient heralds; though Pliny and Iſidore, by *color ſinopicus*, or *ſinople*, mean a browniſh red, ſuch as that of our ruddle.

F. Meneſtrier derives the word from the Greek *praſina hopla*, *green armories:* by corruptedly retrenching the firſt ſyllable *pra:* which is no new thing among oriental words, witneſs Salonica for Theſſalonica.

Sinople is ſuppoſed to ſignify love, youth, beauty, rejoicing, and liberty: whence it is, that letters of grace, abolition, legitimation, &c. are always to be ſealed with green wax.

SINOVIA. See Synovia.

SINUATED *leaf*, in *Botany*. See Leaf.

SINUOSITY, a ſeries of bends and turns in arches, or other irregular figures; ſometimes jetting out, and ſometimes falling in. Such as deſcribed by the motion of a ſerpent, &c.

It is the *ſinuoſity* of the ſea-coaſts that forms bays, ports, capes, &c. Du Loir obſerves, that the courſe of the river Meander, creeping in a thouſand agreeable *ſinuoſities*, ſerved Dædalus as a model to form his labyrinth by.

SINUOUS *ulcers*. See Ulcer.

SINUS, in *Surgery*, a little cavity or ſacculus, frequently formed by a wound, or ulcer, wherein pus is collected.

A *ſinus* is properly a cavity in the middle of a fleſhy part, formed by the ſtagnation and putrefaction of the blood or humours, and which has wrought itſelf ſome vent or exit.

Deep *ſinuſes* that ſlope downwards, Scultetus obſerves, are difficult to heal: yet that ſurgeon undertakes to cure any *ſinus* in a week, by the medicaments he deſcribes, page 338, and by an agglutinative bandage. He adds, that he never comes to the inciſion till he finds, that the pharmaceutic applications are ineffectual; and that, for the dilatation of *ſinuſes*, he does not uſe the deceitful ſcalpel, as being more apt to deceive the operator than the patient.

Sinus, in *Anatomy*, denotes a cavity in certain bones, and other parts, the entrance whereof is very narrow, and the bottom wider, and more ſpacious.

Of theſe *ſinuſes* we find ſeveral in divers parts of the body, particularly in the baſis of the ſkull, on the oſſa petroſa; where the ancients imagined their uſe was to render the bones more light. In ſeveral of the joints of the body, they ſerve to receive the epiphyſes of the other bones.

Sinus is alſo an appellation given to the duplicatures of the dura mater.

Theſe *ſinuſes*, Dr. Drake obſerves, are venous channels, formed for the reconveyance of the blood. There are four of them chiefly conſiderable, viz. the *ſinus longitudinalis*, which, running along the middle of the convex part of the brain, ſends out a branch on each ſide, between the brain and cerebellum, called the *lateral ſinuſes*, and the torcular Herophili, formed out of a concourſe of the *lateral ſinuſes*, and pineal gland. They are all formed of the ſeveral venous branches, which return the blood from the brain and cerebellum, and deliver their contents into the jugular veins; whereof they are, as it were, the roots. Their coats are furniſhed with ſtrong fibres, by means whereof they are dilated by the influx of the venous blood, and again contracted with a reciprocal motion, like the pulſe of an artery. See *Tab. Anat. (Oſteol.) fig.* 4. *lit. b. b. c. c.*

Sinus *of an artery*, is uſed by ſome for any part of an artery, where its ſides are ſtretched out beyond the ordinary proportional dimenſions elſewhere.

Morgagni has obſerved four ſuch *ſinuſes* in the aorta; three of them anſwering to the ſemilunar valves, and the fourth is all that part of the aorta, between the former *ſinuſes* and the origin of the common trunk of the right ſubclavian and carotid arteries. He gives ſome reaſons to prove, that the nervus acceſſorius ariſes from the eighth pair, to be joined to the medulla ſpinalis. Med. Eſſ. Edinb. abr. vol. ii. p. 410.

Sinus *of the womb*, is uſed for any cavity within its ſubſtance. Theſe *ſinuſes* are much of the ſame texture with the cells of the ſpleen, or rather of the corpora cavernoſa penis; being membranous cavities communicating with each other, and having numerous arteries ſpread on them, whoſe lateral branches open into the cells, from which veins go out to be joined to other veins, that return the blood from the other parts of the womb.

Theſe *ſinuſes* are diſtended with blood in the time of the menſes, and their orifices are then alſo enlarged.

During the time of pregnancy the *ſinuſes*, and their canals that open into the womb, are gradually diſtended and enlarged; ſo that, at the end of nine months, the *ſinuſes* will contain the largeſt fingers, and the canals from them will receive the little finger. Vide Monro, in Medic. Eſſ. Edinb. vol. ii. art. 9.

SION-*college*. See College.

SIPHAC, a name uſed by ſome authors for the *peritonæum*.

SIPHILIS. See Syphylis.

SIPHITA, a word uſed by Paracelſus, and his followers, with the addition of *parva* and *magna*, for two diſorders. The *ſiphita parva* ſignifies the *chorea ſancti Viti*, or *St. Vitus's dance*; and the *ſiphita magna*, walking in time of ſleep.

SIPHNIUS *lapis*, in the *Natural Hiſtory* of the ancients, a ſubſtance found in great plenty in the iſland Siphnus, in the Ægean Sea. It was dug up in large maſſes in the neighbourhood of the ſea, and when freſh might be cut or worked into any ſorts of veſſels, by reaſon of its ſoftneſs, but when afterwards burnt and oiled over, became black and ſolid, and fit for any ſervice: and the veſſels made of it bore the fire very well. The ſame ſubſtance is ſtill found in many parts of Europe, and called *lapis lebitum*, and applied to the ſame uſe. It is no other than the *ſteatites*, or our SOAP-*rock*.

SIPHON, or SYPHON, in *Hydraulics*, a crooked tube, one leg or branch whereof is longer than the other; uſed in the raiſing of fluids, emptying of veſſels, and in various hydroſtatical experiments.

The word in the original Greek, *σιφων*, ſignifies ſimply *tube*, whence ſome apply it to common tubes or pipes. Wolfius particularly deſcribes two veſſels under the name of *ſiphons*; the one cylindrical in the middle, and conical at the two extremes; the other globular in the middle, with two narrow tubes fitted to it axis-wiſe; both ſerving to take up a quantity of water, &c. and to retain it when up.

But the moſt uſeful and celebrated *ſiphon* is that which follows: a crooked tube ABC (*Tab.* VI. *Hydraulies, fig.* 64.) is provided of ſuch a length, and with ſuch an angle, or ſo bent at the vertex, as that when the orifice A is placed on an horizontal plane, the height of AB may not exceed thirty-two or thirty-three feet. For common uſes a foot or half a foot high ſuffices. If, now, the leſs arm AB be immerged in water, or any other liquid, and the air be ſucked out of it by the aperture C, till the liquor follow; the liquor will continue to flow out of the veſſel, through the tube BC, as long as the aperture A is under the ſurface of the liquor.

Note, inſtead of ſucking out the air, the event will be the ſame, if the *ſiphon* be at firſt filled with the fluid, and the aperture C ſtopped with the finger, till the aperture A be immerged.

The truth of the phenomenon is known by abundance of experiments; nor is the reaſon of part of it far to ſeek. In ſucking, the air in the tube is rarefied, and the equilibrium deſtroyed; conſequently the water muſt be raiſed into the leſſer leg, AB, by the preponderating preſſure of the atmoſphere.

The *ſiphon* being thus filled, the atmoſphere preſſes equally on each extremity thereof; ſo as to ſuſtain an equal quantity of water in each leg; but the air not being able to ſuſtain all the water in the longer leg, and being more than able to ſuſtain that in the ſhorter leg; with the exceſs of force, therefore, it will raiſe new water into the ſhorter leg; and this new water cannot make its way, but by protruding the firſt before it; by this means is the water continually driven out at the longer leg, as it is continually raiſed by the ſhorter.

The cauſe of the *ſiphon's* running may be otherwiſe explained in the following manner; the air which paſſes into the veſſel ABCD, (*fig.* 65.) repreſented by the column KL, ſuſtains the column of water LD in the ſhort leg of the *ſiphon*, preſſing againſt that air with its perpendicular height DF; whilſt the column of air MS preſſing upwards againſt the hole of the long or iſſuing leg DS, which acts according to the height DC, muſt yield and ſuffer the water to run out as long as the leg DS is longer, or rather perpendicularly higher than DG. For ſince K and M are ſuppoſed to be at the top of the atmoſphere, the columns KL and MS are equal in height and preſſure (for the height of L above S is of no account with reſpect to the whole height of the atmoſphere), as long as MS is acted upon by the deſcending water DS, whoſe height is from D to S, (e. g. fifteen inches) an height ſuperior to that of the column DG (e. g. ſeven inches) ſupported by the column of air KL, the column MS muſt yield to the water iſſuing out at S; and however the ſurface of the water EF deſcends, the column KL, by its preſſure, will always overcome the reſiſtance of the column MS, becauſe it has a leſs height of water to ſuſtain than MS has. If the mouth of the iſſuing leg had been at T, the water would hang *in equilibrio*, filling both legs of the *ſiphon*, when the water is come down in the upper veſſel to IHT; becauſe then the two columns of air KL and MS will be acted againſt by an equal height of water in the legs of the *ſiphon*; but if you raiſe the iſſuing end of the *ſiphon* (now ſuppoſed at T) up to the level of *u* V above IH, the water will run back up from V to D, and ſo out at H in the upper veſſel; becauſe then the column MS, having only the height VD to ſuſtain, will be acted againſt with leſs force than the column KL, which is preſſed againſt by the whole height DH ſuperior to VD. Since, therefore, the preſſure of the air is the cauſe of the water being puſhed up into the *ſiphon*, and the difference of its preſſure (as one column is acted againſt by the water in the ſhort leg more weakly than another column of air is acted upon by the water in the long leg) is the cauſe of its running continually from one veſſel into another, when once ſet a-going; it follows, that the bend D of the upper part of the *ſiphon* muſt not be above thirty-two feet higher than the water in the upper veſſel, becauſe the air cannot ſuſtain a column of water, whoſe height exceeds thirty-two feet.

Mercury will run in a *ſiphon* in the ſame manner as water; but in this caſe, the bend of the *ſiphon* muſt not be more than $30\frac{8}{10}$ inches above the ſtagnant mercury in the upper veſſel; becauſe, as it is about fourteen times ſpecifically heavier than water, it will be lifted up by the preſſure of air but the fourteenth part of the height to which water is lifted. Deſag. Exp. Phil. vol. ii. ſect. 8.

But ſome authors aſſert, that the water continues to flow through the *ſiphon*, even when placed under a receiver, and the air exhauſted from it.

Some will have it, that there is ſtill air enough left in the evacuated-receiver, to raiſe the water to an inch or two. But as both mercury and water are found to fall entirely out of the Torricellian tube, *in vacuo*; the preſſure of the thin remaining air there can never be the cauſe of the aſcent, both of mercury and water, in the ſhorter leg of the *ſiphon*. Hence, as the height of the *ſiphon* is limited to thirty-two feet; for this only reaſon, that air cannot raiſe water higher; ſome have queſtioned whether or no we are in the right in rejecting Hero's method of carrying water, by means of a *ſiphon*, over the tops of mountains, into an oppoſite valley. For Hero only orders the apertures of the *ſiphon* to be ſtopped, and water to be poured through a funnel into the angle or meeting of the legs, till the *ſiphon* be full: when ſhutting the aperture in the angle, and opening the other two, the water, he ſays, will continue to flow. Now, if there only need air for the firſt riſe of the water into the leſs leg, not for the continuation of the motion, it were poſſible to raiſe the water much higher than the height of the atmoſphere would carry it.

Wolfius (Elem. Matheſ. tom. ii. p. 348. ed. 1733.) expreſly ſays, that this propoſed artifice of Hero is very juſtly rejected; becauſe air is neceſſary not only for the elevation of the water in the ſhorter leg, but for the continuance of its motion; and he adds, that this method was unſucceſsfully tried, where the height was greater than thirty-two feet.

Deſaguliers alſo obſerves, that in a crane or *ſiphon* (ſuch as that propoſed by Hero) of about forty feet high, the water, inſtead of running from the upper veſſel into the lower, as it would do if the height of the ſhort leg were much under thirty-two feet, will in the two legs fall back to the height of thirty-two feet, above the reſpective veſſels, where it will hang; the air not being able to ſuſtain the water above thoſe heights, and conſequently drive it up over the bend.

In an experiment of this kind, the water in the legs of the *ſiphon*, unleſs it be purged of its air, will not reſt at a height of quite thirty feet above the water in the veſſels, becauſe air will extricate itſelf out of the water, and getting above the water in the legs preſs it downwards, ſo that its height will be leſs to balance the preſſure of the atmoſphere. However, this is certain, that a *ſiphon* of a particular kind, once ſet a running, will perſiſt in its motion, though removed into the moſt perfect vacuum our air pumps will make: or, if the lower orifice of a full *ſiphon* be ſhut, and the whole be thus placed in a receiver, with a contrivance for opening the orifice when the air is exhauſted; the water will be all emptied out of the veſſel, as if it had been in open air.

This fact has been ſufficiently aſcertained by many approved hydroſtatical writers.

Deſaguliers informs us, that he made the experiment, both with water and mercury; for having filled a *ſiphon*, recurved at the extremities of its legs, ſucceſſively with thoſe liquors, and ſuſpended it by a ſlip-wire in the receiver of an air-pump, over two ſmall jars containing mercury to unequal heights (and water, when water was uſed in the *ſiphon*) he exhauſted the air out of the receiver, and then letting down the *ſiphon*, ſo that its two ends went into the liquor in the jars, the liquor ran from the higher into the lower veſſel. He alſo made an experiment in the open air, where the mercury ran through a *ſiphon*, whoſe bend was more than thirty-one inches above the lower orifice of the ſhort leg of the *ſiphon*. But neither of theſe experiments affords a juſt objection againſt the doctrine advanced in the preceding part of this article, viz. that the air is the cauſe of the diſcharge of liquors from one veſſel into another by means of *ſiphons*; for its running *in vacuo* was only owing to the attraction of coheſion, which acts for a ſmall height; becauſe,

becauſe the experiment will not ſucceed *in vacuo*, if the *ſiphon* uſed for mercury has its bend ſix inches higher than the orifice of the ſhort leg, and if the bend of the *ſiphon* for water be two or three feet high; neither will the laſt mentioned experiment with mercury in the open air anſwer, if the bend of the *ſiphon* be forty inches high: and in all the experiments the bores of the *ſiphons* muſt be very ſmall. Exp. Phil. ubi ſupra, p. 168.

The figure of the *ſiphon* may be varied at pleaſure (ſee *fig.* 66, 67, 68,) provided only the orifice C be below the level of the ſurface of the water to be drawn up; but ſtill the farther it is diſtant from it, the faſter will the fluid be carried off. And if, in the courſe of the flux, the orifice A be drawn out of the fluid; all the liquor in the *ſiphon* will go out at the lower orifice C; that in the leg CB dragging, as it were, that in the ſhorter leg AB after it.

If a filled *ſiphon* be ſo diſpoſed, as that both orifices A and C, be in the ſame horizontal line: the fluid will remain pendant in each leg, how unequal ſoever the length of the legs may be. Fluids, therefore, in *ſiphons*, ſeem, as it were, to form one continued body; ſo that the heavier part deſcending like a chain, pulls the lighter after it.

Laſtly, it muſt be obſerved, that the water will flow out, even through a *ſiphon* that is interrupted, by having the legs AD and FC joined (*fig.* 68.) together, by a much bigger tube full of air.

The SIPHO *Wirtembergicus* is a very extraordinary machine of this kind, performing divers things which the common *ſiphon* will not reach. E. gr. in this, though the legs be in the ſame level, yet the water riſes up the one, and deſcends through the other; the water riſes, even though the aperture of the leſs leg be only half immerged in water; the *ſiphon* has its effect after continuing dry a long time; either of the apertures being opened, the other remaining ſhut for a whole day, and then opened, the waters flow out as uſually. Laſtly, the water riſes and falls indifferently through either leg. Muſchenbroek, in accounting for the operation of this *ſiphon*, obſerves, no diſcharge could be made by it, unleſs the water applied to either leg cauſe the one to be ſhorter, and the other longer by its own weight. Introd. ad Phil. Nat. tom. ii. p. 853. ed. 4to. 1762.

The project of this *ſiphon* was laid by Jordanus Pelletier, and executed at the expence of prince Frederic Charles, adminiſtrator of Wirtemberg, by his mathematician Shahackard, who made each branch twenty feet long, and ſet them eighteen feet apart; the deſcription thereof was publiſhed by Reiſelius, the duke's phyſician.

This gave occaſion to M. Papin to invent another, that did the ſame things, deſcribed in the Philoſophical Tranſactions; and which Reiſelius, in another paper in the Tranſactions, ingenuouſly owns it to be the very ſame with that of Wirtemberg. Its ſtructure will appear from its figure, which is repreſented (*Tab.* VI. *Hydraulics fig.* 69.)

SIPHONANTHUS, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are theſe: the flower conſiſts of one petal, it is tubulated and divided into ſeveral ſegments at the edge; the piſtil ariſes from the cup, and finally becomes a fruit reſembling four berries, divided into four cells, in each of which there is one large greeniſh yellow ſeed. This genus which was eſtabliſhed by Dr. Amman, under the denomination of *ſiphonanthemum*, has only one ſpecies. Art. Petrop. vol. viii. p. 216.

SIPTACE, in *Natural Hiſtory*, the name given by the ancients to a beautiful bird, of which they were very fond, and which was often kept in their houſes. Some have conjectured this to be the goldfinch, from the fine yellow they deſcribe about it; but Pliny plainly makes it the parrot: he tells us, among other things, that it imitated the human voice the beſt of all birds.

SIPUNCULUS, in *Natural Hiſtory*, a genus of the *inteſtina* claſs of worms in the Linnæan ſyſtem. Its characters are: that the body is round and enlongated; the mouth attenuated and cylindric; and the lateral aperture of the body rugged. There are two ſpecies; one found under ſtones in the European, and the other in the Indian ocean.

SIRA, a name by which ſome of the chemical writers have called orpiment.

SIRACAUSTUM, a name given by Meſue to a medicine he recommends in acute diſeaſes.

SIRÆUM, a word uſed by ſome to expreſs a ſweet decoction, whether given in that form, or firſt inſpiſſated into a ſort of rob by evaporation.

SIRE, a title of honour in France, now given to the king only, as a mark of ſovereignty. In all placets and petitions, epiſtles, diſcourſes, &c. to the king, he is addreſſed under the title of *ſire*.

Some derive the word from the Latin *herus*, *maſter*: of which opinion ſeems Budæus, who, in ſpeaking to king Francis I. always called him *here*, q. d. *maſter*, or *ſire*; others derive it from the Greek κυριος *lord*; of which opinion is Paſquier, who adds, that the ancient Franks gave the ſame title to God, calling him *beau ſire Dieu*: others fetch the word from the Syriac; and maintain it was firſt given to the merchants who traded in Syria: Menage will have it come from *ſenior*, *elder*; whence *ſeigneur*, then *ſeignor*, and *ſire*.

SIRE was likewiſe anciently uſed in the ſame ſenſe with *ſieur* and *ſeigneur*, and applied to barons, gentlemen, and citizens.

SIREN, σειρην, in *Antiquity*, *mermaid*; a name given to a kind of fabulous beings repreſented by the moderns, as ſea-monſters, with women's faces and fiſhes tails; but by the ancient poets, &c. as having the upper part human, and the lower like birds; and decked with a plumage of various colours.

The three *ſirens* are ſuppoſed to have been the three daughters of the river Achelous; and are called *Parthenope*, *Lygea*, and *Leucoſia*. Homer only makes mention of two *ſirens*, and ſome others reckon five. Virgil places them on rocks, where veſſels are in danger of ſplitting. Pliny makes them inhabit the promontory of Minerva, near the iſland Capreæ. Others fix them in Sicily, near Cape Pelorus.

Claudian ſays, they inhabited harmonious rocks; that they were charming monſters; and that ſailors were wrecked on their rocks without regret, and even expired in raptures: *Dulce malum in pelago ſiren*.

Pauſanias tells us, that the *ſirens*, by the perſuaſion of Juno, challenged the Muſes to a trial of ſkill in ſinging; and theſe, having vanquiſhed them, plucked the golden feathers from the wings of the *ſirens*, and formed them into crowns, with which they adorned their own heads.

This deſcription is, doubtleſs, founded on a literal explication of the fable, that the *ſirens* were women who inhabited the ſhores of Sicily; and who, by all the allurements of pleaſure, ſtopped paſſengers, and made them forget their courſe.

The name, according to Bochart, who derives it from the Phœnician language, implies a *ſongſtreſs*: and hence, it is probable, that in ancient times there might have been excellent ſingers, but of corrupt morals, on the coaſt of Sicily, who, by ſeducing voyagers, gave riſe to this fable.

Some interpreters of the ancient fables will have the number and names of the three *ſirens* to have been taken from the triple pleaſure of the ſenſes, wine, love, and muſic, which are the three moſt powerful means of ſeducing men; and hence, ſo many exhortations to avoid the *ſirens* fatal ſong.

Probably, it was hence, that the Greeks fetched their etymology of *ſiren*, viz. from σειρα, *a chain*; as if there there was no getting free of their enticement.

Others, who do not look for ſo much myſtery in the fable, maintain that the *ſirens* were nothing but certain ſtreights in the ſea, where the waves whirling furiouſly around, ſeized and ſwallowed up veſſels that approached them too near.

Laſtly, others hold the *ſirens* to have been certain ſhores and promontories, where the winds, by the various reverberations and echoes, cauſe a kind of harmony that ſurpriſes and ſtops paſſengers. This, probably, might be the origin of the *ſirens* ſong, and the occaſion of giving the name of *ſirens* to theſe rocks.

The learned Mr. Bryant ſays, that the *ſirens* were Cuthite and Canaanitiſh prieſts, who had founded temples in Sicily, which were rendered infamous on account of the women who officiated. They were much addicted to cruel rites, ſo that the ſhores upon which they reſided, are deſcribed as covered with the bones of men, deſtroyed by their artifice. Virgil. Æneid. lib. v. v. 864.

The ancients repreſent their ſongs as ſo fatally winning, that nobody could withſtand their ſweetneſs; all were ſoothed with it; though their life was the purchaſe of the gratification. See Homer's Odyſſ. M. v. 39.

Mr. Bryant obſerves, that the ſtory of the *ſirens* relates to thoſe people, who with their muſic uſed to entice ſtrangers into the purlieus of their temples, and then put them to death. Nor was it muſic only with which perſons were ſeduced to follow them; the female part of their choirs were maintained for a two-fold purpoſe, both on account of their voices and their beauty. They were accordingly very liberal of their favours, and by theſe means enticed ſea-faring perſons, who paid dearly for their entertainment. Analyſis of Ancient Mythol. vol. ii. p. 17, &c.

SIREN, in *Ichthyology*, a name given by Artedi to the ſea-monſter often deſcribed by authors, but either not exiſting

ing at all, or not ſo like man as their deſcription make it. Artedi ſuppoſes it to conſtitute a peculiar genus of the plagiuri, or cetaceous fiſhes. The characters he gives of it are theſe; it has no pinnated tail; the head, neck, and breaſt, down to the navel, repreſent thoſe of the human ſpecies; there are only two fins on the whole body, and thoſe ſtand on the breaſt.

Bartholine, in his Hiſtory of Curioſities, deſcribes ſuch a fiſh as this under the name of *ſyrene*, and Barchewitz under the name of *homo marinus*. See MERMAID, SEA-*calf*, SEA-*cow*, and SEA-*man*.

SIREN, in *Zoology*, a genus of the order of *meantes*, in the claſs of *amphibia*. Its characters are: that its body is biped, naked, and furniſhed with a tail; the feet are brachiated with claws. This animal was diſcovered by Dr. Garden in Carolina; it is found in ſwampy and muddy places, by the ſides of pools, under the trunks of old trees that hang over the water. The natives call it by the name of *mud-inguana*. Phil. Tranſ. vol. lvi. p. 189.

Linnæus firſt apprehended, that it was the larva of a kind of lizard; but as its fingers are furniſhed with claws, and it makes a croaking noiſe, he concluded from theſe properties, as well as from the ſituation of the anus, that it could not be the larva of the lizard, and, therefore, formed of it a new genus under the name of *ſiren*. He was alſo obliged to eſtabliſh for this uncommon animal a new order, called *meantes*, or *gliders*: the animals of which are amphibious, breathing by means of gills and lungs, and furniſhed with arms and claws. See *Tab. Serpents*.

SIREN is alſo a name given by Mouffet, and other authors, to a ſpecies of bee; of which they diſtinguiſh two kinds, a larger and a ſmaller. Theſe differ greatly from the common bee, in that they live ſolitary, and never unite into ſwarms, or build neſts, or make combs.

SIREX, in the Linnæan ſyſtem of *Zoology*, a genus of the *hymenoptera* claſs of inſects. Its characters are: that the mouth has two ſtrong jaws; that it has two truncated palpi or feelers, filiform antennæ, an exſerted, ſtiff, ſerrated ſting, a ſeſſile mucronated abdomen, and lanceolated wings. There are ſeven ſpecies.

SIRI, among the Romans, were ſubterranean caves or vaults, in which wheat could be kept ſound and freſh for fifty years.

SIRIASIS, a name given by medical writers to a diſeaſe to which children are ſubject; it conſiſts in an inflammation of the brain and its membranes, and is attended with a depreſſure of the fontanella, or hollowneſs of the eyes, a burning fever, a paleneſs and dryneſs of the whole body, and an utter loſs of appetite.

SIRICON *plumbi*, a name given by ſome chemical writers to calcined lead, or the grey powder made of lead by a ſlight calcination in an open fire.

SIRIUS, σειριος, in *Aſtronomy*, the *Dog-ſtar*; a very bright ſtar of the firſt magnitude, in the mouth of the conſtellation *Canis Major*, or the Great Dog.

This, indeed, is the brighteſt of all the ſtars in our firmament, and therefore, probably, ſays Dr. Maſkelyne, the aſtronomer royal, in a paper recommending the diſcovery of its parallax, Phil. Tranſ. vol. li. p. 889. the neareſt to us of them all. Some, however, ſuppoſe *Arcturus* to be the neareſt.

The Arabs call it *Aſchere*, *Elſchecre*, *Scera*; the Greeks, *Sirius*; and the Latins, *Canicula*, or *Canis cadens*. See CANICULA.

SIRNAME. See SURNAME.

SISARUM, or SISER, in *Botany*. See SKIRRET.

SISKIN, in *Ornithology*. See SPINUS.

SISON, in *Botany*. See *Baſtard-ſtone* PARSLEY.

SISON *Syriacum*, in *Botany*, a name given by ſome authors to the ammi, or biſhop's weed, a plant whoſe ſeeds were once much uſed in medicine.

SISSITIEPTERIS, in *Botany*, a name uſed by Pliny, and ſome others of the old authors, for the pimpinella, or burnet.

SISTROID *angle*. See ANGLE.

SISTRUM, or CISTRUM, an ancient kind of muſical inſtrument uſed by the prieſts of Iſis and Oſiris.

Spon deſcribes it as of an oval form, made in manner of a racket, with three ſticks traverſing it breadthwiſe, which, playing freely by the agitation or beating of the inſtrument, yielded a kind of ſound, which, to the ancients, ſeemed melodious. The upper part was adorned with three figures; that of a cat with a human face in the middle, the head of Iſis on the right ſide, and the head of Nephthys on the left. See *Tab. Muſic*, *fig.* 11.

Mr. Malcolm takes the *ſiſtrum* to have been no better than a kind of rattle. Jer. Boſius has an expreſs treatiſe on the *ſiſtrum*, intituled, Iſiacus de *Siſtro*.

Oiſelius obſerves, that the *ſiſtrum* is found repreſented on ſeveral medals; and alſo on taliſmans. Oſiris, on ſome medals, is painted with the head of a dog, and with a *ſiſtrum* in his hand.

SISYMBRIUM, in *Botany*. See *Water* CRESSES.

Siſymbrium, among the Romans, was one of the ingredients, whereof the nuptial garlands were compoſed.

SISYMBRIUM, in *Botany*, is alſo a name uſed to expreſs the wild water-mint. See MINT.

SISYRA, among the *Ancients*, a woolly ſkin uſed for a covering to beds.

SISYRINCHIUM, *Bermudiana*, in *Botany*, a genus of the *gynandria triandria* claſs. Its characters are theſe: the ſheath, which encloſes the flowers, faces both ways, and is compoſed of two compreſſed, keel-ſhaped leaves; the flower has ſix oblong petals, and three very ſhort ſtamina, terminated by bifid ſummits, which are fixed to the baſe of the ſtyle; with an oval germen, ſituated under the flower, ſupporting an awl-ſhaped ſtyle; crowned by a trifid, reflexed ſtigma; the germen afterward turns to an oval, three-cornered capſule, with three cells, filled with roundiſh ſeeds. There are three ſpecies, natives of America.

SI TE *fecerit ſecurum*, in *Law*, a ſpecies of original writ, called peremptory, which directs the ſheriff to cauſe the defendant to appear in court, without any option given him, provided the plaintiff gives the ſheriff ſecurity effectually to proſecute his claim. This writ is in uſe, where nothing is ſpecifically demanded, but only a ſatisfaction in general; to obtain which, and miniſter complete redreſs, the intervention of ſome judicature is neceſſary. Such are writs of treſpaſs, or on the caſe, wherein no debt, or other ſpecific thing, is ſued for in certain, but only damages to be aſſeſſed by a jury. See PRÆCIPE.

SITE, or SCITE, *ſitus*, denotes the ſituation of a houſe, meſſuage, &c. And ſometimes the ground-plot, or ſpot of earth it ſtands on.

SITE, *ſitus*, in *Logic*, one of the predicaments, declaring a ſubject to be ſo and ſo placed.

SITHCUNDMAN, in our *Old Writers*, one whoſe province it was to lead the men of a town or pariſh. Leg. Inæ, cap. 56.

Dugdale ſays, that in Warwickſhire the hundreds were formerly called *ſytheſoca*, and that *ſithecoſundman*, and *ſithcundman*, was the chief officer within ſuch a diviſion, i. e. the high-conſtable of the hundred.

SITHESOCA, in our *Old Writers*, is uſed to denote the diſtrict now called a *hundred*. The word is Saxon, ſignifying a *franchiſe*, or *liberty*.

SITICINES, among the Romans, perſons who founded a kind of trumpet, having a very mournful tone, at the burying of the dead.

SITONÆ, Σιτωναι, among the Athenians, officers appointed to lay in corn for the uſe of the city, for which purpoſe the ταμιας της διοικησεως or the public treaſurer, was to furniſh them with as much money as they had occaſion for. Potter, Archæol. Græc. lib. i. cap. 15 tom. i. p. 83.

SITOPHYLAX, Σιτοφυλαξ, formed from σιτος, *corn*, and φυλαξ, *keeper*, in *Antiquity*, an Athenian magiſtrate, who had the ſuperintendance of the corn; and was to take care that no body bought more than was neceſſary for the proviſion of his family.

By the Attic laws, particular perſons were prohibited buying more than fifty meaſures of wheat a man; of thoſe meaſures, we mean, called φορμαι, and the *ſitophylax* was to look to the obſervation of this law. It was a capital crime to prevaricate in it.

There were fifteen of theſe *ſitophylaces*; ten for the city, and five for the Piræus.

SITTA, in the Linnæan ſyſtem of *Ornithology*, the name of a diſtinct genus of birds, of the order of *picæ*. The characters of this genus are, that the bill is awl-ſhaped, tapering, ſtraight, extended, and entire, with the upper mandible a little longer than the lower, and a compreſſed apex; the tongue is jagged, the noſtrils covered with feathers, and the feet formed for walking; having three toes forward, and one backward; the middle toe being joined at the baſe to both the outmoſt, and the back toe as large as the middle one. Linnæus reckons three ſpecies; the *picus cinereus*, or grey woodpecker, or *ſitta Europæa*, is called in Engliſh the NUT-*hatch*, or *nut-jobber*.

The bill is long and ſtraight; the upper mandible black, the lower white; the crown of the head, back, and coverts of the wings, are of a fine bluiſh grey; a black ſtroke paſſes over the eye from the mouth; the cheeks and chin are white; the breaſt and belly of a dull orange-colour; the quill-feathers duſky; the wings underneath are marked with two ſpots, one white, the other black: the tail conſiſts of twelve feathers, the two middle are grey, the two exterior tipt with grey, to which ſucceds a tranſverſe white ſpot; beneath that the reſt is black; the legs are of a pale yellow; the back toe very ſtrong, and the claws large.

It is a ſmall bird, not quite ſo large as the chaffinch. It builds in holes of trees, and when their entrance is too large, artfully ſtops them up with mud. It feeds on inſects and fruits. It hoards nuts for the winter, and breaks them by ſticking them in a cleft of the tree, and ſtriking them with its beak. It autumn it begins to make a chattering noiſe, being ſilent for the greateſt part of the year.

The two other ſpecies are found the one in Canada, the other in Jamaica.

SITUS, in *Geometry* and *Algebra*, denotes the ſituation of lines, ſurfaces, &c.

Wolfius gives us ſome things in geometry, which are not deduced from the common analyſis; particularly, matters depending on the *ſitus* of lines and figures. M. Leibnitz has even invented a particular kind of analyſis thereon, called *calculus ſitus*.

SIVAN, in *Chronology*, the third month of the Jewiſh eccleſiaſtical year, anſwering to part of our May and June.

SIUM, in *Botany*. See SKIRRET.

SIXAIN, SIXTH, SEXAGENA, in *War*, an ancient order of battle, wherein ſix battalions being ranged in one line, the ſecond and fifth were made to advance, to form the vanguard; the firſt and ſixth to retire, to form the rearguard; the third and fourth remaining on the ſpot, to form the corps, or body of the battle.

The word is French, ſignifying the ſame thing.

SIX-CLERKS, officers in chancery of great account, next in degree below the twelve maſters; whoſe buſineſs is to inroll commiſſions, pardons, patents, warrants, &c. which paſs the great-ſeal, and to tranſact and file all proceedings by bill, anſwer, &c.

They were anciently *clerici*, and forfeited their places, if they married; but when the conſtitution of the court began to alter, a law was made to permit them to marry. Stat. 14 & 15 Hen. VIII. cap. 8. They are alſo ſolicitors for parties in ſuits depending in the court of chancery.

Under them are ſix deputies and ſixty clerks, who, with the under *clerks*, do the buſineſs of the office.

SIXHINDEMEN. See SYXHINDEMEN.

SIXTH, in *Muſic*, is not properly, as ſome have ſuppoſed, an original concord, ſince it ariſes from the ſubtraction of the third from the octave. There are properly but three original concords, the octave, fifth, and third major. See FUNDAMENTAL and INTERVAL.

The *ſixth* is of two kinds, *greater* and *leſs*; and hence it is eſteemed one of the imperfect concords; though each of the two ſpecies ariſes from a diviſion of the octave.

The greater SIXTH, called by the Greeks *hexachordon majus*, is the concord reſulting from a mixture of the ſounds of two ſtrings, that are to each other as 5 to 3.

The leſs SIXTH, *hexachordon minus*, reſults from two ſtrings, which are to each other as 8 to 5.

The leſs *ſixth* is compoſed diatonically of ſix degrees, whence its name; and of five intervals, three whereof are tones and two ſemitones; chromatically of eight ſemitones; five whereof are greater, and three leſs. It has its form or origin from the *ratio ſuper-tri-partiens quintas*: as of 8 to 5.

The greater *ſixth* is compoſed diatonically, like the leſs, of ſix degrees and five intervals; among which are four tones, and a ſemitone; and chromatically of nine ſemitones; five whereof are greater, and four leſs: of conſequence it has a leſs ſemitone more than the former. It has its origin from the *ratio ſuper-bi-quartiens tertias*; as 5 to 3.

Anciently, the *ſixth* had only one repetition, which was the 13th; but, in the modern ſyſtem, it has ſeveral, as the 20th, 27th, &c. all marked indifferently in the thorough baſs, by the figure 6. And even the *ſixth* itſelf, both greater and leſs, when natural, is not expreſſed any otherwiſe than by a ſimple 6. But when it is greater or leſs, by accident, to the ſix is added the mark of a ſharp or a flat: as may be ſeen in M. Broſſard.

Beſides the two kinds of *ſixths* here deſcribed, which are both good concords, there are two others that are vicious and diſſonant:

SIXTH, *the firſt, is the defective*, compoſed of two tones and three ſemitones, or of ſeven ſemitones, five whereof are greater, and two leſs.

SIXTH, *the ſecond, is the redundant*, compoſed of four tones, a greater ſemitone, and a leſs. Whence ſome call it *pentatonon*, as comprehending five tones.

Theſe two, being both diſcords, ſhould never be uſed in melody, and very rarely in harmony.

As to the two conſonant *ſixths*, they were anciently uſed very ſparingly: at preſent they are allowed to be uſed as often as one pleaſes; as is the caſe with thirds; the *ſixths* being, in reality, no other than inverted thirds: but care is uſually taken, that the firſt *ſixth* that occurs be a leſs, and the laſt a greater; and that from the greater, we riſe to the octave; and, from the leſs fall to the fifth.

SIXTH, in the *Military Art*. See SIXAIN.

SIXTH *pair of nerves*. See NERVE.

SIXTH *Rates*. See RATE.

SIZE, the name of an inſtrument uſed to find the bigneſs of fine round pearls.

It conſiſts of thin pieces, or leaves, about two inches long, and half an inch broad; faſtened together at one end, by a rivet. In each of theſe are ſeveral round holes drilled, of different diameters. Thoſe in the firſt leaf ſerve for meaſuring pearls from half a grain to ſeven grains. Thoſe of the ſecond, for pearls from eight grains, or two carats, to five carats, &c. and thoſe of the third, for pearls from ſix and a half to eight and a half.

SIZE, is alſo uſed for a kind of weak GLUE. The ſhreds and parings of leather, parchment, or vellum, by being boiled in water, and ſtrained, make *ſize*. Common *ſize* is made of leather boiled in water till it becomes of a viſcid conſiſtence. If it is wanted in painting for nicer purpoſes, it ſhould be prepared by taking any quantity of the ſhreds or cuttings of glovers leather, and putting to each pound a gallon of water; let theſe be boiled for ſix or eight hours, ſupplying water ſo that it may not diminiſh to leſs than two quarts. Then ſtrain the hot fluid through a flannel, and afterwards evaporate it till it is of the conſiſtence of a jelly when cold. The *ſize* uſed in burniſh gilding, and made of cuttings of parchment, is prepared much after the ſame manner. This ſubſtance is uſeful in many trades. Mr. Boyle mentions, among other uſes, that fine red ſtands, and hanging-ſhelves, are coloured with ground vermilion tempered with *ſize*, and when dry, are laid over with common varniſh.

SIZE, *Gold*. See GOLD-*ſize*.

SIZE, *Iſinglaſs*. See ICHTHYOCOLLA.

SIZE *Painting*. See DISTEMPER.

SIZE *for Silvering*. See SILVERING.

SIZEL, in *Coining*, is uſed where pieces of money are cut out from the flat bars of ſilver, after having been drawn through a mill into the reſpective ſizes or dimenſions of the money to be made; the reſidue is called *ſizel*, and melted down again.

SIZING, in *Mineralogy*, a term uſed by the Corniſh miners for a peculiar method of ſeparating the purer from the impurer parts of an ore by means of ſieves. When the ore has been powdered, they put into a wire-ſieve with fine holes, and in this they ſiſt it till the fine part goes through: this is properly what is called *ſizing*. They ſend the larger, or coarſer part, to be powdered again, and putting the reſt into a ſieve with a cloſe bottom, they let in a ſtream of water from the cock, and by means of continued ſhaking it about, they cauſe the lighter and fouler parts to be waſhed over the rims of the ſieve, and the remaining powder is the black tin.

SKATE, in *Ichthyology*, the Engliſh name of a ſpecies of the ray-fiſh, called by the generality of authors *raia undulata*, and *raia lævis*, and by ſome *rubus*.

It is diſtinguiſhed by Artedi by the name of the variegated *ray-fiſh*, with the middle of the back ſmooth, and with only one row of ſpines in the tail.

This ſpecies, which is the RAIA *Batis* of Linnæus, is the thinneſt in proportion to its bulk of any of the genus, and alſo the largeſt, ſome weighing near two hundred pounds. The noſe, though not long, is ſharp-pointed; above the eyes is a ſet of ſhort ſpines; the whole upper part of a pale brown, and in ſome ſpecies ſtreaked with black; the lower part white, marked with many ſmall black ſpots; the jaws covered with ſmall granulated but ſharp-pointed teeth; the tail is of a moderate length; near the end are two fins; along the top of it is one row of ſpines, and on the edges are irregularly diſperſed a few others. In the males of this ſpecies the fins are full of ſpines. *Skates* generate in March and April, at which time they ſwim near the ſurface of the water, ſeveral males purſuing one female. The females begin to caſt their purſes, as the fiſhermen call the bags in which the young are included, in May, and continue to do it till September. In October they are very poor and thin, but begin to improve in November, and grow gradually better till May, when they are in the higheſt perfection. The males go ſooner out of ſeaſon than the females. Pennant.

SKEETS, in the *Sea Language*, narrow oblong ladles, or ſcoops, for wetting the ſails, decks, or ſides of a ſhip.

SKEGG, in a *Ship*, that ſmall and ſlender part of the keel, which is cut ſlanting, and left a little without the ſternpoſt. It is now much out of uſe.

SKELETON, Σκελετον, formed from σκελλω, *I dry*, in *Anatomy*, an aſſemblage or arrangement of all the bones of a dead animal, dried, cleaned, and diſpoſed in their natural ſituation; and kept in that diſpoſition by means of wires, &c. See *Tab. Anat.* (*Oſteol.*) *fig.* 3. 7.

Skeletons ſerve for good purpoſe in learning the oſteology. For the ſeveral bones of which a *ſkeleton* conſiſts, ſee BONE.

We have, in the Philoſophical Tranſactions, an account of a human *ſkeleton,* all the bones of which were ſo united, as to make but one articulation from the back to the os ſacrum, and downwards a little way. On ſawing ſome of them, where they were unnaturally joined, they were found not to cohere throughout their whole ſubſtance, but only about a ſixth of an inch deep all round. The figure of the trunk was crooked, the ſpinæ making the convex, and the inſide of the vertebræ the concave part of the ſegment. The whole had been found in a charnel-houſe, and was of the ſize of a full grown perſon.

SKELETON, *Vegetable.* The preparations of leaves, fruits, roots, &c. called *vegetable ſkeletons*, are made in this manner. Chooſe for this purpoſe the leaves of trees or plants, which are ſomewhat ſubſtantial and tough, and have woody fibres, ſuch as the leaves of orange, jaſmine, bay, laurel, cherry, apricot, peach, plum, apple, pear, poplar, oak, and the like; but avoid ſuch leaves as have none of the woody fibres, which are to be ſeparated and preſerved by this method; ſuch are the leaves of the vine, lime-tree, and the like. The leaves are to be gathered in the months of June or July, and ſuch to be choſen as are ſound and untouched by caterpillars, or other inſects. Theſe are to be put into an earthen or glaſs veſſel, and a large quantity of rain-water to be poured over them; and after this they are to be left to the open air, and to the heat of the ſun, without covering the veſſel; when the water evaporates, ſo as to leave the leaves dry, more muſt be added in its place: the leaves will by this means putrefy, but they require a different time for this: ſome will be finiſhed in a month, and others will require two months or longer, according to the hardneſs of the parenchyma of them. When they have been in a ſtate of putrefaction ſome time, the two membranes will begin to ſeparate, and the green part of the leaf to become fluid; then the operation of clearing is to be performed. The leaf is then to be put upon a flat white earthen plate, and covered with clear water; and being gently ſqueezed with the finger, the membranes will begin to open, and the green ſubſtance will come out at the edges; the membranes muſt be carefully taken off with a finger, and great caution muſt be uſed in ſeparating them near the middle rib. When once there is an opening towards this ſeparation, the whole membrane always follows eaſily; when both membranes are taken off, the *ſkeleton* is finiſhed, and it is to be waſhed clean with water, and then preſerved between the leaves of a book.

The fruits are diveſted of their pulp, and made into *ſkeletons* in a different manner. Take, for inſtance, a fine large pear that is ſoft, and not ſtrong; let it be nicely pared without ſqueezing it, and without hurting either the crown or the ſtalk; then put it into a pot of rain-water, cover it, ſet it over the fire, and let it boil gently till it is perfectly ſoft, then take it out, and lay it in a diſh, filled with cold water; then hold it by the ſtalk with one hand, and with the other hand rub off as much of the pulp as you can with the finger and thumb, beginning at the ſtalk, and rubbing it regularly towards the crown. The fibres are moſt tender toward the extremities, and are therefore to be treated with great care there. When the pulp is thus cleared pretty well off, the point of a fine penknife may be of uſe to pick away the pulp ſticking to the core. In order to ſee how the operation advances, the foul water muſt be thrown away from time to time, and clean poured on in its place. When the pulp is in this manner perfectly ſeparated, the clean *ſkeleton* is to be preſerved in ſpirit of wine.

Skeletons of roots which have woody fibres, ſuch as turnips, and the like, muſt be made by boiling the root without peeling it till it be ſoft, that the pulp may be ſqueezed away by the fingers in the ſame manner, in a diſh of water. Many kinds of roots are thus made into elegant *ſkeletons*, and the ſame method ſucceeds with the barks of ſeveral kinds of trees; which when thus treated, afford extremely elegant views of their conſtituent fibres. Philoſ. Tranſ. Nº 416.

SKEPLE, or SKUTTLE, in rural affairs, a ſort of flat broad baſket for winnowing corn.

SKEW, or SKILL *facets*, among *jewellers*. See FACETS.

SKIDS, or SKEEDS, in *Sea Language*, are long compaſſing pieces of timber, notched below ſo as to fit cloſely upon the wales, extending from the main-wale to the top of the ſide, and retained in this poſition by bolts or ſpike-nails. They are intended for preſerving the planks of the ſide, when any heavy body is hoiſted or lowered.

SKIFF, or SQUIFF, the leſs of two ſhip-boats, reſembling a YAWL, ſerving chiefly to go aſhore in when the ſhip is in harbour.

SKIMMER, in *Ornithology*. See RYNCHOPS.

SKIN, in *Anatomy*, a large thick membrane, ſpread over the whole body, ſerving as the external organ of feeling, and as a cover and ornament of the parts underneath.

The *ſkin* conſiſts of three parts; the external one called the CUTICLE, EPIDERMIS, or *ſcarf-ſkin*. The middlemoſt is called the *corpus reticulare*, or RETICULAR *body*, becauſe pierced through with a great number of holes, like a net or ſieve. The innermoſt, called the CUTIS, is a fibrous ſubſtance, woven out of the extremities of arteries, veins, nerves, tendons, &c. Whence alſo ariſe abundance of little eminences, called PAPILLÆ *pyramidales*. See *Tab. Anat.* (*Myol.*) *fig.* 8.

It is likewiſe ſet with an infinity of glands, called MILIARY *glands*, each whereof has its excretory duct paſſing along with the pyramidal papillæ, through the holes of the corpus reticulare, and terminating at the cuticle.

The papillæ are held by the moderns to be the organ of FEELING; and the excretory veſſels ſerve to carry off the matter of PERSPIRATION, which is ſeparated from the blood in the miliary glands.

The cuticle, or ſcarf-*ſkin* of the human body is remarkable for its ſcales, and for its pores. Its ſcales are wholly a microſcopical diſcovery, for being ſo very minute, that two hundred of them may be covered with a grain of ſand, they never could have been diſcovered by the naked eye. Theſe are placed on our *ſkin* as on fiſhes, that is three deep, or each ſcale ſo far covered by two others, that only a third part of it appears; and their lying in this manner over one another ſeems to be the reaſon of the *ſkin*'s appearing white; for about the mouth and lips, where they only juſt meet together, and do not fold over, the blood-veſſels are ſeen through, and the parts appear red.

The perſpirable matter is ſuppoſed to iſſue from between theſe ſcales, which lie over the pores, or excretory veſſels, through which the watery and oily matters perſpire; and theſe may find vent in a hundred places round the edges of each ſcale; ſo that if a grain of ſand can cover two hundred of theſe ſcales, it may cover twenty thouſand places through which perſpiration may iſſue forth.

A piece of the *ſkin* taken from between the fingers, from the forehead, neck, arms, or any other ſoft part of the body, which is not hairy, ſerves to ſhew theſe ſcales; for where the ſkin is become hard and callous, they are faſtened confuſedly together. They are generally compoſed of five ſides, and may be ſeen very diſtinctly if ſcraped off with a penknife, and applied to the microſcope in a drop of water.

Every part of the *ſkin* of the human body is alſo full of excretory ducts, or pores, which continually emit the ſuperfluous humours from the maſs of the circulating fluid. In order to view theſe pores, cut a ſlice of the upper *ſkin* with a ſharp razor, as thin as poſſible, then immediately cut alſo a ſecond ſlice from the ſame place, which apply to the microſcope; and in a piece of this, not larger than what a grain of ſand can cover, there may be diſcovered innumerable pores, as plainly as little holes pricked in paper by a fine needle may be perceived, when it is held up againſt the ſun. The ſcales of the upper *ſkin*, prevent any diſtinct view of the pores, unleſs they are thus cut off firſt, or elſe ſcraped away with a penknife; but if a piece of the *ſkin* between the fingers, or in the palm of the hand, be ſo prepared, and then examined, the light will be ſeen very beautifully through its pores.

Mr. Leewenhoeck has attempted to give ſome ſlight notion of the number of the pores in the human body: he ſuppoſes that there are a hundred and twenty ſuch pores in a line one tenth of an inch long; however, to keep within compaſs, he reckons only a hundred; an inch in length will then contain a thouſand in a row, and a foot twelve thouſand. According to this computation, a foot ſquare muſt have in it a hundred and forty-four millions; and ſuppoſing the ſuperficies of a moderate ſized man to be fourteen feet ſquare, there will be in his *ſkin* two thouſand and ſixteen millions of pores. Leewenhoeck, Epiſt. Phyſ. ſupra Nat. Arcanis, tom. iv. p. 413.

Dr. Grew has obſerved that the pores through which we perſpire, are more remarkably diſtinguiſhable in the hands and feet; for if the hands be well waſhed with ſoap, and examined with but an indifferent glaſs in the palm, or upon the ends and firſt joints of the thumb and finger, there will be found innumerable little ridges parallel to each other, and of equal bigneſs and diſtance; and upon theſe ridges the pores may be diſcovered by a very good eye, even without a glaſs, lying in rows, but viewed through a good glaſs, every pore ſeems like a little fountain, with the ſweat ſtanding therein as clear as rock water; and this, when wiped away, will be found to be immediately renewed again.

Probably fleas, gnats, and other inſects which feed on our blood and humours, make no new holes, but prey upon us through theſe pores. Philoſ. Tranſ. Nº 159. Baker's Microſcope, p. 172, &c.

Nutrition, M. Perrault obſerves, is ſometimes taken in throughout the whole body of animals, at the pores of the *ſkin*. The ſubtle ſubſtances of nutritious matters, applied externally to thoſe bodies, are found to penetrate them, to mix with the blood and juices, and they are there aſſimilated. On this account, he adds, it is that butchers dogs, turnſpit dogs, &c. are generally very fat, and even butchers, cooks, &c. themſeves. M. Dodart takes it, that plants thus receive a great part of their food by the external bark, not all of it by the ROOT.

SKIN, in *Commerce*, is particularly uſed for this membrane ſtripped off the animal, to be prepared by the tanner, ſkinner, currier, parchment-maker, &c. and converted into LEATHER, &c.

The uſe of *ſkins* is very ancient; the firſt garments in the world having been made thereof. The Danes and other northern nations have a long time dreſſed in *ſkins*. MOROCCOES are made of the *ſkins* of a kind of goats. PARCHMENT is uſually made of ſheep-*ſkins*; ſometimes of goat *ſkins*. VELOM is a kind of parchment made of the ſkin of an abortive calf, or at leaſt of a ſucking calf. The true SHAMMY is made of the *ſkin* of an animal of the ſame name; though frequently it is counterfeited with common goats and ſheep-*ſkins*.

The Indians in Carolina and Virginia dreſs buck and doe-*ſkin* in this manner: the ſelt being taken off, they ſtrain them, with lines or otherwiſe, much like the clothiers racks, in order only to dry them. When the hunting time is over, the women dreſs the *ſkins*, by putting them in a pond or hole of water, to ſoak them well; then with an old knife, fixed in a cleft ſtick, they force off the hair whilſt they remain wet. This done, they put them into a kettle, or earthen-pot, and a proportion of deers brains, dried and preſerved for this purpoſe, is put along with them; this veſſel is ſet on the fire till they are more than blood-warm, which will make them lather and ſcour clean; after this, with ſmall ſticks, they wreſt and twiſt each *ſkin*, as long as they find any wet to drop from them, letting them remain ſo wreſted for ſome hours, and then they untwiſt and ſtretch each of them in a ſort of rack, ſo that every part is extended, and as the *ſkin* dries they take a dull hatchet, or ſome ſuch inſtrument, and rub them well over to force all the water and greaſe out of them, till they become perfectly dry, and then their work is done.

In this manner one woman (for the men never employ themſelves in this work) will dreſs eight or ten *ſkins* in a day, that is, begin and finiſh them. Phil. Tranſ. Nº 194. See BUFF.

For the manner of preparing ſhagreen. See SHAGREEN.

SKINS, *lacquering* and *gilding*. See LACQUER.

SKINK. See SCINCUS.

SKINKER, a cup-bearer, or butler. See ARCH *Butler*.

SKINUS, σκινος, a name given by the ancient naturaliſts to the lentiſk-tree, and alſo to a peculiar ſpecies of the ſquill, or ſcilla, which was not nauſeous and emetic as the common ſquill, but eſculent and pleaſant to the taſte.

SKIPPER. See SHIPPER.

SKIPPER, an Engliſh name for the common gar-fiſh. See ACUS.

SKIRMISH, in *War*, a diſorderly kind of combat, or encounter, in preſence of two armies, between ſmall parties, or perſons, who advance from the body for that purpoſe, and introduce to a general, regular fight.

The word ſeems formed from the French, *eſcarmouche*, which ſignifies the ſame, and which Nicod derives from the Greek χαρμη, which ſignifies, at the ſame time, both *light*, *combat*, and *joy*: Menage derives it from the German, *ſchirmen* or *ſhermen*, *to fence* or *defend*: Du-Cange, from *ſcarramuccia*, a *light engagement*, of *ſcara* and *muccia*, a body of ſoldiers hid in ambuſh; in regard many *ſkirmiſhes* are performed by perſons in ambuſcade.

SKIRRET, *Sium*, in *Botany*, a genus of the *pentandria digynia* claſs; the characters of which are theſe: it hath an umbellated flower; the general umbel is various in different ſpecies; the ſmall ones are plain and ſpreading; the general involucrum is compoſed of ſeveral ſhort, ſpear-ſhaped, reflexed leaves; thoſe of the ſmaller are, very ſmall narrow leaves; the general umbel is uniform; the flowers have five inflexed petals, which are equal; they have five ſtamina, terminated by ſingle ſummits, and a ſmall germen ſituated under the flower, ſupporting two reflexed ſtyles, crowned by obtuſe ſtigmas; the germen afterward becomes a roundiſh, oval, ſtreaked fruit, ſplitting in two, each part containing one ſtreaked ſeed, plain on one ſide, and convex on the other. Miller reckons ſix, and Linnæus nine ſpecies.

The common *ſkirret* may be propagated either by ſowing the ſeeds, or by planting the ſlips and off-ſets, but the firſt is much the beſt method. It ſhould be ſowed on a moiſt rich ſoil, in the latter end of March, or beginning of April; and in five or ſix weeks the young plants will come up, when the ground ſhould be hoed to deſtroy the weeds, as is practiſed for carrots; and when the ſeeds are ſown in broad-caſt, the plants ſhould be cut up, leaving them at the ſame diſtance as carrots. Thoſe ſown in the drills ſhould alſo be thinned to the diſtance of four inches, and the ground cleared of weeds. This ſhould be repeated three times, after which their leaves will ſpread, and prevent the growth of weeds. In autumn, when the leaves begin to decay, they ſhould be taken up for uſe; but this ſhould only be done as they are wanted, for they ſpoil with lying out of the ground. The leaves decay in October, and from that time till the middle of March the roots are in ſeaſon; after this the roots begin to ſhoot, and become good for little. Miller.

The taſte of the *ſkirret*-root has ſomewhat of a bitterneſs and ſubaſtringency in it. It is eſteemed a wholſome root, affording good nouriſhment; but it generates flatulence, and its very ſweet taſte is diſagreeable to many.

SKITTISH, in the *Manege*. A horſe is ſaid to be *ſkittiſh*, in French *ecouteux*, or *retenu*, that leaps inſtead of going forward; that does not ſet out, or part from the hand freely, nor employ himſelf as he ought to do.

SKOUT, in *Ornithology*. See LOMWIA.

SKRABBA, in *Ichthyology*, a name given by ſome to a fiſh called by Jonſton and Schoneveldt the *ſcorpius marinus*, but wholly different from the *ſcorpæna* of other authors. See FATHER-*laſher*.

SKREEN. See SCREEN.

SKUA, in *Ornithology*. See CATARACTA.

This bird inhabits Norway, the Ferro iſles, Shetland, and the noted rock Foula, a little weſt of them. It is alſo a native of the South Sea. It is the moſt formidable GULL; its prey being not only fiſh, but the leſſer ſort of water-fowl, as teal, &c. and it is alſo ſaid to prey on ducks, poultry, and even young lambs; it has all the fierceneſs of the eagle in defending its young: when the inhabitants of the Ferro iſlands viſit the neſt, it attacks them with great force, ſo that they hold a knife erect over their heads, on which the *ſkua* will transfix itſelf in its fall on the invaders. In Foula it is a privileged bird, becauſe it defends the flocks from the eagle, which it beats and pierces with great fury; and the natives impoſe a fine on any perſon who deſtroys one of theſe birds. Pennant.

SKULL, *Cranium*, in *Anatomy*, that great bony cavity of the head, which contains the brain. See *Tab. Anat.* *(Oſteol) fig.* 1 & 2.

The *cranium* is divided into two tables, or laminæ, laid or applied over each other; between which is a thin ſpongeous ſubſtance, made of bony fibres detached from each lamina, and full of little cells of different bigneſſes, called *diploe*, or *meditullium*.

The tables are hard and ſolid, the fibres being cloſe to one another; the diploe is ſoft, in regard the bony fibres are here at a greater diſtance: a contrivance whereby the *ſkull* is not only made lighter, but leſs liable to fractures.

The external lamina is ſmooth, and covered with the pericranium; the internal is likewiſe ſmooth, abating the furrows made by the pulſation of the arteries of the dura mater, before the cranium be arrived at its conſiſtence.

It has ſeveral holes, through which it gives paſſage to the ſpinal marrow, nerves, arteries, and veins, for the conveyance and re-conveyance of the blood, &c. between the heart and the brain.

Its figure is round, which is an advantage to its capacity; but a little depreſſed, and longiſh; advancing out behind, and flatted on the two ſides, which form the temples; which contributes to the enlargement of the ſight and hearing.

It is compoſed of eight bones, ſix whereof are *proper*, and two *common*. The *proper*, or thoſe which are wholly employed in forming the globe of the *ſkull*, are the bone of the forehead, OS *frontis*, that of the back of the head, *os* OCCIPITIS, the two *oſſa* PARIETALIA, and the two of the TEMPLES, *oſſa temporum*.

Within the eminences of the bones of the temples, is contained the organ of hearing, with the four little bones belonging thereto, viz. the malleolus, incus, ſtapes, and os orbiculare. See Ear.

The *common* bones of the *cranium*, or thoſe which contribute to form the face as well as the *ſkull*, are the *os* SPHENOIDES, and ETHMOIDES: but Winſlow obſerves, that this diviſion is not juſt, becauſe the *os frontis* and *oſſa temporum* deſerve as much to be called *common*, as thoſe that are reckoned ſuch; and thus, inſtead of ſix, there would be only three proper bones, and inſtead of two, there would be five common ones. Anat. vol. i. p. 21.

The *cranium* has three *common* ſutures, which divide it from the jaw: it has others *proper*, whereof there are three genuine, the coronalis, ſagittalis, and lambdoides; the reſt ſpurious, called *ſquammoſæ*, or *temporales*.

This diviſion of the *cranium* into pieces by ſutures, is of good uſe, as it makes it leſs liable to break, gives paſſage to the membranes which ſuſtain the pericranium, and affords vent to the matter of inſenſible perſpiration.

It is not uncommon to find in ſome human *ſkulls* a different ſtructure and conformation from that which nature has given to others, or to the generality of the ſpecies.

Frequently there are met with heads, the ſagittal ſuture of which is prolonged to the root of the noſe, and divides the coronal bone into two parts: and there have been anatomiſts, who have judged this ſort of conſtruction of the *ſkull* peculiar to one ſex, rather than common to both.

To find the true cauſe of this, we are to have recourſe to the ſtate of the *ſkull* in infancy. The bone is, at that time, always found divided into two lateral portions; ſo the ſame ſeparation, which is found between the two ſides, is found alſo between the two pieces, which afterwards compoſe the coronal bone. The two pieces of this coronal bone unite one with another, by means of their indented edges, and theſe afterwards coaleſce ſo perfectly, that the ſuture is obliterated; and this coaleſcence, which thus in proper time takes place in the coronal bone, ſometimes extends itſelf alſo to almoſt all the other bones of the *ſkull*; but this only happens in old age. But if, on the contrary, the two pieces, of which the coronal bone is compoſed, acquire their full thickneſs and hardneſs before this coaleſcence is brought about, the ſuture remains, and is not obliterated, except in extreme old age. This reflection may be alſo carried much farther.

In the *ſkulls* of a great number of infants, the coronal and the two ſides ſo perfectly unite as not to leave the leaſt trace of their original ſeparation. It ſeems as if the bones, having expanded and grown in theſe early ſtages too faſt for the brain, have been united to one another while yet ſoft and tender: but when the brain, on the other hand, grows too faſt for the bones of the *ſkull*, theſe bones preſſed more from within outwards than any other way, have little diſpoſition to unite with one another; and thus acquiring their thickneſs and hardneſs before their coaleſcence, they become much leſs inclined to coaleſce than before.

From theſe conſiderations we may conclude, that in thoſe infants, in which the growth of the brain is ſlow, and that of the bones of the *ſkull* quick, the ſuture, which is between the two portions of the coronal bone, is very quickly obliterated; and, on the contrary, when the increaſe of the brain is quick, and the growth of the bones is ſlow, the ſuture, which divides the coronal bone into two pieces, is found to a great age.

That which is the *ſkull* in the more advanced ſtate of the infant, is originally no other than a membrane, which is afterwards to oſſify: not unfrequently the oſſification is impeded in different parts of this membrane; and in the *ſkulls* of young ſubjects it is common to ſee theſe diſtinct parts which remain membranous while the reſt of the *ſkull* has acquired its proper bony hardneſs. If the cauſe, which impeded the progreſs of the oſſification, ſubſiſts ſo long, as till the other parts of the *ſkull* are hardened into bone, and have their full growth and hardneſs, then will that, which ſhould have been naturally only one bone, form two.

This is the origin of the ſingular and unnatural ſutures, found in ſome human *ſkulls*, and called by ſome *ſupernumerary ſutures*. Sometimes there are, from this cauſe, ſuch ſupernumerary ſutures in almoſt all the bones of the *ſkull*. The os planum frequently is found thus divided into two; and from the ſame principle in nature it is, that a ſmall ſuture is ſometimes found in the maxillary bone, below the orbit, along the canal, which forms the lower orbitary cavity: the place where this little ſuture is found has happened to remain a long time membranous, and the oſſification at laſt taking place on the two edges of the remaining membrane, there has been formed a ſuture.

In other bones of the *ſkull* we alſo frequently meet with larger or ſmaller ſpaces which have continued membranous; and there are inſtances in which the oſſification may be plainly perceived juſt begun in the centre of the membranous ſpots.

It might be ſuppoſed that the brain was little liable to an unnatural growth, or expanſion, when we conſider that the brain is no other than a vaſt aſſemblage of pipes, or tubes, of a moſt extreme fineneſs, and that the particles, which compoſe theſe tubes, have but a very weak band of union one with another. Indeed we know very well, that when an injection has penetrated to the cortical ſubſtance of the brain, if that ſubſtance be macerated a little in water, its parts detach themſelves from one another, the veſſels become wholly deſtroyed, and there remains nothing but a number of extremely fine filaments of the matter of the injection, which has found its way into theſe veſſels, and been formed into their ſhape by cooling in their cavities. As there are found, however, a great number of *ſkulls* which have a ſingular and odd configuration, it cannot but be that the brain muſt be expanded into the ſame form. We are informed, that the people of ſome nations preſs the fore part of the heads of their children, as ſoon as born, with conſiderable violence, and continue this, in order to reduce the forehead to a flatneſs; but theſe *ſkulls* are always found to get in length behind what they want before.

Sometimes there has been obſerved, in the *ſkulls* of perſons of an advanced age, in the middle of the ſagittal ſuture, a deep impreſſion, or ſinking in, which had remained there from infancy; but nature, in this caſe, ſupplies the cavity with two protuberances of bone from the ſides of the adjoining parts; and ſome *ſkulls* are found very narrow, and of a remarkable length, nature giving one way the room ſhe denied the other. Many other ſingular conſtructions of the *ſkull* have been obſerved by anatomiſts; and probably in the perſons, to whom they have belonged, the brain has been able to perform its functions but badly. Be that as it will, it is certain that the brain has expanded, and formed itſelf to the ſhape of the *ſkull* in all theſe its unnatural figures; and neceſſarily the parts, of which the brain in ſuch caſes is compoſed, have taken a very different figure and arrangement from what nature intended: and in this caſe it cannot be, but that ſome portions of the brain have extended themſelves farther than they naturally ſhould have done, and others much leſs than was allotted to them. Mem. Acad. Scienc. Par. 1740.

The adheſion of the pericranium to the *ſkull* has been thought a ſure ſign of the bone's being entire, but this is a miſtake; and the ſeparation of the cranium from the *ſkull*, is as uncertain a ſign of the cranium's being broken. Mem. de l'Acad. de Chirurg. tom. i.

We have ſome very particular obſervations on the bones of the human *ſkull*, by Mr. Hunauld, in the Memoires de l'Acad Royal de Sciences, an. 1730.

Skull, *concealed injuries of the*. When a blunt inſtrument is the occaſion of an injury on the cranium, if the injured part does not ſufficiently appear of itſelf, great induſtry is to be uſed to diſcover it. Where the common integuments appear tumid and ſoft, they are in this caſe to be divided to the bone; but in making the inciſion, great care muſt be taken not to lay too much ſtreſs upon the knife, leſt ſplinters of the fractured cranium ſhould by that means be forced in upon the brain. The beſt way to make this inciſion is in form of the letter X, and about an inch and a half in length, lifting up the ſkin at each angle, and leaving the bone bare. The blood that is ſpilt is to be taken up with a ſpunge, and dry lint ſtuffed between the ſkin and the cranium; and having thus found out the injured part of the cranium, the trepan is to be applied, if it be found neceſſary. If ſplinters of the bone are now found, they muſt be removed either with the fingers or the forceps, or, when they hang to the pericranium, with ſciſſors; but when they adhere pretty firmly to the neighbouring parts of the cranium, it is more adviſeable to replace them than to endeavour to remove them by violence. Heiſter's Surgery, p. 85.

Skull, *fiſſures of the*, cracks in the bone of the *ſkull*, made by falls, blows, or other injuries. When theſe are attended with no other bad ſymptoms but white, yellow, or brown ſpots upon the face of the bone, they may be remedied with boring ſeveral ſmall holes through the ſurface of the *ſkull*, down to the diploe, and dreſſing with balſamic medicines: but where violent ſymptoms come on which demonſtrate an extravaſation of blood in the cavity of the cranium, the trepan is to be uſed without delay.

Skull, *depreſſions of the*, are dentings in of the bone of the *ſkull* by a blow, without any manifeſt fracture, or, at the utmoſt, with ſuch a fracture, that from its flexibility, it does not ſtart out by means of it, but continues to adhere firmly to the neighbouring bones. The *ſkulls* of infants are frequently ſubject to theſe, but in adults this caſe cannot happen, for the bones in them are become ſo rigid, that it is impoſſible to beat in any part of the cranium, without beating the bone to pieces. Theſe injuries of the cranium are called by the ſurgeons *fractures*, and the brain is frequently injured by theſe accidents, and its actions diſturbed. The firſt thing to be done to give relief in this diſorder, is to liſt up any part of the bone that is depreſſed, or beaten in upon the brain, or to remove any other body by which it is compreſſed. Sometimes a ſplinter, which is quite ſeparated from the reſt of the bone, is driven into the cavity of the cranium, and lies conſtantly vellicating the brain and its membranes with its pointed parts; this is to be removed without delay.

When ſlight depreſſions are made in the *ſkulls* of infants, without bringing on any bad ſymptoms, the forcible methods of raiſing the depreſſed part are not to be uſed, but medicated bags, boiled in ſpirit of wine, warm fomentations, and ſuch remedies are to be applied; and laſtly, a plaſter of melilot to cover all. Theſe ſlight applications frequently cure ſuch little depreſſions, and prevent the miſchievous conſequences which might be expected from them. When a very large depreſſion, however, happens to infants, the elevation, or reſtitution of the parts is to be performed in the following manner. After ſhaving the part, apply a plaſter made of gummy and very ſticking ingredients, and ſpread upon very ſtrong leather, with a cord faſtened to the middle of it: this plaſter is to be laid on pretty warm, and left in its ſituation till grown cold; the ſurgeon then taking hold of the cord, which is faſtened to it, is to pull it directly upwards, and with it the depreſſed part of the cranium will often riſe, and be reſtored to its place. When this method does not ſucceed at the firſt trial, it is to be repeated; and when this fails, the application of a cupping-glaſs to the depreſſed part will ſometimes ſucceed, eſpecially if you ſtop the patient's breath, both at the noſe and mouth, during the operation; but if neither the plaſter nor cupping prove ſucceſsful, it will be neceſſary to take in the aſſiſtance of an inſtrument.

But when the cranium is ſo depreſſed, whether in adults or infants, as to ſuffer a fracture or diviſion of its parts, it muſt be inſtantly relieved. Some praiſe very much the uſe of a ſternutatory powder on this occaſion, affirming, that the diſtention of the brain is ſo violent in the act of ſneezing, that it will reſtore the depreſſed parts of the bone to their former ſituation: but the ill conſequences that may attend this practice, are ſo grievous, that it ought wholly to be rejected, and the trepan and elevatories always to be uſed. Heiſter's Surgery, p. 87.

SKULL, *wounds of the*. In wounds of the cranium, or *ſkull*, the firſt buſineſs is to find whether they are terminated in the external parts of the cranium, or whether they penetrate into its cavity. This is to be known, 1. By the eye. 2. By the probe, which, however, muſt be uſed very gently here, for fear of bringing on farther miſchief. 3. By examining the inſtrument with which the blow was given, and conſidering the degree of force with which it was impelled. And laſtly, by the preſence, or abſence of violent bad ſymptoms. A violent blow upon the head will always be attended with vomitings, and vertigoes, and blood will be diſcharged by the noſe, ears and mouth, and the wounded perſon will loſe alſo his ſpeech and ſenſes. Theſe diſorders will appear ſometimes ſooner, ſometimes later, but always are more violent than otherwiſe, when the wound is made by a fall, or ſome blunt inſtrument; in which caſes the cranium is uſually much ſhattered. The blood which diſcharges itſelf by the wound, when that is made by a ſharp inſtrument, will inſinuate itſelf between the common integuments and the cranium: in the contuſions that are made with blunt inſtruments, ſometimes it will be concealed under the cranium, and, by corrupting the perioſteum and cranium, will bring on ulcers, and caries of the bone, and frequently occaſions fevers, convulſions, and death. Heiſter's Surgery, p. 82.

SKULL-*cap*, *ſcutellaria*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the flower has a very ſhort tubulous empalement, whoſe brim is entire, having an incumbent ſcaly operculum, which ſeems cloſed; it is of the lip kind, with a very ſhort crooked tube, long compreſſed chaps, and a concave trifid upper lip; the under lip is broad and indented; it has four ſtamina hid under the upper lip, two of which are longer than the other, terminated by ſmall ſummits, and a four-pointed germen ſupporting a ſlender ſtyle ſituated with the ſtamina, crowned by a ſingle recurved ſtigma; the empalement afterwards becomes a helmet-ſhaped capſule, including four roundiſh ſeeds. Miller enumerates ſix, and Linnæus fourteen ſpecies.

Theſe plants are all of them propagated by ſeeds; if theſe are ſown in autumn, ſoon after they are ripe, they will more certainly ſucceed than when they are ſown in the ſpring; for theſe ſometimes miſcarry, and if they ſucceed, the plants ſeldom come up the ſame ſeaſon. They require no other care but to thin them, and keep them clear from weeds. Miller.

SKUNK, in *Zoology*. See *American* POLE-*cat*.

SKY, the blue expanſe of AIR OR ATMOSPHERE.

The azure colour of the *ſky*, ſir Iſaac Newton attributes to vapours beginning to condenſe therein, which have got conſiſtence enough to reflect the moſt reflexible rays, viz. the violent ones; but not enough to reflect any of the leſs reflexible ones.

M. de la Hire attributes it to our viewing a black object, viz. the dark ſpace beyond the regions of the atmoſphere, through a white or lucid one, viz. the air illumined by the ſun; a mixture of black and white always appearing blue. But this account is not originally his; it is as old as Leonardo da Vinci. See BLUENESS and COLOUR of the *Clouds*.

SKY-*colour*. To give this colour to glaſs, ſet in the furnace a pot of pure metal of fritt from rochetta, or barilla, but the rochetta fritt does beſt; as ſoon as the metal is well purified, take for a pot of twenty pounds of metal ſix ounces of braſs calcined by itſelf, put it by degrees, at two or three times, into the metal, ſtirring and mixing it well every time, and diligently ſcumming the metal with a ladle: at the end of two hours the whole will be well mixed, and a proof may be taken; if the colour be found right, let the whole ſtand twenty-four hours longer in the furnace, and it will then be fit to work, and will prove of a moſt beautiful *ſky-colour*. Neri's Art of Glaſs, p. 40.

SKY-*flower*. See CINERARIA.

SKY-*rocket*. See ROCKET.

SLAB, an outſide ſappy plank or board ſawed off from the ſides of a timber-tree: the word is alſo uſed for a flat piece of marble.

SLAB-*line*, in *Sea Language*, a ſmall cord paſſing up behind a ſhip's main-ſail or fore-ſail, and being reeved through a block attached to the lower part of the yard, is then tranſmitted in two branches to the foot of the ſail to which it is faſtened.

It is uſed to truſs up the ſail as occaſion requires, and more particularly for the convenience of the pilot or ſteerſman, that they may look forward beneath it as the ſhip advances. Falconer.

SLABBERING-*bit*, in the *Manege*. See MASTIGADOUR.

SLABS *of tin*, the leſſer maſſes, which the workers at the tin-mines caſt the metal into: theſe are run into moulds made of ſtone.

SLACK *a leg*, in the *Manege*, called in French *mollir la jambe*, is ſaid of a horſe when he trips or ſtumbles.

SLACK *the hand*, is to *ſlack* the bridle, or give a horſe head.

SLACK-*water*, in *Sea Language*, denotes the interval between the flux and reflux of the tide, or between the laſt of the ebb and the firſt of the flood, during which the current is interrupted, and the water apparently remains in a ſtate of reſt.

SLACKEN, in *Metallurgy*, a term uſed by the miners to expreſs a ſpungy and ſemivitrified ſubſtance, which they uſe to mix with the ores of metals, to prevent their fuſion. It is the ſcoria, or ſcum, ſeparated from the ſurface of the former fuſions of metals. To this they frequently add a lime-ſtone, and ſometimes a kind of coarſe iron-ore, in the running of the poorer gold-ores.

SLAG, in *Metallurgy*, &c. denotes vitrified cinder. See SMELTING.

SLANDER, in *Law*. See SCANDALUM *magnatum*.

SLATCH, at *Sea*. When a rope or cable hangs ſlack, the ſeamen call the middle part, which hangs down, *the ſlatch of the cable*, or rope: ſo alſo, after long foul weather, if there come a ſmall interval of fair, they ſay, *this is a ſlatch of fair weather*. But the term is generally applied to the period of a tranſitory breeze of wind.

SLATE, a bluiſh fiſſile ſtone, very ſoft when dug out of the quarry, and on that account eaſily cut and ſplit into thin long ſquares or eſcallops, to ſerve in lieu of tiles for the covering of houſes: ſometimes alſo to make tables of and for paving.

Mr. Da Coſta defines *ſlates* to be ſtones of a cloſe compact texture, of a laminated ſtructure, and ſplitting only horizontally, or into plates.

The ancients were unacquainted with the uſe of *ſlate*, and inſtead thereof, covered their houſes with ſhingle, as we read in Pliny. Beſides the blue *ſlate*, we have in England a greyiſh *ſlate*, called HORSHAM-*ſtone*, from a town in Suſſex of that name, where the greateſt quantities of it are found.

The blue *ſlate* is a very light, laſting, and beautiful covering;

ing; but it is chargeable withal, in regard the roof muſt be firſt boarded over, and the *ſlates* hung on tacks, and laid with finer mortar than tyles. The grey *ſlate* is chiefly uſed in the covering of churches, chapels, chancels, &c.

It is dearer than tiles, but far more durable. The timber of the roof needs to be very ſtrong for this grey *ſlate*, it being almoſt double the weight of tiles.

Mr. da Coſta has diſtributed *ſlates* into eight ſections or claſſes, according to their different colours. 1. Of the *black ſlates* he has enumerated four ſorts, which are not acted upon by acids. The firſt ſpecies is of a black colour, heavy and very hard, of a fine ſmooth, but not gloſſy ſurface, and capable of a very good poliſh, of a cloſe compact texture, and impenetrable by water: when written on, the characters are white. This *ſlate* will not ſtrike fire with ſteel, and burns to a pale brown colour. It is not found in this kingdom; but in Sweden and Germany there are many mountains and ſtrata of it: however, that dug in Switzerland, where it abounds, is eſteemed the fineſt and beſt in Europe. Where it riſes in ſmall plates, it is chiefly uſed for covering houſes, churches, &c. as in Germany; but the Switzerland *ſlates*, which riſe in large plates, are ſent down the Rhine to Holland, where they form a conſiderable branch of trade, and they are only uſed for tables, pavements, writing-*ſlates* for ſchools, &c. The ſecond ſpecies, which is incapable of a poliſh, and on which the written characters are black, and which burns to a pale reddiſh colour, is ſometimes, but very rarely, found in ſome parts of England and Wales. The third ſpecies, on which the written characters are white, is vulgarly called SHALE. The fourth ſort, which is of a jet black, forms a ſtratum above coal in the places where it is found, eſpecially in Somerſetſhire and Yorkſhire, &c. and it is always full of the impreſſions of vegetables. 2. The *white ſlates*, which are alkaline, comprehend three different ſorts, the two firſt of which have frequently between the plates fine impreſſions of ſkeletons and fiſh, and of ſeveral kinds of cruſtaceous animals, as well as elegant ſuperficial dendritæ, and are found in different parts of Germany; the third, which is generally thickſet with veins of coarſe ſpar, is dug in ſeveral parts of this kingdom. 3. The *aſh* and *grey ſlates* include two ſorts of thoſe which are alkaline, one found in the alps of Savoy, the other in Schwartzburg and Saxony, and three ſpecies of ſuch as are not acted upon by acids; one found in Wales, and applied to no uſe, becauſe it breaks into ſhort ſlips like wooden lathes, but uſed in ſome parts of England, where it is found, as a whetſtone; another found in Caernarvonſhire, and other parts of the kingdom, which ſplits into laminæ of about ¼ of an inch, and makes both an elegant and excellent covering for houſes; it is ſometimes found of a pale bluiſh grey, and ſometimes of a deep grey colour with a caſt of purple.

The ſtrata of this ſtone, according to Dr. Woodward, uſually lie very much inclining, and are of a conſiderable extent. At Mullinecke in Wales, the *ſlate* lies thus, and reaches from near the ſurface to the level of the tide that flows up the river, in the cliffs of which it lies. It may go much deeper, for it has not been examined to the bottom there; but what is obſervable in this place is, that there are evident flexures or bendings in ſeveral parts of the ſtrata, and theſe always run from the top downwards; in the other parts of the ſame ſtrata there are ſeveral perpendicular fiſſures or cracks, but they are narrow like cracks, and always empty.

It appears from this, that at the time when the bed of *ſlate* cracked in ſome places, it was ſo tough as to abide being bent in others, by which means theſe flexures were formed. Sometimes the beds of *ſlate* are cracked at the angles of theſe flexures, the intermediate maſs, though parted from the reſt, lying obliquely. It is obſerved thus cracked alſo in many parts of Yorkſhire.

The third ſpecies belonging to this claſs is compoſed of a grey earthy matter, indurated by cryſtal, and on being firſt dug is ſolid and hard, but on being expoſed to the weather, readily falls into ſhivers: it is always full of curious impreſſions of vegetables, chiefly of a blackiſh colour, and is found in the coal counties of this kingdom, and in moſt other parts of Europe where coal is dug: this *ſlate* is applied to no uſe. 4. The *red ſlates* are not acted upon by acids, of which there are two ſpecies: one of a fine dark purple colour, of a ſmooth and even ſurface, and compoſed of a number of thin plates, impenetrable by water, and, when written on, bearing white characters with a ſlight reddiſh caſt: of this *ſlate* there are vaſt quarries in the northern counties of England, and in Caernarvonſhire in Wales, as well as in other parts of Europe; and the other, which is a coarſe earthy *ſlate*, of a deep browniſh red colour, and rough ſurface, but glittering with ſmall ſpangles of a ſilvery talc, and frequently adorned with ſome rude black dendritæ: the characters written on it are of the ſame colour as the *ſlate*: it is dug in great quantities in ſome parts of Germany. The *ſlate* mentioned by Woodward, Cat. c. b. 26, and found near Hereford, is probably a variety of this ſpecies. 5. The *yellow ſlates*, which are alkaline, and to which belongs that ſpecies ranked by moſt writers, on account of its elegant poliſh and beauty, as a ſpecies of marble, and from the delicate black arbuſcular delineations or dendritæ with which it is adorned, called the *Florentine dendrites marble*. This *ſlate* is dug near Florence, and found in thin ſtrata; it is greatly valued for inlaying all kinds of ornamental works of cabinets, tables, &c. 6. The *blue ſlates*, which are not acted upon by acids; to this claſs belongs the greyiſh blue *ſlate*, impenetrable by water, and on which the written characters are whitiſh, which is dug in great quantities in many parts of England and Wales, and is a well known and uſeful ſtone for the covering of houſes: it is ſupplied alſo by moſt parts of Europe; but the Engliſh *ſlate* is moſt eſteemed, and quantities of it are annually exported; thoſe of Caernarvonſhire in Wales, as being more durable and light, are chiefly valued.

To judge of the goodneſs of *ſlate*, Mr. Colepreſs, in the Philoſophical Tranſactions, orders it to be knocked againſt any hard body, to make it yield a ſound; if the ſound be good and clear, the ſtone is firm and good; otherwiſe it is friable and ſoft.

Another method of proving its goodneſs is, by weighing it exactly, then letting it lie ſix or eight hours under water, and wiping it very clean; if it weighs now more than it did before, it is of that kind that ſoaks in water, and therefore will not long endure without rotting the laths or timber.

Another method of trial is, by placing a *ſlate* half a day perpendicularly in a veſſel of water, ſo as to reach a conſiderable height above the level thereof: if the *ſlate* be firm and cloſe, then it will not draw water, that is, the water will not have aſcended above half an inch above the level of that in the veſſel, nor that perhaps any where but at the edges, the texture whereof might be looſened by hewing; but a bad ſtone will have drawn the water to the very top, be it as high as it will.

There are *ſlates* in ſeveral places, which the moſt experienced *ſlaters*, or coverers, conjecture to have continued on houſes ſeveral hundreds of years, and which are yet as firm as when firſt put up.

7. The *green ſlates*, not acted upon by acids, are dug in Cumberland and in ſome other parts of England and Wales, and alſo in Sweden, and ſeveral parts of Germany, where they are uſed with other kinds for ſlating houſes: they are impenetrable by water, and the characters written on them are white. When burnt they acquire a purple colour, and much reſemble the purple *ſlate*; and therefore it has been ſuggeſted, that the purple kind owes its origin to this ſpecies, which acquires that colour and hardneſs by heats, exhalations, and other ſubterranean cauſes. 8. The *variegated ſlates*, which are alkaline, to which belongs the *graptolithus* of Linnæus; a ſpecies which, on account of its poliſh and beauty, has been reckoned a ſpecies of marble by moſt authors. Its colour is generally a pale yellowiſh brown, elegantly variegated with ſpots of different ſhades, of a deep reddiſh brown colour, which are divided into compartments by ſtraight lines, or fine cracks or flaws in the ſtone, and repreſent ruins of caſtles, towers, &c. whence this ſtone has generally obtained the name of the Florentine ruined marble. Of this *ſlate* Mr. Da Coſta enumerates three varieties. It is dug in the ſame quarries near Florence, with that deſcribed under the fifth claſs; and is much uſed for inlaid works, cabinets, tables, &c. Hiſt. of Foſſils, p. 165, &c.

M. Leibnitz informs us, in the hiſtory of the French academy, that in ſeveral parts of the dutchy of Brunſwick, particularly about Oſteroda, &c. there are horizontal veins of *ſlate*, wherein are found very exact and finiſhed repreſentations of various kinds of fiſhes and plants, appearing in their natural breadth and length, but without any thickneſs. The ſame impreſſions are alſo frequently found on other ſubſtances, as on the black *ſlate* that lies over veins of coals.

M. Leibnitz accounts for this appearance, by ſuppoſing the lakes and meadows of theſe places to have been covered over with a kind of earth, which has buried the fiſhes and plants; or that ſome very muddy water much impregnated with earth, has covered them up, or carried them away. This earth he takes to have ſince hardened into *ſlate*; and by length of time, or ſome other cauſe, to have conſumed the delicate matter of the fiſh, &c. much as the bodies of flies or ants, which are found incloſed in amber, are quite diſſipated, and nothing left, but as it were, a mere delineation.

The matter of the fiſh, or plant, thus conſumed, has left its form impreſſed in the *ſlate*, by means of the cavity remaining therein; which cavity hath ſometimes been afterwards filled up with a metallic matter: whether by reaſon that the ſubterranean fire, in baking the earth into *ſlate*, has ſeparated a metal therefrom, or that a metallic vapour, penetrating the *ſlate*, has become fixed in theſe cavities. See DENDRITIS and *Adventitious* FOSSILS.

SLATE, *Iriſh*, *Lapis Hybernicus*, a ſtone of the *ſlate*-kind, ſo ſtrongly impregnated with alum, as to deſerve the name of an alum-ore. It is often found likewiſe to contain a large portion of vitriol; and, from Dr. Rutty's experiments, it appears to be a matrix of ferrugineous vitriol.

It is found in great abundance in many parts of Ireland, as alſo in ſeveral of our own counties. Many preſcribe it in powder as a ſtyptic, in hæmorrhages of all kinds, with ſucceſs; and accordingly it has been ſometimes taken by the common people, powdered and mixed with ſpruce beer, againſt inward bruiſes: but perhaps it would be full as prudent for the perſon who knows to what ſalt or ſalts it owes this virtue, to give thoſe ſalts alone, in a doſe that he can depend upon, and without the load of earthy matter which is always to be found in this powder.

This ſubſtance beaten to powder, and infuſed twelve hours in water, will impart ſo much of the vitriolic ſalt it contains to the water, that being mixed with an infuſion of galls the liquor will become reddiſh, in the ſame manner that the medicinal waters of many parts of this kingdom do, which not containing vitriol enough to make ink with, the infuſion of galls yet turn reddiſh with them. It is hence not improbable, that many of theſe waters owe their virtues to this very ſubſtance.

This on being calcined, in order to try whether it be an iron ore, does not, after burning, anſwer to the magnet, ſo that it ſeems to contain no iron at all in the ſtate of metal. But this is obſervable, that it calcines to a ſort of ochre, becoming of a yellow colour, and marking as ochres will do. The yellow of this *ſlate* being burnt too far, becomes of an orange colour, exactly like the ſediment of yellow matter, which we find about the ferrugineous waters; and this ſediment is hence eſteemed by ſome to be the remains of this *ſlate* diſſolved by the water, rather than iron ore. It is even doubted by ſome, whether the yellow ochres are indeed iron ores, or not; for many of them will not anſwer to the magnet, even after ſeveral days and nights continued calcination. It is indeed very certain, that all the naturally red ochres do contain iron, all of them having particles that anſwer to the magnet after a much ſlighter calcination than this given in vain to the yellow kinds. Phil. Tranſ. Nº 243. p. 272.

It may be preſumed, ſays Dr. Lewis, that this foſſil conſiſts of argillaceous earth impregnated, like the pyritæ, with ſulphur and iron; and that, like the pyritæ alſo, it is capable of becoming vitriolic by long expoſure to the air and moiſture. Mat. Med.

SLAVE, a perſon in the abſolute power of a maſter, with regard to his life and fortune. See SERVANT.

Menage and Voſſius derive the word from *Sclavus*, the name of a Scythian people, whom Charlemagne condemned to perpetual impriſonment. See SCLAVONIC.

The Romans called their *ſlaves*, *ſervi*, from *ſervare*, *to keep*, or *ſave*; as being ſuch as were not killed, but ſaved to yield money either by ſale, or by their work. Though other authors are of opinion, that the Roman name *ſervi* might come from that of *ſerbi*; as that of *ſlaves* from *Sclavi*, *a people*.

We find no mention of *ſlaves* before the deluge, but immediately after, viz. in the curſe of Canaan, Gen. ix. 25. whence it is eaſily inferred, that ſervitude commenced ſoon after that time; for in Abraham's days we find it generally eſtabliſhed. Some will have it to have commenced under Nimrod, becauſe it was he who firſt began to make war, and of conſequence to make captives; and to bring ſuch as he took either in his battles, or irruptions, into ſlavery.

Among the Romans, when a *ſlave* was ſet at liberty, he changed his name into a ſurname; he took the nomen or prenomen of his maſter, to which he added the cognomen he had been called by when a *ſlave*. See NAME.

By the civil law, the power of making *ſlaves* is eſteemed a right of nations, and follows, *jure gentium*, as a natural conſequence of captivity in war.

This is the firſt origin of the right of *ſlavery* aſſigned by Juſtinian, Inſt. i. 3. 4. whence *ſlaves* are called *mancipia quaſi manu capti*.

The conqueror, ſay the civilians, had a right to the life of his captive; and having ſpared that, has a right to deal with him as he pleaſes. But this poſition, taken generally, is denied by judge Blackſtone; who obſerves, that a man has a right to kill his enemy only in caſes of abſolute neceſſity for ſelf-defence; and, it is plain, this abſolute neceſſity did not ſubſiſt, ſince the victor did not kill him, but made him priſoner. Since, therefore, the right of making *ſlaves* by captivity depends on a ſuppoſed right of ſlaughter, that foundation failing, the conſequence drawn from it muſt fail likewiſe. Farther, it is ſaid, that *ſlavery* may begin "*jure civili*," when one man ſells himſelf to another: but this when applied to ſtrict *ſlavery*, in the ſenſe of the laws of old Rome or modern Barbary, is alſo impoſſible. Every ſale implies a price, a *quid pro quo*, an equivalent given to the ſeller in lieu of what he transfers to the buyer; but what equivalent can be given for life and liberty, both of which, in abſolute *ſlavery*, are held to be in the maſters diſpoſal? His property alſo, the very price he ſeems to receive, devolves *ipſo facto* to his maſter, the inſtant he becomes his *ſlave*: and beſides, if it be not lawful for a man to kill himſelf, becauſe he robs his country of his perſon, for the ſame reaſon he is not allowed to barter his freedom: the freedom of every citizen conſtitutes a part of the public liberty. In this caſe, therefore, the buyer gives nothing, and the ſeller receives nothing; of what validity then can a ſale be, which deſtroys the very principles upon which all ſales are founded? Laſtly, we are told, that beſides theſe two ways by which *ſlaves* "*fiunt*," or are acquired, they may alſo be hereditary, "*ſervi naſcuntur*;" the children of acquired *ſlaves* are, *jure naturæ*, by a negative kind of birth-right, *ſlaves* alſo; but this being founded on the two former rights, muſt fall together with them. If neither captivity, nor the ſales of one's ſelf, can by the law of nature and reaſon reduce the parent to *ſlavery*, much leſs can they reduce the offspring. Blackſt. Com. b. i. c. 14. Monteſquieu's Spirit of Laws, b. 15. c. 2. &c.

The Lacedemonians, ſay ſome, or as others ſay, the Aſſyrians, firſt introduced the practice; which the Romans not only approved of, but they even invented new manners of making *ſlaves*; for inſtance, a man born free among them might ſell his freedom, and becom a *ſlave*. This voluntary *ſlavery* was firſt introduced by a decree of the ſenate, in the time of the emperor Claudius, and at length was abrogated by Leo.

The Romans had power of life and death over their *ſlaves*, which no other nations had; but this ſeverity was afterwards moderated by the laws of the emperors; and by one of Adrian, it was made capital to kill a *ſlave* without a cauſe.

The *ſlaves* were eſteemed the proper goods of their maſters, and all they got belonged to them: but if the maſter were too cruel in his domeſtic corrections, he was obliged to ſell his *ſlave* at a moderate price.

As *ſlavery* was not formally aboliſhed by the goſpel, the cuſtom of keeping *ſlaves* laſted a long time in Chriſtendom. In the time of Louis le Groſs, they were ſo numerous in Egypt, that it was found a difficult matter to quell a body of them who had made head againſt their maſters: yet Bartolus, who lived in 1300, obſerves, there were none left in his days.

For the cuſtom of marking, or ſtigmatizing *ſlaves*, ſee STIGMATIZING.

Slavery is abſolutely aboliſhed in England and France as to perſonal ſervitude; our ſervants are not *ſlaves*, but only are ſubject to certain determinate ſervices. It is ſaid, that the moment a *ſlave* ſteps on Engliſh ground, he by law becomes free. See NEGRO.

When an attempt was made to introduce *ſlavery* within this nation, by ſtat. 1 Edw. VI. c. 3. which ordained, that all idle vagabonds ſhould be made *ſlaves*, and fed upon bread, water or ſmall drink, and refuſe of meat; ſhould wear a ring of iron round their necks, arms, or legs; and ſhould be compelled by beating, chaining, or otherwiſe, to perform the work aſſigned them, were it ever ſo vile; the ſpirit of the nation could not brook this condition, even in the moſt abandoned rogues; and, therefore, this ſtatute was repealed in two years afterwards. 3 & 4 Edw. VI. c. 16.

SLAVES make a very conſiderable article of traffic in America and the Weſt Indies.

SLAUGHTER. See MANSLAUGHTER, HOMICIDE, MURTHER, BUTCHER, &c.

SLAUGHTER-*ſkins*, a term uſed by our curriers and leather-dreſſers for the ſkins of oxen, or other beaſts, when freſh, and covered with the hair: ſuch as they receive them from the *ſlaughter*-houſes where the butchers flay the carcaſe.

SLEASY *holland*, a kind of holland thus called, becauſe made in Sileſia in Germany; and which, from its ſlightneſs, occaſions all thin, ſlight, ill-wrought hollands to be called *ſleaſy*.

SLEDGE, a kind of carriage, without wheels, for the conveyance of very weighty things, as huge ſtones, bells, &c. The *Sledge* for carrying criminals, condemned for high treaſon, to execution is called HURDLE.

The Dutch have a kind of *ſledge*, whereon they can carry a veſſel of any burden by land. It conſiſts of a plank of the length of the keel of a moderate ſhip, raiſed a little behind, and hollow in the middle; ſo that the ſides go a little aſlope, and are furniſhed with holes to receive pins, &c. The reſt is quite even.

SLEDGE is a large ſmith's hammer, to be uſed with both hands: of this there are two ſorts, the *up-hand ſledge*, which is uſed by under workmen, when the work is not of the largeſt ſort; it is uſed with both the hands before, and they ſeldom raiſe it higher than their head. But the other, which is called the *about-ſledge*, and which is uſed for battering or drawing out the largeſt work, is held by the handle with both hands, and ſwung round over their heads, at their arms end, to ſtrike as hard a blow as they can.

SLEDGE, among *Miners*. See DIGGING.

SLEEP, that ſtate wherein the body appearing perfectly at reſt, external objects move the organs of ſenſe as uſually, without exciting the uſual ſenſations.

Sleep, according to Rohault, conſiſts in a ſcarcity of ſpirits, which occaſions that the orifices or pores of the nerves in the brain, whereby the ſpirits uſed to flow into the nerves, being no longer kept open by the frequency of the ſpirits, ſhut of themſelves. For, this being ſuppoſed, as ſoon as the ſpirits, now in the nerves, ſhall be diſſipated, the capillaments of thoſe nerves, having no ſupplement of new ſpirits, will become lax, and cohere as if cemented together; and be ſo unfit to convey any impreſſion to the brain: beſides, the muſcles, being now void of ſpirits, will be unable to move, or even to ſuſtain the members: thus will ſenſation, and motion, be both for the time deſtroyed.

Sleep is broken off unnaturally when any of the organs of ſenſe are ſo briſkly acted on, that the action is propagated to the brain: for, upon this, the few ſpirits remaining in the brain are all called together, and unite their forces to unlock the pores of the nerves, &c. But if no object ſhould thus affect the organ, yet *ſleep* would in ſome time be broken off naturally; for the quantity of ſpirits generated in *ſleep* would at length be ſo great, that ſtretching out the orifices of the nerves, they would open themſelves a paſſage.

With regard to medicine, *ſleep* is defined, by Boerhaave, to be that ſtate of the medulla of the brain, wherein the nerves do not receive ſo copious, nor ſo forcible an influx of ſpirits from the brain, as is required to enable the organs of ſenſe, and voluntary motion, to perform their offices.

The immediate cauſe hereof appears to be the ſcarcity of animal ſpirits, which being ſpent, and requiring ſome time to be recruited, the minute veſſels, being inflated, become flaccid, and collapſe: or elſe, it is owing to ſuch a preſſure of the thicker blood againſt the cortex of the brain, as that the medulla, becoming likewiſe compreſſed by its contiguity with the cortex, the paſſage of the ſpirits is obſtructed.

The natural cauſe of *ſleep*, then, is any thing that may contribute to theſe two. And hence its effects may be underſtood: for in *ſleep* ſeveral functions are ſuſpended, their organs and muſcles are at reſt, and the ſpirits ſcarce flow through them; therefore there is a leſs conſumption of them; but the ſolid villi and fibres of the nerves are but little changed, and an equilibrium obtains throughout; there is no difference of preſſure on the veſſels, nor of velocity in the humours: the motion of the heart, lungs, arteries, viſcera, &c. is increaſed. The effects of which are, that the vital humours circulate more ſtrongly and equably through the canals, which are now freer, laxer, and opener, as not being compreſſed by the muſcles. Hence, the blood is driven leſs forcibly, indeed, into the lateral veſſels, but more equably; and through the greater veſſels, both more ſtrongly, and more equably. Thus are the lateral fibres ſenſibly filled, as being leſs traverſed, and at length they remain at reſt, with the juices they have collected: and hence the lateral adipoſe cells become filled and diſtended with an oily matter. By this means the circulation, being almoſt wholly performed in the larger blood-veſſels, becomes gradually ſlower, and at length ſcarce ſenſible, if the *ſleep* be too long continued: thus, in moderate *ſleep*, is the matter of the chyle beſt converted into *ſerum*; that into thinner humours; and thoſe into nouriſhment. The attrition of the ſolid parts is leſs conſiderable; the cutaneous ſecretion is increaſed, and all the reſt diminiſhed. The parts worn off are now beſt ſupplied, as an equable, continual repletion reſtores the humours, and repairs the ſolids, the preventing and diſturbing cauſes being then at reſt. In the mean time, while the nutritious matter is beſt prepared; there is an aptitude in the veſſels to receive, and the humours to enter, and the means of application, and conſolidation, are at liberty: hence, a new production, and accumulation of animal ſpirits, in all the humours, as to matter; and in the minuteſt veſſels, as to repletion: the conſequence of which is, an aptitude for waking, and an aptitude for *ſleep*; ſo that upon the firſt occaſion the man awakes. For inſtances of extraordinary *ſleep*. See Phil. Tranſ. Abr. vol. v. p. 353. Mem. Ac. Abr. vol. iv. p. 360. Med. Obſ. vol. i. 280.

Some of the more extraordinary phenomena of *ſleep* yet to be accounted for, are, that when the head is hot, and the feet cold, *ſleep* is impracticable: that ſpirituous liquors firſt bring on drunkenneſs, then *ſleep*: that perſpiration, during the time of *ſleep*, is twice as great as at other times: that, upon *ſleeping* too long, the head grows heavy, the ſenſes dull, the memory weak, with coldneſs, pituitouſneſs, an indiſpoſition of the muſcles for motion, and a want of perſpiration: that much ſleeping will ſuſtain life a long time, without either meat or drink: that upon a laudable *ſleep* there always follows an expanſion of all the muſcles, frequently a repeated yawning, and the muſcles and nerves acquire a new agility: that fœtuſes always *ſleep*; children often; youth more than grown perſons, and they more than old men; and that people recovering from violent diſtempers, *ſleep* much more than when perfectly at health.

SLEEP, *Somnus*, in *Mythology*, the ſon of Erebus and of Night, according to Homer and Heſiod, and the brother of *Mors*, or *Death*.

Virgil (Æn. vi. v. 278), aſſigns to this deity an abode with Death, in the ſubterraneous or inviſible world.

Statius and Ovid place the chief reſidence, or great palace of *Somnus* on our earth, in the country of the Cimmerians. Theb. x. v. 84 to 117. Met. xi. v. 592 to 645.

This deity is moſt commonly repreſented by the artiſts as a ſoft youth, ſtretched at his eaſe on a couch, reſting his head on a lion's ſkin, and ſometimes on a lion; with one arm either a little over or under his head, and the other dropping negligently by the ſide of the couch, and either holding poppies, or a horn with the juice of poppies in it. He is often winged, and much reſembles a little Cupid, from whom he is diſtinguiſhed by the lizard (an animal ſuppoſed to *ſleep* half the year) placed at his feet. There is ſcarce any one of the deities that is more fully and particularly deſcribed by the poets than this deity of *Sleep*. Spence's Polymetis, p. 263, &c.

SLEEP *of plants*. See PLANTS.

SLEEP *of the ſoul*, in *Theology*, denotes that inſenſible, unconſcious, and inactive ſtate, into which ſome have ſuppoſed, that mankind are removed at death, and in which they remain till the period of the general reſurrection and laſt judgment. The term *ſleep* has been uſed by way of contradiſtinction to that which has been commonly called the intermediate or ſeparate ſtate. Of the advocates of this opinion, ſome have allowed the eſſential diſtinction between body and ſpirit, and the natural immortality of the human ſoul; ſo that, being a ſubſtance and not a mode, it will go on to exiſt, till by ſome poſitive act of the Creator it is annihilated. They cannot admit the ſuppoſition, that the whole man becomes extinct at death, or that death deſtroys or annihilates the thinking ſubſtance; becauſe, they ſay, the reſurrection on this hypotheſis, will not be a reſurrection, but a creation of a new ſet of beings: if death annihilates us in this ſenſe, there can be no future ſtate; becauſe, a being who has loſt his exiſtence cannot be recovered. Accordingly, they maintain, that what happens to the ſoul at death can be no more than a ſuſpenſion of the exerciſe of its faculties, or an incapacitation, from which it will, by the power of Chriſt, be delivered at the reſurrection: and they alledge, that there is an infinite difference between the annihilation of the ſoul at death, and its incapacitation; becauſe, one who believed the former, could not poſſibly entertain the hope of a future ſtate; but one who believes the latter, might reaſonably entertain ſuch a hope. Death, they ſay, is a diſtreſs in which our ſpecies has been involved by extraordinary cauſes, and from which we have obtained the hope of being ſaved by the moſt extraordinary means, viz. by the interpoſition of Jeſus Chriſt, who, taking upon him our nature, and humbling himſelf to death, has acquired the power of deſtroying death, and is on this account ſtyled the Saviour of the world. However, moſt of thoſe who deny the notion of an intermediate ſtate of conſcious perception between death and the general reſurrection, reject the ſuppoſition of two diſtinct natures in man, and conſider that principle, which is called the *ſoul*, not as a ſpiritual ſubſtance, but as a quality, or property, either ſuperadded to matter by the Creator of our frame, or reſulting from the organization of the human body, and particularly of the brain. See Soul.

Accordingly, they alledge, that when the organized ſyſtem, to which the power of thinking, &c. is annexed, on which it depends, and from the organization of which, as ſome maintain, it neceſſarily reſults, is diſſolved by death; all the percipient and thinking powers of man, all his capacities of action, and of ſuffering, or of enjoyment, muſt be extinguiſhed, and ceaſe of courſe And if the property of thinking neceſſarily attends the property of life, as ſome apprehend, nothing can be requiſite to the reſtoration of all the powers of the man, but the reſtoration of the body (no particle of which can be loſt) to a ſtate of life. Whatever is decompoſed, it is ſaid, may certainly be recompoſed by the ſame Almighty Power that firſt compoſed it, with whatever change in its conſtitution, advantageous or diſadvantageous, he ſhall think proper; and then the powers of thinking, and whatever depended upon them, will return of courſe, and the man will be, in the moſt proper ſenſe, the ſame being that he was before. Thoſe who hold this opinion maintain, that, according to the Scriptures, life and immortality were brought to light by the Goſpel of Chriſt, in a ſenſe excluſive of all other teachers, and all other revelations, at leaſt from the birth of Moſes downwards; excluſive, likewiſe, of all information from the light of nature, or the reſult of philoſophical diſquiſition on the ſubſtance or qualities of the human ſoul. They hold, moreover, that the ſentence pronounced upon our firſt parents, imported a total deprivation of life, without any reſerve, or ſaving to the life of the ſoul; and conſequently, that eternal life, or a reſtoration and redemption from the conſequences of this ſentence, was effected for, revealed, conſigned, and inſured to man, in and through Chriſt, and will be accompliſhed in no other way than that ſpoken of by Chriſt and his apoſtles, who, they ſay, have left no room to conclude, that there is a ſeparate or intermediate life for the ſoul, when diſunited from the body.

The learned Dr. Law, biſhop of Carliſle, having, with a particular view to the controverſy concerning the intermediate ſtate, enumerated the ſeveral paſſages both in the Old and New Teſtament, in which the words, that are tranſlated ſoul or ſpirit in our verſion, occur, maintains, that none of them ever ſtand for a purely immaterial principle in man, or a ſubſtance wholly ſeparable from, and independent of the body; and after examining the account which the Scriptures give of that ſtate to which death reduces us, he obſerves, that it is repreſented by *ſleep*, by a negation of all life, thought, or action; by reſt, reſting-place, or home, ſilence, oblivion, darkneſs, deſtruction, or corruption. He adds, that the Scripture, in ſpeaking of the connection between our preſent and future being, doth not take into account our intermediate ſtate in death; no more, than we, in deſcribing the courſe of any man's actions, take in the time he *ſleeps*: and that, therefore, the Scriptures (in order to be conſiſtent with themſelves) muſt affirm an immediate connection between death and judgment. As for thoſe texts, that are uſually alledged on the other ſide of the queſtion, which he has cited and endeavoured to accomodate to his own opinion, he thinks that they are either quite foreign to the point, or purely figurative, or capable of a clear and eaſy ſolution on the principle which he adopts, viz. that the times of our death and reſurrection are coincident: and that they cannot be fairly oppoſed to the conſtant, obvious tenor of the ſacred writings. With reſpect to philoſophical arguments, deduced from our notions of matter, and urged againſt the poſſibility of life, thought, and agency, being ſo connected with ſome portions of it as to conſtitute a compound being or perſon, he imagines that they are merely grounded on our ignorance, and that they will equally prove againſt known fact and obſervation, in the production of various animals, as againſt the union of two ſuch heterogeneous principles as thoſe of the ſoul and body are ſuppoſed to be. With reſpect to the conſequences of either opinion, he ſays, that, on the one ſide, there is nothing more than a temporary ceſſation of thought, which can hurt nobody, except the ſelf-intereſted papiſt, or the ſelf-ſufficient deiſt; but on the other ſide, there is a manifeſt derogation from, if not a total ſubverſion of that poſitive covenant, which profeſſes to entitle us to everlaſting life. He adds, that all proper and conſiſtent notions of death, reſurrection, and a future judgment, are confounded, and in fine, all the great ſanctions of the goſpel rendered unintelligible or uſeleſs.

The doctrine of the New Teſtament, ſays another writer againſt a ſeparate ſtate, is, that man ſhall become immortal, by the way of a reſurrection of the dead, a reſtoration of the whole man to life; and the New Teſtament is ſo far from acknowledging any intermediate conſciouſneſs in man, between death and the reſurrection, that it always ſpeaks of that interval as a *ſleep*, which implies a ſuſpenſion of the thinking faculty, a reſt from thoſe labours, which require thought, memory, conſciouſneſs, &c. during which thoſe faculties are uſeleſs.

Beſides, the ſcriptural ſyſtem of immortality ſuppoſes, that man had forfeited his original title to immortality, and would never have received it, but for the interpoſition of a Redeemer. The conſequence of this doctrine is, that between the time of the forfeiture and the actual appearance of the Redeemer, the dead could have life in no ſenſe at all; and that neither before nor after the appearance of the Redeemer, dead men were, or would be reſtored to life, otherwiſe than in the way revealed by him, namely a reſurrection of the dead.

On the other hand, the advocates of a ſeparate ſtate inſiſt, that the ſoul, being an active, ſimple, uncompounded, immaterial ſubſtance, is immortal in its own nature, and capable of an active and conſcious exiſtence, in a ſtate of diſunion and ſeparation from the body: that this natural capacity of the ſoul was not impaired, or at all affected by any thing that happened upon the tranſgreſſion of our firſt parents; that the death to which they were condemned was only the death of the body: hence, they infer, that there is, and would have been a future immortal ſtate of being beyond the preſent life, and (the moral attributes of God preſuppoſed) a juſt retribution therein, independent of the doctrine of a reſurrection of the dead; and that in the interval between death and the general reſurrection, there is an intermediate ſtate, in which the departed ſouls of good men are ſuppoſed to have an imperfect reward, and the ſouls of the wicked an imperfect puniſhment; but that every one, at the period of the reunion of the ſoul and body and of final judgment, will receive a full and complete recompence for the deeds done in the body.

In proof of this opinion, they alledge a variety of paſſages both from the Old and New Teſtament, the principal of which we ſhall here enumerate; ſeveral of which they think cannot be conſiſtently explained on the other hypotheſis. Gen. ii. 7. xv. 15. xxxvii. 35. Exod. iii. 6. 1 Sam. xxviii. 11.—19. 1 Kings xvii. 21, 22. Pſ. xxxi. 5. Eccleſ. iii. 21. xii. 7. Mat. x. 28. xvii. 3. Luke xvi. 19. xx. 38. xxiii. 43. xxiv. 39. Acts i. 25. vii. 59. 2 Cor. v. 8. xii. 2. Phil. i. 21.—24. 1 Pet. iii. 19. iv. 6. Heb. xi. 40. xii. 23. Rev. vi. 9. 10. xiv. 13.

To theſe authorities of Scripture, they add the teſtimony of the fathers of the church, who lived in or near the times of the apoſtles, who are ſaid to be unanimous in this opinion, and perſuaded that the ſoul of every man upon the diſſolution of the body died not, but had a proper place to go to, and that accordingly this doctrine is to be found in the moſt ancient Chriſtian liturgies.

Great ſtreſs has been laid, in this controverſy, on the meaning of the term death, as it occurs in Scripture, and particularly in the ſentence denounced againſt the firſt parent of the human race. The biſhop of Carliſle obſerves, that the word *death*, in its original and obvious ſenſe, implies a ceſſation of all natural life, or a real diſſolution and deſtruction of the whole man. But Mr. Farmer, a well known and excellent writer, in the introduction to his learned work of the General Prevalence of the Worſhip of Human Spirits, &c. 1783, has taken ſome pains to aſcertain the meaning of the word death, in the threatening denounced againſt Adam. To this purpoſe, he ſays, that if human ſpirits were worſhipped in the age of Moſes, particularly in Egypt and Phœnicia, the word death could not at that time, and in thoſe countries, denote more than the deſtruction of bodily life; for, if this term had farther included in it the inſenſibility or extinction of the ſoul, the dead would not have been honoured as gods. And if Moſes had uſed it in this extenſive ſenſe, he would have been miſunderſtood by the Egyptians, who aſſerted the immortality of the ſoul, and by the Hebrews, who dwelt among them, and had adopted their ſyſtem of religion.

This learned writer, in confirmation of this interpretation of death, obſerves, that, although one great deſign of Moſes in giving an account of the introduction of death into the world, was to guard againſt the worſhip of departed ſpirits, and though nothing could have anſwered this deſign more effectually than repreſenting the ſoul of Adam as a mere quality, or as the reſult of the peculiar ſtructure and organization of his body, yet, ſo far is he from ſuppoſing this to be the caſe, that according to him, after the body of the firſt man was perfectly organized by the immediate hand of the Almighty, he did not become a living ſoul or perſon, till God breathed into his noſtrils the breath of life; a principle diſtinct from the duſt out of which his body was formed, and, therefore, capable of ſubſiſting in a ſtate of ſeparation from it. Nor does Moſes uſe the ſame language in relating the formation of any other living creatures; which proves that the principle of life in man is of a ſuperior kind to that in brutes.

Beſides, the ancient patriarchs did not believe that the ſoul of man periſhed with his body. Agreeably to the moſt ancient opinion concerning departed ſpirits, the ſacred writers ſuppoſed the ſouls of the dead to exiſt in *ſheol*, or *hades*, a place inviſible to human ſight, and that, in the diſtribution of them, regard was had to the former relation in which they ſtood to one another. Moreover, Moſes himſelf believed the ſeparate ſubſiſtence of the ſoul, and has even given it a divine ſanction. Gen. xv. 15.

Nor do any of the ſacred writers ever deſcribe death in terms different from thoſe uſed by perſons, who certainly acknowledged the continuance of the ſoul after it.

Sleep, by which it is deſcribed, is not a ſtate of non-exiſtence, but of reſt; and it is well known, that this ſoft image of death was commonly uſed to expreſs the thing itſelf by thoſe who aſſerted the exiſtence of ſouls in hades. Silence, oblivion, darkneſs, and corruption, by which the ſtate of the dead is deſcribed, refer only to the body, or to the ſuppoſed ſtate of the ſoul while it was in ſheol, and are not peculiar to the ſacred writers, but were common in all countries, where both the popular belief, and the eſtabliſhed worſhip, were inconſiſtent with the notion of the ſoul's periſhing with the body.

And many of the terms, by which death was deſcribed in all countries, clearly imply, and are built upon, a belief of the diſtinction between ſoul and body, and of their being ſeparated at death.

According to the Greeks, to die was to depart, to go away; and the writers of the New Teſtament deſcribe death by a departure, Luke ix. 31. that is, of the ſoul from the body to another ſtate. To all which it may be added, that the Jews, from the time of their return from Babylon, aſſerted the ſeparate exiſtence of the ſoul after death; as appears from their imitation of the heathen idolatry, from their evocation of the dead, and from the early references in Scripture to the receptacle of departed ſouls, and many other proofs. This was the opinion, not only of a few eminent individuals, ſuch as Philo, but of the learned ſects, the Eſſenes, and Phariſees, and of the whole body of the people, almoſt without exception, in the time of our Saviour. To this principle the Phariſees, whoſe doctrine formed the popular creed, added another, viz. the reſurrection of the dead. The Sadducees believed the extinction of the ſoul at death, and did not admit the reſurrection: the Phariſees, on the other hand, admitted the latter and denied the former. By the term reviviſcence, or return to life, by which the reſurrection is deſcribed, the Jews could not mean creating anew the ſoul that had been deſtroyed, becauſe, if it were poſſible, they did not allow that the former ſoul periſhed at death. Nor did they believe, that man had no ſoul; and, therefore, that his reſurrection conſiſted in the re-organization of his former body, or in furniſhing him with a new body, organized as that was; becauſe this is a flat contradiction to their belief of the diſtinction between ſoul and body, and the ſeparate exiſtence of the former. What then did they, or could they mean by the reſurrection to life, but the reſtoration of that kind of life which they had loſt, by the reunion of their ſouls to a human body, either the ſame which they had before, or one in effect the ſame? In virtue of this reunion, the *dead* man became a *living* man, the ſame as he was before he died, with the ſame conſciouſneſs and recollection, the principle of conſciouſneſs having never periſhed. And if, in or near the time of Chriſt, the terms reſurrection, reviviſcence, or living again, as uſed both by Jews and Gentiles, denoted the reunion of a ſoul to a human body, the ſame terms, when adopted by Chriſt and his apoſtles, muſt have the ſame meaning: and every one would underſtand them in their common and ordinary ſignification. Conſequently, if life, as expreſſing the reſurrection, ſignifies the ſoul's return to a human body, death its oppoſite, denotes its ſeparation; both terms imply the continuance of the ſoul after death: a principle, ſays Mr. Farmer, held in the moſt ancient times, by Heathens and Jews, by patriarchs and prophets, and by the people, particularly in the times of Moſes and the Meſſiah, and which gives great probability to the doctrine of a reſurrection.

The advocates of the *ſleep of the ſoul*, on the other hand, earneſtly contend, that it was the opinion of the apoſtles and early Chriſtians, that, whatever be the nature of the ſoul, its percipient and thinking powers ceaſe at death; and that they had no hope of the reſtoration of thoſe powers, but in the general reſurrection of the dead.

Before the council of Florence, held in 1439, under pope Eugenius IV. the ancient doctrine, both of the Greek and Latin churches, is ſaid to have been, that the ſouls of the ſaints were in *abditis receptaculis*, or in *exterioribus atriis*, where they expected the reſurrection of their bodies, and the glorification of their ſouls; and though the fathers believed all of them to be happy, yet they did not think they would enjoy the beatific viſion before the reſurrection. But in this council it was decreed, that the ſouls of thoſe, who, after baptiſm, have incurred no ſtain of ſin, and alſo thoſe ſouls, which having contracted the ſtain of ſin, whether in their bodies or diveſted of their bodies, have been purged by the ſacrifice of the maſs, prayer, and alms, are received into heaven immediately, &c.

In the Lateran council, held under Leo X. in 1513, it was decreed, that the ſoul is not only truly, and of itſelf, and eſſentially the form of the human body, as is expreſſed in the canon of pope Clement V. publiſhed in the general council of Vienne, but likewiſe immortal, and according to the number of bodies into which it is infuſed, is ſingularly multipliable, multiplied, and to be multiplied.

However, Peter Pomponatius, a philoſopher of Mantua, publiſhed a book in 1516, on the immortality of the ſoul, in which, after ſtating the moral arguments againſt the mortality of the ſoul, and endeavouring to ſhew that they are weak and inconcluſive, infers upon the whole, that the immortality of the ſoul, being a problematical queſtion, we can have no aſſurance of it but from revelation, and that they who would build immortality upon any other foundation, only verify the character given to certain ſelf-ſufficient reaſoners by the apoſtle, viz. profeſſing themſelves wiſe, they became fools.

In 1520, Luther, in the defence of his propoſitions, which had been condemned by a bull of Leo X. ranks the natural immortality of the ſoul among the monſtrous opinions of popery; and he afterwards made uſe of the doctrine of the *ſleep of the ſoul* as a confutation of purgatory and ſaint-worſhip, and he is ſaid to have continued in that belief to the laſt moment of his life.

William Tyndall alſo, the famous tranſlator of the Bible into Engliſh, in defending Luther's doctrine againſt ſir Thomas More's objections, conſiders the *ſleep of the ſoul* as the doctrine of the proteſtants in his time, and founded on the Scriptures: though in conſequence of the oppoſition given to this doctrine by Calvin, in his Pſychopannychia, publiſhed in 1534, and the turn hereby given to the ſentiments of the Reformed in general, he ſeems to have recanted his opinion. Calvin, however, ſeems to have been embarraſſed with the ſouls of the wicked, and ſays, he would only be reſponſible for the faithful.

The firſt expreſs condemnation of the doctrine of the *ſleep of the ſoul*, in a proteſtant confeſſion, occurs in the fortieth of king Edward's Articles, compoſed in 1552.

After the long prevalence of the doctrine of the intermediate ſtate, that of the *ſleep of the ſoul* has of late years been revived, and as one of its zealous advocates affirms, gains ground, not ſo much from conſiderations of philoſophy, as from a cloſer attention to the ſenſe of the Scriptures.

We ſhall cloſe this article with obſerving, that a ſingular hypotheſis was advanced a few years ago by Dr. Caleb Fleming, and of late vindicated by an anonymous writer; and this is, that the reſurrection takes place immediately after death. On this ſubject ſee Law's Appendix and Poſtſcript to his Conſiderations on the Theory of Religion, &c. 1774. Hiſtorical View of the Controverſy concerning an intermediate State, &c. 1772. Prieſtley's Diſquiſitions on Matter and Spirit, 1777. Correſpondence between Dr. Price and Dr. Prieſtley, 1778, and the publications of Steffe, Warburton, Goddard, Coward, Peckard, Jortin, &c. on both ſides of the queſtion, cited by the author of the Hiſtorical View, &c. Fleming's Search after Souls.

SLEEPERS, in *Natural Hiſtory*, a name given to ſome animals which ſleep all the winter: ſuch as bears, marmotes, dormice, bats, hedge-hogs, &c. Theſe do not feed in winter, have no ſenſible evacuations, breathe little, or not at all, and moſt of the viſcera ceaſe from their functions. Some of theſe creatures ſeem to be dead, and others to return to a ſtate like unto that of the fœtus before birth. In this condition they continue, till by length of time maturating the proceſs, or by new heat, the fluids are attenuated, the ſolids ſtimulated, and the functions begin where they left off. See Dr. Stevenſon in Med. Eſſ. Edinb. vol. v. art. 77. See Migration.

Sleeper, in *Building*, a name uſed for the oblique rafter, that lies in a gutter.

Sleepers, in the *Glaſs Trade*, are the large iron bars croſſing the ſmaller ones, and hindering the paſſage of the coals, but leaving room for the aſhes,

Sleepers, in the *Military Art*. See Platform.

Sleepers, in a *Ship*, a name formerly given by ſhipwrights to the thick ſtuff placed longitudinally in a ſhip's hold, oppoſite to the ſeveral ſcarfs of the timbers. It is now properly applied to the knees which connect the tranſoms to the after-timbers on the ſhip's quarter. Falconer.

SLEETS, in *Gunnery*, are the parts of a mortar, paſſing from the chamber to the trunnions, for ſtrengthening that part.

SLEEVE, *Hippocrates's*. See Hippocrates.

SLICH, in *Metallurgy*, the ore of any metal, particularly of gold, when it has been pounded, and prepared for farther working.

The manner of preparing the *ſlich* at Chremnitz, in Hungary, is this; they lay a foundation of wood three yards deep, upon this they place the ore, and over this there are four and twenty beams, armed at their bottoms with iron; theſe, by a continual motion, beat and grind the ore, till they reduce it to powder: during all this operation, the ore is covered with water. There are four wheels uſed to move theſe beams, each wheel moving ſix; and the water, as it runs off, carrying ſome of the metalline particles with it, is received into ſeveral baſons, one placed behind another; and finally, after having paſſed through them all, and depoſited ſome ſediment in each, it is let off into a very large pit, of almoſt half an acre of ground; in this it is ſuffered to ſtand ſo long, as to depoſit all its ſediment, of whatever kind, and after this it is let out. This work is carried on day and night, and the ore taken away, and replaced by more, as often as occaſion requires. That ore which lies next the beams, where it was pounded, is always the cleaneſt or richeſt.

When the *ſlich* is waſhed as much as they can, a hundred weight of it uſually contains about an ounce, or perhaps but half an ounce of metal; which is not all gold, for there is always a mixture of gold and ſilver, but the gold is in the largeſt quantity, and uſually is two thirds of the mixture: they then put the *ſlich* into a furnace with ſome lime-ſtone, and ſlaken, or the ſcoria of former meltings, and run them together. The firſt melting produces a ſubſtance, called *lech*; this lech they burn with charcoal, to make it lighter, to open its body, and render it porous, after which it is called *roſt*; to this roſt they add ſand in ſuch quantity as they find neceſſary, and then melt it over again.

They have at Chremnitz many other ways of reducing gold out of its ore, but particularly one, in which they employ no lead during the whole operation; whereas, in general, lead is always neceſſary, after the before mentioned proceſſes. See Gold.

SLIDING, in *Mechanics*, *ſuperinceſſus radens*, is, when the ſame point of a body, moving along a ſurface, deſcribes a line on that ſurface.

Such is the motion of a parallelepiped, protruded along a plane.

Sliding *rule*, a mathematical inſtrument, ſerving to work queſtions in gauging, meaſuring, &c. without the uſe of compaſſes; merely by the *ſliding* of the parts of the inſtrument one by another, the lines and diviſions whereof give the anſwer, by inſpection.

This inſtrument is variouſly contrived, and applied by various authors, particularly Everard, Coggeſhall, Gunter, Hunt, and Partridge; but the moſt uſual and uſeful ones, are thoſe of Everard and Coggeſhall; the deſcription and uſes whereof are as follow:

Sliding *rule*, *Everard's*, is principally uſed in gauging; being ordinarily made of box, a foot long, an inch broad, and $\frac{6}{10}$ of an inch think. It conſiſts of three parts: a rule, on each ſide whereof, *a b*, and *c d* (*Tab.* III. *Surveying fig.* 51.) is a groove, and two ſmall ſcales, or *ſliding* pieces, *m*, *n*, *ſlide* in the grooves. When both theſe pieces are drawn out to their full extent, the inſtrument is three feet long.

On the firſt broad face of the inſtrument *a b*, are four lines of numbers; for the properties, &c. whereof, ſee Gunter's *line*. The firſt, marked A, conſiſting of two radiuſes numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, 1; and then 2, 3, 4, 5, &c. to 10. On this line are four braſs centre-pins, two in each radius; one in each whereof is marked M B, to ſignify that the number it is ſet againſt, 2150.42, is the number of cubic inches in a malt-buſhel; the other two are marked with A, to ſignify that the numbers they are ſet againſt, viz. 282, are the cubic inches in an ale-gallon. The ſecond and third lines of numbers are on the *ſliding* pieces, and are exactly the ſame with the firſt. They are diſtinguiſhed by the letter B. Cloſe to the figure 7, in the firſt radius, is a dot marked *S i*, ſet exactly over .707, denoting .707 to be the ſide of a ſquare inſcribed in a circle, whoſe diameter is unity. Cloſe to 9 is another dot, marked *S e*, ſet over .886, which is the ſide of a ſquare equal to the area of a circle, whoſe diameter is unity. Another dot, nigh W, is ſet over 231, the number of cubic inches in a wine-gallon; and another near C, is ſet over 3.14 the circumference of a circle, whoſe diameter is unity. The fourth line of numbers, marked M D, to ſignify *malt depth*, is a broken line of two radiuſes, numbered 2, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 9, 8, 7, &c. the number 1 being ſet directly againſt M B on the firſt radius.

On the ſecond broad face, marked *c d*, are 1°, A line of numbers of one radius, numbered 1, 2, 3, &c. to 10, noted by the letter D. On this are four centre-pins; the firſt, marked W G, is the gauge-point for a wine gallon, i. e. the diameter of a cylinder, whoſe height is an inch, and content 231 cubic inches, or a wine-gallon, which is 17.15 inches: the ſecond centre-pin A G ſtands at the guage-point for an ale-gallon, which is 18.95 inches. The third M S ſtands at 46.3 the ſide of a ſquare, whoſe content is equal to the inches in a ſolid buſhel. The fourth M R is the gauge-point for a malt-buſhel, which is 52.32 inches. 2°, Two lines of numbers on the *ſliding* piece, which are exactly the ſame as thoſe on the *ſliding* piece on the otherſide, called C. Cloſe to the diviſion 8 is a dot marked *c*, which is ſet to .795, the area of a circle whoſe circumference is unity; and another, marked *d*, ſtands at .785, the area of a circle, whoſe diameter is unity. 3°, Two lines of ſegments, each numbered 1, 2, 3, to 100; the firſt, for finding the ullage of a caſk, taken as the middle fruſtum of a ſpheroid, lying with its axis parallel to the horizon; and the other for finding the ullage of a caſk ſtanding.

Again, on one of the narrow ſides, noted *e*, are 1°, A line of inches, numbered 1, 2, 3, &c. to 12, each ſubdivided into ten equal parts. 2°, A line, by which, with that of inches, we find a mean diameter for a caſk, in the figure of the middle fruſtum of a ſpheroid: it is numbered 1, 2, 3, &c. to 7, and marked *ſpheroid*. 3°, A line for finding the mean diameter of a caſk, in the figure of the middle fruſtum of a parabolic ſpindle, which gaugers call the *ſecond variety of caſks*; it is numbered 1, 2, 3, &c. and noted *ſecond variety*. 4°, A line, by which we find the mean diameter of a caſk of the third variety, i. e. of a caſk in the figure of two parabolic conoids, abutting on a common baſe; it is numbered 1, 2, 3, &c. and noted *third variety*.

On the other narrow face, marked *f*, are 1°, A foot divided into 100 equal parts, marked F M. 2°, A line of inches, like that before mentioned, noted I M. 3°, A line for finding the mean diameter of a fourth variety of caſks, which is the middle fruſtum of two cones, abutting on a common baſe. It is numbered 1, 2, 3, &c. and noted F C, ſignifying fruſtum of a cone.

On the backſide of the two *ſliding* pieces are a line of inches, from 13 to 36, when the two pieces are put endwiſe; and againſt that, the correſpondent gallons, or hundred parts, that any ſmall tub, or the like open veſſel (from 13 to 36 inches diameter), will contain at one inch deep.

Mr. Overley, and other writers on this ſubject, have ſuggeſted ſome improvements in the conſtruction of this inſtrument. See Overley's Young Gauger's Inſtructor, p. 108.

Sliding *rule*, *uſe of Everard's*. 1°, To multiply one number by another. Suppoſe 4 required to be multiplied by 6: ſet 1 on the line of numbers B, to 4 on the line A; then, againſt 6 upon B is 24, the product ſought upon A. Again, to multiply 26 by 68, ſet 1 on B to 26 on A; then, againſt 68 on B is 1768 on A, the product ſought.

2°, To divide one number by another. Suppoſe 24 to be divided by 4: ſet 4 on B to 1 on A; then againſt 24 on B is 6 on A, which is the quotient. Again, to divide 952 by 14; ſet 14 on A to 1 on B, and againſt 952 on A you have, on B, 68, which is the quotient.

3°, To work the rule of three. If 8 gives 20, what will 22 give? ſet 8 on B to 20 on A, then againſt 22 on B ſtands 55 on A, the number ſought.

4°, To find a mean proportional between two numbers, ſuppoſe between 50 and 72: ſet 50 on C to 72 on D; then againſt 72 on C you have 60 on D, which is the mean required.

5°, To extract the ſquare root of a number. Apply the lines C and D to one another, ſo that 10 at the end of D be even with 10 at the end of C; then are theſe two lines a table, ſhewing the ſquare root of any number leſs than 1000000 by inſpection: for againſt any number on C, the number anſwering to it on D, is the ſquare root thereof. Note, if the given number conſiſts of 1, 3, 5, or 7 places of integers, ſeek it on the firſt radius, on the line C, and againſt it is the root required at D.

6°, Either the diameter or circumference of a circle being given, to find the other. Set 1 on the line A againſt 3.141 (to which is written C), on the line B; and againſt any diameter on the line A, you have the circumference on B, and contrariwiſe: thus, the diameter being 20 inches, the circumference will be 62.831 inches; and the circumference being 94.247, the diameter will be 30.

7°, The diameter of a circle given, to find the area in inches, or in ale or wine gallons. Suppoſe the diameter 20 inches, what is the area? ſet 1 upon D, to .785 (noted *d)* on C; then againſt 20 on D is 314.159 the area required. Now to find that circle's area in ale-gallons, ſet 18.95 (marked A G) upon D, to 1 on C; then againſt the diameter 20 upon D, is the number of ale-gallons on C, viz. 1.11. The ſame may ſerve for wine-gallons, regard being only had to the proper gauge-point.

8°, The two diameters of an ellipſis being given, to find the area in ale-gallons. Suppoſe the tranſverſe diameter 72 inches, and the conjugate 50; ſet 359.05 the ſquare of the gauge-point on B, to one of the diameters (ſuppoſe 50) on A; then againſt the other diameter 72 on B, you will have the area on A, viz. 10.02 gallons, the content of this ellipſis at one inch deep. The like may be done for wine-gallons, if inſtead of 359.05 you uſe 249.11 the ſquare of the guage-point for wine-gallons.

9°, To find the area of a triangular ſurface in ale-gallons. Suppoſe the baſe of the triangle 260 inches, and the perpendicular let fall from the oppoſite angle 110 inches; ſet 282 (marked A) upon B to 130, half the baſe on A; then againſt 110 on B is 50.7 gallons on A.

10°, To find the content of an oblong in ale-gallons. Suppoſe one ſide 130 inches, and the other 180; ſet 282 on B to 180 on A; then againſt 130 upon B is 82.97 ale-gallons, the area required.

11°, To find the content of a regular polygon in ale-gallons, one of the ſides being given. Find the length of the perpendicular let fall from the centre to one of the ſides: this multiplied by half the ſum of the ſides, gives the area. For an inſtance; ſuppoſe a pentagon, whoſe ſide is 1 inch, here the perpendicular will be found .837, by ſaying, as the ſine of half the angle at the centre, which in this polygon is 36°, is to half the given ſide .5, ſo is the ſine of the complement of 36°, viz. 54°, to the perpendicular aforeſaid. Whence the area of a pentagon, whoſe ſide is unity, will be found 1.72 inches, which divided by 282, gives .0061, the ale-gallons in that polygon.

12°, To find the content of a cylinder in ale-gallons. Suppoſe the diameter of the baſe of the cylinder 120 inches, the perpendicular height 36 inches: ſet therefore the gauge-point (A G) to the height 36 on C; then againſt 120, the diameter on D, is found 1443.6, the content in ale-gallons.

13°, The bung and head diameters of any caſk, together with its length, being given; to find its content in ale or wine-gallons. 1°, Suppoſe the length of a caſk taken (as the middle fruſtum of a ſpheroid, which is the firſt caſe or variety) be 40 inches, its head diameter 24 inches, and bung diameter 32 inches: ſubtract the head diameter from that of the bung, the difference is 8. Look, then, for 8 inches on the line of inches, on the firſt narrow face of the rule; and againſt it, on the line *ſpheroid* ſtands 5.6 inches, which, added to the head-diameter 24, gives 29.6 inches for that caſk's mean diameter: ſet therefore the gauge-point for ale (marked A G) on D, to 40 on C; and againſt 29.6 on D, is 97.45, the content of the caſk in ale-gallons. If the gauge-point for wine (marked W G) be uſed inſtead of that for ale; you will have the veſſel's content in wine-gallons.

2°, If a caſk, of the ſame dimenſions as the former, be taken (as the middle fruſtum of a parabolic ſpindle, which is the *ſecond variety*), ſee what inches, and parts, on the line marked ſecond variety, ſtand againſt the difference of the bung and head diameters, which in this example is 8; and you will find 5.1 inches, which added to 24, the head diameter, makes 29.1 inches, the mean diameter of the caſk: ſet therefore the rule, as before, and againſt 29.1 inches, you will have 94.12 ale-gallons for the content of the caſk.

3°, If the caſk taken be the middle fruſtum of two parabolic conoids, which is the third variety; againſt 8 inches, the difference of the head and bung diameters, on the line of inches, you will find 4.57 inches on the line called *third variety*; this added as before to 24, gives 28.57 for the caſk's mean diameter; proceeding as before, you will find the content 90.8 gallons.

4°, If the caſk taken be the fruſtums of two cones, which is the *fourth variety*, againſt 8 inches on the line of inches, you will find on the line marked F C, 4.1 inches to be added to 24 inches: the reſt, carried on as before, gives the content of the caſk 87.93 ale-gallons.

14°, A caſk partly empty, lying with its axis parallel to the horizon; to find the quantity of liquor therein. Find its whole content as above; which ſuppoſe 97.455 gallons, and ſuppoſe the inches left dry, 8, and the bung diameter 32: then, as the bung diameter on C is to 100 on the line of ſegments L, ſo are the dry inches on C to a fourth number on the line of ſegments: and as 100 upon B is to the caſk's whole content on A, ſo is that fourth number to the liquor wanting to fill up the caſk, which, ſubtracted from the whole content of the caſk, gives the liquor remaining therein, e. gr. ſet 32, the bung diameter on C to 100 on the ſegment line L, then againſt 8, the dry inches on C, ſtands 17.6 on the ſegment line: ſet, therefore, 100 on B to the caſk's whole content on A; and againſt 17.6 on B, you have 16.5 gallons on A: ſubtracting therefore the ſaid gallons from 97.45, the veſſel's whole content, the liquor in the caſk will be 80.95 gallons.

15°, A caſk ſtanding upright, or with its axis perpendicular to the horizon, to find the liquor therein. Suppoſe the length of the caſk 40 inches, and 10 of them dry; ſet 40 inches on the line C, to 100 on the ſegment line S; and againſt 10, the dry inches on the line C, ſtands 24.2 on S, the ſegment line. Set, then, 100 on B, to 97.455, the caſk's whole content on A; and againſt 24.2 on B, you will have 23.5 gallons, which is what is wanting to fill up the caſk: this, therefore, ſubtracted from the whole content 97.455, gives 73.955 gallons, for the quantity of liquor remaining in the caſk.

16°, To find the content of any right-angled parallelepiped (*e. gr.* a ciſtern, uting-fat, or the like) in malt buſhels. Suppoſe the length of the baſe 80 inches, the breadth 50, and depth 9 inches: ſet the breadth 50 on B, to the depth 9 on C; then againſt the length 80 on A, ſtand 16.8 buſhels on B, the number required.

SLIDING *rule, Coggeſhal's*, is principally uſed in meaſuring of the ſuperficies and ſolidity of timber, &c.

It conſiſts of two rulers, each a foot long, which are framed or put together, various ways: ſometimes they are made to *ſlide* by one another, like glaziers rules: ſometimes a groove is made in the ſide of a common two-foot joint rule, and a thin *ſliding* piece put in, and Coggeſhal's lines added on that ſide: but the moſt uſual and commodious way is, to have one of the rulers *ſlide* in a groove made along the middle of the other, as it is repreſented in *Tab.* III. *Surveying*, *fig.* 52.

On the *ſliding* ſide of the rule are four lines of numbers, three whereof are double, that is, are lines to two radiuſes, and one, a ſingle broken line of numbers: the three firſt, marked A, B, C, are figured, 1, 2, 3, &c. to 9; then 1, 2, 3, &c. to 10. Their conſtruction, uſe, &c. are the ſame as thoſe on Everard's *ſliding* rule. The ſingle line, called the *girt-line*, and noted D, whoſe radius is equal to the two radiuſes of any of the other lines, is broken for the eaſier meaſuring of timber, and figured 4, 5, 6, 7, 8, 9, 10, 20, 30, &c. from 4 to 5. It is divided into ten parts, and each tenth ſubdivided into 2, and ſo on from 5 to 10, &c.

On the backſide of the rule, are, 1°, A line of inch meaſure, from 1 to 12; each inch being divided and ſubdivided.

2°, A line of foot-meaſure; conſiſting of one foot, divided into 100 equal parts, and figured 10, 20, 30, &c. The backſide of the *ſliding* piece is divided into inches, halves, &c, and figured from 12 to 24; ſo that when ſlid out, there may be a meaſure of two feet.

SLIDING *rule, in meaſuring plain ſuperficies, uſe of Coggeſhall's*. 1. To meaſure a ſquare. Suppoſe, e. gr. the ſides be each five feet: ſet 1 on the line B, to 5 on the line A; then againſt 5 on the line B, is 25 feet, the content of the ſquare on the line A.

2. To meaſure a long ſquare. Suppoſe the longeſt ſide 18 feet, and the ſhorteſt 10: ſet 1 on the line B, to 10 on the line A; then againſt 18 feet, on the line B, is 180 feet, the content on the line A.

3. To meaſure a rhombus. Suppoſe the ſide 12 feet, and the length of a perpendicular let fall from one of the obtuſe angles to the oppoſite ſide, 9 feet: ſet 1, on the line B, to 12, the length of the ſide, on the line A; then againſt 9, the length of the perpendicular on the line B, is 108 feet, the content.

4. To meaſure a triangle. Suppoſe the baſe 7 feet, and the length of the perpendicular let fall from the oppoſite angle to the baſe 4 feet; ſet 1 on the line B, to 7 on the line A: then againſt half the perpendicular, which is 2, on the line B, is 14 on the line A, for the content of the triangle.

5. To find the content of a circle, its diameter being given. Suppoſe the diameter 3.5 feet: ſet 11 on the girt-line D, to 95 on the line C; then againſt 3.5 feet. on D is 9.6 on C, which is the content of the circle in feet.

6. To find the content of an oval or ellipſis. Suppoſe the longeſt diameter 9 feet, and the ſhorteſt 4. Find a mean proportional between the two, by ſetting the greater 9 on the girt line, to 9 on the line C, then, againſt the leſs number 4, on the line C, is 6; the mean proportional ſought. This done, find the content of a circle, whoſe diameter is 6 feet; this, when found, by the laſt article, will be equal to the content of the ellipſis ſought.

Sliding *rule, in meaſuring timber, uſe of Coggeſhall's.*

1°, To meaſure timber the uſual way. Take the length in feet, half feet, and, if required, quarters; then meaſure half-way back again; there girt the tree with a ſmall cord or line; double this line twice, very evenly; and meaſure this fourth part of the girt or perimeter, in inches, halves, and quarters. The dimenſions thus taken, the timber is to be meaſured as if ſquare, and the fourth of the girt taken for the ſide of the ſquare, thus; ſet 12 on the girt-line D, to the length in feet on the line C; then againſt the ſide of the ſquare, on the girt-line D, taken in inches, you have, on the line C, the content of the tree in feet.

For an inſtance: ſuppoſe the girt of a tree, in the middle, be 60 inches, and the length 30 feet, to find the content: ſet 12 on the girt-line D, to 30 feet on the line C; then againſt 15, one fourth of 60, on the girt-line D, is 46.8 feet; the content on the line C. If the length ſhould be 9 inches, and the quarter of the girt 35 inches, here, as the length is leſs than a foot, meaſure it on the line of foot-meaſure, and ſee what decimal part of a foot it makes, which you will find .75: ſet 12, therefore, on the girt-line to 75 on the firſt radius of the line C, and againſt 35 on the girt-line is 6.4 feet on C, for the content.

2°, To meaſure round timber the true way. The former method, though that generally in uſe, is not quite juſt. To meaſure timber accurately, inſtead of the point 12 on the girt-line, uſe another, viz. 10.635; at which there ſhould be placed a centre pin. This 10.635 is the ſide of a ſquare equal to a circle, whoſe diameter is 12 inches. For an inſtance: ſuppoſe the length 15 feet, and ¼ of the girt 42 inches: ſet the point 10.635 to 15 the length; then againſt 42 on the girt-line is 233 feet for the content ſought; whereas, by the common way, there ariſes only 184 feet. In effect, the common meaſure is only to the true meaſure, as 11 to 14. See Timber.

3°, To meaſure a cube. Suppoſe the ſides to be 6 feet each; ſet 12 on the girt-line D, to 6 on C; then againſt 72 inches (the inches in 6 feet) on the girt-line, is 216 feet on C, which is the content required.

4°, To meaſure unequally ſquared timber; that is, where the breadth and depth are not equal. Meaſure the length of the piece, and the breadth and depth (at the end) in inches; then find a mean proportional between the breadth and depth of the piece. This mean proportional is the ſide of a ſquare, equal to the end of the piece: which found, the piece may be meaſured as ſquare timber. For an inſtance: let the length of the piece of timber be 13 feet; the breadth 23 inches, and the depth 13 inches: ſet 23 on the girt-line D, to 23 on C; then againſt 13 on C is 17.35 on the girt-line D, for the mean proportional. Again, ſetting 12 on the girt-line D, to 13 feet, the length on the line C, againſt 17.35, on the girt-line is 27 feet, the content.

5°, To meaſure taper timber. The length being meaſured in feet, note one third of it; which is found thus: ſet 3 on the line A, to the length on the line B; then againſt 1 on A is the third part on B: then if the ſolid be round, meaſure the diameter at each end in inches, and ſubtract the leſs diameter from the greater; add half the difference to the leſs diameter; the ſum is the diameter in the middle of the piece. Then ſet 13.54 on the girt-line D to the length on the line C, and againſt the diameter in the middle, on the girt-line, is a fourth number on the line C. Again, ſet 13.54 on the girt-line to the third part of the length on the line C; then againſt half the difference on the girt-line, is another fourth number on the line C: theſe two fourth numbers, added together, give the content. For an inſtance: let the length be 27 feet (one third whereof is 9), the greater diameter 22 inches, and the leſs 18; the ſum of the two will be 40, their difference 4, and half the difference 2, which, added to the leſs diameter, gives 20 inches for the diameter in the middle of the piece. Now, ſet 13.54 on the girt-line, to 27 on the line C, and againſt 20 on D is 58.9 feet. Again, ſet 13.54 of the girt-line to 9 on the line C; and againſt 2 on the girt-line (repreſented by 20) is .196 parts; therefore, by adding 58.9 feet to .196 feet, the ſum is 59.096 feet the content.

If the timber be ſquare, and has the ſame dimenſions; that is, the length 27 feet, the ſide of the greater end 22 inches, and that of the leſſer 18 inches; to find the content; ſet 12 on the girt-line to 27, the length on the line C; and againſt twenty inches, the ſide of the mean ſquare on the girt-line, is 75.4 feet. Again, ſet 12 on the girt-line to 9 feet, one third of the length, on the line C, and againſt 2 inches, half the difference of the ſides of the ſquares of the ends on the girt-line, is .25 parts of a foot: both together make 75.65 feet, the content of the ſolid.

The girt or circumference of a tree, or round piece of timber, given; to find the ſide of the ſquare within, or the number of inches of a ſide, when the round timber is ſquared. Set 10 on A to 9 on B; then againſt the girt on A are the inches for the ſide of the ſquare on the line B. See Dendrometer.

SLING, *funda*, a ſtring inſtrument, ſerving for the caſting of ſtones with the greater violence.

Pliny, l. lxxvi. c. 5. attributes the invention of the *ſling* to the Phœnicians; but Vegetius aſcribes it to the inhabitants of the Balearic iſlands, who were famous in antiquity, for the dextrous management thereof. Florus and Strabo ſay, thoſe people bore three kinds of *ſlings*; ſome longer, others ſhorter, which they uſed according as their enemies were nearer or more remote. Diodorus adds, that the firſt ſerved them for a head-band, the ſecond for a girdle, and that the third they conſtantly carried with them in their hand.

SLINGING is uſed variouſly at ſea; but chiefly for the hoiſting up caſks, or other heavy things, with ſlings, i.e. contrivances of ropes ſpliced into themſelves at either end, with one eye big enough to receive the caſk, or other thing to be flung.

There are other *ſlings*, which are made longer, and with a ſmall eye at each end; one of which is put over the breech of a piece of ordnance, and the other eye comes over the end of an iron crow, which is put into the mouth of the piece, to weigh and hoiſe the gun as they pleaſe.

There are alſo *ſlings* for the yards; which is done by binding them faſt to the croſs-tree aloft, and to the head of the maſt, with a ſtrong rope or chain, that if the tie ſhould happen to break, or to be ſhot to pieces in fight, the yard, nevertheleſs, may not fall upon the hatches.

Slinging *a man overboard*, in order to ſtop a leak in a ſhip, is done thus: the man is truſſed up about the middle in a piece of canvas, and a rope to keep him from ſinking, with his arms at liberty, a mallet in one hand, and a plug, wrapped in oakum and well tarred in a tarpawling-clout in the other, which he is to beat with all diſpatch into the hole or leak.

SLIP, among *Ship-Builders*, denotes a place lying with a gradual deſcent on the banks of a river, convenient for *ſhip-building*.

SLIPPER. See Plinth.

Slipper, *lady's*, in *Botany*. See Lady's *ſlipper*.

SLIPPING, among *Gardeners*, the tearing off a ſprig from a branch, or a branch from an arm of the tree. Theſe ſorts of ſlips take root more readily than cuttings.

SLIT *grafting*. See Engrafting.

SLOANEA, *apeiba* of the Braſilians; in *Botany*, the name of a genus of plants, of the *polyandria monogynia* claſs, deſcribed by Linnæus and Plumier, the characters of which are theſe: the calyx is five-leaved and deciduous; the corolla has five petals; the ſtigma is perforated, and the fruit is an echinated, polyſpermous, gaping berry. There are two ſpecies.

SLOATH, or **Sloth**, in *Zoology*, the name of an animal remarkable for its ſlow motion. Of this animal there are two ſpecies. See Bradypus.

The *three-toed ſloth* has a blunt black noſe, a little lengthened; very ſmall external ears; ſmall, black, and heavy eyes, with a duſky line from the corner of each; the colour of the face and throat a dirty white; hair on the limbs, and body long, and very uneven, of a cinereous brown colour, with a black line along the middle of the back; each ſide, about the ſhoulders, is daſhed with ruſt colour; the reſt of the back and limbs ſpotted irregularly with black; the tail ſhort; legs thick, long, and aukwardly placed; the face naked; and three very long claws on each foot. Pennant. See *Tab.* V. *Quadrupeds*, N° 58.

This creature, which grows to the bulk of a middle-ſized fox, is ſo very tedious in all its motions, that it will be three or four days in climbing up, and coming down a tree, and does not go the length of fifty paces upon even ground in a day. It never ſtirs till compelled by hunger: its food is fruit, or the leaves of trees: its motion is attended with a very moving and plaintive cry, ſo that beaſts of prey avoid it with horror.

The ſound of its voice ſeems only to expreſs the word *haii*, for which reaſon the Braſilians call him by that name; but he uſually repeats the ſound about ſix times together, deſcending, as if one ſhould ſing *la*, *ſol*, *fa*, *mi*, *re*, *ut*.

Its look is ſo piteous as to move compaſſion, and accompanied with tears. Whatever he takes hold of, he does it ſo ſtrongly, or rather ſo ſtiffly, that he will ſometimes ſleep ſecurely while he hangs at it.

Cluſius, Margrave, Piſo, and others, have given deſcriptions of this animal, but they none of them mention the length of his fore-feet; which, according to the animal preſerved in the Muſeum of the Royal Society of London, is double that of the hinder pair.

From the ſhag of his body, the ſhape of his legs, and his having little or no tail, as alſo from the ſlowneſs of his gait, and his climbing up trees as little bears uſe to do, he ſeems to come near the bear-kind, from which he differs chiefly in having but three claws upon a foot.

This creature breeds principally in Florida and Braſil. Grew's Muſ. p. 11.

The *two-toed ſloth* has a round head; ſhort projecting noſe; ears like the human; two long ſtrong claws on the fore feet, and three on the hinder; long and rough hair on the body, in ſome parts curled and woolly; in ſome, of a pale red above, and cinereous below, in others of a yellowiſh white below, cinerous brown above; it has no tail. This animal inhabits South America, and the iſland of Ceylon. Pennant.

SLOATS *of a cart*, the under pieces which keep the bottom of the car together.

SLOE, *prunus ſylveſtris*, the Engliſh name for the wild PLUM.

The juice expreſſed from the fruit of the *ſloe*-buſh while unripe, inſpiſſated by a gentle heat to dryneſs is called *German* ACACIA. It differs from the Egyptian moſt remarkably in this property, that it gives out its aſtringency in good meaſure to rectified ſpirit as well as to water, whereas that of the other is not at all diſſoluble in ſpirit.

A conſerve of this fruit is prepared in the ſhops, by mixing the pulp, preſſed out through a ſieve after the *ſloes* have been ſteeped in water over the fire, till they are ſufficiently ſoft without burſting, with thrice its weight of double refined ſugar.

In ſome places, the unripe *ſloes* are dried in an oven, and then fermented with wines or malt liquors for a reſtringent diet drink in alvine and uterine laxities. The bark, both of the branches and roots, is ſaid to be ſucceſsfully given in intermitting fevers, and it has been recommended by ſome as equal to the Peruvian bark. It is apparently a ſtrong ſtyptic. The watery infuſion of the flowers, ſweetened with ſugar, or made into a ſyrup, is ſaid to be a very uſeful purgative for children. Lewis's Mat. Med.

SLOE-*worm*, in *Natural Hiſtory*, the name of an inſect found on the leaves of the *ſloe*, or black thorn, and ſometimes on thoſe of the garden plum.

This and a like worm, found on the leaves of the oak, both remarkable for the hairs which cover them, each of which is forked, or divided into two at the ends, are uſually eſteemed caterpillars, but they are in reality animals of a very different claſs; the caterpillar has, at the utmoſt, but ſixteen legs, theſe have twenty-two, and have all the other characters of that claſs of inſects called by the French naturaliſts *fauſſes chenilles*, or *baſtard caterpillars*.

All the animals of that claſs are very remarkable for the different figure they make after the laſt change of their ſkins, but this is in none ſeen ſo obviouſly, as in theſe two ſpecies; that of the oak is of a greeniſh colour, and its hairs, which are ſo ſtiff that they almoſt deſerve the name of ſpines, are black: that of the *ſloe* is of a greyiſh hue, and its ſpines longer, and of a deep brown; every one of theſe is, toward the extremity, divided into two, in the manner of the tines of a fork. Theſe give the animal a very remarkable figure, and are caſt off with the ſeveral ſkins, while the new ſkins have others in their place; but in the laſt change, before that into the nymph ſtate, the change made in the creature is ſuch, that it could never be ſuſpected to be the ſame animal by any one, who was not an eye-witneſs of the change.

The creature in this, throwing off its ſkin, becomes perfectly ſmooth, and of a dirty yellowiſh colour, with not the lighteſt variegation on it, nor the leaſt appearance even of the remains of the ſpines. In this ſtate it remains till it goes into the nymph ſtate, and from that, after about ſixteen days, it comes out in the ſhape of a four-winged fly. The whole proceſs of the change is the ſame, in the two ſpecies of the oak and the *ſloe*, but the flies they produce are very different. Reaumur's Hiſt. Inſ. vol. ix. p. 119.

SLOOP, in *Sea-Language*, a ſmall veſſel furniſhed with one maſt, the main-ſail of which is attached to a gaff above, to the maſt on its foremoſt edge, and to a long boom below; by which it is occaſionally ſhifted to either quarter.

SLOOP *of war* is a name given to the ſmalleſt veſſels of war, except cutters. They are rigged either as ſhips or ſnows. See RATE.

SLOPING *alley*. See ALLEY.

SLOT, in the *Sportſman's Language*, a term uſed to expreſs the mark of the foot of a ſtag or other creature proper for the chace, in the clay or earth, by which they are able to gueſs how long the creature has been gone by, and which way he went. The *ſlot*, or treading of the ſtag is very nicely ſtudied on this occaſion; if the *ſlot* be large, deep printed in the ground, and with an open cleſt, and, added to theſe marks, there is a large ſpace between mark and mark, it is certain that the ſtag is an old one. If there be obſerved the *ſlots*, or treadings of two, the one long, and the other round, and both of one ſize, the long *ſlot* is always that of the larger beaſt.

There is alſo another way of knowing the old ones from the young ones by the treading; which is, that the hinder feet of the old ones never reach to their fore-feet, whereas thoſe of the young ones do.

Old ſtags alſo are long-jointed, and they never tread double or falſely, as the young ones do, becauſe the tendons, that hold the joints of their feet, are ſtronger; but the feet of the young ones are ſometimes forced, for want of theſe ſtrong ſinews, to turn away double.

It is to be obſerved alſo, that there is a great difference between the *ſlot* of a ſtag or hart, and that of a hind; for there is no hart of the ſecond head ſo young, but that he leaves a larger and wider *ſlot* than the hind, excepting when the hinds are big with young, for on that occaſion their claws will open as wide as thoſe of the hart.

Another method of knowing the age of a ſtag is by his fumets, though ſome general rules are to be known, before any thing can be judged from this article. Theſe are that in April and May they caſt their fumets as it were in cakes, and in June and July they caſt them in thin, long, and large crotels, and from thence to the end of Auguſt they hold the ſame form and ſize; but they are in this laſt month always hard and knotty. In all theſe caſes, the largeſt and longeſt fumets are eſteemed to be the marks of the largeſt and oldeſt ſtags. If they have been diſturbed, or if they have received any hurt, they uſually caſt them ſharp at one end, and dry. This alſo is conſtantly the caſe, when their new horns are juſt grown to their hardneſs, and they rub them againſt the trees to get off the cracked membranes, which were the velvetings in their firſt ſtate.

There is always alſo a difference between the fumets of the morning and thoſe of the evening: thoſe made at night, when they go to relief, are better digeſted, and conſequently moiſter than thoſe made in the morning, becauſe having taken their reſt all day, there is a more perfect digeſtion made than can be in the night, as they are, during that time, ſeeking food.

There are alſo ſeveral other ways of judging of the growth and ſize of a ſtag, as by his carriage, or bearings, according to the huntſman's phraſe; that is, according to the breaking of the tender branches of trees which he makes with his horns in paſſing through. When the boughs are found bruiſed and broken very high, and to a good width, there is no doubt of his being an old one; but this judgment is not to be made in the months of March, April, May, and June, becauſe their horns are at that time either wholly wanting, or they are young and velvety. The height of the creature's entries into the woods is alſo another mark of his ſize, for the old ones are always proud and ſtately, and go in erect, but the young ones will creep.

The older the ſtag is the ſooner he goes to fray, and the larger are the trees he chooſes for this uſe; the young ones go later into it, and always chooſe the weaker and lower trees. Notwithſtanding that, after the ſixth year, the age is not certainly known by the horns, as there is, after this time, no increaſe in the number of their branches, yet a probable gueſs may be made from their being all thicker and more robuſt, and the tops more open.

SLOT, *drawing on the*. See DRAWING.

SLOTH, in *Zoology*. See SLOATH.

SLOUGH, a deep muddy place. The caſt ſkin of a ſnake, the damp of a coal-pit, and the ſcar of a wound, are alſo called by the ſame appellation.

SLOUGH *of a wild boar*, is the bed, ſoil, or mire, wherein he wallows, or in which he lies in the day-time.

SLOUGH-*ſilver*, in *Old Writers*, a rent paid in ſome places in lieu of certain days work in harveſt, heretofore reſerved to the lord from his tenants.

SLOUTH, or SLOUGHT, in *Hunting*, is uſed for a company of ſome ſorts of wild beaſts. As, a *ſlouth* of bears.

SLOW *fevers*. See FEVER.

SLOW *pulſe*. See PULSE.

SLOW-*worm*, the Engliſh name of the *cæcilia*, or *anguis fragilis* of Linnæus, called alſo the *blind-worm*, and by ſome the *deaf adder*, which, in the Linnæan ſyſtem, is a ſpecies of the *anguis* or SNAKE: the *cæcilia* being a diſtinct genus of SERPENTS.

It is diſtinguiſhed from all our ſnakes by its ſmallneſs, and by the ſhape of its tail, which runs out a great way beyond the anus, and yet is blunt and conſiderably thick at the end.

The colour of the back is cinereous, marked with ſmall lines compoſed of minute black ſpecks; the ſides are of a reddiſh caſt; the belly duſky; both marked like the back; the tongue is broad and forky; the teeth ſmall, but numerous, and the ſcales ſmall. It is ſlow in its motion, and inoffenſive in its nature.

Theſe ſnakes lie torpid in the winter, and are ſometimes found in vaſt numbers twined together.

It reſembles the viper in its manner of producing its young, which are brought forth alive.

Dale, from Geſner, gives an account of a theriaca being prepared of this ſerpent and treacle water, for a ſudorific in the plague. James.

SLUDS, a term uſed by the miners in Cornwall for half-roaſted ores.

SLUE, *to*, is to turn any cylindrical or conical piece of timber about its axis, without removing it. This term, in ſea language, is generally applied to the movement by which a maſt or boom is turned about, in its cap or boom-iron.

SLUG. See LIMAX.

SLUICE, a frame of timber, ſtone, or other matter ſerving to retain and raiſe the water of a river, &c. and, on occaſion, to let it paſs.

Such is the *ſluice* of a mill, which ſtops and collects the water of a rivulet, &c. to let it fall, at length, in the greater plenty upon the mill-wheel: ſuch alſo are thoſe uſed as vents or drains to diſcharge water off land. And ſuch are the *ſluices* of Flanders, &c. which ſerve to prevent the waters of the ſea overflowing the lower lands, except when there is occaſion to drown them.

Sometimes there is a kind of canal incloſed between two gates or *ſluices*, in artificial navigations, to ſave the water, and render the paſſage of boats equally eaſy, and ſafe, upwards and downwards: as in the *ſluices* of Briare in France, which are a kind of maſſive walls built parallel to each other, at the diſtance of twenty or twenty-four feet, cloſed with ſtrong gates at each end, between which is a kind of canal, or chamber, conſiderably longer than broad; wherein a veſſel being incloſed, the water is let out at the firſt gate, by which the veſſel is raiſed fifteen or ſixteen feet, and paſſed out of this canal into another much higher. By ſuch means a boat is conveyed out of the Loire into the Seine, though the ground between them riſe above one hundred and fifty feet higher than either of thoſe rivers.

Sluices are made different ways, according to the uſe for which they are intended; when they ſerve for navigation, they are ſhut with two gates, preſenting an angle towards the ſtream; when they are made near the ſea, two pair of gates are made, the one to keep the water out and the other in, as occaſion requires: in this caſe, the gates towards the ſea preſent an angle that way, and the others the contrary way; and the ſpace incloſed by thoſe gates is called the *chamber*. When *ſluices* are made in the ditches of a fortreſs, to keep up the water in ſome parts, inſtead of gates, ſhutters are made ſo as to ſlide up and down in grooves; and when they are made to raiſe an inundation, they are then ſhut by means of ſquare timbers let down in culliſes, ſo as to lie cloſe and firm.

The word *ſluice* is formed of the French *eſcluſe*, which Menage derives from the Latin *excluſa*, found in the Salic law in the ſame ſenſe. But this to be reſtrained to the *ſluices* of mills, &c. for as to thoſe ſerving to raiſe veſſels, they were wholly unknown to the ancients.

SLUR, in *Muſic*, a mark like the arch of a circle, drawn from one note to another, comprehending two or more notes in the ſame or different degrees. If the notes are in different degrees, it ſignifies that they are all to be ſung to one ſyllable; for wind inſtruments that they are to be made in one continued breath; and for ſtringed inſtruments, that are ſtruck with a bow, as a violin, &c. that they are made with one ſtroke. If the notes are in the ſame degree, it ſignifies that it is all one note, to be made as long as the whole notes ſo connected; and this happens moſt frequently betwixt the laſt note of one line, and the firſt of the next; which is particularly called SYNCOPATION.

SMACK, is a ſmall veſſel only rigged as a ſloop, or hoy, and uſed in the coaſting or fiſhing trade; or as a tender in the king's ſervice.

SMALL-*craft*, in the *Sea Language*. See CRAFT.

SMALL-POX, *variolæ*. See POX, and VARIOLÆ.

SMALL *repeat*. See REPEAT.

SMALL *ſtones*, among *Jewellers*, denote diamonds under the weight of a carat.

SMALL-*work*, among *Jewellers*, is uſed to denote the ſtar and ſhell-FACETS of diamonds.

SMALLAGE, in *Botany*, a ſpecies of APIUM.

Smallage is what the phyſicians intend when they preſcribe *apium*. It grows naturally by the ſides of ditches in many parts of England; and is therefore rarely cultivated in gardens: it is biennial, and flowers in Auguſt. Care ſhould be taken to diſtinguiſh *ſmallage* from the poiſonous water-hemlock, which grows naturally in the ſame places with it; the latter has its leaves deeply divided, quite to the pedicle, into three long narrow ſharp pointed ſegments; whereas, thoſe of *ſmallage* are only ſlightly cut into three roundiſh obtuſe ones.

The root is chiefly uſed in medicine: it is about the thickneſs of a thumb, whitiſh, fibrous, of a warm taſte, and a fragrant ſmell; being one of the five greater openers of the ſhops. It is grateful and detergent, promotes urine, diſlodges gravel, and is alſo recommended in diſorders of the breaſt, and to promote expectoration.

The freſh roots, eſpecially when produced in their native watery places, are ſuppoſed to participate, in ſome degree, of the ill quality of thoſe of the hemlock kind, and to be particularly hurtful to epileptic perſons and pregnant women.

Its ſeed is alſo of the number of the leſſer hot ſeeds, and appears to poſſeſs greater virtues as a carminative and aperient than the root: its leaves have been given in decoction, or the expreſſed juice of them in nephritic complaints. The root is greatly recommended againſt ſuppreſſions of the menſes, and of the lochia, and is ſaid to be alone a remedy for the king's evil; but this wants proof.

SMALT, the laſt produce of cobalt, a kind of mineral matter, prepared and purified abroad, and brought hither, ſometimes in form of a blue powder, and ſometimes in lumps; chiefly uſed along with ſtarch, to give linens the finer and clearer caſt; and beſt known by the name of *powder*-BLUE. See COBALT.

The preparation of *ſmalt*, as practiſed in Hermandurïa, we find deſcribed in the Philoſophical Tranſactions by Dr. Krieg; who tells us, that the matter it is made of is the mineral ſtone called cobalt, or cadmia mineralis; which being pulverized, and the lighter ſtuff waſhed away, the remainder is laid on a furnace, and by a fire, underneath and aſide it, the flames whereof are reverberated over it, a matter is ſeparated from it in form of a ſmoke; which, ſticking to the walls, makes what we call ARSENIC.

When the cobalt has done ſmoking, it is cooled, mixed with pot-aſhes and powder of white flint ſtones; the mixture is put in pots, and melted for five or ſix hours in a furnace. By this means, the matter is formed into a blue glaſs, which, being put in cold water, cracks, and grows tender; and is, at length, powdered by an engine, the fineſt part ſeparated by a ſieve, put into a mill, and ground in water, into a very fine powder; which, by waſhing, is ſtill farther ſeparated from the coarſer, then dried in warm chambers, barrelled up, and ſent away.

There is not a more precarious proceſs in all metallurgy than the preparation of this fine blue glaſs from cobalt, nor any manufacture in which ſo expert workmen are neceſſary. The carrying the heat to too great a degree, in the roaſting of the cobalt, is a very miſchievous error, and the ſuffering as much of the arſenic as may be, to remain in the earth, is greatly to the advantage of the *ſmalt*; and its colour may be greatly heightened by adding common arſenic to it while it is in fuſion.

It is always neceſſary to make careful and repeated experiments on a new ore, or a kind of cobalt, which has not been worked before; by trying it with various degrees of heat in the roaſting, and with different proportions of the flints and pot-aſh in the fuſion. On comparing the ſeveral products of theſe experiments, it will eaſily be ſeen which yields the fineſt colour, and this muſt be always after followed in the great operations.

It is well known, that the beautiful blue glaſs, called *ſmalt*, is prepared from the fixed earth of cobalt; but experiments have proved, that this earth alone will not acquire that fine colour. Dr. Link tried ſome of it, by keeping it eight hours in the moſt intenſe heat, yet on taking it out, it was only a grey glaſs, excepting that there were a few blue ſpecks in it near the edges of the crucible. Theſe ſpecks make no objection to this doctrine, when properly conſidered; for they were owing, doubtleſs, to the ſame ſubſtance which is found neceſſary to be uſed, in order to procure the blue colour.

Flints are the neceſſary addition to cobalt for the making of the blue glaſs, or *ſmalt*; and the crucible being made of earth, might eaſily contain ſome particles of ſand. Every piece of ſand is a ſmall ſtone, of the nature of flint; that is, a piece of cryſtal debaſed by earth; and theſe ſmall flints mixing with the glaſs of the cobalt-earth, while in fuſion, rendered the ſmall ſpecks, where they were mixed, true *ſmalt*, while the reſt remained grey and unaltered.

This earth of cobalt evidently contains ſome portion of copper, though ſo ſmall in quantity, that it can never be diſcerned by the common ſigns, and ſo intimately blended with the earth, that it can never be procured ſeparate. The lightneſs of this earth alſo, in which the copper reſides after the ſublimation of the arſenic, is a proof that its quantity muſt be very ſmall; yet that it exiſts there, is evident from the colours it affords.

Copper is well known to yield a green colour with acids, and a fine blue with alkalies. Thus a ſolution of this earth in aqua fortis is of a deep green, and its glaſs, when mixed with the alkali of flints and of pot-aſh, is the deep blue *ſmalt*: nor is it wonderful, that the vitrified earth of cobalt will never become blue by calcination alone, ſince, if it owes this colour to copper, it cannot be ſuppoſed to ſhew itſelf till called forth by an alkali.

Some cobalt yields *ſmalt* before roaſting, even better than it would afterwards; this is a peculiar kind of cobalt, but is ſo like the reſt, that it cannot be diſtinguiſhed by the eye, but experiment alone ſhews this property in it. Though cobalt in general requires roaſting, in order to fit it for yielding the *ſmalt*, yet its different kinds require ſome more, and ſome leſs roaſting; and the degree can never be judged of by the inſpection of the mineral, but is only known by the experienced artiſt in the proceſs. Hence it is, that expert and intelligent perſons are neceſſary in the *ſmalt*-works more than in almoſt any other branch of this ſort of buſineſs.

The addition of a ſmall quantity of arſenic, or of the arſenical flowers, during the time that the *ſmalt* is in fuſion, adds greatly to the beauty of the colour: this is a practice kept ſecret by the workmen of ſome places; and by this means their *ſmalt* is always rendered better than that of their neighbours.

It is eaſy to ſee from this, that the roaſting of cobalt is the neceſſary beginning of the *ſmalt*-work, not the diveſting it of its arſenic, which only happens accidentally in that proceſs; and it would be much better if it did not happen, ſince we find the arſenic added afterwards exalts the colour. From hence it is evident, that thoſe cobalts which will make *ſmalt* without previous roaſting, muſt, as they are found to do, make the very fineſt *ſmalt*, becauſe their arſenic is yet left in them in great part: and from this alſo appears the neceſſity of having expert workmen for the *ſmalt*-making; ſince the knowing the degree of fire neceſſary to the ore is a moſt eſſential article, and after the roaſting has been carried to a ſufficient degree, every moment's heat diveſting it of more of its arſenic than was neceſſary, makes the colour of the *ſmalt* to be made afterwards ſo much the worſe. From this alſo appears the reaſon why the blue, made by precipitation from a ſolution of cobalt, is ſo much ſuperior to the common *ſmalt* made by fire; becauſe in this the arſenic is all preſerved, whereas in the common way of preparing it by fire, it is driven off. Philoſ. Tranſ. N° 396. See AZURE and ZAFFRE.

SMARAGD, σμαραγδος, a precious ſtone of a green colour, very beautiful and brilliant; called alſo the EMERALD.

SMARIS, in *Ichthyology*, the name of a ſmall fiſh caught in the Mediterranean, and common in the markets of Rome, Venice, and elſewhere, and ſold to the poorer ſort of people at a very ſmall price. This, in the Linnæan ſyſtem, is a ſpecies of the SPARUS.

It is ſeldom of more than a finger's length, and of a round, not flatted body, of a duſky blackiſh green on the back and ſides, and not marked with any variegations, but having on each ſide, near the middle of the body, one large black ſpot; its gill-fins and tail are of a faint red; the iris of the eyes is of a browniſh white, and the tail is forked.

SMATCH, in *Ornithology*, a name by which the common OENANTHE is called in many parts of England.

SMEAR-*dab*, in *Ichthyology*, is a name given to a ſpecies of DAB among the fiſhmongers of London, which is of equal goodneſs with the common *dab*.

SMECTIS, in *Natural Hiſtory*, a name uſed by ſeveral authors for the common FULLER'S *earth*, more commonly called *cimolia purpuraſcens*.

SMECTYMNUUS, a cant term that made ſome figure in the time of the civil war, and during the interregnum. It was formed of the initial letters of the names of five eminent Preſbyterian miniſters of that time, viz. Stephen Marſhal, Edmund Calamy, Thomas Young, Matthew Newcomen, and William Spurſtow: who, together, wrote a book againſt epiſcopacy, in the year 1641, whence they and their retainers were called *Smectymnuans*.

SMEGMA, a kind of waſh in uſe among the ancients. See DETERSORIUM.

SMELL, *odor*, with regard to the organ, is an impreſſion made on the noſe by little particles continually exhaling from odorous bodies.

SMELL, with regard to the object, is the figure and diſpoſition of odorous effluvia, which, ſticking on the organ, excite the ſenſe of *ſmelling*.

SMELL, with regard to the ſoul, is the perception of the impreſſion of the object on the organ; or the affection in the ſoul reſulting from it.

The ancient chemiſts teach, that ſulphur is the principle of all *ſmells*; and that theſe are more or leſs ſtrong, as the ſulphur in the odorous body is more or leſs dried and exalted. Sulphur, they ſay, is the foundation of odours, as ſalt is of ſavours, and mercury of colours.

Smell, like taſte, conſiſts altogether in the arrangement, compoſition, and figure of the parts, as appears from the following experiments of Mr. Boyle.

1°, From a mixture of two bodies, each whereof is, of itſelf, void of all *ſmell*; a very urinous *ſmell* may be drawn; this is done by the grinding of quick-lime with ſal ammoniac.

2°, By the admixture of common water, which of itſelf is void of *ſmell*, or inodorous; another inodorous body may be made to emit a very rank *ſmell*. Thus, camphor diſſolved in oil of vitriol is inodorous, yet mixed with water it immediately exhales a very ſtrong *ſmell*.

3°, Compound bodies may emit *ſmells* which have no ſimilitude to the *ſmells* of the ſimples they conſiſt of. Thus, oil of turpentine, mixed with a double quantity of oil of vitriol, and diſtilled; after diſtillation, there is no *ſmell* but of ſulphur; and what is left behind in the retort, being again urged by a more violent fire, yields a *ſmell* like oil of wax.

4°, Several *ſmells* are only to be drawn forth by motion, and agitation. Thus, glaſs, ſtones, &c. which, even when heated, yield no *ſmell*; yet, when rubbed and agitated in a peculiar manner, emit a ſtrong *ſmell*: particularly beech-wood, in turning, yields a kind of roſy *ſmell*.

5°, A body that has a ſtrong *ſmell*, by being mixed with an inodorous one, may ceaſe to have any *ſmell* at all. Thus, if aqua fortis, not well dephlegmated, be poured on ſalt of tartar, till it ceaſe to ferment; the liquor, when evaporated, will yield inodorous cryſtals, much reſembling nitre: yet theſe, when burnt, will yield a moſt noiſome *ſmell*.

6°, From a mixture of two bodies, one whereof *ſmells* extremely ill, and the other not well, a very pleaſant aromatic odour may be gained, viz. by a mixture of aqua fortis, or ſpirit of nitre, with an inflammable ſpirit of wine.

7°, Spirits of wine, by mixing with an almoſt inodorous body, may gain a very pleaſant aromatic *ſmell*. Thus inflammable ſpirits of wine, and oil of Dantzick vitriol, mixed in equal portions, then digeſted, and at laſt diſtilled, yield a ſpirit of a very fragrant *ſmell*.

8°, A moſt fragrant body may degenerate into a fetid one, without the admixture of any other body. Thus if the ſpirit mentioned in the former experiment, be kept in a well-cloſed receiver, it will ſoon acquire the rankneſs of garlic.

9°, From two bodies, one whereof is inodorous, and the other fetid, a very pleaſant *ſmell* may ariſe, much reſembling muſk, viz. by putting pearls into ſpirit of vitriol; for, when diſſolved, they yield a very agreeable *ſmell*.

SMELL is uſed as the name of a peculiar ſort of wine, of which there are two ſpecies; the one ſort is very fragrant, muſcatelline, and aromatic; this is called ſimply the *ſmell-wine*: but the other, which is very rank and offenſive to the noſe, is called by the Germans *ſmelbruntzer*. Many have been the conjectures about the occaſion of the rank ſmell of this wine.

The *ſmell* is truly urinous, and is that of a volatile alkali; which not being embodied in, or ſubdued by the acid of the grape in this imperfect fermentation, vents itſelf in this rank manner.

It is evident, that the *ſmell* is of a volatile nature, for it is often loſt in the drawing of the wine ſeveral times out of one veſſel into another, evaporating during the time of drawing it out.

SMELLING, the act whereby we perceive *ſmells*, or whereby we become ſenſible of odorous bodies, by means of certain effluvia thereof, which, ſtriking on the olfactory organ, briſkly enough to have their impulſe propagated to the brain, excite a ſenſation of the ſoul.

The principal organs of *ſmelling* are the noſtrils and the olfactory nerves; the minute ramifications of which latter are diſtributed throughout the whole concave of the former: their deſcriptions ſee under their proper heads.

Smelling is performed by the odorous effluvia, floating in the air, being drawn into the noſtrils, in inſpiration, and ſtruck with ſuch force againſt the fibrillæ of the olfactory nerves, which the figure of the noſe, and the ſituation of the little bones, render oppoſite thereto, as to ſhake them, and give them a vibratory motion; which action, being communicated hence to the common ſenſory, occaſions an idea of a ſweet, or fetid, or ſour, or an aromatic, or a putrefied object, &c.

The matter in animals, vegetables, foſſils, &c. which chiefly affect the ſenſe of *ſmelling*, Boerhaave obſerves, is that ſubtile ſubſtance, inherent in the oily parts thereof, called *ſpirits*: becauſe, when this is taken away from the moſt fragrant bodies, what remains has ſcarce any *ſmell* at all; but this, poured on the moſt inodorous bodies, gives them a fragrancy.

Willis obſerves, that brutes have, generally, the ſenſe of *ſmelling* in much greater perfection than man; as by this alone, they diſtinguiſh the virtues and qualities of bodies unknown before; hunt out their food at a great diſtance, as hounds and birds of prey: or hid among other ſubſtances, as ducks, &c.

Man, having other means of judging of his food, &c. did not need ſo much ſagacity in his noſe; yet have we inſtances of a great deal, even in man. In the Hiſtoire des Antilles, we are aſſured, there are Negroes who, by the *ſmelling* alone, can diſtinguiſh between the footſteps of a Frenchman and a Negro.

It is found, that the laminæ, wherewith the upper part of the noſtrils is fenced, and which ſerve to receive the divarications of the olfactory nerves, are always longer, and folded up together in greater numbers, as the animal has this ſenſe more accurate: the various windings and turnings of theſe laminæ detain and fetter the more of the odoriferous particles.

The ſenſe of *ſmelling* may be diminiſhed or deſtroyed by diſeaſes; as the moiſture, dryneſs, inflammation or ſuppuration of the olfactory membrane, the compreſſion of the nerves which ſupply it, or ſome fault in the brain itſelf at their origin. A defect, or too great a degree of ſolidity of the ſmall ſpungy bones of the upper jaw, the caverns of the forehead, &c. may likewiſe impair this ſenſe; and it may be alſo injured by a collection of fetid matter in theſe caverns, which is continually exhaling from them, and alſo by immoderate uſe of ſnuff.

When the noſe abounds with moiſture, after gentle evacuations, ſuch things as tend to take off irritation, and coagulate the thin ſharp ſerum may be applied, as the oil of aniſe, mixed with fine flour, camphor diſſolved in oil of almonds, &c. the vapours of amber, frankincenſe, gum-maſtic, and benjamin, may likewiſe be received into the noſe and mouth. For moiſtening the mucus when it is too dry, ſome recommend ſnuff made of the leaves of marjoram, mixed with oil of amber, marjoram, and aniſeed; or a ſternutatory of calcined white vitriol, twelve grains of which may be mixed with two ounces of marjoram water, and filtrated. The ſteam of vinegar upon hot iron, and received up the noſtrils, is alſo of uſe for ſoftening the mucus, removing obſtructions, &c. If there be an ulcer in the noſe, it ought to be dreſſed with ſome emollient ointment, to which, if the pain be very great, a little laudanum may be added. If it be a venereal ulcer, twelve grains of corroſive ſublimate may be diſſolved in a pint and a half of brandy, and a table-ſpoonful of it taken twice a day. The ulcer ought likewiſe to be waſhed with it, and the fumes of cinnabar may be received up the noſtrils.

If there be reaſon to ſuſpect that the nerves which ſupply the organs of *ſmelling* are inert, or want ſtimulating, volatile ſalts, or ſtrong ſnuffs, and other things which occaſion ſneezing, may be applied to the noſe; the forehead may likewiſe be anointed with balſam of Peru, to which may be added a little oil of amber. Buchan's Dom. Med. p. 504, &c. 1776.

SMELT, *apua phalerica*, or *ſalmo eperlaus* of Linnæus, in *Ichthyology*, a fiſh which is claſſed, by the generality of writers, among the truttaceous kinds, and is acknowledged to have a general external reſemblance to the ſalmon. Its characters, by which it is diſtinguiſhed from all the reſt of the truttaceous kinds, are, 1. That it is much ſmaller than any other. 2. It is longer and ſlenderer, in proportion to its ſize: and, 3. It has a very grateful ſmell, which ſome authors have hence compared to that of the violet. Some authors have hence called it the viola, and others, particularly Schonefeldt, calls it the *ſpirinchus*.

The *ſmelt* is a fiſh of a very beautiful form and colour; the head is tranſparent, and the ſkin in general ſo thin, that, with a good microſcope, the blood may be obſerved to circulate.

It inhabits the ſeas of the northern parts of Europe, and Mr. Pennant apprehends, is never found as far ſouth as the Mediterranean. *Smelts* inhabit the ſeas that waſh theſe iſlands the whole year, and never go very remote from ſhore, except when they aſcend the rivers. In ſome rivers they appear a long time before they ſpawn, being taken from November to January in the Thames and Dee, but in others not till February, and in March and April they ſpawn; after which they all return to the ſalt water, and are not ſeen in the rivers till the next ſeaſon.

Theſe fiſh will live almoſt any where, but they are very apt to degenerate. They are common in the rivers of New England, and are as large as with us, often weighing two ounces and a half; but a pail-full of theſe being taken from one of their rivers, and put into an adjoining pond, they all degenerated in ſuch a manner, that they were afterwards found ſo ſmall, that the largeſt did not weigh more than five pennyweights. Though thus ſmall, however, they are much valued, and are better taſted than the others. Philoſ. Tranſ. Nº 374. p. 232.

They are called *ſmelts*, becauſe they melt, as it were, or diſſolve between the fingers in handling them; or, as others ſay, on account of their ſcent, *quaſi ſmell it*. The name *ſparling*, by which they are called in Wales and the North of England, is taken from the French *eperlan*: *ſmelts* are often ſold in the ſtreets of London ſplit and dried, and called *dried ſparlings*.

SMELT *fiſhing*. See FISHING, *ſmelt*.

SMELT, among the fiſhermen in Yorkſhire, and ſome other parts of England, is alſo a name given to the ſalmon, while in its firſt year. See SALMON.

SMELTING, among *Metalliſts*, the melting of a metal from the ore, in a *ſmelting* furnace; in order to ſeparate the metallic parts from the ſulphur and arſenic, and the earthy and ſtrong ſubſtances of all kinds with which they are combined.

Smelting, in propriety, is reſtrained to large works, wherein ores from the mines are melted down, and ſeparated.

In ſpeaking of works in a leſſer way, we do not ſay *ſmelting*, but melting.

The art of *ſmelting* the ores of all metallic ſubſtances was, probably, at firſt very imperfect; hence the uſe of iron has every where been of a more recent date than that of the other metals, becauſe it requires the application of a much ſtronger fire to *ſmelt* the ores of iron than thoſe of any other metal. We have no certain accounts when, or by whom the ſeveral metals were diſcovered. Wallerius ſays, that, as far as he knew, Pliny was the firſt who enumerated the ſix metals; but they were certainly known long before his age, and were mentioned both by Homer and by Moſes, a much more ancient author, Numb. xxxi. 22. From this teſtimony we may certainly infer that all the metals anciently mentioned were known, at leaſt in the country of the Midianites, above fourteen hundred and fifty years before the birth of Chriſt, or near nine hundred years after the deluge. Moreover, iron and copper were, without doubt, known before the deluge, and, probably, all the other metals, which are more eaſily extracted from their ores than the former.

In the time of Abraham, however, gold and ſilver were eſteemed, as they are at preſent, precious metals, Gen. xxiii. 16. Gen. xiii. 2. and hence it is reaſonable to conclude, that Noah was able to inſtruct his deſcendants in the art of *ſmelting* metallic ores; this art was afterwards loſt among the various colonies, which quitted the plains of Aſia in ſearch of ſettlements; and as the earth ſoon after the deluge, and long before it could have been peopled by the poſterity of Noah, muſt have become covered with wood, and in proceſs of time different countries might have been cleared by ſetting the wood on fire, which might flux metallic ores contiguous to the ſurface of the earth, it is not improbable that the firſt idea of *ſmelting* ores might have been thus ſuggeſted to many nations. See Creech's Lucretius, vol. ii. p. 572.

We may hence conjecture, that the firſt rude proceſs by which metals were extracted from their ores, was that of putting a quantity of ore upon a heap of wood, and ſetting the pile on fire, in conformity to the manner in which ores were *ſmelted* during the burning of foreſts; but as the force of the fire is greatly diminiſhed by the diſperſion of its flame, and as the air acts more forcibly in exciting fire, when it ruſhes upon it with greater velocity, it is likely, that the heap of wood and ore would ſoon be ſurrounded with a wall of ſtone, in which ſufficient openings would be left for the entrance of the air, and thus a kind of furnace would be conſtructed.

The Peruvians, we are told, had diſcovered the art of *ſmelting* and refining ſilver, either by the ſimple application of fire, or where the ore was more ſtubborn, and impregnated with foreign ſubſtances, by placing it in ſmall ovens or furnaces on high grounds, ſo artificially conſtructed, that the draught of air performed the function of a bellows, a machine with which they were totally unacquainted. This method of *ſmelting* ores on high grounds, without the aſſiſtance of a bellows, or at leaſt of bellows moved by water, ſeems to have been formerly practiſed in other countries as well as in Peru. There are ſeveral places in Derbyſhire, called *boles* by the inhabitants, where lead has been anciently ſmelted, before the invention of moving bellows by water; theſe boles were always ſituated upon high grounds, and moſtly upon that ſide of a hill which faces the weſt, probably becauſe the wind proceeds moſt frequently from that quarter.

From a pig of lead, dug up in 1766, at one of theſe boles near Matlock, and bearing an inſcription in relievo, from which it appears to have been *ſmelted* in the age of Adrian; many of the boles in Derbyſhire ſeem to be of high antiquity. However, this method of *ſmelting* ore by the variable action of the wind, being a very troubleſome and precarious proceſs, has been univerſally diſuſed, and the more regular blaſt of a bellows has been introduced in its ſtead.

The invention of the BELLOWS is attributed by Strabo to Anacharſis, the Scythian; but he was probably the improver of this machine; for Homer, who lived long before his time, deſcribes Vulcan as employing twenty pair of bellows at once in the formation of the ſhield of Achilles. Iliad, lib. xviii. v. 470.

When the art of moving bellows by means of a water wheel, was firſt diſcovered, is uncertain: the ancients ſeem to have been unacquainted with it; but we learn from Agricola (De Re Metal. publiſhed in 1550, p. 165. 338.) that it was very generally known, at leaſt among the Germans, in his time; for he ſpeaks of it often, without hinting at its being a recent invention. By this advantageous contrivance, however, the moderns have, in many inſtances, worked over again, with conſiderable profit, the heaps of iron and other kinds of ſlag, from which the metal has been but imperfectly extracted, before the moving of the bellows by water was diſcovered.

About fifty years ago, the blaſt, or hearth furnace, was the only one in uſe for *ſmelting* lead ore in Derbyſhire. In this furnace, ore and charcoal, or ore, and what is called *white coal*, which is wood dried but not charred, being placed in alternate layers, upon a hearth properly conſtructed, the fire is raiſed by the blaſt of a bellows, moved by a water-wheel; the ore is ſoon *ſmelted* by the violence of the fire, and the lead, as it is produced, trickles down a proper channel, into a place contrived for its reception. Theſe *ore hearths* are now very rare; though they are frequently applied to the extracting lead from the ſlag, which is produced, either at the ore hearth, or the *cupola* furnace, and they are then called *ſlag-hearths*, and the lead thus obtained is called *ſlag-lead*: the fire in a ſlag-hearth is made of the cinder of pit-coal, inſtead of charcoal; the furnace called a *cupol*, or *cupola*, and *reverberatory* furnace, and by the Germans a *wind-furnace*, in which ores are *ſmelted* by the flame of pit-coal, is ſaid to have been invented about the year 1698, by a phyſician named Wright; though Beccher may, perhaps, be thought to have a prior claim to its invention, or introduction from Germany. But whoever was the firſt inventor of the cupola, it is now in general uſe, not only in Derbyſhire and other countries for the *ſmelting* of ores of lead, but both at home and abroad, where it is called the *Engliſh furnace*, for the *ſmelting* of copper ores. This furnace is ſo contrived, that the ore is melted, not by coming into immediate contact with the fuel, but by the reverberations of the flame upon it. The bottom of the furnace, on which the lead ore is placed, is ſomewhat concave, ſhelving from the ſides towards the middle; its roof is low and arched, reſembling the roof of a baker's oven; the fire is placed at one end of the furnace, upon an iron grate, to the bottom of which the air has free acceſs; at the other end, oppoſite to the fire place, is a high perpendicular chimney; the direction of the flame, when all the apertures in the ſides of the furnace are cloſed up, is neceſſarily determined, by the ſtream of air which enters at the grate, towards the chimney, and in tending thither it ſtrikes upon the roof of the furnace, and being reverberated from thence upon the ore, ſoon melts it. This furnace does not require the uſe of bellows, and may, therefore, be conſtructed any where. In *ſmelting* lead ore, they generally put into the cupola furnace a ton of ore, previouſly beat ſmall and dreſſed, at one time, which quantity they call a *charge*; and they work off three charges of ore in every twenty-four hours. In about ſix hours from the time of charging, the ore becomes as fluid as milk. In order to obtain the lead free from the ſlag which ſwims over it, the ſmelters uſually throw in about a buſhel of lime, which dries up the ſlag, and prevents its running out with the lead. The ſlag, thus thickened, is raked up towards the ſides of the furnace, and the lead guſhes out through a hole in one of the ſides of the furnace, which, having been properly ſtopped during the *ſmelting* of the ore, is opened for this purpoſe, into an iron pot, from which it is laded into iron moulds, containing what they call a pig of lead; the pigs, when cold, being ordinarily ſtamped with the maker's name, are ſold under the name of *ore lead*. After the lead has all flowed out of the furnace, they ſtop up the tap-hole, and drawing down the ſlag and lime into the middle of the furnace, they raiſe the fire, till the mixture of ſlag and lime, which they ſimply term *ſlag*, is rendered very liquid; upon this maſs they throw another quantity of lime, and proceed as before. When the lead thus obtained, amounting generally to twenty or thirty pounds, is let out of the furnace, a new charge of ore is put in and the operation renewed.

In order to ſpare the time and expence of fuel, they have, in ſome furnaces, lately contrived a hole, though which they ſuffer the main part of the liquid ſlag to flow out, before they tap the furnace for the lead; upon the little remaining ſlag, they throw a ſmall portion of lime, and draw the mixture out of the furnace without *ſmelting* it. This kind of furnace they have nick named a *maccaroni*.

Dr. Watſon has ſuggeſted ſome improvements in the conſtruction of this furnace, and in the proceſs of *ſmelting* above deſcribed. He propoſes to ſubſtitute an horizontal chimney in the place of the perpendicular one now in uſe, and that the end fartheſt from the fire, ſhould be turned up by a tube of earthen ware, or otherwiſe; ſo that the ſulphureous acid, ſet at liberty during the burning of the ſulphur, may iſſue out in a direction parallel to the flue of the chimney, and at the diſtance of about one foot and a half above it. Let a number of large globular veſſels be made either of glaſs or lead; each of which muſt have two necks, ſo as to be capable of being inſerted into one another: let theſe veſſels be placed in the flue of the chimney, the neck of the firſt being inſerted into the above mentioned tube, and the neck of the laſt being left open, for fear of injuring the draught of the furnace. Let each of theſe globular veſſels contain a ſmall quantity of water, in which caſe, he apprehends, that the heat of the flue will raiſe the water into vapour, and that this watery vapour will be the means of condenſing the ſulphureous acid vapour, in ſuch a degree, as to render the undertaking profitable. When the ſulphur is all conſumed, the draught of the furnace may be ſuffered to have its ordinary exit at the end of the horizontal chimney, by a very ſlight contrivance of a moveable damper.

The ſame ingenious writer alſo obſerves, that very ſulphureous ores ſhould be roaſted for a long time with a gentle heat. He alſo propoſes, to leave as little lead as poſſible in the ſlag; for this purpoſe he ſuggeſts, that it might be uſeful to throw a quantity of charcoal duſt upon the liquid ſcoria in the cupola furnace, in order that the calcined lead might be converted into lead, by uniting itſelf to the inflammable principle of the charcoal; and that it might be alſo uſeful to flux ſulphureous lead ores in conjunction with the ſcales or other refuſe pieces of iron, or even with ſome ſorts of iron ore.

The ſmelter might farther find it worth his while to reduce the ſlag into a powder by a ſtamping mill, or to grind it by any other contrivance, and then he may ſeparate the ſtony part of the ſlag from the metallic, by waſhing the whole in water, inaſmuch as the metallic part is heavier than the other. Watſon's Chem. Eſſ. vol. iii. p. 253, &c.

The other furnaces uſed in *ſmelting*, are ſupplied with large bellows, moved by the labour of a wheel, which is turned round by a current of water. Theſe have obtained different names, according to ſome difference in their conſtruction. Their greater or leſs height gives occaſion alſo to the diſtinction of *high furnaces* and *middle furnaces*. The high furnaces are of modern invention; they were firſt introduced at Mansfeldt in 1727, and are now uſed in almoſt all countries where ores are ſmelted, as in Saxony, Bohemia, Hungary, &c. They contribute, by their great height, being above eighteen feet high, which allows the ore to undergo a roaſting by different degrees of heat, before it is melted, to ſimplify and diminiſh the labour. They are chiefly employed for crude fuſions, and particularly for the ſlate copper ore.

In order to facilitate the extraction of metallic ſubſtances from the ores and minerals containing them, ſome operations,

rations, previous to the fuſion or *ſmelting* of theſe ores and minerals, are generally neceſſary. Theſe operations conſiſt of, 1. The *ſeparation* of the ores and metallic matter from the adhering unmetallic earths and ſtones, by hammers, and other mechanical inſtruments, or by waſhing with water. 2. Their *diviſion* or reduction into ſmaller parts by contuſion and trituration, that by another waſhing with water they may be more perfectly cleanſed from extraneous matters, and rendered fitter for the ſubſequent operations. 3. Roasting, or *calcination*, the uſes of which operation are to expel the volatile, uſeleſs, or noxious ſubſtances, as water, vitriolic acid, ſulphur, and arſenic; to render the ore more friable and fitter for the ſubſequent contuſion and fuſion; and, laſtly, to calcine and deſtroy the viler metals; for inſtance, the iron copper ores, by means of the fire, and of the ſulphur and arſenic. Stones, as quartz, and flints, containing metallic veins or particles, are frequently made red-hot, and then extinguiſhed in cold water, that they may be rendered ſufficiently friable and pulverable, to allow the ſeparation of the metallic particles.

Roaſting is unneceſſary for native metals; for ſome of the richer gold and ſilver ores; for ſome lead ores, the ſulphur of which may be ſeparated during the fuſion; and for many calciform ores, as theſe do not generally contain any ſulphur and arſenic.

In the roaſting of ores, the following attentions muſt be given, 1. To reduce the mineral previouſly into ſmall lumps, that the ſurface may be increaſed; but they muſt not be ſo ſmall, nor placed ſo compactly, as to prevent the paſſage of the air and flame. 2. The larger pieces muſt be placed at the bottom of the pile, where the greateſt heat is. 3. The heat muſt be gradually applied, that the ſulphur may not be melted, which would greatly retard its expulſion; and that the ſpars, fluors, and ſtones, intermixed with the ore, may not crack, fly, and be diſperſed. 4. The ores not thoroughly roaſted by one operation muſt be expoſed to a ſecond. 5. The fire may be increaſed towards the end, that the noxious matters more ſtrongly adhering, may be expelled. 6. Fuel which yields much flame, as wood and foſſil coals free from ſulphur, is ſaid to be preferable to charcoal or coaks. Sometimes cold water is thrown on the calcined ore at the end of the operation, while the ore is yet hot, to render it more friable.

No general rule can be given concerning the duration or degree of the fire, theſe being very various according to the difference of the ores. A roaſting during a few hours or days is ſufficient for many ores; while ſome, ſuch as the ore of Rammelſberg, require that it ſhould be continued during ſeveral months.

Schlutter enumerates five methods of roaſting ores. 1. By conſtructing a pile of ores and fuel placed in alternate ſtrata, in the open air, without any furnace. 2. By confining ſuch a pile within walls, but without a roof. 3. By placing the pile under a roof, without lateral walls. 4. By placing the pile in a furnace conſiſting of walls and a roof. 5. By roaſting the ore in a reverberatory furnace, in which it muſt be continually ſtirred with an iron rod.

Several kinds of *fuſions of ores* may be diſtinguiſhed. 1. When a ſulphureous ore is mixed with much earthy matter, from which it cannt be eaſily ſeparated, by mechanical operations, it is frequently melted, in order to diſengage it from theſe earthy matters, and to concentrate its metallic contents. By this fuſion, ſome of the ſulphur is diſſipated, and the ore is reduced to a ſtate intermediate betwixt that of ore and of metal. It is then called a *matt (lapis ſulphureo-metallicus)*, and is to be afterwards treated like a pure ore by the ſecond kind of fuſion, which is properly the *ſmelting*, or *extraction of metal by fuſion*. 2. By this fuſion or *ſmelting*, the metal is extracted from the ore previouſly prepared by the above operations, if theſe be neceſſary.

The ores of ſome very fuſible metals, as of biſmuth, may be ſmelted by applying a heat ſufficient only to melt the metals, which are thereby ſeparated from the adhering extraneous matters. This ſeparation of metals by fuſion, without the vitrification of extraneous matters, may be called *eliquation*. Generally, a complete fuſion of the ore and vitrification of the earthy matters are neceſſary for the perfect ſeparation of the contained metals. By this method, metals are obtained from their ores, ſometimes pure, and ſometimes mixed with other metallic ſubſtances, from which they muſt be afterwards ſeparated. To procure this ſeparation of metals from ores, theſe muſt be ſo thinly liquefied, that the ſmall metallic particles may diſengage themſelves from the ſcoria; but it muſt not be ſo thin as to allow the metal to precipitate before it be perfectly diſengaged from any adhering extraneous matter, or to pervade and deſtroy the containing veſſels and furnace. Some ores are ſufficiently fuſible; but others require certain additions called *fluxes*, to promote their fuſion, and the vitrification of their unmetallic parts; and alſo to render the ſcoria ſufficiently thin to allow the ſeparation of the metallic particles.

Different fluxes are ſuitable to different ores, according to the quality of the ore, and of the matrix, or ſtone adherent to it.

The matrixes of two different ores of the ſame metal frequently ſerve as fluxes to each other; as, for inſtance, an argillaceous matrix with one that is calcareous; theſe two earths being diſpoſed to vitrification when mixed, though each of them is ſingly unfuſible. For this reaſon, two or more different ores to be ſmelted are frequently mixed together.

The ores alſo of different metals require different fluxes. Thus calcareous earth is found to be beſt ſuited to iron ores, and ſpars and ſcoria to fuſible ores of copper.

The fluxes moſt frequently employed in the *ſmelting* of ores are calcareous earth, fluors or vitreous ſpars, quartz, and ſand, fuſible ſtones, as ſlates, baſaltes, the ſeveral kinds of ſcoria, and pyrites.

Calcareous earth is uſed to facilitate the fuſion of ores of iron, and of ſome of the poorer ores of copper, and, in general, of ores mixed with argillaceous earths, or with felt-ſpar. This earth has been ſometimes added with a view of ſeparating the ſulphur, to which it very readily unites: but by this union, the ſulphur is detained, and a hepar is formed, which readily diſſolves iron and other metals, and ſo firmly adheres to them, that they cannot be ſeparated without more difficulty than they could from the original ore. This addition is therefore not to be made till the ſulphur be previouſly well expelled.

Fluors, or fusible spars, facilitate the fuſion of moſt metallic minerals, and alſo of calcareous and argillaceous earths, of ſteatites, aſbeſtus, and of ſome other unfuſible ſtones, but not of ſiliceous earths without a mixture of calcareous earth.

Quartz is ſometimes added in the fuſion of ferruginous copper ores, the uſe of which is ſaid chiefly to be, to enable the ore to receive greater heat, and to give a more perfect vitrification to the ferruginous ſcoria.

The fusible stones, or slates, basaltes, are ſo tenacious and thick when fuſed, that they cannot be conſidered properly as fluxes, but as matters added to leſſen the too great liquidity of ſome very fuſible minerals.

The ſcoria obtained in the fuſion of an ore is frequently uſeful to facilitate the fuſion of an ore of the ſame metal, and ſometimes even of the ores of other metals.

Sulphurated pyrites greatly promote the fuſibility of the ſcoria of metals, from the ſulphur it contains. It is chiefly added to difficultly fuſible copper ores, to form the ſulphureous compounds called *matts*, that the ores thus brought into fuſion, may be ſeparated from the adhering earthy matters, and that the ferruginous matter contained in them may be deſtroyed, during the ſubſequent calcination and fuſion, by means of the ſulphur.

As in the ores called *calciform*, the metallic matter exiſts in a calcined ſtate; and as calcination reduces the metals of mineraliſed ores (excepting the perfect metals) to that ſtate alſo; therefore all calciform and calcined ores require the addition of ſome *inflammable ſubſtance* to reduce them to a metallic ſtate. In great works, the charcoal or other fuel uſed to maintain the fire, produces alſo this effect.

Metals are ſometimes added in the fuſion of ores of other more valuable metals, to abſorb from theſe ſulphur and arſenic. Thus iron is added to ſulphurated cupreous and ſilver ores. Metals are alſo added in the fuſion of ores of other more valuable metals, to unite with and collect the ſmall particles of theſe diſperſed through much earthy matter, and thus to aſſiſt their precipitation. With theſe intentions, lead is frequently added to ores and minerals containing gold, ſilver, and copper.

Ores of metals are alſo ſometimes added to aſſiſt the precipitation of more valuable metals. Thus antimony is frequently added to aſſiſt the precipitation of gold intermixed with other metallic matters. Chem. Dict. Eng. edit. art. *Smelting*, note *m*. See Copper, Gold, Iron, Lead, Silver, Tin, &c. See alſo Schlutter's Treatiſe on the *Smelting* of Ores, tranſlated from the German into French by M. Hellot, and Chem. Dict. art. *Smelting*, Eng. ed. notes *n*, *o*, *p*, *q*.

Smelting-*houſe*, a houſe where they run and melt the ore into lead; one of theſe will run a ton in ten or twelve hours; a fodder is their uſual day's work, that is, twenty-two hundred and an half weight.

SMEW, in *Ornithology*, the Engliſh name of the common mergus, known among authors by the name *albellus*, and *mergus cirratus*.

SMILAX, *rough bindweed*, in *Botany*, a genus of the *dioecia hexandria* claſs. Its characters are; that it is male and ſemale in different plants; the male flowers have a ſix-leaved empalement; they have no petals, but have ſix ſtamina, terminated by oblong ſummits; the female flowers have the like empalement, but they fall off; they have no petal nor ſtamina, but have an oval germen ſupporting their very ſmall ſtyles, crowned by oblong reflexed ſtigmas; the germen turns to a globular berry, with two cells, containing two globular ſeeds.

Miller enumerates ſixteen, and Linnæus thirteen ſpecies.

Smilax *aſpera*, is uſed for the great ſcarlet OAK, or *ilex*.

Smilax *lævis*, in *Botany*, a name given by many authors to our common great white bind-weed. See Convolvulus.

SMINTHEAN, Smintheus, σμινθευς, in *Antiquity*, an epithet given to Apollo: from the Greek σμινθος, a *rat*. There are two different accounts of the origin of this appellation: the firſt is, that, in the city of Chryſa in Myſia, was a prieſt of Apollo, called *Crinis*, with whom that god being offended, ſent a herd of rats to ſpoil all his lands; but Crinis appeaſing the deity, he came in perſon to his aſſiſtance, took up his lodgings with Crinis's ſhepherd, told him who he was, and deſtroyed all the rats with his arrows: in memory whereof, Crinis built a temple to his deliverer, under the name of *Apollo Smintheus*.

Clemens Alexandrinus, in his exhortation to the Greeks, gives us a different ſtory. The Cretans, ſays he, intending to ſend out a colony, conſulted the oracle of Apollo, as to the place: the anſwer was, that they ſhould fix their colony where thoſe born of the earth ſhould oppoſe them. Upon their arrival in the Helleſpont, the rats, in the night-time, gnawed aſunder all the ſtrings of their bows: this they deemed an accompliſhment of the oracle, and there built a city called *Smintha*.

SMIRIS, in *Natural Hiſtory*. See Emery.

SMITING-*line*, in a *Ship*, is a ſmall rope faſtened to the mizen-yard-arm, below at the deck, and is always furled up with the mizen-ſail, even to the upper end of the yard, and from thence it comes down to the poop. Its uſe is to looſe the mizen-ſail without ſtriking down the yard, which is eaſily done, becauſe the mizen-ſail is furled up only with rope-yarns; and therefore, when this rope is pulled hard, it breaks all the rope-yarns, and ſo the ſail falls down of itſelf. The word of art is, *ſmite the mizen* (whence this rope takes its name) that is, hale by this rope that the ſail may fall down.

SMOKE, or Smoak, *fumus*, a humid matter, exhaled in form of vapor by the action of heat, either external or internal; or *ſmoke* conſiſts of palpable particles, elevated by means of the rarefying heat, or by the force of the aſcending current of air, from bodies expoſed to heat; and theſe particles vary much in their properties, according to the ſubſtances from which they are produced. See Flame.

Smoke, ſir Iſaac Newton obſerves, aſcends in the chimney by the impulſe of the air it floats in: for that air, being rarefied by the fire underneath, has its ſpecific gravity diminiſhed; and thus, being determined to aſcend itſelf, it carries up the ſmoke along with it. The tail of a comet that great author takes alſo to aſcend from the nucleus after the ſame manner. See Comet.

Smoke of fat unctuous woods, as fir, beech, &c. makes what we call *lamp*-BLACK.

There are various inventions for preventing and curing *ſmoking* chimneys: as the æolipiles of Vitruvius, the ventiducts of Cardan, the windmills of Bernard, the capitals of Serlio, the little drums of Paduanus, and ſeveral artifices of De Lorme, &c. See Chimney and Fire-*places*.

In the Philoſophical Tranſactions we have the deſcription of an engine, invented by Monſieur Daleſme, which conſumes the *ſmoke* of all ſorts of wood, and that ſo totally, as the moſt curious eye cannot diſcover it in the room, nor the niceſt noſe to ſmell it, though the fire be made in the middle of the room. It conſiſts of ſeveral iron hoops, four or five inches in diameter, which ſhut into one another, and is placed on a trevet. A brand taken out of the fire *ſmokes* inſtantly, but ceaſes as ſoon as returned: the moſt fetid things, as a coal ſteeped in cat's piſs, which ſtinks abominably when taken out of the fire, yet in it makes not the leaſt ill ſcent; no more than red-herrings broiled, &c.

Smoke *farthings* were the pentecoſtal or cuſtomary oblations offered by the inhabitants within any dioceſe, when they made their proceſſions to the cathedral church: which came, by degrees, into an annual ſtanding rent, called *ſmoke farthings*. See Pentecostals.

Smoke *jack*. See Jack.

Smoke-*ſilver*, in our *Old Writers*. Lands were held in ſome places by the payment of the ſum of ſix pence yearly to the ſheriff, called *ſmoke-ſilver*.

Smoke-ſilver, and *ſmoke-penny*, are to be paid to the miniſters of divers pariſhes as a modus, in lieu of tithe-wood; and in ſome manors, formerly belonging to religious houſes, there is ſtill paid, as appendant to the ſaid manors the ancient Peter-pence, by the name of *ſmoke-money*.

SMORZATO, in the *Italian Muſic*, is uſed to ſignify that the bow or fiddle-ſtick, ſhould be drawn to its full length, not with the ſame ſtrength of hand throughout, but bearing lighter and lighter on it by degrees, till at laſt ſcarce any ſound be heard. This term is not much uſed at preſent.

SMUGGLING, a cant term for the running of goods, or the offence of importing them without paying the duties impoſed thereon by the laws of the CUSTOMS and EXCISE.

This is reſtrained by a great variety of ſtatutes, which inflict pecuniary penalties, and ſeizure of the goods, for clandeſtine *ſmuggling*; and affix the guilt of felony, with tranſportation for ſeven years, upon more open, daring, and avowed practices: but the laſt of them, 19 Geo. II. c. 34. is for this purpoſe *inſtar omnium*: for it makes all forcible acts of *ſmuggling*, carried on in defiance of the laws, or even in diſguiſe to evade them, felony, without benefit of clergy; enacting, that if three or more perſons ſhall aſſemble, with fire arms, or other offenſive weapons, to aſſiſt in the illegal exportation or importation of goods, or in reſcuing the ſame after ſeizure, or in reſcuing offenders in cuſtody for ſuch offences; or ſhall paſs with ſuch goods in diſguiſe; or ſhall wound, ſhoot at, or aſſault any officers of the revenue, when in the execution of their duty, ſuch perſons ſhall be felons, without the benefit of the clergy.

But the laws relating to *ſmuggling* ſtill need reviſal; and the wiſdom of the legiſlature is at this time (viz. 1784.) deviſing methods for preventing the frauds attending the evaſion of them.

SMUSH-*pot*, amongſt *Painters*, is the veſſel into which they rub off the paint from the pencils, and put the ſcrapings of the pallet.

SMUT, in *Huſbandry*, a diſeaſe in corn, in which the grains, inſtead of being filled with flower, are full of a black ſtinking powder. See Blight and Rust *of corn*.

Many things have been ſuſpected as the cauſes of this diſtemperature in corn; but Mr. Tull ſeems convinced by experiment, that it is cauſed only by too much moiſture, the ſeveral plants of corn, which he had taken up by the roots, and planted in troughs of very moiſt earth, all bringing forth *ſmutty* ears, while very few ſuch were found in the corn of the field from whence theſe plants were taken. It is obſervable, alſo, that thoſe ears, the grains of which are to be *ſmutty*, never ſend up any flowers at all.

The two things, recommended by writers of huſbandry as remedies, or preventions of this diſeaſe, are brining, and changing the ſeed. The firſt of theſe methods was accidentally diſcovered about a century ago: a ſhip's load of wheat was, about autumn, ſunk near Briſtol, and afterwards was taken up at the ebbs at ſeveral times, after being thoroughly ſoaked in ſea water. When the wheat was all taken up, it was found unfit to make bread of, but a farmer trying ſome of it for ſowing, found it anſwer very well, and himſelf, and the neighbouring farmers, bought it all up at a ſmall price; the country all about was ſown out of this cargo. It happened that *ſmuttineſs* in the wheat corn was a reigning diſtemper in all parts of the kingdom at that time, but it was remarkable, that all the fields ſown with this ſalt wheat, were abſolutely free from the miſchief: this eaſily introduced the practice of ſoaking wheat, before ſowing, in a brine of ſalt and water, to prevent it in other places, and it has ſucceeded well.

Mr. Tull gives an inſtance of the certainty of its effect, in the caſe of two farmers whom he perſonally knew, and whoſe farms lay intermixed: theſe men bought the ſame ſeed between them from a very good change of land, and parted every land between them in the field; the oldeſt farmer believed the brining to be a fancy, and ſowed his ſeed unbrined, the other brined all his ſeed, and the conſequence was, that the old farmer had a great deal of *ſmut* in his corn, while the other had not one *ſmutty* ear.

When wheat is intended for drilling, it muſt be ſoaked in no other brine than that of pure ſalt and water, for if there be any greaſe among it, it will never be dry enough for this manner of ſowing. If ſeed-wheat be ſoaked in urine, it will not grow, and if it be only ſprinkled with it, it will moſt of it die, unleſs it be planted preſently. The moſt expeditious way of brining wheat for drilling, is to lay it in a heap, and waſh it with a ſtrong brine ſprinkled on it, ſtirring it up with a ſhovel, that it may be equally brined, or wetted with it; after this ſift on ſome fine lime all over the ſurface, and ſtir it up, ſtill ſifting on more in the ſame manner till the whole is duſted with the lime, it will then be ſoon dry enough to be drilled without farther trouble. It muſt be quicklime, in its full ſtrength, that is uſed on this occaſion.

Bad years will cauſe *ſmut* in corn, and good years will prevent it: it is, however, obſervable, that the crops in which there is *ſmutty* corn will, if uſed for ſeed, be liable to produce *ſmutty* corn again, rather than other ſeed. The brining is a defence againſt bad years, and againſt the miſchiefs attending the ſowing of corn among which there has been *ſmut*.

Mr. J. Reynolds aſcribes this diſeaſe to inſects, and recommends a pickle for effectually deſtroying their breed: this pickle he pronounces, after thirty years experience, to be a ſure remedy. See Brining *of corn*.

The other method of changing the ſeed is by many held effectual to prevent *ſmuttineſs* in the crop; ſeveral, who have tried this with due care, have found perfect ſucceſs from it: and it is to be obſerved, as to the great ſucceſs of the drowned wheat at Briſtol, that it was owing to a change of ſeed to the lands on which it was ſown, as well as a brined ſeed.

Seed-wheat ſhould be bought from the crop on a ſtrong clay-land, whatever kind of land it is to be ſowed upon. A white clay is a good change for a red clay, and a red clay for a white; but whatever the land be, from which the ſeed is taken, it may be inſected, if that be not changed there the preceding year, and then there may be danger, though it be had from ever ſo proper a land.

It is a rule among the farmers, never to buy ſeed-wheat from a ſandy ſoil, they expreſs their diſlike of this by the coarſe rhime; ſand is a change for no land.

A crop of wheat, very early planted, is not ſo apt to be *ſmutty*, as one planted leſs early; and the farmers have obſerved, that the largeſt and plumpeſt ground fat wheat is more liable to be *ſmutty* than the ſmall ground wheat. Tull's Horſe-hoeing Huſbandry.

The *ſmut* of corn uſually happens after rain, followed by a bright ſunſhine; and when the *ſmutted* ſtalks are examined, they are found to be ſpotted, and pricked as it were with ſmall burnt places. The cauſe of the malady therefore, probably is, that thoſe ſmall drops of rain, which remain upon the ſtalks before they are dried up by the ſun, act as ſo many lenſes, or ſmall burning-glaſſes, and their focus being very near them, their effect falls upon the ſtalk which ſupports them; wherefore the ſun's rays, collected in this point, muſt burn, and this burning dries up the ſtalk, and prevents the ear from graining, or producing its proper ſeeds.

Smutty corn is of a very miſchievous nature to thoſe who eat it. Schober has publiſhed a diſſertation on a terrible epidemical malady that raged in the year 1722, in many parts of Germany, and carried off a great many people of all ages and ſexes: this he attributes wholly to their eating flour and bread made of corn, among which a larger than ordinary quantity of this *ſmut* had been produced the year before, and ground down with it. From this it appears, that theſe black ears have a ſtupefactive and narcotic quality, depending on a peculiar ſulphur they are endowed with, and to this ſulphur it is owing that they are ſo inflammable beyond other corn.

This ſulphureous principle is very hurtful to the nerves, and never fails to cauſe diſorders of them, of various kinds, when taken in any quantity; contractions, and convulſions of the limbs, vertigos, ſleepineſs, and, in fine, light-headedneſs, were the ſymptoms of the diſeaſes brought on by the eating it on the occaſion above mentioned; and ſometimes true and incurable epilepſies come on. Some were ſeized with fevers, and children in particular were found more ſubject to the ſmall-pox that year, than they had been obſerved to be, and they had commonly very bad kinds.

SMYRHIZA, in *Botany*, a name uſed by Pliny, and ſome other old authors, for the common myrrhis, or chervil.

SMYRNIUM, in *Botany*. See Alisanders.

SMYRUS, in *Ichthyology*, a name ſometimes given by Pliny to the fiſh called by authors *myrus*, the Murænа *myrus* of Linnæus, and by Willughby the *ſea-ſerpent*, with a compreſſed tail.

It is a ſpecies of the muræna according to Artedi, and is diſtinguiſhed from all the others by that author, under the name of the *muræna* with a ſharp ſnout, variegated with white ſpots, and with the edge of the back-fin black. See Myrus.

SMYTHAM, in *Mineralogy*, lead-ore ſtamped and pounded down, like powder or ſand, to cleanſe the ſtones and earth from the ore.

SNAFFLE, in the *Manege*, a well known kind of bridle.

The *ſnaffle*, after the Engliſh faſhion, is a very ſlender bit-mouth without any branches; they are much uſed in England inſtead of true bridles, which are only employed in the ſervice of war. The French call them *bridons*, by way of diſtinction from *brides*, i. e. *bridles*.

The *ſnaffle*, or ſmall watering bit, is commonly a ſcatch-mouth, accoutred with two little very ſtraight branches, and a curb, and mounted with a head-ſtall, and two long reins of Hungary leather.

The *ſnaffle* is much recommended by Mr. Berenger in his Hiſtory and Art of Horſemanſhip, vol. ii. p. 225, &c.

SNAIL, in *Ichthyography*. See Liparis *noſtras*.

Snail, *helix*, in *Natural Hiſtory*, is a genus of the *teſtacea* order of worms. Its characters are; that its animal is a ſlug, the ſhell univalve, ſpiral, ſub-pellucid, and brittle, and that it has a ſemi-lunar aperture. Linnæus enumerates ſixty ſpecies.

The *garden-ſnail*, or *helix lucorum* of Linnæus, is a well known ſpecies: it abounds with a viſcid ſlimy juice, which it readily gives out by boiling to milk or water, ſo as to render them thick and glutinous. The decoctions in milk are apparently very nutritious and demulcent, and have been recommended in a thin acrimonious ſtate of the humours; in conſumptive caſes and emaciations.

The *exotic ſnail*, or *pomatia helix* of Linnæus, is alſo celebrated on account of its naturalization in this country, by ſir Kenelm Digby, and its uſe, as a food, in ſeveral parts of Europe during Lent. See Pomatia.

It was alſo much valued by the ancient Romans.

Perrault doubts of *ſnails* having eyes, and Dr. Brown denies it; but according to Dr. Porterfield, a good microſcope ſhews them diſtinctly.

The eyes of *ſnails* are lodged in their horns, one at the end of each horn, which they can retract at pleaſure.—Med. Eſſ. Edin. vol. iii. art. 12.

The manner of examining theſe eyes, which are four in number, is this; when the horns are out, cut off nimbly the extremity of one of them, and placing it before the microſcope, you may diſcover the black ſpot at the end to be a really ſemiglobular eye.

The diſſection of this animal is very curious; for by this means the microſcope not only diſcovers the heart beating juſt againſt the round hole near the neck, which ſeems the place of reſpiration, but alſo the liver, ſpleen, ſtomach, and inteſtines, with the veins, arteries, mouth, and teeth, are plainly obſervable; the guts of this creature are green, from its eating of herbs, and are branched all over with fine capillary white veins; the mouth is like a hare's, or rabbit's, with four or ſix needle-teeth, reſembling thoſe of leeches, and of a ſubſtance like horn.

Snails are all hermaphrodites, having both ſexes united in each individual; they lay their eggs with great care in the earth, and the young ones are hatched with ſhells completely formed. Cutting off a *ſnail*'s head, a little ſtone appears, which is ſuppoſed to be a great diuretic, and good in all nephritic diſorders. Immediately under this ſtone the heart is ſeen beating, and the auricles are evidently diſtinguiſhable, and are membranous, and of a white colour; as are alſo the veſſels which proceed from them.

Snails diſcharge their extremities at a hole in their neck, they alſo breathe by this hole, and their parts of generation are ſituated very near it. The penis is very long, and in ſhape reſembles that of a whale.

In the proceſs of generation, it has been obſerved, that with the male and female part there iſſues, at the aperture of the neck, a kind of ſpear, ſhaped like the head of a lance, and terminating in a very acute point: and when the two *ſnails* turn the clefts in their necks towards each other, the ſpear iſſuing from one pricks the other, and then either drops to the ground, or is carried off by the *ſnail* it has pricked. This *ſnail* inſtantly withdraws, but ſoon after rejoins the other, which it pricks in its turn, and after ſuch mutual puncture, the copulation never fails of being conſummated.

Snails are ſaid to couple three times at the diſtance of about fifteen days from each other, nature producing a new ſpear for each time of copulation, which laſts ten or twelve hours; at the end of about eighteen days they bring forth their eggs, by the aperture of their neck. Baker's Microſcope, p. 217. Mem. R. A. Abr. vol. iii. p. 85.

So ſmall an animal as the *ſnail* is not free from the plague of ſupporting other ſmall animals on its body; and as in other animals we find theſe ſecondary ones either living only on their ſurface, as lice, &c. or only in the inteſtines as worms; it is very remarkable that this creature infeſts the *ſnail* in both theſe manners, being found ſometimes on the ſurface of its body, and ſometimes within its inteſtines.

There is a part of the common garden *ſnail*, and of other of the like kinds, commonly called the *collar*; this ſurrounds the neck of the *ſnail*, and is conſiderably thick, and is the only part that is viſible when the animal is retired quietly into its ſhell. In this ſtate of the animal, theſe inſects, which infeſt it, are uſually ſeen in conſiderable numbers marching about very nimbly on this part: beſides the *ſnail*, every time it has occaſion to open its anus, gives them a place by which to enter into its inteſtines, and they often ſeize the opportunity. Mem. R. A. Abr. vol. iii. p. 377, &c.

Snails are great deſtroyers of fruit in our gardens, eſpecially the better ſorts of wall-fruit. Lime and aſhes ſprinkled on the ground where they moſt reſort, will drive them away, and deſtroy the young brood of them; it is a common practice to pull off the fruit they have bitten, but this ſhould never be done, for they will eat no other till they have wholly eat up this, if it be left for them.

The Romans were fond of *ſnails*, and had them fed on purpoſe for their tables. The POMATIÆ were preferred for this purpoſe; and they were fed with bran and ſodden wine. Fulvius Hirpinus was the firſt inventor of this luxury, a little before the civil wars between Cæſar and Pompey.

Their taſte is not delicious, but rather diſagreeable; but this they diſguiſed by means of good ſauces, and had other reaſons for the receiving them into the liſt of foods. They uſed them as provocatives, or inciters to venery.

Ariſtotle, and the old Greeks, had no idea of the generation of theſe inſects, in the manner of other animals, but ſuppoſed them produced ſpontaneouſly; but the Romans ſhew, by many paſſages in their writings, that they had got over this error, and even ſeem, by the preference they gave to the neck of this animal in this intention, to have underſtood the hermaphrodite ſtructure of this inſect, which much later ages have pretended to make a new diſcovery.

The eaſtern nations at preſent run much into the opinions of the Romans of old, as to provocatives; they uſe, as the others did, every thing that ſerves to the purpoſes of generation in other animals, and every thing that has but the reſemblance of the external figure of the parts ſubſervient to it.

SNAIL, *ear*. See SHELLS.

SNAIL, *naked, limax*. See SLUG and LIMAX.

SNAIL, *oat*, a name given by Dr. Liſter, in the Philoſophical Tranſactions, to a ſmall *ſnail*, which he obſerved under the looſe bark of old willows, elms, and other trees, and which is of a very ſingular ſtructure; the ſhell reſembling an oat-corn, whence the name, and its volutæ, or wreaths, running contrary to the direction of them in other *ſnails*, that is eaſt and weſt, as the philoſophers expreſs it, referring it to the motion of the ſun; but theſe ſhells, to uſe that language, have the turns weſt and eaſt, or more plainly, they have the turns running from the right hand to the left, not from the left to the right as other *ſnails*. Phil. Tranſ. Nº 250.

SNAIL, *trefoil*, in *Botany*. See TREFOIL.

SNAIL is alſo the name of the animal inhabiting many kinds of ſhells, as the patella, cochlea, nerite, buccinum, turbo, trochus, voluta, murex, purpura, lyra, and concha Veneris. See PATELLA, COCHLEA, &c.

SNAKE, *anguis*, in the Linnæan *Syſtem of Zoology*, is a genus of SERPENTS, the characters of which are, that the animals belonging to this genus have abdominal and ſubcaudal ſcales. Here we may obſerve, that Linnæus has diſtinguiſhed the ſmall ſcales, with which the back and ſides of the animals belonging to the claſs of SERPENTS are covered, by the name of *ſquamæ*; and the oblong, narrow, tranſverſe plates, with which the bellies of ſome of them are covered, by the denomination of *ſcuta*. Thoſe that have both *ſquamæ* and *ſcuta*, he diſtributes under the genus of *coluber*; thoſe that have only *ſquamæ* under the appellation of *anguis*. In conformity to this diſtribution, he has ranked the *common ſnake* as well as the VIPER, &c. under the genus of *coluber*; and claſſed ſixteen different ſpecies, as the four-footed Javan *ſnake*, the common SLOW-*worm*, &c. under that of *anguis*.

SNAKE, *annulated*. See AMPHISBÆNA and SERPENTS.

SNAKE, *common*, or *ringed*, *coluber natrix* of Linnæus. See NATRIX.

The following account of an eaſy method of preſerving *ſnakes* may not be unacceptable. When the *ſnake* is killed, it muſt be waſhed clean, and put into a glaſs of a proper ſize, the tail firſt, and afterwards the reſt of the body, winding it in ſpiral aſcending circles, and diſpoſing the back, which is always the moſt beautiful, outwardly. A thread connected with a ſmall bead is then, by a needle, to be paſſed through the upper jaw from within outwardly, and then through the cork of the bottle, where it muſt be faſtened; by this means the head will be drawn into a natural poſture, and the mouth kept open by the bead, whereby the teeth, &c. will be diſcovered: the glaſs is then to be filled with rum, and the cork ſealed down. In this manner the *ſnake* may be preſerved for many years; nor will the ſpirits impair or change the luſtre of its colour.

SNAKE, *blood*, *hæmorrhous*, the name of a peculiar ſpecies of ſerpent, ſo called, becauſe it was ſuppoſed, that on a perſon's being bit by it, the blood flowed out of every part of the body.

It is a ſmall ſerpent, ſeldom arriving to more than a foot long; its eyes are remarkably vivid, bright, and ſparkling; its ſkin is very gloſſy, and its back variegated with a great number of black and white ſpots; its neck is very ſlender; its tail extremely ſharp, and it has a ſort of ſmall horns placed over its eyes: it is found in Egypt.

There is alſo an American kind of this, found in the ſouthern parts, and called by the natives *ahucyatli*, which is larger than the other, and reſembles the rattle-*ſnake* in many particulars, but wants the diſtinguiſhing character in the tail. See *Tab. Serpents*, and Ray's Syn. An. p. 287.

SNAKE, *horned*. See CERASTES.

SNAKE, *oak*. See DRYINUS.

SNAKE, *rattle*, *crotalus*, a very dreadful genus of SERPENTS. Its characters are, that the animals of this genus have abdominal ſcuta, or ſhields, and ſubcaudal *ſcuta* and *ſquamæ*, or ſcales, and that the tail terminates in a horny rattle. Linnæus enumerates five ſpecies, which are all inhabitants of America, and venomous.

The *rattle-ſnake*, or *horridus crotalus*, is a very dreadful ſpecies of ſerpent, whoſe bite is fatal, if not timely remedied, and which is diſtinguiſhed from other ſerpents by the rattle in its tail. This is compoſed of ſeveral ſcaly ſubſtances, and is ſaid to increaſe by the creature's age, every year adding one ſcale to it. It moves over the rocks and mountains with prodigious ſwiftneſs, but is leſs nimble on even ground, than many other *ſnakes*.

It grows to four or five feet long, and ſometimes, though rarely, more; Cateſby ſays, that ſome of them are eight feet long, and weigh about eight or nine pounds; one of more than four feet long having been diſſected, and accurately deſcribed by Dr. Tyſon, the account that gentleman gives of it may not be unacceptable to the reader.

The body, where largeſt, which was near the middle, meaſured ſix inches and a half round; its neck only three inches; its head was flat, as that of the viper; and as the jaws are very broad and protuberant, and the noſe ſharp, it ſomewhat reſembles the head of an arrow; at the end of the noſe are placed the noſtrils, and between theſe and the eyes, there are two other holes which may be miſtaken for ears; but they only go into a hollow of the bone of the ſkull, without any perforation into the brain. The viper has nothing of theſe holes. The eyes are round, and wholly reſemble thoſe of the viper; the whole body of the creature greatly alſo reſembles the viper, but for the ſingularity of the *rattle*; and over the eyes there are two large ſcales, looking like eye-brows.

The ſcales which cover the head are very ſmall, thence they become gradually larger, as they reach toward the middle of the body, and from the middle to the tail they grow leſs and leſs again; and all in ſhape much reſemble the broad and flat ſeeds of the common garden parſnip. There is ſome variety in the colours of this creature, whether according to the difference of age or ſex, or from leſſer accidents; the moſt uſual colours are theſe; the ſcales are of a duſky greeniſh, like the feathers of the back of the green-finch, and are variegated with ſmall black ſpots in great numbers; there alſo are four large ones of the ſame colour.

The back is of a mixt colour, of a dead yellowiſh brown, variegated with blotches of black and yellow, and with a number of ſmall dots of the ſame colours; the larger blotches being laid in great regularity, and making a very beautiful teſſelated figure; the ſcales become darker as they approach the tail, where they are almoſt black; and thoſe on the ridge of the back all along, are raiſed into a ſort of ſharp prominence in their middle, like the ſcales of a crocodile; thoſe on the ſides are plain and flat; the belly is all along covered with oblong parallelogram ſcales, laid tranſverſely, and joined to each other by diſtinct muſcles; theſe are very bright and gloſſy, and are yellow ſpotted with black. From the neck to the anus there were one hundred and ſixty-eight; beyond the anus two half ſcales, and thence nineteen whole ſcales of black lead colour, with yellowiſh edges; from thence to the *rattle*, ſix orders or rows of ſmaller ſcales of the ſame colour.

The head is ſmall in proportion to the body, but the mouth is capable of opening to a prodigious width; the tongue is wholly like that of the viper, compoſed of two oblong portions, joined toward the baſes, but ſeparate as they approach the end; the teeth are of two kinds, the ſmaller ones deſigned for its eating with, the larger and longer for biting and poiſoning what it ſeizes; theſe are only placed in the upper jaw, but all the teeth of the mouth are of the canine kind, as the creature, never chewing its prey, has no uſe for dentes molares, or grinders.

The poiſonous teeth are ſituated on the outſide of the jaw, in the interior part of the mouth; not fixed in the ſockets of the jaws, as the others, but fixed to two bones. Theſe, in their natural ſtate, are not viſible, even when the creature's mouth is opened, unleſs it be with an intent to wound; for they lie back under a membranaceous covering, and the creature has a power of erecting, and wounding with them at pleaſure, as the lion and cat-kind can retract, or thruſt out their claws. Theſe teeth are crooked, and have a hollow at their bottom, and at their point a very plain and evident ſlit, looking like the nib of a writing pen; the teeth are hollow all the way from this ſlit to their bottom, and on preſſing the gums in a dead *rattle-ſnake*, the poiſonous juice may be ſeen to aſcend by degrees up the tooth, and at length to be diſcharged out of the ſlit at the point; this makes it very plain in what manner the poiſon is conveyed into the fleſh, when the creature bites. See Viper.

The rattle is affixed to the laſt vertebra of the tail, and is compoſed of a ſeries of ſmall bones; that next the tail is uſually of a bluiſh grey colour, the reſt of a pale brown. Theſe bones are hollow, very thin, hard, and dry, and of a brittle texture, and very ſonorous. They are all of the ſame figure, repreſenting, in ſome degree, the os ſacrum in the human ſkeleton, and are all nearly of the ſame ſize. The laſt of theſe is ſeen to have a rigid extremity, in manner of a tail, and all the others have the ſame, though it is not diſtinguiſhable in them, as in the joining it runs under two others; and by means of this ſtructure they are all moveable with the ſmalleſt force, and the ſound is the more vigorous, as each of theſe tails ſtrikes on two of the hollow joints, when put in motion.

The age of the creature, as ſome authors have aſſerted, is known by the number of joints of this rattle, which are found to be from one to twenty, or more. The uſe of this ſeems not to the creature, but to other animals, that they may be alarmed at the approach of ſo terrible an enemy, and get out of its way in time; beſides, if a ſingle *ſnake* be ſurpriſed and rattles, others that are near take the alarm, and rattle in like manner. Phil. Tranſ. Abr. vol. ii. p. 797, &c. See Phil. Tranſ. Abr. vol. viii. p. 410—416, &c. See *Tab. Serpents.*

The general food of *rattle-ſnakes* conſiſts of toads, frogs, crickets, graſshoppers, and other inſects, but chiefly of ground-mice; and they again ſerve for food to bears, and even hogs. Theſe animals are viviparous, and commonly bring forth about twelve, in the month of June. They couple in Auguſt, and are then the moſt dangerous. They ſhed their ſkins every year in June, and turn it inſide out, when they throw it off. They generally den among the rocks in great numbers together, retiring about the middle of September, and coming abroad about the middle of May.

The charming or faſcination of the *rattle-ſnake*, as this is uſually called, has exerciſed the wits of many naturaliſts in vain, and many have diſbelieved the fact.

Sir Hans Sloane mitigates the matter, by ſuppoſing the creature firſt to ſeize or bite its prey, which it then ſuffers to eſcape, as far as the poiſon will let it, watching its death, that it may devour it without trouble: and that it is in this poiſonous ſtate that people have ſeen the ſquirrels, &c. dancing about before the *rattle-ſnake*, and dying convulſed; all which they have attributed to the power of charming in the eye of the *ſnake*, not conceiving that it was the effect of the creature's having before bitten them. This, though a very plauſible account, yet however wants experience to confirm it, and the general teſtimony of people, who have ſeen the facts, makes againſt it.

The ſame author gives us, however, from colonel Beverley, the whole proceſs of the charm. The colonel acquaints us, that ſome company he was with once ſaw a hare, about half grown, ſitting quietly in an orchard, and ſtriking at her, ſhe only removed a few yards, when wondering at the cauſe, they ſaw a *rattle-ſnake* about ten feet diſtance, eying the hare as his deſtined prey. The poor creature was, by this time, in agonies and convulſions, often getting up on its legs, as if intending to run away, but always immediately falling down again, and growing worſe and worſe, ſoon loſt the uſe of its hinder legs, and panting vehemently, fell on its ſide.—In about half an hour more the hare ſeemed to have done with all ſtruggles, and to be dead, on which the *ſnake* uncoiled itſelf, and moved gently towards it, but the poor hare ſtarting again he ſtopt; but when all was again quiet, he moved up to it, and, raiſing his head, looked all over his prey, his colours looking at that inſtant more beautiful than before, and his eyes ſparkling. The hinder part of the hare had been toward the *ſnake* all this time, and it had periſhed without much looking at its enemy. The *ſnake* wetted the body all over with his ſlaver, and then, with great difficulty, taking firſt the head into his mouth, ſwallowed that, and afterwards the whole body, ſucking it gently down, and not getting in the ſhoulders without great difficulty.

It is certain, upon the whole, that there is much in this account to favour ſir Hans Sloane's opinion of the hare's having been firſt bitten, though that was not ſeen, ſince the convulſions, and loſs of the uſe of the hinder legs, ſeem a very natural effect of poiſon; but we are aſſured, by perſons who have been eye-witneſſes to the fact, that a bird hopping about in all this agony and terror, has, on the frightening the *rattle-ſnake* away, flown off without any difficulty; ſo that the whole ſeems yet not underſtood. Sloane's Hiſt. Jamaica. Phil. Tranſ. Abr. vol. ix. p. 55, &c.

Mr. Dudley (Phil. Tranſ. Abr. vol. viii. p. 410.) obſerves, that though he dares not anſwer for the truth of every ſtory, yet he is abundantly ſatisfied from many witneſſes, both Engliſh and Indian, that a *rattle-ſnake* will charm both ſquirrels and birds from a tree into his mouth; and others have aſcribed the effect accounted for by faſcination, to exceſs of fear, obſerving, that the unguarded rage and ſurprize which birds and ſquirrels are in at the ſight of animals capable of hurting them or their young, and the fear and confuſion at being diſturbed in their retreats, or at the time of gathering their food, put them into the power of their enemies, and bring them ſo near the *ſnake*, that he may eaſily reach them when placed on a coil. For an account of the poiſon, &c. of the *rattle-ſnake*, ſee Viper.

Snake, *ſand*, the Engliſh name of a kind of ſerpent found in Lybia, and ſome parts of Italy. See Ammodytes.

Snake, *ſea*, *ſerpens marinus*, the name of a fiſh of the eel-kind, being the cylindric murÆna, with the tail naked and acute, uſually of five or ſix feet in length, and a furrowed body, continuing all the way of the ſame thickneſs, till near the tail. See *Tab.* IV. *Fiſhes*, N° 50. Its back is of a duſky yellow, and its belly a ſhining blue; its ſnout is long, ſlender, and pointed, and the opening of its mouth extremely large; near the end of the under jaw it has four or five large ſharp teeth, which bend backwards, the reſt of the teeth are very ſmall, and ſtand cloſe together: at the very extremity of the upper jaw it has four very large teeth, and all the reſt are ſmall, and like thoſe in the under one; but the largeſt teeth of all are placed in a row, in the middle of the palate; it has only one pair of fins, which are placed near the gills; the opening of the gills are at a conſiderable diſtance from the head, and it is marked with dotted lines down its ſides; it is common in the Mediterranean, and its fleſh is very fine taſted, but full of ſmall bones. Willoughby, Hiſt. Piſc. p. 108.

Biſhop Pontopiddan mentions (in his Hiſt. of Norway, vol. ii. p. 195, &c.) a *ſea-ſnake* of a very prodigious ſize; for the particulars of its dimenſions, &c. we muſt refer to the teſtimonies which he has recorded. Theſe animals, ſome of which are ſaid to be no leſs than ſix hundred feet long, are dangerous to navigators, as they throw themſelves over veſſels of ſome hundred tons burthen, and ſink them to the bottom by their weight. The preſervative againſt them is caſtor, the ſmell of which they are ſaid to avoid. The biſhop apprehends, that this creature, which inhabits the North Sea, is the leviathan mentioned in the ſcripture. Iſaiah xxvii. 1. Job xxvi. 13.

Snake, *ſleep*. See Hypnoticus *ſerpens*.

Snake, *ſpectacle*. See Cobras *de capello*.

Snake-*ſtones*, *ammonitæ*, in *Natural Hiſtory*, the name of a large genus of foſſil ſhells, very few, if any, of which are yet known in their recent ſtate, or living either on our own, or any other ſhores, ſo that it ſeems wonderful whence ſo vaſt a number and variety of them ſhould be brought into our ſubterranean regions. They ſeem indeed diſperſed in great plenty throughout the world, but no where are found in greater numbers, beauty, and variety, than in our own iſland.

Theſe are frequent in many parts of the world, beſide the plenty we have of them in England, and elſewhere. The accurate obſerver, Mr. Harenberg, found prodigious numbers of them on the banks and among the ſand of a river in Germany. He traced this river through its ſeveral windings for many miles, and among a great variety of belemnitæ, cornua ammonis, and cochlitæ, of various kinds, he found alſo great quantities of wood, of recent petrifaction, carrying in it at that time the plain marks of the axe, by which it had been cut from the trees then growing on the ſhore. The water of this river he found, in a dry ſeaſon, and when the ſupplies of its natural ſprings were not diluted with rains, to be conſiderably heavier than common water; and many experiments ſhewed him that it contained ferruginous as well as ſtony particles, in great quantity, whence the petrifactions in it appeared the leſs wonderful, though many of them of recent date.

Of the cornua ammonis, or *ſerpent-ſtones*, he there obſerved more than thirty different ſpecies, and doubts not but there are many more yet unobſerved. They lie immerſed in a bluiſh foſſil ſtone, of a ſoft texture, and fatty appearance. They lie in this in prodigious numbers and of a great variety of ſizes, from the larger known ſorts, down to ſuch as could not be ſeen without very accurate inſpection, or the aſſiſtance of a microſcope. Such as lie in the ſofteſt of theſe ſtones, are ſoft like their matrix, and eaſily crumble to pieces; others are harder. In a piece of this ſtone, of the bigneſs of a finger, it is common to find thirty or more of theſe foſſils; and often they are ſeen only in form of white ſpecks, too minute to ſhew their figure till examined by the microſcope. But what is moſt obſervable of the cornua ammonis of this place is, that they are often found growing not only to, but into one another, in ſuch a manner, that they cannot be ſuppoſed ever to have been inhabited by any living fiſh, eſpecially the ſpecimen which is pierced by the other. This author is of opinion, that they grow, and are formed where they are; and attempts to prove it by affirming, that they have an actual increaſe in ſize there in a little time, and that not only if left in their beds but if taken out, and put into a glaſs of the water. This is an opinion wholly different from the received one at preſent in the world, and perhaps will be found erroneous on farther trials. Act. Erudit. 1727. p. 140.

They are of very different ſizes, as well as ſpecies, ſome being found of a ſize of the ſix-pence, or leſs than that, and others of more than two feet in diameter; they are all made up of ſeveral circles, like thoſe of a *ſnake* when rolled up, the tail lying in the centre, and the larger end, where was the mouth of the fiſh, at the other. Some of them are rounded, others greatly compreſſed, or flatted, and they are at times found lodged in almoſt all the different ſtrata of earth and ſtone.

They all conſiſt of ſeveral volutæ, which are different in number in the different ſpecies, and their ſtriæ alſo are extremely various, ſome very deep with very high ridges between them, others were ſlight; ſome ſtraight, others crooked; others undulated, and ſome terminating in dots, tubercles, or cavities, towards the back, and others having tubercles in two or three places.

They are all compoſed of a great number of chambers, or cells, in the manner of the *nautilus Græcorum*, each having a communication with the others, by means of a pipe or ſiphunculus. There is a ſmall white ſhell fiſh of Barbadoes, which ſeems truly a recent animal of this genus; and in the Eaſt-Indies there is another alſo, ſmall and greyiſh; but the large, and beautifully marked ones, are found only foſſil.

They are compoſed of various foſſil bodies, often of quarry-ſtone, ſometimes of the matter of the common pyrites, and of a great variety of other ſubſtances; and though they appear uſually mere ſtones, yet in ſome the pearly part of the original ſhell is preſerved in all its beauty. Sometimes alſo, while the outer ſubſtance is of the matter of the pyrites, or other coarſe ſtony, or mineral matter, the inner cavity is filled with a pure white ſpar of the common plated texture. This gives a great beauty to the ſpecimen. Hill's Hiſt. of Foſſ. p. 649—650.

The cornua ammonis, or *ſnake-ſtones*, are found in many parts of England, particularly in Yorkſhire, where they are very plentiful in the alum-rocks of ſeveral ſizes. See *Tab. of Foſſils, claſs* 9. See CORNU *ammonis*.

SNAKE-*root*, *ſerpentaria*, the root of a ſpecies of *ariſtolochia*, or BIRTHWORT.

The ancients were only acquainted with two kinds of *ſerpentaria*, the *great* and the *ſmall*: but ſince the diſcovery of America, botaniſts have added ſeveral others; as, the *ſerpentaria Virginiana*, or *Virginia ſnake-root*: beſides that of Canada, and that of Braſil.

They are ſuppoſed to be alexipharmics, or counter-poiſons; and as ſuch are ingredients in the Venice treacle. The herb *dragon*, is alſo called, by ſome writers, the *great ſerpentaria*, by the ancients *dracunculus major*; this has its ſtem very ſtraight, ſmooth, and marked with red ſpots, like the ſkin of a ſerpent; whence, probably, as much as from its virtues, it is, that it takes its name. Its root is big, round, and white, covered with a thin ſkin. The ſmaller *ſerpentaria*, of this kind, has its ſtalk much like that of the larger, only its leaves are like thoſe of ivy, whereas thoſe of the larger are digitated, after the manner of baſtard hellebore. Its root is round and bulbous.

The *ſerpentaria of Virginia*, called alſo *colubrina Virginiana*, *aſarum Virginianum*, *ſerpentaria nigra*, and the *contrayerva of Virginia*, has its leaves green and large, almoſt in figure of a heart; its fruit round, and its root, which is of a very ſtrong aromatic ſmell, has, at bottom, an infinite number of long ſmall filaments, repreſenting a kind of beard, of a browniſh colour on the outſide, and paler or yellowiſh within.

It was firſt brought into Europe from Virginia by the Engliſh; and is by the Americans eſteemed a ſovereign antidote againſt the bite of the rattle-ſnake.

We are told by travellers, that this root not only cures the bite of a rattle-ſnake, but that that animal flies the very ſmell thereof; for which reaſon the Indians, and other travellers, always carry it with them on the end of a ſtaff, by way of preſervative from that creature.

This root is a warm diaphoretic and diuretic. It is reckoned one of the principal medicines of the alexipharmic kind; and as ſuch, is in general uſe, in low and malignant fevers and epidemic diſeaſes, for raiſing the pulſe, promoting a diaphoreſis, and correcting a putrid diſpoſition of the humours. It is given, in ſubſtance, from a few grains to a ſcruple, or half a dram; in decoction, or infuſion, to a dram and upwards.

Tinctures of it are prepared in the ſhops, by macerating two or three ounces of the root in a quart of proof ſpirit, or of a ſpirituous alexiterial water, mixed with one-ſixth its quantity of diſtilled vinegar, which laſt ingredient is an excellent addition to this kind of medicines in acute diſeaſes. See ARISTOLOCHIA.

SNAKE-*weed*. See BISTORT.

SNAKE-*root, rattle*. See MILK-*wort*.

SNAKE-*wood*, in the *Materia Medica*, is the wood or root of the tree which affords the *nux vomica*, or of other trees of the ſame genus. It is brought from the Eaſt-Indies under the name of LIGNUM *colubrinum*, in pieces about the thickneſs of a man's arm, covered with a ruſty-coloured bark, internally of a yellow colour, with whitiſh ſtreaks. This wood, in raſping or ſcraping, emits a faint but not diſagreeable ſmell, and when chewed for ſome time diſcovers a very bitter taſte.

From the experiments of Cartheuſer, water appears to be the proper menſtruum of its active matter.

SNAKE-*wood* has been recommended, in ſmall doſes, not exceeding half a dram, as an anthelminthic, and in obſtinate quartans, jaundices, cachexies, and other chronical diſorders: it is ſaid to operate moſt commonly by ſweat, ſometimes by ſtool, and ſometimes by vomit. It appears, however, to be poſſeſſed, in a lower degree, of the ſame ill qualities with the NUX *vomica*. Lewis.

SNAP-*dragon*, or CALF'S *ſnout*, *antirrhinum*, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the empalement is of one leaf, cut into five parts; the flower is ringent, having an oblong tube, and divided at the top into two lips, which are cloſed at the jaw; in the bottom is ſituated an obtuſe nectarium, which is not prominent; in the centre is placed a roundiſh germen, which becomes a round obtuſe capſule, having two cells, which are full of ſmall angular ſeeds.

To this genus Linnæus has joined the *linaria* and *aſarina*; but as the flowers of the linaria have ſpurs to their petals, and the nectarium being very prominent, which are not ſo in this genus, it ſhould be ſeparated from it: eſpecially as there are many ſpecies of both kinds, which cannot ſo well be diſtinguiſhed when the genera are united. Linnæus has enumerated forty, and Miller ſix ſpecies.

Theſe plants grow very well upon old walls or buildings, in which places they will endure for ſeveral years; whereas thoſe planted in gardens ſeldom laſt longer than two, unleſs in a very poor ſoil, and when the flowers are not ſuffered to ſeed. Wherever they are deſigned to grow on walls, or on a rocky barren ſoil, the ſeed ſhould be ſown the beginning of March, where they are deſigned to remain; for when they are tranſplanted from a better ſoil, they ſeldom ſucceed. Miller.

SNAP-*dragon of America*. See RUELLIA and BARLERIA.

SNAP-*tree*, in *Botany*, a ſpecies of the JUSTICIA.

SNATCH-*block*, in a *ſhip*. See BLOCK.

SNEAD, or SNEATH, in *Agriculture*, the handle of a ſcythe, or like tool.

SNEEZING, *ſternutatio*, a convulſive motion of the muſcles of the breaſt uſed in expiration; wherein, after ſuſpending the inſpiration begun, the air is repelled from the mouth and noſe with a momentary violence and noiſe.

The cauſe is, an irritation of the upper membrane of the noſe, which communicates with the intercoſtal nerve by means of the twigs that it detaches to it.

This irritation is performed either externally, by ſtrong ſmells, as marjoram, roſes, &c. or by duſt floating in the air, and taken in by inſpiration; or by ſharp pungent medicine, as creſſes, and other ſternutatories, which vellicate the membrane of the noſe; or internally, by the acrimony of the lympha, or mucus, which naturally moiſtens that membrane.

The matters caſt forth in *ſneezing*, come primarily from the noſe and throat; the pituitary membrane continually exuding a mucus thither; and, ſecondarily, from the breaſt, the trachea, and the bronchia of the lungs.

F. Strada, in an expreſs treatiſe of *ſneezing*, has diſcovered the original of the cuſtom of ſaluting thoſe who *ſneeze*. He ſhews it to be a relic of Paganiſm; though he owns it was in uſe among the Jews, as well as among the Romans. From an epigram in the Anthology it appears, that among the ancients, a perſon after *ſneezing* made a ſhort prayer to the gods; as *Ζευ σωζε*, *Jupiter ſave me*.

Sneeze-*wort* in *Botany*, a ſpecies of ACHILLEA. See YARROW.

Sneeze-*wort*, *Auſtrian*, in *Botany*, a ſpecies of *xeranthemum*. See ETERNAL *flower*.

SNET, among *Sportſmen*, the fat of all kinds of deer. Dict. Ruſt.

SNIEGULKA, in *Natural Hiſtory*, the name given by the common people of Poland to a bird of paſſage, that only comes to them in the colder months.

The name ſignifies the SNOW-*bird*, and Rzaczinſki, in his Hiſtory of Poland, calls it *nivalis avis*. The people preſage from its coming, the mildneſs or ſeverity of their winter.

SNIGGLING, a method of fiſhing for eels, chiefly uſed in the day-time, when they are found to abſcond themſelves near wears, mills, or flood-gates; it is performed thus; take a ſtrong line and hook, baited with a lob or garden-worm, and obſerving the holes where the eels lie hid, thruſt your bait into them by help of a ſtick, and if there be any, you ſhall be ſure to have a bite; and may, if your tackling hold, get the largeſt of eels.

SNIPE, *gallinago minor*, or SCOLOPAX *gallinago* of Linnæus, in *Ornithology*, a bird well known among the ſportſmen, and which though in general a bird of paſſage, yet ſometimes remains with us the whole year, and builds and breeds here. Its young are ſo often found in England, that Mr. Pennant doubts whether it ever entirely leaves this iſland. It lives in marſhy places, and builds among reeds in winter, but in the ſummer is found in our higheſt mountains as well as low moors; it lays four or five eggs at a time, of a dirty olive colour marked with duſky ſpots.

When *ſnipes* are much diſturbed, particularly in the breeding ſeaſon, they ſoar to a great height, making a peculiar bleating noiſe, and when they deſcend, dart down with great rapidity. The cock is obſerved (while his mate ſits on her eggs) to poiſe himſelf on his wings, making ſometimes a whiſtling and ſometimes a drumming noiſe. Their food is the ſame with that of the woodcock, and they are found in every quarter of the globe, and in all climates.

The breaſt and belly of the *ſnipe* are white; its back covered with long feathers, which are variegated with black and a reddiſh brown; its tail is ſhort, and hid by the wings when folded; it has a line of a reddiſh white running along the middle of the head; its beak is about three fingers breadth long, and is black at the end, and has ſeveral rough tubercles on it.

Theſe birds are eaſily taken, by means of lime-twigs in this manner: take fifty or ſixty birchen twigs, and lime them all very well together; take theſe out into places where there are *ſnipes*, and having found the places which they moſt frequent, which may be ſeen by their dung, ſet the twigs in theſe places, at about a yard diſtance one from another. Other places are thoſe where the water lies open in hard froſt and ſnowy weather; in theſe places alſo, and wherever they are ſuſpected to come to feed, let more lime twigs be placed in the ſame manner. The twigs are not to be placed perpendicularly in the ground, but ſloping, ſome one way, ſome another; the ſportſman is then to retire to a diſtance, and watch the coming of the birds to theſe places. When they fly to them, they naturally take a ſweep round the earth, and by this means they will almoſt always be caught by one or other of the twigs. When the firſt *ſnipe* is taken, the ſportſman is not to run to take it up, for it will feed with the twig under its wings, and this will be a means of bringing down more of them to the place. When three or four are taken, they may be taken up, only leaving one faſt to entice others; and thus the ſport may be continued as long as there are any birds of this kind about the place. It may be very proper, when the twigs are planted, to go about, and beat all the open and watery places near, that they may be raiſed from thence, and fly to thoſe places where the twigs are placed to receive them.

Snipe, *great*, in *Ornithology*, a ſpecies very rarely found in England. It weighs eight ounces; the head is divided lengthways by a teſtaceous line, bounded on each ſide by another of black; above and beneath each eye is another; the neck and breaſt are of a yellowiſh white finely marked with ſemicircular lines of black; the belly with cordated ſpots; and the ſides are undulated with black; the back, coverts of the wings, and ſcapulars teſtaceous, ſpotted with black, and edged with white: the primaries duſky; tail ruſt coloured, barred with black; and legs black. This ſpecies was ſhot in Lancaſhire. Pennant.

Snipe, *mire*. See BITTERN.

Snipe *bills*, in *Maritime Affairs*, a kind of hooks for faſtening the axle-tree of chain pumps to the bits.

Snipe, *jack*. See JACK *ſnipe*.

SNORING. This affection is otherwiſe called *ſtertor*, which is a ſound like that of the *cerchnon*, but greater and more manifeſt.

Many confound thoſe affections, and make them to differ only in place and magnitude, calling by the name of *ſtertor* that ſound, or noiſe, which is heard, or ſuppoſed to be made in the paſſage between the palate and the noſtrils, as in thoſe who ſleep; that boiling or bubbling noiſe, which in reſpiration proceeds from the larynx, or head, or orifice of the aſpera arteria, they call *cerchon*; but if the ſound comes from the aſpera arteria itſelf, they will have it called *cerchnos*, that is, as ſome underſtand it, a rattling, or as others a ſtridulous or wheezing roughneſs of the aſpera arteria. In dying perſons this affection is called by the Greeks ῥεγχος, *rhenchos*, which is a *ſnoring* or rattling kind of a noiſe, proceeding as it were from a conflict between the breath and the humours in the aſpera arteria.

This and ſuch like affections are owing to a weakneſs of nature, as when the lungs are full of pus or humours, to which purpoſe we read in the Prognoſtics of Hippocrates: "it is a bad ſign when there is no expectoration, "and no diſcharge from the lungs, but a noiſe, as from "an ebullition, is heard in the aſpera arteria, from a ple-"nitude of humour". Expectoration is ſuppreſſed either by the viſcidity of the humour, which requires to be diſcharged, and which adhering to the aſpera arteria, and being there agitated by the breath, excites that bubbling noiſe or ſtertor; or by an obſtruction of the bronchia; or, laſtly, by a compreſſion of the aſpera arteria and throat; whence the paſſage is ſtraitened, in which the humours being agitated, excite ſuch a kind of noiſe as before deſcribed. Hence Galen calls thoſe who are ſtrait breaſted ſtertorous. That author aſſigns but two cauſes of this ſymptom, which are either the ſtraitneſs of the paſſage of reſpiration, or redundance of humours, or both together; but it is neceſſary to add a third, which is the weakneſs of the faculty, which is the cauſe of the *rhenchos* in dying perſons, where nature is too weak to make diſcharges.

From what has been ſaid, we conclude, that this ſymptom, or this ſort of fervor, or ebullition in the throat, is not always mortal, but only when nature is oppreſſed with the redundance of humour, in ſuch a manner, that the lungs cannot diſcharge themſelves by ſpitting: or the paſſage appointed for the breath, being the aſpera arteria, is very much obſtructed, upon which account many dying perſons labour under a ſtertor with their mouths gaping. James.

SNORT, in the *Manege*, called in French *ebrouer*, denotes a certain ſound which a horſe of fire makes by breathing through his noſtrils; as if he had a mind to expel ſomething that was in his noſe, and hindered him to take breath.

This noiſe or ſound is performed by means of a cartilage within the noſtrils, called in French *ſouris*. Horſes of much metal *ſnort*, when you offer to keep them in. See SOURIS.

SNOTTER, in a *ſhip*. See SPRIT.

SNOW, *nix*, a meteor formed in the middle region of the air, of vapour raiſed by the action of the ſun, or ſubterraneous fire; there congealed, its parts conſtipated, its ſpecific gravity increaſed, and thus returned to the earth in form of little white villi, or flakes.

The *ſnow* we receive, may properly enough be aſcribed to the coldneſs of the atmoſphere though which it falls. When the atmoſphere is warm enough to diſſolve the *ſnow* before it arrives at us, we call it *rain*; if it preſerves itſelf undiſſolved, it makes what we call *ſnow*. See EVAPORATION.

Dr. Grew, in a diſcourſe of the nature of *ſnow*, obſerves, that many parts thereof are of a regular figure, for the moſt part ſo many little rowels, or ſtars of ſix points; and are perfect and tranſparent ice, as we ſee on a pond, &c. Upon each of theſe points are thoſe collateral points, ſet at the ſame angles as the main points themſelves; among which there are divers other irregular ones, which are chiefly broken points, and fragments of the regular ones: others, alſo, by various winds, ſeem to have been thawed, and frozen again into irregular cluſters; ſo that it ſeems as if the whole body of *ſnow* were an infinite maſs of icicles irregularly figured. A cloud of vapours being gathered into drops, the ſaid drops forthwith deſcend; upon which deſcent, meeting with a freezing air as they paſs through a colder region, each drop is immediately frozen into an icicle, ſhooting itſelf forth into ſeveral points; but theſe ſtill continuing their deſcent, and meeting with ſome intermitting gales of warmer air, or, in their continual waftage to and fro, touching upon each other, ſome of them are a little thawed, blunted, and again frozen into cluſters, or entangled ſo as to fall down in what we call flakes.

Clouds of *ſnow*, ſignior Beccaria obſerves, differ in nothing from clouds of RAIN, but in the circumſtance of cold, which freezes them. Both the regular diffuſion of *ſnow*, and the regularity in the ſtructure of the parts of which it conſiſts (particularly ſome figures of *ſnow* or hail, which he calls *roſette*, and which fall about Turin) ſhow the clouds of *ſnow* to be actuated by ſome uniform cauſe, like electricity. He even endeavours, very particularly, to ſhew in what manner certain configurations of *ſnow* are made, by the uniform action of electricity. He adds, that his apparatus never failed to be electrified by *ſnow*, as well as by rain; and that a more intenſe electricity unites the particles of HAIL more cloſely than the more moderate electricity does thoſe of *ſnow*. Lett. dell' Elletricismo, p. 520, &c. Prieſtley's Hiſt. &c. of Electricity, vol. i. p. 432.

The lightneſs of *ſnow*, although it is firm ice, is owing to the exceſs of its ſurface, in compariſon to the matter contained under it; as gold itſelf may be extended in ſurface till it will ride upon the leaſt breath of air.

The uſes of *ſnow* muſt be very great, if all be true that Bartholine has ſaid in its behalf, in an expreſs treatiſe De Nivis Uſu Medico. He there ſhews, that it fructifies the earth (which, indeed, is a very old and general opinion); and that it preſerves from the plague, cures fevers, colics, tooth-aches, ſore eyes, and pleuriſies (for which laſt uſe, his countrymen of Denmark uſually keep *ſnow* water gathered in March). He adds, that it contributes to the prolongation of life; giving inſtances of people in the Alpine mountains, that live to great ages: and to the preſerving of dead bodies; inſtances whereof he gives in perſons buried under the *ſnow* in paſſing the Alps, which have been found uncorrupted in the ſummer, when the *ſnow* is melted.

He obſerves, that, in Norway, *ſnow* water is not only their ſole drink in the winter; but *ſnow* even ſerves for food; people having been known to live ſeveral days without any other ſuſtenance.

Indeed, the generality of the medicinal effects of *ſnow* are not to be aſcribed to any ſpecific virtue in *ſnow*, but to other cauſes.

It fructifies the ground, for inſtance, by guarding the corn, or other vegetables, from the intenſer cold of the air, eſpecially from the cold piercing winds; and it preſerves dead bodies, by conſtipating and binding up the parts, and thus preventing all ſuch fermentations, or internal conflicts of their particles, as would produce putrefaction.

It has been a vulgar opinion, very generally received, that *ſnow* fertilizes the lands upon which it falls more than rain, in conſequence of the nitrous ſalts which it is ſuppoſed to acquire by freezing. But it appears from the experiments of Margraaf, in the year 1751, that the chemical difference between rain and *ſnow*-water is exceedingly ſmall, and that the latter, however, is ſomewhat leſs nitrous and contains a ſomewhat leſs proportion of earth than the former; but neither of them contain either earth or any kind of ſalt in any quantity which can be ſenſibly efficacious in promoting vegetation. Allowing, therefore, that nitre is a fertilizer of land, which many are, upon good grounds, diſpoſed utterly to deny, yet ſo very ſmall is the quantity of it contained in *ſnow*, that it cannot be ſuppoſed to promote the vegetation of plants upon which the *ſnow* has fallen. The peculiar agency of *ſnow* as a fertilizer, in preference to rain, may, without recurring to nitrous ſalts ſuppoſed to be contained in it, be rationally aſcribed to its furniſhing a covering for the roots of vegetables, by which they are guarded from the influence of the atmoſpherical cold, and the internal heat of the earth is prevented from eſcaping. *Snow* may alſo fertilize the earth, agreeably to the hypotheſis of thoſe who make oil the food of plants, by means of the oily particles which it contains: beſides, *ſnow*, in melting, moiſtens and pulverizes the ſoil, which had been bound up by the froſt; and as its water has a tendency to putrefaction, it ſeems, on many occounts, without admitting it to contain any nitre, to be admirably fitted to promote vegetation. Watſon's Chem. Eſſ. vol. ii. p. 77, &c.

It is a popular error, that the firſt *ſnow* that falls in the year, has particular virtues. In Italy they cool their wines all the ſummer with *ſnow-water*.

Snow may be preſerved by ramming it down in a dry place underground, and covering it well with chaff. At Leghorn they uſe barley-chaff for this purpoſe.

Snow and ice are alſo preſerved with ſtraw or reeds. Mr. Boyle has deſcribed the manner in his experimental hiſtory of cold. See ICE and ICE-*houſe*.

It is uſual in hot countries to mix *ſnow* and ice with their wine. Hence Pliny ſays, *Hi nives, illi glaciem potant, pœnaſque mentium in voluptatem gulæ vertunt.*—

Signior Sarotti, in the Philoſophical Tranſactions, mentions a *red* or *bloody ſnow*, which fell on the mountains La Langhe, near Genoa, on St. Joſeph's day. This *ſnow*, when ſqueezed, yielded a liquor of the ſame red colour.

SNOW, in *Sea-language*, is generally the largeſt of all two-maſted veſſels employed by Europeans, and the moſt convenient for navigation. The ſails and rigging on the main-maſt and fore-maſt of a *ſnow* are exactly ſimilar to thoſe on the ſame maſts in a ſhip, only that there is a ſmall maſt behind the main-maſt of the former, which carries a ſail nearly reſembling the mizen of a ſhip. The foot of this maſt is fixed in a block of wood on the quarter-deck, abaft the main-maſt, and the head of it is attached to the after-part of the main top. The ſail, which is called the try-ſail, is extended from its maſt towards the ſtern of the veſſel. When the ſloops of war are rigged as *ſnows*, they are furniſhed with a HORSE, which anſwers the purpoſe of the try-ſail-maſt, the fore-part of the ſail being attached by rings to the ſaid horſe, in different parts of its height. Falconer.

SNOW-*bird*, the EMBERIZA *nivalis* of Linnæus, in *Ornithology*, is diſtinguiſhed by the following characters: the bill and legs are black; the forehead and crown white, with ſome mixture of black on the hind part of the head; the back of a full black, the rump white; the baſtard wing and ends of the greater coverts black, the others white; the quill-feathers black, their baſe white; the ſecondaries white, with a black ſpot on their inner webs; the middle feathers of the tail black, the three outermoſt white, with a duſky ſpot near their ends; from the chin to the tail of a pure white.

Theſe birds are called in Scotland *ſnow-flakes*, becauſe they appear in hard weather and in deep *ſnows*. Some few breed in the Highlands, on the ſummits of the higheſt hills, but the greateſt number migrate from the extreme North. Their appearance is a certain forerunner of hard weather and ſtorms of *ſnow*, being driven by the cold from their common retreats. Their progreſs ſouthward is probably thus: Spitzbergen and Greenland, Hudſon's Bay, the Lapland Alps, Scandinavia, Iceland, the Ferro iſles, Shetland, Orknies, Scotland, and the Cheviot hills. They viſit, at that ſeaſon, all parts of the northern hemiſphere, Pruſſia, Auſtria, and Siberia. They arrive lean and return fat. In their flights they keep cloſe to each other, and fling themſelves collectively into the form of a ball, at which inſtant the fowler makes great havock among them. Pennant.

SNOW-*ball tree*, in *Botany*, a ſpecies of *viburnum*. See WAYFARING *tree*.

SNOW-*berry buſh*, in *Botany*, a ſpecies of *lonicera*. See *Upright* HONEYSUCKLE.

SNOW-*drop*, *galanthus*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the ſpatha, or ſheath of the flower is oblong, blunt, and compreſſed, which opens ſideways, and becomes a dry ſkin; the flower has three oblong concave petals, which ſpread open; in the bottom is ſituated the three-leaved nectarium, which is cylindrical, obtuſe, and indented at the top; under the flower is ſituated an oval germen, ſupporting a ſlender ſtyle, crowned by a ſingle ſtigma, attended by ſix ſtamina, which are gathered together; the germen becomes an oval capſule, which is obtuſe and three-cornered, opening in three cells filled with roundiſh ſeeds. We know but one ſpecies, which is valued for its early appearance in the ſpring: there is a variety of it with double flowers. Miller.

SNOW-*drop*, *great*, *leucoium*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are: that it has an oblong, obtuſe, compreſſed ſpatha or ſheath, which opens on one ſide; the flower is of the ſpreading bell-ſhape, cut into ſix parts, which join at their baſe; it hath ſix ſhort briſtly ſtamina, terminated by oblong, obtuſe, four-cornered ſummits, which are erect; the roundiſh germen is ſituated under the flower, ſupporting a ſtyle thick and obtuſe at the top, crowned by an erect briſtly ſtigma; the germen afterward becomes a turbinated capſule, with three cells, opening with three valves, and filled with roundiſh ſeeds. There are three ſpecies.

Snow-*drop tree*, *chionanthus*, in *Botany*, a genus of the *diandria monogynia* claſs. Its characters are theſe: it hath a permanent empalement of one leaf, erect, and cut into four acute parts; the flower is of one petal, divided into four very long narrow ſegments, which are erect, and it has two ſhort ſtamina inſerted in the tube of the petal, and terminated by upright heart-ſhaped ſummits; in the centre is placed an oval germen, ſupporting a ſingle ſtyle, crowned by an obtuſe trifid ſtigma; the germen becomes a round berry with one cell, encloſing one hard ſeed. Linnæus enumerates two ſpecies, but Miller only one, which is a very beautiful American tree, and bears the cold of our climate in the open air; but it is very difficult to increaſe, the layers being two years before they take root, nor will they ever take root at all unleſs they are well ſupplied with water in dry weather. Miller.

Snow-*ſtone*, in *Natural Hiſtory*, a name given by ſome to a very beautiful ſtone found in America; of which the Spaniards are very fond, making it into tables, and other ornaments, in their houſes. Alonſo Barba, who had ſeen much of it, tells us, that it is found in the province of Atocama, uſually in pieces of four feet long, and four or five inches broad; ſo that they are forced to join them in the working. Its general thickneſs is about two inches. It has a great variety of colours, which form clouds and variegations of a very beautiful kind. The principal colours are red, yellow, green, black, and white. The white is generally formed into ſpots on the very blackeſt parts of the maſs, and is ſo beautifully diſpoſed, that it repreſents *ſnow* falling in all its whiteneſs upon a jetty ſurface.

SNUFF, a preparation of tobacco, made by reducing it into a powder, fit to be taken in at the noſe, in order to purge or clear the head of pituita.

Ordinarily, tobacco is the baſis of *ſnuff*; other matters being only added to give it a more agreeable ſcent, &c. The kinds of *ſnuff*, and their ſeveral names, are infinite; and new ones are daily invented; ſo that it would be difficult, not to ſay impoſſible, to give a detail of them. We ſhall only ſay, that there are three principal ſorts: the firſt granulated; the ſecond an impalpable powder; and the third the bran, or coarſe part remaining after ſifting the ſecond ſort.

The many miſchiefs attending the unnatural practice of taking this powder of tobacco at the noſtrils, have been deſcribed by the writers in general on theſe ſubjects, ſince this pernicious cuſtom has reigned in the world: but one of the moſt remarkable accidents, occaſioned by it, is related in the Acta Eruditorum, which was the forming a polypus in the œſophagus, and which killed the patient, by ſtarving him, from an inability of ſwallowing. Act. Erudit. an. 1715. p. 475. See **Pica** *Naſi*.

Snuff, or **Snuffler**, in the *Manege*. See **Snort**.

SOAGGIO, the name of a fiſh common in the markets of Rome and of Venice, and of the turbot kind. See **Luga**-*leaf*.

SOAL, or **Sole**, in *Ichthyology*, the Engliſh name of the fiſh, called by the generality of authors the *bugloſſus*, by ſome *ſolea*, and the PLEURONECTES *ſolea* of Linnæus, with both eyes on the right ſide of the head, a rough oblong body, and the upper jaw longer than the lower. Some authors call it the *linguacula*.

The *ſoal* is found on all our coaſts, but thoſe on the weſtern ſhores are much larger than thoſe of the north. They are uſually taken in a trawl-net; they keep much at the bottom, and feed on ſmall ſhell-fiſh. The ſmall *ſoals* are much ſuperior in goodneſs to the large ones.

They are common in the Mediterranean, Engliſh, and German ſeas. The chief fiſhery for them on the Engliſh coaſt is at Brixham in Torbay.

Soals may be taken at any time of the year, but they muſt not be under ſeven inches from the eye to the end of the tail. 1 & 2 Geo. I. cap. 18.

Soal, *ſmooth*, is a ſcarce ſpecies, but is found in Cornwall, where, from its tranſparency, it is called the LANTERN-*fiſh*.

SOAP, or **Sope**, a kind of paſte, ſometimes hard and dry, and ſometimes ſoft and liquid, much uſed in waſhing and whitening linens, cleanſing woollen cloths from oil, whitening ſilk, and freeing it from the reſinous varniſh with which it is naturally covered; and for various other purpoſes, by the dyers, perfumers, hatters, fullers, &c.

The alkaline lixiviums, being capable of diſſolving oils more effectually than *ſoap*, might be employed for the ſame purpoſes; but when this activity is not mitigated by oil, as it is in *ſoap*, they are capable of altering, and even deſtroying entirely, by their cauſticity, moſt ſubſtances, eſpecially animal matters, as ſilk, wool, and others; whereas *ſoap* cleanſes from oil almoſt as effectually as pure alkali, without danger of altering or deſtroying, which renders it very uſeful.

The manufacture of *ſoap* in London, firſt began in the year 1524; before which time this city was ſerved with white *ſoap* from foreign countries, and with grey *ſoap*, ſpeckled with white, from Briſtol, and ſold for a penny a pound, and alſo black *ſoap* for a halfpenny the pound.

The principal *ſoaps* of our own manufacture, are, the *ſoft*, the *hard*, and the *ball ſoap*. The *ſoft ſoap* again, is either *white* or *green*. The proceſs of making each kind is as follows.

Soap, *green ſoft*. The chief ingredients uſed in making this are, lees drawn from pot-aſh and lime, boiled up with tallow and oil. Firſt, the ley of the proper ſtrength, of which they judge by the weight of the liquor, and tallow are put into the copper together, and, as ſoon as they boil up, the oil is added; then the fire is damped, or ſtopped up, while the ingredients lie in the copper to unite, or incorporate; which done, the copper is again ſet on boiling, being fed or filled with lees as it boils, till there be a ſufficient quantity put therein; then it is boiled off, with all convenient ſpeed, and put into caſks.

When this *ſoap* is firſt made, it appears uniform; but in about a week's time, the tallow ſeparates from the oil into thoſe white grains which we ſee in common *ſoap*. *Soap* thus made would appear yellow, but, by a mixture of indico added at the end of the boiling, it is turned green, that being the colour which reſults from the mixture of yellow and blue.

Soap, *white ſoft*. One ſort of *white ſoap* is made after the ſame manner as *green ſoft ſoap* is, oil alone excepted, which is not uſed in *white*. The other ſort of *white ſoft ſoap* is made from lees of aſhes of lime boiled up at twice with tallow. Firſt, a quantity of lees and tallow are put into the copper together, and kept boiling, being fed with lees as they boil, until the whole grains, or is boiled enough; then the lees are ſeparated or diſcharged from the tallowiſh part, which part is removed into a tub, and the lees thrown away: this is called the firſt *half-boil*: then the copper is charged again with freſh tallow and lees, and the firſt half-boil is put out of the tub into the copper a ſecond time, where it is kept boiling with freſh lees and tallow, till it comes to perfection. It is then put out of the copper into the ſame ſort of caſks as are uſed for *green ſoft ſoap*.

The common ſoft *ſoap* uſed about London, generally of a greeniſh hue, with ſome white lumps, is prepared chiefly with tallow: a blackiſh ſort, more common in ſome other places, is ſaid to be made with whale oil.

Soap, *hard*, is made with lees from aſhes, and tallow, and is moſt commonly boiled at twice: the firſt, called the *half-boil*, hath the ſame operation as the firſt half-boil of ſoft white *ſoap*. Then the copper is charged with freſh lees again, and the firſt half-boil put into it, where it is kept boiling, and fed with lees as it boils, till it grains, or is boiled enough; then the ley is diſcharged from it, and the *ſoap* put into a frame to cool and harden.

Common ſalt is made uſe of for the purpoſe of graining the *ſoap*; for when the oil or tallow has been united with the ley, after a little boiling, a quantity of ſalt is thrown into the maſs, which readily diſſolving in water, but not in the oil or tallow, draws out the water in a conſiderable degree, ſo that the oil or tallow, united with the ſalt of the ley, ſwims on the top. When the ley is of a proper ſtrength, leſs ſalt is neceſſary to raiſe the curd than when it is too weak.

Note, There is no certain time for bringing off a boiling of any of theſe ſorts of *ſoap*: it frequently takes up part of two days.

Soap, *ball*, commonly uſed in the North, is made with lees from aſhes and tallow. The lees are put into the copper, and boiled till the watery part is quite gone, and there remains nothing in the copper but a ſort of ſaline matter (the very ſtrength or eſſence of the ley); to this the tallow is put, and the copper is kept boiling and ſtirring for above half an hour, in which time the *ſoap* is made; and then it is put out of the copper into tubs, or baſkets, with ſheets in them, and immediately (whilſt ſoft) made into balls. Note, it requires near twenty-four hours, in this proceſs, to boil away the watery part of the ley.

The making of *ſoap* depending only on the mixing the ſalt of pot-aſh with oil or fat, though this is at preſent procured by a tedious operation, and long boiling, it ſeems very practicable to ſhorten, and make the proceſs much eaſier, and leſs expenſive, by ſubſtituting motion in the place of fire. This motion might be eaſily given by an engine to any quantities of the ingredients at a time; and we find it practicable to make *ſoap* by this means only by mixing in a large phial half a pint of *ſoap*-lees, and an ounce or more of oil-olive; for by ſhaking theſe together for a quarter of an hour, an abſolute *ſoap* is procured in a cake at the top of the liquor, which hardens on being expoſed to the air. Shaw's Lectures, p. 160.

The fineſt hard *ſoap* for medicinal uſe is prepared with oil of almonds. See SAPO *Amygdalinus*.

The fineſt of the common *ſoaps* is that called *Spaniſh*, or *Caſtile ſoap*, which is made with oil-olive, and the alkaline ſalt called ſoda, or barilla; our *ſoap*-boilers find that this alkali gives a better conſiſtence, or greater hardneſs to the *ſoap*, than the other pot-aſhes or common vegetable alkalis.

That which is uſed in medicine is made without heat in the following manner: one part of quick-lime, and two parts of good Spaniſh ſoda, are boiled together during a ſhort time, with twelve times as much water, in an iron cauldron. This lixivium is to be filtered, and evaporated by heat, till a phial, which is capable of containing an ounce of water, ſhall contain an ounce and three drams of this concentrated lixivium. Of this, one part is to be mixed with two parts of oil of olives, or of ſweet almonds, in a glaſs or ſtone veſſel: the mixture is to be ſtirred from time to time with an iron ſpatula, or peſtle, and it ſoon becomes thick and white. The combination is gradually completed, and, in ſeven or eight days, a very white and firm *ſoap* is obtained.

Soap is made with heat in manufactures where large quantities of it are prepared. A lixivium of quick-lime and ſoda is made, concentrated to ſuch a degree as that it may ſuſtain a freſh egg: a part of this is to be diluted, and mixed with an equal weight of oil of olives. The mixture is to be put on a gentle fire, and agitated, in order to accelerate the union; when it begins to unite well, the reſt of the lixivium is to be added to it, and the whole is to be digeſted with a very gentle heat, till the *ſoap* be completely made. Good *ſoap* of this kind ought to be firm and very white when cold, not ſubject to become moiſt by expoſure to air, and entirely miſcible with pure water, to which it communicates a milky appearance, but without any drops of oil floating on the ſurface. When the *ſoap* has not theſe qualities, the combination has not been well made, or the quantity of ſalt or oil is too great, which faults muſt be corrected. Dict. Chem. art. *Soap*.

Soaps, both hard and ſoft, have been applied to medical uſe. *Hard ſoap*, triturated with vegetable reſins and thick balſams, incorporates with them into a compound ſoluble, like the *ſoap* itſelf, in watery liquors; hence it proves an uſeful ingredient in reſinous pills, which of themſelves are apt to paſs entire through the inteſtines, but by the admixture of *ſoap* become diſſoluble in the ſtomach. It renders unctuous and thick animal matters diſſoluble in like manner in aqueous fluids, and hence may be preſumed to act as a menſtruum for theſe kinds of ſubſtances in the body, that is to attenuate viſcid juices and reſolve obſtructions: ſuch, in effect, are the virtues which it appears to exert in cachectic, hydropic, and icteric caſes, in which laſt, particularly, its aperient and reſolvent powers have been often experienced. Solutions of it have been likewiſe found to diſſolve certain animal concretions of the harder kind, as the filaments which are ſometimes ſeen floating in the urine of rheumatic and arthritic perſons, the matter ſecreted in gouty joints, and the more compact urinary calculus; on theſe ſubſtances (at leaſt in the latter) though *ſoap* of itſelf acts more languidly than LIME-*water*, yet, when joined to that menſtruum, it remarkably increaſes its activity; the diſſolving power of a compoſition of the two being, according to Dr. Whytt's experiments, conſiderably greater than that of the *ſoap* and lime-water unmixed: of the good effects of theſe medicines in calculous caſes there are ſeveral inſtances; but what their effects may be in gouty and rheumatic ones is not yet well known. See LITHONTRIPTICS, STEPHENS's *Medicine*, &c. and STONE.

The uſual doſe of *ſoap*, as an aperient, is half a dram or a dram; as a lithontriptic, half an ounce, or an ounce, or more, are taken in a day at proper intervals. It is given in the form of a bolus or pills, or made into an electary with ſome grateful ſyrup, or diſſolved in milk or other liquids.

From the properties of *ſoap* we may know, that it muſt be a very effectual and convenient anti-acid. It abſorbs acids as powerfully as pure alkalis and abſorbent earths, without having the cauſticity of the former, and without oppreſſing the ſtomach by its weight like the latter. *Soap* is alſo one of the beſt antidotes to ſtop quickly, and with the leaſt inconvenience, the bad effects of acid corroſive poiſons, as aqua fortis, corroſive ſublimate, &c.

Soap is employed externally for diſcuſſing rheumatic pains, arthritic tumours, the humours ſtagnating after ſprains, &c. Some pretend that the indurated tophaceous concretions in arthritic joints, have been reſolved by the external uſe of ſoapy cataplaſms. Several compoſitions for external purpoſes are prepared in the ſhops. The *emplaſtrum e ſapone* is formed by ſtirring one part of Spaniſh *ſoap*, ſhaved in thin ſlices, into ſix parts of common plaſter melted over the fire, and boiling the mixture till it acquires the conſiſtence of a plaſter: ſome endeavour to promote the reſolvent virtue of the *ſoap* by uſing, inſtead of the common plaſter, a more compounded one, in which turpentine, galbanum, and ammoniacum are ingredients. But *ſoap* acts to much better advantage in the form of a cataplaſm or liniment, than in the ſtiff one of a plaſter. See LINIMENTUM *Saponaceum* and OPODELDOC.

The ANODYNE balſam, commonly called Bates's balſam, is prepared by digeſting two ounces of *ſoap* and half an ounce of opium, in a gentle ſand-heat, for three days, with eighteen ounces of rectified ſpirit of wine, and then adding ſix drams of camphor and one dram of oil of roſemary to the ſtrained liquor. This compoſition, with the addition of opium, is ſuppoſed to be more effectual for allaying violent pains than the common opodeldoc: it is alſo given internally in nervous colics, jaundices, &c.

Soft *ſoap* is conſiderably more acrid than the hard *ſoap*, and it is, therefore, employed only for ſome external purpoſes: a mixture of equal parts of our common ſoft *ſoap* and quick-lime is uſed as a mild CAUSTIC. Lewis's Mat. Med.

SOAP, *almond*. See SAPO *Amygdalinus*.

SOAP-*lees*. See LIXIVIUM *Saponarium*.

SOAP, *Starkey's*, is a combination of fixed vegetable alkali with eſſential oil of turpentine. It is ſo called from its inventor, who combined ſalt of tartar with this oil, and obtained a ſaponaceous compound, to which many medicinal virtues have been aſcribed. It enters alſo into the compoſition of pills, named alſo from Starkey. As fixed alkalis are very difficultly made to unite with eſſential oils, Starkey found no other expedient for the preparation of his *ſoap* than time and patience. His method conſiſts in putting dry alkali into a matraſs, and pouring upon it eſſential oil of turpentine to a height equal to the breadth of two or three fingers; in five or ſix months part of the alkali and oil will be thus combined together, and form a *ſoap*, which muſt be ſeparated from the mixture, and more of it will be afterwards formed in the ſame manner. The moſt commodious method, ſays Dr. Lewis, of obtaining the combination, is by throwing the ſalt, red-hot, into a heated mortar, immediately reducing it to powder, then pouring on it, whilſt hot, by little at a time, an equal quantity, or more, of the oil, and continuing to grind them together, ſo as to form a ſmooth ſoft maſs. Stahl, Rouelle, Beaumé, &c. have publiſhed proceſſes for this combination. Mr. Beaumé ſays, that it may be made in a few hours by triturating, during a long time, alkaline ſalt upon a porphyry, and adding to this ſalt during the trituration, oil of turpentine. This medicine was formerly celebrated, under the denomination of *ſoap* of tartar, univerſal corrector, &c. as a diuretic in nephritic complaints, and as a corrector of certain vegetables, particularly of opium: its virtues have not been fully determined by experience, nor does the preſent practice pay any regard to it.

SOAP, *volatile*, is of three kinds, viz. one compoſed of fixed alkalis and volatile oils; another of volatile alkalis and oils of the groſſer or more fixed kind; and the third, in which both the alkali and the oil are volatile. Of the firſt kind is Starkey's *ſoap*: thoſe of the ſecond ſort are obtained more readily. See LINIMENTUM *volatile*, and EPITHEM *volatile*. Combinations of the latter kind, in a liquid form, have been deſcribed under SAL *alkalinus volatilis*; and compoſitions of the ſame kinds may be obtained in a ſolid ſtate, by mixing the ſalt with the oil, and ſubliming them together.

Soap imported is ſubject by 10 Ann. cap. 19. to a duty of 2*d*. a pound (over and above former duties); and by 12 Ann. ſtat. 2. cap. 9. to the farther ſum of 1*d*. a pound. And by the ſame acts, the duty on *ſoap* made in the kingdom is 1½*d*. a pound. By 17 Geo. III. cap. 52. no perſon within the limits of the head office of exciſe in London, ſhall be permitted to make any *ſoap* unleſs he occupy a tenement of 10*l*. a year, and be aſſeſſed to, and pay the pariſh rates; or elſewhere, unleſs he be aſſeſſed to, and pay to church and poor. Places of making are to be entered on pain of 50*l*. and covers and locks to be provided under a forfeiture of 100*l*.; the furnace door of every utenſil uſed in the manufacture of *ſoap* ſhall be locked by the exciſe officer, as ſoon as the fire is damped or drawn out, and faſtenings provided, under the penalty of 50*l.*; and opening or damaging ſuch faſtening incurs a penalty of 100*l.* Officers are required to enter and ſurvey at all times, by day or night, and the penalty of obſtructing is 20*l.*; and they may unlock and examine every copper, &c. between the hours of five in the morning and eleven in the evening, and the penalty of obſtructing is 100*l.* Every maker of *ſoap* before he begins any making, if within the bills of mortality, ſhall give twelve hours, if elſewhere, twenty-four hours notice, in writing to the officer, of the time when he intends to begin, on pain of 50*l.* No maker ſhall remove any *ſoap* unſurveyed on pain of 20*l.* without giving proper notice of his intention. And if any maker, ſhall conceal any *ſoap* or materials, he ſhall forfeit the ſame, and alſo 500*l.* Every barrel of ſoap ſhall contain 256*lb.* avoirdupois, half-barrel 128*lb.* firkin 64*lb.* half-firkin 32*lb.* beſides the weight or tare of each caſk: and all *ſoap*, excepting hard cake *ſoap* and ball *ſoap*, ſhall be put into ſuch caſks and no other, on pain of forfeiture and 5*l.* The maker ſhall weekly enter in writing at the next office the *ſoap* made by him in each week, with the weight and quantity at each boiling, on pain of 50*l.*; and within one week after entry clear off the duties, on pain of double duty. By 24 Geo. III. c. 41. every *ſoap*-maker ſhall take out a licence at the yearly expence of 2*l.* See, beſides the ſtatutes above cited, 5 Geo. III. cap. 43. 12 Geo. III. cap. 46. 11 Geo. cap. 30. 1 Geo. ſtat. 2. cap. 36.

Soap-*rock*, or **Soap**-*earth*, *ſteatites*, or *lapis ollaris*, in *Natural Hiſtory*, names given to the ſubſtance, called by the ancients CIMOLIA *purpuraſcens*.

The latter ages finding the purple Cimolian earth of the old writers to be wholly different from their white kind, have given that name (though it is not eaſy to gueſs why) to the common FULLER's *earth*, which has no tinge of purple in its whole ſubſtance.

This earth, however, called by us *ſoap-earth*, and *ſteatites*, is well worth enquiring after, as a ſubſtance for imitating the fine porcelain ware of China. Dr. Woodward much recommends it on this account, and repeated trials have been made of it ſince his time, and ſome of them very lately, in all which it has afforded the fineſt earthen ware ever made with us, and promiſes fair, with good management, for the equalling any in the world. See HOACHE.

As the texture of theſe *ſoap-earths* is conſiderably hard, and they have a great admixture of talc in their conſtitution, Imperatus firſt, then Grew, Linnæus, and ſome other authors after him, range them among the talcky ſubſtances; but Dr. Hill, and Mr. Da Coſta, obſerving that they have all the properties of a harder clay, are of opinion that they ſtrictly and properly belong to the claſs of clays.

The *ſoap-earth*, or genuine *ſteatites*, is dug in many parts of Devonſhire and Cornwall, and the neighbouring counties; the cliff of the Lizard point is almoſt wholly compoſed of it, and the adjacent little iſlands abound with it; and from all theſe places it might be brought, at ſmall expence, in any quantities. It is known from all other earths by theſe characters: it is compoſed of extremely fine particles, and is of a firm, equal, and regular texture, and great weight: it is very firm and hard as it lies in the earth; but when it has been ſome time expoſed to the air, it becomes almoſt of a ſtony hardneſs: it is of a perfectly fine, ſmooth, and gloſſy ſurface, ſofter to the touch than any other ſpecies of earth, and does not at all adhere to the tongue, nor melt in the mouth, nor ſtain the fingers in handling; but drawn along a rough ſurface, as a piece of cloth, or the like, it marks it with a fine and even white line. In colour the fineſt is generally a clear white, ſometimes with a yellowiſh hue, veined and variegated very beautifully with purple of different degrees of deepneſs: at other times it is as elegantly variegated with red, and ſometimes, though rarely, has veins and ſpots of green; at other times the ground is red or purple, variegated with white; but in all theſe appearances it ſo much reſembles hard *ſoap*, that it has hence obtained its Engliſh name of *ſoap-earth*, or *ſoap-ſtone*, and that of *ſteatites*, from ϛεαρ, *ſuet*, from its reſemblance to the hard fat of animals. It is of ſo fine a ſtructure of parts, that when cut into thin pieces it is in ſome degree tranſparent. It makes no effervefcence with acids, and burns to a pure white, even in its purple parts.

This ſubſtance may be formed into a paſte with water, ſufficiently ductile to be worked on the potter's wheel; and by fire it is hardened ſo as to ſtrike fire with ſteel. It has alſo the property of FULLER's *earth* in cleanſing cloths from greaſe: but it does not diffuſe in water ſo well as clays do; and when digeſted with vitriolic acid, it does not form alum, as clays do, but a ſalt ſimilar to Epſom ſalt; hence it contains a large portion of the earth called magneſia, as M. Margraaf has diſcovered.

This ſubſtance is ſo ſoft as to be cut with a knife, or with a tool turned by a lathe. Accordingly it is in ſome places made into pots for the uſe of the kitchen, and hence it is called *lapis ollaris*.

It is obſerved, that all the indurated talcky *ſoap* clays, as the *ſteatites*, the *morochtus*, the *galactites*, the *melitites*, ſucceed in a remarkable experiment, which is, that by writing with them on glaſs, they leave the letters, though inviſibly fixed upon it, yet not to be removed by waſhing, but always ready to appear, if the place be moiſtened by breathing upon it. Hill's Hiſt. Foſſ. p. 22. Da Coſta's Nat. Hiſt. Foſſils, p. 37, &c. Dict. Chem. art. *Steatites*, Eng. edit.

Soap-*earth*, *Smyrna*. See FLOS *Aſiæ*, NATRON, and SAPONACEA *Terra*.

SOAPWORT, *ſaponaria*, in *Botany*, a genus of the *decandria digynia* claſs. Its characters are theſe: the flower has a permanent empalement of one leaf, which is cut into five points; it has five petals, whoſe tails are narrow, and the length of the empalement, their borders broad, obtuſe, and plain; it has ten awl-ſhaped ſtamina alternately inſerted into the petals, and terminated by obtuſe proſtrate ſummits; and a taper germen ſupporting two erect parallel ſtyles crowned by acute ſtigmas; the germen becomes a cloſe capſule the length of the empalement, having one cell filled with ſmall ſeeds. Miller enumerates five, and Linnæus ſeven ſpecies.

The common *ſoapwort* grows wild, but not very common, in moiſt grounds, and flowers in July.

The decoction of this plant is uſed to cleanſe and ſcour woollen cloths; and the poor people in ſome countries uſe it inſtead of ſoap for waſhing; from whence it had its title.

This ſmoothneſs or ſoapineſs is ſtrongeſt in the leaves. The plant, though diſregarded among us, may be preſumed to have conſiderable medicinal virtues: by the German phyſicians, the roots are uſed in venereal maladies, and ſuppoſed to be ſimilar, but ſuperior to thoſe of ſarſaparilla. Lewis.

SOAPBERRY-*tree*, *ſapindus*, in *Botany*, a genus of the *octandria trigynia* claſs. Its characters are theſe: the empalement of the flower is compoſed of four plain oval coloured leaves; the flower has four oval petals which are leſs than the empalement, and it has eight ſtamina which are the length of the petals, terminated by erect ſummits; alſo an oval germen, with three or four lobes, ſupporting a ſhort ſtyle crowned by a ſingle ſtigma; the germen afterward becomes one, two, or three globular berries, including nuts of the ſame forms; there is rarely above one of theſe pregnant, the others being abortive. Miller enumerates two, and Linnæus three ſpecies.

The ſkin or pulp of the berries of the *ſoapberry*-tree is uſed as ſoap; they are of the ſize of a muſket-bullet, with winged leaves, and are uſed in waſhing without any admixture of ſalt or oil. They perform the office of ſoap very well, as to the cleanſing of the linen, but being of a very acid nature, they rot it in time.

The Negroes in general uſe them for their coarſe apparel, which bears them much better than the finer linen worn by the Europeans.

It is ſaid that this fruit is a medicine of ſingular and ſpecific virtue in chloroſes, and that a tincture or extract is preferable to the berry in ſubſtance, whence it may be preſumed, that the ſoapy matter is diſſoluble in ſpirit. Its medicinal virtue was firſt publiſhed by Marloe, in a letter to Mr. Boyle; but it is unknown in practice, and in the ſhops. Lewis.

SOAR-*hawk*. See FALCON.

SOATTO. See SOAGGIO.

SOAVE, or SOAVEMENT, in the *Italian Muſic*, ſignifies to ſing or play in a ſweet and agreeable manner.

SOBIESKI's *ſhield*, in *Aſtronomy*. See SCUTUM *Sobieſki*.

SOBRE *buena*, a name given by the Spaniards in America to a ſpecies of vanilla, which is greatly ſuperior to all the other kinds.

The pods of this are of the ſame ſhape with thoſe of the common vanilla, but are nearly twice as large. A bundle of about fifty of theſe uſually weighs five ounces, and ſuch a bundle of the *ſobre buena* kind often weighs eight. Theſe are full of a blackiſh balſamic liquor, in which are contained a number of ſmall ſeeds.

SOC, or SOK, SOKA, in *Law*, denotes juriſdiction; or a power or privilege to adminiſter juſtice, and execute laws.

The word is alſo uſed for the ſhire, circuit, or territory, wherein ſuch power is exerciſed by him endued with ſuch juriſdiction.

Hence, alſo, the law Latin *ſoca*, uſed for a ſeignory or lordſhip infranchiſed by the king, with liberty of holding a court of his *ſoc-men* or *ſocagers*, that is, his tenants; whoſe tenure is hence called *ſocage*.

This kind of liberty ſtill ſubſiſts in ſeveral parts of England, under the name of *ſoke* or *ſoken*. Skene defines *ſoc* to be, *ſecta de hominibus ſuis in curia ſecundum conſuetudinem regni*. Brady makes mention of theſe liberties: *ſoc*, *ſac*, *tol*, *team*, *infangthef*, and *utfangthef*.

In the laws of Henry I. *ſoca* is alſo uſed as ſynonymous with franchiſe, for a privileged place, refuge, aſylum, or ſanctuary, &c. from the Saxon *ſocn*, or *ſocne*.

SOCAGE, or **Soccage**, in its moſt extenſive ſignification, ſeems to denote a tenure by any certain and determinate ſervice. And thus our ancient writers conſtantly put it in oppoſition to chivalry, or knight-ſervice, where the render was uncertain.

Thus Bracton; if a man holds by a rent in money, without any eſcuage or ſerjeanty, *id tenementum dici poteſt* ſocagium. Littleton alſo defines it to be, where the tenant holds his tenement of the lord by any *certain* ſervice in lieu of all other ſervices, ſo that they be not ſervices of chivalry, or knight-ſervice: therefore he tells us, that whatſoever is not tenure in chivalry is tenure in *ſocage*. The ſervice muſt therefore be certain, in order to denominate it *ſocage*; as to hold by fealty and 20 *s.* rent; or by homage, fealty and 20 *s.* rent; or by homage and fealty, without rent: or by fealty and certain corporal ſervices, as ploughing the lord's land for three days; or by fealty only without any other ſervice; for all theſe are tenures in *ſocage*.

Socage is of two ſorts; viz. *free ſocage*, where the ſervices are not only certain but honourable; and *villein-ſocage*, where the ſervices, though certain, are of a baſer nature. See Villenage.

Such as hold by the former tenure are called in Glanvil, and other ſubſequent authors, by the name of *liberi ſokemanni*, or tenants in *free ſocage*. This, in the nature of its ſervice, and the fruits and conſequences appertaining to it, was always much the moſt free and independent ſpecies of any. On this account the learned judge Blackſtone aſſents to Mr. Somner's etymology of the word; who derives it from the Saxon appellation *ſoc*, which ſignifies *liberty* or *privilege*, and, being joined to a uſual termination, is called *ſocage*, ſignifying thereby a free or privileged tenure. This etymology, he ſays, ſeems to be much more juſt than that of our common lawyers in general, who derive it from *ſoca*, a *plough*; becauſe in ancient time their *ſocage* tenure conſiſted in nothing elſe but ſervices of huſbandry, which the tenant was bound to do to his lord, as to plough, ſow, or reap for him; but that in proceſs of time, this ſervice was changed into an annual rent by conſent of all parties, and that, in reference to its original, it ſtill retains the name of *ſocage*, or plough-ſervice. But this by no means agrees with what Littleton himſelf tells us, that to hold by fealty only without paying any rent, is tenure in *ſocage*; for here is plainly no commutation for plough-ſervice. Beſides, even ſervices, confeſſedly of a military nature and original, the inſtant they were reduced to a certainty, changed both their name and nature, and were called *ſocage*. It was the *certainty*, therefore, that denominated it a *ſocage*-tenure; and nothing ſurely could be a greater liberty or privilege, than to have the ſervice aſcertained, and not left to the arbitrary calls of the lord, as in the tenure of chivalry. Wherefore alſo Britton, who deſcribes *ſocage*-tenure under the name of *fraunke ferme*, tells us, that they are lands and tenements, whereof the nature of the fee is changed by feoffment *out of chivalry* for *certain* yearly ſervices, and in reſpect whereof neither homage, ward, marriage, nor relief can be demanded. Moreover, if *ſocage* tenures were of ſuch baſe and ſervile original, it is hard to account for the very great immunities which the tenants of them always enjoyed; ſo highly ſuperior to thoſe of the tenants by chivalry, that it was thought, in the reigns of both Edward I. and Charles II. a point of the utmoſt importance and value to the tenants, to reduce the tenants by knight-ſervice to *fraunke ferme*, or tenure by *ſocage*. It ſeems, probable, therefore, that the *ſocage*-tenures were the relics of Saxon liberty, retained by ſuch perſons as had neither forfeited them to the king, nor been obliged to exchange their tenure for the more honourable, as it was called, but at the ſame time more burthenſome tenure of knight-ſervice. This is peculiarly remarkable in the tenure, called gavel-kind, which is generally acknowledged to be a ſpecies of *ſocage*-tenure; the preſervation whereof inviolate from the innovations of the Norman Conqueror is a fact univerſally known. And thoſe who thus preſerved their liberties were ſaid to hold in *free* and *common ſocage*. This tenure will, therefore, include all other methods of holding free lands by certain and invariable rents and duties; and, in particular, petit serjeanty, tenure in burgage, and gavel-*kind*. Blackſt. Com. book ii. cap. 6. Lord Lyttelton's Hiſt. of Hen. II. vol. iii. p. 185, 8vo.

Skene defines *ſocage*, a tenure of lands, whereby a man is infeoffed freely, without wardſhip and marriage, paying to his lord ſome ſmall rents, &c. which is called *free ſocage*, &c. Several diviſions of *ſocage* are met with in law-writers, *as ſocage in capite*, &c. But by ſtat. 12 Car. II. it is ordained, that all tenures from and after the 24th of February, 1645, ſhall be adjudged and taken for ever, to be turned into *free* and *common ſocage*.

Socage, *Guardian in*. See Guardian.

SOCAGERS, in our *Old Writers*, ſuch tenants as held by the tenure called *ſocage*. They were otherwiſe called sockmen.

SOCCELLI, among the *Romans*, were ſwaths or bands, which covered the leg down to the soccus.

SOCCUS, Sock, in *Antiquity*, a kind of high ſhoe, reaching above the ancle, worn by the actors in the ancient drama, in the repreſentation of comic characters.

The *ſoccus* was much lower than the cothurnus, and was the diſtinguiſhing wear of the comedians; as the cothurnus was of the tragedians; hence *ſoccus* is frequently uſed for comedy itſelf. Comedy, ſays M. Fenelon, muſt talk in a humbler ſtyle than tragedy; the *ſock* is lower than the buſkin.

SOCIAL *War*, in *Roman Hiſtory*, commenced A. U. C. 663, on the following occaſion. M. Livius Druſus, tribune of the people, influenced by a view to the public welfare, formed a ſcheme to reconcile all orders of men, and put an end to all diſcontents, which he foreſaw would, in proceſs of time, if not removed, produce a general inſurrection. With this view he propoſed a law for inveſting the Italian allies with all the privileges of Roman citizens. They remonſtrated, that they paid conſiderable taxes: that in time of war their countries raiſed double the number of forces that were raiſed in Rome; that the commonwealth owed greatly to their valour that prodigious power which ſhe had acquired; and that it was but juſt they ſhould ſhare the honour of a ſtate, which they had helped to aggrandize both with their arms and treaſures. But this law of Druſus in their favour was oppoſed with great violence, not only by the ſenators and knights, but even by the people, who could not bear the thoughts of making thoſe their fellow-citizens, whom they looked upon as their ſubjects. In the mean time the Italian allies flocked to Rome from all parts to ſupport their protector, and determined to effect by force what they could not gain by favour. The death of Druſus, who was baſely aſſaſſinated for attempting to procure for them the right of citizenſhip, provoked the allies to ſuch a degree, that they recurred to arms, in order to do themſelves juſtice. The Marſi, Peligni, Samnites, Campanians, and Lucanians, and in ſhort all the provinces from the Liris to the Adriatic, revolted at once. Rome had never engaged more formidable enemies. As they had all ſerved in the ſame armies of the republic, they were as well diſciplined as her legions, and their leaders had learned the art of war under her moſt famous commanders. It is ſaid of the Marſi in particular, that Rome had never gained a victory in which they had not a great ſhare. The firſt ſteps they took in their revolt was to erect themſelves into a republic in oppoſition to that of Rome. After many alternate ſucceſſes and defeats, the conſul Julius Cæſar, deſirous to put an end to the war, drew up a law, which was confirmed by the ſenate, and enacted, that all the nations in Italy, whoſe alliance with Rome was indiſputable, ſhould enjoy the rights of Roman citizens. This law, called the Julian law, much abated the ardour of the enemy, and drew off ſeveral nations from the confederacy. The tribune, M. Plautius Sylvanus, in conjunction with Caius Papirius Carbo, one of his colleagues, put the laſt hand to the Julian law in favour of the allies, and got it confirmed by the people, and publiſhed in the following words: all the citizens of the allied cities, who ſhall be in Italy at the time of the promulgation of this law, ſhall be deemed citizens of Rome, provided they regiſter their names with one of the three prætors within ſixty days. This brought the Italians to Rome in ſuch numbers, that the new citizens became more numerous than the old; but, leſt this ſhould make ſtrangers maſters of the elections, and conſequently of the republic, the cenſors did not incorporate them in the thirty-five Roman tribes, but formed them into new tribes, who were to vote laſt. By this means all matters were determined by a majority of voices, before the new tribes gave their ſuffrages. The allies were ſenſible of this artifice, but diſſembled their diſſatisfaction, being reſolved when an opportunity offered, to put themſelves upon a level with the old inhabitants of Rome. The tribune, Sulpicius, propoſed a law, that all the inhabitants of Italy, who had lately obtained the right of citizenſhip, ſhould be incorporated into the thirty-five tribes, and conſequently have the ſame right of voting, each in his tribe, as others had, without any diſtinction, and got it paſſed. But when Sylla prevailed, all the laws of Sulpicius were declared void and null.

SOCIETY, Societas, an aſſemblage or union of ſeveral perſons in the ſame place, for their mutual aſſiſtance, ſecurity, intereſt, or entertainment. See Government.

Of ſocieties we have a great many kinds, diſtinguiſhed by the different ends propoſed by them: *civil ſocieties, trading ſocieties, religious ſocieties, literary ſocieties*, &c.

Society, in *Trade*, is a contract or agreement between two or more perſons, whereby they bind themſelves together for a certain time, and agree to ſhare equally in the profits or loſſes which ſhall accrue in the affairs for which the *ſociety* or copartnerſhip is contracted.

We have ſeveral very conſiderable *ſocieties* of this kind: as the Merchant Adventurers, the Turkey, Eaſt India, Muſcovy, Eaſtland, Greenland, Spaniſh, African, South Sea, and Hudſon's Bay, companies: the inſtitutions, policies, &c. whereof, ſee under the article Company.

By the Roman Law, the ſocial contract needs no other ſolemnity but the ſole conſent of parties, without any writing at all; but among us, articles of copartnerſhip are required. There is no contract wherein probity is more required than in *ſociety*; inſomuch as the laws pronounce thoſe null that are made contrary to equity, and with deſign to deceive.

The French diſtinguiſh three kinds of mercantile *ſociety: ordinary ſociety*, called alſo *collective* and *general*; *ſociety in commendam* or *commandity*; and *anonymous ſociety*, called alſo *momentary* and *inconnue*.

The firſt is, where ſeveral merchants act alike in the affairs of the *ſociety*, and do all under their collective names, which are public, and known to every body.

Society *in commendam*, &c. is that between two perſons, one of whom only puts his money into ſtock, without doing any other office of a copartner; the other, who is called the *complementary* of the *ſociety*, diſpatching all the buſineſs under his own name.

Society, *anonymous*, is that where all the members are employed, each particularly, in the common intereſt, and each is accountable for profits, &c. to the reſt, but without the public's being informed thereof; ſo that the ſeller has only an action againſt the particular buyer, no other name appearing.

It is alſo called *momentary*, becauſe frequently made on particular occaſions, and ceaſing with them: as in the making a purchaſe, ſelling any commodity, &c.

Of this they diſtinguiſh four kinds: *ſociety by participation*, which is uſually formed by letters from one city to another, where a merchandize is to be bought or ſold. The ſecond is, when two or three perſons go together to fairs to buy goods. The third, when two or three perſons agree to buy up the whole of ſome commodity in any country, to ſell it again at their own price. And the fourth is, when three or four perſons make a journey together, to buy and ſell the ſame commodity. Beſide merchants, people of quality, &c. are admitted into theſe anonymous *ſocieties*.

Societies, *religious*, are parties of perſons formed either to live regularly together, or to promote the intereſt of religion, or to cultivate it in themſelves.

Of the firſt kind are all congregations of religious; particularly the Jeſuits, who are called the *ſociety* of Jeſus; though they more uſually call themſelves the *company* of Jeſus; the *ſociety* of the Sorbonne; the *ſociety* of St. Thomas de Villeneuve, inſtituted in 1660, by F. Ange le Prouſt; the *ſociety* of St. Joſeph, inſtituted in 1638; the *ſociety* of Bretagne, a reform of Benedictines in 1606; and the *ſociety* of Jeſus, a religious military order, inſtituted by Pius II.

Society of the *Cord*. See Cord.

Of the ſecond kind are, the

Society *for the reformation of manners*, and putting in execution the laws againſt immorality and prophaneneſs. A *ſociety* of this kind was ſet on foot about the time of the Revolution, by five or ſix private perſons in London, and was afterwards exceedingly increaſed by numbers of members of all denominations.

Societies for this purpoſe have been occaſionally eſtabliſhed, not only in London, but in other principal towns, in a later period.

Society *for propagating the goſpel in foreign parts* was inſtituted by king William III. in 1701, for ſecuring a maintenance for an orthodox clergy, and making other proviſions for the propagation of the goſpel in the plantations, colonies, factories, &c. to that end he incorporated the archbiſhops, ſeveral biſhops, and others of the nobility, gentry, and clergy, to the number of ninety, into a body, with privilege to purchaſe two thouſand pounds a year inheritance, and eſtates for lives or years, with other goods, to any value.

They are directed by their charter to meet yearly, on the third Friday in February, to chuſe a preſident, vice-preſident, and other officers; and the third Friday in every month, to tranſact buſineſs, depute fit perſons to take ſubſcriptions for the ſaid uſes, and of all monies ſo received to give account to the lord chancellor, &c. They now meet at queen Anne's bounty office, Dean's-yard, Weſtminſter. They are truſtees of Codrington college, in Barbadoes, ſupported by plantations in that iſland. A ſermon, recommending the objects of the *ſociety*, is annually preached in London.

Society *for promoting Chriſtian knowledge* was begun in 1699, by ſome perſons of worth, &c. Its original deſign was to propagate religion in the plantations, to ſecure the pious education of the poor at home, and to reclaim thoſe that err in the fundamentals of Chriſtianity.

In the year 1701, they had procured conſiderable charities, and had tranſmitted the ſame to the plantations, in libraries, bibles, catechiſms, &c. with a voluntary maintenance for the ſeveral miniſters to be employed in the plantations. But the *ſociety* for propagating the goſpel in foreign parts being then inſtituted, they were incorporated, by charter, into the ſame; and thus diſcharged, as a particular *ſociety*, from the farther purſuit of that branch of their original deſign; whereupon they wholly turned themſelves to the other, and became very conſiderable, by great acceſſions from among the clergy and laity.

They meet weekly, to concert meaſures for raiſing charity for the education of poor children, and ſetting up ſchools for that purpoſe; as alſo for the more regular diſpoſal of pious books and catechiſms, for inſtruction of the ignorant, erroneous, &c. By the aſſiſtance of members of other religious *ſocieties*, they have procured ſubſcriptions for the education of above three thouſand children, who are placed out in ſchools about London, and taught reading, writing, pſalmody, &c. They have diſperſed great numbers of books among the poor, in the fleet, army, &c. and have procured ſeveral to be tranſlated into Welſh, and other foreign languages, and diſperſed accordingly.

Society, *New England*, was firſt incorporated by an ordinance of parliament in 1649, by the name of the *Preſident and Society for the Propagation of the Goſpel in New England*; and empowered to receive and diſpoſe of monies in ſuch manner as ſhould beſt conduce to the preaching and propagation of the goſpel amongſt the natives, and for the maintenance of ſchools for the education of their children; for which purpoſe a general collection was to be made in all the counties, cities, towns, and pariſhes of England and Wales. With the ſum of money thus collected, the *ſociety* was enabled to purchaſe an eſtate in land of between 5 and 600*l.* a year. But upon the reſtoration of king Charles II. the charter became void, and colonel Bedingfield, a papiſt, who had ſold an eſtate of 322*l. per ann.* which had been ſettled for the uſes of this *ſociety*, repoſſeſſed himſelf of it, and refuſed to pay back the money which he had received for it. However, the corporation being revived in 1661, by an expreſs charter, which ordained, that there be for ever within the kingdom of England, a *Society or Company for Propagation of the Goſpel in New England and the Parts adjacent in America*, the eſtate which had been detained by Bedingfield, was reſtored by the chancellor's decree. The members of this *ſociety* are not to exceed forty-five; theſe and their ſucceſſors to be choſen by the *ſociety*, are conſtituted one body corporate, with the powers and privileges uſual in ſuch caſes: and a power is likewiſe given them to appoint commiſſioners reſiding in New England to tranſact their buſineſs in thoſe parts. The honourable Mr. Boyle was appointed by charter the firſt governor of this company. See a copy of the charter in the Appendix to Dr. Birch's Life of Mr. Boyle.

Society of *the Sons of the Clergy* was incorporated by king Charles II. in 1678, by the name of *the Governors of the Charity for Relief of the poor Widows and Children of Clergymen*. This *ſociety* is under the direction and management of a preſident and vice-preſident, three treaſurers, and a court of aſſiſtants compoſed of forty members. Several hundreds of widows and children of the clergy have annually received conſiderable relief from this uſeful charity.

Society *for promoting religious knowledge among the poor* commenced in the year 1750, for the purpoſe of giving bibles, teſtaments, and other good books, to thoſe who moſt needed them, and who were moſt likely to improve them. This *ſociety* is ſupported by an annual ſubſcription of the members, together with the donations and legacies of other contributors; and each ſubſcriber is intitled to a nomination of books in turn, correſponding to the amount of his ſubſcription. The *ſociety* meets every month.

SOCIETY *for promoting Chriſtian Knowledge in the Highlands and Iſlands of Scotland*, was firſt begun by the aſſociation of private contributors at Edinburgh about the year 1701; their deſign was approved and encouraged by queen Anne, who, in 1708, iſſued her royal proclamation for this purpoſe; and, in 1709, ſhe granted a patent, conſtituting a certain number of the ſubſcribers a *ſociety*, or body politic, with full powers to receive donations and purchaſe lands, &c. not exceeding 2000*l.* a year, and with the profits of the ſame to erect and maintain ſchools, &c. Accordingly the lords of ſeſſion, under her majeſty's commiſſion, nominated eighty-two ſubſcribers to be the firſt members of this *ſociety*, who choſe a preſident, treaſurer, ſecretary, and other officers. They alſo choſe a committee of fifteen, who were to meet every month, or oftener, as occaſion required. There is a general meeting of the whole *ſociety* every three months, when they admit members, make general regulations, give orders to the committee, and ſettle their accounts. In 1710 the *ſociety* began to ſettle ſchools. In 1738, the king granted a new patent, to cauſe ſuch children as were found proper to be inſtructed in huſbandry, houſewifery, and manufactures; in purſuance of which the *ſociety* erected ſeveral working ſchools. The *ſociety's* firſt charter extends to popiſh and infidel countries beyond the ſeas, and four miſſionaries have been maintained for converting the native Indians in America to the Chriſtian faith. The *ſociety* has ſeveral correſponding members in London, who meet every quarter to receive ſubſcriptions, donations, &c.

There is alſo a charitabe SOCIETY in London, correſponding with the incorporated *ſociety* in Dublin, for promoting the Engliſh proteſtant charter-ſchools in Ireland; under the management of a treaſurer, a ſtanding committee of fifteen, and ſecretary, who meet once a month.

Of the third kind are divers religious *ſocieties*, very properly ſo called: theſe were firſt ſet on foot in London about the year 1678, by a few young men, who agreed to meet weekly, for prayer, pſalmody, and ſpiritual conference. Theſe afterwards increaſed to forty diſtinct dodies, who ſet up public prayers in many churches where they were not before frequent, procured frequent adminiſtrations of the ſacrament, and maintained lectures on that ſubject, in one church or another, almoſt on every Sunday evening.

SOCIETY, *American Philoſophical*, was eſtabliſhed at Philadelphia in the year 1769, for promoting uſeful knowledge, under the direction of one patron, one preſident, three vice-preſidents, one treaſurer, four ſecretaries, and three curators. The firſt volume of their tranſactions comprehends a period of two years, viz. from Jan. 1, 1769, to Jan. 1. 1771.

A *ſociety* of a ſimilar kind, under the title of the Academy of Arts and Sciences, &c. has been lately eſtabliſhed at Boſton. See ACADEMY.

An inſtitution of the like kind, under the title of the Royal Academy of ſciences, was inſtituted at Stockholm in 1739, and ſince that time to 1783, has publiſhed forty-two volumes of Tranſactions, quarterly, in 8vo. in Swediſh.

A *Royal Society of Sciences* was inſtituted at Upſal, about the year 1720: the meetings are monthly, and the Tranſactions are publiſhed quarterly, in 4to.

There is alſo another *ſociety* at Gottenburgh, called the *Royal Society* of Sciences and Belles Lettres.

The *Society* of Natural Hiſtorians at Berlin, was founded by Dr. Martini; in which place there is alſo a philoſophical *ſociety*.

The *Royal Society* of Gottingen was inſtituted by king George II. in 1751.

The *Imperial and Royal Academy* of Sciences and Belles Lettres of Bruſſels was founded in 1773. Three volumes of their Tranſactions have been publiſhed.

In France there have been ſeveral inſtitutions of this kind for the improvement of ſcience, beſides thoſe recounted under ACADEMY: as the Royal Academy at Soiſſons, founded in 1674; at Villeſranche, Beaujolois, in 1679; at Niſmes, in 1682; at Angers, in 1685; the Royal *Society* at Montpelier, in 1706, which is ſo intimately connected with the *Royal* ACADEMY of Sciences of Paris, as to form with it, in ſome reſpects, one body; the literary productions of this *ſociety* are publiſhed in the memoirs of the academy: the Royal Academy of Sciences and Belles Lettres at Lyons, in 1700; at Bourdeaux, in 1703; at Marſeilles, in 1726; at Rochelle, in 1734; at Dijon, in 1740; at Pau in Bearn, in 1721; at Beziers, in 1723; at Montauban, in 1744; at Rouen, in 1744; at Amiens, in 1750; at Toulouſe, in 1750; at Beſançon in 1752; at Metz, in 1760; at Arras, in 1773; and at Chalons ſur Maine in 1775. For other inſtitutions of a ſimilar nature and their literary productions, ſee ACADEMY, JOURNAL, and TRANSACTIONS.

SOCIETY, *Edinburgh, Philoſophical*, a *ſociety* which ſucceeded the *Medical* SOCIETY, and formed upon the plan of including all the different branches of natural knowledge and the antiquities of Scotland. The meetings of this *ſociety*, interrupted in 1745, were revived in 1752; and, in 1754, the firſt volume of their collection was publiſhed, under the title of *Eſſays or Obſervations, Phyſical and Literary*, which has been ſucceeded by other volumes. This *ſociety* has been lately incorporated by royal charter, under the name of the *Royal Society* of Scotland, inſtituted for the advancement of learning and uſeful knowledge. The members are divided into two claſſes, viz. phyſical and literary; and thoſe who are near enough to Edinburgh to attend the meetings, pay a guinea on admiſſion, and the ſame ſum annually. The firſt meeting was held on the firſt Monday of Auguſt, 1783; when were choſen a preſident, two vice-preſidents, a ſecretary, treaſurer, and a council of twelve perſons.

There is alſo an *experimental ſociety* at Dublin, for promoting natural knowledge, which was inſtituted in 1777; the members meet once every week, and diſtribute three honorary gold medals annually for the moſt approved diſcovery, invention or eſſay, on any mathematical or philoſophical ſubject. The *ſociety* is under the direction of a preſident, two vice-preſidents, and a ſecretary.

A *Literary and Philoſophical Society*, of conſiderable reputation, has been lately eſtabliſhed at Mancheſter, under the direction of two preſidents, four vice-preſidents, and two ſecretaries. The number of members is limited to fifty; beſides whom there are ſeveral honorary members, all of whom are elected by ballot; and the officers are choſen annually in April. Several valuable eſſays have been already read at the meetings of this *ſociety*.

SOCIETY *of Antiquaries*. See ANTIQUARY.

SOCIETY *for the Encouragement of Arts, Manufactures, and Commerce*, was inſtituted in the year 1754, in purſuance of a plan formed in 1753, for the purpoſe of exciting emulation and induſtry in the improvement of ingenious and commercial arts, the various branches of agriculture, &c. by honourable and pecuniary rewards. It was ſet on foot by lord Folkſtone, lord Romney, Mr. Shipley, Dr. Hales, and a few other gentlemen; but its importance and utility ſoon gained a very conſiderable acceſſion of members and ſubſcribers. This *ſociety*, according to its preſent conſtitution, is under the direction and management of one preſident, nine vice preſidents, the chairmen of the ſeveral committees of accounts, correſpondence, polite arts, agriculture, manufactures, mechanics, chemiſtry, colonies, and trade; in each of which department there are two, a principal ſecretary, at a ſalary of 150*l.* a year, aſſiſtant ſecretary, regiſter, collector, and meſſenger. The office is in the Adelphi.

Every perſon, deſiring to be a member, muſt be propoſed by ſome member at one meeting, and balloted for at a ſucceeding meeting, and if he be choſen by two thirds of the members preſent, he is deemed a perpetual member on payment of twenty guineas, or elſe a ſubſcribing member on payment of any yearly ſum not leſs than two guineas.

The proceedings of the ſociety are regulated by a body of rules and orders eſtabliſhed for this purpoſe; all queſtions are determined by holding up of hands or ballot, and no matter can be confirmed without the aſſent of the majority at two meetings. They invite the public in general to propoſe ſubjects for encouragement, and whatever is deemed deſerving attention is referred to the conſideration of a committee, which makes a report to the whole *ſociety*, where it is approved, rejected, or altered. Their premiums, which have been very extenſively beſtowed, are either ſums of money, or the *ſociety's* medals in gold or ſilver.

Their meetings are every Wedneſday evening, from the ſecond Wedneſday in November to the end of May, and at other times on the firſt and third Wedneſday in every month.

In the Memoirs of Agriculture, and other œconomical arts, by Mr. Doſſie, and Bailey's machines of the *Society* of Arts, we may ſee how various, extenſive, and liberal the plan which this *ſociety* has adopted and purſued.

Similar *ſocieties*, particularly with a view to the improvement of agriculture, have been eſtabliſhed in different parts of the kingdom.

SOCIETY *of Artiſts of Great Britain*, which conſiſts of directors and fellows, was incorporated by charter in 1765, and empowered to purchaſe and hold lands, not exceeding 1000*l.* a year. The directors of this *ſociety*, annually elected, are to conſiſt of twenty-four perſons, including the preſident, vice-preſident, treaſurer, and ſecretary; and it is required that they be either painters, ſculptors, architects, or engravers by profeſſion.

Society, *Humane*. See Drowning.

Society, *Marine*, was inſtituted in 1756, and incorporated in 1772, for promoting the intereſt of the navy: it is under the direction of one preſident, five vice-preſidents, a treaſurer, and vice-treaſurer.

This *ſociety* was firſt eſtabliſhed, and is ſtill maintained by voluntary ſubſcription, for cloathing landmen for the ſea-ſervice, providing cloaths, bedding, and other neceſſaries for boys, as faſt as there is a demand for them from his majeſty's ſhips, and for other ſimilar purpoſes.

Society, *Medical*. To this claſs belong ſeveral *ſocieties*, the principal of which in our own country are the following, viz. the *Medical Society* of London, inſtituted in the year 1752, on the plan recommended by lord Bacon (De Augm. Scient. lib. iv. cap. 2.), to revive the Hippocratic method of compoſing narratives of particular caſes, in which the nature of the diſeaſe, the manner of treating it, and the conſequences, are to be ſpecified; to attempt the cure of thoſe diſeaſes, which, in his opinion, have been too boldly pronounced incurable; and laſtly, to extend their inquiries after the powers of particular medicines in the cure of particular caſes; the collections of this *ſociety* have been already publiſhed, under the title of *Medical* Obſervations and Inquiries, in five volumes: *Society of Phyſicians* in London, inſtituted about the year 1764, the members of which, who muſt be merely licentiates of the College of Phyſicians, are elected by ballot, and meet once a fortnight, on Wedneſday evening, for the purpoſe of converſing on the prevailing diſeaſes, &c. and dine together once in a quarter: the *Medical Society* in Crane-court, inſtituted in 1773, under the direction of a council, conſiſting of a preſident, treaſurer, librarian, three phyſicians, three ſurgeons, three apothecaries, and three ſecretaries; the members meet once a fortnight, on Tueſday evening, and their council is annually elected in January, when an oration is delivered by one of the members on ſome medical ſubject: *Society for the Improvement of Medical Knowledge* in London, eſtabliſhed in 1782, for the purpoſe of collecting uſeful eſſays and obſervations for publication; the meetings of this *ſociety* are held once a fortnight, on Tueſday evening, and the members dine together once a quarter; on which occaſion candidates for admiſſion are ballotted for; the *ſociety* is under the direction of a preſident, treaſurer, two ſecretaries, and a committee for reviſing and ſelecting papers for publication, who are elected annually by ballot: the *Medical Society* of Edinburgh, to which the public are indebted for ſix volumes of curious and uſeful eſſays, collected principally by the late Dr. Monro, from June 1731, to June, 1736; but this *ſociety* was afterwards united to another, called the *Philoſophical* Society: the *Medical ſociety of Edinburgh*, incorporated by royal charter in 1778, under this title; this inſtitution appears to have been coeval with the eſtabliſhment of a regular ſchool of phyſic in the univerſity, though none of its records of an earlier date than 1737, are now preſerved; the ordinary members of this *ſociety* are elected by ballot, and three diſſentient exclude a candidate; an ordinary member may alſo be elected an honorary member, who enjoys the privileges of the others, and receives a diploma, but is freed the obligation of attendance, delivering papers in rotation, &c. to which the ordinary members are ſubject, but in this caſe the votes muſt be unanimous; the meetings of this *ſociety* are held every Saturday evening in their own hall, during the winter ſeaſon, when papers on medical ſubjects are delivered by the ſeveral members in rotation; and four of theſe are annually elected to fill the chair in rotation, with the title of annual preſidents.

The *Royal Medical Society* of Paris was inſtituted in 1776. The members are divided into aſſociates ordinary, limited to thirty, honorary to twelve, extraordinary to ſixty, and foreign to ſixty, and correſpondents. This *ſociety* has publiſhed three volumes of Memoirs in 4to.

Society, *Royal*. See Royal *Society*.

SOCII, *allies*, among the Romans. See Alliance and Social *War*.

SOCINIANS, in *Eccleſiaſtical Hiſtory*, a ſect of Antitrinitarians, who are ſaid to have derived this denomination from the illuſtrious family of the Sozzini, which flouriſhed a long time at Sienna, in Tuſcany, and produced ſeveral great and eminent men; and, among others, Lælius and Fauſtus Socinus, who are commonly ſuppoſed to have been the founders of this ſect. Lælius was the ſon of Marianus, a famous lawyer, and diſtinguiſhed by his genius and learning, as well as by the luſtre of an unblemiſhed and virtuous conduct. Having conceived a diſguſt againſt popery, and diſapproving many doctrines of the church, he left his country in 1547; and having paſſed four years in viſiting France, England, Holland, Germany, and Poland, he at laſt fixed his reſidence at Zurich, in Switzerland, where he died in 1562, in the thirty-ſeventh year of his age. Although he adopted the Helvetic confeſſion of faith, and profeſſed himſelf a member of the church of Switzerland, he entertained doubts with reſpect to certain doctrines of religion, which he communicated to ſome learned men, whoſe judgment he reſpected, and in whoſe friendſhip he could confide. However, his ſentiments were propagated, in a more public manner, after his death; as Fauſtus, his nephew and his heir, is ſuppoſed to have drawn from the papers he left behind him, that religious ſyſtem, upon which the ſect of the *Socinians* was founded. This Fauſtus Socinus was born at Sienna in 1539; and having continued many years in his own country, twelve of which he ſpent in the court of the grand-duke of Tuſcany, he determined, in the year 1574, and the thirty-fifth of his age, to withdraw from Italy into Germany. During this period he had laboured under many diſadvantages in the purſuit of knowledge, and his ſtudies had been chiefly confined to the rudiments of logic and juriſprudence; but at Baſil, where he firſt reſided after his voluntary exile, he devoted himſelf for three years to the ſtudy of theology, under the direction and aſſiſtance of the writings of his uncle Lælius; and in 1577 he began to propagate his religious opinions without reſerve or diſguiſe. In 1578 he was invited by Blandrata, a perſon of eminence in Tranſylvania, to compoſe the commotions which were occaſioned by a party, under the lead of Francis David, in the Antitrinitarian churches of that country. But failing of ſucceſs, he removed to Poland in 1579, zealouſly wiſhing to join himſelf to the Unitarian churches; but here he ſuffered many vexations, and much oppoſition, from a conſiderable number of perſons, who looked upon ſome of his tenets as highly erroneous. At length, however, he vanquiſhed the animoſity of his enemies by his gentleneſs and firmneſs, by his addreſs and eloquence, and the favour and protection of the nobility, with which he was honoured, and lived to form the Unitarians into one community, under his own ſuperintendency and direction. Having retired to a village about nine miles from Cracow, he there cloſed his life, in the year 1604; and the following epitaph was inſcribed on his tomb:

> *Tota licet Babylon deſtruxit tecta Lutherus,*
> *Muros Calvinus, ſed fundamenta Socinus.*

i. e. Luther deſtroyed the houſes of Babylon, Calvin the walls, but Socinus ſubverted the foundations. The ſentiments of Socinus, with regard to the principal theological ſubjects controverted among Chriſtians, will appear in the following abſtract of them from his own writings; ſome of which were publiſhed during his own life, and ſome after his death; and the collection of them, in two volumes, folio, forms part of the Bibliotheca Fratrum Polonorum. With regard to the nature and character of Chriſt, Socinus maintained, that he was a man, conceived and formed in the womb of the Virgin, without the intervention of a man, by the power of the divine ſpirit; on this account he was, in a peculiar ſenſe, God's own and only begotten ſon, as no other perſon ever was the ſon of God in the ſame way, by the immediate origin of his being. Moreover, he was conſtituted the ſon of God by his reſurrection from the dead, and was then begotten by God, when God raiſed him from the dead. As to thoſe paſſages which have been ſuppoſed to aſſert Chriſt's exiſtence in the heavenly world, previous to his birth and appearance among men, he explains them, by alledging that Chriſt himſelf, after he was born, and before he entered on the office aſſigned him by his Father, was, in conſequence of the divine counſel and agency, in heaven, and remained there for ſome time; that he might hear from God, and being with him, as the Scripture ſays, might ſee thoſe things which he was to announce to the world, in the name of God himſelf; though he explains John iii. 13, as figurative language. Accordingly, in explaining the firſt words of St. John's goſpel, *In the beginning was the word*, &c. he obſerves, that the terms, *in the beginning*, do not relate to eternity, but to the order of thoſe things which John was about to write concerning Jeſus Chriſt; imitating Moſes, who, in writing his hiſtory, opens his introduction with this word, *beginning*, in reference to the tranſactions which he was about to record. And Jeſus is called the Word, he ſuppoſes, not on account of his nature or ſubſtance, but becauſe of the office he diſcharged when he revealed to us the word of the goſpel from his Father. *The word was with God*, i. e. Jeſus, as the word of God, before he was pointed out by the preaching of the Baptiſt, was known to God alone. And *the word was God:* the term God, ſays this commentator, does not denote ſubſtance, but authority, power, and beneficence, which were derived from the Father, and which entitled Chriſt, according to the opinion of this writer, to adoration and worſhip. His ideas of the efficacy of our Lord's death and mediation are utterly repugnant to thoſe that have been generally entertained by perſons called Calviniſts. Nothing, he ſays, can be more incompatible with each other, than a free pardon and ſatisfaction. He adds, no man of judgment and piety ought to entertain the idea of a ſatisfaction for ſin; ſince it plainly does very much derogate from the power and authority, or goodneſs and mercy of God; and though a propitiation be not the ſame thing as a ſatisfaction, and though God never refrained from the puniſhment of ſin, on account of any real ſatisfaction given him, yet it is certain, that in remitting the puniſhment of our ſins by Jeſus Chriſt, no propitiation intervened; but God hath, from his free will, exhibited himſelf ſo propitious to us in Chriſt, as not to exact the puniſhment of our ſins, though he might juſtly have done it. However, he allows not only that the death of Chriſt, and the pouring out of his blood for us, was an offering and ſacrifice to God, but that this ſacrifice may be ſaid to have been offered up for our ſins in order to their being forgiven; yet he apprehended, that this ſacrifice, as far as it was expiatory, was offered by Chriſt, not on the croſs, but in heaven itſelf, after his reſurrection. To which purpoſe he obſerves, that Chriſt did not obtain eternal redemption for us before he entered into the holy place, and there aſſumed the prieſthood; and without a prieſthood no expiatory offering could be made.

Socinus does alſo expreſsly deny the diſtinct perſonality of the Holy Ghoſt, underſtanding by the Holy ſpirit, a divine energy or influence.

With reſpect to the nature and ſtate of man, Socinus thought, that the progenitor of our race was mortal, i. e. liable to death, by reaſon of his frame, and incapable of exemption, without an exertion of the divine favour and influence, which was not granted to him at creation; and, therefore, when the apoſtle aſſerts, that by ſin death entered into the world, he meant not natural mortality, but the neceſſity of dying, or eternal death. To this purpoſe he explains himſelf: Adam, if he had not ſinned, might have been preſerved from death by the kindneſs of God, though naturally mortal; or, if he had died, have been reſtored to life, and made immortal. By his ſin he did, as it were, refuſe to give himſelf and his poſterity this bleſſing; and, therefore, unleſs the favour of God be renewed to us, we muſt all die, and remain in the ſtate of the dead. As to the nature of the human ſoul, it ſeems to have been the opinion of Socinus, that, after this life, it doth not ſo ſubſiſt of itſelf, without the body, as to be capable of any reward or puniſhment, or any ſenſations at all. To the queſtion, whether the firſt man had any original righteouſneſs before he ſinned? Socinus replies, that if by original righteouſneſs be meant ſuch a condition that he could not ſin, this certainly was not the ſtate of Adam, as it is clear he did ſin. But if original righteouſneſs conſiſted in this, that his reaſon had the abſolute rule over his appetites and ſenſes, and invaraibly directed them, then the opinion of thoſe who aſcribe it to Adam, is ſupported by no argument: hence it ſhould ſeem from Adam's fall, that there was no perfect harmony between them; and that his appetites and ſenſes had the dominion over his reaſon. If it be aſked, ſays Socinus, whether there is original ſin? he anſwers, this is the ſame as the inquiry, whether men, when they are born, becauſe they derive their origin from Adam, have, on account of his fall, contracted any guilt or puniſhment, or are obnoxious to either? Therefore, ſince the conſent of the will muſt conſtitute guilt, and there can be no puniſhment without antecedent guilt, it ſeems not at all poſſible, that either of theſe ſhould pertain to a man when he is born, as he neither has, nor could have before, any uſe of his own will. If by original ſin be underſtood certain innate deſires, or evil concupiſcence in man, and a proneneſs to ſin, this opinion Socinus denies, and labours to refute; concluding upon the whole, that there is no ſuch thing as original ſin, i. e. a taint or pravity in conſequence of the ſin of the firſt man, neceſſarily produced, or by any means inflicted on the human race; and that no other evil neceſſarily flows to all his poſterity from that firſt tranſgreſſion, than by ſome means or other the neceſſity of dying; not indeed through the influence of that tranſgreſſion, but becauſe man, being naturally mortal, was on that account left by God to his own natural mortality, and what was natural became neceſſary as a puniſhment on the offender; conſequently, they who were born of him, muſt be born in the ſame circumſtances, for he was deprived of nothing he naturally had or could have. From reaſoning on this ſubject, Socinus concludes, that there is a freedom of will in man, and that the powers of man are not ſofe w and feeble, but that he may, with the aſſiſtance of God, obey the divine law by the right uſe and application of his powers. Divine aſſiſtance he conſiders as external and internal; and the latter, he ſays, is twofold; the one, when God by ſome means impreſſeth on the heart what he hath promiſed to them that obey him; and the other, when he inſtructs and illuminates the mind rightly to diſcern his will, in thoſe inſtances which cannot be expreſly contained in his written word: however, this internal aſſiſtance belongs only to thoſe who have made good uſe of the external. The doctrine of predeſtination Socinus abſolutely denies, and he endeavours to account for the preſcience of the Deity, without admitting that notion of his decrees, which ſome divines have adopted. On the head of juſtification, Socinus obſerves, that God out of his mere mercy juſtifies us, i. e. pronounces us righteous, and grants us forgiveneſs of ſins, and eternal life; but he requireth from us, before this be done, that we believe in Chriſt, i. e. confide in and obey him; and our good works, or the obedience we render to Chriſt, though not the efficient or meritorious cauſe, are the *ſine qua non*, or indiſpenſable pre-requiſite of our juſtification before God, and eternal ſalvation. But if any ſhould deviate from this obedience, by falling into ſin, and continuing therein, they ceaſe to be juſtified; nevertheleſs, by repentance and amendment of life, they may be juſtified again; but this ſecond repentance, he ſays, is not in our power, God granting an ability for it to whom he pleaſeth.

Socinus denied the perpetuity of baptiſm, as an ordinance in the church, alledging that it was not preſcribed for thoſe who in any other way have publicly given their names to Chriſt, or from their earlieſt years have been educated in the Chriſtian diſcipline; or if it is to be retained in theſe days, he apprehends it ſhould be retained principally on account of thoſe who have been converted from other religions to the Chriſtian. He farther thought, that, in order to the right adminiſtration of baptiſm, it is previouſly neceſſary, that the baptized perſon ſhould be a believer, and he, therefore, reckoned the practice of infant baptiſm unſcriptural and erroneous.

After this compendious abſtract of the chief theological ſentiments of Socinus, it is proper to obſerve, that, according to the uſual manner of ſpeaking, all are denominated *Socinians*, whoſe opinions bear a certain affinity to the ſyſtem of Socinus: but, in a ſtrict and proper ſenſe, they only are deemed the members of this ſect, who embrace wholly, or with few exceptions, the form of theological doctrine, which Socinus either drew up himſelf, or received from his uncle, and delivered to the Unitarian brethren, or *Socinians*, in Poland and Tranſylvania. Their ſentiments are explained at large in their Catechiſm, printed ſeveral times under the title of Catecheſis eccleſiarum Polonicarum, unum Deum Patrem, illiuſque Filium unigenitum, una cum Sancto Spiritu, ex Sacra Scriptura confitentium. See *Catechiſm of* RACOW.

The *Socinians*, like other ſects diſtinguiſhed by one general denomination, are divided into ſeveral parties. Some differ from Socinus with regard to the worſhip of Chriſt: ſome deny the eternity of the future puniſhment of the wicked, and ſome apprehend it contradictory to maintain God's foreknowledge of future contingencies, &c. See BUDNÆANS, FARNOVIANS, and SEMIJUDAIZERS.

The chief ſchool of the *Socinians* was at Racow, where they obtained the grant of a ſettlement, and there all their firſt books were publiſhed. But in the year 1638, in conſequence of the intemperate zeal of ſome ſtudents of the Unitarian academy in this city againſt popery, a law was enacted at Warſaw, by which it was decreed, that the academy of Racow ſhould be deſtroyed, its profeſſors baniſhed, the printing-houſe of the *Socinians* deſtroyed, and their churches ſhut up. This law was immediately executed; and ſimilar edicts were enacted in other parts of Poland. In 1658 another ſevere act was publiſhed by a diet held at Warſaw, requiring all the *Socinians* to leave the kingdom for ever, and denouncing capital puniſhment againſt all who ſhould profeſs their opinions, or harbour their perſons. This terrible edict was renewed in 1661; and, in conſequence of theſe meaſures, the *Socinians* ſought an aſylum among their brethren in Tranſylvania; a conſiderable number was diſperſed through the adjacent provinces of Sileſia, Brandenburgh, and Pruſſia, where their poſterity ſtill ſubſiſt. Others repaired to Holland and England. In Tranſylvania they ſtill continue numerous; and are much at their eaſe. In Holland their number is not conſiderable; and all who profeſs themſelves ſuch are by law excluded from the general toleration which prevails in that kingdom. They are called COLLEGIANS.

As to the preſent ſtate of the *Socinians* in Poland, a late writer obſerves, that ſince their ſuppreſſion they have had churches, which have aſſembled in private houſes, woods, or fields, as opportunity permitted; and theſe aſſemblies have been conducted under the inſpection of regular miniſters, educated at Leyden and Amſterdam. Since the edict of 1661, they have beeen included by the Romiſh party under the general name of DISSIDENTS: however, in thoſe parts of Poland, which by the late partition fell to the lot of Pruſſia, Ruſſia, or the emperor, they have now their liberty in common with their other diſſident brethren, and their public places of worſhip. The only ſociety of *Socinians* in England was that formed by Mr. John Biddle, under the patronage of Mr. Thomas Firmin, and his adherents were called Bidellians; but this name was loſt in the more common appellation of *Socinians*, or, what they preferred, Unitarians. They differed from Socinus, and the foreign Unitarians, in maintaining the perſonality of the Holy Spirit. This ſociety does not appear to have ſubſiſted after the death of Biddle; nor have the *Socinians*, though their ſentiments have been adopted by ſeveral, made any figure as a community in England. The moſt diſtinguiſhed *Socinian* writers, in Poland, were Crellius, Smalcius, Volkelius, Slichtingius, Wolzogenius, Przipcovius, and Staniſlaus Lubianicius: to this number ſome have added Grotius; and in later times we might enumerate Le Clerc, Biddle, Lardner, Lowman, Fleming, Lindſey, Prieſtley, &c. See on this ſubject Socini Oper. tom. i. & ii. paſſim. Moſheim's Eccl. Hiſt. vol iv. p. 167. &c. 8vo. Toulmin's Life of Socinus, paſſim. See UNITARIANS.

SOCK. See SOCCUS.

SOCK and *ſythe-land*. See HUSBAND-*land*.

SOCKET. Ball and *ſocket*. See BALL.

SOCKETS, in a *Ship*, are the holes which the pintles of the murthering pieces go into.

SOCLE, or ZOCLE, in *Architecture*, a flat, ſquare member under the baſes of pedeſtals, of ſtatues, vaſes, &c. which it ſerves as a foot, or ſtand.

The word is French; formed from the Italian *zoccolo*, or the Latin *ſoccus*, the ſhoe of the ancient comic actors. Vitruvius calls it *quadra*; we, frequently, *plinth*.

SOCLE, *continued*, is a kind of continued ſtand, or pedeſtal, without either baſe, or corniche, ranging round the whole building; called, by Vitruvius, STEREOBATA; and, by the French, *ſoubaſſement*.

SOCMEN, or SOKEMEN, *ſocmanni*, ſuch tenants as held their lands and tenements in *ſocage*; but the tenants in ancient demeſne ſeem moſt properly to be called *ſocmans*. See SOC and VILLENAGE.

SOCNA, in our *Old Writers*, a privilege, liberty, or franchiſe. The word is Saxon.

SOCO, in *Ornithology*, the name of a Braſilian bird of the heron-kind, the *ardea Braſilienſis* of Linnæus, remarkable, beyond all the reſt of that genus, for the length of its neck. It is very common in the Braſils; it is ſmaller than the common heron; its beak is ſtrong, ſtraight, and ſharp; its tail ſhort; its head and neck brown, and variegated with black; and its body is of the ſame colours in different variegations, but its wings have a mixture of whiteneſs. See *Tab.* V. *of Birds*, N° 54.

SOCOME, in our *Law-Books*, &c. a cuſtom of grinding corn at the lord's mill.

There is a *bond-ſocome*, where the tenants are bound to it; and *love-ſocome*, where they do it freely, out of affection to the lord. See MOLTA.

SOCRATIC *induction*, in *Rhetoric*. See INDUCTION.

SOCRATIC *philoſophy*, the doctrines and opinions, with regard to morality and religion, maintained and taught by Socrates.

By the character of Socrates, left us by the ancients, particularly by his ſcholar Plato, Laertius, &c. he appears to have been one of the beſt and the wiſeſt perſons in the heathen world. To him is aſcribed the firſt introduction of moral philoſophy; which is what is meant by that popular ſaying, *Socrates firſt called philoſophy down from heaven to earth*: that is, from the contemplation of the heavens, and heavenly bodies, he led men to conſider themſelves, their own paſſions, opinions, faculties, duties, actions, &c.

While young, he was exceedingly fond of natural knowledge, as he witneſſes of himſelf, in Plato; but in his older age he caſt aſide this part of philoſophy as obſcure, uncertain, impracticable, and even uſeleſs and impertinent; and applied himſelf wholly to moral or active philoſophy.

It was he, firſt, who when all the other philoſophers boaſted they knew all things, owned, ingenuouſly, he knew nothing but this, that he knew nothing; which Pyrrho, the father of the ſceptic philoſophy, improved on, when he ſaid he knew nothing; not even this, that he knew nothing. Yet, in an anſwer to the oracle, it was pronounced, Ανδρων απαντων Σωκρατης σοφωτατος, *that Socrates was the wiſeſt of all men*. He was accuſed by Anytus, Melitus, and Lycon, three perſons, whoſe hatred he had incurred by his ſevere declamations againſt the poets, of which number the two firſt were, and the third an actor. His accuſation was, that he corrupted the Athenian youth, and broached new ſuperſtitions. He was condemned to drink cicuta by two hundred and eighty-one votes, as we are told by Quintilian.

After his death, his fellow-citizens repented to that degree, that the gymnaſia, courts of juſtices, &c. were all ſhut up: Melitus was put to death, Anytus was baniſhed, and a ſtatue was erected to Socrates.

He wrote nothing himſelf; yet almoſt all the Grecian ſects of philoſophers refer their origin to his diſcipline; particularly the Platoniſts, Peripatetics, Academics, Cyrenaics, Stoics, &c. But the greateſt part of his philoſophy we have in the works of Plato.

SODA, in *Medicine*. See CARDIALGIA, and HEART-*burn*.

It is to be obſerved, that what we underſtand by the word *ſoda* is to be diſtinguiſhed from the *ſoda* of the ancients; for they expreſſed by this word a peculiar ſharp and terrible pain in the head.

The common opinion being, that this complaint is merely owing to an acid humour, has given riſe to the uſe of chalk in it as an univerſal remedy; and people, who are afflicted with it, uſually ſwallow chalk alone, and that in large quantities, for their cure. But this is by no means a ſafe, or adviſable method; for the chalk meeting with an acid, becomes a violent aſtringent on mixing with it, and powerfully contracts the tender fibrillæ of the ſtomach. Whence it often happens, that inſtead of a cure, the conſequences are more painful cardialgias, with obſtructions of the viſcera, anorexies, and often in women ſuppreſſion of the menſes. Some give the powder of bricks inſtead of chalk; but this is more dangerous than the chalk, as it is in itſelf more aſtringent. In people, who are afflicted with this complaint from eating fat things, a draught of brandy often proves an immediate cure. Juncker's Conſp. Med. p. 589.

SODA *ſubethica*, a term uſed to expreſs a heavy and dull pain in the head.

SODA, in *Natural Hiſtory*. See KALI.

SODALES *Auguſtales*. See AUGUSTALES.

SODALITIUM, among the Anglo Saxons, was the name of a voluntary aſſociation, the object of which was the perſonal ſecurity of thoſe who joined in it, and which the feebleneſs of government at the time rendered neceſſary. Among other regulations, which are contained in one of theſe ſtill extant, the following deſerves notice: if any aſſociate ſhall either eat or drink with a perſon who has killed any member of the *ſodalitium*, unleſs in the preſence of the king, the biſhop, or the count, and unleſs he can prove that he did not know the perſon, let him pay a great fine. Hicks Diſſ. Epiſt. apud. Theſ. Ling. Septentr. vol. i. p. 21.

SODDER, or SODER. See SOLDER.

SODDERING. See SOLDERING.

SODDING *of brick*. See BRICK.

SODE-*ſhoots*, in *Botany*, a name given by ſome to the tree, whoſe inſpiſſated juice is the gum tacamahacca of the ſhops.

SODOMY, the unnatural crime of buggery; thus called from the city of *Sodom*, which was deſtroyed by fire for the ſame.

The Levitical laws adjudged thoſe guilty of this execrable evil to death, Lev. xviii. 22, 23. xx. 15, 16. and the civil law aſſigns the ſame puniſhment to it. Our laws alſo make it felony. 25 Hen. VIII. cap. 6. 5 Eliz. cap. 17.

SOFA, in the Eaſt, a kind of alcove raiſed half a foot above the floor of a chamber, or other apartment; and uſed as the place of ſtate, where viſitors of diſtinction are received.

Among the Turks, the whole floor of their ſtate-room is covered with a kind of tapeſtry, and on the window-ſide is raiſed a *ſofa* or *ſopha*, laid with a kind of matraſs, covered with a carpet much richer than the other. On this carpet the Turks are ſeated, both men and women, like the taylors in England, croſs-legged, leaning againſt the wall, which is bolſtered with velvet, ſattin, or other ſtuff, ſuitable to the ſeaſon. Here they eat their meals; only laying a ſkin over the carpet, to ſerve as a table-cloth, and a round wooden board over all, covered with plates, &c.

The ambaſſadors of France ſtood out a long while, and refuſed to viſit the grand vizir, unleſs he would receive them on the *ſofa*: at length he granted them the *ſofa*.

SOFEE. See SOPHI.

SOFFIETTA, the bellows-fiſh, a name by which ſome have called the SCOLOPAX, a ſmall ſea-fiſh, common in the markets of Rome and Venice.

SOFFITA, SOFFIT, or SOFIT, in *Architecture*, any timber ceiling, formed of croſs beams, or flying corniches;

the ſquare compartiments or pannels whereof are enriched with ſculpture, painting, or gilding.

The word is Italian, and ſignfies the ſame with the Latin *lacuna* and *laquear*; with this difference, that *lacunar* is uſed for any cieling with ſquare, hollow pannels, called *lacus*; and *laquear* for compartiments interlaced with plat-bands, after the manner of knots or *laquei*.

Such are thoſe we ſee in the baſilics and palaces of Italy, in the apartments of Luxembourg, at Paris, &c. See *Tab. Archit. fig.* 10.

Soffita, or **Soffit**, is alſo uſed for the under-ſide or face of an architrave; and more particularly for that of the corona or larmier, which the ancients called *lacunar*, the French *plafond*, and we uſually the *drip*.

It is enriched with compartiments of roſes; and in the Doric order has eighteen drops, diſpoſed in three ranks, ſix in each, placed to the right of the guttæ, at the bottom of the triglyphs.

SOFI, or Sophi. See Sophi.

SOFIT. See Soffit.

SOFT *pulſe, roe*, and *ſoap*. See the ſubſtantives.

SOFTENING, in *Painting*, the mixing and diluting of colours with the bruſh or pencil.

To *ſoften* deſigns in black and white, made with the pen, &c. ſignifies to weaken the teint.

To *ſoften* a portrait, according to Felibien, is to change ſome of the ſtrokes, and give a greater degree of ſweetneſs and *ſoftneſs* to the air thereof, which before had ſomething rough and harſh in it.

SOGETTO, *ſubject*, in the *Italian Muſic*, is uſed for a ſong or melody, on which ſome counterpoint is to be made. This may be done variouſly: thus, 1. *Contrapunto ſopra il ſogetto*, a counterpoint above the ſubject is that of which the ſubject is the baſs. 2. *Contrapunto ſotto il ſogetto*, when the given ſubject is the higher part. If the ſubject, in either caſe, does not change its notes, it is called *ſogetto invariato*. But if the notes be changed, either in figure or poſition, it is called *ſogetto variato*. 3. *Sogetto* is alſo uſed for the words to which a ſong is to be made. 4. *Sogetto* is likewiſe applied to a ſeries of notes, from which a FUGUE is formed.

SOIL, *ſolum*, in *Agriculture* and *Gardening*, denotes earth, or ground, conſidered with regard to the quality of its mould for the production and growth of vegetables.

Mr. Bradley reduces all *ſoils* to three heads or kinds; viz. *ſand, loam*, or *mother earth*, and *clay*.

Gravels, and all the open *ſoils*, till we come at loam, are of the ſandy race; and the binding earths, from loam down to the ſtiffneſs of chalk, may be ranged under the clay kind.

Loam, or mother-earth, is the medium between the two, and includes all the intermediate kinds.

Each of theſe *ſoils* tends alike to VEGETATION, and has its peculiar plants, which will not grow in the other; but the peculiar plants of both the other two will grow in loam, as partaking equally of the qualities of both. Loam, then, muſt be allowed the beſt and moſt beneficial *ſoil*, where it can be had; and where it cannot, if, by a mixture of other earths, we can make a compoſt to reſemble it, we have more to expect from it, eſpecially in plantations of durable trees, than from a compoſition of dung, or other forcing ingredients, which, like exceſs of high intemperate foods and liquors, though they give a haſty growth, yet make the thing ſhort-lived.

The land of England, as conſidered by the farmer, is reduced into nine ſorts of *ſoils*; the ſandy, the gravelly, the chalky, the ſtony, the rocky, the hazely, the black earth, the marſh, and the clay land. Of this laſt kind there are four varieties, diſtinguiſhed by their colours; the black, the blue, the yellow, and the red.

In many places theſe *ſoils* are mixed and blended together, and where it is ſo, it is much better than where they are ſeparate or ſingle; eſpecially where the mixtures happen to be of a right kind, as thoſe of the hot and the dry *ſoils* blended with the cold and the moiſt. Nature does this often, and art may imitate it. All ſands are hot, and all clays are cold, and therefore the laying clay upon ſandy lands, or ſand upon clayey lands, is the beſt of all manure; this alters and changes for the better the very nature of the land itſelf, whereas dung only improves it for a time, and after that leaves it as bad as it was before. Mixt *ſoils*, that tend to the clayey kind, are the beſt of all others for corn. It is not only the natural *ſoil* we are to conſider, but the depth of it, and what *ſoil* is underneath; for the richeſt *ſoil*, if it be only eight or ten inches deep, and lies upon a cold clay, or upon ſtone, will not be ſo fruitful to the farmer as the leaner *ſoils* that lie upon better under-ſtrata. Gravel and ſand are the beſt under-ſtrata of all others, to make the land above prolific.

Cold and wet clays are much more fruitful in the ſouthern parts of England, than in the north. The climates, therefore, are to be conſidered, and the quantities or proportions of the different kinds in the mixed ſoils. The natural produce of the land, as to weeds or graſs, is alſo to be greatly regarded by the perſon who intends to improve upon it. What is the effect of ploughing is next to be enquired into, and experiment muſt ſhew what kind of corn agrees beſt with it.

All land that moulders into duſt with froſt, with all ſorts of warm lands, black mould, yellow clays, if not too ſpewy when wet, and all that turn black after rain, are in general good lands for corn. Land that produces large trees, as alſo ſuch as produces black-thorn, weeds, thiſtles, rank graſs, and the like, and that lies in bottoms open to the eaſt or ſouth, being well ſheltered from other winds, may be always eſteemed to bid fair for good land. Thyme, ſtrawberries, betony, and wild ſage, direct to the places where woods will thrive beſt; and chamomile is always an indication of a land being diſpoſed to bear corn in large crops.

All land that binds after froſt and rain, all that turns white, and is full of worms, or is very moiſt and cold, or that is too hot and dry, and lies open to the north on the ſides of hills, expoſed to cold winds and froſts in winter, and to the ſun's ſcorching heat in ſummer; and all that bears naturally holly, box, ivy, juniper, fern, or brakes, furzes, broom and heath; and lands that bear moſſes, ruſhes, yarrow, and wild tanzy, with flags, and other ſuch weeds, which betoken a cold and damp ground, are leſs fit for corn, though other things may ſucceed on them. Where plants appear blaſted, ſhrubby, and curled, theſe are diſtempers in them occaſioned by ſudden changes of wet and cold, and a dry heat. All theſe lands are, by their natural produce, to be judged leſs fruitful than the others. Blackiſh, dun, or yellow ſand, and very hot ſtony gravel, are generally eſteemed very unfruitful. Chalky lands are naturally cold, and therefore they require warm compoſts; and this is the reaſon why chalk itſelf is ſo good a manure for hot and dry lands. Sandy land, well manured with marl, will bear turneps, or white or blue peaſe, to great advantage. Mortimer.

The great article, in the culture of plants, trees, &c. is the *ſoil*; and in many caſes it is not ſufficient to have found a *ſoil*, which once tried proves convenient, and to ſuppoſe that it will always continue ſo. In courſe of time the *ſoil*, which was once proper for the nouriſhment of ſome peculiar vegetable, loſes its virtue; and this ſooner in ſome lands, and later in others. All who are converſant in huſbandry, are well acquainted with this. If a good piece of ground be choſen for the ſowing of wheat, and it produces very well the firſt year, it will not for ever continue to do ſo; the ſecond year's crop will be perhaps good, and the third and fourth tolerable: all this while the land is in heart, as the farmers expreſs it; but after this it becomes improper, and very little wheat will be raiſed if ſown upon it; yet when it refuſes to produce wheat, it will, without any alteration, produce barley in ſufficient plenty for ſome years; when it will yield no more good crops of barley, it may be ſtill ſowed with oats, and will produce that grain as well as freſh land; and when it has been worn out with all theſe, it will produce peaſe. After this it is made quite barren, and can be of no farther uſe to the farmer, the vegetative quality of it being worn off by theſe ſucceſſive crops, each ſort of grain taking off that part which is more peculiarly fitted for its own nouriſhment; the wheat firſt, and the reſt in their order. While one of theſe plants is taking up what belongs to its particular nature, the reſt all remain quiet and undiſturbed; and theſe are afterwards carried away by ſucceſſive changes of plants, which require them; and at length, by the whole, all the vegetable matter is carried away, and the lands ſo drained of it, that there muſt be a ſupply of ſomething in its room, before any thing more of any kind can be raiſed from it.

The ſupply of freſh vegetable matter, in the place of that which was drained away by the ſucceſſive growths of plants, is done by ſeveral ways, but by none ſo well, as by letting it lie fallow for ſome time. The other means of giving a ſupply to the exhauſted earth are the manures laid on it by the farmer, and theſe are, all of them, ſome animal or vegetable remains, and their uſe is to drain into the earth thoſe particles from themſelves, which may be again received into the bodies of new productions of the ſame kinds. Blood, urine, the excrements of animals, with their ſeveral parts, as horns, hoofs, hairs, feathers, calcined ſhells, and vegetable bodies in an altered ſtate, ſuch as lees of wine and beer, aſhes of burnt vegetables, leaves, ſtraw, roots, ſtubble, and the like, when in a decaying ſtate, turned under the earth again by plowing, there become diſunited into their component parts, and theſe again are carried up into other new plants. See MANURING *of ground*.

If we take off our thoughts from the fields, and look among the gardens, we there meet with farther confirmations of the ſame thing: the trees, ſhrubs, and herbs, cultivated in theſe, after they have continued in one ſtation, till they have derived thence the greater part of the matter fitted for their increaſe and nouriſhment, will either decay or degenerate, unleſs they have a new ſupply of manure added to the earth about their roots, or are themſelves tranſlated into other earth, not ſo drained of that particular matter out of which they are to be fed.

The older trees have ſome more ſupplies of fit matter than the younger, by means of the length of their roots, which, when they have drained one ſpot of ground, uſually are carried much farther into another, and reach a very great way; but at laſt they can reach no farther, and all fails, unleſs ſuch a ſupply of manure, or the being removed into freſh earth, ſupply that nouriſhment they can no longer have where they ſtand. The gardeners, when they tranſplant trees, cut off theſe long roots; but though they only do this to prevent the trouble of opening a larger hole than neceſſary for their reception, yet there is in nature this good reaſon for it, that they have, when brought to a freſh *ſoil*, no occaſion for thoſe long roots to draw nouriſhment from afar off, when there is enough of it every where about them. From the whole of this reaſoning it is inferred, that the modern ſyſtem is erroneous, which ſays that water is the only thing that gives nouriſhment and increaſe to plants; ſince, if this was the caſe, there could be no need of manures, nor any need of altering the crop, in order to its ſucceeding, or of tranſplanting trees to make them thrive: and that ſome ſort of terreſtrial matter, taken from among the *ſoil*, is what gives increaſe and bulk to plants; for were it only water, the rain falling in all places alike, all would alike be at all times ſuited to produce all plants; and if the earth, according to lord Bacon's ſyſtem, ſerved to no other purpoſe to plants and trees, but to keep their roots firm, and to defend them from over-heat, and over-cold, one earth would do as well for theſe uſes as another, and the ſame earth would do as well for the ſame plant as a different earth. Phil. Tranſ. Nº 255 p. 219.

Mr. Tull, who thinks that earth is the true food of plants, maintains, that the only difference of *ſoil*, except the richneſs, is the different degree of heat and moiſture it has; the earth is equally proper, of whatever kind it be, and if theſe additions be properly adjuſted, any *ſoil* will nouriſh any plant. See *Food* of PLANTS, and VEGETATION.

Soil, *brickiſh*, a term uſed by our farmers to expreſs a kind of hazely earth, or land, of a reddiſh caſt. It is frequent in Eſſex, and ſome other counties, and approaches to the nature of a loam. It has no ſtones in it, and does not bind after wet as clay does, but lets all the water in that comes; whereas all clays hold the water till the ſun exhales it, and after rain with a froſt, moulder into duſt.

Theſe loams are an excellent mixture for other earths, being a happy medium between two extremes, uniting what is too looſe, cooling what is too hot, and entertaining a moderate ſhare of moiſture.

The beſt produce of the brick-earth is rye; if well dunged it will bear white oats, turneps, barley, wheat, buckwheat, and peaſe. The natural produce in weeds, is broom, fern, quick-graſs, and the like. If it be well dunged, it will produce large crops of clover, but it ſoon wears out of it, and ſhould therefore be ſowed mixed with rye-graſs. The beſt manure for theſe lands is chalk, mixed with coal-aſhes: marl makes a great improvement in them, and there is a ſtiff yellow kind of clay, that moulders with the froſt, that anſwers the ſame purpoſe. Whatever amendment is beſtowed upon this ſort of land by dung, and other enriching things that do not abſolutely alter the nature of the earth, laſts but a little while. Theſe lands bind very much after rain, and turn whiter; no froſt will diſſolve the clod, and if they are newly ploughed up, and ever ſo much rain comes on them, people may walk or ride over them almoſt as firm as over gravel. If they are not frequently ploughed, they are very ſubject to worms, which deſtroy the winter corn. They yield but poor crops in wet years; the weeds are generally very rank, and the wheat runs all into ſtraw. Ploughing is a great improvement of them, they always grow well the year after it. Theſe lands are to be ordered for corn in the ſame manner with the clay land, only as they are rank, and carry the crop much into ſtraw, it is beſt to dung them on the etch crop, and to ſow them with barley, and never to dung the fallows. Where the farmer has not a mind to plough them, but keep them for graſs, they ſhould be mowed one year, and then kept ſhort fed with ſheep, which will in time ſweeten them very much. The red ſandy lands in Northamptonſhire are of this kind; they will not hold manure, ſo they plough but once for the year's crop, which is juſt before the ſowing-time, and manure juſt before they plough it; for if they plough it oftener, and manure it ſooner, they find a great quantity of the beſt mould waſhed away below the ſurface, and out of the reach of the roots of the corn.

In Oxfordſhire they have a ſort of red land which they begin fallowing as ſoon in the year as they can, before the ſun is too high: if it is moderately moiſt, when fallowed, they eſteem it the better, but it ſhould not be too wet. They ſeldom give it a ſecond ſtirring, and they reckon that if it is too fine and light, it runs to weeds. Mortimer.

Soil, *Chalk*. Barley and wheat will ſucceed very well on the better ſort of *chalky land*; and oats generally do very well on any kind of it.

The natural produce of this ſort of land in weeds is that ſort of ſmall vetch called the tine tare, with poppies, may-weed, &c. Saintfoin and hop-clover will generally ſucceed tolerably well on theſe lands; and where they are of the better ſort, the great clover will do. The beſt manure for theſe lands is dung, old rags, and the ſheep-dung left after folding them on it. If rain happens to fall on theſe lands juſt after the ſowing, the earth will bind ſo hard after it, that the ſhoots from the ſeed cannot pierce through it, and the greater part of the crop will be by this means loſt. In Hertfordſhire they manure the *chalk-lands* with pigeon's-dung, aſhes, and ſoot, and with ſome horſe-dung: and in Oxfordſhire they uſe no other manure than half-rotten dung, with which they mix ſand; and this, they ſay, prevents the earth from binding. They generally ſow theſe lands there with wheat, meſlin, and barley, only after wheat they ſow peaſe and vetches; in the ſowing of theſe they are particularly forced to wait for fair weather, becauſe of the land's binding. Mortimer.

Soil, *Clay*. The *clay-lands* in different parts of England are of different colours, as blue, black, yellow, white, and red. Of theſe the black and the yellow are every where found the beſt for corn; the red is very good, but the white and blue are the worſt. Some of the blue in particular is of ſuch a nature and diſpoſition, that nothing can ſubdue it; and is ſo greedy and voracious, that nothing will ſatiate it without the utmoſt induſtry. Some *clay-lands* are more pinguid, and others more ſlippery, but all of them are very tenacious of water upon the ſurface, where it ſtagnates, and chills the plant, inſtead of penetrating and nouriſhing it; and in dry ſeaſons they become ſo hard, that the dews cannot penetrate them. Wheat, barley, grey-peaſe, and horſe-beans, are the principal produce of this ſort of lands; and that the farmer may know which of his untried *lands* are of this kind, he muſt obſerve their natural productions, and if he finds gooſe-graſs, or chivers, with wild tanzy, great daiſies, thiſtles, May-weed, and ſome red poppies, he may be aſſured the *land* that produces them is of this kind.

Some of theſe *clays* will bear exceeding good crops of clover, or rey-graſs, and if well manured and fed, they will anſwer the expence by the richneſs of the crop. The beſt manures for them are dung, particularly horſe-dung, aſhes, lime, ſoot, pigeon's dung, malt-duſt, and the dung of ſheep, by folding them upon the *land* in different places. Mortimer.

Clays hold the manure that is beſtowed on them better than any other *lands* whatever, and yield the beſt grain of any, eſpecially where there is a mixture of lime-ſtone with them. It is the common practice of the farmers of England to ſow theſe *lands* at firſt breaking up with black oats; they then fallow them, and after this ſow them with wheat or barley, and the etch-crop with either oats, peas, or beans.

Soil, *Gravelly*. The farmers obſerve, that *gravelly* and ſandy lands eaſily admit of heat and moiſture, but that they have leſs advantage from the laſt than any other lands, becauſe they let it paſs too ſoon, if they have a looſe under-ſtratum; or retain it too long, if they have a firm one, ſuch as clay, or a cold ſolid ſtone. From theſe accidents it either parches or chills too much; but when *gravelly* ground has a thin coat of good mould at top, and a bottom of looſe ſtone, it will produce excellent crops of *graſs*, for it will receive heat and moiſture enough; and if at any time it parches up the roots, the leaſt rain refreſhes it again, and the growth is quicker than before. Mortimer.

Soil, *Maumy*, in *Agriculture*, an earth conſiſting of a white marly clay, chalk, and ſand, which cauſes it to work very ſhort, as the farmers call it, when in any degree dry. This ſort of land is uſually ſowed with wheat, meſlin, or barley, and requires the ſame tillage that the clay-land does, and muſt be kept dry and warm.

Its moſt proper manure is the rotteneſt dung. As they frequently ſow beans next after wheat in clayey grounds, ſo in theſe they chooſe to ſow peaſe, chooſing a fair and ſettled ſeaſon for their ſeed time; for if there happen a ſmart ſhower ſoon after their ſowing, the earth will bind ſo firmly together after it, that moſt of the ſeed will be loſt. Plot's Oxfordſhire, p. 246.

Soil, *Marſhy*. See **Marshy** *Lands*, **Fen**, **Bog**, &c.

Soil, *ſandy*, a term uſed by our farmers to expreſs ſuch grounds as conſiſt wholly of a pure ſheer *ſand*.

This is of different colours, as white, blackiſh, reddiſh, or yellowiſh, and is very different in its nature, and in the ſize of its particles, ſome being harſher and ſome milder, and ſome very light, ſeeming only to be mere duſt. The grey, black, and aſh-coloured *ſand*-lands are the worſt of all, and generally are found on heaths and commons. Gravelly lands approach much to the nature of theſe, and thoſe which conſiſt of the largeſt ſtones, and are mixed with the harſheſt *ſands*, are of all the moſt barren.

The propereſt plants for arable land, of this kind, are white oats, rye, black wheat, and turneps. The natural produce in weeds, is quick graſs, ſorrel, broom, furze, fern, and heath.

The beſt manure for them is either marl, or ſuch clay as will break with the froſts. Cow-dung is alſo a good manure for theſe lands, and many uſe with ſucceſs chalk, mud, and the half-rotten ſtraw from dunghills.

When the farmer has a mind to raiſe corn on theſe lands, he muſt order them as the clays (ſee *Clay*-**Soil**); but where they are over-run with broom, furzes, and ſuch ſort of weeds, marl is to be laid on in great quantities. This is the practice in Staffordſhire, and by it they rid themſelves of theſe troubleſome weeds, and procure good crops of corn, though at ſome expence.

The firſt ſowing of this land is with black wheat, and for this they make three fallowings in winter, and ſtir them in the May following; at this time they ſow them, allowing one buſhel of ſeed to an acre, which generally yields them ſixty again. Then once ploughing theſe lands, after this crop is off, they are fit to ſow rye on.

In Oxfordſhire they ſeldom give theſe lands more than two fallowings for wheat, except they are very much over-run with weeds; and they eſteem the white and lammas wheat the moſt agreeable for this ſort of land, and then after a fallow rathripe barley. They afterwards generally fallow them every other year, and reckon them unfit for beans and peaſe, though they ſometimes ſow them with winter vetches. If they ſow peaſe on them, they eſteem the rathripe kinds the beſt.

In Herefordſhire they are much ſubject to moſs growing upon their *ſandy-lands*, and they make a great improvement by burning it on the ground, and mixing the aſhes with lime, which they then plough in.

They generally ſow them with rye after this manure, and that yields a very great increaſe upon them, and brings on a very good kind of graſs, if they are laid down after a crop or two. Mortimer.

M. de la Quintinie attributes all the difference we find in ſoils, to the different quality of the *ſands* mixed in them. *Soft ſands*, according to him, make a ſoft gentle earth: *unctuous ſands*, a ſtiff earth: *coarſe ſands*, a rough untractable earth, &c.

Soil, in ſome parts of England, is uſed as the name for the *phoca*, or Sea-*calf*.

This creature, in Cornwall, they frequently find ſleeping on the ſhore, and kill him; ſometimes by ſhooting, ſometimes by ſtriking over the head with long poles. He defends himſelf, when on ſhore, by throwing ſtones backward with great violence.

SOJOURNERS, among the *Athenians*, were permitted to dwell in the city, and follow their own buſineſs, without diſturbance, provided they obſerved all the laws and cuſtoms of the country; but were allowed no ſhare in the government. However, they were not allowed to act any thing, or manage any buſineſs in their own names, but were obliged to chooſe out of the citizens one, to whoſe care and protection they would commit themſelves, whoſe duty it was to defend them from all violence and oppreſſion. He was called **PROSTATES**.

SOIT *fait il comme deſiré*, be it done as it is deſired; a form uſed when the king gives the royal aſſent to a private bill preferred in **PARLIAMENT**.

SOK, **Soke**, **Soc**, in *Ancient Cuſtoms*. See **Soc**.

The word is ſometimes alſo uſed for the privilege of tenants excuſed from cuſtomary impoſitions.

Alſo for a quit-rent, or payment made to the lord by his tenant, for acting in quality of *ſoc-man*, or freeholder. See **Socage**.

SOKEMANS. See **Socmen**.

SOKE-*reeve*, in our *Old Writers*, the lord's rent-gatherer in the *ſoke*, or *ſoken*.

SOKHIO, in the *Materia Medica*, a name uſed by ſome authors for a peculiar ſpecies, if it may be ſo called, of the lignum aloes.

It is of a greyiſh colour, and ſeems to have been the blea, or outer part of the wood next the bark.

SOL, in *Muſic*, the fifth note of the gamut: ut, re, mi, fa, *ſol*, la.

Sol, or **Sou**, *ſhilling*, a French coin, of billon, i. e. of copper with a little ſilver mixed, equal to twelve deniers, or French pence; and the twentieth part of the livre, or pound. See **Shilling**.

The word is formed from the Latin, *ſolidus*, a *ſhilling*. Bodin is miſtaken when he derives it *à ſole*, by reaſon of the ſun ſtruck on it.

The French *ſol* is now worth upwards of an Engliſh halfpenny, or the twenty-third part of an Engliſh ſhilling.

The *ſol* was firſt ſtruck on the foot of twelve deniers Tournois, whence it was alſo called *douzain*, a name it ſtill retains, though its ancient value be changed; the *ſol* having been ſince augmented by three deniers, and ſtruck with a puncheon of a fleur-de-lys, to make it current for fifteen deniers. Soon after the old *ſols* were coined over again, and both old and new were indifferently made current for fifteen deniers. In 1709, the value of the ſame *ſols* was raiſed to eighteen deniers. Towards the latter end of the reign of Louis XIV. the *ſols* of eighteen deniers were again lowered to fifteen, where they now ſtand. The *ſol* of fifteen deniers is called *ſol Pariſis*.

The Dutch have alſo two kinds of *ſols*: the one of ſilver, called *ſols de gros*, and likewiſe *ſchelling*; the other of copper, called alſo the *ſtuyver*. See **Coin**.

In old authors we read of gold *ſols*, which were different at different times. In the time of the Salic law, the gold *ſol* was forty deniers; and thus it continued till the time of king Pepin, when it was reduced to twelve. Some have alſo imagined, that the French had anciently ſilver *ſols*.

Sol, in *Aſtrology*, &c. ſignifies the *ſun*. *Sol* in Aries, &c. See **Sun**.

Sol, *ſun*, in *Chemiſtry*, is gold; thus called from an opinion that this metal is, in a particular manner, under the influence of that Luminary.

What ſhould have been the principal inducement of torturing this metal, with ſo much violence, to obtain from it ſome medicinal virtues, Dr. Quincy obſerves, is not eaſy to be gueſſed.

Moſt, indeed, acknowledge, that gold in ſubſtance, or reduced into the ſmalleſt particles by the hammer, as in the leaf-gold, is not digeſtible in the ſtomach, ſo as to be tranſmitted into the blood, and be of any efficacy there. But there are nevertheleſs many, who are confident of its doing extraordinary matters, if reduced into a powder, by amalgamation with mercury, and by evaporating the mercury afterwards.

Zacutus Luſitanus is one of the ſmarteſt pleaders on this ſide the controverſy, againſt Muſa, Picus Mirandola, and Platerus; who, beſides many inſtances of its efficacy, urges the authority of Avicen, Serapion, Geber, and many of the Arabian phyſicians, with thoſe of other countries and of later date. Quercetan, Schroder, Zwelfer, and Etmuller, with many other more modern practical phyſicians, have fallen into the ſame opinion. But, which ſide ſoever is right, the preſent practice rejects all pretenſions to medicines from it. See **Gold**, in *Medicine* and *Chemiſtry*.

Sol, in the *Hermetical Philoſophy*, ſignifies *ſulphur*.

Sol, in *Heraldry*, denotes **OR**, the golden colour in the arms of ſovereign princes.

SOLÆUS or **Soleus**, in *Anatomy*, a large fleſhy flat muſcle, nearly of an oval figure, and thicker in the middle than at the edges. It has its name from its ſuppoſed likeneſs to a ſole. It is ſituated on the backſide of the leg, lower down than the gaſtrocnemii, by which it is covered, and with which it forms the calf of the leg. It is fixed above, partly to the tibia and partly to the fibula: it is fixed to above one third of the upper part of the backſide of the fibula, and a little to the articular ligament of the head of this bone. It is likewiſe fixed to the backſide of the tibia from the oblique line, or impreſſion, which terminates the inſertion of the poplitæus, down to the middle of the internal angle of the bone; afterwards leaving theſe two bones, it ends in a broad ſtrong tendon, which, together with that of the gaſtrocnemii, forms what it called the *tendo Achillis*. This ſtrong tendon contracts a little in its paſſage to the os calcis, and then expanding a little, it is inſerted obliquely in the backſide of that bone all the way to the tuberoſity. The fleſhy body of the *ſolæus* ſeems to conſiſt of, at leaſt, two planes of fleſhy fibres, that on the backſide of the muſcle being the moſt ſimple, and the other, or that next the bone, penniform. This muſcle, with the two gaſtrocnemii, form what anatomiſts call a *true triceps*. Winſlow.

SOLAND, or Solan-*gooſe*, in *Ornithology*. See Goose.

SOLANDERS, in *Farriery*. See Melanders.

SOLANOIDES, in *Botany*. See Rivina.

SOLANDRA, in *Botany*, a genus of the *monoecia pentandria* claſs. Its characters are: that it has male and female flowers; the involucrum of the former is compoſed of four leaves and five flowers, and it has five petals; the involucrum of the latter is the ſame; it has ſix petals, two ſtyles, and the fruit is a double-berried capſule. There is only one ſpecies.

SOLANUM, in *Botany*, See Nightshade.

Solanum *pomiferum*, *apple-bearing nightſhade*, a name given by writers to the *night-ſhades*, and plants of ſeveral genera allied to thoſe, and bearing large fruits. See Melongena and Lycopersicon.

Solanum *ſomniferum*, *ſleepy night-ſhade*, a name given by Caſpar Bauhine, and ſome others, to a ſpecies of *winter*-CHERRY, the whorled alkekengi with ſmall fruit.

SOLAR, ſomething belonging to the SUN.

Thus, we ſay, SOLAR *fire* in contradiſtinction to *culinary fire*.

Solar *civil month*. See Month.

Solar *cycle*. See Cycle.

Solar *comet*. See Discus.

Solar *eclipſe*, is a privation of the light of the ſun, by the interpoſition of the opake body of the moon. See Eclipse.

Solar *month*, *riſing*, *ſpots*. See the ſubſtantives.

Solar *ſyſtem*, the order and diſpoſition of the ſeveral heavenly bodies, which revolve round the ſun as the centre of their motion; viz. the planets, primary and ſecondary, and the comets. For a ſcheme of the *ſolar ſyſtem*. See System.

Solar *year*. See Year.

SOLATRUM. See Nightshade.

SOLDAN. See Sultan.

SOLDANEL, *ſoldanella*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has an erect permanent empalement, cut into five parts, and has one bell-ſhaped petal; the brim is cut into acute ſegments, and it has five awl-ſhaped ſtamina, terminated by ſingle ſummits; it has a roundiſh germen, ſupporting a ſlender ſtyle the length of the petal, which is permanent, crowned by an obtuſe ſtigma; the germen turns to an oblong taper capſule of one cell obliquely ſtreaked, opening at top with ten indentures, filled with ſmall acute pointed ſeeds. We have but one ſpecies of this genus, which grows naturally on the Alps.

Soldanella is alſo a name very improperly given by many authors to ſome of the proper and genuine ſpecies of bind-weeds; as the purging ſea-bind-weed with roundiſh leaves and purpliſh flowers, the great Italian ſea-bind-weeds with ſinuated leaves, and the common round-leaved ſea kind. See Convolvulus.

SOLDER, Sodder, or Soder, formed from the French *ſoudure*, of the Latin *ſolidare*, *to ſtrengthen*; is a metallic or mineral compoſition, uſed in *ſoldering* or joining together other metals.

For this purpoſe it is required that *ſolders* melt ſooner than the metal to be ſoldered, and that they approach as near as may be to the metal ſoldered in hardneſs and colour.

The different *ſolders* are made of gold, ſilver, copper, tin, biſmuth, and lead; uſually obſerving, that in the compoſition there be ſome of the metal to be *ſoldered*, mixed with ſome higher and finer metals.

Goldſmiths uſually make four kinds of *ſolder*; viz. *ſolder* of eight, where, to ſeven parts of ſilver, there is one of braſs or copper: *ſolder* of ſix, where only a ſixth part is copper; *ſolder* of four, and *ſolder* of three. It is the mixture of copper in the *ſolder* that makes raiſed plate always come cheaper than flat.

As mixtures of gold with a little copper are found to melt with leſs heat than pure gold itſelf, theſe mixtures ſerve as *ſolders* for gold: two pieces of fine gold are ſoldered by gold that has a ſmall admixture of copper; and gold alloyed with copper is ſoldered by ſuch as is alloyed with more copper: the workmen add a little ſilver as well as copper, and vary the proportions of the two to one another, ſo as to make the colour of the *ſolder* correſpond, as nearly as may be, to that of the piece. A mixture of gold and copper is alſo a *ſolder* for fine copper as well as for fine gold.

Gold being particularly diſpoſed to unite with iron, proves an excellent *ſolder* for the finer kinds of iron and ſteel inſtruments. See Iron.

The *ſolder* uſed by plumbers is made of two pounds of lead to one of block-tin. Its goodneſs is tried by melting it, and pouring the bigneſs of a crown-piece on a table; for, if good, there will ariſe little, bright, ſhining ſtars therein.

The *ſolder* for copper is made like that of the plumbers; only with copper and tin; and for very nice works, inſtead of tin, they ſometimes uſe a quantity of ſilver.

Solder for tin is made of two thirds of tin and one of lead or of equal parts of each; but where the work is any thing delicate, as in organ-pipes, where the juncture is ſcarce diſcernible, it is made of one part of biſmuth, and three parts of pewter.

The pewterers uſe a kind of *ſolder* made with two parts of tin and one of biſmuth; this compoſition melts with the leaſt heat of any of the *ſolders*.

Silver ſolder is that which is made of two parts of ſilver and one of braſs, and uſed in ſoldering thoſe metals.

Spelter ſolder is made of one part of braſs and two of ſpelter, and is uſed by the braziers and copper-ſmiths, for ſoldering braſs, copper, and iron. This *ſolder* is improved by adding to each ounce of it one pennyweight of ſilver. But as this *ſolder* does not melt without a conſiderable degree of heat, it cannot be uſed when it is inconvenient to heat the work red-hot; and therefore, in this caſe, copper and braſs are ſoldered with ſilver.

Though ſpelter *ſolder* be much cheaper than *ſilver-ſolder*, yet workmen in many caſes prefer the latter. And Mr. Boyle informs us, that he has found it run with ſo moderate a heat, as not much to endanger the melting of the delicate parts of the work to be *ſoldered*; and if well made, this *ſilver ſolder* will lie even upon the ordinary kind itſelf; and ſo fill up thoſe little cavities that may chance to be left in the firſt operation, which is not eaſily done without a *ſolder* more eaſily fuſible than the firſt made uſe of. Works Abridged, vol. i. p. 135.

As to iron, it is ſufficient that it be heated red-hot, and the two extremities, in this ſtate, be hammered together. By this means they become incorporated one with the other: when it is ſoldered it is uſually done with braſs.

The duke of Florence's nail, anciently ſo much admired as being half iron and half gold, whereas thoſe two metals were deemed irreconcileable, was joined by a kind of *ſolder* made by Turneiſſer, an ingenious chemiſt of Venice; the ſecret whereof was never diſcovered till publiſhed by Tachenius. This *ſolder* is nothing but a little copper, or cyprus vitriol, put between the gold and the iron. For, naturally, the great acidity of the gold reduces the iron into a ſcoria or ruſt, when the two are applied over one another; but this inconvenience is removed, by the interpoſition of a little copper, be it in the ſmalleſt quantity imaginable. See Soldering.

SOLDERING, or Soddering, among *Mechanics*, the joining and faſtening together of two pieces of the ſame metal, or of two different metals, by the fuſion and application of ſome metallic compoſition on the extremities of the metals to be joined.

In *ſoldering*, ſome artifice is neceſſary to make the *ſolder* and metals adhere. All the metals, except ſilver and gold, upon melting, or before, are covered with droſs; and all the ſolders have ſome of theſe metals in them: this droſs hinders the ſolder and metal from uniting, and it is neceſſary to remove it. This is not performed in every kind of *ſoldering* by the ſame materials. The plumbers effect this by greaſing the lead, laying on the ſolder, and melting it with a hot iron, and thus the droſs generated in fuſion, unites with the greaſe, and flows away from the melted metal. The glaziers and tin-men uſe roſin in powder for the ſame purpoſe; for all inflammable ſubſtances that will melt, are equally conducive to this uſe. When copper and braſs are ſoldered with pewter, the work is firſt waſhed with a ſolution of ſal ammoniac in water, then heated juſt hot enough to melt the pewter, and the pewter applied to the joint to be ſoldered. In *ſoldering* that requires a greater heat, borax is uſed.

For a method of *ſoldering*, particularly uſeful to optical and mathematical inſtrument-makers, ſee Grinding of *Metallic Specula*.

SOLDIDO, a name given to the TAMOATA.

SOLDIER, a military man, liſted to ſerve a prince or ſtate, in conſideration of a certain daily pay.

The word is formed from the Italian, *ſoldato*, and that from the Latin, *ſolida*, or *ſolidata*, of *ſolidus*, the *ſolde* or *pay*; though Paſquier chooſes to derive it from the old Gauliſh *ſoldoyer*, a *ſoldier*; and Nicod from *ſoldurius*.

The *ſoldier* is he who takes pay; the vaſſal is he who is obliged to ſerve at his own expence; the volunteer he who ſerves at his own expence, and of his own accord.

Du-Cange obſerves, that the ancient ſoldiers were not to be ſhort of five feet and a half; and that this meaſure was called *incoma* or *incomma*.

Judge Blackſtone obſerves, that in a land of liberty it is extremely dangerous to make a diſtinct order of the profeſſion of arms. In abſolute monarchies this is neceſſary for the ſafety of the prince, and ariſes from the main principle of their conſtitution, which is that of governing by fear; but in free ſtates, the profeſſion of a *ſoldier*, taken ſingly and merely as a profeſſion, is juſtly an object of jealouſy. In theſe no man ſhould take up arms but with a view to defend his country and its laws: he puts not off the citizen when he enters the camp; but it is becauſe he is a citizen, and would wiſh to continue ſo, that he makes himſelf for a while a *ſoldier*. The laws, therefore, and conſtitution of theſe kingdoms know no ſuch ſtate as that of a perpetual ſtanding *ſoldier*, bred up to no other profeſſion than that of war; and it was not till the reign of Henry VII. that the kings of England had ſo much as a guard about their perſons.

As *ſoldiers*, by the annual act of MUTINY, are put in a worſe condition than any other ſubjects, ſo, by the humanity of our ſtanding laws, they are in ſome caſes put in a much better. By ſtat. 43 Eliz. cap. 3. a weekly allowance is to be raiſed in every county for the relief of *ſoldiers* that are ſick, hurt, and maimed; and beſides, the *royal* HOSPITAL at Chelſea is eſtabliſhed for ſuch as are worn out in their duty. Moreover, officers and *ſoldiers*, that have been in the king's ſervice, are by ſeveral ſtatutes, enacted at the cloſe of ſeveral wars, at liberty to uſe any trade or occupation they are fit for in any town in the kingdom (except the two univerſities), notwithſtanding any ſtatute, cuſtom, or charter to the contrary. And *ſoldiers* in actual military ſervice may make nuncupative wills, and diſpoſe of their goods, wages, and other perſonal chattels without thoſe forms, ſolemnities, and expences, which the law requires in other caſes. Blackſt. Com. book i. cap. 13.

The profits attending the profeſſion of a *ſoldier*, among the Romans, were very conſiderable. 1. Booty and plunder, with which they frequently returned home loaded, eſpecially after taking any cities or towns; for theſe were generally given up to be plundered. 2. The ſubdued countries, which were often divided among the *ſoldiers*. 3. Their pay. 4. Cloaths. 5. Proviſions. 6. Farms and houſes in provinces were alſo given them. 7. Many privileges and immunities, as that none could touch his goods in his abſence in the camp. 8. Legacies, which the emperors left to be diſtributed among them. 9. Donatives. 10. Promotions to military honours lay open to every brave man, though of the meaneſt birth.

Not only humanity but intereſt require that great care ſhould be taken of the health of *ſoldiers*. Much inſtruction may be drawn for this purpoſe from Dr. Pringle's excellent treatiſe, called Obſervations on the Diſeaſes of the Army. He there remarks that the circumſtances of *ſoldiers* in time of war differ from thoſe of other people, in that they are more expoſed to the injuries of the weather, and always crouded together, whether in camp, barracks, or hoſpitals: wherefore the moſt general diviſion of theſe diſtempers, may be into ſuch as ariſe from the intemperature of the weather, and thoſe from infection.

Military diſeaſes depending on the weather, are reducible to two ſorts, viz. to thoſe of ſummer, and to thoſe of winter. However, as expoſitions to cold are unavoidable upon the firſt encampment, as alſo for ſome time before the army uſually goes into winter-quarters, the winter diſorders beginning about the end of autumn, will not entirely ceaſe before the ſummer is well advanced; and, on the other hand, as the heats of ſummer and damps of autumn diſpoſe the body to ſickneſs, the camp-diſtempers are never quite over with the campaign, but continue ſome time after the troops retire into winter-quarters.

The ſummer diſeaſes are all of a bilious or putrid nature, as thoſe of winter are inflammatory. See BILIOUS *Fever*, *Inflammatory* FEVER, HOSPITAL *Fever*, HEAT, and INFLAMMATORY *Diſeaſes*.

SOLDIERS, *diet of*. See DIET.

SOLDIERS, *exerciſe of*. See EXERCISE.

SOLDIERS, *liſting or inliſting of*. See LISTING.

SOLDIERS, *puniſhment of*. See *Military* EXECUTION.

For other particulars relating to *ſoldiers*, ſee DESERTER, *Royal* HOSPITAL, *Camp* HOSPITAL, *Martial* COURT, MARTIAL *Law*, MUTINY, &c.

SOLDIERS, *band of*. See BAND.

SOLDIER, in *Ichthyology*. See CANCELLUS.

SOLDIER's *cullions*, in *Botany*, See ORCHIS.

SOLDIERS, *freſh-water*, a name given in ſeveral parts of England to the STRATIOTES, a diſtinct genus of plants, called by Boerhaaave *aloides*.

SOLDURII, in *Antiquity*, a kind of military clients, or retainers to the great men in Gaul, particularly in Aquitania, mentioned by Cæſar.

The *ſoldurii* were people that ſhared all the good and ill fortune of their patrons; to whom, if any diſaſter happened, they either underwent the very ſame or killed themſelves: and Cæſar aſſures us that no one had ever been known to refuſe the alternative. Lib. iii. de Bel. Gall.

Vigenere takes them to have been more than common ſoldiers; and even gentlemen in penſion, or appointment. Athenæus calls them συναποθνησκοντες, q. d. dying together, or with their maſters.

SOLE, in the *Manege*, is a nail or ſort of horn under a horſe's foot, which is much more tender than the other horn that incompaſſes the foot, and, by reaſon of its hardneſs, is properly called the *horn* or *hoof*. A horſe's ſhoe ought to be ſo ſet upon the hoof, as not to bear upon the *ſole*, for otherwiſe the *ſole* would be hurt, and not only make the horſe lame, but corrupt the fleſh that ſeparates it from the coffin-bone.

To take out the *ſole*, is to do it without touching the horn of the hoof; for if you take off the horn, you make a *hoof-caſt*. We take out the *ſole* for ſeveral infirmities, as may be ſeen in Mr. Solleyſel's Complete Horſeman. A horſe that is *unſoled* may recover in leſs than a month.

High-ſoled, called in French *pied comblé*, is ſaid of a horſe whoſe *ſole* is round underneath, ſo that it is higher than the hoof and often makes the horſe halt, and hinders the ſhoeing of him unleſs the ſhoe be vaulted.

SOLE, in a *ſhip*, a name ſometimes given to the lower ſide of a gun-port, which, however, is more properly called the port-ſell.

SOLE *corporation*. See CORPORATION.

SOLEA, the *ſole-fiſh*, a well known fiſh, and much eſteemed at table. See SOAL.

SOLEÆ, among the Romans, were a kind of ſandals or ſlippers, which covered only the ſole of the feet, and were bound on with thongs of leather; inſtead of which the women, and effeminate perſons of the other ſex, tied them on with purple-coloured ribbands, or ſuch as were variouſly adorned with gold and ſilver.

SOLECISM, SOLOECISMUS, in *Grammar*, a groſs impropriety in ſpeech, contrary to the uſe of language, and the rules of grammar, either in reſpect of declenſion, conjugation, or ſyntax. See PURITY.

The word is Greek, σολοικισμος, derived from the *Soli*, a people of Attica, who, being tranſplanted to Cilicia, loſt the purity of their ancient tongue, and became ridiculous to the Athenians for their improprieties therein.

An actor on the Roman theatre having made a falſe geſture, the audience immediately cried out, he had committed a *ſoleciſm* with his hand.

Cicero, ad Herenn. lib. iv. cap. 12. diſtinguiſhes in the following manner between BARBARISM and *ſoleciſm*. *Latinitas eſt quæ ſermonem purum conſervat, ab omni vitio remotum. Vitia in ſermone, quominus is latinus ſit, duo poſſunt eſſe*; ſoleciſmus *et barbariſmus*. Soleciſmus *eſt, cum verbis plurimis conſequens verbum ſuperiori non accommodatur. Barbariſmus eſt, eum verbum aliquod vitioſè effertur.*

SOLEIL. *Ombre de* SOLEIL. See OMBRE.

SOLEIL *de mer*, in *Ichthyology*, a name given by the French writers, and by Rondeletius, to a peculiar ſpecies of STAR-*fiſh*, of a ſmall ſize, the legs of which reſemble very much the tails of lizards, and are very brittle.

Geſner deſcribes alſo a ſpecies under the name of the ſea-moon, *luna marina*, which he ſays is remarkably fragile, and which, from what elſe he has ſaid of it in its deſcription, appears alſo to be the ſame creature. The great character, however, of the creature's legs reſembling, both in colour and figure, the end of the common brown land-newt's tail, is ſo expreſſive, that it cannot but be always known by it.

Theſe rays are ſo extremely friable, that it is ſcarce poſſible to touch them without their breaking, and they are not beſet with points in the manner of the common rays of the creatures of this kind.

The other rays of ſtar-fiſhes being furniſhed with many hundred legs, and theſe wanting them entirely, it follows, that in this ſpecies the rays themſelves muſt ſupply the place of legs, and aſſiſt the creature in walking; and thence its manner of walking muſt neceſſarily be different from that of any other kind. Theſe rays are five in number, and are inſerted very near the mouth of the creature, which is always placed in the centre of the ſtar: the part where this aperture is ſituated, and which may be called the body of the animal, is of a roundiſh figure; the diameter of it is about a third part of the length of the rays; its under ſurface is flat, and its upper convex; and it is covered, both above and below, with ſcales, but they are arranged in different manners.

The common habitations of the ſea-ſtars, on the rough ſhores of the ſea, is no place for theſe tender creatures, every daſh of a wave againſt a ſtone, if they were in the way, would break off their limbs; they have the caution

tion therefore, to fix their reſidence only in calm places, and where the ſhore is covered entirely with a deep ſmooth ſand. When the water has forſaken them, they are often ſeen walking ſlowly on the ſhore; and in this caſe they uſe their rays as ſo many legs. As they divide the body of the fiſh into equal parts, there is no ray before or behind any where, ſo that the creature goes with equal eaſe to any ſide that it likes. The beſt motion they are able to make is, however, very ſlow, and the ground on which they march ought to be very even; for if they attempt to haſten their pace, or if they find any thing uneven in their paſſage, one or more of their legs uſually breaks; and this is the reaſon why this ſpecies is ſeldom found with its rays perfect. They never bury themſelves deep in the ſand, but juſt get under it ſo as to be covered; and this they do by advancing two of the rays together, and burrowing carefully with them, and then following them with the reſt of the rays and the body. Mem. Acad. Par. 1712.

SOLEMN, Solemnis, ſomething performed with much pomp, ceremony, and expence. Thus we ſay, *ſolemn feaſts, ſolemn funerals, ſolemn games*, &c.

Solemn, in *Law*, ſignifies ſomething authentic, or that is clothed in all its formalities.

Solemn *acceptance*. See Acceptance.

Solemn *teſtament*, in the *Civil Law*, is to be atteſted by ſeven perſons, and ſealed with their ſeals.

Solemn *marriage*, is that performed in one's own pariſh-church, after publication of the bans, and in preſence of witneſſes.

SOLEN, the *razor ſhell-fiſh*, in *Natural Hiſtory*, the name of a genus of ſhell-fiſh; the characters of which are theſe: they have bivalve ſhells with an oblong body, and are open at both ends; they are uſually ſtraight, but in ſome ſpecies crooked. It had its name, *ſolen*, from the Greek, in which language that word expreſſes a pipe or tube; this fiſh, when the ſhells are cloſed, very aptly reſembling a tube. The Latin writers have called it *unguis*, from its reſemblance in colour and conſiſtence to the human nail. The common people, in many parts of France, call it *coutelier*, and in Italy it is commonly called *cannolichio*. See Shells.

Rondeletius obſerves that there are, among the *ſolens* of the ſame ſpecies, males and females, which are eaſily diſtinguiſhable from one another; and that the females are larger, have no variegations on the ſhells, and are much better taſted than the males. Rumphius has deſcribed a very remarkable ſpecies of *ſolen*, which always remains buried in ſand, and which is not properly a bivalve, conſiſting only of one piece, though of the ſhape of the *ſolen*; he calls this *ſolen arenarius*. Liſter has called the crooked ſpecies *ſolenes curvi*, and ſome call them the *ſcymitar ſolens*.

We have ſeveral ſpecies of the ſtraight *ſolens*, though but few of the crooked ones. See *Tab. of Shells*, N° 23.

Of the crooked *ſolens*, two are the only known ſpecies. 1. The ſcymitar *ſolen*. 2. The *ſolen arenarius*, always found in ſand.

The ſhell of this fiſh is compoſed of two pieces, which are the two halves of a hollowed cylinder, with an elliptic baſe, divided in a longitudinal direction. Theſe two pieces are faſtened together near one end by a ligament, like that which joins the ſhells of the muſcle or the oyſter. From the place where this ligament is fixed, quite to the other end of the ſhell, there is a membrane faſtened, to each edge of the ſhell, and this increaſes in breadth in proportion to its diſtance from the place of its origin; ſo that viewed externally, it forms a ſort of iſoſceles triangle, the baſe of which has about two lines in breadth. The colour and conſiſtence of this membrane give it very much the appearance of a piece of parchment; it has a conſiderable ſpring in it, and ſerves on occaſion to open, or draw together the two ſides of the ſhell.

There is another membrane of the ſame kind with this, faſtened to the other ſide of the fiſh, there adhering to each ſhell, but this is of an equal breadth all the way down: this ſerves alſo to ſhut or open the edges of the ſhell. When the *ſolen* ſhuts its ſhell, it folds itſelf into ſeveral longitudinal wrinkles, which open again when the ſides of the ſhells ſeparate.

Hence it is to be obſerved, that though this ſhell has a power of opening and ſhutting, yet the body of the fiſh is always ſecured, and is no more expoſed to ſight at one time than at another, and there is no part where the fiſh can be ſeen but at the ends.

This fiſh lives in the ſand on the ſea-ſhore, where it buries itſelf often a foot and a half, or two feet deep; the length of the ſhell is, at this time, nearly in a vertical poſition, and the fiſh has a power of raiſing itſelf at pleaſure up to the ſurface, and ſinking down again, while the ſhell remains all the time buried in its place. Almoſt all other animals have a horizontal motion, and the ſhell-fiſh of the ſea crawl along upon its bottom under water, as the common land animals do on dry ground; but this creature's progreſſive motion is only vertical, and that confined to a very ſmall compaſs; all that it is able to do for itſelf being only to raiſe itſelf higher or lower, and ſink deeper or riſe higher in the ſand, within the narrow compaſs of about two feet at the utmoſt, as the going beyond that muſt occaſion its deſtruction. Where theſe ſhell-fiſh are buried in the ſand, there is a hole reaching from every one of them to the ſurface, by means of which they have a free communication with the water; theſe holes generally are placed in great numbers near one another, and are eaſily diſtinguiſhed at a time when the tide has left the ſhore uncovered. They are not round but oblong, and ſomewhat reſemble the key-hole of a lock, but that they have a roundneſs at each end, whereas that uſually is rounded only at one.

When it has occaſion to aſcend out of its hole, nothing more is required than the putting out the end of the leg, ſwelling it, and thus thruſting itſelf up to the length of that leg; then retracting it into the ſhell again, and thruſting out, and inflating its end for a ſecond movement of the ſame kind. Theſe motions may be all perceived in the creature when out of the ſand, particularly that by which it buries itſelf; for if held up in the fingers, it thruſts out the leg, and performs all the motions as if in the ſand, making a fruitleſs attempt to ſave itſelf in its own way. Mem. Acad. Par. 1712.

Klein, and ſome others, have given the name *ſolen* to the ſeveral ſpecies of *tubuli marini*.

SOLE-TENANT, in *Law*, he or ſhe who hold lands only in his or her own right, without any other perſon joined.

E. gr. If a man and his wife hold lands for their lives, the remainder to their ſon; here, the man dying, the lord ſhall not have heriot, becauſe he dies not *ſole-tenant*.

SOLEUS, in *Anatomy*. Some have given this name to the Gastrocnemius *internus*; but the *ſoleus* is a diſtinct muſcle. See Solæus.

SOL-FA-ING, in *Muſic*, the naming and pronouncing of the ſeveral notes of a ſong, by the ſyllables *ſol, fa, la*, &c. in learning to ſing it.

For a view of the origin of theſe ſyllables, ſee *Harmonical* Hand.

Though this ſyſtem of ſolmiſation does not appear to have been wholly developed in the writings of Guido, to whom the invention of the Gammut and *harmonical* hand has been commonly aſcribed, yet Dr. Burney obſerves, that writers very near the period in which he lived, give him the honour of its diſcovery; and particularly Sigebert, a monk of Gemblours, in the dioceſe of Namur, in Brabant, in his Chronicle under the year 1028. John Cotton alſo, who lived about a century after Guido, ſays, that ſolmiſation by the ſix ſyllables *ut, re, mi, fa*, &c. was practiſed by the Engliſh, French, and Germans; but the Italians, he adds, made uſe of other ſyllables; and by a paſſage from the Chronicle of Tours, under the year 1033, cited by Carpentier, in his Supplement to the Latin Gloſſary of Du-Cange, art. *Gamma*, Guido is put in full poſſeſſion of the ſcale and ſolmiſation. About the end of the laſt century the additional ſyllable *ſi* was univerſally received in France for the ſeventh of the key of C. The earlieſt Engliſh writer, mentioned by Dr. Burney, who takes notice of the omiſſion of *ut* and *re* in ſolmiſation, is Mr. Charles Butler, in his Principles of Muſic, publiſhed in 1636, and after his time the *ut* and *re* were rejected by all the Engliſh ſinging-maſters: Dr. Holder, Dr. Wallis, and every writer on muſic in this kingdom, were unanimous in excommunicating theſe two ſyllables, till Dr. Pepuſch endeavoured, and not unſucceſsfully, to have them again reſtored.

An ingenious member of the academy of Arcadia in Rome, publiſhed a pamphlet in 1746, recommending a new method of ſolmiſation by twelve ſyllables, formed into twelve ideal words, viz. *utparè, bomiſa, tuſoldè, lanoſi*, and comprehending the whole ſcale of ſemitones from C to *c* excluſive. This method is approved by the celebrated compoſer Haſſe, and by ſignor Giambatiſta Mancini, ſinging-maſter to the imperial family at Vienna. Signor Serra, in a treatiſe publiſhed at Rome in 1775, propoſes to name the notes in ſinging by the ſeven firſt letters of the alphabet, diſtinguiſhing the flat, natural, and ſharp notes by the addition of the three firſt vowels to the ſeven letters, as *ca*, *c* flat, *ce*, *c* natural, and *ci* for *c* ſharp, by which means the ſtudent is diſembarraſſed from all the mutations, and every ſound in the ſcale has a ſpecific and invariable name appropriated to it. This method has been approved by ſeveral of the beſt maſters in Rome. Burney's Hiſt. of Muſic, vol. ii. p. 95, &c.

Of the ſeven notes in the ſcale, *ut, re, mi, fa, ſol, la, ſi*; only four are in uſe among us, viz. *fa, ſol, la, mi*. Their office is principally in ſinging; that by applying them to every note in the ſcale, it may not only be pronounced more eaſily, but chiefly that, by them, the tones and ſemitones of the natural ſcale may be better marked out and diſtinguiſhed.

The deſign is obtained by the four ſyllables, *fa, ſol, la, mi*: thus, from *fa* to *ſol* is a tone; as alſo from *ſol* to *la*, and from *la* to *mi*, without diſtinguiſhing the greater or leſs tone; but from *la* to *fa*, alſo from *mi* to *fa* is a ſemitone.

If then theſe be applied in this order, *fa, ſol, la, fa, ſol, la, mi, fa*, &c. they expreſs the natural ſeries from c; and if that be to be repeated to a ſecond or third octave, we ſee by them how to expreſs all the different orders of tones and ſemitones in the diatonic ſcale; and ſtill above *mi* will ſtand *fa, ſol, la*; and below it, the ſame reverſed, *la, ſol, fa*; and one *mi* is always diſtant from another by an octave; which cannot be ſaid of any of the reſt, becauſe after *mi* aſcending, comes always *fa, ſol, la, fa, ſol, la*, which are repeated invertedly, deſcending.

To conceive the uſe of this: it is to be remembered, that the firſt thing in teaching to ſing, is to make one raiſe a ſcale of notes by tones and ſemitones to an octave, and deſcend again by the ſame notes, and then to riſe and fall by greater intervals, at a leap, as a third, fourth, fifth, &c. and to do all this by beginning at notes of different pitch. Then theſe notes are repreſented by lines and ſpaces, to which thoſe ſyllables are applied; and the learner is taught to name each line and ſpace by its reſpective ſyllable, which makes what we call *ſol-faing*; the uſe whereof is, that while they are learning to tune the degrees and intervals of ſound, expreſſed by notes ſet on lines and ſpaces, or learning a ſong to which no words are applied, they may do it the better by means of an articulate ſound; but chiefly, that by knowing the degrees and intervals expreſſed by theſe ſyllables they may more readily know the true diſtance of notes.

Mr. Malcolm obſerves, that the practice of *ſol-fa-ing*, common as it is, is very uſeleſs and inſignificant, either as to the underſtanding or practiſing of muſic, yet exceedingly perplexing; the various applications of the ſeveral names, according to the various ſignatures of the clef, are enough to perplex any learner; there being no leſs than ſeventy-two different ways of applying the names, *ſol, fa*, &c. to the lines and ſpaces of a particular ſyſtem.

SOLFEGGIAMENTO, in the *Italian Muſic*, compoſitions, of which the ſyllables, *ut*, or *do, re, mi, fa*, &c. are the ſubject. See SOLFEGGIARE.

SOLFEGGIARE, SOLFIZARE, or SOLMIZARE, in the *Italian Muſic*, is the uſing the ſyllables *do, re, mi, fa*, &c. in learning to ſing, otherwiſe called *ſolfaing*.

From this muſicians have made what is called a *ſolfeggiamento*, which properly intimates no more than the practice above mentioned; but the name is more particularly applied to certain compoſitions, be they fugues or others, of which theſe ſyllables are the ſubject. Several very fine pieces of this kind are extant.

However, the Italians in general more frequently teach ſinging by the vowels than by ſyllables, which they call *vocalizzare*, inſtead of *ſolfeggiare*; and the friends of this method ſay, that too frequent articulation in the firſt forming of the voice impedes its paſſage, occaſioning a want of ſteadineſs in the portamento, and a convulſive motion in the mouth, which can never afterwards be corrected. Nice obſervers pretend to diſcover this imperfection in ſingers of the Neapolitan ſchool, where the ſyllables are uſed. Burney's Hiſt. of Muſic, vol. ii. p. 101.

SOLID, in *Phyſics*, a body whoſe minute parts are connected together, ſo as not to give way or ſlip from each other, upon the ſmalleſt impreſſion.

The word is uſed in this ſenſe, in contradiſtinction to *fluid*.

SOLID *bodies, atmoſphere of*. See ATMOSPHERE.

For the laws of gravitation of SOLIDS, immerged in fluids ſpecifically, either lighter or heavier than the *ſolids*, ſee GRAVITY and FLUID.

To find the ſpecific gravity of SOLIDS, and its ratio to that of fluids, ſee *Specific* GRAVITY.

For the laws of the reſiſtance of SOLIDS moving in fluids, ſee RESISTANCE.

SOLID, in *Geometry*, is a magnitude endued with three dimenſions, or extended in length, breadth and depth. Hence, as all bodies have theſe three dimenſions, and nothing but bodies, *ſolid* and body are frequently uſed indiſcriminately.

A *ſolid* is terminated, or contained, under one or more planes or ſurfaces, as a ſurface is under one or more lines.

From the circumſtances of the terminating lines, *ſolids* become divided into *regular* and *irregular*.

SOLIDS, *regular*, are thoſe terminated by regular and equal planes.

Under this claſs come the tetraedron, hexaedron or cube, octaedron, dodecaedron, and icoſaedron. See TETRAEDRON, CUBE, &c.

SOLIDS, *irregular*, are all ſuch as do not come under the definition of regular ones. Such are the ſphere, cylinder, cone, parallelogram, priſm, pyramid, parallelepiped, &c.

For the ratio of geometrical *ſolids*, all priſms, parallelepipeds, cylinders, pyramids, and cones, are in a compound ratio of their baſes and altitudes; ſo that if the baſes be equal, they are in the ſimple ratio of the altitudes; or, if the altitudes be equal, of the baſes: and as the baſes of cylinders and cones are circles, and circles are in the duplicate ratio of their diameters, it follows that all cones and cylinders are in a ratio compounded of the direct ratio of their altitudes, and the duplicate one of their diameters.

The geneſes, properties, ratios, conſtructions, dimenſions, &c. of the ſeveral *ſolids*, regular and irregular, ſpherical, elliptical, conical, &c. ſee under each reſpective article.

SOLID, *meaſure of a*. See MEASURE.

SOLID, *cubature*, or *cubing of a*. See CUBATURE and SOLIDITY.

SOLIDS, *to find the ſurfaces of*. See AREA and SUPERFICIES.

SOLID *of the leaſt reſiſtance*. See RESISTANCE.

SOLID *angle*, is that formed by three or more plain angles meeting in a point. See ANGLE. Or, more ſtrictly, a *ſolid angle*, as B (*Tab. V. Geometry, fig.* 112), is the inclination of more than two lines, A B, B C, B F, which concur in the ſame point B, and are in the ſame planes.

Hence, for *ſolid angles* to be equal, it is neceſſary they be contained under an equal number of equal planes, diſpoſed in the ſame manner.

And as *ſolid angles* are only diſtinguiſhable by the planes under which they are contained, and as planes thus equal are only diſtinguiſhable by com-preſence, they are ſimilar; and conſequently ſimilar *ſolid* angles are equal, and *vice verſa*.

The ſum of all the plain angles conſtituting a *ſolid angle*, is always leſs than 360°; otherwiſe they would conſtitute the plane of a circle, and not a *ſolid*.

SOLID *figures, like*. See LIKE.

SOLID *baſtion*. See BASTION.

SOLID *place*. See LOCUS.

SOLID *foot*. See FOOT.

SOLID *numbers* are thoſe which ariſe from the multiplication of a plain number, by any other whatſoever.

Thus 18 is a *ſolid number* made of 6 (which is plain) multiplied by 3; or of 9 multiplied by 2.

SOLID *problem*, in *Mathematics*, is one which cannot be geometrically ſolved, but by the interſection of a circle and a conic ſection; or by the interſection of two other conic ſections beſides the circle.

Thus, to deſcribe an iſoſceles triangle on a given right line, whoſe angle at the baſe ſhall be triple to that at the vertex, is a *ſolid problem*, reſolved by the interſection of a parabola and a circle.

SOLID *root*, among *Botaniſts*, expreſſes the whole *root* to be one uniform lump of matter.

SOLID *ſquare*, in *Military Language*, a body of foot where both ranks and files are equal.

SOLID *theorem*. See THEOREM.

SOLIDAGO, in *Botany*. See GOLDEN *Rod*.

SOLIDITY, in *Phyſics*, a property of matter or body, whereby it excludes every other body from that place which itſelf poſſeſſes.

Solidity, in this ſenſe, is a property common to all bodies, whether ſolid or fluid. It is uſually called *impenetrability*; but *ſolidity* expreſſes it beſt, as carrying ſomewhat more of poſitive with it than the other, which is a negative idea.

The idea of *ſolidity*, Mr. Locke obſerves, ariſes from the reſiſtance we find one body make to the entrance of another into its own place. *Solidity*, he adds, ſeems the moſt extenſive property of body, as being that whereby we conceive it to fill ſpace; it is diſtinguiſhed from mere *ſpace*, by this latter not being capable of reſiſtance or motion.

It is diſtinguiſhed from *hardneſs*, which is only a firm cohesion of the solid parts, ſo as that they may not eaſily change their ſituation.

The difficulty of changing ſituation gives no more *ſolidity* to the hardeſt body than to the ſofteſt; nor is a diamond properly a jot more ſolid than water. By this we diſtinguiſh the idea of the extenſion of body, from that of the extenſion of ſpace: that of body is the continuity or cohesion of ſolid, ſeparable, moveable parts; that of ſpace the continuity of unſolid, inſeparable, immoveable parts.

The Carteſians, however, will, by all means, deduce *ſolidity*, or, as they call it, *impenetrability*, from the nature of extenſion; they contend that the idea of the former is contained in that of the latter; and hence they argue againſt a vacuum. Thus, ſay they, one cubic foot of extenſion cannot be added to another without having two cubic feet of extenſion; for each has in itſelf all that is required to conſtitute that magnitude. And hence they conclude, that every part of ſpace is ſolid, or impenetrable, inaſmuch as of its own nature it excludes all others. But the concluſion is falſe, and the inſtance they give follows from this, that the parts of ſpace are immoveable, not from their being impenetrable or ſolid.

For an account of a late controverſy concerning the *ſolidity* of matter, ſee MATTER.

SOLIDITY, in *Geometry*, the quantity of ſpace contained in a ſolid body; called alſo the *ſolid content*, and the cube thereof.

The *ſolidity* of a CUBE, PRISM, CYLINDER, or PARALLELEPIPED, is had by multiplying its baſis into its height.

The *ſolidity* of a PYRAMID or CONE is had by multiplying either the whole baſe into a third part of the height, or the whole height into a third part of the baſe.

SOLIDITY *of any irregular body, to find the.* Put the body in a hollow parallelepiped, and pour water or ſand upon it, and note the height of the water or ſand AB (*Tab.* V. *Geometry, fig.* 113); then taking out the body, obſerve at what height the water (or ſand when levelled) ſtands, as AC. Subtract AC from AB, the remainder will be BC. Thus is the irregular body reduced to a parallelepiped, whoſe baſe is FCGE, and its altitude BC. To find the *ſolidity* whereof, ſee PARALLELEPIPED.

Suppoſe, e. gr. AB to be 8, and AC, 5; then will BC be 3: ſuppoſe again, DB, 12, DE, 4; then will the *ſolidity* of the irregular body be found 144.

If the body be ſuch as that it cannot be well laid in ſuch a kind of channel, e. gr. if it be required to meaſure the *ſolidity* of a ſtatue, as it ſtands; a quadrangular priſm or parallepiped is to be framed over it; the reſt as before.

SOLIDITY *of a hollow body, to find the.* If the body be not compriſed in the number of regular bodies, its *ſolidity* is found as in the preceding problem. If it be a parallelepiped, priſm, cylinder, ſphere, pyramid, or cone, the *ſolidity* firſt of the whole body, including the cavity, then that of the cavity, which is ſuppoſed to have the ſame figure with the body itſelf, is to be found, according to the reſpective methods delivered under the PARALLELEPIPED, PRISM, &c. For the latter being ſubtracted out of the former, the remainder is the *ſolidity* of the hollow body required.

For the centrobaryc method of meaſuring the *ſolidity* of bodies, ſee CENTROBARYC *Method*.

To *find the* SOLIDITY of *bodies by the method of fluxions.* Let ABC (*Tab.* III. *Analyſis, fig.* 84.) repreſent any ſolid conceived to be generated by a plane PQ, paſſing over it with a parallel motion: let H b perpendicular to PQ, be taken to expreſs the fluxion of AH (x) or the velocity with which the generating plane is carried: alſo let the area of the part E m F n be denoted by A; then it follows, from the definition of a FLUXION, that the fluxion of the ſolid AEF will be expreſſed by $A\dot{x}$. Whence, by expounding A in terms of x (according to the nature of the figure), and then taking the fluent, the contents of the ſolid, which we may repreſent by s, will be given. But, when the propoſed ſolid is that ariſing from the revolution of any given curve AEB about AHD, as an axis, the fluxion ($\dot{s}$) of the *ſolidity* may be exhibited in a manner more convenient for practice; for, putting the area (3,141592, &c.) of the circle, whoſe radius is unity, $=p$, and the ordinate EH$=y$, it will be $1^2 : y^2 :: p : py^2$ the area of the circle E m F n, which being ſubſtituted for A, we have $\dot{s} = py^2\dot{x}$.

Ex. 1. *To find the content of a cone* ABC. (*fig.* 85.) Let the given altitude AD be $=a$, and the ſemidiameter of its baſe BD $=b$, and the diſtance AF of the circle EG from the vertex A, $=x$; then we ſhall have, by ſimilar triangles, $a : b :: x :$ EF $(y) = \frac{bx}{a}$. Whence $\dot{s}\,(=py^2\dot{x}) = \frac{pb^2x^2\dot{x}}{a^2}$; and, conſequently, by the inverſe method of FLUXIONS, $s = \frac{pb^2x^3}{3a^2}$; which, when $x = a$ (=AD) gives $\frac{pb^2a}{3} = p \times \mathrm{BD}^2 \times \frac{1}{3}\mathrm{AD}$, for the content of the whole cone ABC; which appears, from hence, to be juſt $\frac{1}{3}$ of a cylinder of the ſame baſe and altitude. See CONE.

Ex. 2. *To find the content of a ſpheroid* AFBH (*fig.* 86.) *and alſo of a ſphere.* Let the axis AB, about which the ſolid is generated, be $=a$, and the other axis FH of the generating ellipſe $=b$; it follows, from the property of the ELLIPSE, that $a^2 : b^2 :: x \times \overline{a-x}$ (AD×BD): y^2 (DE²) $= \frac{b^2}{a^2} \times \overline{ax-xx}$: whence we have $\dot{s} = (py^2\dot{x} =)$ $\frac{pb^2}{a^2} \times \overline{ax\dot{x}-x^2\dot{x}}$, and $s = \frac{pb^2}{a^2} \times \overline{\frac{1}{2}axx - \frac{1}{3}x^3}$, = the ſegment AIE. Which, when AD (x) = AB (a), becomes $\frac{pb^2}{a^2} \times \overline{\frac{1}{2}a^3 - \frac{1}{3}a^3} = \frac{pb^2}{a^2} \times \frac{a^3}{6} = \frac{1}{6}pab^2 =$ the content of the whole ſpheroid. Where, if b (FH) be taken $=a$ (AB) we ſhall obtain $\frac{1}{6}pa^3$ for the true content of a ſphere whoſe diameter is a. Hence, a ſphere or a ſpheroid, is $\frac{2}{3}$ of its circumſcribing cylinder: for the area of the circle FH being expreſſed by $\frac{pb^2}{4}$, the content of the cylinder, whoſe diameter is FH and altitude AB, will, therefore, be $\frac{pb^2a}{4}$, of which $\frac{1}{6}pab^2$ is, evidently, two third parts. See SPHERE and SPHEROID.

Ex. 3. *To find the content of a parabolic conoid.* From the equation $a^{m-n}x^n = y^m$ of the generating curve, we obtain $y = a^{\frac{m-n}{m}} \times x^{\frac{n}{m}}$, and $\dot{s}\,(=py^2\dot{x}) = pa^{\frac{2m-2n}{m}} \times \dot{x}x^{\frac{2n}{m}}$, and, therefore, $s = pa^{\frac{2m-2n}{m}} \times \frac{x^{\frac{2n}{m}+1}}{\frac{2n}{m}+1} = pa^{\frac{2m-2n}{m}} \times \frac{mx^{\frac{2n}{m}+1}}{2n+2m} = pa^{\frac{2m-2n}{m}} \times x^{\frac{2n}{m}} \times \frac{mx}{2n+2m} = py^2 \times \frac{mx}{2n+m} =$ the content of the ſolid; which, therefore is to py^2x the content of the circumſcribing cylinder, as m to $2n+m$. Whence the ſolid generated by the conical parabola (in which $m=2$ and $n=1$) appears to be juſt $\frac{1}{2}$ of its circumſcribing cylinder. See PARABOLIC *Conoid*.

Ex. 4. *To find the content of an hyperbolical conoid.* From the equation $y^2 = \frac{b^2}{a^2} \times \overline{ax+xx}$ of the generating hyperbola, we have $\dot{s}\,(py^2\dot{x}) = \frac{pb^2}{a^2} \times \overline{ax\dot{x}+x^2\dot{x}}$, and conſequently $s = \frac{pb^2}{a^2} \times \overline{\frac{1}{2}ax^2 + \frac{1}{3}x^3} =$ the content of the conoid; which, therefore, is to $\left(\frac{pb^2}{a^2} \times \overline{ax+x^2} \times x\right)$ that of a cylinder of the ſame baſe and altitude, as $\frac{1}{2}a + \frac{1}{3}x$ to $a+x$. This ratio, if x be very ſmall, will become as 1 to 2 very nearly: whence it may be inferred, that the content of a very ſmall part of any ſolid, generated by a curve, whoſe ray of curvature at the vertex is a finite quantity, is half that of a cylinder of the ſame baſe and altitude very nearly; becauſe any ſuch curve, for a ſmall diſtance, will differ inſenſibly from an hyperbola, whoſe radius of curvature, at the vertex, is the ſame.

Ex. 5. *To find the content of a parabolic ſpindle, generated by the rotation of a given parabola* ACB (*fig.* 87.) *about its ordinate* AB. Put CM the abſciſſe of the given parabola $=a$, and the ſemi-ordinate AM (or BM) $=b$; and ſuppoſing ENF to be any ſection of the ſolid parallel to DC, let its diſtance MN or EP from DC be denoted by w: then, by the property of the curve, we ſhall have AM² (b^2) : EP² (w^2) :: CM (a) : CP $= \frac{aw^2}{b^2}$: therefore EN (=CM−CP) $= a - \frac{aw^2}{b^2} = \frac{a \times \overline{b^2-w^2}}{b^2}$, and conſequently $p \times \mathrm{EN}^2 = \frac{pa^2}{b^4} \times \overline{b^4 - 2b^2w^2 + w^4} =$ the area of the ſection EF: which, multiplied by $\dot{w}$ the fluxion of MN, gives $\frac{pa^2}{b^4}\times\overline{b^4\dot{w}-2b^2w^2\dot{w}+w^4\dot{w}}$ for the fluxion of the ſolidity, whoſe fluent $\frac{pa^2}{b^4}\times\overline{b^4w-\frac{2}{3}b^2w^3+\frac{2}{5}w^5}$, when w becomes $=b$, is $\left(\frac{8pa^2b}{15}\right)$ half the content of the ſolid. See PYRAMIDOID.

For other examples of a ſimilar kind, ſee Simpſon's Fluxions, vol. i. ſect. 9. Hodgſon's Flux. part iii. ſect. 4. Rowe's Flux. c. 6.

SOLIDITY, in *Architecture*, is applied both to the conſiſtence of the ground whereon the foundation of a building is laid, and to a maſs of maſonry of extraordinary thickneſs, without any cavity within. The *ſolidity* of the Egyptian pyramids is inconceivable.

SOLIDS, in *Anatomy*, &c. denote all the continuous and continent parts of the body; thus called, in oppoſition to the *fluids*, or parts contained therein.

Of the *ſolid* kind, are the bones, cartilages, ligaments, membranes, fibres, muſcles, tendons, arteries, veins, nerves, glands, lympheducts, and lacteals.

Notwithſtanding the great number and appearance of the *ſolids* of the body: we find from the microſcope, injections, veſicatories, atrophies, &c. that the *ſolid* parts are exceedingly ſmall and inconſiderable, in compariſon of the fluids. Nay, it is almoſt demonſtrable, from a conſideration of the riſe and generation of the veſſels, and the reſolution of the greateſt veſſels into their ſmalleſt conſtituent ones, that the whole maſs of *ſolids* in the body, conſiſts merely of fibres, as their common elements.

In effect the whole maſs of *ſolids*, as well as fluids, a minute ſtamen or animalcule only excepted, has ariſen from a very ſubtle fluid colliquament, not unlike the nervous juice; as is ſhewn by Malpighi, in his treatiſe de Ovo Incubato.

The white of the egg never nouriſhes, till, from its natural thickneſs, it hath been brought, by incubation, through innumerable degrees of fluidity, to become ſubtile enough to enter the minute veſicles of the ſtamen or ſeed. The firſt, ſoft tender, *ſolids*, ariſing from this ſubtle humour, paſs through infinite intermediate degrees, before they arrive at their utmoſt *ſolidity*.

All the *ſolids*, therefore, in our bodies (unleſs any one will be ſo nice as to except the firſt ſtamen) only differ from the fluids, out of which they ariſe, by their reſt, coheſion, and figure; and a fluid particle will become fit to form a part of a *ſolid*, as ſoon as there is a force ſufficient to effect its coheſion with the other *ſolid* parts.

SOLIDUS. See AUREUS.

SOLILOQUY, SOLILOQUIUM, a reaſoning, or diſcourſe, which a man holds with himſelf.

Papias ſays, that *ſoliloquy* is properly a diſcourſe by way of anſwer to a queſtion that a man has propoſed to himſelf.

Soliloquies are become very common things on the modern ſtage; yet can nothing be more inartificial, or more unnatural, than an actor's making long ſpeeches to himſelf, to convey his intentions, &c. to the audience.

Where ſuch diſcoveries are neceſſary to be made, the poet ſhould rather take care to give the dramatic perſons ſuch confidants, as may neceſſarily ſhare their inmoſt thoughts; by which means, they will be more naturally conveyed to the audience. Yet is even this a ſhift an accurate poet would not be found to have occaſion for.

The uſe and abuſe of *ſoliloquies* is well delivered by the duke of Buckingham, in the following lines:

Soliloquies *had need be very few,*
Extremely ſhort, and ſpoke in paſſion too.
Our lovers talking to themſelves, for want
Of others, make the pit their confidant:
Nor is the matter mended yet, if thus
They truſt a friend, only to tell it us.——

SOLIS *via*. See VIA.

SOLITARY, SOLITARIUS, ſomething retired, or in private; remote from the company or commerce of others of the ſame ſpecies. See HERMIT.

SOLITARY *column*, is a column that ſtands alone in any public place; as the Trajan COLUMN.

SOLITARY *worm*, SOLIUM, *tænia*, or *lumbricus latus*, is a worm ſometimes found in the inteſtines, and which is always the only one of the kind there; as commencing from the pylorus, and extending thence, the whole length of the inteſtines; ſo that there is no room for another. See TÆNIA and WORM.

SOLITARIES, a denomination of the nuns of St. Peter of Alcantara, inſtituted in 1676, by cardinal Barberini, when abbot of Notre Dame de Farſa, in that city.

The deſign of their inſtitute is to imitate the ſevere, penient life of St. Peter of Alcantara, to keep a continual ſilence; never open their mouths to any body but themſelves; employ their time wholly in ſpiritual exerciſes; and leave the temporal concerns to a number of maids, who have a particular ſuperior in a ſeparate part of the monaſtery. They always go bare-footed, without ſandals, gird themſelves with a thick cord, and wear no linen.

SOLICITATION *of gravity*. See PARACENTRIC.

SOLICITOR, or SOLLICITOR, *ſolicitator*, a perſon employed to follow, and take care of, other perſons ſuits depending in courts of law or equity: formerly allowed only to nobility, whoſe menial ſervants they were; but now regularly admitted to practiſe in the court of chancery. See ATTORNEY.

The king has a *ſolicitor*-general, who holds his office by patent, during the king's pleaſure. The attorney-general and he had anciently a right to their writs of ſummons, to ſit in the lords houſe on ſpecial occaſions, till the 13 Car. II. ſince which time, they have almoſt conſtantly been choſen members of the houſe of commons.

The *ſolicitor*-general has the care and concern of managing the king's affairs, and hath fees for pleading, beſides other fees ariſing by patents, &c. He hath his attendance on the privy council; and the attorney-general and he were anciently reckoned among the officers of the exchequer: they have audience, and come within the bar, in all other courts.

To the queen's houſhold there belongs alſo an officer with this appellation. See PRECEDENCE.

SOLIPUGA, or SOLIFUGA, in *Natural Hiſtory*, the name given by the Romans to a ſmall venomous inſect of the ſpider-kind, called by the Greeks *heliccentros*; both words ſignifying an animal which ſtings moſt in the country, and ſeaſons, where the ſun is moſt hot.

Solinus makes this creature peculiar to Sardinia; but this is contrary to all the accounts given us by the ancients. It is common in Africa and ſome parts of Europe.

Almoſt all the hot countries produce this venomous little creature. It lies under the ſand, to ſeize other inſects as they go by: and if it can meet with any uncovered part of a man, will bite him, and the wound will prove very painful and envenomed; it is ſaid that the bite is abſolutely mortal, but probably this is not true; Solinus writes the word *ſolifuga*, and ſo do many others, erroneouſly deriving the name from its flying from the ſun's rays, and burying itſelf in the ſand.

SOLITAURILIA, in *Antiquity*. See SUOVETAURILIA.

SOLIVE, *Fr.* among *Carpenters*, a joiſt, rafter, or piece of wood, either ſlit or ſawed, with which the builders lay their ceilings.

SOLLECITO, in the *Italian Muſic*, is ſometimes uſed to expreſs that a piece is to be played in a mournful manner, fit to enforce grief upon the hearer; at other times, that it ought to be done carefully and with exactneſs.

SOLMIZARE, in the *Italian Muſic*. See SOLFEGGIARE.

SOLO, in the *Italian Muſic*, is frequently uſed in pieces conſiſting of ſeveral parts, to mark thoſe that are to perform alone: as *flauto ſolo*, *violino ſolo*.

It is alſo uſed for *ſonatas* compoſed for one violin, one German flute or other inſtruments, and a baſs: thus we ſay *Corelli's ſolos*, *Geminiani's ſolos*, &c.

When two, or three parts, play or ſing ſeparately from the grand chorus, they are called a *doi ſoli*, a *tre ſoli*, &c. *Solo* is ſometimes denoted by *S*.

SOLOMON'S *ſeal*, a plant called by authors *polygonatum*. See LILY *of the valley*.

SOLSEQUIUM, a word uſed by ſome chemical writers as a name for ſulphur.

SOLOS, σολος, in *Antiquity*, an inſtrument with which the exerciſe of the quoit was performed, which ſome will have to be diſtinguiſhed from the diſcus, becauſe that was of iron, this of ſtone: but others, with more reaſon, report that the difference conſiſted in this, viz. that the σολος was of a ſpherical figure, and the diſcus broad.

SOLSTICE, SOLSTITIUM, in *Aſtronomy*, the time when the ſun is in one of the *ſolſtitial* points; that is, when he is at his greateſt diſtance from the equator, which is twenty-three degrees and a half: thus called, becauſe he then appears to *ſtand ſtill*, and not to change his place in the degrees of the zodiac, any way: an appearance owing to the obliquity of our ſphere, and which thoſe who live under the equator are ſtrangers to.

The *ſolſtices* are two, in each year; the *æſtival* or *ſummer ſolſtice*, and the *hyemal* or *winter ſolſtice*.

The *ſummer ſolſtice* is when the ſun is in the tropic of Cancer; which is on the twenty-firſt of June; when he makes the longeſt day.

The *winter ſolſtice* is when he enters the firſt degree of Capricorn; which is on the twenty-ſecond of December; when he begins to return towards us, and makes the ſhorteſt day.

This is to be underſtood, as in our northern hemiſphere; for in the ſouthern, the ſun's entrance into Capricorn makes the *ſummer ſolſtice*, and that into Cancer the *winter ſolſtice*.

SOLSTITIAL *points*, are thoſe points of the ecliptic, whereby the ſun's aſcent above the equator, and his deſcent below it are terminated.

The firſt point, which is in the beginning of the firſt degree of Cancer, is called the *æſtival* or *ſummer point*; and the latter, which is in the beginning of the firſt point of Capricorn, the *winter point*. The *ſolſtitial points* are diametrically oppoſite to each other.

Solstitial *colure* is that which paſſes through the *ſolſtitial* points. See Colure.

SOLUBLE, in *Medicine*, looſe, or apt to go to ſtool. In chemiſtry it ſignifies eaſily diſſolvible.

Soluble *tartar*. See Tartar.

SOLVENT, the ſame with *diſſolvent*. See Dissolvent and Solution.

SOLUTIO *continui*, or Solution *of continuity*, a term uſed by phyſicians, &c. to expreſs a diſorder common to the ſolid parts of the body, wherein their natural coheſion is ſeparated: as by a wound, or other cauſe.

If this happen to a ſimple, ſimilar part of the body; it is called ſimply *ſolutio continui*. If to a compound, or organical part, it acquires a particular denomination, from the nature of the part, the difference of the cauſe, or the manner of application; as, a *wound, rupture, fracture, puncture, fiſſure, contuſion, ulcer, corroſion, dilaceration, exfoliation, caries*, &c.

SOLUTION, Solutio, in *Algebra* and *Geometry*, is the anſwering of a queſtion; or reſolving any problem propoſed. See Resolution and Reduction *of equations*.

The *ſolution* of the problem of the quadrature of the circle, and that of the duplicature of the cube, by right lines, are held impoſſible.

Solution *of continuity*, in *Surgery*. See Solutio *continui*.

Solution, in *Phyſics*, the reduction of a ſolid, or firm body, into a fluid ſtate, by means of ſome menſtruum.

Solution is frequently confounded with what we otherwiſe call *diſſolution*, but there is a difference.

Solution, in *Chemiſtry*, is ſometimes uſed for the analyſis, or reduction, of a natural body into its chemical principles.

In this ſenſe, *ſolution* is the ſame with what we otherwiſe call resolution.

Solution, as the term is commonly uſed by chemical writers, conſiſts in an union formed by the integrant parts of one body with thoſe of another body of a different nature; and this cannot be effected till the aggregation of one, at leaſt, of the two bodies is broken. And as bodies whoſe aggregation is broken, are neceſſarily in a ſtate of fluidity, or of vapours, an axiom has been formed, *corpora non agunt niſi ſint fluida*, i. e. bodies do not act unleſs they be fluid.

The two bodies which unite in *ſolution* are generally diſtinguiſhed by two different names. That body is generally called the *ſolvent*, which, by its fluidity or acrimony, appears to be active; and the body which, from its want of taſte, or from its ſolidity, appears to be altogether paſſive, is ſaid to be *diſſolved*. E. g. when metal or marble is diſſolved in aqua fortis, the ſolid bodies are conſidered as being diſſolved, and aqua fortis as the ſolvent. Nevertheleſs, it muſt be remembered, that two bodies which unite together in *ſolution*, act reciprocally upon one another, and their union is the effect of their mutual tendency to each other: and thus the marble and metal act as much upon the nitrous acid as this does upon them.

M. Gellert, however, repreſents as *ſolvents* the bodies which are generally conſidered as *diſſolved*, and hence, he ſays, that ſand diſſolves alkali. If, indeed, we allow the action of the combining bodies to be mutual, it ſignifies little which we call the *ſolvent*, and which the body *diſſolved*; though it ſeems more clear and accurate to call that body the *ſolvent*, whoſe integrant parts are already ſeparated before the *ſolution*, and that the body diſſolved, whoſe integrant parts are only diſunited during the act of *ſolution*. The *ſolution* of bodies may be effected either by the humid, or by the dry way; of the former kind are thoſe *ſolutions*, in which the integrant parts of one or both of the two bodies are diſtributed in an aqueous fluid, e. g. of acids; and thoſe *ſolutions*, in which one or both bodies are rendered fluid by fire, as in vitrification, and in allays of metals with each other, are of the latter kind. A perfect *ſolution* requires, that each of the integrant parts of one body be united to one of the integrant parts of another: hence, if one of them be tranſparent, we ought to have, after the mutual *ſolution*, a tranſparent compound, ſuch as occurs in the *ſolutions* of calcareous ſtones and acids, and thoſe of earths by alkalis: whereas the *ſolution* of ſoap in water is incomplete; and the ſame may be ſaid of glaſſes that are not perfectly tranſparent.

As the *ſolution* of two bodies can only be effected by the mutual attraction of their parts to each other, theſe parts, after the *ſolution*, are found to adhere together: ſo that heavy bodies, e. g. corroſive ſublimate, may be ſuſpended in the thinneſt and lighteſt liquids, e. g. ſpirit of wine, when they are truly diſſolved by each other. Chem. Dict. Eng. ed. Art. *Solution*. See Dissolution.

The great Boerhaave has ſummed up the doctrine of *chemical ſolution*, by its ſeveral agents, in the following ſuccinct manner.

1. *Solution* is performed by water, by diluting, infuſing, boiling, diſtilling, mixing, fermenting, putrefying, and ſeparating.

2. With oil, by diluting, infuſing, boiling, diſtilling, mixing, ſeparating, but not by fermenting, or by putrefying.

3. With fire, by calcining, roaſting, burning, melting, ſubliming, mixing, ſeparating, and by the promoting ſeveral other operations.

4. With the aſſiſtance of air, by fermenting, putrefying, agitating, exciting, and adding other parts capable of diſſolving.

5. With fermented ſpirits, by diluting, infuſion, boiling, diſtilling, mixing, and making oils thinner.

6. With alkaline ſalts, by calcining, torrefying, burning, melting, mixing, and ſeparating, according to the various force of a dry fire employed.

7. By volatine alkaline ſalts, by ſubliming in the dry way, and by diluting, diſtilling, and digeſting in the moiſt way.

8. With fixed alkaline ſalts, aſſiſted and moved by water and fire, by digeſting, boiling, diluting, ſeparating, and mixing.

9. With fixed acid ſalts, as thoſe of alum, ſulphur, and vitriol; either ſeparately in a liquid form, or in their calxes, by diluting, boiling, diſtilling, digeſting; or in a dry form, by calcining, roaſting, burning, and diſtilling.

10. With volatile acid ſalts, by diluting, digeſting, diſtilling, and inſinuating.

11. With compound ſalts and ſoaps, by calcining, ſubliming, diſtilling, and digeſting, either in a dry or a liquid form.

And, 12. with metals, by fuſion and amalgamation.

This ſeems an accurate and perfect table of the whole work of *ſolution*, and will eaſily be underſtood in every article, on recollecting the ſeveral chemical proceſſes. Boerh. Chem. part ii. p. 338. See Menstruum.

When *ſolutions* of ſalts are congealed, the ice often affords very pretty figures; but it is to be obſerved, that the ſame ſalt does not always give the ſame figures. Thus the ſame *ſolution* of verdigriſe, frozen by means of ſnow and ſalt, affords a different figure, from what is produced by the natural cold of the air. And the former ice being thawed, and left to freeze in the ſame vial, did not give the ſame figures as at firſt. See Boyle's Works Abridged, p. 168.

Solution, in *Metallurgy*, is diſtinguiſhed into dry and moiſt. The dry *ſolution* is the blending imperceptibly a ſmall quantity of a metal, or mineral, with a very large one of ſome other body, dry, hard, and not fluid when cold. The moiſt *ſolution* is the diſtributing a body through the very minuteſt parts of an aqueous, or in great part aqueous fluid, in ſuch manner, that both may turn into a fluid, to appearance homogeneous, which goes through all filters, without being detained or ſeparated by them, and the ſmalleſt part of which contains in it a proportionable quantity of both the menſtruum or diſſolvent, and of the diſſolved body. The *ſolution* of gold in aqua regia, and of ſilver in aqua fortis, as alſo that of any of the ſalts in water, are *ſolutions* of this kind. Cramer's Art of Aſſaying, p. 194.

In the making of the ſeveral *metallic reſolutions*, for the neceſſary proceſſes in chemiſtry, the operator is ſubject to great danger in his health, from the noxious vapours. This has been an accident complained of indeed by many, but ſcarce attempted to be remedied or obviated by any, in a rational way, till Mr. Geoffroy, whoſe experiments ſubjected him greatly to the miſchief, employed his thoughts for his own ſake, as well as that of the world in general, to the effectual prevention of it.

The diſſolutions of the metals, in the corroſive acid ſpirits, are thoſe which ſend out the moſt copious and moſt dangerous vapours. The exhalation of quickſilver, of antimony, and of lead and copper, are all in themſelves greatly hurtful, as well as the fiery vapours of ſpirit of nitre, ſea-ſalt, or vitriol; and if either of theſe is ſingly ſo, how pernicious muſt they need be in thoſe caſes, where two of them are joined together in ſuch a manner, as that this union ſends up infinitely more vapours than would otherwiſe ariſe; in this caſe, the utmoſt care is neceſſary to prevent the chemiſt from falling a ſacrifice to his zeal for his diſcoveries.

The common way of avoiding this danger, is by making the *ſolution* either abroad in the open air, or in a chimney; but ſometimes theſe cautions cannot be uſed, and under ſome circumſtances they are ineffectual. This gave occaſion to Mr. Geoffroy to uſe a method, which he afterwards propoſed to the public, of ſtopping the riſe of the vapours entirely, or at leaſt of diminiſhing them ſo greatly, that they ſhall be harmleſs and unperceived. All that was neceſſary to this, ſeemed to him to be the contriving to cover the ſurface of the fluid with ſome body, capable of retaining thoſe vapours, yet not capable of diſturbing the operation of the menſtruum on the metal; and the common expreſſed oils of fruits, as the oil of olives, almonds, or the like, were found capable of happily performing this effect; and that particularly, as they would eaſily receive into themſelves the acid ſalts which ariſe in the conflict. The thing which gave this gentleman the hint of the diſcovery was, that in the boiling of ſugars, honey, or the like ſubſtances, when there is any danger of their boiling over the veſſel, the pouring in a little oil ſtops the ſwelling. In the *metallic ſolutions* it has the ſame effect; and that heightened by this good conſequence, that by keeping in the fiery vapours of the acid, it returns them back upon the metal, and by this means does, in effect, add greatly to the power of the menſtruum.

This method of uſing oil has indeed three advantages. 1. The preſerving the operator from the injuries of the vapours. 2. The greatly moderating of that violent rarefaction, which is often of ill conſequence. And 3. the ſame quantity of the menſtruum, by this means, diſſolves more of the metal. The beſt method of making *ſolutions* with this advantage is this: firſt, wet the ſurface of the metal to be diſſolved with water, or ſpirit of wine; then pour a little water or ſpirit of wine, into the glaſs in which the *ſolution* is to be made, this will prevent the oil from ſticking to the ſurfaces of either; then put the metal into the glaſs, and pour in the oil upon it; laſt of all, pour on the menſtruum: this being greatly heavier than the oil, will ſink to the bottom and work upon the metal, while the oil perfectly covers the whole ſurface. There is no need to be exact as to the quantity of the oil, but more or leſs is to be uſed, in proportion to the greater or leſs ebullition which the mixture is expected to make.

The air-bubbles, which ariſe to the ſurface with great impetuoſity in the making of theſe *ſolutions*, are here ſeen to break by degrees as they enter the covering of oil, and generally are quite diſſipated before they ariſe to the ſurface of it. The few of them which retain their figure till they arrive at the ſurface, there burſt and give a ſlight exhalation; and one may continually ſee the drops of the menſtruum falling back again out of the oil into it, after being deſerted by the bubbles of the air which had raiſed them ſo far. On the contrary, in the common way of making *ſolutions*, the air-bubbles puſh one another up to the ſurface, where they form a ſort of ſcum, which continually thickens by their freſh riſing and ſupporting one another, till it often riſes over the top of the veſſel. Theſe bubbles of air ſeem to be formed of ſmall particles of air extremely condenſed in the pores of the metal, which, when the particles of it are ſeparated for *ſolution*, find themſelves at liberty to dilate and expand, and ariſe to the ſurface in their proper form.

If it be thought neceſſary, in any *ſolution* which raiſes a more than ordinary quantity of vapours, to prevent the flying off of that ſmall quantity which may eſcape through the oil, there is nothing more neceſſary than to pour a little ſpirit of wine upon the oil; for the acid vapours which paſs the oil will then be received in the ſpirit, and will be dulcified in it, and inſtead of a diſagreeable odour, will yield only a very ſweet and ſafe one. Spirit of wine alone, uſed inſtead of oil, and poured gently on the *ſolution*, has very great effects; inſomuch, that if uſed to the *ſolutions* in ſpirit of nitre, which uſually ſend up very noxious and coarſe red vapours, they by this means are made to ſend up only very fine light white ones, and thoſe of a very agreeable ſmell: the bubbles raiſed in this caſe are very ſmall, and uſually burſt before they arrive at the ſurface of the ſpirit. The only objection to this method is, that the ſpirit of wine ſoon mixes itſelf with the menſtruum, and there are ſome caſes in which this may be of ill conſequence to the proceſs. Mem. Acad. Par. 1719.

SOLUTIVE, *looſening*, or *laxative*. See LAXATIVE.

SOLUTIVE *diaprunum*. See DIAPRUNUM.

SOMASQUO, *fathers of*. See FATHERS.

SOMNABULI, or SOMNAMBULONES, formed from *ſomnus*, *ſleep*, and *ambulo*, *I walk*; an appellation given to people who walk in their ſleep; more uſually called *noctambuli*. See NOCTAMBULATIO.

SOMNIFEROUS. See SOPORIFEROUS.

SOMNOLENTUM *coma*. See COMA.

SOMNUS, in *Mythology*. See SLEEP.

SON, a relative term, applied to a male CHILD, conſidered in the relation he bears to his PARENTS.

The children of the king of England are called *ſons* and *daughters of England*. The eldeſt *ſon* is born duke of Cornwall, and created prince of Wales. The younger *ſons* are called *cadets*.

The king of France's children were anciently called *fils* and *filles de France*, *ſons* and *daughters of France*; and the grandchildren, *petits fils* and *petits filles de France*. At preſent, the daughters are called *meſdames*; and the grand-daughters *meſdemoiſelles de France*.

SON, *natural*. See BASTARD.

SON, *adoptive*. See ADOPTIVE.

SON *of God*, is a term uſed in various ſenſes in the holy Scripture, as, 1°, For Jeſus Chriſt, or the Saviour of mankind; who is thus called with reſpect to the manner of his generation; as being begotten of the Father.

Some ſuppoſe, that this title belongs to Chriſt on account of his poſſeſſing the ſame divine nature with the Father: others maintain, that it is aſcribed to him on account of the ſupernatural manner of his birth, &c. and others again conſider it as merely or principally a title of office.

The appellation *Son* is applied to him both before and after his incarnation. Thus, it is ſaid, The *Son* of God created the world; the *Son* of God was incarnate, and lived thirty-three years on earth, &c.

2°, Several creatures are alſo called SONS *of God*, not as being ſo by nature and generation, but on divers other accounts. Thus, the angels are called *ſons of God* by Job; in reſpect to their creation, adoption, &c. And great men are called *ſons of God* in the Pſalms, as being his lieutenants, or the depoſitaries of his authority. Good men, and particularly the eminently pious, are alſo called *ſons of God*, in various places of the ſacred writings.

SON *of man*, is frequently uſed, in Scripture, to ſignify man; as expreſſing not only the nature of man, but his frailty.

The expreſſion is very uſual among the Hebrews and Chaldeans: Daniel, Ezekiel, and Jeſus Chriſt, are particularly thus called; the firſt once, and the two latter frequently.

Sometimes the phraſe *ſon of man* is alſo uſed for the wicked and reprobate; in contradiſtiction to thoſe called *ſons of God*.

SON, or *ſun-plant*, the CROTALARIA *juncea* of Linnæus, in *Botany*, is cultivated in every part of Hindoſtan with great aſſiduity, and applied to various uſes. The ſeeds reduced to powder, and mixed with oil, form a kind of unguent, which the black ladies apply to their hair, in order to make it grow; the bark of this plant furniſhes all kinds of rope, packing-cloths, nets, &c. and from theſe, when old, moſt of the paper in that country is prepared. For this purpoſe they cut them into ſmall pieces, macerate them in water for about five days, waſh them in water, and then throw them into a veſſel of water ſtrongly impregnated with a lixivium compoſed of ſix parts of ſedgi mutti, which is an earth containing a large portion of foſſil alkali, and ſuppoſed to be the NATRON of the ancients, and ſeven parts of quick-lime; here they remain eight or ten days, when they are again waſhed, broken into fibres by a ſtamping lever, and then expoſed to the ſun, and again ſteeped in a freſh lixivium as before. When they have undergone three operations of this kind, they are fit for making coarſe brown paper: and after ſeven or eight operations, they are prepared for making paper of a tolerable whiteneſs. For a farther account of the proceſs, ſee Phil. Tranſ. vol. lxiv. p. 131. where it is minutely deſcribed and illuſtrated by figures.

SONATA, SUONATA, in *Muſic*, a piece, or compoſition, of muſic, wholly executed by inſtruments; and which is, with regard to the ſeveral kinds of inſtruments, what the *cantata* is in reſpect of voices.

The *ſonata*, then, is properly a grand, free, humorous compoſition, diverſified with a great variety of motions and expreſſions, extraordinary and bold ſtrokes, figures, &c. And all this purely according to the fancy of the compoſer; who, without confining himſelf to any general rules of counter-point, or to any fixed number or meaſure, gives a looſe to his genius, and runs from one mode, meaſure, &c. to another, as he thinks fit.

This ſpecies of compoſition had its riſe about the middle of the ſeventeenth century: thoſe who have moſt excelled in it were Baſſani and Corelli.

We have *ſonatas* of 1, 2, 3, 4, 5, 6, 7, and even 8 parts, but uſually they are performed by a ſingle violin, or with two violins, and a thorough baſs for the harpſichord; and, frequently, a more figured baſs, for the baſs viol, &c.

There are a thouſand different ſpecies of *ſonatas*; but the Italians uſually reduce them to two kinds.

Suonate de chieſa, that is, *ſonatas* proper for church muſic,

ſic, which uſually begin with a grave, ſo'emn motion, ſuitable to the dignity and ſanctity of the place, and the ſervice, after which they ſtrike into a briſker, gayer, and richer manner. Theſe are what they more particularly call *ſonatas*.

Suonate de camera, or *ſonatas* for the chamber, are properly ſerieſes of ſeveral little pieces, for dancing, only compoſed to the ſame tune. They uſually begin with a prelude, or little *ſonata*, ſerving as an introduction to all the reſt: afterwards come the allemand, pavane, courant, and other ſerious dances; then jigs, gavots, minuets, chacons, paſſecailles, and other gayer airs: the whole compoſed in the ſame tune or mode.

SONCHUS, in *Botany*. See SOW-*thiſtle*.

SONG, in *Poetry*, a little compoſition, conſiſting of ſimple, eaſy, natural verſes, ſet to a tune, in order to be ſung.

Each ſtanza of a *ſong* is called a *couplet*.

The *ſong* bears a great deal of reſemblance to the madrigal, and more to the ode; which is, indeed, nothing but a *ſong*, according to the ancient rules.

Its object is uſually either wine or love, whence M. le Brun defines a modern *ſong*, to be either a ſoft and amorous, or a briſk and Bacchic thought expreſſed in few words.

Indeed, this is to reſtrain it to too narrow bounds; for we have devout *ſongs*, ſatyrical *ſongs*, and panegyrical *ſongs*. But, be the *ſong* what it will, the verſes are to be eaſy, natural, and flowing; and are to contain a certain harmony, which neither ſhocks the reaſon nor the ear; and which unites poetry and muſic agreeably together.

Anciently, the only way of preſerving the memory of great and noble actions, was by recording them in *ſongs*; and, in America, there are ſtill people who keep their whole hiſtory in *ſongs*.

SONG, in *Muſic*, is applied, in the general, to any ſingle piece of muſic, whether contrived for a voice or inſtrument.

A *ſong*, Mr. Malcolm obſerves, may be compared to an oration: for, as in this latter there is a ſubject, viz. ſome perſon or thing the diſcourſe is referred to, and which is always to be kept in view throughout the whole; ſo, in every truly regular and melodious *ſong*, there is one note which regulates all the reſt, wherein the *ſong* begins, and at laſt ends; and which is, as it were, the principal matter, or muſical ſubject, to be regarded in the whole courſe of the *ſong*. And as, in the oration, there may be ſeveral diſtinct parts, which refer to particular ſubjects, yet muſt they have an evident connexion with the principal ſubject which regulates the whole; ſo in melody, there may be ſeveral ſub-principal ſubjects, to which the different parts of the *ſong* may belong; but theſe are themſelves under the influence of the principal ſubjects, and muſt have a ſenſible connexion with it. This principal or fundamental note, is call the *key of the ſong*.

SONG *of birds*, is defined by the hon. Daines Barrington to be a ſucceſſion of three or more different notes, which are continued without interuption, during the ſame interval, with a muſical bar of four crotchets in an adagio movement, or whilſt a pendulum ſwings four ſeconds.

It is obſerved that notes in birds are no more innate than language in man, and that they depend entirely upon the maſter under which they are bred, as far as their organs will enable them to imitate the ſounds which they have frequent opportunities of hearing: and their adhering ſo ſteadily, even in a wild ſtate, to the ſame ſong is owing entirely to the neſtlings attending only to the inſtruction of the parent-bird, whilſt it diſregards the notes of all others that may perhaps be ſinging round him.

Birds in a wild ſtate do not commonly ſing above ten weeks in the year, whereas birds that have plenty of food in a cage, ſing the greateſt part of the year: and we may add, that the female of no ſpecies of birds ever ſings; and this is a wiſe proviſion of nature, becauſe her ſong would diſcover her neſt, and, in the ſame manner, we may rationally account for her inferiority in reſpect to plumage. The faculty of ſinging is confined to the cock-birds; and accordingly Mr. Hunter, in diſſecting birds of ſeveral ſpecies, found the muſcles of the larynx to be ſtronger in the nightingale than in any other bird of the ſame ſize; and in all thoſe inſtances, where he diſſected both cock and hen, the ſame muſcles were ſtronger in the cock. To the ſame purpoſe, it is an obſervation as ancient as the time of Pliny, that a capon does not crow.

Some have aſcribed the ſinging of the cock-bird in the ſpring to the motive only of pleaſing his mate during incubation; nature, indeed, partly for this end, has given to the male the power of ſinging; but the ſinging of a bird in the ſpring is more probably owing to the greater plenty of plants and inſects, which (as well as feeds) are the proper food of ſinging birds, at that time of the year.

Mr. Barrington remarks, that there is no inſtance of any bird's ſinging which exceeds our black-bird in ſize; and this, he ſuppoſes, may ariſe from the difficulty of its concealing itſelf, if it called the attention of its enemies, not only by bulk, but by the proportionable loudneſs of its notes. This writer farther obſerves, that ſome paſſages of the *ſong* in a few kinds of birds correſpond with the intervals of our muſical ſcale, of which the cuckow is a ſtriking and known inſtance; but much the greater part of ſuch *ſong* is not capable of muſical notations; partly, becauſe the rapidity is often ſo great, and it is alſo ſo uncertain when they may ſtop, that we cannot reduce the paſſages to form a muſical bar in any time whatſoever; partly alſo, becauſe the pitch of moſt birds is conſiderably higher than the moſt ſhrill notes of thoſe inſtruments, which comprehend even the greateſt compaſs; and principally, becauſe the intervals uſed by birds are commonly ſo minute, that we cannot judge at all of them from the more groſs intervals into which we divide our muſical octave. This writer apprehends, that all birds ſing in the ſame key; and in order to diſcover this key, he informs us, that the following notes have been obſerved in different birds, A, B flat, C, D, F, and G; and therefore E only is wanting to complete the ſcale: now theſe intervals, he ſays, can only be found in the key of F with a ſharp third, or that of G with a flat third; and he ſuppoſes it to be the latter, becauſe, admitting that the firſt muſical notes were learned from birds, thoſe of the cuckow, which have been moſt attended to, form a flat third, and moſt of our compoſitions are in a flat third, where muſic is ſimple, and conſiſts merely of melody. As a farther evidence, that birds ſing always in the ſame key, it has been found by attending to a nightingale, as well as a robin which was educated under him, that the notes reducible to our intervals of the octave were always preciſely the ſame.

Moſt people, who have not attended to the notes of birds, ſuppoſe, that thoſe of every ſpecies ſing exactly the ſame notes and paſſages, which is by no means true, though it is admitted that there is a general reſemblance. Thus the London bird-catchers prefer the ſong of the Kentiſh goldfinches, and Eſſex chaffinches; but ſome of the nightingale-fanciers prefer a Surry bird to thoſe of Middleſex.

The nightingale has been almoſt univerſally reckoned the moſt capital of ſinging birds; and its ſuperiority (deduced from a caged bird) conſiſts in the following particulars; its tone is much more mellow than that of any other bird, though at the ſame time, by a proper exertion of its muſical powers, it can be exceſſively brilliant. Another point of ſuperiority is its continuance of *ſong*, without a pauſe, which is ſometimes no leſs than twenty ſeconds; and when the reſpiration became neceſſary, it has been taken with as much judgment as by an opera-ſinger. The ſky-lark in this particular, as well as in compaſs and variety, is only ſecond to the nightingale. The nightingale alſo ſings (if the expreſſions may be allowed) with ſuperior judgment and taſte. Mr. Barrington has obſerved, that his nightingale, which was a very capital bird, began ſoftly like the ancient orators; reſerving its breath to ſwell certain notes, which by this means had a moſt aſtoniſhing effect. This writer adds, that the notes of birds, which are annually imported from Aſia, Africa, and America, both ſingly and in concert, are not to be compared to thoſe of Europe.

The following table formed by Mr. Barrington, agreeably to the idea of M. de Piles in eſtimating the merits of painters, is deſigned to exhibit the comparative merit of the Britiſh ſinging birds: in which twenty is ſuppoſed to be the point of abſolute perfection.

	Mellowneſs of tone.	Sprightly notes.	Plaintive notes.	Compaſs.	Execution.
Nightingale - -	19	14	19	19	19
Sky-lark - - -	4	19	4	18	18
Wood-lark - -	18	4	17	12	8
Tit-lark - - -	12	12	12	12	12
Linnet - - -	12	16	12	16	18
Goldfinch - - -	4	19	4	12	12
Chaffinch - - -	4	12	4	8	8
Greenfinch - - -	4	4	4	4	6
Hedge ſparrow -	6	0	6	4	4
Aberdavine or ſiſkin	2	4	0	4	4
Red-poll - - -	0	4	0	4	4
Thruſh - - -	4	4	4	4	4
Blackbird - - -	4	4	0	2	2
Robin - - - -	6	16	12	12	12
Wren - - - -	0	12	0	2	4
Reed ſparrow - -	0	4	0	4	2
Black-cap, or Norfolk mock nightingale	14	12	12	14	14

See Phil. Tranſ. vol. lxiii. p. ii. art. 31. p. 249, &c.

Song, *reſponſary.* See Responsary.

SONNA, a book of the Mahometan traditions, wherein all the orthodox Muſſulmen are required to believe. See Mahometanism.

The word ſignifies, in Arabic, the ſame with *miſhna* in the Hebrew, that is, *ſecond law*; or, as the Jews call it *oral law*.

The adherents to the *Sonna* are called *Sonnites*: and, as among the Jews, there is a ſect of Caraites, who reject the traditions as fables invented by the rabbins, there are alſo ſectaries among the Mahometans, called *Schiites*, who reject the traditions of the *Sonnites*, as being only founded on the authority of an apocryphal book, and not derived to them from their legiſlator.

There is the ſame enmity between the *Sonnites* and Schiites, as between the rabbiniſt Jews and the Caraites. The Schiites reproach the *Sonnites*, with obtruding the dreams of their doctors for the word of God: and the *Sonnites*, in their turn, treat the Schiites as heretics, who refuſe to admit the divine precepts, and who have corrupted the koran, &c.

SONNET, Sonetto, in *Poetry*, a kind of compoſition properly contained in fourteen verſes; viz. two ſtanzas, or meaſures, of four verſes each, and two of three; the eight firſt verſes being all in two rhymes.

The *ſonnet* is of Italian origin, and Petrarch is allowed to be the father of it: it is held the moſt difficult and artful of all poetical compoſitions, as requiring the utmoſt accuracy and exactneſs. It is to end with ſome pretty ingenious thought: the cloſe muſt be particularly beautiful, or the *ſonnet* is defective.

In Malherb, and ſome other French poets, we meet with *ſonnets*, where the two firſt ſtanzas are not in the ſame rhyme; but they are held irregular; and, in effect, great part of the merit of theſe pieces conſiſts in a ſcrupulous obſervation of the rules.

Ronſard, Malherb, Maynard, and Gombaut, have compoſed abundance of *ſonnets*; but, among two or three thouſand, there are ſcarce two or three worth much.

Paſquier obſerves, that du Bellai was the firſt who introduced *ſonnets* into France. But du Bellai himſelf ſays, that Melin de S. Gelais firſt converted the Italian *ſonnets* into French.

Of twenty-three *ſonnets* which were written by our great poet Milton, that addreſſed to Henry Laws is one of the beſt; and yet this ſhews how difficult and unnatural the conſtruction of this ſpecies of poem is in the Engliſh language; whereas, from the great number of ſimilar terminations in the Italian tongue, and the ſucceſs of Petrarch, it has long been the favourite meaſure of Italy for ſhort compoſitions. However, Muratori thinks it extremely difficult for his countrymen to make a good *ſonnet*; and he compares this kind of poem to the bed of Procruſtes, where the legs of thoſe that were too ſhort were ſtretched, and thoſe too long were cut to the ſize of the bed.

Antonio á Tempo, a civilian at Padua, in his Treatiſe on Poetry, 1332, diſtinguiſhed ſixteen different kinds of *ſonnet*. Burney's Hiſt. Muſic, vol. ii. p. 324.

SONTAGE, in our *Old Writers*, a tax of forty ſhillings laid upon every knight's fee, according to Stow, p. 284.

SOOINS, a name given in the North to a kind of rural food that has been found very beneficial in the scurvy.

This food is prepared by putting ſome oatmeal into a wooden veſſel, and pouring hot water upon it, and continuing the infuſion till the liquor begins to taſte ſouriſh, i. e. till a fermentation comes on, which in a place moderately warm, may be in the ſpace of two days. The water is then poured off from the grounds, and boiled down to the conſiſtence of a jelly.

SOOP. See Soup.

SOOT, an earthy volatile matter, ariſing from wood, coals, and other fuel, along with the ſmoke, by the action of fire; or rather, it is the ſmoke itſelf, fixed and detained on the ſides of the chimney.

Soot is a collection of ſubſtances formed by the matter of the flame of inflammable bodies, but which have eſcaped combuſtion, from not having ſufficient contact with the air. This matter is always of a black colour, more or leſs browniſh, which colour it acquires fron an oil that is burnt, and half reduced to the ſtate of coal. Its different qualities and appearances are owing to the nature of the inflammable ſubſtances which produce it, and the different manner in which they are burnt.

Soot is found an excellent manure for corn-lands, eſpecially where the ſoil is cold, and has been long over-run with moſs; but ſea-coal *ſoot* is much better for this purpoſe than wood-*ſoot*. They uſually allow forty buſhels to an acre, but ſome lands require more. It produces an extremely fine and ſweet graſs, and deſtroys weeds of all kinds.

The dyers make a conſiderable uſe of *ſoot*, for a kind of dun-colour; which, it is true, has no agreeable ſmell; but, in return, it has the property of ſaving cloaths, and other ſtuffs, from moths.

Soot, *of frankincenſe*, is the ſmalleſt and fineſt part of the incenſe, called *olibanum*, or *male incenſe*; burnt after the manner of roſin, to make *lamp*-black.

Soot, *wood*, has been long known as a good medicine in many caſes, but the principles upon which it acted as ſuch were never well underſtood, till Boerhaave gave a regular analyſis of it. The directions he gives for the proceſs are theſe.

Chooſe the blackeſt and drieſt *wood-ſoot* from the chimney of an oven, where nothing is baked but bread, and nothing burnt but vegetables; gather this in a dry day, and fill with it a glaſs retort almoſt up to the neck; clean the neck of the retort, and luting on a receiver, give a fire of a hundred and fifty degrees, and keep it up equably, a large quantity of tranſparent water will come over with conſiderable violence. When no more water will come over, cleanſe the receiver, and raiſing the fire to a little above two hundred degrees, there will then come over a whitiſh fat liquor; this alſo comes over with great violence, and the fire muſt be gradually increaſed, till no more of this will come. Change the receiver, and raiſe the fire to a yet greater degree, and a yellow, copious, volatile ſalt will come over, and ſtick all over the ſides of the new receiver. When no more of this ſalt will ariſe, increaſe the fire to the utmoſt that ſand can give, and with a heat of ſuppreſſion there will ariſe a black thick oil; when this is all come over, and the veſſels cooled, there will be found in the neck of the retort a ſalt, which could be raiſed no higher, even by that violent fire; and in the bottom of the retort there remains a black feculent matter, the upper ſurface of which is covered with a white ſaline cruſt, which, both in figure, colour, and the ſtructure of its ſtriæ, reſembles the common ſal ammoniac. If the milky liquor be rectified, it affords a very penetrating volatile ſpirit, and ſome ſharp volatile ſalt.

Here we are taught what the agitation of an open fire can move, change, expel, and drive through the air by burning; firſt in the form of ſmoak, then of flame, and laſtly of exhalation, and how high it is able to carry them; for a chimney is a kind of ſtill-head, converging in an open top, and *ſoot* is often carried up thirty or forty feet, or more, to the top of theſe, and after this a black ſmoak is diſcharged out of the orifice, which diſperſes in the air, and finally ſeems to vaniſh.

This ſmoak and *ſoot* conſiſt of ſeveral parts; as, 1. A fetid, oily, unpleaſant, bitter ſpirit, reſiding in the water that firſt comes over, and is afterwards found diſperſed alſo through all its other parts; this ſpirit ſeems to be the oily and more ſubtile part of the vegetable, acted on by the force of fire. 2. A water, which is here contained in great plenty in this ſpirit; in the firſt limpid, and in the ſecond milky liquor, as alſo in the ſaline ſpirit, and the volatile ſalt itſelf, and even in ſome degree in the oil. This water can ſcarce be ſeparated pure by any art, being always impregnated with the bitter taſte and nauſeous ſmell of the ſpirit. 3. A ſharp volatile alkaline oily ſalt, which firſt comes over, and ſticks to the ſides of the receiver. From this principle we are well aſſured, that ſuch a volatile alkaline ſalt always ſtrongly impregnates the whole air, where wood fuel is burnt. 4. A ſharp alkaline fat ſpirit, conſiſting of the ſalt juſt now mentioned, diſſolved in water, and ſo reſembling ſpirit in fluidity, pungency, volatility, and the other qualities. 5. A fetid, black, bitter, nauſeous, and almoſt cauſtic oil, mixed with an oily ſalt. 6. A true ſal ammoniac, raiſed to the neck of the retort, and covering the ſurface of the black matter left at its bottom. If this ſalt be carefully collected and ſeparated from the alkaline kind, it proves to be a perfect and genuine ſal ammoniac; it is of a whitiſh colour, ſomewhat tranſparent, and makes no efferveſcence with acids, and if mixed with fixed alkalis, it eaſily yields a volatile ſalt, wholly agreeing with that from the common ſal ammoniac; whence by the bye it is evident, that all ſal ammoniac owes its origin to *ſoot*. 7. The laſt ſubſtance found in *ſoot*, is the remaining black earth left at the bottom of the retort: this has an oil which tenaciouſly adheres to it, and when this is driven off in a ſtrong open fire, there remains a white calx.

By this accurate analyſis of *wood-ſoot*, we learn what parts of vegetables are volatile, and fly off by an open fire, and what are fixed and remain behind, and finally, what fire throws off from vegetables into the air; and hence, among other things, we may learn that even earth, which appears ſo very fixed in the fire when ſeparated from the other principles, yet when mixed with them is, by the force of fire, thrown up to the height of forty feet and more, in the air; whence it aſcends to yet greater heights, and finally diſperſes in form of a thin cloud.

Hence, we may alſo learn, that *ſoot*, which contains ſo many active principles, muſt be qualified for a powerful medicine. Pills of dry *ſoot* are found very beneficial in all cold diſtempers; the volatile ſalt of *ſoot* poſſeſſes the virtues of the volatile ſalts of animals. The ſalt which riſes laſt is recommended greatly by Hartman for giving relief in cancers; and this is very probable, ſince ſal ammoniac of the common kind, properly applied, is known to be of great uſe in caſes of running cancers. *Soots* of different fuels are not all to be ſuppoſed to poſſeſs the ſame virtues; that of pitcoal is found to be a ſubſtance of a very different kind from that of wood, and that of the common turf, or peat, and of the oak-wood, have alſo been found, on experiment, to be very different.

Boerhaave very juſtly obſerves, that the *ſoot* from kitchen-chimneys, where the ſmoak muſt have been impregnated with the effluvia of the victuals, muſt be very different from pure *wood-ſoot*. Boerhaave's Chemiſtry.

Wood-ſoot is directed in hyſteric caſes, and in different nervous diſorders, as an antiſpaſmodic and corroborant. It is uſed chiefly in the form of a ſpirituous tincture, in conjuction, commonly, with aſafœtida, or other materials of ſimilar intention: the officinal tincture is drawn from two ounces of *ſoot* and one of aſafœtida, with a quart of proof ſpirit.

The virtues of the *ſoot* are extracted almoſt equally by proof ſpirit, rectified ſpirit, and water, each of which, if the *ſoot* is of a good kind, diſſolves about one-fourth of it. The extracts, obtained by inſpiſſating the filtered ſolutions, are very bitter, and the ſpirituous extract retains moſt perfectly the peculiar flavour of the *ſoot*. Lewis.

Dioſcorides ſhews how to make a *ſoot* of butter, which has ſeveral uſes in medicine. The *ſoot* found in furnaces of glaſs-houſes is uſed by painters.

SOPE. See SOAP.

SOPHI, or SOFI, a title or quality, given to the emperor of Perſia; importing as much as wiſe, ſage, or philoſopher.

The title is by ſome ſaid to have taken its riſe from a young ſhepherd thus named, who attained to the crown of Perſia in 1370; others derive it from the *ſophoi*, or ſages, anciently called *magi*. Voſſius gives a different account of the word: *ſophi*, in Arabic, he obſerves, ſignifies *wool*; and he adds, that it was applied by the Turks out of deriſion to the kings of Perſia, ever ſince Iſhmael's time; becauſe, according to their ſcheme of religion, he is to wear no other covering on his head, but an ordinary, red, woollen ſtuff; whence the Perſians are alſo called *hazelbaſchs*, q. d. *red-heads*. But Bochart aſſures us, that *ſophi*, in the original Perſian language, ſignifies one that is pure in his religion, and who prefers the ſervice of God in all things: and derives it from an order of religious called by the ſame name.

The *ſophis* value themſelves, and with ſome reaſon, on their illuſtrious extraction; the race being ſecond to none in the Eaſt. They are deſcended in a right line from Houſſein, ſecond ſon of Ali, Mahomet's couſin, and Fathima, Mahomet's daughter.

There is no prince in the world whoſe authority is more abſolute, than that of the *ſophi* of Perſia; his power is not even limited by any laws he himſelf can make; but he ſuſpends, changes, and annuls them at pleaſure.

SOPHIS, or *ſofees*, a kind of order of religious among the Mahometans in Perſia, anſwering to what are otherwiſe called DERVISES; and, among the Arabs and Indians, FAQUIRS.

Some will have them called *ſophis*, from a kind of coarſe camblet which they wear, called *ſouf*, from the city Souf, in Syria, where it is principally manufactured.

The more eminent of thoſe *ſophis* are complimented with the title SCHIEK, that is, *reverend*; much as in Romiſh countries the religious are called *reverend fathers*.

Sheic *ſophi*, who laid the firſt foundation of the grandeur of the royal houſe of Perſia, was the founder, or rather the reſtorer, of this order: Iſhmael, who conquered Perſia, was himſelf a *ſophi*, and greatly valued himſelf on his being ſo. He choſe all the guards of his perſon from among the religious of this order; and would have all the great lords of his court *ſophis*.

The king of Perſia is ſtill guard-maſter of the order; and the lords continue to enter into it, though it be now fallen under ſome contempt.

The vulgar *ſophis* are now chiefly employed as uſhers and attendants of the court; and ſome even as executioners of juſtice: the emperor laſt reigning would not allow them, according to cuſtom, to gird the ſword on him.

This neglect into which the *ſophis* are ſunk, has occaſioned the late emperors to diſuſe the title of *ſophi*, or *ſofi*: however, M. de la Croix is miſtaken, when he ſays, that they never bore it.

SOPHIA *chirurgorum*, in *Botany*, a name ſometimes given to a ſpecies of *water* CRESSES.

SOPHISM, Σοφισμα, in *Logic*, a captious and fallacious reaſoning; or an argument, which, with ſome ſubtilty, carries much appearance of truth, but little ſolidity. See FALLACY.

A *ſophiſm* is, properly, an argument falſe at bottom, and only invented to amuſe and embarraſs the perſon to whom it is uſed.

Logicians enumerate the following kinds of *ſophiſm*, viz. *ignoratio elenchi*, or a miſtake of the queſtion, i. e. when ſomething elſe is proved, which has neither any neceſſary connection nor inconſiſtency with the thing enquired, and conſequently gives no determination to the enquiry, though at firſt ſight it may ſeem to determine the queſtion: PETITIO *principii*; a CIRCLE; *non cauſa pro cauſa*, or the aſſignation of a falſe cauſe; *fallacia accidentis*, which pronounces concerning the nature and eſſential properties of any ſubject, according to ſomething which is merely accidental to it. *A dicto ſecundum quid ad dictum ſimpliciter*, arguing from that which is true in particular circumſtances to prove the ſame thing true abſolutely, ſimply, and abſtracted from all circumſtances, and *vice verſa*: the *ſophiſms* of compoſition and diviſion, when we infer any thing concerning ideas in a compounded ſenſe, which is only true in a divided ſenſe, and *vice verſa*: and the *ſophiſms* ariſing from an abuſe of the ambiguity of words: to which may be added an imperfect enumeration, or falſe induction, when from a few experiments and obſervations, men infer general theorems and univerſal propoſitions. Watts's Logic, p. iii. c. 3. ſect. 1.

SOPHISMS, or SOPHISTICAL *arguments*, among *Logicians*, are more particularly ſuch as are not in form, or are founded on equivocals.

As, *You have every thing you have not loſt*; *but you have not* loſt *horns*, *therefore you have horns*.

SOPHIST, Σοφιϛης, formed from σοφος, *wiſe*; or rather from σόφιϛης, *impoſtor*, *deceiver*, a perſon who frames ſophiſms; that is, uſes ſubtle arguments, with deſign to deceive thoſe he would perſuade or convince.

The term *ſophiſt*, which is now reproachful, was anciently honourable, and carried a very innocent idea. St. Auguſtine obſerves, it ſignifies a rhetor, or profeſſor of eloquence: ſuch as were Lucian, Athenæus, Libanius, &c. Suidas, and after him Olar. Celſius, in an expreſs diſſertation on the Greek *ſophiſts*, tells us, that the appellation was applied indifferently to all who excelled in any art or ſcience; whether divines, lawyers, phyſicians, poets, orators, or muſicians.

However, as rhetoricians often employed their art rather to vindicate what was falſe and unjuſt, than to ſupport truth and virtue, their conduct brought a diſcredit both upon themſelves and their profeſſion; and, therefore, the name *ſophiſt*, or *ſophiſter*, has been more generally uſed in an ill ſenſe, to ſignify one ſkilled rather in the arts of cavilling than qualified to ſpeak well and accurately upon any ſubject.

Solon is the firſt who appears to have ever borne the appellation of *ſophiſt*, which is given him by Iſocrates: afterwards, it was ſcarce ever given except to philoſophers and declaimers.

The title *ſophiſta* was in great credit among the Latins in the twelfth century, and in the time of St. Bernard; but it began to loſe ground in Greece as early as Plato's time; on account of Protagoras and Gorgias, who made a ſordid traffic thereof, by ſelling eloquence for money. Hence Seneca calls the *ſophiſts* quacks, or empirics.

Cicero ſays, that the title *ſophiſti* was in his time given to ſuch as profeſſed philoſophy with too much oſtentation, in order to make a trade of it, by running from town to town, to retail their deceitful ſcience. A *ſophiſt*, therefore, was then, as now, a rhetor, or logician, who makes it his buſineſs to enſnare and perplex people, by frivolous diſtinctions, vain reaſonings, and captious diſcourſes.

Nothing has conduced more to the increaſing of the number of *ſophiſts* than the contentious ſchool-philoſophy; people are there taught to puzzle and obſcure the truth, by barbarous unintelligible terms; as, antipredicaments, great and little logicals, quiddities, &c.

The title *ſophiſt* was given to Rabanus Maurus, by way of eminence. John Hinton, a modern Engliſh ſcholaſtic writer, endeavoured alſo to procure the ſplendid title of *ſophiſt*.

SOPHISTICATION, in *Chemiſtry*, *Alchemy*, &c. a term particularly applied to the counterfeit works of fraudulent alchemiſts, who uſe indirect means of whitening copper, gilding ſilver, and giving other ſuperficial tinctures to metals; as alſo of making augmentations, by divers mixtures, and other illegal operations, to delude thoſe at whoſe expence they are employed.

Hence the term is alſo applied to merchandizes and, other goods adulterated, mixed, or altered, by the deceit of the ſeller.

SOPHORA, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the flower has a ſhort bell-ſhaped empalement, cut at the brim into five obtuſe ſegments; it is of the butterfly kind, the ſtandard oblong, broad, and reflexed on the ſides; it has two oblong wings with appendages to their baſe; the keel is of two leaves like thoſe of the wings, whoſe lower borders join like the keel of a boat; it has ten diſtinct ſtamina, which are awl-ſhaped, parallel, and the length of the petals hid in the keel, terminated by ſmall ſummits; and a taper oblong germen ſupporting a ſtyle the length of the ſtamina, crowned by an obtuſe ſtigma; the germen turns to a long ſlender pod, with ſwellings where each ſeed is depoſited. Miller reckons three, and Linnæus twelve ſpecies.

This genus of plants agrees with the other papilionaceous and diadelphous genera, except that in this the ſtamina are diſtinct and ſeparate.

SOPHRONISTÆ, σωφρονιϛαι, among the *Athenians*, were ten officers appointed to take care that the young men behaved themſelves with ſobriety and moderation.

SOPHRONISTERIUM, σωφρονιϛηριον, among the Athenians, a houſe of correction like our Bridewell.

SOPIO, an name uſed by ſome of the *old Writers* for opium, from its ſoporific virtue.

SOPORARIÆ *arteriæ*, a name given by ſome authors to the carotid arteries.

SOPORIFIC, or SOPORIFEROUS, a medicine that has the faculty of procuring ſleep. Such are opium, laudanum, &c.

The word is formed from the Latin *ſopor*, *ſleep*. The Greeks, in lieu hereof, uſe the word *hypnotic*.

SOPOROUS, *ſleepy*, or *drowſy diſeaſes*, a term by which, medical writers expreſs the LETHARGY and COMA, and ſome others even the CARUS and APOPLEXY.

SOPRANO, in the *Italian Muſic*, ſignifies the treble.

SORA, in *Botany*, the name given by the people of Guinea to a kind of ſhrub which they uſe in medicine, boiling it in water, and giving the decoction in caſes of pain of any kind.

The leaves of this ſhrub are of the ſize and ſhape of thoſe of ſena; they ſtand upon ſhort foot-ſtalks, and are woolly underneath. Philoſ. Tranſ. Nº 231.

SORBON, or SORBONNE, the houſe or college of the faculty of theology eſtabliſhed in the univerſity of Paris.

It was founded in 1256, by St. Louis, or rather by Robert de Sorbonne, his confeſſor and almoner; firſt canon of Cambray, and afterwards of the church of Paris; who gave his own name to it, which he himſelf took from the village of *Sorbon*, or *Serbon*, near Sens, where he was born.

The foundation was laid in 1250, afterwards the king gave him all the houſes he had in the ſame place, in exchange for ſome others in another.

The college has been ſince magnificently rebuilt by the cardinal de Richelieu. The deſign of its inſtitution was for the uſe of poor ſtudents in divinity.

There are lodgings in it for thirty-ſix doctors and bachelors of the houſe; who are ſaid to be of the *ſociety of the Sorbonne*. Thoſe admitted into it without being doctors, are ſaid to be of the *hoſpitality of the Sorbonne*. Six regent doctors hold lectures every day, for an hour and half each: three in the morning, and three in the afternoon.

SORBONNE is alſo uſed in the general for the whole faculty of theology at Paris, in regard the aſſemblies of the whole body are held in the houſe of the *Sorbonne*: and that the bachelors of the other houſes of the faculty, as the houſe of Navarre, &c. come thither to hold their *ſorbonnique*, or act, for being admitted doctor of divinity.

SORBUS, in *Botany*. See SERVICE-*tree*.

SORCERY, the crime of witchcraft, or divination, by the aſſiſtance of evil ſpirits. See MAGIC and MAGICIAN.

Some hold *ſorcery* to be properly what the ancients call *ſorti-legium*, or divination, by means of SORTES, or *lots*. Lord Coke, 3d Inſt, fol. 44. deſcribes a *ſorcerer*, *qui utitur ſortibus, & incantationibus dæmonum*.

Sorcery is pretended to have been a thing formerly very common; at leaſt the credulity of thoſe ages made it paſs for ſuch; and people ſuffered frequently for it.

This ſuppoſed crime was made felony by 33 Hen. VIII. c. 8. and 1 Jac. I. c. 12. but this abſurd law was very properly repealed by an act of George II. See CONJURATION.

SORE, among *Sportſmen*, denotes a buck of the fourth year.

SOREL, in the *language of Sportſmen*, a BUCK of the third year.

SOREL, in *Botany*. See SORREL.

SOREX, *ſhrew*, in the Linnæan ſyſtem of *Zoology*, a genus of the order of *feræ*, and claſs of *mammalia*. Its characters are; that it has two fore-teeth above, which are bifid, and four below; and ſeveral canine teeth on both ſides. There are five ſpecies, viz. the creſted of Penſylvania; the minute of Siberia, weighing a dram, and ſuppoſed by Linnæus to be the leaſt of all quadrupeds, though Dr. Pallas reckons the pigmy, which weighs about half a dram, the ſmalleſt; the water-ſhrew, murine of Java, and the fetid or common. See SHREW-*mouſe*.

SORGUM, in the *Materia Medica*, the name of the grain of the *milium arundinaceum*, called *Indian* MILLET.

SORITES, Σωρειτης, formed from σωρος, *cumulus*, *heap*, in *Rhetoric*, &c. a kind of argument, in which ſeveral middle terms are choſen to connect one another ſucceſſively in ſeveral propoſitions, till the laſt propoſition connects its predicate with the firſt ſubject. Whence Cicero calls it *ſyllogiſmus acervatus*, an *accumulative ſyllogiſm*.

Such was that merry argument of Themiſtocles, to prove, that his little ſon, under ten years old, governed the whole world. Thus: *My ſon governs his mother*; *his mother me*; *I the Athenians*; *the Athenians the Greeks*; *Greece commands Europe*; *Europe the whole world*: *therefore my ſon commands the whole world*.

This method of diſputing prevailed much among the Stoics; eſpecially with Zeno and Chryſippus; but it is very ſophiſtical.

SORNI, a name given by ſome of the chemical writers to iron.

SORRANCES, among *Farriers*, ſignify two things; viz. either an ill ſtate, or habit, of a horſe's body, ariſing from ſome part diſeaſed; or a looſening and ſolution of the continuity of the parts; which, according to the various circumſtances thereof, acquire new names, as *fracture*, *wound*, *ulcer*, *rupture*, *convulſion*, *cramp*, *excoriation*, &c.

SORRANCE-*water*, a name given by our farriers to a ſolution of vitriol, and ſome other ingredients, in vinegar; a medicine much eſteemed in many of the diſeaſes of horſes. It is prepared in the following manner.

Take Roman vitriol, and roach-alum, of each an ounce and half; verdigriſe, an ounce; copperas, two ounces; reduce all theſe to powder together, and put them into a two-quart-bottle, into which pour a quart of the ſtrongeſt and beſt wine-vinegar; this is to be ſet in balneo Mariæ. The ſhort way of doing which by the farrier, is this: he puts a whiſp of hay into the bottom of the kettle, and then tying ſome pieces of lead or iron about the neck of the bottle, to make it heavy enough to ſink in water, it is ſet upon the hay ſo, as to ſtand very upright; then three notches are cut lengthwiſe in the cork to give paſſage to ſome of the vapours when the bottle is heated, that it may not burſt. When every thing is thus prepared, ſo much cold water is to be put into the kettle, that the neck of the bottle may ſtand two or three inches above it; the kettle is then to be ſet over the fire, and the water is to be made to boil, and kept boiling about half an hour, the bottle being at times taken out, and thoroughly ſhaken. When the ſalts are thus thoroughly diſſolved in the vinegar, the whole is to be kept for uſe.

The method in which they uſe it is this: take an earthen pan, which will hold about twelve quarts; let this be filled with urine that has been made by ſound, healthy, and young perſons; the ſtaler the urine is, the better it is for uſe, and it ought indeed always to ſtand, at leaſt, three weeks before it is uſed. It is proper for the farrier, therefore, always to keep a quantity of this ready, and when the water is to be uſed, half a pint of it is to be mixed with a quart of the urine, or if it be required ſtronger, more of the water is to be added: theſe are to be thoroughly mixed together, and the legs, or other affected part of the horſe, bathed with it with ſoft rags twice a day.

The virtues of this water are highly extolled; it is ſaid to cure the malanders in two or three times dreſſing; it is alſo a ſovereign remedy for the mange, either dry or wet, and for the rat-tails, ſcratches, gourded or ſwelled legs and heels, and it alſo cures horſes when the greaſe is fallen into their heels, as the farriers expreſs it. The farcy is alſo ſaid to be often cured by a long continuance in the uſe of it, purging the horſe two or three times, at different diſtances of time, during the time of his being under cure by the water. They alſo find it a good cleanſer and healer of foul ulcers, and that it prevents the breeding of proud-fleſh and worms in wounds, and drives away a flux of humours that were falling upon any part. They uſe it alſo in clefts and cracks of the heels, and in windgalls, eſpecially in the prevention of the laſt, by its repellent qualities. The green water alone is an excellent remedy for fiſtulas, cankers, and the galled backs of horſes; diſpoſing ſuch *ſorrances*, as they are called, not to feſter, rot, and grow worſe, as all greaſy and oily medicines do, but cleanſing them, and preparing the way to a very ſound and ſtanding cure.

SORREL, *acetoſa*, in *Botany*. Its characters are theſe: it is male and female in different plants; the male plants have a three-leaved empalement, and ſix ſtamina, crowned with flat, oblong ſummits, but have no corolla or petals; the female flowers have alſo a three-leaved empalement, in the centre of which is ſituated a three-cornered germen, ſupporting a trifid ſtyle; the germen afterwards turns to a triangular ſeed.

The *ſorrels* and docks are by Linnæus included in the ſame genus, under the title of *rumex*; but they are more generally diſtinguiſhed from each other. Miller enumerates ſeven ſpecies; ſome of which grow wild in paſtures in many parts of England.

The common *ſorrel* is propagated either by ſeed, or by parting the roots

The leaves of the common *ſorrel*, the ſheep's *ſorrel*, and the garden or French *ſorrel*, are mildly acid, and were all formerly directed as officinals, and occaſionally uſed for abating heat, quenching thirſt, and preventing or correcting a tendency to putrefaction, in febrile and ſcorbutic diſorders; but other vegetable acids have now, in a great meaſure, ſupplied their place. Schroder recommends a conſerve of the freſh leaves in the plague, and in all peſtilential, petechial, and malignant fevers. Mr. Morin, of the academy of Paris, who in the Hotel Dieu had many hundred ſcorbutic patients, cured the greater part of them only by *ſorrel*, boiled and eaten with eggs. The juice yielded by expreſſion from the leaves is one of the moſt elegant preparations of *ſorrel* for medicinal uſe, and may be advantageouſly joined, in ſcorbutic caſes, to the juices of the acrid herbs: the inhabitants of Greenland, who are very ſubject to theſe diſtempers, are ſaid to employ, with good ſucceſs, a mixture of *ſorrel* and cochlearia.

The greateſt part of the acid matter of *ſorrel* may be obtained, in the form of a concrete ſalt, by inſpiſſating the depurated juice to a due conſiſtence, and ſetting it to cryſtallize. The roots of the *ſorrels*, which have a roughiſh, bitteriſh taſte, without any acidity, have been looked upon as aperient and diuretic, and with theſe intentions have been made ingredients in watery infuſions and decoctions.

The ſeeds of *ſorrel* are very ſlightly, if at all, aſtringent, without acidity, or bitterneſs. They are now deſervedly excluded from the ſhops. Lewis's Mat. Med.

Sorrels, *Indian red*, and *Indian white*, are ſpecies of *hibiſcus*. See *Syrian* Mallow.

Sorrel, *wood*, *oxalis*, in *Botany*, a genus of the *decandria pentagynia* claſs. Its characters are theſe: the empalement of the flower is permanent, and cut into five acute parts; the flower is of one petal, cut into five obtuſe indented ſegments, and it hath ten erect, hairy ſtamina, and a germen with five angles, ſupporting five ſlender ſtyles, the germen becomes a five-cornered capſule, with five cells, which open longitudinally at the angles, containing roundiſh ſeeds, which are thrown out with an elaſticity on the touch, when ripe. Linnæus enumerates fourteen, and Miller ſeven ſpecies, one of which grows naturally in moiſt ſhady woods in many parts of England.

The leaves of the common *wood ſorrel* are uſeful ſaline antiſeptics, and antiphlogiſtics; ſimilar, both in taſte and medicinal virtue, to thoſe of the common *ſorrels*, but ſomewhat more acid, and rather more grateful to the palate and ſtomach. Beaten with thrice their weight of fine ſugar, they form a grateful, ſub-acid conſerve. Their expreſſed juice, depurated, is a very agreeable acid; duly inſpiſſated, and ſet to ſhoot, it yields a cryſtalline acid ſalt, of the ſame nature with that of the *ſorrels:* the ſaline matter amounts to nearly one hundredth part of the weight of the freſh leaves. Lewis.

Externally, it is extolled againſt inflammatory eruptions of all kinds, in decoction, which is to be uſed by way of fomentation.

Sorrel, in the *Manege*, is uſed for a reddiſh colour. The mane ought to be red, or white, in a horſe of this colour. It is diſtinguiſhed, according to the degrees of its deepneſs, into a *burnt ſorrel*, and a *bright*, or *light ſorrel*. Generally ſpeaking, it is a ſign of a good horſe.

Sorrel-*tree*, in *Botany*. See Andromeda.

SORTES, *lots*, in *Antiquity*, a method of deciding dubious caſes, where there appears no ground for a preference; by referring the diciſion to chance; as in caſting of dice, drawing of tickets, &c.

The *ſortes*, or *lots*, were of ancient uſe among the Jews; and in the books of the Old Teſtament we meet with divers ſtanding and perpetual laws, and divers particular commands, preſcribing and regulating the uſe thereof. Thus the Scripture informs us, that the *lot* fell on St. Matthias, when a ſucceſſor to Judas in the apoſtolate was to be choſen. Our Saviour's garment itſelf was caſt *lots* for.

The Sortes *Prænestinæ* were famous among the Greeks. The method of theſe was to put a great number of letters, or even whole words, into an urn; to ſhake them together, and throw them out; and whatever ſhould chance to be made out in the arrangement of the letters, &c. compoſed the anſwer of this oracle.

Cicero, de Divin. lib. ii. § 41. ſays, that a variety of predictions were inſcribed on pieces of wood, which were kept in a box or cheſt; and one of theſe drawn out by a child, after the box was ſhaken, contained the anſwer ſought. He alſo informs us, how theſe fragments of wood were firſt diſcovered; but he obſerves, *Tota res eſt inventa fallaciis, aut ad quæſtum, aut ad ſuperſtitionem.*

In lieu of this, another kind of *ſortes* was introduced into Greece and Italy; which was, to take ſome celebrated poet, as Homer, or Euripides, or Virgil, to open the book, and whatever firſt preſented itſelf to the eye upon opening, was taken for the ordinance of heaven. This made what they called the *ſortes Homericæ*, and *ſortes Virgilianæ*; which ſucceeded to the uſe of the *ſortes Præneſtinæ*.

The Bath *kol* among the Jews was much of the ſame kind, differing only in this circumſtance, that the Jews took their oracle from the firſt words which they heard any body pronounce; the heathen from the firſt they caſt their eyes upon, on opening Homer, &c. in which they endeavoured to diſcover a meaning ſuitable to the matter concerning which they enquired.

This ſuperſtition paſſed from paganiſm into Chriſtianity; and the Chriſtians took their *ſortes* out of the books of the Old and New Teſtament. The firſt paſſage that preſented itſelf upon opening a book of Scripture, was eſteemed the anſwer of God himſelf.

If the firſt paſſage did not happen to be any thing to the purpoſe for which the *ſortes* were conſulted, another book was opened; till a paſſage was met with that might be taken for an anſwer. This was called *ſortes ſanctorum*. St. Auguſtine (Epiſt. ad Jan. 109.) does not diſapprove of this method of learning futurity, provided it be not uſed for wordly purpoſes.

Gregory of Tours adds, that the cuſtom was firſt to lay the Bible on the altar, and to pray the Lord, that he would diſcover by it what was to come to paſs.

Inſtances of the uſe of the *ſortes ſanctorum* are very frequent in hiſtory. Heraclius, Mr. Fleury tells us, in his war againſt Coſroes, to learn where he ſhould take up his winter-quarters, purified his army for three days, and then opened the Goſpels, and found the place appointed for his winter-quarters was in Albania.

Gilbert of Nogent informs us, that, in his time (that is, about the beginning of the twelfth century), the cuſtom was, at the conſecration of biſhops, to conſult the *ſortes ſanctorum*, to learn the ſucceſs, fate, &c. of their epiſcopate.

The practice is founded on a ſuppoſition, that God preſides over the *ſortes*, and on Prov. xvi. 33. *The lot is caſt into the lap; but the diſpoſing thereof is of the Lord.*

In effect, many divines hold, that the *lot* is conducted in a particular manner by providence; that it is an extaordinary manner, wherein God declares his will by a kind of immediate revelation. The *ſortes ſanctorum*, however, were condemned by the council of Agda, in 506, at the time they were beginning to take footing in France, &c.

SORTILEGE, *ſortilegium*, a kind of divination by ſortes, or lots.

SORY, in *Natural Hiſtory*, the name of a foſſile ſubſtance, much ſpoken of by the ancients, but erroneouſly ſuppoſed to be now loſt.

It is a firm and not brittle ſubſtance, though of a ſpungy and cavernous ſtructure, and is conſiderably heavy. It is found in maſſes of no regular ſhape or ſize, ſome being roundiſh, others angular or flatted, and ſome of the ſize of a walnut, others of many pounds weight. It feels very harſh and rough to the touch, and is covered with no inveſtient coat or cruſt, but ſhews its natural ſurface, which is always corrugated or wrinkled, and uſually full of ſmall protuberances and cavities, and when broken, is found to be of a rugged and ſpongy ſtructure within.

Its natural colour is a ruſty black, but it is ſometimes reddiſh, and ſometimes bluiſh; and is commonly ſtained, in different places, with ſpots of a bluiſh or ruſt-colour, when black; and of a greeniſh hue, when it is of a reddiſh colour: in the places where it is free from theſe, it is uſually ſomewhat bright and ſparkling. It is of an acrid and diſagreeable taſte, and of a ſtrong and nauſeous ſmell; put into the fire it burns to a deep purple, and if boiled in water a great part of it becomes diſſolved in it; and this may again be ſeparated from the water by evaporation and cryſtallization, and then appears in the form of pure blue vitriol, forming regular rhomboidal cryſtals, and tinging iron to a copper colour, on being firſt wetted, and then rubbed upon it.

It is found in many parts of the Turkiſh dominions, particularly in Gallo-Græcia; as alſo in ſome parts of Germany. In this country it is boiled for the blue vitriol it contains. In Turky it is mixed with lime, and made into a paſte with water, which is laid on ſuch parts of the body as they would eradicate the hair from, and effects that purpoſe in a very few minutes. In the eaſtern nations, where it is thus uſed, it is known by the name RUSMA.

The ancients uſed it externally to take off pimples, and put a piece of it into a hollow tooth, as a remedy for the tooth-ach. There can be no doubt of their *ſory* being the ſame ſubſtance with this; ſince Dioſcorides has deſcribed it to be blackiſh in colour, full of ſmall cavities, moiſt on the ſurface (as ours always is in moiſt weather), and of a diſagreeable taſte and ſmell.

This ſubſtance, as alſo the CHALCITIS, MISY, and MELANTERIA, are all properly ores of vitriol, the particles of thoſe ſalts being ſo perfectly blended in them, as not to be at all diſtinguiſhable to the naked eye, yet being always regularly ſeparable from them by water, which is to the ſaline ores what fire is to thoſe of the metalline kind. Hill's Hiſt. of Foſſ. p. 606.

SOSPIRO, in the *Italian Muſic*, a pauſe, or reſt, equal to the time of a crotchet.

SOSPIRO, *canone al*. See CANONE *al ſoſpiro*.

SOSTENUTO, in the *Italian Muſic*, denotes that the ſound is to be held out in an equal and ſteady manner for the whole time of the note. Thus they ſay *arcate ſoſtenute*. See Corelli, Concerto 8.

SOTERIA, formed from *σωτηρ*, *ſaviour*, in *Antiquity*, ſacrifices offered to the gods, in gratitude for their having delivered a perſon from danger. See SACRIFICE.

The term is alſo applied to poetical pieces compoſed for the ſame end. Orpheus is the firſt who appears to have compoſed *ſoteria*.

Our Latin poets give the ſame name to poems in Latin verſe, written to give thanks to God, or the ſaints, for having preſerved them on any occaſion. F. Petavius being delivered from a dangerous diſeaſe, by the interceſſion, as he ſuppoſed, of St. Genevieve, compoſed that fine piece in honour of that ſaint, ſtill extant under the title of *Soteria*.

SOTIRELLA, a name given by ſome to a compound medicine, in form of a hard maſs, and conſiſting of opium and ſome other narcotics, with camphor, wood-ſoot, and nutmeg. It is deſcribed in the Auguſtan Diſpenſatory, and is intended to be put into hollow teeth, as a remedy for the tooth-ach.

SOU. See SOL.

SOVEREIGN, *ſupreme*, the chief and higheſt Being, or the Almighty; a term, in ſtrictneſs, only applicable to God.

The word is French, *ſouverain*; which Paſquier derives farther from the Latin *ſuperior*, the firſt in any thing; or he who is ſuperior to the reſt. Hence,

In the ancient French cuſtoms we meet with *ſovereign* maſter of the houſhold; *ſovereign* maſter of the foreſts; *ſovereign* maſter of the treaſury. Under Charles VI. the title *ſovereign* was given to bailiffs and ſeneſchals, with regard to their ſuperiority over prevots, and chatelains.

SOVEREIGN, with regard to ſubjects, is applied to kings and princes, who are ſupreme and independent.

The authority of a *ſovereign* is only bounded by the law of God, of nature, and the fundamental laws of the ſtate. See KING.

SOVEREIGN is alſo a title given to ſuch as are inveſted with certain rights and prerogatives, which belong only to *ſovereigns*; as the power of coining money, ſending agents to diets, to treat of war and peace, &c.

In which ſenſe the feudatories of the empire, and the tributaries of the grand ſignior, are called *ſovereigns*.

SOVEREIGN is alſo applied to courts and judges, who have a power from a prince to decide the proceſſes of his ſubjects without appeal, or in the laſt reſort.

At Paris there are five *ſovereign* companies; the parliament, the chamber of accounts, the court of aids, the grand council, and the court of moneys.

In England we have but one *ſovereign* court, which is the houſe of lords.

SOUGH, otherwiſe called an *adit*, in *Mineralogy*, is a paſſage like a vault cut out under the earth, to drain the water from the mines.

SOUL, *anima*, a ſpirit adapted to an organized body. See SPIRIT, and BODY.

Many of the ancient philoſophers aſſerted an ANIMA *mundi*, a ſoul which moved and animated the machine of the univerſe, and gave action to all natural cauſes. This doctrine Plato handles very fully in his Timæus.

Others have given particular *ſouls* to all the heavenly bodies, the ſun, ſtars, earth, &c. to regulate their motions.

The philoſophers, many of them, allow of two, and others of three, kinds of *ſouls*; viz. a

SOUL, *rational*, which they hold to be divine, and infuſed by the breath of God. This they call the ſpirit, and in this they ſuppoſe the intellect and will to be ſeated.

SOUL, *ſenſitive*, or *irrational*, which man has in common with brutes; which is formed out of the elements, and in which they apprehend the paſſions and appetites are ſeated.

SOUL, *vegetative*, which we have in common with plants; and which, as the firſt is the principle of reaſon and underſtanding, or that in us which thinks and underſtands; and the ſecond, the principle of life; the third is the principle of growth, nutrition, and vegetation.

The Epicureans took the ſubſtance of the *ſoul*, we mean of the rational *ſoul*, to be a ſubtile air, compoſed of their atoms, or primitive corpuſcles.

The Stoics held it to be a flame, or portion of heavenly light. Spinoza, and his followers, allowing only of one kind of ſubſtance, viz. matter; maintain the ſoul to be of the ſame ſubſtance with the body, viz. material. See SPINOZISM.

The doctrine of the materiality of the human *ſoul* has been adopted and maintained by ſeveral modern writers; and even by thoſe who have diſtinguiſhed themſelves as able and zealous advocates in the cauſe of religion both natural and revealed. In this number we may reckon Dr. Prieſtley, who, rejecting the commonly received notion of MATTER, as an abſolutely impenetrable, inert ſubſtance, and premiſing, that the powers of ſenſation or perception, and thought, as belonging to man, have never been found but in conjunction with a certain organized ſyſtem of matter, maintains, that thoſe powers neceſſarily exiſt in, and depend upon, ſuch a ſyſtem. In proof of this doctrine, it is alledged, that perception and thought are not incompatible with the properties of matter, conſidered as a ſubſtance extended and endued with the powers of attraction and repulſion; and, therefore, if one kind of ſubſtance be capable of ſupporting all the known properties of man, true philoſophy, which will not authorize us to multiply cauſes or kinds of ſubſtance, without neceſſity, will forbid us to admit of any ſubſtance in the conſtitution of human nature eſſentially different from matter. The proper ſeat of the powers of perception and thought, according to this writer, is the brain; becauſe, as far as we can judge, the faculty of thinking, and a certain ſtate of the brain, always accompany and correſpond to one another: and there is no inſtance of any man retaining this faculty, when his brain was deſtroyed; and whenever that faculty is impeded or injured, there is ſufficient reaſon to believe that the brain is diſordered in proportion. Dr. Prieſtley apprehends, that ſenſation and thought neceſſarily reſult from the organization of the brain, when the powers of mere life are given to the ſyſtem, and that they follow of courſe, as much as the circulation of the blood follows reſpiration; but he profeſſes to have no idea at all of the manner in which the power of perception reſults from organization and life.

To this reaſoning it has been replied, in general, that Dr. Prieſtley's account of matter does not anſwer to the common ideas of matter, or that it is not ſolid extenſion, or an impenetrable and inert ſubſtance, which is the only matter that is the object of natural philoſophy; but ſomething not ſolid, that exiſts in ſpace, and ſo far agreeing with ſpirit; and conſequently, if ſuch matter, is, as he aſſerts, the only matter poſſible, it will follow, not that we have no ſouls diſtinct from our bodies, but that we have no bodies diſtinct from our ſouls, and that all in nature is ſpirit. Beſides it has been farther urged, that a connection and dependence by no means prove ſameneſs. From the dependence of actual ſenſations and thought on the brain, we have no more reaſon to conclude that the brain is the mind, than a ſavage who had never heard the muſic of a harpſichord, and did not ſee the hand that played upon it, would have to conclude, that it played upon itſelf, and was the muſician; becauſe he could trace all the ſounds to the inſtrument, and found that when the ſtrings were out of order, the muſic was diſturbed or deſtroyed. What experience teaches us is, that the exerciſe of the mental powers *depends* on the brain and the nerves; not that the mind *is* the brain and the nerves. We are ſure the mind cannot be the brain, becauſe the brain is an aſſemblage of beings; whereas the mind is one being.

Dr. Prieſtley farther argues, that all our ideas either proceed from the bodily ſenſes, or are conſequent upon the perceptions of ſenſe; and hence infers, that the notion of the poſſibility of thinking in man, without an organized body, is not only deſtitute of all evidence from actual appearances, but is directly contrary to them. Moreover, if the mind was naturally ſo independent of the body, as to be capable of ſubſiſting by itſelf, and even of appearing to more advantage after the death of the body, as ſome of the advocates for an intermediate ſtate have maintained, it might, he ſays, diſcover ſome ſigns of its independence before its death, and eſpecially when the organs of the body were obſtructed, ſo as to leave the *ſoul* more at liberty to exert itſelf, as in a ſtate of ſleep or ſwooning, which moſt reſemble the ſtate of death, in which it is pretended that the *ſoul* is moſt of all alive, moſt active, and vigorous; but, judging by appearances, the reverſe of all this is the caſe. Beſides, if the mental principle was, in its own nature, immaterial and immortal, all its particular faculties would be ſo too; whereas we ſee that every faculty of the mind, without exception, is liable to be impaired, and even to become wholly extinct before death. Whence he infers, that the ſubſtance, or principle, in which theſe faculties exiſt, muſt be pronounced to be mortal too. He adds, if the ſentient principle in man be immaterial, it can have no extenſion, but every thing within it, or properly belonging to it, muſt be ſimple and indiviſible; and if this were not the caſe, the *ſoul* would be liable to corruption and death. But Dr. Prieſtley obſerves, that, whatever ideas are in themſelves, they are evidently produced by external objects, and muſt thereſore correſpond to them; and ſince many of the objects or archetypes of ideas are diviſible, it neceſſarily follows, that the ideas themſelves are diviſible alſo; and hence he infers, that the ſentient principle in man, containing ideas which certainly have parts, and are diviſible, and conſequently having extenſion, cannot be that ſimple, indiviſible, and immaterial ſubſtance, that ſome have imagined it to be; but ſomething that has real extenſion, and therefore may have the other properties of matter. To this reaſoning an excellent writer replies, that it would be as proper to aſſert that ideas are hard or round, as to aſſert, that they are diviſible. Perception is a ſingle and indiviſible act; and though the object perceived may be diviſible, the perception of it by the mind cannot be ſo. Dr. Prieſtley farther adds, that the *ſoul* poſſeſſes a great variety of mental affections, which neceſſarily imply alteration, eſpecially melioration and depravation, which is ſomething ſo ſimilar to corruption, that it has univerſally obtained the ſame name, and which is certainly incompatible with natural and perfect ſimplicity. This writer alledges alſo, in favour of the ſyſtem of materialiſm, that we hereby get rid of many difficulties, which muſt embarraſs the oppoſite ſyſtem; ſuch, e. gr. as theſe—what becomes of the *ſoul* during ſleep, in a ſwoon, when the body is ſeemingly dead (as by drowning, or other accidents), and eſpecially after death? alſo what was the condition of it before it became united to the body, and at what time did that union take place? what are the nature and the ſtate of the *ſouls* of brutes? what is the uſe of the human body, &c. The ſyſtem of materialiſm, he ſays, which revelation uniformly ſuppoſes, is clogged with no difficulties of this kind. Man, according to this ſyſtem, is no more than what we now ſee of him. His being commences at the time of his conception, or perhaps at an earlier period. The corporeal and mental faculties, inhering in the ſame ſubſtance, grow, ripen, and decay together; and, whenever the ſyſtem is diſſolved, it continues in a ſtate of diſſolution, till it ſhall pleaſe that almighty Being, who called it into exiſtence to reſtore it to life again. Accordingly the Chriſtian ſyſtem provides no reward for the righteous till the general reſurrection of the juſt, nor any puniſhment for the wicked till the end of the world. Hence alſo the doctrine of the pre-exiſtence of human *ſouls*, and that of the pre-exiſtence of Chriſt, are rejected, as having no other foundation than the notion of there being ſomething in man quite different from his corporeal organized ſyſtem.

Dr. Prieſtley argues in many parts of his work on the ſuppoſition, that, according to the ideas of modern immaterialiſts, ſpirit can have no relation to place, and is incapable of being preſent any where. But Dr. Clarke, and ſome others of the beſt modern writers, did not entertain theſe ideas of ſpirit. Time and place are neceſſary to the exiſtence of all things; and hence Dr. Clarke infers, that infinite ſpace and duration are the eſſential properties of the Deity. Sir Iſaac Newton was alſo of the ſame opinion; and Dr. Price obſerves, that if ſpirit exiſts at all, it muſt exiſt ſomewhere, as well as in ſome time.

Dr. Prieſtley deduces another argument in favour of the material ſyſtem, from the conſideration, that ſpirit and body have no common property, and that it muſt, therefore, be impoſſible for them to act upon one another: againſt which it has been objected, that his principles tend to prove, that the Deity is material, as well as all inferior beings: and if matter be a power of attraction and repulſion united to extenſion, the Deity muſt be the ſame. But if this maxim be not univerſally true, and the Deity be immaterial, as Dr. Prieſtley himſelf aſſerts, it will follow, that ſpirit may act upon matter, without having any other common property with it than being locally preſent to it; and one of his chief arguments for the materiality of the *ſoul* will be given up. Beſides, allowing this maxim, how is it poſſible to avoid aſſerting the impoſſibility of the creation of the world out of nothing? For what common property can the Creator have with *nothing?* Dr. Prieſtley has laboured to prove, that the ſcriptures, both of the Old and New Teſtament, ſuppoſe and inculcate the doctrine of the uniform compoſition of man, or of the materiality of the human *ſoul*, and that, in conformity to this doctrine, the ſtate of retribution does not take place till after the general reſurrection. Accordingly his ſyſtem leads him to deny the natural immortality of the *ſoul*, and its conſcious exiſtence in the intermediate ſtate. To thoſe who object, that if the *ſoul* be not naturally capable of ſurviving the body, or if death is unavoidably its deſtruction, then the reſurrection muſt be the reſurrection of a non-entity; he replies, that though the power of thinking cannot exiſt without its ſubſtance, which is an organized ſyſtem, yet if this property of thinking neceſſarily attends the property of life, nothing can be requiſite to the reſtoration of all the powers of the man, but the reſtoration of the body to a ſtate of life. And he apprehends that a reſurrection properly ſo called (becauſe this can be only a reſurrection of ſomething that had been dead, viz. the body), is manifeſtly uſeleſs, upon the ſuppoſition of there being a *ſoul* diſtinct from the body; it being, upon this hypotheſis, the *ſoul*, and not the body, that is, the ſeat of all perception, and the ſource of all action. See SLEEP *of the Soul.*

Dr. Prieſtley conceives, that the three doctrines of *Materialiſm*, of that which is commonly called SOCINIANISM, and of philoſophical NECESSITY, are equal parts of one ſyſtem, being equally founded on juſt obſervations of nature, and fair deductions from the Scriptures; and that whoſoever ſhall duly conſider their connection and dependence on one another, will find no ſufficient conſiſtency in any general ſcheme of principles, that does not comprehend them all. But it has been urged by another able writer, that, if man be the matter itſelf which conſtitutes the man, and not its form or arrangement, as Dr. Prieſtley allows, the man will always remain while the matter which conſtitutes him remains, however different its organization or arrangement may be; that ſince death does not deſtroy the matter which conſtitutes man, it does not deſtroy the man; and that, conſequently he goes on to exiſt after death, or is naturally immortal: that, in order to the reſurrection of the ſame man, the ſame matter muſt ariſe: and that it is no leſs poſſible for man to have exiſted *before* his birth, than it is, that he ſhould exiſt *after* his death; and that, conſequently, all the ſupport to the Socinian ſcheme, which Dr. Prieſtley derives from his ſentiments of materialiſm, falls to the ground. To this reaſoning, however, he replies, that the pre-exiſtence of the materials of the man Jeſus is a very different kind of pre-exiſtence from that of thoſe who make Chriſt, or rather the principal part of him, to have pre-exiſted in an active ſtate. We ſhall here ſubjoin the following argument urged by the learned Dr. Clarke againſt Mr. Dodwell, in proof of the immateriality and natural immortality of the *ſoul*. That the *ſoul* cannot be material, he ſays, is demonſtrable from the ſingle conſideration even of bare ſenſe and conſciouſneſs itſelf. For matter being a diviſible ſubſtance, conſiſting always of ſeparable, nay, of actual ſeparate and diſtinct parts; it is plain, unleſs it were eſſentially conſcious, in which caſe every particle of matter muſt conſiſt of innumerable ſeparate and diſtinct conſciouſneſſes, no ſyſtem of it in any poſſible compoſition or diviſion can be an individual conſcious being: for ſuppoſe three, or three hundred particles of matter at a mile, or any given diſtance one from another, is it poſſible that all thoſe ſeparate parts ſhould, in that ſtate, be one individual conſcious being? Suppoſe then all theſe particles brought together, into one ſyſtem, ſo as to touch one another, will they, thereby, or by any motion or compoſition whatſoever, become any whit leſs truly diſtinct beings than they were at the greateſt diſtance? How then can their being diſpoſed in any poſſible ſyſtem, make them one individual conſcious being? If you ſuppoſe God by his infinite power ſuperadding conſciouſneſs to the united particles, yet ſtill thoſe particles, being really and neceſſarily as diſtinct beings as ever, cannot be themſelves the ſubject in which that individual conſciouſneſs inheres; but the conſciouſneſs can only be ſuperadded by the addition of ſomething, which, in all the particles, muſt ſtill itſelf be but one individual being. The *ſoul*, therefore, whoſe power of thinking is undeniably one individual conſciouſneſs, cannot poſſibly be a material ſubſtance. See on this ſubject Prieſtley's Diſquitions relating to

Matter and Spirit, 8vo. 1777. Correſpondence between Dr. Price and Dr. Prieſtley, 8vo. 1778. Clarke's Demonſtration of the Being and Attributes of God. Anſwer to Dodwell. Controverſies with Collins; and Letters between him and Leibnitz. Butler's Analogy, chap. i. Baxter's Matho, vol. i. Enquiry into the Nature of the Human Soul, &c. vol. i.

The Carteſians make thinking the eſſence of the *ſoul*; and, from this principle, deduce its immateriality and immortality. But, according to Mr. Locke, &c. the principle is falſe; nor is there any need to define the *ſoul* a ſubſtance that thinks to prove it immortal. It is enough that the *ſoul* be capable of thinking, and that it produce its own thoughts, without making thinking its eſſence. It is no more eſſential to the *ſoul* to think than to will; for a thing I can conceive the *ſoul* without, cannot be its eſſence.

Again, if thought be the eſſence of the *ſoul*, as a thing cannot produce itſelf, its own being, or eſſence; the *ſoul* does not produce its own thoughts, nor its own will: and thus is it brought to the condition of brutes, or even of inanimate bodies, without any action, any liberty, &c.

If the Carteſians only mean this of the faculty of thinking, they do wrong even to call this the eſſence of the *ſoul*. It is no more its eſſence than the faculty of willing is. And we conceive ſomething in the *ſoul* prior to both thoſe faculties.

The *ſoul* is a ſpiritual ſubſtance, proper to inform or animate a human body; and, by its union with this body, to conſtitute a reaſonable animal or man. This is its eſſence, and this its definition.

It muſt be owned, the Carteſians prove the ſpirituality and immortality of the *ſoul*, from its thinking, exceedingly well; but they are not to have the honour of this proof as their own invention. All the great philoſophers uſed it before them, and uſe it ſtill.

The philoſophers are not at all agreed as to the manner wherein the *ſoul* reſides in the body. Some hold it equally diffuſed throughout every part thereof. And others ſay it influences, and acts on every part of the body, though it has its principal reſidence in ſome particular part, called the SENSORY.

This principal part, Deſcartes maintains, is the PINEAL *gland* of the brain, where all the nerves terminate. See GLAND.

Borri, a Milaneſe phyſician, in a letter to Bartholine, De Ortu Cerebri, & Uſu Medico, aſſerts, that in the brain is found a very ſubtle, fragrant juice, which is the principal ſeat or reſidence of the reaſonable *ſoul*; and adds, that the ſubtlety and fineneſs of the *ſoul* depends on the temperature of this liquor rather than on the ſtructure of the brain, to which it is uſually aſcribed. This liquor, we conceive, muſt be the ſame with what is uſually called the *nervous juice*, or *animal ſpirits*: the conſtitution whereof is, doubtleſs, of great importance, with regard to the faculties of the *ſoul*.

Mr. Locke diſtinguiſhes two principal faculties or powers of the rational or human *ſoul*, viz. *perception* and *willing*. See POWER.

To theſe other philoſophers add others; as *ſenſation*, *liberty*, *memory*, *imagination*, and *habit*.

The myſtic divines diſtinguiſh two principal parts of the *ſoul*: the *ſuperior part*, which comprehends the underſtanding and the will, and the *inferior part*, which comprehends imagination and ſenſation.

As to the *ſoul* of brutes, the Carteſians, and ſome others, deny its exiſtence in the common ſenſe of the word *ſoul*; that is, they ſtrip it of all the properties or faculties of the human *ſoul*: and the Peripatetics, on the contrary, inveſt it with the greateſt part, if not all of them.

In man, a particular agitation of the fibres of the brain is accompanied with a ſenſation of heat; and a certain flux of animal ſpirits towards the heart and viſcera, is followed by love or hatred.

Now the Peripatetics maintain, that brutes feel the ſame heat, and the ſame paſſions, on the ſame occaſions; that they have the ſame averſion for what incommodes them; and, in the general, are capable of all the paſſions, and all the ſenſations we feel.

The Carteſians deny they have any perceptions or notices at all, that they feel any pain or pleaſure, or love or hate any thing. The ground of their opinion is, that they allow of nothing in brutes but what is material; and that they deny ſenſations and paſſions to be any properties of matter.

Some of the Peripatetics, on the other hand, maintain matter, when ſubtilized, framed, ranged, and moved, in a certain manner, to be capable of ſenſation and paſſion; that beaſts may feel and perceive, by means of the animal ſpirits, which are a matter thus modified; and that even the human *ſoul* itſelf only becomes capable of ſenſation and paſſion by means thereof.

The maintainers of the contrary opinion urge that appearance of ſenſe, of fear, caution, love for their young, admirable ſagacity, both for their own preſervation and that of their ſpecies, viſible through the whole brute creation. And it is true, that all the actions of beaſts plainly expreſs an underſtanding, for every thing that is regular expreſſes it, even a machine or watch expreſſes it, and a plant much more; the radicle of the ſeed turning downwards, and the ſtem upwards, whatever ſituation the ſeed is ſown in; the young plant knitting from ſpace to ſpace to ſtrengthen it, its putting forth prickles, &c. to defend it, &c. mark a great underſtanding. All the motions of plants and brutes plainly diſcover an intelligence; but the intelligence does not reſide in the matter thereof; it is as diſtinct from the beaſt or plant, as that which ranged the wheels of the watch is diſtinct from the watch itſelf.

For, in effect, this intelligence appears infinitely great, infinitely wiſe, infinitely powerful; and the ſame which formed us in our mother's womb, which gave us our growth, &c. Thus, in brutes, there is not either underſtanding or *ſoul*, in the ſenſe we generally uſe the word; they eat without pleaſure, cry without pain, grow without knowing it. They fear nothing, know nothing, and if they act in ſuch manner as ſhews underſtanding, it is becauſe God, having made them, to preſerve them, has formed their bodies ſo as to avoid whatever might hurt them mechanically.

Otherwiſe it might be ſaid, that there is more underſtanding in the vileſt inſect, nay, in the ſmalleſt grain, than in the moſt knowing men; for it is evident, either of them contains more parts, and produces more regular motions and actions than we are capable of underſtanding. Thus does the great F. Malebranche argue againſt the *ſouls* of brutes. Recherche de la Verite, liv. vi.

Mr. Locke (Eſſ. vol. i. p. 120. 148.) maintains, that the *ſouls* of brutes are wholly material; that they do not poſſeſs the power of abſtraction; and that the having general ideas is that which puts a perfect diſtinction between man and brutes. Dr. Prieſtley is of opinion, that as brutes have the ſame external ſenſes that we have, they have, of courſe, all the ſame inlets to ideas; and though, on account of their wanting a ſufficient quantity of brain, perhaps, chiefly, the combination and aſſociation of their ideas cannot be ſo complex as ours, and, therefore, they cannot make ſo great a progreſs in intellectual improvements, they muſt neceſſarily have, in kind, every faculty that we are poſſeſſed of. And ſince they evidently have memory, paſſions, will, and judgment too, as their actions demonſtrate, they muſt, of courſe, have the faculty of abſtraction as well as the reſt; though not having the uſe of words, they cannot communicate their ideas to us. However, he expreſſes a doubt whether they will ſurvive the grave, as there is no hint of this kind in revelation, which alone informs us, that men will riſe again. Nevertheleſs, Dr. Prieſtley adds, that if the reſurrection be, in fact, within the proper courſe of nature, extenſively conſidered, and conſequently there be ſomething remaining of every organized body that death does not deſtroy, there will be reaſon to conclude, that they will be benefited by it as well as ourſelves. And the great miſery to which ſome of them are expoſed in this life, may incline us to think, that a merciful and juſt God will make them ſome recompence for it hereafter. Diſquiſitions, &c. p. 239. See BRUTES and INSTINCT.

SOULS, *cure of*. See CURE.

SOULS, *migration of*. See MIGRATION and METEMPSYCHOSIS.

SOUL, *ſleep of the*. See SLEEP *of the Soul*.

SOUL-*ſcot*, a certain fee paid by our Saxon anceſtors to the prieſt on opening a grave.

SOUL's *cheat*, a legacy anciently bequeathed at their deaths by our ſcrupulouſly pious anceſtors, to the pariſh-prieſt, to compenſate for any tithes that might have been forgot in their lives.

SOUND, SONUS, a perception of the ſoul, communicated by means of the ear; or the effect of a colliſion of bodies, and a tremulous motion, conſequent thereon, communicated thence to the circumambient fluid, and propagated through it to the organs of hearing.

To illuſtrate the cauſe of *ſound* we obſerve, firſt, that a motion is neceſſary in the ſonorous body for the production of *ſound*. Secondly, that this motion exiſts, firſt, in the ſmall and inſenſible parts of the ſonorous bodies; and is excited in them by their mutual colliſion and percuſſion againſt each other, which produces that tremulous motion ſo obſervable in bodies that have a clear *ſound*,

ſound, as bells, muſical chords, &c. Thirdly, That this motion is communicated to, or produces a like motion in the air, or ſuch parts of it, as are fit to receive and propagate it, inaſmuch as no motion of bodies, at a diſtance, can affect our ſenſes, without the mediation of other bodies, which receive thoſe motions from the ſonorous body, and communicate them immediately to the organ. Laſtly, That this motion muſt be communicated to thoſe parts that are the proper and immediate inſtruments of hearing.

Further, that motion of a ſonorous body, which is the immediate cauſe of *ſound*, may be owing to two different cauſes: either the percuſſion between it and other hard bodies, as in drums, bells, chords, &c. or the beating and daſhing of the ſonorous body and the air immediately againſt each other, as in wind-inſtruments, flutes, trumpets, &c.

But, in both caſes, the motion, which is the conſequence of the mutual action, and the immediate cauſe of the ſonorous motion which the air conveys to the ear, is an inviſible, tremulous, or undulating motion, in the ſmall and inſenſible parts of the body.

To explain this, all ſenſible bodies are ſuppoſed to conſiſt of a number of ſmall and inſenſible parts or corpuſcles, which are of the ſame nature in all bodies, and are perfectly hard and incompreſſible.

Of theſe are compoſed others, ſomewhat greater, but ſtill inſenſible; and theſe different according to the different figures and union of their component parts. Theſe, again, conſtitute other maſſes bigger and more different than the former; and, of the various combinations of theſe laſt, are thoſe groſs bodies compoſed that are viſible, tangible, &c. The firſt and ſmalleſt parts, we have obſerved, are abſolutely hard; the others are compreſſible, and are united in ſuch manner, that, being compreſſed by an external impulſe, they have an elaſtic or reſtitutive power, whereby they reſtore themſelves to their natural ſtate.

A ſhock, then, being made by one body upon another, the ſmall particles, by their elaſtic principle, move to and again with a very great velocity in a tremulous, undulating manner, ſomewhat like the viſible motions of groſſer ſprings; as we eaſily obſerve in the chords of muſical inſtruments. And this is what we may call the *ſonorous motion*, which is propagated to the ear; but obſerve, that it is the inſenſible motion of thoſe particles next the ſmalleſt, which is ſuppoſed to be the immediate cauſe of *ſound*; and, of theſe, only thoſe next the ſurface communicate with the air, the motion of the whole, or of the greater parts, being no farther concerned, than as they contribute to the other.

To apply this theory, ſtrike a bell with any hard body, and you eaſily perceive a ſenſible tremor in the ſurface, ſpreading itſelf over the whole, and that more ſenſibly as the ſhock is greater. Upon touching it in any other part, the motion and the *ſound* too are ſtopped. Now this is apparently a motion of the ſmall and inſenſible parts, changing their ſituation, with reſpect to one another; which being ſo many, and ſo cloſely united, we cannot perceive their motions ſeparately and diſtinctly; but only a trembling, which we reckon to be the effect of the confuſion of an infinite number of little particles, cloſely joined, and only moving in infinitely little lines.

Mr. Perrault adds, that the viſible motion of the parts contributes no otherwiſe to *ſound* than as it cauſes the inviſible motion of the ſmaller parts, which he calls *particles*, to diſtinguiſh them from the ſenſible ones, which he calls *parts*, and from the ſmalleſt of all, which we call *corpuſcles*.

This he ſupports from the inſtance of a chord, which being ſtruck, and the *ſound*, and ſenſible undulations, at reſt again, if you approach the chord ſoftly with the finger, you will find a ſmall tremulous motion, which is the remains of the vibrations of the whole chord and the parts. Now the parts vibrate without any *ſound*; but no ſooner is the vibration felt by the finger than the *ſound* is heard again; which he aſcribes to this, that the motion of the parts being inſufficient to move the particles, whoſe motion is the firſt that ceaſes, requires ſome aſſiſtance from daſhing againſt the finger, whereby to become enabled to give the particle the motion neceſſary for the producing of *ſound*. He finiſhes his proof by the inſtance of flutes, which when made of different matters, as wood, metal, &c. whoſe parts are very different, but their particles nearly the ſame, if their lengths and bore be the ſame, there is very little ſenſible difference in their *ſounds*.

The ſonorous body having made its impreſſion on the contiguous air, that impreſſion is propagated from one particle to another, according to the laws of pneumatics. A few particles, for inſtance, driven from the ſurface of the body, drive their neighbouring particles into a leſs ſpace; and the medium, as it is thus rarefied in one place, becomes condenſed in the other; but the air thus compreſſed in the ſecond place, is, by its elaſticity, returned back again, both to its former place and its former ſtate; and the air contiguous to that is compreſſed; and the like obtains, when the air leſs compreſſed expanding itſelf, a new compreſſion is generated. From each agitation of the air, therefore, there ariſes a motion of the air, analogous to the motion of a wave on the ſurface of the water; which we call a *wave*, or *undulation* of air.

In each wave the particles go and return back again, through very ſhort, but equal ſpaces; the motion of each particle is analogous to the motion of a vibrating pendulum, while it performs two oſcillations; and moſt of the laws of the pendulum, with very little alteration, are applicable thereto.

Sounds are as various as are the means that concur to their production. The principal varieties reſult from the figure, conſtitution, quantity, &c. of the ſonorous body; the manner of percuſſion, with the velocity, &c. of the vibrations conſequent thereon; the ſtate and conſtitution of the medium; the diſpoſition, diſtance, &c. of the organ; the obſtacles between the organ and the ſonorous object, and the adjacent bodies. The moſt notable diſtinction of *ſounds*, ariſing from the various degrees and combinations of the conditions mentioned, are into *loud* and *low* (or ſtrong and weak); into *grave* and *acute* (or ſharp and flat, or high and low); and into *long* and *ſhort*. The management whereof makes the office of muſic.

Mr. Euler is of opinion, that no *ſound* making fewer vibrations than 30, or more than 7520 in a ſecond, is diſtinguiſhable by the human ear. According to this doctrine, the limit of our hearing, as to acute and grave, is an interval of eight octaves. Tentam. Nov. Theor. Muſ. cap. i. ſect. 13.

The velocity of *ſound* is the ſame with that of the aerial waves, and does not differ much, whether it go with the wind or againſt it. By the wind, indeed, a certain quantity of air is carried from one place to another; and the *ſound* is accelerated, while its waves move through that part of the air, if their direction be the ſame as that of the wind. But as *ſound* moves vaſtly ſwifter than wind, the acceleration it will hereby receive is inconſiderable; and the chief effect we can perceive from the wind is, that it increaſes and diminiſhes the ſpace of the waves, ſo that by help hereof the *ſound* may be heard to a greater diſtance than otherwiſe it would. See WIND, & *infra*.

That the air is the ordinary medium of *ſound*, appears from various experiments in rarefied and condenſed air. In an unexhauſted receiver, a ſmall bell may be heard ſome diſtance; but when exhauſted, it can ſcarce be heard at the ſmalleſt diſtance. If the air be condenſed, the *ſound* will be louder proportionably to the condenſation, or quantity of air crouded in; of which we have many inſtances in Mr. Haukſbee's experiments.

Beſides, ſounding bodies communicate tremors to diſtant bodies; e. g. the vibrating motion of a muſical ſtring puts others in motion, whoſe tenſion and quantity of matter diſpoſe their vibrations to keep time with the pulſes of air, propagated from the ſtring that was ſtruck. Galileo explains this phenomenon by obſerving, that a heavy pendulum may be put in motion by the leaſt breath of the mouth, provided the blaſts be often repeated, and keep time exactly with the vibrations of the pendulum, and alſo by the like art in raiſing a large bell.

Dr. Prieſtley conſtructed an apparatus in order to aſcertain whether the intenſity of *ſound* is affected by any other property of the air in which it is made beſides its mere denſity. The reſult of his experiments with different kinds of air was, that the intenſity of *ſound* depends ſolely upon the denſity of the air in which it is made, and not at all upon any chemical principle in its conſtitution. In inflammable air the *ſound* of the bell he uſed was hardly to be diſtinguiſhed from the ſame in a pretty good vacuum; and this air is ten times rarer than common air. In fixed air the *ſound* was much louder than in common air, ſo as to be heard about half as far again; and this air is in about the ſame proportion denſer than common air. In dephlogiſticated air the *ſound* was alſo ſenſibly louder than in common air. Experiments and Obſervations, &c. vol. v. p. 296, &c.

But it is not the air alone that is capable of the impreſſions of *ſound*, but water alſo, as is manifeſt by ſtriking a bell under water, the *ſound* of which may plainly enough be heard, only not ſo loud, and alſo a fourth deeper, according to good judges in muſical notes. And Merſenne ſays, a *ſound* made under water is of the ſame tone or note as if made in air, and heard under water.

The ſpace through which *ſound* is propagated in a given time, has been very differently eſtimated by authors who have written concerning this ſubject. Roberval gives it at the rate of 560 feet in a ſecond: Gaſſendus at 1473; Merſenne at 1474; Du Hamel, in the Hiſtory of the Academy of Sciences at Paris, at 1172; the Academy del Cimento at 1148; Boyle, at 1200; Roberts, at 1300; Walker, at 1338; ſir Iſaac Newton, at 968; Dr. Derham, in whoſe meaſure Mr. Flamſteed and Dr. Halley acquieſced, at 1142.

The reaſon of which variety Dr. Derham aſcribes partly to ſome of thoſe gentlemen uſing ſtrings and plummets inſtead of regular pendulums; and partly to there not being diſtance enough between the ſonorous body and the place of obſervation; and partly to there being no regard had to the winds.

But by the accounts ſince publiſhed by M. Caſſini de Thury, in the Memoirs of the Royal Academy of Sciences at Paris for the year 1738, where cannon were fired at various as well as great diſtances, under great variety of weather, wind, and other circumſtances, and where the meaſures of the different places had been ſettled with the utmoſt exactneſs, *ſound* was propagated at a medium at the rate only of 1038 French feet in a ſecond. The French foot exceeds the Engliſh by nearly ſeven lines and a half, or is as 107 to 114; and conſequently 1038 French feet are equal to 1106 Engliſh feet. The difference, therefore, of the meaſures of Dr. Derham and M. Caſſini is 34 French, or 36 Engliſh feet, in a ſecond. According to this laſt meaſure, the velocity of *ſound*, when the wind is ſtill, is ſettled at the rate of a mile, or 5280 Engliſh feet in $4\frac{77}{100}''$.

Some of the moſt conſiderable queries, relating to the laws of *ſounds*, Dr. Derham propoſes; and anſwers ſeveral of them accurately, from experiments made for that purpoſe by himſelf, as follows:

How far does a *ſound* move in a ſecond of a time? *Sound* moves 1142 feet, or 380 yards in a ſecond, which is juſt an Engliſh mile in $9\frac{1}{4}$ or 9.25 half ſeconds: two miles in $18\frac{1}{2}$; three miles, or a league, in $27\frac{1}{4}$, &c. and about 13 miles in one minute.

But ſea miles are to land miles nearly as 7 to 6; and therefore, *ſound* runs a ſea-league in about 12 ſeconds of time. It is a common obſervation, that perſons in good health have about 75 pulſations, or beats, of the artery at the wriſt, in a minute; conſequently, in 75 pulſations, *ſound* flies about 13 land miles, and about $11\frac{4}{7}$ ſea miles, which is about one land mile in 6 pulſes, and about 1 ſea mile in near 7 pulſes, or a league in 20 pulſes. And hence the diſtance of objects may be found, by knowing the time which *ſound* takes to move from thoſe objects to an obſerver. E. g. upon ſeeing the flaſh of a gun at ſea, if 56 beats of the pulſe at the wriſt were counted before the report was heard, the diſtance of that gun may be eaſily found by dividing 56 by 20, which gives 2.8 leagues, or about 8 miles.

Does the report of a gun, diſcharged with its mouth towards us, come ſooner than when the muzzle is from the obſerver? By repeated experiments it appears, there is no difference in the *ſound* from this different direction.

Do *ſounds* move in the ſame time, through the ſame ſpaces, in all ſtates of the atmoſphere, and heights of the barometer, by day and by night, in ſummer and in winter, in ſnowy and in clear weather, in this or that climate? By repeated experiments, it does not appear there ariſes any difference from any of theſe different circumſtances.

Do the winds affect the motion of *ſounds?* By repeated experiments, it appears, there is ſome, though a very ſmall difference, in the velocity of *ſounds*, with or againſt the wind; which is alſo augmented or diminiſhed by the ſtrength or weakneſs of the wind.

Do a great and intenſe *ſound*, and a ſmall or languid one, move with the ſame velocity? It appears, that they do.

For by experiments, a cannon fired with a half-pound charge of powder, was heard at about the diſtance of $17\frac{1}{2}$ miles in the ſame time after the flaſh was ſeen, as when fired with a charge of 6 lb.

Does the *ſound* of a gun move equally ſwift at all elevations of the gun? It does.

Do different quantities or ſtrengths of gun-powder occaſion any difference as to the velocity of the *ſound?*—None.

Does *ſound* move in a right line the neareſt way, or does it ſweep along the earth's ſurface? And is there any difference in the time, if the piece be diſcharged in an acclive and a declive poſition? *Sound* moves the neareſt way; and the velocity appears to be the ſame in acclivities as in declivities.

Have all kinds of *ſounds*, as thoſe of guns, bells, &c. the ſame velocity? And are *ſounds* equally ſwift in the beginning of their motion and in the end? There appears no inequality in either of theſe reſpects; and, therefore, the times in which *ſound* is heard are proportional to the diſtance; that is, at a double diſtance it is heard in twice the time, &c.

Sound, *for the reflection, refraction, &c. of*, ſee Echo and Phonics.

Sounds, *articulate.* See Articulate.

Sound, in *Muſic*, denotes a quality in the ſeveral agitations of the air, conſidered as their diſpoſition, meaſure, &c. may make MUSIC or HARMONY.

Sound is the object of muſic; which is nothing but the art of applying *ſounds*, under ſuch circumſtances of tone and time, as to raiſe agreeable ſenſations.

The principal affection of *ſound*, whereby it becomes fitted to have this end, is that whereby it is diſtinguiſhed into *acute* and *grave*.

This difference depends on the nature of the ſonorous body; the particular figure and quantity thereof; and even, in ſome caſes, on the part of the body where it is ſtruck; and this is that which conſtitutes what we call *different tones.*

The cauſe of this difference appears to be no other than the different velocities of the vibrations of the *ſounding* body. In effect, the tone of a *ſound* is found, by abundance of experiments, to depend on the nature of thoſe vibrations, whoſe difference we can conceive no otherwiſe than as having different velocities: and ſince it is proved, that the ſmall vibrations of the ſame chord are all performed in equal time, and that the tone of a *ſound*, which continues for ſome time after the ſtroke, is the ſame from firſt to laſt, it follows, that the tone is neceſſarily connected with a certain quantity of time in making each vibration, or each wave; or that a certain number of vibrations or waves, accompliſhed in a given time, conſtitute a certain and determinate tone. From this principle, are all the phenomena of *tune* deduced.

If the vibrations be iſochronous, the *ſound* is called muſical, and is ſaid to continue at the ſame pitch; and is ſaid to be acuter, ſharper, or higher than any other *ſound* whoſe vibrations are ſlower and graver, flatter or lower, than any other whoſe vibrations are quicker. See Unison.

From the ſame principle ariſe what we call CONCORDS, &c. which are nothing but the reſults of frequent unions and coincidences of the vibrations of two ſonorous bodies; and conſequently of the waves and undulating motions of the air occaſioned thereby.

On the contrary, the reſult of leſs frequent coincidences of thoſe vibrations is what we call a DISCORD.

Another conſiderable diſtinction of SOUNDS, with regard to muſic, is that whereby they are denominated *long* and *ſhort*; not with regard to the ſonorous body's retaining a motion, once received, a longer or a leſs time, though gradually growing weaker, but to the continuation of the impulſe of the efficient cauſe on the ſonorous body, for a longer or ſhorter time, as in the notes of a violin, &c. which are made longer or ſhorter by ſtrokes of different length or quickneſs.

This continuity is, properly, a ſucceſſion of ſeveral *ſounds*, or the effect of ſeveral diſtinct ſtrokes, or repeated impulſes, on the ſonorous body, ſo quick that we judge it one continued *ſound*, eſpecially if it be continued in the ſame degree of ſtrength; and hence ariſes the doctrine of *meaſure* and *time.*

Sounds again are diſtinguiſhed, with regard to muſic, into *ſimple* and *compound*, and that two ways. In the firſt, a *ſound* is ſaid to be *compound*, when a number of ſucceſſive vibrations of the ſonorous body, and the air, come ſo faſt upon the ear that we judge them the ſame continued *ſound*; as in the phenomenon of the circle of fire, cauſed by putting the fire end of a ſtick in a quick circular motion; where, ſuppoſing the end of the ſtick in any point of the circle, the idea we receive of it there continues till the impreſſion is renewed by a ſudden return.

A *ſimple* SOUND then, with regard to this compoſition, ſhould be the effect of a ſingle vibration, or of ſo many vibrations as are neceſſary to raiſe in us the idea of *ſound.* In the ſecond ſenſe of compoſition, a *ſimple ſound* is the product of one voice, or one inſtrument, &c.

A *compound* SOUND conſiſts of the *ſounds* of ſeveral diſtinct voices or inſtruments, all united in the ſame individual time and meaſure of duration, that is, all ſtriking the ear together, whatever their other differences may be. But in this ſenſe again, there is a two-fold compoſition; a natural and an artificial one.

The natural compoſition is that proceeding from the manifold reflections of the firſt *ſound* from adjacent bodies, where the reflections are not ſo ſudden as to occaſion echoes, but are all in the ſame tune with the firſt note.

The artificial compoſition, which alone comes under the muſician's province, is, that mixture of ſeveral *ſounds*, which being made by art, the ingredient *ſounds* are ſeparable, and diſtinguiſhable from one another. In this ſenſe the diſtinct *ſounds* of ſeveral voices or inſtruments, or ſeveral notes of the ſame inſtrument, are called *ſimple ſounds*, in contradiſtinction to the compound ones, wherein, to anſwer the end of muſic, the ſimples muſt have ſuch an agreement in all relations, chiefly as to acuteneſs and gravity, as that the ear may receive the mixture with pleaſure.

Another diſtinction of *ſounds* with regard to muſic is, that whereby they are ſaid to be *ſmooth* and *even*, or *rough* and *harſh*, alſo *clear* and *hoarſe*: the cauſe of which differences depends on the diſpoſition and ſtate of the ſonorous body, or the circumſtances of the place; but the ideas of the differences muſt be ſought from obſervation.

Smooth and *rough ſounds* depend principally on the *ſounding* body; of theſe we have a notable inſtance in ſtrings that are uneven, and not of the ſame dimenſion or conſtitution throughout.

M. Perrault, to account for roughneſs and ſmoothneſs, maintains, there is no ſuch thing as a ſimple *ſound*; but that the *ſound* of the ſame chord or bell is a compound of the *ſounds* of the ſeveral parts of it; ſo that where the parts are homogeneous, and the dimenſions or figure uniform, there is always ſuch a perfect mixture and union of all the *ſounds*, as makes one uniform and ſmooth *ſound*; contrary conditions produce harſhneſs.—In effect, a likeneſs of parts and figure make an uniformity of vibrations, whereby a great number of ſimilar and coincident motions conſpire to fortify and improve each other, and unite, for the more effectual producing of the ſame effect.

This account he confirms from the phenomenon of a bell, which differs in tone according to the part it is ſtruck in; and yet ſtrike it any where, there is a motion over all the parts. Hence he conſiders the bells as compoſed of an infinite number of rings, which, according to their different dimenſions, have different tones, as chords of different lengths have; and, when ſtruck, the vibrations of the parts immediately ſtruck ſpecify the tone, being ſupported by a ſufficient number of conſonant tones in other parts. This muſt be allowed, that every note of a ſtringed inſtrument is the effect of ſeveral ſimple *ſounds*; for there is not only the *ſound* reſulting from the motion of the ſtring, but that from the motion of the parts of the inſtrument, which has a conſiderable effect in the total *ſound*, as is evident from hence, that the ſame ſtring on different violins, *ſounds* very differently.

But Perrault affirms the ſame of every ſtring itſelf, and without conſidering the inſtrument. Every part of the ſtring, he ſays, has its particular vibrations, different from the groſs and ſenſible vibrations of the whole; and theſe are the cauſes of different motions and *ſounds* in the particles, which, uniting, compoſe the whole *ſound* of the ſtring, and make an uniform compoſition, wherein the tone of the particular part ſtruck prevails, and all the others mix under a due ſubordination with it, ſo as to make the compoſition ſmooth and agreeable. If the parts be unevenly or irregularly conſtituted, the *ſound* is harſh; which is the caſe in what we call *falſe ſtrings*, and various other bodies, which, for this reaſon, have no certain and diſtinct tone, but a compoſition of ſeveral tones, which do not unite and mix, ſo as to have one predominant to ſpecify the total tone.

As to *clear* and *hoarſe ſounds*, they depend on circumſtances that are accidental to the ſonorous body; thus a voice and inſtrument will be hollow and hoarſe if raiſed within an empty hogſhead, that yet is clear and bright out of it: the effect is owing to the mixture of other and different *ſounds*, raiſed by reflections, which corrupt and change the ſpecies of the primitive *ſounds*.

For *ſounds* to be fit to obtain the end of muſic, they ought to be ſmooth and clear, eſpecially the firſt: ſince, without this, they cannot have one certain and diſcernible tone, capable of being compared to others, in a certain relation of acuteneſs, of which the ear may judge, and of conſequence they can be no part of the object of muſic.

Upon the whole then, with Mr. Malcolm, we call that an *harmonic* or *muſical ſound* which, being clear and even, is agreeable to the ear, and gives a certain and diſcernible tone (hence called *tunable ſound)*, which is the ſubject of the whole theory of harmony.

Sounds, *harmonical.* See **Harmonical.**

The *harmonical ſounds*, viz. the twelfth and ſeventeenth above the principal (as well as ſome others), have been long known to accompany every fundamental *ſound*; and may naturally, and in general, be ſuppoſed to be produced by the partial or ſeparate vibrations of the ſtring or ſonorous body, ſpontaneouſly dividing itſelf, according to a determinate law, into three, five, or other aliquot parts of the whole, conſidered as unity. The theory of M. Rameau, which has been ſo excellently illuſtrated by M. d'Alembert, in his *Elémens de Muſique*, is founded on theſe *harmonical ſounds*. See **Fundamental** *Baſs*.

Sounds, *harmonic*, denote alſo a ſingular kind of *ſounds*, which are produced in certain inſtruments, ſuch as the violin and violincello, by a particular motion of the bow, and by placing the finger lightly in certain diviſions of the chord. The *ſounds* are very different, both with regard to their tone and their modification, from ſuch as would be produced by keeping the finger always immoveable. As to the tone, they will yield the fifth when they ought to have given the 3d, and the 3d inſtead of the 4th, &c. And with regard to their modification, they are much ſweeter than thoſe that are drawn full from the ſame diviſion of the chord, and, on account of their ſweetneſs, they are called *fluted ſounds*. By ſliding the finger lightly from ſharp to flat, from the middle of a chord which is touched at the ſame time with the bow, we hear diſtinctly a ſucceſſion of *harmonic ſounds* from flat to ſharp, which are very aſtoniſhing to thoſe who are not acquainted with the theory.

The principle on which this theory is founded is, that if a chord be divided into two parts which are commenſurable with each other, and conſequently with the whole chord, and the obſtacle placed at the point of diviſion obſtructs, in an imperfect manner, the communication of the vibrations from one part to another; when it is founded, it will not yield the *ſound* of the entire chord, nor that of its greater part, but that of the ſmaller part, if it exactly meaſures the other; or if it does not meaſure it, the *ſound* of the greateſt aliquot common to theſe two parts. Let a chord as 6 be divided into two parts, as 4 and 2, the *harmonic ſound* will be produced by the ſmall part 2, which is aliquot of the other 4; but if a chord, as 5, be divided into two parts, as 2 and 3, then, as the ſmall part does not meaſure the greater, the *harmonic ſound* will proceed from the half, 1, of the ſmall part; unit being the greateſt common meaſure of the two parts 3 and 2, and of the whole chord 5. By means of this law, which is conformable to the experiments of M. Sauveur and of Dr. Wallis, it is eaſy, by a very ſimple calculation, to aſſign to each tone the *harmonic ſound* which anſwers to it. Whilſt the finger ſlides the length of the chord, we obtain a ſeries of *harmonic ſounds*, which ſucceed each other rapidly according to the order of the diviſions of the chord, to which the finger is ſucceſſively applied.

The firſt column of the following table exhibits the *ſounds* which the diviſions of the inſtrument would yield when touched full, and the ſecond column ſhews the fluted *ſounds* correſponding to them when the chord is touched harmonically.

Table of Harmonic Sounds.

The whole chord	gives	the uniſon
The minor third		the 19th, or double octave of the 5th
The major third		the 17th, or double octave of the major third
The fourth		the double octave
The fifth		the 12th, or octave of the ſame 5th
The minor ſixth		the triple octave
The major ſixth		the 17th major, or double octave of the 3d
The octave		the octave.

After the firſt octave, i. e. advancing from the middle of the chord towards the bridge, we ſhall have again the ſame *harmonic ſounds* in the ſame order on the ſame diviſions, i. e. the 19th on the minor 10th, the 17th on the major 10th, &c. *Encyclopedie*, art. *Harmoniques* Sons.

Sounds, *third*, in *Muſic*, denote thoſe which are produced by ſounding two notes at the ſame time, either on the ſame or on two different inſtruments; and which are almoſt always graver than the loweſt of the two tones that generated them, and are their proper fundamental baſs.

The diſcovery of theſe *ſounds* has been generally aſcribed to Tartini who publiſhed an account of them in his Tratto di Muſica, ſecundo la vera Scienza dell' Armonia, printed at Padua, 1754; but the Encyclopedie, art. *Harmonie*, attributes the firſt diſcovery, though probably unknown

known to Tartini, to M. Romieu, of the Royal Society of Sciences of Montpellier, who publiſhed an account of it in a Memoir in 1752.

The experiment may be made by ſounding the perfect interval of a 3d, 4th, or 5th, &c. either on two ſtrings of the ſame violin, or on two violins played upon at the diſtance of about thirty feet, with a ſtrong bow, and holding out the notes; or with two trumpets, hautbois, or German flutes; the hearer, in the laſt mentioned caſes, playing himſelf in the middle of the interval between the two inſtruments. Thus e. g. the interval C *e*, or a major 3d, produces C, the octave below the lower note; C *ſharp e*, a minor 3d, produces A, a tenth below the graver tone; B *e*, a 4th, gives E, the octave of the upper note; B *f ſharp*, a 5th, produces an uniſon to B; B *g*, a 6th, generates the double octave below the upper note; and B *flat g*, or the major 6th, produces E *flat*, the 5th of the lower note, &c.

M. Tartini obſerves, that the *third ſound* reſulting from the 4th, from two 3ds, from two 6ths, whether major or minor, is the moſt eaſily diſtinguiſhed, becauſe this ſound is always more grave than either of the two which produce it; that the *third ſound* produced by the 5th is diſtinguiſhed with greater difficulty, becauſe it is an uniſon of a graver *ſound*; and that it is more difficult to diſtinguiſh it in the tones major and minor, becauſe theſe tones, differing little from one another, are eaſily confounded in the intonation; and for the ſame reaſon, with greater difficulty, in the ſemitones major and minor.

The author, in a ſong compoſed of two parts, diſcovers, by means of two correſponding *ſounds*, the *third ſound* reſulting from them; and this, he ſays, is the true baſs of the ſong; and every other baſs will be a paralogiſm. From his experiments and reaſoning he concludes, that if any adjoining two ſimple intervals in the harmonic ſeries 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. be ſounded, the *third ſound* will always be that of half the ſtring; that the ſmaller the interval is, the farther diſtant is the *third ſound*: ſo that e. g. the *third ſound* to the interval of the ſemitone minor G G *ſharp*, is the 26th below G *natural*.

M. Serre, of Geneva, in his Eſſai ſur les Principes de l'Harmonie, printed at Paris in 1753, mentions this diſcovery of Tartini as a fact ſufficiently aſcertained; and adds, that he has produced the ſame effect by means of two fine female voices, as Tartini had done by inſtruments; but he mentions only the *third ſound* produced by the third major, and that produced by the third minor: and there is this difference between the reſults of theſe two gentlemen. According to M. Tartini, the two ſounds of a third major, as *ut mi*, produced the octave *ut* below *ut*; and according to M. Serre, a double octave: according to the former, the two ſounds of a third minor, *la ut*, produced the tenth major, *fa* below *la*; but according to the latter, the ſeventeenth major below *la*, or the octave under the tenth *fa*. M. Serre takes no notice of a *third ſound* produced by any other two *ſound*, and it does not appear that he made any trials of this kind.

As to the phyſical cauſe of theſe *third ſounds*, it is much more difficult to offer any plauſible conjectures concerning it, than concerning the harmonical notes mentioned in the preceding article; becauſe all thoſe of the latter kind being more acute than the principal, or generating tone, are, for that reaſon, capable of being actually and immediately produced by the vibrations of certain portions of the ſtring or other ſounding body; whereas, in the *third ſounds*, a tone is heard always (except in the caſe of the fifth), and often conſiderably below the pitch of either of the bodies whoſe vibrations it accompanies, and which conſequently cannot immediately proceed from either of theſe bodies. To take the firſt of the above mentioned intervals, that of the greater third, for an example: a *third ſound* is here heard, ſuch as would be produced by the actual vibration of a ſtring of the ſame diameter and tenſion with, but of double the length of, that which produced the loweſt note of the interval. As no ſuch ſtring, however, is employed in the experiment, we are obliged to ſeek for the cauſe of this new *ſound* in the air, or other medium of *ſound*, or in the organ of hearing, or in ſome internal modification of the ſenſitive faculty.

As the immenſe variety of our ſenſations of colour is juſtly ſuppoſed to be produced by an equal diverſity of coloured particles of light, each highly qualified to excite one particular ſenſation and no other, ſo ſome, with M. Mairan, have ſuppoſed, that our numerous and diverſified ſenſations of muſical tones are not produced by the undulations of the air, conſidered in its whole maſs, but by aerial particles, ſpecifically different in elaſticity, magnitude, figure, &c. each capable of exciting, by its motions or other modifications, the idea of only one determinate tone. Therefore we might ſay, that the two orders of particles which give the tones C and *e*, either by an harmonical congruity in their ſpring with that ſet of particles which give the *third ſound* C below, or by ſome other peculiar affinity to them, are qualified, by their joint action on theſe laſt mentioned particles, to give them that particular modification, by which they excite in us the ſenſation of that ſpecific tone to which they are adapted. Or, may we not conceive in general, that a mixture of two given tones may excite the idea of a third and different *ſound*, in ſome ſuch manner as two given colours, e. g. blue and yellow, nay, the paſt impreſſions of theſe colours, excite the idea of green, different from both of them.

But if the effect is produced merely by the organ of hearing, we may obſerve, that, from a conſideration of the ſpiral and conical ſtructure of the cochlea, ſome phyſiologiſts have been tempted to imagine, that the branches or filaments of the auditory nerve, after paſſing out from the nucleus or axis of the cochlea, are ſtrained upon the ſpiral plates, like the radii of a circle, and become gradually ſhorter and ſhorter towards its apex. It may be ſuppoſed likewiſe, that of theſe nervous ſtrings, the longeſt, which are in the baſis of the cochlea, are adapted to receive the tremors or other impreſſions, and convey to the mind the ideas, of grave tones; and the ſhorter nervous chords, fixed more towards the apex of the cone, thoſe of acute *ſounds*. This being allowed, and taking the former interval C *e* for an example, it may be ſaid that the tone C, beſides acting on the nervous chord appropriated to excite the idea of that tone, muſt act likewiſe on another nervous chord of double its length, ſituated towards the baſis of the cochlea, &c. and which is naturally adapted to receive and tranſmit to the mind C, the octave below; but which the upper tone C now divides into two equal parts, each giving tones uniſon to the ſaid note C. The tone *e*, in like manner, will excite five equal vibrations in each of the halves of this nervous chord; all which, likewiſe, produce ſenſations uniſon with itſelf. Theſe phenomena at leaſt are invariably obſerved to be produced in muſical ſtrings. Thus we obtain the uniſons to C and *e*: and farther, the laſt mentioned chord thus vibrating in two and in ten parts, and from one extremity of it to the other, may fairly be ſuppoſed to vibrate in its whole length; in which caſe it muſt excite in the mind the idea of its own fundamental tone, the *third ſound* C, an octave below the firſt of theſe notes, and a tenth below the latter. See, on the ſubject of this article, Encyclopedie, art. *Baſſe* FONDAMENTALE. Principles and Power of Harmony, 4to. 1771, and Monthly Rev. vol. xlv. p. 371, &c.

SOUND, in the *Manege*. A horſe is ſaid to be *ſound* that does not halt. When a jockey ſells a horſe he warrants him *ſound* hot and cold; that is, that he does not halt either when you mount him or when he is heated, nor yet after alighting, when he ſtands and cools.

SOUND, in *Geography*, denotes a ſtraight or inlet of the ſea, between two capes or head-lands.

The SOUND is uſed, by way of eminence, for that famous ſtreight which joins the German ſea to the Baltic. It is ſituate between the iſland of Zealand and the coaſt of Schonen. It is about ſixteen leagues long, and in general five broad, excepting againſt the caſtle of Cronenburg, where it is but one; ſo that there is there no paſſage for veſſels but under the cannon of the fortreſs.

This was firſt erected for the better commanding of the *Sound*, as was alſo Helſinburg, on the oppoſite ſhore in Schonen, for the protection of ſhips from pirates, then numerous in that ſea.

This has given occaſion to the Danes to ſettle a toll on all veſſels, which it is ſaid to be one of the beſt revenues of the crown of Denmark; and to forbid all pilots from paſſing through the Great and Little Belt, which are two other inlets into the Baltic, though ſomewhat leſs commodious than the former.

All nations who traffic into this part of the North are ſubject to this toll: the Swedes, indeed, were exempted from it by the treaty of 1644, but by the treaty of 1720, they are excluded the privilege, and put on the ſame footing with their neighbours.

By the treaty of Spire, made between the Danes and Charles V. in behalf of his Netherland ſubjects, the toll for this paſſage was fixed at two roſe nobles for a ſhip of two hundred tons; yet, in the year 1640, the ſame was riſen to upwards of five hundred rix-dollars.

The connivance of our king James I. who had married a daughter of Denmark, and the wars which the Hollanders had been long engaged in for their liberty, furniſhed the occaſion for ſo grievous an exaction. Of late years the toll has been again reduced to an eaſier footing.

Cromwell was bent on extorting this paſſage from the Danes, and had probably effected it, but that, before the fleet for that purpoſe arrived there, he died.

However, in 1659. England, Holland, and France, by treaty, obliged Denmark to ſtipulate, that it ſhall never be increaſed upon the ſaid three nations, who are mutual guarantees to this treaty.

The origin and progreſs of this impoſition (which from an eaſy contribution, of which we have an account ſo early as 1348, voluntarily paid by merchants for maintaining lights on certain places of the coaſt, and for protection of ſhips from pirates, and whereof the king of Denmark was only treaſurer or truſtee, grew at length to be a heavy burden on trade, as well as a kind of ſervile acknowledgment of his ſovereignty of theſe ſeas) is given in lord Moleſworth's Account of Denmark, chap. iii. p. 11. ſeqq.

As to the preſent ſtate of this toll, Dr. Buſching, in his New Geography, obſerves, that it is on an equal footing with all nations, excepting the Hamburghers, who pay more than others: the Engliſh, Dutch, Swediſh, and, French ſhips are not ſearched when provided with proper paſſes, according to treaties; and pay down only 1 *per cent.* for ſuch goods as are not ſpecified in the tarif. But all other nations pay 1 ½ *per cent.* and muſt ſubmit to be ſearched. With regard to the Hanſe Towns, on the Baltic, there is a great variety in the toll they pay, for almoſt every one of thoſe towns is treated with in particular.

SOUND-BOARD, the principal part of an ORGAN, and that which makes the whole machine play.

The *ſound-board*, or *ſummer*, is a reſervoir, into which the wind drawn in by the bellows is conducted by a port-vent, and hence diſtributed into the pipes placed over the holes of its upper part. This wind enters them by valves, which open by preſſing upon the ſtops or keys, after drawing the regiſters, which prevent the air from going into any of the other pipes but thoſe it is required in.

Organs, whoſe longeſt blind pipes are four feet, have their *ſound-board* from five to ſix feet. Organs of ſixteen feet have two *ſound-boards*, which communicate the wind from one to the other by a pewter port-vent.

SOUNDING, in *Navigation*, the act of trying the depth of the water, and the quality of the bottom, by a line and plummet, or other artifice.

There are two plummets uſed for this purpoſe; one of which is called the hand-lead, weighing about 8 or 9 *lb.* and the other the deep-ſea lead, which weighs from 25 to 30 *lb.* and both are ſhaped like the fruſtum of a cone or pyramid. The former is uſed in ſhallow waters, and the latter at a great diſtance from the ſhore, particularly on approaching the land after a ſea voyage. Accordingly the lines employed for this purpoſe are called the DEEP-*ſea* lead-line and the hand-lead line. The hand-lead line, which is uſually twenty fathoms in length, is marked at every 2 or 3 fathoms; ſo that the depth of the water may be aſcertained either in the day or night: at the depth of 2 and 3 fathoms there are marks of black leather; at 5 fathom, there is a white rag; at 7, a red rag; at 10, and at 13, black leather; at 15, a white rag; and at 17, a red one.

Sounding with the hand-lead, which the ſeamen call heaving the lead, is generally performed by a man who ſtands in the main-chains to windward. Having the line all ready to run out, without interruption, he holds it nearly at the diſtance of a fathom from the plummet, and having ſwung the latter backwards and forwards three or four times, in order to acquire the greater velocity, he ſwings it round his head, and thence as far forwards as is neceſſary; ſo that, by the lead's ſinking whilſt the ſhip advances, the line may be almoſt perpendicular when it reaches the bottom. The perſon *ſounding* then proclaims the depth of the water in a kind of ſong reſembling the cries of hawkers in a city, thus, if the mark of 5 is cloſe to the ſurface of the water, he calls, 'by the mark 5,' and as there is no mark at 4, 6, 8, &c. he eſtimates thoſe numbers, and calls, 'by the dip four, &c.' If he judges it to be a quarter or a half more than any particular number, he calls, 'and a quarter 5,' and 'a half 4,' &c. If he conceives the depth to be three quarters more than a particular number, he calls it a quarter leſs than the next: thus, at 4 fathom ¾, he calls, 'a quarter leſs 5,' and ſo on.

The deep-ſea-lead line is marked with two knots at 20 fathom, 3 at 30, 4 at 40, &c. to the end. It is alſo marked with a ſingle knot at the middle of each interval, as at 25, 35, 45 fathoms, &c. To uſe this lead more effectually at ſea, or in deep water on the ſea-coaſt, it is uſual previouſly to *bring-to* the ſhip, in order to retard her courſe: the lead is then thrown as far as poſſible from the ſhip on the line of her drift, ſo that as it ſinks, the ſhip drives more perpendicularly over it. The pilot feeling the lead ſtrike the bottom, readily diſcovers the depth of the water by the mark on the line neareſt its ſurface. The bottom of the lead being alſo well rubbed over with tallow, retains the diſtinguiſhing marks of the bottom, as ſhells, ooze, gravel, &c. which naturally adhere to it.

The depth of the water, and the nature of the ground, which are called the *ſoundings*, are carefully marked in the log-book, as well to determine the diſtance of the place from the ſhore, as to correct the obſervations of former pilots. Falconer.

For a machine to meaſure unfathomable depths of the ſea, ſee ALTITUDE.

SOUNDING *the pump*, at *Sea*, is done by letting fall a ſmall line, with ſome weight at the end, down into the pump, to know what depth of water there is in it.

SOUP, or SOOP, a kind of pottage made of bread, and broth, or of the juice of fleſh, or other matters, uſually ſerved at the beginning of a meal.

The word is French, formed from the Italian, *zuppa*, or *ſuppa*, of the Latin, *ſapa*, wine boiled away to a third part. Others derive it from the Celtic, *ſouben*, which ſignifies the ſame.

Soup is eſteemed eſſential to a French dinner. Sometimes they heighten the reliſh by the addition of onions, or leeks, or cabbage, or turneps, &c.

SOUP, *portable*, is a kind of cake, formed of concentrated broth, which, being freed from all fat, and having by long boiling evaporated the moſt putreſcent parts of the meat, is reduced to the conſiſtence of a glue, as in reality it is, and will like other glues, in a dry place, keep ſound for years together. Sir John Pringle inclines to believe, that the gelatinous parts of animal ſubſtances, ſuch as compoſe theſe cakes, are not of a nature much diſpoſed to putrefy. But, however that be, captain Cook obſerves, that, in his voyage (ſee SCURVY), this *ſoup* was the means of making his people eat a greater quantity of greens than they would have done otherwiſe, and ſo far we muſt allow it to have been virtually antiſeptic.

SOUR *kroute*. See CROUTE.

SOUR-*dock*, in *Botany*. See SORREL.

SOUR-*land*, in *Agriculture*, a term uſed by the farmers to expreſs a cold and ſomewhat wet clayey ſoil.

This muſt have its tilth according to its ſtate and condition, when they ſet about it. If it hath a ſtrong ſwarth upon it, then they give it a fallow, by turning it up when the ſun is in Cancer; this they call a ſcalding fallow, and eſteem it of great uſe, becauſe it kills the graſs-roots, and makes the land fine; but if it be light, and hath but a thin ſwarth, they leave it for a cooler tillage, and plough it early in the year, when their clay is fallowed.

Pigeon's dung and malt-duſt are the moſt proper manures for this ſoil. The malt-duſt is to be ſown with the winter corn, and ploughed in with it, for then it lies warm at the roots of the corn all winter. Plot's Oxfordſhire, p. 246.

SOURDON, in *Natural Hiſtory*, the name of a bivalve ſhell-fiſh found on the coaſt of Poitou, and other places. It is a ſmall fiſh, its length being little more than an inch, and its breadth about three quarters of an inch; its ſhells are both conſiderably convex, the outer ſurface is deeply furrowed, but the inſide is perfectly ſmooth: the fiſh buries itſelf lightly in the ſand, and has a pipe of communication, which it raiſes to the ſurface; but as this creature never buries itſelf deep, the pipe is neceſſarily very ſhort; but they are cut into ſeveral ſegments at the extremity, and appear as it were fringed, and have ſeveral hairs growing from theſe ſegments. The *ſourdon* is capable of a progreſſive motion by means of a limb, ſomewhat reſembling that of the other chamæ, but more than any approaching the nature of a leg, as it in ſome meaſure repreſents, in miniature, a human leg with a clumſy boot upon it: by means of this limb the creature can eaſily bury itſelf in the ſand, or riſe up out of it, or move horizontally on the ſurface, and that as well backwards as forwards, and that with more ſwiftneſs than could well be ſuppoſed. Mem. Acad. Par. 1710.

SOUR, *ſop*, or SOWR *ſop*, in *Botany*. See *Cuſtard* APPLE.

SOURIS, in the *Manege*, is a cartilage in the noſtrils of a horſe, by means of which he ſnorts. See SNORT.

The cutting of this cartilage is called in French *eſſouriſſer*.

SOUTH *Sea company*. See COMPANY and FUND.

SOUTHERN *hemiſphere*. See HEMISPHERE.

Southern *ocean*. See Ocean.

Southern *ſign*. See Sign.

SOUTHERNWOOD, *abrotanum*, in *Botany*, the name of a genus of plants, the characters of which are wholly the ſame with thoſe of wormwood, and the plants are only to be diſtinguiſhed by their very different general face and appearance.

The characters under which it is deſcribed by Mr. Miller, who enumerates ſixteen ſpecies of it, are the following: it hath a compounded flower, compoſed of many hermaphrodite flowers, which are tubulous, ſituated on the diſk, with a border of female flowers ſurrounding them, which are naked; theſe are all incloſed in one common ſcaly empalement, each hermaphrodite flower being tubulous, and divided at the top into five parts, in the centre of which is ſituated a ſmall germen, having a ſlender pointal, which is attended by five ſmall ſtamina; the germen afterwards becomes one naked ſeed.

In the Linnæan ſyſtem this is a genus of *artemiſia*. See Mugwort.

In diſtillation of the leaves of the common or greateſt narrow-leaved *ſouthernwood* with water, there ariſes an eſſential oil, of a bright yellow colour, in ſmell exactly reſembling the plant. When rectified or diſtilled a ſecond time with freſh water, this oil leaves a conſiderable quantity of an inodorous and almoſt inſipid reſinous matter. Infuſions of the leaves are of a browniſh hue, in taſte and ſmell not unpleaſant: decoctions are darker coloured, and very nauſeous; tinctures made in rectified ſpirit are of a deep green colour, taſting ſtrongly of the *ſouthernwood*.

This bitteriſh pungent plant has been employed as a moderately ſtimulating deobſtruent, in different cachectic diſorders, as an anthelmintic, and as poſſeſſing ſome degree of an anodyne, or antiſpaſmodic virtue depending on the oil or odorous matter. In the preſent practice, it is ſcarcely otherwiſe made uſe of than for external purpoſes, as an ingredient in diſcutient and antiſeptic fomentations, in which intention it has conſiderable efficacy. It has likewiſe been recommended in unguents for promoting the growth of hair, a virtue to which, ſays Dr. Lewis, it does not ſeem to have much claim.

There are accounts of perſons being cured of jaundices ſolely by the expreſſed juice of the tender tops of this plant. Matthiolus recommends the leaves dried, and taken in powder, as a remedy for the fluor albus.

Southernwood, *female*, in *Botany*, a ſpecies of the Lavender Cotton, which ſee for the characters.

The *female ſouthernwood* has the ſame virtues aſcribed to it with the *male ſouthernwood*, and for fomentations, which is the principal uſe that either of them is applied to in the preſent practice, they may be looked upon as very nearly alike.

It is alſo particularly recommended in uterine complaints. It is uſed to deſtroy worms; for which purpoſe it has been cuſtomary, among the common people, to uſe a decoction of the leaves made in milk; and the powder of the dried leaves, half a drachm for the doſe, and to be continued for a conſiderable time, is eſteemed good in the fluor albus, alſo in pleuriſies and peripneumonies.

SOUTHING, in *Navigation*, the difference of latitude a ſhip makes in ſailing to the ſouthward.

SOW, in *Zoology*. See Hog.

Sow, in the *Iron-works*, the name of the block or lump of metal they work at once in the iron-furnace. The ſize of theſe *ſows* of iron is very different, even from the ſame workmen and the ſame furnace. Theſe furnaces having ſand-ſtone for their hearths and ſides, up to the height of a yard, and the reſt being made of brick, the hearth, by the force of the fire, is continually growing wider; ſo that if it at firſt contains as much metal as will make a *ſow* of ſix or ſeven hundred weight, at laſt it will contain as much as will make a *ſow* of two thouſand weight.

Sow, in *Ancient Military Language*, a kind of covered ſhed, fixed on wheels, under which the beſiegers filled up and paſſed the ditch, ſapped or mined the wall, and ſometimes worked a kind of ram.

Sow-*bread*, *cyclamen*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower, which has a roundiſh permanent empalement of one leaf, divided into five parts at the top, hath one petal with a globular tube, which is much larger than the empalement; the upper part is divided into five large ſegments, which are reflexed; it hath five ſmall ſtamina, ſituated within the tube of the petal, and a roundiſh germen ſupporting a ſlender ſtyle, which becomes a globular fruit with one cell, opening in five parts at the top, incloſing many oval angular ſeeds. Linnæus mentions two, and Miller ſix ſpecies.

There are ſeveral ſpecies of this plant cultivated in gardens, for the pretty appearance of its flower: they are propagated by the curious from ſeed, in the manner of the *xiphium*.

The roots of the round-leaved *ſow-bread* with a purple under-ſide, have a nauſeous, acrid, biting taſte; by drying their acrimony is abated, nevertheleſs, when taken internally, they betray a great degree of irritating power. Dried and powdered they have been given in doſes of a dram, and found to operate as a ſtrong, inflammatory, but ſlow cathartic. The juice is ſaid to purge when applied externally to the belly in ointments; and the juice or bruiſed root to be of great efficacy for ſoftening and diſcuſſing indolent hard tumors. The flowers are of a different nature, and have not been uſed medicinally; and the uſe of the roots is now, among us, in a great meaſure, laid aſide. Lewis.

Sow-*thiſtle*, *ſonchus*, in *Botany*, the name of a genus of plants of the *ſyngeneſia polygamia æqualis* claſs; the characters of which are theſe: the receptacle is naked, the calyx imbricated and ventricoſe, and the down hairy. The ſpecies of *ſonchus* enumerated by Linnæus are nine.

The common *ſow-thiſtle* is greatly recommended by authors as a refrigerant and attenuant. It is preſcribed by many of the old phyſicians in ſtranguries, and other diſorders of the urinary paſſages; and is ordered externally in cataplaſms, in all kinds of inflammations.

Sow-*thiſtle*, *downy*. See Andryala.

SOWING, in *Agriculture*. One very great article in *ſowing* to advantage, is to exactly know at what depth the ſeed may be planted, without danger of burying it. Seed is ſaid to be buried when it is laid at a depth below what it is able to come up at. Different ſorts of ſeed come up at different depths, ſome ſix inches, or more, and others will not bear to be buried at more than half an inch. The way to come at an accurate knowledge of the depth at which every ſeed will come up beſt from the *ſowing*, is to make gages in the following manner: ſaw off twelve ſticks of about three inches diameter, bore a hole in the end of each ſtick, and drive into each a taper peg; let the peg in the firſt ſtick be half an inch long, the next an inch, and ſo on, every peg being half an inch longer than the other, till the laſt is ſix inches long; then, in that ſort of ground in which you intend to plant, make a row of twenty holes with the half-inch gage, put therein twenty good ſeeds, cover them up, and then ſtick the gage at the end of that row. Proceed in the ſame manner with the eleven other gages, making the ſame holes in the ſame row all with the ſame gage, and ſticking it at the end of the row: when the ſeeds begin to appear, it will be eaſy to ſee at what depth they come up beſt, by obſerving the moſt flouriſhing row, and taking up the gage at the end, and ſeeing what is its length.

By this means we not only know what is the depth in that ſort of ground at which this ſort of ſeed will come up beſt, but alſo we are able to judge of the nature of the ſeed; for by obſerving how many of the twenty ſeeds that were *ſown* come up, and how many fail, it is eaſy to calculate how much bad ſeed there is among any given quantity, and to allow properly for it in the *ſowing*, that the field may be neither overſtocked with plants, nor too bare of them. The farmer often ſuſtains great loſſes by *ſowing* bad ſeed, or by burying good ſeed, and both might be effectually prevented by making theſe eaſy trials. One caution is to be obſerved in this, that it is not proper to *ſow* the ſeeds of all plants at the greateſt depths at which they will come up, becauſe in wheat, and ſome other grain, a moiſt ground will rot the roots at this depth. Experience alone, added to theſe rules, can perfectly inſtruct the farmer in the certain way of ſucceeding; the nature of the land, the manner how it is laid, either flat or in ridges, and the ſeaſon of planting, muſt all be conſidered.

The quantity of ſeed is to be different alſo, according to the manner of the *ſowing*. The proper quantity to be drilled into an acre, is much leſs than muſt be *ſown* in the common way, not becauſe the hoeing will not maintain as many plants as the other way, for, on the contrary, it will maintain many more, but the difference is upon many other accounts, as that it is impoſſible to *ſow* it ſo evenly by hand as the drill will do. For let the hand ſpread it never ſo exactly, which yet is difficult enough to do with ſome ſeeds in windy weather, yet the unevenneſs of the ground will alter the ſituation of the ſeeds, the greateſt part of them rebounding into holes, and the loweſt places, or elſe the harrows, in covering, drawing them down thither; ſo that theſe low places may have ten times too much ſeed, and the higheſt may have much too little, or even none of it; and this inequality leſſens in effect the quantity of the ſeed, becauſe fifty ſeeds, in the room of one, will not produce ſo much as one will do; and where they are too thick, without being in theſe cluſters, they cannot well be nouriſhed, their roots not ſpreading to near their natural extent, for want of hoeing to open the earth, and give them way. In the common way of *ſowing*, ſome of the ſeeds are buried out of all hope of ever coming up again, and ſome others are left naked upon the ſurface, where they become the food of birds and of vermin: as ſo many muſt, therefore, periſh in the common way of *ſowing*, and ſo few can be loſt in the way by drilling, there is plain reaſon why the ſeed, neceſſary to *ſow* any given quantity of ground, ſhould be much leſs for the drill way than for the other. The farmers, in general, know nothing of the proper depth at which they ſhould *ſow* their ſeed, nor of the difference in quantity that is to be obſerved in different circumſtances; they allow the ſame quantity to an acre of rough ground, as they do to an acre of fine, and forget that what is too little for one, may yet be too much for the other; it is all mere chance-work, and they put the confidence in good ground, and a large quantity of dung to cover their errors.

The farmers in Wiltſhire allow more corn for the *ſowing* than in any other part of England; they uſe ſometimes eight buſhels of barley to an acre, ſo that if it produced four quarters for an acre, there is but four grains for one increaſe. This is *ſown* on land ploughed once, and double dunged, the ſeed only harrowed into the hard and ſtale ground, ſo that it is very probable that not ſo much as two buſhels out of the eight take place, or come to any thing. Sometimes, in a very dry ſeaſon, an acre ſcarce produces four buſhels at the harveſt.

Inſtead of all this uncertainty and loſs in the common way, in drilling all the ſeed lies juſt at the ſame depth, not one grain of it being placed deeper or ſhallower than the reſt. As none of the ſeeds, therefore, can be loſt by being buried, or by being expoſed on the ſurface to vermin, no allowance is to be made for theſe accidents; all that is to be allowed for in the *ſowing*, is the miſchief that may happen from the worm, the froſt, or the like unavoidable accidents, common to all ſeeds.

When a man has (by the uſe of the gages, and the growth of the ſeeds planted in the rows marked by them) proved the goodneſs of the ſeed, and found the depth it is to be planted at, he is to calculate what number of ſeeds a buſhel, or any other weight or meaſure, contains; for one buſhel, or one pound of ſmall ſeed may contain double the number of ſeeds of a buſhel, or a pound of large ſeed of the ſame ſpecies. This calculation is made by weighing an ounce, and then calculating the number of ſeeds this ounce is compoſed of; then weighing a buſhel, and multiplying the number of ſeeds in an ounce by the number of ounces in the buſhel, and the product will give the number of ſeeds in the buſhel with ſufficient exactneſs. When this is known, the ſeeds are to be proportioned by the rule of three to the ſquare feet in an acre; or elſe it may be done by dividing the ſeeds of the buſhel by the ſquare feet in an acre, and the quotient will give the number of ſeeds for every foot. Then the farmer is to conſider how near he intends to plant the rows, and whether ſingle, double, treble, or quadruple; for the more numerous the rows are, the more ſeed will be required. The narrow ſpaces between double, triple, or quadruple rows, ſuppoſe ſeven inches, the double having one, the treble two, and the quadruple three, are called PARTITIONS. The wide ſpace, ſuppoſe of five feet, between any two of theſe double, treble, or quadruple rows, is called an INTERVAL.

Examine next what is the produce of one middle-ſized plant of the annual, but the produce of the beſt and largeſt of the perennial ſort, becauſe that, by hoeing, will be brought to its utmoſt perfection; proportion the ſeed of both to the reaſonable product, and when it is worth while adjuſt the plants to their competent number with the hand-hoe after they are up, and plant perennials generally in ſingle rows. Laſtly, plant ſome rows of the annual thicker than others, which will ſoon give experience, preferable to all the rules in the world, for the quantity of ſeed neceſſary for the drilling.

The diſtance of the rows is one extremely material point in the obtaining a good crop; but as a much larger diſtance is to be allowed in theſe than common practice has been uſed to, it is very difficult to perſuade the farmer to venture a trial at ſuch diſtances as he may have experience from. There is a method of planting the rows by the drill at very near diſtances, and in this work one horſe may draw a drill with eleven ſhares, making the rows at three inches and a half diſtance from each other, and at the ſame time *ſowing* in them three different ſorts of ſeeds, which do not mix, and theſe at different depths. Thus the barley-rows may be ſeven inches aſunder, and the barley four inches deep; a little more than three inches above that, in the ſame channels, clover-ſeed: and betwixt every two of theſe rows a row of ſaintfoin ſeed covered half an inch deep.

Mr. Tull, who tried this method, obtained the firſt year a very good crop of barley, the next year two crops of broad clover, where that was *ſown*; and where hop-clover was *ſown*, a mixture of that and of ſaintfoin, and every year afterwards a crop of ſaintfoin. But the ſame gentleman was afterwards ſo fully convinced of the folly of theſe, or any other mixed crops, and of *ſowing* with theſe narrow ſpaces, that he never practiſed it afterwards.

Every row of vegetables to be horſe-hoed, ought to have an empty ſpace, or interval, of thirty inches, on one ſide of it at leaſt, and of near five feet in all ſorts of corn: this will ſeem a monſtrous allowance to thoſe who have not experienced the good effects of it, but all who have, will readily come into the practice of it ever afterwards. The line of corn is called one row, though it be double, triple, or quadruple, becauſe when four of theſe rows grow up in the ſpring, they unite, and ſeem to be all one row. Wide intervals are neceſſary for perfect horſe-hoeing, and the largeſt vegetables have generally the greateſt benefit by them, though ſmall plants may have conſiderable benefit from much narrower intervals than thoſe of five feet. See HUSBANDRY.

In hand-hoeing there is always leſs ſeed, fewer plants, and a greater crop, *cæteris paribus*, than in the common *ſowing*; yet there the rows muſt be much nearer than in horſe-hoeing, becauſe as the hand moves many times leſs earth than the horſe, the roots will be ſent out in a like ſmaller proportion; and if the ſpaces, or intervals, where the broad hoe only ſcratches a little of the ſurface, ſhould be wide, they would be ſo hard and ſtale underneath, that the roots of perennial plants would be a great while in running through them, and the roots of annual plants would not be able to do it at all. The advantage of the horſe-hoeing is principally owing to the depth to which it ſtirs the ground, and familiar inſtances have proved, that the ſtirring it to a like depth, by whatever inſtrument, is of the utmoſt advantage to whatever plants are ſet in the place. A poor fellow in Wiltſhire was obſerved to have his cabbages much larger and finer than his neighbours, though his ground was no better, and he could afford leſs dung; but the reaſon was, that inſtead of clearing away the weeds between them with a hand-hoe, he uſed to dig between with a ſpade, which goes as deep as a horſe-hoe, and comes the neareſt anſwering its purpoſes of any inſtrument whatever. Tull's Horſe-hoeing Huſbandry. See INTERVALS.

Man has found out many advantageous ways of propagating, whether by *ſowing* or planting, ſuch trees and herbs as he beſt knows the uſes of; but nature as much excels him in this article as in all the reſt, when any compariſon can be made; and it appears evident to the naturaliſt, that ſhe has taken more care to propagate and ſow the moſt trivial weeds, as we eſteem them, than we can employ in regard to the choiceſt plant. It is owing to this care that no one ſpecies of plant has ever been loſt, notwithſtanding all the accidents they are daily ſubject to.

Many inſtances of this kind are recited in Phil. Tranſ. N° 251. p. 116, &c. See SEMINATION.

SOWNE, a term uſed in the exchequer; ſeeming to be a corruption from the French *ſouvenu*, *remembered*.

Such eſtreats and caſualties as the ſheriff by his induſtry cannot get or levy, are ſaid to be eſtreats that *ſowne* not, that is, are not to be remembered, or are not in demand. On the contrary, eſtreats that *ſowne*, are ſuch as he may gather.

SPA, or SPAW, in *Geography*, a town in the biſhoprick of Liege in Germany, famous for its mineral waters. Thoſe of the Pouhon ſpring in *Spa* have been preferred, by our chief phyſicians, to any others in or near the country of Liege; particularly to the waters of Bru, which they complain have been impoſed on the public, to their and their patients frequent diſappointment.

However, as the *Spa* waters are impregnated with different proportions of the ſame ingredients, they may be choſen differently, according to the intentions with a view to which they are uſed. The Pouhon is the ſtrongeſt chalybeate. This is in its moſt perfect and natural ſtate in cold dry weather; but in warm moiſt weather it loſes its tranſparence, appears turbid or wheyiſh, contains leſs fixed air, and is partly decompoſed. This water, which is colder by many degrees than the heat of the atmoſphere, is ſuppoſed to contain the greateſt quantity of fixed air of almoſt any acidulous water; and in conſequence of this ingredient it has a remarkable ſprightlineſs and vinoſity, and boils by mere warmth; but this ſoon flies off if the water be left expoſed, though it may in a great meaſure be preſerved in well-corked bottles. It is capable of diſſolving more iron than it naturally contains, and of thus becoming a ſtronger chalybeate, on account of the great quantity of fixed air which it contains: and for the ſame reaſon an ebullition is raiſed in it on the addition of acids, which diſengage its fixed air. This water mixes ſmoothly with milk, whether it be cold or of a boiling heat.

The Tonnelet and Geronſterre waters are weaker chalybeates, but briſker and more ſpirituous. The Groeſbeck, Sauveniere, and Wartroz, are ſtill weaker chalybeates, but highly impregnated with calcareous and ſelenitical earths, and contain alſo a greater proportion of the foſſil alkali. The Geromont is likewiſe a weak chalybeate, but contains a great deal of calcareous and ſelenitical earth, and about three times as much alkaline ſalt as any of the others. The four laſt waters, therefore, will be better in diſorders ariſing from an acid cauſe, and as diuretics, particularly the Geromont. The Bru, or Churon water, approaches to the nature of the Tonnelet, aud though it has been decried, is ſaid, in conſequence of every trial, not to be inferior to any of the *Spa* waters.

All the waters that are comprehended under this denomination, abound with fixed air; they alſo contain more or leſs iron, foſſil alkali, and calcareous and ſelenitical earths, together with a ſmall portion of ſea-ſalt, and an oily matter common to all waters.

All theſe ingredients are kept ſuſpended, and in a neutral ſtate, by means of the fixed air, on which the virtues chiefly depend; though they are probably rendered more active and penetrating both in the firſt paſſages, and alſo when they enter the circulation, by means of that ſmall portion of iron, earth, ſalt, &c. with which they are impregnated.

Theſe waters are diuretic, and ſometimes purgative; and, like other chalybeate waters, they tinge the ſtools black. They exhilarate the ſpirits much better than wine or ſpiritous liquors, and their general operation is by ſtrengthening the fibres. They cool and quench thirſt much better than common water.

They are found excellent in caſes of univerſal languor or weakneſs, proceeding from a relaxation of the ſtomach, and of the fibres in general, and where the conſtitution has been weakened by diſeaſes, or by a too ſedentary life; in weak, relaxed, groſs habits; in nervous diſorders; at the cloſe of fits of the gout and rheumatiſm; in ſuch aſthmatic diſorders and chronic coughs as proceed from too great a relaxation of the pulmonary veſſels; in obſtructions of the liver and ſpleen; in ſcorbutic and other putrid diſorders; in hyſterical and hypochondriacal complaints; in paralytic diſorders; in gleets; in the fluor albus; in fluxes of the belly; in the gravel and ſtone; in female obſtructions; in barrenneſs, and in moſt other caſes where a ſtrengthening and briſk ſtimulating reſolving chalybeate remedy is wanted: but they are generally hurtful in hot, bilious, and plethoric conſtitutions, when uſed before the body is cooled by proper evacuations; they are alſo hurtful in caſes of fever and heat, in hectic fevers, and ulcerations of the lungs, and of other internal parts, and in moſt confirmed obſtructions attended with fever. The uſual ſeaſon for drinking them is in July and Auguſt, or from May to September. The quantity to be drank is ſuch as the ſtomach can bear without heavineſs or uneaſineſs: but it is adviſeable to begin with drinking a glaſs or two ſeveral times in a day, and ſo increaſe the quantity daily, as the ſtomach can bear; and during the courſe to continue that doſe, and to diminiſh the quantity at the cloſe in the ſame degree as it was augmented at the beginning. Moderate exerciſe is proper after drinking. Previous to the uſe of the water the firſt paſſages ſhould be cleanſed by gentle purges, and, if neceſſary, an emetic ſhould be given; and during the courſe, coſtiveneſs ſhould be prevented, by occaſionally adding Rochelle ſalts or rhubarb to the firſt glaſſes of water in the morning; and a cooling regimen ſhould be obſerved.

The *Spa* water is alſo uſed externally, in a variety of caſes, with good ſucceſs. It is uſed as an injection in the fluor albus, and in ulcers and cancers of the womb, and alſo in the gonorrhœa; it is ſerviceable for waſhing venereal aphthæ, and ulcers in the mouth, phagædenic ulcers, by way of gargle for relaxed tonſils, and for faſtening looſe teeth, and in other caſes of relaxation. It is alſo ſaid to cure the itch, and ſimilar complaints, by waſhing and bathing, an internal courſe being obſerved at the ſame time. Elliott's Mineral Waters, p. 201, &c.

The town of *Spa* being reſorted to by perſons from all parts of Europe, on account of its waters, has always been allowed a neutrality during the hotteſt wars.

SPAAD, or SPALT, SPATUM, a word uſed in ſeveral different ſenſes; ſometimes for a ſpecies of Engliſh fibroſe talc, or of GYPSUM; and ſometimes for SPAR.

The various kinds of *ſpaad* are found pretty frequently in England and Germany, and ſometimes brought from the Levant: they are all ſoft, and eaſily pulverized.

SPACE, SPATIUM, a ſimple idea, the modes whereof are diſtance, capacity, extenſion, duration, &c.

Space, conſidered barely in length between any two bodies, is the ſame idea which we have of diſtance.

If it be conſidered in length, breadth, and thickneſs, it is properly called *capacity*.

When conſidered between the extremities of matter, which fills the capacity of *ſpace* with ſomething ſolid, tangible, and moveable, it is then called *extenſion*.

So that extenſion is an idea belonging to body only; but *ſpace*, it is plain, may be conſidered without it.

Space, therefore, in the general ſignification, is the ſame thing with diſtance conſidered every way, whether there be any ſolid matter in it or not.

Each different diſtance is a different modification of *ſpace*; and each idea of any different *ſpace* is a ſimple mode of this idea. Such are an inch, foot, yard, &c. which are the ideas of certain ſtated lengths, which men ſettle in their minds for the uſe, and by the cuſtom of meaſuring. When theſe ideas are made familiar to men's thoughts, they can in their minds repeat them as often as they will, without joining to them the idea of body, and frame to themſelves the ideas of feet, yards, and fathoms, beyond the utmoſt bounds of all bodies; and by adding theſe ſtill to one another, they can enlarge their idea of *ſpace*, as much as they pleaſe.

From this power of repeating any idea of diſtance, without being ever able to come to an end, we acquire the idea of immenſity.

Another mode, or modification, of *ſpace*, is taken from the relation of the parts of the termination of extenſion, or circumſcribed *ſpace* amongſt themſelves; and this is what we call *figure*. This the touch diſcovers in ſenſible bodies, whoſe extremities come within our reach; and the eye takes, both from bodies and colours whoſe boundaries are within its view; where, obſerving how the extremities terminate, either in ſtraight lines, which meet at diſcernible angles, or in crooked lines, wherein no angles can be perceived; by conſidering theſe as they relate to one another in all parts of the extremities of any body or *ſpace*, it acquires the idea we call figure; which affords to the mind infinite variety.

Another mode belonging to this head is that of PLACE.

Another mode of *ſpace*, is the idea which we get from the fleeting, and perpetually periſhing, parts of ſucceſſion, which we call DURATION.

Space is uſually divided into *abſolute* and *relative*.

SPACE, *abſolute*, is that conſidered in its own nature, without regard to any thing external, which always remains the ſame, and is infinite and immoveable.

SPACE, *relative*, is that moveable dimenſion, or meaſure of the former, which our ſenſes define by its poſitions to bodies within it; and this the vulgar uſe for immoveable *ſpace*.

Relative *ſpace*, in magnitude and figure, is always the ſame with abſolute; but it is not neceſſary it ſhould be ſo numerically: as if you ſuppoſe a ſhip to be, indeed, in abſolute reſt, then the places of all things within her will be the ſame abſolutely and relatively, and nothing will change its place; but ſuppoſe the ſhip under ſail, or in motion, and ſhe will continually paſs through new parts of abſolute *ſpace*: but all things on board conſidered relatively, in reſpect to the ſhip, may be, notwithſtanding, in the ſame places, or have the ſame ſituation and poſition, in regard to one another.

The Carteſians, who make extenſion the eſſence of matter, aſſert, that the *ſpace* any body takes up, is the ſame thing with the body itſelf; and that there is no ſuch thing as mere *ſpace*, void of all matter, in the univerſe: but this ſee diſproved under VACUUM.

The Carteſians, who do not allow of any diſtinction between *ſpace* and matter, were naturally enough led to to the opinion, that *ſpace* or extenſion was a ſubſtance. Others, who admit a vacuum, and conſequently an eſſential difference between *ſpace* and matter, aſſert alſo that *ſpace* is a ſubſtance. Among theſe we find s'Graveſande, Introd. ad Philoſ. ſect. 19.

Others put *ſpace* into the ſame claſs of beings as time and number; that is, they make it to be no more than a notion of the mind. Hence, according to theſe authors, abſolute *ſpace*, of which the Newtonians ſpeak, is a mere chimera. See the writings of the late biſhop of Cloyne, paſſim.

Space and time, according to Dr. Clarke, are attributes of the Deity, and the impoſſibility of annihilating theſe, even in idea, is the ſame with the neceſſary exiſtence of the Deity. See Watts's Phil. Eſſ. Eſſ. i.

SPACE, in *Geometry*, denotes the area of any figure; or that which fills the interval or diſtance between the lines that terminate it.

The *parabolic ſpace* is that included in the whole parabola. The *conchoidal ſpace*, or the *ciſſoidal ſpace*, are what are included within the cavities of the conchoid and ciſſoid. By the new methods now introduced, of applying algebra to geometry, it is demonſtrated, that the conchoidal and ciſſoidal *ſpaces*, though infinitely extended, are yet finite magnitudes.

SPACE, *cycloidal*. See CYCLOIDAL.

SPACE, *elliptic*. See ELLIPTIC.

SPACE, in *Mechanics*, the line a moveable body, conſidered as a point, is conceived to deſcribe by its MOTION.

SPADE, an inſtrument for digging up the ground; the handle or ſhaft is about three feet long; the head of it is all of iron, the upper part being flat, for the workman to ſet his foot on to force it into the ground; the length of the head is a foot, or fifteen inches, and the breadth ſix or eight.

SPADE, *turfing*. See TURFING.

SPADE alſo denotes any gelded beaſt, or a deer three years old.

SPADING. See SPAYING.

SPADIX, in *Botany*, was formerly uſed to denote the receptacle of a palm, produced within a ſpatha or ſheath, or the branches that bear fruit; but it is now uſed in a more general ſenſe, to expreſs all flower-ſtalks that come out of a ſpatha.

SPADO, among the Romans, differed from an eunuch only in this, that the latter was deprived both of the penis and teſtes, but the *ſpado* of the teſtes only.

SPAID, or SPAYD, a term uſed by ſportſmen for a red male deer three years old.

SPAGIRIC, an epithet given to chemiſtry; which is called the *ſpagiric art*, or *medicina ſpagirica*; and to chemical phyſicians, who are alſo called *ſpagiriſts*.

It is chiefly reſtricted to that ſpecies of chemiſtry which works on metals, and is employed in the ſearch of the philoſopher's ſtone.

Voſſius derives the word from *σπαω*, *to extract*, and *αγειρειν*, *congregare*, *to collect*; which are the two principal offices of chemiſts. Paracelſus firſt introduced the word.

SPAGIRICAL *phyſicians*. See PHYSICIANS.

SPAHIS, from the Perſian *eſpawhee*, q. d. *horſeman*, horſemen in the Ottoman army; chiefly raiſed in Aſia.

The great ſtrength of the grand ſignior's army conſiſts in the janizaries, who are the foot, and the *ſpahis*, who are the horſe.

The aga, or commander of the *ſpahis*, is called *ſpahilar agaſi*. See AGA.

SPAN, a meaſure taken from the ſpace between the thumb's end and the tip of the little finger, when both are ſtretched out.

The *ſpan* is eſtimated at three hands breadths, or nine inches.

SPAN, in a *ſhip*, a ſmall line or cord, the middle of which is uſually attached to a ſtay, from whence the two ends branch outwards to the right and left, and having either a block or thimble attached to their extremities.

The intention of the *ſpan* is alſo to confine ſome rope which paſſes through the correſponding block or thimble, as well to increaſe the effect of the ſaid rope, as to prevent it from ſwinging at too great a diſtance from the centre of its action in ſtormy weather. Such are the *ſpans* occaſionally uſed for the top-gallant braces, or the fore-top-gallant bow-lines, &c. Falconer.

SPANGLES for *paper-hangings*. See PAPER-*hangings*.

SPANIEL, *Hiſpaniolus*, or *Canis Avicularius* of Linnæus, a variety of the *canis familiaris*, a ſpecies of DOG uſed in fowling.

From the name it may be ſuppoſed, that we were indebted to Spain for this breed. There are two varieties of this kind; the firſt formerly uſed in hawking to ſpring the game, the ſame with our ſtarters; the others uſed only for the net, and formerly called *index*, or *ſetter*. This kingdom has been remarkable for producing dogs of this ſort, particular care having been taken to preſerve the breed in the utmoſt purity. They are diſtinguiſhed by the name of Engliſh *ſpaniels*; ſo that, notwithſtanding the derivation of the name, it is more than probable they are natives of Great Britain.

The pointer, which is a dog of foreign extraction, was unknown to our anceſtors.

The aquaticus, or finder, in Dr. Caius's ſyſtematic arrangement (ſee DOG), was the ſame with our water *ſpaniel*, and uſed to find or recover the game that was loſt. See *Water* DOG.

The *ſpaniel* is of great uſe, but ſubject to many diſtempers; among theſe the mange is a very frequent one, and is the moſt pernicious of all others to his quiet and his beauty, and is very apt, when one dog has it, to ſpread to others that come in its way. The beſt cure is a decoction of a large quantity of brimſtone, with ſome common ſalt and wood-aſhes, in water and urine, of each equal quantities; this is to be uſed three or four times a day, waſhing the creature well with it before the fire, or in the warm ſun. If this is not ſtrong enough, the ſame ingredients, with the addition of a conſiderable quantity of wood-ſoot, are to be boiled in ſtrong vinegar, and the liquor uſed in the ſame manner; but this muſt never be uſed in cold weather, as it would then endanger the creature's life.

When this diſeaſe is not in a violent degree, it may be cured by the herb agrimony internally taken. The method is to pound the roots, leaves, and ſeeds of this plant in a mortar, and mix them with a large quantity of wheaten-bran; they are to be then made into dough in the common way, and baked in an oven; the dog is to have no other bread but this for ſome time, but he is to eat of this as often, and as much he will: this, without any farther care, has cured many.

Another very troubleſome diſorder in this creature, is what is called the *formica*: this infeſts only the ears, and is cauſed by flies, and by the dog's ſcratching for them. The beſt medicine for the cure of theſe is this: take a quantity of pure and clean gum tragacanth, infuſe it in white-wine vinegar; let as much vinegar be uſed as will ſerve to ſoften it, and when it has lain a week in it, let it be taken out and ground on a marble, as the painters grind their colours, adding to it roch-alum and galls, reduced to powder, of each two ounces; all this is to be well mixed together, and the matter, if it grows too ſtiff in the grinding, is to be moiſtened with ſome of the vinegar in which the gum was ſoaked: when all is thoroughly mixed, and ground fine, it is to be put in a gallypot, and a ſmall quantity of it applied to the creature's ear every night till the complaint is removed.

The ſwelling of the throat is another diſeaſe very common to *ſpaniels*, but the cure of this is eaſy; there needs only to bathe it well with oil of camomile, and afterwards waſh it with a mixture of vinegar and ſalt; this done night and morning will, in a few days, wholly remove the complaint. *Spaniels* will ſometimes, when they have much reſt and good food, loſe their ſenſe of ſmelling, but this is recovered by a briſk purge and repeated airings; a very common doſe, on this occaſion, is a drachm of jalap, and two drachms of ſal gem, mixed up into a bolus with oxymel of ſquills: this is to be rubbed over with ſome butter, and will be got down in that manner pretty eaſily, and will work briſkly.

SPANIEL *gentle*. See LAP-DOG.

SPANISH *academy*, *bible*, *black*, *brown*, *coinage*, *coins*, *epocha*, *inquiſition*, *language*, *meaſures*, *order*, *plough*, *ſilks*, *ſoap*, *wax*, and *white*, ſee the ſeveral articles.

SPANISH *flies*. See CANTHARIDES.

SPANISH *juice*. See LIQUORICE.

SPANSHACKLE, *aboard a ſhip*, a large claſp of iron, which goes round the end of the davit upon the forecaſtle.

SPAR, *ſpatum*, in *Natural Hiſtory*, a ſhining ſtony ſubſtance, generally, though improperly, ſuppoſed to be compounded of cryſtal incorporated with lac lunæ, or other mineral, earthy, ſtony, or metallic matter; frequently found in caves and grottos, and in the clefts of rocks, lead-mines, &c.

Spars are defined by Dr. Hill to be foſſils not inflammable, nor ſoluble in water: when pure, pellucid, and colourleſs, and emulating the appearance of cryſtal, but wanting its diſtinguiſhing characters; compoſed of plane and equable plates, not flexile nor elaſtic; not giving fire with ſteel; readily calcining in a ſmall fire, and fermenting violently with acids, and wholly ſoluble in them. See CRYSTALS and STONES.

Of this claſs of bodies Hill enumerates ten orders, and under thoſe twenty-one genera, many of which, from their accidental admixtures, deviate greatly in appearance from the natural ſtate of pure *ſpar*.

Of the firſt order are the pellucid cryſtalliform and perfect *ſpars*, compoſed of a column terminated at each end by a pyramid.

Of the ſecond are thoſe compoſed of two pyramids joined baſe to baſe, without any intermediate column.

Of the third are the cryſtalliform columnar *ſpars*, adhering by one end to ſome ſolid body, and terminated at the other by a pyramid.

Of the fourth are the pyramidal cryſtalliform *ſpars* without columns.

Of the fifth are the *ſpars* of a parallelepiped form.

Of the ſixth are the *ſpars* externally of no regular form, but breaking into rhomboidal maſſes.

Of the ſeventh order are the cruſtaceous *ſpars*. Theſe are of a cryſtallino-terrene ſtructure, or debaſed from their natural pellucidity by an admixture of earth, and formed into plates or cruſts of a ſtriated figure within.

The eighth order comprehends the cruſtaceous terrene *ſpars*; bodies ſo highly debaſed with earth, as to appear merely earthy, of an irregular ſtructure, and not ſtriated within. Theſe often encruſt fiſſures of ſtone, and ſometimes vegetable and other extraneous bodies in ſprings.

Of the ninth order are the *ſpars* formed into oblong cylindric bodies, known by the name of *ſtalactitæ*, or ſtony icicles.

And the tenth comprehends thoſe formed into ſmall round figures, compoſed of various cruſts encloſing one another, and generally known by the name *ſtalagmitæ*; and adding to theſe the *ſpars*, influenced in their figures by metalline particles, we have the whole ſeries of theſe bodies. Theſe are, 1. The *cubic*, owing their figure to lead. 2. The *pyramidal*, with four planes, owing their figure to tin. 3. The *rhomboidal*, conſiſting of ſix planes, owing their figure to iron.

The genera of theſe ſeveral orders are theſe.

Of the firſt there are three, viz. the TRIEXAHEDRIA, the TRIPENTAHEDRIA, and the ENNEAHEDRIA.

Of the ſecond order there are three genera, viz. the DIOCTAHEDRIA, the DIEXAHEDRIA, and the DITRIHEDRIA.

Of the third order there are alſo three genera, viz. the HEXAEDROSTYLA, the PENTAEDROSTYLA, and the TRIEDROSTYLA.

Of the fourth order there are only two genera, viz. the HEXAPYRAMIDES, and TRIPYRAMIDES.

Of the fifth order there is only one known genus, the PARALLELOPIPEDIA.

Of the ſixth order there alſo is only one known genus, the ANOMORHOMBOIDIA.

Of the ſeventh order, there are two known genera, viz. the PLACAGNODIAUGIA, and the PLACAGNOSCIERIA.

Of the eighth order there are two genera, viz. the CIBDELOSTRACIA, and CIBDELOPLACIA.

Of the ninth order there are two genera, viz. the STALACTAGNIA, and STALACTO-CIBDELA.

And of the tenth order there are alſo two genera, viz. the STALAGMODIAUGIA, and STALAGMOSCIERIA. Hill's Hiſt. of Foſſils, p. 201, &c.

The obſervation that *ſpar* is continually formed at this time in caves and grottos under ground, has given birth to many different conjectures as to the origin of that ſubſtance. We have accounts from Switzerland, and other places, that the ſnow, by long lying on the earth, and being ſubject to repeated freezing, is at length hardened into *ſpar*: this is much of the nature of that opinion of the ancients concerning cryſtal, that it was water frozen by ſevere colds to a ſort of ice, much harder than the common kind; both are equally erroneous and abſurd. But more rational conjectures, as to its origin, are, that it is produced either by effluvia alone, or by the joint force of effluvia iſſuing up from the depths of the earth, and mixing with water ouzing out of rocks into their cracks and cavities, or by the ſame water or effluvia paſſing through beds of this *ſparry* matter contained in clay. In the firſt place we are to obſerve, that *ſpar* is capable of being diſſolved either by water or vapour, and ſuſpended imperceptibly in either; and that though it remains ſuſpended a long time, yet there are occaſions of its ſeparating itſelf from either of theſe vehicles, ſuch are long ſtanding ſtill, and evaporation. What is called the growth and formation of *ſpar*, therefore, is properly perhaps only the change of place in this ſubſtance, and all that theſe agents, waters and vapours, do, is only to waſh it out of the ſtrata of earth or ſtone, in which it lay in ſcattered particles, and bring it together into the cracks and crevices of ſtones, where it may again ſeparate itſelf, and become more pure and perfect.

The operation of nature, in this caſe, is very like that of art in extracting of ſalts from the various bodies they are mixed with; and *ſpar*, in its two ſtates, when blended in the ſtrata of ſtone, &c. and when pure, and in form of cryſtals in the cracks, may be compared to alum, for inſtance, in its bed, and when purified. The alum, in the common ſtones, from which it is made, is not perceptible to the eye, but lies in ſcattered particles; water being added to this, takes up the ſalt, and when it has been managed by evaporation and reſt, yields it again purified and alone, and it forms ſuch cryſtals on the ſides of the veſſel as the other does on the ſides of the fiſſures of ſtone, which are the veſſels where the water, out of which it was formed, was ſet to evaporate, and to reſt a proper time.

That ſome *ſpars* grow from vapours alone, is evident from the *ſtalactitæ*, or ſtony icicles, hanging down from the roofs of our caverns, which, though they grow downwards, yet have many times little plants of the ſame ſubſtance growing out at their ſides, and ſtanding upwards, contrary to the growth of the other, and evidently formed of the matter ſeparated from the vapours in their aſcent, as the ſtalactitæ themſelves are from ſuch as have aſcended to the roof, and there been condenſed into water, and ſent down again in drops. Nor is the *ſparry* matter alone thus raiſed in vapour, for even the metals, and other bodies, as little likely as thoſe to be thus raiſed, yet are found to form ſtalactitæ.

The mundics, in general, though they never form regular ſtalactitæ, yet often are found adhering to the ſides of them, and the metals, particularly iron and lead, form regular ſtalactitæ; the iron ones very common and very perfect; the lead leſs perfect and more rare; and Dr. Brown gives us abundant inſtances, of *ſpars* growing entirely from vapours in the baths of Buda in Hungary.

Mr. Beaumont is of opinion, that earth by degrees will ripen into *ſpar*; but this is an error. He founds his opinion on certain ſtalactitæ, and ſtalagmitæ, found in caverns, partly earth and partly *ſpar*, and ſuppoſes that the whole would in time become *ſpar*; but there is nothing in nature to warrant this conjecture. Phil. Tranſ. N° 129.

Mr. de Juſſieu has given us, in the Memoirs of the Paris Academy, a very remarkable account of the recryſtallization, or reproduction of the parts of *ſpar*, after ſolution. Mem. Acad. Paris, 1719.

The denomination of *ſpars*, ſays the editor of the Chemical Dictionary, is given to many ſtones of different properties and appearances, which do not poſſeſs conſtantly any one common character or mark, by which they may be certainly diſtinguiſhed from other ſtones. In general, we may obſerve, that they are moſt frequently found in mines, and that they generally conſiſt of ſmooth and ſhining plates or laminæ; that ſome are tranſparent and others opake; that ſome are colourleſs and others coloured; that they are cryſtallized in various determinate figures, or poſſeſs no determinate ſhape; and, laſtly, that they differ ſo much in hardneſs, denſity, degree of fuſibility, and in their moſt eſſential chemical properties, that they cannot be conſidered as forming a diſtinct claſs of foſſil ſubſtances.

The ſeveral ſtones to which the name of *ſpar* has been given are, the calcareous, the gypſeous, the fluors, and felt *ſpar*. *Calcareous ſpars* are ſoft heavy ſtones, which have the common chemical properties of CALCAREOUS earth. Their texture is laminated, ſome of them have no determinate figure, and others from their form are called rhomboidal. Some *ſpars*, called *dogs tooth ſpars*, have a pyramidal figure; but when theſe are broken, their fragments ſhew that they alſo conſiſt of rhomboidal particles. Some rhomboidal *ſpars* are tranſparent, others are opake; ſome are colourleſs, and others are coloured; and ſome of them have a property of doubly refracting the rays of light: this *ſpar* has been called *refracting ſpar*, or *iſland* CRYSTAL. Its figure is that of an oblique parallelepiped, contained within ſix parallelogrammic ſides, and eight ſolid angles. Each of the obtuſe angles of the parallelograms is 101° 52′; and each of the acute angles is 78° 8′. Theſe calcareous *ſpars* may be diſtinguiſhed from others by effervеſcing with acids.

The *gypſeous*, or *ſelenitic ſpars*, are gypſeous earth, diſtinctly cryſtallized. The form of the cryſtals is rhomboidal. They are alſo called SELENITES and GLACIES *mariæ*. Theſe *ſpars* ſometimes aſſume other forms, and are very heavy.

Mr. Margraaf has ſhewn, that under this claſs are to be comprehended, thoſe white opake *ſpars*, which by calcination with inflammable matters are capable of receiving a phoſphoric quality, ſimilar to that of the Bolognian ſtone, which he alſo ſhews is a gypſeous *ſpar*. For the *ſpars* called *fluors*, ſee FLUOR.

The *felt-ſpar*, or *ſpatum ſcintillans*, differs from all the preceding, in being ſo hard as to be capable of ſtriking ignited *ſparks* from ſteel. For which reaſon it is referred by Cronſtedt to the ſiliceous claſs of earths, and by him called *rhombic quartz*, becauſe the particles of which it conſiſts ſeem to be parallelepipeds, each of which is contained within ſix rhomboidal ſides. Its colours are various, white, grey, and red.

Several other foſſil ſubſtances conſiſt of large plates, and are, therefore, ſaid to have a *ſparry* texture. Such are ſome kinds of talcs, of horn-blend, of quartz, of amianthus, and ſome calciform ores of metals.

SPARS, in *Medicine*, have from the earlieſt times been recommended in nephritic complaints. Some have uſed one kind, ſome another, as the *lapis judaicus*, the *ſparry* incruſtations of caverns, petrified oyſter-ſhells, and water in which large quantities of *ſpar* are ſuſtained. After all, the nephritic virtues of *ſpar* want ſufficient proof; ſome even ſuſpect its uſe to be more hurtful than beneficial. See Crystal.

SPARADRAP, Sparadrapum, in *Pharmacy*, &c. an ancient name for a kind of ſear-cloth; or a linen-cloth ſmeared on both ſides with ſome kind of plaſter, or unguent.

The *ſparadrap* is ſometimes alſo called *tela Gualteriana*, or *tela Gualteri*; ſometimes *tela emplaſtica*.

It is prepared by melting a ſufficient quantity of ſome plaſter or unguent, and dipping a linen-cloth therein, till ſuch time as it hath imbibed its fill. It is then taken out, cooled, and poliſhed on a marble.

SPARAGUS, or Asparagus, *ſperage*, in *Botany*. See Asparagus.

SPARGANIUM, *burr-reed*, in *Botany*, a genus of the *monœcia triandria* claſs. Its characters are theſe; it has male and female flowers; in both which the calyx is a roundiſh amentum or katkin, and compoſed of three leaves, without a corolla; the ſtigma of the female is bifid, and the fruit a ſingle-ſeeded drupe. Linnæus enumerates two ſpecies.

SPARGANOSIS, a word uſed by ſome to expreſs a milk-tumor in women's breaſts.

SPARGUS, in *Ichthyology*, a name given by Gaza to the common ſparus, which he calls alſo *fluta*.

Artedi calls it the plain yellow *ſparus*, with an annular ſpot near the tail.

SPARLING, in *Ichthyology*. See Smelt.

Sparling-*fowl*, in *Ornithology*, a name given in ſome places by the country people to the female MERGANSER, called more uſually the DUNDIVER.

SPARRING, among *Cock-fighters*, is the fighting a cock with another to breathe him. In *ſparring*, they put hotts on their ſpurs, that they may not hurt one another. To *ſpar the cock*, imports in general to breathe him in order to embolden him to fight. See Hotts.

SPARROW, *paſſer*, in *Ornithology*, the name of a large order of birds. See Passeres.

Sparrow, *common*, or *houſe*, the FRINGILLA *domeſtica* of Linnæus, is a well-known bird, and needs no deſcription. *Sparrows* are proverbially ſalacious; they breed early in the ſpring, often in the neſts of the martin, after expelling the owner; the martin, however, in revenge, is ſaid to aſſemble its companions, and to aſſiſt in plaiſtering up the entrance with dirt, and thus leaves the invader to periſh.

Sparrow, *hedge*, *curruca*, or MOTACILLA *modularis* of Linnæus, in *Ornithology*, a bird of the ſize of the red-breaſt, or of the tit-lark; its beak is longiſh, ſlender, and black; its head is of a deep brown, mixed with aſh-colour; the cheeks are marked with oblong ſpots of dirty white; the back and coverts of the wings are duſky, edged with reddiſh brown; the quill-feathers and tail duſky; the rump brown, tinged with green; the throat and breaſt are of a dull aſh-colour; the belly of a dirty white; the ſides, thighs, and vent-feathers are of a pale tawny brown; and the legs of a dull fleſh-colour. This bird frequents low hedges, particularly thoſe of gardens; making its neſt in ſome ſmall buſh, where it lays four or five eggs of a fine pale blue colour; and during the breeding ſeaſon it has a remarkable flirt with its wings. The male has a ſhort but very ſweet plaintive note, which it begins with the firſt froſty mornings, and continues till a little time in the ſpring.

The bird which Linnæus ſuppoſes to be our *hedge-ſparrow*, which he deſcribes under the title of *motacilla curruca*, and to which he applies the denomination of *cannavarola*, differs in colour of plumage as well as eggs. Pennant.

It is in the neſt of this bird that the cuckow hatches her eggs for the moſt part, though not always, the neſts of turtle and wood pigeons being ſometimes uſed by her for that purpoſe. Hence it was that the ancients made the cuckow an emblem of ſuch men as made bold with the marriage-bed of others, who, on that account, were called *curruca*.

Sparrow, *reed*, *paſſer arundinaceus*, the EMBERIZA *ſchœniclus* of Linnæus, in *Ornithology*, a bird that lives moſt commonly among reeds in marſhy places, and known among authors by the name of *junco*.

Its neſt is curiouſly contrived, being faſtened to four reeds, and ſuſpended by them like a hammoc, about three feet above the water. It lays four or five eggs of a bluiſh white, marked with irregular purpliſh veins. This bird is much admired for its ſong, and like the nightingale it ſings in the night. In the male, the head, chin, and throat are black; the tongue livid; at each corner of the mouth commences a white ring, which encircles the head; at approach of winter the head changes to hoary, but on return of ſpring reſumes its jet colour; the whole underſide of the body is white; the back, coverts of the wings, and the ſcapular feathers are black, deeply bordered with red; the two middle feathers of the tail are of the ſame colours; the three next black; the exterior web, and part of the interior of the outmoſt feather is white; the head of the female is ruſt-coloured, ſpotted with black; it wants the white ring round the neck; but in moſt other reſpects reſembles the male. Pennant.

Sparrow, *leſſer reed*, *willow lark*, or *ſedge-bird*, *paſſer arundinaceus minor*, the MOTACILLA *ſalicaria* of Linnæus, is a ſpecies of a ſlender elegant form; the head brown, marked with duſky ſtreaks; over each eye a line of pure white, over that another of black; cheeks brown; throat, breaſt, and belly white; the two laſt tinged with yellow; hind-part of the neck and back of a reddiſh brown; the back ſpotted with black; coverts of the tail tawny; coverts of the wings duſky, edged with pale brown; quill-feathers duſky; tail brown, and in the form of a wedge, and making a circle when ſpread; and legs duſky. This bird is common in low wet grounds; ſits on the top of ſome ſpray, with its wings diſhevelled: its ſong conſiſts but of two notes, which are loud, querulous, and harſh. Pennant.

Ray obſerves, that the *leſſer reed ſparrow* ſings ſweetly, and ſome have called it *cannavarola*. See *Tab.* IV. *Birds*, Nº 42.

Sparrow, *ſolitary*. See Passer *ſolitarius*.

Sparrow, *tree*, *paſſer montanus*, or FRINGILLA *montana* of Linnæus, is inferior in ſize to the common *ſparrow*; the bill is thick and black; the crown of the head, hind part of the neck, and leſſer coverts of the wings are of a bright bay; the two firſt plain, the laſt ſpotted with black; the chin black; the cheeks and ſides of the head white, marked with a great black ſpot beneath each ear; the breaſt and belly of a dirty white: juſt above the greater coverts is a row of feathers, black edged with white; the greater coverts are black edged with ruſt-colour; the quill-feathers duſky, edged with pale red; lower part of the back of an olive brown; the tail brown; and legs of a ſtraw colour.

Theſe birds are common in Lincolnſhire, among trees, and collect like the common kind in great flocks. Pennant.

Sparrow, *water*, *paſſer aquaticus*, in *Ornithology*, a bird deſcribed by Nieremberg, which he ſays the Indians call *acototlequichitl*. It ſings all day long without ceaſing, but with no very pleaſing note: it is, however, a well-taſted bird; it lives among ſedge and buſhes, and is of the ſize and ſhape of a ſwallow, but has a black bill and yellow legs; its breaſt and belly are white, and its back is of a browniſh yellow, variegated with ſpots of black and white. This bird much reſembles our reed-*ſparrow*. Ray.

Sparrowgrass, in *Botany*. See Asparagus.

Sparrow *hawk*. See Hawk.

Sparrow-*wort*, *paſſerina*, in *Botany*, a genus of the *octandria monogynia* claſs. Its characters are theſe: the flower has no empalement, but has one withered petal, having a ſlender cylindrical tube ſwelling below the middle, and divided into four parts at the top, which ſpread open; and it has eight briſtly ſtamina, ſitting on the top of the tube, terminated by erect ſummits; it has an oval germen under the tube, having a ſlender ſtyle riſing on one ſide of the germen, crowned by a headed ſtigma, ſet with prickly hairs on every ſide; the germen afterwards turns to an oval ſeed, pointed at both ends, and incloſed in a thick oval capſule of one cell. There are four ſpecies. Miller.

SPARSE-*leaves*, *ſparſa folia*, among *Botaniſts*. See Leaf.

SPARTIUM, in *Botany*. See Broom-*tree*.

SPARTOPOLIAS *lapis*, in *Natural Hiſtory*, a name given by ſome authors to a whitiſh agate, variegated with long and ſlender ſtreaks of grey, diſpoſed in a variouſly undulated order, and reſembling grey hairs.

SPARUS, in the Linnæan ſyſtem of *Ichthyology*, the name of a genus of fiſh of the general order of the *thoracici*, the characters of which are, that the opercula of the gills are ſcaly, and the mouth is furniſhed with ſtrong cutting teeth, and that the grinders are obtuſe and cloſe-ſet, covered with lips: the branchioſtege membrane conſiſts of five rays; the body is compreſſed; the lateral line is curved behind, and the pectoral fins are roundiſh. Of this genus there are twenty-ſix ſpecies, as the GILT-*head*, the PAGRUS, SARGUS, MELANURUS, SMARIS, CANTHARUS, &c.

The name *ſparus* is of Greek origin, being derived from the verb *σπαιρειν*, *to palpitate*, or *tremble*; and was given to this fiſh from its remarkle quality of trembling or palpitating all over the body, as ſoon as taken out of the water.

Sparus, among the Romans, a kind of ruſtic weapon, bent backwards like the foot. It was likewiſe uſed for a ſmall dart, or miſſive weapon.

SPASM, **SPASMA**, or **SPASMUS**, *σπασμα, σπασμος*, a Greek term, of equal import with the Latin *convulſio*, and Engliſh *convulſion*.

Cardan diſtinguiſhes two kinds of *ſpaſms*; the firſt conſiſting in a conſtant contraction of the muſcles, which renders the members rigid and inflexible. The ſecond, in ſudden, unnatural motions and palpitations, frequently intermitting and beginning again.

Accidental *ſpaſms* are of ſhort continuance: there are ſome ariſing from flatulencies; others from bites of venomous beaſts, from the puncture of a nerve, the acrimony of the humours vellicating the ſtomach, exceſſive cold, hyſteric vapours, &c.

A *ſpaſm* may be either univerſal, extending itſelf over the whole body, which is a very rare caſe: or partial, occupying only ſome one part of the body; theſe are very frequent, and ſeize at times on every part, from the head to the foot.

Of the nature of the univerſal *ſpaſms* are, 1. The TETANUS, which ſeizes upon the whole body, and makes it ſtiff and rigid in every part. 2. The EMPROSTHOTONOS, which bends the body forwards, ſo that the head is brought to meet the knees. 3. The OPISTHOTONOS, which inclines the whole body forcibly backwards: and, 4. The CATALEPSIS, which ſeizes the whole ſyſtem in a moment, and fixes it rigidly and unalterably in that poſture in which it finds it; ſo that the poſition of every limb, and the very turn of the countenance, and look of the eyes, is the ſame as when the patient was ſeized. This is a very rare caſe.

To the claſs of particular and partial *ſpaſms* belong, 1. Many of the arthritic complaints. 2. The INCUBUS, or nightmare, which is a *ſpaſm* of the breaſt. 3. The *convulſive* ASTHMA. 4. The CYNIC *ſpaſm*, which is a peculiar diſtortion of the face, reſembling that of a perſon while laughing. This endures uſually many hours, and is often of very fatal conſequence, frequently terminating in an apoplexy, or in the moſt terrible convulſions. 5. The SARDONIC *laugh*, which only differs from the former in that it is attended with an abſolute delirium, which is not the caſe in the other. 6. The PRIAPISM, which is an involuntary and painful erection of the penis. 7. The ſpaſtic contraction of the colon in flatulent colics. 8. The *fixt ſpaſms* of Paracelſus, which the author deſcribes as often afflicting podagric and arthritic patients.

Spaſms in general, beſide theſe diſtinctions, are divided by authors into the ſudden, or inſtantaneous, which ſeize upon any muſcle in a moment, and keep it for a conſiderable time in a painful ſtate of contraction, and the ſlow ones.

The *ſlow ſpaſms* are alſo divided into two kinds. 1. The *muſcular* and *tendinous*: and, 2. The *fibriliary*. In the firſt of theſe the whole muſcle is affected with tenſive pains, and the limb becomes finally contracted. In the other, the ſeparate fibres in the muſcle are only affected. This is uſually the caſe in *ſpaſms* in arthritic caſes, which ſeize a few fibres only at firſt, but finally faſten upon more, and extend themſelves over the whole muſcle, in which caſe the pain uſually becomes leſs. A tenſive pain in the neck, occaſioned by ſitting or lying in an uneaſy poſture, uſually called a *crick in the neck*, is alſo to be enumerated among the partial *ſpaſms*; and finally, theſe affections are not reſtrained wholly to the external parts, but often ſeize alſo upon the internal, as the œſophagus, the ſtomach, the bladder, &c.

It is a common error to confound the word *ſpaſm* with *convulſion*; their difference is evident, the one being ſtationary and immoveable, the other erratic, and flying from one part of a muſcle to another, and from one muſcle to another; the convulſion alſo uſually extends itſelf farther than the *ſpaſm*, and is greater in degree; and finally, the *ſpaſm* is a much leſs dangerous complaint than the convulſion. Men are more ſubject to *ſpaſms* in general than women, and among them, ſuch as are of a ſanguine and plethoric habit, are moſt of all ſubject to them. The general cauſe of *ſpaſms* is an abundance of blood in a body where the veſſels are ſmall, and nature is endeavouring to throw off the load of the plethora from veſſels, where it is troubleſome to her, by this means; which, though an erroneous one, is therefore not without its end.

SPASMS, *prognoſtics in*. The univerſal *ſpaſms* are much the moſt dangerous, as they are frequently attended with internal inflammations; and the partial *ſpaſms* too often degenerate into convulſions. If *ſpaſms* are very frequent in young people, they are to be ſuſpected of threatening arthritic complaints in old age; and when perſons have been free from *ſpaſms* in their youth, and become ſubject to them when old, it is much to be feared that they portend apoplexies, palſies, and ſuffocative catarrhs: and in general all *ſpaſms*, as they are in reality no other than the incomplete attempts of nature to free herſelf of ſomewhat that offends her in particular parts, portend ſome worſe miſchief, when they are obſerved to return frequently, and with violence. *Spaſms* happening in acute diſeaſes, and from wounds, are all very dangerous ſymptoms, and threaten convulſions, and other miſchiefs.

Method of cure. The means to be uſed, when the fits are off, are bleeding in any manner, by the lancet, by leeches, or by cupping, as may be moſt proper in regard to the part principally affected, and other circumſtances; after this the primæ viæ are to be cleared by purges from any foulneſſes that may adhere to them; and finally, ſuch medicines are to be given, as are known to attenuate the blood; and with all this, gentle exerciſe is of great ſervice; in the time of the fit, lenient and paregoric medicines, as amber, and the ſpirit of hartſhorn: and to theſe are to be added the acrid vegetables, ſuch as the more temperate carminatives, and the emulſive diluent medicines, with nitre and cinnabar.

This laſt drug is famous alone in all theſe caſes, and indeed in all emotions of the blood; but neither this, nor any of the others, will take effect till after bleeding, if the *ſpaſm* be violent. The volatile alkalis alſo ſucceed beſt when mixed with a fixed one; ſuch as the ſpirit of hartſhorn with the tincture of ſalt of tartar, or of antimony. Junker's Conſp. Med. p. 608, &c. See CONVULSION.

SPASMODIC, ſomething belonging to a *ſpaſm*, or convulſion; as a *ſpaſmodic medicine*, *ſpaſmodic diſeaſe*, &c.

Hunger, according to M. Hecquet, is a *ſpaſmodic* affection of the fibres of the ſtomach; unleſs it ariſe from the fibres being too much moiſtened by the liquors thereof, ſo as to incapaciate them for their office. See HUNGER.

SPAT, a term uſed by the fiſhermen for the ſpawn of OYSTERS, which is caſt in the month of May.

SPATAGOIDES, in *Natural Hiſtory*, the name of a genus of the *echini marini*, the characters of which are, that it has the aperture for the anus on one ſide of the upper ſurface, and has a large furrow on the back, which makes it of a cordated form; but has no furrows on the vertex, but only four or five ſmooth rays, made of a number of ſlight tranſverſe ſtriæ. See *Tab. of Teſtaceous Animals*, N° 14.

SPATANGI, in *Natural Hiſtory*, the name of a genus of the *echini marini*, including all thoſe which are marked in the ſhape of a heart, and have the aperture for the anus in one of the ſides of the upper ſuperficies. Theſe have all a remarkable furrow on the back; their baſe is nearly flat, and they have ſeveral furrows on the vertex. By theſe characters they are diſtinguiſhed from the briſſi, with which they have in common the marks of two lips to their mouth, and want the teeth the other kinds have. See *Tab. of Teſtaceous Animals* N° 11. Klein's Echin. p. 35.

SPATHA, is a word uſed by different authors in various ſenſes; ſome expreſs by it a rib; others the inſtrument called by ſurgeons a *ſpatula*, and uſed for ſpreading ointments and plaſters; and Celſus calls a ſort of inciſion-knife by this name. It is alſo uſed for the external covering of the fruit of the palm-tree, and by others for a ſword. This laſt is indeed its proper ſignification, and all the others are only metaphorical applications of it to different things, which bear ſome reſemblance to a ſword.

SPATHA, among *Botaniſts*, expreſſes that ſort of cup which conſiſts of a ſingle membrane growing from the ſtalk, or which burſts lengthways, and puts forth a ſpadix or receptacle. This kind of cup is of various figures; often diphyllous, or divided into two parts; often ſimple; ſometimes more divided: it incloſes ſometimes a ſingle flower, ſometimes ſeveral flowers together, and theſe have often no perianthium. The *ſpatha* is of a very different texture and conſiſtence, in different plants.

SPATHALIUM, among the Romans, an ornament which the women wore about their hands, not unlike the coral ones of the moderns.

SPATHELIA, in *Botany*, a genus of the *pentandria trigynia* claſs. Its characters are, that the calyx is compoſed of five leaves; that it has five petals; that the fruit is a three-cornered capſule, with three cells, containing a ſingle ſeed. There is only one ſpecies.

SPATHESTER, the name of a chirurgical inſtrument uſed to draw the prepuce over the glans.

SPATHINUS, in *Natural Hiſtory*, a name given by the Greeks to the ſtag or deer, when in its ſecond year.

In the firſt, it was called *nebrus*; in the third year, *dicrotus*; and after this *ceraſtes*, as long as it lived.

SPATHOMELE, a word uſed by ſome to expreſs the ſpatula, uſed by apothecaries and ſurgeons in mixing and ſpreading ointments and plaſters.

SPATLING-*poppy*, a name given to the common field-lychnis, a ſpecies of *cucubalus*, from the white froth found on it in the ſpring. See FROTH-*ſpit*.

SPATTERDASHES, a kind of covering for the legs, made of leather, &c. Thoſe of ſoldiers are made of coarſe linen, waxed over and buttoned tight.

SPATTS, a ſmall ſort of ſpatterdaſhes, reaching only a little above the ankle.

SPATULA, or Spathula, formed from *ſpatha*, of the Greek, *σπαθιον*, which ſignifies the ſame; an inſtrument uſed by ſurgeons and apothecaries; made flat at one end, and round at the other: ſerving to ſpread their plaſters and unguents.

The ſurgeons have little ſteel *ſpatulas*. And the apothecaries have alſo large ones of wood, to ſtir their drugs in diluting, tempering, or boiling them.

The *ſpatula* is uſed by ſurgeons to depreſs the tongue, in order to examine the ſtate of the tonſils, uvula, and fauces, when they are affected with any diſorders. It is alſo uſed to ſuſpend the tongue, when the frænum is to be divided; for which purpoſe it has a fiſſure at its extremity, and ſhould rather be made of ſilver than of any other metal. Theſe *ſpatulæ* are made of different ſhapes. Vide Heiſter's Surg. Introd. ſect. 36.

SPAVIN, formed from the French *eſparvin*, which ſignifies the ſame; a diſeaſe in a horſe: being a ſwelling or ſtiffneſs, uſually in the ham, which cauſes him to halt.

There are two kinds of *ſpavins*, viz. the

Spavin, *ox*, which is a callous tumor, at the bottom of the ham, on the inſide; hard as a bone, and very painful. While it is yet young, ſome horſes only halt with it at the firſt coming out of the ſtable.

Spavin, *dry*, which is more eaſily perceived, by the horſe's raiſing one of his hind-legs, with a twitch, higher than the other: but ſometimes it is found in both legs.

This kind, which ſome alſo call *ſtring-halt*, frequently degenerates into the *ox ſpavin*; for which there is no remedy, but to apply the fire; and even this is not always ſucceſsful.

There are two other kinds of *ſpavin*, which have their ſeat in the hoof, viz.

Spavin, *blood*, a ſoft tumor, which grows through a horſe's hoof, and is uſually full of blood.

Spavin, *bone*, a cruſty ſubſtance growing on the inſide of the hoof under the joint.

SPAWS, mineral waters ariſing out of the earth; impregnated with nitre, ſulphur, alum, bitumen, copperas, or other mineral matter, in paſſing through the ſtrata thereof; and hence endued with ſome medicinal qualities, cathartic, diuretic, emetic, alterant, or the like. See *Mineral* Waters and Spa.

SPAX, a name given by ſome authors to the common tænia, a ſmall fiſh of the anguilliform kind, frequent on the ſhores of Italy.

SPAYING, or Spading, the operation of caſtrating the females of the ſeveral kinds of animals, to prevent conception, and promote their fattening. It is performed, by cutting them in the mid-flank, on the left ſide, with a ſharp knife or lancet, taking out the uterus, and cutting it off, and ſo ſtitching up the wound, anointing the part with tar, and keeping the animal warm for two or three days.

The uſual way is, to make the inciſion aſlope, two inches and a half long, that the fore-finger may be put in towards the back, to feel for the ovaries, which are two kernels as big as acorns on both ſides the uterus, one of which is drawn to the wound, the ſtring thereof cut, and thus both taken out.

Spaying *of fiſh*. See *Caſtration of* Fish.

SPEAKER *of the houſe of commons*, a member of the houſe, elected by a majority of the votes thereof, to act as chairman, or preſident, in putting queſtions, reading briefs or bills, keeping order, reprimanding the refractory, adjourning the houſe, &c.

The firſt thing done by the commons upon the firſt meeting of a parliament is to chooſe a *ſpeaker*, who is to be approved of by the king; and who, upon his admiſſion, begs his majeſty, that the commons, during their ſitting, may have *free acceſs to his majeſty, freedom of ſpeech in their own houſe*, and *ſecurity from arreſts*. See Parliament.

The *ſpeaker* is not allowed to perſuade, or diſſuade, in paſſing of a bill; but only to make a ſhort and plain narrative; nor to vote, unleſs the houſe be equally divided.

The lord chancellor, or keeper, or any other appointed by the king's commiſſion, is uſually *ſpeaker of the houſe of lords*; and if none be thus appointed, the houſe of lords (it is ſaid) may elect. The *ſpeaker* of the houſe of lords, if a lord of parliament, may give his opinion, or argue any queſtion in the houſe.

The *ſpeaker of the convocation* is called PROLOCUTOR.

Speaker is uſed by *rhetorical* writers in the ſame ſenſe with orator. See Oratory. See alſo Elocution, Pronunciation, and Action.

As to the character and addreſs of an orator, it is neceſſary that every thing appear eaſy and natural, and the diſpoſition of the *ſpeaker* be diſcovered by his words: thus would he expreſs what Quintilian calls a propriety of manners: accordingly, the ancient rhetoricians made it a neceſſary qualification in an orator, to be a good man; ſince he ſhould always be conſiſtent with himſelf, or, as we ſay, talk in character. There are four qualities more eſpecially ſuited to the character of an orator, which ſhould always appear in his diſcourſes, in order to render what he ſays acceptable to his hearers; theſe are wiſdom, integrity, benevolence, and modeſty. See an illuſtration and inforcement of them in Ward's Orat. vol. i. lect. 10.

SPEAKING, the art, or act, of expreſſing one's thoughts in articulate ſounds or words.

Pliny, Ælian, Plutarch, and other authors, make mention of ſeveral beaſts that have *ſpoken*: and Pliny himſelf ſpeaks with aſſurance, in his hiſtory, of an ox that *ſpoke*. Philoſtratus, in his life of Apollonius, gives the like quality to an elm, and even to ſhips. Homer makes Xanthos, one of Achilles's horſes, ſpeak; wherein he has been followed by Oppian. But theſe are all fabulous ſtories; we have much better authority for a ſerpent and an aſs's *ſpeaking*. See Language.

Speaking-*trumpet*. See Trumpet, and Stentorophonic.

SPEAR, in the *Manege*; the feather of a horſe, called the *ſtroke of the ſpear*, is a mark in the neck, or near the ſhoulder of ſome Barbs, and ſome Turky and Spaniſh horſes, repreſenting the blow or cut of a *ſpear* in thoſe places, with ſome reſemblance of a ſcar. This feather is an infallible ſign of a good horſe.

Spear-*hand*, or *ſword-hand* of a horſeman, is his right hand.

Spear-*foot*, of a *horſe*, is the far-foot behind. See Far.

Spear-*mint*. See Mint.

SPEARWORT, the Engliſh name of the RANUNCULUS *flammeus*.

This is with us generally eſteemed a poiſon, but the Scots uſe it as a medicine. They beat it, and ſqueeze out the juice, which they take as a purge, drinking a little melted butter or oil before and after it, to prevent its taking the ſkin off from the throat. It operates very violently, but with robuſt conſtitutions it does very well.

They uſe it alſo externally in caſes of pain in the head, or any other part of the body. They bruiſe the leaves to a ſort of paſte, and apply them to the part; they ſoon raiſe a bliſter, and a large quantity of water is diſcharged, after which the pain goes off. This is a ſhort way of bliſtering, and anſwers as ſafely and as well as ours by the cantharides: but it is a wonder that people, who ſee this quality in the plant, ſhould dare to take it into their mouths and ſtomachs.

SPECIAL, ſomething that is particular, or has a particular deſignation; from the Latin *ſpecies*: in oppoſition to *general*, of *genus*. See General, Particular, Species, and Genus.

The king, in his letters, frequently ſays, of our *ſpecial grace*, full power, and royal authority.

Special *aſſiſe*, *attorney*, *bail*, *caſe*, *fee-tail*, *iſſue*, *jury*, *plea*, *ſeſſion*, *ſtatute*, *verdict*, and *warrant*. See the articles.

SPECIALTY, in *Law*, is moſt commonly taken for a bond, bill, or other inſtrument in writing. Accordingly, debts by *ſpecialty*, or ſpecial contract, are ſuch whereby a ſum of money becomes, or is acknowledged to be, due by deed or inſtrument under ſeal: ſuch as by deed of covenant, by deed of ſale, by leaſe reſerving rent, or by bond or obligation. Theſe are looked upon as the next claſs of debts after thoſe of record, being confirmed by ſpecial evidence under ſeal.

SPECIES, an idea, which relates to ſome other more general one, or is compriſed under a more univerſal diviſion of a genus; as in the definition of any thing, we obtain its general nature or GENUS, by comparing it with other things that are moſt like to itſelf, and obſerving wherein its eſſence or nature agrees with them; ſo we obtain the eſſential or ſpecific difference, by conſidering the moſt remarkable and primary attribute, property, or idea, wherein this differs from thoſe other things that are moſt like it: and this attribute, or ſpecific DIFFERENCE, diſtinguiſhes each ſpecies from one another, while they ſtand ranked under the ſame genus.

The word is Latin, formed from the ancient verb *ſpecio*, *I ſee*; as if a *ſpecies* of things were a collection of all the things ſeen at one view.

Species is a mere term of relation: and the ſame idea may be a *ſpecies*, when compared to another more general one; and a genus, with regard to a more particular one. Thus body is a genus, with regard to an animate and inanimate body; and a *ſpecies*, with regard to ſubſtance.

The laſt *ſpecies* is that which can only be divided into individuals.

Animal is a *ſpecies*, with regard to body, and man is a *ſpecies* with regard to animal. God deſtroyed mankind by the deluge; but he preſerved the *ſpecies*.

Species, in *Logic*, is one of the five words, called by Porphyry, *univerſals*.

Species, in *Rhetoric*, is that which comprehends under it all the individuals of the ſame nature. From hence, we may argue; he is a man, therefore he has a rational ſoul. And orators ſometimes take occaſion to deſcend from the theſis or genus, to the hypotheſis or *ſpecies*: that is, in treating upon what is more general to introduce ſome particular contained under it, for the better illuſtration of the general.

Species, in the *ancient Muſic*, denotes a ſubdiviſion of one of the genera.

The genera of muſic were three, the ENHARMONIC, CHROMATIC, and DIATONIC; the two laſt of which were variouſly ſubdivided into *ſpecies*: nor was the firſt without *ſpecies*, though thoſe had not particular names, as the *ſpecies* of the other two had. Theſe *ſpecies* were alſo called the *chroai*, colours of the genera. See GENUS.

Species is alſo applied by *ancient muſicians*, to the different diſpoſitions of the tones and ſemitones in a fourth, fifth, or octave. Hence they ſay there are three *ſpecies* of fourths, four of fifths, ſeven of octaves. Wallis's Append. Ptolom. Harm. p. 171.

The Grecians expreſſed this ſenſe of the term *ſpecies* by ειδος, or by σχημα. The Latin word, *figura*, has alſo been taken in the ſame ſenſe. Ariſtox. p. 6, 74. ed. Meib. Wallis, ibid. p. 170.

Species, in *Optics*, the image painted on the retina by the rays of light reflected from the ſeveral points of the ſurface of an object, received in at the pupilla, and collected in their paſſage through the cryſtalline, &c.

Philoſophers have been in great doubt, whether the *ſpecies* of objects, which give the ſoul an occaſion of ſeeing, are an effuſion of the ſubſtance of the body; or a mere impreſſion which they make on all ambient bodies, and which theſe all reflect, when in a proper diſtance and diſpoſition; or, laſtly, whether they are not ſome other more ſubtile body, as light, which receives all theſe impreſſions from bodies, and is continually ſent and returned from one to another, with the different figures and impreſſions it has taken. But the moderns have decided this point by their invention of artificial eyes, wherein the *ſpecies* of objects are received on a paper or linen cloth in the ſame manner as they are received in the natural eye. The ancients have diſtinguiſhed the *ſpecies*, whereby objects become viſible, into *impreſſæ* and *expreſſæ*.

Species, *impreſſed*, are ſuch, as come from without; or are ſent from the object to the organ; ſuch are thoſe we have already been ſpeaking of.

Species, *expreſſed*, are thoſe, on the contrary, which proceed from within; or that are ſent from the organ to the object.

Le Clerc, in his ſyſtem of viſion, by one of thoſe revolutions very frequent in philoſophical opinions, has called upon the ſtage again the *ſpecies expreſſæ* of the ancient philoſophers. For, according to him, it is not by *ſpecies* or images impreſſed on the optic nerve, that the ſoul ſees objects; but by rays, which ſhe herſelf directs to them, and which ſhe uſes as a blind man does his ſtaff, to grope out objects.

The Peripatetics account for viſion, from a kind of *intentional ſpecies*, thus: every object, ſay they, expreſſes a perfect image of itſelf on the air next to it. This expreſſes another leſs one on the air next to that; and this a third ſtill leſs. Thus are the images continued from the object to the cryſtalline, which theſe philoſophers hold the principal organ of ſeeing. Theſe they call *ſpecies intentionales*; and to account the better for their generation, they affirm, that objects exhibit them in the ſame manner, as mirrors do a man's face. See VISION.

Species, in *Theology*, denote the appearances of the bread and wine in the ſacrament after conſecration. Or, as the Romaniſts define them, the accidents remaining in the bread and wine, whereby they become ſenſible to us, after their ſubſtance is deſtroyed.

The *ſpecies* of the bread, &c. are its whiteneſs, quantity, figure, friableneſs, &c. Of wine, its flavour, quickneſs, ſpecific gravity, &c.

The generality of Romiſh divines hold, that the *ſpecies* are abſolute accidents. And the Carteſians, who are bound to deny any ſuch things as abſolute accidents, are greatly puzzled to explain the *ſpecies*, without incurring the cenſure of hereſy. F. Magnan is forced to aſſert, that the *ſpecies* are mere deluſions and appearances, which God impreſſes on our ſenſes.

Species, in *Commerce*, are the ſeveral pieces of gold, ſilver, copper, &c. which, having paſſed their full preparation, and coinage, are current in public.

Species *decried*, or *cried down*, are ſuch as the ſovereign has forbidden to be received in payment.

Species, *light*, are thoſe which fall ſhort of the weight preſcribed by law.

The weights of the current coins as coined, are now as follow:

	dw.	*grs.*
Gold, guinea - - - -	5	9½
half-guinea - - - -	2	16¾
Silver, crown - - - -	19	8½
half crown - - - -	9	16¼
ſhilling - - - - -	3	21
ſix-pence - - - -	1	22

The current weight of gold:

Guinea - - - - - -	5	8
Half ditto - - - - - - -	2	16

Under this weight no gold is allowed to paſs by the laſt proclamation.

Species, *falſe*, are thoſe of different metal or alloy from what they ſhould be, &c.

Species, in *Algebra*, are the ſymbols, or CHARACTERS, whereby quantities are repreſented.

Species *aromaticæ*, a new name given in the late London Diſpenſatory to the compoſition uſually called *ſpecies* DIAMBRÆ. The College obſerved, that the intention of this medicine was beſt anſwered, by compoſing it of ſuch ſpices as the daily experience of the table ſhews were moſt grateful to the ſtomach, and by avoiding all ingredients which, though of the aromatic kind, are accompanied with any thing nauſeous and diſguſtful in their flavour, and therefore have ordered it to be now made in the following manner. Take cinnamon two ounces, cardamom-ſeeds, ginger, and long pepper, of each an ounce; make all together into a fine powder.

Species, *e ſcordio*, the ingredients of the diaſcordium electary in a dry form. The recipe is ſomething altered in the late London Pharmacopœia, and ſtands thus: take bole Armenic, four ounces; ſcordium, two ounces; cinnamon, an ounce and half; ſtorax, roots of tormentil, biſtort, gentian, dittany of Crete, galbanum, and gum arabic and red roſes, each an ounce; long pepper and ginger, each half an ounce; opium three drams; this may be left out at pleaſure; and all are to be beat to a fine powder.

SPECIFIC, in *Philoſophy*, that which is proper and peculiar to any thing; or that characterizes it, and diſtinguiſhes it from every other thing. See PROPER, &c.

Thus, the attracting of iron is *ſpecific* to the load-ſtone, or is a *ſpecific* property of the load-ſtone: a juſt definition ſhould contain the *ſpecific* notion of the thing defined, or that which ſpecifies and diſtinguiſhes it from every thing elſe.

Specific, in *Medicine*, a remedy, whoſe virtue and effect are peculiarly adapted to ſome certain diſeaſe; that is adequate thereto; and exerts its whole force immediately thereon.

Thus quinquina, or the Jeſuits bark, is held a *ſpecific* for intermitting fevers or agues; mercury for the venereal diſeaſe, &c.

Authors make mention of three kinds of *ſpecific* medicines.

1°, Such as are eminently and particularly friendly to this or that part; as to the heart, the lungs, the brain, the ſtomach, &c.

2°, Such as ſeem to attract, expel, or evacuate, ſome determinate humour, by a kind of *ſpecific* power with which they are endowed; as jalap is ſuppoſed to purge watery humours, rhubarb bile, &c. See PURGATIVE.

3°, Such as remove the cauſe of a diſeaſe, by ſome ſudden property, without our knowing how or why; or the manner of whoſe operation we are entirely ignorant of, and have only learnt their effects by experience.

In the uſe of theſe laſt, there is no enquiry into the nature of the diſeaſe; no regard had to the ſymptoms or phenomena: nor is the medicine to be at all adapted to the particular circumſtances thereof. All that we regard, is the name of the diſeaſe, and that of the remedy; as, immediately, upon finding an intermitting fever, we preſcribe the bark: to aſſuage pain, opium; or to expel poiſon, its particular antidote.

On this footing, a *ſpecific* medicine ſeems to ſtand in oppoſition to a *ſcientific* or *methodic* medicine.

The mild operation of ſome alterant medicines by inſenſible perſpiration, ſweat, and urine, may have led ſome men into this notion of *ſpecific* alteratives, or the tranſmutation of poiſonous into innocent juices. Phyſicians are apt to think they cure diſeaſes ſpecifically, when they do not bleed, purge, vomit, or ſalivate: But it is certain, mercury, when it cures the lues without ſalivation, does not act ſpecifically, any more than when the higheſt ſalivation is raiſed by it; when it does not ſalivate, it infallibly and ſenſibly paſſes off by the cutaneous and venous glands.

Several mineral and metalline ſubſtances, eſpecially the compoſitions of ſulphur and mercury, as the æthiops and cinnabar, may indeed cure many diſeaſes; but then they do it by acting as evacuants, by attenuating, diſſolving, and carrying off the viſcid concretions and foulneſſes of the ſtomach and inteſtines, and thus cleanſing the foul paſſages, and reſtoring them to their natural action; not by any alterative or *ſpecific* operation.

Dr. Martin endeavours to defend the doctrine of the *ſpecific operations* of cathartic medicines, from the different nature of the drugs, and by an appeal to experience. See his Eſſ. Phyſ. and Medic.

Specific *gravity*, in *Hydroſtatics*. See *Specific* GRAVITY.

Specific *gravity of living men*. Mr. Robertſon, in order to determine the *ſpecific gravity* of men, prepared, a ciſtern ſeventy-eight inches long, thirty inches wide, and thirty inches deep; and having procured ten men for his purpoſe, the height of each was taken, and his weight; and afterwards they plunged ſucceſſively into the ciſtern.

A ruler, graduated to inches and decimal parts of an inch, was fixed to one end of the ciſtern, and the height of the water noted before each man went in, and to what height it roſe when he immerſed himſelf under its ſurface.

The following table contains the ſeveral reſults of his experiments.

No. of men.	Height. Feet.	Height. Inc.	Weight. Pounds.	Height of water beforeimmerſed. Inches.	Height of water when immerſed. Inches.	Water raiſed. Inches.	Solidity.	Weight of water. Pounds.
1	6	02	161	19,30	21,20	1,90	2,573	160,8
2	5	10⅞	147	19,25	21,16	1,91	2,586	161,6
3	5	0½	156	19,21	21,06	1,85	2,505	156,6
4	5	6¼	140	19,17	21,21	2,04	2,763	172,6
5	5	5⅞	158	19,13	21,21	2,08	2,817	176,0
6	5	5½	158	19,09	21,26	2,17	2,939	183,7
7	5	4⅜	140	19,05	21,06	2,01	2,722	170,1
8	5	3⅛	132	19,01	20,86	1,85	2,505	156,6
9	5	4⅛	121	18,97	20,76	1,79	2,424	151,5
10	5	3¼	146	18,93	20,66	1,73	2,343	146,4

One of the reaſons, Mr. Robertſon ſays, that induced him to make theſe experiments, was a deſire of knowing what quantity of fir or oak timber would be ſufficient to keep a man afloat in river or ſea-water, thinking that moſt men were ſpecifically heavier than river or common freſh water; but the contrary appears from the trials above recited: for, excepting the firſt and laſt, every man was lighter than his equal bulk of freſh water, and much more ſo than his equal bulk of ſea-water: conſequently, if perſons, who fall into water, had preſence of mind enough to avoid the fright uſual on ſuch accidents, many might be preſerved from drowning; and a piece of wood not larger than an oar, would buoy a man partly above water as long as he had ſpirits to keep his hold. Phil. Tranſ. vol. l. art. 5.

Specific *gravity of metals*. See METALS.

Specific *names*, in *Natural Hiſtory*, are thoſe epithets compoſed each of one or more terms, and placed after the generical name, in the denomination of any ſpecies of plant, animal, or mineral, expreſſing thoſe characters by which it differs from all the other ſpecies of that genus.

The more accurate of the modern naturaliſts have, in their ſeveral provinces, ſet about the reformation of the *ſpecific* names of things. They firſt obſerve, that many of the *ſpecific* names of the ancients no way anſwered the intent of their formation, but expreſſed the more trivial diſtinctions, or accidents, while they omitted the realities, and more eſſential grounds of diſtinction. On this foundation the critical writers of our times diſtinguiſh the old *ſpecific* names into the genuine, or true, and the ſpurious, or falſe ones.

The genuine names are thoſe which expreſs thoſe characters, by means of which the thing becomes a different ſpecies; theſe are invariable, and by theſe names the thing is, in ſome ſort, deſcribed. The falſe ones are thoſe *ſpecific* names which do not, and cannot diſtinguiſh the ſpecies, called by them, from the others of the ſame genus, which may as well belong to ſome other ſpecies as to that, and which therefore are of no uſe to the ſtudent. The true formation of theſe names is on the real characters of the body to be named; but inſtead of this theſe falſe ones are often formed from accidental, or variable diſtinctions.

Specific *waters*. See WATER.

SPECILLUM, or SPECULUM, an inſtrument, wherewith ſurgeons ſearch and dilate wounds, &c. See SPECULUM.

Specious *arithmetic*. See ARITHMETIC.

SPECTABILES, among the Romans, a title of honour given to the ſecond rank or degree of nobility under the Roman emperors, being unknown in the time of the republic. There were other two degrees; the firſt had the title of *illuſtres*, and the third that of *clariſſimi*.

SPECTACLE, SPECTACULUM, *ſhew*; ſome extraordinary object, which draws the view and attention; and is not beheld without ſome emotion or paſſion of the mind.

The term is chiefly uſed, by the ancients, for theatrical and amphitheatrical performances; for comedies, combats of gladiators, and of beaſts; and even for ſolemn proceſſions, as thoſe of the Circus, &c.

The people of Rome were extremely fond of *ſpectacles*; and the Roman hiſtorians obſerve, there was no ſurer way of gaining their affections, and making parties to introduce tyranny and oppreſſion, than by the uſe of *ſpectacles*.

SPECTACLES, an optic machine, conſiſting of two lenſes ſet in a frame, and applied on the noſe, to aſſiſt in defects of the organ of ſight.

Old people, and all PRESBYTÆ, uſe *ſpectacles* of convex lenſes, to make amends for the flatneſs of the eye, which does not make the rays converge enough to have them meet in the retina.

Short-ſighted people, or MYOPES, uſe concave lenſes, to keep the rays from converging too faſt, on account of the great roundneſs of the eye, which is ſuch, as to make them meet before they reach the retina.

In Spain, and at Venice eſpecially, *ſpectacles* are uſed with a different view: all the people of note and faſhion there have them continually on their noſes: a folly, that has its ſource in the natural pride of thoſe people, who value themſelves on a profound wiſdom; and affect to ſtare very near at every thing; as if their eyes were weakened, and worn out with exceſs of attention. Vign. de Marv.

F. Cherubin, a capuchin, deſcribes a kind of *ſpectacle* teleſcopes, for the viewing of remote objects with both eyes; hence called *binoculi*. Though F. Rheita had mentioned the ſame before him, in his Oculus Enoch et Eliæ. See BINOCLE.

The ſame author invented a kind of *ſpectacles*, with three or four glaſſes, which performed extraordinarily.

Spectacles were certainly unknown to the ancients. Franciſco Redi, in a very learned treatiſe on *ſpectacles*, will have them to have been invented in the thirteenth century, between the years 1280 and 1311 (probably about the year 1299 or 1300) and adds, that Alexander de Spina, a monk of the order of Predicants of St. Catharine, at Piſa, firſt communicated the ſecret, which was of his own invention; upon learning that another perſon had it as well as himſelf. This hiſtory is written in the chronicles of that convent.

The ſame author tell us, that in an old manuſcript ſtill preſerved in his library, compoſed in 1299, *ſpectacles* are mentioned as a thing invented about that time: and that a famous Jacobin, one Jourdon de Rivalto, in a treatiſe compoſed in 1305, ſays expreſly, that it was not yet twenty years ſince the invention of *ſpectacles*. He likewiſe quotes Bernard Gordon in his Lilium Medicinæ, written the ſame year, where he ſpeaks of a collyrium, good to enable an old man to read without *ſpectacles*.

Muſchenbroeck, Introd. vol. ii. p, 786. obſerves, that it is inſcribed on the tomb of Salvinus Armatus, a nobleman of Florence, who died in 1317, that he was the inventor of *ſpectacles*.

Du-Cange, however, carries the invention of *ſpectacles* farther back; aſſuring us, that there is a Greek poem in manuſcript in the French king's library, which ſhews, that *ſpectacles* were in uſe in the year 1150; nevertheleſs, the dictionary of the academy *della Cruſca*, under the word *occhiale*, inclines to Redi's ſide; and quotes a paſſage from Jourdon's Sermons, which ſays, that *ſpectacles* had not been twenty years in uſe: and Salvati has obſerved, that thoſe ſermons were compoſed between the years 1330 and 1336.

It is probable, that the firſt hint of the conſtruction and uſe of *ſpectacles* was derived from the writings either of Alhazen, who lived in the twelfth century, or of our own countryman Roger Bacon, who was born in 1214, and died in 1292 or 1294. The following remarkable paſſage occurs in Bacon's Opus Majus by Jebb, p. 352. *Si vero homo aſpiciat literas et alias res minutas per medium cryſtalli vel vitri, vel alterius perſpicui ſuppoſiti literis, et ſit portio minor ſpheræ, cujus convexitas ſit verſus oculum et oculus ſit in aere, longe melius videbit literas, et apparebunt ei majores.—Et ideo hoc inſtrumentum eſt utile ſenibus et habentibus oculos debiles: nam literam quantumcunque parvam*

parvam poſſunt videre in ſufficienti magnitudine. Hence, and from other paſſages in his writings much to the ſame purpoſe, Molyneux, Plott, and others, have attributed to him the invention of reading-glaſſes.

Dr. Smith, indeed, obſerving that there are ſome miſtakes in his reaſoning on this ſubject, has diſputed his claim. See Molyneux's Dioptr. p. 256. Smith's Optics, Rem. 86—89.

SPECTATOR, a perſon preſent at a ſpectacle.

Among the Romans, SPECTATORS, SPECTATORES, more particularly denoted a kind of GLADIATORS, who had received their diſcharge; and were frequently hired to be preſent, as *ſpectators*, at the combats of gladiators, &c. with which the people were entertained. See RUDIARIUS.

SPECTER, in *Conchyliology*, a name given by the French naturaliſts to a ſpecies of *voluta*, on which there are ſeveral reddiſh broad bands, compoſed of looſe and irregular figures; the ground colour is a fine white. They are called by Latin writers CONCHA *ſpectrorum*.

SPECTRORUM *candela*, in *Natural Hiſtory*, a name by which ſome have called the BELEMNITES.

SPECULA, among the Romans, were places whence a good view might be had of what was doing at a diſtance. The word is particularly uſed to ſignify watch-towers and beacons.

SPECULARES, in *Natural Hiſtory*, the name of a genus of foſſils of the claſs of the talcs.

The word is derived from the Latin *ſpeculum*, *a looking-glaſs*; the bodies of this kind being naturally of bright, gloſſy, and poliſhed ſurfaces, and in the thicker maſſes not tranſparent, but reflecting the images of things.

The *ſpeculares* are talcs, compoſed of viſibly ſeparate plates of extreme thinneſs, and each fiſſile again into a number of others yet finer. See *Tab. of Foſſils*, *claſs* I. The bodies of this genus are the common Muſcovy talc; the *ſpecularis lucida fuſca*, or brown talc, a ſpecies little inferior to the former in beauty, and found in Germany and England; and the *ſpecularis amethyſtina*, called *talc rouge*, or *red talc*, by the French. This is found in Muſcovy and Perſia, and no where elſe, as far as is yet known, and is often imported into France in maſſes, which are of a beautiful purple: we have of it brought into England, but only in thin flakes, fit for the covering of miniature pictures. In theſe flakes it has none of the redneſs natural to it in the lump, but is the fineſt and moſt tranſparent of all the talcs.

Pliny, and other of the ancient writers, as well as ſeveral of the moderns, uſe the term *ſpecularis lapis* for that ſpecies of talc commonly known by the name of *iſinglaſs*, or *Muſcovy glaſs*.

This has been a ſubſtance in great uſe among mechanics, from the earlieſt times we have any accounts of. It is found in broad flat maſſes of ten or twelve inches in breadth, and from half an inch to three inches in thickneſs; and is compoſed in theſe of an almoſt infinite number of broad and beautifully even plates, or flakes, laid with a perfect regularity on one another, and ſeldom parting naturally from each other, though by art they may be divided, almoſt without end, into broad and extremely thin laminæ. Theſe are very flexile and elaſtic, and make no efferveſcence with aqua fortis. By the laſt of theſe properties they are diſtinguiſhed from the plated ſpars which ſome have confounded with them, and by their elaſticity from all other foſſile bodies.

It is found in many parts of the world. The iſland of Cyprus abounds with it. It is very common alſo in Ruſſia, and has of late been diſcovered to abound in the Alps, the Apennines, and many of the mountains of Germany. It is imported in large quantities into England, and is uſed by the lanthorn-makers inſtead of horn, in their nicer works; by the painters to cover miniature pictures; and by the microſcope-makers to preſerve ſmall objects for viewing by glaſſes. The ancients uſed it inſtead of GLASS in their windows. Hill's Hiſt. of Foſſils, p. 72.

Some take the *lapis ſpecularis* to have been a ſpecies of GYPSUM, and compoſed of the acid of vitriol and calcareous earth. It came into uſe at Rome in the age of Seneca (Ep. 90.) and, ſoon after its introduction, was applied not only to lighten apartments, but to protect fruit trees from the ſeverity of the weather; and it is recorded, that the emperor Tiberius was enabled, principally by its means, to have cucumbers at his table during almoſt every month in the year.

Dr. Watſon apprehends it is ſtill uſed in ſome countries in the place of glaſs; however, it is well known, that it was ſo uſed in the time of Agricola, for he mentions (De Nat. Foſ. lib. v. p. 257) two churches in Saxony which were lighted by it. Agricola eſteemed it to have been a ſpecies of plaſter-ſtone, and in ſpeaking of it he remarks, that though it could bear, without being injured, the heat of ſummer, and the cold of winter, yet the largeſt maſſes of it were waſted by the rain. However, it differs from plaſter-ſtone in this property, that it does not after being calcined and wetted with water, ſwell and concrete into a hard ſtony ſubſtance. Watſon's Chem. Eſſ. vol. ii. p. 297, &c.

SPECULARIA, among the Romans, a kind of window-caſements, which were uſed before glaſs was introduced for this purpoſe. They conſiſted of tranſparent ſtones, called *lapides* SPECULARES.

SPECULARIA, the art of preparing and making *ſpecula*, or mirrors. Or, the laws of mirrors, their phenomena, cauſes, &c. called alſo *catoptrics*.

SPECULARIS *lapis*, in *Natural Hiſtory*. See SPECULARES.

SPECULATION.—*Certitude of* SPECULATION. See CERTITUDE.

SPECULATION-*ſhell*, in *Natural Hiſtory*, a name given by the French writers to a very beautiful ſpecies of the VOLUTA, uſually called by us the *Guinea-ſhell*, from its being brought from that part of the world.

SPECULATIVE *geometry*, *mathematics*, *muſic*, and *philoſophy*, ſee the ſubſtantives.

SPECULUM, *mirror*, in *Optics*, any poliſhed body, impervious to the rays of light: ſuch as water in wells, and deep rivers, poliſhed metals, and glaſſes lined with mercury, or any other opake matter, popularly called LOOKING-*glaſſes*.

For the ſeveral kinds and forms of *ſpecula*, *plain*, *concave*, and *convex*, with their theory and phenomena, and the methods of preparing, grinding them, &c. ſee MIRROR and GRINDING.

For the laws and effects of *ſpecula* of various forms, ſee REFLECTION and BURNING-*glaſs*.

As for the *ſpecula* of reflecting teleſcopes, we ſhall here obſerve, that the perfection of the metal of which they ſhould be made conſiſts in its hardneſs, whiteneſs, and compactneſs; for upon theſe properties the reflective powers and durability of the *ſpecula* depend. There are various compoſitions recommended in Smith's Optics, book iii. chap. 2. ſect. 787.

Three parts of copper, and one part and a quarter of tin, it is ſaid, will make a very hard white metal, but it is very liable to be more porous than it ſhould be, eſpecially if the metal be too much heated in melting. Beſides, Mr. Mudge obſerves, that it is not hard enough. Six parts of good ſhruff braſs, and one part of tin, will make a whiter and harder metal; but the fume of the calamy ſtone in braſs, often leaves ſtreaks of ſcabrous parts in the ſurface of the metal, which, if numerous, utterly ſpoil it. Take two parts of the former mixed metal of copper and tin, and one part of the latter braſs and tin; this compoſition will make a good metal: let the copper and the braſs be firſt melted together, and keep them in fuſion for half an hour or more; then clear the pot, and put in the proper quantity of tin for both, which will inſtantly melt; ſtir it well about, and pour it off immediately.

This mixture may be melted over and over again in caſe of neceſſity, provided always care be taken that the fire is not too violent. A common bellows-furnace has been found moſt convenient for governing the fire, and ſome metals have ſucceeded which have been caſt by a common braſs founder in their ordinary way of caſting; the compoſition having been firſt made and melted together for the *ſpeculum*, and delivered to them only for caſting. There hath been tried alſo another mixture and another manner of caſting, which ſucceeded better than any of the above mentioned; it was formed of copper, ſilver, regulus of antimony, tin, and arſenic; and the metal was caſt in very hot moulds of braſs; but this is too expenſive to become common.

Mr. Mudge obſerves, that all theſe compoſitions have their ſeveral defects, and after repeated trials he infers, that nothing more is neceſſary in order to procure a metal that ſhall be white, as hard as it can be wrought, and perfectly compact, than to melt two pounds of Swediſh copper, and when ſo melted, to add fourteen ounces and a half of grain-tin to it; then, having taken off the ſcoria, to caſt it into an ingot. This metal muſt be a ſecond time melted to caſt the *ſpeculum*; but as it will fuſe in this compound ſtate with a ſmall heat, and, therefore, will not calcine the tin into putty, it ſhould be poured off as ſoon as it is melted, giving it no more heat than is abſolutely neceſſary. It is to be obſerved, however, that the ſame metal, by frequent melting, loſes ſomething of its hardneſs and whiteneſs; when this is the caſe, it becomes neceſſary to enrich the metal by the addition of a little tin, perhaps in the proportion of half an ounce to a pound. And, indeed, when the metal is firſt made, if inſtead of adding the fourteen one half ounces of tin to two pounds of melted copper, about one

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ounce of the tin were to be reſerved and added to it in the ſucceeding melting, before it is caſt off into the moulds, the compoſition would be the more beautiful, and the grain of it much finer.

The beſt method for giving the melted metal a good ſurface is this: the moment before it is poured off, throw into the crucible a ſpoonful of charcoal duſt, immediately after which the metal muſt be ſtirred with a wooden ſpatula, and poured into the moulds. Phil. Tranſ. vol. lxvii. part i. art. 16.

For the method of grinding and poliſhing, &c. *ſpecula* of this kind. See GRINDING.

Mr. Hearne's method of cleaning a tarniſhed *ſpeculum* was this; get a little of the ſtrongeſt ſoap-ley from the ſoap-maker, and having laid the *ſpeculum* on a table with its face upwards, put on as much of the ley as it will hold, and let it remain about an hour: then rub it ſoftly with a ſilk or muſlin, till the ley is all gone; then put on ſome ſpirit of wine, and rub it dry with another part of the ſilk or muſlin. If after this the *ſpeculum* will not perform well, it muſt be new poliſhed. A few ſpots of faint tarniſh may be rubbed off with ſpirit of wine only. Smith's Opt. Rem. p. 107.

SPECULUM, *horizontal.* See HORIZONTAL.

SPECULUM, among *Surgeons*, the ſame with *ſpecillum.* More particularly,

SPECULUM *ani*, is an inſtrument wherewith they dilate the fundament to examine ſores, extract bones, or let out any peccant matter that may be there lodged. It conſiſts of a hollow cone or beak, which, being gently warmed or lubricated with oil, is paſſed into the anus; and by preſſing together the two handles, the ſides of the cone are thereby gradually ſeparated, and dilate the parts for inſpection.

SPECULUM *linguæ*, a chirurgical inſtrument. See GLOSSOSPATHA.

SPECULUM *indicum*, an affected term uſed by ſome chemical writers to expreſs filings of iron.

SPECULUM *matricis*, is an inſtrument uſed to examine and dreſs corrupted places in the privy parts of women. Its form is the ſame with that of the *ſpeculum ani.*

SPECULUM *oculi*, in *Surgery*, is an inſtrument uſed for holding the eyes firm, and opening their lids in couching and other operations for the eyes.

SPECULUM *oris*, is an inſtrument ſerving to examine diſorders in the mouth. There are two kinds: the one common; the other bigger and ſtronger, fit not only to keep down the tongue, but alſo the lower jaw; while the mouth is ſurveyed to the very extremity of the throat, and the neceſſary remedies applied. For an account of theſe inſtruments, with figures, ſee Heiſter's Surgery, vol. i. p. 441. vol. ii. p. 309, and 441.

SPEECH, the act, or art of expreſſing a man's thoughts, by certain ſigns invented for that purpoſe.

Theſe ſigns are principally ſounds made by the voice, and letters. See LANGUAGE.

SPEECH, in *Grammar*, denotes an aſſemblage of ſeveral words ranged in order.

The grammarians generally make *eight parts of ſpeech*, i. e. eight kinds of words uſed in diſcourſe; viz. *noun*, *pronoun*, *verb*, *participle*, *adverb*, *conjunction*, *prepoſition*, and *interjection*; each of which ſee under its proper article.

F. Buffier, one of the laſt and beſt writers on grammar, only admits of three parts of ſpeech, viz. *noun*, *verb*, and *modificative*; which laſt includes the *adverb*, *conjunction*, and *prepoſition*.

The ingenious Mr. Harris, after Ariſtotle, diſtributes all words into four ſpecies, viz. ſubſtantives, or nouns; attributives, or verbs; definitives, or articles; and connectives, or conjunctions; the two former are principals, or ſignificant from themſelves; and the two latter are acceſſories, or ſignificant by relation. Under theſe four ſpecies are included pronouns, adverbs, propoſitions, and interjections. Hermes, p. 31.

SPEEDWELL, *veronica*, in *Botany*, a genus of the *diandria monogynia* claſs. Its characters are theſe: the flower has a permanent empalement, cut into five acute ſegments, and it has one tubulous petal the length of the empalement; the brim is cut into four oval plain ſegments, which ſpread open, and two ſtamina, which are terminated by oblong ſummits; it has a compreſſed germen ſupporting a ſlender declining ſtyle, crowned by a ſingle ſtigma; the germen becomes a compreſſed heart-ſhaped capſule, with two cells filled with roundiſh ſeeds Miller reckons ſixteen, and Linnæu thirty-five ſpecies.

The common male *ſpeedwell*, or Paul's betony, is in great eſteem among the Germans, in diſorders of the breaſt, both catarrhous and ulcerous, and for purifying the blood and humours. Infuſions of the leaves, which are not unpalatable, are drank as tea, and are found to operate ſenſibly by urine. See BROOKLIME.

SPEEDWELL, *female.* See ELATINE.

SPEISSE, in *Mineralogy*, a name given by the Germans, and other workers on cobalt, to a ſort of impure regulus of biſmuth, ſometimes occurring in their proceſſes.

It is not uncommon for ores of biſmuth to be mixed with the cobalt in the ſmalt-works. Both this ore and the cobalt yield the blue vitrifiable earth of which ſmalt is made; but in one of them it is blended with arſenic, and in the other with the biſmuth. The ſeparating it from theſe two minerals requires different proceſſes, and the workmen, therefore, ſeparate the two minerals, and work each by itſelf; but it ſometimes happens that the ore of biſmuth is ſo like to the true cobalt, that it cannot be diſtinguiſhed by the eye, and ſo intimately mixed with it, that it cannot be ſeparated from it; in this caſe the whole is expoſed to the fire together, and after the arſenic is ſublimed in form of meal, there remains a coarſe and impure regulus of biſmuth, which having mixed itſelf with the earth of the cobalt, and other extraneous ſubſtances, is of a reddiſh white colour, and very impure and friable. This gives them the trouble of a ſecond operation, by which they ſeparate the pure regulus of biſmuth, and the remainder being a mixture of its earth and that of the cobalt, is run together into the blue glaſs called *ſmalt*, the earth of biſmuth ore being of the ſame nature with that of cobalt. Phil. Tranſ. N° 396, p. 199.

SPELL, a kind of CHARM, to drive away a diſeaſe, by hanging a word or ſentence written on a paper about the neck.

SPELL, in the *Sea Language*, the period wherein a ſailor, or gang of ſailors, is employed in a particular exerciſe, from which they are relieved as ſoon as the limited time expires. Such are the *ſpells* to the hand-lead in founding, to the pump, to look out on the maſt head, &c. and to ſteer the ſhip, which laſt is generally called the *trick*.

Spell alſo implies the relief or return of duty to thoſe ſervices: thus it is ſaid, *ſpell* the pump, *ſpell* the lead, &c.

SPELLING, that part of grammar properly called ORTHOGRAPHY.

Dr. Jones gives the following rules, or maxims of *ſpelling*.

1°, That all words were originally pronounced as *ſpelt*.

2°, That in all words whoſe ſounds have been ſince altered (the origin of the difficulty of *ſpelling*), the alteration was made for the ſake of eaſe and pleaſure.

And hence, 3°, All words that can be written ſeveral ways, muſt be *ſpelt* according to the hardeſt, harſheſt, and moſt unuſual ſound.

SPELTA, in the *Materia Medica*, a name uſed for the grain of the zea dicoccos, commonly called *ſpelt corn.*

SPELTER, or SPELTRE, a name ſometimes given to ZINC.

SPENT, at *Sea.* The ſeamen ſay a ſhip hath *ſpent* any maſt or yard, when it is broken down by foul weather, or any ſuch accident; but if it be done by an enemy's ſhot in a fight, they ſay, *ſuch a yard*, or *maſt*, *was ſhot by the board.*

SPERAGE, *aſparagus*, in *Botany*. See ASPARAGUS.

SPERGULA, in *Botany*. See SPURREY.

SPERM, SPERMA, σπερμα, the SEED whereof an animal is formed.

SPERMACETI, or *parmaſitty*, in *Pharmacy*, is a whitiſh, flaky, unctuous ſubſtance, prepared from oil; principally from that of a cetaceons fiſh, called by ſome the *male whale*, by others CACHALOT, and by the Latins *orga*; diſtinguiſhed from the common whale by its having teeth in lieu of whale-bone, and by a bunch on its back. See PHYSETER.

The ancients were ſtrangers to the nature of this preparation; and even Schroder ſeems in doubt, whether to reckon it an animal or mineral ſubſtance.

It had its name *ſpermaceti*, ſeed or ſperm of whale, given it, no doubt, to raiſe its value, by a notion of its ſcarcity: the oil it is properly to be made from, is found in a large trunk, four or five feet deep, and ten or twelve long, filling almoſt the whole cavity of the head, and ſeeming to ſupply the office of brain and cerebellum.

The method of preparing it is a ſecret in the hands of a very few. The proceſs is ſaid to be thus: the matter, being taken out of the animal, is melted over a gentle fire, and put into moulds, like thoſe wherein ſugar-loaves are formed. When cold, and drained, it is taken out, and melted over again, and this they continue to do till it be well purified, and become white. It is then cut with a knife for the purpoſe, and reduced into flakes, ſuch as we have from the druggiſts. Some of our druggiſts have now got the art of making it from the ſediment or fæces of any kind of oil. It muſt be choſen white, clear, and tranſparent, of a ſweetiſh ſmell, which ſome fancy to partake of that of the violet: ſome ſophiſticate it with wax; but the deceit is diſcovered, either by the ſmell of the wax, or by the dullneſs of the colour. Some alſo ſell a preparation of oil gained from the tail of the whale, inſtead of that from the brain; which laſt kind turns yellow, as ſoon as opened to the air. In the general, there is no merchandize that ſhould be kept cloſer from the air than *ſpermaceti*.

Spermaceti is of great uſe in medicine. Quincy ſays, it is a noble remedy in the aſthma, &c. though chiefly uſed in bruiſes, inward hurts, and after delivery. For internal uſe, it may be diſſolved in aqueous liquors into the form of an emulſion, by trituration with almonds, the yolk or white of an egg, and more elegantly by mucilages; or made into a lohoch, by mixing two drams of it with a ſuitable quantity of yolk of egg, then adding half an ounce of freſh drawn oil of almonds, and an ounce of balſamic ſyrup.

Spermaceti is not capable of being diſſolved by cauſtic alkalis, and of forming ſoaps, like other oily matters: but it is altogether ſoluble in oils, and unites by liquefaction with wax and reſins; and in theſe forms is applied externally.

But it is certain, its greateſt property, and that which makes it ſo much in vogue in many places, is its ſoftening the ſkin. Whence it comes to be uſed by the ladies in paſtes, waſhes, &c.

Spermaceti candles are of modern manufacture: they are made ſmooth, with a fine gloſs, free from rings and ſcars, ſuperior to the fineſt wax candles in colour and luſtre; and, when genuine, leave no ſpot or ſtain on the fineſt ſilk, cloth, or linen.

SPERMACOCE, *button weed*, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are theſe: the flower has a permanent empalement, indented in four parts, ſitting on the germen; it has one cylindrical petal, whoſe tube is longer than the empalement, and the brim indented in four parts; and it has four awl-ſhaped ſtamina, ſhorter than the petal, terminated by ſingle ſummits; it has a roundiſh compreſſed germen, ſituated under the flower, ſupporting a ſingle ſtyle, divided into two parts at the top, crowned by obtuſe ſtigmas; the germen afterwards turns to two oblong ſeeds, which are joined, having two horns, and are convex on one ſide, and plain on the other. Linnæus enumerates ſix, and Miller two ſpecies, natives of Jamaica, where one of the ſpecies is known by the name of button-weed. Miller.

SPERMATIC, *σπερματικος*, in *Anatomy*, ſomething belonging to the ſperm or ſeed.

The ancients made a general diviſion of the parts of the animal body into *ſpermatic* and *ſanguineous*. *Spermatic parts* are thoſe, which by their colour, &c. bear ſome reſemblance to the ſeed; and were ſuppoſed to be formed thereof; ſuch are the nerves, membranes, bones, &c. *Sanguineous* are thoſe ſuppoſed to be formed of the blood after conception.

But the moderns, with much better reaſon, hold all the parts to be *ſpermatic* in this ſenſe, and either formed originally of the ovum of the female, or of the ſemen of the male. M. Andry ſpeaks of *ſpermatic worms* in the human body. See Worms.

Spermatic *veſſels*, called alſo *vaſa præparantia*, are certain veſſels appointed for bringing the blood to the teſticles, &c. to be ſecreted and prepared into ſeed, and for carrying back again the blood remaining after the ſecretion is effected.

The *ſpermatic veſſels* are two arteries, and as many veins.

Spermatic *arteries, the*, ariſe from the fore part of the trunk of the aorta, below the emulgents. See *Tab. Anat.* (*Angeiol.*) *fig.* 1. *n.* 51. (*Splanch.*) *fig.* 1. *lit. p. p.* &c.

Their ſtructure is very ſingular, in that, contrary to the fabric of all other arteries, which are largeſt at their exit from the trunk, theſe are ſmalleſt at their origin, and grow bigger in their progreſs towards the teſtes. By this means the blood receives a check at its firſt going off for thoſe parts, which diſpoſes it for the future changes, &c. it is to paſs. The ſame end is anſwered in quadrupeds, by having theſe arteries curled and contorted in their paſſage like a ſcrew.

The reaſon why nature has taken another method in man, Mr. Cowper obſerves, is, that, in that caſe, the abdominal muſcles muſt have been larger than they are; by which means the inteſtines would have been frequently let down into the ſcrotum; an inconvenience which quadrupeds are ſecured from, by the horizontal poſition of their bodies.

The *ſpermatic arteries*, in their progreſs, ſend off to the common membrane of the kidney ſmall branches, named *arteriæ adipoſæ*, and, meeting with the *ſpermatic veins*, enter together with them the inner lamella of the peritonæum, where, inſinuating into the duplicature of the proceſs, and being clothed therewith, they paſs on to within three or four fingers breadth of the teſticles, where they divide into two unequal branches, the biggeſt of which goes to the Testicle, and is diſtributed therein: and the leſs in the paraſtata or epididymis.

In women, the *ſpermatic arteries* do not go out of the abdomen, but are diſtributed to the ovaria and uterus, and communicate with branches of the hypogaſtrica, at the jagged extremities of the tubæ Fallopianæ.

Spermatic *veins, the*, take the ſame courſe with the arteries; the right vein ariſing commonly from the trunk of the vena cava, and the left vein from the vena renalis ſiniſtra, only, a little above the teſticles, they ſplit into ſeveral branches, which, uniting, form a plexus, called *corpus varicoſum pampiniforme*, or *pyramidale*. They differ from the *ſpermatic* arteries, not only in that they are larger, and their coats thinner, but alſo in being more divided and multiplied, as they deſcend to the rings of the abdominal muſcles: and as they gradually produce a large faſciculus of ramifications, the ancients gave to them and the arteries the name of vaſa pyramidalia. The numerous convolutions formed by theſe ramifications, gave riſe to the name of vaſa pampiniformia, formerly given to theſe veſſels. The blood returned by the *ſpermatic veins* is delivered on the right ſide to the cava, and on the left into the emulgent vein. See *Tab. Anat.* (*Angeiol.*) *fig.* 6. *n.* 2.

SPERMATOCELE, in *Surgery*, a kind of rupture, occaſioned by a diſtenſion of the ſeminal veſſels, whereby they are let fall into the ſcrotum.

SPERMATOPŒA, a name given to ſuch medicines as are ſuppoſed to increaſe the ſemen.

SPERMATOSIS, is a term ſometimes uſed for the formation of ſeed.

SPERVERIUS, in *Ornithology*, a name by which Bellonius, and ſome other authors, have called the *ſparrow*-Hawk, more commonly known by the names of *niſus*, and *accipiter fringillarius*.

SPHACELUS, or Sphacelismus, formed, perhaps, of *σφαττω*, *I kill*, in *Surgery*, a total corruption or mortification of any ſort, occaſioned by an interception of the blood and ſpirits. See Mortification.

It is ſometimes, alſo called *necroſis*, and ſometimes *ſideratio*.

SPHÆCULÆ, among the Romans, were tickets of wood, *teſſeræ ligneæ*, by which the emperors ſcattered their preſents to people of both ſexes in the theatre, or circus.

SPHÆRANTHUS, in *Botany*. See Globe *Flower*.

SPHÆRISTERIUM, *σφαιριςεριον*, in *Antiquity*, the ſeventh part of the ancient gymnaſium; being that wherein the youth practiſed tennis-playing.

The *ſphæriſterium*, or tennis-court, was between the place named *palæſtra*, and that where they ran races, which was between the porticoes and the outer wall, though Vitruvius does not make mention of it in the deſcription he gives of the ancient gymnaſium.

The exerciſe here performed was called *σφαιριστικη*, *ſphæriſtica*, and *σφαιρομαχια*, *ſphæromachia*, which ſome will have to have differed from the modern tennis; but it is not known wherein the difference conſiſted.

The Mileſians were particularly averſe from this exerciſe; and the Athenians were as remarkably fond of it. Theſe latter frequently gave the freedom of their city to the *ſphæriſtæ*, or maſters in this art, by way of compliment.

SPHÆROMACHIA, *σφαιρομαχια*, in *Antiquity*, a particular kind of Boxing, wherein the combatants had balls of ſtone or lead in their hands, which were called *σφαιραι*.

SPHAGITIDES, a name given by ſome authors to the jugular veins.

SPHAGNUM, in *Botany*, the name of a genus of the *cryptogamia* claſs of moſſes, the characters of which are theſe: they produced heads or capſules only of one kind, which differ alſo from thoſe of all the other moſſes, in that they have no calyptra, or any other covering; theſe ſtand on very ſhort pedicles, and are therefore ſo guarded by the leaves, as not to need any other covering. The *ſphagna* are divided into two orders, the one comprehending the branched kinds, and the other the unbranched ones: theſe are diſtinguiſhed by ſome by the terms *cauliſtrous* and *acaulous*. See *Tab.* XIII. *of Botany*, Nº 8. Dillon, Hiſt. Muſc. p. 242.

Of the firſt order there are nine known ſpecies.

Of the *ſphagna* of the ſecond order, or thoſe which have no branched ſtalks, there are only four known ſpecies. Linnæus enumerates three ſpecies.

SPHENOIDAL *ſuture*, in *Anatomy*, a *ſuture* thus called, from its encompaſſing the os ſphenoides, which it ſeparates from the os frontis, the os petroſum, and os occipitis.

SPHENOIDES, in *Anatomy*, os cuneiforme; a bone of the head, common to the cranium and upper jaw.

It is ſituate in the lower part of the ſkull, whereof it is, as it were, the baſis, and is connected to all the other members thereof by the *ſphenoidal ſuture*. See *Tab. Anat. (Oſteol.) fig. 7. n.* 5.

Its form is irregular, and not eaſy to be deſcribed, whence ſome have called it *multiforme*.

It has its name *ſphenoides*, from the Greek σφην, *cuneus*, *wedge*, by reaſon of the manner of its inſertion into the other bones of the ſkull.

In adults it is one continued bone; but in young children it ſometimes conſiſts of three, and ſometimes of four diſtinct pieces.

Its greateſt extent is tranſverſe, and it may in ſome manner be ſaid to repreſent a bat with its wings extended: its poſterior, or thickeſt part, by which it is joined to the apophyſis of the os occipitis, may be called its body; the reſt of it is wholly made up of eminences and cavities. And in order to examine theſe methodically, the bone muſt be divided into two ſides, the one external, the greateſt part of which may be ſeen in an entire ſkull; the other internal, which does not appear till the ſkull is opened.

The eminences on the outſide are theſe: two temporal apophyſes, which are the largeſt of all the proceſſes of this bone, and at the greateſt diſtance from each other, called *the great wings of the os ſphenoides*, and theſe are ſometimes, though rarely, ſeparated from the reſt of the bone by tranſverſe ſutures: two orbitary apophyſes, which form a conſiderable portion of the orbit next the temples; a ſmall ſharp proceſs, formed like a bird's bill between the orbitary apophyſes: two pterygoide apophyſes, each of which is divided into two alæ; one external, which is the largeſt, the other internal, the lower end of which is in the ſhape of a hook; and each of theſe alæ is again divided into two ſides, the one internal toward the palate, the other external toward the temples: two ſpinal apophyſes; a little anterior eminence above the ſharp proceſs, for the articulation of this bone with the os ethmoides; but in ſome ſubjects, inſtead of this eminence, there is only a little notch.

The external cavities of this bone are two portions of the temporal foſſæ; two portions of the orbitary foſſæ; two pterygoide foſſæ; the lower ends of theſe are divided by a little notch, or ſlit, of irregular figure, which may be called the *fiſſura palatina*: a little oblong foſſula at the root of the internal ala; two ſuperior orbitary, or *ſphenoidal* fiſſures, a little notch at the end of each of theſe fiſſures, for the paſſage of an artery of the dura mater; two temporal notches; two maxillary notches, the edges of which help to form the two inferior orbitary fiſſures, which may be called *fiſſuræ ſpheno-maxillares*, two holes for the ſuperior maxillary nerves; two other holes on one ſide of the former, called *pterygoide*, which, in an entire ſkull, are hid by the other bones; two oval holes, for the inferior maxillary nerves; two little ſpinal holes, each of which tranſmits an artery of the dura mater, but ſometimes theſe are only notches; a little hole between the two maxillary holes; and a little groove on one ſide of the ſpinal apophyſis, which forms part of the Euſtachian tube.

The internal eminences are two thin ſharp tranſverſe apophyſes, which form the ſuperior arbitrary fiſſures, called *the little wings of the ſphenoidal bone*; a little proceſs, in ſome ſubjects, between theſe two thin apophyſes, for the articulation with the os ethmoides, which in ſome other ſubjects is a notch: four clynoide apophyſes, two anterior, two poſterior; which laſt are ſometimes united in one, and ſometimes run forward all the way to the anterior proceſſes, forming a kind of bridge, under which the internal carotid artery paſſes at its laſt curvature; this paſſage has alſo ſometimes been found divided into two by a thin bony ſeptum, beſide other varieties; one or two ſmall productions where the internal carotid enters the cranium; two little ſtyloide proceſſes, or hooks, which in ſome ſubjects join the extremity of the os occipitis, before the perfect union of theſe bones.

The internal cavities are two portions of the large middle foſſæ of the baſis cranii; two ſuperior, orbitary, or *ſphenoidal* fiſſures; two optic holes; a ſmall ſuperior orbitary hole, near the end of each *ſphenoidal* fiſſure, which is often no more than a notch; a ſmall groove at the extremities of the ſame fiſſures; a depreſſion between the clynoide apophyſes, called *ſella ſphenoidalis*, *ſella turcica*, and *foſſa pituitaria*. Here are alſo ſeen almoſt all the holes mentioned on its outſide, and it appears that the ſuperior maxillary hole ought more juſtly to be called a ſhort canal. Beſide theſe, there are alſo two very conſiderable cavities, called the *ſphenoidal ſinuſes*, ſituated in the thick portion of this bone, under the anterior part of the ſella turcica, and middle ſpace between the two optic holes, reaching as far as the ſharp proceſs, or bill, already deſcribed; theſe are commonly divided by a bony ſeptum, and they open before on each ſide of the ſharp proceſs, juſt behind the ſuperior conchæ of the noſe, or oſſa convoluta ſuperiora.

The figure, ſize, openings, and ſeptum of theſe vary greatly; ſometimes one is wanting, ſometimes both are ſo; ſometimes there are ſeveral cells without any ſeptum, and ſometimes the ſeptum is placed more on one ſide than the other. The ſubſtance of the bone is for the moſt part compact, having very little diploe; and what there is of this lies in diſtinct parts of the bone, viz. in the thick portion behind the ſella turcica, toward the ſymphyſis with the occipital bone, and in the orbitary apophyſes in a ſmall quantity. It is articulated with all the other bones of the cranium, with the oſſa malarum, oſſa maxillaria, oſſa palati, and vomer. Winſlow's Anatomy, p. 26.

SPHENOIDES *ſella*. See SELLA.

SPHENO-*maxillary artery*, in *Anatomy*, is the firſt branch of the internal maxillary artery; it paſſes to the *ſpheno*-maxillary fiſſure, and to the orbit, through the foramen *ſpheno*-palatinum.

SPHENO-*maxillary fiſſures*. See SPHENOIDES and PALATE.

SPHENO-*palatini*, in *Anatomy*, are thoſe muſcles which riſe (one on each ſide) from the os ſphenoides, and are inſerted into the glandula palati, and poſterior part of the uvula.

SPHENO-*palatinus*, is the name of a branch of the *fifth pair* of NERVES.

SPHENO-*pharyngæi*, in *Anatomy*, muſcles of the PHARYNX, inſerted partly in the os ſphenoides, directly above the internal ala of the apophyſis pterygoides, and partly in the neighbouring cartilaginous portion of the Euſtachian tube. For their uſe, ſee PTERO-*pharyngæi*.

SPHENO-*pterygo-palatinus*, is a muſcle belonging to the tuba Euſtachiana, which riſes from the os ſphenoides, and is inſerted into the fore-part of the PALATE.

SPHENO-*ſalpingo-ſtaphylini*, are two diſtinct muſcles; each of which is fixed by one extremity, partly to the ſphenoidal ſide of the bony portion of the Euſtachian tube, partly to the neareſt ſoft portion of the ſame tube. From thence it runs toward the external ala of the apophyſis pterygoides, into which one portion of this muſcle is inſerted. The other portion runs to the end of the ala, and turns round to the forked extremity thereof as over a pulley, and is afterwards inſerted in the ſeptum palati near the uvula.

SPHENO-*ſtaphylinus*, in *Anatomy*, a muſcle of the uvula: it deſcends from a round fleſhy origination, near the root of a proceſs of the os ſphenoides; and is implanted into the poſterior part of the uvula, where it joins its partner. It ſerves to draw the uvula upwards and backwards; and hinders the maſticated aliment from paſſing into the formina narium in deglutition.

SPHERE, SPHÆRA, σφαιρα, in *Geometry*, a ſolid body contained under one ſingle ſurface, and having a point in the middle, called the *centre*, whence all lines, drawn to the ſurface, are equal.

The *ſphere* is ſuppoſed to be generated by the revolution of a ſemicircle A B C (*Tab.* IV. *Geometry*, *fig.* 114.) about its diameter A C, which is alſo called the *axis of the ſphere*, and the extreme points of the axis, A and C, the *poles of the ſphere*.

SPHERE, *properties of the.* 1°, A *ſphere* is equal to a pyramid, whoſe baſe is equal to the ſurface, and its height to the radius of the *ſphere*.

Hence, a *ſphere* being eſteemed ſuch a pyramid, its cube, or ſolid content, is found like that of a pyramid.

2°, A *ſphere* is to a cylinder, ſtanding on an equal baſis, and of the ſame height, as 2 to 3. Hence, alſo, may the cube, or content of the *ſphere* be found.

3°, A *ſphere* is equal to four times the cone, the baſe of which is equal to the generating circle, and the height of which is equal to the radius. Or a hemiſphere is equal to twice the cone of the ſame baſe and height. And a cylinder, of the ſame height and baſe, being a triple of the cone, it follows, that the hemiſphere is two thirds of the cylinder, and conſequently the whole *ſphere* two thirds of the circumſcribing cylinder. Archim. de Sph. et Cycl. Apud Opera per Rivaltum, p. 67.

4°, The cube of the diameter of a *ſphere* is to the ſolid content of the *ſphere*, nearly as 300 to 157: and thus, alſo, may the content of the *ſphere* be meaſured.

5°, The ſurface of a *ſphere* is quadruple the area of a circle deſcribed with the radius of the *ſphere*. For ſince a *ſphere* is equal to a pyramid, whoſe baſe is the ſurface, and its altitude the radius of the *ſphere*; the ſurface of the *ſphere* is had, by dividing its ſolidity by a third part of its ſemidiameter, or one ſixth of the whole diameter.

But the ſolidity of the *ſphere* is the product of $\frac{2}{3}$ of the greateſt circle by the diameter; and if this product be divided by $\frac{1}{6}$ of the diameter, the quotient, or $\frac{12}{3}$ of the greateſt circle, i. e. four times the greateſt circle, will be the ſurface of the *ſphere*.

Otherwiſe: the ſurface of a *ſphere* is equal to the product of its diameter and the periphery of its generating circle; but the area of this circle is equal to the product of the ſemidiameter and half the periphery, or one fourth of the product of the diameter and periphery; and, therefore, the ſurface of the *ſphere* is equal to four times the area of its generating circle.

Hence 6°, The ſurfaces of *ſpheres* are to one another as the ſquares of their diameters; becauſe theſe ſurfaces, being four times their generating circles, are as theſe circles, i. e. as the ſquares of their diameters.

7°, *Spheres*, being $\frac{2}{3}$ parts of cylinders of equal baſe and altitude, and CYLINDERS being as the cubes of their altitudes, are as the cubes, or in the triplicate ratio of their diameters.

8°, The ſurface of any portion of a *ſphere*, greater or leſs than the hemiſphere, is equal to the area of a circle, whoſe radius is a line drawn from the vertex of that portion to the circumference of the circle which is its baſe. Archimedes, ubi ſupra, p. 84, 85.

Sphere, *the diameter of a, being given, to find its ſurface and ſolidity.* Find the periphery of the circle deſcribed by the radius of the *ſphere*, or of the generating circle.

Multiply this, found, into the diameter, or the ſquare of the diameter, by 3,1416, the product is the ſurface of the *ſphere*. Multiply the ſurface by a ſixth part of the diameter, or the area of the generating circle by $\frac{2}{3}$ of its diameter; or again (becauſe the area of ſuch circle is to the ſquare of the diameter as ,7854 to 1), the cube of the diameter by ,5236 ($=\frac{2}{3}$ of ,7854); and the product is the ſolidity of the *ſphere*.

Thus, ſuppoſing the diameter of the *ſphere* 56, the periphery will be found 175,9, which multiplied by the diameter, the product 9852 is the ſurface of the *ſphere*; which multiplied by one ſixth part of the diameter, gives the ſolidity 91623,6.

Or thus;

Find the cube of the diameter 175616; then to 300,157, and the cube found, find a fourth proportional. This is the ſolidity of the *ſphere* required.

For finding the ſurface and ſolidity of the *ſphere* by the method of fluxions, ſee SUPERFICIES and SOLIDITY.

For ſegments and ſectors of *ſpheres*, ſee SEGMENT and SECTOR.

Sphere, *doctrine of the.* See SPHERICS.

Sphere, *projection of the.* See PROJECTION.

Sphere *of activity.* See ACTIVITY.

Sphere, in *Aſtronomy*, that concave orb or expanſe which inveſts our globe, and in which the heavenly bodies, viz. ſun, ſtars, planets, and comets, appear to be fixed at an equal diſtance from the eye.

This is alſo called the *ſphere of the world*; and is the ſubject of the ſpherical aſtronomy.

This *ſphere*, as it includes the fixed ſtars, whence we alſo occaſionally call it the *ſphere of the fixed ſtars*, is vaſtly great. The diameter of the earth's orbit is ſo ſmall, in reſpect of the diameter hereof, that the centre of the *ſphere* is not ſenſibly changed by any alteration of the ſpectator's place in the ſeveral parts of the orbit; but ſtill, in all the points of the earth's ſurface, and at all times, the inhabitants have the ſame appearance of the *ſphere*; that is, the fixed ſtars ſeem to poſſeſs the ſame points in the ſurface of the *ſphere*. For our way of judging of the places, &c. of the ſtars, is to conceive right lines drawn from the eye, or the centre of the earth, through the centre of the ſtars, and continued thence till they cut the foreſaid *ſphere*; the points where theſe lines terminate therein are the apparent places of thoſe ſtars.

The better to determine the places of the heavenly bodies in the *ſphere*, ſeveral circles are imagined to be deſcribed in the ſurface thereof, hence called CIRCLES *of the ſphere*.

Sphere, in *Geography*, &c. denotes a certain diſpoſition of the circles on the ſurface of the earth, with regard to one another, which varies in various parts thereof.

The circles originally conceived on the ſurface of the *ſphere* of the world, are almoſt all transferred, by analogy, to the ſurface of the earth, where they are conceived to be drawn directly underneath thoſe of the *ſphere*, or in the ſame planes therewith; ſo that, if the planes of thoſe of the earth were continued to the *ſphere*, they would coincide with the reſpective circles thereon.

Thus we have an horizon, meridian, equator, &c. on the earth.

As the equator in the heavens divides the *ſphere* into two equal parts, the one north, and the other ſouth, ſo does the equator on the ſurface of the earth divide the globe in the ſame manner.

And as the meridians in the heavens paſs through the poles of the horizon, ſo do thoſe of the earth, &c.

With regard, then, to the poſition of ſome of the circles in reſpect of others, we have a RIGHT, a PARALLEL, and an OBLIQUE *ſphere*.

Sphere, *armillary*, or *artificial*, is an aſtronomical inſtrument, repreſenting the ſeveral circles of the *ſphere* in their natural order; ſerving to give an idea of the office and poſition of each of them; and to ſolve various problems relating to them.

It is thus called, as conſiſting of a number of faſciæ or rings of braſs, or other matter, called by the Latins *armillæ*, from their reſembling of bracelets, or rings for the arm.

By this it is diſtinguiſhed from the *globe*, which, though it hath all the circles of the *ſphere* on its ſurface; yet is not cut into armillæ or rings, to repreſent the circles ſimply and alone; but exhibits alſo the intermediate ſpaces, between the circles.

Sphere, *the armillary*, of Mr. Ferguſon, conſtructed after the model of the glaſs *ſphere* of Dr. Long, is repreſented (*Tab.* IV. *Aſtronomy*, *fig.* 89.)

The exterior parts of this machine are a compages of braſs rings, which repreſent the principal circles of the heaven, viz. 1. The equinoctial A A, which is divided into 360 degrees (beginning at its interſection with the ecliptic in Aries), for ſhewing the ſun's right aſcenſion in degrees; and alſo into twenty-four hours, for ſhewing his right aſcenſion in time. 2. The ecliptic B B, which is divided into 12 ſigns, and each ſign into 30 degrees, and alſo into the months and days of the year, in ſuch a manner, that the degree or point of the ecliptic in which the ſun is, on any given day, ſtands over that day in the circle of months. 3. The tropic of Cancer C C, touching the ecliptic at the beginning of Cancer in *e*; and the tropic of Capricorn D D, touching the ecliptic at the beginning of Capricorn in *f*; each 23 ½ degrees from the equinoctial circle. 4. The arctic circle E, and the antarctic circle F, each 23 ½ degrees from its reſpective pole at N. and S. 5. The equinoctial colure G G, paſſing through the north and ſouth poles of the heaven at N and S, and through the equinoctial points Aries and Libra, in the ecliptic. 6. The ſolſtitial colure H H, paſſing through the poles of the heaven, and through the ſolſtitial points Cancer and Capricorn, in the ecliptic. Each quarter of the former of theſe colures is divided into 90 degrees, from the equinoctial to the poles of the world, for ſhewing the declination of the ſun, moon, and ſtars: and each quarter of the latter, from the ecliptic at *e* and *f*, to its poles *b* and *d*, for ſhewing the latitudes of the ſtars.

In the north pole of the ecliptic is a nut *b*, to which is fixed one end of a quadrantal wire, and to the other end a ſmall ſun Y, which is carried round the ecliptic B B, by turning the nut: and in the ſouth pole of the ecliptic is a pin at *d*, on which is another quadrantal wire, with a ſmall moon Z upon it, which may be moved round by hand: but there is a particular contrivance for cauſing the moon to move in an orbit which croſſes the ecliptic at an angle of 5 ⅓ degrees, in two oppoſite points, called the *moon's nodes*; and alſo for ſhifting thoſe points backward in the ecliptic, as the moon's nodes ſhift in the heaven.

Within theſe circular rings is a ſmall terreſtrial globe I, fixt on an axis K K, which extends from the north and ſouth poles of the globe at *n* and *s*, to thoſe of the celeſtial *ſphere* at N and S. On this axis is fixt the flat celeſtial meridian L L, which may be ſet directly over the meridian of any place on the globe, and then turned round with the globe, ſo as to keep over the ſame meridian upon it. This flat meridian is graduated the ſame way as the braſs meridian of the common globe, and its uſe is much the ſame. To this globe is fitted the moveable horizon M M, ſo as to turn upon two ſtrong wires proceeding from its eaſt and weſt points to the globe, and entering the globe at oppoſite points of its equator, which is a moveable braſs ring let into the globe in a groove all round its equator. The globe may be turned by hand within this ring, ſo as to place any given meridian upon it, directly under the celeſtial meridian L L. The horizon is divided into 360 degrees all round its outermoſt edge, within which are the points of the compaſs, for ſhewing the amplitude of the ſun and moon, both in degrees and points. The celeſtial meridian L L paſſes through two notches in the north and ſouth points of the horizon, as in a common globe: but here, if the globe be turned round, the horizon and meridian turn from its encompaſſing the os ſphenoides, which it ſeparates from the os frontis, the os petroſum, and os occipitis.

SPHENOIDES, in *Anatomy*, os cuneiforme; a bone of the head, common to the cranium and upper jaw.

It is ſituate in the lower part of the ſkull, whereof it is, as it were, the baſis, and is connected to all the other members thereof by the *ſphenoidal ſuture*. See *Tab. Anat.* (*Oſteol.*) *fig.* 7. *n.* 5.

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In adults it is one continued bone; but in young children it ſometimes conſiſts of three, and ſometimes of four diſtinct pieces.

Its greateſt extent is tranſverſe, and it may in ſome manner be ſaid to repreſent a bat with its wings extended: its poſterior, or thickeſt part, by which it is joined to the apophyſis of the os occipitis, may be called its body; the reſt of it is wholly made up of eminences and cavities. And in order to examine theſe methodically, the bone muſt be divided into two ſides, the one external, the greateſt part of which may be ſeen in an entire ſkull; the other internal, which does not appear till the ſkull is opened.

The eminences on the outſide are theſe: two temporal apophyſes, which are the largeſt of all the proceſſes of this bone, and at the greateſt diſtance from each other, called *the great wings of the os ſphenoides*, and theſe are ſometimes, though rarely, ſeparated from the reſt of the bone by tranſverſe ſutures: two orbitary apophyſes, which form a conſiderable portion of the orbit next the temples; a ſmall ſharp proceſs, formed like a bird's bill between the orbitary apophyſes: two pterygoide apophyſes, each of which is divided into two alæ; one external, which is the largeſt, the other internal, the lower end of which is in the ſhape of a hook; and each of theſe alæ is again divided into two ſides, the one internal toward the palate, the other external toward the temples: two ſpinal apophyſes: a little anterior eminence above the ſharp proceſs, for the articulation of this bone with the os ethmoides; but in ſome ſubjects, inſtead of this eminence, there is only a little notch. The external cavities of this bone are two portions of the temporal foſſæ; two portions of the orbitary foſſæ; two pterygoide foſſæ; the lower ends of theſe are divided by a little notch, or ſlit, of irregular figure, which may be called the *fiſſura palatina*: a little oblong foſſula at the root of the internal ala; two ſuperior orbitary, or *ſphenoidal* fiſſures, a little notch at the end of each of theſe fiſſures, for the paſſage of an artery of the dura mater; two temporal notches; two maxillary notches, the edges of which help to form the two inferior orbitary fiſſures, which may be called *fiſſuræ ſpheno-maxillares*, two holes for the ſuperior maxillary nerves; two other holes on one ſide of the former, called *pterygoide*, which, in an entire ſkull, are hid by the other bones; two oval holes, for the inferior maxillary nerves; two little ſpinal holes, each of which tranſmits an artery of the dura mater, but ſometimes theſe are only notches; a little hole between the two maxillary holes; and a little groove on one ſide of the ſpinal apophyſis, which forms part of the Euſtachian tube.

The internal eminences are two thin ſharp tranſverſe apophyſes, which form the ſuperior arbitrary fiſſures, called *the little wings of the ſphenoidal bone*; a little proceſs, in ſome ſubjects, between theſe two thin apophyſes, for the articulation with the os ethmoides, which in ſome other ſubjects is a notch: four clynoide apophyſes, two anterior, two poſterior; which laſt are ſometimes united in one, and ſometimes run forward all the way to the anterior proceſſes, forming a kind of bridge, under which the internal carotid artery paſſes at its laſt curvature; this paſſage has alſo ſometimes been found divided into two by a thin bony ſeptum, beſide other varieties; one or two ſmall productions where the internal carotid enters the cranium; two little ſtyloide proceſſes, or hooks, which in ſome ſubjects join the extremity of the os occipitis, before the perfect union of theſe bones.

The internal cavities are two portions of the large middle foſſæ of the baſis cranii; two ſuperior, orbitary, or *ſphenoidal* fiſſures; two optic holes; a ſmall ſuperior orbitary hole, near the end of each *ſphenoidal* fiſſure, which is often no more than a notch; a ſmall groove at the extremities of the ſame fiſſures; a depreſſion between the clynoide apophyſes, called *ſella ſphenoidalis*, *ſella turcica*, and *foſſa pituitaria*. Here are alſo ſeen almoſt all the holes mentioned on its outſide, and it appears that the ſuperior maxillary hole ought more juſtly to be called a ſhort canal. Beſide theſe, there are alſo two very conſiderable cavities, called the *ſphenoidal ſinuſes*, ſituated in the thick portion of this bone, under the anterior part of the ſella turcica, and middle ſpace between the two optic holes, reaching as far as the ſharp proceſs, or bill, already deſcribed; theſe are commonly divided by a bony ſeptum, and they open before on each ſide of the ſharp proceſs, juſt behind the ſuperior conchæ of the noſe, or oſſa convoluta ſuperiora.

The figure, ſize, openings, and ſeptum of theſe vary greatly; ſometimes one is wanting, ſometimes both are ſo; ſometimes there are ſeveral cells without any ſeptum, and ſometimes the ſeptum is placed more on one ſide than the other. The ſubſtance of the bone is for the moſt part compact, having very little diploe; and what there is of this lies in diſtinct parts of the bone, viz. in the thick portion behind the ſella turcica, toward the ſymphyſis with the occipital bone, and in the orbitary apophyſes in a ſmall quantity. It is articulated with all the other bones of the cranium, with the oſſa malarum, oſſa maxillaria, oſſa palati, and vomer. Winſlow's Anatomy, p. 26.

SPHENOIDES *ſella*. See SELLA.

SPHENO-*maxillary artery*, in *Anatomy*, is the firſt branch of the internal maxillary artery; it paſſes to the *ſpheno*-maxillary fiſſure, and to the orbit, through the foramen *ſpheno*-palatinum.

SPHENO-*maxillary fiſſures*. See SPHENOIDES and PALATE.

SPHENO-*palatini*, in *Anatomy*, are thoſe muſcles which riſe (one on each ſide) from the os ſphenoides, and are inſerted into the glandula palati, and poſterior part of the uvula.

SPHENO-*palatinus*, is the name of a branch of the *fifth pair* of NERVES.

SPHENO-*pharyngæi*, in *Anatomy*, muſcles of the PHARYNX, inſerted partly in the os ſphenoides, directly above the internal ala of the apophyſis pterygoides, and partly in the neighbouring cartilaginous portion of the Euſtachian tube. For their uſe, ſee PTERO-*pharyngæi*.

SPHENO-*pterygo-palatinus*, is a muſcle belonging to the tuba Euſtachiana, which riſes from the os ſphenoides, and is inſerted into the fore-part of the PALATE.

SPHENO-*ſalpingo-ſtaphylini*, are two diſtinct muſcles; each of which is fixed by one extremity, partly to the ſphenoidal ſide of the bony portion of the Euſtachian tube, partly to the neareſt ſoft portion of the ſame tube. From thence it runs toward the external ala of the apophyſis pterygoides, into which one portion of this muſcle is inſerted. The other portion runs to the end of the ala, and turns round to the forked extremity thereof as over a pulley, and is afterwards inſerted in the ſeptum palati near the uvula.

SPHENO-*ſtaphylinus*, in *Anatomy*, a muſcle of the uvula: it deſcends from a round fleſhy origination, near the root of a proceſs of the os ſphenoides; and is implanted into the poſterior part of the uvula, where it joins its partner. It ſerves to draw the uvula upwards and backwards; and hinders the maſticated aliment from paſſing into the formina narium in deglutition.

SPHERE, SPHÆRA, σφαιρα, in *Geometry*, a ſolid body contained under one ſingle ſurface, and having a point in the middle, called the *centre*, whence all lines, drawn to the ſurface, are equal.

The *ſphere* is ſuppoſed to be generated by the revolution of a ſemicircle A B C (*Tab.* IV. *Geometry*, *fig.* 114) about its diameter A C, which is alſo called the *axis of the ſphere*, and the extreme points of the axis, A and C, the *poles of the ſphere*.

SPHERE, *properties of the.* 1°, A *ſphere* is equal to a pyramid, whoſe baſe is equal to the ſurface, and its height to the radius of the *ſphere*.

Hence, a *ſphere* being eſteemed ſuch a pyramid, its cube, or ſolid content, is found like that of a pyramid.

2°, A *ſphere* is to a cylinder, ſtanding on an equal baſis, and of the ſame height, as 2 to 3. Hence, alſo, may the cube, or content of the *ſphere* be found.

3°, A *ſphere* is equal to four times the cone, the baſe of which is equal to the generating circle, and the height of which is equal to the radius. Or a hemiſphere is equal to twice the cone of the ſame baſe and height. And a cylinder, of the ſame height and baſe, being a triple of the cone, it follows, that the hemiſphere is two thirds of the cylinder, and conſequently the whole *ſphere* two thirds of the circumſcribing cylinder. Archim. de Sph. et Cycl. Apud Opera per Rivaltum, p. 67.

4°, The cube of the diameter of a *ſphere* is to the ſolid content of the *ſphere*, nearly as 300 to 157: and thus, alſo, may the content of the *ſphere* be meaſured.

5°, The ſurface of a *ſphere* is quadruple the area of a circle deſcribed with the radius of the *ſphere*. For ſince a *ſphere* is equal to a pyramid, whoſe baſe is the ſurface, and its altitude the radius of the *ſphere*; the ſurface of the *ſphere* is had, by dividing its ſolidity by a third part of its ſemidiameter, or one ſixth of the whole diameter.

But the ſolidity of the *ſphere* is the product of $\frac{2}{3}$ of the greateſt circle by the diameter; and if this product be divided by $\frac{1}{6}$ of the diameter, the quotient, or $\frac{12}{3}$ of the greateſt circle, i. e. four times the greateſt circle, will be the ſurface of the *ſphere*.

Otherwiſe: the ſurface of a *ſphere* is equal to the product of its diameter and the periphery of its generating circle; but the area of this circle is equal to the product of the ſemidiameter and half the periphery, or one fourth of the product of the diameter and periphery; and, therefore, the ſurface of the *ſphere* is equal to four times the area of its generating circle.

Hence 6°, The ſurfaces of *ſpheres* are to one another as the ſquares of their diameters; becauſe theſe ſurfaces, being four times their generating circles, are as theſe circles, i. e. as the ſquares of their diameters.

7°, *Spheres*, being $\frac{2}{3}$ parts of cylinders of equal baſe and altitude, and CYLINDERS being as the cubes of their altitudes, are as the cubes, or in the triplicate ratio of their diameters.

8°, The ſurface of any portion of a *ſphere*, greater or leſs than the hemiſphere, is equal to the area of a circle, whoſe radius is a line drawn from the vertex of that portion to the circumference of the circle which is its baſe. Archimedes, ubi ſupra, p. 84, 85.

Sphere, *the diameter of a, being given, to find its ſurface and ſolidity*. Find the periphery of the circle deſcribed by the radius of the *ſphere*, or of the generating circle.

Multiply this, found, into the diameter, or the ſquare of the diameter, by 3,1416, the product is the ſurface of the *ſphere*. Multiply the ſurface by a ſixth part of the diameter, or the area of the generating circle by $\frac{2}{3}$ of its diameter; or again (becauſe the area of ſuch circle is to the ſquare of the diameter as ,7854 to 1), the cube of the diameter by ,5236 ($=\frac{2}{3}$ of ,7854); and the product is the ſolidity of the *ſphere*.

Thus, ſuppoſing the diameter of the *ſphere* 56, the periphery will be found 175,9, which multiplied by the diameter, the product 9852 is the ſurface of the *ſphere*; which multiplied by one ſixth part of the diameter, gives the ſolidity 91623,6.

Or thus;

Find the cube of the diameter 175616; then to 300,157, and the cube found, find a fourth proportional. This is the ſolidity of the *ſphere* required.

For finding the ſurface and ſolidity of the *ſphere* by the method of fluxions, ſee SUPERFICIES and SOLIDITY.

For ſegments and ſectors of *ſpheres*, ſee SEGMENT and SECTOR.

Sphere, *doctrine of the*. See SPHERICS.

Sphere, *projection of the*. See PROJECTION.

Sphere *of activity*. See ACTIVITY.

Sphere, in *Aſtronomy*, that concave orb or expanſe which inveſts our globe, and in which the heavenly bodies, viz. ſun, ſtars, planets, and comets, appear to be fixed at an equal diſtance from the eye.

This is alſo called the *ſphere of the world*; and is the ſubject of the ſpherical aſtronomy.

This *ſphere*, as it includes the fixed ſtars, whence we alſo occaſionally call it the *ſphere of the fixed ſtars*, is vaſtly great. The diameter of the earth's orbit is ſo ſmall, in reſpect of the diameter hereof, that the centre of the *ſphere* is not ſenſibly changed by any alteration of the ſpectator's place in the ſeveral parts of the orbit; but ſtill, in all the points of the earth's ſurface, and at all times, the inhabitants have the ſame appearance of the *ſphere*; that is, the fixed ſtars ſeem to poſſeſs the ſame points in the ſurface of the *ſphere*. For our way of judging of the places, &c. of the ſtars, is to conceive right lines drawn from the eye, or the centre of the earth, through the centre of the ſtars, and continued thence till they cut the foreſaid *ſphere*; the points where theſe lines terminate therein are the apparent places of thoſe ſtars.

The better to determine the places of the heavenly bodies in the *ſphere*, ſeveral circles are imagined to be deſcribed in the ſurface thereof, hence called CIRCLES *of the ſphere*.

Sphere, in *Geography*, &c. denotes a certain diſpoſition of the circles on the ſurface of the earth, with regard to one another, which varies in various parts thereof.

The circles originally conceived on the ſurface of the *ſphere* of the world, are almoſt all transferred, by analogy, to the ſurface of the earth, where they are conceived to be drawn directly underneath thoſe of the *ſphere*, or in the ſame planes therewith; ſo that, if the planes of thoſe of the earth were continued to the *ſphere*, they would coincide with the reſpective circles thereon. Thus we have an horizon, meridian, equator, &c. on the earth.

As the equator in the heavens divides the *ſphere* into two equal parts, the one north, and the other ſouth, ſo does the equator on the ſurface of the earth divide the globe in the ſame manner.

And as the meridians in the heavens paſs through the poles of the horizon, ſo do thoſe of the earth, &c.

With regard, then, to the poſition of ſome of the circles in reſpect of others, we have a RIGHT, a PARALLEL, and an OBLIQUE *ſphere*.

Sphere, *armillary*, or *artificial*, is an aſtronomical inſtrument, repreſenting the ſeveral circles of the *ſphere* in their natural order; ſerving to give an idea of the office and poſition of each of them; and to ſolve various problems relating to them.

It is thus called, as conſiſting of a number of faſciæ or rings of braſs, or other matter, called by the Latins *armillæ*, from their reſembling of bracelets, or rings for the arm.

By this it is diſtinguiſhed from the *globe*, which, though it hath all the circles of the *ſphere* on its ſurface; yet is not cut into armillæ or rings, to repreſent the circles ſimply and alone; but exhibits alſo the intermediate ſpaces, between the circles.

Sphere, *the armillary*, of Mr. Ferguſon, conſtructed after the model of the glaſs *ſphere* of Dr. Long, is repreſented (*Tab.* IV. *Aſtronomy*, *fig.* 89.)

The exterior parts of this machine are a compages of braſs rings, which repreſent the principal circles of the heaven, viz. 1. The equinoctial A A, which is divided into 360 degrees (beginning at its interſection with the ecliptic in Aries), for ſhewing the ſun's right aſcenſion in degrees; and alſo into twenty-four hours, for ſhewing his right aſcenſion in time. 2. The ecliptic B B, which is divided into 12 ſigns, and each ſign into 30 degrees, and alſo into the months and days of the year, in ſuch a manner, that the degree or point of the ecliptic in which the ſun is, on any given day, ſtands over that day in the circle of months. 3. The tropic of Cancer C C, touching the ecliptic at the beginning of Cancer in *e*; and the tropic of Capricorn D D, touching the ecliptic at the beginning of Capricorn in *f*; each 23 ½ degrees from the equinoctial circle. 4. The arctic circle E, and the antarctic circle F, each 23 ½ degrees from its reſpective pole at N. and S. 5. The equinoctial colure G G, paſſing through the north and ſouth poles of the heaven at N and S, and through the equinoctial points Aries and Libra, in the ecliptic. 6. The ſolſtitial colure H H, paſſing through the poles of the heaven, and through the ſolſtitial points Cancer and Capricorn, in the ecliptic. Each quarter of the former of theſe colures is divided into 90 degrees, from the equinoctial to the poles of the world, for ſhewing the declination of the ſun, moon, and ſtars: and each quarter of the latter, from the ecliptic at *e* and *f*, to its poles *b* and *d*, for ſhewing the latitudes of the ſtars.

In the north pole of the ecliptic is a nut *b*, to which is fixed one end of a quadrantal wire, and to the other end a ſmall ſun Y, which is carried round the ecliptic B B, by turning the nut: and in the ſouth pole of the ecliptic is a pin at *d*, on which is another quadrantal wire, with a ſmall moon Z upon it, which may be moved round by hand: but there is a particular contrivance for cauſing the moon to move in an orbit which croſſes the ecliptic at an angle of 5 ⅓ degrees, in two oppoſite points, called the *moon's nodes*; and alſo for ſhifting thoſe points backward in the ecliptic, as the moon's nodes ſhift in the heaven.

Within theſe circular rings is a ſmall terreſtrial globe I, fixt on an axis K K, which extends from the north and ſouth poles of the globe at *n* and *s*, to thoſe of the celeſtial *ſphere* at N and S. On this axis is fixt the flat celeſtial meridian L L, which may be ſet directly over the meridian of any place on the globe, and then turned round with the globe, ſo as to keep over the ſame meridian upon it. This flat meridian is graduated the ſame way as the braſs meridian of the common globe, and its uſe is much the ſame. To this globe is fitted the moveable horizon M M, ſo as to turn upon two ſtrong wires proceeding from its eaſt and weſt points to the globe, and entering the globe at oppoſite points of its equator, which is a moveable braſs ring let into the globe in a groove all round its equator. The globe may be turned by hand within this ring, ſo as to place any given meridian upon it, directly under the celeſtial meridian L L. The horizon is divided into 360 degrees all round its outermoſt edge, within which are the points of the compaſs, for ſhewing the amplitude of the ſun and moon, both in degrees and points. The celeſtial meridian L L paſſes through two notches in the north and ſouth points of the horizon, as in a common globe: but here, if the globe be turned round, the horizon and meridian turn with it. At the ſouth pole of the *ſphere* is a circle of 24 hours, fixt to the rings, and on the axis is an index which goes round that circle, if the globe be turned round its axis.

The whole fabric is ſupported on a pedeſtal N, and may be elevated or depreſſed upon the joint O, to any number of degrees from 0 to 90, by means of the arc P, which is fixed into the ſtrong braſs arm Q, and ſlides into the upright piece R, in which is a ſcrew at *r*, to fix it at any proper elevation.

In the box T are two wheels (as in Dr. Long's *ſphere*) and two pinions, whoſe axes come out at V and U; either of which may be turned by the ſmall winch W. When the winch is put upon the axis V, and turned backward, the terreſtrial globe, with its horizon and celeſtial meridian, keep at reſt; and the whole *ſphere* of circles turns round from eaſt, by ſouth, to weſt, carrying the ſun Y, and the moon Z, round the ſame way, and cauſing them to riſe above and ſet below the horizon. But when the winch is put upon the axis U, and turned forward, the *ſphere* with the ſun and moon keep at reſt; and the earth, with its horizon and meridian, turn round from weſt, by ſouth, to eaſt; and bring the ſame points of the horizon to the ſun and moon, to which theſe bodies came when the earth kept at reſt, and they were carried round it; ſhewing that they riſe and ſet in the ſame points of the horizon, and at the ſame times in the hour-circle, whether the motion be in the earth or in the heaven. If the earthly globe be turned, the hour-index goes round its hour-circle; but if the *ſphere* be turned, the hour-circle goes round below the index.

And ſo, by this conſtruction, the machine is equally fitted to ſhew either the real motion of the earth, or the apparent motion of the heaven.

To rectify the *ſphere* for uſe, firſt ſlacken the ſcrew *r* in the upright ſtem R, and taking hold of the arm Q, move it up or down until the given degree of latitude for any place be at the ſide of the ſtem R; and then the axis of the ſphere will be properly elevated, ſo as to ſtand parallel to the axis of the world, if the machine be ſet north and ſouth by a ſmall compaſs: this done, count the latitude from the north pole, upon the celeſtial meridian L L, down towards the north notch of the horizon, and ſet the horizon to that latitude; then, turn the nut *b* until the ſun Y comes to the given day of the year in the ecliptic, and the ſun will be at its proper place for that day; find the place of the moon's aſcending node, and alſo the place of the moon, by an Ephemeris, and ſet them right accordingly; laſtly, turn the winch W, until either the ſun comes to the meridian L L, or until the meridian comes to the ſun (according as you want the *ſphere* or earth to move) and ſet the hour-index to the XII, marked noon, and the whole machine will be rectified. Then turn the winch, and obſerve when the ſun or moon riſe and ſet in the horizon, and the hour-index will ſhew the times thereof for the given day. See Ferguſon's Lectures, p. 194, &c.

Armillary ſpheres are of different kinds with regard to the poſition of the earth therein; whence they become diſtinguiſhed into *Ptolemaic* and *Copernican ſpheres*: in the firſt whereof the earth is in the centre, and in the latter near the circumference, according to the poſition which that planet obtains in thoſe ſyſtems.

Sphere, *the Ptolemaic*, is that commonly in uſe, and is repreſented (*Tab. Aſtronomy, fig.* 21.) with the names of the ſeveral circles, lines, &c. of the *ſphere*, inſcribed thereon. In the middle, upon the axis of the *ſphere*, is a ball, T, repreſenting the earth, on whoſe ſurface are the circles, &c. of the earth. The *ſphere* is made to revolve about the ſaid axis, which remains at reſt; by which means the ſun's diurnal and annual courſe about the earth are repreſented according to the Ptolemaic hypotheſis; and even by means hereof all problems relating to the phenomena of the ſun and earth are ſolved, as upon the celeſtial globe, and after the ſame manner, which ſee deſcribed under Globe.

Sphere, *the Copernican*, (repreſented *Tab.* IV. *Aſtron. fig.* 90.) is very different from the Ptolemaic, both in its conſtitution and uſe; and is more intricate in both. Indeed, the inſtrument is in the hands of ſo few people, and its uſe ſo inconſiderable, except what we have in the other more common inſtruments, particularly the globe and Ptolemaic *ſphere*, that we ſhall be eaſily excuſed the not taking up room with any deſcription thereof.

Spheres, *harmony of the*. See Harmony.

Sphere, *obliquity of the*. See Obliquity.

Sphere, *rectifying of the*. See Rectifying.

Sphere, *dialling*. See Dialling.

Spheres, poliſhed ſpherical maſſes of a mixt metalline compoſition, uſed in optics. The manner of making them is as follows: Take of pure tin, three pounds; copper, one pound; melt theſe two metals together, and when in fuſion caſt upon the maſs ſix ounces of burnt tartar, and an ounce and half of ſaltpetre; and laſtly, a quarter of an ounce of alum, and two ounces of arſenic; let all theſe matters evaporate and burn away, and then caſt the pure metal into the figure of a *ſphere*, and it will be capable of a high and elegant poliſh. Neri's Art of Glaſs, p. 166. See Steel-*glaſſes*.

SPHERICAL *angle*, is the mutual inclination of two planes, whereby a *ſphere* is cut.

Thus the inclination of the two planes, C A F and C E F, (*Tab. Trigonometry, fig.* 12.) forms the *ſpherical angle* A C E.

The meaſure of a *ſpherical angle*, A C E, is an arch of a great circle A E, deſcribed from the vertex C, as from a pole, and intercepted between the legs C A and C E.

Hence, 1°, Since the inclination of the plane C E F to the plane C A F is every where the ſame, the angles in the oppoſite interſections, C and F, are equal.

2°, Hence the meaſure of a *ſpherical angle* A C E is deſcribed by the interval of a quadrant A C or E C, from the vertex C between the legs C A, C E.

If a circle of the ſphere, A E B F (*fig.* 13.) cut another C E D F, the adjacent angles, A E C and A E D, are equal to two right ones; and the vertical angles A E C and D E B are equal to one another. The former likewiſe holds of ſeveral angles formed on the ſame arch C E D, at the ſame point E. Hence, any number of *ſpherical angles*, as A E C, A E D, D E B, B E C, &c. made on the ſame point E, are equal to four right angles. See Spherical *triangle*.

Spherical *triangle*, a triangle comprehended between three arches of great circles of a ſphere, interſecting each other in the ſurface thereof.

Spherical *triangles, properties of*. 1. If in two *ſpherical triangles* (*Tab. Trigonometry, fig.* 14.) A B C and abc, $A = a$, $BA = ba$, and $CA = ca$; then will B, b, and the ſides including the angles, be reſpectively equal; the whole triangles are equal: that is, $BC = bc$, $B = b$, and $C = c$.

Again, if in two *ſpherical triangles* $A = a$, $C = c$, and $AC = ac$; then will $B = b$, $AB = ab$, and $bc = BC$.

Laſtly, if in two *ſpherical triangles* $AB = ab$, $AC = ac$, and $BC = bc$; then will $A = a$, $B = b$, and $C = c$: the demonſtrations whereof coincide with thoſe of the like properties in plain triangles; the theorems of the congruency of rectilinear triangles, extending to all other curvilinear, circular, parabolical, &c. provided their ſides be ſimilar. See Triangle.

2. In an equicrural triangle A B C (*fig.* 15) the angles at the baſe, B and C, are equal; and, if in any triangle, the angles B and C, at the baſe B C, are equal, the triangle is equicrural.

3. In every *ſpherical triangle*, each ſide is leſs than a ſemicircle: any two ſides taken together are greater than the third; and all the three ſides together are leſs than the periphery of a great circle; and a greater ſide is always oppoſed to a greater angle, and a leſs ſide to a leſs angle.

4. If in a *ſpherical triangle* B A C (*fig.* 16.) two legs A B and B C, taken together, be equal to a ſemicircle; the baſe A C being continued to D; the external angle B C D will be equal to the internal oppoſite one B A C. If the two legs together be leſs than a ſemicircle, the external angle B C D will be greater than the internal oppoſite one A; and if the legs be greater than a ſemicircle, the external angle B C D will be leſs than the internal oppoſite one A; and the reverſe of all theſe holds, viz. if the angle B C D be equal to, greater, or leſs, than A, the ſides A B and B C are equal to, greater or leſs, than a ſemicircle.

5. If in a *ſpherical triangle* A B C two ſides A B and B C be equal to a ſemicircle, the angles at the baſe, A and C, are equal to two right ones: if the ſides be greater than a ſemicircle, the angles are greater than two right ones; and if leſs, leſs; and converſly.

6. In every *ſpherical triangle*, each angles is leſs than two right ones; and the three together are leſs than ſix right angles, and greater than two.

7. If in a *ſpherical triangle* B A C (*fig.* 16.) the ſides A B and A C be quadrants, the angles at the baſe, B and C, will be right angles. And, if the intercepted angle A be a right angle, B C will be a quadrant: if A be obtuſe, B C will be greater than a quadrant; and if acute, leſs; and converſly.

8. If in a *ſpherical* rectangular triangle, the ſide B C (*fig.* 17.), adjacent to the right angle B, be a quadrant: the angle A will be a right angle; if B E be greater than a quadrant, the angle A will be obtuſe; and if B D be leſs than a quadrant, the angle A will be acute; and converſly.

9. If in a *ſpherical* rectangular triangle, each leg be either greater or leſs than a quadrant, the hypothenuſe will be leſs than a quadrant; and converſly.

10. If in a *ſpherical triangle* A B C (*fig.* 18). rectangular only at B, one ſide C B be greater than a quadrant, and the other ſide A B leſs, the hypothenuſe A C will be greater than a quadrant; and converſly.

11. If in a *ſpherical* oblique-angular triangle A C B (*fig.* 19.) both angles at the baſe, A and B, be either obtuſe or acute; the perpendicular C D, let fall from the third angle C to the oppoſite ſide A B, falls within the triangle: if one of them, A, be obtuſe; and the other, B, acute, the perpendicular falls without the triangle.

12. If in a *ſpherical triangle*, A C B, all the angles A, B, and C, be acute, the ſides are each leſs than a quadrant. Hence, if in an oblique angular *ſpherical triangle*, one ſide be greater than a quadrant, one angle is obtuſe, viz. that oppoſite to this ſide.

13. If in a *ſpherical triangle* A C B, two angles, A and B, be obtuſe, and the third, C, acute; the ſides A C and C B, oppoſite to the obtuſe angles, are greater than a quadrant; and that oppoſite to the acute angle, A B, is leſs than a quadrant. Hence, if the two ſides be leſs than a quadrant, the two angles are acute.

14. If in a *ſpherical triangle* the ſeveral ſides be each greater than a quadrant; or only two of them greater, and the third be equal to a quadrant, the ſeveral angles are obtuſe.

15. If in an oblique-angular *ſpherical triangle* two ſides be leſs than a quadrant, and the third greater; the angle oppoſite to the greateſt will be obtuſe, and the reſt acute.

Spherical *triangles, reſolution of.* See Triangle.

Spherical *aſtronomy*, that part of aſtronomy which conſiders the univerſe ſuch as it appears to the eye. See Astronomy.

Under *ſpherical aſtronomy*, then, come all the phenomena and appearances of the heavens and heavenly bodies, ſuch as we perceive them, without any inquiry into the reaſon, the theory, or the truth thereof. By which it is diſtinguiſhed from theorical *aſtronomy*, which conſiders the real ſtructure of the univerſe, and the cauſes of theſe phenomena.

In the *ſpherical aſtronomy*, the world is conceived to be a concave *ſpherical* ſurface, in whoſe centre is the earth, or rather the eye, about which the viſible frame revolves, with ſtars and planets fixed in the circumference thereof. And on this ſuppoſition all the other phenomena are determined.

The *theorical aſtronomy* teaches us, from the laws of optics, &c. to correct this ſcheme, and reduce the whole to a juſter system.

Spherical *compaſſes*. See Compasses.

Spherical *geometry*, the doctrine of the ſphere; particularly of the circles deſcribed on the ſurface thereof, with the method of projecting the ſame on a plane; and meaſuring their arches and angles when projected.

Spherical *numbers*. See Circular *numbers*.

Spherical *trigonometry*. See *Spherical* Trigonometry.

SPHERICITY, the quality of a ſphere; or that whereby a thing becomes ſpherical, or round.

The *ſphericity* of pebbles, fruits, berries, &c. as alſo of drops of water, quickſilver, &c. and of bubbles of air under water, &c. Dr. Hook takes to ariſe from the incongruity of their particles with thoſe of the ambient fluid, which prevents their coaleſcing; and by preſſing on them, and encompaſſing them all round equally, turns them into a round form.

This, he thinks, appears evidently from the manner of making ſmall round ſhot of ſeveral ſizes, without caſting the lead into any moulds; from drops of rain being formed, in their fall, into round hail ſtones; and from drops of water falling on ſmall duſt, ſand, &c. which ſoon produce an artificial round maſs; and from the ſmall, round, red-hot balls, formed by the colliſion or fuſion of flint and ſteel, in ſtriking fire.

But all theſe caſes of *ſphericity* ſeem better accounted for from the great principle of attraction; whereby the parts of the ſame fluid drop, &c. are all naturally ranged as near the centre as poſſible, which neceſſarily induces a ſpherical figure; and, perhaps, a repelling force between the particles of the drop, and of the medium, contributes alſo not a little thereto. See Attraction and Cohesion.

SPHERICS, the *doctrine of the ſphere*, particularly of the ſeveral circles deſcribed on the ſurface thereof; with the method of projecting the ſame in plano.

The principal matters ſhewn herein are as follow:

1. If a ſphere be cut in any manner, the plane of the ſection will be a circle, whoſe centre is in the diameter of the ſphere.

Hence, 1°, The diameter H I (*Tab. Trigonometry, fig.* 20.) of a circle paſſing through the centre C, is equal to the diameter A B of the generating circle; and the diameter of a circle, as F E, that does not paſs through the centre, is equal to ſome chord of the generating circle.

Hence, 2°, As the diameter is the greateſt of all chords, a circle paſſing through the centre is the greateſt circle of the ſphere; and all the reſt are leſs than the ſame.

Hence alſo, 3°, All great circles of the ſphere are equal to one another.

Hence alſo, 4°, If a great circle of the ſphere paſs through any given point of the ſphere, as A, it muſt alſo paſs through the point diametrically oppoſite thereto, as B.

Hence alſo, 5°, If two great circles mutually interſect each other, the line of ſection is the diameter of the ſphere; and therefore two great circles interſect each other in points diametrically oppoſite.

Hence alſo, 6°, A great circle of the ſphere divides it into two equal parts or hemiſpheres.

2. All great circles of the ſphere cut each other into two equal parts; and, converſly, all circles that thus cut each other are great circles of the ſphere.

3. An arch of a great circle of the ſphere, intercepted between another arch H I L (*fig.* 21.) and its poles A and B, is a quadrant. That intercepted between a leſs circle D E F, and one of its poles A, is greater than a quadrant; and that between the ſame, and the other pole B, leſs than a quadrant; and converſly.

4. If a great circle of the ſphere paſs through the poles of another, that other paſſes through the poles of this. And if a great circle paſs through the poles of another, the two cut each other at right angles; and converſly.

5. If a great circle, as A F B D, paſs through the poles A and B of a leſſer circle D E F, it cuts it into equal parts, and at right angles.

6. If two great circles A E B F and C E D F (*fig.* 26.) interſect each other in the poles E and F of another great circle A C B D; that other will paſs through the poles I and *i*, H and *h*, of the cicles A E B F and C E D F.

7. If two great circles A E B F and C E D F, cut each other mutually; the angle of obliquity A E C will be equal to the diſtance of the poles H, I.

8. All circles of the ſphere, as G F and L K (*fig.* 27.) equally diſtant from its centre C, are equal; and the farther they are removed from the centre, the leſs they are. Hence, ſince of all parallel chords only two, G F and L K, are equally diſtant from the centre; of all the circles parallel to the ſame great circle, only two are equal.

9. If the arches F H and K H, and G I and I L, intercepted between a great circle I M H, and the leſſer circles G N F and L O K be equal, the circles are equal.

10. If the arches F H and G I of the ſame great circle A I B H, intercepted between two circles G N F and I M H, be equal, the circles are parallel.

11. An arch of a parallel circle I G (*fig.* 12.) is ſimilar to an arch of a great circle A E; if each be intercepted between the ſame great circles C A F and C E F.

Hence, the arches A E and I G have the ſame ratio to their peripheries; and conſequently, contain the ſame number of degrees. And hence the arch I G is leſs than the arch A E.

12. The arch of a great circle is the ſhorteſt line which can be drawn from one point of the ſurface of the ſphere to another: and the lines between any two points on the ſame ſurface are the greater, as the circles whereof they are arches are the leſs.

Hence, the proper meaſure, or diſtance, of two places on the ſurface of the ſphere, is an arch of a great circle intercepted between the ſame. See more on this ſubject in Theodoſii Elem. Sphær. apud Dechales Curſus Mathematicus, tom. i. p. 145, &c.

SPHEROID, Sphæroides, Σφαιροειδης, formed from σφαιρα, *ſphæra*, and ειδος, *ſhape*, in *Geometry*, a ſolid approaching to the figure of a ſphere, though not exactly round but oblong; as having one of its diameters bigger than the other; and generated by the revolution of a ſemi-ellipſis about its axis.

When it is generated by the revoluion of a ſemi-ellipſis about its greater axis, it is called an *oblong ſpheroid*. And when generated by the revolution of an ellipſis about its leſs axis, an *oblate ſpheroid*.

The contour of a dome, Daviler obſerves, ſhould be half a *ſpheroid*. Half a ſphere, he ſays, is too low to have a good effect below.

For the ſolid dimenſion of a *ſpheroid*, it is $\frac{2}{3}$ of its circumſcribing cylinder: or it is equal to quadruple of a cone, whoſe altitude is equal to half the great axis, and the baſe equal to the circle deſcribed upon the leſs axis of the generating ellipſis, as its diameter.

Or, a *ſpheroid* is to a ſphere deſcribed on its greater axis, as the ſquare of the leſs axis to the ſquare of the greater: or it is to a ſphere deſcribed on the leſs axis, as the greater axis to the leſs.

For the method of finding the ſuperficies and ſolidity of a *ſpheroid*. See Superficies and Solidity.

Dr. Halley has demonſtrated, that in a ſphere Mercator's nautical meridian line is a ſcale of logarithmic tangents of the half complements of the latitudes. But as the earth has been found to be a *ſpheroid*, this figure will make ſome alteration in the numbers reſulting from Dr. Halley's theorem. Mr. Maclaurin has therefore given us a rule, whereby the meridional parts to any *ſpheroid* may be found with the ſame exactneſs as in a ſphere. We have alſo an ingenious treatiſe of Mr. Murdoch's on the ſame ſubject. See Phil. Tranſ. N° 219.

Mr. Cotes has alſo demonſtrated the ſame propoſition, Harm. Menſ. p. 20, 21. See Meridional *parts*.

SPHEX, in the Linnæan ſyſtem of *Zoology*, a genus of the *hymenoptera* order of inſects. Its characters are, that the mouth has mandibles without a tongue; that the antennæ have ten joints; that the wings are plano-incumbent and not folded; and the ſting concealed. Linnæus enumerates thirty-eight ſpecies.

SPHINCTER, in *Anatomy*, a term applied to a kind of circular muſcles, or muſcles in form of rings, which ſerve to cloſe and draw up ſeveral orifices of the body, and prevent the excretion of the contents.

The word is formed from σφιγκτηρ, *ſtrictor*, or *conſtrictor*, ſomething that binds and conſtringes a thing very cloſely; theſe muſcles having an effect much like that of a purſe-ſtring.

Sphincter *ani* is a circular muſcle, ſerving to ſhut the anus, and keep the excrements from coming away involuntarily.

It is near two inches broad, and is carried down below the rectum, near an inch. It is faſtened on the ſides to the bones of the coxendix, and behind to the os ſacrum: and before, in men, to the accelerator urinæ; and in women to the vagina uteri. Some would have it to be two muſcles, and ſome three. The one, according to Winſlow, is inteſtinal, or orbicular, and conſiſts merely in an augmentation of the inferior portion of the fleſhy fibres of the extremity of the rectum: and the other two are cutaneous or oval, having each an anterior and poſterior inſertion, ending both ways in a kind of point, and comprehending the orifice of the anus, between their middle portions. They are diſtinguiſhed from each other by their ſituation, by their ſize, and by a kind of white cellular line.

The greateſt of the two appears to be double, and the ſmalleſt lies neareſt the ſkin, and adheres moſt cloſely to it. They are inſerted backward in the apex of the os coccygis, and partly in the contiguous portion of the cutaneous ligament of that bone. Forward, their chief inſertion is in the middle tendon of the traverſalis urethræ; and they have likewiſe ſome connexions with other muſcles of the urethra.

Sphincter *cutaneus*, in *Anatomy*, a name given by Laurence, and ſome others, to the muſcle of the anus, called by Albinus and Winſlow *ſphincter internus ani*.

Sphincter *inteſtinalis*. See Intestinalis *ſphincter* and Sphincter *ani*.

Sphincter *labiorum*, in *Anatomy*, a name given by Douglas, and ſome others, to the muſcle of the mouth, called by Riolanus and Albinus *orbicularis*, and *orbicularis oris*, and by Cowper constrictor *labiorum*.

Sphincter *palpebrarum*, in *Anatomy*, a name given by Molinet, and ſome others, to the muſcle of the eyelids, called by Winſlow and Albinus the *orbicularis palpebrarum* and *orbicularis*.

Sphincter *gulæ*. See Oesophagæus and Pharynx.

Sphincter *vaginæ*, a conſtrictory muſcle, ſerving to hinder the reflux of the blood from the clitoris, &c. in coition.

Sphincter *veſicæ*, is a muſcle conſiſting of circular fibres, placed at the exit of the bladder, to prevent the perpetual dripping of the urine. See *Tab. Anat.* (*Splanch.*) *fig.* 9. *lit. k.*

It keeps the bladder conſtantly ſhut; and is only opened when, by the contraction of the abdominal muſcles, the bladder is compreſſed, and the urine forced out.

SPHINX, σφιγξ, in *Sculpture*, &c. a figure or repreſentation of a monſter of that name, famed among the ancients, now moſtly uſed as an ornament in gardens, terraces, &c.

It is repreſented with the head and breaſts of a woman, the wings of a bird, the claws of a lion, and the reſt of the body like a dog or lion.

It is ſuppoſed to have been engendered by Typhon, and ſent by Juno to be revenged on the Thebans. Its office, they ſay, was to propoſe dark enigmatical queſtions to all paſſers by; and, if they did not give the explication thereof, to devour them.

It made horrible ravages, as the ſtory goes, on a mountain near Thebes, and could not by any means be deſtroyed, till after Oedipus had ſolved the following riddle: What animal is it that in the morning walks on four legs, at noon on two, and at night on three? The anſwer was Man.

Among the Egyptians, the *ſphinx* was the ſymbol of religion, by reaſon of the obſcurity of its myſteries. And, on the ſame account, the Romans placed a *ſphinx* in the pronaos or porch of their temples.

Sphinxes were uſed by the Egyptians to ſhew the beginning of the water's riſing in the Nile: with this view as it had the head of a woman and body of a lion, it ſignified that the Nile began to ſwell in the months of July and Auguſt, when the ſun paſſes through the ſigns of Leo and Virgo. There are ſeveral of theſe ſtill to be ſeen; one in particular, near the pyramids, much ſpoken of by the ancients; being of a prodigious ſize, and cut out of the rock; the head and neck appear only at preſent, the reſt of the body being hid in the ſand. This, according to Thevenot, is twenty-ſix feet high, and fifteen feet from the ear to the chin: but Pliny aſſures us, the head was no leſs than one hundred and two feet in circumference, and ſixty-two feet high from the belly, and that the body was one hundred and forty-three feet long, and was thought to be the ſepulchre of king Amaſis.

The learned Mr. Bryant (Anc. Mythol. vol. iii. p. 532.) obſerves, that the *ſphinx* ſeems to have been originally a vaſt rock of different ſtrata; which, from a ſhapeleſs maſs, the Egyptians faſhioned into an object of beauty and veneration.

The Egyptians uſed this figure in their building; from them the Greeks derived it, and afterwards improved it into an elegant ornament. See *Tab. Archit. fig.* 40. *lit.* R.

Sphinx, in the Linnæan ſyſtem of *Zoology*, a genus of the *lepidoptera* order of inſects. Its characters are, that the antennæ are ſubpriſmatic, or thicker in the middle, and attenuated towards each end; the wings decline towards the ſides; and they are apparently heavier and ſlower in their flight in the morning and evening. Linnæus enumerates forty-ſeven ſpecies.

Sphinx, a name given by Reaumur to a very ſingular ſpecies of caterpillar, deſcribed in the ſecond volume of his Hiſtory of Inſects.

The reaſon of the author's having given it that name is, that when it is not eating it erects its head, and with it more than a third part of its body, into a perpendicular ſituation upon the leaf on which it was before laid all along; it keeps itſelf a long time in this ſituation, looking around it with a ſeeming air of fierceneſs. There is alſo a ſeries of broad belts upon the body, which contribute ſomething towards its reſemblance to the figure of that imaginary monſter.

This caterpillar has a horn on the hinder part of its body, which ſeems to be of no ſort of uſe, but merely a trouble to the creature. It is hollow, and incloſes, in the manner of a ſheath, the new horn which is to appear when the creature changes its ſkin. This the author found to be the caſe by cutting it ſeveral times, and always finding within it the new horn cut off alſo at the ſame place, and had often obſerved the great difficulty the animal had in changing its ſkin, when it came to the horn.

Sphinx, *ſimia*. See Simia.

SPHONDYLIUM, in *Botany*. See *Cow* Parsnep.

SPHONDYLUS, in *Ichthyology*, a name given by Pliny, and others of the old authors, to a peculiar ſpecies of the ſyngnathus, or *acus Ariſtotelis*. It is the ſpecies, called by Artedi *ſyngnathus corpore medio hexagono cauda pinnata*; and by other authors the *acus ſecundæ ſpecies*; and by Bellonius and Geſner *typhle marina*.

Sphondylus is alſo uſed by ſome authors, for the ſtones or bones found in the head of a mullet.

SPHRAGIS, the ſeal-ſtone, a name given by ſome authors to the ſingle joints of the aſteriæ, when found looſe, not joined into a column. See Star-*ſtone*.

Sphragis is alſo uſed by ſome of the old Greek naturaliſts, to expreſs the ſpots on the back and ſides of a panther.

The ſkin of this creature is of a pale colour, and theſe ſpots are all dark and round, and look like ſo many regular impreſſions of a ſeal, whence the name *ſphragis*. The Romans called any thing that was variegated in this manner *pantherina*; and we meet with the phraſe *menſæ pantherinæ*, uſed to expreſs tables found of ſome wood, which was variegated with round ſpots, in the manner of thoſe *ſphrages* on the back of the panther.

SPHYGMICA, in *Medicine*, a term uſed by ſome for that part of the judgment of a phyſician, which regards the differences of the *σφυγμος*, or *pulſe*.

SPHYRÆNA, in *Ichthyology*, a name by which ſome authors, have called the SUDIS, or *lucius marinus*, the *ſea-pike*.

SPHYRÆNA *altera*, in *Ichthyology*, a name given by Appian and ſome other of the old Greek writers, to the *eſox*, or common PIKE.

SPICA *bandage*, in *Surgery*, is a kind of bandage thus called from its interſections, which are ſuppoſed to reſemble an ear of corn. It is either ſimple or double. The *ſimple ſpica* applied to the clavicle, when fractured near the ſhoulder, conſiſts of a ſimple band, about five ells long, and three fingers breadth, rolled up either with one or with two heads. The *double ſpica*, which is uſed when the oſſa humeri of each arm are diſlocated, is a band about ſeven or eight ells long, and three or four fingers breadth, rolled up with two heads: the middle is fixed under the axilla, and the two heads croſs each other upon the ſhoulder, and go over the breaſt and back to the oppoſite axilla; here they croſs again, and then riſe up over the other ſhoulder as before, from whence they go acroſs the breaſt, and back again to the left axilla, where they began, forming an X by traverſing each other upon the ſternum and back.

For a farther deſcription of both theſe bandages, with an account of the method of applying them: ſee Heiter's Surgery, vol. ii. part iii. chap. 4. § 1 & 2.

SPICA *virginis*, a ſtar of the firſt magnitude in the conſtellation VIRGO.

SPICCATO, in the *Italian Muſic*, ſignifies that every note ſhould be well ſeparated from others, and diſtinctly ſounded. It is particularly uſed with regard to inſtruments played with a bow; and denotes that every note muſt have a diſtinct bow from that preceding or ſucceeding. See STACCATO.

SPICE, any kind of aromatic drug, that has hot and pungent qualities: ſuch are pepper, nutmeg, ginger, cinnamon, and cloves. Some alſo apply the word to divers other medicinal drugs brought from the Eaſt; as ſenna, caſſia, frankincenſe, &c. See each under its proper article.

SPICE, *all*. See PIMENTO.

SPICE-*wood*, in *Botany*, a ſpecies of LAURUS.

SPICES, *garbler of*. See GARBLER.

SPICULUM, in *Roman Antiquity*, a kind of weapon which ſome will have to be the ſame with the haſta, or ſparus.

SPIDER, *aranea*, in *Zoology*, a genus of the *aptera* order of inſects. The characters of which are, that they have eight feet and eight eyes; the mouth is is furniſhed with two claws; the two palpi are articulated; and the anus is provided with papillæ, or nipples, for weaving. Linnæus enumerates forty-ſeven ſpecies.

Of the *ſpider* we have a great number of ſpecies common among us, which all agree in the general marks and characters.

They all have weapons iſſuing out of the mouth, but theſe are of two kinds, according to the two principal diſtinctions of the *ſpiders*. They conſiſt, in ſome, of two ſpicula, in the manner of a forked hook: this is their ſtructure in all the kinds which have eight eyes. In others they are compoſed of two forcipated arms, or are divided into two claws, in the manner of the legs of a crab: theſe are the weapons of all thoſe *ſpiders* which have only two eyes.

The bodies of all *ſpiders* are covered with a ſort of cruſtaceous coat, but it is tender and brittle; and in the males of all the ſpecies, the forcipes, or weapons at the mouth, are larger and ſtronger than in the females.

All *ſpiders* have two antennæ, placed in the forepart of the head over the mouth; theſe are compoſed, like the legs, of a number of joints. The head of a *ſpider* is not ſeparated from the ſhoulders by any inciſure, but remains fixed to them as all of one piece.

The eyes of the *ſpider* differ greatly in magnitude, ſituation, and colour, in the different ſpecies; and ſometimes the different eyes of the ſame ſpider are of different ſizes.

All *ſpiders* have eight legs, which are all inſerted into the breaſt, but in the length and figure of theſe there is as much variety as in the eyes in the different ſpecies of *ſpiders*: they have all three joints in each leg, but in ſome the foremoſt pair are the longeſt, in others the hinder pair are ſo, and in others ſome of the intermediate pairs.

The belly of the *ſpider* is remarkably divided from the head and ſhoulders, ſo as to adhere only by a thread: this is the caſe in all, except the two-eyed kinds, and in the different ſpecies the body is variouſly painted. The appendages near the anus are very obſervable, they ſerve to ſpin the threads out at. Among the many ſpecies of theſe inſects, ſome are ſmooth, others are hairy, and ſome have a harder, ſome a tenderer ſkin.

Among the great number of ſpecies of this inſect, theſe are the principal diſtinctions among thoſe which have eight eyes. Some ſpin webs for the catching of flies of a rounded figure; theſe have all their eyes of the ſame ſize and figure; they have four middle ones placed in a quadrangular figure, and the other four beſide theſe, but ſtanding ſomewhat obliquely. The firſt pair of legs of theſe *ſpiders* are always the longeſt, the ſecond pair are the longeſt next to theſe, then the fourth pair, the third being much the ſhorteſt of all. Theſe *ſpiders* are always ſmooth, or nearly ſo, and are elegantly figured on the buttocks. Of theſe ſome always live in the centre of the web, others have their habitation in a neighbouring corner. Of the firſt of theſe ſorts we have five ſpecies. 1. The yellowiſh *ſpider* with white back and ſides, and a white head with large pellucid black eyes. This is of a middle ſize, and its legs are variegated with brown and white. The males in this ſpecies are ſlenderer than the females, and of a more reddiſh colour; and in both ſexes the head and ſhoulders are ſomewhat pellucid. 2. The hazel *ſpider* with a croſs on its back, and tubercles on the belly. This ſpecies ſpins very large nets. 3. The ſlender green and gold *ſpider* with a long body. This is of a middle ſize, and its fore-legs are extremely long. 4. The grey wood-*ſpider*, with the body terminating in a three-cornered point. This is a ſmall ſpecies, but it ſpins very large webs: its belly is black. 5. The green *ſpider*, with its tail marked with black ſpots, and the anus yellow. This is of a middle ſize; the eyes are black; the head pellucid, and the feet ſhort.

Of the ſecond kind of *ſpiders*, which ſpin round webs, and have their habitation at a corner of the web, not in its centre, there are five principal ſpecies.

Theſe are, 1. The grey full-bodied *ſpider* with various delineations on the back. This is a very large kind; its ſhoulders are hoary, its legs thick, not long, and ſpotted. 2. The ſmooth black croſs *ſpider*, with an oval body. This is of a middle ſize, its legs are ſhort and ſpotted. It is very common among ruſhes and water plants. 3. The yellow *ſpider*, with four great white ſpots, and many ſmall ones. This is one of the largeſt *ſpiders*, and generally builds its habitation on the tops of plants. This is called by Mouffet, and ſome others, the *Colcheſter ſpider*; and there are two other ſpecies which much reſemble it, the one diſtinguiſhed by having a cheſnut-coloured head, and black belly; the other, by a large brown ſtreak running from the ſhoulders to the tail. 4. The black *ſpider*, with figures like oak leaves upon its buttocks. It is a very large *ſpider*. 5. The grey round-headed *ſpider*, with foliaceous lines on the buttocks undulated at the edges. This is a middle-ſized one, and is common about houſes.

Spiders of another genus are diſtinguiſhed by their building conglobated webs; theſe are all ſmall, and have the fore legs longeſt of all, next theſe the hinder pair, and then the ſecond, the third being the ſmalleſt of all. Of theſe are ſix principal kinds.

1. The black ſmooth houſe-*ſpider*: this is the largeſt of this genus, and has elevated ſhoulders. 2. The white *ſpider* with an oval body, ſurrounded with a ſcarlet-ring. 3. The brown *ſpider* with a round body, ornamented with foliaceous figures. 4. The reddiſh brown wood-*ſpider*, with a round body, marked with the figure of a ſtar. 5. The ſmall grey *ſpider*, with a black ſpot upon its buttocks: and, 6. The ſmall livid *ſpider* with denticulated figures on the rump. This uſually erects its conglobated nets on the top of the branches of furze buſhes.

A third genus of *ſpiders* is diſtinguiſhed by the thickneſs and cloſeneſs of the webs; ſome of theſe inhabit the bottom, or funnel-end of their webs, others live near them, but not in them. Of the firſt claſs there are two remarkable ſpecies.

1. The yellowiſh hairy long-legged houſe-*ſpider*. This is of a middle ſize, and its eyes are very black and ſparkling. 2. The great grey *ſpider*, with the appendices of the anus very remarkably prominent. This is a very large kind, and is of a livid colour.

Of the ſecond claſs of theſe, which live at a diſtance from their webs, there are alſo two principal kinds.

1. The ſmooth cheſnut-coloured, or blackiſh *ſpider*, with elegant ſnow-white ſpots. This is of a middle ſize, and has long and ſlender legs. 2. The black *ſpider* with white ſhoulders, and a denticulated white mark upon the back. This is of the middle ſize. Its legs are hairy.

To theſe is to be added the cave-*ſpider* of Mouffet. This is a large black *ſpider* with a very large ſpot, of a deeper and more ſhining black, upon the ſhoulders.

A fourth genus of *ſpiders* is diſtinguiſhed by the ſmallneſs of the webs they build: theſe are, however, of a very cloſe texture, and the creature always lives within them. Of the *ſpiders* of this kind there are three principal ſpecies.

1. The grey woolly *ſpider*, with a broad black ſpot on the belly. 2. The plain livid or yellowiſh *ſpider*. This is ſometimes of the one, and ſometimes of the other of theſe colours, but never has any variegations. 3. The yellowiſh cylindric-bodied *ſpider*. This is a large *ſpider*, and has ſix eyes. This has a long ſeries or chain of ſpots on the back, and a yellowiſh line or ſtreak on each ſide. Ray's Hiſt. Inſect. p. 12—24—30. See OPILIO and PHALANGIUM.

The *ſpider* affords to the ſagacious obſerver, as well without as with the aſſiſtance of glaſſes, a great many extremely curious particulars. As the fly (which is the *ſpider*'s natural prey) is an animal extremely cautious and nimble, and uſually comes from above, it was neceſſary the *ſpider* ſhould be furniſhed with a quick ſight, and an ability of looking upwards, forwards, and ſideways, at the ſame time; and the microſcope ſhews, that the number, ſtructure, and diſpoſition of its eyes, are wonderfully adapted to the ſerving all theſe purpoſes.

Moſt *ſpiders* have eight eyes: two on the top of the head or body, for there is no diviſion between them, the *ſpider* having no neck; theſe look directly upwards: there are two more in front, placed a little below theſe, and diſcovering all that paſſes forwards, and on each ſide: a couple more, one whereof points ſideways forward, and the other ſideways backward; ſo that it can ſee almoſt quite round it. All kinds of *ſpiders* have not, however, this exact proviſion; for in ſome we find ten, and in others only ſix, or four. The eyes of the *ſpider* are not pearled; and the field-*ſpiders*, or long-legs, have no more than two eyes.

Whatever be the number of the *ſpider*'s eyes, they are however all immoveable and tranſparent, and are ſituated in a moſt curious manner. The beſt way of viewing them with the microſcope, is to cut off the legs and tail, and leave only the head for examination.

All *ſpiders* have eight legs, which they employ in walking, and two ſhorter, called *arms*, which they uſe in ſeizing their prey. All the legs are thickly beſet with hairs; each has ſix joints, and ends with two hooked claws, which are ſerrated on their inſide; by means of theſe teeth, or jags in the claws, they ſeize very faſt hold of any thing, and behind theſe there is a ſort of ſpur, which is perfectly ſmooth.

Beſide theſe, nature has allotted to this creature, for the ſeizing its prey, a pair of ſharp crooked claws, or forceps, in the forepart of its head. Theſe ſtand horizontally, and when not exerted for uſe, are concealed in two caſes contrived for their reception, in which they fold like a claſp-knife, and there lie between two rows of teeth, which are likewiſe employed to hold faſt the prey.

Each of theſe claws, or pincers, has a ſmall ſlit near its point, according to Leewenhoek, like that in a viper's tooth, through which he ſuppoſes that a poiſonous juice is, in like manner, thrown out. But Dr. Mead, in his Eſſay on Poiſons, diſſents wholly from this opinion, having never been able, on repeated examinations, to diſcover any ſuch opening, not even in the claws of the great American *ſpider*; which being above fifty times bigger than any of the European *ſpiders*, would more eaſily have afforded a view of this opening, if nature had allotted any to this part of the animal. Beſides, repeated obſervations alſo convinced him, that nothing dropped out of the claws, which were always dry, while the *ſpider* bit any thing, but that a ſhort white proboſcis was, at the ſame inſtant, thruſt out of the mouth, which inſtilled a liquor into the wound. And the ſame author obſerves, that the quantity of liquor, emitted by our common *ſpiders* when they kill their prey, is viſibly ſo great, and the wounding weapons ſo minute, that they could contain but a very inconſiderable portion thereof, if it were to be diſcharged that way. Baker's Microſcope, p. 196.

Spiders frequently caſt their ſkins, which may be found in the webs perfectly dry and tranſparent; and from ſuch ſkins the forceps, or claws, for they are always ſhed with the ſkins, may eaſier be ſeparated, and examined with much greater exactneſs than in the common *ſpider* while living.

The *ſpider*'s manner of weaving its web is very wonderful. The creature has five little teats, or nipples, near the extremity of the tail; from theſe there proceeds a gummy liquor, which adheres to every thing it is preſſed againſt, and being drawn out, hardens inſtantly in the air, and becomes a ſtring, or thread, ſtrong enough to bear five or ſix times the weight of the *ſpider's body*. This thread is compoſed of ſeveral finer ones, which are drawn out ſeparately, but unite together at two or three hairs breadth diſtance from the creature's body. Theſe threads are finer or coarſer, according to the bigneſs of the *ſpider* that ſpins them. Mr. Leewenhoek has computed that a hundred of the ſingle threads of a full grown *ſpider* are not equal to the diameter of the hair of his beard; and, conſequently, if the threads and hair be both round, ten thouſand ſuch threads are not bigger than ſuch a hair. He calculates farther, that when young *ſpiders* firſt begin to ſpin, four hundred of them are not larger than one which is of a full growth; allowing which, four millions of a young *ſpider*'s threads are not ſo big as the ſingle hair of a man's beard.

The eggs of ſome *ſpiders* are a very pleaſing microſcopic object; they are round at one end, and flattiſh at the other, with a depreſſion in the centre of the flattiſh end, and a yellowiſh circle round it. The colour of theſe eggs is a pearly or bluiſh white, and when the young *ſpiders* hatch, they come out in their perfect form, and run about very nimbly.

The female *ſpider* depoſits her eggs, to the number of five or ſix hundred, in a bag compoſed of her own web, which ſhe either carries under her belly, or hides in ſome very ſafe receſs. Philoſ. Tranſ. N° 272.

The young *ſpiders* are always very beautiful objects for the microſcope. The current of the blood may be eaſily diſcovered in their legs, and part of their bodies; and many other curious particulars occur in their diſſection.

There are two or three ſpecies of this animal, peculiarly worthy the attention of the curious in microſcopic diſcoveries. 1. A little white field-*ſpider* with ſhort legs. This is found plentifully among new hay, and its body appears like white amber with black knobs, out of which grow ſhort but ſharp prickles. The eyes of theſe may be very diſtinctly ſeen, being very briſk and lively, and ſome have ſix, ſome eight of them: each eye has a pupil of a violet blue, which is beautifully clear and tranſparent, and is ſurrounded by a circle of pale yellow. 2. The wandering, or hunting *ſpider*, that ſpins no webs, but runs and leaps by fits. This has two tufts of feathers fixed to its fore-paws, which make a very beautiful appearance before the microſcope. The variety and beauty of colouring alſo, all over this little creature, affords a very pleaſing ſight. 3. The *long-legs*, or ſhepherd-*ſpider*. This is a moſt wonderful creature: it has two fore-claws at a great diſtance from the head, tipped with black like thoſe of a crab, and opening and ſhutting like the ſcorpion's; theſe are ſerrated or indented on their inſide. When all the legs are cut from this *ſpider*, and it is examined by the microſcope, it will be ſeen that the protuberance on the top of its back is furniſhed with two fine black eyes. Power's Microſ. Obſ. p. 13. Hook's Microgr. p. 200.

The venom of many kinds of *ſpiders* is greater than uſually ſuppoſed: we have, in the Philoſophical Tranſactions, an account of a perſon in New-England who was bitten by a ſmall *ſpider*, a little above his ancle: he perceived the creature biting, and cruſhed it to death upon the wound, between his ſtocking and his leg; in half an hour he felt a pain in that leg, which in another half hour extended itſelf to the groin, and at the ſame time he had a creeping pain in the calf of his other leg; and in a quarter of an hour after this it affected his ſtomach, his back, and his head. The pains were not conſtant and fixed, but erratic, and very acute, and his pulſe was extremely low and heavy. He was relieved, by taking internally ſpirit and ſalt of hartſhorn in viper-wine, and applying a cataplaſm of garlic to the part, and in three or four days wholly recovered.

Boccone mentions a ſpecies of large *ſpider*, common in the iſland of Sardinia, whoſe bite proves mortal within the ſpace of a few hours; the whole body uſually ſwells almoſt immediately, in conſequence of this bite. The cure is performed by oil of olives, in which the creature is infuſed over the heat of a ſtove. This is a medicine they always keep ready in the houſe, and while they uſe this externally, they give large doſes of Venice treacle inwardly, diſſolved in ſtrong wine: but many die of this bite, either from the want of power in the remedies, or from their being uſed too late. Bacon. Muſ. de Fiſ.

Some think the white matter we often find floating in the air towards the end of the ſummer, is produced by *ſpiders*. See *Air*-THREADS.

SPIDER, *red*, *acarus*, in the Linnæan ſyſtem of *Natural Hiſtory*, a genus of inſects of the *aptera* order. Its characters are, that it has two eyes placed on the ſides of the head, remote from one another; its mouth, or proboſcis, is formed by a ſmall pointed roſtrum incloſed in a ſheath; the antennæ are ſhorter than the proboſcis, and ſaid to be articulated and made like feet; the head uniform in ſize and united to the thorax; and the feet eight in number, and formed for running. There are many ſpecies of this genus: ſome live upon other animals (ſee ACARUS) others live in the water, others upon trees, plants, &c. They are oviparous.

Theſe inſects, which are often very troubleſome on plants and in hot-houſes, may be effectually deſtroyed by the mixture recommended for deſtroying thoſe on the PINE-*apple*. The following mixture will alſo be equally efficacious: take two ounces of ſoft green ſoap, one ounce of common turpentine, and one ounce of flowers of ſulphur; pour upon theſe ingredients a gallon of boiling water, and work the whole together with a whiſk; and let the mixture be uſed warm. This mixture may alſo be of uſe for preventing the mil-dew on the peach and apricot. However, this method ſhould never be practiſed on fruit-trees near the time when their fruits are ripening. A ſtrong ley made of wood-aſhes will likewiſe deſtroy the acari; but plants are greatly injured by this, and other briny and ſpirituous compoſitions. The acari may alſo be deſtroyed in plants, by bruſhing them with a common painting bruſh, by often duſting them with flowers of ſulphur, by keeping a hot-houſe in a moiſt ſtate, by dipping the tops of plants frequently in clear water, in which flowers of ſulphur and tobacco have been infuſed, in the hot ſummer months, and always keeping the hot-houſe clean.

SPIDER-*ſhell*, a name given to ſome ſpecies of the MUREX.

SPIDERS *ſilk*. See SILK.

SPIDERS *web*. See WEB.

SPIDER-*wort*, *anthericum*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the flower has no empalement, and is compoſed of ſix petals which ſpread open; and it has ſix upright ſtamina; the germen, which is ſituated in the centre, is three cornered, and becomes an oval ſmooth capſule, having three furrows opening in three cells, which are filled with angular ſeeds. Linnæus enumerates thirteen and Miller eleven ſpecies, which, growing naturally upon bogs, are with difficulty preſerved in a garden.

SPIEL, in the *glaſs trade*, an iron inſtrument, hooked at the end and pointed, with which the workmen take the metal up out of the melting-pots for proofs or eſſays, to ſee whether it be fit to work.

SPIGELIA, *worm-graſs*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are, that the flower has a permanent empalement of one leaf, which is cut into five acute points; it has one funnel-ſhaped petal, whoſe tube is longer than the empalement, cut into five points at the brim, which ſpread open; it has five ſtamina terminated by ſingle ſummits, and a germen compoſed of two globular lobes, ſupporting one oval-ſhaped ſtyle of the length of the tube, crowned by a ſingle ſtigma; the germen afterwards becomes two globular ſeed-veſſels, which are joined, ſitting in the empalement, filled with ſmall ſeeds. Linnæus mentions one ſpecies, and Miller enumerates two, one of which grows in moſt of the iſlands of the Weſt-Indies, where it is eſteemed a moſt efficacious medicine for expelling worms; and the other in North America, where it is called *Indian pink*, and employed for the ſame purpoſe. This laſt, in the Linnæan ſyſtem, is a ſpecies of the *lonicera*. See *Upright* HONEYSUCKLE.

The uſe of the root of this plant, as an anthelmintic, was communicated from the native Indians to the coloniſts, and it has been ſince much employed in that country. See an account of its virtues in a paper by Dr. Lining, Eſſ. Phyſ. & Lit. vol. i. confirmed by Dr. Garden, ibid. vol. iii.

The root is given both in powder and infuſion; but the powder is eſteemed moſt efficacious. The doſe is not exactly aſcertained, but extends from twelve to ſixty or ſeventy grains of the powder. It is found to be moſt efficacious when it purges, for which purpoſe it requires ſome additions; the exhibition of a vomit previous to the uſe of it has proved of ſervice.

It is ſaid to act powerfully as a ſedative, in abating the exacerbations of low remittent worm-fevers.

SPIGNEL, *athamanta*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it is a plant with an umbellated flower; the involucrum of the great umbel is compoſed of many narrow leaves, which are ſhorter than the rays; thoſe of the ſmall ones are narrow and equal with the rays; each flower has five ſlender ſtamina of the ſame length with the petals; and the germen is ſituated below the receptacle, which afterward becomes an oblong channelled fruit, divided into two parts, each containing one oval channelled ſeed. Miller enumerates three and Linnæus nine ſpecies.

The common *ſpignel* is alſo called *meum* by medical writers; it is perennial, grows wild in ſome of the mountainous parts of England, and flowers in June; its root is eſteemed by ſome a very great medicine in malignant diſeaſes.

It is alſo eſteemed an attenuant, and is preſcribed whereever there are thick humours to be evacuated. It is given in aſthmas, and all obſtructions of the lungs, and is by many recommended in flatulencies, colics, and ſuppreſſions of urine, and of the menſes.

Dioſcorides and Galen tell us, that the too frequent uſe of this medicine, or the taking it in too large doſes, will occaſion violent pains in the head. It may be given in ſubſtance from half a dram to two ſcruples; or from a dram to two drams in infuſion. Geoffroy, Mat. Med. vol. ii. p. 105.

It ought to be choſen as long and large as can be had, round, not flatted, plump, and full, and of an aromatic ſmell, and a ſomewhat acrid taſte, and ſuch as is not duſty or worm-eaten. It is ſudorific and diuretic; but the principal uſe now made of it is only as an ingredient in the Venice treacle. It appears to be nearly of the ſame nature with that of LOVAGE: its ſpirituous extract, more aromatic than that of the lovage, is moderately warm, bitteriſh and pungent. Lewis Mat. Med.

SPIGNEL, *wild*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are: that it hath an umbellated flower; the principal umbel is uniform, and hath no involucrum; the particular ones have a many-narrow-leaved involucrum, which is as long as the umbel; the empalement of the flowers is ſcarce diſcernible; the flowers have five inflexed heart-ſhaped petals, and each hath five awl-ſhaped ſtamina, terminated by ſingle ſummits; the germen is ſituated under the flower, ſupporting two reflexed ſtyles, crowned by obtuſe ſtigmas; and afterwards turns to a ſmall, oval, channelled fruit, dividing into two parts, each containing one oval ſtreaked ſeed, flat on one ſide and convex on the other. Miller reckons ſix and Linnæus twelve ſpecies. See SERMOUNTAIN and SESELI *ſeed*.

SPIGOLA, in *Ichthyology*, a name given by Paulus Jovius, and ſome others, to that ſpecies of pearch which is generally called the LUPUS *marinus*.

It is a genuine pearch, and is diſtinguiſhed from the others by Artedi, by the name of the *pearch* with the thirteen rays in the ſecond back-fin, and fourteen in the pinna ani.

Authors have called two different fiſh by this name *lupus marinus*, which conveying no diſtinct idea of the characters of the fiſh, was applicable to either as much as the other; but this name of Artedi admits of no equivocation, and muſt always diſtinguiſh the fiſh.

SPIKE, or *oil of* SPIKE, a name given by our druggiſts to an eſſential oil, much uſed by the varniſh-makers and the painters in enamel; and of ſome uſe in medicine.

This *oil*, when genuine, is brought from Provence, and ſome other parts of France, and is there made of lavender. This plant is called in Provence *aſpic*, and thence came the name *oil of aſpic*, which afterwards degenerated into the *oil of ſpike*.

The manner of making the *oil* upon the ſpot is this: when the flowers are perfectly ripe, they put them into an alembic with a great quantity of water, and this they diſtil after ſeveral days maceration: there ariſes with the water a large quantity of an oil of a fine pale amber colour, and this, ſeparated from the water, is the true and genuine *oil of ſpike*.

The flower of this plant is the part which yields the largeſt quantity of oil; as is the caſe with all the plants with galeated flowers, of which the huſk, or flower cup, uſually contains almoſt all the oil of the plant. The aromatic plants, in general, yield indeed but a ſmall quantity of oil, but the vaſt abundance of this plant, in theſe places, makes the expence of gathering it ſo ſmall, that the oil is very cheap. The quantity required on ſeveral occaſions, is, however, much greater than what all the lavender of the country can yield; and the price it is expected to be ſold at is ſo ſmall, that it is not to be wondered that there are ſeveral common adulterations of it.

The moſt uſual ways of ſophiſticating it, however, are two; the one with the ſpirit of wine, which is eſteemed the leaſt hurtful, and the oil thus ſophiſticated is often called the very beſt of the country. The method Mr. Geoffroy took to diſcover the cheat was this: he procured a long and narrow vial, of an equal diameter all the way up, into this he firſt put an ounce of fair water, and to this he added an ounce of the *oil*; he marked the height of the water in the vial, then ſhook the two liquors together, and they became milky, and heated on the mixture, which alone would have been a ſufficient proof that there was ſpirit of wine in the oil. After ſome ſtanding the liquor became clear, and the oil floated at the top, but in a much ſmaller quantity than might have been expected, there being not more than a quarter of an ounce of it, the reſt having been ſpirit of wine, which mixed with the water, and thus left all the true oil, which was only one fourth of the quantity, to float alone on the water, which was greatly increaſed in height in the vial. A pint of this *oil of ſpike*, therefore, contains only four ounces of the genuine oil, and twelve ounces of plain ſpirit of wine.

The ſecond method of adulterating this oil, which the ſame gentleman had ſuſpected, was eaſily diſcovered next: for on mixing this quarter of an ounce of pure *oil of ſpike* with three quarters of an ounce of oil of turpentine, there was produced an ounce of a liquor, which appeared wholly the ſame with the *oil of ſpike* commonly ſold in the druggiſts ſhops. And indeed, much of what is uſually ſold is worſe than this, being no other than oil of turpentine ſcented with a ſmall quantity of the true *oil of ſpike*.

The ready way of diſcovering the oil, counterfeited with oil of turpentine, is to wet a paper in it, and ſet it on fire; the turpentine will here be diſcovered by the thick ſmoak it yields, it being, of all vegetable oils, that which yields much the thickeſt cloud in burning: and, on the contrary, that which has been adulterated with ſpirit of wine, will be diſtinguiſhed by the ſame trial, by its yielding a much finer and thinner ſmoak, and burning with a bright blue flame. If they be tried by firing them in a ſpoon, that which is adulterated with ſpirit of wine will burn very bright, and yield no fume at firſt; but as it grows near the bottom it will ſmoak a little, and finally will leave no reſiduum, except that it varniſhes over the inſide of the ſpoon: that adulterated with the oil of turpentine will burn more vehemently, ſmoak more, and leave a coarſer varniſh upon the ſpoon; and if it be of the coarſeſt kind, that is, if it hath been adulterated with badly rectified oil of turpentine, the fume will be the more abundant, and there will be left in the ſpoon a fetid matter, reſembling melted pitch.

Mr. Geoffroy tried whether, in the buſineſs of varniſhing, the oil of turpentine alone might not do as well as the *oil of ſpike*; he found that it dried perfectly well, but that it left a ſtinking ſmell upon the work, which never went off; whereas the mixture of this oil, with that of *ſpike*, makes a ſmell like neither, and which ſoon goes off.

An ounce of oil of turpentine, with only twenty drops, either of our common oil of lavender, or the pure *oil of ſpike*, makes a liquor tolerably well ſcented, and which ſerves for the purpoſes of *oil of ſpike*. If two drams of our oil of lavender be added to ſix drams of ſpirit of wine, they immediately mix, and this afterwards mixed in a ſmall proportion with oil of turpentine, makes a ſort of *oil of ſpike*.

The moſt regular method, however, that the artificer can uſe, if he can get the genuine *oil of ſpike*, is to mix one ounce of it with three of oil of turpentine, which perfectly fits it for this purpoſe, and makes it the ſame with that in common uſe. The method of making this perfectly pure, is to rediſtil it in a balneum Mariæ; there will thus be procured an oil highly rectified, and pellucid as water, which will dry away as ſoon as touched on any thing. The great diſadvantage attending the *oil of ſpike* adulterated with ſpirit of wine is, that it will not readily mix with all the ſorts of varniſh.

Having gone through the properties of *oil of ſpike*, in regard to varniſh, it remains to enquire into them in regard to its other great uſe in enamel, and to conſider the effects of the two uſual methods of adulterating it in this work.

The *oil of ſpike*, which wants body, is not at all fit for enamelling, becauſe it dries too ſuddenly, and does not at all aſſiſt the natural dryneſs of the enamel, which is only a ſort of powder of glaſs; and the particles of this powder, with a fluid of too little body, are not manageable by the artiſts, ſo that the colour never is brought to a due conſiſtence; and when the oil has too much body, the mixture becomes too tenacious, and is as unmanageable in that extreme as in the other; and this fault is attended with another very great miſchief, which is, that the fume raiſed by this oil, when heated, is often ſo groſs, as to deſtroy the beauty of the colours. In ſhort, thick oil of turpentine is always deſtructive of enamels by its ſmoak.

The true compoſition for enamelling is *oil of ſpike* mixed with ſpirit of wine, but the proportions muſt be nicely regulated from repeated trials: for if the quantity of the ſpirit be too large, it is apt to ſeparate itſelf from the oil and colour in the drying, and this always ſpoils the gloſs and beauty of the work. Artificers obſerve, that *oil of ſpike* does beſt for their purpoſes, after it has been kept two or three years. But this is only owing to the oil's being adulterated with ſpirit of wine, and uſually containing too large a proportion of the ſpirit when firſt ſent over, it becomes better for uſe when a part of that ſpirit has had time to evaporate in the keeping. It would be a better way for theſe curious works, to procure the oil pure, and then occaſionally mix it with ſuch a proportion of ſpirit of wine, as experience ſhews to be the moſt proper. Mem. Acad. Par. 1716.

SPIKE, *hand*, in *Mechanics*. See HAND-*ſpike*.

SPIKE, *lavender*. See LAVENDER.

SPIKE, *winged, graſs*, in *Botany*. See STIPA.

SPIKENARD, *baſtard French, nardus*, in *Botany*, a genus of the *triandria monogynia* claſs; the characters of which are, that there is no calyx; that the flower is compoſed of two valves; the exterior is very ſlender, oblong, and ends in a beard or awn, and in ſome ſort receives the other into a cavity in its fore part; the interior is ſmall and ſtraight, and is terminated by a much ſhorter awn; the ſtamina are three capillary filaments, ſhorter than the flower; the antheræ are oblong; the germen of the piſtillum is oblong; the ſtyle is ſingle, crowned with a ſingle ſtigma; the flower continues firmly attached to the ſeed. The ſeed is ſingle, long, ſtraight, pointed at both ends, and narrower in its upper than in its under part. There are four ſpecies.

SPIKENARD, *Celtic*, a ſpecies of VALERIAN.

SPIKENARD, *falſe*. See LAVENDER.

SPIKENARD, *ploughman's*. See BACCHARIS.

SPIKENARD, *ploughman's*, is alſo the name of a ſpecies of *conyza*. See FLEA-*bane*.

SPIKENARD, *nardus*, or SPICA *nardi*, in the *Materia Medica*, a kind of vegetable ſhoot growing even with the ground, and ſometimes, in part, within the ground, belonging to an Indian graſſy-leaved plant, of which we have no particular deſcription. The nard, as it is brought to us, is a congeries of ſmall, tough, reddiſh-brown fibres, forming a bunch, or *ſpike*, about the ſize of a finger.

The *ſpica nardi* is uſually reckoned in the number of roots. It is alſo called *nardus Indica*; becauſe brought from the Eaſt-Indies.

It is now kept in the ſhops chiefly as an ingredient in the mithridate and theriaca, but was formerly employed in the ſame intention as the *Celtic*, and is ſaid to be uſed among the Orientals as a ſpice. It is moderately warm and pungent, accompanied with a flavour not diſagreeable. Lewis.

There is alſo another kind, called *ſpica Celtica*, a ſpecies of VALERIAN, growing in the Alps, from whence the ſhops have been generally ſupplied with the dried roots, conſiſting of a number of blackiſh fibres. This root has been recommended as a ſtomachic, carminative, and diuretic: at preſent it is ſcarcely otherwiſe made uſe of, in this country, than as an ingredient in mithridate and theriaca, though its ſenſible qualities promiſe ſome conſiderable medicinal powers. It has a moderately ſtrong ſmell, of which it is very retentive, and a warm, bitteriſh, ſubacrid taſte, reſembling thoſe of common wild valerian. Lewis.

SPIKENARD, *ointment of*. See NARDINUM *unguentum*.

SPIKES, or, as the ſeamen call them SPEEKS, in a *ſhip*, are large long iron nails with flat heads. They are of divers lengths, ſome a foot or two long, and ſome are jagged, ſo that they cannot be drawn out again. They are uſed to faſten the planks and timber. See MARLING-*ſpike*.

SPIKES, among *Botaniſts*, a term uſed to ſignify flowers ſet thick above each other.

SPIKING *up the ordnance*, a ſea-phraſe, uſed for faſtening a quoin with *ſpikes* to the deck, cloſe to the breech of the carriages of great guns; that they may keep cloſe and firm to the ſhip's ſides, and not get looſe when the ſhip rolls, and by that means endanger the breaking out of the butt-head of a plank. See QUOIN.

SPIKY *roller*, in *Huſbandry*. See ROLLER.

SPILANTHUS, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are, that the common empalement conſiſts of many oblong leaves, the outer being longer than the others; the corolla is uniform and tubulous; the hermaphrodite corollæ are equal; and the proper corolla is funnel-ſhaped with its limb divided into five ſegments; the ſtamina are five ſhort filaments; the anthera is cylindric and tubulous; the piſtil is an oblong germen; the ſtyle filiform, and of the length of the ſtamina; the ſtamina are two, and recurved; it has no pericarpium; the ſeeds are ſingle, oblong, compreſſed and bearded at their apex, and the receptacle is naked and conical. There are three ſpecies.

SPILES, in a *Ship*, are ſmall wooden pins, which are driven into the nail-holes, when a ſhip's ſheathing is taken off.

SPILL, *to*, in *Sea Language*, is to diſcharge the wind out of the cavity or belly of a ſail, when it is drawn up in the brails, in order to furl or reef it. This is performed either by collecting the ſail together, or by bracing its edge to the wind, ſo as to ſhiver or be laid aback. Falconer.

SPILLING-*lines*, in a *Ship*, certain ropes fixed occaſionally to the main-ſail, and fore-ſail, in tempeſtuous weather, for raiſing or furling them more conveniently. They are paſſed through blocks above the yard, and thence leading down before the ſail, come under its bottom, and return upwards behind it to the yard, where they are faſtened; ſo that the ſail by this effort is cloſely and immoveably confined to the yard. Falconer.

SPIN *hay, to,* in *Military Language*, is to twiſt it up in very hard ropes, for an expedition; ſo that it may be the leſs bulky for the cavalry to carry behind them.

SPINA *bifida*, in *Anatomy*, a parting of the *ſpinal* proceſſes into two rows. The exiſtence of ſuch a caſe is doubted. See SPINE.

SPINA *bifida* is alſo the name of the hydrops medullæ *ſpinalis*; which is a tumor of the colour of the ſkin, ſeated upon the vertebræ of the neck, back, or loins, or on the ſutures of the ſkull. The proceſſes of the *ſpine* are wanting in this diſorder, whence its name. It is known by its ſituation, its watery contents, and the palſy which uſually attends it. It is deemed incurable.

SPINA *burgi*, in *Botany*, a name uſed by ſome authors for the *alaternus*, or ever-green PRIVET, a garden-ſhrub, the fruit of which is a mild aſtringent.

SPINA *ventoſa*, is properly a caries of the bones, attended with a corruption of them, which takes its riſe in their internal parts, and by degrees enlarges the bone, and raiſes it into a tumor.

The ancients were ſtrangers to this name for this diſorder, and called it *ſideratio*, *gangræna*, or *cancer oſſis*, and ſometimes expreſſed it by the word *teredo*. Some among the French call it alſo an *exoſtoſis*, though this is a term more properly denoting certain eminences, or preternatural acuminated excreſcences in the bones, which happen after fracture, or other accident, and are ſometimes attended with a caries.

The name of the diſorder ſeems to have been borrowed from *ſpina, a thorn*, from the reſemblance the eminences of the bone in this caſe bear to thorns, continually pricking the fleſh, and producing the moſt grievous pains; and the epithet *ventoſa* is added, becauſe the tumor ſeems to the touch to be filled with air, though this is very rarely the caſe. This ſeems to have been the origin of the name *ſpina ventoſa*, which ſome after-writers barbarouſly diſtorted into *ſpinæ ventoſitas*.

When this diſorder happens to children, Severinus, and many others, call it *pædarthrocaces*.

In the *ſpina ventoſa* the caries, or eroſion of the bone, is occaſioned by a depravity of the contained fluids, and generally ariſes ſpontaneouſly, or without any external cauſe, and does not begin upon the ſurface of the bone, but between its lamellæ, or elſe in its internal cavity; from whence extending itſelf by degrees to the external parts, it at length either affects the whole bone, or a greater or ſmaller part of it, expanding itſelf to different widths, and riſing to a tumor, which is ſometimes hard, and without pain, and at others feels as if it were filled with wind, and is attended with a greater or leſſer degree of pain, pricking and ſhooting, and at laſt grows red, and is attended with other bad ſymptoms, till the diſordered bone being by degrees corroded, the common integuments, and other ſofter parts that lay over it, remaining at firſt entire, but at laſt partaking of the diſorder, foul ulcers of a very terrible ſort break out. When tumors of the bone are hard, and the ſoft parts about them not inflated, and are free from redneſs, inflammation, and pain, as is very frequently the caſe in ricketty diſorders, the bad ſymptoms juſt deſcribed ſeldom come on. This is properly the pædarthrocaces, but the painful, red, inflated tumors happening equally to children, and to adults, are properly the *ſpina ventoſa*.

It differs from a caries by being attended with a tumor, and from the rickets by its being accompanied with pain and eroſion. It generally begins about the heads, or epiphyſes of the larger bones, where they are moſt tender and ſpungy, and where the noxious matter may not only have ſufficient room to lodge in the cellular ſubſtance, but where it will alſo meet with the leaſt reſiſtance in ſoftening and expanding the parts. Sometimes, however, it alſo ariſes in the middle of the bones, between their lamellæ, eſpecially in the tibia. The os frontis is alſo ſubject to diſorders of this kind in venereal caſes, and it is frequently ſituated in the bones of the face, neck, and breaſt; though thoſe of the arms, legs, fingers, carpus, metacarpus, tarſus, and metatarſus, are more frequently the ſubjects of it.

Though this diſorder uſually ariſes from internal, yet it is ſometimes found to be owing to external cauſes; eſpecially in perſons conſtitutionally addicted to a diſorder of this kind, when the veſſels between the lamellæ of the bone, or in the medulla itſelf, are by a blow, fall, or other external violence, injured, or torn, and their fluids extravaſated, and by degrees putrefy, corrupt, and deſtroy the medulla, and ſoften the very ſubſtance of the bone, and corrode it; whence proceed pain, tumors, ulcers, and fiſtulas of the bone, and adjacent parts, and all the ſame train of miſchiefs which attend theſe diſorders, when begun ſpontaneouſly from internal cauſes.

The proximate cauſe of this diſorder is a collection, or congeſtion, either of a viſcid and thick, or of an acrimonious and corroding humour, or an inflammation ariſing in the medulla, or in the cellular ſubſtance of the bone, degenerating into an abſceſs, and forming matter or ichor. As theſe ſtagnating fluids can find no diſcharge from the bones, eſpecially from their cavities, they continue confined there till they putrefy, and become acrimonious, and corrode and deſtroy the neighbouring parts, converting them, particularly the medulla, into a kind of ſanies; and at length they attack the bone and deſtroy it. The collection of viſcid and pituitous humours, and the expanſion of the bones, ſometimes happen without pain, as in ricketty caſes, but the eroſion of the parts can never happen without the moſt acute pains.

When the internal parts of the bones only are affected by this diſorder, the pain does not increaſe upon external preſſure; when the pain increaſes upon external preſſure, the external parts are brought into conſent; and when this happens, the perioſteum, and parts which ſurround it, with the ſubſtance of the bone and tunica cellularis enlarge, from whence a ſenſation frequently ariſes, as if the parts were filled with air or wind. But when the tumor is opened, either ſpontaneouſly, or by the knife, the bone, if it lies bare, is found full of ſmall eroſions, reſembling a ſponge or pumice-ſtone.

Of this terrible diſorder there are properly three degrees; the firſt is, when the patient complains of a continual grievous pain in the bone, which ſeems to him to proceed from the marrow, and torments him ſo that he can have no ſleep, and all this while there is no external pain or tumor; in this caſe the diſeaſe is confined to the internal part of the bone. The ſecond degree is when a tumor appears to be ariſen on the ſurface of the bone, and is attended with external pain, more or leſs. The third degree is when, after the former ſymptoms, an ulcer is formed in the tumor, which diſcharges a fœtid ichor, or purulent matter, ſmelling like rank butter or lard. There are two methods of treating this diſorder, one ſuited to the milder, the other to the more violent ſtate of it, in which the bones, and the parts ſurrounding them, are entirely corroded and deſtroyed. In the milder ſtages, the acrimony of the blood muſt be endeavoured to be corrected by large draughts of the decoctions of the woods, with the china and ſarſaparilla roots. The parts affected ſhould alſo be fumigated with the ſteam of decoctions of aromatic herbs, and twice a day in the intermediate times, the part may be rubbed over with a mercurial ointment, and afterwards covered with the common mercurial plaſter. Mercurial medicines ſhould alſo be given internally, according to the ſtrength of the patient, and ſometimes a ſalivation is neceſſary.

Mercurial remedies ſeem indeed ſo peculiarly appropriated to this caſe, that nothing is to be done without them; and it hence looks very ſuſpicious, that ſomething venereal is always in the caſe, or elſe that the diſorder is of itſelf very much a-kin to that diſeaſe. By diligently purſuing this method for ſome weeks, the firſt and ſecond ſtages of this diſeaſe may be cured, even where there are bony tumors formed; and the tumors may either be reduced, or at leaſt brought to that ſtate, that they will remain as they are without farther increaſe, or without pain, or any farther inconveniency.

But when theſe tumors are ſo far advanced, as to be out of the reach of the remedies, the pain and tumors increaſing, and abſceſſes forming; as there is great reaſon to fear the entire deſtruction of the bone, if the abſceſs does not burſt of itſelf, the ſurgeon ſhould not ſtay for its maturation, but lay the bone bare in the loweſt, or in the moſt painful part. When the abſceſs is already burſt, if the opening be too ſmall, it muſt be enlarged with a knife, or if the patient too much dreads the knife, the cauſtic may ſupply its place; and after this ſeveral ſmall holes muſt be made in the bone with a ſmall piercer, perforating it into the medulla, to give way for the diſcharge of the confined matter; and when theſe ſmall holes are not ſufficient, a larger muſt be made by the trepan, if the bone will admit it: this will not only make more way for the diſcharge of the matter, but will alſo give room for the proper application of remedies better than any other method.

While this is under cure, the patient muſt uſe internally the decoctions of the woods, and mild mercurial, and antimonial medicines; and externally the wound muſt be treated with cleanſing and balſamic remedies, ſuch as decoctions of agrimony, ſanicle, St. John's wort, or birthwort, and eſſence of myrrh and aloes. Theſe ſhould be injected warm with a ſyringe twice every day, as may alſo a ſolution of mercurius dulcis made in plantane

tane-water, or in lime-water. Honey of roſes ſhould be added in a ſmall quantity to either of the decoctions, uſed as eſſences; and after the uſe of them, the wound ſhould be dreſſed with the before mentioned eſſences, or with thoſe of maſtich or amber, ſpread upon lint, and covered with a mercurial, or other plaſter: this method is to be continued till the parts are healed. The actual cautery is ſometimes neceſſary to root out the diſorder, eſpecially when it is only between the lamellæ of the bone, for in other caſes there is no getting to the bottom with it.

But when all theſe methods are unſucceſsful, and the part is already too much corroded and deſtroyed, there is no hope of ſaving it, nor indeed of ſaving the life of the patient, by any other means than the taking off the limb. When the diſorder is ſituated, however, in ſome ſmall bone, as on the carpus, tarſus, metacarpus, or metatarſus, or fingers, it will not always be neceſſary to take off the whole limb, that is to ſay, the finger, foot, or hand, but it will frequently ſuffice to remove the corrupted bone alone. In larger bones, where the whole bone is not affected, but only a part of its external ſurface is diſordered by either a caries, or *ſpina ventoſa*, the whole limb is by no means to be taken off, but the diſeaſed part of the bone only removed; but when a large bone, as the os humeri, tibia, or femur, or an entire joint of the arm, knee, or foot, is diſeaſed, there is no remedy but amputating it in the ſound parts juſt above. Heiſter's Surgery, vol. i. p. 28, &c.

Dr. Schlichting affirms, that the *ſpina ventoſa* may be cured by rubbing the tumor twice a day with ung. Neapolit. preventing ſalivation by gentle cathartics. Phil. Tranſ. Nº 466. ſect. 10. See ſome Obſervations on the *Spina Ventoſa* by Claudius Amyand, eſq. in Phil. Tranſ. vol. xliv. p. 193.

SPINACH, or SPINAGE, *ſpinacia*, in *Botany*, a genus of the *dioecia pentandria* claſs. Its characters are theſe: it is male and female in different plants; the male flowers have an empalement cut into five oblong, obtuſe, concave ſegments, but no petals; with five hair-like ſtamina longer than the empalement, terminated by oblong twin ſummits; theſe are barren; the female flowers have permanent empalements of one leaf, cut into four points, two of which are very ſmall; they have no petals, but a compreſſed roundiſh germen, ſupporting four hair-like ſtyles, crowned by ſingle ſtigmas.

The germen turns to a roundiſh ſeed, which is ſhut up in the empalement; in ſome ſpecies they are almoſt ſmooth, and in others they have two or three ſharp thorns. There are two ſpecies, including ſeveral varieties.

The common *ſpinach*, intended for winter uſe, ſhould be ſown on an open ſpot of ground in the beginning of Auguſt, obſerving to do it, if poſſible, when there is an appearance of rain. When the young plants are come up, the weeds muſt be deſtroyed, and the plants left at about three or four inches aſunder. The ground being kept clear of weeds, the *ſpinach* will be fit for uſe in October. The way of gathering it to advantage, is only to take off the longeſt leaves, leaving thoſe in the centre to grow bigger; and at this rate a bed of *ſpinach* will furniſh the table for the whole winter, till the *ſpinach* ſown in ſpring is become fit for uſe, which is commonly in April.

Spinach eaten freely is eſteemed laxative, diuretic, and cooling.

SPINACH, *ſtrawberry*. See BLITE.

SPINACHIA, in *Ichthyology*, a name given by ſome authors to our common ſtickleback, or banſtickle, more uſually known among writers by the names *pungitius*, or *aculeatus piſciculus*.

The *gaſteroſteus ſpinachia* of Linnæus has fifteen ſpecies. See STICKLE-*back*.

SPINAL *arteries*, in *Anatomy*, are two arteries, one anterior and one poſterior, both produced by the vertebrales; each of which, as ſoon as it enters the cranium, ſends out a ſmall branch, by the union of which the poſterior *ſpinalis* is formed. Afterwards the vertebrales advancing on the apophyſis baſilaris, or production of the occipital bone, detach backward two other ſmall branches, which likewiſe meet, and by their union form the *ſpinalis* interior. Theſe *ſpinal* arteries run down on the fore and back ſides of the medulla *ſpinalis*, and by ſmall tranſverſe ramifications, communicate with thoſe which the intercoſtal and lumbar arteries ſend to the ſame part. Winſlow.

SPINAL *marrow*. See MEDULLA *ſpinalis*.

In the Hiſtory of the Royal Academy of Sciences, for the year 1714, we have an inſtance of a fœtus born without either brain, cerebel, or *ſpinal marrow*, though perfectly well formed in other reſpects. It had gone its natural time; lived two hours; and even gave ſigns of life, upon ſprinkling the baptiſmal water on its head. Inſtances of this kind, as this is not the only one we meet withal, furniſh a great objection againſt the exiſtence of the animal ſpirits, which ſhould be generated in the brain, or at leaſt in the cerebel or *ſpinal marrow*; and which are generally allowed of ſuch abſolute neceſſity in the animal œconomy.

SPINAL *muſcles*, in *Anatomy*, are thoſe VERTEBRAL muſcles, which are wholly fixed in the *ſpinal* apophyſis.

SPINAL *nerves*. See NERVE.

SPINALIS, in *Anatomy*, a muſcle on the ſide of the neck, ariſing from the five ſuperior proceſſes of the vertebræ of the thorax, and the inferior of the neck; and which in its aſcent, becoming more fleſhy, is inſerted into the inferior part of the vertebræ of the neck laterally. It ſerves to draw the neck backwards.

SPINALIS *cervicis*, in *Anatomy*, a name given by Albinus to a muſcle of the neck, called by Fallopius the *tertium par muſculorum dorſi*, and by Cowper and Morgagni *ſpinalis colli*.

This is the muſcle which the French anatomiſts call *les vertebraux externes du demi-epineux, ou le tranſverſaire epineux ducal*. See TRANSVERSALIS, &c.

SPINALES *colli minores*, muſcles lying between the ſix *ſpinal* apophyſes of the neck, and between the laſt of the neck and firſt of the back; being inſerted in theſe apophyſes by both extremities on one ſide of the poſterior cervical ligament, which parts them from thoſe of the other ſide. They are likewiſe termed INTERSPINALES.

SPINALIS *dorſi*, in *Anatomy*, a name given by Albinus to a muſcle of the back, figured by Euſtachius, Tab. 37. and called by Fallopius *quinti paris dorſi muſculorum pars implantata in ſpinas vertebrarum thoracis*.

Others, as Spigelius, have called it a part of the SEMISPINATUS, and others a part of the LONGISSIMUS *dorſi*. The French have named it *le grand epineux de dos*.

SPINALIS *dorſi major*, a pretty long and ſlender muſcle, lying upon the lateral part of the extremities of the *ſpinal* apophyſis of the back. It is compoſed of ſeveral muſcular faſciculi of different lengths, which croſſing each other, are inſerted laterally by ſmall tendons in the *ſpinal* apophyſes from the ſecond, third, or fourth vertebræ of the back; and ſometimes, though ſeldom, from the laſt of the neck, or firſt of the back, all the way to the firſt or ſecond vertebra of the loins, with ſeveral irregular decuſſations, which vary in different ſubjects The longeſt faſciculi are all a little incurvated, and the whole muſcle terminates in points at its ends, but is conſiderably broad in the middle. It communicates by ſome fibres with the longiſſimus dorſi, and *ſemiſpinalis*, and ſends off faſciculi to ſeveral tranſverſe apophyſes of the back, from the fourth to the eleventh. It is called by ſome *ſemiſpinalis*, but very improperly.

SPINALIS, *ſemi*, *colli*, and *dorſi*. See SEMISPINALIS.

SPINALES *dorſi minores*. Theſe muſcles are of two kinds; ſome go laterally from the extremity of one *ſpinal* apophyſis to another, being often mixed with the ſhort faſciculi of the *ſpinalis* major; the reſt lie directly between the extremities of two neighbouring *ſpinal* apophyſes, being ſeparated from thoſe on the other ſide by the *ſpinal* ligament. Theſe are ſmaller and thinner than thoſe of the neck, and are properly enough termed *interſpinales*. Winſlow.

SPINALES *et tranſverſales lumborum*. There are ſome faſciculi which run up from the ſuperior falſe *ſpines* of the os ſacrum to the lower *ſpinal* apophyſes of the loins, which may be looked upon as ſo many *ſpinales lumborum majores*; and there are alſo ſome *ſpinales lumborum minores* between the *ſpinal* apophyſes of the loins, and *tranſverſales minores* between the tranſverſe apophyſes, which are ſometimes of a conſiderable breadth. Winſlow.

SPINARELLA, in *Ichthyology*, a name given by Bellonius, and ſome other authors, to the little fiſh called by us the *leſſer ſtickleback*. In the Linnæan ſyſtem, this is a diſtinct ſpecies of the GASTEROSTEUS.

SPINATUS, in *Anatomy*, a name given by Riolanus, and others, to a muſcle of the neck, called by Albinus *ſpinalis colli*, and by Winſlow, and the other French writers, *les vertebraux externes du demi-epineux, ou tranſverſaire epineux du col*. See SPINALIS and TRANSVERSALIS.

SPINALIS, *medulla*. See MEDULLA.

SPINDLE, in *Mechanics*. See *Double* CONE.

The axis of the wheel of a watch or clock is called the *ſpindle*, and its ends the *pivot*.

SPINDLE, *parabolic*. See PYRAMIDOID.

For the method of finding its ſolidity. See SOLIDITY.

SPINDLE, in *Sea Language*, a ſort of iron pin, tapering at the upper end to a point. It is uſed to ſtick into the upper end of the top-gallant maſt, ſo as to carry a vane, which, turning thereon horizontally, will ſhew the direction of the wind. It is uſually crowned with a globular or conical piece of wood, called the ACORN, which prevents the vane from being blown off.

SPINDLE alſo denotes the lower end or foot of the capſtern, which is ſhod with iron, and becomes the pivot or axis, upon which it turns in the ſaucer. See CAPSTAN.

Spindle, in *Mining*, is a piece of wood faſtened into either ſtow-blade. See Stows.

Theſe ſtows give a miner, or any other perſon that owns them, as good a right to a meer or meers of ground, (ſo that every meer have a pair of ſtows ſet on them) as a deed of conveyance doth to any purchaſer.

Spindle, *ſhell*. See Trumpet-*ſhell*.

Spindle-*tree*, *euonymus*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: it has a ſhort empalement of one leaf, which is divided into four or five parts; the flower has four or five oval petals, which ſpread open, and four or five ſhort ſtamina, joined at their baſe to the germen, terminated by twin ſummits; in the centre is ſituated a large oval germen, ſupporting a ſhort ſtyle, crowned by an obtuſe ſtigma; the germen becomes a ſucculent four or five-cornered capſule, having five valves, and ſo many cells as angles, each containing one oval ſeed. Linnæus reckons two, and Miller four ſpecies.

This ſhrub is common in our hedges, but if cultivated ſingly with care, will grow to a much larger ſize than is commonly met with. The wood is uſed by the muſical inſtrument-makers, for toothing organs and virginal keys. The branches are cut into tooth-picks, ſkewers, and *ſpindles*; from which latter purpoſe it derives its name: in ſome countries it is called dogwood. Miller.

It is generally ſuppoſed that the *euonymus* of the ancients is the ſame plant that we at this time call by this name. The words of Theophraſtus have probably given occaſion to this opinion; as they ſound at firſt reading like words expreſſing the characters of the fruit of this tree; but on a cloſer inſpection, they will be found to expreſs a fruit of a very different kind. This author ſays, that the fruit of the *euonymus* is like the pod of the ſeſamum, marked with four protuberant ribs, and hard within, and divided into places for four orders of ſeeds. It is plain by this, that as their ſeſamum bore an oblong pod marked with four ribs, ſo as to ſeem of a quadrangular figure; ſo did their *euonymus*, and that in this long pod there were four orders of ſeeds, each of theſe orders containing a great many ſeeds. Now the fruit of our *euonymus* is ſhort and not at all like a pod, and contains only four ſeeds, and not four orders of ſeeds: there is alſo this farther proof of our *euonymus* not being that of the ancients, that ours is a wholeſome food to cattle, and they are very fond of cropping it whenever they can reach it, and never get any hurt by it; whereas the *euonymus* of the Greeks was poiſonous to cattle, according to Theophraſtus. See Fusanus and Tetrastoechon.

Spindle-*tree*, *African*, or *climbing*, in *Botany*. See Staff-*tree*.

Spindle-*tree*, *baſtard*. See Kiggelaria.

SPINDLING, a term uſed by gardeners for the firſt appearance or putting forth of flowers, ſtems; or their running up in length.

SPINE, Spina *dorſi*, in *Anatomy*, the ſeries or aſſemblage of vertebræ, or bones of the back, which ſuſtain the reſt of the body, and to which are connected the ribs. See *Tab. Anat. (Oſteol.) fig.* 3. *lit. a a. fig.* 7. *lit. a a.*

It has its name *ſpine*, becauſe the hind part thereof is edged, or *ſpiny*. Some call it the *canalis ſacer*.

It repreſents a very compound folding pillar, round on the foreſide, and on the backſide ſtuck full of prickles or points, repreſenting ſo many *ſpines*. It has a canal in the middle through its whole length, into which a great number of holes open on each ſide. When it is viewed directly on the foreſide or backſide, it appears ſtraight, and to be made up of different portions of pyramids, in a contrary ſituation to one another; but viewed ſideways, it preſents ſeveral different curvatures.

The pieces which compoſe the *ſpine* are of two kinds, one ſimple, the other compound; the ſingle pieces are generally twenty-four in number, called by the name of *vertebræ*; the compound pieces are two, the os ſacrum and os coccygis. The ſingle pieces are alſo called *true vertebræ*, to diſtinguiſh them from the portions which compoſe the other two, which are called *falſe vertebræ*.

The true vertebræ are divided into three claſſes, viz. ſeven of the neck, twelve of the back, and five of the loins; and to theſe are given the names *cervical*, *dorſal*, and *lumbar*. Winſlow. See Vertebræ.

This bone, when felt through the integuments, ſeems ſometimes divided, and has given riſe to the notion of a *ſpina bifida*, or bifurcation of the *ſpine*. But ſome doubt of the exiſtence of ſuch a caſe; as a perfect *ſpina bifida* ſuppoſes the very canal and *ſpinal* marrow to divide into two branches, and the *ſpinal* proceſſes to divaricate into two rows. We have a caſe in the Philoſophical Tranſactions, where the *ſpinal* marrow of an infant was found bare, without any bony covering, and which was taken for a *ſpina bifida*. See Phil. Tranſ. Nº 472. ſect. 2. and Nº 306. p. 98.

See in Mem. de l'Acad. Royale des Sciences, anno 1730, ſome curious obſervations by Mr. Winſlow, on the motions of the *ſpine*.

Spine, *cartilages of the*. The cartilages of all the vertebræ in general are of two kinds, one proper to each vertebra, the other common to two vertebræ which lie next one another; the firſt may be termed the *cartilages of articulation*, the latter the *cartilages of ſymphyſis*.

The proper articular cartilages of each vertebra of the whole *ſpine*, are thoſe four which cover the ſurfaces of the four ſmall articular apophyſes. In the natural ſtate they are very white and ſmooth, and much thicker than in the dried bones. Their circumference is the ſame with that of the articular ſides of the apophyſes, except in thoſe places where there are ſmall ſuperficial notches. The vertebræ of the back, beſide the four cartilages of their ſmall apophyſes, have others which do not belong to their articulation with one another, viz. thoſe which cover the lateral foſſulæ in the bodies of theſe vertebræ, and the foſſulæ of their tranſverſe apophyſes, by both of which they are articulated with the ribs.

The cartilages of ſymphyſis lie between the bodies of the vertebræ, one of them being contained between, and cloſely joined to the lower ſurface of one vertebra, and to the upper ſurface of the next under it; the breadth and circumference of theſe anſwer exactly to thoſe of the ſurfaces between which they are contained, but their height, or thickneſs, is different in each claſs of the vertebræ. In the vertebræ of the loins they are, according to the ſtature of the ſubject, a quarter or a third of an inch thick; in thoſe of the neck they are not ſo thick, and thinneſt of all in thoſe of the back. Neither are they of equal thickneſs in all their parts; thoſe of the neck and loins appear to be thickeſt on the foreſide, and thoſe of the back rather thickeſt on the contrary part; but theſe differences are moſt remarkable in the vertebræ that lie near the middle of each claſs.

The internal ſtructure of theſe cartilages is different from that of all the other cartilages of the body, and indeed they reſemble the reſt in nothing but in whiteneſs and in elaſticity. When we view their circumferences only, they appear to be one uniform maſs like the reſt, but when divided by an inciſion, parallel to the ſurface of the vertebræ, we ſee that they are made up of a great number of concentric cartilaginous rings, contained within each other, with a ſmall ſpace left between them. Theſe are cloſeſt and thinneſt near the centre, and about the middle ſeem to degenerate into another ſofter kind of ſubſtance. Theſe rings do not form an entire circumference, being turned inward on the back ſide, anſwerably to the poſterior ſlope in the body of each vertebra. They lie horizontally, one edge being fixed to the lower ſide of one vertebra, and the other to the upper ſide of the vertebra next below the former.

The interſtices between the rings are filled with a mucilaginous ſubſtance, leſs fluid than that of the joints, and their breadth, or heighth, is proportionable to the diſtance of the vertebræ between which they lie.

Each cartilaginous lamina taken ſeparately is very pliable, according to its length, but taken altogether they are not ſo eaſily bent, partly becauſe of their circular figure, partly becauſe of their proximity and multiplicity. They yield, however, in the inflections of the *ſpine*, and without any inflection to the weight of the head and upper extremities; but this is done by very ſmall degrees, and moſt of all, when the upper part of the body is loaded with any foreign weight. After theſe compreſſions they reſtore themſelves, merely by being freed from the preſſure; ſo that a man is really taller after lying ſome time, than after he has carried a burden for a great while. Theſe ſingular obſervations of the different heights of the ſame perſon, at different times, which were firſt made in England, and afterwards confirmed at Paris by Mr. Morand, are moſt naturally and eaſily accounted for, merely by the different ſtate of the intervertebral cartilages.

The intervertebral cartilages of the neck lying, for the moſt part, between the convex ſide of one vertebra, and the concave ſide of another, are of a greater extent, in proportion to the ſize of thoſe vertebræ, than thoſe of the back and loins. The os ſacrum has no cartilage, except that between the upper ſide of the firſt falſe vertebra, and the laſt vertebra of the loins; and thoſe by which it is connected to the oſſa innominata, already deſcribed as the cartilages of that bone. The cartilages, which join the different portions of the os coccygis, are preſerved in ſome ſubjects to a very great age, but in others they very ſoon become entirely bony. Winſlow.

Spine, *ligaments of the*. The vertebræ are ſtrongly connected to each other by three kinds of ligaments. Each vertebra is connected to thoſe above and below it by a great number of very ſhort and ſtrong ligaments, which croſs each other obliquely, and are fixed round the edges of the body of each vertebra. Theſe crucial ligaments cover the circumference of the intervertebral cartilages, and adhere cloſely to them.

The bodies of all the vertebræ, from the ſecond of the neck to the os ſacrum, are covered by ligamentary half vaginæ on the convex ſide, in which theſe vaginæ are fixed, ſurrounding all the crucial ligaments, and made up of ligamentary filaments, partly oblique, but for the moſt part longitudinal. All the vertebræ are likewiſe ſtrongly connected by a ligamentary tube, which lines the inner ſurface of the medullary canal from the occipital hole to the os ſacrum; it repreſents a long flexible funnel, its cavity at the upper part being equal to that of the occipital foramen, and ending in a point at the os ſacrum.

The firſt vertebra is fixed to the os occipitis beſide this, by a diſtinct and very ſtrong ligamentary covering; the ſecond has two ligaments peculiar to it, one which connects the apophyſis dentiformis to the os occipitis, and another tranſverſe, which confines this apophyſis within the anterior portion of the cavity of the firſt vertebra. The firſt may be called the occipital, and the ſecond the tranſverſe ligament of the odontoide apophyſis. Along the whole bony canal of the *ſpine*, between the baſes of each *ſpinal* apophyſis, lies a flat and very elaſtic ligament, of a yellowiſh colour, which fills up the poſterior great notches of the vertebræ, adhering to their edges, and to the neighbouring portions of the great ligamentary tube.

Between the extremities, or apices of the *ſpinal* apophyſes, are ſmall ligamentary ropes, which go from one *ſpine* to the next, which are all really double, though they appear ſo only in the neck, being there fixed ſeparately to the forked extremities of the *ſpines*. Between all the *ſpinal* apophyſes, from their apices to the middle of their baſes, lies a ligamentary membrane, going between each two; and there is a ligament of a like kind between the two tranſverſe apophyſes in all.

The articular ligaments of the *ſpina* dorſi are thoſe which tie the glenoide cavities of the firſt vertebra to the condyles of the os occipitis; thoſe that join the cartilaginous ſurface of the apophyſis dentiformis to the anterior cavity of the firſt vertebra, and thoſe by which all the oblique, or articular apophyſes, are connected together. Theſe are all ſmall, ſhort, and ſtrong. The vertebral ligaments of the ribs, or thoſe which connect the ribs to the vertebræ, are of the ſame kind, and are inſerted round the cartilaginous foſſulæ in the body, and apophyſes of each vertebra. Beſide all theſe ligaments of the *ſpine*, there is one that goes in form of a membrane from the os occipitis, all the way to the laſt two vertebræ of the neck: this is a true intermuſcular ligament, and may be properly called the *ligamentum cervicale poſterius*. There are alſo two lateral ligaments of the ſame kind, fixed to the tranſverſe apophyſes of the vertebræ of the neck. Winſlow.

For the fractures and luxations of the vertebræ of the *ſpine*. See Vertebræ.

Spine, *curvature of the*, in *Medicine* and *Surgery*, a diſeaſe proceeding, as Mr. Pott has ſhewn, not from a diſlocation of the vertebræ, and a conſequent preſſure of the diſplaced bones on the ſpinal marrow, but from a ſtrumous or ſcrophulous indiſpoſition in the parts compoſing the *ſpine*, or thoſe in its immediate vicinity, and not unfrequently attended with a partial, or a total loſs of the power of uſing, or even of moving the lower limbs: whence it has been generally, though very improperly, called a *palſy*, and treated as a paralytic affection.

This curvature is occaſioned by means of a carious eroſion of one or more of the bodies of the vertebræ; in conſequence of which, that immediately above the ſeat of the diſeaſe, and that immediately below it, are brought nearer to each other than they ſhould be; the body of the patient bends forward; the *ſpine* is curved from within outwards, and the tuberoſity appears behind on account of the protruſion of the ſpinal proceſſes of the diſtempered vertebræ; and the curvature correſponds to the degree of carious eroſion, and to the number of vertebræ affected.

Mr. Pott obſerves, that the diſeaſe, to which the curvature of the *ſpine* is owing, is the cauſe of a great variety of complaints, both general and local; but when they are not attended with an alteration of the figure of the back-bone, neither the real ſeat, nor true nature of ſuch diſtemper, are pointed out by the general ſymptoms; and, conſequently, they are often unknown as long as the patient lives.

The caries, with curvature and uſeleſs limbs, is moſt frequently of the cervical or dorſal vertebræ: the caries without curve, of the lumbal, though this is by no means conſtant and neceſſary. In the former caſe, it often happens, that internal abſceſſes and collections of matter are formed, which matter makes its way outward, and appears in the hip, groin, or thigh, or being detained within the body, deſtroys the patient.

The *curvature of the ſpine*, from within outward, of which the paralytic, or uſeleſs ſtate of the lower limbs, is a frequent conſequence, is but one effect of a diſtempered *ſpine*; and, therefore, the generally received opinion, that all the attending ſymptoms are derived from the curvature, conſidered abſtractedly, is by no means founded in truth, and may be productive of very erroneous conduct. Hence it appears, that when a caries has taken place, and the parts ſurrounding it are in a ſtate of ulceration, no attempts to remove the diſorder by means of ſwings, ſcrews, &c. can do any good, but, on the contrary, if they act ſo as to produce any effect at all, it muſt be a bad one.

The majority of thoſe who labour under this diſeaſe are infants and young children: however, adults are not exempt from it; but Mr. Pott has never ſeen it at an age beyond forty. When it attacks a child who is old enough to have walked properly, its aukward and imperfect manner of uſing its legs is the circumſtance which firſt excites attention, and this is ſoon ſucceeded by an incapacity of uſing them at all. Previous to this, the child is languid, liſtleſs, and very ſoon tired; unwilling to move and apt to ſtumble; and in quick motion his legs croſs each other involuntarily, by which he is ſuddenly thrown down; and in ſtanding his knees totter and bend under him: afterwards he complains of frequent pains and twitchings in his thighs, eſpecially in bed, and of an uneaſy ſenſation at the pit of his ſtomach: when he ſits down, his legs are almoſt always found acroſs each other, and drawn up under his ſeat; and in a little time he altogether loſes the power of walking. If the incurvation affect ſeveral vertebræ of the neck, the child finds it inconvenient and painful to ſupport its own head, and is always deſirous of laying it on a table or pillow, to be relieved of its weight. If the affection be of the dorſal vertebræ, the general marks of a diſtempered habit, ſuch as loſs of appetite, hard dry cough, laborious reſpiration, quick pulſe, and diſpoſition to hectic, appear early; but theſe complaints are improperly aſcribed to the mere deformity of the trunk, which is as much the effect of the original diſeaſe of the *ſpine* as theſe complaints themſelves.

In an adult, the attack and progreſs of the diſeaſe are much the ſame; but from him we learn, that his firſt intimation of the diſorder was a ſenſe of weakneſs in his back-bone, accompanied with a heavy dull kind of pain, attended with a laſſitude and fatigue after very moderate exerciſe, and ſucceeded by an unuſual ſenſe of coldneſs in his thighs, and a palpable diminution of their ſenſibility. In a little time, his limbs are frequently convulſed by involuntary twitchings, which are particularly troubleſome in the night, and ſoon afterwards he becomes incapable of walking, his power of retaining or of diſcharging his urine and fæces is conſiderably impaired, and his penis is incapable of erection. The adult alſo finds all the offices of his digeſtive and reſpiratory organs much affected, and complains conſtantly of pain and tightneſs at his ſtomach.

The method of cure in this diſeaſe, (firſt ſuggeſted to Mr. Pott, by a ſeemingly accidental abſceſs, and farther recommended by the authority of Hippocrates, who gives an account of a paralyſis of the lower limbs cured by an abſceſs in the back, as well as by the teſtimony of Dr. Cameron of Worceſter, who, in a caſe of uſeleſs limbs, attended with a curvature of the *ſpine*, endeavoured to imitate this act of nature by exciting a purulent diſcharge, and found it beneficial) conſiſts merely in procuring a large diſcharge of matter from underneath the membrana adipoſa on each ſide of the diſtempered bones forming the curvature, and maintaining ſuch diſcharge till the patient recovers his health and limbs. It is a matter of little importance, by what means the diſcharge be procured, provided it be large, and that it comes for a ſufficient length of time. Mr. Pott, having tried the different means of ſetons, iſſues by inciſion, and iſſues by cauſtic, found the laſt in general to be preferable; being leaſt painful, moſt cleanly, moſt eaſily manageable, and capable of being continued for the longeſt time. The cauſtics ſhould be applied on each ſide of the curvature, in ſuch a manner as to leave the portion of ſkin covering the ſpinal proceſſes of the protruding bones entire and unhurt, and ſo large, that each of the ſores, upon the ſeparation of the eſchars, may eaſily hold three or four peas, in caſe of the ſmalleſt curvature; but in large curves at leaſt as many more.

Theſe iſſues ſhould not only be kept open, but the diſcharge

charge from them ſhould be maintained by means of orange peas, cantharides in fine powder, ærugo æris, or any other kind of application that may beſt promote a large and long continued drain. Theſe iſſues muſt be continued long enough not only to effect a complete cure, by reſtoring the health as well as the limbs, but a conſiderable time longer, eſpecially in infants and growing children. By means of theſe diſcharges, the eroding caries is firſt checked and then ſtopped; in conſequence of which an incarnation takes place, and the cartilages between the bodies of the vertebræ having been previouſly deſtroyed, the bones become united with each other, and form a kind of anchyloſis.

The time neceſſary for the accompliſhment of a cure, has differed according to different circumſtances; in ſome caſes it has been perfected in two or three months, and in ſome it has required two years, during two thirds of which time there has been no viſible amendment.

The curvature or deformity of the *ſpine*, which remains after recovery, is ſubject to conſiderable variety, as it depends on the degree of caries, and the number of bones affected: in general, it may be ſaid, that when one of the vertebræ only is affected, and the patient young, the curve will in length of time almoſt totally diſappear; but when two or three are affected, this cannot be expected; nay, the conſolidation and union of the bones, which had been carious, and are become ſound, will render the curvature and conſequent deformity permanent; the iſſues reſtoring the uſe of the limbs, but not the loſt figure of the *ſpine*: and hence it appears, that the curvature is the conſequence of a morbid *ſpine*, and not the cauſe either of the other ſymptoms, or of the uſeleſs ſtate of the limbs.

From a conſideration of the nature, cauſe, and method of cure of this diſorder, Mr. Pott is led to propoſe the uſe of iſſues by way of preventives, when ſymptoms appear which give reaſon to ſuſpect the formation of this diſeaſe in the *ſpine*, though it is not manifeſted by an external change.

See Pott's farther Remarks on the uſeleſs State of the Lower Limbs, in conſequence of a Curvature of the *Spine*; being a ſupplement to a former treatiſe on that ſubject. 8vo. 1782. See alſo Select Caſes of the Diſorder, commonly termed the Paralyſis of the Lower Extremities, by Dr. Jebb. 8vo. 1782.

SPINES *of echini*, in *Natural Hiſtory*. Theſe in their foſſil ſtate make a great appearance in the cabinets of the curious, and in the works of the learned, and are of an almoſt infinite variety of kinds; and many of them are of the ſame figures and dimenſions with thoſe of the echini now living in our own and other ſeas, and well known to us. But beſide theſe there is an almoſt infinite variety of others, which, though allowed on all hands to be truly *ſpines* of ſome echini or other, yet evidently differ from thoſe of all the known recent fiſh of that name, and have certainly belonged to a ſpecies of it, of which we have not now the leaſt knowledge. Theſe, however different in ſhape from one another, yet all agree in their texture and conſtitutent matter. Hill's Hiſt. Foſſils.

SPINET, or SPINNET, a muſical inſtrument, ranked in the ſecond or third place among harmonious inſtruments.

It conſiſts of a cheſt or belly, made of the moſt porous and reſinous wood to be found; and a table of fir glued on ſlips of wood, called *ſummers*, which bear on the ſide. On the table is raiſed a little prominence, wherein are placed as many pins as there are ſtrings to the inſtrument.

The inſtrument is played by two ranges of keys; the foremoſt range being in the order of the diatonic ſcale; and the other range ſet backwards in the order of the artificial notes or ſemitones.

The keys are ſo many long flat ſlips of wood, which, when touched and preſſed down at one end, make the other raiſe a jack, which ſounds the ſtrings by means of the end of a crow's quill, wherewith it is armed. The thirty firſt ſtrings are of braſs; the other more delicate one, ſhould be of ſteel, or iron wires. They are all ſtretched over two bridges glued to the table.

The figure of the *ſpinet* is a long ſquare, or parallelogram. Some call it an *harp couched*, and the harp an *inverted ſpinet*.

The *ſpinet* is generally tuned by the ear; which method of the practical muſicians is founded on this ſuppoſition, that the ear is a perfect judge of an octave and fifth. The general rule is to begin at a certain note, as *c*, taken towards the middle of the inſtrument, and tune all the octaves up and down, and alſo the fifths, reckoning ſeven ſemitones to each fifth, by which means the whole is tuned.

Sometimes to the common or fundamental play of the *ſpinet*, which is the great octave, is added another ſimilar one in uniſon, and a third in octave to the firſt; to make the harmony the fuller. They are played either ſeparately or together, which is called the *double* or *triple ſpinet*. Sometimes a play of violins is added, by means of a bow, or a few wheels parallel to the keys, which preſs the ſtrings, and make the ſounds laſt as long as the muſician pleaſes; and heighten and ſoften them, as they are more or leſs preſſed. The harpſichord is a kind of *ſpinet*, only with another diſpoſition of the keys. See HARPSICHORD.

The inſtrument takes its name from the little quill ends, wherewith the ſtrings are drawn, which are ſuppoſed to reſemble *ſpinæ*, *thorns*.

SPINIS. *Attachiamenta de* SPINIS *&* *boſco*. See ATTACHIAMENTA.

SPINNING, in *Commerce*, the act, or art of reducing ſilk, flax, hemp, wool, hair, or other matter, into thread.

Spinning is either performed on the wheel, or with a diſtaff and ſpindle, or with other machines proper for the ſeveral kinds of working. Hemp, flax, nettle-thread, and other like vegetable matters, are to be wetted in *ſpinning*: ſilks, wools, &c. are *ſpun* dry, and do not need water; yet there is a way of *ſpinning* or reeling SILK as it comes off the caſes or balls, where hot, and even boiling water is to be uſed.

The vaſt variety, and the importance of thoſe branches of our manufactures, which are produced from cotton, wool, and flax, ſpun into yarn, together with the cheapneſs of proviſions, and the low price of labour in many foreign countries, which are our rivals in trade, have occaſioned many attempts at home to render *ſpinning* more eaſy, cheap, and expeditious.

About forty or fifty years ago, one Paul, and others of London, invented an engine for *ſpinning* of cotton, for which they obtained a patent; but the undertaking proved unſucceſsful. About twenty or thirty years ago, various engines were conſtructed, by different perſons, for *ſpinning* cotton, flax, wool, &c. into many threads at once, without producing any very conſiderable or durable advantage.

About the year 1767, one Hargrave of Blackburn, in Lancaſhire, conſtructed an engine, that would ſpin at once twenty or thirty threads of cotton into yarn for the fuſtian manufacture; but meeting with oppoſition, both before and after he obtained a patent for his engine, the inventor died in obſcurity and diſtreſs.

About the year 1768, Mr. Arkwright, a native of Lancaſhire, invented his new method of *ſpinning* cotton, and obatined a patent in 1769 for making cotton, flax, and wool into yarn. He alſo conſtructed engines, in order to prepare the materials for *ſpinning*, for which he obtained a patent in 1775. The proprietors of theſe machines have applied them to the manufacture of ſtockings and callicoes to a very conſiderable extent; and many of Mr. Arkwright's patent machines have been diſperſed through the ſeveral counties of Derby, Leiceſter, Nottingham, Worceſter, Stafford, York, Hereford, and Lancaſter.

The art of *ſpinning*, which nature has given to many animals of different kinds for their preſervation, and other purpoſes, is not confined to the inhabitants of the earth or air alone, but is even extended to thoſe of the ſea. Mr. Reaumur has ſhewn, by a ſeries of curious experiments, that the common muſcle, and ſome other ſhell-fiſh of the ſea, poſſeſs it in a great degree of perfection. See MUSCLE.

But he obſerves, that though the workmanſhip is the ſame, the manner of producing it is very different. Spiders, caterpillars, and the like, make threads of any length that they pleaſe, by making the viſcous liquor, of which they are formed, paſs through a fine perforation in the organ appointed for this *ſpinning*: but the way in which the muſcles form their threads is very different, as the former reſembles the work of the wire-drawer, ſo does this that of the founder, who caſts metals in a mould. The canal of the organ deſtined for the muſcle's *ſpinning*, which, from its ſhape, is commonly called its tongue, is the mould in which its thread is caſt, and gives it its determinate length. Mem. Acad. Par. 1711.

SPINOLETTA, in *Ornithology*, the name of a ſmall bird of the lark-kind, the ALAUDA *ſpinoletta* of Linnæus, called *tordino* by the Venetians, and ſeeming to be the *ſtopparola*, as alſo the *griſola*, and *ſpipola* of Aldrovandus. It is ſmaller than the common lark; its head, neck, ſhoulders, and back, are of a greyiſh colour, with an admixture of green; its breaſt and belly white, and its throat ſpotted: the female differs from the male, in that her belly is yellow; the wing-feathers are of a duſky brown, with whitiſh or yellowiſh edges; its tail is moderately long, and part of the feathers are ſnow-white, the reſt brown or blackiſh; the length of the heel diſtinguiſhes this bird from all others, except the lark-kind, and it differs from all the ſpecies of larks in the colour of its beak and legs, which are black. It is common in the markets of Venice and other places. Ray.

SPINOSA, in *Zoology*, the name by which the Italians call the PORCUPINE.

SPINOSE-*leaf*, among *Botaniſts*. See LEAF.

SPINOSI *piſces*, in *Ichthyology*, ſuch fiſhes as have ſome of the rays of their back-fins running out into thorns and prickles, as the pearch, &c. See FISH.

SPINOZISM, or SPINOSISM, the doctrine of *Spinoza*; or, atheiſm and pantheiſm propoſed after the manner of *Spinoza*.

The great principle of *Spinoziſm* is, that there is nothing properly and abſolutely exiſting, but matter and the modifications of matter; among which are even comprehended thoughts, abſtract and general ideas, compariſons, relations, combinations of relations, &c.

Benedict Spinoza, or *Eſpinoza*, was a man well known in Holland. He was born a Jew at Amſterdam; but did not make profeſſion of any religion, either the Jewiſh or Chriſtian; though, it is ſaid, that he obſerved, in his conduct, the rules of wiſdom and probity much better than many who profeſs themſelves Chriſtians, nor did he ever endeavour to pervert the ſentiments, or to corrupt the morals of thoſe with whom he lived, or to inſpire in his diſcourſe, a contempt of religion or virtue. He died at the Hague in 1677, being ſomewhat above forty-four years of age.

He compoſed ſeveral books in Latin; the moſt celebrated whereof is his Tractatus Theologico-Politicus, printed at Amſterdam in 1670, wherein he overturns the foundation of all religion: the book, accordingly, was condemned by a public decree of the ſtates; though it has ſince been ſold publicly, and even reprinted, both in Latin and French, in that country, and in Engliſh at London.

Spinoza here inſinuates, that all religions are only political engines, calculated for the public good, to render the people obedient to magiſtrates, and to make them practiſe virtue and morality.

He does not here lay down his notion of the Deity openly, but contents himſelf with ſuggeſting it. In his Ethics, publiſhed among his poſthumous works, he is more open and expreſs; maintaining, that God is not, as we imagine him, an infinite, intelligent, happy, and perfect Being; nor any thing but that natural virtue, or faculty, which is diffuſed throughout all creatures.

The life of *Spinoza* has been accurately written by Colerus, whoſe performance was publiſhed at the Hague in 8vo. in 1706. But a more ample and circumſtantial account of this ſingular man has been given by Lenglet du Freſnoy, and is prefixed to Boulainvilliers's Expoſition of the Doctrine of *Spinoza*, which was publiſhed at Amſterdam, in 12mo. in the year 1731. Freſnoy republiſhed the work of Colerus, and added to it ſeveral anecdotes, borrowed from a Life of *Spinoza*, written by Lucas, a phyſician at the Hague.

The learned Fabricius, in his Bibliotheca Græca, lib. v. part iii. p. 119, and Jenichen, in his Hiſtoria Spinoziſmi Lehnhofiani, p. 38—72, have given an ample liſt of thoſe writers who have refuted the ſyſtem of *Spinoza*. Witzius in Holland, Majus in Germany, and De la Mothe in England, wrote againſt his Tractatus; but Bredenburg, according to Mr. Bayle, ſucceeded beſt on this ſubject; who, however, is ſaid to have been afterwards a convert to *Spinoziſm*, and to have written a demonſtration of the truth of it: a refutation of his defence by Iſaac Orobio, a learned Jewiſh phyſician at Amſterdam, was publiſhed in 8vo. 1703. See alſo Buddeu's Theſes de Atheiſmo & Superſtitione, c. i. ſect. 26, and Fabricius's Syllab. Script. de Verit. Relig. Chriſt. p. 357, &c. Mr. Bayle, and above all Dr. Clarke, have diſtinguiſhed themſelves by their refutation of the Syſtem of *Spinoza*. See Bayle's Dict. art. *Spinoza*, and Clarke's Demonſtration of the Being and Attributes of God, p. 25—45, &c. ed. 1725.

Spinoza, in his Tractatus above mentioned, is very full on the ſubject of the authors of the Scriptures; and endeavours to ſhew, that the Pentateuch is not the work of Moſes; contrary to the common opinion, both of the Jews and Chriſtians. He has alſo his particular ſentiments as to the authors of the other books. This part of the work has been anſwered by Mr. Huet, in his Demonſtratio Evangelica; and by M. Simon, in his Hiſt. Crit. du Vieux Teſt. See PENTATEUCH.

Spinoziſm is a ſpecies of naturaliſm, or pantheiſm, or hylotheiſm, as it is ſometimes called, i. e. of the dogma which allows of no other God but nature, or the univerſe; and, therefore, makes matter to be God. Accordingly, Buddeus, in a diſſertation De *Spinoziſmo* ante *Spinozam*, proves at large, that *Spinoza's* doctrine of God and the world, is far from being his own invention, but that it had been held by many philoſophers of different ſects, both among the Chaldeans and Greeks. It is certain, the opinion of the Stoics, and thoſe who held an *anima mundi*, was not far from it. Lucan introduces Cato diſcourſing thus:

> *Eſtne Dei ſedes niſi terra, & pontus, & aër,*
> *Et cœlum, & virtus? ſuperos quid quærimus ultra?*
> *Jupiter eſt quodcunq; vides, quocunq; moveris.*
>
> Luc. Pharſ. l. 9. v. 578.

Strato likewiſe, and others among the Peripatetics, maintained ſomething very like it; and, what is more, though no ancient ſect ſeems farther removed from *Spinoziſm* than the Platonic, as they attributed the greateſt freedom to God, and carefully diſtinguiſhed him from matter; yet Gundlingius has proved at large, that Plato gave matter much the ſame origin with *Spinoza*. But the ſect that approached neareſt to *Spinoziſm* was that which taught, that all things were one, as Xenophanes the Colophonian, Parmenides, Meliſſus, and eſpecially Zeno Eleates; whence it obtained the name of the *Eleatic ſyſtem of atheiſm*. To the ſame may alſo be reduced the opinion of thoſe who held the firſt matter for God, as Amalricus and David of Dinantum. Add, that the ſect of Foe in China and Japan, and that of the Soufi in Perſia, and that of the Zindikites in Turky, are found to philoſophize much after the manner of *Spinoza*.

The chief articles in *Spinoza's* ſyſtem are reducible to theſe: that there is but one ſubſtance in nature; and that this only ſubſtance is endued with an infinite number of attributes, among which are extenſion and cogitation: that all the bodies in the univerſe are modifications of this ſubſtance, conſidered as it is extended; and that all the ſouls of men are modifications of the ſame ſubſtance, conſidered as cogitative: that God is a neceſſary and infinitely perfect Being, and is the cauſe of all things that exiſt, but is not a different being from them: that there is but one being, and one nature; and that this nature produces within itſelf, by an immanent act, all thoſe which we call creatures: and that this being is at the ſame time both agent and patient, efficient cauſe and ſubject; but that he produces nothing but modifications of himſelf.

As *Spinoza* taught, that there is no difference of ſubſtances, he maintained, that the whole and every part of the material world is a neceſſary exiſting being, and that there is no other God but the univerſe: and moreover, ſince it is abſolutely impoſſible for any thing to be created or produced by another, and alſo abſolutely impoſſible for God to have cauſed any thing to be in any reſpect different from what it now is; every thing that exiſts muſt needs be ſo a part of the divine ſubſtance, not as a modification cauſed in it by any will or good pleaſure or wiſdom in the whole, but as of abſolute neceſſity in itſelf, with reſpect to the manner of the exiſtence of each part, no leſs than with reſpect to the ſelf-exiſtence of the whole; conſequently the material world, and every part of it, with the order and manner of being of each part, is, upon this ſcheme, the only ſelf-exiſtent, or neceſſarily exiſting being.

And he alſo maintains, that motion, as a dependent being, has been eternally communicated from one piece of matter to another; and, therefore, without having at all any original cauſe of its being, either within itſelf or from without: this, Dr. Clarke has proved, to be a plain contradiction, and, conſequently, motion muſt of neceſſity be originally cauſed by ſomething that is intelligent, or elſe there never could have been any ſuch thing as motion in the world; and therefore the ſelf-exiſtent being, the original cauſe of all things, muſt of neceſſity be an intelligent being. Hence it follows, that the material world cannot poſſibly be the original ſelf-exiſtent being. For ſince the ſelf-exiſtent being is intelligent, and the material world plainly is not ſo, it follows, that the material world cannot poſſibly be ſelf-exiſtent.

Agreeably to *Spinoza's* ſyſtem, he is led to maintain that the ſupreme cauſe is a neceſſary agent, and, therefore, that no thing, or mode of exiſtence of any thing, could poſſibly have been in any reſpect different from what it now actually is; becauſe, he ſays, from an infinitely perfect nature, infinite things in infinite manners muſt needs proceed: if any thing could poſſibly be otherwiſe than it is, the will and nature of God muſt be ſuppoſed capable of change; and if all poſſible things in all poſſible manners do not always and neceſſarily exiſt, they never can all exiſt, but ſome things that do not exiſt, will ſtill always be poſſible only, and never can actually exiſt; and ſo the actual omnipotence of God is taken away. To this reaſoning Dr. Clarke replies, that the firſt argument

ment is a plain begging of the queſtion; for, that an infinitely perfect nature is able indeed to produce infinite things in infinite manners, is certainly true; but that it muſt always actually do ſo, by an abſolute neceſſity of nature, without any power of choice, either as to time, or manner, or circumſtances, does by no means follow from the perfection of its nature, unleſs it be firſt ſuppoſed to be a neceſſary agent, which is the very queſtion begged that was to be proved.

The ſecond argument, he ſays, is (if poſſible), ſtill weaker; for, how does it follow, if God, according to his eternal unerring purpoſe and infinite wiſdom, produces different things at different times, and in different manners, that, therefore, the will and nature of God are changeable? It might exactly as well be argued, that if God (according to *Spinoza*'s ſuppoſition) does always neceſſarily produce all poſſible differences and varieties of things; therefore his will and nature are always neceſſarily infinitely various, unequal, and diſſimilar to themſelves.

And as to the third argument, it is juſt ſuch reaſoning as if a man ſhould argue, that if all poſſible eternal duration be not always actually exhauſted, it can never be all exhauſted; and that, therefore, ſo the eternity of God is taken away: a mode of arguing, the weakneſs of which muſt be diſcerned by every one at firſt ſight. Beſides the aſſertion itſelf, that no thing, or mode of exiſtence of any thing, could poſſibly have been made in any reſpect different from what it is, is ſo palpably abſurd and falſe, ſo contradictory to experience and the nature of things, and to the moſt obvious and common reaſon of mankind, that of itſelf it immediately, and upon the firſt hearing, ſufficiently confutes any principle of which it is a conſequence. For all things in the world appear plainly to be the moſt arbitrary that can be imagined, and to be wholly the effects not of an abſolute neceſſity of nature, but merely of a neceſſity of fitneſs, or of wiſdom and choice. Moreover, *Spinoza*, maintaining that the ſupreme cauſe is a neceſſary agent, is conſtrained to expoſe all final cauſes as the fictions of ignorant and ſuperſtitious men; and ſo laugh at thoſe who are ſo fooliſh and childiſh as to fancy, that eyes were deſigned and fitted to ſee with, teeth to chew with, food to be eaten for nouriſhment, the ſun to give light, &c. a mode of arguing to which reply is needleſs. See the article God.

Againſt *Spinoza*'s ſyſtem it is alledged by Mr. Bayle, 1. That it is impoſſible the univerſe ſhould be but one ſubſtance, ſince every thing that is extended muſt neceſſarily have parts, and what has parts muſt be compounded. And as the parts of extenſion do not ſubſiſt in each other, it follows, either that extenſion in the general is not ſubſtance, or that every part of extenſion is a different ſubſtance. Now, according to *Spinoza*, extenſion in general is an attribute of ſubſtance. And he allows, with other philoſophers, that the attributes of ſubſtance do not differ really from the ſubſtance itſelf. He muſt therefore allow, that extenſion in general is ſubſtance; whence it will follow, that every part of extenſion is a particular ſubſtance; which overturns the whole ſyſtem.

2°, If it be abſurd to make God extended, as this robs him of his ſimplicity, and makes him be compoſed of parts, it is ſtill worſe to reduce him to the condition of matter, the loweſt of all beings, and that which moſt of the ancient philoſophers ranked immediately above nothing; matter, the theatre of all ſorts of changes, the field of battle of contrary cauſes, the ſubject of all corruptions and generations; in a word, the being, of all others, moſt incompatible with the immutability of the Deity!

The *Spinoziſts* indeed maintain, that it is not ſuſceptible of any diviſion; but the argument they alledge in proof of it we have elſewhere ſhewn to be falſe: it is, that for matter to be divided, it is neceſſary that one of the parts be ſeparated from the other, by a void ſpace, which is impoſſible; ſince, they ſay, there is no vacuum in nature. See Vacuum.

3°, If *Spinoziſm* appear extravagant, when we conſider God as the ſubject of all the mutations, corruptions, and generations, in bodies, it will be found ſtill worſe, when we conſider him as the ſubject of all the modifications of thinking. It is no ſmall difficulty to unite extenſion and thinking in the ſame ſubſtance; ſince it is not an union like that of two metals, or of water and wine, that will ſerve the purpoſe: theſe laſt require only juxta-poſition; whereas, to combine thinking and extenſion, requires an identity. Thinking and extended are two attributes identified with the ſubſtance, and, conſequently, they are identified with each other by the fundamental rule of all logic.

Again, when we ſay, that a man *denies this*, *affirms that*, *likes that*, &c. we make all thoſe attributes fall on the ſubſtance of his mind, not on his thoughts, which are only accidents or modifications of it: if, therefore, what *Spinoza* advances be true, that men are modalities of God, it would be falſe to ſay, *Peter denies*, *likes*, *wills*, &c. ſince, in reality, on this ſyſtem, it is, that God denies, wills, &c. and, conſequently, all the denominations which ariſe from the thoughts, deſires, &c. of men, fall properly and phyſically on the ſubſtance of God. From whence it alſo follows, that God affirms and denies, loves and hates, wills and nills the ſame thing, at the ſame time, and under the ſame conditions; contrary to the great principle of reaſoning, *oppoſita ſunt quæ & neque de ſe invicem, neque de eodem tertio ſecundum idem, ad idem, eodem modo atque tempore verè affirmari poſſunt*; which muſt be falſe, if *Spinoziſm* be true; ſince it cannot be denied, but ſome men love and affirm what others hate and deny, under all the conditions expreſſed in the rule.

4°, But if it be phyſically abſurd to ſay, the ſame ſubject is modified at the ſame time with all the different thoughts of all men; it is horrible when we conſider it in a moral light; ſince it will follow, that the infinite, the all-perfect Being, is not conſtant, is not the ſame one moment, but is eternally poſſeſſed even with contrary paſſions: all the uniformity in him, in this reſpect, will be, that, for one good and wiſe thought, he will have twenty fooliſh and wicked ones. He will not only be the efficient cauſe of all the errors, iniquities, and impurities of men, but alſo the paſſive ſubject of them, the *ſubjectum inhæſionis*. He muſt be united with them in the cloſeſt manner that can be conceived, even by a penetrative union, or rather an identity, ſince the mode is not really diſtinct from the ſubſtance modified. Bayle, art. *Spinoza*.

SPINSTER, in *Law*, an addition uſually given to all unmarried women, from the viſcount's daughter downwards.

Yet ſir Edward Coke ſays, *generoſa* is a good addition for a gentlewoman; and that, if ſuch a perſon be named *ſpinſter* in any original writ, appeal, or inſtrument, ſhe may abate and quaſh the ſame.

Spelman ſays, that anciently, even queens uſed the diſtaff and ſpindle; whence *ſpinſter* became a common appellation for all women.

SPINTHER, among the Romans, a kind of bracelet which the women, in the firſt ages of Rome, uſed to wear on the upper part of their left arm.

SPINUS, in the *Natural Hiſtory of the Ancients*, the name of a foſſil body of a very remarkable quality; for, according to the accounts of Theophraſtus, and other authors of the greateſt credit, if broke to pieces, and thrown in a heap expoſed to the ſun, it took fire and burnt, and that the more if moiſtened or ſprinkled with water.

It ſeems to have been a ſubſtance nearly allied to what they call the *lapis thracius*, but with this remarkable quality, both of them ſeem to have been of the claſs of the harder bitumens, and are wholly unknown to us. Some late writers have imagined, that the common black ſlateſtone, ſo frequent with us in the coal-pits, was the ſubſtance called by Theophraſtus, and the ancients, by this name; but it had none of the qualities attributed to the *ſpinus*. Hill's Theophraſtus, p. 35.

Spinus, in *Ichthyology*, a ſpecies of the sparus, with a bifid tail, and the dorſal ſpine recumbent. It is found in the Indian ſeas.

Spinus, the Fringilla *ſpinus* of Linnæus, in *Ornithology*, the name of a ſmall bird, called by ſome *ligurinus*, and in Engliſh the *ſiſkin*. Its head is black, and its neck and back green; the neck, however, has ſome ſlight admixture of a blackiſh tinge, and the roots of the back-feathers have alſo ſome blackiſhneſs; its rump is of a greeniſh yellow, as are alſo its breaſt and throat; its belly is white, and its tail is yellow underneath, with ſome browniſh ſpots; the female is paler coloured than the male, and its throat, and its ſides, under the wings, are whitiſh, with ſtreaks of brown; the head and back are of a greeniſh aſh-colour, marked with brown. It is common in Germany and England, which it viſits at uncertain times, and is kept in cages for ſinging. In winter theſe birds fly in large flocks. In Suſſex it is called the barley-bird, becauſe it comes to them in the barley-ſeed time.

SPIPOLA, in *Ornithology*, the name of a ſmall bird of the lark-kind, of which there are, according to Aldrovand, three ſpecies, ſuſpected by Mr. Ray to be only varieties of the spinoletta, or *tordino* of the Venetians.

Linnæus makes two of theſe diſtinct ſpecies under the titles of *alauda trivialis*, and *alauda pratenſis*; the laſt of which is our *tit-lark*. See Lark.

SPIRACLE. See Vent.

SPIRACULA, in the *Hiſtory of Inſects*, are little holes or pores placed ſingly on each ſide of every ſegment of the abdomen, through which the inſect breathes; and if oil be applied ſo as to ſtop them up, it proves fatal to moſt of them.

SPIRÆA, ARUNCUS, *greater meadowſweet*, or *ſpiræa frutex*, in *Botany*, a genus of the *icoſandria tetragynia* claſs. Its characters are theſe: the flowers has a permanent empalement of one leaf, plain at the baſe, and cut into five acute ſegments at the top; it has five roundiſh oblong petals inſerted in the empalement, and twenty or more ſlender ſtamina, which are ſhorter than the petals, and are inſerted in the empalement, terminated by roundiſh ſummits; and it has five or more germina, ſupporting as many ſlender ſtyles, which are longer than the ſtamina, and crowned by headed ſtigmas; the germina turn to oblong compreſſed capſules, opening with two valves, containing a few ſmall acute-pointed ſeeds. Linnæus enumerates eleven, and Miller twelve ſpecies, one of which is the common DROPWORT.

SPIRÆA, *African*, in *Botany*. See DIOSMA.

SPIRAL, in *Geometry*, a curve line of the circular kind, which, in its progreſs, recedes from its centre; as in winding from the vertex, down to the baſe of a cone.

It is called from its inventor, *Archimedes's ſpire*, or *helix*, and is thus deſcribed: divide the periphery of a circle A P *p* A (*Tab.* V. *Geometry*, *fig.* 115.) into any number of equal parts, by a continual biſection in the points *p*. Into the ſame number of parts divide the radius C A, and make C M equal to one part, C *m* to two parts, &c. Then will the points M, *m*, *m*, &c. be points in the *ſpiral*; which, connected, will give the *ſpiral* itſelf.

This is more particularly called the *firſt ſpiral*; and the ſpace included between its centre and the point A, the *ſpiral ſpace*.

The firſt *ſpiral* may be continued to a *ſecond ſpiral*, by deſcribing another circle with double the radius of the firſt; and the ſecond may be continued to a *third*, by a third circle, &c.

Hence, 1°, A *p* is to the periphery, as C *m* to the radius: wherefore, if the periphery be called *p*, the radius A C $= r$, A $p = x$, $p\,m = y$; then will C $m = r - y$: conſequently, as $p : r :: x : r - y$, we ſhall have $p\,r - p\,y = r\,x$.

2°, If C $m = y$, then will $r\,x = p\,y$; which equation the *ſpiral* has in common with the quadratrix of Dinoſtrates, and that of Tſchirnhauſen: and therefore $r^n x^m = p^n y^m$ will ſerve for infinite *ſpirals* and quadratrices. See QUADRATRIX.

The *ſpiral* line may be conceived to be thus generated: if a right line, as A B (*Tab.* V. *Geometry*, *fig.* 116.) having one end fixed at B, be equally moved round, ſo as, with the other end A, to deſcribe the periphery of a circle; and, at the ſame time, a point be conceived to move forwards equally, from B towards A, in the right line A B, ſo as that the point deſcribes that line, while the line generates the circle; then will the point, with its two motions, deſcribe the curve B, 1, 2, 3, 4, 5, &c. Which is called a *ſpiral line*, and the plain ſpace contained between the *ſpiral line* and the right line B A, is called the *ſpiral ſpace*.

Again, if the point B be conceived to move twice as ſlow as the line A B, ſo that it ſhall get but half way along B A, when that line ſhall have formed the circle; and if then you imagine a new revolution to be made of the line carrying the point, ſo that they ſhall end their motion at laſt together, there will be formed a double *ſpiral line*, as in the figure: from the manner of which may be eaſily drawn theſe corollaries.

1. That the lines B 12, B 11, B 10, &c. making equal angles with the firſt and ſecond *ſpiral* (as alſo B 12, B 10, B 8, &c.) are in arithmetical proportion.

2. The lines B 7, B 10, &c. drawn any how to the firſt *ſpiral*, are to one another as the arches of the circle intercepted betwixt B A and thoſe lines; becauſe, whatever parts of the circumference the point A deſcribes, as ſuppoſe 7, the point B will alſo have run over 7 parts of the line A B.

3. Any lines drawn from B to the ſecond *ſpiral*, as B 18, B 22, &c. are to each other as the aforeſaid arches, together with the whole periphery added on both ſides: for at the ſame time that the point A runs over 12, or the whole periphery, or perhaps 7 parts more, ſhall the point B have run over 12, and 7 parts of the line A B, which is now ſuppoſed to be divided into 24 equal parts.

The area CABDE of the *ſpiral* of Archimedes (*Tab.* V. *Geometry*, *fig.* 117.) is equal to one third part of the circle, deſcribed with the radius C E.

In like manner, the whole *ſpiral* area, generated by the ray drawn from the point C to the curve, when it makes two revolutions, is the third part of a ſpace double of the circle deſcribed with the radius 2 CD; and the whole area, generated by the ray from the beginning of the motion, till after any number of revolutions, is equal to the third part of a ſpace that is the ſame multiple of the circle deſcribed with the greateſt ray, as the number of revolutions is of unit.

Any portion of the area of the *ſpiral*, terminated by the curve C *m* A, and the right line C A, is equal to one third of the ſector C A G, terminated by the right lines C A, and C G, the ſituation of the revolving ray, when the point that deſcribes the curve ſets out from C. See Maclaurin's Fluxions, Introd. p. 30, 31. See QUADRATURE *of the Spiral of Archimedes*.

SPIRAL, *logiſtic*, or *logarithmic*. See LOGISTIC and QUADRATURE.

SPIRAL *of Pappus*, a *ſpiral* formed on the ſurface of a ſphere, by a motion analogous to that by which the *ſpiral* of Archimedes is deſcribed in plano.

This *ſpiral* is ſo called from its inventor Pappus. Collect. Mathem. lib. ii. prop. 30.

Thus, if C be the centre of the ſphere (*fig.* 118.) A R B A a great circle, P its pole; and while the quadrant I M A revolves about the pole P with an uniform motion, if a point proceeding from P move with a given velocity along the quadrant, it will trace upon the ſpherical ſurface the *ſpiral* P F *a*.

Now if we ſuppoſe the quadrant P M A to make a complete revolution in the ſame time that the point which traces the *ſpiral* on the ſurface of the ſphere, deſcribes the quadrant, which is the caſe conſidered by Pappus; then the portion of the ſpherical ſurface terminated by the whole *ſpiral*, the circle A R B A, and the quadrant P M A, will be equal to the ſquare of A B. In any other caſe, the area P M A *a* F Z P is to the ſquare of the diameter A B, in the ſame proportion as the arch A *a* is to the whole circumference A R B A. And this area is always to the ſpherical triangle P A *a*, as the inſcribed ſquare is to the circle. See Maclaurin's Fluxions, Introd. p. 31—33.

The portion of the ſpherical ſurface, terminated by the quadrant P M A, the arches A R, F R, and the *ſpiral* PZF, admits of a perfect quadrature, when the ratio of the arch A *a* to the whole circumference can be aſſigned. See Maclaurin, ibid. p. 33.

SPIRAL, *parabolic*. See HELICOID.

SPIRAL, *proportional*, is generated by ſuppoſing the radius to revolve equably, and a point from the circumference to move towards the centre with a motion decreaſing in a geometric progreſſion. See LOGISTIC.

From the nature of a decreaſing geometric progreſſion, it is eaſy to conceive that the radius C A (*fig.* 119.) may be continually divided; and although each ſucceſſive diviſion becomes ſhorter than the next preceding one, yet there muſt be an indefinite number of diviſions or terms before the laſt of them becomes of no finite magnitude. Whence it follows, that this *ſpiral* winds continually round the centre, and does not fall into it till after an indefinite number of revolutions: and alſo that the number of revolutions decreaſes, or the number of the equal parts into which the circumference is divided increaſes.

It is alſo evident, that any *proportional ſpiral* cuts the intercepted radii at equal angles: for, if the diviſions A *d*, *d e*, *e f*, *f g*, &c. of the circumference be very ſmall, the ſeveral radii would be ſo cloſe to one another, that the intercepted parts A D, D E, F F, F G, &c. of the *ſpiral* might be taken as right lines: and the triangles C A D, C D E, C E F, &c. would be ſimilar, having equal angles at the point C, and the ſides about thoſe angles proportional: conſequently, the angles at A, D, E, F, &c. being equal, the *ſpiral* muſt neceſſarily cut the radii at equal angles. Robertſon's Elem. of Nav. book ii. p. 87.

Proportional ſpirals, are ſuch *ſpiral* lines as the rhumb lines on the terreſtrial globe, which, becauſe they make equal angles with every meridian, muſt alſo make equal angles with the meridians in the ſtereographic projection on the plane of the equator, and therefore will be, as Dr. Halley obſerves, *proportional ſpirals* about the polar point. From whence he demonſtrates, that the meridian line is a ſcale of log. tangents of the half meridian complements of the latitudes. See RHUMB, LOXODROMY, and MERIDIONAL *Parts*.

SPIRAL *pump*. See *Archimedes's* SCREW.

SPIRAL, in *Architecture* and *Sculpture*, denotes a curve that aſcends, winding about a cone, or ſpire, ſo that all the points thereof continually approach the axis.

By this it is diſtinguiſhed from the HELIX, which winds, after the ſame manner, around a cylinder. Ignorant architects confound the two, but the more knowing diſtinguiſh them carefully.

SPIRAL *ſtairs*, in *Building*. See STAIRS.

SPIRATION. See EXPIRATION, INSPIRATION, PERSPIRATION, RESPIRATION, and TRANSPIRATION.

SPIRE, Spira, in the *Ancient Architecture*, is ſometimes uſed for the baſe of a column, and ſometimes for the aſtragal, or tore.

The word is formed from the Latin *ſpiræ*, the *folds of a ſerpent*, which bear ſome reſemblance thereto; or from the Greek σπειρα, the *coil of a rope.*

SPIRINCHUS, a name by which ſome authors have called the SMELT.

SPIRIT, Spiritus, in *Medicine*, the moſt ſubtle and volatile part, or juice, of the body; by means whereof the functions and operations thereof are ſuppoſed to be performed.

The ancients made a four-fold diviſion of *ſpirits*; into *vital*, *animal*, *natural* and *genital:* whereof the firſt they placed in the heart; the ſecond, in the brain; the third, in the ſtomach and liver; and the laſt, in the teſticles; but as this diviſion is founded on a falſe hypotheſis, it is now deſervedly ſet aſide.

The moderns uſually divide *ſpirits* into *vital* and *animal.*

Spirits, *vital*, are only the fineſt, and moſt agitated parts of the blood; whereon its motion and heat depend.

Spirits, *animal*, are an exceedingly thin, ſubtle, moveable fluid, juice, or humour, ſeparated from the blood in the cortex of the brain, and thence received into the minute fibres of the medulla, and by them diſcharged into the nerves; by which it is conveyed through every part of the body, to be the inſtrument of ſenſation, muſcular motion, &c.

The *animal ſpirits*, called alſo *nervous ſpirits*, and nervous *juice*, only differ from the *vital ſpirits*, in that theſe laſt are ſtill mixed and blended with the groſſer parts of the blood, and circulate along with it: whereas the *animal ſpirits* are ſecreted thence by the glands, whereof the cortical ſubſtance of the brain is compoſed; and have a motion, circulation, &c. peculiar to themſelves.

Dr. Willis conceives, that the *animal ſpirits* are prepared by a proper diſtillation of the ſubtileſt part of the arterial blood, brought by the carotides into the cortex of the brain; and ſhews, that the blood contained in the ſinuſes of the dura mater acts, in this diſtillation, in the ſame manner as the fire does in the chemical diſtillations performed by deſluction, where, being placed over the matter to be diſtilled, it makes the ſubtileſt parts thereof deſcend.

The exiſtence of the *animal ſpirits* is controverted by ſome; but the infinite uſe they are of in the animal œconomy, and the exceedingly imperfect account we ſhould have of any of the animal functions without them, will ſtill keep the greateſt part of the world on their ſide; and, in effect, the learned Boerhaave has gone a good way towards a demonſtration of the reality.

The blood brought to the brain by the carotides and vertebral arteries, he ſhews, is wonderfully prepared, ſecreted, elaborated, and changed from its natural ſtate, before it arrives there, inſomuch as, contrary to the nature of the reſt, inſtead of cohering by fire, it immediately reſolves wholly into a thin vapour, without leaving any fæces behind; and is thus exceedingly well fitted for the formation of ſo extraordinary a fluid.

He ſhews, farther, that the *animal ſpirits* are not formed from the cruor, but from the ſerum of the blood; which Malpighi's hiſtory of the growth of the fœtus in an incubated egg, ſhews to be diviſible into parts, or corpuſcles, inconceivably ſmaller than the cruor.

He adds, that the nature of this juice is ſuch, as that no ſalts or oils in the body can contribute any thing to it; and that, in all appearance, it is only a moſt ſubtle pure water; which liquor is found to reſemble theſe *ſpirits*, in its extraordinary miſcibility, mobility, ſolidity, ſoftneſs, ſimplicity, and want of elaſticity.

The ſame author ſhews, farther, from the magnitude of the carotides and vertebrals, their ſtraight uninterrupted courſe, the great quantity of blood they bring, the bulk of the cortex, &c. that there muſt be a very great quantity of this liquor; that there is freſh prepared every moment of life; and that it is driven, every moment, by the action of heat, &c. from the brain and cerebel, to all the parts of the body furniſhed with nerves: which motion, he ſhews, from the exceeding fineneſs, crookedneſs, &c. of the ramifications, muſt be very gentle, equable, and conſtant, one part continually driving before it another.

Upon the whole, it is no wonder that this fluid eſcapes the notice of our ſenſes; and that no ligatures, wounds, punctures, injections, or the like, make either it, or the apertures of the nerves through which it flows, viſible: nor does it avail what ſome, who allow the exiſtence of the *animal ſpirits*, urge againſt their being any coherent juice, or liquor; viz. that we ſhould find it ouze out, and wet the adjacent parts, upon cutting a nerve, as we do in cutting a lymphatic, &c. or that, upon binding a nerve, the upper part would ſwell; that the agitations which objects make on the filaments, would be deadened, &c. that it is impoſſible a liquor ſhould have two oppoſite motions at the ſame time; and that the velocity of the ſenſations, and rapidity of the motions of man, prove, that the *animal ſpirits* are rather an aura, or even light, than a liquor. See Animal *ſpirits.*

For the ſecretion of the *animal* Spirits from the blood, and the apparatus in order thereto, ſee Brain and Secretion. For the courſe of the *animal* spirits, and the veſſels through which they were carried, ſee Nerve and Circulation. For the office of the *animal* spirits in muſcular motion and ſenſation, ſee Muscular and Sensation.

Spirits, *low*, in *Medicine*. See Melancholy.

Spirit, Spiritus, in the *Newtonian Phyſics*, denotes a moſt ſubtle penetrative ſubſtance, which pervades all, even the denſeſt bodies, and lies hid therein; and by the force and action whereof, the particles of bodies attract each other, at very ſmall diſtances, and, when contiguous, cohere: and by which electrical bodies act at greater diſtances, both attracting and repelling the neighbouring corpuſcles; and light is emitted, reflected, and inflected, and warms bodies; and all ſenſation is excited, and the members of the animals move at the inſtance of the will, viz. by vibrations of this *ſpirit*, propagated through the ſolid capillaments of the nerves, from the external organs of ſenſe to the brain, and from the brain to the muſcles.

Spirit, in *Chemiſtry*, is one of the principles of natural bodies, called alſo *mercury.*

The chemical principle *ſpirit* is a fine, ſubtle, volatile, penetrating, pungent liquor, which riſes, ordinarily, before the phlegm, or water, and ſometimes after it.

The great properties of this liquor are, that it penetrates and opens ſolid bodies; corrodes, breaks, and even diſſolves, certain mixed bodies; coagulates others, and produces an infinity of other effects, many of them even contrary to one another.

In the general, the chemiſts give the denomination *ſpirits* to all the fine, ſubtle, not aqueous particles, raiſed from bodies by heat, and reduced into liquors by diſtillation. Such are, *ſpirit* of vitriol, of nitre, of ſalt, &c.

They alſo apply the name *ſpirits* to thoſe aqueous liquors which are drawn by liquefaction, when they are impregnated with ſalts, or other active principles, raiſed, together with them, by the violence of the fire.

In this ſenſe, the chemiſts are ſaid to draw a *ſpirit* from ſulphur, ſalt, and other bodies, when they extract the eſſence, or the ſubtileſt part thereof, by diſtillation, or otherwiſe.

Spirits are of three principal kinds, viz. *inflammable ſpirits*, *acid ſpirits*, and *alkaline ſpirits.*

To the firſt claſs belong the moſt volatile and thinneſt part of eſſential oils, the principle of ſmell, or *ſpiritus rector* of plants, and *ardent ſpirits*, or the *ſpirit* obtained from wine, beer, and all liquors which have undergone the ſpirituous fermentation.

The ſecond claſs includes all acids obtained by diſtillation of minerals, vegetables, and animals; ſuch are, 1. The acids of ſulphur, vitriol, and alum, which are the ſame as vitriolic acid, and the acid of nitre and common ſalt. They are called *ſpirit of ſulphur*, *ſpirit of vitriol*, *ſpirit of nitre*, &c. without ſpecifying that they are acids. 2. The acids of vinegar, and of all liquors which have undergone the acetous fermentation, and the acids obtained in the diſtillation of vegetables, and of certain animals, as flies, ants, &c. Theſe *ſpirits* are commonly called *acid ſpirits*, as the *acid ſpirit* of guaiacum, the *acid ſpirit* of ants, &c. becauſe the ſubſtances which furniſh them yield alſo *ſpirits* that are not acid. See Acid.

To the third claſs are referred liquid volatile alkalis, obtained from ſal ammoniac, from all vegetable matters which have undergone a complete putrefaction, and from all animal matters. Theſe are generally called *ſpirits*, without ſpecifying their alkaline quality. Thus we ſay, *volatile ſpirit* of ſal ammoniac, *ſpirit* of hartſhorn, &c. As ſome of theſe ſubſtances, particularly ſal ammoniac, contain alſo an acid which may be obtained from them, we ought, when we mention this *ſpirit*, to ſpecify its acid quality, calling it *acid ſpirit* of ſal ammoniac.

Spirits is alſo a general name, among diſtillers, for all diſtilled liquors that are neither oil nor phlegm.

Spirits, *proof*, or *common ſaleable goods*, are ſpirits of any kind of a determinate ſtrength, being the ſame with thoſe of good brandy, and the malt and ſugar *ſpirits* of the diſtillery, as they are uſually ſold; containing equal quantities of rectified *ſpirit* and water.

The beſt *proof ſpirit* is that diſtilled from French wine;

but for common uſe may be employed the *ſpirit* drawn from melaſſes.

The common method of examining whether *ſpirits* have this due degree of ſtrength is this. Take a long vial, fill it half way with the common malt *ſpirit*, and give it a ſmart ſtroke by its bottom againſt the palm of the hand, there will then appear on the ſurface a chaplet, or crown of bubbles, which will go off again in a ſtrong manner; that is, firſt remaining a while, and then going off by degrees without breaking into ſmaller bubbles, or ſwelling into larger.

By this experiment all the traders in *ſpirits* judge of the ſtrength of the goods they purchaſe; yet this is a mere fallacy and deception; for if only a little vinous or ſaccharine matter, as treacle, ſyrup, muſt, rob of fruits, or the like, be added to a quantity of highly rectified *ſpirit* of wine, this ſlight addition will give a brandy proof to that *ſpirit*. See BEAD *proof*.

Whether there be any ſecret for making weaker *ſpirits* ſhew this proof as well as brandies, &c. is not certainly known; but the thing is certainly practicable, ſince arrack, which is but of half the ſtrength of brandy, gives as fair a proof this way; and if a drop or two of any eſſential oil be added to a pint of brandy, it takes off its proof, and makes it appear much weaker than it is. The true ſtrength, may, however, always be known, by carefully burning away a meaſured quantity of brandy, &c. ſince if it leaves one half water it is right; if more or leſs, is too ſtrong, or too weak.

But beſide the falſe method of judging of brandies by what is called *proof*, there is another not leſs fallacious one of judging of their goodneſs, though kept as a great ſecret in the hands of ſome dealers, and imagined a certain criterion to determine whether foreign brandies are mixed with corn *ſpirits*. Theſe diſtillers are provided with a certain yellow liquor, a few drops of which being poured into a glaſs of right French brandy gives it a beautiful blue colour, and, by the ſtrength and goodneſs of this colour, they judge and buy; but if common malt *ſpirit* be tinged with oak, it would give this colour equally with French brandy, and might be purchaſed as ſuch. This proof tincture is expeditiouſly made, by diſſolving a little green vitriol, firſt calcined to a redneſs in a weak *ſpirit* of ſea-ſalt, which thus becomes a yellow liquor, a ſingle drop or two of which being added to a glaſs of any inflammable *ſpirit*, coloured yellow or brown with oak, or with long remaining in the caſk, will inſtantly turn it of a bright and beautiful blue.

The beſt way of judging in theſe caſes is by the noſe and palate. Dilute a quantity of brandy conſiderably with water, and you will perceive the malt-taſte, if mixed with malt *ſpirits*; or burn a little in a ſpoon, and by the ſmell and taſte of the water it leaves, you will eaſily judge whether there be malt in it.

Proof ſpirits may be diſtinguiſhed into three kinds, *perfect proof*, *more than perfect proof*, and *leſs than perfect proof*. By *perfect proof* is uſually underſtood that crown of bubbles, before mentioned, of a certain ſize, ariſing as a head upon a ſmall quantity of a well-qualified *ſpirit* ſhook in a ſlender phial.

Proof more than perfect, is that in which the bubbles raiſed by ſhaking the *ſpirit*, are larger than thoſe on the common or perfect proof, and go off more ſuddenly; that is, according as the *ſpirit* is higher, or approaches more to the nature of rectified *ſpirit*, or, as it is uſually called, *ſpirit of wine*.

Proof leſs than perfect, is that wherein the bubbles are ſmaller, and go off quicker and fainter than in perfect proof; the *ſpirit* in this caſe, being mixed with more than its own quantity of phlegm, or being too poor for ſale.

The ſureſt method of judging of the ſtrength of *ſpirits*, is by the hygrometer, water-poiſe, or balance; or 2. By diſtillation; or finally, by deflagration. The ſpecific gravity of totally inflammable *ſpirit* is ſo much leſs than that of phlegm, or common water, that it is eaſily ſenſible upon the balance; whence an exact hygrometer, well balanced and graduated, and furniſhed with a proper ſcale of weights, may be of great uſe to aſſign the proportions in which pure *ſpirit* and water are mixed in any given liquor. Though perhaps a readier way than this may be that of Mr. Homberg's, mentioned in the Memoirs of the Paris Academy, 1718, for determining the different gravities of different fluids, by means of a bottle with a very long and ſlender neck; which being filled to a certain height, with any mixture of *ſpirit*, is weighed againſt the ſame bottle filled with pure water.

The moſt exact of all methods of determining the *ſtrength* and *ſpirit* is by diſtillation, rectifying it up to an alcohol, or totally inflammable *ſpirit*; but this, though liable to no error, is too tedious to come into common uſe. And, upon the whole, the beſt method, of all others, ſeems to be that of deflagration, which Mr. Geoffroy has been at much pains to adjuſt and improve.

In commerce, with regard to *ſpirits*, it would certainly be a much better method to aboliſh ſuch uncertain proofs, and to make all the goods of the ſtrength of what we call *ſpirits of wine*: that is, a totally inflammable *ſpirit*, whoſe purity is much greater, whoſe ſtrength may always be found out with exactneſs, and whoſe bulk, ſtowage, carriage, and incumbrance, would be only half in regard to that of *brandy*, or *proof ſpirit*; and it might at all times, as occaſion called for it, be mixed into a great variety of extemporaneous liquors, and the exact degree of ſtrength would be always preciſely known.

This operation, indeed, in the common way, proves ſo tedious and expenſive, and, after all, ſo ſhort of expectation, and ſo generally unſatisfactory, that it is not to be expected that the common diſtillers, till they have fallen into a better manner of working, ſhould come into the propoſal. But if, inſtead of the common way of rectifying by the hot-ſtill, they would try the uſing a large balneum Mariæ, made of a large rectangular boiler, and a ſet of tall conical veſſels, they will find that little fire, and little attendance, and conſequently very little expence, will, in this manner, furniſh them with *ſpirits* reduced at once to this ſtandard, and greatly ſuperior, in all reſpects, to the common ones of the ſame ſtrength. In this caſe there would be no need of any addition of ſalts; but the diſtiller may work more perfectly, and more expeditiouſly without them, and thus preſerve the fine eſſential vinoſity of the *ſpirit*, which, in the common way of working, they conſtantly loſe.

The advantage of this method would be yet greater to the apothecaries, and the makers of compound cordial waters, who want only a pure *ſpirit* of ſuch a ſtrength, and ſuffer greatly in the fineneſs and perfection of their commodities, by the *ſpirit* they are obliged to uſe having in it a fulſome and nauſeous oil of its own, which will always mix itſelf with their compoſitions, and the oils of the aromatics, &c. which they add to it. If *ſpirits* were brought to this ſtandard for the market, there would be no poſſibility of deceit, and no farther examination need be made of it by the buyer than its burning perfectly dry in a ſpoon. Shaw's Eſſay on Diſtillery.

It is, however, to be obſerved, that though the burning *ſpirits* away in a ſpoon may ſerve the trader in the common way, yet Mr. Geoffroy has obſerved, that they are no proofs for the philoſopher, or the chemiſt, being not at all determinate or exact, though commonly ſuppoſed ſo.

From what has been ſaid, it appears that brandy is much more inflammable than wine, and *ſpirit* of wine much more ſo than brandy, and ought to burn away without leaving any remainder. Hence it is vulgarly ſuppoſed, that ſuch *ſpirit* of wine as burns wholly away, contains no phlegm, and that if two parcels of *ſpirit* both burn wholly away in this manner, they muſt be the ſame in ſtrength, and in all other qualities; but Mr. Geoffroy has proved by experiment, that ſuch *ſpirit* as burns wholly away, does yet contain a great deal of water, and two parcels both may burn thus away, and yet be very different; and that this trial is not determined by the entire abſence of the phlegm, but by its proportion to the oil.

If the ſame *ſpirit* of wine, which in the common way of burning leaves no water, be again tried, by burning it in a hollow veſſel ſet to float in a large quantity of cold water, it will then leave a conſiderable quantity of water; nay, all that is rectified only in the common way, leaves a large portion of phlegm on this experiment. The plain reaſon of which is, that this is the only fair trial, the other in the common way being fallacious. In this there is no more water left than was in the *ſpirit*; but in the other, the veſſel becoming heated by the burning of the *ſpirit*, that heat gradually evaporates the water, as the *ſpirit* burns away; ſo that the one is as ſoon gone as the other. But keeping the veſſel cool by external water, prevents that evaporation, and conſequently retains and diſcovers all that cannot burn of the *ſpirit*.

The quantity of water thus diſcovered in *ſpirit* of wine, is very great, and it has always been found, that in proportion as the experiment has been made more and more perfect, the *ſpirit* has always appeared proportionably leſs and leſs ſo.

The quality of the phlegm that is left is alſo of uſe to judge of the *ſpirit* by; if that were perfectly fine, this ought to be perfectly limpid and clear, and without taſte or ſmell: as it wants either of theſe properties, it is a proof of the want of perfection of the *ſpirit* it is obtained from; but the greateſt of all defects, is its having a coarſe oil ſwimming upon it, and giving the colours of the rainbow in different lights. Mem. Acad. Par. 1718. See BRANDY.

SPIRITS, *colouring of.* The art of giving to diſtilled liquors a colour, which takes off their watery appearance, and gives them a reſemblance of the foreign brandies, &c.

The colouring is not only neceſſary on this account, but as we uſually eſteem the *ſpirits* by the proof of the crown of bubbles, it is found that the clean rectified *ſpirit* will not afford this proof till it has received its doſe of the colour. The diſtillers diſpenſe this colour in any proportion that they find convenient or neceſſary; it is always yellow, but, according to the degree, differs extremely in deepneſs, from the paleſt ſtraw-colour to the deepeſt orange. This art of colouring was firſt introduced, from obſerving that all the fine and ſoft foreign brandies, that had the mellowneſs neceſſary to their perfection to the taſte, had alſo a yellow colour. The colour, in this caſe, has indeed nothing to do with the flavour; but that being kept in caſks the ſame age that was neceſſary to give them this mellowneſs, would alſo give them a colour from the wood. It was hence ſuppoſed, that the particular excellence of the foreign brandies depended on the woody colour, and accordingly pains have been taken to give the ſame colour to our *ſpirits* by various methods.

The way of obtaining it, by many years ſtanding in the caſk, proved too tedious for our haſty workmen, and accordingly they provided means of giving it extempore by ſtrong tinctures of ſeveral ingredients; the chief of which are logwood, ſaffron, Japan earth, treacle, burnt ſugar, and oak chips: the three former of theſe have but little to recommend them, but the others are found very ready, and very proper for the uſe.

Treacle gives a fine colour not much unlike that of the foreign brandies, and being neceſſarily uſed in a large quantity, as its colour is but dilute, it not only mends the bubble, or bead proof, impaired by the rectification, but alſo gives it a fulneſs in the mouth; both which properties are very agreeable to the vulgar, who are the chief retail conſumers of theſe coarſe goods.

Burnt ſugar, that is, ſugar diſſolved in a little water, and ſcorched over the fire till it turns black, goes much farther in the colouring than treacle, and at the ſame time gives no ſweetneſs, but rather an agreeable bitterneſs; and thus recommends itſelf to the nicer palates, that are not for a luſcious *ſpirit*. Indeed ſugar, thus treated, tinges to a great perfection, and that without loſs of time, and with as much cheapneſs as can well be deſired.

The laſt article mentioned, namely, oak chips, is of all others the moſt natural for imitating the dye of foreign *ſpirits*, as it is the very wood whereof the caſks they come over in are made, and from which they take that colour we are ſo fond of. The colouring with oak has alſo this farther advantage, in *ſpirits* meant as ſophiſtications of the foreign ones, that it will ſtand ſome teſts uſually had recourſe to on the occaſion, which the others will not ſtand.

Common *ſpirit* poured on oak-chips, and digeſted in a moderate heat, eaſily fetches out the reſinous part of the wood, on which the colouring depends; but then it does not go near ſo far as the burnt ſugar; a large quantity of oak being required to colour a ſmall parcel of brandy, or *ſpirits*. It is adviſeable not to make the tincture every time, but to have recourſe to an extract of this wood in a liquid form: this extract is beſt made in two menſtruums, alcohol and water, and may be evaporated to any ſtrength, ſo that a very ſmall doſe of it will tinge a great quantity of liquor. The two liquid extracts will be mixed together, and as they will be apt to ſeparate in ſtanding, it will be proper to add to them, when newly made, a quantity of fine ſugar; this will give a body to the whole, and it will keep better from mouldineſs than it would without it. Shaw's Eſſay on Diſtillery.

SPIRITS, *convertibility of.* This is a doctrine that has obtained among many of the moſt curious experimenters, and, indeed, the moſt intelligent of our chemiſts have always allowed, that provided proper care were taken in the getting together the material, one *ſpirit* may always be changed into another, a brandy into rum, malt-*ſpirit* into brandy, and brandy into malt-*ſpirit*. The principles on which this is believed are theſe.

All ſimple *ſpirits* (as they are called) conſiſt of four parts, water, oil, phlegm, and alcohol; the laſt of theſe is the eſſential part, and is what conſtitutes the whole a *ſpirit*. In reducing *ſpirits*, therefore, to their utmoſt degree of ſimplicity and purity, it is evident that the three ſuperfluous parts are to be got rid of, and the fourth left alone; by this means the alcohol is procured diſtinct, and is a liquor *ſui generis* of many peculiar qualities, not to be found in any other fluid.

Among others, it has theſe remarkable properties: 1. When abſolutely purified, it is an uniform and homogene liquor, capable of no farther ſeparation, without loſs or deſtruction of ſome of its homogeneous parts. 2. It is totally inflammable, having no ſoot nor any moiſture behind. 3. It has no peculiar taſte or flavour, any more than pure water, except what is owing to its nature as alcohol, or perfectly pure *ſpirit*. 4. It is an unctuous and criſpy fluid, running veiny in the diſtillation, and its drops, rolling on the ſurface of any other fluid, like peaſe upon a table, before they unite. 5. It appears to be the eſſential oil of the body it is obtained from, broken very fine, and intimately and ſtrongly mixed with an aqueous fluid, which is aſſimilated, or changed in its nature in the operation. 6. And laſtly, it ſeems to be a kind of univerſal fluid, producible with the ſame properties from every vegetable ſubject; but to produce it thus requires ſome care in the operation.

On theſe principles is founded the opinion, that all *ſpirits* may be reduced to a perfect ſimilarity, or ſameneſs, from whatever ſubject they were procured, and on this depends their *convertibility* into one another; for when once they are brought to this ſtandard of ſimplicity, there needs nothing more than to add the oil of ſuch of the finer *ſpirits* as is required to convert the *ſpirit* into that particular kind. By this means the ſame taſteleſs *ſpirit*, whether obtained from malt, ſugar, or grapes, may be made either into malt-*ſpirit*, brandy, or rum, by adding the eſſential oil of the grape, ſugar, or malt; and thus, what was once malt-*ſpirit*, ſhall become brandy, or whatever elſe the operator pleaſes.

Many methods have been attempted to obtain the firſt point, that is, the reducing the *ſpirit* to perfect and pure alcohol. The moſt practicable means ſeem to be long digeſtion, and the repeated diſtillation from water into water, where the eſſential oil will at once be left upon two ſurfaces, and the acid imbibed. The ſhorter ways are thoſe by rectifying from neutral abſorbent ſalts and earths; ſuch as ſugar, chalk, and the like. And laſtly, the uſe of fixed alkalis may be tried, for theſe very forcibly keep down both the phlegm and oil; inſomuch that this laſt method promiſes to be the ſhorteſt of all, if the art were known of utterly aboliſhing the alkaline flavour, which the alcohol is apt to acquire in this operation, and which, for this purpoſe, is by no means ſuitable, as abſolutely deſtroying all vinoſity, which univerſally conſiſts in a fine volatile pungent acidity. The diſtillers are the only people whoſe buſineſs would lead them to make the experiment. This method of converting one *ſpirit* into another, would be of immenſe profit to them if they could perfectly ſucceed in it; but as it would require time and ſlow proceſſes to bring it about, there is but little hope of its ever being brought to bear among them, while they are in their preſent ſcheme of doing every thing with diſpatch and hurry.

Dr. Shaw has ſaid a vaſt deal in the praiſe of a taſteleſs *ſpirit*, which is producible from a vegetable ſubſtance, only overlooked, as he tells us, becauſe it is too common, with which all the foreign *ſpirits* might be imitated to the utmoſt perfection by means of their eſſential oils, all thin fine wines raiſed to any due degree of ſtrength, without giving them the brandy flavour, and many other things of great uſe performed; but he has not told us what the vegetable ſubſtance is from which we are to obtain this. Shaw's Eſſay on Diſtillery.

SPIRIT, *ardent*, called alſo *ſpirit of wine*, becauſe it can only be obtained from ſubſtances which have undergone the vinous fermentation, is a very light, very volatile, very fluid liquor, perfectly white and limpid, and of a ſtrong, penetrating, agreeable taſte and ſmell.

Spirits drawn from wine, ſuch as French brandy, may, in a great meaſure, be purified or rectified by ſimple diſtillation, in tall veſſels, with a gentle heat, the pure ſpirituous parts riſing before the phlegm: if French brandy be thus diſtilled to one half, the diſtilled *ſpirit* proves tolerably pure. See BRANDY.

But wine or brandy being in this country too dear an article for diſtillation, this purification is chiefly practiſed on the cheaper *ſpirits* of melaſſes and malt liquors. To ſeparate the offenſive oil with which theſe abound, after they have been freed by diſtillation from the greateſt part of their phlegm, they are mixed with an equal quantity of ſpring water, and the *ſpirit* gently drawn off again: a conſiderable portion of the oil is thus left behind in the water, which now proves turbid and milky, and very nauſeous both in ſmell and taſte. By repeating this ablution with freſh quantities of water, the fouleſt and moſt offenſive *ſpirits* may be purified from all ill flavour.

vour. To complete the purification, or free them from their remaining phlegm, or the watery vapour which is raiſed even by the gentleſt heat in which they can be diſtilled, a little fixed alkaline ſalt, thoroughly dried and powdered, is added; which, imbibing the phlegm, is thereby diſſolved into a ponderous liquid, that does not mingle with the *ſpirit*, but ſettles at the bottom. If the *ſpirit* is very phlegmatic, four pints will require a pound of the alkali: if the diſtillation has been performed with due care, half this quantity, or leſs, will be ſufficient: in either caſe, if all the ſalt diſſolves, the *ſpirit* is to be digeſted with a little more, till at leaſt a part remains undiſſolved. The *ſpirit* now poured off is to be again diſtilled, in order to ſeparate from it a portion of the ſalt which has united with it, and which, though extremely minute, may in ſome reſpects change its qualities. As ſome particles of the alkali are apt to be carried up with it, even in the diſtillation, ſo as to communicate an ill flavour, it is adviſeable previouſly to add a ſmall portion of calcined vitriol, or burnt alum, which will completely abſorb the alkali, without giving any new impregnation to the *ſpirit*. Lewis's Mat. Med. See *Combinatory* DISTILLATION.

When only a ſmall quantity of *ſpirit of wine* is to be rectified, the uſual operation for this purpoſe, by means of diſtillations of the *ſpirit* called AQUA *vitæ*, obtained from the firſt diſtillations of liquors that have undergone the ſpirituous fermentation, and which are overcharged with a large quantity of phlegm and light oil, is difficult. Theſe diſtillations being ſlowly conducted with a gentle fire and water-bath, yield but a ſmall quantity of that liquor, which, being the moſt volatile, riſes firſt with the leaſt heat, and which is the true or *rectified ſpirit of wine*. Several chemiſts, therefore, in order to obtain a larger quantity, of the firſt *ſpirit*, propoſe to mix with the *ſpirit of wine* ſome intermediate ſubſtances, to abſorb and retain its phlegm and oil, ſuch as dried and calcined ſalts, very dry chalk, &c. Kunckel propoſes to ſeparate more effectually the oil, by adding to the *ſpirit* a large quantity of water, and by diſtilling this diluted *ſpirit* with a very gentle heat. But the trouble and inconvenience of depriving the *ſpirit of wine* of the water with which it was diluted in this proceſs, may be avoided by rectifying at once a large quantity of *aqua vitæ*. Nothing more is required to obtain at once a conſiderable quantity of pure *ſpirit of wine*, than to ſet aſide the twelve or fifteen pints firſt drawn over from a large quantity, e. g. from three hundred pints of *aqua vitæ*, diſtilled with a very gentle fire in a large alembic. As the moſt ſpirituous, leaſt aqueous, and leaſt oily part of it always riſes firſt, theſe twelve or fifteen pints are perfectly *rectified ſpirit of wine*, eſpecially when the heat has been well conducted.

By thus keeping apart portions of the *ſpirit* obtained, at different times, we may have *ſpirit of wine* of the ſeveral degrees of ſtrength and purity. The weaker *ſpirit* may, by another diſtillation, be again rectified; and the *ſpirit* of moderate ſtrength may be preſerved for many uſes. The method is followed by M. Beaumé in the rectification of *ſpirit of wine*, and is certainly, ſays the author of the Chemical Dictionary, art. *Rectification*, the moſt convenient and the beſt.

A perfectly *rectified ſpirit of wine*, or ſuch as is entirely freed from water, is undoubtedly a thing of frequent and neceſſary uſe in the nice operations of chemiſtry.

It had uſed to be prepared, either by often diſtilling the *ſpirit*, and every time drawing over only half of it, and repeating this till the half remaining in the cucurbit appeared as ſtrong as that drawn over; or elſe by raiſing it to a great height from the body of the veſſel, and this in a very gentle heat, ſo that *ſpirit* alone could riſe, the water not being capable of being driven ſo far by that degree of heat.

But the accurate Boerhaave always found upon trial, that there was ſtill remaining ſome water in theſe *ſpirits*, whether prepared by the firſt or ſecond proceſs, or both Boerhaave's Chem. part ii. p. 124.

The method he therefore invented is this: fill a ſtill half full of the *ſpirit* prepared for *alcohol* in one or the other of theſe ways, add to it half a pound of pure decrepitated, and perfectly dried ſea-ſalt; put this in hot, then place on the head, and carefully lute the junctures; leave this for twelve hours in a heat ſo ſmall, as not to make the *alcohol* boil, then diſtill off the *ſpirit*; keep the firſt two ounces apart, becauſe ſome aqueous vapour may have happened to lodge in the head, or worm of the ſtill, which this certainly waſhes off; after this receive two thirds of the following *alcohol* into a pure dry glaſs veſſel, and keep it perfectly ſtopped; then draw off the remainder, and keep that by itſelf: there will remain a moiſt ſalt in the ſtill, which has attracted the aqueous matter of the *alcohol*, and held it ſo down, that it could not riſe by the heat of boiling water, which is all that muſt be uſed in this diſtillation; and the ſalt having been firſt decrepitated, never makes any change in the *alcohol*, by adding any thing thereto. By this means an *alcohol* is prepared perfectly pure, and fit for all the uſes of chemiſtry.

For the teſts and properties of pure *alcohol*, ſee ALCOHOL.

Stahl and moſt chemiſts believe, that *ſpirit of wine* is compoſed of a very attenuated and very light oil, intimately united by means of an acid, with a larger quantity of water than that which enters as a principle in the combination of oil. Juncker, on the contrary, appears to admit no other inflammable matter in *ſpirit of wine* than phlogiſton, united with the aqueous principle by means of an acid. See ALCOHOL.

Whereas Mr. Cartheuſer poſitively affirms, that *ſpirit of wine* is compoſed of pure phlogiſton, not in an oily ſtate, but immediately united with the watery principle alone. This diverſity of opinions among the ableſt chemiſts, proves, that the true principles of *ſpirit of wine* are not yet perfectly known, and this proceeds from the difficulty of decompoſing it without an intermediate ſubſtance, and alſo from ſeveral phenomena; ſome of which ſeem to ſhew, that it is not a true oil that enters as a principle into the compoſition of *ſpirit of wine*, but phlogiſton alone, while others ſeem to vindicate the preſence of a true oil, exiſting in that which is pureſt.

M. Reaumur diſcovered, that a mixture of *ſpirit of wine* and water acquired a ſpecific gravity greater than that which would arithmetically reſult from the proportions employed of each of theſe liquors. Thus fifty meaſures of *ſpirit of wine*, and fifty meaſures of water, mixed together, were found to make only ninety-eight meaſures; but in what progreſſion the denſity is increaſed by mixing various proportions of the two liquors, had not been determined till M. Briſſon made a ſet of experiments with that view; an account of which is given in the Memoirs of the Academy of Sciences of Paris for the year 1769. From his experiments he has conſtructed the following table, which ſhews this progreſſion, and alſo enables us to diſcover the proportion of *ſpirit of wine* and water, in any given mixture of theſe (as brandies, rums, &c.) the ſpecific gravity of which is found to correſpond with any of the ſpecific gravities in the table. Thus, for inſtance, if we find upon accurate trial, that the ſpecific gravity of the rum, brandy, or other mixture, whoſe ſtrength is required to be known, be to that of water as $942\frac{1}{2}$ to 1000, we learn by inſpection of the table, that this ſpirituous mixture conſiſts of equal parts of water and *ſpirit of wine*, of which *ſpirit* the ſtrength is ſuch, that its denſity is to that of the water as 837 to 1000. The firſt column ſhews the proportion of well *rectified ſpirit of wine* in the mixture; the ſecond column ſhews the proportion of the water in the mixture; the third column ſhews the ſpecific gravity of the mixture; the fourth column ſhews the difference between the ſpecific gravity of the mixture and that of the preceding mixture; and the fifth column ſhews the proportion which the ſeveral augmentations of denſity, cauſed by penetration of the two liquors, have to each other, that is their progreſſion.

Spirit of wine.	Water.	Specific gravity.	Differences.	Proportional augmentations of denſity from penetration.
16 parts	0 parts	837	0	0
15 ——	1 ——	$852\frac{1}{2}$	$15\frac{1}{2}$	$4\frac{51}{128}$
14 ——	2 ——	$867\frac{1}{3}$	$14\frac{5}{6}$	$8\frac{32}{128}$
13 ——	3 ——	$881\frac{1}{3}$	14	$11\frac{11}{128}$
12 ——	4 ——	$894\frac{1}{2}$	$13\frac{1}{6}$	$13\frac{108}{128}$
11 ——	5 ——	$907\frac{1}{8}$	$12\frac{5}{8}$	$15\frac{12}{128}$
10 ——	6 ——	$919\frac{2}{3}$	$12\frac{1}{3}$	$17\frac{58}{128}$
9 ——	7 ——	$931\frac{2}{3}$	12	$19\frac{21}{128}$
8 ——	8 ——	$942\frac{1}{2}$	$10\frac{5}{6}$	$19\frac{104}{128}$
7 ——	9 ——	$951\frac{2}{3}$	$9\frac{1}{6}$	$18\frac{123}{128}$
6 ——	10 ——	$959\frac{2}{3}$	8	$17\frac{14}{128}$
5 ——	11 ——	$967\frac{1}{4}$	$7\frac{7}{12}$	$15\frac{1}{128}$
4 ——	12 ——	$973\frac{1}{6}$	$5\frac{11}{12}$	$11\frac{68}{128}$
3 ——	13 ——	979	$5\frac{5}{6}$	$7\frac{119}{128}$
2 ——	14 ——	985	6	$4\frac{74}{128}$
1 ——	15 ——	$991\frac{1}{4}$	$6\frac{3}{4}$	$1\frac{93}{128}$
0 ——	16 ——	1000	$8\frac{1}{4}$	0

Chem. Dict. Eng. ed. art. SPIRIT *ardent*, note *y*.

Spirit of wine is uſed in dying, as a non-colouring drug, and though it gives no colour itſelf, it ſerves to prepare the ſtuffs to receive other colours. Its conſumption is alſo very conſiderable in ſeveral other works and manufactures, particularly the making of varniſh.

Proof ſpirit cannot be uſed for burning in lamps, for diſſolving reſins, and for making varniſh; and there is alſo a great number of tinctures, ſolutions, and mixtures,

tures, for which it cannot ſerve; but *rectified ſpirit*, or alcohol, beſides its ready uſe for medicinal purpoſes, may, when the *ſpirit* is of a proper kind, be made into punch, and all other mixtures, with greater purity, and much greater certainty and exactneſs in point of ſtrength. See next article and ALCOHOL.

SPIRITS, in *Medicine*. *Rectified ſpirit* coagulates all the fluids of animal bodies that have been tried, except bile and urine. It hardens the ſolid and conſiſtent parts, and, being a powerful ANTISEPTIC, preſerves them from corruption. Applied externally to living animals, it ſtrengthens the veſſels, contracts the extremities of the nerves, and deprives them of ſenſibility; hence its power of reſtraining hæmorrhages, abating ſuperficial pains, &c. Received into the ſtomach undiluted, it produces the like effects; thickening the fluid, and contracting all the ſolid parts which it touches, and deſtroying, at leaſt for a time, their uſe and office: if the quantity taken is conſiderable, a palſy, or apoplexy, follows, and ſpeedily proves mortal. See ALCOHOL.

Proof *ſpirits*, and ſuch as are diluted below the proof-ſtrength, have the ſame effects in a lower degree. Externally they are of uſe in corroborant, anodyne, and antiſeptic fomentations. Taken inwardly, in ſmall quantity, they ſtrengthen lax fibres, incraſſate thin fluids, and warm the habit: in larger quantity, they diſorder the ſenſes, deſtroy voluntary motion, and produce, like the *rectified ſpirit*, a mortal apoplexy or palſy.

Vinous *ſpirits*, therefore, in ſmall quantity, and properly diluted, may be applied to uſeful purpoſes in the relieving of ſome diſorders, whilſt in larger ones, or imprudently continued, they act as a poiſon of a particular kind. The moderate uſe of them is moſt ſerviceable to thoſe who are expoſed to heat and moiſture, to corrupted air, or to other cauſes of colliquative and putrid diſeaſes; and they are the moſt pernicious in oppoſite circumſtances, and to thoſe who are afflicted with hyſterical and hypochondriacal complaints; for whatever temporary relief theſe ſpirituous cordials may afford in the lowneſſes to which hyſterical and hypochondriacal perſons are ſubject, there are none, as Dr. Pemberton obſerves, who feel ſo ſoon the ill effects ariſing from the habitual uſe of them. Lewis's Mat. Med.

The power of brandy, or any thing of this kind, in killing worms, is evident from this, that the children of the people in the northern iſlands of Scotland, who are accuſtomed from their infancy to drink that coarſe ſort of brandy which they call *aqua vitæ*, never are troubled with worms. It is a dangerous practice to uſe brandy in this general manner, but on ſome occaſions it may be very ſerviceable. Philoſ. Tranſ. Nº 233.

SPIRIT, *ætherial, of Frobenius*, *ſpiritus ætherius Frobenii*, a name given by Frobenius, and others, to a liquor famous for its extreme volatility, and many other qualities, for which ſee ÆTHER.

The uſe of this liquor in medicine is now well known: as a very thin and volatile inflammable matter, it acts powerfully on the nervous ſyſtem. Frederic Hoffman was one of the firſt who employed it as a ſedative and antiſpaſmodic. See LIQUOR *mineralis anodynus*.

It is now often preſcribed ſingly, in the doſe of ſeven or eight drops upon a bit of ſugar, which is to be eat, or to be diſſolved in ſome proper liquor, and drank. It is given in flatulent colics, obſtinate hiccups, convulſive hyſterical affections, and other diſorders of this kind. Æther diſſolves all eſſential and expreſſed oils, animal empyreumatic oil, reſins, and almoſt entirely ambergriſe. It diſſolves difficultly petroleum and oil of amber. It precipitates regulus and antimony from aqua regia, and ſilver from nitrous acid: it takes ſpots of greaſe from ſilk, without affecting their colours.

We have ſeveral curious obſervations on this *æther of Frobenius* by Mr. Groſſe, who has deſcribed three different methods of making it in the Memoirs of the Academy of Sciences, for the year 1734.

Æther was at firſt made with difficulty, and in ſmall quantities, but it has more lately been made abundantly and eaſily; particularly ſince Mr. Hellot communicated to ſeveral artiſts a proceſs which he received from a foreign chemiſt, and which was printed, with his conſent, in the Encyclopedie.

The following proceſs for making it, which is the beſt hitherto publiſhed, is extracted from Mr. Beaumé's diſſertation on this ſubject. Put two pounds of perfectly rectified *ſpirit* of wine into a glaſs retort, and pour upon it at once two pounds of well concentrated vitriolic acid. This acid being much heavier than the *ſpirit* of wine, ſinks immediately to the bottom, and does not mix with it: ſhake the retort gently and repeatedly, that the two liquors may mix; the mixture will boil, and become very hot; vapours will iſſue from it with a loud hiſſing noiſe, and a ſweet penetrating ſmell: the mixture will then aſſume a yellow reddiſh colour; place the retort in a ſand-bath, warmed by degrees to the ſame heat with itſelf; lute it to a receiver, in the ſide of which is a ſmall hole, and diſtil the mixture by a heat ſufficiently intenſe to make it quickly boil, and to keep it boiling. At firſt a very ſweet *ſpirit* of wine will paſs into the receiver, after which the æther will come, which may be diſtinguiſhed by ſtriæ formed on the upper part and neck of the retort. Continue the diſtillation with the ſame degree of fire, and from time to time unſtop the ſmall hole of the receiver, till you perceive, upon applying your noſe near this ſmall hole, a ſuffocating ſmell of volatile ſulphureous acid. Then the receiver ought to be unluted, and the contained liquor, which will be nearly eighteen ounces, muſt be quickly poured into a glaſs bottle, which ought to be well ſtopped. This liquor is a mixture of a very dephlegmated part of the *ſpirit* of wine, of a ſweet penetrating ſmell, which paſſes at firſt; of æther, which was formed during the diſtillation, of a little oil, and ſometimes alſo of a ſmall quantity of ſulphureous acid; both which ſubſtances paſs frequently with the laſt portion of the æther, particularly if the diſtillation has been too long continued. To ſeparate the æther from theſe other ſubſtances, put the whole mixture into a glaſs retort, with a little deliquiated fixed alkali, to abſorb and retain the ſulphureous acid, and diſtil very ſlowly in a ſand-bath, with a very gentle lamp-heat, till you have made one half of the liquor paſs over. The liquor that riſes in this diſtillation, called alſo rectification, is æther. For another proceſs of making it, ſee ÆTHER.

SPIRIT *of amber*. See AMBER.

SPIRIT, *coal*. See COAL-*ſpirit*.

SPIRIT, *fœtid*, *ſpiritus fœtidus*, a new medicine introduced into the practice of phyſic, and directed to be made of any fixed alkaline ſalt, a pound and a half; ſal ammoniac, a pound, aſſa fœtida, four ounces; and proof-*ſpirit*, three quarts, diſtilling off five pints with a gentle heat.

SPIRITS *foreign*, a general name by which our dealers in theſe things call BRANDY, RUM, and ARRACK.

It is hard to purchaſe any of theſe genuine and pure, unleſs at the firſt hand, and in large quantities. The dealers generally mix our own *ſpirits* with them. When we had little other *ſpirit* but that of malt made with us, this cheat was eaſily diſcovered, for a nice palate would diſtinguiſh the mixture of only a tenth part of this foul *ſpirit* among the foreign clean ones; but ſince we have the melaſſes-*ſpirit* ſo common, and rectified to ſo great a perfection, the deceit is not eaſily found out, though a larger proportion is uſed.

All *foreign ſpirits* are to be ſuſpected of this adulteration, which have not an uniform taſte and grateful odour. But one of the beſt ways of diſcovering the mixture is to burn away all that is inflammable in a ſmall quantity by way of trial, and then examine the phlegm.

The great art of this ſophiſtication conſiſts in the purity, and well rectified ſtate of the *ſpirit*; and when the diſtiller can furniſh himſelf with ſuch a *ſpirit* as will not be found out, though mixed in a large quantity with brandy or rum, he is very near the art of making brandy and rum himſelf. Shaw's Eſſay on Diſtillery.

By the ſeveral acts a general duty of exciſe is laid on every gallon of ſpirituous liquors imported (over and above the cuſtoms) as follows: viz. ſingle brandy, *ſpirits* or aqua vitæ, 4 *s.* 8 *d.*; double brandy, *ſpirits*, or aqua vitæ, 8 *s.* 8 *d.*; which ſhall be raiſed as the other duties on exciſeable liquors, 12 Car. II. cap. 23, 24. 4 & 5 W. III. cap. 3. 4 Ann. cap. 6. 6 Geo. II. cap. 17. Arrack from the Britiſh colonies in the Eaſt Indies is liable to the ſame duty with brandy and *foreign ſpirits* imported. And by 32 Geo. II. cap. 10. there ſhall be paid an additional duty of 12 *d.* in the pound, according to the value in the book of rates, on all foreign brandy and *ſpirits* imported, except rum or the produce of the Britiſh ſugar plantations. And by 33 Geo. II. cap. 9. over and above all other duties, there ſhall be paid an additional exciſe duty of 1 *s.* for every gallon of ſingle brandy, *ſpirits*, or aqua vitæ imported, and of 2 *s.* for every gallon of brandy, *ſpirits*, or aqua vitæ above proof, commonly called double brandy, imported. And by 6 Geo. III. cap. 47. for every gallon of ſingle brandy, &c. imported, not being the produce of the Britiſh colonies or plantations, a farther exciſe duty of 6 *d.*; above proof 1 *s.* Landing of French brandy without paying or ſecuring the duty, or a licence from the proper office, incurs a forfeiture of the ſame, and alſo double value; and an officer conniving at it, becomes incapable of holding any office in the revenue, and forfeits 500 *l.* 1 Ann. ſtat. 2. cap. 14. If any foreign brandy, arrack, rum, ſtrong waters, or *ſpirits* of any kind ſhall be imported in any ſhip or veſſel of a hundred tons burden, or under (except for the uſe of ſeamen, not exceeding two gallons each), ſuch veſſel, with her tackle, and alſo the *ſpirits* ſhall be forfeited: 5 Geo. III. cap. 43. except rum or other *ſpirits* of the growth and manufacture of the Britiſh ſugar plantations, which may be imported in any veſſel of not leſs burden than 70 tons: 6 Geo. III. cap. 46. No brandy ſhall be imported in any veſſel not containing 60 gallons at leaſt, on pain of forfeiture, 4 W. cap. 5. and no geneva, or rum ſhall be imported in any veſſel, not containing 60 gallons at leaſt (except for the uſe of the ſeamen, not exceeding 2 gallons each), on pain of forfeiture, 5 Geo. III. cap. 43.

For every gallon of *home ſpirits*, made of imported wine or cyder, there ſhall be paid in the whole ſum of 1 *s.* 3 *d.* For every gallon of ſtrong waters, or aqua vitæ, made of any other materials, $7\frac{1}{2}$ *d.*; but if from foreign, or home materials mixed with foreign, a farther duty of 6 *d.*; if from brewer's waſh or tilts, $5\frac{1}{2}$ *d.*; if from drink brewed of malted corn, $5\frac{1}{2}$ *d.*; if from other Britiſh materials, or any mixture therewith, 5 *d.* For every gallon of low wines, or *ſpirits* of the firſt extraction, made from foreign materials, 1 *s.* 7 *d.*; from brewer's waſh or tilts, 1 *s.* 4 *d.*; from drink of malt 5 *d.*; from any other Engliſh materials, 7 *d.* But low wines or *ſpirits*, of the firſt extraction, drawn from melaſſes only, ſhall be liable only to 1 *s.* a gallon; and all *ſpirits* from low wines, &c. drawn from melaſſes only, ſhall be chargeable with 6 *d.* a gallon, 19 Geo. II. cap. 12.

Moreover, by 33 Geo. II. cap. 9. an additional duty is laid as follows: for every gallon of low wines, made from any ſort of drink or waſh, brewed or made from any ſort of malt or corn, or from brewer's waſh or tilts, or any mixture therewith, 5 *d*; for every gallon of ſtrong waters, or aqua vitæ, made for ſale of the ſaid materials, 1 *s.* 3 *d.*; for every gallon of low wines, made from any imported materials, or mixture therewith, 1 *s.* 3 *d.*; for every gallon of *ſpirits* made from ſuch materials 8 *d.*; for every gallon of low wines made from cyder or any Britiſh materials, except the above mentioned, or any mixture therewith, $6\frac{3}{4}$ *d.*; for every gallon of *ſpirits*, made for ſale, from cyder or Britiſh materials, except the above, 1 *s.* $1\frac{3}{4}$. *d.* And by 2 Geo. III. cap. 5. there ſhall farther be paid for ſpirituous liquors made for home conſumption, or imported (not being the produce of the Britiſh colonies), the following additional duties: for every gallon of low wines, made from any ſort of drink, or waſh brewed, or from any ſort of malt or corn, or from brewer's waſh or tilts, or any mixture therewith, 1 *d.* for every gallon of ſtrong waters, or aqua vitæ, made for ſale, of the materials aforeſaid, 3 *d.*; for every gallon of low wines, or *ſpirits*, made from any imported materials, or any mixture therewith, 3 *d.*; for every gallon of *ſpirits* made from any imported materials, or mixture therewith, 2 *d.*; for every gallon of low wines, or *ſpirits*, made from cyder, or any kind of Britiſh materials, except thoſe above mentioned, or any mixture therewith, $1\frac{3}{4}$ *d.*; for every gallon of *ſpirits*, made for ſale, from cyder or Britiſh materials, except as above, 2 *d.*; for every gallon of ſingle brandy *ſpirits*, or aqua vitæ imported (not the produce of the Britiſh colonies), 6 *d.*; for every gallon of brandy *ſpirits*, or aqua vitæ, above proof, imported (not from Britiſh colonies), 1 *s.*

Spirits made for exportation ſhall be duty free.

An additional duty of 5 *l. per cent.* is laid by 19 Geo. III. cap. 25. By 20 Geo. III. cap 35. an additional duty is laid upon the ſeveral kinds of ſpirituous liquors as followeth: for every gallon of low wines made for home conſumption, from any ſort of drink or waſh, brewed from any ſort of malt or corn, &c. 1 *d.*; for every gallon of ſtrong waters, or aqua vitæ, made for ſale, for home conſumption, of the foreſaid materials, 3 *d.*; for every gallon of low wines, made for home conſumption, from any imported materials, or mixture therewith 3 *d.*; for every gallon of *ſpirits* ſo made 2 *d.*; for every gallon of low wines, made for home conſumption, of cyder or Britiſh materials, except the forementioned, or any mixture therewith, $1\frac{3}{4}$ *d.*; for every gallon of *ſpirits* made for ſale, for home conſumption, from cyder, &c. 2 *d.*; for every gallon of ſingle brandy *ſpirits*, or aqua vitæ, imported 1 *s.*; for every gallon of brandy *ſpirits*, or aqua vitæ, above proof, imported 2 *s.* See Distiller, and *low* Wines.

Spirit *of lavender.* See Lavender.

Spirit *of Libavius, ſmoking.* See Liquor *of Libavius.*

Spirit, *malt.* See Malt-*diſtillery.*

Spirit *of melaſſes.* See Molosses-*ſpirit.*

Spirit *of nitre.* See *Nitrous* Acid. The moſt common method of diſtilling *ſpirit of nitre*, eſpecially in any great works, is to employ clay, which contains vitriolic acid, as an intermediate ſubſtance. For this purpoſe two parts of dry and powdered clay are to be well mixed with one part of nitre; the mixture is to be put into an earthenware retort, placed in a reverberating furnace; to this retort a receiver is to be fitted, which is to be well luted, and the diſtillation is to be promoted by a gradual heat, that is very gentle at firſt, and raiſed at laſt ſo much that the retort ſhall be red-hot.

Diſtillers of Aqua *fortis* do not uſe retorts, but ſtone-ware bottles, with ſhort crooked necks; the receivers are veſſels of exactly the ſame form; two rows of theſe veſſels are diſpoſed oppoſite to each other in an oblong furnace, called a galley, and a wood-fire is uſed for the diſtillation. The operation laſts twelve hours.

The *ſpirit of nitre* diſtilled by means of clay, is not ſo high coloured and ſmoking as that which is obtained by other methods though it may be equally ſtrong.

Spirit *of nitre, ſmoking*, may be obtained by means of martial vitriol, previouſly calcined till it becomes red-hot, and very pure nitre of the third or fourth boiling, well dried. Theſe two matters are to be pounded and carefully mixed together in equal proportions: they are then to be poured into a good earthen-ware retort through a paper funnel, which paſſes into the belly of the retort, that none of the powder may adhere to the neck of it. The retort is placed in a reverberatory furnace, upon the bars of which is fixed an earthen diſh filled with ſand; to the retort a large glaſs balloon, in which is a ſmall hole, is to be fitted and luted with a fat lute; this lute is to be covered with a cloth, ſoaked with another lute made of quicklime ſlaked in air, and formed into a thin paſte with whites of eggs; the whole luting apparatus is to be bound with a ſtring; then the diſtillation is to be commenced with a very ſlow fire: the balloon will ſoon be filled with red vapours which are condenſed there, while another portion of *ſpirit of nitre* diſtils gradually by drops. This diſtillation is to be continued till the retort is red-hot, and no more vapour is raiſed.

When the veſſels are cooled, they are cautiouſly to be unluted, and the liquor in the balloon is to be quickly poured into a clean and dry glaſs bottle, through a glaſs funnel; which bottle ought to be quickly ſtopped with a glaſs ſtopple. This is the method of diſtilling ſmoking *ſpirits of nitre* uſed by Mr. Beaumé, and is a very good one.

This proceſs ſhould be conducted with great caution, as the vapours of this *ſpirit* are very elaſtic and very corroſive.

Spirit *of nitre, Glauber's ſmoking*, is ſo called, becauſe Glauber was the firſt chemiſt who thought of diſtilling nitrous and marine acids by means of pure vitriolic acid. The proceſs is as follows: very pure nitre is to be put into a ſtone-ware or glaſs retort; upon this nitre, one third part of its weight of pure vitriolic acid, rectified and highly concentrated, is to be poured through a glaſs funnel, the ſtalk of which ought to be long enough to go down into the belly of the retort; the apparatus of veſſels is to be diſpoſed of as in the preceding article, and the diſtillation to be promoted with the ſame precautions; but with this difference, that this diſtillation is ſooner finiſhed, and requires a leſs heat towards the end. The *ſpirit of nitre* diſtilled in theſe two ways, is the ſtrongeſt and moſt ſmoking that can be obtained. This laſt is ſomewhat leſs red and ſmoking than the former, although it may be equal, or ſuperior in ſtrength. The former is rendered ſo ſmoking by the phlogiſton of the iron of the martial vitriol. Some chemiſts add filings of iron in the diſtillation of the latter, to render the *ſpirit* more ſmoking.

The *ſpirit of nitre* obtained by either of theſe methods, may be purified, by adding ſome pure nitre to the acid, and diſtilling a ſecond time; by which means the ſmall portion of vitriolic acid mixed with the *ſpirit of nitre* is made to unite with the baſis of the nitre, and is rendered ſo fixed that it cannot riſe in diſtillation.

Spirit *of nitre, dulcified, ſpiritus nitri dulcis*, a form of medicine ordered to be made thus: take of rectified *ſpirit* of wine one quart, and of Glauber's *ſpirit of nitre* half a pound; or one part of nitrous acid and two parts of rectified *ſpirit* of wine; mix them by pouring the *ſpirit of nitre* on the other, and diſtil the mixture with a gentle heat, as long as what comes off will not raiſe any fermentation with a lixivial ſalt.

This is uſed medicinally, and conſidered as aperitive, and powerfully diuretic. It is added by drops to potions and juleps, till it has given them an agreeable acidity.

It is alſo much uſed by our diſtillers to give a vinoſity to thoſe *ſpirits*, whoſe natural flavour of that kind they have deſtroyed by the improper uſe of alkaline ſalts in the rectifications. Nothing can be more proper for this purpoſe than this *ſpirit*, as it really gives the brandy-flavour, and is not at all prejudicial to health, but very well falls in with the nature of the *ſpirit*, and promotes its medicinal properties as a diuretic, deobſtruent, and lithontriptic.

The method of making it for this purpoſe is improveable, by uſing in the preparation a *ſpirit* of wine impregnated with ſome fine flavoured ingredient, which has not much oil, for acids do not readily mix where there is much oil.

In the preparation of this *dulcified ſpirit of nitre*, the longer it ſtands in digeſtion with the *ſpirit* of wine, the milder it grows; and by the ſame means alſo, the violently corroſive oil of vitriol may be ſo blunted, as to be rendered ſcarce perceptible to the taſte. In fine, a *ſpiritus nitri dulcis* may be made, by a ſlow digeſtion, greatly ſuperior to that commonly uſed, and of ſo fixed a nature, that it will not be ſubject to have its flavour fly off from the *ſpirit* it is mixed with, any ſooner than the native vinoſity of brandy will of itſelf fly off from that *ſpirit*, as it always will in time. A proper care in the preparation of this acid might free the diſtillers from that troubleſome neceſſity they are under of adding their *ſpirit of nitre*, juſt before they ſend their goods away, for fear the flavour ſhould be loſt before the *ſpirit* is all uſed, and ſo the ſophiſtication be found out. There is no fixing any certain proportion in which the acid is to be mixed with the *ſpirit*, but in general it is beſt not to overdo it; for though it will give an agreeable vinoſity to any tolerable clean *ſpirit*, the perſon will be much deceived who attempts to drown the bad flavour of a foul one by it. Shaw's Eſſay on Diſtillery.

A *nitrous* ÆTHER is obtained by mixing nitrous acid with *ſpirit* of wine; the true method of obtaining it was firſt ſuggeſted by M. Navier; his proceſs, communicated to the Academy of Sciences in 1742, conſiſts in mixing together *ſpirit* of wine and *ſpirit* of nitre in a bottle, which is to be exactly cloſed, and left at reſt, till the æther is formed and collected like an oil upon the ſurface of the liquor.

Mr. Beaume's proceſs is as follows: put ſix ounces of rectified *ſpirit* of wine into a bottle made of ſtrong and thick glaſs, large enough to contain a pound of water; place this bottle in a bucket of freſh water, which will be ſtill better for the purpoſe if it has been rendered colder by throwing into it two or three pounds of ice, in ſmall bits; pour upon the *ſpirit* of wine, at four or five times, four ounces of ſmoking *ſpirit of nitre*, ſo concentrated, that a phial, capable of containing an ounce only of water, ſhall be capable of containing an ounce and a half of this *ſpirit of nitre:* obſerving, during the whole time of pouring the *ſpirit of nitre*, that the *ſpirit* of wine be kept in a ſtate of perpetual rotation. As ſoon as the two liquors are mixed, ſtop the bottle quickly with a good cork, which muſt be driven firmly into the neck of the bottle, and covered and faſtened with a piece of leather doubled, and bound with packthread. Leave it at reſt in the cold water, which ought to be ſometimes renewed.

Two or three hours afterwards the liquor loſes ſome of its tranſparency by the interpoſition of many ſmall drops of æther, which are diſengaged throughout the liquor. This æther gradually collects and floats upon the ſurface. Within twenty-four hours the liquor will have become clear, and the æther formed, which will be about two ounces, may be ſeparated; but as more æther will ſtill be produced, the method is to leave it ſeven or eight days before any of it be ſeparated. After this time no more æther is formed: pierce then the cork with a pointed inſtrument, and a conſiderable quantity of air will eſcape with a hiſſing noiſe, which had diſengaged itſelf during the production of the æther, and which is compreſſed in the bottle. When the air has eſcaped, uncork the bottle, and pour quickly its contents into a glaſs funnel, that the æther may be ſeparated.

The æther will amount to about four ounces, and the reſiduum will weigh five ounces and a half; ſo that half an ounce ſhall have been loſt during the proceſs. This æther ought to be put into a well cloſed cryſtal-glaſs bottle.

Mr. Woulfe deſcribes an apparatus by which nitrous æther may be expeditiouſly obtained by diſtillation, with the heat only occaſioned by mixing together the nitrous acid and the *ſpirit* of wine. This diſtillation is performed in a matraſs with a high neck, to which is fitted a head, with a ſpout, communicating with the receiver by means of a long tube. The vapours that are not condenſed in this receiver, or in a bottle joined to a ſpout in its bottom, are conveyed from the receiver through a bent tube into *ſpirit* of wine contained in a bottle. If any vapours paſs uncondenſed through this *ſpirit* of wine, they are conveyed through another bent tube into more *ſpirit* of wine contained in another bottle. The liquor collected in the bottle annexed to the receiver, being ſlowly rectified with ſlaked lime, furniſhes very fine æther. The *ſpirit* of wine in which the vapours were condenſed, contains ſo much æther, that this fluid may be ſeparated from the *ſpirit* by adding water. This *ſpirit* of wine is by the operation changed into good *dulcified ſpirit of nitre*. Phil. Tranſ. vol. lvii. art. 50.

SPIRIT *of ſal Ammoniac*. See AMMONIAC.

SPIRIT *of ſalt* See *Marine* ACID. Ordinary *ſpirit of ſalt* is diſtilled by the mixture of one part of common ſalt with two parts of dried clay, in the manner already deſcribed for the diſtillation of SPIRIT *of nitre*. But in order to have the ſtrongeſt *ſpirit of ſalt*, it is neceſſary to employ as an intermediate the pure vitriolic acid, as Glauber practiſed. However, this operation is very difficult and laborious. In order to obtain this *ſpirit*, on two pounds of dry ſea-ſalt the college of London directs two pounds of oil of vitriol diluted with a pint of water, that of Edinburgh one pound of oil of vitriol diluted with equal its quantity of warm water, to be poured by little and little, under a chimney, that the operator may not be incommoded with the noxious fumes: the retort is placed in ſand, and the diſtillation performed with a fire gradually increaſed till nothing more will ariſe. The *ſpirit* may be freed from its ſuperfluous water, by a ſecond diſtillation in a glaſs cucurbit; the phlegmatic part riſing in a proper degree of heat, while the ſtronger acid remains behind.

The following is the proceſs ſucceſsfully practiſed by Mr. Beaumé: common ſalt is to be put into a tubulated ſtone-ware or glaſs retort, which is to be placed in the furnace for diſtilling; and to this retort a balloon is to be fitted, exactly in the ſame manner as for the diſtillation of *ſmoking* SPIRIT *of nitre*.

This apparatus is to be left till the lute has become firm; then through the tubulated opening of the retort, by means of a glaſs funnel, a quantity of rectified vitriolic acid, previouſly diluted with a little water, equal to a third part of the weight of the ſalt, is to be poured at ſeveral different times, and the opening is to be cloſed each time immediately after a part of the acid has been added.

As ſoon as the vitriolic acid is added, we ſee white vapours paſſing from the retort into the receiver. Theſe are the ſmoking *ſpirit of ſalt* which this acid diſengages, even without fire; for which reaſon theſe firſt vapours ought to be allowed to paſs before the fire be kindled, which ought not to be done till they are conſiderably diminiſhed, otherwiſe the diſtillation would go on too faſt at firſt, and the veſſels might be broken.

A very little fire is to be kept up in the furnace, and only as much as is neceſſary to continue the diſtillation: laſtly, the diſtillation is to be conducted to the end with the ſame attentions that is required for ſmoking *ſpirit* of nitre; and when it is finiſhed, the *ſpirit of ſalt* is to be collected in the ſame manner.

This *ſpirit of ſalt* may be dulcified by mixing this acid with twice its weight of rectified *ſpirit* of wine, and digeſting this mixture during a month. Authors differ much concerning the methods of dulcification. The proportions are from two to five or ſix parts of *ſpirit* of wine to one part of *ſpirit* of ſalt. Some require a ſmoking *ſpirit*, others do not ſay whether it ſhould be concentrated and ſmoking, or not. Some direct the diſtillation of the mixture, others are content with mere digeſtion. The Edinburgh Diſpenſatory directs this acid to be poured gradually into thrice its quantity of rectified *ſpirit* of wine, and the mixture, after digeſtion for ſome days, to be ſubmitted to diſtillation in a ſand heat. This dulcified marine acid has been held by ſome in great eſteem againſt weakneſs of the ſtomach, indigeſtion, and other ſimilar complaints brought on by irregularities.

SPIRIT *of ſulphur*. See *Spirit of* SULPHUR.

SPIRIT *of Venus*, is a name given by chemiſts to the acid obtained by diſtilling verdegriſe, or cryſtals of verdegriſe, or of Venus, which are nothing elſe than combinations of copper with acetous acid. Nothing more is required for this purpoſe than to put verdegriſe, or cryſtals of verdegriſe, into a retort, one third part of which ſhould remain empty: to this retort a receiver is to be adjuſted, and the diſtillation begun with a very gentle fire: the firſt portions of liquor which paſs are to be ſet apart, as they are nothing but phlegm: the diſtillation is to be promoted by gradually augmenting the fire till the retort begins to be red-hot, and nothing eſcapes from it. The acid of vinegar paſſes in this diſtillation partly in white clouds and partly in drops. This acid forms ÆTHER when diſtilled with *ſpirit* of wine.

SPIRIT *of vinegar*. See VINEGAR and ACETUM.

SPIRIT *of vitriol*, is a name given, in general, to every dilute *vitriolic* ACID. See CONCENTRATION and VITRIOL.

SPIRIT is alſo uſed for any incorporeal being, or intelligence. In which ſenſe God is ſaid to be a *ſpirit*, angels are *ſpirits*; and the devil is an *evil ſpirit*.

In this ſenſe the human ſoul is alſo called a *ſpirit*, from its thinking and reflecting powers, which cannot be conceived to reſide in any thing material. See SOUL.

F. Malebranche obſerves, it is extremely difficult to conceive what it is that ſhould make the communication between the body and the *ſpirit*; for if the *ſpirit* have no material parts, it cannot move the body. But the argument muſt be falſe ſome how or other; for we believe that God can move bodies, and yet do we not attribute any material parts to him.

SPIRIT, in *Theology*, is uſed, by way of eminence, for the third perſon in the Holy Trinity, called *the Spirit*, *the Holy Spirit*, or *Holy Ghoſt*.

The Socinians deny the perſonality of the *Spirit*; and the Arians his coequality with the father.

SPIRIT, *order of the*. See HOLY *Ghoſt*.

SPIRIT is alſo uſed, among *Divines*, for the divine power, and virtue, and the communication thereof to men.

In this ſenſe the *ſpirit* is ſaid to have gone out on the face of the deep, Gen. i. 2. and the prophets to have been poſſeſſed with the *ſpirit* of God. Providence, in this ſenſe, is that univerſal *Spirit* whereby God makes all nature to act.

Thus the holy Virgin is ſaid to have conceived of the *Spirit*.

SPIRIT, *private*, is a term that made a great figure in the controverſies of the two laſt centuries. It ſignifies the particular ſenſe or notion each perſon has of the dogmata of faith, and the truths of religion, as ſuggeſted by his own thoughts, and the perſuaſion he is under with regard to them.

The firſt reformers denying ſtrenuouſly any infallible interpreter of the Scripture, or any ſettled judge of controverſies, maintained, that every perſon was to interpret and judge of revealed truths by his own light, aſſiſted by the grace of God; and this was what they called *private ſpirit*, or *judgment*.

Againſt this, the arguments uſed by the Romaniſts are, that revealed truths being one and the ſame for all believers; the rule God has given us for judging of them, ought to repreſent them to us uniformly, and the ſame; but the *private ſpirit* informs Luther one way, and Zuinglius another. It divides Oecolampadius, Bucer, Oſiander, &c. And the doctrine it diſcovers to the Confeſſionites, is quite different from that it ſhews the Anabaptiſts and Mennonites, in the very ſame paſſage of Scripture.

SPIRIT, *ſpiritus*, is alſo uſed, in *Proſody*, to ſignify the greater or leſs degree of breath employed in the pronunciation of the initial Greek vowels, and of the letter *ρ*.

In ſounding the vowels we may obſerve, every vowel has its ſound by a ſimple conformation of the mouth, wherein the breath has little or no concern, as being confined in the arteria aſpera: the *ſpirits*, or breaths, which are placed on the initial vowels in words, are to denote the force this initial vowel is to have from the breath when the word is pronounced. If the ſound of this vowel be ſmooth, as all the ſounds of the vowels naturally are, this is termed *ſpiritus lenis*, a MILD BREATH; but if this vowel be to be pronounced with a more vehement expulſion of the air, this is termed *ſpiritus aſper*, or a rough breath, or aſpirate; and when the aſpirate and acute are in the ſame ſyllable, the mark of the breath, in this initial vowel, only ſignifies, that the vowel is to be pronounced with a ſtronger breath than the initial mild vowels; for aſpirates do not alter the tone of any ſyllable, but only ſtrengthen, increaſe, and ſwell the tone.

SPIRIT, *modes of*. See MODE.

SPIRITO, in the *Italian Muſic*, is uſed to ſignify that a performer ſhould ſing or play with vigour, life, and *ſpirit*. Hence we meet with *con ſpirito* in cantatas and ſonatas.

SPIRITUAL *friars*. See FRANCISCANS.

SPIRITUALITIES of a biſhop are ſuch profits as ariſe to him from the benefit of his juriſdiction in his dioceſe, and not as a baron of parliament.

Such are thoſe of his viſitations, inſtitutions, ordinations, preſentation-money, &c.

SPIRITUALITIES, *guardian of the*. See GUARDIAN.

SPIRITUALIUM *cuſtos*. See CUSTOS.

SPIRITUALIZATION, in *Chemiſtry*, the action of extracting ſpirits from natural bodies. See SPIRIT.

Spiritualization is an operation that belongs principally to fermented ſalts, and then to fermented juices and liquors; the fermentation rendering the ſpirits volatile and inflammable.

Spirit of wine is ſometimes *ſpiritualized* to that degree, that upon throwing a quantity into the air, not a drop ſhall fall down; but the whole evaporate, and be loſt.

SPIRITUS *aceti*. See ACETI *ſpiritus*.

SPIRITUS *Mindereri*. See VINEGAR.

SPIRITUS *rector of vegetables*. See ARCHÆUS.

SPIRITUS *tartari*, the name of a medicine very famous in Germany, and probably in the greater eſteem becauſe of the difficulty of preparing it. It is the *ſpirit* of ſalt of tartar volatilized; and is ordered by Langelot to be made in this manner: let two or three pounds of crude tartar be burnt to a blackneſs, in order to have what is moſt neceſſary, a ferment to ferment the tartar with; put this into a large pot, and pour to it ſo much water as will ſerve to ſtand an inch above it; make this mixture lukewarm, and then pour into it half a handful of crude tartar powdered; bubbles of air will ariſe upon this, and will continue ſome time; when they ſeem to decreaſe, more powdered tartar is to be added from time to time, to keep up this fermentation. The bubbles will be large, and riſe in cluſters, and reſemble bunches of grapes in all but colour. The fire all this time muſt be carefully managed, and the tartar put in gradually, that the fermentation do not become too great, or the maſs run over the pot.

After this manner it is to be put together into an iron retort, and a very gentle fire kept under it for ſome time, and gradually heightened, ſo as to force up all the ſalt; this being done, the volatilized ſalt is to be carefully ſeparated, and it is remarkable, that the ſalt is ſo wholly volatilized by this fermentation, that there ſcarce remains any fixed ſalts in the caput mortuum in the retort.

The liquor in the receiver is to be rectified by another diſtillation, the water, neceſſarily uſed in the fermentation, rendering it too weak. When it is rectified ſo far, that it appears whitiſh, it is known to be of a due ſtrength, and it is then the famous *ſpirit of tartar*, not only celebrated for its medicinal virtues, but famous for extracting tinctures than can be obtained from no other menſtruum.

SPIRITUS *volatilis aromaticus*, a name given of late to what uſed to be called *ſal volatile oleoſum*. The modern way of making it is this: take eſſence of lemons, and oil of nutmegs, of each two drams: oil of cloves half a dram; dulcified *ſpirit* of ſal ammoniac a quart; diſtil the whole with a very gentle heat. See *Spiritus ſalis* AMMONIACI.

SPIRKETTING, among *Ship-carpenters*, denotes that range of planks which lies between the water ways and the lower edge of the gun-ports, within the ſide of a ſhip of war.

SPIRTING *cucumber*, in *Botany*, a ſpecies of *momordica*. See *Male* BALSAM *apple*.

SPISSUM, in the *Ancient Muſic*, was uſed to ſignify thoſe two ſmaller conjunct intervals of a tetrachord, which, taken together, were leſs than the third.

The Greek term for this was πυκνον. This happened in the enharmonic, and the three chromatic genera; in each of which the interval between the hypate and the lichanos, was leſs than the interval between the lichanos and the nete. To the *ſpiſſum* was oppoſed the *non-ſpiſſum*, ἀπυκνον, or *rarum*, as Martianus Capella tranſlates it. The ἀπυκνον happened in the two diatonic genera, where the two ſmalleſt intervals were equal to, or greater than the third. They were ſuppoſed equal in the diatonicum molle, and greater in the intenſum. See GENUS.

SPIT-*deep*, a term uſed among *Farmers* for a ſoil as deep as can be dug up at once with a *ſpit* or ſpade.

SPITTER, among *Sportſmen*, a red male deer near two years old, whoſe horns begin to grow up ſharp and ſpitwiſe.

It is otherwiſe called a *brocket* and *pricket*.

SPITTLE. See SALIVA and SPUTUM.

SPITTLE, a corruption of the word HOSPITAL.

SPIZA, in *Ornithology*, a name by which the ancient naturaliſts called the CHAFFINCH.

SPLACHNUM, in *Botany*, a genus of the *cryptogamia* claſs of MOSSES. Its characters are, that the anthera reſts upon a coloured apophyſis; the calyptra ſoon falls, and the female flower is diſtinct, and of a ſtar-like form. Linnæus enumerates four ſpecies.

SPLAIT-*ſhoulder*. See SHOULDER.

SPLANCHNICA, a name given to medicines appropriated to diſeaſes of the bowels.

SPLANCHNOLOGY, formed from σπλαγχνον, *inteſtine*, and λογος, *diſcourſe*, in *Anatomy*, a diſcourſe on, or explication of the viſcera. See *Tab. Anat.* p. 3. where the object of this branch is repreſented.

Sarcology is divided into three parts, viz. *ſplanchnology*, *myology*, and *angeiology*; of theſe, *ſplanchnology* is that which treats of the internal parts, and particularly of the viſcera.

SPLEEN, σπλην, *lien*, in *Anatomy*, a ſoft, ſpongy viſcus, of a darkiſh red, or rather livid, colour, ordinarily reſembling the figure of a tongue; though ſometimes triangular, and ſometimes roundiſh, being about ſeven or eight fingers-breadth in length, and four or five in breadth. See *Tab. Anat.* (*Splanch.*) *fig.* 1. *lit. m.*

The *ſpleen* is uſually ſingle; though ſometimes there are two, and ſometimes three found. It is ſituate in the left hypochondrium, between the ſpurious ribs and the ſtomach, under the edge of the diaphragm, and above the left kidney; it is ſomewhat convex on the ſide towards the former, and concave towards the latter. It is connected to the omentum, and, by means of that, and the blood-veſſels, to the ſtomach and left kidney, and ſometimes to the diaphragm.

It is covered with two tunics; the external derived from the peritonæum, and connected to the internal only by intervention of the blood-veſſels. The inner conſiſts of fibres very curiouſly interwoven. From this, probably, are derived thoſe innumerable cells, or little bladders, which make up the main bulk of the *ſpleen*; though Malpighi rather takes them to ariſe from the venous duct. The cells communicate with each other, and diſcharge themſelves into the trunk of the *ſplenic* vein: their inſide, according to Malpighi, is furniſhed with various minute glands adhering together; ſix, ſeven, or eight whereof form a kind of ſmall conglomerate glands, wherein the arteries and veins ſeem to terminate.

Its blood-veſſels are, the SPLENIC artery, which furniſhes it with blood from the cœliac; and the SPLENIC vein, which carries it thence by the porta to the liver.

Its nerves come from the plexus lienaris, near the bottom of the ſtomach, and ſend out, at different diſtances, round all the arterial ramifications of the ſubſtance of the *ſpleen*, a great number of filaments, in form of an irregular net-work; the veſſels are all, as ſoon as they enter the *ſpleen*, wrapt up in one common capſula, or membrane, and plentifully diſtributed together throughout the ſubſtance of the *ſpleen*: beſides theſe, there are lymphatics in great abundance. The anaſtomaſes, between the arteries and veins of the *ſpleen*, are more apparent than in any other part of the body: and this viſcus is obſerved to be furniſhed with a greater proportion of blood than any other part.

The uſe of the *ſpleen* has been diſputed in all ages; both as no immediate uſe thereof appears from diſſection, and as we find, that animals, from whom it has been cut, live very well without it: all the effects, e. gr. following the cutting it from a dog, are, that the animal grows more ſalacious than uſual; that it urines more frequently; is more hungry than ordinary, and, for the firſt days, is troubled with a vomiting and nauſea. It is added, that it is neceſſary the part be taken away, to make a good runner.

Hence ſome have imagined, that the *ſpleen* only ſerved to make a balance in the weight of the body; others, that it was only intended for the ſake of ſymmetry; others hold it a uſeleſs load, and one of nature's redundances; others, a pit, or common ſewer to diſcharge the fæces of the blood into; and others, a fire, by the heat whereof the action of the ſtomach is animated.

Many of the ancients took it to be the receptacle of the atra bilis, or melancholic humour; for which reaſon, ſome of them call it the *organ of laughter*.

Mr. Cowper, from the great quantity of blood, and the apparent inoſculations of the *ſpleen*, draws a very natural conjecture of the uſe thereof; at leaſt of the peculiar mechaniſm. He takes, then, the *ſpleen* to be only a ſubordinate organ, miniſtring to the circulation; and thinks, that by this congreſs of the arterial and venous blood, an impetus is communicated to the latter; by which its progreſs through the ramifications of the porta to the cava is promoted, which would otherwiſe be ſo broken by the double ramifications of the porta, as almoſt to want ſtrength ſufficient to carry it to the heart.

The action or effect of the *ſpleen*, according to Dr. Boerhaave is, to receive the freſh arterial blood, to prepare it in its glands, and pour it into its cells; to return what blood is left, from this action, to the little veins, and thence to the *ſplenic* vein; to mix the humour, thus prepared, with the nervous juice; and to prepare, attenuate, and more intimately unite them together in one humour.

Malpighi, and afterwards Dr. Keill, Winſlow, and ſome others, take the *ſpleen* to be a viſcous aſſiſtant to the liver, in the ſecretion, &c. of the bile. We have obſerved, that by reaſon of the nearneſs of the liver and heart, and the ſwift motion of the blood in the aorta, a humour, conſiſting of particles that combine ſo ſlowly as thoſe of the bile do, could not be prepared but by bringing the blood round about through the ſtomach, inteſtines, and omentum, &c. to the liver, to abate its velocity.

Now Dr. Keill conjectures, that thoſe parts were not ſufficient to receive all the blood neceſſary to be ſent to the liver; and that, therefore, nature framed the *ſpleen*, into whoſe cavities the blood being poured from a ſmall artery, moves, at leaſt, as ſlowly as any that paſſes otherwiſe to the liver; by which means, the particles that compoſe the bile in the blood which paſſes through the ramus ſplenicus, by ſo long and ſlow a circulation, have more chances for uniting, than otherwiſe they would, had they been carried, by the branches of the cœliac, directly to the liver: conſequently, without the *ſpleen*, ſuch a quantity of bile that is now ſecerned, that is, as nature requires, could not have been ſeparated by the liver.

M. du Vernoi has added one opinion more to the many already given, concerning the uſe of the *ſpleen*. From obſerving a large empty ſpace near the *ſpleen*, in the abdomen of a dead body, the proportional largeneſs of its blood-veſſels, and the ſtructure of the *ſpleen* analogous to that of the penis, he concludes the *ſpleen* in a living perſon to be ſubject to inflations like a bellows; but how it is thus to be moved, or to what purpoſe, he does not tell us. See Comment. Acad. Petrop. tom. iv. p. 156, ſeq.

Mr. Lieutaud argues for the *ſpleen*'s being larger by a greater quantity of blood in it, when the ſtomach is empty, and that this blood is preſſed out, when the ſtomach is full, to increaſe the ſecretion of bile. Hiſt. de l'Acad des Scienc. 1733.

We have an account, in the Philoſophical Tranſactions, N° 451, of the extirpation of part of the *ſpleen* of a man, which had begun to mortify, notwithſtanding which the man recovered.

The *ſpleen* has been cut out of dogs without any damage. Mr. Boyle mentions his having ſeen the experiment tried on a young ſetter, who recovered in a fortnight. Works abridg. vol. i. p. 27.

Dr. Pozzi relates the phenomena he remarked in diſſecting a dog, whoſe *ſpleen* was cut out when he was young. The liver, which was larger and more heavy than ordinary, was alſo more brittle; the vena portarum was enlarged; the gall-bladder was full of bile, more acrid than it is commonly. From theſe appearances he thinks the uſe of the *ſpleen* to be for ſeparating a liquor like to ſpittle, which may dilute the bile, and prevent its too great acrimony. Med. Eſſ. Edinb.

The ingenious Mr. Hewſon offers a variety of conſiderations, from which he concludes, that we have as ſtrong proofs that the red or veſicular particles of the blood are completely formed by the *ſpleen*, as that the liver ſecretes bile, or the teſticles ſemen; not that the *ſpleen* is the only organ which executes this function; but it ſerves as an auxiliary to the lymphatic ſyſtem, in perfecting and expediting the formation of the veſicles, or red part of the blood: accordingly it may be cut out of the body of a living animal, without any conſiderable inconvenience to it. In that caſe, as well as when it is diſeaſed, it is ſuppoſed, that the lymphatic veſſels are excited to form a larger quantity than uſual of red particles, in proportion to the exigencies of the habit. See LYMPHATICS.

The uncertainty we are in as to the real uſe of the *ſpleen*, has given ground, perhaps, to the notion that men might live without the *ſpleen*; and that, in many caſes, it might contribute much to health to cut out this uſeleſs viſcus. In the Journal des Sçavans, there is an account of a method of deſtroying it, without the terrors of the operation of opening the body.

This was done by a perſon who applied a wooden-knife to the ſurface of the body where the *ſpleen* is lodged, and ſtriking forcibly on it with a mallet, told the patient that he had broken the ſubſtance of the *ſpleen*; and that after this it required only the taking certain medicines which he prepared, utterly to deſtroy and carry it out of the body.

The folly of a pretence of this kind, one would think, ſhould have been alone ſufficient to have laughed it out of the world; but numbers of people ſubmitted to the operation, till a youth in Peterſburg unhappily being killed by a blow of the kind here mentioned, and his belly ſwelling greatly, excited the curioſity of his relations to have it opened. The cauſe of his death was found to be an hæmorrhage, which had filled the cavity of the abdomen, and which proceeded from the *ſpleen*'s having been burſt by the blow. This convinced them, that attempts to wound the *ſpleen* were no longer looked upon as the means of health. Act. Petrop. vol. i. p. 38.

SPLEEN, *infarction of the*, *infarctus lienis*, a diſeaſe conſiſting in an inflation of this lax and celluloſe viſcus, owing its origin to a reſtriction of the blood toward the *ſplenic* branch, in which nature ſeems to have intended the relieving herſelf from the load of a plethora, by the diſcharging a part of the maſs through the vaſa brevia.

The *infarctus lienis* differs from an obſtruction of the *ſpleen*, in that this laſt is a total ſuppreſſion of the blood in it, this only a partial one. It is too often confounded with nephritic complaints, and is indeed, in general, of the claſs of hypochondriac maladies, but only ariſes from a ſpe-a ſpecial and peculiar derivation of the blood to that one viſcus, not to any other of the circumjacent parts.

Signs of it. An *infarction of the ſpleen* is diſcovered by an inflation of the left ſide, a little below the ſpurious ribs, attended with permanent pains, but theſe not very acute or violent: theſe complaints have frequent remiſſions, ſeldom continuing above a day or two in the ſame ſtate. During the time of the ſymptoms being worſt, there is a difficulty of breathing, and an anxiety of the præcordia, and generally a lowneſs of ſpirits: to theſe it may be added, that there is uſually a dry cough, and frequent belchings.

Perſons ſubject to it. Men are in general much more ſubject to this diſeaſe than women, unleſs at the middle and more advanced periods of life, when they are more ſubject to it than the men. People of a melancholic habit alſo are moſt afflicted with it, and ſuch as have before had hypochondriac complaints, and have been injudiciouſly treated with aſtringents; and all perſons of a ſedentary and ſtudious life, or who employ much time in thinking.

Cauſes of it. Theſe are a ſedentary life, and a diet of too heavy and thick a kind; an omiſſion of habitual bleedings, or other evacuations, or a ſuppreſſion of the menſtrual or hæmorrhoidal diſcharges; an injudicious treatment of intermittent fevers with aſtringents, or of acute ones with too cooling medicines, and an habitual coſtiveneſs; and to theſe may be added an hereditary diſpoſition.

Prognoſtics in it. This is a diſeaſe of no immediate danger to the patient, and the more recent it is when taken in hand, the eaſier it is cured; if left to itſelf it becomes habitual, and brings no danger of death with it, but if improperly treated, it frequently becomes the baſis of the moſt obſtinate kind of quartans, or degenerates into a ſcirrhus, which may be a long time ſuffered without any danger of life; but finally, the whole too often ends in ſlow hectic fevers, and œdomatous and aſcitic ſwellings. In women it often terminates in a vomiting of blood; and ſometimes, but very rarely, an inflammatory and ſuppurating ſtaſis ſupervenes, and a black, fetid, and purulent matter is voided by ſtool or by vomiting.

Method of cure. The plethoric habit, which gives riſe to this complaint, is to be taken down by copious bleedings in the right foot, and then ſhould be repeated every ſpring and autumn; and the menſes ſhould be brought to a proper regularity in the uſual way, as muſt alſo the hæmorrhoids in the other ſex, by the application of leeches to the part. The ſpiſſitude of the blood is to be amended by decoctions of elecampane, hyſſop, and the like; and by moderate and repeated doſes of tartarum vitriolatum, gum ammoniacum, &c. and gentle doſes of rhubarb and ſena in infuſion muſt be taken at times. To theſe may be added the external uſe of reſolvents and ſtrengtheners, ſuch as ointment of marſh-mallows, the plaſter of gum ammoniacum, and the like; and finally, the preparations of ſteel are to be given: to theſe ſome add a number of things eſteemed ſpecifics, ſuch are madder and caper-roots, dodder, yarrow, white maiden-hair, and ſpleenwort, and the bark of the aſh-tree, and wood of the tamariſk. Juncker's conſp. Med. p. 194.

Spleen, *ſcirrhus of the.* This is an indurated tumor of the *ſpleen*, cauſed by a ſtagnation and inſpiſſation of the humours from the exhalation of their thinner parts. This complaint is ſometimes complete, and ſometimes incomplete; but in the moſt favourable caſes it is a much more dangerous complaint than an infarction of the *ſpleen*, and more difficult of cure.

Signs of it. Theſe are a ſenſible and palpable hardneſs under the ribs on the left ſide, extending towards the loins, with a ſenſe of a weight, as it were, hanging in this part; and hence the lying on the right ſide is always very painful and uneaſy. The face has a dull deadneſs in the look, which ſometimes is communicated alſo to the ſkin of the whole body, and there is uſually a blackneſs about the orbits of the eyes; there is alſo a ſenſation of a narrowneſs in the breaſt, with ſome difficulty of breathing, and a dry cough. The appetite is uſually voracious, but ſometimes it is affected with nauſeas, without any apparent cauſe. The bowels are uſually ſomewhat coſtive, but irregularly ſo. The mind alſo ſeems affected, and a gloomy moroſeneſs, ſilence, and anxiety, oppreſs the perſon, without any viſible cauſe. Finally, there uſually is a ſwelling in the right foot, which by degrees extends itſelf farther, and is ſeldom regarded at firſt.

Perſons of both ſexes are equally ſubject to this diſorder, but it is not, however, very common. Men who have long been ſubject to hypochondriac diſorders, and women ſubject to hyſteric complaints, are moſt ſubject to it; and to theſe may be added, perſons of an indolent, ſpeculative, and ſedentary life, and thoſe who have been imprudently treated with aſtringents in intermittent caſes.

Cauſes of it. Beſide thoſe before mentioned, a ſcirrhus is ſometimes brought on in the *ſpleen* by a violent blow, or other external injury; a too thick diet may alſo be very inſtrumental in laying the foundation for it; and not a little may be added to all theſe caſes, by violent paſſions of the mind.

Prognoſtics in it. In recent *ſcirrhuſes*, and ſuch as are yet incomplete, there is ſome hope of ſucceeding in the attempt of a cure; and, on the contrary, in old caſes and complete *ſcirrhuſes*, there is indeed very little hope: but there is this comfort for the patient, that even ſuch a one, when wholly left to itſelf, will remain many years without endangering life.

There is in a ſcirrhus an evident tendency to corruption, but this is rather to be expected from ſphacelation than from an inflammatory ſuppuration; but when emollients are uſed, there is great and imminent danger: for as theſe are nearly allied to the maturating remedies, they may produce their effect; and it is certain, that no laudable ſuppuration is ever to be expected in this caſe.

Method of treatment. This caſe is to be treated in the ſame general manner with the infarctions of the *ſpleen*, already mentioned; but the more powerful reſolvents are to be uſed in this, as the more ſtubborn caſe: gentian, bryony, and arum-root, with the five aperient roots, and the capillary herbs, with the powerful gums, as galbanum, ſagapenum, ammoniacum, and the reſt. Bleeding muſt alſo be ordered, as ſoon as the primæ viæ have been cleanſed; and externally the plaſter of cicuta, with ammoniacum, may be applied; but if the caſe is fixed and obſtinate, it is better to let all applications alone, and leave nature to do the beſt for herſelf. Junker's Conſ. Med. p. 202.

Spleen is alſo uſed for a diſeaſe, by phyſicians more uſually called the *hypochondriac diſeaſe*.

Spleen, in *Ichthyology*. The *ſpleen* in fiſhes is uſually ſituate near the ſtomach, in the left ſide of the abdomen. Its figure is generally triangular, ſometimes oblong. Its colour is always more duſky and obſcure than that of the liver.

Spleen-*wort*, *aſplenium*, in *Botany*. See Milt-*waſte*.

Spleen-*wort*, *rough*, *lonchitis*, in *Botany*, a genus of the *cryptogamia filices* claſs of plants: the characters of which are theſe; the flowers have not been diſcovered, but the ſeeds grow on the back part of the leaves; the leaves reſemble thoſe of the ferns in ſhape, but differ in that the pinnules are auriculated near their baſes.

The general character of the *lonchitis*, according to Linnæus is, that the fructifications are diſpoſed in lines of a lunulated figure, which are placed in the under part of the ſinuſes of the leaves. He enumerates four ſpecies.

Miller mentions two ſpecies, one of which is very common in ſhady woods, by the ſides of ſmall rivulets, in ſeveral parts of England.

The root is aperient and diuretic.

SPLENECTOMIA, the name given to the chirurgical operation of cutting out the spleen.

SPLENETIC, σπληνικος, a perſon affected with oppilations and obſtructions of the ſpleen.

In *ſplenetic* people, the ſpleen is ſwelled beyond the natural bulk; or it is hardened ſo, as to ſhew a ſchirrous tumor therein.

Splenetic people are diſtinguiſhed by a livid, lead-coloured complexion; and their character is, to be very prone to laughter; which is an expedient nature is ſuppoſed to make uſe of, to evacuate the too redundant humour the ſpleen is charged withal; whence it is, that the ancients made the ſpleen the organ of laughter; and hence that popular ſaying, of a perſon laughing heartily, that he *vents his ſpleen*.

Splenetic *waters*. See Water.

SPLENIA, a word uſed by ſurgeons to expreſs compreſſes, or rags ſeveral times doubled, applied to wounds over the plaſters, or other dreſſings.

SPLENIC *veſſels*, a large artery, and vein of the ſpleen.

The *ſplenic artery*, *arteria ſplenica*, is a trunk of the left cœliac, paſſing under the ſtomach and pancreas, and ſerving to bring the blood from that artery to the ſpleen, to be there ſecreted, prepared, &c. Its progreſs is very much contorted; and, after its arrival at the ſurface of the ſpleen, it is diffuſed through the ſubſtance thereof in ſmall branches, which ſeem to terminate in the cells; but before it arrives at that viſcus, it gives two or three branches to the large extremity of the ſtomach, commonly called *vaſa brevia*, and one to the omentum, named *epiploica*.

The *ſplenic vein*, *vena ſplenica*, is formed out of the ſeveral minute veins of the ſpleen, uniting as they quit the ſurface thereof. It carries the blood ſecreted, &c. in the ſpleen, to the left branch of the vena porta, to be thence conveyed to the liver, there to be farther prepared, and converted into bile.

The *ſplenic vein* and *artery* manifeſtly communicate with each other: for water, being poured into one of them, preſently diſcharges itſelf by the other.

SPLENII, in *Anatomy*, a pair of muſcles, ſo called from a ſuppoſed reſemblance to an ox's ſpleen, &c. called alſo from their form, *triangulares*. See *Tab. Anat. (Myol.) fig.* 2. *fig.* 6. *n.* 5. *fig.* 7. *n.* 6. and SPLENIUS.

SPLENII *inferior*, in *Anatomy*, a name given by Cowper to a muſcle, called by Albinus *ſplenicus colli*, and by Winſlow, and others, *maſtoidæus poſterior*, and *portio inferior ſplenii*. See SPLENIUS.

SPLENITIS, in *Medicine*, the name of a ſpecies of fever, in which the blood is powerfully directed toward the ſpleen by nature, in order to break and diſſolve congeſtions formed there. The *ſplenitis* differs from what authors call an *infarctus lienis* in degree, as in this the blood only ſtagnates in ſome degree, and is not wholly obſtructed; and as there is no acute inflammatory fever here, as there is in the *ſplenitis*.

The *ſplenitis* is very various in degree; in ſome caſes the whole parenchymatous ſubſtance of the ſpleen being affected, in others only its membranceous and ſuperficial parts. It is eaſy to conceive that the former caſe is much the more dangerous of the two.

Signs of it. This diſeaſe always firſt attacks people with a very remarkable ſhivering and coldneſs; this is ſucceeded by a very terrible heat, and intolerable thirſt; and there is a preſſive pain, and a ſenſible ſwelling in the left hypochondrium. If the patients expoſe themſelves a little to the open air, the extremities grow cold almoſt immediately; if a hæmorrhage happens, it is always from the left noſtril: and finally the urine is reddiſh and turbid, and after the fourth day depoſits a roſe-coloured ſediment, which has ſomewhat of the appearance of matter. Plethoric perſons are more than all others ſubject to this diſeaſe.

Cauſes of it. The general cauſe is a plethora joined with a thickneſs of the blood, which forms ſtaſes, and fixed coagulations in the ſpleen; and the fever itſelf is no other, than the attempt of nature to break through thoſe ſtaſes, by the additional velocity of the motion of the blood. The uſual accidents that bring on this bad ſtate of the blood, are the omiſſion of habitual bleedings, or the ſuppreſſion of the natural diſcharges of the menſes or hæmorrhoids; and the occaſional accidents that immediately bring on the diſeaſe in this ſtate of the blood are, violent commotions of the mind, ſudden chilling of the body when very hot, as by drinking cold water immediately after violent exerciſe, the taking violently aſtringent medicines in fevers, and an improper uſe of cooling external remedies in diſorders of the ſpleen, as the infarctions of it, and the like.

Prognoſtics in it. It is always a very dangerous diſeaſe, though not ſo fatal as the hepatitis, or a like inflammatory ſtate of the liver; but it is remarkable, that as the vomiting a black matter in the hepatitis is always a fatal ſymptom, ſo in this diſeaſe the ſame matter is frequently voided, but it is here ſalutary, and frequently carries off the diſeaſe. The appearance of the hæmorrhoids has alſo been frequently obſerved to have the ſame good effect. When the inflammation lies deep, it is moſt frequently fatal; when it is ſuperficial, it is often carried off; but when it ſeems cured, it ſometimes is found afterwards to have degenerated into an incurable ſcirrhus of the part.

Method of cure. The firſt thing to be done, is to open the bowels by a clyſter, and they are afterwards to be kept from becoming coſtive, by a repetition of the ſame means. Bleeding is uſually neceſſary, and may be performed once or more in the beginning of the diſeaſe; then gentle diaphoretics are to be given with juleps ſlightly acidulated. Theſe are the proper medicines for the morning; and in the afternoon powders of nitre, vitriolated tartar, and crabs eyes, ſated with lemon-juice, are to be given with the cooling emulſions; and if the pains be very violent, they may be mitigated, by giving ſmall doſes of a gentle anodyne, ſuch as the ſtorax-pill, with the before mentioned powders. If the ſuppreſſion of the habitual hæmorrhoidal evacuations are ſuſpected to be the cauſe of the diſeaſe, leeches muſt be applied to the parts, and no wine, or any other ſtrong liquor, muſt be allowed, till the decline of the diſeaſe. Junker's Conſp. Med. p. 299.

SPLENITIS is alſo uſed by ſome authors to expreſs a tumor or inflammation of the ſpleen.

Splenitis is alſo uſed as the name of a vein in the left hand, the ſame as the *ſalvatella*. The vein of this kind in the right hand is called *jecoraria*.

SPLENIUS, called alſo *maſtoidæus poſterior*, in *Anatomy*, a flat, broad, oblong muſcle, ſituated obliquely between the back part of the ear, and the poſterior and lower part of the neck.

It is partly ſingle, and partly made up of two portions; one ſuperior, the other inferior. Theſe two portions are cloſely united backward, making only one plain, but they are divided above.

The ſuperior portion is fixed to the extremities of the three or four loweſt ſpinal apophyſes of the neck, and of the firſt and ſometimes the firſt and ſecond of the back. It is not fixed immediately to the apophyſes of the neck, which are above the laſt, but only by the intervention of the poſterior cervical ligament. It is likewiſe fixed to the edge of the interſpinal ligaments of the other vertebræ; from thence it runs obliquely toward the maſtoide apophyſis, and is inſerted in its upper part, and along the neighbouring curve portion of the tranſverſe ridge of the os occipitis.

The inferior portion of the *ſplenius* is fixed to three or four ſpinal apophyſes of the back, beginning by the ſecond or third, and afterwards running up till it reaches the ſuperior and lateral part of the neck. It is inſerted in the tranſverſe apophyſes of the three or four ſuperior vertebræ of the neck, by the ſame number of extremities, a little tendinous; theſe, however, are ſometimes only two in number. The two *ſplenii* repreſent a great Roman V, and the *ſplenius*, and ſterno-maſtoidæus of the ſame ſide, form a figure like a Roman A, or the legs of a pair of compaſſes, the points of which are in an horital plane.

The two *ſplenii* ſerve to ſupport the head in an erect poſture, whether in ſtanding or ſitting; to moderate the flexion of the head forward, and to bring it back again to its natural poſture. They ſerve alternately to co-operate with either of the STERNO-MASTOIDÆI for the rotation of the head. The COMPLEXI are aſſiſtants to the *ſplenii* to keep the head ſtraight in ſitting or ſtanding, to hinder it from inclining forward, and to raiſe it when inclined. When they act together, they, as well as the *ſplenii*, may move the head backward, while the trunk is bent forward, or when we lie upon the belly; this latter motion is commonly called *extenſion*, the other *flexion*. Winſlow.

SPLENIUS *capitis*, in *Anatomy*, a name given by Albinus to a muſcle, called by Winſlow, and others, the *maſtoidæus ſuperior*, or upper portion of the *ſplenius*. Riolanus, and others, call it the *triangularis ſplenii*.

SPLENIUS *colli*, in *Anatomy*, a name given by Albinus to the muſcle, called by Winſlow, and others, *maſtoidæus poſterior*, or the lower portion of the *ſplenius*; and by Cowper the *muſculus inferior ſplenii*.

SPLENT, or SPLINT, among *Farriers*, a callous, inſenſible excreſcence, or griſtle, that ſometimes ſticks to an horſe's ſhank-bone; generally on the inſide below the knee. If there be one oppoſite thereto on the outſide, it is called a *pegged* or *pinned ſplint*; becauſe it does, as it were, pierce the bone, and is extremely dangerous. Some call this a *double ſplent*, and others a *thorough ſplent*.

SPLENTS, in *Surgery*, pieces of wood uſed in binding up broken limbs. See FRACTURE.

The word is alſo ſometimes uſed for the pieces of a fractured bone.

SPLICE, *to*, in *Sea Language*, is to join the two ends of a rope together, or to unite the end of a rope to any other part thereof. There are ſeveral different methods of performing this operation, according to the ſervices on which it is to be employed. The *ſhort ſplice* is made by untwiſting the ends of two ropes, or the two ends of one rope, and having placed each of the ſtrands of one oppoſite to, and in the interval between two ſtrands of the other, to draw them cloſe together; and then interweave the ſtrands of the one into the alternate ſtrands of the other, by penetrating the latter with a fid or marline ſpike, parallel to the axis or length of the rope. This *ſplice* is uſed on the cables, ſlings, block-ſtrops, and in general all ropes which are not deſigned to run through blocks, or where the *ſplice* is not in danger of being looſened or ſeparated

The *long ſplice*, being fixed in three places, occupies a greater extent of the rope; but by the diviſion of the joinings, the bulk is divided into different parts of its length. Hence, it is much neater and ſmoother than the *ſhort ſplice*, and better adapted to run through the channel of a block, &c. for which uſe it is generally calculated.

The *eye-ſplice* being intended to make a ſort of eye or circle at the end of a rope, the ſtrands are untwiſted, and their extremities thruſt through the three ſtrands in that part of the ſaid rope whereon the *ſplice* is to be formed, and thence paſſing over the ſurface of the ſecond ſtrand, they are again thurſt through the third, which completes the operation.

The *cut-ſplice* is conſtructed in the ſame manner as the *eye-ſplice*; being no other than the ends of two lines faſtened together, at a ſhort diſtance from each other, the extremities of either being interwoven into the bight of the other, ſo that the line becomes double in the extent of the *ſplice*. This is chiefly uſed in lead-lines, log-lines, and fiſhing-lines, where the *ſhort-ſplice* would be liable to ſeparation, as being frequently looſened by the water. Falconer.

Splice, *to*, among *Gardeners*, is to graft the top of one tree into the ſtock of another, by cutting them ſloping, and faſtening them together.

SPLINT. See Splent.

SPLINTERS *of the bone*, in *Fractures*: in caſes of fractures the ſurgeon is frequently troubled with *ſplinters of the bone* in the way, which vellicate and prick the neighbouring parts, and render the proper execution of his office very difficult. If theſe *ſplinters* are looſe, and have no connection with the bone, they muſt be carefully lifted out of the wound; if they hang to the bone in ſome part by the perioſteum, that muſt be cut off with the ſciſſars; but if they adhere pretty firmly to the neighbouring parts, and do not hinder the reduction of the bone, it is beſt to replace the bone, and leave them either to looſen, and come out of themſelves by the ſuppuration of the parts, or to grow again, as they ſometimes will ſafely and firmly do, to the reſt of the bone. When they adhere pretty firmly to the principal parts of the bone, they ſhould never be extracted by force, but replaced with the greateſt exactneſs; for when this is properly performed, they will frequently unite to the reſt of the bone.

When the points of *ſplinters of bones* ſtick ſo far out, that they are a great hindrance to the reduction of the bone, you are diligently to conſider whether you can, by any means, contrive their reunion to the bone, which may be determined, by obſerving at what diſtance they are from the large bone, and what quantity of fleſh there is intervening: when they cannot be reduced, or reunited to the bone, they muſt be removed with a pair of ſtrong forceps, or, if they ſtick very firmly, with a fine ſaw. If the *ſplinters* are buried under the ſkin, and cannot be got at with hands, it is proper firſt to try if they can be reduced to their natural ſituation; and if they cannot, an inciſion muſt be made through the ſkin, that they may be taken out. Heiſter's Surg. p. 109.

SPLIT, in *Botany*, a name given by ſome authors to the great *fumaria bulboſa*, or hollow root.

Split, at *Sea*; when a ſail is blown to pieces, the ſeamen ſay it is *ſplit*.

Split, when applied to a ſhip, denotes the ſtate of being ſtranded and bilged on a rock or ſhore.

SPLITTING. To *ſplit* a thin piece of metal, as an old ſilver groat, place the metal on the heads of three pins ſtuck up triangularly, and let a heap of flower of brimſtone burn out upon it; then throwing it hard againſt the floor, the upper part will ſeparate from the lower. Boyle's Works, abr. vol. i. p. 134.

SPODIUM, in *Pharmacy*, a kind of abſorbent calx, or aſhes, eſteemed drying, and by ſome held to have the ſame virtues with coral.

The *ſpodium* of the ancient Greeks was a greyiſh kind of recrement, found in form of aſhes, on the hearths of furnaces, wherein braſs was made; and called by them σποδιον, which literally ſignifies *aſhes*.

Spodium is a metalline powder, nearly akin, both in origin and uſe, to tutia and pompholyx; only it is heavier than either.

The *ſpodium* of the Arabian phyſicians, as Avicenna and others, was made of the burnt roots of ruſhes and reeds. Some moderns alſo make a *ſpodium* of ivory burnt and calcined to a blackneſs. This is ſometimes counterfeited by burning bullocks or dogs bones; but theſe are of no value.

The *anti-ſpodium*, which the ancients ſubſtituted for their *ſpodium*, was made of myrtle-leaves, galls, and ſome other ingredients calcined.

SPOILS, Spolia, whatever is taken from an enemy in war. Among the Greeks, the *ſpoils* were divided in common among the whole army; only the general's quota was the biggeſt.

By the military diſcipline of the Romans, the *ſpoils* belonged to the republic, particular perſons had no title to them: and ſuch of the generals as valued themſelves on their probity, always carried them to the public treaſury. Sometimes, indeed, the pillage was diſtributed, by the general among the ſoldiery, to encourage them, or to reward them; but this was not done without great prudence, and reſervedneſs; otherwiſe, it came under the crime of peculation.

The conſuls Romulus and Veturius, were condemned for having ſold the *ſpoils* taken from the Æqui. Livy, lib. viii.

SPOLIARIUM, among the *ancient Romans*, the third part of the bath, uſed for undreſſing and dreſſing in.

Spoliarium was likewiſe a part of the gladiatorial ſchools, where their cloths and ornaments were laid, and where the wounded and killed were carried.

SPOLIATION, in *Law*, is an injury done by one clerk or incumbent to another, in taking the fruits of his benefice without any right thereunto, but under a pretended title. It is remedied by a decree to account for the profits ſo taken. This injury, when the *jus patronatus*, or right of advowſon, does not come in debate, is cognizable in the ſpiritual court; as if a patron firſt preſents A to a benefice, who is inſtituted and inducted thereto; and then, upon pretence of a vacancy, the ſame patron preſents B to the ſame living; and he alſo obtains inſtitution and induction. Now, if A diſputes the fact of the vacancy, then that clerk who is kept out of the profits of the living, whoever he be, may ſue the other in the ſpiritual court for *ſpoliation*, in taking the profits of his benefice. And it ſhall there be tried, whether the living were, or were not vacant; upon which the validity of the ſecond clerk's pretenſions muſt depend. But if the right of patronage comes at all into diſpute, as if one patron preſented A, and another patron preſented B, there the eccleſiaſtical court hath no cognizance, provided the tithes ſued for amount to a fourth part of the value of the living, but may be prohibited at the inſtance of the patron, by the king's writ of Indicavit. So alſo if a clerk, without any colour of title, ejects another from his parſonage, this injury muſt be redreſſed in the temporal courts; for it depends upon no queſtion determinable by the ſpiritual law (as plurality of benefices or no plurality, vacancy or no vacancy) but is merely a civil injury. Blackſt. Com. b. iii. p. 91.

SPONDAULA, σπονδαυλης, formed from σπονδη, *libation*, and αυλος, *flute*, in *Antiquity*, a player of the lute, or other wind-inſtrument of that kind; who, during the offering of ſacrifice, performed ſome ſuitable air in the prieſt's ear, to prevent his hearing any thing that might diſtract him, or leſſen his attention.

SPONDEE, Spondæus, in the *Greek* and *Latin Proſody*, a foot of verſe, conſiſting of two long ſyllables; as *vertunt*, *divos*, *campos*.

The *ſpondee* is a grave meaſure: all Greek and Latin hexameters regularly end with a *ſpondee*.

There are alſo *ſpondaic verſes*; that is, verſes compoſed wholly of *ſpondees*, or, at leaſt, that end with two *ſpondees*; as,

Conſtitit, atque oculis Phrygia agmina circumſpexit.

SPONDIAS, *in Botany*. See *Jamaica* Plum.

SPONDYLI, Σπονδυλοι, in *Antiquity*, pellets of braſs uſed in giving ſentence, before the κυαμοι, or *beans*, came into uſe.

SPONDYLOLITHOS, a name given by authors to a ſtone found in the country of Tyrol, and elſewhere, reſembling the vertebræ of an animal. It is in reality no other than the vertebræ of ſome ſea-fiſh petrified, as is common with us.

SPONDYLUS, σπονδυλος, a term anciently uſed for a vertebra of the ſpina dorſi.

Spondylus, in *Natural Hiſtory*, the name given by Da Coſta to the ſecond family of bivalve shells, which have unequal valves and ſhut cloſe: the diſtinguiſhing character is the hinge, which in the upper ſhell conſiſts of a triangular hollow and cartilage in the centre, on each ſide of which is a large deep cavity, and a very large thick and prominent tooth, or joint, lies on each ſide of the cavity; the ſummit and beak of the under valve is alſo extremely thick and ſtrong, and extends from the hinge outwards, into a broad triangular ſlope or flat. Some of the *ſpondyli* are thickly and curiouſly ſet with long thorns or ſpikes, and called thorny oyſters; theſe, when perfect, are much valued. The ſpecies of this family are not very numerous.

Liſter, Woodward, Gualtieri, Linnæus, and Meuſchen, rank theſe under a particular genus, which they call *ſpondylus*; but Rumphius, Argenville, Seba, and Davila, rank them as oysters.

SPONGE. See Spunge.

SPONGIOLI, a word uſed by ſome authors to expreſs the ſmall button muſhrooms, which are gathered before they expand or open their heads.

SPONGIOSA, in *Anatomy*, an epithet given to ſeveral parts of the body, by reaſon of their texture, which is porous and cavernous, like that of the ſpunge: as,

Spongiosa *penis, corpora*, called alſo *corpora cavernoſa*, and *nervoſa*. See Cavernosa *corpora*.

Spongiosa, *oſſa*, of the noſe, called alſo *oſſa tribunata*, and *cribriformia oſſa*. See Cribrosum os.

SPONSIO *judicialis*. See *Feigned* Issue.

SPONSORS. See God-*fathers*.

SPONSUS, one of the many names given by the chemiſts to mercury.

SPONTANEOUS, Spontaneus, formed from the Latin adverb *ſponte*, *of one's own accord*, in the *ſchools*, a term applied to ſuch motions of the body and mind as we perform ourſelves without any conſtraint.

Thus, in morality, thoſe actions performed upon an inward and natural principle, conformable to our own inclinations,

clinations, excluding all conſtraint, are called *ſpontaneous actions.*

In medicine, an evacuation, effected without any application for that purpoſe, is called a *ſpontaneous evacuation.*

And a laſſitude or wearineſs, not occaſioned by any preceding fatigue, is called a *ſpontaneous wearineſs.*

SPONTANEOUS *generation.* See EQUIVOCAL *generation.*

SPONTANEOUS *precipitation.* See PRECIPITATION.

SPONTOON, in *Military Language*, is a weapon reſembling a halberd, now uſed inſtead of a half-PIKE by the officers of foot. When the *ſpontoon* is planted, the regiment halts; when pointed forwards, the regiment marches; and when pointed backwards, it retreats.

SPOON-*bill*, *platea*, in *Ornithology*, the name of a bird of the long necked kind, approaching to the nature of the ſtork and heron, and called the *ſpoon-bill* from the remarkable figure of its beak, which is different from that of all other birds; being broadeſt at the extremity, and terminating in a large rounded, flat proceſs, reſembling a ſhovel; or, if it were hollow, a *ſpoon*. See *Tab.* V. *of Birds*, N° 55.

This bird has been called *leucorodias* and *albardeola*, and by ſome very improperly the *pelecanus*. In the Linnæan ſyſtem, it belongs to the genus *platalea*, of the order of *grallæ*: the characters of which are, that the bill is flatted, widening towards the end, circular and flat; the feet are ſemipalmated, and have four toes. Of this genus Linnæus enumerates three ſpecies, one of which is the *platalea leucorodias*, or *ſpoon-bill*. The whole bill of this bird is of a fine ſhining black, except a bright orange-coloured ſpot juſt above the point of the upper mandible, which is a little bent downward at its extremity: at the angles of the bill, on each cheek, there is alſo a ſpot of the ſame colour; the upper ſurface of the bill is elegantly waved with dotted protuberances; a depreſſed line, extending from the noſtrils, is continued round it near its edge; its ſubſtance appears like whalebone, being thin, light, and elaſtic; the tongue is ſhort, and heart-ſhaped, and when drawn back, ſerves as a valve to cloſe the entrance of the throat; when pulled forward, it has the appearance of a triangular button; the ears are large, and placed an inch behind the angles of the mouth; the plumage of the whole body, wings, and tail is white; on the back part of the head is a beautiful creſt of white feathers, hanging behind the neck; the legs are black, and alſo the thighs, which are naked about half their length; and the toes are connected by a ſmall web, extending to the firſt joint on each.

This bird breeds on high trees, feeds on fiſh and water-plants, and can ſwim: it inhabits the continent of Europe, South America, and the Philippine iſlands.

A flock of theſe birds migrated into the marſhes near Yarmouth in Norfolk in April, 1774. Pennant.

SPOON-*drift*, in *Sea Language*, a ſort of ſhowery ſprinkling of the ſea water, ſwept from the ſurface of the waves in a tempeſt, and flying according to the wind like a vapour.

SPOON-*wort*, in *Botany*. See SCURVY-*graſs*.

SPOONING, or SPOOMING, in the *Sea Language*, was formerly uſed to denote that movement in ſailing, which is now called SCUDDING.

SPORADES, in *Aſtronomy*, a name which the ancients gave to ſuch ſtars as were not included in any conſtellation.

Theſe the moderns more uſually call *informes*, or *extra-conſtellary ſtars*.

Many of the *ſporades* of the ancients have been ſince formed into new conſtellations, e. gr. of thoſe between Leo and Urſa major, Hevelius has formed a conſtellation, called *Leo minor*; of thoſe between *Urſa minor* and *Auriga* the ſame perſon has formed another conſtellation, called *Lynx*; and of thoſe under the tail of Urſa minor, another called *Canis venaticus*, *&c.*

SPORADIC, σποραδικος, formed from σπορας, *diſperſed*, of σπειρω, *I ſtrew*, *&c.* in *Medicine*, an epithet given to ſuch diſeaſes as have ſome ſpecial or particular cauſe, and are diſperſed here and there, affecting only particular conſtitutions, ages, &c.

Sporadic ſtands in oppoſition to EPIDEMIC diſeaſes which are thoſe ariſing from a general cauſe, and that are common to all kinds of perſons, of what complexion and quality ſoever.

SPORTS, in the *Cuſtoms* of Flanders, were in great vogue through Flanders and the Low-Countries, ſome centuries ago. Every city had a ſolemnity of this kind peculiar to itſelf: thus Bruges had that called the *Foreſter*; Valenciennes the *Prince of Pleaſantry*, and the *Prince of the Horſe-comb*; Cambray, the *King of Ribaldry*; and Bouchain, the *Provoſt of Sots*. Liſle, one of the richeſt towns in Flanders, was not behind hand with its neighbours in celebrating *ſports*, by the magnificence and diverſions whereof, to draw together a vaſt concourſe of people from all parts. One of the chief of theſe divertiſements was called *the King of the Spinet, Roy d'Epinette*, which was celebrated with a great deal of pomp and ſhew. See Hiſt. Acad. Inſcript. tom. iv. p. 452, ſeq.

SPORTULA, in *Antiquity*, a dole, or largeſs, either of meat or money, given by princes, or great men, to the people or poor.

The *ſportula* was properly the pannier, or baſket, wherein the meat was brought, or wherewith the poor went to beg it: thence the word was transferred to the meat itſelf, and thence to money ſometimes given in lieu of it. *Sportula* was alſo frequently uſed in oppoſition to *recta cœna*, a formal or plentiful meal; as in Martial.—*Promiſſa eſt nobis* ſportula, *recta data.*

St. Cyprian gives the denomination *ſportulantes fratres*, to ſuch clergymen as then received gifts, or gratuities, for their maintenance.

SPOT, in *Ornithology*, the name of a particular ſpecies of pigeon, called by Moore the *columba maculata*. It is of the ſize of a ſmall common pigeon, and was brought over to England from Holland. This ſpecies has always a *ſpot* upon its head, juſt above its beak, from whence it has its name. The feathers of the tail are always of the ſame colour with this *ſpot*, and the reſt of the body is all white. The *ſpot* and tail are black in ſome, red in others, and yellow in others. They look very beautiful when they ſpread their tails and fly, and are a diſtinct ſpecies, as they always produce young ones of their own marks.

SPOTS, in *Aſtronomy*, dark places obſerved on the diſks, or faces, of the ſun, moon, and planets.

The *ſpots* in the ſun are only viſible through a teleſcope: ſome diſtinguiſh them into MACULÆ, or dark *ſpots*; and FACULÆ, or bright *ſpots*; but there ſeems but little foundation for any ſuch diviſion.

The *ſolar ſpots* have not been long obſerved. They are very changeable as to number, form, &c. and are ſometimes in a multitude, and ſometimes none at all.

Some imagine they may become ſo numerous, as to hide the whole face of the ſun, at leaſt the greateſt part of it; and to this aſcribe what Plutarch tells us, viz. that in the firſt year of the reign of Auguſtus, the ſun's light was ſo faint and obſcure, that one might look ſteadily at it with the naked eye.

To which Kepler adds, that in 1547, the ſun appeared reddiſh, as when viewed through a thick miſt; and hence conjectures, that the *ſpots* in the ſun are a kind of dark ſmoke, or clouds, floating to the ſurface thereof.

Others will have them ſtars, or planets, tranſiting the body of the ſun; but it is much more probable they are opake bodies, in manner of cruſts, formed like the ſcums on the ſurface of liquors.

Dr. Derham from a variety of particulars which he has recited, relating to rhe ſolar *ſpots* (ſee Phil. Tranſ. abr. vol. iv. p. 235, &c.) and their congruity to what we obſerve in our own globe, infers, that they are cauſed by the eruption of ſome new volcano therein, which, at firſt, pouring out a prodigious quantity of ſmoke, and other opake matter, cauſeth the *ſpots*: and as that fuliginous matter decays and ſpends itſelf, and the volcano at laſt becomes more torrid and flaming, ſo the *ſpots* decay and become *umbræ*, and at laſt *faculæ*; which *faculæ* he ſuppoſes to be no other than more flaming lighter parts than any other parts of the ſun.

Dr. Franklin (in his Exper. and Obſerv. p. 266.) ſuggeſts a conjecture, that the parts of the ſun's ſulphur, ſeparated by fire, riſe into the atmoſphere, and there being freed from the immediate action of the fire, they collect into cloudy maſſes, and growing, by degrees, too heavy to be longer ſupported, they deſcend to the ſun, and are burnt over again. Hence, he ſays, the *ſpots* appearing on his face, which are obſerved to diminiſh daily in ſize, their conſuming edges being of particular brightneſs.

For another ſolution of theſe phenomena, ſee MACULÆ.

The lunar ſpots are fixed: and aſtronomers reckon about forty-eight of them on the moon's face; to each whereof they have given names. The twenty-firſt is one of the moſt conſiderable, and is called *Tycho*. See *Nature*, &c. *of the* MOON.

SPOTS, *circular*, in *electricity*. See CIRCULAR *ſpots* and COLOURS.

SPOTS, *planetary*. Aſtronomers find that the planets are not without their *ſpots*. Jupiter, Mars, and Venus, when viewed through a teleſcope, ſhew ſeveral very remarkable ones: and it is by the motion of theſe *ſpots*, that we conclude the rotation of the planets round their axes, in the ſame manner as that of the ſun is deduced from the motion of his maculæ.

SPOTS, *lucid*, in *the heavens*, are little whitiſh *ſpots*, of which there are ſeveral, that appear magnified, and more luminous when ſeen through teleſcopes; and yet without any ſtars in them. One of theſe is in Andromeda's girdle, and was firſt obſerved, A. D. 1712, by Simon

Marius: it has ſome whitiſh rays near its middle, is liable to ſeveral changes, and is ſometimes inviſible. Another is near the ecliptic, between the head and bow of Sagittarius; it is ſmall, but very luminous. A third is in the back of the Centaur, which is too far ſouth to be ſeen in Britain. A fourth, of a ſmaller ſize, is before Antinous's right foot, having a ſtar in it, which makes it appear more bright. A fifth is in the conſtellation of Hercules, between the ſtars ζ and η, which *ſpot*, though ſmall, is viſible by the bare eye, if the ſky be clear and the moon abſent.

SPOUT, or *water*-SPOUT, in *Natural Hiſtory*, an extraordinary meteor, or appearance, at ſea, and ſometimes at land, very dangerous to ſhips, &c. ofteneſt obſerved in hot, dry weather; and called by the Latins *typho*, and *ſipho*; by the French, *trompe*, &c.

Its firſt appearance is in form of a deep cloud, the upper part whereof is white, and the lower black. From the lower part of this cloud there hangs, or rather falls down, what we properly call the *ſpout*, in manner of a conical tube, biggeſt at top. Under this tube is always a great boiling and flying up of the water of the ſea, as in a jet d'eau. For ſome yards above the ſurface of the ſea, the water ſtands as a column, or pillar; from the extremity whereof it ſpreads, and goes off, as in a kind of ſmoke. Frequently the cone deſcends ſo low, as to touch the middle of this column, and continue for ſome time contiguous to it; though ſometimes it only points to it, at ſome diſtance, either in a perpendicular, or in an oblique line. See *Tab. Nat. Hiſt. fig.* 15.

Frequently it is ſcarce diſtinguiſhable, whether the cone or the column appear the firſt, both appearing all of a ſudden againſt each other. But ſometimes the water boils up from the ſea to a great height, without any appearance of a *ſpout* pointing to it, either perpendicularly or obliquely. Indeed, generally, the boiling or flying up of the water has the priority, this always preceding its being formed into a column. Generally the cone does not appear hollow till towards the end, when the ſea-water is violently thrown up along its middle, as ſmoke up a chimney: ſoon after this the *ſpout*, or canal, breaks and diſappears; the boiling up of the water, and even the pillar, continuing to the laſt, and for ſome time afterwards; ſometimes till the *ſpout* form itſelf again, and appear anew; which it ſometimes does ſeveral times in a quarter of an hour. See a deſcription of ſeveral *water-ſpouts* by Mr. Gordon, and by Dr. Stuart, in Phil. Tranſ. abr. vol. iv. p. 103, &c.

M. de la Pryme, from a near obſervation of two or three *ſpouts* in Yorkſhire, deſcribed in the Philoſophical Tranſactions, N° 281, or Abr. vol. iv. p. 106, concludes, that the *water-ſpout* is nothing but a gyration of clouds by contrary winds meeting in a point, or centre; and there, where the greateſt condenſation and gravitation are, falling down into a pipe, or great tube, ſomewhat like Archimedes's ſpiral ſcrew; and, in its working and whirling motion, abſorbing and raiſing the water, in the ſame manner as the ſpiral ſcrew does; and thus deſtroying ſhips, &c.

Thus, June the 21ſt, he obſerved the clouds mightily agitated above, and driven together; upon which they became very black, and were hurried round; whence proceeded a moſt audible whirling noiſe, like that ordinarily heard in a mill. Soon after there iſſued a long tube, or *ſpout*, from the centre of the congregated clouds, wherein he obſerved a ſpiral motion, like that of a ſcrew, by which the water was raiſed up.

Again, Auguſt 15, 1687, the wind blowing at the ſame time out of the ſeveral quarters, created a great vortex and whirling among the clouds; the centre whereof every now and then dropt down, in ſhape of a long, thin, black pipe, wherein he could diſtinctly behold a motion like that of a ſcrew, continually drawing upwards, and ſcrewing up, as it were, wherever it touched. In its progreſs it moved ſlowly over a grove of trees, which bent under it like wands, in a circular motion. Proceeding, it tore off the thatch from a barn, bent an huge oak-tree, broke one of its greateſt branches, and threw it to a great diſtance. He adds, that whereas it is commonly ſaid, the water works and riſes in a column, before the tube comes to touch it, this is, doubtleſs, a miſtake, owing to the fineneſs and tranſparency of the tubes, which do moſt certainly touch the ſurface of the ſea, before any conſiderable motion can be raiſed therein; but which do not become opake and viſible, till after they have imbibed a conſiderable quantity of water.

The diſſolution of *water-ſpouts*, he aſcribes to the great quantity of water they have glutted; which, by its weight, impeding their motion, whereon their force, and even exiſtence, depends, they break, and let go their contents; which generally prove fatal to whatever is found underneath.

A notable inſtance hereof we have in the Philoſophical Tranſactions (N° 363, or Abr. vol. iv. p. 108.), related by Dr. Richardſon. A *ſpout*, in 1718, breaking on Emmotmoor, nigh Coln, in Lancaſhire, the country was immediately overflowed; a brook, in a few minutes roſe ſix feet perpendicularly high; and the ground whereon the *ſpout* fell, which was ſixty-ſix feet over, was torn up to the very rock, which was no leſs than ſeven feet deep; and a deep gulf was made for above half a mile; the earth being raiſed on either ſide in vaſt heaps. See a deſcription and figure of a *water-ſpout*, with an attempt to account for it in Franklin's Exp. and Obſ. p. 226, &c. Signior Beccaria has taken pains to ſhow that *water-ſpouts* have an electrical origin. To make this more evident, he firſt deſcribes the circumſtances attending their appearance, which are the following.

They generally appear in calm weather. The ſea ſeems to boil, and ſend up a ſmoke under them, riſing in a hill towards the *ſpout*. At the ſame time, perſons who have been near them have heard a rumbling noiſe. The form of a *water-ſpout* is that of a ſpeaking-trumpet, the wider end being in the clouds, and the narrower end towards the ſea. The ſize is various, even in the ſame *ſpout*. The colour is ſometimes inclining to white, and ſometimes to black. Their poſition is ſometimes perpendicular to the ſea, ſometimes oblique; and ſometimes the *ſpout* itſelf is in the form of a curve. Their continuance is very various, ſome diſappearing as ſoon as formed, and ſome continuing a conſiderable time. One that he had heard of continued a whole hour. But they often vaniſh, and preſently appear again in the ſame place.

The very ſame things that *water-ſpouts* are at ſea are ſome kinds of whirlwinds and hurricanes by land. They have been known to tear up trees, to throw down buildings, make caverns in the earth; and, in all theſe caſes, to ſcatter earth, bricks, ſtones, timber, &c. to a great diſtance in every direction. Great quantities of water have been left, or raiſed by them, ſo as to make a kind of deluge; and they have always been attended with a prodigious rumbling noiſe.

That theſe phenomena depend upon electricity cannot but appear very probable from the nature of ſeveral of them; but the conjecture is made more probable from the following additional circumſtances. They generally appear in months peculiarly ſubject to thunder-ſtorms, and are commonly preceded, accompanied, or followed by lightning, rain, or hail; the previous ſtate of the air being ſimilar. Whitiſh or yellowiſh flaſhes of light have ſometimes been ſeen moving with prodigious ſwiftneſs about them. And, laſtly, the manner in which they terminate exactly reſembles what might be expected from the prolongation of one of the uniform protuberances of electrified clouds, mentioned before, towards the ſea; the water and the cloud mutually attracting one another: for they ſuddenly contract themſelves, and diſperſe almoſt at once; the cloud riſing, and the water of the ſea under it falling to its level. But the moſt remarkable circumſtance, and the moſt favourable to the ſuppoſition of their depending upon electricity is, that they have been diſperſed by preſenting to them ſharp-pointed knives or ſwords. This, at leaſt, is the conſtant practice of mariners, in many parts of the world where theſe *water-ſpouts* abound; and he was aſſured by ſeveral of them, that the method has often been undoubtedly effectual.

The analogy between the phenomena of *water-ſpouts* and electricity, he ſays, may be made viſible, by hanging a drop of water to a wire communicating with the prime conductor, and placing a veſſel of water under it. In theſe circumſtances, the drop aſſumes all the various appearances of a *water-ſpout*, both in its riſe, form, and manner of diſappearing. Nothing is wanting but the ſmoke, which may require a great force of electricity to come viſible.

Mr. Wilcke alſo conſiders the *water-ſpout* as a kind of great electrical cone, raiſed between the cloud ſtrongly electrified, and the ſea or the earth, and he relates a very remarkable appearance which occurred to himſelf, and which ſtrongly confirms his ſuppoſition. On the 20th of July, 1758, at three o'clock in the afternoon, he obſerved a great quantity of duſt riſing from the ground, and covering a field, and part of the town in which he then was. There was no wind, and the duſt moved gently towards the eaſt, where appeared a great black cloud, which, when it was near his zenith, electrified his apparatus poſitively, and to as great a degree as ever he had obſerved it to be done by natural electricity. This cloud paſſed his zenith, and went gradually towards the weſt, the duſt then following it, and continuing to riſe higher and higher till it compoſed a thick pillar, in the form of a ſugar-loaf, and at length ſeemed to be in contact with the cloud. At ſome diſtance from this, there came, in the ſame path, another great cloud, together with a long ſtream of ſmaller clouds, moving faſter than the preceding. Theſe clouds electrified his apparatus negatively, and when they came near the poſitive cloud, a flaſh of lightning was ſeen to dart through the cloud of duſt, the poſitive cloud, the large negative cloud, and as far as the eye could diſtinguiſh, the whole train of ſmaller negative clouds which followed it. Upon this, the negative clouds ſpread very much, and diſſolved in rain, and the air was preſently clear of all the duſt. The whole appearance laſted not above half an hour. See Prieſtley's Electr. vol. i. p. 438, &c.

This theory of *water-ſpouts* has been farther confirmed by the account which Mr. Forſter gives of one of them, in his Voyage round the World, vol. i. p. 191. &c. On the coaſt of New Zealand, he had an opportunity of obſerving ſeveral, one of which he has particularly deſcribed. The water, he ſays, in a ſpace of fifty or ſixty fathoms, moved towards the centre, and there riſing into vapour, by the force of the whirling motion, aſcended in a ſpiral form towards the clouds. Directly over the whirlpool, or agitated ſpot in the ſea, a cloud gradually tapered into a long ſlender tube, which ſeemed to deſcend to meet the riſing ſpiral, and ſoon united with it into a ſtraight column of a cylindrical form. The water was hurled upwards with the greateſt violence in a ſpiral, and appeared to leave a hollow ſpace in the centre; ſo that the water ſeemed to form a hollow tube, inſtead of a ſolid column; and that this was the caſe, was rendered ſtill more probable by the colour, which was exactly like that of any hollow glaſs tube. After ſome time, this laſt column was incurvated, and broke like the others; and the appearance of a flaſh of lightning which attended its disjunction, as well as the hail-ſtones which fell at the time, ſeemed plainly to indicate, that *water-ſpouts* either owe their formation to the electric matter, or, at leaſt, that they have ſome connection with it.

In Pliny's time, the ſeamen uſed to pour vinegar into the ſea, to aſſwage and lay the *ſpout*, when it approached them: our modern ſeamen think to keep it off, by making a noiſe with filing and ſcratching violently on the deck; or by diſcharging great guns to diſperſe it.

SPOUTING *fountain*. See FOUNTAIN.

SPRAIN. See STRAIN.

SPRAINTS, among *Sportſmen*, a term uſed for the dung of the otter.

SPRAT, in *Ichthyology*, a ſpecies of the CLUPEA, with the lower jaw the longeſt, and the belly very acute, and the dorſal fin conſiſting of thirteen rays.

The *ſprat*, or *clupea ſprattus* of Linnæus, has generally, but erroneouſly, been ſuppoſed a herring not grown to its full ſize; its uſual length is about four or five inches, and the body much deeper than that of a young herring of equal length; the back fin is placed more remote from the noſe than that of the herring: but one great diſtinction between this fiſh, the herring, and the pilchard is the belly; that of the two firſt being quite ſmooth, that of the laſt very ſtrongly ſerrated; and another is, that the herring has fifty-ſix vertebræ, this only forty-eight. Beſides, *ſprats* viſit our coaſts, and continue with us in large ſhoals, when the others, in general, have retired to the great northern deeps. They come into the river Thames, below bridge, in the beginning of November, and leave it in March, and are, during their ſeaſon, a great relief to the poor of the capital. At Graveſend and at Yarmouth they are cured like red herrings; they are ſometimes pickled, and are little inferior in flavour to the anchovy, but the bones will not diſſolve like thoſe of the latter. Pennant.

SPRAY, in *Sea Language*, denotes the ſprinkling of the ſea, which is driven from the top of a wave in ſtormy weather. It differs from SPOON-*drift*, as being only blown occaſionally from the broken ſurface of a high wave, whereas the latter continues to fly horizontally along the ſea, without intermiſſion, during the exceſs of a tempeſt or hurricane. Falconer.

SPRING, *fons*, in *Natural Hiſtory*, a fountain, or ſource of water, riſing out of the ground.

The origin of *ſprings* or fountains, is a thing much controverted among our late naturaliſts. Meſſ. Mariotte and Perrault aſcribe them to rain: their doctrine is, that the rain-water penetrates the earth till ſuch time as it meets a clayey ſoil, or ſtratum; which proving a ſufficient ſolid bottom to ſuſtain and ſtop its deſcent, it glides along it that way to which the earth declines, till meeting with a place, or aperture, on the ſurface, through which it may eſcape, it forms the head of a river.

Now, that the rain is ſufficient for this effect, appears hence; that, upon calculating the quantity of rain and ſnow which falls yearly on the tract of ground that is to furniſh, for inſtance, the water of the Seine, it is found that river does not take up above one-ſixth part of it.

Springs ordinarily ariſe at the bottom of mountains: the reaſon, ſay they, is, that mountains collect the moſt waters, and give them the greateſt deſcent the ſame way; and that, if we ſometimes ſee *ſprings* on high grounds, and even on the tops of mountains, they muſt be brought from other remoter places, conſiderably higher, along beds of clay, or clayey ground, as in their natural channels. If, then, there happen to be a valley between a mountain on whoſe top is a *ſpring*, and the mountain that is to furniſh it with water, the *ſpring* muſt be looked on as water conducted from a reſervoir of a certain height, through a ſubterraneous channel, to make a jet of an equal, or ſomewhat leſs, height.

This theory M. de la Hire has taken under examination, in its moſt eſſential article, and that where the authors ſeem to have been the leaſt diſtruſtful. He has endeavoured to find, by experiment, whether rain or ſnow-water could penetrate the earth as low as the clayey ſtratum: the reſult of his inquiry is, that they do not penetrate even ſixteen inches deep, in a quantity ſufficient to form the ſmalleſt collection of water on a ſolid bottom. Nay, this he found when the earth he made his experiment on, was quite naked of all herbs and plants; but as ſoon as ever any of theſe came up, and were grown to any bulk, ſo far was the rain that fell from being able to gather itſelf at the depth of ſixteen inches, that it was not ſufficient even to feed the plants, but there was a neceſſity for watering them. For the quantity of water expended in the ordinary ſort of plants, ſee *Food of* PLANTS.

Dr. Halley refers the origin of *ſprings* merely to vapours raiſed by the heat of the ſun, or of ſubterraneous fires, from the ſea, lakes, rivers, &c.

Now, to ſhew that vapour is a ſufficient fund to ſupply all our *ſprings*, rivers, &c. the ſame excellent author makes an eſtimate of the quantity of vapour raiſed from the ſea, by the action of the ſun: for the reſult of which, ſee EVAPORATION.

Yet the quantity of water thus raiſed, great as it is, is only the remains of what is raiſed another way; viz. by the winds, which ſometimes ſweep the water off much faſter than the ſun takes it up.

To find, now, the quantity of water the Mediterranean receives, allow the moſt conſiderable rivers it receives; viz. the Iberus, Rhone, Tyber, Po, Danube, Neiſter, Boriſthenes, Tanais, and the Nile; each to furniſh ten times as much water as the Thames; not that any of them are in reality ſo great, but ſo to allow for the leſſer rivulets; but the Thames is found, by calculation, to evacuate 20,300,000 tuns of water daily. All the nine rivers above mentioned, therefore, will only evacuate 1827 millions of tuns in a day; which is little more than a third of what is raiſed in that time in vapour. Phil. Tranſ. Nº 189. or Abr. vol. ii. p. 110.

The prodigious quantity of water remaining, Dr. Halley allows to rains, which fall again into the ſeas, and for the purpoſes of vegetation, &c. As to the manner in which this water is collected, ſo as to form reſervoirs for the different kinds of *ſprings*, it ſeems to be this: the tops of mountains, in general, abound with cavities and ſubterraneous caverns, formed by nature to ſerve as reſervoirs; and their pointed ſummits, which ſeem to pierce the clouds, ſtop thoſe vapours which fluctuate in the atmoſphere, and being condenſed thereby, they precipitate in water, and by their gravity eaſily penetrate through beds of ſand and lighter earth, till they are ſtopped in their deſcent by more denſe ſtrata, as beds of clay, ſtone, &c. where they form a baſon or cavern, and work a paſſage horizontally, and iſſue out at the ſides of the mountains. Many of theſe *ſprings* diſcharge water, which running down between the ridges of hills, unite their ſtreams, and form rivulets or brooks; and many of theſe uniting again on the plain, become a RIVER.

After all that can be ſaid in favour both of rain and vapour, it muſt be owned, they are both ſtill incumbered with great difficulties.

The perpetuity of divers ſprings, always yielding the ſame quantity of water, when the leaſt rain or vapour is afforded as well as the greateſt, is a ſtrong objection to both. Dr. Derham mentions one in his own pariſh of Upminſter, which he could never perceive by his eye to be diminiſhed in the greateſt droughts, even when all the ponds in the country, as well as an adjoining brook, had been dry for ſeveral months together; nor ever to be increaſed in the moſt rainy ſeaſons, excepting perhaps for a few hours, or at moſt for a day, from ſudden and violent rains. Had this *ſpring* its origin from rain or vapour, there would be found an increaſe and decreaſe of its water correſponding to thoſe of its cauſes; as we actually find in ſuch temporary *ſprings* as have undoubtedly their riſe from rain and vapour: add to this, another conſiderable thing in this Upminſter *ſpring*, and thouſands of others; viz. that it breaks out of ſo inconſiderable an hillock, or eminence, as can have no more influence in the condenſation of the vapours, or ſtopping the clouds, than the lower lands about it have. The very higheſt ground in the country he finds is not above a hundred and thirty-three yards above the level of the ſea; and what is ſuch an inconſiderable riſe of land, to perennial condenſation of vapours, fit to afford ſo conſiderable a *ſpring?* or the high lands of the whole country, to the maintaining all its fountains and rivulets?

Other naturaliſts, therefore, have recourſe to the ſea, and derive the original of *ſprings* immediately thence; but how the ſea-water ſhould be raiſed up to the ſurface of our earth, and even to the tops of the mountains, is a difficulty, in the ſolution of which they cannot agree. Some fancy a kind of hollow ſubterranean rocks to receive the watery vapours raiſed from channels communicating with the ſea, by means of an internal fire, and to act the part of alembics, in freeing them from their ſaline particles, as well as condenſing and converting them into water. This kind of ſubterranean laboratory, ſerving for the diſtillation of ſea-water, was the invention of Des Cartes. Princip. part iv. § 64. Others, as M. de la Hire (Mem. de l'Acad. an. 1703.) &c. ſet aſide the neceſſity of alembics, and think it enough that there be large ſubterranean reſervoirs of water at the height of the ſea, whence the warmth of the bottom of the earth, or even the central fire (if there be ſuch a thing), may raiſe vapours; which, pervading not only the intervals and fiſſures of the ſtrata, but the bodies of the ſtrata themſelves, at length arrive near the ſurface; where, being condenſed by the cold, they glide along on the firſt bed of clay they meet withal, until an aperture in the ground lets them out. M. de la Hire adds, that the ſalts of ſtones and minerals may contribute to the detaining and fixing the vapours, and converting them into water. But we have a ſtill more natural and eaſy way of exhibiting the riſe of the ſea-water up into mountains, &c. by putting a little heap of ſand, aſhes, a loaf of bread, or the like, into a baſon of water; in which caſe the ſand, &c. will repreſent the dry land, or an iſland; and the baſon of water the ſea about it. Here the water in the baſon will riſe to or near the top of the heap, in the ſame manner, and from the ſame principle, as the waters of the ſea, lakes, &c. riſe in the hills The principle of aſcent in both is accordingly ſuppoſed to be the ſame with that of the aſcent of liquids in capillary tubes, or between contiguous planes, or in a tube filled with aſhes; all which are now generally accounted for from the doctrine of attraction. See River.

Againſt this laſt theory, M. Perrault and others have urged ſeveral unanſwerable objections. It ſuppoſes a variety of ſubterranean paſſages and caverns, communicating with the ſea, and a complicated apparatus of alembics, heat and cold, &c. of the exiſtence of which we have no ſufficient proof. Beſides, the water that is ſuppoſed to aſcend from the depths of the ſea, or from ſubterranean canals proceeding from it, through the porous parts of the earth, as it riſes in capillary tubes, aſcends to no great height, and in much too ſmall a quantity to furniſh *ſprings* with water, as M. Perrault has ſufficiently ſhewn. And though the ſand and earth through which the water aſcends may acquire ſome ſaline particles from it, they are nevertheleſs incapable of rendering it ſo freſh as the water of our fountains is generally found to be. Not to add, that in proceſs of time the ſaline particles of which the water is deprived, either by ſubterranean diſtillation or filtration, muſt clog and obſtruct thoſe canals and alembics, by which it is ſuppoſed to be conveyed to our *ſprings*, and the ſea muſt likewiſe gradually loſe a conſiderable quantity of its ſalt.

Springs, *different ſorts of*. *Springs* are either ſuch as run continually, called *perennial*; or ſuch as run only for a time, and at certain ſeaſons of the year, and therefore called *temporary ſprings*. Others, again, are called *intermitting ſprings*, becauſe they flow and then ſtop, and flow and ſtop again; and *reciprocating ſprings*, whoſe waters riſe and fall, or flow and ebb, by regular intervals. In order to account for theſe differences in *ſprings*, let ABCDE (*Tab.* VI. *Hydroſtatics*, *fig.* 70.) repreſent the declivity of a hill, along which the rain deſcends; paſſing through the fiſſures or channels BF, CG, DH, and LK, into the cavity or reſervoir FGHKMI; from this cavity let there be a narrow drain or duct KE, which diſcharges the water at E. As the capacity of the reſervoir is ſuppoſed to be large in proportion to that of the drain, it will furniſh a conſtant ſupply of water to the ſpring at E. But if the reſervoir FGHKMI be ſmall, and the drain large, the water contained in the former, unleſs it is ſupplied by rain, will be wholly diſcharged by the latter, and the *ſpring* will become dry; and ſo it will continue, even though it rains, till the water has had time to penetrate through the earth, or to paſs through the channels into the reſervoir; and the time neceſſary for furniſhing a new ſupply to the drain KE, will depend on the ſize of the fiſſure, the nature of the ſoil, and the depth of the cavity with which it communicates. Hence it may happen, that the *ſpring* at E may remain dry for a conſiderable time, and even whilſt it rains; but when the water has found its way into the cavity of the hill, the *ſpring* will begin to run. *Springs* of this kind, it is evident, may be dry in wet weather, eſpecially if the duct KE is not exactly level with the bottom of the cavity in the hill, and diſcharge water in dry weather; and the intermiſſion of the *ſpring* may continue for ſeveral days. But if we ſuppoſe XOP to repreſent another cavity ſupplied with water by the channel NO, as well as by fiſſures and clefts in the rock, and by the draining of the adjacent earth; and another channel STV, communicating with the bottom of it at S, aſcending to T, and terminating on the ſurface at V, in the form of a siphon; this diſpoſition of the internal cavities of the earth, which we may reaſonably ſuppoſe that nature has formed in a variety of places, will ſerve to explain the principle of *reciprocating ſprings*. For it is plain, that the cavity XOP muſt be ſupplied with water to the height QPT, before it can paſs over the bend of the channel at T, and then it will flow through the longer leg of the ſiphon TV, and be diſcharged at the end V, which is lower than S. Now if the channel STV be conſiderably larger than NO, by which the water is principally conveyed into the reſervoir XOP, the reſervoir will be emptied of its water by the ſiphon, and when the water deſcends below its orifice S, the air will drive the remaining water out of the crooked channel STV and the *ſpring* will ceaſe to flow. But in time the water in the reſervoir will again riſe to the height QPT, and be diſcharged at V as before. It is eaſy to conceive, that the diameters of the channels NO and STV may be ſo proportioned to one another, as to afford an intermiſſion and renewal of the *ſpring* V at regular intervals. Thus, if NO communicates with a well ſupplied by the tide, during the time of flow, the quantity of water conveyed by it into the cavity XOP, may be ſufficient to fill it up to QPT; and STV may be of ſuch a ſize as to empty it, during the time of ebb. It is eaſy to apply this reaſoning to more complicated caſes, where ſeveral reſervoirs and ſiphons, communicating with each other, may ſupply *ſprings*, with circumſtances of greater variety. See Muſchenbroek's Introd. ad Phil. Nat. tom. ii. p. 1010. Deſag. Ex. Phil. vol. ii. p. 173, &c.

We ſhall here obſerve, that Deſaguliers calls thoſe *reciprocating ſprings* which flow conſtantly, but with a ſtream ſubject to increaſe and decreaſe, and thus he diſtinguiſhes them from *intermitting ſprings*, which flow or ſtop alternately.

It is ſaid that in the dioceſe of Paderborn, in Weſtphalia, there is a *ſpring* which diſappears twice in twenty-four hours, and always returns at the end of ſix hours with a great noiſe, and with ſo much force, as to turn three mills not far from its ſource. It is called the *bolderborn*, or boiſterous ſpring. Phil. Tranſ. Nº 7. p. 127.

There are many *ſprings* of an extraordinary nature in our own country, which it is needleſs to recite, as they are explicable by the general principles already illuſtrated.

Springs, *burning*, or *boiling*. The *burning-ſpring* near Grenoble, in Dauphiné, is famous. St. Auguſtin ſpeaks of it as extinguſhing lamps which are lighted, and lighting thoſe which are extinct. But it is now cold like others; only near it is a ſpot of ground, which ſtill emits a light flame; over which ſome imagine it might anciently have paſſed. Auguſt. de Civ. Dei, lib xxi. cap. 7, & 11. Mem. Acad. Inſcript. tom. ix. p. 565. Mem. Acad. Scien. an. 1699. p. 26.

At Boſely, near Wenlock, in Shropſhire, there is a famous boiling well, which was diſcovered in June 1711, by an uncommon noiſe in the night, ſo great, that it awakened ſeveral people, who being deſirous to find what it was owing to, at length found a boggy place under a little hill, not far from the Severn; and perceiving a great ſhaking of the earth, and a little boiling up of water through the graſs, they took a ſpade, and digging up ſome part of the earth, the water flew to a great height, and was ſet on fire by a candle. This water was for ſome time afterwards conſtantly found to take fire, and burn like ſpirit of wine; and after it was ſet on fire, it would boil the water in a veſſel ſooner than any artificial fire, and yet the *ſpring* itſelf was as cold as any whatever. Phil. Tranſ. Nº 334.

This well was at length loſt for many years, and not recovered till May, 1746, when, by a rumbling noiſe under ground, like to what the former well made, it was hit upon again, though in a lower ſituation, and thirty yards nearer the river.

The well is four or five feet deep, and ſix or ſeven wide; within that is another leſs hole of like depth, dug in the clay, in the bottom whereof is placed a cylindric earthen veſſel, of about four or five inches diameter at the mouth, having the bottom taken off, and the ſides well fixed in the clay, rammed cloſe about it. Within the pot is a brown water, thick as puddle, continually forced up by a violent motion, beyond that of boiling water, and a rumbling hollow noiſe, riſing and falling by fits five or ſix inches. It may be fired by a candle at a quarter of a yard diſtance; and it darts and flaſhes in a violent manner, about half a yard high. It has been left burning forty-eight hours, without any ſenſible diminution. It may be extinguiſhed by putting a wet mop upon it, which muſt be kept there a ſmall time. On the removal of the mop there ſucceeds a ſulphureous ſmoke, laſting about a minute, and yet the water is very cold to the touch. Phil. Tranſ. N° 482. ſect. 6.

Spring, *lancarim*. See Lancarim.

Springs, *medicinal*. See Water.

Spring, *Ver*, in *Coſmography*, denotes one of the ſeaſons of the year; commencing, in the northern parts of the world, on the day the ſun enters the firſt degree of Aries, which is about the twenty-firſt day of March, and ending when the ſun leaves Gemini.

Or, more ſtrictly and generally, the *ſpring* begins on the day when the diſtance of the ſun's meridian altitude from the zenith, being on the increaſing hand, is at a medium between the greateſt and leaſt. The end of the *ſpring* coincides with the beginning of ſummer.

Spring, *elater*, in *Phyſics*, denotes a natural faculty, or endeavour, of certain bodies, to return to their firſt ſtate, after having been violently put out of the ſame by compreſſing, bending them, or the like.

This faculty philoſophers uſually call *elaſtic force*, or Elasticity.

Fleas only jump to thoſe exceſſive heights, by means of a *ſpringy* membrane, eaſily viſible by a microſcope; and whereof we have a curious figure in Dr. Hook's Micrography. By the elaſtic force of this *ſpring* they are enabled to leap two hundred times the height of their own body. See Flea.

Nature has provided for the regular ſowing of the ſeeds of ſeveral kinds of plants, by furniſhing them with a *ſpring*, which is wound ſometimes round the outſide, and ſometimes round the inſide, of the caſe wherein the ſeeds are contained. See Semination.

Spring, in *Mechanics*, is uſed to ſignify a body of any ſhape, perfectly elaſtic.

Spring, *elaſticity of a*. See Elasticity.

Spring, *length of a*, may, according to its etymology, ſignify the length of any elaſtic body, but it is particularly uſed by Dr. Jurin to ſignify the greateſt length to which a *ſpring* can be forced inwards, or drawn outwards, without prejudice to its elaſticity. He obſerves this would be the whole length, were the *ſpring* conſidered as a mathematical line; but in a material *ſpring*, is the difference between the whole length, when the *ſpring* is in its natural ſituation, or the ſituation it will reſt in when not diſturbed by any external force, and the length or ſpace it takes up when wholly compreſſed and cloſed, or when drawn out.

Spring, *ſtrength*, or *force of a*, is uſed for the leaſt force or weight, which, when the *ſpring* is wholly compreſſed or cloſed, will reſtrain it from unbending itſelf. Hence alſo the force of a *ſpring* bent, or partly cloſed, is uſed for the leaſt force or weight, which, when the *ſpring* is bent through any ſpace leſs than its whole length, will confine it to the ſtate it is then in, without ſuffering it to unbend any farther.

The theory of *ſprings* is founded on this principle, *ut tenſio, ſic vis*; that is, if a *ſpring* be forced or bent inwards, or drawn outwards, or any way removed from its natural ſituation, its reſiſtance is proportional to the ſpace by which it is removed from that ſituation.

This principle was verified by the experiments of Dr. Hook, and ſince him by thoſe of others, particularly by the accurate hand of Mr. George Graham. Lectures De Potentia Reſtitutiva, 1678.

For the better intelligence of this principle, on which the whole theory of *ſprings* depends, ſuppoſe a *ſpring* (*Tab.* VI. *Mechanics*, *fig.* 110.) CL, reſting with the end L againſt any moveable ſupport, but otherwiſe lying in its natural ſituation, and at full liberty; then if this *ſpring* be preſſed inwards by any force *p*, or from C towards L, through the ſpace of one inch, and can be there detained by that force *p*, the reſiſtance of the *ſpring*, and the force *p*, exactly counterbalancing one another; then will the force 2 *p* bend the *ſpring* through the ſpace of two inches, 3 *p* through three inches, 4 *p* through four inches, &c. The ſpace C *l* (*fig.* 111.) through which the *ſpring* is bent, or by which its end C is removed from its natural ſituation, being always proportional to the force which will bend it ſo far, and will detain it ſo bent.

And if one end L be faſtened to an immoveable ſupport, (*fig.* 112.) and the other end C be drawn outwards to *l*, and be there detained from returning back by any force *p*, the ſpace C *l*, through which it is ſo drawn outwards, will be always proportional to the force *p*, which is able to detain it in that ſituation.

And the ſame principle holds in all caſes, where the *ſpring* is of any form whatſoever, and is in any manner whatſoever forcibly removed from its natural ſituation.

It may be here obſerved, that the *ſpring*, or elaſtic force of the air, is a power of a different nature, and governed by different laws from that of a material *ſpring*. For ſuppoſing the line LC (*fig.* 110.) to repreſent a cylindrical volume of air, which by compreſſion is reduced to L *l*, (*fig.* 111.) or by dilatation is extended to L *l*, (*fig.* 112.) its elaſtic force will be reciprocally as L *l*; whereas the force, or reſiſtance of a *ſpring*, will be directly as C *l*.

This principle being premiſed, Dr. Jurin gives us a general theorem concerning the action of a body ſtriking on one end of a *ſpring*, while the other end is ſuppoſed to reſt againſt an immoveable ſupport. And leſt any objection ſhould be formed againſt the poſſibility of an immoveable ſupport, ſince any body, how great ſoever, may be removed out of its place by the leaſt force, he obſerves, that the objection may be eaſily removed. Thus, if the *ſpring* LM (*fig.* 113.) be ſuppoſed continued to N, ſo that LN=LM, if a body M, with any velocity in the direction ML, ſtrikes one end of the *ſpring*, and a body N, at the ſame time, with an equal velocity, and a contrary direction NL, ſtrikes the other end N of the continued *ſpring*, the point L, the end of the firſt ſuppoſed *ſpring*, will be immoveable.

Theorem. If a *ſpring* of the ſtrength P, and the length CL, (*fig.* 114.) lying at full liberty upon an horizontal plane, reſt with one end L againſt an immoveable ſupport; and a body of the weight M, moving with the velocity V, in the direction of the axis of the *ſpring*, ſtrike directly on the other end C, and thereby force the *ſpring* inwards, or bend it through any ſpace CB; and a middle proportional CG be taken between the line CL $\times\frac{M}{P}$, and 2 *a*, *a* being the height to which a heavy body would aſcend in vacuo, with the velocity V; and upon the radius R=CG be erected the quadrant of a circle GFA: then,

1. When the *ſpring* is bent through any right ſine of that quadrant, as CB, the velocity *v* of the body M is to the original velocity V, as the coſine to the radius; that is, $v=V\times\frac{BF}{R}$

2. The time *t* of bending the *ſpring* through the ſame ſine CB, is to T, the time of a heavy body's aſcending in vacuo, with the velocity V, as the correſponding arch to 2 *a*; that is, $t=T\times\frac{GF}{2a}$.

The doctor gives a demonſtration of this theorem, and deduces a great many curious corollaries from it. Theſe he divides into three claſſes. The firſt contains ſuch corollaries as are of more particular uſe when the *ſpring* is wholly cloſed, before the motion of the body ceaſes.

The ſecond comprehends thoſe relating to the caſe, when the motion of the body ceaſes before the *ſpring* is wholly cloſed. And

The third, in caſe the motion of the body ceaſes at the inſtant that the *ſpring* is wholly cloſed.

We ſhall mention ſome of the laſt claſs, as the moſt ſimple; having firſt premiſed, that P = ſtrength of the *ſpring*, L = its length, V = the initial velocity of the body cloſing the *ſpring*, M = its maſs, *t* = time ſpent by the body in cloſing the *ſpring*, A = height from which a heavy body will fall in vacuo in a ſecond of time, *a* = the height to which a body would aſcend in vacuo with the velocity V, C = the velocity gained by the fall, *m* = the circumſtance of a circle, whoſe diameter is 1. Then,

1. If the motion of the body ſtriking the *ſpring* ceaſe, when it is wholly cloſed, the initial velocity V is equal to $C\sqrt{\frac{PL}{2MA}}$.

2. The initial velocity V is proportional to $\sqrt{\frac{PL}{M}}$.

3. If PL be given, either in the ſame or in different *ſprings*, the initial velocity V is reciprocally as $\sqrt{M}$.

4. The product of the initial velocity, and the time ſpent in cloſing the *ſpring*, or $V\,t$ is equal to $1'' \times \frac{mCL}{4A}$; and is proportional to L, the length of the *ſpring*.

5. The initial quantity of motion, or MV, is equal to $C\sqrt{\frac{PLM}{2A}}$.

6. M V is proportional to $\sqrt{PLM}$, or to $P\,t$. And if PL be given, either in the ſame or different *ſprings*, MV is as $\sqrt{M}$.

7. If $\frac{P}{L}$ be given, either in the ſame or in different *ſprings*, the initial quantity of motion is as the length of the *ſpring* into the time of bending it.

8. If a quantity of motion MV bend a *ſpring* through its whole length, and be conſumed thereby, no other quantity of motion equal to the former, as $nM \times \frac{V}{n}$, will cloſe the ſame *ſpring*, and be wholly conſumed thereby.

9. But a quantity of motion, leſs or greater than MV, in any given ratio, may cloſe the ſame *ſpring*, and be wholly conſumed in cloſing it; and the time ſpent in cloſing the *ſpring* will be reſpectively leſs or greater, in the ſame given ratio.

10. The initial *vis viva*, or MV^2, is equal to $\frac{C^2PL}{2A}$; and $2aM = PL$.

11. The initial *vis viva* is as the rectangle under the ſtrength and length of the *ſpring*; that is, M V V is as P L.

12. If $\frac{P}{L}$ be given, the initial *vis viva* is as P^2, or as L^2.

13. If the *vis viva* MV^2 bend a *ſpring* through its whole length; and be conſumed in cloſing it; any other *vis viva*, equal to the former, as $nnM \times \frac{V^2}{nn}$, will cloſe the ſame *ſpring*, and be conſumed thereby.

14. But the time of cloſing the *ſpring* by this *vis viva* $nnM \times \frac{V^2}{nn}$ will be to the time of cloſing it by the *vis viva* MV^2, as *n* to 1.

15. If the *vis viva* MV^2 be wholly conſumed in cloſing a *ſpring* of the ſtrength P, and length L; then the *vis viva* $nnMV^2$ will be ſufficient to cloſe, 1. Either a *ſpring* of the ſtrength *n n* P, and length L. 2. Or a *ſpring* of the ſtrength *n* P, and length *n* L. 3. Or of the ſtrength P, and length *n n* L. 4. Or if *n* be a whole number, the number *n n* of *ſprings*, each of the ſtrength P, and length L, one after another. We may add, that it appears from hence, that the number of ſimilar and equal *ſprings* a given body in motion can wholly cloſe, is always proportional to the ſquares of the velocity of that body. And it is from this principle that the chief argument, to prove the force of a body in motion to be as the ſquare of its velocity, is deduced. See FORCE.

The theorem above mentioned, and its corollaries, will hold equally, if the *ſpring* be ſuppoſed to have been at firſt bent through a certain ſpace, and by unbending itſelf to preſs upon a body at reſt, and thereby to drive that body before it, during the time of its expanſion: only V, inſtead of being the initial velocity with which the body ſtruck the *ſpring*, will now be the final velocity with which the body parts from the *ſpring* when totally expanded.

It is alſo to be obſerved, that the theorem, &c. will hold equally good, if the *ſpring*, inſtead of being preſſed inward, be drawn outwards by the action of the body. The like may be ſaid, if the *ſpring* be ſuppoſed to have been already drawn outwards to a certain length, and in reſtoring itſelf draw the body after it. And laſtly, the theorem extends to a *ſpring* of any form whatever, provided L be the greateſt length it can be extended to from its natural ſituation, and P the force which will confine it to that length. See Phil. Tranſ. N° 472. ſect. 10. or vol. xliii. art. 10.

SPRING is more particularly uſed, in the *Mechanic Arts*, for a piece of tempered ſteel, put into ſeveral machines to give them motion, by the endeavour it makes to unbend itſelf.

In watches it is a fine piece of well-beaten ſteel, coiled up in a cylindrical caſe, or frame; which by ſtretching itſelf forth, puts the wheels, and the whole movement in motion. See FUSEE, and WATCH.

The *ſpring* of a watch is prepared by forming a very thin plate of ſteel into a double ring, bending it round with wire, and putting it into a proper furnace, in order to give it a ſuitable degree of heat. When that is acquired, it is taken out, and dropped into a kettle of oil, or warm mutton ſuet, in conſequence of which proceſs it poſſeſſes a degree of hardneſs, very little inferior to that of glaſs. After this it is reduced or let down, if the ſteel be of a proper kind for the purpoſe, to a fine violet or blue colour; in which ſtate it becomes exceedingly elaſtic, inſomuch that to make it ſtand bent, it muſt be brought into a very acute curve; nor can it eaſily be brought by twiſting horizontally, to alter its form, without endangering its being broken to pieces. But as it afterwards requires to be planiſhed by the hammer, filed and poliſhed, it is again deprived in a conſiderable degree of its elaſticity; and, therefore, when it has received its laſt poliſh, it muſt again be blued upon a braſs plate over a lamp, by which means its former elaſticity is perfectly reſtored. Dr. Hook, in his Micrographia, ſays, that this blue covering is owing to the fine ſulphur, preſſed through the pores by heat, and fixed by the ambient air in a fine vitrified lamina upon the ſurface. See STEEL.

The *ſpring* of a lock, piſtol, or the like, is a piece of ſteel violently bent, which beats back the bolt, or ſtrikes down the cock, when ſet at liberty.

SPRING-*arbor*, in a *Watch*, that part in the middle of the *ſpring* box, about which the *ſpring* is wound or turned, and to which it is hooked at one end.

SPRING-*box*, in a *Watch*, the cylindrical caſe, or frame, that contains within it the *ſpring* of the watch.

SPRING-*compaſſes*. See COMPASSES.

SPRING *of the air*, or its elaſtic force. See AIR and ELASTICITY.

SPRING, in a *Ship*, is a rope paſſed out of one extremity of a ſhip, and attached to a cable proceeding from the other, when ſhe lies at anchor. It is uſually performed to bring the ſhip's broadſide, or battery of cannon, to bear upon ſome diſtant object; as another ſhip, or a fortreſs on the coaſt, &c.

SPRING is likewiſe a rope reaching diagonally from the ſtern of a ſhip to the head of another which lies alongſide or abreaſt of her, at a ſhort diſtance. This is generally performed to make one of the ſhips ſheer off to a greater diſtance from the other; or to make merchantſhips lie uniformly in the ſame tier. *Springs* of this ſort are, therefore, occaſionally applied from a ſhip to a wharf or key, for the ſame purpoſe. Falconer.

To SPRING *a leak*. See LEAK.

To SPRING *the luff*. See LOOF.

SPRING *a maſt*. See MAST.

SPRING-*tide* is the increaſing of a tide after a dead neap; or, the periodical exceſs of the elevation and depreſſion of the TIDE.

SPRINGER, in *Ichthyology*, a name given by authors to the GRAMPUS.

SPRINGES, a ſort of horſehair nooſes, made ſo as to run very eaſy, and planted in the places where birds run in ſome particular path, to take them as they paſs.

Thoſe birds that frequent the waters, or love to paddle and feed in wet and plaſhy places, are the moſt eaſily taken by ſnares.

The ſportſmen who would uſe them to advantage, muſt firſt carefully ſearch out the haunts and places where the fowls come in flocks, or in couples, and feed in the morning and evening hours. The furrows and water-tracks in theſe places are principally to be regarded; and whereever the ſeveral furrows, or water-courſes, meet in one, and afterwards divide into ſeveral others, theſe places are to be remarked above the reſt: the places which have moſt marks of the birds feet, give alſo the ſureſt of all proofs, that they are well frequented. When theſe places are found, there ſhould be placed a number of ſmall and ſhort ſticks croſs-wiſe overthwart all the other paſſages, one ſtick being placed about half an inch from another, and making together a kind of fence, guarding every way, except that one through which it is intended the fowls ſhould paſs. This being done, a good ſtiff ſtick is to be provided, cut flat on each ſide; both ends of this ſtick are to be planted under water, ſo that the upper part of the flat ſide may only be upon a level with the ſurface; then a bow is to be made of a hazel, or willow, in the form of a pear, broad and round at one end, and narrow at the other, and at leaſt a foot long, and five or ſix inches wide; at the narrow end of this there is to be a nick or dent. Then a ſtiff young grown plant of hazel, elm, or withy, is to be choſen, being buſhy and clear, and without knots, three or four inches about at the bottom, and about an inch at the top. Having

ing made the bottom end of this ſharp, at the top of it there muſt be faſtened a very ſtrong loop, made of about a hundred horſe-hairs, platted very faſt together with ſtrong packthread, and made to ſlip any way with great eaſe. This nooſe or loop ſhould be juſt of the dimenſions of the pear-faſhioned hoop before mentioned. Then hard by this loop, and within an inch of the end of the plant, there is to be faſtened with ſtrong horſe-hair a broad and thin trigger, made ſharp at both ends. Then the bigger ſharp end of the plant being made faſt in the ground, juſt by the edge of the water, the ſmaller end, with the loop and the trigger, muſt be brought down juſt to the firſt bridge; and the pear-faſhioned hoop being ſet upon the bridge, one end of the trigger muſt be ſet upon the nick in the hoop, and the other end on the nick made on the ſmall end of the plate, which by the violence and bend of the plant will make them all ſtick together till the hoop be removed. This done, the loop is to be laid upon the hoop in ſuch faſhion as the hoop is proportioned: then from each ſide of the hoop little ſticks are to be pricked, as before directed, making as it were a kind of impaled path-way, widening it all the way as it goes farther from the hoop, and making it ſo conſiderably wide at the end, that any fowl that chances to come that way may be entered a conſiderable way in, before ſhe perceives the fence; by this means the bird will be enticed to go ſtraight on to the *ſpringe*, and as ſoon as ſhe touches it, either with head or feet, ſhe will be certainly caught; and thus if the plant be ſtrong enough, the largeſt bird may be caught as eaſily as the leaſt.

When the ſmaller fowls, that frequent watery places, are to be taken by this engine, it is to be made only a great deal ſlighter. When it is intended for ſnipes, woodcocks, or the like, the main plant may be of willow, hazel, or grown ozier, or any other pliant wood that will eaſily bend, and will recover its ſtraightneſs again. The uſe of this engine is limited to the winter-ſeaſon, and to times when there is much wet upon the ground. If there happen any great froſts, ſo that there is no advantage to be made of the wet places firſt deſcribed, then the ſportſman is to look for ſome place where there is a conſiderable fall, and where the current is not frozen, and in this place the *ſpringes* are to be ſet; and the greater the froſts are in this caſe, the more birds there will be taken.

There is another uſe of *ſpringes* for birds, which is the taking, by means of them, certain birds on the boughs of trees and in hedges, which is often attended with very great ſucceſs. The ſportſman, for this purpoſe, muſt firſt mark ſome tree where the birds very much reſort; then fix on ſome particular branch that is tolerably ſtraight, and cutting off all the twigs to within a foot or two of the top, he is there to bore a hole through the branch with a piercer or wimble, large enough to admit a gooſe-quill. Then another branch is to be pitched upon, at about a foot diſtance from the firſt, and all its boughs are to be pared away up to a certain height. There is to be fixed to this branch a packthread of half a foot long, and at the end of this is to be tied a nooſe of plaited horſehair. The branch to which the packthread is faſtened, is then to be ſtooped ſo far, that the nooſe may be brought through the hole in the other branch, and faſtened there by means of a little ſtick four fingers long, and hooked at the end, juſt fitting the hole, and ſo brought into it, as juſt to ſtop the flying back of the other branch. Then there is to be placed beyond the nooſe ſome bait of a fruit, or inſect, as a cherry, a pear, or a worm, or any other thing which the bird, intended to be taken, is known to be fond of: this is to be ſet in ſuch a manner, that the bird can no way get at it but by ſetting its feet on the ſmall ſtick which ſupports the nooſe, and ſtops the hole. The weight of the bird will throw down the ſtick, and the bird will then be caught by the legs, and tied faſt to the branch where the hole is, by the flying back of the other branch where the packthread is faſtened.

There is yet another method in uſe for the taking many kinds of birds, from the partridge or pheaſant to the blackbird. This is made in the following manner, and is to be placed either on the ground, or on a tree, buſh, or hedge, according to the nature of the bird intended to be taken by it. A ſtraight and even piece of willow, or ſallow, is to be choſen, of about ſix feet long, and of the thickneſs of a walking cane; this is to be ſharpened at one end, and ſtuck down into the ground, and at the other end there is to be faſtened a ſmall crook; then two holes are to be made in the ſtick, the one big enough to admit a gooſe quill, the other ſmaller; and a piece of ſtick is to be choſen, which being bent will ſpring back to its ſtraightneſs again, ſuch as holly, or the like: this ſhould be about three feet long, and the larger end of it is to be fixed in the larger hole of the firſt ſtick; the ſmaller end muſt have faſtened to it a packthread, at the end of which there is a nooſe of horſehair: this is to be brought through the ſmaller hole, and be pegged in ſo ſlightly, as juſt to prevent its flying back of itſelf. Then the *ſpringe* or nooſe is to be ſpread on the peg, and a bait, proper for the bird to be taken, is to be placed at a proper diſtance; ſo that the bird cannot come at it but by treading on the peg, which will give way under its weight, and the ſtick, to which the packthread is faſtened, will fly back, and the bird will be conſequently caught in the nooſe, and have its legs drawn cloſe to the other ſtick.

SPRINGY, or *elaſtic body*. See ELASTIC *Body*.

SPRIT, in *Sea Language*, is a ſmall boom, or pole, which croſſes the ſail of a boat diagonally, from the maſt to the upper hindmoſt corner of the ſail, which it is uſed to extend and elevate: the lower end of the *ſprit* reſts in a ſort of wreath or collar, called the *ſnotter*, which encircles the maſt in that place: ſails of this kind are accordingly called *ſprit*-ſails. See SAIL.

SPROD, among the fiſhermen of many parts of England, a name given to the SALMON while in its ſecond year's growth.

SPRUCE-*beer*, a kind of diet-drink made by infuſion or coction of the leaves and ſmall branches of the black and white *ſpruce*-fir, and reckoned antiſcorbutic. See CHOWDER-*beer*.

SPRUCE-*fir*. See FIR.

SPULLERS *of yarn*, in our *Old Writers*, perſons that work at the *ſpole*, or *wheel*. It alſo denotes triers of yarn, to ſee if it be well ſpun, and fit for the loom.

SPUN-*hay*, in the *Military Art*, hay twiſted in ropes, very hard, for an expedition in the winter time; each trooper carrying as much as he can behind him.

SPUNGE, or SPONGE, *ſpongia*, in *Natural Hiſtory*, a kind of marine ſubſtance, found adhering to rocks, ſhells, &c. under cover of the ſea-water, or on the ſides of the rocks about the ſhore.

The ancients diſtinguiſhed two kinds, *male* and *female*: but the moderns make only one kind; which, however, they diſtinguiſh, with regard to its texture, into *coarſe* and *fine*.

Naturaliſts have been embarraſſed in all ages, whether to range *ſpunge* in the animal, mineral, or vegetable family? Some would have it a concretion formed of the ſea-mud; others have commonly ſuppoſed it to be a vegetable production; but it is now allowed to be, like the CORALLINES, of animal origin; being the fabric and habitation of ſome ſpecies of worm or POLYPE.

Dr. Peyſſonel has actually diſcovered and deſcribed the worms, that form four different ſpecies of *ſpunges*, without having it in their power to dilate and contract them, as ſome naturaliſts have ſuppoſed; the *ſpunges* being altogether inanimate bodies, and inſenſible to the touch, or to any motion of the ſea, or any other accident, and formed by the juice or ſlaver which is depoſited by the worms that inhabit them. Phil. Tranſ. vol. l. art. 78. p. 590, &c.

Mr. Ellis, to whoſe obſervations on productions of this kind the public are much indebted, informs us, that if we carefully examine a ſmall part of one of thoſe *ſpunges*, whoſe ramifications are large and diſtinct, in the microſcope, we ſhall find that they riſe from many ſmall tubes: theſe, as they extend themſelves upwards, ſend outſide branches in various directions, which inoſculate, and, uniting thus with each other, form a compound reticulation quite through the inſide of the whole maſs. In viewing the extremities of the upper or laſt ſhoots, we may perceive ſmall openings at the end of their fibres; and as we trace theſe fibres back from the opening downwards, we ſee a ſoft whitiſh ſubſtance, which fills the internal hollow part of all the ramifications through the whole *ſpunge*; which ramifications have much the appearance of tranſparent catgut of an amber colour, and are, without doubt, the lodgments of animals of a particular claſs. For though we cannot diſtinguiſh either veſicles, or cells, or diſcover any other kind of organization, than that of a hollow tube variouſly inflected, and wrought together into a multitude of agreeable forms, ſome branched like corals, ſome expanded like a fungus, ſome riſing up ſtraight like a column; others broad at top, with a narrow baſe, and hollow like a funnel, with regular cavities, entrances, or apertures, which are nearly alike in all *ſpunges* of the ſame ſpecies; yet, from many obvious reſemblances to divers other claſſes of ſea productions, which are found to be of animal conſtruction, and from the chemical analyſes of *ſpunges* in general, there ſeems ſufficient reaſon for referring them to the claſs of animal productions. Ellis's Nat. Hiſt. of Corallines, &c. p. 78.

In the Linnæan ſyſtem, the *ſpunge* is a genus of *zoophytes*, in the claſs of *worms*, including ſixteen ſpecies.

The greateſt part of our *ſpunges* are brought from the Mediterranean, eſpecially from Nicaria, an iſland thereof, near the coaſt of Aſia.

The fine or ſmall *ſpunges* however are the moſt eſteemed; and uſually come to us from Conſtantinople. Their goodneſs conſiſts in their being very white and light, and the holes ſmall and cloſe; the larger and coarſer come from the coaſts of Barbary, particularly about Tunis and Algiers.

The *ſpunge* is a very uſeful matter in the arts. In phyſic it ſerves to foment parts inflamed. Taken inwardly, it chokes; and is for that reaſon, cut ſmall, and fried or dipped in honey, and given to quadrupeds to kill them, which it ſeldom fails to do, by ſwelling, and preventing the paſſage of the food into the inteſtines.

Spunge, burnt in a cloſe earthen veſſel, till it becomes black and friable, has been given in doſes of a ſcruple, againſt ſcrophulous complaints and cutaneous defedations; in which it has ſometimes been of ſervice, in virtue, probably, of its ſaline matter, the proper action of which after the great reduction which the other matter of the *ſpunge* has ſuffered in the burning, is very large by virtue of this ſaline matter; alſo the preparation, if ground in a braſs mortar, corrodes ſo much of the metal as to contract a diſagreeable taint, and ſometimes an emetic quality; and therefore, the college of London expreſsly orders it to be powdered in a mortar of glaſs or marble.

The burned *ſpunge* is a principal article in what is called the *Coventry Method of cure* in the BRONCHOCELE, and alſo in that of Mr. Proſſer.

Some have pretended to cure the leproſy with it, and others extol it againſt the bite of a mad dog; but theſe laſt are virtues not univerſally received.

In *ſpunges* are found a kind of ſtones called *cyſtiolithi*, held good for the worms in young children, and to this purpoſe given in powder.

This ſpecies of ſea-ſubſtance, when burnt, yields the ſame ſmell with hair or horns, or other parts of animal bodies.

A pound of *ſpunge*, when weighed in a humid ſeaſon, on drying carefully in a ſtove, without injuring its texture, will be reduced to eleven ounces. This quantity being diſtilled by the retort in the common way, and the principles ſeparated, and the ſalt and ſpirit rectified, there will be found an ounce and a half of a reddiſh phlegm, or a ſpirit ſo weak, as ſcarce to afford any ſmell or taſte; an ounce and a half of a volatile urinous ſpirit; and an ounce four drachms and a half of a volatile urinous ſalt; half an ounce of a fœtid thick oil; half an ounce of a fixed ſalt, which, beſide the common lixivial alkali, contains ſome ſea-ſalt; and five ounces of a caput mortuum, in which the magnet diſcovers ſome particles of iron.

The weight of all theſe amounts to that of the dried *ſpunge* put in, within three drachms, which is a moderate loſs from evaporation, and from ſome little remains which will always ſtick to the veſſels. By this analyſis we find, that *ſpunge* gives nearly as much volatile ſalt as raw ſilk, which yields the moſt of any known animal ſubſtance; and the difference between the quantity, yielded by that ſubſtance and this, is not more than four grains from the ounce. Mem. Acad. Par. 1706.

A *ſpunge* applied to bleeding-veſſels has been found a very ſucceſsful method of ſtopping the effuſion of blood. Phil. Tranſ. Nº 478. p. 33.

For this purpoſe, a very dry and ſolid piece, of a cubical or conical form, ſhould be applied in cloſe contact with the veſſel, and retained by proper compreſſion; and it will ſoon adhere with great force. Very large arteries have been prevented from bleeding by this application.

Dry *ſpunge*, from its property of imbibing and ſwelling by moiſture, is ſometimes uſed as a tent for dilating wounds and ulcers; for this purpoſe, after being carefully freed from the ſmall ſtones generally lodged in it, it is dipt in melted wax, and the wax ſqueezed out from it in a preſs. Lewis.

For the uſe of *ſpunge* in amputation, ſee AMPUTATION.

SPUNGE, *cotton*, a name given by ſome writers to a ſpecies of ſea-*ſpunge* very fine and light, and reſembling cotton in its texture. It is found at conſiderable depths, growing on the rocks in form of a coarſely-branched ſhrub; it is of a greyiſh colour, and very flexile; but it is often rendered coarſe and rigid, by being covered in certain parts with that ſort of tartareous or cruſtaceous ſubſtance, which ſome of the ancients have deſcribed under the name of an *alcyonium*, and others of an *adarce*, and which the druggiſts of the late ages have taught us to call *lapis ſpongiæ*, the *ſpunge*-ſtone. It is formed itſelf of bundles of fibres, and though it has the appearance of a very open texture, yet it admits the water but very badly, and does not imbibe in it any thing like the quantity that the common *ſpunge* does, nor is it, when imbibed, ſo eaſily preſſed out again.

When examined by the microſcope, this ſubſtance appears not at all of the ſtructure of the common *ſpunge*, but ſeems a mere aſſemblage of oblong and ſlender fibres, like thoſe of cotton or wool, not hollow, and very cloſely amaſſed together: theſe are not capable of imbibing any other moiſture than the little that can get between their interſtices in the maſs, and the yet much ſmaller quantity that can enter the ſubſtance of the filaments themſelves. Hence it is no wonder that it will not imbibe water ſo readily as the common *ſpunge*, or retain it ſo well when imbibed, and yet will not yield ſo to the preſſure of a hand as to part with it as that does.

The *ſpunge*-ſtone, or tatarous incruſtation on this ſubſtance, when examined by the microſcope, is found to be very like the incruſtations of ſtony or ſparry matter upon ſticks or ſhells, in ſome of thoſe waters which we call *petrifying ſprings*, for the whole thickneſs of it is compoſed of ſeveral thin laminæ; but then, as in thoſe incruſtations, each of theſe laminæ is of one ſimple piece, and generally of a tranſverſely ſtriated texture. In the *ſpunge*-ſtone each lamina is not thus ſtriated, nor is indeed of one piece, but is a congeries of numbers of ſimple ſmall cakes, reſembling the ſcales of fiſhes. Marſigli, Hiſt. Phyſ. de la Mer.

SPUNGE, *loaf*, in *Natural Hiſtory*, a name given by authors to a peculiar ſpecies of *ſpunge* of the marine kind. It is called by the French *eponge en mie de pain*.

It grows at conſiderable depths to the rocks among coral, and other ſea-ſubſtances. Its ſhape is uſually that of a common loaf, and its texture very much reſembles that of the crumb of bread. It is very various in colour at different times, being uſually of a fine ſcarlet; ſometimes, however, it is purple, ſometimes of a violet colour, and ſometimes ſnow-white, but this more rarely than of any other colour. It is the ſofteſt and lighteſt of all the *ſpunge*-kind, being better ſuited to imbibe the water than any other. It would be greatly eſteemed for the common uſes of *ſpunge*, if it were produced in plenty enough to be had on the common occaſions, but it is ſcarce. When examined by the microſcope, it is found to be compoſed of an almoſt infinite number of cavities and protuberances, and is compoſed of an infinite ſucceſſion of ſmall fibres, which are arranged in a very beautiful manner, and ſeem held together by a ſort of glutinous matter. Marſigli, Hiſt. Phyſ. de la Mer.

SPUNGE, in the *Manege*, is the extremity, or point of a horſe's ſhoe that anſwers to the heel of his foot; upon it the calkins are to be made. Thick *ſpunge* ruins the horſe's heels, and therefore ought never to be uſed.

SPUNGES, *protechnical*, are made of the large muſhrooms or fungous excreſcences growing on old oaks, aſhes, firs, &c. which, being boiled in common water, then dried and well beaten, are put into a ſtrong ley, prepared with ſaltpetre, and again dried in an oven.

Theſe make the black match or tinder brought from Germany, uſed to receive and ſuſtain the fire ſtruck from a flint and ſteel, &c.

SPUNGE is uſed, in *Gunnery*, for a cylinder of wood, from ten to twelve inches long, of the ſame diameter with the rammer, with a piece of ſheep or lamb-ſkin wound about its end, to ſerve for ſcouring great guns when diſcharged, before they be charged with freſh powder; hence called *ſpunging*. In ſmall guns it is commonly fixed to the other end of the handle of the RAMMER; but has a ſeparate one in thoſe of a larger calibre. See *Tab.* II. *Gunnery*, *fig.* 17.

SPUNGING, in *Gunnery*. See SPUNGE.

SPUNK, a term uſed indifferently for half rotten wood, match for guns, and a ſubſtance growing on the ſides of trees. See AGARIC.

SPUN-YARN, among *Sailors*, a ſmall line or cord formed of two or three rope-yarns twiſted together by a winch; the yarns, of which it is uſually made at ſea, are drawn out of the ſtrands of old cables or other ropes, and are knotted together and tarred. It is employed for ſeveral purpoſes, particularly to faſten one rope to another, to ſeize block-ſtrops to the ſhrouds, and to *ſerve* ropes which are liable to be chafed, &c.

SPUR was anciently a piece of the armour of a cavalier, faſtened to the talary, that is, the hind part of that piece of a complete armour, which covers the legs and feet.

The word is derived from the German *ſpohr*: or rather the Saxon, *ſpora*: or Daniſh *ſpor*; which all ſignify the ſame.

At preſent, the *ſpur* is a piece of iron, or other metal, conſiſting of two branches encompaſſing the horſeman's heel, and a rowel in form of a ſtar, advancing out behind, to prick the horſe.

Louis le Debonnair forbad eccleſiaſtics the profane faſhion of wearing *ſpurs*. Anciently, the difference between the knight and eſquire was, that the knight wore gilt *ſpurs*, whence the appellation of *eques auratus*; and the eſquire, ſilvered ones.

SPUR-*ſhell*, a ſpecies of the COCHLEA.

SPURGE, *euphorbia*, in *Botany*, a genus of the *dodecandria trigynia* claſs. Its characters are theſe: the flower hath a permanent empalement of one leaf, which is ſwelling, rough, and divided into five parts at the brim; it has four or five thick truncated petals, and twelve or more ſtamina, which are inſerted in the receptacle; they are longer than the petals, and terminated by globular ſummits; in the centre is ſituated a three-cornered germen, ſupporting three bifid ſtyles, crowned by obtuſe ſtigmas, which afterwards becomes a roundiſh capſule with three cells, each containing one roundiſh ſeed. Linnæus enumerates ſixty-four, and Miller thirty-two ſpecies.

The curious in gardening propagate twelve or thirteen ſpecies of the *euphorbium* plant in their ſtoves; they are all natives of very warm climates, and being replete with a milky juice, they require very little water; nor muſt they ever be planted in a rich ſoil, which is very hurtful to them. The proper ſoil for them is a mixture of one quarter of ſea-ſand, one half of light freſh earth, and one quarter of lime-rubbiſh. This ſhould be mixed for a long while before it is uſed, and very frequently turned in the mean time.

The plants are propagated by planting in this ſoil their cuttings, taken from the old plants in the month of June. Theſe ſhould always be taken off from the old plant at a joint, and ſhould be laid by for ten days or a fortnight, in a dry ſhady place before they are planted, that the part cut off from the old plant may have time to harden and dry. They ſhould then be ſet in very ſmall pots, and have a little water to ſettle the earth to their roots. They are after this to be plunged into a hot-bed of tanner's bark, and ſhaded in the great heats of the day. In ſix weeks they will have ſhot out their roots, and if the bed be not very warm, the plants may remain there, provided they have free air admitted to them every day. During the ſummer ſeaſon they ſhould be watered two or three times a week, but not oftener than once a week in winter. The plants muſt conſtantly remain in the ſtove, giving them much air in warm weather, and in winter keeping the ſtove in a temperate degree of warmth. Miller. See EUPHORBIUM.

SPURGE-*laurel*, or *mezereon*, *laureola*, or *daphne*, in *Botany*, a genus of the *octandria monogynia* claſs. Its characters are theſe: the flower has no empalement; it is cylindrical, of one petal cut into four parts at the top, and it has eight ſhort ſtamina inſerted in the tube, terminated by erect bilocular ſummits; the oval germen is ſituated at the bottom of the tube, which becomes a roundiſh berry with one cell, incloſing one roundiſh fleſhy ſeed. Miller enumerates nine, and Linnæus thirteen ſpecies.

The *thymelæa*, or *ſpurge-flax*, grows on mountainous places in the ſouthern parts of Europe: the *laureola*, or *ſpurge-laurel*, is commonly found in the woods in many parts of England: the *mezereon*, or female *laureola*, which was ſuppoſed to be a native of Germany, but has been lately found plentifully in ſome woods near Andover in Hampſhire, is cultivated in our gardens on account of the elegance and earlineſs of its flowers, which ſometimes appear in the end of January. The berries of all the ſorts ripen in Auguſt and September.

The leaves of all theſe plants have little or no ſmell, but a nauſeous, acrid, very durable taſte: taken internally, in ſmall doſes, as ten or twelve grains, they are ſaid to operate with violence by ſtool, and ſometimes by vomit, ſo as not to be ventured on with ſafety, unleſs their virulence be previouſly abated by long boiling; and even then, they are not to be truſted. The flowers are of a different nature, being in taſte mucilaginous and ſweetiſh, and of a light pleaſant ſmell. The pulpy part of the berries ſeems alſo to be harmleſs, but the ſeeds, called *grana cnidia*, are as acrid, and as violently purgative as the leaves. Lewis.

Dr. Ruſſel has found, in a variety of caſes, that a decoction of the cortical part of the freſh root of the *mezereon*, has proved an effectual remedy for the venereal node, proceeding from a thickening of the membrane of the bones, and that it has been frequently of ſervice in the removal of thoſe nocturnal pains, with which venereal patients are afflicted; eſpecially when, in this latter intention, a few doſes of the ſublimate ſolution have been joined to it. The decoction was adminiſtered in the following ſimple form:

℞ Cort. radic. mezerei recent. ℥j.
Aq. fontan. cong. jß
Coq. ad cong. i ſub fin. addend. rad. glycyrrhizæ inciſ. ℥j. doſ. ℔ ß quater in die.

This decoction, he obſerves, is not nauſeous to the taſte, does not diſagree with any ſtomach or conſtitution, nor has been obſerved ſenſibly to increaſe any of the ſecretions more than the ſame quantity of any ſmall liquor would do. Under a courſe of it, patients have not uſually been confined to a particular regimen, more than to live upon plain food, and to avoid every kind of exceſs. London Med. Obſ. vol. iii. p. 189, &c.

The *laureola* has been uſed externally as a ſeton, to draw a copious diſcharge from the ear in inflammations of the eyes; and the bark of it, macerated in water, has of late, been much employed in France as a topical application to the ſkin, for the purpoſe of excoriating and exciting a diſcharge.

SPURGE, *olive*, the Engliſh name of a genus of plants, called by ſome botaniſts *chamelæa*. See WIDOW-*wail*.

Others have made the *ſpurge* olive a ſpecies of the *euphorbia* or SPURGE.

SPURGE, *ſun*, a name by which ſome call ſeveral ſpecies of *tithymalus*. See SPURGE.

SPURGE-*root*, in the *Materia Medica*. See ESULÆ *radix*.

SPURIOUS *diſeaſes* are ſuch as, in ſome ſymptoms, cannot be brought under any diſtinct head, and, therefore, are called by the name of others with which they moſt agree. Whence, alſo, they are often denominated *baſtards*, *nothi*.

Such are a *ſpurious* or baſtard pleuriſy, a *ſpurious* peripneumony, a baſtard quinſey, and the like. See PLEURISY, PERIPNEUMONY, &c.

SPURIOUS *fleſh*, is an appellation by ſome given to the FLESH of the lips, gums, and that of the glands, &c.

SPURIOUS *medals*. See MEDALS.

SPURIOUS *ribs*. See RIBS.

SPURIOUS *ſuture*. See SUTURE.

SPURKETS, in a *ſhip*. See SPIRKETTING.

SPURRE, in *Ornithology*, a name given by many to the bird more commonly called the *ſea*-SWALLOW.

SPURREY, *ſpergula*, in *Botany*, a genus of the *decandria pentagynia* claſs. Its characters are theſe: the flower has a ſpreading permanent empalement, compoſed of five oval concave leaves; it has five oval, concave, ſpreading petals, which are larger than the empalement, and ten awl-ſhaped ſtamina, ſhorter than the petals, terminated by roundiſh ſummits; it has an oval germen, ſupporting five ſlender, erect, reflexed ſtyles, crowned by thick ſtigmas; the germen turns to an oval cloſe capſule with one cell, opening with five valves, incloſing many depreſſed, globular, bordered ſeeds. Linnæus reckons five, and Miller three ſpecies, which are cultivated in Holland and Flanders for feeding their cattle.

Spurrey is ſown in the Low Countries twice in a ſummer. The firſt ſowing is in May; theſe plants flower in June and July, and the ſeed is ripe in Auguſt. The ſecond time of ſowing it is after the rye-harveſt; they uſually plough up the rye-grounds, and ſow them with this ſeed to ſerve the cows in winter, when the other ſorts of graſs are low or dead. The cows that feed on this plant are found to yield better milk, and finer butter is made from it, than from that of cows feeding on any other paſture. Poultry alſo are very fond of eating this plant, and the farmers, in ſome places, have an opinion, that it makes them lay more eggs. Mortimer's Huſbandry, p. 43.

The ſeeds being very ſmall, about twelve pounds will be ſufficient to ſow an acre of land; the ground ſhould be well harrowed before the ſeed is ſown, for if the larger clods are not broken, there will be an uneven crop of graſs. People in the low country ſow this ſeed after a crop of corn is taken off the land. Miller's Gardener's Dict.

SPUR-WAY, an horſe-way through a man's grounds, through which one may ride by right or cuſtom.

SPUTUM, in *Medicine*, &c. the ſpittle or excrement voided at the mouth. See SALIVA.

An examen of the *ſputum* is of great conſequence in phthiſical caſes; and Bennet, in his Theatrum Tabidorum, applies himſelf in a particular manner thereto. The *ſputum ſanguinis* is a very dangerous ſymptom in that diſeaſe.

SPY, a perſon paid to watch the actions, motions, &c. of another, particularly as to what paſſes in an army.

When a *ſpy* is diſcovered in a camp he is immediately hanged. Wicquefort ſays, an ambaſſador is an honourable *ſpy*, under the protection of the law of nations.

SPYRUS, the *dung of goats.* This is uſually ſound in ſmall round maſſes, and is recommended by Hippocrates as a fumigation in the diſeaſes of the womb.

SQUACCO, in *Ornithology*, the name of a large bird of the heron kind. Its head and neck are variegated with black, white, and yellow, and it has on the back part of its head a creſt of the ſame colour. Its back is of a ferruginous yellow, its breaſt and belly are white, as are alſo its wings and tail, at leaſt in great part, and its legs are green. It is a bold and fierce bird.

SQUAD, in *Military Language.* See ESCOUADE.

SQUADRON, a body of horſe, whoſe number of men is not fixed, but is uſually from eighty to a hundred and twenty men.

The word is formed from the Italian *ſquadrone*; of the Latin *ſqudro*, uſed by corruption for *quadro:* in regard, at firſt, the *ſquadrons* were always ſquare, and called alſo by the Latins, *agmina quadrata.*

The *ſquadron* uſually conſiſts of three troops, and each troop of about forty men: a greater number cannot be advantageouſly poſted, nor have room to act in narrow grounds, woods, marſhes, defiles, &c.

The eldeſt troop takes the right of the *ſquadron*, and the ſecond, the left, the youngeſt being in the centre.

A *ſquadron* is always drawn up three deep, or in three ranks, with the length of a horſe between each rank. The ſtandard is always borne in the centre of the firſt rank.

SQUADRON *of ſhips*, denotes either a detachment of ſhips employed on any particular expedition, or the third part of a naval armament.

The number of ſhips in a *ſquadron* is not fixed: a ſmall number of veſſels, if they be in a body, and have the ſame commander, may make a *ſquadron.*

If there be a great number, they are uſually divided into three *ſquadrons*; and if the *ſquadrons* be numerous, each *ſquadron* is divided into three diviſions, diſtinguiſhed by their flags and colours. See DIVISION and FLEET.

SQUAIOTTA, in *Ornithology*, the name of a bird of the heron kind. Its beak is yellow, but blackiſh at the extremity; its legs are green; its head is variegated with grey and black; and its back very elegantly with white and red. It ſeems to have had its name from its note, which it often repeats in flying.

SQUALL, in *Sea Language*, a ſudden and violent blaſt of wind, uſually occaſioned by the interruption and reverberation of the wind from high mountains. Theſe are frequently in the Mediterranean, particularly in the Levant, as produced by the repulſion and new direction which the wind meets with in its paſſage between the various iſlands of the Archipelago. Falconer.

SQUALLEY, a note of faultineſs in the making of cloth. 43. Eliz. cap. 10. Blount, Cowel. See REWEY.

SQUALUS, in the Linnæan ſyſtem of *Ichthyology*, the name of a diſtinct genus of fiſh of the order of the *nantes*, and claſs of *amphibia.*

The characters of this genus are, that it has five bronchial apertures on the ſides of the neck, an oblong roundiſh body, and the mouth in the anterior part of the head. Linnæus enumerates fifteen ſpecies, four of which have a prickly back, and no pinna ani, viz. the *ſqualus acanthias*, or GALEUS *acanthias*; the *ſqualus centrina*, or CENTRINE; the *ſqualus ſpinax*, with the noſtrils at the extremity of the ſnout; and the *ſqualus ſquatina*, or MONK-*fiſh*; eight of the ſpecies have a back without prickles, with ſharp teeth, and a pinna ani, viz. the *ſqualus zygæna*, or *hammer-headed* SHARK; the *ſqualus* TIBURO, the *ſqualus galeus*, CANIS *galeus*, or TOPE; the *ſqualus canicula*, or CATULUS *major*; the *ſqualus ſtellaris*, with the ventral fins ſeparate, and the dorſal fins near the tail, or CATULUS *maximus*; the *ſqualus catulus*, with a variegated back and belly-fins growing together, CATULUS *minor*, or MORGAY; the *ſqualus maximus*, or *baſking* SHARK; and the *ſqualus carcharias*, or *white* SHARK; and three with granulated teeth, viz. the *ſqualus muſtelus*, or GALEUS *lævis*; the *ſqualus glaucus*, or *blue* SHARK; and the *ſqualus priſtis*, or SAW-*fiſh.*

SQUALUS is alſo a name given by Varro, Columella, Salvian, and others, to a ſpecies of cyprinus, diſtinguiſhed by Artedi by the name of the oblong *cyprinus* with long ſcales, and with the pinna ani containing eleven rays, and commonly known with us under the name of *chub* or *chevin.*

The generality of authors call it *capito* and *cephalus*, but it is very improper to give diſtinct generical names to fiſh, which are genuine ſpecies of other genera.

The name *ſqualus* is originally Latin; it is uſed by Pliny, and many other of the old Roman authors, and is derived from the word *ſqualor*, becauſe this fiſh is found to delight in impure and dirty places.

SQUAMIS, in *Ichthyology*, a name given by Albertus, and others, to the fiſh called by us the MONK, or ANGEL-*fiſh*, by the generality of authors *ſquatina*, and by the old Greek writers *rhine.*

SQUAMMOUS, SQUAMMOSUS, in *Anatomy*, an epithet given to the ſpurious or falſe ſutures of the ſkull, becauſe compoſed of *ſquammæ*, or ſcales, like thoſe of fiſhes, or like tiles, laid ſo as to reach over one another.

The *ſuturæ ſquammoſæ*, are alſo called *mendoſæ*, and *temporales*, from their terminating the temples, or oſſa temporis.

SQUAMOSE-*culm.* See STALK.

SQUAMOSE-*root*, among *Botaniſts*, one compoſed of, or covered with leſſer flakes. See ROOT.

SQUARE, *quadratum*, in *Geometry*, a quadrilateral figure, whoſe angles are right, and ſides equal.

SQUARE, *to find the area of a*; ſeek the length of one ſide; multiply this by itſelf; and the product is the area of the *ſquare.*

Thus, if the length of a ſide be 345, the area will be 119025: and if the ſide of a ſquare be 10, the area will be 100.

Since, then, a decempeda contains 10 feet, a foot 10 digits, &c. a *ſquare* decempeda contains 100 *ſquare* feet, a *ſquare* foot 100 *ſquare* digits, &c.

SQUARE, *the properties of a*, are, that its angles are all right, and, conſequently, its ſides perpendicular; that it is divided into two equal parts, by a diagonal; that the diagonal of a *ſquare* is incommenſurable to the ſide.

SQUARES, *for the ratio of:* they are to each other in the duplicate ratio of their ſides. E. gr. a *ſquare* whoſe ſide is double another, is quadruple of that other *ſquare.*

SQUARE *of the cube.* }
SQUARE *of the ſurdeſolid.* } See POWER.

SQUARE *number*, the product of a number multiplied by itſelf.

Thus 4, the product of 2 multiplied by 2; or 16, the product of 4 multiplied by 4, are *ſquare* numbers.

Such number is called a *ſquare number*, becauſe it may be ranged in the form of a *ſquare*, by making the root, or factor, the ſide of the *ſquare.*

The difference of two *ſquare* numbers, whoſe roots are not unity, is an uneven number, equal to double the root of the leſs, increaſed by unity.

Hence, we have an eaſy method of conſtructing *ſquare* numbers for a number of roots proceeding in the natural ſeries; the double of the root of the antecedent, increaſed by unity, being continually to be added to the preceding *ſquare.*

Thus, if $n=1$; $2n+1=3$: if $n=2$; then will $2n+1=5$: if $n=3$; then will $2n+1=7$: if $n=4$; then will $2n+1=9$, &c. Thus, by a continual addition of the uneven numbers, ariſe the *ſquare* numbers.

SQUARE *root*, a number conſidered as the root of a ſecond power or *ſquare* number: or a number, by whoſe multiplication into itſelf, a *ſquare* number is generated. See ROOT.

To extract the SQUARE *root out of any given number*; ſee EXTRACTION *of roots.*

SQUARE, *norma*, is alſo an inſtrument made of wood or metal, ſerving to deſcribe and meaſure right angles; ſuch is LEM (*Tab.* V. *Geom. fig.* 120).

It conſiſts of two rules or branches faſtened perpendicularly at one of their extremes. When the two branches are moveable on a joint, it is called a *bevel.*

To examine whether or no a *ſquare* be exact, deſcribe a ſemicircle, AEF, of any length, at pleaſure; and therein, from each extreme of the diameter, A and F, draw right lines to a point taken at pleaſure in the periphery, as E: to the ſides of the angle, AEF, apply the *ſquare*, ſo as its vertex may fall on F. If this be poſſible, that *ſquare* is juſt.

SQUARE, *The*, an inſtrument uſed in drawing, which conſiſts of a flat ruler *hg* (*fig.* 121.) at one end of which are faſtened two tranſverſe pieces; one of them, *ab*, fixed at right angles to it, and the other, *cd*, moveable round the centre *f*, ſo as to be fixed at any angle required. Theſe tranſverſe pieces are applied cloſe to the ſide of the drawing board, which is a ſmooth board made in the form of a *ſquare*, or parallelogram, while the ruler lies upon it; and by ſliding them along the board, lines may be drawn parallel to one another with much leſs trouble than by the help of a parallel ruler. By the fixed tranſverſe, lines may be drawn parallel to one ſide of the board and perpendicular to the other; and, by the moveable tranſverſe, lines that have any degree of obliquity to the ſides of the board, may be drawn parallel to one another: and if, without moving the tranſverſe, the ruler be removed to the other ſide of the board, lines may be drawn perpendicular to them. But if the obliquity be very great, it will be impoſſible to apply the *ſquare*, ſo as to interſect the lines at right angles in ſome parts of the board. In this caſe recourſe muſt be had to a PARALLEL *ruler.*

SQUARE, *geometrical*, a compartiment frequently added on the face of the quadrant, called alſo *line of* SHADOWS, and QUADRANT.

SQUARE, *gunner's*. See QUADRANT.

SQUARES, *magic*. See MAGIC *Square*.

SQUARE, in *Glaſs-making*, an inſtrument with which the conciator, or founder, ſtirs and mixes together the metal when in fuſion in the melting-pots. When this inſtrument is grown red-hot, it is always to be quenched in a pail of water, otherwiſe the metal will ſtick to it.

SQUARE, in the *Manege*, is uſed for working in a *ſquare*.

The piſte or tread of a volt, inſtead of being always circular, and traced upon a circumference round a centre, ought to be imagined as if it formed four ſtraight equal lines laid in a *ſquare*, and equally removed from the centre, or the pillar, which repreſents it in the middle of the manege ground; ſo that, to work in a *ſquare*, is to ride along each of theſe four lines, turning the hand at every corner, and ſo paſſing from one line to another.

SQUARE *battalion*. See BATTALION.

SQUARE *cap*. See CAP.

SQUARE *character*. See HEBREW.

SQUARE *foot, nails, niche, pedeſtal, pillar, roof,* and *winding-ſtairs*, ſee the ſubſtantives.

SQUARE, *hollow* and *ſolid*, in the *Military Art*. See BATTALION, HOLLOW, and SOLID.

SQUARE, in *Sea Language*, a term peculiarly appropriated to the yards and their ſails, implying that they hang at right angles with the maſt or keel, or that they are of greater extent than uſual.

Thus, when the yards are ſo balanced by their lifts, as to hang at right angles with the maſt, they are ſaid to be *ſquare* by the lifts; when they hang perpendicular to the ſhip's length, they are called *ſquare* by the braces; but when they lie in a direction perpendicular to the plane of the keel, they are *ſquare* by the lifts and braces; or, in other words, they hang directly acroſs the ſhip, and parallel to the horizon.

The yards are ſaid to be very *ſquare* when they are of extraordinary length; and the ſame epithet is then applied to their ſails, which by conſequence acquire an additional breadth.

SQUARE-*rigged*, is an epithet applied to a ſhip whoſe yards are very long. It is alſo uſed in contradiſtinction to all veſſels whoſe ſails are extended by ſtays or lateen-yards, or by booms and gaffs; the uſual ſituation of which is nearly in the plane of the keel.

Hence, SQUARE-*ſail* is a ſail extended to a yard, which hangs parallel to the horizon, as diſtinguiſhed from the other ſails which are extended by booms and ſtays, placed obliquely. This ſail is only uſed in fair winds, or to ſcud under in a tempeſt. In the former caſe it is furniſhed with a large additional part, called the bonnet, which is then attached to its bottom, and removed when it is neceſſary to ſcud. Falconer.

SQUARING, in *Mathematics*. See QUADRATURE.

SQUARING *the circle*, is the making a ſquare whoſe area ſhall be equal to the area of a given circle.

The beſt mathematicians have found it impoſſible to ſolve this problem ſo as to be preciſely exact; but they can eaſily come ſo near it as not to err ſo much in the area as a grain of ſand would cover in a circle, whoſe diameter is equal to the diameter of Saturn's orbit. The following proportions are near enough to the truth for any real uſe that can ariſe from this problem.

As 100000000 is to the diameter of the given circle, ſo is 88622692 to the ſide of the ſquare required. Therefore,

If the diameter of the circle be	the ſide of the ſquare will be
100000000	88622692.
10000000	8862269.2
1000000	886226.92
100000	88622.692
10000	8862.2692
1000	886.22692
100	88.622692
10	8.8622692
1	0.88622692

And, as 100000000 is to the ſide of a given ſquare, ſo is 112837917 to the diameter of a circle very nearly equal to the ſquare. Therefore,

If the ſide of the ſquare be	The diameter of the circle will be
100000000	112837917.
10000000	11283791.7
1000000	1128379.17
100000	112837.917
10000	11283.7917
1000	1128.37917
100	112.837917
10	11.2837917
1	1.12837917

See CIRCLE, DIAMETER, and QUADRATURE.

SQUARTIA, in *Ichthyology*, a ſpecies of fiſh found in the Eaſt Indies, the ſkin of which makes the SHAGREEN.

SQUASH, in *Botany*. See GOURD.

SQUATAROLA, in *Ornithology*, a name given by the Venetians to the grey plover, or *pluvialis cinerea*.

SQUATINATORIA, in *Ichthyology*, a name by which ſome authors have called the RHINOBATOS, a ſea-fiſh of a ſort of middle nature between the monk-fiſh, or angel-fiſh, and the ray.

SQUATINA, the *monk-fiſh*, a ſpecies of the *ſqualus*, called, in Italian, the *peſce angelo*, and thence in Engliſh the ANGEL-*fiſh*. See MONK-*fiſh*.

SQUATT, in *Mineralogy*, a term given by the Engliſh miners to a peculiar ſort of bed of ore, leſs valuable than a load or vein, becauſe of its reaching but a little way.

Though the ore of the *ſquatts* is generally very rich and good, not inferior in quality to the beſt vein-ore, the miners are often diſappointed, on finding theſe *ſquatts* inſtead of the right veins, after a long ſearch. In the tin countries, the way of ſearching for mines is by looking after the SHOAD-*ſtones*.

Theſe upper parts of the veins have been waſhed off, and carried down the ſides of the hills, in which the mines uſually lie, into the flat country; but they always lie in a regular and continued train from the orifice of the mine to the fartheſt part of the train; ſo that when but one ſtone of this kind is found, the miners are certain of coming to the bed of metal, on tracing it up to its head by the train. This is a laborious and expenſive work, becauſe the ſtones never lie on the ſurface, but at the different depths of one to ten feet, or any depth between theſe. The *ſquatts* have their trains of ſhoad-ſtones as well as the regular veins, and when theſe are traced to the orifice, there is the appearance of a rich load, which the proprietor is not thoroughly undeceived in till the diggers come to the end of it.

The *ſquatt* is a bed of ore from three to ten fathom long, and uſually is about half as broad as it is long; few are larger than this ſtandard, but many much leſs. This is always flat, and thence has its name; the round collections of ore of the ſame kind being called *bonnies*. The *ſquatt* communicates with no other load or vein, but is entire of itſelf, and its extremities terminate at once, without running into ſeveral little ſtrings, in the manner of thoſe of the right veins. It does not lie within walls as the loads or veins always do, though it is always depoſited in the ſhelf, or faſt ground; that is, in ſtrata that have not been moved. Phil. Tranſ. Nº 69.

SQUATUS, in *Ichthyology*, a name uſed by Pliny, and other of the old Roman authors, to expreſs the fiſh called by the old Grecian writers *rhine*, and by the moderns *ſquatina*.

SQUIBS. See FIRE-*works*.

SQUILACHI, in *Zoology*, the name by which the modern Greeks call the JACKALL, or *lupus aureus* of authors.

SQUILL, *ſcilla*, or *ſquilla*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the flower has no empalement, but it has ſix oval petals which ſpread open like a ſtar, and ſix awl-ſhaped ſtamina, terminated by oblong proſtrate ſummits; it has a roundiſh germen ſupporting a ſingle ſtyle, and crowned by a ſingle ſtigma, which afterwards becomes a ſmooth oval capſule, with three furrows, divided into three cells, filled with roundiſh ſeeds. There are ten ſpecies, one of which is the *ſquill*, or ſea-onion, whoſe roots are uſed in medicine.

Of theſe roots there are two ſorts, the red and white, which are ſuppoſed to be accidental varieties; and for medicinal uſe they are both taken promiſcuouſly. They grow naturally on ſea ſhores, and in ditches where the ſalt-water flows in with the tide, in moſt of the warm parts of Europe.

Squil's grow ſpontaneouſly on ſandy ſhores in Spain and in the Levant, from whence we are annually ſupplied with the roots. They ſhould be choſen large, plump, freſh, and full of a clammy juice.

The root of *ſquill* is to the taſte very nauſeous, intenſely bitter and acrimonious; much handled, it exulcerates the ſkin. Taken internally, it acts as a powerful attenuant and aperient: in doſes of a few grains it promotes expectoration and urine; in ſomewhat larger ones it proves emetic, and ſometimes purgative. It is one of the moſt certain diuretics in hydropic caſes, and expectorants in aſthmatic ones, where the lungs or ſtomach are oppreſſed by tenacious phlegm, or injured by the imprudent uſe of opiates.

Wagner recommends the powder of *ſquills*, given with nitre, in hydropical ſwellings, and in a nephritis, and mentions ſeveral examples of cures which he performed, by giving patients from four to ten grains with a double quantity of nitre.

Dr. Heſs ſays, he has cured the aſthma with the powder of *ſquills*. The efficacy of this powder, from four to twelve grains, in curing the aſthma, is atteſted by ſeral. Med. Eſſ. Edinb. Com. Norimb. 1737 and 1739.

This medicine, on account of its ungrateful taſte, is moſt commodiouſly taken in the form of PILLS; and in whatever form *ſquills* are given, unleſs they are deſigned to act as an emetic, the addition of ſome grateful aromatic will prevent the nauſea, which they are apt, even in ſmall doſes, to occaſion.

The freſh root loſes in drying about four-fifths of its weight, without any conſiderable loſs of its taſte or virtue: hence four grains, which are the mean doſe of the dry root in powder, are equivalent to near a ſcruple of the freſh *ſquill*. The moſt convenient way of drying it is, after peeling off the outer ſkin, to cut the roots tranſverſely into thin ſlices, and expoſe them to a gentle warmth. The ancients, in order to abate the acrimony of the *ſquill* for certain purpoſes, after ſeparating the ſkin and fibres, encloſed it in a paſte made of flour and water, and then baked it in an oven, till the paſte became dry and the *ſquill* thoroughly ſoft and tender. The *ſquill* ſo prepared, was beaten with two thirds its weight of flour, the mixture formed into troches, and dried with a gentle heat. Theſe troches were ſuppoſed to be alexipharmic, and on this account were uſed as an ingredient in theriaca, with which view they are ſtill retained. Water, wine, proof ſpirit, and rectified ſpirit, extract the virtues both of the freſh and dry root. Alkalis conſiderably abate both the bitterneſs and acrimony of the *ſquill*: vegetable acids make little alteration in either of theſe reſpects. Theſe acids extract its virtue equally with watery or ſpirituous menſtrua; and, as an expectorant in diſorders of the breaſt, excellently coincide with it. The college of London directs an acetous tincture, *acetum ſcilliticum*, to be prepared, by macerating a pound of the dry roots in ſix pints of vinegar, with a gentle heat; to the liquor preſſed out, and, after ſettling, poured off from the fæces, one twelfth its quantity of proof ſpirit is added, to prevent its growing ſoon foul.

The college of Edinburgh, for the ſame preparation, direct the proportion of two ounces of dried *ſquills*, two pounds and a half of diſtilled vinegar, and three ounces of rectified ſpirit.

A *ſcillitic oxymel* is obtained by boiling a quart of the acetous tincture with three pounds of clarified honey, till the mixture acquires the conſiſtence of a ſyrup: and a ſyrup of *ſquills*, by diſſolving three pounds and a half of fine ſugar in two pounds of the vinegar.

Theſe preparations are uſed as expectorants, in doſes of one, two, or three drams, along with cinnamon, or ſome other grateful water, where the firſt paſſages are overloaded with viſcid phlegm, an ounce or more is given at once, to procure a more ſpeedy and effectual evacuation by vomit. Lewis's Mat. Med.

SQUILL-*mixture*. See MIXTURE.

SQUILLS, *wine of*, is an infuſion of the roots of *ſquills* in white wine for forty days, after which the *ſquills* are taken out, and the liquor preſerved for uſe. It is a gentle emetic, and is good againſt defluxions of rheum.

SQUILL, *white*, *leſſer*, in *Botany*, a ſpecies of *pancratium*. See *Sea*-DAFFODIL.

SQUILL, *ſquilla*, in *Ichthyology*, a large genus of animals comprehending the ſhrimp or *ſquilla*, properly ſo called, the cray-fiſh, the crab, and lobſter; all which, according to Dr. Hill, make only one genus of inſects, of the PODARIA kind.

The characteriſtics of this genus are, that they have ten legs, the foremoſt pair cheliform, and made for pinching and holding things; that they have only two eyes, and that the tail is foliated.

The *ſquillæ*, according to Dr. Hill, may be conveniently arranged under three ſubdiviſions. 1. The ſmaller long-tailed *ſquillæ*, commonly called *ſhrimps*. 2. The larger long-tailed *ſquillæ*, or the *lobſter* and *cray-fiſh* kind. 3. The ſhort-tailed kind, called alſo *canceres*, and in Engliſh crabs.

Of thoſe denominated *ſhrimps* we have the following ſpecies: 1. The long-tailed *ſquilla*, with the ſnout ſerrated above, and tridentated below: this is the common *ſhrimp*. 2. The long-tailed *ſquilla*, with a ſmooth ſnout, called a ſmooth-noſed *ſhrimp*. 3. The long-tailed *ſquilla*, with a ſoft tail, and the right claw largeſt: this is called the *hermit*. 4. The larger, long-ſnouted ſea-*ſquilla*. 5. The ſmaller narrow-ſnouted ſea-*ſquilla*. 6. The freſh-water ſmall *ſquilla*.

Of the ſecond order of *ſquillæ*, commonly called *lobſters*, or *cray-fiſh*, we have the following ſpecies: 1. The common *lobſter*. 2. The thick-horned, ſlender-bodied *lobſter*. 3. The ſhort and broad-bodied *lobſter*. 4. The very long-bodied *lobſter*. 5. The ſmall-bodied *lobſter*. 6. The great ſea *cray-fiſh*. 7. The *cray-fiſh* with the ſnout ſerrated above, and with a ſingle denticulation at the baſe. This laſt ſpecies, though only three inches and a half in length, greatly approaches to the figure of the common *lobſter*.

Of thoſe *ſquillæ*, called *crabs*, *canceres*, there are the following ſpecies: 1. The common large *crab*. 2. The *wart-crab*, *cancer verrucoſus*. 3. The *ſpider-crab*, or long-legged, ſhort-tailed *ſquilla*. 4. The *king-crab*, or *Molucca crab*, called the *ſquilla clypeata*. 5. The rough-bodied, ſmooth-clawed *ſquilla*, called *cancer mæas*. 6. The ſmooth and long-clawed *crab*, called by Johnſon the female of the common kind. 7. The little ſquall *crab*. 8. The little woolly *crab*. 9. The thick-bodied duck *crab*. 10. The round-bodied duck *crab*. 11. The common, or oval-bodied duck *crab*. 12. The very long-armed duck *crab*. 13. The very ſmall-bodied, rough, long-armed *crab*. 14. The lunar *crab*. 15. The florid *crab*. 16. The frog *crab*. 17. The prickly and hairy long-armed *crab*. 18. The great prickly long-armed *crab*. 19. The ſhort-bodied reticulated *crab*. 20. The elliptic bodied *crab*. 21. The ſmooth long-legged *crab*. Vide Hill, Hiſt. Anim. p. 28, ſeq. and *Table of Cruſtaceous Animals*, N° 18, 19, &c.

The *ſquilla*, or white ſhrimp, in the Linnæan ſyſtem, is a ſpecies of the *cancer*, or CRAB; to which genus Linnæus has alſo referred the CRAY-*fiſh*, the *common* SHRIMP, the LOBSTER, &c.

The *ſquilla crangon* of Rondeletius, or prawn, has a long ſerrated ſnout bending upwards, three pair of very long filiform feelers, ſmall claws furniſhed with two fangs, ſmooth thorax, five joints to the tail, middle caudal-fin tubulated, and the two outmoſt flat and rounded. Theſe are frequent on ſeveral ſhores, amidſt looſe ſtones; are ſometimes found at ſea, and taken on the ſurface over thirty fathoms depth of water: they are cinereous when freſh, and of a fine red when boiled.

SQUILLA *aquæ dulcis*, or *freſh water ſhrimp*. Few perſons are aware of the damage done by the freſh water ſhrimp among the ſmall fry of fiſh. This inſect is commonly very plentiful in ſtanding waters, and particularly in breeding-ponds, where they always have their prey in plenty before them; and often ſuffer none, or ſcarce any of the numerous young fry hatched from the ſpawn of carp and tench, to live to grow up. They may be obſerved following the ſhoals of the young fry, and ſeizing multitudes one after another; and at other times lurking among the weeds, to ſeize ſuch as ſtraggle by themſelves. If one of theſe inſects be put into a baſon of water with a dozen or two of theſe young fiſh, though as big as himſelf, he will very ſoon deſtroy them all. They kill numbers that they cannot eat, but leave them to rot.

SQUINANCY, or ESQUINANCY. See QUINZY.

SQUINTING, *ſtrabiſmus*, στραβισμος, a diſorder of the eye, which makes it look a-ſquint, either upwards, downwards, or ſideways. The *ſtrabiſmus* conſiſts in the retraction of the ball of the eye towards one ſide.

A perſon is ſaid to *ſquint*, when the axes of both his eyes are not directed to the ſame object. Philoſophers and phyſicians have adopted various hypotheſes to account for this defect in viſion. It has been generally ſuppoſed to proceed from the want of a due correſpondence in the muſcles of the eyes, which, not acting in a proper concert with one another, are not able to point both eyes at one object. M. de la Hire apprehended, that this diſorder proceeded from a defect in the eye itſelf, having the moſt ſenſible part of the retina not placed in the axis of the eye, but at ſome diſtance from it on one ſide or the other; and that, therefore, not the axis, but this more ſenſible part of the retina is turned towards the object on which the axis of the other eye is fixed, ſo that both axes are not directed to the ſame point.

He ſuppoſed *ſquinting*, alſo, ſometimes to be owing to the oblique ſituation of the cryſtalline humour in one of the eyes. Theſe hypotheſes are examined and refuted by Dr. Jurin, who, in order to account for this defect, conſiders the diſpoſition and ſituation of the eyes in a ſound ſtate. When we look directly forwards at a diſtant object, the pupil of each eye lies in the middle of the aperture formed by the eye-lids; ſo that the diſtance between the two pupils conſiſts of the breadth of the noſe and half the breadth of the aperture of each eye; and this diſtance between them is always preſerved, however obliquely we turn our eyes. In looking at near objects, the diſtance between the pupils is ſomewhat leſs, but ſtill it is always the ſame in all oblique directions of the eyes, as well as when we look ſtraight forwards; by which means the axes of both eyes are directed forwards to the ſame point, in both theſe caſes of looking at diſtant and near objects. But in thoſe who *ſquint*, when the pupil of the undiſtorted eye is ſeated in the middle of the aperture, as in looking directly forwards, the pupil of the other eye is drawn cloſe to the noſe, and conſequently, the diſtance between the two pupils is conſiderably leſs than in other perſons; and this leſs diſtance continues the ſame in all oblique directions for the eyes; ſo that two axes are never pointed at the ſame object, though the muſcles do ſo far act in concert with each other, as to move both eyes the ſame way at the ſame inſtant of time.

This vicious habit, Dr. Jurin obſerves, may eaſily be contracted by a child, if he is often laid into his cradle in ſuch a poſition as to be able to ſee either the light, or any other remarkable object, with one eye only: and when by this means he is brought to *ſquint*, and the habit is confirmed, he apprehends it will be in vain to attempt a cure by his wearing tubes, or ſhells, with ſmall holes to look through; for, notwithſtanding every help of this kind, he will continue to ſee through them diſtinctly with one eye only, and will ſtill diſtort the other. The true method of cure he takes to be the following: when the child is arrived at ſuch an age as to be capable of obſerving directions, place him, ſays he, directly before you, and let him cloſe the undiſtorted eye, and look at you with the other. When you find the axis of this eye fixed directly upon you, bid him endeavour to keep it in that ſituation, and open his other eye. You will now ſee the diſtorted eye turn away from you towards his noſe, and the axis of the other eye will be pointed towards you. But with patience and repeated trials, he will, by degrees, be able to keep his diſtorted eye fixed upon you, at leaſt for ſome little time, after the other is opened; and when you have brought him to keep the axes of both eyes fixed upon you, as you ſtand directly before him, it will be time to change his poſture, and to ſet him firſt a little on one ſide of you, and then to the other, and ſo to practiſe the ſame thing; and when in all theſe ſituations he can perfectly and readily turn the axes of both eyes towards you, the cure is effected. An adult perſon, he ſays, may practiſe all this by a glaſs, without a director, though not ſo eaſily as with one; but the older he is the more patience will be neceſſary. Smith's Optics, Rem. p. 30.

M. Buffon infers, from a great number of obſervations, that the true and original cauſe of *ſquinting* is an inequality in the goodneſs, or in the limits of diſtinct viſion in the two eyes. When one of the eyes, he ſays, is much weaker than the other, we do not direct it towards the object, but make uſe of the ſtronger eye only: when the eyes are equally good, we ſee more diſtinctly with both eyes than with one, by about a thirteenth part; but when they are unequal in goodneſs, objects appear leſs diſtinct with both eyes than with one. It is no wonder, therefore, that perſons, ſubject to this inequality, chuſe to make uſe of one eye, and turn the other aſide. This inequality in the goodneſs of the eyes is the general cauſe of *ſquinting*, according to M. Buffon, and others with reſpect to this are accidental. All the perſons whom he examined, if they ſquinted at all, did ſo from this cauſe, and this effect is ſo neceſſary, that, he ſays, it is not poſſible to cure a perſon of *ſquinting* whoſe eyes differ much in point of goodneſs, except, perhaps, by firſt bringing them nearer to an equality by means of glaſſes; to the ſame purpoſe Dr. Reid obſerves, that, having examined above twenty perſons who ſquinted, he found in all of them a defect in the ſight of one eye. And this writer is opinion, that the centres of the two eyes of *ſquinting* perſons correſpond with them as with others, ſo that if they could be brought to the habit of directing their eyes aright to an object, they would not only remove a deformity, but likewiſe improve their ſight.

In examining the limits of diſtinct viſion in ſeveral children who did not *ſquint*, M. Buffon found (contrary to Dr. Jurin's obſervation), that they did not ſee by any means either ſo far off, or ſo near as adult perſons; ſo that, as we advance in age, the limits of diſtinct viſion are extended both ways; and this, he ſays, is one reaſon why children *ſquint* more than adult perſons.

When the eyes of thoſe perſons who *ſquint* do not differ much in point of goodneſs, M. Buffon thought that the moſt ſimple, the moſt natural, and the moſt effectual method of curing it would be to cover the good eye for ſome time; for the diſtorted eye would thus be obliged to act and turn itſelf directly towards objects, and, by degrees, this would become natural to it.

The reaſon why thoſe perſons who *ſquint* generally turn the weak eye towards the noſe, he ſays, is that, in that ſituation, the direction of its axis is as diſtant as poſſible from that of the good eye: and beſides, in this place, the noſe conceals many objects from its view, ſo that this ſituation is the leaſt diſadvantageous to it of any other.

In ſome caſes, M. Buffon obſerves, that the eyes have what is commonly called a *caſt* only, in conſequene of the optic angle being too great or too ſmall, when they are of equal goodneſs. This, he ſays, is generally the reſult of habit, acquired very early, in conſequence of the miſmanagement of children, and that it is often eaſily cured. If the eye that *ſquints* be turned towards the temples, he ſays, he has generally found that there is no great inequality in the goodneſs of the two; and that, in this caſe, the cauſe being only a vicious habit, the cure has been completed by covering the good eye for a fortnight only. In order to judge with any certainty of the inequality of goodneſs in the two eyes, and the poſſibility of the cure of *ſquinting*, it is neceſſary, he ſays, to cover the good eye for ſome time, in order to exerciſe the bad eye, and give it an opportunity of gaining ſtrength, after which it will be more eaſy to judge whether the cure be poſſible or not. Acad. Par. 1743, p. 329, 342. Reid's Inq. into the Human Mind, p. 253—257.

SQUIRREL, *ſciurus*, formed of σκια, *ſhade*, and ȣρα, *tail*, becauſe the tail ſerves this animal for an umbrella, in the *Linnæan Syſtem of Zoology*, makes a diſtinct genus of animals, of the order of *glires*, and claſs of *mammalia*; the characters of which are; that the creatures have two cutting teeth in each jaw, the upper in the form of a wedge, the lower compreſſed; to which we may add, that they have four toes on the fore-feet, and five on the hinder, and long tails clothed with long hair.

Linnæus has enumerated eleven ſpecies; viz. the *vulgaris*, *niger*, *cinereus*, *flavus*, *palmarum*, *getulus*, *ſtriatus*, *glis*, *æſtuans*, *volans*, and *ſagitta*.

The *common Engliſh ſquirrel* is well known, and is diſtinguiſhed from the others by its ſize and colour. It is ſomething larger than the weaſel, but ſhorter bodied; its ears are terminated with long tufts of hair; it has large, lively, black eyes; its head, body, legs, and tail, are reddiſh; its breaſt and belly white; and it generally carries its long hairy tail erect over its back, ſo that it ſerves for a ſhade. It is a neat, lively, and active animal, common in our woods, and feeds on all ſorts of fruit, but principally on hazel-nuts which it gathers in the ſeaſon, and lays up for its winter ſtore. In ſummer it feeds on buds and young ſhoots, and is particularly fond of thoſe of fir, and the young cones; ſits up to eat, and uſes its forefeet as hands.

There is great diverſion in hunting this little creature, and its fleſh is very delicate and well taſted. The only ſeaſon for hunting it is in autumn, and the beginning of winter, at which time the creature is fat; and the leaves being off the trees, it may be ſeen as it leaps from bough to bough, which, when purſued, it does with ſurpriſing agility.

In the ſummer they build their neſts, which the ſportſmen call *drays*, very artificially in the tops of trees, with ſticks, moſs, and ſuch other things as the woods afford; to their neſt they have two holes, and they ſtop up that on the ſide the wind blows, as Pliny has remarked; they fill this lodging, during the ſeaſon, with nuts and other fruits, which are to ſerve them in the ſevere weather, when the trees afford nothing. They ſleep in the midſt of this proviſion a great part of the winter, and that ſo ſound, that they will not be waked by ever ſo loud a noiſe made juſt under their drays; though at other times they fly out immediately on hearing any noiſe, even at a conſiderable diſtance.

In the ſpring the female is ſeen purſued from tree to tree by the males, feigning an eſcape from their embraces.

The tail of the *ſquirrel*, which is as large as the body, though compoſed almoſt entirely of hair, ſerves the creature in ſome ſort, inſtead of wings; for by means of it the body is kept ſuſpended in the air, without any viſible ſinking, while the creature throws itſelf from the boughs of one tree to thoſe of another of equal height. But the more general leaps the *ſquirrel* takes, are from the outermoſt branches of a high tree to another ſomewhat lower at a diſtance; it is wonderful to ſee how far it will be carried in theſe leaps; and if it miſſes the tree it aims at, and by that means falls from the top of ever ſo high a tree to the ground, the tail ſupports it ſo well that it comes ſoftly down, and receives no harm. The hunting of the *ſquirrel* is moſt agreeably performed in woods of a young growth, the trees of which may be ſhaken by the hands; and it is neceſſary to take out ſome means of diſlodging them from the clefts of trees, in which they will take refuge, and from which they will never be removed by mere noiſe.

Many people uſually go together on this expedition, and ſometimes they carry bows and arrows for the diſlodging the prey from theſe places; ſometimes bludgeons, or ſhort or thick ſtaves, loaded at one end with lead, to prevent their lodging in the tree when they are thrown up. The *ſquirrel*, which in her fright has taken refuge in any part of a tree and is not to be diſlodged either by hallooing or ſhaking the tree, will always quit the place as ſoon as an arrow, or bludgeon, has been well aimed at her, and will give a farther chace.

The *ſquirrel* is always fond of a large oak in time of danger, and runs to the neareſt ſhe can find as ſoon as ſhe ſees herſelf purſued: in ſome part of the upper boughs of this tree ſhe ſits ſecure from the men and dogs, and as it is too troubleſome to the ſportſmen to clime every tree, the only method is to ſhoot arrows, and throw bludgeons at her; ſhe is very ſeldom hurt by theſe, unleſs hit juſt upon the head, for her back-bone is ſo ſtrong, that ſhe will bear nearly as hard a blow as a dog, without danger of hurt. So long as the ſtrengh and ſpirits of the creature laſt, ſhe always keeps in the tops of the higheſt trees, but when ſhe grows weary ſhe comes down, and takes ſhelter in the hedges; ſhe then ſoon becomes a prey to the dogs, or is very often killed upon the ground, in attempting to gain the hedge in places where there is no continued chain of trees by which ſhe can come at it.

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The *ſtriped ſquirrel*, or *ſciurus ſtriatus*, has plain ears; the ridge of the back marked with a black ſtreak; each ſide with a pale yellow ſtripe, bounded above and below with a line of black; head, body, and tail of a reddiſh brown; the breaſt and belly white; the noſe and feet pale red; and the eyes full. This ſpecies inhabits the north of Aſia, and abounds in the foreſts of North America. They burrow under ground, forming their retreat in the manner of a long gallery, with branches on each ſide, each of which terminates in a large chamber, where they ſtore their winter proviſions, viz. the maize, acorns, hickery-nuts, and chinquapin cheſnut, ſeparately. They are very wild, bite ſeverely, and are ſcarcely ever tamed: the ſkins are ſometimes brought over to line cloaks.

The *fat ſquirrel*, or *ſciurus glis*, inhabits France and the ſouth of Europe, and is alſo found in the woods in the ſouth parts of Ruſſia; lives in trees, feeds on fruits and acorns, lodges in the hollows of trees, remains torpid in winter, and grows very fat. This animal was eſteemed a great delicacy by the Romans, who had their *gliraria*, or places conſtructed for keeping and feeding them; and are ſaid to be now eat by the Italians. See GLIS.

The *Braſilian ſquirrel*, or *ſciurus æſtuans*, has plain ears and a round tail; the head, body, and ſides covered with ſoft duſky hairs, tipt with yellow; the hairs annulated with black and yellow; the throat cinereous; the inſide of the legs and belly yellow; the belly divided lengthways with a white line, beginning on the breaſt, interrupted for a ſmall ſpace in the middle, and then continued to the tail; the length from noſe to tail eight inches one quarter. This ſpecies inhabits Braſil and Guiana.

The *flying ſquirrel*, or *ſciurus volans*, is much leſs than the common *ſquirrel*; it has round naked ears; full black eyes; a lateral membrane from the fore to the hind legs, and the fore legs are for the moſt part clear of the membrane; a tail with long hairs diſpoſed horizontally, longeſt in the middle, and ending in a point; the colour above is a browniſh aſh, and beneath white, tinged with yellow. This ſpecies inhabits North America and New Spain; it lives in hollow trees, ſleeps in the day, and is very lively during the night; it is gregarious, numbers being found in one tree; leaps from bough to bough even at the diſtance of ten yards; when it would leap, it ſtretches out the fore legs, and, extending the membranes, it is enabled to ſpring farther than other *ſquirrels*: this motion is improperly called flying, becauſe the animal can only go forward, and even ſinks conſiderably before it can reach the place at which it aims; and, on this account, the farther it wiſhes to go, the higher it mounts. This ſpecies is eaſily tamed.

The *European flying ſquirrel*, has naked ears, full eyes, eye-lids bordered with black, membranes which extend to the baſe of the fore feet, and form a large wing on the exterior ſide; a tail full of hair, and round at the end; the colour of the upper part of the body is a fine grey, and that of the lower part a pure white; the length from noſe to tail four inches and a quarter; of the tail to the tip of the hair five inches. This animal inhabits Finland and Lapland, and the Ruſſian dominions; lives ſolitarily in hollow trees; when at reſt flings its tail over its back, but in leaping extends it.

The *ſailing ſquirrel*, or *ſciurus ſagitta*, has a ſmall rounded head, cloven upper lip, ſmall blunt ears, two ſmall warts at the outmoſt corner of each eye, with hairs growing out of them, ſhort neck, four toes on the fore feet, and, inſtead of a thumb, a ſlender bone two inches and a half long, lodged under the lateral membrane, and ſerving to ſtretch it out; from thence to the hind legs extends the membrane, which is broad, and a continuation of the ſkin of the ſides and belly; the membrane extends along the fore legs and ſtretches out near the joint in a winged form; five toes on the hind feet, and on all the toes ſharp, compreſſed, bent claws; tail long, and covered with long hairs, diſpoſed horizontally; the colour or the head, body, and tail, a bright bay, inclining in ſome parts to orange: the breaſt and belly of a yellowiſh white; the length from noſe to tail eighteen inches, and tail fifteen. This ſpecies inhabits Java and others of the Indian iſlands; it leaps from tree to tree as if it flew, and will catch hold of boughs with its tail. See *Tab.* V. *Quadrupeds*, N° 59.

Mr. Pennant has enumerated and deſcribed ſeveral other ſpecies and varieties of the *ſquirrel*, for which we refer to his Hiſtory of Quadrupeds, vol. ii. p. 406, &c. 4to.

Mr. Ray has alſo, among other ſpecies, mentioned the black-backed *ſquirrel* of Ceylon, which is called *rukkia*, on account of the noiſe it makes; its ears are tufted with black; the cheeks, legs, and belly, of a pale yellow; between the ears a yellow ſpot; the forehead, back, ſides, and haunches black; the cheeks marked with a bifurcated ſtroke of black; the under ſide red; the tail twice as long as the body, of a light grey, and very buſhy, and in ſize about thrice that of the European *ſquirrel*. Ray's Synopſ. Quad. p. 214, &c. and Pennant, &c. ubi ſupra.

ST, an indeclinable term, chiefly uſed to command ſilence. The Romans had theſe two characters written over the doors of the eating-rooms, as who ſhould ſay, *ſed tace*, or *ſilentium tene*.

Porphyry obſerves, the ancients made a point of religion of it, not to ſpeak a ſingle word in paſſing in or out of the doors.

STABBING, in *Law*. See MANSLAUGHTER.

STABILES, in the *Ancient Muſic*, was a name given to the extreme chords of a tetrachord.

They were ſo called becauſe they remained the ſame throughout all the genera and ſpecies of muſic. One of theſe chords was the hypate, and the other the nete.

They are ſometimes alſo called *ſtantes*, *immobiles*, or *quieſcentes*; and by the Greeks ἑϛῶτες, ακινητοι, ηρεμȣντες.

STABLE. Nothing conduces more to the health of a horſe than the having a good and wholeſome *ſtable*. The ſituation of a *ſtable* ſhould always be in a good air, and on a firm, dry, and hard ground, that in winter the horſe may come in and go out clean. It ſhould always be built ſomewhat on an aſcent, that the urine, and other foulneſſes may be eaſily conveyed away by means of drains or ſinks cut for that purpoſe.

As there is no animal that delights more in cleanlineſs than the horſe, or that more abominates bad ſmells, care ſhould be taken that there be no hog-ſtie, hen-rooſt, or neceſſary-houſe, near the place where the *ſtable* is to be built; for the ſwallowing of feathers, which is very apt to happen when hen-rooſts are near, often proves mortal to horſes, and the ſteams of a bog-houſe, or hog's-dung, will breed many diſtempers; and particularly, they will bring on the farcy and blindneſs in many horſes. It is much better to build the walls of a *ſtable* of brick than of ſtone, for the former is always dry, the other often ſweats, and is very apt to be damp, and to cauſe rheums and catarrhs to horſes that are ſet in the *ſtable* in damp weather.

The walls ought to be made of a moderate thickneſs, both for the ſake of ſafety and warmth in winter, and to keep off the heat of the ſun in the midſt of ſummer, which would ſpoil the horſe's appetite, and ſink his ſpirits. The windows ſhould be made on the eaſt and north ſides of the building, that the north air may be let in to cool the *ſtables* in ſummer, and for the benefit of the riſing ſun all the year round, eſpecially in winter.

The windows ſhould either be ſaſhed, or have large caſements, for the ſake of letting in air enough; and there ſhould always be cloſe wooden ſhutters, that the light may be ſhut out at pleaſure; by which means the horſe will be brought to ſleep in the middle of the day, as well as in the night, when it is judged proper that he ſhould do ſo.

Many pave the whole *ſtable* with ſtone, but it is much better to have that part, which the horſe is to lie upon, boarded with oak planks; for it will be not only eaſier, but more warm and comfortable to the creature.

The boards muſt be laid as even as poſſible, for this is the way to make the creature lie moſt at his eaſe, and in the moſt healthful poſture. The dealers in horſes generally, indeed, make the boards be laid higher toward the top, and ſlanting down: this ſhews a horſe to more advantage as he lies, but it is very uncomfortable to the creature, and his hinder parts are always ſlipping down, and the hind legs are often made ſubject to ſwellings by it.

The planks ſhould be laid croſſwiſe, not lengthwiſe, and there are to be ſeveral holes bored through them to receive the urine, and carry it off underneath the floor into ſome drain or common receptacle. The ground behind ſhould be raiſed to a level with the planks, that the horſe may always ſtand even, and the floor behind ſhould be paved with ſmall pebbles, and the place where the rack ſtands ſhould be well wainſcotted. There are to be two rings placed on each ſide of the ſtall for the horſe's halter to run through, and a logger is to be fixed to the end of this, ſufficient to poiſe it perpendicularly, but not ſo heavy as to tire the horſe, or to hinder him from eating. The beſt place for him to eat his corn in is a drawer, or locker, made in the wainſcot partition; this need not be large, and conſequently need not take up much room, ſo that it may be eaſily fixed, and taken out to clean at pleaſure: by this means the common dirtineſs of a fixed manger is to be avoided.

Many people are againſt having a rack in their *ſtables*; they give the horſe his hay ſprinkled upon his litter, and if they think he treads it too much, or too ſoon, they only nail up three or four boards, by way of a trough, to give it to him in. The reaſon of this is, that the continuing lifting up the head to feed out of the rack is an unnatural poſture for a horſe, which was intended to take his food up from the ground, and makes him, as they expreſs it, withy-cragged. In the way of ſprinkling the hay on the litter, or laying it in a trough even with the ground, he not only takes it up as if from the earth in a natural way, but can eat as he lies, which is a piece of indulgence that a horſe takes great pleaſure in.

When there is *ſtable*-room enough, partitions are to be made for ſeveral horſes to ſtand in; theſe ſhould always allow room enough for the horſes to turn about, and lie down conveniently in, and they ſhould be boarded up ſo high toward the head, that the horſes placed in ſeparate ſtalls may not be able to ſmell at one another, nor moleſt each other any way. One of theſe ſtalls ought to be covered in, and made convenient for the groom to lie in, in caſe of a great match, or the ſickneſs of a valuable horſe. Behind the horſes there ſhould be a row of pegs to hang up ſaddles, bridles, and other neceſſary utenſils; and ſome ſhelves for the hanging up bruſhes, &c. and the ſtanding of pots of ointment, and other preparations.

The *ſtables* of the nobility are often incommoded by bins for oats, placed in them, which take up a great deal of room with very little advantage. Dr. Plott has given us in his Hiſtory of Oxfordſhire, a very convenient method, uſed by a gentleman of that county, to prevent this. It is done by making a conveniency to let the oats down from above, out of a veſſel like the hopper of a mill, whence they fall into a ſquare pipe of about four inches diameter, let into the wall, which comes down into a cupboard alſo let into the wall, but with its mouth ſo near the bottom, that there ſhall never be more than about a gallon in the cupboard at a time; which being taken out, and given to the horſes, another gallon immediately ſucceeds it from above, without any trouble to the groom or any body elſe. By this means there is not an inch of room loſt in the lower part of the *ſtable* where the horſes ſtand: and there is this great conveniency beſide, that the oats are always kept ſweet by it, for every gallon that is taken away puts the whole quantity above in motion, by the running down of the gallon that ſupplies its place, and no muſtineſs ever comes where there is this continual airing and motion. There may eaſily be contrived two of theſe, the one for the oats, the other for ſplit beans; and both of theſe may be let into the range of preſſes, the oats and beans being ſeparated above by partitions. The other requiſites for a *ſtable* are a dung-yard, a pump, and a conduit; and if ſome pond or running river be near, it is much the better.

STABLESTAND, in the *Foreſt-law*, is when a perſon is found at his ſtand in the foreſt, with a croſs-bow, or long-bow, ready to ſhoot at a deer, or elſe ſtanding cloſe by a tree with greyhounds ready to ſlip.

This is one of the four evidences, or preſumptions, by which a man is convicted of intending to ſteal the king's deer; the other three being back-berond, bloody-hand, and dog-draw. See FOREST.

STACCATO, or STOCCATO, in the *Italian Muſic*, intimates that every note ſhould be divided and ſeparated from the next in a very plain and diſtinct manner, and is much the ſame with SPICCATO. They are marked in modern muſic with ſtrokes, or dots, placed over or under notes.

STACHYS, in *Botany*. See *Baſe* HOREHOUND.

STACK, in *Huſbandry*, denotes a large quantity of corn, hay, ſtraw, &c. regularly piled up, and generally thatched, to defend the contents from the weather. Theſe by being erected on ſtones of a conical ſhape, covered at top with flat ſtones of about a foot ſquare, or round in proportion, will ſecure the corn, &c. not only from damp, but alſo from mice and rats.

STACK *of wood*, among *Huſbandmen*, is a pile of wood, three feet long, as many broad, and twelve feet high.

STACTE, ϛακτη, in *Pharmacy*, a fatty reſinous liquid matter, of the nature of a liquid myrrh.

This liquor is very odoriferous, and is held very precious; making alone the perfume, called by Dioſcorides *ſtacte*, which, he ſays, ſmells finely, though very bitter to the taſte. We have none of it now, but what is ſophiſticated, and what the apothecaries call *ſtacte*, is uſually no more than liquid ſtorax.

STADIUM, ϛαδιον, an ancient Greek long meaſure, containing one hundred and twenty-five geometrical paces, or ſix hundred and twenty-five Roman feet; correſponding to our furlong.

The word is formed from the Greek ϛασις, *ſtation*; and it is ſaid, on this occaſion, that Hercules, after running ſo far at one breath, ſtood ſtill. The Greeks meaſured all their diſtances by *ſtadia*, which they call ϛαδιαζειν.

Eight *ſtadia* make a geometrical or Roman mile; and twenty, according to M. Dacier, a French league: but according to others, eight hundred *ſtadia* make forty-one and two-thirds of a league.

Guilletiere obſerves, that the *ſtadium* was only ſix hundred Athenian feet, which amount to ſix hundred and twenty-five Roman, five hundred and ſixty-ſix French royal feet, or ſix hundred and four Engliſh feet; ſo that the *ſtadium* ſhould only have been one hundred and thirteen geometrical paces. It muſt be obſerved, however, that the *ſtadium* was different in different times and places.

STADIUM was alſo the courſe or career, wherein the Greeks ran their races.

Vitruvius deſcribes it as an open ſpace one hundred and twenty-five paces long, terminated at the two extremes with two poſts, called *carcer* and *meta*.

Along it was built a kind of amphitheatre, where the as ſoon as an arrow, or bludgeon, has been well aimed at her, and will give a farther chace.

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The *palm ſquirrel* has plain ears; an obſcure pale-yellow ſtripe on the middle of the back, another on each ſide, and a third on each ſide of the belly; the reſt of the hair on the ſides, back, and head, is of a black and red colour, very cloſely mixed; that on the thighs and legs more red; the belly, pale yellow; the hair on the tail encircles it, is coarſe, and of a dirty yellow, barred with black. This ſpecies lives much in the cocoa-trees, and is fond of the ſury, or palm-wine produced from them; and on this account called by the Indians *ſuricatſje*, or the *little cat of the ſury*. This *ſquirrel*, it is ſaid, expands its tail ſideways, without erecting it.

The *Barbary ſquirrel*, or *ſciurus getulus*, has full black eyes and white orbits; head, body, feet, and tail, cinereous, inclining to red; the ſides are marked longitudinally, with two white ſtripes; the belly is white; the tail buſhy, marked regularly with ſhades of black, one beneath the other: its ſize is that of the common *ſquirrel* This and the former ſpecies inhabit Barbary, and other hot countries, living in the trees.

The *ſtriped ſquirrel*, or *ſciurus ſtriatus*, has plain ears; the ridge of the back marked with a black ſtreak; each ſide with a pale yellow ſtripe, bounded above and below with a line of black; head, body, and tail of a reddiſh brown; the breaſt and belly white; the noſe and feet pale red; and the eyes full. This ſpecies inhabits the north of Aſia, and abounds in the foreſts of North America. They burrow under ground, forming their retreat in the manner of a long gallery, with branches on each ſide, each of which terminates in a large chamber, where they ſtore their winter proviſions, viz. the maize, acorns, hickery-nuts, and chinquapin cheſnut, ſeparately. They are very wild, bite ſeverely, and are ſcarcely ever tamed: the ſkins are ſometimes brought over to line cloaks.

The *fat ſquirrel*, or *ſciurus glis*, inhabits France and the ſouth of Europe, and is alſo found in the woods in the ſouth parts of Ruſſia; lives in trees, feeds on fruits and acorns, lodges in the hollows of trees, remains torpid in winter, and grows very fat. This animal was eſteemed a great delicacy by the Romans, who had their *gliraria*, or places conſtructed for keeping and feeding them; and are ſaid to be now eat by the Italians. See GLIS.

The *Braſilian ſquirrel*, or *ſciurus æſtuans*, has plain ears and a round tail; the head, body, and ſides covered with ſoft duſky hairs, tipt with yellow; the hairs annulated with black and yellow; the throat cinereous; the inſide of the legs and belly yellow; the belly divided lengthways with a white line, beginning on the breaſt, interrupted for a ſmall ſpace in the middle, and then continued to the tail; the length from noſe to tail eight inches one quarter. This ſpecies inhabits Braſil and Guiana.

The *flying ſquirrel*, or *ſciurus volans*, is much leſs than the common *ſquirrel*; it has round naked ears; full black eyes; a lateral membrane from the fore to the hind legs, and the fore legs are for the moſt part clear of the membrane; a tail with long hairs diſpoſed horizontally, longeſt in the middle, and ending in a point; the colour above is a browniſh aſh, and beneath white, tinged with yellow. This ſpecies inhabits North America and New Spain; it lives in hollow trees, ſleeps in the day, and is very lively during the night; it is gregarious, numbers being found in one tree; leaps from bough to bough even at the diſtance of ten yards; when it would leap, it ſtretches out the fore legs, and, extending the membranes, it is enabled to ſpring farther than other *ſquirrels*: this motion is improperly called flying, becauſe the animal can only go forward, and even ſinks conſiderably before it can reach the place at which it aims; and, on this account, the farther it wiſhes to go, the higher it mounts. This ſpecies is eaſily tamed.

The *European flying ſquirrel*, has naked ears, full eyes, eye-lids bordered with black, membranes which extend to the baſe of the fore feet, and form a large wing on the exterior ſide; a tail full of hair, and round at the end; the colour of the upper part of the body is a fine grey, and that of the lower part a pure white; the length from noſe to tail four inches and a quarter; of the tail to the tip of the hair five inches. This animal inhabits Finland and Lapland, and the Ruſſian dominions; lives ſolitarily in hollow trees; when at reſt flings its tail over its back, but in leaping extends it.

The *ſailing ſquirrel*, or *ſciurus ſagitta*, has a ſmall rounded head, cloven upper lip, ſmall blunt ears, two ſmall warts at the outmoſt corner of each eye, with hairs growing out of them, ſhort neck, four toes on the fore feet, and, inſtead of a thumb, a ſlender bone two inches and a half long, lodged under the lateral membrane, and ſerving to ſtretch it out; from thence to the hind legs extends the membrane, which is broad, and a continuation of the ſkin of the ſides and belly; the membrane extends along the fore legs and ſtretches out near the joint in a winged form; five toes on the hind feet, and on all the toes ſharp, compreſſed, bent claws; tail long, and covered with long hairs, diſpoſed horizontally; the colour or the head, body, and tail, a bright bay, inclining in ſome parts to orange: the breaſt and belly of a yellowiſh white; the length from noſe to tail eighteen inches, and tail fifteen. This ſpecies inhabits Java and others of the Indian iſlands; it leaps from tree to tree as if it flew, and will catch hold of boughs with its tail. See *Tab.* V. *Quadrupeds*, N° 59.

Mr. Pennant has enumerated and deſcribed ſeveral other ſpecies and varieties of the *ſquirrel*, for which we refer to his Hiſtory of Quadrupeds, vol. ii. p. 406, &c. 4to.

Mr. Ray has alſo, among other ſpecies, mentioned the black-backed *ſquirrel* of Ceylon, which is called *rukkia*, on account of the noiſe it makes; its ears are tufted with black; the cheeks, legs, and belly, of a pale yellow; between the ears a yellow ſpot; the forehead, back, ſides, and haunches black; the cheeks marked with a bifurcated ſtroke of black; the under ſide red; the tail twice as long as the body, of a light grey, and very buſhy, and in ſize about thrice that of the European *ſquirrel*. Ray's Synopſ. Quad. p. 214, &c. and Pennant, &c. ubi ſupra.

ST, an indeclinable term, chiefly uſed to command ſilence. The Romans had theſe two characters written over the doors of the eating-rooms, as who ſhould ſay, *ſed tace*, or *ſilentium tene*.

Porphyry obſerves, the ancients made a point of religion of it, not to ſpeak a ſingle word in paſſing in or out of the doors.

STABBING, in *Law*. See MANSLAUGHTER.

STABILES, in the *Ancient Muſic*, was a name given to the extreme chords of a tetrachord.

They were ſo called becauſe they remained the ſame throughout all the genera and ſpecies of muſic. One of theſe chords was the hypate, and the other the nete.

They are ſometimes alſo called *ſtantes*, *immobiles*, or *quieſcentes*; and by the Greeks ἑϛῶτες, *ακινητοι*, *ηρεμȣντες*.

STABLE. Nothing conduces more to the health of a horſe than the having a good and wholeſome *ſtable*. The ſituation of a *ſtable* ſhould always be in a good air, and on a firm, dry, and hard ground, that in winter the horſe may come in and go out clean. It ſhould always be built ſomewhat on an aſcent, that the urine, and other foulneſſes may be eaſily conveyed away by means of drains or ſinks cut for that purpoſe.

As there is no animal that delights more in cleanlineſs than the horſe, or that more abominates bad ſmells, care ſhould be taken that there be no hog-ſtie, hen-rooſt, or neceſſary-houſe, near the place where the *ſtable* is to be built; for the ſwallowing of feathers, which is very apt to happen when hen-rooſts are near, often proves mortal to horſes, and the ſteams of a bog-houſe, or hog's-dung, will breed many diſtempers; and particularly, they will bring on the farcy and blindneſs in many horſes. It is much better to build the walls of a *ſtable* of brick than of ſtone, for the former is always dry, the other often ſweats, and is very apt to be damp, and to cauſe rheums and catarrhs to horſes that are ſet in the *ſtable* in damp weather.

The walls ought to be made of a moderate thickneſs, both for the ſake of ſafety and warmth in winter, and to keep off the heat of the ſun in the midſt of ſummer, which would ſpoil the horſe's appetite, and ſink his ſpirits. The windows ſhould be made on the eaſt and north ſides of the building, that the north air may be let in to cool the *ſtables* in ſummer, and for the benefit of the riſing ſun all the year round, eſpecially in winter.

The windows ſhould either be ſaſhed, or have large caſements, for the ſake of letting in air enough; and there ſhould always be cloſe wooden ſhutters, that the light may be ſhut out at pleaſure; by which means the horſe will be brought to ſleep in the middle of the day, as well as in the night, when it is judged proper that he ſhould do ſo.

Many pave the whole *ſtable* with ſtone, but it is much better to have that part, which the horſe is to lie upon, boarded with oak planks; for it will be not only eaſier, but more warm and comfortable to the creature.

The boards muſt be laid as even as poſſible, for this is the way to make the creature lie moſt at his eaſe, and in the moſt healthful poſture. The dealers in horſes generally, indeed, make the boards be laid higher toward the top, and ſlanting down: this ſhews a horſe to more advantage as he lies, but it is very uncomfortable to the creature, and his hinder parts are always ſlipping down, and the hind legs are often made ſubject to ſwellings by it.

The planks ſhould be laid croſſwiſe, not lengthwiſe, and there are to be ſeveral holes bored through them to receive the urine, and carry it off underneath the floor into ſome drain or common receptacle. The ground behind ſhould be raiſed to a level with the planks, that the horſe may always ſtand even, and the floor behind ſhould be paved with ſmall pebbles, and the place where the rack ſtands ſhould be well wainſcotted. There are to be two rings placed on each ſide of the ſtall for the horſe's halter to run through, and a logger is to be fixed to the end of this, ſufficient to poiſe it perpendicularly, but not ſo heavy as to tire the horſe, or to hinder him from eating. The beſt place for him to eat his corn in is a drawer, or locker, made in the wainſcot partition; this need not be large, and conſequently need not take up much room, ſo that it may be eaſily fixed, and taken out to clean at pleaſure: by this means the common dirtineſs of a fixed manger is to be avoided.

Many people are againſt having a rack in their *ſtables*; they give the horſe his hay ſprinkled upon his litter, and if they think he treads it too much, or too ſoon, they only nail up three or four boards, by way of a trough, to give it to him in. The reaſon of this is, that the continuing lifting up the head to feed out of the rack is an unnatural poſture for a horſe, which was intended to take his food up from the ground, and makes him, as they expreſs it, withy-cragged. In the way of ſprinkling the hay on the litter, or laying it in a trough even with the ground, he not only takes it up as if from the earth in a natural way, but can eat as he lies, which is a piece of indulgence that a horſe takes great pleaſure in.

When there is *ſtable*-room enough, partitions are to be made for ſeveral horſes to ſtand in; theſe ſhould always allow room enough for the horſes to turn about, and lie down conveniently in, and they ſhould be boarded up ſo high toward the head, that the horſes placed in ſeparate ſtalls may not be able to ſmell at one another, nor moleſt each other any way. One of theſe ſtalls ought to be covered in, and made convenient for the groom to lie in, in caſe of a great match, or the ſickneſs of a valuable horſe. Behind the horſes there ſhould be a row of pegs to hang up ſaddles, bridles, and other neceſſary utenſils; and ſome ſhelves for the hanging up bruſhes, &c. and the ſtanding of pots of ointment, and other preparations.

The *ſtables* of the nobility are often incommoded by bins for oats, placed in them, which take up a great deal of room with very little advantage. Dr. Plott has given us in his Hiſtory of Oxfordſhire, a very convenient method, uſed by a gentleman of that county, to prevent this. It is done by making a conveniency to let the oats down from above, out of a veſſel like the hopper of a mill, whence they fall into a ſquare pipe of about four inches diameter, let into the wall, which comes down into a cupboard alſo let into the wall, but with its mouth ſo near the bottom, that there ſhall never be more than about a gallon in the cupboard at a time; which being taken out, and given to the horſes, another gallon immediately ſucceeds it from above, without any trouble to the groom or any body elſe. By this means there is not an inch of room loſt in the lower part of the *ſtable* where the horſes ſtand: and there is this great conveniency beſide, that the oats are always kept ſweet by it, for every gallon that is taken away puts the whole quantity above in motion, by the running down of the gallon that ſupplies its place, and no muſtineſs ever comes where there is this continual airing and motion. There may eaſily be contrived two of theſe, the one for the oats, the other for ſplit beans; and both of theſe may be let into the range of preſſes, the oats and beans being ſeparated above by partitions. The other requiſites for a *ſtable* are a dung-yard, a pump, and a conduit; and if ſome pond or running river be near, it is much the better.

STABLESTAND, in the *Foreſt-law*, is when a perſon is found at his ſtand in the foreſt, with a croſs-bow, or long-bow, ready to ſhoot at a deer, or elſe ſtanding cloſe by a tree with greyhounds ready to ſlip.

This is one of the four evidences, or preſumptions, by which a man is convicted of intending to ſteal the king's deer; the other three being back-berond, bloody-hand, and dog-draw. See FOREST.

STACCATO, or STOCCATO, in the *Italian Muſic*, intimates that every note ſhould be divided and ſeparated from the next in a very plain and diſtinct manner, and is much the ſame with SPICCATO. They are marked in modern muſic with ſtrokes, or dots, placed over or under notes.

STACHYS, in *Botany*. See *Baſe* HOREHOUND.

STACK, in *Huſbandry*, denotes a large quantity of corn, hay, ſtraw, &c. regularly piled up, and generally thatched, to defend the contents from the weather. Theſe by being erected on ſtones of a conical ſhape, covered at top with flat ſtones of about a foot ſquare, or round in proportion, will ſecure the corn, &c. not only from damp, but alſo from mice and rats.

STACK *of wood*, among *Huſbandmen*, is a pile of wood, three feet long, as many broad, and twelve feet high.

STACTE, *ϛακτη*, in *Pharmacy*, a fatty reſinous liquid matter, of the nature of a liquid myrrh.

This liquor is very odoriferous, and is held very precious; making alone the perfume, called by Dioſcorides *ſtacte*, which, he ſays, ſmells finely, though very bitter to the taſte. We have none of it now, but what is ſophiſticated, and what the apothecaries call *ſtacte*, is uſually no more than liquid ſtorax.

STADIUM, *ϛαδιον*, an ancient Greek long meaſure, containing one hundred and twenty-five geometrical paces, or ſix hundred and twenty-five Roman feet; correſponding to our furlong.

The word is formed from the Greek *ϛασις*, *ſtation*; and it is ſaid, on this occaſion, that Hercules, after running ſo far at one breath, ſtood ſtill. The Greeks meaſured all their diſtances by *ſtadia*, which they call *ϛαδιαζειν*.

Eight *ſtadia* make a geometrical or Roman mile; and twenty, according to M. Dacier, a French league: but according to others, eight hundred *ſtadia* make forty-one and two-thirds of a league.

Guilletiere obſerves, that the *ſtadium* was only ſix hundred Athenian feet, which amount to ſix hundred and twenty-five Roman, five hundred and ſixty-ſix French royal feet, or ſix hundred and four Engliſh feet; ſo that the *ſtadium* ſhould only have been one hundred and thirteen geometrical paces. It muſt be obſerved, however, that the *ſtadium* was different in different times and places.

STADIUM was alſo the courſe or career, wherein the Greeks ran their races.

Vitruvius deſcribes it as an open ſpace one hundred and twenty-five paces long, terminated at the two extremes with two poſts, called *carcer* and *meta*.

Along it was built a kind of amphitheatre, where the ſpectators were placed to ſee the athletæ exerciſe running, wreſtling, &c.

Pauſanias (lib. vi.) informs us, that the Olympic *ſtadium* was a terrace compoſed of earth; on one ſide of which was the ſeat of the HELLENODICS, and over againſt them on the other, was an altar of white marble, upon which the prieſteſs of Ceres Chamyne, and ſome virgins, had the privilege to ſit and view the games. At the farther end of the *ſtadium* was the barrier, whence thoſe who ran the ſimple foot race began their courſe; and there, according to the tradition of the Elians, was the tomb of Endymion.

According to the deſcription given by Wheeler, in his travels, of the remains of the *ſtadium* at Athens, which was built by Herodes Atticus, it appears to have been a long place, with two parallel ſides, cloſed up circularly at the eaſt end, and opened towards the other end, and about one hundred and twenty-five geometrical paces long, and twenty-ſix or twenty-ſeven broad, which gave it the name of a STADIUM.

Though the Olympic *ſtadium* does not ſeem to have been ſo ſplendid as this at Athens, or another at Delphi, built likewiſe of marble by the ſame magnificent citizen of Athens, yet we may ſuppoſe they were all formed upon the ſame model, as they were deſtined to the ſame uſe. In the *ſtadium* were exhibited thoſe games, which are properly called GYMNASTIC. At either end of the courſe ſtood a pillar, the one conſtituting the barrier where the race began, and the other the goal, where the ſimple foot race, inſtituted or revived by Iphitus, ended.

In the fourteenth Olympiad was added the DIAULOS, or double *ſtadium*, and the DIAULODROMOI, who ran this race, turned round the pillar erected for that purpoſe at the end of the *ſtadium*, and returned to the barrier, where their race terminated. But the *dolichodromoi*, or runners in the race, called DOLICHOS, or the long courſe, which was introduced in the fifteenth Olympiad, and which conſiſted of ſeven or twelve, or even of twenty-four *ſtadia*, when they came to the barrier, turned again round the pillar erected at that end, in order to continue their courſe, which required many doublings of the *ſtadium*.

The *ſtadium* or race-ground, called the *Olympian* HIPPODROME, conſiſted of two parts; the firſt reſembled in ſhape the prow of a ſhip, and was called the *barrier*. In this place were the ſtands for the horſes and chariots, and here they were matched and prepared for the courſe. The next partition was the liſts, or the ſpot on which the races were to be run. At the end of the courſe ſtood a pillar, which was the goal, round which the candidates were to turn; and that rider or driver who could make the narroweſt turn and approach neareſt to it, had the faireſt chance, *cæteris paribus*, of ſurpaſſing his rivals. To this Horace alludes in the expreſſion, *Meta fervidis evitata rotis*. Beyond this goal, there was a figure, placed on purpoſe to frighten the horſes, called *Taraxippus*, or the *terrifier of horſes*. It is probable, that ſome tricks were practiſed under the diſguiſe of this figure, to render the victory more difficult, and of courſe more honourable, or to try and prove the reſolution and temper of the horſes. On each ſide of the courſe, from one end to the other, the ſpectators were placed; the moſt advantageous ſtations being aſſigned to the judges of the games, and other diſtinguiſhed perſons. In that place where the horſes ſtood, which were to run, a long cable was drawn from one ſide to the other, which ſerved the purpoſe of a barrier: about the middle of the prow already mentioned, an altar was erected, upon which ſtood a brazen eagle, with outſtretched wings, and the figure of a brazen dolphin was likewiſe placed at the entrance of it. This laſt was ſo contrived, that when the preſident of the races thought proper to put it in motion, it would aſcend at once to ſuch a height, as to be viſible to all the ſpectators. This eagle was dedicated to Jupiter, the patron god of the Olympic games, as the dolphin was ſacred to Neptune, the ſuppoſed creator of the horſe. In the moment when the eagle ſprang into the air, the dolphin ſunk under ground; and upon this ſignal, the cable was removed, and the horſes advanced from their ſtands into the courſe, where they ſtood ready to ſtart. The ſignal for ſtarting was probably the ſame as in the chariot races, and was given by the ſounding of a trumpet. The ſpace of ground round which the horſes were to run, and the number of times which they were required to run round it, will make their courſe or heat to amount to about four miles, or ſomewhat more. See on this ſubject Weſt's Odes of Pindar, and Preliminary Diſſertation on the Olympic Games, p. 43, &c. p. 84, &c.

There were *ſtadia* likewiſe covered over, and encompaſſed, with colonnades and porticoes, ſerving for the ſame exerciſes in ill weather. Captive children uſed to run the *ſtadium*.

A more natural derivation of the word *ſtadium*, from ςασις, *ſtation*, than that popular one mentioned in the laſt article, may be drawn from the athletæ ſtopping and reſting, when at the end of this courſe: whence the name might be applied to the ſame diſtance, meaſured in any other place.

STADTHOLDER, STADTHOULDER, or *ſtadholder*, a governor or lieutenant of a province, in the United Netherlands; particularly that of Holland: where the word is moſt uſed, by reaſon of the ſuperior importance of the government of that province.

Menage derives the word from *ſtadt*, *ſtate*; and *boulder*, *holding*, q. d. lieutenant of the ſtates: others will have it compounded of *ſtad*, or *ſtede*, *ſtead*, or *place*; and *houlder*, *holding*; in regard this officer held the place of the counts, and repreſented them in their abſence.

The *ſtadtholder*, i. e. the *ſtadtholder* of Holland, is the firſt member of the republic: he is chief of all the courts of juſtice; and may preſide therein when he pleaſes. All ſentences, judgments, &c. are diſpatched in his name. When an office becomes vacant in any of the courts, the ſtates propoſe three perſons to the *ſtadtholder*, who is to chuſe one of them. He can even pardon criminals, which is a ſovereign prerogative; and he has the choice of ſcabines, or chief magiſtrates, in each city; to which end the council of the city always preſent him two perſons, one of whom he appoints.

In ſeveral cities, he has the ſame right of nominating the burgomaſters and counſellors; as at Rotterdam, Dort, &c. He has alſo a power to caſhier the magiſtrates, and put others in their room, when he finds it neceſſary for the public good, upon giving a reaſon for the ſame.

By article VI. of the union of Utrecht, the ſtates conſtitute him arbiter of all the differences that may ariſe between the ſtates of the ſeveral provinces, or between the cities and the members of the ſtates of the province.

To the dignity of *ſtadtholder* is inſeparably annexed, that of captain and admiral-general of the province; in which quality he names all the officers, and diſpoſes of all military poſts. It is he takes care of the execution of the ordinances of the ſtates; and his authority gives him a right to receive, and give audience to ambaſſadors from foreign princes, and even to ſend ambaſſadors on his own private affairs.

The office of *ſtadtholder* is very ancient: the counts, not being able to reſide in Holland, appointed *ſtadtholders* to command in their abſence in the ſeveral provinces; beſides a governor general of all the ſeventeen provinces of the Netherlands.

William I. prince of Orange, was made *ſtadtholder* of Holland and Zealand, in 1576, and ſoon after of the provinces of Guelders, Utrecht, and Overyſſel, at the time when the Dutch ſhook off the Spaniſh yoke; which enabled him to contribute greatly to that happy event.

In 1584, when William I. was aſſaſſinated, the ſame dignity was conferred, by the ſame provinces, on his ſon prince Maurice, who was ſucceeded by his brother Frederic-Henry in 1625: upon his death in 1643, his ſon, William II. became *ſtadtholder*, and he poſſeſſed this dignity till his death in 1650. The ambitious views of this prince having given offence to the provinces of the republic, they took meaſures to reduce the authority of the *ſtadtholder*, and the province of Holland formed a deſign of excluding his ſon William III. prince of Orange, afterwards king of England, from the dignity poſſeſſed by his anceſtors. However, in 1672, Holland, alarmed at the progreſs of Lewis XIV. declared William *ſtadtholder*, and captain-general of the forces of the republic, with the ſame power which his predeceſſors had enjoyed. Their example was followed by four other provinces; and, in 1674, on account of his ſignal ſervices to the ſtates of Holland, they declared him hereditary *ſtadtholder*, and determined that his dignity ſhould deſcend to his male heirs. He was ſucceeded by his appointed heir the prince of Naſſau-Dietz, hereditary *ſtadtholder* of the provinces of Frieſland and Groningen, from whom the dignity deſcended to his ſon William-Charles-Henry-Friſon: in 1722, he was named *ſtadtholder* by the province of Guelderland.

In 1747, the *ſtadtholderſhip* was extended to all the ſeven united provinces, and made hereditary in the male and female repreſentatives of the family of Orange.

STÆBIS, in *Botany*, a name given by the modern Greeks to a plant growing very plentifully in the iſland of Crete, and ſeeming to be the ſame with the *ſtæbe* of the ancient Greeks, when uſed as the name of the pheos or hippopheos; for the ancients uſed it alſo as the name of a low plant of the gnaphalium-kind, growing in marſhy places, and uſed to ſtuff beds, &c. with.

STÆBIUM, in *Botany*, a name given by the modern Greeks to the plant called *hippopheos* by Dioſcorides; that author alſo ſometimes called it *ſtæbe*.

STÆCHAS, in *Botany*. See CASSIDONY.

STÆHELINA, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: the common empalement of the flower is oblong, cylindrical, and imbricated; the ſcales are reflexed; the flower is compoſed of ſeveral uniform funnel-ſhaped florets, of one petal; the brim is cut into five equal acute points; they have five hair-like ſtamina, terminated by cylindrical ſummits, and a ſhort crowned germen, ſupporting a ſlender ſtyle, crowned by a double oblong ſtigma; the germen becomes a ſhort four-cornered ſeed, crowned with a feathery down, which ripens in the empalement. Linnæus enumerates five, but Miller only two ſpecies, natives of the Cape of Good-Hope.

STAFF, *baculus*, an inſtrument ordinarily uſed to reſt on, in walking. Card. Bona obſerves, in his treatiſe of liturgies, that, anciently, thoſe who uſed a *ſtaff* in the church to lean on, were obliged to lay it by, and to ſtand alone, firm and upright, while the Goſpel was reading; to teſtify their reſpect by their poſture; and to ſhew they were ready to obey Jeſus Chriſt, and to go whereſoever he ſhould command them.

The *ſtaff* is alſo frequently uſed as a kind of natural weapon, both of offence and defence. The Lacedæmonians never wore any ſwords in the time of peace; but contented themſelves with a thick, crooked *ſtaff*, which was peculiar to them.

Among the Romans, M. St. Evremond obſerves, blows with a *ſtaff* were the gentleſt correction they gave their ſlaves; inaſmuch as they received them over their cloaths. Among the maſters of honour and arms, it is held a greater affront to be beaten with a *ſtaff* than with a ſword; becauſe the ſword is the inſtrument of war, the *ſtaff* the inſtrument of outrage.

Blows with a *ſtaff* are very ſeverely puniſhed by the French laws: by a regulation of the marſhals of France, in 1653, for reparations and ſatisfactions of honour, it is adjudged, that a perſon who ſhall ſtrike another with a *ſtaff*, ſhall be impriſoned a whole year; unleſs ſix months be moderated, upon paying three thouſand livres, applicable to the neareſt hoſpital; beſide which, the offender is to aſk pardon of the offended on his knees, &c. ready to receive from him a like number of blows with a *ſtaff*, which, on ſome occaſions, the latter may be obliged to give; if he have too much generoſity to do it of himſelf.

By another regulation of the marſhals in 1679, he who ſtrikes with a *ſtaff*, after receiving blows with the fiſt in the heat of a fray, is condemned to two years impriſonment; and to four if he ſtruck firſt with the fiſt.

STAFF, *a*, is uſed as an inſtrument for taking acceſſible, or inacceſſible heights. For the manner of operation, in taking the height of an acceſſible object, ſee ALTITUDE.

Inacceſſible heights may likewiſe be taken by means of two *ſtaves*. This muſt be done at two ſtations in a right line from the object, at each of which the *ſtaves* are to be placed in ſuch a manner, that the ſummit, or top of the height, may be ſeen along their tops in the ſame right line. Thus, ſuppoſe A (*Tab.* V. *Geometry*, *fig.* 122.) the ſummit of the object whoſe height is to be meaſured, D E, F G, the two *ſtaves* at the firſt ſtation; and R N, K O, the ſame *ſtaves* at the ſecond, ſo placed, that the points F D A, K N A, are in the ſame right line. Through the point N let there be drawn the right line N P, parallel to F A: wherefore in the triangles K N P, K A F, the angles K N P, K A F, are equal; alſo the angle A K F is common to both; conſequently the remaining angles K P N, K F A are equal. And P N : F A :: K P : K F. But the triangles P N L, F A S, are ſimilar; therefore P N : F A :: N L : S A. Thence alternately K P : N L :: K F : S A; i. e. as the exceſs of the diſtance of the *ſtaves* at the ſecond ſtation above their diſtance at the firſt, to the difference of their lengths; ſo is the diſtance of the two ſtations of the ſhorter *ſtaves*, to the exceſs of the height ſought above the height of the ſhorter *ſtaff*. Wherefore S A may be found by the rule of three; to which add the height of the ſhorter *ſtaff*, and the ſum will give the whole inacceſſible height A B.

Staves may be uſed for meaſuring any diſtance; ſuppoſe A B, (*fig.* 123.) to one of whoſe extremities we have acceſs. Let there be a *ſtaff* fixed at the point A, then going back to ſome ſenſible diſtance, in the ſame right line; let another be fixed in C, ſo that both the points A and B may be covered or hid by the *ſtaff* C. Likewiſe going off in a perpendicular, from the right line C B at the point A, let there be placed another *ſtaff* at H; and in the right line C G K, perpendicular to the ſame C B at the point C, and at ſuch a point of it K, that the points K, H, and B, may be in the ſame right line, let there be fixed a fourth *ſtaff*. Let there be drawn, or ſuppoſed to be drawn, a right line H G parallel to C A. The triangles K H G, H A B, will be equiangular: wherefore K G : G H (=C A) :: A H : A B; i. e. as the exceſs of C K above A H is to the diſtance betwixt the firſt and ſecond *ſtaff*, ſo is the diſtance betwixt the firſt and third *ſtaff* to the diſtance ſought. Tr. Pract. Geom. p. 22—25.

STAFF, *Almucantar's*, *augural*, *back*, *croſs*, *fore*, *paſtoral*, *whip*, ſee the articles.

STAFF, *Jacob's*. See RADIUS *aſtronomicus*.

STAFF, *quarter*. See QUARTER.

STAFF, *ward*. See WARD-*ſtaff*.

STAFF-*officers*, in *Military Language*, &c. See OFFICERS.

STAFF, *field*. See FIELD.

STAFF, *regimental*, conſiſts of the adjutant, quarter-maſter, chaplain, and ſurgeon, &c.

STAFF, in *Heraldry*. See BASTON.

STAFF, in *Muſic*, five lines, on which, with the intermediate ſpaces, the notes of any ſong or piece of muſic are marked. Guido Aretin, the great improver of the modern muſic, is ſaid to be the firſt who introduced the *ſtaff*, marking his notes by ſetting points (.) up and down them, to denote the riſe and fall of the voice; and each line and ſpace he marked at the beginning of the *ſtaff*, with Gregory's ſeven letters, a, b, c, d, e, f, g.

But others will have the artifice of an older date; and Kircher particularly affirms, that in the Jeſuits library at Meſſina, he found an old Greek MS. book of hymns, above ſeven hundred years old; wherein ſome hymns were written on a *ſtaff* of eight lines, marked at the beginning with eight Greek letters. The notes or points were on the lines, but no uſe was made of the ſpaces.

The ingenious and learned Dr. Burney has proved that parallel lines were of higher antiquity than the time of Guido. It appears from an ancient MS. treatiſe on muſic by Odo the monk, written about the year 920, that lines began to be uſed in the tenth century: they were eight or nine in number; and at firſt, the ſyllables of the pſalm or hymn, that was to be ſung, were placed in the ſpaces between theſe lines; after this an alphabetic character was placed at the beginning of each line, capitals for the grave ſounds, and minuſcules for the acute; to this kind of notation ſucceeded points, a ſcale formed of which Dr. Burney has given from a tract written by the great muſical monk Hubaldus, who flouriſhed about the year 880. He has alſo produced three examples from ancient miſſals, one of which was written about the year 900, cited by P. Martini, in which only one line is uſed to aſcertain the predominant ſound of the chant; a red line for the cleff of F; and a yellow one for that of C; and this, he ſays, ſeems to have been the firſt time that a line was drawn through notes of the ſame elevation, and the origin of clefs which are only Gothic letters corrupted or diſfigured.

Vincenzo Gallilei ſays, that a little before the time of Guido, the points were placed on ſeven lines only, without uſing the ſpaces; perhaps, in imitation of the ſeven ſtrings of the lyre. The regular *ſtaff* of four lines was not generally uſed till the thirteenth century. Kircher, indeed, ſpeaks of Guido's uſing five lines and five ſpaces, but, as Dr. Burney ſays, without authority. However, though lines without ſpaces, and ſpaces without lines had been uſed before the time of Guido, he ſeems to have firſt ſuggeſted the uſe of lines and ſpaces together: and thus the lines, which by ſome had been made as numerous as the notes, were reduced to four; a number which in miſſals and rituals of the Romiſh church has never ſince been exceeded. Indeed the uſe of a line for each note above mentioned, may never have arrived at the knowledge of Guido, who ſpeaks the language of an inventor, with reſpect to lines and ſpaces, more than on any other occaſion: and, if he be allowed the invention of lines and ſpaces, clefs will of courſe accompany them. Burney's Hiſt. of Muſic, vol. ii. p. 34, &c. p. 87, &c.

STAFF, in a *Ship*, a light pole erected in different parts of a ſhip, whereon to hoiſt and diſplay the colours. The principal of theſe is reared immediately over the ſtern, to diſplay the ENSIGN; another is fixed on the bowſprit to extend the JACK: three more are erected at the three maſt-heads, or formed by their upper ends, to ſhew the FLAG or PENDANT of the reſpective ſquadron or diviſion to which the ſhip belongs.

STAFF, in *Surgery*. See CATHETER, and *Tab.* III. *Surgery*, *fig.* 28.

The proceſs of cutting for the ſtone, called the *high operation*, having been attended with ſome inconveniences, which occaſioned its being haſtily left off, Mr. Cleland has attempted to remedy thoſe inconveniences, by means of a *catheter* of a peculiar ſtructure, which he is of opinion, had it been known at that time when this operation was ſet on foot and miſcarried, would have turned the advantage of the methods to the ſide of the high operation, and made it allowed much preferable to any other method hitherto practiſed, and hopes that it will be yet brought into uſe, and revive that method.

The *catheter* is to be made either of ſilver or ſteel, and may be of different ſizes to ſuit different ages. It has the outward appearance of the common *catheter*, and will anſwer all the ſame uſes; but in reſpect of this operation it differs from the common one, in that it is compoſed of two legs with blunt points, a long tube, a ſliding bolt, and a handle, which ſerves to open and ſhut the legs. The bolt, which is fixed to the extremity of the tube, goes into two holes fixed in the plate of the handle; the one ſerves to keep the legs cloſe during the time it is to be introduced into the bladder, and the other to extend them to the diſtance of an inch or more, during the time that the operation is performing. The ſtructure of this *catheter* is well expreſſed by ſome figures given in N° 401 of the Philoſophical Tranſactions, or Abr. vol. ix. p. 179. and the manner of uſing it is this: after having taken the neceſſary precautions, and filled the bladder, the *catheter* is to be introduced into the bladder with its points ſhut; then unbolt it at the handle, and by holding the tube in one hand, and the handle that moves the legs in the other, turn or open the legs till the bolt becomes oppoſite to the ſecond hole upon the plate, into which it muſt be thruſt; then by preſſing gently downward the handle between the patient's legs, the two blunt points will be eaſily felt above the os pubis in the protuberance made by the injection into the bladder.

The advantages propoſed by uſing this *catheter* are theſe: firſt, it is a director to the operator, ſhewing the place in which the puncture is to be made into the bladder; it alſo ſerves as a ſupport to the bladder when the water is run out, and keeps it from ſubſiding during the time of the operation, or till the ſtone is extracted. It ſerves alſo to reſiſt the preſſure of the abdominal muſcles and the peritonæum, and hinders the inteſtines from being forced down upon the knife, keeping the orifice ſufficiently open, till the ſtone or ſtones are taken out. And finally, it may always be diſcovered by the help of this inſtrument, whether the bladder be become ſcirrhous.

The method of performing the operation with this *catheter* is thus: after the *catheter* is introduced, and fixed with its legs open, the two points are to be felt for, above the os pubis; when theſe are found, the finger and thumb are to be placed gently upon them, and the handle is to be held by an aſſiſtant, to keep it firmly in that poſition; then with a knife in the other hand a puncture is to be made immediately into the bladder, directly in the middle between the two points; but for the more ſecurity, it may be made ſomewhat lower, nearer the os pubis: when the knife is thus introduced, a large inciſion is to be made downward, inclining under the arch of the pubis, in proportion to the bigneſs of the ſtone, taking care not to wound the cartilage that joins the bones together when the knife is withdrawn. The bladder being thus ſupported, the ſtone may be taken out either with the fingers, or with a pair of tenets, there being little danger of breaking it in this method. When the operation is finiſhed, the handle of the *catheter* is to be raiſed; it is to be unbolted and ſhut cloſe, then fixed in this poſition and drawn out, and the patient dreſſed in the uſual way. Philoſ. Tranſ. N° 401. p. 786. See LITHOTOMY.

STAFF, in *Surveying*, a kind of ſtand, whereon to mount a theodolite, circumferentor, plain table, or the like, for uſe. It conſiſts of three legs of wood joined together at one end, whereon the inſtrument is placed; and made peeked at the other, to enter the ground. Its upper end is uſually fitted with a BALL and *ſocket*.

STAFF, *ſtation*, in *Surveying*, an inſtrument conſiſting of two rulers that ſlide to ten feet, divided into feet and inches, with a moveable vane or ſight, two of which are uſed with a level; and on the edges there are the links of Gunter's chain divided. Its chief uſe is for the eaſy taking off-ſets. See OFF-*ſet ſtaff*.

STAFF-*tree*, *celaſtrus*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower hath a ſmall one-leaved empalement, cut into five unequal blunt parts; it hath five equal oval petals, which ſpread open; it hath five ſtamina as long as the petals, terminated by ſmall ſummits; and a ſmall germen with a large receptacle, marked with ten deep channels, ſupporting a ſhort ſtyle, crowned by an obtuſe trifid ſtigma; the germen afterwards becomes an oval blunt five cornered capſule, opening in three cells, each containing an oval ſmooth ſeed. Miller enumerates five, and Linnæus ſix ſpecies.

STAFF, *ſhepherd's*, in *Botany*. See TEAZEL.

STAG, or *red deer*, or *hart*, *cervus elaphus* of Linnæus, in *Zoology*, is a ſpecies of DEER, with long upright horns, much branched, and ſlender ſharp brow antlers.

The colour of the *ſtag* is generally a reddiſh brown, with ſome black about the face, and a black liſt down the hind part of the neck, and between the ſhoulders. It grows to a large ſize, weighing ſometimes three hundred and fourteen pounds. The horns of ſome American *ſtags* weigh thirty pounds, and are above four feet high. The *ſtag* is common to Europe, Barbary, the north of Aſia, and North America. It grows to a very large ſize in the ſouthern tract of Siberia. *Stags* are ſtill found wild in the Highlands of Scotland, in herds of four or five hundred together, one male being generally ſupreme in each herd. They are likewiſe met with on the moors that border on Cornwall and Devonſhire, and in Ireland on the mountains of Kerry. Theſe animals are furious and dangerous in rutting-time, which is in Auguſt: they are fond of the ſound of the pipe, ſtanding and liſtening to it attentively. The fleſh of theſe animals is coarſe and rank; the ſkin is uſeful for many purpoſes; and the horns yield hartſhorn. *Tab.* V. *Quadrupeds*, N° 60. Pennant. See HART, HUNTING, and SLOT.

STAG-*beetle*, in *Natural Hiſtory*, is the *lucanus cervus* of Linnæus. *Lucanus*, according to his diſtribution, is a genus of the *coleoptera* order of inſects, whoſe characters are, that the antennæ are elevated, and that the maxillæ are extended, exſerted, and dentated. It comprehends ſeven ſpecies, one of which is the *ſtag-beetle* or CERVUS *volans*.

STAG-*evil*, in the *Manege*. See HART.

STAG-*worms*, in *Natural Hiſtory*, a name given to a ſpecies of worms produced of the eggs of a *fly*, and lodged in a very ſtrange place behind, and under the palate of the *ſtag*, or *deer's* mouth.

They are always found in great numbers together, and are contained in fleſhy bags, which are placed as the almonds of the ears in the human ſpecies. The huntſmen are well acquainted with theſe *worms*, and are of opinion that they are the cauſe of the falling off of the creature's horns; they eat their way to theſe, according to their opinion, through the proper parts of the head, and then gnawing them round at the roots, they are forced to fall like a tree that is ſawed off at the bottom. This however is a vulgar error.

M. Reaumur has abundantly proved that theſe *worms* never attempt ſo ſtrange a paſſage; they always remain where they are firſt found till they are in a ſtate to change into the flies, to whoſe eggs they owe their origin, and whoſe forms they are at length to aſſume. Reaumur's Hiſt. vol. ix. p. 8.

STAG-*horn tree*, in *Botany*. See SUMACH.

STAGGARD, among *Sportſmen*, a male deer only four years old.

STAGE, in the *Modern Drama*, the place of action and repreſentation; included between the pit and the ſcenes.

The *ſtage* anſwers to the proſcenium or pulpitum of the ancient theatre.

For an account of the Engliſh *ſtage*, ſee MYSTERY, PLAYHOUSE, and SCENE.

Unlicenſed *ſtage*-plays are deemed public NUISANCES, and may upon indictment be ſuppreſſed and fined.

STAGE, *laws of the*, are the rules and decorums to be obſerved, with regard to the œconomy and conduct of a dramatic performance to be exhibited on the *ſtage*. Theſe relate, principally, to the unities, the diſpoſition of the acts and ſcenes, the unravelling, &c.

STAGGERS, among *Farriers*, a giddineſs in a horſe's head, which ends in madneſs.

It is frequently occaſioned, by turning out a horſe to graſs too ſoon, before he is well cold: where, by hanging down his head to feed, ill vapours and humours are generated, which oppreſſing the brain, are the proximate cauſe of this diſeaſe. Sometimes it comes by over exerciſe in hot weather, which inflames the blood, &c. and ſometimes by noiſome ſmells in the ſtable, exceſſive eating, &c.

The ſigns of it, are dimneſs of ſight, reeling, and ſtaggering, watery eyes, &c. At length, through extreme pain, he beats his head againſt the wall, thruſts it into the litter, riſes and lies down with fury, &c.

The moſt approved remedy for this diſtemper, which ſhews itſelf in horſes in a giddineſs, and reeling about, in waterineſs of the eyes, and a variety of odd motions of the head, is the following method. The creature is firſt to be blooded largely, then a glyſter is to be given him, compoſed of two quarts of emetic wine, and four ounces of the unguentum populneum. When he has repoſed an hour or two after voiding this glyſter, let another be given him, made of two ounces of the ſcoriæ of the liver of antimony finely powdered, boiled a little while in five pints of beer, and with the addition of four ounces of the ſame ointment, or of ointment of roſes. This laſt glyſter is to be frequently repeated, and his legs are to be all the while rubbed ſtrongly with whiſps of hay, wetted in warm water, to make a revulſion. His food ſhould be bran and white bread, and he ſhould be walked from time to time in ſome temperate place. If theſe methods do not ſucceed, let an ounce of Venice-treacle be diſſolved in a quart of ſome cordial waters and given him; and after this let the following glyſter be given warm: take Venice treacle and ſal polychreſtum, of each two ounces: diſſolve them in two quarts of a decoction of mallows and camomile flowers; add a quarter of a pint of oil of rue. This repeated two or three times after bleeding, and the other methods, will often cure the worſt ſtages of this diſeaſe.

Mr. Boyle mentions a cure of this diſeaſe in horſes, by rubbing their gums with the coach whip till they bleed. Works Abr. vol. i. p. 88.

STAGONIAS, a word uſed by the old authors to expreſs that ſort of male frankincenſe which is in round drops, and very clear and fine.

STAGONIUS, a name ſometimes given to STORAX.

STAINING *of bone, horn, hair,* and *ivory,* ſee each article, and alſo DYING *of bone,* &c.

STAINING *of marble.* See MARBLE and *ſolutions, &c. of* STONES.

STAINING *of paper and parchment.* See PAPER and PARCHMENT.

STAINING *of porcelain.* See PORCELAIN.

STAINING *of ſtones.* See *Solution, and Colours of* STONES.

STAINING *of wood.* See WOOD and DYING.

STAJOLUS, among the *Romans,* a meaſure of length uſed in ſurveying land; it was equal to five palms and three fourths of a palm.

STAIRCASE, an aſcent incloſed between walls, or a baluſtrade, conſiſting of ſtairs or ſteps, with landing-places and rails; ſerving to make a communication between the ſeveral ſtories of a houſe.

The dimenſions of *ſtairs* are differently aſſigned by different authors: in this however they agree, that they muſt not be more than ſix, nor leſs than four inches high; nor more than eighteen, nor leſs than twelve inches broad; nor more than ſixteen, nor leſs than ſix feet long each *ſtair.* But theſe meaſures have only regard to fine buildings, ordinary houſes are excepted; yet even in theſe, the *ſtairs* are not to exceed eight inches in height; nor be leſs than nine inches in breadth; nor three feet in length.

To reduce the dimenſions of *ſtairs* to ſome natural, or at leaſt geometrical ſtandard, Vitruvius borrows the proportions of the ſides of a right angled triangle, which the ancient ſchool expreſſed by the numbers 3, 4, and 5. The firſt for the perpendicular height; the ſecond for the horizontal breadth; and the third for the whole ſlope or inclination, from the edge of one *ſtair* to that of another.

But this rule is ſet aſide, and with good reaſon, by the modern builders. For, on this principle, the lower the *ſtairs,* the narrower they muſt be; and *ſtairs,* for inſtance, four inches high (ſuch as we find mentioned by ancient architects) muſt be but five and one third inches broad.

One rule to be regarded in the making of *ſtairs* is, that they be laid according to the Italian phraſe, *con un tantino da ſcarpa, i. e.* ſomewhat ſloping, or a little higheſt behind, that the foot may, as it were, both aſcend and deſcend at once; which, though obſerved by few, is found a ſecret and delicate deception of the pains in mounting.

The conſtruction of a complete *ſtaircaſe* is one of the moſt curious works in architecture. The common rules to be obſerved therein are as follow:

1°, That it have a full free light to prevent accidents of ſlipping, falling, &c.

2°, That the ſpace over head be large and airy, which the Italians call *un bel ſfocato,* good ventilation, becauſe a man ſpends much breath in mounting.

3°, That the half paces, or landing places, be conveniently diſtributed for repoſing in the way.

4°, That to prevent rencounters, &c. the *ſtaircaſe* be not too narrow; but this laſt is to be regulated by the quality of the building.

5°, That care be taken in placing the *ſtaircaſe,* ſo that, the ſtairs may be diſtributed, without prejudice to the reſt of the building.

The kinds of *ſtaircaſes* are various: in ſome, the ſtairs are *ſtraight,* in others *winding,* in others both ways or *mixed.*

Again, of *ſtraight ſtairs,* called alſo *fliers,* ſome fly directly forwards; others are ſquare; others triangular; and others are called *French flights.*

Of *winding ſtairs,* called alſo *ſpiral,* or *cockle-ſtairs,* ſome are ſquare, ſome circular, and ſome elliptical. And theſe, again, are various; ſome winding round a ſolid, and others round an open newel.

Laſtly, of *mixed ſtairs,* ſome are called *dog-legged;* others both wind about a ſolid newel, and fly about a ſquare open newel.

STAIRS, *ſtraight,* are ſuch as always fly, that is, proceed in a right line; and never wind; whence their denomination.

Of theſe there are ſeveral kinds; as,

Direct fliers, or *plain fliers,* which proceed directly from one floor to another, without turning either to the right or left; theſe are ſeldom uſed, except for garret or cellar *ſtairs.*

Square fliers, which fly round the ſides of a ſquare newel, either ſolid or open, having at every corner of the newel, a ſquare half ſtep, taking up one fourth of a circle. So that they fly from one half ſtep to another, and the length of the *ſtairs* is perpendicular to the ſide of the newel.

Triangular fliers, which fly round by the ſides of a triangular newel, either ſolid or open, having at each corner of the newel a trapezial half ſtep, taking up two thirds of a circle: ſo that they fly from one half ſtep to another; and their length is perpendicular to the ſide of the newel.

French fliers, which fly firſt directly forwards, till they come within the length of a *ſtair* of the wall; and then have a ſquare half pace, from which you immediately aſcend to another half pace, from which the *ſtairs* fly directly back again, parallel to their firſt flight.

STAIRS, *winding,* are ſuch as always wind, and never fly: of theſe there is great variety; as,

Circular winding ſtairs, whereof there are four kinds, viz. ſuch as wind about a ſolid newel, the fore-edge of each being in a right line, pointing to the centre of the newel; commonly uſed in church ſteeples, and great old houſes: ſuch as wind round an open newel, the foreſide of each being in a right line, pointing to the centre of the newel; as thoſe in the Monument, London: ſuch as wind round a ſolid newel, only the fore ſide of each, an arch of a circle, either concave or convex, pointing near to the circumference of the newel: and ſuch as reſemble the laſt, in all other reſpects, ſave that they have an open newel. Any of theſe winding *ſtairs* take up leſs room than other kinds.

In *ſtairs* that wind round a ſolid newel, architects make the diameter of the newel either $\frac{1}{6}$ or $\frac{1}{4}$ or $\frac{1}{3}$ or $\frac{3}{7}$ of that of the *ſtaircaſe,* according as that is in bigneſs. If very ſmall, the newel is but $\frac{1}{6}$, and if large $\frac{3}{7}$, &c.

In *ſtairs* that wind round an open newel, Palladio orders the newel to be one half the diameter of the *ſtaircaſe;* though there does not appear any reaſon why the newel here ſhould not be proportioned to the *ſtaircaſe,* as in the former.

As to the number of *ſtairs* in each revolution; Palladio orders, that, in a *ſtaircaſe* ſix or ſeven feet diameter, the *ſtairs* in each revolution be twelve; if the diameter be eight, the *ſtairs* to be ſixteen; if nine or ten, the *ſtairs* to be twenty; and if eighteen, to be twenty-four.

Elliptical winding ſtairs, whereof there are two kinds; the one winding round a ſolid, the other round an open newel: they are much of the ſame nature as circular *ſtairs,* excepting that, in the one, the newel is a circle, and, in the other, an ellipſis.

Square winding ſtairs, are ſuch as wind round a ſquare newel, either ſolid or open; the fore ſide of each ſquare being in a right line, pointing to the centre of the newel.

Triangular winding ſtairs, are ſuch as wind round a triangular newel; the fore ſide of each being a right line, pointing to the centre of the newel.

Columniated winding ſtairs. Palladio mentions a *ſtaircaſe* in Pompey's portico at Rome, ſet on columns, ſo as that the light they receive from above may diſtribute itſelf to all parts alike.

Double winding ſtairs. Scamozzi mentions a *ſtaircaſe* in this form, made by Piedro del Bergo, and Jean Coſſin, at Sciamburg in France, in the king's palace. It is ſo contrived, as that two perſons, the one aſcending, and the other deſcending, ſhall never meet.

Dr. Grew deſcribes a model of this kind of *ſtaircaſe,* kept in the Muſeum of the Royal Society. The foot of one of the *ſtaircaſes,* he ſays, is oppoſite to that of the other; and both make a parallel aſcent, and within the ſame cylinder. The newel in the middle is hollow, and built with long apertures, to convey light from candles placed at the bottom, and on the ſides of the newel into both caſes.

Quadruple winding ſtairs. Palladio mentions a *ſtaircaſe* of this form, in the caſtle of Chambor, near Bloys. It conſiſts of four *ſtaircaſes,* carried up together, having each its ſeveral entrance, and going up one over another, in ſuch manner, as that, being in the middle of the building, the four ſerve to lead to four apartments: ſo that the people of the one need not go up and down the *ſtairs* of the other; yet, being open in the middle, they all ſee each other paſs.

Mixed ſtairs, are ſuch as partly *fly*, and partly *wind*; whence ſome call them *fliers* and *winders*. Of theſe there are ſeveral kinds; as,

Dog-legged ſtairs, which firſt fly directly forwards, then wind a ſemicircle, and then fly directly backwards, parallel to that.

Square fliers and winders have a ſquare newel, either ſolid or open; and fly by the ſides of the newel, winding a quadrant of a circle at each corner.

Solid and open newelled fliers and winders, are of two kinds; the one winds a quadrant of a circle about a ſolid newel; then flies by the ſide of a ſquare open newel; then winds again, by the ſide of a ſolid newel, then flies again, and ſo alternately. The other flies firſt, then winds and then flies again alternately.

STAIRS, in *Building*, the ſteps whereby we aſcend and deſcend from one ſtory of a houſe to another. See STAIRCASE.

STAKE, the name of a ſmall anvil uſed by ſmiths; ſometimes it ſtands on a broad iron foot, on the work-bench, to be moved up and down occaſionally; and ſometimes it hath a ſtrong iron ſpike at the bottom, by which it is fixed to ſome place on the work-bench. Its uſe is to ſet ſmall and cold work ſtraight, by hammering it on the *ſtake*, or to cut and punch upon with the cold chiſſel, or cold punch.

STAKE *of a plough*; the *ſtake* is an upright piece of wood, paſſing at its bottom through that link of the tow-chain which paſſes through the box of the plough, and at its upper end receiving the end of what is called the *bridle chain*, which ties it to the crow ſtaff, or if it be not long enough, a wythe, or cord, is uſed to tie it: it is alſo tied to it again, a little below the pillow of the plough, by another wythe or cord. See PLOUGH, PILLOW, CROW-STAVES, &c.

STAL-*boat*, a kind of fiſhing-boat, mentioned 27 Eliz. c. 21.

STALACTAGNIA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek *ϛαλακτος*, *ſtillatitious*, or formed by dropping, and *αγνος*, *pure*.

The bodies of this genus are formed by the dropping of water from the roofs of ſubterranean caverns, and are the purer ſort of what are called by authors *ſtalactitæ*. They are cryſtalline ſparry bodies, formed into oblong conical figures, compoſed of various cruſts, and uſually found in form of icicles. Of this genus there are three known ſpecies. Hill.

STALACTITES, or STAGONITES, in *Natural Hiſtory*, a ſparry ſort of icicles, which often hang down from the tops or arches of grottos and ſubterranean caverns; and from the roofs of buildings, and capitals of pillars of ſuch places as are built over hot ſprings, &c.

Of this kind are the *vitriolum ſtalacticum*; the *minera ferri ſtalactica*, and the common dropſtones of ſpar.

The *ſtalactites* which incruſtate or line the tops and ſides of caves, &c. are often manifeſtly formed of ſparry particles raiſed in vapour, and condenſed on the ſtones they hang from. Thoſe in the cave on the top of Bredon hill, Dr. Derham fancies, might be formed by the rain's ſoaking through, and carrying with it impregnations from the ſtones: the hill there being all rocky. See STONE.

STALACTOCIBDELA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek *ϛαλακτος*, *ſtillatitious*, or formed by the dropping of water, and *κιϐδηλος*, *impure*.

The bodies of this genus are formed by the dropping of water from the roofs of ſubterranean caverns, and are the coarſer kinds of what authors have called *ſtalactitæ*. They are cryſtallino-terrene ſpars, formed into oblong bodies, and found hanging from the roofs of caverns and grottos. Of this genus there are only two known ſpecies. Hill.

STALAGMITÆ. See STALAGMOSCIERIA.

STALAGMODIAUGIA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek *ϛαλαγμος*, *a drop*, and *διαυγης*, *pellucid*. The bodies of this genus are the purer kinds of what authors call *ſtalagmitæ*, or *drop-ſtones*.

They are ſpars found in form of ſmall balls, each compoſed of numerous cruſts, and conſiderably pellucid and cryſtalline. Of this genus there are three known ſpecies. Hill.

STALAGMOS, a term uſed by authors to expreſs a diſtillation of rheum from the head.

STALAGMOSCIERIA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek *ϛαλαγμος*, *a drop*, and *σκιερος*, *opake*, and expreſſes an opake ſpar, which has received its form from the dropping of water.

The bodies of this genus are the coarſer kinds of what are called by authors *ſtalagmitæ*, and are ſmall round maſſes, compoſed of numerous thin cruſts, and of an opake and coarſe ſtructure.

Of this genus we have only two known ſpecies. Hill.

Scotland affords a vaſt variety of the *ſtalagmitæ*. One cave, about eight miles diſtant from Aberdeen, on the ſea ſide, has its whole roof cruſted over with *ſtalactitæ*, of a foot in length, hanging down like the fringe of a bed; the floor alſo is as deep covered with congeries of *ſtalagmitæ*; the upper coat, both of theſe and the *ſtalactites*, is of a ſea colour, but the inner parts are as white as ſal prunellæ; the water which drops from theſe is of a very peculiar nature, for it is ſo acrimonious, that if it touch the ſkin but ever ſo ſlightly, it makes it ſmart. Near this cave there is another hollow rock, in which the *ſtalactitæ* make a very beautiful figure: they are all formed into long and thick columns, and ſtand perpendicularly, ſo that they repreſent the pipes of an organ; when broken, they are all found to be hollow within. The rock, and all the ſtone thereabouts, is of the limeſtone kind.

STALE, the urine of cattle. See URINE.

STALE, alſo denotes a living fowl, put in a place to allure and bring others where they may be taken. See DECOY.

For want of theſe, a bird, ſhot, his entrails taken out, and dried in an oven, in his feathers, with a ſtick thruſt through to keep it in a convenient poſture, may ſerve as well as a live one.

STALK, among *Botaniſts*, that part of a plant which riſes immediately from the root, and which uſually ſupports the leaves, the flowers, and the fruit.

The term *ſtalk* is uſed on all occaſions; but in ſpeaking of the graſſes, and gramineous plants, where the word CULM is uſed in its place, to diſtinguiſh that peculiar kind of *ſtalk* which is general to all theſe plants, and is not found in any others.

The terms uſed in deſcribing the *ſtalks* of plants are, a *ſimple ſtalk*, one which runs up undivided from the root to the top.

Naked ſtalk, one that has no leaves.

Folioſe ſtalk, one with leaves on it.

Ramoſe ſtalk, that which ſends out branches.

Erect ſtalk, that which riſes ſtraight up.

Oblique ſtalk, that which is ſlanting.

Voluble ſtalk, that which twiſts round other things.

Flexuous ſtalk, that which bends.

Reclinate ſtalk, that which ſtoops toward the ground.

Procumbent ſtalk, that which lies on the ground.

Creeping, or *ſarmentous ſtalk*, that which emits roots as it runs along.

If the *ſtalk* be rounded in ſhape, it is called *round*; if it make two angles, *ancipital*; if three, *trigonal*; if four, *ſquare*; if more, *polygonal*.

If the *ſtalk* be lightly ridged and furrowed on the ſurface, it is ſaid to be *ſtriated*; if more deeply, *canaliculate*; if full of protuberances, *ſcabrous*; if lightly hairy, *villoſe*; if more roughly, *hiſpid*.

In the *branched ſtalk*, if the branches riſe erect, it is expreſſed by *aſcendant*; if they ſpread, by *diffuſe*; if they are very large, it is called *branchiated*.

If the *ſtalk* divaricate, or, inſtead of ſending out branches, it divide into them, it is called a *compoſite ſtalk*. If theſe divarications proceed by pairs, or if every branch be divided only into two others, it is called *dichotomous*; if it part into two ſeries of branches, it is expreſſed by the term *diſtichous*; if it part into a multitude of ramifications, it is called *ſubdivided*.

All theſe terms are uſed alſo in expreſſing the different ſtates of the *culm*, which, having no articulations, is called *equal*; when ſcaly, *ſquamoſe*.

STALKING, a term of conſiderable import in fowling; applied to a kind of ſcreen, or device to hide the fowler, and amuſe the game, while he gets within ſhot.

Of ſuch devices there are ſeveral kinds.

STALKING-*horſe*, is a horſe trained up for the purpoſe. This horſe ſhould be choſen of the talleſt and largeſt kind; no matter how old he is, but he muſt be well trained and ready at command. The horſe, being properly trained, will walk ſlowly along in any ſort of ground, as ſtubble-fields, mooriſh places, or the banks of rivers, and will always feed, or pretend to feed as he is directed. The ſportſman is to conceal himſelf and his gun behind the horſe's fore-ſhoulder, bending his body low by his ſide, and keeping the whole body of the horſe always full between the fowl and himſelf; when by this means the ſportſman is come ſo near to the birds, that the gun will reach them with ſtrength to kill, he is not to attempt advancing any nearer, that they may not be diſturbed. Some recommend the ſhooting over the horſe's buttocks, and ſome over his neck, but the beſt way is under the neck, and before the breaſt, for by this means the body of the ſportſman is covered by the ſhoulder, and his legs by the legs of the horſe. When the birds are ſhot, the dog will bring them to his maſter, and as they often fall in places where a man cannot come at them, this creature is of very neceſſary ſervice.

This is the beſt of all methods of *ſtalking*; but as ſuch a horſe is difficult to train, chargeable to keep, and is not always to be had, there are many contrivances introduced to ſupply the place of it; among theſe the principal are the *ſtalking* wheelbarrow, the *ſtalking* buſh, and the *ſtalking* hedge. The firſt of theſe is to be thus contrived; take a wheelbarrow, made on purpoſe of light fir, and ſet round about it boughs and buſhes in ſuch a manner, that you may ſit in it, and not be diſcovered by the fowl, and drive it along without giving them diſturbance.

The *ſtalking* buſh is to be contrived of ſeveral buſhes well platted together, with all their leaves on; it is to be faſtened to a ſtake, which is to have an iron point at the end; the whole is to be the height of a man, and thick ſet with boughs all the way, from top to bottom. When the ſportſman ſees his game before him, he is to advance ſlowly with this artificial buſh between him and them: when he is come within a proper diſtance, he is to fix the buſh into the ground, by running in the iron ſpike, and then to ſhoot through the boughs.

The *ſtalking* hedge is generally made about nine feet long, and a yard and half high: it is to be made of ſmall wands, ſo woven together, as to give room for the placing of green boughs among them, that it may reſemble a great growing hedge: this is to be carried before the ſportſman, and, in the manner of the buſh, it is to be faſtened down when near enough for the gun to kill from it.

As birds however are apt to have ſome apprehenſion of terror from ſeeing a tree or hedge move, theſe machines are to be carried on very ſlowly; and the reſemblance of a real animal, as a horſe, or cow, are better for the purpoſe: theſe may be made of canvas, ſupported on a ſlight frame, and with tails of hair. For pheaſants, woodcocks, and the like fooliſh birds, the common flat figure of a horſe will do; but the water fowl are generally much more ſhy, and it is neceſſary, for the getting near them, to have the body made hollow, and ſtuffed with hay, or ſome other matter, to keep it out. The proper time to uſe theſe engines is either early in the morning, or late in the evening; for the ſun-ſhine in the middle of the day very ſoon diſcovers to the fowl the imperfection of the engine.

STALKER, in *Brick-making*. See **Brick**.

Stalkers, in our *Old Writers*, a kind of fiſhing-nets Stat. 13 Rich. II. cap. 20.

STALLAGE, *ſtallagium*, in our *Old Writers*, the liberty, or right of pitching and erecting ſtalls in fairs and markets, or the money paid for the ſame.

STALLION, in the *Manege*, in French *etalon*, a ſtone-horſe kept to breed. See *Breeding of* **Horses** and **Mare**.

STAMINA, in *Botany*, thoſe fine threads, or capillaments, growing up within the flowers of tulips, lilies, and moſt other plants, around the ſtyle or piſtil.

The word is Latin and literally ſignifies *threads*.

They are the male organs of generation in flowers: theſe conſiſt of two parts, a filament and anthera, though ſometimes the latter ſtands alone; the filament is a ſlender body, ſupporting a tumid one, which is the anthera, on its head or top: the anthera is the great male organ of generation, is hollow, and contains in it a fine powder, called **farina** *fæcundans*. Accordingly M. Geoffroy, Mr. Bradley, and other late writers on plants, as well as ſome former, explain the generation of plants, in a manner analogous to that of animals; and maintain the uſe of the *ſtamina* to be to ſecrete, in their fine capillary canals, a juice, which, being collected, hardened, and formed into a farina or duſt in the tips or apices, is thence, when the plant arrives at maturity, diſcharged, by the burſting of the apices, upon the top of the piſtil, whence is a paſſage for it to deſcend into the uterus, where being received, it impregnates and fecundifies the plant.

On this principle, it may be ſaid, that the ſame flower contains both ſexes, which contribute each their part to the generation: that the *ſtamina* are the male part; and the farina, which is always found of an oily, glutinous nature, the ſeminal liquor; and that the piſtil is the female part, which conducts the ſemen to the ova or embryo. See *Generation of* **Plants**, and **Sexual** *Syſtem*.

Stamina, in the *Animal Body*, are thoſe ſimple, original parts, which exiſted firſt in the embryo, or even in the ſeed; and by whoſe diſtinction, augmentation, and accretion by additional juices, the human body, at its utmoſt bulk, is ſuppoſed to be formed.

All that is eſſential to the animal, are the *ſtamina*, which exiſt *in ovo*; the reſt being foreign, additional, and even accidental.

The *ſtamina* ſeem to coincide with the ſolids, which are ſurpriſingly ſmall in quantity.

STAMINEOUS *flowers*, among *Botaniſts*, are ſuch as are ſo far imperfect, as to want thoſe coloured leaves, which we call *petala*; and which only conſiſt of a cup, and a piſtil ſurrounded by ſtamina. See *Tab.* X. *of Botany*, *claſs* 15.

This cup is ſometimes miſtaken for a flower, and its leaves thought to be true petals; but they remain when the *ſtamina* are fallen, and become the capſules containing the ſeed, which is the true character of a cup, not of a flower.

Such plants as bear *ſtamineous* flowers, Mr. Ray makes to conſtitute a large genus, which he calls *herbæ flore imperfecto ſive apetalo, ſtamineove*. And theſe he divides into ſuch as,

1. Have their fruit or ſeed totally divided from the flower; which are ſuch plants as are ſaid to be of different ſexes; the reaſon of which is, that from the ſame ſeed, ſome plants ſhall ariſe with flowers, and no fruit; and others, with fruit and no flowers: ſuch are hops, hemp, ſome ſtinging nettles, ſpinach, mercurialis, and phyllon.

2. Such as have their fruit only a little disjoined from their flowers; as the ambroſia, bardana minor, ricinus, and the heliotropium tricoccon.

3. Such as have their fruit immediately contiguous, or adhering to their flower: and the ſeed of theſe is either,

1. Triangular; of which ſort, ſome are lucid and ſhining; as the lapathum, rhabarbarum, and biſtorta, to which alſo may be added the perſicaria: others are rough, and not ſhining; as the helleborus albus, ſagopyrum, convolvulus niger, and the polygonum.

2. Such as have a roundiſh ſeed, a little flatted or compreſſed, or of any other figure but the former triquetrous or triangular one; and theſe have their flower, or the calyx of the flower, adhering to the bottom or baſis of the ſeed or fruit; as the potamogiton, blitum ſylveſtre, parietaria, atriplex, blitum ſativum, amaranthus holoſericus, and the ſaxifraga aurea,

3. Such whoſe flowers adhere to the top of the ſeed; as the beta, aſarum, alchimilla.

And to theſe kinds of plants, Mr. Ray reduces alſo the kali geniculatum, and ſedum fruticoſum, the ſcoparia or belvidere of the Italians.

STAMNOS, an urn, or veſſel for holding water. Some authors have made it ſignify the bucket-head, as it is called, of thoſe alembics which have no worm, but are cooled about the head by this means.

STAMP-*duties*, are a **tax** impoſed upon all parchment and paper whereon any legal proceedings, or private inſtruments of almoſt any nature whatſoever are written; and alſo upon licences for retailing wines of all denominations; upon all almanacks, newſpapers, advertiſements, cards, dice, and pamphlets, containing leſs than ſix ſheets of paper. Theſe impoſts are very various, according to the nature of the thing ſtamped, riſing gradually from a penny to ten pounds.

This tax, though in many inſtances very burthenſome, is of ſervice to the public in general, by authenticating inſtruments, rendering it much more difficult than formerly to forge deeds of any ſtanding; ſince, as the officers of this branch of the revenue vary their *ſtamps* frequently, by marks perceptible to none but themſelves, a man that would forge a deed of king William's time, muſt know, and be able to counterfeit the *ſtamp* of that date alſo.

The firſt inſtitution of the *ſtamp-duties* was by ſtatute 5 & 6 Will. and Mar. cap. 21. and they have ſince, in many inſtances, been increaſed by ſubſequent ſtatutes to five times their original amount. It would far exceed the limits of this work to recite all the duties of this kind that already exiſt; but it may not be improper to mention ſome of thoſe that are moſt common.

By 5 W. c. 21. 9 & 10 W. c. 25. and 12 Anne ſtat. 2. c. 9. 23 G. III. c. 58, the following duties are enacted, viz. for every ſkin and piece of vellum, or parchment, or ſheet of paper, on which ſhall be written any grant, or letters patent under the great ſeal, or ſeal of the duchy of Lancaſter, or of any honour, dignity, &c. or exemplification of the ſame, 8*l.* for a grant from the king of any ſum above 100*l.* which ſhall paſs the great or privy ſeal, 6*l.*; for a grant of any office above 50*l.* a-year, 6*l.*; for pardon of any crime or forfeiture, warrant of reprieve, or relaxation from any fine, corporal puniſhment, or forfeiture (general circuit, or Newgate pardon excepted), 6*l.*; for diſpenſation to hold two livings, or any other diſpenſation or faculty from the archbiſhop of Canterbury, or maſter of the faculties, 6*l.* and a farther ſum of 40*s.* by 19 Geo. III. cap. 66, and another ſum of 40*s.* by 23 Geo. III. *c.* 58; for admittance of a fellow of the college of phyſicians, or of any attorney, clerk, advocate, proctor, notary, or other officer in any court (except annual officers in corporations, or inferior courts, whoſe office is under 10*l.* a year,) 8*l.*; for appeals from the court of admiralty, arches, or prerogative courts, 6*l.*; for grant of lands in fee, leaſe for years, &c. under the great ſeal or privy ſeal, or ſeal of the duchy of Lancaſter; 4*l.* by the two former acts; for preſentation or donation under the great ſeal, collation, or any preſentation or donation by any patron to any ſpiritual promotion of 10*l.* a year in the king's books, 4*l.* by the ſame ſtatutes, and a farther ſum of 40*s.* by 19 Geo. III. cap. 66; for letters patent for charity briefs, 40*s.* and general circuit or Newgate pardons, 40*s.* both by the firſt ſtatute, and 40*s.* more for each by 23 Geo. III *c.* 58; for regiſter, entry, teſtimonial, certificate of any degree in the univerſities or inns of court (except bachelor of arts), 40*s.* by the ſame, and by 2 Geo. III. cap. 36; for the regiſter entry, &c. of utter barriſter in any of the four inns of court, 40*s.* more, and by 5 Geo. III. cap. 47. 6*l.* more; for inſtitution or licence that ſhall paſs the ſeal of any biſhop, chancellor, or other ordinary, or eccleſiaſtical court (licences to ſchoolmaſters or tutors excepted), 15*s.*; for letters of mart, 15*s.*; for exemplification that ſhall paſs the ſeal of any court, 10*s* and by 19 Geo. III. cap. 66. 5*s.* more; for licence to ſchoolmaſters and tutors, 10*s.*; for probate of a will, or letters of adminiſtration for an eſtate above 20*l.* value (ſeamen or ſoldiers excepted), 10*s.* and by 19 Geo. III. cap. 66. if the eſtate is of 100*l.* value, an additional ſum of 20*s.* if of 300*l.* value, 40*s.*; and by 20 Geo. III. cap. 28. for any receipt or diſcharge for any legacy left by will, or other teſtamentary inſtrument, or ſhare of any perſonal eſtate, divided by the ſtatute of diſtributions, and not exceeding the value of 20*l.* 2*s.* 6*d.*; not amounting to 100*l.* 5*s.*; and 100*l.* or above, 20*s.*; which ſtamped receipt ſhall be the only evidence admiſſible in a court of law or equity: for licence, or certificate of marriage (except that of a ſeaman's widow), 5*s.*; for matriculation in the univerſities, 2*s.*; for admiſſion into the inns of court, 2*s.* and by 2 Geo. III. cap. 36. 40*s.* more, and by 5 Geo. III. cap. 47. 4*l.* more: for indenture (except pariſh appentices) leaſe, or deed poll, charter party, policy of aſſurance, bond, releaſe, contract, or other obligatory inſtrument, proteſt, procuration, order of attorney, or other notarial act, 1*s.* 6*d.* and by 30 Geo. II. cap. 19. for every inſtrument charged with a 6*d.* *ſtamp* by 12 Anne, over and above all other duties, 1*s.* and by 16 Geo. III. cap. 34. 1*s.* more, and by 17 Geo. III. cap. 50. 1*s.* 6*d.* more, except for policies of aſſurance; which, by 10 Anne, cap. 26. and 5 Geo. III. cap. 35. are chargeable with a farther duty of 2*s.* 6*d.*; and by 7 Geo. III. cap. 44. and 8 Geo. III. cap. 25. it ſhall be lawful to aſſure the properties of any number of perſons, in any ſhip, cargo, or both, to the amount of 1000*l.* by a policy with a 5*s.* *ſtamp*; and to the amount of more than 1000*l.* with two 5*s.* *ſtamps*; and by 17 Geo III. cap. 50. for a policy of aſſurance, whereby the property of one or more perſons in houſes and goods ſhall be inſured to a greater amount than 1000*l.* 5*s.* more, under a penalty of 10*l.* and by 20 Geo. III. an additional duty of 1*s.* 6*d.* per 100*l.* on all houſes and goods; for indentures of pariſh apprentices, 6*d.*; for pleadings in any court of law, and copy thereof, 3*d.* each; for copy of a will, 2*d.*; and by 19 Geo. III. c. 66. a farther ſum of 1*d.*

Beſides the duties above recited, and principally impoſed by the three acts above mentioned, there are other duties ariſing from other ſtatutes, ſome of which are as follow, viz.

For every entry in the court books, or record of any corporation or company of any admiſſion into it, 2*s.* by 5 Geo. III. c. 46.; for every certificate or debenture for drawback of cuſtoms, 8*d.* by 9 Anne cap. 23. and by 19 Geo. III. cap. 66. 8*d.* more; for bill of lading for goods exported 4*d.* by 9 Anne, cap. 23. and by 19 Geo. III. cap. 66 4*d.* more; for wine licences, 4*s.* by 9 Anne, cap. 23. and by 30 Geo. II. cap. 19. a farther duty of 5*l.* for perſons not having ale or brandy licence; of 4*l.* for perſons having an ale and not a brandy licence, and of 40*s.* for thoſe who have both; and by 31 Geo. II. cap. 37. the ſame is extended to *ſweets* or made wines: for licence for retailing beer, ale, or other exciſeable liquors, 1*s.* by 9 Anne, c. 23. and 20*s.* more by 29 Geo. II. cap. 12. By 8 Anne, cap. 9. over and above the *ſtamp-duties* upon the indenture, there ſhall be paid by the maſter 6*d.* for every 20*s.* of every ſum of 50*l.* or under; and the duty of 1*s.* for every 20*s.* of every ſum above 50*l.* which ſhall be given or contracted for in relation to any clerk, apprentice, or ſervant (except pariſh apprentices), and proportionably for greater or leſs ſums: perſons admitted to ſue or defend *in forma pauperis*, are not liable to *ſtamp-duties* by 5 Wil. cap. 21. Inſtead of ſeveral *ſtamps*, there may be one general *ſtamp* for the whole, 30 Geo. II. cap. 19. By the ſeveral acts, the commiſſioners ſhall make an allowance (of four per cent. for ſix months, 5 Geo III. cap. 46.) for prompt payment of 10*l.* or upwards, at any one time, except for *ſtamp* of wine licences, by 32 Geo. II. cap. 19.

The penalty of writing on any paper, &c. before it be duly ſtamped is 10*l.* by 5 Will.; and 9 & 10 Will. an officer offending ſhall, beſides, forfeit his office, and an attorney be diſabled to practiſe. The writing is required to be as near the *ſtamp* as poſſible, on pain of 10*l.* 1 Anne, ſt. 2. cap. 22.; nor is the ſame *ſtamp* to ſerve twice on pain of 20*l.* beſides the penalty on unſtamped paper; and by 12 Geo. III. cap. 48. the perſon ſo offending ſhall be guilty of felony, or liable to tranſportation for ſeven years. *Stamps* that are ſpoiled before the writing hath been executed, may, upon oath, be exchanged at the *ſtamp*-office. 5 Geo. III. cap. 46. Counterfeiting and fraudulently uſing the *ſtamps*, incurs the guilt of felony without benefit of clergy.

The *ſtamp-duty* on almanacks is as follows, viz.

For every ſheet almanack for one year or leſs, printed on one ſide, 1*d.* by 9 Anne, cap. 23. and 1*d.* more by 30 Geo. II. cap. 19. and 2*d.* more by 21 Geo. III.; for every other almanack for one year 2*d.* by 9 Anne, cap. 23. and 2*d.* more by 30 Geo. II. cap. 19. and if for more than one year 2*d.* a year to the amount of three years, by 9 Anne, c. 23. and 2*d.* more for every ſuch year, by 30 Geo. II. cap. 19. and 2*d.* more by 21 Geo. III.

By 11 Geo. I. cap. 8. for every journal, or public newſpaper, a duty ſhall be paid of 1*d.* a ſheet, and ½*d.* for every half ſheet; and by 30 Geo. II. cap. 19. for every newſpaper not exceeding one ſheet ½*d.* more, and by 16 Geo. III. cap. 34. ½*d.* more; and by 13 Geo. III. cap. 65. if they be more than one ſheet and a half, they ſhall pay for every ſheet and half ſheet as newſpapers.

For every pamphlet contained in half a ſheet of paper. ½*d.* 10 Anne, cap. 19.; larger than half, but not exceeding a ſheet, for every printed copy, 1*d.*; above one ſheet, not exceeding ſix in octavo, or under twelve in quarto, or twenty in folio, for every ſheet contained in one printed copy, 2*s.* from which are exempt acts of parliament, proclamations, orders of council, forms of prayer, and other acts of ſtate, printed votes, ſchool books, books of devotion, daily accounts of exports and imports, and weekly bills of mortallity, 10 Anne, cap. 19. the penalty of offence is 10*l.* A printed copy of every pamphlet, containing more than one ſheet, ſhall be duly entered, and duty paid, under a penalty of 20*l.*; nor ſhall any pamphlet be expoſed to ſale without the name of the printer or publiſher, under the ſame penalty; and by 6 Geo. II. c. 26. if any perſon ſhall ſell, or expoſe to ſale any newſpaper, or any book, pamphlet, &c. unſtamped, a juſtice of peace may commit him on conviction, by confeſſion, or oath of one witneſs, to the houſe of correction, for any time not exceeding three months.

For every advertiſement in the gazette, or other printed paper, publiſhed weekly or oftener, a duty ſhall be paid of 1*s.* by 10 Anne, cap. 19. and 1*s.* more by 30 Geo. II. cap. 19.; and for every advertiſement contained in, or publiſhed with any paper or pamphlet yearly, monthly, or at any interval of time exceeding one week, 2s.; which duty ſhall be paid within thirty days after publication, on pain of treble duty, with full coſts, 10 Anne, cap. 19. By 20 Geo. III. cap. 28. for every advertiſement in the London Gazette, or other printed paper, to be publiſhed weekly or oftener, there ſhall be paid, over and above all other duties, an additional duty of 6*d.* and for every advertiſement contained in or publiſhed with any paper or pamphlet whatſoever, to be publiſhed yearly or monthly, an additional duty of 6*d.*

The duty on CARDS and dice is as follows, viz.

For every pack of cards made in Great Britain, 6*d.* by 9 Anne, cap. 23.; 6*d* more by 29 Geo. II. cap. 13.; and 6*d.* more by 16 Geo. III. cap. 34.; and for every pair of dice, 5*s.* by the firſt and 5*s.* more by the ſecond, and 2*s.* 6*d.* more by the third ſtatute above cited. Expoſing to ſale cards or dice not ſtamped, incurs a forfeiture, for every pack, and every one of ſuch dice, of 5*l.* with full coſts, 10 Anne, cap. 19. and by 6 Geo. I. cap. 21. 10*l.* with full coſts. Taking off the *ſtamp* of playing cards or outſide paper, with intent to uſe the ſame again, is felony, and tranſportation for ſeven years, by 12 Geo. III. cap. 48. Uſing any ace of ſpades, or wrapper, &c. that has been uſed before, incurs, a forfeiture of 20*l.* 5 Geo. III. cap. 46. Selling waſte cards, that are not rendered unfit for playing, incurs a forfeiture of 20*l.* 29 Geo. II. cap. 13. Selling ſecond-hand cards, that are not rendered unfit for playing, is liable to a penalty of 5*l.* for each pack, 16 Geo. III. cap. 34. Counterfeiting, &c. the *ſtamps* on cards or dice is felony without benefit of clergy.

All receipts are charged with a *ſtamp*-duty of 2*d.* above 40*s.* and of 4*d.* above 20*l.* by 23 Geo. III. c. 47.

For the *ſtamp-duty* on poſt-horſes. See Post. See Promissory *note.* See Burn's Juſtice, vol. iv. art. *Stamps.*

Stamp-*office*, is an office under the direction of five commiſſioners, with an annual ſalary of 500*l.* each, who are impowered to ſubſtitute inferior officers for the management of the *ſtamp*-duties, 5 Will. cap. 21. 9 & 10 Will. c. 25. To this office belong a receiver-general, with an annual ſalary of 600*l.* a comptroller at 400*l.* *per annum*, a ſecretary at 300*l.* *per annum*, and a number of clerks, &c. &c.

STAMPS, in *Metallurgy*, a ſort of large peſtles lifted up by water-wheels, and ſerving to beat to powder the ores, and refuſe of ores of metals.

STAMPING-*mill*, or *knocking-mill*, an engine uſed in the tin-works to bruiſe the ore ſmall.

STANCH, or Staunch, a name given by the country people of Northamptonſhire, and ſome other counties, to a ſpecies of foſſil called SELENITES, from its ſuppoſed virtue in ſtopping fluxes of blood. See Pachodecarhombis.

STANCHIONS, in *Building*. See Punchion.

Stanchions, in a *Ship*, thoſe ſmall pillars of wood or iron, which are uſed for various purpoſes; as to ſupport the decks, the quarter-rails, the nettings, the awnings, &c. The firſt of theſe are two ranges of ſmall columns fixed under the beams, throughout the ſhip's length between decks; one range being on the ſtarboard, and the other on the larboard ſide of the hatchways. They are chiefly intended to ſupport the weight of the artillery.

Stanchions *of the nettings*, are either ſlender bars of iron, whoſe lower ends are fixed in iron ſockets at proper diſtances; or ſquare wooden pillars let into the upper part of the ſhip's ſide. See Quarter-*netting*.

STAND, Stablestand. See Stablestand.

Stand, in *Commerce*, a weight from two hundred and a half to three hundred of pitch.

Stand *of arms.* See Arms.

STANDARD, in *Commerce*, the original of a weight, meaſure, or coin, committed to the keeping of the magiſtrate, or depoſited in ſome public place, to regulate, adjuſt, and try the weights uſed by particular perſons in traffick.

The juſtneſs of weights and meaſures is of that conſequence to the ſecurity and good order of trade, that there is no civilized nation but makes it part of their policy to preſerve the equality thereof by means of *ſtandards.* The Romans and Jews even ſeem to have affixed a kind of religious worſhip to theſe *ſtandards*, by laying them up in their temples, as it were under the eye of their deities.

The *ſtandards* of weights and meaſures in England are appointed, by Magna Charta, to be kept in the exchequer by a ſpecial officer, called the CLERK, or *comptroller of the market.* See Measure and Weight.

The *ſtandard* of gold coin is 22 carats of fine gold and 2 carats of alloy, in a pound weight troy.

The pound weight is cut into forty-four parts and a half, each current for 21 ſhillings. So that the mint-price of fine gold is nearly 4*l.* 4*s.* 11$\frac{1}{2}$*d.* an ounce.

The proportion of ALLOY in other nations is various: according to the ASSAYS of ſundry foreign coins, made at the Tower by the direction of ſir Iſaac Newton, and publiſhed in Arbuthnot's Tables of Coins, the moidores of Portugal, and their ſubdiviſions, and the old piſtoles and doubloons of Spain and Italy, are a little worſe than our *ſtandard*, but within the latitude allowed to our own mint-maſter. See Remedy.

The new louis d'or of France is about a fifth of a carat below that latitude. The ducats of Germany, Holland, Sweden, and Denmark are a carat and a half better than *ſtandard*; and the ſequin of Venice, the fineſt of all the modern European coins, is a carat and ſeven-eighths better, or only the eighth of a carat worſe than fine-gold.

The *ſtandard* gold of England was formerly of the ſame fineneſs with the Venetian ſequin, viz. 23 carats 3$\frac{1}{2}$ grains. Our preſent *ſtandard* of 22 carats was introduced in 1527, about 270 years after the commencement of our gold coinage, for a particular ſort of coin, called CROWNS, of equal value with thoſe of ſilver, and hence this kind of gold has been often diſtinguiſhed by the name of crown gold.

Both the old and new *ſtandard* were continued to the year 1642, ſince which period only the latter has been uſed.

The *ſtandard* of ſilver is 11 ounces and 2 penny weights of ſilver, and 18 penny-weight of alloy of copper. This pound of *ſilver* is cut into 62 ſhillings, whence the proportional value of fine gold to fine ſilver is, in our coinage, as 15$\frac{1}{5}$ to 1. See Gold and Silver.

Whether gold or ſilver be above or below *ſtandard*, is found by aſſaying.

Standard, in *War*, a ſort of banner or flags borne as a ſignal for joining together of the ſeveral troops belonging to the ſame body. See Flag, &c.

Du Cange derives the word from *ſtandarum* or *ſtantarum*, *ſtandardum* or *ſtandale*, words uſed in the corrupt Latin, to ſignify the principal *flag* of an army. Menage derives it from the German, *ſtander*, or the Engliſh, *ſtand.*

The *ſtandard* is uſually a piece of ſilk, a foot and a half ſquare, on which are embroidered the arms, device, or cypher of the prince, or of the colonel. It is fixed on a lance, eight or nine feet long, and is carried in the centre of the firſt rank of a ſquadron of horſe by the cornet.

The *ſtandard* is uſed for any martial enſign of horſe; but more particularly for that of the general; or the royal *ſtandard.* Thoſe borne by the foot are rather called COLOURS.

The ancient kings of France bore St. Martin's hood for their *ſtandard.* The Turks preſerve a green *ſtandard* borne by Mahomet, with a great deal of devotion, as believing it to have been brought down by the angel Gabriel. Every time it is diſplayed, all who profeſs the Mahometan faith are obliged to take arms; thoſe who refuſe are to be deemed as infidels.

Standard-*guard.* See Guard.

Standards, for the Roman, ſee Signa.

Standard, *royal*, in *Sea Language*, is a FLAG in which the imperial enſigns of Great Britain, and the arms of France and Ireland, together with the armorial bearings of Hanover, are united and quartered. This is never hoiſted unleſs when the ſovereign is aboard, and then it is diſplayed at the main-top-maſt-head.

Standards, or Standels, in *Huſbandry*, are young trees, reſerved at the felling of woods, for growth of timber.

Twelve ſuch young trees are to be left ſtanding in every acre of wood, at the felling thereof. 35 Hen. VIII. cap. 17. 13 Eliz. cap. 25. Blount.

STANDING, in *Navigation*, denotes the movement by which a ſhip advances towards a certain object, or departs from it: as the enemy *ſtands* in ſhore, the Engliſh fleet are *ſtanding-off*, &c.

Standing-*coins.* See Coins.

Standing *of colours*, is uſed by painters for their durableneſs in oppoſition to FLYING.

Standing-*marriage*, in the *Law* of Scotland, is uſed to expreſs one actually ſubſiſting, though perhaps reducible for adultery, or liable to be declared void for impotency, or contingency of blood; that is, conſanguinity. Bayne's Crim. Law.

Standing *part of the ſheat*, in a *Ship*, that part of it which is made faſt to a ring at the ſhip's quarter. When they ſay, *overhale the ſheat*, they mean, *hale upon the ſtanding part*; but when they ſay *hale the ſheet* barely, they intend only of the running part.

Standing *part of a tackle*, aboard a *Ship*, is the end of the rope where the block is ſeized or faſtened; as the other which is haled, is called *fall.*

Standing-*ropes*, in a *Ship*. See *Standing* Ropes.

STANNARIES, Stannaria, the mines and works where tin is dug and purified; as in Cornwall, Devonſhire, &c.

There are four courts of the *ſtannaries* in Devonſhire, and as many in Cornwall, for the adminiſtration of juſtice among the tinners. Theſe, which are courts of record, are held before the lord warden and his ſubſtitutes, in virtue of a privilege granted to the workers in the tin-mines there, to ſue and be ſued only in their own courts, that they may not be drawn from their buſineſs, which is highly profitable to the public, by attending their law-ſuits in other courts.

The privileges of the tinners are confirmed by a charter, 33 Ed. I. and fully expounded by a private ſtatute, 50 Ed. III. which has ſince been explained by a public act, 16 Car. I. cap. 15. All tinners and labourers in and about the *ſtannaries* ſhall, during the time of their working therein *bona fide*, be privileged from ſuits in other courts, and be only impleaded in the *ſtannary* courts in all matters, excepting pleas of land, life, and member. No writ of error lies from hence to any court in Weſtminſter-hall, as was agreed by all the judges in 4 Jac. I. But an appeal lies from the ſteward of the court to the under-warden, and from him to the lord-warden, and thence to the privy-council of the prince of Wales, as duke of Cornwall, when he hath had livery or inveſtiture of the ſame; and from thence the appeal lies to the king himſelf, in the laſt reſort. Blakſt. Com. book iii. p. 80.

STANNEL, in *Ornithology*, an Engliſh name of a ſpecies of hawk, more commonly known by the names of the KESTREL, or the *windhover*; and called by Latin authors TINNUNCULUS and *cenchris*.

STANNUM, *tin*. See TIN.

STANZA, in *Poetry*, a certain ſtated number of grave verſes, containing ſome perfect ſenſe, terminated with a reſt, or pauſe.

The word is Italian, and literally ſignifies a ſtand or ſtation, becauſe of the pauſe to be made at the end of each *ſtanza*, or complete ſenſe.

What the *couplet* is in ſongs, and the *ſtrophe* in odes, the *ſtanza* is in the great and graver pieces, as epic poems, &c. Indeed, the Italians ſcarce write any poems but they divide them into *ſtanzas*. There are *ſtanzas* of four, ſix, eight, ten, twelve, and fourteen verſes, and ſometimes of an uneven number of verſes, as five, ſeven, &c. But theſe laſt are ſomewhat more difficult to execute, by reaſon of the three verſes to one rhyme. The French lay it down as a rule, that if the firſt *ſtanza* begin with a maſculine, or a feminine verſe, the ſecond is to begin and end with the ſame.

Every *ſtanza* ought not only to contain a perfect ſenſe, but to be terminated with ſome lively and ingenious thought, or ſome juſt and pertinent reflection.

Stanzas were firſt introduced from the Italian into the French poetry, about the year 1580, and thence they were transferred into the Engliſh.

The uſe of *ſtanzas* in tragedy, or comedy, is condemned by all the beſt critics; for though we ſpeak verſe on the ſtage, it is ſtill preſumed we are ſpeaking proſe. *Stanzas* ſhew a degree of ingenuity on the part of the poet, which has nothing of nature in it on the part of the actor. Add to this, that *ſtanzas* are not fit to expreſs every thing: wrath, threatening, &c. ſit very ill on a regular *ſtanza*: though irreſolution, reveries, and every thing that leads the actor to think on what he is to reſolve, agree well enough with the unequal cadence of the *ſtanza*.

STAPEDIUM, in *Anatomy*, a name given by Albinus to the muſcle of the ſtapes in the ear, called by others *ſtapidis muſculus*, and *ſtapidanus muſculus*.

STAPELIA, *ſwallow wort*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: the flower has a permanent empalement of one leaf, cut into five acute ſegments; it has one large plain petal, cut into five acute ſegments above the middle; and a plain five-pointed ſtarry nectarium, with linear ſegments, whoſe torn points ſurround the parts of generation; it has five plain, broad, erect ſtamina, with linear ſummits faſtened on each ſide, and two oval plain germina, having no ſtyle, crowned by a blunt ſtigma; the germina turn to two oblong taper pods, filled with compreſſed ſeeds, crowned by a feathery down, lying over each other like the ſcales of fiſh. There are two ſpecies.

STAPES, in *Anatomy*, a little bone ſituated in a cavity of the feneſtra ovalis; thus called from its reſembling a ſtirrup. See EAR.

The *ſtapes* is one of the four little bones faſtened to the tympanum of the ear, firſt diſcovered and publiſhed, as Fallopius tells us, by Jo. Phil. ab Ingraſſia, a phyſician of Sicily. Its uſe is in ſtretching or relaxing the membrana tympani.

This bone is divided by anatomiſts into its head, legs, and baſis. The head is placed upon a ſhort flatted neck, the top of it being ſometimes flat, ſometimes a little hollow. The two legs, taken together, form an arch like that of a ſtirrup, in the concave ſide of which is a groove, which runs through their whole length; one of the legs is longer, more bent, and a little broader than the other.

The baſis reſembles that of a ſtirrup, both in its oval ſhape, and union with the legs, except that it is not perforated, as the ſtirrups now are, but ſolid, like thoſe of the ancients. Round its circumference, next the legs, is a little border, which makes that ſide of the baſis appear a little hollow; the other ſide is pretty ſmooth, and one half of the circumference is ſomething more curve than the other. The ſubject being in an erect poſture, the *ſtapes* is to be conſidered as lying on its ſide with the head turned downward, near the extremity of the leg of the incus; the baſis inward being fixed in the feneſtra ovalis, the longeſt leg backward, the ſhorteſt forward, and both in the ſame place. By this ſituation it is eaſy to know the *ſtapes* of each ear. Winſlow.

STAPHYLÆA, in *Botany*. See BLADDER-*nut*.

STAPHYLE, a word uſed by the old Greek writers, ſometimes to expreſs a grape, and ſometimes a diſorder of the uvula, which conſiſts in an extenuation of its ſuperior part, and a tumor of the inferior, whence it hangs down in the ſhape of a grape. The uvula, or gargareon, is alſo thus called by ſome writers.

STAPHYLEPARTES, the name of a chirurgical inſtrument, in uſe among the ancients for elevating the uvula. It is mentioned by Paulus Ægineta.

STAPHYLINI, in *Anatomy*, are two ſmall fleſhy ropes, cloſely united together, as if they made but one muſcle, but diſtinguiſhed in ſome ſubjects by a very fine white line. They are fixed by one extremity in the common point of the poſterior edges of the oſſa palati, and from thence run downward and backward along the middle of the ſeptum, and likewiſe along the middle of almoſt the whole uvula. Theſe two muſcles, which Morgagni, the diſcoverer of them, conſidered as one, have been called AZYGOS *Morgagnii & epiſtaphilini*. See GLOSSO-*ſtaphylini*, PALATOSTAPHYLINUS, PERISTAPHYLINUS, PTERYGOSTAPHYLINUS, SPHENO-*ſalpingo-ſtaphylini*, SPHENOSTAPHYLINUS, and THYRO *ſtaphylini*.

STAPHYLINI, *pharyngo*, are two ſmall muſcles, each of which is fixed by one extremity to the lateral part of the THYRO-*pharyngæi*; from thence they run up obliquely forward along the two poſterior half arches of the ſeptum, and terminate in the ſeptum above the uvula, where they meet together, and ſeem to form an entire arch by the union of their fibres. Winſlow.

STAPHYLINI, *petro-ſalpingo*, or *ſalpingo-ſtaphylini interni*, are thoſe muſcles which are commonly called *peri-ſtaphylini interni*. Each muſcle is fixed by one extremity, partly to the inner ſide of the bony portion of the Euſtachian tube, or that next the apophyſis petroſa, and partly along the cartilaginous portion of the ſame tube; from thence it paſſes a little way under the ſoft membranous part, and then, turning toward the ſeptum, is fixed in the edge, and partly in the upper ſide of it. Winſlow.

STAPHYLINUS, *peri, externus*, is a name commonly given to the *ſtaphylinus externus*, or SPHENO-*ſalpingo-ſtaphylinus*.

STAPHYLINUS, in *Botany*, a name given by ſome authors to the common *daucus ſylveſtris*, wild carrot, or bird's neſt.

STAPHYLINUS, in *Zoology*, the name of a genus of the *coleoptera* order of *inſects*; the characters of which are, that the antennæ are ſlender and filiform; the elytra are dimidiated; the alæ are covered; the tail is ſimple, projecting two oblong veſicles.

Of this genus Linnæus enumerates twenty-ſix ſpecies, diſtinguiſhed from each other by the colour of the ſeveral parts of their bodies.

STAPHYLIS, a name given by ſome authors to a ſort of cup, or boat, made for feeding young children, and contrived with a ſpout in form of a grape or nipple.

STAPHYLODENDRON. See BLADDER-*nut*.

STAPHYLOMA, in *Surgery*, the name of a diſtemperature of the eye, which is of two kinds: in one the cornea is more than uſually protuberant: and in the other the uvea breaks forth, and forms an unſightly tumor on the cornea, either from internal cauſes, or from ſome wounding inſtrument forced through the coat; in which laſt caſe the ſight of the eye is uſually deſtroyed.

This is a very dangerous diſorder, as it not only deforms the face, and deſtroys the ſight of the eye, but very often it induces violent inflammations, head-achs, reſtleſſneſs, abſceſſes, and ſometimes a cancer in theſe parts. In the cure of this diſorder, the tumor and deformity are to be relieved by the application of compreſſes dipped in alum-water, together with a plate of lead and a bandage, or ſome proper inſtrument. If the uva protrudes itſelf through a wound in the cornea, it ſhould be returned with a probe, and the patient muſt be ordered to lie in a ſupine poſture, and the wound muſt conſtantly be dreſſed with the white of an egg, and a mucilage of quince-ſeeds, till it is healed, and by this means the ſight is often reſtored.

If this diſorder is become inveterate and inflexible to all remedies, a needle, armed with a double thread, muſt be paſſed through the middle of the tumor, and the two ends of the thread are then to be tied on a knot, firſt on one ſide, and then on the other, by which means the tumor will gradually wither, and fall off along with the threads; but as this method occaſions a continued pain, and from thence ſometimes ariſe inflammations, it is better to cut off the tumor with a ſcalpel, or ſciſſars. Heiſter's Surgery, p. 423.

STAPIDACEUS *muſculus*, in *Anatomy*, a name given by Duverney, Douglas, and many others, to the muſcle of the ſtapes of the ear, called by others *ſtapidis muſculus*, and by Albinus, *ſtapidium*. See EAR.

STAPLE, STAPULA, primarily ſignifies a public place, or market, whither merchants, &c. are obliged to bring their goods to be bought by the people; as the Greve, or the places along the Seine, for the wines and corns at Paris; whither the merchants of other parts are obliged to bring thoſe commodities.

Voſſius and Menage derive the word from *ſtaplus*, which is found in the Ripuary laws, ſignifying a place where juſtice is adminiſtered. Others derive it from the German *ſtapel*, or Latin *ſtapula*, which Boxhornius derives farther from the German *ſtapelen*, *to put in a heap*. Others again have obſerved, that the Engliſh word *ſtaple* is, in the civil-law Latin ſtyle of former times, termed *ſtabile emporium*, i. e. a fixed port or mart for the importing of merchandize. And hence probably they ſay, the contracted word *ſtaple* (uſed, with ſome ſmall variation in the orthography of it, all over Europe) had its derivation.

STAPLE alſo ſignifies a city or town, where merchants jointly agree to carry certain commodities, as wool, cloth, lead, tin, &c. in order to their being commodiouſly ſold by the great. In England *ſtaples* were ſettled and appointed to be conſtantly kept in ſeveral towns, to which places merchants and traders were to carry goods to ſell in thoſe parts. See *Merchants of the* STAPLE.

The *ſtaple* commodities of England were chiefly wool, leather, cloth, tin, lead, &c. though by *ſtaple goods* are now generally meant any proper ſaleable commodities, not eaſily ſubject to periſh; or ſuch wares and merchandize as are the natural and uſual product or manufacture of any city or country.

The *ſtaples* in the Levant, called by the French *eſchelles*, i. e. *ſcales*, are ſuch cities where the Engliſh, French, Dutch, Italians, &c. have conſuls, factors, and magazines; and whither they ſend veſſels regularly each year. The principal of theſe are Smyrna, Alexandretta, Aleppo, Seyda, Cyprus, Sallee, Alexandria, Cairo, Tunis, Algiers, Tripoli, the Morea, Candia, and the iſlands of the Archipelago. See FACTORY.

STAPLE, *law of the.* See LAW.

STAPLE, *merchants of the*, in the *Hiſtory of Engliſh Commerce*, a denomination given to the firſt and moſt ancient commercial ſociety in England, from their exporting the *ſtaple* wares of the kingdom, which were wool, ſkins, lead, and tin, in their rough ſtate for manufacture. This ſociety is ſaid to have had its riſe in the year 1248; and it appears to have had the legal form of a corporation before the 12th year of Edward II. A. D. 1319; as there are records in the pipe-office of the exchequer, which mention, that it was actually a corporation, with the title of the mayor and conſtables of the *ſtaple* of England, who then had their *ſtaple* at Antwerp, for conducting the ſale of Engliſh *ſtaple* wares, and the importation of ſuch foreign goods as were wanted at home. However, in 1328, by 2 Ed. III. cap. 9. it was enacted, that the *ſtaples*, on both ſides of the ſea, ſhould ceaſe, and that all merchant ſtrangers, &c. might go and come with their merchandize into England, after the tenor of the Great Charter. In 1336 the *ſtaple* of wool was again fixed in Brabant; in 1341, at Bruges; and in 1348, at Calais; whither, and to no other place, all merchandize exported from England, Wales, and Ireland, either by denizens or aliens, were to be ſhipped from England and there landed. The cuſtoms from this *ſtaple* are ſaid to have then amounted to upwards of 60,000*l* ſterling yearly. In 1353, Edward III. removed the *ſtaple* of wool from Bruges to Weſtminſter, Canterbury, Chicheſter, Exeter, Wincheſter, Briſtol, Lincoln, York, Norwich, Newcaſtle, and Hull, for England; and to Dublin, Cork, Waterford, and Drogheda, for Ireland: and it was enacted by 27 Edw. III. called the *ſtatute of the ſtaple*, that all *ſtaple* wares for exportation, ſhould be firſt brought to ſome of theſe places only, where the cuſtom ſhould be paid, and exported by merchant-ſtrangers only, under an oath not to hold any *ſtaple* thereof beyond ſea; which privilege was extended, by 31 Edw. III. to denizens alſo: Calais, however, ſtill remained a *ſtaple*.

In theſe *ſtaple*-towns, courts of *law-merchant* were eſtabliſhed, by the ſaid ſtatute, for determining all mercantile affairs, and for puniſhing and amercing offenders. The principal matters under the cognizance of theſe courts were ſuch as pertained to the five *ſtaple* commodities of England, viz. wool and wool-fels or ſheep-ſkins, leather, lead, and tin. From the year 1375, the *ſtaple* of Weſtminſter ſeems to have been removed to the place called *Staple-Inn*, in Holborn. When Calais, which had been for many years a principal *ſtaple*-port for diſperſing, in more early times, the Engliſh wool, lead, and tin, and in latter times, the Engliſh woollen manufactures, under the conduct of the *merchant-adventurers*, into the inland countries of the Netherlands, France, and Germany, was loſt to this country in 1588, the *ſtaple* for wool, &c. was eſtabliſhed at Bruges; and queen Elizabeth, in the third year of her reign, granted a new charter of confirmation to the corporation of the mayor and conſtables of the *ſtaple* of England, of all ſuch privileges as they did, might, or ought to have enjoyed before the loſs of Calais. However, king James I. in 1604, granted a new charter to the *Merchant* ADVENTURERS, and, in 1617, confirmed all their former powers and privileges for trading to the Netherlands and to Germany, with the woollen manufactures of England, excluſively of all who were not free of their company; in conſequence of which, the merchants of the *ſtaple*, who had before been declining, by the manufacture and exportation of our woollen cloth, were brought to ruin. And when at length it was judged expedient to enact a total prohibition of the exportation of our WOOL, it is no wonder that the *ſtaplers* company ſhould become extinct. At this day they exiſt only in name; though they maintain the form of a corporation by annually electing the officers of their company, according to the direction of their ancient charters. This nominal corporation is kept up by thoſe who deal in wool (ſtill called *wool-ſtaplers*), and who, in their corporate capacity, poſſeſs a ſmall ſum in the public funds, the intereſt of which ſerves to defray the expence of their meetings and elections. But they never had a hall, or office of their own, within the city of London, like other trading companies, although the inn of Chancery in Holborn is ſo denominated from their warehouſes, which were formerly ſituated there; as was alſo an office and warehouſe of theirs, which, ſince the erection of the new bridge at Weſtminſter, has loſt its place, as well as name of *wool-ſtaple*, at the upper part of Cannon-row. Anderſon's Hiſt. Com. vol. i. See CUSTOMS.

STAPLE, *ſtatute.* See STATUTE, and the preceding article.

STAR, STELLA, in *Aſtronomy*, a general name for all the heavenly bodies.

The *ſtars* are diſtinguiſhed, from the phenomena of their motion, &c. into *fixed* and *erratic*.

STARS, *erratic* or *wandering*, are thoſe whoſe diſtances and places, with regard to each other, are continually changing. Theſe are what we properly call PLANETS. Though to the ſame claſs may likewiſe be referred, what we popularly call *blazing ſtars*, or COMETS.

STARS, *fixed*, called alſo, by way of eminence, *ſtars*, are thoſe which have been generally obſerved to keep the ſame diſtance, with regard to each other.

The principal points that have come under the conſideration of aſtronomers concerning the *fixed ſtars*, are, their *diſtance*, *magnitude*, *number*, *nature*, and *motion*.

STARS, *diſtance of the fixed.* The fixed *ſtars* are bodies exceedingly remote from us; indeed ſo remote, that we have no diſtances in the planetary ſyſtem to compare to them.

Their immenſe diſtance is argued hence, that they have no ſenſible PARALLAX; that is, that the diameter of the earth's orbit bears no ſenſible proportion thereto; but they are ſeen the very ſame in all the points thereof. Mr. Huygens (Coſmotheor. lib. iv.) attempts to determine the diſtance of the *ſtars*, by making the aperture of a teleſcope ſo ſmall, as that the ſun through it appears no bigger than Sirius. In this ſtate he found the ſun's diameter to be as 1 to 27664 of his diameter, when ſeen with the naked eye. Were the ſun's diſtance, then, 27664 times as great as it is, it would be ſeen of the ſame diameter with Sirius; ſo that, allowing Sirius to be equal in magnitude with the ſun (which is a very reaſonable ſuppoſition), the diſtance of Sirius from the earth will be found to be to that of the ſun from the earth, as 27664 to 1. On which principle, Sirius will be 657020000 ſemi-diameters of the earth diſtant from our earth.

Mr. James Gregory inveſtigated the diſtance of Sirius, by ſuppoſing it of the ſame magnitude with the ſun, and of the ſame diameter with Jupiter in oppoſition, as may be ſeen at large in Gregory's Aſt. lib. iii. prop. 47.

Caſſini (Mem. d'Acad. ann. 1717), from comparing Jupiter and Sirius, when viewed through the ſame teleſcope, inferred, that the diameter of that planet was ten times as great as that of the *ſtar*, and the diameter of Jupiter being 50″, he concluded that the diameter of Sirius was about 5″; ſuppoſing then that Sirius is equal to the ſun in magnitude, and the diſtance of the ſun from us to be about 10000 diameters of the earth, and the apparent diameter of Sirius being to that of the ſun as 1 to 384, the diſtance of Sirius from the earth becomes equal to 3840000 diameters of the earth.

Theſe methods of Gregory, Huygens, and Caſſini, are conjectural and precarious, becauſe they ſuppoſe that the ſun and Sirius are equal in magnitude, and principally becauſe they take it for granted, that the diameter of Sirius is determined with ſufficient exactneſs.

Mr. Michell has propoſed an inquiry into the probable parallax and magnitude of the fixed *ſtars*, from the quantity of light which they afford us, and the peculiar circumſtances of their ſituation. With this view he ſuppoſes, that they are, at a medium, equal in magnitude and natural brightneſs to the ſun; and then proceeds to inquire what would be the parallax of the ſun, if he were to be removed ſo far from us, as to make the quantity of the light, which we ſhould then receive from him, no more than equal to that of the fixed *ſtars*. Accordingly, he aſſumes Saturn in oppoſition, excluſively of his riſing (and when the earth and this planet are at their mean diſtances from the ſun) as equal, or nearly equal in light to the moſt luminous fixed *ſtar*. As the mean diſtance of Saturn from the ſun is equal to about 2082 of the ſun's ſemidiameters, the denſity of the ſun's light at Saturn will conſequently be leſs than at his own ſurface, in the proportion of the ſquare of 2082 or 4334724 to 1. If Saturn, therefore, was to reflect all the light that falls upon him, he would be leſs luminous in the ſame proportion; and, beſides, his apparent diameter, in oppoſition, is at moſt but 105th part of that of the ſun, and conſequently the quantity of light, which we receive from him, muſt be again diminiſhed in the proportion of the ſquare of 105 or 11025 to 1. By multiplying theſe two numbers together, we ſhall have the whole of the light of the ſun to that of Saturn, as the ſquare nearly of 220,000 or 48,400,000,000 to 1: and removing the ſun to 220,000 times its preſent diſtance, he would ſtill appear at leaſt as bright as Saturn, and his whole parallax upon the diameter of the earth's orbit would be leſs than two ſeconds: and this muſt be aſſumed for the parallax of the brighteſt of the fixed *ſtars*, upon the ſuppoſition that their light does not exceed that of Saturn.

By a ſimilar computation it may be found, that the diſtance, at which the ſun would afford us as much light as we receive from Jupiter, is not leſs than 46,000 times his preſent diſtance, and his whole parallax in that caſe, upon the diameter of the earth's orbit, would not be more than nine ſeconds; the light of Jupiter and Saturn, as ſeen from the earth, being in the ratio of about 22 to 1, when they are both in oppoſition, and ſuppoſing them to reflect equally in proportion to the whole of the light that falls upon them. But if Jupiter and Saturn, inſtead of reflecting the whole of the light that falls upon them, ſhould really reflect only a part of it, e. g. a fourth or ſixth, which may be the caſe, their diſtances computed above, muſt be increaſed in the proportion of 2 or 2½ to 1, to make the ſun's light no more than equal to their's; and his parallax would be leſs in the ſame proportion. Suppoſing then that the fixed *ſtars* are of the ſame magnitude and brightneſs with the ſun, it is no wonder that their parallax ſhould hitherto have eſcaped obſervation; ſince, if this is the caſe, it could hardly amount to two ſeconds, and probably not more than one in Sirius himſelf, though he had been placed in the pole of the ecliptic; and in thoſe that appear much leſs luminous, e. g. γ Draconis, which is only of the third magnitude, it could hardly be expected to be ſenſible with ſuch inſtruments as have hitherto been uſed. However, Mr. Michell ſuggeſts, that it is not impracticable to conſtruct inſtruments, capable of diſtinguiſhing even to the 20th part of a ſecond, provided the air will admit of that degree of exactneſs. This ingenious writer apprehends, that the quantity of light which we receive from Sirius does not exceed the light which we receive from the leaſt fixed *ſtars* of the 6th magnitude, in a greater proportion than that of 1000 to 1, nor in leſs proportion than that of 400 to 1, and the ſmaller *ſtars* of the ſecond magnitude ſeem to be about a mean proportional between the other two. Hence the whole parallax of the leaſt fixed *ſtars* of the 6th magnitude, ſuppoſing them of the ſame ſize and native bigneſs with the ſun, ſhould be from about $2'''$ to $3'''$, and their diſtance from about eight to twelve millions times that of the ſun: and the parallax of the ſmaller *ſtars* of the ſecond magnitude, upon the ſame ſuppoſition, ſhould be about $12'''$, and their diſtance about two millions times that of the ſun.

This author farther ſuggeſts, that, from the apparent ſituation of the *ſtars* in the heavens, there is the higheſt probability (the odds againſt the contrary opinion being many million millions to one) that the *ſtars* are collected together in cluſters in ſome places, where they form a kind of ſyſtem, whilſt in others there are either few or none of them, whether this diſpoſition be owing to their mutual gravitation, or to ſome other law or appointment of the Creator. Hence it may be inferred, that ſuch *double ſtars*, &c. as appear to conſiſt of two or more *ſtars* placed very near together, do really conſiſt of *ſtars* placed near together, and under the influence of ſome general law: and he proceeds to inquire, whether if the *ſtars* are collected into ſyſtems, the ſun does not likewiſe make one of ſome ſyſtem, and which are thoſe, among the fixed *ſtars*, that belong to the ſame ſyſtem with himſelf.

Thoſe *ſtars*, he apprehends, which are found in cluſters, and ſurrounded by many others at a ſmall diſtance from them, belong probably to other ſyſtems and not to ours. And thoſe *ſtars*, which are ſurrounded with nebulæ, are probably only very great *ſtars*, which on account of their ſuperior magnitude, are ſingly viſible, while the others, which compoſe the remaining part of the ſame ſyſtem, are ſo ſmall as to eſcape our ſight. And thoſe nebulæ, in which we can diſcover either none or only a few *ſtars*, even with the aſſiſtance of the beſt teleſcopes, are probably ſyſtems that are ſtill more diſtant from the reſt.

For other particulars of this inquiry, we muſt refer to Phil. Tranſ. vol. lvii. art. 27. p. 234, &c.

As the diſtance of the fixed *ſtars* is beſt determined by their parallax, various methods have been purſued, hitherto without ſucceſs, for inveſtigating it; and the reſult of the moſt accurate obſervations has given us little more than a diſtant approximation, from which we may conclude, that the neareſt of the fixed *ſtars* cannot be leſs than forty thouſand diameters of the whole annual orbit of the earth diſtant from us.

The method pointed out by Galileo, and firſt attempted by Hooke, Flamſteed, Molineux, and Bradley, of taking diſtances of *ſtars* from the zenith that paſs very near it, has given us a much juſter idea of the immenſe diſtance of the *ſtars*, and furniſhed us with an approximation to the knowledge of their parallax, that is much nearer the truth than we ever had before.

Dr. Bradley aſſures us (Phil. Tranſ. Nº 406 or Abr. vol. vi. p. 162.), that, if it had amounted to a ſingle ſecond, or two at moſt, he ſhould have perceived it in the great number of obſervations which he made, eſpecially upon *γ Draconis*; and that it ſeemed to him very probable, that the annual parallax of this *ſtar* is not ſo great as a ſingle ſecond, and conſequently, that it is above four hundred thouſand times farther from us than the ſun.

But Dr. Herſchel, to whoſe ingenuity and induſtry in exploring the heavens aſtronomy is already much indebted, and from which much more may be expected, remarks, that the inſtrument uſed on this occaſion, being the ſame with the preſent zenith ſectors, can hardly be allowed ſufficient to ſhew an angle of one or even two ſeconds with accuracy: and beſides, the *ſtar*, on which the obſervations were made, is only a bright *ſtar* of the third or ſmall *ſtar* of the ſecond magnitude; and, therefore, its parallax is probably conſiderably leſs than that of a *ſtar* of the firſt magnitude: ſo that we are not warranted in inferring, that the parallax of the *ſtars* in general does not exceed $1''$, whereas thoſe of the firſt magnitude may have, notwithſtanding the reſult of Dr. Bradley's obſervations, a parallax of ſeveral ſeconds.

Moreover, the method of zenith diſtances is liable to conſiderable errors, on account of refraction, the change of poſition of the earth's axis ariſing from nutation, preceſſion of the equinoxes, and other cauſes, and the aberration of light.

Dr. Herſchel has propoſed another method, by means of double *ſtars*, which is free from theſe errors, and of ſuch a nature, that the annual parallax, even if it ſhould not exceed the tenth part of a ſecond, may ſtill become viſible and be aſcertained, at leaſt to a much greater degree of approximation than it ever has been done. This method, which was firſt propoſed in an imperfect manner, by Galileo, and has been alſo mentioned by other authors, is capable of every improvement which the teleſcope and mechaniſm of micrometers can furniſh. In order to obtain a general idea of it, let O, E, (*Tab. Aſtronomy, fig.* 55.) be two oppoſite points of the annual orbit, taken in the ſame plane with two *ſtars a, b*, of unequal magnitudes. Let the angle *a* O *b* be obſerved when the earth is at O, and *a* E *b* be obſerved when the earth is at E. From the difference of theſe angles, if there ſhould be any, we may calculate the parallax of the *ſtars*, according to the theory ſubjoined. Theſe two *ſtars* ought to be as near each other as poſſible, and alſo to differ as much in magnitude as we can find them.

Dr. Herſchel's theory of the annual parallax of double *ſtars*, with the method of computing from thence what is generally called the *parallax* of the fixed *ſtars*, or of ſingle *ſtars* of the firſt magnitude, ſuch are neareſt to us, ſuppoſes, *firſt*, that the *ſtars*, one with another, are about the ſize of the ſun: and, *ſecondly*, that the difference of their apparent magnitudes, is owing to their different diſtances, ſo that the *ſtar* of the ſecond, third, or fourth magnitude is two, three, or four times as far off as one of the firſt. Theſe principles, which he premiſes as poſtulata, have ſo great a probability in their favour, that they will hardly be objected to by thoſe who are in the leaſt acquainted with the doctrine of chances. See

Mr. Michell's Inquiry, &c. already cited. Phil. Tranſ. vol. lvii. p. 234, 236, 237, 240. And Dr. Halley on the Number, Order, and Light of the Fixed *Stars*. Phil. Tranſ. vol. xxxi. or Abr. vol. vi. p. 148.

Accordingly, let O E (*Tab. Aſtronomy, fig.* 56.) be the whole diameter of the earth's annual orbit; and let *a*, *b*, *c*, be three *ſtars* ſituated in the ecliptic, in ſuch a manner, that they may be ſeen all in one line O *a b c*, when the earth is at O. Let the line O *a b c* be perpendicular to O E, and draw P E parallel to *c* O: then, if O *a*, *a b*, *b c*, are equal to each other, *a* will be a *ſtar* of the firſt magnitude, *b* of the ſecond, and *c* of the third. Let us now ſuppoſe the angle O *a* E, or parallax of the whole orbit of the earth, to be 1″ of a degree; then we have P E *a* = O *a* E = 1″: and becauſe very ſmall angles, having the ſame ſubtenſe O E, may be taken to be in the inverſe ratio of the lines O *a*, O *b*, O *c*, &c. we ſhall have O *b* E = $\frac{1}{2}''$, O *c* E = $\frac{1}{3}''$, &c. Now when the earth is removed to E, we ſhall have P E *b* = E *b o* = $\frac{1}{2}''$, and P E *a* — P E *b* = *a* E *b* = $\frac{1}{2}''$: i. e. the *ſtars a*, *b*, will appear to be $\frac{1}{2}''$ diſtant. We alſo have P E *c* = E *c* O = $\frac{1}{3}''$, and P E *a* — P E *c* = *a* E *c* = $\frac{2}{3}''$; i. e, the *ſtars a*, *c*, will appear to be $\frac{2}{3}''$ diſtant, when the earth is at E. Now, ſince we have *b* E P = $\frac{1}{2}''$, and *c* E P = $\frac{1}{3}''$, therefore *b* E P — *c* E P = *b* E *c* = $\frac{1}{2}'' - \frac{1}{3}'' = \frac{1}{6}''$; i. e. the *ſtars b*, *c*, will appear to be only $\frac{1}{6}''$ removed from each other, when the earth is at E. Whence we may deduce the following expreſſion, to denote the parallax that will become viſible in the change of diſtance between the two *ſtars*, by the removal of the earth from one extreme of its orbit to the other. Let P expreſs the total parallax of a fixed *ſtar* of the firſt magnitude, M the magnitude of the largeſt of the two *ſtars*, *m* the magnitude of the ſmalleſt, and *p* the partial parallax to be obſerved by the change in the diſtance of a double *ſtar*; then will $p = \frac{m-M}{Mm}P$; and *p*, being found by obſervation, will give us $P = \frac{pMm}{m-M}$.

E. G. ſuppoſe a *ſtar* of the firſt magnitude ſhould have a ſmall *ſtar* of the twelfth magnitude near it; then will the partial parallax we are to expect to ſee be $\frac{12 \times 1P}{12-1}$, or $\frac{11}{12}$ of the total parallax of a fixed *ſtar* of the firſt magnitude; and if we ſhould, by obſervation, find the partial parallax between two ſuch *ſtars* to amount to 1″, we ſhall have the total parallax $P = \frac{1 \times 1 \times 12}{12-1} = 1''.0909$.

If the *ſtars* are of the third and twenty-fourth magnitude, the partial parallax will be $\frac{24-3}{3 \times 24} = \frac{21}{72}P$; and if, by obſervation, *p* is found to be a tenth of a ſecond, the whole parallax will come out $\frac{.1 \times 3 \times 24}{24-3} = 0''.3428$.

Farther, ſuppoſe the *ſtars*, being ſtill in the ecliptic, to appear in one line, when the earth is in any other part of its orbit between O and E; then will the parallax ſtill be expreſſed by the ſame algebraic formula, and one of the maxima will ſtill lie at O, the other at E; but the whole effect will be divided into two parts, which will be in proportion to each other as radius — ſine to radius + ſine of the *ſtars* diſtance from the neareſt conjunction or oppoſition.

When the *ſtars* are any where out of the ecliptic, ſituated ſo as to appear in one line O *a b c* perpendicular to O E, the maximum of parallax will ſtill be expreſſed by $\frac{m-M}{Mm}P$; but there will ariſe another additional parallax in the conjunction and oppoſition, which will be to that which is found 90° before or after the ſun, as the ſine (S) of the latitude of the *ſtars* ſeen at O is to the radius (R); and the effect of this parallax will be divided into two parts; half of it lying on one ſide of the large *ſtar*, the other half on the other ſide of it. This latter parallax, moreover, will be compounded with the former, ſo that the diſtance of the *ſtars* in the conjunction and oppoſition will then be repreſented by the diagonal of a parallelogram, whereof the two ſemi-parallaxes are the ſides; a general expreſſion for which will be $\sqrt{\overline{\frac{m-M}{2mM}P}\Big|^2 \times \frac{SS}{RR} + 1}$; for the *ſtars* will apparently deſcribe two ellipſes in the heavens, whoſe tranſverſe axis will be to each other in the ratio of M to *m* (*fig.* 59,) and A *a*, B *b*, C *c*, D *d*, will be the cotemporary ſituations. Now, if *b* Q be drawn parallel to A C, and the parallelogram *b q* B Q be completed, we ſhall have *b* Q = $\frac{1}{2}$ C A − $\frac{1}{2}$ *c a* = $\frac{1}{2}$ C *c* = $\frac{1}{2}$ *p*, or ſemi-parallax 90° before or after the ſun, and B *b* may be reſolved into, or is compounded of, *b* Q and *b q*; but *b q* = $\frac{1}{2}$ B D — $\frac{1}{2}$ *b d* = the ſemi-parallax in the conjunction or oppoſition. We alſo have R : S : : *b* Q : $bq = \frac{pS}{2R}$; therefore the diſtance B *b* (or D *d*) = $\sqrt{\overline{\frac{p}{2}}\Big|^2 + \overline{\frac{pS}{2R}}\Big|^2}$; and by ſubſtituting the value of *p* into this expreſſion we obtain $\sqrt{\overline{\frac{m-M}{2Mm}P}\Big|^2 \times \frac{SS}{RR} + 1}$, as above. When the *ſtars* are in the pole of the ecliptic, *b q* will become equal to *b* Q, and B *b* will be .7071 $P\frac{m-M}{Mm}$. Again, let the *ſtars* be at ſome diſtance, e. g. 5″ from each other, and let them both be in the ecliptic. This caſe is reſolvable into the firſt; for imagine the *ſtar a* (*fig.* 64.) to ſtand at *x*, and in that ſituation the *ſtars x*, *b*, *c*, will be in one line, and their parallax expreſſed by $\frac{m-M}{Mm}P$. But the angle *a* E *x* may be taken to be equal to *a* O *x*; and as the foregoing formula gives us the angles *x* E *b*, *x* E *c*, we are to add *a* E *x* or 5″ to *x* E *b*, and we ſhall have *a* E *b*. In general, let the diſtance of the *ſtars* be *d*, and let the obſerved diſtance at E be D, then will D = *d* + *p*, and therefore the whole parallax of the annual orbit will be expreſſed by $\frac{DMm - dMm}{m-M} = P$.

Suppoſe the two *ſtars* now to differ only in latitude, one being in the ecliptic, the other e. g. 5″ north, when ſeen at O. This caſe may alſo be reſolved by the former; for imagine the *ſtars b*, *c* (*fig.* 56.) to be elevated at right angles above the plane of the figure; ſo that *a* O *b*, or *a* O *c*, may make an angle of 5″ at O; then, inſtead of the lines O *a b c*, E *a*, E *b*, E *c*, E P, imagine them all to be planes at right angles to the figure; and it will appear that the parallax of the *ſtars* in longitude, muſt be the ſame as if the ſmall *ſtar* had been without latitude. And ſince the *ſtars b*, *c*, by the motion of the earth from O to E, will not change their latitude, we ſhall have the following construction for finding the diſtance of the *ſtars a b*, *a c* at E, and from thence the parallax P. Let the triangle *a b* β (*Tab. Aſtronomy, fig.* 7.) repreſent the ſituation of the *ſtars*; *a b* is the ſubtenſe of 5″, the angle under which they are ſuppoſed to be ſeen at O. The quantity *b* β by the former theorem is found, $\frac{m-M}{Mm}P$, which is the partial parallax that would have been ſeen by the earth's moving from O to E, if both *ſtars* had been in the ecliptic; but on account of the difference in latitude it will be now repreſented by *a* β, the hypothenuſe of the triangle *a b* β: therefore, in general, putting *a b* = *d*, and *a* β = D, we have $\sqrt{\frac{DD - dd \times Mm}{m-M}} = P$. Hence D being taken by obſervation, and *d*, M, and *m*, given, we obtain the total parallax.

If the ſituation of the *ſtars* differs in longitude as well as latitude, we may reſolve this caſe by the following method. Let the triangle *a b* β (*Tab.* IV. *Aſtronomy fig.* 91.) repreſent the ſituation of the *ſtars*, *a b* = *d* being their diſtance ſeen at O, *a* β = D their diſtance ſeen at E. That the change *b* β, which is produced by the earth's motion will be truly expreſſed by $\frac{m-M}{Mm}P$ may be proved as before, by ſuppoſing the *ſtar a* to have been placed at α. Now let the angle of poſition *b a* α be taken by a micrometer, or by any other method ſufficiently exact; then, by ſolving the triangle *a b* α, we ſhall have the longitudinal and latitudinal differences *a* α and *b* α of the two *ſtars*. Put *a* α = *x*, *b* α = *y*, and it will be *x* + *b* β = *a q*, whence $D = \sqrt{\overline{x + \frac{m-M}{Mm}P}\Big) + yy}$; and $\frac{\sqrt{D^2 - y^2} \times M^2 m - xMm}{m-M} = P$.

If neither of the *ſtars* ſhould be in the ecliptic, nor have the ſame longitude or latitude, the laſt theorem will ſtill ſerve to calculate the total parallax whoſe maximum will lie in E. There will, moreover, ariſe another parallax, whoſe maximum will be in the conjunction and oppoſition, which will be divided, and lie on different ſides of the large *ſtar*; but as we know the whole parallax to be exceedingly ſmall, it will not be neceſſary to inveſtigate every particular caſe of this kind; for, by reaſon of the diviſion of the parallax, which renders obſervations taken at any other time, except where it is greateſt, very unfavourable, the formulæ would be of little uſe. Dr. Herſchel cloſes his account of this theory with a general obſervation on the time and place where the maxima of parallax will happen.

When two unequal *ſtars* are both in the ecliptic, or, not being in the ecliptic, have equal latitudes, north or ſouth, and the largeſt *ſtar* has moſt longitude, the maximum of the apparent diſtance will be when the ſun's longitude is 90° more than the *ſtars*, or when obſerved in the morning: and the minimum when the longitude of the ſun is 90° leſs than that of the *ſtar*, or when obſerved in the evening. When the ſmall *ſtar* has moſt longitude, the maximum and minimum, as well as the time of obſervation, will be the reverſe of the former. When the *ſtars* differ in latitudes, this makes no alteration in the place of the maximum or minimum, nor in the time of obſervation; i. e. it is immaterial whether the largeſt *ſtar* has the leaſt or the greateſt latitude of the two *ſtars*. Phil. Tranſ. vol. lxxii. part i. art. 11.

The diſtance of the *ſtar γ Draconis* appears by Dr. Bradley's obſervations, already recited, to be at leaſt four hundred thouſand times that of the ſun, and the diſtance of the neareſt fixed *ſtar* not leſs than forty thouſand diameters of the earth's annual orbit: i. e. the former is diſtant from the earth at leaſt 38,000,000,000,000 miles, and the latter not leſs than 7,600,000,000,000 miles. As theſe diſtances are immenſely great, it may not be unamuſing to compare them with the velocity of ſome moving body by which they may be meaſured.

The ſwifteſt motion we know of is that of LIGHT, which paſſes from the ſun to the earth in eight minutes thirteen ſeconds, and yet this would be above ſix years traverſing the firſt ſpace, and near $1\frac{1}{4}$ year in paſſing from the neareſt fixed *ſtar* to the earth. A cannon ball diſcharged from a twenty-four pounder, with $\frac{2}{3}$ its weight of powder, which moves at the rate of about nineteen miles in a minute (ſee GUN), would be three million eight hundred thouſand years paſſing from *γ Draconis* to the earth, and ſeven hundred and ſixty thouſand years paſſing from the neareſt fixed *ſtar*. Sound, which moves at the rate of about thirteen miles in a minute, would be five million ſix hundred thouſand years traverſing the former diſtance, and one million one hundred and twenty thouſand paſſing through the latter.

The celebrated Huygens purſued ſpeculations of this kind ſo far, as to believe it not impoſſible, that there may be *ſtars* at ſuch inconceivable diſtances, that their light has not yet reached the earth ſince its creation.

Dr. Halley has alſo advanced, what he ſays (Phil. Tranſ. N° 364. or Abr. vol. vi. p. 148.) ſeems to be a metaphyſical paradox, viz. that the number of fixed *ſtars* muſt be more than any finite number, and ſome of them more than at a finite diſtance from others: and Mr. Addiſon has juſtly obſerved, that this thought is far from being extravagant, when we conſider that the univerſe is the work of infinite power, prompted by infinite goodneſs, having an infinite ſpace to exert itſelf in; ſo that our imagination can ſet no bounds to it.

STARS, *the magnitudes of the fixed*, appear to be very different, which difference may probably ariſe, not only from a diverſity in their real magnitudes, but principally from their diſtances, which are different.

The *ſtars* appear of a ſenſible magnitude to the bare eye, becauſe the retina is affected not only by the rays of light which are emitted directly from them, but by many thouſands more, which, falling upon our eye-lids, and upon the aerial particles about us, are reflected into our eyes ſo ſtrongly, as to excite vibrations, not only in thoſe points of the retina where the real images of the *ſtars* are formed, but alſo in other points at the ſame diſtance round about. This makes us imagine the *ſtars* to be much bigger than they would appear, if we ſaw them only by the few rays which come directly from them, ſo as to enter our eyes without being intermixed with others.

Any one may be ſenſible of this by looking at a *ſtar* of the firſt magnitude through a long narrow tube, which though it takes in as much of the ſky as would hold a thouſand ſuch *ſtars*, ſcarce renders that one viſible.

The *ſtars*, on account of their apparently various magnitudes, have been diſtributed into ſeveral claſſes, called *magnitudes*.

The firſt claſs, or *ſtars* of the firſt magnitude, are thoſe which appear largeſt, and may probably be neareſt us. Next theſe, are thoſe of the ſecond magnitude, and ſo on to the ſixth, which comprehends the ſmalleſt *ſtars* viſible to the naked eye. All beyond theſe are called *teleſcopic ſtars*. Not that all the *ſtars* of each claſs appear juſtly of the ſame magnitude; there is great latitude in this reſpect; and thoſe of the firſt magnitude appear almoſt all different in luſtre and ſize. Other *ſtars* there are, of intermediate maguitudes, which aſtronomers cannot refer to one rather than another claſs, and therefore they place them between the two.

Procyon, for inſtance, which Ptolemy makes of the firſt magnitude, and Tycho of the ſecond, Mr. Flamſteed lays down as between the firſt and ſecond.

Thus, inſtead of ſix ſeveral magnitudes, we may ſay there are almoſt as many orders of *ſtars* as there are *ſtars*; ſuch a difference being obſervable in the magnitude, colour, and brightneſs of them.

Whatever room there may be to hope, that we may ſome time or other be able to diſcover the parallax of a few among the fixed *ſtars*, yet at the ſame time it ſeems probable, that we ſhall never be able to diſcover any ſenſible magnitude in their apparent diameters, which even in Sirius, if his native brightneſs is not leſs than that of the ſun, muſt be conſiderably leſs, whatever be his parallax, than the hundredth, probably than the two hundredth part of a ſecond; ſo that it could ſcarcely be diſtinguiſhable with a teleſcope, upon the former ſuppoſition, that ſhould magnify ſix, or, upon the latter, with one that ſhould magnify twelve thouſand times. Nor can we well expect to find their apparent diameters from any occultation by the moon, ſince the diameter of a hundredth part of a ſecond would be covered by the moon, if it entered directly, in leſs than the fiftieth part of a ſecond of time, and, therefore, a *ſtar* can hardly enter ſo obliquely, as to appear to vaniſh by degrees: no *ſtar*, probably, which the moon can paſs over, ſubtending an angle half ſo great. Nor is it likely there can any thing be determined from occultations by any of the planets. And, therefore, there ſeems to be little chance of diſcovering with certainty the real ſize of any of the fixed *ſtars*, and we muſt be content to deduce it from their parallax (if that ſhould ever be found) and the quantity of light which they afford us, compared with that of the ſun. Dr. Herſchel, however, informs us, that with a magnifying power of 6450, and by means of his new micrometer, he found the apparent diameter of *α* Lyræ to be 0″.355.

The *ſtars* are likewiſe diſtinguiſhed, with regard to their ſituation, into *aſteriſms*, or CONSTELLATIONS, which are nothing but aſſemblages of ſeveral neighbouring *ſtars*, conſidered as conſtituting ſome determinate figure, as of an animal, &c. and denominated therefrom; a diviſion as ancient as the book of Job, wherein we find mention of Orion, and the Pleiades, &c.

Beſides the *ſtars* thus diſtinguiſhed into magnitudes and conſtellations, there are others not reduced to either. Thoſe not reduced into conſtellations, are called INFORMES, or *unformed ſtars*; of which kind ſeveral, ſo left at large by the ancients, have been ſince formed into new conſtellations by the modern aſtronomers; as *Cor Caroli*, by Dr. Halley; *Scutum Sobieſci*, by Hevelius, &c.

Thoſe not reduced to claſſes or magnitudes, are called NEBULOUS *ſtars*, being ſuch as only appear faintly in cluſters, in form of little lucid nebulæ, or clouds.

Ptolemy ſets down five cloudy *ſtars*, viz. one at the extremity of the right hand of Perſeus, which appears, through the teleſcope, thick ſet with *ſtars*; one in the middle of the Crab, called *Præſepe*, or the Manger, in which Galileo counted above forty *ſtars*; one unformed near the ſting of the Scorpion; the eye of Sagittarius, in which two *ſtars* may be ſeen in a clear ſky with the naked eye, and ſeveral more with the teleſcope; and one in the head of Orion, in which Galileo counted twenty-one *ſtars*.

Flamſteed obſerved a cloudy *ſtar* before the bow of Sagittarius, which conſiſts of a great number of ſmall *ſtars*, and the *ſtar d* above Sagittarius's right ſhoulder is encompaſſed with ſeveral more.

Caſſini and Flamſteed diſcovered one between the Great and Little Dog, which is very full of *ſtars*, viſible only by the teleſcope.

But the moſt remarkable of all the cloudy *ſtars* is that in the middle of Orion's ſword, in which Huygens, and ſince Dr. Long, obſerved twelve *ſtars*, ſeven of which (three of them, now known to be four, being very cloſe together) ſeem to ſhine through a cloud, very lucid near the middle, but faint and ill defined about the edges. See GALAXY, MAGELLANIC *clouds*, and *lucid* SPOTS.

Caſſini is of opinion, that the brightneſs of theſe proceeds from *ſtars* ſo minute, as not to be diſtinguiſhed by the beſt glaſſes: others more probably think, they are large ſpaces in the æther through which a lucid medium is diffuſed. Although moſt of theſe ſpaces are but a few minutes of a degree in breadth, yet, ſince they are among the fixed *ſtars*, they are probably ſpaces not leſs than our whole ſolar ſyſtem; in which there ſeems to be a perpetual uninterrupted day, which may furniſh matter of ſpeculation, as well to the curious naturaliſt, as to the aſtronomer.

There are alſo ſeveral *ſtars* which appear ſingle to the naked eye, but are diſcovered by the teleſcope to be double, &c. Of theſe ſeveral have been obſerved by Caſſini, Hooke, Long, Maſkelyne, Hornſby, Pigott, Mayer, &c. but Dr. Herſchel has been much the moſt ſucceſsful in obſervations of this kind. Beſides the ſkill and induſtry by which he is no leſs diſtinguiſhed than other aſtronomers, who have been employed in celeſtial obſervations, his ſucceſs has been chiefly owing to the very extraordinary magnifying powers of the Newtonian ſeven feet reflector which he has uſed, and the advantage of an excellent micrometer of his own conſtruction. The powers which he has uſed, have been 146, 227, 278, 460, 754, 932, 1159, 1536, 2010, 3168, and even 6450. He has already formed a catalogue, containing two hundred and ſixty-nine double *ſtars*, two hundred and twenty-ſeven of which, as far as he knows, have not been noticed by any other perſon. Among theſe there are alſo ſome *ſtars*, that are treble, double-double, quadruple, double-treble, and multiple. His catalogue comprehends the names of the *ſtars*, and number in Flamſteed's Catalogue, or ſuch a deſcription of thoſe that are not contained therein, as will be found ſufficient to diſtinguiſh them; the comparative ſize of the *ſtars*; their colours as they appeared to his view; their diſtances determined in ſeveral different ways; their angle of poſition with regard to the parallel of declination; and the dates when he firſt perceived the *ſtars* to be double, treble, &c. His obſervations appear to commence with the year 1776, but almoſt all of them were made in the years 1779, 1780, 1781: and, therefore, much may be expected from his continued aſſiduity. See *Georgium* SIDUS.

Dr. Herſchel has diſtributed the double *ſtars* contained in his catalogue, into ſix different claſſes. In the firſt he has placed all thoſe which require a very ſuperior teleſcope, the utmoſt clearneſs of air, and every other favourable circumſtance to be ſeen at all, or well enough to judge of them: of theſe there are twenty-four, viz.

ε Bootis, Flamſteed's 36. ξ Urſæ Majoris, Fl. 53. σ Coronæ Borealis, Fl. 17. a treble *ſtar*. Fl. 16. Draconis. σ Caſſiopeæ, Fl. 8. Fl. 12. infra oculum Lyncis, a curious treble *ſtar*. *b* Draconis, Fl. 39. ε Draconis, Fl. 63. Fl. 38. in cauda Lyncis media. Fl. 11. in ſiniſtro anteriore pede Monocerotis, a curious treble *ſtar*. Fl. 11. Cancri. *d* Serpentis, Fl. 59. Near Fl. 37. in Aquila, a curious treble *ſtar*. Fl. 24. in Aquila. *i* Bootis, Fl. 44. η Coronæ Borealis, Fl. 2. Near Fl. 51. in Boote. Between θ and δ in Corona Boreale. *h* Draconis near Fl. 19. Fl. 52. in dextro humero Orionis. *c* Trianguli near Fl. 12 and 13. η Orionis, Fl. 33. In poſterioribus femoribus Canis Minoris following Procyon. ζ Cancri, Fl. 16. a very minute treble *ſtar*.

To the ſecond claſs belong all thoſe double *ſtars* that are proper for eſtimation by the eye, and very delicate meaſures of the micrometer. Of this claſs there are thirty-eight, viz.

α Geminorum, Fl. 66. α Herculis, Fl. 64. ρ Herculis, Fl. 75. *p* Serpentarii, Fl. 70. ε Lyræ, Fl. 4 and 5, a very curious double-double *ſtar*. ζ Aquarii, Fl. 55. ζ Coronæ Borealis, Fl. 7. λ Orionis, Fl. 39. quadruple, or a double *ſtar* with two more at a ſmall diſtance. σ Orionis, Fl. 48. a double-treble *ſtar* or two ſets of treble *ſtars*. α Piſcium, Fl. ult. μ Draconis, Fl. 21. ω Aurigæ, Fl. 4. ψ Cygni, Fl. 24. ξ Cephei, Fl. 17. In ſiniſtro anteriore pede Monocerotis, Fl. 11. ξ Bootis, Fl. 37. *g* Serpentarii. Fl. 5. ξ Libræ, Fl. ult. double-double. ε Perſei, Fl. 45. In Serpentario near Fl. 11. In Aquario, Fl. 108. *k* Cygni, Fl. 52. In Orione near Fl. 42. δ Geminorum, Fl. 55. In Aquila near Fl. 54. following *o*. In Aquila near Fl. 63. ζ Sagittæ, Fl. 8. In Dracone Fl. 56. In Sagitta near Fl. 4 β Orionis, Fl. 19. ι Trianguli, Fl. 6. In Triangulo near Fl. 6. In Eridano, Fl. 32. In capite Monocerotis. In Boote following Fl. 15.

The third claſs comprehends all thoſe double *ſtars*, that are more than five but leſs than 15″ aſunder; of which there are forty-ſix, viz.

θ Orionis, Fl. 41. quadruple, being the ſmall teleſcopic trapezium in the nebula. ζ Urſæ Majoris, Fl. 59. η Caſſiopeæ, Fl. 44. In extrem. pedis Caſſiopeæ, Fl. 55. being ſince found to be a treble ſtar of the firſt claſs. γ Andromedæ, Fl. 57. β Cephei, Fl. 8. β Scorpii, Fl. 8. π Bootis, Fl. 29. γ Arietis, Fl. 5. γ Delphini, Fl. 12. κ Bootis, Fl 17. ι Orionis, Fl. 44. treble. ι Orionis, Fl. 44. double-treble, being the preceding or ſmalleſt of the two *i*'s. μ Cygni, Fl. 78. In Delphino, Fl. 1. In extrem. caudæ Lacertæ, Fl. 1. γ Virginis, Fl. 29. ζ Cancri, Fl. 16. In Boote, determined by drawing a line through π and ζ to the ſmall *ſtar* under the right foot, and erecting a perpendicular towards the left foot of equal length, the end of which will mark out this double *ſtar*. In Equuleo, Fl. 1. Infra oculum Lyncis, Fl. 12. In Caſſiopæa, Fl. 34. θ Sagittæ, Fl. 17. treble. In Serpentario, Fl. 39. In Cerbero Fl. Herculis 95. In Nave, near Fl. 3. between η Canis Majoris and ξ Navis. In Nave, near Fl. 9. being one of two teleſcopic *ſtars* under Monoceros. In naribus Monocerotis, Fl. 8. In Leone, Fl 54. In Hercule over ι. In Aquila, Fl. 11. In Aquila, near Fl. 7 and 8. preceding the two ſmall *ſtars* north of *k* and *l*. In Aquario, Fl. 94. In Serpentario, Fl. 54. In Perſeo a little ſouth of γ. In Perſeo near Fl. 38. preceding the firſt *o*, double-double. *o* Perſei. Fl. 40. In Hercule, near Fl. 87. *i* Herculis, Fl. 43. In Triangulo, north following δ. In ſiniſtro anteriore pede Monocerotis, ſouth of two teleſcopic *ſtars* preceding the treble *ſtar*. In ore Monocerotis. In Tauro near Fl. 10. In Monocerote, following the tip of the ear.

The fourth, fifth, and ſixth claſſes, contain double *ſtars* that are from 15″ to 30′, from 30″ to 1′, and from 1′ to 2′ or more aſunder.

The fourth claſs contains forty-four, viz.

α Urſæ Minoris, Fl. 1. η Lyræ, Fl. 20. ξ Capricorni, η Perſei in dextro brachio. In Ariete, Fl. 33. θ Serpentis, Fl. 63. ψ Draconis, Fl. 31. ζ Piſcium, Fl. 86. Ima, ad ψ Piſcium, Fl. 74. χ Tauri, Fl. 59. χ Cygni, Fl. 17. ψ Aquarii, Fl. 91. In Leone, Fl. 83. In Aquila, Fl. 57. In dextra aure Camelopardali ult. Hevelii. In Caſſiopæa, Fl. 31. Cor Caroli, Fl. 12. Canum Venaticorum. In Cygno, Fl. 61. In Auriga, Fl. 14. *o* Draconis, Fl. 47. ξ Orionis, Fl. 50. *f* Cygni, Fl. 63. IIda, ad ω Cygni, Fl. 45. IIItia, ad ω Cygni, Fl. 46. treble. In Ceto, near the place of the periodical *ſtar o*. In Nave, Fl. 19. In Coma Berenices, Fl. 24. In conſt. Geminorum, near γ towards ζ Tauri. *h* Urſæ Majoris, Fl. 23. In Lynce, Fl. 44. In Cepheo, near Fl. 27 treble. In Serpentario, Fl. 61. In Aquila, treble, firſt of two *ſtars* preceding υ. In Aquila near Fl. 64. and preceding θ. β Delphini, Fl. 6. β Serpentis, Fl. 28. δ Equulei, Fl. 7. In Aquario, Fl. 24. In Cygno north following σ. *a* Trianguli, Fl. 10. μ Herculis, Fl. 86. In Hercule juſt by ν. λ Eridani, Fl. ult. in Tauro, near Fl. 4. a ſmall teleſcopic *ſtar* ſouth following *s*.

The fifth claſs contains fifty one *ſtars*, viz.

δ Herculis, Fl. 11. ζ Lyræ, Fl. 6. β Lyræ, Fl. 10. δ Cephei, Fl. 27. β Cygni, Fl. 6.. ν Scorpii, Fl. 14. μ Sagittarii, Fl. 13. treble. κ Herculis, Fl. 7. ι Bootis, Fl. 21. δ Orionis, Fl. 34. ν Draconis, Fl. 24 and 25. λ Arietis, Fl. 9. φ Tauri, Fl. 52. In Monocerote, multiple, being a ſpot over the right foot, comprehending four or five ſmall *ſtars* within one minute. *c* Urſæ Majoris, Fl. 16. σ Piſcium, Fl. 76. π Andromedæ, Fl. 29. α Caſſiopeæ, Fl. 18. γ Herculis, Fl. 20. *c* Pegaſi, Fl. 1. τ Auri. Fl. 29. λ Aurigæ, Fl. 15. multiple, two *ſtars* being within about 30″. In Orione following *f*. In Ceto, Fl. 37. τ Orionis, Fl. 20. *h* Leonis, Fl. 6. In Libra, near Fl. 31. In Cepheo, near β. ν Serpentis, Fl. 53. In Serpentario, Fl. 53. In Aquila, next but one preceding δ. α Andromedæ. *b* Aquilæ, Fl. 15. In Aquila near Fl. 28. In Aquila near that which follows θ. *o* Scuti, Fl. 2. In Aquilla. υ Coronæ, Fl. 18. treble. In Hercule, Fl. 23. α Lyræ, Fl. 3. ν Lyræ Fl. 8. treble. A Perſei. Fl. 43. In Lyra juſt by η. In Cygno, Fl. 76. In Cygno, Fl. 69. treble. In Cygno, ſouth of two teleſcopic *ſtars* following τ. *c* Cygni, Fl. 16. Ima. ad *c*. Cygni, Fl. 26. IIda. ad *c*. In conſtell. Piſcium, a teleſcopic *ſtar* juſt by θ northwards. In Ariete, Fl. 30. γ Leporis, Fl. 13. In Sagitta north following ε.

The ſixth claſs contains ſixty-ſix *ſtars*, viz.

o Ceti, Fl. 68. *o* Serpentarii, Fl. 67. δ Lyræ, Fl. 11. α Capricorni, Fl. 5. In conſt. Arietis, Fl. 35. ε Capricorni, Fl. 39. τ Tauri, Fl. 94. κ Tauri. Fl. 59. ζ Geminorum, Fl. 43. *o* Cygni, Fl. 31. α Leonis, Fl. 32. τ Leonis, Fl. 84. *o* Leonis, Fl. 95. η Serpentis, Fl. 58. In conſt. Bootis near Fl. 6. δ Bootis, Fl. 49. μ Bootis, Fl. 51. ν Coronæ, Fl. 21. χ Perſei, multiple. μ Perſei, Fl. 51. η Pegaſi, Fl. 44. In conſt. Draconis, between α Draconis and the tail of Urſa Major. In Naribus Lyncis. *d* Caſſiopeæ, Fl. 4. treble. In conſt. Caſſiopeæ, Fl. 3. ε Sagittæ, Fl. 11. In conſt. Aquilæ north of θ. β Capricorni, Fl. 9. π Capricorni, Fl. 10. α Aurigæ, Fl. 13. *d* Tauri, Fl. 88. λ Cygni, Fl. 54. In conſt. Cygni, Fl. 32. θ Aurigæ, Fl. 37. In conſt. Camelopardali, Fl. 13. In conſt. Camelopardali, Fl. 10. *c* Draconis, Fl. 46. ε Draconis, Fl. 64 or 65. α Orionis, Fl. 58. γ Leporis, Fl. 13. ρ Cancri Vta ad ρ, Fl. 67. β Geminorum, Fl. 78. multiple. θ Virginis, Fl. 51. ι Libræ, Fl. 24. In conſt. Andromedæ, near ι towards *o*. α Aquilæ, Fl. 53. In conſt. Aquilæ, near Fl. 35. one of the preceding *ſtars* of a ſmall quartile near *c*. In conſt. α Aquilæ, near Fl. 35. as the former. In conſt. Aquilæ, the following *ſtar* of a trapezium near *l*. In conſt. Aquilæ as the former. In Monte Mænali Heveliana near the middle. In conſt. Bootis between ε and *f*. In conſt. Bootis more ſouth than *i*. In conſt. Serpentarii more ſouth than *o*. In conſt. Caſſiopeæ, Fl. 2. θ Lyræ, Fl. ult. In conſt. Cygni, Fl. 79. In conſt. Aquarii, Fl. 5. In conſt. Cygni, near Fl. 28. near *b*. In conſt. Cygni near the ſecond *c*. In conſt. Piſcium near Fl. 7. preceding *b*. κ Piſcium, Fl. 8. In conſt. Sagittæ north following ε. In conſt. Eridani near ν. In capite Monocerotis, multiple, being one *ſtar* with at leaſt twelve around it. α Tauri, Fl. 87. the apparent diameter of which, upon the meridian meaſured with a power of 460, at a mean of two obſervations $1'' 46'''$, and with 932, $1'' 12'''$ a mean of two obſervations.

Dr. Herſchel has diſtinguiſhed thoſe double *ſtars* in the preceding catalogue, which have been obſerved by others as well as by himſelf, with a peculiar mark. Phil. Tranſ. vol. lxxii. part i. art. 12.

The *number of* STARS appears to be vaſtly great, almoſt infinite; yet have aſtronomers long ago aſcertained the number of thoſe viſible to the eye, which are found much fewer than one would imagine. See CATALOGUE of the *Stars*.

Of the 3000 contained in the Britannic Catalogue, there are many only viſible through a teleſcope; nor does a good eye ſcarce ever ſee more than a thouſand at the ſame time in the cleareſt heaven; the appearance of innumerable more, frequent in clear winter nights, ariſing from our ſight's being deceived by their twinkling, and from our viewing them confuſedly, and not reducing them to any order. Yet, for all this, the *ſtars* are really almoſt infinite. See Halley, on the Number, Order, and Light of the fixed *Stars*, Phil. Tranſ. N° 364, or Abr. vol. vi. p. 148.

Riccioli makes no ſcruple to affirm, in his new Almageſt, that a man who ſhould ſay there are above twenty thouſand times twenty thouſand, would ſay nothing improbable.

For a good teleſcope, directed to almoſt any point of the heavens, diſcovers numbers that are loſt to the naked ſight; particularly in the Milky Way, which ſome ſuppoſe to be an aſſemblage of *ſtars*, too remote to be ſingly ſeen, but ſo cloſely diſpoſed as to give a luminous appearance to that part of the heavens where they are.

The fact, however, is diſputed, and the whiteneſs of the Milky Way muſt, therefore, be owing to ſome other cauſe.

In the ſingle conſtellation of the PLEIADES, inſtead of 6, 7, or 8 *ſtars* ſeen by the beſt eye, Dr. Hooke, with a teleſcope twelve feet long, told 78, and with larger glaſſes many more of different magnitudes. And F. de Rheita, a Capuchin, affirms, that he has obſerved above 2000 *ſtars* in the ſingle conſtellation of Orion.

The ſame author found above 188 in the Pleiades. And Huygens, looking at the *ſtar* in the middle of Orion's ſword, inſtead of one found it to be twelve. Galileo found eighty in the ſpace of the belt of Orion's ſword, 21 in the nebulous *ſtar* of his head, and above 500 in another part of him, within the compaſs of one or two degrees ſpace, and more than 40 in the nebulous *ſtar* Præſepe. See *Magnitudes of the* STARS, *ſupra*.

If an ordinary teleſcope, therefore, will, in ſeveral parts of the heavens, diſcover ten times as many *ſtars* as are viſible to the naked eye, what may not be expected from the improved magnifying powers of modern times.

The *changes that have happened in the* STARS are very conſiderable; contrary to the opinion of the ancients, who held, that the heavens and heavenly bodies were incapable of any change, the matter thereof being permanent and eternal, infinitely exceeding the hardneſs of diamonds, and not ſuſceptible of any different form. And, in effect, till the time of Ariſtotle, and even two hundred years afterwards, there had no change been obſerved. The firſt was above 120 years before the incarnation; when Hipparchus, diſcovering a new *ſtar* to appear, was firſt induced to make a CATALOGUE of the *ſtars*, that poſterity might perceive any future changes of the like kind.

In the year 1572, Cornelius Gemma and Tycho Brahe obſerved another new *ſtar* in the conſtellation Caſſiopea, which was, likewiſe, the occaſion of Tycho's making a new catalogue. Its magnitude and brightneſs, at firſt, exceeded that of the biggeſt of our *ſtars*, Sirius and Lyra; it even equalled that of Venus when neareſt the earth, and was ſeen in fair day-light. It continued ſixteen months; towards the latter end whereof, it began to dwindle, and at laſt, viz. March, 1574, totally diſappeared, without any change of place in all that time.

Leovicius tells us of another *ſtar* appearing in the ſame conſtellation, about the year 945, which reſembled that of 1572, and quotes another ancient obſervation, whereby it appears, that a new *ſtar* was ſeen about the ſame place in 1264.

Dr. Keil takes thoſe to have been all the ſame *ſtar*.

Fabricius, in 1596, diſcovered another new *ſtar*, called the *ſtella mira*, or *wonderful ſtar*, in the neck of the Whale, which has been ſince found to appear and diſappear periodically, ſeven times in ſix years, continuing in the greateſt luſtre for 15 days together; and is never quite extinguiſhed. Its courſe and motion are deſcribed by Bullialdus, in a treatiſe printed at Paris in 1667.

Dr. Herſchel has lately, viz. in the years 1777, 1778, 1779, and 1780, made ſeveral obſervations on this *ſtar* an account of which may be ſeen in the Phil. Tranſ. vol. lxx. part ii. art. 21.

In the year 1600, William Janſenius diſcovered a changeable *ſtar* in the neck of the Swan, which, in time, became ſo ſmall as to be thought to diſappear entirely, till the years 1657, 1658, and 1659, when it recovered its former luſtre and magnitude; but ſoon decayed, and is now of the ſmalleſt ſize.

In the year 1604, Kepler, and ſeveral of his friends, ſaw a new *ſtar* near the heel of the right foot of Serpentarius, particularly bright and ſparkling; and took notice, that it was every moment changing into ſome of the colours of the rainbow, except when it is near the horizon, at which time it was generally white. It ſurpaſſed Jupiter in magnitude, but was eaſily diſtinguiſhed from it, by the ſteady light of that planet. It diſappeared between October, 1605, and the February following, and has not been ſeen ſince that time.

Simon Marius diſcovered another in Andromeda's girdle, in 1612 and 1613, though Bullialdus ſays, it had been ſeen before in the 15th century.

In July, 1670, Hevelius diſcovered a ſecond changeable *ſtar* in the Swan, which, in October, was ſo decayed as to be ſcarce perceptible: in April following it regained its former luſtre, but wholly diſappeared in Auguſt: in March, 1672, it was again ſeen, but appeared very ſmall, and has not been viſible ſince.

In 1686, a third changeable *ſtar* was diſcovered by Kirchius in the Swan, viz. the *ſtar* χ of that conſtellation, which returned periodically in about four hundred and five days.

In 1672, Caſſini ſaw a *ſtar* in the neck of the Bull, which he thought was not viſible in Tycho's time, nor when Bayer made his figures.

It is certain, from the old catalogues, that many of the ancient *ſtars* are not now viſible. This has been particularly remarked with regard to the PLEIADES.

M. Montanari, in his letter to the Royal Society in 1670, obſerves, that there are now wanting in the heavens two *ſtars* of the ſecond magnitude, in the ſtern of the ſhip Argo, and its yard, which had been ſeen till the year 1664. When they firſt diſappeared is not known; but he aſſures us, there was not the leaſt glimpſe of them in 1668 He adds, he has obſerved many more changes in the *fixed ſtars*, even to the number of a hundred.

Many other changes in the *ſtars* have been taken notice of by Caſſini, Maraldi, and other obſervers. See Gregory's Aſt. lib. ii. prop. 30.

As none of theſe *ſtars* could ever be perceived to have tails, it is plain they could not be comets; eſpecially as they had no parallax, even when largeſt and brighteſt. It is not improbable that the periodical *ſtars* have vaſt cluſters of dark ſpots, and very ſlow rotations on their axes, by which means they muſt diſappear when the ſide covered with ſpots is turned towards us. And as for thoſe which break out on a ſudden with ſuch luſtre, theſe may, perhaps, be ſuns whoſe fuel is almoſt ſpent, and again ſupplied by ſome of their comets falling upon them, and occaſioning an uncommon blaze and ſplendor for ſome time; which has been conjectured to be one uſe of the cometary part of any ſyſtem.

M. Maupertuis, in his Diſſertation on the Figures of the Celeſtial Bodies (p. 61—63.), is of opinion, that ſome *ſtars*, by their prodigious ſwift rotation on their axes, may not only aſſume the figures of oblate ſpheroids, but that by the great centrifugal force ariſing from ſuch rotations, they may become of the figures of mill-ſtones, or be reduced to flat circular planes, ſo thin as to be quite inviſible when their edges are turned towards us, as Saturn's ring is in ſuch poſition. But when very eccentric planets or comets go round any flat *ſtar* in orbits much inclined to its equator, the attraction of the planets or comets in their perihelions muſt alter the inclination of the axis of that *ſtar*; on which account it will appear more or leſs large and luminous, as its broad ſide is more or leſs turned towards us. And thus he imagines we may account for the apparent changes of magnitude and luſtre of thoſe *ſtars*, and likewiſe for their appearing and diſappearing.

Hevelius (Cometograph. p. 380.) apprehends, that the ſun and *ſtars* are ſurrounded with atmoſpheres, and that, whirling round their axes with great rapidity, they throw off great quantities of matter into thoſe atmoſpheres, and thereby cauſe great changes therein; and that thus it may come to paſs, that a *ſtar*, which when its atmoſphere is clear, ſhines out with great luſtre, may at another time, when it is full of clouds and thick vapours, appear greatly diminiſhed in brightneſs and magnitude, or even become quite inviſible.

As for *the nature of the fixed* STARS, their immenſe diſtance leaves us greatly at a loſs about it. What we can gather for certain from their phenomena is as follows:

1. That the fixed *ſtars* are greater than our earth: becauſe, if that was not the caſe, they could not be viſible at ſuch an immenſe diſtance.

2. The fixed ſtars are farther diſtant from the earth than the fartheſt of the planets. For we frequently find the fixed *ſtars* hid behind Saturn's body, the moſt diſtant of the planets: and beſides, they have no parallax, which the planets have.

3. The fixed *ſtars* ſhine with their own light; for they are much farther from the ſun than Saturn, and appear much ſmaller than Saturn; but ſince, notwithſtanding this, they are found to ſhine much brighter than Saturn, it is evident they cannot borrow their light from the ſame ſource as Saturn does, viz. the ſun; but ſince we know of no other luminous body beſide the ſun, whence they might derive their light, it follows, that they ſhine with their own native light.

Beſides, it is known, that the more a teleſcope magnifies, the leſs is the aperture through which the *ſtar* is ſeen; and conſequently, the fewer rays it admits into the eye. Now ſince the *ſtars* appear leſs in a teleſcope, which magnifies two hundred times, than they do to the naked eye, inſomuch that they ſeem to be only indiviſible points, it proves at once that the *ſtars* are at immenſe diſtances from us, and that they ſhine by their own proper light. If they ſhone by borrowed light, they would be as inviſible without teleſcopes as the ſatellites of Jupiter are; for theſe ſatellites appear bigger when viewed with a good teleſcope than the largeſt fixed *ſtars* do. Hence,

1. We deduce, that the fixed *ſtars* are ſo many ſuns; for they have all the characters of ſuns.

2. That, in all probability, the *ſtars* are not ſmaller than our ſun.

3. That it is highly probable, that each *ſtar* is the centre of a ſyſtem, and has planets or earths revolving round it, in the ſame manner as round our ſun, i. e. it has opake bodies illuminated, warmed, and cheriſhed by its light.

As we have incomparably more light from the moon than from all the *ſtars* together, it is abſurd to imagine that the *ſtars* were made for no other purpoſe than to caſt a faint light upon the earth; eſpecially ſince many more require the aſſiſtance of a good teleſcope to find them out than are viſible without that inſtrument. Our ſun is ſurrounded by a ſyſtem of planets and comets, all which would be inviſible from the neareſt fixed *ſtar*; and from what we already know of the immenſe diſtance of the *ſtars*, it is eaſy to prove, that the ſun, ſeen from ſuch a diſtance, would appear no bigger than a *ſtar* of the firſt magnitude.

From all this it is highly probable, that each *ſtar* is a ſun to a ſyſtem of worlds moving round it, though unſeen by us; eſpecially as the doctrine of a plurality of worlds is rational, and greatly manifeſts the power, wiſdom, and goodneſs of the great Creator.

How immenſe, then, does the univerſe appear! Indeed, it muſt either be infinite, or infinitely near it.

Kepler, it is true, denies that each *ſtar* can have its ſyſtem of planets as ours has; and takes them all to be fixed in the ſame ſurface or ſphere; urging, that were one twice or thrice as remote as another, it would appear twice or thrice as ſmall, ſuppoſing their real magnitudes equal; whereas there is no difference in their apparent magnitudes, juſtly obſerved, at all. But to this we oppoſe, that Huygens has not only ſhewn, that fires and flames are viſible at diſtances where other bodies, comprehended under equal angles, diſappear; but it ſhould likewiſe ſeem, that the optic theorem about the apparent diameters of objects, being reciprocally proportional to their diſtances from the eye, does only hold while the diameter of the object has ſome ſenſible ratio to its diſtance.

As for periodical *ſtars*, &c. ſee *changes*, &c. of STARS, ſupra.

Motion of the STARS. The fixed *ſtars* have two kinds of apparent motion; one called the *firſt*, *common*, or *diurnal motion*, ariſing from the earth's motion round its axis: by this they ſeem to be carried along with the ſphere, or firmament (wherein they appear fixed) round the earth, from eaſt to weſt, in the ſpace of twenty-four hours.

The other, called the *ſecond*, or *proper motion*, is that whereby they appear to go backwards from weſt to eaſt, round the poles of the ecliptic, with an exceeding ſlowneſs, as not deſcribing above a degree of their circle in the ſpace of 72 years, or 50 ſeconds in a year.

This apparent motion is owing to the receſſion of the equinoctial points, which is 50 ſeconds of a degree in a year backward, or contrary to the order of the ſigns of the zodiac.

Some have imagined, but it is unknown on what grounds, that when they are got round to the points, whence they firſt departed, nature will have finiſhed her courſe; and the *ſtars* having performed their career, the heavens will remain at reſt; unleſs the Being, who firſt gave them motion, appoint them to begin another circuit.

On the footing of this calculation, the world ſhould laſt about 30000 years, according to Ptolemy; 25816, according to Tycho; 25920, according to Riccioli; and 24800, according to Caſſini.

In conſequence of this ſecond motion, the longitude of the *ſtars* will be always increaſing.

Thus, e. gr. the longitude of Cor Leonis was found by Ptolemy, A. D. 138, to be 2° 30′; in 1115, it was obſerved by the Perſians to be 17° 30′; in 1364, by Alphonſus, 20° 40′; in 1586, by the prince of Heſſe, 24° 11′; in 1601, by Tycho, 24° 17′; and in 1690, by Mr. Flamſteed, 25° 31′ 20″: whence the proper motion of the *ſtars*, according to the order of the ſigns in circles parallel to the ecliptic, is eaſily inferred.

It was Hipparchus who firſt ſuſpected this motion, upon comparing the obſervations of Timocharis and Ariſtylius, with his own. Ptolemy, who lived three centuries after Hipparchus, demonſtrated the ſame by undeniable arguments.

Tycho Brahe makes the increaſe of longitude in a century 1° 25′; Copernicus, 1° 23′ 40″ 12‴; Flamſteed and Ricciolus, 1° 23′ 20″; Bullialdus, 1° 24′ 54″; Hevelius, 1° 24′ 46″ 50‴; whence, with Flamſteed, the annual increaſe of the longitudes of the fixed *ſtars* may be well fixed at 50″.

From theſe data, the increaſe of the longitude of a *ſtar* for any given time is eaſily had; and hence the longitude of a *ſtar* for any given year being given, its longitude for any other year is readily found: e. gr. the longitude of Sirius, in Mr. Flamſteed's tables, for the year 1690, being 9° 49′ 1″; its longitude for the year 1724, is found by multiplying the interval of time; viz. 34 years by 50″, the product 1700″, or 28′ 20″ added to the given longitude, will give the longitude required, 10° 17′ 21″. By means of this correction, the longitudes of the *ſtars*, tranſcribed from Mr. Flamſteed's tables, under the ſeveral conſtellations, may be adapted to the preſent or any given time.

The principal phenomena of the fixed *ſtars*, ariſing from their common and proper motion, beſides their longitude, are their altitudes, right aſcenſions, declinations, occultations, culminations, riſings, and ſettings. See ALTITUDE, ASCENSION, DECLINATION, and OCCULTATION.

Some have ſuppoſed that the latitudes of the *ſtars* are invariable; but this ſuppoſition is founded on two aſſumptions, which are both controverted among aſtronomers; one is, that the orbit of the earth continues unalterably in the ſame plane, and conſequently that the ecliptic is invariable, the contrary of which is now very generally allowed. See ECLIPTIC.

The other aſſumption is, that the *ſtars* are ſo fixed as to keep their places immoveably. Ptolemy, Tycho, and others, comparing the obſervations of ancient aſtronomers with their own, have adopted this opinion. But from the reſult of the compariſon of our beſt modern obſervations, with ſuch as were formerly made with any tolerable degree of exactneſs, there appears to have been a real change in the poſition of ſome of the fixed *ſtars*, with reſpect to each other; and ſeveral *ſtars* of the firſt magnitude have already been obſerved, and others ſuſpected to have a proper motion of their own.

Dr. Halley (Phil. Tranſ. Nº 355. or Jones's Abr. vol. iv. p. 225.) has obſerved, that the Bull's eye, Sirius, and Arcturus are now found to be about half a degree more ſoutherly than the ancients reckoned them: that this difference cannot ariſe from the errors of the tranſcribers, becauſe the declination of the *ſtars*, ſet down by Ptolemy, as obſerved by Timocharis, Hipparchus, and himſelf, ſhew their latitudes given by him are ſuch as thoſe authors intended; and it is ſcarce to be believed, that thoſe three obſervers could be deceived in ſo plain a matter. To this he adds, that the bright *ſtar* in the ſhoulder of Orion has, in Ptolemy, almoſt a whole degree more ſoutherly latitude than at preſent: that an ancient obſervation, made A. D. 509, at Athens, as Bullialdus ſuppoſes, of an appulſe of the moon to the Bull's eye, ſhews that *ſtar* to have had leſs latitude at that time than it now has: that as to Sirius, it appears by Tycho's obſervations, that he found him 4½′ more northerly than he is at this time. All theſe obſervations, compared together, ſeem to favour an opinion, that ſome of the *ſtars* have a proper motion of their own, which changes their places in the ſphere of heaven: this change of place, as Dr. Halley obſerves, may ſhew itſelf in ſo long a time as 1800 years, though it be entirely imperceptible in the ſpace of one ſingle century; and it is likely to be ſooneſt diſcovered in ſuch *ſtars* as thoſe juſt now mentioned; becauſe they are all of the firſt magnitude, and may, therefore, probably be ſome of the neareſt to our ſolar ſyſtem. Arcturus, in particular, affords a ſtrong proof of this: for if its preſent declination be compared with its place as determined either by Tycho or Flamſteed, the difference will be found to be much greater than what can be ſuſpected to ariſe from the uncertainty of their obſervations. See ARCTURUS, and Mr. Hornſby's Enquiry into the Quantity and Direction of the proper Motion of Arcturus, Phil. Tranſ. vol. lxiii. part i. p. 93, &c.

For an account of Dr. Bradley's obſervations, ſee the ſequel of this article.

Dr. Herſchel has alſo lately obſerved, that the diſtance of the two *ſtars* forming the double *ſtar* ν Draconis, Fl. 24 and 25, is 54″ 48‴, and their poſition 44° 19′ N. preceding. Whereas, from the right aſcenſion and declination of theſe *ſtars* in Flamſteed's Catalogue, their diſtance, in his time, appears to have been 1′ 11″, 418, and their poſition 44° 23′ N. preceding. Hence he infers, that as the difference in the diſtance of theſe two *ſtars* is ſo conſiderable, we can hardly account for it, otherwiſe than by admitting a proper motion in one or the other of the *ſtars*, or in our ſolar ſyſtem: moſt probably he ſays, neither of the three is at reſt. He alſo ſuſpects a proper motion in one of the double *ſtars* in cauda Lyncis media, Fl. 38, and in *o* Ceti Fl. 68. Phil. Tranſ. vol. lxxii. part i. p. 117. 143. 150.

It is reaſonable to expect, that other inſtances of the like kind muſt alſo occur among the great number of viſible *ſtars* becauſe their relative poſitions may be altered by various means. For if our own ſolar ſyſtem be conceived to change its place with reſpect to abſolute ſpace, this might, in proceſs of time, occaſion an apparent change in the angular diſtances of the fixed *ſtars*; and in ſuch a caſe, the places of the neareſt *ſtars* being more affected than of thoſe that are very remote, their relative poſition might ſeem to alter, though the *ſtars* themſelves were really immoveable: and vice verſa, we may ſurmiſe, from the obſerved motion of the *ſtars* that our ſun, with all its planets and comets, may have a motion towards ſome particular part of the heavens, on account of a greater quantity of matter collected in a number of *ſtars* and their ſurrounding planets there ſituated, which may perhaps occaſion a gravitation of our whole ſolar ſyſtem towards it. If this ſurmiſe ſhould have any foundation, as Dr. Herſchel obſerves, ubi ſupra, p. 103, it will ſhew itſelf in a ſeries of ſome years; as that from that motion will ariſe another kind of hitherto unknown parallax (ſuggeſted by Mr. Michell, Phil. Tranſ. vol. lvii. p. 252.) the inveſtigation of which may account for ſome part of the motions already obſerved in ſome of the principal *ſtars*; and for the purpoſe of determining the direction and quantity of ſuch a motion, accurate obſervations of the diſtance of *ſtars*, that are near enough to be meaſured with a micrometer, and a very high power of teleſcopes, may be of conſiderable uſe, as they will undoubtedly give us the relative places of thoſe *ſtars* to a much greater degree of accuracy than they can be had by tranſit inſtruments or ſectors, and thereby much ſooner enable us to diſcover any apparent change in their ſituation, occaſioned by this new kind of ſecular or ſyſtematical parallax, if we may ſo expreſs the change ariſing from the motion of the whole ſolar ſyſtem.

And, on the other hand, if our ſyſtem be at reſt, and any of the *ſtars* really in motion, this might likewiſe vary their apparent poſitions; and the more ſo, the nearer they are to us, or the ſwifter their motions are, or the more proper the direction of the motion is to be rendered perceptible by us. Since then the relative places of the *ſtars* may be changed from ſuch a variety of cauſes, conſidering the amazing diſtance at which it is certain ſome of them are placed, it may require the obſervations of many ages to determine the laws of the apparent changes even of a ſingle *ſtar*; much more difficult, therefore, muſt it be to ſettle the laws relating to all the moſt remarkable *ſtars*.

When the cauſes which affect the places of all the *ſtars* in general are known, ſuch as the preceſſion, aberration, and nutation; it may be of ſingular uſe to examine nicely the relative ſituations of particular *ſtars*, and eſpecially of thoſe of the greateſt luſtre, which, it may be preſumed, lie neareſt to us, and may therefore be ſubject to more ſenſible changes, either from their own motion, or from that of our ſyſtem. And if, at the ſame time that the brighter *ſtars* are compared with each other, we likewiſe determine the relative poſitions of ſome of the ſmalleſt that appear near them, whoſe places can be aſcertained with ſufficient exactneſs, we may perhaps be able to judge to what cauſe the change, if any be obſervable, is owing. The uncertainty that we are at preſent under, with reſpect to the degree of accuracy wherewith former aſtronomers could obſerve, makes us unable to determine ſeveral things relating to this ſubject; but the improvements, which have of late years been made in the methods of taking the places of the heavenly bodies, are ſo great, that a few years may hereafter be ſufficient to ſettle ſome points, which cannot now be ſettled, by comparing even the earlieſt obſervations with thoſe of the preſent age.

Dr. Hooke communicated ſeveral obſervations on the apparent motions of the fixed *ſtars*; and as this was a matter of great importance in aſtronomy, ſeveral of the learned were deſirous of verifying and confirming his obſervations. An inſtrument was accordingly contrived by Mr. George Graham, and executed with ſurpriſing exactneſs.

With this inſtrument the *ſtar* γ, in the conſtellation Draco, was frequently obſerved by Meſſrs. Molyneux, Bradley, and Graham, in the years 1725, 1726; and the obſervations were afterwards repeated by Dr. Bradley, with an inſtrument contrived by the ſame ingenious perſon, Mr. Graham, and ſo exact, that it might be depended on to half a ſecond. The reſult of theſe obſervations was, that the *ſtar* did not always appear in the ſame place, but that its diſtance from the zenith varied, and that the difference of the apparent places of Themis, the third ſatellite of Jupiter, amounted to 21 or 22 ſeconds. Similar obſervations were made on other *ſtars*, and a like apparent motion was found in them, proportional to the latitude of the *ſtar*. This motion was by no means ſuch as was to have been expected, as the effect of a parallax; and it was ſome time before any way could be found of accounting for this new phenomenon. At length Dr. Bradley reſolved all its variety, in a ſatisfactory manner, by the motion of light and the motion of the earth compounded together. See LIGHT, and Phil. Tranſ. Nº 406. p. 364. or Abr. vol. vi. p. 149, &c.

Our excellent aſtronomer, Dr. Bradley, had no ſooner diſcovered the cauſe, and ſettled the laws of the aberration of the fixed *ſtars*, than his attention was again excited by another new phenomenon, viz. an annual change of declination in ſome of the fixed *ſtars*, which appeared to be ſenſibly greater than a preceſſion of the equinoctial points of 50″ in a year, the mean quantity now uſually allowed by aſtronomers, would have occaſioned.

This apparent change of declination was obſerved in the *ſtars* near the equinoctial colure, and there appearing at the ſame time an effect of a quite contrary nature, in ſome *ſtars* near the ſolſtitial colure, which ſeemed to alter their declination leſs than a preceſſion of 50″ required, Dr. Bradley was thereby convinced, that all the phenomena in the different *ſtars* could not be accounted for merely by ſuppoſing that he had aſſumed a wrong quantity for the preceſſion of the equinoctial points. He had alſo, after many trials, ſufficient reaſon to conclude, that theſe ſecond unexpected deviations of the *ſtars* were not owing to any imperfection of his inſtruments. At length, from repeated obſervations, he began to gueſs at the real cauſe of theſe phenomena.

It appeared from the Doctor's obſervations, during his reſidence at Wanſted, from the year 1727 to 1732, that ſome of the *ſtars* near the ſolſtitial colure had changed their declinations 9″ or 10″ leſs than a preceſſion of 50″ would have produced; and, at the ſame time, that others near the equinoctial colure had altered theirs about the ſame quantity more than a like preceſſion would have occaſioned: the north pole of the equator ſeeming to have approached the *ſtars*, which come to the meridian with the ſun about the vernal equinox, and the winter ſolſtice; and to have receded from thoſe, which come to the meridian with the ſun about the autumnal equinox and the ſummer ſolſtice.

From the conſideration of theſe circumſtances, and the ſituation of the aſcending node of the moon's orbit when he firſt began to make his obſervations, he ſuſpected that the moon's action upon the equatorial parts of the earth might produce theſe effects. For, if the preceſſion of the equinox be, according to ſir Iſaac Newton's principles, cauſed by the actions of the ſun and moon upon thoſe parts; the plane of the moon's orbit being, at one time, above ten degrees more inclined to the plane of the equator than at another, it was reaſonable to conclude, that the part of the whole annual preceſſion, which ariſes from her action, would, in different years, be varied in its quantity; whereas the plane of the ecliptic, wherein the ſun appears, keeping always nearly the ſame inclination to the equator, that part of the preceſſion, which is owing to the ſun's action, may be the ſame every year; and from hence it would follow, that although the mean annual preceſſion, proceeding from the joint actions of the ſun and moon, were 50″; yet the apparent annual preceſſion might ſometimes exceed, and ſometimes fall ſhort of that mean quantity, according to the various ſituations of the nodes of the moon's orbit.

In the year 1727, the moon's aſcending node was near the beginning of Aries, and conſequently her orbit was as much inclined to the equator as it can at any time be; and then the apparent annual preceſſion was found, by the Doctor's firſt year's obſervations, to be greater than the mean; which proved, that the *ſtars* near the equinoctial colure, whoſe declinations are moſt of all affected by the preceſſion, had changed theirs, above a tenth part more than a preceſſion of 50″ would have cauſed. The ſucceeding year's obſervations proved the ſame thing; and, in three or four years time, the difference became ſo conſiderable, as to leave no room to ſuſpect it was owing to any imperfection either of the inſtrument or obſervation.

But ſome of the *ſtars*, that were near the ſolſtitial colure, having appeared to move, during the ſame time, in a manner contrary to what they ought have done, by an increaſe of the preceſſion; and the deviations in them being as remarkable as in the others, it was evident that ſomething more than a mere change in the quantity of the preceſſion would be requiſite to ſolve this part of the phenomenon. Upon comparing the obſervations of *ſtars* near the ſolſtitial colure, that were almoſt oppoſite to each other in right aſcenſion, they were found to be equally affected by this cauſe. For whilſt γ Draconis appeared to have moved northward, the ſmall *ſtar*, which is the 35th Camelopardali Hevelii, in the Britiſh catalogue, ſeemed to have gone as much towards the ſouth; which ſhewed, that this apparent motion in both thoſe *ſtars* might proceed from a nutation of the earth's axis; whereas the compariſon of the Doctor's obſervations of the ſame *ſtars*, formerly enabled him to draw a different concluſion, with reſpect to the cauſe of the annual aberrations ariſing from the motion of light. For the apparent alteration in γ Draconis, from that cauſe, being as great again as in the other ſmall *ſtar*, proved that that did not proceed from a nutation of the earth's axis; as, on the contrary, this may. Upon making the like compariſon between the obſervation of other *ſtars*, that lie nearly oppoſite in right aſcenſion, whatever their ſituations were with reſpect to the cardinal points of the equator, it appeared, that their change of declination was nearly equal, but contrary; and ſuch as a nutation or motion of the earth's axis would effect.

The moon's aſcending node being got back towards the beginning of Capricorn in the year 1732, the *ſtars* near the equinoctial colure appeared about that time to change their declinations no more than a preceſſion of 50″ required; whilſt ſome of thoſe near the ſolſtitial colure altered theirs above 2″ in a year leſs than they ought. Soon after the annual change of declination of the former was perceived to be diminiſhed, ſo as to become leſs than 50″ of preceſſion would cauſe; and it continued to diminiſh till the year 1736, when the moon's aſcending node was about the beginning of Libra, and her orbit had the leaſt inclination to the equator. But by this time, ſome of the *ſtars* near the ſolſtitial colure had altered their declinations 18″ leſs ſince the year 1727, than they ought to have done from a preceſſion of 50″. For γ Draconis, which in thoſe nine years would have gone about 8″ more ſoutherly, was obſerved, in 1736, to appear 10″ more northerly than it did in the year 1727.

As this appearance in γ Draconis indicated a diminution of the inclination of the earth's axis to the plane of the ECLIPTIC, and as ſeveral aſtronomers have ſuppoſed that inclination to diminiſh regularly; if this phenomenon depended upon ſuch a cauſe, and amounted to 18″ in nine years, the obliquity of the ecliptic would, at that rate, alter a whole minute in thirty years; which is much faſter than any obſervations before made would allow. The Doctor had therefore reaſon to think, that ſome part of this motion at leaſt, if not the whole, was owing to the moon's action upon the equatorial parts of the earth, which, he conceived, might cauſe a libratory motion of the earth's axis. But as he was unable to judge, from only nine years obſervations, whether the axis would entirely recover the ſame poſition that it had in the year 1727, he found it neceſſary to continue his obſervations through a whole period of the moon's nodes; at the end of which he had the ſatisfaction to ſee, that the *ſtars* returned into the ſame poſitions again, as if there had been no alteration at all in the inclination of the earth's axis; which fully convinced him, that he had gueſſed rightly as to the cauſe of the phenomenon. This circumſtance proves likewiſe, that if there be a gradual diminution of the obliquity of the ecliptic, it does not ariſe only from an alteration in the poſition of the earth's axis, but rather from ſome change in the plane of the ecliptic itſelf; becauſe the *ſtars*, at the end of the period of the moon's nodes, appeared in the ſame places, with reſpect to the equator, as they ought to have done if the earth's axis had retained the ſame inclination to an invariable plane.

The Doctor having communicated theſe obſervations, and his ſuſpicion of their cauſe, to the late Mr. Machin, that excellent geometer ſoon after ſent him a table, containing the quantity of the annual preceſſion in the various poſitions of the moon's nodes, as alſo the correſponding nutations of the earth's axis; which was computed upon the ſuppoſition that the mean annual preceſſion is 50″, and that the whole is governed by the pole of the moon's orbit only; and therefore Mr. Machin imagined, that the numbers in the table would be too large, as, in fact, they were found to be. But it appeared that the changes which Dr. Bradley had obſerved, both in the annual preceſſion and nutation, kept the ſame law, as to increaſing and decreaſing, with the numbers of Mr. Machin's table. Thoſe were calculated upon the ſuppoſition, that the pole of the equator, during a period of the moon's nodes, moved round in the periphery of a little circle, whoſe centre was 23° 29′ diſtant from the pole of the ecliptic; having itſelf alſo an angular motion of 50″ in a year about the ſame pole. The north pole of the equator was conceived to be in that part of the ſmall circle which is fartheſt from the north pole of the ecliptic at the time when the moon's aſcending node is in the beginning of Aries; and in the oppoſite point of it, when the ſame node is in Libra.

If the diameter of the little circle, in which the pole of the equator moves, be ſuppoſed equal to 18″, which is the whole quantity of the NUTATION, as collected from Dr. Bradley's obſervations of the *ſtar* γ Draconis, then all the phenomena of the ſeveral *ſtars* which he obſerved will be very nearly ſolved by his hypotheſis. But for the particulars of his ſolution, and the application of his theory to the practice of aſtronomy, we muſt refer to the excellent author himſelf, our intention being only to give the hiſtory of the invention.

The corrections ariſing from the aberration of light, and from the nutation of the earth's axis, muſt not be neglected in aſtronomical obſervations; ſince ſuch neglects might produce errors of near a minute in the polar diſtances of ſome *ſtars*.

As to the allowance to be made for the aberration of light, Dr. Bradley aſſures us, that having again examined thoſe of his own obſervations, which were moſt proper to determine the tranſverſe axis of the ellipſis which each *ſtar* ſeems to deſcribe, he found it to be neareſt to 40″; and this is the number he makes uſe of in his computations relating to the nutation.

Dr. Bradley ſays, in general, that experience has taught him, that the obſervations of ſuch *ſtars* as lie neareſt the zenith, generally agree beſt with one another, and are therefore the fitteſt to prove the truth of any hypotheſis. Phil. Tranſ. N° 485. vol. xlv. p. 1, &c.

Monſieur d'Alembert has publiſhed a treatiſe, intitled, Recherches ſur la Preceſſion des Equinoxes et ſur la Nutation de la Terre dans le Syſteme Newtonien, 4to. Paris, 1749. The calculations of this learned gentleman agree, in general, with Dr. Bradley's obſervations. But Monſieur d'Alembert finds, that the pole of the equator deſcribes an ellipſis in the heavens, the ratio of whoſe axes is as 4 to 3; whereas, according to Dr. Bradley, the curve deſcribed is either a circle or an ellipſis, the ratio of whoſe axes is as 18 to 16.

The ſeveral *ſtars* in each conſtellation, e. gr. in Taurus, Bootes, Hercules, &c. their longitudes, latitudes, magnitudes, names, places, &c. as fixed by Mr. Flamſteed, in the Britannic catalogue, ſee under the proper article of each conſtellation, TAURUS, BOOTES, HERCULES, &c.

To learn to know the ſeveral fixed *ſtars* by the globe, ſee GLOBE.

The parallax and diſtance of the fixed *ſtars*, ſee under PARALLAX and DISTANCE.

STARS, *circumpolar*. See CIRCUMPOLAR.

STAR, *morning*. See MORNING.

STAR, *place of a*. See PLACE.

STAR, *pole*. See POLE.

STARS, *twinkling of the*. See TWINKLING.

STARS, *unformed*. See INFORMES.

A Catalogue of the moſt remarkable Fixed Stars, with their Magnitudes, Right Aſcenſions, Declinations, and Annual Variations.

Thoſe marked with an Aſteriſk are according to the lateſt Obſervations at Greenwich, in their Right Aſcenſions; and the reſt are taken from M. De la Caille's Ephemeris, rectified for A. D. 1750.

Nº	Northern Stars Names, and Places in their Constellations.	Bayer's Letters.	Magnit.	Right Aſcenſion in Degrees, &c.			Right Aſcenſion in Time.			Ann. Var. +	Declination North.			Ann. Var. +
				°	′	″	H.	M.	S.	″	°	′	″	″
1	Tip of the Wing of Pegaſus *	γ	2	0	13	35.5	0	0	54	3.08	13	47	6.3	20.04
2	Shoulder of Andromeda	δ	3	0	30	15.0	0	26	1	3.16	29	29	18.3	20.01
3	Breaſt of Caſſiepeia	α	3	6	37	4.8	0	26	28	3.30	55	9	37.9	20.00
4	Waiſt of Caſſiepeia	γ	3	10	27	14.2	0	41	49	3.49	59	21	19.2	19.70
5	Pole Star *	α	2	10	40	56.0	0	42	44	10.05	87	59	59.0	19.69
6	Waiſt of Andromeda *	β	2	14	5	40.0	0	56	22	3.29	34	17	15.7	19.43
7	Knee of Caſſiepeia	δ	3	17	25	14.5	1	9	41	3.71	58	55	27.1	19.07
8	Leg of Caſſiepeia	ι	3	24	10	22.9	1	36	42	4.13	62	25	20.6	18.27
9	Preceding of the North Triangle	α	4	24	43	28.0	1	38	54	3.49	28	20	59.3	18.19
10	Middle of thoſe at the Ear of the Ram	γ	4	24	57	46.3	1	39	51	3.27	18	3	34.0	18.16
11	Preceding Horn of the Ram	β	3	25	13	4.7	1	40	52	3.28	19	34	34.1	18.12
12	Foot of Andromeda *	γ	2	27	19	17.0	1	49	16	3.61	41	7	0.5	17.82
13	Knot of the Fiſhes	α	3	27	17	7.0	1	49	8	3.09	1	32	50.2	17.80
14	Following Horn of the Ram *	α	2	28	25	28.0	1	53	42	3.34	22	16	9.6	17.63
15	Northmoſt of the Triangle	β	4	28	41	15.6	1	54	45	3.48	33	47	28.2	17.56
16	Southmoſt of the Triangle	γ	4	30	38	0.7	2	2	32	3.52	32	40	37.7	17.22
17	Following in the Whale's Cheek	γ	3	37	35	34.0	2	30	22	3.12	2	10	10.5	15.87
18	Northern in the Fleur de Luce		4	38	16	0.0	2	33	4	3.53	28	11	26.3	15.73
19	Southern in the Fleur de Luce		4	38	49	39.5	2	35	19	3.50	26	12	44.4	15.61
20	Shoulder of Perſeus	γ	3	41	42	55.6	2	46	52	4.24	52	30	13.8	14.96
21	Whale's Jaw *	α	2	42	26	24.0	2	49	46	3.13	3	5	32.0	14.81
22	Meduſa's Head	β	2	43	0	4.6	2	52	0	3.84	39	58	17.9	14.64
23	Brighteſt Star of Perſeus	α	2	46	39	22.5	3	6	37	4.19	48	56	46.6	13.74
24	Thigh of Perſeus	δ	3	51	18	33.3	3	25	14	4.17	46	57	40.0	12.52
25	Brighteſt of the Pleiades *	υ	3	53	18	55.0	3	33	16	3.54	23	18	35.8	12.01
26	Extreme of the Foot of Perſeus	ζ	3	54	37	4.6	3	38	28	3.72	31	7	2.6	11.60
27	Knee of Perſeus	ε	3	55	17	24.1	3	41	10	3.94	38	15	41.6	11.41
28	Firſt of the Hyades	γ	3	61	23	56.2	4	5	36	3.39	15	0	6.8	9.59
29	Second of the Hyades	δ	4	62	8	17.3	4	8	33	3.44	16	56	2.8	9.35
30	Northern Eye of the Bull	ε	3	63	30	42.4	4	22	3	3.48	18	36	13.7	8.93
31	Southern Eye of the Bull, Aldebaran *	α	1	65	32	39.0	4	22	11	3.43	15	59	3.2	8.33
32	Goat, Capella *	α	1	74	44	59.0	4	59	0	4.40	45	42	36.7	5.33
33	Northern Horn of the Bull *	β	2	77	47	7.0	5	11	8	3.78	28	22	6.2	4.29
34	Weſtern Shoulder of Orion	γ	2	77	56	2.2	5	11	44	3.22	6	5	55.7	4.19
35	Southern Horn of the Bull	ζ	3	80	40	42.9	5	22	43	3.58	20	57	52.7	3.24
36	Shoulder of the Coachman	β	3	85	17	57.8	5	41	12	4.41	44	53	16.5	1.64
37	Eaſtern Shoulder of Orion *	α	1	85	32	47.0	5	42	11	3.25	7	20	10.6	1.60
38	Hand of the Coachman	θ	3	85	40	8.5	5	42	41	4.08	37	9	51.6	1.51
39	Foot of Caſtor	κ	4	89	56	35.3	5	59	48	3.63	21	33	15.5	0.02
40	Foot of Pollux, not the brighteſt	μ	4	91	58	25.0	6	7	54	3.63	22	30	59.2	0.07
41	Bright Star in the Foot of Pollux *	γ	2,3	95	57	40.0	6	23	51	3.48	16	15	16.9	2.02
42	Knee of Caſtor	ε	3	97	8	9.0	6	28	33	3.71	25	21	9.4	2.49
43	Knee of Pollux	ζ	3	102	18	49.4	6	49	15	3.58	20	54	45.1	4.27
44	Thigh of Pollux	δ	3	106	17	26.4	7	5	10	3.61	22	25	8.5	5.61
45	Neck of the Little Dog	β	3	108	23	46.5	7	13	35	3.27	8	46	20.2	6.32
46	Bright Star in the Head of Caſtor *	α	1,2	109	48	46	7	22	16	3.87	32	24	34.5	6.73
47	Bighteſt in the Little Dog, Procyon *	α	1	111	40	57	7	26	44	3.21	5	50	42.5	7.35
48	Head of Pollux *	β	2	112	39	4	7	30	36	3.75	28	36	22.5	7.66
49	Southern Foot of the Crab	β	4	120	44	4.3	8	2	56	3.15	9	56	7.0	10.23
50	Northern Aſs	γ	4	127	11	42.2	8	27	47	3.52	22	20	59.3	12.11
51	Southern Aſs	δ	4	127	36	43.4	8	30	27	3.44	19	3	22.0	12.22
52	Northern in the Foot of the Great Bear	ι	3	130	29	7.9	8	41	57	4.25	48	59	58.7	13.00
53	Claw of the Crab	α	3	130	32	21.3	8	42	9	3.31	12	48	33.5	13.01
54	Southern in the Foot of the Great Bear	κ	4	131	36	28.[illegible]	8	46	2[illegible]	4.20	48	7	16.6	13.30
55	Preceding Knee of the Great Bear	θ	3	138	59	39.2	9	15	59	4.22	52	47	42.3	15.11
56	Foot of the Lion	ο	4	141	56	46	9	27	47	3.24	10	40	56.5	15.79
57	Eye of the Lion	ε	3	142	54	6.0	9	31	36	3.45	24	24	35.2	15.99
58	Northern in the Head of the Lion	μ	3	144	37	21.0	9	38	29	3.47	27	10	8.5	16.33
59	Southern in the Neck of the Lion	η	3	148	24	53.8	9	53	40	3.31	17	58	18.4	17.07
60	Lion's Heart, Regulus *	α	1	148	53	33	9	55	34	3.24	13	10	43.7	17.13
61	Northern in the Neck of the Lion	ζ	3	150	40	55.0	10	2	44	3.34	29	39	4.0	17.47
62	Following in the Neck of the Lion	γ	3	151	32	6.1	10	6	0	3.31	21	5	49.3	17.61
63	In the Belly of the Lion	ρ	4	154	54	20.0	10	19	37	3.18	10	35	6.4	18.14
64	Southern in the Square of the Great Bear	β	2	161	38	26.5	10	46	34	3.75	57	42	51.0	19.01
65	Northern following in the Great Bear	α	2	162	0	45.1	10	48	3	3.89	63	5	32.9	19.05
66	Thigh of the Lion *	δ	2,3	165	19	26	11	1	18	3.18	21	53	28.6	19.37
67	Back of the Lion	θ	3	165	16	3.1	11	1	5	3.18	16	47	32.5	19.38
68	Tail of the Lion *	β	2	174	12	0.0	11	36	48	3.12	15	58	7.2	19.93
69	Northern Wing of the Virgin	β	3	174	25	5.0	11	37	40	3.08	3	10	20.5	19.94
70	Southern following in the Square of the Great Bear	γ	2	175	8	7.1	11	40	32	3.24	55	5	0.7	19.98
71	Laſt in the Square of the Great Bear	δ	3	180	43	47.[illegible]	12	2	55	3.05	58	25	19.8	20.04
72	Southern Wing of the Virgin	η	3	181	46	48.1	12	7	7	3.07	0	43	31.1	20.02
73	Firſt in the Tail of the Great Bear	ε	2	190	44	5.6	12	42	56	2.69	57	19	15.1	9.69
74	Foremoſt in the Waiſt of the Virgin	δ	3	190	45	18.1	12	43	1	3.06	4	45	43.2	19.69
75	The brighteſt under the Great Bear		3	191	4	20	12	44	17	2.86	39	40	25.8	19.66
76	Northern Wing of the Virgin	ε	3	192	25	5.8	12	49	43	3.01	12	18	34.3	19.57
77	Middle of the Tail of the Great Bear	ζ	2	198	26	53.8	13	13	48	2.45	56	14	12.2	19.01
78	Following in the Waiſt of the Virgin	ζ	3	200	29	37.0	13	21	58	3.08	0	41	27.5	18.77
79	Extremity of the Tail of the Great Bear	η	2	204	24	58.6	13	37	40	2.41	50	34	5.4	18.24
80	Preceding Thigh of Bootes or the Clown	η	3	205	41	34.1	13	42	46	2.88	19	39	45.0	18.06
81	Extremity of the Dragon's Tail	α	3	209	24	28.7	13	57	38	1.50	65	34	32.5	17.45
82	Brighteſt in the Clown, Arcturus *	α	1	211	10	53.0	14	4	44	2.82	20	29	39.2	17.16
83	Preceding Shoulder of the Clown	γ	3	215	29	55.5	14	22	0	2.43	38	24	19.0	16.31
84	Following Foot of the Clown	ζ	3	217	18	14.6	14	29	13	2.86	14	48	52.2	15.93
85	Following Thigh of the Clown	ε	3	218	32	15.8	14	34	9	2.63	28	8	27.0	15.07
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86	Preceding in the Square of the Little Bear	β	3	222	55	42.3	14	51	43	0.36	75	10	51.2	14.66
87	Head of the Clown	β	3	223	8	0.0	14	52	32	2.28	41	23	15.7	14.62

Nº	Northern Stars Names, and Places in their Constellations.	Bayer's Letters.	Magnit.	Right Aſcenſion in Degrees, &c.			Right Aſcenſion in Time.			Ann. Var. +	Declination North.			Ann Var. —
				°	′	″	H.	M.	S.	″	°	′	″	″
88	Following Shoulder of the Clown	δ	3	226	23	12.5	15	5	33	2.44	34	15	40.8	13.82
89	Preceding in the laſt Joint of the Dragon	ι	4	229	51	2.1	15	19	24	1.31	59	50	54.3	12.91
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90	Following in the Square of the Little Bear	γ	3	230	19	58.5	15	21	20	0.22	72	43	27.9	12.79
91	Preceding in the Neck of the Serpent	δ	3	230	43	9.0	15	22	53	2.87	11	23	32.0	12.68
92	Brighteſt in the Crown	α	2	231	1	40.2	15	24	7	2.05	27	34	18.2	12.60
93	Brighteſt in the Neck of the Serpent *	α	2.3	233	7	0.0	15	32	28	3.01	7	13	50.5	12.06
94	Southern in the Neck of the Serpent	β	3	233	39	52.0	15	34	39	2.76	16	13	16.9	11.87
95	Following the Brighteſt in the Serpent	ε	4	234	35	30.2	15	38	22	2.98	5	14	56.2	11 62
96	Following of Southern in the Serpent's Neck	γ	3	236	13	52.5	15	44	55	2.75	14	29	41.4	11.14
97	Following in the laſt Joint of the Dragon	θ	4	239	18	37.2	15	57	14	1.14	59	14	17.5	10.23
98	Preceding arm of Hercules	γ	3	242	43	30.8	16	10	54	2.66	19	45	29.6	9.18
99	Preceding Shoulder of Hercules	β	3	244	52	29.7	16	19	30	2.59	22	3	7.1	8.51
100	Laſt in the Joint of the Dragon	η	4	245	9	46.9	16	20	39	0.78	62	5	2.5	8.41
101	Foremoſt in the Side of Hercules	ζ	3	247	58	6.2	16	31	52	2.30	32	4	19.4	7.51
102	Loins of Hercules	η	4	248	34	59.6	16	34	20	2.07	39	24	46.9	7.31
103	Following in the Side of Hercules	ε	3	252	40	52.2	16	50	43	2.29	31	18	41.6	5.96
104	Head of Hercules	α	2	255	48	49.2	17	3	15	2.74	14	41	44.5	4.91
105	Following Shoulder of Hercules	δ	3	256	26	36.4	17	5	46	2.47	25	9	4.7	4.69
106	Head of Ophiuchus	α	2	260	50	5.3	17	23	20	2.78	12	45	47.9	3.17
107	Eye of the Dragon	β	3	261	12	6.8	17	24	48	1.36	52	29	44.5	3.00
108	Northern in the Shoulder of Ophiuchus	β	3	262	46	55.0	17	31	8	2.97	4	41	40.6	2.52
109	Southern in the Shoulder of Ophiuchus	γ	3	263	50	35.2	17	35	22	3.01	2	49	28.3	2.15
110	Elbow of Hercules	μ	4	264	10	9.5	17	36	41	2.38	27	53	3.9	2.03
111	Knee of Hercules	θ	3	266	55	25.6	17	47	42	2.06	37	17	56.4	1.08
112	Head of the Dragon	γ	3	267	42	3.0	17	50	48	2.21	51	31	37.9	0.80
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113	Brighteſt in the Harp *	α	1	277	12	11.0	18	28	49	2.06	38	34	0.0	2.48
114	Preceding in the Lozenge of the Harp	β	3	280	12	47.3	18	40	51	2.22	33	5	23.4	3.55
115	Preceding in the extremity of the Serpent's Tail	θ	4	280	56	51.2	18	43	47	3.00	3	54	6.0	3.80
116	Following in the Lozenge of the Harp	δ	3	281	26	36.3	18	45	46	2.11	36	35	48.6	3.97
117	Preceding in the Tail of the Eagle	ε	4	282	4	17.5	18	48	17	2.73	14	44	56.1	4.18
118	Following in the Lozenge of the Harp	γ	3	282	23	54.4	18	49	35	2.29	32	21	49.1	4.29
119	Following in the Tail of the Eagle	ζ	4	283	28	50.4	18	53	55	2.69	13	30	42.5	4.67
120	Second Joint of the Dragon	δ	3	288	6	23.0	19	12	26	0.06	67	13	17.1	6 22
121	Preceding Wing of the Eagle	δ	3	288	13	24.7	19	12	54	3.02	2	38	18.2	6.26
122	Beak of the Swan	β	3	290	9	25.3	19	20	38	2.43	27	27	4.0	6.90
123	Brighteſt in the Arrow	α	4	292	14	1.0	19	28	56	2.69	17	27	28.9	7.58
124	Preceding in the Neck of the Eagle	γ	3	293	35	30.2	19	34	22	2.28	10	1	22.0	8.02
125	Northern Wing of the Swan	δ	3	294	17	28.4	19	37	10	1.86	44	31	58.5	8.24
126	Brighteſt in the Eagle, Alcair *	α	1, 2	294	46	1.0	19	39	4	3.91	8	13	44.3	8.36
127	Following Shoulder of Antinous	η	4	294	55	55.0	19	39	44	3.07	0	23	5.4	8.45
128	Following in the Neck of the Eagle	β	3	295	45	31.0	19	43	2	3.02	5	48	10.6	8.71
129	Breaſt of the Swan	γ	3	303	18	50.0	20	13	15	2.16	39	8	12.8	11 00
130	Preceding in the Tail of the Dolphin	ε	4	305	18	56.4	20	21	16	2.88	10	28	20.0	11.58
131	Preceding in the Lozenge of the Dolphin	ζ	4	305	54	17.8	20	23	37	2.82	13	49	52.2	11.74
132	Southerly in the Lozenge of the Dolphin	β	3	306	27	34.3	20	25	50	2.82	13	44	32.6	11.91
133	Northerly in the Lozenge of the Dolphin	α	3	307	0	22.2	20	28	1	2.79	15	2	51.5	12.05
134	Southerly following in the Lozenge of the Dolphin	δ	4	307	56	44.9	20	31	47	2.81	14	11	36.6	12.32
135	Tail of the Swan *	α	1, 2	308	18	51.0	20	33	15	2.05	44	23	54.5	12.39
136	Laſt in the Lozenge of the Dolphin	γ	4	308	46	3.0	20	35	4	2.79	15	14	22.5	12.54
137	Brighteſt in the Southern Wing of the Swan	ε	3	309	1	19.6	20	36	5	2.40	33	2	50.4	12.62
138	Extremity of the Southern Wing of the Swan	ζ	4	315	34	26.4	21	2	18	2.55	29	12	50.7	14.31
139	Head of the Little Horſe	α	4	315	49	36.0	21	3	18	3.01	4	14	8.1	14.27
140	Firſt of Pegaſus	ε	4	317	37	25.3	21	10	30	2.79	18	44	53.7	14.80
141	Preceding Shoulder of Cepheus	α	3	318	8	41.8	21	12	34	1.43	61	31	55.7	14.92
142	Girdle of Cepheus	β	4	321	19	34.4	21	25	18	0.81	69	27	54.8	15.64
143	Mouth of Pegaſus	ε	3	322	58	21.6	21	31	53	2.95	8	44	29.8	16.00
144	Lower part of Southern Wing of the Swan	μ	4	323	14	41.1	21	32	59	2.64	27	37	24.1	16.05
145	Neck of Pegaſus	ζ	3	337	14	43.9	22	28	59	2.99	9	32	4.3	18.46
146	Northern Knee of Pegaſus	η	3	337	49	37.7	22	31	18	2.80	28	55	14.5	18.55
147	Ring of Andromeda's Chain	ο	4	343	36	49.0	22	50	27	2.72	40	59	22.0	19.12
148	Thigh of Pegaſus *	β	2	343	2	40.0	22	52	11	2.89	26	43	52.7	19.15
149	Wing of Pegaſus *	α	2	343	12	22.0	22	52	49	2.99	13	51	56.0	19.17
150	Following Foot of Cepheus	γ	4	352	19	22.1	23	29	17	2.31				19.86
151	Head of Andromeda *	α	2	359	0	25.0	23	57	40	3.06	27	42	32.1	20.04
152	Chair of Caſſiopeia	β	3	358	59	41.4	23	55	59	3.04	57	46	7.0	20.04

Nº	Southern Stars Names, and Places in their Constellations.	Bayer's Letters.	Magnit.	Right Aſcenſion in Degrees, &c.			Right Aſcenſion in Time.			Ann. Var. +	Declination South.			Ann. Var. —
				°	′	″	H.	M.	S.	″	°	′	″	″
1	Tail of the Male Hydra	β	3	3	2	58.3	0	12	12	2.72	78	39	50.3	20.01
2	Head of the Phenix	α	2	3	28	0.9	0	13	52	3.01	43	39	43.4	20.00
3	Brighteſt in the Whale's Tail	β	2	7	45	28.6	0	31	2	3.01	19	21	51.1	19.85
4	Thigh of the Phenix	β	3	13	43	21.7	0	54	53	2.73	48	4	42.1	19.46
5	Preceding towards the Whale's Tail	η	4	14	00	16.1	0	56	1	3.00	11	30	48.8	19.44
6	Following towards the Whale's Tail	θ	4	17	53	9.1	1	11	33	3.01	9	28	49.5	19.07
7	Following Wing of the Phenix	γ	3	19	22	10.7	1	17	29	2.67	44	36	18.8	18.90
8	In the Source of the River, Achernar	α	1	22	5	42.2	1	28	23	2.26	58	30	52.1	18.56
9	Head of the Male Hydra	α	3	27	43	22.5	1	50	53	1.87	62	47	36.3	17.73
10	Variable of the Whale	ο	4	31	40	53.8	2	6	44	3.03	4	7	28.0	17.05
11	Preceding in the Cheek of the Whale	δ	3	36	40	35.4	2	26	42	3.08	0	45	50.2	16.07
12	Breaſt of the Whale	ι	3	36	52	22.9	2	27	30	2.90	12	56	51.9	16.03
13	Firſt turning of the River	θ	3	42	11	52.7	2	48	48	2.30	41	19	4.0	14.85
14	Third turning of the River		4	45	21	58.8	3	1	28	2.54	29	59	13.7	14.07
15	River before the Whale	ζ	3	45	55	39.1	3	3	43	2.91	9	45	51.2	13.93
16	Following in the River	ι	3	50	17	32.0	3	21	10	2.89	10	19	12.0	12.79
17	Following ſtill, in the River	δ	3	52	49	30.1	3	31	18	2.88	10	37	32.0	12.10
18	Fourth turning of the River	γ	4	56	35	48.3	3	46	23	2.79	14	14	21.6	11.02
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19	Middle of the Male Hydra	γ	4	57	51	51.2	3	51	27	1.14	74	59	55.9	10.66
20	Brighteſt in the rhomboidal Reticula	α	3	62	49	11.8	4	11	17	0.74	63	6	16.3	9.15
21	Tail of the Gold Fiſh, or Dorade	α	3	67	9	19.7	4	28	37	1.28	55	34	12.9	7.78
22	Laſt of the River	β	3	73	53	44.0	4	55	35	2.95	5	25	49.2	5.56
23	Bright Foot of Orion, Rigel *	β	1	75	45	11.0	5	3	44	2.89	8	30	37.4	4.97

N°	Southern Stars Names, and Places in their Constellations.	Bayer's Letters.	Magnit.	Right Aſcenſion in Degrees, &c.			Right Aſcenſion in Time.			Ann. Var. +	Declination South.			Ann. Var. —
				°	′	″	H.	M.	S.	″	°	′	″	″
24	Northern in the Sword of Orion	η	3	77	58	46.0	5	11	55	3.02	2	38	56.9	4.17
25	Belly of the Hare	β	4	79	23	11.8	5	17	33	2.58	20	58	43.1	3.69
26	Preceding of Orion's Girdle	δ	2	79	48	54.4	5	19	16	3.07	0	30	22.8	3.54
27	Brighteſt of the Hare	α	3	80	25	49.7	5	21	43	2.65	18	1	19.0	3.34
28	Middle of Orion's Girdle	ε	2	80	53	11.1	5	23	33	3.05	1	23	1.2	3.17
29	Laſt of Orion's Girdle	ζ	2	82	2	33.5	5	28	10	3.04	2	5	48.9	2.77
30	Preceding of the Brighteſt of the Dove	α	2	82	39	12.2	5	30	37	2.20	34	13	22.7	2.56
31	Belly of the Gold Fiſh, or Dorade	β	4	82	52	17.5	5	31	19	0.50	62	39	29.7	2.48
32	Southern in the Hare's Foot	γ	4	83	30	43.2	5	34	3	2.53	22	32	58.7	2.26
33	Knee of Orion	κ	3	83	58	48.2	5	35	55	2.85	9	46	38.3	2.10
34	Northern in the Hare's Foot	δ	4	85	8	46.0	5	40	35	2.57	20	55	16.1	1.68
35	Following in the brighteſt of the Dove	β	3	85	32	30.4	5	42	10	2.11	35	52	4[illegible].3	1.55
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36	Preceding foot of the Great Dog	ζ	3	92	40	58.9	6	10	44	2.31	29	58	11.8	0.94
37	Knee of the Great Dog	β	3	92	55	25.3	6	11	42	2.63	17	51	11.4	1.0
38	Brighteſt of the Ship Canopus	α	1	94	36	7.6	6	18	25	1.34	52	34	8.9	1.60
39	Summit of the Ship's Rudder	ι	3	97	11	44.4	6	30	7	1.84	42	59	25.2	2.62
40	Brighteſt of the Great Dog, Sirius *	α	1	98	38	37.0	6	34	34	2.69	16	23	36.6	2.97
41	Thigh of the Great Dog	ε	3	102	12	7.2	6	48	48	2.36	28	38	59.6	4.23
42	Back of the Great Dog	δ	2	104	33	26.8	6	58	14	2.45	26	0	56.1	5.03
43	Poop or Stern of the Ship	π	3	107	4	44.0	7	8	19	2.13	36	39	44.4	5.88
44	Tail of the Great Dog	η	2	108	33	3.6	7	14	12	2.39	28	49	59.7	6.37
45	Poop of the Ship	σ	3	110	19	40.5	7	21	19	1.94	42	48	25.6	6.96
46	Poop of the Ship	ζ	2	118	42	4.5	7	34	48	2.12	39	18	39.5	9.62
47	Preceding in the Body of the Ship	γ	2	120	27	48.0	8	1	51	1.85	46	36	34.9	10.16
48	Following in the Body of the Ship	ε	3	124	20	10.7	8	17	21	1.26	58	42	52.5	11.30
49	Brighteſt in the Middle of the Ship	δ	2	129	27	5.0	8	37	48	1.61	33	48	2.1	12.73
50	Sail of the Ship	λ	3	134	42	17.7	8	57	49	2.21	42	26	4.1	14.09
51	Brighteſt about the Oars of the Ship	β	1	137	35	26.0	9	10	22	0.75	68	41	26.5	14.79
52	Maſt of the Ship	ι	3	137	36	3.3	9	10	24	1.65	58	14	8.3	14.79
53	Brighteſt more Northerly	κ	3	138	35	52.9	9	14	24	1.86	53	57	0.1	15.03
54	Heart of the Female Hydra *	α	2	138	56	57.0	9	15	48	2.96	7	35	13.1	15.08
55	Oars of the Ship	υ	3	145	12	41.2	9	40	51	1.50	65	55	6.7	16.45
56	Southern in Section of the Ship	θ	3	158	31	34.9	10	34	6	2.12	63	5	24.9	18.64
57	Northern in Section of the Ship	η	2	158	51	29.3	10	35	26	2.27	58	22	39.2	18.68
58	Top of the Ship's Section	μ	3	159	1	11.4	10	36	5	2.55	46	6	15.0	18.81
59	Foot of the Cup	α	4	161	54	13.7	10	47	37	2.95	16	58	29.0	19.05
60	Preceding in the Crupper of the Centaur	δ	3	178	51	51.4	11	55	27	3.05	49	19	39.8	20.03
61	Beak of the Raven	α	4	178	53	31.4	11	55	34	3.07	23	20	6.0	20.03
62	Head of the Raven	ε	4	179	19	46.1	11	57	19	3.06	21	13	44.6	20.04
63	Preceding Arm of the Croſs	δ	3	180	30	34.7	12	2	2	3.10	57	21	30.0	20.04
64	Preceding Wing of the Raven	γ	3	180	44	44.5	12	2	59	3.09	16	9	32.5	0.04
65	Foot of the Croſs	α	1	183	13	53.7	12	12	56	3.22	61	42	47.4	20.01
66	Preceding in the following Wing of the Raven	δ	4	184	14	29.6	12	16	58	3.29	15	7	18.2	19.98
67	Head of the Croſs	γ	2	184	28	35.0	12	17	54	3.36	70	44	54.3	19.97
68	Foot of the Raven	β	3	185	19	30.9	12	21	18	3.14	22	0	40.0	19.95
69	Preceding of the Fly	α	4	185	38	41.6	12	22	35	3.42	67	46	17.2	19.94
70	Top of the Centaur's Crupper	γ	2	186	57	53.8	12	27	52	3.27	47	34	52.9	19.89
71	Southern in the Virgin's Girdle	γ	3	187	15	7.2	12	29	0	3.08	0	4	22.3	19.88
72	Head of the Fly	β	4	187	48	53.4	12	31	16	3.52	66	44	6.1	19.84
73	Following Arm of the Croſs	β	2	188	19	40.1	12	33	19	3.42	58	19	8.3	19.83
74	Southern Wing of the Virgin	θ	4	194	15	26.2	12	57	2	3.09	4	11	47.2	19.41
75	Tail of the Female Hydra	γ	3	196	20	46.6	13	5	23	3.22	21	50	43.8	19.22
76	Preceding Shoulder of the Centaur	ι	3	196	39	27.6	13	6	38	3.34	35	23	6.6	19.20
77	Spike of the Virgin	α	1	198	8	44.0	13	12	35	3.15	9	50	51.1	19.06
78	Belly of the Centaur	ε	3	201	3	30.4	13	24	14	3.69	52	10	55.2	18.70
79	Waiſt of the Centaur	ζ	3	205	1	46.6	13	40	5	3.66	46	2	38.3	18.15
80	Preceding Leg of the Centaur	β	2	206	36	41.8	13	46	27	4.09	59	9	1.8	17.91
81	Following Shoulder of the Centaur	θ	3	207	59	57.5	13	52	0	3.52	35	7	34.9	17.69
82	Robe of the Virgin	κ	4	209	53	57.8	13	59	36	3.19	9	5	43.3	17.37
83	Southern Foot of the Virgin	λ	4	211	24	18.4	14	5	37	3.22	12	2	29.0	17.20
84	Southern in the Shield of the Centaur	η	3	214	56	9.1	14	19	45	3.75	41	2	28.8	16.43
85	Head of the Compaſſes	α	3	215	39	45.4	14	22	39	4.68	63	51	48.2	16.26
86	Brighteſt in the Foot of the Centaur	α	1	215	42	31.1	14	22	50	4.41	59	47	9.4	16.26
87	Foot of the Wolf	α	3	216	21	48.0	14	25	27	3.89	46	17	40.1	16.14
88	Southern Scale of the Balance *	α	2	219	24	43.0	14	37	39	3.30	14	59	9.7	15.50
89	Extremity of the Foot of the Wolf	β	3	220	34	6.6	14	42	16	3.86	42	6	13.9	15.22
90	Following Foot of the Centaur	κ	3	220	45	12.7	14	43	1	3.84	41	4	45.6	15.17
91	Preceding Claw of the Scorpion	γ	4	222	22	28.5	14	49	30	3.48	24	16	53.5	14.70
92	Preceding of the Southern Triangle	γ	3	224	0	2.8	14	56	0	5.29	67	43	32.3	14.40
93	Northern Scale of the Balance *	β	2	226	1	55.0	15	4	8	3.30	8	26	30.5	13.94
94	Following in the Wolf's Shoulder	γ	3	229	38	36.2	15	18	34	3.94	40	18	4.6	12.97
95	Following in the North Scale of the Balance	γ	4	230	23	42.6	15	21	35	3.34	13	56	10.4	12.77
96	Top of the Southern Triangle	β	3	233	20	42.1	15	33	23	5.06	62	37	34.2	11.96
97	Southern Claw of the Scorpion	ρ	4	235	22	40.5	15	41	31	3.68	28	27	36.0	11.38
98	Southern in the Forehead of the Scorpion	π	4	235	56	38.8	15	43	47	3.60	25	22	18.7	11.32
99	Middle in the Forehead of the Scorpion	δ	3	236	23	52.2	15	45	35	3.52	21	53	17.6	11.09
100	Northern in the Forehead of the Scorpion *	β	2	237	52	49.0	15	51	31	3.50	19	5	55.2	10.69
101	Top of the Forehead of the Scorpion	υ	4	239	15	5.4	15	57	0	3.47	18	47	19.6	10.14
102	Preceding Foot of Ophiuchus	δ	3	240	18	58.8	16	1	16	3.14	3	1	46.3	9.92
103	Following in the ſame Foot of Ophiuchus	ε	3	241	16	51.2	16	5	7	3.16	4	3	36.0	9.93
104	Preceding of the Scorpion's Heart	σ	4	241	30	40.7	16	6	3	3.62	24	58	2.9	9.56
105	Brighteſt in the Scorpion's Heart, Antares *	α	1	243	41	1.0	16	14	44	3.66	25	51	8.4	8.93
106	Following in the Scorpion's Heart	τ	4	245	5	32.3	16	20	22	3.70	27	40	14.7	8.44
107	Following in the Southern Triangle	α	3	245	37	5.0	16	22	28	6.16	68	31	24.3	8.26
108	Southern in the Knee of Ophiuchus	ζ	3	245	51	19.0	16	23	25	3.30	10	2	16.0	8.20
109	Firſt Joint of the Scorpion's Tail	ε	3	248	30	14.8	16	34	1	3.90	33	48	41.1	7.34
110	Second Joint of the Scorpion's Tail	μ	3	248	44	54.6	16	35	0	4.04	37	35	18.6	7.26
111	Brighteſt in the third Joint	ζ	3	249	15	51.0	16	37	3	4.20	41	54	3.6	7.09
112	Fourth Joint	η	3	253	34	34.1	16	54	18	4.28	42	52	39.2	5.66
113	Following Knee of Ophiuchus	η	2	254	0	53.9	16	56	4	3.44	15	23	28.4	5.52
114	Following Foot of Ophiuchus	θ	3	256	40	11.2	17	6	21	3.67	24	43	20.6	4.61
115	Middle of the Altar	α	3	258	8	27.0	17	12	34	4.61	49	38	31.8	4.12
116	Little Star in the Extremity of the Scorpion's Tail	υ	4	258	27	0.8	17	13	48	4.09	37	3	55.9	4.01
117	Brighteſt in the Extremity thereof	λ	3	259	9	59.4	17	16	40	4.08	36	53	28.6	3.77

No.	SOUTHERN STARS NAMES; and PLACES in their CONSTELLATIONS.	Bayer's Letters.	Magnit.	Right Aſcenſion in Degrees, &c.			Right Aſcenſion in Time.			Ann Var. +	Declination South.			Ann. Var. +
				°	'	"	H.	M.	S	"	°	'	"	"
118	Fifth Joint of the Scorpion's Tail	θ	3	259	50	50.1	17	19	24	4.30	42	48	23.2	3.53
119	Seventh Joint of the ſame	κ	3	261	18	19.2	17	25	13	4.13	38	52	14.	3.03
120	Sixth Joint thereof	ι	3	262	31	53.5	17	30	8	4.18	9	59	49.0	2.60
121	In the laſt Joint of the Serpent	ζ	4	266	49	26.9	17	47	18	3.16	3	38	56.3	1.11
122	Following at the point of the Arrow of Sagittary	γ	4	267	26	21.5	17	49	45	3.87	30	23	53.7	0.89
123	Top of the Bow of Sagittary	μ	4	269	42	12.7	17	58	49	3.60	21	5	56.9	0.10
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124	Hand of Sagittary	δ	3	271	14	31.8	18	4	58	3.85	29	54	18.4	0.43
125	Southern Extreme of the Bow of Sagittary	ε	3	271	53	39.7	18	7	35	4.00	34	28	17.4	0.67
126	Northern Extreme of the Bow of Sagittary	λ	3	273	8	5.2	18	12	32	3.72	25	31	57.4	1.09
127	Arrow of Sagittary	φ	4	277	30	26.7	18	30	2	3.77	27	13	13.	2.61
128	Preceding Shoulder of Sagittary *	τ	2, 3	280	5	40.0	18	40	23	3.74	26	34	51.0	3.45
129	Arm of Sagittary	ξ	3	281	40	16.	18	45	41	3.84	30	12	36.0	4.06
130	Head of Sagittary	ο	4	282	25	19.	18	49	41	3.60	22	5	0.8	4.31
131	Preceding Shoulder of Sagittary	τ	4	282	49	38.3	18	51	19	3.77	28	0	30.6	4.45
132	Following in the Head of Sagittary	π	3	283	35	43.4	18	54	23	3.59	21	23	48.8	5.70
133	Preceding of the two in the Foot of Sagittary	β	4	286	9	8.7	19	4	37	4.34	44	53	42.4	5.57
134	Leg of Sagittary	α	4	286	37	43.3	9	6	31	4.20	41	3	21.5	5.73
135	Side of Antinous	ι	4	290	58	30.6	19	23	54	4.01	1	49	12.2	7.17
136	Back of the Peacock	δ	4	295	58	55.0	19	43	56	5.92	66	46	50.8	8.78
137	Brighteſt preceding in the Head of Capricorn *	α	3	301	2	24.0	20	4	10	3.55	13	18	2.8	10.30
138	Eye of the Peacock	α	2	301	25	2.0	20	5	41	4.89	57	30	27.	10.14
139	Following in the Head of Capricorn *	β	3	301	52	34.0	20	7	30	3.39	15	33	2.7	10.54
140	Zagaye of the Indian	α	3	304	57	56.9	20	19	52	4.29	48	8	14.0	11.42
141	Wing of the Peacock	β	3	305	31	18.6	20	22	5	5.65	67	4	8.5	1.64
142	Breaſt of the Peacock	γ	4	316	21	5.2	21	5	24	5.28	66	28	19.8	14.50
143	Preceding Shoulder of Aquarius	β	3	319	35	53.7	21	18	24	3.18	6	39	22.4	15.35
144	Preceding in the Tail of the Goat	γ	3	321	27	12.	21	25	49	3.35	17	46	42.0	16.66
145	Following in the Tail of the Goat	δ	3	323	18	8.6	21	23	13	3.33	17	14	48.3	16.06
146	Head of the Crane	γ	3	324	40	33.5	21	38	42	3.70	38	31	28.7	16.35
147	Preceding Wing of the Crane	α	2	328	5	7.7	21	52	21	3.98	48	9	21.4	17.00
148	Following Shoulder of Aquarius *	α	3	328	21	47.0	21	53	27	3.10	1	31	25.9	17.03
149	Back of the Toucan	α	3	330	16	46.0	22	1	7	4.31	61	29	34.0	17.40
150	Following Arm of Aquarius	γ	3	332	11	5.	22	8	44	3.09	2	38	13.5	17.71
151	Thigh of the Crane	β	3	336	54	3.2	22	7	36	3.68	48	10	51.0	18.43
152	Water of Aquarius	λ	4	339	53	27.8	22	39	34	3.16	8	54	8.2	18.82
153	Leg of Aquarius	δ	3	340	20	14.6	22	41	21	3.22	17	8	39.9	18.87
154	Brighteſt of the Southern Fiſhes, Fomalhaut *	α	1	341	5	5.0	22	44	20	3.34	30	56	24.8	18.94
155	Water of Aquarius	φ	4	345	20	23.1	23	1	22	3.13	7	23	31.2	19.38

STAR, in *Electricity*, denotes the appearance of the electric matter on a point into which it enters. Beccaria ſuppoſes that the *ſtar* is occaſioned by the difficulty with which the electric fluid is extricated from the air, which is an electric. See BRUSH.

STAR, in *Fortification*, a little FORT, with five or more points, or ſaliant and re-entering angles, flanking one another, and their faces 90 or 100 feet long.

Formerly, *ſtar* forts were frequently made in lines of circumvallation, after two or three redoubts. See REDOUBT, and SCONCE.

STAR, in *Heraldry*, denotes a charge frequently borne on the ſhield, and the honourable ordinaries, in the figure of a *ſtar*. It differs from the mullet, or ſpur-rowel, in that it is not pierced as this laſt is.

It uſually conſiſts of five rays, or ſpokes. When it has ſix or eight, as among the Germans and Italians, particular mention muſt be made thereof in blazoning.

STARS, on *Medals*, are marks of conſecration and deification, being intended as ſymbols of eternity. F. Joubert ſays, they ſometimes expreſs the children of princes reigning, and ſometimes the children dead; and placed in the rank of deities.

STAR, in the *Manege*. *White ſtars in the forehead* are eſteemed good marks in all horſes, except white and grey ones: where nature fails to produce this good criterion, our jockeys have frequently recourſe to art. See HORSE.

The method of making *ſtars*, practiſed among the Dutch, is to roaſt a large onion in hot aſhes, and when near thoroughly done, to divide it in two, and dip it in ſcalding hot walnut-oil. This done, they immediately apply the flat ſide thereof to the place the *ſtar* is to be on, and keep it there half an hour. After taking it off, they anoint the ſcalded place with ointment of roſes: in a ſhort time, the ſcarf-ſkin falls off, and white hair grows up in its room; but the middle always continues bare of hair, which is the certain characteriſtic of an artificial *ſtar*.

The method moſt uſed among us is, to ſhave the hair from the place it is to be made on; then to apply a little oil of vitriol with a feather, or the like, paſſing it lightly over the bald place. This eats away the roots of the former hair, which will be ſucceeded by white. The ſore is healed up with copperas, and green ointment.

STAR, *to make a black*, on a white or other coloured horſe, waſh the place to be changed frequently, with fern-roots and ſage, boiled in ley; and they ſay it will breed black hairs. The ſame may be done by beating four milk, galls, and ruſt, together, and anointing the part therewith.

STAR, *a red*, is made with an ounce of aqua fortis, a pennyworth of aqua vitæ, and ſilver to the value of eighteenpence, all heated together in a glaſs, and the place anointed therewith. This immediately turns the hair to a perfect red; but it laſts no longer than till the horſe caſts his coat; when it is to be renewed.

STAR, or **STARR**, *ſtarrum*, in our *Old Writers*. All the deeds, obligations, &c. of the Jews, were called *ſtarrs*, and writ for the moſt part in Hebrew alone, or in Hebrew and Latin; one of which yet remains in the Treaſury of the Exchequer, written in Hebrew without points; the ſubſtance whereof is expreſſed in Latin juſt under it, like an Engliſh condition under a Latin obligation: this bears date in the reign of king John; and many *ſtarrs*, as well of grant and releaſe, as obligatory and by way of mortgage, are pleaded and recited at large in the Plea Rolls.

Before the baniſhment of the Jews under Edward I. their contracts and obligations were denominated *ſtarra*, or *ſtarrs*; which by an ordinance of Richard I. preſerved by Hoveden, were commanded to be enrolled and depoſited in cheſts, under three keys, in certain places; one and the moſt conſiderable of which was in the king's exchequer at Weſtminſter; and no *ſtarr* was allowed to be valid, unleſs it were found in ſome of the ſaid repoſitories.

The word *ſtarr* is a contraction from the Hebrew *ſchetar*, a deed or contract.

STAR, in *Pyrotechny*, a compoſition of combuſtible matters; which being borne, or thrown aloft into the air, exhibits the appearance of a real *ſtar*.

Stars are generally uſed as appendages to ROCKETS, a number of them being uſually encloſed in a conical cap, or cover, at the head of the rocket, and carried up with it to its utmoſt altitude, where the *ſtars* taking fire, are ſpread around, and exhibit an agreeable ſpectacle.

STARS, *to make*, mix three pounds of ſalt-petre, eleven ounces of ſulphur, one of antimony, and three of gunpowder-duſt; or twelve ounces of ſulphur, ſix of ſaltpetre, five and a half of gunpowder-duſt, four ounces of olibanum, one of maſtic, camphor, ſublimate of mercury, and half an ounce of antimony and orpiment.

Moiſten the maſs with gum-water, and make it into little balls, of the ſize of a cheſnut, which dry either in the ſun, or the oven. Theſe ſet on fire in the air, will repreſent *ſtars*.

STAR is alſo a badge of the orders of the GARTER and BATH.

STAR, *order of the*, or our *Lady of the* STAR, an order of knighthood inſtituted by king John of France, in the year 1352, denominated from a *ſtar* they wore on the ſtomach.

At firſt there were but thirty knights; but the order, in time, became depreciated by the multitude of perſons admitted without any diſtinction. For which reaſon, Charles VII. when grand-maſter thereof, quitted it, and gave it the chevalier du Guet, knight of the watch at Paris, and his archers; who ſtill wear a *ſtar* on their coats. But this account is contradicted by others; who will have the order inſtituted by king Robert, in 1022, in honour of the Holy Virgin, and to have fallen into diſregard during the wars of Philip de Valois.

Juſtiniani mentions another *order of the Star*, at Meſſina, in Sicily, called alſo the *order of the Creſcent*. This was inſtituted in the year 1268, by Charles of Anjou, brother of St. Louis, king of the Two Sicilies.

Others will have it inſtituted in 1464, by Renatus duke of Anjou, who took the title of king of Sicily. At leaſt, it appears, from the arms of this prince, that he made ſome alteration in the collar of the order; for, inſtead of fleurs-de-lys, and *ſtars*, he only bore two chains, whence hung a creſcent, with the old French word *loz*; which, in the language of rebus, ſignified *loz in a creſcent*.

The order, being ſunk into obſcurity, was raiſed again by the people of Meſſina, under the name of the *Noble Academy of the Knights of the Star*; reducing the ancient collar to a ſingle *ſtar*, placed on a forked croſs; and the number of knights to ſixty-two. Their device was, *Monſtrant regibus aſtra viam*: which they expreſſed by

MR
the four initial letters • with the *ſtar* in the middle.
AV

STAR *of Alexandria*, in *Botany*. See STAR *of Bethlehem*.

STAR-*apple*, in *Botany*. See *Star*-APPLE.

STAR *of Bethlehem*, *ornithogalum*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the flower has no empalement; it is compoſed of ſix petals, whoſe under parts are erect, but ſpread open above; it hath ſix erect ſtamina, about half the length of the petals, crowned by ſingle ſummits, with an angular germen, ſupporting an awl-ſhaped ſtyle, terminated by an obtuſe ſtigma; the germen turns to a round, angular capſule, with three cells, filled with roundiſh ſeeds. Linnæus enumerates twelve, and Miller thirteen ſpecies. The ſeveral ſpecies of this plant produced in our gardens are all propagated with great eaſe by the off-ſets which the roots produce in very great abundance. The beſt time to tranſplant the roots is in July or Auguſt, when the leaves are decayed. They ſhould have a light, ſandy ſoil, which, if it be over-dunged, will decay and rot the roots: they continue flowering a long time, and are a very great ornament in gardens, but they ought to be tranſplanted once in two or three years, otherwiſe the roots grow luxuriant in off-ſets, and the flowers are weak. They may be alſo propagated from ſeeds, which ſhould be ſown and managed as other bulbous rooted flowers, and will produce their flowers in three or four years after ſowing. Miller.

STAR *of the earth*, in *Botany*, the name of a plant famous for its virtues in curing the bite of a mad dog; but unhappily there has been a very great miſunderſtanding among authors about the plant properly ſignified by this name; ſome calling by it the coronopus, or buckſhorn-plantain, an herb common every where; and others a ſpecies of lychnis, or catch-fly, which is a very ſcarce plant. The original account of its nature and virtues ſeems to be this: king James ſent to the Royal Society a dried ſpecimen of a plant, which had been ſent to him as the plant with which his dogs had been cured when bitten by a mad-dog, and the name, by which this was called, was *ſtar of the earth*.

This plant was ſo ill dried, that it was not eaſily diſtinguiſhed, but at length Mr. Ray found it to be the *ſeſamoides ſalamanticum magnum*. It does not ſeem, however, clear, that this was the plant vulgarly known by that name, but rather that it was gathered by ſome ignorant perſon; neither the name *ſtar of the earth* at all agreeing with it, nor any account having been given before of its having ſuch virtues. Dr. Grey, in his Complete Farrier, greatly recommends the *ſtar of the earth* in the cure of this bite, and the plant he means is plainly the coronopus, or buckſhorn-plantain; and, upon the whole, it ſeems that this laſt mentioned is the plant properly called by this name, as its virtues have always been celebrated even in this caſe, and its leaves always are diſpoſed on the earth in the form of the rays of a *ſtar*. It is to be added to this, that the counteſs of Suffolk's powder, ſo famous in many places for this terrible diſeaſe, and by which ſeveral perſons have been known to be cured, is principally compoſed of this plant. Phil. Tranſ. Nº 450. p. 455.

STAR-*board* denotes the right ſide of a ſhip, when the eye of the ſpectator is directed forward. See LARBOARD. They ſay, *ſtar-board the helm*, or *helm a ſtar-board*, when the man at the helm ſhould put the helm to the right-ſide of the ſhip.

STAR-*fiſh*, *aſterias*, or *ſtella marina*, in *Zoology*, a genus of naked inſects, in form of a radiated ſtar: the mouth is ſituated in the centre, on the under part, and the anus in the centre, on the upper part. The tentacula are extremely numerous, and in a manner cover, either the whole upper ſurface of the body, or the extremities of the ramifications.

The ſpecies of this genus being very numerous, are diſtinguiſhed according to the number of their rays; they are alſo of different ſizes, the largeſt or greateſt Magellanic *ſtar-fiſh*, forming a circle of three feet in diameter, when its rays are fully extended; while there are others not exceeding an inch in diameter.

In the Linnæan ſyſtem, the *ſtar-fiſh*, *ſea-ſtar*, or *aſterias*, is a genus of the *molluſca* order of *worms*, the characters of which are, that the body is depreſſed, covered with a coriaceous coat, and furniſhed with tentacula; the mouth is in the centre, and has five valves. Of this genus Linnæus has enumerated ſixteen ſpecies, one of which, or the *moon aſterias*, is entire, nine ſtellated, and ſix radiated.

The moſt frequent kind of *ſtar-fiſh*, is that which has five rays, which iſſue in the manner of ſo many vermiform, or worm-like proceſſes: theſe therefore are called *ſtellæ vermiformes*, or the worm-like *ſtar-fiſh*. Another kind, nearly approaching to the nature of theſe, has more than five rays, and from the ſides of theſe other tranſverſe proceſſes are produced, which are covered with an extremely fine kind of down, or hairineſs: theſe are called the *hairy ſtar-fiſh*. A third kind is called the *aſtrophyta*, or plant-like *ſtar-fiſh*: this is compoſed of a body from whence there ariſe a great number of branches, which divaricating more and more, are at length increaſed, or divided into a prodigious number; and theſe being cylindric in figure, reſemble very much the branches of plants.

This general diſtinction being eſtabliſhed, the general and particular arrangements are naturally deduced from the ſubordinate diſtinctions: from the moſt remarkable differences in each ſeries of *ſtellæ* of every claſs are conſtituted the genera; from the leſs remarkable difference among each genus, the ſubordinate diſtinctions, and from the minuter diſtinctions among theſe, the ſpecies are diſtinctly ſeparated from one another. The accurate Linkius has hence eſtabliſhed a very regular method of theſe animals, calling them by names expreſſive of their differences, as *oligactis*, for ſuch of the firſt general diviſion as have leſs than five lobes, or rays, and the like. Several of the ſpecies of the *ſtar-fiſh* are eatable, and ſome of them afford a very good nouriſhment. Some are preſcribed by phyſicians as ingredients in plaſters.

The common *ſtar-fiſh*, *aſterias glacialis*, of Linnæus, with five heptagonal rays, and prickly angles, is frequent in our ſeas, feeds on oyſters, and is very deſtructive to the beds.

Every ray of the *ſtar-fiſh* is furniſhed with ſo very large a number of legs, that they cover the whole ſurface: they are diſpoſed in four ranges, each of which contains about ſeventy-four; ſo that the whole ray contains three hundred and four, and conſequently the fiſh has, upon all five of its rays, no leſs than fifteen hundred and twenty legs. With all this numerous train of legs, however, the animal moves but very ſlowly; and indeed they are ſo ſoft and feeble, that they ſcarce deſerve the name of legs, and, more properly ſpeaking, they are only a ſort of horns, like thoſe of our garden-ſnails, but they ſerve the animal to walk with, and are therefore called legs. Mem. Acad. Par. 1710.

The amazing property of reproducing the eſſential parts, when loſt, is not confined to the POLYPE, and ſome few others of the inſect world, but is extended to the *ſtar-fiſh*, and to the URTICÆ *marinæ* of various kinds, and probably to many others, in which we at preſent have no expectation of finding it. Mr. Reaumur, on the diſcovery of this property in the polype, obſerved theſe other animals, as they lay on the ſhores of Poictou, and other places, and often found that ſpecies of *ſtar-fiſh*, which is very commonly known, and which has naturally five rays or arms, with only three or four, one or two being wanting; and on taking up and examining theſe mutilated ones, nature was always found reproducing the limb that was wanting; and on cutting and breaking other *ſtar-fiſh* into ſeveral parts, it was but a very little while before the broken parts cicatriſed, and every part remained alive; and by the appearances of things there remained no doubt, but that theſe living pieces will all, in time, re-produce their wanting parts.

Mr. Reaumur could not ſtay long enough on the ſpot to ſee this; but Mr. de Villars, on the coaſt of Rochelle, ſaw the whole proceſs very frequently in the urticæ marinæ, which he cut to pieces on purpoſe for the experiment, and which always reproduced the parts he had cut off; and the common fiſhermen of the coaſts, where Mr. Reaumur was in company with Mr. Juſſieu, ſeeing them making their experiments on the *ſtar-fiſh*, appeared to be well acquainted with their nature, and told them that they might cut and tear them as much as they pleaſed, but they would not be able to kill them; ſo familiarly was this piece of natural hiſtory known among theſe people, though unknown to thoſe who had employed their lives in the ſearches after ſuch things. Phil. Tranſ. N° 464. Append.

The *arboreſcent ſtar-fiſh*, *ſtella arboreſcens*, or *caput* MEDUSÆ of Linnæus, is one of the curioſities of nature found in ſeveral cabinets of natural rarities. It is deſcribed as upwards of a foot in diameter, having its mouth in the middle; the figure of the trunk is pentangular, and from the five angles ariſe as many branches, which ſubdivide into ſeveral others, and thoſe again into other leſſer ones, till the laſt are ſcarce thicker than horſe-hairs, and in number, by a moderate eſtimate, above a thouſand. The *ſtella arboreſcens*, in ſwimming, ſpreads all his branches like a net to their full length; and, as he perceives any prey within them, draws them in again; and thus takes it with all the dexterity of a fiſherman. Grew, Muſ. Reg. Societ. part i. ſect. 5. cap. 4. p. 122. This has been found in the north of Scotland, and on the coaſt of Cornwall. See BASKET-*fiſh*.

STAR-*gazer*, in *Ichthyology*, the Engliſh name of the URANOSCOPUS.

STAR-*ſhot*, the common name of a gelatinous ſubſtance often found lying on the ſurface of the earth, and called by ſome *ſtar-jelly*, and *ſtar-fallen*.

The vulgar have been always of opinion, that this was produced from that meteor which they call a *falling*-STAR; others have imagined it a vegetable ſubſtance, and ſuppoſed it grew out of the earth: neither of theſe however appear, upon a cloſe examination, to be the caſe, but that it is really the half-digeſted food of herons, bitterns, crows, ſea-mews, and coddy-moddies, principally when they have fed upon frogs or earth-worms.

The heads of frogs have been found whole in maſſes of this matter, as have alſo parts of worms; and theſe birds, when ſhot, have been found, when dying, to diſgorge a ſubſtance of the ſame kind.

It is a gelatinous ſubſtance, reſembling a thick mucilage of gum tragacanth, and is cold to the touch. There are often yellow ſpecks, and ſmall clots, like grumous blood, in it. It ſtinks like putrid fleſh, when kept, and is principally found in miſty mornings, and in wet weather in autumn, winter, and ſpring. Moreton's Northampt. p. 353.

Mr. Boyle ſays, he has ſeen this jelly reſolved, by digeſtion only, into a permanent liquor; and that a phyſician of his acquaintance extolled it as a ſpecific, outwardly applied, to wens. Works abr. vol. i. p. 310.

STAR-*ſhot*, in *Artillery*, conſiſts of four pieces of iron, whoſe baſes, when ſeparate, form the quadrant of a circle; ſo that the whole being joined, forms a cylinder equal to the *ſhot* of the cannon. Each of theſe pieces is furniſhed with an iron bar, the extremity of which is attached to a ſort of link, as keys are ſtrung upon a ring. Being diſcharged from the gun, the four branches or arms extend every way from the link in the centre. Theſe are uſed in the ſea-ſervice, and chiefly deſigned for deſtroying the ſails and rigging; but their flight and execution are very precarious at any conſiderable diſtance.

STAR-*ſtone*, *aſteria*, in *Natural Hiſtory*, the name of a kind of extraneous foſſil, of a very regular figure and ſtructure, and approaching very much to the nature of the *entrochi*, having the ſame ſubſtance and inner ſtructure, and being much of the ſame ſize, though different in form; and as thoſe foſſils have fragments of ſhelly bodies, to which they are ſometimes found affixed, and appendages like branches, or the rudiments of ſuch, growing from them, ſo theſe have both the one and the other; the firſt called *aſteropodia*, and the others the *appendiculæ*, or wires of the *aſteriæ*. *Tab.* II. *Foſſils, Claſs* 7.

The foſſile world has been greatly enriched by the fragments and remains of the ſeveral kinds of *ſtar-fiſh* which have been converted into ſtone, and have been variouſly gueſſed at in that ſtate, as to their origin. The aſteriæ are by many affirmed to be the foſſile radii of the *ſtar-fiſh* of the decempede, or ten-rayed kind; and others have thought it evident, that ſome ſpecies of them have been the remains of the common coriaceous kinds. The ENCRINOS, or LILIUM *lapideum*, ſeems to be a part of one of the ten-rayed kinds; and the TROCHITÆ, and ENTROCHI, are plainly owing to the fragments of ſeveral of theſe kinds. Linkius, de Stellis Marin.

Mr. Ellis has particularly deſcribed, and illuſtrated by figures, foſſils of this kind, as well as the animal or *ſtar-fiſh* to which they belong; but as the ſtem of the animal, the ſpecimen of which he examined, and from which his deſcription is taken, was broke off ſhort at the bottom; he is in doubt whether it moves about in the ſea, or is fixed to rocks and ſhells by a baſe, like corals, ſponges, and keratophytons. Phil. Tranſ. vol. lii. part i. art. 56.

The ASTEROPODIA, in ſubſtance and inner ſtructure, agree perfectly with the ſhells of the ECHINITÆ, found in our chalk-pits, and with the *aſteriæ* and entrochi; theſe bodies being all compoſed of obliquely-arranged plates of a tabulated ſpar: they are uſually compoſed of ſeveral joints, but they are only very imperfect fragments of the body of the animal the *aſteriæ* have once been a part of; the ſeveral parts of which they are compoſed are all convex on one ſide, and concave on the other, but they are of very different ſhapes, being ſometimes roundiſh, ſometimes oblong, often quadrangular, and not unfrequently of different numbers of angles. They have frequently two, ſometimes more ridges running acroſs them, and ſometimes they have tubercles, or ſmall protuberances, ſtanding either on their upper or under ſide: they are ſometimes found ſingle, but more frequently compound, or arranged into ſmaller or larger parcels, being placed over one another in the manner of the tiles of a houſe, and ſeem truly to have been originally part of an imbricated ſhell, or cruſt of ſome ſpecies of ſea-fiſh. They are in theſe compound maſſes even very evidently fragments, and are uſually of irregularly broken figures, though ſometimes they reſemble, in ſome degree, parts of the rays of one or other of the kinds of *ſtar-fiſh*. They are uſually found looſe from the *aſteriæ*, though lying among them; but ſometimes the *aſteriæ* are regularly fixed on them, juſt as the entrochi on the modioli, and are plainly ſeen to have originally grown out of them.

The *encrinos* of authors is one kind of *aſteropodium*, and has been affirmed by ſome perfectly to agree in figure with a ray of the Magellanic *ſtar-fiſh*. This is, however, ſeldom found in ſuch a compound ſtate; it uſually is met with in ſingle joints, and then is what authors call the *aſteropodium minus*, or ſmall *aſteropodium*.

Theſe bodies are uſually of a pale bluiſh grey, or aſh-colour; ſometimes they are whitiſh, and ſometimes, though more rarely, yellowiſh, or reddiſh.

Having thus far deſcribed the *aſteropodia*, which ſeem properly the baſes of the *aſteriæ*, we ſhall be more intelligible in the account of the *aſteriæ* themſelves, which are to be treated of merely as branches of them; though, from their being much more frequent than theſe their baſes, they are much more familiarly known, and uſually more regarded. The *aſteriæ* are ſhort, and commonly ſomewhat crooked angular columns, compoſed of ſeveral joints, each reſembling the figure of a radiated *ſtar*, with a greater or ſmaller number of rays in the different ſpecies: they are uſually found of about an inch in length, and of the thickneſs of a gooſe-quill. Some of them have five angles, or rays, and others only four, and in ſome the angles are equidiſtant, while in others they are irregularly ſo; in ſome alſo they are ſhort and blunt, while in others they are long, narrow, and pointed; and ſome have their angles ſo very ſhort and obtuſe, that at firſt ſight they may be taken for *entrocho-aſteriæ*. The ſeveral joints in the ſame ſpecimen are uſually all of the ſame thickneſs; this however is not always the caſe, but in ſome they are larger at one end, and in others at the middle, than in any other part of the body; and ſome ſpecies have one of the rays bifid, ſo as to emulate the appearance of a ſix-rayed kind.

All the *aſteriæ* are naturally ſulcated between the angles, but this in a very different degree; ſome are very little ſo, while others are cut ſo deeply, that the ſingle joints of them reſemble the rowels of a ſpur. One end of the column is frequently found finely engraved along the edges of the angles, or rays, while the other end is ſmooth, or nearly ſo; and the ſame is often the caſe alſo in the ſingle joints. Not unfrequently, alſo, one end of a column is indented, and the other has five ſtriæ, running from a hollow centre to the ſulci between the rays. They are found of various bigneſſes and colours; the longeſt ſeldom arrive, however, at two inches, and they are found of all the intermediate bigneſs from this down to the length of a barley-corn: they are not unfrequently found, alſo, compreſſed and flatted, as is common to the foſſils that have been formed in animal moulds.

They are uſually bedded in ſtrata of clay, though not unfrequently in thoſe of a lax ſort of quarry-ſtone, and ſometimes in a harder. They uſually have ſea-ſhells, and other marine remains, lying about them; and ſometimes theſe ſhells adhere to the *aſteriæ*, and when ſeparated from them do no injury to the *aſteriæ*, but themſelves ſhew a mark of the figure of the body, or part of the column, when a part has been always wanting in the ſhell.

From the columns of the *aſteriæ* there are ſometimes propagated certain ſmall branches, like thoſe of the entrochi; theſe are called by authors *appendiculæ aſteriarum*, or the wires of the *aſteriæ*.

They are compoſed of ſeveral ſhort cylindric joints, with obliquely-truncated ends, and each hollowed to the middle, where there ſtands a ſmall tubercle. Theſe branches are ſometimes two inches long, and the largeſt or thickeſt joint always adheres to the *aſteria*, all the ſucceeding ones growing ſmaller, and the branch taperer toward the end. In their natural ſituation on the *aſteria*, they ſtand in regular circles at different diſtances, one above another: there is always one wire in each of the ſulci, or channels of the body, and theſe ſtand evenly againſt one another.

Theſe wires, or appendiculæ, are very ſeldom, however, found in this their native ſtate, or fixed to the bodies of the *aſteriæ*; they are commonly found broken off, and lying looſe among them, and the rudiments only of them remaining on the *aſteriæ*, and very rarely even theſe. The wires themſelves are more frequently found wholly ſeparate from them, and either in fragments of different lengths, or in ſingle joints, immerſed in ſtone, or lying among the ſtrata of clay. Hill's Hiſt. of Foſſ. p. 654.

The *aſteriæ* may be reduced to two kinds; the firſt, thoſe whoſe whole bodies make the form of a *ſtar*; the ſecond, thoſe which in the whole are irregular, but which are adorned, as it were, with conſtellations in the parts.

Dr. Liſter, for diſtinction ſake, only gives the name *aſteria* to the former ſort, diſtinguiſhing the latter by the appellation of *aſtroites*; the other naturaliſts generally uſe the two indiſcriminately. The *aſteria*, ſpoken of by the ancients, appears to be this latter kind. Plott, Nat. Hiſt. Oxford. cap. 5. ſect. 16. ſeq. Mercat. Metalloth. arm. 9. cap. 10.

The quality of moving in vinegar, as if animated, is ſcarce perceivable in the *aſtroites*, but is ſignal in the *aſteria*. The former muſt be broken in ſmall pieces before it will move; but the latter will move, not only in a whole joint, but in two or three knit together. Plott, Nat. Hiſt. Oxford. ſect. 26, ſeq.

STAR *thiſtle*. See CENTAURY.

STAR-*wort*, *aſter*, in *Botany*, the name of a genus of plants of the *ſyngeneſia polygamia ſuperflua* claſs; the characters of which are theſe: it has a compound flower, compoſed of ſeveral female and hermaphrodite florets, which are included in one common ſcaly empalement; the rays of the flower are compoſed of female flowers, whoſe upper parts are ſtretched out on one ſide like a tongue, and indented in three parts at the end; the hermaphrodite flowers form the diſk or middle; theſe are funnel-ſhaped, divided at the top into five parts, which ſpread open, and have each five ſhort ſlender ſtamina, crowned with cylindrical ſummits; in the bottom is placed a germen, which becomes an oblong ſeed, crowned with down; the female flowers have a germen, ſupporting a ſlender ſtyle, crowned by two reflexed, oblong ſtigmata, which have no ſtamina, but in other reſpects reſemble the hermaphrodite flowers. Linnæus and Miller enumerate thirty-ſeven ſpecies.

STAR-*wort*, *American*, or *trailing*, of *Vera Cruz*, *tridax*, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. Its characters are theſe: the flower has a common, cylindrical, imbricated empalement; the ſcales are acute-pointed, and erect; the flowers are compoſed of hermaphrodite florets in the diſk, and the rays of female half florets; the hermaphrodite florets are funnel-ſhaped, of one petal, cut at the brim into five points; theſe have five ſhort hair-like ſtamina, terminated by cylindrical ſummits, joined together, and an oblong crowned germen, ſupporting a briſtly ſtyle, crowned by an obtuſe ſtigma; the germen afterward becomes an oblong, ſingle ſeed, crowned with a ſimple down; the female half-florets are plain, of one petal, cut into three ſegments at the top; theſe have an oval germen, like the hermaphrodite florets, but no ſtamina, and are ſucceeded by ſingle ſeeds of the ſame ſhape. We know but one ſpecies of this genus.

STAR-*wort*, *baſtard*, in *Botany*, a ſpecies of *buphthalmum*. See OX-*eye*.

STAR-*wort*, *yellow*, in *Botany*, a ſpecies of *inula*. See ELECAMPANE.

STAR, *falling*, in *Meteorology*, a meteor, the explication of which has puzzled all philoſophers, till our modern diſcoveries in electricity have led to the moſt probable account of it. Signor Beccaria makes it pretty evident, that it is an electrical appearance, and in proof of this poſition he recites the following fact. About an hour after ſun-ſet, he and ſome friends that were with him, obſerved a *falling ſtar* directing its courſe towards them, and apparently growing larger and larger, but it diſappeared not far from them; when it left their faces, hands, and cloaths, with the earth, and all the neighbouring objects, ſuddenly illuminated with a diffuſed and lambent light, attended with no noiſe at all. During their ſurprize at this appearance, a ſervant informed them that he had ſeen a light ſhine ſuddenly in the garden, and eſpecially upon the ſtreams which he was throwing to water it. All theſe appearances were evidently electrical; and S. Beccaria was confirmed in his conjecture, that electricity was the cauſe of them, by the quantity of electric matter which he had ſeen gradually advancing towards his kite, which had very much the appearance of a *falling ſtar*. Sometimes alſo he ſaw a kind of glory round the kite, which followed it when it changed its place, but left ſome light, for a ſmall ſpace of time, in the place which it had quitted. Prieſtl. Elect. vol. i. p. 434, 8vo. See IGNIS *fatuus*.

STAR-*chamber*, *court of*. See COURT.

STAR-*fort*, or *redoubt*, in *Fortification*. See STAR, REDOUBT, and FORT.

STARAPHAXAT, a name uſed by ſome of the old writers for any medicine that reſtrains fluxions upon the eyes, noſe, or fauces.

STARCH, a fecula, or ſediment, found at the bottom of veſſels wherein wheat has been ſteeped in water; of which fecula, after ſeparating the bran from it, by paſſing it through ſieves, they form a kind of loaves, which, being dried in the ſun, or an oven, is afterwards broken into little pieces, and ſo ſold.

The beſt is white, ſoft, and friable, eaſily broken into powder. Such as require very fine *ſtarch* do not content themſelves, like the ſtarchmen, with refuſe of wheat; but uſe the fineſt grain. The proceſs is as follows.

STARCH *of wheat, method of making*. The grain, being well cleaned, is put to ferment in veſſels full of water, which they expoſe to the ſun, when in its greateſt heat; changing the water, twice a day, for the ſpace of eight or twelve days, according to the ſeaſon. When the grain burſts eaſily under the finger, they judge it ſufficiently fermented. The fermentation perfected, and the grain thus ſoftened, it is put, handful by handful, in a canvas bag, to ſeparate the flour from the huſks; which is done by rubbing and beating it on a plank, laid acroſs the mouth of the empty veſſel that is to receive the flour.

As the veſſels are filled with this liquid flour, there is ſeen ſwimming on the top a reddiſh water, which is to be carefully ſcummed off from time to time, and clean water is to be put in its place; which, after ſtirring the whole together, is alſo to be ſtrained through a cloth, or ſieve; and what is left behind, put into the veſſel with new water, and expoſed to the ſun for ſome time. As the ſediment thickens at the bottom, they drain off the water four or five times, by inclining the veſſel, but without paſſing it through the ſieve. What remains at bottom is the *ſtarch*, which they cut in pieces to get out, and place it to dry in the ſun or ſtove. When dry it is laid up for uſe.

To uſe *ſtarch*, they take as much as needed, and ſteep it in water over night, changing the water four or five times. The ſtarchmen, uſing the refuſe of wheat, only obſerve a part of all theſe things in their proceſs: but their *ſtarch* falls far ſhort of this.

In the Hiſtory of the Royal Academy of Sciences, 1739, p. 24. edit. Paris, a kind of *ſtarch* is mentioned, made of potatoes and red truffles. By the ſhort account there given, this *ſtarch* ſeems not to be ſo good as the common, but might be of uſe in caſe of a ſcarcity of wheat.

Starch yields in analyſis the ſame principles with honey, ſugar, and manna; viz. an acid, and an oil, which ſinks; and it is the ſame ſubſtance in all vegetables containing it.

Starch is uſed along with ſmalt, or ſtone blue, to ſtiffen and clear linen. The powder thereof is alſo uſed to whiten and powder the hair.

It is alſo uſed by the dyers, to diſpoſe their ſtuffs to take colours the better.

Starch is ſometimes uſed inſtead of ſugar-candy for mixing with the colours that are uſed in ſtrong gum-water, to make them work more freely, and to prevent their cracking. It is alſo uſed medicinally for the ſame intentions with the viſcous ſubſtance which the flour of wheat forms with milk, in fluxes and catarrhs, under various forms of powders, mixtures, &c. A dram of *ſtarch*, with three ounces of any agreeable ſimple water, and a little ſugar, compoſe an elegant jelly, of which a ſpoonful may be taken every hour or two. Theſe gelatinous mixtures are likewiſe an uſeful injection in ſome diarrhœas, particularly where the lower inteſtines have their natural mucus abraded by the flux, or are conſtantly irritated by the acrimony of the matter.

By 10 Ann. cap. 26. and 12 Ann. ſtat. 2. cap. 9. for all *ſtarch* imported, ſhall be paid 4*d.* a pound, over and above all other duties; and all hair-powder made of *ſtarch*, or other powder that will ſerve for the ſame uſes as *ſtarch*, ſhall on importation pay the ſame duties a foreign *ſtarch* imported, 3 Geo. cap. 4. And by the ſaid acts, for all *ſtarch* made in the kingdom, a duty ſhall be paid of 3*d.* a pound. No perſon ſhall be a maker of *ſtarch* within the limits of the head office of exciſe in London, unleſs he occupies a tenement of 10*l.* a year or upward, for which he ſhall be aſſeſſed in his own name, and alſo pay to the poor rates; and elſewhere, unleſs he pay to the church and poor. Places of making *ſtarch* are to be entered, under penalty of 50*l.* Officers may at all times enter and ſurvey, and the penalty of obſtructing them is 50*l.* Notice of emptying the vats, and of taking the waters out of the tubs, ſhall be given, on pain of forfeiting 100*l.* 19 Geo. III. cap. 40. The maker ſhall uſe regular, ſquare, or oblong boxes only, for boxing and draining his green *ſtarch*, before it is dried in the ſtove, on pain of 10*l.*; and give notice of boxing, and an account of drying, &c. nor ſhall he remove any *ſtarch* after it is dried, before it be weighed, &c. by the officers, on pain of 200*l.* 4 G. II. cap. 14. 19 G. III. cap. 40.

Clandeſtine manufacture, or concealing of *ſtarch*, expoſes the party concerned, unleſs he can make it appear that the duty has been paid, to a forfeiture of 50*l.*; and obſtructing the officer in entering, ſeizing, &c. the ſame, incurs a forfeiture of 100*l.* 4 G. II. cap. 14. 23 G. II. cap. 21. And by 19 G. III. cap. 40. if the maker ſhall conceal any *ſtarch*, with intent to defraud his majeſty of the duties, he ſhall forfeit 100*l.* Weekly entry ſhall be made, on pain of 50*l.*; and the duties, ſhall be cleared within ſix weeks, on pain of double duty. No *ſtarch* ſhall be imported, except in packages, containing 224lb. on pain of forfeiture, and of 50*l.* from the maſter of the veſſel. *Starch* that hath paid the duties may be exported with a draw-back of the duties, but no draw-back ſhall be allowed on the exportation of foreign *ſtarch* imported. 10 Ann. cap. 26. 23. G. II. cap. 21. No perfumer, &c. ſhall make, uſe, or offer to ſale, any hair-powder made of or mixed with alabaſter, talc, plaiſter of Paris, whiting, lime, &c. (ſweet ſcents only excepted) on pain of forfeiting the ſame, and 50*l.* 12 Ann. ſtat. 2. cap. 9. And if any maker of hair-powder ſhall mix any powder of alabaſter, &c. (rice firſt made into *ſtarch*, and ſweet ſcents only excepted) or make or ſell any made, with ſuch materials, he ſhall forfeit the ſame, and 20*l.* Or if he ſhall have in his poſſeſſion, for making, mixing, or counterfeiting hair-powder, any materials beſides *ſtarch*, or powder of *ſtarch*, or rice made into *ſtarch*, he ſhall forfeit the ſame, and 10*l.* Places for making hair-powder are to be entered, and officers may enter and ſurvey them, under a penalty of 20*l.* 4 G. II. cap. 14. The forementioned forfeitures ſhall be diſtributed half to the king, and half to the proſecutor. By 20 Geo. II. c. 52. for all *ſtarch*, and hair-powder made of *ſtarch*, or other powder that will ſerve for the ſame uſes, imported, ſhall be paid an additional duty of 2*d.* a pound. For all *ſtarch* made in Great Britain ſhall be paid an additional duty 1*d.* a pound. Beſides the above duties, *ſtarch* is ſubject to the two 5*l.* *per cent.* impoſed by 19 & 22 G. III. By 22 G. III. c. 41. Every *ſtarch*-maker is to take out a licence annually at 5*l.* The maker's name ſhall be painted on the front of the houſe on pain of 100*l.* and every package of more than 28*lb.* ſhall be marked with the word *ſtarch*, before removal, under pain of forfeiture; and dealer receiving an unmarked package ſhall forfeit 200*l.* 24 G. III. c. 48.

STARLING, or **STARE**, *ſturnus*, in *Ornithology*, a diſtinct genus of birds, of the order of the *paſſeres*; the characters of which are, that the beak is awl-ſhaped, depreſſed, and obtuſe; the upper mandible is entire, with ſpreading margins; the noſtrils are guarded above by a prominent rim, and the tongue is ſharp. Of this genus Linnæus enumerates five ſpecies.

The common *ſtarling* is about the ſize of the common black bird; the weight of the male being about three ounces, and that of the female ſomewhat leſs; the bill, in old birds, is yellow; the whole plumage black, very reſplendent, with changeable blue, purple, and copper; each feather being marked with a pale yellow ſpot; the leſſer coverts are edged with yellow, and ſlightly gloſſed with green; the quill-feathers and tail are duſky; the former edged with yellow on the exterior ſide, the laſt with dirty white; the legs are of a reddiſh brown. Theſe birds breed in hollow trees, eaves of houſes, towers, cliffs, and high rocks over the ſea; they lay four or five eggs of a pale greeniſh aſh-colour; they feed on worms and inſects, and, it is ſaid, will get into pigeon holes, and ſuck the eggs; in winter aſſemble in large flocks; their fleſh is ſo bitter, as to be ſcarce eatable; they are very docile, and may be taught to ſpeak. Pennant.

Mr. Ray mentions a beautiful ſpecies, deſcribed by Bontius under the name of the *Indian ſtarling*, or *ſturnus Indicus*. This is of the ſize and ſhape of our common *ſtarling*, but is variegated with a deep blue, a lead colour, and a pale grey, and has on its head a very beautiful yellow creſt. It learns to imitate the human voice, and talks much better than the parrot, but is troubleſome in being over noiſy.

STARO. See *Italian Dry* MEASURES.

STAROSTE, in *Modern Hiſtory*, a name given in Poland to the governors of cities and caſtles. They are appointed by the king to ſuperintend his revenues, and to adminiſter juſtice in his name. The diſtrict ſubject to the juriſdiction of each is called *ſtaroſty*. However, there are ſome *ſtaroſts*, who have no juriſdiction.

STARTING, among *Brewers*, the putting of new beer, or ale, to that which is decayed, to revive it again.

STARTING, in the *Manege*. A horſe is ſaid to be *ſtarting*, ſkittiſh, or timorous, that takes every object he ſees to be otherwiſe than it is: upon which he ſtops, flies out, and ſtarts ſuddenly to one ſide, inſomuch that the rider cannot make him come near the place where the object is. This fault is more common to geldings than ſtone-horſes. Such horſes alſo as have bad eyes are moſt ſubject to it, as well as thoſe that have been kept a long time in a ſtable without airing; but theſe laſt are eaſily cured of it. When you have a ſkittiſh horſe, never beat him in his conſternation, but make him advance gently, and with ſoft means, to the ſcare-crow that alarms him, till he recovers it, and gains aſſurance.

STARVING *to death*, a kind of puniſhment uſed by the people of Arragon ſome ages ago; and it is reported by Tavernier, that the chief ladies in the kingdom of Tonquin are at this day ſtarved to death for adultery.

STASIS, a word uſed by phyſicians to expreſs a ſtagnation of the humours.

STATE, or **ESTATE**, an empire, kingdom, province, or extent of country, under the ſame government. See ESTATE.

STATE, *civil*. See CIVIL.

STATE, *free*. See FREE.

STATE is alſo uſed for the policy or form of government of a nation. Hence, miniſters of *ſtate*, reaſons of *ſtate*, &c. See GOVERNMENT.

Politicians diſtinguiſh ſeveral forms of *ſtate*, viz. the *monarchic*, as that of England; ſee MONARCHY: the *democratic*, as that of Rome and Athens; ſee DEMOCRACY: the *oligarchy*, as that of Venice; ſee OLIGARCHY: and the *ariſtocracy*, as that of Sparta; ſee ARISTOCRACY.

STATE, *council of*, in *Modern Hiſtory*, was projected by the ſtates of Holland, Zealand, and Utrecht, in conjunction with William I. prince of Orange, and erected in 1584 with ample authority. All affairs of *ſtate*, the army, and revenue, were entruſted to the care of this council; but the ſtates, growing jealous of this extraordinary power, reduced it gradually; and by a new inſtruction in 1651, the diſpoſition of military affairs, and the command of the army, were in part transferred to the ſtates-general, with the advice of the council. In this council the provinces are repreſented by ſuch a number of deputies as bears ſome proportion to the quota of money which each contributes for the ſupport of the whole, Groeningen excepted. Guelderland has one, Holland three, Zealand two, Utrecht one, Frieſland two, Overyſſel one, and Groeningen two. Theſe are all changed every three years, except the deputy from the nobility of Holland, and the two from Zealand, who enjoy their poſts for life. Here every member has a deciſive voice, and preſides for a week in his turn, without regard to the rank of the provinces. The governors or STADTHOLDERS of the provinces have a ſeat, but no deciſive vote in this council, in which affairs are determined by a majority of voices.

STATE *of a diſeaſe*, the ſame with ACME.

STATED *wind*. See WIND.

STATELY, in the *Manege*. A horſe is ſaid to be *ſtately*, that goes with a proud, ſtrutting gait.

STATER, an ancient ſilver coin, weighing four Attic drachms, and worth about three ſhillings and a penny ſterling. See DRACHM.

There was alſo a gold coin under this name: that of Cyzicus was much valued, having on one ſide the figure of a woman's head, and on the other that of the head of a lion; in weight it was equal to two drachms, and in value to twenty-eight ſilver drachms of Athens. The gold *ſtater* of Athens was equal in value to twenty drachms, and a drachm of gold was equal to about ten of ſilver.

STATERA *Romana*, or ſteelyard, a name given to the Roman balance.

STATES, a term applied to the ſeveral orders, or claſſes, of a people, aſſembled to conſult of matters for the public good. See ESTATE.

STATES-GENERAL, the name of an aſſembly, conſiſting of the deputies of the Seven United Provinces.

In this aſſembly, the deputies of each province, of what number ſoever they be, have only one voice, and are eſteemed as but one perſon, the votes being given by provinces. Each province preſides at the aſſembly in its turn, according to the order ſettled among them: Guelderland preſides firſt, then Holland, &c.

This aſſembly is the repreſentative of the ſovereignty of the Union, which reſides properly in the general aſſembly of the ſtates themſelves of all the ſeveral provinces; but as that aſſembly ordinarily conſiſts of ſeven or eight hundred perſons, it was reſolved, after the departure of the earl of Leiceſter, in order to avoid expence, and the confuſion of ſo numerous a body, that the provincial eſtates ſhould, for the future, be ordinarily repreſented by their deputies, under the name of the *States-general*; who were always to reſide at the Hague, and who alone are now called *ſtates-general*.

STATES *of Holland*, an aſſembly conſiſting of the deputies of the council, or colleges, of each city; wherein reſides the ſovereignty of that province.

Originally, none but the nobility, and the ſix principal cities, had ſeats, or voices, in the *ſtates*. At preſent there are the deputies of eighteen cities. The nobility have the firſt voices, which is pronounced by the grand penſionary, as penſionary of their order. The other provinces of the Union have likewiſe their *ſtates*, repreſenting their ſovereignty; deputies from which make what they call the *States-general*.

STATHEUSIS, formed of ςαθευω, *I heat*, a word uſed by the old writters to expreſs the torrefaction, or roaſting of ſome medicines before a ſlow fire, as is done frequently at preſent with rhubarb, &c.

STATHOLDER. See STADTHOLDER.

STATICAL *baroſcope*. See BAROSCOPE, and BAROMETER.

STATICAL is ſometimes applied in a peculiar ſenſe to the experiments made as to the quantity of PERSPIRATION, and other excretions of the human body.

We have a very particular account of ſome experiments of this kind in the Philoſophical Tranſactions, N° 472. or Abr. vol. ix. p. 475. made by Dr. John Lining of Charles-Town, in South Carolina.

STATICAL *hygroſcope*. See HYGROSCOPE.

STATICE, in *Botany*. See THRIFT.

STATICS, *ſtatice*, formed of ιςημι, *I weigh*, a branch of mathematics, which conſiders weight or gravity, and the motion of bodies ariſing therefrom.

Thoſe who define mechanics the ſcience of motion, make *ſtatics* a member thereof; viz. that part which conſiders the motion of bodies ariſing from gravity.

Others make them two diſtinct doctrines, reſtraining mechanics to the doctrine of motion and weight, in reference to the ſtructure and power of machines: and *ſtatics* to the doctrine of motion, conſidered merely as ariſing from the weight of bodies, without any immediate reſpect to machines. On which footing, *ſtatics* ſhould be the doctrine, or theory, of motion; and mechanics, the application thereof to machines.

For the laws of STATICS, ſee GRAVITY, DESCENT, &c.

STATICS, *ſtatici*, in *Medicine*, a kind of epileptics, or perſons ſeized with epilepſies.

Statics differ from *cataleptics*, in that theſe laſt have no ſenſe of external objects, nor remember any thing that paſſes at the time of the paroxyſm; whereas the *ſtatici* are all the while taken up with ſome very ſtrong, lively idea; which they remember well enough when out of the fit.

STATICULA, among the Romans, thoſe little figures with which it was uſual to adorn their drinking cups, called *ſcyphi*.

STATICULI, among the Romans, a kind of dancing pantomimes. See PANTOMIME.

STATION, in *Geometry*, &c. a place pitched upon to make an obſervation, take an angle, or the like.

An inacceſſible height, or diſtance, is only to be taken by making two *ſtations*, from two places whoſe diſtances are known. In making maps of provinces, &c. *ſtations* are fixed on all the eminences, &c. of the country, and angles taken thence to the ſeveral towns, villages, &c.

In ſurveying, the inſtrument is to be adjuſted by the needle, to anſwer the points of the horizon at every *ſtation*; the diſtance from the laſt *ſtation* to be meaſured, and an angle to be taken to the next *ſtation*; which includes the whole buſineſs of ſurveying.

In levelling, the inſtrument is rectified, that is, it is placed level at each *ſtation*, and obſervations made forwards and backwards.

We have a method of meaſuring diſtances at one *ſtation*, in the Philoſophical Tranſactions, N° 7. by means of a teleſcope. But the practice of this method does not anſwer to the theory.

STATION, *line of*, in *Perſpective*. See LINE.

STATION, in *Aſtronomy*, the poſition, or appearance, of a planet, in the ſame point of the zodiac, for ſeveral days. As the earth, whence we view the motions of the planets, is out of the centre of their orbits, the planets appear to proceed irregularly; being ſometimes ſeen to go forwards, that is, from weſt to eaſt, which is called their *direction*; ſometimes to go backwards, or from eaſt to weſt, which is called their *retrogradation*.

Now between theſe two ſtates there muſt be an intermediate one, wherein the planet neither appears to go backwards nor forwards, but to ſtand ſtill, and keep the ſame place in her orbit; which is called her *ſtation*.

STATION, STATIO, in *Church Hiſtory*, is applied to the faſt of the fourth and ſixth days of the week, that is Wedneſday and Friday; which many among the ancients obſerved with much devotion, till three of the clock in the Afternoon. St. Peter of Alexandria, in his Canonical Epiſtle, can. 15. obſerves, that it was appointed conformably to ancient tradition, to faſt weekly on thoſe days; on Wedneſday, in memory of the council the Jews took to put our Saviour to death; and on Friday on account of his paſſion. Some regard to which is ſtill had by the church of England. See ABSTINENCE.

STATION is alſo uſed in the church of Rome, for a church where indulgences are to be had on certain days.

It was St. Gregory that fixed the *ſtations* at Rome, i. e. the churches where the office was to be performed each day of Lent, and on ſolemn feaſt-days. Theſe *ſtations* he marked down in his Sacramentary, as they now ſtand in the Roman Miſſal; appropriating them chiefly to the patriarchal and titular churches: but though the *ſtations* were fixed, the archdeacon did not fail, at each *ſtation*, to publiſh to the people the following *ſtation*.

STATION is alſo a ceremony in the Romiſh church, wherein the prieſts or canons go out of the choir to ſing an anthem before the crucifix, or the image of our Lady. This ceremony is aſcribed to St. Cyril.

STATION, *ſtatio*, ςασις, in the *Ancient Muſic*, was ſometimes uſed for any fixed pitch, or degree of ſound, whether produced by intention or remiſſion.

STATION-*line*, in *Surveying*. See LINE and SURVEYING.

STATIONARY, in *Aſtronomy*, the ſtate of a planet when it ſeems to remain immoveable in the ſame point of the zodiac. The planets having ſometimes a progreſſive, and ſometimes a retrograde motion, there will be ſome point wherein they appear *ſtationary*. Now a planet will be ſeen *ſtationary*, when the line that joins the earth's and planet's centre is conſtantly directed to the ſame point in the heavens, that is, when it keeps parellel to itſelf. For all right lines drawn from any point of the earth's orbit, parallel to one another, do all point to the ſame ſtar; the diſtance of thoſe lines being inſenſible, in compariſon of that of the fixed ſtars.

Saturn is ſeen *ſtationary* at the diſtance of ſomewhat more than a quadrant from the ſun; Jupiter at the diſtance of 52°; and Mars at a much greater diſtance; Venus at 47°, and Mercury at 28°.

Saturn is *ſtationary* eight days, Jupiter four, Mars two, Venus one and a half, and Mercury an half; though the ſeveral ſtations are not always equal; becauſe the orbits of the planets are not circles which have the ſun in their centre.

STATIONARY *fevers*, a term uſed by Sydenham to expreſs a peculiar kind of fever, adapted, and owing to ſome general conſtitution of the air and ſeaſons. There are certain general conſtitutions of years, which owe their origin neither to heat, cold, dryneſs, nor moiſture, but rather depend upona certain ſecret and inexplicable alteration in the bowels of the earth, whence the air becomes impregnated with ſuch kinds of effluvia as ſubject the human body to peculiar diſtempers, ſo long as that kind of conſtitution prevails, which after a certain courſe of years declines, and gives way to another. Each of theſe general conſtitutions is attended with its own proper and peculiar kind of fevers, which never appear in any other; and this is thence called a *ſtationary fever*.

STATIVA, among the Romans, a ſtanding camp kept for the defence of the frontiers of the empire. Theſe camps gave riſe to a great many towns, which took their names from the legion ſtationed there.

STATORES, among the Romans, made a part of the emperor's life guard.

STEATOCELE, Στεατοκηλη, in *Medicine*, a rupture, or tumor, of the ſcrotum, conſiſting of a fatty ſubſtance, reſembling ſuet, collected therein. See HERNIA.

STATUARY, STATUARIA, a branch of ſculpture, employed in the making of ſtatues.

Statuary is one of thoſe arts wherein the ancients ſurpaſſed

paſſed the moderns: indeed it was much more popular, and more cultivated among the former than the latter. It is diſputed between *ſtatuary* and painting, which of the two is the moſt difficult, and the moſt artful. See Sculpture.

The invention of *ſtatuary* was at firſt very coarſe. Leon Battiſta Alberti, who has an expreſs treatiſe on ſtatues, imagines, that it took its riſe from ſomething caſually obſerved in the productions of nature, that, with a little help, ſeemed diſpoſed to repreſent the figure of ſome animal. The common ſtory is, that a maid, full of the idea of her lover, made the firſt eſſay, by the aſſiſtance of her father's implements, who was a potter. This, at leaſt, is pretty certain, that earth was the firſt matter *ſtatuary* was practiſed upon.

Statuary is alſo uſed for the artificer who makes ſtatues. Phidias was the greateſt *ſtatuary* among the ancients; and Michael Angelo among the moderns.

Statuary *column*. See Column.

Statuary *fountain*. See Fountain.

Statuary *marble*, among our artificers, the name of the ſofter white marble uſually wrought into *ſtatues*, the ſame with the *Parian* marble of the ancients.

STATUE, Statua, a piece of ſculpture in full relievo, repreſenting a human figure.

Daviler more ſcientifically defines *ſtatue* a repreſentation in high relievo, and inſulate, of ſome perſon diſtinguiſhed by his birth, merit, or great actions; placed as an ornament in a fine building, or expoſed in a public place, to preſerve the memory of his worth.

In ſtrictneſs, the term *ſtatue* is only applied to figures on foot; the word being formed from the Latin *ſtatura*, the ſize of the body; or from *ſtare, to ſtand*.

Statues are formed with the chiſſel, of ſeveral matters, as ſtone, marble, plaſter, &c.

They are alſo caſt of various kinds of metal, particularly gold, ſilver, braſs, and lead. For the method of caſting *ſtatues*, ſee Foundery *of ſtatues*.

Dædalus, the ſon of Eupalmus, who lived not only before the ſiege of Troy, but even before the expedition of the Argonauts, among many other notable contrivances aſcribed to him, is ſaid to have been the inventor of *ſtatues*. And yet it is certain, there were ſtatuaries before him; only it was he who firſt found how to give them action and motion, and to make them appear as if alive. Before him, they made them with the feet joined together, never intending to expreſs any action. He firſt looſened the feet of his, and gave them the attitudes of people walking and acting.

The Phœnicians are ſaid to have been the firſt who erected *ſtatues* to the gods. The Greeks ſucceeded in their *ſtatues* beyond the Romans, both the workmanſhip and the fancy of the Roman *ſtatues* were inferior to the Grecian. Indeed we have very few remaining that have eſcaped the injuries of time.

Statues are uſually diſtinguiſhed into four general kinds. The firſt are thoſe leſs than the life; of which kind we have ſeveral *ſtatues* of men, of kings, and of gods themſelves.

The ſecond, thoſe equal to the life; in which manner it was that the ancients, at the public expence, uſed to make *ſtatues* of perſons eminent for virtue, learning, or the ſervices they had done.

The third, thoſe that exceed the life, among which, thoſe which ſurpaſs the life once and an half, were for kings and emperors; and thoſe double the life, for heroes.

The fourth kind were thoſe that exceeded the life twice, thrice, or even more; and were called *coloſſuſes*.

Every *ſtatue* reſembling the perſon it is intended to repreſent, is called *ſtatua iconica*. See Sculpture.

Statue, *allegorical*, that which, under a human figure, or other ſymbol, repreſents ſomething of another kind, as a part of the earth, a ſeaſon, age, element, temperament, hour, &c.

Statue, *caryatic*. See Caryatides.

Statue, *coloſſal*. See Colossus.

Statues, *curule*, thoſe which are repreſented in chariots drawn by bigæ, or quadrigæ, that is, by two or four horſes: of which kind there are ſeveral in the circuſes, hippodromes, &c. or in cars, as we ſee ſome, with triumphal arches, on antique medals.

Statue, *equeſtrian*, that which repreſents ſome illuſtrious perſon on horſeback; as that famous one of Marcus Aurelius at Rome, and that of king Charles I. at Charingcroſs.

Statue, *Greek*, denotes a figure that is naked and antique, it being in this manner the Greeks repreſented their deities, athletæ of the Olympic games, and heroes. The reaſon of this nudity, whereby the Greek *ſtatues* are diſtinguiſhed, is, that thoſe who exerciſed wreſtling, wherein the Greek youth placed their chief glory, always performed naked.

The *ſtatues* of heroes were particularly called *Achillean ſtatues*, by reaſon of the great number of figures of that prince, in moſt of the cities of Greece.

Statue, *hydraulic*, any figure placed as an ornament of a fountain, or grotto, or that does the office of a jet d'eau, a cock, ſpout, or the like, by any of its parts, or by any attribute it holds. The like is to be underſtood of any animal ſerving for the ſame uſe.

Statue, *pedeſtrian*, a *ſtatue* ſtanding on foot; as that of king Charles II. in the Royal Exchange; and that of king James II. in the Privy-Gardens.

Statue, *Perſian*. See Persian.

Statues, *Roman*, is an appellation given to ſuch as are clothed; and which receive various names from their various dreſſes.

Thoſe of emperors, with long gowns over their armour, were called *ſtatuæ paludatæ*; thoſe of captains and cavaliers, with coats of arms, *thoracatæ*; thoſe of ſoldiers, with cuiraſſes, *loricatæ*; thoſe of ſenators and augurs, *trabeatæ*; thoſe of magiſtrates with long robes, *togatæ*; thoſe of the people with a plain tunica, *tunicatæ*; and laſtly, thoſe of women, with long trains, *ſtolatæ*.

The Romans had another diviſion of *ſtatues*, into *divine*, which were thoſe conſecrated to the gods; as Jupiter, Mars, Apollo, &c. *heroes*, which were thoſe of the demigods; as Hercules, &c. and *Auguſti*, which were thoſe of the emperors; as thoſe two of Cæſar and Auguſtus, under the portico of the Capitol.

Statues, *foundery of*. See Foundery.

Statues, *pedeſtal of*. See Pedestal.

Statues, *plinth of*. See Plinth.

Statue, *reparing a*. See Repairing.

STATURE, the ſize, or height of man. From the Latin *ſtatura*, of *ſtare, to ſtand*.

The *ſtature*, or pitch, of a man, is found admirably well adapted to the circumſtances of his exiſtence. See Dwarf and Giant.

It is a common opinion, and has been ſo ever ſince Homer's time, that people, in the earlieſt ages in the world, much ſurpaſſed the moderns in *ſtature*; and, it is true, we read of men, both in ſacred and profane hiſtory, whoſe pitch appears ſurpriſing: but then, it is true they were, even then, eſteemed giants.

The ordinary *ſtature* of men, Dr. Derham obſerves, is, in all probability, the ſame now as at the beginning; as may be gathered from the monuments, mummies, &c. ſtill remaining. The oldeſt monument in the world is that of Cheops, in the firſt pyramid of Egypt, which Mr. Greaves obſerves, ſcarce exceeds the meaſure of our ordinary coffins. The cavity, he ſays, is only 6.488 feet long, 2.218 feet wide, and 2.160 deep: from which dimenſions, and thoſe of ſeveral embalmed bodies, obſerved by him in Egypt, that accurate writer concludes, there is no decay in nature; but that the men of this age are of the ſame *ſtature* as thoſe three thouſand years ago.

To theſe, we have other and later inſtances to add from Hakewell: the tombs at Piſa, which are ſome thouſands of years old, are yet no longer than ours. The ſame may be ſaid of Athelſtan's in Malmſbury church; and of Sheba's in Paul's, of the year 693, &c.

The like evidence we have from the ancient armour, ſhields, veſſels, &c. dug up this day, e. gr. the braſs helmet, dug up at Metaurum, fits one of our men; yet it is allowed to have been left there at the overthrow of Aſdrubal. Add, that Auguſtus was five feet nine inches, which was the meaſure of our queen Elizabeth; only the queen exceeded the emperor by two inches, allowance being made for the difference between the Roman and our foot.

STATUS *de manerio*, in *Ancient Records*, denotes all the tenants, and legal men, within the lands of a manor, aſſembled in their lord's court to do their cuſtomary ſuit, and enjoy their rights and privileges.

STATUTE, Statutum, in its general ſenſe, ſignifies a law, decree, ordinance, &c.

Statute, in our *Laws* and *Cuſtoms*, more immediately ſignifies an act of parliament, made by the three eſtates of the realm; and having the force of a law. See Law and Parliament.

Statutes were anciently proclaimed by the ſheriff, but upon the invention of printing, this method was diſcontinued. Every body is obliged to take notice of an act of parliament at his peril.

Statutes are either *general* or *ſpecial*, *public* or *private*. A general or public act is an univerſal rule, that regards the whole community; and of this the courts of law are bound to take notice judicially and *ex officio*; without the *ſtatute* being particularly pleaded, or formally ſet forth by the party who claims an advantage under it. Special or private acts are rather exceptions than rules, being thoſe which only operate upon particular perſons, and private concerns: ſuch as the Romans intitled, *ſenatus-decreta*, in contradiſtinction to the *ſenatus-conſulta*, which regarded the whole community: and of theſe the judges are not bound to take notice, unleſs they be formally ſhewn and pleaded.

Statutes are alſo either DECLARATORY of the common law, or REMEDIAL of ſome defects therein; and there is alſo a ſubordinate diviſion of remedial acts into enlarging and reſtraining *ſtatutes*.

The principal rules laid down by the learned Blackſtone for the conſtruction of *ſtatutes* are the following.

As there are three points to be conſidered in the conſtruction of all remedial *ſtatutes*, viz. the old law, the miſchief, and the remedy; that is, how the common law ſtood at the making of the act; what the miſchief was, for which the common law did not provide.; and what remedy the parliament hath provided to cure this miſchief: it is the buſineſs of the judges ſo to conſtrue the act, as to ſuppreſs the miſchief and advance the remedy. A *ſtatute*, which treats of things or perſons of an inferior rank, cannot by any general words be extended to thoſe of a ſuperior. Penal *ſtatutes* muſt be conſtrued ſtrictly. *Statutes* againſt frauds are to be liberally and beneficially expounded. One part of a *ſtatute* muſt be ſo conſtrued by another, that the whole may (if poſſible) ſtand. A ſaving, totally repugnant to the body of the act, is void. Where the common law and a *ſtatute* differ, the common law gives place to the *ſtatute*; and an old *ſtatute* gives place to a new one. If a *ſtatute* that repeals another, is itſelf repealed afterwards, the firſt *ſtatute* is thereby revived, without any formal words for that purpoſe. Acts of parliament derogatory from the power of ſubſequent parliaments bind not. And, laſtly, acts of parliament that are impoſſible to be performed, are of no validity; and if there ariſe out of them collaterally any abſurd conſequences, manifeſtly contradictory to common reaſon, they are, with regard to ſuch conſequences, void.

The method of citing acts of parliament is various. Many of our ancient *ſtatutes* are called after the name of the place, where the parliament that made them was held; as the *ſtatutes* of Merton and Marlberge, of Weſtminſter, Glouceſter, and Wincheſter. Others are denominated entirely from their ſubject; as the *ſtatutes* of Wales and Ireland, the *articuli cleri*, and the *prærogativa regis*. Some are diſtinguiſhed by their initial words, as the *ſtatute* of *quia emptores*, and that of *circumſpecte agatis*. But the moſt uſual method of citing them, eſpecially ſince the time of Edward II. is by naming the year of the king's reign in which the *ſtatute* was made, together with the chapter or particular act, according to its numeral order; as 9 Geo. II. c. 4. For all the acts of one ſeſſion of parliament taken together, make properly but one *ſtatute*; and, therefore, when two ſeſſions have been held in one year, it is uſual to mention *ſtat.* 1 or 2. Thus the bill of rights is cited as 1 W. & M. *ſt.* 2. c. 2. ſignifying that it is the ſecond chapter, or act of the ſecond *ſtatute*, or the laws made in the ſecond ſeſſions of parliament, held in the firſt year of king William and queen Mary. Blackſt. Com. book i. p. 85, &c.

Abridgments of the *ſtatutes* have been made by ſeveral, from Magna Charta to the times of the reſpective abridgers. The firſt by Raſtal, publiſhed in 1559; the ſecond by Pulton in 1606; the third by Wingate in 1641; and others ſince by Hughes, Manby, Waſhington, Boult, Nelſon, Cay, &c.

STATUTES *of a corporation*, are thoſe bye-laws, or private regulations, which it is impowered to make for its own better government, and which are binding upon the members, unleſs contrary to the laws of the land, and then they are void. This right of making bye-laws, under the preceding reſtriction, was allowed by the law of the Twelve Tables at Rome; but no trading company is, with us, allowed to make bye-laws, which may affect the king's prerogative, or the common profit of the people, under penalty of 40*l.* unleſs they be approved by the chancellor, treaſurer, and chief juſtices, or the judges of aſſize in their circuits; and even though they be ſo approved, ſtill, if contrary to law, they are void. Bl. Com. book i. p. 476.

STATUTE, *acceſſory by.* See ACCESSORY.

STATUTE, *action upon the.* See ACTION.

STATUTE, *guardian by.* See GUARDIAN.

STATUTE-*merchant* is a bond of record, purſuant to the *ſtatute*, 13 Edw. I. *de mercatoribus*, acknowledged before one of the clerks of the *ſtatutes-merchant*, and mayor, or chief warden of the city of London; or two merchants of the ſaid city for that purpoſe aſſigned; or before the mayor, chief warden, or maſter, of other cities or towns; or other ſufficient men for that purpoſe appointed; ſealed with the ſeal of the debtor, and of the king, which is of two pieces, the greater to be kept by the mayor, chief warden, &c. and the leſs by the ſaid clerks. Its effect is, that if the obligor pay not the debt at the day, execution may be awarded againſt his body, lands, and goods; and that the obligee ſhall hold the ſame till the debt be levied. See STATUTE-*ſtaple*.

STATUTE-*ſeſſions*, called alſo *petit-ſeſſions*, in *Law*, are meetings in every hundred, to which conſtables repair, and others, both maſters and ſervants, for deciding differences between maſters and ſervants, rating of wages, beſtowing people in ſervice, who, being fit to ſerve, either refuſe to ſeek, or cannot get maſters.

STATUTE-*ſtaple* is a ſort of *ſtatute*-merchant, relating to merchants and merchandizes of the STAPLE.

The *ſtatute-ſtaple* is of two kinds; *proper* and *improper*.

The *proper* is a bond of record, acknowledged before the mayor of the ſtaple, in the preſence of one or more conſtables of the ſtaple; by virtue of which the creditor may forthwith have execution of the body, lands, and goods, of the debtor, on non-payment.

This and the *ſtatute*-merchant are both ſecurities for debts, originally permitted only among traders for the benefit of commerce; whereby the lands of the debtor are conveyed to the creditor, till out of the rents and profits of them his debt may be ſatisfied, and during ſuch time as the creditor ſo holds the lands, he is TENANT by *ſtatute*-merchant, or *ſtatute-ſtaple*.

Improper is a bond of record, or recognizance, founded upon the *ſtatute* 23 Hen. VIII. cap. 6. of the nature of a proper *ſtatute-ſtaple* as to the force and execution of it, and acknowledged before one of the chief juſtices; or in their abſence, before the mayor of the ſtaple, and recorder of London; which extends the benefit of the mercantile tranſaction already mentioned, to all the king's ſubjects in general.

STATUTO *mercatorio*, a writ for the impriſoning him that has forfeited a *ſtatute-merchant* bond, until the debt is ſatisfied: and of theſe writs there is one againſt lay perſons, and another againſt perſons eccleſiaſtical.

STATUTO *ſtapulæ*, a writ that lies to take the body to priſon, and ſeize upon the land and goods of one who hath forfeited the bond called *ſtatute-ſtaple*.

STATUTUM *de laborariis*, an ancient writ for the apprehending ſuch labourers as refuſe to work according to the *ſtatute*.

STAVERS. See STAGGERS.

STAVES, *flag.* See FLAG-*ſtaves*.

STAVES, *levelling.* See LEVELLING-*ſtaves*.

STAVES, *tip.* See TIP-*ſtaves*.

STAVESACRE, *ſtaphiſagria*, in *Botany*; for the characters, ſee LARKSPUR.

Staveſacre grows in Provence, Languedoc, and many other parts of Europe; the leaves are large and fingered, the flower blue, and ſomewhat like that of the larkſpur; the ſeed, which is the only part of the plant uſed in medicine, is a duſky brown, and very rough on the outſide, and of a pale yellow within, and of a bitter, diſagreeable, and very acrid taſte. The ſeeds ſhould be choſen new, clean, and plump. They were formerly employed ſometimes as a cathartic, in doſes of from twelve grains to a ſcruple, but they operate with ſo much violence both upwards and downwards, and are ſo liable, not only to diſorder the bowels, but likewiſe to inflame the throat, that their internal uſe has been long laid aſide. They are now uſed only in external application, for ſome kinds of cutaneous eruptions, and for deſtroying inſects, particularly lice in children's heads, for which end they are powdered, and ſometimes mixed with *cocculus indicus*. Some take them into their mouths alſo for the tooth-ach, and others have ventured to uſe gargariſms of them to cure phlegm, and as an errhine, ſnuffing them up the noſtrils. They are alſo commended for the cleanſing old ulcers.

STAUROPHORI, Σταυροφοροι, compounded of ςαυρος, *a croſs*, and φερω, *I carry*, in *Church Hiſtory*, certain eccleſiaſtics, whoſe buſineſs it was to carry the croſs in proceſſions.

STAUROPHYLAX, Σταυροφυλαξ, derived from ςάυρος, *a croſs*, and φυλασσῶ, *I keep*, in *Church Hiſtory*, a dignified officer in the church of Conſtantinople, to whoſe care the keeping of the croſs, found by St. Helena, was committed.

STAXIS, a word uſed by the ancient phyſicians to expreſs a diſtillation of the blood in drops from the noſe.

A *ſtaxis*, in the doctrine of criſes, is juſtly condemned as indicating a weakneſs and decay of ſtrength in nature; whereas on the contrary, free and copious diſcharges of blood from the noſe are eſteemed good indications, and often make happy criſes.

STAY, in the *Sea Language*, a big ſtrong rope employed to ſupport the MAST on the fore part, by extending from its upper end towards the fore part of the ſhip, as the

SHROUDS are extended to the right and left, and behind it. The *ſtay* of the fore-maſt, called the *fore-ſtay*, reaches from the maſt-head towards the bowſprit end: the *main-ſtay* extends over the fore-caſtle to the ſhip's ſtem; and the *mizen-ſtay* is ſtretched down to that part of the main-maſt which lies immediately above the quarter-deck: the *fore-top-maſt-ſtay* comes alſo to the end of the bowſprit, a little beyond the *fore-ſtay:* the *main-top-maſt-ſtay* is attached to the head or hounds of the fore-maſt; and the *mizen-top-maſt-ſtay* comes alſo to the hounds of the main-maſt: the *fore-top-gallant-ſtay* comes to the outer end of the jib-boom; and the *main-top-gallant-ſtay* is extended to the head of the fore-top-maſt. See *Tab. Ship. fig.* 1. *n.* 29. 33. 78. 85. 120.

Stay-*ſail*, in a *ſhip*, a ſort of triangular SAIL, extended upon a *ſtay*.

Stay *a ſhip, to*, or *bring her on the ſtays*, is to manage her tackle and ſails, ſo as that ſhe cannot make any way forwards, which is done in order to her tacking about.

Stay, in the *Manege*. To *ſtay*, or ſuſtain your horſe, is to hold the bridle firm and high. We likewiſe *ſtay* or ſuſtain a horſe with the in-leg, or in heel, when he makes his croupe go before his ſhoulders upon volts: as alſo when we hinder him to traverſe, and ride him equally, keeping him always ſubject, ſo that his croupe cannot ſlip out, and he cannot loſe either his cadence, or his ground, but marks all his times equal.

STEADY, a word of command at ſea, given by the pilot to the man at the helm, in a fair wind, to keep the ſhip *ſteady* in her courſe, without deviating to the right or left, or making angles (or *yaws*, as they call them) in and out. The helmſman accordingly anſwers *ſteady*; thus denoting his attention and obedience to the pilot's orders.

STEALING *an heireſs*. See Forcible *abduction*.

Stealing, in *Law*. See Larceny.

STEAM, denotes the ſmoke, or vapour, proceeding from any thing that is moiſt and hot. Subterranean *ſteams* often affect the ſurface of the earth in a very remarkable manner, and influence or prevent vegetation more than any thing elſe. The ſurface of ſome ground is ſo hollow and light, and ſo ſwoln by a warm and continually working ferment, that it muſt needs ſend up a warming *ſteam*, and that it does ſo, even in the coldeſt weather, is evident from the immediate melting of the ſnow that falls on it: nay, in many places, the effect of this *ſteam* is ſo great, that it melts the ſnow before it reaches the ground, ſo that it falls on it in form of rain.

Some ſtones alſo, and ſome waters, impregnate the earth by their innate warmth, ſending up a continual ſucceſſion of warm effluvia from all parts of their ſurfaces; and other ſtones have exactly a contrary effect, rendering the places where they lie barren and cold. Streams of water, which have in their ſubterranean courſe run through beds of lime-ſtone, marl, or chalk, are always enriched, and warmed by the *ſteams* iſſuing from thoſe ſubſtances, and mixing with them as they paſs, and conſequently theſe waters enrich the ground wherever they run; and, on the contrary, ſome waters are uliginous, or corroſive, from the *ſteams* they have received in their channels from the veins of pyrites, or beds of metallic ores. It is even reported, that the very ſubſtances of metals and minerals are thus raiſed in *ſteams*, and that the juices of plants are found loaded with them; thus we are told, that in Italy crude quickſilver is found in the juices and at the roots of plants; and that in Moravia, Hungary, and Peru, the ſubſtances of the metals are found in the bodies of plants, particularly lead and ſilver. The Miſcellanea Curioſa of Leipſic ſpeak of wonderful appearances of gold in the form of plants, which, if true, muſt be owing to that metal's having been raiſed in *ſteams*, and carried into the veſſels of the plants in ſuch quantity, as in fine to deſtroy the vegetable appearance, and leave the figure of the plant in metal. Phil. Tranſ. N° 110.

Steam-*engine*, commonly called FIRE-*engine*, in *Hydraulics*, is one of the moſt curious and uſeful machines, which modern art can boaſt, for draining mines and raiſing water, &c. by the proper application and uſe of the *ſteam* of boiling water. The marquis of Worceſter, in his Century of Inventions (printed A. D. 1663.) was probably the firſt perſon who propoſed raiſing great quantities of water by the means of fire converting water into *ſteam*; and he mentions an engine of this kind, which he ſaw playing a continual ſtream in the manner of a fountain, forty feet high. He alſo ſays, that a perſon attending it turned two cocks; that, one veſſel of water being conſumed, another begins to force and refill with cold water, and ſo ſucceſſively; the fire being tended and kept conſtant by the ſame perſon in the interim between the ſeveral occaſions of turning the cocks.

Captain Savery, having read this account, immediately attempted to raiſe water by fire, and was the firſt who erected an engine for this purpoſe, which he propoſed for the draining of mines. His engine is deſcribed in Harris's Lexicon (art. *Engine*) and being compared with the marquis of Worceſter's deſcription, appears to have been taken from him. However, capt. Savery, in order to ſecure the invention to himſelf, bought up, as Deſaguliers informs us, all the books of the marquis, which he could find, and burnt them: and then gave out, that he diſcovered the power of *ſteam* by accident. He made many experiments to bring the machine to perfection, and erected ſeveral for gentlemen's ſeats, but could not ſucceed for mines; the depth from which water was to be raiſed in this caſe being ſo great, that it required the *ſteam* of ſuch a ſtrength as to be dangerous in its application.

Thus the progreſs of the engine was ſtopped, till Mr. Newcomen, an iron-monger, and Mr. John Cowley, a glazier, both diſſenters of the Baptiſt denomination at Dartmouth, contrived another way to raiſe water by fire, where the *ſteam* for this purpoſe, even at the greateſt depths of mines, is not required to be greater than the preſſure of the atmoſphere: and this is the ſtructure of the *fire-engine* as it is now uſed, and which has been of about ſeventy years ſtanding; the inventors, or improvers of this engine having begun to work with it in 1712.

In order to explain the principles, conſtruction, and uſe of this engine, let us ſuppoſe a well or mine, as *p* (*Tab.* VI. *Hydraulics*, *fig.* 71.) one hundred and fifty feet deep, from which water is to be raiſed with a pump, the diameter of whoſe barrel is $7\frac{1}{4}$ inches; and, therefore, in this caſe, the weight of a cylindric column of water one hundred and fifty feet high, and $7\frac{3}{4}$ inches in diameter, will be about three thouſand pounds. If now the rod of this pump were hung by a chain to the end of a lever *h h*, as at H, and at the other end a power were applied, as at P, with a ſuperior force, the pump might be worked, and the water raiſed. It appears, that this power cannot be ſupplied by the ſtrength of man or beaſt; for it will require one hundred men to pull down the beam, each pulling with a force of thirty pounds; but as the pump in a mine muſt not ſtand ſtill, there ſhould be one hundred more to relieve theſe when weary: and even ſuppoſing two hundred men to be ſufficient, which is far from being the caſe, the expence would be too great. If we allow horſes, and one horſe equal to five men, there muſt be twenty horſes working at a time, and twenty more to relieve theſe, which number of horſes would be attended with too great an expence for moſt mines: and neither men nor horſes would be able to give more than fifteen or ſixteen ſtrokes in a minute; ſome other power, therefore, muſt be applied. The philoſopher will propoſe to fix a large barrel or cylinder C C, truly bored, about eight or nine feet long, and twenty-two inches wide, on the top of an air-pump; and in this a piſton well leathered, whoſe rod L is faſtened to a chain hanging from the end of a lever at P. Now, ſays he, allowing fifteen pounds of preſſure upon every ſquare inch, the whole preſſure of air upon ſuch a piſton will be five thouſand eight hundred pounds, which is near twice the force to be overcome. But this muſt be effected by exhauſting ſo large a barrel by the air-pump, and which he cannot do more than twice in an hour; ſo that he can produce only two ſtrokes of the pump, whereas we ought to have nine hundred and ſixty in the ſame time: ſixteen ſtrokes in a minute being neceſſary to keep the water in the mine from overflowing the works. But an effectual method has been found of making a vacuum under the piſton C, ſixteen times in a minute, which is as follows: B is a large boiler, whoſe water by the fire under it is converted into elaſtic *ſteam*. The great cylinder C C is fixed upon it, and communicates with it by the pipe D *d*; on the lower orifice of which (within the boiler) moves a broad plate, by means of the *ſteam*-cock or regulator E 10, ſtopping or opening the paſſage, to prevent or permit the *ſteam* to paſs into the cylinder, as occaſion requires. The diameter of the pipe D is about four inches. The *ſteam* in the boiler ought always to be a little ſtronger than the air, that when let into the barrel, it may be a little more than a balance to the preſſure of the external air, which keeps down the piſton at the bottom *d n*. The piſton being by this means at liberty, the pump-rod will, by its great weight, deſcend at the oppoſite end to fetch a ſtroke, which is more than double the weight of the piſton, &c. at the other end. The end of the lever at the pump, therefore, will always preponderate and deſcend, when the piſton is at liberty. The handle of the *ſteam*-cock E 10, being turned towards *n*, opens the pipe D to let in the *ſteam*; and being turned towards O, ſhuts it off, that no more can enter. The piſton is now raiſed towards the top of the cylinder at C, and the cylinder is full of *ſteam*. The lever O 1 muſt then be lifted up to turn, by its teeth, the injecting cock at N, which permits the water, brought from the ciſtern *g*, by the pipe *g* M N, to enter the bottom of the cylinder at *n*, where it flies up like a fountain, and ſtriking againſt the bottom of the piſton, the drops, being driven all over the cylinder, will by their coldneſs condenſe the *ſteam* into water again, and precipitate it to the bottom of the cylinder.

Mr. Beighton made an experiment to determine the rarity of *ſteam*, and found the content of a certain cylinder of *ſteam* was one hundred and thirteen gallons; and ſince there were ſixteen ſtrokes in a minute, therefore, $113 \times 16 = 1808$ gallons of *ſteam* per minute. He alſo obſerved, that the boiler, proportioned to that cylinder, required to be ſupplied with water at the rate of five pints per minute, and ſince 282 cubic inches make a gallon, $35\frac{1}{4}$ make a pint, and $5 \times 35\frac{1}{4} = 176\frac{1}{4}$ in five pints; and the cubic inches of *ſteam* are $1808 \times 282 = 509856$: if then we ſay, as $176\frac{1}{4} : 509856 :: 1 : 2887$; or one cubic inch of water is expanded into 2887 inches of *ſteam*: conſequently the *ſteam* in the cylinder is reduced to $\frac{1}{2887}$ part, when converted into water by the jet of cold water; and, therefore, a ſufficient vacuum is made in the cylinder for the piſton to deſcend unbalanced, by the preſſure of the atmoſphere. The piſton, being forced down, raiſes the other end of the lever, and conſequently the piſton of the pump, which brings up and diſcharges the water at *p*. Now the whole operation of opening and ſhutting the *ſteam* regulator and injection cock, may be performed in ſuch a time as will produce very well ſixteen ſtrokes in a minute. That the ciſtern *g* may be always ſupplied with water, there is an arch *x* fixed near the arch H at the pump end, from which another pump rod *k* with its piſton draws water from a ſmall ciſtern near the mouth of the pit (ſupplied from the water raiſed at *p*) and forces it up the pipe *m m m* into the ciſtern *g*, which, therefore, can never want water. That the leathers of the piſton C may be always ſupple, and ſwelled out ſo as to be always air-tight, a ſmall ſtream of water is ſupplied from the injecting pipe M by the arm z. On the top of the cylinder is a cup L, to hold the water that lies on the piſton, leſt it ſhould overflow when the piſton is at its greateſt height, as at W; at which time, if the cup be too full, the water will run down the pipe V to the waſte well at Y. The water in the boiler, which waſtes in generating *ſteam*, is ſupplied by a pipe F *f* about three feet long, ſupplied by the pipe W with water from the top of the piſton, which has the advantage of being always warm, and ſo not apt to check the boiling of the water. That the boiler may not have the ſurface of the water too low (which would endanger its burning) or too high, which would not leave room enough for *ſteam*, there are two gage-pipes at G; one going a little below the ſurface of the water when at a proper height, and the other ſtanding a little above it. When every thing is right, the ſtop-cock of the ſhorter pipe being opened, gives only *ſteam*, and that of the long one water; but if otherwiſe, both cocks will give *ſteam* when the ſurface is too low, and both give water when it is too high: and hence the cock which feeds the boiler at F may be ſo opened as always to keep the ſurface of the water to its due height. The cold water, conſtantly injected into the cylinder to condenſe the *ſteam*, is carried off by the eduction-pipe *d* T Y, going from the bottom of the cylinder to the waſte-well Y, where paſſing a little under water, it has its end turned up with a valve Y to keep out the air from preſſing up into the pipe, but allowing the injected water coming the other way to be diſcharged; whereby the cylinder is kept empty. Leſt the *ſteam* ſhould become too ſtrong for the boiler and burſt it, there is a valve fixed at *b*, with a perpendicular wire ſtanding up from the middle of it, on which are fixed weights of lead, for examining the ſtrength of the *ſteam* puſhing againſt it from within. Thus the *ſteam* is known to be as ſtrong as the air, if it will raiſe up ſo much weight on the valve as is at the rate of fifteen pounds to an inch ſquare. When the *ſteam* becomes ſtronger than what is required, it will lift up the valve and go out. This valve is called the *puppet-clack*. The *ſteam* is variable in ſtrength, but never one tenth ſtronger or weaker than common air; for it has been found that the engine will work well, when there is the weight of one pound on every ſquare inch of the valve *b*. This ſhews that the *ſteam* is then one fifteenth part ſtronger than the common air. Now as the height of the feeding pipe from the funnel F to the ſurface of the water S *s* is not above three feet, and $3\frac{1}{2}$ feet of water afford one tenth of the preſſure of the air; if the *ſteam* were one tenth part ſtronger than air, it would puſh the water out at F; which, not doing, cannot be ſtronger than air, even in this caſe, where the regulator being ſhut, it is moſt of all confined. When the regulator is opened, the *ſteam* gives the piſton a puſh, which raiſes it up a little way, then occupying a greater ſpace, it becomes of the ſame ſtrength, and ſo a balance to the atmoſphere: thus the piſton, being at liberty, riſes to the top W. The *ſteam*, now expanded into the whole capacity of the cylinder, is weaker than the air, and would not ſupport the piſton, if it were not for the greater weight at the other end of the lever, which keeps it up. The *ſteam*, at each ſtroke, drives the injected water of the preceding ſtroke out of the eduction-pipe *d* T Y, and would itſelf follow and blow out the valve Y, which is not loaded, if it were ſtronger than the air, which it never does. If it were exactly equal to the ſtrength of the air, it would juſt drive out all the water at Y, but could not follow itſelf, the preſſure on each ſide of the valve being equal by ſuppoſition. If it be weaker than the air, it will not force all the water out of the pipe *d* T Y, but the ſurface will ſtand, e. g. at T, where the column of water T Y added to the ſtrength of the *ſteam* is equal to the preſſure of the air. When the *ſteam* is one tenth weaker than the air, the height $TY = 3\frac{1}{2}$ feet. Now ſince the whole perpendicular diſtance from *d* to Y is but four feet, and the *ſteam* always ſufficient to expel the water; it is plain, that it can never be more than one tenth part weaker than the air, when weakeſt. There is air in all the water injected, and though that air cannot be taken out or condenſed with the *ſteam*, yet it will precipitate and fall through the *ſteam* to the bottom of the cylinder, as being much heavier. For it has been ſhewn, that *ſteam* is to water as 1 to 2887 in its denſity; but the denſity of air is to that of water as 1 to 864; therefore, the rarity of *ſteam* is to that of air as 2887 to 864: the air will therefore fall through the *ſteam* to the bottom, and from thence be driven out through a ſmall pipe opening into the cup at 4, on which is a valve. Now when the *ſteam* firſt ruſhes into the cylinder, and is a little ſtronger than the outward air, it will force the precipitated air to open the valve at 4 and make its eſcape, but the *ſteam* cannot follow, becauſe it is weaker than the outward air, as the piſton gives it room, by aſcending, to expand. The valve, on account of the noiſe it makes, is called the *ſnifting-clack*.

Among the greateſt improvements of this engine, we may reckon that contrivance, by which the engine itſelf is made to open and ſhut the regulator and injection cock, and even more accurately than any perſon attending could poſſibly do it: for this purpoſe there is fixed to an arch Z, at a proper diſtance from the arch P, a chain from which hangs a perpendicular piece or working beam Q Q, which comes down quite to the floor, and goes through it in a hole, which it very exactly fits. This piece has a long ſlit in it, and ſeveral pin-holes and pins, for the movement of ſeveral ſmall levers deſtined to the office of opening and ſhutting the cocks, after the following manner. Between two perpendicular pieces of wood on each ſide of P, there is a ſquare iron axis A B (*fig.* 72.), which has upon it ſeveral iron pieces of the lever kind. The firſt is the piece C E D, called the Y, from its repreſenting that letter inverted by its two ſhanks E and D; on the upper part is a weight F to be raiſed higher or lower, and fixed as occaſion requires. This Y is fixed very faſt upon the iron axis A B. From the axis hangs a ſort of iron ſtirrup I K L G, by its two hooks I, G, having on the lower part two holes K, L, through which paſſes a long iron pin L K, keyed in the ſame. When this pin is put in, it is alſo paſſed through the two holes in the ends E, N, of the horizontal fork or ſpanner E Q N, joined at its end Q to the handle of the regulator V 10. From Q to O are ſeveral holes, by which the ſaid handle may be fixed to that part of the end which is moſt convenient. Upon the axis AB is fixed at right angles to the Y a handle or lever G 4, which goes on the outſide of the piece Q Q, and lies between the pins. Another handle is alſo faſtened upon the ſame axis, viz. H 5, and placed at half a right angle to the former G 4; this paſſes through the ſlit of the piece Q Q lying on one of its pins. Hence we ſee, that when the working beam goes up, its pin in the ſlit lifts up the ſpanner H 5, which turns about the axis ſo faſt as to throw the Y with its weight F from C to 6, in which direction it would continue to move, after it paſſed the perpendicular, if it were not prevented by a ſtrap of leather fixed to it at *æ*, and made faſt at the ends *m* and *n*, in ſuch manner as to allow the Y to vibrate backwards and forwards about a quarter of a circle, at equal diſtances, on this ſide and that of the perpendicular. In the repreſentation here given, the regulator is open, its plate T Y being ſhewn on one ſide of the pipe S, which joins the cylinder and boiler. The piſton is now up, and alſo the working beam near its greateſt height: the pin in the ſlit has ſo far raiſed the ſpanner H 5, that the weight F on the head of the Y is brought ſo far from *n*, as to be paſt the perpendicular, and ready to fall over towards *m*; and when it does ſo, it will by its ſhank E, with a ſmart blow, ſtrike the iron pin K L, and drawing the fork O N horizontally towards the beam Q, will draw the end 10 of the regulator towards *t*, and thereby ſhut it by ſtopping the plate Y under the holes of the throat-pipe S. Immediately after the regulator is ſhut, the beam riſing a little higher, with its pin *s*, on the outſide upon the lower part, lifts up the end *k* 1 of the handle of the injection cock, and opens it by the turning of the two parts with teeth. The jet immediately making a vacuum, the beam again deſcends, and the pin *r* depreſſing the handle *k* 1 ſhuts the injection-cock: and the beam continuing to deſcend, the pin *p* bears down the handle G 4, and throwing back the Y, its ſhank D throws forward the fork N Q, and again opens the regulator to admit freſh *ſteam*; after this every thing returns as before, and thus the engine is wonderfully contrived for working itſelf.

After the engine had been made as above deſcribed, for many years, it received another improvement of very great advantage: that was, inſtead of feeding the boiler with warm water from the top of the cylinder, by the pipe W (*fig.* 71.) above, and F *f* below, it was ſupplied with the ſcalding hot water which comes out of the eduction pipe *d* T Y, which now, inſtead of going to the waſte-well at Y, was turned into the boiler in the top part: and as the eduction pipe before went out at the ſide of the cylinder, it was now inſerted in the bottom of the ſame: and though the preſſure of the *ſteam* in the boiler be ſomewhat greater in the cylinder, yet the weight of water in the eduction-pipe, being added to the force of *ſteam* in the cylinder, will carry the water down continually, by overcoming the reſiſtance in the boiler.

If the cylinder be forty-two inches in diameter, the piſton will be preſſed down with a force greater than twenty thouſand pounds, and will conſequently lift up that weight at the oppoſite end of the beam: and as the pump-rod with its plunger is fixed to that end, if the bore where the plunger works were ten inches diameter, the water would be forced up through a pipe of one hundred and eighty yards perpendicular height.

But, as the parts of this engine have a good deal of friction, and muſt work with a conſiderable velocity, and there is no ſuch thing as making a perfect vacuum in the cylinder, it is found that no more than eight pounds of preſſure muſt be allowed for, on every circular inch of the piſton in the cylinder, that it may make about ſixteen ſtrokes in a minute, about ſix feet each.

Where the boiler is very large, the piſton will make between twenty and twenty-five ſtrokes in a minute, and each ſtroke ſeven or eight feet; which, in a pump of nine inches bore, will raiſe upwards of three hundred hogſheads of water in an hour.

It is found by experience, that a cylinder, forty inches diameter, will work a pump ten inches diameter, and one hundred yards long: and hence we can find the diameter and length of a pump, that can be worked by any other cylinder.

For the conveniency of thoſe who ſhould make uſe of this engine for raiſing water, we ſhall ſubjoin part of a table calculated by Mr. Beighton, ſhewing how any given quantity of water may be raiſed in an hour, from forty-eight to four hundred and forty hogſheads; at any given depth, from fifteen to one hundred yards; the machine working at the rate of ſixteen ſtrokes per minute, and each ſtroke being ſix feet long.

One example of the uſe of this table, will make the whole plain. Suppoſe it were required to draw one hundred and fifty hogſheads per hour, at ninety yards depth; in the ſecond column from the right hand, I find the neareſt number, viz. 149 hogſheads 40 gallons, againſt which, on the right hand, I find the diameter of the bore of the pump muſt be 7 inches; and in the ſame collateral line, under the given depth 90, I find 27 inches, the diameter of the cylinder fit for that purpoſe. And ſo for any other.

A Table ſhewing the Power of the Engine for raiſing water by Fire.

Diameter of the cylinder in inches.	The depth to be drawn in yards.													In one hour.		Diam. of pump.
	15	20	25	30	35	40	45	50	60	70	80	90	100	Hogſh.	Gal.	Inches.
	18½	21¼	24	26½	28½	30½	32½	34¼	37¼	40	—	—	—	440		12
	17	19¾	22	24¾	26¼	28	29¾	31¼	34½	37	39½	—	—	369	33	11
	15½	18	20	22	23¾	25¼	27	28¾	31¼	33¾	36	38¼	40	304	48	10
	14	16¼	18	20	21½	23	24¼	25	28	30½	33	35	36½	247	7	9
	13½	15¼	17¼	19	20¼	21¾	23	24	26¼	28½	31	32½	35¼	221	15	8½
	12½	14½	16½	18½	19	20½	21½	23	25	27	29	30½	32½	195	22	8
	12	14	15½	17½	18¾	19¼	21	22	24¼	26	28	29½	31½	182	13	7¾
	11	13¾	15	16½	18	19	20	21¼	23¼	25	27	28½	30¼	172	30	7½
	10¾	13	14	15½	16¼	18¾	19	20½	22	24	25½	27	28½	149	40	7
	10	12	13	14	15½	16¼	18	19	20	22	23	24½	26¼	128	54	6½
	9½	11	12	13	14	15½	16	17	19	20½	22	23	24½	110	1	6
		10	11	12	13	14	15	15¾	17	19	20	21	22¼	94	30	5½
			10	11	11¾	13	13¾	14	15½	16¾	18½	19¼	20¼	66	61	5
				10	10	11¼	12	13½	14	15	16	17	18¼	60	60	4½
					9	10	11	11½	12	13½	14	15	16	48	51	4

This table is calculated to the meaſure of ale gallons, at 282 cubic inches per gallon.

See another uſeful table of a ſimilar kind in Pryce's Minerologia Cornubienſis, p. 160.

The method of conſtructing a *fire-engine* according to the directions ſuggeſted by the marquis of Worceſter, and firſt executed by capt. Savery, wherein the water was to be raiſed ſolely by the preſſure of elaſtic vapour or *ſteam* is very uſeful and cheap, compared with the other ſort; and when the height, to which the water is to be raiſed, does not exceed one hundred or one hundred and fifty-feet, then this engine is applicable with great advantage; as it requires but a ſmall fire (not bigger than what is generally uſed in a parlour chimney) is of a very ſimple and eaſy ſtructure, and admirably adapted for playing of fountains to great heights. We ſhall, therefore, here ſubjoin an account of its ſtructure, with the laſt improvements made in it by Dr. Deſaguliers.

The boiler B B (*fig.* 73.) is a large copper body of a globular form, as being beſt adapted to withſtand the very great force of *ſteam*, that is in this caſe neceſſary: round the body of this boiler the fire and flame are conducted, as at T T T. It has a copper cover ſcrewed on, which contains the *ſteam*-pipe C D, and two gage-pipes N *n* and O *o*, which, by turning their cocks, ſhew the height of the ſurface of the water within, as in the other engine. On the ſame cover at P is a valve, over which lies a ſteelyard with its weight Q to keep it down, the ſtrength of the vapour being this way moſt exactly eſtimated: for being in the nature of a lever, of the third ſort, it is plain, if the beam of the lever be divided into ten equal parts, and the firſt of them be upon the middle of the valve, and the weight Q hangs at the 2d, 3d, &c. diviſions, that then the force of the *ſteam* which can raiſe up the valve will be 2, 3, &c. times as great as the weight. If the area of the valve be a ſquare inch, and Q = 15 lb. hanging at the ſecond diviſion is raiſed by *ſteam* puſhing up the valve, it will ſhew the *ſteam* will then preſs with the force of two atmoſpheres, and ſo on to ten atmoſpheres: but great care muſt be taken leſt the *ſteam*, ſo very ſtrong, burſt the boiler to pieces. The *ſteam* is carried from the boiler to a copper veſſel A, by means of the pipe C D, and is let into the ſame by turning the handle K of the *ſteam*-cock D I. The key of this cock is kept down by the ſcrew L, held up by the gibbet DL. The handle turned from K to *k* admits a paſſage to the *ſteam* into the copper receiver A. This receiver communicates at bottom with the ſucking-pipe Z H going down to the water H in the well X; and above with the forcing pipe E E, which goes up a little above the water of the reſervoir R: between theſe two pipes are two valves F and G, both opening upwards. The *ſteam* being let in upon the water of the receiver A, forces it up through the valve F, and the pipe F E to the reſervoir, and then the ſaid receiver is full of hot *ſteam*. This *ſteam* in the receiver is condenſed by a jet of cold water coming from the forcing pipe by the ſmall pipe M I, being let in and ſhut off by the cock at M. The *ſteam*, being condenſed by this jet, will be reduced within a very ſmall ſpace, and ſo make a vacuum, upon which the water in the well will ruſh up the forcing-pipe to reſtore the equilibrium, and thus again fill the receiver A: the little air being compreſſed within a ſmall compaſs at the top above *b c*. That there may be always water in the forcing pipe for the jet, there is a little pipe which brings the water to it from the reſervoir, with the ſmall ſtop-cock Y, to ſhut it off upon occaſion. The valves at F and G are examined at any time, by unſcrewing the pin 1 to looſen the ſtrap 2, and let down the flanch 3, all which parts are ſhewn larger under *fig.* 74. By the peculiar contrivance of the cock at D I, and its key, the water is made to paſs from the forcing-pipe to the boiler, to ſupply the waſte in *ſteam*. This is plainly ſhewn in the ſections of the cock and key (*fig.* 74.) where 5 is the top of the key, 6 a hole on one ſide, which goes down to the bottom, to convey the *ſteam* or jet of water alternately to the receiver, 7 is a notch on the other ſide to take in the water from the force-pipe, and conduct it to the boiler B. How this is done, it is eaſy to conceive from a view of the two ſections of the cock and key in two poſitions within it. The boiler may hold about five or ſix hogſheads, and the receiver one hogſhead: it will work four or five hours without recruiting; about four ſtrokes per minute will produce upwards of two hundred hogſheads per hour. The *ſteam* makes a vacuum ſo effectually, as to raiſe water from the well to the height of twenty-nine or thirty-feet: and ſuppoſing the *ſteam* able to lift up the ſteel-yard, with its weight hanging at the ſixth diviſion, it will then be able to raiſe a column of water about fifty yards high, as being then ſix times ſtronger than the preſſure of the air. The elaſticity of the *ſteam* increaſing with its heat, and the ſpace into which it endeavours to expand itſelf being as its elaſticity or ſtrength, and ſince we know by the preceding part of this article, that water expanded into vapour of the ſame ſtrength with the air, occupies near three thouſand times the ſpace as before, it follows, that when the *ſteam* has twice that ſtrength, it will be expanded into ſix thouſand: if it be five times as ſtrong as the air's ſpring, it will become expanded into fifteen thouſand times that ſpace, &c. whence it appears how near a perfect vacuum we may approach by this engine or any other, by means of rarefied vapour. For a fuller account of theſe engines, ſee Deſagulier's Exp. Phil. vol. ii. ſect. 14. p. 465, &c. or for an abſtract, Martin's Phil. Brit. vol. ii. p. 74, &c.

For an account of the improvement made in the fire-engine by Mr. Payne, ſee Phil. Tranſ. N° 461, or Martin, ubi ſupra, p. 87, &c.

Mr. Blake communicated to the Royal Society in 1752, remarks on the beſt proportions for *ſteam*-engine cylinders of a given content: and Mr. Smeaton deſcribes an engine of this kind, invented by Mr. De Moura of Portugal, being an improvement of Savery's conſtruction, to render it capable of working itſelf; for both which accounts ſee Phil. Tranſ. vol. xlvii. art. 29. p. 197. and art. 72. p. 436.

We are informed in the new and much improved edition of the Biog. Brit. by Dr. Kippis (art. Brindley,) that in 1756 Mr. Brindley, ſo well known for his concern in our inland navigations (ſee Canal), undertook to erect a *ſteam*-engine near Newcaſtle under Line, upon a new plan. The boiler of it was made with brick and ſtone, inſtead of iron plates, and the water was heated by iron flues of a peculiar conſtruction, by which contrivances the conſumption of fuel neceſſary for working a *ſteam*-engine, was reduced one half. He introduced likewiſe in his engine, cylinders of wood, made in the manner of cooper's ware, inſtead of iron ones; the former being not only cheaper but more eaſily managed in the ſhafts; and he ſubſtituted wood too for iron in the chains which worked at the end of the beam. He had formed deſigns of introducing other improvements into the conſtruction of this uſeful engine; but was diſcouraged by obſtacles that were thrown in his way.

Mr. Blakey, ſome years ago, obtained a patent for his improvement of Savery's *ſteam*-engine, by which it is excellently adapted for raiſing water out of ponds, rivers, wells, &c. and for forcing it up to any height wanted for ſupplying houſes, gardens, and other places; though it has not power ſufficient to drain off the water from a deep mine. The principles of his conſtruction are explained by Mr. Ferguſon, in the Supplement to his Lectures, p. 19, &c. and a more particular deſcription of it, accompanied with a drawing, is given by the patentee himſelf in the Gentleman's Magazine for 1769, vol. xxxix. p. 392, &c.

Mr. Blakey is the only perſon who ever thought of making uſe of air as an intermediate body between *ſteam* and water; by which means the *ſteam* is always kept from touching the water, and conſequently from being condenſed by it, and on this new principle he has obtained a patent. The engine may be built for a trifling expence, in compariſon of the common fire-engine now in uſe; it will ſeldom need repairs, and will not conſume half ſo much fuel. And as it has no pumps with piſtons, it is clear of all their friction; and the effect is equal to the whole ſtrength or compreſſive force of the *ſteam*; which the effect of the common fire-engine never is, on account of the great friction of the piſtons in their pumps.

Ever ſince Mr. Newcomen's invention of the *ſteam* fire-engine, the great conſumption of fuel with which it is attended, has been complained of as an immenſe draw-back upon the profits of our mines. It is a known fact, that every fire engine of conſiderable ſize conſumes to the amount of three thouſand pounds worth of coal in every year. Hence many of our engineers have endeavoured in the conſtruction of theſe engines to ſave fuel. For this purpoſe the fire-place has been diminiſhed, the flame has been carried round from the bottom of the boiler in a ſpiral direction, and conveyed through the body of the water in a tube before its arrival at the chimney; ſome have uſed a double boiler, ſo that fire might act in every poſſible point of contact; and ſome have built a moor-ſtone boiler, heated by three tubes of flame paſſing through it. But the moſt important improvements which have been made in the *ſteam*-engine for more than thirty years paſt, we owe to the ſkill of Mr. James Watt; of which we ſhall give ſome account: premiſing, that the internal ſtructure of his new engines ſo much reſembles that of the common ones, that thoſe who are acquainted with them will not fail to underſtand the mechaniſm of his from the following deſcription: he has contrived to preſerve an uniform heat in the cylinder of his engines, by ſuffering no cold water to touch it, and by protecting it from the air, or other cold bodies, by a ſurrounding caſe filled with the *ſteam*, or with hot air or water, and by coating it over with ſubſtances that tranſmit heat ſlowly. He makes his vacuum to approach nearly to that of the barometer, by condenſing the *ſteam* in a ſeparate veſſel, called the *condenſer*, which may be cooled at pleaſure without cooling the cylinder, either by an injection of cold water, or by ſurrounding the condenſer with it, and generally by both. He extracts the injection water, and detached air from the cylinder or condenſer by pumps, which are wrought by the engine itſelf, or blows them out by the *ſteam*. As the entrance of air into the cylinder would ſtop the operation of the engines, and as it is hardly to be expected that ſuch enormous piſtons as thoſe of *ſteam*-engines can move up and down, and yet be abſolutely air-tight in the common engines; a ſtream of water is kept always running upon the piſton, which prevents the entry of the air: but this mode of ſecuring the piſton, though not hurtful in the common ones, would be highly prejudicial in the new engines. Their piſton is, therefore, made more accurately; and the outer cylinder having a lid covers it, the *ſteam* is introduced above the piſton; and when a vacuum is produced under it, acts upon it by its elaſticity, as the atmoſphere does upon common engines by its gravity. This way of working effectually excludes the air from the inner cylinder, and gives the advantage of adding to the power, by increaſing the elaſticity of the *ſteam*.

In Mr. Watt's engines, the cylinder, the great beams, the pumps, &c. ſtand in their uſual poſitions. The cylinder is ſmaller than uſual, in proportion to the load, and is very accurately bored. In the moſt complete engines, it is ſurrounded at a ſmall diſtance with another cylinder, furniſhed with a bottom and a lid. The interſtice between the cylinders communicates with the boiler by a large pipe, open at both ends; ſo that it is always filled with *ſteam*, and thereby maintains the inner cylinder always of the ſame heat with the *ſteam*, and prevents any condenſation within it, which would be more detrimental than an equal condenſation in the outer one. The inner cylinder has a bottom and piſton as uſual: and as it does not reach up quite to the lid of the outer cylinder, the *ſteam* in the interſtice has always free acceſs to the upper ſide of the piſton. The lid of the outer cylinder has a hole in its middle; and the piſton-rod, which is truly cylindrical, moves up and down through that hole, which is kept *ſteam*-tight by a collar of oakum ſcrewed down upon it. At the bottom of the inner cylinder, there are two regulating valves, one of which admits the *ſteam* to paſs from the interſtice into the inner cylinder below the piſton, or ſhuts it out at pleaſure: the other opens or ſhuts the end of a pipe, which leads to the condenſer. The condenſer conſiſts of one or more pumps furniſhed with clacks and buckets (nearly the ſame as in common pumps) which are wrought by chains faſtened to the great working beam of the engine. The pipe, which comes from the cylinder, is joined to the bottom of theſe pumps, and the whole condenſer ſtands immerſed in a ciſtern of cold water ſupplied by the engine. The place of this ciſtern is either within the houſe under the floor, between the cylinder and the lever wall; or without the houſe, between that wall and the engine ſhaft, as conveniency may require. The condenſer being exhauſted of air by blowing, and both the cylinders being filled with *ſteam*, the regulating valve which admits the *ſteam* into the inner cylinder is ſhut, and the other regulator which communicates with the condenſer is opened, and the *ſteam* ruſhes into the vacuum of the condenſer with violence: but there it comes into contact with the cold ſides of the pumps and pipe, and meets a jet of cold water which was opened at the ſame time with the exhauſtion regulator; theſe inſtantly deprive it of its heat, and reduce it to water; and the vacuum remaining perfect, more *ſteam* continues to ruſh in, and be condenſed until the inner cylinder is exhauſted. Then the *ſteam* which is above the piſton, ceaſing to be counteracted by that which was below it, acts upon the piſton with its whole elaſticity, and forces it to deſcend to the bottom of the cylinder, and ſo raiſes the buckets of the pumps which are hung to the other end of the beam. The exhauſtion regulator is now ſhut, and the *ſteam* one opened again, which, by letting in the *ſteam*, allows the piſton to be pulled up by the ſuperior weight of the pump rods, and ſo the engine is ready for another ſtroke.

The working of theſe engines is more regular and ſteady than the common ones, and from what has been ſaid, their other advantages ſeem to be very conſiderable.

It is ſaid, that the ſavings amount at leaſt to two thirds of the fuel, which is an important object, eſpecially where coals are dear. The new engines will raiſe from twenty thouſand to twenty-four thouſand cubic feet of water, to the height of twenty-four feet, by one hundred weight of good pit coal: and Mr. Watt has propoſed to produce engines upon the ſame principles, though ſomewhat differing in conſtruction, which will uſe much leſs fuel, and be more convenient for the purpoſes of mining, than any kind of engine yet uſed. Mr. Watt has alſo contrived a kind of mill wheel, which turns round by the powers of *ſteam* exerted within it.

The improvements above recited were invented by Mr. James Watt, at Glaſgow, in Scotland, in 1764: he obtained his majeſty's letters patent for the ſole uſe of his invention in 1768; but meeting with difficulties in the execution of a large machine, and being otherwiſe employed, he laid aſide the undertaking till the year 1774, when, in conjunction with Mr. Boulton near Birmingham, he completed both a reciprocating and a rotative or wheel engine. He then applied to parliament for a prolongation of the term of his patent, which was granted by an act paſſed in 1775. Since that time Mr. Watt and Mr. Boulton have erected ſeveral engines in Staffordſhire, Shropſhire, and Warwickſhire, and a ſmall one at Stratford near London. They have alſo lately finiſhed another at Hawkeſbury colliery near Coventry, which is juſtly ſuppoſed to be the moſt powerful engine in England. It has a cylinder fifty-eight inches in diameter, which works a pump fourteen inches in diameter ſixty-five fathoms high, and makes regularly twelve ſtrokes, each eight feet long, in a minute. They have alſo erected ſeveral engines in Cornwall; one of which has a cylinder thirty inches in diameter, that works a pump of 6½ inches in diameter in two ſhafts, by flat rods with great friction, three hundred feet diſtant from each other, forty-five fathoms high in each ſhaft, equal in all to ninety fathoms, and can make fourteen ſtrokes, eight feet long, in a minute, with a conſumption of coal leſs than twenty buſhels in twenty-four hours. The terms they offer to the public are, to take in lieu of all profits one third part of the annual ſavings in fuel, which their engine makes when compared with a common engine of the ſame dimenſions in the neighbourhood. The engines are built at the expence of thoſe who uſe them, and Meſſrs. Boulton and Watt furniſh ſuch drawings, directions, and attendance, as may be neceſſary to enable a reſident engineer to complete the machine. See the Appendix to Pryce's Mineralogia, &c. 1778.

The editor has been informed that ſome uſeful improvements have been made in the *ſteam*-engine by Mr. William Powel, who had lately the direction and care of an engine of this kind at a colliery near Swanſea, in Glamorganſhire.

It is hardly neceſſary to add, that Dr. Falck, in 1776, publiſhed an account and deſcription of an improved *ſteam*-engine, which, as he ſays, will, with the ſame quantity of fuel, and in an equal ſpace of time, raiſe above double the quantity of water raiſed by any lever-engine of the ſame dimenſions; as he does not ſeem to have conſtructed even a working model of his propoſed engine. The principal improvement, however, which he ſuggeſts is to uſe two cylinders; into which the *ſteam* is let alternately to aſcend, by a common regulator, which always opens the communication of the *ſteam* to one, whilſt it ſhuts up the opening of the other: the piſton-rods are kept (by means of a wheel fixed to an arbour) in a continual aſcending and deſcending motion, whereby they move the common arbour, to which is affixed another wheel moving the pump-rods, in the ſame alternate direction as the piſton-rods, by which continual motion the pumps are kept in conſtant action.

STEATITES, in the *Hiſtory of Foſſils*, a name given by late authors to a ſubſtance called in Engliſh SOAP-*earth*.

STEATOCELE, a term uſed by the ancients to expreſs a ſort of rupture, occaſioned by a large quantity of fat or ſuety matter lodged in the ſcrotum.

STEATOMA, Στεατωμα, a kind of ſwelling, or abſceſs, conſiſting of a matter much like ſuet; ſoft, without pain and without diſcolouring the ſkin; contained in a cyſtis, and eaſily turned out upon inciſion.

STEEL is iron reduced or converted by art to a particular ſtate, which occaſions ſome changes in its properties; though theſe are eſſentially the ſame as thoſe of IRON.

Stahl, Cramer, and all good chemiſts, juſtly conſider *ſteel* as an improved iron, poſſeſſing a larger quantity of the inflammable principle, ſo neceſſary to all metals, and containing fewer heterogeneous, and more metallic parts than an equal bulk of iron.

Steel may be made by fuſion or by cementation.

The firſt method is uſed to convert iron into *ſteel* immediately from the ore. All ores of iron are not uſed indifferently for this purpoſe; becauſe ſome of theſe, which are therefore, called *ores of ſteel*, are much fitter than others for affording good *ſteel*; and the *ſteel* extracted from them is called *natural ſteel*. But though *ſteel* is made ſometimes directly from the ore, it is more frequently produced from crude or caſt-iron.

Theſe methods of making *ſteel* are not known in England, but are practiſed in Sweden and other parts of Europe. The proceſs of making *ſteel* from caſt-iron is thus deſcribed by Swedenborgius, as it is performed in Dalecarlia.

The ore from which the crude iron to be converted into *ſteel* is obtained is of a good kind. It is black, friable, and compoſed of many ſmall grains, and it produces very tough iron. The converſion into *ſteel* is made upon a forge-hearth, ſomething ſmaller than common. The ſides and bottom are made of caſt-iron. The tuyere is placed, with very little inclination, on one of the ſide-plates. The breadth of the fire-place is fourteen inches; its length is greater. The lower part of the tuyere is ſix one half inches above the bottom. In the interior part of the fire-place there is an oblong opening for the flowing of the ſuperfluous ſcoria. The workmen firſt put ſcoria on the bottom, then charcoal and powder of charcoal, and upon theſe the caſt-iron run or cut into ſmall pieces. They cover the iron with more charcoal, and excite the fire. When the pieces of iron are of a red white, and before they begin to melt, they ſtop the bellows, and carry the maſs under a large hammer, where they break it into pieces of three or four pounds each. The pieces are again brought to the hearth, and laid within reach of the workman, who plunges ſome of them into the fire, and covers them with coal. The bellows are made to blow ſlowly till the iron is liquefied. Then the fire is increaſed; and when the fuſion has been long enough continued, the ſcoriæ are allowed to flow out; and at that time the iron hardens. The workman adds more of the pieces of crude iron, which he treats in the ſame manner, and ſo on a third and a fourth time, till he obtains a maſs of *ſteel* of about a hundred pounds, which is generally done in about four hours. This maſs is raiſed and carried to the hammer, where it is forged, and cut into four pieces, which are farther beat into ſquare bars four or five feet long. When the *ſteel* is thus forged, it is thrown into water that it may be eaſily broken; for it is yet crude and coarſe-grained. The *ſteel* is now carried to another hearth ſimilar to the former, and there broken in pieces. Theſe pieces are laid regularly in the fire-place, firſt, two parallel, upon which ſeven or eight others are placed acroſs, then a third row acroſs the ſecond, in ſuch a manner as that there is ſpace left between thoſe of the ſame row. The whole is then covered with charcoal, and the fire is excited. In about half or three quarters of an hour the pieces are made hot enough, and are then taken from the fire one by one, to the hammer, to be forged into little bars from half a foot to two feet long, and while hot, are thrown into water to be hardened. Of theſe pieces ſixteen or twenty are put together ſo as to make a bundle, which is heated and welded, and afterwards forged into bars four inches thick, which are then broken into pieces of convenient length for uſe.

The other method of making *ſteel*, or that which is called *artificial ſteel*, is by cementation, and according to Cramer, is performed in the following manner: chooſe ſome bars of pure iron, or of that which is moſt perfect and moſt malleable, either when it is hot or cold, and not too thick; prepare a cement capable of giving the iron much inflammable principle, as of charcoal duſt, moderately pulverized, one part, and wood aſhes half a part; or of charcoal-duſt two parts, bones, horns, ſkins, or hair of animals, burnt to blackneſs in a cloſe veſſel, and in a gentle fire, and afterwards reduced to powder, one part, wood-aſhes half a part; mix them together. Prepare a cylindrical earthen veſſel, or crucible, two or three inches higher than the bars are long; put into the bottom of this veſſel the cement, prepared as before directed, ſo that being gently preſſed down, it may cover the bottom of the veſſel an inch and half deep; place then the iron bars perpendicularly, ſo that they may be every where an inch diſtant from the ſides of the veſſel, and from each other; fill the interſtices with the cement, and cover the bars with it, that the veſſel may be quite full, cover it with a tile, and ſtop the joints with a lute of clay mixed with ſand; put this veſſel into a furnace, and keep it moderately, but equally red hot, for ſix or ten hours: the iron will then be found to be converted into *ſteel*, which will be ſo much better, as the iron employed was of a better quality: it then only requires to be tempered. See TEMPERING. See alſo *Annealing of* STEEL *infra*.

In this operation the iron ſuffers no diminution of weight, and no ſcoria appears on its ſurface, as Mr. Cramer remarks. And, therefore, by the ſole addition of a new quantity of phlogiſton, the iron acquires the quality of *ſteel*.

Thus, if this iron contained ſome parts of martial earth which was not metallized, by the cementation they are metalliſed, and the iron or *ſteel* are thereby improved: but if the iron contained ſome earthy unmetallic parts, they are not ſeparated by this operation, becauſe the metal has not been fuſed; and as the beſt forged iron which is uſually ſold, is never ſo well purified from theſe extraneous matters, as that which is converted into *ſteel* in the great works for procuring *ſteel* from the ore of iron; hence, in general, artificial *ſteel* made by cementation is not ſo perfect as that made by fuſion.

We may obſerve that, in the cementation above deſcribed, the iron combines with a part of the phlogiſton of the cement, without fuſion; which effect proceeds from a peculiar property of the earth of iron, by which it is capable of combining with the inflammable principle, and of being metalliſed without fuſion, which is, nevertheleſs, neceſſary for the reduction of all other metallic earths.

The furnaces generally made uſe of for converting iron into *ſteel*, ſays a manufacturer of this metal, are of different ſizes; ſome capable of converting only three or four ton weight, while others are capacious enough to contain from ſeven to eight or ten tons. The outſides of theſe furnaces riſe up in form of a cone, or ſugar-loaf, to the height of a very conſiderable number of feet. In the inſide, oppoſite to each other, are placed two very long cheſts, made either of ſtone, or of bricks capable of bearing the ſtrongeſt fire; which is placed between the two cheſts. The bars of iron, after the bottom is furniſhed with a neceſſary quantity of charcoal duſt, are laid in *ſtratum ſuper ſtratum*, with intermediate beds of the charcoal duſt, to ſuch a height of the cheſts, as only to admit of a good bed at top; which is then all covered over, to prevent the admiſſion of the common air; which, could it procure entrance, would greatly injure the operation. The iron being thus ſituated, the fire is lighted; which is ſome time before it can be raiſed to a ſufficient degree of heat, to produce any conſiderable effect. After which it is continued for ſo many days as the operator may judge proper; only now and then drawing out what they call a proof bar. This is done by openings fit for the purpoſe, at the ends of the cheſt, which are eaſily and with expedition ſtopped up again, without occaſioning any injury to the contents left behind. When the operator apprehends the converſion is ſufficiently completed, the fire is ſuffered to go out, and the furnace, with its contents, is left gradually to cool. This may take up ſeveral days: after which the furnace is diſcharged, by taking out the bars of *ſteel*, and the remainder of the charcoal duſt.

The appearance of the bars, as well upon the ſurface as in the interior parts, abundantly diſcovers the prodigious efficacy of this ſimple material, when urged by a ſtrong and ſufficiently continued fire. For the ſurface exhibits a great number of tumors, or bliſters, which give it the denomination of *bliſtered ſteel*.

Theſe excreſcences, which we call *bliſters*, Mr. Reaumur terms *bulles*, or *bouillons*; and apprehends they may be owing to a ſort of boiling, or to a kind of motion ſimilar to that of boiling, made in the iron: but a little farther on he intimates that theſe ſwellings may be owing to ſome parts of the iron not being ſo well cloſed, and rendered compact, while the bars were under the diſcipline of the hammer at the chafery. Horne's Eſſays concerning Iron and *Steel*.

There is another kind of *ſteel*, beſides thoſe which are produced from the ore and caſt-iron, or from the forged iron, which is obtained by remelting bar-*ſteel* in crucibles, and caſting it into ingots. This, which is of modern diſcovery, is called *caſt-ſteel*, and being more uniform and ſimilar in all its parts than any other ſort of *ſteel*, is fitter for being wrought into the finer kinds of utenſils for which *ſteel* is employed.

Anciently *ſteel* is ſaid to have been made by immerſing forged iron during ſome time in melted crude iron. Forged iron may alſo be changed into *ſteel*, as Wallerius affirms, by immerſion in melted ſcoria; or by fuſion with black flux, glaſs-gall, or borax; or by ſtrewing ſea-ſalt upon heated iron, and extinguiſhing it in dung.

Steel may be again unmade, or reduced to the ſtate of iron by a management ſimilar to that by which it is made, that is, by cementation. But the cement uſed for this purpoſe, muſt be compoſed of ſubſtances entirely free from inflammable matter, and rather capable of abſorbing it, as calcareous earth and quicklime are; by a cementation with theſe matters, continued during eight or ten hours, *ſteel* is reduced to the ſtate of iron; and caſt-*ſteel*, when thus reduced to the ſtate of forged iron by cementation with abſorbent earths, is the moſt uniform, equal, and perfect iron which can be obtained.

By converſion of iron into *ſteel*, this metal acquires a darker and browner colour, a cloſer, more compact, and finer grained texture, greater hardneſs, elaſticity, tenacity, denſity, ſonorouſneſs, and diſpoſition to receive the magnetic property. Beſides, *ſteel* is much more fuſible than iron, on account of the greater quantity of phlogiſton united with it; as phlogiſton is known to be, in general, the cauſe of the fuſibility of metals. Indeed ſoft forged iron can ſcarcely, without addition be brought into perfect fuſion by the heat of our furnaces, till the fuel has converted it into *ſteel*.

Moreover, ſome ſay, that iron converted into *ſteel*, acquires an increaſe both of bulk and weight.

M. Reaumur, in particular, obſerves, that a ſmall bar, five inches long, increaſed one line and a half in length: and he makes the amount of the increaſe of weight to be $\frac{1}{258}$ parts of the whole; but others concerned in the manufacture of *ſteel* have eſtimated it to be one hundred weight upon ſeven tuns. *Steel* is likewiſe leſs liable to ruſt when expoſed to air than iron, and leſs liable to emit ſparkles when heated. It is well known that poliſhed plates of *ſteel*, put upon a gentle fire of charcoal, acquire different colours on their ſurfaces, and paſs ſucceſſively through ſeveral ſhades, as they become hotter, in the following order, viz. white, yellow, orange, purple, violet, and laſtly blue, which diſappears and leaves a water colour, if the *ſteel* has been heated too much or too long. Theſe different ſhades mark the degrees of heat, or of annealing, applied to different tools or utenſils. The ſhade moſt generally uſed is the blue, ſuch as that given to *ſteel*-SPRINGS.

Theſe colours may alſo be produced by the ſame means on all other calcinable metals, as well as *ſteel* and iron; and proceed from a calcination, gradually advancing on that part of the metals which is expoſed to air, whence the particles of the metals in their different degrees of calcination, are probably of different ſizes, and, according to the Newtonian theory, acquire different reflective powers, and thus exhibit changes of COLOURS.

There have been various opinions concerning the cauſe of the difference between iron and *ſteel*. The moſt general opinion attributes this difference to the preſence of a larger quantity of phlogiſton in the latter than in the former. Some authors, attending chiefly to the method of converſion by fuſion, conſider that operation only as a purification of the iron from earthy and heterogeneous particles, and *ſteel* merely as a more pure and perfect iron. Others, obſerving ſome ſimilitude in the texture of *ſteel* to certain kinds of caſt iron, and the hardneſs of both theſe, without attending to their eſſential differences, have imagined that the ſtate of *ſteel* was intermediate betwixt that of caſt and that of forged iron.

Mr. Reaumur, who has taken great pains in his inveſtigation of this ſubject, affirms, that *ſteel* differs in nothing from forged iron, except that it contains more ſulphurs and more ſalts. Hence, he ſays, it follows, that caſt iron ſhould be *ſteel*, ſince it evidently differs from forged iron in the ſame manner, and by the ſame properties; and in effect, caſt iron is *ſteel* ſuch as it is, eſpecially the white ſort, which is more pure, and more perfectly diveſted of its earth, than the browner ſorts: and this white kind may be accordingly brought to all the hardneſs of *ſteel*, by repeated heating and quenching in cold water. And it follows, according to this writer, that in order to convert iron into *ſteel*, we are to give it new ſalts and new ſulphurs. If it be aſked, where is the neceſſity of giving again that which the mere caſt iron poſſeſſes? It is replied, that *ſteel* is required to be malleable in ſome degree, which the mere caſt iron is not, and it may be poſſible to give to forged iron ſuch ſalts and ſulphurs as are more proper for the *ſteel* than thoſe which the caſt iron naturally poſſeſſes. Mr. Reaumur, after many trials, found that, for ſulphurs, powdered charcoal, and common ſoot, and for ſalts, ſea-ſalt alone, ſucceeded beſt, and that theſe were properly to be mixed with aſhes, as an intermediate ſubſtance, that they muſt be proportioned in quantity to each other, and that there muſt alſo be a proportional quantity of the whole employed according to the quantity of iron that is to be wrought upon; and in this, regard muſt alſo be had to the ſeveral ſorts of ores from which the iron was obtained, ſince the iron of ſome ores is much ſooner convertible into *ſteel* than that of others, and makes alſo a better *ſteel*. Mr. Reaumur alſo contrived a new ſort of furnace, by means of which theſe ſalts and ſulphurs might be beſt introduced into the body of the iron.

A bar of iron, when converted into *ſteel*, is not equally ſo converted in all its parts; the fire has always acted more ſtrongly upon its ſurface than on its central parts, and it is therefore more perfect *ſteel* there than in its inner parts; but a perfection in the operation is not neceſſary to the *ſteel's* being good and uſeful, and the whole bar is often very good *ſteel*, as are alſo many bars made at the ſame time, yet all perhaps ſomewhat differently affected.

If the compoſition, which is to convert the iron into *ſteel*, be too ſtrong, or if the fire be too violent, or the matter continued too long in it, in all theſe caſes the *ſteel* will be over-made; that is, there will be an over proportion of ſaline and ſulphureous parts added to the iron: theſe will therefore too far ſeparate the particles of the metal aſunder, and the conſequence will be, that the *ſteel* will be too brittle to bear hammering, and will be of great loſs to the proprietor in the great quantities that will be broken, beſide the loſs he will ſuſtain from the abundance of ſcales which will fly off in the working. The way to meliorate ſuch *ſteel* as this, muſt be to diveſt it of part of its ſalts and its ſulphurs, but peculiarly of the laſt; and Mr. Reaumur found, that the burying the bars of ſuch *ſteel* in lime, or any other alkaline ſubſtance that would readily abſorb the ſulphurs, and placing it for a proper time in the fire, it would be in a manner decompoſed again, and come out a very good and perfect *ſteel*; and this, he apprehends, is no trivial proof, that the account given of the manner of iron's becoming *ſteel* is the true one.

By this management *ſteel* may again be converted, or reduced to its primitive iron, and a body of any middle degree, between *ſteel* and iron, may be produced, by ſtopping this proceſs at different points of time, or continuing it till all the adventitious ſalts and ſulphurs are drawn off or abſorbed. Hardneſs and flexibility are the two great points in this operation, and what the metal gets of the one of theſe, it aſſuredly loſes of the other. The greater hardneſs is from the greater quantity of the adventitious ſalts and ſulphurs; and the greater flexibility, or, as the workmen call it, the *greater body*, is from the greater quantity of the metallic; and he who is able to calculate properly the quantities of his ſalt, charcoal, and ſoot, and to regulate exactly the degree of fire, is capable of making *ſteel* of what degree of temper or perfection he pleaſes.

If *ſteel*, after the tempering, be found too hard, there is a very familiar way of bringing it back to what ſtate one pleaſes, between that and iron, which is only the heating it in the fire; for it may be kept in the fire ſo long, as to be reduced wholly to iron again. It is eaſy to infer from hence, what was before obſerved, that caſt iron is *ſteel* of a peculiar kind; its properties plainly evince, that it is *ſteel* with an over proportion of all that makes it ſo, and conſequently of all its properties. It is not malleable, is very brittle, and too hard for the file, or any other tool, to cut. Theſe are the qualities of *ſteel* which is over tempered, or, as it may be called, too much *ſteel*; it owes theſe qualities to its being overcharged with thoſe ſulphurs and ſalts, which in a due proportion make *ſteel* of iron.

The method of reducing this to the ſtate of wrought iron, is the ſame with what we have before obſerved is to be uſed to untemper too high tempered *ſteel*, that is, keeping it in the fire till part of its ſalts and ſulphurs are driven off; and if the fire alone be thought too difficult, or too tedious a method, Mr. Reaumur has found that thoſe alkaline ſubſtances, which naturally abſorb ſulphurs, will aſſiſt the reducing this to the ſtate of wrought iron, as they do to the untempering of *ſteel*, and that the very ſame ſubſtances of this kind, which have been found beſt in the untempering *ſteel*, ſucceed beſt in the rendering this malleable; ſuch are lime, chalk, and the like.

Caſt iron may be taken for theſe operations in two ſtates; the one, that of ſimply melted iron in its firſt fuſion, the other that of the iron, which has been run into the mould. When a caſt piece of iron, in a certain form, is heated again with the calx of animal bones, which is one common way, this being a ſubſtance extremely diveſted of ſalts and ſulphurs, it abſorbs thoſe of the metal too greedily, and diveſts it of too great a quantity of them; ſo that when the piece comes afterwards to be filed, the fragments fly off in large ſcales, and the beauty of the caſt figure muſt be loſt: to remedy this difficulty, ſome powdered ſulphur is to be added in the heating; for this being a ſulphureous and ſaline body, checks and moderates the effects of the calx of bone.

Chalk in the ſame manner can only be employed with certain regulations; it ſucceeds very well, if the fire be not too violent, or too long continued, but if it be exceſſive in either of theſe particulars the chalk throws into the body of the iron ſalts and ſulphurs of its own, which lay hid in its ſtructure, and which would not have been diſlodged by a ſmaller fire; but which being diſlodged, and thrown into the iron, act upon it, and render the ſucceſs of the operation quite different from what was intended, the iron becoming more hard and brittle by it.

One great nicety in all theſe operations, is the underſtanding the ſigns by which it is known at what time caſt iron is ſufficiently ſoftened, or over tempered *ſteel* is ſufficiently reduced toward the ſtate of iron again; but this is only to be acquired by nice obſervation, and on this depends the whole certainty of the proceſſes, ſince every minute's continuance in the fire gives the operation a different turn in degree.

For other obſervations of this ingenious writer, on the nature and manufacture, and properties of *ſteel*, ſee Mem. Acad. Sc. Paris, 1722. See alſo TEMPERING.

It is obſerved by the author of the Dictionary of Chemiſtry, that the opinion of thoſe who ſuppoſe, that *ſteel* is in a ſtate intermediate betwixt that of caſt iron and ſoft forged iron, is manifeſtly erroneous. They have been deceived by the hardneſs and brittleneſs of caſt iron, which are nearly as great as in *ſteel*. But theſe qualities proceed from a remaining part of the mineraliſing ſubſtances, which leave it a pyritous character, very different from that of true *ſteel*, ſince this can only be hardened by the temper, and ſince in the preparation of it all ſulphureous matter muſt be carefully avoided. The miſtake of theſe authors proceeded from their ignorance of the inflammable principle, the properties of which have been ſo well explained by the illuſtrious Stahl, and from their being led into an error by the old chemiſts, who perpetually confounded phlogiſton, or the pureſt and ſimpleſt inflammable principle of all bodies, with ſulphur, with ſulphureous matters, and with moſt other inflammable compounds.

Some metallurgiſts have maintained, that the converſion of iron into *ſteel* is effected not by abſorption of phlogiſton, but by expulſion of ſulphureous or acid particles. To ſupport this opinion, they obſerve, 1. That *ſteel* is leſs diſpoſed than iron to ruſt; the cauſe of ruſt being, as they think, an acid contained in iron: 2. That *ſteel* emits fewer ſparkles under the hammer than iron, which ſparkles are found to be moſt frequent in iron abounding with ſulphur, as in red-ſhort iron; 3. That iron may be converted into *ſteel* by cementation with alkaline ſalts, capable of attracting the acid and ſulphur: 4. That in the preparation of *ſteel* by fuſion, the metal is rather expoſed to a diſſipation of its inflammable parts and burnt, than farther phlogiſticated; and that this operation is accordingly called by workmen *the burning of ſteel*.

In the preparation of *ſteel* by fuſion, probably much of the earthy matters contained in the iron may be ſeparated, and any contained acid or ſulphur may be burnt or diſſipated. But the converſion of *ſteel* into iron by cementation with abſorbent earths, in which operation no acid or ſulphur can be abſorbed by the metal, ſhews that the difference between iron and *ſteel* does not conſiſt in the preſence of an acid or of ſulphur in the iron, but rather in the preſence of ſome ſubſtance in the *ſteel*, which the inflammable cementing ſubſtance can give to it, and of which abſorbent earths can deprive it. This ſubſtance has been generally believed to be phlogiſton; by the addition of which the metal acquires a new texture, together with the hardneſs, elaſticity, and other peculiar properties of *ſteel*.

The affinities and medicinal virtues of *ſteel* are the ſame as thoſe of IRON. Dict. Chem. Engl. ed art. *Steel*.

STEEL, *annealing*, or *nealing of*, is by ſome uſed for the ſoftening it, in order to make it work eaſier; which is uſually done by giving it a blood-red heat in the fire, and then taking it out, and letting it cool of itſelf. Mox. Mechan. Exerc. p. 60.

Some have pretended to ſecrets in annealing, by which they could bring down iron or *ſteel* to the temper of lead: this was to be done by often heating the metal in melting lead, and letting it cool again out of the lead. But this method is found by Moxon to have no other effect than what is had from the former. Hought. Collect. N° 276.

Steel may indeed be made a little ſofter than in the common way, by covering it with coarſe powder of cowhorn, or hoofs; thus encloſing it in a loam, heating the whole in a wood-fire till it be red hot, and then leaving the fire to go out of itſelf, and then the *ſteel* to cool. Mox. loc. cit. See TEMPERING and STEEL, *ſupra*.

For the expanſion of *ſteel* by heat. See PYROMETER.

STEEL-*glaſſes*, a name given by ſome authors to the metalline SPHERES uſed in optics. Theſe, according to Cardan, are made of three parts of braſs, one part of tin, and one of ſilver, with an eighteenth part of antimony; but moſt either totally leave out the ſilver, or add only a twenty-fourth part, to ſave the expence. There are many other methods, directed by ſeveral authors, but moſt uſe arſenic and tartar, mixed with the metals. Theſe are afterwards to be poliſhed with emery, rotten-ſtone, putty, and the like.

STEEL *ore*, is uſed to ſignify a particular kind of LEAD-ore.

STEEL-*powder*. See POWDER.

STEEL, *ſalt of*. See SALT *of Steel*.

STEEL-*waters*. See *Mineral* WATERS.

STEEL, *Damaſcus*. See DAMASCUS.

STEEL, *engraving on*. See ENGRAVING.

STEEL, *faggot of*. See FAGGOT.

STEEL, in *Medicine*. See CHALYBEAT and IRON in *Medicine*.

STEEL-*wine*. See WINE.

STEELING, in *Cutlery*, the laying on a piece of *ſteel* upon a larger maſs of iron, to make that part which is to receive the edge harder than the reſt. The body of an ax may very well be of iron, as it never comes into uſe to cut with, and perhaps is ſtronger, and leſs liable to break, than if of *ſteel*; but it muſt have a quantity of *ſteel* at that part where the edge is to be made.

STEELYARD, or STILYARD, in *Mechanics*, a kind of balance, called alſo *ſtatera Romana*, or the Roman BALANCE; by means whereof, the gravities of different bodies are found by the uſe of one ſingle weight.

STEELYARD, *conſtruction of the*. It conſiſts of an iron beam A B (*Tab*. VI. *Mech. fig*. 115), wherein a point is aſſumed at pleaſure, as C, and, on this, a perpendicular raiſed C D. On the ſhorter arm A C, is hung a ſcale or baſon to receive the bodies weighed: the weight I is ſhifted this and that way on the beam, till it be a counterbalance to one, two, three, four, &c. pounds placed in the ſcale; and the points are noted wherein I weighs as one, two, three, four, &c. pounds. From this conſtruction of the *ſteelyard*, the manner of uſing it is apparent. But the inſtrument, being very liable to deceit, is therefore not to be countenanced in commerce.

STEELYARD, *ſpring*, is a kind of portable balance, ſerving to weigh any matter, from about one to forty pounds.

It is compoſed of a braſs tube, into which goes a rod, and about that is wound a ſpring of tempered ſteel in a ſpiral form. On this rod are the diviſions of pounds and parts of pounds, which are made by ſucceſſively hanging on to an hook faſtened to the other end, one, two, three, four, &c. pounds.

Now the ſpring being faſtened by a ſcrew to the bottom of the rod; the greater weight is hung on the hook, the more will the ſpring be contracted, and, conſequently, a greater part of the rod will come out of the tube; the proportions of which greater weights are indicated by the figures appearing againſt the extremity of the tube.

STEELYARD, *company of the*. STILLYARD.

STEELYARD, *Chineſe*. The people of China carry this ſtatera about them to weigh their gems, and other things of value. The beam, or yard, is a ſmall rod of wood or ivory about a foot in length; upon this are three rules of meaſure, made of a fine ſilver-ſtudded work; they all begin from the end of the beam, whence the firſt is extended eight inches, the ſecond ſix and one half, the third eight and one half. The firſt is the European meaſure, the other two ſeem to be China meaſure. At the other end of the yard hangs a round ſcale, and at three ſeveral diſtances from this end are faſtened ſo many ſlender ſtrings, as different points of ſuſpenſion. The firſt diſtance makes eight fifths of an inch, the ſecond is double to the firſt, and the third four inches and four fifths. When they weigh any thing, they hold up the yard by ſome of theſe ſtrings, and hang a ſealed weight, of about one ounce and one-fourth troy weight, upon the reſpective diviſions of the rule, as the thing requires. Grew's Muſeum, p. 369.

STEELYARD-*ſwing*. In the Philoſophical Tranſactions (N° 462, ſect. 5.) we have an account of the *ſteelyard-ſwing*, propoſed as a mechanical method for aſſiſting children labouring under deformities, owing to the contraction of the muſcles on one ſide of the body. The crooked perſon is ſuſpended with cords under his arm, and theſe are placed at equal diſtances from the centre of the beam. It is ſuppoſed that the gravity of the body will affect the contracted ſide, ſo as to put the muſcles upon the ſtretch; and hence by degrees the defect may be remedied.

STEEPING *of ſeeds*. See SEED.

STEEPLE, an appendage generally raiſed on the weſtern end of a church to hold the bells.

Steeples are denominated from their form, either *ſpires*, or *towers*. The firſt are ſuch as aſcend continually, diminiſhing either conically or pyramidically.

The latter are mere parallelepipeds, and are covered a-top, platform like.

In each kind, there is uſually a ſort of windows, or apertures, to let out the ſound; and ſo contrived, at the ſame time, as to drive it down.

Maſius, in his treatiſe of bells, treats likewiſe of *ſteeples*. The moſt remarkable in the world is that at Piſa, which leans all one ſide, and appears every moment ready to fall; yet is in no danger. This odd diſpoſition, he obſerves, is not owing to a ſhock of an earthquake, as is generally imagined; but was contrived ſo at firſt by the architect; as is evident from the cielings, windows, doors, &c. which are all in the level.

STEER, *hog-ſteer*. See HOG.

STEERAGE, in a *ſhip*, is an apartment without the great cabin. In large ſhips of war it is uſed as a hall, through which it is neceſſary to paſs to or from the great cabin. In merchant ſhips it is generally the habitation of the inferior officers and ſhip's crew. See *Tab. Ship. fig*. 2. N° 102.

STEERAGE, in *Sea Language*, is alſo uſed to expreſs the effort of the helm: and hence

Steerage-way is that degree of progreſſive motion communicated to a ſhip, by which ſhe becomes ſuſceptible of the effect of the helm to govern her courſe.

STEERING, in *Navigation*, the art of directing a ſhip's way from one place to another, by means of the helm and rudder, or of applying the efforts of the helm to regulate her courſe when ſhe advances.

He is held the beſt *ſteerſman*, who uſes the leaſt motion in putting the helm over to and again, and who keeps the ſhip beſt from making yaws; that is, from running in and out.

For this purpoſe the helmſman ſhould diligently watch the movements of the head by the land, clouds, moon, or ſtars; becauſe, although the courſe is in general regulated by compaſs, yet the vibrations of the needle are not ſo quickly perceived, as the ſallies of the ſhip's head to the right or left, which, if not immediately reſtrained, will acquire additional velocity in every inſtant of their motion, and demand a more powerful impulſe of the helm to reduce them; the application of which will operate to turn her head as far on the contrary ſide of her courſe.

The phraſes uſed in *ſteering* a ſhip, vary according to the relation of the wind to her courſe. Thus, if the wind is *fair* or *large*, the phraſes, uſed by the pilot or officer who ſuperintends the ſteerage, are PORT, STARBOARD, and STEADY. The firſt is intended to direct the ſhip's courſe farther to the right; the ſecond is to guide her farther to the left; and the laſt is deſigned to keep her exactly in the line, on which ſhe advances, according to her preſcribed courſe. The exceſs of the firſt and ſecond movement is called *hard-a-port*, and *hard-a-ſtarboard*;

the former of which gives the greateſt poſſible inclination to the right, and the latter an equal tendency to the left.

If, on the contrary, the wind is *foul* or *ſcant*, the phraſes are LUFF, THUS, and NO NEARER; the firſt of which is the order to keep her cloſe to the wind; the ſecond, to retain her in her preſent ſituation; and the third to keep her ſails full. See FULL-*and-by*. See alſo COND.

In a ſhip of war, the exerciſe of ſteering the ſhip is uſually divided amongſt a number of the moſt expert ſailors, who attend the helm in their turns; and are accordingly called *timoneers*, from the French term *timonier*, which ſignifies *helmſman*.

The *ſteerage* is conſtantly ſuperviſed by the QUARTER-*maſters*, who alſo attend the helm by rotation. In merchant ſhips every ſeaman takes his turn in this ſervice, being directed therein by the mate of the watch, or ſome other officer. Falconer.

For the theory and effect of *ſteering*, ſee SAILING, COURSE, &c.

STEEVING, in *Sea Language*, denotes the elevation of a ſhip's bowſprit above the ſtem, or the angle which it makes with the horizon.

STEEVING, in *Merchant ſhips*, is uſed for the ſtowing of of cotton or wool, by means of ſcrews, to force it cloſe together.

STEGANOGRAPHY, Στεγανογραφια, formed of στεγανος, *ſecret*, and γραφω, *I write*, the art of ſecret writing, or of writing in ciphers; known only to the perſons correſponding. See CIPHER and DECIPHERING.

STEGNOSIS, Στεγνωσις, an obſtruction of any natural diſcharge, eſpecially that by the pores.

STEGNOTICS, Στεγνοτικα, formed from στεγω, *conſtipo*, *I cloſe*, in *Medicine*, remedies proper to cloſe and ſtop the orifices of the veſſels, or emunctories, when relaxed, ſtretched, lacerated, &c.

Such are pomegranate leaves, red roſes, plantain leaves, tormentil roots, &c. *Stegnotics* are proper in the hæmorhoids, and other fluxes of blood.

STEINBIZA, in *Ichthyology*, a name given by Hildegard, and ſome other writers, to that ſmall ſpecies of cobitis, called by others COBITIS *aculeata*, and *tænia cornuta*. It is the *cobitis* with a forked ſpine under each eye, deſcribed by Artedi.

STEINHUN, *ſtone-hen*, a name given by the Germans to a bird of the lagopus kind, more commonly known by the name of OTOMO, and in ſome places by that of *colmeſtre*.

It ſeems not to differ from the lagopus in any thing but colour, and that bird being known to change its colour in the ſummer months, it is probably no other ſpecies.

STELE, Στηλη, in *Antiquity*, a kind of puniſhment, being a pillar whereon a criminal was expoſed, and on which was engraven an account of his crime.

The perſons, thus expoſed to the laughter and reproaches of the people, were called *ſtelitæ*. Potter, Archæol. Græc. lib. i. cap. 25. tom. i. p. 130.

STELECHEIA, a word uſed by ſome authors to expreſs the vena portæ.

STELECHITES, in the *Materia Medica*, a name given by Dioſcorides, and ſome other of the Greek writers, to a peculiarly fine kind of ſtorax. It was the ſame with the calamite, only that this name was given to the larger, and the name *calamite* to the ſmaller or ſlenderer pieces.

Pliny, Strabo, and many others, join in telling us, that the wood of the ſtorax-tree, on account of its ſoftneſs and ſweet taſte, was the moſt ſubject to be eaten by worms, of that of any tree in the world.

When the worms attacked the body of the tree, the duſt they made by their eroſion formed a hillock or heap round the tree, or at its foot, and the extravaſated balſam running amongſt this duſt, made a maſs that was called the *cymatius ſtorax* at that time, and was the ſame with the common ſtorax now in uſe.

STELECHITES *ſtibii facie*, in *Natural Hiſtory*, a very uncouth name given by Aldrovandus, and ſome others, to the ENTROCHI. He gave them this name from the reſemblance of ſome of the longeſt pieces to fragments of the trunks of trees, the arms parting out from the ſides of theſe main branches, the rudiments of which are very frequent in many of the entrochi, paſſing for the remains of boughs, and the hollow in the middle, for the cavity where the pith of the tree was. The addition of *ſtibii facie*, was only from the obſerving that the top and bottom were radiated, or ſtriated, from the central hole to the circumference, in the manner of antimony. Theſe are truly no vegetable remains, but parts of the arms of that ſtrange fiſh called *ſtella arboreſcens*. See STAR-*fiſh*.

STELENCHIS, a ſtrigil, or an inſtrument uſed in the baths to rub off the ſweat from the ſkin.

STELITÆ, Στελιται, in *Antiquity*. See STELE.

STELLA. See PSEUDA *ſtella*.

STELLA *crinita*, in *Natural Hiſtory*, a name given by Linkius to a genus of ſtar-fiſh, the characters of which are theſe: that they have more than five rays, and from theſe have ſeveral other lateral proceſſes, which are covered with a fine down or hair.

STELLA *lapis*, in the *Materia Medica*, the name of a ſtone which has been very differently interpreted by different writers. Some have ſuppoſed it the *aſteria* of Pliny, and ſome the common *coralloide aſtroites*; but Meſue explains it to be the *lapis* LAZULI.

STELLA *marina*. See STAR-*fiſh*.

STELLA *arboreſcens*. See BASKET-*fiſh* and STAR-*fiſh*.

STELLA *occidens*, a word uſed by ſome of the chemical writers to expreſs ſal ammoniac.

STELLA *ſcolopendroides*, in *Natural Hiſtory*, a name given by Linkius to a kind of *ſtar-fiſh* with an undivided body, and five rays, reſembling the bodies of the ſcolopendræ, as thoſe of the more uſual kind, called *ſtella lumbricalis*, do the bodies of common earth-worms.

STELLA *vermiformis*, in *Natural Hiſtory*, a name given by Linkius, and other authors, to a common kind of *ſtar-fiſh*, which has five rays parting from the body, each ſomewhat reſembling the body of a large worm.

STELLAR. See INTER-*ſtellar*.

STELLARIA, in *Botany*. See *Great* CHICK-*weed*.

STELLARIA is alſo a name uſed by ſome authors for the *carduus ſtellatus*, or *ſtar-thiſtle*. See CENTAURY.

STELLARIS *lapis*, a name given by many authors to the various ſpecies of ASTROITES or STAR-*ſtone*.

STELLATE *plants*, ſuch as have their leaves growing on the ſtalks, at certain diſtances, in the form of a ſtar with rays; or ſuch flowers as are ſtar-like, or full of eyes reſembling ſtars.

Mr. Ray makes the *ſtellate* plants, ſo called from the diſpoſition of their leaves, the tenth genus of Engliſh plants; of which kind are croſs-wort, mollugo, wild madder, aſperula or woodruff, gallium, or ladies bed-ſtraw, aparine or cleavers, and rubia tinctorum or dyers madder.

STELLERA, *German groundſel*, in *Botany*, a genus of the *octandria monogynia* claſs. Its characters are, that it has no calyx; that the corolla is cut into four ſegments; that the ſtamina are very ſhort; and that it has a ſingle roſtrated ſeed. There are two ſpecies.

STELLIO, in *Zoology*, the name by which authors call the ſwift, or ſpotted lizard. The ſpots which diſtinguiſh this kind are not, however, ſtellated, as might be ſuppoſed from the name, but round; ſome ſmall, and ſcattered irregularly all over the body; and others larger, and diſpoſed in thirteen zones or ſemicircles. The ſpots are much more diſtinct and clear on the back than on the belly. It is common in Syria, and ſome other places. See EFT.

The bite of this animal is ſaid to inſpiſſate the humours and ſtupify the ſenſes; to remedy which venice treacle and volatile ſalts are recommended. The fleſh is ſaid to excite ſweat, and reſiſt poiſon.

STELLIO *aduſta*, an affected term uſed by ſome chemical writers for cinnabar.

STELLIONATE, STELLIONATUS, in the *Civil Law*, a kind of crime committed by a fraudulent bargain, where one of the parties ſells a thing for what it is not.

Cujas ſays, the word comes from *ſtellio*, a very ſubtile kind of lizard. We find mention hereof in the Code, leg. ix. tit. 34.

As, if I ſell an eſtate for my own, which belongs to another; or convey a thing as free and clear, which is already engaged to another; or put off copper for gold, &c.

The Romans frequently uſed *ſtellionatus* to expreſs all kinds of crimes that had no proper names.

STELLITES, in *Natural Hiſtory*, a name given by ſome writers on foſſils to a kind of white ſtone found on Mount Libanus, and in ſome other parts of Syria, containing the lineaments of the ſtar-fiſh complete.

The ſame ſtones frequently contain the lineaments of other fiſh.

STELOCHITES, a name given to OSTEOCOLLA.

STELLULARIA, in *Botany*. See CHICK-*weed*.

STEM, in *Botany*, that part of a plant ariſing out of the root, and which ſuſtains the leaves, flowers, and fruits.

In trees, the *ſtem* is called the *trunk*, or *ſtock*; in Latin *caudex*, and *truncus*.

In herbs, it is ordinarily called the STALK; by the Latins *caulis*, and *ſcapus*, when ſtraight like a column.

When ſlender, and creeping on the ground, as that of nummulary, ſome authors call it *viticulus*.

In the ſeveral kinds of corn and plants of that kind, it is more properly called *culmus*.

The *ſtem* of the plant, according to Dr. Grew, is no more than the cutis, or ſkin, which at firſt covers the two lobes, and the plume of the ſeed, and which is farther dilated as the plant grows.

Stem *of a ſhip*, is a circular piece of timber, into which her two ſides are united at the fore-end; the lower end of it is ſcarfed to the keel; and the bowſprit reſts upon its upper end.

The *ſtem* is formed of one or two pieces, according to the ſize of the veſſel; and as it terminates the ſhip forward, the ends of the wales and planks of the ſides and bottom are let into a groove or channel, in the middle of its ſurface, from the top to the bottom; which operation is uſually called RABETTING.

The outſide of the *ſtem* is uſually marked with a ſcale, or diviſion of feet, according to its perpendicular height from the keel; the intention of which is to aſcertain the draught of water at the fore-part, when the ſhip is in preparation for a ſea-voyage, &c.

The *ſtem*, at its lower end, is of equal breadth and thickneſs with the keel, but it grows proportionably broader and thicker towards its upper extremity. Falconer. See *Tab. Ship. fig.* 1. *lit. b. fig.* 2. *n.* 1.

Stem, *falſe*, in a *Ship*, that fixed before the right one. When a ſhip's *ſtem* is too flat, ſo that ſhe cannot keep a wind well, they uſe to put a *falſe ſtem* above, which makes her rid more way, and bear a better ſail.

STEMMATA, in the *Hiſtory of Inſects*, are three ſmooth hemiſpheric dots, placed generally on the top of the head, as in moſt of the HYMENOPTERA, and other claſſes. The name was firſt introduced by Linnæus.

STEMODIA, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the calyx is divided into two ſegments, the corolla is bilabiated, the ſtamina are four, with ſingle bifid filaments, and double antheræ; and the fruit is a bilocular capſule. There is one ſpecies.

STEMPHYLA, a word uſed by the ancients to expreſs the huſks of grapes, or the remains of the preſſings of wine. The ſame word is alſo uſed by ſome to expreſs the remaining maſs of the olives, after the oil is preſſed out.

STEMPHYLITES, a name given by the ancients to a ſort of wine preſſed hard from the huſks.

STEMPLES, in *Mining*, croſs bars of wood in the ſhafts which are ſunk to mines.

In many places the way is to ſink a perpendicular hole, or ſhaft, the ſides of which they ſtrengthen from top to bottom with wood-work, to prevent the earth from falling in: the tranſverſe pieces of wood, uſed to this purpoſe, they call *ſtemples*, and by means of theſe the miners in ſome places deſcend, without uſing any rope, catching hold of theſe with their hands and feet.

STEMSON, in a *Ship*, an arching piece of timber fixed within the apron, to reinforce the ſcarf thereof, in the ſame manner as the apron ſupports the ſcarf of the ſtern: In large ſhips it is uſually formed of two pieces.

STENCH. See STINK.

STENCILLING. See PAPER-*hangings*.

STENO's *duct*, a name given from its diſcoverer to the ſuperior SALIVAL *duct*.

Several anatomiſts, particularly Heiſter and Palfyn, have diſputed whether *Steno's duct* is pervious in recent ſubjects, as well as in the ſkeleton. Dr. Kulm affirms, he has demonſtrated it to ſeveral to be pervious in deer, bears, wild goats, hares, calves, and in the human ſubjects, and mentions the manner of tracing it. See Med. Eſſ. Edinb. Abridg. vol. ii. p. 421.

STENOMARGA, in *Natural Hiſtory*, a name uſed by ſome authors for a light marly earth, more uſually called AGARICUS *mineralis*, and LAC *lunæ* by the later writers, and *terra*, or *creta Seleneuſiaca*, by Dioſcorides and Galen.

STENTATO, in the *Italian Muſic*, is uſed to ſignify that the voice ſhould be forced in ſome part of a ſong, or on ſome particular ſound, to expreſs an extraordinary emotion.

STENTOROPHONIC *tube*, a *ſpeaking* TRUMPET, thus called from Stentor (a perſon mentioned in the fifth book of the Iliad, who, as Homer tells us, could call louder than fifty men), and φωνη, *voice*. The *ſtentorophonic* horn of Alexander the Great is famous; with this it is ſaid he could give orders to his army at the diſtance of 100 ſtadia, which is above twelve Engliſh miles.

STEP. See PACE, STAIR, &c.

Steps, in a *Building*. See *Tab. Architecture, fig.* 40. W W.

Step, in a *Ship*, a block of wood fixed on the decks or bottom of the ſhip, and having a hole in its upper ſide fitted to receive the heel of a maſt or capſtern. The *ſteps* of the main and foremaſts of every ſhip reſt upon the kelſon, to which they are firmly ſecured by knees, bolts, or ſpike-nails. The *ſtep* of the mizen maſt uſually reſts upon the lower deck.

Step and *leap*, in the *Manege*, one of the ſeven airs or artificial motions of a horſe, conſiſting, as it were, of three airs: viz. the pace or *ſtep* which is terra a terra; the raiſing, which is a curvet; and the whole finiſhed with a ſault or *leap*.

The *ſtep*, properly, puts a horſe on the hand, and gives him a riſe to leap; like one that runs before he leaps, that he may go the higher or the farther.

For leaps of all kinds the rider is not to give any aids or helps with his legs, only to hold the horſe well up with the bridle hand when he riſes before, that he may riſe the higher behind; when he begins to riſe behind, he is to put the bridle hand a little forwards to hold him before, and ſtay him there on the hand, as if he hung in the air; timing the motion of the bridle hand ſo as to take him like a ball on the bound, which is the great ſecret in leaping.

STEPHANITÆ, στεφανιται, in *Antiquity*, an epithet given to games and exerciſes, where the prize was only a garland.

STEPHANOPHORUS, στεφανοφορος, in *Antiquity*, the chief prieſt of Pallas, who preſided over the reſt. It was uſual for every god to have a chief prieſt; that of Pallas was the *Stephanophorus*, juſt mentioned, and that of Hercules was called *Dadouchus*.

Stephanophorus was alſo a prieſt that aſſiſted the women in the celebration of the feſtival THESMOPHORIA.

STEPHENS's *medicine for the ſtone*. Mrs. *Stephens* having ſold medicines for the ſtone in the bladder or kidneys, Dr. Hartley publiſhed ſeveral caſes of their ſucceſs; and ſo much was ſaid of them, that the parliament appointed truſtees to examine into the truth of what was alledged in their favour. The report of theſe truſtees being favourable, ſhe had 5000*l.* ſterling ordered her, in 1739, for publiſhing the receipt.

Her medicines are a powder, a decoction, and pills. The powder is ſix parts of fine powder of hen-egg ſhells calcined till they become of a greyiſh white colour, and of an acrid ſalt taſte, then left two months in an open veſſel, till what is ſufficiently calcined falls into a fine powder, to be ſeparated from the groſſer parts by paſſing it through a hair-ſieve. To this egg-ſhell lime add one ſixth part of the powder of ſnails, with their ſhells burnt in a crucible till they have done ſmoking. A dram of this powder is to be taken thrice a day in a large tea-cup full of white wine, cyder, or ſmall punch, and half a pint of the decoction is to be drank after each doſe. If the patient feels pain, it is to be made milder by opiates; if he is coſtive, gentle laxatives are to be taken, and purging is to be reſtrained: if the powder is too ſtrong in the above proportion of ſix parts of the powder of egg-ſhells to one of ſnail-powder, it is to be weakened by increaſing the proportion of the ſmall powder.

To make the decoction, the prepared balls compoſed of four ounces and a half of the beſt Alicant ſoap, a large ſpoonful of the powder of ſwines-creſſes, burnt to blackneſs, and as much honey as was neceſſary. She boiled one of theſe balls ſliced with cut green camomile, or camomile-flowers, ſweet fennel, parſley, and burdock-leaves, of each one ounce, in two quarts of water, half an hour, then ſtrained it off and ſweetened it with honey. When theſe herbs are not to be had green, ſhe takes the ſame quantity of their roots, cut and ſliced. Thoſe, whoſe ſtomachs cannot bear this decoction, may take one ſixth part of the ball formed into pills, with every doſe of the powder.

The pills are made by taking equal quantities by meaſure of ſnails calcined as before, of wild carrot-ſeeds, burdock-ſeeds, aſhen-keys, hips and haws all burnt to blackneſs, and reduced to a fine powder: with a large ſpoonful of this powder, four ounces of ſoap, and as much honey as is neceſſary, bring them to the conſiſtence of pills, of which ſixty are to be formed out of every ounce of the compoſition. In fits of the gravel five of theſe pills are taken every hour awake, till the complaints are removed.

During the uſe of theſe medicines, the patient ought to abſtain from ſalt meats, red wines, and milk, drink few liquors, and uſe little exerciſe.

Dr. Hartley, leaving out the ſuperfluous part of Mrs. *Stephens's* preſcription, reduces her receipt to a more ſimple form; to wit, to two ounces and a half of ſoap and ſeven ſcruples and a half of egg-ſhell powder, as the mean doſe of the medicines to be taken.

He has alſo recommended the following method of preparing and adminiſtering this medicine: take of Alicant ſoap eight ounces; powdered quick lime, a little flaked, one ounce; ſalt of tartar, or purified pot-aſh, a dram; and ſhaving the ſoap, and mixing it with the lime and ſalt, beat all into a maſs, with as much water as is neceſſary: of this maſs, the quantity of three to four ounces is to be taken every day, made into rolls taper at each end, which are to be laid lengthways on the tongue, and ſwallowed with a mouthful of water. In this way the quantity of ſoap to be taken daily, is nearly from two ounces and five drams to three ounces and a half; of lime-powder, from three drams to near half an ounce; and of ſalt of tartar, or purified pot-aſh, from a ſcruple to near half a dram.

Dr. Hales, after ſeveral trials on the different ingredients, found that the diſſolving powder of them lay in the lime, which Dr. Rutty confirmed; and Dr. Jurin having taken ſoap-lees, the ingredients of which are pot-aſhes and lime, beginning with a few drops, and increaſing the quantity till he took an ounce, or an ounce and a half every day, in a proper vehicle, was cured of bloody urine, pain, &c. and paſſed ſeveral ſmall ſtones; after which he had no uneaſineſs. Med. Eſſ. Edinb. vol. vi. p. 157, 489.

For other forms of adminiſtering ſoap and lime, and remarks on Mrs. *Stephens's* medicine, ſee LITHONTRIPTICS. See alſo LIME-*water* and STONE.

STERA, in *Anatomy*, a word uſed by ſome of the barbarous writers to expreſs the uterus. It ſeems to have been only a corruption of the word *hyſtera*.

STERCORARIANS, or STERCORANISTÆ, formed from *ſtercus, dung*, a name which thoſe of the Romiſh church anciently gave to ſuch as held that the hoſt was liable to digeſtion, and all its conſequences, like other food.

STERCORARIUS *piſcis*, the *dung-fiſh*, the name of an Eaſt Indian fiſh; ſo called from its frequenting neceſſary-houſes which are over the water, and other places, where the like naſtineſs is to be found. It is for this reaſon ſuppoſed unwholeſome by ſome, but is really a very well taſted fiſh, and eaten by moſt people where it is to be had. It is a broad and thin fiſh, of about ſix or ſeven inches long, and nearly as much in breadth. Its back is variegated with ſpots of deep brown; its belly is bluiſh.

STERCULIA, in *Botany*, a genus of the *monoecia adelphia* claſs. Its characters are theſe: it hath male and female flowers; the calyx of the male is divided into five ſegments; it has no corolla, and fifteen filaments; the calyx of the female is like that of the other; it has no corolla; the germen reſts upon a column, and the capſule has five cells, and is polyſpermous. There are two ſpecies.

STERCUMEZEFF, an affected word uſed by ſome of the chemical writers for litharge.

STERCUTIUS, in *Mythology*, a ſurname given to Saturn, becauſe he was the firſt that inſtructed men to dung the earth in order to render it fertile.

STEREOBATA, or STEREOBATES, formed from ςερεοβατης, *ſolid, prop*, in the *Ancient Architecture*, the baſis, or foundation, whereon a column, wall, or other piece of building is raiſed.

This anſwers pretty well to the continued SOCLE or baſement of the moderns.

Some confound it with the ancient *ſtylobata*, or PEDESTAL; but, in effect, the *ſtereobata* is that to the ſtylobata, which the ſtylobata is to the ſpire or baſe of the column.

STEREOGRAPHIC *projection of the ſphere* is that wherein the eye is ſuppoſed to be placed in the ſurface of the ſphere.

Stereographic projection is, the projection of the circles of the ſphere on the plane of ſome one great circle; the eye being ſuppoſed placed in the pole of that circle. For the fundamental principles and chief properties of this kind of projection, ſee PROJECTION *ſtereographic*.

The method and practice of this projection in all the principal caſes, viz. on the planes of the meridian, equinoctial, and horizon, are as follow:

STEREOGRAPHIC *projection on the plane of the meridian.* Let ZQNE (*Tab.* IV. *Perſpect. fig.* 85.) be the meridian, Z and N the poles, as alſo the zenith and nadir; EQ the equinoctial and horizon; ZN the equinoctial colure, and prime vertical circle: Z 15 N, Z 30 N, Z 45 N, &c. are hour-circles or meridians, and alſo azimuths, becauſe the pole is in the zenith. To deſcribe theſe circles, find the points 15, 30, 45, 60, &c. in the equinoctial, by ſetting the half tangent of their diſtance from ♈; and then their centres are found by ſetting their coſecants both ways, from their points of interſection with the equator: ♋, ♋, and ♑, ♑, are the northern and ſouthern tropics, which are deſcribed by ſetting the half-tangent of 23° 30′ from ♈ each way; then the tangent of its complement, viz. 66° 30′, each way from thence on the colure produced, gives their centres. By this method all parallels of declination may be drawn. Or you might have ſet the co-ſecant of the parallel from the centre of the primitive, which would alſo have found the ſame point for the centre of the parallel, whoſe radius is equal to the tangent of its diſtance from its pole.

The parallels in this projection are alſo almicantars, or parallels of altitude; ♋, ♑ is the ecliptic, which muſt be divided from the diviſion on the ſcale of half-tangents; but denominated according to the ſigns in the zodiac, reckoning 30° to each ſign.

STEREOGRAPHIC *projection on the plane of the equinoctial.* Let SC (*fig.* 86.) be the meridian, and ſolſtitial colure; EN the equinoctial colure, and hour-circle of 6; P the north pole; ♋♋, the northern tropic; E ♋ N the northern half of the ecliptic (whoſe centre is found by ſetting off the ſecant of 23 degrees 30 minutes from ♋); and its pole is at *a* the interſection of the polar circle and meridian, being the place through which all circles of longitude muſt paſs; and EZN the horizon of London, which is deſcribed thus: ſet the half-tangent of the co-latitude from P to Z; then the tangent of the ſame, ſet from P to O, or its ſecant from Z to O, gives its centre; and its pole will be at *b*, 38 degrees 30 minutes (in the half-tangents) diſtant from P, where *b* is at the zenith.

To draw any other circles in this projection: 1. For circles of longitude, which muſt all paſs through *a*, and the ſeveral degrees of the ecliptic; ſet the tangent of 66 degrees 30 minutes, from *a* downwards, on the meridian produced; which will find a point, through which a perpendicular, drawn to the meridian, ſhall contain in it the centres of all the circles of longitude, whoſe diſtances ſet off to the radius P *x*, ſhall be the tangents of the degrees of their diſtances from the meridian SPC (which is that belonging to 180 degrees.) 2. All parallels of declination are drawn by ſetting the half-tangents of their diſtances from P. 3. All azimuths, or vertical circles, muſt paſs through *b* at the zenith: ſince, therefore, the zenith is 38 degrees 30 minutes diſtant from P, ſet the co-ſecant of that (or the ſecant of 51 degrees 30 minutes) from *b* on the meridian extended below, and that will find the point *x*, the centre of the azimuth of eaſt and weſt; viz. E*b*N; and the centres of all the reſt are in a line that is perpendicular to the meridian, and drawn through *x*. 4. Circles of altitude, or almicantars, are leſſer circles, whoſe poles are not in the plane of the projection: thus the circle O *c* is a parallel of altitude 50 degrees above the horizon. 5. All hour-circles are ſtraight lines from the centre to the limb.

STEREOGRAPHIC *projection on the plane of the horizon.*— Firſt draw a circle repreſenting the horizon, and quarter it with two diameters; then will z be the zenith of the place, 12 z 12 the meridian; 6 z 6 the prime vertical, or azimuth of eaſt and weſt, (*fig.* 87.); make z P = half tangent of 38° 30′ (or tangent of 19° 15′); and P ſhall be the pole of the world. Make z Æ = half-tangent of 51° 30′ (or tangent of 25° 45′)

$\left.\begin{array}{l}\text{and Æ } o = \text{ſecant}\\ z\,o = \text{tangent}\end{array}\right\}$ of 38 degrees 30 minutes; then ſhall *o* be the centre of the equinoctial 6 Æ 6.

In this projection almicantars are all parallel to the primitive circle; and azimuths are all right lines paſſing through z the centre of the primitive, to the equal diviſions in the limb. Parallels of declination are all leſſer circles, and parallel to the equinoctial, and their interſections with the meridian are found, by ſetting the half-tangent of their diſtance from the zenith, ſouthward or northward, or both ways from z. Their centres are found by biſecting the diſtance between thoſe two points; for the middle will be the centre of the parallel.

$\left.\begin{array}{l}\text{Thus z ♋ = half-tangent of 28° 00′ = diſtance of the}\\ \text{tropic of ♋ from the zenith.}\\ \text{And z ♑ = half-tangent of 75°}\\ \text{= diſtance of the tropic of ♑}\\ \text{from the zenith.}\end{array}\right\}$ to the ſouthward or downward from z.

And the interſection again with the north of the meridian, is at $\left\{\begin{array}{l}105^\circ\ 30'\\ 152^\circ\ 30'\end{array}\right\}$ for $\left\{\begin{array}{c}♑\\ ♋\end{array}\right\}$ to the northward or upward from z.

For the hour circles, make z *c* = tangent of 51° 30′, or P *c* = ſecant of 51° 30′: draw G *c* T perpendicular to the produced meridian; then, if from *c* with the radius z *c*, you ſet off the tangents of 15°, 30°, 45°, &c. both ways, you will have the centres of the ſeveral hour-circles, 7 and 5, 8 and 4, &c.

Note, in all *ſtereographic* projections, all diameters are meaſured on the ſcale of half-tangents; and this is the ground of all dialling, or the true projection of the hour-circles of the ſphere on any given plane. See SPHERICS.

STEREOGRAPHY, formed from ςερεος, *ſolid*, and γραφω, *I deſcribe*, the art of drawing the forms and figures of the ſolids upon a plane.

STEREOMETRY, Στερεομετρια, formed of ςερεος, *ſolid*, and μετρον, *meaſure*, that part of geometry which teaches how to meaſure ſolid bodies, i. e. to find the ſolidity, or ſolid content, of bodies; as globes, cylinders, cubes, veſſels, ſhips, &c.

The methods hereof ſee under the reſpective bodies; as GLOBE, SPHERE, CYLINDER, &c. See alſo GAUGING.

STEREOTOMY, formed from ςερεος, and τομη, *ſection*, the art, or act, of cutting ſolids, or making ſections thereof; as walls and other membranes in the profiles of architecture.

STERILITY, formed from *ſterilitas*, of *ſterilis*, *barren*, the quality of a thing that is barren; in oppoſition to FECUNDITY.

Sterility was held a grievous affliction by the wives of the ancient patriarchs. Nature has annexed *ſterility* to all monſtrous productions, that the creation might not degenerate. Hence the *ſterility* of mules, &c.

Women frequently become *ſterile* after a miſcarriage, or a difficult labour, by reaſon the uterus, or ſome other of the genital parts, are injured thereby.

The *ſterility* of mercury, ſay the alchemiſts, reſembles that of women who are too cold and moiſt; and who, by being purged and heated, would be cured of their *ſterility*, as mercury is when purged according to the rules of art.

STERIS, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: the calyx is parted into five ſegments; the corolla is rotated, and the fruit is a ſingle-celled polyſpermous berry. There is only one ſpecies.

STERLING, a term frequent in the Engliſh commerce.

A *pound*, *ſhilling*, or *penny ſterling*, ſignifies as much as a pound, ſhilling, or penny, of lawful money of England, as ſettled by public authority.

Antiquaries and critics are greatly divided as to the origin of the word *ſterling*. Buchanan fetches it from the caſtle of Striveling, or Sterling in Scotland, where a ſmall coin was anciently ſtruck; that in time, according to him, came to give name to all the reſt. Camden derives the word from *eaſterling*, or *eſterling*; obſerving, that in the reign of king Richard I. money coined in the eaſt parts of Germany begun to be of eſpecial requeſt in England by reaſon of the purity thereof, and was called *eaſterling money*, as all the inhabitants of thoſe parts were called *eaſterlings*; ſome of whom, ſkilled in coinage, were ſoon after, viz. in the reign of king John, ſent for over to perfect the Engliſh money, or reduce it to its due fineneſs, which was thence forwards denominated from them, *ſterling*, for *eaſterling*, or *eſterling*: not, ſays Camden, from Striveling in Scotland, nor from *ſtella*, a *ſtar*, which ſome dream to have been coined thereon; for in old deeds, the Engliſh ſpecies are always called *nummi eaſterlingi*, which implied as much as good and lawful money, &c. Clarke, in his Connexion of the Roman, Saxon, &c. Coins, p. 80. obſerves, that the Saxon or Engliſh pound was called the pound *ſterling*, becauſe their anceſtors brought it from the moſt eaſtern parts of Europe, the ſhores of the Euxine; and that they called it *libra eſterlingorum*, the pound *eſterling* or *ſterling*, to diſtinguiſh it from the Roman pound, which, to preſerve the ſame diſtinction, was called *libra occidua*, or the weſtern pound. Somner, again, derives the word from the Saxon *ſteore*, a *rule* or *ſtandard*; intimating, that this, as to weight and fineneſs, was to be the common ſtandard of all current money.

In Stow, and ſome other of our ancient writers, *ſterling*, or *eaſterling*, is alſo uſed for a certain coin, in value amounting nearly to our ſilver penny; and on ſome occaſions we find the ſame word *ſterling* uſed in the general for a piece of money, it being obſervable, that for a good while together, there was no other coin but pennies, with which *ſterlings* or *eaſterlings* were become ſynonymous: much as, among the ancients, the words *denarius* and *nummus* were uſed.

STERN *of a ſhip*, denotes her poſterior face; or that part which is preſented to the view of a ſpectator, placed on the continuation of the keel behind. It is terminated above by the *tafferel*, and below by the *counters*: it is limited on the ſides by the quarter-pieces; and the intermediate ſpace comprehends the galleries and windows of the different cabins.

STERN, among *Hunters*, is the tail of a wolf, or a greyhound.

STERN-*chaſe*. See CHASE.

STERN-*faſt*, aboard a *Ship*, ſome faſtenings of ropes, &c. behind the *ſtern* of a ſhip, to which a cable or hawſer may be brought, or fixed, in order to hold her *ſtern* to a wharf, &c.

STERN-*moſt*, in *Sea Language*, uſually denotes that part of a fleet of ſhips which is in the rear, or fartheſt *a-ſtern*, as oppoſed to *head-moſt*.

STERN-*poſt*, in a *Ship*, a great timber let into the keel at the *ſtern* of a ſhip, ſomewhat ſloping, into which are faſtened the after-planks; and on this poſt, by its pintle and gudgeons, hangs the rudder. It is uſually marked like the STEM, with a ſcale of feet from the keel upwards, in order to aſcertain the draught of water at that part of the veſſel. The difficulty of procuring a *ſtern-poſt* of ſufficient breadth in one piece has introduced the practice of fixing an additional piece behind it, which is ſtrongly bolted to the former. The hinges, which ſupport the rudder, are accordingly fixed to this latter, which is alſo tenanted into the keel, and denominated the back of the poſt. It is half the breadth of the *ſtern-poſt* at the keel, but diminiſhes gradually towards the upper end, where it is one third narrower. The *ſtern-poſt* is ſtrongly attached to the keel by a knee, of which one branch extends along the keel, being ſcarfed and bolted to the dead wood, and fore-locked under the keel, while the other branch inclines upwards, and correſponds with the inſide, or fore-part of the *ſtern-poſt*, to which it is alſo bolted in the ſame manner. Falconer.

STERN-*ſheets*, that part of a boat which is contained between the *ſtern* and the aftmoſt, or hindmoſt ſeat of the rowers. It is generally furniſhed with benches to accommodate the paſſengers. Falconer.

STERN-*way*, in *Sea Language*, the movement by which a ſhip retreats, or falls backward, with her *ſtern* foremoſt.

STERN-*way*, *to make*. See MAKE.

STERNA, *tern*, in *Ornithology*, a genus of the order of *anſeres*, in the Linnæan ſyſtem. Its characters are, that the bill is toothleſs, ſubulated, ſtraight, acute, and a little compreſſed on the ſides; the noſtrils are linear, and ſituated at the baſe of the bill; to which we may add from Pennant, that the tongue is ſlender and ſharp, the wings very long, the tail forked, and that the birds of this genus have a ſmall back toe. Linnæus enumerates ſeven ſpecies, ſome of which are referred by other writers to the genus of GULL. Of theſe there are the SCARE-*crow*, the greater and leſſer *ſea*-SWALLOW, PASSER *ſtultus*, black and brown TERN, &c.

STERNOCOSTALES, commonly called the *muſculi triangulares ſterni*, in *Anatomy*, are five pairs of fleſhy planes, diſpoſed more or leſs obliquely on each ſide the ſternum, on the inſides of the cartilages of the ſecond, third, fourth, fifth, and ſixth true ribs. They are inſerted by one extremity in the edges of the inſide of all the lower half of the ſternum; from thence the firſt muſcle on each ſide runs up obliquely, and is fixed in the cartilage of the ſecond rib. The ſecond runs leſs obliquely to its inſertion in the cartilage of the third rib; and the reſt are inſerted in the ſame manner, in the cartilages of the following ribs; their obliquity decreaſing, and their length increaſing, in proportion as they are ſituated lower down, ſo that the loweſt of all is almoſt tranſverſe. This laſt muſcle, which is fixed by one extremity in the cartilage of the ſixth true rib near the bone, ſeems to paſs the appendix enſiformis, immediately above the inſertion of the diaphragm in that appendix, and to join the muſcle on the other ſide.

The uſe of theſe muſcles appears from their inſertions and direction to be for depreſſing the cartilaginous portions and interior extremities of the ribs, eſpecially the ſuperior ribs, except the firſt; and, at the ſame time, for drawing the cartilages of the inferior ribs near the ſternum, by reaſon of the curvature. They may, therefore, very well be called *depreſſores coſtarum*, as the *ſupracoſtales* are named *levatores*. The SUBCOSTALES, having the ſuperior extremities of their fibres much more diſtant from the vertebral articulation of the ribs than the lower extremities, can more eaſily move the upper than the lower ribs; and conſequently they are aſſiſtants to the *ſternocoſtales*.

The *ſternocoſtalis* was called by ſome of the older anatomiſts *ſextus thoracis*; and by Riolanus, and ſome others of the later writers, PECTORALIS *internus*.

STERNODACTYLÆUS, in *Anatomy*, a name given by Riolanus, and ſome others, to a muſcle of the foot, called by Albinus the *flexor brevis digitorum pedis*, and by others the *ſublimis flexor*, or PERFORATUS *pedis*.

STERNOHYOIDEUS, in *Anatomy*, is a long, thin, flat muſcle, broader at the lower than the upper part, and is ſituated, together with its fellow, on the foreſide of the throat; from whence ſome have improperly named it *muſculus bronchialis*. It is fixed by its lower extremity in the ſuperior and lateral part of the inner, or poſterior ſide of the ſternum, in the poſterior part of the ſternal extremity of the clavicula, in the tranſverſe ligament which connects thoſe two bones, and in the inner, or backſide of the cartilage of the firſt rib. All theſe other inſertions are more conſiderable than that in the ſternum, which is ſometimes ſcarce perceivable. From hence it runs up to the foreſide of the aſpera arteria, joined to its fellow by a membrane which forms a ſort of linea alba, and is inſerted laterally in the lower edge of the baſis of the os hyoides. There is ſometimes a tranſverſe tendinous line about the middle of the backſide of this muſcle. The *ſterno-hyoidæi* draw the os hyoides directly downward, and ſerve to counterbalance the different motions of the *ſtylo-hyoidæi*, *omo-hyoidæi*, and *genio-hyoidæi*. Winſlow. See *Tab. Anat. (Myol.) fig.* 2. *n.* 7, 8.

STERNOMANTIS, Στερνομαντις, in *Antiquity*, a deſignation given to the Delphian prieſteſs, more uſually called PYTHIA.

STERNOMANTIS is alſo uſed for any one that had a propheſying demon within him.

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The action of theſe muſcles is different, according as either both, or only one of them acts, and according to the different ſituation of the head and trunk. When we keep the head and trunk ſtraight, whether in ſtanding or ſitting, both muſcles preſerve the head in that poſture againſt any force by which it would otherwiſe be moved backward. One of theſe muſcles, acting alone, may have the ſame uſe, if the force to puſh the head back be applied between the anterior and lateral parts of it. In that caſe the *ſternomaſtoidæus* on the ſame ſide, would oppoſe this force; but if it were applied directly on the ſide of the head, that oppoſition would have no effect, without the aſſiſtance of the ſplenius on the ſame ſide. They both ſerve likewiſe to perform the rotations of the head, and alſo to bring the head near the thorax when we lie on the back, or bend backward in ſitting; and the lower the head is in theſe ſituations, the greater force muſt theſe muſcles exert to raiſe it; and in great efforts they are aided by the muſculi recti of the abdomen. Winſlow.

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This is a long flat bone, not all of the ſame breadth, but repreſenting a kind of dagger. It is generally made up of three principal pieces; the firſt broad and ſhort, the ſecond longer and narrower, and the third a ſort of ſmall appendix, called by the Greeks *xyphoides*, from its reſemblance to the point of a broad-ſword.

The firſt, or uppermoſt piece, is broad and thick at the top, but thinner and narrower below, being nearly of the figure of a triangle with the three angles cut off, or of an irregular ſquare. The ſecond is much longer than the firſt, and is flat on both ſides, whereas the outſide of the upper is unequally convex, and the inner a little concave. This is broader alſo toward the lower, than toward the upper part, and has ſometimes ſeveral transverſe lines, eſpecially on its outſide, which point out the places where the pieces, of which it is made up in children, are joined together. The two lateral edges of this bone have each one cartilaginous half notch, and five cartilaginous whole notches; the half notches are at the upper part of the lateral edges, and the five entire notches come nearer to each other, in proportion as they are lower, and part of the laſt properly belongs to the third piece.

The third piece, commonly called *cartilago enſiformis*, and *xyphoides*, is entirely cartilaginous in infants and young ſubjects, but in an advanced age it generally oſſifies, either wholly, or in part. This piece is joined to the lower extremity of the ſecond, between the cartilages of the laſt true ribs, and is often more or leſs notched on each ſide to form part of the articular notches of the *ſternum*. Its figure and ſize vary, and in ſome ſubjects it is forked, and in others perforated. Sometimes alſo it is very large, and at others very ſmall, hardly exceeding in ſome ſubjects the third part of an inch. The inner ſubſtance of the *ſternum* is almoſt all cellulous, and very tender; it is covered with a thin, but compact lamina. The *ſternum* completes the fore-part of the cavity of the thorax, and ſuſtains the anterior extremities of the ribs; being ſufficiently fixed to reſiſt compreſſions, and other outward accidents, and yet moveable enough, by means of its articulation with the cartilages of the ribs, not to obſtruct the motions neceſſary to reſpiration. It ſerves alſo for the inſertion of ſeveral muſcles, and to ſupport the mediaſtinum. Winſlow.

We owe to Mr. Hunauld a very judicious account of the perforation which is ſometimes found in the lower part of the *ſternum*.

This perforation is ſometimes larger, ſometimes ſmaller; and a certain German author has found a very ſingular uſe for it, ſuppoſing that it gives paſſage to the mamillary veins and arteries; but Mr. Hunauld, though he had often found the *ſternum* thus perforated, never could obſerve any veſſels paſſing it, but always found it filled up with a cartilaginous ſubſtance. The German author does not poſitively affirm that he ſaw the veſſels paſſing through this perforation, and Mr. Hunauld ſuppoſes it to have been but a conjecture, that this might be its uſe. Its origin and formation, however, may be more rationally accounted for on much ſounder principles.

The *ſternum* is in its firſt ſtate wholly cartilaginous, and the oſſification begins afterwards in ſeveral different parts of it; the number of theſe oſſifying ſpots is wholly uncertain, but as they increaſe they unite, ſooner or later, into three pieces, and afterwards theſe three pieces unite themſelves, ſo as to form only one. If therefore, when theſe different oſſifications begin to unite, there be ſome place where the oſſification has been impeded, this place, or ſpot, muſt remain only of a cartilaginous ſubſtance, and in making the ſkeleton, this cartilage will be ſeparated from the bones, and will conſequently leave a perforation in the *ſternum*; and what makes this the more probable, is, that this perforation, which is ſo commonly ſeen in ſkeletons, is never found in diſſecting the recent body. It may alſo have happened, that the three pieces of bone, which conſtitute the *ſternum*, by uniting at their edges, may, in acquiring their growth and ſolidity, have naturally left a vacancy between them. We never find a perforation of this kind in the upper part of the *ſternum*, which is probably owing to that part of it being only one piece in the earlier times, and not oſſifying in different places and ſpots at the ſame time; as is always the caſe, in regard to this lower part of the *ſternum*, where the perforation is always found. Mem. Acad. Par. 1740.

STERNUM, *cartilages of the*. The *ſternum* of an adult ſubject has commonly ſixteen cartilages; fourteen of the number are articular, the other two are ſymphyſes. Of the former, two belong to the articulations of the clavicle, and twelve to thoſe of the true ribs, from the ſecond to the ſeventh incluſively; and the two ſymphyſes are both between the *ſternum*, and the firſt rib on each ſide. There is likewiſe another ſymphyſis, by which the upper portion of the *ſternum* is connected to the lower; but the cartilage of this is often obliterated in advanced age. The apophyſis enſiformis is often bony toward the *ſternum*, and more or leſs cartilaginous toward the other end. This has, in very aged perſons, been ſometimes found entirely oſſified, and ſometimes wholly cartilaginous even in adults. Winſlow.

STERNUM, *ligaments of the*. The *ſternum* has ſeveral ligaments, by which it is connected with the clavicles and ribs. It is joined to the clavicles by ſtrong ſhort ligaments, fixed by one extremity round the edges of its two ſuperior notches, and by the other in the extremity of each clavicle, and by the middle to the inter-articular cartilages, ſurrounding the particular ligaments which ſolid content, of bodies; as globes, cylinders, cubes, veſſels, ſhips, &c.

The methods hereof ſee under the reſpective bodies; as GLOBE, SPHERE, CYLINDER, &c. See alſo GAUGING.

STEREOTOMY, formed from ϛερεος, and τομη, *ſection*, the art, or act, of cutting ſolids, or making ſections thereof; as walls and other membranes in the profiles of architecture.

STERILITY, formed from *ſterilitas*, of *ſterilis*, *barren*, the quality of a thing that is barren; in oppoſition to FECUNDITY.

Sterility was held a grievous affliction by the wives of the ancient patriarchs. Nature has annexed *ſterility* to all monſtrous productions, that the creation might not degenerate. Hence the *ſterility* of mules, &c.

Women frequently become *ſterile* after a miſcarriage, or a difficult labour, by reaſon the uterus, or ſome other of the genital parts, are injured thereby.

The *ſterility* of mercury, ſay the alchemiſts, reſembles that of women who are too cold and moiſt; and who, by being purged and heated, would be cured of their *ſterility*, as mercury is when purged according to the rules of art.

STERIS, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: the calyx is parted into five ſegments; the corolla is rotated, and the fruit is a ſingle-celled polyſpermous berry. There is only one ſpecies.

STERLING, a term frequent in the Engliſh commerce.

A *pound*, *ſhilling*, or *penny ſterling*, ſignifies as much as a pound, ſhilling, or penny, of lawful money of England, as ſettled by public authority.

Antiquaries and critics are greatly divided as to the origin of the word *ſterling*. Buchanan fetches it from the caſtle of Striveling, or Sterling in Scotland, where a ſmall coin was anciently ſtruck; that in time, according to him, came to give name to all the reſt. Camden derives the word from *eaſterling*, or *eſterling*; obſerving, that in the reign of king Richard I. money coined in the eaſt parts of Germany begun to be of eſpecial requeſt in England by reaſon of the purity thereof, and was called *eaſterling money*, as all the inhabitants of thoſe parts were called *eaſterlings*; ſome of whom, ſkilled in coinage, were ſoon after, viz. in the reign of king John, ſent for over to perfect the Engliſh money, or reduce it to its due fineneſs, which was thence forwards denominated from them, *ſterling*, for *eaſterling*, or *eſterling*: not, ſays Camden, from Striveling in Scotland, nor from *ſtella*, a *ſtar*, which ſome dream to have been coined thereon; for in old deeds, the Engliſh ſpecies are always called *nummi eaſterlingi*, which implied as much as good and lawful money, &c. Clarke, in his Connexion of the Roman, Saxon, &c. Coins, p. 80. obſerves, that the Saxon or Engliſh pound was called the pound *ſterling*, becauſe their anceſtors brought it from the moſt eaſtern parts of Europe, the ſhores of the Euxine; and that they called it *libra eſterlingorum*, the pound *eſterling* or *ſterling*, to diſtinguiſh it from the Roman pound, which, to preſerve the ſame diſtinction, was called *libra occidua*, or the weſtern pound. Somner, again, derives the word from the Saxon *ſteore*, a *rule* or *ſtandard*; intimating, that this, as to weight and fineneſs, was to be the common ſtandard of all current money.

In Stow, and ſome other of our ancient writers, *ſterling*, or *eaſterling*, is alſo uſed for a certain coin, in value amounting nearly to our ſilver penny; and on ſome occaſions we find the ſame word *ſterling* uſed in the general for a piece of money, it being obſervable, that for a good while together, there was no other coin but pennies, with which *ſterlings* or *eaſterlings* were become ſynonymous: much as, among the ancients, the words *denarius* and *nummus* were uſed.

STERN *of a ſhip*, denotes her poſterior face; or that part which is preſented to the view of a ſpectator, placed on the continuation of the keel behind. It is terminated above by the *tafferel*, and below by the *counters*: it is limited on the ſides by the quarter-pieces; and the intermediate ſpace comprehends the galleries and windows of the different cabins.

STERN, among *Hunters*, is the tail of a wolf, or a greyhound.

STERN-*chaſe*. See CHASE.

STERN-*faſt*, aboard a *Ship*, ſome faſtenings of ropes, &c. behind the *ſtern* of a ſhip, to which a cable or hawſer may be brought, or fixed, in order to hold her *ſtern* to a wharf, &c.

STERN-*moſt*, in *Sea Language*, uſually denotes that part of a fleet of ſhips which is in the rear, or fartheſt *a-ſtern*, as oppoſed to *head-moſt*.

STERN-*poſt*, in a *Ship*, a great timber let into the keel at the *ſtern* of a ſhip, ſomewhat ſloping, into which are faſtened the after-planks; and on this poſt, by its pintle and gudgeons, hangs the rudder. It is uſually marked like the STEM, with a ſcale of feet from the keel upwards, in order to aſcertain the draught of water at that part of the veſſel. The difficulty of procuring a *ſtern-poſt* of ſufficient breadth in one piece has introduced the practice of fixing an additional piece behind it, which is ſtrongly bolted to the former. The hinges, which ſupport the rudder, are accordingly fixed to this latter, which is alſo tenanted into the keel, and denominated the back of the poſt. It is half the breadth of the *ſtern-poſt* at the keel, but diminiſhes gradually towards the upper end, where it is one third narrower. The *ſtern-poſt* is ſtrongly attached to the keel by a knee, of which one branch extends along the keel, being ſcarfed and bolted to the dead wood, and fore-locked under the keel, while the other branch inclines upwards, and correſponds with the inſide, or fore-part of the *ſtern-poſt*, to which it is alſo bolted in the ſame manner. Falconer.

STERN-*ſheets*, that part of a boat which is contained between the *ſtern* and the aftmoſt, or hindmoſt ſeat of the rowers. It is generally furniſhed with benches to accommodate the paſſengers. Falconer.

STERN-*way*, in *Sea Language*, the movement by which a ſhip retreats, or falls backward, with her *ſtern* foremoſt.

STERN-*way*, *to make*. See MAKE.

STERNA, *tern*, in *Ornithology*, a genus of the order of *anſeres*, in the Linnæan ſyſtem. Its characters are, that the bill is toothleſs, ſubulated, ſtraight, acute, and a little compreſſed on the ſides; the noſtrils are linear, and ſituated at the baſe of the bill; to which we may add from Pennant, that the tongue is ſlender and ſharp, the wings very long, the tail forked, and that the birds of this genus have a ſmall back toe. Linnæus enumerates ſeven ſpecies, ſome of which are referred by other writers to the genus of GULL. Of theſe there are the SCARE-*crow*, the greater and leſſer *ſea*-SWALLOW, PASSER *ſtultus*, black and brown TERN, &c.

STERNOCOSTALES, commonly called the *muſculi triangulares ſterni*, in *Anatomy*, are five pairs of fleſhy planes, diſpoſed more or leſs obliquely on each ſide the ſternum, on the inſides of the cartilages of the ſecond, third, fourth, fifth, and ſixth true ribs. They are inſerted by one extremity in the edges of the inſide of all the lower half of the ſternum; from thence the firſt muſcle on each ſide runs up obliquely, and is fixed in the cartilage of the ſecond rib. The ſecond runs leſs obliquely to its inſertion in the cartilage of the third rib; and the reſt are inſerted in the ſame manner, in the cartilages of the following ribs; their obliquity decreaſing, and their length increaſing, in proportion as they are ſituated lower down, ſo that the loweſt of all is almoſt tranſverſe. This laſt muſcle, which is fixed by one extremity in the cartilage of the ſixth true rib near the bone, ſeems to paſs the appendix enſiformis, immediately above the inſertion of the diaphragm in that appendix, and to join the muſcle on the other ſide.

The uſe of theſe muſcles appears from their inſertions and direction to be for depreſſing the cartilaginous portions and interior extremities of the ribs, eſpecially the ſuperior ribs, except the firſt; and, at the ſame time, for drawing the cartilages of the inferior ribs near the ſternum, by reaſon of the curvature. They may, therefore, very well be called *depreſſores coſtarum*, as the *ſupracoſtales* are named *levatores*. The SUBCOSTALES, having the ſuperior extremities of their fibres much more diſtant from the vertebral articulation of the ribs than the lower extremities, can more eaſily move the upper than the lower ribs; and conſequently they are aſſiſtants to the *ſternocoſtales*.

The *ſternocoſtalis* was called by ſome of the older anatomiſts *ſextus thoracis*; and by Riolanus, and ſome others of the later writers, PECTORALIS *internus*.

STERNODACTYLÆUS, in *Anatomy*, a name given by Riolanus, and ſome others, to a muſcle of the foot, called by Albinus the *flexor brevis digitorum pedis*, and by others the *ſublimis flexor*, or PERFORATUS *pedis*.

STERNOHYOIDEUS, in *Anatomy*, is a long, thin, flat muſcle, broader at the lower than the upper part, and is ſituated, together with its fellow, on the foreſide of the throat; from whence ſome have improperly named it *muſculus bronchialis*. It is fixed by its lower extremity in the ſuperior and lateral part of the inner, or poſterior ſide of the ſternum, in the poſterior part of the ſternal extremity of the clavicula, in the tranſverſe ligament which connects thoſe two bones, and in the inner, or backſide of the cartilage of the firſt rib. All theſe other inſertions are more conſiderable than that in the ſternum, which is ſometimes ſcarce perceivable. From hence it runs up to the foreſide of the aſpera arteria, joined to its fellow by a membrane which forms a ſort of linea alba, and is inſerted laterally in the lower edge of the baſis of the os hyoides. There is ſometimes a tranſverſe tendinous line about the middle of the backſide of this muſcle. The *ſterno-hyoidæi* draw the os hyoides directly downward, and ſerve to counterbalance the different motions of the *ſtylo-hyoidæi*, *omo-hyoidæi*, and *genio-hyoidæi*. Winſlow. See *Tab. Anat. (Myol.) fig.* 2. *n.* 7, 8.

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The action of theſe muſcles is different, according as either both, or only one of them acts, and according to the different ſituation of the head and trunk. When we keep the head and trunk ſtraight, whether in ſtanding or ſitting, both muſcles preſerve the head in that poſture againſt any force by which it would otherwiſe be moved backward. One of theſe muſcles, acting alone, may have the ſame uſe, if the force to puſh the head back be applied between the anterior and lateral parts of it. In that caſe the *ſternomaſtoidæus* on the ſame ſide, would oppoſe this force; but if it were applied directly on the ſide of the head, that oppoſition would have no effect, without the aſſiſtance of the ſplenius on the ſame ſide. They both ſerve likewiſe to perform the rotations of the head, and alſo to bring the head near the thorax when we lie on the back, or bend backward in ſitting; and the lower the head is in theſe ſituations, the greater force muſt theſe muſcles exert to raiſe it; and in great efforts they are aided by the muſculi recti of the abdomen. Winſlow.

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They are covered by the *ſterno-hyoidæi*, and they cover the thyroide glands. Each muſcle is fixed by its lower extremity, partly in the ſuperior portion of the inner or backſide of the ſternum, partly in the ligament and neighbouring portion of the clavicula, and partly in the cartilaginous portion of the firſt rib. Sometimes it runs a great way down on the firſt bone of the ſternum, and croſſes the muſcle on the other ſide. From thence it runs up on the aſpera arteria, cloſe by its fellow, paſſes before the thyroide glands, over the cricoide cartilage, and is inſerted by its upper extremity in the lower part of the lateral ſide of the thyroide cartilage, and partly along that whole ſide. Winſlow obſerves, that he has found this muſcle double, one diſtinct portion of it being inſerted in the baſis, and the other laterally. The *ſterno-thyroidæi* ſerve in general to pull down the thyroide cartilage, and the whole LARYNX along with it. They may likewiſe aſſiſt the STERNO-*hyoidæi* in their actions, and compreſs the thyroide gland. Winſlow.

SERNUM, Στερνον, in *Anatomy*, the breaſt-bone, a cartilaginous ſort of bone, which makes the fore-part of the breaſt, and into which the ribs are fitted. See *Tab. Anat. (Oſteol.) fig.* 3. *n.* 11.

This is a long flat bone, not all of the ſame breadth, but repreſenting a kind of dagger. It is generally made up of three principal pieces; the firſt broad and ſhort, the ſecond longer and narrower, and the third a ſort of ſmall appendix, called by the Greeks *xyphoides*, from its reſemblance to the point of a broad-ſword.

The firſt, or uppermoſt piece, is broad and thick at the top, but thinner and narrower below, being nearly of the figure of a triangle with the three angles cut off, or of an irregular ſquare. The ſecond is much longer than the firſt, and is flat on both ſides, whereas the outſide of the upper is unequally convex, and the inner a little concave. This is broader alſo toward the lower, than toward the upper part, and has ſometimes ſeveral tranſverſe lines, eſpecially on its outſide, which point out the places where the pieces, of which it is made up in children, are joined together. The two lateral edges of this bone have each one cartilaginous half notch, and five cartilaginous whole notches; the half notches are at the upper part of the lateral edges, and the five entire notches come nearer to each other, in proportion as they are lower, and part of the laſt properly belongs to the third piece.

The third piece, commonly called *cartilago enſiformis*, and *xyphoides*, is entirely cartilaginous in infants and young ſubjects, but in an advanced age it generally oſſifies, either wholly, or in part. This piece is joined to the lower extremity of the ſecond, between the cartilages of the laſt true ribs, and is often more or leſs notched on each ſide to form part of the articular notches of the *ſternum*. Its figure and ſize vary, and in ſome ſubjects it is forked, and in others perforated. Sometimes alſo it is very large, and at others very ſmall, hardly exceeding in ſome ſubjects the third part of an inch. The inner ſubſtance of the *ſternum* is almoſt all cellulous, and very tender; it is covered with a thin, but compact lamina.

The *ſternum* completes the fore-part of the cavity of the thorax, and ſuſtains the anterior extremities of the ribs; being ſufficiently fixed to reſiſt compreſſions, and other outward accidents, and yet moveable enough, by means of its articulation with the cartilages of the ribs, not to obſtruct the motions neceſſary to reſpiration. It ſerves alſo for the inſertion of ſeveral muſcles, and to ſupport the mediaſtinum. Winſlow.

We owe to Mr. Hunauld a very judicious account of the perforation which is ſometimes found in the lower part of the *ſternum*.

This perforation is ſometimes larger, ſometimes ſmaller; and a certain German author has found a very ſingular uſe for it, ſuppoſing that it gives paſſage to the mamillary veins and arteries; but Mr. Hunauld, though he had often found the *ſternum* thus perforated, never could obſerve any veſſels paſſing it, but always found it filled up with a cartilaginous ſubſtance. The German author does not poſitively affirm that he ſaw the veſſels paſſing through this perforation, and Mr. Hunauld ſuppoſes it to have been but a conjecture, that this might be its uſe. Its origin and formation, however, may be more rationally accounted for on much ſounder principles.

The *ſternum* is in its firſt ſtate wholly cartilaginous, and the oſſification begins afterwards in ſeveral different parts of it; the number of theſe oſſifying ſpots is wholly uncertain, but as they increaſe they unite, ſooner or later, into three pieces, and afterwards theſe three pieces unite themſelves, ſo as to form only one. If therefore, when theſe different oſſifications begin to unite, there be ſome place where the oſſification has been impeded, this place, or ſpot, muſt remain only of a cartilaginous ſubſtance, and in making the ſkeleton, this cartilage will be ſeparated from the bones, and will conſequently leave a perforation in the *ſternum*; and what makes this the more probable, is, that this perforation, which is ſo commonly ſeen in ſkeletons, is never found in diſſecting the recent body. It may alſo have happened, that the three pieces of bone, which conſtitute the *ſternum*, by uniting at their edges, may, in acquiring their growth and ſolidity, have naturally left a vacancy between them. We never find a perforation of this kind in the upper part of the *ſternum*, which is probably owing to that part of it being only one piece in the earlier times, and not oſſifying in different places and ſpots at the ſame time; as is always the caſe, in regard to this lower part of the *ſternum*, where the perforation is always found. Mem. Acad. Par. 1740.

STERNUM, *cartilages of the*. The *ſternum* of an adult ſubject has commonly ſixteen cartilages; fourteen of the number are articular, the other two are ſymphyſes. Of the former, two belong to the articulations of the clavicle, and twelve to thoſe of the true ribs, from the ſecond to the ſeventh incluſively; and the two ſymphyſes are both between the *ſternum*, and the firſt rib on each ſide. There is likewiſe another ſymphyſis, by which the upper portion of the *ſternum* is connected to the lower; but the cartilage of this is often obliterated in advanced age. The apophyſis enſiformis is often bony toward the *ſternum*, and more or leſs cartilaginous toward the other end. This has, in very aged perſons, been ſometimes found entirely oſſified, and ſometimes wholly cartilaginous even in adults. Winſlow.

STERNUM, *ligaments of the*. The *ſternum* has ſeveral ligaments, by which it is connected with the clavicles and ribs. It is joined to the clavicles by ſtrong ſhort ligaments, fixed by one extremity round the edges of its two ſuperior notches, and by the other in the extremity of each clavicle, and by the middle to the inter-articular cartilages, ſurrounding the particular ligaments which go between the edges of theſe cartilages and the *ſternum*; and the capſular ligaments between them and the clavicles. Winſlow.

Sternum *fractured.* The *ſternum* is equally ſubject to depreſſions and fractures, from falls and blows, with the reſt of the bones. When either of theſe accidents happens to it, the part is not only uneven and painful, but the ſubjacent arteries and veins are alſo contuſed and ruptured; whence ariſe pains in the breaſt, difficulty of breathing, violent coughs, ſpitting of blood, or elſe extravaſations of it in the præcordia, or between the duplicatures of the mediaſtinum, with many bad ſymptoms of the like nature. The ſigns of a *fractured ſternum* will therefore be very evident by theſe, and by its being moveable to the touch, eſpecially when one part of it grates againſt another, and when there are a cavity and inequality very remarkably viſible there.

In order to reduce a fracture of this bone, the patient muſt be laid on his back on a bed, or hard even place, as a table, putting a hard pillow, a large parcel of cloth rolled up, or ſome other ſuch body, under his back, and preſſing down his ſhoulders, by which means the *fractured ſternum* will be elevated and extended; and to facilitate the reduction, the ſurgeon muſt preſs the bones of the *ſternum* together, and ſhake them very ſtrongly. But when this method is impracticable, or not proper, the ſkin muſt be divided, and the depreſſed part of the *ſternum* liſted up into its place, by means of an elevator, or elſe of a ſcrew gently wormed into the part, and afterwards pulled upwards: and when it has regained its natural ſituation, it muſt be kept in it by the proper bandages. If after the reduction violent pains continue under the *ſternum*, and if blood ſhould gather, and ſuppurate internally, between the duplicature of the mediaſtinum, the lower part of the *ſternum* ought to be trepanned, as the cranium on the like occaſions; and when the putrid matter is diſcharged, and the wound cleanſed, it muſt be healed with vulnerary balſams; and if any blood ſhould be found diſcharged from the cavity of the thorax, the cure muſt entirely depend on the evacuating that by the paracenteſis, in the manner of wounds of the thorax. Heiſter.

STERNUTATION. See Sneezing.

STERNUTATIVE, or Sternutatory, a medicine proper to produce ſneezing.

Sternutatives, alſo called *ptarmics*, are of two kinds, *gentle* and *violent*. Of the firſt kind are betony, ſage, marjoram, tobacco, and the whole faſhionable tribe of ſnuffs. Of the latter kind are euphorbium, white hellebore, pellitory, &c.

Sternutatives operate by their ſharp pungent parts vellicating the inner membrane of the noſe, which is exceedingly ſenſible, and occaſioning the ſerous matter contained in the gland of the noſe, and in ſeveral ſinuſes ſituate in the baſe of the cranium, and the os frontis, to be expelled.

STEW, a ſmall kind of fiſh-pond, the peculiar office whereof is to maintain fiſh, and keep them in readineſs for the daily uſes of the family, &c.

The fiſh bred in the large ponds are drawn out, and put in here. For two large ponds of three or four acres apiece, it is adviſeable to have four *ſtews*, each two rods wide, and three long. The *ſtews* are uſually in gardens, or at leaſt near the houſe, to be more handy, and the better looked to.

The method of making them is, to carry the bottom in a continual decline from one end, with a mouth to favour the drawing with a net. See Fish-*ponds*.

Stews, or Stues, were alſo places anciently permitted in England, to women of profeſſed incontinency, for the proffer of their bodies to all comers. Theſe were under particular rules and laws of diſcipline, appointed by the lord of the manor.

The word is probably borrowed from the French, *eſtuves*, hot baths, in regard proſtitutes are wont to prepare themſelves for venereal acts by bathing.

STEWARD, or Seneschal, an officer, whereof there are various kinds; thus called from the Saxon *ſteda*, *ſtead*, *place*, or *room*; and *ward*, *keeper*, q. d. a deputy, or perſon appointed in the place of another. See Seneschal.

Steward *of Great Britain*, *lord high*, is the firſt and higheſt officer of the crown; as having the power of what we call a *vice-roy*, the Danes, &c. *ſtadtholder*, and the Swedes, *reichs droſſet*, q. d. *vice rex*. Chamberlayne.

Common lawyers call him *magnus Angliæ ſeneſchallus*. His office, as expreſſed in an ancient record, is to ſuperviſe and regulate the whole kingdom, both in time of peace and war, immediately under the king, and after him; an authority ſo very great, that it has not been judged ſafe to truſt it any longer in the hands of any ſubject. The office was hereditary and permanent in the family of the dukes of Lancaſter, till the time of Henry IV. ſince whom it has only been made *pro hac vice*, occaſionally: as to officiate at a coronation; at the arraignment and trial of ſome nobleman for treaſon, or other great crime. And it hath been the conſtant practice (and therefore ſeems now to have become neceſſary) to grant it to a lord of parliament, elſe he is incapable of trying ſuch delinquent peer.

During his *ſtewardſhip* he bears a white ſtaff in his hand, and the trial, &c. ended, he breaks his ſtaff, and with it his commiſſion expires.

The court of the lord high *ſteward* is a court inſtituted for the trial of peers indicted for treaſon or felony, or for miſpriſion of either. When ſuch an indictment is found by a grand jury of freeholders in the King's Bench, or at the aſſizes before the juſtices of oyer and terminer, it is to be removed by a writ of certiorari into the court of the lord high *ſteward*, which only has a power to determine it. A peer may plead a pardon before the court of King's Bench, and the judge have power to allow it, in order to prevent the trouble of appointing a *high-ſteward*, merely for the purpoſe of receiving ſuch plea. But he may not plead, in that inferior court, any other plea, as guilty or not guilty of the indictment, but only in this court; becauſe, in conſequence of ſuch plea, it is poſſible that judgment of death might be awarded againſt him. The king, therefore, in caſe a peer be indicted of treaſon, felony, or miſpriſion, creates a *lord-high-ſteward pro hac vice*, by commiſſion under the great ſeal, which recites the indictment ſo found, and gives his grace power to receive and try it *ſecundum legem et conſuetudinem Angliæ*. Then, when the indictment is regularly moved by writ of certiorari, commanding the inferior court to certify it up to him, the *lord high-ſteward* directs a precept to a ſerjeant at arms, to ſummon the lords to attend and try the indicted peer. This precept was formerly iſſued to ſummon only eighteen or twenty, ſelected from the body of the peers; then the number came to be indefinite, and the cuſtom was, for the *lord high-ſteward* to ſummon as many as he thought proper (but of late years not leſs than twenty-three), and that thoſe lords only ſhould ſit upon the trial; which threw a monſtrous weight of power into the hands of the crown, and this its great officer, of ſelecting only ſuch peers as the then predominant party ſhould moſt approve of. But now, by ſtat. 7 W. III. cap. 3. upon all trials of peers for treaſon or miſpriſion, all the peers (the lords ſpiritual excepted) who have a right to ſit and vote in parliament, ſhall be ſummoned, at leaſt twenty days before ſuch trial, to appear and vote therein; and every lord appearing ſhall vote in the trial of ſuch peer, firſt taking the oaths of allegiance and ſupremacy, and ſubſcribing the declaration againſt popery.

During the ſeſſion of parliament, the trial of an indicted peer is not properly in the court of the *lord high-ſteward*, but before the court of our lord the king in parliament. In this caſe, however, a *lord high-ſteward* is always appointed to regulate and add weight to the proceedings; but he is rather in the nature of a ſpeaker *pro tempore*, or chairman of the court, than the judge of it; for the collective body of the peers are therein the judges both of law and fact, and the *high-ſteward* has a vote with the reſt, in right of his peerage. But in the court of the *lord high-ſteward*, which is held in the receſs of parliament, he is the ſole judge in matters of law, as the lords triers are in matters of fact; and as they may not interfere with him in regulating the proceedings of the court, ſo he has no right to intermix with them in giving any vote upon the trial. Blackſt. Com. book iv. p. 260.

Steward *of the houſhold, lord*, is an officer to whom the ſtate of the king's houſe is committed, to be ruled and guided at his diſcretion. See Houshold and Lord *Steward*.

The court of *lord-ſteward*, treaſurer, or comptroller of the king's houſhold was inſtituted by ſtat. 3 Henry VII. cap. 14. to enquire of felony by any of the king's ſworn ſervants, in the cheque-roll of the houſhold, under the degree of a lord, in confederating, compaſſing, conſpiring, and imagining the death or deſtruction of the king, or any lord, or other of his majeſty's privy council, or the *lord ſteward*, treaſurer, or comptroller of the king's houſe. The enquiry and trial thereupon muſt be by a jury according to the courſe of the common law, conſiſting of twelve ſad men (i. e. ſober and diſcreet perſons) of the king's houſhold.

There is another court of the *lord ſteward* of the king's houſhold, or (in his abſence) of the treaſurer, comptroller, and *ſteward* of the Marſhalſea, that was erected by ſtat. 33 Henry VIII. cap. 12 with a juriſdiction to enquire of and determine all treaſons, miſpriſions of treaſon, murders, manſlaughters, bloodſhed, and other malicious ſtrikings, whereby blood ſhall be ſhed in any of the palaces and houſes of the king, or in any other houſe where the royal perſon ſhall abide. The proceedings are alſo by jury, both a grand and a petit one, as at common law, taken out of the officers and ſworn ſervants of the king's houſhold. Blackſt. Com. book iv. p. 273. See *Marſhalſea* COURT and *Palace* COURT.

STEWARD *of the univerſities, lord high.* See UNIVERSITY.

STEWARD *of a ſhip of war*, an officer appointed by the purſer to diſtribute the different kinds of proviſion to the officers and crew; for which purpoſe he is furniſhed with a mate and proper aſſiſtants.

He hath an apartment for himſelf in the hold, which is called the *ſteward's-room.* See *Tab. Ship, fig.* 2. *lit.* Y.

STEWARTIA, in *Botany*, a genus of the *monadelphia polyandria* claſs. Its characters are theſe: the flower has a permanent empalement, cut into five oval concave ſegments; it has five large oval petals, which ſpread open, and a great number of ſlender ſtamina, joined in a cylinder at bottom; theſe are ſhorter than the petals, to which they are connected at their baſe, terminated by proſtrate roundiſh ſummits, with a roundiſh hairy germen, ſupporting five ſtyles the length of the ſtamina, crowned by obtuſe ſtigmas; the germen afterwards turns to a five-cornered capſule, with five cells, opening with five valves, whoſe cells are cloſed, each containing one oval compreſſed ſeed.

We have but one ſpecies of this genus, which is a ſhrub growing naturally in Virginia.

STHENIA, Σθενια, in *Antiquity*, a feſtival of Argos, ſuppoſed to be kept in honour of Minerva, ſurnamed Σθενιας, from σθενος, *ſtrength.*

STIÆ, a word uſed by ſome of the old authors for pebbles found on the ſea-ſhore.

STIBADIUM, among the *Romans*, a low kind of table-couch, or bed of a circular form, which ſucceeded to the triclinia, and was of different ſizes, according to the number of gueſts they were deſigned for. They were called *hexaclina*, *octaclina*, or *enneaclina*, according as they held ſix, eight, or nine gueſts, and ſo of any other number.

STIBIALIA, a term uſed by ſome to expreſs the antimonial medicines.

STIBINUS *color*, a term uſed by St. Jerom, and others, to expreſs the falſe black colour which the ancient Jews, and other eaſtern people, gave to their eye-brows with *ſtibium*, or antimony.

STIBIUM. See ANTIMONY.

STIBIUM *ceratum.* See VITRUM *antimonii ceratum.*

STICA, a name given by ſome authors to all external aſtringents uſed in hæmorrhages.

STIGA, in *our Old Writers*, a braſs Saxon coin, of the value of half a farthing, four of them making an elfing. Blount.

STICHOMANTIA, ϛιχομαντεια, in *Antiquity*, a ſort of divination by verſes (commonly thoſe of the Sibylline oracles), which being wrote on little pieces of paper, and thrown into a veſſel, the firſt drawn out was ſuppoſed to contain the will of the gods. See SORTES.

STICHOMETRY, formed of ϛιχος, *verſe*, and μετρω, *I meaſure*, in *Scripture Hiſtory*, a catalogue of books of ſacred Scripture, to which is added the number of the verſes which each book contains.

STICHOS, a name given by the old writers to a pectoral confection, the principal ingredient of which was the herb *marrubium*, or horehound.

STICKADORE, in *Botany*. See CASSIDONY.

STICKLEBACK, in *Ichthyology*, a name given by us to that ſmall fiſh called by authors by the ſeveral names of *ſpinachia*, *ſpinax*, and *pungitius piſcis*; as alſo *piſciculus aſper*, *piſciculus aculeatus*, and the like; and finally, by Artedi, by the much more expreſſive name of *gaſteroſteus*, expreſſing that great ſingularity it has in the bony ſtructure of its belly.

The common *ſtickleback*, or GASTEROSTEUS *aculeatus* of Linnæus, is diſtinguiſhed by Artedi by the name of the *gaſteroſteus* with three ſpines on the back; and by this character it differs from the other ſpecies of this genus.

It is a very well known fiſh, and is found every where in new dug ditches, &c. where no body can perceive how it comes. Hence the vulgar have an opinion, that it breeds there equivocally and of itſelf, without the help of parents of its own kind, and that from it all other fiſhes are bred.

Theſe are idle opinions; the ſmalleſt animalcule is not produced in putrid matter otherwiſe than by the egg of a parent animal; this origin, will, therefore, hardly be believed of larger, and, as they are called, more perfect animals. Theſe ſmall fiſh are ſo far from peopling ponds with other fiſh, that they are very great devourers of the ſpawn of larger fiſh, and do infinite miſchief in ponds.

This ſpecies ſeldom reaches the length of two inches; the eyes are large; the belly prominent; the body near the tail ſquare; the ſides are covered with large bony plates, placed tranſverſely. On the back are three ſharp ſpines, that can be raiſed or depreſſed at pleaſure; the dorſal fin is placed near the tail; the pectoral fins are broad; the ventral fins conſiſt each of one ſpine, or plate, of unequal lengths; between both is a flat bony plate, reaching almoſt to the vent; beneath the vent is a ſhort ſpine, and then ſucceeds the anal fin. The tail conſiſts of twelve rays, and is even at the end: the colour of the back and ſides is an olive green; the belly white; but in ſome the lower jaws and belly are of a bright crimſon.

Theſe are found no where in ſuch great quantities as in the fens of Lincolnſhire, and ſome of the rivers flowing from them. At Spalding there are, once in ſeven or eight years, amazing ſhoals that appear in the Welland, and come up the river in the form of a vaſt column. Theſe are ſuppoſed to be the multitudes that have been waſhed out of the fens by the floods of ſeveral years, and collected in ſome deep hole, till overcharged with numbers, they are periodically obliged to attempt a change of place. The quantity is ſo great, that they are uſed to manure the land, and trials have been made to get oil from them. See Phil. Tranſ. Nº 223.

The *leſſer ſtickleback*, or *gaſteroſteus pungitius* of Linnæus, is much ſmaller than the former, and of a more ſlender make. The back is armed with ten ſhort ſharp ſpines, which croſs each other; the ſides are ſmooth, not plated like thoſe of the former, which in other particulars it reſembles: the colour of the back is olive, and the belly ſilvery.

The *fifteen-ſpined ſtickleback*, or *gaſteroſteus ſpinachia* of Linnæus is about ſix inches long; the noſe is long and ſlender; the mouth tubular and the teeth ſmall: the fore part of the body is covered on each ſide with a row of bony plates, forming a ridge; the body afterwards becomes very ſlender, and is quadrangular: between the head and the dorſal fin are fifteen ſmall ſpines; the dorſal fin is placed oppoſite the anal fin; the ventral fins are wanting; the tail is even at the end; the colour of the upper part is a deep brown, and the belly white. This ſpecies inhabits the ſea, and is never found in freſh water. Pennant.

STICKS, *foot*, in *Printing*, ſlips of wood that lie between the foot of the page and the chaſe, to which they are wedged faſt by the quoins, to keep the form firm, in conjunction with the *ſide-ſticks*, which are placed at the ſide of the page, and fixed in the ſame manner by means of quoins. See REGLET.

STICKLER, in *our Old Writers*, an inferior officer, who cuts wood within the king's parks of Clarendon.

STICK *of eels*, a quantity or meaſure of twenty-five. A bind of eels contains ten *ſticks*, and each *ſtick* twenty-five eels. Stat. Weights and Meaſures.

STIFFLE, or *great muſcle*, in the *Manege*, is the part of the hind leg of a horſe which advances towards his belly. This is a moſt dangerous part to receive a blow upon.

STIFT, in *Etching*. See ETCHING.

STIGMA, among *Botaniſts*, is the ſummit of the PISTIL, covered with a moiſture for the breaking of the pollen.

STIGMATA, in *Natural Hiſtory*, the apertures in different parts of the bodies of inſects communicating with the tracheæ, or air-veſſels, and ſerving for the office of reſpiration.

Nature has given to theſe minute animals a much larger number of tracheæ and bronchia, than to us. We have the ramifications of the trachea reaching no farther than into the breaſt, whereas, in the bodies of theſe inſects, we find them extended through the whole, and finely and admirably interlaced with one another. We have but one mouth to reſpire by: and the organization of the parts, inſervient to reſpiration, is very admirable in us; but in the inſect claſs, the mouths or openings to breathe at, are much more numerous, and the organization much more complex.

All the two-winged and four-winged flies, which have a ſingle or undivided corcelet, to which their legs are all fixed, have alſo four *ſtigmata* in that corcelet, two on each ſide. They have them alſo on the rings of their body, but thoſe on the corcelet are the moſt conſiderable.

Of the four on the corcelet, the two anterior ones are uſually the largeſt. The beſt way to find them, in the generality of flies, is to examine them firſt in the larger ſpecies of the libellæ, where they are very diſtinct and plain, and after their ſituation is well known in that ſpecies, they will be much the more readily found in the reſt.

Theſe *ſtigmata* of the corcelet, as well the anterior, as the poſterior, are oblong, and placed obliquely to the length of the body; that end of them next the head is more elevated than the other, and their ſize is ſufficiently large to render them viſible, eſpecially the firſt pair. Each of theſe ſeems not a little to reſemble a ſea-muſcle with its ſhells a little open, or is ſomewhat like the opening of an eye. It is alſo ſurrounded by two eye-lids, proportionably thick; and beſide theſe, which make its outer circumference, one may diſcover two others within, which are bordered with hairs, and which, when cloſed, often quite ſhut up the opening.

The colour of the *ſtigmata* often is ſome help alſo to us for the diſcovering them; they are very frequently different in colour from the corcelet; ſome are yellowiſh, others of a coffee colour, or ſome degree of a ſallow colour, in flies whoſe corcelet is brown, or black, or bluiſh.

Flies have, beſides theſe, ſeveral *ſtigmata* alſo in the rings of their bodies, perhaps in every one of them, though commonly thoſe in the two or three firſt are only to be diſtinguiſhed; theſe are not like thoſe of the corcelet, but are round, uſually a little eminent above the reſt of the ſurface, and reſembling pins heads; they are not eaſily diſcovered, becauſe they are not only ſmall, but uſually hid by the folds, or commiſſures of the rings. They are uſually two on each ring, placed on the two oppoſite ſides, and partly under the belly. Reaumur, Hiſt. In. vol. iv. p. 248.

Malpighi firſt diſcovered, that thoſe eighteen openings, which are placed nine on each ſide of the caterpillar, and which are called by the name of *ſtigmata*, ſerve to give reſpiration to this claſs of animals. Mr. Reaumur repeated his experiments, and made ſeveral new ones; and he concluded that theſe apertures ſerved only for the inſpiration of the air, which the caterpillar afterwards expired through the whole ſuperficies of its body, becauſe he could never obſerve that any bubbles of air were ever driven out of theſe *ſtigmata*: but Mr. Bonnet, on the contrary, having ſeen bubbles of air coming out of theſe openings, was led to infer that the inſpired air was alſo reſpired or diſcharged through theſe ſame orifices; and he is of opinion that no part of it is expired through the pores of the body. From ſeveral experiments he alſo inferred, that of the eighteen *ſtigmata* with which the caterpillar is furniſhed, the two anterior and the two poſterior ones are of greater uſe for reſpiration than any of the others. Phil. Tranſ. vol. xlv. p. 300, &c.

Stigmata, in *Antiquity*, certain marks impreſſed on the left ſhoulder of the ſoldiers when liſted. See Stigmatizing.

Stigmata were alſo a kind of notes, or abbreviations, conſiſting only of points, diſpoſed various ways; as in triangles, ſquares, croſſes, &c.

Stigmata is alſo a term introduced by the Franciſcans to expreſs the marks, or prints, of our Saviour's wounds, ſaid to have been miraculouſly impreſſed by him on the body of their ſeraphic father, St. Francis.

A ſolemn feaſt was hereupon appointed to be annually celebrated in memory of the miracle, called *the Feaſt of the* ſtigmata *of St. Francis*; and a peculiar maſs or office was compoſed for the ſame.

An archi-confraternity was erected on the ſame occaſion, by Frid. Pizzi, a Roman ſurgeon, in the year 1594.

STIGMATICI, among the Romans, were ſervants marked in the face for ſome crime.

STIGMATIZING, among the *Ancients*, was inflicted upon ſlaves as a puniſhment, but more frequently as a mark to know them by; in which caſe it was done by applying a red-hot iron, marked with certain letters, forming the name or ſome peculiar character belonging to their maſters, to their foreheads till a fair impreſſion was made, and then pouring ink into the furrows, that the inſcription might be the more conſpicuous.

Soldiers were branded in the hand with the name or character of their general.

After the ſame manner it was cuſtomary to *ſtigmatize* the worſhippers and votaries of ſome of the gods. The marks uſed on theſe occaſions were various; ſometimes they contained the name of the god, ſometimes his particular enſign, as the thunderbolt of Jupiter, the trident of Neptune, the ivy of Bacchus, &c. or they marked themſelves with ſome myſtical number, whereby the god's name was deſcribed. To theſe three ways of *ſtigmatizing* St. John is ſuppoſed to refer. Rev. chap. xiii. ver. 16, 17.

Theodoret is of opinion, that the Jews were forbidden to brand themſelves with *ſtigmata*, becauſe the idolaters, by that ceremony, uſed to conſecrate themſelves to their falſe gods.

Among ſome nations, *ſtigmatizing* was conſidered as a diſtinguiſhed mark of honour and nobility. In Thrace, as Herodotus tells us (lib. v.), it was practiſed by none but perſons of credit, nor admitted by any but perſons of the meaneſt rank.

The ancient Britons are alſo ſaid to have imprinted on the bodies of their infants the figures of animals, and other marks, with hot irons. Potter Arch. Græc. tom. i. p. 64, &c.

STIL *de grain*, in the *Colour Trade*, the name of a compoſition uſed for painting in oil or water, and is made of a decoction of the lycium, or Avignon berry, in alum-water, which is mixed with whiting into a paſte, and formed into twiſted ſticks. It ought to be choſen of a fine gold yellow, very fine, tender, and friable, and free from dirt.

STILAGO, in *Botany*, a genus of the *gynandria triandria* claſs. Its characters are, that it is monogynous, has a ſingle-leaved calyx, no corolla, and a globoſe berry. There is one ſpecies.

STILE, and Stilus. See Style.

STILES, in *Carpentry*, denote the upright pieces which go from the bottom to the top in any wainſcot, or the like.

STILL, is the name of an apparatus uſed in Distillation. Thus, in caſes where it is neceſſary to put to diſtillation a great quantity of materials, and where the vapour is ſo copious as would require a receiver of immenſe bigneſs to contain it, a particular contrivance is made uſe of to condenſe the vapour in its paſſage. For this end the vapour is let paſs through a contorted pipe, or worm, lodged in a veſſel filled with cold water, by the coldneſs of which, what enters the worm in vapour, runs out condenſed into a ſtream of liquor. The veſſel here uſed to hold the matter to be diſtilled is uſually made of copper, which being well tinned within, is ſufficiently ſecured from giving any tinge to thoſe kinds of ſubſtances for which this veſſel is made uſe of. This veſſel is commonly called a copper *ſtill*, and the pipe, through which the vapour paſſes, is fixed to a head, which lifts off from the body of the *ſtill*, for the convenience of putting the materials in and taking them out: the head is properly called the alembic. Theſe are the veſſels uſed by the diſtillers in drawing their ſpirits. In ſmall *ſtills* of this kind, a more compendious method is made uſe of for condenſing the vapour, which is by including the head itſelf in a veſſel of water.

There is alſo another method of performing the operations, for which theſe inſtruments are commonly uſed; which is by what is called the cold *ſtill*, becauſe here a much leſs heat is uſed. The material to be diſtilled is laid on a copper or iron plate, firſt covered over an inch thick with ſand or aſhes, or put into a leaden pot ſet upon ſuch a plate. Over this is placed a conical head to receive the aſcending vapour, which by a hole fixed in this head deſcends into a receiver. The fire muſt be kept very low, that the vapour may riſe ſo ſlowly and ſo cool, as not much to heat the head, which receives it, that it may condenſe without any help, except, perhaps, in ſome caſes by laying a wet cloth upon the head of the *ſtill*. See Alembic, Retort, Worm, &c.

Dr. Lewis has contrived a *ſtill*, adapted to his *portable* furnaces, which is ſufficient for the purpoſes of an experimental laboratory. The body of the *ſtill* is a wide copper pan; and, for diſtillation in a water-bath, another veſſel of the ſame figure is received into it almoſt to the top, the ſpace between them being nearly filled with water. Both theſe veſſels are of the ſame width at the mouth, and either may be uſed as a *ſtill* equally with the other: either of them ſerves alſo, on other occaſions, as an evaporating pan, a boiler for experiments in dying, and other like purpoſes.

All the parts are made of thin copper plate, and well tinned on the inſide with pure tin; in conſequence of their thinneſs, they admit of ſome alteration of their figure about the edges, ſo that though they ſhould not be perfectly round, they are readily accommodated to one another, and fit cloſe: the juncture is eaſily made perfectly tight by applying round it narrow ſlips of moiſtened bladder, which are more convenient than luting, as being readily ſtripped off when the operation is finiſhed. A ſhort pewter pipe, with a pewter ſtopper fitted to it, for returning the diſtilled liquor, or pouring freſh liquor occaſionally into the *ſtill*, without the trouble of unluting and ſeparating the veſſels, is ſoldered into the top of the head, which, in theſe kinds of inſtruments, is the moſt convenient place for it. For ſeparating, by diſtillation, ſpirituous from watery liquors, or the rectification of ſpirit of wine, the head is raiſed, by inſerting between it and the breaſt, a thin copper pipe about two feet long. A worm and refrigeratory are neceſſary, as for the common *ſtill*; and a glaſs head is requiſite for ſome uſes, particularly for the diſtillation of vinegar, and ſuch other liquors as would corrode a copper one, and impregnate themſelves with the metal; in which caſe the uſe of the metalline worm alſo is to be avoided, and the glaſs or ſtone-ware receiver joined to the pipe of the head. Lewis's Com. of Arts, p. 9, 10.

STILL-*bottoms*, in the *Diſtillery*, a name given by the traders to what remains in the *ſtill* after the working the waſh into low wines.

Theſe *bottoms* are procured in the greateſt quantity from the malt waſh, and are of ſo much value to the diſtiller in the fattening of hogs, &c. that he often finds them one of the moſt valuable articles of the buſineſs. They might alſo be put to other uſes, ſuch as the affording a large proportion of an acid ſpirit, an oil, a fuel, and a fixed ſalt; and with ſome addreſs, and good management, a vinegar and a tartar. Another very advantageous uſe of them, is the adding them to the next brewing of the malt for more ſpirit: the increaſe of the produce from this is more than could eaſily be conceived. It alſo more readily diſpoſes the new waſh to ferment, and gives the ſpirit a vinoſity that it cannot have without it; the proportion in this caſe, can never exceed that of a fifth or ſixth part of the whole quantity of the liquor employed.

The liquor left behind in the *ſtill*, after the rectifying the low wines into proof ſpirit, is alſo called by ſome by the name of *ſtill-bottoms*; but this is little more than mere phlegm, or water impregnated with a few acid, and ſome oily parts, not worth ſeparating, unleſs for curioſity. The liquor left in the *ſtill*, after the rectifying the proof ſpirit into alcohol, is alſo of the ſame kind.

The *bottoms* of melaſſes ſpirits ſeem calculated for many uſes. It is very probable that the vinegar-makers would find their account in trying them, and the ſtrong and laſting yellow colour with which they tinge the hands may recommend them to the dyers. A ſmall proportion of them added to the new treacle to be fermented, greatly promotes the operation, and increaſes the quantity of ſpirit.

The *bottoms* of the wine ſpirit, that is the remainder after diſtilling the ſpirituous part from damaged wines, or wine lees, may be brought to afford Mr. Boyle's acid ſpirit of wine, and that ſubſtance, called by Becher, the *media ſubſtantia vini*. A parcel of tartar may alſo be procured in very great perfection; and the laſt remainder may be converted into excellent aud genuine ſalt of tartar. The liquor may otherwiſe be ſerviceable in making vinegar and white lead. Shaw's Eſſay on Diſtillery.

STILL-*houſe*. The Dutch have much the advantage of us in the ſtructure of their *ſtill-houſes*, and have every thing in great readineſs and neatneſs. The general rules in building theſe houſes ſhould be theſe.

The firſt caution is to lay the floor aſlope, not flat, where any wet work is to be performed; it ſhould alſo be well flagged with broad ſtones, ſo that no wet be detained in the crevices, but all may run off, and be let out at the drains made at the bottom and ſides.

The *ſtills* ſhould be placed abreaſt on that ſide of the *ſtill-houſe* to which the floor has its current. The largeſt *ſtills* in Holland, for their greateſt works, are never of that monſtrous ſize that we ſee them of in England, but much more manageable and convenient, as ſeldom containing more than ſix or eight hogſheads; and with ſuch *ſtills*, a ſingle hand will perform much more buſineſs than with one of a much larger ſize. Fronting the *ſtills*, and adjoining to the back wall, ſhould be a ſtage for holding the fermenting backs, and theſe being placed at a proper height, may empty themſelves, by means of a cock and a canal, into the *ſtills*, which are thus charged with very little trouble.

Near this ſet of fermenting backs ſhould be placed a pump or two, that may readily ſupply them with water by means of a trunk or canal, leading to each back. Under the pavement adjoining to the *ſtills*, ſhould be a kind of cellar, wherein to lodge the receivers, each of which ſhould be furniſhed with its pump, to raiſe the low wines into the *ſtill* for rectification; and through this cellar the refuſe waſh, or *ſtill*-bottoms, ſhould be diſcharged by means of a hoſe, or other contrivance. Theſe are the principal things to be regarded in the erecting a *ſtill-houſe* for the original production of ſpirits; and if theſe rules are well obſerved, malt-ſpirit will be made with little more trouble than melaſſes; for by this means the buſineſs of brewing and cooling the waſh, which, according to the method generally practiſed in England, takes up ſo much time and trouble, is entirely ſaved, fermentation is carried on to a much greater advantage, and the quantity of ſpirit increaſed. Shaw's Eſſay on Diſtillery.

STILLATITIOUS *oils*, are ſuch as are procured by diſtillation,—in oppoſition to thoſe got by infuſion, expreſſion, &c.

STILLATORY. See STILL-*houſe*.

STILLINGIA, in *Botany*, a genus of the *monoecia adelphia* claſs. The characters are, that it has male and female flowers; the calyx of the male is hemiſpheric, and multiflorous, and the corolla tubulous and eroſe, or gnawed; the calyx of the female is ſingle-flowered and inferior, the corolla ſuperior, the ſtyle trifid, and the capſule conſiſting of five berries. There is one ſpecies.

STILLYARD, STILYARD, or STEELYARD, in *Commerce*. *The company of the* STILLYARD was a community, or corporation of foreign merchants, eſtabliſhed at London; thus called from the place where they had their reſidence, called the *Stillyard*, near London bridge, which was aſſigned them by act of parliament; and which, in ſome records, is called *Guilhalda Teutonicorum*; being, as ſome write, a broad place or yard, where much ſteel had been uſed to be ſold.

Lambecius thinks, that the name of *Steelyard*, or as he calls it *Staelhof*, is only a contraction of *Staplehof*, whence comes *ſtafelhoff*, i. e. a place or general warehouſe for keeping merchandize.

This company was created, as ſome ſay, in the year 1215, but, according to others, in 1232, under Henry III. in favour of the free cities of Germany, which had been aſſiſtant to him in his wars againſt France.

However, it is ſaid, that foreign merchants, under this appellation, were fixed at London as early as the Norman Conqueſt, and that their privileges were conſiderably enlarged by Hen. III. at this time, and alſo in 1260. King Ed. I. in 1280, granted a charter to the *Steelyard* merchants, and to them it belonged to guard and keep in repair the gate called Biſhopſgate, in London. The charter of Edward I. was confirmed by Henry V. in 1413; and in 1463, Edward IV. granted them a new charter, which was renewed in 1466. Their privileges were confirmed by ſtat. 19 Hen. VII. cap. 23.

It had rendered itſelf miſtreſs of all the Engliſh manufactories, particularly thoſe of cloth, which it was allowed not only to ſell throughout the kingdom, but alſo to tranſport abroad.

The prejudice theſe privileges did, and by which the company frequently abuſed the nation, occaſioned their being revoked by Edward VI. in 1552: they were reſtored by queen Mary in 1554, and ſoon after revoked. In the year 1578, their ancient immunities were totally and finally abrogated by queen Elizabeth; and in 1597, their houſe, which in former times had ſerved as a bank for our princes in their exigence, was ſhut up, and its German inhabitants ſent away.

STILOBATUM, in *Architecture*, denotes the body of the PEDESTAL of any column.

STIMULATING, STIMULANS, a property in angular or ſharp bodies, whereby they vellicate, and cauſe vibrations and inflections of the fibres of the nerves, and a greater derivation of nervous fluid into the parts affected.

Stimulants produce pain, heat, redneſs, &c. They may be reduced to violent penetrating depilatories, gentle ſinapiſms, veſicatories, and cauſtics. See SINAPISM, VESICATORY, &c.

STING, *aculeus*, an apparatus in the body of certain inſects, in form of a little ſpear, ſerving them as a weapon of offence.

The *ſting* of a bee, or waſp, is a curious piece of mechaniſm; it conſiſts of a hollow tube, at the root whereof is a bag full of ſharp penetrating juice, which, in ſtinging, is injected into the fleſh through the tube.

Within the tube, Dr. Derham has obſerved, there lie two ſmall ſharp bearded ſpears: in the ſting of a waſp, he told eight beards on the ſide of each ſpear, ſomewhat like the beards of fiſh hooks. See *Tab. Nat. Hiſt. fig.* 16 and 17.

One of theſe ſpears in the *ſting*, or ſheath, lies with its point a little before the other, to be ready, as ſhould ſeem, to be firſt darted into the fleſh, which once fixed, by means of its foremoſt beard, the other then ſtrikes in too; and ſo they alternately pierce deeper and deeper, their beards taking more and more hold in the fleſh: after which the ſheath or *ſting* follows, to convey the poiſon into the wound, which, that it may pierce the better, is drawn into a point, with a ſmall ſlit below that point, for the ſpears to come out at.

By means of theſe beards it is, that the animal is forced to leave its *ſting* behind it, when diſturbed, before it can have time to withdraw the ſpears into their ſcabbard. See *Anatomy*, &c. of BEE.

STING *of a gnat*. See TRUNK.

STINK, or STENCH, a diſagreeable ſmell exhaling from a corrupted, or other body, and which is prejudicial to the noſe and brain.

A *ſtinking* breath is uſually the reſult either of diſeaſed lungs, or elſe of ſcorbutic gums, &c.

A *ſtinking* noſe, *fætor naris*, is the reſult of a deep ulcer within the noſe, whence ariſe fœtid ſcabs, &c. Its cauſe, according to Galen, is a ſharp putrid humour falling from the brain, on the proceſſus mamillares. This is reckoned, by the civilians, one of the legal cauſes of annulling marriage.

STINK-*horns*, in *Botany*. See PHALLUS.

STINK-*pot*, an earthen ſhell charged with powder, and other inflammable and ſuffocating materials, with a lighted fuſe at the aperture, thrown on board an enemy's ſhip in the action of boarding.

STINT, *tringa cinclus* of Linnæus, in *Ornithology*, the name of a ſmall bird common about the ſea-ſhores in many counties of England, and ſeeming to be the ſame with the *cinclus prior* of Aldrovand, and the *ſchæniclos*, or *junco* of Bellonius, called by the French *alouette de mer*, the *ſea-lark*; and by Pennant, *purre*.

It is ſomewhat ſmaller than the common lark, and in ſhape reſembles the ſmaller ſnipe. Its beak is black, ſlender, and ſtraight; its legs of a duſky green, the toes being divided to their origin; the head and hind part of the neck are aſh-coloured, marked with duſky lines; a white ſtroke divides the bill and eyes; the chin white; under ſide of the neck mottled with brown; the back is of a browniſh aſh-colour; the breaſt and belly white; the coverts of the wings and tail of dark brown, edged with light aſh-colour or white; the greater coverts duſky tipt with white; the upper part of the quill-feathers duſky, the lower white; the two middle feathers of the tail duſky, the reſt of a pale aſh-colour, edged with white.

Theſe birds come in prodigious flocks to our coaſts during the winter; in their flight they perform their evolutions with great regularity; appearing like a white or duſky cloud, as they turn their breaſts or backs towards you. They leave our ſhores in ſpring, and retire to ſome unknown place to breed. They were formerly a well known diſh at our tables, under the name of *ſtints*. Pennant.

STIP *viſch*, in *Ichthyology*, a name given by the Dutch in the Eaſt Indies to a fiſh of the claſs of our European ones which have two back-fins, the anterior of which is prickly, the hinder not ſo. Its ſkin is ſpotted, and its fleſh very delicate, and well taſted. It is generally caught by hooks. Ray.

STIPA, *feather-graſs*, or *winged ſpike-graſs*, in *Botany*, a genus of the *triandria digynia* claſs. Its characters are theſe: the calyx is uniflorous and has two valves; the corolla has a ſmall valve, terminated by a beard, and articulated at the baſe. There are eight ſpecies.

STIPEND, STIPENDIUM, among the *Romans*, ſignified the ſame with *tribute*; and hence *ſtipendarii* were the ſame with *tributarii*.

STIPITE, *nativi de* STIPITE. See NATIVI.

STIPULATION, in the *Civil Law*, the act of *ſtipulating*, that is, of treating, and concluding terms and conditions to be inſerted in a contract.

Stipulation: were anciently performed at Rome with abundance of ceremonies, the firſt whereof was, that one party ſhould interrogate, and the other anſwer, to give his conſent, and oblige himſelf.

By the ancient Roman law, nobody could *ſtipulate* but for himſelf; but as the tabelliones were public ſervants, they were allowed to *ſtipulate* for their maſters; and the notaries, ſucceeding the tabelliones, have inherited the ſame privilege. The *ſtipulation* had its origin in the *lex Aquilia*, and another law of the emperor Arcadius. See SATISDATIO.

The word is formed from the Latin *ſtipula*, a *ſtraw*, becauſe in making a ſale, a ſtraw was given the purchaſer, in ſign of a real delivery. Which cuſtom is ſtill retained in ſome parts of France, particularly at Verdun. The cuſtom always has been on this occaſion, for the two parties to break a ſtraw between them, and each take his moiety, which they afterwards joined again to recognize their promiſe.

STIRK, or STURK, a term uſed among country people for a young ox or heiſer.

STIRROP, or STIRRUP, in the *Manege*, a reſt or ſupport for the horſeman's foot, ſerving to keep him firm in his ſeat, and to enable him to mount.

The great art of a cavalier in the ancient tournaments was to make his antagoniſt loſe his *ſtirrup*.

For combating, it is a rule to have the right foot *ſtirrup*, ſomewhat ſhorter than the other.

Stirrups are allowed to be a modern invention; no mention being made of them in any ancient Latin or Greek author; no figure of them to be ſeen in any ſtatue or monument, nor any word expreſſive of them to be met with in claſſical antiquity.

Menage obſerves, that St. Jerom is the firſt author who mentions them. This paſſage, however, is not to be found in his epiſtles; and if it were there, it would prove nothing, becauſe St. Jerom lived at a time when *ſtirrups* are ſuppoſed to have been invented, and after the uſe of SADDLES. Montfaucon denies the authenticity of this paſſage; and, in order to account for the ignorance of the ancients with regard to an inſtrument ſo uſeful and ſo eaſy of invention, he obſerves, that while cloths and houſings only were laid upon the horſes backs, on which the riders were to ſit, *ſtirrups* could not have been uſed, becauſe they could not have been faſtened with the ſame ſecurity as upon a ſaddle. But it is more probable, that in this inſtance, as in many others the progreſs of human genius and invention is uncertain and ſlow, depending frequently upon accidental cauſes. Berenger's Hiſt. and Art of Horſemanſhip, vol. i. p. 65, &c.

To loſe one's *ſtirrups*, is to ſuffer them to ſlip from the foot.

The *ſtirrup-foot*, is the near, or left foot before.

Stirrup-leather, is a thong of leather deſcending from the ſaddle down by the horſe's ribs, upon which the *ſtirrups* hang.

Stirrup-bearer, called in French *porte etrier*, is an end of leather made faſt to the end of the ſaddle, to truſs up the *ſtirrup* when the rider is alighted, and the horſe ſent to the ſtable.

STIRRUP *of a ſhip*, a piece of timber put upon a ſhip's keel, when ſome of her keel happens to be beaten off, and they cannot come conveniently to put, or fit in a new piece; then they patch in a piece of timber, and bind it on with an iron, which goes under the ſhip's keel, and comes up on each ſide of the ſhip, where it is nailed ſtrongly with ſpikes; and this they call a *ſtirrup*. See HORSE.

STITCH-*wort*, a name ſometimes given to the *alſine*, or *ſtellularia* of botaniſts, otherwiſe called CHICKWEED.

STITHY, or STUTHY, is uſed either for a ſmith's anvil, or a diſeaſe in oxen, cauſing their ſkin to ſtick ſo cloſe to the ribs that they cannot ſtir.

STIVER, a Dutch coin, twenty of which make a guilder. See COIN.

STOÆ, ϛοαι, in *Antiquity*, the PORTICOS at Athens. Theſe were full of exedræ, εξεδραι, and ſide buildings, furniſhed with ſeats fit for ſtudy or diſcourſe. Here it is probable philoſophers and their ſcholars uſed to meet. See EXEDRÆ.

STOAKED, in a *Ship*. When the water in the bottom cannot come to the well of the pump, they ſay, *the ſhip is aſtoak*, or *ſtoaked*: ſo they ſay alſo, *the limber holes are ſtoaked*, when the water cannot paſs through them; and that *the pump is ſtoaked*, when ſomething is got into it which choaks it up, ſo that it will not work.

STOAT, in *Zoology*, the name uſed by many for the animal whoſe ſkin is the ermin. See ERMINEUM *animal*, and *Tab. Quadrupeds*, N° 9.

STOC *and Stovel*, in our *Old Writers*, a forfeiture where any one is taken carying *ſtipites* and *pabulum* out of the woods; for *ſtoc* ſignifies *ſticks*, and *ſtovel*, *pabulum*.

STOCK, in *Gardening*, the ſtem or trunk of a tree. What *ſtock* is moſt proper for each kind of fruit, ought as well to be conſidered and known, as what ſoil is moſt ſuitable to trees; for on theſe two things the future vigour of trees, and the goodneſs of fruit equally depend. The beſt way for thoſe who intend to plant, is to raiſe their own *ſtocks*, by which they will be better aſſured of what they do; but if they ſhould buy their trees of nurſerymen, they ſhould diligently enquire upon what *ſtocks* they were propagated.

For *ſtocks* are, in ſome meaſure, a ſort of ſoil to the kinds of trees raiſed on them; as every part of a tree, let it be ever ſo minute, forms its roots upon the parts below: thus the taſtes of fruits may be improved by proper *ſtocks* as well as by proper ſoils.

Perhaps it may be the opinion of ſome, that all juices are changed by the pores or veſſels through which they paſs, and that all trees propagated upon any *ſtocks* whatſoever, will equally produce good fruit, provided that their growth is healthful and ſtrong; but if they will give themſelves the trouble to examine this point carefully, and without prejudice, they will find as conſiderable a difference, with reſpect to fruit, between *ſtocks* as between ſoils.

Their opinion, indeed, has ſome appearance of reaſon in it; for as the apricot, almond, peach, and nectarine, are generally budded upon plum-*ſtocks*, yet bear fruit of their own kind, which ſhews that juices are changed by paſſing through a ſmall bud, and the little quantity of rind joined to it (the compaſs of both of which is ſeldom above an inch in length, and the breadth about a tenth part thereof). yet, if different juices be applied, the taſte of the fruit will be different: an inſtance of this may be given in the nonpareil, viz. if one tree of this kind be planted in a wet clay ſoil, and another in a loam properly dry, and both propagated on the ſame kind of *ſtock*, and from one and the ſame branch, they will yield fruits very different from each other, in ſize and goodneſs.

on the other hand, if two nonpareil branches are grafted, the one upon a paradiſe-*ſtock*, and the other upon a crab, and both planted in the ſame ſoil and ſituation, that upon the crab-*ſtock* will produce fruit ſo ſour and ill-taſted, in compariſon to the fruit of the other, that if a perſon ſhould taſte them both in the dark, he could not imagine them to be the ſame fruit.

A very great difference has been obſerved between the fruit of theſe trees, when one was grafted upon a paradiſe, and the other upon a codling *ſtock*; for though the juices were ſo far changed by paſſing through the buds and pores of nonpareil branches, as to produce fruit alike in ſhape, yet their taſtes were different, and ſomewhat reſembled the taſte of that fruit which the *ſtocks* would have naturally produced. The juices of the crab and codling are known to be very acid, but the juice of the natural fruit of the paradiſe is ſweet. Hill on Fruit Trees, chap. xii.

They that intend to buy their trees, ſhould chuſe ſuch (after the *ſtocks* and kinds are known) as ſtand not too cloſe in the nurſery; for if they do, their ſhoots will be long-jointed, tender, and ſpungy; beſides, their buds will be very weak, eſpecially the loweſt, and will be long kept back from a bearing ſtate, by having deprived each other of the ſun's rays, of which no trees can have too much in a nurſery; for they attract and carry off a great quantity of watery particles from them and the earth about them, when planted at proper diſtances; which, when they are not, prove very prejudicial to them: and if weeds have been ſuffered to grow among dwarfs, it will be as bad or worſe than if the *ſtocks* themſelves had ſtood too near each other. In ſhort, the roots of all trees are much hurt by the weeds, which keep off the ſun's rays from warming the ſoil, and encouraging the proper growth of the trees.

It need not be much regarded from what kind of ſoil you take your trees, provided they have the following marks of health, viz. if their ſhoots at the extremities be very full of buds, and are plump, without any appearance of mildew or blight, and all their parts free from canker, gum, and moſs; for all theſe are ſymptoms of defects in the roots. And though planting them in proper ſoils may reſtore them in time, yet it will not be prudent to chuſe ſuch trees, as there will be more time loſt in their bearing than if they were at firſt free from ſuch imperfections. Idem, chap. xx.

In the choice of young *ſtocks* for grafting, ſays Mr. Miller, you ſhould always prefer ſuch as have been raiſed from the ſeed, and that have been once or twice tranſplanted. Next to theſe are thoſe *ſtocks* which have been raiſed from cuttings or layers, but thoſe which are ſuckers from roots of other trees, ſhould always be rejected; for theſe are never ſo well rooted as the others, and conſtantly put out a great number of ſuckers from their root, whereby the borders and walks of the garden will be always incommoded by them during the ſummer ſeaſon. If theſe *ſtocks* have been allowed a proper diſtance in the nurſery where they have grown, the wood will be better ripened, and more compact than thoſe which have grown cloſe, and have been thereby drawn up to a greater height: the wood of theſe will be ſoft and their veſſels large, ſo that the cions grafted into them will ſhoot very ſtrong: but they will be leſs diſpoſed to produce fruit than the other; and when trees acquire an ill habit at firſt, it will be very difficult to reclaim them afterward

As for old trees which are already growing in the places where they are to remain, whoſe fruit is intended to be changed, there is no other choice but that of the branches, which ſhould be ſuch as are young, healthy, well ſituated, and have a ſmooth bark. If theſe trees are growing againſt walls or eſpaliers, it will be proper to graft ſix, eight, or ten branches, according to the ſize of the trees, by which method they will be much ſooner furniſhed with branches again, than when a leſs number of cions are put in; but in ſtandard trees, four, or at moſt ſix cions, will be ſufficient. Miller's Gard. Dict. art. *Grafting*. See ENGRAFTING, FRUIT-*trees*, and GRAFT.

Stock, *brokers*. See BROKER.

Stock, *capital*. See CAPITAL.

Stock, *pen*. See PEN *ſtock*.

Stock-*fiſh*, in the *Fiſh Trade*, a name given to the common COD-*fiſh* when cured in a particular manner, which makes it neceſſary to beat it with ſticks before it is fit for dreſſing.

The commerce for *ſtock-fiſh* is very conſiderable in Holland, both from the great conſumption thereof in the country, and from their victualling their veſſels therewith. See *Cod* FISHERY.

Stock-*gilly-flower*, and WALL-*flower*, *cheiranthus*, in *Botany*, a genus of the *tetradynamia ſiliquoſa* claſs. Its characters are theſe; it hath a four-leaved compreſſed empalement; the two outer leaves are ſwelling at their baſe: the flower hath four petals in form of a croſs, which are longer than the empalement: it hath ſix parallel ſtamina, two of which are between the ſwelling leaves of the empalement, the other are a little ſhorter, and are terminated by erect bifid ſummits, reflexed at the top; it hath a four-cornered priſmatic germen, ſupporting a very ſhort compreſſed ſtyle, crowned with an oblong divided ſtigma, which is reflected and permanent; the germen afterward becomes a long compreſſed pod with two cells, opening with two valves, filled with compreſſed ſeeds. Miller enumerates fifteen, and Linnæus ſeventeen ſpecies.

The *ſtock*-gilly flowers are diſtinguiſhed from the wall-flowers by their hoary leaves. Thoſe of the latter ſort, with ſingle flowers, produce ſeed in plenty, from which the plants are raiſed; but the largeſt and deepeſt coloured flowers ſhould always be ſelected for ſeeds, which ſhould be ſown in April, upon poor or undunged ſoil; and when they are fit to be removed, they ſhould be tranſplanted into nurſery-beds, at about ſix inches diſtance every way, and watered and ſhaded till they have taken root. Till Michaelmas they need only be kept clean from weeds, and then tranſplanted into the borders of the flower garden, that they may get good roots before the froſt comes on. However, if the ſeeds are ſown upon poor land, where they are deſigned to remain, and not tranſplanted, they will thrive and endure the froſt of winter better than thoſe which are removed. Upon ruins and rubbiſh, theſe plants if properly diſpoſed, will be very ornamental, and their flowers, having a ſtrong odour, perfume the air to a conſiderable diſtance. Thoſe with double flowers may be propagated by ſlips planted in the ſpring; but the large bloody wall-flower will frequently riſe with double flowers from ſeeds, carefully ſaved from ſuch plants as have five petals, and produce larger ſpikes of flowers than thoſe that are propagated by ſlips.

The ten weeks *ſtock*, formerly called the annual *ſtock*-gilly-flowers, may be raiſed from ſeeds ſown at two or three different times; and thus the flowers may be continued in ſucceſſion near three months. The firſt ſowing ſhould be about the middle of February, upon a very ſlender hot-bed, guarded againſt froſt; and when they are fit for removal, be tranſplanted into nurſery-beds, at about three or four inches diſtance, watering and ſhading them till they have taken root, and afterwards keeping them clean from weeds: after remaining in theſe beds about ſix or ſeven weeks, they may be planted in the borders of the flower garden where they are to remain. There ſhould be another parcel ſown in March to ſucceed the former; and again a freſh parcel towards the latter end of May; and if theſe laſt are planted upon a warm border, where they may be covered with glaſſes or mats, they may be continued in flower till Chriſtmas; and with proper management, by putting them in pots, and placing them under a hot-bed frame in autumn, where they may enjoy the open air in mild weather, and be ſecured from hard rains and froſt, they may be kept flowering all the winter, if it be not ſevere.

There are ſome who propagate the double *ſtock-gilly*-flowers by ſlips and cuttings, which will take root when properly managed; but the plants ſo raiſed are never ſo ſtrong as thoſe which proceed from ſeeds, and their ſpikes of flowers are ſhort, and conſequently not ſo beautiful.

The queen's, Brompton, and white *ſtock-gilly*-flowers, and the white wall-flower, all which are biennial, may be raiſed from ſeeds, ſown about the beginning of May in ground that has no dung; in a dry ſeaſon the beds ſhould be ſhaded with mats every day, but the covering ſhould be removed every evening to admit the the dews of night; and they ſhould be gently watered in the evening two or three times a week. To prevent their being injured by flies, when they firſt appear with their two ſeed-leaves, the covering ſhould be continued over them during the heat of the day, and the plants frequently refreſhed with water, that they may be kept in a growing ſtate. When the plants have acquired ſtrength, they will require no other care beſides being kept clear from weeds, and being thinned to the diſtance of nine inches or a foot. Miller.

Stock-*gilly-flower*, *dwarf*. See *Dame's* VIOLET.

STOCKER, in *Ichthyology*, a name given by the Germans to the *ſaurus* of the ancients, the *trachurus* of the later writers. It is a ſpecies of the *ſcomber*, known among us under the name of the *horſe*-MACKREL.

STOCKING, that part of the cloathing of the leg and foot which immediately covers and ſcreens them from the rigour of the cold.

Anciently, the only *ſtockings* in uſe were made of cloth, or of milled ſtuffs ſewed together; but ſince the invention

tion of knitting and weaving *ſtockings* of ſilk, wool, cotton, thread, &c. the uſe of cloth *ſtockings* is quite diſcontinued.

Dr. Howel, in his Hiſtory of the World (vol. ii. p. 222.) relates, that queen Elizabeth, in 1561, was preſented with a pair of black knit ſilk *ſtockings*, by her ſilk-woman, and thenceforth ſhe never wore cloth ones any more. The ſame author adds, that king Henry VIII. ordinarily wore cloth hoſe, except there came from Spain, by great chance, a pair of ſilk *ſtockings*. His ſon, king Edward VI. was preſented with a pair of long Spaniſh ſilk *ſtockings* by ſir Thomas Greſham, and the preſent was then much taken notice of. Hence it ſhould ſeem, that the invention of knit ſilk *ſtockings* originally came from Spain.

Others relate, that one William Rider, an apprentice on London bridge, ſeeing at the houſe of an Italian merchant a pair of knit worſted *ſtockings*, from Mantua, took the hint, and made a pair exactly like them, which he preſented to William, earl of Pembroke, and that they were the firſt of that kind worn in England, anno 1564. Anderſon's Hiſt. Com. vol. i. p. 400.

The modern *ſtockings*, whether woven or knit, are a kind of plexuſes formed of an infinite number of little knots, called *ſtitches*, *loops*, or *maſhes*, intermingled in one another.

Stockings, *knit*, are wrought with needles made of poliſhed iron, or braſs wire, which interweave the threads, and form the maſhes the *ſtocking* conſiſts of.

This operation is called *knitting*; the invention whereof it is difficult to fix preciſely, though it has been uſually attributed to the Scots, on this ground, that the firſt works of this kind came from Scotland. It is added, that it was on this account, that the company of *ſtocking*-knitters, eſtabliſhed at Paris, 1527, took for their patron St. Fiacre, who is ſaid to have been the ſon of a king of Scotland: however, it is moſt probable, that the method of knitting *ſtockings* by wires, or needles, was firſt brought from Spain.

Stockings, *woven*, are ordinarily very fine; they are manufactured on the frame or machine made of poliſhed iron, the ſtructure whereof is exceedingly ingenious, but withal exceedingly complex; ſo that it were very difficult to deſcribe it well, by reaſon of the diverſity and number of its parts; nor is it even conceived, without much difficulty, when working before the face.

The Engliſh and French have greatly conteſted the honour of the invention of the *ſtocking-loom*; but the matter of fact, ſays Mr. Chambers, after M. Savary, in his Dictionary of Commerce, waving all national prejudices, ſeems to be this, that it was a Frenchman who firſt invented this uſeful and ſurpriſing machine; and who, finding ſome difficulties in procuring an excluſive privilege, which he required, to ſettle himſelf at Paris, went over into England, where his machine was admired, and the workman rewarded according to his merit.

The invention thus imparted to the Engliſh, they became ſo jealous hereof, that for a long time it was forbid, under pain of death, to carry any of the machines out of the iſland, or communicate a model thereof to foreigners. But as it was a Frenchman firſt enriched our nation with it, ſo a Frenchman firſt carried it abroad; and, by an extraordinary effort of memory and imagination, made a loom at Paris, on the idea he had formed thereof in a voyage he had made to England. This loom, firſt ſet up in the year 1656, has ſerved for the model of all thoſe ſince made in France, Holland, &c.

But this account of the original inventor of the *ſtocking-frame* ſeems to be erroneous, as it is now generally acknowledged, that it was invented in the year 1589, by William Lee, M. A. of St. John's college, in Cambridge, a native of Woodborough, near Nottingham. Soon after he had completed the frame, he applied to queen Elizabeth for protection and encouragement, but his petition was rejected. Deſpairing of ſucceſs at home he went to France, under a promiſe of being patronized and recompenſed by Henry IV. and with nine of his ſervants, ſettled at Roan in Normandy. But Mr. Lee, diſappointed by the ſudden murder of the French monarch of the reward which he had reaſon to expect, died of a broken heart at Paris. After his death ſeven of his workmen returned with their frames to England, and in conjunction with one Aſton, who had been apprentice to Mr. Lee, and who had made ſome improvements in his maſter's invention, laid the foundation of this manufacture in England.

In the ſpace of fifty years the art was ſo improved, and the number of workmen ſo much increaſed, that they petitioned the protector to conſtitute them a body corporate, but their requeſt was refuſed. King Charles II. in 1663, granted them a charter, extending their juriſdiction to ten miles round London. See Company.

Such is the account given of this invention by Dr. Deering in his Hiſt. of Nottingham, p. 100, who has alſo deſcribed the *ſtocking-frame*, and exhibited ſeveral figures of this machine, and of the numerous parts of which it conſiſts.

Mr. Lee's invention, about twenty-eight years after we had firſt learned from Spain the method of knitting them by wires and needles, has proved a very conſiderable benefit to the *ſtocking* manufacture, by enabling England in after times to export vaſt quantities of *ſilk ſtockings* to Italy, &c. where, it ſeems, ſays Anderſon (Hiſt. Com. vol. i. p. 435.) by ſir Joſiah Child's excellent Diſcourſes on Trade, firſt publiſhed in 1670, they had not then got the uſe of the *ſtocking-frame*, though not much leſs than one hundred years after its invention. Yet Dr. Howell, in his Hiſtory of the World (vol. ii. p. 222.) makes this invention eleven years later, viz. anno. 1600; and adds, that Mr. Lee not only taught this art in England and France, but his ſervants did the ſame in Spain, Venice, and in Ireland.

A late writer in the Bibliotheca Topographia Britannica, N° 7, ſays, that Mr. Lee, after ſome years reſidence in France, received an invitation to return to England, which he accepted, and that thus the art of frame-work knitting become famous in this country. This account of the invention, he adds, is moſt generally received, though it has alſo been attributed to a Mr. Robinſon, curate of Thurcaſton, in Leiceſterſhire. The firſt frame, we are told, was brought into Hinckley, before the year 1640, by William Iliffe; and now the manufacture of this town is ſo extenſive, that a larger quantity of hoſe, of low price, in cotton, thread, and worſted, is ſuppoſed to be made there than in any town in England. The manufacture now employs about two thouſand five hundred and eighty-five working people; the number of frames is computed at about one thouſand, and there are alſo about two hundred in the neighbouring villages.

The editor is informed, that about the year 1756, Meſſrs. Jedidiah Strut and William Woollatt of Derby, invented a machine, by which, when annexed to the *ſtocking frame*, the turned ribbed *ſtockings* are made the ſame with thoſe made upon the common knitting-pins. Theſe, together with the manner of making the open-work mills, in imitation of the French mills, a curious ſort of lace for caps, aprons, and handkerchiefs, as well as a great variety of figured goods for waiſtcoats, &c. have ſprung from the ſame machine, and form a conſiderable additional branch of the *ſtocking* trade.

Stockings, *fulling of*. See Fulling.

STOCK-*jobbing*, denotes the practice of trafficking in the public funds, or of buying and ſelling *ſtock* with a view to its riſe and fall. The term is commonly applied to the illegal practice of buying and ſelling *ſtock* for time, or of accounting for the differences in the riſe or fall of any particular *ſtock* for a ſtipulated time, whether the buyer or ſeller be poſſeſſed of any ſuch real *ſtock* or not. See *Stock*-Broker.

STOCKS, *cippus*, a wooden machine to put the legs of offenders in, for the ſecuring of diſorderly perſons, and by the way of puniſhment in divers caſes ordained by ſtatute, &c. And it is ſaid that every vill within the precinct of a torn, is indictable for not having a pair of *ſtocks*, and ſhall forfeit 5*l*.

Stocks, in *Ship Carpentry*, a frame erected on the ſhore of a river or harbour, on which to build ſhipping. It generally conſiſts of a number of wooden blocks, ranged parallel to each other, at convenient diſtances, and with a gradual declivity towards the water. See Launch.

Hence we ſay, *a ſhip is on the ſtocks*, when ſhe is building.

STOEBE, *baſtard Æthiopian elichryſum*, in *Botany*, a genus of the *ſyngeneſia polygamia ſegregata* claſs. Its characters are, that the flower is compoſed of many hermaphrodite florets, which are included in one common empalement, whoſe ſcales are awl-ſhaped and permanent; between each ſcale is ſituated one floret, whoſe empalement is compoſed of five narrow acute leaves, which are equal and erect; the florets are funnel-ſhaped, of one petal cut into five points at the brim, ſpread open; they have five ſhort hair-like ſtamina, terminated by cylindrical ſummits with five indentures, and an oblong germen, ſupporting a ſlender ſtyle, crowned by a bifid acute ſtigma; the germen afterward becomes a ſingle ſeed, crowned with a long feathery down, ſitting in the common empalement. There is one ſpecies.

STOECHAS, in *Botany*. See Cassidony.

STOICAL *fate*. See Fate.

STOICISM, the doctrines and opinions of Zeno's followers, called *Stoics*.

STOICS, a ſect of ancient philoſophers, the followers of Zeno; thus called from the Greek ϛοα, *portico*, in regard Zeno uſed to teach under a portico or piazza.

The author of this ſect, Zeno, was of Cittium, a town in Cyprus, inhabited by a colony of Phœnicians, whence he is ſuppoſed to have borrowed many of his dogmata from Phœnician philoſophy, which many learned men maintain was, itſelf, borrowed from the Jewiſh: though it muſt be allowed, there appear as many things in the *Stoic* philoſophy, borrowed from Plato's and Socrates's ſchool, as from that of Moſes.

Zeno making a trading voyage from Cittium to Athens, richly freighted with Tyrian purple, was ſhipwrecked not far from port; upon which, we are told, conſulting the oracle how he ſhould beſt ſpend the reſt of his life, he was anſwered, *ει ζυγχρωτιζοιτο τοις νεκροις, by becoming of the ſame colour with the dead*; upon which he applied himſelf to the ſtudy of the ancient philoſophers, and became a hearer of Crates, the Cynic. But Laertius tells us, he had too much natural modeſty to ſuffer him to give into the Cynic impudence.

From Crates he had recourſe to Stilpon and Xenocrates, then to Diodorus Cronus and Polemon, and at length began to think of inſtituting a new ſect. To this purpoſe a *στοα, portico*, called from the pictures of Polignotus therein the *painted portico*, was pitched on.

Here, uſing to walk and philoſophize, he was ſoon attended by a great number of diſciples, hence called *Στωικοι, Stoics*.

He became exceedingly reverenced at Athens, for the probity and ſeverity of his life and manners, and the conſiſtency thereof with his doctrine; inſomuch that the Athenians decreed him, when living, a golden crown, and uſed in dubious times to depoſit the keys of the city with him; and, after his death, they conſecrated an altar to him.

One of his chief followers was Cleanthes, who was ſucceeded by Chryſippus, and he by Diogenes Babylonius, Antipater, Panætius, and Poſidonius, among the Greeks; and by Cato, Varro, Cicero, Seneca, the emperor Antoninus, &c. among the Romans; and by Pantenus and Clemens Alexandrinus, among the Chriſtians. And the chief reſtorers of the *Stoic* philoſophy among the moderns were Juſtus Lipſius, Scioppius, Heinſius, and Gataker.

The *Stoics* cultivated logics, phyſics, metaphyſics, &c. but chiefly ethics. The principal of the dogmata of the former kinds are as follow:

That there are certain *καταληψεις, comprehenſions* (which others call *κοιναι εννοιαι, common notices*, or *innate ideas*, or *principles*, and Cicero, *inchoatæ intelligentiæ, beginnings of underſtanding)*, naturally found in the mind: that God is the ſeminal cauſe of the univerſe; that the world is an animal; which opinion the *Stoics* maintained in common with the Platoniſts, by reaſon of God's inhabiting and informing every part thereof, in quality of an ANIMA *mundi*: that nature is an artificial fire, tending to generation; and that the world is to be deſtroyed at laſt by a conflagration.

As for the morality of the *Stoics*, it was couched much in paradoxes: as, that a wiſe man is void of all paſſion or perturbation of mind: that pain is no real evil; but that a wiſe man is happy in the midſt of the ſevereſt torture: that a wiſe man is always the ſame, and always joyful: that none but a wiſe man is free; all others are ſlaves: that none but a wiſe man is rich: that none but a wiſe man ought to be eſteemed a king, magiſtrate, poet, or philoſopher: that all wiſe men are great: that all things are a wiſe man's, who is contented with himſelf: that wiſe men are the only friends, and the only lovers: that nothing ever happens to a wiſe man beyond expectation: that all virtues are inviolably connected together: that all good things are equal, and equally to be deſired; and that goodneſs admits of no increaſe or diminution.

Whether virtue might be loſt or no, was warmly diſputed among them? Chryſippus held it might, and by drunkenneſs and atra bilis; Cleanthes, that it could not, by reaſon of the firmneſs of the *καταληψεις, comprehenſions*.

They owned but one God, whom, however, they called by various names, as *Mind*, *Fate*, *Jupiter*, &c. by which they did not mean various things; but various powers and relations of the ſame things. Providence they expreſſed under the name of FATE, which Chryſippus defines to be a natural ſeries or compoſition of things mutually following each other by an immutable nexus, or tie, fixed from all eternity; and which ſome have ſuppoſed to be different from what is now called abſolute fatality, and not altogether inconſiſtent with free agency.

Laſtly, they held that the human ſoul ſurvived the body.

STOLE, STOLA, from στολη, ſignifying a *long robe*, or *veſtment*, a ſacerdotal ornament, worn by the Romiſh pariſh-prieſts over their ſurplice, as a mark of ſuperiority in their reſpective churches.

The *ſtole* is worn by other prieſts over the alb, at celebrating of maſs; in which caſe it goes acroſs the ſtomach; and by deacons over the left ſhoulder, ſcarf-wiſe.

The *ſtola* is a broad ſwath, or ſlip of cloth or ſtuff, hanging from the neck to the feet, with three croſſes thereon. The biſhops anciently pretended, that the pariſh-prieſts were never to appear before them but in their *ſtoles*. In Flanders and Italy they always preach in *ſtoles*. It is ſuppoſed to be a repreſentation of the borders of the long robe worn by the Jewiſh high-prieſts.

The *ſtola* of the ancient Romans, &c. was very different from that now in uſe; the former was a kind of robe fitter for women than men, though it was held a robe of honour among all nations. Kings themſelves ſometimes uſed it, and ſometimes beſtowed it as a reward of virtue.

STOLE, *groom of the*, the eldeſt lord of his majeſty's BED-*chamber*, whoſe office and honour is to preſent and put on his majeſty's firſt garment or ſhirt every morning; and to order the things in the chamber.

STOLE, *order of the*, an order of knights inſtituted by the kings of Arragon; though, as to the particular author or time of the inſtitution, we are in the dark. The firſt time we hear of it is under Alphonſus V. who mounted the throne in 1416. Juſtiniani takes it to have been inſtituted about the year 1332.

STOLE, *order of the golden*, a military order at Venice, thus called from a golden *ſtole*, which the knights wore over their left ſhoulder, reaching down to the knee, both before and behind, a palm and a half broad. None are raiſed to this order but the patricians, or noble Venetians. Juſtiniani obſerves, that the time of the inſtitution of this order is unknown.

STOMACACE, a word uſed by ſome authors to expreſs a ſymptom of the ſcurvy, which is a fœtor of the mouth, with a ſoreneſs and bleeding of the gums.

STOMACH, *στομαχος, ventriculus*, in *Anatomy*, a hollow, membranous, organical part of an animal, deſtined to receive the food after deglutition, and to convert it into chyle. See *Tab. Anat. (Splanch.) fig.* 2. *litt. d. d. h.*

Its form is oblong, incurvated, large, and capacious at one end, and ſmall and contracted at the other, compared by ſome to a gourd, by others to a bag-pipe. It is ſituated partly in the left hypochondrium, and partly in the epigaſtrium.

It lies tranſverſely, obliquely, and almoſt laterally, in ſuch a manner, as that the great extremity, and the orifice next to it, are on the left hand, and the ſmall extremity with its orifice or the pylorus on the right hand, and lower, or more inclined than the former. Therefore we ought, with the ancient anatomiſts, to call one of theſe orifices ſuperior, the other inferior. The great extremity of the *ſtomach* is in the left hypochondrium, and for the moſt part immediately under the diaphragm; yet the ſuperior orifice is not in the left hypochondrium, but almoſt oppoſite to, and very near the middle of the bodies of the loweſt vertebræ of the back. The ſmall extremity of the *ſtomach* does not reach to the right hypochondrium. It bends obliquely backward toward the upper orifice, ſo that the pylorus lies about two fingers breadth from the body of the vertebræ, immediately under the ſmall portion of the liver, and conſequently lower down, and more forward than the other orifice by almoſt the ſame diſtance. This extremity of the *ſtomach* has ſometimes a particular dilatation on the ſide next the great curvature.

According to the natural ſituation, the *ſtomach*, eſpecially when full, lies ſo as that the great curvature is turned more forward than downward, and the ſmall curvature more backward than upward. One of the lateral convex ſides is turned upward, the other downward; and not forward and backward as they appear in dead bodies, where the inteſtines do not ſupport them in their natural ſituation. If we divide the *ſtomach* along the two curvatures into two equal parts, we ſhall ſee that the two orifices do not both adhere to the ſame half of this diviſion, as we would be apt to imagine according to the common notion; but that the diaphragmatic orifice is intirely in the upper half, and the inteſtinal orifice in the lower half. Therefore the body of the *ſtomach* is ſo far from lying in the ſame plane with the œſophagus, as it is commonly repreſented in figures drawn from a *ſtomach* taken out of a body and laid on a table, that it forms an angle or fold, immediately at the paſſage of the œſophagus through the ſmall muſcle of the diaphragm; and it is on account of this angle that the ſuperior orifice is turned backward. Winſlow.

The *ſtomach* has two orifices, one at each end. The left orifice is properly called *στομαχος*, from *στομα, mouth*; and alſo *καρδια*: this is joined to the œſophagus, of which it ſeems to be only a continuation. By this orifice, the aliments enter the *ſtomach*, where being digeſted, they aſcend obliquely to the pylorus, or right orifice, which is united to the firſt of the inteſtines. See *Tab. Anat. (Splanch.) fig.* 2. *lit.* 6.

The *ſtomach* conſiſts of four membranes or coats; the firſt and inmoſt (called *villoſa*, becauſe when it ſwims in clear water, ſome have imagined they ſaw ſomething in it like the pile of velvet) is formed of ſhort fibres, which ſtand perpendicularly upon the fibres of the next coat, and are to be ſeen plainly towards the pylorus; when the *ſtomach* is diſtended with meat, theſe fibres become thick and ſhort. Whilſt they endeavour to reſtore themſelves by their natural elaſticity, they contract the cavity of the *ſtomach* for the attrition and expulſion of the aliments. This coat is much larger than the reſt, being full of plaits and wrinkles, and that chiefly about the pylorus: theſe plaits retard the chyle, that it runs not out of the *ſtomach* before it be ſufficiently digeſted. In this coat there are alſo a great number of ſmall glands, which ſeparate a liquor, which beſmears all the cavity of the *ſtomach*, and helps the concoction of the aliments; for which reaſon this coat is called the *tunica glanduloſa*; the ancients called it *tunica fungoſa*. See *Tab. Anat. (Splanch.) fig*. 2. *lit*. i.

The ſecond is much finer and thinner; it ſuſtains on its convex ſide a very large reticular diſtribution of capillary veſſels and nerves: on the concave ſide it ſeems to be of a looſe texture, and as it were, ſpongy, or filamentary, containing a great number of ſmall glandular bodies, eſpecially near the ſmall curvature and ſmall extremity of the *ſtomach:* it is of an exquiſite ſenſe, and is called *nervoſa*. See *Tab Anat. (Splanch.) fig*. 2. *lit. k*.

The third is muſcular, being made of ſtraight and circular fibres; the ſtraight run upon the upper part of the *ſtomach*, between its ſuperior and inferior orifices; and the circular run obliquely from the upper part of the *ſtomach* to the bottom. Of theſe the innermoſt deſcend towards the right ſide, and the outermoſt towards the left; ſo that, by their action, both ends of the *ſtomach* are drawn towards its middle, and the whole is equally contracted; by their contraction and continual motion, the attrition and digeſtion of aliments are in great meaſure performed.

The fourth tunic is common: it comes from the peritonæum. Between theſe two laſt coats there is a cellular ſubſtance, which adheres very cloſely to the external coat, and inſinuates itſelf between the fleſhy fibres of the third all the way to the ſecond, as may be perceived by blowing it up. Some make it a diſtinct coat, and call it *tunica celluloſa*; but it is no more than the cellular portion of the membranous coat, like the cellular portion of the peritonæum.

The principal arteries of the *ſtomach* are the coronaria ventriculi, which runs along the ſmall curvature; and the two GASTRIC arteries, which form one common artery that runs along the great curvature. The coronaria ventriculi becomes united in the ſame manner with the pylorica, and both make one common veſſel. Theſe two arterial arches ſend a great number of branches toward each other on both ſides of the *ſtomach*, which are gradually ramified in different directions, and moſtly communicate with thoſe from the other artery. The arteries of the *ſtomach* come originally from the cœliaca, by means of the hepatica, ſplenica, and coronaria. The pylorica and meſenterica ſuperior contribute to them by communications, more or leſs immediate. They communicate alſo with the mammariæ internæ and diaphragmaticæ, and by means of the epigaſtrica ſiniſtra with the meſenterica inferior.

The veins of the *ſtomach* are ramifications of the vena portæ in general, and in particular of the meſeraica major, ſplenica, and hæmorrhoidalis interna. They accompany the arteries more or leſs, and form nearly the ſame kinds of arches and reticular textures.

The eighth pair of nerves gives two conſiderable branches to the *ſtomach*, which are ſpread much about the upper orifice, by which it is rendered very ſenſible; whence alſo proceeds the great ſympathy betwixt the *ſtomach*, head, and heart; on account whereof Van Helmont thought, that the ſoul had its ſeat in the upper orifice of the *ſtomach*.

As for the motion of the STOMACH; Dr. Pitt, in the Philoſophical Tranſactions, acquaints us, that, in diſſecting a dog, he found the periſtaltic motion of the guts continued through the *ſtomach*; the pylorus, which is uſually found as high as the diaphragm, being, in every undulation, brought below the very bottom of the *ſtomach*; and that he could manifeſtly obſerve a conſtriction in the middle of the *ſtomach*, at every motion downwards, preſſing it in ſo as to be able to compreſs whatever was contained in its cavity. Theſe motions, he obſerves, were as regular as any he ever obſerved in the guts; and adds, that he has ſince obſerved the ſame in three others; whence one may ſafely enough conclude it holds of all.

Hence, we eaſily ſee the reaſon of the quick diſtribution of the nouriſhment; the food being no ſooner opened by the drink and ſpittle, &c. than it has a free motion through the pylorus into the inteſtines, from this compreſſion in the middle of the *ſtomach*.

In order to underſtand the action of the *ſtomach*, in turning the aliments into chyle, we are firſt to thoroughly conſider its form. It is eaſy to obſerve, that the two orifices of the *ſtomach*, the œſophagus, and pylorus, are not ſituated exactly over-againſt one another; but that if the *ſtomach* be regularly divided longitudinally into two halves, the œſophagus will be found wholly in the anterior half, and the pylorus, in great part, in the poſterior. Near the inſertion of the œſophagus there are two planes of muſcles; the one is placed near the bottom of the *ſtomach*, and encompaſſes all that part of the œſophagus that is neareſt that part. This muſcle throws off obliquely ſeveral bundles of fibres, which run to the middle, both of the anterior and poſterior ſides of the *ſtomach*, and many of theſe extending even to the lower part of it, make what are there called *the oblique fibres of the ſtomach*. The other muſcular plane encloſes, in the ſame manner, the other part of the mouth of the œſophagus, or that which lies towards the pylorus; this terminates on each ſide near the bottom of the *ſtomach*. Theſe two planes of fibres are, as it were, two fleſhy bands about the mouth of the œſophagus, which croſs one another both on the upper and under part of the *ſtomach*.

The longitudinal fibres are very ſlender, and appear about an inch from the pylorus, extending themſelves along both the anterior and poſterior ſides of the *ſtomach*, quite to the orifice of the œſophagus; and finally, they are inſerted round about the pylorus by two ligamentary bands, which authors have generally paſſed over without obſerving. Theſe bands are much like thoſe of the colon, and occupy all the length of the neck, and may be eaſily diſtinguiſhed by the touch, and are not difficult to be ſeen on bending the part in an inflated *ſtomach*.

The fibres of the bottom of the *ſtomach*, when nicely examined, are found to be circular, all compoſing ſeveral ſmall concentric circles, each ſeries of which is independent of all the reſt. There is one of theſe circles placed juſt in the centre of the bottom of the *ſtomach*, and from this the other circles ſpread, being of ſeveral different diameters, according to the places where they ſtand, and reaching to near the orifices where the fleſhy fibres take another courſe, as before obſerved. The bodies, called *circular fibres of the ſtomach*, and ſuppoſed to part from the upper part of the *ſtomach*, cloſe to one another, and taking the round of the *ſtomach* to return thither again, are truly a number of ſmall muſcles, or bundles of fibres, placed at ſmall diſtances from one another, no one of which ever reaches perfectly round the *ſtomach*; from theſe ſeveral ſmaller fibres are propagated in an irregular manner, which fill up the interſtices of the circular directions of theſe, and form a ſort of net-like plexus, between the fibres of which the nervous membrane of the *ſtomach* is eaſily ſeen. Theſe interſtices, in general, are of a ſort of lozenge-ſhape, and the whole of theſe fibres may be ſaid to conſtitute a ſort of muſcular net, enveloping the whole *ſtomach*. All thoſe bundles of fibres, or ſmall muſcles, which are ſituated below the upper orifice of the *ſtomach*, or near about it, form together a plane or ſeries which runs in a ſtraight line from the upper to the lower extremity of the *ſtomach*; whereas, on the contrary, thoſe which are placed about the middle of the *ſtomach* ſeem to turn about, and form parts of circles, the convex part of all which ſtands toward the bottom of the *ſtomach*; and finally, thoſe which are placed about the neck of the *ſtomach* are much bent, and their bending is always the greater as they approach nearer to the pylorus. This appears to be the true figure and arrangement of the fibres of the *ſtomach*; and as this is very different in many particulars, from the common accounts of anatomical authors, it was neceſſary to give this at large, in order to underſtand and explain the action of this part in the great work of digeſtion; and according to this account, the offices of every part will be very eaſily underſtood.

The circular bands of muſcular fibres placed round the orifice of the œſophagus, are deſigned to prevent the upper orifice of the *ſtomach* from being too much diſtended, whether by our careleſsly ſwallowing too large morſels, or by the action of vomiting. The uſe of the muſcular circles, at the bottom of the *ſtomach*, is as eaſily ſeen: the aliments received into this part of the *ſtomach*, were it not for theſe circular arrangements of fibres, would remain there, and have no tendency given them to go out of the *ſtomach*; but by this wonderful ſtructure, the whole bottom of the *ſtomach* can at once be put into a ſafe and eaſy, though a powerful contraction, by means of which the aliments are naturally ſent toward the pylorus for their diſcharge. Theſe circles give the firſt principle of the periſtaltic motion of the *ſtomach*, which is much the ſame with that of the inteſtines.

When the aliments have been thrown off theſe circles, they are not immediately, however, diſcharged into the pylorus, but are thrown upon thoſe bundles of fibres, or ſmall muſcles, which make what has been before called the *reticular coat of the ſtomach*. That part of this coat which immediately receives them, is that compoſed of ſegments of circles, the convex parts of which are all placed towards the bottom of the *ſtomach*; and as theſe afterwards form their contractions, their middle naturally elevates, and throws off the aliment ſtill toward the pylorus, and this is done with the more force, as the action of theſe fibres is ſtrengthened by the longitudinal ones; and, in fine, thoſe longitudinal fibres, which are attached to the bands that ſurround the pylorus, when they act, contract, or pull the other parts of the *ſtomach* toward their inſertions; ſo that every thing tends to help the throwing the food upon the pylorus.

The reticular coat of the *ſtomach* has alſo other great advantages: it is eaſily capable of extenſion, and conſequently gives the *ſtomach* a capacity of enlarging, ſo as to hold a larger quatity of aliments than it otherwiſe could; and when they act, ſo as to be approaching toward their natural ſtate again after ſuch diſtenſion, this action, which is no other than their contraction, neceſſarily throws the aliments toward the pylorus; this contraction is always ſucceeded by a ſmall dilatation again, and that by another contraction, and theſe alternately ſucceeding one another, ſo long as any of the aliments continue in the *ſtomach*, conſtitute what authors call its periſtaltic motion. Although this motion is very ſlight, and only a kind of vermicular undulation, which is ſcarce ſenſible, yet there have not been wanting very great men who have thought it ſufficient for the great work of digeſtion. Theſe authors ſet aſide the uſe of any liquors, or juices of the *ſtomach*, mixing themſelves with the aliments, and aſcribe the whole to this motion, which they call a kind of trituration, which they ſay breaks the aliments into ſmall and fine parts, by rubbing them againſt one another, and that theſe fine broken particles make what is called chyle; but it is ſcarce conſonant to reaſon, that ſo weak a cauſe ſhould be productive of ſuch great effects.

This motion is no ſtronger than the periſtaltic motion of the inteſtines, and that is never ſuppoſed to have any ſuch effects on their contents, but only to puſh them forward. The liquor prepared from the food is known alſo to be grey at its paſſing out of the *ſtomach*, and only to acquire its white colour in the duodenum; and how is this accountable for, on the plan of trituration only? And finally, if that were all that was required to digeſtion, to what purpoſe did nature, which does nothing in vain, ordain ſuch an abundance of fluids to be preſent in all places, where the aliments were deſtined to undergo any change? To know the abundant quantity of theſe we need only follow the courſe of the food from the time of its being taken into the mouth to that of its being changed into chyle.

All the time that the teeth are chewing the food, the parotid glands afford a prodigious quantity of ſaliva, which runs into the mouth, mixes with it, and paſſes with it into the *ſtomach*; beſide theſe, there are alſo many other ſources of the ſaliva, which all diſcharge it at the ſame time, but the quantity from theſe alone is not eaſily conceived. A ſoldier had, by a wound in the cheek, one of the parotids cut in two, and had the wound cloſed within, but not without; it was obſerved, that whenever he uſed his jaws in chewing, this one wounded gland alone diſcharged a quantity of lymph enough to wet ſeveral napkins; what then muſt be the quantity at every meal diſcharged from both, and from all the other ſources together? Though this is all carried down into the *ſtomach*, yet there freſh juices are added to it.

Wepfer diſcovered multitudes of glands in the human *ſtomach*, the orifices of which were very ſenſible; and beſide theſe, Mr. Ruyſch diſcovered ſeveral other eminences, which, by their reſemblance to thoſe in the ſecond *ſtomach* of an ox, ſeem to be only caſes encloſing cluſters of minute glands, all deſtined, with the others, to pour out their contents on the maſs of aliments. All theſe fluids, however, only change the food into a thick greyiſh liquor, which is too coarſe to be received into the lacteals, and needs a farther elaboration. This elaboration changes it into a white liquor, which we call chyle; and this is only performed in the duodenum, where there can be no trituration, but where there is a very remarkable aſſemblage of different liquors to affect it: for beſide the common ones, the liver and gall-badder diſcharge into this inteſtine a great quantity of bile by the ductus choledocus; and the pancreas ſends thither alſo a great deal of its lymph. Brunderus has obſerved alſo, in this inteſtine, a vaſt number of glands, which, according to him, make a ſort of ſecond pancreas: theſe all furniſh alſo a great quantity of liquors to the duodenum, where this great change is made in the matter of the aliment: and it is very natural to conclude from the whole, that it is by means of theſe liquors that this change is effected; and if it appear, that the laſt change of the greyiſh liquor of the *ſtomach* into chyle be wrought by theſe fluids, why ſhould it be doubted but that nature, which is alike in all its works, has uſed the ſame means in the firſt change, and by the liquors mixt with the aliments in the *ſtomach*, has wrought them into that grey liquor they are found there changed into? Trituration does not at all ſeem the buſineſs of the *ſtomach*; nature we ſee has appointed another part, the mouth, for that office, and has furniſhed that with hard bodies, capable of tearing and grinding things to pieces. The moſt natural opinion, on the whole, ſeems therefore, that the office of the mouth was thus to rend and tear in pieces the aliments before their paſſage into the *ſtomach*, that there the juices might act more ſtrongly upon them; in the ſame manner as the chemiſt beats and breaks to pieces the ſubſtances, which he is going to throw into proper liquors, to extract their tincture. Mem. Acad. Par. 1719.

It may, however, be obſerved, that the operation which goes by the general name of digeſtion, and by which chylification begins, is performed partly by the *gaſtric juice*, which flows continually from the tunica villoſa, and partly by the continual contraction and relaxation of the muſcular coat; aided by the alternate motions of the diaphragm, or muſcles of the abdomen: and, accordingly, Mr. Winſlow obſerves, that trituration might be a term proper enough for expreſſing this operation, provided it be made to ſignify only a gentle agitation or action of the fleſhy fibres on a ſubſtance continually moiſtened by the gaſtric liquor, and not a violent grinding of a dry ſubſtance. See on this ſubject CHYLIFICATION and DIGESTION.

Ruminating animals have four *ſtomachs*; yet it is obſerved, that ſome of theſe, which have four in Europe, have only two in Africa, probably by reaſon the herbs in Africa, are more nouriſhing. See ABOMASUS.

Birds that live ordinarily on ſeeds, covered with a tough rind, have a kind of *ſtomach*, called the *gizzard*, conſiſting of four large muſcles withoutſide, and a hard callous membrane within. Such as live on fleſh, as eagles, vultures, &c. have only one *ſtomach*.

The digeſtive power of the *ſtomach* of ſome fowls is vaſtly greater than that in men, or any other animals. Cryſtal bullets, ſome hollow, and others ſolid, have been cramed down the throats of hens, and have been found afterwards ſtrangely eroded, and eaten by the juices there. Hollow bullets of glaſs have been alſo crammed down by the members of the Florentine Academy, and have been found afterwards not only eroded on their ſurface, but filled within with a whitiſh liquor like cream, which ſeemed to prey upon their ſubſtance. It is probable hence, that the ſtrong digeſtion of theſe fowls may be in ſome meaſure owing to a powerful menſtruum in their *ſtomach*; glaſs and cryſtal are two things wholly indiſſoluble by any menſtruums we are acquainted with, and yet they are corroded here.

This menſtruum in the *ſtomach* of theſe animals, aſſiſted by what the gravel-ſtones, which they ſwallow, are able to do in the manner of teeth, may very well deſtroy, and reduce ſubſtances of ſuch denſe texture, as we ſcarce know how to manage.

The glaſs drops with long tails, called *Prince Rupert's drops*, having been in the ſame manner forced down the throats of capons, were found entire in the *ſtomach* after many days, and burſt as uſual on breaking off the tail. Theſe loſt ſomewhat of their weight by remaining in the *ſtomach* ſome time, but the ſame ſort of drops, when untempered by heating in the fire, loſt a great deal in a very ſhort time. One of them, with which Redi made his experiments, loſt four grains of its weight in four days, and giving it to another fowl, it in ſix days time loſt nine grains more. This is an argument, not only of the vaſt power of digeſtion in the *ſtomach* of theſe fowls, but of the great difference of hardneſs there is between the ſame glaſs when tempered, by being dropped hot into water, and when untempered again by fire.

Experiments were alſo made by giving diamonds, topazes, leaden-bullets, jaſpers, and porphyry, to the ſame animals, and others of like kinds. The diamond loſt nothing of its weight; the topaz almoſt nothing, the loſs being ſcarce diſcernible with nice ſcales; other *ſtones* ſcarce loſt any thing, but the leaden bullets loſt conſiderably. Hence it is eaſy to conclude, that the ſmall gravel-ſtones, which they pick up to ſerve for grinding the food in their *ſtomachs*, do their office without parting with almoſt any thing from themſelves: theſe little ſtones, though leſs beautiful, yet approaching in their nature to the gems. There is great difference, however, between theſe and pearls; for it was found that four pearls given to a pigeon loſt one third of their weight in twenty-four hours, and eight ſmall pearls given to another pigeon loſt two thirds of their weight in two days. Redi, Eſperienz. See DIGESTION.

STOMACH *of fiſh.* The *ſtomach of fiſh* is very different in the various kinds, in reſpect of ſize, thickneſs, and its ſeveral properties and qualities; but its ſituation is generally longitudinal, and it is ſingle in all the known fiſhes, except in the *ſtromateus* of Rondeletius, in which it is ſaid to be double.

The *ſtomach* in living fiſh is cold to the touch, but this is only a proof that it is leſs hot than our own fleſh. That there is heat in it, is evident enough from the digeſtion which is ſo powerful in it, the *ſtomachs* of many fiſhes digeſting ſubſtances which ours could not at all effect; ſuch are the ſhells of ſhell-fiſh. It is not eaſy to ſuppoſe this could be performed without ſome degree of heat in the part, but at the ſame time we are informed by this how ſmall a degree of heat is neceſſary for working theſe effects, and how much may be done by the continual attrition of the fibres, and by a proper fluid. Artedi, Ichthyolog.

STOMACH *of flies.* In examining with care the bodies of theſe little animals, one may perceive, that when the paſſage of the aliments is got beyond the lungs, and below the place where they form a ſort of diaphragm, the canal that ſerved for this paſſage, forms a large though ſhort body, the diameter of which three or four times exceeds that of the canal itſelf. This body is compoſed of three fleſhy lobes, and is unqueſtionably the *ſtomach* of the animal. The inteſtine goes out of it, very nearly from the ſame part where the other paſſage is admitted into it; the inteſtine then directs itſelf toward the anus, and afterward runs upward again toward the diaphragm, or bottom of the lungs; and thence, after many convolutions, many times running backward and forward, it terminates in the anus.

In caterpillars and butterflies, the canal from the mouth to the anus is only one ſtraight inteſtine; but it is much otherwiſe in theſe creatures, the inteſtines both in the fly, and in the worm it is produced from, always making a number of contortions and convolutions.

STOMACH-*bruſh.* See EXCUTIA *ventriculi.*

STOMACH, *inflammation of the.* See INFLAMMATION, &c.

STOMACHIC, Στομαχικος, a medicine that ſtrengthens the *ſtomach*, and promotes the office of DIGESTION.

Of this kind are wormwood, rhubarb, mint, maſtic, aloes, pepper, cinnamon, and aromatic bitters: good wine is alſo a *ſtomachic.*

STOMACHIC, in *Anatomy*, is applied to the arteries, veins, &c. of the *ſtomach*, called alſo GASTRIC.

The *ſtomachic* veins terminate in the trunk of the vena porta, and the ſplenic vein. The *ſtomachic* arteries ariſe from the cœliac. The *ſtomachic* nerves come from the eighth pair.

STOMACHIC *coronary.* See CORONARY.

STOMACHIC *elixir.* See ELIXIR *ſtomachic.*

STOMACHIC *pills.* See PILLS.

STOMACHIC *water.* See WATER.

STOMACHICA *febris*, the *ſtomachic fever*, a name given by Heiſter, and ſome others, to a ſpecies of fever, called by others a *meſenteric fever*, and by our Sydenham *nova febris*, in a peculiar treatiſe. See *Inteſtinal* FEVER.

STOMATIA, in *Natural Hiſtory*, the name of a genus of ſhell-fiſh, frequently confounded with the EAR-*ſhell.*

The ſhell of the *ſtomatia* is formed of one piece, has no perforations in any part of its ſurface, and is of a depreſſed flat figure; and its mouth is the moſt patent of all the univalve ſhells, the limpet only excepted. It has a ſhort ſpiral turn running into the mouth at the head.

There are ſeveral ſpecies of this genus. See Hill, Hiſt. Anim. p. 119, ſeq.

STOMATICA, a term uſed by ſome for all medicines uſed in diſorders of the mouth.

STONE, in *Natural Hiſtory*, a hard, ſolid body, neither malleable, nor ſoluble in water; formed by ſucceſſion of time, in the body of the earth, by earthy particles, which in approaching to one another, acquire various degrees of connection and union. Bodies of this kind are infinitely various, according to their different conſiſtence, colour, form, and other properties.

Naturaliſts vulgarly define *ſtone* a foſſile incapable of fuſion, yet *ſtone* has been known to be melted, and when cold to become *ſtone* again. See SCIARRI.

Hence it ſhould ſeem not impoſſible for *ſtone* to be caſt or run into the ſhape of columns, vaſes, ſtatues, or relievos; which experiment may, perhaps, ſome time or other, be attempted by the curious, who following where nature has ſhewn the way, may poſſibly, by the aid of certain ſalts and minerals, arrive at a method for melting and running *ſtone*, both to their own profit, and that of the public.

STONES are of various kinds, with regard to the place they are produced in: the moſt common are formed under ground; others in the bodies of men, and other animals; others ſeem to be generated by the ſea, as pumice, &c. and others, to be the effect of a petrifying virtue in certain waters. Of theſe, ſome ſerve ſimply for magnificence and ornament, as all thoſe called,

Precious ſtones; which make the commerce of lapidaries and jewellers.

Others are much more uſeful, if one might credit all the virtues attributed to them, and are uſed in medicine; ſuch as bezoards, Jews *ſtone*, eagles *ſtone*, &c.

Others, again, are uſed in painting; either to prepare colours from, by calcining and grinding them, or to be uſed as crayons or pencils for deſigning: of which number are the Armenian *ſtone*, black lead, ruddle, &c.

Laſtly, much the greateſt quantity, and thoſe too of the moſt immediate and common uſe, are thoſe employed in building; ſuch as *free-ſtone, marble, lime-ſtone, fire-ſtone,* &c.

STONES are divided by biſhop Wilkins into *vulgar*, *middle-priced*, and *precious.*

1. *Vulgar ſtones*, or ſuch as are of little price, are diſtinguiſhable by their different magnitudes, uſes, and conſiſtence, into the

- Greater magnitudes of *ſtone*, uſed either about
  - Buildings, whether of
    - Walls; chiefly being of a
      - ſofter conſiſtence, whether natural or factitious,
        - 1 *free ſtone.* *brick.*
      - harder conſiſtence; not eaſily yielding to the tool of the workman, growing either in
        - great maſſes,
          - 2 *ragg.*
        - leſſer maſſes; whether ſuch as are for their figure,
          - more knobbed and unequal; uſed for the ſtriking of fire, either the more common, which is leſs heavy; or leſs common, which is more heavy, as having ſomething in it of a metalline mixture,
            - 3 *flint,* *marcaſite,* fire-*ſtone.*
          - more round and even,
            - 4 *pebble.*
    - Roof or pavement, being of a laminated figure, either natural or factitious,
      - 5 *ſlate,* *tyle.*
  - Metals either for the
    - ſharpening or trying of them,
      - 6 *whet-ſtone,* *touch-ſtone.*
    - poliſhing, or cutting of them; being either of a more ſpongy and ſoft, or of a more hard conſiſtence,
      - 7 *pumice,* *emery.*
- leſſer magnitudes, either more, leſs, or minute,
  - 8 *ſand,* *gravel.*

2. *Middle priced ſtones*, are either of a

- ſhining politure, or capable of it; whether of a
  - ſimple white colour, and more ſoft conſiſtence,
    - 1 *alabaſter.*
  - ſometimes white, ſometimes black or green, and ſometimes variegated with veins, growing in greater or leſſer maſſes,
    - 2 *marble, porphyry,* *agat.*
  - ſpotted with red, upon a greeniſh colour, or with ſpots of gold colour upon blue,
    - 3 *jaſpis, heliotrope,* *lapis lazuli.*
- Tranſparency, either
  - brittle, whether natural or factitious,
    - 4 *cryſtal,* *glaſs*
  - fiſſile into flakes, either greater or leſs,
    - 5 *ſelenite,* Muſcovia *glaſs*, or *iſing-glaſs,* *ſpar.*
- Relation to metals, attracting iron, or making of braſs,
  - 6 *load-ſtone,* *cadmia calaminaris.*
- Incombuſtible nature.
  - 7 *amiantus, aſbeſtus.*
- Strange original; not being properly minerals, though uſually reckoned amongſt them; but either a ſubmarine plant, or ſuppoſed to proceed from a liquid bitumen,
  - 8 *coral, coralline,* *amber*

2. *Precious ſtones.* See GEM.

The ingenuity and induſtry of modern naturaliſts have led them to form a variety of ſyſtems in the arrangement of foſſils in general, and of *ſtones* in particular: ſome of the principal of theſe it may not be improper to enumerate. Some have founded the baſis of their ſyſtem on the figure, colour, ſtructure, and other external and viſible characters; calling in the aid of chemiſtry, ſo far at leaſt as the mineral acids would aſſiſt them. Others, as the profeſſed chemiſts and metallurgiſts, have eſtabliſhed their arrangement chiefly on chemical principles, as more immediately leading to the origin of foſſil bodies in general. And, at preſent, mineralogiſts ſeem more intent on this view than ever; and probably the due conſideration of the volcanic ſyſtem will open new ſources of information in this way.

With reſpect to the ſyſtematic arrangement of *ſtones*, Bromelius in 1730, diſtributes them into ſuch as are permanent in the fire, ſuch as the *lapis ollaris*, *amiantus*, *aſbeſtus*, and *fuſorii*; calcinable, ſuch as the *calcarius*, *ſuillus*, *marmor*, *gypſum*, *ſpatum*, *ſtalactites*, *fiſſilis*, and *ſpecularis*; and thoſe that are vitrifiable in the fire, ſuch as the *arena*, *arenarius*, *gemma*, *granatus*, *ſilex*, *quartzum*, *cryſtallus*, and *fluor*. The other foſſil bodies he ranges under the ſeveral claſſes of earths, ſalts, ſulphurs, figured *ſtones*, petrifactions, calculi, ſemi-metals, and metals.

Wallerius, in 1747, diſtributes *ſtones* into calcareous, as the *calcareus*, *marmor*, *gypſum*, and *ſpatum*; the vitreſcent, as *fiſſilis*, *cos*, *ſilex*, *petroſilex*, *quartzum*, and *cryſtallus*; the apyrous, as *mica*, *talcum*, *ollaris*, *corneus*, *amiantus*, and *aſbeſtus*; and ſaxa or rocky *ſtones*, as the *ſimplicia*, *mixta*, *griſea*, and *petroſa*. The other bodies, pertaining to the foſſil kingdom, he claſſes under the general heads of earths, lean, fat, mineral, and arrenaceous, minerals, ſulphurs, ſemi-metals, metals, concrete ſubſtances ſuch as the pori, petrifactions, figured *ſtones*, and calculi.

Wolteridorf, in 1748, divides *ſtones* into the vitreſcent, as *gemma*, *cryſtallus*, *quartzum*, *arenarius*, *corneus*, *ſpatum vitreſcens*, *ſaxum*, and *pumex*; the argillous, as the *ſmectis*, *aſbeſtus*, *talcum*, *mica*, and *ſchiſtus*; the gypſeous, as *gypſus*, *alabaſtrum*, and *ſpatum gypſeum*; and the alkaline, as *calcareus*, *marmor*, *ſpatum alcalinum*, *tophus*, *ſtalactites*, and *margodes*. The other foſſil ſubſtances he diſtributes under the titles of earths, argillous and alkaline; ſalts acid, alkaline and mean; bitumens, fluid, and ſolid; ſemi-metals, fluid and ſolid; metals noble and ignoble; and petrifactions of ſanguineous animals, of inſects, of teſtaceous animals, of vegetables and of marine bodies.

Cartheuſer, in 1755, diſtributes *ſtones* into the lamellous, as *ſpatum*, *mica*, and *talcum*; filamentous, as *amianthus*, *aſbeſtus*, and *inolithus*; ſolid as *ſilex*, *quartzum*, *calcareus*, *gypſeus*, *fiſſilis*, and *ſmectis*; and granulated, as *arenarius*, and *jaſpis*. The other foſſils he claſſes under earths diſſoluble and indiſſoluble; ſalts, alkaline, acid, mean, and ſtyptic; inflammables, both genuine and ſpurious; ſemi-metals, not malleable, ſub-malleable, and fluid; metals, flexile, hard, and fixed; and heteromorpha, including the true and ſpurious petrifactions, and the figured ſubſtances.

Juſti, in 1757, diſtributes terrene bodies into the noble, as the *adamas*, *ſapphirus*, *ſmaragdus*, *amethyſtus*, *topazius*, *turcois*, *opalus*, *chryſolithus*, and *hyacinthus*; the ſemi-noble, as *chryſtallus*, *cameolus*, *achates*, *chalcedonius*, *onyx*, *ſardonyx*, *malachites*, and *lazuli*; apyrous ignoble, as *talcum*, *mica*, *molybdæna*, *vitrum moſchouit*, *ſteatites*, *corneus*, *jaſpis*, and *aſbeſtus*; calcareous, as *marmor*, *gypſum*, and *ſpatum*; and vitreſcent, as *cos*, *quartzum*, *ſilex*, *ſchiſtus*, *ſerpentinus*, *tripela*, *pumex*, *granites*, *ſaxus*, *argilla*, *marga*, *limus*, and *umbra*. The other foſſils he ranks under the heads of metals, noble and ignoble; ſemi-metals, fluid, hard, and mineraliſed; ſalts, acid, alkaline and mean; and petrifactions, animal, plants obſcure, figured, and cryſtal.

Cronſtedt, in 1758, arranges foſſils under the claſſes of earths, calcareous, ſiliceous, granate, argillaceous, micaceous, fluor, aſbeſtine, zeolitic, and magneſian; ſalts, acid and alkaline; phlogiſtic bodies; and metals, perfect and ſemi-metals.

Vogel, in 1762, diſtributes *ſtones* into the argillaceous, calcareous, margaceous, ſelenitic, pyromachous, ſchiſtous, folious, plumous, ſaline, metallic, fuſile, petræ or rocky, and new: and the other foſſils under earths, argillaceous, calcareous, ſiliceous, margaceous, ſelenitic, talcous, micaceous, inflammable, ſaline, metallic, and mould; petrifactions of animals, plants, lithophytous, lithotomous, and pori; ſalts ſtyptic, fuſile, ſuch as are capable of being hardened, volatile, and alkaline; combuſtibles, as ſulphureous, bituminous, ſevum, and balſam; and metals, perfect and ſemi-metals.

Pott, in his Lithogeogneſia, diſtributes *ſtones* into calcareous, gypſeous, argillous, and apyrous.

It has been doubted by ſome of the moſt reſpectable mineralogiſts, whether we ought to deſcend below what are called *generical diſtinctions* in the foſſil kingdom, becauſe the ſubjects are infinitely various, and the gradation by which they run into one another is in general imperceptible, in the various combined forms, in which they are found in the earth. Nevertheleſs, ſome diſtinctions of this kind ſeem to be quite neceſſary in ſyſtems eſtabliſhed principally on external characters.

Linnæus and Wallerius have been among the firſt who attempted the arduous taſk of fixing the ſpecific characters. For this purpoſe Linnæus has formed a ſet of terms that expreſs all differences in the figures of foſſil bodies, in their cruſt or outward appearance, their ſuperficies, their correſpondent particles or fibres, in their texture, whether plated, fiſſile, &c. in their hardneſs, or in their colour, and in the alterations they undergo by ſolution, both by acids and by fire.

The chemical ſyſtematics and metallurgiſts, in their arrangements, uſually begin with the earths, conſidering them as the baſis of *ſtones*: Linnæus begins with the latter, profeſſing to take a middle way between the mere metallurgiſt, and thoſe who characterize from external appearance only. He divides the whole *regnum lapideum* into three claſſes, under the names of *petræ*, *mineræ*, and *foſſilia*, each being ſubdivided into ſeveral orders, and comprehending in the whole fifty-four genera.

To the firſt claſs belong *petræ*, or *ſtones*, which he defines to be foſſile bodies, originating from a terrene principle by coheſion: theſe are ſimple, as in their compoſition they are deſtitute of ſaline, inflammable, and metallic principles; they are fixed, as not being entirely and intimately ſoluble in any menſtruum; and ſimilar, as they conſiſt of homogeneous component parts. Of theſe there are five orders, viz,

1. The *humoſæ*, or *ſlaty ſtones*, which originate from vegetable earth, are combuſtible, and leave groſs light aſhes. Under this order there is one genus, viz. the *ſchiſtus*, or *ſlate*, including thirteen ſpecies, among which the moſt diſtinguiſhed are the table ſlate, black ſlate, blue houſe ſlate, and black crayon.

2. The *calcareæ*, or *calcareous ſtones*, which originate from calcareous marine animal bodies, become light and porous in the fire, and fall into an impalpable powder, and efferveſce, and are ſoluble in acids, unleſs they are previouſly ſaturated with an acid, as the gypſum. This order comprehends four genera, viz. *marble*, of which there are fifteen ſpecies, ſuch as the black ſlaty marble, the Parian marble, and all its varieties; the Florentine marble, the white grain lime-ſtone, the ſcaly lime-ſtone, &c. *gypſum*, or *plaiſter-ſtone*, of which there are three ſpecies, ſuch as the common plaiſter, alabaſter, &c. *ſtirium*, or *fibrous alabaſter*, including four ſpecies, as the fibrous gypſum, or Engliſh talc, &c. and *ſpatum*, or *ſpar*, of which there are fourteen ſpecies, ſome ſoluble in aqua fortis, as the ſoft ſpar, refracting ſpar, or iſland cryſtal, ſubdiaphanous compact ſpar of different colours, pellucid coloured ſpar, as ſpurious topaz, emerald, and ſapphire, &c. and ſome not ſoluble in aqua fortis, as the felt-ſpar, &c.

3. The *argillaceæ*, or *argillaceous ſtones*, which originate from the viſcid ſediment of the ſea, are ſomewhat unctuous to the touch, and harden in the fire. To this order belong three genera, viz. *talcum*, or *ſoap earth*, including twelve ſpecies, as the ruddle, ſmectis, or French chalk, or ſoap-earth, ſerpent-*ſtone*, and horn-blend, &c. *amianthus*, or *earth-flax*, of which there are ten ſpecies, as the aſbeſtos, plumoſe aſbeſtos, mountain cork, and aluta, or mountain leather, &c. and *mica*, or *talc*, of which there are ten ſpecies, as Moſcovy glaſs, gold glimmer, and green talc, &c.

4. The *arenatæ*, or *ſand-ſtones*, which originate from the precipitation of rain water, are extremely hard, ſtrike fire with ſteel, and by triture yield a very rough powder. This order comprehends three genera, viz. the *cos*, or *whet-ſtone*, of which there are ſixteen ſpecies, as the grindſtone, filtering-*ſtone*, mill-*ſtone*, building *ſtone*, &c. the *quartz*, including eight ſpecies, as the pellucid rock quartz, coloured rock quartz, red, blue, yellow, &c. milky quartz, granulated quartz, pebble, quartz, &c. and the *ſilex*, or *flint*, of which there are ſixteen ſpecies, ſome being vague or looſe flints, as the common flint, gun-flint, Ægyptian pebble or mochoa *ſtone*, opal, onyx, or cameyeu, chalcedony, cornelian, &c. and ſome being rock-flints, as the agate, petro-ſilex or chert, jaſper, &c.

5. The *aggregatæ*, or *rock* or *compound ſtones*, which originate from a mixture of the four preceding orders variouſly conglutinated; the interſtices uſually filled up with quartz, ſpar, or glimmer. Of this order there is only one genus, viz. the *ſaxum*, or *rock-ſtone*, including thirty-nine ſpecies, as the porphyry of different colours; the trapezium or trap-*ſtone*, the granite, the fuſorium, or founder's *ſtone*, the ſilicinum, or pudding-*ſtone*, &c.

The ſecond claſs of foſſil bodies are the *mineræ*, or *minerals*, which Linnæus defines to be foſſil bodies, originating from a ſaline principle by cryſtallization; they are compound, as conſiſting of a baſe, united with ſaline, inflammable, or metallic principles; and they are ſoluble, perfectly, in an appropriate menſtruum: of theſe there are three orders, viz.

1. *Salia*, *ſalts*, or *cryſtals*, which are ſapid bodies ſoluble in water; diſtinguiſhed from each other by their different effects on the organs of taſte: under this order there are ſix genera, viz. *nitre*, of which there are nine ſpecies, as the ſaline, or native ſaltpetre; the quartzoſe, or mountain cryſtal: fluor, or coloured cryſtal, from the varieties of which are the true hyacinth, the falſe topaz, ruby, amethyſt, ſapphire, beryl, and emerald; and the calcareous, as the hexagonal truncated ſpar, the ſuillum, or ſparry ſwine-*ſtone*, &c. *natron*, including fourteen ſpecies, as the ſaline, or native mineral alkali, aphronitrum, and Epſom ſalt; the lapidoſe, or ſpatoſe, decædrous natron, the gypſeous pellucid, fuſiform natron, the ſelenite, or rhombic natron, the hyodon, or pyramidal, or dog-tooth ſpar, &c. *borax*, of which there are ſix ſpecies, as the ſaline, or tincal, or native borax; the lapidoſe, to which belongs the gemma nobilis, or lapidoſe, priſmatic, pellucid borax, with truncated pyramids, and as varieties of this ſpecies, the yellow or topaz, the pale green or chryſolite, the ſea-green, or beryl, and the deep green, or emerald, the baſaltes, the tourmalin, the garnet, and the margodes, or opake, argillaceous, teſſelated borax; the *muria*, or *ſea-ſalt*, of which there are nine ſpecies, as the ſaline, or ſea foſſil, fountain, and hot bath ſalt; the lapidoſe, or Bononian *ſtone*, ſparry fluor, or Derbyſhire ſpar, &c. *alumen*, or *alum*, including ſix ſpecies, as the native, or native alum, plumoſe, &c.; ſoluble, or alum ſlate, *ſtone* alum, or calcareous alum *ſtone*, called *Roman alum*; and lapidoſe, to which belong the ſpatoſe alum, or falſe amethyſt, the gemma pretioſa, or diamond, ruby, and ſapphire, &c.; *vitriolum*, or *vitriol*, of which there are eight ſpecies, as the ſimple, or thoſe of iron, of copper, and of zinc; the compound, or triple vitrol of iron, zinc, and copper, the atramentarium, i. e. vitriols mineraliſed with friable *ſtone*, ſuch as red chalcitis, grey ſory, black melanteria, and yellow miſy, &c.; and the lapidoſe, or ſpatoſe vitriol of zinc.

2. *Sulphura*, or *inflammable* bodies, flaming and odorous while burning; ſoluble in oil; and diſtinguiſhed from each other by their different effect on the organs of ſmell: of this order there are five genera, viz. *ambra*, or *ambergriſe*, including two ſpecies, as the grey and the brown; *ſuccinum*, or *amber*, of which there is one ſpecies, as the electric amber, and the varieties of diaphanous, opake, yellow, brown, and that which includes inſects; *bitumen*, of which there are ten ſpecies, as the naptha, petrolem, or rock oil, maltha, or Jew's pitch, mumia, or ſevum minerale, aſphaltum, or foſſil pitch, ampelites, or peat, lithanthrax, or common coal, or ſchiſtoſe bitumen, gagas, or jet, ſuillum, or calcareons fetid bitumen, of which there are the varieties of compact, granulated, ſquamoſe, and cryſtalline, and the hepaticum, or liver bitumen: *pyrites*, or *ſulphurs*, including ſeven ſpecies, as native ſulphur, orpiment, cryſtalliſed pyrites, or marcaſite, figured pyrites, iron pyrites, copper pyrites, of which there are thirteen varieties, and aquoſe, or liver-coloured pyrites: and *arſenic*, comprehending eight ſpecies, as the ſolid teſtaceous arſenic, the ſandaraca, or red arſenic mineraliſed with ſulphur; the arſenical marcaſite, the arſenicum albicans, or arſenic mineraliſed with iron, &c.

3. *Metalla*, or *metals*, which are ſhining heavy bodies, fuſible in the fire, and ſoluble in appropriated acid menſtrua; diſtinguiſhed from each other by inſpection: of this order, there are two ſubdiviſions into ſemi-metals, not malleable, and metals malleable. The firſt ſubdiviſion includes ſix genera, viz. *hydrargyrum*, or *mercury*; of which there are five ſpecies, as virgin, or native quickſilver, cubic cryſtallized quickſilver, cinnabar, with the varieties of lamellated, granulated, and cryſtallized, and pyritical, cupreous, *ſtone* mercury, &c.; *molybdænum*, *wadd*, or *black lead*, of which there are three ſpecies, as plumbago, or black lead, or wad, or ſulphur ſaturated with iron and tin, mangneſia, or black manganeſe, and ſpuma lupi, or red maganeſe, or wolſram: *ſtibium*, or *antimony*, of which there are four ſpecies, ſuch as native regulus of antimony, cryſtallized ſtibium, fibrous, or common antimony, and red antimony mineralized with ſulphur and arſenic: *zinc*, or *tutenag*, of which there are eight ſpecies, as cryſtallized zinc, that mineralized with ſulphur and lead, or iron, that mineraliſed with ſulphurated iron, fibroſe zinc, calamine, or *ſtone* zinc, or zinc mixed with martial ochre, blend or mock-lead, or black jack, or ſemi-teſſelated black zinc, and red zinc or micaceous, liver-coloured zinc: *viſmutum*, or *biſmuth*, of which there are four ſpecies, as native biſmuth, common biſmuth, mineralized with ſulphur and arſenic, martial biſmuth, and biſmuth mineraliſed with ſulphur only: and *cobalt*, of which there are four ſpecies, as cryſtallized cobalt with ſulphur, arſenic, and iron, cobalt mineralized with arſenic and iron, pyriticoſe cobalt and flag-cobalt.

The ſecond ſubdiviſion comprehends malleable metals, and of theſe there are ſix genera, viz. *ſtannum*, or *tin*, including four ſpecies, as cryſtallized tin or tin grains, tin-*ſtone*, ſpatoſe tin, &c. *plumbum*, or *lead*, of which there are ten ſpecies, as native lead, cubic lead cryſtallized, cubic lead mineraliſed with ſulphurated ſilver, or galena, ſtibiated lead ore, greeniſh areſenical lead ore, ſparry arſenical lead ore, &c.: *ferrum*, or *iron*, including twenty-ſeven ſpecies, as native iron in grains, cryſtallized iron, ſuch as obey the magnet, to which denomination belong ſteel-grained iron ore, fine-grained iron ore, common iron ore, pyriticoſe iron ore, talky iron ore, calcareous iron ore, emery, &c. ſuch as do not obey the magnet, of which there are red micaceous iron ore, blood-*ſtone*, red blood-*ſtone*, ſpar-like iron ore, &c. and magnetical, or the magnet: *cuprum*, or *copper*, of which there are ſixteen ſpecies, as copper precipitated upon iron, native copper, cryſtallized octaedral copper, pyriticoſe yellowiſh-green copper ore, pyriticoſe purple copper ore, ſoft pyriticoſe grey copper ore, ſooty, pyriticoſe, arſenical copper ore, white arſenical, pyriticoſe copper ore, indurated ochraceous red copper ore, which is ſometimes liver-coloured; ſandy ochraceous copper *ſtone*, green and blue copper ſlate, lapis lazuli, lapis armenus or blue calcareous copper *ſtone*, malachites, or green gypſeous copper *ſtone*, nickel, or copper mineraliſed with ſulphur, arſenic and iron, &c.: *argentum*, or *ſilver*, of which there are nine ſpecies, as native ſilver in various forms, horn ſilver ore, ſhining, ſubmalleable, and ſomewhat diaphanous, mineraliſed with ſulphur and arſenic, glaſs ſilver ore or lead-cloured malleable ſilver ore mineraliſed with ſulphur, red ſilver ore mineraliſed with ſulphur and arſenic, white ſilver ore mineraliſed with arſenic, copper, and ſulphur, grey ſilver ore mineraliſed with ſulphur, antimony, copper, and iron, ſilyer ore mineraliſed with arſenic and iron, ſilver ore mineraliſed with ſulphur and zinc, and ſooty ſilver ore mineraliſed with arſenic and copper: and *aurum*, or *gold*, of which are two ſpecies, as native gold found in various forms, as in thin plates or leaves, ſolid, or in thick pieces, and a cryſtalline form; it is alſo found imbedded in quartz, talc, and cinnabar, and in rivers in looſe grains and lumps, called *gold duſt*; and mineraliſed pyritical gold ore.

The third claſs are foſſils, which are bodies originating from different modifications of the ſubjects comprehended in the preceding claſſes: of theſe there are three orders, viz.

1. *Petrificata*, or ſuch foſſil bodies, as repreſent in figure certain animals or vegetables, or parts thereof. The true petrifactions are ſuch as have the texture and organic parts of the bodies entirely filled up with ſtony particles, either of a calcareous or flinty, and ſometimes marcaſitical nature: there are others in which the bodies are preſerved and unaltered, as having loſt only the animal gluten: others again, are only bodies incruſtated with ſtalactite, or calcareous matter: and frequently they are only impreſſions received in their ſoft ſtate. Of this order there are eight genera, viz. *zoolithus*, or the petrifactions of mammalia including four ſpecies, as bones of men, remains of the rein-deer, foſſil ivory, and turquoiſe, or teeth tinctured by copper: *ornitholithus*, or petrifactions of birds, in whole or in part, and of their neſts, of which the firſt ſpecies are ſcarce, and are uſually ſtalactical incruſtations; *amphibolithus*, or petrifactions of amphibia, of which there are ſix ſpecies, as of an entire tortoiſe, of a toad, of the ſkeleton of a crocodile, of an entire ſerpent, of various nantes, as of the raia, baliſtes, &c. and gloſſopetræ, or ſhark's teeth: *ichthyolithus*, or petrifactions of fiſhes, including three ſpecies, as thoſe of entire ſkeletons, with the fins in ſlate, and in marble, and the bufonites, or grinding teeth of the wolf-fiſh; *entomolithus*, or petrifactions of inſects including three ſpecies, as the cancri or petrified crab, lobſter, &c. parodoxus, or unknown inſect, petrified, and inſects incloſed in amber, which indeed are not proper petrifactions; *helmintholithus*, or petrifactions of worms, including twenty-four ſpecies, as the cornu ammonis, orthocerotes, or ſtraight nautilus, anomites, or various anomiæ, gryphites, or crow *ſtone*; Jew's *ſtone*, ſuppoſed to be ſpines of echini, echinites, madrepores of various kinds, entrochus, ſtar-*ſtones*, belemnites, &c.; *phytolithus*, or petrifactions of plants, of which there are ſeven ſpecies, as of the entire plant in coal ſlate, of ferns in ſlate, of roots in marble, of wood in various ſlates, as of lime-*ſtone*, agate, flint, ſand-*ſtone*, and ſlate, of leaves in ſlate and marble, of flowers in ſlate, and of fruits in coal ſtrata, commonly cones of the pine, nuts, acorns, &c.; *graptolithus*, or *ſtones* reſembling pictures, including eight

ſpecies, among which are Florentine marble or ſlate, reſembling ruins, dendrites, repreſenting woods, landſcapes, &c. ariſing from vitriolic ſolutions inſinuated between the plates of fiſſile *ſtones*, or in marble.

2. *Concreta*, which are ſlight conglutinations of different kinds of earths, whoſe ſpecific differences ariſe principally from the nature of the component parts: of this order there are ſix genera, viz. *calculi*, or animal concretions, including eight ſpecies, as the *ſtone* in the kidney or bladder, tartar of the teeth, of the lungs, bezoar *ſtones*, formed in the abomaſus, or fourth ſtomach of ruminating animals, ægagropila, or hair-balls, formed in the firſt ſtomach, bile ſtones, pearls, and crab's-eyes: *tartari*, or vegetahle concretes, of which are two ſpecies, as yeaſt, and red and white tartar: *ætites*, or concretions within the cavity of ſtones, of which there are the true, having a looſe nucleus, as the geodes with an earthy nucleus, and the aquilinus with a ſtony nucleus, and the ſpurious, as the hæmachates, or flinty ætites, with a fixed cryſtalline nucleus, marble ætites, including dog-tooth ſpar, and echinited ætites, including fluor cryſtals: *pumex*, or concretions by means of fire, including eight ſpecies, ſuch as black ſlate pumice, white pumice of iron furnaces, red copper pumice, ſoot, aſhes of volcanos, Rheniſh mill-*ſtone*, vitreous pumice, or black and green Iceland agate, &c.: *ſtalactites*, or concretions by means of air, including twelve ſpecies, as vegetable incruſtations, drop-*ſtone*, ſolid and branched marmoreous ſtalactite, ſolid ſpatoſe ſtalactite, red ſpatoſe ſtalactite, or zeolite, &c.: and *tophus*, or concretions in water, including twenty-two ſpecies, of which there are the metallic *tophs*, as the marly toph-*ſtone*, the tubular, marly, ochraceous toph-*ſtone*, the ſandy ochraecous ſea toph-*ſtone*, the bog iron ore in various forms, &c. and the ſimple tophs, as alum toph, concretions of tea-kettles, pea-*ſtone* of hot ſprings, oſteocolla, or bone-binder, ſolid black ſchiſtoſe toph, &c.

3. *Terræ*, or *earths*, which are foſſile ſubſtances not conglutinated, but uſually in a ſlightly cohering or pulverized ſtate: of this order there are five genera, viz. *ochra*, or *ochres*, or earths of metals, of which are fifteen ſpecies, ſome in the form of powder, as ochre of iron, green and blue ochres of copper, native ceruſs, ochre of cobalt, &c. and others plumoſe or germinating ochres, as copper blue, or plumoſe copper, flowers of antimony, plumoſe ſilver ore, with ſulphurated antimony and arſenic, &c.: *arenæ*, or *ſands*, including fourteen ſpecies, as ſea ſand, coloured ſands, ſands of heaths, ſabulum, or common ſand, micaceous, or glittering, or writing ſand; gold, iron, and flint ſand, &c.: ARGILLÆ, or *clays*, boles, and marles, including twenty-one ſpecies, ſome ſimple, among which are porcelain clay, tobacco pipe clay, China Porcelain earth, Lemnian earth, fuller's earth, tripoli, or rotten *ſtone*, brick clay, potter's clay, boles of different colours, &c. others mixed, as fermenting clay, marle, umbre, marle of the Nile, &c.: *calx*, or *chalk*, comprehending nine ſpecies, ſome ſoluble in acids, as creta or chalk, mineral agaric, ſhell-chalk, or mouldered ſhells, &c. ſome not ſoluble in acids, as true mineral agaric, gypſeous gur, or lac lunæ, and others granulated or ſandy, as alabaſter chalk, ſoluble arenaceous calx of the iſle of Aſcenſion, and lenticular granulated calx: and *humus*, or *mould*, of which there are fourteen ſpecies, as the impalpable vegetable mould, common black mould, depauperated mould of heaths, ſpongy mould of marſhes, alpine earth, turf, mould of lakes, or mud mould, red mould, animal mould, &c. See Linnæi Syſtema Naturæ, tom. iii. 1770. paſſim, and Pulteney's General View of the Writings of Linnæus, 1781, p. 131.—166.

Mr. Da Coſta, in his Natural Hiſtory of Foſſils, 1757, diſtributes *ſtones* into four general claſſes. The firſt claſs comprehends thoſe *ſtones* which are found forming continued ſtrata, coarſe, harſh, and rough, of a lax texture, of a viſible grit or grain, reſembling ſand in form, uſually immerſed in a cementitious matter, of little brightneſs, and ſcarce capable of any poliſh: of this claſs there are two genera, viz. *ſtones* harſh and rough, compoſed of a viſible grit, not of a laminated ſtructure, and ſplitting equally in any direction, called PSADURIA by Hill, of which there are the alkaline ſand-*ſtones*, as the PORTLAND-*ſtone*, FREE-*ſtone*, &c. ſand-*ſtones* not acted on by acids, as the WHET-*ſtone*, FILTRUM, MILL-*ſtone*, GRIND-*ſtone*, &c. and ſand-*ſtone*s imperfectly deſcribed by authors: and *ſtones* harſh and rough, compoſed of a viſible grit, of a laminated ſtructure, and ſplitting only horizontally or into plates. See FLAG.

The ſecond claſs includes *ſtones* that are found forming continued ſtrata, of a cloſe, ſolid, ſmooth texture, or compoſed of no viſible grit, and generally deſtitute of brightneſs, though in ſome degree capable of a poliſh: of this claſs there are two genera, viz. *ſtones* of a cloſe, ſolid texture, of a plain uniform ſtructure, and ſplitting with equal eaſe in any direction, diſtributed according to their colours, into black, white, aſh, and grey, red, brown, blue, green, and variegated, each of which is again ſubdivided into alkaline *ſtones*, and thoſe which are not acted upon by acids, comprehending the PURBECK-*ſtone*, OIL-*ſtone*, &c. and *ſtones* called SLATES.

The third claſs comprehends MARBLES and MARMOROIDÆ.

The fourth claſs includes the MARMORO-*præſera*, the GRANITES, and the PORPHYRIES. See FOSSILS.

STONES, *for the origin and formation of*. M. Tournefort, on his return from the Eaſt, in the year 1702, propoſed to the Royal Academy a new theory.

On a curious ſurvey of the famous LABYRINTH of Crete, he obſerved, that ſeveral people had engraved their names in the living rock, whereof its walls are formed; and, what was very extraordinary, the letters whereof they conſiſted, inſtead of being hollow, as they muſt have been at firſt (being all cut with knife-points) were prominent, and ſtood out from the ſurface of the rock, like ſo many baſſo-relievos.

This, he ſays, is a phenomenon no otherwiſe accountable for, than by ſuppoſing the cavities of the letters filled inſenſibly with a matter iſſuing from out of the ſubſtance of the rock; and which even iſſued in greater abundance than was neceſſary for filling the cavity. Thus is the wound made by the knife healed up, much as the fracture of a broken bone is conſolidated by a callus, formed of the extravaſated nutritious juice, which riſes above the ſurface of the bone: and this reſemblance is the more juſt, as the matter of the letters was found whitiſh, and the rock itſelf greyiſh.

Something very like it is obſerved in the barks of trees, wherein letters have been cut with the knife; ſo that the poet had reaſon to ſay, that the characters grew as the trees themſelves grew: *Creſcent illæ; creſcetis, amores.*

M. Tournefort ſupports his opinion by ſimilar calluſes apparently formed in ſeveral other *ſtones*, which had re-united after, by accident, they had been broken.

From theſe obſervations, he ſays, it follows, that there are *ſtones* which grow in the quarries, and of conſequence that are fed; that the ſame juice which nouriſhes them, ſerves to rejoin their parts when broken; juſt as in the bones of animals, and the branches of trees, when kept up by bandages; and, in a word, that they vegetate.

There is, then, he ſays, no room to doubt but that they are organized; or that they draw their nutritious juice from the earth. This juice muſt be firſt filtrated and prepared in their ſurface; which may be here eſteemed as a kind of bark; and hence it muſt be conveyed to all the other parts.

It is highly probable, the juice which filled the cavities of the letters, was brought thither from the bottom of the roots; nor is there any more difficulty in conceiving this, than in comprehending how the ſap ſhould paſs from the roots of our largeſt oaks, to the very extremities of their higheſt branches.

It muſt be owned, that the heart of thoſe trees is exceedingly hard; and yet thoſe of Braſil, called *iron wood*, guaiacum, and ebony, are much harder. Coral is as hard in the ſea as out of it, and ſea-muſhrooms, which every body allows to grow, are true *ſtones*, and ſo, like the common *ſtones*, are uſed in America to make lime of.

Some *ſtones*, then, he concludes, muſt be allowed to vegetate and grow like plants: but this is not all; he adds, that probably they are generated in the ſame manner; at leaſt, that there are abundance of *ſtones*, whoſe generation is inconceivable, without ſuppoſing that they come from a kind of ſeeds, wherein the organical parts of the *ſtones* are wrapped up in little; as thoſe of the largeſt plants are in their ſeeds.

The *ſtones* called *cornu Ammonis*, *lapis Judaicus*, *aſtroites*, thoſe of Bologna and Florence, the ſeveral kinds of pyrites, cryſtals of the rock, and an infinity of other *ſtones*, he ſuppoſes to have their ſeveral ſeeds: as much as muſhrooms, truffles, and various kinds of moſſes, whoſe ſeeds were a long time before they were diſcovered.

He continues, how ſhould the cornu Ammonis, which is conſtantly in figure of a volute, be formed without a ſeed, containing that ſame ſtructure in little? who moulded it ſo artfully? and where are the moulds? Far from this, theſe kinds of *ſtones* are found in the earth, like common flints. Nor were either their moulds, or any thing like them, ever diſcovered.

M. Tournefort examines the ſeveral kinds of *ſtones* above mentioned, and finds them under the ſame neceſſity of ſeed. Again, that immenſe quantity of pebbles, wherewith the Crau of Arles is covered, he thinks a ſtrong argument in behalf of this theory.

The country there, for twenty miles round, is full of roundiſh pebbles; which are ſtill found in equal abundance, to whatever depth you dig. Mr. Piereſc, who firſt propoſed the generation of *ſtones* by means of ſeeds (though he took the word *ſeed* in a very different ſenſe from M. Tournefort), firſt brought this extraordinary collection of them as a proof thereof. In effect, how could ſo many ſimilar pebbles be formed? There is no ſaying they are coeval with the world, without aſſerting at the ſame time, that all the *ſtones* in the earth were produced at once; which were to go directly contrary to the obſervations above mentioned.

Among the ſeeds of *ſtones*, M. Tournefort obſerves, there are ſome, which do not only grow ſoft by the juices of the earth, but even become liquid. Theſe, then, if they penetrate the pores of certain bodies, grow hard, petrify, and aſſume the figure or impreſſion of the body: thus what we call *pectinites*, *conchites*, *mytulites*, *oſtracites*, *nautilites*, *echinites*, &c. are real *ſtones*, the liquid ſeeds whereof have inſinuated into the cavities of the ſhells called *pecten*, *concha*, *mytulus*, *oſtrea*, *nautilus*, and *echinus*. On the contrary, if thoſe liquid ſeeds fall on flints, on ſhells, ſand, &c. they encloſe thoſe ſeveral bodies, and, fixing between them, form a kind of cement, which yet grows like other *ſtones*. It is highly probable, that ſuch rocks as are only an aſſemblage of cemented flints, have been formed by a number of theſe liquid ſeeds; in like manner as the quarries full of ſhell: unleſs the rocks have enveloped theſe bodies in their growth.

He even ſuppoſes, that there are ſeeds of real *ſtones* encloſed in the ſpawn of certain ſhell-fiſh; as well as that hard ſolid matter deſtined for the forming their ſhells.

There is, ſays he, a particular kind of ſhell-fiſh, called *pholas*, which are never found any where but in the cavities of flints, which are always found exactly fitted to receive them. Now, it is highly improbable the fiſh ſhould come and dig ſuch a nitch to ſpawn in; it is much more likely, the *ſtones* they are found encloſed in, were at firſt ſoft; and that the matter they are formed of, was originally found in the ſpawn, in like manner as the matter which forms the egg-ſhell, is really found in the ſeed thereof.

From the whole, he concludes, that the ſeed of *ſtones*, and even of metals, is a kind of duſt which probably falls from them while they are alive, i. e. while they continue to vegetate as above. This duſt may be compared to the ſeeds of ſeveral plants, which no microſcope ever yet diſcovered; though their exiſtence is not at all to be doubted.

Probably, flints and pebbles are among *ſtones*, what truffles are among plants: nor is this opinion new; Pliny aſſures us, that Theophraſtus and Mutianus believed, that *ſtones* produced *ſtones*: and Gregory Nazianzen adds, that there were authors who even believed, that *ſtones* made love, *Εϛι και αψυχοισιγαμος και δεσμος ερωτος*. Poem. de Virgin.

All this however is founded on the imperfect knowledge of thoſe times.

Since Mr. Tournefort's days we have diſcovered other ways of formation for the lapis Judaicus and cornu Ammonis, the firſt being only a petrifaction of the ſpines of an echinus marinus; and the other of a ſhell-fiſh nearly allied to the nautilus kind. See FOSSIL, JUDAICUS LAPIS, and CORNU AMMONIS.

M. Geoffroy accounts for the origin and formation of *ſtones*, in a different manner. He lays it down as a principle, that all *ſtones*, without exception, have been fluid; or at leaſt a ſoft paſte, now dried and hardened: witneſs the *ſtones* wherein are found foreign bodies; witneſs alſo figured *ſtones*, &c.

On this principle, he examines the formation of the different kinds of *ſtones*; and ſhews, that the earth alone ſuffices for the ſame, independent of all ſalts, ſulphurs, &c. The metallic particles contained in flints, give them their colour; but theſe are only accidents: for proof of which, he inſtances the ſapphires and emeralds of Auvergne, which loſe all their colour by a moderate fire conſuming their metallic parts; but without any damage to their tranſparence; they being hereby rendered mere cryſtals.

To view rock-cryſtal, indeed, one would not take it for earth; and yet earth it muſt be, not water congealed, as the ancients imagined.

M. Geoffroy conceives two kinds of primitive particles in the earth. Thoſe of the firſt kind are exceedingly fine, thin lamellæ, equal to each other, or nearly ſo. Now, when theſe meet together, from any cauſe whatever, in a ſufficient quantity; the regularity and equality of their figures determine them to range themſelves equally and regularly; and thus to form an homogeneous compound, which is very hard, from the immediate contact of the parts; and very tranſparent, by reaſon of their regular diſpoſition, which leaves a free paſſage to the rays of light every where: and this is cryſtal.

The parts of the ſecond kind have all ſorts of irregular figures; and muſt accordingly form aſſemblages that are much more opake, and leſs hard. Now cryſtal is formed wholly of parts of the firſt kind; and all other *ſtones* of a mixture of the two kinds of parts together: this mixture is abſolutely neceſſary, in order to unite and bind together the parts of the ſecond kind, and give them a hardneſs and conſiſtence, without which they would only make a ſand or duſt. Water now appears the fitteſt vehicle, to carry the parts of the firſt kind. This is ſeen from ſeveral petrifying ſprings, which incruſtate the pipes through which their waters are conveyed, or even ſolid bodies laid in them for ſome time. The water does not diſſolve thoſe earthy parts; it only keeps them in fuſion, as it does the juices wherewith plants are fed.

This water, thus charged with earthy particles of the firſt kind, M. Geoffroy calls the *ſtony*, or *cryſtalline juice*, whereof thoſe bodies are primarily formed. See CRYSTAL.

Some look upon *ſtones* as unorganized vegetables, and that they grow by the accretion of ſalts, which often ſhoot into angular and regular figures. This, it is ſaid, appears in the formation of cryſtals on the Alps; and that *ſtones* are formed by the ſimple attraction and accretion of ſalts, appears by the tartar on the inſide of a claret-veſſel, and eſpecially by the formation of a *ſtone* in the human body. Henkell has thrown together ſome very ingenious thoughts on this abſtruſe ſubject, in a treatiſe publiſhed in the year 1734, where he builds no opinions on any other baſis than that of facts, obſervations of nature, and experiments.

He ſuppoſes that the earth was at firſt every where ſoft on the ſurface, and that this ſoft matter by degrees, hardened, and formed *ſtones* of ſeveral kinds. He ſeems to imagine, that the ſurface of the earth was a ſecond time all reduced to this ſoft ſtate by the univerſal deluge at the time of Noah, and that this matter afterwards hardening into *ſtones* of various kinds, included the ſhells of ſea-fiſhes, and other animal remains of the produce of the ſeas, in flints, in lime-ſtone, or in whatever other ſubſtance the matter, among which they lay, chanced to harden. Thus may the ſea-ſhells, found ſingly in the middle of hard flints, or lodged in vaſt numbers in the ſtrata of earth, limeſtone, or marble, be accounted for.

Nor is water alone the agent that may have made theſe changes in the once ſoft parts of the earth's ſurface; we can by fire reduce the pooreſt earths into a ſort of glaſs, a hard tranſparent body, not a little reſembling the nature of flint, or the other ſemi-pellucid ſtones. Fire is of power to do great things in the bowels of the earth, and the way to learn what changes it may there make in *ſtones*, is to try its effect upon the ſeveral different kinds of *ſtones* and earths here. By experiments of this kind we learn, that of the ſeveral ſpecies of *ſtones* in their preſent ſtate ſome are reduced to a friable maſs, and finally to powder, by the force of fire; others are hardened by it; others are melted, and become a kind of glaſs: and by experiments on the other foſſil ſubſtances, it appears, that the original matter of all *ſtones* has been earth, either of the nature of chalk, marl, or clay; and that many of them have been greatly altered by receiving metallic or other mineral matter into their earthy matter, at the time of their formation; and all ſeem to have owed their change into their hard ſtate, either to fire alone, or to ſaline, oily, metallic, or ſaline ſulphureous matters, either conjunctly with the force of this agent, or alone. Henkell, Lithogeneſia.

Thoſe *ſtones*, which are formed in their preſent ſtate, immediately out of fluids, have been produced either by congelation, a rude coalition, or cryſtallization; and that all the gems have been once fluid is plain, from their imperfections in certain inſtances, as from their containing grains of ſand, or the like extraneous ſubſtances, firmly embodied in them. If theſe, the hardeſt of all *ſtones*, have been once fluid, there is no reaſon to diſpute, but that all the other kinds may have been ſo, which are leſs hard and leſs perfect.

STONES, *formed*, among *Naturaliſts*, mineral, or *ſtony* matter, caſt in the cavities of certain ſea-ſhells, or other parts of marine animals.

Of theſe ſome are found quite naked and bare; others have the remainder of the ſhell about them: and among theſe there are alſo found many real ſhells, ſcarce at all altered from their recent ſtate, buried at great depths in the earth, far from ſeas, and even on the tops of mountains.

This is by moſt ſuppoſed an effect of the general deluge, and by many is thought a convincing proof of the truth of that hiſtory; but there have been many who have aſſerted, that theſe bodies can convey no ſuch proof, ſince, as they aſſirm, they are not, nor ever were marine bodies, or owed their form to ſuch, but mere *luſus naturæ*, *ſtones* formed in the places where they are found, having no relation to animals of any kind, but only accidentally reſembling them. But the aſſertors of the former opinion have rather the better ſide of the argument.

It ſeems indeed contrary to the great wiſdom of nature, which is in all its productions, to deſign every thing to ſome determinate end, that theſe bodies ſhould have been ſo nicely formed by a mere plaſtic virtue in the earth, or endued with all the characters and neceſſary parts of animal coverings, &c. for no other end but merely to exhibit ſuch a form, without having any relation to the uſes theſe particulars are appropriated to in the animal. But if the origin of *ſtones*, found in the ſhape of ſhells, be doubtful, yet the real ſhells found in the earth cannot be ſuppoſed to have been formed there: yet theſe are found at as great diſtances from the ſea, and not only in the lower grounds and hillocks, but in the higheſt parts of the loftieſt mountains, even without the leaſt particle of ſtony matter about them; mere ſhells, unpetrified, uncorrupted, and of the exact figure, ſtructure, and conſiſtence of the ſea-ſhells, which are now habitations of living animals of the ſame ſpecies.

That nature ſhould form real ſhells, without ever intending them for the covering of an animal, ſeems no way probable; and indeed, were it true, would give great ſtrength to the atheiſt's opinion, that all things exiſted by mere chance, and were intended for no end or uſe. Nor are the ſhells the only inſtances of theſe foſſil bodies perfectly reſembling animal ones, but we find with them other parts of animals, as the teeth of fiſhes and land animals; which, though met with buried in earth, or on the tops of mountains, are plainly the ſame with the ſubſtances produced by the fiſhes, &c. of this kind are the teeth of the ſeveral ſpecies of ſharks, called *gloſſopetræ*; thoſe of the wolf-fiſh, called *bufonitæ*; the vertebræ of ſeveral fiſh, and the like.

The very inſpection is abundantly ſufficient to prove, that theſe were once parts of animals; but were that inſufficient, they have not, even in this their foſſil ſtate, ſo far diveſted themſelves of their animal nature, but that they carry proofs of it; and Columna has evidently proved their true origin from theſe. He obſerves, that all animal and vegetable ſubſtances, whether of a woody, bony, or fleſhy nature, by burning, are changed firſt into a coal, before they go into a calx of aſhes; whereas *ſtony* ſubſtances, on the contrary, do not burn into a coal, but are reduced at once into their calx or lime, or elſe into glaſs. But theſe teeth, ſuppoſed by ſome mere productions of the earth, all burn firſt to a coal, while the *ſtony* matter adhering to them does not; whence alone it is ſufficiently plain, that they and that ſubſtance are of very different kinds, and that they are truly of a bony, not a *ſtony* matter. It is alſo repugnant to that great maxim, that nature does nothing in vain, to ſuppoſe theſe teeth formed in the earth where they are now found, ſince they could there have no uſe as teeth, nor the vertebræ, or other bones, as bones. It is very certain, that nature never made teeth without a jaw, nor ſhells without an animal inhabitant, nor bones without the reſt of the body they belong to; theſe things are not made in this ſeparate and uſeleſs ſtate in the element to which they naturally belong, much leſs in a foreign one.

Their very ſubſtance and place alſo evince plainly, that they were not formed where they are now depoſited, for they are uſually lodged in *ſtones*, and *ſtones* contain not the matter of which they are made: and as to their place, they might have been lodged there, either when formed, which proves our aſſertion, or elſe they muſt have been at ſome time generated all of a ſudden there, or have grown from a ſmall origin, increaſing by little and little, as the animal ſubſtances which they reſemble do. Now, if the *ſtone*, in which they lie, was formed before them, and they were formed on a ſudden in it, how came the cavity there juſt to correſpond to their ſize? and if they grew by little and little, how could they form a cavity in the *ſtone*, without burſting or cracking it?

It is alſo no ſmall proof of theſe teeth being of a marine or animal origin; that they are not regularly ſhaped at the baſe, but are all broken, and that in various manners; which proves very plainly, that there has been no vegetation in the caſe, becauſe in all other figured foſſils it is obſerved, that they are never found mutilous or imperfect. It cannot, with any ſhew of reaſon, be ſuppoſed, that theſe teeth were thus broken within the body of the *ſtone* where they now lie, but it is plain that they were lodged in the *ſtone* at a time when it was ſoft, and were before that broken off from the jaw of the creature in this irregular manner.

It is likewiſe no weak argument, that theſe bodies are not formed at this time in the *ſtone*, that they are all found perfectly alike; for, if they were continually increaſing in ſize or number, it is probable, that the new formed ones would be ſome way different from thoſe which were of older date. The variety of ſpecies in the *gloſſopetræ* alone may evince, that they belong to the animal to which they are attributed, ſince they are of very different kinds. See GLOSSOPETRÆ and SERPENT's *tongues*.

The perfection of the figures of theſe bodies is a farther proof of their origin from animals which they repreſent, ſince in all cryſtallizations there are many imperfect and mutilated figures, nay more than perfect ones.

To all this it may alſo be added, as an unanſwerable proof of the foſſil ſhells having been once marine, and having lived in the ſea, that they are found with injuries which could have been no way elſe received. The purpura, and ſome other ſhell-fiſhes, have bony tongues, with which they bore regular holes though the ſhells of ſhell-fiſh of other kinds, in order to make their way in, and prey upon their fleſh. Theſe holes are always eaſily known by their regularity and ſhape; and ſhells bored through in this manner are not only frequent on our ſhores, but there are ſuch alſo found foſſil, bedded in the ſtrata of earth or *ſtone*; and ſurely, if ſalts could be allowed to have ſhot into the figures of ſea ſhells, they could never be ſuppoſed able to ſhoot into the figures of ſuch wounds, as a few of thoſe ſhells have received in their recent ſtate from other animals.

The general opinion is, that the deluge brought all theſe ſhells into the places where we ſee them; but this ſeems not eaſily conceived; and as there is no argument ſo good, but that being carried too far it will make againſt its purpoſe, ſo the laying too much to the effects of the general deluge, has made many believe it has done nothing at all.

Theſe *formed ſtones* and real ſhells are both found in vaſt ſtrata on the tops of the higheſt mountains, the Alps, Apennines, and others in different parts of the world. The deluge laſted only ten months, and probably the tops of mountains were not covered half that time; and theſe immenſe quantities of ſhells cannot be ſuppoſed either to have bred there in that time, or to have been carried ſo high in ſuch prodigious numbers. It is more probable that theſe tops of mountains were once not ſuch, but bottoms of the ſea. The hiſtory of the marine bodies they contain is then very plain, and earthquakes may have raiſed them, or they may indeed not be ſo high above the level of the ſea, as we at firſt ſight ſuppoſe. If indeed we adhere to the letter of the text, in the Scripture hiſtory of the creation, we can find no account for theſe bodies from that time; for if the creation of fiſhes ſucceeded the ſeparation of the land from the water in all parts of the globe, they could not be then depoſited there; but it is poſſible, that at the creation the whole earth was not at once uncovered, but only thoſe parts where Adam and the animals were created, and the reſt gradually afterwards, perhaps not in many years, as there ſeems no neceſſity of underſtanding the account of the creation to have been in ſix natural days. If we may thus underſtand, and conjecture in this reſpect, it is not difficult to conceive, that during the years in which the earth remained covered with ſea-water, ſhell-fiſh might breed and multiply abundantly all over its bottom; and this bottom being afterwards elevated, deſerted by the ſea, and made dry land, theſe ſhells muſt be elevated with it, and retained in thoſe ſtrata, which afterwards hardened into the various kinds of earth and *ſtone*: and ſomething of this kind ſeems to have been the caſe, much rather than, according to Dr. Woodward, that all ſtony matter ſhould have been diſſolved by the deluge, and afterwards have concreted again. Ray's Phyſico-theological Diſcourſes.

For other hypotheſes and obſervations relating to this ſubject, ſee *Adventitious* FOSSILS, MARINE *Remains*, SEMINIUM and SHELLS.

STONES, *ſolution and colours of*. The various beauties of the form and colour of the ſeveral more precious *ſtones*, cannot but have been always the admiration of the curious part of the world, and the ingenuity of the ableſt chemiſts hath been tried, in attempting to counterfeit them; and much may be gathered even from their attempts, which have not ſucceeded, toward the learning the true nature and hiſtory of theſe beautiful bodies.

The beautiful figures of the Florentine marble, whoſe veins repreſent trees, rivers, and ruins of buildings, are well known; as are alſo the delineations of trees and ſhrubs in thoſe ſpecies of white agates, called *Mocoa ſtones*. All the *ſtones* of this kind are natural, for art has yet not been able to come up to any counterfeit of them; but it is not ſo in regard to thoſe agates which repreſent regular figures of beaſts, &c. theſe are all aſſiſted by art, and that by a very ſimple and eaſy proceſs; and Mr. Du Fay, in the Memoirs of the Paris Academy, has given at one view the ſeveral ways, then known, to penetrate into the ſubſtances of agate, marble, &c. and to lodge figures in them.

The *ſtones* ſubject to be tinged he divides into two claſſes, the harder and the ſofter. Of the harder kind are thoſe which reſiſt the force of acids, even of the moſt powerful kind; and of this claſs are agates, onyxes, and all that are vulgarly comprehended under the general name of the gems, or precious *ſtones*, with cryſtal, porphyry, granite. Theſe, and the like *ſtones*, are not ſoluble in any of the known acids, yet theſe ſame acids, impregnated with the ſolutions of metals, are capable of penetrating very deeply into them, and tinging them with different colours.

The ſimple agates and jaſpers, and other *ſtones* of the like uniform ſtructure, are eaſily coloured in an uniform manner; but thoſe which are variegated with veins are compoſed of ſeveral different ſorts of matter, and therefore are leſs eaſily, and leſs evenly ſtained. As the tinging matter does not penetrate the ſeveral beds, or veins, in the ſame manner, therefore all that can be done to theſe, is to add ſpots and veins to their natural ones, but they cannot be tinged throughout to one uniform colour, as the chalcedony or white agate may.

If a ſmall quantity of a ſolution of ſilver in ſpirit of nitre, be poured upon one of theſe agates, and the *ſtone* expoſed to the ſun, it will in a few hours be tinged to a reddiſh brown colour; and if more of the ſame ſolution be added, and it be again expoſed, the colour will become ſtronger, and will penetrate deeper into the body of the *ſtone*; and if the *ſtone* be not too thick (e. g. more than a ſixth part of an inch), and the ſolution be rubbed on both ſides, it will tinge it throughout. Nor is this all the effect, for it will give it ſeveral veins and lineations, which were not diſtinguiſhable in it before; the reaſon of which is, that in all theſe *ſtones* there are ſome parts harder than the reſt, and conſequently more difficultly coloured, and theſe remaining, therefore, paler than the reſt of the maſs, make the lines and veins in it.

If there be added to the ſolution of ſilver, uſed for this purpoſe, a fourth part of its quantity of ſoot, and as much ſalt of tartar, the colour becomes grey; and if, inſtead of this ſoot and tartar, the ſame quantity of plumoſe alum be uſed, the *ſtone* will be tinged to a deep violet colour, tending to black.

A ſolution of gold gives agate only a pale brown colour, and that penetrates but a little way into it; and a ſolution of biſmuth gives a colour, which appears white when the light falls directly upon it, but brown when it is held againſt the ſunſhine, or a candle; and all the metallic and mineral ſolutions, employed in the ſame manner, affect the *ſtone* more or leſs in the ſame way.

The expoſing the *ſtones* to the ſun is a very neceſſary article in the proceſs, ſince without that the tinge is but very faint, and penetrates but to a very little depth. To trace in the chalcedony, or white agate, figures of any determinate kind, the uſual method is this: before the agate is poliſhed, mark out the intended figure with the point of a fine needle, and afterwards with a bruſh, or a pen, follow thoſe lines with a very ſtrong ſolution of ſilver.

One would imagine that the dendritæ, or delineations of trees in Mocoa *ſtones*, might be imitated in this manner; but it is difficult to give the due blackneſs of colour, and to mark the figures with a like preciſion and exactneſs. See Agates.

If any *ſtone* ſhould, however, be ſuſpected to be adulterated, or counterfeited in this manner, it is eaſily brought to the trial; for if it be thus made, a ſmall heat over the fire will almoſt entirely diveſt it of its colour, and the rubbing a little ſpirit of nitre, or aqua fortis over it, will have the ſame effect. In both caſes the *ſtone* may, however, be reſtored again to its beauty; in the firſt, by tinging it afreſh with the ſame liquor, and in the laſt, by only expoſing it for ſeveral days to the ſun.

It is well known, that by means of fire alone the amethyſt, the ſapphire, and the other gems, may alſo be wholly diveſted of their beautiful colours. The method of doing this is, to put the gems into a crucible, ſurrounding them with ſand, or with ſteel filings; then putting them into the fire, they loſe their colour as they become hot, and are taken out wholly colourleſs. If the white agate be calcined in this manner alone, it becomes of a cloudy or opake white; but if it has before been ſtained with the ſolution of ſilver, thoſe ſpots or ſtains become of a yellow colour, which aqua fortis afterwards has no power to take away. If the agate be calcined firſt, and afterwards rubbed over with the ſolution of ſilver, it receives ſome ſpots and lines of brown. The cornelian loſes a great part of its redneſs by calcination, and becomes of a duſky fleſh-coloured white; and the Mocoa *ſtone*, treated in the ſame manner, loſes all its colour, and the delineations of trees diſappear.

There are many *ſtones* on which the ſolution of ſilver has no effect; of this number are all the gems, rock cryſtal, and the like. The dendrites of Catalonia is alſo of this kind; and of this *ſtone* the artificers relate an odd phenomenon, which is, that if it be ſawn aſunder there, are very few delineations obſerved in it, but if it be ſplit by a blow, it is uſually found full of them. The reaſon of this is only that theſe delineations are ſo many flaws and cracks, and the *ſtone* breaks eaſieſt in theſe places.

The effects of the ſolution of ſilver are different, as to degree of colour, on different *ſtones*. The Oriental agate receives from it a deeper and blacker tinge than the common chalcedony. Some agates, naturally diſtinguiſhed by their yellow ſpots, receive a purple colour from it. The jade *ſtone*, uſed by the Turks, takes only a faint tinge of brown. The common prime emerald, or root of the emerald, becomes blackiſh with it. The Oriental granite is tinged in many places with a violet colour by it; this is principally effected in the white parts. The ſolution does not act much on the black ones, only that it takes ſome of them away. The ſerpentine marble receives an olive colour from it; but it is remarkable that the amianthuſes, and the talcs, and other foliaceous *ſtones*, are wholly unaffected by it.

There is another method of ſtaining *ſtones* of a colour more truly black than that which the ſolution of ſilver communicates to moſt of them, and with this farther difference, that the colour being produced by fire, has not been deſtroyed (ſays Dr. Lewis) either by moderate fire, or by aqua fortis. Pieces of different *ſtones*, marbles, pebbles, flints, &c. may be waſhed over with a ſaturated ſolution of copper made in aqua fortis; when dry let them be put into a crucible, and kept for a little time in a fire juſt ſufficient to make the veſſel almoſt red hot. All of them will be thus ſtained in the parts moiſtened with the ſolution of a black colour, durable, and pretty deep, though it penetrated only a very little way into the ſubſtance of the *ſtones*.

Dr. Lewis ſuſpects, from ſome experiments on the ſolution of ſilver applied to different ſubſtances, which he has mentioned (Phil. Com. of Arts, p. 350.) that this ſolution ſtains *ſtones* only in virtue of their containing a calcareous earth, or ſuch an earth as the acid is capable of diſſolving: if this be the caſe, there is no wonder that ſome of the hard *ſtones* ſhould be ſtained, and ſome of the ſoft unaffected by it.

Marble being a ſubſtance much ſofter than agate, receives the colours with much greater eaſe, and the doing this in an accurate manner has been the ſubject of the attempts of many eminent men.

Kircher has given ſome directions for the ſtaining marble, which have been tranſlated word for word in the Philoſophical Tranſactions; but they are ſo indeterminate and uncertain, that nothing can in reality be learned from them. See *Colouring of* Marble.

Many others have alſo written on the ſame ſubject, but Mr. Du Fay is the only one whoſe experiments are plainly and clearly laid down, and may be followed by any body.

This gentleman choſe the common white marble without veins for making his experiments, for the ſame reaſon that he choſe the plain agates, becauſe in the veined ones there are ſeveral different ſorts of matter, all of which are not to be penetrated with equal eaſe. The ſolution of ſilver penetrates into marble to the depth of an inch, or more, and gives a tinge, reddiſh or purple at firſt, and afterwards brown, from which colour it never varies afterwards. It always takes off the poliſh of the marble, eating away a part of its ſurface. The ſolution of gold does not penetrate ſo deep into marble as that of ſilver, but it gives a beautiful violet colour.

Both theſe experiments are much aſſiſted by expoſing the marble to the ſun. The liquors uſually diffuſe themſelves, and ſpread every way in the marble, ſo that it is not eaſy to make any figure with them that ſhall keep its outline tolerably regular. And this imperfection appears to be the leſs, according as the ſolution is the more ſaturated, ſo as to dry or cryſtallize the more ſpeedily. An eaſy method of obviating this inconvenience, ſays Dr. Lewis, is ſuggeſted by the practice of the engraver; for the means, by which he confines the aqua fortis on his copper-plates to the minuteſt ſtrokes, would doubtleſs anſwer the ſame intention here. The ſurface of the *ſtone* being coated with a proper tenacious ſubſtance, which the acid cannot act upon, as the compoſition called Etching-*wax*, which conſiſts of reſinous ſubſtances melted with wax, or boiled with oil to a due conſiſtence; and the drawing being made in this ground, ſo that each ſtroke may reach down to the *ſtone*, it may be preſumed that the ſolution of ſilver, afterwards applied, will no where ſpread farther than the parts thus laid bare. See *Colouring of* Marble.

The ſolution of copper gives marble a beautiful green tinge, but it does not penetrate deep, and on the application

tion of boiling water becomes black; when the ſurface is poliſhed off afterwards, however, it becomes again of a beautiful green. Beſide the powerful acid menſtruums, there are many other liquors which have a power of penetrating deep into marble. Of this nature are all the oily fluids; but the expreſſed oils have this diſadvantage, that they leave a fattineſs in the marble which will not ſuffer it afterwards to take a good poliſh.

All ſubſtances which can penetrate marble, can carry colours into it; but ſuch are moſt eligible, which having lodged the colours, evaporate, and leave them there, without injuring the *ſtone*. Spirit of wine is of this number; it is excellently qualified for the extracting beautiful tinctures, and ſinks them very deep. Oil of turpentine alſo has its value, but it does not take tinges ſo well as the ſpirit. Some have recommended lixiviums of the fixt alkaline ſalts, but they very rarely produce any beautiful colour. In the uſing theſe fluids the marble is to be gently heated, and the ſpirit is by that means evaporated before it is cooled, leaving its colour always behind.

White wax penetrates very deep into hot marble, and conveys colours into it in a very beautiful and determinate manner. There are however but a few bodies, which will impart their colours to wax, and therefore this valuable means is of a very limited uſe.

Several of the gums alone are alſo able to tinge marble very ſtrongly. Dragon's blood, and gamboge, if rubbed on hot marble, penetrate to the depth of about a twelfth of an inch: the gamboge requires the marble to be hotter than the other, and tinges it to a very beautiful yellow; the dragon's blood tinges to a red in different degrees, according to the heat of the marble.

If theſe gums have been uſed to poliſh marble, there is no farther caution neceſſary than the cleanſing them off from the ſurface with a little ſpirit of wine: but the way to make them ſink deeper into the *ſtone*, is to take off the poliſh by rubbing the ſurface with pumice, or the like, and then the gums ſink much farther, and the colours appear very beautiful when the marble is poliſhed again.

Though theſe gums act alone, yet they will ſucceed much better if diſſolved in ſpirit of wine, and applied with a pencil; for by this means they ſink deeper in, and the figures traced out will keep their determinate form and outlines, theſe ſolutions fixing immediately, without ſpreading any way. It is alſo remarkable, that the ſolution of dragon's blood hardens the marble, and renders it leſs ſoluble in acids than before; ſo that if a piece, ſtained in part with this ſolution, be afterwards rubbed over with an acid diſſolvent, and its ſurface eaten away to ſome depth, the parts which are coloured will all ſtand out above the reſt.

A tincture of Braſil wood in ſpirit of wine tinges marble red, and if the heat given to the marble be greater, it becomes purple; but both theſe colours fade a little in keeping. A tincture of cochineal gives a purpliſh red, and the more the marble is heated, the farther the colour penetrates, and the deeper it is.

In oil of turpentine the colour of cochineal penetrates much deeper into the marble, but it has a browniſh caſt. Alkanet root, by means of ſpirit of wine, gives alſo a red colour, which, if the heat be too great, changes to brown; and this, and moſt other of the like matters, tinge the marble, in tincture with ſpirit, to a ſlight depth; and in oil of turpentine they ſink much deeper, but then the oil leaves a greaſy look upon the marble.

If verdigreaſe be boiled a conſiderable time in white wax, it tinges marble, when rubbed hot upon it, to a beautiful green, little inferior to that of the coarſer emeralds, and the colour ſpreads itſelf very equally, and penetrates to a third of an inch deep; if the marble be made too hot, the colour becomes that of the jade-*ſtone*. Alkanet boiled in white wax gives a fleſh colour, which penetrates very deep; and the roucou boiled in wax makes a permanent yellow, which alſo ſinks very deep. The beſt way of heating marble for this purpoſe, is to lay the piece, intended to be ſtained, upon a bed of ſand, a fifth of an inch deep, upon an iron plate; this is to be ſet over the fire, and when of a proper degree of heat, the colour is to be applied. The juſt degree can only be found by experience, and it varies indeed in almoſt every colour; but in general, the finer colours require the marble to be of ſuch a heat, that the hand can juſt bear to be laid upon it, and the others require a ſomething greater degree than this.

Black is, of all colours, the moſt difficult to give in this manner to marble; and perhaps indeed it is impoſſible to give that colour in any degree of perfection; and that for this plain reaſon, that all theſe colours only fill the interſtices between the granules of the marble, thoſe granules themſelves remaining unaltered: thus, in the other colours, the whiteneſs of the granules is only a heightning to the tinge, making it brighter, and a little paler; but the whiteneſs can never fail to appear diſtinguiſhably as ſuch in black, and by that means deſtroy that colour.

Dr. Lewis obſerves, that he has ſtained the porous marbles, which admit water to ſink into them, of a full black colour with common ink, either by applying on the warm marble an ink already made, or by the alternate application of aſtringent liquors and ſolutions of iron; but with the more compact marbles this method did not ſucceed, though they were heated ſo far as to make the liquors boil upon them: however, by ſolution of copper, managed as above related, and by a ſolution of the metallic part of cobalt in aqua regia, employed in the ſame manner, the moſt compact pieces were ſtained black; though the proceſs requires too great a heat to be practiſed on marble without danger of injuring the *ſtone*. The colour which ſolutions of gold communicate to marble, in its deep ſhades, obtained by repeated applications of the ſolution, approaches very near to black.

Next to black, blue ſeems the moſt difficult, of all the colours, to give to marble. Mr. Du Fay, however, having found by Mr. Geoffroy's experiments, that oil of thyme, by long ſtanding with ſpirit of ſal ammoniac, acquired a blue colour, tried this mixture, and found it ſucceed very beautifully; but this is one of thoſe colours which require the marble to have but a very ſmall degree of heat, ſince a greater would evaporate them before the colour had time to penetrate.

When the oil of thyme is digeſted with the volatile ſpirit, it becomes firſt yellow, then red, then violet, and at laſt of a deep blue. In ſix weeks digeſtion it had acquired a pale blue, and in this ſtate gave little colour to marble: after ſtanding for ſix months, it was deepened almoſt to a black blue, and being now applied on warm marble, gave the ſtain deſired.

Mr. Du Fay alſo ſtained marble of a blue colour with tincture of archel. The tincture of it in water is applied on cold marble, and renewed as it evaporates, till the colour is ſufficiently deep. He ſays, that he ſaw pieces of marble thus ſtained, which in two years were not ſenſibly changed.

The colours of the gums may be laid on when the marble is cold, and on heating it afterwards they will ſink into it. See *Colouring of* MARBLE.

There is another very elegant ſort of workmanſhip to be performed on marble, that is, the tracing figures in relief in it; and this is done much more eaſily than might be imagined, there being nothing more required to it, than the ſaving the parts which are to be left in relief, by covering them with a varniſh, and eating away the reſt by means of an acid. For this purpoſe let the deſigned figures be traced in chalk upon the marble, and cover them with a bed of varniſh, made by diſſolving a piece of common red ſealing-wax in ſpirit of wine; then pour on the marble a mixture of equal parts of ſpirit of ſalt and diſtilled vinegar, and this will eat down all the ground, and leave the figures ſtanding, as if engraved with immenſe trouble. The adding the colours before deſcribed, to theſe marbles afterwards, in a regular manner, will give them a ſurpriſing beauty. Mem. Acad. Par. 1728 and 1732. Lewis's Phil. Com. of Arts, p. 436, &c.

Mr. Muller, in grinding ſome aurum fulminans, made by diſſolving gold in aqua regia, and precipitating it with ſalt of tartar, together with ſome red glaſs powdered, and a little water added, found that this mixture ſtained the onyx, or chalcedony, of which the mortar was made. He was rubbing this mixture together to make an enamel colour, and leaving it three or four days in this little mortar, he found, that not only where it had been rubbed againſt the bottom of the mortar, but where it had accidentally ſplaſhed againſt the ſides of it, and on the ſurface of the peſtle, it had tinged them both very deeply to a fine red, leaving the intermediate parts of a true onyx, or chalcedony colour, wholly unaltered. The poliſh of the *ſtone* was not injured in the places where it was thus *ſtained*, nor could any art get out the colour, though it was tried with alkalis and other ſharp liquors. This colour was not given to theſe parts of the *ſtone* of the mortar in ſimple blotches, but formed itſelf into regular lines, as we ſee the natural colours of *ſtones* do; but this not in the ſame degree of colour, but ſome of the lines were deeper, others paler.

This experiment was repeated in ſeveral other mortars of the ſame *ſtone*, but without ſucceſs; on which the *ſtones*, of which they were compoſed, were examined with the help of glaſſes, and it was found that this mortar chanced to be made of a more flaky chalcedony than any of the others, though it appeared equally ſolid and beautiful to the naked eye, and bore a poliſh no way inſerior to them. It may be worth while, on this occaſion, ſtrictly to examine *ſtones* of this chalcedony kind, and on meeting with a plate of one of them of this flaky kind, to cover it with this mixture, and by that means give it a ſeries of lineation, which muſt make it a very beautiful and valuable *ſtone*. The poliſh will not be injured by this, or if it ſhould, the adding a new poliſh will not at all affect the colours. In the ſame manner the texture of *ſtones*, intended for any other experiments in *ſtaining*, ſhould be conſidered, and the chooſing proper ones may make this proceſs ſucceed on them. Phil. Tranſ. N° 179.

STONE, *artificial*. See MORTAR and STUCCO.

STONE, *Bolognian*. See BONONIAN, LAPIS *Bononienſis* and PHOSPHORUS.

STONE, *butter of*. See BUTTER *of ſtone*.

STONE, *calamine*. See *Lapis* CALAMINARIS.

STONE, *cauſtic*. See CAUSTIC and LAPIS *infernalis*.

STONES, *chalk*. See CHALK.

STONE, *chich*. See CICERUM *lapis*.

STONE, *copperas*. See COPPERAS and PYRITES.

STONES, *corner*. See CORNER.

STONE, *eagle*. See ÆTITES.

STONES, *eft*. See EFT-*ſtones*.

STONE, *emery*. See EMERY.

STONE, *fire*. See FIRE-*ſtone*.

STONE, *fleſh*. See SARCITES.

STONES, *free, grind, gritt, gypſine*, and *Horſham*. See FREE, &c.

STONES, *gall*. See BILIARY *concretions* and STONE, in *Medicine*.

STONE, *horn*. See LAPIS *corneus*.

STONE, *Jewiſh*. See JUDAICUS *lapis*.

STONE, *infernal*. See LAPIS *infernalis*.

STONE, *lime*. See LIME.

STONES, *medical*, a term uſed by ſome to expreſs thoſe particular *ſtones*, which for their real or imaginary virtues have, at one time or other, been made ingredients in medicinal preparations.

The opinions of the ancients, in regard to the virtues of gems and precious *ſtones*, were very whimſical; they ſuppoſed that they had certain ſympathetic properties, and that the wearing them on the finger, or carrying them in the pocket, would cure diſeaſes, render the gods propitious to their prayers, or ſave them from thunder. Theſe have been deſervedly laughed out of the world in our more enlightened times; but it has remained a queſtion, and does ſo, even to this time, whether or not ſome of the gems have real medical virtues, naturally reſulting from their parts, and conſtituent matter. See GEM.

STONE, *moor*. See MOOR-*ſtone*.

STONE, *philoſopher's*. See PHILOSOPHER'S *ſtone*.

STONES, *Portland, pumice, Purbeck*, and *roll-rich*. See PORTLAND, &c.

STONE, *rotten*. See TRIPOLI.

STONE, *ſanguine*. See SANGUINE *ſtone*.

STONES, *ſhoad*. See SHOAD-*ſtones*.

STONE, *touch*. See TOUCH-*ſtone*.

STONE, *whet*. See COS and WHET-*ſtone*.

STONE alſo denotes a certain quantity, or weight, of ſome commodities.

A *ſtone* of beef at London, is the quantity of eight pounds: in Herefordſhire, twelve pounds: in the North, ſixteen pounds.

A *ſtone* of glaſs is five pounds; of wax, eight pounds.

A *ſtone* of wool (according to the ſtatute of 11 Hen. VII.) is to weigh fourteen pounds; yet in ſome places it is more, in others leſs; as in Glouceſterſhire, fifteen pounds; in Herefordſhire, twelve pounds.

Among horſe courſers, a *ſtone* is the weight of fourteen pounds.

The *ſtone troy*, in Scotland, contains ſixteen pounds, the pound being two marks, or ſixteen ounces.

STONES, *characters on tomb*. See CHARACTERS.

STONES, *engraving on*. See ENGRAVING.

STONE, *face of*. See FACE.

STONE, *oil of*. See OIL *of ſtone*.

STONE, *painting on*. See PAINTING.

STONE, *ſculpture in*. See SCULPTURE.

STONES, *ſtaining of*. See *Solutions*, &c. *of* STONES and MARBLE.

STONE, *of ſcandal*. See SCANDAL.

STONE, in *Medicine*, is the denomination of a diſeaſe, called alſo *calculus, lithiaſis* or *nephritis*.

It conſiſts of a ſtony concretion, formed either in the bladder, in which caſe it is called LITHIASIS; or in the kidneys, when it is denominated NEPHRITIS; which prevents the diſcharge of urine, and occaſions violent pains.

The *ſtone*, Etmuller ſays, is not a diſeaſe, but the product of a diſeaſe. the diſeaſe, properly, is the *lithiaſis*, or the diſpoſition of the kidneys and bladder to generate *ſtones*.

When ſmall *ſtones* are lodged in the kidneys, or diſcharged along with the urine, the diſorder is called the GRAVEL; but if one of theſe *ſtones* happen to make a lodgment in the kidneys, or in the bladder for ſome time, ſo as to accumulate freſh matter, and become too large to paſs off with the urine, or if it paſſes from the kidneys, and obſtructs the ureter, or paſſes with great difficulty, the patient is ſaid to have the *ſtone*. By a fit of the gravel, or *ſtone*, are underſtood the pain and other ſymptoms that uſually attend ſtony concretions in the kidneys, &c. eſpecially when nature makes an effort for their diſcharge.

The *ſtone* and gravel may be occaſioned by high living; the uſe of ſtrong aſtringent wines; a ſedentary life; lying too hot, too ſoft, or too much on the back; the conſtant uſe of water impregnated with earthy or ſtony particles; aliments of an aſtringent or windy nature, &c. Theſe diſorders may likewiſe ſometimes proceed from an hereditary diſpoſition. Perſons in the decline of life, and thoſe who have been much afflicted with the gouty rheumatiſm, are moſt ſubject to them.

The *ſtone* is generated, according to ſome authors, of the earthy viſcid parts of the blood, hardened, in courſe of time, by the heat of the kidneys; much after the manner as brick is baked in a kiln.

Dr. Quincy ſuppoſes it generated of the harder parts of the urine, pent up by the ſtraitneſs of the ducts, and brought into contact and coheſion.

Etmuller aſcribes the *ſtone*, ſometimes to the ſtony and metallic particles of our foods and drinks, which the reins, through weakneſs and relaxation thereof, cannot eject; but more uſually to the unequal ſtrength of the kidneys, whence it is that we ſee one kidney often breeds *ſtones*, the other remaining ſound.

The matter of the *ſtone* in the bladder is firſt formed in the pelvis of the kidneys; whence falling into the bladder, it becomes augmented by new lamellæ or coats.

Dr. Mead ſeems to think, that the proximate cauſe of this diſeaſe is a tartarous ſalt conveyed out of the blood into the ſmall ducts of the kidneys, for it is the nature of theſe ſalts to contain a conſiderable quantity of that ſubtile matter which Newton has ſhewn to be the cauſe of the coheſion of bodies. Thus, the calculus is a ſubſtance compoſed of earth and a very large ſhare of air concreted in the renal ducts; and either remains therein, or drops down into the urinary bladder.

Dr. Hales found, by diſtilling a human calculus in an iron retort, that half of it was raiſed by the action of the fire into elaſtic air. Theſe particles of air, which are combined in it in an unelaſtic ſtate, are firmly united together by ſulphur and ſalt; the proportion of caput mortuum, or earth, being very ſmall. And Mr. Boyle found in ſuch a calculus a conſiderable quantity of volatile ſalt, with ſome oil.

Dr. Hales alſo found, that tartar of wine contained above five hundred times its bulk of air: and, therefore, this as well as the calculus yielded a much greater proportion of air in diſtillation than any other ſubſtances, whether animal, vegetable, or mineral. It was alſo remarkable, that a greater proportion of this new raiſed air from theſe two ſubſtances was reſorbed, and loſt its elaſticity in ſtanding a few days, than that of any other parts of animals or vegetables: from whence, as well from the great ſimilitude obſervable in many other reſpects between theſe ſubſtances, he infers, that the calculus is a true animal tartar, of the ſame kind with gouty concretions.

As the tartar of urine is known conſtantly to adhere to urinals, and other veſſels in which it is contained, he does not doubt that it would likewiſe adhere to the ſubſtance of the bladder, if it were not defended with a ſlimy coat. Accordingly, it is obſerved by modern phyſicians, that the more mucilaginous the urine itſelf is, the leſs apt it is to breed the *ſtone*, and *vice verſâ*. Hence, he infers, that the ancients were much miſtaken, when they generally attributed the growth of the calculus to mucoſe, pituitous matter, which is ſometimes ſeparated plentifully from the ſcrophulous glands of the bladder, but is not found to harden into a calculus.

It was the general opinion of the learned in Beverovicius's time (who publiſhed what they wrote to him about one hundred years ago) that the matter of the calculus was a pituitous viſcid matter, cauſed by the ill-diſpoſed kidney, and hardened by the heat of the bed: but Helmont, in his treatiſe De Lithiaſi, explodes this notion; and obſerves, on the contrary, that the viſcid matter, which is ſometimes found in thoſe who have a *ſtone* in the bladder, ariſes from the mucilage which the *ſtone* rubs off the bladder; for when the calculus is out of the bladder, there is no more viſcid matter in the urine; that if it aroſe from this mucus, the bladder would ſoon be filled with a calculus; that this mucus dried, makes only a little chalk-*ſtone*; and that it cannot incruſt in the bladder to form a calculus; whence he concludes, that it does not ariſe from this mucus, but from a part of the urine which adheres to urinals. Though he filtrated urine through linen, yet it ſtill depoſited its tartar; and hence he infers, that the tartar was not formed when the urine was firſt voided, but that it is formed, and adheres to the veſſel long after the urine is made, when it begins to putrefy, the very inſtant before it fixes; to which more and more is continually added: and he apprehends, that the calculus grows in the ſame manner. He obſerves this tartar to adhere ſooner, and in greater plenty, to a veſſel already incruſted with it than to a clean veſſel; becauſe the fixed tartarine particles attract more ſtrongly than thoſe of the ſides of the veſſel. The reaſon he gives why urine long detained in the bladder does not depoſit its tartar on the ſides of the bladder as in a pot, is, becauſe in the bladder it is not ſo ſoon diſpoſed to putrefy, and that tartar will not adhere ſo well to the bladder as to a pot.

The urine that is made at the greateſt diſtance from drinking is obſerved to be moſt rancid, becauſe it has not only been longer digeſting in the blood, but alſo becauſe the more watery part goes off firſt in greater proportion. Hence it ſeems probable, that the *ſtone* does not increaſe with an equable progreſſion in thoſe that are ſubject to it, but faſter or ſlower, in proportion to the more diuretic and diluted, or more rancid ſtate of the urine. Whence we may not unreaſonably conclude, that the *ſtone* increaſes faſter in the ſummer, when a greater proportion of moiſture is perſpired off, and the urine rendered thereby more rancid, than in the winter, when the perſpiration being diminiſhed, a greater quantity is diſcharged by urine. And, beſides, heat is known to contribute to the induration of many bodies. Aretæus, on the contrary, imagined the calculus to be increaſed moſt in winter and autumn, from a ſuppreſſed perſpiration. The laminæ, or coats, which are obſerved in many of the calculi, afford a farther confirmation of this reaſoning; for when the urine does not depoſit its tartar plentifully on the calculus, then its ſurface acquires, by rolling up and down in the bladder, a kind of hard poliſh; but when the urine returns again to its more rancid tartarine ſtate, then the calculus is covered with a new coat: the laſt poliſhed ſurface being the partition between the two laminæ, at which ſurface they more eaſily ſeparate than elſewhere.

Human calculi are known to vary in their ſtructure and compoſition: and it has been demonſtrated by Dr. Dawſon (Med. Tranſ. vol. ii. p. 195.) that ſome of them, which are ſoluble in an alkaline, are but little affected by an acid menſtruum; whilſt others will reſiſt the action of an alkali, and yet be readily diſſolved by an acid. Even in the ſame ſubject, he obſerves, there may be found calculi of oppoſite kinds, ſome of which will diſſolve in acids, ſome in alkalis, and ſome in neither. This writer has recommended an attention to the fragments, ſcales, or films, which the *ſtone* in the kidneys or bladder may caſt off, and alſo to the contents of ſediment of the urine, that a diſcovery may be made whether the proper ſolvent be an acid or an alkaline menſtruum.

Dr. Percival infers, from ſeveral experiments on urinary calculi, that an abſorbent earth often enters into the compoſition of them; for it is the peculiar property of this claſs of bodies to be convertible into quick-lime, by the action of fire. It does not ſeem probable, ſays this ingenious writer, that this ſubſtance is the product of animalization in the human ſpecies. The ſhells of ſea-fiſhes and of ſnails furniſh it indeed in large quantity; but the bones, horns, blood, ſkin, and fleſh of animals, however ſtrongly calcined, are not changeable into lime.

M. Rouelle has lately diſcovered the fixed alkali in the ſerum of the blood; and Dr. Lewis (Neumann's Chem. p. 494.) has obſerved, that the aſhes of fleſh and blood are readily, perfectly, and plentifully ſoluble in the mineral acids; and that they form with them an auſtere, aſtringent liquor, approaching to an aluminous nature. The human calculus muſt, therefore, be conſidered as an heterogeneous ſubſtance, conſiſting of thoſe recrementitious parts which are ſeparated from the blood by the kidneys. Whether theſe parts differ eſſentially in different conſtitutions, or whether they vary only in the proportion they bear to each other, is a point of difficult ſolution.

Dr. Percival inclines to adopt the latter ſuppoſition; however, he thinks, it is very evident that calculi of the kidneys and bladder are not merely of animal origin, as they frequently contain an abſorbent earth, which is not generated in the human body. This ſubſtance is probably conveyed into the ſyſtem by the uſe of hard ſpring water, in which it commonly abounds. The effects of ſuch waters are known to be pernicious in habits which are ſubject to the *ſtone* and gravel.

Dr. Hales, conſidering the diſpoſition that moſt of the liquors which we drink have to depoſit tartarine concretions (as well as the great quantities of air that are in our food, whether animal or vegetable) is not ſurpriſed to find the urine of ſome perſons ſo much diſpoſed to breed the calculus: this quality of the urine he aſcribes in a greater meaſure to our drink than to our food: our food, eſpecially that which is boiled, being more mucilaginous than the greateſt part of the liquors which we drink, and conſequently leſs apt to depoſit its tartar. That waters are impregnated with theſe tartarine particles, more or leſs, according to the different nature of the ſeveral ſtrata of minerals, *ſtone*, &c. through which they percolate, he has evinced by ſeveral experiments: ſmall wines likewiſe, which abound with tartar, are well known to ſubject thoſe who drink them to the *ſtone* and gout.

Dr. Percival at one time apprehending, in deference to ſeveral reſpectable authorities, that the calculi of the urinary organs partake not in the leaſt of a foſſil nature, but that their formation depended either upon ſome accidental nucleus, or upon a peculiar and often hereditary diſpoſition to concrete in the animal fluids, was led to conclude, that impure waters were only negatively favourable to this diſpoſition, by having no tendency to diminiſh it; as a menſtruum, ſuch as water is under every form in which it is uſed, already loaded, and perhaps ſaturated with different contents, cannot act ſo powerfully, as one which is free from all ſenſible impregnations. But when he found by ſubſequent experiments, that an abſorbent earth is often a component part of the human calculus, he became convinced that hard waters actually contribute to the formation of it. This is an opinion which the father of phyſic advanced, and which, till of late, has remained uncontroverted by his followers. *Damnantur imprimis fontes*, ſays Pliny (lib. xxxi. c. 3.) *quorum aquæ decoctæ craſſis obducunt vaſa cruſtis.* It was obvious indeed to infer, that waters which depoſit a large earthy ſediment, either in the aqueducts through which they are conveyed, or in the veſſels in which they are boiled or preſerved, would let fall their groſſer particles in paſſing through the kidneys, and eſpecially whilſt retained in the bladder; and that theſe, by the continued appoſition of freſh matter, connected by the animal gluten, and compacted by the action of thoſe organs, would form the *ſtone* or gravel. But the ſeparation of earthy matter in the urinary paſſages may be better explained by the chemical doctrine of affinities. For the vitriolic acid contained in SELENITES, with which hard ſpring waters are uſually impregnated, will forſake its baſis, and combine with the alkaline ſalts, ſo copiouſly diſcharged by thoſe excretories. In order to account for the *ſtone* being a rare diſorder in this country, which abounds with calcareous waters, Dr. Percival obſerves, that internal affections of the human body are ſeldom produced by a ſingle cauſe, and the concurrence of many may be neceſſary to form a calculus in the bladder. This malady, however, is ſcarcely known in Switzerland, as he has been informed by a letter from Baron Haller. And the ſprings of that Alpine region are remarkably light, pure, and free from all mineral ingredients.

Dr. Saunders, of whom we ſhall have occaſion to ſpeak more particularly in the ſequel of this article, obſerves, that in all human calculi there is a very large proportion of animal mucus, and more eſpecially in thoſe of a laminated ſtructure; while ſuch as put on a more ſhining cryſtalline form, contain a larger proportion of ſaline and earthy matter.

The diagnoſtic ſigns of the *ſtone in the kidneys*, are, 1°, A fixed obtuſe pain in the region of the loins, ſeeming like a weight loading the reins, accompanied with coſtiveneſs and flatulency, ſickneſs, and ſometimes vomiting. As the *ſtone* falls out of the pelvis into the ureter, the pain is exceedingly acute and racking, which continues till either the *ſtone* be got into the bladder, or returned again to the pelvis. 2°, An inflexibility of the ſpina dorſi, from the extenſion and compreſſion of the nerves. 3°, A ſtupor of the thigh and leg of that ſide, from the conſent of parts. 4°, A retraction of the teſticle. 5°, A very ſmall quantity of urine, diſcharged frequently, and with difficulty, either thin and limpid, or bloody; in this caſe the ſediment of the urine ſubſides directly. But as ſoon as the *ſtone* is got into the bladder, the urine becomes thick, turbid, blackiſh, and in great quantity.

The diagnoſtics of the *ſtone in the bladder*, are a ſenſe of heavineſs in the perinæum, and inguinal region, a perpetual and troubleſome deſire of making water, which is preceded and followed with a ſharp pain, and an itching principally in the glans of the penis, whence a prolapſus of the anus; and an inclination to go to ſtool during the diſcharge of urine; the urine's coming away by drops, or ſtopping ſuddenly when it was running in a full ſtream;

the patient's paſſing his urine more eaſily when lying than in an erect poſture; a kind of convulſive motion occaſioned by the ſharp pain in diſcharging the laſt drops of the urine; a white, thick, copious, ſtinking, mucous ſediment in the urine; and a violent pain in the neck of the bladder upon motion, eſpecially on horſeback, or in a coach on a rough road.

But the ſureſt way of finding it is by the touch; viz. by thruſting the finger, or a catheter, up the anus.

Mr. le Dran aſſures us, when a ſmall *ſtone* is lodged in the neck of the bladder, the patient only is pained in making water till the firſt drops of urine come away; when the *ſtone* is large, his greateſt pain is while the laſt drops are evacuated; but when the difficulty of urining depends on the diſeaſes of the coats of the bladder, the pain continues all the time of the evacuation. By obſerving theſe ſymptoms, he has declared people to have no *ſtone* in the bladder, after ſeveral others had aſſured them there was a *ſtone*; and his opinion was confirmed by probing with the catheter. He names one inſtance of this, in a perſon who had laboured under what he calls a contracted hardened bladder, whom he cured after ſeveral bleedings and purges, by injecting into the bladder a decoction of marſhmallow-roots and linſeed, which he changed afterwards for barley-water, with ſome honey of roſes. By theſe he removed the pain, and brought the bladder, which at firſt could ſcarce contain two ſpoonfuls of liquor, to the ordinary capacity.

Stones have been diſtinguiſhed according to their colour, into red, white, and yellow; but the laſt are the moſt uſual.

As to the regimen proper to be obſerved by perſons afflicted with the *ſtone* or gravel, they ſhould avoid aliments of a windy or heating nature, as ſalt meats, ſour fruits, &c. Their diet ſhould be light and eaſy of digeſtion, and conſiſt chiefly of ſuch things as tend to promote the ſecretion of urine, and to keep the body open. Artichokes, aſparagus, ſpinage, lettuce, parſley, ſuccory, purſlane, turnips, potatoes, carrots, and raddiſhes, may be eaten with ſafety; onions, leeks, and celery, are reckoned medicinal.

Dr. Hales obſerves, that onion-juice ſeems to have conſiderable efficacy in diſſolving the calculus; and where frequently eaten, ſhould, if not waſte, at leaſt prevent its increaſe.

Dr. Lobb found leeks more effectual ſolvents than onions.

The moſt proper drinks are whey, butter-milk, milk and water, barley-water; decoctions, or infuſions of the roots of marſhmallows, parſley, HEATH, liquorice, or of other mild mucilaginous vegetables, as linſeed, &c. Pitcairn recommends the uſe of milk for common drink, in the *ſtone*, with barley-water and a little ſugar. He adds, that he cannot give any better reaſon why milk is ſerviceable to nephritics, than becauſe the ſame is always found ſerviceable to gouty perſons. The ſymptoms of both diſeaſes are the ſame, excepting what relates to the parts affected.

If the patient has been accuſtomed to generous liquors, he may drink ſmall gin and water without acid.

Dr. Mead allows either ſmall wine and water, or new ſoft ale; which, he ſays, will be rendered better and wholeſomer, if ground-ivy leaves be infuſed in it, while it is working: mead is likewiſe a proper drink, for honey is an excellent diuretic. A ſpoonful alſo of honey in a glaſs or two of the infuſion of marſhmallow roots is an admirable cleanſer of the kidneys, if conſtantly uſed. See HONEY.

The wines ought to be the ſofteſt and ſmootheſt that can be had, and the lighteſt, cleareſt river, or running water, is preferable to any other, except ſuch as abound with fixed air, and may be taken medicinally.

Out of the fit the patient ſhould uſe moderate exerciſe, without ſatigue, or any violent motion, which is apt to occaſion bloody urine. Indeed perſons afflicted with gravel often paſs a great number of *ſtones* after riding on horſeback, or in a carriage, but thoſe who have a *ſtone* in the bladder cannot bear ſuch exerciſe. Perſons who have an hereditary tendency to this diſeaſe ſhould never indulge themſelves in a ſedentary life. Much depends in the way of prevention, when the firſt ſymptoms of gravel, &c. appear, on a proper regimen of diet, and the uſe of ſufficient exerciſe.

In a fit of the gravel, occaſioned by the *ſtone* ſticking in the ureter, or ſome part of the urinary paſſages, the patient ſhould be bled, warm fomentations ſhould likewiſe be applied to the part affected, emollient clyſters adminiſtered, and diluting mucilaginous liquors drank: and the treatment of this caſe is ſimilar to that of an inflammation of the kidneys. See NEPHRITIS.

Dr. Whytt adviſes patients who are ſubject to frequent fits of gravel in the kidneys, but have no *ſtone* in the bladder, to drink every morning two or three hours before breakfaſt, a pint of oyſter, or cockle-ſhell LIME-*water*, which, though it may not diſſolve the *ſtone*, may prevent its growth.

Dr. Mead obſerves, that in order to prevent thoſe tartarous ſalts which form the *ſtone*, from ſhooting into cryſtals, lixivial ſalts ſeem to be very proper. Next, to keep the cryſtals from coaleſcing into a calculous ſubſtance, oily medicines are very efficacious; and this rule ought to take place with regard to diet as well as medicines.

But when calculous concretions are actually formed in the kidneys, and are to be brought away by the ureters, the caſe requires very prudent management. It is a very common error in practice to give ſtrong forcing diuretics, with an imaginary view of driving out the gravel with the urine: whereas this intention is anſwered with greater ſafety in moſt caſes by relaxing and lubricating medicines; eſpecially, if in caſe of violent pain, bleeding be premiſed, and anodynes interſperſed. For a *ſtone* is never forced out while the patient is in great torture; though when the pain ceaſes it ſometimes comes away unexpectedly, and almoſt of its own accord, with the urine; and the reaſon of this is, that pain conſtringes the fibres of the parts, which reſume their natural ſtate, and perform their functions properly, when the troubleſome ſenſation is over. Wherefore three or four grains of opium, diſſolved in five or ſix ounces of the common decoction, may be given by way of clyſter; which will greatly relieve the pain, and ſometimes procure greater advantages. However, there are conjunctures, after the pain is abated, when powerful diuretics may be adminiſtered; but with this precaution, that as ſoon as they have had their effect, they are no longer to be continued. All this while the body ſhould conſtantly be kept open: wherefore, in caſe of coſtiveneſs, it will be expedient to give clyſters, and ſometimes to purge gently with infuſion of ſena and manna: but ſtrong cathartics are to be avoided.

Of all the purging medicines the oleum ricini, or CASTOR *oil*, is to be preferred in calculous diſorders: this oil admirably conduces to relax the paſſage from the kidneys to the bladder, and may be given by the mouth, or in form of a clyſter. As a ſubſtitute for this oil, manna with nitre, or ſal. cath. amar. mixed with oil of almonds, will ſerve to empty the inteſtines, allay the inflammation, and relax the ſpaſm occaſioned by the pain. If the ol. ricini is taken in the fit ſo as to keep the belly lax, and the lixiv. ſapon. is taken at proper intervals, mixed in any ſuitable vehicle, their efficacy in calculous diſorders, it is ſaid, will equal that of the moſt boaſted noſtrums.

Of the lubricating medicines above mentioned, the chief are oil of ſweet almonds, ſyrup of marſhmallows, emulſions made with almonds, and the like; to which may be added, the uſe of the warm bath. But among the powerful diuretics, turpentine and ſoap are the beſt.

Such is the courſe to be purſued in the paroxyſm of the diſeaſe. But particular care ſhould be taken, not to put the patient into a courſe of powerful diuretics, with a view of preventing the gravel from concreting in the kidneys: becauſe, whatever great things may be ſaid of this ſort of medicines by ignorant pretenders, they certainly injure the parts by their heat and acrimony.

When a *ſtone* is formed in the bladder, Dr. Whytt recommends Alicant ſoap, and oyſter or cockle-ſhell lime-water. He adviſes the patient to ſwallow every day, in any form that is leaſt diſagreeable, an ounce of the internal part of Alicant ſoap, and to drink three or four pints of the lime-water. The ſoap is to be divided into three doſes; the largeſt to be taken faſting in the morning early; the ſecond at noon; and the third at five in the afternoon, drinking above each doſe a large draught of the lime-water; the remainder of which he may take at any time betwixt dinner and ſupper. He ſhould begin with a ſmaller quantity of the lime-water and ſoap than that above mentioned: at firſt a pint of the former, and three drams of the latter, may be taken daily. The quantity ſhould be increaſed by degrees; and the patient muſt perſevere in the uſe of theſe medicines for ſeveral months, and if the *ſtone* be large, for ſeveral years. The diſſolving power of the lime-water may be heightened by pouring it a ſecond time on freſh calcined ſhells. For caſes of the efficacy of this courſe, ſee Philoſoph. Tranſ. vol. l. p. 205—227.

The cauſtic alkali, or ſoap-lees, has been of late much extolled and much uſed as a ſolvent for the *ſtone*. As it is of a very acrid nature, it ought to be given in ſome gelatinous or mucilaginous liquor; as veal-broth, new milk, linſeed-tea, a ſolution of gum-arabic, or a decoction of marſhmallow-roots. The patient muſt begin with ſmall doſes of the lees, as thirty or forty drops, and increaſe by degrees, as the ſtomach will bear. The cauſtic alkali may be prepared by mixing two parts of quick-lime with one of pot-aſhes, and ſuffering them to ſtand till the lixivium be formed, which muſt be carefully filtrated before it be uſed. See Lixivium *Saponarium*.

Mrs. Stephens's *medicines*, and Dr. Chittick's, which is ſuppoſed to be nothing more than a weak veal-broth without fat, medicated with a greater or leſs quantity as circumſtances require, of ſoap-lees, or ſome ſubſtance of which a fixed alkaline ſalt is the baſis, have been much recommended.

Dr. Cheyne (Nat. Method of Curing, p. 266.) ſays, that ſoap-lees, ſoftened with a little oil of ſweet almonds, drank about a quarter of an ounce twice a day, on a faſting ſtomach; or ſoap and egg ſhell-pills, with a total milk and ſeed-diet, and Briſtol-water, will either diſſolve the *ſtone* in the kidneys and bladder, or make it eaſy. See Lime-*water*, and Lithontriptics.

Since *fixed* air has become the object of the attention of phyſicians, it has been found to poſſeſs many conſiderable medicinal properties; and the happieſt effects have been experienced from the uſe of it in pulmonic diſorders, the gangrenous ſore throat, malignant fevers, foul ulcers, &c. It has alſo been found a ſolvent of the human calculus.

The firſt perſon who employed it in the year 1774, with this intention, and obſerved its efficacy, was Dr. W. Saunders, phyſician of Guy's Hoſpital in London, a gentleman diſtinguiſhed both by his chemical and medical knowledge; and to whom the public is alſo indebted for the late diſcovery of the peculiar efficacy of the red bark. Dr. Saunders was led to proſecute his inquiries into the ſolvent powers of fixed air by the experience of Dr. Hales, undertaken with a view of diſcovering ſome fermenting mixture that would diſſolve the calculus without injuring the bladder.

Dr. Hales, after repeated trials, found that the moſt powerful mixture for this purpoſe was formed of one cubic inch of water, one third of a cubic inch of ſolution of ſal tartar, and twenty-five or ſometimes thirty drops of oil of ſulphur; and alſo of ſix cubic inches of water, ¾ cub. of the ſolution of ſal tartar, and fifty drops of oil of ſulphur. Theſe proportions fermented briſkly, and made air-bubbles ariſe very faſt from the calculi for eight or ten minutes: and after ſeveral freſh effuſions of them, they diſſolved ſome calculi that were very hard to the touch; and alſo ſeveral gravel-*ſtones*, though not all; nor had they any effect on many of the hardeſt calculi. The liquor had no effect on the caculus after the ferment was over, as Dr. Hales found by laying ſeveral calculi to ſoak in it for a whole year.

Dr. Saunders repeated the experiments of Dr. Hales with the ſame ſucceſs: from which it appears, that the calculus was diſſolved during the efferveſcence from the application of the fixed air; for the ſolvent power ceaſed after the efferveſcence was over, and the neutral ſalt formed by the combination of the acid and alkali had no power. In this opinion he was confirmed by the two following experiments. Having put ten grains of a human calculus into two ounces of diſtilled water, and letting them ſtand for ſome hours, there was found no diminution of its weight, and the water manifeſted no precipitation upon the addition of a ſolution of ſilver in the nitrous acid, or of a very cauſtic alkali, prepared by Mr. Lane. Ten grains of the ſame calculus were alſo added to two ounces of diſtilled water, ſaturated with fixed air; in which caſe it loſt three grains of its weight, and there was a precipitation upon the addition of the cauſtic alkali. This laſt experiment was repeated upon different calculi, which were always found diſſolved in a greater or ſmaller proportion, admitting of that variety which might be expected in the ſolubility.

Dr. Percival, of Mancheſter, as ſoon as he was informed that Dr. Saunders had employed fixed air as a ſolvent of the *ſtone*, though ignorant of the manner in which his trials were conducted, and of the ſucceſs which had attended them, engaged in the purſuit of this remedy with a philanthropy and zeal, which do him much honour. Recollecting that Dr. Black and Mr. Cavendiſh had proved the ſolubility of various earthy bodies in water, either by abſtracting from or ſuper-adding to the fixed air which they contain, and knowing that the human calculus is diſſolved in the former way by lime-water, and the cauſtic alkali; it appeared highly probable that the like effect would be produced on the ſame ſubſtance, by the latter mode of operation: the hypotheſis ſuggeſted by analogy, was confirmed by experiment. A human calculus of fifty-two grains, ſuſpended in pure ſpring water, ſtrongly impregnated with fixed air, and continually ſupplied with freſh ſteams of it, after forty-eight hours maceration, being well dried, weighed forty-nine one-half grains, and became more friable in its texture. Another ſimilar calculus from the ſame bladder, was immerſed for the ſame time in a quantity of the ſpring water before employed, but unimpregnated with fixed air: its weight before immerſion was forty-two one-half grains, but after it was taken out of the water and thoroughly dried, it weighed forty-two grains, and the texture and outward appearance of it were unchanged.

From theſe and ſeveral other experiments, Dr. Percival concluded, that water impregnated with fixed air is a powerful diſſolvent of the human calculus, and that its ſolvent powers are ſuperior to thoſe of lime-water, which has been long and juſtly celebrated as a lithontriptic; and as far as his obſervations reached, it acts upon every calculus that is ſuſpended in it. Of this new lithontriptic medicine, he ſays, that it is at once grateful to the palate, ſtrengthening to the ſtomach, and ſalutary to the whole ſyſtem. Lime-water often nauſeates the patient, deſtroys his appetite, and creates the heart-burn; and the ſoap-ley is ſo cauſtic and acrimonious, that it can be taken only in the ſmalleſt quantity, frequently produces bloody urine, and aggravates the tortures it is intended to relieve. Both theſe remedies alſo require a very ſtrict regimen of diet; and their qualities are liable to be changed either by acidities, or the fermentation of our food in the firſt paſſages. But the mephitic water may be drank in the largeſt quantity, without ſatiety or inconvenience: it requires no reſtrictions in diet, and its medicinal virtues will be undiminiſhed in the ſtomach or bowels.

Of this medicine Dr. Saunders alſo ſays, that it reaches the urinary paſſages in its full force, communicating its ſolvent power to the urine: and that it poſſeſſes every advantage over the lixival, and other boaſted ſolvents now in uſe; being ſalutary to the conſtitution, and checking that tendency to putrefaction, which is ſo prevalent in calculous habits, and which is ſo much increaſed by alkaline ſalts, and the ſeptic regimen, generally recommended along with them.

If it be queſtioned, whether fixed air can be conveyed by the ordinary courſe of circulation to the kidneys and bladder? Dr. Percival replies, that in an elaſtic ſtate, it certainly cannot; but diſſolved in water, it may paſs through the vaſcular ſyſtem without creating the leaſt diſorder, and by its diuretic quality will be powerfully determined to the urinary organs. So ſtrong is the relation that ſubſiſts between mephitic air and water, that they remain firmly combined, although expoſed to conſiderable variations of heat and cold.

Dr. Percival confirmed this reaſoning as to the conveyance of fixed air in the courſe of circulation to the kidneys and bladder by fact: for a young gentleman having taken daily large quantities of mephitic water, his urine, as long as he continued this courſe, was ſtrongly impregnated with fixed air, as appeared from the precipitation which it produced in lime-water, from the bubbles which it copiouſly emitted when placed under the receiver of an air-pump; and from the ſolution of ſeveral urinary *ſtones* which were immerſed in it.

Dr. Prieſtley has alſo expelled from a quantity of freſh made urine, by means of heat, about one-fifth of its bulk of pure fixed air; though it required ſeveral hours to expel this air by heat; and, after the proceſs, there was a conſiderable whitiſh ſediment at the bottom of the veſſel. This, he ſays, was probably ſome calcareous matter, with which the fixed air had been united; and by this fixed air, the calcareous matter which would otherwiſe have formed a *ſtone* or gravel, may have been held in ſolution. And therefore, drinking water impregnated with fixed air, may, by impregnating the urine, enable it to diſſolve calcareous matters better than it would otherwiſe have done; and may, therefore, be a means of preventing or diſſolving a *ſtone* in the bladder.

It is impoſſible, ſays Dr. Saunders, to determine abſolutely in what caſes one ſolvent ſhould be preferred to another, until the urine and its contents have been properly examined. We may reaſonably conclude, that when the urine of a particular perſon, impregnated with fixed air, does not depoſit its terreſtrial parts, or when it has depoſited them, the fixed air can be made to rediſſolve them, the mephitic ſolvent is beſt adapted to ſuch a conſtitution. If on the other hand, ſuch be the nature of the calculous concretions, that they conſiſt chiefly of earthy matter laminated and cemented by animal mucus, the lixivial ſolvent will exert a more powerful operation in ſoftening and deſtroying the coheſion of the calculus, in ſuch a manner, as ſometimes to promote the ſeparation of its parts, and thereby facilitate the evacuation. Hence, Dr. Saunders thinks it highly probable, that advantages might ariſe from alternating its various ſolvents; and that after ſufficient trials have been made by the lixivial ſolvents, in many caſes the mephitic acid might be employed with additional advantage; the former diminiſhing the coheſion, and thereby facilitating the menſtrual power of the latter.

As to the manner of preſcribing this uſeful remedy, Dr. Saunders obſerves, that the patient ſhould be directed to pre prefer the uſe of ſuch water as contains it in the largeſt quantity, ſuch as Briſtol-water, Seltzer-water, and Rathbone-place water, &c. and as it cannot be difficult to find water of this kind in moſt places, it ſhould be made one chief article of his diet. All hard water which becomes ſofter, by being expoſed to the air, or even by boiling, and depoſits a calcareous earth, is of this kind: and the ACIDULÆ of all countries have been conſidered as the moſt powerful lithontriptics. The ſkilful phyſician may alſo ſuggeſt a great variety of forms in which this ſalutary acid may be introduced. The moſt eligible manner of preſcribing it, is by impregnating water with it. See PYRMONT-*water*.

Saline draughts may be taken in their ſtate of efferveſcence, and it may be ſtill more agreeably preſcribed in the form of briſk vinous liquors, ſuch as Champagne, Perry, and the like.

Beſides the powerful medicines for the *ſtone* above recited, there are ſome things of a more ſimple nature, which in ſome caſes are found beneficial, and therefore deſerve a trial. An infuſion of the ſeeds of daucus ſylveſtris, or *wild* CARROT, ſweetened with honey, has been found to give conſiderable eaſe, and is recommended by Mr. Boyle. A decoction of raw coffee-berries taken morning and evening, to the quantity of eight or ten ounces, with ten drops of ſweet ſpirit of nitre, has likewiſe been found very efficacious in bringing away large quantities of earthy matter in flakes. The UVA *urſi* has of late been greatly extolled both for the gravel and *ſtone*. It is generally taken in powder from half a dram to a whole dram, two or three times a day. It may, however, be taken, ſays Dr. Buchan, to the quantity of ſeven or eight drams a day, with great ſafety and good effect. We have ſomewhere read, that a glaſs of cold ſpring water, amounting to about a quarter of a pint, drank upon riſing in the morning, and at night in going to bed, and continued for ſome time, has given relief in the *ſtone* and gravel. If this be a fact, the preceding obſervations on the efficacy of fixed air will account for it. For the removal of the *ſtone* by cutting, ſee LITHOTOMY.

Dr. Hales is of opinion, that all paſſable *ſtones*, which have lately fallen from the kidneys into the bladder, and which have broken off from larger ones, might readily and eaſily be brought out thence, by conveying into the empty bladder, by a catheter, ſome very mucilaginous ſubſtance, ſuch as ſyrup of marſh-mallows, or a ſolution of gum arabic, or barley-water; ſuch ſubſtances would bring away the *ſtone* ſoon, and with great eaſe to the patient: and thereby not only prevent much pain by the fruitleſs endeavours to bring them away with the weak force of the urine, but alſo effectually ſecure the patient from the danger of their growing too big to come away, by long continuing in the bladder. Phil. Tranſ. Nº 477. vol. xliii. p. 502.

The ſame ingenious writer, ſuſpecting that a principal cauſe of the firſt beginning of the growth of gravel in the kidneys is owing to the horizontal poſture in which we lie in bed, in which poſture one of the kidneys being lower than the bladder when we lie on one ſide, and both the kidneys when we lie on our backs, the pelvis, or cavity of the kidneys becomes thereby the ſink for the tartarine parts of the urine to ſettle in, and that the preſſure of the urine againſt the orifices of the excretory ducts of the kidneys retards its progreſs, and gives it more time to depoſit its tartar; recommends lying in a reclined poſture, with the head and upper parts of the body conſiderably higher than the feet and lower parts. He alſo adviſes to lie alternately, ſometimes on one ſide and ſometimes on the other, ſo that whatever ſediment may have been depoſited in the inferior kidney may, by inverting it, be waſhed out before it has time to fix into ſmall ſand and gravel, whence it too eaſily increaſes to a larger ſize. Dr. Hales has deſcribed a new inſtrument for extracting *ſtones* from the urethra, &c. See CATHETER.

Dr. Liſter obſerves, that *ſtones* are found, not only in the bladder and kidneys, but alſo in the pituitary ducts, the brain, liver, lungs, ſtomach, inteſtines, and joints of the hands and feet; to which may be added, that, in the Philoſophical Tranſactions, we have likewiſe accounts of *ſtones* in the pineal gland, heart, gall-bladder, &c.

Gall-ſtones are BILIARY *concretions*, which are generally found in the gall-bladder, though they are often found in the ductus communis choledochus. They often lie quiet in the gall-bladder, and until diſſection after death, have been never known to exiſt; but when they are obſtructed in their paſſage through the gall-ducts, they impede the paſſage of the gall into the inteſtines, and produce many other afflictive ſymptoms; the moſt uſual of which are a loſs of appetite, a ſenſe of fulneſs in the ſtomach, ſickneſs, vomiting, languor, inactivity, ſleepleſſneſs, and, if the obſtruction continues, a waſting of the fleſh, yellowneſs of the eyes, ſkin, and urine, whitiſh ſtools, a pain in the pit of the ſtomach, and the pulſe in its natural ſtate.

The pain is relieved by opium; an emetic ſhould alſo be adminiſtered, and, if needful, repeated; purging medicines ſhould alſo be uſed, and eſpecially thoſe which act with the greateſt eaſe; as ſea-water, the waters of purging ſprings, neutral ſalts, &c. which may be repeated every other day for ſeveral months, without palling the appetite or leſſening the ſtrength. A little rhubarb may alſo be taken occaſionally. The Bath waters are excellent for reſolving concretions of the bile, not ſo much (Dr. Percival apprehends) by a chemical operation, as by accelerating the ſecretions of the liver, ſtimulating the organs of digeſtion, and invigorating the whole animal ſyſtem.

A remedy which would paſs unchanged into the ſyſtem of the liver, and medicate the bile ſo as to render it unapt to coagulate, or enable it to reſolve the concretions already formed, would be a moſt valuable acquiſition. Acids, alkalis, ſoap, ardent and dulcified ſpirits, with freſh vegetable juices, have been recommended. Valiſnerius found, that a compoſition of alcohol and oil of turpentine deſtroyed the texture of the coheſion of *gall-ſtones* more perfectly than any other menſtruum, and Mr. W. White, of York has confirmed this obſervation, by ſeveral judicious experiments. Dr. Percival alſo once thought favourably of this remedy, but, upon farther reflection, he thinks the continued uſe of it is more likely to prove injurious than beneficial. Spirituous liquors have a very unfavourable effect on the liver, and it would be abſurd to ſeek a ſpecific medicine for the diſeaſes of the bile in what experience has fatally ſhewn to be a ſpecific poiſon to the organ which ſecretes it. It is probable that fixed air, under ſome form or other, may be the deſideratum in this caſe. The virtues which the Bath waters poſſeſs, may be partly owing to this ingredient in their compoſition; and when they cannot be employed, the mephitic water may be recommended as an innocent and efficacious ſubſtitute. When other methods for curing the *ſtone* fail, recourſe muſt be had to LITHOTOMY. See on the ſubject of this article, Mead. Monit. & Pract. Med. p. 191, ſeq. Hale's Statical Eſſ. vol. ii. p. 187—250. Percival's Phil. Med. & Exp. Eſſ. 1776, p. 132—170, and Appendix, p. 295—321. Med. Eſſ. Edinb. vol. v. part ii. p. 156, &c. Prieſtley on Air, vol. ii. p. 360, &c. Buchan's Dom. Med. p. 352—357, ed. 5.

We have not only accounts of *ſtones* of various degrees of hardneſs taken out of the bladders of perſons affected with this terrible malady, but even of extraneous matter lodged within, and ſerving for the nucleus of thoſe *ſtones*. Thus in the Philoſophical Tranſactions there is an account of a boy who for a long time voided hair by urine, and afterwards being troubled with the *ſtone*, on being cut for it, the *ſtone* taken away was very hard and heavy, and of the bigneſs of a gooſe's egg: it was covered with a cruſt, looking like the mortar of an old wall, and this was full of cracks and chinks, out of every one of which there was found to grow hair.

The hairs, which he had been uſed to void by urine, certainly grew alſo out of the clefts of this *ſtone*, for they would often hang out of the end of the penis; and, on pulling them away, ſeemed to grow faſt to ſomething, and to be pulled out by the roots.

In another boy about five or ſix years of age, who was cut for the *ſtone*, the *ſtone* taken out being broken by accident, there was diſcovered within it a piece of flint, of the ſhape and figure, as well as bigneſs of the common piſtol-flint. This ſerved as the nucleus of the other *ſtony* matter which incruſted it over. It is utterly impoſſible that a flint of this ſhape ſhould have been formed in the bladder, nor is it eaſy to account for its coming there; the boy muſt have ſwallowed it at ſome time, but then its making its way into the bladder, is a very hard matter to account for. A perſon who uſed himſelf to ſwallow piſtol bullets, is recorded in the ſame place to have voided them by urine, cruſted over with *ſtony* matter; but all this is equally hard to account for. Philoſ. Tranſact. Nº 266, p. 688.

We often meet with hiſtories, in medical writers, of the *ſtone*, or human calculus, making its way through unuſual places, as the perineum, ſcrotum, ſpinal muſcles, &c. Philoſ. Tranſ. Nº 456.

STONES *in animals*. We meet with great variety of forms and appearances in the *ſtones* produced by different animals, and in their different parts. Wedelius deſcribes a vaſt number of various kinds taken from dogs, hogs, cows, and other animals which he had opened; but the moſt ſingular inſtance is of one which was taken from a cow, and was of the colour of burniſhed gold. Dr. Liſter confirms this ſingular obſervation with another of a like kind, that came within his own knowledge: this was of two hundred ſmall globular *ſtones*, the largeſt not exceeding the ſize of a ſmall tare, and the ſmaller not bigger than pins-heads. They were covered with a frothy ſubſtance in the bladder, and adhered to one ſide of it; but when cleaned and dried, they reſembled ſeed-pearl in ſhape, and were of a fine gold colour. They were finely poliſhed, even when viewed by the microſcope; and when broken, and examined in the ſame manner, it was found to be only a thin ſkin of a gold colour that covered them in this manner, the inner ſubſtance being coarſe and opake, ſomewhat reſembling ſugar-candy, but not ſo fine. Wedel. Obſerv. Nº 106. Philoſ. Tranſ. Nº 206.

Mr. Pennant mentions two inſtances of *ſtones* found in horſes; the one of a horſe that voided ſixteen calculi, each of an inch and a half diameter: the other of a *ſtone* taken out of the bladder of a horſe, and depoſited in the cabinet of the late Dr. Mead, weighing eleven ounces. Theſe *ſtones* are formed of ſeveral cruſts, each very ſmooth and gloſſy; their form triangular, but their edges round as if by colliſion againſt each other. Brit. Zool. vol. i. p. 12.

STONE-*blue*, a preparation uſed in waſhing linen. See BLUE, INDIGO, and SMALT.

STONE-*break*, a name by which ſome writers call *alchemilla* or lady's mantle.

STONE-*braſh*, in *Agriculture*, is a light lean ſoil, full of larger and ſmaller maſſes of rubble-ſtones. See STONY-*land*.

STONE-*chatter*, in *Ornithology*, the name of a ſmall bird of the *œnanthe*, or fallow-finch kind, the MOTACILLA *rubicola* of Linnæus, called by ſome authors *rubetra* and *muſcicapia*, and in ſome places the *ſtone-ſmich* and the *moor-titling*.

The head, neck and throat are black, but on both ſides of the latter there is a white bar; the feathers on the back are edged with tawny; the lower part of the back juſt above the rump, is white; the end and exterior ſide of the two outmoſt feathers of the tail are of a pale ruſt-colour, the reſt are black; the breaſt is of a deep reddiſh-yellow; the belly of a lighter hue; the quill feathers duſky, edged with dull red; thoſe next the body marked with a white ſpot near their bottoms; and the coverts of the wings are adorned with another. The head of the female is ferruginous, ſpotted with black, and the colours in general leſs vivid: in both ſexes the legs are black.

Theſe birds are common during ſummer on heaths and gorſy grounds, but in winter diſperſe into marſhes, &c. without quitting the iſland: they make a very loud and often repeated noiſe. Pennant.

STONE-*crop*, a name ſometimes given to the *ſedum*, or HOUSE-LEEK.

STONE-*crop-tree*, in *Botany*, the name by which ſome call the maritime ſhrubby blite, which is a ſpecies of *chenopodium*, or GOOSE-*foot*.

STONE-*curlew*, in *Ornithology*, the Engliſh name for the OEDICNEMUS, a bird of the colour of the curlew. See *Stone*-CURLEW.

STONE *mummy*. See RAUTY *mummy*.

STONE *parſley*. See BUBON.

STONE *parſley*, *baſtard*. See PARSLEY.

STONE-*phoſphorus*. See LITHOPHOSPHORUS.

STONE-*plant*. See LITHOPHYTON.

STONE-*ſmich*, a common Engliſh name for that ſpecies of œnanthe, which we more frequently call the STONE-*chatter*.

STONE, *toad*. See BUFONITÆ, and TOAD-*ſtone*.

STONE-*ware*. See POTTERY.

STONE-*ſucker*, in *Ichthyology*. See PETROMYZON.

STONEHENGE, or STONE-HENG, in *Antiquity*, a famed pile or monument of huge ſtones on Saliſbury plain, nine miles diſtant from that city.

It is deſcribed by Mr. Camden to be a huge and monſtrous piece of work, ſuch as Cicero termeth *inſanam ſubſtructionem*. For within the circuit of the ditch, he ſays, there are erected, in manner of a crown, in three ranks or courſes, one within another, certain mighty and unwrought ſtones, whereof ſome are twenty-eight feet high, and ſeven feet broad; upon the heads of which, others, like overthwart pieces, do bear and reſt croſs-wiſe, with ſmall tenons and mortiſes, ſo that the whole frame ſeemeth to hang: on which account we call it *ſtone-heng*, as our old hiſtorians termed it, becauſe of its magnitude, *chorea gigantum*, the *giants dance*. The perpendicular ſtones are called corſe-ſtones, and the over-thwart ones are called cronets. This antiquity, ſays Mr. Inigo Jones, becauſe the architraves are ſet upon the heads of the upright ſtones, and hang, as it were, in the air, is generally known by the name of *ſtone-heng*. The whole work, in general, being of a circular form, is a hundred and ten feet in diameter; double winged about, with a roof; anciently evironed with a deep trench, ſtill appearing about thirty feet broad: ſo that betwixt it and the work itſelf, a large and void ſpace of ground being left, it had from the plain three open entrances, the moſt conſpicuous of which lies north-eaſt; at each of which was raiſed, on the outſide of the trench, two huge ſtones, gate-wiſe; parallel to which, on the inſide, are two others of leſs proportion. The inner part of the work, conſiſting of an hexagonal figure, was raiſed, by due ſymmetry, upon the baſis of four equilateral triangles, which formed the whole ſtructure. This inner part was likewiſe double, having, within it alſo, another hexagon raiſed; and all that part within the trench, ſituated upon a commanding ground, eminent and much higher than the ſurrounding plain; in the midſt of which, upon a foundation of hard chalk, the work itſelf was placed; inſomuch that, from whatſoever part they came into it, they roſe by a hill of eaſy aſcent. In the inmoſt part of the work is a ſtone, appearing not much above the ſurface of the earth, and lying towards the eaſt, four feet broad, and ſixteen feet long; which, whether it be an altar or no, this author refers to the judgment of others. The great ſtones, which made the entrances from the outſide of the trench, are ſeven feet broad, three feet thick, and twenty feet high. The parallel ſtones, on the inſide of the trench, are four feet broad, and three feet thick; but they are ſo broken, that their proportions in height cannot be exactly meaſured. The ſtones which make the outward circle are ſeven feet broad, three feet and a half thick, and fifteen feet and a half high; each ſtone having two tenons mortiſed into the architrave continuing upon them, throughout the whole circumference. For theſe architraves, being jointed exactly in the middle of each of the perpendicular ſtones, that their weight might have an equal bearing; and upon each ſide of the joint a tenon wrought (as remains yet to be ſeen) it may hence poſitively be concluded, that the architrave is continued round about this outward circle. The ſmaller ſtones of the inner circle are one foot and a half broad, one foot thick, and ſix feet high. Theſe had no architrave upon them; but were raiſed perpendicular, of a pyramidal form. The ſtones of the greater hexagon are ſeven feet and a half broad, $3\frac{1}{4}$ thick, and twenty feet high, each ſtone having one tenon in the middle. The ſtones of the inner hexagon are two feet and a half broad, one foot and a half thick, and eight feet high, in form pyramidal, like thoſe of the inner circle. The architrave lying round about upon the perpendicular ſtones of the outward circle is three feet and a half broad, and two feet and a half high. The architrave on the top of the great ſtones of the outward hexagon is ſixteen feet long, $3\frac{1}{4}$ feet broad, and $3\frac{1}{3}$ feet high. This architrave, continuing only from ſtone to ſtone, left betwixt every two and two a void ſpace free to the air, uncovered. The vulgar have thought it ominous, and indeed abſolutely impoſſible, to count the number of ſtones compoſing this ancient monument. To this legendary tale Sydney refers in his ſonnet of the wonders of England; when he ſays,

Near Wilton ſweet, huge heaps of *ſtones* are found,
  But ſo confuſed, that neither any eye
Can count them juſt, nor reaſon reaſon try,
  What force brought them to ſo unlikely ground.

In reference to this abſurd ſuperſtition, Mr. Jones ſays, that if any one will obſerve the orders of the circles, as they now appear, without paſſing from one to another, confuſedly, and note where he begins, he may eaſily find the number. Dr. Stukely computes them in the following manner: the great oval, he ſays, conſiſts of ten uprights; the inner, with the altar, of twenty; the great circle of thirty; the inner of forty; which are a hundred upright ſtones; five impoſts of the great oval; thirty of the great circle; the two ſtones on the bank of the area, the ſtone lying within its entrance, and that ſtanding without; and another on the ground directly oppoſite to the entrance of the avenue; ſo that the whole number is a hundred and forty. This writer obſerves, that, according to the intention of the founders, the whole circle of this work was to conſiſt of thirty ſtones, each ſtone to be four cubits (a cubit being $20\frac{4}{5}$ inches Engliſh meaſure) broad, each interval two cubits; 30 times 4 cubits will give twice 60, and 30 times 2 cubits 60; and, therefore, thrice 60 cubits complete a circle, whoſe diameter is 60. A ſtone, 4 cubits broad, and 2 thick, is double the interval, which is a ſquare of 2 cubits.

Antiquaries are divided, as to the origin, uſe, ſtructure, &c. of this wonderful fabric. Some of them take the ſtones to be artificial, and to have been made on the ſpot; arguing, that the ancients had the art of making ſtones with ſand and a ſtrong lime or cement; and as the ſtones ſeem too big for land-carriage, and yet are in a plain, which for ſome miles round ſcarce affords any ſtones at all. Inigo Jones, however, a better judge than moſt antiquaries, is poſitive that the ſtones are all natural; and there is hardly any architect or naturaliſt who examines the grain of them exactly, but will be of his mind. As to their unwieldineſs, which is brought as an argument againſt their being portable, it is without foundation; they being really but trifles compared to many other ſtones which are known to have been thus carried.

Mr. Jones obſerves, that in ſeveral places about the plain the ſame kind of ſtone, of which this antiquity conſiſts, may be found; and ſtones of far greater dimenſions than any at *ſtone-heng*; particularly about Aibury, about fifteen miles from it. And it is well known that the ancients tranſported much heavier weights to a greater diſtance, and raiſed them to a greater height, than are obſerved in the preſent caſe. The moſt ancient and vulgar opinion concerning the firſt foundation of *ſtone-heng* is, that it was erected by the renowned Britiſh-Roman Aurelius Ambroſius, in memory of four hundred and ſixty noble Britons invited to a treaty of accommodation, held in or near the town of Ambreſbury, by Hengiſt the leader of the Saxons, and treacherouſly murdered by him and his confederates. Giraldus Cambrenſis relates, that there was in Ireland a pile of ſtones called the Giants dance, becauſe Giants brought them from the remoteſt parts of Africa into Ireland, and miraculouſly ſet them up in the plains of Kildare. And (according to the Britiſh ſtory) Aurelius Ambroſius, king of the Britons, procured Merlin, by ſupernatural means, to bring them from Ireland into Britain, for the purpoſe above mentioned. The principal, if not the firſt author, who aſcribes *ſtone-heng* to Ambroſius, (Hiſt. Britann. lib. vi.) Mr. S. Gale inclines to this opinion, on account of the name Ambroſius, which is ſtill retained in the neighbouring town of Ambreſbury, once celebrated for its monaſtery of three hundred monks, founded here by Ambroſius, on condition that they ſhould pray for the ſouls of thoſe that were ſlain by the treachery of Hengiſt the Saxon. Another opinion is that which is founded chiefly on the authority of Polydore Virgil, (lib. iii.) who ſays, that the Britons erected this magnificent ſepulchre for their general Ambroſius, in the place where he was ſlain in battle; that his fortitude and atchievements for the good of his country might neither be forgotten among themſelves, nor left unremembered by poſterity. This monument, he ſays, is yet remaining in the dioceſe of Saliſbury, near the town called Ambreſbury. To this opinion ſome circumſtances in his hiſtory, the ſtill remaining Latin name of the place (Mons Ambroſii), and that very ancient Welch proverb, *Malgwaith Ambrys, like the work of Ambroſe*, give ſome countenance.

A third conjecture is that of Mr. Bolton, tranſlator of Lucius Florus, and author of Nero Cæſar, publiſhed in 1624, who ſays, that *ſtone-heng* was built by the old Britons, as a ſepulchral monument for their magnanimous but unfortunate queen Boadicea, who with all her principal nobility was totally overthrown in battle by a ſmall army of Romans, under the command of Suetonius Paulinus. Mr. Inigo Jones having recited theſe opinions, as well as that of thoſe who aſcribe the ſtructure of *ſtone-heng* to the Druids, and urged the improbabilities and objections to which each of them are liable, advances his own opinion; and this is, that *ſtone-heng* was a work of the Romans, built by them when they flouriſhed here in the greateſt peace and proſperity, probably betwixt the times of Agricola's government, and the reign of Conſtantine; not as a ſepulchral monument, but as a temple, and particularly conſecrated to the imaginary deity Cœlus, whence they derived the original of all things. That the Romans were the founders of *ſtone-heng* he argues from its magnificence, order, which is the Tuſcan, architectonical ſcheme, conſiſting of four equilateral triangles, inſcribed within a circle, double portico in the greater circle of ſtones, and another portico in the cell or hexagon, the manner and poſition of the columns of the building, and from the Roman reliques often found near the place. That it was a temple he infers, from the interval or ſpacious court round about, the cell and its porticos, the altar, and its poſition eaſtward, the mixed or compound order, the aſpect of the whole fabrick, and the ſkulls of beaſts digged up in the circumjacent ground. And that it was conſecrated to the god Cœlus he concludes, from the ſituation, the aſpect hypæthros, the manner or form, the order, the decorum of the ſtructure, the pyramidal figure of the ſtones, and from the kinds of beaſts cuſtomarily offered in ſacrifice to that deity.

Dr. Charleton has endeavoured to refute the claims urged by Mr. Jones in favour of the Romans, and to prove that *ſtone-heng* was a Daniſh ſtructure. For this purpoſe he alledges, that of all nations in the world, none were ſo much addicted to monuments of huge and unhewn *ſtones* as the Danes appear to have been for many hundred years together; that they uſed to ſet up ſuch not only in their own country, but alſo in all other places wherever the fortune of war had at any time made their adventures and atchievements memorable; and more particularly in England and Scotland: that in Denmark there are now ſtupendous piles of *ſtones* in moſt particulars reſembling *ſtone-heng*; that upon a ſtrict and impartial enquiry, neither the ancient Britons, nor Romans, nor Saxons, are found to have any juſtifiable title to the honour of founding this ſtructure; that none of our old hiſtorians mention any ſuch work till long after the Danes had acquired the ſovereign power in this iſland, and left ſeveral monuments of their victorious armies: that the great impairment of the fabrick ſince the time of the Daniſh conqueſt doth not evince it to be of greater antiquity: and that neither the magnificence of the ſame at firſt, nor the ſtrength and ſkill in engines required for the tranſportation and elevation of *ſtones* of ſuch prodigious weight, are ſufficient arguments to the contrary. This writer is of opinion, that this ſtructure was erected in the beginning of the reign of Alfred, when the Danes, having over-run the whole kingdom, encamped their main army in Wiltſhire, near two years together, and employed their time of reſt and ſecurity in erecting *ſtone-heng*, as a place in which to elect and inaugurate their ſupreme commander, king of England, according to the cuſtom of their country; which Dr. Charleton ſays, was to erect courts royal of huge ſtones for the election of their kings in all countries where the ſucceſs of their arms had given them a title to ſovereignty. The weakneſs of the diſtreſſed Alfred afforded them an opportunity, and the country in which they were encamped ſupplied them with fit materials for ſo great and ſtupendous a work.

Mr. Inigo Jones's opinion was afterwards vindicated from the objections of Dr. Charleton, and his hypotheſis invalidated by Mr. John Webb. See Jones's Antiquity of *Stone-heng* reſtored, drawn up by direction of king James I. in 1620, and publiſhed in 1655, after the author's death, by Mr. John Webb; Dr. Walter Charleton's Chorea Gigantum, compoſed from authorities and arguments furniſhed by Olaus Wormius, the celebrated antiquary of Denmark, and publiſhed in 1633; and Mr. John Webb's Vindication of *Stone-heng* reſtored, wherein the Roman architecture is diſcuſſed, publiſhed in 1664. Biſhop Nicholſon inclines to the opinion, if the true old writing of the name be *Stan-Hengiſt*, as the Monaſticon ſeems to tell us, that the Saxons have as juſt a title as any to the honour of it.

Sammes, in his Britannia Antiqua illuſtrata, 1676, p. 395, &c. apprehends, that *ſtone-heng* is of more ancient date than that of the Romans. The fable of the giants, recorded by Giraldus Cambrenſis, and already mentioned, is, in his opinion, founded on an ancient tradition; and by the giants he underſtands the Phœnicians; and that the art of erecting theſe *ſtones*, inſtead of the *ſtones* themſelves, was brought from the farthermoſt parts of Africa, the known habitation of the Phœnicians. The metal table, formed of a mixture of tin and lead, which was found near *ſtone-heng* in the time of Henry VIII. and upon which many letters are inſcribed that have puzzled our antiquaries, he ſuppoſes to have been of Phœnician compoſure, and the characters (which Dr. Charleton apprehends to have been Runic or Gothic, ſuch as were conſtantly uſed by the Danes in all their antique monumental inſcriptions) Phœnician. He is farther of opinion, that this pile was dedicated to Hercules, to whom the Phœnicians built altars and erected temples, as their tutelar deity, whom they adored as the ſun, and who is ſaid by ſome to have firſt diſcovered this nation.

Mr. Aubrey, in his Monumenta Britannica, conſiders *ſtone-heng* as a Britiſh work. Dr. Stukely, in his *Stonehenge*, a temple reſtored to the Britiſh Druids, aſcribes it to the Druids; and the time he aſſigns for the building of it is not long after Cambyſes's invaſion of Egypt; when he committed ſuch horrid outrages there, and made ſuch dreadful havock with the prieſts and inhabitants in general, that they diſperſed themſelves to all parts of the world; ſome of whom, it is ſuppoſed, migrated as far weſtward as Britain, and introduced their learning, arts, and religion, among the Druids, who are ſaid to have been introduced into Britain about Abraham's time, and probably aſſiſted in this work. This conjecture is the more probable, ſays this author, becauſe, at the period now mentioned, the Phœnician commerce was at its height, and afforded a ready conveyance hither: it might be eaſily made, Dr. Langwith thinks, probable, at leaſt, that it was a temple dedicated to the ſun and moon, and having taken his meaſures of it on the ſpot, he aſſures us, that he could by no means reconcile them with Mr. Inigo Jones's idea of a Roman temple.

The learned Mr. Bryant, in his Analyſis of Ancient Mythology, vol. iii. p. 533. apprehends that there is not in the world a monument which is much prior to *ſtone-henge*. There is reaſon to think that it was erected by a foreign colony of Cuthites, or ſons of Chuſh (ſee DISPERSION *of mankind*), probably before the time when the Druids and Celtæ were firſt known, and one of the firſt which came into this iſland. With them it was uſual to place one vaſt ſtone upon another for a religious memorial; and theſe they often placed ſo equably, that even a breath of wind would ſometimes make them vibrate. Of ſuch ſtones one remains at this day in the pile of *ſtone-henge*. The ancients diſtinguiſhed ſtones erected with a religious view by the name of amber; by which was ſignified any thing ſolar and divine. The Grecians called them ϖετραι αμϐροσιαι, *petræ ambroſiæ*. *Stone-henge*, according to Mr. Bryant, is compoſed of theſe amber ſtones; hence the next town is denominated Ambreſbury, not from a Roman Ambroſius, for no ſuch perſon exiſted; but from the *ambroſiæ petræ*, in whoſe vicinity it ſtood. Some of theſe were rocking ſtones; and there was a wonderful monument of this ſort near Penzance, in Cornwall, which ſtill retains the name of main-amber, or the ſacred ſtones. Such a one is mentioned by Apollonius Rhodius, ſuppoſed to have been raiſed in the time of the Argonautæ, in the iſland Tenos, as the monument of the two-winged ſons of Boreas, ſlain by Hercules; and there are others in China and other countries. See HIPPODROME.

STONY *land*. The farmers expreſs by this term two ſorts of land, the one full of large flints and pebbles, and the other full of fragments of free-ſtones, or other coarſe ſtones.

Theſe lands in many places yield good crops, and the general rule is, that in ſtiff and cold lands the ſtones ſhould be as carefully picked out as may be, but in light and dry grounds they ſhould be left. In Oxfordſhire they have great quantities of a lean earth, and a ſmall rubble ſtone, or a ſour ſort of land mixed with it; this is ſometimes very full of weeds, and ſometimes very clear of them; if they are weedy they fallow them late, but if they be ſeary, as they expreſs it, that is, if they have no ſwerd upon them, they either fold them in winter, and add ſome hay-ſeed to the ſheep's dung, to bring up graſs, or elſe they lay old thatch or ſtraw, and dung upon it; for they reckon, that if theſe lands have no ſwerd upon them before they are fallowed, they will by no means be brought to bear a good crop, but a great deal of May-weed, and other unprofitable herbs. In September, November, and December, they fallow as the ſwerd directs them: if this is done in either of the two laſt months, they call it a winter-fallowing, and never ſtir it again till they plough it, and ſow it with barley; and theſe lands are reckoned to do better than if finely tilled. They will bear wheat and meſlin in a kindly year, and large crops of barley, if they are well managed, and kept in good heart. They always fallow theſe lands every other year, unleſs they ſow peaſe upon them; ſometimes they ſow them with lentils; and when they are quite worn out, they lay them down with clover, or rye-graſs. Plot's Hiſt. Oxf. p. 247. Mortimer's Huſbandry, p. 71.

STOOK, a term uſed in many parts of the kingdom for a ſhock of corn, containing twelve ſheaves.

STOOL, *alvus*, in *Medicine*. A thing is ſaid to be voided by *ſtool*, when it is diſcharged by the anus, or fundament. In the Philoſophical Tranſactions, we have inſtances of ſick perſons voiding factitious ſtones, balls, &c. by *ſtool*. See ALVUS, and DEJECTION.

STOOLS, *bloody*, in *Medicine*. The ſpirit of vitriol, mixed with the patient's drink, has often been found beneficial in cures of *bloody ſtools*. See DYSENTERY and FLUX.

STOOLS, *retention of the firſt*, in infants. See INFANT.

STOOL, in *Mining*, is uſed when the miners leave digging deeper, and work in the ends forward. The end before them is called the *ſtool*.

STOOL, in *Ship Building*, the name of the ſupporters of the poop and top lanterns.

STOOL, *cucking*. See CUCKING.

STOOMING *of wine*, the putting bags of herbs, or other ingredients, into it.

STOOPING, in *Falconry*, is when a hawk, being upon her wings at the height of her pitch, bends down violently to take the fowl.

STOP, in the *Manege*, is a pauſe, or diſcontinuation of going. In order to *ſtop* a horſe, the rider ſhould, in the firſt place, quicken him a little, and at the inſtant, when he begins to go faſter than the uſual cadence, or time of his pace, bring-to the calves of his legs, to animate the horſe, then flinging his ſhoulders backwards, hold the bridle more and more tight, till the *ſtop* is made; then vigorouſly extend the hams, and reſt upon the ſtirrups, to make him form the times or motions of his *ſtop*, in falcading with his haunches three or four times. You ſhould not form the *ſtops* of your horſe ſhort and precipitate, leſt you ſpoil his hams and mouth. After *ſtopping*, a horſe ſhould be made to make two or three corvets.

With a raw and young horſe very few *ſtops* ſhould be made; and when they are made, they ſhould be performed by degrees, very gently, and not all at once; becauſe nothing ſo much ſtrains and weakens the hocks of a ſtiff and aukward horſe as a ſudden and rude *ſtop*. If your horſe has not readily obeyed in making his *ſtop*, make him go backwards, by way of puniſhing his fault. If in *ſtopping* he toſſes up his noſe, or forces the hand, keep your bridle-hand low and firm, and your reins quite equal; give him no liberty, preſs upon his neck with your right hand, till he has brought down his noſe, and then immediately give him all his bridle: this is the ſureſt method to bring him into the hand. To compel a horſe to *ſtop* upon his haunches, nothing is ſo efficacious as a little ſloping ground: nevertheleſs you muſt examine, previouſly to this kind of exerciſe, if his feet, reins, ſhoulders, and legs, are able to bear it; for otherwiſe your horſe would ſoon be ſpoiled. In this caſe the rider ſhould put the ſtreſs of his aids rather in his thighs and knees than in the ſtirrups. The moſt certain method, ſays Mr. Berenger, to unite and aſſemble together the ſtrength of a horſe, in order to give him a good mouth, to fix and place his head as well as to regulate his ſhoulders, to make him light in the hand, and capable of performing all ſorts of airs, depends entirely upon the perfection and exactneſs of the *ſtop*. Hiſt. and Art of Horſemanſhip, vol. ii. chap. 5.

The oppoſite term to *ſtop* is *parting*. In former times, the *ſtop* of a horſe was called *parade*. See NAIL.

STOP, *half a*, is a *ſtop* not finiſhed by a *peſate*; ſo that the horſe, after falcading three or four times upon the haunches, reſumes and continues his gallop, without making PESATES, or CORVETS.

STOP, at *Sea*, a word uſed by him that holds the half-minute glaſs, in heaving the log; for immediately when the glaſs is out, he calls *ſtop* to them that let run the line. See STOPPING.

STOP, *Saturday*. See SATURDAY.

STOPS, } in *Grammar*. See { POINT.
STOPPING, } { PUNCTUATION.

STOPS *of an organ*. See ORGAN.

STOPE, or STEP, in *Mining*. When a ſumph or pit is ſunk down in a lode, they break and work it away in ſtairs or ſteps, which method of working is called *ſtopeing*; and the height or ſtep which each man breaks, is called a *ſtope*.

STOPPAROLA, in *Ornithology*, the name of a bird of the lark kind, deſcribed by Aldrovandus, and ſuppoſed by Mr. Ray to be the ſame with the SPIPOLETTA, or the TORDINO of the Venetians; but the *muſcicapa griſola* of Linnæus. See FLY-*catcher*.

STOPPERS, in a *Ship*, certain ſhort pieces of rope, which are uſually knotted at one or both ends, according to the purpoſe for which they are deſigned. They are either uſed to ſuſpend any heavy body, or to retain a cable, ſhroud, &c. in a fixed poſition. Thus, the anchors, when firſt hoiſted up from the ground, are hung to the cat-head, by a *ſtopper* attached to the latter, which paſſing through the anchor-ring, is afterwards faſtened to the timber-head; and the ſame rope ſerves to faſten it on the bow at ſea; or to ſuſpend it by the ring which is to be ſunk from the ſhip to the bottom. The *ſtoppers* of the cable have a large knot, and a laniard, at one end, and are faſtened to a ring-bolt in the deck, by the other. They are attached to the cable by the laniard, which is faſtened ſecurely round both by ſeveral turns paſſed behind the knot, or about the neck of the *ſtopper*; by which means the cable is reſtrained from running out of the ſhip, when ſhe rides at anchor.

The *ſtoppers* of the ſhrouds have a knot and a laniard at each end. They are only uſed when the ſhrouds are cut aſunder in battle, or diſabled by tempeſtuous weather; at which time they are laſhed, in the ſame manner as thoſe of the cables, to the ſeparated parts of the ſhroud, which are thereby reunited, ſo as to be fit for immediate ſervice. This, however, is only a temporary expedient. Falconer.

STOPPING *a leak*, at *Sea*. See LEAK.

STOPPING *a ſhip*, at *Sea*. When a ſhip comes to an anchor, and the cable is veered out by degrees till the ſhip is found to ride well, and then ſtopped, it is called *ſtopping the ſhip*.

STORAX *tree*, *ſtyrax*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the flower has a ſhort cylindrical empalement, indented in five parts; it has one funnel-ſhaped petal, with a ſhort cylindrical tube, whoſe brim is cut into five large obtuſe ſegments, which ſpread open; and it has ten or twelve awl-ſhaped ſtamina, diſpoſed circularly, inſerted in the petals, and terminated by oblong ſummits; it has a roundiſh germen, ſupporting a ſingle ſtyle, the length of the ſtamina, crowned by a ragged ſtigma; the germen turns to a roundiſh fruit with one cell, including two nuts, which are plain on one ſide, and convex on the other.

We know but one ſpecies of this tree, which grows plentifully in the neighbourhood of Rome, and alſo in Paleſtine, and ſeveral iſlands in the Archipelago; from whence the fruit has been brought into England, where the plants have alſo been raiſed in ſeveral curious gardens.

The gum of this tree is uſed in medicine, which is obtained by making inciſions in the tree. It is brought from Turkey, but is ſo adulterated, that it is very difficult to meet with any that is pure. It has a moſt pleaſant fragrant odour, and is called *ſtyrax calamita*, becauſe it is ſaid to be.tranſported in hollow canes; or, according to others, becauſe it exſudated from the tender twigs and young ſhoots of the tree, and coated them over, ſo as to reſemble a reed or other hollow cylindric body, drawn on over the twigs. Miller.

Two ſorts of this reſin have been commonly diſtinguiſhed in the ſhops; viz. 1. *Storax in the tear*, which is generally brought in maſſes, ſometimes compoſed of whitiſh and pale reddiſh brown tears, and ſometimes of an uniform reddiſh yellow, or browniſh appearance; unctuous and ſoft like wax, and free from viſible impurities. This is ſuppoſed to be the ſort which the ancients received from Pamphylia, in reeds or canes, and which was thence, or for the reaſon above ſuggeſted, called calamita. 2. *Common ſtorax*, in large maſſes, conſiderably lighter and leſs compact than the former, with a large admixture of woody matter like ſaw-duſt. There is rarely any other in the ſhops, and therefore the London college directs the *ſtyrax calamita* to be purified for medicinal uſe by ſoftening it with boiling water, and preſſing it out from the fæces betwixt warm iron plates. The pure *ſtorax* in the tear is generally preferred, but the laſt, notwithſtanding its impurities, is the moſt fragrant. *Storax* is one of the moſt agreeable of the odoriferous reſins, of a mild taſte, of no great heat or pungency, nearly ſimilar in its medical and in its pharmaceutic qualities to BENZOIN and BALSAM *of Tolu*. It is not, however, much uſed in common practice, unleſs as an ingredient in ſome of the old compoſitions, and in an opiate pill, to which it gives its name. See PILLS *of ſtorax*.

STORAX, *liquid*, is a reſinous juice, obtained from a large tree, with leaves like thoſe of the maple, called by Ray *ſtyrax aceris folio*, a native of Virginia and Mexico, and lately naturalized to our own climate. The juice, called liquid amber, is ſaid to exude from inciſions made in the trunk of this tree, and the *liquid ſtorax* to be obtained by boiling the bark or branches in water. See LIQUID AMBER, and BALSAM *of liquid amber*.

Two ſorts of *liquid ſtorax* are diſtinguiſhed by authors: one, the purer part of the reſinous matter that riſes to the ſurface in boiling, ſeparated by a ſtrainer, of the conſiſtence of honey, tenacious like turpentine, of a reddiſh or aſh-brown colour, moderately tranſparent, of an acrid unctuous taſte, and a fragrant ſmell, reſembling that of the ſolid *ſtorax*, but ſomewhat diſagreeable; the other, the more impure part, which remains on the ſtrainer, untranſparent, in ſmell and taſte much weaker, and containing a conſiderable portion of the ſubſtance of the bark. That which is commonly met with in the ſhops under this name, is of a weak ſmell and a grey colour, and is ſuppoſed to be an artificial compoſition. *Liquid ſtorax* has been chiefly uſed in external applications. Among us, it is at preſent almoſt wholly in diſuſe,, and accordingly diſcontinued by the London college; but retained by the Edinburgh as an ingredient in the mercurial plaſter. Lewis's Mat. Med.

STORAX, *white*. See BALSAM *of Peru*.

STORE. *Bill of* STORES. See BILL.

STORES, *naval*. See NAVAL.

STORE-*room*, in a *Ship*, an apartment or place of reſerve, of which there are ſeveral, to contain the proviſions or ſtores of a ſhip, together with thoſe of her officers, during a ſea voyage.

STORE-*houſe*, a large building, in which goods, grain, utenſils, &c. of various kinds, are depoſited and preſerved from injury. The *ſtore-houſes* of a fortreſs are conſtructed for the preſervation of all kinds of artillery and ammunition; thoſe of a dock-yard, or of a maritime town, for cables, anchors, timber, and other neceſſaries, to repair and furniſh ſhips. And they are of different forms and ſizes, according to the purpoſes for which they are intended.

STORE-*keeper* is an officer in the royal dock-yards, inveſted with the charge of the principal naval ſtores; as the ſails, anchors, cordage, &c.

STORE-*ſhip*. See *Store*-SHIP.

STOREA, among the Romans, a kind of baſket made of ropes or ruſhes, for gathering flowers or garden-fruits.

STOREA was likewiſe a kind of defence, made of large cables faſhioned into a ſort of netting; which was ſo ſtrong, that no weapon, though thrown out of an engine, could penetrate it.

STORGE, Στοργη, a Greek term, frequently uſed by noturaliſts, to ſignify that parental inſtinct, or natural affection, which animals bear toward their young.

The *ſtorge* is an admirable principle implanted by the all-wiſe Creator throughout the animal world, for the preſervation thereof; and is governed by ſuch rules as make it beſt contribute thereto. By means of this, with what care and alacrity do animals nurſe their young? and what dangers will they brave for their ſecurity? Even the moſt timorous creatures, which at other times fly the face of men, dogs, &c. will, for the ſake of their young, expoſe themſelves. Thus, hens, inſtead of flying from, will aſſault ſuch as meddle with their brood; and partridges, before their young can fly, will frequently drop down before the dogs, firſt at leſs, then at greater diſtanges, to dodge, and draw them off, from purſuing their young.

With what concern do others lead about their young in places of ſafety? and ſome even admit them for ſhelter into their bodies. Thus the opoſſum, Dr. Tyſon obſerves, has a curious bag on purpoſe for the ſecuring and carrying about her young. The ſame author adds, from Oppian, that the dog-fiſh, upon any ſtorm or danger, receives her young into her belly, which come out again when the fright is over. And it is ſaid the ſquatina and glaucus do the like.

With what tenderneſs do others ſeek and prepare the food for their young, teach them to ſuck, cheriſh, or lull them to reſt, &c. like ſo many nurſes, deputed by the Creator to take care of his creatures? and ſtill in proportion, as they grow up, and become fit to look to themſelves, this *ſtorge* abates; and, at length, when no longer needed, becomes extinct. Mr. Ray obſerves, that young doves are fed with meat firſt eat by the dam, and ſodden awhile in her prolobe. And Cluſius obſerves, that the old female Ethiopian takes no food but from the male, after this manner.

The returns made by the young to the parent animal, when grown old, are not leſs conſiderable. Pliny ſays of rats, that they nouriſh their aged parents with eminent piety.

St. Ambroſe, and after him Olaus Magnus, obſerve of the crane, that when the parents, through old age, are bereft of their feathers, and left half naked, their offſpring ſtand around them, and cheriſh them with their own feathers; that they ſeek food for them; and when nature, as it often happens, repairs their decays, and reſtores them to ſtrength again, they take them up by turns, on their wings, and habituate their unpractiſed limbs to their ancient art of flying. See INSTINCT.

STORK, *ciconia*, in *Ornithology*, a ſpecies of the HERON, or the *ardea ciconia*, in the Linnæan ſyſtem.

The white *ſtork* is larger than the common heron, but its neck is ſhorter and thicker; its head, neck, breaſt, and belly, are white; its eye-lids are naked; its rump, and the outer feathers of the wings, are black; its tail is white, and its beak long and reddiſh; its legs alſo are red.

The black *ſtork*, or *ardea nigra* of Linnæus, is ſomewhat ſmaller than the white; its head, neck, back, and wings, are black, with a greeniſh caſt among it; the eye-lids naked; the belly, breaſt, and ſides, are white, and the beak and legs are green. Many are of opinion, that this is the bird mentioned by Ovid under the name of mergus.

Naturaliſts have been much puzzled in aſſigning the winter abode of *ſtorks*. Many authors have ſuppoſed that they go to the Nile at this ſeaſon in queſt of food; to which purpoſe Dr. Shaw obſerves, that in the middle of April he ſaw three flights of theſe birds, each of which took up more than three hours in paſſing by him, extending itſelf more than half a mile in breadth. Theſe, he ſays, were then leaving Egypt, where the canals and the ponds that are annually left by the Nile, were become dry, and directed themſelves towards the north-eaſt. He adds, that they return again a little after the autumnal equinox, when the waters of the Nile returning within the banks, leave the country in a fit ſtate to ſupply them with nouriſhment. But M. Klein controverts the opinion, that *ſtorks* viſit Egypt in the winter in ſearch of food; obſerving, that if this were the caſe, they would not go in the winter, and remain till April, but in the ſummer; for the inundation of the Nile begins towards the end of April, and about the month of September the waters diminiſh, and about the ſeventh or eighth of October quite retire into their channel, ſo that in the winter this river is extremely ſmall; and he apprehends that they take up their winter-quarters under water.

It is obſerved of the *ſtorks*, ſays Dr. Shaw, that for the ſpace of about a fortnight before they paſs from one country into another, they conſtantly reſort together from all the circumjacent parts in a certain plain, and there forming themſelves every day into a *dou-wanne* (according to the phraſe of the people), are ſaid to determine the exact time of their departure, and the places of their future abodes. See Jer. chap. viii. ver. 7.

The *ſtork* is held in the higheſt eſteem and veneration among the Mahometans, with whom it is no leſs ſacred than the IBIS was among the Egyptians; and no leſs profane would that perſon be deemed, who attempted to kill or moleſt it. The regard paid to theſe birds, Dr. Shaw ſuggeſts, may probably have ariſen, not ſo much from the ſervice they perform to a moiſt fenny country, in clearing it of uſeleſs reptiles and inſects, as from the ſolemn geſticulations they are obſerved to make, as often as they reſt upon the ground, or return to their neſts. Shaw's Travels, p. 428. fol.

STORM, in the *Military Art*. See Assault.

Storm-*fink*, *little petrel*, or PROCELLARIA *pelagica* of Linnæus, in *Ornithology*, the name of a ſmall bird deſcribed by Hoier, and ſaid to be ſeen principally at ſea, where it always is, except in breeding time, and is looked on as a foreteller of bad weather.

It is a little larger than the common ſparrow, and is all over black, except the coverts of the tail, and vent-feathers, which are white; the bill is hooked at the end; the noſtrils tubular, and the legs long and ſlender; it has the ſame faculty of ſpouting oil from its bill as the other ſpecies of *petrels*. It is very remarkable for its ſkimming very ſwiftly along the ſurface of the water. When large flocks of theſe appear, the mariners know they are to expect a *ſtorm*, and prepare for it.

STORYNE, the name of an inſtrument uſed by the ancients for drawing blood from the noſe; but we are not perfectly informed of its ſhape or ſtructure.

STOVE, in *Building*, a hot-houſe or room. The term *ſtove* is alſo uſed more reſtrictedly for a place in which fire is made, and by means of which heat is communicated to a room or buildings. See Chimney.

Palladio obſerves, that the ancients uſed to warm their rooms with certain ſecret pipes, which came through the walls, conveying heat to ſeveral parts of the houſe, from one common furnace. Whether this were a general cuſtom, ſays ſir Henry Wotton, or a curioſity, we cannot determine; but it was certainly, both for profit and uſe, far beyond the German *ſtoves*.

Stoves, *American*, are contrivances for warming rooms, &c. by a continual introduction and exchange of dry freſh air: theſe *ſtoves* are called American, becauſe the firſt patterns in caſt iron upon this principle were the invention of Dr. Franklin, who then reſided in Philadelphia. See Fire-*places*.

Notwithſtanding the acknowledged advantages of the conſtruction which he propoſes, the expence and trouble of it, and the difficulty of procuring workmen who underſtood the manner of executing it, have prevented the general uſe of his *ſtoves*. Mr. James Sharp, with a view of obviating theſe objections and difficulties, has propoſed ſeveral improvements, for which he has obtained his majeſty's patent. According to the method which he propoſes, they are eaſily accommodated to any rooms, where communication can be had with the external air; both to thoſe which have, and thoſe which have not chimneys: ſo that not only ſmall rooms, but the largeſt halls, libraries, or churches, may be warmed in a more effectual manner than had ever been done before, and the greateſt degree of heat produced from a given quantity of fuel. Mr. Sharp, by adding funnels to the top, renders theſe *ſtoves* fit for any chimney, and by lengthening the funnel, to any place without a chimney. By the hollow baſe with which his *ſtove*-grates are furniſhed, he is able to apply them with much greater effect to the external air, without any addition of brickwork; and by the alterations in the air box, a much greater quantity of warm air is introduced than it was poſſible to introduce in their former ſtate. If a *ſtove* of this kind is to be placed in a common fire-place, a hole muſt be made through the back of the chimney, or through the hearth, to communicate with the external air; and this hole ſhould be made as large as poſſible, and in a deſcending poſition, ſo that the outward air may aſcend towards the *ſtove*. The hollow baſe of the *ſtove* muſt be placed againſt this hole, ſo as to cover it completely; and the bottom of the baſe muſt be fitted ſo cloſe to the earth, and pointed with lime or putty, that the air may not paſs. Upon the *ſtove* there muſt be put a few feet of iron funnel to reach above the breaſt of the chimney; and the chimney encloſed by iron plates, ſo conſtructed and placed in a ſquare or oblong iron frame, that they may be eaſily removed when the chimney wants ſweeping. By this conſtruction the warm air, introduced by the *ſtove*, will be carried into the room, which would otherwiſe paſs up the chimney, and be loſt. But if the *ſtove* is to be fixed in a room where there is no chimney, it may be placed in any part of it, where communication may be had with the outward air; and nothing more is neceſſary than a ſufficient length of funnel to carry it through the roof, or wall, or window, or into any other chimney that may be convenient. If the fire-place be too ſmall for the *ſtove*, the chimney may be cloſed by the aforementioned frame and plates, and the *ſtove* ſtand before the fire-place, and the ſmoke be carried off, by the help of a circular elbow, into the chimney above the mantle-piece. Many of theſe *ſtoves*, it is ſaid, have been lately put up, in order to cure ſmoky chimneys, and have always ſucceeded. For farther particulars, ſee Sharp's Account of the Air *Stove* Grates, &c. For Dr. Lewis's method of heating a room with little fuel, ſee *Portable* Furnaces.

Stoves, *Chineſe*. See Kang.

Stoves, *Dutch* and *German*. See Fire-*places*.

Stoves, in *Gardening*, are buildings erected for the preſervation of tender exotic plants, which, without that aſſiſtance, will not bear the cold of our winter, becauſe they require an artificial warmth.

The principal *ſtoves* for this purpoſe are of two kinds, diſtinguiſhed by the names of the *dry*, and the *bark-ſtove*.

The dry *ſtove* has the flues, in which the ſmoke is carried, either laid under the pavement of the floor, or erected in the back part of the houſe over each other, and returned ſix or eight times all along the whole length of the *ſtove*. In theſe *ſtoves* the plants are placed on ſcaffolds, and benches of boards, raiſed above one another; and the plants, principally preſerved in theſe, are the aloes, cereuſes, euphorbium, tithymals, and other ſucculent plants, which are impatient of moiſture in winter, and therefore are not to be kept among trees, or herbaceous plants, which perſpire freely.

The bark-*ſtoves* are made with a large pit, nearly of the length of the houſe, which is three feet deep, and ſix or ſeven feet wide. This pit is to be filled with freſh tanner's bark to make a hot-bed, and in this the pots, containg the tender plants, are to be plunged.

This invention of tanner's bark for hot-beds has been of prodigious ſervice to the curious in gardening, as many plants are, by this means, annually preſerved and raiſed, which no other method could have made to endure our climate.

The dimenſions of theſe *ſtoves* muſt be wholly directed by the number of plants intended to be preſerved; and for the dry *ſtove*, the floor muſt be raiſed above the ſurface of the earth, more or leſs, according to the dryneſs or wetneſs of the ſoil. In the front there is to be a walk about two feet wide, for the convenience of walking. The fire-place may be made either in the middle, or at one end, and the furnace muſt be contrived according to the nature of the fuel which is to be burnt there. The beſt firing, when it can be had, is turf; for it burns longer, and more moderately, than any other fuel, as alſo more uniformly, and therefore requires leſs attendance.

The entrance into the bark-*ſtove* ſhould always be either out of a green-houſe, or the dry *ſtove*, or elſe through the ſhed where the fire is made; becauſe in cold weather the front glaſſes muſt not, by any means, be opened, and the top ſhould be covered either with tarpaulins, or ſliding ſhutters, in bad weather.

The tender ſhrubs and exotic plants muſt be plunged in their pots into the bark-beds; ſuch are the caſhew, cabbage-tree, cocoa-tree, dumb-cane, fuſtic, logwood, mancinel, papaw-tree, ſour-ſop, and the like; and upon the top of the flues may be ſet the melon, thiſtle, the tender cereuſes, and the like.

The thermometer, by which the heat in the *ſtove* is regulated, muſt always be hung with its back to the ſun, and as far from the flues as may be. The proper ſtructure of theſe ſhelters, for the curious part of the vegetable creation, is to have a green-houſe in the middle, and two *ſtoves*, and a glaſs-caſe at each end. The particular rules for the ſtructure of all theſe, with plans of them, are accurately given by Mr. Miller in his Dictionary.

Stove, among *Confectioners*, denotes a little cloſet well cloſed on all ſides, wherein are ſeveral ſtories or rows of ſhelves made of wires one above another, for the drying of ſweetmeats.

STOVES, at *Sea*, are ſquare boxes made of plank, and lined with brick, for burning charcoal in, to dreſs the admiral's victuals.

STOVER, a word uſed by country people for ſtraw or fodder for cattle.

STOWAGE, in *Sea Language*, the general diſpoſition of the ſeveral materials contained in a ſhip's hold, with regard to their figure, magnitude, or ſolidity. The caſks which contain any liquid are, according to the ſea-phraſe, to be *bung-up* and *bilge-free*, i. e. cloſely wedged up in an horizontal poſition, and reſting on their quarters; ſo that the bilges, where they are thickeſt, being entirely free all round, cannot rub againſt each other by the motion of the veſſel. Dry goods are to be carefully encloſed in caſks, bales, caſes, or wrappers, and wedged off from the bottom and ſides of the ſhip, as well as from the bows, maſts, and pump-well. Due attention muſt likewiſe be had to their diſpoſition with regard to each other, and to the trim and centre of gravity in the ſhip; ſo that the heavieſt may be always neareſt the keel, and the lighteſt gradually above them. Falconer. See ROLLING and TRIM.

STOWS, in *Mining*, are ſeven pieces of wood, ſet upon the ſurface of the earth, faſtened together with pins of wood. See SPINDLE.

STRABISMUS, Στραβισμος. See SQUINTING.

STRAIGHT, STREIGHT, or STRAIT, in *Hydrography*, a narrow channel or arm of the ſea, ſhut up between lands on either ſide, and affording a paſſage out of one great ſea into another.

There are three kinds of *ſtreights*. 1. Such as join one ocean to another. Of this kind are the *ſtreights* of Magellan and Le Maire. 2. Thoſe which join the ocean to a gulf: the *ſtreights* of Gibraltar and Babelmandel are of this kind, the Mediterranean and Red Sea being only large gulfs. 3. Thoſe which join one gulf to another; as the *ſtreight* of Caffa, which joins the Palus Mæotis to the Euxine or Black Sea.

The paſſage of *ſtreights* is commonly dangerous, on account of the rapidity and oppoſite motion of currents.

The moſt celebrated *ſtreight* in the world is that of Gibraltar, which is about one hundred and thirty miles long, and twelve broad, joining the Mediterranean ſea with the Atlantic ocean.

The *ſtreights* of Magellan, diſcovered in 1520, by F. Magellan, were uſed ſome time, as a paſſage out of the North into the South Sea; but ſince the year 1616, that the *ſtreight* of Le Maire has been diſcovered, the former has been diſuſed; both becauſe of its length, which is full three hundred miles, and becauſe the navigation thereof is very dangerous, from the waves of the North and South Seas meeting herein, and claſhing.

The *ſtreight* at the entrance of the Baltic is called the SOUND. That between England and France, *Le pas de Calais*, or the *Channel*. There are alſo the *ſtreights* of *Babelmandel*, of *Weigats*, of *Jeſſo*, of *Anian*, of *Davis*, and *Hudſon*, &c.

STRAIGHT is alſo uſed in *Geography*, for an iſthmus or neck of land between two ſeas; preventing the communication thereof.

STRAIGHT, in the *Manege*. To part, or go *ſtraight*, or right out, is to go upon a tread traced in a *ſtraight* line. When you would puſh your horſe forwards, make him part *ſtraight* without traverſing, or bearing ſidewiſe.

STRAIGHT *arches*, and *ſtairs*. See the ſubſtantives.

STRAIGHT *membered*, called in French *droit ſur les jambes*. See LEGS.

STRAIKS, in the *Military Art*, are ſtrong plates of iron, ſix in number, fixed with large nails, called *ſtraik-nails*, on the circumference of a cannon-wheel, over the joints of the fellows, both to ſtrengthen the wheel, and to ſave the fellows from wearing on hard ways or ſtreets.

STRAIN, or SPRAIN, a violent extenſion of the ſinews or tendons of ſome muſcle.

STRAINED *ſugar*. See SUGAR.

STRAINING, is the clarification of a liquor, by paſſing it through a ſieve, or filtre.

The word is derived from the French, *eſtreindre*; which is formed from *ex*, *out of*, and *ſtringere*, *to preſs*.

STRAIT. See STRAIGHT.

STRAKES, or STREAKS, in a *Ship*, the uniform ranges of planks on the bottom and ſides of a ſhip, or the continuation of planks joined to the ends of each other, and reaching from the ſtem to the ſtern-poſt and faſhion-pieces; the loweſt of theſe, which is called the *garboard-ſtreak*, is let into the keel below, and into the ſtem and ſtern-poſt.

They ſay alſo a ſhip *heels a ſtrake*, that is, hangs or inclines to one ſide the quantity of a whole plank's breadth.

STRAKES, or *ſtreks*, in *Mining*, are frames of boards fixed on or in the ground, where they waſh and dreſs the ſmall ore in a little ſtream of water, hence called *ſtraked* ore.

STRAMONIUM, in *Botany*. See THORN-*apple*.

STRAND *and ſtream*, in *Ancient Cuſtoms*, a freedom from all impoſitions upon goods or veſſels by land or water.

STRAND, in *Sea-phraſe*, denotes one of the twiſts or diviſions of which a ROPE is compoſed.

STRAND alſo implies the ſea-beach: hence a ſhip is ſaid to be *ſtranded* when ſhe has ran a-ground on the ſea-ſhore.

Where a veſſel is *ſtranded*, juſtices of the peace ſhall command conſtables near the ſea-coaſt to call aſſiſtance for the preſervation of the ſhip; and officers of men of war are to be aiding and aſſiſting, 12 Anne, cap. 18.

STRANGER, in *Law*, denotes a perſon who is not privy, or party, to an act.

Thus, a *ſtranger* to a judgment is he to whom a judgment does not belong; in which ſenſe the word ſtands directly oppoſed to *party* or *privy*.

STRANGALIDES, a word uſed by authors to expreſs hard tumors in women's breaſts, ariſing from coagulations of obſtructed milk, after child-birth.

STRANGLES, in the *Manege*, is a collection of foul humours formed in the body of a young colt, which are voided by the noſtrils, or by a ſuppuration of ſome glands or knots, that lie between the bones of the lower jaw, and are crowded with impurities.

The *falſe ſtrangles* happen in old horſes, that have not well caſt the *ſtrangles*. See GLANDERS.

STRANGULATIO, a word uſed to expreſs that kind of ſuffocation which is common to women in hyſteric diſorders, and for the ſtraitening of the inteſtines in hernias.

STRANGULATORIA, in the *Materia Medica*, a name by which Avicenna, and ſome other authors, have called the *doronicum*, or *leopard's bane*.

STRANGURY, ϛραγγουρια, formed from ϛραγξ, *gutta*, *drop*, and ουρον, *urine*, in *Medicine*, a diſeaſe occaſioning a frequent and involuntary emiſſion of urine, in very ſmall quantities, and, as it were drop by drop, with an intenſe pain.

Some authors confound the *ſtrangury*, which the Latins call *urinæ ſtillicidium*, with the *urinæ incontinentia*. The difference between them conſiſts in this, that in the former, the urine comes away with pain; in the latter, without pain. The former proceeds from the acrimony of the urine; and the latter from a relaxation or palſy of the ſphincter of the bladder, which cannot keep the neck thereof cloſe ſhut.

The vulgar generally underſtand by this word the three ſeveral complaints called by phyſicians *ſtrangury*, DYSURY, and ISCHURY; the differences of which are theſe.

The *ſtrangury* is properly and diſtinctly a difficult excretion of urine, which comes away by drops, with a ſenſation of a ſpaſmodic pain about the ſphincter and neck of the bladder.

The *dyſury* is a difficulty of making water, attended with a violent attempt and preſſure of the parts. This ſometimes has its origin from the kidneys, ſometimes from the bladder.

The *iſchury* is a total ſuppreſſion of urine for ſome days, without the leaſt drop being voided, or the patient's feeling the leaſt ſtimulus toward attempting to void it.

Theſe three diſtemperatures of the urinary organs, though very properly diſtinguiſhed by their ſeveral names, are, however, in reality, all the ſame in their origin, and differ only in degree.

In the *ſtrangury*, the difficulty of voiding the urine is ſomewhat tolerable, and is not attended with any ſenſation of heat, but rather with a coldneſs; and though the urine is voided only by drops, yet, as this is continual, there is more in quantity voided in this than in the ſame time in a *dyſury*.

The *ſtrangury* ſeems a ſort of middle complaint, combined of the two others, the *dyſury* and *iſchury*; and it differs in point of duration, being ſometimes only a complaint of a few hours, and ſometimes fixing itſelf upon the patient for a long time. Sometimes alſo it is idiopathic, and is properly a diſeaſe in itſelf; but ſometimes it is ſymptomatic, attending nephritic complaints of ſeveral kinds.

Phyſicians alſo diſtinguiſh the *iſchury* into the proper and improper: the firſt is the denomination they give to this diſeaſe, when the bladder is full of urine all the time, and is ſo diſtended, that it brings on ſpaſmodic affections, which prevent the natural efforts for the excretion of it. The improper *iſchury* is that in which there is no ſuch fullneſs of urine, but this fluid is, by ſome means, prevented from flowing as it ought into this receptacle. We muſt be careful not to confound with theſe diſtempers the natural imminution of urine, which happens after copious ſweats or diarrhœas, in which a great quantity of wet ſtools hath been voided:

this is diſtinguiſhed from theſe morbid affections, by its being attended with no pain, and always going off of itſelf.

Symptoms of a STRANGURY. Theſe are frequent irritations to make water, which are ſucceeded either by a few drops, or a ſomewhat larger quantity, according to the nature and violence of the caſe: there is always a ſenſation of coldneſs while the urine is coming away, and a heat afterwards; and the whole body is very frequently affected with ſhiverings and ſudden coldneſs.

In a *dyſury* the difficulty of voiding the urine is great, and the pain violent; but in this caſe it does not go off as ſoon as the urine is voided, but continues afterwards.

In the *iſchury*, where there is for ſeveral days together no attempt to the voiding any urine, if the complaint is in the bladder, the patient feels a weight and preſſure upon the os pubis; but when the kidneys and ureters are in fault, the pain is felt in the loins; and ſometimes this is attended with heart-burnings, iſchiatic pains, and even with diſorders of the ſtomach, and actual vomiting; and if the cauſe is ſome inflammatory tumor, which is not unfrequently the caſe, then the pains are very violent, and the body is all over preternaturally hot.

The *dyſury* more frequently attacks thoſe who are ſubject to the ſtone in the kidneys or bladder, or to other nephritic complaints, and ſuch as have taken cantharides internally, and by that means brought on an eroſion of the neck of the bladder; ſometimes, alſo, this becomes a ſymptom in hyſteric complaints.

The *iſchury* principally attacks young men, and moſtly thoſe of plethoric habits; and thoſe who have been too free with hot medicines, ſtrong liquors, and powerful diuretics.

Cauſes. The cauſe of a *ſtrangury* is a ſpaſmodic contraction of a ſphincter, and neck of the bladder, attempting to throw off ſomething that is troubleſome; and the fermentative ſtate of the urine, accuſed by many as the cauſe of this diſeaſe, has indeed no ſhare in the occaſioning it. The *dyſury* ſometimes has its cauſe and origin in the kidneys, ſometimes in the bladder, and when in the laſt place, a ſpaſmodic conſtriction of the ſphincter is often the caſe, and this is not unfrequently brought on by a high diet, the feeding on very ſalt foods, or uſing too much ſpices. The *iſchury* is often occaſioned by accidents, ſuch as ſtone, gravel, a worm, a grume of blood, or a collection of purulent matter ſtopping up the paſſage in the neck of the bladder: ſometimes it is occaſioned by a venereal caruncle, or inflammatory tumor; ſometimes by the weight of the uterus in women with child, when near the time of their delivery; ſometimes by external violence; and ſometimes by the ſitting a long time drinking, without going to make water; but this laſt more rarely happens.

Prognoſtics in theſe Caſes. A ſimple and idiopathic *ſtrangury* is rather a painful than a dangerous diſeaſe; but if it often recurs upon the perſon, it beſpeaks a calculous nepritic complaint for its cauſe; and, in general, it is a worſe complaint in old people than in the young or middle-aged. The *dyſury* is of the ſame nature with the *ſtrangury* in its event, but the longer it continues the greater danger there is of its bringing on ſpaſms and fevers. But though theſe two caſes are not attended with any very imminent danger, the *iſchury* is, eſpecially when it is of ſome days ſtanding; for if it is not cured before the ſeventh day, an inflammatory fever comes on, which is uſually followed by a ſpeedy mortification, and by the death of the patient with hiccups and violent convulſions. People ſubject to *iſchuries* are alſo in danger of dropſies; and dropſical people are more ſubject to this complaint than any others, eſpecially when the diſeaſe is increaſed to a conſiderabte height.

Method of Cure. The *ſtrangury* and *dyſury* are to be treatd in the ſame manner. The acrimony of the fermentitious matter in the blood, which might be apt to occaſion new congeſtions, is to be obtunded, and the ſpaſtic motions taken off; both theſe purpoſes are excellently anſwered by nitre, whether given alone or mixed with ſome abſterſive ſalt, or with an abſorbent, mixed with a ſmall quantity of an acid to ſaturate it, and with a little cinnabar. A compound powder may be prepared of theſe ingredients, and a ſcruple of it given four times a day, will uſually ſoon take off the complaint. The cooling emulſions, made with barley-water and almonds, and with the cold ſeeds, are alſo of great ſervice; and when there is farther occaſion for medicines, gum arabic, and pills of boiled turpentine, are found very good ones; and decoctions of liquorice-root in barley-water, with ſyrup of marſh-mallows, may be drank in large draughts. Many people are alſo fond of external remedies, and recommend onions, roaſted and buttered, to be applied to the pubes, and goat's ſuet to be rubbed warm about the navel.

In caſes of the *iſchury* there is occaſion for greater medicines, and the method muſt neceſſarily be varied, according to the ſtate of the patient, and the cauſe of the diſeaſe. The firſt thing to be done is the injecting an emollient clyſter to looſen the bowels; for when theſe are emptied, the other complaint will be much more eaſily removed: after the clyſter, powders compoſed of cinnabar, nitre, and diaphoretic antimony, are to be given, to prevent an inflammation in the abdomen, and to attemperate the offending matter. When theſe things are done, the peculiar cauſes of the diſeaſe are to be examined. If a plethora and violent emotion of the blood be in fault, making a congeſtion of it at the kidneys; in this caſe, if the before mentioned methods do not take effect, bleeding in the foot will be of ſervice, and an external uſe of camphorated ointments probably will complete the cure. When the cauſe is a ſpaſtic conſtriction of the ureters and kidneys, then the relaxing medicines are to be given, and gentle purges of ſena, manna, and the like, will be of great uſe. Externally, warm baths, oily liniments and ointments, and emollient cataplaſms, are alſo great aſſiſtants to the internal medicines.

If a ſmall ſtone, or a grume of blood, or mucous matter, or a worm, have ſtopped up the paſſage, and prevented the urine from paſſing after the clyſter, and the powders are found not to have the deſired effect, the catheter is to be introduced; or if the ſtone be lodged in the urethra, the injecting a little oil may be of uſe to lubricate the paſſage, and eaſe its way out. When a genuine nephritis is the cauſe, this is firſt of all to be regarded, and treated in the common way. See NEPHRITIS and STONE.

If a venereal caruncle be in the way, it muſt be taken down by the ſurgeon with the ſeptics uſually employed on thoſe occaſions; and if the caſe be violent, and of this kind, the cure muſt be perfected by treating the patient in the uſual method in venereal caſes.

If an inflammatory tumor ſtops the neck of the bladder, this is to be diſcuſſed by reſolvents internally taken, and externally applied to the pubes; and if there is an eroſion, or ulceration, balſamics are to be given, and particularly the pills of boiled turpentine. *Iſchuries*, in infants, are cured by giving crab's eyes, and the like powders, with the uſual catarthal medicines, to the nurſe who gives them ſuck. Finally, in caſes of grown people, as ſoon as the urine comes away at all, the common diuretics are to be given, as the daucus-ſeeds, and the like, with gentle purges at the intermediate times; but it is a very dangerous practice to give diuretics before the cauſe of the obſtruction is removed, ſince they always add greatly to the pain and miſery of the patient.

There is no medicine ſo uſeful in theſe caſes as nitre, and it is better given in ſubſtance than any other way; for its dulcified ſpirit, though well known as a diuretic, is leſs ſafe than the ſalt itſelf. Many people have a great opinion of ſpecifies in theſe caſes, and golden-rod, and mouſe-ear, and ground-ivy, are accounted of that number, as alſo violet-ſeeds, and powder of egg-ſhells; but it is a very dangerous thing, in caſes of ſo great importance, to rely upon uncertain remedies. A common *ſtrangury* often is carried off by mere diluters, ſuch as tea, barley-water, or any other watery liquor, drank in large quantities till a ſweat comes on; and in the gentler caſes, where theſe alone are not quite effectual, there is no better addition to them than a little nitre. Bleeding, in time, often prevents great miſchiefs from theſe diſorders; and in caſes of a *dyſury*, brought on by the taking cantharides, there is no remedy ſo powerful as warm milk, alone, drank in large quantities. The great Mr. Boyle has alſo ſaid much in favour of Venice ſoap on this occaſion. Junker's Conſp. Med. p. 534, 535. See SUPPRESSION *of Urine.*

Strangury is a well known effect of bliſters; for preventing which Dr. Greenfield, about the beginning of this century, diſcovered that camphor had a power of correcting this effect of cantharides: and Dr. Home, in his Clinical Experiments, has found the efficacy of camphor rubbed on bliſters with this intention: and he has alſo removed, ſuddenly, a *ſtrangnry* in a typhus, by rubbing oil of camphor on the aucles. However, Dr. Heberden (Med. Tranſ. vol. i. p. 470.) ſuggeſts a query, whether experience ſufficiently warrants that virtue ſometimes aſcribed to camphor, of preventing a *ſtrangury?* Two ſcruples of it (he ſays) given to a woman in a clyſter, proved ſo irritating, as to bring on pains reſembling thoſe of labour. Another woman was ſeized with a *ſtrangury* ſoon after ſhe had taken a camphor bolus, which ſhe imputed to the camphor, and no other probable cauſe of it could be aſſigned. Camphor is in its nature nearly allied to ſpirit of turpentine, one dram of which taken internally, brings on a *ſtrangury* as certainly as cantharides.

STRAP, among *Surgeons*, a ſort of band uſed to ſtretch our limbs in the ſetting of broken or disjointed bones. See Bandage.

Strap, in a *Ship*, the rope which is ſpliced about any block, and made with an eye to faſten it any where on occaſion.

Straps, in the *Manege*. The *ſtraps* of a ſaddle are ſmall leather-*ſtraps*, nailed to the bows of the ſaddle, with which we make the girths faſt to the ſaddle.

STRAPADO, or **Strappado**, a kind of military puniſhment, wherein the criminal's hands being tied behind him, he is hoiſted up with a rope to the top of a long piece of wood, and let fall again almoſt to the ground; ſo that, by the weight of his body in the ſhock, his arms are diſlocated. Sometimes he is to undergo three *ſtrapados*, or more.

The word is formed from the French *eſtrapade*, which ſignifies the ſame, and which is ſuppoſed to come from the old verb *eſtreper*, to *break*, *extirpate*, or from the Italian *ſtrappata*, of the verb *ſtrappare*, to *wreſt by force*.

STRAPAZINO, in *Ornithology*, the name of a bird of the wheat-ear kind, with a white rump and tail, and of a browniſh yellow on the head and back; its wings are variegated with black and yellow, and its beak is longer, and of a browniſh yellow colour; throat, breaſt, and belly, of a yellowiſh white. It is common in Italy, and is frequently brought to market among the ſmall birds. Bellonius de Avibus.

STRASITES, **Stasites**, or **Staxites**, a ſtone deſcribed by the writers of the middle ages, and famed for its imaginary virtue of promoting venery, aſſiſting digeſtion, and the like, and that whether taken inwardly, or outwardly applied. It is not eaſy, from the accounts they have left us, to gueſs what ſtone they mean.

STRATA, in *Natural Hiſtory*, the ſeveral beds, or layers, of different matters, whereof the body of the earth is compoſed. The *ſtrata* include all the layers of earths, minerals, metals, ſtones, &c. lying under that upper tegument or ſtratum, the turf or mould.

The time when thoſe ſeveral *ſtrata* were laid, was doubtleſs at the creation; unleſs, with ſome great naturaliſts, as Steno, Dr. Woodward, &c. we ſuppoſe the globe of earth to have been diſſolved by the flood.

At that time, ſays Dr. Derham, whenever it was that the terreſtrial globe was in a chaotic ſtate, and the earthy particles ſubſided, then theſe ſeveral beds were repoſited in that commodious order wherein they are now found; and that, as is aſſerted, according to the laws of gravity, the lower ſtill heavier than the upper.

But Dr. Leigh, in his Natural Hiſtory of Lancaſhire, ſpeaking of the coal-pits, denies the *ſtrata* to lie according to the laws of gravitation; obſerving, that the *ſtrata* there are firſt a bed of marle, then free-ſtone, next ironſtone, then coal, or channel-mire, then ſome other *ſtrata*, then coal again, &c. This determined Dr. Derham to make a nicer inquiry into the matter; accordingly, in 1712, he cauſed divers places to be bored, laying the ſeveral *ſtrata* by themſelves, and afterwards determined very carefully their ſpecific gravity. The reſult was, that in his yard the *ſtrata* were gradually ſpecifically heavier and heavier, the lower and lower they went; but, in another place in his fields, he could not perceive any difference in the ſpecific gravities.

Acquainting the Royal Society therewith, their operator, Mr. Hawkſbee, was ordered to try the *ſtrata* of a coal-pit, which he did to the depth of thirty *ſtrata*; the thickneſs and ſpecific gravity of each whereof, he gives us in a table in the Philoſophical Tranſactions; and from the whole makes this inference, that it evidently appears, the gravities of the ſeveral *ſtrata* are in no manner of order; but purely caſual, as if mixed by chance.

The moſt frequent opportunities we have of obſerving theſe in England, is in the coal-mines in coal-countries. Here we find them lying in a regular manner, on what appears to us a plane, as we ſee any ſmall part of it; but when we conſider the ſame *ſtrata*, according to the globular figure of the earth, and ſuppoſe the maſs of the earth to conſiſt of the foregoing, and perhaps in different parts, and at different depths of *ſtrata*, of ten thouſand other kinds, all originally, while in a ſoft and fluid ſtate, tending toward the centre, we ſhall find that it muſt mechanically, and almoſt neceſſarily follow, by the continual revolution of the crude maſs from weſt to eaſt, like the winding up of a jack, or the rolling up of the leaves of a paper book, that every one of theſe *ſtrata*, though they each reach the centre, muſt, in ſome place or other, appear to the day, or on the ſurface. In which caſe there needs no ſpecific gravitation to cauſe the lighteſt to be uppermoſt; and were it practicable to ſink to the centre of the earth, all the *ſtrata* that are, would be found in every part, and, according to the poet, *ponderibus librata ſuis*. Add to this, that, according to an obſervation of Dr. Stukely, the precipices of all hills are to the weſtward, whereas the aſcent to the eaſt is more gradual. Philoſ. Tranſ. Nº 391, p. 396.

STRATARITHMOMETRY, formed from ϛρατος, *army*, αριθμος, *number*, and μετρον, *meaſure*, in *War*, the art of drawing up an army, or any part of it, in any given geometrical figure; and of expreſſing the number of men contained in ſuch a figure, as they ſtand in array, either near at hand, or at any diſtance aſſigned.

STRATAGEM, ϛρατηγημα, formed from ϛρατηγεω, *I lead*, or *command an army*, a military wile, or a device in war, ſurpriſing or deceiving an enemy.

The ancients dealt very much in *ſtratagems*; the moderns wage war more openly, and on the ſquare. Frontinus has made a collection of the ancient *ſtratagems* of war.

STRATEGUS, ϛρατηγος, in *Antiquity*, an officer among the Athenians, whereof there were two choſen yearly, to command the troops of the ſtate.

Plutarch ſays, there was one choſen from out of each tribe; but Pollux ſeems to ſay, they were choſen indifferently out of the people. The people themſelves made the choice; and that on the laſt day of the year, in a place called Pnyx. The two *ſtrategi* did not command together, but took their turns day by day: as we find from Herodotus and Cornelius Nepos. Sometimes, indeed, as when a perſon was found of merit vaſtly ſuperior, and exceedingly famed in war, the command was given to him alone: but it was ever a rule, not to put any perſon in the office but whoſe eſtate was in Attica, and who had children, that there might be ſome hoſtages and ſecurities for his conduct and fidelity.

Conſtantine the Great, beſides many other privileges granted to the city of Athens, honoured its chief magiſtrate with the title of Μεγας Στρατηγος, *Magnus Dux*.

STRATIFICATION, **Stratificatio**, in *Chemiſtry*, the arrangement of different matters in ſeveral *ſtrata* or layers, alternately; called alſo by the Latins, *ſtratum ſuper ſtratum*, and marked in books of chemiſtry with SSS.

This operation is uſed in calcining of minerals or metals with ſalts or other matters.

To purify gold by cementation, they *ſtratify* laminæ or plates of gold in a crucible, with a dry paſte called *cement*.

STRATIOTES, in *Botany*. See *Water* Aloe, and *Water* Violet.

STRATOR, among the *Romans*, an officer who took care of the horſes furniſhed by the provincials for the public ſervice.

Strator is alſo uſed for an officer in the army, whoſe buſineſs it was to take care there was nothing in the roads to hinder or incommode the army in its march. For which purpoſe he ordered banks and ſteep eminences to be levelled; laid bridges, cut down woods, and aſſiſted the quarter-maſter to find out places proper for tranſporting the army over rivers.

Strator is alſo uſed for an equerry, who held the bridle of the prince's horſe, and aſſiſted him in mounting. This officer was by the Greeks called Anaboleus.

Strator likewiſe denotes a ſurveyor of the highways.

STRAWBERRY, *fragaria*, in *Botany*, a genus of the *icoſandria polygynia* claſs. Its characters are theſe: the empalement of the flower is of one leaf, which is cut into ten parts at the top; the flower has five roundiſh petals, which are inſerted in the empalement, and ſpread open, and twenty ſtamina, terminated by moon-ſhaped ſummits, with a great number of germina, collected into a head, each having a ſingle ſtyle, inſerted in the ſide of the germen, crowned by ſingle ſtigmas; the head afterward becomes a large ſoft pulpy fruit, which, if left, falls away, leaving ſmall angular ſeeds in the empalement. There are four ſpecies.

The *common*, or *wood ſtrawberry*, is frequent in the woods of England, and is thence tranſplanted into gardens. Of this ſort there are three varieties, viz. the common ſort with red fruit; the white *wood-ſtrawberry*, which ripens later in the ſeaſon; and the green *ſtrawberry*, by ſome called the pine-apple *ſtrawberry*, on account of its rich flavour. The *ſcarlet ſtrawberry*, which was brought from Virginia, where it grows in the woods, is the ſort which is firſt ripe. The *hautboy ſtrawberry*, came originally from America, but has been long cultivated in the Engliſh gardens: there is an improvement of this called the globe hautboy. The *Chili ſtrawberry* was firſt brought to Europe from America, by M. Frazier, engineer to the French king, and cultivated in the royal garden at Paris, whence it was conveyed to Holland, and to England by Mr. Miller in 1727.

The proper ſoil for *ſtrawberries* is a light hazely loam, not over rich; the ground, which ſhould be moiſt, muſt be well dug, and very carefully cleared of all noxious weeds, but not much dunged; and when it is levelled even, it ſhould be marked out into beds about four feet wide, leaving a pathway between each bed of two feet broad. In each of theſe beds ſhould be planted four rows of plants, ſo that they may ſtand about a foot diſtant from each other in the rows, and they ſhould be planted at about a foot plant from plant in each: and if there be no rain ſoon after they are planted, they ſhould be well watered to ſettle the earth to their roots. This is the proper diſtance for the wood *ſtrawberry*, which is of the leaſt growth of any; but the ſcarlet and hautboy *ſtrawberries* ſhould have but three rows of plants in each bed, at fifteen inches diſtance from row to row, and from plant to plant. And finally, the large Chili *ſtrawberry*, which is the largeſt grower of all, muſt be ſet at two feet diſtance plant from plant; and there ſhould be only two rows in a bed.

The whole ſucceſs in the management of *ſtrawberries* depends on the proper choice of all the ſorts of plants; many of them being blind, or having flowers without the female organs of generation, with few if any ſtyles, though they may abound with ſtamina. *Strawberry* plants ſhould therefore never be taken from old neglected beds, where they have a multitude of ſuckers: thoſe off-ſets, which ſtand neareſt to the old plants, ſhould be preferred to thoſe which are produced from the trailing ſtalks at a farther diſtance; and the wood *ſtrawberry* is beſt when the plants are taken freſh from the woods, if the plants are fruitful.

The beſt time to remove theſe plants is October, that they may take root before the froſt ſets in. When the plants have taken new roots, the next care is, if the winter proves ſevere, to cover them with tanner's bark, or ſtraw-duſt, or ſea-coal aſhes, or the decayed leaves of trees. The following ſummer the plants ſhould be kept clean from weeds, and the runners pulled off as faſt as they are produced: in autumn the plants ſhould again be diveſted of any ſtrings or runners, and the beds cleared from weeds, and ſome earth laid over the ſurface of the beds between the plants, together with ſome old tanner's bark. In the ſpring, when the danger of froſt is paſt, the ſoil ſhould be looſened and ſtirred, and thus the bark will be buried, and afford a good dreſſing for the *ſtrawberries*: about the end of March, or beginning of April, the ſurface of the ground ſhould be covered with moſs, which will keep the ground moiſt. The ſoil in which the Chili *ſtrawberry* ſucceeds beſt is a very ſtrong brick earth, approaching near to clay. The ſorts which are proper for forcing early, are the ſcarlet and wood *ſtrawberries*; and this may be done on the borders of hot walls, or ſtoves, or even upon common hot-beds. The methods practiſed to retard this fruit are to plant them in the coldeſt part of the garden, and to cut off all the flowers when they firſt appear.

Theſe beds, however, well managed, will not continue good above three years; and the beds of the firſt year bearing but few fruit, it is neceſſary to new-plant ſome freſh ground every third year, and deſtroy the old beds, but the new ones muſt be firſt of one year's growth.

Different palates prefer different ſpecies of *ſtrawberry*, but the white fruited one is of all others, the beſt flavoured, though it is but a very bad bearer. The great Chili *ſtrawberry* is cultivated in the fields in that country; it is a much ſtronger and larger plant than any of our kinds, and its fruit is as large as a walnut, but not ſo well taſted as our own *ſtrawberries*. Miller. See SUMMER *fruits*.

STRAWBERRY-*blite*. See BLITE.

STRAWBERRY *cinquefoil*. See CINQUEFOIL.

STRAWBERRY *ſpinach*. See BLITE.

STRAWBERRY-*tree*. See ARBUTUS.

STRAY. See ESTRAY.

STREAK-*fallowing*, in *Huſbandry*, a particular ſort of tillage. The way of doing it is to plough one furrow, and leave one, ſo that but half the land is ploughed, each furrow that is ſo lying on that which is not; when this is ſtirred, it is then clean ploughed, and laid ſo ſmooth that it will come, at ſowing time, to be as plain as before. This is done when lean or poor lands are not ſwardy enough to bear clean tillage, nor light enough to lie to get ſward. The intent of this tillage is to keep the ſun from ſcorching them too much; but in many places they think this wears the land too faſt, and therefore are not fond of having recourſe to it.

STREAM *anchor*. See ANCHOR.

STREAM *cable*. See CABLE.

STREAM *tin ore*, is a name given to the ſmaller and looſe particles of the mineral, in the form of ſmall pyramids of various planes, very broad at the baſe, and tapering to a point at the top; theſe are detached from the bryle or backs of ſundry lodes, which are ſituated on hilly grounds, and carried down from hence by the retiring waters of the deluge, or floods of ſubſequent dates, and collected in large heaps in the vallies. This is found in different places at different depths, and ſometimes ſtratified between what is called a firſt, ſecond, or third ſhelf. The ſtratum of *ſtream*-tin may be from one to ten feet thickneſs or more; in breadth from one fathom to almoſt the width of the valley; and in ſize from a walnut to the fineſt ſand, which laſt makes the principal part of the ſtratum, being intermixed with ſtones, gravel, and clay, as it was torn from the adjacent hills. Hence,

STREAMING, or STREAM-*work*, denotes the management of the *ſtream* tin. The firſt part of this buſineſs, after ſecuring the ground which contains it, is to ſink a hatch or ſhaft, three, five, or ſeven fathoms deep, to the rocky ſhelf or clay on which the tin is ſtratified. If upon trying a ſhovel of it, it be worth working, the operator digs an open trench in the loweſt part of the valley, which he calls a level; and this ſerves to drain off all water from the workings. Thoſe places that are rich in ore are called beuheyle, or *living ſtream*. The *ſtreamer* next carries off what he calls the overburden, i. e. the looſe earth, rubble, or ſtone which covers the *ſtream*; and the *ſtream*-tin is dug up and waſhed at the ſame time, by caſting every ſhovel of it as it riſes into a *tye*, which is an inclined plane of boards for the water to run off, about four feet wide, four high, and nine feet long; in which with ſhovels they turn it over and over again under a caſcade of water that waſhes through it, and ſeparates the waſte from the tin, till it becomes one half tin. The beſt of the tin is collected, by its ſuperior gravity, in the head of the tye under the caſcade; and the refuſe and ſoil are caſt into the beds of adjacent rivers, or buried under the gravel and ſtones that form the interior ſtrata. This kind of tin is dreſſed by waſhing it again in a ſmaller tye, called a gounce, with a leſs current of water and greater care. The richer part is put into large vats, and the waſte is dreſſed again, till what remains becomes refuſe; the tin is then ſifted through wood or wire ſieves, which ſeparate the greater and ſmaller particles: the ſmalleſt tin is put into another firmly weaved horſe-hair ſieve, called a dilluer, by which it is made ſaleable.

Some of the nodules of tin are ſmelted as they come out of the tye; but thoſe which are mixed with water, as well as the refuſe of the poor tin, which were in the tails of the tye and gounce, are triturated and pulveriſed in the ſtamping mill, ſo that all waſte may be cleared from the tin by ſeveral ablutions, as in the dreſſing of mine-tin. See *Dreſſing of* ORES.

Beſide theſe *ſtream-works*, there is another ſort occaſioned by the refuſe from the ſtamping-mills, &c. which are carried by the rivers into the lower grounds, and after lying ſome years and collecting there, yield ſome money to the laborious dreſſers, called *lappiors*, probably from the Corniſh word, lappior, or dancer, from the method of moving up and down with naked feet in the BUDDLES, to ſeparate the tin from the refuſe. *Stream*-tin is then carried to the blaſt-furnace, called the blowing-houſe, in which a fire is made with charcoal, excited by two large bellows, which are worked by a water-wheel. The tin and charcoal are laid in a furnace, made by moor-ſtones and clay, well-cemented, and cramped together with iron, called the caſtle, ſtratum ſuper ſtratum, in ſuch quantities, that from eight to twelve hundred weight of tin, by the conſumption of eighteen to twenty-four ſixty-gallon packs of charcoal, may be ſmelted in a tide, or twelve hours time. The tin is forced out by the blaſt of the bellows through a hole at the bottom of the earth into a moor-ſtone trough, called the *float*; whence it is laded into leſs troughs or moulds, each of which contains about three hundred of metal, called ſlabs, blocks, or pieces of tin, in which ſize and form it is ſold in every market in Europe. This, on account of its ſuperior quality, is known by the name of *grain-tin*, which formerly fetched a price of 7 *s.* and of late is advanced to 10 *s.* or 12 *s.* more per hundred than mine-tin is ſold for, becauſe it is ſmelted from a pure mineral by a charcoal fire; whereas mine-tin is uſually corrupted with ſome portion of mundick, or other minerals, and is always ſmelted with a bituminous fire, which communicates a harſh ſulphureous quality to the metal. Pryce's Mineral. p. 136, &c.

STREAMERS, in a *Ship*, the ſame with PENDANTS.

STREIGHT. See STRAIGHT.

STRENÆ, in *Antiquity*, *new years gifts*; preſents made out of reſpect on new year's day; as an happy augury for the enſuing year.

The ancient lawyers derive the word hence, that theſe preſents were only given *viris ſtrenuis:* Symmachus adds, that the uſe hereof was firſt introduced by king Tatius, Romulus's colleague, who received branches of vervain gathered in the ſacred grove of the goddeſs Strenia, as a happy preſage of the beginning year.

Anciently, a pound of gold was given to the emperors every new year's day, by way of *ſtrena*. Du-Cange obſerves, that *ſtrina*, or *ſtrinna*, denoted a kind of tribute which the people of Dalmatia or Croatia paid to the Venetians, or to the kings of Hungary, whom they obeyed voluntarily.

STRENGTH, *vis*, force, or power.

The *ſtrengths* of different animals of the ſame ſpecies, or of the ſame animal at different times, are demonſtrated to be in a triplicate proportion of the quantities of the maſs of their blood: the whole *ſtrength* of an animal is the force of all the muſcles taken together; therefore, whatever increaſes *ſtrength*, increaſes the force of all the muſcles, and of thoſe ſerving digeſtion, as well as others. See MUSCLE.

Yet, notwithſtanding the truth of this, the quantity of blood may be increaſed in ſuch circumſtances as to abate the *ſtrength*. The equilibrium between the blood and veſſels being deſtroyed, wonderfully leſſens the *ſtrength*. The ſudden ſuppreſſion of perſpiration, though it increaſes the quantity of the blood, as it muſt conſiderably do ſo, by Sanctorius's calculation, yet it leſſens the *ſtrength*; becauſe the retained matter, being what ought to be evacuated, ſo alters the texture of the blood, as to make it unfit for muſcular motion.

Suppoſe the increaſe of quantity to be connected with an extraordinary viſcidity, the quantity of ſmall ſeparable parts decreaſing, as the viſcidity increaſes, the quantity of animal ſpirits ſeparated in the brain will be leſs; and the tenſion of the fibres being in proportion to the animal ſpirits forced into them, they will not be able to counterpoiſe the great weight of the blood, and ſo the *ſtrength* will be diminiſhed.

Bellini proves, that if the blood be ſo vitiated as to increaſe or diminiſh *ſtrength*, it amounts to the ſame as if the blood were in a natural ſtate, but its quantity increaſed or diminiſhed in the ſame proportion: ſo that the blood, when vitiated, may ſo impair the *ſtrength* of the muſcles, as even to ſpoil digeſtion; and yet, in ſome caſes, it may be ſo vitiated as to help digeſtion, and increaſe *ſtrength*.

M. De la Hire, in a calculation of the *ſtrength* of a man in drawing and bearing, ſhews, that the *ſtrength* of an ordinary man walking in an horizontal direction, and with his body inclining forwards, is only equal to twenty-ſeven pounds; which is much leſs than one would have imagined.

He adds, that this force would be much greater if the man were to walk backwards; and that it is for this reaſon, the watermen fetch their ores from before backwards: and though, he obſerves, the gondoliers of Venice fetch them the contrary way, yet this is, becauſe they chooſe to loſe the advantage of *ſtrength*, to have that of ſeeing the place they are going to, in the numerous turns and canals they there meet with.

It is known by experience, that a horſe draws, horizontally, as much as ſeven men; conſequently, his *ſtrength* will be 189 pounds. A horſe, as to puſhing forwards, has a great advantage over a man, both in the *ſtrength* of its muſcles, and the diſpoſition of the whole body; but the man has the advantage over the horſe in aſcending. M. de la Hire ſhews, that three men, laden with 100 pounds apiece, will aſcend a pretty ſteep hill with more eaſe and expedition than a horſe loaden with 300 pounds.

Hakewell, in his Apology, p. 238, furniſhes us with abundance of inſtances of extraordinary *ſtrength*.

STRENGTHENERS, *corroborants*; ſuch medicines as add to the bulk and firmneſs of the ſolids.

Strengtheners differ from *cordials*, as a bandage does from a fleſh-bruſh; the latter are ſuch as facilitate and drive on the vital actions; but the former, ſuch as confirm the ſtamina, and maintain the ſolids in ſuch a condition, as to exert themſelves into action on all proper occaſions, with the greateſt force and vigour.

The continual waſte which conſtant motion makes in the conſtitution, were it not for frequent and proper ſupplies, would ſoon wear the body quite out. The attritions and abraſions of the circulating fluids would quickly carry away the canals in which they circulate, were not ſomewhat furniſhed in their compoſition, which is ſuited to fall into, adhere with, and recruit, that which is waſhed off. And thoſe particles muſt be much more diſpoſed ſo to do, whoſe adheſions are greateſt, when once they come into contact; ſuch are thoſe of bodies we call *glutinous*, and which eaſily form themſelves into jellies, and ſuch-like conſiſtencies; for the parts of ſuch bodies are very light, by the over-proportion of their ſurfaces to their ſolidities, whereby their motions are both more languid, when in circulation; and, when they ſtop, their coheſions will be much the ſtronger, with whatſoever they happen to fall into contact. See NUTRITION.

Medicines of this tribe are therefore of great ſervice in hectics; where the ſwift motion of a thin, ſharp blood, wears away the ſubſtance of the body, inſtead of nouriſhing it; for they not only retard the inordinate motion, but give ſuch a weight and conſiſtence to the juices, as fits them alſo for nouriſhment. There are likewiſe other cauſes, which may weaken the ſolids, by admitting or occaſioning them to relax too much.

Whatſoever therefore acts as a ſtimulus, and criſps and corrugates the fibres into a more compacted tone, which moſt auſtere and pointed bodies do, will remove ſuch weakneſs, and increaſe ſtrength; and as too much moiſture may alſo contribute to ſuch a relaxation, what has no other quality but that of abſorbing, and drying up, ſuch ſuperfluous humidities, may deſerve, though accidentally, to come under this denomination.

An artificial method of procuring a powerful, ſafe, and innocent *ſtrengthener*, is the following. Put half a pound of fine Peruvian bark, reduced to a ſubtile power, into a long or tall glaſs body, and pour upon it two quarts of ſpirit of wine; ſhake them well together, and ſet them in a ſand-heat two or three days, or till the ſpirit of wine is of a fine purple colour; pour off this tincture, and preſs the ſæces very ſtrongly, to get it all away; then return the powder into the ſame veſſel, and pour upon it two quarts of ſtrong white wine; ſet this in ſand for two or three days, then pour off this tincture; mix it with the former, and putting the whole into a glaſs body, diſtill off a great part of the ſpirit of wine; then put the remainder into a glazed earthen pan, and evaporate it to the form of an extract, adding, toward the end, three ounces of ſyrup of orange-peel.

This is the invention of Charas, and ſeems the beſt preparation of bark known. Beſide all the common caſes in which the bark is given, this preparation may be tried in other weakening diſtempers as well as intermitting fevers, as the inconveniences attending the taking the bark in ſubſtance are obviated by this preparation, which is equally powerful and innocent. It may be aromatized at pleaſure with any of the eſſential oils. Shaw's Lectures, p. 232.

STRENGTHENING *pills*. See PILL.

STREPITOSUS, the name of a diſtemper common to the inhabitants of ſome parts of the Alps, in which the face, neck, and arms, are ſo diſtended with flatulencies, as to make a noiſe, when ſtruck, like a dry bladder half diſtended with wind.

STREPSICEROS, in *Zoology*. See SHEEP.

STRETCH. When at ſea they are going to hoiſt the yard or hale the ſheet, they ſay, *Stretch forward the ſheets*; meaning, that the part which the men are to hale by, ſhould be put into their hands, in order to their haling.

STRETCHER, in *Sea Language*, a ſort of ſtaff fixed athwart the bottom of a boat, for the rower to place his feet againſt, in order to communicate a greater effort to his oar.

STRETCHING, in *Navigation*, is generally underſtood to imply the progreſſion of a ſhip under a great ſurface of ſail, when cloſe-hauled. The difference between this term and STANDING, conſiſts apparently in the quantity of ſail, which, in the latter, may be very moderate; but in *ſtretching* generally ſignifies exceſs: as, we ſaw the enemy at day-break *ſtretching* to the ſouthward, under a crowd of ſail, &c. Falconer.

STRETTO, in the *Italian Muſic*, is ſometimes uſed to ſignify that the meaſure is to be ſhort and conciſe, and conſequently quick. In this ſenſe it ſtands oppoſed to LARGO.

STRETWARD, in our *Old Writers*, an officer whoſe buſineſs it was to take care of the ſtreets, like our ſurveyor of the highways, or rather ſcavenger.

STREVER, in *Ichthyology*, a name given by many to the fiſh called by authors *aſper piſciculus*. Geſner, in particular, calls this fiſh GOBIUS *aſper*.

STRIÆ, in the *Ancient Architecture*, the liſt, fillets, or rays, which ſeparate the ſtriges or flutings of columns.

STRIÆ, among *Naturaliſts*, denotes the ſmall grooves or channels in the ſhells of cockles, ſcollops, &c.

STRIATA *corpora*, a term uſed by anatomiſts to expreſs two protuberances of the BRAIN upon the crura of the MEDULLA *oblongata*.

STRIATED *leaf*, among *Botaniſts*. See LEAF.

STRIATED *ſtalk*. See STALK.

STRIATULA, in *Natural Hiſtory*, a name given by Mr. Lhuyd to a ſpecies of *foſſile* PLANTS of the fern-kind, remarkable for their *ſtriated* appearance.

STRIBILIGO, a name given by ſome authors to any ſort of cutaneous eﬄoreſcence.

STRICKLE, or STRIKE, an inſtrument for ſtriking off the over-meaſure of corn.

STRICTOR, in *Anatomy*, the ſame as SPHINCTER.

STRIDOR *dentium*, a grinding of the teeth. Proſper Alpinus, in his treatiſe De Præſag. Vit. et Mort. Ægrot. tells us, that a *ſtridor dentium*, which he calls a convulſion of the teeth, has been frequently obſerved to be a mortal ſymptom; and he confirms his obſervations by the authority of Hippocrates. James.

STRIGA, among the Romans, a ſpace or interval in a camp, a hundred and twenty feet long, and ſixty feet broad, uſed for currying and rubbing down the horſes.

STRIGA is alſo uſed for a furrow drawn out at length, for a long row, or ſeries of any thing, and by ſurveyors for a long meaſure.

STRIGES, in the *Ancient Architecture*, are what in the modern we call FLUTINGS.

They were thus denominated, as being ſuppoſed to have been originally intended to imitate the folds or plaits in women's robes; which the Latins call *ſtrigæ*. The fillets or ſpaces between them were called *ſtriæ*.

STRIGIL, an inſtrument uſed among the ancients in their baths, and at ſome of their gymnaſtic exerciſes.

It ſerved to abſterge the ſweat, or other ſordes from the body. Perſons who intended to bathe, or to uſe any of theſe exerciſes, when they entered the gymnaſium, put off their cloaths in the apodyterium; after which, ſuch of them as intended to box, wreſtle, or uſe any of the more violent exerciſes, went into the alipterium, where they were anointed, and thence returning into the place where the duſt was, they were ſprinkled with this as they paſſed along, and then entered upon their ſeveral exerciſes; after this they returned to the alipterium, where they had the ſweat and ſordes wiped off from their bodies by the alipta with an iron *ſtrigil*.

The ſordes taken off from the body, and conſiſting of oil, duſt, and ſweat, were preſerved for medicinal purpoſes, and we find them uſed among the old phyſicians.

The *ſtrigils* were of the ſhape of a gardener's knife; they were made of different materials, as ivory, horn, gold, ſilver, iron, braſs, and the like; but in ſome after-times the word was only uſed to ſignify a linen cloth, or a piece of ſpunge, which every one carried about him for his own uſe. The ſordes, ſaved for medicinal purpoſes, were called *ſtrigmenta*.

STRIGMENTUM, the filth, dirt, or ſordes, abſterged from the ſkins of thoſe that bathed in the baths and places of public exerciſe among the ancients, or from the walls of bathing places, or ſtatues ſet up in them.

Theſe were all reſerved for medicinal purpoſes, and were properly of three kinds. The firſt, or bath *ſtrigments*, conſiſted of the ſweat, oil, and ſordes, collected in thoſe places. The ſecond kind was the *ſtrigments* of the palæſtra, conſiſting of the ſame things, with the addition of duſt, which was thrown upon the bodies of the perſons before they entered on thoſe exerciſes. The third kind was that collected from the walls of the gymnaſia, and from the ſtatues of whatever materials they were made, which were placed there. Hence the nature of the firſt and ſecond kind might always be aſcertained, but that of the third was very different; for as it was often collected from braſs and copper ſtatues, it partook of the nature of the ruſt, or ærugo of thoſe metals which was collected from them with it.

Theſe *ſtrigments* were ſuppoſed to be of a heating, drying quality, and diſcutient; they were, therefore, uſed for diſcuſſing the parotides, and for condylomata of the anus. Thoſe of the palæſtræ were uſed to diſcuſs collections of matter about the joints; and applied in the manner of a cataplaſm, were ſaid to be of great uſe in the ſciatica; and thoſe collected from the walls and ſtatues were uſed to cleanſe old ulcers.

STRIGONIENSIS *terra*, earth of *Strigonium*, in the *Materia Medica*, a red earth of the bole-kind, found about the gold mines at *Strigonium* in Hungary, and uſed in ſome places as an aſtringent and ſudorific.

The characters by which it is known from the other earths, are theſe. It is but of a coarſe and impure texture, and lighter than moſt of the boles; in colour it is of a ſtrong, but dull red, and is of a tolerably ſmooth ſurface. It is apt to crumble to pieces between the fingers, and ſtains the ſkin in handling. It melts freely in the mouth, and has a remarkable ſmoothneſs, but very little aſtringency in its taſte, and leaves a ſenſible grittineſs between the teeth. It is ſometimes veined and ſpotted with ſmall moleculæ of an earth, like the whitiſh variegations of the red French bole. It makes a ſlight effervеſcence with aqua fortis, or any other acid menſtruum, and ſuffers no change of colour by burning. Hill's Hiſt. of Foſſ. p. 11.

STRIGOSULA, in *Natural Hiſtory*, a name given by Mr. Lhuyd to a ſpecies of foſſile oyſter-ſhell.

STRIKE, or STRYKE, a meaſure, containing four buſhels; two of which make a quarter.

A STRIKE *of flax* is as much as can be heckled at one handful.

STRIKE, or STRIKING, is a ſea-word, variouſly uſed. When a ſhip in a fight, or upon meeting with a man of war, lets down, or lowers her top-ſails, at leaſt half-maſt high; they ſay, *She ſtrikes*: meaning, ſhe yields or ſubmits, or pays her devoir to that man of war, as ſhe paſſes by. See JEERS, SAIL, and SALUTE.

When a top-maſt is to be taken down, they ſay, *Strike the top maſt*.

And when any thing is let down or lowered into the hold, they call it *ſtriking down into the hold*.

Alſo when a ſhip touches ground in a ſhoal-water, they ſay, *She ſtrikes*.

STRIKE *a hull*. See HULL.

STRIKE *a nail*, in the *Manege*, is to drive through the horſe's ſhoe, and the horn or hoof of his foot, and to rivet it for holding on the ſhoe.

STRIKE *a vein*, in the *Manege*. See BAR.

STRIKING. The puniſhment appointed by our laws, 33 Hen. VIII. cap. 12. for *ſtriking* in the king's palace, where his royal perſon reſides, whereby blood is drawn, is perpetual impriſonment, and fine at the king's pleaſure; and alſo loſs of the offender's right hand, the ſolemn execution of which ſentence is preſcribed in the ſtatute at length. See *Lord*-STEWARD.

But *ſtriking* in the king's ſuperior courts of juſtice, in Weſtminſter-hall, or at the aſſizes, is made ſtill more penal than even in the king's palace. By the ancient common law, before the Conqueſt, *ſtriking* in the king's courts of juſtice, or drawing a ſword therein, was a capital felony; and by our modern law, a ſtroke or a blow in ſuch court of juſtice, whether blood be drawn or not, or even aſſaulting a judge, ſitting in the court, by drawing a weapon, without any blow ſtruck, is puniſhable with the loſs of the right hand, impriſonment for life, and forfeiture of goods and chattels, and of the profits of his lands during life.

By 5 and 6 Edw. VI. cap. 4. if any perſon ſhall maliciouſly *ſtrike* another with any weapon, in any church or church-yard, or ſhall draw any weapon with an intent to *ſtrike* another with it, he ſhall upon conviction, by verdict of twelve men, or by his own confeſſion, or by two lawful witneſſes, at the aſſizes or ſeſſions, be adjudged to have one of his ears cut off; and if he have no ears, he ſhall be burned in the cheek with a hot iron, having the letter F, whereby he may be known for a fray-maker and fighter; and beſides ſhall be *ipſo facto* excommunicated.

STRIKING-*watch*. See WATCH.

STRIKING-*wheel*, in a *Clock*, the ſame with that which by ſome is called the *pin-wheel*, becauſe of the pins which are placed on the round or rim (which in number are the quotient of the pinion divided by the pinion of the detent-wheel). In ſixteen-days clocks, the firſt, or great wheel, is uſually the pin-wheel; but in ſuch as go eight days, the ſecond wheel is the pin-wheel, or *ſtriking-wheel*. See CLOCKWORK.

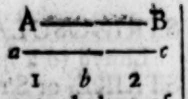
STRILLOZZO, in *Ornithology*, a name by which ſome authors have called the emberiza alba, or bunting, or perhaps a bird ſomewhat different from our bunting, and common in Italy; for it is not yet aſcertained, whether the *ſtrillozzo* ſpecifically differs from the bunting, or only by ſome accidental variegations.

STRING, in *Muſic*. See CHORD.

If two *ſtrings* or chords of a muſical inſtrument only differ in length; their tones, that is, the number of vibrations they make in the ſame time, are in the inverſe ratio of their lengths. If they only differ in thickneſs, their tones are in the inverſe ratio of their diameters. As to the tenſion of *ſtrings*, to meaſure it regularly, they muſt be conceived ſtretched or drawn by weights; and then, cæteris paribus, the tones of two *ſtrings* are in a direct ratio of the ſquare roots of the weights which ſtretch them; that is, e. gr. the tone of a *ſtring* ſtretched by a weight 4, is an octave above the tone of a *ſtring* ſtretched by the weight 1.

It is an obſervation of very old ſtanding, that if a viol or lute-*ſtring* be touched with the bow, or hand, another *ſtring* on the ſame, or another inſtrument, not far from it, if in uniſon to it, or in octave, or the like, will at the ſame time tremble of its own accord. See UNISON.

But it is now found, that not the whole of that other *ſtring* doth thus tremble; but the ſeveral parts, ſeverally, according as they are uniſons to the whole, or the parts of the *ſtring* ſo ſtruck. Thus, ſuppoſing A B to be an upper octave to *a c*, and therefore an uniſon to each half of it ſtopped at *b*;



if while *ac* is open, A B be ſtruck, the two halves of this other, that is, *a b* and *b c*, will both tremble; but the middle point will be at reſt; as will be eaſily perceived, by wrapping a bit of paper lightly about the *ſtring a c*, and removing it ſucceſſively from one end of the *ſtring* to the other. In like manner, if A B were an upper twelfth to *a c*, and conſequently, an uniſon to its three parts *a* 1, 1 2, and 2*c*; if *a c* being open, A B be ſtruck, its three parts *a* 1, 1 2, and 2 *c* will ſeverally tremble; but the points 1 and 2 remain at reſt. This, Dr. Wallis tells us, was firſt diſcovered by Mr. William Noble of Merton college; and after him by Mr. T. Pigot of Wadham college, without knowing that Mr. Noble had obſerved it before. To which we may add, that M. Sauveur, long afterwards, propoſed it to the Royal Academy, at Paris, as his own diſcovery, as it is like enough it might be; but upon his being informed, by ſome of the members then preſent, that Dr. Wallis had publiſhed it before, he immediately reſigned all the honour thereof. Phil. Tranſ. abr. vol. i. p. 606.

STRING, in *Ship Building*, the higheſt range of planks in a ſhip's cieling; or that which lies between the gunwale, and the upper edge of the upper-deck ports.

STRINGS *of metal*, a term uſed by our miners to expreſs thoſe thin and ſmall veins of ore, into which the beds or veins degenerate toward their terminations. Theſe are from an inch to a tenth part of that in thickneſs, and run through the ſolid rocks to a great diſtance. The ore in them is uſually very pure and rich, and as they lie in the rocks, communicating with the larger veins of ore, they reſemble the ſeveral ſmall brooks and rivulets in a hilly country, which by degrees uniting all their ſtreams, form the rivers.

STRING-HALT, a ſudden twitching or ſnatching up of a horſe's hinder leg, much higher than the other, as if he trod on needles; generally befalling only the beſt mettled horſes, and ranked in the number of ſpavins. See SPAVIN.

It frequently happens upon taking cold, after hard riding, or ſore labour; eſpecially upon waſhing him when too hot, which chills the blood, and ſo benumbs the ſinews, as to take away the ſenſe and feeling of the member.

To cure it, the middle vein is taken up above and underneath the thigh; under which is found a *ſtring*, which is to be cut away, and the part anointed with butter and ſalt.

STRINSIA, in *Ichthyology*, a name given by authors to that ſpecies of the gadus, which is called by ſome *lota*, and by others *muſtela fluviatilis*; by us in Engliſh the EEL*pout*. Olaus Magnus calls it the *borbocha*.

STRIP, at *Sea*. A chaſe is ſaid to *ſtrip* himſelf into ſhort or fighting ſails, when he puts out his colours in the poop; his flag on the main-top; his ſtreamers or pendants at the end of his yard-arm; furls his ſprit-ſail; peeks his mizen; and ſlings his main-yard. In which caſe, the chaſer muſt prepare himſelf for fight.

To STRIP *the maſts*, is to unrig a ſhip, or diveſt the maſts of their machinery and furniture, otherwiſe called diſmantling.

STRIPED *ſtalk*. See STALK.

STRIPED *velvet*. See VELVET.

STRIVALE, in *Ichthyology*, the name uſed by many for the fiſh more uſually known by the name of APER, the boarfiſh. See *Tab. of Fiſh*, N° 19.

STRIX. See OWL.

STROAKING, a method of cure which ſome people have given into, in certain diſeaſes, conſiſting in a mere application of the hand to the part affected, in the way of friction or rubbing.

That FRICTION has very conſiderable uſes in many diſeaſes, is allowed. But as to the particular efficacy of the *ſtroak* of particular perſons; we ſee little foundation for it in nature. Experience, indeed, ſeems to afford ſome; to which we do not well know what to object.

Mr. Thoreſby, in the Philoſophical Tranſactions, N° 256. p. 332. or Abr. vol. iii. p. 11. gives ſeveral very remarkable inſtances of cures performed by that famous *ſtroaker*, Mr. Greatrix; and adds, that when Mr. Greatrix *ſtroaks* only for pains, he uſes nothing but his hand; but that for ulcers, or running ſores, he uſes ſpittle on his hand or fingers.

STROBILE, a word uſed by chirurgical writers to expreſs a pledget of a twiſted form.

STROBILITES *vinum*. See VINUM.

STROBILUS, among *Botaniſts*, a kind of PERICARPIUM, formed of an amentum, or number of vaginæ with contorted points applied cloſe to one another.

STROBULUS, among the *Ancients*, a kind of mitre, which roſe to a height by many windings and turnings, and uſed by the Barbarians; inſtead of which the Romans wore the APEX, which had a high but ſtraight top.

STROCAL, in *Glaſs-making*, a long iron inſtrument like a fire-ſhovel, uſed to empty the metal out of a broken pot into a whole one.

STROKE, in *Sea Language*, a ſingle ſweep of the oars in rowing. Hence they ſay *row a long ſtroke*, which is intended to puſh the veſſel forward the more readily.

STROKESMAN is the perſon who rows the hindmoſt oar in a boat, and gives the *ſtroke* which the reſt are to follow; ſo that all the oars may operate together.

STROMATEUS, in *Ichthyology*, a genus of fiſh of the *malacopterygious*, or ſoft-finned kind, according to Artedi, but of the order of *apodes* in the Linnæan ſyſtem; the characters of which are theſe: the head is compreſſed; it has no belly-fins, and has only one back-fin, which is extended over the whole back; the tail is very forked; the mouth is very ſmall; the teeth are placed in the jaws and palate; and the tongue is ſmooth and broad; the body is oval and ſlippery. There are two ſpecies, viz. the *ſtromateus ſubfaſciatus*, or *fiatola*, which is a broad, flat, and ſhort ſea-fiſh, ſomething reſembling the turbot in figure, and thin both on the back and belly, but ſwimming erect, not flatwiſe; the colour of the back is a pale blue, and that of the ſides and belly a ſilvery white; its back and upper part of the ſides are beautifully variegated with yellow lines and ſpots, and towards the belly with others of a paler colour: on the ſides there are two longitudinal lines, one ſtraight and the other crooked; the ſkin is thin and covered with ſcales. Its common ſize is about a pound and half weight. It is caught in the Mediterranean, and brought to market at Rome under the name of the *lampuga*, and is a very delicate fiſh. Ray.

The other ſpecies is the *ſtromateus unicolor* or PARU of America.

STROMBUS, in *Conchyliology*, the name of a genus of ſhells, nearly allied to the buccinums, and called by the generality of authors TURBO.

The *ſtrombus* in the Linnæan ſyſtem, is a genus of the *teſtacea* order of worms; the characters of which are, that its animal is a ſlug; the ſhell is univalve and ſpiral; the opening much dilated, and the lip expanding and terminating in a groove. Linnæus enumerates twenty-nine ſpecies. See SHELLS.

STROMLINGUS, in *Ichthyology*, a name given by ſome writers to the *aras* of the Greeks, which is no other than the common herring.

There is no other difference between the *ſtromling* and herring, but that the former is ſmaller.

STRONG *place* and *pulſe*. See the ſubſtantives.

STROP, in a *Ship*, a piece of rope ſpliced into a circular wreath, and uſed to ſurround the body of a block; ſo that the latter may be hung to any particular ſtation about the maſts, yards, or rigging.

Strops are alſo uſed occaſionally to faſten upon any large rope, for the purpoſe of hooking a tackle to the eye, or double part of the *ſtrop*, in order to extend, or pull with redoubled effort upon the ſaid rope; as in ſetting up the rigging, where one hook of the tackle is fixed in a *ſtrop* applied to the particular ſhroud, and the other to its laniard. Falconer.

STROPHE, in the *Greek and Latin Poetry*, a ſtanza, or certain number of verſes, including a perfect ſenſe; ſucceeded by another, conſiſting of the ſame number and meaſure of verſes, and in the ſame diſpoſition and rhythmus, called ANTISTROPHE.

What the couplet is in ſongs, and the ſtanza in epic poetry; *ſtrophe* is in odes.

The word is Greek, *ϛροφη*, formed from *ϛρεφω*, *I turn*; becauſe at the end of the *ſtrophe*, the ſame meaſures returned again; or rather, as the term related principally to the muſic or dancing, becauſe, at firſt coming in, the chorus, or the dancers, turned to the left; and, that meaſure ended, they turned back again to the right.

STROPHIARIUS, among the Romans, a perſon who prepared and made the *ſtrophia*. See STROPHIUM.

STROPHIUM, among the Romans, a ſhort ſwath or band, whereby the young women kept down the ſwelling of their breaſts.

STROPHIUM was likewiſe a bandage for the head, made of two or three garlands of flowers tied together.

STROPPUS, among the Romans, the thong with which the oars were tied to the SCALMUS.

STRUCTURE, in *Architecture*. See BUILDING.

STRUFERTARII, among the Romans, perſons hired to perform ſome kind of ſacrifices near trees that had been thunder-ſtruck.

STRUMÆ, formed, as ſome will have it, *a ſtruendo*; becauſe they grow inſenſibly, *ſtructum aſſurgunt*, in

Medicine and *Surgery*, tumors ariſing moſt uſually on the neck and throat; called alſo *ſcrophulæ*, and popularly the *evil, or king's evil*.

The Greeks call them χοιραδες, *ſores*. See **Evil** and **Bronchocele**.

STRUMARIA, a name by which Galen has called the little burdock.

STRUMPSIA, in *Botany*, a genus of the *ſyngeneſia monogamia* claſs. Its characters are, that the calyx is quindentated; that the corolla has five petals, and that the fruit is a monoſpermous berry. There is only one ſpecies.

STRUMUS, in *Botany*, a name given by ſome of the old Roman authors to the *cucubalus*, or *berry-bearing* CHICKWEED.

It had this name from its being found of ſervice in *ſtrumous* and ſcrophulous ſwellings, when externally applied. The name *cucubalus* ſeems to have been derived from the word *halicaccabum*, or the winter-cherry, for the ancients eſteemed both theſe plants ſpecies of nightſhade; and ſome of them have plainly deſcribed the *cucubalus* under the name of *ſolanum hortenſe*.

STRUNTJAGGER, *arctic bird*, or LARUS *paraſiticus* in the Linnæan ſyſtem of *Ornithology*, is a ſpecies of GULL found in the Hebrides and Orkneys with a duſky hooked bill, and narrow noſtrils. In the male, the crown of the head is black; the back, wings, and tail duſky; the hind-part of the neck and lower ſide of the body white; the tail conſiſts of twelve feathers; the legs are black, ſmall and ſcaly: the female is entirely brown.

Theſe birds purſue the leſſer gulls till they mute for fear, and catch up their excrement, and therefore they are ſometimes called *dung-hunters*, as well as another ſpecies of the gull called MARTINAZZO.

STRUPPI, among the *Romans*, garlands or wreaths of vervain, wherewith the ſtatues of the gods were crowned.

STRUT, a term uſed by ſome builders for that BRACE which is framed into the king-piece and the principal rafters.

STRUTHIO, in *Ornithology*. See **Ostrich**.

STRUTHIOLA, in *Botany*, a genus of the *tetrandria monogynia* claſs in Linnæus's mantiſſa, of which he enumerates two ſpecies, both of which are found at the Cape of Good Hope.

STRUTHIOMELA, a word uſed by Pliny and the ancients to expreſs a ſort of quinces, which were ſmaller than the common kind, and of a ſweeter juice and leſs aſtringent.

STRUTHIOPTERI, in *Natural Hiſtory*, a name given to a ſeries of flies, of the claſs of thoſe which do not feed on fleſh: theſe have remarkable ſhort wings, and are always found on flowers and leaves of plants. There are ſeveral ſpecies of theſe. The moſt frequent among us are a white bodied one with black wings, which cover but a very ſmall part of the back, and with feathered wings; two others with long bodies of a duſky grey, ſtreaked with white. Theſe are all early flies, being found in the ſpring in hedges and buſhes.

STRUTHIOPTERIS, in *Botany*, a name by which Tragus, and ſome other authors have called the *lonchitis*, or SPLEEN-*wort*.

STRUTHIUM, in *Natural Hiſtory*, a name given by the Greeks to a plant called by the Latins *lunaria herba*, from its uſe in the manufacture of their wool. Many have ſuppoſed the *chaſcuſa* of the ancients to be the ſame with this plant, but this is an error, for the *chaſcuſa* of the Greeks is the *antirrhinum* of the Latins, as is plain from Pliny; and the ſame author tells us, that it has leaves like thoſe of flax, ſmall, narrow, and ſmooth. All the accounts we have of the *ſtruthium* is from Dioſcorides, who ſays, that it was a kind of thiſtle, ſomewhat reſembling the ſcolymus, and having a large root, long, and of the thickneſs of two or three fingers, and very ſharp prickles on the leaves. This ſhort account, though not enough perhaps certainly to informs us what the plant was, is yet abundantly ſufficient to prove, that it was not the chaſcuſa, or antirrhinum.

We find the *ſtruthium* celebrated among the Romans for its virtues; but all the account we have of it from them is, that it was a prickly plant, and was very common in the Grecian iſlands. This however is ſufficient to convince us of the great error of thoſe who make this plant and the *oſtrucium* of the later writers to be the ſame plant. The oſtrucium is the Smyrnium, or Alexanders, and can by no means be ſuppoſed the ſame with this prickly plant; yet Macer has made them the ſame, and has attributed to the Smyrnium, or Alexanders, the virtues which Theophraſtus gives to the *ſtruthion*.

Struthium, in the *Materia Medica*, is uſed by modern authors as the name of the *luteola*, or DYERS-*weed*, a common wild plant with narrow leaves and yellow flowers.

Struthium is alſo uſed by ſome for the *ſaponaria*, or SOAP-*wort*.

STRYCHNUS, a name given by the ancients to the plant we call *ſolanum*, or NIGHTSHADE. Some of the old authors have alſo called this *tithymal*; and in the times of Theophraſtus we find that tithymal and nightſhade were ſynonymous terms. See **Manicum** *ſtrychnum*.

Strychnus, in the Linnæan ſyſtem, is a genus of the *pentandria monogynia* claſs. Its characters are, that the corolla is divided into five ſegments, and the fruit is a ſingle-celled berry, with a woody bark. There are two ſpecies, which are the NUX *vomica*, and the LIGNUM *colubrinum*.

STRYKE. See **Strike**.

STUB, in the *Manege*, is uſed for a ſplinter of freſh-cut under-wood, that goes into a horſe's foot as he runs; and piercing the ſole through to the quick, becomes more or leſs dangerous, according as it ſinks more or leſs into the foot.

STUC, or **Stucco**, in *Building*, a compoſition of white marble pulverized, and mixed with plaiſter or lime; the whole ſifted and wrought up with water; to be uſed like common plaiſter.

This is what Pliny means by *marmoratum opus*, and *albarium opus*. See **Mosaic**, &c.

Of this are made ſtatues, buſts, baſſo relievos, and other ornaments of architecture. See **Statue**, &c.

A ſtucco for walls, &c. may be formed of the GROUT or putty, made of good ſtone-lime, or the lime of cockle-ſhells, which is better, properly tempered and ſufficiently beat, mixed with ſharp grit ſand, in a proportion which depends on the ſtrength of the lime: drift ſand is beſt for this purpoſe, and it will derive advantage from being dried on an iron plate kiln, ſo as not to burn; for thus the mortar will be diſcoloured. When this is properly compounded, it ſhould be put up in ſmall parcels againſt walls, or otherwiſe to mellow (as the workmen term it); reduced again to a ſoft putty, or paſte, and ſpread thin on the walls without any under coat, and well trowelled. A ſucceeding coat ſhould be laid on, before the firſt is quite dry, which will prevent joints of brick-work appearing through it. Much depends upon the workmen's giving it ſufficient labour and trowelling it down. If this *ſtucco*, when dry, is paid over with boiled linſeed oil, it will laſt a long time, and not be liable, when once hardened, to the accidents to which common *ſtucco* is liable.

Liardet's, or, as it is commonly called, *Adam's oil-cement*, or *ſtucco*, is prepared in the following manner: for the firſt coat, take twenty-one pounds of fine whiting, or oyſter-ſhells, or any other ſea-ſhells calcined, or plaiſter of Paris, or any calcereous material calcined and pounded, or any abſorbent material whatever proper for the purpoſe; add white or red lead at pleaſure, deducting from the other abſorbent materials in proportion to the white or red lead added; to which put four quarts, beer-meaſure, of oil; and mix them together with a grinding-mill, or any levigating machine: and afterwards mix and beat up the ſame well with twenty-eight quarts beer-meaſure, of any ſand or gravel, or of both, mixed and ſifted, or of marble or ſtone pounded, or of brick-duſt, or of any kind of metallic or mineral powders, or of any ſolid material whatever, fit for the purpoſe.

For the ſecond coat, take ſixteen pounds and a half of ſuperfine whiting, or oyſter-ſhells, or any ſea-ſhells calcined, &c. as for the firſt coat; add ſixteen pounds and a half of white or red lead, to which put ſix quarts and a half of oil, wine meaſure, and mix them together as before; afterwards mix and beat up the ſame well with thirty quarts, wine-meaſure, of fine ſand or gravel ſifted, or ſtone or marble pounded, or pyrites, or any kind of metallic or mineral powder, &c. This compoſition requires a greater proportion of ſand, gravel, or other ſolids, according to the nature of the work, or the uſes to which it is to be applied. If it be required to have the compoſition coloured, add to the above ingredients ſuch a proportion of painter's colours, as will be neceſſary to give the teint or colour required. In making the compoſition, the beſt linſeed or hempſeed, or other oils proper for the purpoſe are to be uſed, boiled or raw, with drying ingredients, as the nature of the work, the ſeaſon, or the climate requires, and in ſome caſes bees-wax may be ſubſtituted in place of oil; all the abſorbent and ſolid materials muſt be kiln-dried. If the compoſition is to be of any other colour than white, the lead may be omitted, by taking the full proportion of the other abſorbents; and alſo white or red lead may be ſubſtituted alone, inſtead of any other abſorbent material.

The firſt coat of this compoſition is to be laid on with a trowel, and floated to an even ſurface with a rule or darby (i. e. a handle-float.) The ſecond coat, after it is laid on with a trowel, when the other is nearly dry, ſhould be worked down and ſmoothed with floats edged with horn, or any hard ſmooth ſubſtance that does not ſtain. It may be proper, previous to laying on the compoſition to moiſten the ſurface on which it is to be laid by a bruſh with the ſame ſort of oil and ingredients which paſs through the levigating machine, reduced to a more liquid ſtate, in order to make the compoſition adhere the better. This compoſition admits of being modelled or caſt in moulds, in the ſame manner as plaiſterers or ſtatuaries model or caſt their *ſtucco* work. It alſo admits of being painted upon, and adorned with landſcape, or ornamental, or figure-painting, as well as plain painting. For the invention of this *ſtucco* Mr. Liardet obtained a patent in 1773 for fourteen years, the term of which was extended to eighteen years in conſequence of an act of parliament in 1776. For compoſitions very ſimilar to the preceding patents were granted to Dr. Wark in 1765, Mr. Emerton in 1771, and to Mr. Rawlinſon in 1772.

Dr. Shaw informs us in his Travels (p. 286), that the cement or mortar uſed in Barbary, which is apparently of the ſame conſiſtence and compoſition with thoſe of the ancients, is made in the following manner: they take two parts of wood-aſhes, three of lime, and one of fine ſand, which, after being well ſifted and mixed together, they beat for three days and nights inceſſantly with wooden mallets, ſprinkling them alternately and at proper times with a little oil and water, till they become of a due conſiſtence. This compoſition, he adds, is chiefly uſed in their arches, ciſterns, and terraces; but the pipes of their aqueducts are joined, by beating tow and lime together with oil only, without any mixture of water. Both theſe compoſitions quickly aſſume the hardneſs of ſtone, and ſuffer no water to pervade them: and will, therefore, anſwer the purpoſe of *ſtucco*.

For other compoſitions of a like kind, See MORTAR, MORTAR *for ſun-dials*, &c. and PLAISTERING.

STUD, in the *Manege*, denotes a collection of breeding horſes and mares. See *Breeding of* HORSES and MARE.

STUDDING-*ſails*, in a *Ship*, are certain light ſails extended in moderate and ſteady breezes, beyond the ſkirts of the principal ſails, where they appear as wings on the yard-arms: hence ſome have called them GOOSE-*wings*.

The origin of the name has been variouſly aſſigned: ſome have derived *ſtudding* from *ſcud*, becauſe the ſmall ſails uſed in SCUDDING are nearly of the ſame ſize and figure with the lower *ſtudding*-ſails: others have ſought its etymology in *ſteddy*, becauſe theſe ſails feel the effort of a breeze, and ſerve to puſh the ſhip forward, and to give her head way; ſo that ſhe becomes ſuſceptible of the power of the helm, and is retained in a ſteddy courſe; whence *ſtedding*-ſails, afterwards corrupted into *ſtudding*-ſails. Others again derive *ſtudding* from the Saxon *ſted*, to *aſſiſt*, whence theſe ſails which help the ſhip's courſe are called *ſteading*, *ſtedding*, or *ſtudding*-ſails.

The top maſt *ſtudding*-ſails, or thoſe which are ſet on the out ſide of the top-ſails, are ſpread below by a boom, which ſliding out from the extremities of the main and fore-yards, puſhes out their lower corners; and their upper edges, which are attached to a light pole, are hoiſted up to the top-ſail-yard-arms. The lower *ſtudding*-ſails, which are ſpread beyond the ſkirts or leech of the main-ſail and fore-ſail, are fixed nearly in the ſame manner; only that the boom, which extends their bottoms, is generally hooked to the chains by means of a GOOSE-*neck*; or elſe ſwings off along with the ſail, to which it is ſuſpended; being kept ſteddy behind by a rope called the GUY. Falconer.

STUFF, in *Commerce*, a general name for all kinds of fabrics of gold, ſilver, ſilk, wool, hair, cotton, or thread, manufactured on the loom; of which number are velvets, brocades, mohair, ſattins, taffeties, cloths, ſerges, &c.

STUFF is particularly uſed for certain kinds of ſlight woollen ſtuffs, uſed principally for linings, and women's wear; as linſeys, rateens, &c.

STUFFS, *bleaching of*. See BLEACHING.

STUFF, *croſs-grained*. See CROSS-GRAINED.

STUFFS, *fulling of*. See FULLING.

STUFF, in *Naval Language*, any compoſition, or melted maſs, uſed to ſmear or daub the maſts, ſides, or bottom of a ſhip. That which is chiefly uſed for the lower maſts is ſimply turpentine, roſin, or varniſh of pine: for the top-maſts, tallow or butter: for the ſides, turpentine, varniſh of pine, tar, and oil, or tar mixed with oil and red oker; and for the bottom, a mixture of tallow, ſulphur, and roſin or tar; whale oil and broken glaſs; or any part of theſe ingredients: and this operation is called giving a new coat of *ſtuff* to the maſts, ſides, &c. Falconer. See PAY and SHIP.

STUFFING, or CONGESTION, in *Medicine*, the name of a diſtempered ſtate of the body, in which there is a ſpecial and peculiar direction of the blood, in larger quantities than ordinary, to ſome particular places, in order to its there making its way out by an hæmorrhage, and relieving nature from an over-abundant quantity of it, that the reſt may circulate the more freely and eaſily.

Congeſtions differ in regard to the places where they appear; ſome are made in the head, others in the breaſt; ſome in the hypochondria, and ſome in the kidneys; and others in the hæmorrhoidal veſſels. In this alſo there is ſome regularity in regard to the age and conſtitution of the patient; for in young perſons *congeſtions* are uſually made in the head, in middle aged people in the breaſt, and in thoſe ſomewhat farther advanced in years toward the abdomen.

Medical writers diſtinguiſh *congeſtions* into two kinds, the *complete*, and the *incomplete*. The complete *congeſtions* are thoſe in which the blood is directed to ſuch a part where it is natural and eaſy for it to be diſcharged by an hæmorrhage; ſuch are the head, the lungs, the uterus, and inteſtinum rectum; and in which it is carried in large quantities to the very parts.

The incomplete *congeſtions*, are thoſe in which the blood is indeed directed towards theſe, or the like parts, from whence it ought to be diſcharged, but never is carried to them, or indeed near them, but collecting itſelf at a diſtance from them, can never come to a diſcharge by an hæmorrhage. Something of this kind is obſerved in the rheumatiſm, gout, and what are called the *old catarrhs*.

Congeſtions are alſo divided into two kinds, from the matter they are occaſioned by: the one are called *ſanguineous*: in theſe the blood is always ready to appear in its own form in an hæmorrhage. The other are ſtyled *bechic*; theſe extend themſelves farther than the ſanguineous, and theſe have their origin from the blood: but when a paſſage is by any means denied to the whole ſubſtance of the blood, its ſerous parts only form the *congeſtions*, and theſe, as they are become either mucidoſeroſe, or ſcroſoſaline, are the occaſion of coryzæ, gravedines, moiſt coughs and aſthmas, cold, œdematous, ſcirrhous, and glandulous tumors.

Authors diſtinguiſh *congeſtions* from ſtaſes ſanguinis, by this, that in theſe the quality and progreſſive motion of the humours are greatly altered; in the others, as ſuch, they are not altered at all.

The ſigns of *congeſtions* are deduced from their effects, and are theſe. In the parts affected there is a diſtenſion of the veſſels, ſo that the very ſmall ones, which ſcarce appear at another time, are found turgid, with heavy and tenſive pains, and often, as it were, with a ſenſation of pricking; if the *congeſtion* be carried farther, there ſucceeds to theſe, redneſs, and preternatural heat in the part: when upon this there appears an hæmorrhage, all the ſymptoms vaniſh; but if this diſcharge does not happen, there are frequently formed tumors, and running ulcers, with violent pains and inflammation. Theſe are the ſymptoms in the affected parts; in the more remote ones, there is a conſtriction of the veſſels, ſo that they appear leſs than natural, and a ſenſation of coldneſs in the fleſh.

The perſons moſt ſubject to *congeſtion* are thoſe of a plethoric habit, and ſuch as live ſedentary lives, and eat and drink high; and to theſe are to be added, ſuch as have been uſed to ſome habitual diſcharge of blood, whether natural, or by regularly bleeding in the arm at ſtated times of the year, and afterwards live wholly without theſe; and ſuch as have had iſſues, bliſters, or old natural ulcers dried up, without uſing the neceſſary precautions on ſuch occaſions.

Cauſes of congeſtions. Theſe are principally a plethoric habit of body, and an effort of nature to relieve herſelf from the load, diſcharging part of it at ſome proper outlet. To theſe are to be added many external and occaſional ones; ſuch are a moiſt and cold air, and ſometimes a moiſt and hot one; a refrigeration of the remoter parts, or of thoſe oppoſite to ſuch as are proper for the *congeſtion*.

The effects of *congeſtions* are generally ſtagnations; and from theſe ſtaſes and corruptions of the blood and humours too frequently ariſe. When *congeſtions* are become habitual to a perſon, they very rarely yield to the effects of medicines, even though the material cauſe is removed, but often after this renew their ſymptoms in ſome different way. When *congeſtions* are ill treated, eſpecially when narcotics are given, or hot medicines, or a warm diet are indulged, they always return the more frequently upon the patient, or bring on a ſeries of other diſorders; and *congeſtions* in themſelves are not without danger, when they affect perſons at a certain time of life. Finally, *congeſtions* in the breaſt are always of more unhappy conſequence than thoſe of the head and abdomen, becauſe the evacuation of the blood, which is what nature aims at in a *congeſtion*, is not to be effected any way happily in the breaſt.

Method of treating them. In the time of the paroxyſm, the bowels, which are uſually bound in this caſe, are to be looſened by a gentle emollient clyſter, or by ſome of the gentle purges; and the too great expanſion of the blood, and ſtricture of the fibres, are to be prevented by abſorbents, and nitrous medicines, with the addition of cinnabar, and of the common diaphoretics: to this purpoſe powders are to be given three or four times a day, compoſed of crabs eyes, nitre, antimonium diaphoreticum, and cinnabar, either native or that of antimony; and if the pains are violent, a gentle opiate may be added to the powder to be taken at night. To theſe things are to be added the temperate alexipharmics, and the mild and diluent diaphoretics; ſuch as tea made of the flowers of lavender, of ſage, and the like: and when the blood begins to ſtagnate in the place of the *congeſtion*, topics may be uſed; ſuch as camphorated ſpirit of wine, or a cataplaſm of caraway ſeeds, juniper berries, ſalt, and crumb of bread: and in ſome caſes repellents may be ſafely uſed; ſuch as the vinegar of roſes, and mixtures with nitre, and with ſaccharum ſaturni. Junker's Conſp. Med. p. 92.

Stuffings *of the breaſts*, in *infants*. See Infant.

STUM, *in* the *Wine Trade*, a term for the unfermented juice of the grape, when it has been ſeveral times racked off, and ſeparated from its ſediment. The caſks are for this purpoſe well matched, or fumigated with brimſtone, every time, to prevent the liquor from fermenting, as it would otherwiſe readily do, and become wine.

It is this fume of the ſulphur from the match that prevents, in this caſe, all tendency to fermentation, and continues the natural juice of the grape in a ſweet ſtate, fit to be readily mixed with wines inſtead of ſugar; for which purpoſe it is very much uſed in Holland, and ſome other countries, as alſo for giving a new fret, or briſkneſs, to decayed wines. So that very large quantities of this *ſtum* are annually imported to all parts along with the foreign wines; and after the ſame manner a *ſtum* is prepared in England from the juice of apples which ſerves the ordinary purpoſes of the wine-cooper. In preſerving this liquor in this ſtate, we ſee the vaſt uſe of brimſtone, for it could never be done otherwiſe than by the matching of the caſks. Shaw's Lectures, p. 192. See Matching.

Stum, *artificial*, an artificial muſt, or *ſtum*, as good as the natural, and as fit for the re-fermenting, fretting, improving, or making of wines, vinegars, and ſpirits, may be prepared in the following manner.

Take three pounds of fine lump ſugar, or ſuch as has been well refined from its treacle, melt it in three quarts of water, and add in the boiling, of Rheniſh tartar, finely powdered, half an ounce; this diſſolves with a remarkable ebullition, and gives a grateful acidity to the liquor; take the veſſel from the fire, and ſuffer it to cool, and you have an artificial muſt, which in all reſpects reſembles the natural taſte and ſweet juice of a white flavourleſs grape, when well purified, and racked off from its ſediment, in order to make *ſtum*. If this artificial muſt be ſtummed, that is, well fumigated with burning brimſtone, it becomes a perfect *ſtum*, and may be made of any flavour, at the diſcretion of the artiſt. Shaw's Lectures, p. 202. See Must.

STUMBLING, in the *Manege*, &c. a vice in a horſe, either *natural* or *accidental*.

The *natural* ariſes from the ſinews of the fore-legs being ſomewhat too ſtrait, which cramps the horſe, and prevents his uſing his legs with the neceſſary freedom and nimbleneſs. The way to cure him is, to cut him of the cords, i. e. to make a ſlit on the top of his noſe, and with a cornet to raiſe up the great ſinews, to cut them aſunder, and heal them up again with a proper ſalve.

The *accidental* ariſes from a ſplint, wind-gall, being foundered, pricked, ſtubbed, gravelled, &c.

STUNG, *adder*-stung. See Adderstung.

STUPA. See Stupha.

STUPEFIERS, in *Medicine*, the ſame as narcotics, and opiates.

STUPHA, Stupa, Stupe, ſometimes denotes a fomentation.

STUPIO, a name given by ſome of the writers in chemiſtry to tin.

STUPOR, a numbneſs, occaſioned by an accidental bandage that ſtops the motion of the blood and nervous fluids, or by a decay in the nerves, as in a palſy, &c.

STURDY, in *Cattle*, a kind of diſtemper, otherwiſe called the turning-*evil*.

STURGEON, acipenser *ſturio* of Linnæus, in *Ichthyology*, a very well known, large, and fine-taſted fiſh, caught in many places, and ſometimes in the river Thames, being one of thoſe fiſhes called *anadromi* by authors, which ſpend a part of their time in the ſea, and a part in rivers.

It never goes into the ſea to any great diſtance, and never is caught there of any very great ſize. The ſea ſerves for its production, but it is only in large rivers that it grows to its uſual ſize.

This fiſh is admired for the delicacy and firmneſs of its fleſh, which is white as veal, and extremely good when roaſted. It is generally pickled. The *ſturgeon* which we receive comes either from the Baltic rivers, or North America. Thoſe cured at Pillau, were reckoned the beſt, though of late they are rivalled by thoſe brought from America, in the rivers of which country they abound in May, June, and July; at which time they leap ſome yards out of the water, and falling on their ſides make a noiſe to be heard in ſtill weather at ſome miles diſtance.

The *ſturgeon* grows to a great ſize, to the length of eighteen feet, and to the weight of five hundred pounds; but in our rivers it is ſeldom taken of that bulk; the noſe is long, ſlender, and pointed; the eyes very ſmall, with the noſtrils near them; in the lower part of the noſe are four cirri; the mouth is placed far beneath, is ſmall, without teeth, and unſupported by any jaw-bones; ſo that the mouth of a dead fiſh is always open, but when alive, cloſed or opened at pleaſure by certain muſcles; the body is long, pentagonal, and covered with five rows of large bony tubercles; the whole under-ſide of the fiſh is flat; on the back, near the tail, is a ſingle fin; and it has alſo two pectoral fins, two ventral, and one anal fin; the tail is bifurcated, the upper part being much longer than the other; the upper part of the body is of a dirty olive colour, the lower part ſilvery; the middle of the tubercles white.

This fiſh, in the manner of its breeding, is an exception among the cartilaginous fiſh, being like the bony oviparous, ſpawning in winter. Cavear is made of the roes, and ichthyocolla of the ſound of the *ſturgeon*. Ray and Pennant. See *Tab.* V. *Fiſh*, *fig.* Nº 52. *Sturgeon* is reckoned one of the royal *fiſhes*.

STURK. See Stirk.

STURNUS, in *Ornithology*. See Starling.

STUTHY. See Stithy.

STYE, or Stithe, in *Surgery*, the Engliſh name for a diſorder on the eyelids, called by the phyſicians *hordeolum*, and by ſome *crithe*, *chalazium*, or *grando*.

It is a ſmall encyſted tumor, uſually of about the bigneſs of a barley-corn, which ſometimes degenerates into matter, and occaſions great pain and uneaſineſs.

The tenderneſs of the organ of ſight makes it neceſſary to be careful about theſe tumors, which, if ſituated in any other part of the body, would hardly deſerve much attention. Some authors commend cataplaſms, and the like applications, to theſe, but the eye is often hurt by thoſe applications; and it is obſerved beſides, that theſe tubercles ſeldom give way to topical applications of any kind.

When they are ſmall, it is beſt to let them take their own courſe; but if ſo large as to occaſion deformity, or danger of hurting the ſight, the way to extirpate them, is to make a longitudinal inciſion on the part, and carefully take them out whole; or if they cannot be thus got out clean, they muſt be cut out, as far as may be, with ſciſſars, and dreſſed with Ægyptian ointment, and a little red precipitate, or touched at times with the common cauſtic, till eaten thoroughly away, and then the wound dreſſed and healed in the common manner.

This is the method by which the flat and broad-bottomed tumors of this kind are to be extirpated; and in this great care muſt be taken that none of the ſharp applications touch the eye, as they might injure the ſight. It is common, however, with theſe tumors to hang by a ſort of ſmall root, and then they are much more eaſily managed, there being no more neceſſary than the cutting them cloſe off with a pair of ſciſſars, or the tying them firmly round with a piece of ſilk, or horſe-hair. They are ſometimes, if taken in time, diſperſed by rubbing them with faſting ſpittle, or with applying the pulp of a roaſted apple mixed with ſome ſaffron and camphor. Heiſter.

Stye, a place to keep ſwine in for fattening.

STYGIA *aqua*, a term uſed ſometimes to expreſs aqua regia; ſometimes for the other ſtrong acid ſpirits.

STYGIAN *liquors*, a term which ſome chemiſts apply to the corroſive acid ſpirits, as aqua regia, from their efficacy in deſtroying or diſſolving mixt bodies.

STYLE, Στυλος, a kind of bodkin of gold, ſilver, braſs, iron, or bone, pointed at one end, for cutting the letters, and flat and broad at the other, for eraſing any thing to be altered; wherewith the ancients wrote on plates of lead, or on wax, &c. and which is ſtill uſed to write on ivory leaves, and paper prepared for that purpoſe, &c.

This is the origin of all the other ſignifications of the ſame word in Engliſh. See a Diſſertation on the *Style* of the Ancients, in Phil. Tranſ. N° 420. p. 157. or Eames's and Martyn's Abr. vol. vii. part iv. p. 39.

STYLE, STYLUS, in *Botany*, the part riſing up in the middle of a flower, and bearing, by its lower part, on the rudiment of the fruit, and ſerving to elevate the ſtigma from the germen.

This we more uſually call the *piſtil*; though Bradley makes a diſtinction, calling it *ſtyle* when it is only joined or contiguous to the ſeed or fruit; and *piſtil* when it contains the ſeed or fruit within it, as the ovary does the egg. See PISTIL.

STYLE, STYLUS, in *Chirurgery*, denotes a long ſteel inſtrument, which diminiſhes to a point at one end, ſo as to be of a conical form; ſerving either to expand and open, or to be thruſt into a part.

The *ſtyle* is frequently uſed to be thruſt in red-hot, in cannulæ, and to be pulled out again immediately: it is put in and drawn out ſucceſſively, as often as is neceſſary. In order to do this, it is uſeful to have two *ſtyles*, to be put in alternately.

STYLE, in *Chronology*, denotes a particular manner of accounting time, with regard to the retrenchment of ten days from the calendar, in the reformation made thereof under pope Gregory XIII. See CALENDAR.

Style is either *old* or *new*.

STYLE, *old*, is the Julian manner of computing, which obtains in ſome proteſtant ſtates, who refuſed to admit of the reformation.

STYLE, *new*, is the Gregorian manner, followed by the catholics, and others, in conſequence of that reformation.

The Julian, or old *ſtyle*, agrees with the Julian year, which contains three hundred and ſixty-five days ſix hours. The Gregorian, or *new ſtyle*, agrees with the true ſolar year, which contains only three hundred and ſixty-five days five hours forty-nine minutes.

In the year of Chriſt 200, there was no difference of *ſtyles*, but now there has ariſen a difference of eleven days between the old *ſtyle* and the new, the latter being ſo much beforehand with the former: ſo that when the catholics, e. gr. reckon the twenty-firſt of May, thoſe who uſe the old *ſtyle* reckon the tenth.

There are ſeveral places where the new *ſtyle* obtains even among proteſtants; and it is not unlikely that the old *ſtyle* may, in time, dwindle quite away.

At the diet of Ratiſbon in 1700, it is decreed by the body of proteſtants of the empire, that eleven days ſhould be retrenched from the old *ſtyle*, to accommodate it for the future to the new. And the ſame regulation has ſince paſſed into Sweden, Denmark, and into England, where it was eſtabliſhed by 24 Geo. II. c. 23. which enacts, that in all dominions belonging to the crown of Great Britain, the ſupputation, according to which the year of our Lord begins on the twenty-fifth day of March, ſhall not be uſed from and after the laſt day of December 1751; and that from thenceforth, the firſt day of January every year ſhall be reckoned to be the firſt day of the year: and that the natural day next immediately following the ſecond day of September 1752, ſhall be called and reckoned the fourteenth day of September, omitting the eleven intermediate nominal days of the common calendar, and that the ſeveral natural days ſucceeding the fourteenth, ſhall be called and reckoned forwards in numerical order from the fourteenth day of September. Moreover, it is enacted, that all kinds of writings, &c. ſhall bear date according to the new method of ſupputation, and that all courts and meetings &c. feaſts, faſts, &c. ſhall be held, and obſerved accordingly. And for preſerving the calendar in the ſame regular courſe for the future, it is enacted, that the ſeveral years of our Lord 1800, 1900, 2100, 2200, 2300, &c. except only every four hundredth year of our Lord, of which the year 2000 ſhall be the firſt, ſhall be common years of three hundred and ſixty-five days, and that the years 2000, 2400, 2800, &c. and every other four hundredth year from the year 2000 incluſive, ſhall be leap years, conſiſting of three hundred and ſixty-ſix days. See BISSEXTILE and CALENDAR.

The following table ſhews by what number of days the *new ſtyle* differs from the old, from five thouſand nine hundred years before the year of CHRIST's birth, to five thouſand nine hundred years after it. The days under the ſign — (viz. from ſix thouſand years before to two hundred years after Chriſt) are to be ſubtracted from the old *ſtyle* to reduce it to the new; and the days under the ſign + (viz. from two hundred to 5900 years after Chriſt) are to be added to the old *ſtyle* to reduce it to the new.

N. B. All the years mentioned in the table are leap years in the old *ſtyle*; but thoſe only which are marked with an L are leap-years in the new.

Years before Chriſt New Style	Days diff. —	Years before and after Chriſt. New Style.	Days diff. — and +	Years after Chriſt. New ſtyle.	Days diff. +
5900	46	1900	16	L. 2000	13
5800	45	1800	15	2100	14
5700	44	1700	14	2200	15
L. 5600	44	L. 1600	14	2300	16
5500	43	1500	13	L. 2400	17
5400	42	1400	12	2500	17
5300	41	1300	11	2600	18
L. 5200	41	L. 1200	11	2700	19
5100	40	1100	10	L. 2800	19
5000	39	1000	9	2900	20
4900	38	900	8	3000	21
L. 4800	38	L. 800	8	3100	22
4700	37	700	7	L. 3200	22
4600	36	600	6	3300	23
4500	35	500	5	3400	24
L. 4400	35	L. 400	5	3500	25
4300	34	300	4	L. 3600	25
4200	33	200	3	3700	26
4100	32	100	2	3800	27
L. 4000	32	L. 0	2	3900	28
3900	31	Aft. Chriſt		L. 4000	28
3800	30	100	—1	4100	29
3700	29	200	+0	4200	30
L. 3600	29	300	1	4300	31
3500	28	L. 400	1	L. 4400	31
3400	27	500	2	4500	32
3300	26	600	3	4600	33
L. 3200	26	700	4	4700	34
3100	25	L. 800	4	L. 4800	34
3000	24	900	5	4900	35
2900	23	1000	6	5000	36
L. 2800	23	1100	7	5100	37
2700	22	L. 1200	7	L. 5200	37
2600	21	1300	8	5300	38
2500	20	1400	9	5400	39
L. 2400	20	1500	10	5500	40
2300	19	L. 1600	10	L. 5600	40
2200	18	1700	11	5700	41
2100	17	1800	12	5800	42
L. 2000	17	1900	13	5900	43

STYLE, in *Dialling*, denotes the gnomon or cock of a dial, raiſed on the plane thereof, to project a ſhadow.

STYLE, in *Juriſprudence*, the particular form or manner of proceeding in each court or juriſdiction, agreeable to the rules and orders eſtabliſhed therein. Thus we ſay, the *ſtyle* of the court of Rome, of the court of chancery, of parliament, of the privy council.

STYLE, in *Grammar*, is a particular manner of delivering a man's thoughts in writing, agreeably to the rules of ſyntax; or, as F. Buffier more accurately defines it, the manner wherein the words, conſtructed according to the laws of ſyntax, are arranged among themſelves, ſuitably to the genius of the language.

This definition fixes the notion of *ſtyle* to ſomething determinate, which before was very vague and arbitrary; whence many authors, even of note, confounded it with ſyntax itſelf.

From the definition it appears, that *ſtyle* ſuppoſes or includes the ſyntax; and that ſyntax does not extend ſo far as *ſtyle*; for the ſyntax may be very juſt, where the *ſtyle* is wretched.

Indeed, againſt what particular rule of grammar the fault is committed, it is ſcarcely poſſible always to determine preciſely; the taſte and uſe of a language being ſo exceedingly delicate and precarious. It is true, a fault in *ſtyle* is not leſs a fault againſt grammar than is a fault in *ſyntax*; only the former is leſs preciſe and palpable than the latter.

A very common error in grammarians, F. Buffier adds, is to conſound two kinds of *ſtyles* in one: the *grammatical ſtyle*, or that directed by the rules of grammar; and the *perſonal ſtyle*, which depends leſs on the grammar than on the perſon that writes; whether with regard to his particular taſte and genius, or with regard to his matter, or the kind or character of his work.

There are a great many differences between the two: the moſt eſſential is, that the one may be diverſified an infinite number of ways, and the other cannot. In effect, the perſonal *ſtyle* is naturally variable, according to the different geniuſes, humours, and complexions.

It is the imagination that acts, that conceives, that propoſes, and that expreſſes things, according to its character, which is different in all men; and which is to be varied, according to the particular kind of the work.

Hence ariſe the gay, the grave, the florid, the jejune, the copious, the conciſe, the poetical, the epiſtolary, and the burleſque *ſtyles*.

Theſe perſonal *ſtyles* are all independent on the grammatical; and we have authors who excel in the one, yet are miſerably defective in the other. The perſonal *ſtyle* is not under the direction of grammar; but of the imagination, or rather of rhetoric, that art having to do directly with our thoughts, as grammar with our words.

This, however, may be ſaid, that grammar is far from being able to vary the ſame words of a phraſe with equal perfection; and that generally there is but one way of delivering them in the taſte and genius of the language.

But in the perſonal *ſtyle*, where the imagination comes to be concerned, a ſentence may be varied infinite ways, according to the kind of the writing, whether oratorial, poetical, &c.

In a *philoſophical ſtyle*, the only end is accurately to explain our thoughts to others; thence the particular rules to be obſerved by a philoſopher, in delivering his doctrines naturally follow: ſuch as,

1°, Not to deviate from the received ſignifications of terms.

2°, That the ſame terms be always taken in the ſame ſenſe.

3°, To fix the meaning of ſuch words as have only a vague ſenſe.

4°, To ſignify objects eſſentially different, by different names.

From theſe rules, the uſe and neceſſity of terms of art appear, and we ſee with how little reaſon they are vulgarly condemned.

5°, The philoſopher ought always to make uſe of proper expreſſions, and uſe no more words than what are preciſely neceſſary to eſtabliſh the truth of his doctrines. Wolf. Diſ. Prælim. Logic. cap. v.

Style, in *Muſic*, denotes a peculiar manner of compoſing, or ſinging.

The *ſtyle* is, properly, the manner that each perſon has, either of compoſing, of performing, or teaching; which is very different, both in reſpect of the different geniuſes of countries and nations, and of the different matters, places, times, ſubjects, expreſſions, &c.

Thus we ſay, the *ſtyle* of the Chariſſimi, of Lully, of Lambert; the *ſtyle* of the Italians, the French, the Spaniards, &c. The *ſtyle* of gay pieces of muſic is very different from that of ſerious pieces; the *ſtyle* of church muſic very different from theatrical muſic. The *ſtyle* of the Italian compoſitions is poignant, florid, expreſſive; that of the French compoſitions, natural, flowing, tender, &c.

Hence, the various epithets, given to diſtinguiſh theſe various characters, as the ancient and modern *ſtyle*, the Italian and German *ſtyle*, the eccleſiaſtical and dramatic *ſtyle*, the gay, grave, majeſtic, natural, ſoft, familiar, gallant, low, ſublime *ſtyles*, &c.

STYLO *recitativo*, or *dramatico*, in the Italian *Muſic*, is a *ſtyle* fit to expreſs the paſſions.

Stylo *eccleſiaſtico* is full of majeſty, very grave, and fit to inſpire devotion.

Stylo *motectico* is a various, rich, florid *ſtyle*, capable of all kinds of ornaments; and of conſequence, fit to expreſs various paſſions, particularly admiration, grief, &c.

Stylo *madrigaleſco* is a *ſtyle* proper for love, and the other ſofter paſſions.

Stylo *hyperchematico* is a *ſtyle* proper to excite mirth, joy, dancing, &c. and of conſequence, full of briſk, gay motions.

Stylo *ſymphoniaco* is a *ſtyle* fit for inſtrumental muſic; but as each inſtrument has its particular effect, there are as many different ſymphonical *ſtyles*. The *ſtyle* of violins, for inſtance, is uſually gay; that of flutes, melancholy and languiſhing; and that of trumpets, ſprightly and animated.

Stylo *meliſmatico* is a natural, artleſs *ſtyle*, which almoſt any body may ſing.

Stylo *phantaſtico* is a free, eaſy, humorous manner of compoſition, far from all conſtraint, &c.

Stylo *choraico* is the *ſtyle* proper for dancing; and is divided into as many different kinds as there are dances.

Style, in *Oratory* and *Poetry*, is reſtrained wholly to what F. Buffier calls the *perſonal ſtyle*.

Language refers principally to the matter of the diſcourſe, viz. the words; elocution to thepart icular members or parts thereof; and *ſtyle* to the whole compoſition.

The maſters of the art of rhetoric reduce the kinds of *ſtyle* to three, viz. the *low* or *plain*, the *middle*, *temperate*, or *equable*, and the *lofty* or *ſublime ſtyle*. Theſe ſeveral characters are diſtinguiſhed from one another, both by the thoughts and by the language.

Low, or *ſimple* STYLE, pertains to ſubjects that are either common things, or to ſuch as ſhould be treated in a plain and familiar way: and, therefore, plain thoughts are moſt ſuitable to it, and diſtinguiſh it from the other characters of *ſtyle*. By plain thoughts are meant ſuch as are ſimple and obvious, and ſeem to riſe naturally from the ſubject, when duly conſidered; ſo that any one upon firſt hearing them, would be apt to imagine, they muſt have occurred to himſelf.

Cicero's account of the fight between Milo and Clodius, in which Clodius was killed, is a remarkable inſtance of natural plainneſs and ſimplicity. Pro Mil. c. 10.

There are two properties of plain thoughts, one of which ought conſtantly to attend them in common with all thoughts, and the other is often neceſſary to animate and enliven this character. The firſt of theſe is juſtneſs and propriety; which is what reaſon dictates in all caſes; and the other property, which ſhould often accompany plain and ſimple thoughts, is, that they be gay and ſprightly; becauſe, the fewer ornaments this *ſtyle* admits of, the greater ſpirit and vivacity are requiſite to prevent its being dry and jejune: care, however, ſhould be taken, leſt, while fancy is too much indulged, the juſtneſs of the thoughts ſhould be overlooked.

As to the language proper for the *low ſtyle*, it may be obſerved, in general, that the dreſs ought to be agreeable to the thoughts, plain, ſimple, and unaffected; elegance, or a proper choice of words and expreſſions, including both PURITY and PERSPICUITY, ſhould be an object of primary attention. Epithets ſhould be uſed ſparingly, becauſe they enlarge the images of things, and contribute very much to heighten the *ſtyle*. The compoſition in this kind of *ſtyle*, does not require the greateſt accuracy and exactneſs. A ſeeming negligence, as it appears more natural, is ſometimes a beauty. Short ſentences, or thoſe of a moderate length, are beſt ſuited to this character. Such a harmony of numbers, proportion of the ſeveral parts, and ſtudied cadency, as are evidently the effects of art, ſhould be avoided: and yet it is neceſſary to obſerve ſome proportions in the members, ſo that neither the ears be too much defrauded, nor the ſenſe obſcured. As to order, the plaineſt and cleareſt diſpoſition, both of the words and members of ſentences, and what is moſt agreeable to the natural conſtruction, beſt ſuits with this character, of which perſpicuity is one of the principal beauties: and a proper connection likewiſe of ſentences, with a regular order in the dependence of things one upon another, very much contributes to this end. As to dignity of language we may obſerve, that tropes ſhould be uſed cautiouſly. Verbal figures, which ſerve chiefly to enliven an expreſſion, and give an agreeable turn, are often not improper for this character: nor are figures of ſentences wholly to be excluded, eſpecially ſueh as are chiefly uſed in reaſoning or demonſtration. But thoſe which are more peculiarly adapted to touch the paſſions, or paint things in the ſtrongeſt colours, are the more proper ornaments of the higher *ſtyles*.

Upon the whole, pure nature, without any colouring, or appearance of art, is the diſtinguiſhing mark of the *low ſtyle*; the deſign of which is to make things plain and intelligible, and ſet them in an eaſy light. And, therefore, the proper ſubjects of it are epiſtles, dialogues, philoſophical diſſertations, or any other diſcourſes that ought to be treated in a plain and familiar manner, without much ornament, or addreſs to the paſſions. A freedom and eaſe both of thought and expreſſion, attended with an agreeable humour and pleaſantry, are its peculiar beauties that engage us: and as the *plain ſtyle* admits of fewer ornaments than the *florid*, and has little more to recommend it than its own native beauty and ſimplicity, the greater is the art neceſſary to render it agreeable and entertaining.

Middle, or *equable ſtyle*, pertains to ſubjects that are of weight and importance, and which, therefore, require both a gravity and accuracy of expreſſion: and the diſtinguiſhing marks of this *ſtyle* are fine thoughts. A fine thought, as diſtinguiſhed from plain thoughts on the one hand, and lofty thoughts on the other, may deſerve that character from ſome or other of the following properties, viz. 1. Gravity and dignity, an inſtance of which occurs in Cicero's ſpeech to Cæſar (Pro Marcell. c. 8.) when he ſays, *It has been often told me, that you have frequently ſaid, you have lived long enough for yourſelf. I believe it, if you either lived, or was born, for yourſelf only.*

2. Beauty and elegance: this property is exemplified in the fine compliment, which Pliny pays to the emperor Trajan, when he ſays, *It has happened to you alone, that you was father of your country, before you was made ſo.* Paneg. c. 21.

3. Delicacy. A delicate thought is that which is not wholly diſcovered at once, but by degrees opening and unfolding itſelf to the mind, diſcloſes more than was at firſt perceived. To this property Quintilian (Inſt. Orat. lib. viii. c. 2.) ſeems to refer, when he ſays, thoſe things are grateful to the hearers, which when they apprehend, they are delighted with their own ſagacity; and pleaſe themſelves as though they had not heard, but diſcovered them; of this kind is that of

Pliny (Paneg. c. 22.) ſpeaking of Trajan's entry into Rome; *Some declared upon ſeeing you, they had lived long enough; others, that now they were more deſirous to live.* 4. Novelty, which is applicable not only to things abſolutely new, but to the ſame thought ſet in a different light, or applied to a different occaſion. Thus Cicero (De Orat. lib. iii. c. 1.) ſays of Craſſus: *Craſſus always excelled every other perſon, but that day he excelled himſelf:* and alſo of Cæſar (Pro Marcell. c. 4.) *You had before conquered all other conquerors by your equity and clemency, but to day you have conquered yourſelf: you ſeem to have vanquiſhed even victory herſelf, therefore you alone are truly invincible.*

As to the language proper to the *middle ſtyle*, it may be obſerved in general, that as the proper ſubjects of it are things of weight and importance, though not of that exalted nature as wholly to captivate the mind, and divert it from attending to the diction; ſo all the ornaments of ſpeech and beauties of eloquence have place here. Elegance, conſiſting in the choice of ſingle words, of thoſe that are moſt full and expreſſive, and of proper epithets, and the moſt accurate compoſition in all the parts of it, have place here. Periods the moſt beautiful and harmonious, and of a due length, and wrought up with the moſt exact order, juſt cadency, eaſy and ſmooth connection of the words, and flowing numbers, are the genuine ornaments, which greatly contribute to form this character. But the principal diſtinction of *ſtyle* ariſes from tropes and figures. By theſe it is chiefly animated, and raiſed to its different degrees or characters, as it receives a leſs or greater number of them; and thoſe either more mild, or more ſtrong and powerful. As to tropes, thoſe which afford the moſt lively and pleaſing ideas, eſpecially metaphors, ſuit the middle character. Virgil's Eclogues are written in the *low ſtyle*, agreeably to the language of ſhepherds, and his Georgics in the *middle ſtyle*, ſuited to the nature of the ſubject, and the greateſt men in Rome, amuſing themſelves in rural affairs, who were the perſons for whom they were deſigned. Accordingly, in the former (Eclog. v. ver. 37.) the following verſe, occurs.

Infelix lolium et ſteriles naſcuntur avenæ:

In Engliſh:

Wild oats and darnel grow inſtead of corn.

In the latter (Georg. lib. i. ver. 154.) the ſame ſentiment is thus expreſſed:

Infelix lolium et ſteriles dominantur avenæ.

In Engliſh:

Where corn is ſown, darnel and oats command.

Upon which ſome critics have remarked, that where the ſame ſenſe is intended, inſtead of the proper word *naſcuntur, grew*, the author ſubſtitutes a metaphor, *dominantur, command.*

Figures, both of words and ſentences, alſo belong to this *ſtyle*; which admits of the fineſt deſcription, moſt lively images, and brighteſt figures, that ſerve either for delight, or to influence the paſſions, without tranſport or extacy, which is the property of the *ſublime*. The moſt conſiderable embelliſhments, that form the *middle* or *florid ſtyle*, are deſcriptions, the proſopopeia, ſimilitudes and compariſons, and the antitheſis. Theſe, and ſuch like florid figures, are ſometimes found in hiſtorians, but more frequently in orators; and indeed this *middle* character, in the whole of it, is beſt accommodated to the ſubjects of hiſtory and oratory. Cicero has excellently deſcribed this *ſtyle* in the following paſſage: *Eſt ſtylus quidam interjectus, intermedius, et quaſi temperatus; nec acumine inferioris nec fulmine utens ſuperioris, vicinus amborum, in neutro excellens, utriuſque particeps.* The ſame author calls it the *florid* and *poliſhed ſtyle*; as in this all the graces and beauties of language are principally to be uſed.

STYLE, *ſublime*, is that which is the moſt noble, as well as the moſt difficult part of the province of an orator: and indeed, the nobleſt genius and greateſt art are both requiſite to form this character; becauſe the juſteſt propriety, joined with the greateſt ſtrength and higheſt elevation of thought, is required to complete the *true ſublime*. Lofty and grand ſentiments are the baſis of this character of *ſtyle*; and, therefore, Longinus adviſes thoſe who aſpire at this excellence, to accuſtom themſelves to think upon the nobleſt ſubjects. Lofty thoughts are principally thoſe which relate either to divine objects, or to power, wiſdom, courage, beneficence, and ſuch other things as are of the higheſt eſteem among mankind. Of the former ſort is Cicero's declaration to Cæſar, in his interceſſion for Ligarius, when he ſays, *Men in nothing approach nearer to deity, than in giving life to men:* and an inſtance of the latter ſort occurs on the ſame occaſion, when he ſays, *Your fortune has given you nothing greater than a power, nor your nature than a will to ſave many.* Of the ſame kind is the reply of Porus the Indian king, when, after his defeat by Alexander, being brought before him, and aſked how he expected to be treated, he anſwered, *Like a king:* or that of Cæſar chiding the pilot, who was afraid to ſet out with him in a ſtorm, *Quid times? Cæſarem vehis.* It is proper to remark, that the *true ſublime* is conſiſtent with the greateſt plainneſs and ſimplicity of expreſſion: and, generally ſpeaking, the more plain and natural the images appear, the more they ſurpriſe us. Of this kind is the expreſſion of Cæſar, upon his victory over Pharnaces, *I came, I ſaw, I conquered.* But there cannot be a greater or more beautiful example of this, than what Longinus has taken notice of from Moſes: *The legiſlator of the Jews,* ſays he (ſect. 9.) *no ordinary perſon, having a juſt notion of the power and majeſty of the Deity, has expreſſed it in the beginning of his laws in the following words: And God ſaid: What? Let there be light, and there was light. Let the earth be made, and it was made.* The image of a thing is ſometimes much heightened, when it is expreſſed in ſo undetermined a manner, as to leave the mind in ſuſpenſe what bounds to fix to the thought. An inſtance of this kind occurs in Milton's deſcription of the fall of Satan, Parad. Loſt, book ii.

——— *And to this hour*
Down had been falling.

As to the language proper for the *ſublime ſtyle*, elegance, compoſition, and dignity, which comprehend all the properties of *ſtyle*, are to be particularly regarded. With reſpect to elegance, thoſe words and expreſſions chiefly contribute to form the *ſublime*, which are moſt ſonorous, and have the greateſt ſplendor, force, and dignity; and they are principally long words, which are preferable to ſhort ones, and eſpecially monoſyllables; compound words rather than ſimple ones; and alſo epithets, the uſe of which contributes in a particular manner to this character. The force of compoſition is ſo great, as Longinus obſerves, (ſect. 39.) that ſometimes it creates a kind of *ſublime*, where the thoughts themſelves are but mean, and gives a certain appearance of grandeur to that which otherwiſe would ſeem but common. Sublimity ariſes from the ſeveral parts of a period ſo connected, as to give force as well as beauty to the whole. The periods, therefore, in this character of *ſtyle*, ſhould be of a proper length; neither too ſhort, ſo as to loſe their juſt weight and grandeur; nor too prolix, ſo as to loſe their force, by becoming heavy and unweildy. And more eſpecially, nothing ſhould be admitted that is ſuperfluous, which very much enervates the force of a ſentence. Beſides the order and diſpoſition of the ſeveral words and members of a ſentence ſhould be regarded; as the different placing of one or two words will ſometimes wholly deſtroy the grandeur of a ſentence, and make it extremely flat. Another thing to be attended to in compoſition, is the connection of words, with regard to the ſound; that the pronunciation, in paſſing from one to another, may be moſt agreeable to the ear, and beſt ſuited to the nature of the ſubject. Soft and languid ſounds are very unſuitable to this character: and, in this reſpect, therefore, our tongue, by its multitude of conſonants, is more ſuited for ſublime diſcourſes than ſome other modern languages, which abound with vowels. The dignity of *ſtyle* depends on the proper uſe of tropes and figures, which, when they are lively and ſtrong, give a force and energy to a diſcourſe, on which its ſublimity depends. Metaphors are peculiarly ſuited to raiſe and animate the *ſtyle:* and as to figures, whether verbal, or thoſe which conſiſt in the ſenſe, the nature of this character will eaſily direct to ſuch as are moſt proper. The chief figures that ſeem beſt ſuited for this purpoſe are deſcription, enumeration, ſimilitude, antitheſis, and apoſtrophe. The *ſublime ſtyle* is proper for laudatory diſcourſes or panegyric; but the ſublimity ſhould appear rather from the elevation of the thought, attended with a ſimplicity of expreſſion, than from the ornaments and dreſs of the language. Though, upon the whole, grandeur and majeſty of expreſſion conſtitute the proper marks of this character, with relation to the language, as beauty and ſplendor are of the *middle ſtyle*. Ward's Orat. vol ii. lect. 35—39.

Of the five ſources of the *ſublime* aſſigned by Longinus, viz. boldneſs or grandeur in the thoughts, the pathetic, the proper application of figures, the uſe of tropes and beautiful expreſſions, and a muſical ſtructure and arrangement of words; the two firſt are only allowed by a late excellent writer to have any relation to the *ſublime*; the other three having no more relation to the *ſublime* than to other kinds of good writing; perhaps leſs to this than to any other ſpecies whatever; becauſe it requires leſs the aſſiſtance of ornament. The foundation, he obſerves, of the *ſublime* in compoſition, muſt be always laid in the nature of the object deſcribed, which ſhould be ſuch, as if exhibited to us in reality, would raiſe ideas of that elevating, awful, and magnificent kind, which we call *ſublime*. And, beſides, it muſt be ſet before us in ſuch a light as is moſt proper to give us a clear and full impreſſion of it: it muſt be deſcribed with ſtrength, with conciſeneſs and ſimplicity. As for what is called the *ſublime ſtyle*, it is, ſays this writer, for the moſt part, a very bad one; and has no relation whatever to the real *ſublime*. Perſons are apt to imagine, that magnificent words, accumulated epithets, and a certain ſwelling kind of expreſſion, by riſing above what is uſual or vulgar, contributes to, or even forms the *ſublime*. Nothing, he ſays, can be more falſe. In general, in all good writing, the *ſublime* lies in the thought, not in the words; and when the thought is truly noble, it will, for the moſt part, clothe itſelf in a native dignity of language. The *ſublime*, indeed, rejects mean, low, or trivial, expreſſions; but it is equally an enemy to ſuch as are turgid. The main ſecret of being *ſublime* is to ſay great things in few and plain words: and it will be found to hold, without exception, that the moſt *ſublime* authors are the ſimpleſt in their *ſtyle*.

The faults oppoſite to the *ſublime* are chiefly two; the *frigid* and the *bombaſt*. The *frigid* conſiſts in degrading an object, or ſentiment, which is *ſublime* in itſelf, by our mean conception of it; or by our weak, low, and childiſh deſcription of it. The *bombaſt* lies in forcing an ordinary or trivial object out of its rank, and endeavouring to raiſe it into the *ſublime*; or in attempting to exalt a ſublime object beyond all natural and reaſonable bounds. This is alſo called *fuſtian* or *rant*. Shakſpeare is not unexceptionable in this reſpect. Dryden and Lee in their tragedies abound with it. Blair's Lectures on Rhetoric, vol. i. lect. 4.

Dr. Campbell, in his Philoſophy of Rhetoric, vol. ii. p. 4. obſerves, that, beſides purity, which is a quality entirely grammatical, the five ſimple and original qualities of *ſtyle*, conſidered as an object to the underſtanding, the imagination, the paſſions, and the ear, are perſpicuity, vivacity, depending on the choice of words, their number, and their arrangement, elegance, which conſtitutes dignity of manner, animation, and muſic.

All the qualities of a good *ſtyle*, ſays Dr. Blair, may be ranged under the two heads of perſpicuity and ornament. For all that can be required of language is, to convey our ideas clearly to the minds of others, and, at the ſame time, in ſuch a dreſs, as by pleaſing, and intereſting them, ſhall moſt effectually ſtrengthen the impreſſions we endeavour to make.

PERSPICUITY, conſidered with reſpect to words or phraſes requires, according to this writer, theſe three qualities, PURITY, PROPRIETY, and PRECISION. The former is the uſe of ſuch words, and ſuch conſtructions, as belong to the idiom of the language which we ſpeak; in oppoſition to words or phraſes that are imported from other languages, or that are obſolete, or new coined or uſed without proper authority. Propriety is the ſelection of ſuch words in the language, as the beſt and moſt eſtabliſhed uſage has appropriated to thoſe ideas, which we intend to expreſs by them. And as the words which a man uſes to expreſs his ideas, may be faulty in three reſpects; not expreſſing the idea which the author intends, but ſome other which reſembles it; or expreſſing that idea incompletely; again expreſſing it, together with ſomething more than he intends; preciſion is oppoſed to all theſe three faults, but chiefly to the laſt. The proper oppoſite to preciſion is a *looſe* STYLE. In the conſtruction of ſentences, according to this writer, the moſt eſſential properties are clearneſs and preciſion, unity, ſtrength, and harmony. The firſt is oppoſed to ambiguity in the arrangement of words in a ſentence; and is to be attained by obſerving exactly the rules of grammar, as far as theſe can guide us, and by placing the words, or members moſt nearly related, as near to each other as poſſible; ſo as to make their mutual relation clearly appear; particularly, that adverbs may always be made to adhere cloſely to the words which they are intended to qualify; that, where a circumſtance is thrown in, it may be determined by its place to one or other member of it; and that every relative word which is uſed, may inſtantly preſent its antecedent to the mind of the reader without the leaſt obſcurity. In order to preſerve the unity of a ſentence, the ſcene, during the courſe of the ſentence, ſhould be changed as little as poſſible; things, which have ſo little connection, that they could admit of being divided into two or three ſentences, ſhould never be crowded into one ſentence; all parentheſes in the middle of ſentences ſhould be avoided, and the ſentence ſhould be always brought to a full and perfect cloſe. The ſtrength of a ſentence, is ſuch a diſpoſition of the ſeveral words and members, as ſhall bring out the ſenſe to the beſt advantage; as ſhall render the impreſſion which the period is deſigned to make, moſt full and complete, and give every word and every member its due weight and force. For this purpoſe, care ſhould be taken to prune the ſentence of all redundant words and members; particular attention ſhould be had to the uſe of copulatives, relatives, and all the particles employed in tranſition and connection; the capital word or words ſhould be diſpoſed of in that place of the ſentence, where they will make the fulleſt impreſſion; the members of ſentences ought to go on riſing and growing in their importance above one another, ſo as to form a CLIMAX; the concluſion ſhould ſeldom conſiſt of an adverb, prepoſition, or any inconſiderable word; and in the members of a ſentence, where two things are compared or contraſted to one another, where either a reſemblance or an oppoſition is intended to be expreſſed, ſome reſemblance in the language and conſtruction ſhould be preſerved.

In the harmony of periods, we may conſider agreeable ſound, or modulation in general, without any particular expreſſion, and the ſound ſo ordered, as to become expreſſive of the ſenſe. The firſt depends on the choice of words, and the arrangement of them, with reſpect to which no writer equals Cicero, who was fond, perhaps to an exceſs, of the *plena ac numeroſa oratio*.

There are two things on which the muſic of a ſentence chiefly depends, viz. the proper diſtribution of the ſeveral members of it, and the cloſe cadence of the whole, which ſhould be ſo contrived, that the ſound ſhould be made to grow to the laſt; the longeſt members of the period, and the fulleſt and moſt ſonorous words being reſerved for the concluſion. This rule, however, ought to be obſerved with reſtriction; for all unmeaning words introduced merely to round the period, or fill up the melody, *complementa numerorum*, as Cicero calls them, are great blemiſhes in writing. Of ſound adapted to the ſenſe there are two degrees, viz. the current of ſound, adapted to the tenor of a diſcourſe, and a particular reſemblance effected between ſome object, and the ſounds that are employed in deſcribing it.

The ſecond quallity of *ſtyle* is ornament, which ariſes partly from a graceful, ſtrong, or melodious conſtruction of words, and partly alſo from figurative language, which is prompted either by the imagination or the paſſions. Figures contribute to the beauty and grace of *ſtyle*, by enriching the language, and rendering it more copious: by beſtowing dignity upon *ſtyle*; by giving us the pleaſure of enjoying two objects preſented together to our view without confuſion; the principal idea, which is the ſubject of the diſcourſe, along with its acceſſory, which gives it the figurative dreſs, and by giving us frequently a much clearer and more ſtriking view of the principal object than we could have if it were expreſſed in ſimple terms, and diveſted of its acceſſory idea. See FIGURE, TROPE, METAPHOR, &c.

With reſpect to the uſe of figures, Dr. Blair obſerves, that neither all the beauties, nor even the chief beauties of compoſition, depend upon tropes and figures; that, in order to their being beautiful, they muſt always ariſe naturally from the ſubject; that they muſt not be employed too frequently; and that, without a genius for figurative language, none ſhould attempt it.

This writer conſiders the various kind of *ſtyle*; the firſt and moſt obvious diſtinction is that which ariſes from an author's ſpreading out his thoughts more or leſs; and which forms what are called the *diffuſe* and the *conciſe ſtyles*. Each of theſe has its advantages, and each becomes faulty when carried to the extreme. Diſcourſes that are to be ſpoken require a more copious *ſtyle* than books that are to be read. Of conciſeneſs, the two moſt remarkable examples are Tacitus, and Monteſquieu in l'Eſprit de Loix. Of a beautiful and magnificent diffuſeneſs, Cicero is the moſt illuſtrious inſtance: Addiſon alſo, and ſir William Temple, belong to this claſs.

The *nervous* and the *feeble* are generally held to be characters of *ſtyle*, of the ſame import with conciſe and diffuſe. They often coincide, inſomuch that diffuſe writers have generally ſome degree of feebleneſs, and nervous writers will generally be inclied to a conciſe expreſſion. However, there are inſtances of writers, who, in the midſt of a full and ample *ſtyle*, have maintained a great degree of ſtrength. Livy is an example; and in the Engliſh language Dr. Barrow. One of the moſt complete models of a *nervous ſtyle* is Demoſthenes in his Orations.

The reſtoration of king Charles II. ſeems to be the æra of the formation of our preſent *ſtyle* in Great Britain. Lord Clarendon began; ſir William Temple poliſhed the language ſtill more; and the author who formed it more than any one into its preſent ſtate, is Dryden. Since his time, conſiderable attention has been paid to purity and elegance of *ſtyle*; but it is elegance, rather than ſtrength, that forms the diſtinguiſhing quality of moſt of the good Engliſh writers.

Style, with regard to the degree of ornament employed to *beautify* it, ſeems to riſe in the following gradation, viz. a dry, plain, neat, elegant, and flowery manner. The *dry* manner excludes ornament of every kind; and content with being underſtood, it has not the leaſt aim to pleaſe either the fancy or the ear: Ariſtotle is a thorough exanple of a *dry ſtyle*. A *plain ſtyle* riſes one degree above a dry one. A writer of this character gives us his meaning in good language, diſtinct and pure, but ſeeks no farther ornament; either, becauſe he thinks it unneceſſary to the ſubject; or becauſe his genius does not lead him to delight in it, or becauſe it leads him to deſpiſe it. Dean Swift is placed at the head of thoſe that have employed the *plain ſtyle*: and among our philoſophical writers, Mr. Locke comes under this claſs The *neat ſtyle* makes uſe of ornament, but that not of the higheſt or moſt ſparkling kind. The attention of a writer of this character is ſhewn in the choice of his words, and in a graceful collocation of them, rather than in any high efforts of imagination or eloquence. A familiar letter, or a law paper on the drieſt ſubject, may be written with neatneſs; and a ſermon or a philoſophical treatiſe, in a *neat ſtyle*, will be read with pleaſure. An *elegant ſtyle* expreſſes a higher degree of ornament than a neat one; and is, indeed, the term uſually applied to *ſtyle* when poſſeſſing all the virtues of ornament, without any of its exceſſes or defects. To this claſs we may refer Addiſon, Dryden, Pope, Temple, Bolingbroke, Atterbury, and a few more.

When the ornaments applied to *ſtyle*, are too rich and gaudy in proportion to the ſubject; when they return upon us too faſt, and ſtrike us either with a dazzling luſtre, or a falſe brilliancy; this forms what is called a *florid ſtyle*: a term commonly uſed to ſignify the exceſs of ornament. It is not only pardonable, but even a promiſing ſymptom in young people, that their *ſtyle* ſhould incline to the florid and luxuriant, but it is not entitled to the ſame indulgence from writers of maturer years. Without a foundation of good ſenſe and ſolid thought, the moſt *florid ſtyle* is but a childiſh impoſition on the public.

Among the characters of *ſtyle* we may reckon that of ſimplicity, or a *natural ſtyle*, as diſtinguiſhed from affectation. Simplicity, with reſpect to *ſtyle*, ſtands oppoſed to too much ornament or pomp of language, and in this ſenſe the *ſimple ſtyle* coincides with the *plain* or *neat ſtyle*. Simplicity, as it regards *ſtyle*, may alſo denote the eaſy and natural manner in which our language expreſſes our thoughts, and ſtands oppoſed to affectation or ornament, or appearance of labour about our *ſtyle*; and this is a diſtinguiſhing excellence in writing. Of this ſimplicity Homer, Heſiod, Anacreon, Theocritus, Herodotus, and Xenophon, among the Greeks; Terence, Lucretius, Phædrus, and Cæſar, among the Romans; and Tillotſon, ſir William Temple, and Addiſon, among Engliſh writers, are diſtinguiſhed models.

Dr. Blair mentions another character of *ſtyle*, which he diſtinguiſhes by the name of the *vehement*; which always implies ſtrength, and is not by any means inconſiſtent with ſimplicity; but in its predominant character is diſtinguiſhable from either the ſtrong or the ſimple manner. It is a peculiar ardour, it is a glowing *ſtyle*; the language of a man whoſe imagination and paſſions are heated, and ſtrongly affected by what he writes; who is therefore negligent of leſſer graces, but pours himſelf forth with the rapidity and fullneſs of a torrent, This belongs to the higher kinds of oratory; and, indeed, is rather expected from a man who is ſpeaking than from one who is writing in his cloſet. The orations of Demoſthenes furniſh the full and perfect example of this ſpecies of *ſtyle*. Among Engliſh writers, lord Bolingbroke has moſt of this character, though mixed indeed with ſeveral defects. Blair's Lectures on Rhetoric, &c. vol. i. paſſim.

As to the choice of *ſtyle*, in the general, the nature of the ſubject is to determine it. Such *ſtyle*, ſays Cicero, is to be choſen, as expreſſes great things magnificently, middle things moderately, and low things ſubtilely or acutely: but more particularly, as theſe are three branches of the duty of an orator, to teach, to delight, and to move; the ſimple *ſtyle* is uſed to teach, the middle to delight, and the ſublime to move.

Again, the ſimple or low *ſtyle* is fit for comedy; the ſublime for tragedy: and the middle for hiſtory. Cæſar, it is true, rather uſed the ſimple than the intermediate *ſtyle*, but then he wrote commentaries, not a hiſtory, as is obſerved by Tully.

Again, the ſimple *ſtyle* is fit for bucolics and eclogues; the intermediate *ſtyle* for georgics; and the ſublime for epics: which triple difference we eaſily dicover in Virgil, though he ſometimes mixes them all in the Æneid itſelf, uſing the ſimple *ſtyle* in the fifth book, where he deſcribes games, and the intermediate in the beginning of the poem. Care is ſtill to be taken, that the *ſtyle* be not flat and dull on pretence of being ſimple

Mr. Boileau obſerves, that in all languages a mean thought, expreſſed in noble terms, is better liked than the nobleſt thought expreſſed in mean terms: the reaſon he gives is, that every body cannot judge of the force and juſtneſs of a thought: but ſcarce any but perceives the meanneſs of words. The latter we find by our ſenſes, the former only by our reaſon.

It is neither eaſy nor neceſſary, ſays Dr. Blair; to determine what is preciſely the beſt *ſtyle*. Some general qualities, indeed, there are of ſuch importance, as ſhould always in every kind of compoſition be kept in view; and ſome defects we ſhould always ſtudy to avoid. An oſtentatious, a feeble, a harſh, and an obſcure *ſtyle*, for inſtance, are always faults; and perſpicuity, ſtrength, neatneſs, and ſimplicity, are beauties to be always aimed at. But as to the mixture of all, or the degree of predominancy of any one of theſe good qualities, for forming one peculiar diſtinguiſhing manner, no preciſe rules can be given; nor is it eaſy to point out any one model as abſolutely perfect. Dr. Blair propoſes the following directions concerning the proper method of attaining a good *ſtyle* in general: leaving the particular character of that *ſtyle* to be either formed by the ſubject on which we write, or prompted by the bent of genius. For this purpoſe, we ſhould ſtudy clear ideas on the ſubject concerning which we are to write or ſpeak; the frequent practice of compoſing with attention and care is indiſpenſibly neceſſary: we ought to render ourſelves well acquainted with the *ſtyle* of the beſt authors, and yet, at the ſame time, be cautious in avoiding a ſervile imitation of any one author whatever: we ſhould always ſtudy to adapt our *ſtyle* to the ſubject, and alſo to the capacity of our hearers, if we are to ſpeak in public: and it ſhould be remembered, that attention to *ſtyle* ought not to engroſs us ſo much, as to detract from a higher degree of attention to the thoughts. *Curam verborum*, ſays the great Roman critic, *rerum volo eſſe ſolicitudinem.* Lect. on Rhet. lect. xix.

The chief faults in *ſtyle* are, its being *tumid* and *ſwollen*, or *cold* and *puerile*, or *ſtiff*, or *looſe*, or *dry* and *jejune*.

STYLE, *a tumid*, is that immoderately ſtuffed with big words and ſentences; ſuch are thoſe verſes of the emperor Nero, ridiculed by Perſius:

> *Torva mimalloneis implerunt cornua bombis,*
> *Et raptum vitulo caput ablatura ſuperbo*
> *Baſſaris, & lyncem mænas flexura corymbis*, &c.

STYLE *frigid*, or *puerile*, is that which affects certain trifling ornaments, inſipid jeſts, remote and ſtrained alluſions, redundant deſcriptions, &c. Such, e. gr. as a Centaur's riding himſelf; more golden than gold, &c. Of this vice, that paſſage of Virgil ſeems guilty.

> *Num capti potuere capi? Num incenſa cremavit*
> *Troja viros?*

In the *puerile ſtyle*, the writer runs on in a ſpecious verboſity, amuſing his reader with ſynonymous terms and identical propoſitions, well-turned periods, and highſounding words; but, at the ſame time, uſing thoſe words ſo indifferently, that the latter can either affix no meaning to them at all, or may almoſt affix any meaning to them he pleaſes. See *Sublime* STYLE *ſupra*.

STYLE, *looſe*, is that, which, wanting articles, numbers, &c. fluctuates here and there, not connected or joined together: or, a *looſe ſtyle*, in oppoſition to preciſion, generally ariſes from a ſuperfluity of words; and the great ſource of it is the injudicious uſe of ſynonymous words. This is a fault ſo frequent, eſpecially in young writers, that it is needleſs to give inſtances of it.

STYLE, *dry*, *jejune*, is that which is deſtitute of ornament, ſpirit, &c. The ancients made a notable diſtinction of *ſtyle*, into *Laconic* and *Aſiatic*.

STYLE, *Aſiatic*, is that which is very florid, diffuſive, and prolix; or where abundance of words are uſed to expreſs a little matter; thus called by the Greeks from the people of Aſia, who affected ſuch redundancies, in oppoſition to the

STYLE, *Laconic*, which is diſtinguiſhed by its exceeding conciſeneſs; and by comprehending much matter under a few words.

Such, e. gr. is that anſwer returned by the Lacedæmonians, to a long epiſtle of an enemy, threatening to deſtroy them with fire and ſword: *ει*, *ſi*, *if*; that is, do *if* you can: or, that returned by the ſame people to king Philip, demanding ſome extravagant thing of them, *ȣ*, *n n*, *no*. Or that of Cleomenes, the Spartan general, to the ambaſſador of Samos; "As to what you have ſaid, "the firſt part I do not remember; the middle I do not "underſtand; the laſt I do not approve." Or that epiſtle of Archidamus to the Elei, who were preparing war againſt him. Archidamus to the Eleans: "It is "good to be quiet." Or that of Cæſar to the Roman ſenate, after his conquering Pharnaces, king of Pontus: *Veni, vidi, vici*; *I came, I ſaw, I conquered.*

STYLE *of dialogues.* See DIALOGUE, and *Low* STYLE, *ſupra.*

STYLE, *epiſtolary.* See EPISTOLARY.

STYLE, *hiſtorical*, is of a middle nature between that of a poet and an orator, differing from both not only in the ornamental parts, but likewiſe in the common idioms and forms of expreſſion. As HISTORY is a narrative of ſuch facts, as are fit to be tranſmitted to poſterity, for the uſe of mankind, and the better conduct of human life, the firſt law in writing it is, as Cicero obſerves (De Orat. lib. ii. c. 15.) not to dare to ſay any thing that is falſe; and the next not to be afraid to ſpeak the truth: that on the one hand there be no ſuſpicion of affection, nor of prejudice on the other. The ſuperſtructure on theſe foundations conſiſts partly in things, and partly in the *ſtyle* or language. The former require an order of times, and deſcription of places: and becauſe in great and memorable events, we are deſirous to know firſt their cauſes, then the actions themſelves, and laſtly their conſequences; the hiſtorian ſhould take notice of the ſprings or motives that occaſioned them; and in mentioning the facts themſelves, ſhould not only relate what was done or ſaid, but likewiſe in what manner; and in treating upon their conſequences, ſhew if they were the effects of chance, wiſdom, or imprudence. Nor ſhould he only write the actions of great and eminent perſons, but likewiſe deſcribe their characters. As to the *ſtyle*, he ſays, (De Clar. Orat. c. 75.) that nothing is more agreeable in hiſtory, than brevity of expreſſion, joined with purity and perſpicuity. And he adds, in the place above cited, that it ought to be fluent, ſmooth, and even free from that harſhneſs and poignancy, which are uſual at the bar.

Dionyſius (Epiſt. ad Cn. Pomp.) makes decency a principal virtue in an hiſtorian; which he explains by ſaying, that he ought to preſerve the characters of the perſons, and dignity of the actions of which he treats: and, therefore, an *hiſtorical ſtyle* ſhould be animated with a conſiderable degree of life and vigour.

Painting and imagery form no ſmall part of the hiſtorian's province, though his colours are not ſo ſtrong and glittering as thoſe of the poet or orator. He ought, therefore, to be well acquainted with the manners of men, and the nature of the paſſions, both of which he is often obliged to deſcribe: in the former of which Herodotus excels, and Thucydides in the latter, as Dionyſius has obſerved. From theſe ſeveral requiſites, an *hiſtorical ſtyle* ſeems, upon the whole, to agree beſt with the middle character.

As to compoſition, which reſpects the ſtructure of ſentences, and the ſeveral parts of them, Demetrius (De Interpret.) remarks, that an hiſtorical period ought neither to riſe very high, nor ſink very low, but to preſerve a medium; i.e. theſe periods ſhould neither be ſo full and ſonorous, as are frequent in oratory, nor yet ſo ſhort and flat, as in dialogue. This ſimplicity, he ſays, becomes the gravity and credit of hiſtory, and diſtinguiſhes it from oratory on the one hand, and dialogue on the other.

The periods beſt ſuited for hiſtory are thoſe which, being of a moderate length, will admit of a juſt riſe and cadency, and may be pronounced with eaſe. The harmony of periods ariſing from ſuch a poſition of the words as renders the ſound pleaſant and agreeable, ought alſo to be regarded in hiſtory. And as to dignity, which reſpects the uſe of tropes and figures, Dionyſius ſays, that hiſtory ſhould be embelliſhed with ſuch figures as are neither vehement, nor carry in them the appearance of art. This obſervation coincides with that of Cicero (De Orat. lib. ii. c. 14.) in comparing Xenophon and Calliſthenes, two Greek hiſtorians.

Hiſtorical ſtyle, however, admits of conſiderable varieties from the different nature and dignity of the ſubject. The lives of particular perſons do not require that ſtrength and majeſty of expreſſion, nor all thoſe ornaments of language, which ſuit an hiſtory of the Roman empire: and, accordingly we find, the *ſtyle* of Nepos and Suetonius very different from that of Livy: the former being ſmooth and eaſy, ſcarce riſing above the low character, and the latter often approaching near to the ſublime. And other hiſtorians have obſerved a medium between theſe. Ward's Orat. vol. ii. lect. 45.

STYLE, *lapidary* and *marotic.* See the adjectives.

STYLE *of an orator*, conſiſts of the low, middle, and ſublime characters, as they are applied by him in the different parts of his province. The orator has three things in view, viz. to prove what he aſſerts, to repreſent it in an agreeable light, and to move the paſſions: and each of theſe parts of his province require a different *ſtyle*. The *low ſtyle* is moſt proper for proof and information: the *middle ſtyle* is moſt ſuited for pleaſure and entertainment; becauſe it conſiſts of ſmooth and well-turned periods, harmonious numbers, with florid and bright figures. But the *ſublime* is neceſſary, in order to ſway and influence the paſſions. Here the orator calls in all the aſſiſtance both of nature and art: the moſt raiſed and lofty thoughts, cloſed with the brighteſt and ſtrongeſt colouring, enter into this character.

The INTRODUCTION ſcarce riſes above the *middle ſtyle*; and if it carry in it an air of pleaſantry and good humour, it is generally the more apt to engage the attention.

The qualities of a good NARRATION, are clearneſs, brevity, and probability. The firſt ariſes from the choice of proper words, and ſuch tropes as have been rendered moſt familar by uſe; brevity requires moderate periods, whoſe parts are but little tranſpoſed: and a plain and ſimple dreſs, without ornament or colouring, is beſt ſuited to repreſent things probable: all which are the properties of the *low ſtyle.* In the PROPOSITION there can be no room for ornament. In the cool reaſoning and debate of CONFIRMATION, the *low ſtyle* is certainly the moſt proper: but as the orator's method of reaſoning often differs very much from that of the philoſopher, and he endeavours not only to convince the judgment, but to affect the paſſions in a great variety of ways; his *ſtyle* is very different, according to the nature and circumſtances of the cauſe. The *ſtyle* of CONFUTATION is much the ſame with that of confirmation.

In that part of the CONCLUSION, called RECAPITULATION, the language ought to be forcible and ſtrong, rather than florid, becauſe brevity and conciſeneſs are neceſſary qualities. But in the other branch of the concluſion, which is an addreſs to the PASSIONS, all the ſprings of eloquence, ſays Quintilian (Inſt. Orat. lib. vi. cap. 1.) are to be opened. Now we are paſt the rocks and ſhallows, all the ſails may be hoiſted, and as the greateſt part of the concluſion conſiſts in illuſtration, the moſt pompous language and ſtrongeſt figures have place here. Regard, however, muſt be had in every part of a diſcourſe to the nature of the ſubject, the time, place, and perſons, and other circumſtances, by all which the *ſtyle* is to be regulated. Ward's Orat. vol. ii. ſect. 46. See STYLE, *ſupra.*

STYLES *of hunting.* See HUNTING.

STYLET, STYLETTO, a ſmall dangerous kind of poniard, which may be concealed in the hand; chiefly uſed in treacherous aſſaſſinations.

The blade is uſually triangular, and ſo ſlender, that the wound it makes is almoſt imperceptible. The *ſtyletto* is ſtrictly prohibited in all well diſciplined ſtates.

STYLITES, ϛυλιτης, *ſancti columnares*, or *pillar ſaints*, in *Eccleſiaſtical Hiſtory*, an appellation given to a kind of ſolitaries, who ſtood motionleſs upon the tops of pillars, raiſed for this exerciſe of their patience, and remained there for ſeveral years, amidſt the admiration and applauſe of the ſtupid populace.

Of theſe we find ſeveral mentioned in ancient writers, and even as low as the twelfth century, when they were totally ſuppreſſed.

The founder of the order was St. Simeon *Stylites*, a famous anachoret in the fifth century, who firſt took up his abode on a column ſix cubits high; then on a ſecond of twelve cubits, a third of twenty-two, a fourth of thirty-ſix, and on another of forty cubits, where he thus paſſed thirty-ſeven years of his life.

The extremities of theſe columns were only three feet diameter, with a kind of rail or ledge about, that reached almoſt to the girdle ſomewhat reſembling a pulpit. There was no lying down in it. The faquirs, or devout people of the Eaſt, imitate this extraordinary kind of life to this day.

STYLOBATON, or STYLOBATA, in *Architecture*, the ſame with the PEDESTAL of a column. It is ſometimes taken for the trunk of the pedeſtal, between the cornice and the baſe, and then called *truncus.* It is alſo called by the name of *abacus.*

STYLOCERATOIDES, in *Anatomy*, a name given by Riolanus, and ſome others, to a muſcle, more generally known by the name of STYLOHOIDÆUS.

STYLOIDES, in *Anatomy*, an apophyſis of the os petroſum, thus called from its reſembling a ſtyle, or ſtylet. See *Tab. Anat. (Oſteol.) fig.* 13. *lit. e.*

STYLOGLOSSI, in *Anatomy*, a pair of muſcles, running off ſharp and fleſhy, from the proceſſus ſtyloides, whence deſcending obliquely forwards, they are inſerted into the root of the tongue, and form two portions of its lateral parts.

When either of the *ſtylo-gloſſi* acts, it turns the tongue toward the cheek, and forces the aliment between the upper and lower molares. When they act jointly with the lateral portions of the ſuperior fleſhy plane of the tongue, they turn the tongue obliquely upward to the teeth of the upper jaw, and near the cheeks, as when we bring down any part of the food that may have ſtuck there after maſtication. When they act jointly with the lateral portions of the HYO-GLOSSI, they turn the tongue downward between the lower teeth and the cheek Winſlow.

STYLOHYOIDÆUS, in *Anatomy*, a ſmall fleſhy muſcle, lying obliquely between the apophyſis ſtyloides, and os hyoides.

It is fixed laterally by one extremity to the root, or baſis of the apophyſis ſtyloides, and by the other to the os hyoides, at the place where the baſis and cornu unite, and likewiſe to the cornu itſelf, from whence it has been called *ſtylo-cerato-hyoidæus*. The fleſhy fibres of this extremity are often parted, and encloſe the middle tendon of the digaſtricus.

This muſcle moves the os hyoides upward and backward in a middle direction, between thoſe in which they lie; and they draw it more upward and backward when they act freely. When one acts more than the other, the bone is moved obliquely Winſlow.

Stylohyoidæus *novus*, a name given by Santorini to a ſmall muſcle of the os hyoides, called by Albinus *ſtylohyoidæus alter*, and by Douglas *ſtylochondrohyoidæus*.

STYLOPHARYNGÆI, in *Anatomy*, a pair of muſcles ariſing round and fleſhy from the apophyſis, or epiphyſis ſtyloides, and which in their oblique deſcent along the lateral part of the pharynx, cover and croſs the other muſcles. They extend gradually in breadth as they deſcend, and each forms two principal portions, one ſuperior, which is narrow, and one inferior, which is broad. The narrow portion is ſpread among the muſcular fibres above the thyroide cartilage and the broad portion is inſerted in the ſide of that cartilage; and thus the *ſtylopharyngæus* is partly a true *ſtylo-thyroidæus*. They ſerve to draw the pharynx laterally upward; but the uſe commonly aſſigned to them of dilating the pharynx ſeems conformable neither to their ſituation nor direction. Winſlow.

STYMMATA, formed of ϛυφω, *I thicken*, a word uſed by ſome authors to expreſs the ſtiff ointments. The ancients uſed the word both for the more ſolid and ſtiff ointments, and for the ingredients which gave thoſe ointments that conſiſtence: they alſo called by the ſame name the ſeveral ſweet ingredients which they put into their ointments, to give them a fragrancy, and preſerve them from corruption; ſuch were the powders of ſpikenard, mint, amomum, and the ſeveral ſpices.

STYMPHALIA, ϛυμφαλια, in *Antiquity*, a feſtival at Stymphalus in Arcadia, in honour of Diana, called from that place *Stymphalia*.

STYMPHALIDES *aves*, in *Fabulous Antiquity*, birds of an extraordinary ſize, which, in their flight, are ſaid to obſcure the ſun. They fed only on human fleſh; but Hercules, by the help of Minerva, drove them out of Arcadia by the noiſe of cymbals.

STYPTIC, ϛυπτικον, formed of ϛυφω, *adſtringo*, in *Medicine*, *aſtringent*; a remedy that has the virtue of ſtopping blood, or of binding up the aperture of a wounded veſſel.

The ſervice, nettle, Solomon's ſeal, &c. are *ſtyptics*. There are various *ſtyptic* waters, and powders of great efficacy, in moſt of which vitriol is the principal ingredient.

The uſual *ſtyptic* water is made of colcothar calcined, or vitriol diſſolved with burnt alum, ſugar-candy, the urine of a young man, &c.

Dr. Colbatch's *ſtyptic* powder has been famed; though Mr. Cowper, in the Philoſophical Tranſactions, gives us a number of inſtances, wherein it was applied with very little or ill ſucceſs in human ſubjects; but he gives us others made in dogs, where it anſwered well.

M. Tournefort obſerves, from the analyſis he has made of *ſtyptic* and aſtringent plants, that acids and earths always prevail therein; though ſome of them yield an urinous ſpirit. On this principle he aſſerts, that their ſalt is analogous to alum, and that there is ſomewhat of ſal ammoniac in their texture. But Chomel notes, that this does not hold univerſally.

Styptic *powder of Helvetius*, in *Pharmacy*, a compoſition of alum and dragon's blood. In the Edinburgh Diſpenſatory, two parts of alum are directed to be made into powder with one of the dragon's blood: others uſe equal parts of both. See Med. Eſſ. Edinb. vol. iv. art. 7. This medicine is ſaid to be extremely ſerviceable in uterine hæmorrhages, either to correct the too frequent return of the menſes, or their too great abundance; alſo to ſtop the flooding, to which women with child are ſubject, and to moderate the flow of the lochia. It has alſo been found to have ſurpriſing good effects in the fluor albus.

In violent bleedings it may be given in the quantity of half a dram every half hour, and it ſeldom fails of ſtopping the bleeding before the quantity of three drams, or half an ounce, has been taken.

Heiſter alſo, in his Compendium Medicinæ Practicæ, p. 143, recommends this powder, or alum alone, with a decoction of linſeed, from Helvetius's Traité des Pertes de Sang.

Styptic, *Eaton's*, a medicine famous for curing freſh wounds in a very ſmall time, and immediately ſtopping their bleeding.

The method of curing freſh wounds in a few days without ſuppuration, where neither nerves, large veſſels, bones, nor any of the viſcera are concerned, has been a practice long ago uſed.

The French were a long time very fond of a *ſtyptic* ball, made of the filings of iron and tartar, mixed to a conſiſtence with French brandy, which was afterwards publiſhed by Helvetius, and from him has been generally known by the name of Helvetius's *ſtyptic* This was extolled with us as one of the greateſt medicines in the world for the cure of wounds, bruiſes, and external injuries of all ſorts; but the author never ſaid ſo much about it; he only modeſtly introduced it into the world as an uſeful thing for a firſt dreſſing of freſh wounds with people who lived too far off for the immediate aſſiſtance of a ſurgeon; and he mentions ſeveral caſes in which it ought not to be uſed. In fine, he publiſhed it as a good medicine under proper reſtrictions; but we made it an univerſal one. The only univerſal remedy of this kind, that we have had recommended by the author, as ſuch, is the famous *ſtyptic* of Dr. Eaton, which the inventor ſays is good to ſtop all manner of bleeding both without and within, without any manner of exception.

Sir Richard Blackmore ſoon after the publication of this great ſecret, wrote a treatiſe on conſumptions, in which he highly extols this *ſtyptic* of Dr Eaton, declaring poſitively, that it will be of more ſervice to the world than all the diſcoveries that had been made before it. On this Dr. Sprengel, who had before examined Eaton's *ſtyptic*, and judged it to be no other than that of Helvetius; which, after having been tried and diſcarded in France, Germany, and Holland, had been ſet on foot as an univerſal medicine here, thought it worthy a more ſtrict and public examination, and ordering an apothecary of credit to prepare ſome of Helvetius's *ſtyptic* in the common way, he produced, before a judicious audience, a bottle of that, and another of *Eaton's ſtyptic*; and giving them both the ſame trial, they both anſwered in the ſame manner, and proved, beyond all poſſibility of doubt, that they were in effect the ſame medicine.

Upon the whole, the virtues of theſe *ſtyptics* externally are too trifling to be truſted to, and internally too precarious to meddle with, without the greateſt caution. Philoſ. Tranſ. Nº 383, p. 110.

STYRAX, ϛυραξ, in *Botany*. See Storax.

STYX, in *Mythology*, a river of HELL, or ADES, over which was the paſſage called the hateful paſſage, from the previous region or ſuburbs of the realms of death into Erebus.

It is repreſented as a torrent, pouring down a precipice, and then as rolling on, to take its courſe along the boundaries of Ades. On the hither ſide, the ghoſts or ſouls of the departed are waiting in a croud, as Virgil (Æn. vi. ver. 306.) has deſcribed them; and Erebus commences with the bank on the other ſide the river. The ſole governor of this part, and director of the paſſage, is Charon, whoſe dominion lies where the river has recovered itſelf from the turbulence occaſioned by its fall, and begins to become navigable, and who is repreſented with his boat, both receiving paſſengers, and landing them on the farther ſhore. Virgil (Æn. vi. ver. 304.) deſcribes him as ſtrong, and in all the vigour and firmneſs of old age, meanly clad, and with a large rude beard, and matted grey hair, and his eyes fixed and fiery. He is repreſented as carrying over the ſouls of the departed, one freight after another, according to his own pleaſure.

SUB, a Latin prepoſition, ſignifying *under* or *below*; frequently uſed in compoſition, in our language. E. gr.

SUB-BRIGADIER, an officer in the horſe-guards, who ranks as cornet. See Brigadier.

SUB-CHANTOR, an officer in the choir, who officiates in the abſence of the CHANTOR, &c.

SUB-DEAN, a dignity in certain chapters beneath the DEAN.

SUB-PRIOR, a clauſtral officer, who aſſiſts the PRIOR, &c.

SUB-DEACON, an inferior miniſter, who anciently attended at the altar, prepared the ſacred veſſels, delivered them to the deacons in time of divine ſervice, attended the doors of the church during communion-ſervice, went on the biſhop's embaſſies with his letters or meſſages to foreign churches, and was inveſted with the firſt of the holy orders.

They were ſo ſubordinate to the ſuperior rulers of the church, that, by a canon of the council of Laodicea, they were forbidden to ſit in the preſence of a deacon without his leave. See DEACON.

According to the canons, a perſon muſt be twenty-two years of age to be promoted to the order of *ſubdeacon*.

It is diſputed among the Romaniſts, whether the ſubdeaconhood be a ſacrament or not; in regard *ſubdeacons* are ordained without impoſition of hands, and that there is no mention made of them in Scripture. Yet Bellarmin holds the affirmative ſide of the queſtion.

By the papal canons, a married man may be ordained *ſubdeacon*, upon condition his wiſe conſent to it, make a vow of continence, and ſhut herſelf up in a monaſtery.

SUBALTERN, formed from *ſub* and *alter*, *another*, an inferior officer, or one who diſcharges his poſt under the command, and ſubject to the direction of another.

Such are lieutenants, ſub-lieutenants, cornets, and enſigns, who ſerve under the captain.

We alſo ſay, *ſubaltern* courts, juriſdictions, &c. Such are thoſe of inferior lords, with regard to the lord paramount; hundred-courts with regard to county-courts, &c.

For the *ſubaltern* perſons in an epic poem, F. Boſſu obſerves, there is no neceſſity to be very ſtrict in preſerving every one's character.

The patriarchs, M. St Evremont tells us, had ſeveral wives, who did not all hold the ſame rank; but there were ſeveral *ſubaltern* to the principal wiſe.

SUBALTERN *genus*. See GENUS.

SUBARMALE, among the *Romans*, a coarſe and thick kind of caſſock worn by the ſoldiers under their arms, in order to keep them from being hurt with their weight.

SUBBUTEO, in *Ornithology*, the name of a bird of the hawk kind, called in Engliſh the RINGTAIL: the male of which has been ſuppoſed to be the HEN-HARRIER. Some authors give it the name of *pygargus accipiter*. See HOBBY.

SUBCLAVIAN, SUBCLAVIUS, is applied to any thing under the arm-pit, or ſhoulder, whether artery, nerve, vein, or muſcle.

The two *ſubclavian arteries* are named from their ſituation near the clavicles; they ariſe from the arch of the aorta, on each ſide of the left carotid, which commonly lies in the middle between them. Theſe arteries terminate, or rather change their name, above the middle of the two firſt ribs, between the anterior inſertions of the muſculi ſcaleni.

The *ſubclavian* veins are two branches of the *vena* CAVA, *ſuperior* and *aſcendens*, ſo called becauſe they lie behind, and in ſome meaſure under the clavicles. They are of unequal lengths, becauſe the trunk of the vena cava does not lie in the middle of the thorax, but toward the right ſide, where the left *ſubclavian* ariſes as well as the right, and is conſequently longeſt.

The two *ſubclaviæ* run laterally or toward each ſide, and terminate as they go out of the thorax, between the firſt rib and clavicula, immediately before the anterior inſertion of the muſcular ſcalenus. The right *ſubclavian* ſends out four capital branches, viz. the *jugularis externa*, *jugularis interna*, *vertebralis*, and *axillaris*. The left *ſubclavian* covers the origin of three large arteries, which come from the curvature of the aorta, and ſends off four large branches, beſides the ſmall pectoral veins, and receives the ductus thoracicus.

Each *ſubclavian* vein, near the middle of the clavicula, ſends off a branch called *cephalica*. See CEPHALIC *vein*. Winſlow.

SUBCLAVIUS denotes a muſcle which ariſes from the lower ſide of the clavicula, near the acromium, and deſcends obliquely to be inſerted into the upper part of the firſt rib, near the *ſternum*. See *Tab. Anat.* (*Myol.*) *fig.* 2. *n.* 9.

It is fixed by one end in all the middle lower portion of the clavicle, at the diſtance of about an inch from each extremity; and by the other in the cartilage, and a ſmall part of the bone of the firſt rib. It ſeems likewiſe to adhere to the extremity of the clavicle, next the ſternum, by a kind of broad thin ligament.

The *ſubclavius* is a proper depreſſor of the clavicula; and an aſſiſtant depreſſor of the acromium, or of the ſhoulder in general, together with the pectoralis minor, rhomboides, and angularis; all which, in their turns, aſſiſt the *ſubclavius* in its action on the clavicula. Winſlow.

SUBCONTRARY *poſition*, in *Geometry*, is when two ſimilar triangles are ſo placed, as to have one common angle, O (*Tab.* V. *Geom. fig.* 124.), at their vertex, and yet their baſes not parallel.

If the ſcalenous cone ABLCK be ſo cut by the plane DIEH, as that the angle at $E = B$, the cone is then ſaid to be cut *ſubcontrarily* to its baſe BC: and in this caſe the ſection DIEH will be a circle.

For, through the vertex A and centre of the baſe, let the triangular ſection ABC be taken, ſo as to be at right angles to the planes of the baſe BKCL of the *ſubcontrary* ſection DIEH, and of the ſection FIGH taken parallel to the baſe, and cutting the *ſubcontrary* ſection in the line IOH: conſequently IOH is perpendicular to DE and FG, interſecting one another in O. The ſection FIGH, parallel to the baſe of the cone, is a circle; therefore $FO \times OG = OI^2$: and the triangles GOE and FOD having $GEO = ABC = DFO$, and $GOE = DOF$, are ſimilar; therefore $EO : OG :: FD : DO$, and $EO \times DO = FO \times OG = OI^2$; conſequently OI is a mean proportional, either between FO and OG, or DO and EO: and as the ſame would happen wherever FG cuts DE, all the lines OI, both in the ſections FIGH, and DIEH, are lines in a circle; conſequently the ſection DIEH is a circle.

SUBCOSTAL *muſcles*, in *Anatomy*, are fleſhy planes of different breadths, and very thin, ſituated more or leſs obliquely on the inſide of the ribs near their bony angles, and running in the ſame direction with the external INTERCOSTALS. They are fixed by both extremities in the ribs, the inferior extremity being always at a greater diſtance from the vertebræ than the ſuperior, and ſeveral ribs lying between the two inſertions. Theſe muſcles are more ſenſible in the lower ribs than in the upper, and they adhere cloſely to the ribs that lie between their inſertions. Winſlow. For their uſe ſee STERNOCOSTALES.

SUBCUTANEUS, in *Anatomy*, a thin membranous muſcle, running under the ſkin, called alſo QUADRATUS *genæ*, and *platyſma myoides*.

A convulſion herein is called a *ſpaſmus cynicus*. See CYNIC.

In ſome perſons it reaches to the ears, and in others not; which is the reaſon ſome folks have a faculty of moving their ears, which others want.

SUB-DOMINANTE, in *Muſic*, is a name given by M. Rameau to the fourth note of the tone, becauſe the dominant is immediately above it, or rather becauſe it has the ſame interval of the tonic in deſcending, as the dominant has in aſcending.

SUBDUCTION, in *Arithmetic*, the ſame as SUBTRACTION.

SUBDUPLE *ratio*, is when any number or quantity is contained in another, twice. Thus 3 is ſaid to be *ſubduple* of 6, as 6 is duple of 3. See RATIO.

SUBDUPLICATE *ratio* of any two quantities, is the RATIO of their ſquare roots.

SUBER, in *Botany*. See CORK and OAK.

SUBER *montanum*. See CORK *foſſil*.

SUBETH, the word uſed by the Arabian writers to expreſs a carus.

SUBETH *ſabala*, a term uſed by the Arabian writers to expreſs a coma vigil.

SUBFRONTALIS *ſutura*, a name given by ſome anatomical writers to the ſuture, by which the os frontis is connected with the bones of the ſuperior jaw.

SUBJECT, SUBDITUS, a perſon under the rule and dominion of a ſovereign prince or ſtate.

Of *ſubjects*, ſome are ſo by birth, others become ſo by acts of naturalization.

Anciently the lords called, abuſively, thoſe who held lands or fees of them, or owed them any homage, their *ſubjects*.

SUBJECT, SUBJECTUM, is alſo uſed for the matter of an art or ſcience, or that which it conſiders, or whereon it is employed. Thus the human body is a *ſubject* of medicine.

In this ſenſe, anatomiſts call the body they are diſſecting, and whereon they read lectures, their *ſubject*.

The *ſubject* of logic is thinking, or reaſoning; but more particularly in a ſyllogiſm, one of the terms of a propoſition is called the *ſubject*, and the other the *attribute*.

In poetry, the *ſubject* is the matter treated of, or the event related, or ſet to view, and enriched with ornaments.

SUBJECT alſo denotes the ſubſtance or matter to which an accident is added.

It is a maxim, that two contraries can never ſubſiſt in the ſame *ſubject*.

Subject, in the *Manege*. To keep a horſe *ſubject*, is an expreſſion relating to volts; ſignifying, to keep the croupe of the horſe in the round, ſo that it may not ſlip out; that he may not traverſe, and that he may work in the manege, croupe in, marking his equal times, without loſing his ground.

Subject, in *Muſic*. See Sogetto.

SUBJECTION, *ſubjectio*, in *Rhetoric*. See Hypobole.

Subjection, *civil*, in *Law*. See Civil *ſubjection*.

SUBJECTIVE *part*. See Part.

SUBINFEUDATION, in *Law*, was where the inferior lords, in imitation of their ſuperiors, began to carve out and grant to others minuter eſtates than their own, to be held of themſelves, and were ſo proceeding downwards *in infinitum*, till the ſuperior lords obſerved, that by this method of *ſubinfeudation* they loſt all their feodal profits of wardſhips, marriages, and eſtreats, which fell into the hands of theſe meſne or middle lords, who were the immediate ſuperiors of the terre-tenant, or him who occupied the land. This occaſioned the ſtatute of quia *emptores*. Bl. Com. vol. ii. p. 91.

SUBJUNCTIVE, in *Grammar*, the fourth mood, or manner of conjugating verbs; thus called, becauſe uſually ſubjoined to ſome other verb, or at leaſt to ſome other particle, as, *if I loved: though this were true*, &c.

The Greek is almoſt the only language that properly has any *ſubjunctive* mood; though the French, Spaniſh and Italian, have ſome ſhew thereof. In all other languages the ſame inflections ſerve for the optative and the *ſubjunctive* moods: for which reaſon the *ſubjunctive* mood might be retrenched from the Latin, and thoſe other grammars; it not being the different ways of ſignifying, which may be very much multiplied, but the different inflections, that conſtitute the different moods. See Mood.

SUBINTRANTES *febres*, a term uſed by ſome medical writers to expreſs thoſe fevers in which one fit begins before the other is perfectly worn off.

SUBITO, in the *Italian Muſic*, is uſed to ſignify that a thing is to be performed quickly and haſtily: thus we meet with *volti ſubito*, turn over the leaf quickly.

SUBLAPSARY, or *Infralapſary*, in *Theology*, a term applied to ſuch as hold that God, having foreſeen and permitted the fall of Adam, and, in conſequence thereof, the loſs of mankind, reſolved to give a grace ſufficient for ſalvation to ſome, and to refuſe it to others.

Sublapſarian is uſed as ſynonymous with infralapsarian, in oppoſition to supralapsarian.

SUBLIMABLE *bodies*, a term uſed by ſome of our chemical writers to expreſs ſuch ſubſtances as are capable of *ſublimation* in a dry form.

SUBLIMATE, a chemical preparation, the baſis whereof is mercury or quickſilver.

In making corroſive *ſublimate*, the quickſilver is extinguiſhed by trituration in calcined vitriol. But M. Lemery obſerves, that bole armenic and potters clay are cheaper, and extinguiſh the mercury ſooner.

It has been ſaid, that to try whether *ſublimate* has been ſophiſticated with arſenic or not, it was to be rubbed with ſalt, or oil of tartar; and that if ſophiſticated, it would turn black. But M. Lemery agrees with Barchuſen and Boulduc, that this is no trial; for the ſalt of tartar has the ſame effect on the good and the bad *ſublimate*. Mem. de l'Acad. des Scien. 1704. See Mercury.

Liver of ſulphur is known to be an excellent antidote againſt the poiſonous effects of corroſive *ſublimate*, &c. See Liver *of Sulphur* and Poison.

Sublimate, *blue*, a preparation of mercury with ſome other ingredients, yielding a fine blue for painting. The method of making it is this: take quickſilver, two parts; flower of brimſtone, three parts; ſalammoniac, eight parts; grind theſe upon a porphyry, and, with the quickſilver, put them into a long-necked glaſs veſſel, luted at bottom; place it in a ſand-heat, and when the moiſture is aſcended, you will have a fine *blue ſublimate* for painting. Neri's Art of Glaſs, p. 164.

Sublimate, *refining gold by*. See Refining.

SUBLIMATION, Sublimatio, in *Chemiſtry*, an operation by which volatile and ſolid ſubſtances are collected and obtained, and differs little from diſtillation, excepting that, in diſtillation, only the fluid parts of bodies are raiſed; but, in *ſublimation*, the ſolid and dry; and that the matter to be diſtilled may be either ſolid or fluid; but *ſublimation* is concerned only about ſolid ſubſtances.

There is alſo another difference, namely, that rarefaction, which is of very great uſe in diſtillation, has hardly any room in *ſublimation*; for the ſubſtances which are to be ſublimed, being ſolid, are incapable of rarefaction, and ſo it is only impulſe that can raiſe them.

However, it may not be improper to enquire a little more nicely into the reaſon of ſuch a diverſity in the elevation of bodies; why ſome do aſcend with a gentle heat, and others are not to be raiſed by the moſt vehement fire; and ſuch an inquiry will more properly come in here, becauſe this head contains all the buſineſs of volatility and fixation.

The cauſe of this elevation and aſcent, in the particles of bodies, is to be aſcribed to the fire, not only on account of impulſe, but of another property the fire has, namely, to inſinuate itſelf into all the interſtices of theſe bodies, and thereby break the coheſion of their parts, ſo that at laſt they become divided into very ſmall parts, if not into the ſmalleſt that art can reduce them into.

Particles, thus ſeparated and divided, loſe much of their gravity. For the gravity of the ſame particle decreaſes in the ſame proportion as the cube of the diameter is leſſened. Suppoſe, therefore a body, whoſe diameter is 12; if, then, its diameter be made leſs by 1, viz. 11, the gravity of that body will be only $9\frac{1}{4}$, or thereabouts; a body, therefore, by being divided into very minute corpuſcles, becomes eaſy to be ſublimed.

Add, that the ſurface of a body decreaſes in a very different manner from gravity, only as the ſquare of the diameter is leſſened. Where the gravity decreaſes, in ſuch a ſeries, as is expreſſed by the numbers 1728, 1331, 1000, the diminution of the ſurface will obſerve this proportion; viz. 144, 121, 100; and when, upon reducing the diameter to 6, the gravity becomes leſs than 2, the ſurface will ſtill amount to 36.

How much this contributes to a quick aſcent, will appear from the *ſublimation* of camphor, benzoin, and arſenic; whoſe particles, as they cohere but looſely, are, for that reaſon, diffuſed into a larger ſurface; upon which account they are the eaſieſt to be ſublimed of any: nay, theſe ſolid particles, upon account of their ſurface, will ſooner aſcend than many fluids.

So flower of ſulphur riſes ſooner than oil, not only than that of vitriol, but any other, though ever ſo light.

By this contrivance of nature, viz. that the gravity of bodies decreaſes in a triplicate, but their ſurface in a duplicate proportion of their diameters, it comes to paſs that bodies, which have a very different gravity, may be raiſed with the ſame force. Thus the ſalts of animals, as of hartſhorn, human blood, that of vipers, &c. being compoſed of very minute corpuſcles, as is found by experience, in diſtilling them, do eaſily aſcend, becauſe the ſurface in them is not leſſened ſo much as gravity is; and the ſalts of vegetables, as of tartar, balſams, &c. which are of a more cloſe texture, by reaſon of their larger ſurfaces, are alſo without much difficulty raiſed.

The corpuſcles alſo of minerals and metals, though very compact and heavy, do, in ſome meaſure, give way to the fire, and are capable of being ſublimed. In all theſe inſtances, the breadth of the ſurface, which expoſes the particles more to the impetus of the fire, is the reaſon why they are raiſed with as much eaſe as if their gravity had been leſſened by diminiſhing their ſurface; ſo that particles, though ever ſo different in weight, may be equally raiſed by the ſame degree of heat, if the proportion of their gravity be reciprocal to that of their ſurfaces.

Sublimation is employed to ſeparate volatile ſubſtances from others which are fixed or leſs volatile, to combine two volatile matters, as in the operation of the ſublimates of mercury, and to collect ſome volatile ſubſtances, as ſedative ſalt, ſulphur, and all the preparations called flowers.

The apparatus for *ſublimation* is very ſimple. A matraſs or ſmall alembic is generally ſufficient for the *ſublimation* of ſmall quantities of matter. But the veſſels, and the method of managing the fire, vary according to the nature of the matters that are to be ſublimed, and according to the form which the ſublimate is to receive. When the matters to be ſublimed are volatile, a high cucurbit, to which is adapted a capital, and even ſeveral capitals placed one upon another, are to be employed. The *ſublimation* is performed in a ſand-bath, with only the preciſe degree of heat requiſite to raiſe the ſubſtance which is to be ſublimed, and the capitals are to be guarded as much as poſſible from heat.

When along with the dry matter, which is to be collected in theſe *ſublimations*, a certain quantity of ſome liquor is raiſed, as in the *ſublimation* of ſedative ſalt, and rectification of volatile concrete alkalis, a paſſage and a receiver for theſe liquors muſt be provided, which is conveniently done by uſing the ordinary capital of the alembic, furniſhed with a beak and a receiver.

Some ſublimates are required to be in as ſolid and compact maſſes as their nature will allow, as camphor, ſal ammoniac, and all the ſublimates of mercury. The moſt proper veſſels for theſe *ſublimations* are bottles or matraſſes, which are to be ſunk more or leſs deeply in ſand, according to the volatility and gravity of the matters that are to be ſublimed. The art of conducting theſe *ſublimations* conſiſts in applying ſuch a degree of heat, or in ſo diſpoſing the ſand (i. e. making it cover more or leſs of the matraſs) that the heat in the upper part of the matraſs ſhall be ſufficient to make the ſublimate adhere to the glaſs, and to give it ſuch a degree of fuſion as is neceſſary to render it compact, but not a heat ſo great as to force the ſublimate through the neck of the matraſs and diſſipate it.

Many ſubſtances may be reduced into flowers and ſublimed, which cannot be ſublimed in cloſe veſſels, but require a very great heat, with the acceſs of free air, and even the contact of coals; ſuch are moſt ſoots or flowers of metals, and even ſome ſaline ſubſtances. The matters from which theſe ſublimates are ſeparated, muſt be placed among burning coals in open air, and the flowers are collected in the chimney of the furnace in which the operation is performed. This proceſs is called *ſublimation* in the manner of Geber. Of this kind of ſublimates are the tutty, calamine, or pompholix, gathered in the tops of furnaces in which ores are ſmelted. Dict. Chem. Eng. edit. art. *Sublimation.*

SUBLIME, in *Diſcourſe*, ſomething extraordinary and ſurſurpriſing, which ſtrikes the ſoul, and makes a ſentiment or compoſition raviſh and tranſport.

This is what Longinus, who has written expreſsly on the ſubject, means by *ſublime*. The definition, indeed, is not his, but M. Boileau's; for the author, writing his book after another of Cecilius on the ſame ſubject, and employing himſelf almoſt wholly in ſhewing what the *ſublime* is, declined defining it, as ſuppoſing it well known.

By the definition, it may appear, that the *ſublime* is a very different thing from what the orators call the *ſublime* STYLE.

SUBLIME *geometry*. See GEOMETRY.

SUBLIMING *pots*. See ALUDELS.

SUBLIMIS, in *Anatomy*, a name given by Albinus, Hunaud, and others, to the muſcle of the wriſt, called by others the PERFORATUS.

SUBLINGUAL *artery*, is the ſecond branch from the external carotid; it ariſes a little above the ſuperior guttural artery, runs forwards, upwards, and over the cornu of the os hyoides, and ſinks into the tongue, in order to ſupply all the adjacent muſcles. It is alſo called the ranine artery.

SUBLINGUAL *glands*, in *Anatomy*, two glands under the tongue, placed one on each ſide thereof.

They are of the ſame kind with the MAXILLARY *glands*, only ſmaller, ſomewhat oblong, and flatted like a blanched almond. They are ſituated under the anterior portion of the tongue, one on each ſide, near the lower jaw, on the lateral portions of the muſculi mylo-hyoidæi, which ſuſtain them. The two extremities of each gland are turned backward and forward, and the edges obliquely inward and outward. They are covered on the upper ſide by a very thin membrane, which is a continuation of the membrane that covers the under ſide of the tongue: they ſend out laterally ſeveral ſmall ſhort ducts, which open near the gums by the ſame number of orifices, all ranked in the ſame line, at a ſmall diſtance from the frænum, and a little more backwards. Winſlow.

Theſe, called alſo *hypoglottides*, filtrate a ſerous humour of the nature of ſaliva, which they diſcharge by little ducts near the gums into the mouth.

SUBLINGUAL *veins*. See RANULARES.

SUBLINGUALIA, a term uſed by ſome authors to expreſs ſuch medicines as were intended to be laid under the tongue, and gradually diſſolve there.

Theſe have been principally intended either to cure coughs, or give a ſweet ſcent to the breath.

SUBLUXATION, in *Surgery*, is applied to a bone that is not quite out of its ſocket, but reſts upon the brim.

SUB-MARSHAL, an officer in the Marſhalſea, who is deputy to the chief marſhal of the king's houſe, commonly called the *knight-marſhal*, and hath the cuſtody of the priſoners there. He is otherwiſe termed *under-marſhal.* Crompt. Juriſ. 104.

SUBMARINE *navigation*. See *Submarine* NAVIGATION.

SUBMERSION, *ſubmerſio*. See DROWNING.

SUBMISSIO, a word uſed by medical writers to expreſs a remiſſion.

Sometimes it imports the ſame as *ſyſtole* with reſpect to the arteries, that is, their contraction.

SUBMULTIPLE, in *Geometry*, &c. A *ſubmultiple* number, or quantity, is that which is contained a certain number of times in another, and which, therefore, repeated a certain number of times, becomes exactly equal thereto.

Thus 3 is a *ſubmultiple* of 21. In which ſenſe a *ſubmultiple* coincides with an ALIQUOT part.

SUBMULTIPLE *ratio*, is that between the quantity contained, and the quantity containing. Thus the ratio of 3 to 21 is *ſubmultiple*.

In both caſes *ſubmultiple* is the reverſe of MULTIPLE: 21, e. gr. being a multiple of 3, and the ratio of 21 to 3 a multiple ratio.

SUBMULTIPLE *ſubſuperparticular.* }
SUBMULTIPLE *ſubſuperbipartiens.* } See RATIO.

SUBNORMAL, or *ſub-perpendicular*, in *Geometry*, a line which determines the point in the axis of a curve, where a normal or perpendicular, raiſed from the point of contact of a tangent to the curve, cuts the axis.

Or, the *ſubnormal* is a line, which determines the point wherein the axis is cut by a line falling perpendicularly on the tangent in the point of contact.

Thus T M (*Tab. Conics, fig.* 19.) being a tangent to a curve in M; and M R a normal or perpendicular to the tangent; the line P R intercepted between the ſemiordinate P M and the normal M R, is called the *ſubnormal.*

Hence, 1. In a parabola, as A M, &c. the *ſubnormal* P R is to the ſemiordinate P M, as P M is to P T, and as M R to T M.

2. In the parabola, the *ſubnormal* P R is ſubduple the parameter; and conſequently it is an invariable quantity: for $PR = \frac{PM^2}{PT} = \frac{PM^2}{2AP} =$ (calling the parameter p) $\frac{p \times AP}{2AP} = \frac{p}{2}$. In general, the *ſubnormal* may be found by dividing the ſquare of the ſemiordinate by the SUBTANGENT.

SUBORDINATED, and **SUBORDINATING** *affections*. See AFFECTIONS.

SUBORDINATION, a relative term, expreſſing the degree of inferiority between one thing and another.

There is a ſeries of *ſubordinations* running throughout all nature. In the church there are ſeveral degrees of *ſubordination*, as of deacons to prieſts, prieſts to prelates, &c. The like are obſervable in the ſecular ſtate, in offices of war, juſtice, &c. And, even

In the ſciences, trigonometry is *ſubordinate* to geometry: and in the virtues, abſtinence and chaſtity are *ſubordinate* to temperance: in muſic, ſome call the plagal tones, *ſubordinate tones*.

SUBORNATIO. See RAPE and RAVISHMENT.

SUBORNATION, SUBORNATIO, a ſecret or underhand preparing, inſtructing, or bringing in a falſe witneſs; or corrupting or alluring a perſon to do ſuch a falſe act. Hence, the *ſubornation* of perjury, mentioned in the act of general pardon, 12 Car. II. cap. 8. is the alluring or diſpoſing to PERJURY.

SUBPERPENDICULAR. See SUBNORMAL.

SUBPŒNA, in *Law*, a writ, whereby any perſon, under the degree of peerage, is called to appear in chancery, in caſes where the common law hath made no proviſion. See SUIT.

The name is taken from the words in the writ, which charge the party ſummoned to appear at the day and place aſſigned, *ſub pœna centum librarum*, on the penalty of a hundred pounds.

The peers, in the like caſes, are called by the lord chancellor's letter, giving notice of the ſuit intended againſt them, and requiring them to appear.

The writ of *ſubpœna*, returnable into the court of chancery only, was deviſed by John Waltham, biſhop of Saliſbury, and chancellor to king Richard II. by a ſtrained interpretation of the ſtat. Weſtm. 2. in order to make the feoffee to uſes accountable to his *ceſtuy que uſe*; which proceſs was afterwards extended to other matters wholly determinable at the common law, upon falſe and fictitious ſuggeſtions; for which, therefore, the chancellor himſelf is, by 7 R. II. cap. 6. directed to give damages to the parties unjuſtly aggrieved. In the reigns of Henry IV. and V. the commons were repeatedly urgent to have the writ of *ſubpœna* entirely ſuppreſſed, as a novelty deviſed by the ſubtlety of chancellor Waltham, againſt the form of the common law; but though Henry IV. gave a palliating anſwer to their petitions, and actually paſſed the ſtat. 4 Hen. IV. cap. 23. whereby judgments at law are declared irrevocable, unleſs by attaint or writ of error, yet his ſon put a negative at once upon their whole proceeding; and, in Edward IV's time, the proceſs by bill and *ſubpœna* was become the daily practice of the court. Bl. Com. book iii. p. 52.

There is alſo a *ſubpœna ad teſtificandum*, for ſummoning of witneſſes in other courts, as well as in chancery. See EVIDENCE.

The *ſubpœna duces tecum*, is a writ of proceſs of the ſame kind with the preceding, including a cauſe of requiſition, for the witneſs to bring and produce books and papers, &

&c. in his hands, belonging to the parties, or ſuch wherein they are intereſted.

There is alſo a *ſubpœna* in the exchequer, as well in the court of equity there, as in the office of pleas.

SUBPOPLITÆUS, in *Anatomy*. See Poplitæus.

SUBREPTION, Subreptio, formed from *ſub*, *under*, and *repo*, *I creep*, the act of obtaining a favour from a ſuperior by ſurprize, or a falſe repreſentation.

Subreption differs from *obreption*, in that the latter denotes a falſe expreſſion of the quality of a thing, or fact, &c. And *ſubreption*, a want of expreſſion, or a fraudulent reticency or concealment of a thing, which would have rendered the obtaining of the favour more difficult. See Obreptitious.

SUBREPTITIOUS, or Surreptiticus, a term applied to a letter, licence, patent, or other act, fraudulently obtained of a ſuperior, by concealing ſome truth, which, had it been known, would have prevented the conceſſion or grant.

The benefit of letters, licences, &c. is forfeited, when they are found contrary to the information given; they being then reputed *ſubreptitious*.

Papal bulls and ſignatures are null and *ſubreptitious*, when the true ſtate of the benefice, the manner of the vacancy, and other neceſſary matters, are not juſtly and properly ſignified to the pope.

SUBPRINCIPALIS, in ſome Latin writers of *Muſic*, is uſed for the note or chord called by the Greeks *παρυπάτην*, *par-hypate*.

SUBPURGATION, *ſubpurgatio*, a word uſed by ſome writers to expreſs a gentle purgation.

SUBROGATION, or Surrogation, in the *Civil Law*, the act of ſubſtituting a perſon in the place, and intitling him to the rights of another.

In its general ſenſe, *ſubrogation* implies a ſucceſſion of any kind, whether of a perſon to a perſon, or of a perſon to a thing.

There are two kinds of *ſubrogation*; the one *conventional*, the other *legal*.

Subrogation, *conventional*, is a contract whereby a creditor transfers his debt, with all appurtenances thereof, to the profit of a third perſon.

Subrogation, *legal*, is that which the law makes in favour of a perſon, who diſcharges an antecedent creditor; in which caſe there is a legal tranſlation of all rights of the ancient creditor to the perſon of the new one.

This the civilians more uſually call *ſucceſſion*, as being wholly the work of the law; and to diſtinguiſh it from the conventional *ſubrogation*, which they alſo call *ceſſion*. The verb is formed from the Latin, *ſubrogatio*, of the verb *rogare*, which, among the ancient Romans, ſignified to *aſk*, to *interrogate*; whence it was that they called the laws themſelves *rogationes*, in regard the people made them, upon being aſked by the magiſtrates.

And, as laws made by the people could not be changed without their conſent, and without being aſked anew; if they thought good to have the law wholly aboliſhed, *lex abrogabatur*; if only a part of it were to be aboliſhed, *lex derogabatur*; and if any clauſe or amendment were added to it, *lex ſubrogabatur*.

The new magiſtrates were alſo *ſubrogated* in the place of the old ones; for, during the time of the republic, no magiſtrate could be, but by conſent of the people, nor of conſequence but by law, ſince whatever the people thought good was law.

This is what occaſioned Salmaſius to ſay, that *ſubrogare* and *ſubſtituere per legem*, were reciprocals.

SUBSCAPULARIS, in *Anatomy*, a muſcle ariſing from the baſis and ſide of the ſcapula; and ſpreading itſelf under the whole convex or under ſide of it, being of the ſame breadth and length with it, is inſerted by a ſemicircular tendon, into the neck of the os humeri. See *Tab. Anat.* (*Myol.*) *fig.* 1. *n.* 16.

It is thick, and made up of ſeveral penniform portions, nearly in the ſame manner with the deltoides. It is fixed in the internal labium of the whole baſis, and in almoſt the whole internal ſurface of the ſcapula; its fleſhy portions lying in the intervals between the bony lines, when theſe are found. Near the neck they leave the bone, and form a very broad tendon, which is inſerted in the ſurface of the ſmall tuberoſity of the head of the os humeri, cloſe by the bony channel. The lower edge of this tendon probably ſends off the ligamentary frænum, mentioned in the deſcriptions of the latiſſimus dorſi, teres major, and coracho-brachialis. This muſcle covers immediately the ſerratus major, being in a manner encloſed between it and the ſcapula: the upper edge of its tendon is joined to the lower edge of that of the ſupra-ſpinatus, except at the upper part of the bony channel, where they give paſſage to one tendon of the biceps. It likewiſe adheres to the capſular ligament. The tendons of the ſupra-ſpinatus, infra-ſpinatus, teres minor, and *ſubſcapularis*, being all joined by their edges, form a ſort of cap, which covers the upper part of the head of the os humeri.

The uſe commonly aſcribed to the *ſubſcapularis* of preſſing the arm againſt the ribs, from which it has the name of *porte-feuille* in French, is without foundation. When the arm hangs down in its natural ſituation, this muſcle may turn it round its axis from without forwards, as it happens when in this ſituation we beat the breaſt with the fore arm bent; and it likewiſe ſtrongly aſſiſts the latiſſimus dorſi, when we turn the hand behind the back. When the arm being raiſed, we move it backward, as in giving a back ſtroke with the elbow or fiſt, the *ſubſcapularis* hinders the head of the os humeri from being luxated forwards, for which purpoſe it is well fitted both by its ſtructure and the number of its fibres, this motion being ſometimes performed with great violence. It may likewiſe, by means of the nearneſs and lateral union of its tendon with that of the *ſupra-ſpinatus*, aſſiſt that muſcle in keeping the head of the os humeri in the glenoide cavity, when the other extremity of the bone is raiſed. Winſlow.

SUBSCRIPTION, the ſignature put at the bottom of a letter, writing, or inſtrument.

In church hiſtory we meet with inſtances of *ſubſcriptions* written with the blood of Jeſus Chriſt. Nicetas, in the life of Ignatius, ſpeaking of the *ſubſcriptions* made at the council, wherein that patriarch was depoſed, ſays, they *ſubſcribed*, not with common ink, but, what ſtrikes a man with horror, with a pen dipped in the blood of Chriſt. The hiſtorian Theophanes tells us, that pope Theodore mixed the blood of Chriſt with ink, wherein he wrote the depoſition of Pyrrhus.

Subscription, in the *Engliſh Commerce*, is uſed for the ſhare or intereſt which particular perſons take in a public ſtock, or a trading company, by writing their names, and the ſhares they require, in the books or regiſters thereof.

The French have likewiſe adopted the word *ſubſcription*, uſing it in ſpeaking of the actions of their India company.

A *ſubſcription* differs from an *action*, in that the firſt is properly only an action begun, or an engagement, by making the firſt payment to acquit the reſt in the time limited; and that the other is the whole action, performed in all its parts.

Subscription, in the *Commerce of Books*, ſignifies an engagement to take a certain number of copies of a book going to be printed; and a reciprocal obligation of the bookſeller or publiſher, to deliver the ſaid copies on certain terms. The uſual conditions of theſe *ſubſcriptions* are, on the part of the bookſeller, to afford the books cheaper to a ſubſcriber than to another, by one third or one fourth of the price; and on the part of the latter, to advance half the money in hand, and to pay the reſt on the delivery of the copies; an agreement equally advantageous to the one and the other, as the bookſeller is hereby furniſhed with money to carry on works which would otherwiſe be above his ſtock; and the ſubſcriber receives, as it were, intereſt for his money, by the moderate price the book ſtands him in.

Subſcriptions had their riſe in England, and it is but very lately that they are got into other countries. They were firſt ſet on foot in the middle of the laſt century, for the printing of Walton's Polyglot Bibles, which is the firſt book ever printed by way of *ſubſcription*.

From England they paſſed a few years ago into Holland, and they have been ſince introduced into France.

In England they are become exceedingly frequent; and their frequency has rendered them liable to ſome abuſes, which begin to diſcredit them.

Subscription *of witneſſes*, in *Law*. A will of lands muſt, by ſtat. 29 Car. II. cap. 3. § 5. be atteſted or ſubſcribed by three credible witneſſes at leaſt; but for other conveyances, the actual *ſubſcription* of the witneſſes is not required by law, though it is prudent in them ſo to do, in order to aſſiſt their memory when living, and to ſupply their evidence when dead.

SUBSEQUENT, ſomething that comes after another, particularly with regard to the order of time. See Posterior.

When two feſtivals happen on the ſame day, the principal one is celebrated; and the other transferred to the *ſubſequent* day, i. e. to the morrow.

Subsequent *condition*. See Condition.

SUBSESQUIALTERATE. See Ratio.

SUBSIDY, Subsidium, in *Law*, any aid, tax, or tribute granted, by authority of parliament, to the king, on preſſing occaſions of the ſtate, levied on the ſubjects, according to their ſeveral abilities, or the yearly produce of their lands, goods, &c.

The ancient Saxon kings had no *ſubſidies* collected after the manner of ours; but in lieu thereof, had ſeveral cuſtoms, whereby they levied money or perſonal ſervice on the people, for the repairing of cities, caſtles, bridges, military expeditions, &c. which they called *burgbote, brigbote, herefare, heregold*, &c.

But, upon the land's becoming oppreſſed by the Danes, king Ethelred, in the year 1007, agreed to pay them yearly 10000*l.* for redemption of peace, which ſum was afterwards increaſed to 36000*l.* and at length to 48000*l.* which was called *Danegeld*, and was levied on land; each hide, or ploughland, that of the church only excepted, being ceſſed 12*d.*

Hence the tribute came to be called *hidage*, a name that afterwards became common to all taxes and *ſubſidies* impoſed on lands, as thoſe on cattle were called *hornegeld.*

Both theſe the Normans ſometimes called *taxes*, from the Greek ταξις, *order*; ſometimes from their own language *taillage*; and ſometimes, according to the cuſtom beyond ſea, *ſubſidia* and *auxilia*. See AID.

After the Conqueſt, in 1066, theſe *ſubſidies* ſeem to have been granted differently from what they now are, as every ninth lamb, every ninth fleece, every ninth ſheep, &c. Sometimes the rate was every tenth, and ſometimes every fifteenth, &c.

The various modes of raiſing money by SCUTAGES upon knights fees, the aſſeſſments of HIDAGE upon all other lands, and TAILLAGE upon cities and burghs, gradually fell in diſuſe, ſays judge Blackſtone, upon the introduction of *ſubſidies*, about the time of king Richard II. and king Henry IV.

Theſe, he ſays, were a tax, not immediately impoſed upon property, but upon perſons, in reſpect to their reputed eſtates, after the nominal rate of 4*s.* in the pound for land, and 2*s.* for their goods; and for thoſe of aliens in a double proportion. But this aſſeſſment was made according to an ancient valuation, which was ſo low, that one *ſubſidy* of this ſort did not amount to more than 70000*l.* It was anciently the rule never to grant more than one *ſubſidy* and two FIFTEENTHS, at a time; but this rule was broken through for the firſt time on occaſion of the Spaniſh invaſion in 1588, when the parliament gave queen Elizabeth two ſubſidies and four fifteenths. Afterwards, as money ſunk in value, more *ſubſidies* were given; and we have an inſtance, in the firſt parliament of 1640, of the king's deſiring twelve *ſubſidies* of the commons, to be levied in three years.

The grant of ſcutages, taillages, and *ſubſidies*, by the commons, did not extend to ſpiritual preferments, thoſe being uſually taxed by the clergy themſelves in convocation; which grants of the clergy were confirmed in parliament; otherwiſe they were illegal and not binding. A *ſubſidy* granted by the clergy was after the rate of 4*s.* in the pound, according to the valuation of their livings in the king's books, and amounted to about 20000*l.*

Whilſt this cuſtom continued, convocations uſed to ſit as frequently as parliaments, but the laſt *ſubſidies* thus given by the clergy, were thoſe confirmed by ſtat. 15 Car. II. car. 10. ſince which another method of taxation has generally prevailed, which comprehends the clergy as well as the laity; in recompence for which the beneficed clergy have from that period been allowed to vote at the election of knights of the ſhire; and thenceforward alſo the practice of giving eccleſiaſtical *ſubſidies* has fallen into total diſuſe. The laſt inſtance of this kind of grant occurs in 1670. Blackſt. Com. book i. p. 310, &c. See LAND-*tax.*

In France the king alone, by his own authority, impoſes *ſubſidies* on his people, at his own diſcretion. What Grotius ſays, that they who pay *ſubſidies* to other ſovereigns, to engage them in their defence againſt powerful enemies, by ſo doing acknowledge their own weakneſs, and that ſuch an acknowledgement diminiſhes ſomewhat of their dignity; muſt be underſtood of ſuch ſtates as are too weak to defend themſelves, and who, in reſpect hereof, render themſelves in ſome meaſure tributary; not of ſuch as, ſubſiſting by their own ſtrength, give *ſubſidies* to their weaker neighbours, to prevent their being over-run by others.

Such. e. gr. as the kings of England and France are, with regard to Sweden, and ſeveral other princes; to whom they generally grant *ſubſidies* in the treaties they conclude with them.

In the liſt of Engliſh duties, or impoſitions, are divers kinds of *ſubſidies*: as the *ſubſidy inwards*, or *old ſubſidy*, which is a duty compoſed of a TONNAGE and POUNDAGE duty; names ariſing from the different regulations whereby it is impoſed and levied: the *new ſubſidy*, which is to be raiſed, levied, and collected by the ſame rules and orders, and under the ſame penalties and forfeitures as are ſignified in the ſeveral acts contained in the book of rates: the *one-third ſubſidy*, or the amount of *one-third* of the preceding *ſubſidy*, or of the net *new ſubſidy* of tonnage and poundage: the *two-thirds ſubſidy*, which is an additional *ſubſidy* of two third parts of the *new ſubſidy*, upon all goods liable to the ſaid *new ſubſidy*, except in certain caſes, excepted by acts of parliament, and contained in the book of rates: the *ſubſidy* of 1747, which, over and above all *ſubſidies*, additional duties, impoſitions, &c. is a poundage duty of 12*d.* in the pound, to be paid in ready money on goods and merchandize imported, except for tobacco, with reſpect to which it may be ſecured by bond; which duty is to be levied and collected by the ſame means, and under the ſame penalties, &c. as are directed for the *old ſubſidy*: *ſubſidies* on ſpirits: *ſubſidy outwards*, compoſed of a tonnage and poundage, and paid in ready money before ſhipping off in order to exportation: *ſubſidy* granted in 1758-9, of poundage upon certain goods and merchandizes to be imported into this kingdom, &c. Poſtlethwayt's Dict. art. *Subſidy.* See CUSTOMS.

SUBSISTENCE, in the *Military Art*, is the money paid to the ſoldiers weekly, not amounting to their full pay, becauſe their cloaths, accoutrements, tents, bread, &c. are to be paid; it is likewiſe the money paid the officers upon accompt, till their accompts be made up, which is generally once a year, and then they are paid their arrears.

SUBSTANCE, SUBSTANTIA, ſomething that we conceive to ſubſiſt of itſelf, *ſub ſe ſtans*, independently of any created being, or any particular mode or accident.

Thus a piece of wax is a *ſubſtance*; becauſe we can conceive it as ſubſiſting of itſelf, and of its own nature, without any dependence on any other created nature, or without any particular mode, form, colour, &c. See MODE.

It is a being, however, which is the ſubject of modes or accidents. Of *ſubſtances*, ſome are thinking or conſcious beings, and others are extended and ſolid, or impenetrable. Of the former claſs is the human ſoul, and of the latter philoſophers conſider matter only. If we ſeclude SPACE out of our conſideration, there will remain but theſe two ſorts of *ſubſtances*, viz matter and mind, or body and ſpirit; at leaſt we have no ideas of any other *ſubſtance* but theſe. See Watts's Logic, chap. ii. ſect. 2. and Phil. Eſſ. eſſ. ii.

Spinoſa maintains, that there is but one ſubſtance in nature, whereof all created things are ſo many different modifications; and thus he makes the ſoul of the ſame *ſubſtance* with the body. The whole univerſe, according to him, is but one *ſubſtance*; which *ſubſtance* he holds endowed with an infinity of attributes, in the number of which are thinking and extenſion. All bodies are modifications of this *ſubſtance*, conſidered as extended; and all ſpirits modifications of the ſame *ſubſtance*, conſidered as thinking. See SPINOZISM. See alſo MATTER and SOUL.

Mr. Locke's philoſophy of *ſubſtances* is more juſt: our ideas of *ſubſtances*, that great author obſerves, are only ſuch a combination of ſimple ideas as is taken to repreſent diſtinct things, ſubſiſting by themſelves; in which the confuſed idea of *ſubſtance* is always the chief. Thus the combination of the ideas of a certain figure, with the powers of motion, thought and reaſoning, joined to *ſubſtance*, make the ordinary idea of man: and thus the mind obſerving ſeveral ſimple ideas to go conſtantly together, which being preſumed to belong to one thing, or to be united in one ſubject, are called by one name, which we are apt, afterwards, to talk of, and conſider as one ſimple IDEA.

We imagine theſe ſimple ideas do not ſubſiſt by themſelves; but ſuppoſe ſome ſubſtratum, wherein they ſubſiſt, which we call *ſubſtance.*

The idea of pure *ſubſtances* is nothing but the ſuppoſed, yet unknown, ſupport of thoſe qualities which are capable of producing ſimple ideas in us.

The ideas of particular *ſubſtances* are compoſed out of this obſcure and general idea of *ſubſtance*, together with ſuch combinations of ſimple ideas as are obſerved to exiſt together, and are ſuppoſed to flow from the internal conſtitution, and unknown eſſence of that *ſubſtance.*

Thus we come by the ideas of man, horſe, gold, &c. Thus the ſenſible qualities of iron, or a diamond, make the complex idea of thoſe *ſubſtances*, which a ſmith, or a jeweller, commonly knows better than a philoſopher.

The ſame happens concerning the operations of the mind, viz. thinking, reaſoning, &c. which we concluding not to ſubſiſt by themſelves, nor apprehending how they can belong to body, or be produced by it, think them the actions of ſome other *ſubſtance*, which we call *ſpirit*; of whoſe *ſubſtance* or nature we have as clear a notion as that of body; the one being the ſuppoſed ſubſtratum of the ſimple ideas we have from without, as the other of thoſe operations, which we experience in ourſelves within; ſo that the idea of corporeal *ſubſtance* in matter is as remote from our conceptions as that of ſpiritual *ſubſtance*.

Hence we may conclude, that he has the moſt perfect idea of any particular *ſubſtance*, who has collected moſt of thoſe ſimple ideas which exiſt in it; among which we are to reckon its active powers, and paſſive capacities, though not ſtrictly ſimple ideas.

Subſtances are generally diſtinguiſhed by ſecondary qualities; for our ſenſes fail us in the diſcovery of primary ones, as the bulk, figure, texture, &c. of the minute parts of bodies, on which their real conſtitutions and differences depend. And ſecondary qualities are nothing but powers with relation to our ſenſes.

The ideas that make our complex ones of corporeal *ſubſtances*, are of three ſorts: firſt, The ideas of primary qualities of things which are diſcovered by our ſenſes; ſuch as bulk, figure, motion, &c. Secondly, The ſenſible ſecondary qualities, which are nothing but powers to produce ſeveral ideas in us by our ſenſes. Thirdly, The aptneſs we conſider in any *ſubſtance*, to cauſe or receive ſuch alterations in its primary qualities, as that the *ſubſtance*, ſo altered, ſhould produce in us different ideas from what it did before.

Beſides the complex ideas we have of material *ſubſtances*, by the ſimple ideas taken from the operations of our own minds, which we experience in ourſelves, as thinking, underſtanding, willing, knowing, &c. co-exiſting in the ſame *ſubſtance*, we are able to frame the complex idea of a ſpirit; and this idea of an immaterial *ſubſtance* is as clear as that we have of a material one.

By joining theſe with *ſubſtance*, of which we have no diſtinct idea, we have the idea of ſpirit; and by putting together the ideas of coherent ſolid parts, and a power of being moved, joined with *ſubſtance*, of which, likewiſe, we have no poſitive idea, we have the idea of matter.

Farther, there are other ideas of *ſubſtances*, which may be called *collective*, which are made up of any particular *ſubſtances*, conſidered as united into one idea; as a troop, army, &c. which the mind does by its power of compoſition. Theſe collective ideas are but the artificial draughts of the mind, bringing things remote and independent, into one view, the better to contemplate the diſcourſe of them united into one conception, and ſignified by one name. For there are no things ſo remote which the mind cannot, by this art of compoſition, bring into one idea, as is viſible in that ſignified by the name *univerſe*.

Such is the generally received doctrine of *ſubſtance*; but biſhop Berkeley, in his Principles of Human Knowledge, and Mr. Collier, in his Clavis Univerſalis, have made great refinements thereon.

SUBSTANTIAL, in the *Schools*, ſomething belonging to the nature of *ſubſtance*.

It is generally diſputed, whether or no there be ſuch things as *ſubſtantial* forms? i. e. forms independent of all matter; or forms that are ſubſtances themſelves.

SUBSTANTIAL is alſo uſed in the ſame ſenſe with *eſſential*, in oppoſition to *accidental*; in which relation it gives room for abundance of diſtinctions.

SUBSTANTIVE, in *Grammar*, is a quality aſcribed to a noun or name, when the object it denotes is conſidered ſimply, and in itſelf without reference to any other, ſubject or idea.

When the object is conſidered, as clothed with certain qualities, the noun is ſaid to be *adjective*.

For a more palpable criterion, all nouns, to which one cannot add the word *thing*, are *ſubſtantives*; and all thoſe to which *thing* may be added, are adjectives.

Subſtantives, according to Mr. Harris, are all thoſe principal words which are ſignificant of ſubſtances, conſidered as ſubſtances. See SPEECH.

Some of theſe are primary, or *ſubſtantives* properly ſo called, and have number and gender, and denominated NOUNS; and others are ſecondary, which are otherwiſe called PRONOUNS. Hermes, ch. iv. and v.

Nouns *ſubſtantive* ſometimes are uſed adjectively; and nouns adjective alſo ſometimes become *ſubſtantives*. In effect, the nature of the adjective being to expreſs the quality of an object; if that quality be the object itſelf ſpoken of, then, according to our definition, it becomes a *ſubſtantive*. If I ſay, a *good prince*, the word *good* is apparently an adjective, becauſe it repreſents the prince having the quality of goodneſs. But if I ſay, the *good* ought to be preferred to the bad, it is evident, *good* is the ſubject ſpoken of; and, conſequently, it is a *ſubſtantive*. Indeed, cuſtom does not allow us to uſe all adjectives indifferently, as *ſubſtantives*; nor all *ſubſtantives* as adjectives. The laws obſerved herein are as follow:

All nouns either ſignify an individual, as Socrates, Alexander, &c. or a ſpecies; as man, horſe, &c. or an eſſential quality, as rational, material, &c. or an accidental one, as black, white, good, fair, &c. or a dignity, office, art, &c. as king, preſident, philoſopher, &c.

Thus have we four kinds of nouns, whereof the firſt is very rarely taken adjectively; for as they ſignify individuals, or particular beings, they can ſcarce be applied to any thing but the thing they properly ſignify; yet we have ſometimes known the name of Cato taken adjectively; as, "This is to be Cato, indeed." Nor does Malherbe ſcruple to ſay in French, "Plus Mars que le "Mars de la Thrace." Add, that proper names are ſometimes converted into names of dignities, &c. as Cæſar, Auguſtus, &c. In which caſe they may be conſidered, in the ſame light, as nouns of the fourth kind. Nouns of the ſecond kind are alſo ſometimes taken adjectively, as "He is much a man," &c. The third kind are adjectives of themſelves. For the fourth kind, all grammarians rank them among *ſubſtantives*, excepting F. Buffier, who will have them to be adjectives; or, to uſe his own term, modificatives. Be that as it will, they are frequently uſed adjectively: "He is more a king, and more a philoſopher, than any of his predeceſſors."

Now, for adjectives taken *ſubſtantively*, 1. Participles paſſive are very rarely thus taken; though we ſometimes ſay, "The loved are leſs happy than the lovers: the "taught have the advantage of the untaught: the be-"ſieged make a ſally," &c. And, 2. Participles active are taken ſtill more rarely for *ſubſtantives*. We ſcarce ever, e. gr. ſay, "The loving, the reading; but the "the lover, the reader:" yet we ſay, "the ſtudent, the "proteſtant, the tenant, the appellant, the opponent," &c. 3. For nouns adjectives, thoſe applied to men are not only uſed *ſubſtantively*, but are even become *ſubſtantives* by uſe; whether they be ſuch as regard religion; as Chriſtian, Pagan, Mahometan, &c. or opinion; as Stoic, Peripatetic, Carteſian, &c. or country; as "the Engliſh, French, Italians:" or temperament: as, "the melancholic, phlegmatic, choleric," &c. Under the ſame rule are likewiſe comprehended abundance of adjectives, ſignifying a number of people agreeing in ſome common attribute; as, "the learned, "the great, the devout, the brave, the diſſolute," &c. But uſe is here to be regarded; for we do not ſay "the "elegant," as we ſay "the learned; but "elegant "writers," &c. Cuſtom, and the ear alone, are to decide about theſe differences.

Again, adjectives taken *ſubſtantively*, for other things, beſide men, are either ſo uſed, to ſignify a number or ſet of things that have ſome common quality; or to expreſs an abſtract quality. In both which, as in thoſe men, there are ſome authorized by cuſtom, and others formed every day on their model.

With regard to which laſt, uſe again, and the ear, are to decide. Here all the adjectives of colours are uſed *ſubſtantively*; as, "the white, black, green," &c. Some of thoſe of qualities; as "the cold," &c. thoſe of time; as "the paſt, preſent, future:" and many other matters; as "the agreeable, the ſublime, the principal," &c. Nor is it only in the poſitive, but alſo in the comparative and ſuperlative degrees, that adjectives are uſed *ſubſtantively*; as the "better of the two; the beſt of it," &c.

SUBSTANTIVE *verb*. See VERB.

SUBSTITUTE, SUBSTITUTUS, formed from *ſub*, *under*, and *ſtatuo*, *I appoint*, or *eſtabliſh*, a perſon appointed to officiate for another, in caſe of abſence, or other legal impediment.

In the French law, the procureurs, or proctors, are obliged to name two of their brethren for *ſubſtitutes*, whoſe names are written after theirs in the liſt, to receive ſignifications and ſummonſes made in their abſence.

SUBSTITUTE, in *Medicine*, denotes a drug, or remedy, that may be uſed in lieu of another; or that ſupplies the place of another of like virtue, which is not to be had; called alſo *ſuccedaneum*.

The root of the great centaury, and ſometimes rhaponticum, have been uſed as *ſubſtitutes* to rhubarb.

SUBSTITUTION, in *Grammar*, the uſing of one word for another; or one mode, ſtate, perſon, or number, of a word for another. This the grammarians otherwiſe call a *ſyllepſis*.

SUBSTITUTION, in *the Civil Law*, a diſpoſition of a teſtator, whereby he ſubſtitutes one heir to another, who has only the uſufruit, and not the property of the thing left him.

Subſtitution is a kind of fiduciary inheritance, called alſo *fidei commiſſio*, in regard the immediate inheritor has only the uſe or produce of the thing; the body thereof being ſubſtituted and appropriated to certain perſons, who are likewiſe to have the uſufruit in their turns, but are never to have the property.

In ſome countries *ſubſtitution* is perpetual; in France it only holds to the fourth generation. *Subſtitution* anſwers to *remainder* in common law.

Among the Romans there were abundance of theſe fiduciary heirs, who enjoyed inheritances till they returned them into the hands of the right heir; and the reaſon why they did not likewiſe reſtore the fruits, or that the fruits were not deemed to make a part of the inheritance, but only of the thing, was, that the fiduciary or truſtee was obliged to run the riſk, and to ſtand the charge of the culture of the land.

SUBSTITUTION, in *Algebra*, &c. is the putting in the room of any quantity in an equation, ſome other quantity which is equal to it, but expreſſed after another manner. See REDUCTION of *Equations*.

SUBSTRACTION, or SUBTRACTION, in *Arithmetic*, the ſecond rule, or rather operation, in arithmetic, whereby we deduct a leſs number from a greater, to learn the preciſe difference:

Or, more juſtly, *ſubſtraction* is the finding a certain number from two homogeneous ones given, which, with one of the given numbers, is equal to the other.

The doctrine of *ſubſtraction* is reducible to what follows:

To SUBSTRACT *a leſs number from a greater.* 1. Write the leſs number under the greater, in ſuch manner, as that homogeneous figures anſwer to homogeneous, i. e. units to units, tens to tens, &c. as directed under ADDITION. 2. Under the two numbers draw a line. 3. *Subſtract*, ſeverally, the units from units, tens from tens, hundreds from hundreds; beginning at the right hand, and proceeding to the left: and write the ſeveral remainders in their correſpondent places, under the line. 4. If a greater figure come to be *ſubſtracted* from a leſs, borrow an unit from the next left-hand place; this is equivalent to 10, and, added to the leſs number, the *ſubſtraction* is to be made from the ſum; or if a cipher chance to be in the next left-hand place, borrow the unit from the next farther place.

By theſe rules any number may be *ſubſtracted* out of another greater. For example;

If it be required, from	9800403459
To *ſubſtract*	4743865263
The remainder will be found	5056538196

For, beginning with the right-hand figure, and taking 3 from 9, there remains 6 units, to be written underneath the line: going then to the next place, 6, I find, cannot be taken from 5; wherefore, from the place of hundreds 4, I borrow 1, which is quivalent to 10, in the place of tens; and from the ſum of this 10 and 5, viz. 15, *ſubſtracting* 6, I find 9 tens remaining, to be put down under the line. Proceeding to the place of hundreds, 2 with the 1 borrowed at the laſt, make 3, which *ſubſtracted* from 4, leave 1.

Again, 5, in the place of thouſands, cannot be *ſubſtracted* from 3; for which reaſon, taking 1 from 4, in the place of hundreds of thouſands, into the empty place of tens of thouſands, the cipher is converted into 10 tens of thouſands; whence one 10 being borrowed, and added to the 3, and from the ſum 13 thouſand, 5 thouſand being *ſubſtracted*, we ſhall have 8 thouſand to enter under the line; then *ſubſtracting* 6 tens of thouſands from 9, there remain 3. Coming now to take 8 from 4; from the 8 farther on the left, I borrow 1, by means whereof, the two ciphers will be turned each into 9. And after the like manner is the reſt of the *ſubſtraction* eaſily performed.

If heterogeneous numbers be to be *ſubſtracted* from each other, the units borrowed are not to be equal to ten, but to ſo many as there go of units of the leſs kind, to conſtitute an unit of the greater: for example:

l.	*s.*	*d.*
45	16	6
27	19	9
17	16	9

For ſince 9 pence cannot be *ſubſtracted* from 6 pence; of the 16 ſhillings, one is converted into 12 pence; by which means, for 6 we have 18 pence; whence 9 being *ſubſtracted*, there remain 9. In like manner, as 19 ſhillings cannot be *ſubſtracted* from the remaining 16; one of the 45 pounds is converted into 20 ſhillings, from which, added to the 15, 19 being *ſubſtracted*, the remainder is 16 ſhillings. Laſtly, 27 pounds *ſubſtracted* from 44 pounds, there remains 17.

If a greater number be required to be *ſubſtracted* from a leſs, it is evident the thing is impoſſible. The leſs number, therefore, in that caſe, is to be *ſubſtracted* from the greater; and the defect to be noted by the negative character. E. gr. If am required to pay 8 pounds, and am only maſter of 3, when the 3 are paid, there will ſtill remain 5 behind, which are to be noted, —5.

Subſtraction is to be proved by adding the remainder to the ſubtrahend, or number to be *ſubſtracted*: for if the ſum be equal to the number whence the other is to be *ſubſtracted*, the *ſubſtraction* is juſtly performed. For example:

		l.	*s.*	*d.*	
9800403459		156	11	3¼	
4743865263	ſubtrahend	21	17	2½	ſubtrahend
5056538196	remainder	134	14	0¼	
9800403459		156	11	3¼	

SUBSTRACTION, in *Algebra*, is performed by connecting the quantities with all the ſigns of the ſubtrahend changed; and at the ſame time uniting ſuch as may be united; as is done in ADDITION.

Thus $+7a$ *ſubſtracted* from $+9a$, makes $+9a-7a$, or $2a$.

In the *ſubſtraction* of compound algebraic quantities; the characters of the ſubtrahend are to be changed into the contrary ones, viz. + into —; and — into +.

As the addition of algebraic quantities includes three caſes, viz. 1. The addition of like quantities with like ſigns, for which the rule is to add the co-efficients, to prefix the common ſign to their ſum, and to ſubjoin the common letter or letters: 2. The addition of quantities that are like with unlike ſigns, for which the rule is to ſubſtract the leſs co-efficient from the greater, to prefix the ſign of the greater to the remainder, and to ſubjoin the common letter or letters: and 3. The addition of quantities that are unlike, for which ſet them all down after one another, with their ſigns and co-efficients prefixed: the general rule for *ſubſtraction*, comprehending all the caſes that occur, is, change the ſigns of the quantity to be ſubſtracted into their contrary ſigns, and then add it ſo changed to the quantity from which it was to be ſubſtracted; the ſum ariſing by this addition is the remainder, becauſe, to ſubſtract any quantity, either poſitive or negative, is the ſame as to add the oppoſite kind.

From $+5a$
Subtract $\underline{+3a}$
Rem. $5a-3a$ or $2a$.

From $+5a$
Subtract $\underline{-3a}$
Rem. $+5a+3a=8a$.

From $-5a$
Subtract $\underline{+3a}$
Rem. $-5a-3a=-8a$.

From $-5a$
Subtract $\underline{-3a}$
Rem. $-5a+3a=-2a$.

From $2a-3x+5y-6$
Subtract $\underline{6a+4x+5y+4}$
Rem. $-4a-7x\,..\;\;0-10$.

Macl. Alg. part i. chap. ii. iii.

SUBSTRACTION *of logarithms*. See LOGARITHMS.

SUBSTRACTION *of vulgar fractions*. See FRACTIONS.

SUBSTRACTION *of decimals*. See DECIMALS.

SUBSTRUCTION, in *Building*, denotes underpinning, ground-ſelling, &c. See FOUNDATION.

SUBSTYLE, or SUBSTYLAR *line*, in *Dialling*, a right line, wherein the ſtyle or gnomon of a dial is erected.

The angle included between this line and the ſtyle is called the elevation or height of the STYLE.

In polar, horizontal, meridional, and northern dials, the *ſubſtylar* line is the meridional line, or line of 12 o'clock; or interſection of a plane, whereon the dial is delineated, with that of the meridian.

In all declining *dials* the *ſubſtyle* makes an angle with the hour line of XII. and this angle is called the diſtance of the *ſubſtyle* from the meridian.

In eaſterly and weſterly dials, the *ſubſtylar* line is the line of 6 o'clock, or the interſection of the plane, whereon the dial is delineated, with the prime vertical.

SUBSUPERPARTICULAR. } See RATIO.
SUBSUPERPARTIENS. }

SUBTANGENT *of a curve*, the line that determines the interſection of a tangent with the axis; or that determines the point wherein the tangent cuts the axis, prolonged.

Thus, in the curve AM, &c. (*Tab. Anal. fig.* 10.) the line TP intercepted between the ſemiordinate PM, and the tangent TM, is the *ſubtangent*. And PR is to PM, as PM to PT; and PM to PT, as MR to TM. See SUBNORMAL.

It is a rule in all equations, that if the value of the *ſubtangent* comes out poſitive, the point of interſection of the tangent and axis falls on that ſide of the ordinate, where the vertex of the curve lies, as in the parabola and paraboloids.

If it come out negative, the point of interſection will fall on the contrary ſide of the ordinate, in reſpect of the vertex or beginning of the abſciſs; as in the hyperbola and hyperboliform figures.

And univerſally, in all paraboliform and hyperboliform figures, the *ſubtangent* is equal to the exponent of the power of the ordinate, multiplied into the abſciſs: thus, in the common parabola, whoſe property is $px=yy$; the *ſubtangent* is in length equal to x, the abſciſs multiplied by 2, the exponent of the power of yy, the ſquare of the ordinate; that is, it is equal to twice the abſciſs; and by the former rule for paraboliform figures, it muſt be taken above the ordinate in the axis produced.

Thus, alſo, in one of the cubical paraboloids, where $pxx=yyy$; the length of the *ſubtangent* will be $\frac{3}{2}$ of the abſciſs: and in a parabola of any kind, the general equation being $a^{m}x^{n}=+y^{m+n}$, the *ſubtangent* is $=\frac{m+n}{n}\times x$, or its ratio to the abſciſs is conſtantly that of $m+n$ to n. See *Method of* TANGENTS.

In the parabola, the *ſubtangent* PT is double the abſciſs AP; and the ſubnormal is PR ſubduple of the parameter.

SUBTENSE, formed from *ſub*, *under*, and *tendo*, *I ſtretch*, in *Geometry*, a right line oppoſite to an angle, and preſumed to be drawn between the two extremities of the arch which meaſures that angle.

The *ſubtenſe* of the angle coincides with the chord of the arch.

In every right-angled triangle, the ſquare of the *ſubtenſe* of the right angle is equal to the ſquares of the *ſubtenſes* of both the other angles, by the 47th prop. of Euclid. See HYPOTHENUSE and TRIANGLE.

SUBTERRANEOUS, or SUBTERRANEAN, ſomething underground.

Naturaliſts talk much of *ſubterranean* fires, as the cauſe of volcanos; and *ſubterranean* winds, as the cauſe of earthquakes.

Among the many places where *ſubterranean* fires are found, England is not wholly without them; though with us they appear only in the coal countries, and plainly feed on nothing but the upper ſtratum of the coal, called by the miners *day coal*, unleſs where they have by accidents been kindled by actual fires at great depths, or fired downward, by being pent in for room. See VOLCANO.

We have an account, in the Philoſophical Tranſactions, of a *ſubterranean* town found at Portici, near Naples, in which many antique ſtatutes, paintings, and other curioſities, have been found.

This *ſubterranean* town is probably the ancient city of Herculaneum, which was ſwallowed up by an earthquake. See Phil. Tranſ. Nº 458. ſect. 4, 5, and 6.

It is remarkable, that ſome of the antique paintings found there are freſh and perfect, as if lately painted. Ibid. ſect. 6.

SUBTILE, in *Phyſics*, intimates a thing exceedingly ſmall, fine, and delicate: ſuch as the animal ſpirits, the effluvia of odorous bodies, &c. are ſuppoſed to be.

One kind of matter is only more *ſubtile* than another, in that, being divided into ſmaller parts, and thoſe, too, more agitated; on the one hand, it makes leſs reſiſtance to other bodies; and, on the other, inſinuates itſelf more eaſily into their pores.

The Carteſians ſuppoſe a *ſubtile* matter for their firſt ELEMENT. See CARTESIAN, and MATERIA *ſubtilis*.

SUBTILIZATION, *ſubtilizatio*, the act of ſubtilizing, or rendering any thing ſmaller and ſubtiler; particularly, the diſſolving or changing a mixt body into a pure liquor, or a fine powder, by ſeparating the groſſer parts therefrom.

SUBTRACTION. See SUBSTRACTION.

SUBTRACTION *of conjugal rights*, in *Law*, is where either the huſband or wife lives ſeparate from the other without ſufficient reaſon; in which caſe the eccleſiaſtical juriſdiction, on a ſuit for reſtitution of conjugal rights, will compel them to come together again, if either party be weak enough to deſire it, contrary to the inclination of the other.

SUBTRACTION *of legacies*, in *Law*, denotes the withholding or detaining of legacies, for which the ſpiritual court adminiſters redreſs, by compelling the executor to pay them. But in this caſe, the courts of equity exerciſe a concurrent juriſdiction with the eccleſiaſtical courts, as incident to ſome other ſpecies of relief prayed by the complainant; as to compel the executor to account for the teſtator's effects, or aſſent to the legacy, or the like.

SUBTRACTION *with regard to real property*, in *Law*, is an injury which happens, when any perſon, who owes any ſuit, duty, cuſtom, or ſervice, to another, withdraws or neglects to perform it. It differs from a DISSEISIN, in that *this* is committed without any denial of the right, conſiſting merely in non-performance; *that* ſtrikes at the very title of the party injured, and amounts to an OUSTER or actual diſpoſſeſſion. *Subtraction*, however, being clearly an injury, is remediable by due courſe of law; but the remedy differs according to the nature of the ſervices; whether they be due by virtue of any tenure, or by cuſtom only. Black. Comm. vol. iii. p. 230, &c.

SUBTRACTION *of tithes*, in *Law*, is the with-holding of TITHES from the parſon or vicar, whether the former be a clergyman or a lay appropriator. In this caſe, ſummary and expeditious aſſiſtance is given by the ſtatutes of 27 Hen. VIII. cap. 20. and 32 Hen. VIII. cap. 7. which enact, that upon complaint of any contempt or miſbehaviour to the eccleſiaſtical judge by the defendant in any ſuit for tithes, any privy counſellor, or any two juſtices of the peace (or in caſe of diſobedience to any definitive ſentence, any two juſtices of the peace) may commit the party to priſon without bail or mainprize, till he enters into a recognizance, with ſufficient ſureties, to give due obedience to the proceſs and ſentence of the court. Black. Comm. vol. iii. p. 88 102.

SUBTRIPLE *ratio*. See RATIO.

SUBVERSIO *ſtomachi*, a term uſed by ſome authors to expreſs a violent vomiting, when what ſhould paſs through the inteſtines is voided conſtantly by the mouth.

SUBULARE *folium*, among *Botaniſts*. See LEAF.

SUBULARIA, *rough-leaved alyſſon*, in *Botany*, a genus of the *tetradynamia ſiliculoſa* claſs. Its characters are, that the pericarpium is an entire, ovated, ſmall pod, with concave ovated valves; and the ſtyle is alſo a ſhorter ſmall pod. There is only one ſpecies.

SUBULATED *leaf*, among *Botaniſts*. See LEAF.

SUBULO, a term uſed by Pliny for two years old. See FERULÆ.

SUBULO, in *Natural Hiſtory*, a word uſed by the ancients to expreſs a deer, or ſtag, at that time of its life when the horns firſt begin to appear.

Others have underſtood it as the name of the oryx, whoſe horn was narrow at the ſummit, and thence gradually larger toward the baſe, ſo that it reſembled the figure of the ſubulo. This is the fabulous creature called the *unicorn*, and deſcribed as a nimble and terrible animal. But it is certain that no ſuch animal ever exiſted, as is called by this name, and thus deſcribed: the only one-horned animal in the word is the rhinoceros, and this is an unwieldly heavy animal, not at all reſembling the characters or figures we have of the *ſubulo*, or oryx.

It is to be obſerved, that the *ſubulo* of the moſt ancient writers was an inſtrument of iron, ſharp at the point, uſed in the ſtone-quarries, to break way through large maſſes.

SUBURBICARY, *ſuburbicarius*, formed from *ſub*, *under*, and *urbs*, *city*, an epithet given to thoſe provinces of Italy, &c. which compoſed the ancient dioceſe, or patriarchate, of Rome. They were alſo ſometimes called *urbicary* provinces.

Authors uſually reckon ten of theſe *ſuburbicary* provinces; whereof Italy, from the Po to the heel, made ſeven; and the iſles of Sicily, Sardinia, and Corſica, the other three.

Yet Salmaſius will have the *ſuburbicary* provinces confined to thoſe four in the neighbourhood of Rome, to which the authority of the prefect of Rome extended; and theſe he makes the limits of the DIOCESE of ancient Rome.

F. Sirmond takes the other extreme, and comprehends all the Weſt under the name of *ſuburbicary* provinces. Rufinus, who lived in the age of the council of Nice, explains the power aſcribed to the pope, in the ſixth canon of that council, by ſaying, that he had the care and ſuperintendance of the *ſuburbicary* provinces. Hence the different ſentiments of authors, with regard to the *ſuburbicary* provinces; ſome only conſidering the pope as biſhop of Rome; others, as patriarch of the Weſt, &c.

SUCCEDANEUM, formed from *ſuccedo*, *to ſucceed*, in *Pharmacy*, a remedy ſubſtituted in the place of another firſt preſcribed, when the ingredients are wanting, neceſſary for the compoſition of that other.

Subſtitute and *ſuccedaneum*, are of equal import; unleſs with ſome authors we chuſe to uſe a ſubſtitute, where a ſimple of like virtue is put for another; and *ſuccedaneum*, where a compound is uſed with the ſame intention for another compound.

SUCCENTURIATI *renes*, in *Anatomy*. See RENES *ſuccenturiati*.

SUCCENTURIATION, the act of ſubſtituting. See SUBSTITUTION.

SUCCENTURIATUS, in *Anatomy*, a muſcle called alſo PYRAMIDALIS.

SUCCESSION, *ſucceſſio*, in *Philoſophy*, an idea which we get by reflecting on that train of ideas conſtantly following one another in our minds when awake.

The diſtance between any parts of this *ſucceſſion*, is what we call DURATION. When this *ſucceſſion* of ideas ceaſes, we have no perception of time, or of the duration thereof; but the moment we fall aſleep, and that wherein we awake ſeem connected.

They who think we get the idea of *ſucceſſion* from our obſervation of motion by our ſenſes, will come into Mr. Locke's ſentiment above, when they conſider, that motion produces an idea of *ſucceſſion* no otherwiſe than by producing a continual chain of diſtinguiſhable ideas.

A man that looks on a body moving, perceives no motion, unleſs that motion produces a conſtant train of ſucceſſive ideas. But wherever a man is, though all things be at reſt about him, if he thinks, he will be conſcious of *ſucceſſion*.

SUCCESSION, in *Aſtronomy*. The *ſucceſſion of the ſigns*, is the order wherein they follow each other, and according to which the ſun enters, ſucceſſively, into one, then into another; called, alſo, *conſequentia*.

This order is expreſſed in the two following technical verſes:

Sunt Aries, Taurus, Gemini, Cancer, Leo, Virgo,
Libraque, Scorpius, Arcitenens, Caper, Amphora, Piſces.

When a planet is direct, it is ſaid to go according to the order and *ſucceſſion of the ſigns*, or *in conſequentia*; that is from Aries to Taurus, &c. When retrograde, it is ſaid to go contrary to the *ſucceſſion of the ſigns*, or *in antecedentia*; viz. from Gemini to Taurus, then to Aries, &c.

SUCCESSION, in the *Civil Law*, implies a right to the whole effects left by a deſunct.

Of this there are ſeveral kinds, *ab-inteſtate*, *inteſtate*, &c.

SUCCESSION *ab-inteſtate*, is that which a perſon has a right to by being next of kin, which is what we call, being *next heir at law*. See INTESTATE.

The ſtatute of diſtributions bears ſome reſemblance to the Roman laws of ſucceſſion *ab inteſtato*; the general rule of which *ſucceſſion* was this. 1. The children, or lineal deſcendants in equal portions. 2. On failure of theſe, the parents, or lineal deſcendants, and with them the brethren or ſiſters of the whole blood: or, if the parents were dead, all the brethren and ſiſters, together with the repreſentatives of a brother or ſiſter deceaſed. 3. The next collateral relations in equal degree. 4. The huſband or wife of the deceaſed. Black. Comm. vol. ii. p. 516.

SUCCESSION, *teſtamentary*, is that which a perſon comes to by virtue of a will.

SUCCESSION *in the direct line*, is that coming from aſcendants or deſcendants. See LINE.

SUCCESSION, *collateral*, is that coming by uncles, aunts, or other collaterals. See COLLATERAL.

SUCCESSION, *adjacent*, or *abandoned*, is a burdenſome or vexatious one, which no body will accept of.

There is no real *ſucceſſion* in benefices; for, here nobody inherits.

In effects that cannot be divided, as kingdoms, &c. the *ſucceſſion* falls on a ſingle head; which is uſually the eldeſt ſon of the deceaſed, as being ſuppoſed the indiviſible repreſentative of his father.

In effects that are divided, all the children repreſent their father. It was on this principle, M. Courtin obſerves, that each of the ſons of Jacob had his ſhare aſſigned him in the Land of Promiſe. It is true, Manaſſeh and Ephraim, the two ſons of Joſeph, had likewiſe their ſhares; but this was becauſe a double portion had been allotted their father, wherein he was treated as elder brother, in conſideration of the great ſervices he had done his father and brethren.

SUCCESSION *to the crown*. See CROWN.

SUCCESSIVE *action*. See ACTION.

SUCCESSOR, a perſon who holds a place which another held before him; whether he arrived at it by election, collation, inheritance, or otherwiſe.

The king of the Romans is preſumptive *ſucceſſor* to the empire.

The canoniſts ſay, a coadjutor is a neceſſary *ſucceſſor* to a prelature; a reſignee to the reſignant.

Civilians ſay, a titular uſufructuary can do nothing to the prejudice of his *ſucceſſor*.

SUCCIFERA *vaſa*, in *Natural Hiſtory*, a name given by thoſe who have written of the anatomy of plants, to thoſe veſſels which contain the juices, by way of diſtinction from thoſe which only give paſſage to the air, and are called *tracheæ*. Leewenhoek tells us, that the microſcope diſcovers the *ſucciferous* veſſels of plants to be, in all reſpects, analogous to thoſe of animals, and that they are of two kinds, veins and arteries: the latter receiving the juices from the root, and carrying them all over the plant; and the others receiving the juice from their extremities, and carrying it back again to the root, where it is again delivered to the arteries. See *Anatomy of* PLANTS.

SUCCINUM, in *Pharmacy*. See AMBER.

SUCCISA, a medicinal alexipharmic herb; called alſo *morſus diaboli*, or the *devil's bit*. See SCABIOUS.

It is a powerful ſudorific, inſomuch that ſir Theodore Mayerne obſerves, in the Philoſophical Tranſactions, laying a perſon ſick of a plague, or other malignant fever, on a bed thereof, moderately hot, he ſhall ſweat till they take him off; and much more, if he drink of the decoction or juice of the ſame herb. But, with all theſe ſuppoſed virtues, the *ſucciſa* is now little uſed.

SUCCORY, in *Botany*. See ENDIVE.

SUCCORY, *gum*, *chondrilla*, in *Botany*. See GUM-*ſuccory*.

SUCCOTRINE *aloes*. See ALOES.

SUCCOUR, in the *Military Art*, denotes aſſiſtance for relieving a place, that is, raiſing the ſiege and forcing the enemy from it.

SUCCUBUS, or SUCCUBA, a term uſed by ſome viſionary writers to ſignify a *dæmon*, or ſpirit, who aſſumes the ſhape of a woman, and, as ſuch, lies with a man.

Some authors uſe INCUBUS and *ſuccubus* indiſcriminately; but they ought to be diſtinguiſhed; *incubus* being only properly uſed, where the demon is ſuppoſed to be in form of a man, and, as ſuch, lies with a woman.

SUCCULA, in *Mechanics*, an axis, or cylinder, with ſtaves in it to move it round; but without any tympanum, or peritrochium.

SUCCULENT *plants*, among *Botaniſts*, ſuch whoſe leaves are thick and full of juice.

SUCCUS *pancreaticus*. See PANCREATIC *juice*.

SUCCUS *nervoſus*. See NERVOUS *juice*.

SUCKERS, *off-ſets*, in *Agriculture* and *Gardening*, young ſhoots proceeding from the root of a tree; being of the ſame kind with the tree from which they ſpring; becauſe ſuch as grow from trees raiſed by grafting or inoculation, follow the nature of the ſtock.

They ſometimes ſpring forth near the body of the mother-plant; but other *ſuckers* at a greater diſtance from it are better: yet the former, removed when there is leaſt ſap in the top, and preſerving what fibrous roots are upon them, often proſper.

When they are taken up, the ground is to be well opened; and if they grow from the body of the tree, or great roots, they muſt be cut off cloſe to the ſtem, and ſet preſently. See STOCK.

It forwards much the ſpringing out of *ſuckers*, to bare the roots of trees, and ſlip them in ſome places.

SUCKER, or SUCK-*fiſh*, in *Ichthyology*. See REMORA.

SUCKER, in *Ichthyology*, is alſo a name given to the LUMP-*fiſh*.

SUCKER, *bimaculated*, in *Ichthyology*, is a new ſpecies of *ſucker* diſcovered near Weymouth, and deſcribed by Mr. Pennant. Its head is flat and tumid on each ſide; the body taper; the pectoral fins placed unuſually high; it has only one dorſal fin, placed near the tail; the tail is even at the end; the colour of the head and body is a fine pink, that of the fins whitiſh; on each ſide of the belly is a round black ſpot.

SUCKER, *ſtone*, the Engliſh name of a genus of fiſh. See PETROMYZON.

SUCKER, *unctuous*, in *Ichthyology*. See LIPARIS.

SUCKER, *goat*, *caprimulgus*, in *Ornithology*, a genus of the order of *paſſeres* in the Linnæan ſyſtem. Its characters are, that the beak is a little hooked, very ſmall, awl-ſhaped, and fluted at the baſe; the mouth very wide, with ſeveral ſtiff briſtles on the edges of the upper part, and the tongue acute and entire. Linnæus enumerates two ſpecies, viz. the European and American. This genus, in its characters, reſembles the ſwallow, whence Klein has ranked the common goat-*ſucker* among the ſwallows, calling it the *ſwallow with an undivided tail*. See *Churn*-OWL.

SUCKING-*pump*. See PUMP.

SUCTION, SUCTIO, the act of ſucking, or of drawing up a fluid, as air, water, or the like, by the mouth and lungs. Air is ſucked in at the mouth, by the muſcles of the thorax and abdomen diſtending the cavity of the lungs and abdomen, by which means the air included therein is rareſied, and ceaſes to be a counterbalance to the external air, which, of conſequence, is driven in by the preſſure of the atmoſphere through the mouth and noſtrils. See RESPIRATION.

Air is ſucked through a pipe, in the ſame manner as with the naked mouth; it being here the ſame as if the mouth were extended the length of the pipe.

The *ſuction* of heavier liquors is performed after the ſame manner, e. gr. in lying prone to drink out of a ſpring, &c. the lips are applied cloſe to the ſurface of the water, ſo as to prevent any paſſage of the air between them; then the cavity of the abdomen, &c. being diſtended as before, the preſſure of the air incumbent on the ſurface of the water without the circumference of the mouth prevailing over that upon the water within the ſame, the fluid is raiſed from the ſame principle as water in a pump.

In ſucking a heavy liquor, as water, through a pipe, the longer the pipe is, the greater difficulty is found in the *ſuction*; and the bigneſs and diameter of the pipe make a farther alteration therein. The reaſon of this ariſes from that great principle in hydroſtatics, that fluids preſs in the compound ratio of the baſes, and perpendicular altitudes.

From what we have ſaid, it evidently enough appears, that what we call *ſuction*, is not performed by any active faculty in the mouth, lungs, &c. but is performed by the mere impulſe and preſſure of the atmoſphere.

A very curious and intelligent perſon diſtinguiſhes two different ſorts of *ſuction*, performed after two quite different manners; a diſtinction which, however hitherto overlooked by authors, ſeems abſolutely neceſſary.

Suction, then, according to him, is performed either, 1°, By the dilatation of the thorax; or, 2°, By that of the cavity of the mouth.

In the former caſe the lungs are kept continually diſtended; for if the breath be let go ever ſo little, the liquor in the tube will begin to ſubſide.

On the contrary, when *ſuction* is performed by enlarging the cavity of the mouth, we may ſuck with our utmoſt force, and yet breathe freely through the noſtrils at the ſame time. This is the true proper *ſuction*; the other ought rather to be called *ſupping* than ſucking through a tube.

Note, the cavity of the mouth is enlarged by being a little opened, while the lips are cloſe ſhut, the tongue being at the ſame time contracted, and drawn backwards towards the throat.

SUCU, in *Botany*, a ſpecies of apple-tree, ſaid to be frequent in the province of Canton in China. The fruit is dried like figs to be kept all the year, and is brought into Europe. It is ſomewhat larger than our apple, almoſt round, and of a reddiſh colour, or ſometimes green. When it is dry, it has a cruſt reſembling honey or ſugar.

SUCULA, in *Mechanics*. See SUCCULA.

SUDAMINA, little heat-pimples in the ſkin, like millet-grains, frequent in youth; eſpecially thoſe of a hot temperament, and that uſe much exerciſe.

SUDARIUM, in *Eccleſiaſtical Writers*, the ſame with BRANDEUM.

SUDATORY, SUDATORIUM, a name given by the ancient Romans to their hot or ſweating-rooms; ſometimes alſo called *laconica*.

The *ſudatory* was a ſpecies of their hypocauſta or ſtoves. See HYPOCAUSTUM. See alſo SWEATING-*houſe*.

SUDIS, Esox *ſphyræna* of Linnæus, in *Ichthyology*, a name uſed by moſt authors for the ſea-pike, a fiſh called by others *lucius marinus*, and *ſphyræna*. See *Tab.* V. *of Fiſh*, N° 53.

It in ſome degree reſembles the common river-pike, but is thinner in proportion to its length, and in ſome degree approaches to the *acus*, or tobacco-pipe-fiſh, in that particular. Its ſcales are ſmall, and its noſe long, and of a conic form, the under jaw running out a good way beyond the upper, and ending in a ſharp point; its mouth is very wide, and yellow within; its tongue large and narrow and armed with very ſharp teeth; each of the jaws is furniſhed with a ſingle row of large and ſharp teeth, and in the middle of the lower jaw is one tooth longer than the reſt, which has a hollow in the upper jaw for receiving it; it has two fins on the back, which are both very deeply forked. It is caught in the Mediterranean, and uſually ſwims in ſhoals together. Its uſual length is ten or twelve inches; and it is eſteemed a very well taſted fiſh. Ray.

SUDOR, in *Medicine*. See SWEAT.

SUDOR *Anglicanus*, the *Engliſh ſweat*. See SWEATING SICKNESS.

SUDORIFIC, in *Medicine*, a remedy that cauſes or promotes ſweat.

Sudorifics only differ from DIAPHORETICS in the degree of their action; the one promoting ſenſible perſpiration, the other inſenſible.

To the claſs of *ſudorifics* belong 1°, All things that moving violently through the body, attenuate the humours, and accelerate their motion.

2°, Such things, as at the ſame time diminiſh the reſiſtance in the ſudatory veſſels about the cutis.

To which ſome add a third kind; ſuch as abſorb the acidities of the blood, and thus ſet at liberty the matter of the ſweat.

The firſt intention is chiefly effected by a copious drinking of very hot waters; by acids drawn from vegetables by fermentation and diſtillation; or thoſe of foſſils attenuated by repeated diſtillations, eſpecially if theſe be drunk mixed with hot water; by alkalis both volatile and fixt, diluted with hot water; by all compound ſalts diſſolved in water; by ſapas, metallic cryſtals, or the attenuated parts of metals themſelves, as ſtibium diaphoreticum, fixt ſulphur of Tachenius, bezoardic mineral, diaphoretic mercury, diaphoretic gold, &c. by ſharp, ſubtile, acrimonious aromatics, as abſynthium, abrotanum, opium, aſparagus, aniſe, aſclepias, ariſtolochia, gum ammoniac, carduus benedictus, caraways, cinnamon, camomile, ſaffron, capillus veneris, china, dittany, eupatorium, gentian, hyſſop, laurel, mint, leeks, roſemary, ſage, ſavin, ſaſſafras, ſcordium, thyme, veronica, nettle, and other medicines compounded of theſe and the like, as Venice-treacle, mithridate, diaſcordium, orvietan, &c. The ſecond is chiefly effected by cleanſing the ſkin, by vaporous lotions, baths, and frictions; by relaxing the cutaneous, and ſubcutaneous veſſels, which is beſt done by hot water ſprinkled all over the body, the head excepted; by increaſing the external heat about the naked body, as by the warmth of a bed, a vapour bath, &c.

The third is effected by abſorbents; as corals, crabs-eyes, diaphoretic antimony, bezoar, &c. See each under its proper article.

Sudorifics, if taken in time, are the beſt medicines for preventing inflammatory and feveriſh diſorders of all kinds. Sir John Pringle condemns the uſe of treacle, given with this intention, on account of its heating quality. However, he obſerves, that it is rendered more *ſudorific* and leſs narcotic, by adding ten grains of ſalt of hartſhorn to a common doſe, and promoting the ſweat by a large draught of vinegar-whey. Inſtead of this compoſition, two ſcruples of ſalt of hartſhorn, ſaturated with about three ſpoonfuls of common vinegar, may be given at bed-time. Pringle's Obſ. on the Diſeaſes of the Army, p. 131.

A ſafe, eaſy, and effectual *ſudorific*, may be prepared in the following manner. Take an ounce of refined camphor, beat it in a marble mortar with two ounces of blanched almonds, till it be reduced to a ſmooth and even paſte. This may be formed into pills, or boluſſes, and given according to the ſtrength of the patient, and other conſiderations, from three grains to forty.

Sudorific, perſpirative and alexipharmic medicines make a large part of the common diſpenſatories. A few medicines, well choſen, might ſupply the place of all theſe; and of theſe one principal one would prove to be camphor, which trial will always ſhew to be greatly ſuperior to bezoar, Gaſcoign's powder, lapis contrayerva, and the like. Shaw's Lectures, p. 227.

SVEGLIATO, in the *Italian Muſic*, is uſed for a briſk, lively, gay manner of ſinging or playing. Thus they ſay, *maniera ſvegliata*.

SUET, SEVUM, a kind of fat, found in deer, ſheep, oxen, hogs, &c. which, melted down and clarified, makes what we call tallow, uſed in the making of candles.

The word is formed from the Latin, *ſuedum*, *ſebum*, or *ſevum*, which ſignify the ſame; and theſe *a ſus*, by reaſon of the fatneſs of that beaſt.

Anatomiſts, &c. diſtinguiſh four kinds of fat in the body of an animal. The firſt, which fixes itſelf, and, after melting, cools into a very firm conſiſtence, they call *ſuet*. It is found in greateſt abundance in the lower belly, and about the kidneys. See ADEPS and FAT.

F. le Compte mentions a tree in China, that bears a kind of *ſuet* or tallow. See TALLOW-*tree*.

SUETA, in *Ichthyology*, a name given by Bellonius, and ſome other writes, to the NASUS, a ſpecies of cyprinus, according to the Artedian and Linnæan ſyſtems, and diſtinguiſhed by the name of the *cyprinus naſus*, with the ſnout ſtanding prominent, in form of a noſe, and with fourteen rays in the pinna ani.

SUFFERANCE, in *Ancient Cuſtoms*, a delay or reſpite of time, which the lord granted his vaſſal, for the performance of fealty and homage, ſo as to ſecure him from any feodal ſeizure.

Sufferance, ſay the cuſtoms, is equivalent to FEALTY and HOMAGE, while it holds.

The word is alſo uſed for a delay which the lord grants his vaſſals, to quit their hands of fees or inheritances they have acquired, till they have paid the due of indemnity, &c.

SUFFERANCE, *bill of*. See BILL.

SUFFERANCE, *eſtate at*, in *Law*, is where one comes into poſſeſſion of land by lawful title, but keeps it afterwards without any title at all. As if a man takes a leaſe for a year, and after the year is expired, continues to hold the premiſes without any freſh leave from the owner of the eſtate. Or, if a man maketh a leaſe at will and dies, the eſtate at will is thereby determined; but if the tenant continueth poſſeſſion, he is tenant at *ſufferance*. This eſtate, in the caſe of a ſubject, may be deſtroyed, whenever the true owner ſhall make an actual entry on the lands and ouſt the tenant; for, before entry, he cannot maintain an action of treſpaſs againſt the tenant by *ſufferance*, as he might againſt a ſtranger; becauſe the tenant being once in by a lawful title, the law will ſuppoſe him to continue upon a title equally lawful; unleſs the owner of the land, by ſome public and avowed act, ſuch as entry, will declare his continuance to be tortious or wrongful. Thus ſtands the law, with regard to tenant by *ſufferance*; and landlords are obliged in thoſe caſes to make formal entries upon their lands, and recover poſſeſſion by the legal proceſs of ejectment; and, at the utmoſt, by the common law, the tenant was bound to account for the profits of the land ſo by him detained; but now, by 4 Geo. II. c. 28. in caſe any tenant for life or years, or other perſon claiming under, or by colluſion with ſuch tenant, ſhall wilfully hold over after the determination of the term, and demand made in writing for recovering the poſſeſſion of the premiſes, by him to whom the remainder or reverſion thereof ſhall belong; ſuch perſon, ſo holding over, ſhall pay, for the time he continues, at the rate of double the yearly value of the lands ſo detained. This has almoſt put an end to the practice of tenancy by *ſufferance*, unleſs with the tacit conſent of the owner of the tenement. Bl. Com. vol. ii. p. 150. See EJECTIONE *firmæ*.

SUFFIBULUM, among the Romans, a name given to the PRÆTEXTA of the pontiffs, and PALLA of the Veſtal virgins.

SUFFIMENTA, *fumigations*, in *Pharmacy*. See FUMIGATION.

SUFFITION, *ſuffitio*, among the Romans, a kind of luſtration, practiſed by perſons who had attended a funeral; it was performed by walking over fire, and being ſprinkled with water.

SUFFITUS, SUFFIMENT, or SUFFUMIGATION, in *Medicine*, a thickiſh powder, prepared of odoriferous plants, gums, &c. which being thrown on coals, the vapours or *ſteam* thereof are received by ſmelling. See PERFUMES.

SUFFOCATION, SUFFOCATIO, in *Medicine*, a privation or obſtruction of reſpiration.

Suffocation ſometimes ariſes from a too great abundance of blood thrown on the lungs, or the muſcles of the larynx, and preventing the ingreſs of the air; as is the caſe in quinzies, ſuffocating catarrhs, peripneumonies, &c. The fumes of wines, or ſtrong beers, when boiling, cauſe *ſuffocation*, by interrupting the circulation of the blood. And the ſame may be obſerved of the fumes of lime, wherewith walls are whitened; and thoſe of charcoal, antimony, ſulphur, vitriol, and ſpirit of nitre.

The *ſuffocation* under water is owing partly to the paſſage of air being ſtopped up, and partly to the irruption of the water into the breaſt.

In France they diſpatch their people that are raving mad by *ſuffocating* them between two pillows: the ſame has been alſo ſometimes practiſed here in caſes of hydrophobiæ, &c.

SUFFOCATION *of the womb*, or *matrix*, is a diſeaſe pretty frequent in women, called alſo *fits of the mother*. In this, the patient imagines a malignant vapour riſing from the matrix, and ſo preſſing againſt the lungs and the diaphragm, as to prevent the free motion neceſſary to reſpiration.

Its true cauſe is a convulſion of the muſcles of the larynx, which ſtreighten the wind-pipe, and prevent the air's paſſing into the lungs. Hence it is, that hyſteric women feel conſtrictions in the throat, as if one were ſtrangling them with a cord. See HYSTERIC *affection*.

SUFFOCATIO *ſtridula*. See CROUP.

SUFFOCATIVE *catarrh*. See CATARRH.

SUFFOLK *powder*, the name of a medicinal powder, good for the bite of a mad dog. It had its name from a counteſs of Suffolk, who uſed to give it with great ſucceſs. It is ſtill kept as a ſecret in ſome private families, but ſeems to be only the ſtar of the earth, or the common buckſhorn plantain dried and powdered, or this powder with ſome very trifling addition. This plant has been famous for its virtues in this caſe a great while among us, and De Grey, in his Complete Farrier, gives the method by which he had cured dogs by it with great ſucceſs. See Phil. Tranſ. N° 450, p. 455.

SUFFRAGAN, SUFFRAGANEUS, in the *Eccleſiaſtical Polity*, a term applied (but not very properly) to a biſhop, with reſpect to his archbiſhop, on whom he depends, and to whom appeals lie from the biſhop's official.

In this ſenſe, the archbiſhop of Canterbury has twenty-one *ſuffragans*, and the archbiſhop of York four.

The term was never heard of before the eighth century. Some derive it hence, that the biſhops are to help and aſſiſt the archbiſhop; *quia archiepiſcopo* ſuffragari & *aſſiſtere tenentur*. Others ſay, it is becauſe eccleſiaſtical matters are determined by their votes, or ſuffrages; & ſuffraganei *dicuntur*, *quia eorum* ſuffragiis *cauſæ eccleſiaſticæ judicantur*. Others hold they are called *ſuffragans*, becauſe when called by a metropolitan to a ſynod, they have a right of ſuffrage, or of voting; or becauſe they could not be conſecrated without his ſuffrage or conſent.

SUFFRAGAN is alſo more properly uſed for a CHOREPISCOPUS, or an aſſiſtant biſhop, or coadjutor, who has a title *in partibus infidelium*, and aſſiſts another in the diſcharge of his function, or diſcharges it himſelf in the abſence of that other. They were conſecrated, like other biſhops, by the archbiſhop of the province, and appointed as titular biſhops, to execute ſuch power and authority, and to receive ſuch profits as were limited in their commiſſions by the biſhops or dioceſans, whoſe *ſuffragans* they were; and whom they aſſiſted in duties merely epiſcopal, as the conferring of orders, confirmation, and conſecration of divers kinds; and in this reſpect, it is ſaid, they differed from the COADJUTORS who aſſiſted their biſhops in matters chiefly of juriſdiction, as in collating to benefices, granting inſtitutions, diſpenſations, and the like, and who for theſe purpoſes need not have been epiſcopally ordained. This was the practice here in England eſpecially: the two ends of orders, and of juriſdiction voluntary, in caſe of the inability of a biſhop, were anſwered by two different perſons; the firſt under the name of *ſuffragans*, and the ſecond under that of coadjutor.

Theſe *ſuffragans* are by ſome alſo called *ſubſidiary biſhops*. By ſtatute 26 Henry VIII. cap. 14. every archbiſhop or biſhop, diſpoſed to have any *ſuffragan*, is allowed to name two proper perſons, and to preſent them to the king, who was impowered to give one of them the title, ſtyle, and dignity of biſhop of ſuch of the ſees as are mentioned in the ſtatute, as he thought fit: and every ſuch perſon ſhould be called biſhop *ſuffragan* of the ſame ſee, and be conſecrated accordingly. This act ſpecifies the places for which ſuch *ſuffragans* were to be nominated, and fixes the place of their reſpective reſidence. Their profits and juriſdiction were to be limited by the commiſſion of the archbiſhop or biſhop to whom they were *ſuffragans*, and the time of the exerciſe of their office was alſo limited by the ſame commiſſion: and they were forbid to exerciſe it otherwiſe than ſuch commiſſion directed, on pain of a præmunire. *Suffragans* have now been diſcontinued for many years.

Du-Cange obſerves, that the title *ſuffragan* has alſo been given to ſuch prieſts as are ſubject to the viſitation of the archdeacon: and *ſuffragans of the pope*, to the biſhops of ſuch dioceſes as are immediately ſubject to the pope.

SUFFRAGE, SUFFRAGIUM, a voice or vote given in an aſſembly where ſomething is deliberated on, or where a perſon is elected to an office or benefice.

The word is formed from the Latin, *ſuffragium*, which anciently ſignified money, as appears in the eighth novel of Juſtinian; *ut judices ſine* ſuffragio *fiant*: and the ſixth novel, *qui emerit præſulatum per* ſuffragium, *epiſcopatu & ordine eccleſiaſtico excidat*.

Suffrages are ſometimes given by word of mouth; and ſometimes in writing, as at elections liable to a SCRUTINY.

The preſident or chairman of the aſſembly uſually collects the *ſuffrages*.

SUFFRAGES *of the ſaints*, in the *Romiſh Church*, denote the prayers and interceſſions which the ſaints are ſuppoſed to make to God in behalf of the faithful.

SUFFRUTEX, *under-ſhrub*, among *Botaniſts*, a name given to the loweſt ſort of woody, perennial plants; ſending no leaves from their root, and beginning to be branched from the bottom of the ſtalk. Such are lavender, rue, ſage, &c.

SUFFUMIGATION, SUFFUMIGATIO, formed from *ſub*, *under*, and *fumus*, *ſmoke*, in *Medicine*, a term applied to all remedies that are received into the body in form of fumes, i. e. of ſmoke, vapour, or perfume.

Suffumigations are compoſed of different matters according to the nature of the diſeaſe. Their intentions are to ſoften ſharp ſerous humours, to provoke or check the courſe of the menſes, to raiſe a ſalivation in venereal evils, &c. See FUMIGATION and FUMIGATOR.

SUFFUSION, SUFFUSIO, in *Medicine*, an overflowing of ſome humour, ſhewing itſelf in the ſkin; particularly that of the blood or bile.

That redneſs ordinarily ariſing from ſhame, is only a *ſuffuſion* of blood appearing in the cheeks. See BLUSHING.

The JAUNDICE is a *ſuffuſion* of bile over the whole body.

SUFFUSION is alſo uſed for a little film or pellicle, formed in the aqueous humour of the eye, before the pupil; called alſo CATARACT.

SUGAR, SACCHARUM, a very ſweet, agreeable ſaline juice, expreſſed from a kind of canes, or reeds, growing in great plenty in the Eaſt and Weſt Indies. See SUGAR-*cane*.

It is a queſtion not yet decided among botaniſts, &c. whether the ancients were acquainted with this cane, and whether they knew how to expreſs the juice from the ſame? What we can gather from the arguments advanced on either ſide is, that if they knew the cane, and juice, they did not know the art of condenſing, hardening, and whitening it; and of conſequence, they knew nothing of our *ſugar*.

Some ancient authors, indeed, ſeem to mention *ſugar*, under the name of *Indian ſalt*; but they add, that it ouſed out of the cane itſelf, and there hardened like a gum; and was even friable between the teeth, like our common ſalt; whereas *ſugar* is expreſſed by a machine on purpoſe, and coagulated by the fire.

Theirs, Salmaſius (Plinianæ Exercit. tom. i. p 716. G.) tells us, was cooling and looſening; whereas ours, the ſame author aſſerts, is hot, and excites thirſt. Hence ſome have imagined, that the ancient and modern *ſugar* plants were different: but Matthiolus on Dioſcorides, c. 75. makes no doubt they were the ſame; and others are even of opinion, that ours has a laxative virtue, as well as that of the ancients, and that it purges pituita.

The generality of authors, however, agree, that the ancient *ſugar* was much better than the modern; as conſiſting of only the fineſt and matureſt parts, which made themſelves a paſſage, and were condenſed in the air. The interpreters of Avicenna and Serapion call *ſugar*, *ſpodium*; the Perſians, *tabaxir*; and the Indians, *mambu*. Salmaſius (Com. de Sacchar. apud Plin. Exercit. vol. ii. p. 257. an. Dom. 1689.) aſſures us that the Arabs have uſed the art of making *ſugar*, ſuch as we now have it, above nine hundred years.

Others produce the following verſes of P. Terentius Varro Atacinus, to prove that it was known before Jeſus Chriſt:

Indica non magna nimis arbore creſcit arundo:
Illius e lentis premitur radicibus humor,
Dulcia cui nequeant ſucco contendere mella.

Dr. William Douglas, in his ſummary, &c. of the firſt planting of our American ſettlements, printed at Boſton in 1751, and reprinted at London in 1755, affirms, that *ſugar* was not known among the ancient Greeks and Romans, who uſed only honey for ſweetening. Paulus Ægineta, he ſays, a noted compiler of medical hiſtory, and one of the laſt Greek writers on that ſubject, about anno 1625, is the firſt who expreſsly mentions *ſugar*: it was at firſt called *mel arundinaceum*, i. e. *reed or cane honey*. He adds that it came originally from China, by way of the Eaſt Indies and Arabia into Europe, and was formerly uſed only in ſyrups, conſerves, and ſuch Arabian medicinal compoſitions.

Another queſtion among the naturaliſts is, whether the *ſugar*-canes be originally of the Weſt Indies, or whether they have been tranſlated rather from the Eaſt?

The learned of theſe laſt ages have been much divided on the point; but F. Labat, a Dominican miſſionary, in a diſſertation publiſhed in 1722, aſſerts, that the *ſugar*-cane is as natural to America as India; and that the Spaniards and Portugueſe firſt learned from the orientals the art of expreſſing its juice, boiling it, and reducing it into *ſugar*.

Other writers, however, have maintained, that it was not known in America till the Europeans tranſplanted it thither. Its origin appears to have been from the inland continent of Aſia, very probably as far eaſt as China, where it ſtill greatly abounds. From that continent it was firſt tranſplanted to Cyprus, and thence (according to various authors) into Sicily, where conſiderable quantities of it were produced about the year 1148, and whither, as ſome have aſſerted, it was brought from India by the Saracens. From Sicily it was tranſplanted by the Portugueſe to Madeira about the year 1420, and from Scilly, or the ſouthern coaſts of Africa, or as Herrera, the American hiſtorian, obſerves, from Granada, which derived it from Valencia, whither it might have been tranſplanted by the Arabian Moors, it was brought to the Canaries; from the Canary iſles to Brazil; where, indeed, ſome ſuppoſe *ſugar* was originally and ſpontaneouſly produced. Others are of opinion, that the Portugueſe, before they diſcovered, or at leaſt planted in Braſil, being in poſſeſſion of the coaſt of Angola in Africa, firſt tranſplanted the *ſugar*-cane from Angola to Braſil. About the year 1506, *ſugar*-canes were brought from Braſil and the Canaries, and planted in the iſland of Hiſpaniola, where many ſugar mills were gradually erected. In 1641, they were tranſplanted from Braſil to Barbadoes, and thence to our other Weſt India iſles: as from Braſil they were alſo carried to the Spaniſh Weſt India iſles, and alſo the Spaniſh dominions in Mexico, Peru, and Chili; and laſtly to the French, Dutch, and Daniſh colonies.

The boiling and baking of *ſugars*, ſays Dr. Heylin in his Coſmography, the firſt edition of which was printed in 1624, as it is now uſed, is not above two hundred years old; and the refining of it more new than that, firſt found out by a Venetian in the days of our forefathers, who got one hundred thouſand crowns by the invention. Before which art of boiling and refining it, our anceſtors made uſe of it rough as it came from the canes, but they moſt commonly uſed honey inſtead of it. The firſt account we have of *ſugar*-refiners in England is in the year 1659. Anderſon's Hiſt. of Com. vol. i. p. 82. 246. 331. 334. vol. ii. p. 72—105.

SUGAR-*cane*, *ſaccharum*, in *Botany*, a genus of the *triandria digynia* claſs. Its characters are theſe: it hath no empalement, but a woolly down longer than the flower that encloſes it; the flower is bivalve; the valves are oblong, acute-pointed, concave, and chaffy; it has three hair-like ſtamina, the length of the valves terminated by oblong ſummits; and an awl-ſhaped germen, ſupporting two rough ſtyles, crowned by ſingle ſtigmas; the germen becomes an oblong acute-pointed ſeed, inveſted by the valves.

We have but one ſpecies of this genus, which grows naturally in both the Indies, where it is cultivated for its juice, which, when boiled, affords that ſweet ſalt which is called *ſugar*.

Linnæus enumerates two ſpecies.

The root of this plant is jointed like thoſe of the other ſorts of canes and reeds, from which ariſe four, five, or more ſhoots, according to the age or ſtrength of the root; theſe grow from eight or ten to twenty feet high, according to the richneſs of the ground; but thoſe of middling growth are the beſt.

The canes are alſo jointed, and the length as well as the ſize of the joints depend upon the weather and the ſoil; at each joint are placed leaves, the lower part of which embraces the ſtalk or cane to the next joint above their inſertion, before they expand. The firſt joint, which comes out either at the third, fourth, or fifth month, according to the ſeaſon and ſoil, always keeps in its firſt place near the earth; out of this comes the ſecond, and out of the ſecond a third, &c. each week producing its joint, or very nearly, and a correſponding leaf likewiſe drying and falling off nearly every week.

A cane of thirty-two joints, which is fit to be cut, has from five to twenty-eight of them which have loſt their leaves; the next five or ſix ſtill have them, in a withered ſtate, and ready to fall off; and the remaining joints, ſurrounded with green leaves, form the head, which is cut off after the laſt leaf is withered. In a cane, whoſe length is from ſeven to nine feet, and which grows in a new, or a very moiſt and favourable ſoil, the number of uſeful joints is between forty and fifty, the firſt above the ground generally appearing at the end of three months, or, with frequent ſhowers, a fortnight ſooner; and many canes in ſuch a ſoil are found rotten or almoſt dried up at the end of thirteen months: in a good ſoil, favourably expoſed, well drained, and worked for a number of years, canes not ſhorter than four feet and a half have thirty-eight or forty joints, the firſt joint appearing about the fourth or middle of the third month, and many canes that have been cut in ſuch a ſoil at the end of fourteen or fifteen months being found rotted or dried: in a dry, but good ſoil, not manured, but well worked, and ſeconded by the ſeaſon, the canes have been from three to four feet long, and have had from thirty to thirty-four joints; the firſt joint coming out at the end of four, or four months and a half, and canes of this kind have been found ſtanding at the end of fifteen months, but very dry, and ſometimes a little changed: in a ſoil which is ſtill drier, and more parched, canes which have been about two feet high have had from twenty-four to twenty-eight joints, the firſt of which appears at the end of the fifth month, and many of theſe canes have been dried at the end of fifteen months. From theſe and ſimilar obſervations on the growth of canes in various kinds of ſoil, it has been inferred, that if there be any in which they can exiſt till the fifteenth or ſixteenth month, they never grow to any kind of purpoſe in any after the thirteenth, or even after the twelfth. A deep ſoil and light land are moſt ſuitable to the *ſugar*-

cane; and the rainy ſeaſon is the proper time for planting it: the ſooner they are planted after the rains begin to fall, the more time they have to get ſtrength before the dry weather ſets in.

If the ground is proper for the *ſugar-canes*, and they are planted at a good diſtance from each other, and the land is carefully managed by changing the crops to other ſpecies, or allowing a fallow to reſt and recover itſelf, the ſame plantation, ſays Mr. Miller, may be continued above twenty years without replanting, and produce good crops the whole time: whereas in the common method, they are generally replanted in ſix or ſeven years, and in ſome of the poor land they are continued but two or three years. The canes are propagated by cuttings or joints of proper lengths, from fifteen to twenty inches, in proportion to the nearneſs of the joints; which are generally taken from the tops of the canes, juſt below the leaves: but Mr. Miller ſays, that if they were choſen from the lower part, where they are leſs ſucculent and better ripened, they would not produce canes ſo luxuriant, but their juice would be leſs crude, and contain a greater quantity of ſalts, which would be obtained by leſs boiling than that of thoſe commonly planted. However, Mr. Cazaud, a late writer, and a planter of *ſugar-canes*, obſerves, that the upper part, commonly called the head, is the beſt part that can be uſed for propagating them: and he recommends to put the plant in the ground as ſoon as it is cut. The diſtance which the canes are uſually allowed in planting is from three to four feet, row from row; and the hills are about two feet aſunder in the rows, in each of which hills they plant from four to ſeven or eight cuttings: inſtead of which number, productive often of blights, Mr. Miller is of opinion, that if one good cutting were planted in each hill, or two at moſt; and if both ſucceeded, the weakeſt were drawn out ſoon after they had taken, blights would be prevented, and the quantity of *ſugar* would be full as great, and require little more than a fourth part of the fuel to boil it. In the proper ſeaſon for planting, the ground ſhould be marked out by a line, that the rows of canes may be ſtraight and at equal diſtances: and the whole ſhould be divided into pieces of ſixty or ſeventy feet broad, leaving intervals between each of about twenty feet, for the convenience of paſſage, and for the admiſſion of the ſun and air between the canes.

The common method of planting the canes now practiſed, is to make a trench with the hoe, which is performed by the hand; into this a negro drops the number of cuttings intended to be planted, which are planted by other negroes, and the earth drawn about the hills with the hoe, all which is performed by the hand: but if the right uſe of the plough was introduced, the work would be both better and cheaper performed. If, therefore, inſtead of a trench drawn by the hoe, a deep furrow is made with a plough, and the cuttings properly planted therein, the ground being deeper ſtirred, will be more favourable to the growth of the canes.

If the ground is afterward to be kept clear by the horſe-hoe, the rows of canes ſhould be five feet aſunder, and the hills be two and a half feet diſtant; and but one cane left in each hill. After they have made ſome ſhoots, the ſooner the horſe-hoe is uſed, the more they will thrive, by keeping the weeds under, and well ſtirring the land.

When the canes are from ſeven to ten feet high, and of proportionable ſize, the ſkin ſmooth, dry, and brittle; if they are heavy, their pith grey or inclinable to brown, the juice ſweet and glutinous; they are eſteemed in perfection.

Mr. Cazaud obſerves, that the withering and fall of a leaf is the only and a ſufficient criterion of the maturity of the joint to which it adhered; and that the eight laſt joints of two canes, which are cut the ſame day, have exactly the ſame age and the ſame degree of ripeneſs, notwithſtanding one of the canes may be fifteen, and the other only ten months old: to which purpoſe he adds, that each joint of the cane of a ſuppoſed growth of ten months, contained the ſame quantity of *ſugar* as that of a cane of the ſuppoſed growth of fifteen.

The time for cutting them is uſually after twelve or fifteen months growth, but this varies according to the ſoil and the ſeaſon. Thoſe which are cut toward the end of the dry ſeaſon before the rains begin to fall, produce better *ſugar* than thoſe cut in the rainy ſeaſons, when they are more replete with watery juice, and require a greater expence of fuel to boil it.

In thoſe plantations where the number of negroes is ſmall, *ſugar* is made in almoſt all ſeaſons indifferently, and conſequently the canes are planted when the planter is beſt prepared for his work, rather than at the moſt advantageous time. The ſyſtem of cultivation among planters, who are better ſupplied in reſpect of labourers, conſiſts in planting a fourth or a fifth of their land in October, November, and December; in digging very deep trenches, for the greater nouriſhment of the root; in planting at great diſtances, for the benefit of a freer circulation of the air; and in cutting the canes in the four fineſt months, viz. February, March, April, and May, becauſe the *ſugar* is then the fineſt, the canes are cut with the leaſt trouble, and ſupply (as is ſuppoſed) greater quantities of it. Thoſe who adopt this method, cut about three fourths of their plantations, the remaining being made up of young canes, to be cut the following year, and for new plants.

Mr. Cazaud, who has made many judicious obſervations and experiments on the cultivation of the *ſugar-cane*, has adopted a new method. He employs the whole of the firſt ſix months of the year in the buſineſs of the crop, and in May and June plants the canes which have been cut in January. This of courſe induces a neceſſity of cutting the rattoons (or the canes proceeding from the old ſtumps) at the end of the eleventh inſtead of the end of the twelfth month, and the planted canes, which ſhould ſtand fifteen months, at the end of the year; ſo that the whole plantation is cut every year; and he only plants a ſixth part of his land every year. He has largely illuſtrated the reaſons and advantages of this method; the fundamental principle of which is the neceſſity of planting the canes in the only ſeaſon fitted to accelerate and preſerve them: as in the windward iſlands, the weather is commonly dry from the fifteenth of February to the fifteenth of May, and the rains are moderate till Auguſt, and copious the two or three following months, and afterwards decreaſe till February: and, therefore, the progreſſion of the rain keeps pace, as it were, with that of the canes, when they are planted in May. With regard to the maturity of the cane, as far as it is of conſequence to the *ſugar*, this, he ſays, does not depend on the age, but on the ſeaſon. In February, March, and April, all the canes, whatever be their age, are as ripe as the nature of the ſoil ever allows them to be, and accordingly he never fails to make the greateſt part of his *ſugar* at this ſeaſon. He obſerves, that the dryneſs of the weather (and not the age of the canes) which increaſes from January to April, is the cauſe, that in January four hundred gallons of juice commonly yield forty-eight gallons of *ſugar* and molaſſes one with another; in February from fifty-ſix to ſixty-four; in March from ſixty-four to ſeventy two; in April ſometimes eighty; after which period the *ſugar* ferments, and even burns when the refiner is not very expert at his buſineſs. The greateſt relative maturity of his canes he infers to be, when the juice of them was made up of four parts water, and one part of ſugar and molaſſes: and in canes perfectly ripe, the quantity of *ſugar*, he ſays, is equal to that of the molaſſes. After a trial of this plan for five years, he is convinced, that there is a difference of above one ſixth in its favour. Miller's Gard. Dict. Phil. Tranſ. vol. lxix. part i. art. xix. p. 207, &c.

When the rattoons or canes are ripe, as they ordinarily are in twelve or fifteen months, or, as Mr. Cazaud apprehends, in eleven or twelve months, they are cut, and carried in bundles to the mills. The mills conſiſt of three wooden rollers, covered with ſteel plates; and have their motion either from the water, the wind, cattle, or even the hands of ſlaves.

SUGAR, *preparation of.* The juice coming out of the canes, when preſſed and broken between the rollers, runs through a little canal into the *ſugar*-houſe, which is near the mill; where it falls into a veſſel, whence it is conveyed into the firſt copper, or caldron, to receive its firſt preparation, only heated by a ſlow fire to make it ſimmer. With the liquor is here mixed a quantity of aſhes and quick-lime, called *temper*; the effect of which mixture, aſſiſted by the action of the fire is, that the unctuous parts are ſeparated from the reſt, and raiſed to the top, in form of a thick ſcum, which is kept conſtantly ſcumming off, and ſerves to feed the poultry, &c.

The juice, in the next place, is purified in a ſecond copper; where a briſker fire makes it boil; and all the time the caſting up of its ſcum is promoted by the means of a ſtrong ley, compoſed of lime-water, and other ingredients.

This done, it is purified and ſcummed in a third boiler, wherein is caſt a kind of ley, that aſſiſts in purging it, collects together its impurities, and makes them riſe to the ſurface, whence they are taken with a ſkimmer.

From the third it is removed to a fourth boiler, where the juice is farther purified by a more violent fire: and hence to a fifth; where it is brought to the conſiſtence of a ſyrup. In a ſixth boiler, the ſyrup receives its full coction; and here all the impurities left from the former leys are taken away by a new ley, and a water of lime and alum caſt into it. In this laſt copper there is ſcarce found one-third of what was in the firſt; the reſt being waſted in ſcum.

By thus paſſing, ſucceſſively, a number of coppers, the *ſugar* juice is purified, thickened, and rendered fit to be converted into any of the kinds of *ſugar* hereafter mentioned. The ſize of the ſeveral coppers always diminiſhes from the firſt to the laſt; each being furniſhed with a furnace, to give an heat proportionable to the degree of coction the juice has received. In ſome large *ſugar*-works there are alſo particular coppers for the boiling and preparing of the ſcums.

F. Labat mentions ſeveral different *kinds of ſugars* prepared in the Caribbees, viz. *Crude ſugar*, or *muſcovado*; *ſtrained*, or *brown ſugar*; *earthed*, or *white ſugar* in powder; *refined ſugar*, either in powder or loaves; *royal ſugar*; *candied ſugar*; *ſugar of fine ſyrup*; *ſugar of coarſe ſyrup*; *ſugar of the ſcum*.

SUGAR, *crude*, or muſcovado, is that firſt drawn from the juice of the cane; and whereof all the reſt are compoſed.

The method of making it is that already deſcribed as for *ſugar* in the general. We need only add, that when taken out of the ſixth copper, it is put into a cooler, where, ſtirring it briſkly together, it is let ſtand to ſettle, till a cruſt of the thickneſs of a crown-piece be formed thereon. The cruſt being formed, they ſtir it up again, then put it into veſſels, where it ſtands to ſettle till it be fit to barrel.

SUGAR, *ſtrained*, or *brown*, though ſomewhat whiter and harder, does not differ much from the crude *ſugar*; though it is held a medium between this laſt and the earthed *ſugar*; which is the white powder *ſugar*.

The preparation of this is the ſame as that of the muſcovado, with this difference, that, to whiten it, they ſtrain the liquor through blankets, as it comes out of the firſt copper. The invention of ſtrained *ſugar* is owing to the Engliſh, who are more careful than their neighbours in the preparation thereof; for they not only ſtrain it, but, when boiled, put it into ſquare wooden forms, or moulds, of a pyramidal figure; and when it has purified itſelf well, they cut it in pieces, dry it in ſtoves, and barrel it up. See *Refining of* SUGAR, *infra*.

SUGAR, *earthed*, is that which is whitened by means of earth laid on the top of the forms it is put in to purge itſelf. See *Refining of* SUGAR.

SUGAR *of the ſcum*. This is all made of the ſcum of the two laſt coppers; thoſe of the former being reſerved for the making of rum.

The ſcum deſtined to make *ſugar* is kept in a veſſel for that purpoſe, and is boiled every morning in a copper ſet apart for that uſe. With the ſcum, is put into the copper a fourth part of water, to retard the boiling, and give time for its purging; when it begins to boil, the uſual ley is put in, and it is carefully ſcummed: when almoſt enough boiled, lime and alum-water are thrown in; and when it is ready to be taken out, they ſprinkle it with a little powdered alum.

SUGAR *of ſyrup*, or *treacle*. There are three kinds of ſyrups that run from *ſugar*. The firſt from the barrels of raw *ſugar*, which is the coarſeſt of all; the ſecond, from the forms, or moulds, after they are perforated, and before they receive their earth; the third, that coming from the forms after they have had their earth; which laſt is the beſt.

The coarſe ſyrups ſhould only be uſed for rum, but *ſugar* being grown dear, endeavours have been uſed to make ſome hereof, and that with tolerable ſucceſs. They are firſt clarified with lime-water: and, when boiled, are put up in barrels, with a *ſugar*-cane in the middle, to make them purify themſelves. After twenty days, a quantity of coarſe earth is thrown in, to make them caſt the remainder of their ſyrup, and fit them to be returned into a crude *ſugar*. The Dutch and German refiners firſt taught the iſlanders how to turn their treacle into *ſugar*.

The ſecond ſyrup is wrought ſomewhat differently: after the copper it is to be boiled in is half full, eight or ten quarts of lime-water are caſt in; it is then boiled with a briſk fire, and carefully ſcummed; ſome add a ley, and others none F. Labat takes the former method to be the better, though it requires more trouble and attention. This *ſugar* may be earthed alone, or at leaſt, with the heads of loaves, the dried tops, and ſuch other kinds of *ſugars* as may not be mixed with true earthed *ſugar*, nor yet with the crude *ſugar*.

For the third ſyrup, after boiling and ſcumming it as the former, they put it inſtantly into coolers, the bottoms whereof are covered half an inch thick with white *ſugar* very dry, and well pounded; and the whole is well ſtirred to incorporate the two together. This done, they ſtrew the ſurface over with the ſame pounded *ſugar*, to the thickneſs of one-fifth of an inch, this aſſiſting the *ſugar* in forming its grain. When ſettled, and the cruſt gathered at the top, a hole is made in the cruſt five or ſix inches diameter.

By this aperture they fill the cooler with a new ſyrup poured gently in, which inſenſibly raiſes up the former cruſt. When all the ſyrups are boiled, and the cooler is full, they break all the cruſts; and, after mixing them well, put them in forms or moulds.

The reſt is performed in the ſame manner as for the earthed *ſugar*; from which it only differs, in that it falls ſhort of its gloſs and brightneſs; being in reality, ſometimes whiter and finer, though of a flatter and duller white. For the uſe and management of the *ſyrup of ſugar*, ſee *Refining of* SUGAR.

SUGAR, *refined*. Crude *ſugar*, ſtrained *ſugar*, and the heads or tops of loaves that have not whitened well, are the baſis, or ground, of this *ſugar*. See *Refining of* SUGAR.

SUGAR, *royal*. The baſis of this ſort ought to be the pureſt refined *ſugar* to be found. This they melt with a weak lime-water; and, ſometimes, to make it the whiter, and prevent the lime from reddening it, they uſe alum-water. This they clarify three times, and paſs as often through a cloſe cloth, uſing the very beſt earth. When prepared with theſe precautions it is whiter than ſnow, and ſo tranſparent, that we ſee a finger touching it, even through the thickeſt part of the loaf.

The curious in the whole art of *ſugar*-making, or the reducing vegetable juices to what we call *ſugar*, by expreſſion, decoction, clarification, graining, claying, and cryſtallization, will find farther accounts and directions, in the ſeveral proceſſes of this art, in Piſo's Hiſt. Ind. in Angelus Sala's Saccharologia; in Dr. Slare's Treatiſe on *Sugars*; and in ſir Hans Sloane's Hiſtory of Jamaica. There are alſo ſeveral valuable papers on theſe ſubjects in the Philoſophical Tranſactions.

SUGAR, *refining of*, is the art of purifying *ſugar*, and of giving it a ſuperior degree of whiteneſs and ſolidity.

The excellence of *Muſcovado ſugars*, or ſuch as have not been refined by the planter, but are ſent home in the moſt crude ſtate, conſiſts in their whiteneſs, dryneſs or freeneſs, cleanneſs, and ſharpneſs or ſtrength. The judicious refiner decides upon theſe ſeveral qualities by the eye, the touch, and the taſte.

The firſt operation in the proceſs of refining is that of *clearing the pans*; previous to which they are charged, by throwing about ſix quarts of freſh bullock's blood (called *ſpice)* into each pan, and filling it with lime-water to about half the height from the bottom to the part in which the brace is fixed; and when theſe are well ſtirred together, the pan is filled to the brim with raw *ſugar*. This maſs, with a moderate fire, will in about two hours be brought to the verge of boiling heat; but it ſhould not be allowed actually to boil; and in this time the earthy particles of the *ſugar*, and other adventitious impurities, will be ſeparated from it by the effect of the heat, and the cleanſing quality of the ſpice, and thrown up to the ſurface. About two quarts of ſpice are added to each pan, within the firſt hour after the fires are lighted. The ſcum thus produced, which is uſually from four to ten inches thick, is fit to be taken off, when the ſurface appears black and dry, and not greaſy; and it is gently removed with a broad ſkimmer into a portable tub, and conveyed into the ſcum ciſtern. Having done this, the panman ſtirs together a ladle full of ſpice (e. gr. about a quart), and a quantity of lime-water (e. gr. one or two gallons as the caſe may require), and pours this mixture into each pan. When the *ſugar* is again brought to a ſcalding heat, it throws up a ſecond ſcum, not ſo foul as the firſt, which is removed as before. He then adds a freſh quantity of ſpice, but leſs than the former, and repeats this operation, till the *ſugar* caſts up a clean milky froth, which indicates that the impurity is wholly extracted. The liquor is alſo ſometimes examined with a bright ſilver or metal ſpoon, that any remaing foulneſs may be diſcovered. In the making of double loaves, powder loaves, or very fine ſingle loaves, it is uſual to heighten the natural colour of the *ſugar* by the addition of a little blue. For this purpoſe, when the pans are almoſt clear, the quantity of about ſix pennyweights troy of the fineſt indigo, finely powdered and filtered through a piece of woollen or blanketting in a baſon of freſh water, and well ſtirred together in the baſon, is thrown into each pan. The *ſugar* being once raiſed in the pan after this infuſion, the groſſer particles of the colour are taken off in the laſt ſcum, and the remainder is incorporated with the *ſugar* in the pan.

The panman, having brought the *ſugar* to the cleaneſt ſtate, prepares to *ſkip it off*, or to ſhift it from one veſſel to another: this is done by means of a wooden gutter laid along the pans, and opening into the clarifying ciſtern. Over this ciſtern, upon large iron bars, is fixed an oblong baſket, about ſixteen inches deep, in which a large thick blanket is faſtened; and through this blanket and baſket the *ſugar* liquid paſſes out of the gutter; and to the maſs a quantity of ſyrup is uſually added. Having meaſured the quantity of liquid in the ciſtern with a rod graduated by inches, the panman pumps back into the pans either the ſixth or ninth part of the whole, as he is directed by the ſuperviſor or boiler; and the pans are all ſupplied together by means of a trough. When this is done, the fire is ſtirred up to a conſiderable degree of fierceneſs; and then commences a new operation, viz. the *evaporation*. In this part of the proceſs (the day's work being divided into three fillings), the panman pumps into the pan one-ninth part of the quantity in the ciſtern, which in a few ſeconds begins to boil, and muſt be continued in a boiling ſtate, but not with too intenſe a fire; and to prevent the *ſugar* from boiling up to the ſurface of the pan, or from boiling over, he caſts a ſmall quantity (viz. a piece as large as a nutmeg or walnut, as the caſe may require) of butter or greaſe into the boiling liquor. Here it is to be obſerved, that *ſugar* ſhould boil low in the pan, and yet not too flat like water; for by riſing hollow from the bottom, the neceſſary evaporation is retarded, and the *ſugar* is expoſed to the action of the fire for a longer time than it ought to be. In a ſpace of time from twelve to thirty minutes, the evaporation will have produced its effect, and the *ſugar* acquire the requiſite degree of viſcouſneſs. The ſtate will be indicated by various circumſtances; as by the bubbles dragging heavily over the ſurface of the boiling maſs, and by the clammy liquid falling in ropes from the proof-ſtick; but principally by that teſt which is called the *proof*. For this purpoſe the boiler draws the ſtick out of the boiling liquid with his right hand, and placing his left thumb upon the *ſugar*, draws it acroſs the ſtick, carrying away upon the end of his thumb as much of the *ſugar* as will hang upon it; he then by means of a candle placed in a black box, called the proof-box, and by repeated trials (drawing the *ſugar* to a thread between his thumb and fore-finger) determines when the evaporation is complete; and when this is decided, the fire is ſmothered, and nearly quenched. The hot *ſugar* liquor is then removed by means of baſons out of the pans into coolers, two or three gallons being left in each pan to prevent the bottom from being ſcorched; and the pans are again ſupplied with a quantity of liquor for the next evaporation. The liquor in the coolers is gently ſtirred to prevent a cruſt from forming on its ſurface. When the ſecond quantity is brought to proof, and ſkipped off into the coolers, the pans are ſupplied with a ſimilar quantity; and while this is boiling, that part of the proceſs of refining, called *granulation*, is purſued. For this purpoſe the *ſugar* is diſturbed in the coolers by an inſtrument, called an *oar*, and reſembling the oar of a boat: the violent motion thus continued for ſeveral minutes, ſerves to deſtroy the viſcouſneſs of the ſugar, and to complete the granulation. Upon this operation much of the beauty and ſucceſs of the manufacture depends; for if the *ſugars* are not ſtirred enough, the grain of the refined *ſugar* will be large and looſe, and its colour not ſufficiently white; but if it be ſtirred too much, the grains will be broke, the *ſugar* will be diſunited in its parts, and, though cloſe and ſmooth, without luſtre; and it will loſe conſiderably of its due weight. When the third ſkipping is boiled, and the coolers ſufficiently ſtirred, the contents of the pans are removed to the coolers as before; and thus the firſt ſtage of boiling for the day is completed. The courſe with the other two fillings is preciſely the ſame.

The next operation in refining is conducted in that part of the ground floor of a *ſugar-houſe*, which is denominated the *fill-houſe*, becauſe all the upper floors of the houſe are to be filled from this; and this operation conſiſts in *filling* the moulds with the three ſkippings contained in the coolers. The moulds, in the form of inverted cones, previouſly prepared by ſoaking and waſhing them, and ſtopping their apertures with wet linen rags, are placed ſide by ſide, and in rows two or three deep: their number is to ſuffice for the quantity of liquor in the coolers, which is eſtimated by the number of baſons which were ſkipped off from the pans; and they are propped up by other moulds (commonly ſuch as are broken) placed with the broad end downwards, in front of the outward rank, by way of abutment: theſe are called *ſlayers*. The *ſugar*, being previouſly ſtirred in the coolers, in order thoroughly to mix each ſkipping, is ladled out of the coolers in ſucceſſion, and not all at once (unleſs the fillings are ſmall, in loaves, and always in lumps) into baſons conveniently ſituated; and theſe are carried into the fill-houſe, where as much of the *ſugar* is poured into each mould as will fill about one third of its capacity; the ſame quantity is again poured into each; and at the third time they are filled to the brim. The moulds being filled, the next operation, which is that of ſtirring the *ſugar* in them, is called *hauling*, and is deſigned to prevent an adheſion to the mould, and to lay the grain of the maſs even and regular through all its parts. In this buſineſs each man takes a tool, made of wainſcot, and called a knife, and in ſize proportion to that of the mould to be ſtirred; with this tool, keeping his hand over the centre of the mould, he ſcrapes the *ſugar* from its ſides by ſucceſſive ſtroaks downwards, carried all round; and when two revolutions are performed, the *ſugar* is allowed to reſt ſome minutes, until it has acquired ſome firmneſs. The moulds, being ſtirred round three or four times according to the direction of the boiler, are no more diſturbed till they are pulled up.

The proceſs already deſcribed relates to *ſugar once refined*, called ſingle loaves; double loaves are uſually cleared with the whites of eggs inſtead of ſpice (two hundred of which are neceſſary to each pan) and with freſh water inſtead of lime-water. With reſpect to the proof, one rule only can be laid down; viz. the *ſugar* muſt be boiled higher as the moulds which contain it are increaſed in ſize.

The order of a refining is uniformly this: to begin the firſt day with the fineſt *ſugar* intended to be wrought, and to proceed daily with *ſugar* of a lower quality, and of courſe to begin with ſmall loaf-moulds, and to uſe larger moulds progreſſively; ſo that the browniſh *ſugar* will be put into large lump moulds; for this *ſugar* works beſt in large maſſes, and it is likewiſe more in demand in England than the finer kind. The uſe of this diſtribution of a refining is to enable the boiler to make a more advantageous diſpoſition of his ſyrups and ſcums. The order of the firſt twelve days is uſually as follows: firſt day, double loaves; ſecond and third days, powder loaves; fourth, fifth, and ſixth, ſingle loaves; ſeventh, Pruſſian lumps; eighth, Canary, or pattern lumps; ninth, tenth, eleventh, and twelfth days, large lumps. To theſe twelve days are added four or five more in a part of the proceſs called *baſtard boiling*; and theſe ſixteen or ſeventeen days conſtitute a complete ſeries, denominated a complement or refining.

From this digreſſion let us now return to the fill-houſe; where the ſecond and third fillings having been boiled off, and paſſed from the coolers into the moulds, in the manner already deſcribed, the panman proceeds to make over the ſcum which was taken off the pans in the morning, in order to extract the remaining *ſugar* from it: the method of doing this will be hereafter explained. When it is finiſhed, the pans are loaded for the work of the following day. In the evening when the new made goods are cool, and fit for removal without damage, they are pulled up into that floor of the houſe which is beſt ſuited for receiving them, and where a proper number of well ſorted pots are placed in ranks for this purpoſe. The up-ſtairs man plucks out from the point of every one the ſtopper or rag; and pricks them in the point with an awl, the ſize of which is proportioned to the mould; and they are then ſet upon the pots.

The contents of the moulds, cleared by the preceding operations of their earthy particles and water, conſiſt of the vegetable ſalt, and an oily matter, now called *ſyrup*, but which, after the final extraction of the ſalts, will be called *melaſſes*. For the ſeparation of theſe there is required a ſeries of operations, which may be diſtinguiſhed by the name of *filtering* or *draining*. In twenty-four hours after the loaves have been placed upon the pots, the quantity of ſyrup which will have exuded from the aperture of each, will fill more than half of the pot on which it ſtands. When the ſtate of the loaves has been examined, by drawing one or two loaves of each filling out of their moulds, if the ſyrups are not in a digeſting ſtate, they are left unclayed for two or three days longer, and the warmth of the room in which they ſtand is ſomewhat increaſed; but if they manifeſt a proper appearance, they are prepared for receiving the firſt clay, which is laid on either the next or the third day. The green new made loaves are judged to bear a healthy and promiſing appearance, when the ſyrups have quitted the broad part of the loaf, and are evenly drawn together; and when the whole ſurface has a compact and ſmooth appearance, they are fit to receive clay. When the ſyrup hath ſcarcely deſcended from the top or face of the cone; when the head, i. e. the narrow and moiſt end, is not evenly drawn off to a line; it is concluded, that the *ſugar* is overboiled, or of an ill quality; the ſyrups are not in a ſtate of digeſtion; and time is given, and heat added, to make them fit to receive the clay. On the other hand, if the moiſture is ſhrunk and ſettled, and of a pale colour juſt round the apex of the cone, there is reaſon to apprehend that the *ſugar* is under-boiled, or too free; in which caſe the ſurface or coat will appear looſe, and want that ſmoothneſs which the well-boiled loaves exhibit. When this is the caſe, they muſt be lightly clayed, and care muſt be taken, that the clay be not too thin or wet. Before the clay is laid on, the thin cruſt, which had been formed round the edge of the mould by the motion of the hauling knife, is ſcraped from each loaf into the receiving box, and by preſſing the face of the loaf with that part of the hand which is neareſt the wriſt, a ſmall concavity is made for receiving the firſt clay, as well as a proper ſolidity to the bed on which it is intended to reſt.

The firſt or green ſyrup is now taken away, and poured into large earthen jars, called *gathering-pots*; and the empty pots are returned to receive the moulds which had been taken from them. When they are returned to their proper places, a ſmall ladle-full of wet clay is poured on the face of each loaf. This firſt, or green clay, dries up in five or ſix days, and forms a cake, which is taken off, and laid by for future uſe. When the clay is removed, the whole ſurface of the loaf will be found to have ſhrunk under it, and the loaf is become concave in the middle. With a tool, called a *bottoming trowel*, the *ſugar* which adheres to the ſides of the mould is cut away by an horizontal movement; and a ſmall quantity of ſcrapings, or of lumps broken down for this purpoſe, is added to the looſe *ſugar* which the trowel had cut; and they are preſſed down together on the ſurface, till the whole has been brought to a good level, and to a moderate degree of firmneſs for bearing the next clay.

On the following day the loaves are clayed a ſecond time; and when this clay is dry, it is removed like the former; and each loaf is drawn out of its mould, and carefully examined; and this part of the proceſs is called *overſeeing*. Double loaves, fine powder loaves, and fine ſingle loaves, will ſometimes, under this clay, be found *neat*, i. e. the redneſs or brownneſs will have quitted the loaf, and the head, though ſtill moiſt, will appear perfectly free from diſcolouration. The workman, however, in order to be farther ſatisfied, cuts off the heads of two or three loaves with the trowel; and if he is ſatisfied, theſe loaves are to be clayed no more; but he proceeds to the operation of *bruſhing off*, i. e. ſcraping of the irregularities and impurities occaſioned by the contact with the clay with an iron tool, called a *bruſhing hoop*; and with one corner of this a number or letter is ſcratched upon the level face of the loaf. To thoſe loaves, which are not found neat, the workman gives a third clay; which is uſually laid on in a thinner maſs than the former. If his loaves are not yet quite finiſhed, he puts a little freſh moiſture on the back of the overſeen clay, and thus effects his purpoſe.

The loaves being now rendered neat and bruſhed off, muſt ſtand ſome days in the moulds to acquire *face*, or that ſtony hardneſs of ſurface, which will enable them to ſtand firm, when they are turned down out of the moulds; and during this time they are once or twice looſened in the moulds by a gentle blow on a ſtool, or againſt a poſt; and thus the coats are improved by preventing adheſion to the moulds, and facilitating the precipitation of the remaining moiſture. The windows are opened to let in air, if the weather be dry; and the points or noſes are alſo examined, which will ſometimes melt away, whilſt the above operation is effecting. When the ſymptoms appear, the workman proceeds to turn down his loaves, by taking the moulds from the pots, covering the floor with clear brown paper, and turning each loaf down with its mould over it. They are uſually turned down either upon the ſtove-head, or in ſome warm place; becauſe by being left uncovered, and expoſed to the action of cold air, the moiſture remaining in the head will not deſcend into the body of the loaf, and be equally diſperſed; but remaining in the head, would ſpoil and disfigure the loaf; partly by the ſyrup's coagulating, and becoming unfit to deſcend between the fine interſtices of the concrete body, and partly from the aſtriction of the ſolid particles. With theſe precautions, in twenty-four hours the moiſture is apparently diſperſed, and the cone aſſumes throughout an uniform appearance. The loaves are then taken off the floor, ſeparately examined, and cleared of any diſcoloured ſpecks with a ſmall knife; and are either papered and ſet in the ſtove, or elſe are placed in the ſtove without paper, as the caſe may require. If any of them have ſtill a remaining yellowneſs in the head, the point is cut off, and they are then called ſpot-loaves. They remain in the ſtove five, ſix, or ſeven days, till they are entirely dry, and are then fit for ſale and uſe. The management above ſtairs in the courſe of this one day's work is nearly the ſame, whether the *ſugar* be fine or coarſe.

Brown *ſugars* wrought in large moulds require more clay than fine *ſugars* in ſmall moulds: nor is it neceſſary that lumps ſhould be made neat; but it is the conſtant practice to cut off the wet head from every lump, ſo as to leave no remaining redneſs; theſe wet tips, called *lump headings*, are received into a large mould, and placed upon a pot to drain, and when dry are melted for making double loaves, or for improving powder loaves; or elſe they are bruiſed and mixed with bruſhings to *bottom up*, i. e. to defend the face of loaves. or other goods, before they receive clay. Large lumps frequently need claying four times. And it may be obſerved in general, that *ſugars* of every kind require more heat to bring them forward, as they ſink in quality.

The materials for double loaf boiling are made from refined *ſugar*, and frequently from loaves or lumps bought for that purpoſe. But thoſe who are moſt curious in this fabric, chuſe to make lumps for this purpoſe, which are called *melters*: they are low boiled, and ſtirred but little (though ſome boilers ſtir them much), in order to preſerve the ſtrength of the *ſugar* unimpaired. Fine double loaves are kept in a room of the temperature of a common parlour; a little warmth is ſufficient for powder loaves, and fine ſingle loaves; inferior loaves, and lumps of a middling quality, require warmth; but the browneſt lumps and *baſtards* thrive in a glowing heat. Every ſort of refined *ſugar* will bear and require more heat in proportion as it is higher boiled; for the brown ſyrupy matter will not quit the denſer, unleſs it be kept in a fluid ſtate; and this can only be effected by the action of heat; and, moreover, the fluid parts of high boiled goods muſt be more viſcous than thoſe of goods which have been leſs bound up by fire.

The *ſyrups* which are diſcharged from refined *ſugar* during the operation of *draining*, exceed in bulk and weight the whole quantity of loaf or lump *ſugar*, and are, therefore, of great importance in this manufactory; and upon the proper management of them much of its ſucceſs depends. It will be proper, therefore, to purſue the inquiry relating to the uſe of *ſyrups*, produced from a day's work of *ſugar* once refined in loaves. When the loaves are prepared to receive the firſt clay, the ſyrup is collected into gathering pots, each of which contain from fifty to ſixty pounds of ſyrup: this is called *green ſyrup*, on account of the new or green ſtate of the loaves from which it runs, and the quantity of it is uſually about fifteen gathering pots from each pan of goods. The next ſyrup, called *ſecond runnings*, is commonly collected when the ſecond clay is removed, and amounts in quantity to about eight gathering pots per pan. The third and laſt collection is made after the moulds are finally removed from the pots; it is called *drippings*, and is about five gathering pots per pan. However, ſome workmen collect their ſyrups oftener than thrice. The ſyrups of every kind of refined *ſugar* increaſe in fineneſs and value, the later they exude from the moulds. As for the appropriation of them, the green or low ſyrups are boiled away on the days next after the concluſion of refining: they are taken into the pans without the addition of any *ſugar*, and after a ſufficient evaporation are poured into large moulds; and under the name of *baſtard ſugar* form a principal article in the *ſugar* trade. The finer ſyrups are all incorporated with *ſugar*, and a proportion of them is daily brought down through the ſyrup pipes into the ciſtern at the ſame time in which the *ſugar* is firſt ſkipped from the pans; the ſyrup pipe diſcharging its contents into the clarifying baſket, ſo that the ſyrup, as well as the *ſugar*, paſſes through the blanket; and it is pumped back from the ciſtern into the pans.

The following eſtimates exhibit the quantity of ſyrup that may be allowed (*cæteris paribus*) to a given quantity of *ſugar*; viz. for double loaves, ſix gathering pots per pan; for powder loaves, ten ditto; for fine ſingle loaves, fifteen ditto; for middling ditto, twenty ditto; for brown ſingle loaves, and Canary lumps, twenty-five ditto; for lumps, thirty or forty ditto.

With the neceſſary allowances for particular circumſtances, the ſeveral ſorts of ſyrups may be duly appropriated in the following manner. Green ſyrups of every kind may be mixed with raw *ſugar*, or applied to the making of goods, two degrees in quality lower than thoſe from which theſe ſyrups were produced. Second runnings of every kind are fit to be incorporated with goods one degree below thoſe from which they were produced. Drippings may be uſed with raw *ſugar*, or with other proper materials, in making the ſame kind of goods from which they had been ſupplied. In other words, the green ſyrup of double loaves would be uſed in making ſingle loaves; the ſecond runnings would go into the compoſition of powder loaves, and the drippings would enter into the ſubſtance of other double loaves. Again, the green ſyrup of large lumps would be boiled off in *baſtards*, the ſecond running would make *pieces*, and the dripping, added to proper *ſugar*, would be united therewith in the production of other lumps.

Pieces are a better kind of baſtards, which are either boiled from ſyrups that are too good to make baſtards, or are made of ſuch ſyrups, and a ſmall portion of cheap and bad *ſugar* which is too poor to make lumps. In the latter caſe they are called *ſugar pieces*; but in either all the ſyrup that comes from them is boiled again either to make baſtards or other pieces, according to its goodneſs; whereas the ſyrup that runs from baſtards is always conſidered as a caput mortuum, and no efforts are made to obtain any *ſugar* from it, but it is put into caſks, and ſold under the denomination of melaſſes. It is, therefore, worth the boiler's attention to keep all the weight of *ſugar* poſſible in his baſtards; and for this purpoſe he boils them as high as he may venture, without incurring the danger of making ſtopped baſtards, i. e. baſtards from which the melaſſes will not run; which may be owing either to the ill quality of the materials, or to overboiling. But as the ſyrup of pieces is to be boiled again, a good workman never exhauſts it by overboiling. The materials, of which baſtards and pieces are compoſed, not abounding with ſalts like thoſe already treated of, have not an equal diſpoſition to concrete; and, therefore, it is found neceſſary to give them ſome aid, in order to effect the neceſſary granulation: this is done by taking *grain* (which we ſhall preſently explain) into the coolers. Theſe inferior productions are ſtirred, neither in the coolers nor in the moulds, any more than by a ſmall movement round the coolers, with an iron ſcraper juſt ſufficient to incorporate the grain with the hot fluid maſs.

In order to illuſtrate the formation of this grain, we may obſerve, that the ſtrong particles of *ſugar* which are capable of concretion, have evidently a greater degree of denſity than the oily or aqueous. When the hot fluid is poured into a baſtard or piece mould, theſe denſer particles deſcend, and would paſs into the pots if there were any paſſage for them; but the ſtopper is not taken out of the moulds of theſe goods until five ſix, ſeven, or eight days after they have been pulled up; for they want time to harden, and cannot ſafely be left unſtopped. Having reached the lower part of the mould, they are formed into ſmall ſtony ſubſtances of the nature of candy, and when the ſtoppers are withdrawn, theſe ſmall ſtones remain near the point of the mould, and form what is properly called *baſtard grain*.

Baſtards and pieces are uſually clayed but twice, and when dry enough, are knocked out of the moulds, their wet heads being cut off into a large mould placed to receive them, and they are called *baſtard-heading*, or *ſmear*; in another mould is preſerved the grain, which uſually forms a ſtratum about two inches broad, beginning about four inches from the point of the mould. The baſtards and pieces are then put into the ſtove, and in five, ſix, or ſeven days, will be found dry enough; for they muſt not, like lumps and loaves, be rendered perfectly dry. They are then taken out and piled in a room, as near the mill as poſſible, and ground altogether: or the brown tip is cut off, and the other two parts called the *middle* and *face*, are ground together: or ſometimes the baſtard or piece is divided into three parts, which are ground ſeparately, and ſold at different prices.

We ſhall now cloſe this article with a ſhort account of the method of making over *ſcums*, and the application of their produce. The refiner extracts from the ſcum of his *ſugars* every particle of *ſugar* which it is in his power to obtain, and after he has reduced the ſcum to ſuch a ſtate that it appears to be a mere earth reſembling garden mould, he ſells it to a ſcum-boiler, who again tries it over the fire, and extracts a ſmall quantity of ſweet liquor out of it. The ſcum of fine treble or double loaves is often put into the pans again without any proceſs, and mixed with raw *ſugar* for the production of inferior goods: but, in general, the ſcum of each day's work is made over in the ſame day after the boiling of the *ſugar* is finiſhed. The method is this: the panman, having put about three quarts of ſpice into his pan, draws lime-water until the pan be four fifths full without the pan-brace; to this he adds about four tubs of the ſcum, each tub containing about three fourths of a hundred weight. Having ſtirred the liquor well, he makes a moderate fire, and the ſcum will ſeparate from the fluid and float upon the top of it: with a ſmall iron ſcraper he prevents any foulneſs from adhering to the bottom of the pans: and then ſuffers the fire to increaſe, and the liquid, upon the verge of boiling, is ſeen through the openings of the dirty ſurface. Having kept it ſimmering for ſeveral hours, and having provided a cooler or receiver, over which is placed a ſtrong wooden frame, and upon this a baſket, to which a coarſe bag called the *ſcum-bag* is fitted, he pours the contents of his pan into this baſket, and bag; and then the mouth of the bag is drawn up, and well twiſted together, and a ſtrong board, called a *ſcum-board*, is laid upon the bags with ſeveral weights upon the board to preſs down the ſcum. In the ſpace of an hour or an hour and half, the bag ſhould be twiſted and preſſed; and the liquor, which ouzes plentifully through the bag, is uſually taken into the pans the next morning; its thinneſs renders it uſeful in clearing the pans, and if any groſs matter hath paſſed through the bags, it is drawn off with the reſt of the ſcum of the *ſugar* when cleared. The ſcum, as it is taken from the pan, is called *fat ſcum*, and the liquid matter drawn from it bears the ſame appellation; in contradiſtinction to the poor meagre liquor, which is expreſſed from the ſame ſcum when they are made over a ſecond time, by an operation much like the former. After preſſing and draining, the exhauſted remains, under the name of *rubbiſh ſcum*, is either burnt in the cockell, or delivered to the ſcum-boiler at a very low rate. The produce of over-made ſcums muſt be uſed immediately, or it muſt be ſhortened i. e. boiled thick; otherwiſe it will turn ſour and do great harm; for acidity is a conſtant enemy and deſtroyer of *ſugar*.

The liquor drawn from theſe ſcums is commonly uſed in baſtard boiling, or in the browneſt lumps. There is a large proportion of the fat ſcum uſually left of every refining, to be made over during the baſtard boiling: it is common to ſet by the firſt or groſſeſt ſcum for this purpoſe, and to keep ſeparate the finer and later ſcums, which are made over day by day in the manner already deſcribed: the liquor thus obtained from the fat ſcums, being full of *ſugar*, is very uſeful to the baſtards, fortifying the ſyrups, and promoting their ſtrength and adheſion. The editor is indebted for the materials which have ſupplied this article, and thoſe on the manufacture of SUGAR-*candy*, and the conſtruction of a SUGAR-*houſe*, to the kind communication of Mr. Griffin, an eminent *ſugar*-refiner in London.

The duty on raw *ſugar* imported is 12*s.* $3\frac{8}{10}$*d.* per hundred, which is allowed on exportation. The drawback on exportation of lumps, ſingle loaves, powder ditto, and double loaves, is 1*l.* 6*s.* per hundred, and on tips, middles, faces, and candy, 11*s.* 8*d.* per hundred.

SUGAR-*candy*, *ſaccharum candum*, or *cryſtallinum*, is *ſugar* depurated and cryſtallized. See CANDY.

The *ſugar* to be uſed herein is firſt diſſolved in a weak lime-water, then clarified, ſcummed, ſtrained through a cloth, and boiled, and put in forms or moulds, that are traverſed with little rods, to retain the *ſugar* as it cryſtallizes. Theſe forms are ſuſpended in an hot ſtove, with a pot underneath, to receive the ſyrup that drops out at the hole in the bottom, which is half-ſtopped, that the filtration may be the gentler. When the forms are full, the ſtove is ſhut up, and the fire made very vehement.

Upon this, the *ſugar* faſtens to the ſticks that croſs the forms, and there hangs in little ſplinters of cryſtal. When the *ſugar* is quite dry, the forms are broken and the *ſugar* is taken out candied. Red *ſugar*-candy they make, by caſting into the veſſel, where the *ſugar* is boiling, a little juice of the Indian fig; and, if it is deſired to have it perfumed, they caſt a drop of ſome eſſence in, when the *ſugar* is putting into the forms.

This method of making *ſugar*-candy is that of F. Labat, practiſed in the Caribbees.

The method among our manufacturers is as follows. A ſtove is ſet apart for this purpoſe, the entrance into which is in the ground-floor, and as near as poſſible to the pans, and the top is uſually from ten to fourteen feet above the ground, and covered like the top or crown of an oven. Beams are faſtened into the walls, at the diſtance of about twenty-ſix inches from each other, and ſufficient to bear a large weight: upon which ſtrong planks are laid when they are wanted, and upon the planks the candy-pots are ſet: when the ſtove of candy is finiſhed, the planks are removed. The pots are uſually made of thin copper, without feet, and with an iron rim round the top to ſtrengthen them: the bottoms are hammered into the moſt perfect flatneſs, that they may ſtand firm and ſteady: they are perforated in rows on two ſides with holes about one tenth of an inch in diameter. According to the old method of piercing, the holes were very cloſe laterally, and the candy of each ſtring united with that of the next, and the whole formed a ſtrong cake: but according to the improved method, the holes are kept at a proper diſtance apart, i. e. at the diſtance of one inch and a half in the upper rows, and widening downwards to two inches; and the candy is formed in diſtinct bars, more convenient for package and ſale, and much more beautiful than the former.

When a ſtove of candy is intended to be made, the cockell ſhould be moderately heated, at leaſt twenty-four hours before the operation begins; and the candy-pots are ſtrung, i. e. a coarſe white thread is drawn by a needle through the firſt hole of the bottom row, and the end being faſtened there, the thread is led acroſs the inſide-ſide of the pot to the oppoſite hole, and continued from ſide to ſide till that row is finiſhed: the next row above it is then ſtrung in the ſame manner, &c. till every row is finiſhed. The pots, being all ſtrung (viz. about forty to each pan of ſugar) muſt be paſted, i. e. the holes muſt be ſtopped either by paſting papers over them on the outſide, or by bruſhing any glutinous matter, over the outſide. When the ſtoves and pots are ready, the workman places five pots upon the pavement, beginning either at the right or the left hand corner of the ſtove oppoſite to the cockell.

The management of the pans is nearly the ſame as has been deſcribed under *refining of* SUGAR, with ſome ſmall difference. The *ſugar* intended for candy ſhould be cleared with leſs water than other goods: the lime-water for brown candy ſhould be of the greateſt ſtrength; and the workman endeavours to extract the ſcum as ſoon as poſſible, becauſe it is imagined that the ſtrength of the *ſugar* may be impaired if it be ſuffered to lie too long diſſolved. No ſcum is ever incorporated with the *ſugar* intended for candy; indeed four or ſix gathering pots to a pan are ſometimes taken; but it is apprehended, that it would be better to omit even this. The *ſugar* melted for candy ſhould be the ſtrongeſt that can be obtained.

When theſe precautions have been obſerved, let us imagine the *ſugar* cleared off and ſkipped into the ciſtern. The panman pumps back about the uſual quantity: the boiler carries the evaporation to the point he judges proper; and it is immediatly ſkipped off into baſons, which are carried directly to the ſtove; and the pots are then filled in the following manner. The fill-houſe man receives the firſt baſon, and pours its contents into N° 1, proceeds to N° 2, and ſo on till he has reached N° 5; and then proceeds to till N° 5, 4, 3, 2, and 1. When this ſet is filled, the fill-houſe man goes on, till he has covered the whole pavement: he then lays two planks upon the loweſt beams, and places a ſeries of pots upon the farther one, ſtanding upon the other to fill them: he then lays down another ſtrong plank, and covers that on which he ſtood, and ſo proceeds to build up row after row till the whole is finiſhed. In the whole progreſs of this buſineſs he moves ſlowly and cautiouſly, and cauſes all the doors to be ſhut, ſo that no currents of air may approach him; as ſtillneſs is of the greareſt conſequence, and the leaſt concuſſion of the air is ſufficient to diſturb, and break the cryſtallization. When the pots are filled, the ſtove-door is faſtened up, and covered with a blanket, or ſtopped with wet clay. The cockell is ſtoked to ſuch a degree, that the candy may ſtand in a blood-heat; at the end of ſix or ſeven days, the cryſtallization of brown candy will be complete. The pots are then removed from the planks and the floor, and the operation commences, which is called *ſtirring* or *breaking up* a ſtove of candy. Each pot is brought to the ſide of a cooler, upon which over a frame a clean baſket is laid, into which all the *ſugar* that has not cryſtallized is poured off, and along with it the *cruſt*, which is a coat of candy, that had formed itſelf upon the ſurface; the ſyrup or uncryſtallized *ſugar* runs through the baſket into the cooler, but the cruſt remains in the baſket, in which it is waſhed and dried, and afterwards packed for ſale with the candy. As ſoon as the ſyrup is poured off, the pot is brought to the ſide of the pan, and ladles of clean water, blood-warm, are poured in till it be nearly filled; the pot is then ſmartly ſhook round, and the water is returned into the pan. The candy being thus worked, the boiler examines it. If it be ſtrong and good, it preſents a beautiful appearance; the ſides of the pot are every where covered with a coat about half an inch thick, the front of which is cut in ſtarry forms, reflecting the light in various directions: and upon every line the cryſtals faſten in the moſt varied and capricious forms. If the pots were pierced, as they formerly were, ſo that the ſtrings might lie but an inch aſunder, the candy of each line would then run into the next, their ſides become united, and the whole form a ſtrong cake not to be ſeparated without force: but the modern improved pots are ſo pierced, that the cryſtals are ſuſpended upon every thread in diſtinct bars, without either lateral or perpendicular coheſion.

The waſhing above deſcribed is neceſſary to cleanſe from the face of the cryſtals every particle of ſyrupy matter, which would otherwiſe occaſion a clammineſs in the candy, and obſcure its luſtre. After waſhing, each pot is turned down into a cooler or other receiver to drain, and when they are waſhed and drained, they are again put into the ſtove to be dried; for this purpoſe they are placed in the ſtove aſlant, reſting againſt the wall, or againſt each other, with the mouth downwards; and under each pot is placed a ſmall earthen pan, called a *candy-baſon*, to receive the remaining moiſture which will drip from them: the ſtove is again faſtened up, and the cockell ſtoked ſo as to produce a fierce fire, which muſt be well kept up for three days: at the end of which time the candy will be dry enough to quit the pot; they are therefore taken out of the ſtove, and turned down upon the floor, previouſly covered with clean paper; and with a little ſhaking or a gentle blow, the whole maſs of candy quits the pot, retaining the form of it complete: and then the candy is returned to the ſtove for the third and laſt time, where in three or four days, with a good fire, it will become perfectly dry and fit for ſale. It is generally packed in boxes of about fifty-ſix pounds each: at the bottom of the box is a layer of the bottoms of the pots, which have the leaſt beauty or fineneſs; then a courſe of bars of candy; upon that a ſtratum of cruſt, and ſo on to the top of the box; finiſhing with bars of the handſomeſt candy, neatly laid with the face upwards. At the bottom of the candy there are often found maſſes of *ſugar* which hath not cryſtallized, but is become concreted in ſmall round grains of lighter colour than the candy; this is called *foot*, and is either ſold at a lower rate, under the name of *candy-foot*, or melted with other *ſugar* for the making of lumps and loaves. The ſyrup of candy is fit to be taken copiouſly with raw *ſugar* in lump-boiling. The waſhings and the drips from the baſons are applicable to the ſame uſes.

White candy is made like the former, but from fine lump or loaf *ſugar*, cleared as for double loaves. It is boiled to lower proof; ſtands in a milder warmth; forms in three days inſtead of ſeven; and the value depending upon the whiteneſs, it muſt be managed with the utmoſt delicacy in every ſtage of the proceſs.

White ſugar-candy, and alſo *ſugar*, are uſed as ingredients to render water a vehicle for colours in miniature-painting. The intention of uſing them is to prevent the colours from cracking when mixed with gum arabic, and alſo to make the gum-water work more kindly with the pencil. See STARCH.

SUGAR-*houſe*, is a brick or ſtone building, conſtructed for a *ſugar*-refining manufactory. A houſe intended to contain one or two pans ſhould be ſquare, or nearly ſquare: but a houſe of larger dimenſions ought to be of an oblong form; as it may be conveniently heated, by placing the chimney of the ſtove and of the pans at oppoſite angles. A houſe to contain one pan ſhould conſiſt of ſix floors beſides the ground-floor; the dimenſion about twenty-ſeven feet ſquare: a two-pan houſe about thirty-ſix feet by forty feet: a houſe of four pans, about forty feet by ſixty or ſixty-five feet. The ſtove is a brick building from eight to fourteen feet ſquare, uſually placed in one corner of the building. The height of the ſeveral ſtories ſhould be as follows: the fill-houſe, or ground-floor, nine feet below the girders; the next floor above it, called the *warehouſe*, of the ſame height: and every other floor upwards, ſix feet at moſt between the girders and the floor. In every floor muſt be left an aperture, through which a rope is ſuſpended upon a braſs pulley on the uppermoſt floor for drawing up the *ſugars*: and provided due attention be given to the ſtrength of the building, and to the excluſion of damps and a cold air, a *ſugar-houſe* cannot be rendered too light. The utenſils neceſſary to a *ſugar-houſe* are of copper, lead, iron, carpentry, back-maker's work, wicker-work, pottery, &c. The copper utenſils are the pans, coolers, ciſterns, ſyrup-pipes, baſons, ladles, ſkimmers, and, in ſome caſes, candy-pots, &c.

The pans are uſually made of a conic form, five to ſix feet diameter at the top, decreaſing to a diameter of about two feet ſix inches, or three feet. The coolers are veſſels of thin copper of ſix feet in diameter, and about twenty inches high: the number of pans and coolers is uſually the ſame. The clarifying ciſtern is a large receiver either of copper or lead, placed as near as poſſible to the ſides of the pans, and capable of containing at leaſt one-third more than the contents of all the pans collectively. The ſyrup-pipes are tubes of four inches diameter, made of thin copper, or tin plates, and ſuſpended perpendicularly over the clarifying ciſtern, from the upper floor through the whole building. The baſons are veſſels containing from four to ſix gallons each, in which the boiled *ſugar* is carried from the pans to the coolers, and from the coolers to the moulds. The ladles are of ſeveral ſizes. Skimmers are of fourteen inches diameter, pierced with holes like a cullender; and likewiſe a ſmall one of the ſame kind. Cullenders are of eighteen inches diameter, and fourteen inches deep, through which the clay is to be ſtrained: and there is alſo another, which is ſmaller, for the purpoſe of ſtraining ſpice.

The leaden utenſils and plumbers ware, are ſuch as follow: the bench is a ledge about one foot broad, running before the pans, and riſing in front, whereby it is capable of receiving the *ſugar* which is ſpilled before the pans.

The ſcum ciſtern is a wooden receiver, uſually lined with lead, and nearly as large as the clarifying ciſtern. The water-pipes are a pewter or hard metal pipe from the lime ciſtern to the pans, and leaden pipes for the conveyance of common water or liquor to the pans, and to the lime ciſterns. The pumps are a copper pump fixed in the clarifying ciſtern, and a ſpare pump of the ſame kind.

The iron-founder ſupplies bars of a triangular form to be laid under the pans, and the cockell, which is an iron trunk, uſed to dry the goods in the ſtove; and alſo iron doors, ſtove-door, and pan-doors, &c.

The carpenter raiſes the ſteam-vent over the pans, which is a hood of thin boards, ſo formed as to conduct the ſteams to the two brick funnels, which are led up on either ſide of the pan-chimney to the top. He alſo furniſhes the racks of the ſtove, a trough to convey the *ſugar* from the pans to the ciſtern, and another to return it from the ciſtern to the pans, ſyrup-ſtools, blocks, cooler oars, &c.

The back-makers ſupply two or more tubs or backs for lime-water, which are round, oval, or ſquare, and whoſe capacity varies from thirty to two hundred barrels. The liquor-back, is any veſſel large enough to hold a conſiderable quantity of common water. The mould ciſtern is a large oblong veſſel, in which the moulds are ſoaked before they are uſed: it is uſually about four feet ſix inches deep, and ſhould be capable of containing at once as many moulds as are uſed in one day's refining.

The clay ciſterns are ſupplied either by the back-maker or carpenter, and alſo the clay ſtar, which is made of oak or elm, its club end being ſtuck full of iron points: its uſe is to macerate and fine the clay.

The wicker-work conſiſts of refining baſkets, ſcum baſkets, pulling up baſkets, coal and clay baſkets, &c.

The *ſugar*-mill is one of the moſt ſimple machines of the kind: the runner is ſometimes made of caſt-iron and ſometimes of ſtone: the former is preferable, becauſe a large diameter and a broader ſurface may be had with the ſame weight. The runner and the centre poſt ſhould have a braſs collet within them, for the iron ſpindle to turn upon. The mill ſhould ſtand on a ſolid foundation; either on the earth, or on the centre of a brick or ſtone arch.

The veſſels of pottery are of various ſizes, and of two different forms and denominations, viz. pots and moulds.

The conſtruction of the pan-chimney requires peculiar attention; it ſhould be placed on iron baſes, and the horizontal bars on which it reſts muſt be wrought in the walls of the building, and clenched down on the outſide. But the ſetting of the pans is the moſt difficult work; for it is neceſſary, that they ſhould be ſo fixed, as that the ſtones, which burn away under them three or four times in a year, ſhould be taken out and replaced, without pulling down the whole work.

After all, a principal conſideration in the conſtruction of a *ſugar-houſe*, is the obtaining a ſufficient degree of heat. Various degrees of heat are required for different ſorts of goods, and occaſionally for the ſame ſort: accordingly each floor may be made more or leſs warm as the caſe requires. The heat is introduced through the pan-chimney, the ſtove-chimney, and ſometimes through iron or brick flues raiſed on purpoſe. It is communicated from the chimneys by ſhutting the regiſter-plates, after the fires are extinguiſhed, or when they are nearly out, and the remaining aſhes are perfectly clear. After ſhutting the regiſter-plates, the ſmall iron doors (one of which is fixed in the chimnies both of the cockell and the pans upon every floor) are opened, to convey heat where it is wanted.

Labourers in *ſugar-houſes* are very ſubject to dyſenteries: the VITRUM *antimonii ceratum* is an effectual remedy in theſe caſes.

SUGAR, *barley*, *ſaccharum hordeatum*, is a *ſugar* boiled till it be brittle, and then caſt on a ſtone anointed with oil of ſweet almonds, and formed into twiſted ſticks, about the length of the hand, and the thickneſs of a finger.

It ſhould be boiled up with a decoction of barley, whence it takes its name; but, in lieu thereof, they now generally uſe common water, to make the *ſugar* the finer. To give it the brighter amber colour, they ſometimes caſt ſaffron into it. It is found very good for the cure of colds and rheums.

SUGAR, in *Chemiſtry* and *Medicine*, denotes a cryſtallizable eſſential ſalt, of a ſweet agreeable taſte, contained more or leſs plentifully in many kinds of vegetables, as well as in the SUGAR-*cane*, which furniſhes the greateſt quantity of it.

Mr. Margraaf has obtained *ſugar* from the roots of ſeveral plants, as from carrots, parſnips, white and red beets. Conſidering that *ſugar* is ſoluble in ſpirit of wine, and that the mucilaginous parts of plants are not ſoluble in that fluid, he eaſily obtained a pure *ſugar* by digeſting the dried roots in that ſpirit, and by evaporating the liquor. It is alſo preſumed, that much *ſugar* may be obtained from other vegetables, as from green peas, cabbage, green farinaceous grains, and from ſeveral trees, as the ſycamore and birch trees. Green MAIZE contains a liquor from which the American ſavages are ſaid to extract *ſugar*. It may alſo be extracted from the *aſclepias caule erecto ſimplici annuo*, and from any flowers collected while the morning dew is upon them. But the vegetable which yields the largeſt quantity of *ſugar*, next to the *ſugar-cane*, is the *ſugar*-MAPLE. The methods employed for extracting *ſugar* from this tree in Canada are related by M. Gautier, in the Mem. des Scav. Eſtrang. tom. ii. and by Mr. Kalm in the Swediſh Mem. for 1757. By diſcovering a menſtruum, that would diſſolve the *ſugar* and not the ſlimy ſubſtance, the ſaccharine and mucilaginous parts of plants might be ſeparated from one another with advantage.

Sugar diſſolves by the aſſiſtance of heat in rectified ſpirit; but as the greateſt part of it ſeparates again in the cold, and concretes into a cryſtalline form, ſaccharine concretions are thus obtained from ſaturated ſpirituous tinctures of ſeveral of the ſweet plants of our own growth. *Sugar* is alſo ſoluble in water, and is one of thoſe ſalts that is ſoluble in the ſmalleſt quantity of water. *Sugar* when diſtilled yeilds a phlegm, an oily empyreumatic acid, a ſmall portion of coloured empyreumatic oil, and leaves a conſiderable quantity of reſiduous coal.

Sugar-candy conſiſts of an acid united with a large quantity of a very attenuated and mucilaginous earth, and with a certain quantity of ſweet and not volatile oil, which is in a ſtate perfectly ſaponaceous, or entirely ſoluble in water by means of the acid.

Solutions of *ſugar* mingle uniformly with thoſe of other ſaline ſubſtances, whether acid, alkaline, or neutral, without making any viſible alteration in the infuſions of the coloured flowers of vegetables, or other liquors in which acids or alkalis produce a change of colour or a precipitation. *Sugar* appears to be completely neutral, and unites with moſt humid bodies, without altering their native qualities, and ſerves as a medium for uniting together ſome bodies naturally repugnant, as diſtilled oils and water. It impedes alſo the coagulation of milk, and the ſeparation of its butyraceous part. This ſalt is very ſuſceptible of the ſpirituous fermentation, when it is diluted in a ſufficient quantity of water. And from theſe properties, it is ſuppoſed to unite the unctuous part of the food with the animal juices: hence, ſome have concluded, that it is nutritive to animals, and increaſes corpulence; others have aſcribed to it a contrary effect, as it is ſaid to prevent the ſeparation of the oily matter, which forms fat from the blood; and others again have charged it with rendering the juices thicker and more ſluggiſh, retarding circulation, obſtructing the natural ſecretions, and thus occaſioning or aggravating ſcorbutic, cathartic, hypochondriacal, and other diſorders. However, experience ſeems to ſhew, that the moderate uſe of it is at leaſt innocent.

Sugar preſerves both animal and vegetable ſubſtances from putrefaction; and Dr. Lewis ſays, that it poſſeſſes this power in a higher degree than the common alimentary ſalt. On account of this property, it has been ſometimes applied externally as a balſamic and antiſeptic.

The impure brown *ſugars*, by virtue of their oily or treacly matter, prove emollient and gently laxative. The cryſtals or candy are moſt difficult of ſolution, and hence are moſt proper where this ſoft lubricating ſweet is wanted to diſſolve ſlowly in the mouth, as in tickling coughs and hoarſeneſs. Dict. Chem. Art. *Sugar*. Lewis's Mat. Med.

Sugar has been ſaid to be a ſpecific againſt the famous Indian poiſon mentioned by Mr. de la Condamine; but this ſeems a miſtake. See POISON.

Coarſe *ſugar*, in which there is more oil than in refined *ſugar*, is recommended as a good medicine in collyria for diſcharging ulcers of the cornea, in which aſtringents are hurtful.

SUGAR, *maple*. See MAPLE.

SUGAR *of milk*. See MILK.

SUGAR *of roſes*, *ſaccharum roſatum*, is white *ſugar* clarified, and boiled into a conſiſtence in roſe water; when boiled, they form it into lozenges, ſometimes into little grains, of the ſize of peas, by keeping it ſtirring till it be cold and dry. It is reputed good to ſoften and allay acrimonies, &c. of the breaſt. See ROSE.

SUGAR, *acid of*, a new acid lately diſcovered by M. Bergman. The proceſs of procuring it is this: to one ounce of the fineſt *ſugar* are added three ounces of the ſtrongeſt ſpirit of nitre, in a tubulated retort. After the moſt phlogiſticated part of the nitrous acid has exhaled, a receiver is to be adapted to the neck of the retort, and the ſolution made to boil gently, till it acquires a brown or cheſnut colour; when three more ounces of nitrous acid are to be added, and the ebullition is to be continued till the tinged and ſmoking acid has nearly diſappeared. The liquor remaining in the retort is now to be put into a broad veſſel; and, on cooling, quadrilateral priſmatic cryſtals will be formed, which, after being dried on a bibulous paper, will weigh about a dram and a half and nineteen grains. The remaining liquor, in which the cryſtals were formed, is to be treated in the ſame manner, with two ounces more of ſpirit of nitre; and will furniſh half a dram and thirteen grains of freſh cryſtals. To the glutinous fluid now remaining, two more ounces of nitrous acid are to be added in ſmall portions at different times; and the whole is to be evaporated to dryneſs; when a ſaline maſs is left, which, when dry, weighs about half a dram. Theſe different products mixed together are purified by repeated ſolution and cryſtallization. The cryſtals, thus prepared, are the *acid of ſugar:* the proceſs for obtaining which is expenſive; as to produce one ounce of it from three ounces of *ſugar*, thirty ounces of ſtrong ſpirit of nitre muſt be employed. It may alſo be extracted from honey and other ſaccharine juices; and from gum-arabic, and the moſt highly rectified ſpirit of wine.

For a farther account of this acid, its chemical properties and affinities, and combinations with other ſubſtances, ſee T. Bergman, Chemiæ Profeſſoris, &c. Opuſcula Phyſica & Chemica, &c. vol. i. diſſ. 8. Upſal, 1779.

SUGAR-*ſpirit*, a name given by our diſtillers to a ſpirit made in England, Holland, and other places, from the waſhings, ſcummings, droſs, and waſte of a *ſugar*-baker's refining-houſe. The manner of preparing it is the ſame with that uſed for the malt and melaſſes ſpirits. The refuſe of the *ſugar* is fermented with water in the uſual manner, then diſtilled into what is called *low wines*, and afterwards rectified, without any addition, into proof ſpirit.

When the operation is well performed, and no foul, fœtid, or foreign matter has got in among the waſh, this is a tolerably clean ſpirit. We uſually make it ſuch, but in Holland it is uſually made very nauſeous and diſagreeable; though capable, by an eaſy rectification, familiar with us, though not much known abroad, of being brought to a fine and clean ſpirit. With us this *ſugar* ſpirit is uſed to mix with, and adulterate brandy, rum, and arrack, which will receive a large doſe of it without its being at all diſcoverable; but the Dutch, who have it very coarſe, can only adulterate rum with it, and even that will bear but a ſmall proportion, without being betrayed by its nauſeouſneſs.

This *ſugar-ſpirit*, reduced to alcohol, makes one of the pureſt ſpirits we are acquainted with, much ſuperior to that of melaſſes, and much more to that of malt. Shaw's Eſſay on Diſtillery.

We have, in the Philoſophical Tranſactions, an account of a volatile and pungent ſpirit of ſugar, which was made from what the *ſugar*-bakers call *ſugar-water*; which is no other than the water in which the apron, moulds, and other utenſils, employed in the refining of *ſugar*, are waſhed. This was ſo extremely pungent, that a man could not ſmell to a large quantity of it without danger of ſuffocation; and ſo volatile, that no ſtopping it up could preſerve its ſpirit for any length of time. Phil. Tranſ. N° 130.

SUGAR, *caſk of*. See CASK.

SUGAR, *cheſt of*. See CHEST.

SUGAR *of Saturn*.
SUGAR *of lead*. } See SACCHARUM *Saturni*.

SUGGESTION, SUGGESTIO, the act of hinting, or furniſhing another with a thought or deſign, or of inſinuating it artfully into his mind.

In the French law, a teſtament is ſaid to be made by *ſuggeſtion*, when it is made by ſurprize, and contrary to the intention of the teſtator.

If *ſuggeſtion* be proved, the teſtament becomes null. Articles of *ſuggeſtion* are not admittable againſt a teſtament written with the teſtator's own hand, which is never ſuſpected.

SUGGESTION *for prohibition*, in *Law*. See PROHIBITION.

SUGGESTION, *proſecution by information or*. See INFORMATION.

SUGGESTUS, among the Romans, a place in the Campus Martius raiſed higher than the reſt, where every magiſtrate, according to his rank, was allowed to harangue the people; but private perſons could not, unleſs they firſt obtained leave from ſome magiſtrate to do it.

SUGGRUNDARIUM, among the Romans, a place where infants, not exceeding forty days old, were buried; it being unlawful to burn them.

SUGILLATION *of the eye*, in *Surgery*, is an inflammation, uſually called the *blood-ſhot eye*. See OPHTHALMIA.

SUGITIVA, a term uſed by ſome authors to expreſs medicines, which ſuck up and abſorb the ſeroſities in dropſical perſons.

SUICIDE. See FELO *de ſe*.

SUIT, SUTE, SECTA, in *Law*, (from the French *ſuite*, a following another), is uſed in divers ſenſes. As, SUIT *in law*, which is of two kinds, *real* and *perſonal:* the ſame with what we call *real* and *perſonal actions:* from which alſo proceed *mixed actions*. See ACTION.

SUIT *in equity or chancery*, commences by preferring a BILL to the lord chancellor in the ſtyle of a petition, praying relief at his hands, and alſo proceſs of ſubpœna againſt the defendant, to compel him to anſwer upon oath to all the matter charged in the bill. And if it be to grant the poſſeſſion of lands, to ſtay waſte, or to ſtop proceedings at law, an INJUNCTION is alſo prayed, commanding the defendant to ceaſe. The bill muſt call all neceſſary parties before the court, otherwiſe no decree can be made to bind them, and muſt be ſigned by counſel, as a certificate of its decency and propriety. When the bill is filed in the office of the SIX *clerks*, if an injunction be prayed therein, it may be had at various ſtages of the cauſe, according to the circumſtances of the caſe. But, upon common bills, as ſoon as they are filed, proceſs of SUBPOENA is taken out; which is a writ commanding the defendant to appear and anſwer to the bill, on pain of 100*l*. And if the defendant, on ſervice of the ſubpoena, does not appear within the time limited by the rules of the court and plead, demur, or anſwer to the bill, he is ſaid to be in CONTEMPT, and is liable firſt to ATTACHMENT, then to an *attachment* with proclamations, next to COMMISSION of *rebellion*, afterwards to the ſearch of a ſerjeant at arms, and laſtly to a SEQUESTRATION. After an order for ſequeſtration iſſues, the plaintiff's bill is to be taken PRO CONFESSO, and a decree to be made accordingly. But if the defendant is taken upon any of this proceſs, he is to be committed to priſon till he puts in his appearance or anſwer, performs what this proceſs is deſigned to enforce, and clears his contempts by paying the charges.

The proceſs againſt a body corporate is by *diſtringas*, to diſtrain them by their goods and chattels, rents and profits, till they ſhall obey the ſummons of the court. And for the proceſs againſt a peer and member of the houſe of commons, ſee LETTER *miſſive*.

If the defendant appears regularly and takes a copy of the bill, he is next to demur, plead, or anſwer. See DEMURRER and PLEA.

The moſt uſual defence that is made to the plaintiff's bill is an anſwer given in upon oath, or the honour of a peer or peereſs; but where there are amicable defendants, their anſwer is uſually taken without oath, by conſent of the plaintiff. If the defendant lives within twenty miles of London, he muſt be ſworn before one of the maſters of the court; if farther off, there may be a DEDIMUS *poteſtatem* to take his anſwer in the country, where the commiſſioners adminiſter to him the uſual oath; and then, the anſwer being ſealed up, either one of the commiſſioners carries it up to the court, or it is ſent by a meſſenger, who ſwears he received it from one of the commiſſioners, and, that the ſame has not been opened or altered ſince he received it. An anſwer muſt be ſigned by counſel, and muſt either deny or confeſs all the marial parts of the bill; or it may confeſs and avoid, i. e. juſtify or palliate the facts. If one of theſe is not done, the anſwer may be excepted to for inſufficiency, and the defendant be compelled to give another. A defendant cannot pray any thing in this his anſwer but to be diſmiſſed the court; if he has any relief to pray againſt the plaintiff, he muſt do it by CROSS-*bill*.

After anſwer put in, the plantiff, upon payment of coſts, may amend his bill, either by adding new parties or new matter, or both, and the defendant is obliged to anſwer afreſh to ſuch amended bill. But this muſt be before the plaintiff has replied to the defendant's anſwer, whereby the cauſe is at iſſue; for afterwards, if new matter ariſes, which did not exiſt before, he muſt ſet it forth by a *ſupplemental bill*. There may be alſo a bill of REVIVOR, and likewiſe a bill of *interpleader*, where a perſon who owes a debt or rent to one of the parties in *ſuit*, but, till the determination of it, he knows not to which, deſires they may interplead, that he may be ſafe in the payment. In this caſe it is uſual to order the money to be paid into court, for the benefit of ſuch of the parties, to whom, upon hearing, the court ſhall decree it to be due.

If the plaintiff finds ſufficient matter confeſſed in the defendant's anſwer to ground a decree upon, he may proceed to the hearing of the cauſe upon bill and anſwer only; in which caſe he muſt take the defendant's anſwer to be true in every point. Otherwiſe the courſe is for the plaintiff to reply generally to the anſwer, averring the bill to be true, certain, and ſufficient, and the defendant's anſwer to be directly the reverſe, which he is ready to prove as the court ſhall award; upon which the defendant rejoins, averring the like on his ſide, which is rejoining iſſue upon the facts in diſpute. Theſe are proved by examination of witneſſes, and taking their depoſitions in writing. For the purpoſe of examining witneſſes in or near London, there is an EXAMINER's office, and elſewhere it is done by COMMISSION. When the depoſitions of witneſſes are taken, they are tranſmitted to the court with the ſame care that the anſwer of a defendant is ſent. When they are all examined, the depoſitions may be publiſhed, by a rule to paſs publication: after which they are open to the inſpection of all the parties, and copies may be taken of them. The cauſe is then ripe to be ſet down for hearing, which may be done at the procurement of the plaintiff or defendant before either the lord chancellor or the maſter of the rolls, according to the diſcretion of the clerk in court, regulated by the nature and importance of the *ſuit*, and the arrear of cauſes depending before each of them reſpectively. Either party may be ſummoned to hear judgment on the day fixed for the hearing; and then if the plaintiff does not attend, his bill is diſmiſſed with coſts; or if the defendant makes default, a decree will be made againſt him, which will be final, unleſs he pays the plaintiff's coſts of attendance, and ſhews good cauſe to the contrary on a day appointed by the court. A plaintiff's bill may alſo at any time be diſmiſſed for want of proſecution, which is in the nature of a nonſuit at law, if he ſuffers three terms to elapſe without moving forward in the cauſe. For the method of hearing cauſes, ſee HEARING.

The chancellor's decree is either interlocutory or final. If any matter of fact is ſtrongly controverted, it is referred to a jury, upon a *feigned* ISSUE.

If a queſtion of mere law ariſes in the courſe of a cauſe, it is referred to the opinion of the judges of the court of king's bench, upon a caſe ſtated for that purpoſe. Another thing alſo retards the completion of decrees. Frequently long accounts are to be ſettled, incumbrances and debts are to be inquired into, and a hundred little facts to be cleared up, before a decree can do full and ſufficient juſtice. Theſe matters are always by the decree on the firſt hearing referred to a maſter in chancery to examine, which examinations frequently laſt for years, and then he is to report the fact, as it appears to him, to the court. This report may be excepted to, diſproved, and overturned, or otherwiſe is confirmed, and made abſolute by order of the court.

When all iſſues are tried and ſettled, and all references to the matter ended, the cauſe is again brought to hearing upon the matters of equity reſerved; and a final decree is made, the performance of which is inforced (if neceſſary) by commitment of the perſon, or ſequeſtration of the party's eſtate. And if by this decree either party thinks himſelf aggrieved, he may petition the chancellor for a REHEARING. But unleſs a rehearing be deſired, the decree is ſigned by the chancellor, and enrolled of courſe. 3 Geo. II. cap. 30. However, a *bill of* REVIEW may be had on ſufficient cauſe alledged: and from this court the dernier reſort is a PETITION *of appeal* to the houſe of lords. Bl. Com. vol. iii. p. 442, &c.

SUIT *of court*, or *ſuit of ſervice*, an attendance which the tenant owes the court of his lord. See SECTA and SERVICE.

SUIT *covenant*, when your anceſtor hath covenanted with mine to ſue to his court.

SUIT *cuſtom*, when I and my anceſtors owe *ſuit* time out of mind.

SUIT *real*, or *regal*; when men come to the ſheriff's turn or leet. See SECTA *regalis*.

SUIT-*ſilver*, in *our Old Writers*, a ſmall rent, or ſum of money, paid in ſome manors to excuſe the appearance of freeholders at the courts of their lords.

SUIT alſo ſignifies the following one in chaſe, as FRESH *ſuit*.

SUIT, again, ſignifies a PETITION made to the king, or any great perſon.

SUKOTYRO, in *Natural Hiſtory*, the Chineſe name of a very large and remarkable horned animal, which ſeems to be the ſame with the carvnivorous bull of Pliny and the ancients.

It is of the ſize of a large ox; its head is ſhaped like that of a hog; its ears are long and hairy; and its tail is buſhy. On each ſide of the head, near the eyes, there ſtands a large horn, reſembling the ivory tuſk of the elephant, but not altogether ſo thick. Nieuhoff, who gives this account, adds, that it is very rarely caught, and that it feeds on graſs; but this laſt obſervation may poſſibly have been ſpoken of courſe, without any one's having certainly known it. All that we have ever ſeen of this animal is a pair of horns of an enormous ſize, formerly in the poſſeſſion of ſir Hans Sloane, and of which he has given an account to the Academy of Sciences at Paris, 1727.

The captain of an Eaſt India ſhip, on ſeeing theſe horns, aſſured ſir Hans, that they belonged to a large ſpecies of bull in the Eaſt, which he had ſeen, and which, by his account, ſeemed to be the ſame with the creature before mentioned, as deſcribed by the ancients; but as none of the modern naturaliſts have ſeen it, it has been left out of their accounts.

The pair here mentioned ſeem not to be the only ones preſerved in Europe, for Geſner tells us of one of an enormous ſize, which is ſtill hung up in the cathedral church of Straſburg.

SULA, in *Ornithology*, a name given by Hoier, and ſome others, to a bird, deſcribed as a diſtinct ſpecies of the webfooted water-fowl, but ſeeming to be no other than the *anſer baſſanus*, or *ſoland* GOOSE.

SULCATED *leaf*, among *Botaniſts*. See LEAF.

SULL, a word uſed in the weſtern parts of England for a plough.

SULPHUR, in a *general ſenſe*, is a term that has been uſed by the ancient chemiſts to denote all inflammable ſubſtances, of whatever nature they might be. *Sulphur*, according to them, is one of the principles of bodies, and they call the inflammable principle itſelf the principal *ſulphur*.

Accordingly, they ſpeak continually of the *ſulphurs* of metals, of the *ſulphurs* of plants, and of the *ſulphurs* of animals: and oils, ardent ſpirit, reſins and bitumens were, in this extenſive application of the term, all *ſulphurs*.

But, by the more accurate diſtinction, ſuggeſted by Beccher, and more fully illuſtrated and eſtabliſhed by Stahl and modern chemiſts, between the pure and ſimple inflammable principle, called PHLOGISTON, and the more compounded bodies which contain it, and owe their inflammability to it, we acquire a knowledge of the true theory of *ſulphur* and all inflammable ſubſtances. Hence we learn, that the inflammable principle is always alike, and the ſame in every body, and that this principle, by its combination with different ſubſtances, produces all the inflammable matters with which we are acquainted.

Oils, fats, reſins, bitumens, ardent ſpirits, coals, metals, *ſulphur* properly ſo called, or common *ſulphur*, are ſo many compounds, all which have the common property of burning, becauſe they all contain the principle of inflammability; but which differ in other reſpects, becauſe this principle is united to different ſubſtances, and in different proportions.

SULPHUR, *in a more confined and proper ſenſe*, denotes that concrete maſs, which is formed by the combination of the vitriolic acid with the inflammable principle or phlogiſton.

Nature probably forms, and combines daily, mineral *ſulphur* within the earth. This ſubſtance, commonly called *brimſtone*, is abundantly diffuſed in many places, eſpecially where metallic minerals exiſt.

Sulphur almoſt pure, denominated *native*, or *virgin ſulphur*, *ſulphur vivum*, is found in volcanos and grottos, where it is ſublimed in form of tranſparent cryſtals. But the greateſt quantity of *ſulphur*, which exiſts naturally, is combined with metals in ores, and eſpecially in PYRITES. And as it is fuſible and volatile, it is procured from theſe minerals by diſtillation and ſublimation.

Sulphurs, conſidered in their native ſtate, are defined to be dry, ſolid, but friable foſſil bodies, melting with a ſmall heat, when fired in the open air, burning almoſt wholly away with a blue flame and noxious vapour, endued with an electric power, and not diſſoluble in acids.

Of this genus of foſſils, Dr. Hill enumerates four known ſpecies. 1. The yellow native *ſulphur*, which, in its pureſt ſtate, is of a pale ſtraw-colour, and as pellucid as the fineſt amber; but is more frequently found coarſer, and more opake. It is found in the gold mines of Peru, in Hungary, and ſome other places. 2. The green native *ſulphur*. This is harder than the other, and is uſually found in ſmall maſſes compoſed of ſeveral cruſts. It is found, ſo far as is yet known, only about mount Veſuvius. 3. The grey native *ſulphur*, which is common in Iceland, and many other places, and is the coarſeſt and worſt of all the kinds. And, 4. The moſt rare and beautiful of all the kinds, the red native *ſulphur*. This is of a fine glowing red, like cinnabar, and very bright and tranſparent, and is found, ſo far as is yet known, only in the gold mines of Peru. Hill's Hiſt. of Foſſ. p. 400.

Dr. Heberden found ſome native *ſulphur* exceedingly pure on peak Teneriffe.

Dr. Liſter has given it as his opinion, that there is no ſuch thing as pure mineral *ſulphur* found native, or in its original ſtate, in the earth. He ſuppoſes all the pyrites to contain a vaſt quantity of *ſulphur*, as indeed experience proves; and is of opinion, that as we by art can, by means of fire, melt and ſeparate pure *ſulphur* from the pyrites, ſo nature, acting by ſubterranean fires, can do, and frequently does the ſame; and that the *ſulphur*, found pure about the burning mountains, and in mines, is all of this kind. He ſuppoſes, alſo, that thunder, lightning, and earthquakes, are all owing to this matter; and that it is owing to the exhalations of the pyrites, which are in effect the pyrites itſelf. Phil. Tranſ. Nº 156.

Sulphur, ſuch as it is in commerce and the arts, is of a pale yellow colour, and of a diſagreeable and peculiar ſmell, which is rendered more ſenſible when the *ſulphur* is heated or rubbed. The ſpecific gravity is much greater than that of water, and leſs than that of earths and ſtones. Mr. Kirwan (Phil. Tranſ. vol. lxxii. part i. p. 235.) by weighing flowers of *ſulphur* in a perforated braſs box in water, found its ſpecific gravity to be 1,294. Mr. Petit weighed it in oil, and found its ſpecific gravity 2,344, which Mr. Kirwan believes to be nearly the truth.

Sulphur is brittle and pulverable, although it may be eaſily ſoftened. The greateſt part of the *ſulphur* met with in the ſhops, is extracted from certain ores by a kind of diſtillation, or prepared from minerals abounding with vitriolic acid, by ſtratifying them with wood, which being ſet on fire, the *ſulphur* is collected in cavities made in the upper part of the pile. The largeſt quantities are brought from Saxony, in irregular maſſes, which are afterwards melted and caſt into cylindrical rolls.

Sulphur ſeems to be incapable of receiving any alteration from air or from water, ſeparately or jointly, and even from fire in cloſe veſſels. By expoſure to fire and to air it is inflamed and burnt; when it is very hot and burns quickly, its flame is ardent and capable of kindling inflammable bodies, but always bluiſh, not very luminous, and not accompanied with any ſoot or ſmoke, but with an acid vapour of a penetrating and ſuffocating ſmell. If, on the contrary, *ſulphur* is burnt very ſlowly in open air, its flame can only be ſeen in the dark, like a ſmall bluiſh glimmering light, and its heat is ſo inconſiderable, that it cannot kindle the moſt inflammable ſubſtances. Accordingly, M. Beaumè has contrived to burn all the *ſulphur* that is contained in gun-powder, without kindling the powder, by heating a tile to ſuch a degree, that the powder, which is thrown upon it, may not fulminate, but only emit a white ſmoke. If the tile and powder be carried in this ſtate to a dark place, the vapour which ſeemed to be a white ſmoke, will then appear to be a true flame, but very bluiſh and faint; and this flame will continue till all the *ſulphur* of the powder be conſumed, if the tile remains ſufficiently hot for that purpoſe.

Sulphur heated ſo much as to burn, and thrown while melted and burning into water, is very ſoon rendered ſolid, acquiring firſt a conſiderable degree of ſoftneſs, and then recovering its natural conſiſtency and brittleneſs.

Pure acids ſeem to have no action upon *ſulphur*, though M. Beaumè has obſerved, that if concentrated vitriolic acid be poured upon it, and heated to a certain degree, the *ſulphur* will liqueſy, and appear in the water like oil, and when it is cooled, appear to have a green colour.

Spirit of wine does not ſenſibly act upon this concrete ſubſtance, unleſs they be applied to each other (as the count de Lauraguais diſcovered) in the ſtate of vapour. But *ſulphur* diſſolves, by the aſſiſtance of heat, in oils both expreſſed and diſtilled, and in the mineral petrolea; and when diſſolved, yields a very offenſive ſmell, and diſcovers to the taſte a nauſeous pungency and heat. However, expreſſed oils and petroleum diſſolve it more readily and more plentifully than the diſtilled, taking up ſo much as to become thick and almoſt conſiſtent. *Sulphur* is alſo diſſolved by alkalis fixed and volatile, and even by calcareous earths.

Sulphur unites eaſily, but with different degrees of affinity, with all metallic matters, excepting gold, platina, and zinc. See *Tables of* AFFINITY.

The compounds formed by *ſulphur* with different metals, are different; but all of them poſſeſs a metallic luſtre, without any ductility; and theſe combinations of *ſulphur* and of metals are very frequently found in a natural ſtate.

The pureſt gold, when melted with common *ſulphur*, remains perfectly the ſame as before; it lets the *ſulphur* burn freely away, remaining itſelf entire, and in a maſs. Silver, when it begins to grow red-hot in a crucible, melts immediately on adding common *ſulphur*; and when poured out, it proves a maſs that cuts very eaſily, is very malleable, and is of the colour and conſiſtence of lead: this maſs, however, being a ſecond time expoſed to a very ſtrong fire for a conſiderable time, is freed from its *ſulphur*, which becomes diſſipated, and the ſilver germinates into a kind of woolly ſubſtance, if the fire be ſlackened towards the end of the operation.

Tin, granulated and ſtratified with an equal, or double quantity of *ſulphur*, deflagrates in the fire as if nitre had been added, and leaves the fluid, which becomes ſolid and conſiſtent while it is yet red in the fire; whence it is plain that the fuſion of tin is retarded by *ſulphur*. The remaining regulus is very brittle under the hammer, much like a ſemi-metal, and is of the colour of lead; but the part of the tin, thus turned into ſcoriæ, look like aſhes and duſt upon the ſurface, but is darker-coloured, and cleaner within. The whole quantity of the tin will be converted into theſe ſcoriæ, by repeating the burning with freſh quantities of brimſtone.

Lead, melted with brimſtone, after the deflagration, is reduced to a maſs which is hardly fuſible by a great fire, but forms a friable maſs, conſiſting of very bright and glittering particles.

Copper, ſtratified with *ſulphur*, melts immediately in the fire, and turns to a black brittle maſs. The ſame thing alſo happens, if *ſulphur* be put upon copper when red-hot. Iron being taken red-hot out of the fire, and rubbed with *ſulphur*, melts into a ſpungy droſs; it afterwards quits this *ſulphur* with difficulty, but melts very eaſily with it. There is no metal, or ſemi-metal, that ſeems ſo nearly allied to iron as *ſulphur*, or that melts ſo eaſily and remains ſo intimately mixed with it. Regulus of antimony being well powdered, and mixed with *ſulphur*, and ſtirred with an iron while in fuſion, returns to crude antimony again. The fuſion of crude antimony is alſo greatly promoted and aſſiſted by common *ſulphur*: but it does not mix ſo readily with the *ſulphur* as the regulus.

Biſmuth, melted with common *ſulphur*, runs into a maſs reſembling antimony, of a faint grey colour, conſiſting of minute and very bright needles, each cutting the others acroſs: this maſs is extremely brittle.

Zinc, melted with *ſulphur*, does not readily mix with it, but if it be kept a long time in a moderate fire, and *ſulphur* be many times poured over it, ſo as to cover the whole ſurface, and it be continually ſtirred together, it at laſt produces a very brittle dark-coloured ſhining ſubſtance.

From theſe experiments with *ſulphur* on the metals, it appears, 1. That iron being very greedy of *ſulphur*, all the other metals, and ſemi-metals, may be freed from *ſulphur*, by adding iron to them. 2. That a very ſmall quantity of iron, a greater quantity of copper, and a much larger of lead, or tin, are neceſſary to abſorb the ſame proportion of *ſulphur*. Cramer's Art of Aſſaying, p. 43.

Sulphur may be ſeparated from metallic ſubſtances by ſeveral methods; as by the mere action of fire, in the operation of ROASTING of ores, the ore of mercury and the combinations of arſenic with *ſulphur* excepted; by means of acids, which ſerve to decompoſe ſeveral combinations of *ſulphur* with metals, as in the ſeparation of this ſubſtance from crude antimony with aqua regia; and alſo by means of other metals, to which the *ſulphur* has a greater affinity, as in the *dry* PARTING, the purification of gold by antimony, and the decompoſition of cinnabar, of orpiment, and of crude antimony.

From the analyſis of *ſulphur* effected by combuſtion, chemiſts have been led to infer, that its two conſtituent principles are an inflammable matter and the vitriolic acid; for, during its combuſtion, nothing is perceptible but two matters, one of which is deſtroyed or diſſipated by the inflammation, and another which has the properties of this acid. Beſides, *ſulphur* may actually be made by combining its acid with the inflammable principle or phlogiſton.

The proceſs by which the celebrated Stahl formed *ſulphur* exactly ſimilar to the native *ſulphur*, conſiſts in mixing and melting together in a crucible equal parts of fixed alkali, and of vitriolated tartar, to which is added, a quantity of powdered charcoal, equal to a fourth part of the weight of the ſalts. The matter is to be ſtirred with an iron rod, that the charcoal may be well mixed with the ſalts; the crucible is to be covered, and a pretty ſtrong heat is to be immediately applied, and continued for a very ſhort time: the crucible is then to be removed from the fire, and the melted matter is to be poured upon a ſtone previouſly greaſed. This matter, which ſparkles when it is poured, is coagulated by cold, and becomes a brittle maſs, of a deeper red colour than ordinary liver of *ſulphur*; but it has the ſmell, the ſolubility, the deliqueſcency, and all the other properties of liver of *ſulphur*. By diſſolving it in water, and by adding any acid to the ſolution, an artificial *ſulphur* will be precipitated, which being collected and dried, is found not to differ from natural *ſulphur*. But we are not to conclude with Glauber and Boyle in ſimilar operations, that the *ſulphur* thus obtained exiſted ready formed in any of the ſubſtances employed, and that it is only extracted from theſe. On the contrary, it is certainly known, that not a particle of *ſulphur* exiſts in vitriolic acid, nor in neutral vitriolic ſalts, with the baſis of fixed alkali, nor in very pure alkalis, nor in any oil, nor in any vegetable coal, and conſequently, the *ſulphur* obtained in theſe operations is a new product, reſulting from the union of the vitriolic acid with the inflammable principle of the vegetable coal, as Stahl has advanced.

The fixed alkali is not abſolutely neceſſary to the ſucceſs of this proceſs, but it is uſeful for facilitating the fuſion of the vitriolated tartar, and for preventing the diſſipation and combuſtion of moſt of the *ſulphur* as ſoon as it is formed.

From the proceſs above recited we may infer, that vitriolic acid, and the inflammable principle, cannot form *ſulphur* by combining together, unleſs they be both perfectly dry; that the inflammable principle of all bodies is always capable of forming *ſulphur* with the vitriolic acid, provided it be, or can be made dry, and therefore, that the inflammable principle is always the ſame, whether it reſides in reſins, bitumens, oils, and fat, coals or metals: that the vitriolic acid quits any body with which it happens to be combined, when it can unite with the inflammable principle of any other body, and with this principle forms *ſulphur* when it is properly applied: that the principles and properties of *ſulphur* being known, we may deduce from theſe a more accurate knowledge of the particular nature of the inflammable principle, by comparing the difference between *ſulphur*, volatile ſulphureous acid, and pure vitriolic acid; hence it is found, that the ſmell and colour of *ſulphur*, its volatility, its conſtant dryneſs, its inſolubility in water, which are properties that do not belong to vitriolic acid, are produced by the inflammable principle, that poſſeſſes all theſe qualities in itſelf, or that is, at leaſt, capable of communicating them to the compounds in the combination of which it enters: and finally, that the inflammable principle poſſeſſes eminently the above mentioned properties; for we know that the quantity of it in *ſulphur* is much leſs than the quantity of the vitriolic acid. In order to determine the proportion of the two principles of *ſulphur*, Stahl made the following experiment. He put a quantity of powdered liver of *ſulphur* upon an earthen-ware plate, and placed this plate upon fire, ſo gentle, that the liver of *ſulphur* might not be melted, nor even ſo ſoftened as to run into lumps. This powder muſt be ſtirred, and the fire increaſed toward the end, till no ſmell be perceived. The remaining matter is to be diſſolved in water, and, by cryſtallization, a very pure vitriolated tartar is formed. In this operation the inflammable principle of the *ſulphur* is gradually diſſipated without any ſenſible combuſtion, and its acid combines, or remains combined, with the alkali of the liver of *ſulphur*.

Mr. Brandt, who carefully repeated this experiment, found, from the quantity of vitriolated tartar thus obtained, that, in *ſulphur*, the proportion of inflammable principle is to that of the vitriolic acid as 3 to 50; or, that the *ſulphur* contains only one ſixteenth of its weight of inflammable principle.

Neumann, from a ſimilar experiment, infers, that in 16 ounces of *ſulphur*, there are upwards of $15\frac{3}{4}$ ounces of pure acid, and not quite $\frac{1}{4}$ of an ounce of the inflammable principle. Others have concluded, that *ſulphur* contained $\frac{1}{7}$ of phlogiſton.

The ingenious Mr. Kirwan (Phil. Tranſ. vol. lxxii. part i. p. 233.) has endeavoured to find the quantity of phlogiſton in *ſulphur*, by eſtimating the quantity of fixed air produced during its combination; and the reſult of his experiment is, that 100 grains of *ſulphur* contain 40,61 grains of phlogiſton, and 59,39 of vitriolic acid.

The compoſition of *ſulphur* may be obviouſly and compendiouſly illuſtrated, by pouring upon melted lead the acid of *ſulphur*, and collecting the riſing vapour in a large glaſs, or other veſſel, held over the melted lead; and as ſoon as the vapour is condenſed, we may obſerve ſeveral filaments of *ſulphur* ſticking to the ſides of the glaſs. When lead is in a ſtate of ſtrong fuſion, its phlogiſton is in a ſtate of diſperſion; the acid of *ſulphur* inſtantaneouſly unites itſelf with this phlogiſton, and forms *ſulphur*.

The author of the Chemical Dictionary remarks, on the ſubject of the name *ſulphur*, that as other acids beſides the vitriolic can alſo contract an intimate union, and form compounds with pure phlogiſton, this name may be generally applied to all compounds of pure acid and phlogiſton, which may be diſtinguiſhed from each other by adding the name of the acid; as *vitriolic ſulphur*, *nitrous ſulphur*, and *marine ſulphur*, if any ſuch *ſulphur* does exiſt: but he alſo remarks, that the name of *ſulphur* can be given to thoſe compound bodies only which do not contain any oil; this condition being eſſential to the ſulphureous combination, and conſequently that we cannot admit of *acetous ſulphur*, or *tartareous ſulphur*, or of others of this nature containing vegetable acids, on account of the oil which enters into their compoſition as an eſſential principle.

The uſes of *ſulphur* are very extenſive in chemiſtry, in medicine, and in the arts. The LIVER *of ſulphur* is employed in a chemiſtry for ſeveral ſolutions. *Sulphur* is alſo uſeful for ſeveral fuſions, precipitations, and ſeparations of metals and minerals. And as *ſulphur* contains a very large quantity of vitriolic acid, a method is now practiſed of extracting from it this acid, by burning *ſulphur* in cloſe veſſels with the addition of nitre. See CLYSSUS *of ſulphur*.

Sulphur is employed in medicine, both internally and externally: the internal preparations are flowers of *ſulphur*, waſhed *ſulphur*, magiſtery of *ſulphur*, tablets, balſams, &c. (ſee the following articles), in ſome of which this ſubſtance is not altered, but only purified and divided, and in others it is combined with other ſubſtances. The native *ſulphurs* ſhould never be uſed internally without purification, becauſe they almoſt always participate of arſenic, which is diſcoverable in ſome by their having naturally more or leſs of a red colour, and in others by their exhibiting this colour after a part of the pure *ſulphur* has been ſeparated by ſublimation. Pure *ſulphur*, taken in doſes of ten grains to a dram or more, gently looſens the belly, and promotes perſpiration. Some phyſicians and chemiſts, indeed, conſidering that *ſulphur* is unſoluble in water, and capable of reſiſting the action of moſt menſtrua, have advanced, that it can produce no effect when taken internally, ſingle and unaltered; but this notion ſeems to be groundleſs, and *ſulphur*, which is attached by all oily and ſaponaceous ſubſtances, and conſequently by almoſt all animal liquors, is much more ſoluble than is generally believed. It ſeems to paſs through the whole habit, and manifeſtly tranſpires through the ſkin, as appears from the ſulphureous ſmell of perſons who have taken it, and from ſilver being ſtained in their pockets to a blackiſh hue, as by the vapour of ſulphureous ſolutions.

Sulphur is principally recommended againſt the piles, in diſorders of the breaſt, and in cutaneous eruptions: in the ITCH it is a certain remedy, whether internally or externally uſed, in which caſe its efficacy probably depends, not ſo much on its purifying the blood, as on its fumes being deſtructive to the cuticular animalcules to which the preſent theory aſcribes that diſtemper. It remarkably corrects or reſtrains the power of certain mineral ſubſtances of the more active kind: by the admixture of *ſulphur* mercury becomes inert, the virulent antimonial regulus mild, and arſenic itſelf almoſt innocent.

Several mineral waters, which are drank or uſed as baths for ſome diſeaſes of the breaſt or of the ſkin, owe their good qualities to the *ſulphur* contained in them. And *ſulphur* combined with other ſubſtances may contribute to their medicinal powers.

Sulphur is alſo uſed in ſeveral arts. By means of it fine impreſſions of engraved ſtones are taken. See BRIMSTONE, and *Impreſſions of* MEDALS.

The utility of this ſubſtance as an ingredient in the preparation of GUNPOWDER and FIRE-*works* is well known; and it is alſo uſed for whitening wool, ſilk, and many other matters expoſed to its vapour during its combuſtion, the colours and redneſs of which could not be deſtroyed by any other ſubſtance, but are quickly effaced by this acid vapour. In this caſe it muſt be burnt, as Stahl has obſerved, very ſlowly. See BLEACHING.

The vapours of *ſulphur* alſo whiten red roſes; and even young rooks, taken out of the neſt, and expoſed to them, are ſaid to become perfectly white. They have the ſame effect on gold, which is to be reſtored to its colour by boiling it in water with tartar. See on the ſubject of this article Dict. Chem. art. *Sulphur*. Watſon's Chem. Eſſ. vol. i. p. 167, &c. Lewis's Mat. Med. art. *Sulphur*.

There is a preparation of common *ſulphur*, ſtrongly recommended by Mortimer for preſerving timber from being worm-eaten, as it is very ſubject to be when felled before the ſap is wholly at reſt. A quantity of common yellow brimſtone is to be put into a common retort of glaſs, and covered three fingers deep with aqua fortis; this is to be diſtilled off to a dryneſs, and the ſame repeated three times. The *ſulphur* then is to be taken out, and laid on a marble, or put into an open flat glaſs veſſel, where it will ſoon run into an oil by deliquium. This oil is to be rubbed on any curious piece of wood that is in danger of worms; it will deſtroy them if they have begun to breed in it, and wholly prevent them if not yet begun. It alſo gives the wood an agreeable tinge or colour, which no art can ever rob it of afterwards. It is alſo a great preſervative of wood that is to be ſet in the earth, or under water; and may be uſed with ſucceſs to rub over the cables in ſhipping, or any other ropes that are endangered by lying much in the water. Mortimer's Huſbandry, vol. ii. p. 104.

SULPHUR *of antimony*. See ANTIMONY.

The method of Angelus Sala for preparing the *ſulphur of antimony*, ſeems, according to Dr. Plummer, preferable to the common way. The curious may find the deſcription of Sala's in the Medic. Eſſ. Edinb. vol. i. art 6. The doctor thinks, that, in the common preparation, much of the true *ſulphur* is conſumed by the deflagration, and the precipitated powder conſiſts of many of the groſs earthy parts of the ſalts in antimony. However, the *ſulphur of antimony*, uſed by the doctor in the preparation of his *æthiops*, was made in the common way. See PLUMMER's *æthiops*.

SULPHUR *auratum*, a name given by ſome chemiſts to a preparation of *ſulphur* and arſenic, called by others *rubinus arſenicalis*. See REALGAR.

SULPHUR, *balſam of*. See BALSAM *of ſulphur*.

The college of London directs one part of flowers of *ſulphur* and four of oil olive, and the ſame proportions of the flowers and of the petroleum, called Barbadoes tar; and that of Edinburgh, four ounces of the flowers and a pint of linſeed oil, to be boiled together till they unite into the conſiſtence of a balſam. When two ounces of the flowers are digeſted in ten of oil of turpentine, or in a mixture of ſix of oil of turpentine and four of oil of aniſeeds, which laſt acts the moſt powerfully of any of the eſſential oils that have been tried, a conſiderable part of the ſulphur remains undiſſolved.

The proceſs for preparing theſe balſams requires caution, becauſe when the *ſulphur* is ſtrongly acted on either by expreſſed or eſſential oils, in a boiling heat, the matter rarefies and ſwells much, and throws out great quantities of an elaſtic vapour, which, without a free exit, would produce violent exploſions. A more elegant compoſition of this kind (ſays Dr. Lewis) might be obtained by adding to the eſſential oil a proper quantity of the balſam made with expreſſed oils, which will unite with it by a gentle warmth. Theſe balſams have been employed externally for cleanſing and healing foul ulcers; and they are recommended internally in ſome cachectic and hydropic caſes, and alſo in coughs and conſumptions, in which they promiſe (ſays Dr. Lewis), by their manifeſt heat and acrimony, to be oftener injurious than beneficial, as they have been frequently obſerved to hurt the appetite, and excite febrile ſymptoms.

SULPHUR, *clyſſus of*. See CLYSSUS.

SULPHUR, *embryonatum*. See EMBRYONATUM.

SULPHUR, *fixed*. *Fixed ſulphur* is uſed by the enamellers, and is prepared in the following manner. Boil flower of brimſtone in common oil for an hour; take the matter off the fire, and pour on it a quantity of very ſtrong vinegar, the flower of brimſtone will on this ſink to the bottom; pour off the liquors, and repeat the operation to the third time, and the powder then ſeparated is the *fixed ſulphur*. Neri's Art of Glaſs, p. 188.

SULPHUR, *flowers of*. See FLOWERS *of ſulphur*.

Thoſe who prepare the flowers in the way of trade, uſe for the ſubliming veſſel a large iron pot, capable of holding two or three hundred weight, which is placed under an arched chamber, lined with glazed tiles, ſerving for the recipient. Some ſmall portion of *ſulphur* that riſes firſt, eſpecially when the veſſels are large, or the air not ſufficiently excluded, is apt to take fire, and give out its acid, which adhering to the flowers that ſublime afterwards, communicate to them a ſenſible acidity or roughneſs; in conſequence of which they are ſometimes found to coagulate milk; when taken internally to produce gripes, and to receive from ſome metalline veſſels a diſagreeable taint: and, therefore, the London college directs ſuch of the flowers, as may happen to concrete or melt together from the vicinity of the receiver to the fire, to be reduced to powder, not with metalline inſtruments, but either in a wooden mill, or in a marble mortar with a wooden peſtle. From this ſuperficial acid they are freed by boiling them in water, and afterwards carefully waſhing them with cold water.

The flowers of *ſulphur* in ſubſtance ſeem to be preferable, for internal uſe, to any of the preparations: they are certainly more ſafe, and perhaps not leſs effectual, as they do not heat or irritate the firſt paſſages, and yet are evidently diſſolved in the body and carried through the habit. They are moſt commodiouſly taken in the form of troches. Lewis. See *Troches of* SULPHUR.

SULPHUR, *liver of*. See LIVER *of ſulphur*.

SULPHUR *metallorum*, or *ſulphur of metals*, called alſo *ſulphur figens*, is uſed among *Chemiſts* and *Alchemiſts*, for a peculiar matter, which enters the compoſition of all metals.

Metals are ſuppoſed to conſiſt of two eſſential parts or principles; mercury as the baſis, or metallic matter; and *ſulphur*, as the binder, or cement, which fixes the fluid mercury into a coherent malleable maſs.

Some chemiſts, particularly Monſ. Homberg, will have this *ſulphur* to be no other than fire. It is now known to be the inflammable principle, called phlogiſton. See SULPHUR.

SULPHUR, *milk of*, *lac ſulphuris*, is directed by ſome to be prepared with fixt alkalis, which will diſſolve *ſulphur*; and this method is the moſt expeditious and leaſt troubleſome, provided the *ſulphur* has been thoroughly united with a ſufficient quantity of the alkali. But the preparation by quick-lime affords a more ſaleable whiteneſs, and accordingly it is directed to be made by the London Diſpenſatory in the following manner: boil flowers of *ſulphur* in water, with three times their weight of quick-lime, till they are thoroughly diſſolved; filtre the ſolution through paper, and pour on it weak ſpirit of vitriol, till a precipitation is procured; ſeparate the precipitated matter, by pouring off the water, and waſh it with freſh water, till it is become quite inſipid.

The pure *lac* is not different in quality from pure *ſulphur* itſelf, to which it is preferred, in external applications, only on account of its colour.

SULPHUR, *oil of*. See OIL *of ſulphur*. Some think there is an eſſential difference between the acid of *ſulphur* and its ſuccedaneum, the oil of vitriol; but a late author aſſerts, notwithſtanding the experiments brought to ſupport this opinion, that if the two acid liquors be reduced to the ſame ſtrength, and perfectly freed from all heterogeneous ſubſtances, they will be perfectly ſimilar, and not to be diſtinguiſhed. See Eſſay for Reforming of the London Pharmacopœia, London, 1774, p. 64.

It is evident, from numerous experiments, that vitriol and *ſulphur* are things very nearly allied to one another. The vitriolate ſalt, in common *ſulphur*, differs ſcarce at all from common vitriol, and the acid liquors obtained from both, under the different names of *ſpirit of ſulphur*, and *oil of vitriol*, are the ſame, except in degree of ſtrength.

The effects of theſe two acids in the body, and alſo on metals, &c. are exactly the ſame. It is obſerved, that the *ſulphur* yields but a very ſmall quantity of this acid, in compariſon of the vitriol; but the reaſon of this is, that in the operation the rapid motion of the flame ſublimes the far greateſt part of the ſubſtance, unſeparated in the form of flowers.

There are ways, however, of remedying this, and by ſome ſuch means it was that the famous Drebbel obtained, at the rate of eight, and ſometimes ten ounces of ſpirit, from a pound of *ſulphur*; whereas, in the common proceſs, one ounce is a conſiderable quantity to obtain. Poſſibly the grand ſecret, poſſeſſed by Mr. Ward, of making oil of vitriol, as he calls it, cheaper than others, may depend on this ſort of contrivance. The veſſels he uſes are vaſt ſpheres of glaſs, of three feet in diameter, which muſt ſerve as well at leaſt, if not much better, than bells; and oil of *ſulphur*, and oil of vitriol, are ſo much the ſame, that there is no deceit in ſelling the one for the other.

In all the operations for the making oil of *ſulphur*, the weather is a material thing to be regarded; for when the operation is performed in moiſt weather, there is always a greater quantity of ſpirit or oil prepared than when in dry; and Drebbel acknowledged, that he could obtain one fourth more in theſe than in other ſeaſons. This great chemiſt tells us, that he was convinced the contrivance he uſed was capable of very great improvements, and that he made no doubt of carrying it ſo far, at length, as to obtain an equal weight of acid ſpirit to that of the *ſulphur* uſed in the experiment; the humidity of the air, at leaſt, adding as much as the quantity of the *ſulphur* loſt in the operation. There are ſeveral common menſtrua, by means of which *ſulphur* may be reduced into the form of a highly rectified acid, and corroſive liquor; and even ſpirit of nitre, or aqua fortis, well rectified, being digeſted upon the flowers of brimſtone, and then diſtilled in aſhes, and the proceſs repeated five or ſix times, after the laſt operation, there will remain with the flowers nearly an equal weight of an acid ſpirit, in all things reſembling that made by the bell, the ſpirit of nitre being ſcarce at all changed from what it was before the operation; and it ſeems, from experiment, that if the proceſs were frequently reiterated, and the ſpirit of nitre changed, the whole might be thus tranſmuted into an acid ſpirit, abating only for ſome ſmall proportion of earthy or metalline particles. Phil. Tranſ. N° 104.

SULPHUR, *ointment of*. See UNGUENTUM.

SULPHUR *præcipitatum*, a name given in the London Pharmacopœia to the medicine called by other authors *lac ſulphuris*, or *milk of* SULPHUR.

SULPHUR, *purified*, is uſed in the making of GUN-*powder*, and other occaſions. The method of preparing it at the powder-mills is this: they diſſolve the *ſulphur* by a very gentle heat, and then ſkim it, and paſs it through a ſtrainer. If the brimſtone ſhould happen to take fire in the melting, they have an iron cover that fits cloſe to the melting-flame, and damps the veſſel. The brimſtone is judged to be ſufficiently refined if it will melt without yielding any fœtid odour between two hot iron plates, and be changed into a kind of red ſubſtance. Shaw's Lectures, p. 389.

SULPHUR *rapax*, in *Chemiſtry*, a name given to arſenic, from its carrying off a great quantity of many metals in the fire, which it carries up with it, and ſublimes in form of flowers, called by ſome CADMIA *fornacum*.

SULPHUR, *ſalt of*, is a chemical preparation, very improperly ſo called, being no other than the ſal polychreſton, impregnated with ſpirit of *ſulphur*, and reduced to an acid ſalt, by evaporating its humidity. Some hold it a powerful febriſuge.

SULPHUR, *ſpirit of*, is nothing elſe than vitriolic acid obtained from *ſulphur* by burning. This was formerly obtained by burning *ſulphur* in an open crucible, placed upon a ſtand in an earthen diſh filled with hot water, a large capital, or glaſs bell being ſuſpended above this diſh. The acid of the burning *ſulphur* meeting the vapour of the hot water, united with this water, and fell down along the ſides of the bell, or by the beak of the capital. The weak acid thus procured, was afterwards concentrated.

But the true method of obtaining much acid of *ſulphur*, is to burn it in cloſe veſſels by means of a ſmall quantity of nitre.

The greateſt part of the vitriolic acid now employed is obtained by burning *ſulphur*. The vapours of burning *ſulphur* are the volatile, vitriolic, or ſulphureous acid. Theſe are very difficultly condenſible. For which reaſon, very large veſſels, and much time, are required in this operation. In great works leaden veſſels are uſed, called *houſes*, of a priſmatic form, of which the altitude is about ten feet, and the baſe, which is a rectangle, is ſix feet long and four feet broad. The bottom of each of theſe veſſels is covered with a little water, to aſſiſt the condenſation of the vapour. Above the water is placed a ſmall veſſel, capable of containing a few pounds of *ſulphur*, to which a ſmall portion of nitre is added; becauſe, by this addition, a larger quantity of *ſulphur* may be burnt without acceſs of freſh air. The veſſels are to be filled with the vapour of hot water, and their ſides wetted with the condenſed ſteam; then the *ſulphur* is to be kindled by touching it with a red-hot iron: the vapour of the burning *ſulphur* riſes ſlowly; and when it has riſen as high as the mouth of the great veſſel, this muſt be ſtopt, or very nearly ſtopt, that the vapour may be confined. The *ſulphur* continues to burn till the air contained within the veſſel and the nitre be no longer capable of maintaining the combuſtion. The vapour remains a conſiderable time before it be entirely condenſed, notwithſtanding that this condenſation is facilitated by the water in the veſſel, and eſpecially by the ſteam of water with which the veſſel was previouſly filled. When all the vapour of the ſulphureous acid is at laſt condenſed, the *ſulphur* is to be again kindled, and more added if it be neceſſary, and the proceſs treated as before. When a ſufficient quantity of acid is collected, it is to be taken out of the veſſel; and after it has loſt its ſulphureous, or volatile quality, by expoſure to air, it is concentrated and rectified by diſtillation.

The uſual methods of preparing the acid *ſpirit of ſulphur*, or oil of *ſulphur*, by the bell, are ſo tedious and expenſive, that few are at the pains to make it. Both the methods, deſcribed by M. Charras in the Pharmacop. Royale, p. 883, are liable to many uncertainties and inconveniences, as well as that recommended by M. Homberg, in the Memoirs de l'Acad. des Sciences, anno 1703.

In the Medical Eſſays of Edinburgh, vol. v. art. 14, we have an eſſay on extracting the acid of *ſulphur* in an eaſy manner, by placing a crucible, with about three ounces of flowers of *ſulphur* in it, under a retort. The *ſulphur* being fired by throwing a lighted coal into it, the crucible is then gradually raiſed till it be juſt received within an orifice cut in the bottom of the hole of the retort, to which a large receiver with a ſpout is adapted. When the *ſulphur* is conſumed, the ſame quantity of new lighted *ſulphur* is to be put into another crucible; and thus the proceſs may be continued, till as much acid is obtained as is required.

This method is indeed an improvement on the common one; but there are two other more elegant and eaſy ways of extracting the acid from *ſulphur*. The firſt is by Stahl, who directs woollen-cloths to be moiſtened in a ſolution of fixed alkaline ſalt, and then dried. Theſe are to be ſuſpended over the fume of burning *ſulphur*, which will be imbibed and locked up in the ſalt, from whence it may be eaſily ſeparated by the addition of oil of vitriol, and the aſſiſtance of common glaſs diſtilling veſſels.

The ſecond is by Mr. Seehl, who pours oil of vitriol on a *hepar ſulphuris* placed in a glaſs retort, to which he adapts a receiver, and by a ſmall heat draws off the acid liquor. See Improvement on making Volatile Spirit of Sulphur, by Ephr. Rinh. Seehl, Lond. 1744, and Medic. Eſſ. Abridg. vol. i. p. 164. Not.

A pound of flowers of *ſulphur* may be burnt in about ſeven or eight hours, and will yield about ſeven drams, or an ounce of pure acid. But it is obſervable, that the quantity of acid liquor varies greatly with the weather, being, as before mentioned, conſiderably more when the air is moiſt than when it is dry.

It is ſaid that *ſulphur* may be made by combining a fat, oily, or bituminous ſubſtance, with any mineral acid ſalt; but, in reality, the difficulty of making *ſulphur* with every acid is very great, if not impoſſible. With the vitriolic acid, indeed, the inflammable part of bodies eaſily combines into a true *ſulphur*; but it does not appear that any way has yet been found, by which the marine or nitrous acid may directly be combined into ſuch a ſubſtance. Stahl is expreſsly of this opinion in his Opuſcul. Phyſ. Medic. 4to.

SULPHUR, *volatile acid of*. The *volatile acid of ſulphur*, according to ſome, contains not only the oil of *ſulphur*, but, at the ſame time, the pure native *gas*, or highly volatile ſpirit of the *ſulphur*. Mr. Seehl has given us an eaſy method of procuring this *volatile acid of ſulphur*, which he thinks of ſuperior virtue, both as a menſtruum and as a medicine, to the oil of *ſulphur* by the bell. For this purpoſe he gives us two proceſſes; one with an alkaline ſalt *per ſe*, mentioned above; and the other, which he prefers, by means of the ſame ſalt, with the addition of quick-lime. See Phil. Tranſ. N° 472. The ſpirit, obtained thus by quick-lime, is ſtronger, more acid, and more volatile, although ſpecifically heaver than the former.

The caput mortuum, remaining after diſtillation, makes an excellent tartar of vitriol, by ſolution, filtration, and cryſtallization.

SULPHUR, *ſyrup of*, is formed of ſolution of the liver of *ſulphur* in water, mixed with ſugar, into the conſiſtence of a ſyrup.

SULPHUR, *tincture of*, is formed by throwing the liver, whilſt hot from the fire, into rectified ſpirit of wine, in the proportion of about four ounces to a pint, and digeſting it about twenty-four hours, which communicates a rich gold colour, a particular, not ungrateful ſmell, and a hot ſomewhat aromatic taſte.

The ſyrup above mentioned, and a few drops of this tincture mixed with a glaſs of Canary, or other rich wine, to which it communicates a milky hue, have been ſometimes given in the ſame intentions as the balſams, and ſeem to be accompanied with the ſame inconveniencies.

The tincture, commonly called *volatile tincture of ſulphur*, may be obtained by boiling half a pound of flowers of *ſulphur* with a pound of quick-lime, in a gallon of water, till half the liquor is waſted, then putting the remainder into a retort, with eight ounces of powdered ſal ammoniac, and diſtilling with a gradual fire. The ſpirit comes over loaded with the *ſulphur*, and has a ſtrong offenſive ſmell.

Hoffman ſays, a mixture of it with thrice its quantity of ſpirit of wine, given in doſes of thirty or forty drops, proves a powerful diaphoretic; and that applied externally as a fomentation, with the addition of camphor, it alleviates gouty pains. Lewis.

Sulphur, *troches of*, are directed by the college of London to be made by beating together two ounces of the waſhed flowers and four of double refined ſugar, and making up the maſs with mucilage of quince-ſeeds: but that of Edinburgh directs, one ounce of the flowers of *ſulphur*, a dram of flowers of benzoin, and three ounces of fine ſugar, to be formed with mucilage of gum tragacanth; by the addition of the flowers of benzoin, the medicine is ſuppoſed to be rendered more efficacious in ſome diſorders of the breaſt. Lewis.

Sulphur-*water*. See Aqua *ſulphurata*.

Sulphur-*wort*, in *Botany*. See *Hog's* Fennel.

SULPHURATED *iron*. See Iron.

Sulphurated *ſilver*. See Silver.

Sulphurated *wine*. See Wine.

SULTAN, or **Soldan**, a title or appellation given to the emperor of the Turks.

It had its riſe under Mahmoud, ſon of Sebecteghin, the firſt emperor of the dynaſty of the Gaznevides, toward the cloſe of the fourth century of the æra of the hegira: when that prince going to Segeſtan to reduce Kalaf, governor of that province, who affected the ſovereignty; Kalaf was no ſooner advertiſed of his coming, than he went out to meet him, delivered the keys of his fortreſs, and owned him his *ſultan*; that is, his lord or commander. The title pleaſed Mahmoud ſo well, that he aſſumed it ever afterwards; and from him it paſſed to his deſcendants, and to other Mahometan princes.

Vattier will have the word Turkiſh, and to ſignify king of kings; adding, that it was firſt given the Turkiſh princes Angrolipex and Maſgud, about the year 1055: others will have it originally Perſian, alledging, in proof hereof, an ancient medal of Coſroe; others derive it from *ſoldanus, quaſi ſolus dominus*; others from the Hebrew שלט, *ſchalat, to rule, reign*.

In the Roman ceremonial, we alſo find mention made of a *ſoldan*, or marſhal, who is to attend the pope when he marches in ſtate. He is alſo to apprehend malefactors.

Sultans, *epocha of the*. See *Gelalæan* Epocha.

Sultan *flower*, *cyanus*, a ſpecies of *centaurea*. See Blue *bottle* and Centaury.

Sultan-*ſcheriff*. See Scherif.

SULTANA, the wife of a ſultan. The favourite *ſultana* is called *bhaſeki-ſultana*, i. e. private *ſultana*. See Aseki.

The *ſultana* queen is the emperor's chief wife. The old *ſultana*, mother of the emperor reigning, is called *ſultana valide*.

If any of the virgins of the ſeraglio, whom the grand ſignior makes choice of for his bed-fellow, by walking between two ranks of them, and throwing a handkerchief into her hand, conceives by him and brings forth his firſt begotten child, ſhe is called by the name of *ſultana* queen: and if this child be a ſon, ſhe is confirmed and eſtabliſhed by great feaſts and ſolemnities, and hath a ſeparate dwelling aſſigned unto her of many ſtately rooms well furniſhed, and many ſervants to attend upon her. She is likewiſe allowed a large revenue, and acknowledged in the ſeraglio as queen, by every expreſſion of duty and reſpect. The other women (though they may have iſſue) are not called queens; but they are called *ſultanas*, becauſe they have had carnal commerce with the king: but ſhe only is honoured with the title of queen, who is the mother of the firſt begotten ſon, heir to the empire. If this ſon ſhould die, and another of the *ſultanas* ſhould have a ſecond ſon; then her ſon being to ſucceed the deceaſed heir, ſhe is immediately made queen, and the former ſhall remain a *ſultana* only, and be deprived of her revenue and royalty: and thus the title of queen is transferred from one *ſultana* to another, by virtue of the ſon's ſucceſſion. Greaves's Works, vol. ii. p. 638, &c.

Sultana, alſo denotes a ſtrong Turkiſh veſſel of war.

SULTANIN, a gold coin, called alſo sequin.

SULTZ, or Sulz. See Salz.

SUM, **Summa**, in *Mathematics*, ſignifies the quantity that ariſes from the addition of two or more magnitudes, numbers, or quantities, together.

This is ſometimes called the *aggregate*: and, in algebra, it is ſometimes denoted by the letter Z, which ſtands for *zuma*, or *ſuma*; and ſometimes by the letter S.

Sum *of an equation* is when the abſolute number being brought over to the other ſide, with a contrary ſign, the whole becomes equal to 0: this Des Cartes calls the *ſum of the equation* propoſed.

SUMA, a name given by ſome of the chemical writers to tartar.

SUMACH, *rhus*, in *Botany*, a genus of the *pentandria trigynia* claſs. Its characters are theſe: the empalement of the flower is permanent, erect, and cut into five parts; the flower has five oval, erect, ſpreading petals, and five ſhort ſtamina, terminated by ſmall ſummits; it has a roundiſh germen, as large as the petals, with ſcarcely any ſtyle, crowned by three ſmall ſtigmas; the germen afterwards becomes a roundiſh hairy berry, encloſing a ſingle hard ſeed of the ſame form. Linnæus enumerates ſixteen, and Miller fifteen ſpecies, natives of various parts of the world.

The elm-leaved *ſumach*, or *rhus folio ulmi*, grows naturally in India, Spain, and Turkey: the branches of this tree are uſed inſtead of oak for tanning of leather, and it has been ſaid that the Turkey leather is all tanned with this ſhrub. See Morocco. The berries of *ſumach* have an acrid auſtere taſte: they were formerly uſed for reſtraining bilious fluxes and hæmorrhages, and colliquative hectic ſweats. Some direct an infuſion of half an ounce of the berries, and others two or three drams of an extract made from them by water, for a doſe. The leaves and young twigs are ſtrong aſtringents, and have been directed in the ſame intentions. Lewis.

The ancients uſed *ſumach*, inſtead of ſalt, for ſeaſoning their meat: whence the Latins call the tree *rhus obſoniorum*: and from its uſe in dreſſing of leather, it has been called *rhus coriaria*.

Sumach *myrtle-leaved*, *coriaria*, a genus of the *dioecia decandria* claſs. Its characters are theſe: it is male and female in different plants; the male flowers have five-leaved empalements; the flower has five leaves which are joined to the empalement, which have ten ſlender ſtamina, terminated by oblong ſummits; the female flowers have the like empalement, and the ſame number of petals; and in the centre are placed five pointals, which turn to a berry, encloſing five kidney-ſhaped ſeeds. There are two ſpecies. The ſort with male flowers is the moſt common in England; the other being very rarely ſeen in our gardens. Theſe grow wild in great plenty about Montpelier in France, where they are uſed for tanning of leather; and from this uſe it has been intitled by botaniſts, *rhus coriariorum*, i. e. tanner's *ſumach*. Miller.

SUMAGE, **Sumagium**, or **Summagium**, in our *Old Writers*, toll for carriage on horſeback. *Pro uno equo portante* ſummagium *per dimidium ann. obolum*. Chart. de Foreſt. c. 14.

SUMEN, a word uſed by ſome anatomical writers to expreſs the hypogaſtrium.

SUMMARY, an abridgement, containing the ſum and ſubſtance of a thing in a few words.

The *ſummary*, placed at the head of a book, a chapter, a law, or the like, is very uſeful to the reader, to facilitate the underſtanding thereof.

A recapitulation is to contain a *ſummary* of the whole preceding diſcourſe.

Summary *conviction*, in *Law*. See Conviction.

SUMMATORIUS *calculus*, the method of ſumming differential quantities; that is, from any differential given, to find the quantity, from whoſe differencing the given differential reſults.

This method we more uſually call *the inverſe method of fluxions*; and foreigners *integralis calculus*. See Calculus, and Fluxions.

SUMMER, one of the ſeaſons of the year, commencing, in theſe northern regions, on the day the ſun enters Cancer; and ending when he quits Virgo.

Or, more ſtrictly and univerſally, the ſummer begins on the day when the ſun's meridian diſtance from the zenith is the leaſt. It ends on the day when his diſtance is a mean betwixt the greateſt and ſmalleſt.

The end of *ſummer* coincides with the beginning of winter.

It is ſaid, that a froſty winter produces a dry *ſummer*; and a mild winter a wet *ſummer*. It often happens ſo, in fact, but why it ſhould be ſo, is perhaps a queſtion difficult to determine. The curious may, on this ſubject, conſult the Philoſophical Tranſactions, N° 458. ſect. 10.

Summer *flowers*. See Flowers.

Summer *fruits*, *fructus horæi*, comprehend ſtrawberries, currants, mulberries, raſpberries, &c. Theſe mild, ſweet, ſubacid fruits, are ſometimes uſed medicinally, as refrigerants, antiſeptics, relaxants, attenuants, and aperients. Boerhaave conſiders the continued uſe of them as one of the principal remedies in caſes of obſtruction and viſcidity, and in putrid diſorders: and Hoffman furniſhes inſtances of ſome obſtinate diſeaſes being cured by them. They apparently promote the alvine and urinary excretions; and, in ſome fevers, where watery liquors run off almoſt unchanged, theſe fruits, or their juices, render the urine coloured. As dietetic articles, they afford little nouriſhment, and are liable to produce flatulencies: to perſons of a bilious temperament and rigid fibres, and where the habit is diſpoſed, naturally or from extrinſic cauſes, to an inflammatory or putreſcent centſtate; the moderate or even plentiful uſe of them is ſalubrious; but by thoſe of a cold inactive diſpoſition, where the veſſels are lax, the circulation languid, and the digeſtion weak, they ſhould be uſed very ſparingly. The juices, extracted from fruits by expreſſion, contain their medicinal parts, freed from the groſſer indigeſtible matter. On ſtanding they ferment, and change to a vinous or acetous ſtate; but by a proper addition of ſugar and by boiling, their fermentative power is ſuppreſſed, and their medical qualities preſerved. The inſpiſſated juices are found to be leſs flatulent, and leſs diſpoſed, when taken freely, to produce gripes and fluxes than an equivalent quantity of the fruits in ſubſtance, or of the juices unboiled. Theſe juices, purified by ſettling and ſtraining, are made into ſyrups by a leſs proportion of ſugar than water, or the common watery infuſions require. For a quart of the depurated juices of mulberries, raſpberries, &c. fifty ounces at moſt are ſufficient; whereas vegetable infuſions, in general, require fifty-eight. The more juicy berries give out their juices by heat without expreſſion: thus, if equal parts of picked CURRANTS and ſugar be ſet over a gentle fire, the ſugar diſſolves in the juice of the fruit, and by boiling for a little time, an elegant JELLY is formed, which may be freed from the ſkins by ſtraining. Theſe preparations may be occaſionally diſſolved in water, and uſed as diluents, reſolvents, &c. in acute and other diſeaſes. Lewis.

SUMMER *ſolſtice*. See SOLSTICE.

SUMMER *teal*, in *Ornithology*, the name of a bird, the ſmalleſt of all the duck kind, called by Geſner the *anas circias*. See TEAL.

SUMMER, formed from the French *ſommier*, which ſignifies the ſame thing, in *Architecture*, is a large ſtone, the firſt that is laid over columns and pilaſters, in beginning to make a croſs vault; or it is a ſtone, which, being laid over a piedroit or column, is hollowed, to receive the firſt haunce of a platband.

SUMMER, in *Carpentry*, is a large piece of timber, which, being ſupported on two ſtone piers, or poſts, ſerves as a lintel to a door, window, &c.

There are alſo *ſummers* uſed in various engines, &c. ſerving to ſuſtain the weight, &c.

SUMMER *tree*, denotes a beam into which the ends or joiſts are faſtened, and to which the girders are framed. See BREST-SUMMER and GIRDER.

SUMMER *of an organ*. See SOUND-*Board*.

SUMMIT, formed from the French *ſommet*, which ſignifies the ſame, the vertex or point of any body or figure; as of a triangle, a pyramid, a pediment, &c.

SUMMITS *of flowers*, the ſame with the ANTHERÆ, or tops of the ſtamina. See FLOWER.

SUMMONER, SUMMONITOR, an apparitor, or petty officer, who is to cite perſons to appear at a certain time and place, to anſwer to the charge exhibited againſt them. See APPARITOR and SUMMONS.

SUMMONS, SUMMONITIO, in *Law*, a citing or calling a perſon to any court, to anſwer a complaint, or even to give in his evidence.

This is the ſame with the *vocatio in jus*, or the *citatio* of the civilians: hence alſo our old word *ſumner*, or *ſummoner*.

SUMMONS *in terra petita*, is that made on the land which the party, at whoſe ſuit the *ſummons* is ſent out, ſeeks to have. This warning on the land is given, in real actions, by erecting a white ſtick or wand on the defendant's grounds (which ſtick or wand among the northern nations, is called the *baculus nunciatorius*); and by ſtat. 31 Eliz. c. 3. it muſt alſo be proclaimed on ſome Sunday before the door of the pariſh church.

SUMMONS *ad warrantizandum*, is a proceſs, whereby the vouchee in a common recovery is called.

SUMMONS to *parliament*. See PARLIAMENT.

SUMMONS, in *War*.—To *ſummons* a place, is to ſend a drum, or trumpet, to command the governor to ſurrender; or, in defect thereof, to proteſt to make an aſſault, and to lay all in fire and blood. See CAPITULATION and CHAMADE.

SUMMUM *bonum*, in *Ethics*. See *Chief* GOOD.

SUMMUM *genus*. See GENUS.

SUMP, in *Metallurgy*, a round pit of ſtone, lined with clay within, for the receiving the metal on its firſt fuſion from the ore.

SUMP, in the *Engliſh Salt Works*, where ſea-water is boiled into ſalt, is uſed as the name of a ſort of pond, which they make at ſome diſtance from the ſaltern on the ſea-ſhore, between full ſea and low water mark. From this pond they lay a pipe, through which, when the ſea is in, the water runs into a well adjoining to the ſaltern; and from this well they pump it into troughs, through which it is carried to their ciſterns, in order to be ready to ſupply the pans. See SALT.

SUMPH, in *Mining*, denotes a pit ſunk down in the bottom of the mine, to cut or prove the lode ſtill deeper than before; and in order to ſlope and dig it away, if neceſſary, and alſo to drive on the lode in depth. The *ſumph* principally ſerves as a baſon or reſervoir, to collect the water of a mine together, that it may be cleaned out by an engine or machine.

SUMPTER-*horſe*, is a horſe that carries proviſions and neceſſaries for a journey.

SUMPTUARY *laws*, *leges* SUMPTUARIÆ, are laws made to reſtrain exceſs in apparel, coſtly furniture, eating, &c.

Moſt ages and nations have had their *ſumptuary* laws; and ſome retain them ſtill, as the Venetians, French, &c. But it is obſerved, that no laws are worſe executed than *ſumptuary laws*.

Political writers have been much divided in opinion with reſpect to the utility of theſe laws to a ſtate. Baron Monteſquieu obſerves, that luxury is neceſſary to monarchies, as in France; but ruinous to democracies, as in Holland. With regard to England, whoſe government is compounded of both ſpecies, it may ſtill be a dubious queſtion, ſays judge Blackſtone, how far private luxury is a public evil; and as ſuch cognizable by public laws.

The *ſumptuary* laws of that ancient Locrian legiſlator Zaleucus, are famous: by theſe it was ordained, that no woman ſhould go attended with more than one maid in the ſtreet, except ſhe were drunk: that ſhe ſhould not go out of the city in the night, unleſs ſhe went to commit fornication: that ſhe ſhould not wear any gold or embroidered apparel, unleſs ſhe propoſed to be a common ſtrumpet: and that men ſhould not wear rings, or tiſſues, except when they went a whoring, &c.

The Engliſh have had their ſhare of *ſumptuary* laws, chiefly made in the reigns of Edw. III. Edw. IV. and Hen. VIII. againſt picked ſhoes, ſhort doublets, and long coats; though all repealed by ſtatute 1 Jac. I. c. 25. As to exceſs in diet, there remains ſtill one law unrepealed. See DIET.

Under king Henry IV. Camden tells us, pride was got ſo much into the foot, that it was proclaimed, that no man ſhould wear ſhoes above ſix inches broad at the toes. And their other garments were ſo ſhort, that it was enacted, 25 Edw. IV. no perſon, under the condition of a lord, ſhould, from that time, wear any mantle or gown, unleſs of ſuch length, that, ſtanding upright, it might cover his privy members and buttocks.

Among the Romans, the *ſumptuary* and cibary laws were very numerous: by the Lex Orchia, the number of gueſts at feaſts was limited, though without limitation of the charges thereof. By the Fannian law, made twenty-two years afterwards, it was enacted, that more than ten aſſes ſhould not be ſpent at any ordinary feaſt; for the ſolemn feaſts, as the Saturnalia, &c. an hundred aſſes were allowed; ten of which, Gellius informs us, was the price of a ſheep; and a hundred, of an ox.

By the Didian law, which was preferred eighteen years after, it was decreed, that the former *ſumptuary* laws ſhould be of force, not only in Rome, but throughout all Italy; and that, for every tranſgreſſion, not only the maſter of the feaſt, but all the gueſts too, ſhould be liable to the penalty.

SUN, SOL, in *Aſtronomy*, the great luminary which enlightens the world, and by his preſence conſtitutes day.

The *ſun*, which, in the infancy of aſtronomy, was reckoned among the planets, ſhould rather be numbered among the fixed STARS. It appears bright and large in compariſon with them, becauſe we keep conſtantly near the *ſun*, whereas we are at an immenſe diſtance from the ſtars. For a ſpectator, placed as near to any ſtar as we are to the *ſun*, would ſee that ſtar a body as large and bright as the *ſun* appears to us; and a ſpectator, as far diſtant from the *ſun* as we are from the ſtars, would ſee the *ſun* as ſmall as we ſee a ſtar, diveſted of all its circumvolving planets; and would reckon it one of the ſtars in numbering them.

According to the Copernican hypotheſis, which is now generally received, and which has even demonſtration on its ſide, the *ſun* is the centre of all the planetary and cometary ſyſtem; round which all the planets and comets, and our earth among the reſt, revolve, in different periods, according to their different diſtances from the *ſun*. See this motion illuſtrated and demonſtrated under EARTH and PLANET.

But the *ſun*, though thus eaſed of that prodigious motion, whereby the ancients imagined him to revolve daily round our earth, yet is not a perfectly quieſcent body.

From the phenomena of his maculæ or ſpots, it evidently appears, that he has a rotation round his axis; like that of the earth, whereby the natural day is meaſured;

only ſlower.—Some of theſe ſpots have made their firſt appearance near the edge or margin of the *ſun*, and have been ſeen ſome time after on the oppoſite edge; whence, after a ſtay of about fourteen days, they have reappeared in their firſt place, and taken the ſame courſe over again; finiſhing their entire circuit in twenty-ſeven days $12^h\ 20'$: which is hence deduced to be the period of the *ſun*'s rotation round his axis; and, therefore, the periodical time of the *ſun's* revolution to a fixed ſtar is $25^d\ 15^h\ 16^m$; becauſe in $27^d\ 12^h\ 20^m$ of the month of May, when the obſervations on which this calculation is founded were made, the earth deſcribes an angle about the *ſun's* centre of $26^\circ\ 22'$; and, therefore, as the angular motion of $363^\circ + 26^\circ\ 22'$ is to 360°, ſo is $27^d\ 12^h\ 20^m$ to $25^d 15^h\ 16'$. This motion of the ſpots is from weſt to eaſt: whence we conclude that of the *ſun*, to which the other is owing, to be from eaſt to weſt.—For the various appearance of the ſolar ſpots, their cauſe, &c. ſee MACULÆ.

Beſides this motion round his axis, the *ſun*, on account of the various attractions of the ſurrounding planets, is agitated by a ſmall motion round the centre of gravity of the ſyſtem. See *Motion of the* EARTH, and GRAVITY. Whether the *ſun* and ſtars have any proper motion of their own in the immenſity of ſpace, however inconſiderable, is not abſolutely certain. Some very accurate obſervers have intimated conjectures of this kind. See STARS.

As for the apparent annual motion of the SUN *round the earth*; it is eaſily ſhewn, by aſtronomers, that the annual motion of the earth will occaſion ſuch an appearance.

A ſpectator in the *ſun* would ſee the earth move from weſt to eaſt, for the ſame reaſon as we ſee the *ſun* move from eaſt to weſt: and all the phenomena reſulting from this annual motion, in which ſoever of the bodies it be, will appear the ſame from either.

Let S for inſtance (*Tab. Aſtron. fig.* 39.) repreſent the *ſun*, A B C D the earth's orbit, which it paſſes through from weſt to eaſt, in the ſpace of a year.—Now, a ſpectator in S, viewing the earth at A, will refer it to the point of the ſphere of the ſtars, ♈: when arrived in B, the ſpectator will ſee it, as in the point ♋: when in C, as in the point ♎, &c. till after its whole circuit, it will be again ſeen in ♈. Thus will the earth appear to deſcribe the whole ecliptic, and to paſs, ſucceſſively from ſign to ſign.

Suppoſe, now, the ſpectator removed from the *ſun* to the earth, which imagine in C, the diſtance of the fixed ſtars, we have ſhewn, is ſo vaſt, that that of the *ſun* is but a point to it. The ſpectator, therefore, now ſituate on the earth, will ſee the ſame face of the heavens, the ſame ſtars, &c. as before: the only difference will be, that as before he imagined the earth in the heavens, and the *ſun* in the centre; he will now ſuppoſe the *ſun* in the heavens, and the earth in the centre.

The earth, therefore, being in C, the ſpectator will ſee the *ſun* in ♈; and the ſpectator, being carried along with the earth, and partaking of its annual motion, will not perceive either his own motion, or that of the earth; but obſerving the *ſun*, when the earth is arrived at D, the *ſun* will be ſeen at ♋. Again, while the earth proceeds to A, the *ſun* will ſeem to have moved through the ſigns ♋, ♌, and ♍; and while the earth deſcribes the ſemicircle ABC, the *ſun* will appear to have moved, in the concave ſurface of the heavens, through the ſix ſigns, ♎, ♏, ♐, ♑, ♒, ♓; ſo that an inhabitant of the earth will ſee the *ſun* go through the ſame orbit, or circle, in the heavens, and in the ſame ſpace of time as a ſpectator in the *ſun* would ſee the earth deſcribe the ſame.

Hence ariſes that apparent motion of the *ſun*, whereby he is ſeen to advance, inſenſibly, towards the eaſtern ſtars; inſomuch that, if any ſtar, near the ecliptic, riſe any time with the *ſun*; after a few days, the *ſun* will be got more to the eaſt of the ſtar, and the ſtar will riſe and ſet before him.

For the ſeveral phenomena reſulting from the *ſun*'s apparent motion, or the earth's real motion, as the diverſity of day and night, of ſeaſons, &c. ſee EARTH.

Nature, properties, figure, &c. of the SUN. See MACULÆ and FACULÆ.

Thoſe who have maintained that the ſubſtance of the *ſun* is fire, argue in the following manner: the *ſun* ſhines, and his rays, collected by concave mirrors, or convex lenſes, burn, conſume, and melt, the moſt ſolid bodies; or elſe convert them to aſhes, or glaſs: wherefore, as the force of the ſolar rays is diminiſhed, by their divergency, in a duplicate ratio of the diſtances reciprocally taken; it is evident, their force and effect are the ſame, when collected by a burning lens, or mirror, as if we were at ſuch diſtance from the *ſun*, where they were equally denſe. The *ſun*'s rays, therefore, in the neighbourhood of the *ſun*, produce the ſame effects, as might be expected from the moſt vehement fire: conſequently, the *ſun* is of a fiery ſubſtance.

Hence it follows, that its ſurface is every where fluid; that being the condition of flame.

Indeed, whether the whole body of the *ſun* be fluid, as ſome think; or ſolid, as others; they do not preſume to determine; but as there are no other marks, whereby to diſtinguiſh fire from other bodies, but light, heat, a power of burning, conſuming, melting, calcining, and vitrifying; they do not ſee what ſhould hinder, but that the *ſun* may be a globe of fire, like ours, inveſted with flame; and ſuppoſing that the maculæ are formed out of the ſolar exhalations, they infer, that the *ſun* is not pure fire; but that there are heterogeneous particles mixed along with it.

Philoſophers have been much divided in opinion with reſpect to the nature of fire, light, and heat, and the cauſes that produce them: and they have given very different accounts of the agency of the *ſun*, with which, whether we conſider them as ſubſtances, or qualities, they are intimately connected, and on which they ſeem primarily to depend. Some, among whom we may reckon ſir Iſaac Newton, conſider the rays of light as compoſed of ſmall particles, which are emitted from ſhining bodies, and move with uniform velocities in uniform mediums, but with variable velocities in mediums of variable denſities. Theſe particles, they ſay, act upon the minute conſtituent parts of bodies, not by impact, but at ſome indefinitely ſmall diſtance; they attract and are attracted; and in being reflected or refracted, they excite a vibratory motion in the component particles. This motion increaſes the diſtance between the particles, and thus occaſions an augmentation of bulk, or an expanſion in every dimenſion, which is the moſt certain characteriſtic of fire. This expanſion, which is the beginning of a diſunion of the parts, being increaſed by the increaſing magnitude of the vibrations proceeding from the continued agency of light, it may eaſily be apprehended, that the particles will at length vibrate beyond their ſphere of mutual attraction, and thus the texture of the body will be altered or deſtroyed; from ſolid it may become fluid, as in melted gold; or from being fluid, it may be diſperſed in vapour, as in boiling water. According to this theory, we are led to infer, that the conſtituent parts of all bodies are in perpetual motion. The temperature of the atmoſphere is different in different latitudes, and it changes, almoſt every inſtant, in the ſame. The temperature of bodies, which is ever proportionable to that of the ſurrounding atmoſphere, muſt, therefore, be perpetually varying. The bulk of every body, which is proportionable to its temperature, muſt alſo be ſubject to a perpetual viciſſitude: and this variation of dimenſions cannot be effected without a perpetual vibratory motion of its conſtituent parts.

Others, as Boerhaave, repreſent fire as a ſubſtance *ſui generis*, unalterable in its nature, and incapable of being produced or deſtroyed; naturally exiſting in equal quantities in all places, imperceptible to our ſenſes, and only diſcoverable by its effects, when, by various cauſes, it is collected for a time into a leſs ſpace than that which, from its tendency to an univerſal and equable diffuſion, it would otherwiſe occupy. The matter of this fire is not ſuppoſed to be derived from the *ſun* in any wiſe: the ſolar rays, whether direct or reflected, are of uſe only as they impel the particles of fire in parallel directions: that paralleliſm being deſtroyed, by intercepting the ſolar rays, the fire inſtantly aſſumes its natural ſtate of uniform diffuſion. According to this explication, which attributes heat to the matter of fire, when driven in parallel directions, a much greater muſt be given it, when the quantity ſo collected, is amaſſed into a focus; and yet the focus of the largeſt ſpeculum does not heat the air or medium in which it is found, but only bodies of denſities different from that medium.

M. de Luc, in his Lettres Phyſiques, is of opinion, that the ſolar rays are the principal cauſe of heat; but that they only heat ſuch bodies as do not allow them a free paſſage. In this remark he agrees with Newton; but then he differs totally from him, as well as from Boerhaave, concerning the nature of the rays of the *ſun*. He does not admit the emanation of any luminous corpuſcles from the *ſun*, or rather ſelf-ſhining ſubſtances, but ſuppoſes all ſpace to be filled with an ether of great elaſticity and ſmall denſity, and that light conſiſts in the vibrations of this ether, as ſound conſiſts in the vibrations of the air. Upon Newton's ſuppoſition, ſays an excellent writer, the cauſe by which particles of light, and the corpuſcles conſtituting other bodies, are mutually attracted and repelled, is uncertain. The reaſon of the unform diffuſion of fire, of its vibration, and repercuſſion, as ſtated in Boerhaave's opinion, is equally inexplicable; and in the laſt mentioned hypotheſis, we add to the other difficulties attending the ſuppoſition of an univerſal ether, the want of a firſt mover to make the *ſun* vibrate. Of theſe ſeveral opinions concerning elementary fire it may be ſaid, as Cicero remarked concerning the opinions of philoſophers concerning the nature of the ſoul: *Harum ſententiarum quæ vera ſit, Deus aliquis viderit; quæ veriſimillima, magna quæſtio eſt.* Watſon's Chem. Eſſ. vol. i. p. 164.

For a farther account of theſe opinions, ſee FIRE, HEAT, and LIGHT.

The figure of the *ſun* is a ſpheroid, higher under its equator, than about the poles. This we prove thus: the *ſun* has a motion about its own axis; and therefore the ſolar matter will have an endeavour to recede from the centres of the circles wherein it moves; and that with the greater force, as the peripheries of the circles are greater: but the equator is the greateſt circle; and the reſt, towards the poles, continually decreaſe; therefore the ſolar matter, though at firſt in a ſpherical form, will endeavour to recede from the centre of the equator farther than from the centres of the parallels.

Conſequently, ſince the gravity, whereby it is retained in its place, is ſuppoſed to be uniform throughout the whole *ſun*; it will really recede from the centre more under the equator than under any of the parallels; and hence the *ſun's* diameter, drawn through the equator, will be greater than that paſſing through the poles, i. e. the *ſun's* figure is not perfectly ſpherical, but ſpheroidical.

SUN, *diameter, diſtance, magnitude, and parallax of the.* See PARALLAX and PLANETS.

SUN, *apparent diameter of the.* See DIAMETER.

SUN *at the horizon, apparent magnitude of the.* See *Apparent* MAGNITUDE.

SUN, *altitude of the.* See ALTITUDE and MERIDIAN *altitude.*

SUN'S *altitude, tables of the.* See DIAL.

SUN, *angle at the.* See ANGLE.

SUN, *diurnal and nocturnal arch of the.* See ARCH.

SUN, *cycle of the.* See CYCLE.

SUN, *declination of the.* See DECLINATION.

SUN, *eclipſes of the.* See ECLIPSE.

SUN, *nadir, place, retrogradation, and vertical of the.* See the ſeveral articles.

SUN, *raiſins of the.* See RAISIN.

SUN-*burning*, in *Medicine.* See EPHELIS.

SUNDAY, the firſt day of the week; thus called by our idolatrous anceſtors, becauſe ſet apart for the worſhip of the ſun.

It is now more properly called the *Lord's day, dies Dominicus*, becauſe kept as a feaſt in memory of our Lord's reſurrection on this day; and *ſabbath-day*, becauſe ſubſtituted under the new law in the place of the ſabbath in the old law. See SABBATH.

In the breviary, and other offices we meet with *Sundays* of the *firſt* and *ſecond claſs.* Thoſe of the firſt claſs are, *Palm*, *Eaſter*, *Advent*, and *Whitſunday*, thoſe of *Quaſimodo* and *Quadrageſima*; each whereof ſee under its proper article. Thoſe of the ſecond claſs are the common *Sundays.*

Anciently each *Sunday* in the year had its particular name which was taken from the introit of the day; which cuſtom has only been continued to ſome few in lent: as *Reminiſcere*, *Oculi*, *Lætare*, *Judica.*

It was Conſtantine the Great who firſt made a law for the proper obſervation of *Sunday*; and who, according to Euſebius, appointed it ſhould be regularly celebrated throughout the Roman empire.

Before him, and even in his time, they obſerved the Jewiſh ſabbath, as well as *Sunday*; both to ſatisfy the law of Moſes, and to imitate the apoſtles, who uſed to meet together on the firſt day.

Indeed ſome are of opinion, that the *Lord's-day*, mentioned in the Apocalypſe, is our *Sunday*; which they will have to have been ſo early inſtituted by the apoſtles. Be this as it will, it is certain, a regard was had to this day, even in the earlieſt ages of the church; as appears from the firſt apology of Juſtin Martyr, where he deſcribes the exerciſe of the day not much unlike to ours.

By Conſtantine's laws, made in 321, it was decreed, that, for the future, the *Sunday* ſhould be kept a day of reſt in all cities and towns, but he allowed the country people to follow their work. In 538, the council of Orleans prohibited this country labour, but becauſe there were ſtill many Jews in the Gauls, and the people gave into a good many ſuperſtitious uſages in the celebration of the new ſabbath, like thoſe of the Jews among that of the old; the council declares, that to hold it unlawful to travel with horſes, cattle, and carriages, to prepare foods, or to do any thing neceſſary to the cleanlineſs and decency of houſes or perſons, ſavours more of Judaiſm than Chriſtianity.

It is well obſerved by judge Blackſtone, (book iv. p. 63.) that beſides the notorious indecency and ſcandal of permitting any ſecular buſineſs to be publicly tranſacted on this day, in a country profeſſing Chriſtianity, and the corruption of morals which uſually follows the profanation of it; the keeping one day in ſeven holy, as a time of relaxation and refreſhment as well as for public worſhip, is of admirable ſervice to a ſtate, conſidered merely as a civil inſtitution. It humanizes, by the help of converſation and ſociety, the manners of the lower claſſes, which would otherwiſe degenerate into a ſordid ferocity and ſavage ſelfiſhneſs of ſpirit: it enables the induſtrious workman to purſue his occupation in the enſuing week with health and chearfulneſs: it imprints on the minds of the people that ſenſe of their duty to God, ſo neceſſary to make them good citizens; but which would be worn out and defaced by an unremitted continuance of labour, without any ſtated times of recalling them to the worſhip of their Maker. Accordingly the laws of king Athelſtan (c. 24.) forbad all merchandizing on the Lord's day under very ſevere penalties. And by 27 Hen. VI. c. 5. no fair or market ſhall be held on the principal feſtivals, Good-friday, or any *Sunday* (except the four *Sundays* in harveſt) on pain of forfeiting the goods expoſed to ſale. Moreover, by 1 Jac. c. 22. no ſhoemaker is to expoſe to ſale any ſhoes, &c. on pain of 3*s.* 4*d.* a pair: and by 1 Car. I. c. 1. no perſons ſhall aſſemble out of their own pariſhes for any ſport whatſoever upon this day; nor, in their pariſhes, ſhall uſe any bull or bear-baiting, interludes, plays, or other unlawful exerciſes or paſtimes, on pain that every offender muſt pay 3*s.* 4*d.* to the poor. By 29 Car. II. c. 7. no perſon is allowed to work on the Lord's day, or uſe any boat or barge (unleſs allowed by a juſtice of peace, or forty watermen allowed to ply on the Thames), or expoſe any goods to ſale; except meat in public houſes, milk and mackarel at certain hours, and works of neceſſity or charity, on forfeiture of 5*s.* Nor ſhall any drover, carrier, or the like, travel upon that day, under pain of 20*s.* No arreſt can be made nor proceſs ſerved upon a *Sunday*, except for treaſon, felony, or breach of the peace: nor can any proceedings be had nor judgment given, nor ſuppoſed to be given on *Sunday*; nor ſhall any hundred be anſwerable for a robbery on this day.

For the penalty of killing game on *Sunday*, ſee GAME.

For the penalty of not attending public worſhip, ſee NONCONFORMISTS.

SUNDAY, *quinquageſima.* See QUINQUAGESIMA.

SUNDAY, *Trinity.* See TRINITY.

SUNDAY *letter.* See DOMINICAL *letter.*

SUN *crown, American.* See AMERICAN, &c.

SUN *dew, droſera, ros ſolis*, in *Botany*, a genus of the *pentandria pentagynia* claſs; the characters of which are theſe: the calyx is divided into five ſegments; the petals are five; the capſula is ſingle celled, with five valves at the apex, and contains many ſeeds.

The ſpecies of *ſun dew*, enumerated by Linnæus, are ſix. *Ros ſolis* is commended by ſome as a great cordial, and good for conſumptions, convulſions, and the plague. Formerly a cordial water, in which this herb, with ſeveral ſpices, as a principal ingredient, was in great repute, under the name of *roſa ſolis*, though now almoſt out of date. Miller's Bot. Off.

SUN *fiſh, mola*, the TETRAODON *mola* of Linnæus, and a ſpecies of OSTRACION in the Artedian ſyſtem, in *Ichthyology*; a fiſh of a very ſingular figure. Its body is broad and ſhort, and its hinder extremity is terminated by a circular fin, which ſerves it for a tail; ſo that it looks like the head of a large fiſh ſevered from its body; it is frequently of two feet in length, and ſonetimes very much exceeds that ſize, growing even to two hundred weight. It has no ſcales, but is covered with a hard, harſh, and rough ſkin. Its back is black, and its belly white; the ſides are of a middle colour between both. Its back and belly both terminate in a narrow edge. Its mouth is very ſmall for the ſize of the fiſh, and, when open, is round. Its jaws are hard, and edged like a knife within; externally they are rough, as if beſet with ſeveral rows of ſmall teeth. The head does not at all project from the reſt of the body. The eyes are very ſmall. The gills are only two elliptic holes, covered with their proper membranes. Its fleſh is very ſoft, and its bones are all griſly and tender. The ſkin ſticks very firmly to the fleſh, and is not eaſily taken off. It is caught in the Mediterranean, and ſometimes in the Britiſh ſeas. See *Tab.* V. *of Fiſh*, Nº 54. Willughby's Hiſt. Piſc. p. 151.

Mr. Pennant deſcribes the *ſun-fiſh* of Mount's-bay, under the title of the *oblong diodon*; in form, he ſays, it reſembles a bream, or ſome deep fiſh cut off in the middle: the mouth is very ſmall, and contains in each jaw two broad teeth with ſharp edges; the eyes are little, having before each a ſmall ſemilunar aperture; the pectoral fins are very ſmall, and placed behind them: the dorſal fin, and the anal fin, are high, and placed at the extremity of the body; the tail fin is narrow, and fills all the abrupt ſpace between thoſe two fins; the colour of the back is duſky and dappled; the belly ſilvery; between the eyes and the pectoral fins are ſtreaks pointing downwards: the ſkin is free from ſcales; the meat of the fiſh is uncommonly rank: it feeds on ſhell-fiſh. Care, ſays Mr. Pennant, muſt be taken not to confound this fiſh with the *ſun-fiſh* of the Iriſh, which in all reſpects differs from it. The former, or TETRAODON *mola* of Linnæus, which he calls the *ſhort diodon*, differs from the other in being ſhorter and deeper: the back and anal fins are higher, and the aperture to the gills not ſemilunar, but oval: the ſituation of the fins is the ſame in both.

One of theſe fiſh, of five-hundred weight, was taken in 1734, near Plymouth, and on boiling a piece of the fleſh, to try how it would taſte, (as ſome authors have deſcribed it as a fine fiſh for the table) it was found, inſtead of a firm maſs, to be all converted, in a few minutes, into a perfect jelly, ſo that it could not be taken out otherwiſe than with a ſpoon. In colour and conſiſtence this jelly reſembled boiled ſtarch when cold, and had little or nothing of a fiſhy flavour, but a very agreeable taſte; it ſtuck firmly to the lips, however, and to the fingers, appearing very remarkably glutinous: and as the ancients had no other glue than one made of fiſh, this jelly was tried, as to its ſticking quality, on leather, and on paper, and was found to anſwer as well as common paſte; but by ſome accident it was not tried upon wood.

It will be extremely worth while, on ſome other opportunity, to try whether a true ichthyocolla may not be prepared by boiling down its jelly. Philoſ. Tranſ. N° 456. p. 343. Abr. vol. ix. p. 73, &c.

Sun-*fiſh*, is alſo a name ſometimes given to the *baſking* SHARK.

Sun-*flower*, *helianthus*, in *Botany*, a genus of the *ſyngeneſia polygamia fruſtranea* claſs. Its characters are theſe: it has a compound radiated flower, the border or rays being compoſed of female half-florets, which are barren, and the diſk of hermaphrodite florets, which are fruitful, contained in one common ſcaly empalement; the hermaphrodite florets are cylindrical, and cut the brim into five acute ſegments, which ſpread open; theſe have five ſtamina, curved at the bottom, as long as the tube, and terminated by tubulous ſummits, ſwelling at their baſe; the germen, which is ſituated at the bottom of the tube, ſupports a ſlender ſtyle of the length of the tube, crowned by a reflexed ſtigma divided into two parts, and afterwards becomes an obong blunt four-cornered ſeed; the female half florets, which compoſe the border, are ſtretched out on the ſide like a tongue, have a germen in the bottom, but no ſtyle or ſtamina, and are not fruitful. Linnæus enumerates twelve, and Miller ten ſpecies.

All the ſpecies of *ſun-flowers* enumerated by Miller are natives of America, from whence we are often ſupplied with new kinds. The firſt ſort, or corona ſolis, is commonly called *annual ſun-flower*. It is eaſily propagated by ſeeds, which ſhould be ſown in March, upon a bed of common earth; and when the plants are grown ſix inches high, they may be taken up with balls of earth to their roots, and planted in the large borders of the pleaſure garden, watered, and kept clear from weeds; and after that will require no farther care. In July the flowers appear, and ſtand a conſiderable time: the largeſt of theſe ſhould be left to ſtand for ſeed; the birds are very apt to devour this ſeed, but it ſhould be carefully guarded from them, and the head left on the plant till October, at which time it ſhould be cut off, and hung up to dry in an airy place, and in a month more the ſeeds will be perfectly hardened. The ſeeds are excellent food for domeſtic poultry.

Several ſpecies of this plant alſo are perennial, and increaſe greatly by the root. Among theſe the common ſmaller-flowered one is a very valuable plant in gardens, as it requires no culture, will grow in all ſoils and ſituations, and is a very ornamental flower, continuing in bloom from July to October. Miller's Gard. Dict.

Etmuller ſays, that the ſeed-veſſel taken when the ſeeds are almoſt ripe, and cut and boiled, affords a copious gum, which reduced into the form of a plaſter, is extolled as a moſt ſingular vulnerary. The pulp of the ſeeds is ſweet, and greedily coveted by birds, which are fattened by it. According to Hernandez, the ſeeds, though they excite a head-ach when eaten too freely, are lenitive to the breaſt, and extinguiſh burning heats. In ſome countries they are bruiſed and made into bread; though they are ſaid to prove incentive to venery. James.

Sun-*flower*, *baſtard*, *helenium*, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. Its characters are theſe: the flower is compoſed of ſeveral hermaphrodite florets, forming the diſk, and female half-florets, compoſing the rays; the former are tubulous, and cut at the brim into five parts; they have each five ſhort hairy ſtamina, terminated by cylindrical ſummits, with an oblong germen, ſupporting a ſlender ſtyle, crowned by a bifid ſtigma; the germen becomes an angular ſingle ſeed, crowned by a ſmall five-pointed empalement; the female half-florets have ſhort tubes, ſtretched out like a tongue, and cut into five ſegments at their points; the female flowers have no ſtamina, but an oblong germen, which turns to a ſingle ſeed: they are all included in one common empalement, which ſpreads open, and is cut into ſeveral ſegments. Miller enumerates two ſpecies, which are natives of America; Linnæus mentions only one.

Sun-*flower*, *dwarf*, *helianthemum*, or *ciſtus*, in *Botany*. Its characters are theſe: the flower has a three-leaved empalement, which is permanent, afterward covering the ſeed-veſſel; and has five roundiſh petals, which ſpread open, with a great number of erect ſtamina, terminated by ſmall roundiſh ſummits: in the centre is ſituated an oval germen, ſupporting a ſingle ſtyle, crowned by an obtuſe ſtigma, which afterward becomes a roundiſh or oval capſule with one cell, opening in three parts, filled with ſmall roundiſh ſeeds. There are twenty-four ſpecies. Miller.

This genus is joined by Linnæus to that of *ciſtus*. See *Rock*-ROSE.

The root of *helianthemum*, taken internally, is eſteemed good againſt the bites of ſepents; and the tops are effectual for the ſame purpoſe. The plant is aſtringent, and a good demulcent, in the form of a decoction, particularly in diarrhœas, hæmorrhages, and diſeaſes of the fauces. J. Bauhine ſays, it is good in all diſorders attended with a flux of any kind James.

Sun-*flower*, *dwarf American*, *Rudbeckia*, in *Botany*, a genus of the *ſyngeneſia polygamia fruſtranea* claſs. Its characters are theſe: it hath female and hermaphrodite florets, encloſed in one common empalement, compoſed of two orders of leaves, the ſcales of which are plain, broad, and ſhort: the border of the flower is compoſed of female half-florets, which are ſtretched out on one ſide like a tongue, and end with two or three indentures; theſe have germina ſitting upon proper receptacles, but have neither ſtyle nor ſtamina, and are barren; the hermaphrodite florets are tubulous, funnel-ſhaped, and indented in five parts at the brim; they have five ſhort hair-like ſtamina in each, terminated by cylindrical ſummits, and a germen ſitting in the common empalement, having a ſlender ſtyle crowned by a reflexed ſtigma, divided into two parts; the germen becomes ſingle, oblong, four-cornered ſeeds, crowned by their proper cup, which has four indentures. There are ſix ſpecies.

Dwarf ſun-flower is alſo a name given to the *tetragonotheca*, which Miller deſcribes as a diſtinct genus, but which Linnæus in the laſt edition of his Syſtema Naturæ, has made a ſpecies of POLYMNIA.

Sun-*flower*, *tick-ſeeded*. See Coreopsis.

Sun-*plant of Hindoſtan*. See Sun.

Sun-*ſcorched*, a term uſed by our *Gardeners*, in ſome parts of England, to expreſs a diſtemperature of fruit trees, owing to the *ſun*'s affecting them too forcibly and too ſuddenly; the conſequence of which is the loſs and withering of the fruit. Such trees only are ſubject to this as are planted in places ſheltered from the ſpring *ſun*, and only open to the ſummer's, and it may be always cured by proper waterings.

Mr. Merret gives us an account of three cherry-trees, of that kind we call *May-dukes*, which he cured in this manner. Theſe trees were planted in a very rich mould, which lay to a ſouth wall, ſhaded four months of the winter from the *ſun* by a high building, ſo that the *ſun* never came upon them till the latter end of March; when being high, and ſhining ſomewhat fiercely upon them, from that time the fruit had been always uſed to wither. In a very hot ſummer, when theſe trees ſeemed going into a worſe way than ordinary, the roots of one of them were bared, and a hole being made about it, a gallon of water was poured into it every morning and evening for about a fortnight before the cherries came to a redneſs.

The effect of this was, that the fruit was full and good, while the two trees that ſtood next it had their fruit withered and ſcorched up. One of theſe was taken into conſideration more late, and being watered from time to time, the fruits which were moſt withered on it fell off, and the reſt grew ripe of themſelves, and proved very good ones. The third tree, which was left to itſelf, produced not one ripe cherry. Phil. Tranſ. N° 23.

Sun-*ſpurge*, in *Botany*, a ſpecies of SPURGE.

SUNCOPULLY, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a kind of ſparry ſubſtance of a whitiſh a whitiſh colour, which they calcine, and afterwards give in agues, and other intermittent caſes.

It is erroneouſly by ſome ſuppoſed to be a ſpecies of arſenic; for it has none of its qualities.

SUONATA, in *Muſic*. See SONATA.

SUONATINA, or SONATINA, in the *Italian Muſic*, a little, ſhort, eaſy SONATA.

SUOVETAURILIA, or SOLITAURILIA, a ſolemn ſacrifice among the ancient Romans: wherein they offered three victims of three different kinds, viz. a bull, a ram, and a boar.

Livy, deſcribing it, calls it *ſuovetaurilia*; as compoſed of *ſus*, *ovis*, and *taurus*; the names of the three victims ſacrificed.

Dion. Halicarnaſſeus, deſcribing the ſame, calls it *ſolitaurilia*; in regard it was required, that the victims were perfect, and without any defect; *ſollus*, or *ſolus*, in the language of the Oſci, ſignifying *integer*, *intire*. See AMBARVALIA.

SUPERBIPARTIENS. See RATIO.

SUPERBUS *muſculus*, in *Anatomy*, a name given by ſome to the elevator *oculi*, or the muſcle whoſe office is to raiſe and lift up the eye; that motion giving a haughty look.

The *ſuperbus muſculus* is one of the muſcles called by Albinus the *quatuor recti oculi*. See EYE.

SUPERCARGO, an officer charged with the accounts of the cargo, and all other commercial affairs in a merchant-ſhip.

SUPERCILII *corrugator*. See CORRUGATOR.

SUPERCILIUM, in *Anatomy*, the *eye-brow*. See EYE.

SUPERCILIUM, in the *Ancient Architecture*, denotes the uppermoſt member of the corniche; called by the moderns *corona*, *crown*, or *larmier*.

Mr. Evelyn conceives, it ſhould rather have been called *ſtillicidium*, or *drip*; to denote its office of ſheltering the order from rain, &c.

SUPERCILIUM is alſo uſed for a ſquare member under the upper tore, in ſome pedeſtals.

Some authors comfound it with the TORE itſelf.

SUPERCILIUM *terræ*. See ADIANTUM.

SUPEREROGATION, in *Theology*, what a man does beyond his duty, or more than he was commanded to do.

The Romaniſts ſtand up ſtrenuouſly for works of *ſupererogation*; and maintain, that the obſervance of evangelical counſels is ſuch. By means hereof, a ſtock of merit is laid up, which the church has the diſpoſal of and which ſhe diſtributes in indulgences to ſuch as need.

This monſtrous and abſurd doctrine was firſt invented towards the cloſe of the twelfth century, and modified and embelliſhed by St. Thomas in the thirteenth: according to which it was pretended, that there actually exiſted an immenſe treaſure of merit, compoſed of the pious deeds and virtuous actions, which the ſaints had performed beyond what was neceſſary for their own ſalvation, and which were, therefore, applicable to the benefit of others; that the guardian and diſpenſer of this precious treaſure was the Roman pontiff; and that, of conſequence, he was empowered to aſſign to ſuch as he thought proper a portion of this inexhauſtible ſource of merit, ſuitable to their reſpective guilt, and ſufficient to deliver them from the puniſhment due to their crimes.

The reformed church do not allow of any work of *ſupererogation*; but hold with the apoſtles, that when we have done our beſt, we are but unprofitable ſervants.

SUPERFETATION, SUPERFOETATIO, formed from *ſuper*, *over*, and *fœtus*, *embryo*, in *Medicine*, an after or ſecond conception; happening when the mother, already pregnant, conceives of a later coition; ſo that ſhe bears at once two fœtuſes of unequal age and bulk, and is delivered of them at different times.

We meet with inſtances of *ſuperfetations* of women, in Hippocrates, Ariſtotle, Pliny, Du Laurens, &c. But they are much more frequent in hares and ſows.

We alſo meet with ſomething like a *ſuperfetation* in plants; there being a kind of lemon found to grow encloſed in the body of another.

SUPERFICIAL *content*. See SUPERFICIES, AREA, and MEASURING.

SUPERFICIAL *fourneau*, in *Fortification*, the ſame with CAISSON, which is a wooden cheſt, or box, with three, four, five, or ſix bombs, in it. Sometimes it is filled only with powder, and uſed in ſieges, by being buried under ground, with a train to it, to blow up any lodgment that the enemy may make.

SUPERFICIALIS *ſphincter*, in *Anatomy*, a name given by Riolanus, and ſome others, to the muſcle of the anus, called by Winſlow and Albinus *ſphincter internus ani*. This author, and ſome others, call it alſo SPHINCTER *cutaneus*.

SUPERFICIES, or SURFACE, in *Geometry*, a magnitude, conſidered as having two dimenſions; or extended in length and breadth, but without thickneſs or depth.

In bodies, the *ſuperficies* is all that preſents itſelf to the eye. A *ſuperficies* is chiefly conſidered as the external part of a ſolid: when we ſpeak of a ſurface ſimply, and without any regard to body, we uſually call it *figure*.

SUPERFICIES, *rectilinear*, is that comprehended between right lines.

SUPERFICIES, *curvilinear*, that comprehended between curve lines.

SUPERFICIES, *plane*, is that which has no inequality, but lies evenly between its bounding lines.

SUPERFICIES, *convex*, is the exterior part of a ſpherical or ſpheroidical body.

SUPERFICIES, *concave*, is the internal part of an orbicular or ſpheroidical body.

The meaſure or quantity of a ſurface is called the AREA thereof.

The finding of this meaſure, or area, is called the QUADRATURE thereof.

To meaſure the ſurfaces of the ſeveral kinds of bodies, as ſpheres, cubes, parallelepipeds, pyramids, priſms, cones, &c. ſee AREA and SPHERE, CUBE, &c.

In order to evince the uſe of fluxions in finding the *ſuperficies* of ſolid bodies; let FAF (*Tab.* IV. *Analyſis*, *fig.* 88.) repreſent a ſolid generated by the revolution of any given curve AF about its axis AH; alſo let a circle, whoſe diameter is the variable line (or ordinate) RBR, be conceived to move uniformly from A towards FF, and to dilate itſelf ſo, on all ſides, at the ſame time, as to generate, by its periphery, the propoſed *ſuperficies* RAR: then, the length of that periphery, or the generating line, being expreſſed by 3,141592, &c. × RR ($=2py$) and the celerity with which it moves by $\dot{z}$, the fluxion of the *ſuperficies* RAR, or the ſpace that would be uniformly generated in the time of deſcribing $\dot{z}$, will therefore be truly repreſented by $2py\dot{z}$.

Hence, if w be taken to repreſent the whole ſurface RAR, generated from the beginning, we ſhall have $\dot{w}=2py\dot{z}=2py\sqrt{\dot{x}^2+\dot{y}^2}$; whence w itſelf may be found: as in the following examples.

1. *To determine the convex ſuperficies of a cone*: the ſemidiameter of the baſe BD or CD (*fig.* 85.) being put $=b$, the ſlanting line, or hypothenuſe, AC $=c$, and FG parallel to DC $=y$, &c. we ſhall, from the ſimilarity of the triangles ADC and Gmg, have $b:c::\dot{y}\ (mg):\dot{z}\ (Gg)=\frac{c\dot{y}}{b}$: whence $\dot{w}\ (2py\dot{z})=\frac{2pcy\dot{y}}{b}$; and conſequently $w=\frac{pcy^2}{b}$. This, when $y=b$, becomes equal $pcb=p\times DC\times AC=$ the convex *ſuperficies* of the whole cone ABC: which therefore is equal to a rectangle under half the circumference of the baſe and the ſlanting line.

2. *To find the ſuperficies of a ſphere* AEBH (*fig.* 89.) In this caſe, putting the radius OH $=a$, AF$=x$, Hm $=\dot{x}$, &c. we ſhall (by reaſon of the ſimilar triangles OHF and Hmb) have $y\ (FH):a\ (OH)::\dot{x}\ (Hm):\dot{z}\ (Hb=\frac{a\dot{x}}{y}$: therefore $\dot{w}\ (2py\dot{z})=2pa\dot{x}$; and conſequently the *ſuperficies* (w) itſelf $=2pax=$ AF × periphery AEBH. Which, if the whole ſphere be taken, will become AB × periph. AEBH $=$ four times the area BEAHO.

Hence the the *ſuperficies* of a ſphere is equal to four times the area of its greateſt circle: and the convex *ſuperficies* of any ſegment thereof, is to that of the whole, as the axis (or thickneſs) of the ſegment to the diameter of the ſphere.

3. *To determine the ſuperficies of a ſpheroid.* Let ACFHG (*fig.* 90.) repreſent one half of the propoſed ſpheroid, generated by the rotation of the ſemi-ellipſis FAG, about its axis AH; put AH $=a$, FH (or HG) $=c$, BH $=x$, BC $=y$, FC $=z$, and the *ſuperficies* generated by FC (or GD) $=w$: then, from the nature of the ellipſis, we have $y=\frac{c}{a}\sqrt{a^2-x^2}$; whence $\dot{y}=-\frac{cx\dot{x}}{a\sqrt{a^2-x^2}}$, and conſequently $\dot{z}$ ($=\sqrt{\dot{x}^2+\dot{y}^2}=\sqrt{\dot{x}^2+\frac{c^2x^2\dot{x}^2}{a^2\times\overline{a^2-x^2}}}=\frac{\dot{x}\sqrt{a^4-\overline{aa-cc}\times xx}}{a\sqrt{aa-xx}}=\frac{\dot{x}\sqrt{a^4-b^2x^2}}{a\sqrt{a-x^2}}=$(by putting the eccentricity) $\sqrt{a^2-c^2}=b$) $=\frac{b\dot{x}\sqrt{\frac{a^4}{bb}-x^2}}{a\sqrt{a^2-x^2}}$: therefore, in this caſe $\dot{w}\ (2py\dot{z})=\frac{2pbc\dot{x}}{aa}\sqrt{\frac{a^4}{bb}-x^2}$; whoſe fluent, in an infinite

ſeries

is $2pcx \times \overline{1 - \frac{b^2x^2}{2.3a^4} - \frac{b^4x^4}{2.4.5a^8} - \frac{3b^6x^6}{2.4.6.7a^{12}}}$. But the ſame fluent may be otherwiſe very eaſily exhibited by means of the area of a circle: for, if from the centre H, with a radius equal to $\frac{aa}{b}$, a circle S E R be deſcribed, and the ordinate B C be produced to interſect it in E, it is evident that $BE = \sqrt{\frac{a^4}{bb} - xx}$, and that the fluxion of the area E S H B will be expreſſed by $\dot{x}\sqrt{\frac{a^4}{bb} - x^2}$; which being to $\frac{2pbc\dot{x}}{aa} \times \sqrt{\frac{a^4}{bb} - x^2}$, the fluxion before found, in the conſtant ratio of 1 to $\frac{2pbc}{a^2}$, their fluents muſt therefore be in the ſame ratio; and ſo the latter expreſſing the *ſuperficies* C F G D, will conſequently be $= \frac{2pbc}{aa} \times BESFH = 2p \times \frac{FH}{HS} \times BESFH$. This ſolution, it may be obſerved, obtains only in caſe of an oblong ſpheroid, generated by the rotation of the ellipſis about its greater axis; for, in an oblate ſpheroid, generated about the leſſer axis, the value of $b\ (\sqrt{a^2 - c^2})$ will be impoſſible; ſince, in this caſe H F is greater than H A. But, if we, here, put $b = \sqrt{c^2 - a^2}$, and $d = \frac{a^2}{b}$, the value $\dot{w}$ (found above) will become $= \frac{2pbc\dot{x}}{a^2}\sqrt{\frac{a^4}{bb} + x^2} = \frac{2pc\dot{x}}{d}\sqrt{d^2 + x^2} = \frac{2pc}{d} \times \dot{x}\sqrt{a^2 + x^2}$: whoſe fluent may be brought out by the help of a table of logarithms: for, let the variable part $\dot{x}\sqrt{d^2 + x^2}$ be transformed to $\left(\frac{\dot{x} \times \overline{d^2 + x^2}}{\sqrt{d^2 + x^2}} = \frac{d^2\dot{x} + x^2\dot{x}}{\sqrt{d^2 + x^2}} = \frac{d^2x\dot{x} + x^3\dot{x}}{\sqrt{d^2x^2 + x^4}} =\right)$ $\frac{\frac{1}{2}d^2x\dot{x} + x^3\dot{x}}{\sqrt{d^2x^2 + x^4}} + \frac{\frac{1}{2}d^2x\dot{x}}{\sqrt{d^2x^2 + x^4}}$, ſo that the numerator of the firſt term $\frac{\frac{1}{2}d^2x\dot{x} + x^3\dot{x}}{\sqrt{d^2x^2 + x^4}}$ (now in a given ratio to the fluxion of the quantity under the radical ſign) may be had by the common rule; by which means we get $\frac{1}{2}\sqrt{d^2x^2 + x^4}$, for the true fluent of the ſaid term; to which adding the fluent of the other term $\frac{\frac{1}{2}d^2x\dot{x}}{\sqrt{d^2x^2 + x^4}}$ or $\frac{\frac{1}{2}d^2\dot{x}}{\sqrt{d^2 + x^2}}$ there ariſes $\frac{1}{2}x\sqrt{d^2 + x^2} + \frac{1}{2}d^2 \times$ hyp. log. $x + \sqrt{d^2 + x^2}$, for the fluent of $\dot{x}\sqrt{d^2 + x^2}$: and this corrected and multiplied by $\frac{2pc}{d}$, gives $\frac{pcx}{d}\sqrt{d^2 + x^2} + pcd \times$ hyp. log. $\frac{x + \sqrt{dd + xx}}{d}$, for the *ſuperficies* in this caſe, where the propoſed ſpheroid is an oblate one. Simpſon's Fluxions, vol. i. p. 187, &c.

SUPERFICIES, *line of*, a line uſually found on the ſector, and Gunter's ſcale. The deſcription and uſe hereof, ſee under SECTOR and GUNTER's *ſcale*.

SUPERFICIES *of the earth, internal*, a term uſed by Tull, and others, to expreſs that part of the earth which affords the pabulum, or what is called the *paſture of plants*. Plants themſelves are the paſture of animals; but it is from this *internal ſuperficies of the earth* that vegetables firſt receive the nouriſhment which they afterwards give to animals. This inner *ſuperficies of the earth* is the *ſuperficies* of the pores, cavities, and interſtices of the divided parts of the earth; and theſe are of two kinds, natural and artificial. Tull is the firſt who has uſed this term, and he juſtifies himſelf from the imputation of having uſed an abſurd phraſe, as it might at firſt ſeem, the adjective expreſſing ſomething within, and the ſubſtantive ſomething without, by obſerving, that though the vegetable paſture is within the earth, yet it is alſo on the outſide of the divided parts of the earth.

Of the natural and artificial paſture of plants, or the natural and artificial cavities, pores, and interſtices of the earth, the natural alone will ſuffice to furniſh a country with vegetables for the maintenance of a few inhabitants: but if the artificial, that is, if agriculture, the ſole buſineſs of which is the making this artificial paſture for plants, were aboliſhed out of the world, it is much to be feared, that the people of all populous countries, eſpecially of thoſe toward the borders of the frigid zones, (for there the trees often fail of producing fruit) would be reduced to the utmoſt neceſſity for this proper kind of food.

The artificial paſture of plants is that inner *ſuperficies* of the earth, which is made by dividing the ſoil by art. This, on all parts of the globe where it is uſed, maintains many more people than the natural one; in the colder countries it maintains ten times as many as the natural one; and when the art of agriculture is more advanced to perfection, it will maintain twice as many as it does at preſent; and this improvement is eaſy, and to be done by ſimple means.

The natural paſture is not only leſs than the artificial, in an equal quantity of ground; but the little there is of it conſiſting alſo of the *ſuperficies* of the pores and cavities not having a free communication with one another, they are leſs pervious to the fine roots of all vegetables, which require a greater force to break through their partitions; and by that means roots, eſpecially of weak plants, are excluded from many of thoſe cavities; ſo that the benefit of a great part of the paſture that really is there, is loſt to the huſbandman.

The artificial paſture, on the other hand, conſiſts in *ſuperficies* of cavities that are pervious to all roots, and give them free paſſage throughout the whole extent of the cultivated place; and conſequently, the fine horizontal roots of plants, which run much farther than is generally ſuppoſed, thoſe of a turnep, for inſtance, running ſix feet diſtant from the main root every way (ſee ROOT), will find an eaſy paſſage in every part to the utmoſt extent to which nature allows them to run.

The *internal ſuperficies of the earth*, which is the paſture of plants, is not like the external ſurface, which is the paſture of animals, in that it cannot be enlarged without the addition of more ſurface taken from land adjoining to it, by enlarging its bounds or limits: but the *internal ſuperficies*, or artificial paſture of land, may be enlarged without addition, or more land, only by diviſion of the ſame earth: and this artificial paſture may be increaſed in proportion to the diviſion of the parts of the earth, whereof it is the *ſuperficies*.

A cube of earth of one foot has but ſix ſquare feet of *ſuperficies*, but divide this cube into cubical inches, and then its *ſuperficies* will be increaſed twelve times, that is, it will be ſeventy-two *ſuperficial* feet. Divide theſe cubes again into ſuch others, as bear the ſame proportion to an inch that an inch does to a foot, and then the ſame quantity of earth, which had at firſt only ſix feet *ſuperficies*, will have a *ſuperficies* of eight hundred and ſixty-four feet of natural paſture: and in the ſame manner is the ſoil diviſible, and conſequently this paſture increaſable *ad infinitum*.

Poor land does not afford an *internal ſuperficies* ſo well ſtocked with theſe fruitful particles as rich land does, but this we may compenſate by dividing it more, and then what it wants in quality, may be made up in quantity.

The common method of dividing the ſoil is by dung, or by tillage, or by both; and none of the natural paſture is ever loſt, or injured by the uſe of the artificial means, but, on the contrary, it is mended by ſuch means, a free communication being made by them between pore and pore. Tull's Horſehoeing Huſbandry, p. 18.

SUPERFINE, in the *Manufactories*, a term uſed to expreſs the ſuperlative fineneſs of a ſtuff.

Thus a cloth, a camblet, &c. are ſaid to be *ſuperfine*, when made of the fineſt wool, &c. or when they are the fineſt that can be made.

The term is particularly uſed, among gold wire-drawers, for the gold or ſilver wire, which, after being drawn through an infinite number of holes, each leſs and leſs, is at length brought to be no bigger than a hair.

SUPERFLUOUS *interval*, in *Muſic*, is one that exceeds a true diatonic interval by a ſemitone minor. See INTERVAL. Thus the

SUPERFLUOUS *ſecond*, or *tone*, contains a ſemitone minor more than a tone, or greater ſecond; and will therefore be expreſſed by $\frac{125}{108}$, or $\frac{75}{64}$. The firſt of theſe expreſſions is a tone minor, and a ſemitone minor; ſince $\frac{10}{9} \times \frac{25}{24} = \frac{125}{108}$: and the other is a tone major, and ſemitone minor; for $\frac{9}{8} \times \frac{25}{24} = \frac{75}{64}$. This laſt occurs in practice, and is one of the intervals of the chromaticum toniæum. See CHROMATIC and SECOND.

In the temperate ſcales theſe two *ſuperfluous* tones coincide. Thus from B^b to C ſharp, or from F to G ſharp, are *ſuperfluous* tones.

SUPERFLUOUS *third* is greater than the third major by a ſemitone minor, and will therefore be expreſſed by $\frac{125}{96} = \frac{5}{4} \times \frac{25}{24}$. It is not in uſe. It ſeems a fourth on our harpſichords. Thus from B^b to D ſharp is, properly ſpeaking, a *ſuperfluous third*; but D ſharp and E^b being confounded, it paſſes for a fourth.

SUPERFLUOUS *fourth*. This interval is expreſſed by $\frac{25}{18} =$

$\frac{4}{3}\times\frac{25}{24}$. It is by practitioners, and in temperate ſcales, confounded with the tritonus. See INTERVAL.

SUPERFLUOUS *fifth* is expreſſed by $\frac{25}{16}=\frac{3}{2}\times\frac{25}{24}$. This is equal to two thirds major, for $\frac{5}{4}\times\frac{5}{4}=\frac{25}{16}$. The *ſuperfluous fiſth* occurs in practice, as from C to G ſharp.

SUPERFLUOUS *ſixth*. This interval is of two kinds; being the reſpective complements of the two diminiſhed thirds to the octave. One only, ſtrictly ſpeaking, anſwers to the general definition of a *ſuperfluous* interval, which is that interval which exceeds the ſixth major by a ſemitone minor, and is therefore expreſſed by $\frac{125}{72}=\frac{5}{3}\times\frac{25}{24}$. But the other interval which is a comma more than the former, and is two ſemitones major leſs than the octave, is chiefly uſed in harmony, as between B^b and *a* ſharp, where it has a fine effect. It is expreſſed by $\frac{225}{128}=\frac{2}{1}:\frac{16}{15}\cdot\frac{16}{15}=\frac{2}{1}::\frac{256}{225}$. See INTERVAL and DIMINISHED *third*.

SUPERFLUOUS *ſeventh* is expreſſed by $\frac{15}{8}\times\frac{25}{24}=\frac{125}{64}$. This is a dieſis leſs than the octave. See INTERVAL.

SUPERFLUOUS *octave* is a ſemitone minor more than the octave, as from C to *c* ſharp. It ſometimes occurs in the baſſes of inſtrumental pieces.

SUPERGEMINANS, a name given by ſome anatomical writers to the EPIDIDYMIS.

SUPERGENUALIS, a name given by ſome authors to the PATELLA, or knee-pan.

SUPERINCESSUS *radens*. See SLIDING.

SUPERINCESSUS *volvens*. See ROLLING.

SUPERINSTITUTION, SUPERINSTITUTIO, denotes one upon another. As if A be admitted and inſtituted to a benefice upon one title, and B be admitted, inſtituted, &c. by the preſentation of another.

SUPERINTENDENT, in the *French Cuſtoms*, an officer who has the prime management and direction of the finances or revenues of the king.

The term is alſo uſed for the firſt officer in the queen's houſehold, who has the chief adminiſtration thereof.

They have alſo a *ſuperintendent* of the buildings, anſwering to the ſurveyor of the works among us.

The cardinal de Richelieu made himſelf *ſuperintendent* of commerce.

SUPERINTENDENT alſo denotes an eccleſiaſtical ſuperior in ſeveral reformed churches where epiſcopacy is not admitted; particularly among the Lutherans in Germany, and the Calviniſts in ſome other places.

The *ſuperintendent* is in effect, little other than a biſhop; only his power is ſomewhat more reſtrained than that of our dioceſan biſhops.

He is the chief paſtor, and has the direction of all the inferior paſtors within his diſtrict or dioceſe.

In Germany they had formerly *ſuperintendents general*, who were ſuperior to the ordinary *ſuperintendents*. Theſe in reality were archbiſhops; but the dignity is ſunk into diſuſe; and, at preſent, none but the *ſuperintendent* of Wirtemberg aſſumes the quality of *ſuperintendent general*.

SUPERIOR, or SUPERIOUR, ſomething raiſed above another, or that has a right to command another. Thus an abbot is called the *ſuperior* of an abbey, and a prior the *ſuperior* of a convent.

The canoniſts hold, that a perpetual ſuperiority conſtitutes a title; but a *ſuperior* may be continued by thoſe who conſtituted him ſuch, yet without the ſuperiority's being rendered by that means perpetual.

The church of France allow the ſuperiority and primacy of the pope, not his infallibility; as all the other Romiſh churches do. See POPE, ABBOT, and PRIOR.

SUPERIOR *auriculæ muſculus*, in *Anatomy*, a name given by Santorini, and by Winſlow, to one of the muſcles of the ear, called by Albinus and Cowper the *attollens auriculam*, and by many *auriculæ primus*.

SUPERIOR *courts of record*. See COURT.

SUPERIOR *capitis obliquus*, *maxilla*, *oculi obliquus*, *planets*, *poſticus ſerratus*, and *reſpondeat*. See the reſpective articles.

SUPERIOR *ſcapularis*. See SUPRASPINATUS.

SUPERIORIS *labii elevator*. See ELEVATOR.

SUPERJURARE. Anciently, when a criminal endeavoured to excuſe himſelf by his own oath, or by that of one or more witneſſes, and yet the crime was ſo notorious, that he was convicted by the oaths of many more witneſſes; this was called *ſuperjurare*.

SUPERLATIVE, in *Grammar*, an inflexion of nouns adjective, ſerving to augment and heighten their ſignification, and ſhew the quality of the thing denoted to be in the higheſt degree.

In Engliſh, the *ſuperlative* is uſually formed by the addition of *eſt*; as richeſt, holieſt, &c. rarely by the addition of *iſſimo*, as generaliſſimo; more frequently by the prefixing of *moſt*; as *moſt* honourable, *moſt* amiable, &c.

The French are generally forced to form their *ſuperlatives* by prefixing of *le plus*, ſometimes of *tres*, and ſometimes of *fort*. The Italians and Spaniards have great advantages over them in this reſpect; their language abounding with magnificent words, for exaggerating things with auxiliary particles: yet the Hebrews are more poor than the French in this reſpect, as having neither comparatives, nor *ſuperlatives*. They uſe to expreſs theſe degrees by the particles *joter* and *meod*; ſometimes by the prepoſition *min*, and ſometimes by redoubling the word; of which we find frequent inſtances in the Bible.

SUPERNATURAL *grace*. See GRACE.

SUPERNATURAL *theology*. See THEOLOGY.

SUPERNUMERARII, in the latter times of the Roman empire, ſoldiers added to the legion after it was completed. Theſe were the ſame with thoſe in former times called ACCENSI.

SUPERNUMERARY, ſomething over and above a fixed number. In ſeveral of the offices are *ſupernumerary* clerks, to be ready on extraordinary occaſions.

There are alſo *ſupernumerary* ſurveyors of the exciſe, to be ready to ſupply vacancies, when they fall: theſe have but half-pay.

In muſic, the *ſupernumerary*, called by the Greeks, *proſlambanomenos*, is the loweſt of the chords of their ſyſtem; anſwering to *a*, *mi*, *la*, of the loweſt octave of the moderns. See DIAGRAM.

SUPERNUMERARY *bones of the head*: anatomiſts diſtinguiſh by this appellation ſeveral bony pieces found in ſome ſkulls, chiefly between the parietal and occipital bones. They form breaks in the lambdoidal ſuture, and are joined by the ſutures to the bones already mentioned.

Their figure, number, and ſize, vary extremely; ſometimes they are triangular, or approaching to that form, but oftener they are of no determinate figure: in ſome ſubjects they incroach on the occipital bone, and in others on the parietal bones; and ſometimes they extend themſelves every way. They are commonly indented, and broader on the outſide of the ſkull than on the inſide, in which they have no viſible indentations; and ſometimes when they are ſmall on the outſide, are hardly at all to be ſeen within. They have by ſome been termed keys, a name uſed by joiners for the pieces which ſerve to ſtrengthen the joints of boards; but this can agree to them only in reſpect to their ſituation, not in reſpect to their uſes with regard to the other bones of the head. Some ſuch bones have alſo been found in the joints, between the bones of the head and face; and between thoſe of the bones of the face with each other. Winſlow.

SUPERONERATIONE *paſturæ*. See SURCHARGE.

SUPERPARTICULAR. See RATIO. Ptolemy, in his Harmonics, ſeems to lay a great ſtreſs on *ſuperparticular ratios*, beyond the ſuperpartient in muſic. He does not call the intervals which may be expreſſed by the former ratios, excepting 2 : 3 and 3 : 4, diſſonants, as the Pythagoreans did, but concinnous, as if they were of a middle nature between conſonant and diſſonant. But all the doctrine of *ſuperparticular ratios* is a precarious hypotheſis. The two thirds, major and minor, expreſſed by 5 : 4 and 6 : 5, are *ſuperparticular*, and concords. Their octaves, 5 : 2 and 12 : 5, are *ſuperparticular*, and concords alſo. Ptolemy himſelf refutes the Pythagoreans for excluding the diapaſon diateſſaron, expreſſed by 8 : 3, from the number of concords, becauſe its proportions were ſuperpartient; yet his own doctrine is equally precarious. Vide Euler, Tentam. Nov. Theor. Muſic, p. 63, 64.

SUPERPARTIENT *ratio*. See RATIO.

SUPER-PRÆROGATIVA *regis*, a writ which formerly lay againſt the king's widow for marrying without the ſucceſſor's licence.

SUPERPURGATION, *hypercatharſis*, in *Medicine*, an exceſſive, over-violent purging.

SUPERQUADRIPARTIENS. See RATIO.

SUPERSCAPULARIS *inferior*, in *Anatomy*, is called alſo INFRASPINATUS.

SUPERSCAPULARIS *ſuperior*, in *Anatomy*, a muſcle, called alſo SUPRASPINATUS.

SUPERSEDEAS, in *Law*, a writ iſſued in divers caſes, importing, in general, a command to ſtay or forbear ſome ordinary proceedings in law, which, in appearance, ought to be done, or purſued, were it not for the cauſe whereon this writ is granted.

Thus a man regularly is to have a ſurety of peace againſt him of whom he will ſwear he is afraid; and the juſtice required hereunto cannot deny it him: yet, if the party be formerly bound to the peace, either in chancery, or elſewhere; this writ lies, to ſtay the juſtice from doing that, which otherwiſe he ought not to deny.

Clerk of the SUPERSEDEAS. See CLERK.

SUPERSEDING a *commiſſion* of *bankrupt*. If ſuch a commiſſion

miſſion iſſues, and there is ſufficient to pay all the creditors, and the charges, and ſatisfaction is made to all the creditors, the commiſſion may be *ſuperſeded*. A commiſſion is alſo ſometimes *ſuperſeded*, when the creditors agree with the bankrupt, and conſent to a *ſuperſedeas*.

SUPER-STATUTO, 1 Ed. III. cap. 12, 13. is a writ that lay againſt the king's tenants holding in chief, who aliened the king's land without his licence.

Super-statuto *de articulis cleri, cap.* 6. a writ lying againſt the ſheriff, or other officer, that diſtrains in the king's highway, or in the lands anciently belonging to the church.

Super-statuto *facto pour ſeneſchal & marſhal de roy, &c.* a writ that lies againſt the ſteward or marſhal for holding plea in his court, or for treſpaſs or contracts not made, and ariſing within the king's houſhold.

Super-statuto *verſus ſervantes & laboratores*, a writ which lies againſt him who keeps any ſervants, departed out of the ſervice of another, contrary to law.

SUPERSTITION, extravagant devotion, or religion wrongly directed, or conducted.

Superſtition conſiſts in falſe and abject notions of the Deity, in the gloomy and groundleſs fears of inviſible beings, and in the abſurd rites which theſe notions and fears naturally produce: and, generally ſpeaking, it is the effect of ignorance, or of a judgment perverted by a ſour and ſplenetic temper.

The author of the article *fanaticiſm* in the Dict. Encyclop. Paris, defines *fanaticiſm* as a blind and paſſionate zeal, which ariſeth from ſuperſtitious opinions, and leads its votaries to commit ridiculous, unjuſt, and cruel actions, not only without ſhame, but even with certain internal feelings of joy and comfort; from which he concludes that *fanaticiſm* is really nothing more than *ſuperſtition* ſet in motion.

The difference between true religion and *ſuperſtition* ſeems to be this: that the former is the exerciſe of the underſtanding and affections, and the regulation of the conduct, founded on juſt notions of God, and of the method of averting his diſpleaſure and ſecuring his favour; and the latter is the reſult of fancy and paſſion undirected and ungoverned, and originating either in the deluſive hope of pleaſing God by ſome opinion or practice entirely diſtinct from and contrary to thoſe notions, or the diſtreſſing fear that he will not be pleaſed without the addition of ſomething which ſuch notions neither require nor juſtify.

Superſtition has been often uſed, eſpecially by the ancients, for an exceſs of religion, agreeably to that verſe of Aulus Gellius, lib. iv. cap. 9.

> *Religentem eſſe oportet; religioſum nefas.*

It was a piece of *ſuperſtition*, in the ancient Romans, to obſerve the flight of birds, the entrails of victims, &c. It has been obſerved by ſome excellent critics, that the Greek word δεισιδαιμονια, which occurs in the New Teſtament, though it is often uſed in a bad ſenſe, has alſo a good, or at leaſt an innocent, meaning. Accordingly they think that it ſhould be rendered *religion* and not *ſuperſtition*, in Acts xxv. 19. alledging, that it cannot be ſuppoſed Feſtus would ſpeak contemptuouſly to Agrippa of the Jewiſh, that is, of Agrippa's own religion, when Agrippa was come to Cæſarea, with his ſiſter Bernice, to ſalute him. Thus alſo it is apprehended that the word δεισιδαιμονεστερους, Acts xvii. 22. ſhould be tranſlated *very devout*, or exceedingly addicted to the worſhip of inviſible powers, and not too *ſuperſtitious*. The word in the former ſenſe, it is urged, would give no offence at Athens; it was the peculiar character of the Athenians, and conveyed an encomium which they were fond of above any other. The latter harſh ſenſe of the word is inconſiſtent with the whole deſign of St. Paul's argument. Lardn. Cred. vol. i. p. 429, note *s*. Doddr. in loc.

Monſ. Thiers has an expreſs treatiſe, Des ſuperſtitions *populaires*. Women, he obſerves, are naturally more inclined to *ſuperſtition* than impiety. Plutarch has endeavoured to ſhew, that *ſuperſtition* is worſe than atheiſm. The puniſhment allotted, by ſeveral councils, for the ſuperſtitious, is, to faſt a month in priſon.

SUPERSTITIOUS *magic*. See Magic.

Superstitious *uſes*, in *Law*. See Mortmain.

SUPERVISOR ſignifies a surveyor, or overseer.

It was formerly, and ſtill remains, a cuſtom, among ſome, eſpecially of the better ſort, to make a *ſupervisor* of wills; to overlook the executors, and ſee their wills truly performed; but it is to little purpoſe; as being now ſo careleſly executed.

SUPINATION, Supinatio, in *Anatomy*, the action of a ſupinator muſcle; or the motion whereby it turns the hand ſo, as that the palm is lifted upwards. See Pronation.

SUPINATOR, in *Anatomy*, a denomination given to two muſcles of the arm; the one called *ſupinator longus*, the other *ſupinator brevis*; both ſerving to turn the palm of the hand upwards.

The firſt is a long flat muſcle, lying on the external condyle of the os humeri, and on the convex ſide of the radius from one end to the other. It is fixed by fleſhy fibres to the external intermuſcular ligament, and to the criſta of the external condyle of the os humeri, for five or ſix fingers breadth above the condyle, between the brachiæus and anconæus externus; from thence it runs along the whole convex ſide of the radius, and is inſerted by a flat narrow tendon, a little above the ſtyloide apophyſis, in the angle between the concave and flat ſides of the extremity of this bone. This muſcle was believed to be concerned only in the motion of supination, till Mr. Heiſter juſtly obſerved, that it was likewiſe a flexor of the fore-arm; for which uſe it is much better fitted than for the firſt. Winſlow. See *Tab. Anat. (Myol.) fig.* 1. *n.* 20. *fig.* 2. *n.* 19. *fig.* 6. *n.* 16. *fig.* 7. *n.* 44.

The ſecond is a ſmall thin fleſhy muſcle, ſurrounding a great portion of the upper third part of the radius. It is fixed by one end to the lower part of the external condyle of the os humeri, to the external lateral ligament of the joint, to the annual ligament of the radius, and to part of the lateral eminence in the head of the ulna; from thence it paſſes obliquely over the head of the radius, covering ſome part of it, and running down upon, and in ſome meaſure ſurrounding the neck, it turns in under the bicipital tuberoſity, and is inſerted by the ſide of the interoſſeous ligament, in the inſide of the ſuperior quarter of the bone, and even a little lower. In ſome ſubjects we may obſerve the marks of the paſſage of this muſcle over the outſide of the bone. It makes an angle with the pronator teres, reſembling the Roman V. Winſlow. See *Tab. Anat. (Myol.) fig.* 7. *n.* 10. and 45.

This muſcle ſeems to have no other uſe than what is expreſſed by its name; and as it is a ſhort ſmall muſcle, it muſt be very weak. Its uſe is chiefly owing to the obliquity of its fibres: but Mr. Winſlow obſerves, that neither this nor the former muſcle would be able to perform ſupination, where a great force is required, without the aſſiſtance of the biceps, which is the moſt powerful of all the *ſupinators*, and the chief actor in this motion.

SUPINE, in the *Latin Grammar*, a part of the conjugation of a verb, of like effect with the infinitive mood.

There are two kinds of *ſupines*: the one in *um*, whoſe ſignification is active, and marks a motion, as *dare nuptum*; the other in *u*, having a paſſive ſignification, as *horrendum auditu*, &c. The *ſupines* have neither number, nor perſon.

They have their name, ſays Probus, and after him Voſſius, *quod ad inſtar* ſupinorum & *otioſorum hominum omnia habent confuſa*: or, according to Priſcian, *quod naſcantur a participiis paſſivis, quæ* ſupina *appellata ſunt, quia in infimo loca ſita, totam conjugationis molem ſuſcipiant.*

SUPPLANTALIA, or Suppedanea, among *Phyſicians*, plaſters, or other medicaments, applied to the ſoles of the feet; generally made of leaven, muſtard, horſe-radiſh, ſalt, ſoap, gunpowder, &c.

SUPPLE. To *ſupple* a horſe in the manege, is to make him bend his neck, ſhoulders, and ſides, and to render all the parts of his body more pliable.

SUPPLEMENT *of an arch*, in *Geometry*, or *Trigonometry*, is the number of degrees that it wants of being an entire ſemicircle: as *complement* ſignifies what an arch wants of being a quadrant.

Supplement, in *Matters of Literature*, an appendage to a book, to ſupply what is wanting therein.

Freinſhemius has written divers *ſupplements*, to reſtore the books of ſeveral ancient authors, part whereof had been loſt. The French have alſo uſed the word *ſupplement* for a kind of tax, or after-payment, charged on lands, offices, &c. that are pretended to have been ſold beneath their value.

SUPPLEMENTAL *bill*, in *Law*. See Suit *in equity*.

SUPPLETORY *oath*, in *Law*. When there is only one witneſs (the civil law univerſally requiring the teſtimony of two) to make up the neceſſary complement of two, the civil courts admit the party himſelf (plaintiff or defendant) to be examined in his own behalf; and adminiſter to him what is called the *ſuppletory oath*; and if his evidence happens to be in his own favour, this immediately converts the half-proof into a whole one. Blackſt. Com. vol. iii. p. 371.

SUPPLICATION, *ſupplicatio*, in *Antiquity*, a religious ſolemnity obſerved on account of ſome remarkable ſucceſs againſt an enemy: and eſpecially when the army had conferred the title of *imperator* on their general, in whoſe name the ſenate ordered the temples to be opened for the reception of the people, and thanks to be rendered to the gods.

On ſuch an occaſion the *imperator* ſent meſſengers crowned with laurel with letters to the ſenate, which were likewiſe adorned with laurel, to demand of them the title of *imperator*, and the honour of a *ſupplication*. This ſolemnity conſiſted in ſacrificing and feaſting in the temples, with giving thanks to the gods for the ſucceſs obtained, and praying for the continuance of their aſſiſtance. At firſt there were only a few days taken up in ſuch feſtivals; but afterwards they were increaſed gradually, till they came to no leſs than fifty. On ſubduing the Sabines, in the year of the city 304, a *ſupplication* of one day only was ordained; on the taking of Veii, Camillus had a *ſupplication* of four days decreed him; Pompey had twelve on putting an end to the Mithridatic war; Cæſar had fifteen, and afterwards twenty, for reducing Gaul; Octavianus and Panſa had fifty days of *ſupplication* for delivering the colony of Mutina.

SUPPLICAVIT, a writ, iſſuing out of the court of king's bench, or chancery, for taking ſurety of the peace when one is in danger of being hurt in his body by another.

It is directed to the juſtices of the peace, and ſheriff of the county; and is grounded on the ſtatute 1 Ed. III. which appoints, that certain perſons ſhall be aſſigned by the lord chancellor to take care of the peace. See GOOD-*abearing*.

SUPPLIES, called alſo AIDS and SUBSIDIES, are extraordinary grants made by the commons of Great Britain in parliament aſſembled; who, when they have voted a *ſupply* to his majeſty, and ſettled the *quantum* of that *ſupply*, uſually reſolve themſelves in what is called a committee of ways and means, to conſider of the ways and means of raiſing the *ſupply* ſo voted. And in this committee every member (though it is looked upon as the peculiar province of the chancellor of the exchequer) may propoſe ſuch ſchemes of taxation as he thinks will be leaſt detrimental to the public. The reſolutions of this committee (when approved by a vote of the houſe) are in general eſteemed to be (as it were) final and concluſive. For though the *ſupply* cannot be actually raiſed upon the ſubjects till directed by an act of the whole parliament, yet no monied man will ſcruple to advance to the government any quantity of ready caſh, on the credit of a bare vote of the houſe of commons, though no law be yet paſſed to eſtabliſh it; and which requires the aſſent of the other two branches of the legiſlature. The general reaſon given for this excluſive privilege of the houſe of commons, is, that the *ſupplies* are raiſed upon the body of the people, and, therefore, it is proper that they alone ſhould have the right of taxing themſelves. This reaſon, ſays judge Blackſtone, would be unanſwerable, if the commons taxed none but themſelves; but it is notorious, that a very large ſhare of property is in the houſe of lords, which is equally taxed with the property of the commons; and, therefore, he ſays, the commons not being the *ſole* perſons taxed, this cannot be the reaſon of their having the *ſole* right of raiſing and modelling the *ſupply*. The true reaſon, ariſing from the ſpirit of our conſtitution, he apprehends to be this. The lords being a permanent hereditary body, created at pleaſure by the king, are ſuppoſed more liable to be influenced by the crown, and when once influenced to continue ſo, more than the commons, who are a temporary elective body, freely nominated by the people. It would, therefore, be extremely dangerous to give the lords any power of framing new taxes for the ſubjects. It is ſufficient that they have a power of rejecting, if they think the commons too laviſh or improvident in their grants. See PARLIAMENT and MONEY-*bills*. Blackſt. Com. vol. i. p. 170. 308.

SUPPLY, in *Sea-language*, a freſh recruit of proviſions or ſtores ſent to a ſhip or fleet.

SUPPOPLITÆUS, in *Anatomy*, a name given by Spigelius, and ſome others, to the muſcle more generally known by the name of the POPLITÆUS.

SUPPORTED, in *Heraldry*, a term applied to the uppermoſt quarter of a ſhield, when divided into ſeveral quarters: theſe ſeeming, as it were, *ſupported*, or ſuſtained, by thoſe below.

The chief is alſo ſaid to be *ſupported* when it is of two colours, and the upper colour takes up two thirds of it: in this caſe it is *ſuppoſed* by the colour underneath.

SUPPORTERS, in *Heraldry*, figures, ſtanding on the ſcroll, and placed by the ſide of the eſcutcheon, and ſeeming to *ſupport* or hold up the ſame.

Supporters are, chiefly, figures of beaſts: figures of human creatures, uſed for the like purpoſe, are more properly called *tenants*.

Some make another difference between *tenant* and *ſupporter*: when the ſhield is borne by a ſingle animal, it is called *tenant*; when by two, they are called *ſupporters*.

The figures of things inanimate, ſometimes placed aſide of eſcutcheons, but not touching, or ſeeming to bear them, though ſometimes called *ſupporters*, are more properly called *cotiſes*.

Supporters have formerly been taken from ſuch animals as are borne in ſhields; and ſometimes they have been choſen as bearing ſome alluſion to the names of thoſe whoſe arms they are made to ſupport. F. Meneſtrier traces the origin to the ancient tournaments, in which the knights cauſed their ſhields to be carried by ſervants or pages under the diſguiſe of lions, bears, griffons, blackamoors, &c. who alſo held and guarded the eſcutcheons, which the knights were obliged to expoſe to public view ſome time before the liſts were opened. But ſir G. Mackenzie ſays, that the firſt origin and uſe of them are derived from the cuſtom of leading ſuch as are inveſted with any great honour, to the prince who confers it, and of his being ſupported by two of the quality, when he receives the ſymbols of ſuch honour: and in remembrance of that ſolemnity, his arms were afterwards ſupported by any two creatures which he chooſes.

The *ſupporters* of the Engliſh arms are, a lion, and an unicorn; ſome of the former kings have had a leopard, and an unicorn; others, gryphons; others, eagles. See ARMS.

The *ſupporters* of the French arms are angels; which are ſaid to have been firſt introduced by Philip VI. his device being an angel overthrowing a dragon; the dragon being, at that time, the device of the kings of England.

Thoſe of the prince of Monaco are, Auguſtine monks; thoſe of the family of the Urſini, bears; in alluſion to their names.

In England *ſupporters* are the prerogative firſt, of thoſe called nobiles majores, viz. dukes, marquiſſes, earls, viſcounts, and barons; ſecondly of all knights of the Garter, though they ſhould be under the degree of barons; thirdly, of knights of the Bath, who both receive on their creation a grant of *ſupporters*: and laſtly, of ſuch knights as the king chuſes to beſtow this honour upon. *Supporters* are not hereditary, except to the elder branches of ſome knights of the Garter, whoſe anceſtors had this honour granted them; and to the eldeſt ſons of peers, above the degree of a baron, who bear their father's arms and *ſupporters* with a label, &c. See CROWN.

The Germans permit none but princes, and noblemen of rank, to bear them: among the French, the uſe of them is more promiſcuous.

SUPPOSITI *medium*. See MEDIUM.

SUPPOSITION, in *Muſic*, is when one of the parts dwells on a note, while another part makes two or more leſſer notes equivalent to it, by conjoint degrees.

Suppoſition is defined, by a late author, the uſing of two ſucceſſive notes, of the ſame value, as to time; the one whereof, being a diſcord, *ſuppoſes* the other a concord.

The harmony, Mr. Malcolm obſerves, is always to be full on the accented part of the bar, or meaſure; but, on the unaccented, diſcords may tranſiently paſs, without any offence to the ear. This tranſient uſe of diſcords, followed by concords, make what we, after the French, call *ſuppoſition*.

Concords by *ſuppoſition* are thoſe where the continued baſs adds, or ſuppoſes, a new ſound below the fundamental baſs: whence ſuch concords always exceed the extent of the octave. Of theſe concords there are three ſorts, all which are concords of the ſeventh: the firſt, when the added ſound is a third below the fundamental ſound; ſuch is the concord of the ninth: and if the concord of the ninth is formed by the mediant, added below the ſenſible concord in the minor mode, then the concord is called the ſuperfluous fifth. The ſecond kind is, when the ſuppoſed ſound is a fifth below the fundamental ſound, as in the concord of the fourth or eleventh; and if the concord is ſenſible, and the tonic be ſuppoſed, this concord is called the ſuperfluous ſeventh. The third kind is that where the ſuppoſed ſound is below a concord of the diminiſhed ſeventh: if it is a fifth below, i. e. if the ſuppoſed ſound be the mediant, the concord is called the concord of the fourth and ſuperfluous fifth: if it is a ſeventh below, i. e. if the ſuppoſed ſound be the tonic, the concord is called the leſſer ſixth and ſuperfluous ſeventh. Encyclopedie, art. *Suppoſition*. See FUNDAMENTAL *Baſs*.

SUPPOSITION, in *Arithmetic*. See POSITION.

SUPPOSITORY, SUPPOSITORIUM, in *Pharmacy*, a ſolid medicine thruſt up the fundament, in lieu of a liquid one, or clyſter, where that would not be ſo convenient. The Latins call it *balanus*, becauſe anciently made in figure of an acorn.

It is uſually compoſed of common honey, mixed up with either ſoap or oil, and formed into pieces of the length and thickneſs of the little finger, only pyramidal. To the compoſition is ſometimes alſo added powder of ſcammony, euphorbium, colocynthis, ſalt, aloes, &c. according to the caſe of the patient.

On ſome occaſions, *ſuppoſitories* are only a cut of bacon, a piece of tallow-candle, the ſtem of a leek, or the like matter, thruſt, like a tent, up the anus, irritate the ſpincter muſcle, and oblige it to extrude the excrements. Some uſe a lozenge of ſugar, or a piece of linen rolled up and dipt in ſalt butter, which will occaſionally produce effect. For ulcers of the rectum, the beſt *ſuppoſitories* are made of *mel. roſar. cum pulv. maſtic. myrrh. vel colophon.*; thoſe compounded with euphorbium, aloes, and ſubſtances which give a ſtrong ſtimulus, are advantageouſly uſed to promote a difficult birth, or to expel the ſecundines, when they are preternaturally retained in the uterus.

The *ſuppoſitory* was invented for the convenience of ſuch as have an averſion to the taking of clyſters; or to be uſed when the diſeaſe does not allow thereof.

SUPPRESSION, formed from *ſub*, and *premo*, *I preſs under*, in *Law*, the extinction or annihilation of an office, right, rent, or the like.

Suppression, in *Grammar*, denotes an omiſſion of certain words in a ſentence, which yet are neceſſary to a full and perfect conſtruction. As, "I come from my father's; " that is, " from my father's houſe."

Suppreſſion is a figure of ſpeech very frequent in our language; chiefly uſed for brevity and elegance. Some rules relating hereto are as follow:

1°. Whenever a word comes to be repeated in a ſentence oftener than once, it is to be ſuppreſſed. Thus we ſay, " This is my maſter's horſe; " not, " This horſe is " my maſter's horſe."

2°. Words that are neceſſarily implied may be ſuppreſſed.

And, 3°, All words that uſe and cuſtom ſuppreſs in other languages, are to be ſuppreſſed in Engliſh; unleſs there be particular reaſons to the contrary.

Suppression, in *Medicine*, is applied to the humours that are retained in the body by ſome obſtruction or ſtoppage of the uſual outlet.

We ſay, a *ſuppreſſion* of urine, of the menſes, &c. See Ischuria, Urine, Menses, &c.

Suppression *of urine*. There are commemorated in the Philoſophical Tranſactions three caſes of an actual and total *ſuppreſſion of urine*, ſuppoſed to proceed from a ſtone lodged in the neck of the bladder; but in all which, on introducing the catheter, it was found that there was no ſtone there, nor any urine in the bladder. In all theſe caſes the ſame remedy was uſed; that is, a great quantity of acid diluted largely with water; and in conſequence of this the urinary ſecretion was immediately reſtored, and the patient ſoon voided it in a proper manner, and was reſtored to health without any farther uſe of medicines. Philoſ. Tranſ. N° 253.

A *ſuppreſſion of urine* ſometimes happens to women with child, by the womb falling down, and preſſing on the urethra.

It is alſo occaſioned by an inflammation *of the bladder*, a ſwelling of the hæmorrhoidal veins, hard fæces lodged in the rectum, a ſtone in the bladder, excreſcences in the urinary paſſages, a palſy of the bladder, hyſteric affections, &c. each of which caſes requires a particular treatment. It may be obſerved, in general, that in all of them mild and gentle applications are the ſafeſt, as ſtrong diuretic medicines, or things of an irritating nature, generally increaſe the danger. Buchan. See Ischuria and Strangury.

Fire of Suppression, in *Chemiſtry*. See Fire.

SUPPURATION, formed from *ſub*, *under*, and *pus*, *puris*, in *Medicine*, the action whereby extravaſated blood, or other humours in the body, are ripened, or changed into pus. See Abscess.

The change is begun by a diſſipation of the moſt ſubtile and the ſpirituous parts of the blood; what is left behind, thickens and purifies by little and little; that is, its ſalts and ſulphurs diſengage themſelves from the groſſer parts wherein they were embarraſſed: theſe parts, thus diſengaged, and acting on one onother, bruiſe and break each other, and thus excite a fermentation, which increaſes the heat of the part; whereby the matter is farther digeſted, and a pain and tenſion produced: at length the blood loſes its natural colour, and becomes quite white, by the mixture of its acid, ſulphureous, acrimonious particles; as we ſee happen to ſulphureous alkalis, when mixed with acids.

In *ſuppuration* the ſolids are ruptured, the fluids are extravaſated, and entering into a proceſs of reſolution with the broken fibres, procure for themſelves an evacuation, by puſhing outwardly through the teguments. In this caſe the indications are to dilute and ſoften the fluids, that the pus may be formed free from irritation, and to relax the ſolids, that they may yield kindly, and without violence.

When in tumors and phlegmons nature ſhews a tendency to *ſuppuration*, or ripening, all the reſolving or diſperſing medicines muſt be laid aſide, and great care muſt be taken to forward the maturity of the inflammation, that is, to convert the ſtagnating blood into laudable matter; then to give a diſcharge, or vent, to this *ſuppurated* matter, afterwards to cleanſe the part, and finally to incarn, and heal it.

The firſt of theſe intentions, the ripening of the ſwelling, is to be promoted by ſuch of the emollient medicines as obſtruct the pores of the ſkin, as fats, oils, and glutinous medicines; as alſo the ſharp, pungent, and, in ſome degree, cauſtic medicines, which may be uſed in form of cataplaſms, or plaſters. Of the firſt kind are mallows, marſhmallows, figs, linſeed, honey, crumb of bread, the various animal fats, and the oils of lilies, chamomile, &c. and of the latter, or the ſharp and pungent ripeners, are garlic, onions, ſaffron, turpentine, and many of the gums, as galbanum and ammoniacum; and laſtly, ſour leaven of bread.

Medicines compounded of theſe are to be applied hot to the part, and the application frequently repeated till the matter within is found to be ſufficiently ripened, by the ſoftneſs and whiteneſs of the tumor. But when the abſceſs is ſmall, it is more convenient and ſufficient, to apply ſome of the ripening plaſters, as diachylon, with the gums, or the like, till the *ſuppuration* is perfected.

Mr. Goulard recommends ſaturnine applications for ſuppurating tumors, though, Mr. Aikin obſerves, they do not ſeem to anſwer any one indication: for this purpoſe, nothing can have a greater ſanction from practice than the application of warm emolient fomentations and cataplaſms.

Nor are internal remedies wholly to be neglected in caſes of this kind, eſpecially where the tumors are large, or of conſequence. In theſe caſes, when the blood moves too ſlowly, which may be known by the pulſe, the patient muſt be allowed to eat meat, and muſt take ſuch medicines as are warm and ſtimulating; by means of which, and by the increaſed motion of the blood, the inſpiſſated particles contained in the ſmaller veſſels will be the more eaſily converted into matter.

Strong broths are very proper for this purpoſe as alſo the uſe of wine, or ale, in moderation; and Venice treacle, diaſcordium, and the confection of alkermes, are to be the medicines taken three or four times a day, and medicated teas, made of ſanders-wood, ſaſſafras, or cinnamon. But, on the contrary, when the motion of the blood is too violent, and the heat too great, cooling medicines are to be given, ſuch as the the thin and watery drinks, the ſubacid medicines, and nitre: bleeding, in a ſmall quantity, is alſo often neceſſary in this caſe. But when the conſtitution is ſound, and the blood's motion regular, the uſe of internal medicines, to promote *ſubpuration*, is trifling, and may be altogether rejected.

When by theſe means the matter is perfectly formed, the abſceſs is to be carefully opened by the ſurgeon, and the matter diſcharged, after which the wound is to be cleanſed and healed in the common way. Heiſter's Surg. p. 183. Aikin's Obſ. on the external Uſe of Preparations of Lead, &c. p. 49, &c.

SUPPURATIVES, or Suppurating *medicines*, are ripeners, or medicines that promote ſuppuration.

Suppuratives are all hot; by which means, increaſing the warmth of the part, they reſolve the humour into a pus. Such are mallows, melilot, lily-roots, diachylon, pellitory, figs, aromatic gums, meals, &c.

SUPPUTATION. See Computation.

SUPRACOSTALES, in *Anatomy*, muſcles irregularly triangular, and ſituated on the back parts of the ribs, near the vertebræ, commonly called *levatores coſtarum*.

Each of theſe is fixed by one tendinous extremity in the tranſverſe apophyſis, which lies above the articulation of each rib, and to the neighbouring ligament; the firſt being inſerted in the tranſverſe apophyſis of the laſt vertebra of the neck, and the laſt in that of the eleventh vertebra of the back. From thence the fleſhy fibres run down obliquely, increaſing in breadth as they deſcend, and are inſerted in the back part of the outſide of the following rib; ſome of the fibres often paſs beyond that rib, and are fixed in one or more of the ribs below it by ſeveral digitations, which lie at a greater diſtance from the vertebræ, in proportion as they run lower. In the inferior ribs theſe digitations are more conſiderable than in the ſuperior.

The *ſupracoſtales* are powerful aſſiſtants to the intercostals in their common action, and are therefore very juſtly termed *levatores coſtarum*. Winſlow.

Supracostales *longi*, in *Anatomy*, a name given by Verheyen to thoſe muſcles of the loins, which Albinus has deſcribed under the name of the LEVATORES *longi coſtarum.*

SUPRALAPSARIANS, in *Theology*, perſons who hold that God, without any regard to the good or evil works of men, has reſolved, by an eternal decree, *ſupra lapſum*, antecedently to any knowledge of the fall of Adam, and independently of it, to ſave ſome, and damn others: or, in other words, that God intended to glorify his juſtice in the condemnation of ſome, as well as his mercy in the ſalvation of others; and for that purpoſe decreed that Adam ſhould neceſſarily fall, and by that fall bring himſelf, and all his offſpring, into a ſtate of everlaſting condemnation.

Theſe are alſo called *antelapſaries*; and are oppoſed to ſublapſaries and infralapſaries.

According to the *ſupralapſarians*, the object of predeſtination, is, *homo creabilis & labilis*; and, according to the SUBLAPSARIANS and INFRALAPSARIANS, *homo creatus & lapſus.*

SUPRASPINATUS, in *Anatomy*, a thick narrow muſcle, thus called from its fleſhy origination at the upper end of the baſis of the ſcapula *above the ſpine.* See *Tab. Anat. (Myol.) fig. 7. n. 32.*

This muſcle fills all the *ſupra-ſpinal* cavity of the ſcapula, and is fixed to all the poſterior half of the *ſupra-ſpinal* foſſa, and ſometimes its inſertion reaches near the neck of the bone. Then the fibres leave the ſurface of the bone, and being, as it were, ſupported by the fat, or cellulous ſubſtance, paſs between the acromium, and neck of the ſcapula, under the arch formed by the acromium and extremity of the clavicle, and under the ligament between the acromium and apophyſis coracoïdes; being afterwards inſerted in the ſuperior ſurface of the great tuberoſity of the head of the os humeri, very near the bony channel. This muſcle is covered by the trapezius. The *ſupra-ſpinatus* is commonly ſuppoſed to join with the deltoides in lifting up the arm; this muſcle beginning that action, and the deltoides continuing it. But Mr. Winſlow obſerves, that this muſcle is not only very ſmall, but it ſeems to be too near the articulation of the head of the os humeri, to be able to raiſe the whole upper extremity, which is of a conſiderable weight and length. It has, however, he ſays, two other very remarkable uſes, when the arm is raiſed from the thorax to the head by the action of the deltoides. The ſtrong deltoide muſcle, he obſerves, in the firſt inſtant of its action to raiſe the arm, would thruſt the head of the os humeri upwards out of the cavity, if ſomething did not ſupply the place either of a bony fulcrum or ligamentary frænum. Beſides, the broad orbicular ligament would be apt to be entangled and bruiſed between the edges of the two articulated bones, if this inconvenience were not prevented. The *ſupra-ſpinatus* anſwers both theſe ends. When it contracts its tendon, which runs over the convex part of the head of the os humeri, to be inſerted in the upper ſurface of the great tuberoſity, it preſſes very ſtrongly on the head of the bone, hereby ſupplying the place of a fulcrum, and hindering the head to riſe, during the beginning of the action of the deltoides. For preventing the ſecond inconveniency, its tendon is a kind of band, which adheres cloſely to the outſide of the orbicular ligament, and ſeveral of its fibres do not go ſo far as the head of the os humeri, but are gradually inſerted in the outer ſurface of the ligament; and ſerve to pull the orbicular ligament uniformly, and thereby prevent its running into irregular folds, and being entangled between the two articulated bones.

The INFRA-SPINATUS, being inſerted by its tendon in the middle ſurface of the great tuberoſity of the os humeri, muſt perform different motions, according to the different ſituations of that bone. If it acts while the arm hangs down, parallel to the trunk of the body, it may move the os humeri round its axis from before outward, and conſequently if the fore-arm be at the ſame time bent, it will turn the hand from the body. If while the arm is kept raiſed by the deltoides, the poſterior portion of that muſcle draws the arm backward, the *infra-ſpinatus* has the ſame uſe with reſpect to the orbicular ligament, as that of the *ſupra-ſpinatus* already deſcribed. And as theſe two muſcles adhere cloſely by the edges of their tendons, they may in ſome meaſure co-operate in their actions on that ligament. When the arm, already raiſed, is ſtrongly pulled forward by the pectoralis major, a conſiderable force is neceſſary to prevent the head of the os humeri from being thrown backward out of the glenoide cavity: the ſtructure of the *infra-ſpinatus*, and the number of its fibres, fit it for anſwering this purpoſe: it may likewiſe aſſiſt the teres major in great efforts. Winſl. Anat. vol. i. p. 292, &c.

SUPREMACY, in the *Engliſh Polity*, the ſuperiority or ſovereignty of the king over the church as well as ſtate, of England, whereof he is eſtabliſhed head. See KING.

The king's *ſupremacy* was firſt eſtabliſhed, or, as others ſay, recovered, by king Henry VIII. in 1534, after breaking with the pope. Stat. 25 Hen. VIII. cap. 12. 20. 1 Eliz. cap. 1. It is ſince confirmed by ſeveral canons, as well as by the articles of the church of England; and is paſſed into an OATH, which is required as a neceſſary qualification for all offices and employments, both in church and ſtate, from perſons to be ordained, from the members of both houſes of parliament, &c.

This oath, as finally eſtabliſhed by 1 W. cap. 8. is as follows: "I A. B. do ſwear, that I do from my heart "abhor, deteſt, and abjure, as impious and heretical, "that damnable doctrine and poſition, that princes ex-"communicated or deprived by the pope, or any autho-"rity of the ſee of Rome, may be depoſed or mur-"dered by their ſubjects, or any other whatſoever. "And I do declare, that no foreign prince, perſon, pre-"late, ſtate, or potentate, hath or ought to have any "juriſdiction, power, ſuperiority, pre-eminence, or au-"thority, eccleſiaſtical or ſpiritual, within this realm. "So help me God." By ſtat. 5 Eliz. cap. 1. to refuſe the oath of *ſupremacy* will incur the pains of PRÆMUNIRE.

This right of *ſupremacy* conſiſts chiefly in the following articles: 1°. That the archbiſhops of either province cannot ſummon the biſhops and clergy to convocation, or enact any canons, without the king's expreſs conſent, by 25 Henry VIII. cap. 19. whereas, before that act, the convocation was often called, and laws made by it for governing the church, without any authority from the crown.

2°. In that there lies now an appeal from the archbiſhop to the king in chancery; and, on ſuch an appeal, a commiſſion, under the ſeal, is to be directed to certain perſons, whereof commonly half are laymen, and half clergymen, which is called the COURT *of delegates*, and which finally determine all eccleſiaſtical cauſes, by 25 Hen. VIII. cap. 19. though ſometimes a review is granted. Before this ſtatute, the appeal from the archbiſhop's court lay to the pope only.

3°. The king can grant commiſſions for viſiting ſuch places as are exempt from the juriſdiction of biſhops, or archbiſhops; and appeals lie from thence to the king in chancery: whereas before 25 Henry VIII. the pope only could viſit them, and receive appeals from thoſe courts.

4°. Perſons in holy orders are not, as formerly, exempt from the king's temporal laws, any more than laymen.

5°. The biſhops and clergy do not ſwear, or pay any obedience to the pope; but muſt take the oaths of allegiance and *ſupremacy* to the king.

SUPREME *pear*, a name given by the gardeners to a ſmall pear, called alſo by ſome the *little muſk pear.* It is of a roundiſh ſhape, and is uſually produced in cluſters: the ſtalk is ſhort, and when it is ripe, the ſkin is yellow; the juice is ſomewhat muſky. If it be not ſuffered to hang till too ripe, it is an excellent pear. It ripens in the beginning of July, and continues but a few days. The French call it *le petit muſcat.*

SURA, in *Anatomy*, the calf, or fleſhy part of the leg.

The word is alſo uſed, by ſome, for the FIBULA.

SURA is alſo the name of a drink uſed in the Eaſt-Indies, and made of the juice that flows from the cocoa-tree.

This juice being evaporated, and expoſed to the ſun, forms a ſugar, but it is little eſteemed.

SURALIS. See MUSCLE.

SURBATING, among *Farriers*, is when the ſole of an horſe's foot is worn, bruiſed, or ſpoiled, by beating the hoof againſt the ground in travelling without ſhoes, or going in hot ſandy lands, or with a ſhoe that hurts the ſole, lies too flat to it, or the like.

Sometimes, alſo, it happens by over-riding a horſe while young, before his feet are hardened; and ſometimes by the hardneſs of the ground, and high-lifting his feet.

The ſigns hereof are, his halting on both fore-legs, and going ſtifly, and creeping as if half-foundered.

In the general, there is nothing better for *ſurbated* feet than tar melted into the foot; or vinegar boiled with ſoot to the conſiſtence of a broth, and put into the foot boiling hot, with hurds over it, and ſplints to keep it in.

SURCHARGE of the foreſt, is when a commoner puts more beaſts in the foreſt than he has a right to. See FOREST.

SURCHARGE *of common*, is a diſturbance of common of paſture, by putting more cattle therein than the paſture and herbage will ſuſtain, or the party had a right to do. This injury can only happen where the common is appendant or appurtenant, and of courſe limitable by law; or where, when in groſs, it is expreſly limited and certain; for where a man hath common in groſs, ſans nombre, or without ſtint, he cannot be a *ſurcharge*. In this caſe, indeed, there muſt be left ſufficient for the lord's own beaſts.

The uſual remedies for *ſurcharging* the common are by the lord's diſtraining the ſurplus number, or by his bringing an action of treſpaſs, or by a ſpecial action on the caſe, in which any commoner may be plaintiff.

The ancient and moſt effectual method of proceeding is by writ of ADMEASUREMENT *of paſture*.

SURCHARGE, *writ of ſecond, de ſecunda ſuperoneratione*, is given by the ſtatute of Weſtm. 2. 13 Ed. I. cap. 8. when, after the ADMEASUREMENT of paſture hath aſcertained the right, the ſame defendant *ſurcharges* the common again; and thereby the ſheriff is directed to enquire by a jury, whether the defendant has in fact again ſurcharged the common; and if he has, he ſhall then forfeit to the king the ſupernumerary cattle put in, and alſo pay damages to the plaintiff.

SURCINGLE, a girdle, wherewith the clergy of the church of England uſually tie their caſſocks. See GIRDLE.

SURCOAT, a coat of arms, to be worn over body armour. See COAT *of arms*.

The *ſurcoat* is properly a looſe thin taffety coat, with arms embroidered or painted on it. Such as is worn by heralds, anciently alſo uſed by military men over their armour, to diſtinguiſh themſelves by.

SUR CUI *in vita*, in *Law*, a writ that lies for the heir of a woman, whoſe huſband aliened her land in fee, and ſhe neglected to bring the writ *cui in vita* for recovery thereof, her heir may bring this writ againſt the tenant after her deceaſe.

SURCULUS, in the *Anatomy of Plants*, a word uſed to expreſs that part of the branching of the ribs of the leaf which is of the middle kind, between the great middle rib and the ſmalleſt reticular ramifications. The middle rib is, by the writers on theſe ſubjects, called *petiolum*.

The firſt diviſions that go off laterally from theſe, are called *rami*, or branches; the next diviſion of theſe, into more minute ones, are called *ſurculi*; and the final divarications of theſe into the reticular work, that ſpreads itſelf over the whole leaf, are called *capillamenta*.

Many, however, confound theſe two laſt diviſions, and call all beyond the ſecond diviſion, or lateral branches of the middle rib, by this name of *ſurculi*. See PETIOLE and RAMUS.

SURD, in *Arithmetic*, denotes a number or quantity that is incommenſurate to unity; or that is inexpreſſible by any known way of notation, otherwiſe than by its radical ſign or index.

This is otherwiſe called an *irrational* or *incommenſurable number*; and an *imperfect* POWER.

When any number or quantity hath its root propoſed to be extracted, and yet is not a true figurate number of that kind; that is, if its ſquare root be demanded, and it is not a true ſquare, if its cube root be required, and itſelf be not a true cube, &c. then it is impoſſible to aſſign, either in whole numbers, or in fractions, any exact root of ſuch number propoſed.

And whenever this happens, it is uſual, in mathematics, to mark the required root of ſuch numbers, or quantities, by prefixing before it the proper mark of radicality, which is $\surd$, and placing above the radical ſign the number that denominates what kind of root is required. Thus $\sqrt[2]{2}$ ſignifies the ſquare root of 2, and $\sqrt[3]{16}$, ſignifies the cubic root of 16: which roots, becauſe they are impoſſible to be expreſſed in numbers exactly (for no effable number, either integer or fraction, multiplied into itſelf, can ever produce two; or, being multiplied cubically, can ever produce 16,) are properly called *ſurd roots*.

There is alſo another way of notation, now much in uſe, whereby roots are expreſſed without the radical ſign, by their indices, thus, as x^2, x^3, x^5, &c. ſignify the ſquare, cube, and fifth power of x; ſo $x^{\frac{1}{2}}$, $x^{\frac{1}{3}}$, $x^{\frac{1}{5}}$, ſignify the ſquare root, cube, &c. of x.

The reaſon of which is plain enough; for ſince $\sqrt{x}$ is a geometrical mean proportional between 1 and x, ſo $\frac{1}{2}$ is an arithmetical mean proportional between 0 and 1; and therefore as 2 is the index of the ſquare of x, $\frac{1}{2}$ will be the proper index of its ſquare root, &c.

Obſerve alſo, that, for convenience, or brevity's ſake, quantities or numbers, which are not *ſurds*, are often expreſſed in the form of *ſurd* roots. Thus, $\sqrt{4}$, $\sqrt{\frac{9}{4}}$, $\sqrt[3]{27}$, &c. ſignify, 2, $\frac{3}{2}$, 3, &c.

But though theſe *ſurd* roots (when truly ſuch) are inexpreſſible in numbers, they are yet capable of arithmetical operations (ſuch as addition, ſubtraction, multiplication, diviſion, &c.); how readily to perform which the algebraiſt ought not to be ignorant.

For the method of performing theſe operations, ſee the ſequel of this article.

Surds are either *ſimple* or *compound*.

SURDS, *ſimple*, are thoſe which are expreſſed by one ſingle term, as $\sqrt[3]{c}$.

The *ſurds* $\sqrt[2]{2}$, $\sqrt[2]{3}$, $\sqrt[2]{5}$, &c. though they are themſelves incommenſurable with unit, according to the definition, are commenſurable in power with it, becauſe their powers are integers, i. e. multiples of unit. They may be alſo ſometimes commenſurable with one another; as the $\sqrt[2]{8}$, and the $\sqrt[2]{2}$, becauſe they are to one another as 2 to 1. Theſe incommenſurables are called by ſome communicable: and when they have a common meaſure, as $\sqrt[2]{2}$ is the common meaſure of both, then their ratio is reduced to an expreſſion in the leaſt terms, by dividing them by their greateſt common meaſure. This common meaſure is found as in commenſurable quantities, only the root of the common meaſure is to be made their common diviſor. Thus, $\frac{\sqrt{12}}{\sqrt{3}}=\sqrt{4}=2$; and $\frac{\sqrt{18a}}{\sqrt{2}}=3\sqrt{a}$.

SURDS, *compound*, are thoſe formed by the addition or ſubtraction of ſimple *ſurds*: as $\sqrt{5}+\sqrt{2}$: $\sqrt{5}-\sqrt{2}$, or $\sqrt[3]{7+\sqrt{2}}$: which laſt is called an *univerſal* root, and ſignifies the cubic root of that number, which is the reſult of adding 7 to the ſquare root of 2.

1. *To reduce rational quantities to the form of any* SURD *roots aſſigned*. Involve the rational quantity according to the index of the power of the *ſurd*, and then prefix before it the radical ſign of the *ſurd* propoſed. Thus, $a=\sqrt[2]{a^2}=\sqrt[3]{a^3}=\sqrt[4]{a^4}=\sqrt[n]{a^n}$; and $4=\sqrt{16}=\sqrt[3]{64}=\sqrt[4]{256}=\sqrt[n]{4^n}$.

And by this way may a ſimple *ſurd* fraction, whoſe radical ſign refers only to one of its terms, be changed into another, which ſhall reſpect both numerator and denominator. Thus, $\frac{\sqrt{2}}{5}$ is reduced to $\sqrt{\frac{2}{25}}$, and $\frac{5}{\sqrt{4}}$ to $\sqrt[2]{\frac{125}{4}}$: thus alſo a reduced to the form of $\overline{x}|^{\frac{1}{n}}$ is $\overline{a^n}|^{\frac{1}{n}}$.

And roots with rational co-efficients may thus be reduced ſo as to be wholly affected by the radical ſign. Thus, $a\times e^{\frac{1}{n}}=\overline{a^n e}|^{\frac{1}{n}}$

2. *To reduce ſimple* SURDS, *having different radical ſigns (which are called heterogeneal* ſurds), *to others that may have one common radical ſign, or which are homogeneal: or to reduce roots of different names into thoſe of the ſame name*. Involve the powers reciprocally according to each others indices, for new powers; and let the product of the indices be the common index. Otherwiſe, as *ſurds* may be conſidered as powers with fractional exponents, reduce theſe fractional exponents to fractions having the ſame value, and a common denominator. Thus, by either rule, $\sqrt[n]{a}$ or $a^{\frac{1}{n}}$ and $\sqrt[m]{e}$ or $e^{\frac{1}{m}}$, will be $\sqrt[nm]{a^m}$ or $\overline{a^m}|^{\frac{1}{nm}}$ and $\sqrt[nm]{e^n}$ or $\overline{e^n}|^{\frac{1}{nm}}$.

Alſo $\sqrt[2]{3}$ and $\sqrt[3]{2}$, are reduced to other equal *ſurds* $\sqrt[6]{27}$ and $\sqrt[6]{4}$, having a common radical ſign.

3. *To reduce* SURDS *to their moſt ſimple expreſſions, or to the loweſt terms poſſible*. Divide the *ſurd* by the greateſt power denoted by the index, which you can diſcover is contained in it, and will meaſure it without any remainder; and then prefix the root of that power before the quotient, or *ſurd* ſo divided; this will produce a new *ſurd* of the ſame value with the former, but in more ſimple terms. Thus, $\sqrt{16aab}$, by dividing by $16aa$, and prefixing the root $4a$, will be reduced to this, $4a\sqrt{b}$, and $\sqrt{12}$, will be depreſſed to $2\sqrt{3}$. Alſo $\sqrt[3]{cb^3r}$ will be brought down to $b\sqrt[3]{cr}$.

To reduce $a^{\frac{1}{n}}$ to its loweſt term: ſuppoſe x^n the greateſt n power, that will divide a without a remainder; and let $y=\frac{a}{x^n}$; then will $a^{\frac{1}{n}}=x\times y^{\frac{1}{n}}$; for $a=x^n y$, therefore $a^{\frac{1}{n}}\ (=\overline{x^n y}|^{\frac{1}{n}}=\overline{x^n}|^{\frac{1}{n}}\times y^{\frac{1}{n}})=x\times y^{\frac{1}{n}}$.

Alſo $\sqrt[3]{75}$ or $\overline{75}|^{\frac{1}{2}}=5\times 3^{\frac{1}{2}}$ or $5\sqrt{3}$, and $\sqrt[3]{81}$ or $\overline{81}|^{\frac{1}{3}}=\sqrt[3]{27}\times 3$. or $27^{\frac{1}{3}}\times 3=3\sqrt[3]{3}$ or $3\times 3^{\frac{1}{3}}$.

This reduction is of great uſe whenever it can be performed; but if no ſuch ſquare, cube, biquadrate, &c.

can be found for a diviſor, find out all the diviſors of the power of the *ſurd* propoſed; and then ſee whether any of them be a ſquare, cube, &c. or ſuch a power as the radical ſign denotes; and if any ſuch can be found, let that be uſed as in the ſame manner as above, to free the *ſurd* quantity in part from the radical ſign. Thus if $\sqrt{288}$ be propoſed, among its diviſors will be found the ſquares, 4, 9, 16, 36, and 144; by which, if 288 be divided, there will ariſe the quotients 72, 32, 18, 8, and 2; wherefore inſtead of $\sqrt{288}$, you may put $2\sqrt{72}$, or $3\sqrt{32}$, or $4\sqrt{18}$, or $6\sqrt{8}$, or laſtly, $12\sqrt{2}$, and the ſame may be done in ſpecies.

By the two laſt problems we may determine, whether any two roots are commenſurable one to another; and alſo find their ratio. For after reduction into the loweſt terms and the ſame name, if the powers are equal, the roots are commenſurable, and their ratio is equal to that of the rational co-efficients. Thus, $\sqrt{75}$ and $\sqrt{27}$ reduced, will be $5\sqrt{3}$ and $3\sqrt{3}$, which are commenſurable; and $5\sqrt{3} : 3\sqrt{3} :: 5 : 3$.

4. *To add and ſubtract* SURDS. When they are reduced to their loweſt terms, if they have the ſame irrational part, add or ſubtract their rational co-efficients, and prefix the ſum or difference to the common irrational part. Thus, $\sqrt[2]{75}+\sqrt[2]{48}=5\sqrt{3}+4\sqrt{3}=9\sqrt{3}$: and $\sqrt{a^2x}+\sqrt{b^2x}=a\sqrt{x}+b\sqrt{x}=\overline{a+b}\times\sqrt{x}$. And $\sqrt[2]{150}-\sqrt[2]{54}=5\sqrt{6}-3\sqrt{6}=2\sqrt{6}$. If they have not the ſame irrational part, they can only be connected by the ſign + or −.

Hence it appears, that the ſum or difference of any two ſquare roots is equal to the ſquare root of the ſum, or difference, of the ſum of the powers, and twice the product of their roots.

E. g. $\sqrt{75}+\sqrt{48}=\sqrt{75+48+2\times\overline{5\sqrt{3}\times4\sqrt{3}}}=\sqrt{75+48+2\times20\times3\,(120)}=\sqrt{243}=9\sqrt{3}$. For if $\sqrt{aa}$ and $\sqrt{ee}$ be any given quantities, it is plain that $\overline{aa}\rceil^{\frac{1}{2}}\pm\overline{ee}\rceil^{\frac{1}{2}}=a\pm e=\overline{aa+2ae+ee}\rceil^{\frac{1}{2}}$.

5. *To multiply and divide* SURDS. If they have the ſame rational quantity, they are multiplied by adding their indices, and divided by ſubtracting them. Thus, $\sqrt[2]{a}\times\sqrt[3]{a}=a^{\frac{1}{2}}\times a^{\frac{1}{3}}=\frac{3+2}{6}=a^{\frac{5}{6}}=\sqrt[6]{a^5}$; and $\sqrt[2]{2}\times\sqrt[3]{2}=\sqrt[6]{2^5}=\sqrt[6]{32}$. Alſo, $\frac{\sqrt[3]{a}}{\sqrt[5]{a}}=\frac{a^{\frac{1}{3}}}{a^{\frac{1}{5}}}=a^{\frac{1}{3}-\frac{1}{5}}=a^{\frac{5-3}{15}}=a^{\frac{2}{15}}=\sqrt[15]{a^2}$; and $\frac{\sqrt[2]{2}}{\sqrt[3]{2}}=\sqrt[6]{2}$.

If they have different rational quantities, and the ſame ſign, multiply theſe rational quantities into one another, or divide them by one another, and ſet the common radical ſign over their product: thus, $\sqrt[n]{a^2}\times\sqrt[n]{b^3}=\sqrt[n]{a^2b^3}$ and $\sqrt[2]{2}\times\sqrt[2]{5}=\sqrt[2]{10}$: alſo, $\frac{\sqrt[m]{a^4}}{\sqrt[m]{b^3a}}=\sqrt[m]{\frac{a^4}{b^3a}}=\sqrt[m]{\frac{a^3}{b^3}}$; and $\frac{\sqrt[3]{9}}{\sqrt[3]{24}}=\sqrt[3]{\frac{9}{24}}=\sqrt[3]{\frac{3}{8}}=\frac{1}{2}\sqrt[3]{3}$.

But if the *ſurds* have not the ſame radical ſign, reduce them (by prob. 2) to ſuch as ſhall have the ſame radical ſign, and proceed as before. Thus, $\sqrt[m]{a}\times\sqrt[n]{b}=\sqrt[nm]{a^n b^m}$; and $\sqrt[2]{2}\times\sqrt[3]{4}=2^{\frac{1}{2}}\times4^{\frac{1}{3}}=2^{\frac{3}{6}}\times4^{\frac{2}{6}}=\sqrt[6]{2^3\times4^2}=\sqrt[6]{8\times16}=\sqrt[6]{128}$. Alſo, $\frac{\sqrt[m]{a}}{\sqrt[n]{x}}=\sqrt[mn]{\frac{a^n}{x^m}}$; and $\frac{\sqrt[3]{4}}{\sqrt[2]{2}}=\frac{4^{\frac{1}{3}}}{2^{\frac{1}{2}}}=\frac{4^{\frac{2}{6}}}{2^{\frac{3}{6}}}=\sqrt[6]{\frac{4^2}{2^3}}=\sqrt[6]{\frac{16}{8}}=\sqrt[6]{2}$. If the *ſurds* have any rational co-efficients, their product or quotient muſt be prefixed. Thus $2\sqrt[2]{3}\times5\sqrt[2]{6}=10\sqrt[2]{18}$; and $\frac{8\sqrt[2]{5}}{2\sqrt{6}}=4\sqrt[2]{\frac{5}{6}}$.

6. *Involution and evolution of* SURDS. The powers of *ſurds* are found by multiplying their indices by the index of the power required. Thus, the ſquare of $\sqrt[3]{2}$ is $2^{\frac{1}{3}\times2}=2^{\frac{2}{3}}=\sqrt[3]{4}$, and the cube of $\sqrt[2]{5}=5^{\frac{1}{2}\times3}=5^{\frac{3}{2}}=\sqrt[2]{125}$. Or, raiſe the quantity under the radical ſign to the power required, containing the ſame radical ſign; unleſs the index of that power is equal to the name of the *ſurd*, or a multiple of it, and in that caſe the power of the *ſurd* becomes rational. Thus, the cube of $\sqrt[3]{4}=\overline{\sqrt[3]{4}}\rceil^{3}=4$.

Evolution is performed by dividing the fraction which is the index of the *ſurd* by the name of the root required. Thus, the ſquare root of $\sqrt[3]{a^4}$ is $\sqrt[3]{a^2}$ or $\sqrt[6]{a^4}$.

Simple *ſurds* are commenſurable in power, and by being multiplied into themſelves give, at length, rational quantities. But compound *ſurds*, multiplied into themſelves, commonly give irrational products. Yet, in this caſe, when any compound *ſurd* is propoſed, there is another compound *ſurd*, which, multiplied into it, gives a rational product. Thus, if $\sqrt[3]{a}-\sqrt[3]{b}$ were propoſed, multiplying it by $\sqrt[3]{a^2}+\sqrt[3]{ab}+\sqrt[3]{b^2}$, the product will be $a-b$.

The inveſtigation of that *ſurd*, which multiplied into the propoſed *ſurd*, gives a rational product, is made eaſy by three theorems, delivered by Mr. Maclaurin, in his Algebra, p. 109, ſeq. to which we refer the curious. This operation is of uſe in reducing *ſurd* expreſſions to more ſimple forms. Thus ſuppoſe a binomial *ſurd* divided by another, as $2\sqrt{20}+2\sqrt{12}$ by $2\sqrt{5}-2\sqrt{3}$, the quotient might be expreſſed by $\frac{2\sqrt{20}+2\sqrt{12}}{2\sqrt{5}-2\sqrt{3}}$. But this might be expreſſed in a more ſimple form, by multiplying both numerator and denominator by that *ſurd*, which multiplied into the denominator, gives a rational product: thus, $\frac{\sqrt{20}+\sqrt{12}}{\sqrt{5}-\sqrt{3}}=\frac{\sqrt{20}+\sqrt{12}}{\sqrt{5}-\sqrt{3}}\times\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}+\sqrt{3}}=\frac{\sqrt{100}+2\sqrt{60}+6}{5-3}=\frac{16+2\sqrt{60}}{2}=8+2\sqrt{15}$. To do this generally, ſee Maclaurin, lib. cit. p. 113.

When the ſquare root of a *ſurd* is required, it may be found, nearly, by extracting the root of a rational quantity that approximates to its value. Thus, to find the ſquare root of $3+2\sqrt{2}$, firſt calculate $\sqrt{2}=1{,}41421$. Hence, $3+2\sqrt{2}=5{,}82842$, the root of which is found to be nearly 2,41421.

In like manner we may proceed with any other propoſed root. And if the index of the root, propoſed to be extracted, be great, a table of logarithms may be uſed. Thus, $\sqrt[7]{5+\sqrt[13]{17}}$ may be moſt conveniently found by logarithms.

Take the logarithm of 17, divide it by 13; find the number correſponding to the quotient; add this number to 5; find the logarithm of the ſum, and divide it by 7, and the number correſponding to this quotient will be nearly equal to $\sqrt[7]{5+\sqrt[13]{17}}$.

But it is ſometimes requiſite to expreſs the roots of *ſurds* exactly by other *ſurds*. Thus, in the firſt example, the ſquare root of $3+2\sqrt{2}$ is $1+\sqrt{2}$: for $\overline{1+\sqrt{2}}\times\overline{1+\sqrt{2}}=1+2\sqrt{2}+2=3+2\sqrt{2}$.

For the method of performing this, the curious may conſult Mr. Maclaurin's Algebra, p. 115, ſeq. where alſo rules for trinomials, &c. may be found.

For extracting the higher roots of a binomial, whoſe two members being ſquared are commenſurable numbers, we have a rule in ſir Iſaac Newton's Arithmetica Univerſalis, p. 59. but without demonſtration. This is ſupplied by Maclaurin, in his Algebra, p. 120, ſeq. as alſo by 'sGraveſande, in his Matheſeos Univerſalis Element. p. 211, ſeq.

It ſometimes happens, in the reſolution of cubic equations, that binomials of this form $a\pm b\sqrt{-9}$ occur, the cube roots of which muſt be found. To theſe ſir Iſaac's rule cannot always be applied, becauſe of the imaginary, or impoſſible factor $\sqrt{-9}$; yet if the root be expreſſible in rational numbers, the rule will often lead to it in a ſhort way, not merely tentative, the trials being confined to known limits. See Maclaur. loc. cit. p. 127, ſeq.

It may be farther obſerved, that ſuch roots, whether expreſſible in rational numbers, or not, may be found by evolving the binomial $a+b\sqrt{-9}$ by the Newtonian theorem, and ſumming up the alternate terms. Maclaur. loc. cit. p. 130.

Thoſe who are deſirous of a general and elegant ſolution of the problem, *to extract any root of an impoſſible binomial* $a+\sqrt{-b}$, *or of a poſſible binomial* $a+\sqrt{b}$, may have recourſe to Mr. de Moivre's Letter to Dr. Saunderſon, inſerted by way of Appendix to his Algebra, and to the Philoſophical Tranſactions, N° 451; or to Dr. Martyn's Abridgement, vol. viii. p. 1, ſeq. See alſo on the management of *ſurds*, Kerſey's Algebra. Ward's Mathem. part ii. chap. 4. Jones's Synopſis. Palm. Math. part i. ſect. 3. cap. 6. Saunderſon's Algebra, vol. ii.

SURDS *commenſurable.* See COMMENSURABLE.

SURDS *heterogeneous.* See HETEROGENEOUS.

SURDS *homogeneous.* See HOMOGENEOUS.

SURDESOLID. See SURSOLID.

SURETY, in *Law*, a bail that undertakes for another man in a criminal caſe, or action of treſpaſs, &c. See FIDE*Juſſor*.

SURETY *of the peace*, an act whereby a perſon in danger of hurt from another, is ſecured by a bond, or recognizance acknowledged by the other to the king, and bail bound with him, for keeping the peace. See SECURITATE *pacis*.

This ſecurity a juſtice of the peace may command, either as a miniſter, when commanded thereto by higher authority; or, as a judge, when he doth it of his own power, derived from his commiſſion.

It differs from *ſurety of good abearing*, in that whereas the peace is not broken without an affray, or ſuch like; the *ſurety de bono geſtu* may be broken by the number of a man's company, or by his or their weapon, or harneſs. See PEACE, and GOOD *abearing*.

SURF *of the ſea*, the ſwell of the ſea which breaks upon the ſhore, or any rock lying near the ſurface of the ſea; and which renders ſuch places dangerous.

SURFACE, in *Geometry*. See SUPERFICIES.

A *ſurface* is not a body of the leaſt ſenſible magnitude, as ſome have imagined, but it is the termination, or boundary of a body; neither is a line to be conſidered as a *ſurface* of the leaſt ſenſible breadth, but as a termination or limit of a *ſurface*: nor is a point to be conſidered as the leaſt ſenſible line, but as the termination of a line; and in this ſenſe it is plain that a point cannot be conceived to have parts, or magnitude. See MAGNITUDE. See alſo Maclaurin's Fluxions, vol. i. p. 245, and Mr. John Bernoulli's Letter to Monſieur Crouzas, concerning his Comment on the Analyſe des Infiniment petits. Jo. Bernoul. Oper. vol. iv. p. 160, ſeq.

SURFEIT, an indiſpoſition cauſed by exceſs in eating or drinking, that is, by over-charging the ſtomach; and uſually attended with eruptions, and ſometimes with a fever.

SURFEIT-*water*, is a water diſtilled from poppies, and other herbs, proper to cure indigeſtions.

SURGE. The ſailors call a wave, or billow of the ſea, a *ſurge*.

Alſo, when they are heaving at the capſtan, if the cable happen to ſlip back a little, they ſay, *the cable ſurges*.

SURGEONS, *company of*. See COMPANY. See alſo PHYSICIANS.

SURGERY. See CHIRURGERY.

The principal inſtruments uſed in *Surgery* appear in *Tab.* I. II. III. of *Surgery*, and the deſcription and uſe of them occur either under their reſpective titles, or the operations to which they belong.

SURIANA, in *Botany*, a genus of the *decandria pentagynia* claſs. Its characters are theſe; the empalement of the flower is permanent, and compoſed of five ſpear-ſhaped ſmall leaves; the flour has five oval petals, which ſpread open; it has five ſlender ſtamina ſhorter than the petals, terminated by ſingle ſummits, and five roundiſh germina ſupporting a ſlender ſtyle, crowned with an obtuſe ſtigma; the germina become five roundiſh ſeeds joined together. There is only one ſpecies.

SURMOUNTED, in *Heraldry*, is when one figure is laid over another. As the pile *ſurmounted* of a chevron, in *Tab.* II. *Herald. fig.* 84.

SURMULLET, in *Ichthyology*, a name uſed both by the French and Engliſh, for the *mullus major*, a fiſh of the cuculus kind, and in the Linnæan ſyſtem the MULLUS *cirris geminis*, &c. in many things reſembling the mullus barbatus, but differing from it, in that it is twice as big, being often caught of twelve or fourteen inches in length. Its fins alſo are yellowiſh, and have a ſlight bluſh of red, mixed with that colour. Its ſcales are large and broad, and thick, and are more firmly joined to the fleſh. It has alſo three or four ſtraight yellow lines, running parallel with one another down its ſides. It is caught in the Mediterranean, and in the Britiſh ſeas, eſpecially on the coaſt of Cornwall, and is every where eſteemed a very delicate fiſh. Ray.

Mr. Pennant calls this ſpecies of mullus the *ſtriped ſurmullet*, but he expreſſes a doubt whether this is not a variety, as Gronovius apprehends, of the red *ſurmullet*, or *mullus barbatus*. This laſt, he obſerves, was highly eſteemed by the Romans, and bore a very high price. See Hor. Sat. lib. ii. ſect. 2. 33. and Juvenal, Sat. iv.

SURNAME, or SIRNAME, a name added to the proper or baptiſmal name, to denominate the perſon of ſuch a family. They were the Romans who firſt introduced the uſe of hereditary names; and that on occaſion of their league with the Sabines, for the confirmation whereof, it was agreed, that the Romans ſhould prefix Sabine names, and the Sabines, Roman names, to their own.

Theſe new names became family names, or *ſurnames*, and the old ones continued perſonal names. The former they called *cognomina*, and *gentilitia nomina*; and the latte *prænomina*. See NAME.

When the former came to be uſed among the French and Engliſh, they were called *ſurnames*, or *ſirnames*, not becauſe they are the names of the ſire, or father; but, according to Camden, becauſe they are ſuperadded to the perſonal name; or, rather, with Du-Cange, becauſe at firſt, this family name was written over *(Sur)* the other name, thus:

de Bourbon
Louis.

In lieu of *ſurnames*, the Hebrews, to keep up the memory of their tribes, uſe the name of their father, with the addition of *Ben*, ſon; as *Melchi Ben Addi*, *Addi Ben Coſam*, &c. ſo the Greek, Ικαρος τȣ Δαιδαλȣ; Icarus, the ſon of Dædalus: Dædalus, the ſon of Eupalmus, &c.

So alſo, the ancient Saxons, *Ceonred*, *Ceolwalding*, *Ceolwald Cuthing*, that is, Ceonred, ſon of Ceolwald, ſon of Cuth: and in the ſame ſenſe, the Welſh uſe *ap* for *mab*, ſon; as *ap Owen*, *Owen ap Harry*, *Harry ap Rhys*; and the Iriſh, *Mac*, as *Donald Mac Neal*, *Neal Mac Cen*, &c. and the old Normans, *Fitz*, as *John Fitz Robert*, *Robert Fitz Ralph*, &c.

Scaliger adds, that the Arabs uſed their father's name, or *ſurname*, without their perſonal name; as, *Aven-Pace*, *Aven-Zoar*, &c. q. d. ſon of Pace, ſon of Zoar, &c. As, if Pace had a ſon at his circumciſion called *Haly*, he would be called *Aven-Pace*, concealing Haly; but his ſon, however he were named, would be called *Aven-Haly*, &c.

The Romans, in time, multiplied their *ſurnames*: beſides the general name of the race, or family, called *gentilitium*, they took a particular one, to diſtinguiſh the branch of the family, called alſo *cognomen*; and ſometimes a third, on account of ſome perſonal diſtinction; as that of *Africanus*, by Scipio; of *Torquatus*, by Manlius.

Theſe three different kinds of *ſurnames* had alſo their different names, viz. *nomen*, *cognomen*, and *agnomen*: but theſe laſt were not hereditary; being, in effect, a kind of ſobriquets, or nick-names, if that word be indifferent with reſpect to good and evil. See the ſubject of the Roman names and *ſurnames* accurately treated of by Spanheim, de Præſt. and Uſu Numiſm. Diſſ. 10.

In theſe, too, they have been imitated by later times: thus, in our Engliſh hiſtory, we find that Edgar was called the *Peaceable*: Ethelred, the *Unready*; Edmund, *Ironſide*; Harold, *Harefoot*; William, *the Baſtard*; Henry I. *Beauclerk*; John, *Lackland*, &c.—But as theſe names were never borne by the ſons, Camden, and others, think it ſtrange, that PLANTAGENET ſhould be accounted the *ſurname* of the royal family of England, till Henry VII. or *Tydur*, or *Tudor*, that from Henry VII. to king James I. or that of *Steward* from king James I. to king George; or that *Valois* ſhould be eſteemed the *ſurname* of the late family of French kings; or *Bourbon* of the preſent; or *Oldenberg* of the kings of Denmark; or *Hapſburg* of the emperors.

Du Cheſne obſerves, that *ſurnames* were unknown in France before the year 987, when the lords began to aſſume the names of their demeſnes.—Camden relates, that they were firſt taken up in England, a little before the Conqueſt, under king Edward the Confeſſor; but he adds, they were never fully eſtabliſhed among the common people, till the time of Edward II. till then they varied with the father's name; if the father, e. gr. was called *Richard*, or *Roger*, the ſon was called *Richardſon*, or *Hodgſon*; but from that time they were ſettled, ſome ſay, by act of parliament.

The oldeſt *ſurnames* are thoſe we find in *Domeſday-Book*, moſt of them taken from places, with the addition of *de*: as Godefridus *de* Mannevilla, Walterus *de* Vernon, Robert *de* Oyly, &c. Others from their fathers, with *filius*, as Guilelmus *filius* Oſberni; others from their offices, as Eudo *Dapifer*, Guilelmus *Camerarius*, Giſlebertus *Cocus*, &c. But the inferior people are noted, ſimply, by their Chriſtian names; without any *ſurnames* at all.

In Sweden, till the year 1514, nobody ever took *ſurnames*: and the common people there have none to this day, nor have even the native Iriſh, Poles, and Bohemians, &c.—It is very late that the Welſh have had any; and thoſe they have, are generally only formed, by leaving out the *a* in *ap*, and annexing the *p* to their father's name; as in lieu of *Evan ap Rice*, they now ſay *Evan Price*; for *ap Howel*, *Powel*, &c. Du Tillet mantains, that all *ſurnames* were originally given by way of ſobriquets, or nick-names; and adds, that they are all ſignificant and intelligible to thoſe who underſtand the ancient dialects of the ſeveral countries. The greateſt part of our *ſurnames*, and thoſe of the greateſt account, Camden ſhews, are local, and borrowed from the places in Normandy, &c. where the reſpective perſons who came over with the Conqueror, and firſt bore them, had their poſſeſſions, or their births: ſuch as *Mortimer*, *Warren*, *Albigny*, *Piercy*, *Devereux*, *Tankervil*, *Nevil*, *Tracy*, *Montfort*, &c. He adds, that there is not a village in Normandy, but gives name to ſome family in England.—Others were taken from places in England, as *Aſton*, *Sutton*, *Wotton*, &c.

The Saxon common people generally took their father's or their mother's Chriſtian name, with the addition of *ſon*: though many were *ſurnamed* from their trade, as *Smith*, *Carpenter*, *Taylor*, *Weaver*, *Fuller*, &c. others from their offices, as, *Porter*, *Shepherd*, *Carter*, *Cook*, *Butler*, &c. others from their complexions, as *Fairfax*, i. e. fair hair; *Blunt* or *Blond*, i. e. flaxen, or yellow; others from birds, as *Wren*, *Finch*, &c. others from beaſts, as *Lamb*, *Hare*, *Hart*, &c. others from the winds, others from ſaints, &c.

SURO, in *Ichthyology*, a name given by ſome to a fiſh of the cuculus kind, much reſembling the mackrel in taſte and in ſhape, and more uſually known by the name of the TRACHURUS.

SURPLICE, the habit of the officiating clergy in the church of England. By Can. 58. every miniſter ſaying the public prayers, or miniſtering the ſacrament or other rites of the church, ſhall wear a decent and comely *ſurplice* with ſleeves, to be provided at the charge of the pariſh. But by 1 Eliz. c. 2. and 13 and 14 Car. II. the garb preſcribed by act of parliament, in the ſecond year of king Edward the Sixth, is enjoined; and this requires that in the ſaying or ſinging of matins and even ſong, baptizing and burying, the miniſter in pariſh churches and chapels ſhall uſe a *ſurplice*. And in all cathedral churches and colleges, the archdeacon, dean, provoſts, maſters, prebendaries, and fellows, being graduates, may uſe in the choir, beſides their *ſurplices*, ſuch hoods as pertain to their ſeveral degrees. But in all other places every miniſter ſhall be at liberty to uſe any *ſurplice* or no. And hence in marrying, churching of women, and other offices not ſpecified in this rubric, and even in the adminiſtration of the holy communion, it ſeems that a *ſurplice* is not neceſſary. Indeed for the holy communion the rubric appoints a white ALB plain, which differs from the *ſurplice* in being cloſe-ſleeved, with a veſtment or cope.

SURPLUSAGE, in *Common Law*, ſignifies a ſuperfluity, or addition of more than is needful; which ſometimes is the cauſe that a writ abateth.—But in pleading it is frequently ſet aſide; the reſt remaining good.

SURPLUSAGE is ſometimes alſo applied to matters of accounts, and denotes a greater diſburſement than the charge of the accountant amounteth to.

SURPLUSAGE *of inteſtate's effects*. See INTESTATE.

To **SURPRISE**, in *War*, is to fall on an enemy unexpectedly, in marching through narrow and difficult paſſes, as in the paſſage of rivers, woods, incloſures, &c. There are various ways of ſurpriſing an enemy or place. See STRATAGEM.

SURREBUTTER, in *Law*, is a ſecond rebutter; or the replication of the plaintiff to the defendant's REBUTTER.

SURRECTORIUM, the name of a ſurgical inſtrument, mentioned by Ambroſe Paré, and intended to keep the arm in an erect ſituation when required.

SURREJOINDER, is a ſecond defence of the plaintiff's declaration; by way of anſwer to the defendant's REJOINDER.

SURRENDER, in *Common Law*, a deed or inſtrument teſtifying, that the particular tenant of lands and tenements for life, or years, doth ſufficiently conſent and agree, that he, who has the next or immediate remainder or reverſion thereof, ſhall have the preſent eſtate of the ſame in poſſeſſion; and that he hereby yields and gives up the ſame to him, ſo that the eſtate for life or years may merge or drown by mutual agreement of the parties. Of *ſurrenders* there are three kinds; a *ſurrender* properly taken at common law, a *ſurrender* of copyhold or cuſtomary eſtates; and a *ſurrender* improperly taken, as of a deed, a patent, &c. The firſt is the uſual *ſurrender*, and is uſually divided into that in *deed*, and that in *law*.

SURRENDER, *in deed*, is that which is really made by expreſs words in writing, where the words of the leſſee to the leſſor prove a ſufficient aſſent to *ſurrender* his eſtate back again.

SURRENDER, in *Law*, is that wrought by operation of the law, and which is not actual.—As if a man have a leaſe of a farm for life, or years; and during the term, he accepts a new leaſe; this act is, in law, a *ſurrender* of the former.

SURRENDER of a *bankrupt*. See PETITION of *Bankruptcy*.

SURRENDER of *copyholds* is the yielding up of the eſtate by the tenant into the hands of the lord, for ſuch purpoſes as are expreſſed in the *ſurrender*: as to the uſe and behoof of A and his heirs, to the uſe of his own will, and the like. This method of conveyance is ſo eſſential to the nature of a copyhold eſtate, that it cannot poſſibly be transferred by any other aſſurance. No feoffment, fine, or recovery (in the king's courts) hath any operation upon it. If I would exchange a copyhold with another, I cannot do it by an ordinary deed of exchange at the common law, but we muſt *ſurrender* to each other's uſe, and the lord will admit us accordingly. If I would deviſe a a copyhold, I muſt *ſurrender* it to the uſe of my laſt will and teſtament; and in my will I muſt declare my intentions, and name a deviſee, who will then be intitled to admiſſion. Blackſtone's Com. vol. ii. ch. 22.

SURRENDER of *letters patent* and *offices*. A *ſurrender* may be made of letters patent to the king, ſo that he may grant the eſtate to whom he pleaſes, &c. and a ſecond patent for years to the ſame perſon for the ſame thing, is a *ſurrender* in law of the firſt patent. 10 Rep. 66. If an officer for life accepts of another grant of the ſame office, it is in law a *ſurrender* of the firſt grant; but if ſuch an officer takes another grant of the ſame office to himſelf and another, it may be otherwiſe.

SURRENDER, in *War*, is to lay down one's arms, and yield yourſelf priſoner.

To *ſurrender* a place, ſee CAPITULATION.

SURREPTITIOUS. See SUBREPTITIOUS.

SURROGATE, SURROGATUS, a perſon ſubſtituted or appointed in room of another; moſt commonly of a biſhop, or biſhop's chancellor. By 26 Geo. II. c. 33. no *ſurrogate* deputed by any eccleſiaſtical judge, who hath power to grant licences of marriage, ſhall grant any ſuch before he hath taken an oath before the ſaid judge, faithfully to execute his office according to law, to the beſt of his knowledge; and hath given ſecurity by his bond in the ſum of 100*l.* to the biſhop of the dioceſe, for the due execution of his office.

SURROGATION. See SUBROGATION.

SURSOLID, or SURDESOLID, in *Arithmetic*, the fifth power of a number, or the fourth multiplication of any number, conſidered as a root.

The number 2, for inſtance, conſidered as a root, and multiplied by itſelf, produces 4, which is the ſquare, or ſecond power of 2; and 4 multiplied by 2, produces 8, the third power, or cube, or ſolid number of 2; 8, again multiplied by 2, produces 16, the fourth power, or quadrato-quadratum of 2; and 16 multiplied once more by 2, produces 32, the fifth power or *ſurſolid*, or *ſurdeſolid* number of 2.

SURSOLID *problem*, is that which cannot be reſolved, but by curves of a higher kind than the conic ſections.

Thus, e. gr. to deſcribe a regular endecagon, or figure of eleven ſides in a circle, it is required to deſcribe an iſoſceles triangle on a right line given, whoſe angles at the baſe ſhall be quintuple to that at the vertex; which may eaſily be done by the interſection of a quadratrix, or any other curve of the ſecond gender, as they are by ſome called, but not by any lower curve.

SURVEY, in *Law*, is the aſcertaining not only of the boundaries and royalties of a manor, or eſtate in lands; but alſo of the tenure of the reſpective tenants, and the rent and value of the ſame. In this laſt ſenſe it is taken for a court, becauſe in the falling of an eſtate, conſiſting of manors, to a new lord, where there are tenants by leaſe and copyholders, a court of *ſurvey* is generally held; and ſometimes upon other occaſions, to apprize the lord of his right and intereſt, &c.

SURVEY, in *Sea-language*, denotes an examination made by ſeveral naval officers, into the ſtate of the proviſions or ſtores, belonging to a ſhip, or fleet of men of war.

SURVEYING, the art, or act, of meaſuring lands; i. e. of taking the dimenſions of any tract of ground; then laying down the ſame in a map or draught; and finding the content or area thereof.

Surveying, called alſo GEODÆSIA, is a very ancient art; it is even held to have been the firſt, or primitive part of geometry, and that which gave occaſion to, and laid the foundation of all the reſt.

Surveying conſiſts of three parts or members; the firſt is the taking of the neceſſary meaſures and making the neceſſary obſervations on the ground itſelf: the ſecond, is the laying down of theſe meaſures and obſervations on paper: and the third, the finding the area or quantity of the ground thus laid down.

The firſt is what we properly call *ſurveying*: the ſecond we call *plotting*, or *protracting*, or *mapping*: and the third *caſting up*.

The firſt, again, conſiſts of two parts. viz. the making of obſervations for the angles, and the taking of meaſures for the diſtances.

The former of theſe is performed by ſome one or other of the

the following inſtruments; viz. the theodolite, circumferentor, ſemicircle, plain-table, or compaſs: the deſcription and manner of uſing each whereof, ſee under its reſpective article, Theodolite, Circumferentor, Plain-table, Compass, &c.

The latter is performed by means either of the chain, or the perambulator: the deſcription and manner of applying each whereof ſee under Chain, and Perambulator.

It is uſeful in *ſurveying* to take the angles which the bounding lines form with the magnetic needle, in order to check the angles of the figure, and to plot them conveniently afterwards. Nevertheleſs, as the difference between the true meridian and magnetic meridian perpetually varies in all places, and at all times; it is impoſſible to compare two *ſurveys* of the ſame place, taken at diſtant times, by magnetic inſtruments, without making due allowance for this variation. See obſervations on this ſubject, by Mr. Molyneux, Phil. Tranſ. Nº 230, p. 625. or Abr. vol. i. p. 125.

Large maps, repreſenting conſiderable extents of ground, are ſubject to a good many inconveniencies, eſpecially if carried into the fields, to be compared with them; ſuch maps become very troubleſome in the wind, and it is difficult to find out the part you want. To remedy this, a general and ſmall map of the manor or county, &c. ſhould be firſt made on one ſheet of paper, the ſeveral parts may be ſet off on other ſeparate ſheets, and the general map being divided into as many ſquares as there are of theſe particular ſheets, the relation of the whole to the ſeveral parts is eaſily ſeen; and all theſe maps may then be bound up in a book. See Mr. Baighton's Deſcription and Uſe of his New Plotting Table, in Phil. Tranſ. Nº 461. ſect. 1.

The ſecond branch of *ſurveying* is performed by means of the protractor, and plotting ſcale: the uſe, &c. whereof, ſee under Protractor, Plotting, &c. See alſo Map.

If the lands to be plotted are hilly, and not in any one plane, the lines meaſured cannot be truly laid down on paper, without being reduced to one plane, which muſt be the horizontal, becauſe angles are taken in that plane.

In viewing objects, if they have much altitude or depreſſion, either write down the degree and decimal ſhewn on the double ſextant, or the links ſhewn on the back ſide, which laſt ſubtracted from every chain in the ſtation line, leaves the length in the horizontal plane; but if the degree is taken, the following table will ſhew the quantity.

A Table *of the links to be ſubtracted out of every chain in hypothenuſal lines of ſeveral degrees, altitude, or depreſſion, for reducing them to horizontal.*

degrees.	links.	degrees.	links.	degrees.	links.
4.05	¼	14.07	3	23.074	8
5.73	½	16.26	4	24.495	9
7.02	¾	18.195	5	25.84	10
8.11	1	19.95	6	27.13	11
11.48	2	21.565	7	28.36	12

Let the firſt ſtation line really meaſure 1107 links, and the angle of altitude, or depreſſion, be 19° 93′; looking in the table, I find 19° 95′ is 6 links; now 6 times 11 is 66, which ſubtracted from 1107 leaves 1041, the true length to be laid down.

The third is performed by reducing the ſeveral diviſions, incloſures, &c. into triangles, ſquares, trapeziums, parallelograms, &c. but eſpecially triangles; and finding the areas or contents of theſe ſeveral figures, by the rules delivered under the articles Area, Triangle, Square, &c.

A *ſurveyor* ought to be provided with an off-ſet ſtaff, equal in length to ten links of the chain, and divided into ten equal parts. He ought likewiſe to have ten arrows, or ſmall ſtraight ſticks, near two feet long, ſhod with iron-ferrils. When the chain is firſt opened, it ought to be examined by the off-ſet ſtaff. In meaſuring any line, the leader of the chain, is to have ten arrows at firſt ſetting out. When the chain is ſtretched in the line, and the near end touches the place from which you meaſure, the leader ſticks one of the ten arrows in the ground at the far end of the chain. Then the leader leaving the arrow, proceeds with the chain another length; and the chain being ſtretched in the line, ſo that the near end touches the firſt arrow, the leader ſticks down another arrow at his end of the chain. The line is preſerved ſtraight, if the arrows be always ſet ſo as to be in a right line with a place you meaſure from, and that to which you are going. In this manner they proceed till the leader have no more arrows. At the eleventh chain the arrows are to be carried to him again, and he is to ſtick one of them in the ground, at the end of the chain and the ſame is to be done at the 21, 31, 41, &c. chains, if there are ſo many in the right line to be meaſured. In this manner an error can hardly be committed in numbering the chains, unleſs of ten chains at once. See farther under Chain, Field-*book*, Off-sett, Staff, and Theodolite.

The method of *ſurveying* harbours, and of forming maps of theſe; and of the adjacent coaſts, ſands, &c. depends on the ſame principles, and is in general conducted like that of common *ſurveying*. The operation is, indeed, more complicated and laborious; as it will be neceſſary to erect a number of ſignals, and to mark a variety of objects along the coaſt, with different bearings from one another, and the ſeveral parts of the harbour; and likewiſe to meaſure a great number of angles at different ſtations. The angles and diſtances are meaſured and plotted as in other caſes; and the map of a harbour may be conſtructed much after the ſame manner with that of any particular diſtrict of land. Mr. Michell recommends the uſe of Hadley's quadrant, for the *ſurveying* of harbours, or ſuch ſands as lie within ſight of land, which, he ſays, may oftentimes be performed by it, not only with greater eaſe, but alſo with much greater preciſion, than can be hoped for by any other means; as it is the only inſtrument in uſe, in which neither the exactneſs of the obſervations, nor the eaſe with which they may be made, are ſenſibly affected by the motion of a veſſel: and hence a ſingle obſerver, in a boat, may generally determine the ſituation of any place, at pleaſure, with a ſufficient degree of exactneſs, if with this inſtrument he takes the angles ſubtended by two or three pairs of objects properly choſen upon the ſhores round about him; but it will be ſtill better to have two obſervers, one of whom, being in a boat, muſt at the time he takes the angle ſubtended by ſome two objects upon the ſhore, make a ſignal to the other obſerver; who, being placed at one of the objects, as a ſtation, muſt at the ſame time obſerve the angle ſubtended by the boat and the other object. By this means, two angles in a plain triangle being given, together with the diſtance between the two objects, as a baſe, the whole triangle, and the ſituation of every part of it, will be given likewiſe. By ſuch obſervations, provided the boat be at reſt during the time of making them, and they be made carefully with good quadrants, though without the aſſiſtance of teleſcopic ſights, the ſituation of places may be eaſily determined to twenty or thirty feet, upon every three or four miles. Phil. Tranſ. vol. lv. p. 70, &c.

Surveying *croſs*. See Cross.

Surveying *quadrant*. See Quadrant.

Surveying *ſcale*, the ſame with reducing scale.

Surveying *wheel*. See Perambulator.

SURVEYOR, one that hath the overſight and care of conſiderable works, lands, or the like. See Supervisor.

Such are the *ſurveyor* general of the king's manors; *ſurveyor* of the king's exchange, mentioned in the ſtat. 9 Hen. V. ſtat. 2. c. 4. *ſurveyor* general of the works; *ſurveyor* general of his majeſty's woods and parks; *ſurveyor* general of the crown-lands, &c.

Surveyor *of the highways*. See Highway.

Surveyor, *marine*. See Marine *ſurveyor*.

Surveyor *of the melting*, is an officer of the mint, whoſe buſineſs is to ſee the bullion caſt out; and that it be not altered after the delivery of it to the melter.

Surveyors *of the navy*, are two officers who ſit at the navy-board, being inveſted with the charge of building and repairing his majeſty's ſhips, at the different dockyards of the kingdom, for which purpoſe they are trained to the theory and practice of ſhip-building. It is alſo their office to know the ſtate of the navy; to audit the accounts of all boatſwains and carpenters ſerving therein, and to enquire into the condition of all the naval ſtores, at home or abroad, in order to ſupply whatſoever may be deficient.

Surveyor *of the ordnance* is an officer, whoſe charge is to ſurvey all the king's ordnance, ſtores, and proviſions of war, in the cuſtody of the ſtore-keeper of the Tower of London; to allow all bills of debts, to keep checks on labourers and artificers works, &c.

There are alſo many other officers called *ſurveyors*, in the different departments in the ſtate and revenue; as the *ſurveyor* of the pictures in the royal houſhold; *ſurveyor* of the private roads, and *ſurveyor* of gardens and waters, belonging to the board of works, &c *ſurveyor* general of the duchy of Cornwall; ten general *ſurveyors*, and one hundred and ſeventy three *ſurveyors* of counties, belonging to the tax-office; *ſurveyors* of land and woods, belonging to the duchy court of Lancaſter; *ſurveyor* general, *ſurveyor*, *ſurveyors* general, reſident in London, and alſo of the riding officers; ten land *ſurveyors*, *ſurveyors* of paper, keys, baggage, land-carriage officers, buildings, coaſt-waiters, king's warehouſe, Eaſt India warehouſe, and navigation, belonging to the cuſtoms; five general *ſurveyors*; five general *ſurveyors* of diſtillery; *ſurveyors* of glaſs and coaches, in the exciſe-office; two *ſurveyors* of the ſalt-office; two reſident *ſurveyors* of the general poſt-office, and bye-letter office; eight *ſurveyors* of the ſtamp duties; fifteen *ſurveyors* of the hawkers and pedlars office; *ſurveyor* of the royal hoſpital at Greenwich; *ſurveyor* of the victualling office, &c.

SURVEYOR is alſo uſed for a gauger.—And alſo for a perſon who meaſures and makes maps of lands. See SURVEYING and GAUGING.—And alſo for a perſon who directs and ſuperintends private and public buildings. See BUILDING and PARTY-*walls*.

SURVIVOR, in *Law*, ſignifies the longer liver of two joint tenants; or any two perſons joined in the right of any thing.

Thus, when two or more perſons are ſeiſed of a joint eſtate of inheritance, for their own lives, or *pur auter vie*, or are jointly poſſeſſed of any chattel intereſt, the entire tenancy upon the deceaſe of any of them, remains to the *ſurvivors*, and at length to the laſt *ſuurvivor*; and he ſhall be entitled to the whole eſtate, whatever it be, whether an inheritance or a common freehold only, or even a leſs eſtate. This right of ſurvivorſhip is called by our ancient authors the *jus accreſcendi*, becauſe the right upon the death of one *joint-tenant*, accumulates and increaſes to the *ſurvivors*; or, as they themſelves expreſs it, *pars illa communis accreſcit ſuperſtitibus, de perſona in perſonam, uſque ad ultimum ſuperſtitem*. And this *jus accreſcendi* ought to be mutual; which judge Blackſtone apprehends to be the reaſon why neither the king, nor any corporation, can be a joint-tenant with a private perſon: for here is no mutuality; the private perſon has not even the remoteſt chance of being ſeiſed of the entirety, by benefit of ſurvivorſhip; for the king and corporation can never die. For the encouragement of huſbandry and trade, it is held that a ſtock on a farm, though occupied jointly, and alſo a ſtock uſed in a joint undertaking, by way of partnerſhip in trade, ſhall always be conſidered as common and not as joint property; and there ſhall be no ſurvivorſhip therein. Blackſt. Com. b. ii. p. 183, &c. p. 399.

SURVIVORSHIP. Payments which are not to be made till ſome future period, are termed *reverſions*, to diſtinguiſh them from payments which are to be made immeately.

Reverſions are either *certain*, or *contingent*. Of the former ſort are all ſums or annuities, payable *certainly* at the expiration of any terms, or the extinction of any lives. Of the latter ſort are all reverſions, the title to which depends on any contingency; as, particularly, the *ſurvivorſhip* of any lives beyond other lives. An account of the former may be found under the articles ASSURANCE, ANNUITIES, and LIFE-*annuities*. The latter form the moſt intricate and difficult part of the doctrine of reverſions and life-annuities; and the books in which this ſubject is treated moſt at large, and at the ſame time with the moſt preciſion, are Mr. Simpſon's Select Exerciſes; Mr. Morgan on Annuities and Aſſurances of Lives and *Survivorſhips*; and Dr. Price on Reverſionary Payments.

The whole likewiſe of the third volume of Mr. Dodſon's Mathematical Repoſitory is on this ſubject; but all Mr. Dodſon's inveſtigations being founded on a falſe hypotheſis, we do not think them fit to be recommended. The hypotheſis we mean is, Mr. De Moivre's hypotheſis of an equal decrement of life through all its ſtages, explained under LIFE-*annuities*. This hypotheſis, as has been obſerved under life-annuities, does not correſpond ſufficiently to fact; and therefore the rules deduced from it cannot be ſufficiently correct. For this reaſon, Dr. Price, and alſo the ingenious Mr. Maſeres, curſitor baron of the exchequer (in two volumes juſt publiſhed, entitled the Principles of the Doctrine of Life Annuities), have diſcarded the valuations of lives grounded upon it; and the former, in particular, in order to ſet aſide all occaſion for uſing them, has ſubſtituted in their room a great variety of new tables of the probabilities and values of lives, at every age, and in every ſituation; calculated, not upon any hypotheſis, but in ſtrict conformity to the beſt obſervations. Theſe tables, added to other new tables of the ſame kind in Mr. Baron Maſeres's work juſt mentioned, form a complete ſet of tables, by which all queſtions relating to annuities on lives and *ſurvivorſhips*, may be anſwered with as much correctneſs as the nature of the ſubject allows.

It is neceſſary to mention farther here, that in calculating the values of reverſions depending on *ſurvivorſhips*, there is particular danger of being led by Mr. De Moivre's authority into other very great incorrectneſſes, as will appear from the following quotation from the third eſſay in Dr. Price's Treatiſe on Reverſionary Payments.

Queſtion. A, aged 40, expects to come to the poſſeſſion of an eſtate, ſhould he ſurvive B, aged likewiſe 40. In theſe circumſtances he offers, in order to raiſe a preſent ſum, to give ſecurity for 40*l.* *per ann.* out of the eſtate at his death, provided he ſhould get into poſſeſſion; that is, provided he ſhould ſurvive B. What is the ſum that ought now to be advanced to him, in conſideration of ſuch ſecurity, reckoning compound intereſt at 4 per cent.?

Mr. De Moivre's directions, in his Treatiſe on Annuities, problems 17th and 20th, lead us to ſeek the required ſum in this caſe, by the following proceſs.

Find, firſt, the preſent ſum A ſhould receive, for the reverſion of 40*l.* *per annum* for ever after his death; ſuppoſing it *not* dependent on his ſurviving B. The preſent value of ſuch a reverſion is "the value of the life ſub-"tracted from the *perpetuity*, and the *remainder* multi-"plied by the annual rent." The value of the life is, by Table IV. (under LIFE-*annuities*) 13.196. This ſubtracted from 25, the *perpetuity*, leaves 11.80; which, multiplied by 40, gives 472*l.* the value of the ſuppoſed eſtate, after the life of A. But, as Mr. De Moivre obſerves, the lender having a chance to loſe his money, a compenſation ought to be made him for the riſk he runs, which is founded on the poſſibility, that a man of forty years of age may not ſurvive another perſon of the ſame age. This chance is an *equal* chance; and, therefore, half the preceding ſum, or 236*l.* is the money which ſhould be advanced now on the expectation mentioned.

This ſolution carries a plauſible appearance; and moſt perſons will, probably, be ready to pronounce it right; nor will this be at all wonderful, as ſo great a maſter of theſe ſubjects as Mr. de Moivre appears to have been miſled by it. Nothing more is neceſſary to prove it to be fallacious, than proceeding in the ſame way to ſolve the following ſimilar queſtion.

"A. aged 40, offers to give ſecurity for 40*l.* *per annum*,
"to be entered upon at his death, provided it ſhould
"happen *before* the death of B, aged likewiſe 40. What
"ſum ſhould now be advanced to him for ſuch a rever-
"ſion, intereſt being reckoned at 4 *per cent.*?"

In ſolving this problem, agreeably to the method juſt deſcribed, we are to find the value of 40*l.* *per annum*, to be entered upon *certainly* at the death of A; and then to multiply this value by the chance that A ſhall not ſurvive B, or by ½; and this way the anſwer comes out the ſame with that already given.

Now it may be eaſily ſeen, that this muſt be wrong. The value of a reverſion, to be received when a perſon of a given age dies, cannot be the ſame, whether the condition of obtaining it is, that he ſhall die *before*, or that he ſhall die *after* another perſon. That is, whether it is provided, that a purchaſer, if he ſucceeds, ſhall get into poſſeſſion *ſooner* or *later*. The reverſion in the latter caſe muſt, without doubt, be of leſs value than in the former.

The firſt queſtion here propoſed, reſolves itſelf into the following general queſtion.

"What is the preſent value of a given reverſionary
"eſtate, to be entered upon after the failure of two lives,
"provided one *in particular* of them ſhould be the *longeſt*
"*life*?"

Now, the preſent value of an eſtate to be enjoyed for ever, after the failure of the *longeſt* of two lives, is, "the "value of the *longeſt* of the two lives, ſubtracted from "the *perpetuity*; and the remainder multiplied by the "annual rent of the eſtate." The value of the *longeſt* of two lives is (as is well known) the value of the two *joint* lives, ſubtracted from the *ſum* of the values of the two *ſingle* lives. In the preſent caſe, therefore, it is 9.82, (the value of two joint lives at the age of 40, by Table VII. under LIFE-*annuities*) ſubtracted from twice 13.196; (the value of a *ſingle* life at the ſame age by Table VI.) that is, 16.57 years' purchaſe. And this ſubtracted from 25 (the perpetuity), gives 8.43; which, multiplied by 40, gives *l.*337.2, the value of the given eſtate, were it *certainly* to be enjoyed after the extinction of the longeſt of two lives, both 40; that is, whether *one* or *other* of them failed laſt. But that A's life in particular ſhould fail laſt, rather than B's, is an even chance. The true value of the reverſion, therefore, is half the laſt value, or *l.*168.6.

In like manner. The ſecond queſtion is the ſame with the queſtion, "What is the preſent value of 40*l.* *per ann.* "for ever, to be entered upon after the extinction of "two *joint* lives both 40; that is, whenever *either* of "them ſhall fail; provided the firſt that fails ſhould "happen to be A's life in particular?" And the anſwer is ſound by ſubtracting the preſent value of the *two joint* lives from the *perpetuity*, and multiplying the remainder by ½, or by the chance that A. in particular ſhall die firſt; and this will give the required value, *l.* 303.4.

In ſhort, it appears in *both* theſe caſes, that, according to the firſt method of ſolution, we are to ſubtract from the *perpetuity* the value of *one* of the ſingle lives; when, in the *former* caſe, the value of the *longeſt* of the two lives; and, in the *latter* caſe, the value of their *joint continuance*, ought, in reality, to be ſubtracted. We need not ſay what prodigious errors may often ariſe from hence; and how unfit ſuch a method of ſolution is for practice.

Rules for calculating correctly, in moſt caſes, the values of reverſions depending on *ſurvivorſhips*, may be found in the three treatiſes juſt mentioned. Mr. Morgan, in particular, has gone a good way towards exhauſting this ſubject, as far as any queſtions can involve in them any *ſurvivorſhips* between two or three lives, either for terms, or the whole duration of the lives.

There is, however, one circumſtance neceſſary to be attended to in calculating ſuch values to which no regard could be paid till lately. This circumſtance is the ſhorter duration of the lives of males than of females; and the conſequent advantage in favour of females in all caſes of *ſurvivorſhip*. In the fourth edition of Dr. Price's Treatiſe on Reverſionary Payments, this fact is not only aſcertained, but ſeparate tables of the duration and values of lives are given for males and females.

This edition of this treatiſe having been but juſt publiſhed, we could not inſert theſe tables in the former parts of this work. We ſhall, therefore, inſert ſome of the moſt important of them here.

TABLE I.

Shewing the probabilities of the duration of human life among males and females, deduced from obſervations of the proportions of the living to the numbers that have died at all ages for twenty-one years, from 1755 to 1776, in the kingdom of Sweden.

	Males.			Females.		
	Born 10,282—282 born dead.			10,277-217 born dead.		
Ages.	Living.	Decr.	Expectat.	Living.	Decr.	Expectat.
Born alive.	10,000	2300	33.20	10,000	2090	35.70
1 year	7,700	500	42.45	7,910	518	44.00
2	7,200	337	43.83	7,392	350	46.05
3	6,863	240	44.96	7,042	250	47.31
4	6,623	150	45.57	6,792	135	48.04
5	6,473	125	45.62	6,657	120	48.00
6	6,348	105	45.50	6,537	105	47.87
7	6,243	90	45.26	6,432	85	47.64
8	6,153	75	44.91	6,347	70	47.28
9	6,078	65	44.46	6,277	60	46.80
10	6,013	55	43.94	6,217	52	46.25
11	5,958	45	43.26	6,165	46	45.55
12	5,913	45	42.58	6,119	40	44.85
13	5,868	40	41.91	6,079	35	44.15
14	5,828	40	41.24	6,044	35	43.46
15	5,788	39	40.56	6,009	35	42.76
16	5,749	39	39.83	5,974	40	42.04
17	5,710	39	39.11	5,934	40	41.31
18	5,671	44	38.39	5,894	42	49.59
19	5,627	44	37.67	5,852	43	39.87
20	5,583	50	36.95	5,809	43	39.15
21	5,533	50	36.28	5,766	43	38.43
22	5,483	50	35.62	5,723	43	37.72
23	5,433	55	34.96	5,680	44	37.01
24	5,378	55	34.30	5,636	45	36.29
25	5,323	55	33.63	5,591	45	35.58
26	5,268	55	32.98	5,546	50	34.90
27	5,213	55	32.32	5,496	52	34.21
28	5,158	55	31.66	5,444	55	33.53
29	5,103	56	31.00	5,389	55	32.85
30	5,049	59	30.34	5,334	60	32.17
31	4,988	60	29.69	5,274	6	31.54
32	4,928	60	29.04	5,214	65	30.91
33	4,868	60	28.39	5,149	65	30.28
34	4,808	60	27.74	5,084	65	29.66
35	4,748	60	27.09	5,019	60	29.03
36	4,688	60	26.43	4,959	56	28.26
37	4,628	60	25.76	4,903	56	27.50
38	4,568	60	25.09	4,847	56	26.74
39	4,508	60	24.42	4,791	58	25.97
40	4,448	65	23.75	4,733	65	25.21
41	4,383	72	23.15	4,668	75	24.68
42	4,311	80	22.54	4,593	76	24.75
43	4,231	80	21.93	4,517	76	23.62
44	4,151	80	21.32	4,441	75	23.10
45	4,071	80	20.71	4,366	72	22.57
46	3,991	80	20.12	4,294	67	21.91
47	3,911	80	19.52	4,227	65	21.24
48	3,831	80	18.92	4,162	65	20.28
49	3,751	85	18.32	4,097	70	19.92
	Males.			Females.		
Ages.	Living.	Decr.	Expectat.	Living.	Decr.	Expectat.
50	3,666	95	17.72	4,027	75	19.26
51	3,571	95	17.17	3,952	80	18.64
52	3,476	95	16.63	3,872	85	18.01
53	3,381	95	16.08	3,787	85	17.39
54	3,286	95	15.53	3,702	85	16.77
55	3,191	95	14.98	3,617	85	16.15
56	3,096	95	14.43	3,532	85	15.53
57	3,001	100	13.87	3,447	90	14.92
58	2,901	100	13.33	3,357	90	14.31
59	2,801	100	12.79	3,267	100	13.69
60	2,701	105	12.24	3,167	110	13.08
61	2,596	110	11.72	3,057	118	12.56
62	2,486	115	11.21	2,939	120	12.04
63	2,371	115	10.73	2,819	120	11.52
64	2,256	115	10.26	2,699	120	11.01
65	2,141	115	9.78	2,579	120	10.49
66	2,026	115	9.30	2,459	120	9.97
67	1,911	120	8.84	2,339	120	9.46
68	1,791	125	8.40	2,219	120	8.94
69	1,666	125	7.99	2,099	120	8.42
70	1,541	125	7.60	1,979	130	7.91
71	1,416	125	7.22	1,849	140	7.53
72	1,291	120	6.87	1,709	150	7.16
73	1,171	120	6.53	1,559	160	6.78
74	1,051	110	6.22	1,399	150	6.40
75	941	105	5.89	1,249	140	6.03
76	836	100	5.56	1,109	130	5.73
77	736	90	5.25	979	120	5.43
78	646	85	4.92	859	110	5.11
79	561	80	4.59	749	100	4.79
80	481	75	4.27	649	95	4.47
81	406	70	3.96	554	95	4.13
82	336	65	3.69	464	85	3.84
83	271	60	3.45	379	80	3.59
84	211	50	3.30	299	75	3.42
85	161	40	3.16	224	55	3.40
86	121	30	3.04	169	40	3.34
87	91	22	2.88	129	30	3.22
88	69	17	2.64	99	23	3.05
89	52	14	2.34	76	18	2.82
90	38	12	2.02	58	15	2.55
91	26	9		43	12	
92	17	7		31	10	
93	10	6		21	8	
94	4	3		13	6	
95	1	1		7	4	
96	0	0		3	2	
97	0	0		1	1	

TABLE II.

Shewing the probabilities of the duration of human life among males and females, taken collectively, deduced from the preceding table.

Born 10,249—249 born dead.				Age.	Living.	Decr	Expect.
Age.	Living.	Decr.	Expect.	40	4591	65	24.66
Born alive.	10000	2195	34.42	41	4526	73	24.05
1 year	7805	509	42.95	42	4453	78	23.44
2	7296	344	44.92	43	4375	78	22.83
3	6952	245	46.11	44	4297	78	22.22
4	6707	143	46.78	45	4219	76	21.61
5	6564	122	46.79	46	4143	74	20.98
6	6442	105	46.66	47	4069	72	20.33
7	6337	87	46.43	48	3997	73	19.72
8	6250	73	46.07	49	3924	78	19.09
9	6177	62	45.61	50	3846	85	18.46
10	6115	54	45.07	51	3761	87	17.87
11	6061	45	44.38	52	3674	90	17.29
12	6016	42	43.70	53	3584	90	16.70
13	5974	38	43.01	54	3494	91	16.12
14	5936	37	42.33	55	3403	91	15.53
15	5899	37	41.64	56	3312	92	14.95
16	5862	40	40.92	57	3220	95	14.37
17	5822	40	40.19	58	3125	95	13.79
18	5782	42	39.47	59	3030	100	13.21
19	5740	43	38.74	60	2930	108	12.63
20	5697	47	38.02	61	2822	114	12.12
21	5650	47	37.33	62	2708	118	11.62
22	5603	48	36.64	63	2590	118	11.11
23	5555	48	35.96	64	2472	118	10.61
24	5507	50	35.27	65	2354	118	10.10
25	5457	50	34.58	66	2236	118	9.62
26	5407	52	33.91	67	2118	121	9.15
27	5355	54	33.23	68	1997	124	8.67
28	5301	55	32.56	69	1873	124	8.20
29	5246	55	31.88	70	1749	127	7.72
30	5191	59	31.21	71	1622	133	7.32
31	5132	60	30.57	72	1489	135	6.89
32	5072	62	29.94	73	1354	140	6.53
33	5010	63	29.30	74	1214	130	6.23
34	4947	63	28.67	75	1084	121	5.91
35	4884	59	28.03	76	963	115	5.59
36	4825	58	27.31	77	848	105	5.28
37	4767	58	26.63	78	743	95	4.96
38	4709	58	26.01	79	648	90	4.61
39	4651	60	25.33	80	558	90	4.28

Age

Age.	Living.	Decr.	Expect.	Age.	Living.	Decr.	Expect.
81	468	84	4.01	89	62	15	2.43
82	384	75	3.80	90	47	14	2.05
83	309	65	3.57	91	33	12	1.71
84	244	55	3.39	92	21	10	1.40
85	189	45	3.23	93	11	6	
86	144	35	3.09	94	5	3	
87	109	27	2.92	95	2	1	
88	82	20	2.71	96	1	1	

TABLE III.

Shewing the values of annuities on ſingle lives among males and females, according to the probabilities of the duration of life in the kingdom of Sweden. See Table I.

	MALES.		FEMALES.		Lives in general.	
Ages	4 per Ct.	5 per Ct	4 per Ct.	5 per Ct.	4 per Ct.	5 per Ct.
1	10.503	14.051	16.820	14.271	16.661	14.161
2	17.355	14.778	17.719	15.034	17.537	14.906
3	17.935	15.279	18.344	15.571	18.139	15.425
4	18.328	15.624	18.780	15.951	18.554	15.787
5	18.503	15.786	18.927	15.088	18.715	15.937
6	18.622	15.901	19.045	16.203	18.833	16.052
7	18.693	15.977	19.131	16.291	18.912	16.134
8	18.725	16.021	19.162	16.335	18.943	16.178
9	18.715	16.030	19.151	16.343	18.933	16.186
10	18.674	16.014	19.109	16.325	18.891	16.169
11	18.600	15.970	19.041	16.286	18.820	16.128
12	18.491	15.896	18.952	16.229	18.721	16.06[illegible]
13	18.378	15.819	18.840	16.153	18.609	15.986
14	18.246	15.724	18.707	16.059	18.476	15.891
15	18.105	15.624	18.568	15.960	18.336	15.792
16	17.958	15.517	18.424	15.856	18.191	15.686
17	17.803	15.404	18.290	15.761	18.046	15.582
18	17.643	15.285	18.151	15.662	17.897	15.473
19	17.492	15.175	18.013	15.563	17.752	15.369
20	17.335	15.059	17.872	15.462	17.603	15.260
21	17.192	14.955	17.725	15.356	17.458	15.155
22	17.042	14.846	17.573	15.245	17.307	15.045
23	16.887	14.732	17.414	15.129	17.150	14.930
24	16.742	14.627	17.252	15.009	16.997	14.818
25	16.592	14.517	17.087	14.886	16.839	14.701
26	16.436	14.402	16.915	14.757	16.675	14.579
27	16.274	14.282	16.751	14.636	16.512	14.459
28	16.105	14.156	16.588	14.515	16.346	14.335
29	15.930	14.024	16.427	14.396	16.178	14.210
30	15.751	13.889	16.261	14.272	16.006	14.080
31	15.575	13.756	16.104	14.156	15.839	13 956
32	15.395	13.619	15.941	14.035	15.668	13.827
33	15.208	13.477	15.787	13.923	15.497	13.700
34	15 014	13.327	15.629	13.806	15.321	13.566
35	14.81[illegible]	13.170	15.465	13.684	15.138	13.427
36	14.601	13.006	15.278	13.542	14.939	13.274
37	14.382	12.833	15.070	13.382	14.726	13.107
38	14.154	12.652	14.854	13.213	14.504	12.932
39	13.916	12.462	14.629	13.036	14.272	12.749
40	13.668	12.261	14.401	12.856	14.034	12.558
41	13.42[illegible]	12.065	14.185	12.687	13.805	12.376
42	13 196	11.880	13.994	12.538	13.595	12.209
43	12.984	11.710	13.798	12.387	13.391	12.048
44	12.763	11.532	13.596	12.229	13.179	11.880
45	12.535	11.347	13.383	12.061	12.959	11.704
46	12.297	11.153	13.151	11.876	12.724	11.514
47	12.051	10.951	12.894	11.668	12.472	11.309
48	11.795	10.738	12.620	11.443	12.217	11.090
49	11.528	10.516	12.333	11.205	11.930	10.860
50	11.267	10.298	12.049	10.970	11.658	10.634
51	11.030	10.100	11.769	10.737	11.399	10.418
52	10.785	9.895	11.492	10.507	11.138	10.201
53	10.531	9.682	11.220	10.280	10.875	9.981
54	10.269	9.460	10.937	10.042	10.603	9.751
55	9.998	9.229	10.642	9.792	10.320	9.510
56	9.717	8.98	10.334	9.529	10.025	9.258
57	9.425	8.736	10.012	9.253	9.718	8.994
58	9.140	8.489	9.692	8.976	9.416	8.732
59	8.845	8.232	9.358	8.687	9.101	8.458
60	8.540	7.963	9.039	8.406	8.789	8.184
61	8.241	7.700	8.739	8.144	8.490	7.922
62	7.950	7.442	8.453	7.895	8.201	7.668
63	7.669	7.193	8.166	7.643	7.917	7.418
64	7.382	6.938	7.870	7.382	7.626	7.160
65	7.090	6.676	7.566	7.111	7.328	6.893
66	6.792	6.408	7.252	6.831	7.022	6.619
67	6.489	6.13[illegible]	6.930	6.541	6.709	6.337
68	6.201	5.872	6.596	6.239	6.39[illegible]	6.055
69	5.933	5.628	6.253	5.926	6.093	5.777
70	5.670	5.389	5.897	5.599	5.783	5.494
71	5.418	5.158	5.564	5.293	5.491	5.225
72	5.180	4.940	5.261	5.013	5.220	4.976
73	4.940	4.719	4.998	4.770	4.969	4.744
74	4.724	4.521	4.792	4.581	4.758	4.551
75	4.487	4.302	4.582	4.388	4.534	4.345
76	4.253	4.084	4.367	4.189	4.310	4.136
77	4.024	3.871	4.145	3.983	4 084	3.927
78	3.768	3.631	3.913	3.767	3.840	3.699
79	3.512	3.390	3.668	3.536	3.590	3.463
80	3.260	3.152	3.402	3.[illegible]85	3.331	3.218
81	3.017	2.921	3.145	3.041	3.081	2.981

	MALES.		FEMALES.		Lives in general.	
Ages.	4 per Ct.	5 per Ct.	4 per Ct.	5 per Ct.	4 per Ct.	5 per Ct.
82	2.792	2.706	2.905	2.812	2.848	2.759
83	2.600	2.523	2.699	2.615	2.649	2.569
84	2.473	2.403	2.559	2.480	2.516	2.441
85	2.371	2.306	2.552	2.476	2.461	2.391
86	2.281	2.222	2.518	2.446	2.399	2.334
87	2.154	2.103	2.431	2.365	2.292	2.338
88	1.955	1.912	2.294	2.236	2.124	2.074
89	1.698	1.664	2.108	2.059	1.903	1.861
90	1.417	1.392	1.873	1.833	1.645	1.612
91	1.154	1.136	1.628	1.596	1.391	1.366
92	0.835	0.824	1.349	1.325	1.092	1.074
93	0.477	0.471	1.071	1.054	0.774	0.762
94	0.240	0.238	0.799	0.788	0.519	0.513
95	0.000	0.000	0.544	0.537		
96	0.000	0.000	0.320	0.317		

TABLE IV.

Shewing the values of annuities on two joint lives, according to the probabilities (in Table II.) of the duration of human life among males and females collectively, reckoning intereſt at 4 per cent.

Intereſt 4 per cent.

Differences of age 0, 6, 12, and 18 years.

Ages.	Values.	Ages.	Values.	Ages.	Values.	Ages.	Values.
1- 1	12.252	1- 7	13.989	1-13	13.894	1-19	13.389
2- 2	13.583	2- 8	14.780	2-14	14.557	2-20	14.008
3- 3	14.558	3- 9	15.323	3-15	14.988	3-21	14.417
4- 4	15.267	4-10	15.685	4-16	15.259	4-22	14.671
5- 5	15.577	5-11	15.817	5-17	15.326	5-23	14.725
6- 6	15.820	6-12	15.887	6-18	15.354	6-24	14.740
7- 7	16.003	7-13	15.914	7-19	15.351	7-25	14.727
8- 8	16.109	8-14	15.888	8-20	15.310	8-26	14.673
9- 9	16.152	9-15	15.824	9-21	15.244	9-27	14.590
10-10	16.141	10-16	15.729	10-22	15.149	10-28	14.484
11-11	16.087	11-17	15.617	11-23	15.033	11-29	14.357
12-12	15.982	12-18	15.477	12-24	14.889	12-30	14.202
13-13	15.855	13-19	15.327	13-25	14.736	13-31	14.045
14-14	15.701	14-20	15.164	14-26	14.566	14-32	13.874
15-15	15.535	15-21	15.001	15-27	14.392	15-33	13.700
16-16	15.361	16-22	14.832	16-28	14.216	16-34	13.520
17-17	15.196	17-23	14.665	17-29	14.042	17-35	13.340
18-18	15.023	18-24	14.491	18-30	13.860	18-36	13.141
19-19	14.854	19-25	14.320	19-31	13.687	19-37	12.934
20-20	14.682	20-26	14.144	20-32	13.512	20-38	12.720
21-21	14.525	21-27	13.976	21-33	13.345	21-39	12.505
22-22	14.360	22-28	13.807	22-34	13.173	22-40	12.286
23-23	14.194	23-29	13.635	23-35	12.997	23-41	12.073
24-24	14.020	24-30	13.455	24-36	12.801	24-42	11.873
25-25	13.849	25-31	13.284	25-37	12.599	25-43	11.683
26-26	13.671	26-32	13.108	26-38	12.387	26-44	11.485
27-27	13.495	27-33	12.935	27-39	12.170	27-45	11.284
28-28	13.323	28-34	12.763	28-40	11.953	28-46	11.072
29-29	13.148	29-35	12.586	29-41	11.742	29-47	10.847
30-30	12.965	30-36	12.390	30-42	11.543	30-48	10.606
31-31	12.795	31-37	12.192	31-43	11.359	31-49	10.365
32-32	12.624	32-38	11.988	32-44	11.170	32-50	10.128
33-33	12.456	33-39	11.779	33-45	10.978	33-51	9.905
34-34	12.286	34-40	11.568	34-46	10.775	34-52	9.679
35-35	12.109	35-41	11.361	35-47	10.5[illegible]7	35-53	9.452
36-36	11.904	36-42	11.156	36-48	10.314	36-54	9.207
37-37	11.683	37-43	10.953	37-49	10.059	37-55	8.951
38-38	11.452	38-44	10.741	38-50	9.805	38-56	8.683
39-39	11.209	39-45	10.519	39-51	9.558	39-57	8.404
40-40	10.964	40-46	10.286	40-52	9.308	40-58	8.124
41-41	10.732	41-47	10.049	41-53	9.066	41-59	7.839
42-42	10.531	42-48	9.813	42-54	8.830	42-60	7.569
43-43	10.346	43-49	9.581	43-55	8.597	43-61	7.318
44-44	10.154	44-50	9.351	44-56	8.354	44-62	7.075
45-45	9.954	45-51	9.129	45-57	8.101	45-63	6.836
44- 6	9.736	46-52	8.897	46-58	7.841	46-64	6.586
47-47	9.497	47-53	8.658	47-59	7.563	47-65	6.323
48-48	9.236	48-54	8.402	48-60	7.281	48-66	6.048
49-49	8.966	49-55	8.139	49-61	7.008	49-67	5.704
50-50	8.707	50-56	7.874	50-62	6.749	50-68	5.487
51-51	8.469	51-57	7.613	51-63	6.505	51-69	5.221
52-52	8.230	52-58	7.351	52-64	6.256	52-70	4.953
53-53	7.994	53-59	7.083	53-65	6.004	53 71	4.694
54-54	7.748	4-60	6.814	54-66	5.743	54-72	4.455
55-55	7.495	55-61	6.555	55-67	5.474	55-73	4.231
56-56	7.229	56-62	6.299	56-68	5.204	56-74	4.043
57-57	6.924	57-63	6.045	57-69	4.936	57-75	3.844
58-58	6.678	58-64	5.788	58-70	4.604	58-76	3.637
59-59	6.388	59-65	5.519	59-71	4.395	59-77	3.430
60-60	6.104	60-66	5.249	60-72	4.149	60-78	3.210
61-61	5.844	61-67	4.984	61-73	3.927	61-79	2.974
62-62	5.600	62-68	4.729	62-74	3.747	62-80	2.744
63-63	5.367	63-69	4.482	63-75	3.563	63-81	2.557
64-64	5.128	64-70	4.231	64-76	3.370	64-82	2.396
65-65	4.881	65-71	3.982	65-77	3.180	65-83	2.252
66-66	4.626	66-72	3.750	66-78	2.974	66-84	2.123
67-67	4.362	67-73	3.527	67-79	2.743	67-85	2.010
68-68	4.103	68-74	3.340	68-80	2.514	68-86	1.910
69-69	3.851	69-75	3.147	69-81	2.324	69-87	1.798
70-70	3.593	70-76	2.946	70-82	2.15[illegible]	70-88	1.661
71-71	3.345	71-77	2.752	71-83	2.004	71-89	1.464

Interest 4 per cent.

Ages.	Values.	Ages.	Values.	Ages.	Values.	Ages.	Values.
72-72	3.128	72-78	2.558	72-84	1.875	72-90	1.189
73-73	2.935	73-79	2.355	73-85	1.768	73-91	0.937
74-74	2.797	74-80	2.172	74-86	1.692	74-92	0.708
75-75	2.648	75-81	2.017	75-87	1.605	75-93	0.575
76-76	2.490	76-82	1.877	76-88	1.497	76-94	0.481
77-77	2.340	77-83	1.756	77-89	1.339	77-95	0.421
78-78	2.170	78-84	1.639	78-90	1.097		
79-79	1.967	79-85	1.524	79-91	0.863		
80-80	1.758	80-86	1.416	80-92	0.638		
81-81	1.600	81-87	1.320	81-93	0.511		
82-82	1.472	82-88	1.225	82-94	0.427		
83-83	1.364	83-89	1.094	83-95	0.379		
84-84	1.276	84-90	0.902				
85-85	1.212	85-91	0.725				
86-86	1.172	86-92	0.556				
87-87	1.127	87-93	0.459				
88-88	1.071	88-94	0.396				
89-89	0.949	89-95	0.364				
90-90	0.718						
91-91	0.516						
92-92	0.326						
93-93	0.236						
94-94	0.190						
95-95	0.024						

TABLE V.

Shewing the values of two joint lives, according to the probabilities (in Table II.) of the duration of human life among males and females collectively.

Interest 4 per cent.

Differences of age 24, 30, 36, and 42 years.

Ages.	Values.	Ages.	Values.	Ages.	Values.	Ages.	Values.
1-25	12.832	1-31	12.196	1-37	11.465	1-43	10.546
2-26	13.409	2-32	12.730	2-38	11.913	2-44	10.946
3-27	13.778	3-33	13.066	3-39	12.164	3-45	11.168
4-28	14.003	4-34	13.264	4-40	12.284	4-46	11.260
5-29	14.037	5-35	13.277	5-41	12.242	5-47	11.183
6-30	14.033	6-36	13.242	6-42	12.185	6-48	11.064
7-31	14.006	7-37	13.170	7-43	12.112	7-49	10.915
8-32	13.944	8-38	13.059	8-44	12.004	8-50	10.743
9-33	13.855	9-39	12.913	9-45	11.865	9-51	10.560
10-34	13.741	10-40	12.743	10-46	11.694	10-52	10.357
11-35	13.604	11-41	12.563	11-47	11.493	11-53	10.140
12-36	13.428	12-42	12.379	12-48	11.259	12-54	9.898
13-37	13.234	13-43	12.196	13-49	11.011	13-55	9.644
14-38	13.023	14-44	11.997	14-50	10.759	14-56	9.371
15-39	12.798	15-45	11.787	15-51	10.514	15-57	9.087
16-40	12.570	16-46	11.562	16-52	10.264	16-58	8.799
17-41	12.351	17-47	11.328	17-53	10.018	17-59	8.503
18-42	12.146	18-48	11.076	18-54	9.761	18-60	8.208
19-43	11.951	19-49	10.819	19-55	9.500	19-61	7.928
20-44	11.751	20-50	10.567	20-56	9.228	20-62	7.658
21-45	11.550	21-51	10.332	21-57	8.953	21-63	7.396
22-46	11.335	22-52	10.092	22-58	8.675	22-64	7.127
23-47	11.107	23-53	9.852	23-59	8.385	23-65	6.851
24-48	10.862	24-54	9.602	24-60	8.097	24-66	6.566
25-49	10.612	25-55	9.347	25-61	7.823	25-67	6.275
26-50	10.364	26-56	9.080	26-62	7.557	26-68	5.986
27-51	10.130	27-57	8.807	27-63	7.297	27-69	5.702
28-52	9.894	28-58	8.534	28-64	7.032	28-70	5.415
29-53	9.659	29-59	8.250	29-65	6.761	29-71	5.136
30-54	9.413	30-60	7.967	30-66	6.481	30-72	4.881
31-55	9.167	31-61	7.702	31-67	6.197	31-73	4.646
32-56	8.912	32-62	7.446	32-68	5.917	32-74	4.453
33-57	8.651	33-63	7.196	33-69	5.642	33-75	4.251
34-58	8.389	34-64	6.942	34-70	5.364	34-76	4.040
35-59	8.114	35-65	6.679	35-71	5.093	35-77	3.833
36-60	7.833	36-66	6.402	36-72	4.840	36-78	3.605
37-61	7.561	37-67	6.115	37-73	4.603	37-79	3.352
38-62	7.296	38-68	5.828	38-74	4.405	38-80	3.098
39-63	7.033	39-69	5.543	39-75	4.195	39-81	2.889
40-64	6.763	40-70	5.254	40-76	3.975	40-82	2.710
41-65	6.492	41-71	4.977	41-77	3.762	41-83	2.553
42-66	6.225	42-72	4.730	42-78	3.539	42-84	2.418
43-67	5.957	43-73	4.507	43-79	3.295	43-85	2.305
44-68	5.689	44-74	4.322	44-80	3.052	44-86	2.203
45-69	5.426	45-75	4.128	45-81	2.854	45-87	2.083
46-70	5.153	46-76	3.921	46-82	2.684	46-88	1.933
47-71	4.884	47-77	3.715	47-83	2.533	47-89	1.708
48-72	4.633	48-78	3.489	48-84	2.396	48-90	1.385
49-73	4.398	49-79	3.238	49-85	2.227	49-91	1.090
50-74	4.205	50-80	2.990	50-86	2.171	50-92	0.818
51-75	4.008	51-81	2.792	51-87	2.050	51-93	0.662
52-76	3.803	52-82	2.623	52-88	1.901	52-94	0.551
53-77	3.605	53-83	2.475	53-89	1.681	53-95	0.468
54-78	3.389	54-84	2.344	54-90	1.366		
55-79	3.150	55-85	2.232	55-91	1.078		
56-80	2.909	56-86	2.130	56-92	0.810		
57-81	2.710	57-87	2.010	57-93	0.655		
58-82	2.539	58-88	1.864	58-94	0.546		
59-83	2.385	59-89	1.644	59-95	0.464		
60-84	2.248	60-90	1.333				
61-85	2.135	61-91	1.050				

Interest 4 per cent.

Ages.	Values.	Ages.	Values.	Ages.	Values.	Ages.	Values
62-86	2.037	62-92	0.789				
63-87	1.926	63-93	0.639				
64-88	1.79[illegible]	64-94	0.533				
65-89	1.585	65-95	0.456				
66-90	1.290						
67-91	1.017						
68-92	0.764						
69-93	0.617						
70-94	0.514						
71-95	0.411						

The values of *joint* lives in theſe Tables have been computed for only one rate of intereſt; and of *ſingle* lives in Table III. for only two rates of intereſt. The following rules will ſhew, that it would be a needleſs labour to compute theſe values (in ſtrict conformity to the obſervations) for any other rates of intereſt.

ACCOUNT of a method of deducing, from the *correct* values (according to any obſervations) of any ſingle or joint lives at *one* rate of intereſt, the ſame values at *other* rates of intereſt.

PRELIMINARY PROBLEMS.

Problem I. The *expectation* given of a ſingle life by any table of obſervations, to find its value, ſuppoſing the decrements of life equal, at any given rate of intereſt.

Solution. Find in Table III. under ANNUITIES, the value of an annuity certain for a number of years equal to twice the expectation. Multiply this value by the perpetuity increaſed by unity, and divide the product by twice the expectation. The quotient ſubtracted from the perpetuity will be the value required.

Example. The expectation of a male life aged ten, by the Sweden obſervations (ſee Table I.) is 43.94. Twice this expectation is 87.88. The value of an annuity certain for 87.88 years is, by Table III. under ANNUITIES (reckoning intereſt at 4 *per cent.*) 24.200. The product of 24.200 into 26 (the perpetuity increaſed by unity) is 629.2, which, divided by 87.88, gives 7.159. And this quotient ſubtracted from 25 (the perpetuity) gives 17.84 years purchaſe, the value of a life aged ten, deduced from the expectation of life at that age, according to the Sweden obſervations.

Problem II. Having the expectations given of any two lives by any table of obſervations, to deduce from thence the value of the joint lives at any rate of intereſt, ſuppoſing an equal decrement of life.

Solution. Find the difference between twice the expectation of the youngeſt life, and twice the expectation of the oldeſt life increaſed by unity and twice the perpetuity. Multiply this difference by the value of an annuity certain for a time equal to *twice* the expectation of the *oldeſt* life; and by twice the ſame expectation divide the product, reſerving the quotient.

From twice the perpetuity ſubtract the reſerved quotient, and multiply the remainder by the perpetuity increaſed by unity. This laſt product divided by twice the expectation of the *youngeſt* life, and then ſubtracted from the perpetuity, will be the required value.

When twice the expectation of the youngeſt life is *greater* than twice the expectation of the oldeſt life increaſed by unity and twice the perpetuity, the reſerved quotient inſtead of being *ſubtracted* from twice the perpetuity, muſt be added to it, and the *ſum*, not the *difference*, multiplied by the perpetuity increaſed by unity.

Example. Let the joint lives propoſed be a female life aged 10, and a male life aged 15, and let the table of obſervations be the Sweden table for lives in general, and rate of intereſt at 4 *per cent.* Twice the expectations of the two lives are 90.14 and 83.28. See Table I.

Twice the expectation of the *oldeſt* life, increaſed by unity and twice the perpetuity, is 134.28, which leſſened by 90.14 (twice the expectation of the *youngeſt* life) leaves 44.14 for the *reſerved* remainder. This remainder multiplied by 24.045 (the value of an annuity certain for 83.28 years) and the product divided by 83.28 (twice the expectation of the *oldeſt* life) gives 12.744 the quotient to be *reſerved*; which ſubtracted from double the perpetuity, and the remainder (or 37.255) multipled by the perpetuity increaſed by unity (or by 26) gives 968.630, which divided by 90.14 (twice the expectation of the *youngeſt* life) and the quotient ſubtracted from the perpetuity, we have 14.254 for the required value.

The value of an annuity certain, when the number of years is a whole number with a fraction added (as will be commonly the caſe) may be beſt computed in the following manner.

In this example the number of years is 83.28.

The value of an annuity certain for 83 years is (by Table

ble III. ſee Annuities) 24.035. The ſame value for 84 years is 24.072. The difference between theſe two values is .037; which difference multiplied by .28 (the fractional part of the number of years) and the product (.0103) added to the *leaſt* of the two values, will give 24.045 the value for 83.28 years.

General Rule. Call the *correct* value (ſuppoſed to be computed for any rate of intereſt) the firſt value.

Call the value deduced (by the preceding problems) from the *expectations* at the ſame rate of intereſt, the ſecond value.

Call the value deduced from the *expectations* for any other rate of intereſt the third value.

Then, the difference between the *firſt* and *ſecond* values added *to* or ſubtracted *from* the *third* value, juſt as the *firſt* is *greater* or *leſs* than the *ſecond*, will be the value at the rate of intereſt for which the third value has been deduced from the expectations.

The following examples will make this perfectly plain.

Example I. In the two laſt tables the correct values are given of two joint lives among mankind at large, without diſtinguiſhing between males and females, according to the Sweden obſervations, reckoning intereſt at 4 *per cent.* Let it be required to find from theſe values the values at 3 *per cent.*; and let the ages of the joint lives be ſuppoſed 10 and 10.

The correct value by Table IV. (reckoning intereſt at 4 *per cent.*) is 16.141. The expectation of a life aged 10 is (by Table II.) 45.07. The value deduced from this expectation at 4 *per cent.* by Prob. II. is 14.539. The value deduced by the ſame problem from the ſame expectation at 3 *per cent.* is 16.808. The difference between the *firſt* and *ſecond* values, is 1.602, which, added to the *third* value (the firſt being *greater* than the ſecond) makes 18.410, the value required.

Example II. Let the value be required of a ſingle male life aged 10, ar 3 *per cent.* intereſt, from the correct value at 4 *per cent.* according to the Sweden obſervations.

Firſt, or correct value at 4 *per cent.* (by Table III.) is 18.674. The expectation of a male life aged 10, is (by Table I.) 43.94.

The *ſecond* value (or the value deduced from this expectation by Prob I.) is 17.838.

The *third* value (or the value deduced from the ſame expectation at 3 *per cent.*) is 21.277.

The difference between the firſt and ſecond is .836; which (ſince the firſt is greater than the ſecond) muſt be added to the *third*; and the *ſum* (that is, 22.113) will be the value required.

The *third* value at 5 *per cent.* is 15.286; and the difference added to 15.286 makes 16.122 the value of a male life aged 10 at 5 *per cent.* according to the Sweden obſervations. The exact value at 5 *per cent.* is (by Table III.) 16.014.

Again. The differences between 16.014 (the correct value at 5 *per cent.*) and 15.286 (the value at the ſame intereſt deduced from the expectation) is .728; which, *added* (becauſe the firſt value is greater than the ſecond) to 13.335 (the value deduced at 6 *per cent.* from the expectation) gives 14.063, the value of the ſame life, reckoning intereſt at 6 *per cent.*

Theſe deductions, in the caſe of ſingle lives particularly, are ſo eaſy, and give the true values ſo nearly, that it will be ſcarcely ever neceſſary to calculate the *exact* values (according to any given obſervations) for more than *one* rate of intereſt.

If, for inſtance, the correct values are computed at 4 *per cent.* according to any obſervations, the values at 3, 3½, 4½, 5, 6, 7, or 8 *per cent.* may be deduced from them by the preceding rules, as occaſion may require, without much labour or any danger of conſiderable errors. The values thus deduced will ſeldom differ from the true values ſo much as a tenth of a year's purchaſe. They will not generally differ more than a 20th or 30th of a year's purchaſe. In joint lives they will differ leſs than in *ſingle* lives; and they will come equally near to one another *whatever* the rates of intereſt are.

All this has been diſtinctly ſhewn in the new edition of the Treatiſe on Reverſionary Payments; and it ſeems to be an improvement in the doctrine of life-annuities of ſo much uſe, that, not having had it in our power to give it in the proper place, we have thought it neceſſary to introduce it here. We ſhall now return to the main purpoſe of this article.

The preceding Tables furniſh the means of determining the exact differences between the values of annuities, as they are made to depend on the *ſurvivorſhip* of any *male* or *female* lives; which hitherto has been a *deſideratum* of conſiderable conſequence in the doctrine of life-annuities. What has made this of conſequence is chiefly the multitude of ſocieties lately eſtabliſhed in this and foreign countries for providing annuities for *widows*. The general rule for calculating from theſe tables the value of ſuch annuities is the following.

Rule. "Find in Table III. the value of a *female* life at the age of the wife. From this value ſubtract the value in Tab. IV. of the joint continuance of two lives at the ages of the huſband and wife. The remainder will be the value in a *ſingle preſent* payment of an annuity for the life of the wife ſhould ſhe be left a widow. And this laſt value divided by the value of the joint lives increaſed by unity, will be the value of the ſame annuity in *annual* payments during the joint lives, and to commence immediately."

Example. Let the age of the wife be 24, and of the huſband 30. The value in Table III. (reckoning intereſt at 4 *per cent.*) of a *female* life aged 24, is 17.252. The value in Table IV. of two joint lives aged 24 and 30, is 13.455, which ſubtracted from 17.252 leaves 3.797, the value, in a *ſingle preſent* payment, of an annuity of 1*l.* for the life of the wife after the huſband; that is, for the life of the *widow*. The annuity, therefore, being ſuppoſed 20*l.* its value, in a *ſingle payment*, is 20 multiplied by 3.797, that is, *l.* 75.94. And this laſt value divided by 14.455 (that is, by the value of the joint lives increaſed by unity) gives 5.25, the value in *annual payments* beginning immediately, and to be continued during the joint lives, of an annuity of 20*l.* to a wife aged 24 for her life, after her huſband aged 30.

In order to give as full directions as poſſible in this important caſe, we ſhall here inſert the following table, taken from the Treatiſe on Reverſionary Payments, vol. ii. p. 165.

TABLE VI.

Shewing the value of an annuity for the uſe of a wife after the death of her huſband, deduced from the Sweden obſervations, on the *ſeparate* probabilities of the duration of life among the males and females.

Annuity 10*l.* Intereſt 4 *per cent.*

Wife's age.	Huſb. age.	Value of the Ann.	
		Single Paym. C.	Ann. paym. C.
16	16	30.63	1.87
	22	35.92	2.26
	28	42.08	2.76
	34	49.04	3.38
	40	58.54	4.31
	46	68.62	5.46
	52	81.60	7.24
	58	96.25	9.82
20	20	31.90	2.03
	26	37.28	2.46
	32	43.60	3.00
	38	51.52	3.80
	44	61.21	4.80
	50	73.05	6.31
	56	86.44	8.36
	62	102.14	11.79
24	24	32.32	2.15
	30	37.97	2.62
	36	44.51	3.22
	42	53.79	4.18
	48	63.90	5.38
	54	76.50	7.21
	60	91.55	10.06
28	28	32.64	2.28
	34	38.25	2.77
	40	46.35	3.58
	46	55.16	4.57
	52	66.94	6.14
	58	80.54	8.45
	64	95.56	11.90
32	32	33.16	2.43
	38	39.52	3.04
	44	47.71	3.92
	50	58.13	5.22
	56	70.29	7.09
	62	84.95	10.05
	68	100.24	14.49
36	36	33.74	2.61
	42	41.81	3.86
	48	49.64	4.38
	54	61.71	6.04
	60	74.44	8.43
	66	88.76	12.00
42	42	34.62	3.00
	48	41.81	3.86
	54	51.63	5.25
	60	64.25	7.49
	66	77.69	10.75
	72	92.63	16.16
46	46	34.15	3.18
	52	42.54	4.29
	58	53.10	6.00
	64	65.65	8.65
	70	79.97	12.99
50	50	33.42	3.44
	56	41.75	4.70
	62	53.00	6.83
	68	65.62	10.11
54	54	31.89	3.63
	60	41.23	5.27
	66	51.94	7.70
	72	64.82	11.88
58	58	30.14	3.92
	64	39.04	5.75
	70	50.28	8.87

In moſt of the ſocieties for providing annuities for widows, the right to the annuity is made to depend on the continuance of the huſband's life for a given term. In this caſe the value of the annuity is to be obtained by the following rule.

Rule. "Find the value of the annuity for two lives greater by the given term of years than the given lives. *Diſcount* this value for the given term (that is, multiply it by the value of 1*l.* due at the end of the given term), and then multiply it again by the probability that the two given lives ſhall *both* continue the given term. This laſt product will be the anſwer in a *ſingle preſent payment*. And this anſwer divided by the value of the joint lives increaſed by unity, will be the

" anſwer in *annual* payments, to commence immedi-" ately, and to be continued during the joint lives."

Example. The value is required of an annuity of 1*l.* for the life of a wife aged 20, after her huſband aged 26; provided the huſband lives four years. Intereſt at 4 *per cent.*

Anſwer. The given lives increaſed by four years become 24 and 30. The value of an annuity for the life of a wife aged 24, after her huſband aged 30, has been juſt found to be 3.797, which diſcounted for four years (that is, multiplied by .8548, the value of 1*l.* due at the end of four years, by Tab. II. under ANNUITIES) becomes 3.245. The probability that a female life aged 20 ſhall continue four years is (by Tab. I.) $\frac{5636}{5809}$. The probability that a *male* life aged 26 ſhall continue four years is $\frac{5049}{5268}$. The probability, therefore, that the two lives ſhall *both* continue four years is $\frac{5636}{5809}$ multiplied by $\frac{5049}{5268}$. The product is $\frac{2845}{3060}$, which multiplied by 3.245 give 3.017, the anſwer in a ſingle payment. And 3.017 divided by 15.144 (the value increaſed by unity of two joint lives aged 20 and 26, by Tab. IV.) gives .199, the value in annual payments, to commence immediately, and to be continued during the joint lives of the huſband and the wife. The annuity, therefore, being ſuppoſed 20*l.* (to be enjoyed for life by a wife aged 20, after her huſband aged 26, *provided* he lives four years) the value is, in a *ſing'e preſent payment*, *l.* 60.34; and, in *annual payments*, *l.* 3.99.

PROBLEMS in the doctrine of reverſionary ſums and annuities payable on *ſurvivorſhips*.

Problem I. To find the value of an *annuity* payable for what ſhall happen to remain of a given life, after it has ſurvived another given life.

Solution. From the value of the life of the expectant ſubtract the value of the joint lives. The remainder will be the number of years purchaſe which ought to be given for the annuity.

Example. Let the expectant be a male aged 24, who is to enjoy 20*l.* *per annum* for his life, after a female aged 30. The value of his life, reckoning intereſt at 4 *per cent.* is (by Tab. III.) 16.742. The value of the joint lives is (by Tab. IV.) 13.455; which ſubtracted from 16.742, leaves 3.287, the number of years purchaſe to be given for the annuity; which being 20*l.* its value is 65.74*l.* in a *ſingle payment*. And *l.* 65.74, divided by 14.455 (that is, by the value of the joint lives increaſed by unity) gives *l.* 4.54, the value, in *annual payments*, to commence immediately, and to be continued during the joint lives.

N. B. It has been before ſhewn, that had the *expectant* been a female aged 24, and the *poſſeſſor* a male aged 30, the former value would have been 75.94; and the latter *l.* 5.25. Such is the difference in this caſe depending on the *ſurvivorſhip* being that of a female rather than a male. In many other caſes the difference is much greater.

Problem II. To find the preſent value of an *eſtate* of a given yearly value, to be entered upon on the *ſurvivorſhip* of a given life beyond another.

Solution. Find the value of an annuity on two equal joint lives, whoſe common age is equal to the age of the oldeſt of the two propoſed lives, which value ſubtract from the perpetuity, and take *half* the remainder. Then ſay as the *expectation* of the youngeſt of the two lives is to that of the oldeſt, ſo is the ſaid half remainder to a fourth proportional, which will be the number of years purchaſe required when the life of the expectant is the oldeſt of the two. But if the *expectant* is the youngeſt, then add the value ſo found to that of the joint lives, and let the ſum be ſubtracted from the perpetuity, and the anſwer will be obtained in this caſe.

The value thus found, divided by the value of the joint lives, increaſed by unity, will give the value in *annual* payments, beginning immediately, and to be continued during the joint lives.

N. B. In this and all the following ſolutions, no diſtinction is made between the lives of males and females.

Example. Suppoſe the ages of the two lives to be 30 and 24, the former of which is the expectant. Let the yearly value (or *net rent*) of the eſtate be 20*l.* and the rate of intereſt 4 *per cent.* The value of two equal joint lives, aged 30, is (by Tab. IV.) 12.965; the perpetuity is 25; the difference is 12.035; the *half* of which is 6.017; the expectation of the *youngeſt* life is (by Table II.) 35.27; and of the *oldeſt* life, 31.21. Therefore, as 35.27 is to 31.21, ſo is 6.017 to 5.324 years purchaſe, which multiplied by 20 (the rent of the eſtate), gives 106.48, the required value *in a ſingle payment* of a reverſionary eſtate to come to a perſon aged 30, provided he ſurvives a perſon aged 24. And 106.48, divided by 14.455 (the value of the joint lives increaſed by unity), quotes 7.36, the value required in annual payments during the joint lives.

Had the youngeſt life been the expectant, the value juſt found in years purchaſe (that is, 5.324) muſt have been added to 13.455, the value (by Tab. IV.) of the joint lives, which would have made 18.779, and this ſum ſubtracted from 25 (the perpetuity), would have given 6.221, the value in years purchaſe of the eſtate, ſuppoſing it to come to the youngeſt of two lives aged 24 and 30, provided it ſurvives the oldeſt.

Problem III. To find the value in preſent money of a legacy or any groſs ſum, payable to a perſon of a given age, on his ſurviving another perſon, whoſe age is alſo given.

Find by the laſt problem the value in years purchaſe of an eſtate whoſe net rent is the ſame with the intereſt of the given ſum; and this value divided by 1*l.* increaſed by its intereſt for a year, and the quotient multiplied by the intereſt of the given ſum will be its value in a *ſingle payment*. And this *ſingle payment*, divided by the value increaſed by unity of the joint lives, will be the value in *annual payments*, to commence immediately.

Example. Suppoſe, as in the laſt example, the ages of the two lives to be 30 and 24, the former of which is expectant. Let the legacy be 500*l.* the intereſt of which, at 4 *per cent.* is 20*l.* The value of an eſtate of 20*l.* *per ann.* to come to a perſon aged 30, if he ſurvives a perſon aged 24, is, by the ſolution of the laſt problem, 5.324 years purchaſe, which divided by 1.04 (that is, 1*l.* increaſed by its intereſt at 4 *per cent.* for a year), and multiplied by 20*l.* gives 102.2, the required value in a ſingle payment of 500*l.* payable to a perſon aged 30, on his ſurviving a perſon aged 24. The value in annual payments, during the joint lives, is *l.* 7.01. The reaſon of the difference between the value of an *eſtate*, and a *ſum* equivalent to it, may be ſeen in the Treatiſe on Reverſionary Payments, vol. i. chap. 1. queſt. 10.

Problem IV. To find the annuity payable during life to a perſon of a given age, if he ſurvives another perſon whoſe age is given, and which is equivalent in preſent value to a given ſum or legacy payable on the ſame condition.

Solution. Find the difference between the value of the ſingle life of the expectant, and the value of the joint lives. Find alſo, by the laſt problem, the value in a ſingle payment of the given ſum or legacy. The latter divided by the former will give the required life annuity.

Example. Let the ages be 30 and 24, the former of which is expectant. Let the ſum be 500*l.* and the rate of intereſt 4 *per cent.* The value of the life of the expectant (in the columns for lives in general, in Table III.) is 16.006; the value of the joint lives is (by Table IV.) 13.455; the difference is 2.551. The value, by the laſt problem, of 500*l.* payable, if a life aged 30, ſurvives a life aged 24, is 102.2, which divided by 2.551, gives 40.06, the life-annuity, equivalent in value to the ſum, reckoning intereſt at 4 *per cent.*

The following table has been computed by the two laſt rules.

TABLE VII.

Shewing the value of 100l. depending on the contingency of one life ſurviving another, according to the Northampton Table of Obſervations (ſee Tab. III. under LIFE-*annuities*), reckoning intereſt at 3 *per cent.*

Poſſeſſor.	Expectant.	Single Premium.	Annual Premium.	Equivalent Annuity.	Poſſeſſor.	Expectant.	Single Premium.	Annnal Premium.	Equivalent Annuity.
10	10	24.749	1.427	5.723	15	60	14.083	1.439	14.264
	15	24.198	1.444	6.213		65	12.092	1.407	17.086
	20	23.498	1.455	6.738		70	9.973	1.373	21.219
	25	22.531	1.437	7.197	20	10	29.461	1.824	5.345
	30	21.468	1.417	7.746		15	28.786	1.838	5.760
	35	20.317	1.399	8.422		20	27.961	1.848	6.207
	40	19.070	1.383	9.272		25	26.811	1.819	6.582
	45	17.696	1.364	10.314		30	25.546	1.788	7.027
	50	16.214	1.346	11.652		35	24.176	1.759	7.570
	55	14.631	1.324	13.362		40	22.692	1.733	8.246
	60	12.925	1.299	15.671		45	21.058	1.703	9.059
	65	11.098	1.273	18.935		50	19.294	1.674	10.085
	70	9.153	1.246	23.651		55	17.410	1.640	11.356
15	10	26.979	1.609	5.505		60	15.381	1.603	13.029
	15	26.365	1.625	5.954		65	13.206	1.564	15.341
	20	25.602	1.635	6.435		70	10.892	1.523	18.634
	25	24.549	1.612	6.849	25	10	31.789	2.027	5.336
	30	23.391	1.588	7.340		15	31.093	2.042	5.729
	35	22.136	1.564	7.944		20	30.254	2.052	6.178
	40	20.778	1.544	8.698		25	29.053	2.020	6.557
	45	19.281	1.520	9.617		30	27.683	1.982	6.998
	50	17.666	1.497	10.791		35	26.198	1.946	7.540
	55	15.941	1.469	12.271		40	24.590	1.913	8.215

Poſſeſſor.	Expectant.	Single Premium.	Annual Premium.	Equivalent Annuity.	Poſſeſſor.	Expectant.	Single Premium.	Annual Premium.	Equivalent Annuity.
25	45	22.819	1.876	9.027	45	60	25.057	2.854	12.552
	50	20.907	1.841	10.055		65	21.514	2.740	14.797
	55	18.866	1.799	11.329		70	17.744	2.629	18.012
	60	16.607	1.755	13.004	50	10	48.705	4.044	5.064
	65	14.310	1.710	15.313		15	47.968	4.066	5.415
	70	11.803	1.662	18.595		20	47.144	4.091	5.809
30	10	34.404	2.271	5.282		25	46.017	4.052	6.170
	15	33.094	2.287	5.689		30	44.680	4.004	6.608
	20	32.843	2.299	6.136		35	43.101	3.950	7.153
	25	31.640	2.266	6.526		40	41.208	3.891	7.838
	30	30.209	2.223	6.974		45	38.846	3.807	8.657
	35	28.589	2.177	7.510		50	35.853	3.691	9.634
	40	26.834	2.133	8.183		55	32.353	3.535	10.791
	45	24.901	2.088	8.995		60	28.581	3.778	12.338
	50	22.815	2.044	10.025		65	24.540	3.224	14.491
	55	20.588	1.993	11.307		70	20.239	3.074	17.570
	60	18.188	1.939	12.997	55	10	53.170	4.810	5.012
	65	15.616	1.885	15.330		15	52.454	4.834	5.349
	70	12.880	1.829	18.642		20	51.668	4.867	5.727
35	10	37.375	2.573	5.236		25	50.596	4.826	6.074
	15	36.647	2.590	5.632		30	49.329	4.776	6.497
	20	35.794	2.604	6.073		35	47.822	4.721	7.027
	25	34.588	2.569	6.464		40	46.034	4.664	7.702
	30	33.166	2.525	6.924		45	43.800	4.585	8.530
	35	31.472	2.474	7.466		50	40.993	4.479	9.569
	40	29.540	2.419	8.128		55	37.357	4.303	10.771
	45	27.413	2.359	8.930		60	33.002	4.080	12.272
	50	25.116	2.302	9.952		65	28.336	3.863	14.383
	55	22.664	2.237	11.227		70	23.370	3.656	17.409
	60	10.022	2.170	11.917	60	10	58.087	5.836	4.900
	65	17.191	2.102	15.255		15	57.403	5.863	5.282
	70	14.170	2.034	18.590		20	56.669	5.905	5.643
40	10	40.763	2.956	5.178		25	55.675	5.863	5.975
	15	40.023	2.974	5.560		30	54.499	5.811	6.379
	20	39.164	2.991	5.986		35	53.103	5.755	6.887
	25	37.969	2.954	6.371		40	51.437	5.699	7.539
	30	36.560	2.909	6.830		15	49.367	5.622	8.352
	35	34.888	2.857	7.384		50	46.777	5.529	9.402
	40	32.868	2.794	8.046		55	43.439	5.371	10.695
	45	30.301	2.715	8.825		60	38.923	5.117	12.274
	50	27.946	2.639	9.821		65	33.419	4.795	14.315
	55	25.218	2.555	11.064		70	27.563	4.490	17.283
	60	22.278	2.468	12.714	65	10	63.570	7.285	4.900
	65	19.128	2.382	15.005		15	62.872	7.313	5.213
	70	15.776	2.296	18.274		20	62.203	7.367	5.556
45	10	44.511	3.439	5.124		25	61.311	7.325	5.871
	15	43.766	3.450	5.491		30	60.251	7.271	6.253
	20	42.921	3.471	5.903		35	58.99	7.213	6.734
	25	41.753	3.433	6.278		40	57.484	7.159	7.353
	30	40.369	3.386	6.730		45	55.620	7.085	8.130
	35	38.735	3.333	7.287		50	53.293	7.002	9.149
	40	36.775	3.273	7.974		55	50.302	6.858	101.146
	45	34.306	3.183	8.763		60	46.279	6.640	12.156
	50	31.432	3.080	9.727		65	40.575	6.270	14.321
	55	28.364	2.968	10.940		70	33.466	5.787	17.150

N. B. This is one of the tables of the Equitable Society for Aſſurances on Lives and *Survivorſhips*. See ASSURANCES.

Explanation. The annual premium in this table is ſuppoſed to be payable during the joint continuance of the lives of the *poſſeſſor and expectant*; and the firſt payment is ſuppoſed to be made at the time of purchaſing the aſſurance.

The *equivalent annuity* ſignifies that annuity to which either the *ſingle* premium ſpecified in the table, or the *annual* premium, will entitle an *expectant* during his *ſurvivorſhip*, ſhould ſuch an annuity be preferred to a groſs ſum payable on *ſurvivorſhip*. Thus the payment of either *l.* 34.588 (34*l.* 11*s.* 10*d.*) in hand, or of *l.* 2.569 (2*l.* 11*s.* 5*d.*) annually, during the joint lives of a wife aged 25 and a huſband aged 35, the firſt payment to be made immediately, will, according to this table, entitle the wife, ſhould ſhe ſurvive the huſband, either to 100*l.* payable to her when ſhe becomes a widow, or to an annuity payable during her life, after becoming a widow, of *l.* 6.464 (6*l.* 9*s.* 4*d.*) If ſhe is 35 (or of the ſame age with her huſband) a ſingle payment of *l.* 31 472, or an annual payment of *l.* 2.474 will, by the table, entitle her either to 100*l.* payable on her *ſurvivorſhip*, or to an annuity for her life of *l.* 7.466, after *ſurvivorſhip*.

Any payments greater or leſs will entitle to groſs ſums or annuities proportionably greater or leſs.

Problem V. To find the value of an eſtate to be entered upon at the deceaſe of B, provided he ſurvives A.

Anſwer. Find the value of an annuity on the *longeſt* of two equal lives (ſee LIFE-*annuities*), whoſe common age is that of the older of the two lives A and B, which value ſubtract from the perpetuity, and take *half* the remainder. Then it will be as the expectation of the duration of the younger of the lives A and B is to that of the older, ſo is the ſaid half remainder to the number of years purchaſe required, when B is the oldeſt of the two. But if B be the youngeſt, then to the number of years purchaſe thus found, add the value of an annuity on the longeſt of the lives A and B, and ſubtract the ſum from the perpetuity for the anſwer in this caſe.

The value of the reverſion in *annual* payments, till the claim is *determined*, is found by dividing the *ſingle preſent* payment by the value of the two joint lives; and the ſame value in *annual* payments, till the claim *becomes due*, is found by dividing the ſingle payment by the value of the life of B.

Example. Let the age of A be 30, and that of B 60 years. Let the given eſtate be 40*l. per ann.* and intereſt at 4 *per cent.* The value of the longeſt of two lives whoſe common age is 60, is, according to column 3, Table III. and by Problem VI. under LIFE *annuities*, 11.474; which taken from 25, the perpetuity, leaves 13.526 for the remainder: therefore it will be as 31.21, the expectation of A, by Table II. is to 12.63, the expectation of B, ſo is 6.762, the half remainder, to 2.733, the number of years purchaſe required, which being multiplied by 40, gives 109.32 for the value in one preſent payment.

But if A had been 60, and B 30, the value required would have been 5.433, multiplied into 40, or 217.42, becauſe the value of the longeſt of the two lives A and B (by column 3, Table III. and the rule in Prob. VI. under LIFE-*annuities*) is 16.828 years purchaſe.

Theſe problems include all the caſes of *ſurvivorſhip* between two lives for *their whole duration*. The two following problems relate to caſes of *ſurvivorſhip* between two lives, when the *ſurvivorſhip* is reſtricted to a term of years leſs than the whole duration of the lives.

Problem VI. "B, expectant, will loſe a given ſum, "ſhould he ſurvive A, *within a given time.* What "ought he to pay for the *aſſurance* of it?" In other words: "What ought he to pay for a given ſum to be "received at the death of A, ſhould he happen to ſur-"vive him within a given time?"

Anſwer. Divide the *ſum* of the decrements of life in the Table of Obſervations from the age of A, for the given time, by the given time; and, by the *quotient*, divide the number of the living in the table at the age of A; and, again, by this *ſecond* quotient, divide the given ſum, reſerving the *third* quotient.

(N. B. When the age of A is under 60, and the term ſo large as to exceed the difference between it and 70, it will be beſt, when the London table is uſed, to divide the given ſum, not by the ſecond quotient here mentioned, but by the *complement* of the life of A).

Find the value of an annuity on the life of B, for the given time. To this value add the *quotient*, that will ariſe from dividing the value of an annuity certain, for the given time, by twice the *complement* of the life of B; and the *ſum*, multiplied by the *reſerved quotient*, will be the required value in a ſingle preſent payment.

Example. Let the Table of Obſervations be Mr. Simpſon's for London (ſee EXPECTATION). Let the rate of intereſt be 3 *per cent.* A, ſeven years of age. B, 30. The given time 14 years; the given ſum 100*l.* The ſum of the *decrement* for 14 years from the age of 7, is 73, which, divide by 14, gives 5.2. The number of the living at ſeven is 430, which, divided by 5.2, and 100*l.* divided by the quotient, gives *l.* 1.21, the *quotient* to be *reſerved.*

The value of an annuity for 14 years on the life of B, is, by Prob. IV. under LIFE-*annuities*, 9.5. The value of an annuity certain for 14 years, is by Tab. III. under ANNUITIES, 11.296, which, divided by 94.4 (twice the *complement* of the life of B), gives .12, which, added to 9.5, gives 9.62; and this again multiplied by 1.21, the *reſerved quotient*, gives 11.64, the *preſent* value in *one* payment of 100*l.* payable at the death of A, aged 7, to B, aged 30, ſhould A die and leave B the ſurvivor within 14 years.

(N. B. The expectation of B is 23.6, by the Table under EXPECTATION; and it ſhould be remembered, that twice the expectation is always the complement of a life.)

The preſent value for 14 years of two joint lives, one 7, and the other 30 years of age, may be found in the method explained under LIFE-*annuities*, to be nearly 9 years purchaſe; and, *l.* 11.64 divided by this value, with unity added, or by 10, gives 1.164, the foregoing value in *annual payments* during the joint lives for 14 years, the *firſt* payment to be made immediately, and the *laſt* payment at the end of 14 years, ſhould the joint lives not fail.

Scholium. It deſerves particularly to be remembered, that in this method likewiſe may be calculated, what ſums ought to be paid on any *ſurvivorſhip*, within a given time, of one life beyond another, in conſideration of any given ſum now advanced. The following example of this is a caſe which has offered itſelf in practice.

“ A perſon, aged 30, has in expectation an eſtate which
“ is to come to him, provided he ſurvives a *minor*, aged
“ 7, before he is out of his minority; that is, provided
“ he ſhould be himſelf living at the time of the minor's
“ death, ſhould that happen before he is 21. In theſe
“ circumſtances, he wants to borrow 1000*l.* on his *ex-*
“ *pectation.* What *reverſion* out of the eſtate depending
“ on ſuch a *ſurvivorſhip*, is a proper equivalent for this
“ ſum now advanced, intereſt being reckoned at 3 *per*
“ *cent.* and the probabilities of life being ſuppoſed the
“ ſame with thoſe in Mr. Simpſon's Table of London
“ Obſervations?”

Anſwer. It appears from what has been juſt determined, that for *l.* 11.64 now advanced, the proper equivalent in ſuch circumſtances, is, 100*l.* to be paid in caſe the *ſurvivorſhip* ſhould take place; or as much of the eſtate as 100*l.* will buy at 3 *per cent.* ſuppoſing the firſt rent to be received immediately, that is, *l.* 2.912 *per annum*. By the rule of proportion, therefore, for 1000*l.* the proper equivalent will be 8591*l.* in money, or 250*l.* *per annum* out of the eſtate.

Problem VII. “ 100*l.* will be loſt to B's heirs, ſhould
“ he happen to die after A, *within a given time*. What
“ is the price of the *aſſurance* of it?—That is, what is
“ the preſent value of 100*l.* payable at the death of B,
“ provided his death ſhould happen *after* A's death,
“ *within a given time?*”

Anſwer. Divide the ſum of the decrements of life in the Table of Obſervations, from the age of B, for the given time, by the given time; and by the *quotient* divide the number of the living at the age of B; and again, by this *ſecond quotient*, divide the given ſum, reſerving the *third quotient*.

Find the value of an annuity on the life A for a number of years, leſs by *one* year than the given time, which ſubtract from the value of an annuity certain for the ſame number of years. Multiply the *remainder* by the *reſerved quotient*, and divide the *product* by the amount of 1*l.* for one year, and let it be a *ſecond* reſerved quotient.

Again. Multiply into one another the *firſt* reſerved quotient, and the value of an annuity certain for the given time; and divide the product by twice the *complement* of A's life. This *laſt* quotient, added to the *ſecond* reſerved quotient, will be the *anſwer* in a preſent ſingle payment.

Example. Let the age of B be 40. Of A 30. The ſum 100*l.* Rate of intereſt 4 *per cent.* The given time 20 years. The Table of Obſervations, Mr. Simpſon's. See EXPECTATION.

The ſum of the decrements of life, in this table, from the age of 40 for 20 years, is 127, which, divided by 20 (the given time), gives 6.38. The number of the living at 40 is 229, which, divided by 6.38, gives 35.8; and 100*l.* (the given ſum) divided by 35.8, gives 2.79, the *firſt* quotient to be reſerved.

The value of an annuity for 19 years on a life at 30 years of age, is 10.3; which, ſubtracted from 13.134, the value of an annuity *certain* for 19 years, by Table III. under ANNUITIES, and the remainder multiplied by 2.79, gives 7.89. This product divided by 1.04 (the amount of 1*l.* in one year) gives 7.60; the *ſecond* reſerved quotient.

2.79 multiplied by 13.59, (the value of an annuity certain for 20 years) gives 37.916; and this *product* divided by 94.4 (twice the complement of A's life) gives .401. which, added to 7.60, gives 8*l.* the anſwer; or, the value of 100*l.* payable at the death of B, on the contingency of his ſurviving A, aged 30, and *both* dying in 20 years.

It is plain, that this is likewiſe the ſum that ought to be lent to B now, on the expectation of 100*l.* at his death, provided it ſhould happen after A's death in 20 years.

This rule gives the juſt ſolution in all caſes, except when B, the expectant, is the *youngeſt* of the two lives, and at the ſame time the term of years *greater* than the complement of A's life. In this particular caſe the following rule muſt be uſed.

Find, by the preceding rule, the value of the aſſurance of the given ſum for a term of years, equal to the complement of A's life, and let this value be *reſerved*. Multiply by one another the given *ſum*; the value of 1*l.* to be received at the end of a number of years equal to the complement of A's life; and the value of an *annuity certain* for as many years as the given term exceeds this complement; and the *product*, divided by the complement of B's life, and the quotient added to the *value reſerved*, will be the true value ſought.

Example. Let the age of B be 30; of A 40. The term 47 years; and every thing elſe as in the laſt example. The complement of A's life is 39,2. The value of 100*l.* to be received at the death of B, if he ſurvives A within 39 years, may be found by the preceding rule to be *l.* 16.15; the value to be reſerved. The value of 1*l.* to be received at the end of 39 years is, by Table II. under ANNUITIES, .2166. The value of an annuity *certain* for 8 years (the exceſs of the given term above the complement of the life of B,) is 6.733.

And theſe two values multiplied by one another, and by 100*l.* gives 145.83; which, divided by 47.2 (the complement of the life of B), and 16.15, added to the quotient, make *l.* 19.23, the value ſought.

Remark. As after finding the preſent value of an eſtate, or annuity, it is neceſſary to *divide* that value by the amount of 1*l.* in one year, in order to find the preſent value of a *ſum* equivalent to the *annuity*; ſo, after finding the value of a ſum, it is neceſſary to *multiply* that value by the ſaid amount, in order to find from it the value of an equivalent annuity.

In the firſt example, therefore, the value of an eſtate of 4*l.* *per annum*, would be *l.* 8.32. In the ſecond example, 20*l.* And this is, as it ought to be, the value for the whole duration of the lives.

The caſes of *ſurvivorſhips* between three lives are ſo numerous, that an account of them cannot be given here. We muſt, therefore, refer for this to Mr. Morgan's Treatiſe.

SUS, in *Zoology*. See HOG.

SUS *agreſtis*. See *Wild* BOAR.

SUS-*piſcis*, in *Ichthyology*, a name given by Ovid, and ſome other of the ancient writers, to the fiſh called alſo *us* and *mus*, and by the later writers *capriſcus*. See GOAT-*fiſh*.

SUSCEPTOR, among the Romans, a citizen choſen by the decuriones to collect the debts belonging to the public.

SUSCEPTOR is alſo a term uſed by eccleſiaſtical writers for SPONSOR.

SUSCEPTOR *aurarius*, in *Middle Age Writers*. See AURARIA.

SUSPENSE, SUSPENSIO, in *Common Law*, denotes a temporary ſtop or ceſſation of a man's right for a time. As, when the rent, or other profits of land, by reaſon of the unity of poſſeſſion of the rent, and the land out of which it iſſues, is not in eſſe for a certain time, but *tunc dormit*, or *remains aſleep*; but ſo as it may be revived or awaked. By which, *ſuſpenſion* differs from *extinguiſhment*, where the right dies for ever.

SUSPENSION, SUSPENSIO, the act of preventing the effect or courſe of any thing for a certain time.

The principal point urged in the philoſophy of the Sceptics and Pyrrhonians, is a *ſuſpenſion* of mind.

SUSPENSION *of arms*, in *War*, is a ſhort truce which the contending parties agree on, for the burial of their dead, the waiting for ſuccours, or the orders of their maſters, &c.

In rhetoric, *ſuſpenſion* is a keeping the hearer attentive and doubtful, in expectation of what the ſpeaker will conclude with.

SUSPENSION, in *Mechanics*. *Points of ſuſpenſion* in a balance, are thoſe points in the axis or beam wherein the weights are applied, or from which they are ſuſpended.

SUSPENSION, in *Law*, denotes a cenſure inflicted by way of puniſhment, on an eccleſiaſtic, for ſome conſiderable fault.

It is of two kinds, viz. *ab officio*, and *a beneficio*.

SUSPENSION *ab officio*, is that whereby a miniſter is, for a time, forbidden to execute the office of a miniſter.

SUSPENSION *a beneficio*, is when a miniſter is, for a time, deprived of the profits of his beneſice.

Where the fault is more notorious, the two kinds of *ſuſpenſion* are ſometimes joined; and the perſon both *ſuſpended ab officio*, and *a beneficio*.

The penalty upon a clergyman officiating after *ſuſpenſion*, if he ſhall perſiſt therein after a reproof from the biſhop, is (by the ancient canon law) that he ſhall be excommunicated all manner of ways, and every perſon who communicates with him ſhall be excommunicated alſo.

There is another ſort of *ſuſpenſion*, which extendeth alſo to the laity; *ſuſpenſion ab ingreſſu eccleſiæ*, or from hearing of divine ſervice, and receiving the holy ſacrament; which may be, therefore, called a *temporary* EXCOMMUNICATION.

SUSPENSOR *teſticuli*, in *Anatomy*, a muſcle called alſo CREMASTER.

SUSPENSORIUS, in *Anatomy*, a muſcle of the eye. It is ſo called from its uſe in ſuch animals as go much with their head hanging down. Veſalius has deſcribed it as belonging to man, in whom it is never found. Fiſhes and fowls are commonly without it, as well as man; but oxen, and, ſo far as has been obſerved, all quadrupeds, are provided therewith; though it is not of the ſame ſtructure in all. Dr. Porterfield, in Med. Eſſ. Edinb. vol. iii. art. 12.

The doctor thinks, that the uſe of this muſcle is not only to ſuſpend the eye, and preſerve the optic nerve from being too much ſtretched, but principally to aſſiſt the ſtraight muſcles in moving the eye, according as its different fibres act.

SUSPIRAL, a ſpring of water, paſſing under-ground towards a conduct or ciſtern. Alſo a breathing-hole, or VENTIDUCT.

SUSSEX *marble*, a name given by many to a peculiar ſpecies of marble found in the county, the name of which it bears, and formerly much uſed in the pillars of churches, and other buildings, but now leſs regarded. The ground of this *marble* is grey, with a faint caſt of green, and it is very thick ſet in all parts with ſhells; theſe are chiefly of the turbinated kind, and they are generally filled with a white ſpar, which adds very greatly to the beauty of the ſtone.

SUTE, [illegible], or SUTE. See SUITE.

SUTH-DURE, in *Ancient Cuſtoms*, denotes the ſouth door of a church, mentioned in old authors, as the uſual place where canonical purgation was performed. That is, when a fact could not be proved by ſufficient evidence, the party accuſed came to the *ſouth door* of the church; and there, in the preſence of the people, made oath that he was innocent.

This was called *judicium Dei*. And it is for this reaſon that large porches were anciently built at the *ſouth doors* of churches.

SUTLER, in *Military Language*, denotes one who follows the army, and furniſhes proviſions for the troops. The *ſutlers* pitch their tents and build their huts in the rear of each regiment, and about head-quarters.

SUTORIUS, in *Anatomy*, a name given by Riolanus to a muſcle of the leg, called by Cowper, Albinus, and others, the *ſartorius*. The French authors call it the *couturier*; Veſalius, and others of the more early anatomical writers, have called it the *primus tibiam moventium*.

SUTTON's *quadrant*. See QUADRANT.

SUTURE, SUTURA, in *Anatomy*, a peculiar kind of juncture, or articulation, of certain bones in the animal body; thus called as reſembling a ſeam.

There are two kind of *ſuture*; one called the *true* or *genuine ſuture*; wherein bones are indented like ſaws, and reciprocally received into each other.

The other, called *falſe*, *ſpurious*, or *ſquammous ſuture*; wherein the bones are laid over each other, like the ſcales of fiſhes.

The bones of the cranium are uſually joined by three genuine *ſutures*; the *coronal*, reaching acroſs from one temple to the other. See *Tab. Anat.* (*Oſteol.*) *fig.* 1. *lit. g. fig.* 2. *lit. h.* and the article CORONALIS. The *ſagittal* joining the oſſa parietalia. See *Tab. Anat.* (*Oſteol.*) *fig.* 1. *lit. f. fig.* 2. *lit.* i. and the article SAGITTAL. And the *lamboidal*; thus called from its reſembling the Greek A, lambda.

Beſides theſe, there is a fourth *ſuture*, of the ſpurious or ſquammous kind, ſuppoſed, though falſely, to have no indentures: it joins the oſſa temporum to the os ſphenoides, occipitis, &c. and is alſo called the *temporal ſuture*. See *Tab. Anat.* (*Oſteol.*) *fig.* 2. *lit. k.* See alſo SQUAMMOUS.

Natural hiſtorians tell us, that in Perſia it is frequent to have people without any *ſutures* at all in the ſkull; but the whole one ſolid bone; yet without any apparent inconvenience: and M. Flechier, in his Life of cardinal Ximenes, affirms the ſame of that cardinal: yet it ſhould ſeem, that great diſorders muſt ariſe therefrom; as the perſpiration can be but very imperfectly effected; whence heavineſs and ſwimming in the head. See SKULL.

SUTURE, *ſphenoidal*. See SPHENOIDAL.

SUTURE, in *Surgery*, denotes a ſeam made to cloſe the lips of a wound, in order to its healing.

All wounds are not to be united by the needle, but thoſe only that are oblique, tranſverſe, or angular, and at the ſame time very large and deep; or in caſes where a part is very nearly cut off; or if a wound is ſo circumſtanced, that it cannot be kept in a proper ſituation by plaſters and bandages. Wounds that are to be ſtitched, ſhould be in their recent ſtate, and muſt be firſt well cleanſed from extravaſated blood, and all extraneous bodies; there ſhould alſo be no loſs of ſubſtance, except in thoſe fleſhy parts that are eaſily elongated; and no contuſion, nor any ſign of inflammation.

The ancients invented a great variety of *ſutures*, which they reduced to three kinds; *incarnatives*, *reſtrictives*, and *conſervatives*.

SUTURE, *incarnative*, is thus called, becauſe, by rejoining the edges of a wound, and keeping them together by means of a thread run acroſs them with a needle, they grow together, and incarnate as before.

This they ſubdivided into five kinds, viz. the *interrupted*, *intertwiſted*, *pinned* or *feathered*, *with claſps*, and the *dry ſuture*.

Of theſe five, two are altogether diſuſed, viz. the *feathered ſuture*, and the *ſuture with claſps*, as being too barbarous, and at the ſame time unneceſſary. The firſt was called *pinned*, when little pins were made uſe of; and *feathered*, when the barrels were of feathers and quills.

To perform it, two or three needles threaded with a double thread, were paſſed through the lips of the wound, at a finger's breadth from each other, and a pin or feather put in the ſtitch; and another pin or feather bound with the ends of the ſame thread, that the feather might keep the lips of the wound cloſe together.

To perform the ſecond, they had large, crooked claſps, pointed at each end; one of which they thruſt into the upper part of the wound, the other into the lower, to bring the lips together.

Theſe *ſutures*, cruel as they were, are yet known to be uſeleſs; for in the only caſes where they ſhould ſeem ſerviceable, viz. in deep wounds, where the contraction of the fleſhy parts keeps the lips far aſunder, and in wounds of tendons; they expoſe the patient to terrible convulſions and ſhudderings, which are avoided by diminiſhing the dilatation of the wounds, by moderate compreſſions, and patiently waiting till the fibres relax.

SUTURES, *reſtrictive*, were thoſe wherewith they endeavoured to ſtop the flux of blood from large wounds, where any conſiderable veſſels were cut.

To this end they invented ſeveral kinds, in the number whereof were the *ſhoemakers*, *taylors*, *ſkinners*, and other *ſeams*, each more impertinent than the other. It is evident, the very deſign of ſuch a *ſuture* is blameable; for, ſuppoſing the wound ſo exactly ſewed up, that no blood could eſcape through the lips thereof; yet will it ſtill flow out of the veſſels; and will thus be forced to make its way between the laminæ of the muſcles, by which means the part will ſwell, rot, and gangrene. Yet the *ſkinners ſuture*, *ſutura pellionum*, is ſtill in uſe for wounds of the inteſtines: it is thus called, becauſe the ſkinners uſe the like, in ſewing up the holes made by the butchers in flaying off the ſkin.

SUTURE, *conſervative*, is that kind of ancient *ſuture*, whereby the lips of large wounds, wherein there was a loſs of ſubſtance, were prevented from receding too far. But a bandage now ſuffices.

SUTURE, *bloody*. In large wounds, eſpecially tranſverſe ones, as their lips cannot be kept in their ſituation by means of the dry *ſuture*, which is frequently the caſe in wounds of the thigh, or in the abdomen, nates, or arms; or when pieces hang from the wounded part, as often happens in wounds of the forehead, cheeks, noſe, or ears; or when wounds are large, and made in an angular or cruciform manner, the needle muſt be uſed to bring their lips together; and this is called the *bloody*, or the *true ſuture*. This operation is alſo diſtinguiſhed in two kinds, the ſimple and compound.

The ſimple *ſuture* is that which is performed only by the aſſiſtance of the needle and thread: to this claſs belong the interrupted *ſuture*, the glover's *ſuture*, and the twiſted *ſuture*; the laſt of theſe is ſeldom uſed but in caſes of the hare-lip, and the ſecond only in wounds of the inteſtines; but the firſt is in common uſe for all wounds which require the true, or *bloody ſuture*.

The compound *ſuture*, is that which requires other aſſiſtances beſides the needle and thread.

The beſt method of making the common, or interrupted *ſuture*, is this: take a double thread, well waxed, paſs it through a ſtrong crooked needle; when the lips of the wound are brought together, and held firmly in their proper ſituation by an aſſiſtant, with one ſtroke pierce through them both, paſſing the needle through the lower lip from without inwards almoſt to the bottom, and ſo on from within outwards, obſerving to make the punctures at a finger's breadth diſtance from the wound, which in this caſe we will ſuppoſe to be in length two fingers, varying this diſtance according to the ſize of the wound. After taking off the needle, tie the ends of the thread firſt in a ſingle knot, and then a ſlip knot, covering all with the ſame dreſſings, as are uſed in the dry *ſuture*. But if the wound be ſo large, that one ſtitch will not be ſufficient, then two or more are to be made, according to the length of it, at about a finger's breadth diſtance one from the other. To prevent the knots from bringing on any miſchief, lay a ſmall linen compreſs over the ſingle knot, and make the ſlip-knot over that; which if any pain or inflammation ſhould ſucceed, may be afterwards eaſily looſened at pleaſure.

This is the method to be obſerved in ſtraight, oblique, or tranſverſe wounds; but where there are angles, as in a triangular wound, you are to proceed in the ſame manner, but obſerve to let the *ſuture* begin at the angle, and the other ſtitches be taken about the middle, both ways; but if the wound be quadrangular, or have two angles like the Greek letter Π, which ſometimes happens in the face, then the *ſutures* muſt be made in both the angles; and when the wound is ſo large, that theſe are not ſufficient, then as many more, as are neceſſary, muſt be made in the midway between them. When you meet with a cruciform wound, and the lips of it cannot be kept together by the uſe of plaſters, the *bloody ſuture* muſt be made, by paſſing the needle through the lips, near the end of each extremity of the wound; and when the ſtitches are all thus made, the threads muſt be tied as in the other caſes. Heiſter.

SUTURE, *compound*. Some of the ſurgeons among the ancients uſed a *compound ſuture* for large wounds, inſtead of the interrupted *ſuture*, now generally practiſed: they preferred this method, becauſe it prevented the lips of the wound from being lacerated, which ſometimes happened when the other method was uſed, and not only prevented the wound from uniting, but frequently brought on other grievous diſorders; and though this method has of late years been rejected, and particularly by Dionis, in his Surgery, yet many ſtill prefer it in ſeveral caſes to the common interrupted *ſuture*: but inſtead of the pieces of wood uſed by the ancients, thoſe who now practiſe it uſe pieces of plaſter rolled up in a cylindrical form, of the length of the wound, and of about the ſize of a gooſe-quill, from whence it is called by ſome the *quilled ſuture*. This method prevents tumors, pain, and inflammations, which might be brought on by the hardneſs and preſſure of wood.

Palfynus performs this operation, in deep wounds of the muſcular parts, with a large and ſtrong crooked needle, furniſhed with a double thread well waxed, which has alſo a bow at one end. The needle thus fitted being paſſed through both lips of the wound, in the ſame manner as in the other operations of the true *ſuture*, and afterwards a ſecond, and a third, paſſed in the ſame manner, a roll of plaſter is to be introduced into the bow ends of the thread, which are left hanging out; then when the needle is taken out at the other ſide, another roll of plaſter is to be placed between the ends of the thread; and the lips of the wound being brought together, theſe ends are to be gently tied over the roll, firſt in a ſingle and then in a ſlip-knot. If there are three of theſe threads, you are to tie the middle one firſt, and afterwards, the reſt in the ſame manner.

On the firſt days after the operation of the *ſuture* is performed, in whatever method that be done, the bandage and compreſs are to be gently removed, and the ſtate of the wound examined: if every thing now looks well and there is little or no pain, or inflammation, the *ſutures* are to be left alone for ſix or ſeven days, or longer, and the wounds dreſſed till there appears a ſtrict union in the lips. If, in any of theſe examinations, the ſtitches of the *ſuture* are ſeen to be looſe, they muſt be tightened, if too tight, looſened. When the lips of the wound appear to be enlarged or bruiſed, they muſt be dreſſed with a digeſtive ointment, the continuance of which uſually ſoon takes off thoſe ſymptoms; but if the wound be attended with great inflammation and fever, the ſtitches muſt be looſened, and the patient blooded, kept on a thin diet, and the body kept open; if this method remove the ſymptoms, the ſtitches muſt be tightened again, and the wound dreſſed and managed as before; but if this method proves fruitleſs, and the ſymptoms continue and increaſe, the ſtitches muſt then be cut, and the wound treated as if there were a loſs of ſubſtance.

If the wound heals by the aſſiſtance of the *ſuture*, the threads of it are to be cut with ſciſſars, near the knots, and the lower lip of the wound to be ſuſpended with one hand, while the threads are gently drawn out with the other. The punctures that are left from them will eaſily heal, by injecting the arquebuſade-water, or ſpirit of wine, or lime-water, and laying on compreſſes dipt in the ſame liquors. But larger wounds are to be dreſſed with ſome vulnerary balſam, and the lips kept firm together with ſome ſticking plaſter, till a firm cicatrix is formed. Heiſter.

SUTURE, *intertwiſted*, is thus called, becauſe the needles being left ſticking in the wound, the thread is wound around them: much after the ſame manner as the taylors do the threaded needles they keep in their ſleeves, &c. This *ſuture* is performed two ways; for either the needles are paſſed acroſs the wound, or they are ſtuck on the ſides thereof. This kind of *ſuture* is uſed in the cure of a *hare*-LIP.

All the *ſutures* hitherto mentioned are made with needle and thread: but, beſide theſe, there is another kind, called *dry* or *baſtard ſutures*, which are performed with plaſters; or other proper viſcous matter, to keep the lips of the wound united.

SUTURE, *the dry*, is ordinarily made with ſmall pieces of leather, or linen cloth, indented like a ſaw, ſo that the teeth may fall between each other, and the whole row may be cloſed. The cloth, before it is cut into this form is ſpread with ſome proper plaſter in order to its firm adheſion.

This is to be uſed in ſlight wounds, and eſpecially when they happen in the face; and indeed, wherever it may appear of force enough to keep the lips of the wound together; and as it gives no freſh pain, and occaſions no ſcar, it is much fitter for wounds of the face than the needle. The plaſters, which are to form the *dry ſuture*, ſhould be of a ſufficient length, and ſhaped like the part to which they are to be applied, ſo as to ſurround the greateſt part of it, but not the whole, leſt they ſhould retard the circulation of the blood, and bring on tumors, and miſchiefs of that kind: they muſt alſo be ſuch as will ſtick very faſt; the diachylon, if good, or the common ſticking plaſter, are fitteſt for this purpoſe. The hæmorrhage being well ſtopped, and the wound well cleanſed, ſome vulnerary balſam of the gummy kind, as the balſam of Peru, or the like, is to be applied; and over all a ſticking plaſter is to be laid, adapted to the ſize of the part. Two or more of theſe may be applied, as occaſion ſhall require, leaving a ſpace between, and they are to be ſecured in their place by the application of proper bolſters and bandages.

Petit's method of making the *ſuture* of this kind, is by letting the plaſters have one, two, or more openings in the middle, through which the ſurgeon may diſcover, as by the ſpaces left between in the former method, whether the lips of the wound are properly united or not; and may alſo be able to apply proper remedies on the part, without removing the plaſters. Theſe plaſters are applied in the ſame manner as the former, and left on till the work is completed.

But there is alſo yet another manner of performing the *dry ſuture*, viz. ſpread two plaſters upon ſtrong cloth, anſwering in ſize to the wound; to the ſides or margins of theſe faſten three or four tape ſtrings, according to the length of the wound, and then, after warming the plaſters, apply them on each ſide of the wound, at about a finger's breadth from it; after this bring the lips of the wound together, dreſs it as in the former method, and while an aſſiſtant keeps the lips of the wound together in a proper ſituation, tie the ends of the tapes, firſt in a ſingle, and afterwards in a ſlip knot, to keep the part in contact; over each of theſe ſhould be laid an oblong compreſs, and over all a large ſquare one, and the whole kept on by a proper bandage. The day following the wound is to be again examined, and if the tapes are looſened, they muſt be drawn tighter again; but if they are not looſened, let them remain untouched, and only moiſten the parts with a few drops of balſam, and cover them up again with the compreſſes and bandages, as before. Some inſtead of the tape, uſe claſps of braſs, or ſteel; but this method is much leſs convenient than the former, and therefore is little uſed. Heiſter.

In the other kinds of *ſutures*, the ſtitches ought always to be taken of a depth proportionable to that of the wound; care being had to avoid the nerves as much as poſſible. In long wounds they are beſt begun at the ends; but in ſhort ones at the middle.

SUTURE *of the abdomen and inteſtines*. See GASTRORAPHY, and *Wounds of the* INTESTINES.

SUTURE *of the tendons*. See TENDON.

SUTURE, in *Anatomy*. See SYNOTHROSIS.

SWAB, a ſort of mop formed of a large bunch of old rope-yarn, and uſed to clean the decks and cabins of a ſhip. Hence,

SWABBER, the title of an inferior officer on board a man of war, whoſe office is to take care the ſhip be kept neat and clean.

In order to this, he is to ſee her waſhed well once or twice a week at leaſt; eſpecially about the gun-wales and chains.

He ought alſo to burn pitch, or ſome ſuch thing, now-and-then between decks, to prevent infection, and to acquaint the captain with ſuch of the men as are naſty and offenſive.

SWAIN. See BOATSWAIN and COCKSWAIN.

SWAINMOTE. See SWANIMOTE.

SWALLOW, *hirundo*, in *Ornithology*, a diſtinct genus of birds of the order of the *paſſeres*. The characters are, that the beak is extremely ſmall, a little bending, pointed, and depreſſed at the baſe, and the opening of the mouth larger than the very head of the bird.

The characters of this genus, according to Ray, are theſe: they have very large heads, and very ſhort beaks, but very wide mouths, adapted to the ſwallowing large inſects, which are their food; their tails are long and forked, their eggs are white: they are birds of paſſage, and with us are the fore-tellers of ſummer. Linnæus enumerates twelve ſpecies.

We have in England four ſpecies of ſwallows: 1. The *hirundo domeſtica*, or *houſe ſwallow*. 2. The *hirundo agreſtis*, or *martin*. 3. The *hirundo riparia*, called the *ſand-martin*, or *ſhore-bird*. 4. The *hirundo apus*, called the *black martin*, or *ſwift*. Beſide theſe, there are alſo the *hirundo marina*, or *ſea-ſwallow*; the *hirundo Americana*, called TAPERA; the Chineſe *ſwallow*, or *hirundo eſculenta* of Linnæus, whoſe neſt is eaten in ſoups, &c.

The common houſe or chimney *ſwallow*, or *hirundo ruſtica* of Linnæus, is well known every where with us, and is ſometimes ſeen all over of a fine white. This ſpecies is diſtinguiſhed from all others by the ſuperior forkyneſs of its tail, and by the red ſpot on the forehead and under the chin. It is obſerved, that the exterior feathers of the tail are much longer in the male than in the female. Its food is the ſame with that of others of its kind, viz inſects, for the taking of which in their ſwifteſt flight, nature hath admirably contrived their ſeveral parts: their mouths are very wide to take in flies, &c. in their quickeſt motion; their wings are long, and adapted for diſtant and continual flight; and their tails are forked, to enable them to turn the more readily in purſuit of their prey. The firſt brood of *ſwallows* are obſerved to quit the neſt the laſt week in June, or the firſt in July, and the laſt brood towards the middle or end of Auguſt. The *ſwallow* has a ſweet note, which it emits in Auguſt and September, perching on houſe-tops.

This ſpecies appears in Great Britain near twenty days before the martin, or any other of the *ſwallow* tribe. They leave us the latter end of September. See MIGRATION.

The martin, or martlett, or *hirundo urbica* of Linnæus, has a very broad and flat head, and a very broad beak pointed at the end; its legs are very ſhort and its claws white; the head and upper part of the body, except the rump, are black gloſſed with blue; the breaſt, belly, and rump are white; it is inferior in ſize to the former ſpecies, and its tail is much leſs forked; its toes are all covered to the very claws, with a white downy plumage, by which it is diſtinguiſhed from all the other *ſwallows*.

The ſand-martin, the *hirundo riparia* of Linnæus, or ſhore-bird, or ſand-*ſwallow*, is the ſmalleſt of all the *ſwallow* kind. Its head, neck, and back are of a mouſe-colour; its breaſt and belly white; and it has a ring of brown round the lower part of its throat. It builds in the banks of rivers, and makes its neſt of ſtraw, the ſtalks of plants, &c. and covers it with feathers. It is not uncommon with us, but is extremely plentiful in Spain, in the ſummer months, where it is eaten, and is called by the common people, *papilion di montana*.

The black martin, or ſwift, the *hirundo apus* of Linnæus, by ſome called the diveling, is the largeſt of all the *ſwallow* kind; its head is remarkably broad and flat; its beak is very ſmall, ſhort, and weak; but its mouth opens to an immenſe width, like that of the goat-ſucker, or churn-owl; it is all over of a brown colour, with a ſlight admixture of green, and has no other variegation, but a greyiſh white ſpot at the top of its throat; its legs are extremely ſhort, and its feet remarkably ſmall; it feeds on beetles and other inſects, and ſeldom alights on the ground, the ſhortneſs of its legs making it not eaſy for it to riſe again.

It is more on the wing than any other of the *ſwallows*; its flight is more rapid, and attended with a ſhrill ſcream. This ſpecies appears in our country about fourteen days later than the ſand-martin; but differs greatly in the time of its departure, retiring invariably about the tenth of Auguſt. Swifts delight in ſultry weather, when they fly in ſmall parties with particular violence; and, as they paſs by ſteeples, towers, &c. where their mates perform the office of incubation, emit a loud ſcream, which is, as ſome ſuppoſe, a ſort of ſerenade to their reſpective females. Ray and Pennant.

SWALLOW, *water*, *hirundo aquatica*, a name very improperly given by Beſler, and ſome others, to the northern colymbus, commonly known by the name of the LUMME.

SWALLOW, *ſea*, *hirundo marina*, or *pratincola* of Linnæus, the name of a large bird of the *ſwallow* kind. Its belly is all white; its head and back of a duſky brown; its wings and tail are very long and blackiſh, but ſomewhat brown underneath; its tail is forked; its beak black and ſtrong, and its mouth very wide and red within; a black line forms a kind of ring round the throat, paſſing by the eyes to the ears; the legs are lead-coloured or reddiſh.

SWALLOW, *ſea*, is alſo a name given to the STERNA *hirundo* of Linnæus. See TERN.

SWALLOW-*fiſh*, *hirundo piſcis*, or, as it is called in Cornwall, the *tub-fiſh*, a ſea-fiſh of the *trigla* kind, remarkable for the ſize of its gill-fins. See *Sapphirine* GURNARD, and *Tab.* V. *Fiſh*, N° 55.

SWALLOW-*fly*, in *Natural Hiſtory*, the name of the CHELIDONIUS, a fly very remarkable for its ſwift and long flight.

SWALLOW-*ſtone*, *chelidonius lapis*, in *Natural Hiſtory*, the name of a ſtone which Pliny, and many other authors affirm to be found in the ſtomachs of young *ſwallows*. It is always deſcribed to be ſmall, roundiſh, convex on the outſide, and concave on the other, and of a browniſh, yellowiſh, or blackiſh colour: this, and the figures given of it, plainly ſhew that it is either a ſmall ſpecies of the lycodontes, or bufonitæ, or elſe a detached piece of one of the compound ICHTHYPERIA, or, as they are vulgarly called, *ſiliquaſtra*.

De Boot tells us, that he cut up ſeveral young *ſwallows*, but never found any ſuch ſtones in them; and indeed it is no wonder, ſince they are not to be looked for there, but in the jaws of the wolf-fiſh, or in the palates of ſome of the leſs known kinds.

SWALLOW-*wort*, *hirundinaria*, or *aſclepias*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: the flower hath an empalement of one leaf, which is cut into five acute ſegments; and the petal is alſo of one leaf divided into five oval parts, which are reflexed; in the centre are ſituated five nectariums, which encompaſs the parts of generation; theſe have horns which turn towards the ſtamina, which are joined in a truncated body encloſed by five ſcales, and are ſcarcely viſible; it has two oval pointed germina, which become two large oblong ſwelling pods ending in a point, which open with two valves in one cell, filled with compreſſed ſeeds, lying over each other like tiles in a houſe, and are crowned with a ſoft down. Miller enumerates twenty, and Linnæus nineteen ſpecies.

The common *ſwallow-wort* of the ſhops, with a white flower, called *vincetoxicum* and *hirundinaria*, is alſo denominated tame-poiſon, becauſe it has been deemed a powerful counter-poiſon. The flowers appear in June, and the ſeeds ripen in September. It grows naturally in the ſouth of France, Spain, and Italy; and is ſaid alſo to grow wild in gravelly grounds in ſome parts of England. The root has, when freſh, a moderately ſtrong but agreeable ſmell, approaching to that of wild valerian, which in drying is in a great degree diſſipated; chewed, it impreſſes firſt a conſiderable ſweetneſs, which is ſoon ſucceeded by an unpleaſant ſubacrid bitteriſhneſs: an extract made from it by water is moderately ſweetiſh, balſamic, and bitteriſh; the ſpirituous extract is ſtronger in taſte, proportionably ſmaller in quantity, and retains a part of the ſpecific flavour of the root. It is recommended as reſolvent, ſudorific, and diuretic; in catarrhal, cachectic, and ſcrophulous diſorders, and in uterine obſtructions; in doſes of from a ſcruple to a dram or more in ſubſtance, and three or four drams in infuſion. It has been employed by ſome of the Germans as an alexipharmic, and hence received the name of *contrayerva Germanorum*. Some, however, have ſuſpected it to poſſeſs noxious qualities, and obſerve that when freſh it excites vomiting. Among us it is ſcarcely ever made uſe of in any intention. Lewis.

SWALLOW-*wort*, in *Botany*, is alſo a name given to the STAPELIA.

SWALLOWING. See DEGLUTITION.

SWALLOWING, *difficulty of*, in *Infants*. See INFANT.

SWALLOWS-TAIL, in *Fortification*. See QUEUE *a aronde*.

SWALLOWS-TAIL, in *Joinery* and *Carpentry*, denotes a particular way of faſtening together two pieces of timber, ſo ſtrongly as that they cannot fall aſunder. See DOVE-*tail*.

SWAN, in *Aſtronomy*. See CYGNUS.

SWAN, *cygnus*, in *Ornithology*, a ſpecies of the ANAS or DUCK kind in the Linnæan ſyſtem, of which there are two varieties, viz. the wild and tame *ſwan*.

The *wild ſwan*, or *anas cygnus ferus* of Linnæus, called alſo *elk* and *hooper*, is leſs than the tame ſort; the lower part of the bill is black; the baſe of it, and the ſpace between that and the eyes is covered with a naked yellow ſkin; the eye-lids are bare and yellow; the whole plumage in old birds is of a pure white; the down is very ſoft and thick, and the legs black.

The cry of this bird is very loud, whence its name *hooper*. The wild *ſwan* frequents our coaſts in hard winters in large flocks, but Mr. Pennant apprehends that it does not breed in Great Britain. *Swans* come in October in great numbers to Lingey, one of the weſtern iſles, and continue there till March, when they retire more northward

ward to breed. At Main-land, one of the Orkneys, *ſwans* are the countryman's almanack; as on their quitting the iſland, they preſage good weather, and on their arrival, they announce bad.

The *tame ſwan*, or *anas cygnus manſuetus* of Linnæus, is the largeſt of the Britiſh birds. It is diſtinguiſhed externally from the wild *ſwan*, firſt, by its ſize, being much larger; ſecondly, by the bill, which is red, and the tip and ſides black, and the ſkin between the eyes and bill is of the ſame colour. Over the baſe of the upper mandible projects a black callous knob; the whole plumage in old birds is white; in young aſh-coloured till the ſecond year; the legs duſky, and in ſome varieties red. The *ſwan* lays ſeven or eight eggs, and is near two months in hatching. It feeds on water-plants, inſects, and ſhell-fiſh. No bird perhaps makes ſo inelegant a figure out of the water, or has the command of ſuch beautiful attitudes in that element as the *ſwan:* thus deſcribed by Milton, Paradiſe Loſt, book vii.

> *The ſwan with arched neck*
> *Between her white wings mantling, proudly rows*
> *Her ſtate with oary feet.*

In former times this bird was ſerved up at every great feaſt: and it is ſaid that cygnets are to this day fattened at Norwich about Chriſtmas, and ſold for a guinea a-piece. *Swans* were formerly held in ſuch great eſteem in England, that by an act of Edw. IV. c. 6. no one, that poſſeſſed a freehold of leſs clear yearly value than five marks, was permitted to keep any, other than the ſon of our ſovereign lord the king; and by 11 Hen. VII. c. 17. the puniſhment for taking their eggs was impriſonment for a year and a day, and a fine at the king's will. It is alſo ſaid, that if *ſwans* be lawfully marked, it is felony to ſteal them, though at large in a public river; and that it is likewiſe felony to ſteal them, though unmarked, if in any private river or pond, otherwiſe it is only a treſpaſs.

Theſe birds were by the ancients conſecrated to Apollo and the Muſes; and upon this idea ſeems to have been ingrafted the notion which they had of *ſwans* being endowed with a muſical voice: and the fable might likewiſe ariſe from the doctrine of the tranſmigration of ſouls into the bodies of animals, under the perſuaſion that the body of the *ſwan* was allotted for the manſion of departed poets. In time a *ſwan* became a common trope for a bard. Beſides theſe opinions, the ancients apprehended that the *ſwan* foretold it own end; for explaining which, Mr. Pennant ſuggeſts the conſideration of the twofold character of the poet, viz. *vates* and *poeta*, which the fable of the tranſmigration might aſcribe to the bird, or they might be ſuppoſed to derive that faculty from Apollo their patron deity, the god of prophecy and divination. As to their being ſuppoſed to ſing more ſweetly at the approach of death, Plato (Pſeudo, Ed. Cant. l. 683. p. 124.) attributes that unuſual melody to the ſame ſort of extacy that good men are ſometimes ſaid to enjoy at that awful hour, foreſeeing the joys that are preparing for them on putting off mortality. The notion, however, was a popular one long before the time of Plato; for Æſchylus alludes to it in his Agamemnon; Clytemneſtra ſpeaking of Caſſandra ſays———

> —— η δε τοι, κυκνου δικην
> Τον υστατον μελψασα θανασιμον γοον,
> Κειται.
>
> ——*She, like the ſwan*
> *Expiring, dies in melody.*

Pennant Brit. Zool. vol. ii. p. 565, &c.

Bartholine has given an accurate account of the anatomy of the wild *ſwan*, and of the ſtructure of its œſophagus, and the wind-pipe, which is very remarkable. Theſe are ſo framed that they go down together into the ſternum; and, after reaching its bottom, they turn up again, and the wind-pipe riſing out of the ſtreights of the ſternum, climbs up the intermediate clavicles, on which it leans, as on a baſe, and then bends to the thorax; but before it come to the thorax and lungs, it forms a ſort of larynx, with an os hyoides, covered with a thick membrane, and reſembling a muſical pipe, wide above, but with a narrow ſlit, and ſtraight, and depreſſed below: under this larynx, before the windpipe enters into the lungs, it is divaricated into two branches like unto bronchia, thicker in the middle, but narrower where they are near the lungs. In this particular it differs from the human aſpera arteria, which, it is true, is divided into branches, but that is not before it has entered into the lungs. Bartholin. Diſſert. de Cygni. Anatom. See remarks on the wind-pipe of the wild *ſwan* in Phil. Tranſ. vol. lvi. p. 205, &c. See alſo **Crane**, **Colum**, &c.

Swan-*ſhell*. See **Cigne**.

SWANIMOTE, or **Swainmote**, a court touching matters of the foreſt, kept, by the charter of the foreſt, thrice in every year, before the verderers, as judges.

This court is as incident to a foreſt as a court of piepowder to a fair.

Its juriſdiction is to enquire into the oppreſſions and grievances committed by the officers of the foreſt, and to receive and try preſentments certified from the court of **attachments** againſt offences in vert and veniſon.

SWARTH, among *country people*, the ſame with *ſwath*.

SWATH, a word uſed by *country people* for a row of graſs or corn, as laid by the mower.

Swath, *faſcia*, among *Surgeons*, a long and broad band to bind up any diſeaſed member, or part. See **Bandage**.

SWARDY, in *Agriculture*, a term uſed by the farmers for a ſoil well covered with graſs.

SWARM, denotes a large body or number of bees, or of other ſmall animals: the term is particularly applied to a number of bees that emigrate in a body from a hive. Every *ſwarm* is compoſed of a queen, many common bees, both old and young, and drones, the number of which is uncertain.

The nature of the annual new *ſwarms* of bees, which we ſee depart from old hives, is not to be truly underſtood, otherwiſe than by knowing the hiſtory of the propagation of the ſpecies among theſe animals, for which ſee **Bee** and **Queen**-*bee*.

Some have ſuppoſed that thoſe *ſwarms* which have moſt drones are the moſt likely to proſper; but this has been controverted by others. The multitude of *ſwarms* does not forebode the proſperity of an apiary: neither do thoſe earlieſt *ſwarms*, ſuch as thoſe that riſe towards the latter end of April or the beginning of May, prove the beſt or proſper moſt; but thoſe that happen at the latter end of May, or beginning of June, are the moſt promiſing.

If a hive has been very well peopled during the winter, the young progeny go out early in the ſpring; and if it hath been very thinly peopled, it is ſometimes as late as the middle of June before they go, even without any accidental delay from the want of a queen. But the two principal ſwarming months are May and June.

The people who manage bees, are informed of the time when they are going to ſend out new *ſwarms* by ſeveral ſigns. One is, when the hive is ſo peopled, that many of the bees cannot find room within, but ſtand in cluſters on the outſide of the hive; another is the appearance of a large number of drones, or male bees eſpecially if the weather be clear, calm, and warm; for in a cloudy, wet, and ſtormy ſeaſon, the firſt *ſwarms* ſeldom or never riſe, though the caſts, or ſecond *ſwarms*, often riſe in indifferent weather: theſe, however, are not certain ſigns, nor do they point out the very day of the *ſwarming*; but there is one which declares it very punctually, which is the obſerving, that though the hive be very full, and the day very fine, yet very few bees go out in ſearch of honey; in this caſe it is a certainty that they are aſſembling themſelves in the hive, and preparing to be gone in a very little time. If a perſon go near the hives, that are ready to ſend out *ſwarms*, in the evening, or even in the night, he will hear a ſort of humming noiſe in them, which is not to be heard at ſuch times on any other occaſion: in ſhort, the whole is in agitation on the occaſion, and the tumult never ceaſes till the new colony goes out.

The ſignal of the going out of a *ſwarm* from a hive is ſometimes only a humming noiſe made by one ſingle bee, but that a very particularly acute, and clear ſound: this ſeems to be the voice of the new queen, or female bee, calling together the *ſwarm* that is to follow her out, and animating them with a ſort of martial muſic for the great adventure they are going to engage in.

It is rare to hear theſe previous notices given for a firſt *ſwarm*; but the time of ſecond *ſwarms* may generally be fixed within a day or two, by means of theſe diſtinct and muſical notes, which are always heard two or three days before they riſe. Eight or nine days after the firſt *ſwarm* is gone, one of the young princeſſes addreſſing herſelf to the queen-mother, petitions for leave to withdraw and erect a new empire, with a ſelect body of the populace. For a day or night the regent gives no anſwer, but the young princeſs perſiſts in her ſuit, and at laſt ſucceeds. The ſecond night the queen, with a very audible voice, iſſues her royal grant, and proclaims it through the whole kingdom; and the following day, the weather being tolerable, you may expect the *ſwarm*. When it is ready to come forth, the notes are louder, quicker, and more conſtant; when the greater part of the *ſwarm* is out, the muſic is then at an end.

All the different modulations of ſounds made by the bees, are the effect of the different vibrations of their wings in the air. It has been ſuppoſed by Swammerdam, that the air iſſuing from the ſtigmata of the body was very inſtrumental to the making of this ſound; but this is proved to be an erroneous conjecture, by the eaſy experiment of cutting off a bee's wings, which always renders the creature perfectly mute, though this could not be the caſe, if the voice proceeded from other parts. It is evident, therefore, that all the ſounds of the bee are made by the ſtriking of its wings againſt the air; and it ſeems very eaſy to imagine, that when the motion of wings can make a ſound, the more quick or ſlow motion of them can modulate it in a different manner, and the moving them in ſeveral different directions, may alſo add greatly to the variety.

The hours of going out of *ſwarms* are generally between eleven in the morning and one or two in the afternoon: the air is at this time very hot, and the ſun often ſhines brightly on the ſurface of the hive; the effect of this, in cauſing them to go out, is eaſily conceived. The few who are neareſt the mouth of the hive, and are ready to follow their queen, ſoon find that this is a pleaſant ſeaſon for their expedition, and the numbers of others, which remained irreſolute in the inner parts of the hive, now find the natural heat of the place increaſed to ſo great a degree by the action of the external warmth, that it is very natural for them to reſolve at once to depart with thoſe which are going off, in order to find a place where they may be more at eaſe, or leſs crowded and heated in their habitation. People, who have the care of bees ſhould attend to their *ſwarming* or going out on theſe occaſions; and if they are not at leiſure to watch them in the hours before mentioned, ſhould defend the hives, during that part of the day, from the heat of the ſun, that they may not go off and be loſt.

Immediately before the going out of a *ſwarm* there is heard a prodigious humming in the hive, much greater than what is heard at any other hive, and immediately after this, the openings of the hive are crowded with bees, in a violent hurry to get out; thoſe which firſt come out immediately take flight, and if the female, or queen, be among theſe, vaſt numbers immediately follow, and the air is ſeen as full of them, as it is of flakes of ſnow in a winter ſtorm; and, in fine, it is not a minute before all the bees, that are to make the new *ſwarm*, are out of the hive: when the body is thus joined, they riſe and fall in the air, and ſeem very curious in chooſing a place where to fix themſelves. It does not appear that the female bee chooſes the place for them, but they all ſeem to be aſſiſtant in it; and as ſoon as they have fixed upon a proper branch of a tree, or the like, they all fly towards it, and begin to form a cluſter in one part of it. The female does not place herſelf at the head of this cluſter, but ſits on the branch near it, to ſee how ſhe approves the management; as ſoon as the cluſter is of a proper ſize, ſhe adds herſelf to it, and from that inſtant it thickens in a ſurpriſing manner, all trying firſt to fix themſelves to the reſt, ſo that in a quarter of an hour they are all collected together in a vaſt maſs, hanging to one another by the legs. In this condition they remain abſolutely quiet, though expoſed to the open air, and there are no more of them ſeen flying looſe about, than there are about the hives in a ſummer's day.

When the time of a *ſwarm's* going out of the hive is expected, the people, who have the care of them, ſhould always be prepared with a hive to receive them; and when the *ſwarm* ſettles upon ſome branch of a buſh, or low tree, the hiving of them is an eaſier matter than could be imagined. See HIVING.

The hives of bees are commonly placed in gardens, that the bees may have ſome flowers at leaſt in their own neighbourhood, and not be compelled to go far in ſearch of food; and the *ſwarms* from theſe hives always ſucceed beſt, when there are ſome buſhes, as of filberts, barberries, or the like, in the garden, as well as high trees; for when the bees take a high flight, they often take a very long one before they ſettle, and ſometimes go ſo far, that the eye cannot trace them to the place of their ſettling; in which caſe, all attempts to ſearch for them are uſually vain, and they are loſt entirely. The low buſhes in view uſually determine them to low flights, and if they are ſeen to be aſcending too high, the cuſtom is to throw handfuls of duſt and ſand upon them; this uſually brings them down, as they probably miſtake the particles for drops of rain.

Another very ancient cuſtom, and which is continued to this day, is the beating on inſtruments of braſs, and the like, to make a great noiſe, while they are gathered in the air: it is pretended, that this diſpoſes to fix themſelves the ſooner. The origin of this cuſtom has been an obſervation, that thunder always ſends thoſe bees, which are abroad, from the flowers back to the hive, and it is ſuppoſed that this artificial noiſe may have the ſame effect; but in all probability, the bees are better acquainted with thunder than to be thus deceived: there is indeed much more probability of their miſtaking the particles of duſt, falling upon their backs, for drops of rain, than taking ſo unlike a ſound for thunder; for it is found by experience, that the making all the noiſe that can be conceived, this way, never was able to drive one bee from a flower where it was buſy, or to ſend one ſtraggler home. Reaumur Hiſt. Inſ. vol. x p 290. Thorley's Enquiry, &c. c. 6.

SWARM, *after*. See AFTER-*ſwarm*.

SWAYING, in *Sea Language*. See JEERS.

SWEALING *a hog*, a term uſed in many parts of the kingdom for ſingeing a hog.

SWEARING, *profane*. See PROFANENESS.

SWEARING, *the peace*. See PEACE.

SWEAT, a ſenſible moiſture iſſuing out of the pores of the ſkin of animals, through too much heat, exerciſe, or weakneſs; or through the action of certain medicines called *ſudorifics*. See PERSPIRATION.

Sweat is either the conſequence of an acceleration of the blood's motion, by ſtimuli, or exerciſe; or of a relaxation of the pores of the cutis; by means of either whereof, the matter which before perſpired inſenſibly, is now rendered ſenſible. The former is the caſe in natural and medicinal *ſweats*, and the latter in morbid, fainting, and cold *ſweats*.

The principal organs of *ſweat* are the miliary glands; which are ſpread over the whole ambit of the body; and furniſhed each with a vein, artery, and nerve, beſides an excretory duct, through the orifice whereof the *ſweat* is caſt out under the cuticle. This duct is covered with a little round valve, lying immediately under the cuticle, whereby the *ſweat* is occaſionally either retained or tranſmitted.

The *ſweat*, thus ſecreted, is various, according to the variety of the weather, ſoil, ſex, age, temperament, emunctory, diet, time of digeſtion, &c. as in the urine. In a ſound body, *ſweat* is ſcarce ever found, but from a fault in ſome of the ſix non-naturals: its immediate effect is always hurtful; by accident ſometimes it does good.

The phyſicians order *ſweats* in cold and inveterate diſeaſes, as the palſy, rheumatiſm, ſciatica.

Many diſtemperatures of the body have their riſe, as well as their cure, by means of the differences of this evacuation.

Sweating is indicated by the beginning of critical *ſweat*, to carry off the diſeaſes; by the tenuity of the morbid matter diſperſed through all the veſſels, as in the plague, a venomous bite, or the French diſeaſe, before it is yet fixed; by the particular temperature of the patient, and by various obſtructions to be removed in the ſeveral parts of the body; particularly in ſubcutaneous diſeaſes, the itch, pſora, leproſy, &c.

The faults of our *ſweats*, in regard to the general health of the body; are reduced principally to three kinds. 1. They are too exceſſive: they uſually happen early in the morning, as ſoon after three o'clock, and are in ſome degree periodical; but in others they are rather continual, or have very few intermiſſions. 2. The uſual and habitual ſecretions by *ſweat* are ſubject to be impeded, or retarded, and hence many diſtempers take their riſe. And, 3. There is in ſome particular people a remarkable difficulty of being brought to *ſweat* at all.

The perſons principally ſubject to too profuſe *ſweats*, are men of a plethoric and ſanguineo-phlegmatic temperament; theſe, on the ſlighteſt motion of the body, are uſually thrown into profuſe *ſweats*; and the ſame perſons are uſually ſubject to violent nocturnal *ſweats* in the ſpring and autumn ſeaſons. Perſons in hectics alſo, when near the time of their death, uſually fall into profuſe nocturnal *ſweats*, which are always a fatal prognoſtic.

The perſons principally ſubject to a natural difficulty of *ſweating*, are thoſe who have a mucous and thick dyſcraſy of the humours; and ſometimes perſons of very tender and delicate conſtitutions, who are ſubject to emotions of the blood, and are continually thin in fleſh.

Prognoſtics in ſweats. A profuſe *ſweat*, though it conſiderably waſtes the fleſh and ſtrength, yet is leſs dangerous when left to itſelf, than when raſhly ſuppreſſed. The conſequences of habitual *ſweats* being ſuppreſſed, are uſually according to the habit and diſpoſition of the patient, either cutaneous eruptions, as the itch, and the like; as catarrhs, coryzas, gravedos; and ſometimes they bring on congeſtions, inflammations, and convulſions.

Method of treatment. So long as *ſweats* bring on no bad ſymptoms in illneſſes, they are to be rather promoted than checked, even though they may ſeem profuſe in quantity; and in this caſe, the proper regimen is a moderate warmth, a quiet ſtate of the body, and frequent draughts of warm liquors; but when the ſtrength is found to be too much exhauſted by theſe *ſweats*, ſmall doſes of nitre are found of great ſervice.

When different diſorders ariſe from the ſuppreſſion of *ſweats*, nothing is of greater ſervice than the compound powder of antimonium diaphoreticum, crabs eyes, and nitre, given in ſmall doſes every three hours; and a quiet poſture of the body is to be ordered, which greatly tends to promote *ſweating*; and frequent draughts of warm and weak liquors are to be taken, and the bowels are to be relaxed with a clyſter, or a gentle purge, if there be no ſymptom neceſſarily forbidding it. In regard to thoſe perſons, who are naturally very difficult to be *ſweated*, a draught made of freſh arum-root and wine, or vinegar, uſually brings on profuſe *ſweating*, if they are put to bed, and warm liquors drank afterwards. It is a very good general caution, that profuſe *ſweats*, if they have continued ever ſo many months, are never to be repreſſed by aſtringents; for in that caſe they are uſually attended with ſymptoms much worſe than the original complaint. The common method of forcing out ſuppreſſed *ſweats* by the hot alexipharmics and volatile ſalts is by no means adviſeable in any caſe. Bleeding, judiciouſly timed, is often of very great ſervice in promoting *ſweats*. When the natural *ſweats* of children are repelled, they become ſuddenly feveriſh and ill, and nothing relieves them till the *ſweats* are recalled. This may be done ſimply, by keeping them warmer than before, in moſt caſes; but when that fails, the gentle abſorbents are to be preſcribed, and if they ſuck, the nurſe may take the common alexipharmic medicines: crabs-eyes are as proper as any thing for the child in this caſe, and for the nurſe the lapis contrayerva. The convulſions of children very often ariſe from the ſuppreſſion of their *ſweats*, and are always then taken off by making them *ſweat* again. Junker's Conſp. Med. p. 330.

Matthiolus tells us, that the *ſweat* of all quadrupeds, as horſes, aſſes, &c. is venomous; and that that of other beaſts is unwholeſome. Tachenius adds, that the *ſweat* of horſes, particularly, is ſo acid, that it pierces the ſtrongeſt and firmeſt boots, which are proof againſt all water. Some naturaliſts affirm, that dogs and cats never *ſweat*, how hot ſoever they be, becauſe they are not found to have any pores in the cuticle.

The *ſweat* of human bodies has ſometimes been obſerved to be phoſphoraceous. This once happened to a perſon who uſed to eat great quantities of ſalt, and who was a little ſubject to the gout, after ſweating with violent exerciſe. Stripping himſelf in the dark, his ſhirt ſeemed to be all on fire; and, upon examination, red ſpots were found upon his ſhirt, and the phyſician who was preſent perceived an urinous ſmell, though it had nothing in it of volatile alkali, but of the muriatic acid; ſuch as iſſues from cabbage much ſalted and ſtrongly fermenting. This fact indicates the connection that ſubſiſts between the light of PHOSPHORUS, and that of putreſcent ſubſtances.

SWEATH, the ſame with SWATH.

SWEATING-*houſe*. The natives of North-America, when we firſt ſettled among them, had a great many houſes to *ſweat* in, it being their general remedy for diſeaſes of whatever kind; but at preſent they are leſs uſed among them.

The cave, or *ſweating-houſe*, was uſually eight feet in diameter, and four feet high, the roof being ſupported by ſticks, or boards. They uſually dug theſe caves in the ſide of a hill, and as near as could be to ſome river, or pond. The entrance into the cave was ſmall, and when any perſon was *ſweating* in it, the door was covered with a blanket or ſkin. Near the cave they uſed to make a large fire, and heat in this a quantity of ſtones, perhaps five hundred weight; theſe they rolled into the cave, and piled up in a heap in the middle. When this is done the Indians go in naked, as many as pleaſe, and ſit around the heap of ſtones; and as ſoon as they begin to grow faint, which is uſually in a quarter of an hour, they come out, and plunge themſelves all over in the water, remaining in it a minute or two; and repeating this a ſecond time, they dreſs themſelves and go about their buſineſs.

This has been for many ages uſed among them with ſucceſs, in caſes of colds, ſurfeits, ſciaticas, and pains fixed in their limbs, and the Engliſh have often uſed the ſame means, and found relief by it. It it practiſed equally at all times of the year, and the Indians do it not only in ſickneſſes, but by way of refreſhment after long journies, and other fatigues, and to ſtrengthen themſelves for any expeditions. Philoſ. Tranſ. Nº 384. p. 131.

SWEATING-*turf*. See TURF-*ſweating*.

SWEATING-*iron*, in the *Manege*, is a piece of a ſcythe about a foot long, and of the breadth of about three or four fingers, very thin, and ſuch as cuts only with one ſide. When a horſe is very hot, and the grooms have a mind to leſſen the *ſweat*, or make it glide off, they take this knife or iron in their two hands, and gently run the cutting edge along the horſe's ſkin, commonly with the grain, or as the hair lies, and but ſeldom againſt it; with intent to ſcrape off the *ſweat*, and dry the horſe.

SWEATING-*room*. See an account of the remains of a Roman *ſweating-room* in the Philoſophical Tranſactions, Nº 461. ſect. 29. See HYPOCAUSTUM.

SWEATING *ſickneſs*, the name of an epidemic diſeaſe, firſt perceived in England in 1485. It was properly a ſort of plague, thus called, becauſe attended with an extraordinary kind of ſweat. It made its return four times in the ſpace of ſixty-ſix years, viz. in 1506, 1517, 1528, and 1551.

It began with a ſweat, which never ended but either with the death of the patient, or his recovery. If he ſurvived twenty-four hours, he was ſafe. Few people eſcaped of it at firſt: too much care, and too little, were found equally deſtructive.

The patient was to continue without ſtirring, either in his bed, or in his cloaths, according to the condition nature was ſurpriſed in; without burthening him either with remedies or with food; without clothing either too much or too little; and, if poſſible, without either eating or drinking. The ſweat to be kept up, without either promoting it, by any extraordinary heat, or checking it by the leaſt cold.

This was what was found by experience, and which was at length practiſed with happy ſucceſs. The diſeaſe was firſt felt on the twenty-firſt of September, and in the ſame day ſpread itſelf all over England; where, after a great mortality, it ſtopped all at once towards the end of October.

Its ravages were ſo great, that in ſome parts it took off a third part of the people in a very little time.

At its return under Henry VIII. in 1506, it was as general, and as dangerous as before, and again diſappeared all at once. At the attack in 1528, it was leſs fatal, inſomuch that Bellay, biſhop of Bayonne, then ambaſſador in England, who ſweated like the reſt, tells us, that of forty thouſand ſouls, ſeized with it in London, only two thouſand died. In 1534, it paſſed over into Ireland, where it killed great numbers.

SWEDISH *coins*, and *meaſures*. See the ſubſtantives.

SWEEP, among *Refiners*, the almond-furnace. See ALMOND, and FURNACE.

SWEEP, among *Goldſmiths*, *Moneyers*, &c. See WASHING.

SWEEP, in the *Sea Language*. The ſeamen call the mold of a ſhip, when ſhe begins to compaſs in at the rung-heads, the *ſweep* of her, or the *ſweep* of the futtock.

SWEEP-*bar of a waggon*, is that which is fixed on the hinder part of the fore-guide, and paſſes under the hind-pole, which ſlides upon it.

SWEEPING, at *Sea*, ſignifies dragging along the ground, the bight, or looſe part of a ſmall rope, in a harbour or road, in order to hook or recover ſome anchor, wreck, or other materials ſunk at the bottom. It is performed by faſtening the two ends of this rope to the ſides of two boats which are abreaſt of each other, at ſome diſtance. To the middle of the rope are ſuſpended two cannon-ſhot, or ſomething which weighs heavy, in order to ſink it to the ground; ſo that, as the boats advance, by rowing a-head, the rope drags along the bottom, to hook any anchor, &c. for which they are ſearching.

SWEET. By a *ſweet* is underſtood any vegetable juice, whether obtained by means of ſugar, raiſins, or other foreign or domeſtic fruit, which is added to wines, with a deſign to improve them. It is plain, from the making of artificial muſt, or ſtum, by means of fine ſugar, with a ſmall addition of tartar, that the art of *ſweet*-making might receive a high degree of improvement, by the uſing pure ſugar, as one general wholeſome *ſweet*, inſtead of thoſe infinite mixtures of honey, raiſins, ſyrups, treacle, ſtum, cyder, &c. wherewith the *ſweet*-makers ſupply the wine-coopers to lengthen out, or amend their wines: for pure ſugar being added to any poor wine, will ferment therewith, and improve it and bring it to a proper degree of ſtrength and vinoſity. If the wine that is to be amended is tart of itſelf, no tartar ſhould be added to the ſugar; but if it be too *ſweet* or luſcious, then the addition of tartar is neceſſary. Shaw's Lectures, p. 203. See *Artificial* STUM.

The duty on *ſweets* made for ſale is 12*s.* a barrel, 10 Geo. II. c. 17. to which is added another duty of 6*s.* by 20 Geo. III. c. 52. See WINES, *domeſtic*.

SWEET *almonds*. See ALMONDS.

SWEET-*briar*, a ſpecies of the ROSE.

SWEET *gum*. See LIQUIDAMBER.

SWEET-*johns*. See PINK.

SWEET *ſublimate of mercury*. See MERCURY.

SWEET *corn*, a term uſed by the Indians to expreſs a ſort of corn they are fond of, and generally keep in their houſes.

While the ear of the maize, or Indian corn, is yet green, but full, they gather it, and firſt boil, and afterwards dry it, and lay it up for uſe in bags or baſkets. When they eat it, they boil it again, either whole, or groſsly beaten in a mortar; they then mix it with fiſh, or with veniſon, or beaver fleſh, and account it a very fine diſh. The green ears, or freſh *ſweet corn*, they alſo ſometimes eat, as ſoon as it is gathered, roaſting it before the fire, and then picking out the grains. This is a new ſupply of food for them many times, when their winter, or laſt harveſt-ſtore is exhauſted. Their ſoldiers alſo commonly go out to war againſt their enemies about this time of the year, and find this ſupply in their enemies fields. See MAIZE.

SWEET *root*. See LIQUORICE.

SWEET *ſop*, a ſpecies of *annona*. See *Cuſtard* APPLE.

SWEET *ſultan*, a ſpecies of CENTAURY.

SWEET *weed*. See CAPRARIA.

SWEET-*williams*, the Engliſh name of ſeveral ſpecies of pink. See DIANTHUS and PINK.

SWEET-*william of Barbadoes*. See *Scarlet* CONVOLVULUS.

SWEET *willow*. See WILLOW.

SWELL *of an organ*. See ORGAN.

SWELL, in *Sea Language*, generally denotes a heavy and continual agitation of the waves, according to a particular direction; as there is a great *ſwell* ſetting into the bay. It is, however, more particularly applied to the fluctuating motion of the ſea, which remains after the expiration of a ſtorm: and alſo to that which breaks on the ſhore, or on rocks and ſhallows, called SURF. Falconer.

SWELLED *columns*. See COLUMN.

SWELLED *hoof*. See HOOF.

SWELLING. *Swellings* in the face and ſalivary glands, without any fever, or redneſs of the ſkin, ſometimes happen in ſummer months, and often give way to a gentle purge or two.

Theſe *ſwellings* are ſometimes eryſipelatous, and fall chiefly on the forehead and eyelids, and yield to purges and bliſters. Med. Eſſ. Ed. Abr. vol. i. p. 65.

There is a *ſwelling* in one or both of the lower extremities, which ſometimes happens to lying-in women; this diſorder has been little noticed by the writers of our country. Mr. White has lately deſcribed it. The ſymptoms of this diſorder, when in its ſimpleſt ſtate, are theſe: generally in about twelve or fifteen days after delivery, the patient is ſeized with great pain in the groin of one ſide, accompanied with a conſiderable degree of fever; and this part ſoon becomes affected with *ſwelling* and tenſion, which extends to the labium pudendi of the ſame ſide, and down the inſide of the thigh to the ham, leg, foot, and whole limb; and the progreſs of the *ſwelling* is ſo quick, that in a day or two the limb becomes twice the ſize of the other, and is moved with great difficulty, is hot and exquiſitely tender, without any external inflammation. The pain in the groin is generally preceded by a pain in the ſmall of the back, and ſometimes in the bottom of the belly on the ſame ſide: the parts which ſuffer the greateſt pain are the groin, the ham, and the middle of the back part of the leg. In a day or two the pain abates. The *ſwelling* is equal over the whole limb, and in every ſtage is harder and firmer than in the anaſarca; and does not pit when preſſed by the finger, nor yield any water when punctured. It is ſmooth, ſhining, and pale, and in every part even to the touch, except where the conglobate glands are ſituated, which are ſometimes knotty and hard, as in the groin, ham, and middle of the back part of the leg. The parts that firſt begin to mend, both as to pain and *ſwelling*, are the groin and labium pudendi, the thigh next, and laſtly the leg.

Several of the French authors in midwifery, have attributed this diſorder to a depoſition of milk in the glands of the groin, and upper part of the thigh. But Mr. White ſays, this notion is ſufficiently refuted by the obſervation, that it happens under every poſſible ſtate of that ſecretion, whether copious or deficient, encouraged or repreſſed: nor are our beſt writers on puerperal diſorders diſpoſed to admit, that the re-abſorption of the milk is ſo general, or common a cauſe of diſeaſe as foreign writers have maintained. According to Mr. White, the proximate cauſe of this diſorder is an obſtruction, detention, and accumulation of lymph in the limb. In inveſtigating the remote cauſe, he finds that a common trunk of the lymphatics of the leg and thigh paſſes over the bones of the pelvis in its way towards the thoracic duct. This, he apprehends, may in ſome ſubjects be preſſed upon by the child's head as it deſcends into the pelvis during labour. Such a preſſure would cauſe an obſtruction to the paſſage of the lymph flowing through the veſſel; and as it cannot regurgitate on account of the valves, but is ſtill receiving freſh acceſſions of fluid from below, he ſuppoſes it would be ſo diſtended as ſometimes to burſt. The extravaſated lymph would, he imagines, be re-abſorbed; and little or no inconvenience would enſue, till the wound of the lymphatic were cloſed. But as this cannot happen without a great contraction of the diameter of the veſſels, he conceives that the whole ſyſtem of lymphatics, below the cicatrix, would now become ſuddenly diſtended; and not being able to free themſelves, would occaſion a large and painful tumefaction of the limbs, which would not ſubſide till the confined lymph had found a new paſſage by collateral and anaſtomoſing branches, as in the caſe of an arterial trunk tied, on being wounded. The cure of the diſorder, on Mr. White's hypotheſis, muſt be effected by nature, and art can only be in a ſmall degree auxiliary to it: the method of treatment is propoſed and explained in his Inquiry into the Nature and Cauſe of that *Swelling*, in one or both of the Lower Extremities, which ſometimes happens to Lying-in Women. 8vo. 1784.

SWELLING, *white*. See *Fungous* TUMORS.

SWELLING, *diameter of the*. See DIAMETER.

SWERTIA, in *Botany*, a genus of the *pentandria digynia* claſs: its characters are, that the corolla is rotated, and has at the baſe of its ſegments, nectariferous pores; and the fruit is a ſingle-celled, double-valved capſule. There are five ſpecies.

SWIETERIA, *mahogany tree*, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are, that the calyx is divided into five ſegments; it has five petals; the nectarium is cylindric, and bears antheræ; the capſule is five-celled, ligneous, and open at the baſe, and the ſeeds are imbricated and winged. There is only one ſpecies. See CEDAR.

SWIFT, in *Ornithology*. See SWALLOW.

SWIFT, in *Zoology*, a name given by many to the common newt, or EFT.

SWIFTER, in a *Ship*, a rope uſed to confine the bars of the capſtern in their ſockets, while the men are heaving it about; for which purpoſe it is paſſed through holes in the extremities of the bars, ſo as to ſtrain them firmly together like the ſpokes of a wheel, which is accordingly called *ſwifting*.

SWIFTER is alſo a ſtrong rope ſometimes uſed to encircle a boat longitudinally, as well as to ſtrengthen and defend her ſides, ſo as to enable her the better to reſiſt the impreſſion of other boats which may run againſt her occaſionally. It is uſually fixed about a foot under the boat's upper edge or gunnel.

SWIFTERS are likewiſe two ſhrouds fixed on the ſtarboard and larboard ſide of the lower maſts, above all the other ſhrouds, as an additional ſecurity to the maſts. Falconer.

SWIFTEST *deſcent, line of the*. See CYCLOID and DESCENT.

SWIFTING *of a ſhip*. See SWIFTER.

SWIGGING, a particular way of caſtrating rams.

The operation is performed by throwing the creature on his back, in which poſture he is held; then a ſtring is drawn about his teſticles as tight as poſſible, and fixing it there, the part is anointed with freſh butter. The beaſt is then left to feed, and in two or three days the teſticles grow ſo rotten, as to fall off with the ſtring, or may be plucked away with a ſmall force. Boyle's Works abr. vol. i. p. 87.

SWIMMING, the act, or art, of ſuſtaining the body in water, and of advancing therein by the motion of the arms, legs, &c.

Man alone learns to *ſwim*; all other perfect animals ſeem to take it naturally; though ſeveral of the imperfect *ſwim* not at all.

Among the ancient Greeks and Romans, *ſwimming* made ſo eſſential a part of the diſcipline of their youth, that to repreſent a man perfectly rude and uneducated, they uſed to ſay proverbially, he had neither learned to read nor to *ſwim*.

In fiſhes, it is the tail that is the grand inſtrument of *ſwimming*, not the fins, as has been generally imagined: for this reaſon fiſhes are more ſtrong and muſculous in that part than in all the reſt of their body; according as we find it in all other animals; the motive parts whereof are ſtill the ſtrongeſt, as the thighs of men for walking, the pectoral muſcles of birds for flight, &c.

The manner wherein fiſhes row themſelves forwards by the tail, is well explained by Borelli de Motu Animal. part i. cap. 23. The fins of fiſhes ſerve only to keep the body well poiſed and balanced, and to prevent vacillation. See AIR-*bladder*, and SWIMMING *of fiſh*.

M. Thevenot has publiſhed a curious piece in French, called L'Art de Nager, the art of *ſwimming*, demonſtrated by figures. Before him, Everard Digby, an Engliſhman, and Nicholas Winman, a Dutchman, had alſo laid down the rules of this art: Thevenot has done little more than copy from them. Had he but read, with half that application, Borelli's Treatiſe de Motu Animalium, he would ſcarce have maintained, as he has done, that men would *ſwim* naturally, like other animals, were they not prevented by fear, which magnifies their danger. We have abundant experience againſt this: throw any brute, newly born, into a river, and it *ſwims*; throw an infant in before it is yet capable of fear, and it *ſwims* not, but is drowned. The reaſon is, that the human machine differs very notably in its ſtructure and configuration from that of brutes; and particularly, which is very extraordinary, in the ſituation of its centre of gravity. In man, the head is exceedingly heavy, with regard to the reſt of the body; by reaſon the head is furniſhed with a very great quantity of brain, and has, beſides, a deal of fleſh and bones, and no cavities only filled with air; ſo that the head immerging under water by its own gravity, the noſe and ears are ſoon filled: thus the heavy carrying down the light, the man ſoon is drowned, and loſt. But in brutes it is otherwiſe: for the head, here, having but little brain, and there being abundance of ſinuſes therein; its weight, with regard to the reſt of the body, is much leſs conſiderable; ſo that they are eaſily able to keep their noſe above water; and thus reſpiring freely, are out of danger of being drowned, on the principles of ſtatics.

In effect, the art of *ſwimming*, which is no otherwiſe to be acquired but by exerciſe, conſiſts principally in keeping the head above water, ſo that the noſe and mouth being at liberty, reſpiration may be carried on: for as to the feet and hands, it is enough to ſtir them, and to uſe them as oars to conduct the veſſel.

Swimming *of fiſh*. The *ſwimming of fiſh*, in general, is greatly aſſiſted by their air-bladder. Thoſe kinds which have not this bladder, either have regular lungs, and contain air in them, as is the caſe in the cetaceous fiſhes; or they have remarkably thin and flat bodies, as the rays and thornbacks, and the pleuronecti; or remarkably long and flexuous ones, as the petromyza; and by theſe means are capable of eaſy flexuous motions, which, with the help of the fins, thruſt them any way at pleaſure; though their bodies are not ſo nicely poiſed, as to the weight of the water, as thoſe of ſuch fiſh as have the aſſiſtance of theſe air-veſſels.

It has been ſuppoſed by ſome, that the motion of fiſh in the water depended principally upon the pectoral fins, but this is eaſily proved falſe by experiment; for if the pectoral fins of a fiſh are cut off, and it be again put into the water, it will be found to move forward or ſideways, upward and down, as well as it did when it had them on. If a fiſh be carefully obſerved, while *ſwimming* in a baſon of clear water, it will be found not to keep theſe pectoral fins conſtantly expanded, but only to open them at ſuch time as it would ſtop or change its courſe, this ſeeming to be their principal, if not their only uſe. The pectoral and ventral fins, in the common fiſh of the cathetoplateous or compreſſed form, ſerve in the ſame manner in the keeping the fiſh ſtill, and ſerve in ſcarce any other motion than that toward the bottom: ſo that this motion of the fiſh, which has been generally attributed to their fins, is almoſt wholly owing to their muſcles, and to the equipoiſe of their air-bladder. That the uſe of the pectoral and ventral fins is to keep the fiſh ſteady and upright in the water, is evident from the conſequences of their loſs: if they are cut off, and the fiſh put again into the water, it cannot continue in its erect natural poſture, but ſtaggers about, and rolls from ſide to ſide. The fins of the back and anus are alſo of great uſe to the keeping the creature in its natural poſition, as is eaſily ſeen by cutting them off, and obſerving the motions of the fiſh afterwards.

Though a great deal depends on the motion of the muſcles of the ſeveral parts of the body in the *ſwimming* of the fiſh, yet the tail, and thoſe muſcles which move the lower part of the body, to which it is affixed, are the great inſtruments by which their ſwift motions in the water are performed. The moving the tail, and that part of the body to which it adheres, backward and forward, or ſideways any one way, throws the whole body of the fiſh ſtrongly the contrary way; and even in *ſwimming* ſtraight forward, the motion and direction are both greatly aſſiſted by the vibrations of this part, as may be experienced by the motion of a boat, which when impelled forward, may be firmly guided by means of an oar held out at its ſtem, and moved in the water as occaſion directs. The dorſal muſcles, and thoſe of the lower part of the body between the anus and tail, are the principal that are uſed in the motion of this part; and theſe are therefore the moſt uſeful to the fiſh in *ſwimming*. The muſcles of the body ſeem to have their principal uſe in contracting the belly and the air-bladder. They have been ſuppoſed of uſe to move the belly-fins; but there are too many of them for ſuch a purpoſe, and theſe fins have each its peculiar muſcle fully ſufficient to the buſineſs. The uſe of the tail in *ſwimming*, is eaſily ſeen, by cutting it off, and committing the fiſh to the water without it, in which caſe it is a moſt helpleſs creature. See Air-*bladder*.

SWINE, in *Zoology*. See Hog.

Swine's *creſs*. See Cresses.

Swine-*pipe*, in *Ornithology*, a name uſed in many parts of England for the red-wing.

Swine-*pox*. See Pox.

SWING, *to*, in *Sea Language*, is to turn round the anchors, or moorings, at the change of the wind or tide. It is uſually expreſſed of a ſhip, either when ſhe is moored by the head, or riding at ſingle anchor.

SWING-*tree*, of a *waggon*, is the bar faſtened acroſs the fore guide, to which the traces of the horſes are faſtened.

SWING-*wheel*, in a *royal pendulum*, that wheel which drives the pendulum. In a watch, or balance clock, it is called the *crown-wheel*,

SWINGING was preſcribed by ancient phyſicians, as a good exerciſe in ſome caſes. See Agitation.

SWINGLE, in the *Wire-works* in England, the wooden-ſpoke which is fixed to the barrel that draws the wire, and which, by its being forced back by the cogs of the wheel, is the occaſion of the force with which the barrel is pulled.

SWINGLING. See Brake.

SWIT, in *Natural Hiſtory*, a name given by the people of the Philippine Iſlands to a very ſmall bird of the humming-bird kind, frequent in that part of the world. It is beautifully coloured, and lives on the honey of flowers.

SWIVELS, a kind of rings made to turn round in a ſtaple, or other ring. Theſe are uſed when a ſhip lies at her moorings; alſo in tedders for cattle, that they may turn round without unwarping the tedder.

Swivel-*cannon*, is a ſmall piece of artillery, belonging to a ſhip of war, which carries a ſhot of half a pound, and is fixed in a ſocket on the top of the ſhip's ſide, ſtern, or bow, and alſo in her tops. The trunnions of this piece are contained in a ſort of iron crotch, whoſe lower end terminates in a cylindrical pivot reſting in the ſocket, ſo as to ſupport the weight of the cannon. The ſocket is bored in a ſtrong piece of oak, reinforced with iron hoops, in order to enable it to ſuſtain the recoil. By means of this frame, which is called the *ſwivel*, and an iron handle on its caſcabel, the gun may be directed by the hand to any object. It is, therefore, very neceſſary in the tops, particularly when loaded with muſket balls, to fire down on the upper decks of the adverſary in action.

SWOONING, a kind of lipothymia, or fainting, whereing the patient loſes all his ſtrength, as well as ſenſe and underſtanding.

Swooning may be occaſioned by any thing that alters, corrupts, or diſſipates the vital ſpirits; as long watching, violent pains, great and ſudden evacuations, putrid vapours ariſing from abſceſſes in the noble parts, &c.

SWORD, an offenſive weapon, worn at the ſide, ſerving either to prick, or cut, or both.

Its parts are the blade, guard, hand or graſp, and pummel; to which may be added, the bow, ſcabbard, hook, and chape. The maſters of defence divide the *ſword* into the *upper*, *middle*, and *lower* part; or the *fort*, *middle*, and *foible* or ſmall and weak part.

Anciently, there were a kind of two-handed *ſwords*, called *ſpados*, which were to be managed with both hands; and which in thoſe days they accuſtomed themſelves to brandiſh ſo nimbly, as to cover the whole body therewith.

The ſavages of Mexico, when firſt viſited by the Spaniards, had a kind of wooden *ſwords*, which would do as much execution as ours. In Spain, *ſwords* are only allowed of ſuch a length, determined by authority. The ancient cavaliers gave names to their *ſwords*; *Joyeuſe* was that of Charlemagne; *Durandol* that of Orlando, &c.

Sword-*bearer*, an officer in the city of London, who attends the lord mayor at his going abroad, and to carry the *ſword* before him, as the emblem of juſtice.

It is obſerved by an ancient writer of armoury, that the bearer muſt carry it upright, the hilts being holden under his bulk, and the blade directly up the middle of his breaſt, and between the *ſword-bearer*'s brows.

The *ſword* is likewiſe carried before the principal officers of boroughs, and other corporate towns, to repreſent the ſtate and princely office of the king, as the chief governor.

Sword, *broad*, ſometimes called the *back-ſword*, has only one edge, and is baſket-handled.

Sword *bearers*. See Port-glaive.

Sword-*belt*. See Belt.

Sword-*blades*, *mills for*. See Mill.

Sword, *pleas of the*. See Pleas and Jus *gladii*.

Sword, *St. James of the*. See James.

Sword-*hand*, in the *Manege*. See Hand.

Sword-*fiſh*, *xiphias*, in *Ichthyology*, the name of a genus of fiſh of the order of *apodes*.

The characters of this genus, according to Linnæus, are, that the membranes of the gills have eight bones, and the point or extremity of the noſe, ſnout, or upper jaw of the fiſh, is ſhaped like a *ſword*, and the body taper and without ſcales. There is only one ſpecies, viz. the *xiphias gladius*.

According to the Artedian ſyſtem of ichthyology, the characters of this genus of fiſh are theſe: the branchioſtege membrane on each ſide contains about eight bones; the ſnout is extended into a very long and depreſſed point, imitating the figure of a *ſword*, and of a bony ſubſtance; the body is oblong and roundiſh, the back-fin is ſmall, and is very low in the middle; there are no belly-fins at all. The air-bladder in this fiſh is remarkably long, and the anus very near the tail.

The *ſword-fiſh* is ſo remarkable for the ſhape of its ſnout, which is extended in form of a *ſword*, that it has been called by all nations by a name expreſſive of that character. Its common name *xiphias* is from the Greek ξιφος, *a ſword*, and it is called *gladius* in Latin, and in Engliſh the *ſword-fiſh*.

It grows to a very conſiderable ſize, ſo as ſometimes to weigh an hundred pounds. It is of a long and rounded body, largeſt near the head, and tapering by degrees toward the tail; its ſkin is conſiderably rough, its back black, and its belly of a ſilvery white; its mouth is of a moderate ſize, and has no teeth; its ſnout runs out into the figure of a *ſword* in the upper jaw, the under is much ſhorter, and terminates in a very ſharp point; it has one only fin on the back, running almoſt the whole length of it; its tail is very remarkably forked; it has only one pair of fins at the gills, having none on the belly. It is common in the Mediterranean, and ſome other ſeas, and is eſteemed by many a very delicate fiſh for the table. The manner of fiſhing for it is the ſame at this time that the old writers have deſcribed it to be in theirs, by the harping-iron. Willughby's Hiſt. Piſc. p. 161. See *Tab.* V. *Fiſh*, N° 57.

The ancient manner of taking this fiſh is particularly deſcribed by Strabo (lib. i. p. 16.) and agrees exactly with that practiſed by the moderns. A man aſcends one of the cliffs that overhangs the ſea; as ſoon as he ſpies the fiſh, he gives notice of the courſe he takes. Another that is ſtationed in a boat, climbs up the maſts, and on ſeeing the *ſword-fiſh*, directs the rowers towards it: as ſoon as he thinks they are got within reach, he deſcends, and taking a ſpear in his hand, ſtrikes it into a fiſh, which, after wearying itſelf with its agitation, is ſeized and drawn into the boat. It is much eſteemed by the Sicilians, who buy it eagerly for about 6*d*. per pound, at its firſt coming into ſeaſon. The ſeaſon laſts from May till Auguſt. This fiſh is ſaid to be very voracious, and a very great enemy to the tunny, which (according to Belon) are as much terrified by it as ſheep are at the ſight of a wolf. Ovid Halieut. 97. Pennant.

Sword-*graſs*, in *Botany*, See *Sweet* Rush.

SYCABIS, in *Ornithology*, a name by which ſome authors have called the Atricapilla, or black-*cap*, a ſmall bird well known in England.

SYCAMINOS, a word uſed by ſome for the mulberry fruit, and by ſome for the tree.

SYCAMORE, a ſpecies of the *ficus*, or fig-*tree*.

Sycamore-*tree*, a name improperly given by us to the *acer majus*. See Maple.

Sycamore-*moth*, in *Natural Hiſtory*, the name of a peculiarly large and beautiful moth, or night-butterfly, ſo called from its caterpillar feeding on the leaves of the *ſycamore*. This caterpillar is remarkably large, very often growing to three inches and a half long, and three quarters of an inch in diameter.

Theſe caterpillars being put into a box, each ſpun itſelf a ſtrong and firm caſe, which it faſtened to the ſide of the box, and in it waited the time of its laſt transformation: in each of theſe ſhells there was left a ſmall aperture, by means of which the creature was to get out when in its butterfly ſtate, and the head of this animal was placed exactly againſt this aperture. In this ſtate they lie all the autumn, winter, and ſpring, and in the beginning of ſummer come out in the ſhape of a very elegant moth. The wings, when expanded, meaſure more than five inches, and each has an eye, like that on the peacock's tail, near the extremity. The horns are of the feathered kind, and are very large and elegant; and the body and origins of the wings are covered with very long hairs. Mem. Acad. Par. 1692.

SYCION, a word uſed by ſome authors to expreſs a decoction of dried figs.

SYCITES, the *fig-ſtone*, a name given by ſome authors to ſuch natural nodules of flint or pebbles, as happen to approach to a fig in ſhape.

Sycites *vinum*, a term uſed by the ancients to expreſs a wine impregnated with figs.

SYCOMANTIA, συκομαντεια, in *Antiquity*, a ſpecies of divination performed with fig-leaves; for which ſee Potter, Archæol. Græc. lib. ii. cap. 18. tom. i. p. 353.

SYCOPHANT, συκοφαντης, formed from συκος, *a fig*, and φαινω, *I diſcover*, a Greek term, originally uſed at Athens, for perſons who made it their buſineſs to inform againſt thoſe who ſtole figs to the owners, or againſt thoſe who, contrary to the law, which prohibited the exportation of figs, practiſed the thing, and deceived the officers, the inſpectors of the ports, &c.

At length, the term became uſed, in the general, for all informers, tale-bearers, paraſites, flatterers, &c. eſpecially thoſe in the courts of princes: and at laſt, for liar, impoſtor, &c.

SYCOPHANTIC *plants*. See Parasites.

SYCOSIS, a term uſed by ſome authors to expreſs a tumor of the anus, differing only in bigneſs from the thymus. It had this name from the reſemblance of the fleſh about its edges to a ripe fig. The ancients underſtood two ſorts of ulcerated tumors by this name, though both attending the ſame part; the one was hard and round, the other ſofter, and of an irregular figure: from the firſt there was diſcharged only a ſmall quantity of matter, from the latter a very large quantity, and that of a very ill ſmell. Some other of the ancient phyſicians make the ſame word alſo expreſs two ſorts of ulcerated tumors of the head, or beard, which they diſtinguiſh by the ſame characters into a hard and a ſoft one.

SYCOTA, a word uſed by ſome of the ancients to expreſs a ſort of food prepared of figs.

SYCOTON, a name given by the ancients to the liver of a pig fed with figs. This was eſteemed a very elegant diſh among the old Greeks.

SYDEROPŒCILUS, in *Natural Hiſtory*, the name of a ſtone mentioned by the ancients. It was found in Arabia, and ſeems to have obtained this name from its being ſpotted with a ferruginous colour. The deſcriptions of the ancients are, however, in this, as in many other inſtances, too ſhort to ſuffer us to gueſs what ſtone they meant. This might poſſibly be a granite with ſpots of this peculiar colour.

SYENITES, in the *Natural Hiſtory of the Ancients*, a name given by many to the granite, the ſame with the oriental granite of the moderns. It had this name from its country; but our artificers have of late learned to call a different ſubſtance by that name that ſounds very like this, the beautiful purple and yellow marble, ſo frequent with us now in tables, &c. being called among them *Sienna marble*.

SYLLABIC, in the *Greek Grammar*. There are two kinds of augments; the firſt called *ſyllabic*, which is when the word is increaſed by a *ſyllable*; the other *temporal*, which is when a ſhort ſyllable becomes long.

SYLLABLE, Syllaba, in *Grammar*, a part of a word, or an articulate ſound, conſiſting of one or more letters which are pronounced together; or which of itſelf conveys either no idea, or part only of what is denoted by the word. The word is derived from the Greek συλλαβη, which literally denotes comprehenſion, or aſſemblage.

Or, a *ſyllable* is a complete ſound, uttered in one breath conſiſting either of a vowel alone, or of a vowel and one or more conſonants, not exceeding ſeven.

Scaliger defines a *ſyllable* to be an element under one tone or accent, that is, which can be pronounced at once.

Priſcian, more intelligibly, calls it a comprehenſion of ſeveral letters falling under one accent, and produced at one motion of the breath. But ſome grammarians reject this definition, as excluding all *ſyllables* of one letter.

Another defines *ſyllable*, a literal or articulate voice, of an individual ſound.

The learned biſhop Lowth defines *ſyllable*, a ſound, either ſimple or compounded, pronounced by a ſingle impulſe of the voice, and conſtituting a word or part of a word.

In every word, therefore, there are as many *ſyllables* as there are vocal ſounds; and as many vocal ſounds, as there are ſimple or compound vowels, each whereof requires a diſtinct motion of the pectoral muſcles. Thus, *a*, *a*, *a*, make three *ſyllables*, formed by ſo many motions, diſtinguiſhed by ſmall ſtops betwixt each expiration.

In the Hebrew, all the *ſyllables* begin with conſonants allowing aleph to be one; nor has any *ſyllable* more than a ſingle vowel.

From the number of *ſyllables* in words, they become denominated *monoſyllables*, *biſyllables*, *triſyllables*, and *polyſyllables*, q. d. words of one *ſyllable*, two *ſyllables*, three *ſyllables*, and many *ſyllables*.

As it is the number of *ſyllables* that conſtitutes the meaſure of Engliſh verſe, it were to be wiſhed we had fixed and ſettled rules to determine the preciſe number of *ſyllables* in each word; for we have words very dubious in that reſpect; and there are even ſome which have more *ſyllables* in verſe than in proſe. Many of the words ending in *ious*, occaſion great embarraſſment to ſuch as pique themſelves on exactneſs; as odious, precious, &c.

With reſpect to the diviſion of *ſyllables*, we may obſerve, that any letter, or combination of letters, which will begin a word, may likewiſe begin a *ſyllable* in the middle of a word, and no other; for each *ſyllable* being as much a perfect ſound, as a monoſyllable word, can properly commence with ſuch letters only as will ſuit the beginning of a word. Accordingly, there is no letter in the Engliſh language, that may not begin a word, except *e* mute, which therefore in the middle of words always goes with the former *ſyllable*. Moreover, every *ſyllable* ends in the middle of a word, when a ſound is complete, and the next letter or letters will begin a new *ſyllable*, of which the firſt at leaſt is a conſonant, unleſs where two vowels meet, which do not unite in a diphthong. However, there are ſome few exceptions to this general rule.

A *ſyllable* in the beginning or middle of a word ends in a vowel, unleſs it be followed by *x*, or by two or more conſonants, which are for the moſt part to be ſeparated; and at leaſt one of them always belongs to the preceding *ſyllable*, when the vowel of that *ſyllable* is pronounced ſhort. Particles in compoſition, though followed by a vowel, generally remain undivided in ſpelling. A mute generally unites with a liquid following; and a liquid, or a mute, generally ſeparates from a mute following: *le* and *re* are never ſeparated from a preceding mute, e. g. *ma-ni-feſt*, *ex-e-cra-ble*, *un-e-qual*, *miſ-ap-ply*, *diſ-tin-guiſh*, *cor-reſ-pon-ding*. But the beſt and eaſieſt rule for dividing the *ſyllables* in ſpelling, is to divide them as they are naturally divided in a right pronunciation; without regard to the derivation of words, or the poſſible combination of conſonants at the beginning of a *ſyllable*. See this ſubject purſued in Ward's Eſſays upon the Engliſh Language, p. 44, &c. See alſo Lowth's Introduction to Engliſh Grammar, p. 23.

With regard to the accenting of *ſyllables*, to what has been delivered under ACCENT we may here add, that all words of one *ſyllable* have either an acute or circumflex accent, agreeably to their quantity. In words of more than one *ſyllable*, the Latin and Greek language differ very much from each other, as to the uſe of accents. Many words of two or more *ſyllables*, are accented on the laſt *ſyllable* in Greek, but none in Latin, except a few compounds of *fio*, as *malefit*, &c. In words of more than two *ſyllables*, if the penultima is long, the Latin accent is placed there, otherwiſe on the antepenultima. But in Greek words it is ſometimes placed on the antepenultima when the penultima is long, and at other times on the laſt *ſyllable*, but when this is long, it is never carried farther back than the penultima. No word in the Latin or Greek language is accented farther from the end than the antepenultima.

Engliſh words are not only accented upon each of the three laſt ſyllables, but ſeveral upon the fourth, and ſome few upon the fifth from the end. In pronouncing long words, a variation of the tone is neceſſary upon ſome other *ſyllable*, beſides that where the accent is placed, though not equally high, both for the ſake of eaſing the voice, and modulating the ſound. Many Engliſh nouns and verbs written alike, are diſtinguiſhed from each other, by pronouncing the former with an acute accent on the penultima, and the latter on the laſt *ſyllable*; as *ábſent* and *abſént*, *cónteſt* and *contéſt*, &c. In the inflection of verbs, the accent always remains on the root, as *lóve*, *lóveth*, *lóved*, &c. In derivatives the accent is always on the theme, except ſubſtantives from the French, ending in *eer* and *ier*, where it is carried to the termination, as *voluntéer*, &c. Moſt compound words have their accent on the former part, unleſs that be a prepoſition, and then oftener on the latter. But the exceptions from either are more eaſily known from obſervation than reduced to any certain rules. Ward ubi ſupra, p. 32, &c.

SYLLABLES, *quantity of*. See QUANTITY.

SYLLABUB, a kind of compound drink, moſt affected in the ſummer ſeaſon; ordinarily made of white wine and ſugar, into which is ſquirted new milk with a ſyringe, or wooden cow.

Sometimes it is made of canary, in lieu of white wine; in which caſe the ſugar is ſpared, and a little lemon and nutmeg are added in lieu of it.

To prepare it the beſt way, the wine and other ingredients, excepting the milk, are to be mixed over night, and the milk or cream added in the morning. The proportion is, a pint of wine to three of milk. For

SYLLABUB, *whipt*, to half a pint of white wine or rheniſh, is put a pint of cream, with the whites of three eggs. This they ſeaſon with ſugar, and beat with birchen rods, or work with a ſyringe. The froth is taken off as it riſes, and put into a pot; where, after ſtanding to ſettle two or three hours, it is fit to eat. Ruſt.

SYLLEPSIS, in *Grammar*, *conceptio*, a figure whereby we conceive the ſenſe of words otherwiſe than the words import; and thus make our conſtruction, not according to the words, but the intention of the author. See SUBSTITUTION.

The *ſyllepſis*, ſays an ingenious author, is a figurative conſtruction, which agrees rather with our ideas than with the words; and expreſſes rather the ſenſe of our mind than the ſenſe of the terms themſelves.

SYLLEPSIS is alſo uſed for the agreement of a verb, or adjective, not with that word next it, but with the moſt worthy in the ſentence: as *rex & regina beati*.

Some authors call the *ſyllepſis*, *ſyntheſis*; others, *ſubſtitution*. It is a figure of conſiderable uſe for the well underſtanding of authors. Scioppius divides it into two kinds, *ſimple* and *relative*.

SYLLEPSIS, *ſimple*, is when the words of a diſcourſe either diſagree in gender, or number, or both.

SYLLEPSIS, *relative*, is, when the relative is referred to an antecedent which is not expreſſed; but which we conceive by the ſenſe of the whole period.

SYLLOGISM, συλλογισμος, in *Logic*, an argument, or form of reaſoning, conſiſting of three propoſitions; having this property, that the concluſion neceſſarily follows from the two premiſes: ſo that if the firſt and ſecond propoſitions be granted, the concluſion muſt be granted in like manner; and the whole allowed for a demonſtration.

If the premiſes be only probable, or contingent, the *ſyllogiſm* is ſaid to be *dialectical*; if they be certain, *apodictical*; if falſe, under an appearance of truth, *ſophiſtic* or *paralogiſtic*.

As often as the mind obſerves any two notions to agree to a third, which is done in two propoſitions; it immediately concludes, that they agree to each other: or if it find, that one of them agrees, and the other diſagrees, which is likewiſe done in two propoſitions; it immediately pronounces, that they diſagree to each other. And ſuch is a *ſyllogiſm*; which, it hence appears, is nothing but a mental diſcourſe, or reaſoning, whereby, from any two propoſitions granted, a third is neceſſarily deduced.

Hence, as the Greeks call it *ſyllogiſm*, the Latins call it *collectio*, or *ratiocinatio*, as being a kind of computation, which, either by adding, or ſubtracting, gathers either the ſum or the remainder: for, as if we add two and three, we may thence collect five; ſo, if to this propoſition, "man is an animal," you add this, "every animal thinks," you thence deduce this, "therefore man thinks."

Of the three propoſitions whereof a *ſyllogiſm* conſiſts; the firſt is, by way of eminence, called the *propoſition*, as being propoſed for the baſis of the whole argument; the ſecond is called the *aſſumption*, as being aſſumed to aſſiſt in inferring the third: though they are both called *ſumptiones*, becauſe aſſumed for the ſake of the third; and both *premiſes*, as being premiſed to it; and for the ſame reaſons both are called *antecedents*, only the firſt the *major*, and the latter the *minor*.

The third is called the *concluſion*, as being the cloſe of the whole argumentation; and ſometimes *complexio*, as including the two notions, before ſeparately compared; and *conſequens*, becauſe it follows from the antecedents; and laſtly, *illatio*, becauſe inferred from the premiſes by means of the illative particle *ergo*, therefore, &c.

As the concluſion is the principal part of a *ſyllogiſm*, it hence ariſes, that though both the propoſition and aſſumption conſiſt each of its ſubject and attribute; yet the ſubject and attribute of a *ſyllogiſm* are properly underſtood of thoſe of the concluſion.

Again, in the inſtance above mentioned, *animal* being uſed both as ſubject and attribute, it is held a kind of intermediate between the two, and frequently called *medium*; in reſpect to which, both the ſubject and attribute, *man* and *thinks*, are called *extremes* or *terms*; only the ſubject *the greater extreme*, and the attribute *the leſs*.

In the conſtitution of a *ſyllogiſm*, we may conſider the matter and the form of it. The matter is three propoſitions, made up of three ideas, or terms variouſly joined. The three terms are named the major, minor, and middle. The predicate of the concluſion is called the *major term*, becauſe it is generally of larger extent than the minor term, or the ſubject. The major or minor terms are called the *extremes*. The middle term, or medium, is the third idea invented and diſpoſed in two propoſitions, in ſuch a manner as to ſhew the connection between the major and minor term in the concluſion; whence the middle term is ſometimes called the ARGUMENT. The propoſition which contains the predicate of the concluſion, connected with the middle term, is uſually called the *major propoſition*, whereas the minor propoſition connects the middle term with the ſubject of the concluſion, and is ſometimes called the *aſſump-*

tion. The major propoſition is generally placed firſt, and the minor ſecond, and the concluſion in the laſt place, when the *ſyllogiſm* is regularly compoſed and repreſented.

The FORM of a *ſyllogiſm*, is the framing and diſpoſing of the premiſes according to art, or juſt principles of reaſoning, and the regular inference of the concluſion from them.

Syllogiſms are diſtributed, with regard to the queſtion to be proved, into *univerſal affirmative*, *univerſal negative*, *particular affirmative* and *particular negative:* and with reſpect to their nature and compoſition, into *ſingle* and *compound.* *Single ſyllogiſms*, are made up of three propoſitions, and may be divided into *ſimple*, *complex*, and *conjunctive.*

Simple, or *categorical ſyllogiſms*, are made up of three plain, ſingle, or categorical propoſitions, wherein the middle term is evidently and regularly joined with one part of the queſtion in the major propoſition, and with the other in the minor, whence follows a plain ſingle concluſion. For *complex ſyllogiſms*, ſee COMPLEX.

Conjunctive ſyllogiſms, are thoſe, in which one of the premiſes, viz. the major, has diſtinct parts, joined by a conjunction, or ſome ſuch particle of ſpeech; the chief of which are CONDITIONAL, *disjunctive*, which have the major propoſition DISJUNCTIVE, *relative*, requiring the major propoſition to be RELATIVE, and *connective*, or *copulative*, which require that two or more ideas be ſo connected either in the complex ſubject, or predicate of the major, that if one of them be affirmed or denied in the minor, common ſenſe will ſhew what will be the conſequence.

Compound ſyllogiſms are made up of two or more ſingle ones, and may be reſolved into them: the chief kinds are EPICHIREMA, DILEMMA, PROSYLLOGISMUS, and SORITES. Watts's Logic, part iii. c. 3.

A *ſyllogiſm*, wherein one of the premiſes is ſuppreſſed, but ſo as to be underſtood, is called an ENTHYMEME, e. gr. "every animal thinks, therefore man thinks;" wherein the propoſition, "man is an animal," is underſtood.

The demonſtrations of mathematicians, it is obſerved, are only ſerieſes of enthymemes: ſo that every thing in mathematics is concluded or proved by *ſyllogiſm*; only omitting ſuch premiſes, as occur of their own accord, or as are referred to, by the citations. See SOPHISM.

There are two general methods of reducing all *ſyllogiſms* to a teſt of their truth or falſehood. The firſt is, that the premiſes muſt contain the concluſion, or one of them muſt contain the concluſion, and the other muſt ſhew that the concluſion is contained in it; and the ſecond is this, as the terms in every *ſyllogiſm* are uſually repeated twice, they muſt be taken preciſely in the ſame ſenſe in both places. Watts ubi ſupra.

For the uſe SYLLOGISM *is of to reaſon*, Mr. Locke obſerves, that of four things, which reaſon is employed about; viz. the finding out of proofs, the regular diſpoſition of them ſo as their connection may appear, the perceiving their connection, and the making a right concluſion; *ſyllogiſm* only aſſiſts in one, viz. ſhewing the connection of the proofs in any inſtance. Nor is it of any great uſe even here; ſince the mind can perceive ſuch connection, where it really is, as eaſily, nay, perhaps better, without it. We ſee men reaſon very ſtrongly, who do not know how to make a *ſyllogiſm*.

Indeed, *ſyllogiſm*, the ſame author adds, may ſerve to diſcover a fallacy in a rhetorical flouriſh, or by ſtripping an abſurdity of the cover of wit, and good language, ſhew it in its natural deformity. But it only ſhews the weakneſs or fallacy of ſuch a diſcourſe by the artificial form it is put into, to thoſe who have thoroughly ſtudied mood and figure, and have ſo examined the many ways three propoſitions may be put together in, as to know which of them does certainly conclude right, and which not, and upon what grounds they do ſo.

The mind is not taught to reaſon by theſe rules; it has a native faculty of perceiving the coherence or incoherence of its ideas, and can range them right, without ſuch perplexing repetitions. Add, that to ſhew the weakneſs of an argument, there needs no more, than to ſtrip it of the ſuperfluous ideas, which, blended and confounded with thoſe on which the inference depends, ſeems to ſhew a connection where there is none; or at leaſt hinder the diſcovery of the want of it: and then to lay the naked ideas, on which the force of the argumentation depends, in their due order. In this poſition, the mind taking a view of them, ſees what connection they have, and ſo is able to judge of their inference, without any need of *ſyllogiſm* at all.

Nor muſt it be omitted, that *ſyllogiſms* are as liable to fallacies, as the plainer ways of argumentation; for which one might appeal to common obſervation; which has always eſteemed theſe artificial methods of reaſoning, more adapted to catch and entangle the mind, than to inſtruct and inform the underſtanding. And if it be certain, that fallacy can be couched in a *ſyllogiſm*, as nobody will deny but it may; it muſt be ſomething elſe, and not a *ſyllogiſm*, that muſt diſcover it.

The ſame author proceeds to ſhew, that this way of reaſoning diſcovers no new proofs, nor makes any diſcoveries; but is wholly converſant in the marſhalling and ranging thoſe we already have: a man muſt know, before he be able to prove *ſyllogiſtically*; ſo that the *ſyllogiſm* comes after knowledge, when we have but little need of it. See REASON and LOGIC.

SYLLOGISM, *figure and mood of a.* See FIGURE and MOOD.

SYLLOGISMS, *reduction of.* See REDUCTION.

SYLLOGISTIC *form.* See FORM.

SYLLUK, the principal of the Hebrew ACCENTS, uſed to cloſe a period, and called *king* and *pauſe.* It is marked under a letter thus (ɩ).

SYLVA, among the Romans, a ludicrous kind of hunting exhibited in the circus; ſo called, becauſe the circus was really planted with trees, which had been dug up with the roots by the ſoldiers and brought thither, and fixed to large beams, after which earth being thrown upon their roots, the circus actually reſembled a wood; then being filled with all ſorts of herbiferous animals, the people were let looſe upon them, and carried all clear off.

SYLVANS, in *Mythology.* See FAUNS, SATYRS, and SILENI.

SYLVA, or SILVA, in *Poetry*, a poetical piece compoſed, as it were, at a ſtart; or in a kind of rapture or tranſport, and without much thought or meditation. Such are the *ſilvæ* of Statius, which, he aſſures us, were all compoſed after this manner.

Quintilian extends the uſe of the word *ſylva* to any writing done in haſte, and on the ſpot.

The word is Latin, and literally ſignifies *foreſt*; whence its chief uſe in our language, is metaphorically to expreſs certain collections of poetical pieces, of various kinds, and on various ſubjects; as a foreſt is an aſſemblage of trees of different ſorts.

SYLURUS, in *Ichthyology*, a name given by Geſner to the *ſilurus* of Willughby and others, which we call in Engliſh the *ſheat-fiſh.* See SILURUS.

SYMBACCHI, συμϐακχοι, in *Antiquity*, a deſignation given to the two men, who purified the city of Athens at the feſtival THARGELIA.

SYMBOL, SYMBOLUM, formed from συμϐολον, a *mark*, *ſign*, or *badge*, of συμϐαλλειν, *to compare*, a ſign or repreſentation of any moral thing, by the images or properties of natural things.

Thus we ſay, the lion is the *ſymbol* of courage; the pelican of paternal love, &c. *Symbols* were in a very great repute among the ancient Hebrews, and eſpecially among the Egyptians; and ſerved to cover a great part of their moral myſteries; being uſed not only to repreſent moral things by natural; but even natural by natural.

Symbols are of various kinds, as types, ænigmas, parables, fables, allegories, emblems, hieroglyphics, &c. each whereof ſee under its reſpective article, TYPE, ÆNIGMA, PARABLE, FABLE, &c.

The Chineſe letters are moſt of them abſolute *ſymbols*, or ſignificative. The *ſymbols* in algebra, &c. are arbitrary. Medaliſts alſo apply the term *ſymbol* to certain marks or attributes peculiar to certain perſons or deities. The thunder-bolt, for inſtance, accompanying the heads of certain emperors, is a ſign or *ſymbol* of the ſovereign authority, and of a power equal to that of the gods: the trident is the *ſymbol* of Neptune; the peacock of Juno; a figure ſeated on an urn, of a river, &c. See MEDAL.

SYMBOL, among *Chriſtians*, is particularly uſed for the creed, or the articles of religion, which every Chriſtian is to know and believe. See *Apoſtles* CREED.

In the emperor's library is a Greek MS. of the *ſymbol* of the apoſtles, divided into twelve articles, with the names of the reſpective apoſtles, who are ſaid to have compoſed each article. The firſt is attributed to St. Peter, and the reſt ſucceſſively to Andrew, James major, John, Thomas, James minor, Philip, Bartholomew, Matthew, Simon, Thaddeus, and Matthias.

But the teſtimony of that MS. does not much confirm the opinion, that each apoſtle compoſed an article of the *ſymbol*; yet the opinion is, at leaſt, as old as St. Leo, who ſeems to have believed it.

Authors are in doubt why the name *ſymbol* ſhould be given to this compendium of the articles of the Chriſtian faith: ſome ſay, it is thus called in alluſion to a military cuſtom; that as ſoldiers were known by ſigns and tokens, this was to be the mark or characteriſtic of a Chriſtian.

To this purpoſe Ruffinus ſays, that the Greek word συμϐολὸν may be rendered in Latin by *indicium*. Others derive it from an aſſembly or conference of the apoſtles, where each expreſſing his ſenſe of the faith, and what each had chiefly preached, the creed was framed, and called by the Greek word συμϐολον, which ſignifies *collation* or *conference*.

Lord King derives the ſignification of the word with greater probability from the *ſacra*, or religious ſervices of the heathens, where thoſe who were initiated into myſteries had certain ſigns or marks, called *ſymbola*, delivered to them, by which they might know each other, and claim admiſſion to the ſecret worſhip and rites of that god, whoſe *ſymbols* they had received. He produces many inſtances of the common uſe of *ſymbols*, both mute and vocal: and in alluſion to theſe he apprehends the creed is thus called, becauſe it was ſtudiouſly concealed from the Pagan world, and not revealed to the catechumens themſelves, till they were initiated by baptiſm into the viſible church; when it was delivered to them, as that ſecret mark or ſign, by which they ſhould be known from all others, and mutually know each other. Hiſt. of Apoſtle's Creed, p. 11, &c.

SYMBOLICAL *characters*, *column*, *fountain*, *freezes*. See the ſubſtantives.

SYMBOLICAL *philoſophy*. See HIEROGLYPHIC.

SYMBOLICAL *phyſics*. See PHYSICS.

Clemens Alexandrinus, Euſebius, &c. obſerve, that the Egyptians had two ways of repreſenting their *ſymbolical* myſteries; one by the virtues of animals, herbs, &c. the other by geometrical figures. Thus, the ſun and moon were repreſented, in the firſt manner, by the beetle and ibis; and in the latter by their own figures. Again, the four elements they repreſented after the firſt manner, by four animals which have qualities correſponding thereto; and after the ſecond manner by +.

SYMBOLISM, a word uſed by ſome of the chemical writers to expreſs a conſent of parts.

SYMBOLOGICE, is uſed by ſome for that part of the ſcience of medicine, which treats of the ſymptoms of diſeaſes.

SYMMETRY, συμμετρια, formed from συν, *with*, and μετρον, *meaſure*, the relation of parity, both in reſpect of height, length, and breadth of the parts neceſſary to compoſe a beautiful whole.

Symmetry, according to Vitruvius, conſiſts in the union and conformity of the ſeveral members of a work to their whole, and of the beauty of each of the ſeparate parts to that of the intire work; regard being had to ſome certain meaſure: ſo that the body is framed with *ſymmetry*, by the due relation which the arm, elbow, hand, fingers, &c. have to each other, and to their whole.

Symmetry ariſes from that proportion which the Greeks call *analogy*, which is the relation of conformity of all the parts of a building, and of their whole, to ſome certain meaſure; whereupon depends the nature of *ſymmetry*.

SYMMETRY, *uniform*, in *Architecture*, is that where the ſame ordonnance reigns throughout the whole.

SYMMETRY, *reſpective*, is that where only the oppoſite ſides are equal to each other.

SYMPARATAXIS, a word uſed by Hippocrates to expreſs the conflict between nature and a diſeaſe, and the aliments or medicines given in it.

SYMPASMA, a word uſed by many authors to ſignify a cataplaſm.

SYMPATHETIC, συμπαθητικος, ſomething that has a ſympathy; or that acts, or is acted on by ſympathy.

SYMPATHETIC is particularly applied to all diſeaſes which have two cauſes; the one remote, the other near. In which ſenſe, the word is oppoſed to *idiopathetic*.

Thus, an epilepſy is ſaid to be *ſympathetic* when produced by a remote cauſe; i. e. when the diſorder in the brain, embarraſſed with blood, is preceded and produced by ſome other diſeaſe.

There is a *ſympathetic* palpitation of the heart, and an idopathetic one. There is but one idiopathetic cauſe of the palpitation; but there are ſeveral *ſympathetic* ones.

Among chemiſts and alchemiſts, the term *ſympathetic* is principally applied to a kind of powder and of ink.

SYMPATHETIC *ink*. See INK.

SYMPATHETIC *powder*, a powder once very much famed; ſuppoſed to have this wonderful property, that if ſpread on a cloth dipt in the blood of a wound, the wound would be cured, though the patient be any number of miles off.

This powder, M. Lemery tells us, is nothing but Roman vitriol, opened by the ſun-beams penetrating it, and imperfectly calcining it, in the middle of ſummer.

But it is now generally allowed a mere piece of charletanery, whatever ſir Kenelm Digby, and others before him, and after plead in its favour.

The compoſition of the *famous ſympathetic powder*, uſed at Goſſelaer by the miners in all their wounds, is this. Take of green vitriol eight ounces, of gum tragacanth, reduced to an impalpable powder, one ounce; mix theſe together, and let a ſmall quantity of the powder be ſprinkled on the wound, and it immediately ſtops the bleeding. The vitriol is to be calcined to whiteneſs in the ſun, before it is mixed with the gum.

SYMPATHY, συμπαθεια, formed from συν, *with*, and παθος, *paſſion*, q. d. *compaſſion*, *fellow-feeling*; an agreement of affections and inclinations, or a conformity of natural qualities, humours, temperaments, &c. which makes two perſons pleaſed and delighted with each other.

A late ingenious writer has endeavoured to account for the origin of our moral ſentiments from *ſympathy*, denoting our fellow-feeling with any paſſion whatever. When we approve of any character or action, the ſentiments which we feel, are, according to this ſyſtem, derived from four ſources, which are in ſome reſpects different from one another. Firſt, we ſympathize with the motives of the agent; ſecondly, we enter into the gratitude of thoſe who receive the benefit of his actions; thirdly, we obſerve, that his conduct has been agreeable to the general rules by which thoſe two *ſympathies* generally act; and, laſt of all, when we conſider ſuch actions as making a part of a ſyſtem of behaviour, which tends to promote the happineſs either of the individual or of the ſociety, they appear to derive a beauty from this utility, not unlike that which we aſcribe to any well contrived machine. There is another ſyſtem that traces our moral ſentiments to *ſympathy*, different from the former. It is that which places virtue in utility, and accounts for the pleaſure with which the ſpectator ſurveys the utility of any quality from *ſympathy*, with the happineſs of thoſe who are affected by it. This *ſympathy*, however, is different both from that by which we enter into the motives of the agent, and from that by which we go along with the gratitude of the perſons who are benefitted by his actions. It is the ſame principle with that by which we approve of a well contrived machine. But no machine can be the object of either of thoſe two laſt mentioned *ſympathies*. Smith's Theory of Moral Sentiments. Ed. 3. 1767. See VIRTUE.

SYMPATHY is alſo uſed with regard to inanimate things; intimating ſome propenſion they have to unite, or to act on one another.

In this ſenſe, naturaliſts ſay, there is a *ſympathy* between the vine and the elm; between the loadſtone and iron; the two poles of a loadſtone, &c.

The alchemiſts talk much of the powder of *ſympathy*. See SYMPATHETIC *powder*.

SYMPATHY, in *Medicine*, an indiſpoſition befalling one part of the body, through the defect or diſorder of another; whether it be from the affluence of ſome humour, or vapour ſent from elſewhere; or from the want of the influence of ſome matter neceſſary to its action.

We have ſome practical remarks on the *ſympathy* of the parts of the body, in the Medical Eſſays of Edinburgh, vol. v. part 2. art. 45.

For the force and effect of *ſympathy*, in the production of monſters, ſee MONSTER.

SYMPESIS, a word uſed by the old Greek writers to ſignify *concoction* or *digeſtion*.

SYMPHONIACA, in *Botany*, a name given by ſome authors to the common *hyoſciamus*, or *henbane*.

SYMPHONIALE, in the *Italian Muſic*, is ſometimes prefixed to a canon, or fugue, to ſhew that it is at uniſon, i. e. that the ſecond part is to follow, or imitate the firſt in the ſame intervals, ſounds, notes, &c. the third to obſerve the ſame with regard to the ſecond, and ſo on.

SYMPHONIACO *ſtylo*. See STYLE.

SYMPHONY, συμφωνια, formed from συν, *with*, and φωνη, *ſound*, in *Muſic*, properly denotes a conſonnance, or concert of ſeveral ſounds agreeable to the ear; whether they be vocal or inſtrumental, or both; called alſo HARMONY.

Some authors reſtrain *ſymphony* to the ſole muſic of inſtruments: in this ſenſe, ſay they, the recitativos in ſuch an opera were intolerable, but the *ſymphonies* excellent.

The *ſymyhony* of the ancients went no farther than to two or more voices or inſtruments ſet to uniſon; for they had no ſuch thing as muſic in parts; as is very well proved by M. Perrault: at leaſt, if ever they knew ſuch a thing, it muſt be allowed to have been early loſt.

It is to Guido Aretine, about the year 1022, that moſt writers agree in aſcribing the invention of compoſition: it was he, they ſay, who firſt joined in one harmony ſeveral diſtinct melodies; and brought it even to the length of four parts, viz. baſs, tenor, counter-tenor, and treble. But there is nothing, ſays the ingenious Dr. Burney, more difficullt than to fix ſuch an invention as this upon any individual; an art utterly incapable of being brought to any degree of perfection, but by a ſlow and gradual improvement, and the ſucceſſive efforts of ingenious men during ſeveral centuries, muſt have been trivial and inconſiderable in its infancy; and the firſt attempt at its uſe neceſſarily circumſcribed and clumſy. This excellent writer has impartially examined and recited the evidence for and againſt the antiquity of harmony or COUNTERPOINT, and after an elaborate detail expreſſed his own opinion againſt it: and he has alſo given a liſt and analyſis of the writings of Guido, in order to aſcertain how much modern muſic has been indebted to this celebrated monk of Arezzo. Hiſt. Muſic, vol. i. p. 112, &c. vol. ii. p. 72, &c.

The word *ſymphony* is now applied to inſtrumental muſic, both that of pieces deſigned only for inſtruments, as ſonatas and concertos, and that in which the inſtruments are accompanied with the voice, as in operas, &c. A piece is ſaid to be in grand *ſymphony*, when, beſides the baſe and treble, it has alſo two other inſtrumental parts, viz. tenor and fifth of the violin.

SYMPHORICARPOS, in *Botany*. See *Upright* HONEYSUCKLE.

SYMPHYSIS, *συμφυσις*, denoting *a natural coherence or connection*, in *Anatomy*, one of the manners of articulating, or joining the bones. See ARTICULATION.

Symphyſis is a natural union, whereby two ſeparate bones coaleſce, and grow together; ſo that neither retains any proper diſtinct motion.

Such are moſt of the junctures of the epiphyſes, and many others of bones, which in children are ſeparate, but with age grow together; as the os ethmoides, the bones of the cranium, os ſacrum, &c.

The *ſymphyſis*, or natural union of bones, is of two kinds, either *with a medium*, or *without*.

SYMPHYSIS *without a medium*, is where the articulated bones ſupport themſelves in their ſituation, without any other aſſiſtance than that of their conformation only: thus, the parietal bones are mutually fixed by their indentations, and furniſh an example both of articulation and *ſymphyſis*: in the ſame manner the bones in the baſis of the ſkull are ſupported by thoſe which make the convex part of it.

This union is effected much after the ſame manner as that of a graft of a tree.

The SYMPHYSIS *with a medium*, is of three kinds, called *ſynneuroſis*, *ſyſſarcoſis*, and *ſynchondroſis*; each whereof ſee under its proper article SYNNEUROSIS, &c.

SYMPHYTUM, in *Botany*. See COMFREY.

SYMPLEXIUM, in *Natural Hiſtory*, the name of a genus of foſſils, of the claſs of the ſelenitæ, but not of the determined and regular figure of moſt of the genera of thoſe bodies, but compoſed of various irregular connections of differently ſhaped, and uſually imperfect bodies. The different bodies that form this kind are ſeldom quite perfect, having uſually fallen together before they were wholly hardened; but generally, whether they form a larger or ſmaller maſs, they together affect the external figure of a flat hexaedral column, though variouſly notched at the ſides, and truncated at the ends. Hill.

SYMPLOCE, *συμπλοκη*, in *Rhetoric*, a figure, where the ſame word is repeated ſeveral times in the beginning and end of a ſentence, including the ANAPHORA and EPITROPHE: thus *Quis legem tulit? Rullus. Quis majorem populi partem ſuffragiis privavit? Rullus. Quis comitiis præfuit? Idem Rullus.*

SYMPLOCOS, in *Botany*, a genus of the *polyandria monogynia* claſs. Its characters are, that the calyx is divided into five ſegments; it has five petals, and the ſtamina are inſerted in the petals. There is only one ſpecies.

SYMPOSIAC, *συμποσιακον*, formed from *συμποσιον*, *feaſt*; a conference or converſation of philoſophers at a banquet.

Plutarch has nine books, which he calls *ſympoſiacs*; or *ſympoſiac* queſtions, q. d. diſputations at table.

YMPOSIARCH, *συμποσιαρχος*, in *Antiquity*, the director, or manager of an entertainment. This office was ſometimes performed by the perſon at whoſe charge the entertainment was provided; ſometimes by another, named by him; and at other times, eſpecially in entertainments provided at the common expence, he was elected by lot, or by the ſuffrages of the gueſts. He was otherwiſe called *baſileus*, *rex*, and *modimperator*, &c. and determined the laws of good fellowſhip, obſerved whether every man drank his proportion, whence he was called *ophthalmus*, *oculus*, the eye.

SYMPTOM, *συμπτομα*, in *Medicine*, is ordinarily confounded with *ſign*, and defined an appearance, or aſſemblage of appearances in a diſeaſe, which ſhew and indicate its nature and quality; and from which one may judge of the events thereof.

In this ſenſe, a delirium is held a *ſymptom* of a fever. Pain, waking, drowſineſs, convulſions, ſuppreſſion of urine, difficulty of breathing and ſwallowing, coughs, diſtaſtes, nauſeas, thirſts, ſwoonings, faintings, looſeneſs, coſtiveneſs, dryneſs and blackneſs of the tongue, are the principal *ſymptoms* of diſeaſes.

Boerhaave gives a more juſt notion of *ſymptom*: every preternatural thing ariſing from a diſeaſe, as its cauſe, in ſuch manner, however, as that it may be diſtinguiſhed from the diſeaſe itſelf, and from its next cauſe, is properly a *ſymptom* of that diſeaſe.

If it ariſe after the ſame manner, from the cauſe of the diſeaſe, it is called a *ſymptom of the cauſe*.

If it ariſe from ſome former *ſymptom* as its cauſe, it is properly called a *ſymptom of a ſymptom*.

Whatever happens to a diſeaſe, from any other cauſes than thoſe mentioned, is more properly an *epigennema*.

Hence it appears, that the *ſymptoms* above recited are really diſeaſes themſelves. They are various as to number, effect, &c. though, after the ancients, they may be conveniently enough reduced to faults in the functions, excretions, and retentions.

Under the firſt come all diminutions, abolitions, increaſes, and depravations of animal actions; particularly with regard to hunger and thirſt, ſleeping and waking.

Under the ſecond come nauſeas, vomitings, lienteries, cœliac affections, diarrhœas, dyſenteries, iliac paſſions, &c.

Under the third come the jaundice, ſtone, dropſy, fever, iſchuria, ſtrangury, aſthma, catarrh, &c. See HUNGER, NAUSEA, LIENTERY, DIARRHOEA, JAUNDICE, DROPSY, STONE, FEVER, &c.

SYMPTOMS, *critical*. See CRITICAL.

SYMPTOMATICAL, in *Medicine*, is a term often uſed to denote the difference between the primary and ſecondary diſeaſes. Thus a fever from pain is ſaid to be *ſymptomatical*, becauſe it ariſes from pain only; and therefore the ordinary means in fevers are not, in ſuch caſes, to be had recourſe to; but to what will remove the pain; for when that ceaſes, the fever will ceaſe, without any direct means taken for it.

SYMPTOMATICAL *claſſification of diſeaſes*. See NOSOLOGY.

SYNÆRESIS, *συναιρεσις*, *contraction*, in *Grammar*, a figure, whereby two ſyllables are united in one. As *vemens* for *vehemens*. See CONTRACTION.

SYNAGOGUE, SYNAGOGA, *συναγωγη*, literally importing *aſſembly*, *congregation*; a particular aſſembly of Jews, met to perform the office of their religion. Alſo, the place wherein they meet.

The Jews uſe the term in the primary ſenſe, when they ſpeak of the great *ſynagogue*; meaning the court of ſeventy elders, which they pretend to have been inſtituted originally by Moſes, and the members of which they afterwards increaſed to one hundred and twenty.

Some authors take the uſe of *ſynagogues* to be of no old ſtanding among the Jews; and maintain, that it was not till after their return from the Babyloniſh captivity, that the opinion firſt got footing, that the worſhip of God was not ſo reſtrained to the temple at Jeruſalem, that it could not be held any-where elſe. The conſequence of which new opinion was, that the Jews began to build them *ſynagogues* in all their cities.

Others hold, that there were *ſynagogues* even in the time of David. But be this as it will, no aſſemblies of the Jews appear to have been called *ſynagogues* till a little before the coming of Jeſus Chriſt; who is ſaid to have preached in the middle of the *ſynagogue*.

The *ſynagogues* were uſed, not only for divine ſervice, but for holding courts of juſtice, eſpecially upon eccleſiaſtical affairs. To this uſe of *ſynagogues*, ſome have ſuppoſed that St. James refers, ch. ii. 2—4.

There were reckoned four hundred and eighty *ſynagogues* in the ſingle city of Jeruſalem. There are *ſynagogues* at London, Amſterdam, Rotterdam, Avignon, Metz, &c.

SYNAGRIS, in *Ichthyology*, a fiſh caught in the Archipelago, and ſome other ſeas, and much reſembling the *dentex*. Some have uſed it as a ſynonym for that fiſh, and others accounted it only a name applied to the *dentex* while young, but it is properly a diſtinct ſpecies.

According to Artedi, it is a ſpecies of the ſparus, and is diſtinguiſhed by him by the name of the variegated *ſparus* with a ſharp back, and with four large teeth. Linnæus alſo makes it a ſpecies of SPARUS, with a bifid red tail, and purple body, with ſeven golden coloured lines on each ſide.

SYNALOEPHA, *συναλοιφη*, from *συν*, *together*, and *αλειφω*, *I anoint*, in *Grammar*, a contraction of ſyllables, performed principally, by ſuppreſſing ſome vowel or diphthong at the end of a word, on account of another vowel or diphthong at the beginning of the next. As, *ill' ego*, for *ille ego*, &c.

Conticuer' omnes intentiqu' ora tenebant. Virg.

It is called by the Latins *colliſio*.

SYNANCHE, *συναγχη*, formed from *συν*, *with*, and *αγχειν*, *to conſtringe* or *ſuffocate*, in *Medicine*, a kind of QUINSY, wherein the internal muſcles of the fauces, or pharynx, are attacked. See ANGINA.

When the external muſcles of the ſame part are ſeized, it is called a PARASYNANCHE.

SYNARTHROIDALIS *diarthroſis*. See DIARTHROSIS.

SYNARTHROSIS, *συναρθρωσις*, formed from *συν*, *with*, and *αρθρον*, *articulus*, *joint*; in *Anatomy*, a kind of articulation, or jointure of the bones of the body; wherein they remain without any, at leaſt, apparent motion.

The *ſynarthroſis* is when the bones are bound ſo faſt together that they are rendered immoveable with regard to each other. In which view it ſtands oppoſite to *diarthroſis*.

It is divided into two kinds: one is made by engrailing, and the other in the ſame manner as a nail or pin is fixed in wood. The firſt may be again ſubdivided into the deeper, and the more ſuperficial kind.

The deep kind is obſervable in the articulation of the broad bones; the ancients termed this a SUTURE, from the reſemblance it bears to a coarſe ſeam, as is ſeen in the upper bones of the ſkull. It is made by jags, notches and holes, in each of the articulated bones, by which they are mutually indented, much after the ſame manner as what is called *dove-tailing* among the joiners. By the ancients this was called alſo *unguis*, probably becauſe the indented pieces are rounded like nails. Sutures have been divided alſo into the true and the falſe. See SKULL.

The other kind is that which is obſerved in bones joined together by more extended ſurfaces, in which no indentation appears outwardly. This kind of articulation the ancients termed *harmonia*, and the articulations of ſome of the bones of the upper jaw were given as examples of it. But though they deſcribe this as running in a ſingle line, they did not mean this in a ſtrict ſenſe, but only that the joint was like that of two rough boards without grooves; for they have expreſsly told us, that ſome ſmall inequalities might be obſerved in theſe joints, and ſome of them have uſed the terms *ſuture* and *harmony* indifferently. The other kind of *ſynarthroſis*, an example of which we have in the teeth, is called GOMPHOSIS, a Greek term ſtill retained. Winſlow.

To theſe three kinds of *ſynarthroſis*, ſome add ſeveral others, as *ſymphyſis*, *ſyntenoſis*, and *ſynneuroſis*. See SYMPHYSIS, &c.

SYNARTHROISMUS, *συναρθροισμος*, in *Rhetoric*, a figure which, in order to magnify a thing, whether good or bad, enumerates a great many different perſons, actions, &c. to which it relates: thus Cicero, *qui mihi fratrem optatiſſimum, me fratri amantiſſimo, liberis noſtris parentes, nobis liberos; qui dignitatem, qui ordinem, qui fortunas, qui ampliſſimam rem publicam, qui patriam, qui nihil poteſt eſſe jucundius; qui denique noſmet ipſos nobis reddidiſtis.* See Voſſ. Rhet. lib. v. p. 372.

SYNALIA, *συναυλια*, in the *Ancient Muſic*, a concert of ſeveral pipes, or flutes, performing alternately, without voices.

Mr. Malcolm, who doubts whether the ancients had properly any ſuch thing as inſtrumental muſic, that is, muſic compoſed wholly for inſtruments, without any ſinging; yet quotes the practice of the *ſynaulia* from Athenæus.

SYNCAMPE, formed of *συν*, and *καμπη*, *bending*, a word uſed by the old writers to expreſs the joint, or flexure, where the upper part of the arm is joined to the lower.

SYNCATEGOREMA, *συγκατηγορημα*, in *Logic*, denotes a word which, ſignifying little or nothing of itſelf, yet, when joined with others, adds force thereto: as *all*, *none*, *certain*, *&c.*

SYNCAUSIS, formed of *συν*, and *καυσις*, *burning*, a word uſed by ſome medical writers to expreſs the drying, and, as it were, burning up of the excrements with the body by febrile heat.

SYNCELLUS, or SINCELLUS, an ancient officer in the family of the patriarchs, and other prelates of the eaſtern church.

The word in the corrupt Greek, *συγκηλλος*, ſignifies a perſon who lies in the chamber with another; a *chamber-fellow*, or *chum*.

The *ſyncellus* was an eccleſiaſtic, who lived with the patriarch of Conſtantinople, to be a witneſs of his conduct; whence it is, that the *ſyncellus* was alſo called the *patriarch's eye*, becauſe his buſineſs was to obſerve and watch.

The other prelates had alſo their *ſyncelli*, who were clerks living in the houſe with them, and even lying in the ſame chamber, to be witneſſes of the purity of their manners.

Afterwards the office degenerated into a mere dignity; and there were made *ſyncelli* of churches. At laſt it became a title of honour, and was beſtowed by the emperor on the prelates themſelves; whom they called *pontifical ſyncelli*, and *ſyncelli Auguſtales*.

There were alſo *ſyncelli* in the weſtern church, particularly in France. The ſixth council of Paris ſpeaks with a great deal of indignation of ſome biſhops who aboliſhed the office of *ſyncelli*, and lay alone; and ſtrictly injoins them, that for the future, to take away all occaſion of ſcandal, they made the office of *ſyncelli* inſeparable from that of biſhops.

SYNCHONDROSIS, *συγχονδρωσις*, formed from *συν*, *with*, and *χονδρος*, *cartilage*, in *Anatomy*, a kind of articulation of the bones of the body; being a ſpecies of SYMPHYSIS.

The *ſynchondroſis* ſignifies the union of two bones by means of a cartilage: and is either moveable, as in that by which the bodies of the vertebræ are kept together, or which joins the firſt rib to the ſternum; or immoveable, as that of the oſſa pubis, in an ordinary ſtate.

SYNCHORESIS, *συγχωρησις*, in *Rhetoric*, the ſame with PERMISSION.

SYNCHRONISM, *συγχρονισμος*, formed from *συν*, and *χρονος*, *time*; the being or happening of ſeveral things together, at or in the ſame time.

The happening or performing of ſeveral things in equal times, as the vibrations of pendulums, &c. is more properly called *iſochroniſm*: though ſome authors confound the two.

SYNCHYSIS, formed of *συν* and *χυσις*, *effuſion*, a word uſed by the old medical writers to expreſs a confuſion and perturbation of all the humors in concoction, from the imbecility of the ſtomach. It is alſo uſed to expreſs a diſeaſe of the eye, which conſiſts in a confuſion of the humors: this generally proceeds from a violent blow; ſometimes from an inflammation of the uvea, occaſioning rupture of the veſſels, and an effuſion of the humors.

SYNCHYSIS, *συγχυσις*, in *Rhetoric*, a confuſed manner of expreſſion, where the natural order of the words is perverted. Horace affects it much: thus, lib. i. ſat. 5.

Pæne macros arſit dum turdos verſat in igne.

SYNCOMISTERIA, *συγκομιςηρια*, in *Antiquity*, the ſame with THALYSIA.

SYNCOMISTON, formed of *συν*, and *κομιζω*, *I nouriſh*; a name given by Athenæus, and ſome other authors, to the coarſer ſort of bread eaten by the poor in many countries, and made of unſifted meal, the bran being mixed up among the reſt. This is a very nouriſhing food, and for laborious people, or thoſe who uſe much exerciſe, is highly preferable to all other ſorts of bread.

SYNCOPATION, in *Muſic*, denotes a ſtriking or breaking of the time; whereby the diſtinctneſs of the ſeveral times or parts of the meaſure is interrupted.

SYNCOPATION, or SYNCOPE, is more particularly uſed for the connecting the laſt note of one meaſure or bar with the firſt of the following meaſure; ſo as only to make one note of both. See LEGATE-*note*, and SLUR.

A *ſyncope* is ſometimes alſo made in the middle of a meaſure.

SYNCOPATION is alſo uſed when a note of one part ends, or terminates, on the middle of a note of the other part. This is otherwiſe denominated *binding*.

SYNCOPATION is alſo uſed for *driving a note*; that is, when ſome ſhorter note at the beginning of a meaſure or half-meaſure is followed by two, three, or more longer notes, before another ſhort note occurs, equal to that which occaſioned the driving, to make the number even:—e. gr. when an odd crotchet comes before two or three minims, or an odd quaver before two, three, or more crotchets.

In *ſyncopated*, or driving notes, the hand or foot is taken up, or put down, while the note is ſounding.

SYNCOPE, *Συγκοπη*, formed from *συν*, and *κοπτειν*, *to cut* or *ſtrike*, in *Medicine*, a deep and ſudden ſwooning, wherein the patient continues without any ſenſible heat, motion, ſenſe, or inſpiration: and is ſeized with a cold ſweat over the whole body, and all the parts turn pale and cold, as if dead.

There are ſeveral cauſes of *ſyncopes*: 1°, Too great an exhauſtion of ſpirits; as after long diets, exceſſive evacuations, violent exerciſes, long bathings, &c.—2°, The irregular motion of the ſpirits preventing their due influx into the parts; as ſometimes happens in fear, wrath, and other violent paſſions.—3°, Immoderate hæmorrhages—4°, An ill conſtitution of blood; as in cacothymias, or in perſons who have taken ſomething that either diſſolves or coagulates the blood.—5°, Secret diſeaſes, as abſceſſes, or polypuſes of the heart, worms, &c.

In very numerous, crouded aſſemblies, people ſometimes fall into *ſyncopes*, merely through the hot, thick, impure air they breathe.—Some women are alſo liable to them upon the ſmell of muſk, civet, &c.

For *ſyncopes*, many give volatile ſpirits, and aromatics. Heurnius recommends treacle-water, and cinnamon-water; and Etmuller the volatile ſalt of vipers, ſpirit of ſal ammoniac, oil of amber, and, ſometimes, bleeding. See LIPOTHYMIA.

SYNCOPE, in *Grammar*, denotes an eliſion, or retrenchment, of one or more letters, or ſyllables, from a word.

As when we ſay, *virûm*, for *virorum*; and *manet alta mente repôſtum*, for *repoſitum*.

SYNCRETISTS, formed of *συγκρινω*, *I compare* or *reconcile*, denote in general perſons who from a variety of diſcordant opinions, either in philoſophy or religion, form a kind of comprehenſive and pacific ſyſtem, with a view of uniting the ſeveral parties who maintain ſuch opinions. The moderate men, as they are called, of every perſuaſion, may be comprehended under this denomination. The Platonic *Syncretiſts*, towards the cloſe of the fifteenth century, were of this claſs; for they conſidered Plato as the ſupreme oracle of philoſophy, and yet would by no means ſuffer Ariſtotle to be treated with indifference or contempt; and they propoſed to reconcile the jarring doctrines of theſe two famous Grecian ſages, and to combine them into one ſyſtem. Theſe moderate philoſophers, both in their manner of teaching and in the opinions they adopted, followed the modern Platonic ſchool, of which Ammonius was the original founder. Their ſect was for a long time held in the utmoſt veneration, particularly amongſt the myſtics; while the ſcholaſtic doctors, and all ſuch as were infected with the itch of diſputing, favoured the Peripatetics. But, after all, theſe reconciling Platoniſts were chargeable with many errors and follies; they fell into the moſt childiſh ſuperſtitions, and followed, without either reflexion or reſtraint, the extravagant dictates of their wanton imaginations. The CALIXTINS, who, in the cloſe of the ſeventeenth century, endeavoured to promote union and concord among Chriſtians in the heathen churches, were alſo called *ſyncretiſts*. Moſheim's Eccl. Hiſt. vol. iii. p 220, &c. vol. iv. p. 445, &c.

SYNCRISIS, *συγκρισις*, a word uſed by the chemical writers to expreſs a concretion, or coagulation of any thing, effected by a ſpontaneous, or violent reduction of a liquid ſubſtance to a ſolid one, by a privation of the humid.

SYNCRISMATA, a ſort of ointment of the nature of the acopa, in uſe among the ancients.

SYNCRITICA, a name given by ſome writers to ſuch medicines as are of a coercive and aſtringent quality, whether uſed externally, or given internally.

SYNDESIS, formed of *συνδεω*, *I bind together*, a word uſed by the ancient phyſicians to expreſs a binding, or ſtraightening.

SYNDESMO-*Pharyngæi*, in *Anatomy*, are faſciculi of muſcular fibres, very diſtinctly inſerted by one end along the ligaments, by which the ſuperior cornua of the cartilago thyroides are connected to the extremities of the great cornua of the os hyoides. From thence they run backward, and meet at the linea alba.

SYNDESMOSIS, in *Anatomy*, a connection of the bones, called alſo SYNNEUROSIS.

SYNDESMUS, in *Anatomy*, is ſometimes uſed for a LIGAMENT. The word is *συνδεσμος*, which ſignifies a joining together.

In grammar, *ſyndeſmus* is uſed for a conjunction.

SYNDIC, in *Government* and *Commerce*, an officer in divers countries, entruſted with the affairs of a city, or other community, who calls meetings, makes repreſentations and ſolicitations, to the miniſtry, magiſtracy, &c. according to the exigency of the caſe.

The word is formed from the Latin *ſyndicus*; and that from the Greek *συνδικος*; which ſignifies the ſame.

The *ſyndic* is appointed to anſwer and account for the conduct of the body: he makes and receives propoſals for the advantage thereof; controuls and corrects the failings of particular perſons of the body; or, at leaſt, procures their correction at a public meeting.—In effect, the *ſyndic* is, at the ſame time, both the agent and cenſor of the community. Almoſt all the companies in Paris, &c. as the univerſity, companies of arts and trades, have their *ſyndics*; and ſo have moſt of the cities of Provence and Languedoc.

SYNDIC is alſo uſed for a perſon appointed to ſolicit ſome common affair, wherein he himſelf has a ſhare; as happens particularly among the ſeveral creditors of the ſame debtor, who fails, or dies inſolvent.

The chief magiſtrate of Geneva is alſo called *ſyndic*. There are four *ſyndics* choſen every year; the eldeſt of whom preſides in the council of twenty-five, which is the chief council of the city, wherein all affairs are diſpatched, both civil and political; thus the other three elect cannot all come at the office till the four years end; ſo that the *ſyndicate* rolls among ſixteen perſons, all choſen out of the council of twenty-five.

SYNDROME, Συνδρομη, the concourſe, or combination, of ſymptoms, in any diſeaſe.

SYNECDOCHE, Συνεκδοχη, formed of *συνεκδεχομαι*, *I take together*, in *Rhetoric*, a kind of figure, or rather trope, frequent among orators and poets, whereby the whole of a thing is put for a part of it, or a part for the whole: and becauſe a thing may be conſidered as a whole, in three different reſpects, which logicians call an univerſal, eſſential, and integral whole, there are ſix kinds of *ſynecdoche*: by the firſt the genus is put for the ſpecies: thus virtue in general is ſometimes uſed for ſome particular part of virtue, and every creature, Mark xvi. 15. denotes every rational creature: by the ſecond the ſpecies is put for the genus; thus bread denotes any ſort of food: by the third, the eſſential whole is put for one of its parts, that is either for the matter or form: by the fourth, the matter or form is put for the whole being; thus ſilver and gold are uſed to ſignify money made of thoſe metals: and by the fifth, the whole of any material thing or quantity, whether continued or diſcrete, is put for a part of it: thus the Roman empire is called the world, and our Saviour ſays he ſhould be three days and three nights in the heart of the earth, Mat. xii. 40, meaning part of the firſt and third day, and the whole ſecond day; and by this kind of *ſynecdoche*, the plural number is ſometimes put for the ſingular, as Mat. xxvii. 44, compared with Luke xxiii. 39: by the ſixth kind of *ſynecdoche*, part of any material thing or quantity is put for the whole of it, as the roof for the houſe, ſails for ſhips, &c. and thus alſo the ſingular number is put for the plural, and a number leſs than the real number is uſed for any round number. Ward's Or. vol. ii. p. 2, &c.

SYNECHES, in *Medicine*, is the name of a fever of the next degree to the intermittent: it alſo ſeems to be ſomething of kin to thoſe, and is called the *continent*, or *remitting fever*. It is a continuing fever in regard to duration, though not in degree, continuing many days together without intermiſſion: but then it has its diminutions and augmentations; ſometimes regular, ſometimes irregular, though no true intermiſſions. Allen's Synopſis, p. 3.

SYNECPHONESIS, or SYMPHONESIS, in *Grammar*, a coalition, whereby two ſyllables are pronounced as one.

It is much the ſame thing as the SYNALOEPHA, or *ſynæreſis*.

SYNECTICON, a word uſed by the old writers to expreſs the proximate cauſe of a diſeaſe; called alſo the *cauſa continens*, and always remaining cloſely united with the diſeaſe.

SYNEDRIN, or SYNEDRION. See SANHEDRIN.

SYNEMMENON *nete*. See NETE.

SYNERGASMA, formed of *συν*, and *εργαζομαι*, *I work*, a word uſed by Libavius, and ſome other authors, to expreſs any operation in chemiſtry. The operations are by this author divided into two claſſes, the energetic, and preparatory: the firſt producing ſuch bodies as are of power to act on others as menſtruums, to cure diſeaſes, and the like; and the others producing no ſuch things, but being neceſſary preparatives to them.

SYNERGISTS, formed of *συνεργεια*, *co-operation*, in *Eccleſiaſtical Hiſtory*, a name given to thoſe whoſe doctrine was almoſt the ſame with that of the SEMIPELAGIANS, and who denied that God was the only agent in the converſion of ſinful man, and affirmed, that man co-operated with divine grace, in the accompliſhment of this ſalutary purpoſe. The friends and diſciples of Malancthon adopted expreſſions of this kind, in deſcribing the nature of the divine agency in man's converſion; but the Lutherans conſidered this repreſentation as ſubverſive of the true and genuine doctrine of their maſter, relating to the abſolute ſervitude of the human will, and the total inability of man to do any good action, or to bear any part in his own converſion.

SYNESTIC, formed of *συνιστημι*, *I render conſiſtent*, is ſometimes applied by phyſicians to expreſs the ſtools when firm, and of a conſiſtence; ſuch as to make them remain in their ſhape, in oppoſition to liquid ones.

SYNGENESIA, in *Botany*, the nineteenth claſs of plants, with hermaphrodite flowers, whoſe ſtamina are naturally formed into a ſingle regular congeries.

This claſs combrehends ſix orders, viz. *polygamia æqualis*, including ſuch plants as have compound flowers, of which the florets are all hermaphrodite; of which there are forty-one genera, diſtinguiſhed into ſuch as have ligulate compound flowers, of which there are nineteen, and ſuch as have tubuloſe compound flowers, of which there are twenty-two; *polygamia ſuperflua*, including ſuch plants as have the florets of the diſk hermaphrodite, and thoſe of the radius female, of which there are thirty-ſix genera, diſtinguiſhed into tubuloſe, comprehending eight genera, and radiate, of which there are twenty-eight: *polygamia fruſtranea*, including ſuch plants as have the florets of the diſk hermaphrodite, and thoſe of the radius neuter, of which there are ſeven genera, and all radiate: *polygamia neceſſaria*, including ſuch plants as have the flowers of the diſk male, and thoſe of the radius female, of which there are fourteen genera, moſt being radiate: *polygamia ſegregata*, including ſuch plants as have many partial cups contained in the common calyx, which ſeparate and ſurround the floſculi; of which there are ſix genera, diſtinguiſhed into ſuch as have four floſculi in each partial calyx, ſuch as have many floſculi in the ſame, and ſuch as have one floſculus: and *monogamia*, including ſuch plants as have ſimple flowers, of which there are ſeven genera. See FRUCTIFICATION and ORDER.

The *ſyngeneſia* expreſſes the ſame claſs of plants with the compound flowered plants of Ray, and others. The general characters of the claſs are theſe.

The cup is the crown of the ſeed, and ſtands on the ſummit of the germen. The flower conſiſts of one petal, and has a very narrow and long tube placed upon the germen: this is either tubular, ligulated, or naked.

The ſeeds are, in the different genera of this claſs, of a very different appearance at the ends. Some are crowned with a downy matter, compoſed of a great number of ſingle ſhort filaments, placed circularly, or otherwiſe, on the head of the ſeed. In ſome the downy matter is radiated; in others it is ramoſe, or branched; and in ſome it is ſupported on a pedicle, while in others it ſtands immediately on the ſeed. In ſome genera the ſeeds have no down at all, but have a ſmall corona, formed of what was originally the cup of the flower; this is permanent, and divided uſually into five ſegments. In ſome genera the ſeed is wholly naked, having neither any down, nor this crown of a cup.

The ſexes of the plants of this claſs are very variouſly diſpoſed, and it is owing to this that there are among them ſeveral different kinds of flowers. The tubulated flower is called an hermaphrodite flower, when it contains both the ſtamina and piſtil. It is called a male flower, when it contains only ſtamina without any ſtigmata. It is called a female flower, when it contains a ſtigma and no ſtamina. And there is ſtill another ſort of flower, called neutral, among this claſs of plants; theſe have neither ſtamina, piſtil, nor ſtigma, nor indeed any other part of fructification. The ſeveral kinds of flowers are, in the deſcriptions of the genera, called ligulated, campanulated, &c. from their ſhape. A flower compoſed of a great number of theſe ſmall flowers is called floſcular, or floſculoſe flower; each of theſe, from their being ſmall, and only making up a part of a general flower, being called a floſcule. The common receptacle of the fructification in the floſculous flowers contains always ſeveral floſcules; and in the various genera the diſk, on which theſe are received, is either concave, convex, plain, globoſe, or, finally, pyramidal. This receptacle is called by ſome *thalamus*.

The eſſential character of a floſculous flower conſiſts in its antheræ growing together into a cylindric body, and producing a ſingle ſeed, which ſtands under the receptacle of the ſeparate floſcule.

It is very remarkable that Plumier has no genus of compound flowers. Tournefort, though he had not the aſſiſtances of the later obſervations on the ſtamina and antheræ to guide him, yet has fixed very natural genera in the claſs of the *ſyngeneſious*, or compound-flowered plants.

Vaillant made more obſervations on the nature of the flowers of theſe plants, than any one who went before him, and the only error he run into, was the making too many genera. Pontedera has rendered the method of this claſs very eaſy and clear, though he found it very confuſed. Linnæus.

SYNGENESIA is alſo the name of the tenth order of the claſs MONOECIA, and of the thirteenth order of the DIOECIA.

SYNGNATHUS, in *Ichthyology*, the name of a genus of fiſhes, of the order of *nantes* and claſs of *amphibia*; the characters of which are theſe; the coverings of the gills are on each ſide compoſed of a thin and ſingle bony lamella: the head is oblong and compreſſed; the jaws are cloſed up at the ſides; and the mouth is only capable of opening at the extremity of the ſnout, which is cylindric, and covered by the lower jaw: the body is long and very ſlender; the ſhape is ſometimes roundiſh, but more uſually angular. There are no belly fins. The ſpecies of this genus, enumerated by Artedi, are four, and by Linnæus ſeven; ſuch are the *pipe-fiſh*, *hippocampus*, *ophidion*, *typhle*, &c. The name *ſyngnathus* is of Grecian origin, and is formed of the word *συν*, which in compoſition ſignifies the ſame as the Latin *con*, *together*, and *γναθος*, a *jaw*. It is given to this fiſh from that remarkable ſtructure of its mouth, by which the jaws are made to grow together, and the very end of the mouth only opens.

SYNGNOME, Συνγνομη, in *Rhetoric*, the ſame with CONCESSION.

SYNGRAPH. See CHIROGRAPH.

SYNNAS, or SYNNADIUM *marmor*, in the *Writings of the Ancients*, the name of a ſpecies of marble uſed in the larger buildings of the Romans. It is by ſome confounded with the docimenum marmor, with which the temple of Jupiter, erected by Adrian, was built; but this is erroneous, ſince that elegant marble was always charactered as perfectly white, without blemiſh; and this was always ſpotted and clouded with black, inſomuch that ſome writers have called it by an epithet expreſſing thoſe variegations, *maculoſa ſynnas*.

SYNNEUROSIS, formed from *συν*, *with*, and *νευρον*, *nerve*, in *Anatomy*, a kind of articulation, or juncture of the bones.

The *ſynneuroſis* is reckoned a branch of the SYMPHYSIS; and is when the bones are connected together by a ligament; as is the os femoris to the os iſchium, and the patella to the tibia: and in all the joints deſigned for motion.

SYNOCHA, in *Medicine*, the name of a ſpecies of fever, of which authors diſtinguiſh two kinds, the ſimple, and the compound. The ſimple *ſynocha* is very rare in our parts of the world. The compound one is a mixed diſeaſe of the *ſynochal* and ordinary continued fever, and has been called by ſome the *putrid* FEVER, and *ſynocha putrida* by the ancient medical writers.

Signs of it. The *ſynocha* always ſeizes people at once with a violent heat, without thoſe ſhiverings which frequently attend the firſt attacks of other fevers. It is attended with a violent thirſt, an univerſal languor, and laſſitude of the limbs; and often with anxieties, ſighings, and ſuffocative difficulties of breathing. Acute and violent pains are felt in the head, with a tumid redneſs of the face and eyes, noiſes in the ears, vertigos, and eternal reſtleſſneſs and toſſing about in the bed, with wildneſſes in the thoughts. The urine from the firſt is red and pellucid; it rarely admits of any breaking, or depoſits any ſediment before the fourth day, then it frequently precipitates a reddiſh matter. There is generally an obſtinate coſtiveneſs, and ſpaſmodic tenſions of the back and limbs are uſually very painfully felt during the whole time of the diſeaſe. The ſeventh day generally brings on a criſis in this diſeaſe, which in young people is uſually by an hæmorrhage of the noſe, in older by profuſe ſweats. The perſons moſt ſubject to this diſeaſe are thoſe of a plethoric habit, who eat high-ſeaſoned foods, and uſe little exerciſe; and eſpecially ſuch as have had any habitual evacuation of blood ſtopt upon them. It is more frequent in the ſpring and autumn than at other ſeaſons.

Cauſes of it. Theſe are principally violent and unaccuſtomed exerciſe, drinking large quantities of ſpirituous liquors, long watchings, immoderate paſſions, violent ſweatings from hot medicines, and ſudden cooling the body when very hot, by drinking large draughts of cold water, or other weak liquors. All theſe occaſion the fever, by affecting the plethoric habit of the perſon; but this, which is the general and original baſis of the diſtemper, is uſually brought on by omiſſion of uſual bleeding at ſpring and autumn, and other ſeaſons, by ſuppreſſions of accuſtomed hæmorrhages by the noſe, and by ſtoppages of the menſtrual, or hæmorrhoidal evacuations.

Prognoſtics in it. The *ſynochal* fever, in itſelf, is ſeldom attended with any great danger; and when the criſis happens by profuſe ſweats, or by an hæmorrhage, on the ſeventh day, there is no fear of any ill accidents; but if this time paſs without a criſis, and the congeſtions remain, young perſons are uſually thrown into a violent phrenitis, and older ones into ſoporous affections; and even in ſome caſes, where the criſis comes regularly on by hæmorrhages, there is danger from their being too great in quantity, and two much impairing the ſtrength of the patient. There muſt be great caution, however, uſed in aſſuaging this hæmorrhage, if that be found neceſſary; ſince, when it is imprudently done, it often brings on terrible obſtructions in the viſcera, and hectics, dropſies, and cachectic complaints, that are very difficult to get rid of. The critical hæmorrhage is known to be coming on by a ſtricture and itching of the noſe, an intenſe pain in the head, a redneſs of the eyes and face, and ringing in the ears. Very frequently, alſo, the criſis is predicted by a remarkable perturbation of mind, but this is not the peculiar ſymptom of the hæmorrhage, but happens as often, when it is by ſweat. Often there is a dripping of blood from the noſe on the fourth day; and in this caſe, if nature be not diſturbed, there will certainly bear farther bleeding on the ſeventh day. Complaints of an anxiety and uneaſineſs about the breaſt preſage an unhappy event. Other very bad ſymptoms, alſo, are involuntary tears, great reſtleſſneſs, no relief from ſleep, and the appearance of livid, or brown ſpots. The thick ſtate of the blood, in this fever, makes it very eaſily paſs into ſlow continued fevers and hectics; and ſometimes, when the criſis does not come on at the ſeventh day, and there appear clouds in the urine, it appears afterwards on the fourteenth day.

Method of cure Bleeding is always neceſſary in the firſt ſtages of this fever, before the ſigns of coction appear in the urine; after this the violent emotions of the blood are to be quelled by nitrous and acid medicines, as the juice of lemons: to theſe muſt be added reſt, and a frequent drinking of warm and weak liquors. The bowels, if much bound, muſt be gently looſened by an emollient clyſter; and after the criſis, ſome gentle purgatives muſt be given to clear the primæ viæ. Bleeding is not to be ordered after the ſigns of coction appear in the urine, for it often prevents the critical hæmorrhage, and renders the patient ſoporous, or delirious; and in the compound, or putrid *ſynochal* fever, the patient is not to be blooded at all. Volatile ſalts are given by ſome in this caſe, but very improperly, for they are always attended with miſchief, and often occaſion cachectic tumors. Symptomatic quinſeys often attend this diſeaſe, and are to be relieved by gargariſms, rendered aſtringent by an admixture of terra Japonica, or the like medicines; and in this particular caſe, wine is to be more cautiouſly forbid than at any other time. Junker's Conſp. Med. p. 267.

SYNOCHUS, Συνοχος, denotes a continent fever, which proceeds, without any remiſſion, to the end, and is either of the ardent or putrid kind. See Fever.

SYNOD, formed from συνοδος, *convention, aſſembly*, compounded of συν, *with*, and οδος, *via, way*, in *Aſtronomy*, a conjunction, or concourſe, of two or more ſtars or planets, in the ſame optical place of the heavens.

Synod, Synodus, in *Church Hiſtory*, a council; or a meeting or aſſembly of eccleſiaſtics, to conſult on matters of religion.

Of theſe there are four kinds, viz.

General, or *œcumenical*, where biſhops, &c meet from all nations.

Theſe were firſt called by the emperors, afterward by Chriſtian princes; till in later ages the pope uſurped to himſelf the greateſt ſhare in this buſineſs, and by his legates preſided in them when called.

National, where thoſe of one nation only come together to determine any point of doctrine or diſcipline. The firſt of this ſort which we read of in England, was that of Herudford or Hertford, in 673, and the laſt was that held by cardinal Pole, in 1555.

Provincial, where they of one only province meet, now called the *convocation*: and

Dioceſan, where thoſe of but one dioceſe meet, to enforce canons made by general councils, or national and provincial *ſynods*, and to conſult and agree upon rules of diſcipline for themſelves. Theſe were not wholly laid aſide, till by the act of ſubmiſſion, 25 Hen. VIII. c. 19. it was made unlawful for any *ſynod* to meet, but by royal authority. See Council and Convocation.

Synods, *Provincial, in the Government of the Church of Scotland*, are compoſed of ſeveral adjacent preſbyteries, of which there are fifteen in all. The members are a miniſter and a ruling elder out of each pariſh. Theſe *ſynods* meet twice a year, and chuſe a moderator, who is their prolocutor. The acts of the *ſynods* are ſubject to the review of the general aſſembly, which is the dernier reſort of the kirk of Scotland; and conſiſts of commiſſioners from preſbyteries, royal burghs and univerſities. A preſbytery of twelve miniſters, ſends two miniſters and one ruling elder; a preſbytery of between twelve and eighteen ſends three and one ruling elder: of between eighteen and twenty-four, ſends four, and two ruling elders; of twenty-four ſend five and two elders; every royal burgh ſends one elder, and Edinburgh two; every univerſity ſends one commiſſioner, uſually a miniſter. The general aſſembly meets once a year, in the month of May, and is opened and adjourned by the king's royal commiſſion appointed for that purpoſe.

SYNODALS, or Synodies, were pecuniary rents (commonly of two ſhillings), paid to the biſhop or archdeacon, at the time of their Eaſter viſitation, by every pariſh prieſt.

They were thus called, becauſe uſually paid in ſynods; becauſe, anciently, biſhops uſed to viſit and hold their dioceſan ſynods at once.—For the ſame reaſon, they are ſometimes alſo denominated *ſynodalica*; but, more uſually, procurations.

Conſtitutions made in the provincial or dioceſan ſynods, were ſometimes called *ſynodales*, which were required in many caſes to be publiſhed in the pariſh churches.

Synodales *teſtes* was an appellation anciently given to the *urban and rural* deans from their informing againſt, and atteſting, the diſorders of the clergy and people in the epiſcopal ſynod.

When theſe ſunk in their authority, in their ſtead roſe another ſort of *ſynodal* witneſſes, who were a kind of impanelled jury, conſiſting of a prieſt, and two or three laymen, for every pariſh; though at length, two for every dioceſe were annually choſen; till, at laſt, the office came to be devolved on the church-wardens.

Some think our queſtmen, who are aſſiſtants to the church-wardens, were called *ſideſmen*, quaſi *ſynodſmen*. See Sides-*men*, and Quest-*men*.

Synodale *inſtrumentum*, a ſolemn oath, or engagement, that theſe ſynodical witneſſes took: as our church-wardens now are ſworn to make juſt preſentments.

SYNODICAL, Συνοδικος, ſomething belonging to a Synod.

Synodical *epiſtles* are circular letters written by ſynods to the abſent prelates and churches; or even thoſe general ones directed to all the faithful, to inform them of what had paſſed in the ſynod.

In the collection of councils are abundance of theſe *ſynodical* epiſtles.

Synodical *month* is the period or interval of time, wherein the moon, departing from the ſun at a ſynod, or conjunction, returns to him again.

Kepler found the quantity of the mean *ſynodical* month, twenty-nine days, twelve hours, forty four minutes, three ſeconds, eleven thirds.

This period is alſo called a lunation; in regard in the courſe hereof, the moon puts on all her phaſes, or appearances.

SYNODIES. See Synodals.

SYNOD's *men*, *teſtes ſynodales*. See Synodales, and Sides-*men*.

SYNODON, or Cynodon, in *Ichthyology*, a name given by ſeveral authors to a fiſh caught in the Mediterranean, and more commonly known by the name of dentex. It is a ſpecies of sparus, in the Linnæan ſyſtem.

SYNODONTIDES, in *Natural Hiſtory*, the name of a ſtone deſcribed by the ancients, and ſaid to be taken out of the head of the fiſh, called by them *ſynodontes*, the *dentex* of the moderns.

SYNOECIA, Συνοικια, in *Antiquity*, a feaſt celebrated at Athens, in memory of Theſeus's having united all the petty communities of Attica into one ſingle commonwealth, the ſeat whereof was Athens; where all the aſſemblies were to be held.

The feaſt was dedicated to Minerva; and, according to the ſcholiaſt of Thucydides, it was held in the month Metagitnion.

SYNONYMOUS, Synonymus, is applied to a word or term that has the ſame import, or ſignification, with another. Some ſevere critics condemn all uſe of *ſynonymous* terms in the ſame period; but this is to condemn all antiquity: ſo far is the uſe thereof from being vicious, that it is frequently neceſſary; as ſynonymas contribute both to the force and clearneſs of the expreſſion. If the firſt word ſketch out the reſemblance of the thing it repreſents, the ſynonym that follows is, as it were, a ſecond touch of the pencil, and finiſhes the image.

Indeed, they muſt be uſed with great diſcretion and œconomy. The ſtyle muſt be raiſed and brightened, not ſtuffed or loaded, with *ſynonymous* terms. They muſt be uſed as ornaments, and to render the expreſſion the more forcible, without making a ſhew of the riches thereof, or heaping ſynonymas on ſynonymas.

But, though *ſynonymous* words in ſome caſes may be laudable, *ſynonymous* phraſes are inexcuſable: the reaſon is, that two *ſynonymous* phraſes keep the mind at reſt, and let it flag and languiſh.

The perplexity in the writing of the ancients, ariſing from the uſe of *ſynonymous*, as well as homonymous terms, is very great, when they uſe the ſame word as the name of two different things. The whole value of the accounts they left us is loſt, by our not being able to diſtinguiſh which of the two they mean.

The great ſource of this confuſion has been in the love of ſecrets in medicine, which prevailed as ſtrongly among the ancients as it does among the moderns. In order to conceal the remedies they uſed, they often gave them new names, and often (which was worſe) uſed for them the names of other things.

Thus they called the pine-tree *itea*, the univerſally received name of the willow, and ſo in many other inſtances; from which we have, at this time, the ſame word in uſe in different authors, as the name of different things.

Galen gives a preſcription for baldneſs, in which almoſt all the ingredients are called by names wholly different from thoſe that the reſt of the world knew them by at that time, and by that means paſſed upon the vulgar for new-diſcovered medicines. The bay-tree is there called *ladonis*; the bear, *amorphon brephos*, from the ſtory of its young cubs being ſhapeleſs till licked into form by the mother bear: the ladanum, or labdanum, is called *apotragopogon*, becauſe of being gathered from the beards of goats; and the adarce is called *pericalamitis*, from its being found concreted about a reed.

The compoſition of Philo, called *cholice*, given in the ſame author, is thus given in the ænigmatical manner by the ſame means. The more learned and ingenuous people of theſe ages deteſted this idle practice, and gave all things their common names; but as the abſurdities of one man will generally find followers in others of the ſame ſtamp, though the phyſicians diſcarded the practice, the ſucceeding race of chemiſts, famous for their love of ſecrets, continued and improved it to ſo great a degree, that were their writings of any value, it would be wholly impoſſible, in many of them, ever to arrive at the author's meaning.

The Arabian writers have fallen more into the uſe of *ſynonyms*, and that in a more erroneous manner, than any other authors.

SYNONYMISTS, among the *Botanical Writers*, ſuch as have employed their care in collecting the different names, or *ſynonyma*, uſed by different authors, and reducing them to one another.

SYNONYMY, Synonymia, formed from *συν*, *with*, and *ονομα*, *name*, in *rhetoric*, a *figure* whereby ſynonyms, or ſynonymous terms, that is, various words of the ſame, or nearly ſimilar ſignification, are made uſe of, to amplify the diſcourſe.

Such is that paſſage in Cicero, *Abiit*, *evaſit*, *effugit*, *erupit*. He went off, he eſcaped, he run away, &c.

This figure ſometimes adds force to an expreſſion by enlivening the idea; and it often promotes the harmony and juſt cadence of a ſentence, which otherwiſe would drop too ſoon, and diſappoint the ear.

SYNOVIA, or Sinovia, in *Medicine*, a term uſed by Paracelſus, and his ſchool, for the nutritious juice proper and peculiar to each part.

Thus they talk of the *ſynovia* of the joints, of the brain, &c. Others uſe *ſynovia* for the gout and other diſeaſes in the joints, ariſing from a vice in the nutritious juice.

Others reſtrain the term to the ouſing out of the nutritious juice through a wounded part, eſpecially at a joint.

Van Helmont defines *ſynovia* a kind of tranſparent mucilage, like ſeed, ſuch as iſſues from the legs of a calf upon cutting off the feet. See Mucilaginous *glands*.

SYNTAGMA, Συνταγμα, the diſpoſing, or placing, of things in an orderly manner.

SYNTAX, Συνταξις in *Grammar*, the conſtruction, or connexion of the words of a language into ſentences or phraſes.

F. Buffier more accurately defines *ſyntax*, the manner of conſtructing one word with another, with regard to the different terminations thereof, preſcribed by the rules of grammar.

Some authors, as M. Vaulegas, &c. confound *ſyntax* with ſtyle; but there is a real difference.

The office of *ſyntax* is, to conſider the natural ſuitableneſs of words with reſpect to one another; in order to make them agree in gender, number, perſon, mood, &c.

To offend in any of theſe points, is called to offend againſt *ſyntax*: and ſuch kind of offence, when groſs, is called a solecism; and when more ſlight, a barbarism.

The ſeveral parts of ſpeech are, with regard to language, what materials are with regard to a building. How well prepared ſoever they may be, they will never make a houſe, unleſs they be placed conformably to the rules of architecture. It is, properly, the *ſyntax* that gives the form to language; and it is that on which turns the moſt eſſential part of grammar.

There are two kinds of *ſyntax*; the one of *concord*, wherein the words are to agree in gender, number, caſe, and perſon. The other, of *regimen*, or *government*; wherein one word governs another, and occaſions ſome variation therein. See Concord and Regimen.

SYNTENOSIS, a word uſed by anatomiſts to expreſs an articulation of the bones when they are connected, as the oſſa ſeſamoidea of the toes, only by a tendon.

SYNTERICE, denotes that branch of medicine which is concerned in preſerving health.

SYNTEXIS, Συντηξις, in *Medicine*, an attenuation, or colliquation, of the ſolids of the body; ſuch as frequently happens in atrophies, inflammations of the bowels, colliquative fevers, &c. wherein a fatty and uliginous matter is voided with the excrements, by ſtool. See Colliquation.

SYNTHENA, a term uſed by Paracelſus to expreſs an apoplectic, or epileptic diſorder, attended with violent griping pains in the bowels. This is generally mortal.

SYNTHESIS, Συνθησις, formed from *συν*, *with*, and εσις, *poſitio*, *compoſition*, or the putting of ſeveral things together: as in making a compound medicine of ſeveral ſimple ingredients, &c. See Composition.

Synthesis, in *Logic*, denotes a branch of method, oppoſite to analyſis.

In the *ſyntheſis*, or *ſynthetic method*, we purſue the truth by reaſons drawn from principles before eſtabliſhed, or aſſumed, and propoſitions formerly proved; thus proceeding by a regular chain, till we come to the concluſion.

Such is the method in Euclid's *Elements*, and moſt demonſtrations of the ancient mathematicians, which proceed from definitions and axioms, to prove propoſitions, &c. and from thoſe propoſitions proved, to prove others.

This method we alſo call composition, in oppoſition to *analyſis* or *reſolution*.

Synthesis, in *Grammar*. See Syllepsis.

Synthesis, in *Surgery*, an operation whereby divided parts are reunited; as in wounds, fractures, &c.

SYNTHETIC, or Synthetical, is a term given to that part of chemiſtry, which, after the analytical chemiſtry has taken bodies to pieces, or reduced them to their principles, can, from theſe ſeparated principles, either recompound the ſame body again, or, from the mixtures of the principles of one or more bodies in various manners, form a large ſet of new productions, which would have been unknown to the world but for this art: ſuch productions are brandy, ſoap, glaſs, and the like.

Synthetical chemiſtry, taken in the ſtrict ſenſe for the recompoſition of bodies from their own principles, is rather of philoſophical than of ordinary uſe. This however is not eaſy, except in a few caſes, nor are we to imagine, becauſe it may be done in ſome, that nature has taken this way to compoſe them; her method of compoſition of bodies is a new ſubject, and worthy a diligent inquiry. Shaw's Lectures, p. 169.

Synthetic *method*. See Synthesis and Method.

SYNTHETISMUS, a word uſed in chirurgical writings to expreſs the four operations neceſſary to the reſtitution of fractures, which are extenſion, coaptation, repoſition, and deligation, or the buſineſs of bandage.

SYNTONUM *diatonum*, in *Muſic*. See Genus.

SYNTROPHIC, formed of *συν*, and *τρεφω*, *I nouriſh*, an epithet uſed to certain diſeaſes, which grow up with the patient. Of this kind is the epilepſy, which often firſt ſeizes the perſon in infancy, and continues growing up with him, and increaſing in ſtrength as he does.

SYNULOTIC, a word uſed by ſome writers in the ſame ſenſe as epulotic.

SYNUSIASTS, Synusiastes, Συνουσιαςαι, formed from *συν*, *with*, and *ουσια*, *ſubſtance*, a ſect of heretics, who maintained that there was but one nature, and one ſingle ſubſtance, in Jeſus Chriſt.

The *Synuſiaſts* denied, that the Word aſſumed a body in the womb of the virgin; but held, that part of the divine Word, being detached from the reſt, was there changed into fleſh and blood.—Thus they taught that Jeſus Chriſt was conſubſtantial to the Father, not only as to his divinity, but even as to his humanity, and very body.

SYNYMENSIS, a word uſed by ſome chirurgical writers to expreſs a conjunction of two bones by means of a membrane, as the bones of the ſinciput are connected to thoſe of the forehead in young children.

SYPHAR, a word uſed by ſome naturaliſts in the ſame ſenſe as exuviæ, to expreſs the ſkins which many reptiles caſt off at certain times. Thus the ſnake, the water newt, and all the caterpillar tribe, part with their ſkins during the time they remain in that ſtate.

SYPHILIS, is a term uſed, by ſome writers, for the lues venerea, or pox.

Some derive it from *συν*, *cum*, *with*, and *φιλια*, *amor*, or *amicitia*, *love*, or *friendſhip*; becauſe it proceeds from the infectious intercourſe of lovers in coition. Others will have it come from the name of a ſhepherd, ſo called, who was remarkably afflicted with this diſeaſe.—However

ever, divers authors of note uſe the term; particularly Fracaſtorius, a famous Italian phyſician, who uſes it for the title of a fine poem, which he wrote upon that diſtemper.

SYPHON, or SIPHON. See SIPHON.

SYRENS, SIRENES, in *Antiquity*. See SIREN.

SYRIAC *Bible*. See BIBLE.

SYRIAC *Language*. See LANGUAGE.

SYRIAC *year*. See YEAR.

SYRIACUS *lapis*, in *Natural Hiſtory*, a name given by Aetius, and many other authors, to the petrified ſpines of the *echini ovarii*, called by us the *Jew-ſtones*, and *petrified olives*, from their likeneſs to an olive in ſhape, and called by the ancients *tecolithus*.

It has been a common opinion that this ſtone was good againſt the gravel and ſtone; but Aetius limits its efficacy to a particular caſe, which is that where the ſtony matter is lodged in the kidneys and ureters; but he frankly confeſſes it is of no power to diſſolve or break the ſtone in the bladder.

This is contrary to the doctrine of Dioſcorides, and the other old Greeks; but more conſonant to reaſon and experience. Some have carried its virtue ſo far, as to pretend, that when rubbed to powder, and mixed in water, and that mixture rubbed on the groin and perinæum, it will break the ſtones concreted within, and bring them away in pieces by urine. This, though too groſs for belief, is yet given us by Pliny. In moſt of the common editions, the words ſtand thus, *lingentium frangit calculos*; but all the beſt copies have it *ungentium*; and the word *lingentium* is only made by dividing the two perpendicular lines in the letter U.

SYRICON, a word uſed by ſome authors in the ſame ſenſe as ſandyx. Pliny makes it a compoſition of equal parts of ſinopis and ſandyx; and Aetius gives it as the name of a collyrium, uſed in many diſorders of the eyes.

SYRINGA, the *pipe-tree*, in *Botany*, ſee LILAC.

SYRINGA *of Pan*, a muſical inſtrument formed of reeds or pipes of different length, joined together. The figure of it frequently occurs on medals. See PAN.

SYRINGE, formed from *συριγξ*, or *ſyrinx*, *pipe*, an inſtrument ſerving to imbibe, or ſuck in, a quantity of any fluid; and to ſquirt or expel the ſame with violence.

The *ſyringe* is made of a hollow cylinder, as ABCD (*Tab.* VII. *Hydraulics*, and *Hydroſtatics*, *fig.* 75.) furniſhed with a little tube at the bottom EF. In this cylinder is an embolus K, made, or at leaſt covered with leather, or ſome other matter that eaſily imbibes moiſture; and ſo filling the cavity of the cylinder, as that no air or water may paſs between the one and the other.

If, then, the little end of the tube F be put in water, and the embolus drawn up, the water will aſcend into the cavity left by the embolus; and, upon thruſting back the embolus, it will be violently expelled again through the ſame tube EF: and ſtill with the greater impetus will the water be expelled, and to the greater diſtance, as the embolus is thruſt down with the greater force, or the greater velocity.

This aſcent of the water the ancients, who ſuppoſed a plenum, attributed to nature's abhorrence of a vacuum: but the moderns more reaſonably, as well as more intelligibly, attribute it to the preſſure of the atmoſphere on the ſurface of the fluid.

For, by drawing up the embolus, the air left in the cavity of the cylinder muſt be exceedingly rarefied; ſo that being no longer a counterbalance to the air incumbent on the ſurface of the fluid; that prevails, and forces the water through the little tube, up in the body of the *ſyringe*.

In effect, a *ſyringe* is only a ſingle pump, and the water aſcends in it on the ſame principle, as in the common ſucking pump; whence it follows, that water will not be raiſed in a *ſyringe* to an height exceeding thirty-two or thirty-three feet.

Syringes are of conſiderable uſe in medicine and ſurgery. By them clyſters are adminiſtered: injections of medicinal waters, &c. made into wounds, &c. They alſo ſerve to inject coloured liquors, melted wax, &c. into the veſſels of the parts of animals, to ſhew the diſpoſition, texture, ramifications, &c. thereof. For a figure of Anel's *ſyringe* and *probe*. See *Tab. Surgery*, *fig.* 20.

The *ſyringe* is an inſtrument, that is uſed both in the rarefaction and condenſation of air. In order to underſtand its uſe in both theſe reſpects, it will be proper to explain the conſtruction of its embolus or piſton. ABCD (*Tab.* VII. *Hydraulics*, *fig.* 76.) repreſents a ſmall cylinder of braſs about one fourth of an inch thick, and of ſuch a diameter as juſt to move up and down in the *ſyringe* without interruption, but ſo cloſe as not to admit a thin paper between it and the *ſyringe*. It has a ſcrew at the top and bottom of the ſame bigneſs, and of the ſame thread, but with this difference, that at the end C, a piece of bladder is tied on, which makes a valve, ſo fixed as to ſuffer all the air coming in the direction DC to paſs by, but to ſtop all that endeavours to paſs from C to D. The rod of the *ſyringe* whoſe end is repreſented at R, (*fig.* 77.) has a piece like a bell, PP *ll*, with ſmall holes through its upper part, and a female ſcrew at bottom, to receive the end D of the ſcrew of *fig.* 76. That piece being ſcrewed in, as repreſented by the ſmall letters *a b c d*, there muſt be another cylindric piece *gg*, whoſe diameter is about $\frac{1}{16}$ of an inch ſmaller than the other ſcrewed on to C or *c*: ſerving for two uſes, the one to preſerve the valve at C, from being damaged againſt the bottom of the *ſyringe* by its thickneſs, and the other (which is its principal uſe) to preſs a ſoft oiled leather *ff* againſt *ab*. This leather will never fold upwards for want of room between AB and the ſides of the *ſyringe*, but will ſpread againſt them and AB, ſo as to drive all the air before it (which air is alſo ſtopped by the valve at C) forward through the noſe in the *ſyringe* into any place where it is intended to be driven. But when the rod is drawn up, as the leather *ff* folds eaſily about the ſmaller cylindric plate *gg*, the air will eaſily paſs by to fill the *ſyringe* that way, as well as through the valve in the direction *dc*. When the *ſyringe* is made uſe of for ſucking, you muſt only invert the piece ABCD, ſo as to ſcrew the end C with its valve into the bell PP with the ſoft oiled leather *ll* between; and then the reverſe will happen of what has been juſt mentioned: for then in driving down the piſton, the air from any veſſel coming into the *ſyringe* will ſlip in the direction *al*, *bl* between the bell and ſides of the *ſyringe* (the leather *ff* not being on now) and alſo through the valve piece, and the holes near PP: but in drawing up the valve will ſhut, and the leather *ll* will apply cloſe to *ab*, ſo as to admit of no external air to go back into the *ſyringe*. In both caſes, whether of injecting or exhauſting air, ſuch a double ſcrew as ABCD (*fig.* 76.) with its valve is to be uſed; but with the valve towards the rod in ſucking; and the other way in forcing, that no air injected into any thing may return into the *ſyringe*. Deſag. Exp. Phil. vol. ii. p. 391.

SYRINGITES, a ſtone mentioned by Pliny, and deſcribed as being always full of cavities. Some have ſuppoſed this author meant the oſteocolla by this name; but it is more probable, that he meant the ſtone we now call *ſyringoides*, or the pipe-ſtone.

SYRINGOIDES *lapis*, the *pipe-ſtone*, in *Natural Hiſtory*, the name of a very beautiful foſſil ſubſtance, of which there are ſeveral different kinds. The *tubuli marini*, or caſes of ſea-worms, lodged in any ſolid ſubſtance of the foſſil kind, conſtitute what is called the *lapis ſyringoides*.

The moſt frequent kind is made of the common matter of the ludus Helmontii, or ſeptaria, with tubuli of different kinds and dimenſions in it; but the moſt beautiful ſort is that made of the bottoms of ſhips, old boards, or piles of wood; which, having been long in the ſea, have been pierced by the ſea worms, which have made their ſeveral burrows, and left their ſhells behind in them: the whole of theſe ſubſtances becoming afterwards petrified, is found in form of wood, with all the knots, veins, and other characters, but wholly of the hardneſs of ſtone. This is uſually of a blackiſh colour, and the pipes being of a pale yellow, the whole makes a very elegant appearance.

Our clay-pits about London afford alſo a *ſyringoides* of this kind, but the earth there abounding with the matter of the common vitriolic pyrites, that ſubſtance, by degrees, gets into the pores of the wood, and the whole ſeems a maſs of pyrites, with theſe pipes lodged in it in different directions. This has been called by authors *pyrites ſyringoides*. Hill's Hiſt. of Foſſ. p. 64.

SYRINGOTON, in *Surgery*, an inſtrument to lay open fiſtulæ. We have a propoſal of a *ſyringoton*, of a new form, for laying open fiſtulæ in ano, by Mr. Freke. See Appendix to Barrowby's Tranſlation of Aſtruc on the Fiſtula in Ano.

SYRINGOTOMY, in *Surgery*, a term uſed for the cutting for the FISTULA.

SYRITES, in *Natural Hiſtory*, a name uſed by ſome for the ſapphire; but by Pliny for a ſtone, which he ſays was generated in the bladder of a wolf.

SYRIUS, a word uſed by ſome authors for a very ſtrong purge, a preparation of ſcammony; being no other than a reſin, or magiſtery of that drug.

SYRMA, among the Romans, a long garment, common to both ſexes, that reached to the ground. It was uſed in tragedies, that the perſons of the heroes and heroines might appear the taller. Pitiſc. in voc.

SYRMÆA, a name given by the ancients in general to a certain root, ſaid to be of the radiſh-kind, and to be frequently uſed to provoke vomiting.

Some have made it alſo the name of a ſort of viand, prepared of honey, the fine fat of animals and other ingredients, which was the prize beſtowed at one of the Spartan games: others have uſed it to expreſs a purging potion, made of ſalt and water, or plain brine. The Ægyptians frequently purged themſelves with this radiſh-juice and ſalt, which operated gently both upwards and downwards, and theſe potions were called by the ſame name *ſyrmæa*.

Syrmæa, Συρμαια, in *Antiquity*, was uſed as a deſignation of the games at Sparta, the prize in which was συρμαια, or a mixture of fat and honey.

SYRMÆSMUS, a word uſed by the ancient medical writers to expreſs a gentle purging of the ſtomach or bowels, either by ſtool or vomit, it had its name from *ſyrmæa*, a word expreſſing a medicine that acted in this gentle manner.

SYRUP, Syrupus, or Sirupus, in *Pharmacy*, an agreeable liquor, or compoſition, of a thick conſiſtence, made of juices, tinctures, or waters of fruits, flowers, or herbs, boiled up, in order to preſerve it from ſpoiling, by fermentation or otherwiſe, with ſugar or honey.

Menage derives the word from the Arabic, *elſcherab*, potion; formed from the root *ſcherebe*, to drink.—Others derive it from the Greek, συρω, I draw; and οπος, juice. Eſthius, from Συρια, and οπον; in regard theſe kind of liquors were much in uſe among the Syrians, a very delicate people. According to D'Herbelot, the words *ſyrup*, and *ſherbet*, or *ſorbet*, come both from the Arabic, *ſcharab*, which ſignifies any kind of drink in the general.

There are various kinds of *ſyrups* denominated from the various fruits, &c. they are extracted from, or from their virtues; as *ſyrup* of violets, of elder, of wormwood, of poppies, &c. emetic *ſyrups*, lienteric, and antinephritic *ſyrups*, and chologogue, phlegmagogue, *ſyrups*, &c.

Syrups, which were formerly looked upon as medicines of conſiderable value, are at preſent regarded chiefly as vehicles for medicines of greater efficacy, and are uſed for ſweetening draughts, juleps, or mixtures, and for reducing the lighter powders into boluſes, pills, and electaries. But as all theſe purpoſes may be anſwered by the *ſimple* SYRUP alone, there is little occaſion for any other.

There ſeems to be no part of pharmacy, in which the writers of diſpenſatories have more erred than in their directions about the making of *ſyrups*; which ſeems the more ſtrange, becauſe this part is particularly eaſy.

The whole of the buſineſs of *ſyrup*-making may be, however, reduced to a few ſhort and eaſy rules. As firſt, it is matter of experience that aqueous infuſions, decoctions, or other aqueous liquors, require twice their own weight of dry ſugar-candy to make them into a *ſyrup* of a juſt conſiſtence, for keeping without candying or fermenting.

This rule, by directing the uſe of ſugar-candy, fixes the conſiſtence of *ſyrups* in an exacter manner than any way elſe, becauſe all ſalts require a determinate proportion of water in cryſtallizing; ſo that ſugar, in the form of candy, contains always one certain proportion of water, while different kinds of ſugar may hold more or leſs aqueous matter, according to their different manner of refining, the accidents of the weather, &c. Hence, therefore, all ſuch infuſions for *ſyrups* as are of a delicate or deſtructible colour, which is impaired by boiling, ſuch as violets, clove July flowers, &c. and all ſuch infuſions as contain any volatile parts, which would evaporate by a boiling heat, as thoſe of cinnamon, orange-peel, &c. ſhould have twice their own weight of ſugar, added to them, and be kept cloſe covered in the gentle heat of the balneum Mariæ, till the ſugar is diſſolved; which, to haſten the ſolution, ſhould be reduced to powder.

Secondly, the decoctions of all ſuch vegetable ſubſtances as loſe no valuable parts by boiling, may be boiled down to the proper conſiſtence with their own weight of ſugar, the two being firſt clarified together with the whites of eggs in the uſual way: but if the ingredients here contain any unctuous, or balſamic parts, whereon their medicinal virtues depend, let the ſugar be added from the very firſt, and boiled along with the ingredients; afterwards ſtraining and clarifying it, before it be near the conſiſtence of a *ſyrup*. This rule is founded on the property in ſugar of diſſolving reſins and oils, ſo as to make them intimately mix with water.

Thirdly, all vegetable juices are to be thoroughly purified, before they are boiled into *ſyrups*. Thus the juices of lemons, oranges, &c. are firſt to be filtered, and then made into *ſyrups* without boiling, according to the firſt rule; but the juices of mulberries, and the like, will not clariſy without a beginning fermentation; whereſore they muſt firſt ſtand a day or two, and then they will paſs through a flannel; after which theſe are to be made into *ſyrup* with an eighth part leſs than twice the quantity of ſugar; that is, with one pound twelve ounces of ſugar to a pint of the juice, on account of their being ſomewhat ſaccharine themſelves. And wines and vinegars, muſt be made into *ſyrups* with the ſame quantity. Shaw's Lectures, p. 205.

Syrup, *balſamic*. See Tincture of *balſam of Tolu*.

Syrup *of buckthorn*. See Buckthorn.

Syrup *of ginger*. See Ginger.

This *ſyrup* may be made by infuſing two ounces of bruiſed ginger in two pints of boiling water for twenty-four hours. After the liquor has been ſtrained, and has ſtood for ſome time to ſettle, it may be poured off, and a little more than double its weight of fine powdered ſugar diſſolved in it. This *ſyrup* is ſometimes of uſe as a warm vehicle for giving medicines to perſons afflicted with flatulency.

Syrup *of marſhmallow*. See Marshmallow.

The lubricating virtues of this *ſyrup*, may be ſupplied by adding to the common *ſyrup* a ſufficient quantity of mucilage of gum arabic.

Syrup *pectoral*, *ſyrupus pectoralis*, a new form of medicine, preſcribed in the late London Pharmacopœia, and intended to ſtand in the place of the *ſyrup* of maiden-hair, and ſome others of that kind. It is to be made thus: take leaves of Engliſh maiden-hair dried five ounces, liquorice four ounces, boiling water five pints; ſteep the ingredients for ſome hours, and afterwards ſtrain off the liquor; and when it is made clear by ſettling, add to it the neceſſary quantity of ſugar to make it a *ſyrup* in the common way.

Syrup *of poppy*. See Meconium.

If twenty-five drops of laudanum be added to an ounce of the ſimple *ſyrup*, it will ſupply the place of DIACODIUM, or the *ſyrup* of poppies, and will be found a more ſafe and certain medicine.

Syrup *of ſaffron*. See Saffron.

Syrup, *ſimple*, is made by diſſolving in water, either with or without heat, about double its weight of fine ſugar.

Syrup *of Sapor* is an ancient medicament, the baſe whereof is apples, with juices of bugloſs, aniſe, ſaffron, &c. Thus called from Sapor king of Perſia, who overcame the emperor Valerian, and who was ſuppoſed to be the inventor thereof.

Syrup *of ſugar*. See Sugar.

Syrup *of ſulphur*. See Sulphur.

SYRTITES, in *Natural Hiſtory*, is uſed by ſome authors as the name of a gem of a very beautiful appearance, in the ſubſtance of which are interſperſed faint ſtars of a ſaffron colour.

SYRUS *lapis*, a name given by the writers of the middle ages to a foſſil, ſeeming to be the ſame with the THYRREUS of Pliny.

SYSSARCOSIS, compounded of συν, *with*, and σαρξ, *fleſh*, in *Anatomy*, a particular ſpecies of the kind of articulation, called alſo SYMPHYSIS.

The *ſyſſarcoſis* is a natural union of two bones, by means of fleſh or muſcles: ſuch is that of the os hyoides and omoplata.

Beſides the uſe of this word to ſignify a kind of articulation of the bones, by means of fleſh, when the muſcles are extended from one bone to another; it is alſo uſed by ſome chirurgical writers to expreſs a method of curing wounds in the head when the cranium is laid bare, and the interſtice between the lips of the wound too wide for a contraction, by means of promoting the granulation, as it is called, or growth of new fleſh. Paulus Ægineta uſes it alſo to expreſs a preternatural generation of fleſh about the veſſels and coats of the teſtes, which is ſometimes the caſe in a ſarcocele.

SYSTASIS properly only denotes the conſiſtence of any thing, as of a ſyrup or ointment; but authors have uſed it alſo in a different ſenſe. Hippocrates underſtands by it a collection of humours about the palate; and ſometimes expreſſes by it a contraction of any part of the body from an uneaſineſs, or ſenſation of pain.

SYSTEM, *ſyſtema*, formed from συστημα, *compoſition*, in the general, denotes an aſſemblage or chain of principles and concluſions; or the whole of any doctrine, the ſeveral parts whereof are bound together, and follow or depend on each other.

In this ſenſe we ſay, a *ſyſtem* of philoſophy; a *ſyſtem* of motion; a *ſyſtem* of fevers, &c. Divines have framed abundance of *ſyſtems* of grace; the *ſyſtem* of intermediate ſcience, and predetermination, are invented to explain that of grace.

Among phyſicians, ſome follow the *ſyſtem* of alkali and acid; others, that of the four qualities, &c. Dr. Woodward

ward accounts for moſt things on his *ſyſtem* of the bile.

Des Cartes's *ſyſtem* is held deſtructive to religion. Gaſſendus renewed the ancient *ſyſtem* of atoms; which was that of Democritus, followed by Epicurus, Lucretius, &c. Sir Iſaac Newton's doctrine of colours, Mr. Leibnitz's *protogæa*, and ſome diſcourſes of M. Juſſieu, in the Academy of Sciences, to ſhew, that there are bodies whoſe parts are not to be deſtroyed by any natural agents, are very favourable to the *ſyſtem* of Gaſſendus.

Experiments and obſervations are the materials of *ſyſtems*; an infinity are required to build one.

SYSTEM, in *Aſtronomy*, denotes an hypotheſis or ſuppoſition of a certain order and arrangement of the ſeveral parts of the univerſe; whereby aſtronomers explain all the phenomena or appearances of the heavenly bodies, their motions, changes, &c.

This is more peculiarly called *the ſyſtem of the world*, and ſometimes the *ſolar ſyſtem*.

Syſtem and *hypotheſis* have much the ſame ſignification; unleſs, perhaps, hypotheſis be a more particular *ſyſtem*; and *ſyſtem* a more general hypotheſis.

Some late authors, indeed, furniſh another diſtinction: an hypotheſis, ſay they, is a mere ſuppoſition or fiction; founded rather on imagination than reaſon; a *ſyſtem* is only built on the firmeſt ground, and raiſed by the ſevereſt rules: it is founded on aſtronomical obſervations, and phyſical cauſes, and confirmed by geometrical demonſtrations.

The moſt celebrated *ſyſtems* of the world are the *Ptolemaic*, and the *Copernican*; to which may be added, the *Tychonic*; the œconomy of each whereof is as follows.

SYSTEM, *Ptolemaic*, places the earth at reſt, in the centre of the univerſe; and makes the heavens revolve round the ſame from eaſt to weſt, and carry all the heavenly bodies, ſtars, and planets, along with them in twenty-four hours.

For the order, diſtances, &c. of the ſeveral bodies in this *ſyſtem*, ſee *Tab* IV. *Aſtron. fig.* 92.

The principal aſſerters of this *ſyſtem* are Ariſtotle, Hipparchus, Ptolemy, and many of the old philoſophers, followed by the whole world, for a great number of ages, and long adhered to in divers univerſities, and other places, where free philoſophizing was excluded; but the late improvements have put it out of all countenance; and we do not want even demonſtration againſt it.

SYSTEM, *Copernican*. See COPERNICAN *ſyſtem*.

SYSTEM, *the ſolar*, or *planetary*, is uſually confined to narrower bounds; the ſtars, by their immenſe diſtance, and the little relation they appear to bear to us, being reputed no part thereof. It is highly probable, that each fixed ſtar is, itſelf, a ſun; and the centre of a particular *ſyſtem*, ſurrounded with a company of planets, &c. which, in different periods, and at different diſtances, perform their courſes round their reſpective ſuns; and are enlightened, warmed, and cheriſhed thereby: hence, we have a very magnificent idea of the world, and the immenſity thereof: hence, alſo, ariſes a kind of *ſyſtem* of *ſyſtems*.

The planetary *ſyſtem*, deſcribed under COPERNICAN, is the moſt ancient in the world. It was the firſt, that we know of, introduced into Greece and Italy by Pythagoras; whence, for many ages, it was called the *Pythagorean ſyſtem*. It was followed by Philolaus, Plato, Archimedes, &c. but loſt under the reign of the Peripatetic philoſophy; till happily retrieved above two hundred years ago, by Nic. Copernicus; whence its new appellation of *Copernican ſyſtem*. For the œconomy of this *ſyſtem*, ſee the ſcheme thereof, *Tab*. IV. *Aſtron. fig*. 93.

SYSTEM, *Tychonic*, was taught by Tycho Brahe, a noble Dane, who was born A. D. 1546. It ſuppoſed the earth to be fixed in the centre of the univerſe or firmament of ſtars, and that all the ſtars and planets revolve round the earth in twenty-four hours; but it differs from the *Ptolemaic* SYSTEM, as it not only allows a menſtrual motion to the moon round the earth, and that of the ſatellites about Jupiter and Saturn, in their proper periods, but it makes the ſun to be the centre of the orbits of Mercury, Venus, Mars, Jupiter, and Saturn, in which they are carried round the ſun in their reſpective years, as the ſun revolves round the earth in a ſolar year; and all theſe planets, together with the ſun, are ſuppoſed to revolve round the earth in twenty-four hours. This hypotheſis was ſo embarraſſed and perplexed, that few perſons embraced it. It was afterwards altered by Longomontanus and others, who allowed the diurnal motion of the earth on its own axis, but denied its annual motion round the ſun. This hypotheſis, partly true and partly falſe, is called the *Semi-Tychonic ſyſtem*. For the order and œconomy of the Tychonic *ſyſtem*, ſee the ſcheme in *Tab*. IV. *Aſtron. fig*. 94.

SYSTEM, in *Poetry*, denotes a certain hypotheſis, or ſcheme of religion, from which the poet is never to recede. E. gr. Having made his choice either in the heathen mythology, or in Chriſtianity, he muſt keep the two apart, and never mix ſuch different ideas in the ſame poem.

Thus, after invoking Apollo and the Muſes, he muſt bid adieu to the language of Chriſtianity, and not confound the two *ſyſtems*. The fabulous ſtyle indeed is the richer and more figurative; but a pagan god makes but a miſerable figure in a Chriſtian poem. The *ſyſtem* of poetry, Bouhours obſerves, is itſelf wholly fabulous and pagan.

SYSTEM, in *Muſic*, denotes a compound interval; or an interval compoſed, or conceived to be compoſed, of ſeveral leſs intervals. Such is the *octave*, &c.

The word is borrowed from the ancients; who call a ſimple interval, DIASTEM, and a compound one *ſyſtem*. As there is not any interval in the nature of things, ſo we can conceive any given interval, as compoſed of, or equal to the ſum of ſeveral others. This diviſion of intervals, therefore, only relates to practice; ſo that a *ſyſtem* is properly an interval which is actually divided in practice, and where along with the extremes, we conceive always ſome intermediate terms. See INTERVAL.

The nature of a *ſyſtem* will appear plain, by conceiving it as an interval, whoſe terms are in practice taken either in immediate ſucceſſion; or the ſound is made to riſe and fall, from the one to the other, by touching ſome intermediate degrees; ſo that the whole is a *ſyſtem* or compoſition of all the intervals between one extreme and the other.

Syſtems of the ſame magnitude, and, conſequently, of the ſame degree of concord and diſcord, may yet differ in reſpect of their compoſition; as containing and being actually divided into, more or fewer intervals; and when they are equal in that reſpect, the parts may differ in magnitude. Laſtly, when they conſiſt of the ſame parts, or leſs intervals, they may differ as to the order and diſpoſition thereof between the two extremes.

There are ſeveral diſtinctions of *ſyſtems*; the moſt remarkable is into *concinnous* and *inconcinnous*.

SYSTEMS, *concinnous*, are thoſe conſiſting of ſuch parts as are fit for muſic; and thoſe parts placed in ſuch an order between the extremes, as that the ſucceſſion of ſounds, from one extreme to the other, may have a good effect.

SYSTEMS, *inconcinnous*, are thoſe, where the ſimple intervals are inconcinnous, or ill diſpoſed between the extremes.

SYSTEMS, again, are either *particular*, or *univerſal*.

SYSTEM, *univerſal*, is that which contains all the particular *ſyſtems* belonging to muſic; and makes what the ancients call the DIAGRAMMA, and we the SCALE *of muſic*.

The ancients alſo diſtinguiſhed *ſyſtems* into *perfect* and *imperfect*. The diſdiapaſon, or double octave, was reckoned the perfect *ſyſtem*; becauſe within its extremes are contained examples of all the ſimple and original concords; and in all the variety of order wherein their concinnous parts ought to be taken; which variety conſtitutes what they call the *ſpecies* or *figures of conſonances*. All the *ſyſtems*, leſs than the diſdiapaſon, were reckoned imperfect.

The double octave was alſo called *ſyſtema maximum*, and *immutatum*; becauſe they took it to be the greateſt extent, or difference of time, that we could go in making good melody; though ſome added a fifth to it, for the greateſt *ſyſtem*; but the diapaſon, or ſimple octave, was reckoned the moſt perfect, with reſpect to the agreement of its extremes; ſo that how many octaves ſoever were put into the greateſt *ſyſtem*, they were all to be conſtituted or ſubdivided the ſame way as the firſt: ſo that, when we know how the octave is divided, we know the nature of the DIAGRAMMA OF SCALE; the varieties whereof conſtituted the genera melodiæ, which were ſubdivided into ſpecies.

SYSTEMATICAL *qualities*, a term uſed by Mr. Boyle to expreſs ſuch qualities as are alſo called *coſmical*, and do not depend on the nature and conſtitution of the body itſelf, but on its being a member of this general ſyſtem of the univerſe, in which capacity it is acted upon by agents unperceived by us, which occaſions great changes in it.

SYSTEMATISTS, in *Botany*, thoſe authors, whoſe works in this ſcience are principally employed about the arranging plants into certain orders, claſſes or genera. See BOTANY.

SYSTOLE, from συϛελλειν, *to contract*, in *Grammar*, denotes the ſhortening of a long ſyllable.

SYSTOLE, συϛολη, in *Medicine*, the contraction of the heart of an animal; whereby the blood is driven out of its ventricles into the arteries, to be diſtributed throughout the body.

The *ſyſtole* of the heart is well accounted for by Dr. Lower; who ſhews that the heart is a true muſcle, the fibres whereof are acted on like thoſe of other muſcles, by means of certain branches of the eighth pair of nerves inſerted into it, which bring the animal ſpirits from the brain hither. By a flux of theſe ſpirits the muſcular fibres of the heart are inflated, and thus are ſhortened; the length of the heart diminiſhed, its breadth or thickneſs increaſed, the capacity of the ventricles cloſed, the tendinous mouths of the arteries dilated, thoſe of the veins ſhut up by means of their valves, and the contained juice forcibly expreſſed into the orifices of the arteries.

And this we call συστολη, or the contraction of the heart; the oppoſite ſtate to which is called the *diaſtole*, or dilatation of the heart.

The French anatomiſts have diſputed, whether the heart is ſhortened in its *ſyſtole*, though all allow that it is then ſtraitened. Hiſt. de l'Acad. des Scien. 1731.

Dr. Drake adds to Dr. Lower's account, that the intercoſtal muſcles, and diaphragm, contribute to the *ſyſtole*, by opening for the blood a paſſage from the right ventricle of the heart to the left through the lungs, to which it could not otherwiſe paſs: by which means, the oppoſition the blood contained in that ventricle muſt neceſſarily have made its conſtriction, is taken off.

Lower and Drake make the *ſyſtole* the natural ſtate or action of the heart; and the diaſtole, the violent one. Boerhaave, on the contrary, makes the *ſyſtole* the violent, and the DIASTOLE the natural ſtate.

SYSTREMMA, a word uſed by Hippocrates to expreſs a collection of humours forming a hard tumor, or tubercle, in any part of the body; called alſo ſometimes *ſyſtrophe*.

SYSTYLE, in *Architecture*, that manner of placing columns, where the ſpace between the two fuſts conſiſts of two diameters, or four modules. See INTERCOLUMNIATION.

SYXHINDEMEN, or SIXHINDEMEN, a term purely Saxon, literally ſignifying ſix hundred men, or men worth ſix hundred ſhillings a-piece. See HINDENI.

SYZYGY, *ſyzygia*, formed from συζυγια, which properly ſignifies *conjunctio*, in *Aſtronomy*, a term equally uſed for the conjunction, and oppoſition of a planet with the ſun.

On the phenomena and circumſtances of the *ſyzygies*, a great part of the lunar theory depends. See MOON.

For, 1. It is ſhewn in the phyſical aſtronomy, that the force which diminiſhes the gravity of the moon in the *ſyzygies*, is double that which increaſes it in the quadratures; ſo that, in the *ſyzygies*, the gravity of the moon, from the action of the ſun, is diminiſhed by a part, which is to the whole gravity as 1 to 89,36; for, in the quadratures, the addition of gravity is to the whole gravity, as 1 to 178,73.

2. In the *ſyzygies*, the diſturbing force is directly as the diſtance of the moon from the earth, and, inverſly, as the cube of the diſtance of the earth from the ſun. And at the *ſyzygies*, the gravity of the moon towards the earth receding from its centre, is more diminiſhed than according to the inverſe ratio of the ſquare of the diſtance from that centre.

Hence, in the motion of the moon, from the *ſyzygies* to the quadratures, the gravity of the moon, towards the earth, is continually increaſed; and the moon is continually retarded in its motion; and, in the motion from the quadratures to the *ſyzygies*, the moon's gravity is continually diminiſhed, and its motion in its orbit is accelerated.

3. Farther, in the *ſyzygies*, the moon's orbit or circle, round the earth, is more convex than in the quadratures; for which reaſon the moon is leſs diſtant from the earth at the former than the latter. When the moon is in the *ſyzygies*, her apſides go backwards, or are retrograde.

When the moon is in the *ſyzygies*, the nodes move in antecedentia faſteſt; then ſlower and ſlower, till they become at reſt when the moon is in the quadratures.

Laſtly, when the nodes are come to the *ſyzygies*, the inclination of the plane of the orbit is the leaſt of all.

Add, that theſe ſeveral inregularities are not equal in each *ſyzygy*, but are all ſomewhat greater in the conjunction than in the oppoſition. See *Phyſical cauſe of the* MOON'*s motions*.

T.

T, A conſonant, and the nineteenth letter in the alphabet; the ſound of which is formed by a ſtrong expulſion of the breath through the mouth, upon a ſudden drawing back of the tongue from the fore part of the palate, with the lips at the ſame time open.

The *T*, at the beginning and end of words, has always the ſame ſound, nearly reſembling that of D, for which reaſon they are often put for each other; and Quintilian even rallies thoſe who made any ſcruple of writing the one indifferently for the other: as *at* for *ad*, *ſet* for *ſed*, *haut* for *haud*, &c.

The cuſtomary ſound of *T* is that which occurs in the words *take*, *temptation*; but before an *i*, when followed by a vowel, it has the ſound of an obſcure *s*, as *nation*, *ſalvation*, except when *s* precedes *t*, as *Chriſtian*; and in derivatives from *y*, as *mighty*, *mightier*.

The *T* is one of the five conſonants which the abbot de Dangeau calls *palatal:* theſe five are, *D*, *T*, *G*, *K*, and *N*; the four firſt whereof have the ſame relation to each other, as the labials *B-P* and *V-F* have; *D*, for inſtance, having the ſame relation to *T*, that *B* has to *P*, and *V* to *F*.

The *T*, the ſame author obſerves, is a letter of a ſtrong ſound; ſo that a feeble one cannot be heard before it. Hence, to form the ſupine of *rego*, the *T* of *tum* changes the *g*, and ſtrengthens it to the ſound of a *c*, ſo that we ſay *rectum*; as in the preterperfect tenſe *rexi*, which we pronounce *rekſi*.

Th has two ſounds; the one ſoft, as *thus*; the other hard, as *thing*. The ſound is ſoft in theſe words, *then*, *thence*, *there*, with their derivatives and compounds, *that*, *theſe*, &c. and in all words between two vowels, as *father*; and between *r* and a vowel, as *burthen*. In other words, it is hard, as *thick*, *thunder*. Where it is ſoftened at the end of a word, an *e* ſilent muſt be added, as *breath*, *breathe*. Johnſon.

T is uſed as an abreviature on ancient monuments, &c. for Titus, Titius, and Tullius.

T, among the *Ancients*, was uſed as a numeral letter, ſignifying 160, according to the verſe.

T quoque centenos & ſexaginta tenebit.

When a daſh was at the top, thus $\overline{\text{T}}$, it ſignified 160 thouſand.

T′, with a kind of acute accent over it, denoted among the Greeks 300; and if the accent was below it, thus *T*,, it denoted 300,000. The ט of the Hebrews ſignified 9, and with two points fixed horizontally over it, thus, ט̈, it ſignified 9000.

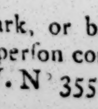
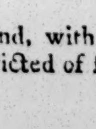
T, on the French coins, denotes thoſe that were ſtruck at Nantes.

When the Roman tribunes approved of the decrees of the ſenate, they teſtified their conſent by ſubſcribing a *T*.

T, in *Muſic*, is ſometimes uſed to mark the tenor part, or pitch.

T, in the *Italian Muſic*, ſtands for TUTTI, all or altogether.

It is alſo uſed to mark the tenor, and has the words *primo*, *ſecundo*, or the figures 1°. 2°. added, to ſignify the firſt or ſecond tenor.

The letters T, *t*, or *tr*, are often uſed likewiſe to ſignify a ſhake or trillo, to be made on any ſound, and are to be placed over the note on which the ſhake is to be made; thus 
or 
being an abbreviation of the word TRILLO.

T is alſo a mark, or brand, with which, by ſtat. 4 Hen. VII. every perſon convicted of felony, ſave murder, and admitted to the benefit of the clergy, ſhall be marked, on the brawn of the left thumb.

T, or Tau, in *Heraldry*, is a kind of croſs-potent, or truncated; found in all the armories of the commanders of the order of St. Anthony.

The azure *T*, or TAU, is ſeen in arms above 400 years old. Its origin, according to ſome authors, is taken from the Apocalypſe; where the ſame is a mark that the angel impreſſes on the foreheads of the elect: others take it to repreſent a crutch, a ſymbol proper enough for this order, which was ſworn to hoſpitality. But the truth F. Meneſtrier obſerves, is, that it is the top of a Greek croſier.

The biſhops and abbots of the Greek church wear it ſtill; and if it be found on the habit of St. Anthony, it is only to ſhew that he was an abbot.

T, in *Surgery*, is the name of a BANDAGE, ſo called on account of its figure.

TAAUT, or Thoyt, in *Ancient Mythology*, the name of a deity among the Phœnicians, and probably the ſame with the Egyptian *Thoyt*, or Hermes: his coſmogony has been tranſmitted to us by the Phœnician writer Sanchoniatho, whoſe account is preſerved by Euſebius, De Præp. Ev. lib. i. cap. 10. To him the Phœnicians aſcribe the firſt invention of letters.

TABA, or *tabo-ſeil*, in *Modern Hiſtory*, a name by which the Negroes, who inhabit the Gold-coaſt in Africa, deſcribe their king, whoſe power is very arbitrary, inſomuch that they regard him as a being ſuperior in nature to themſelves.

TABANUS, *ox-fly*, in the Linnæan ſyſtem of *Zoology*, a genus of the *diptera* order of inſects; the characters of which are, that the mouth has a fleſhy proboſcis, terminated by two lips, and two-awled ſhaped palpi, placed ſideways, and parallel to the proboſcis. Linnæus enumerates nineteen ſpecies.

TABACCO. See Tobacco.

TABARD, or Taberd, derived from the low Latin, *tabarda*, denotes a ſhort jacket, or coat, open on both ſides, with a ſquare collar and hanging-ſleeves. From the wearing of this garment, ſome of thoſe on the foundation of Queen's college, in Oxford, are called *Taberdarii*.

From an inn in Southwark, whoſe ſign was the *Tabard*, afterwards changed to the Talbot, Chaucer and his companions ſet out on a pilgrimage to the ſhrine of Becket at Canterbury; on which was founded his Canterbury Tales.

TABARZET, a word uſed by ſome writers to expreſs highly refined ſugar.

TABAXIR, and *arundo* Tabaxifera, names by which ſome authors call the Bamboo-*cane*.

TABBY, in *Commerce*, a kind of thick ſilk, uſually watered. It is manufactured like the common taffety, excepting that it is ſtronger and thicker both in the woof and warp.

The watering is given it by means of a calender, the rolls whereof are of iron, copper, or wood, which, bearing unequally on the ſtuff, render the ſurface thereof unequal, ſo as to reflect the rays of light differently.

TABBYING, or *watering*, the paſſing a ſtuff under a calender, to make the repreſentation of waves thereon, as on a tabby. It is uſual to tabby mohairs, ribbands, &c. *Tabbying* is performed without the addition of any water, or dye; and furniſhes the modern philoſophers with a ſtrong proof that colours are only appearances.

TABELLA, or Tablet, Tabularium, in *Pharmacy*, a ſolid kind of electary, or confection, made of dry ingredients, uſually with ſugar, and formed into little flat morſules, or ſquares, more uſually called LOZENGES, and ſometimes MORSELLI, TROCHES, &c.

Powders, fruits, ſalts, &c. are diſſolved with ſugar, and made into *tabulæ*, as thoſe of the juice of liquorice for colds, &c.

We have *cordial*, *ſtomachic*, *aperitive*, and *hepatic tablets.*

Jellies and broths are ſometimes reduced into a ſort of *tablets*, to be carried in the pocket, and called *pocket-ſoup*. *Tabellæ manus Chriſti* are made of ſugar of roſes pearled. *Tabellæ magnanimitatis* are a ſort taken by feeble old men, when matched with young wives, to aſſiſt them in the affair of generation.

Tabellæ *votivæ*, in *Antiquity*, a name given to certain tablets, which were hung up in the temples: for, according to an ancient cuſtom, which prevailed all over Greece, ſuch as recovered from any diſtemper uſed to write in a tablet the nature and ſymptoms of their reſpective maladies, and the remedies which had been moſt ſucceſsful. Theſe tablets Hippocrates is ſaid to have copied and followed when he firſt began to practiſe: and, if we believe Pliny (lib. vii. c. 37.), he learned from theſe the firſt rudiments of phyſic.

A tablet of this nature was diſcovered at Rome, not many years ago, among the ruins of the ancient temple of Æſculapius, with this inſcription in Greek. Julianus being afflicted with vomiting of blood, and abandoned by men, the gods haſtened to his relief, and having nouriſhed him for the ſpace of three days with honey, reſtored him to his health: for which favour he came to return them thanks in the preſence of the people. *Tables* of a ſimilar kind, under the ſame denomination, were hung up in the temples by thoſe who had eſcaped ſhipwreck, &c.

TABELLIO, **Tabularius**, in the Roman law, a *ſcrivener*; a kind of officer often confounded with the NOTARY, *notarius:* yet the two differed in this; that the notaries only drew up and kept the minutes of acts and inſtruments on paper, and in notes, or ſhort-hand; whereas the *tabelliones* delivered them engroſſed fair, on parchment, in the full executory form. The ſame alſo put the ſeals to contracts, and rendered them authentic.

The domeſtic clerks of theſe *tabelliones*, who at firſt wrote under them, in proceſs of time came to be called *notaries*.

Paſquier obſerves, that the *tabelliones* at Rome were public ſlaves, appointed for the keeping of contracts made between private perſons. According to Loyſeau, a contract written by a notary was not perfect, or obligatory, till the *tabellio* had written it fair: after which, the parties ſubſcribed it, i e. they wrote at bottom, that they approved the contents; for ſignatures were not then in uſe. See Signature.

Quoniam tabellionum *uſus in regno Angliæ non habetur, propter quod magis ad ſigilla authentica credi eſt neceſſe, ut eorum copia facilius habeatur, ſtatuimus, ut ſigillum habeant non ſolum archiepiſcopi, et epiſcopi, ſed eorum officiales.*

TABERNA *meritoria*, among the Romans, Mars's hoſpital, or a place where diſabled ſoldiers were maintained at the charge of the government.

TABERNACLE, **Tabernaculum**, q. d. *a tent*; among the *Jews*, was a kind of moveable chapel, ſo contrived as to be taken to pieces, and put together at pleaſure, for the convenience of carrying it from place to place, during the migration of the Iſraelites in the wilderneſs for forty years. It was erected by Moſes, in conſequence of the expreſs command of God, partly to be a palace of his preſence as the king of Iſrael, and partly to be the medium of the moſt ſolemn public worſhip, which the people were to pay to him. It was erected on the firſt day of the firſt month of the ſecond year after the Iſraelites exodus from Egypt. Exod. xl. 2. 17. 26. 29 34, 35.

The *tabernacle* was of a rectangular figure, thirty cubits long, ten broad, and ten high; or, according to Dr. Cumberland's reduction to Engliſh meaſure, fifty-five feet long, eighteen broad, and eighteen high. The two ſides and one end were compoſed of broad boards, ſtanding upright; each board being about two feet nine inches broad, faſtened at the bottom by two tenons in each board, fitted into two mortiſes on the foundation; at the top by links or haſps, and on the ſides by five wooden bars, which run through rings or ſtaples in each of the boards. Each ſide conſiſted of twenty of theſe boards, and the end of eight. Both the boards and bars were overlaid with gold; and the rings and haſps were of the ſame metal. The foundation, on which they ſtood, conſiſted of ſolid blocks of ſilver, two under each board; each of which was about ſixteen inches long, and weighing a talent, or about an hundred weight. The number of theſe blocks was about an hundred; ninety-ſix of which were laid under the forty-eight boards, and the other four were the baſes of the columns that ſupported the veil or curtain, which divided the inſide of the *tabernacle* into two rooms. Hence ſome have derived the ancient faſhion of ſetting porphyry columns on baſes of white marble.

The *tabernacle* had four different coverings, or carpets, thrown over one another. The firſt and loweſt was made of fine linen, richly embroidered with figures of cherubims, in ſhades of blue, purple, and ſcarlet: and conſiſted of ten breadths, which were joined together with blue loops and claſps of gold. The next over this was made of a ſort of mohair, the breadths of which were joined with claſps of braſs. The third carpet was made of ram's ſkin dyed red; and the uppermoſt of all was made of *tachaſh*, i. e. as has been generally ſuppoſed, badger's ſkins.

The eaſt end of the *tabernacle* had no boards, but was ſheltered with a fine embroidered curtain, hung upon five pillars of Shittim wood, overlaid with gold, and ſuppoſed by Philo to touch the ground.

The inſide of the *tabernacle* was divided into two rooms, by means of a veil or curtain, hung upon four pillars: the veil was curiouſly manufactured of the richeſt ſtuff, and adorned with cherubims and other ornaments, embroidered upon it. By this veil the *tabernacle* was divided, and learned writers have reaſonably conjectured, in the ſame proportion with the temple, afterwards built according to its model: that is, two thirds of the whole length were allotted to the firſt room, and one third to the ſecond; ſo that the room beyond the veil, which was called the *holy of holies*, was exactly ſquare, being ten cubits each way: and the firſt room, called the SANCTUARY, was twice as long as broad.

Round the *tabernacle* there was a ſpacious court, one hundred cubits long, and fifty broad, ſurrounded with pillars ſet in baſes of braſs, and filletted with ſilver, at the diſtance of five cubits from one another. The chief things in this court were the altar of burnt-offering, and the brazen laver. See Exod. ch. xxviii. and ch. xxx.

In the ſanctuary, or firſt room of the *tabernacle*, were the altar of incenſe (Exod. xxx. 1—10.), the golden candleſtick (Exod. xxv. 31, &c.) valued by Cumberland at upwards of five thouſand and ſeventy-ſix pounds ſterling, and the table of ſhew-bread, deſcribed Exod. xxv. 23—30. Within the ſecond veil, in the holy of holies, was the ark of teſtimony, and its lid or cover, called the *mercy-ſeat*, deſcribed Exod. xxv. 10—21. See Ark *of the covenant*.

The learned Spencer (De Leg. Hebr. diſſ. 1.) ſuggeſts, that Moſes projected the *tabernacle*, with its furniture and appurtenances, after the faſhion of a ſimilar ſtructure, which he had obſerved in Egypt, and which was in uſe among other nations; or, at leaſt, that God directed it to be made with a view of indulging the Iſraelites in a compliance with their cuſtoms and modes of worſhip, ſo far as there was nothing in them really ſinful: and he alledges evidence of ſuch portable temples among the heathens, in which they depoſited the moſt valuable ſacred, or religious utenſils. But it has been replied to this conjecture, that it is not probable. But, on the other hand, it ſhould ſeem more likely, that the heathens took theſe things from the Jews, who derived the whole of their religion from God, than that the Jews, or rather that God ſhould take them from the heathens: and beſides, the Jewiſh *tabernacle* was ordered to be directly the reverſe of the heathen *tabernacles*, both in its form, which was capable of being taken to pieces, whereas theirs was carried about entire; and in its ſituation, which was accommodated to the people's worſhipping towards the Weſt; whereas it was the general practice of the heathens to worſhip with their faces towards the Eaſt. See Ezek. viii. 16. and Virgil Æneid. xii. l. 172—174.

The value of the gold and ſilver only, uſed for the work of the *tabernacle*, (Exod. xxxviii. 24, 25.) amounted, according to biſhop Cumberland's reduction of Jewiſh talents and ſhekels to Engliſh coin, to upwards of one hundred and eighty-two thouſand five hundred and ſixty-eight pounds. Jenning's Jewiſh Ant. vol. ii. b. 2. c. 1. Anc. Univ. Hiſt. v. i. part ii. p. 651, &c. folio.

We have alſo an account of two other *tabernacles*, before the building of Solomon's temple, beſides that above deſcribed. One of theſe was erected by Moſes for himſelf; in which he gave audience, heard cauſes, and inquired of God; and, perhaps, alſo, the public offices of religious worſhip were performed in it for ſome time; whence it was called the *tabernacle of the congregation*, Exod. xxxiii. 7. The other was that which David erected in his own city, for the reception of the ark, when he received it from the houſe of Obededom. 2 Sam. vi. 17. 1 Chron. xvi. 1.

Tabernacles, *feaſt of*. See Scenopegia.

Tabernacle is alſo uſed, of late, for a place of religious worſhip, appropriated to the uſe of thoſe that are called METHODISTS.

TABERNAEMONTANA, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has a ſmall empalement, cut into five acute parts;

it has one funnel-ſhaped petal, with a long cylindrical tube, which is bellied at both ends, and at the brim is cut into five oblique ſegments; and it has five ſmall ſtamina in the middle of the tube, terminated by ſummits which join together; it has two germina ſupporting an awl-ſhaped ſtyle, crowned by decayed ſtigmas; the germina turn to two-bellied capſules, which are horizontally reflexed, opening with one valve, having one cell filled with oblong oval ſeeds, lying imbricatim, and ſurrounded with pulp. Linnæus reckons ſix, and Miller two ſpecies, natives of the Weſt-Indies.

TABES, in *Medicine*, a general name for conſumptions of all kinds. See CONSUMPTION.

TABES *dorſalis* is a kind of conſumption proceeding ſometimes from an exceſſive application to venery; the proximate cauſe of which is a general debility of the nerves.

Of the ſeveral kinds of conſumptions incident to human bodies the *tabes dorſalis* is the ſloweſt in its progreſs, but the moſt melancholy in its circumſtances; and, unleſs timely obviated, for the moſt part fatal.

This diſeaſe is incident only to young men of ſallacious diſpoſitions; and proceeds from too early venery, an immoderate uſe of it, or pollutions.

It ſeems, therefore, to derive its origin from too frequent venereal ſpaſms. And the immoderate loſs of the ſeminal fluid, has alſo a conſiderable ſhare in producing the effect.

The ſymptoms of the *tabes dorſalis* are involuntary nocturnal ſeminal emiſſions, a pain in the back, and often in the head; formication in the ſpine, an aching pain, rolling, and hanging down of the teſticles, a weakneſs of memory and ſight, and a mucous diſcharge from the urethra, eſpecially after ſtraining at the diſcharge of the excrements. The mucous diſcharge here mentioned, is called by Hippocrates *liquidum ſemen*; but it is no more than the mucus of the proſtate glands. The patient has neither a fever nor loſs of appetite: but after any violent exerciſe his head is heavy, and his ears tingle.

This diſeaſe is farther attended with great melancholy and dejection of mind; and a gutta ſerena often follows The eyes grow hollow, the viſage meagre and thin; the body emaciated and weak, a palpitation of the heart, and ſhortneſs of breath ſucceed; with a concourſe of hectical complaints, ending in death.

For the cure of this diſtemper, a regularity of the non-naturals is of the utmoſt importance. Good air, rather cool than hot, is of great uſe. As to diet, high-ſeaſoned meats, ſpirituous and fermented liquors ſhould be avoided. No food is ſo beneficial as milk: chocolate alſo is eſteemed, in ſuch quantities as to ſit eaſy on the ſtomach. Animal food of eaſy digeſtion at dinner, does no harm. Suppers ſhould be avoided, at leaſt milk only ſhould be then taken, about two hours before going bed. Sleep muſt be little, and in due ſeaſon; that is, the patient ſhould go to bed and riſe early. Indulgence in bed in a morning is hurtful. The general rule ſhould be, to riſe immediately upon waking; which, though irkſome at firſt, will by cuſtom be made familiar and agreeable. Moderate exerciſe, or ſo much as the patient's ſtrength will admit of without wearineſs, ought to be uſed. Some recommend riding, eſpecially a long journey, by ſuch daily portions as to avoid extraordinary fatigue. The ſecretions of the body, if out of order, ſhould be regulated: and the patient ſhould be entertained with cheaſful company. As to medicines, the claſſes of balſamics and aſtringents are chiefly uſeful. Among the latter, the Peruvian bark, either in ſubſtance, extract, or tincture, the acid elixir of vitriol, and the *tinctura ſaturnina* or *antiphthyſica*, are the moſt efficacious. Strengthening plaſters may alſo be laid on the loins; and chief of all, the cold bath ſhould be uſed. See Pract. Eſſay on the *Tabes Dorſalis*, Lond. 1748.

TABLATURE, in *Anatomy*, a diviſion or parting of the SKULL into two TABLES.

TABLATURE, TABLATURA, in *Muſic*, in general, is when, to expreſs the ſounds or notes of a compoſition, we uſe letters of the alphabet, or cyphers, or any other characters not uſed in the modern muſic.

TABLATURE, in its ſtricter ſenſe, is the manner of writing a piece for the lute, theorbo, guitarre, baſs viol, or the like; which is done by writing on ſeveral parallel lines (each whereof repreſents a ſtring of the inſtrument) certain letters of the alphabet, referring to the frets on the neck of the inſtrument: whereof A marks, that the ſtring is to be ſtruck open, i. e. without putting the finger of the left-hand on the head; B ſhews, that one of the fingers is to be put on the firſt ſtop; C, on the ſecond; D, on the third, &c,

The time of the notes is ſignified by marks over the letters of a hooked form, that anſwer to the minim, crochet, quaver, &c. in the French *tablature*; but the Italians and Spaniards, till of late years, made uſe of figures inſtead of letters.

The *tablature* of the lute is uſually written in letters of the alphabet, and that of the harpſichord in the common notes.

TABLE, TABULA, a moveable, uſually made of wood, or ſtone, ſupported on pillars, or the like; for the commodious reception of things placed thereon.

Moſes made a *table*, in the TABERNACLE, for laying the ſhew-bread upon, deſcribed by Philo Judæus as two cubits long, one broad, and one and a half high.

Among Chriſtians, the *table*, or *Lord's table*, ſignifies the ſacrament of the Lord's ſupper. See COMMUNION.

TABLE, *Round*, *Knights of the Round* TABLE, a military order, ſuppoſed to have been inſtituted by Arthur, the firſt king of the Britons, in the year 516.

They are ſaid to have been twenty-four in number; all ſelected from among the braveſt of the nation.

The *round table*, which gave them their title, was an invention of that prince, to avoid diſputes about the upper and lower end, and to take away all emulation as to places.

Leſley aſſures us, he ſaw the *table* at Wincheſter; at leaſt, he ſays, if he might believe the keepers thereof, who ſtill ſhew it with great ſolemnity. He adds, that the names of a great number of knights, written around it, ſeemed to confirm the truth of the tradition.

Larrey alſo, and ſeveral other authors, make no ſcruple to relate this fable of knighthood as matter of hiſtory: but that it is a fable, is certain; F. Papebroch having ſhewn, that there was no ſuch thing as an order of knights before the ſixth century.

Camden alſo obſerves, that the *table* at Wincheſter is of a ſtructure much more modern than the ſixth century.

It is to be added, that Arthur himſelf is eſteemed by many no more than a fabulous prince.

An excellent hiſtorian obſerves, that Arthur was undoubtedly a great general, though his actions have given occaſion to innumerable fables; and though the inſtitution of the *Knights of the Round Table* has ſerved as a foundation for many fabulous relations, it is not to be deemed altogether chimerical. For where is the improbability that Arthur ſhould inſtitute an order of knighthood, in Britain, when we learn from the letters of Caſſiodorus, that Theodoric, king of the Oſtrogoths, inſtituted one in Italy in the ſame century. Rapin's Hiſt. of Eng. vol. i. p. 39. fol.

However, others have ſuppoſed that the *round table* was not any military order, but rather a kind of juſt, or military exerciſe, between two perſons armed with lances. Several authors ſay, that Arthur, duke of Bretagne, renewed it. See Matthew Paris, the abbot Juſtiniani, and F. Helyot.

Paulus Jovius ſays, it was under the empire of Frederic Barbaroſſa that the knights of the *Round Table* firſt began to be talked of; others attribute their origin to the factions of the Guelphs and Gibellins. King Edward I. built a houſe called the *Round Table*, the court whereof was two hundred feet in diameter. Du-Cange Gloſſ. *Tabula*.

TABLE, in *Architecture*, a ſmooth, ſimple member, or ornament, of various forms, but moſt uſually in that of a long ſquare. See PLATBAND.

TABLE, *projecting*, is ſuch a one as ſtands out from the naked of the wall, pedeſtal, or other matter which it adorns.

TABLE, *raked*. See RAKING-*table*.

TABLE, *razed*, an emboſſment in a frontiſpiece, for the putting an inſcription, or other ornament, in ſculpture. This is what M. Perrault underſtands by *abacus* in Vitruvius. See *Tab. Archit. fig*. 39. *a*.

TABLE, *crowned*, that covered with a corniche, and wherein is cut a baſſo-relievo, or a piece of black marble incruſtated, for an inſcription.

TABLE, *ruſticated*, that which is picked, and whoſe ſurface ſeems rough, as in grottoes, &c. See RUSTICS.

TABLE, *water*. See WATER-*table*.

TABLE, *plain*, a ſurveying inſtrument. See PLAIN *table*.

TABLE, in *Perſpective*, denotes a plain ſurface, ſuppoſed to be tranſparent, and perpendicular to the horizon.

It is always imagined to be placed at a certain diſtance between the eye and objects, for the objects to be repreſented thereon by means of viſual rays paſſing from every point thereof, through the *table* to the eye.

Whence it is alſo called *perſpective plane*. See PERSPECTIVE.

TABLE, in *Anatomy*. The cranium is ſaid to be compoſed of two *tables*, or laminæ; i. e. it is double, as if it conſiſted of two bones laid one over another. See SKULL.

TABLE *of Pythagoras*, called alſo *multiplication-table*, is a ſquare, formed of an hundred leſſer ſquares, or cells, containing the products of the ſeveral digits, or ſimple numbers, multiplied by each other.

As it is abſolutely neceſſary thoſe who learn arithmetic ſhould have the ſeveral multiplications, contained in this *table*, off by heart, we have thought fit to ſubjoin it here with an example to ſhew the manner of uſing it.

Table of Pythagoras, *or* Multiplication *Table*.

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

Example. Suppoſe it were required to know the product of 6 multiplied by 8. Look for 6 in the firſt horizontal column, beginning with 1; then look for 8 in the firſt perpendicular column, beginning likewiſe with 1; the ſquare or cell wherein the perpendicular column from 6, meets with the horizontal one from 8, contains the product required; viz. 48.

TABLES, *laws of the Twelve*, were the firſt ſet of laws of the Romans; thus called, either becauſe the Romans then wrote with a ſtyle on thin wooden *tables*, covered with wax; or, rather, becauſe they were engraved on *tables*, or plates of copper, to be expoſed in the moſt noted part of the public forum.

After the expulſion of the kings, as the Romans were then without any fixed or certain ſyſtem of law; at leaſt, had none ample enough to take in the various caſes that might fall between particular perſons; it was reſolved to adopt the beſt and wiſeſt laws of the Greeks.

One Hermodorus was firſt appointed to tranſlate them; and the decemviri afterwards compiled and reduced them into ten *tables*. After immenſe care and application, they were, at length, enacted and confirmed by the ſenate, and an aſſembly of the people, in the year of Rome 303.

The following year they found ſome things wanting therein, which they ſupplied from the laws of the former kings of Rome, and from certain cuſtoms, which long uſe had authorized: all theſe, being engraven on two other *tables*, made the *law of the twelve tables*, ſo famous in the Roman juriſprudence; the ſource and foundation of CIVIL or Roman law.

The laws of the twelve *tables* were alſo called *decemviral laws*, from the officers entruſted with the compoſing them.

It is a great pity, this ſyſtem of law ſhould have periſhed through the injuries of time: we have now nothing of it, but a few fragments diſperſed in divers authors. J. Gothroſed has collected them together, and we have them in Roſinus, and ſome other authors. The Latin is very old and barbarous, and remarkably obſcure.

TABLES *of the Law*, in *Scripture Hiſtory*. See DECALOGUE.

TABLES, *new*, TABULÆ *novæ*, an edict occaſionally publiſhed, in the Roman commonwealth, for the aboliſhing all kinds of debts, and annulling all obligations.

It was thus called, in regard that all antecedent acts being deſtroyed, there were nothing but new ones to take place.

TABLE, among *Jewellers*. A *table diamond*, or other precious ſtone, is that whoſe upper ſurface is quite flat, and only the ſides cut in angles: in which ſenſe, a diamond cut *table-wiſe*, is uſed in oppoſition to a roſe-diamond. See DIAMOND.

TABLE-*glaſs*. See GLASS.

TABLE is alſo uſed for an index, or repertory, put at the beginning or end of a book, to direct the reader to any paſſage he may have occaſion for.

Thus we may ſay, *table of matters*; *table of authors quoted*; *table of chapters*, &c. *Tables*, of themſelves, ſometimes, make large volumes: as that of Dravitz on the civil and canon laws.

TABLES *of the Bible*, are called *Concordances*. See CONCORDANCE.

TABLE-*rents*. See BORD-*lands*.

TABLES *of houſes*, among *Aſtrologers*, are certain *tables*, ready drawn up, for the aſſiſtance of practitioners in that art, for the erecting or drawing of figures or ſchemes. See HOUSE.

TABLES, in *Mathematics*, are ſyſtems of numbers, calculated to be ready at hand for expediting aſtronomical, geometrical, and other operations. See CANON.

TABLES, *aſtronomical*, are computations of the motions, places, and other phenomena of the planets, both primary and ſecondary.

The oldeſt *aſtronomical tables* are the Ptolemaic, found in Ptolemy's ALMAGEST; but theſe now no longer agree with the heavens.

In 1252, Alphonſo XI. king of Caſtile, undertook the correcting them, chiefly by the aſſiſtance of Iſaac Hazen, a Jew; and ſpent four hundred thouſand crowns therein. Thus aroſe the *Alphonſine tables*, to which that prince himſelf prefixed a preface. But the deficiency of theſe, alſo, was ſoon perceived by Purbachius and Regiomontanus; upon which Regiomontanus, and after him Waltherus and Warnerus, applied themſelves to celeſtial obſervations, for the farther amending them; but death prevented any progreſs therein.

Copernicus, in his books of the celeſtial revolutions, inſtead of the *Alphonſine tables*, gives others of his own calculation, from the latter, and partly from his own obſervations.

From Copernicus's obſervations and theories, Eraſ. Reinholdus afterwards compiled the *Prutenic tables*, which have been printed ſeveral times, and in ſeveral places.

Tycho de Brahe, even in his youth, became ſenſible of the deficiency of the *Prutenic tables*; which was what determined him to apply himſelf, with ſo much vigour, to celeſtial obſervations: yet all he did, thereby, was, to adjuſt the motions of the ſun and moon; though Longomontanus, from the ſame, to the theories of the ſeveral planets publiſhed in his Aſtronomia Danica, added *tables* of their motions, now called the *Daniſh tables*; and Kepler likewiſe, from the ſame, in 1627, publiſhed the Rudolphine *tables*, which are much eſteemed.

Theſe were afterwards, anno 1650, turned into another form, by Maria Cunitia, whoſe aſtronomical *tables*, comprehending the effect of Kepler's phyſical hypotheſis, are exceedingly eaſy, and ſatiſfy all the phenomena, without any trouble of calculation, or any mention of logarithms; ſo that the Rudolphine calculus is here greatly improved.

Mercator made a like attempt in his Aſtronomical inſtitution, publiſhed in 1676, and the like did J. Bap. Morini, whoſe abridgment of the Rudolphine *tables* was prefixed to a Latin verſion of Street's Aſtronomia Carolina, publiſhed in 1705.

Lanſbergius, indeed, endeavoured to diſcredit the Rudolphine *tables*, and framed *Perpetual Tables*, as he calls them, of the heavenly motions; but his attempt was never much regarded by the aſtronomers; and our countryman Horrox warmly attacked him, in his defence of the Keplerian aſtronomy.

Since the *Rudolphine tables*, many others have been publiſhed; as the *Philolaic tables* of Bullialdus; the *Britannic tables* of Vincent Wing, calculated on Bullialdus's hypotheſis; the *Britannic tables* of Newton; the French ones of the count De Pagan; the *Caroline tables* of Street, all calculated on Dr. Ward's hypotheſis, and the *Novalmajeſtic tables* of Ricciolus. Among theſe, however, the *Philolaic* and *Caroline tables* are eſteemed the beſt; inſomuch that Mr. Whiſton, by the advice of Mr. Flamſteed (a perſon of undoubted authority in ſuch caſes), thought fit to ſubjoin the *Caroline tables* to his aſtronomical lectures.

The *Ludovician tables*, publiſhed in 1702, by M. De la Hire, are conſtrued wholly from his own obſervations, and without the aſſiſtance of any hypotheſis; which, before the invention of the micrometer, teleſcope, and the pendulum clock, was held impoſſible.

Another ſet of *tables* Dr. Halley, the aſtronomer royal, long laboured to perfect.

M. le Monnier in 1746, publiſhed in his Inſtitutions Aſtronomiques *tables* of the motions of the ſun, moon, and ſatellites, of refractions, and of the places of the fixed ſtars. M. de la Hire has alſo publiſhed *tables* of the planets, and M. de la Caille *tables* of the ſun; Mayer conſtructed *tables* of the moon; and we have many aſtronomical *tables* of various kinds, and computed with different views, in our modern books of aſtronomy, navigation, &c. For an account of ſeveral, and eſpecially of thoſe publiſhed annually under the direction of the commiſſioners of longitude, ſee ALMANAC, EPHEMERIDES, and LONGITUDE.

For TABLES *relating to annuities*, &c. ſee ANNUITIES, EXPECTATION *of life*, LIFE-*annuities*, MORTALITY, and SURVIVORSHIP.

TABLES, *ſexagenary*. See SEXAGENARY.

For TABLES *of the ſtars*, ſee CATALOGUE.

TABLES *of ſines*, *tangents*, and *ſecants*, of every degree and minute of a quadrant, uſed in trigonometrical operations, are uſually called CANONS. See SINE.

TABLES *of logariths*, *rhumbs*, &c. uſed in geometry, navigation, &c. ſee LOGARITHM and RHUMB.

TABLES, *loxodromic*, are *tables* wherein the difference of longitude, and quantity of the way in any rhumb, are exhibited to every ten minutes of every degree of the quadrant variation of the latitude. See RHUMB.

TABLE, in *Heraldry*. Coats, or eſcutcheons, containing nothing but the mere colour of the field, and not charged with any bearing, figure, or moveable, are called *tables d'attente*, *tables of expectation*, or *tabulæ raſæ*.

TABLET, in *Pharmacy*, &c. See TABELLA.

TABLING *of fines* is the making a table for every county where his majeſty's writs run; containing the contents of every fine paſſed each term.

It is to be done by the chirographer of fines of the common-pleas; who, every day of the next term, after engroſſing any ſuch fine, fixes one of the ſaid *tables* in ſome open place of the ſaid court, during its ſitting; and likewiſe delivers to the ſheriff of each county, a content of the ſaid *tables* made for that reſpective county, the term before the aſſizes, to be affixed in ſome place in the open court, while the juſtices ſit.

TABLING, in a *Ship*, is a ſort of broad hem formed on the ſkirts and bottoms of a ſhip's ſails, to ſtrengthen them in that part which is attached to the bolt-rope.

TABON, in *Natural Hiſtory*, a name given by the people of the Philippine Iſlands to a bird called in other places *daie*, and remarkable for the largeneſs of its eggs; though ſome accounts of theſe are certainly fabulous.

TABOR, TABOURIN, a ſmall DRUM.

TABOURET, *privilege of the*, in France, is a privilege ſome great ladies enjoy, to ſit, or have a ſtool, in the queen's preſence.

TABORITES, or THABORITES, a branch or ſect of the ancient HUSSITES.

The Huſſites, towards the beginning of the fifteenth century, dividing into ſeveral parties, and about the year 1420, into two great factions; one of them retired to a little mountain, or rock, ſituate in Bohemia, fifteen leagues from Prague, and there put themſelves under the conduct of Ziſka; building themſelves a fort, or caſtle, and a regular city, which they called *Tabor*, or *Thabor*, either from the general word *thabor*, which in the Sclavonic language ſignifies *caſtle*; or from the mountain *Tabor*, mentioned in Scripture: and hence they became denominated *Thaborites*. Thoſe of the other party were denominated CALIXTINS.

The *Taborites* not only inſiſted upon reducing the religion of Jeſus to its primitive ſimplicity, but required alſo that the ſyſtem of eccleſiaſtical government ſhould be reformed in the ſame manner, the authority of the pope deſtroyed, and the form of divine worſhip changed: they demanded the erection of a new church and hierarchy, in which Chriſt alone ſhould reign, and all things ſhould be carried on by a divine direction and impulſe. In maintaining theſe demands, ſome of their leaders went ſo far as to flatter themſelves with the chimerical notion, that Chriſt would deſcend in perſon upon earth, armed with fire and ſword, to extirpate hereſy, and purify the church from its numerous corruptions. This enthuſiaſtic claſs of Huſſites alone, Moſheim ſays, we are to look upon as accountable for all thoſe acts of violence, which are too indiſcriminately laid to the charge of the Huſſites in general, and to their two leaders Ziſka and Procopius in particular. After the time of the council of Baſil, in 1433, which endeavoured, though without ſucceſs, to reconcile the *Taborites* with the Roman pontiff, they began to review their religious tenets, and their eccleſiaſtical diſcipline, with a deſign to render them more perfect. This review, conducted with great prudence and impartiality, gave a rational aſpect to the religion of this ſect, who withdrew themſelves from the war with Sigiſmund, in which they were engaged, abandoned the doctrines, which, upon ſerious examination, they found to be inconſiſtent with the genius and ſpirit of the Goſpel, and baniſhed from their communion all thoſe whoſe diſordered brains or licentious manners might expoſe them to reproach. The *Taborites*, thus new-modelled, were the ſame with thoſe Bohemian brethren (or Piccards, i. e. Beghards, as their adverſaries called them) who joined Luther and his ſucceſſors at the Reformation, and of whom there are at this day many of the deſcendants and followers in Poland and other countries. Moſh. Eccl. Hiſt. vol. iii. p. 263, &c. ed. 8vo.

TABULARIUM, among the Romans, the name of that part of the treaſury where the ELEPHANTINE books were kept.

TABULARIUS. See TABELLIO.

TABULARUM *apertura*. See APERTURA.

TABULATUM. See TABELLA.

TABUM, a word uſed by medical writers, to expreſs a thin, ſanious, and putrid humour, flowing from old ulcers, or from mortified parts, in caſes where the vital powers are not ſufficient for the generation of a perfect or concocted matter.

TACAMAHACA, or TACAMACHA, a kind of reſinous gum, diſtilling from the trunk of a very large tree, a ſpecies of POPLAR, growing in New Spain, Canada, and other parts of America; but in the greateſt abundance, as it is ſaid, in the iſland of Madagaſcar.

The tree is not unlike our poplar-tree, only bigger and taller; its leaves long and green, its fruit red, of the ſize of our walnuts, exceedingly reſinous, and containing a ſtone like our peaches.

The wood of the tree makes good timber for ſhips, and the gum it yields ſerves there for their caulking, though its chief uſe with us is in medicine.

Two ſorts of this reſin are ſometimes to be met with. The beſt, called *tacamahaca* in ſhells, from its being collected in a kind of gourd ſhells, is ſomewhat unctuous and ſoft, of a pale yellowiſh or greeniſh colour, a bitteriſh aromatic taſte, and a fragrant delightful ſmell, approaching to that of lavender and ambergriſe. This ſort is very rare. That commonly found in the ſhops is in tranſparent grains or globes, of a whitiſh, yellowiſh, browniſh, or greeniſh colour, and of a leſs grateful ſmell than the foregoing.

The firſt is ſaid to exude from the fruit of the tree; the other from inciſions made in the trunk. The tree, as raiſed among us, affords in its young buds, or the rudiments of the leaves, a reſinous juice of the ſame kind of fragrance.

Tacamahaca is uſed chiefly as an ingredient in warm nervine plaſters; though the fragrance and taſte of the finer ſort indicate its being applicable to other purpoſes, as an internal balſamic corroborant. Both kinds diſſolve in rectified ſpirit into a gold-coloured liquor, with a ſmall quantity of remaining impurity: they alſo impregnate water conſiderably with their ſmell and taſte, but give out very little of their ſubſtance to this menſtruum. Lewis.

The Indians are ſaid to uſe it for all kinds of pains. Schroder affirms, that he has ſeen intolerable pains in the leg removed by it.

TACET, in the *Italian Muſic*, is often uſed to denote a long reſt, or pauſe. It uſually ſignifies that a whole part is to lie ſtill: thus, *Chriſte tacet*, *depoſuit tacet*, intimates that while one or more parts are performing the *Chriſte*, or the verſe *depoſuit*, &c. the part marked *tacet* ſhould be ſilent.

TAC-*free*, in *Old Charters*, an exemption from payments.

TACHAS, in *Ichthyology*, a name given by ſome authors to the manati, or SEA-*cow*.

TACHYGRAPHY, called alſo BRACHYGRAPHY, formed from ταχυς, *ſwift*, and γραφη, *writing*; the art of quick or ſhort writing.

There have been various kinds of *tachygraphy* invented: among the Romans, there were certain notes uſed, each whereof ſignified a word.

The rabbins have a kind of *tachygraphy* formed by abbreviations, which made a kind of technical words; wherein each conſonant ſtands for a whole word: as רמבם, רשי, *raſchi*; which ſtands for *rabbi Schelomoh Jarri*, See NOTARICON.

In France, &c. the only *tachygraphy* uſed is, the retrenching of letters, or even whole ſyllables of words: as in *ſdm* for *ſecundum*, *aut* for *autem*, *d* for *ſed*, *o* for *non*, *participaon* for *participation*, &c.

The firſt printers imitated theſe abbreviations; but at preſent they are almoſt laid aſide, except among ſcriveners, &c.

In England we have great variety of methods of *tachygraphy*, or ſhort-hand; more by far, and thoſe much better, eaſier, ſpeedier, and more commodious, than what are known in any other part of the world: witneſs Shelton's, Wallis's, Rich's, Maſon's, Webſter's, Weſton's, Macaulay's, Annet's, Gurney's, Lyle's, and ſeveral other ſhort-hands.

TACIT *acceptance*. See ACCEPTANCE.

TACIT *community*. See COMMUNITY.

TACIT *decree*, in *Roman Antiquity*, ſecret deliberations, to which none but old ſenators were ſummoned.

J. Capitolinus mentions a decree of this ſecret kind, which he calls *S. C. tacitum*, and ſays, that the uſe of them among the ancients was derived from the neceſſities of the public, when upon ſome imminent danger from enemies, the ſenate was either driven to ſome low and mean expedients, or to ſuch meaſures as were proper to be executed before they were publiſhed, or ſuch as they had a mind to keep ſecret even from friends; on which occaſions they commonly recurred to a *tacit decree*, from which they excluded their clerks and ſervants, perfoming that part themſelves, leſt any thing ſhould get abroad. Capitol. de Gordian. c. 12.

In the early times of the republic there are ſeveral inſtances mentioned by hiſtorians, of ſuch private meetings of the ſenate, ſummoned by the conſuls to their own houſes; to which none but the old or proper ſenators were admitted, and of which the tribunes uſually complained. Vide Dion. Halic. l. x. 40. l. xi. 55. 57. Middlet. of Rom. Sen. p. 90.

TACK, in a *Ship*, a rope uſed to confine the foremoſt lower corners of the courſes and ſtay-ſails in a fixed poſition, when the wind croſſes the ſhip's courſe obliquely. The ſame name is alſo given to the rope employed to pull out the lower corner of a ſtudding ſail or driver to the extremity of its boom. The main-ſail and fore-ſail of a ſhip are furniſhed with a *tack* on each ſide, which is formed of a thick rope tapering to the end, and having a knot wrought upon the largeſt end, by which it is firmly retained in the clue of the ſail. By this means one *tack* is always faſtened to windward, at the ſame time that the ſheet extends the ſail to leeward. Falconer.

TACK is alſo applied, by analogy, to that part of any ſail to which the *tack* is uſually faſtened. A ſhip is ſaid to be on the ſtarboard or larboard *tack*, when ſhe is cloſe hauled, with the wind upon the ſtarboard and larboard ſide: and in this ſenſe, the diſtance which ſhe ſails in that poſition is conſidered as the length of the *tack*; although this is more frequently called a board. Falconer.

TACK, *to*, in *Sea Language*, is to change the courſe from one board to another, or to turn the ſhip about from the ſtarboard to the larboard *tack*, in a contrary wind.

Tacking is alſo uſed, in a more enlarged ſenſe, to ſignify that manœuvre in navigation, by which a ſhip makes an oblique progreſſion to the windward, in a zig-zag direction. This, however, is more uſually called BEATING or TURNING to windward. In order to explain the theory of *tacking* a ſhip, recourſe muſt be had to the two firſt laws of motion, recited under *laws* of NATURE: according to which, it is eaſy to conceive how a ſhip is compelled to turn into any direction, by the force of the wind acting upon her ſails in horizontal lines. For the ſails may be ſo arranged as to receive the current of air, either directly, or more or leſs obliquely: hence the motion communicated to the ſails muſt neceſſarily conſpire with that of the wind upon their ſurfaces. To make the ſhip *tack*, or turn round with her head to the windward, it is therefore neceſſary, after ſhe has received the firſt impreſſion from the helm, that the head-ſails ſhould be ſo diſpoſed as to diminiſh the effort of the wind, in the firſt inſtant of her motion, and that the whole force of the wind ſhould be exerted on the after-ſails, which operating on the ſhip's ſtern, carries it round like a weathercock. But ſince the action of the after-ſails to turn the ſhip will unavoidably ceaſe, when her head points to the windward, it then becomes neceſſary to uſe the head-ſails to prevent her from falling off, and returning to her former ſituation. Theſe are, accordingly, laid aback on the lee-ſide, to puſh the veſſel's fore-part towards the oppoſite ſide, till ſhe has fallen into the line of her courſe thereon, and fixed her ſails to conform with that ſituation.

The firſt effort to turn the ſhip in *tacking*, communicated by the helm, which is then put to the lee-ſide, being announced by the pilot, or commanding officer, who then calls out, *Helm's a-lee!* the head ſails are immediately made to ſhiver in the wind, by caſting looſe their ſheets or bow-lines. The pilot then calls, *Up tacks and ſheets!* which is executed by looſening all the ropes which confine the corners of the lower ſails, in order that they may be more readily ſhifted to the other ſide. When the ſhip has turned her head directly to windward, the pilot gives the order to turn about the ſails on the main and mizen-maſts, by the exclamation, *Haul main-ſail, haul!* the bow-lines and traces are then inſtantly caſt off on one ſide, and as expeditiouſly drawn in on the other ſide, ſo as to wheel the yards about their maſts: the lower corner of the main-ſail is, by means of its *tack*, pulled down to its ſtation at the cheſs-tree; and all the after-ſails are, at the ſame time, adjuſted to ſtand upon the other board. Finally, when the ſhip has fallen off five or ſix points, the pilot cries, *Haul off all!* or, *let go, and haul!* the ſails on the foremaſt are wheeled about by their braces; and as the ſhip has then a tendency to fall off, ſhe is checked by the effort of the helm, which for that purpoſe is put *hard-a-lee*. The fore *tack*, or the lower corner of the fore-ſail, being fixed in its place, the bow-lines are hauled; and the other ſails, which have been neglected in the hurry of *tacking*, are properly arranged to the wind, which exerciſe is called *trimming the ſails*. Falconer.

TACKLE, in a *Ship*, a machine formed by the communication of a rope with an aſſemblage of blocks, and known in mechanics by the name of PULLEY.

Tackles are uſed in a ſhip to raiſe, remove, or ſecure weighty bodies, to ſupport the maſts, or to extend the ſails and rigging. They are either moveable, as communicating with a runner; or fixed, as being hooked in an immoveable ſituation; and they are more or leſs complicated, with blocks and ſheaves, in proportion to the efforts which they are intended to produce. That part of the *tackle* which is fixed to one of the blocks, &c. is called the *ſtanding part*; all the reſt are called *running parts*; and that on which the men pull when employing the *tackle*, is called the *fall*. The application of the *tackle* to mechanical purpoſes is termed HOISTING or *bowſſing*. Falconer.

For ſeveral kinds of theſe *tackles*, ſee *Tab. Ship*, *fig.* 1. *n.* 39, 40, 59, 61, 82, 93, and 103.

TACKLE, *burton*, in a *Ship*. See BURTON.

TACKLE, *ground*. See GROUND.

TACKLE, *gunners*, in a *Ship*, that which ſerves to hale the ordnance in or out.

TACKLE, *reef*. See REEF.

TACKLE, *relieving*. See RELIEVING.

TACKLE, *rolling*. See ROLLING.

TACKLE, *tack*, is a ſmall *tackle* uſed occaſionally to pull down the *tack* of the principal ſails of a ſhip to their reſpective ſtations. There is alſo a *tackle* of this kind conſtantly fixed to the tacks of the main-ſail in brigs, ſloops, and ſchooners, for the ſame purpoſe. Falconer.

TACKLE, *winding*, in a *Ship*. See WINDING.

TACKLE *blocks*, *wind*. See WIND.

TACOMAR-*tree*, a name by which ſome authors call the ſugar-cane.

TACTICKS or TACTICS, *τακτικα*, formed from *ταξις*, *order*; the art of diſpoſing forces in form of BATTLE, and of performing the military motions and EVOLUTIONS. See alſo CAMP, EXERCISE, &c.

The Greeks were very ſkilful in this part of the military art; having public profeſſors of it, called *tactici*, who taught and inſtructed their youth therein. We have an account of the progreſs of this art among them in Thucydides, Xenophon, and Polybius. Ælian alſo hath a particular book on this ſubject; and there is a great deal of it in Arrian, in his hiſtory of Alex. M and in Mauritius, and Leo Imperator.

From the Greeks this art was tranſmitted to the Romans, among whom it arrived at its higheſt perfection. Vegetius has given us a compilation and abridgment of authors who have written on this ſubject; and his work contributed in a conſiderable degree to the eſtabliſhment of military diſcipline in Europe; for which we are greatla indebted to Maurice prince of Orange, Alexander Farneſe, duke of Parma, Coligny, Henry IV. Guſtavus Adolphus, &c.

Voſſius, De Scient. Mathemat. mentions twenty-four ancient authors on the ſubject of *tacticks*.

TACTICKS is alſo uſed for the art of inventing and making machines for throwing of darts, arrows, ſtones, fire-balls, &c. by means of ſlings, bows, and counter poiſes. Vegetius, Hero, &c. have written on theſe machines; and we have them deſcribed and figured by Lipſius.

TACTILE, or TANGIBLE, in the *Schools*, ſomething that may fall under the ſenſe of feeling.

Though atoms be corporeal, yet are they not either *tactile*, or viſible, by reaſon of their ſmallneſs.

The principal *tangible* qualities are, heat, cold, drineſs, hardneſs, and humidity. See HEAT.

TACTION, in the *Schools*. See FEELING.

TACTION, in *Geometry*. See TANGENT.

TACTUS, the *touch*, in *Midwifery*, is the exploration of the ſtate of the vagina and uterus, and of the ſituation of the fœtus, and whatever elſe is contained therein. Hippocrates in his Treatiſe on the Diſeaſes of Women, has been very full and exact in his directions upon this ſubject. James.

TADORNA, the ANAS *tadorna* of Linnæus, in *Ornithology*, a name given by many authors to a ſpecies of duck, called by others *vulpanſer*, and in Engliſh the *ſhiel-drake*, or *borough-duck*; and by ſome the *bergander*.

It is of a middle ſize between the duck and gooſe; its beak is broad, ſhort, and red; and at the origin of the upper chap there is a large red tubercle of fleſh; the head and upper part of the neck are of a fine blackiſh green, the lower part of the neck white; the breaſt and upper part of the back ſurrounded with a broad band of bright orange bay: the coverts of the wings and middle of the back are white; the neareſt ſcapulars black, the others white; the greateſt quill-feathers black; the exterior webs of the next are of a fine green, and thoſe of the three ſucceeding orange; the coverts of the tail white, and the tail of the ſame colour, except the two outmoſt feathers, which are tipt with black; the belly white, divided lengthways by a black line; the legs are of a pale fleſh-colour.

They inhabit the ſea-coaſts, and build in deſerted rabbit-holes; but their fleſh is not well taſted.

When a perſon attempts to take their young, they divert his attention by flying along the ground as if wounded, till the brood are ſecure, and then return and collect them together. Turner, therefore, concludes, that this bird is the chenalopex, or fox-gooſe of the ancients: and the natives of the Orkneys at this day call it the *ſly-gooſe*. Theſe birds lay fifteen or ſixteen white roundiſh eggs. In winter they collect in large flocks. Ray and Pennant.

TADPOLE. The animal called by this name is no other than the frog in its firſt ſtate from the ſpawn; and this creature furniſhes the curious in microſcopic obſervations with a beautiful view of the circulation of the blood, eſpecially when young. See *Tab. of Microſcopical Objects, Claſs* 1.

The method of procuring them for this purpoſe in the greateſt perfection, is this: let a ſmall quantity of frog's ſpawn be kept for ſome days in water, and from this will be produced a vaſt number of young *tadpoles*; theſe, while very young, are perfectly tranſparent, and when placed before the double microſcope, the heart may be eaſily ſeen, and its pulſation regularly obſerved; and the blood protruded thence may be beautifully ſeen circulating through the whole body; but particularly in the tail, where, though ſo very minute, more than fifty veſſels may be ſeen at one view. The young brood grow more and more opake every hour, and in a day or two the circulation of the blood can only be ſeen in their tail, or in the fins near the head. Baker's Microſcope, p. 126.

TÆDA, in *Pharmacy*, a term uſed by ſome authors to expreſs certain compoſitions made up in form of troches. Theſe are ſometimes meant as peſſaries to be introduced into the vagina, and therefore made into this form; ſometimes they are compoſitions of fragrant or other ingredients for fumigations.

TÆDA, in *Botany*, a name given by ſome authors to the pinaſter, or common wild-pine, or mountain-pine.

TAEL, an Eaſt-Indian weight, being the ſixteenth part of a *cati*. See CATY.

TAEL is alſo the name of a coin. See COINS *of Japan*.

TÆNARIA, ταιναρια, in *Antiquity*, a feſtival in honour of Neptune, ſurnamed *Tænarius*, from *Tænarus* a promontory in Laconia, where he had a temple.

TÆNARIUM *marmor*, the name of a marble uſed by the ancient architects and ſtatuaries. There were two kinds of it, very different in colour, but perfectly agreeing in hardneſs, and in the high poliſh they are capable of. The firſt or moſt frequent kind was black, and was dug from the promontory called *Tænarus*, in the Lacedæmonian ſtate; the other, which was more ſcarce, and much more beautiful, was of a green colour with a caſt of yellow; this was dug in the Tagetan quarries, and was called by ſome *marmor herboſum*, and *xanthon*.

TÆNIA, or TENIA, in *Architecture*, a member of the Doric architrave, reſembling a ſquare fillet, or reglet; and ſerving in lieu of a cymatium.

The word is Greek, ταινια, which literally denotes a *ſwathe, bandage, fillet*, or the like. Barbo renders it by *liſtel*, but Palladio uſes the old name *tænia*.

Leon Baptiſta Alberti calls the *tænia*, regulæ, and faſciolæ; and Daviler, bandelettes. Philander ſays, there are two kinds, viz. that above mentioned, which he calls the *lower*; and an *upper*, which ſerves for a capital to the triglyphs.

TÆNIA, in *Ichthyography*, the name of a fiſh of the anguilliform, or eel-ſhaped kind, common in the Mediterranean ſea, and brought to market in Italy and elſewhere. It is a very remarkable little fiſh, being of a pale fleſh-colour with a ſlight admixture of blue, and is free from ſcales; and its fleſh ſo tranſparent, that the vertebræ of the back may be eaſily counted through it. Its body terminates in a long and very ſlender tail; the mouth is ſmall, and has one row of ſharp teeth in each jaw, and is very ſingular in that the belly-fin is twice as wide as the back-one; and runs ſo far up to the head, that the anus, which is ſituated at its termination, is very near the angle of the under jaw. The inteſtines are all covered with a ſilvery peritonæum, which is ſeen alſo plainly through the fleſh. It is commonly of a foot long, and not more than a finger's breadth. Willughby's Hiſt. Piſc. p. 116.

This is a ſpecies of CEPOLA in the Linnæan ſyſtem. The other ſpecies is the SERPENS *rubeſcens*. Some alſo make the FALX, or *ſickle*-fiſh, a ſpecies of *tænia*.

TÆNIA *cornuta*, the *horned tænia*, in *Ichthyology*, a name given by many authors to the ſpecies of COBITIS, named by Artedi, the cobitis with a forked prickle placed under each eye. This fiſh is the *cobitis tænia* of Linnæus.

TÆNIA, in the Linnæan ſyſtem of *Zoology*, is a genus of the *zoophyte* order of worms; including four ſpecies. See TAPE-*worm*.

TAFFARAL, or TAFFEREL, in a *Ship*, the uppermoſt part of a ſhip's ſtern, being a curved piece of wood, uſually ornamented with ſculpture. See *Tab. Ship. fig.* 2. *n.* 97. *fig.* 1.

TAFFETY, or TAFFATY, in *Commerce*, a kind of fine, ſmooth, ſilken ſtuff; having, uſually, a remarkable luſtre, or gloſs.

ALAMODE, }
LUSTRING. } the *taffetas* noirs of Lyons.

TAFFETAS noir luſtre of the French, is our ALAMODE. Non luſtre is our LUSTRING.

There are *taffeties* of all colours; ſome plain, others ſtriped with gold, ſilver, ſilk, &c. others chequered, others flowered, others in the Chineſe point, others the Hungarian; with various others to which the mode, or the caprice of the workmen gives ſuch whimſical names that it would be as difficult, as it is uſeleſs, to rehearſe them: beſides that they ſeldom hold beyond the year wherein they firſt roſe. The old names of *taffeties*, and which ſtill ſubſiſt, are, *taffeties* of Lyons, of Spain, of England, of Florence, of Avignon, &c.

The chief conſumption of *taffeties* is in the ſummer-dreſſes for women, in gowns, linings, window-curtains, &c.

There are three things which contribute chiefly to the perfection of *taffeties*, viz. the ſilk, the water, and the fire. The ſilk is not only to be of the fineſt kind, but it muſt be worked a long time, and very much before it be uſed: the watering is only to be given very lightly, and ſeems only intended to give that fine luſtre, by a peculiar property not found in all water: laſtly, the fire, which is paſſed under it to dry the water, has its particular manner of application, whereon the perfection of the ſtuff depends very much.

Octavio May, of Lyons, is held the firſt author of the manufacture of gloſſy *taffeties*; and tradition tells us the occaſion of it. Octavio, it ſeems, going backwards in the world, and not able to retrieve himſelf by the manufacture of *taffeties*, ſuch as were then made, was one day muſing on his misfortunes, and, in muſing, chanced to chew a few hairs of ſilk which he had in his mouth: his reverie being over, the ſilk he ſpit out ſeemed to ſhine, and, on that account, engaged his attention. He was ſoon led to reflect on the reaſon; and, after a good deal of thought, concluded, that the luſtre of that ſilk muſt come, *1ſt*, From his having preſſed it between his teeth. *2dly*, From his having wetted it with his ſaliva, which had ſomething glutinous in it. And, *3dly*, From its having been heated by the natural warmth of his mouth. All this he executed upon the next *taffeties* he made, and immediately acquired immenſe riches to himſelf, and to the city of Lyons the reputation it ſtill maintains, of giving the gloſs to *taffeties* better than any other city in the world.

It will not, we conceive, be leſs uſeful than curious, to give here the deſcription of the engine contrived by Octavio to give the gloſs to *taffety*; and to add the manner of applying it, and the compoſition of the water uſed therein.

The machine is much like a ſilk-loom, except that, inſtead of iron points, here are uſed a kind of crooked needles, to prevent the *taffety* from ſlipping: at the two extremities are two beams, on one of which is rolled the *taffety* to take the gloſs; and on the other, the ſame *taffety*, as faſt as it has received it. The firſt beam is kept firm by a weight of about two hundred pounds, and the other turned by means of a little lever paſſing through mortiſes at each end. The more the *taffety* is ſtretched, the greater luſtre it takes: care, however, is to be uſed, that it be not weakened by over-ſtretching.

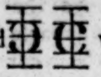
Beſides this inſtrument for keeping the ſtuff ſtretched, there is another to give it the fire: this is a kind of carriage, in form of a long ſquare, and of the breadth of the *taffeties*: it moves on trundles, and carries a charcoal fire under the *taffety*, at the diſtance of about half a foot.

Theſe two machines prepared, and the *taffety* mounted, the luſtre is given it by rubbing it gently with a ball, or a handful of liſts of fine cloth, as it rolls from one beam to the other; the fire, at the ſame time, being carried underneath it to dry it. As ſoon as the piece has its luſtre, it is put on new beams to be ſtretched a day or two; and the oftener this laſt preparation is repeated, the more it increaſes the gloſs.

For black *taffeties*, the gloſs is given with double beer and orange or lemon-juice; but this laſt is the leaſt proper, as being apt to whiten them. The proportion of the two liquors is, a gallon of orange-juice to a pint of beer, to be boiled together to the conſiſtence of a rich broth. For coloured *taffeties*, they uſe gourd-water, diſtilled in an alembic.

There are alſo ſeveral different ſorts of *taffeties* manufactured in China; as corded *taffeties*, which wear well; and alſo ſome with flowers, and others beautifully ſtriped; and a particular *taffety*, of which they make drawers, and other kinds of wearing apparel. This laſt is thick, and yet ſo pliant, that it may be folded and preſſed with the hand, without leaving any mark in it. They alſo waſh it, like other ſtuffs, without its loſing much of its luſtre. The Chineſe workmen give the luſtre to this *taffety* with the fat of the river-porpoiſe, which they purify by waſhing and boiling; and then with a fine bruſh, they give the *taffety* two beds in the ſame direction, on the ſide which they intend to render gloſſy.

TAGETES, in *Botany*. See *African* MARYGOLD.

TAGLIATO, in the *Italian Muſic*, is uſed for a meaſure called by the French *barré*; that is, when the character of common time is thus marked  with a perpendicular line drawn down through its middle. It ſignifies a pretty quick motion, and contains a breve or its quantity in ſmaller notes, in each bar. Hence it is called *alla breve*.

TAJACU, or the SUS *tajacu* of Linnæus, in *Zoology*, the name of an animal common in ſome parts of America, called by many authors *aper moſchiferus*, or the muſk-boar.

It is of the ſhape of our hog, but much ſmaller, and has no tail, and its head is broader, and the ſnout much leſs pointed than in our hog; it has two tuſks in each jaw, thoſe in the upper jaw pointing down, and hardly apparent when the mouth is ſhut, the others hid; the neck is ſhort and thick, and the whole body of a griſly colour, or mixture of black and grey; its body is covered with hairs, much thicker and ſtronger than our hogs-briſtles, ſomething like the briſtles of the hedge-hog, and like them alſo variegated with circles of black and white; theſe are four or five inches long on the back, and gradually diminiſh to the ſides; on the middle of its head, between the ears, it has a ſort of creſt, made up of black briſtles; the belly almoſt naked; from the ſhoulders to the breaſt is a band of white; its ears are ſmall and erect, and its eyes ſmall; its ſnout, feet, and hoofs, are juſt like thoſe of the European hog; but the two poſterior or exterior hoofs are longer than in any other of the cloven-footed beaſts.

What is moſt ſingular, however, in this creature, is a certain gland which he has upon the back, and which has given occaſion to ſome to ſay its navel was placed there. This gland is ſituated on the very ridge of the back near the rump, and is ſo cloſely covered with long briſtles, that till they are removed by blowing, and keeping them back with the hand, the gland is not to be ſeen; when theſe are removed there is ſeen a ſpot almoſt naked, in the middle of which the top of the gland is ſeen; the lips of this gland uſually ſtand a little way above the fleſh, and its aperture eaſily admits a large ſtylus; and this gland, when lightly preſſed, ſpews out a liquid ſubſtance of a browniſh yellow colour, and ſcent ſomething like that of muſk or civet. The gland itſelf is placed between the ſkin and fleſh, and is not wholly covered by its conſtringing muſcle, but only ſurrounded by it at its bottom.

This animal inhabits the hotteſt parts of South America, and ſome of the Antilles; lives in foreſts, on the mountains, is very fierce, and if wounded, will turn on the hunter. It feeds on fruits and roots, toads and ſerpents, which it ſkins with great dexterity. It is reckoned very good food; but unleſs the dorſal gland be cut out as ſoon as it is killed, the fleſh will be infected by it. The Indians call this animal *pequaris*, whence its name *pecary*. *Tab.* V. *Quadrupeds*, N° 61. Ray and Pennant.

TAIIBI, in *Zoology*, the name of an American animal, deſcribed by Margrave and other authors, and ſuppoſed by ſome to be only the male of the OPOSSUM. The Portugueſe in America call it the *cachorro de mato*, and by the Dutch it is called *boſchratte*.

TAIL, *cauda*, that part of an animal which terminates its body behind.

The *tail* is different, both in figure and uſe, in the various ſpecies. In land-animals it ſerves to rid them of flies, and is uſually covered with hair, and ſtrengthened with bones: in fiſhes it is cartilaginous, and ſerves them as a helm to ſteer their courſe withal in ſwimming.

In birds it is covered with feathers, and greatly aſſiſts in all aſcents and deſcents in the air; as alſo to render their flight ſteady, by keeping the body upright in that ſubtile and yielding medium, by its readily turning and anſwering to every vacillation of the body.

TAIL *of fiſh*. This part in the fiſh-kind is the ſubject of very great diſtinctions, among the characters of the ſeveral genera. It differs in the ſeveral kinds of fiſh in a very obvious manner, in number, ſituation, and figure. In regard to the firſt difference, the *acus lumbriciformis*, and one of the kinds of the *ſerpens marinus*, have no *tail* at all; in all other fiſh there is a *tail*, and it is never more than one on each fiſh.

In regard to ſituation, there is this great difference, that in ſome it is placed perpendicularly, in others horizontally. In almoſt all the known fiſhes it is placed perpendicularly, except in the dolphin, the phocæna, the orca, the manati, and all the whale-kinds; for in all theſe it is placed horizontally, when the body is laid in its natural poſture.

In figure it has many very remarkable differences, which are of great uſe in ichthyological diſtinctions. 1. In ſome fiſh it is rounded at the end; as in the cottus, and ſome others. 2. In ſome it is cut off even as it were at the end, ſo that the whole *tail* is a ſort of parallelogram; as in the tench, and ſome of the ſalmons. 3. In ſome fiſhes it is cuſpidated at the end, as is the caſe in the conger, the eel, and the petromyzon. 4. In others it has as it were a ſmall ſegment of a circle cut out at the end, and ſo is ſlightly hollowed out; this is the caſe in the caraſſius, and ſome of the ſalmons. 5. In many fiſh it is forked or opened into two points, making an acute angle: this is the figure of the *tail* in the pearches, the cyprini of many kinds, &c. 6. Finally, the *tail* is falcated in many fiſh, that is, it is of the ſhape of a creſcent; as in the ſword-fiſh, the tunny, mackrel, and the like. Artedi, Ichthyolog.

TAIL, in *Anatomy*, is uſed for that tendon of a muſcle which is fixed to the moveable part. In oppoſition to which, the tendon fixed to the immoveable part is called the *head*.

TAIL, *dove*, or *ſwallow's*-TAIL, among *Carpenters*. See DOVE-*tail*.

TAIL, *peacock's*, a term applied to all circular compartiments which go enlarging from the centre to the circumference; imitating, in ſome meaſure, the feathers of a peacock's *tail*, when ſpread.

TAIL, *dragon's*, *cauda draconis*, in *Aſtronomy*. See DRAGON and NODE.

The aſtrologers take care to put this in all their horoſcopes.

TAIL, *horſe's*, among the Tartars and Chineſe, is the enſign or flag under which they make war.

Among the Turks, it is the ſtandard borne before the grand viſier, the baſhaws, and ſangiacs; in order to which, it is fitted on the end of a half-pike, with a gold button, and is called *toug*.

There are baſhaws of *one*, others of *two*, others of *three horſes tails*. The *horſes-tail* placed on the general's tent, is a ſignal of battle. For the original of this cuſtom, it is related, that in a certain battle, the ſtandard being taken by the enemy, the general of the army, or, as others ſay, a private horſeman, cut off the *tail* of his horſe, and faſtening it to the end of a half-pike, encouraged the troops, and gained the victory. In memory of which noble action, the grand ſignior appointed that ſtandard to be borne, for the future, as a ſymbol of honour. Ricaut.

TAIL, in *Heraldry*, &c. is particularly uſed for the *tail* of an hart; thoſe of ſeveral other creatures having peculiar and diſtinct names.

As, that of a buck, roe, or any other kind of deer, is called the *ſingle*; that of a boar, the *wreath*; of a fox, the *buſh*; of a wolf, the *ſtern*; and of a hare and rabbit, the *ſcut*.

TAIL *of a comet*. See COMET.

TAIL, or TAILE, in *Common Law*, ſignifies a limited fee, as oppoſite to fee-ſimple.

It is thus called from the barbarous word *taliare*, whence the French *tailler*, *to cut*; becauſe ſuch fee is ſo minced, or parted, as it were, that it is not in the owner's free power to diſpoſe of; but is, by the firſt giver, *cut*, *taillé*, and divided from all others, and tied to the iſſue of the donee.

The limitation of *tail* is either *general* or *ſpecial*. See FEE-*tail*.

TAIL *after poſſibility of iſſue extinct*, is where land being given to a man and his wife, and the heirs of their two bodies, and the one outlives the other, without iſſue between them begotten: the ſurvivor upon this ſhall hold the land for term of his own life in quality of tenant in *tail after the poſſibility of iſſue extinct*.

This eſtate muſt be created by the act of God, i. e. by the death of that perſon out of whoſe body the iſſue was to ſpring; for no limitation, conveyance, or other human act, can make it. It partakes partly of the nature of an eſtate-*tail*, and partly of an eſtate for life. The tenant is, really, only tenant for life, but with many of the privileges of a tenant in *tail*; as not to be puniſhable for waſte, &c. or he is tenant in *tail*, with many of the reſtrictions of a tenant for life; as, to forfeit his eſtate if he aliens it in fee-ſimple: whereas ſuch alienation by tenant in *tail*, though voidable by the iſſue, is no forfeiture of the eſtate to the reverſioner; who is not concerned in intereſt, till all poſſibility of iſſue be extinct. But, in general, the law looks upon this eſtate as equivalent to an eſtate for life only; and, as ſuch, will permit this tenant to exchange his eſtate with a tenant for life: which exchange can only be made of eſtates that are equal in their nature. Blackſt. book ii. p. 124, &c.

TAIL, *fee*. See FEE-*tail*.

TAIL, *ſeveral*. See INHERITANCE.

Tail, or **Taile**, is alſo uſed for what we vulgarly call TALLY, *taille de bois*.

Tail, in the *Manege*. Many affirm that the dock of a horſe's *tail* ſerves to point out his ſixth or ſeventh year; ſaying, that about the time that the black ſpeck, or eye of the bean begins to diſappear, and the cavity to be filled, the dock of the tail becomes longer, becauſe the vigour of the young years begins to abate; and nature has not ſtrength enough to nouriſh and keep up the joints or knots that form the dock; ſo that when the horſe is ſix years old, one of theſe joints ſlackens, and begins to fall down; and a year after, another deſcends in like manner. But this relaxation or downfalling happens ſooner in ſome than in others, according as they have been well or ill kept, with reference to feeding, houſing, and working. Accordingly we find the marks of a horſe's age, taken from his *tail*, are ſo erroneous, that many jockies maintain, that the firſt joint deſcends when he is nine, and the ſecond when he is ten years old.

Tail *of the trenches*, in the *Military Art*. See TRENCH.

Tail, in *Sea Language*, is a name given by ſailors to the extremities of a hurricane, wherein the violence is conſiderably exhauſted.

Tail-*block*, in a *Ship*, a ſmall ſingle block, having a ſhort piece of rope attached to it, by which it may be faſtened to any object at pleaſure, either for convenience, or to increaſe the force applied to the ſaid object. Falconer.

TAILLE', or **Taillee**, in *Heraldry*. See TRANCHE'.

TAILLOIR, in *Architecture*, a term which ſome of our writers, after the French, uſe for ABACUS.

TAINHA, in *Ichthyology*, a name given by ſome to a ſpecies of mullet caught in the American ſeas, and more uſually called the CUREMA.

TAINT, in *Law*, ſignifies either, ſubſtantively, a conviction; or, adjectively, a perſon convicted of felony, treaſon, &c. See ATTAINT.

TAIPARA, in *Ornithology*, the name of a Braſilian ſpecies of PARROQUET. It is of the ſize of a lark, and of a pale green colour over its whole body; its tail is ſhort, not reaching beyond the tips of the wings when cloſed; its beak is red, and its legs are grey; near the origin of the beak it has a ſemilunar red ſpot on the head, and a yellow ſpot on the middle of each wing. It builds in the deſerted abodes of ants on trees. Margrave's Hiſt. Braſ.

TAKE *and Leave*, in the *Sea Language*: the ſailors ſay, a ſhip can *take and leave upon her when ſhe will*; when ſhe ſails ſo well that ſhe can come up with another, or outſail her at pleaſure.

Take, *thiſtle*. See THISTLE.

TAKERS—*carr*-TAKERS. See CARR.

TAKING-*in*, in *Sea Language*, denotes the act of brailing-up and furling the ſails at ſea, particularly when the wind increaſes. It is generally uſed in oppoſition to *ſetting*.

TAL, a name uſed by ſome writers on the materia medica to expreſs the dung of peacocks; and by ſome of the chemical writers, for any alkali ſalt.

TALA, in *Botany*, a name by which ſome authors call the plant whoſe ſeed is the ſeſamum or oily purging grain of the ſhops.

TALABONG, in *Natural Hiſtory*, a name given by the inhabitants of the Philippine Iſlands to a ſpecies of heron, common among them; which is much ſmaller than our heron, and perfectly white all over.

TALÆDITES, ταλαιδιτης, in *Antiquity*, gymnical exerciſes in honour of Jupiter ταλαιος.

TALARIUS *ludus*, among the Romans, a game ſomewhat reſembling our dice-playing, and performed with a kind of gold or ivory dice, which they ſhook as we do in a box, before they threw them. There was this difference, however, between their game and ours, that our dice have ſix ſides, becauſe they are cubical; but theirs had but four, and were conically ſhaped. They made uſe of them for divination, as well as playing; and they concluded upon a good or evil augury, according to what came up. As they uſually threw four of them at a time, the beſt chance was when four different ſides came up. The ſides were called by the name of ſome animal, as the dog, vulture, baſiliſk, &c. Or of ſome deity, as Venus, Hercules, &c. Some authors have been of opinion, that they were marked with the forms of animals, or images of gods, and not with numbers or dots, as our dice are.

TALASSIO, among the Romans, an acclamation uſed at marriages.

TALBOT, a ſort of dog, noted for its quick ſcent, finding out the tracks, lodgings, and forms of beaſts, and purſuing them with open mouth, and continual cry, with ſuch eagerneſs, that, if not taken off by the huntſman, he is often ſpoiled.

TALC, or **Talk**, in *Natural Hiſtory*, a ſhining, ſquamous, fiſſile ſpecies of ſtone, eaſily ſeparable into thin tranſparent ſcales or leaves. See SPECULARES.

The *talcs* in general are defined to be foſſils, compoſed of broad, flat, and ſmooth laminæ or plates, laid evenly and regularly on one another; eaſily fiſſile, according to the ſite of theſe plates, but not all ſo in any other direction; flexile and elaſtic; bright, ſhining, and tranſparent; not giving fire with ſteel, nor fermenting with acid menſtrua, and ſuſtaining the force of a violent fire without calcining. See *Tab. of Foſſils, Claſs* I.

By theſe characters, the *talcs* may be diſtinguiſhed from all other bodies which reſemble them; and, according to their ſeveral natural and eſſential differences among one another, they are themſelves divided into two ſeparate orders, and under thoſe into four genera.

The *talcs* of the firſt order, are thoſe compoſed of plates of great extent, each making ſingly the whole horizontal ſurface of the maſs.

Thoſe of the ſecond order, are thoſe compoſed of ſmall plates, in form of ſpangles, irregularly diſpoſed, and uſually many of them concurring in different directions, to the formation of one of the ſurfaces of the maſs. Hill's Hiſt. of Foſſ. p. 71.

Authors have hitherto been uſed to call alſo another ſet of bodies by the name of *talcs*, with the addition of the adjective *fibroſe*; but as theſe are found not at all of the nature of the true *talcs*, they are now diſtinguiſhed by the name FIBRARIÆ.

Talc is often confounded with ſimilar concretions, as with the *ſchiſtus* or *lapis fiſſilis*, with the *ſpathum* or *ſpatum*, and *gypſum*, Muſcovy glaſs, or *glacies Mariæ*, and the *lapis ſpecularis*. Boyle takes it for an alkaline ſpathum, and others for other ſubſtances, from which nevertheleſs it differs. See Pott, in Mem. de l'Acad. de Berlin, 1746.

Anciently, *talc* was found only in Spain; but ſince, mines thereof have been found in Cyprus, Cappadocia, and ſince that in Arabia and Africa; and at preſent they dig it in the Alps and Appennines, ſeveral mountains in Germany, and even in England, particularly in Northamptonſhire.

We uſually diſtinguiſh two kinds of *talc*, viz. *white talc of Venice*, and that called *red talc of Muſcovy*: to which ſome add, though improperly, *parget*, *plaiſter-ſtone*.

That from Venice has been the moſt eſteemed in medicine: it is brought in large ſhining greeniſh ſtones; but becomes white, and exceedingly bright when wrought. It ſeems greaſy to the touch, though there is ſcarce any ſtone drier; yet, notwithſtanding its drineſs, it pulverizes with difficulty; nor is it eaſily calcined. However, this *talc* does not appear capable of anſwering any medicinal intention, as not being diſſolved or ſenſibly affected by any known humid menſtruum.

The chief uſe of the Ruſſian is as a ſcreen or cover for paintings in miniature and crayons; to which purpoſe thin ſlices thereof are uſed. The Venetian is ſometimes alſo uſed for a fucus; in order to which, by reaſon of the difficulty of pulverizing it, &c. they content themſelves to raſp it with the ſkin of a ſea-dog, and to paſs the raſping through a ſieve.

Pliny, in his Natural Hiſtory, lib. xxxvi. c. 22 obſerves, that the Romans not only uſed the Ruſſian ſort for window-lights, but they alſo paved the circus with a kind of it. See GLASS.

The *talc* brought from Muſcovy, is reddiſh when in the ſtone; but it ſeldom comes to us otherwiſe than in leaves, which are colourleſs, ſmooth, gloſſy, and exceedingly tranſparent: it is found in quarries in Muſcovy and Perſia, and is uſed to make lanterns, to cover paintings, &c. Many of the mountains in Hungary and Germany abound with the Muſcovy *talc*, not inferior to the *talc* of that country from whence it has its name. The mountain of Cliſſuro, which is a part of mount Hæmus, as alſo mount Pyrlipe, ſhine like ſilver in all parts both day and night, provided there be any moon.

The *talc* in theſe hills is the only occaſion of this: there are alſo *talc* rocks near Spittal in Upper Carinthia; and many other hills are ſaid alſo to contain great quantities of it; but there is a ſort of ſelenites ſo very like this *talc*, that people are eaſily deceived by its appearance. This ſelenites ſplits into flakes like the *talc*, but they are brittle.

Talc is uſed with great ſucceſs in the diſtillation of acid ſpirits; that ſalt is always naturally impure, and can ſcarce be rendered pure but by an admixture of *talcky* earth in the retort.

The mixture of *talc* with different kinds and quantities of glaſs, may be ſucceſsfully performed with a violent fire, but not with a ſmaller degree: thus three parts of *talc* with one part of cryſtalline glaſs, make only a ſpongy and friable maſs in a common fire; but in a more violent one they become a firm and ſolid maſs of a brown colour. Minium, or glaſs of lead, mixed in equal quantities with *talc*, and ſet in a violent fire, run into a yellowiſh glaſs, reſembling the opake pieces of amber; and two parts of minium to one of *talc*, produce a clear and tranſparent yellow glaſs, which is of a hardneſs capable of giving fire with ſteel. The alkaline earths, mixed with *talc*, produce a maſs ſcarcely vitrifiable by any fire: hence appears the reaſon why copels made of lime and *talc* are ſo very hard to vitrify. Minium, added to theſe mixtures, make them combine into a firm maſs, but without perfect fuſion; but borax added to them, melts them readily into a true glaſs. The gypſeous earths mixed with *talc*, will not unite into a maſs in any degree of fire; but if borax be added, the *talc* readily melts. Thus two parts of *talc*, two parts of that ſpar or gypſeous matter called *glacies Mariæ*, or the common plated ſpar, with one part of borax, run into a yellow maſs reſembling a topaz.

The argillaceous earths do not vitrify with *talc*; but they run into a maſs of great hardneſs, which will give fire with ſteel, and is very ſerviceable to make crucibles of, theſe veſſels not ſuffering the glaſs of lead to run through them. *Talc*, joined with the vitrifiable ſtones, forms no remarkable body, but the maſs remains friable; but from theſe maſſes, by the addition of proper matter to render them fluid, great variety of elegant compounds may be made. Thus *talc* mixed in equal quantities with powder of flints, on adding to the whole a fourth part of cryſtal-glaſs, the whole unites into an opake but ſolid white maſs. Alkali-ſalt, added in equal quantity to *talc* and flint, gives a tranſparent yellow glaſs; and white ſand, *talc*, and a fixed alkali, in equal quantities, afford a green glaſs; with other mixtures of this kind, in different quantities, the reſemblances of many beautiful ſtones are produced; and what is very remarkable, ſome grains of metalline matter are often found on the ſurface of the maſſes.

Cæſalpinus, Aldrovand, and ſome others affirm, that *talc* melted with copper, or added to copper, while in fuſion, gave it a white colour; this being taken for granted, authors have hence agreed that *talc* contains an arſenical earth. But experiment ſhews this to have been a falſe aſſertion, in regard to *talc*; and probably it only owes its origin to the cant language of ſome of the alchemiſts, who have called the flowers of zinc *talc*, though theſe alone muſt render copper yellow, not white. Antimony and *talc*, firſt calcined with nitre, run in a violent fire into a ſort of flint, which will give fire with ſteel. With regulus of antimony and the black flux, it runs into a black maſs; and with biſmuth it calcines into a grey powder. So little is there in the propoſals of the chemiſts for the metallization of *talc* by antimony and biſmuth. Mem. de l'Acad. de Berlin, Ann. 1746.

In what part of Mr. Boyle's works the learned author, from whom the foregoing extract was taken, has found that *talc* may be reduced by common fire to a gypſum in an hour, we know not; but we find that Mr. Boyle ſays, that the calcination of *talc* is ſo very difficult, that eminent chemiſts have looked upon calxes of *talc* as counterfeits. Works abr. vol. i. p. 160.

Mr. Boyle mentions the extracting of gold from *talc*, as having ſometimes ſucceeded. See Work abr. vol. i. p. 160. but *vide ſupra*.

Some chemiſts, and empirics, have held, that *talc* might be uſed for many more important purpoſes than it uſually is; and pretend to draw from it that precious oil, ſo much boaſted of by the ancients, particularly the Arabs, called *oil of talc*, which is ſuppoſed a wonderful coſmetic, and preſerver of the complexion: but the truth is, the word *talc*, among many of them, ſignified no more than an equal diſpoſition of the humours, which keep the body in good temperament and perfect health. Now, as nothing contributes more than health to the preſerving of beauty, this has given occaſion to the chemiſts to ſearch out this *oil of talc*, which is to maintain the body in this diſpoſition, and to engage the ladies to be at the expence of the ſearch. See *Philoſophic* TALC.

Some have alſo pretended, that yellow or ruddy *talc* contained the ſeeds of gold, and that an oil might be drawn from it, to tranſmute metals into gold or ſilver, to fix mercury, &c. but this is mere charletanery.

TALC, *Mexico*. There is a famous cave ſome leagues from Mexico, on the north-weſt ſide of the city, beyond the lake, the top and ſides of which are ſaid to be lined with leaf-gold; but that of ſuch a kind, that the common methods of fluxing the ores have no effect upon it. The Spaniards, after many trials, have given it over, but are ſtill perſuaded by the Indians that it is gold, and that the famous Montezuma obtained a great part of his treaſures from this cave. The leaves, as they are called, are no more than ſpangles of the ſize of a man's nail; and the account we have of it in the Philoſophical Tranſactions, and the various methods attempted in vain to reduce it to metal, abundantly prove that it is only a yellow *talc*. Vide Phil. Tranſ. N° 39.

TALC, *Muſcovy*, a kind of foliaceous body, well known by the Engliſh name of iſinglaſs. See SPECULARES.

TALC, *philoſophic*, a name given by ſome of the chemical writers to the flowers of zinc.

This ſubſtance, diſſolved in vinegar, affords what they have in their unintelligible language called *oil of talc*, and extolled as a thing of vaſt power in the fixing of mercury, and many other imaginary operations; and beſides this, they call it a ſovereign remedy for all diſeaſes.

The chemiſts of after-ages, ſeeing ſuch prodigious effects aſcribed to oil of *talc*, and not conceiving that *talc* was a mere cant word in this place, have been at infinite pains, by means of a thouſand differently varied menſtruums, to obtain an oil from the common Venetian *talc*, a dry ſtone which in a very remarkable manner reſiſts the force of all menſtrua, and of fire; and from which, therefore, no oil can be obtained. In the various operations uſed to this purpoſe, ſome have really hit upon liquors of a conſiderable power; but that power has been wholly owing to the menſtruums they employed, not to the ſtone; and even if it were, could have none of the effects of the oil of *talc*, mentioned by theſe dark writers, who meant by it ſo very different a ſubſtance as a ſolution of theſe flowers, which are only zinc in another form.

TALE, in *Law*. See COUNT and DECLARATION.

TALED, in the *Jewiſh Antiquities*, a ſort of habit that the Jews wore, chiefly when they repeated their prayers in the ſynagogue. Numbers xv. 38. Deuteronomy xxii. 12.

It ſerved inſtead of that ſquare garment they wore heretofore, to which Moſes had appointed that they ſhould faſten borders of blue to the four quarters, and fringes or ribbands all along the borders. But at preſent, that they may not be expoſed to the laughter of the people for the too great ſingularity of their dreſs, they content themſelves with wearing a ſquare piece of cloth underneath, with four tufts at the four corners, and when they meet in the ſynagogue to ſay their prayers, they cover their heads with a ſquare woollen veil, which has four tufts at its four corners. It is this they call *thaled*, or *taled*. Calmet, Dict. & Leo of Modena, Ceremonies of the Jews, p. i. ch. 11.

TALENT, TALENTUM, a weight, and a coin, both very famous among the ancients; but very different in different countries.

The value of the *talent* is very hard to aſſign in Engliſh money, as being uſed among all the people throughout the Eaſt, and its value, and the manner of computation, different among each. A difficulty abundantly ſhewed by Budæus, in his learned treatiſe De Aſſe.

There were various kinds of *talents*, both with regard to weight and to ſpecies; the value of theſe laſt ſtill increaſing, as the metal whereof it conſiſted was purer, though the *talent* weights contained the ſame number of pounds and drams. Accordingly, all *talent* weights are equally ſixty minæ, and the mina one hundred drachmæ; but the drachma of one place exceeding that of another, there hence aroſe a difference in the *talents*.

The common Attic *talent* then (the *talent* weight we mean) contained ſixty Attic minæ, or ſix thouſand Attic drachmæ; equal, according to Dr. Arbuthnot's reduction, to fifty-ſix pounds, eleven ounces, ſeventeen and one-ſeventh grains, Engliſh Troy weight.

There was another Attic *talent*, by ſome ſaid to conſiſt of eighty, by others of one hundred minæ. The Egyptian *talent* was eighty minæ; the Antiochian alſo eighty; the Ptolemaic of Cleopatra eighty-ſix and two-thirds; that of Alexandria ninety-ſix; the Inſular *talent* one hundred and twenty; and that of Antioch three hundred and ſixty minæ. In the valuation of money, the Grecian *talent*, according to Dr. Arbuthnot, was equal to ſixty minæ, or reckoning the mina at 3*l.* 4*s.* 7*d.* equal to 193*l.* 15*s.* the Syrian *talent* in this valuation conſiſted of fifteen Attic minæ; the Ptolemaic of twenty; the Antiochian of ſixty; the Euboic of ſixty; the Babylonic of ſeventy; the Greater Attic of eighty; the Tyrian of eighty; the Eginean of one hundred; the Rhodian of one hundred; and the Egyptian of eighty minæ. See Arbuthnot's Tables of Ancient Coins, &c. p. 33, and *Tab.* 18, 19. 23, 24.

But Mr. Raper makes the Attic *talent*, which conſiſted of ſixty minæ, or ſix thouſand drachmæ, each drachm being equal to ſixty-ſix grains and a half Troy weight, or 3*l.* 17*s.* 4$\frac{6}{10}$*d.* ſterling, equal to 232*l.* 3*s.* See DRACHM.

This ingenious writer alſo obſerves, that hiſtorians and others mention the Eginean and the Euboic *talent*. The former weighed ten thouſand Attic drachms; but, like other *talents*, contained only ſix thouſand of its own; which being ſo much heavier than the Attic, the Athenians called it ϖαχειαν δραχμην, or the thick drachm. This *talent* was uſed at Corinth, and in a paſſage of Aulus Gellius, lib. i. c. 8. it is valued at ten thouſand Attic drachms; and was probably uſed in moſt of the cities of Peloponneſus. If the Attic drachm weighed ſixty-ſix and a half Troy grains, the Eginean ſhould weigh one hundred and ten and five ſixths, which Mr. Raper ſtates at one hundred and eleven. This Eginean *talent* he concludes from the mean drachm of ſix Macedonian coins, which he found to be one hundred and eleven grains and one fourth, muſt have been the ſtandard of the Macedonian money, till Philip changed it. And it appears likewiſe to have been the ſtandard of the Ptolemaic money in Egypt. Pliny indeed (Nat. Hiſt. lib. xxxiii. c. 3.) tells us, on the authority of Varro, that the Egyptian *talent* weighed eighty Roman pounds; but he ſuppoſes that this is a falſe reading, and that for Ægyptium we ſhould read Euboicum: for Pliny is ſpeaking of the riches of Aſia, where the Euboic *talent* was uſed for weighing gold; and it is known, that the weight of that *talent* was ſettled at eighty Roman pounds, by the treaty between the Romans and Antiochus. There is a paſſage in Pollux (lib. ix. c. 6. § 86.) which makes the Egyptian *talent* contain fifteen hundred Attic drachms. But this, he apprehends, is an injudicious interpolation in the laſt collection of that author.

The Euboic *talent*, ſays this writer, certainly came from Aſia; for Herodotus (lib. iii. ſect. 89.) tells us, the kings of Perſia weighed their gold by that *talent*: in the ſame place he informs us, that the Babylonian *talent* weighed ſeventy Euboic minæ. Pollux ſays, it weighed ſeventy Attic minæ. Therefore the Euboic *talent* ſhould be equal to the Attic. But Ælian (Var. Hiſt. lib. i. c. 22.) tells us, that it weighed ſeventy-two Attic minæ; and if ſo, the Euboic *talent* ſhould be heavier than the Attic, in the proportion of ſeventy-two to ſeventy. By two paſſages, cited by Mr. Raper, from Xenophon. Exped. lib. i. it appears probable, that the Babylonian *talent* weighed above ſeventy Attic minæ, and above ſeventy Euboic minæ; and if Pollux took his value of the Babylonian *talent* from Herodotus, as the text now ſtands, and Ælian his value of the ſame from a more correct copy of that author, or from ſome better authority, the Euboic *talent* muſt have been equal to the Attic. Accordingly it contained ſix thouſand Attic drachms. Phil. Tranſ. vol. lxi. part ii. p. 483, &c.

There is another *talent* much more ancient, and much leſs than any of thoſe already mentioned, which Dr. Arbuthnot calls the Homerical *talent* of gold, ſuppoſed, he ſays, to be equal to three Attic aurei. Pollux ſpeaks of ſuch a *talent*. Euſtathius upon Homer reckons it worth twenty-four drachmæ. That its value was ſmall, whether fixed or uncertain, is conjectured from the paſſage of Homer, where, deſcribing the prizes at the funeral of Patroclus, two *talents* of gold are propoſed as a more inconſiderable prize than a mare with foal, &c. Hence Mr. Raper, *ubi ſupra*, p. 527. concludes, that it was the ſame that the Dorian colonies carried to Sicily and Calabria: for Pollux tells us, from Ariſtotle, that the ancient *talent* of the Greeks in Sicily contained twenty-four nummi, each of which weighing an obolus and a half, the *talent* muſt have weighed ſix Attic drachms, or three darics; but the daric weighed very little more than one guinea; and if two *talents* weighed about ſix guineas, we may reckon the mare with foal worth twelve; which was no improbable price, ſince we learn from a paſſage in the Clouds of Ariſtophanes, that, in his time, a running horſe coſt twelve minæ, or above forty-ſix pounds ſterling; therefore, this ſeems to have been the ancient Greek *talent*, before the art of ſtamping money had introduced the greater *talents* from Aſia and Egypt.

According to this ancient *talent*, ſays Dr. Arbuthnot, ſome reckon the treaſure of king David, particularly that mentioned 1 Chron. xxii. 14. which according to the common reckoning, would amount in gold *talents* to the value of 547,500,000*l.* and the ſilver to above 342,000,000; or reckoning according to the decuple proportion of gold to ſilver, the two ſums would be equal. As David reigned in Judæa after the ſiege of Troy, it is not improbable but Homer and he might uſe the ſame numeral *talent* of gold.

Among the Romans there were two kinds of *talents*, the *little* and the *great talent*; the little was the common *talent*; and whenever they ſay ſimply *talentum*, they are to be underſtood of this: the little *talent* was ſixty minæ or Roman pounds; the mina, or pound, eſtimated at one hundred drachmæ, or denarii: it was alſo eſtimated at twenty-four great ſeſterces, which amounted to ſixty pounds.

The great *talent* exceeded the leſs by one-third part. Budæus computes, that the little *talent* of ſilver was worth ſeventy-five pounds ſterling; and the greater 99*l.* 6*s.* 8*d.* ſterling. The greater of gold was worth 1125*l.* ſterling.

TALENT, *as a ſpecies, or money*, among the Hebrews, was ſometimes uſed for a gold coin, the ſame with the SHEKEL of gold, called alſo *ſtater*, and weighing only four drachms. The Hebrews reckoned by theſe *talents* as we do by pounds, &c. Thus a million of gold, or million of *talents* of gold, among them, was a million of ſhekels, or nummi; the nummus of gold being the ſame weight with the ſhekel, viz. four drachms.

But the Hebrew *talent* weight of ſilver, which they called *cicar*, was equivalent to that of three thouſand ſhekels, or one hundred and thirteen pounds, ten ounces, one penny weight, ten grains and two ſevenths, Engliſh Troy weight, according to Arbuthnot's computation.

TALES, in *Law*, a ſupply or addition of men for thoſe impanelled on a jury of inqueſt, and not appearing, or at their appearance challenged by either party as not indifferent.

In ſuch caſe, the judge, upon motion, grants ſupply to be made by the ſheriff, of one or more *tales*, ſuch as are preſent in court, equal in reputation to thoſe impanelled. For this purpoſe a writ of *decem tales*, *octo tales*, and the like, was uſed to be iſſued to the ſheriff at common law; and muſt be ſtill ſo done at the trial at bar, if the jurors make default; but at the aſſizes, or niſi prius, by virtue of the ſtatue 35 Hen. VIII. c. 6. and other ſubſequent ſtatutes, the judge is impowered at the prayer of either party to award a *tales de* CIRCUMSTANTIBUS, of perſons preſent in court, to be joined to the other jurors to try the cauſe; who are liable however to the ſame challenges as the principal jurors. This is uſually done, till the legal number of twelve be completed. The *tales de circumſtantibus* is in ſome meaſure rendered uſeleſs by the ſtatute for regulating juries, 3 Geo. II. c. 25. See CHALLENGE and JURY.

TALIO, *Lex* TALIONIS, or *Pœna* TALIONIS, a retaliation, or puniſhment, whereby an evil is returned perfectly like that committed againſt us by another—which is what we uſually expreſs by the words, *eye for eye, tooth for tooth.*

The *pœna talionis* was enjoined by the law of Moſes, among the Jews; it was eſteemed a natural piece of juſtice, and yet the Romans ſet it aſide, inaſmuch as ſuch a parity or equality of puniſhment could not always be obſerved. For this reaſon the prætor allowed ſuch as had ſuffered an injury to make an eſtimate thereof in money, that juſtice might be done him that way; only reſerving to himſelf the power of moderating the ſame. And this was what was conſtantly practiſed, and thus the *pœna talionis* became quite diſuſed with them.

TALISMANS, magical figures engraven or cut under certain ſuperſtitious obſervances of the characteriſms and configurations of the heavens; to which ſome aſtrologers, hermetical philoſophers, and other adepts, attribute marvellous virtues, particularly that of calling down celeſtial influences.

The word is pure Arabic; though Menage, after Salmaſius, thinks it may come from the Greek τελεσμα, *operation*, or *conſecration.* Borel ſays, it is Perſian, and ſignifies literally an engraven conſtellation. Others derive it *a talamacis literis*, which are myſterious characters, or ciphers, uſed by ſorcerers, thus called from *talamaſca*, a phantom, or illuſion.

The author of a book, intituled, *Taliſmans juſtifiez*, ſays, a *taliſman* is the ſeal, figure, character, or image of a heavenly ſign, conſtellation, or planet, engraven on a ſympathetic ſtone, or on a metal correſponding to the ſtar, &c. in order to receive its influences.

The *taliſmans* of the Samothracians, ſo famous of old, were pieces of iron, formed into certain images, and ſet in rings, &c. They were held preſervatives againſt all kinds of evils.—There were other *taliſmans* taken from vegetables, and others from minerals.

In the general, we uſe to diſtinguiſh three kinds of *taliſmans*.—*Aſtronomical*, which are known by the ſigns or conſtellations of the heavens engraven thereon, with other figures, and ſome unintelligible characters.—*Magical*, which bear very extraordinary figures, with ſuperſtitious words and names of angels unheard of.—And *mixt*, which conſiſt of ſigns, and barbarous words; but have no ſuperſtitious ones, or names of angels.

Some rabbins maintain, that the brazen ſerpent, raiſed by Moſes in the wilderneſs, for the deſtruction of the ſerpents that annoyed the Iſraelites, was properly a *taliſman*.

All the miraculous things wrought by Apollonius Tyanæus are attributed to the virtue and influence of *taliſmans*: and that wizard is even ſaid by ſome to have been the inventor of *taliſmans*.

Some authors take ſeveral Runic medals, at leaſt medals whoſe inſcriptions are in Runic characters, for *taliſmans*; it being notorious, that the northern nations, in their heathen ſtate, were much devoted thereto. M. Keder, however, has ſhewn, that the medals here ſpoken of are quite other things than *taliſmans*.

TALK. See TALC.

TALKING. See SPEAKING.

TALLIAGE, TALLAGIUM, a certain rate, according to which barons and knights were anciently taxed by the king towards the expences of the ſtate, and inferior tenants by their lords, on certain occaſions.

That raiſed to the king was on his demeſnes, eſcheats and wardſhips, and upon the cities and burghs of the realm. When it was paid out of knights fees, it was called SCUTAGE; when by cities and burghs, *talliage*; when upon lands not of military tenure, hidage.

This latter *talliage* of the cuſtomary tenants was ſometimes fixed and certain, and ſometimes at the pleaſure of the lord; and was alſo ſometimes compounded for.

Talliages were anciently called *cuttings*; which name is ſtill retained in Ireland, though in a different ſignification.

Talliage, ſays ſir Ed. Coke, is a general name including all taxes; and is derived from the French *taille*, *tax*, founded on the TALLY of petty tradeſmen; as the country people appointed to collect it, not being able to write, ſcored down what they received on tallies. See LAND-TAX and SUBSIDY.

TALLOW, a ſort of animal fat, melted down and clarified. There are ſcarce any animals but a ſort of *tallow* may be prepared from; but thoſe which yield the moſt, and whereof the moſt uſe is made, are the horſe, bullock, ſheep, hog, goat, deer, bear, and viper.—Some of which *tallows*, or fats, are uſed in medicine, and called AXUNGIÆ.

Moſt of the reſt are uſed in the making of ſoap, and the dreſſing of leather; but chiefly in making of candles.

For candles, the beſt compoſition is half ſheeps *tallow*, and half cows or bullocks *tallow*, without any mixture of other kinds of fat, which only ſerve to turn the candles yellow, make them run, and ſpoil the clearneſs of their light. See CANDLE.

TALLOW-TREE, in China, is a tree growing in great plenty in that country, which produces a ſubſtance like our *tallow*, and ſerving for the ſame purpoſe. See CROTON.

It is about the height of a cherry-tree; its leaves in form of a heart, of a deep, ſhining, red colour, and its bark very ſmooth. Its fruit is encloſed in a kind of pod, or cover, like a cheſtnut, and conſiſts of three round white grains, of the ſize and form of a ſmall nut, each having its peculiar capſula, and within that a little ſtone.

This ſtone is encompaſſed with a white pulp, which has all the properties of true *tallow*, as to conſiſtence, colour, and even ſmell: and accordingly the Chineſe make their candles of it; which would, doubtleſs, be as good as thoſe in Europe, if they knew how to purify their vegetable *tallow* as well as we do our animal kind, and to make their wicks as well.

All the preparation they give it, is to melt it down and mix a little oil with it, to make it ſofter, and more pliant.—It is true, their candles made of it yield a thicker ſmoke, and a dimmer light, than ours; but thoſe defects are owing, in a great meaſure, to the wicks, which are not of cotton, but only a little rod or ſwitch of dry light wood, covered with the pith of a ruſh, wound round it; which being very porous, ſerves to filtrate the minute parts of the *tallow*, attracted by the burning ſtick, which by this means is kept burning.

TALLY, or TAILE, TAILLE, a piece of wood whereon retail traders uſe to ſcore or mark, by notches or inciſions, the ſeveral quantities of goods they deliver out on credit, to ſave the trouble of writing down ſo many little articles in books.

Each ſcore conſiſts of two pieces of wood, or rather of a ſingle piece cleft length-wiſe, the parts whereof falling in with one another, things delivered are ſcored on both at the ſame time; the ſeller keeping one, and the buyer the other.

Tallies are taken as evidences in courts of juſtice, as much as books. The ancient way of keeping all accounts was by *tallies*; the debtor keeping one part, and the creditor the other. Hence the *tallier* of the Exchequer, now called the *teller*.

There are three kinds of *tallies* mentioned in our ſtatutes, and long uſed in the exchequer; viz.

TALLIES *of Loans*, one part whereof is kept in the exchequer, and the other part given to particular perſons, in lieu of an obligation for the monies they have lent to the government on acts of parliament.—This laſt part is called the *ſtock*, and the former the *counter-ſtock*, or the counter-tail.

The *tallies* are numbered, and bear the perſon's name, and the ſum lent: thus we ſay, the *tallies*, N°. have been paid, or diſcharged: *tallies* are riſen, fallen, 4, 5, &c.

TALLIES, or TAILES *of Debt*, are a kind of acquittances for debts paid to the king.

E. gr. the univerſity of Cambridge pays yearly 10*l* for ſuch things as are by charter granted them in fee-farm. He that pays this, receives a *taile*, or *tally*, for his diſcharge, with which, or a note of it, he repairs to the clerk of the pipe, and there for the *tally* receives a full diſcharge on parchment.

TALLIES *of Reward*, or allowance: theſe are made to ſheriffs, for ſuch matters as (to their charge) they have performed in their office, or by ſuch money as is by courſe caſt on them in their accounts, but which they cannot levy.

In the Exchequer there is a *tally*-court, where attend the two deputy chamberlains of the exchequer, and the *tally*-cutter.

TALLY-*counter*. See COUNTER.

TALLIES, *cutter of the*. See CUTTER.

TALLY, *petty*. See PETTY.

TALLIES, *writer of*. See WRITER.

TALLY *the ſheets*, at ſea, a word of command, when the ſheets of a main-ſail, or fore-ſail are to be haled aft. See SHEETS.

TALMUD, or THALMUD, from תלטוד *doctrine*, from למר *he taught*, a Jewiſh book, wherein is collected all that relates to the explication of their law.

The *Talmud* is the body of the Hebrew law: a compilation of expoſitions of the duties impoſed on that people, either in Scripture, or by tradition, or by authority of their doctors, or by cuſtom, or even by ſuperſtition: to ſpeak more plainly ſtill, it is the courſe of caſes of conſcience, or of moral theology, wherein the duties are explained, and the doubts cleared, not by reaſoning, but generally by authority, by the cuſtom of the nation, and by the deciſions of the moſt approved of the ancient doctors.

The *Talmud* conſiſts of two general parts: the one called the MISCHNA, the other the GEMARA; which firſt part is alſo frequently called abſolutely *the Talmud*, the general name of the whole work.

The Jews divide their law into *written*, which is that contained in the books of Moſes; and *unwritten*, which is that conveyed by tradition.—This latter is, in effect, no other than a gloſs or interpretation of the former, given by the ancient rabbins.

The *Talmud* then contains the traditions of the Jews, their polity, doctrine, and ceremonies, which they obſerve as religiouſly as the law of God itſelf: they would never put them in writing till they were compelled to it by the deſtruction of Jeruſalem, and till they ſaw themſelves diſperſed throughout the world.

They had two famous ſchools; the one at Babylon, and the other at Jeruſalem: in theſe they made two ſeveral collections of thoſe traditions; the firſt at Jeruſalem: the other at Babylon; but both called *Talmud*, both exceedingly reverenced, eſpecially the Babylonian, though full of extravagancies. It was compiled by the Jews of Meſopotamia, about 500 years after Chriſt, according to Buxtorf; but Father Morinus offers ſeveral reaſons to prove, that it was not finiſhed till the year 700. The laſt edition of this *Talmud* at Amſterdam, is in twelve folios.

The *Talmud* of Jeruſalem is the leaſt eſteemed.—It was compiled by the Jews of that city, and particularly by Rabbi Jochanan, rector of the academy at Tiberias, about 300 years after Chriſt, according to Buxtorf; but Father Morinus, in his Exercitationes Biblicæ, lib. ii. exerc. 6. judges from ſeveral barbarous terms found in it, of Vandalic or Gothic extraction, that it did not appear till the 5th century. This is publiſhed in one large folio.

The Babylonian *Talmud* conſiſts of two parts: the one the text, the other the gloſs or comment; the comment, called the *Gemara*, contains the deciſion of the Jewiſh doctors, and their expoſitions of the text.—This we find ſtuffed with dreams and chimæras; together with much ignorance, and many impertinent queſtions and diſputations: the ſtyle is alſo very coarſe.—On the contrary, the text, called the *Miſchna*, is written in a tolerably pure ſtyle, and the reaſonings generally much more ſolid.

The Jews pretend, that this was compoſed by rabbi Juda, ſurnamed the *Saint*; and that God revealed to him the doctrine and the chief myſteries thereof.—But this is only to be underſtood of the *Miſchna*, not of the

Gemara, the compilation whereof was not begun till the ſixth century, after the deſtruction of the ſecond temple.

Rabbi Juda is ſaid to have compoſed the *Miſchna* under the empire of Antoninus, in the ſecond century; but they do not all agree about this antiquity, ſome carrying it back much farther.

It is the *Talmud* of Babylon that is uſually read, and moſt frequently conſulted, among the Jews; ſo that when they ſay ſimply the *Talmud*, they always mean this; never quoting the other without the addition of Jeruſalem.

Maimonides has made an abridgment of the *Talmud*, which Scaliger prefers to the *Talmud* itſelf; as being purged of many of the fables wherewith the other is full. It is a ſyſtem of the laws and cuſtoms of the Jews, both of their civil and their canon law, and the beſt of their traditions.

About the year 1236, a Jew of Rochelle, well verſed in the Hebrew, becoming Chriſtian, made a journey to pope Gregory the IX. and diſcovered to him a number of errors in the *Talmud* · theſe the pope ſent, in thirty-nine articles, to the archbiſhops of France, with a letter, appointing them to ſeize the books of the Jews, and to burn all ſuch as ſhould contain thoſe errors; in conſequence of which order, about twenty cart-loads of Hebrew books were burnt. He wrote to the ſame effect to the kings of England, France, Arragon, Caſtile, &c.

His ſucceſſor, Innocent IV. giving commiſſion to his legate, Eudes de Chateauroux, to examine the *Talmud*, and other Jewiſh books, more carefully, and to tolerate ſuch errors as were not contrary to the Chriſtian religion; the legate wrote to the pope, that to tolerate them was to approve them; and the 15th of May 1248, he alſo condemned them juridically to the flames; and Paul IV. ordered 12,000 volumes of the *Talmud* to be conſumed; and Clement VIII. ordered all the talmudic books that could be found to be deſtroyed. A zeal worthy of the papal ſee! See MISCHNA, GEMARA, CARAITES, and RABBINISTS.

TALON, in *Ornithology*; the claw of a bird.

TALON, in *Architecture*, a kind of moulding, conſiſting of a cymatium, crowned with a ſquare fillet; frequently found to terminate ornaments of joiners-work, as thoſe of doors, &c.

The word is French, and literally ſignifies heel.

The *talon*, more properly ſo called, is a moulding concave at the bottom, and convex a-top; having an effect juſt oppoſite to the DOUCINE.—See *Tab. Archit. fig.* 25. *fig.* 26. *fig.* 40. lit. E.

When the concave part is a-top, it is called an *inverted talon*. See *Tab. Archit. fig.* 7.

The *talon* is uſually called by our Engliſh workmen OGEE, or *O. G.* and by authors an *upright* or *inverted* CYMATIUM.

TALPA, in *Zoology*, ſee MOLE.

TALPA, in *Medicine and Surgery*, a tumor of the œdematous kind, called alſo *teſtudo*.

The *talpa*, and *nata*, chiefly ariſe about the head in conſequence of ſome venereal diſorder.

The *talpæ* elevate the ſkin from the pericranium, and generally denote a foulneſs in the ſubjacent bone of the ſkull.

TALSHIDE. See TALWOOD.

TALUS, in *Anatomy*, a bone of the foot, called alſo ASTRAGALUS.

The foot is articulated with the leg, by the aſtragalus alone. This articulation is a true angular ginglymus, and confined entirely to the motions of flection and extenſion. It is commonly thought, that two other motions are likewiſe performed by means of this articulation, viz. that of turning the toes inward or outward, and that of the lateral flexion of the foot, or the turning of the ſole of the foot toward either ankle. But Winſlow obſerves, that neither of theſe motions depends on the articulation of the foot with the leg, as the ſtructure of the parts and juſt obſervations evidently ſhew. The articulation of the aſtragalus with the ſeveral ſurfaces of the os calcis is a kind of obſcure arthrodia. By theſe articulations, the foot not being ſupported, makes the ſmall lateral motions already mentioned: but when the toes are turned outward or inward independently of the tibia, the os calcis makes ſmall half rotations under the aſtragalus, and obliges the os ſcaphoides to ſlide in the ſame direction with it on the anterior ſide of the aſtragalus; and this motion of theſe two bones is communicated to all the reſt. It is by the articulation of the os ſcaphoides with the aſtragalus, that the ſmall lateral flexions of the foot are performed, viz. when the ſole of one foot is turned towards the other foot, or the contrary way. In this caſe the os ſcaphoides makes ſmall rotations in the anterior ſide of the aſtragalus, while the os cuboides ſlides up and down in the fore-ſide of the great apophyſis of the os calcis. The obliquity of the articular ſurfaces of theſe bones is perfectly ſuitable to ſuch a motion. In theſe motions the os calcis and aſtragalus are in a manner immoveable, but the other bones are carried along with the os ſcaphoides. Winſlow.

TALUS, or TALUD, in *Architecture*, the inclination or ſlope of a work; as of the outſide of a wall, when its thickneſs is diminiſhed by degrees, as it riſes in height, to make it the firmer.

TALUS, or TALUD, in *Fortification.*—*Talus of a baſtion*, or *rampart*, is the ſlope or diminution allowed to ſuch a work; whether it be of earth, or ſtone; the better to ſupport its weight.

The *exterior talus* of a work is its ſlope on the ſide towards the country; which is always made as little as poſſible, to prevent the enemies eſcalade, unleſs the earth be bad, and then it is abſolutely neceſſary to allow a conſiderable *talus* for its parapet, and ſometimes to ſupport the earth with a ſlight wall, called a revetement.

The *interior talus* of a work, is its ſlope on the inſide, towards the place.

This is larger than the former, and has, at the angles of the gorge and ſometimes in the middle of the curtains, RAMPS or ſloping roads for mounting upon the terre-plain of the rampart.

TALUS, *ſuperior*, of the *parapet*, is a ſlope on the top of the parapet, that allows of the ſoldiers defending the covert-way with ſmall-ſhot, which they could not do if it were level.

TALWOOD, *taliatura*, in our old writers, fire-wood cut and cleft into billets of a certain length: it is otherwiſe written *talghwood*, and *talſhide*. Stat. 34 and 35 Hen. VIII. c. 3. 7 Edw. VI. c. 7. 43 Eliz. c. 14.

TAMALAPATRA, in the *Materia Medica*, a name by which ſome authors have called the *folium Indicum*, or Indian leaf, uſed in medicine.

The tree which produces this leaf is the LAURUS *caſſia* of Linnæus, or *caſſia lignea tree*. It is a large and lofty tree, the flowers and fruit of which reſemble the cinnamon-tree. Its leaves, when full grown, are ten inches or more in length; and ſix or eight in breadth. The flowers ſtand in cluſters, in the manner of umbels on the tops of the branches, and are of a greeniſh white colour. The fruit is of the bigneſs of our currant.

The ancients recommended *Indian-leaf*, as ſtomachic, ſudorific, and cephalic. At preſent, it is utterly diſregarded, being only kept in the ſhops as an ingredient in mithridate and theriaca; and is, in its greateſt perfection, far inferior to the mace which our college directs as a ſuccedaneum to it. See CASSIA-*lignea*.

TAMANDUA, in *Natural Hiſtory*, a creature called in Engliſh the ant-bear; and by the Braſilians *tamanduaguacu*; and the *tamanoir* of Buffon.

This animal has its Engliſh name from its feeding on ants, and having its hinder feet like a bear's. It has a very long and ſharp ſnout, and its tongue is ſlender, and extenſible to a very great length; it has no teeth, the body is covered with hair; from the neck acroſs the ſhoulders to the ſides is a black line bounded above with white: the tail, which is 2½ feet long, is clothed with very coarſe black hairs about a foot in length. This animal, which is the *myrmecophaga jubata* of Linnæus, with four toes on the fore-feet, and five on the hinder ones, inhabits Braſil and the Cape of Good Hope.

The principal food of the *tamandua* is ants, which he catches by ſcratching open their ſubterranean hives, and thruſting his long tongue into them; when the ants are gathered in great numbers upon this, he draws it back and eats them; and this he repeats till he is ſatisfied.

His tail ſerves him for a ſort of cover; and he can, upon occaſion, ſpread it almoſt over his whole body.

Though this animal has no teeth, it is fierce and dangerous. It ſleeps in the day and preys by night. The fleſh has a ſtrong and diſagreeable taſte, but is eaten by the Indians. See ANT-*eater*.

The leſſer *tamandua*, or *myrmecophaga tretradactyla* of Linnæus, inhabits the ſame country with the former, and reſembles it in its manner. The leaſt *tamandua*, or white American coati, is the *myrmecophaga didactyla* of Linnæus, and the FOURMILLIER of Buffon. Linnæus mentions another ſpecies under the title of *myrmecophaga tridactyla*, which lives on ants and inſects in the Eaſt-Indies.

TAMARIND, *tamarindus*, in *Botany*, a genus of the *triandria monogynia* claſs. Its characters are theſe: the empalement of the flower is compoſed of five oval plain leaves, which are equal; the flower has five petals, which are almoſt like thoſe of the butterfly kind, one of them ſtanding erect, two placed like wings on each ſide, and two reflexed downward; it has three awl ſhaped-ſtamina, ſituated in the ſinuſes of the empalement, and arched toward the upper petal, and termined by ſingle ſummits; it has an oblong oval germen, ſupporting an awl-ſhaped aſcending ſtyle, crowned by a ſingle ſtigma; the germen becomes a long ſwelling compreſſed pod, having a double cover, and one cell containing three, four, or five angular compreſſed ſeeds, ſurrounded with a pulp. We know but one ſpecies of this genus, which is the common tamarind tree.

The Eaſt-India *tamarinds* are longer than thoſe of the Weſt; the former containing ſix or ſeven ſeeds each, the latter rarely above three or four; nevertheleſs they ſeem to be the produce of the ſame plant: the oriental ſort is drier and darker coloured than the occidental, and has more pulp; the former is ſometimes preſerved without addition, but the latter has always an admixture of ſugar.

We owe the knowledge of the uſe of *tamarinds*, in medicine, to the Arabians. The ancient Greeks knew nothing of them; and Serapion, Meſue, and Avicenna, are the firſt authors who preſcribe them.

The fruit of the *tamarind*, which is what we uſe, is only the piſtil of the flower ſwelled into a pod; this is greeniſh at firſt, but grows browniſh or reddiſh, as it ripens; its common ſize is four inches in length, and one in breadth; and it is undulated on the back, and deeply notched in three or four places at the front, which is terminated by a large rib, which runs from the pedicle on which it grows, to the end of the pod, and there frequently terminates in a ſort of hook.

This fruit is, properly ſpeaking, compoſed of two pods, the one encloſed within the other; the outer pod is fleſhy, and of the twelfth of an inch in thickneſs when freſh, and the inner one is thin as a fine piece of parchment; between theſe two there is an intermediate ſpace of about a quarter of an inch all the way; and this ſpace is filled up with a very ſoft and pulpy ſubſtance, of a tart but very agreeable taſte, which is what we uſe in medicine. This is blackiſh and of a viſcous texture, and is traverſed by three large veſſels, or rather bundles of veſſels, one of which runs all along the back of the pod, and the two others are placed on the oppoſite ſide, and often there are ſeveral ramifications of veſſels, which run off different ways from theſe. Theſe veſſels carry the vinous juice, which afterwards hardens into the viſcous matter of the pulp; but this is not all their office, for they alſo convey nouriſhment to the ſeeds in the inner pod.

We uſe the *tamarinds* only in medicine; but the Africans, and the people of many of the Oriental nations, where they are common, make them into a ſort of confection with ſugar, which they eat as a delicacy, and which cools them in the violent heats of their climates; and at the ſame time keeps their bowels in a proper ſtate of laxity. The ſour taſte of this fruit proves, that acid particles abound greatly in it, and a chemical analyſis of it gives farther proof of this. There is indeed no alkali to be obtained from *tamarinds*, otherwiſe than by diſtilling them in a retort with quick-lime. A ſimple analyſis of them yields no other principles but acid and ſulphur. Six pounds of *tamarinds* mixed with ſix pints of water will yield ſix drams of eſſential ſalt; this however requires a long time to cryſtallize, not fixing itſelf to the ſides of the veſſels under two months ſtanding; in all this time however the liquor never grows mouldy, as ſuch liquors uſually do; and it in this ſomewhat reſembles tartar, or the eſſential ſalt of grapes, which never ſeparates itſelf from their juice under a very long time. Indeed, to be aſſured of gaining all the eſſential ſalt of any plant, the liquor ought to be covered half an inch deep with oil, to prevent its ſpoiling, and ſuffered to ſtand a whole year unmoved in the ſame veſſel. The ſalt of *tamarinds* in all things reſembles cream of tartar; it is ſharp to the taſte, and will not diſſolve in cold water. It does not detonate on the fire, nor yield any vinous ſmell, when moiſtened with oil of tartar. *Tamarinds* diſſolved alſo in common water, and ſet in digeſtion for ſeveral months, yield on diſtillation only an acid ſpirit, like that from vinegar.

It is not uncommon in thoſe places where *tamarinds* are frequent, to find an eſſential ſalt cryſtallized on the branches of the tree, this greatly reſembles cream of tartar in all reſpects, and is no other than the genuine ſalt of the plant formed by the ſun's drying up the accidentally extravaſated juices; nor is this peculiar to this tree alone, but many others are at times found with their juices thus extravaſated, and their ſalts thus cryſtallized by the heat. The leaves of that large ſpecies of maple, which we vulgarly but improperly call the ſycamore, are often in hot ſeaſons found thus covered with cryſtals of their eſſential ſalt, which is ſweet and very much of the nature of ſugar; and the lime-trees have their leaves often covered with a like ſaccharine matter, which being waſhed off from them and the liquor given to any perſon to drink, is found to have the taſte and the purgative virtue of manna. Mem. Acad. Par. 1699.

This ſalt, as Beaumé obſerves, may be obtained more expeditiouſly, by clarifying the decoction of the *tamarinds* with whites of eggs, than by filtering and evaporating it to a proper conſiſtence, and ſetting it to cool: the ſalt ſhoots into cryſtals of a brown colour, and very acid taſte, but in diſſolving and cryſtallizing them again, or barely waſhing them with water, they loſe almoſt all their acidity; the acid principle of the *tamarind* ſeeming not to be truly cryſtallizable.

The pulp of *tamarinds* is an agreeable laxative acid, of common uſe in inflammatory and putrid diſorders, for abating thirſt and heat, correcting putrefaction, and looſening the belly. The doſe, as a laxative, is two or three drams; an ounce or two prove moderately cathartic. It is an uſeful addition to the purgative ſweets, caſſia and manna, in increaſing their action, and rendering them leſs liable to produce flatulencies: the reſinous cathartics are ſaid to be ſomewhat weakened by it. Lewis.

TAMARISK *tree*, *tamarix*, in *Botany*, a genus of the *pentandria trigynia* claſs. Its characters are theſe: the empalement of the flower is obtuſe, erect, and permanent, and is cut into five parts; the flower has five oval concave petals which ſpread open, and five hair-like ſtamina, terminated by roundiſh ſummits; it has an acute-pointed germen without a ſtyle, crowned with three oblong, feathery, twiſted ſtigmas; the germen turns to an oblong acute-pointed capſule with three corners, having one cell opening with three valves, containing many ſmall downy ſeeds. There are two ſpecies.

The wood, bark, and leaves of the French *tamariſk* are uſed in medicine, and are accounted ſpecific for all diſorders of the ſpleen. The bark is ſometimes uſed for the rickets in children.

It is a very remarkable property of this tree, that its ſalts made in the way of other lixivial ſalts are no alkali, but a mere ſal ſalſus. The ſalt of guaiacum alſo approaches to the nature of this.

TAMATIA, in *Ornithology*, the name of a very ſtrange bird of the Braſils. It is a ſpecies of CANCROMA, or the *cancroma canchrophaga*, in the Linnæan ſyſtem.

Its head is very large; its eyes large and black; its beak is two fingers breadth long, and one broad, ſhaped ſomewhat like a duck's, but pointed at the end; its upper chap is black, its under one yellow; its legs are long, and the thighs in great part naked; its toes are long; its tail is very ſhort. Its head is black, and its back and wings of a plain duſky brown; its belly is of the ſame brown, variegated with white. See *Tab.* V. *of Birds*, Nº 56.

TAMBAC, or TAMBAQUA, a mixture of gold and copper, which the people of Siam hold more beautiful, and ſet a greater value on, than gold itſelf.

Some travellers ſpeak of it as a metal found in its peculiar mines; but upon what authority we do not know. The abbé de Choiſy, in his Journal of Siam, doubts whether this may not be the *electrum* or amber of Solomon.

The ambaſſadors of Siam brought ſeveral works in *tambac* to Paris, in the reign of Lewis XIV. but they were not found ſo beautiful as was expected. See TOMBAC and GOLD-*coloured metal*.

TAMBOS, in *Peruvian Antiquity*, buildings placed at certain diſtances for the lodging of the princes of that country, in their travels through their dominions. See M. de la Condamine, in Mem. de l'Acad. de Berlin, tom. ii. p. 435; who tells us (p. 438.) that he ſaw ſeveral remains of theſe *tambos*, in his journey from Quito to Lima.

TAMBOUR, in *Architecture*, a term applied to the Corinthian and Compoſite capitals, as bearing ſome reſemblance to a drum, which the French call *tambour*.

Some chooſe to call it the *vaſe*, and others *compana*, or the bell.

TAMBOUR is alſo uſed for a little box of timber work, covered with a cieling, within-ſide the porch of certain churches; both to prevent the view of perſons paſſing by, and to keep off the wind, &c. by means of folding-doors, &c.

TAMBOUR alſo denotes a round courſe of ſtone, ſeveral whereof form the ſhaft of a column, not ſo high as a diameter.

TAMBOUR, in the *Arts*, is a ſpecies of EMBROIDERY.

The *tambour* is an inſtrument of a ſpherical form, upon which is ſtretched, by means of a ſtring and buckle, or other ſuitable appendage, a piece of linen or thin ſilken ſtuff; which is wrought, with a needle of a particular form, and by means of ſilken or gold and ſilver threads into leaves, flowers, or other figures.

TAMBOURIN, is the name of a dance, performed on the French ſtage. The air is lively, and the movements are quick.

TAMOATA, in *Ichthyology*, the name of an American freſh water fiſh, called by the Portugueſe *ſoldido*.

It is a ſmall oblong fiſh, with a flat head, ſomewhat like that of a frog. Its mouth is ſmall, and from each angle of it there hangs a long ſingle filament, by way of a beard. It has no teeth, and its eyes are extremely ſmall. It has eight fins; two at the gills of one finger in length, and hard and firm like horns; two on the belly, of a ſofter ſubſtance; and one on the middle of the back, another near the tail, and another ſmall one oppoſite to it on the belly; its tail is the eighth; its whole head is covered above with a hard coat like a ſhell; and its body with a ſort of coat of mail made up of oblong, hard, ſquamoſe bodies, dented at their edges; its colour is a ſort of ruſty-iron colour. It is accounted a very well-taſted fiſh. It lives only in freſh water rivers; and it is ſaid, when the water where it is dries up, it will crawl out upon the land, and go in ſearch of more. See *Tab.* V. *of Fiſhes*, N° 58. Marcgrave's Hiſt. of Braſil.

TAMPING *a hole*, in *Mining*, is uſed for filling the upper part of a hole, bored in the rock for blaſting with gunpowder, upon the charge of powder, with clay or ſtony matter rammed down very cloſe and tight: and the clay and ſtone are called the *tamping*. This operation is called, in the North of England, ſtemming a hole.

TAMPION, TOMPION, TAMKIN, or TOMKIN, a kind of plug or ſtopple, ſerving to cloſe a veſſel.

The word is formed from the French *tampon*, a bung, ſtopper, &c. Some derive it from the Engliſh, tap.

In *Gunnery*, the *tampions* are wooden cylinders put into the mouth of guns, howitzers, and mortars, in travelling, to prevent the duſt or wet from getting in. They are faſtened round the muzzle of the guns, &c. by leathern collars. At ſea they are carefully encircled with tallow or putty, to prevent the penetration of the water in the bore, whereby the powder contained in the chamber might be damaged or rendered incapable of ſervice. They are alſo ſometimes uſed to put into the chamber of mortars, over the powder, when the chambers are not full. *Tampions* are alſo iron-bottoms to which the grape ſhot deſigned for ſea-ſervice are fixed.

TAMPOE, in *Natural Hiſtory*, the name of an Eaſt Indian fruit, approaching to the figure of the mangouſtan, but not near ſo agreeable to the taſte. This fruit is very much of the ſize, ſhape, and colour of ſome of our common ſummer-apples; but its ſkin is very thick and tough, and it has no crown. The Indians eat it in places where better fruits are ſcarce, and in ſome places call it the mangouſtan.

TAMUS, *black bryony*, in *Botany*, a genus of the *dioecia hexandria* claſs. Its characters are theſe: it has male and female flowers on different plants: the male plants have empalements, compoſed of ſix oval ſpear-ſhaped leaves, which ſpread wide at the top; they have no petals, but ſix ſhort ſtamina terminated by erect ſummits: the female flowers have bell-ſhaped empalements of one leaf cut into ſix ſpear-ſhaped ſegments, which ſit upon the germen; theſe have no petals, but have oblong punctured nectaria ſitting on the inſide of each ſegment of the empalement, and a large, oblong, oval, ſmooth germen under the empalement, with a cylindrical ſtyle, crowned by three reflexed indented ſtigmas; the germen afterward becomes an oval berry with three cells, including two globular ſeeds. There are two ſpecies.

TAMUZ, in *Chronology*, the fourth month of the Jewiſh eccleſiaſtical year, anſwering to part of our June and July. The 17th day of this month is obſerved by the Jews as a faſt, in memory of the deſtruction of Jeruſalem by Nebuchadnezzar, in the 11th year of Zedekiah, before Chriſt, 588.

TAN, the bark of oak, chopped, and ground by a tanning-mill, into a coarſe powder; to be uſed in the TANNING or dreſſing of ſkins.

New tan is the moſt eſteemed; when old and ſtale, it loſes a great deal of its effect, which conſiſts in condenſing or cloſing the pores of the ſkins; ſo that the longer the ſkins are kept in *tan*, the greater ſtrength and firmneſs they acquire.

This bark, which is more abundant in the gummy reſinous part than any of our common indigenous aſtringents, and which, on account of its aſtringent gummy-reſinous property, ſerves both to preſerve leather from rotting, and to render it impervious to water, is preferred to all other ſubſtances for the purpoſe of tanning. It is uſed either in the way of infuſion, which is called ooze; or the dry powder is ſtrewed between layers of hides and ſkins, when theſe are laid away in the tan-pits. The ooze is made by macerating the bark in common water, in a particular ſet of holes or pits, which by way of diſtinction from the other holes in the tan-yard, are called letches. See TANNING.

Every part of the oak-tree, of what age or growth ſoever, is fit for the *tanners* uſe, and all oaken coppice-wood, of any age or ſize, being cut and procured in barking-time, will *tan* all ſorts of leather, at leaſt as well as the bark alone. When this material is got at the proper ſeaſon, it muſt be very well dried in the ſun, more than the bark alone; thence it is to be cut up, and preſerved in a covered place for uſe.

When it is to be uſed, the greater wood muſt be firſt cleft ſmall, to fit it for the beating and cutting engine; and the ſmaller muſt be put into the engine as it is. Which done, it muſt be again dried upon a kiln, and after that ground in the ſame manner that the *tanners* grind their bark. Such wood as is to be uſed preſently after it is gotten, will require the better and the more drying upon the kiln; and if this is omitted it will blacken and ſpoil all the leather it is uſed about. Where oak is ſcarce, black-thorn, or ſloe-tree, will tolerably well ſupply its place; and where that is not to be had in ſufficient plenty, the white thorn will do. Phil. Tranſ. N° 108.

Birch alſo, being ordered in the ſame manner with oak, is fit for ſome uſes in *tanning*, particularly it does very well for *tanning* of ſhoe ſole-leather. All theſe ingredients will *tan* much better than bark alone, and that with much leſs charge; ſo that this diſcovery may very well ſave the felling of trees when the bark is wanted, at a ſeaſon when the ſap is up, which, when it is done, cauſes the outſides of the trees to rot and grow worm-eaten; whereas if the trees had been felled in winter, when the ſap is down, they would have been almoſt all heart, as the people expreſs it, and not ſubject to worms. This manner of uſing the wood with the bark, in *tanning*, will alſo increaſe the value of underwoods very conſiderably. Phil. Tranſ. N° 105.

The engine neceſſary for cutting the wood conſiſts of a long ſquare wooden block, and ſome pieces of iron to be faſtened on, and uſed about it, viz. a hammer, an anvil, an iron holding the wood to be bruiſed and cut, and a knife to cut it. The whole is a very ſimple and cheap machine, and is deſcribed at large, and figured in the above mentioned number of the Philoſophical Tranſactions.

By Mr. de Buffon's experiments upon different ſkins, it was found that a decoction of young oak wook ſucceeded perfectly well in *tanning* ſheep and calve ſkins, but did not do equally well for ox, and the other harder ſkins. This, however, he imagines might be only for want of knowing the beſt method of uſing the wood. And certainly theſe trials deſerve to be farther proſecuted; ſince the ſmall branches of the oak, which are of little value, might be thus made to ſupply the place of a much dearer commodity, the bark; and as in many trees the bark of the young branches is found to be of greatly more virtue than that of the larger branches or the trunk, the uſe of theſe ſmall boughs, bark and all, might very probably be found to anſwer to all the effects of the bark, of the larger kind alone. Memoirs Acad. Scienc. Par. 1736.

The ſociety of arts, &c. granted a premium of 100*l.* in the year 1765, for the diſcovery of a method of tanning with oaken ſaw-duſt; but the acquiſition has not hitherto had its deſired effect; though it is ſaid that the uſe of oaken ſaw-duſt has been advantageouſly adopted in Germany. Doſſie's Mem. of Agr. vol. i. p. 227.

We are told in Phil. Tranſ. N° 36. that the operation of tanning is performed, on leather, better in the Weſt-Indies than in England. They uſe three ſorts of bark, the mangrove-bark, the olive-bark, and another; and the whole buſineſs is ſo ſoon done, that a hide delivered to them, is in ſix weeks ready to be worked into ſhoes, though they beſtow leſs labour than we do.

Mr. Albert Geſner, firſt phyſician to the duke of Wirtemberg, having made ſome experiments on the duſt of heath, dried in an oven, and afterwards pulveriſed, as a ſubſtitute to that of oak-bark in tanning, found that the leather prepared by this method was very good; but he obſerves, that the operation is much more tedious. Hiſt. R. A. S. Paris, for 1756. Others have propoſed a trial of the ſmall branches of heath, and the leaves of oak.

The tanners bark is a ſubſtance of prodigious uſe in gardening. Its fermentation is very laſting and very equal: hence it is the moſt valuable of all things for the making of hot beds; and when it has ſerved to this uſe, and is thoroughly rotted, it makes a very valuable manure for rotten land, one load of it doing as much ſervice as two loads of ſtiff dung: and if it is laid on cold graſs-ground in autumn, that the rains in winter may waſh it into the ground, it will greatly improve the graſs.

It has not been of very long uſe in England, and was brought to us from Holland in the reign of king William, and then uſed for the raiſing of orange-trees; but after this period it became diſuſed; and it is of a much later date, viz. about the year 1719, that it has been brought into uſe again for the raiſing the PINE-*apple*, ſince which time it is become generally uſed, wherever it is to be had, for all the purpoſes of the hot-bed, in raiſing tender plants.

There are ſeveral ſizes of this *tan*, which they heat in a different manner in proportion to their ſize, the ſmalleſt heating much quicker, and cooling again in a ſmaller time; and the largeſt acquiring its heat more gradually, but keeping it much longer. The ſkilful gardener therefore muſt uſe one or the other of theſe, or a mixture of both, according to the ſeveral occaſions he wants them for.

It ſhould always be taken within a fortnight or three weeks after it comes out of the pit, and laid up in a round heap for two or three days, to drain out the moiſture; after which it ſhould be formed into a bed, and ſhould be laid at leaſt three feet thick. HOT-*beds*, properly prepared, of this ſubſtance in pits, having brick walls round them, and a brick pavement at the bottom, three feet deep, ſix feet wide, and above ten feet long, will retain a moderate heat three months. Miller.

TAN, *flower of*. Flower of *tan* is a name given by the people employed in the tanning-trade, to a yellow ſubſtance, often found upon old *tan*, or oak bark broken to pieces, which has been uſed as *tan*, and is of no farther ſervice.

The name, however, is very improper; and though every body converſant in *tan*-yards muſt have ſeen the thing, yet it has always paſſed as an effloreſcene of the bark, till the curious Mr. Marchand inquired more accurately into its nature, and found it to be a plant of itſelf, wholly different from the matter of the *tan*; and to which the bark which had been often wetted and dried again, ſerved as a proper matrix. He found it to be more nearly allied to the ſpunge, than to any other genus of plants, and therefore named it *ſpongia fugax mollis flava & amæna in pulvere coriario naſcens*, ſoft, beautiful, yellow fading ſpunge, growing on *tanners*-bark.

It makes its appearance moſt frequently in the ſummer-months, and is then ſeen in ſmall tufts of a beautiful yellow colour, on different parts of the old heaps of bark. It appears at firſt in form of a thin yellow ſcum, and is of a ſort of jelly-like ſtructure; but it every day grows larger and thicker, till it ſtands above half an inch out from the ſurface of the bark. As it grows, its ſurface becomes more and more cavernous and ſpungy, the pores or holes being of different diameters, and the interſticial matter forming a ſort of net-work more or leſs regular, and often interrupted by irregular prominences in ſeveral parts; and, in fine, when the growth is complete, the whole more reſembles a ſpunge, than any other vegetable ſubſtance, and is of a deep yellow colour, and conſiderably thick and tough conſiſtence; there are no roots to be diſcovered iſſuing from it; its ſmell is like that of rotten wood, and its taſte is ſomewhat ſtyptic. It always happears in the warm months, and always upon ſuch old *tan* as has begun to ferment, and is in the ſtate in which our gardeners uſe it for hot-beds. If it happens to ſtand expoſed to the ſouth ſun, it is but of ſhort duration; but if it be in a ſheltered place, it will laſt a conſiderable time, and often ſpread itſelf to a great extent, and make a very beautiful figure for many weeks. Mem. Acad. Par. 1727.

TANACETUM, *tanzy*, in *Botany*. See TANZY.

TANAGRA, in *Ornithology*, a genus of the PASSERES: the characters of which are that the bill is conic, and a little inclining towards the point, the upper mandible ſlightly ridged, and notched near the end. Linnæus enumerates twenty-four ſpecies. The Braſilian name is *tangara*. The birds of this genus inhabit North and South America, but are moſt numerous in the latter. To this genus belong the JACAPU, JACARINI, TEITEI, SAYACU, &c. deſcribed by Marcgrave, Hiſtory of Braſil.

TANE. See TAROATAIHETOOMO.

TANGARAC, a poiſonous Braſilian plant; but the root, ſays Piſo, is an antidote to the leaves, flowers, and fruit. Boyle's Works abr. vol. i. p. 14.

TANGENT, in *Geometry*, a right line which touches a circle, that is, meets it in ſuch manner, as that though infinitely produced, it would never cut the ſame; that is, never come within the circumference.

Thus the line AD (*Tab.* V. *Geom. fig.* 125.) is a *tangent* to the circle in D.

It is demonſtrated in *Geometry*; 1. That if a *tangent* AD, and a ſecant AB, be both drawn from the ſame point A; the ſquare of the *tangent* will be equal to the rectangle, under the whole ſecant AB, and that portion thereof AC, which falls without the circle.

2. That if two *tangents* AD, AE, be drawn to the ſame circle from the ſame point A, they will be equal to each other.

As a right line is the *tangent* of a circle, when it touches the circle ſo cloſely, that no right line can be drawn through the point of contact between it and the arch, or within the angle of contact that is formed by them; ſo in general, when any right line touches any arch of a curve, in ſuch a manner that no right line can be drawn through the point of contact, betwixt the right line and the arch, or within the angle of contact, that is formed by them, then is that line the *tangent* of the curve at the ſaid point.

The *tangent* of an arch is the right line that admits the poſition of all the ſecants that can paſs through the point of contact, though ſtrictly ſpeaking, it is no ſecant. Macl. Flux. art. 181, 505.

TANGENT, in *Trigonometry*.—*A* TANGENT *of an Arch*, is a right line, raiſed perpendicularly on the extreme of the diameter, and continued to a point, where it is cut by a ſecant, that is, by a line, drawn from the centre through the extremity of the arch whereof it is a *tangent*.

A tangent of an arch EA (*Tab. Trigonom. fig.* 3.) is a part of a *tangent* of a circle (that is, of a right line, which touches a circle without cutting it) intercepted between two right lines, drawn from the centre C, through the extremes of the arch E and A.

Hence, the *tangent* FE is perpendicular to the radius EC.

And hence the *tanget* FE is the *tangent of the angle* ACE, as alſo of that ACI; ſo that two adjacent angles have only the ſame common *tangent*.

TANGENT, *co*; or TANGENT *of the Complement*, is the *tangent* of an arch which is the complement of another arch to a quadrant.

Thus a *tangent* of the arch AH, is the *co-tangent* of the arch AE, or the *tangent* of the complement of the arch AE.

To find the length of the TANGENT *of any arch*, the ſine of the arch being given: ſuppoſe the arch AE, the given ſine AD, and the *tangent* required EF. Since both the ſine and *tangent* are perpendicular to the radius EC, they are parallel to each other. Wherefore as the coſine DC is to the ſine AD, ſo is the whole ſine to the *tangent* EF. See SINE.

Hence, a canon of ſines being had, a *canon of tangents* is eaſily conſtructed therefrom.

TANGENTS, *artificial*, are the logarithms of the *tangents* of arches.

TANGENTS, *line of*, is a line uſually placed on the ſector, and Gunter's ſcale; the deſcription and uſes whereof ſee under SECTOR.

TANGENT *of a conic ſection*, as of a parabola, is a right line, which only touches or meets the curve in one point, and does not cut or enter within the curve. See CONIC *Section*.

TANGENTS, *method of*, a method of determining the quantity of the *tangent* of any algebraic curve, the equation defining that curve being given.

This method is one of the great reſults of the *calculus differentialis*, or *fluxions*.

Its uſe is very great in *Geometry*; becauſe in determining the *tangents* of curves, we determine at the ſame time the QUADRATURE of the curvilinear ſpaces: on which account it well deſerves to be here particularly inſiſted on.

To find the SUB-TANGENT *in any algebraic curve.*

Let the propoſed curve be AMO (*Tab. Anal. fig.* 18.) and the right line TMQ a tangent to it at the point M; let the ſemiordinate *pm* be infinitely near another PM, and MR parallel to AH; then the relative celerities of the point M, moving along the curve from A towards O, in the directions MR and PM, wherewith AP and PM increaſe in this poſition, will be truly expreſſed by MR and R*m*; but the celerities by which quantities increaſe are as the fluxions of thoſe quantities; therefore

(M *m* being the fluxion of the curve line A M) M R and R *m* are the correſponding fluxions of the abſciſs A P, and the ordinate PM; and, becauſe the triangles M *m* R and T M P are ſimilar, we have R *m* : MR :: P M : PT. Let, therefore, the abſciſs A P be put $= x$, and the ordinate P M $= y$, and we ſhall have $\dot{y} : \dot{x} :: y : \frac{y\dot{x}}{\dot{y}} =$ PT.

By means of this general expreſſion for the SUBTANGENT, and the equation of the curve expreſſing the relation between x and y, the ratio of the fluxions $\dot{x}$ and $\dot{y}$ will be found, and from thence the length of the ſubtangent; whence the *tangent* itſelf may be eaſily determined and drawn. This we ſhall illuſtrate in the following examples.

I. The equation defining a circle is $ax - xx = y^2$; and by taking the fluxions of theſe quantities, $a\dot{x} - 2x\dot{x} = 2y\dot{y}$; conſequently $\frac{\dot{x}}{\dot{y}} = \frac{2y}{a-2x} = \frac{y}{\frac{1}{2}a-x}$; and, multiplying both ſides by y, we have $\frac{y\dot{x}}{\dot{y}} = \frac{y^2}{\frac{1}{2}a-x} =$ the *ſubtangent* P T (ſee *fig.* 24.); whence ($\frac{1}{2}a - x$), or A C − AP, i.e. CP : (y) PM :: (y) PM : P T; a property of the circle deduced from the principles of common geometry.

II. The equation defining the common parabola is $ax = y^2$, a being the parameter, x the abſciſs, and y the ordinate; hence $a\dot{x} = 2y\dot{y}$, and $\frac{\dot{x}}{\dot{y}} = \frac{2y}{a}$; conſequently, $\frac{y\dot{x}}{\dot{y}} = \frac{2y^2}{a} = \frac{2ax}{a} = 2x$; therefore the *ſubtangent* P T (*fig.* 18.) is the double of its correſponding abſciſs A P; which is a well known property of the PARABOLA.

III. The general equation for parabolas of any kind being $a^m x^n = y^{m+n}$; we have $n a^m x^{n-1} \dot{x} = \overline{m+n} \times y^{m+n-1} \dot{y}$; and, therefore, $\frac{\dot{x}}{\dot{y}} = \frac{\overline{m+n} \times y^{m+n-1}}{n a^m x^{n-1}}$; whence $\frac{y\dot{x}}{\dot{y}} = \frac{\overline{m+n} \times y^{m+n}}{n a^m x^{n-1}} = \frac{\overline{m+n} \times a^m x^n}{n a^m x^{n-1}}$ (becauſe $y^{m+n} = a^m x^n$) $= \frac{\overline{m+n}}{n} \times x =$ the true value of the *ſubtangent*; which, therefore, is to the abſciſs in the conſtant ratio of $\overline{m+n}$ to n.

IV. The equation defining an ellipſis is $b^2 \times \overline{ax - x^2} = a^2 y^2$, A P (*fig.* 26) being $= x$, MP $= y$, AB $= a$, and the leſſer axis $= b$; for, by the property of the ELLIPSIS, we have $a^2 : b^2 :: ax - x^2$ (AP × PB) : y^2 (MP²); and, therefore, $b^2 \times \overline{ax - x^2} = a^2 y^2$; whence $b^2 \times \overline{a\dot{x} - 2x\dot{x}} = 2a^2 y\dot{y}$, and $\frac{\dot{x}}{\dot{y}} = \frac{2a^2 y}{b^2 \times \overline{a - 2x}}$; and, conſequently, the *ſubtangent* P T $\left(\frac{y\dot{x}}{\dot{y}}\right) = \frac{2a^2 y^2}{b^2 \times \overline{a - 2x}} = \frac{a^2 y^2}{b^2 \times \overline{\frac{1}{2}a - x}} = \frac{b^2 \times \overline{ax - x^2}}{b^2 \times \overline{\frac{1}{2}a - x}} = \frac{\overline{ax - x^2}}{\overline{\frac{1}{2}a - x}}$: whence the point T being given, through which the *tangent* muſt paſs, the *tangent* itſelf may be drawn.

V. Becauſe the equation exhibiting the nature of all kinds of ellipſes, (putting a and c for the two principal diameters) is $\overline{a-x}|^{m} \times x^n = \frac{c}{a} \times y^{m+n}$, we ſhall have $-m\dot{x} \times \overline{a-x}|^{m-1} \times x^n + n\dot{x}x^{n-1} \times \overline{a-x}|^{m} = \frac{c}{a} \times \overline{m+n} \times y^{m+n-1}\dot{y}$; and, therefore, $\frac{y\dot{x}}{\dot{y}} =$

$$\frac{\frac{c}{a} \times \overline{m+n} \times y^{m+n}}{-m \times \overline{a-x}|^{m-1} \times x^n + nx^{n-1} \times \overline{a-x}|^{m}}$$

$$= \frac{\overline{m+n} \times \overline{a-x}|^{m} \times x^n}{-mx^n \times \overline{a-x}|^{m-1} + nx^{n-1} \times \overline{a-x}|^{m}}$$ (becauſe $\frac{c}{a} \times y^{m+n} = \overline{a-x}|^{m} \times x^n$) $= \frac{\overline{m+n} \times \overline{a-x} \times x}{-mx + n \times \overline{a-x}} = \frac{\overline{m+n} \times \overline{ax-x^2}}{na - \overline{n+m} \times x}$ = the *ſubtangent* required.

VI. The equation defining the HYPERBOLA is $c^2 \times \overline{ax + x^2} = a^2 y^2$, a and c being uſed to denote the two principal diameters; whence we have, $c^2 \times \overline{a\dot{x} + 2x\dot{x}} = 2a^2 y\dot{y}$; conſequently $\frac{\dot{x}}{\dot{y}} = \frac{a^2 y}{c^2 \times \overline{\frac{1}{2}a + x}}$; and $\frac{y\dot{x}}{\dot{y}} = \frac{a^2 y^2}{c^2 \times \overline{\frac{1}{2}a + x}} = \frac{c^2 \times \overline{ax + x^2}}{c^2 \times \overline{\frac{1}{2}a + x}} = \frac{\overline{ax + x^2}}{\overline{\frac{1}{2}a + x}} =$ the *ſubtangent*; whence the diſtance of the point of interſection of the tangent and axis from the vertex, which is equal to the difference of the *ſubtangent* and abſciſs, may be found; for $\frac{\overline{ax + x^2}}{\overline{\frac{1}{2}a - x}} - x = \frac{\frac{1}{2}ax}{\frac{1}{2}a - x}$; and, therefore, that point being given, the *tangent* may be eaſily drawn.

The manner of drawing *tangents* to all ſorts of hyperbolas univerſally, will be the ſame as in the ellipſes, the equations of the two kinds of curves differing in nothing but their ſigns.

After the manner above explained, the *ſubtangent*, in curves whoſe abſciſſes are right lines, may be determined; but if the abſciſs, or line terminating the ordinate, on the lower part, be another curve, then the *tangent* may be drawn as in the following example.

VII. Let the curve B R F (*Tab.* IV. *Anal. fig.* 91.) be a cycloid; whoſe abſciſs is here ſuppoſed to be the ſemicircle B P A, to which let the *tangent* P T be drawn, as above. Moreover, let *r* R H be a *tangent* to the cycloid, at the correſponding point R, and let G R *e* be parallel to T P *v*; putting the arch, or abſciſs, B P $= z$, its ordinate P R $= y$, A F $= b$, and B P A $= c$; then, by the property of the CYCLOID, we ſhall have c (B P A) : b (A F) :: z (B P) : y (P R); therefore $y = \frac{bz}{c}$, and $\dot{y} = \frac{b\dot{z}}{c} = re$. But, by ſimilar triangles, re ($\dot{y}$) : R e (= P v $= \dot{z}$) :: P R (y) : P H $= \frac{y\dot{z}}{\dot{y}} = z$ (becauſe $y = \frac{bz}{c}$); conſequently, if in the right line P T, there be taken P H equal to the arch P B, we ſhall have a point H, through which the *tangent* of the cycloid muſt paſs.

The preceding examples relate to curves whoſe ordinates are parallel to each other. We ſhall now briefly illuſtrate the method of drawing *tangents* to curves of the SPIRAL kind, all whoſe ordinates iſſue from a point: ſuch as the ſpiral B A G (*fig.* 92.) whoſe ordinates C B, C A, C G, are referred to the point C, called the centre of the ſpiral. Let S A N be a *tangent* to the ſpiral at any point A, and let C T be perpendicular to it, and let the arch C B A (conſidered as variable by the motion of A towards G) be denoted by z, and the ordinate C A by y. Then $\dot{z} : \dot{y} ::$ A C (y) : A T $= \frac{y\dot{y}}{\dot{z}}$. Hence, if upon C A, as a diameter, a ſemicircle be deſcribed, and in it, from A, a right line equal to $\frac{y\dot{y}}{\dot{z}}$ be inſcribed, that right line will be a *tangent* to the ſpiral at the point A.

VIII. Let the nature of the curve C B A be ſuch, that the arch C B A may be, always, to its correſponding ordinate C A in a conſtant ratio, viz. as a to b: then, becauſe $z : y :: a : b$, we have $z = \frac{ay}{b}$, and $\dot{z} = \frac{a\dot{y}}{b}$; and, conſequently, A T $\left(\frac{y\dot{y}}{\dot{z}}\right) = \frac{by}{a} = \frac{b}{a} \times$ A C: therefore, A C and A T being in a conſtant ratio, the angle C A T muſt alſo be invariable; which is a known property of the *logarithmic* SPIRAL.

IX. Let B A A (*Tab.* III. *Anal. fig.* 81.) be the SPIRAL of Archimedes; whoſe nature is ſuch, that the part E A of the generating ordinate, intercepted by the ſpiral, and a circle B E D deſcribed about the ſame centre C, is always in a conſtant ratio to the correſponding arch B E of that circle. Suppoſe A *n* perpendicular to A C; B C $= c$, C A $= y$, and the given ratio of A E to B E that of b to c; then $b : c :: y - c$ (A E) : $\frac{cy - cc}{b} =$ BE; whoſe fluxion is $= \frac{c\dot{y}}{b}$. If the right line C E A *a* be ſuppoſed to revolve about the centre C, the angular celerity of the generating point A, in the perpendicular direction A *n*, will be to that of E as A C to E C; and as the latter of theſe celerities is expreſſed by $\frac{c\dot{y}}{b}$, the former will be expreſſed by $\frac{y}{c} \times \frac{c\dot{y}}{b}$, or $\frac{y\dot{y}}{b}$; which is to $\dot{y}$, the celerity of A in the direction A *a*, as $\frac{y}{b}$ to unit, or as y to b. Conſequently C T and A T are in the ſame ratio, and A C : C T :: $\sqrt{yy + bb} : y$; and A C : A T :: $\sqrt{yy + bb} : b$; whence C T and A T are given, equal to $\frac{y^2}{\sqrt{yy + bb}}$, and $\frac{by}{\sqrt{yy + bb}}$ reſpectively; from either of which expreſſions the *tangent* A T may be drawn: and, in the ſame manner, may the poſition of the *tangent* of any other ſpiral be determined. Simpſon's Flux. vol. i. ſect. 3.

As to the method of inveſtigating *tangents* by fluxions, ſee Macl. Flux. book i. chap. 7. where it is demonſtrated independently of infiniteſimals.

To determine the *tangents* of curves, ſuppoſed to be deſcribed by the interſections of right lines revolving about given poles, ſee Mr. Maclaurin's Fluxions, art. 210, ſeq.

In finding the *tangents* of curves by the method of infiniteſimal differences, it has been objected that the concluſion is found by a double error. 1. By taking the curve for a polygon of an infinite number of ſides. 2. By the falſe rule for taking the differential of a power. But there is no need of ſuch ſuppoſitions in the method of fluxions, for it may be geometrically demonſtrated, that the fluxions of the baſe, ordinate, and curve, are in the ſame proportion to each other, as the ſides of a triangle reſpectively parallel to the baſe, ordinate, and *tangent.* When the baſe is ſuppoſed to flow uniformly, if the curve be convex towards the baſe, the ordinate and curve increaſe with accelerated motions; but their fluxions at any term are the ſame as if the point which deſcribes the curve had proceeded uniformly from that term in the *tangent.* Any farther increment which the ordinate or curve acquires, is to be imputed to the acceleration of the motions with which they flow. See Maclaurin's Fluxions, book i. chap. vii. and viii.

Any two arches of curve lines touch together, when the ſame right line is the *tangent* of both at the ſame point. But when they are applied to each other in this manner, they never perfectly coincide, unleſs they be ſimilar arches of ſimilar and equal figures.

In the Philoſophical Tranſactions, we have the following method of drawing *tangents* to all geometrical curves, without any labour, or calculation, by M. Sluſius.

Suppoſe a curve, as D Q (*Tab. Anal. fig.* 14.) whoſe points are all referable to any right line given, as E A B, whether that right line be the diameter or not; or whether there be more given right lines than one, provided their powers do but come into the equation. In all his equations he puts v for the line D A, y for B A; and for E B, and the other given lines, he puts b, d, &c. that is, always conſonants only.

Then, ſuppoſing D C to be drawn touching the curve in D, and meeting with E B produced in C, he calls the ſought line C A, by the name of a.

To find which, he gives this general method. 1. Reject out of the equation all members, which have not either v or y in them; then put all thoſe that have y on one ſide, and all thoſe which have v, on the other; with their ſigns + or −; and the latter, for diſtinction and eaſe ſake, he calls the right, the former the left ſide. 2. On the right ſide, let there be prefixed to each member the exponent of the power, which v hath there; or, which is all one, let that exponent be multiplied into all the members. 3. Let the ſame be done alſo on the left ſide, multiplying each member there by the power of the exponent of y; adding this morever, that one y muſt, in each part, be changed into a. This done, the equation, thus reformed, will ſhew the method of drawing the required *tangent* to the point D; for, that being given, as alſo y, v, and the other quantities expreſſed by conſonants, a cannot be unknown. Suppoſe an equation $by - yy = vv$, in which E B is called b; $BA = y$, $DA = v$, and let a, or A C, be required ſo as to find the point C, from whence C D being drawn, ſhall be a true *tangent* to that curve Q D in D. In this example, nothing is to be rejected out of the equation, becauſe y or v are in each member: it is alſo diſpoſed, as required by the rule 1; to each part, therefore, there muſt be prefixed the exponent of the powers of y or v, as in the rule 2; and on the left ſide, let one y be changed into a, and then the equation will be in this form, $ba - 2ya = 2vv$, which equation reduced, gives eaſily the value of $a = \frac{2vv}{b-2y} =$ A C. And ſo the point C is found, from whence the *tangent* D C may be drawn.

To determine which way the *tangent* is to be drawn, whether towards B or E, he directs to conſider the numerator and denominator of the fraction. For, 1. If in both parts of the fraction all the ſigns are affirmative; or if the affirmative ones are more in number; then the *tangent* is to run towards B. 2. If the affirmative quantities are greater than the negative in the numerator, but equal to them in the denominator, the right line drawn through D, and touching the curve in that point, will be parallel to A B; for in this caſe, a is of an infinite length. 3. If in both parts of the fraction the affirmative quantities are leſs than the negative, changing all the ſigns, the *tangent* muſt be drawn now alſo towards B; for this caſe, after the change, comes to be the ſame as the firſt. 4. If the affirmative quantities are greater than the negative in the denominator, but in the numerator are leſs, or *vice verſa*, then changing the ſigns in that part of the fraction where they are leſs, the *tangent* muſt be drawn a contrary way; that is, A C muſt be taken towards E. 5. But whenever the affirmative and negative quantities are equal in the numerator, let them be how they will in the denominator, a will vaniſh into nothing: and, conſequently, the *tangent* is either A D itſelf, or E A, or parallel thereto; as will eaſily be found by the data. This he gives plain examples of, in reference to the circle, thus: let there be a ſemicircle, whoſe diameter is E B; in which there is given any point; as D (*fig.* 15.), from which the perpendicular D A is let fall to the diameter. Let $DA = v$, $BA = y$, $BE = b$: then the equation will be $by - yy = vv$, and drawing the *tangent* D C, we have A C, or $a = \frac{2vv}{b-2y}$. Now, if b be greater than $2y$, the *tangent* muſt be drawn towards B; if leſs, towards E; if it be equal to it, it will be parallel to E B, as was ſaid in the firſt, ſecond, and fourth rules.

Let there be another ſemicircle inverted; as N D D (*fig.* 16.), the points of whoſe periphery are referred to the right line B E, parallel and = to the diameter. Let N B be called d, and all things elſe as before; then the equation will be $by - yy = dd + vv - 2dv$; which being managed according to his rules, you have $a = \frac{2vv - 2dv}{b - 2y}$. Now, ſince v here is ſuppoſed to be always leſs than d; if b be greater than $2y$, then the tangent muſt be drawn towards E; if equal, it will be parallel to B E; if leſs, changing all the ſigns, the *tangent* muſt be drawn towards B, as by rules fourth, fifth, and third. But there could be no *tangent* drawn, or at leaſt E B would be it, if N B had been taken equal to the diameter. Let there be another ſemicircle, whoſe diameter N B (*fig.* 17.) is perpendicular to E B, and to which its points are ſuppoſed to be referred. Let N B be called b, and all things elſe as above; the equation will be $yy = bv - vv$, and $a = \frac{bv - 2vv}{2y}$. If, now, b be greater than $2v$, the *tangent* muſt be drawn towards B; if leſſer, towards E; if equal, D A will be the *tangent*, as appears by rules 4 and 5.

TANGENTS, *inverſe method of*, is a method of finding the equation, or the conſtruction, of any curve; from the *tangent* of any other line, whoſe determination depends on the *tangent* given.

This method is alſo one of the great reſults of the new CALCULUS *integralis*.

Its application we ſhall give in what follows. The fluxional expreſſions of the *tangent*, *ſub-tangent*, &c. being delivered under the laſt article, if you make the given value equal to the fluxional expreſſion, and either ſum up the fluxional equation, or, if that cannot be, conſtruct it, the curve required is had. For example:

1. *To find the curve-line, whoſe* ſub-tangent $= \frac{2y^2}{a}$.

Since the *ſub-tangent* of an algebraic line is $= \frac{y\dot{x}}{\dot{y}}$; we have $\frac{y\dot{x}}{\dot{y}} = \frac{2y^2}{a}$, and $ay\dot{x} = 2y^2\dot{y}$, and $a\dot{x} = 2y\dot{y}$; therefore (taking the fluents by the *inverſe method of* FLUXIONS) $ax = y^2$.

The curve ſought, therefore, is a parabola; whoſe conſtruction is ſhewn under PARABOLA.

2. *To find the curve, whoſe* ſub-tangent *is a third proportional to* $\frac{1}{2}a - x$ and y. Since $\frac{1}{2}a - x : y :: y : \frac{y\dot{x}}{\dot{y}}$, we have $\frac{1}{2}a - x : y \; (:: y\dot{y} : y\dot{x}) :: \dot{y} : \dot{x}$; conſequently $\frac{1}{2}a\dot{x} - x\dot{x} = y\dot{y}$, and, taking the fluents, $\frac{1}{2}ax - \frac{1}{2}x^2 = \frac{1}{2}y^2$, i. e. $ax - x^2 = y^2$. The curve ſought is, therefore, a circle.

3. *To find a line, wherein the* ſub-tangent *is equal to the ſemiordinate.* Since $\frac{y\dot{x}}{\dot{y}} = y$; $y\dot{x} = y\dot{y}$, and $\dot{x} = \dot{y}$; therefore $x = y$.

Hence it appears, that the line ſought is a right line, which reſpects the cathetus of an equicrural triangle, as an axis, or the hypothenuſe of an equicrural rectangled triangle. If x had been taken for the arch of a circle, the ſought line had been a CYCLOID.

TANGERE, *noli me.* See NOLI.

TANGIBLE. See TACTILE.

TANISTRY, *taniſtria*, an ancient municipal law, or tenure, which allotted the inheritance of lands, caſtles, &c. held by this tenure, to the oldeſt and moſt worthy and capable perſon of the deceaſed's name and blood, without any regard to proximity. This, in reality, was giving it to the ſtrongeſt; and this naturally occaſioned bloody wars in families; for which reaſon it was aboliſhed under king James I.

Sir John Davies deſcribes it thus: *Quant aſcun perſon moruſt ſeiſie des aſcuns caſtles, manors, terres ou tenements del* nature & tenure de teniſtry; *que donques meſmes le caſtles,* &c.

&c *doent deſcender, & de temps dont memory ne court ont uſe de deſcender*, Seniori & digniſſimo viro ſanguinis & cognominis *de tiel perſon*, &c.

TANNED *hide*. See HIDE.

TANNER, a perſon who dreſſes hides by TANNING.

No perſon ſhall be a *tanner*, who hath not ſerved ſeven years, except the wiſe or ſuch ſon of a *tanner* as hath uſed the trade four years, or the ſon or daughter of a *tanner*, or ſuch perſon who ſhall marry ſuch wiſe or daughter to whom he ſhall leave a tan-houſe and fats, on pain of forfeiting all leather tanned by him, or its value. No *tanner* ſhall be a butcher, on pain of 6*s*. 8*d*. a day; nor ſhall a *tanner* be of any craſt exerciſed in cutting or working leather, on pain of forfeiting the ſame, or its value. No *tanner* ſhall ſuffer any hide to lie in the limes till they be over-limed, nor put it into any tan-fats, before the lime be perfectly wrought out of it, nor uſe in tanning any thing but aſh-bark, oak-bark, tap-wort, malt, meal, lime, culver-dung, or hen-dung; nor ſuffer it to lie wet till it be frozen; nor dry it by the fire or ſummer ſun, nor tan any hide and ſkin putrefied or rotten, nor ſuffer the hides for utter ſole leather to lie in the oozes leſs than twelve months, nor the hides for upper leathers leſs than nine months, &c. on pain of forfeiting every ſuch hide or ſkin, or its value. 1 Jac. cap. 22. Places of working uſed by *tanners*, tawers, curriers, or dreſſers of hides or ſkins, are to be entered, on pain of 50*l*.; and uſing any private tan-yard, &c. incurs a forfeiture of 20*l*. and the goods, or their value. And the refuſal of entrance to officers is liable to a forfeiture of 10*l*. By 24 G. III. c. 41. every *tanner* ſhall take out a licence, and pay for the ſame yearly, within the bills, 5 *l*. and elſewhere 2*l*. 10*s*.

Notice of removal to the place of drying ſhall be given to the officer; and entry on oath, ſhall be made before removal from the place of drying, under a penalty of 20*l*. and forfeiture of the goods, or their value; and concealing goods, in order to avoid the duty, incurs the ſame forfeiture.

Tanners, &c. are to keep ſcales and weights, or forfeit 50*l*.; and falſe or inſufficient ſcales and weights incur a penalty of 100*l*. The duty ſhall be aſcertained, and the leather marked, before removal, under a penalty of 50*l*. and forfeiture of the goods; and perſons counterfeiting the ſtamp, and knowingly ſelling goods with a counterfeit ſtamp, ſhall be guilty of felony, without benefit of clergy.

Perſons within the bills of mortality ſhall pay off the duties in fourteen days to the commiſſioners, and elſewhere within ſix weeks, to the collectors, after the goods ſhall be marked, or forfeit double duty. And *tanners*, &c. are required to balance their accounts with the officers once in three months, if demanded, on pain of 50*l*. 9 Ann. cap. 11. 10 Geo III. cap. 44.

By 9 Ann. cap. 11. and 10 Ann. cap. 26. tanned goods pay the following duties, viz. all tanned hides 1 ½*d*. a pound; calf, kids, hogs, and dog-ſkins tanned, 1 ½*d*. a pound; goat-ſkins, tanned with ſumach, or otherwiſe, to reſemble Spaniſh leather, 4*d*. a pound; ſheep-ſkins tanned for roans, after the nature of Spaniſh leather, 2*d*. a pound; ſheep-ſkins and lamb-ſkins tanned for glovers and baſils 1 ½*d*. a pound: and by 9 Geo. III. cap. 39. ſeal ſkins tanned or tawed 1 ½*d*. a pound; tanned ſkins not before charged, 30*l*. in the hundred, according to the real value. All theſe duties are to be paid by the *tanner*. For other tegulations relating to hides and ſkins, ſee LEATHER, TAWING, and VELLUM. Burne's Juſtice, *Exciſe* and *Leather*.

TANNER's *bark*. See TAN.

TANNING, the preparing of ſkins, or hides, in a pit, with tan and water; after having firſt taken off the hair, by ſteeping in lime-water.

TANNING *oxen's hides, method of*. The proceſs of *tanning* the thickeſt and beſt hides, which are uſually termed ſole-leather, and applied to the ſoles of ſhoes, is as follows. When the horns are taken out, they are laid quite ſmooth in a heap, conſiſting of twenty (more or leſs), for a few days; after which they are hung up in a cloſe brick building, in which there is kept a ſmall heat, without any vent for the ſmoke, and thus the hair will be made to move from the ſkin. In this ſtage of the operation great care is required. They are next removed to a wooden beam, over which each hide is laid, and the hair is ſcraped or forced from it with a crooked knife. When this is done, the hide is thrown into water, the clearer and purer the better; and in this ſtate it is moved once or twice a day for two or three days, more or leſs, according to the quality of the water, or the ſeaſon of the year. The hide is then laid on the wooden beam, and the looſe fleſh is pared from it, and the fat or greaſe ſcrubbed or worked out, with an inſtrument, called by the tanners a fleſhing-knife. When this operation is finiſhed, the hides are taken to a vat, in which is prepared a liquor made of oak bark, called ooze, the ſtronger the better, in which they are to be kept, almoſt conſtantly moved, for a ſpace of time, from four to ſeven or eight hours, according to the ſtrength of the ooze or quality of the hides. They are next removed to a vat, in which there is a preparation made with barley or rye-meal ſcalded, termed ſcourings, or workers, which fills the pores of the hides and thickens them, where they are to remain for a few days. The hides are then removed to another vat, in which is prepared a mixture of water with ooze, in which they are laid ſmooth, with ground oak-bark ſpread between one and another; and here they remain from five to ſeven or eight weeks, without being moved; after which time they are taken up, and a freſh one being prepared from the bark, by laying bark in a vat with a falſe bottom, to which the liquor is put, and from which it may be drawn off again without diſturbing the bark in the vat, the hides are again laid in ſmooth as before, and uſually lie from ten to twelve or fourteen weeks, when they are removed, with a repetition of the laſt proceſs, and may lie from three to four months; and this proceſs muſt be renewed once, twice, or thrice more, according to the ſubſtance of the hides.

When they are to be got ready for ſale, they are hung up in a drying ſhed, on a fir or aſh pole, and when in a proper ſtate, the grain is preſſed or ſqueezed down with a ſteel or braſs pin, and they are alſo beat ſmooth with a wooden beetle in the courſe of their being dried.

Of late years, ſpirits of vitriol mixed with water have been applied for the ſame purpoſe with barley or rye-meal; but this is a method practiſed by very few of the tanners.

The inferior ſortment of hides is tanned into that which is termed crop-leather, and ſome of them for dreſſing leather. Thoſe intended for crops, when the horns are taken out, are put into water one night; the next day they are removed to a vat in which has been put lime with water; they are there moved every day from five to ten days, when the hair will eaſily be moved off, in the ſame manner, and with the ſort of knife as before deſcribed: they are then thrown into clean water for one night, whence they are removed to the beam, and the looſe fleſh, &c. taken off, as in the caſe already deſcribed: they are then put into a vat, in which there is a preparation made with pigeon or hens-dung and water, where they remain a few days, being kept moved; during which time they are worked or ſcrubbed on the grain with a crooked knife, which extracts the filth or ſcum acquired in the limes; after this ſtage they are removed to the vats, out of which other leather has been taken, and there kept well moved, till they are in a proper ſtate to be put into ſtrong oozes, with freſh bark applied to them.

If leather manufactured in this manner be deſigned for dreſſing for coachmakers or other uſes, more lime will be required, and likewiſe more time be allowed in the pigeon's-dung, &c. When theſe hides are fit to dry, they are hung up in the manner already deſcribed.

The proceſs of manufacturing calf ſkins is the ſame with that laſt mentioned.

The editor is indebted for this account of the operation of *tanning* to one of the firſt men in that branch of buſineſs. The late ingenious Dr. Macbride of Dublin, having invented a new method of *tanning*, by which the leather (as it is ſaid) is not only improved in its quality, but tanned in much leſs time, and with a ſmaller quantity of bark than in any other method hitherto known or practiſed, has publiſhed inſtructions to tanners, from which the following particulars are extracted. His method depends on this principle, that lime-water extracts the virtues of oak-bark more completely than plain water: accordingly he begins with inſtructing the tanner in the preparation of lime-water. Having provided a ciſtern of ſufficient dimenſions, and fixed it in a convenient ſituation, he directs it to be filled with water, and to throw in ten or twelve pounds of unſlaked lime for every hogſhead of water contained in it. The lime is to be well mixed with the water, by ſtirring it with a bucket or plunger, till it is completely diffuſed, and the whole mixture becomes as white as milk; and then the liquor is left to ſettle for two days, that the undiſſolved lime may ſubſide, and the water become perfectly limpid, and clear as rock-water, in which ſtate it will be fit for immediate uſe, and may be drawn off by a cock, fixed at leaſt twelve inches from the bottom of the ciſtern. When the firſt quantity of lime-water is expended, the ciſtern is to be filled with water a ſecond time, the lime ſtirred from the bottom, and the liquor left to ſubſide as before; and thus will be obtained a ſecond brewing, and in like manner a third, fourth, fifth, or perhaps a ſixth, or more, from the original quantity of lime; provided that the lime-water continues to be of ſufficient ſtrength. The ſtrength of it may be determined either by the taſte, or by obſerving a certain ſolid ſcum, like the flakes of very thin ice, which collects and forms itſelf on the ſurface of the lime-water ; and whilſt this continues to float on the water, there is no need of adding freſh lime. But if it is not ſufficiently ſtrong, the groſs remains of lime muſt be drawn off by a hole in the bottom, ſtopped with a plug ; and when the ciſtern is cleaned, the brewings of lime-water muſt be repeated as before. The ooze is prepared by ſteeping the bark in this lime-water inſtead of common water, running it through two letches, that the lime-water may completely ſpend its force in the bark, and uſed in the ſame way with the common ooze. The previous management, before the hides are fitted for the ooze ; and the ſubſequent proceſſes are conducted according to the common practice : obſerving, however, that the ooze is to be turned from one letch on another before it is uſed, without which precaution it will be apt to blacken the leather.

The proceſs of *tanning*, as far as it is already recited, relates only to bulls and calf-ſkins.

Sole-leather is prepared for the ooſe by ſteeping it in ſome ſour liquor, in order to open its pores and *raiſe* it, according to the phraſe of the tanners. The ſourings commonly uſed are brewed from rye, or ſome other grain ; but theſe, Dr. Macbride obſerves, are uncertain with reſpect to the degree of their ſourneſs or ſtrength, which depend on the ſtate of the weather and other variable circumſtances, and are apt to rot the leather. He therefore recommends the uſe of a ſour prepared by diluting the ſtrong ſpirit of vitriol, vulgarly termed oil of vitriol, with a ſufficient quantity of water. This, he ſays, is ſubject to no change from the ſtate of the weather, and, inſtead of rotting, gives unuſual firmneſs to the leather ; beſides, the ſame ſour may ſerve for many parcels of leather, by adding a little vitriol to it. A wine pint of the ſtrong ſpirit of vitriol is ſufficient for fifty gallons of water, to prepare the ſouring at firſt ; and in raiſing the ſoles, they are previouſly prepared in the uſual way, and when they are fit for the ſouring, a quantity of vitriol and water, in the proportion above ſtated, is mixed together, according to the number of hides which are to be raiſed ; and they are then left to lie in the ſouring till they are ſufficiently raiſed ; nor is there any danger of their rotting, as the vitriolic ſouring prevents putrefaction ; they are then put into the ooze, and the proceſs is purſued in the common way.

In large works, and in the ordinary courſe of buſineſs, ſole-leather may be completely tanned and finiſhed in a ſpace of time from eleven to fifteen months, according to the different weight and thickneſs of the hides ; butts in eight to twelve months, and calf ſkins in ſix to twelve weeks ; and, in general, the tanner may ſave at leaſt a third of the time that has been hitherto required.

In making freſh ooze freſh lime-water muſt always be uſed, and the ooze run through two letches ; and the lime-water ooze, when ſpent from lying on the leather, is never to be returned back upon the bark which is in the letches, but muſt be thrown away as entirely uſeleſs. The letches ought to be under cover, leſt the rain get into them and weaken the ooze ; but it is of no importance to cover the vats, provided that, when the leather is laid away in them, they are kept conſtantly full to the brim. A ſufficient ſtock of unſlacked lime ſhould always be in reſerve, which if poſſible ſhould be procured freſh from the kiln, and immediately packed in any kind of old dry caſks. The expence of lime will be amply compenſated by the ſaving of bark, becauſe lime-water ſo completely exhauſts the bark, and makes it go much farther than when the ooze is made only of plain water. In proof of this, there may be made a pretty ſtrong ooze from the tan or ſpent bark, which is now conſidered as completely exhauſted, by infuſing it in lime-water. See Philoſ. Tranſ. vol. lxviii. part i. art. 8.

Mr. Beal, in a letter to the ſecretary of the Royal Society, publiſhed by Dr. Birch, in the Hiſt. R. S. vol. i. p. 387. gives the following brief account of *tanning* and dreſſing dog-ſkins. He obſerves that the ſkins of the biggeſt maſtiffs are fitteſt to be tanned for boots or ſhoes, or thick riding-gloves, and are held to be ſtronger and to have a finer grain than any Spaniſh or Barbary leather ; but they are cold and moiſt, and fitteſt for ſummer ; and he ſays, that old fame reports, that they produce the palſy.

Hunting-hounds and grey-hounds, and water ſpaniels yield the ſofteſt, moſt limber, and pleaſant leather : the ſkins of leſſer dogs are not ſo fit to be tanned, as to be dreſſed white for gloves.

In *tanning*, lime it quick, i. e. let it lie not above a fortnight or three weeks in lime, taking it out of the lime-pits once every day for an hour or more during this time ; then put it for a week in a pit of weak ooze, or water in which the bruiſed bark of oak lies, taking the ſkins alſo once every day, out of the ooze, for an hour, &c. as before, then it ſhould be tanned in the ſtrongeſt ooze : the quicker it is tanned, the better it is, and ſtronger ; by long *tanning* it rots. If it lie three weeks or a month in the ſtrongeſt ooze (taking it out but once a week), it is beſt to take it up as ſoon as it is tanned enough ; then hang it on poles, as plain as poſſible, till the ſun and wind dry it, which may be in two days of good weather : if it ſhould rain it muſt be dried within doors. If the horn (as they call it) be quite out, i. e. if it be not ſtiff and horny, you may take it out at the third laying of this ſtrong ooze. If ſome parts obſtinately continue horny the horn may be taken out thus ; take for each ſkin half a pound of alum, and the ſame quantity of ſalt, diſſolve both in fair water, and bathe the horny parts often in this liquor, in ſome earthen or tinned veſſel. This is neceſſary to be done to leather that is tanned for gloves, not for boots or ſhoes.

To dreſs white for gloves, it muſt be better limed, i. e. lie a week longer in the lime ; after it is taken out of the lime it muſt lie in warm water mingled with bran ; and thus let it lie three days together without ſtirring it ; and let it lie one day in the infuſion of alum and ſalt above mentioned ; then dry it ſmooth upon poles.

Cat-ſkins are dreſſed like dog-ſkins ; but if you would ſave their furs, you muſt not put them in lime at all, but in fair water, in which bran is boiled, and cooled before you put the ſkins in, in which they muſt lie for two or three days. So alſo ſquirrel's ſkins, and thus are dreſt ſeal-ſkins with the hair on, for the covers of ſaddles, &c. in which care muſt be taken that the bran-liquor be not too warm, but thoroughly cooled before the ſkin be put in. A boar's-ſkin will be thicker than a bull's-ſkin, and cannot be tanned limber ; but is always horny. All caſtling-ſkins may be dreſſed (as above) for gloves.

If dog-ſkins be not tanned very quick, they will not hold any colour in perfection.

To take out the alum, mingle the yolks of eggs and oatmeal in fair water, and in that liquor let the leather lie a few hours, and then waſh it well therein, and ſo dry it.

TANT, in *Natural Hiſtory*, an Engliſh name for a ſmall ſpider of the OPILIO kind, having only two eyes, and eight very long legs, and commonly ſuppoſed to be very poiſonous.

It is all over of an elegant ſcarlet colour, reſembling that of the flowers of the red poppy when full blown, except that the belly has a whitiſh caſt. Four of its legs are inſerted in the upper part of the breaſt, and the other four near the belly ; and near the origin of each leg there is a ſmall black ſpot. Its body is round and full, and it is all over covered with a fine ſhort velvety down. It is not unfrequent in dry paſtures in the ſpring-ſeaſon. It is terribly dreaded by our farmers, who ſuppoſe that an ox will die who chances to ſwallow it. Ray's Hiſt. Inſect. p. 44.

TANTALUS, one of the many names given by chemiſts to mercury.

TANTALUS, in *Mythology*, a king of Lydia, Phrygia, or Paphlagonia, according to ſome, but, according to others, the ſon of Jupiter by the nymph Plota, who is ſaid to have preſented the mangled members of his ſon Pelops, whom he murdered, to the gods, at a feaſt, in order to prove their divinity ; or, according to the modern explication of this fable, he offered up his ſon as a ſacrifice to the gods. Others, however, have charged him with revealing the ſecrets of the gods, i. e. the myſteries of their worſhip, of which he was the high-prieſt. But whatever was the nature of his crime, the poets repreſent him as condemned to hell, and tormented there with perpetual hunger and thirſt in the midſt of plenty of both meat and drink. Some repreſent him as ſtanding up to the chin in water, which he was incapable of reaching ; or as ſtanding under a tree. Some of the branches of which, loaded with the fineſt ripe fruits, hung down juſt before his mouth, which, the moment he endeavoured to take, always waved out of his reach. Others repreſent him as ſtanding under a heavy ſtone, which was ſuſpended over his head, and which he ſuſpected would every moment fall and cruſh him.

Horace (lib. i. ſat. i. v. 71.) ſeems to make *Tantalus* only an emblem of the covetous : as Lucretius (lib. iii. v. 1015.) makes Siſyphus, who is repreſented as bending under the weight of a great ſtone, or labouring to heave it againſt the ſide of a ſteep mountain, and which always rolls precipitately down again before he can fix it on the top, as an emblem of the ambitious.

TANTALUS, in *Ornithology*, a genus of the order of *grallæ*.

Its characters are, that the bill is long, thick at the baſe, and wholly incurvated; the face naked; the tongue ſhort and broad; the noſtrils linear, and the feet, with four toes, palmated at the baſe. Linnæus enumerates ſeven ſpecies, of which the Egyptian IBIS is one.

TANTALUS's *cup*, in *Hydraulics*, is a cup, as A (*Tab.* VII. *Hydraulics*, *fig*. 78.) with a hole in the bottom, and the longer leg of the ſyphon BCED cemented into the hole ſo that the end D of the ſhorter leg DE, may almoſt touch the bottom of the cup within. Then, if water be poured into this cup, it will riſe in the ſhorter by its upward preſſure, extruding the air before it through the longer leg; and when the cup is filled above the bend of the ſyphon at F, the preſſure of the water in the cup will force it over the bend of the ſyphon; and it will deſcend in the longer leg CBG, and even through the bottom, until the cup be emptied. The legs of this ſyphon are almoſt cloſe together, and it is ſometimes concealed by a ſmall hollow ſtatue, or figure of a man, placed over it; the bend E being within the neck of the figure as high as the chin. So that poor thirſty *Tantalus* ſtands up to the chin in water, according to the fable, imagining it will riſe a little higher, and he may drink; but, inſtead of that, when the water comes up to his chin, it immediately begins to deſcend, and therefore, as he cannot ſtoop to follow it, he is left as much tormented with thirſt as ever. Feguſon's Lect. p. 72. 4to.

TANTAMOUNT, ſomething that amounts to, or is equivalent to ſome other.

TANTUM *decies*. See DECIES.

TANSY, or TANZY, *tanacetum*, in *Botany*, a genus of the *ſyngeneſia polygamia equalis* claſs: its characters are theſe: it has a flower compoſed of hermaphrodite and female florets, contained in one common, hemiſpherical, imbricated empalement, whoſe ſcales are compact and acute pointed. The hermaphrodite florets which compoſe the diſk of the flower, are funnel-ſhaped, and cut into five ſegments, which are reflexed; theſe have five ſhort hair-like ſtamina, terminated by cylindrical tubulous ſummits, and a ſmall oblong germen, ſupporting a ſlender ſtyle, crowned by a bifid revolved ſtigma; the germen becomes an oblong naked ſeed; the female florets are trifid, which compoſe the rays or border, and are deeply divided within; theſe have an oblong germen, with a ſlender ſtyle, crowned with two reflexed ſtigmas, but no ſtamina. Miller enumerates ſeven, and Linnæus eight ſpecies.

The common yellow *tanſy*, of which there are three varieties, is eaſily propagated by its creeping roots, which, if undiſturbed, will ſoon overſpread any ground where they are permitted to grow. The ſlips are to be planted either in ſpring or autumn, and will thrive almoſt in any ſoil or ſituation. Miller.

This is perennial, grows wild about road-ſides, and about the borders of fields, and flowers about June and July.

The leaves and flowers of *tanſy* have a ſtrong, not very diſagreeable ſmell, and a bitter ſomewhat aromatic taſte. They give out their virtue both to water and ſpirit, but moſt perfectly to the latter: the tincture, made from the leaves, is of a fine green; from the flowers of a bright pale colour. Diſtilled with water, they yield a greeniſh-yellow eſſential oil, ſmelling ſtrongly of the herb: the remaining decoction, inſpiſſated, affords a ſtrong, bitter, ſubſaline extract.

This plant is uſed as a warm deobſtruent bitter, in weakneſs of the ſtomach, and in cachectic and hyſteric diſorders; and likewiſe as an anthelmintic. The ſeeds have been chiefly recommended in this laſt intention, and ſuppoſed to be the *ſantonicum* of the ſhops, from which they differ not a little in quality as well as in appearance, being much leſs bitter, and of a more aromatic flavour. Lewis.

TANZY, *wild*. See CINQUEFOIL.

TAOS *lapis*, the *peacock-ſtone*, a name given by ſome of the ancient writers to a very beautiful variegated agate, reſembling, in ſome degree, the great variety of colours in the peacock's tail.

TAP, among *Hunters*: a hare is ſaid to *tap*, or beat, when ſhe makes a particular noiſe at rutting time.

TAP-*root*, in *Trees*, that part of the root that deſcends ſtraight down.

In removing or tranſplanting young oaks, great care ſhould be taken not to wound this root, much leſs to cut it off; but it muſt be dug up to the bottom, and the hole prepared deep enough to ſet it; otherwiſe the tree either dies, or, if not, it is always greatly ſtinted or impeded in its growth.

TAPASSANT, among *Hunters*, denotes *lurking*, or *ſquatting*. Hence, alſo, to *tappy*, is to lie hid, as deer may do.

TAPAYAXIN, in *Zoology*, the name of a very remarkable ſpecies of lizard, called by Hernandez the *lacertus orbicularis*.

It is not of the long and ſlender ſhape of the common lizards, but as broad as it is long, and much reſembling the ray-fiſh in ſhape, though ſeldom exceeding four inches in length or breadth. It is a cartilaginous lizard, of a very beautiful variety of colours, always very cold to the touch, and ſo ſluggiſh a creature, that it often will not move out of its place even on touching it. Its head is exceedingly hard and elate, and has a ſort of crown of prickles for its defence; yet it is a perfectly harmleſs animal, and ſo far from having the fear of man, and ſhyneſs that other beaſts have, that it loves to be taken up and played with, and will ſtand perfectly ſtill, and ſeem very happy while played with. Hernandez, lib. ix. cap. 16.

TAPE-*worm*, a ſpecies of worm breeding in the human bowels, and called by authors, *tænia*, and *lumbricus latus*, or the broad worm.

In the Linnæan ſyſtem, this is a genus of the order of *zoophytes*, in the claſs of worms, the characters of which are, that the body is jointed in the form of a ſimple chain, and that each joint has its proper mouth, viſcera, &c. This genus includes four ſpecies.

The Greek and Roman phyſicians, as well as thoſe of our own time, have deſcribed thoſe ſorts of worms to which the human bowels are ſubject: the common long worms, which reſemble earth-worms; the aſcarides, or ſmall worms; and this *tape-worm*, which they have alſo called *vermis cucurbitinus*, or the gourd-worm, from its reſembling, in ſome degree, the ſeeds of that fruit.

The interpreters of ſome of the Greek phyſicians have, however, been guilty of a great error, in confounding the gourd-worms and the aſcarides together, though nothing can be more unlike. The ancients ſeem to have had a very juſt opinion of this animal in calling it *vermis cucurbitinus*, ſince it is plain by this, that they underſtood every joint, as we call them, of this creature, to be a diſtinct worm; and what we call a ſingle worm, to be a long ſeries of theſe worms, joined together end to end.

The true hiſtory of this animal is, that it is ſhort and broad. What is called a link of the long worm is really a diſtinct worm; and when one of theſe multiplies in the bowels, its young adhere to it, and to each other endwiſe, ſo as to form a ſort of chain, which lengthens as they continue to increaſe, and in fine becomes immoderately long. Hence it is that the breaking, as it is called, of this worm, does not deſtroy it, and that the voiding large pieces of it is no cure, ſince it ſtill recovers that length again by new young ones. Every ſeparate link of ſuch a chain, if examined, is found to be entire, lively, and briſk, and not at all injured by the ſeparation.

Dr. Tyſon, in the Phil. Tranſ. N° 146, gives a curious account of this worm: it is always ſingle; it lies variouſly convoluted, being ſometimes as long as all the guts, and ſometimes it very much exceeds that length. Olaus Borrichius aſſures us, that a patient of his, in a year's time, voided eight hundred feet in meaſure of this worm, though in that length he did not meet with the head; in voiding, the patient always obſerved it to break off.

Dr. Tyſon parallels this caſe with that of a patient of his, who diſcharged vaſt quantities of this worm for ſeveral years, but in various pieces, of two, three, four, ſix, or more yards long, but all put together, would (he ſays) much exceed the length of that of Borrichius.

The joints in this worm are very numerous in one of twenty-four feet long. Dr. Tyſon numbered five hundred and ſeven joints. Above the middle of the edges of each joint, he obſerved a protuberant orifice. Thoſe orifices he takes for ſo many mouths; the beſt microſcopes diſcovering no mouth in that part which uſually paſſes for the head. This worm is common in moſt kinds of animals, as dogs, oxen, crabs, herrings, pikes, &c.

Some authors have aſſerted, that it is not one, but many worms linked together, and included in a ſpolium of the inteſtines; and that this ſpolium is not animated, but receives its ſenſe and motion from a ſort of vermiculi cucurbitini encloſed in it. This Gabucinus, de Lumb. Com. ſays, he has plainly diſcovered; but Dr. Tyſon abundantly evinces the contrary.

Authors who have treated of theſe worms as a diſeaſe, have given a canine appetite, or unnatural appetite, to food, as one of the ſymptoms; but this is wrong, for it has never been found, in reality, that theſe worms, even where moſt numerous, have at all increaſed the natural appetite; and indeed it is very difficult to judge of their being in the body by ſymptoms, ſince they occaſion none which are not alſo common in many other diſeaſes. Many people have had them a long courſe of time, without being ſenſibly hurt by them; and there has never been a known inſtance of their occaſioning any one's death, or indeed any conſiderable diſorder.

Fern-root has been long known as a remedy againſt worms. See FERN and WORMS.

However, it was ſunk into neglect till a few years ago, when it again came into notice, by being diſcovered to be the remedy which had become greatly celebrated in Switzerland as a ſpecific in the cure of the *tænia* or *tape-worm*. The ſecret was purchaſed by the king of France, after its efficacy had been atteſted upon trial by ſome of the principal phyſicians at Paris.

The following has been publiſhed as the mode of its exhibition. After the patient has been prepared by an emollient clyſter, and a ſupper of panada with butter and ſalt, he is directed to take in bed in the morning a doſe of two or three drams of the powder of male fern-root. The doſe to infants is only one dram. The powder muſt be waſhed down with a draught of water, but nothing elſe muſt be taken till two hours after, when a bolus of calomel, joined with ſome of the ſtrongeſt cathartics, is to be given. If this does not operate, it muſt be followed by a doſe of purging ſalts. By this method the worm is commonly expelled in a few hours. If the trial does not ſucceed, the proceſs muſt be repeated at due intervals. Lewis's Mat. Med. by Aikin, 1784.

TAPECON, in *Ichthyology*, a name given by ſome to the fiſh generally called the URANOSCOPUS, or *ſtar-gazer*.

TAPER, TAPERING, is underſtood of a piece of timber, or the like, when broad at one end, and gradually diminiſhing to the other; as is the caſe in pyramids, cones, &c.

To meaſure *taper* timber, &c. ſee SLIDING-*rule*.

TAPER-BORED is applied to a piece of ordnance, when it is wider at the mouth than towards the breech.

TAPER alſo denotes a kind of tall wax-candle, placed in a candleſtick, and burnt at funeral proceſſions, and in other church ſolemnities.

Tapers are made of different ſizes; in ſome places, as Italy, &c. they are cylindrical; but in moſt other countries, as England, France, &c. they are conical or *taper*; whence poſſibly the name; unleſs we rather chooſe to derive *taper* in the adjective ſenſe from the ſubſtantive *taper*, in the Saxon *tapen* or *tapon*, *cereus*, *wax-candle*.

Both kinds are pierced at bottom, for a pin in the candleſtick to enter.

The uſe of lights in religious ceremonies is of a long ſtanding; the ancients, we know, uſed flambeaux in their ſacrifices, and particularly in the myſteries of Ceres; and they had *tapers* placed before the ſtatues of their gods.

Some ſuppoſe that it was in imitation of this heathen ceremony, that lights were firſt introduced into the Chriſtian church; others take it, that the Chriſtians borrowed the practice from the Jews; but recourſe need not be had to the one or the other. Doubtleſs, as in the firſt ages of Chriſtianity, they had their meetings in obſcure ſubterraneous vaults, there was a neceſſity for *tapers*, &c. and there was even occaſion for them after they had the liberty of building churches, thoſe being contrived in ſuch a manner as only to receive very little light, that they might inſpire the greater awe and reſpect by the obſcurity.

This original of *tapers* in churches is the moſt natural; but it is now a long time ſince the uſe of *tapers*, which neceſſity firſt introduced, is become a mere ceremony. St. Paulinus, who lived at the beginning of the fifth century, obſerves, that the Chriſtians of his days were ſo fond of *tapers*, that they even painted them in their churches.

There are two ways of making TAPERS, the firſt with the *ladle*, the ſecond by *hand*.

In the firſt, after the wicks (which are uſually half cotton, half flax) have been well twiſted, and cut of the due length, a dozen of them are hung, at equal diſtances, around an iron hoop, directly over a large copper baſon full of melted wax.

Then taking an iron ladleful of the wax, they pour it gently over the wicks, a little below the tops thereof, one after another; ſo that, the wax running down them, they become ſoaked and covered therewith, and the ſurplus returns into the baſon, under which is a pan of coals to keep it in fuſion.

Thus they continue to caſt on more and more wax for ten or twelve times, till the *tapers* be brought to the required dimenſions. The firſt caſt only ſoaks the wick, the ſecond begins to cover it, and the reſt give it the form and thickneſs; in order to which, they take care that every caſt, after the fourth, be made lower and lower below the wicks to make them *taper*. The *tapers* thus formed, are laid, while yet hot, one againſt another, in a feather-bed folded double, to preſerve them ſoft; and afterwards taken out thence, one after another, to be rolled on a long ſmooth table, with an oblong inſtrument of box, poliſhed at the bottom, and furniſhed with a handle above.

The *taper* thus rolled and poliſhed, a piece of its larger end is cut off, and a conical hole bored therein, with a boxen inſtrument, into which the pin, or point of the candleſtick, is to be received.

While the broach is yet in the hole, they uſe to ſtamp the maker's name and the weight of the *taper*, with a boxen ruler, whereon proper characters are cut. The *taper* is then hung up to harden, after which it is fit for uſe.

Making of TAPERS *by hand*. The wicks being diſpoſed, as in the former manner, they begin to ſoften the wax, by working it in hot water, in a narrow, deep, copper veſſel. They then take a quantity of this wax out with the hand, and apply it gradually on the wick, which is faſtened to a hook in the wall, at the end oppoſite to the collet; ſo that they begin to form the *taper* by the large end, and proceed, ſtill leſſening the thickneſs to the neck or collet.

The reſt is performed after the ſame manner as in *tapers* made with the ladle, except that they do not lay them in the feather-bed, but roll them on the table as faſt as they are formed.

Two things there are to be obſerved in the two kinds of *tapers*; the firſt, that, in the whole proceſs of *tapers* with the ladle, they uſe water to moiſten the table, and other inſtruments uſed therein, that the wax may not ſtick; and that, in the other, they uſe oil of olives, or lard, for the ſame end.

TAPER, *paſchal*, among the *Romaniſts*, is a large *taper*, whereon the deacon applies five bits of frankincenſe, in holes made for the purpoſe, in form of a croſs; and which he lights with new fire in the ceremony of Eaſter-Saturday.

The Pontifical makes pope Zoſimus the author of this uſage; but Baronius will have it more ancient; and quotes a hymn of Prudentius to prove it. That pope he ſuppoſes to have only eſtabliſhed the uſe thereof in pariſh-churches, which, till then, had been reſtrained to greater churches.

F. Papebroch explains the original of the *paſchal taper* more diſtinctly in his *Conatus Chronico-Hiſtoricus*, &c. It ſeems, though the council of Nice regulated the day whereon Eaſter was to be celebrated, it laid it on the patriarch of Alexandria to make a yearly canon thereof, and to ſend it to the pope. As all the other moveable feaſts were to be regulated by that of Eaſter, a catalogue of them was made every year; and this was written on a *taper*, *cereus*, which was bleſſed in the church with much ſolemnity.

This *taper*, according to the abbot Chaſtelain, was not a wax-candle made to be burnt; it had no wick, nor was it any thing more than a kind of column of wax, made on purpoſe to write the liſt of moveable feaſts on; and which would ſuffice to hold that liſt for the ſpace of a year.

For, among the ancients, when any thing was to be written to laſt for ever, they engraved it on marble or ſteel; when it was to laſt a long while, they wrote it on Egyptian paper; and, when it was only to laſt a ſhort time, they contented themſelves to write it on wax. In proceſs of time, they came to write the moveable feaſts on paper, but they ſtill faſtened it to the *paſchal taper*; which practice is obſerved to this day at Notre Dame, in Rouen, and throughout the order of Cluny. Such is the original of the benediction of the *paſchal taper*.

TAPERA, in *Ornithology*, a ſpecies of SWALLOW.

TAPESTRY, or TAPISTRY, a curious kind of manufacture, ſerving to adorn a chamber, or other apartment, by hanging or lining the walls thereof.

Some uſe *tapeſtry* as a general name for all kinds of hanging, whether woven or wrought with the needle; and whether ſilken, woollen, linen, leathern, or of paper, (in which they are countenanced by the etymology of the word, formed from the French *tapiſſer, to line*; of the Latin *tapes*, a cover of a wall or bed, &c.). But, in the common uſe of our language, the term is now appropriated to a kind of woven hangings, of wool and ſilk, frequently raiſed and enriched with gold and ſilver, repreſenting figures of men, animals, landſcapes, &c.

The invention of *tapeſtry* ſeems to have come from the Levant; and what makes this the more probable is, that formerly, the workmen concerned herein were called, at leaſt in France, *Sarazins*, or *Sarazinois*.

Some have ſuppoſed that the Engliſh and Flemiſh, who were the firſt that excelled therein, might bring the art with them from ſome of the croiſades or expeditions againſt the Saracens. Accordingly they ſay, that thoſe two nations were the firſt who ſet on foot this noble and rich manufacture in Europe, which afterwards became one of the fineſt ornaments of palaces and churches, &c. At leaſt, if they be not allowed the inventors, they have the honour of being the reſtorers of this curious and admirable art, which gives a kind of life to wools and ſilks, in ſome reſpects not inferior to the paintings of the beſt maſters. However, it does not appear at what preciſe æra this manufacture was introduced into Europe; nor is it certain to whom it was owing.

Guicciardin, in his Deſcription and Hiſtory of the Netherlands, printed at Antwerp in 1582, aſcribes the invention of the art of making *tapeſtry* hangings to the Netherlanders, but he does not aſſign the time of the invention.

The art of weaving *tapeſtry* was brought into England by William Sheldon, eſq. about the end of the reign of Henry VIII. See Dugdale's Warwickſhire in Stemmate Sheldon, p. 584.

In the reign of king James the manufacture of *tapeſtry* was ſet up at Mortlake, in Surry. Aubrey, indeed, in his hiſtory of that county, dates its inſtitution in the ſubſequent reign; but Lloyd (State Worthies, p. 953.) is not only poſitive for the former æra, but affirms, that at the motion of king James himſelf, who gave two thouſand pounds towards the undertaking, ſir Francis Crane erected the houſe at Mortlake for the execution of the deſign; and this is confirmed by authentic evidence; for, in Rymer's Fœdera, vol. xviii. p. 66. there is an acknowledgment from king Charles in the firſt year of his reign, viz. 1625, that he owes ſix thouſand pounds to ſir Francis Crane for *tapeſtry:* and he grants to him two thouſand pounds yearly, for ten years, towards the maintenance of the ſaid work.

Theſe works at Mortlake, which at firſt had been conducted after old patterns, were afterwards formed from deſigns both in hiſtory and groteſque, furniſhed by Francis Cleyn, and thus carried to ſingular perfection.

From the deed above recited it is plain, that the manufacture was then arrived at great perfection. See Mr. Walpole's Anecdotes of Painting in England, vol. ii. p. 36.

In the year 1663, a ſtatute was enacted (cap. 15.) for the encouragement of linen and *tapeſtry* manufactures of England, and diſcouragement of the very great importation of foreign linen and *tapeſtry*.

The firſt eſtabliſhment of a *tapeſtry* manufacture at Paris was under Henry IV. in the year 1606 or 1607, by means of ſeveral excellent artiſts, whom he invited from Flanders.

But this fell with the death of that prince. Under Lewis XIV. the manufacture was retrieved by the care and addreſs of the great M. Colbert, to whom is owing the eſtabliſhment of the GOBELINS, a royal *tapeſtry* manufacture, which has produced works of this kind ſcarce inferior to the fineſt Engliſh or Flemiſh *tapeſtry*, either with regard to the deſign, the colours, or the ſtrength.

In this manufactory both wool and ſilk are uſed, and ſometimes gold and ſilver. The fineſt paintings may be copied in this work, and the greateſt maſters have been employed in draughts for the *tapeſtry* weavers.

The weavers of the Gobelins work behind, or on the wrong ſide of the loom, which ſtands upright, and the pattern is placed on either ſide of the workman.

As the *tapeſtry* of the Gobelins is made of pieces of a certain breadth only, there are other workmen called rentrayeurs, or fine drawers, who are employed in ſewing or fine-drawing the ſeveral parts together, ſo that no ſeam is diſcernible, but the whole appears as one deſign, like a piece of ſilk from a loom. Theſe workmen are alſo uſeful in mending and cleaning *tapeſtry* when damaged or ſullied.

The *tapeſtry-men* diſtinguiſh two kinds of work; viz. *tapeſtry* of the *high* and the *low-warp*, though the difference is rather in the manner of working, than in the work itſelf, which is, in effect, the ſame in both, only the looms, and conſequently the warps, are differently ſituated; thoſe of the *low-warp* being placed flat, and parallel to the horizon, and thoſe, on the contrary, of the *high warp*, erected perpendicularly.

The French have three conſiderable *tapeſtry* manufactures beſides that of the Gobelins; the firſt at Aubuſſon, in Auvergne; the ſecond at Felletin, in the Upper Marche; and the third at Beauvois: they were all equally eſtabliſhed for the *high* and the *low warp*; but have all laid aſide the former, excepting the Gobelins.

There are admirable *low warps* in Flanders, generally exceeding thoſe of France; the chief and almoſt only Flemiſh manufactories are at Bruſſels, Antwerp, Oudenard, Liſle, Tournay, Bruges, and Valenciennes.

At Bruſſels and Antwerp they ſucceed both in human figures and animals, and in landſcapes: and that both with reſpect to the deſigning and the workmanſhip. At Oudenard their landſcapes and animals are good, but their human figures naught. Liſle and the other cities named, come behind Oudenard. The French manufacture of Felletin does tolerably well in landſcapes, Aubuſſon in figures, and Beauvois in both.

The uſual widths of *tapeſtries* are from two ells to three ells and a half, Paris meaſure.

The manufacture of *tapeſtry* of each kind is too curious to be here paſt over without a ſhort deſcription. We ſhall give each under its ſeparate article.

Manufacture of TAPESTRY *of the high warp.* The loom whereon this is wrought is placed perpendicularly: it conſiſts of four principal pieces; two long planks or cheeks of wood, and two thick rollers or beams. The planks are ſet upright, and the beams acroſs them, one atop, and the other at bottom, a foot diſtance from the ground. They have each their trunnions, by which they are ſuſpended on the planks, and are turned with bars. In each roller is a groove, from one end to the other, capable of containing a long round piece of wood, faſtened therein with hooks. Its uſe is to tie the ends of the warp to. The ~~warp, which~~ is a kind of worſted, or twiſted woollen thread, is wound on the upper roller; and the work, as faſt as woven, is wound on the lower.

Withinſide the planks, which are ſeven or eight feet high, fourteen or fifteen inches broad, and three or four thick, are holes pierced from top to bottom, in which are put thick pieces of iron, with hooks at one end, ſerving to ſuſtain the coat-ſtave: the pieces of iron have alſo holes pierced in them, by putting a pin in which, the ſtave is drawn nearer, or ſet farther off; and thus the coats or threads are ſtretched and looſened at pleaſure. The coat-ſtave is about three inches diameter, and runs all the length of the loom; on this are fixed the coats, or threads, which make the threads of the warp croſs each other. It has much the ſame effect here as the ſpring-ſtave and treddles have in the common looms. The coats are little threads faſtened to each thread of the warp, with a kind of ſliding-knot, which forms a ſort of maſh or ring. They ſerve to keep the warp open, for the paſſages of broaches wound with ſilks, woollens, or other matters uſed in the piece of *tapeſtry*.

Laſtly, there are a number of little ſticks, of different lengths, but all about an inch diameter, which the workman keeps by him in baſkets, to ſerve to make the threads of the warp croſs each other, by paſſing them acroſs: and that the threads thus croſſed may retain their proper ſituation, a packthread is run among the threads above the ſtick.

The loom thus formed, and mounted with its warp, the firſt thing the workman does, is to draw, on the threads of this warp, the principle lines and ſtrokes of the deſign to be repreſented on the piece of *tapeſtry*; which is done by applying cartoons made from the painting he intends to copy, to the ſide that is to be the wrong ſide of the piece; and then with a black lead pencil following and tracing out the contours thereof, on the thread of the right ſide; ſo that the ſtrokes appear equally both before and behind. As to the original deſign the work is to be finiſhed by, it is hung up behind the workman, and wound on a long ſtaff, from which a piece is unrolled, from time to time, as the work proceeds.

Beſides the loom, &c. here deſcribed, there are three other principal inſtruments required for working the ſilk, or wool of the woof within the threads of the warp. Theſe are a broach, a reed, and an iron needle.

The broach is of hard wood, ſeven or eight inches long, and two thirds of an inch thick, ending in a point, with a little handle. It ſerves as a ſhuttle, the ſilks, woollens, gold, or ſilver, to be uſed in the work, being wound on it. The reed or comb is alſo of wood, eight or nine inches long, and an inch thick at the back; whence it uſually grows leſs and leſs, to the extremity of the teeth, which are more or leſs apart, according to the greater or leſs degree of fineneſs of the intended work.

Laſtly, the needle is in form of a common needle, only bigger and longer. Its uſe is to preſs cloſe the wool and ſilks, when there is any line or colour that does not ſit well.

All things being prepared for the work, and the workman ready to begin, he places himſelf on the wrong ſide the piece, with his back towards the deſign; ſo that he works, as it were, blindfold, ſeeing nothing of what he does; and being obliged to quit his poſt, and go to the other ſide the loom, whenever he would view and examine the piece, to correct it with his preſſing-needle.

To put any ſilk, &c. in the warp, he firſt turns and looks at his deſign; then taking a broach full of the proper colour he places it among the threads of the warp, which he brings acroſs each other with his fingers, by means of the coats or threads faſtened to the ſtaff: this he repeats every time he is to change his colour.

The ſilk or wool being placed, he beats it with his reed or comb; and when he has thus wrought in ſeveral rows over each other, he goes to ſee the effect they have; in order to reform the contours with his needle, if there be occaſion.

As the work advances, they roll it up on the lower beam, and unroll as much warp, from the upper beam, as ſuffices them to continue the piece: the like they do of the deſign behind them. When the pieces are wide, ſeveral workmen may be employed at once.

We have but two things to add: the firſt, that this *high warp tapeſtry* goes on much more ſlowly than the *low warp*, and takes almoſt double the time and trouble. The ſecond, that all the difference the eye can obſerve between the two kinds conſiſts in this, that, in the *low warp*, there is a red fillet, about one twelfth of an inch broad, running on each ſide from top to bottom; which is wanting in the *high warp*.

Manufacture of TAPESTRY *of the low warp.* The loom or frame whereon the *low warp* is wrought, is much like that of the weavers: the principal parts thereof are two ſtrong pieces of wood forming the ſides of the loom, and bearing a beam or roller at each end: they are ſuſtained at bottom with other ſtrong pieces of wood, in manner of treſtles; and, to keep them the firmer, they are likewiſe faſtened to the floor with a kind of buttreſſes, which prevent any ſhaking, though there are ſometimes four or five workmen leaning on the beam at once.

The rollers have each their trunnions, by which they are ſuſtained: they are turned by large iron pins three feet long. Along each beam runs a groove, wherein is placed the wich, a piece of wood of about two inches diameter, and almoſt of the length of the roller: this piece fills the groove entirely, and is faſtened therein, from ſpace to ſpace, by wooden pins. To the two wiches are faſtened the two extremities of the warp, which is wound on the farther roller; and the work, as it advances, on the nearer.

Acroſs the two ſides, almoſt in the middle of the loom, paſſes a wooden bar, which ſuſtains little pieces of wood, not unlike the beam of a balance: to theſe pieces are faſtened ſtrings, which bear certain ſpring-ſtaves, wherewith the workman, by means of two treddles under the loom whereon he ſets his feet, gives a motion to the coats, and makes the threads of the warp riſe and fall alternately. Each loom has more or fewer of theſe ſpring-ſtaves, and each ſtaff more or fewer coats, as the *tapeſtry* conſiſts of more or fewer threads.

The deſign or painting, the *tapeſtry-man* is to follow, is placed underneath the warp; where it is ſuſtained from ſpace to ſpace with ſtrings, by means of which the deſign is brought nearer the warp.

The loom being mounted, there are two inſtruments uſed in working of it; viz. the reed, and the flute. The flute does the office of the weaver's ſhuttle; it is made of an hard poliſhed wood, three or four lines thick at the ends, and ſomewhat more in the middle, and three or four inches long. On it are wound the ſilks, or other matters, to be uſed as the woof of the *tapeſtry*. The comb or reed is of wood or ivory; it has uſually teeth on both ſides; it is about an inch thick in the middle, but diminiſhes each way to the extremity of the teeth: it ſerves to beat the threads of the woof cloſe to each other, as faſt as the workman has paſſed and placed them with his flute among the threads of the warp.

The workman is ſeated on a bench before the loom, with his breaſt againſt the beam, only a cuſhion or pillow between them; and, in this poſture, ſeparating, with his fingers, the threads of the warp, that he may ſee the deſign underneath, and taking a flute, mounted with a proper colour, he paſſes it among the threads, after having raiſed or lowered them, by means of the treddles moving the ſpring-ſtaves and coats.

Laſtly, To preſs and cloſe the threads of the ſilk or yarn, &c. thus placed, he ſtrikes each courſe (i. e. what the flute leaves in its paſſing and coming back again) with the reed.

What is very remarkable in the manufacture of the *low warp*, is, that it is all wrought on the wrong ſide; ſo that the workman cannot ſee the right ſide of his *tapeſtry*, till the piece be finiſhed and taken out of the loom.

Mr. Le Blon, in endeavouring to fix the true harmony of colouring in painting, found that all viſible objects may be repreſented by the three primitive colours, red, yellow, and blue; becauſe out of theſe, all others, even black itſelf, may be compounded.

From the principle of producing any viſible object with a ſmall number of colours, as repreſented under the article MEZZO-TINTO, and from obſerving the compounded colours which were reflected from two pieces of ſilk of different colours, placed near to one another, he arrived at the ſkill of producing in the loom all that the art of painting requires. In weaving, indeed, he hath been obliged to make uſe of white and black threads, beſides red, yellow, and blue; and though he found that he was able to imitate any picture with theſe five colours, yet for cheapneſs and expedition, and to add a brightneſs where it was required, he found it more convenient to make uſe of ſeveral intermediate degrees of colours.

In his new way of weaving *tapeſtry* in the loom with a draw-boy, it may be performed almoſt as expeditiouſly as fine brocades; for when the loom is once ſet and mounted, any common draught-weaver, unacquainted with drawing or painting, and indeed hardly knowing what figure he is about, may exactly produce what the painter hath repreſented in the original pattern: and thus a piece of *tapeſtry* may be woven in a month or two, which, in the common way of working, would take up ſeveral years: and what in the common way coſts a thouſand pounds, may, by this means, be afforded finer and better for a hundred.

The main ſecret of this art conſiſts in drawing the patterns, from which any common draught-weaver can mount the loom; and when that is done, the piece may be made of any ſize, by only widening the reeds and the warp: and a reverſe may be made with the ſame eaſe; which is done by the boy's pulling the laſhes up again in the ſame order in which he pulled them down before: by which contrivance the *tapeſtry* may be ſuited to any room, whether the light comes in on the right, or on the left. The patterns are painted upon paper, whereon are painted ſquares from copper-plates, and theſe ſubdivided by as many lines as anſwer to the threads of the warp, which run lengthwiſe of the piece; then they try how many threads of the ſhoot anſwer in breadth to every ſubdiviſion of the ſquares. Every thread of the warp goes through a ſmall braſs ring called a *male*, or through a loop in the leiſh, and hath a ſmall long weight or lingoe hung below, to counterbalance the packthreads, which going from the top of the rings or loops, are paſſed over the pullies in the table directly over the loom, and are continued nearly in an horizontal poſition on one ſide of the loom to a convenient diſtance; where they are all ſpread on a croſs piece faſtened to two ſtaples: theſe are called the *tail of the mounture*; and from each of theſe packthreads, juſt by the ſide of the loom, are faſtened other packthreads, called *ſimples*, which deſcend to the ground; ſo that by pulling theſe ſimple cords, you raiſe any of the threads of the warp at pleaſure: wherefore they faſten a loop or potlart to as many of theſe ſimple cords as there are threads of the warp to be pulled up at every ſhoot, or every throw of the ſhuttle; by which means the ſhoot ſhews itſelf on the right ſide, where the warp is pulled up: and in ordering this, they are guided by the pattern, on which they count the diſtances of the ſubdiviſions, which contain the ſame colours in the ſame line, and can be ſhot at once: then they faſten potlarts to the ſeveral ſimple cords that draw up the rings, through which thoſe threads of the warp run, which are to lie behind this colour; they tie all theſe loops together, and faſten a piece of worſted or ſilk to the knot, of the ſame colour that the workman is to throw; and the boy, when he pulls each loop, names the colour, that the weaver may take the proper ſhuttle, and ſo on for every colour to be thrown. Phil. Tranſ. Abr. vol. vi. p. 469, &c.

In connection with this ſubject, we are naturally led to give a brief account of the manufacture of carpets. This is ſaid to have been introduced into France from Perſia in the reign of Henry IV. where it has been diſtinguiſhed by extraordinary encouragement. The moſt conſiderable manufactory of this kind is that of Chaillot, or the royal manufactory of La Savoniere, or the Soap-houſe, about a league from Paris. This manufacture is altogether of wool, and worked in the manner of velvet. All ſorts of figures of animals may be imitated in this work, but fruits and flowers anſwer beſt, and it is moſt ſucceſsfully applied to the manufacture of carpets and all ſorts of ſcreens.

The carpets are, in ſome reſpects, wrought by the upright way of *tapeſtry*. The two rollers are placed the ſame way: the warp is braced from the top downward: the chain, with its loops, keeps all the threads of the warp equally perpendicular; the ſtick, which facilitates their croſſing, runs through them in the ſame manner, and ſeparates the foremoſt threads from the reſt: the lizier-pole holds all the ſtrings, which ſerve to draw the fore-threads in their turns, and then the oppoſite threads, in order to inſert the ſpindles of wool. But the method of working in this manufactory differs from the upright way of *tapeſtry* in the following particulars.

The warp is divided, both before and behind, into parcels of ten threads, nine white and one blue; which is regularly continued through the whole width of the piece. The weaver works on the foreſide, and conſequently ſees what he does. The deſign or pattern is traced in its proper colours on cartons, tied about the workman, who looks at it every moment, becauſe every ſtitch is marked upon it, as it ought to be in his work. By this means he always knows what colours and ſhades he is to uſe, and how many ſtitches of the ſame colour. In this he is aſſiſted by ſquares, into which the whole deſign is divided; each ſquare is ſubdivided into ten vertical lines, correſponding with each parcel of ten threads of the warp; and beſides each ſquare is ruled with ten horizontal lines, croſſing the vertical lines at right angles The workman having placed his ſpindles of thread near him, begins to work on the firſt horizontal line of one of the ſquares. Theſe lines marked on the carton are not traced on the warp, for this would be endleſs; becauſe an iron-wire, which is longer than the width of a parcel of ten threads ſupplies the place of a croſs line. This wire is managed by a crook at one end, at the workman's right hand; towards the other end it is flatted into a ſort of knife, with a back and edge, and grows wider to the point. The workman fixes his iron wire, or rod, horizontally on the warp, by twiſting ſome turns of a ſuitable thread of the woof round it, which he paſſes forward and backward, behind a fore-thread of the warp, and then behind the oppoſite thread, drawing them in their turn by their leiſhes. Afterwards, if it be neceſſary, he brings his woof-thread round the wire, in order to begin again to thruſt it into the warp. He continues in this manner to cover the iron rod or wire, and to fill up a line to the tenth thread of the warp, which is the blue one. He is at liberty either to ſtop here, or go on with the ſame croſs line in the next diviſion. According as he paſſes the thread of the woof round the iron wire, and into the warp, the threads of which he cauſes to croſs one another every inſtant; when he comes to the end of the line, he takes care to ſtrike in, or cloſe again all the ſtitches with an iron reed, whoſe teeth freely enter between the empty threads of the warp, and which is heavy enough to ſtrike in the woof he has uſed. This row of ſtitches is again cloſed and levelled, by a dweet of blue thread doubled, which the workman puts into the warp, ſliding his hand over the whole length of line he has wrought. He croſſes the ſame threads of the warp, and then ſtretches through them another ſingle blue thread. He beats in theſe two threads, one after another with his reed; theſe dweets of croſs thread, which are a ſupport to each line, will be hid by the pile on the fore-ſide, and they indeed diminiſh the beauty of the wrong ſide; but this is of no conſequence. This done, the workman draws the iron rod or knife out of the loops of the woof that covered it; and as it is wider towards its end, theſe loops reſiſt its paſſage; but being edged at its fore part, it cuts them through. Then the workman with his left hand lays a ſtrong pair of ſhears along the finiſhed line, cuts off the looſe hairs, and thus forms a row of tufts perfectly even, which, together with thoſe before and after it, form the ſhag. One line of this ſort comprehending the row of ſtitches and woollen pile, with the two blue threads which ſupport them, ſomewhat ſurpaſs in thickneſs the ſpace between the firſt and ſecond croſs line of a ſquare. By this means the workman always ſees what he is doing. He follows, ſtitch for ſtitch and colour for colour, the plan of his pattern which he is at, and paints magnificently without having the leaſt notion of painting or drawing.

The manufacture of carpets, after the manner of Chaillot, was introduced into London in the year 1750, by two workmen who left the manufactory in diſguſt, and came here to procure employment. They were encouraged and furniſhed with materials by Mr. Moore, to whoſe aſſiduity and zeal the eſtabliſhment of this ſort of manufacture has been principally owing. However, theſe men afterwards connected themſelves with a Mr. Peter Pariſot, who, under the patronage, and by means of the pecuniary aſſiſtance of his royal highneſs the late duke of Cumberland, purſued the manufacture of a carpet already begun at Paddington. This undertaking was ſoon removed to Fulham, and, under the munificence of the duke, promiſed to be durable and advantageous. In 1752, Pariſot, the undertaker, propoſed a plan of ſubſcription, the nature of which it is now needleſs to recite; as the whole ſcheme, as far as he was concerned in it, ſoon came to nothing. But Mr. Moore, being provided with the neceſſary materials and engaging proper workmen, and riſquing a very conſiderable expence, ſucceeded in eſtabliſhing this important and uſeful manufacture, inſomuch, that, in 1757, he obtained a premium from the Society of Arts, &c. for the beſt carpet in imitation of the Turky carpets; and by his ingenuity and perſeverance in bringing this manufacture to perfection, it is now arrived at a very high degree of reputation.

Mr. Whitby and Mr. Paſſavant were alſo honoured with premiums for carpets of their manufacture by the Society of Arts in 1757 and 1758. We have alſo manufactories for carpets that are much eſteemed at Axminſter and Wilton; not to mention thoſe of Kidderminſter and other places.

TAPETI, in *Zoology*, the name of an animal common in the Weſt Indies, and called by ſome *cuniculus Americanus*, the *American rabbit*. In the Linnæan ſyſtem, this animal is a ſpecies of HARE, or *lepus Braſilienſis*. It has large ears like the common hare; a white ring round the neck, though ſome have not this ring; the face of a rediſh colour; the chin white, the eyes black; colour of the body like that of the common hare, but darker; the body whitiſh, without a tail. Theſe animals inhabit Braſil, live in woods, do not burrow, are very prolific, and afford good meat. The *tapeti* is found alſo in Mexico, where it is called *citli*. Pennant.

TAPHICESIUS *lapis*, a name given by Pliny and the ancients to a ſpecies of ætites, or eagle-ſtone, found in a place of that name near Leucadia.

TAPHNEUS, a word uſed by ſome writers to expreſs any thing when depurated or purified to the greateſt degree, as the ſalts by repeated ſolutions and cryſtallizations, and the like. Paracelſus uſes it for a ſpecies of earth, the things produced from which, he ſays, never alter their nature by calcination or reverberation, or the like operations.

TAPIA, in *Botany*, a name given by Plumier to a genus of plants called afterwards by Linnæus CRATEVA.

TAPIIR, or TAPIJERETE, in *Natural Hiſtory*, the name of an animal found in ſome parts of America, and called by the Portugueſe *anta*. It is of the ſize of a young calf, and in ſhape ſomewhat approaching to the figure of the hog, and the back arched; its head is thicker than a hog's, and ends in a ſharp ridge at top; and the male has a ſnout, or ſort of proboſcis, hanging over the opening of the mouth, in which he has a very ſtrong muſcle, ſerving to retract it at pleaſure; the noſe of the female is deſtitute of the proboſcis, and the jaws are of equal length; the dentes inciſores are ten in each jaw; from the end of theſe the jaw ſeems toothleſs for a little ſpace; the grinders are large, and are placed five on each ſide; ſo that, on the whole, the creature has twenty of each ſort of teeth; its eyes are ſmall, and very like thoſe of the hog; its ears roundiſh, bordered with white; and theſe he can draw forward at pleaſure; its legs are thick, and not longer than thoſe of our hogs; its fore-hoofs are divided into three portions, and a ſort of falſe hoof behind; but its hind-hoofs into three; its tail is very ſmall; the ſkin is hard and ſolid; and the hair ſhort, and of a pale brown, and when young, variegated with white ſpots; and along the neck is a briſtly mane, an inch and a half high. It lives in thick woods, on the eaſtern ſide of South America, from the Iſthmus of Darien to the river of Amazons; and ſleeps all day, but at night or early in the morning goes out for its prey: it feeds on vegetables, and is particularly fond of the ſtalks of the ſugar-cane: it often takes the water, and ſwims excellently; the natives, in places where it is common, eat its fleſh, which is ſaid to be good: the Indians ſhoot it with poiſoned arrows, and cut the ſkin into bucklers. This animal is ſalacious, ſlow-footed, and ſluggiſh, and makes a kind of hiſſing noiſe. Ray and Pennant. See *Tab.* V. *Quadrupeds*, N° 62.

TAPINOSIS, ταπείνωσις, in *Rhetoric*, the ſame with DIMINUTION.

TAPIS. See TUNICA.

TAPLINGS, in the *Engliſh Salt Works*, the name given to certain bars of iron which ſupport the bottom of the pan in which the brine is boiled.

Theſe pans are very large, and cover a wide furnace; but as their width would make them apt to bend in the middle, which would ſpoil the working of the ſalt, there is a ſort of wall of brick carried along the middle of the furnace; and on the top of this are placed theſe *taplings*: they are about eight inches high, and from four to ſix in thickneſs, being ſmalleſt at the top. Theſe are placed at about three feet diſtance one from another, and the wall which ſupports them, and which is called the *mid-feather*, is broad at the baſe, and ſo narrow at the top, as barely to give room for the baſes of the *taplings*.

TAPPING, the act of piercing a hole in a veſſel, and applying a tube, or cannula, in the aperture, for the commodious drawing off the liquors contained therein.

Tapping, in *Agriculture*, is the making an inciſion in the bark of a tree, and letting out the juice.

To tap a tree at the root is, to open it round about the root.

Ratray, the learned Scot, affirms, that he has found by experiment, that the liquor, which may be drawn from a birch-tree in the ſpring time, is equal to the whole weight of the tree, branches, roots, and all together.

In the *tapping* of trees, the juice, taken in from the earth, aſcends from the root; and, after it is concocted and aſſimilated in the branches, &c. it deſcends like a liquor in an alembic, to the orifice or inciſion where it iſſues out.

One of the moſt effectual ways of *tapping*, ſo as to obtain the greateſt quantity of ſap, in the ſhorteſt time, is, not only to pierce the bark, or to cut the body of the tree almoſt to the pith, with a chiſſel (as ſome have directed), but to bore it quite through all the circles, on both ſides of the pith, leaving only the outermoſt and the bark on the north-eaſt ſide unpierced.

This hole is to be bored ſloping upwards, as large as the largeſt augre will make; and that alſo through and under a large arm near the ground. So will it not need any ſtone to keep open the orifice, nor tap to direct the ſap into the receiver.

By this method the tree will, in a ſhort time, afford liquor enough to brew withal; and with ſome of this ſweet ſap, one buſhel of malt will make as good ale as four buſhels of malt with ordinary water. The large maple, which we call the ſycamore, is ſaid to yield the beſt brewing ſap, its juice being very ſweet and wholeſome. See Birch-*tree*.

To preſerve the Sap *for brewing*. Inſolate it by a conſtant expoſure to the ſun in proper veſſels, till the reſt be gathered and ready; otherwiſe it will contract an acidity: when there is enough, put into it as much very thin cut, and hard toaſted rye-bread, as will ſerve to ferment it; and when it works take out the bread, and bottle up the liquor. A few cloves in each veſſel that receives the ſap, as it ouſes from the tree, will alſo, certainly, preſerve it a twelvemonth. See Dr. Tonge's Obſ. in the Philoſophical Tranſactions, N° 43, 44. 46. 68. or Abr. vol. ii. p. 673, &c.

Tapping, *paracenteſis*, in *Surgery*, conſiſts in opening a little hole in the abdomen to let out water collected in the cavity thereof, or between the teguments, in an aſcites or water-dropſy.

The ancients cut the aperture with a lancet, or by inſerting a knife, whoſe point was about a third part of an inch broad, into one ſide of the abdomen, about four fingers breadth below the navel; having uſually perforated the ſkin firſt with a cauſtic. Then introducing a cannula of lead, copper or ſilver, they diſcharged ſo much of the water at a time as the patient's ſtrength would allow; and when a ſufficient quantity of water was diſcharged, the cannula was left in the wound, and its orifice ſtopped with a cork or doſſil of lint, over which was applied a ſticking plaſter, compreſs, and bandage, with a napkin and ſcapulary. And the next day they repeated the diſcharge again. But by leaving the cannula in the wound, it is almoſt impoſſible to avoid inflammation, mortification, or other bad ſymptoms. The moderns, in order to avoid this and other inconveniences, have contrived the inſtrument, with the cannula and ſharp-pointed needle or bodkin, called a trochar. This inſtrument, the end of it being firſt dipped in oil, is thruſt into the cavity of the abdomen, in the middle of the ſpace between the navel and angle of the *os ilium*; and after drawing out the ſharp-pointed bodkin from the cannula, which is left in the wound, as much water may be drawn off at a time as the patient can well bear; and if he does not grow faint, the whole quantity may be drawn off at once.

In order to prevent his fainting, the ſurgeon, or his aſſiſtant, preſs with both hands on each ſide of the abdomen during the operation; or a ſwath made of broad linen, perforated in the middle, may be put round the abdomen and gradually drawn tighter till all the water is evacuated. After this may be applied to the abdomen a flannel compreſs, which has been ſqueezed out of ſpirits of wine, and retained by a tight roller; by which means Heiſter obſerves, the patient not only avoids fainting, but rather becomes more eaſy and robuſt, ſo as to walk about after the operation.

In *tapping* for the dropſy, ſurgeons were formerly very careful to draw off only a ſmall quantity of water at one time, and therefore repeated it often, till the whole was evacuated. The reaſon of this was to avoid the ſyncope, which uſually attended the operation when all the water was evacuated at once. But Dr. Mead having diſcovered the true cauſe of this ſyncope to be owing to the removal of the preſſure from the deſcending aorta, it was ſoon found, that the bad conſequences might be prevented by emptying the belly at one operation, and preſerving a proper preſſure at the ſame time, which ſhould be done equally and gradually, as the water runs out. Bandages have been contrived for this purpoſe in England and in France; but according to Mr. Monro, they are not ſufficient, and be therefore invented a belt of fine flannel, covered with ſtrong linen, which will better anſwer the purpoſe. The body of the belt is only ſo wide as to reach from the ſpine of one os ilium to that of the others; to one end of this body ſtrong tapes or ribbands are ſewed at a little diſtance from each other, and to the other end are put as many well poliſhed buckles. Near the inferior ſide of the belt, and at a ſmall diſtance from each end, a little window is cut, which can be ſhut with two buckles and ſtraps. This belt, however, being ſubject to ſome inconveniences in the application of it, when the belly is very much diſtended, he has improved it by adding a ſlanting ſlap to its inferior edge, from which two ſtraps, with buckles at their extremities, paſs between the patient's thighs, and are faſtened to other ſtraps, which come out from the upper edge of the circular band, or to a ſcapular bandage brought over the patient's ſhoulders: by which contrivance, the ſlanting flap will compreſs the hypogaſtric region, which the circular belt could not reach, and the additional ſtraps, being lightly drawn, will keep the circular band ſtretched at its full breadth.

For the draught and deſcription of this belt, we refer to the Medic. Eſſ. Edinb. vol. i. art. 18. or its abridgment, vol. ii. p. 102. where the curious may find ſeveral practical obſervations about this operation.

With contrivances of this kind for compreſſing the abdomen, it is the advice and practice of modern ſurgeons, to draw off the whole quantity of water at the firſt *tapping*, and to repeat it upon a return of the diſorder. Accordingly, Dionis and Garengeot aſſert, that extracting all the water at the firſt time has little or no effect in weakening the patient if a proper preſſure and bandage be uſed; Garengeot, therefore, makes the evacuation at once, and cleans the emptied cavity, in order to remove the feculent part of the waters which ſubſides therein, and is apt, by its acrimony, to occaſion mortifications.

As to the place where the perforation with the trochar is to be made in *tapping* the belly, it has been commonly determined to be four or five inches below, and as much to a ſide of the navel, or a point where a line at that diſtance from, and parallel to the linea alba, would be interſected by another line drawn perpendicular to the linea alba, at four or five inches below the navel.

Mr. Monro obſerves, that this rule of meaſuring four or five inches, which, in healthy perſons of middle growth and ſtature, would determine a very ſafe and convenient place for making the puncture, cannot be applied to hydropic people, whoſe abdomen is diſtended. Garengeot ſays, that the puncture ought to be made in the middle between the navel and ſpine of the os ilium; but this rule is uncertain: and, according to Mr. Monro, *ubi ſupra*, the preciſe point to be pierced may be determined in all ſubjects and different degrees of diſtenſion, by only remarking that in a ſound ſtate, a point four inches below, and to a ſide of the navel, is the middle betwixt the navel and anterior ſpinal proceſs of the os ilium, and that the muſcular parts of the abdomen are almoſt equally ſtretched in the *hydrops aſcites apertus*; whence it follows, that this middle point between the navel and this ſpinal proceſs is nearly invariable, and therefore, is the part where the perforation ought always to be made in *tapping*. In the operation, having marked this point with ink, he applies the belt above mentioned, with the flannel-ſide next the ſkin, well charged with fumes of benzoin, maſtich, and other ſimilar drying and corroborant medicines, the marked point of the ſkin being in the middle of one of the windows or openings of the belt, after which a linen compreſs or piece of flannel is put on the back to defend it from being hurt by the buckles, and a long piece of flannel three or four fold is put under the buckles, that they may not fret the ſkin; and, laſtly, the tapes or ſtraps are put through the buckle and drawn a little tight, ſo that the water is preſſed to the part of the abdomen where is the leaſt reſiſtance, or the part in the open window, which becomes more prominent and fitter for perforation; and thus alſo on account of the increaſed diſtance of the viſcera, &c. there will be leſs danger of wounding the guts, &c. by the point of the trochar. As the water is drawn off, the ſtraps are pulled ſtraighter; and the ſame preſſure on the abdomen may be preſerved in every ſtage of the operation, by maintaining the ſame difficulty of breathing to the patient. When all the water is evacuated, a pledget and plaſter are to be applied to the orifice, from which the cannula is taken away; and a compreſs being put over theſe, the window is to be ſhut on this, and brought to the ſame tightneſs with the reſt of the band. This window can be opened and ſhut at pleaſure, and the wound dreſſed, and the whole belt, as occaſion requires, may be ſlackened or ſtraitened.

Though the trochar is a ſharp-pointed inſtrument, yet there is no danger of wounding the inteſtines by it when thruſt into the abdomen; becauſe they are kept at a conſiderable diſtance from the inſtrument by the intervening water: and even if the inſtrument were to touch the inteſtines, they would receive no great injury, as they make but little reſiſtance. But as early *tapping* has been much recommended, in which caſe the quantity of water may not afford ſufficient reſiſtance to the common inſtrument, Mr. Andree has obviated this inconvenience by a new TROCHAR, which may be introduced without force, and, therefore, a ſmall quantity of water will prevent its point from doing miſchief.

Before the operation of *tapping* is undertaken, the ſurgeon ſhould be well aſſured, that there is a quantity of water in the abdomen, by applying his two hands on each ſide of the patient's belly, as he ſtands or ſits, and ſhaking it from one ſide to the other; by which means he will perceive a fluctuation of the water from one ſide to the other; which cannot be obſerved when the lymph is not extravaſated into the cavity of the abdomen.

Mr. Sharp obſerves, that if the navel protuberates, and not the inteſtines or omentum, and water is only lodged there, a ſmall puncture made there with a lancet will diſcharge the water, without endangering a rupture of the part.

Mr. Warwick tell us, however, that notwithſtanding the improvements introduced into this operation, an aſcites ſhews, that the uſe of *tapping* is but precarious, by returning as conſtantly as ever this method alone is put in practice to remove it. He has therefore endeavoured at a farther improvement, whereby the *tapping*, inſtead of being a bare temporary relief of ſymptoms, becomes an abſolute cure. This method is, after evacuating the water, to make an injection of equal parts of Cahors wine, or claret, and Briſtol water, blood-warm, into the emptied cavity. He mentions a cure he performed in this manner. See Phil. Tranſ. N° 472. ſect. 3.

Dr. Hales has given us in the ſame Tranſaction, ſect. 4. a method of conveying liquors into the abdomen during the operation of *tapping*, by means of two trochars fixed at the ſame time one on each ſide of the belly, one of them having a communication with a veſſel full of the medicine liquor, by means of a ſmall leather pipe. This veſſel might be raiſed high enough above the abdomen to force the liquor in by the laws of hydroſtatics. The advantage propoſed by this method, is to prevent a ſyncope from inanition. See a farther account of the ſucceſs of injecting medicated liquors into the abdomen, in the caſe of an aſcites, in Phil. Tranſ. N° 473. ſect. 4.

It has been a common complaint that *tapping* has ſeldom proved more than a palliative and temporary remedy in dropſies. Indeed when the dropſy proceeds from ſcirrhoſity of ſome of the viſcera, and is attended with an internal abceſs, and a conſumption of the whole habit, the ſurgeon can expect no credit or ſucceſs from undertaking the operation; neither can he expect it in thoſe dropſies, which come upon the patient not by degrees but all at once, which is a ſign of ſome large lymphatic veſſels being burſt. But in young and robuſt patients, who have not been long ſubject to the diſorder, the operation may be uſed with ſucceſs, and the patient perfectly recovered. And though *tapping* of dropſical patients fails often in radically curing the diſorder, the operation is neither dangerous nor very troubleſome, and it at leaſt eaſes them of the oppreſſion, difficulty of breathing, and other ſymptoms with which they are afflicted.

The late Dr. Fothergill obſerves, that *tapping* may have incurred ſome part of its diſgrace, from its being delayed too long: and, therefore he has recommended it as early as poſſible, after finding that the quantity of water was ſuch as could not be removed by medicines, without doing great violence to the conſtitution; and that the fluctuation was ſo evident as to render the operation ſafe. Accordingly, when he has been called to a patient tending to a dropſy, the belly beginning to fill, the urine paſſing in ſmall quantities, the appetite failing and thirſt increaſing, with the loſs of fleſh in the upper parts of the body, he has recourſe to ſuch diuretics, purgatives, and corroborants intermixed, as the ſtate of the caſe, and the nature of its cauſes indicate. If by a reaſonable perſeverance in this courſe, no conſiderable benefit accrues; if the viſcera do not evidently appear to be obſtructed and unfit for the future purpoſes of life; if the complaints have not been brought on by a long and habitual train of intemperance, and from which there ſeems little hope of reclaiming the patient; if the ſtrength and time of life are not altogether unfavourable; he deſiſts from medicine, except of the cordial reſtorative kind; and lets the diſeaſe proceed till the operation becomes ſafely practicable: when this is done, by the moderate uſe of the warmer diuretics, chalybeates, and bitters, and alſo the preparations of ſquills in doſes below that point at which the ſtomach would be affected, he endeavours to prevent them from filling again. Dr. Fothergill alſo mentions a method of ſcarification that has often ſucceeded in anaſarcous ſwellings of the legs and thighs; at leaſt ſo far as to draw off large quantities of water, without either ſo much pain or danger as in the common way by inciſions. He orders this operation to be performed with the common ſcarificator uſed in cupping, and the inſtrument to be placed ſo as to make the wounds tranſverſely. By this method, a large quantity of water will often drain from the legs and thighs, without riſk of inflammation, or deterring the patient from a repetition, if neceſſary. To proceed with all poſſible ſafety, he commonly orders the inſtrument firſt to be applied about the middle of the calf on each ſide of the leg, and either to one leg only, or to both, as occaſion requires. The application of glaſſes, either to raiſe the ſkin, or promote the diſcharge afterwards, is unneceſſary. The inſtrument is gently preſſed upon the ſkin till a ſurface is formed ſufficiently flat to admit the lancets in the ſcarificator to take effect equally. By making theſe little openings in the ſkin tranſverſely, they give vent more freely to the fluid, and are longer before they unite. This kind of application will prevent much miſchief in all anaſarcous habits, where the ſeroſa colluvies increaſes faſt, and the ſkin is ſo ſtretched as to threaten a rupture, or inflammation and gangrene. Likewiſe, where the breath is extremely affected in ſuch habits, a temporary relief may, in this manner, often be obtained, in order to give a fair chance to remedies adminiſtered internally. Lond. Med. Obſ. vol. iv. art. 9.

The paracenteſis, or perforation of the thorax, is performed in ſeveral diſorders; particularly in the EMPHYSEMA and EMPHYEMA: and alſo of the ſcrotum for the HYDROCELE, by means of a lancet or TROCHAR, which is generally preferred, and of which Mr. Andree has propoſed ſome improvement in order to adapt it for this operation. See, beſides the writers already named and cited on this ſubject, Heiſter's Surgery, part ii. p. 65. 70. 117. See THORAX.

TAP-TOO. See TAT-TOO.

TAR, or TARR, a groſs pitchy liquor, iſſuing from the wood and bark of old pines, or firs, either naturally, or by burning. See PINE.

Some modern writers inform us, that *tar* flows from the trunks of pines and firs, when they are very old, through inciſions made in the bark near the root; that pitch is only *tar* inſpiſſated, and both are the oil of the tree grown thick and black with age and the ſun. The trees, like old men, being unable to perſpire, and the ſecretory ducts obſtructed, they are, as one may ſay, choaked and ſtuffed with their own juice. But the method uſed by our colonies in America of making *tar* and pitch, is, in effect, the ſame with that of the ancient Macedonians; as appears from the account given in the Philoſophical Tranſactions. And the relation of Leo Africanus, who deſcribes, as an eye-witneſs, making of *tar* on mount Atlas, agrees in ſubſtance with the methods uſed by the Macedonians of old, and the people of New England of this day.

According to Theophraſtus, not only the turpentine-trees, the pines, and the firs, yield reſin or *tar*, but alſo the cedars and palm-trees: and the words *pix* and *roſin* are taken by Pliny in ſo large a ſenſe, as to include the weepings of the lentiſcus and cypreſs, and the balms of Arabia and Judæa; all which perhaps are near of kin, and in their moſt uſeful qualities concur with common *tar*, eſpecially the Norwegian, which is the moſt liquid and beſt for medicinal uſes. Thoſe trees that grow on mountains, expoſed to the ſun or north wind, are reckoned to produce the beſt and pureſt *tar*; and the Idæan pines were diſtinguiſhed from thoſe growing on the plain as yielding a thinner, ſweeter, and better ſcented *tar*.

There is alſo a kind of *tar*, the project of making which was ſuggeſted by Becher, the celebrated chemiſt, in the time of king Charles II. which has for ſeveral years been prepared from coal in the biſhoprick of Liege, and in other parts of Germany: we alſo make conſiderable quantities in England, eſpecially near Broſely in Shropſhire, and at Briſtol. In the biſhoprick of Liege the coal is diſtilled in a kind of ſtill, compoſed of two large caſt-iron pots. In England the coal is put into ovens, which are heated by fires lighted under their bottom, and the liquid matter is forced through an iron pipe inſerted into the top of the oven, and which communicates with proper condenſing veſſels. Watſon's Chem. Eſſ. vol. ii. p. 346, &c.

The earl of Dundonald, in Scotland, has lately invented the art of extracting *tar* and pitch from pit-coal, by a new proceſs of diſtillation. See Addreſs and Propoſals by Sir John Dalrymple, 1784.

Tar in ſubſtance, mixed with honey, has been found an excellent medicine for coughs.

The ancients eſteemed *tar* good againſt poiſons, ulcers, the bites of venomous creatures: alſo for phthiſical, ſcrophulous, paralytic, and aſthmatic perſons. But the method of rendering it an inoffenſive medicine, and agreeable to the ſtomach, by extracting its virtues in cold water, was unknown to them. Siris, ſect. 9. 16. 17. 21. 28 See Tar-*water*, *infra*.

Tar is ſometimes given in ſubſtance, mixed with ſo much powdered liquorice, or other ſuch powdery matter, as is ſufficient to render it of a fit conſiſtence to be formed into pills. See Unguentum *è pice*.

But the chief uſe of *tar* is for paying the ſides of ſhips and boats, and their rigging, in order to preſerve them from the effects of the weather, which would otherwiſe crack or rot them.

Tar, *Barbadoes*. See Barbadoes *Tar*.

Tar, in *Sea Language*, a figurative expreſſion for a ſailor of any kind.

Tar-*water*. As the cold infuſion of *tar* has been formally much in vogue, and has been recommended by one of the moſt learned and ingenious writers of the age, it may not be improper to give ſome account of its virtues from the biſhop of Cloyne's Siris, or chain of reflections concerning the virtues of *tar-water*.

In ſome parts of America, *tar-water* is made by putting a quart of cold water to a quart of *tar*, and ſtirring them well together in a veſſel, which is left ſtanding till the *tar* ſinks to the bottom. A glaſs of clear water being poured off for a draught, is replaced by the ſame quantity of freſh water, the veſſel being ſhaken, and left to ſtand as before. And this is repeated for every glaſs, ſo long as the *tar* continues to impregnate the water ſufficiently, which will appear by the ſmell and taſte.

But as this method produces *tar-water* of different degrees of ſtrength, the author ſays, he chuſes to make it in the following manner: pour a gallon of cold water on a quart of *tar*, and ſtir and mix them thoroughly with a ladle or flat ſtick, for the ſpace of three or four minutes; after which the veſſel muſt ſtand eight and forty hours, that the *tar* may have time to ſubſide; when the clear water is to be poured off, and kept for uſe, no more being made from the ſame *tar*, which may ſtill ſerve for common purpoſes.

This cold infuſion of *tar* has been uſed in ſome of our colonies as a preſervative or preparative againſt the ſmall-pox, which foreign practice induced the biſhop to try it in his own neighbourhood, when the ſmall-pox raged with great violence. He ſays the trial fully anſwered his expectation; all thoſe within his knowledge, who took the *tar-water*, having either eſcaped that diſtemper, or had it very favourably. Several were preſerved from taking the ſmall-pox by the uſe of this liquor; others had it in the mildeſt manner; and others, that they might be able to take the infection, were obliged to intermit drinking *tar-water*. He ſays, he has found it may be drank with great ſafety and ſucceſs for any length of time, and this not only before, but alſo during the aforeſaid diſtemper.

The general rule for taking it, is about half a pint night and morning, on an empty ſtomach, which quantity may be varied according to the caſe and age of the patient, provided it be always taken on an empty ſtomach, and about two hours before or after a meal.

It has been found, that ſeveral perſons, infected with cutaneous eruptions and ulcers, were immediately relieved, and ſoon after cured by the uſe of this medicine. It is ſaid, that even in the fouleſt diſtempers, it proved much more ſucceſsful than ſalivations and wood-drinks had done. It alſo ſucceeded beyond expectation in a tedious and painful ulceration of the bowels, in a conſumptive cough, and (as appeared by expectorated pus) an ulcer in the lungs, in a pleuriſy and peripneumony. And when a perſon who had been for ſome years ſubject to eriſipelatous fevers, perceived the uſual forerunning ſymptoms to come on, the drinking of *tar-water* prevented the eryſipelas.

Tar-water cures indigeſtion, and gives a good appetite. It is an excellent medicine in an aſthma; it imparts a kindly warmth and quick circulation to the juices, without heating, and is therefore uſeful, not only as a pectoral and balſamic, but alſo as a powerful and a ſafe deobſtruent in cachectic and hyſteric caſes. As it is both healing and diuretic, it is very good for the gravel. The biſhop ſays, he believes it to be of great uſe in a dropſy, having known it cure a very bad anaſarca in a perſon whoſe thirſt, though very extraordinary, was in a ſhort time removed by the drinking of *tar-water*. From the ſucceſs of this medicine in five or ſix inſtances, the biſhop believes it to be the beſt and ſafeſt, either for preventing the gout, or for ſo ſtrengthening nature againſt the fit, as to drive it from the vitals.

It may likewiſe be ſafely uſed in inflammatory caſes; and, in fact, hath been found an admirable febrifuge, at once the ſafeſt cooler and cordial.

The ſalts and more active ſpirits of *tar* are got by infuſion in cold water; but the reſinous is not to be diſſolved thereby. Hence the prejudice which ſome, perhaps, may entertain againſt *tar-water*, the uſe whereof might inflame the blood by its ſulphur and reſin, as a medicine, appears to be not well grounded. It is obſerved by chemiſts, that all ſorts of balſamic wood afford an acid ſpirit, which is the volatile oily ſalt of the vegetable. Herein is chiefly contained their medicinal virtues; and this author affirms, that by the trials he has made, it appears, that the acid ſpirit in *tar-water* poſſeſſes the virtues, in an eminent degree, of that of guaiacum, and other medicinal woods.

It is certain *tar-water* warms, and therefore ſome may perhaps ſtill think it cannot cool. The more effectually to remove this prejudice, let it be farther conſidered, that, as on one hand, oppoſite cauſes do ſometimes produce the ſame effect; for inſtance, heat by rarefaction, and cold by condenſation, do both increaſe the air's elaſticity; ſo, on the other hand, the ſame cauſe ſhall ſometimes produce oppoſite effects. Heat, for inſtance, in one degree thins, in another coagulates the blood. It is not therefore ſtrange, that *tar-water* ſhould warm one habit, and cool another; have one good effect on a cold conſtitution, and another good effect on an inflamed one; nor, if this be ſo, that it ſhould cure oppoſite diſorders. A medicine of ſo great virtue in ſo many different diſorders, and eſpecially in that grand enemy the fever, muſt needs be a benefit to mankind in general. There are nevertheleſs three ſorts of people to whom the biſhop ſays, he would peculiarly recommend it; ſea faring perſons, ladies, and men of ſtudious and ſedentary lives. See Two Letters from the Biſhop of Cloyne, &c. publiſhed in 1747.

If it be aſked what preciſe quantity or degree of ſtrength is required in *tar-water*? it is anſwered, that the palate, the ſtomach, the particular caſe and conſtitution of the patient, the very ſeaſon of the year will diſpoſe and require him to drink more or leſs in quantity, ſtronger or weaker in degree. Preciſely to meaſure its ſtrength by a ſcrupulous exactneſs, is by no means neceſſary.

It is to be obſerved, that *tar-water* ſhould not be made in unglazed earthen veſſels, theſe being apt to communicate a nauſeous ſweetneſs to the water.

The ſame ingenious author recommends *tar-water* in the plague, and for the diſtemper among the horned cattle; with what ſucceſs muſt be left to experience.

Though this medicine, ſays Dr. Lewis, is undoubtedly very far inferior to the character that hath been given of it, it is apparently capable of anſwering important purpoſes, as a deobſtruent balſamic ſolution moderately warm and ſtimulating. It ſenſibly raiſes the pulſe, and increaſes either perſpiration or the groſſer evacuations. He adds, "I have been informed of ſome late inſtances "of its good effects in diſorders of the leprous kind." Mat. Med.

TARABE, in *Ornithology*, the name of a Braſilian parrot, larger than the common green parrot. Its general colour is green; but its head, breaſt, and the origin of its wings, are red; its beak and legs, are of a duſky grey. Marcgrave.

TARAE *lapis*, the name given by the writers of the middle ages to a ſtone which they ſay had the power of ſtopping all ſorts of fluxes. They have left us no deſcription of it, and it ſeems to have been loſt even in their times; for they obſerve that the phyſicians uſed the ſanguis draconis, or dragon's blood, in its place.

TARAGUICO *aycuraba*, in *Zoology*, the Braſilian name for a ſpecies of lizard, much approaching to the nature of the taraguira; but its tail is covered from its beginning with ſmall triangular ſcales, and very regularly marked with four brown ſpots; the back alſo, particularly that part which is next the head, is variegated with undulated brown lines. Ray.

TARAGUIRA, in *Zoology*, the name of an American lizard. It grows to about a foot long; its body rounded, and every where covered with ſmall triangular duſky grey ſcales; its back is ſmooth, and it has not that falſe gullet under the throat which the iguana has.

This is the ſpecies of lizard of which it is reported, that it will wake a ſleeping perſon, if it ſee him in danger of being bitten by a ſerpent. It is very common about houſes and gardens in South America, and runs very ſwiftly, but with a waddling motion; and when it ſees any thing at a diſtance, has an odd way of nodding its head very ſwiftly. Ray.

TARANDUS, in *Zoology*, a name given by Agricola, and ſome other authors, to the *rein*-DEER.

TARANIOLO, in *Ornithology*, a name by which the whimbrel, or ſmall curlew, called the *arquata minor*, by authors, is known in the markets of Italy.

TARANIS, in *Ancient Mythology*, a name given by the Gauls to Jupiter, under which appellation they ſacrificed human victims to him.

Taranis correſponded to the *Jupiter Tonans* of the Romans. See THOR.

TARANTISMUS, in *Medicine*, the diſeaſe or affection of thoſe bit by the *tarantula*.

The patients under this malady are denominated *tarantati*.

Dr. Cornelio, in the Philoſophical Tranſactions, repreſents this as an imaginary diſeaſe; and tells us, that the *tarantati*, or thoſe who think themſelves ſeized with it (excepting ſuch as for particular ends feign themſelves ſo) are moſt of them young wanton girls, ſuch as the Italian writers call *Donne di ſale*, who, falling from ſome particular indiſpoſition, into melancholy madneſs, perſuade themſelves, according to vulgar prejudice, that they have been bitten by a *tarantula*.

But the evidence, on the other ſide of the queſtion, has gained conſiderable credit, as will appear from the following article.

TARANTULA, or TARENTULA, in *Natural Hiſtory*, a venomous inſect, whoſe bite gives name to a new diſeaſe called *tarantiſmus*.

The *tarantula* is a kind of ſpider, the *aranea tarantula* of Linnæus, ſo denominated from the city of Tarentum in Apulia, near which it is chiefly found. It is alſo called *phalangium Apulium*. Valetta, a monk of Apulia, who had always reſided about the places where this miſchievous animal is moſt frequent, and had had many opportunities of tracing its ſeveral qualities, publiſhed a ſuccinct, but very accurate hiſtory of it in the year 1706, under this name.

It has its name *phalangium*, from the three phalanges or joints of its legs, and this name equally ſuiting many other ſpiders, as well as this, it ceaſed to be its appropriated name, and was applied as a generical term to ſeveral other ſpiders of the larger kind; among which this ſpecies was always diſtinguiſhed by the epithet *Apulion*, from the place where it was ſo frequently found.

The *tarantula*, or *Apulian phalangium*, is frequent in all parts of this country, in uncultivated places, but more eſpecially it breeds moſt in ſunny dry hills, and particularly in ſuch parts of them as are expoſed to the ſouth.

It is ſaid not to be found any where except in Apulia, but probably it is an inhabitant of many other places, though its poiſon may not be violent enough any where elſe to bring on the effects it does there: as we find in vipers and many other poiſonous creatures, that the ſtrength of their poiſon differs greatly in degree in different places.

Mr. Geoffroy ſays, that it is the opinion of ſome, that the *tarantula* is never venomous but in the coupling ſeaſon; and Baglivi ſays, that it is never ſo but in the heat of ſummer; particularly in the dog-days, when, becoming enraged, it flies on all that paſs by.

As this ſpider is very tender, and eaſily injured by cold winds and rain, it always digs itſelf a cave in the ſide of a hill for its habitation; and uſually chuſes for this purpoſe the hardeſt ground it can find, which is better able to defend it, and which it eaſily works into with its forceps and claws. This always is hollowed upward in the hill, and by that means is ſafe from wet, all the water in rainy ſeaſons running down over its top. Sometimes it burrows itſelf a cave in a valley or plain, but then it always chuſes a dry, uſually a chalky ſoil. In this caſe, the entrance into its cave is ſmall, and within there are ſeveral winding paſſages: if it happens to be ſurpriſed with wet in this place, from hard rains, it quits the floor and hangs by its feet againſt the top of the cave. It preys upon a number of ſmall inſects, with which the fields of Apulia abound, and ſeldom appears in the day-time, but creeps out about the time of ſun-ſet, and preys at large upon the animals which are then betaking themſelves to reſt; without the danger it would be expoſed to from its own enemies by day-light. If at any time he remains the whole evening in his cave or den, it is only to practiſe another method of hunting his prey. In this caſe, he comes forward to the mouth of the hole, and there lies in wait; his fore-legs are placed at the extremity of the hole, and his eyes have a clear view all round. The other inſects are not aware of this trick, but as they walk near his hole he burſts out upon them; and, ſeizing them, he conveys them into his habitation; where, as ſoon as he has eaten them, he retires back into his cell to diſpoſe of the wings and other fragments, till he can carry them out at a more convenient time, and then places himſelf in his former poſture for another prey.

The peaſants of Apulia have a method of getting him out of his hole in the day-time, in order to deſtroy him. This they do by making a ſoft hiſſing noiſe through an oat ſtraw: whether it be that the creature loves this ſound, or rather that he takes it for the voice of ſome inſect that he is uſed to prey upon, he always comes out, and falls a ſacrifice to his greedineſs.

The creature has eight legs, and walks very well; his legs have each three joints, and are covered with a fine downy hairineſs; they are of a whitiſh colour at the bottom, and variegated with black lines, and are wholly black in their upper part, where they are joined to the breaſt: theſe all ariſe from a kind of oval ſhield, which is placed upon the breaſt, and is black, hairy, and very hard: this is called by ſome the *ſpeculum* of the *tarantula*. From the ſhoulders there grow a pair of horns, at leaſt they are uſually called ſo, though they ſeem much better to deſerve the name of *arms*; the uſe of theſe is to hold faſt the prey, that it may not be able to eſcape while he is killing it with his forceps: theſe horns or arms have the ſame number of joints that the legs have, but they greatly differ from the legs, in that they are ſhorter, and of a yellowiſh colour; they are alſo covered with a longer and thicker hair, for the more certainly holding the prey, and are terminated by black claws, and they are much ſmaller and more capable of motion every way. The belly is either white, or of a pale yellow, and is marked with a tranſverſe black ſtreak: this is ſurrounded with ſeveral other ſmall ſpots of the ſame colour, and is clothed with a very fine and ſhort down; the whole body beſide is covered with longer hairs, and is of a whitiſh or browniſh colour; the apex of the head, the ſhield of the breaſt, and the ends of the forceps, are as hard as a crab's claws; but the reſt of the body is covered with a tender ſupple ſkin: the eyes are very large, and of a fine ſhining black; they are continually in motion, and, when ſeen in the night, or in a duſky place, they ſhine like the eyes of a cat. In the place where the mouth is placed in other animals, there ariſes in this a black hard forceps; the upper part of this inſtrument is covered with a yellow hairineſs, and it is terminated by extremely fine and ſharp claws, which the creature can open or cloſe up at pleaſure. While the arms hold the prey in a proper poſition, theſe ſharp points make wounds in the body, and the other parts of the forceps ſqueeze the body till all its juices are preſſed out, and the creature feeds on them: the mouth is placed much below theſe, and ſtands exactly in the proper place to receive the juices expreſſed by this operation. The *tarantula* ſleeps in his cave the whole winter, and a great part of the autumn and ſpring; and, if during this time he is ploughed up, as is often the caſe, or is any other way taken out of his hole, he is found quite torpid and numbed, and is unable to do any miſchief by biting.

The hole or mouth of a tarantalous cave always gives ſome idea of the ſize of the creature within: he makes it ſmall if he enters it while young; and as he grows larger he eats away more and more of the earth to widen it ſtill more, ſo that the diameter of it is uſually about equal to the diameter of the body. The ſize of a cheſnut is about the ſtandard of a full grown *tarantula*; but there are ſome old ones found much larger and more hairy. The female is known from the male by having longer legs and a larger belly. They copulate in June and July, and at that ſeaſon the females are often met with in the fields carrying the males upon their back. In Auguſt and September they lay their eggs, which remain the whole winter; and in the ſummer after are hatched.

Pliny tells a ſtory of the young ones always eating up their mother for the firſt food, which is countenanced by the relation of the peaſants in thoſe parts, who ſay that they all ſwarm about her and ſuck her juices from many places at once, till they leave her lifeleſs carcaſs on the field, and then go each their ſeveral way in ſearch of other food. The bite of the *tarantula*, as it is called, is not properly a bite, but a wound inflicted in a very peculiar manner. The creature pierces the ſkin with its forceps, and at that inſtant injects from its mouth a poiſon into the wound. The time in which their wounds are fatal, is that of their copulation; at this time they are in their utmoſt vigour and power of hurting. People of faſhion are rarely hurt by them, but principally the poor labourers, who ſleep half naked in the field, and the women who travel the country with naked feet, gathering medicinal herbs.

The bite occaſions a pain, which at firſt ſeems much like that felt on the ſtinging of a bee, or an ant: in a few hours the patient feels a numbneſs, and the part affected becomes marked with a little livid circle, which ſoon after riſes into a very painful tumor; a little after this he falls into a profound ſadneſs, breathes with much difficulty, his pulſe grows feeble, and his ſenſes fail; at length he loſes all ſenſe and motion; and dies, unleſs relieved. But theſe ſymptoms come ſomewhat differently, according to the nature of the *tarantula*, and the diſpoſition of the patient. An averſion for black and blue; and, on the contrary, an affection for white, red, and green, are other of the unaccountable ſymptoms of this diſeaſe.

All the aſſiſtance medicine has been able to diſcover by reaſoning, conſiſts in ſome chirurgical applications on the wound, and in cordials and ſudorifics; but theſe are of little efficacy: a thing that avails infinitely more, is, what reaſon could never have diſcovered—muſic.

As ſoon as the patient has loſt his ſenſe and motion, a muſician tries ſeveral tunes on an inſtrument; and when he has hit on that, the tones and modulations whereof agree with the patient, he is immediately ſeen to make a faint motion: his fingers firſt begin to move in cadence, then his arms, then his legs, by degrees his whole body, at length he riſes on his feet, and begins to dance; his ſtrength and activity ſtill increaſing. Some will continue the dance for ſix hours without intermiſſion.

After this he is put to bed, and when he is judged ſufficiently recruited from his firſt dance, he is called out of bed, by the ſame tune, for a ſecond.

This exerciſe is continued for ſeveral days, ſix or ſeven at leaſt; in which time the patient finds himſelf exceedingly fatigued, and unable to dance any longer; which is the characteriſtic of his being cured; for as long as the poiſon acts on him, he would dance, if one pleaſed, without any diſcontinuation, till he died of the mere loſs of ſtrength.

The patient, on this, perceiving himſelf weary, begins to come to himſelf; and awakes as out of a profound ſleep; without any remembrance of what had paſſed in his paroxyſm, not even of his dance.

Sometimes the patient, thus recovering from his firſt acceſs, is quite cured; if he be not, he finds a melancholy gloom hanging on him; he ſhuns the ſight of men, and ſeeks water; and, if he be not carefully looked to, throws himſelf into ſome river. If he do not die, the fit returns at that time twelvemonth, and he is driven to dancing again. Some have had returns regularly for twenty or thirty years.

Every *tarantula* has his particular and ſpecific tune; but, in the general, they are all very briſk, ſprightly ones, that work cures.

This account was given in the Royal Academy of Sciences, by M. Geoffroy, at his return from Italy, in 1702, and confirmed by letters from F. Gouye. The like hiſtory is given by Baglivi, in an expreſs diſſertation on the *tarantula*, publiſhed in 1696.

Authors are divided about the nature of the poiſon of the *tarantula*. Cardan ſays it is a cold one, and Scaliger ſays it is a hot one; but, be this as it will, Valetta informs us, that its effect is very ſudden; it is no ſooner received into the fleſh, but the veins take it up and carry it to the heart, where it becomes diffuſed through the whole maſs of blood, and gives an immediate trembling of the limbs, and a difficulty of breathing. The next part it ſeizes is the brain, where it produces different effects in different ſubjects; and, according to their ſtate of health, and the condition of their juices, brings on various ſpecies of phrenſies. The patient ſees a thouſand phantoms, ſometimes all jovial and merry ones, and ſometimes imaginary ſcenes of blood and cruelty. Some are fond of ſeeing little ſtreams of water trickling down into a baſon; others are never eaſy unleſs they have green leaves before them: this indeed is almoſt an univerſal ſymptom. Some are delighted with various colours, and ſome are fond of violent motion, ſuch as dancing, leaping, and the like; and ſome are in love with ſlow and graceful movements, as walking majeſtically, bowing, and dancing ſlow dances. Some are military mad, and call out for the noiſe of drums and trumpets, and the claſhing of ſwords; but all of them, as well the briſk and noiſy, as the lethargic and dull, are pleaſed with muſic.

They will get up and dance to any inſtrument; and the moment it ceaſes playing, they will fall down to the ground as if apoplectic, and not ſtir again till the muſic is renewed. Many people have laughed at the whole hiſtory of the bite of a *tarantula*, from this one accident of its poiſon being cured by muſic; but all who have been upon the ſpot atteſt it. Valett. de Phaleng. Apulo.

To ſuch extraordinary facts, it is no wonder a few fables ſhould be added; as, for inſtance, that the patient is no longer infected than while the inſect lives; and that the *tarantula* itſelf dances, all the while, to the ſame air with the perſon bitten.

Dr. Dominico Cirillo, profeſſor of natural hiſtory at the univerſity of Naples, poſitively contradicts the teſtimonies above recited. Having had an opportunity of examining the effects of this animal, in the province of Taranto, where it is found in great abundance, he affirms that the ſurpriſing cure of the bite of the *tarantula* by muſic, has not the leaſt truth in it; and that it is only an invention of the people, who want to get a little money, by dancing when they ſay the tarantiſm begins. He makes no doubt but the heat of the climate contributes very much to warm their imagination, and to throw them into a delirium, which may be in ſome meaſure cured by muſic: but ſeveral experiments have been tried with the *tarantula*; and neither men nor animals, after the bite, have had any other complaint, except a very trifling inflammation on the part, like that produced by the bite of a ſcorpion, which goes off by itſelf without any danger at all. In Sicily, where the ſummer is ſtill warmer than in any part of the kingdom of Naples, the *tarantula* is never dangerous, and muſic is never employed for the cure of the pretended tarantiſm. It is without doubt very extraordinary, ſays this writer, that a man of ſenſe, and a phyſician of great learning, as Baglivi was, ſhould have been ſatisfied with the account of this diſorder; and that, inſtead of examining the facts by experiments, he ſhould rather have tried to explain it: but even philoſophers like very much to meet with wonderful and extraordinary things, and though they are againſt all reaſon, ſtill they want them to be true, and endeavour to find out the cauſe of them. Every year this ſurpriſing diſorder loſes ground; and he is perſuaded, that in a very little while it will entirely loſe its credit. The Neapolitan phyſicians all look upon the *tarantula* in the ſame light, particularly after the ingenious book publiſhed on this ſubject by the learned Dr. Serao; who, by various experiments, has proved, that the bite of the *tarantula* never produced any bad effects, and that muſic never had any thing to do with it. Philoſoph. Tranſ. vol. lx. art. 22.

The bite of the *tarantula*, and the method of its cure, were, however, for many years ſubjects of elaborate diſcuſſion; and different theories were propoſed for explaining them, ſome account of which it may not be improper to preſerve.

Theory of the TARANTULA'*s bite*, by M. Geoffroy. The poiſonous juice injected by the *tarantula*, M. Geoffroy conceives, may give the nerves a degree of tenſion, greater than is natnral to them, or than is proportionate to their functions: and hence may ariſe a privation of knowledge and motion. But, at the ſame time, this tenſion, equal to that of ſome ſtrings of an inſtrument, puts the nerves in uniſon to certain tones, and obliges them to ſhake, after being agitated by the undulations and vibrations of the air proper to thoſe tones. And hence, this wonderful cure by muſic: the nerves, thus reſtored to their motion, call back the ſpirits thither, which before had abandoned them.

It may be added, with ſome probability, and on the ſame principles, that the patient's averſion for ſome colours ariſes hence, that the tenſion of his nerves, even out of the paroxyſm, being ſtill different to what it is in the natural ſtate, the vibrations thoſe colours occaſion in the fibres of the brain, are contrary to their diſpoſition, and occaſion a kind of diſſonance, the effect of which is pain.

Theory of the effects of the TARANTULA'*s bite*, by Dr. Mead. The malignity of the poiſon of the *tarantula* ſeems to conſiſt in its great force and energy, whereby it immediately raiſes an extraordinary fermentation in the whole arterial fluid, by which its texture and craſis are conſiderably altered: the conſequence of this alteration, when the ebullition is over, muſt neceſſarily be a change in the coheſion of its parts, by which the globules, which did before with equal force preſs each other, have now a very differing and irregular niſus, or action; ſo that ſome of them do ſo firmly cohere together, as to compoſe moleculæ, or ſmall cluſters: upon this account, as there is now a greater number of globules contained in the ſame ſpace than before, and the impulſe of many of theſe, when united together, differing according to the conditions of their coheſion, as to magnitude, figure, &c. the impetus, with which this fluid is driven towards the parts, will not only be at ſome ſtrokes greater than ordinary, but the preſſure upon the blood-veſſels muſt be very unequal, and irregular; and this will be particularly felt in thoſe which are moſt eaſily diſtended, as thoſe of the brain, &c.

Upon this, the nervous fluid muſt neceſſarily be put into various undulatory motions, ſome of which will be like thoſe, which different objects, acting upon the organs or paſſions of the mind, do naturally excite in it; whereupon ſuch actions muſt follow in the body, as are uſually the conſequences of the ſeveral ſpecies of ſadneſs, joy, deſpair, or the like determinations of thought.

This, in ſome degree, is a coagulation of the blood, which will, the more certainly, when attended with uncommon heat, as is the caſe in thoſe countries where theſe creatures abound, produce ſuch like effects as theſe: becauſe the ſpirits ſeparated from the blood thus inflamed, and compounded of hard, fixed, and dry particles, muſt unavoidably ſhare in this alteration; that is, whereas their fluid conſiſts of two parts, one more active and volatile, the other more viſcid and glutinous, which is a kind of vehicle to the former; their active part will bear too great a proportion to the viſcid; and conſequently they muſt have more than ordinary volatility and force; and will, therefore, upon the leaſt occaſion imaginable, be irregularly determined to every part.

Whereupon will follow tumblings, anger, or fear, upon a light cauſe; extreme pleaſure at what is trivial, as particular colours, or the like: and, on the other hand, ſadneſs at what is not agreeable to the ſight; nay, laughter, obſcene talk and actions, and ſuch other ſymptoms as attend perſons bit; becauſe, in this conſtitution of nervous fluid, the moſt ſlight occaſion will make as real a reflux and undulation of it to the brain, and preſent as lively ſpecies there, as the ſtrongeſt cauſe and impreſſion can produce in its natural ſtate and condition; nay, in ſuch a confuſion the ſpirits cannot but ſometimes, without any manifeſt cauſe at all, be hurried towards thoſe organs, to which, at other times, they have been moſt frequently determined; and every one knows which theſe are in hot countries.

The effect of muſic on perſons touched with this poiſon confirms the doctrine above delivered. For muſcular motion, we know, is no other than a contraction of the fibres, from the arterial fluid's making an efferveſcence with the nervous juice, which, by the light vibration and tremor of the nerve, is derived into the muſcle.

Thus there is a two fold effect and operation of the muſic, that is, upon the body and the mind: a briſk harmony excites lively ſpecies of joy and gladneſs, which are always accompanied with a more frequent and ſtronger pulſe, or an increaſed impulſe of the liquor of the nerves into the muſcles; upon which ſuitable actions muſt immediately follow.

As for the body, ſince it was ſufficient to put the muſcles into action, to cauſe thoſe tremors of the nerves, by which their fluid is alternately dropped into the moving fibres, it is all one whether it be done by the determination of the will, or the outward impreſſions of an elaſtic fluid: ſuch is the air; and that ſounds are the vibrations of it, is beyond diſpute: theſe, therefore, rightly modelled, may ſhake the nerves as really as the *imperium voluntatis* can do; and, conſequently, may produce the like effects.

The benefit of muſic ariſes not only from their dancing to it, and ſo evacuating by ſweat, a great part of the inflammatory fluid; but, beſides this, the repeated percuſſions of the air hereby made, by immediate contact ſhaking the contractile fibres of the membranes of the body, eſpecially thoſe of the ear, which, being contiguous to the brain, communicate their tremblings to its membranes and veſſels; by theſe continued ſuccuſſions and vibrations, the coheſion of the parts of the blood is perfectly broken, and the farther coagulation prevented: ſo that the heat being removed by ſweating, and the coagulation by the contraction of the muſcular fibrillæ, the wounded perſon is reſtored to his former condition.

If any one doubts of this force in the air, he may conſider, that it is demonſtrated in mechanics, that the ſmalleſt percuſſion of the ſmalleſt body may overcome the reſiſtance of any the greateſt weight, which is at reſt; and that the languid tremor of the air, which is made By the ſound of a drum, may ſhake the largeſt edifices.

but, beſides this, we muſt allow a great deal to the determinate force, and particular modulation of the trembling percuſſions; for contractile bodies may be acted upon by one certain degree of motion in the ambient fluid, though a greater degree of it, differently qualified, may produce nothing at all of the like effect: this is not only apparent in two common-ſtringed muſical inſtruments, tuned both to the ſame height: but alſo in the trick which many have of finding the tone or note peculiarly belonging to any wine-glaſs, and, by accommodating their voice exactly to that tone, and yet making it loud and laſting, make the veſſel, though not touched, firſt to tremble, and finally to burſt; which it will not do, if the voice be either too low, or too high.

This makes it no difficult matter to conceive, why different perſons, infected with this ſort of venom, do require a different ſort of muſic, in order to their cure; inaſmuch as the nerves and diſtractile membranes have different tenſions, and conſequently are not all alike to be acted upon by the ſame vibrations.

TARANTULA, in *Zoology*, is alſo the name given by the Italians to a peculiar ſpecies of lizard, called by Aldrovand and ſome others, *lacertus facetanus*. See *Tab. Serpents*, N° 36.

It is of a grey colour; its ſkin is extremely rough; and it is thicker and rounder bodied than the other lizards. It is found like our common eft, under old walls, and among the ruins of buildings, particularly in the neighbourhood of Rome, in great plenty; its colour looks dead and ghaſtly, and it is as odious to the ſight among the Italians, as the toad is with us, being never ſeen without a ſort of natural horror. It is eſteemed alſo a poiſonous creature, as the toad is with us, though it is not eaſy to find well-atteſted ſtories of any body's ever having been hurt either by the one or the other of theſe creatures. Ray.

TARAXIPPUS, formed of ταρασσω, *I frighten*, and ιππος, *horſe*, a kind of evil genius, the ſtatue of which was erected in the Grecian HIPPODROMES, in order to alarm and frighten the horſes in their courſe. The ſhape and form of this ſtrange deity are not deſcribed; but he certainly anſwered the end for which he was deſigned: it frequently happening, that the horſes were ſo ſcared at his appearance, as to run away with the utmoſt violence, and expoſe the lives of their riders or drivers to the moſt imminent danger. Many conjectures have been formed concerning this ſtrange deity, and the means he uſed to frighten the horſes: but the moſt probable concluſion will be, perhaps, to ſuppoſe that ſome tricks and artifices were practiſed under the diſguiſe of this figure, either with a deſign to render the victory more honourable, in proportion to the difficulty of gaining it, or elſe that this horſe-frightening deity was placed in the courſe as a touch-ſtone, to prove the reſolution and temper of the horſes; and to oblige the candidates to bring none into the field but ſuch as by exerciſe and diſcipline were ſo aſſured and ſteady, as not to let their obedience be ſhaken upon the moſt trying occaſions. Berenger's Hiſt. and Art of Horſemanſhip, vol. i. p. 54. See STADIUM.

TARBASON, a word uſed by ſome chemical writers as a name for antimony.

TARCHONANTHUS, *ſhrubby African flea-bane*, with ſage-leaves ſmelling like camphor, in *Botany*, a genus of the *ſynegeneſia polygamia æqualis* claſs: the characters of which are theſe: it has a flower compoſed of ſeveral hermaphrodite florets included in one common top-ſhaped empalement, which is ſhort, permanent, and hairy: the florets are uniform, funnel-ſhaped, and of one petal indented in five parts at the top; they have each five very ſhort hair-like ſtamina, terminated by cylindrical tubulous ſummits longer than the petal, and an oblong germen, ſupporting a ſtyle of the length of the ſtamina, crowned by two awl-ſhaped ſtigmas, which open lengthways; the germen afterwards turns to a ſingle oblong ſeed, crowned with down, which ripens in the empalement. There is only one ſpecies, which grows naturally at the Cape of Good Hope.

TARDA *avis*, in *Ornithology*, a name given by many to the BUSTARD, more commonly known among authors by the name *otis*.

TARDO, in the *Italian Muſic*, is uſed to denote a ſlow movement, being much the ſame as LARGO.

TARE, in *Botany*. See VETCH.

TARE and *tret*, in *Commerce*, any defect, waſte, or diminution in the weight, the quantity, or the quality of goods,

The ſeller is uſually to account to the buyer for the *tare* and *tret*.

TARE is more particularly uſed for an abatement, or deduction, in the price of a commodity, on account of the weight of cheſts, caſks, bags, &c. in which goods are put up, and whoſe weight may be known ſeparately from that of the goods: and which being ſubtracted from the groſs weight, or that of the caſk, &c. and goods together, gives the weight of the goods alone, or the nett, or neat weight. But if the *tare* is not known ſeparately, and an allowance made for it at ſo much per hundred weight, or hundred yards, &c. then the deduction of the *tare* is by the rule of three. The allowance, called TRET, is calculated in the ſame way. Ex. 1. at 7lb. *tare*, or tret, to 112lb. groſs, what is the *tare*, and alſo the nett weight, when 746lb. groſs was received? ſay, as 112 lb. to 7lb. ſo is 746 lb. to the *tare* ſought, which ſubtracted from 746 lb. the remainder is the nett weight.

Ex. 2. At 5lb. *tret* to 112lb. groſs, what groſs weight muſt be received, when 84lb. nett was paid for; and, how much is allowed? ſubtract 5 from 112, then ſay, as 107 the remainder to 112, ſo is 84 to the groſs weight ſought; the difference of which and 84 is the allowance: or thus: as 107 to 5,ſo is 84 to theallowance ſought,which, added to 84, gives the groſs weight ſought. Thus from the groſs weight, nett weight, and allowance, or any two of theſe in one caſe given, with any one of them in another caſe, we find the other two in that other caſe.

There are ſometimes two allowances deducted out of the ſame quantity; firſt *tare*, and then *tret*: after the *tare* is deducted, the remainder is called particularly *ſubtle*, or *ſuttle weight*, out of which the tret is deducted, and the laſt remainder is called *nett weight*.

Ex. 3. *Tare* being allowed at 4 to 112, and tret at 5 to 112, what is the nett weight in 87 lb. groſs? ſay, as 112 to 108 (=112—4) ſo is 87lb. to the ſubtle; then as 112 to 107 (=112—5) ſo is the ſubtle to the nett. And if you multiply 108, 107, and 87 continuelly, and alſo 112 by 112, and divide that product by this, the quotient is the nett weight ſought. Malcolm's Ar. p. 564.

The *tare* is very different, in different merchandizes: in ſome there is none at all allowed. It is a thing much more regarded in Holland than in England, or elſewhere: a modern author, M. Ricard, treating of the commerce of Amſterdam, obſerves, that the *tares* are one of the moſt conſiderable articles with which a merchant is to be acquainted, if he would trade with ſecurity.

Sometimes the *tare* is, as it were, regulated by cuſtom; but generally, to avoid all diſpute, the buyer and ſeller make a particular agreement about it. We ſhall here add, from the before mentioned author, ſome inſtances of *tares* allowed at Amſterdam, referring the reader for a more ample account to his Negoce d' Amſterdam, edit. 1722.

Spaniſh wools are ſubject to a kind of double *tare*: for, firſt they deduct the *tare* marked on the bales; and after that twenty-four pounds *tare* for every one hundred and ſeventy-five pound weight, beſides the rebate for prompt payment. Indeed, for the common wools, the ſeller will ſeldom allow above fourteen *per cent.* for the whole *tare*; for which reaſon, the bargain is to be agreed on before.

TARE of Roman alum is 4. *lib. per* ſack.
of Iriſh, &c. butter, 20 *per cent.*
of crude borax, 15 *lib. per cent.*
of cinnamon, 17 *lib.* the burden.
of capers, 33 *per cent.*
of white pepper, 40 *lib. per* barrel.
of black pepper, 5 *lib.* &c.

TAREIBOIA, in *Zoology*, the name of a ſpecies of ſerpent found in America, and called alſo *cacaboia*; though, according to ſome authors, the *tareiboia* and *cacaboia* are two different ſpecies.

They are both of the amphibious kind, and live in lakes and waters, as well as on land; but they are not very poiſonous. They are ſmall ſnakes and all over black; when offended they will bite; but the wound is eaſily curable. Authors have written differently of thoſe ſerpents, ſome making the latter very different from the former, and of a yellow colour. Ray.

TAREIRA, in *Ichthyology*, the name of a fiſh caught in the American ſeas, and eaten, but of no fine flavour. It is of an oblong and thick body, gradually tapering toward the tail; its head reſembles that of a ſnake, and is raiſed into two tubercles over the eyes; its eyes are yellow, with a black pupil; its noſe pointed, and its mouth large and yellow within; it has extremely ſharp teeth in both its jaws, and on its tongue; it has eight fins, the tail being accounted one, and this is forked; but this, as well as the reſt, is of the conſiſtence of a poppy-leaf, tender, thin, and ſoft, and ſuſtained by ſoft rays; its ſcales are ſo nicely laid on one another, that it ſeems ſmooth to the touch; its belly is white, and its back and ſides are variegated with longitudinal green and yellow lines. Marcgrave.

TARENTULA. See TARANTULA.

TARGAR, a name given by ſome of the chemical writers to oil of juniper.

TARGET, a *ſhield*; thus called from the Latin, *tergum*, *back*, becanſe originally mede of leather, wrought out of the back of an ox's hide.

TARGET, is alſo the name of a mark for the artillery to fire at in their practice.

TARGIONIA, *vetchcap*, in *Botany*, a genus of the *cryptogamia algæ*. Its characters are, that it has a bivalve calyx including a globular body. There is one ſpecies.

TARGUM, in the *ſacred Literature*, a name which the Jews give to their Chaldee gloſſes,and paraphraſes on theScripture. See PARAPHRASE.

Theſe Chaldee paraphraſes, which were tranſlations of the ſcriptures of the Old Teſtament, from the Hebrew text into the language of the Chaldæans, were called *targums*: for the word *targum* ſignifies in Chaldee an interpretation or verſion of one language into another, and may properly be applied to any ſuch verſion or tranſlation: but it is moſt commonly by the Jews appropriated to theſe Chaldee paraphraſes by way of eminence.

As the Jews, during their long captivity in Babylon, had forgot their ancient language, the Hebrew; and now underſtood nothing but the language of their maſters the Chaldeans; there was a neceſſity of explaining the prophets in that language; and to this neceſſity is owing the firſt beginning of the Chaldee paraphraſe.

To make the ſenſe of the text underſtood, each doctor made a paraphraſe of ſome part thereof in the vulgar tongue; and as theſe ſeveral interpretations, in time, became very voluminous, certain rabbins undertook to collect them together; and this collection they called the *Targum*.

The Jewiſh doctors do not agree about the antiquity of the *Targum*; for the more modern Jews having blended their own comments with thoſe of the ancients, no certain age or æra can be fixed for the whole work.

It is commonly believed, that R. Jonathan, who lived under the reign of Herod the Great, made the firſt Chaldee verſion of the prophets; and with this verſion mixed the interpretations borrowed from tradition. Onkelos, it is certain, tranſlated the Pentateuch almoſt word for word; and without any paraphraſe; and another verſion of the Pentateuch is aſcribed to Jonathan, but that without much certainty.

Dr. Prideaux thinks, that the verſion or *Targum* of Onkelos is the moſt ancient of all that are now extant: and the principal reaſon of his adopting this opinion is, that the ſtyle in which it is written approaches nearer to the ſtyle of that part of Daniel and Ezra, which is written in the Chaldee language, and which may be conſidered as a ſtandard of its purity, more than any other. This *Targum* has been held in higher eſteem among the Jews than all the other *Targums*, and being ſet to the ſame muſical notes with the Hebrew text, it is thereby made capable of being read in the ſame tone in their public aſſemblies. The next to this in the purity of its ſtyle is the *Targum* of R. Jonathan Ben Uzziel. The third *Targum*, or that on the law, aſcribed to Jonathan, is not his, becauſe the ſtyle of it is wholly different from that of his true *Targum* on the Prophets, and ſeveral things are mentioned in it, which had no being, or at leaſt no name till after Jonathan's time. The fourth *Targum* is on the law, written by an unknown author, and at an unknown period. It is called the *Jeruſalem Targum*, probably becauſe it was written in the Jeruſalem dialect, which was ſpoken by the Jews after their return from Babylon, and which contains a mixture of Hebrew words with the Chaldee. This *Jeruſalem Targum* is not a continued paraphraſe, as all the reſt are, but confined to ſelect paſſages, as the author ſeems to have thought the text moſt wanted an explication. In many places it is taken word for word from the *Targum*, ſaid to be Jonathan's on the law: and contains ſeveral things which are delivered in the ſame words in the New Teſtament by Chriſt and his apoſtles. Dr. Prideaux accounts for this circumſtance, by ſuppoſing that theſe were ſayings and phraſeologies which had obtained among the Jews in the time of our Saviour, and continued among them long after: and hence Chriſt and his Apoſtles, and afterward the author of this *Targum* derived them from the ſame ſource. The fifth *Targum*, which is that on the Megilloth, i. e. Ruth, Eſther, Eccleſiaſtes,Solomon's Song, and Jeremiah's Lamentations. The ſixth, which is the ſecond *Targum* on Eſther; and the ſeventh, which is that on Job, the Pſalms, and the Proverbs, are all written in the moſt corrupt Chaldee of the Jeruſalem dialect. Of the two former no author is named: but the author of the third is ſaid to be Joſeph the one-eyed, but who he was, or when he lived, we are not told: that on the Megilloth, which mentions the Miſhna and the Talmud with the explication, muſt have been written after the Babyloniſh Talmud, or the year of Chriſt 500. The eighth, and laſt of theſe *Targums*, is that on the two books of Chronicles; publiſhed by Beckius at Augſburg in Germany, that on the firſt book in 1680, and that on the ſecond in 1683.

That the *Targum* of Onkelos on the law, and that of Jonathan on the prophets, are as ancient as our Saviour's time, if not more ancient, is the general opinion of both Jews and Chriſtians. As to all the other *Targums* beſides theſe two, they are certainly of a much later date: the ſtyle of every one of them is more barbarous and impure than that of the Jeruſalem Talmud, and they muſt, therefore, have been written after the compoſure of that work, i. e. after the begining of the fourth century after Chriſt; and if the Talmudic fables with which they abound were taken out of the Babyloniſh Talmud, this will bring their date ſtill lower, and prove them to have been written after that Talmud, or after the beginning of the ſixth century after Chriſt.

The *Targums* of Onkelos and Jonathan are in ſuch great eſteem among the Jews, that they hold them to be of the ſame authority with the original ſacred text; and for the ſupport of this opinion, they ſeign them to be derived from the ſame fountain. The Chaldee paraphraſe of Onkelos, they ſay, was delivered in the ſame manner with the real law, when God gave the written law unto Moſes at Mount Sinai; and when by his holy Spirit he dictated to the prophets the prophetical books, he delivered ſeverally to them upon each book the *Targum* of Jonathan at the ſame time. Theſe were delivered by faithful hands, the firſt from Moſes, and the other from the prophets, till they came down to Onkelos and Jonathan, who only put them into writing.

Agreeably to the high opinion, that was entertained of them, they were read every Sabbath day in their ſynagogues in the ſame manner as the original ſacred word itſelf, of which they were verſions: and this uſe of them was continued to late times. Whether the *Targum* of Onkelos and Jonathan were received for this uſe ſo early as our Savour's time is not certain; however, it ſeems, that theſe or ſome others were uſed for the inſtruction of the people, and were read among them in private as well as in public. Theſe *Targums* are of great uſe for the better underſtanding not only of the Old Teſtament, on which they are written, but alſo of the New. As to the Old Teſtament they ſerve to vindicate the genuineneſs of the preſent Hebrew text by proving it to be the ſame that was in uſe when theſe *Targums* were made, contrary to the opinion of thoſe who think the Jews corrupted it after our Saviour's time. They help to explain many words and phraſes in the Hebrew original, and they hand down to us many of the ancient cuſtoms of the Jews. And ſome of theſe, with the phraſeologies, idioms, and peculiar forms of ſpeech, which we find in them, do in many inſtances help as much for the better illuſtration and better underſtanding of the New Teſtament as of the Old: the Jeruſalem Chaldee dialect, in which they are written, being the vulgar language of the Jews in our Savour's time. They alſo very much ſerve the Chriſtian cauſe againſt the Jews by interpreting many of the prophecies of the Meſſiah in the Old Teſtament, in the ſame manner as the Chriſtians do. Many inſtances are produced to this purpoſe by Dr. Prideaux in his Connect. of the Hiſt. of the Old and New Teſt. vol. iv. p. 777, &c.

Theſe *Targums* are publiſhed to the beſt advantage in the ſecond edition of the great Hebrew Bible ſet forth at Baſil by Buxtorf the father, anno 1610, for he has rectified the Chaldee text, and reformed the vowel pointings in it: the *Targums* having at firſt been written without vowel points, which were afterwards added very erroneouſly by ſome Jews.

TARIERA, in *Ichthyology*, the name of a river-fiſh caught in many parts of America.

It is an oblong fiſh, with a ſtraight back, and a belly ſomewhat hanging down; its under jaw is longer than its upper, and its teeth are extremely ſharp; among theſe are two longer than the reſt in the middle of the under jaw, and four ſuch in the upper; its ſcales are large, its back brown, and its belly and ſides whitiſh. It is a well-taſted fiſh, but full of bones. Marcgrave.

TARIF, or TARIFF, *book of rates*; a table or catalogue, drawn uſually in alphabetical order, containing the names of ſeveral kinds of merchandize, with the duties or cuſtoms to be paid for the ſame, as ſettled by authority, and agreed on between the ſeveral princes and ſtates, that hold commerce together.

TARIFILON, in *Botany*, a name by which Avicenna, and ſome other authors, have called the *trifolium bituminoſum*, or *ſtinking trefoil*.

TARIN, in *Commerce*, a money of account at Naples, Sicily, and Malta. Its value at Naples is eſtimated at eighteen ſols of France, and at Malta it is reckoned worth twenty grains, which amount to ſame value.

TARIN, in *Ornithology*, a name given by the French, and from them by many others to the CITRINELLA; a bird common in Italy, and kept in cages for its beauty and fine notes.

TARINGTING, in *Natural Hiſtory*, a name given by the people of the Philippine iſlands, to a ſpecies of lapwing which is common on the ſea-ſhores, and runs remarkably ſwift.

TARITH, one of the many names given by the chemiſts to MERCURY.

TARNISHING, a diminution of the natural luſtre of any thing, eſpecially of a metal.

Gold and ſilver, when *tarniſhed*, reſume their brightneſs, by ſetting them over the fire in certain leys. Copper, pewter, &c. that are *tarniſhed*, recover their luſtre with tripoli and pot-aſhes.

TAROATAIHETOOMO is the name of one of the two firſt or ſupreme deities at Otaheite: the other, who is ſuppoſed to have been a rock, is called *Tepapa*. Theſe produced a ſon called *Tane*, to whom their prayers are generally addreſſed, and who is ſuppoſed to intereſt himſelf in the affairs of mankind; and a daughter called *Tellowmatatayo*, the *Year*, from whom proceed the months and days. From the two firſt beings they ſuppoſe alſo to have ſprung an inferior race of deities called EATUAS. Hawkeſworth's Voy. vol. ii. p. 238.

TARPAULIN, or TARPAWLING, is a piece of canvaſs, well pitched and tarred over, to cover the hatchways of a ſhip at ſea, in order to prevent the penetration of the rain or ſea-water, which may occaſionally ruſh over the decks.

The term is alſo uſed in deriſion for a perſon bred at ſea, and educated in the mariner's art. We alſo, of late, uſe it to expreſs a painted floor-cloth.

TARPEIAN, TARPEIUS, in *Antiquity*, an epithet given to a rock in ancient Rome, of conſiderable height; whence, by the law of the Twelve Tables, thoſe guilty of certain crimes were precipitated. It was on this rock that the Capitol was built.

The *Tarpeian* rock might formerly be ſteep enough on one ſide to break a man's neck; but it could never have been of that ſurpriſing height, mentioned by ſome writers, if any judgment can be formed from its appearance at preſent. See Burnet's Letters, p. 238, and Miſſon's N. Voyage, p. 103.

It took its name from a veſtal, called *Tarpeia*, who betrayed the Capitol, whereof her father was governor, to the Sabines; on condition they would give her all they bore on their left arms, meaning their bracleets. But, inſtead of bracelets, they threw their bucklers (which were likewiſe borne on their left arm) upon their head, and cruſhed her to death.

Others aſcribe the delivery of the Capitol to her father, Spurius Tarpeius; and add, that he was precipitated down this rock by Romulus's order, and that this henceforward became the puniſhment of all criminals of the like kind.

TARPEIAN *Games*, *Ludi* TARPEII, were games inſtituted by Romulus in honour of Jupiter Feretrius; and called alſo *Capitolini ludi*. See CAPITOLINE.

TARRACE, TARRASS, TERRACE, or TERRASS, a coarſe ſort of plaſter, or mortar, durable in the wet, and chiefly uſed to line baſons, ciſterns, wells, and other reſervoirs of water.

That which is called the Dutch *terraſs*, is made of a ſoft rock ſtone, found near Collen, upon the lower part of the Rhine; it is burnt like lime, and afterwards reduced to powder by means of mills: from thence it is brought to Holland in great quantities, where it has acquired the name of Dutch *terraſs*. It is of a greyiſh colour when it is not mixt, which is very ſeldom the caſe: becauſe it is very dear, and the demand for it in aquatic works very great. It is ſaid that in ſome parts of England there is found a ſoft ſtone, reſembling that of Dutch *terraſs*, and which might ſerve as well in aquatic works. Muller's Syſt. Math. vol. iv. p. 111.

An artificial *terraſs*, reſembling the true, may be formed of two parts of lime, and one part of plaiſter of Paris, well beaten together and uſed immediately. There is another ſort of *terraſs*, uſed, for coarſer uſes, which is ſometimes called *Welſh terraſs*, formed of one part lime, and two parts of well-ſifted coal aſhes, thoroughly mixed by being well beaten together. Handm. to the Arts, vol. ii. p. 32.

TARRAGON, a name ſometimes given to SOUTHERNWOOD.

TARROCK, in *Ornithology*, the name of a ſea-fowl of the larus or gull-kind, and diſtinguiſhed by authors by the name of the *larus cinereus Bellonii*; and called by Linnæus the *larus tridactylus*.

It is of the ſize of the common pigeon, and is not much unlike it in ſhape, except that the head is larger and thicker. The bill is black, ſhort, thick, and ſtrong; the throat, neck, and under-ſide are white; near each ear, and under the throat is a black ſpot; on the hind part of the neck is a black creſcent, with the horns pointing to the throat.

Its great diſtinction, however, from all the other birds of the gull kind, is, that it has no hinder toe, but in lieu of it a ſmall protuberance. It is very common on the coaſts of Cornwall, and ſome other of the Engliſh ſhores. Ray and Pennant.

TARSI, in the *Materia Medica*, a name by which ſome authors have called the root of the *cyperus eſculentus*, or *ſweet* CYPERUS of the ſhops, and by which it is, in ſome places, uſually called by the druggiſts. See AVELLANDA and HABHAZZIS.

TARSO, in the *Glaſs Trade*, a ſort of white ſtone found in many rivers in Italy, and other places; and uſed inſtead of ſand for the fineſt cryſtal-glaſs, being firſt burnt, and calcined with the ſalt of the polverine into frit. Neri's Art of Glaſs, p. 7.

Neri calls this ſtone a kind of white marble; and adds a general rule, that all ſtones that will ſtrike fire with ſteel, are fit to vitrify; and thoſe that will not ſtrike fire with ſteel, will never vitrify.

The criteria or determinate characters of foſſils were not at all fixed in this author's time, otherwiſe he had not called this ſtone a kind of marble; ſince his own general rule of trying ſtones by ſteel is, though liable to a few exceptions, a very good one; and, according to that, this *tarſo* could be of no affinity to marble; for marble will not ſtrike fire with ſteel, nor ever be converted into glaſs.

The *tarſo*, therefore, of this and other authors, could be nothing of the marble-kind; but is truly a cryſtalline matter debaſed by an admixture of white earth, and found in form of ſmall pebbles of a whitiſh, yellowiſh, or pale reddiſh colour; and this is common in all the gravel-pits of England, and in the beds of ſome of our rivers; and might be uſed with great advantage by our glaſs-makers, if they knew it was ſo eaſily to be had.

On comparing theſe ſtones of ours, with the cuogoli, or *tarſo* of the foreign glaſs-makers, there is no difference diſtinguiſhable to the eye, nor will the niceſt experiments by the fire, acid menſtrua, &c. ſhew the leaſt diſtinction between them. We are not to wonder, however, that the glaſs-makers did not hitherto diſtinguiſh this to be the true cuogoli, or *tarſo*, ſince the characters of foſſils have been hitherto ſo little aſcertained, that the beſt and lateſt author on theſe ſubjects, Dr. Woodward, ſo far miſtook the ſtructure of this ſtone, as to call it a ſparry pebble. It is certain that ſpar could never have any thing to do with glaſs-making; but this ſtone has no ſpar in its compoſition.

TARSUS, ταρσος, in *Anatomy*, is what we vulgarly call the *inſtep*; being the beginning of the foot, or the ſpace between the ancle and the body of the foot, which is called *metatarſus*.

The *tarſus* anſwers to the wriſt of the hand. It conſiſts of ſeven bones: the firſt whereof is called ASTRAGALUS, and by the Latins *talus*, and *os baliſtæ*.

The ſecond is called the *calx*, or *calcar pedis*, or *calcaneum*, or os *calcis*; the third NAVICULARE, and by the Greeks SCAPHOIDES; the fourth, fifth, and ſixth, are generally called *innominata*, but by Fallopius, from their figure, CUNEIFORMIA; laſtly the ſeventh, the CUBOIDES.

The ligaments by which the bones of the *tarſus* are connected with each other, are ſhort, flat, of different breadths, and run from one bone to another in various directions. They are all ſuperficial except one, by which the aſtragalus is tied to the os calcis, and for the moſt part are either ſuperior or inferior; the lateral ligaments being very few in number, The marrow of all the tarſal bones is diſperſed in moleculæ, becauſe their internal ſtructure is ſpungy. Winſlow's Anat. vol. i. p. 133.

TARSUS *luxated*, *bones of the*. If any of the ſmall bones in the foot, the *tarſus* or *metatarſus*, happen to be luxated by ſome external violence, the ligaments with the adjacent nerves and tendons, are generally ſo affected as to excite not only the moſt acute pains, but alſo violent inflammations and convulſions, and even death itſelf has been known to be the conſequence of accidents of this kind, unleſs the bones be ſpeedily replaced. The foot is for this purpoſe to be extended on an even table, and the ſurgeon is to replace the diſlocated bones with the preſſure of the palms of his hands, adjuſting them alſo with his fingers, where need requires. Compreſſes dipped in warm ſpirit of wine are then to be laid on the part, and both theſe and the reduced bones ſecured in their places, by means of the proper bandages; the patient is then to be enjoined to remain in bed till the new-ſet bones have acquired a ſufficient ſtrength. Heiſter.

TARSUS is alſo a name given by ſome anatomiſts to the cartilages which terminate the palpebræ, or eye-lids; and from which the cilia or hairs ariſe.

They are exceedingly thin and fine, which makes them light and flexible. Their form is ſemicircular: that of the upper eye-lid is ſomewhat longer than that of the under: they ſerve alike to cloſe the eyes.

TARTAN, in *Sea Language*, a ſmall coaſting veſſel navigated in the Mediterranean ſea, and having only one maſt and a bowſprit, the principal ſail, which is extremely large, being extended by a lateen-yard.

When *tartans* put up a ſquare ſail, it is called *a ſail of fortune*.

TARTAR, TARTARUS, or TARTARUM, in *Chemiſtry*, an acid concrete ſalt which riſes from wines, after complete fermentation, and ſticking to the top and ſides of the caſks, forms a cruſt, which hardens to the conſiſtence of a ſtone.

Its goodneſs rather depends on the number of repeated fermentations, which a ſucceſſion of new wines in the ſame caſks for ſeveral years makes, than on the ſoil or climate where the wine is produced.

The ſweet wines afford always leſs *tartar* than the ſharp ones, and it is alſo leſs valuable. The *tartar* of Rheniſh wine is better than that of any other; and in general, thoſe wines which have the moſt acid in them, afford the greateſt quantity of *tartar*, and that in the largeſt cryſtals. It is objected by ſome to this ſyſtem, that vinegar affords no *tartar*; but this is eaſily anſwered, by obſerving, that the wine, from which vinegar is made, has before depoſited its *tartar*.

Beſides the uſual way in which *tartar* is produced, there is a very remarkable account in the Memoirs of the Academy of Sciences at Paris, an. 1737, of its having been found in a more than ordinary beautiful ſtate on a human ſkull; the diſcovery was owing to accident, and it was found that there had been lees of wine in the veſſel in which the ſkull had been laid ten days in ſoak.

The formation of the cryſtals of this *tartar* on the ſkull, while the ſides of the veſſel had none concreted on them, ſhews that the ſkull had a diſpoſition for receiving the cryſtals more than any other body; and their peculiar brightneſs proves, that it had ſome ſhare in their formation.

Tartar is either *white*, or *red*, according to the colour of the wine from which it is produced. That brought from Germany is the beſt, as being taken out of thoſe monſtruous tuns, ſome whereof hold a thouſand pipes of wine, ſo that the ſalt has time to come to its conſiſtence, which is one of the chief qualities to be regarded in *tartar*. That of Montpelier is the next in order; then that of Lyons, Paris, &c.

White tartar is preferred to red, and is really better; as containing leſs of the droſſy or earthy part: though both kinds, when purified, are exactly the ſame. The marks of good *tartar* of either kind are, its being thick, brittle, brilliant, and but little earthy.

According to Mr. Spielman's experiment, an ounce of diſtilled water can diſſolve only three grains of cream of *tartar*, with the heat of 50° of Fahrenheit's thermometer; this ſalt is one of thoſe which are moſt difficulty diſſoluble in water, being ſcarcely affected by it in the cold, requiring ten or twelve times its own weight, when aſſiſted by a boiling heat. From the ſaturated ſolution produced by a boiling heat, the *tartar* begins to ſeparate almoſt as ſoon as the boiling ceaſes: if the quantity of water is greater, as about twenty times the weight of the ſalt, it continues long enough ſuſpended to be paſſed, with due care, through a woollen ſtrainer, or a filtre.

The uſual method of refining *tartar* is this: take two pounds of common white *tartar* reduced to powder, and put it into five gallons of fair water; put it over the fire to boil, and in the mean time beat up the whites of two or three eggs, mix theſe among the liquor, and ſkim it as it heats; finally ſtrain it and ſet it in a cool place for two days, at the end of which time a quantity of whitiſh cryſtals will be found ſticking to the ſides of the veſſel.

This is a very troubleſome and inconvenient proceſs, the *tartar* requiring ſo very large a quantity of water to diſſolve it; and the operation muſt alſo be repeated more than once, to make the cryſtals fine. Veſſels of metal cannot be employed, becauſe the *tartar* would corrode them; and earthen ones of ſize to make large quantities, are not eaſily procured. In many arts the crude *tartar*, particularly the purer ſort of white *tartar*, obtained from Rheniſh wine, does as well as the refined; but in many other occaſions none but the refined can be uſed. It were therefore much to be wiſhed, that we could get into a method of refining it here as they do in France. Shaw's Lectures, p. 158.

The purification of *tartar* at Montpelier, from whence our ſhops are generally ſupplied both with cryſtals and cream, conſiſts in boiling *tartar* in pure water, in filtrating this water, and in allowing the ſaline matter to depoſit by cold. By this firſt operation, the groſſer impurities which adhere ſlightly to the *tartar* are ſeparated; but the cryſtals obtained by this operation are ſtill red, and charged with an oily matter extraneous to the *tartar*. From this matter the *tartar* is purified, by boiling it in water, in which clay is diffuſed. By a ſecond filtration and cryſtallization, very pure and white cryſtals of *tartar* are obtained, but, being quickly formed, they are ſmall and ill-ſhaped. This cryſtallization is partly performed by evaporation, and partly by cold. The part which cryſtallizes by evaporation forms a ſaline cruſt, or pellicle, upon the ſurface of the liquor, called *cream of tartar*; and the part which cryſtallizes by cold forms ſmall irregular cryſtals, called *cryſtals of tartar*: but both are comprehended under the general name of *cream of tartar*, which is alſo uſed at large to ſignify purified *tartar*.

A great aſſiſtance in the diſſolving of *tartar* is had from adding lime-water, pot-aſhes, or ſalt of *tartar*; and if the alkali be here too great, it may be taken off by a proper quantity of oil of vitriol. But where a very pure *tartar* is required, the beſt method of obtaining it is to diſſolve the common cryſtals or cream of *tartar* in water, made highly acid with oil of vitriol. For this ſolution, after a proper evaporation, will afford perfectly fine cryſtals of *tartar*, no way participating of the oil of vitriol.

The glaſs-men are very fond of a preparation, which they call burnt *tartar*. This is no more than the large lumps of red *tartar*, burnt or calcined in earthen pans in an open fire, till they have done ſmoaking, and is of a blackiſh purple colour. Neri's Art of Glaſs, p. 69.

Tartar, diſſolved in water, efferveſces with fixt alkaline ſalts, and ſaturates of the vegetable alkalies near one third its own weight. The compound ſalt, reſulting from their union, is a neutral one, more purgative than the *tartar* itſelf, and far eaſier of ſolution, whence its name *ſoluble* TARTAR. Of the mineral fixt alkali or ſoda, this acid ſaturates, according to the faculty of Paris, four-fifths its own weight. Eight drams of the neutral ſalt, reſulting from this coalition, are reckoned by ſome to be equivalent, in cathartic power, to ſix of the ſoluble *tartar*. See RUPELLENSIS *ſal*.

Tartar forms likewiſe ſoluble compounds with all the abſorbent earths, and with ſome metallic bodies, but with theſe laſt it is with difficulty made to ſatiate itſelf completely; for after long boiling, a very conſiderable part of the *tartar* ſeparates on cryſtallization unchanged. If any of theſe combinations of *tartar*, with alkalies, with earth, or with metals, be diſſolved in water, and any other acid added, the pure *tartar* ſeparates and ſubſides, as acid and as difficult of ſolution, as at firſt; the ſubſtance that was combined with it being abſorbed by the acid ſuperadded. As the acids of the vegetable kingdom, whether native or fermented, vinegar, lemon juice, &c. have this effect of diſuniting *tartar* from all the bodies that are combinable with it, equally with thoſe of the mineral kingdom; it follows, that the tartareous acid is of a kind eſſentially different from all the other known vegetable ones, and that no acid, unleſs it be *tartar* itſelf, can be joined in preſcription to the *tartarum ſolubile*, the *ſel de ſeignette*, or the combinations of *tartar* with earths or metals.

Tartar is in a great meaſure decompoſed, and totally changed by the action of fire. If cream of *tartar* be diſtilled in a retort with a naked fire, a little phlegm will firſt riſe with a gentle heat. When the fire is gradually increaſed, which muſt be done very cautiouſly, on account of the prodigious quantity of air that is diſengaged during this diſtillation, an acid ariſes in form of white vapours, which are accompanied with an oil, at firſt thin, but afterwards more and more coloured, and empyreumatic. In the retort there remains a coal, ſtrongly alkaline, equal in weight to two-thirds of the *tartar* employed. Mr. Spielman thinks, that acids are changed into alkalies by the ſubſtraction of a part of their aqueous principle; and the nature and proportion of the conſtituent parts of *tartar* appear to favour this ſubtraction of the watery principle by the action of fire. It has been generally believed, that the alkali of *tartar*, and of other vegetable ſubſtances, is merely the effect of the combuſtion employed in the preparation of the alkali. But M. Margraaf contends, that it exiſts in ſuch vegetable ſubſtances previous to their combuſtion, and ſhews that a fixed alkali may be ſeparated from *tartar*, by means of acids, without combuſtion. He diſſolved a dram of cream of *tartar* in two gros (each gros being equal to 59½ troy grains) of ſpirit of nitre; and from the ſolution, which was clear and tranſparent, he obtained cryſtals of ſalt-petre; and by digeſting, with a very gentle heat, mixtures of powdered cream of *tartar* with marine and vitriolic acids, he obtained a regenerated common ſalt, and vitriolated *tartar*. As theſe neutral ſalts are known to conſiſt of their reſpective acids, united with the vegetable fixed alkali, it is evident they muſt have received the alkali from the *tartar*, with which the acids were mixed, and conſequently that this alkali exiſts in vegetable ſubſtances independently of combuſtion.

The medical characters of pure *tartar* are its acidity and laxative power. In doſes of half a dram or a dram, it is a mild cooling aperient: two or three drams gently looſen the belly; and ſix or eight prove moderately cathartic.

Tartar is of conſiderable uſe among the dyers, as it ſerves to diſpoſe the ſtuffs to take their colours the better. See on this article, Lewis's Mat. Med. by Mr. Aikin, 1784, and Chem. Dict. Eng. ed.

Cream of TARTAR, *cremor tartari*. See CREAM *of Tartar*, and TARTAR ſupra. Cream of *tartar* has a ſenſibly acid taſte; it reddens the blue colours of vegetables; it may be ſaturated by uniting with any of thoſe ſubſtances which are capable of forming with acids neutral ſalts; and it may be afterwards ſeparated from theſe ſubſtances, and recover its former appearance. Whence it may be inferred that this ſalt, which is concrete and cryſtalliſable, on account of a portion of earth and oil, with which it is intimately combined, is an acid. But by the analyſis of Mr. Scheele, in the Swediſh Tranſactions, part iii. for 1770, it appears, that *cream of tartar* is not a pure acid, but a compound ſalt, containing the fixed vegetable alkali, united with a ſuperabundance of the tartareous acid; and, therefore, it differs from ſoluble *tartar* only in the proportion of acid which it contains. The difficult ſolubility of *cream of tartar* being an objection to its medical uſe, ſome experiments were made by Dr. Peter Jonas Berg, for rendering it more ſoluble by certain additions, without altering its medicinal qualities. Borax was found to anſwer beſt for this purpoſe. To four parts of *cream of tartar* one of borax was added. Theſe were diſſolved in a ſufficient quantity of water, and the liquor ſtrained: about a ſixteenth part of impurities was left behind. The pure ſolution evaporated yielded an acid, and extremely ſoluble white ſalt. Nova Act. Phyſ. Med. Acad. Cæſ. Leop. Carol. Nat. Curioſ. tom. iv.

Cream of tartar is reputed a great ſweetener of the blood; for which ſome take it in whey or water-gruel in the ſpring-time, to the quantity of half an ounce every morning, for three or four weeks.

Its operation is by ſtool; and, by its ſaline particles, pretty much alſo by urine.—It is generally mixed with lenitive electaries, and other gentle cathartics, in nephritic and anti-venereal caſes, where it often proves ſerviceable.

TARTAR, *cryſtals of*. See CRYSTALS and TARTAR, ſupra.

TARTAR, *emetic*, or *ſtibiated*, is formed of the acid of *tartar*, combined with the metallic part of antimony, when this is half deprived of its phlogiſton. This is the beſt and the moſt uſed of all the emetic preparations of antimony, becauſe the metallic part of this mineral, which gives the emetic quality, is in a ſaline ſtate, and is perfectly ſoluble in water: and on this account it is juſtly ſubſtituted for the golden ſulphur, for the regulus, for the liver and glaſs of antimony, and for the powder of algaroth; a conſiderable diverſity, however, has occurred in the method of preparing it, probably from want of conſidering, that the emetic quality of this preparation proceeds from the metallic earth being diſſolved by the acid of *tartar*, and forming with it a kind of ſoluble *tartar*, a true neutral ſalt, no leſs capable of a very exact ſolution than the vegetable ſalt, the ſalt of ſeignette, and all the other ſoluble *tartars*. By conſidering this ſaturation as a fixed point, there may be produced only one kind of emetic *tartar*, always equally ſtrong. See a detail of Mr. Geoffroy's experiments on this ſubject, in Mem. Acad. Par. for 1734. M. Beaumé directs it to be prepared by mixing together equal parts of cream of *tartar*, and of porphyriſed glaſs of antimony, or rather a larger quantity of the latter ingredient. This mixture is to be thrown gradually into boiling water; and the boiling muſt be continued gently, till there is no efferveſcence, and till the cream of *tartar* be entirely ſaturated. The liquor is to be filtrated; and when it is cooled, there will be formed in it fine cryſtals, in the form of pyramids with triangular baſes, which are a ſoluble *tartar* perfectly ſaturated with glaſs of antimony. Theſe are tranſparent, while moiſt; but by expoſure to a dry air, they loſe a part of the water of their cryſtallization, and become opake and white. *Emetic tartar*, thus prepared, very well produces an emetic effect when taken from a grain to two and a half, or three, according to the conſtitution of the patient. The reſult of M. Beaumé's experiments on the manner and duration of boiling this preparation is, that veſſels of iron and copper ought to be avoided, and thoſe of ſilver or glaſs uſed, becauſe in theſe it may be boiled for any length of time, without being decompoſed; and that as the intention of the operation is to perfectly ſaturate the cream of *tartar*, the boiling muſt be continued till this ſaturation be effected, which requires a long time, when the glaſs of antimony is groſsly pounded, but a much ſhorter time, when it is well porphyriſed. The author of the Chemical Dictionary obſerves, that we are not certain, that the *emetic tartar*, prepared by ſaturating *tartar* with glaſs of antimony, has always an uniform and conſtant emetic power. And, therefore, he recommends the *powder of algaroth*, or mercury of life, which, however dangerous in itſelf, may be rendered ſafe, by waſhing it with a little fixed alkali, which will ſeparate all that marine acid that communicates to it a certain degree of cauſtic quality. The powder thus waſhed, he ſays, is altogether ſoluble by cream of *tartar*, and convertible into a ſoluble emetic *tartar*, perfectly neutral, by boiling it, and ſaturating it with cream of *tartar*, and treating it in the manner above directed, for the preparation of *emetic tartar* with glaſs of antimony. The powder of algaroth, thus prepared, is a calx of antimony conſtantly of the ſame degree of emetic ſtrength. It is emetic, becauſe the regulus of antimony firſt diſſolved by marine acid, and afterwards ſeparated from the acid, retains the quantity of phlogiſton that is neceſſary to give an emetic quality to the calx of antimony: but the quantity of phlogiſton which it retains, and, therefore, its emetic power, muſt be always the ſame; for the marine acid of the corroſive ſublimate, which afterwards becomes the acid of the butter of antimony, is always the ſame in quantity, and in its degrees of concentration and of activity; conſequently the calx of antimony, ſeparated from it, muſt always contain an equal quantity of phlogiſton, and is, therefore, much preferable to glaſs of antimony, which contains ſometimes more, and ſometimes leſs phlogiſton. Dict. Chem Eng. ed. art. *Tartar Emetic.*

The college of London, for the preparation of this antimonial emetic, directs half a pound of crocus of antimony (reduced to a ſubtle powder, and boiled and waſhed with water till it becomes perfectly inſipid) to be boiled with an equal quantity of cryſtals of *tartar*, in three pints of water, for half an hour; the liquor to be filtered, and, after due evaporation, ſet by to cryſtallize. The Edinburgh college orders ſix ounces either of the waſhed crocus, or powdered glaſs, and four of cream of *tartar*, to be boiled in four quarts of water for ſix hours; the liquor, when cooled, to be filtered, and either cryſtalliſed or evaporated to dryneſs.

The total evaporation of the fluid appears to be the beſt way of ſecuring uniformity of ſtrength to the medicine; and the ſolubility of the compound affords one of the beſt means for eſtimating its ſtrength, or the degree of its impregnation with the antimony.

Dr. Saunders relates, that an ounce of cold water, about the middle temperature of the air, diſſolved, of ſome of the common *emetic tartars* of the ſhop, not thirty-two grains, or one-fifteenth of its own weight: whereas of a well ſaturated ſort, which he had himſelf prepared by long boiling, the ſame quantity of water diſſolved fifty-two grains, or near one ninth of its own weight.

The beſt way, probably, of obtaining a ſaturated and uniform preparation of this kind, would be to digeſt the common *emetic tartar* in eight times its weight, or leſs, of cold water, and evaporate the filtered yellow ſolution to dryneſs; or to continue the boiling of the glaſs of antimony and *tartar* for twelve hours, or longer, adding water occaſionally to keep the *tartar* always diſſolved, and at length to let the water waſte ſo far, as not to exceed eight times the quantity of the *tartar* employed, after which the liquor is to be ſuffered to cool, and then filtered and evaporated. The doſe of this preparation, as an emetic, is from two or three to ſix or eight grains. It may be given alſo as an alterative, or diaphoretic, in doſes of a quarter of a grain, or half a grain, or more, and added, in the quantity of a grain or two, as a ſtimulus to the milder vegetable cathartics. Lewis's Mat. Med. by Aikin.

TARTAR *Foliated*, is a preparation of *tartar* with diſtilled vinegar, which reduces it into white leaves. See TERRA *foliata*.

TARTAR, *oil of*, is the ſalt of *tartar* expoſed to the air for ſome days, in an open veſſel, in a moiſt place, till it diſſolve into a fluid; though it is improperly called an oil, being no more than a diſſolved ſalt.

Oil of *Tartar per deliquium* is held the beſt counterpoiſon to corroſive ſublimate.

TARTAR *regenerated*. When cream of *tartar* has been made ſoluble by any alkaline ſubſtance whatever, it may be revived or regenerated into cream of *tartar* again; its acid in this ſtate has diſſolved the alkaline matter preſented to it, and that has been itſelf attenuated in ſuch a manner as to render it capable of inſinuating itſelf between the molecules or integrant parts of the conſtituent matter of the cream of *tartar*; on this only depends the ſolubility of this preparation: and to render the whole of its primitive nature again, there requires no more than the addition of a new acid, which ſhall free the *tartar* from this alkali; but this muſt neceſſarily be ſtronger than that naturally in the *tartar*. Thus ſpirit of nitre, or oil of vitriol, regenerate the *ſoluble tartar* in a moment, as being more powerful acids than that in the cream of *tartar*, and therefore taking from it all its alkali. The acid of diſtilled vinegar, which is not only a vegetable acid, but the ſame with that of *tartar*, is alſo able to regenerate the ſoluble *tartars*. It might ſeem wonderful that this ſhould be able to effect this change without any ſuperiority of force: but it is to be obſerved, that in the cream of *tartar* the acid has a terreſtrial and alkaline baſis, which is natural to it in that form; but in the ſtate of *ſoluble tartar* it takes a new alkaline baſis; which is not natural to it: and when we view the proceſs in this light, it does not appear wonderful, that an acid of its own kind ſhould be able to take away from it this artificial alkaline baſis, though it was not able to take from it the natural one. Mem. Acad. Par. 1733.

This ſecond or artificial baſis is different, according to the different alkalies which have been employed to render the *tartar* ſoluble, and conſequently the ſame acid may attach itſelf more to one than to another of thoſe alkalies, or quit them the more or leſs eaſily. There is one kind of *ſoluble tartar*, however, which is not to be regenerated at all; this is that which is made with borax.

Dr. Huxham ſays, he has often experienced the good effects of *regenerated tartar* in the cure of obſtructions of the bowels, and for ſluggiſh humours. See TERRA *foliata*.

TARTAR, *ſalt of*, is made of *tartar* waſhed, ground, purified, and calcined, by a reverberatory fire; or it is made by pulverizing what remains in the retort after the diſtillation of *tartar*, and calcining it as above by a reverberatory fire. On the one or the other of theſe preparations, they pour a great quantity of hot water, to make a ley of it; this they filtrate, and evaporate the liquor by a ſand-heat, till the fixed ſalt be found at the bottom of the veſſel. This is the pure alkali, or fixed ſalt of *tartar*.

TARTAR, *ſoluble*. The proceſs for making *ſoluble tartar*, is this: take of an alkaline fixed ſalt, a pound; of water, a gallon; and having diſſolved the ſalt in this water boiling, throw cryſtals of *tartar* in powder as long as any fermentation is raiſed, which uſually ceaſes before thrice the weight of the alkali is thrown in. Then ſtrain the liquor through paper, and after due evaporation ſet it by for the ſalt to cryſtallize, or elſe evaporate the liquor wholly away, that the ſalt may be left dry.

This ſalt by the action of the alkali on the acid of *tartar*, being freed from thoſe groſs terreſtrious parts, with which the cryſtals of *tartar*, how pure ſoever, remain ſtill charged, diſſolves readily, and keeps ſuſpended in cold water. Pemberton's London Diſpenſatory, p. 181. ſeq.

The ſeveral alkaline ſalts, that of *tartar* itſelf, the common pot-aſhes, borax, &c. all make a very good *ſoluble tartar*; and not only theſe but the common terreſtrial alkalies, whether of the mineral kingdom, as chalk or lime; or of the vegetable, as the aſhes of plants after elixivation; or of the animal, as oyſter-ſhells calcined or not calcined, and hartſhorn: all theſe give a better or worſe *ſoluble tartar*; but of theſe none ſucceeds ſo well as the oyſter-ſhell, after it has been calcined; the *ſoluble tartar*, prepared with this, coſts alſo greatly leſs than when prepared with ſalt of *tartar*.

In wood-aſhes there is always a part, which when mixed with water ſwims, and is ſuſpended in it a long time, and at length ſubſides into a kind of ſoft and impalpable matter; and another part, which ſubſides readily to the bottom, and feels rough and harſh. It is the firſt of theſe ſubſtances alone, which being mixed with cream of *tartar*, renders it ſoluble: the other part will not mix with the cream of *tartar*, or produce any ſuch effect, unleſs reduced to the nature of the firſt, by repeated and violent calcinations, and then only a part becomes ſo altered, the whole never is ſo. It appears that the firſt portion has been wholly diveſted of its acid by the fire, and thence is become ſuſceptible of the impreſſion of the weakeſt acid, ſuch as is that of the cream of *tartar*; but in the ſecond, or coarſer part, the acid it naturally contained remains fixed and concentrated, ſo that it is not ſuſceptible of any impreſſion from the weak acid of the cream of *tartar*. Mem. Acad. Par. 1733.

The different kinds of *ſoluble tartar* have alſo their different degrees of ſolubility, or different readineſs to run into a liquor *per deliquium*. The moſt eaſily ſoluble of all are thoſe made with chalk, with lime, and with wood-aſhes; and that which is moſt difficultly ſo, is the kind made with borax; it will at length run however, and is truly *ſoluble tartar*.

Tartar *vitriolated*, which ſome call *magiſtery of tartar*, is a neutral ſalt, compoſed of a vitriolic acid, ſaturated with the fixed alkali of *tartar*, or with any other pure vegetable fixed alkali.

This ſalt is prepared by pouring vitriolic acid into a ſolution of vegetable alkali, till no more efferveſcence appears, or till the liquor becomes perfectly neutral, which may be known by the ordinary trial of ſyrup of violets. From this liquor, filtrated and evaporated, ſmall cryſtals are obtained, the form of which is very inconſtant. *Vitriolated tartar* is one of the ſorts which cryſtallize better by evaporation than by cold It requires a large quantity of water to diſſolve it. Its taſte is moderately ſaline, and ſomewhat diſagreeable, but not acrid nor ſharp. It decrepitates when heated ſuddenly and ſtrongly; it contains only a ſmall quantity of the water of cryſtallization, by means of which it cannot be liquefied; neither can it be fuſed but by a very intenſe heat. *Vitriolated tartar* may be decompoſed by nitrous acid in the following manner, according to M. Beaumé. Equal parts of both are put into a matraſs, and heated till the ſalt be diſſolved. From the liquor when cold, true cryſtals of nitre may be obtained. And according to M. Margraaf *vitriolated tartar* may, in the ſame method of treatment, be decompoſed by marine acid.

This ſalt is not of any uſe in the arts, and little uſed in chemiſtry It is chiefly employed in medicine. Like the other neutral ſalts, with baſes of fixed alkali, it is aperitive in ſmall doſes, as a groſs, or fifty-nine and a half grains, and it is laxative, when taken from ſix gros to twelve. Chem. Dict. Eng. ed.

The chemiſts have ſometimes boaſted of great virtues, in what they call the magiſtery of this ſalt; this is the earth precipitated in the making of it. It is the opinion of ſome ingenious authors, that all fixed ſalts are produced by a blending together of the acid and alkaline ſalts, which the plants they are obtained from originally contained, with ſome earth. The making of this preparation of *tartar* and vitriol, gives great ſtrength to this opinion by means of this magiſtery; which ſhews, that an earth neceſſary to the cementing a mixture of an acid and an alkali into a neutral ſalt, may exiſt even in one of the principles themſelves, though unſeen by us; and that, as in the preſent inſtance, in ſo large a quantity, as not only to be ſufficient for the combining the two volatile ſubſtances into a fixed one, but even to leave a remainder of it that was not neceſſary.

While the acid of vitriol is poured upon the diſſolved ſalt of *tartar*, or its oil *per deliquium*, for the making of this ſalt, during the great efferveſcence between the acid and the alkali, there is a precipitation made of an earth, for the ſeparation of all which great care is to be had to the degree of ſaturation of the alkali with the acid. This earth afterwards may be ſevered by filtration. This earth is precipitated not out of the ſpirit of vitriol, but out of the ſalt of *tartar*; and this experiment ſhews, that this fixed ſalt did originally contain that earth, which, according to the ſyſtem of the formation of fixed ſalts out of volatile ones originally reſiding in plants, muſt neceſſarily be mixed with them, and which not being able to mix with the acid, is ſeparated and thrown off in the conflict in which the acid mixes itſelf with the reſt.

This earth is what is pompouſly called the *magiſtery of vitriolated tartar*; but it is very wrong to give that name to an earth which has none of the properties of that or any other ſalt; and they greatly deceive themſelves and their patients, who preſcribe it inſtead of the ſalt itſelf. Its ſaline taſte, probably, has induced them to think, that it poſſeſſed great virtues; but this is not innate but adventitious, and the effect only of the fluid in which it was precipitated: it cannot but have ſome of the ſalts of that fluid hanging about it, when firſt made; but theſe may, by repeated waſtings, be carried wholly off, and the magiſtery will then remain a pure ſimple earth, and ſhew itſelf to be no other than that earth which may be properly called the earth of all fixed ſalts; and which, though neceſſary to give the ſalt of *tartar* its form as a lixivial ſalt, yet being not neceſſary to it in its new form of a neutral ſalt, is depoſited in the making it into that form. It yet remains to be proved by more numerous experiments, that the fixed ſalts of plants owe that form only to a fixing earth, combining their two original volatile principles into a fixed maſs; for if this be truly the caſe, there then needs no more to the volatilizing them again, but the diveſting them of this earth. Phil. Tranſ. No 90.

TARTARHAN, a word uſed by ſome authors to expreſs ſpirit of tartar.

TARTARIZATUS *chalybs*. See IRON.

TARTARIZING, a term uſed, by ſome writers, for the act of refining or purifying, by means of ſalt of tartar.

TARTARON, a ſort of fine cloth or ſilk, mentioned in the ſtat. 4 Hen. VIII. c. 6. Blount, Cowel.

TARTARUM *tartariſatum*, *tartariſed tartar*, in *Chemiſtry*, the name of a preparation of *tartar*; the manner of doing which is given by Boerhaave, and is as follows: reduce ſome of the pureſt white *tartar* to powder, and boil this powder in ten times its weight of water in a large copper veſſel, till it appears perfectly diſſolved: let it after this continue boiling till the liquor become tolerably tranſparent, and of an acid taſte; then drop into it from on high oil of *tartar per deliquium*, the liquor being ſtill kept boiling; upon the falling in of each drop there ariſes a great ebullition, occaſioned by the meeting of the acid and alkali. Large bubbles appear on this, and in theſe the chemiſts have imagined they found the figures of cluſters of grapes.

The operation is to be patiently continued till there is no more efferveſcence made by the falling in of the drops of the oil. The acidity of the *tartar* will be then ſo perfectly ſaturated with its own alkali, that it will appear neither acid nor alkaline, but a third ſalt; great caution however muſt be uſed in obſerving the true point of ſaturation, otherwiſe the ſalt will be when finiſhed either a little acid, or a little alkaline, as the one or the other exceeds. The liquor is to be then ſtrained ſeveral times through a flannel, till perfectly clear: it is of a deep browniſh colour, and brackiſh ſaline taſte, but has no ſcent. If this be evaporated to a pellicle, and ſet to cryſtallize, it forms a ſalt which is a *tartar*, eaſily ſoluble in water, even when cold; and very properly to be called ſoluble *tartar*. Boerhaave Chem. part ii. p. 161.

TARTARUGA, in *Zoology*, a name by which the Portugueſe in America call a ſpecies of tortoiſe, known among authors by its Braſilian name JURUCUA.

TARTARUS, in *Ancient Mythology*, is one of the general diviſions of the ſubterraneous world, or the place of torments. The other two diviſions of Ades, according to Virgil, are EREBUS and ELYSIUM. The prince, or judge, who preſides over *Tartarus*, is Rhadamanthus. The miſerable inhabitants of this horrid region are of two ſorts, viz. the ſouls of ſuch as are tormented, and the infernal deities, called the FURIES, who attend there either to inflict or aggravate their torments.

Virgil diſtinguiſhed thoſe that are tormented in *Tartarus*, into two general claſſes; the firſt, of ſuch as have been ungrateful or impious towards the gods; and the ſecond, of ſuch as have been miſchievous and hurtful among men: thoſe of the latter, more particularly, who hated their brethren, uſed their parents ill, or cheated their dependents; who made no uſe of their riches; who committed inceſt, or diſturbed the marriage union of others; thoſe who were rebellious ſubjects, or knaviſh ſervants; who were deſpiſers of juſtice, and betrayers of their country; and who made and unmade laws, not for the good of the public, but only to get money for themſelves. All theſe, and the deſpiſers of the gods, of whom the rebel giants occupied the chief claſs, Virgil places in *Tartarus*, and in that vaſt abyſs, which was the moſt terrible part of this infernal region. The great road, that paſſes through Erebus, is repreſented as divided into two; of which, the right hand road leads to Elyſium, or the place of the bleſt; and the left hand road to *Tartarus*, or the place of the tormented. Virgil Æn. vi. v. 540—549. 566—580. 607—624. Spence's Polymetis, p. 259, &c.

TARTI *lapis*, a ſtone mentioned by Ludovicus Dulcis, and ſome other authors, and ſaid to be very beautiful, having all the colours of the tail of a peacock, and to have many medicinal virtues. It was probably ſome ſpecies of agate; but the ſhort account given of it will not enable us to gueſs what particular kind.

TARTON *raire*, in *Botany*, a name uſed by ſome authors for the heath-ſpurge, or that ſpecies of the thymelæa which is called *ſannamunda* in the catalogues of the Materia Medica.

TARUM, in *Botany*, a name given by Pliny to the AGALLOCHUM *ſylveſtre*, a ſpecies of aromatic plants.

TASIS, τασις, in *Rhetoric*, is uſed for the continuation of a period longer than the breath can bear. Voſſ. Rhet. lib. iv. p. 66.

TASCHENMUL, in *Ornithology*, a name given by authors to the *anas clypeata*, a ſpecies of duck, remarkable for the breadth of the end of its beak, and called in Engliſh, the *ſhoveller*. See *Broad-beaked* DUCK.

TASSEL, a ſort of pendant ornament, at the corners of a cuſhion, or the like thing.—Alſo a ſmall ribband of ſilk ſewed to a book, to be put between the leaves.

TASSELS, in a *building*, thoſe pieces of board that lie under the ends of the MANTLE-*trees*.

TASSEL, or TIERCELET, is alſo uſed in *Falconry* for a male hawk.

TASSELS are alſo a kind of hard burrs uſed by cloth workers in dreſſing cloth; they are the heads of the manured TEAZEL.

TASTATURA, in the *Italian Muſic*, the whole range of keys of organs, harpſichords, &c.

TASTE, *ſavour*, a ſenſation, excited in the ſoul by means of the organ of *taſte*; viz. the papillæ of the tongue, &c.

Dr. Grew, in a lecture on the diverſity of *taſtes*, before the Royal Society, diſtinguiſhes them into *ſimple* and *compound*.

TASTES, by *ſimple*, he underſtands ſuch as are ſimple modes of *taſte*, although mingled with others in the ſame thing: thus the *taſte* of a pippin is aci-dulcis; of rhubarb, amar-aſtringent, and therefore compounded, in both; but yet in the pippin the acid is one ſimple *taſte*, and the ſweet another, as diſtinct as the bitter and aſtringent are in the rhubarb.

Two faults, he obſerves, have here been committed: the firſt, a defective enumerating of ſimple *taſtes*; the ſecond, a reckoning them indiſtinctly among ſuch as are compounded.

Simple taſtes, of which we uſually only reckon ſix or ſeven ſorts, are at leaſt ſixteen; 1. *Bitter*, as in wormood; whoſe contrary is, 2. *Sweet*, as in ſugar. 3. *Sour*, as in vinegar; whoſe contrary is, 4. *Salt*. 5. *Hot*, as in cloves; to which is oppoſite. 6. *Cold*, as in ſal prunellæ; for we may as properly ſay a cold *taſte*, as an hot one, ſince there are ſome bodies which do manifeſtly impreſs the ſenſe of a cold upon the tongue, though not the touch. 7. *Aromatic*; to which is contrary, 8. *Nauſeous*, or malignant. 9. *Soft*, which are either vapid, as in water, ſtarch, whites of eggs, &c. or unctuous, as in oils, fat, &c. 10 *Hard*, of which he reckons four kinds. 11. *Penetrant*, which worketh itſelf into the tongue without any pungency; as is found in the root and leaves of the wild cucumbers. 12 *Stupefacient*, as in the root of black hellebore, which, being chewed, and for ſome time retained upon the tongue, affects that organ with a numbneſs, or paralytic ſtupor. 15. *Aſtringent*, as in galls; and, 14. *Pungent*, as in ſpirit of ſal ammoniac; which two laſt *taſtes* he makes contrary to the unctuous, as penetrant and ſtupefacient are contrary to the vapid one.

TASTES, *the compound*, are very numerous; but we have words to expreſs but ſix of them: 1. *Auſtere*, which is aſtringent and bitter, as in the green and ſoft ſtones of grapes. 2. *Acerb*, properly ſo called, which is aſtringent and acid, as in the juice of unripe grapes. 3. *Acrid*, which is pungent and hot. 4. *Muriatic* which is ſalt and pungent, as in common ſalt. 5. *Lixivious*, which is ſaltneſs joined with ſome pungency and heat. 6. *Nitrous*, which is ſaltneſs joined with pungency and cold.

Taſte conſtitutes one of the moſt obvious characters of bodies, and much is to be judged from it of the nature of many things. Dr. Abercromby, in a treatiſe partly written on this ſubject, has carried his obſervations ſo far, as to lay down a ſet of rules for the judging of any plant, or other body, without knowing what it is, merely from its *taſte*, in regard to its virtues in medicine.

In order to judge of what he expreſsly means by the names of the ſeveral *taſtes*, it is proper to add the liſt of them, with ſome of the things to which they are applied.

Plants, fruits, &c. are either ſour as the common ſorrel, harſh as the medlar, auſtere or rough as the quince, ſweet as the freſh juice of ripe grapes, fat and oily as the ſeſamum, bitter as gentian of the wild cucumber, ſalt as common ſea-ſalt, tart as garlic, or laſtly, inſipid as the gourd, or of ſome mixed *taſtes*, made of two or more of theſe.

The harſh or acerb things are cold, repelling and binding, hardly concocted, and they may all be known upon the tongue by their contracting or drying it. The auſtere or rough things differ from theſe only in degree, as being ſomewhat milder in *taſte*, and weaker in virtues.

The ſour or acid things are always cooling; but this never to exceſs, by reaſon of their penetrating parts; this *taſte* is known by a biting on the tongue, but without any heat. Sweet things are all nutritive; and, taking the word in its proper ſenſe, they only have this quality. Their ſweetneſs ariſes from their neither being too hot nor too cold upon the tongue.

Fat things are moderately hot, and, on this account they all, in ſome degree, moiſten and relax; but they alſo obſtruct; they are known from the ſweet things by filling, and, as it were, anointing the tongue, without giving that ſenſe of pleaſure that the others do.

Salt things are aſtringent and deterſive; the one quality they have from their earthy part, the other from their watery.

Bitter things may be very beneficial to the ſtomach; but, in improper caſes, they may alſo hurt. The pungent bitters, ſuch as the elaterium, or wild cucumber, are all hurtful, unleſs rendered ſafe by other means.

Tart things are hot, and often bad for the head; but good in heavy and phlegmatic conſtitutions; they are known by their heat in the mouth.

Laſtly; inſipid things in general have no peculiar quality, but are cold and watery; they are generally hurtful to the ſtomach, unleſs mixed with hotter and ſpicy things. Abercromb. Nov. Medic. Clavis.

It is obſerved by ſir John Floyer, that the *taſte* is ſo good a judge for us, that all the chemical principles in plants may be diſcovered by it, before their diſtillation. All watery plants ſhew their phlegm, as well to the *taſte* as by diſtilling; and in all dry woods, the *taſte* diſcovers the earth they contain, as well as a chemical analyſis; by the mucilaginous and gummy *taſte*, and by the manifeſt oilyneſs in ſome plants, we diſtinguiſh their abounding in oil as well as by the retort. The ſmell alſo helps us greatly in an extemporary judging of plants, and we are able to declare upon the ſpot, that all the aromatic plants, and all the fœtid ones, contain a large quantity of a volatile oil and ſalt. By the acrimony and pungency, we are well aſſured, that there is a votatile ſalt in plants; and, by the burning taſte of others, we find that there is a corroſive ſalt in them. By a crude rough acidity, we diſtinguiſh the tartar or eſſential ſalt of plants to be in large quantity; but if the acidity be of a vinous ſmell, we obſerve that it is of a middle ſtate of digeſtion, and may be called a vinous tartar, and diſtinguiſhed from the firſt; but if the tartar have a pungent ſmell, then it is evidently a volatile tartar, or an acid acrid tartar.

The ſweet *taſtes* are more numerous in plants, and more varied among themſelves than any other kind. Theſe, in general, ſhew their oil by thin ſlimy ſmoothneſs, and their tartar is evident in their extracts, as is very plain in the common liquorice-juice.

The graſs-ſweets, as the common dog-graſs, and the like, have much eſſential ſalt, and a moderate portion of oil; and the ruſh, reed, horſe-tail, and cats-tail, are all ſweet and rough; ſome of theſe have more oil, and others more acid; and the moſt crude among them have more oil than tartar. The corn-ſweets, as barley, rye, wheat, oats, millet and rice, have much oil and eſſential ſalt, and a little volatile; ſo bread, prepared of any of theſe, yields on analyſis oil and eſſential and volatile ſalt.

It is to be obſerved here, that fermentation and fire ſeverally produce a volatile ſalt, where it was not before, by ſubtilizing and volatilizing the eſſential ſalt; and the ſlimy mealineſs in corn ſupplies the oil. The goats-beard and ſcorzonera kind, have the ſame principles as the graſſes, much oil and eſſential ſalt. The ſub-acrid ſweets, as rampions, campanulas, trachelia, and the like, contain much oil and eſſential ſalt; but the acrimony in theſe plants ſhews that they have alſo a volatile ſalt, and that in no ſmall quantity; though Lemery, and the other chemical writers, have not obſerved this.

The ferns, polypodies, and all that claſs of plants, contain much oil and eſſential ſalt; but the chemiſts in general have omitted to mention an acrid principle in all theſe, which beſpeaks a volatile ſalt; and fragrancy is obſerved in ſome of the harts-tongues, which beſpeaks a volatile ſalt alſo, and volatile oil, though hitherto unobſerved.

All the leguminous ſlimy ſweets have more oil than tartar; but all of them have a large quantity of both. Beans, peas, and lentils, have alſo a volatile ſalt, as has alſo that ſtrange fruit, eaten in Ruſſia, and ſome other places, and called *lenticula aquatica* by ſome; but by the botanical writers, *tribulus aquaticus*; the other name belonging to the common duck-weed. The aromatic legumens, ſuch as melilot, have an exalted oil, and volatile ſalt. The honeyſuckle is ſaid by Lemery, and the other chemiſts, only to have an eſſential ſalt and oil; but as there is a highly aromatic flavour, and great acrimony, there muſt be alſo a volatile ſalt.

Theſe are ſome few inſtances, out of a vaſt number recited by the author, for the reſt of which we refer to the paper itſelf in N° 280 of the Tranſactions. Philoſ. Tranſ. N° 299, p. 1160. See TASTING.

TASTE is alſo uſed, in a figurative ſenſe, for the judgment and diſcernment of the mind.

We talk, and we hear every day, of *taſte*, of *good taſte*, and of *bad taſte*, and yet without well underſtanding what we mean by the word: in effect, a *good taſte* ſeems to be little elſe but right reaſon, which we otherwiſe expreſs by the word *judgment*.

To have a *taſte*, is to give things their real value, to be touched with the good, to be ſhocked with the ill; not to be dazzled with falſe appearances; but, in ſpite of all colours, and every thing that might deceive or amuſe, to judge ſoundly.

Taſte and judgment then ſhould be the ſame thing; and yet it is eaſy to diſcern a difference: the judgment forms its opinions from reflection; the reaſon, on this occaſion, takes a kind of circuit to arrive at its end; it ſuppoſes principles, it draws conſequences, and it judges; but not without a thorough knowledge of the caſe: ſo that after it has pronounced, it is ready to render a reaſon of its decrees.—*Taſte* obſerves none of theſe formalities; before it has time to conſult, it has taken its reſolution: as ſoon as ever an object is preſented to it, the impreſſion is made, and the ſentiment formed; and we aſk no more of it. As the ear is wounded with a harſh ſound, as the ſmell is ſoothed with an agreeable odour, before ever the reaſon have meddled with thoſe objects, to judge of them; ſo the *taſte* is ſtruck at once, and prevents all reflection.

Reflections may come afterwards to confirm this *taſte*, and diſcover the ſecret reaſons of its conduct; but it was not in its power to wait for them. Frequently, it happens not to know them at all; and what pains ſoever we uſe, we cannot diſcover what it was that determined it to think as it did.

This conduct is very different from that which the judgment obſerves in its deciſions; unleſs we chooſe to ſay, that *good taſte* is, as it were, a firſt motion, or a kind of inſtinct of right reaſon, which hurries us on with rapidity, and conducts us more ſecurely than all the reaſoning we could uſe. It is a firſt glance of thought, which diſcovers to us the nature and relation of things, as it were, by intuition.

In effect, *taſte* and judgment are one and the ſame thing, one and the ſame diſpoſition and habitude of the ſoul, which we call by different names, according to the different manners wherein it acts: when it acts by ſenſation, by the firſt impreſſion of objects, we call it *taſte*; and when by reaſoning, after having examined the thing by all rules of art, &c. we call it judgment: ſo that one may ſay, *taſte* is the judgment of nature, and judgment is the *taſte* of reaſon.

Good taſte, as defined by Madem. Scudery and Madem. Dacier, in an expreſs treatiſe *of the corruption of taſte*, is a harmony between the mind and reaſon; and a perſon has more or leſs of this *taſte*, as that harmony is more or leſs juſt.

One might, perhaps, improve on this hint, and ſay, that *good taſte* is nothing elſe but a certain ratio or relation between the mind, and the objects preſented to it. Right reaſon cannot but be moved and affected with things conformably thereto, and wounded by thoſe contrary; there is, then, a kind of ſympathy, which unites them as ſoon as ever they meet: and at their union, their good underſtandings diſcover each other.—Make a fine diſcourſe; uſe only the richeſt and nobleſt expreſſions; if they contain an unhappy thought, or an incoherent reaſoning, that thought, this reaſoning, will immediately be felt by a perſon of *taſte*; and the antipathy will ſhew itſelf by a movement of averſion, as ſudden, as lively, and as natural, as that which nature inſpires us withal for toads or ſpiders.

Dr. Gerard, in his ingenious and elaborate Eſſay on *Taſte*, obſerves, that a fine *taſte* is neither wholly the gift of nature, nor wholly the effect of art. It derives its origin from certain powers natural to the human mind, but theſe muſt be aſſiſted by culture, in order to attain their full perfection. *Taſte*, according to this writer, conſiſts chiefly in the improvement of thoſe principles, which are commonly called the powers of imagination, and are conſidered by modern philoſophers as internal or reflex ſenſes, ſupplying us with finer and more delicate perceptions, than any which can be properly referred to our external organs. The ſimple principles of *taſte*, are the ſenſes of novelty, of ſublimity, of beauty, of imitation, of harmony, of ridicule, and of virtue. Any one of the internal ſenſes, exiſting in vigour and perfection, forms a particular branch of *taſte*, and enables a man to judge in ſome one ſubject of art or genius; but all of them muſt at once be vigorous, in order to conſtitute *taſte* in its juſt extent. *Taſte* will alſo derive conſiderable aſſiſtance from another principle, diſtinct from all the internal ſenſes; and this is ſuch a ſenſibility of heart or delicacy of paſſion, as fits a man for being eaſily moved, and for readily catching as by infection any paſſion that a work is fitted to excite. Moreover, the moſt complete union of the internal ſenſes is not of itſelf ſufficient to form good *taſte*, even though they be attended with the greateſt delicacy of paſſion. They muſt be aided with judgment, the faculty which diſtinguiſhes things different, ſeparates truth from falſhood, and compares together objects of their qualities.—Good ſenſe is an indiſpenſible ingredient in true *taſte*, which always implies a quick and accurate perception of things as they really are; and as the poet obſerves,

> Is, though no ſcience, fairly worth the ſeven.

Taſte, like every other human excellence, is progreſſive and improveable: and goodneſs of *taſte* lies in its maturity and perfection; conſiſting, as Dr. Gerard ſays, in certain excellencies of our original powers of judgment and imagination combined. Theſe may be reduced to four, viz. ſenſibility, refinement, correctneſs, and the proportion or comparative adjuſtment of its ſeparate principles. All theſe muſt be in a conſiderable degree united, in order to form true *taſte*. And this excellence of *taſte*, ſuppoſes not only culture, but culture judiciouſly applied. Want of *taſte* unavoidably ſprings from negligence; falſe *taſte* from injudicious cultivation. Senſibility of *taſte*, we are told, depends very much on the original conſtruction of the mind, and is leſs improveable by uſe than any other of the qualities of good *taſte*. Refinement or elegance of *taſte*, is chiefly owing to the acquiſition of knowledge, and the improvement of judgment. Refinement of *taſte* exiſts only, where to an original delicacy of imagination, and natural acuteneſs of judgment, is ſuperadded a long and intimate acquaintance with the beſt performances of every kind. And as ſenſibility of *taſte* diſpoſes us to be ſtrongly affected with whatever beauties or faults we perceive; and refinement of *taſte* makes us capable of diſcovering both, even when they are not obvious; ſo correctneſs of *taſte* prevents our being impoſed upon by falſe appearances, and either approving ſhining faults, or condemning ſhining virtues, and enables us to aſſign to every quality its due proportion of merit or demerit: thus diſtinguiſhing the various kinds, and meaſuring the different degrees of excellence and faultineſs. The laſt finiſhing and complete improvement of *taſte*, reſults from the due proportion of its ſeveral principles, and the regular adjuſtment of all its ſentiments, according to their genuine value, ſo that none of them may engroſs our minds, and render us inſenſible to the reſt. This due proportion of the principles of *taſte* preſuppoſes the correctneſs of each, and includes, beſides, an enlargement and comprehenſion of mind. Dr. Gerard has alſo conſidered, how far *taſte* depends on the imagination, evinced the connection of *taſte* with genius, and the influence of *taſte* on criticiſm, illuſtrated the objects and the pleaſures of *taſte*, and traced the effects of *taſte* on the character and paſſions. *Taſte*, he ſays, may be conceived as employing itſelf about nature, art, and ſcience. With regard to nature, which is the common ſubject of the other two, *taſte* and reaſon are employed in conjunction: as reaſon inveſtigates the laws of nature, *taſte* alone diſcovers its beauties. In art, *taſte* is the ultimate judge, and reaſon but its miniſter. Scarce any art is ſo mean, or ſo entirely mechanical, as not to afford ſubjects of *taſte*. But the finer arts, which imitate the excellencies of nature, ſupply it with more proper materials, and thence derive their merit. Muſic, painting, ſtatuary, architecture, poetry, and eloquence, conſtitute its peculiar and domeſtic territory, in which its authority is abſolutely ſupreme. In ſcience, reaſon is ſupreme, but may ſometimes reap advantage from uſing *taſte* as an auxiliary, which ſerves to judge, not only of the manner in which ſcience is communicated, but alſo of the ſubject matter itſelf. To this eſſay of Dr. Gerard are annexed three diſſertations on the ſame ſubject; one by Voltaire; another by M. D'Alembert, read before the French academy, in 1757, and intended to ſhew the great advantages of philoſophy in its application to matters of *taſte*, and to juſtify it from the accuſations that have been brought againſt it by ignorance and envy; and the third is a fragment of Monteſquieu.

A late excellent writer has defined *taſte* to be the power of receiving pleaſure from the beauties of nature and of art. Though *taſte*, ſays this writer, be ultimately founded on a certain natural and inſtinctive ſenſibility to beauty, yet reaſon aſſiſts taſte in many of its operations, and ſerves to enlarge its power. In this ſenſe it is a faculty common in ſome degree to all men. Quintilian, however, (Inſtit. lib. vi. c. 3.) ſeems to include *taſte* under what he calls judicium. The characters of *taſte*, when brought to its moſt perfect ſtate, are all reducible to two, delicacy, which principally reſpects the perfection of that natural ſenſibility on which *taſte* is founded; and correctneſs, which chiefly reſpects the improvement that faculty receives through its connexion with the underſtanding; the former of theſe qualities is more the gift of nature; the latter more the product of culture and art. Among the ancient critics, Longinus poſſeſſed moſt delicacy; Ariſtotle moſt correctneſs.—Among the moderns, Mr. Addiſon is a high example of delicate *taſte*; and dean Swift, if he had written on the ſubject of criticiſm, would perhaps have afforded the example of a correct one. In determining the ſtandard of *taſte*, thoſe who ſay that nature is this ſtandard, lay down a principle very true and juſt, as far as it can be applied: nevertheleſs, conformity to nature is an expreſſion very often uſed, without any diſtinct or determinate meaning: in a more clear and preciſe ſenſe, nothing can be conſidered as the ſtandard of *taſte*, but the *taſte*, as far as it can be known, of human nature. That which men concur the moſt in admiring, muſt be held to be beautiful. His *taſte* muſt be eſteemed juſt and true, which coincides with the general ſentiments of men. In this ſtandard we muſt reſt. To the ſenſe of mankind the ultimate appeal muſt ever lie, in all works of *taſte*. But this ſenſe is founded on thoſe principles of reaſon and ſound judgment, which are applicable to matters of *taſte*; and yet the ultimate concluſions to which our reaſonings lead, refer at laſt to ſenſe and perception. Accordingly it is obſerved, that the difference between the authors who found the ſtandard of *taſte* upon the common feelings of human nature, aſcertained by general approbation, and thoſe who found it upon eſtabliſhed principles, which can be aſcertained by reaſon, is more an apparent than a real difference. For they who lay the greateſt ſtreſs on ſentiment and feeling, make no ſcruple of applying argument and reaſon to matters of *taſte*; they appeal to eſtabliſhed principles, and plainly ſhew that the general approbation to which they ultimately recur, is an approbation reſulting from diſcuſſion as well as from ſentiment. And they, on the other hand, who, in order to vindicate *taſte* from any ſuſpicion of being arbitrary, maintain that it is aſcertainable by the ſtandard of reaſon, admit, nevertheleſs, that what pleaſes univerſally, muſt on that account be held to be truly beautiful; and that no rules or concluſions concerning objects of *taſte*, can have any juſt authority, if they be found to contradict the general ſentiments of men.

However, it is not pretended, that there is any ſtandard of *taſte*, to which, in every particular inſtance, we can reſort for clear and immediate determination. But it is ſufficient to conclude, that *taſte* is far from being an arbitrary principle, which is ſubject to the fancy of every individual, and which admits of no criterion for determining whether it be falſe or true. Its foundation is the ſame in all human minds. It is built upon ſentiments and perceptions, which belong to our nature; and which, in general, operate with the ſame uniformity as our other intellectual principles. When they are perverted by ignorance or prejudice, they are capable of being rectified by reaſon. Their ſound and natural ſtate is ultimately determined by comparing them with the general *taſte* of mankind.

The ingenious writer, to whom we are indebted for the preceding obſervations, has diſtinguiſhed between *taſte* and GENIUS. *Taſte*, he ſays, conſiſts in the power of judging; genius, in the power of executing. One may have a conſiderable degree of *taſte*, in poetry, eloquence, or any of the fine arts, who has little or hardly any genius for compoſition or execution in any of theſe arts. But genius cannot be found without including *taſte* alſo. Genius, therefore, deſerves to be conſidered as a higher power of the mind than *taſte*: genius always imports ſomething inventive or creative, which does not reſt in mere ſenſibility to beauty where it is perceived, but which can, moreover, produce new beauties, and exhibit them in ſuch a manner as ſtrongly to impreſs the minds of others. Refined *taſte* forms a good critic; but genius is farther neceſſary to form the poet, or the orator. Beſides, genius, in common acceptation, extends much farther than to the objects of *taſte*; but though it is a higher faculty than *taſte*, it is ever, according to the uſual frugality of nature, more limited in the ſphere of its operations. See Dr. Blair's Lectures on Rhetoric, and Belles Lettres, vol. i. lect. ii. and iii. See alſo Hume's Eſſay of the ſtandard of *taſte*, in his Eſſays, &c. vol. i. eſſ. xxiii. p. 253, edit. 1764.

TASTING, the ſenſe whereby we diſtinguiſh ſavours; or the perception which the ſoul has of external objects, by means of the organs of *taſte*.

Authors differ much as to the *organ of taſting*. Bauhin, Bartholin, Veſtingius, &c. place it in the laxer fleſhy parts of the tongue; Dr. Wharton, in the glands at the root of the tongue; Laurentius, in the thin tunic covering the tongue; others in the palate, &c. But the great Malpighi, and after him, all the lateſt writers, place it in the papillæ chiefly lying about the tip and ſides of the tongue. See TONGUE.

Theſe papillæ ariſe from the corpus nervoſum, which covers the muſcular fleſh of the tongue; whence, paſſing through the corpus reticulare, they ſtand up under the external membrane of the tongue, erect, and covered with vaginæ, or ſheaths of the ſaid membrane, to defend them from objects too violent. Theſe vaginæ are porous, and ſtick out ſo far, that when the aliment is ſqueezed, they enter with the ſame, to receive the object, or the matter of *taſte*.

Theſe papillæ, Boerhaave conjectures to ariſe from the ninth pair of nerves; and theſe, he aſſerts, are the only organ of *taſte*: the others, whether of the tongue, palate, or jaws, &c. he obſerves, contribute nothing thereto; though probably thoſe of the cheeks next the dentes molares may.

The *object of taſting*, is any thing, either in animals, vegetables, or minerals, from which ſalt or oils may be extracted. See SALT.

Taſting, then, is performed by the objects being attenuated and mixed with ſaliva, warmed in the mouth, and applied to the tongue; where, inſinuating into the pores of the membranous vaginæ of the nervous papillæ, and penetrating to the ſurface of the papillæ themſelves, it affects and moves them: by which means a motion is communicated along the capillaments of the nerve to the common ſenſory, and an idea excited in the mind, of ſalt, acid, ſweet, bitter, hot, aromatic, auſtere, or the like; according to the figure of the particles that ſtrike the papillæ, or the diſpoſition of the papillæ to receive the impulſe.

The *taſte*, conſidered in a medical view, may be diminiſhed by cruſts, filth, mucus, aphthæ, pellicles, warts, &c. covering the tongue: it may be depraved by a fault of the ſaliva, which, being diſcharged into the mouth, gives the ſame ſenſation as if the food which the perſon takes had really a bad *taſte*; or it may be entirely deſtroyed by injuries done to the nerves of the tongue and palate. Few things prove more hurtful, either to the ſenſe of *taſting* or ſmelling, than obſtinate colds, eſpecially thoſe which affect the head. When the *taſte* is diminiſhed by filth, mucus, &c. the tongue ought to be ſcraped, and frequently waſhed with a mixture of water, vinegar, and honey, or ſome other detergent. When the ſaliva is vitiated, which ſeldom happens, unleſs in fevers or other diſeaſes, the curing of the diſorder is the cure of this ſymptom. To relieve it, however, in the mean time, the following things may be of uſe: if there be a bitter *taſte*, it may be taken away by vomits, purges, and other things which evacuate bile: what is called a nidorous *taſte*, ariſing from putrid humours, is corrected by the juice of citrons, oranges, and other acids: a ſalt *taſte* is cured by plentiful dilution, with watery liquors: an acid *taſte* is deſtroyed by abſorbents, and alkaline ſalts, as powder of oyſter-ſhells, ſalt of wormwood, &c. When the ſenſibility of the nerves, which ſupply the organs of *taſte* is diminiſhed, the chewing of horſe-raddiſh, or other ſtimulating ſubſtances, will help to recover it. Buchan's Dom. Med. p. 505.

TASTO, in the *Italian Muſic*, the touch or part of any inſtrument, whereon, or by means of which its notes are made to ſound, be it on the neck, as lutes, viols, &c. which are called fixed and immoveable; or the front of organs, ſpinets, or harpſichords, where the keys are diſpoſed to raiſe the jacks, called moveable touches; and is properly no more than the finger-board of each.

Taſto ſolo is often found in thorough baſſes, where it ſhews that the inſtruments accompanying, as the lute, organ, &c. are only to ſtrike a ſingle ſound, from that place, till they find cyphers, or the words *accordo* or *accompanimento* placed in their part. Theſe intimate, that the accords are to begin again in this place.

TATA *Youba*, in *Botany*, a name uſed by ſome for the tree which yields what the dyers call the fuſtic, or yellow wood uſed in dying.

TATH, in *Old Laws*, a privilege which ſome lords of manors enjoyed of having their tenants ſheep folded at night on their demeſne lands, for the improvement of the ground.

TATIANITES, TATIANITÆ, in *Eccleſiaſtical Hiſtory*, a ſect of ancient heretics; thus called from Tatian, a diſciple of Juſtin Martyr.

This Tatian, who has the character of one of the moſt learned men of all antiquity, was perfectly orthodox during the life of his maſter. He was, like him, a Samaritan,

maritan, by nation, not by religion, as Epiphanius ſeems to inſinuate. They both belonged to the Greek colonies which were ſpread throughout the country of the Samaritans.

Juſtin being dead, Tatian is ſaid by ſome to have inclined to ſome of the errors of the Valentinians; but Moſheim ſays, that his doctrine approached nearer to that of the oriental philoſophy concerning the two principles. He adds, that it appears from the teſtimony of credible writers, that Tatian looked upon matter as the foundation of all evil, and therefore recommended, in a particular manner, the mortification of the body; that he diſtinguiſhed the creator of the world from the ſupreme Being; denied the reality of Chriſt's body; and corrupted the Chriſtian religion with ſeveral other tenets of the oriental philoſophy. He had a great number of followers, who were, after him, called *Tatianiſts*; but were nevertheleſs more frequently diſtinguiſhed from other ſects, by names relative to the auſterity of their manners. For as they rejected, with a ſort of horror, all the comforts and conveniences of life, and abſtained from wine with ſuch a rigorous obſtinacy as to uſe nothing but water, even at the celebration of the Lord's ſupper; as they macerated their bodies by continual faſting, and lived a ſevere life of celibacy and abſtinence; ſo they were called ENCRATITÆ or temperate, HYDROPARASTATÆ, or drinkers of water, and APOTACTITÆ or renouncers. Moſh. Eccl. Hiſt. vol. i. p. 180. 8vo. Eng. ed.

TAT-TOO, *q. d.* TAP-TO, a beat of a drum, at night, to advertiſe the ſoldiers to retreat, or repair to their quarters in a garriſon, or to their tents in a camp. See RETREAT.

TATTOWING, in *Modern Hiſtory*, a name given at Otaheite, to the operation of ſtaining the body. For this purpoſe they prick the ſkin, ſo as juſt not to fetch blood, with a ſmall inſtrument, ſomewhat in the form of a hoe: that part which anſwers to the blade is made of a bone or ſhell, ſcraped very thin, and from a quarter of an inch to an inch and a half wide: the edge is cut into ſharp teeth or points, from the number of three to twenty, according to its ſize. When this is to be uſed, they dip the teeth into a mixture of a kind of lamp-black, formed of the ſmoke that riſes from an oily nut which they burn inſtead of candles, and water: the teeth, thus prepared, are placed upon the ſkin, and the handle to which they are faſtened, being ſtruck by quick ſmart blows, with a ſtick fitted for the purpoſe, they pierce it, and at the ſame time carry into the puncture the black compoſition, which leaves an indelible ſtain. This operation is performed upon the youth of both ſexes, when they are about twelve or fourteen years of age, in ſeveral parts of the body, and in various figures, according to the fancy of the parent, or perhaps the rank of the party. The women are generally marked with this ſtain, in the form of a z, in every joint of their fingers and toes, and frequently on the outſide of their feet: the men are alſo marked with the ſame figure; and both men and women have ſquares, circles, creſcents, and ill-deſigned repreſentations of men, birds, or dogs, and various other unintelligible devices impreſſed upon their legs and arms. But the part on which theſe ornaments are laviſhed with the greateſt profuſion is the breech; this, in both ſexes, is covered with a deep black; above which arches are drawn over one another, as high as the ſhort ribs. Theſe are often a quarter of an inch broad, and the edges are indented. Theſe arches are exhibited both by the men and women, with ſingular oſtentation. The face in general is left unmarked. Some old men had the greateſt part of their bodies covered with large patches of black, deeply indented at the edges, like a rude imitation of flame. Hawkeſworth's Voyages, vol. ii. p. 189.

TATU, in *Zoology*, the Braſilian name for the ARMADILLO, or ſhell-hedge-hog, or DASYPUS of Linnæus.

TATU-*Apara*, in *Zoology*, the name of a creature of the armadillo kind, being the three-banded or *tricinctus* DASYPUS of Linnæus: but differing from the others in many particulars; its head is oblong, and of a pyramidal figure; its ears are ſmall, ſhort, and roundiſh; and its feet, as well the fore ones as the hinder ones, have each five toes. The fore legs are about three fingers long, the hinder ones five; the tail of a pyramidal figure, and little more than two fingers breadth long. It is covered with a ſhelly coat of a foot long, and eight fingers wide; it is ſmaller at both ends than in the middle; and is convex on the outſide, and concave within. In the middle, or a little toward the fore end, it has four junctures, which are placed tranſverſely, and by means of which it can, at pleaſure, expand its ſhell, or contract it together into a round figure. The whole cruſt is compoſed of pentangular pieces, very nicely fitted to one another, and the ſeries of theſe between the commiſſures are parallelograms. The whole is compoſed of yellowiſh ſcales joined by an extremely tough ſkin. This animal burrows under ground, keeps its hole in the day, and rambles out at night: when it would ſleep, or when it is afraid of being taken up, it contracts its cruſt into a round figure; and hiding its whole body within, it might ſooner be taken for a ſea ſhell than a land animal. It is hunted with little dogs, feeds on potatoes, &c. drinks much, grows very fat, and is reckoned delicious eating when young, but when old has a muſky diſagreeable taſte; breeds every month, and brings four at a time. Ray and Pennant. See *Tab.* III. *of Quadrupeds*, N° 21, and ARMADILLO.

TATU *Muſtelinus*, the *weaſel-headed armadillo*, in *Zoology*, the name of a ſmall animal of the armadillo-kind. This is the *daſypus unicinctus* of Linnæus: it has a very ſlender head, ſmall erect ears, the cruſt on the ſhoulders and rump conſiſting of ſquare pieces; eighteen bands on the ſides; five toes on each foot; length from noſe to tail about fifteen inches; the tail five and a half. It inhabits South America. Ray, Pennant and Grew's Muſ. Reg. Soc. p. 19.

TATU-*Paba* of Braſil, in *Zoology*, is the ſix-banded *daſypus* of Linnæus, having the cruſt of the head, ſhoulders, and rump, formed of angular pieces, and between the bands, and alſo on the neck and belly, a few ſcattered hairs; the tail thick at the baſe, tapering to a point, and not ſo long as the body, and five toes on each foot. It inhabits Braſil and Guiana. Pennant.

TATU *Porcinus*, in *Zoology*, the name of the pig-headed armadillo, or nine-banded *daſypus* of Linnæus, with long ears; cruſt on the head, ſhoulders, and rump, marked with hexangular figures; the nine bands on the ſides diſtinguiſhed by tranſverſe cuneiform marks; breaſt and belly covered with long hairs; four toes on the fore-feet, and five on the hind; the tail taper, and a little longer than the body; and length of the whole animal three feet. This animal inhabits South America: and one, that was brought into England a few years ago from the Moſquito ſhore, was fed with raw beef and milk, but refuſed our grains and fruit. Pennant.

TATUETE, in *Zoology*, the name of a ſpecies of *tatu*, or armadillo, being the nine-banded *daſypus* of Linnæus, though Buffon and Pennant aſcribe to it only eight bands; it has upright ears, two inches long; ſmall black eyes; four toes on the fore-feet, and five on the hinder ones; the length from noſe to tail about ten inches, the tail nine: it is of an iron-colour on the back, and whitiſh at the ſides; its belly alſo is whitiſh and naked, except for a few hairs. It inhabits Braſil.

The fleſh of this is accounted more delicious than that of any other creature of this kind, though they may all be eaten. Ray and Pennant.

TATULA, in *Botany*, a name uſed by Cluſius, and ſome other authors, for the ſtramonium, or thorn-apple.

TAU, in our ancient cuſtoms, ſignifies a CROSS.

Tradendò dicto comiti Thau *choreum.* So Mr. Selden, in his notes upon Eadmerus, p. 159. *Ego Eadgiſa prædicti regis ava hoc opus egregium crucis* Taumate *conſolidavi.* See Mon. tom. iii. p. 121.

TAU, or TAW, in *Heraldry*, an ordinary, in figure of a T, ſuppoſed to repreſent St. Andrew's croſs, or a croſs potence, the top part cut off.

It is thus called from the name of the Greek T, *tau.*

TAVACCARÆ, in the *Materia Medica*, the name by which many authors call the *cocus Maldiviæ*, or Maldive-nut.

TAUGHT, or TAU'T, *Tight*, in the *Sea-language*, denotes the ſtate of being extended or ſtretched out. Thus they ſay, *ſet taught* the ſhrouds, the ſtays, or any other ropes, when they are too ſlack and looſe.

TAULACUM, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a ſpecies of orpiment, which is very common with them.

It is of a dirty yellow colour, and is compoſed partly of an irregular maſs, partly of fine flakes, like ſcales of fiſhes. Theſe are of the beſt colour. The whole maſs, on being expoſed to the fire, burns, and emits copious fumes; but it does not melt readily. After it has been ſeveral times calcined, the Indians give it internally in intermittent fevers, with ſafety and ſucceſs. Woodw. Catal. Foſſ. vol. i. p. 24.

TAUNT, a ſea term, ſignifying high or tall.—When the maſts of a ſhip are too tall for her, the ſailors ſay, ſhe is *taunt-maſted.*

TAUREA, among the *Romans*, a puniſhment inflicted by whipping with ſcourges made of bulls hides.

TAURI *liberi libertas.*—In ſome ancient charters, *taurus liber* ſignifies a common bull kept for all tenants within ſuch a manor, or liberty.—*Cum libertate faldiæ, liberi tauri, & liberi apri*, &c. See *Free* Bull.

TAURIA, Ταυρια, in *Antiquity*, a feſtival in honour of Neptune. Pot. Archæol. tom. i. p. 432.

TAURILIA, among the *Romans*, games in honour of the infernal gods. They were otherwiſe called *ludi taurii*.

TAUROBOLIUM, or Taurobolion, among the *Ancients*, ſacrifices of bulls, which were offered to Cybele, the mother of the gods, to render thanks to the goddeſs of the earth, for her teaching men the art to tame thoſe animals, and fit them for labour.

The *Taurobolium* was a kind of ſacrifice of expiation and purification; of which no trace occurs before the reign of Antonine, and which ſeems to have terminated under Honorius and Theodoſius the younger. It was principally employed in the conſecration of the prieſts of Cybele.

TAUROCOLLA, *bull glue*, a ſort of glue much uſed among the ancients in works that required ſtrength, being accounted far ſtronger than any other kind. It was made by boiling down the ears and genital parts of a bull in water.

TAUROPOLIA, in *Antiquity*, feaſts, celebrated in honour of Diana and Apollo, in the Icarian iſles, viz. thoſe of the Archipelago and of the Ægean ſea.

TAURUS, in *Aſtronomy*, the *Bull*; one of the twelve ſigns of the zodiac, and the ſecond in order.

The ſtars in the conſtellation *Taurus*, in Ptolemy's catalogue, are 44; in Tycho's catalogue 43; in Hevelius's catalogue 51; in the Britannic catalogue 141. The longitudes, latitudes, magnitudes, &c. whereof are as follow.

Names and ſituations of the ſtars.	Bayer's Cha.	Signs	Longitud. ° ′ ″	Latitude. ° ′ ″	Magnitude.
South of 4 in the ſection	ο	♉	16 49 36	9 21 47 S	4
That following it	ξ		17 33 4	8 49 48 S	4
			21 32 28	2 59 57 N	6
That following this	ς		18 44 58	7 28 29 S	6
North of 4 in the ſection	*f*		19 15 18	5 57 13 S	5
5.					
That fol. this in preced. ſhoulder	*t*		18 47 41	9 30 27 S	6
			22 50 12	5 02 40 S	6
			21 46 50	0 05 20 N	6
			23 06 10	3 41 37 N	6
Preced. inform. under the foot			17 38 38	18 27 41 S	4.5
10.					
			24 26 24	5 32 51 S	6
			19 03 08	16 04 57 S	6
			23 30 49	0 00 50 S	6
			23 50 29	0 07 15 S	6
	κ		24 47 09	3 03 43 N	6
15.					
Preced. of ſquare of Pleiades	*g*		25 07 05	4 19 25 N	7
In weſt angle of ſquare	*b*		25 05 21	4 09 05 N	5
Moſt north of Pleiades	*m*		25 18 52	4 50 42 N	7
North of ſquare	*e*		25 14 42	4 29 02 N	5
	c		25 21 31	4 21 25 N	6
20.					
	k		25 25 16	4 31 33 N	6.7
	l		25 26 40	4 29 49 N	7
South of ſquare	*d*		25 22 30	3 54 47 N	4.5
	p		25 38 32	4 01 39 N	7
Lucida pleiadum	η		25 40 08	4 00 37 N	3
25.					
	s		25 56 00	3 41 45 N	7.8
In the eaſt angle	*f*		26 01 52	3 52 37 N	6
A leſs, contiguous to it	*h*		26 03 19	3 57 34 N	7.8
Preceding in the foot 1 at	*u*		21 13 06	13 30 06 S	6
Subſeq. in preced. ſhoulder	*e*		23 00 15	8 40 36 S	5
30.					
Subſequent in foot 2 at	*u*		22 54 17	13 22 57 S	6
			27 25 21	1 58 32 N	6
			27 36 33	2 38 20 N	7
			28 00 57	0 10 38 S	7
That in the breaſt	λ		26 17 31	7 59 57 S	4
35.					
			29 26 17	3 13 26 N	7
In the middle of the neck	A		29 07 19	1 13 20 N	5
In the heel of the preceding foot	ν		25 35 08	14 29 50 S	4
			29 15 00	1 08 01 S	6
			25 37 51	15 04 02 S	7
40.					
Preced. the ſquare of the neck		♊	0 36 10	6 33 07 N	6
North of ſquare of the neck	ψ		0 57 25	7 54 38 N	5
Preceding of 2 at the knee 1 at	ω	♉	29 40 52	1 23 58 S	6
Preced. of middle ones in the ſquare of the neck	ρ	♊	1 19 32	5 16 41 N	6
		♉	27 32 58	15 21 10 S	7
45.					
			28 32 05	13 17 55 S	7
			28 55 38	11 47 39 S	7
That preced. 1ſt of the Hyades		♊	0 27 43	5 50 11 S	7
That in the preceding cheek	μ	♉	29 14 12	12 13 17 S	4
Subſequent of two at knee 2 at	ω	♊	1 43 40	0 47 26 S	6
50.					
			2 09 33	0 08 53 N	7
Subſeq. of middle ones in the ſquare of the neck	φ		3 32 59	5 46 12 N	5
			2 19 18	0 19 23 S	7
Firſt of the Hyades in noſtrils	γ		1 27 34	5 46 22 S	3
			1 39 52	4 45 35 S	7
55.					
			2 42 21	0 15 00 N	7
That under the 1ſt of the Hyades			1 13 31	7 20 32 S	6.7
	b		1 33 12	6 19 57 S	7
South of ſquare of the neck	χ		3 46 56	3 58 41 N	5
			1 38 53	7 22 00 S	7
60.					
Between the noſtr. and n. eye 1 at	δ		2 31 27	4 00 34 S	4
			3 53 21	2 37 06 N	7
			2 31 24	4 44 58 S	6
Second 2 at	δ		2 47 13	4 09 04 S	5
North of the ſouth in the ear 1 at	κ		3 51 53	0 35 21 N	5
65.					
In the heel of the hind foot	*r*		1 24 57	12 01 21 S	5
South of ſouth in the ear 2 at	κ		3 51 37	0 29 46 N	5
Third and ſmall between noſtrils and ear 3 at	δ		3 11 42	3 43 27 S	6
Preced. of north in the ear 1 at	υ		4 09 42	1 04 06 N	5
			2 54 01	5 41 50 S	7
70.					
			3 02 10	6 02 44 S	7
Subſequent 2 at	υ		4 25 18	1 12 36 N	6
Preceding below the hyades	π		2 56 57	6 56 53 S	5
In the north eye	ε		4 07 11	2 35 58 S	3.4
			3 39 12	5 23 43 S	7
75.					
			3 22 25	6 59 01 S	7
Double one between noſtrils and ſouth eye 1 at	θ		3 36 25	5 47 16 S	5
2 at	θ		3 36 51	5 52 55 S	5
In the following ſhoulder	*b*		3 12 31	8 40 32 S	5
			3 56 00	6 09 18 S	7
80.					
			4 03 47	6 07 13 S	7
			3 57 22	6 42 04 S	7
			3 44 57	8 04 25 S	7
			4 05 43	6 43 28 S	7
			4 22 35	6 00 53 S	7
85.					
Middle, beneath the Hyades	*S*		4 42 07	7 05 06 S	5
South eye, palilicium, Aldebaran	α		5 27 00	5 29 49 S	1
In the following leg	*d*		4 27 10	11 46 45 S	5
			5 54 15	6 03 20 S	7
Preceding in the hind knee 1 at	*c*		5 24 30	9 32 32 S	5
90.					
1 at	σ		6 07 14	6 19 19 S	6
Subſequent beneath Hyades 2 at	σ		6 09 52	6 12 35 S	6
2 at	*c*		5 49 58	9 55 14 S	6
Subſequent in hind knee	τ		7 49 20	0 40 23 N	5
			8 23 08	1 44 11 N	6.7
95.					
In root of north horn			8 41 27	6 28 00 S	6
In root of ſouth horn	*i*		9 24 58	3 40 35 S	6
	k		11 40 58	2 19 03 N	6
			11 35 24	0 50 29 N	6
			10 41 58	6 19 06 S	6
100.					
			11 06 28	6 39 00 S	6
Preced. of 3 over ſouth horn	ι		12 27 36	1 14 34 S	4
			13 41 20	1 42 42 N	6
More ſouth in the ſouth horn	*m*		13 09 18	4 16 08 S	6
			13 35 20	1 14 06 S	6
105.					
1 at	*l*		13 26 55	2 30 59 S	6
More north 2 at	*l*		13 38 52	3 05 34 S	6
Middle of 3 over ſouth horn			15 22 54	0 48 04 S	7
In the middle of the horn	*n*		16 14 58	1 03 03 S	5
			16 54 06	6 30 25 S	7
110.					
			17 07 00	5 49 12 S	6.7
In extremity of north horn	β		18 13 56	5 21 34 N	2
			17 29 44	6 33 02 S	6
Hindmoſt of 3 over ſouth horn	ο		18 10 06	1 20 12 S	5
			17 49 31	5 18 04 S	7
115.					
			17 50 11	7 23 00 S	6.7
			17 59 37	6 01 45 S	7
			18 42 56	1 51 14 N	6
			19 03 45	4 43 55 S	7
			19 22 21	4 48 10 S	7
120.					
Preced. of inform. fol. n. horn			20 03 55	0 40 32 N	6
			20 08 48	6 20 26 S	7
In extrem. of ſouth horn	ζ		20 27 28	2 14 21 S	3
		♊	20 51 03	0 07 26 S	7

Names and ſituations of the ſtars.	Bayer's Char.	Signs.	Longitud. °	′	″	Latitude. °	′	″		Magnitude.
Auriga, in Tycho inform.		♊	21	06	07	2	29	23	N	4.5
125. North under ſouth horn			21	09	28	6	52	43	S	6
			21	36	56	4	25	54	S	6
			21	59	23	7	20	57	S	6
South below ſouth horn			22	27	01	7	38	01	S	6
			22	39	22	5	43	23	S	6
130.			22	32	16	8	57	39	S	6
Inform. of Auriga			23	10	03	1	06	31	N	4
			22	38	44	9	33	28	S	6
			23	04	03	10	48	50	S	6
			23	19	48	9	09	37	S	6
135. Inform. of Auriga			24	10	37	4	08	15	N	4.5
			23	46	29	9	18	02	S	5
			23	46	54	9	31	13	S	6
Inform. of Auriga			25	12	28	2	28	05	N	5.9
			25	46	35	0	35	03	S	6
140.			26	03	40	1	04	43	S	6

Taurus, in *ſome Ancient Cuſtoms*, ſignifies a **Husband**. Leg. H. I. cap. 7. *Videtur autem matris ejus cujuſcunque* taurus *alluſerit*—

Taurus, in *Ornithology*, a name given by the ancients to the bittern or butter-bump, from its imitating the roaring of a bull in its noiſe.

Taurus, in *Zoology*. See Bull.

Taurus *Æthiopicus*, the *Æthiopian bull*, an animal deſcribed in a very remarkable manner by Pliny; but ſo contrary to the courſe of nature, that we may very juſtly rank it among the other extraordinary animals, ſuch as the MANTICHORA, and the vermis cæruleus, of ſixty or ſeventy feet long.

TAUTOLOGICAL *echoes*, are ſuch echoes as repeat the ſame ſound or ſyllable many times. See Echo.

TAUTOLOGY, in *Grammar*, a needleſs repetition of the ſame thing in different words. Such, e. g. is that of Virgil:

——Si fata virum ſervant, ſi veſcitur aura
Ætherea, neque adhuc crudelibus occubat umbris.

TAWING, *ſkinning*: the art or manner of preparing or dreſſing ſkins in white, to fit them for uſe in divers manufactures, particularly for gloves, &c.

All kinds of ſkins may be tawed; but it is chiefly thoſe of ſheep, lambs, kids, and goats, that are uſed to be dreſſed this way, as being the fitteſt for gloves.

Method of **Tawing**, *or dreſſing ſkins in white.* The wool or hair being well got off the ſkins by means of lime, &c. (as deſcribed under the article **Shammy**) they are laid in a large vat of wood or ſtone ſet in the ground, full of water, wherein quick-lime has been ſlaked; in this they continue a month or ſix weeks, as the weather is more or leſs hot, or as the ſkins are required to be more or leſs ſoft and pliant.

While in the vat the water and lime are changed twice, and they are taken out and put in again every day. When taken out for the laſt time, they are laid all night to ſoak in a running water, to get out the greateſt part of the lime; and, in the morning, they are laid, ſix together, on the wooden leg, to get off the fleſh, by ſcraping them ſtoutly, one after another, on the fleſh-ſide, with a cutting two-handed inſtrument, called a knife; and while this is in hand, they cut off the legs, and other ſuperfluous parts about the extremes.

This done, they are laid in a vat or pit with a little water; where being well fulled with wooden peſtles for a quarter of an hour, the vat is filled up with water, and the ſkins are rinſed therein. They are next thrown on a clean pavement to drain; which done they are caſt into a freſh pit of water, where being well rinſed they are taken out, and laid on the wooden leg, ſix at once, with the hair-ſide outermoſt, over which they rub a kind of whetſtone very briſkly, to ſoften, and fit them to receive four or five more preparations given them on the leg, both on the fleſh-ſide and the hair-ſide, with the knife, after the manner above mentioned.

They are then put into a pit with water and wheat-bran, and ſtirred about therein, with wooden poles, till the bran is perceived to ſtick to them, and then are left; after this, as they riſe of themſelves to the top of the water by a kind of fermentation, they are plunged down again to the bottom, and, at the ſame time, fire is ſet to the liquor, which takes as eaſily as if it were brandy, but goes out the moment the ſkins are all covered.

This operation is repeated as often as the ſkins riſe above water; and when they riſe no more, they are taken out, laid on the wooden leg, the fleſh-ſide outermoſt, and the knife is paſſed over it to ſcrape off the bran. The bran thus cleared, the ſkins are laid in a large baſket, where they are loaded with huge ſtones to promote their draining; and when ſufficiently drained their feeding is given them, which is performed after the following manner: for a hundred large ſheep-ſkins, and for ſmaller in proportion, they take eight pounds of alum and three of ſea-ſalt, melt the whole with water in a veſſel over the fire, pouring the ſolution out, while yet luke-warm, into a kind of trough, wherein are twenty-pounds of the fineſt wheat flour, with eight dozen yolks of eggs; of all this together is formed a kind of paſte, a little thicker than children's pap, which, when done, is put into another veſſel, to be uſed in manner following.

A quantity of hot water being poured into the trough wherein the paſte was prepared, two ſpoonfuls of the paſte are mixed therewith; in order to which they uſe a wooden ſpoon, which contains juſt what is required for a dozen ſkins: and when the whole is well diluted, two dozen of the ſkins are plunged therein; care being taken by the way that the water be not too hot, which would ſpoil both the paſte and hurt the ſkins. Having ſtaid ſome time in the trough, they are taken out, one after another, with the hand, and ſtretched out; this is repeated twice; when they have all had their paſte, they are put into tubs, where they are fulled afreſh with wooden peſtles.

Then they are put into a vat, where they remain five or ſix days, or more, and are at laſt taken out in fair weather, and hung out to dry on cords or racks; the quicker they dry the better, for if they be too long in drying, the ſalt and alum within them are apt to make them riſe in a grain, which is an eſſential fault in this kind of dreſſing.

When the ſkins are dry, they are put up into bundles, and juſt dipt in fair water; from which being taken out and drained, they are thrown into an empty tub, and, after ſome time, are taken out, and well trampled under foot.

They are then drawn over a flat iron inſtrument, the top whereof is round like a battledore, and the bottom fixed into a wooden block, to ſtretch and open them; when opened, they are hung in the air upon chords to dry; and when dry, they are opened a ſecond time, repaſſing them over the ſame inſtrument.

Laſtly, they are laid on a table, pulled out and laid ſmooth, and are thus in a condition for ſale and uſe.

After the ſame manner are dreſſed horſes, cows, calves-ſkins, &c. for the ſadlers, harneſs-makers, &c. as alſo dogs, wolves, bears-ſkins, &c. excepting that in theſe the uſe of paſte is omitted, ſalt and alum-water being ſufficient. See Tanning.

By ſtat. 9 Ann. cap. 11. and 10 Ann. cap. 26. the following duties are impoſed on hides or ſkins *tawed* or dreſſed in Great Britain. For horſe-hides dreſſed in alum and ſalt, or meal, or otherwiſe tawed, 1*s*. 6*d*. a hide; hides of ſteers, cows, and all other (except horſe-hides) dreſſed in alum and ſalt or meal, or otherwiſe tawed, 3*s*. a hide; calve-ſkins and kips, dreſſed in alum and ſalt or meal, or otherwiſe tawed, 1½*d*. a pound: ſkins ſo dreſſed or tawed with the hair on, 3*s*. a dozen; and without hair 1*s*. a dozen; dog-ſkins ſo dreſſed or tawed, 1 *s*. a dozen; buck and doe-ſkins (except what paid the duty on importation) dreſſed in alum and ſalt or meal, or otherwiſe tawed, 6*d*. a pound; kid-ſkins, ſo dreſſed or tawed, except as before, 1*s*. a dozen; goat-ſkins ſo dreſſed or tawed, 2*s*. a dozen; beaver-ſkins ſo tawed, 2*s*. a dozen; ſheep-kins and lamb-ſkins ſo dreſſed or tawed, 1½*d*. a pound; and all other tawed ſkins not before charged, 30 *l*. for every 100 *l*. value. All theſe duties are to be paid by the tawers or makers.

For hides and ſkins dreſſed in oil, 6*d*. a pound; deer, goat, and beaver-ſkins, dreſſed in oil, 6*d*. a pound; calve-ſkins dreſſed in oil, 8*d*. a pound; ſheep and lamb-ſkins dreſſed in oil, 3*d*. a pound; all ſkins dreſſed in oil, not before charged, 15 *l*. in the 100 *l*. according to the real value; all which are to be paid by the oil leather-dreſſers.

For other regulations, ſee Leather and Tanner.

TAWNY, in *Heraldry*. See Tenne'.

TAX, formed from τάξις, *order*, denotes a certain aid, ſubſidy, or ſupply, granted by the commons of Great Britain in parliament aſſembled, conſtituting the king's extraordinary REVENUE; and paid yearly towards the expences of the government. See Money-*bills*, Parliament, and Supply.

Anciently the *tax* ſeems to have been impoſed by the king at his pleaſure; but Edward I. bound himſelf, and his ſucceſſors, from that time forward, not to levy it but by conſent of the realm.

The *taxes* which are raiſed on the ſubject are either annual or perpetual. The uſual annual *taxes* are thoſe upon land and malt.

The firſt of theſe is the land-*tax*, for an account of which, ſee LAND-*tax*.

See alſo HIDAGE, SCUTAGE, TALLIAGE, TENTH, FIFTEENTH, and SUBSIDY.

The other annual *tax* is the *malt-tax* which is a ſum raiſed every year by parliament ever ſince 1697, by a duty of 9*d.* in the buſhel on MALT, and a proportionable ſum on certain liquors, ſuch as cyder and perry, which might otherwiſe prevent the conſumption of malt. 12 Ann. ſtat. 1. cap. 2. 33 Geo. II. cap. 7. Malt for exportation is excepted by 12 Geo. III. cap. 4. And by 19 Geo. III. cap. 25. there is an additional duty of 15 *l.* per cent. This duty is under the management of the commiſſioners of the exciſe.

The perpetual *taxes* are the CUSTOMS, which are a *tax* immediately paid by the merchant, although ultimately by the conſumer: the EXCISE-*duty*, which is an inland impoſition, paid ſometimes upon the conſumption of the commodity, or frequently upon the retail ſale, which is the laſt ſtage before the conſumption; the duty upon SALT; that for the carriage of letters or POST; the STAMP-*duties*; the duty upon houſes and WINDOWS; the duty ariſing from licences to hackney-COACHES and chairs in London, and the parts adjacent; and the duty upon offices and penſions, which conſiſts in a payment of 1 *s.* in the pound (over and above all other duties) out of all ſalaries, fees, and perquiſites of offices and penſions payable by the crown; this taxation was impoſed by ſtat. 31 Geo. II. cap. 22. and is under the direction of the commiſſioners of the land-*tax*. Blackſt. Com. book i. chap. 8.

The *tax* upon ſervants conſiſts of 21 *s.* to be paid yearly for every male ſervant, excepting any butler, manciple, cook, gardener, or porter of any college or hall in either of the univerſities, or of the colleges of Weſtminſter, Eton, or Wincheſter, or of the hoſpitals of Chriſt, St. Bartholomew, Bridewell, Bethlehem, St. Thomas, or Guy's, or the Foundling hoſpital; and alſo the ſervants of his majeſty, or any of the royal family, or of any ambaſſador, or foreign miniſter reſiding in this kingdom; and alſo any ſervant retained or employed *bona fide* for the purpoſes of huſbandry or manufactures, or of any trade or calling by which the maſter or miſtreſs earns a livelihood or profit.

The above ſum of 21 *s.* ſhall be charged on the maſter or miſtreſs of every ſuch ſervant, within every year ending the 25th day of March, and paid within ſix months ſubſequent to the ſame. This duty is under the management of the commiſſioners of the duties upon houſes and windows, who ſhall appoint aſſeſſors; and theſe ſhall procure liſts of ſervants liable to the duty, deſcribing their number, and their Chriſtian and ſurnames, and the office or capacity in which they are employed, ſigned by the maſter.

The ſurveyors of the duties upon houſes and windows ſhall alſo be ſurveyors with reſpect to this duty. 17 Geo. III. cap. 39. 19 Geo. III. cap. 59.

For the duty on poſt-horſes, &c. ſee POST-*horſe*.

The revenue ariſing from the ſeveral *taxes*, which is annually paid to the creditors of the public, or carried to the ſinking fund, is firſt depoſited in the royal exchequer, and thence iſſued out to the reſpective offices of payment: for the manner in which it is applied, ſee FUND and NATIONAL *debt*. See alſo REVENUE.

The people of France were ſtrangers to *tailles* or *taxes* till the time of St. Louis, when they were firſt impoſed in form of ſubſidies neceſſary for the ſupport of the war in the Holy Land. See CROISADE.

They were then extraordinary levies, and were raiſed by capitation; but they were afterwards made perpetual under Charles VII. and Philip the Fair, who, to raiſe money without diſturbing the people, called the people, as a third eſtate, into the general councils of the realm.

TAX alſo denotes the tribute which tenants were occaſionally to pay their lord.

Moſt lords had a right of *taxing* on four occaſions; viz. when the lord was taken priſoner in a juſt war; when he made his eldeſt ſon a knight; when he married his eldeſt daughter to a gentleman; and when he made the voyage of the Holy Land.

Naude ſhews the extravagant riſe of this kind of *taxes*: thoſe, he obſerves, which under Charles VI. only amounted to the ſum of 40,000 livres, were increaſed under Charles VII. to the ſum of 1,800,000 livres; under Louis XI. to 4,740,000 livres; under Charles VIII. to 6,000,000; and under Lewis XII. to 7,640,000 livres.

Taxes were diſtinguiſhed into *free*, which were thoſe due, in the four caſes, by freemen, or thoſe who held free lands; and *ſervile* and *baſe*, which were thoſe due from perſons of baſe condition.

They were alſo diſtinguiſhed into *real* and *perſonal*. The *perſonal* were impoſed on the head of the ſervant or man in mainmort, and ſo followed him wherever he went.

TAXERS, two officers yearly choſen in Cambridge, to ſee the true gauge of all weights and meaſures obſerved.

The name took beginning from *taxing* and rating the rents of houſes, which was anciently the duty of their office.

TAXIS, τάξις, in the *Antient Architecture*, ſignifies the ſame with ORDONNANCE in the new, and is deſcribed by Vitruvius to be that which gives every part of a building its juſt dimenſions with regard to its uſe.

TAXUS, in *Botany*. See YEW.

TAXUS, in *Zoology*. See BADGER.

TAYL, in *Heraldry*. See TAIL.

TCHA. See TEA.

TCHELMINAR, TCHILMINAR. See CHILMINAR.

TEA-*tree*, *thea*, in *Botany*, the name of a genus of plants, of the *polyandria monogynia* claſs, the characters of which are theſe: the cup is a very ſmall, plane, permanent perianthium, divided into five or ſix roundiſh obtuſe leaves; the flower conſiſts of ſix or nine large roundiſh, concave, and equal petals; the ſtamina are numerous filaments, about two hundred, and are very ſlender, capillary, and ſhorter than the flower; the antheræ are ſimple; the germen of the piſtil is globoſe and trigonal; the ſtyle is ſubulated, and of the length of the ſtamina; the ſtigma is ſimple; the fruit is a capſule, formed of three globular bodies growing together; it contains three cells, and opens into three parts at the top. The ſeeds are ſingle, globoſe, and internally angulated.

From an original drawing taken of the tree when in its flowering ſtate, it appears, that the *tea*-tree, as Mr. Miller firſt obſerved, belongs to the order of *trigynia*; and Linnæus was led to the miſtake of placing it in that of *monogynia*, by not having had an opportunity of examining any other than dried ſpecimens of this ſhrub.

Of this genus Linnæus enumerates two ſpecies; viz. the *bohea tea*, having flowers with ſix petals, and the *green tea*, having flowers with nine petals.

Dr. Lettſom, in his botanical deſcription of the *tea*-plant, thinks it moſt probable, that there is only one ſpecies, and that the difference between the green and bohea *teas* depends on the nature of the ſoil, culture, age, and the manner of drying the leaves. He adds, that it has even been obſerved, that a green *tea*-tree, planted in the bohea country, will produce bohea, and on the contrary; and that on his examining ſeveral hundred flowers, brought both from the bohea and green *tea* countries, their botanical characters have always appeared uniform.

We are principally indebted to Kæmpfer, Le Compte, and Du Halde, for an authentic hiſtory of the culture of this exotic ſhrub, and the manner of preparing or curing its leaves.

The particulars of greateſt importance that have been recited, have lately been judiciouſly collected, and the ſubject farther illuſtrated by additional obſervations by Dr. Lettſom.

The *tea*-tree loves to grow in vallies, at the foot of mountains and upon the banks of rivers, where it enjoys a ſouthern expoſure to the ſun; though it endures conſiderable variations of heat and cold, as it flouriſhes in the northern clime of Pekin, as well as about Canton; and it is obſerved that the degree of cold at Pekin is as ſevere in winter as in ſome of the northern parts of Europe. However, the beſt *tea* grows in a mild temperate climate, the country about Nankin producing better *tea* than either Pekin or Canton, betwixt which places it is ſituated.

The root reſembles that of the peach-tree; the leaves are green, longiſh at the point, and pretty narrow, an inch and half long, and jagged all round. The flower is much like that of the wild roſe, but ſmaller. The fruit is of different forms, ſometimes round, ſometimes long, ſometimes triangular, and of the ordinary ſize of a bean, containing two or three ſeeds, of a mouſe-colour, including each a kernel. Theſe are the ſeeds by which the plant is propagated: a number from ſix to twelve or fifteen being promiſcuouſly put into one hole, four or five inches deep, at certain diſtances from each other. The ſeeds vegetate without any other care, though the more induſtrious annually remove the weeds and manure the land. The leaves which ſucceed are not fit to be plucked before the third year's growth, at which period they are plentiful, and in their prime.

In about ſeven years the ſhrub riſes to a man's height, and as it then bears few leaves, and grows ſlowly, it is cut down to the ſtem, which occaſions an exuberance of freſh ſhoots and leaves the ſucceeding ſummer; ſome, indeed, defer cutting them till they are of ten years growth. In Japan the *tea*-tree is cultivated round the borders of the fields, without regard to the ſoil; but as the Chineſe export conſiderable quantities of *tea*, they plant whole fields with it.

The beſt time to gather the leaves of *tea* is, while they are yet ſmall, young, and juicy; and the different periods in which they are gathered are particularly deſcribed by Kæmpfer. They are plucked carefully one by one, and, notwithſtanding the ſeeming tediouſneſs of this operation, the labourers are able to gather from four to ten or fifteen pounds each in one day. The *tea*-trees that yield often the fineſt leaves, grow on the ſteep declivities of hills, where it is dangerous, and in ſome caſes impracticable to collect them. The Chineſe are ſaid to vanquiſh this difficulty by a ſingular contrivance. The large monkies which inhabit theſe cliffs are irritated, and in revenge they break off the branches, and throw them down, ſo that the leaves are thus obtained.

The buildings, or drying-houſes, that are erected for curing *tea*, contain from five to ten or twenty ſmall furnaces, about three feet high, each having at the top a large flat iron pan. There is alſo a long low table covered with mats, on which the leaves are laid, and rolled by workmen, who ſit round it: the iron pan being heated to a certain degree by a little fire made in the furnace underneath, a few pounds of the freſh gathered leaves are put upon the pan; the freſh and juicy leaves crack when they touch the pan, and it is the buſineſs of the operator to ſhift them as quick as poſſible with his bare hands, till they become too hot to be eaſily endured. At this inſtant he takes off the leaves with a kind of ſhovel reſembling a fan, and pours them on the matts before the rollers, who, taking ſmall quantities at a time, roll them in the palms of their hands in one direction, while others are fanning them that they may cool the more ſpeedily, and retain their curl the longer. This proceſs is repeated two or three times, or oftener, before the *tea* is put into the ſtores, in order that all the moiſture of the leaves may be thoroughly diſſipated, and their curl more completely preſerved. On every repetition the pan is leſs heated, and the operation performed more ſlowly and cautiouſly. The *tea* is then ſeparated into the different kinds, and depoſited in the ſtore for domeſtic uſe or exportation.

The Chineſe know nothing of *imperial tea*, *flower of tea*, and many other names, which in Europe ſerve to diſtinguiſh the goodneſs, and the price of this faſhionable commodity; but, beſide the common *tea*, they diſtinguiſh two other kinds, viz. the *voui* and *ſoumlo*, which are reſerved for people of the firſt quality, and thoſe who are ſick.

We have two principal kinds of *tea* in Europe; viz.

Green TEA, which is the common *tea* of the Chineſe, &c. F. le Compte calls it *bing tea*, and ſays it is gathered from the plant in April. It is held very digeſtive, and a little aſtringent; it gives a paliſh green tincture to water, and its leaves are much twiſted. The ſecond is,

Bohea TEA, which is the *voui tea*, or *bou tcha* of the Chineſe. F. le Compte makes this only differ from the *green tea*, by its being gathered a month before it, viz. in March, while in the bud; and hence the ſmallneſs of the leaves, as well as the depth of the tincture it gives to water. Others take it for the *tea* of ſome particular province; the ſoil being found to make an alteration in the properties of the *tea*, as much as the ſeaſon of gathering it. It is all bought at Nankin, and thence brought into Europe, where it is now much in vogue.

As to the differences in colour and flavour peculiar to theſe two kinds, and to their varieties, Dr. Lettſom thinks that there is reaſon to ſuſpect that they are, in ſome meaſure, adventitious, or produced by art. He has been informed by intelligent perſons, who have reſided ſome time at Canton, that the *tea* about that city affords very little ſmell while growing. The ſame is obſerved of the *tea*-plants now in England, and alſo of the dried ſpecimens from China. We are not, however, as he obſerves, to conclude from hence, that art alone conveys to *teas*, when cured, the ſmell peculiar to each kind; for our vegetable graſſes, for inſtance, have little or no ſmell till they are dried and made into hay.

As to the opinion that the *green tea* owes its verdure to an effloreſcence acquired from the plates of copper on which it is ſuppoſed to be cured or dried, he ſhews that there is no foundation for this ſuſpicion. The infuſions of the fineſt imperial and bloom *teas* undergo no change on the affuſion of a volatile alkali, which would detect the minuteſt portion of copper contained in them, by turning the liquors blue.

The fine green colour of theſe *teas*, with as little reaſon, hath been attributed to green copperas; as this metallic ſalt would, on its being diſſolved in water, immediately act on the aſtringent matter of the leaves, and convert the infuſion into ink, as happens when a chalybeate water has been employed in the making of *tea*.

On the whole, Dr. Lettſom thinks it not improbable, that ſome green dye, prepared from vegetable ſubſtances, is employed in the colouring of the leaves of the green *teas*. And Neumann ſuſpects, that the brown colour and the flavour of the bohea ſorts, are introduced by art. Both the green and bohea *teas* have an agreeable ſmell, and a lightly bitteriſh ſubaſtringent taſte; with ſolution of chalybeate vitriol, they ſtrike an inky blackneſs. They give out their ſmell and taſte both to watery and ſpirituous menſtrua; to water, the green ſorts communicate their own green tincture, and the bohea, their brown; but to a rectified ſpirit they both impart a fine deep green. The extracts, obtained by gently drawing off the menſtrua from the filtered tinctures, are very conſiderably aſtringent, and not a little ungrateful; but the ſpirituous moſt ſo.

Savary alſo ſpeaks of a ſort of *red tea*, or *Tartar tea*, called *honan tcha*, which tinges the water of a pale red, and which is ſaid to be extremely digeſtive; by means hereof it is that the Tartars are ſaid to be able to feed on raw fleſh. Its taſte is earthy, and much the leaſt agreeable of them all; but this is ſcarce known in England.

Tea is to be choſen of the briſkeſt ſmell, and as whole as poſſible; and the greateſt care is to be taken that it have not been expoſed to the air to pall and evaporate.

The drink, *tea*, is made in China, and throughout the greateſt part of the Eaſt, after the ſame manner as in Europe; viz. by infuſing the leaves in boiling water, and drinking the infuſion hot. Indeed, among us, it is uſual to temper its bitterneſs with ſugar, but the Orientals uſe it without the addition of ſugar or milk.

However, the Japoneſe are ſaid to prepare their liquor a ſomewhat different way, viz. by pulverizing the leaves, ſtirring the powder in hot water, and drinking it as we do coffee.

From the account given by Du Halde, this method is not peculiar to the Japoneſe, but is alſo uſed in ſome provinces of China.

The common people, who have a coarſer *tea*, boil it for ſome time in water, and make uſe of the liquor for common drink. Early in the morning, the kettle, filled with water, is regularly hung over the fire for this purpoſe, and the *tea* is either put into the kettle encloſed in a bag, or by means of a baſket of proper ſize, preſſed to the bottom of the veſſel, that there may be no hindrance in drawing off the water.

The Bantſjaa *tea* only is uſed in this manner, whoſe virtues being more fixed, would not be ſo fully extracted by infuſion.

The Chineſe are always taking *tea*, eſpecially at meals: it is the chief treat wherewith they regale their friends. The moſt moderate take it at leaſt thrice a day; others ten times, or more; and yet it is computed, the conſumption of *tea* among the Engliſh and Dutch is as great in proportion as among the Orientals.

With regard to the commercial hiſtory of *tea*, we may obſerve, that it was firſt introduced into Europe by the Dutch Eaſt India company, very early in the laſt century, and that a quantity of it was brought over from Holland by lord Arlington and lord Oſſory, about the year 1666, at which time it was ſold for 60*s*. a pound. But it appears, that before this time, drinking of *tea*, even in public coffee-houſes in this country, was not uncommon; for, in 1660, a duty of 8*d*. per gallon was laid on the liquor made and ſold in all coffee-houſes.

The preſent conſumption of it is immenſe. Dr. Lettſom tells us, that he has been informed, that at leaſt three millions of pounds are allowed for the annual home conſumption, not including the incredible quantity ſmuggled into the kingdom; and that the Eaſt India company have generally in their warehouſes a ſupply for three years. By 13 Geo. III. cap. 44. no licence ſhall be granted to the Eaſt India company to export *tea*, unleſs there remain in the warehouſes a quantity not leſs than ten millions of pounds weight.

As to the properties of *tea*, they are ſtrangely controverted; the eaſtern nations are at leaſt as much poſſeſſed with an idea of their extraordinary virtues as the Europeans; but it is, perhaps, becauſe imagination bears as great a ſway there as here. The reaſon why the gout and ſtone are unknown in China, is aſcribed to the uſe of this plant.

Tea is extolled as the greateſt of all medicines: moderately and properly taken, it acts as a gentle aſtringent and corroborative; it ſtrengthens the ſtomach and bowels, and is good againſt nauſeas, indigeſtions, and diarrhœas. It acts alſo as a diuretic and diaphoretic. The immoderate uſe of it, however, has been very prejudicial to many, who have been thereby thrown into the diabetes.

And alſo in Europe, infuſions of *tea*-leaves have been extravagantly condemned by ſome, and commended by others. From the contradictory opinions even of medical writers on this ſubject, the natural inference ſeems to be, that they poſſeſs neither noxious nor beneficial powers in any very conſiderable degree. They ſeem, when moderately uſed, to be for the moſt part innocent; in ſome caſes they ſeem to be ſalutary; in ſome they are apparently prejudicial. They dilute thick juices, and quench thirſt more apparently, and paſs off by the natural emunctories more freely than more watery fluids: they refreſh the ſpirits in heavineſs and ſleepineſs, and ſeem to counteract the operation of inebriating liquors.

From their manifeſt aſtringency, they have been ſuppoſed to ſtrengthen and brace up the ſolids, but this effect experience does not countenance: as it is in diſorders, and in conſtitutions, wherein corroborants are more ſerviceable, that the immoderate uſe of *tea* is peculiarly hurtful; in cold indolent habits, cachexies, chloroſis, dropſies, and debilities of the nervous ſyſtem. Lewis's Mat. Med.

Dr. Lettſom has particularly enquired into the medical qualities and effects of *tea*; and having obſerved that infuſions of bohea and green *tea*, contribute to preſerve ſweet ſome ſmall pieces of beef immerſed in them, he infers that they poſſeſs an antiſeptic power, when applied to the dead animal fibre, and from their ſtriking a purple colour with ſalt of iron, he deduces their aſtringent quality.

From other experiments he concludes, that the activity of *tea* chiefly reſides in its fragrant and volatile parts; and that if the uſe of it be beneficial or injurious to any particular conſtitution, it becomes ſo principally by means of this odorous fragrant principle. He apprehends that it is the ſafeſt courſe to uſe the infuſion of the more ordinary kinds of this plant, which abound leſs with this fragrant principle. Or the *tea* may be boiled a few minutes, in order to diſſipate this volatile part, which ſtands charged as the cauſe of thoſe nervous affections that are ſaid to be produced, or aggravated, by the uſe of this liquor. By this proceſs may likewiſe be extracted more copiouſly the more fixed, bitter, and ſtomachic parts of this vegetable.

Dr. Lettſom, who ſeems to be thoroughly perſuaded of the occaſionally noxious effects of this volatile principle, in the finer *teas* eſpecially, recommends this laſt mentioned mode of making *tea*, or the ſubſtitution of the extract inſtead of the leaves; by the uſe of which the nervous relaxing effects, which follow the drinking of *tea* in the uſual manner, would be in great meaſure avoided. This extract has been imported hither from China, in the form of ſmall cakes, not exceeding a quarter of an ounce each in weight, ten grains of which might ſuffice one perſon for breakfaſt; but it might eaſily be made here by ſimple decoction and evaporation, by thoſe who experience the noxious qualities of the volatile principles of this plant.

It may be farther obſerved, that the effect of drinking large quantities of any warm aqueous liquor would be to enter ſpeedily into the courſe of circulation, and paſs off as ſpeedily by urine or perſpiration, or the increaſe of ſome of the ſecretions.

Its effects on the ſolid parts of the conſtitution would be relaxing, and thereby enfeebling.

If this warm aqueous fluid were taken in conſiderable quantities, its effects would be proportionable, and ſtill greater if it were ſubſtituted inſtead of nutriment. The infuſion of *tea*, however, has theſe two peculiarities. It is not only poſſeſſed of a ſedative quality, but alſo of a conſiderable aſtringency; by which the relaxing power, aſcribed to a mere aqueous fluid, is in ſome meaſure corrected on this account. It is, perhaps, leſs injurious than many other infuſions of herbs, which, beſides a very ſlight aromatic flavour, have very little, if any, ſtypticity, to prevent their relaxing debilitating effects.

So far, therefore, *tea*, if not too fine, if not drank too hot, nor in too great quantities, is perhaps preferable to any other known vegetable infuſion. And if we take into conſideration, likewiſe, its known enlivening energy, our attachment to it will appear to be owing to its ſuperiority in taſte and effects to moſt other vegetables. See Dr. Lettſom's Natural Hiſtory of the *Tea*-tree, with Obſervations on the Medical Qualities of *Tea*, and Effects of *Tea*-drinking, 4to. 1772.

Tea may be conſidered as a very powerful aphrodiſiac; and accordingly a phyſician of conſiderable eminence in his profeſſion, imputes the amazing population of China amongſt other cauſes, to the general uſe of it. Percival's Eſſ. p. 63.

No *tea* is allowed to be imported, except from the place of its growth, on pain of forfeiture, 11 Geo. cap. 30. and by 24 Geo. III. cap. 38. all the duties upon *tea* imported, ſold, or uſed in this kingdom, ſhall ceaſe from September 15, 1784; at which period the Eaſt India company is diſcharged from the payment of duties on *tea* in their warehouſes; and afterwards there ſhall be paid a duty of 12*l.* 10*s.* *per cent.* computed upon the groſs prices for all *tea* delivered by the company to the purchaſers, which duty ſhall be drawn back on exportation to any place where the drawback is already allowed. The company is required to make four ſales in the year, and to ſell ſuch quantity as ſhall be ſufficient to ſupply the demand, provided an advance of 1*d.* per ℔. be bid upon the prices at which the *teas* ſhall be put up; and at the four firſt ſales after paſſing the act, theſe prices ſhall not exceed the following rates, viz. for bohea *tea* 1*s.* 7*d.* per ℔; congo *tea* 2*s.* 5d. per ℔; for ſouchong *tea* 3*s.* 3*d.* per ℔; for ſinglo *tea* 3*s.* 3*d.* per ℔; and for hyſon *tea* 4*s.* 11*d.* per ℔: and afterwards the whole price at which the *teas* are put up, ſhall not exceed the prime coſt, with the freight and charges of importation, lawful intereſt from the time of the arrival of ſuch *tea* in Great Britain, and the common premium of inſurance. In lieu of the duties on *tea*, this act ſubſtitutes an additional duty on WINDOWS.

By this ſame act, the inland duty upon cocoa-nuts and coffee ſhall ceaſe from September 15, 1784, and the following additional duties be paid, viz. for every pound of cocoa-nuts, the produce of Britiſh America, 6*d.* and the produce of any other place, 1*s.* 6*d.*; and for every pound of coffee, the produce of Britiſh America, 6*d.* and the produce of any other place, 2*s.* 6*d.*; and theſe duties are ſubject to an additional impoſt of 5 *per cent.* and 5 *per cent.* thereon impoſed by 19 Geo. III. cap. 25. and 22 Geo. III. cap. 66.

No drawback ſhall be allowed on *tea* exported, except to Ireland, where the whole duty on exportation ſhall be allowed, 18 Geo. II. cap. 26. 17 Geo. III. cap. 27.

Every perſon having in his cuſtody more than ſix pounds weight of *tea*, is a dealer; and ſelling without a licence, to be had for 12*d.* ſhall forfeit 5*l.* a month. 11 Geo. cap. 30. 15 Geo. II. cap. 11. Every perſon dealing in *tea*, &c. ſhall cauſe to be painted or written over the door of his ſhop, the words, *dealer in coffee, tea, cocoa-nuts*, or *chocolate*, on pain of 200*l.* 19 Geo. III. cap. 69. and any dealer buying of any perſon who has not this inſcription, incurs forfeiture of 100*l.* and any other perſon 10*l.* By 20 Geo. III. cap. 35. no perſon ſhall trade in coffee, *tea*, or chocolate without a licence, at the price of 5*s.* under penalty of 20*l.* More than ſix pounds of *tea* cannot be removed without a PERMIT. 10 Geo. cap. 10. The adulteration of *tea* is ſubject to a penalty of 100*l.* beſides the forfeiture of the ſame, and for every pound of dyed leaves of *tea*, 5*l.* 11 Geo. cap. 30. 17 Geo. III. cap. 29.

TEA, *German*, in *Botany*. See SPEEDWELL.

TEA, *Mexico*, *chenopodium ambroſioides* of Linnæus, in *Botany*, is a ſpecies of *chenopodium*, which, as well as the Jeruſalem oak, or *chenopodium botrys*, are natives of the ſouthern parts of Europe, and ſown annually with us in gardens. Infuſions of the leaves and flowery heads of both theſe plants, which are not unpalatable, drank as *tea*, are ſaid to be of ſervice in humoural aſthmas and coughs, and other diſorders of the breaſt; they are ſuppoſed to be antiſpaſmodic and antihyſteric. Lewis Mat. Med.

TEA, *New Jerſey*, in *Botany*. See CEANOTHUS.

TEA, *Oſwego*, in *Botany*. See MONARDA.

TEA, *Paraguay*, or *South Sea*, in *Botany*. See PARAGUAY.

TEAL, *querquedula*, in *Ornithology*, the ANAS *crecca* of Linnæus, the ſmalleſt of all the duck kind. Its beak is black, and its head and upper part of its neck of a reddiſh brown; but there runs on each ſide of the head a green ſtreak from behind the eyes quite to the back part, and between theſe is a black ſpot under the eyes; there is a white line which ſeparates the reddiſh colour from the green. The lower part of the neck, the ſhoulders, and the ſides, are very beautifully variegated with black and white ſtreaks; the breaſt and belly are of a duſky greyiſh white: the firſt beautifully ſpotted with black; the vent black; the tail ſharp-pointed and duſky; the coverts of the wings brown; the greater quill-feathers duſky; the exterior webs of the leſſer marked with a gloſſy green ſpot, above which is another of black, and the tips white; the irides whitiſh, and the legs duſky. The female is of a browniſh aſh-colour, ſpotted with black, and has a green ſpot on the wing like the male. Ray and Pennant.

TEAL, *creſted*, *querquedula criſtata*, a name given by Bellonius and ſome others to a ſpecies of duck, remarkable for a tuft of feathers of an inch and a half long, hanging down from the back part of the head, and thence called the *tufted* DUCK; but more known among authors by the name of *capo negro*.

TEAL, *ſummer*, *anas circia* of Linnæus, is apprehended by Mr. Pennant to be no other than the female of our TEAL, though Linnæus has deſcribed it as a diſtinct ſpecies.

Summer teal is alſo a name given in ſome places to the GARGANEY.

TEAM, Theam, or Thame, in *our Ancient Cuſtoms*, ſignifies a royalty granted by the king's charter to a lord of a manor, for the having, reſtraining, and judging bondmen, neifs, and villains, with their children, goods, and chattels in his court.

TEARS, *lachrymæ*, a watery humour, iſſuing out at the corners of the eye, by the compreſſion of the muſcles, ſerving to moiſten the cornea, and to expreſs our grief, and even to alleviate it. See Lachrymal and Lachrymalia.

Dr. Vaterus is of opinion, that the *tears* come from the white lines ſeen on the inſide of the palpebræ, deſcribed by Meibomius. He obſerved two ſmall ducts, beſides the common naſal duct, from the lachrymal ſac into the noſe; one of them opened into the upper part of the noſe; the other opened into the *antrum maxillare*. Miſcel. Berol. tom. iv. par. iii. ſect. 5.

The ancients had an opinion, that the *tears* of the living were of uſe, at leaſt of pleaſure, to the dead; for which reaſon they took great care to procure them abundance at their funerals, ſo much, as to introduce a profeſſion, or trade of weepers, as judging thoſe of their own families inſufficient.

Deer, when at bay, are commonly ſaid to ſhed *tears*; indeed, they ordinarily do yield a ſort of *tears*, which ouſing into the two clefts underneath, called *lachrymatories*, are there condenſed into a kind of yellow liquor, or gum which diluted in white wine or carduus water, has been reputed a ſovereign remedy for fits of the mother, and the falling ſickneſs.

Virgil makes the horſe of Pallas ſhed *tears* at the funeral pomp of his maſter; this is one of the paſſages which the modern critics cenſure as a breach of probability.

TEAZEL, or Teasel, *dipſacus*, or *carduus fullonum*, or the *fullers thiſtle*, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are theſe: it has many flowers collected in one common perianthium, which is permanent; they have but one petal, which is tubular, and cut into four parts at the top, which are erect, and they have four hairy ſtamina, as long as the petal, terminated by proſtrate ſummits: the germen is ſituated below the flower, ſupporting a ſlender ſtyle, crowned by a ſingle ſtigma; the germen becomes a column-ſhaped ſeed, encloſed in the common conical fruit, which is divided by long prickly partitions. Miller enumerates four, and Linnæus only three ſpecies, reckoning the cultivated *teazel*, or *carduus fullonum*, only a ſeminal variety of the common wild *teazel*.

Beſide the common wild ſpecies of this plant, there is a large kind of it, the heads of which are of ſingular uſe in raiſing the nap upon woollen cloth, for which it is propagated in great quantities in many parts of the Weſt of England. It is to be ſown in March, on a dry ſoil; a peck of the ſeeds is ſufficient to ſow an acre: the plants, being come up, muſt be hoed up firſt to ſix or eight inches, and ſome time after to a foot aſunder every way; and for the firſt ſummer the ground muſt be kept carefully cleared from weeds. The ſecond year after ſowing, the plants ſhoot up to heads, which are fit to cut in Auguſt, and tied up in bundles, and dried. The common produce of an acre of land is about a hundred and ſixty bundles, which are ſold at about a ſhilling a bundle. Some people ſow carraway among their *teazels*, but it only damages both. Miller.

The largeſt burs, and thoſe moſt pointed, are eſteemed the beſt, and are now called *male teazels*; they are moſtly uſed in the dreſſing and preparing of ſtocking and coverlets; the ſmaller kind, properly called the *fullers* or *drapers teazels*, and ſometimes the *female teazel*, are uſed in the preparation of the finer ſtuffs, as cloths, rateens, &c. The ſmalleſt kind ſometimes, called *linnots heads*, are uſed to draw out the nap from the coarſer ſtuffs, as bays, &c.

The leaves of the common wild *teazel* dried, and given in powder or infuſion, have been commended by ſome as a powerful remedy againſt flatuſes or crudities in the ſtomach.

TEBET, or Thevet, the fourth month of the civil year of the Hebrews, and the tenth of their eccleſiaſtical year. It anſwered to part of our December and January, and has but 29 days. The ſecond day of this month is the laſt of the octave of the dedication of the temple, after it was purified by Judas Maccabeus. Vide 1 Macc. iv. 59. John x. 22.

The 10th day of this month is obſerved by the Jews as a faſt, in memory of the ſiege of Jeruſalem by Nebuchadnezzar, in the ninth year of Zedekiah.

TECHNICAL, Technicus, formed of τεχνικος, *artificial*, of τεχνη, *art*, ſomething that relates to ART.

In this ſenſe we ſay, *technical words*, *technical verſes*, &c. And in this ſenſe Dr. Harris intitles his dictionary of arts and ſciences, Lexicon Technicum.

Technical, is more particularly applied to a kind of verſes, wherein are contained the rules or precepts of any art, thus digeſted to help the memory to retain them. See *Artificial* Memory.

Technical verſes are uſed in chronology, &c. Such, e. gr. are thoſe expreſſing the order and meaſure of the calends, nones, &c. thoſe expreſſing the ſeaſons, and thoſe expreſſing the order, &c. of the ſigns.

F. Labbé has compoſed a ſet of *technical* Latin verſes, including all the epochas in chronology; and F. Buffier, after his example, has put both chronology and hiſtory into French verſe, and even geography alſo.

Technical verſes are commonly compoſed in Latin; they are generally wretched ones, and often barbarous; but utility is all that is aimed at in them: to give ſome idea hereof we will here add a few inſtances. The caſuiſts include all the circumſtances which make us partakers with another in a theft, or other crime, in theſe two *technical verſes*:

Juſſio, conſilium, conſenſus, palpo, recurſus,
Participans, mutus, non obſtans, non manifeſtans.

The firſt of F. Buffier's *technical* verſes of the Hiſtory of France, are theſe:

Ses lois en quatre cents Pharamond introduit,
Clodion Chevelu, qu' Aetius vanquit.
Merovée; avec lui combatit Attila;
Childeric fut chaſſe, mais on le rapella.

Technical *words*, are what we otherwiſe call *terms of art*.

TECOLITHOS, in *Natural Hiſtory*, the name of a gem, otherwiſe called *Syriacus lapis*, and *Judaicus lapis*, good for diſſolving the human *calculus*. See Syriacus and Judaicus.

It has this name from τηκω, *I diſſolve*, and λιθος, *a ſtone*; becauſe it diſſolves ſtones.

TECTRICES, in *Ornithology*, are the leſſer coverts of the wings of birds, or the feathers which lie on the bones of the wings.

TECUM *Duces*. See Duces.

TE DEUM, a kind of hymn, or ſong of thankſgiving, uſed in the church; beginning with the words *Te Deum laudamus*, *We praiſe thee, O God.*—It is uſually ſuppoſed to be the compoſition of St. Auguſtine, and St. Ambroſe.

It is uſed to be ſung in the Romiſh church with extraordinary pomp and ſolemnity upon the gaining a battle, or other happy event; and ſometimes even to conceal a defeat.

TEDDOR, or Tether, a rope tied to a horſe's foot, to confine his grazing within a certain compaſs.

TEE, in the *Manege*. See Breast-*plate*.

Tee-*ſquare*. See Square.

TEETH, *dentes*, in *Anatomy*, little, hard, ſmooth bones, ſet in the gums, and ſerving to maſticate or chew the food, to bite, &c.—See *Tab. Anat. (Oſteol.) fig.* 2, *lit. d, e, f.*

The teeth are the hardeſt, moſt ſolid and whiteſt parts of the whole ſkeleton.

In adult perſons, the ordinary number of *teeth* is 32; ſixteen in each jaw; all fixed in peculiar ſockets, called *alveoli*, by the juncture or articulation called GOMPHOSIS, and by the joiners, *pegging*.

They are fixed in the ſockets like pins or nails, their roots being exactly ſurrounded by the ſpungy ſubſtance or diploe, and appearing like moulds for the cavities of the ſockets, which are rather porous vaginæ than ſpungy foſſulæ. The trunk of the root is ſurrounded by the common orifice of the ſocket at a ſmall diſtance from the circular line or collar. The upper and lower *teeth* meet in ſuch a manner as that the firſt, and eſpecially the inciſors, advance moſt forward, and run over the latter; the arch of the lower *teeth* appearing to be ſmaller than that of the upper.

The *teeth* are of three ſorts: thoſe in the fore part of each jaw are called *inciſores*, *cutters*; and are four in number in each jaw, broad, thin, and flat: ſome call them the *primores*, becauſe they appear the firſt; others the *adverſi*; and others the *ridentes*, *laughers*, becauſe they ſhew themſelves firſt in laughing.

Behind theſe, ſtand four, one on each ſide, in each jaw, which are a little more prominent, and pointed, called *canini*, by the common people *eye-teeth*, becauſe part of the nerve which moves the eyes is inſerted into them, whence the danger of pulling them out.

Behind theſe are five on each ſide, in each jaw, called the *molares*, or *grinders*, being thoſe which in men ſerve chiefly for maſtication.

In each tooth we diſtinguiſh two portions, one without the ſocket, called the body of the tooth, and in the dentes molares the crown; the other within the ſocket, called the root of the tooth. Theſe two portions are divided by a kind of circular line, which may be termed the collar of the tooth. In an adult perſon, the *teeth* in general are very compact and ſolid, not apparently laminated, nor ſubject to exfoliation. A very narrow cavity goes from the body to the point of the roots, where it ends in a ſmall hole, which at length becomes imperceptible, and even quite diſappears.

The *teeth* begin not to appear all at a time; but firſt appears one of the front inciſors of the lower jaw, then, after a little time, the other; a few months afterwards the great inciſors of the upper jaw come forth, both nearly at the ſame time; then come the two lateral inciſors of the lower jaw, and the two ſmall ones of the upper, one in a little time after the other; after them come out the canini, becauſe they are ſharper than the molares, but thicker than the inciſivi; and laſt of all the molares, becauſe they are thickeſt and blunteſt.

About the twentieth year, the two laſt of the molares ſpring up, and are called *dentes ſapientiæ*, becauſe they ariſe when the perſon is at years of diſcretion. See DENTITION.

The *teeth*, according to Peyer, are formed of convolved ſkins, hardened and bound together by a viſcid mucus: and if we view the grinders of deer, horſes, ſheep, &c. we ſhall find great reaſon to be of his opinion.

Others ſpeak of their formation otherwiſe. The ſockets, Dr. Quincy obſerves, are lined with a thin membrane, upon which are ſeveral veſſels, through which there paſſes a thick tranſparent humour, that, as it increaſes, hardens in form of *teeth*; and within the firſt three or ſix months after birth, they begin to pierce the edge of the jaw, and tear the perioſteum and gums, which being very ſenſible, create a violent pain, and other ſymptoms incident to children in the time of dentition.

Of this viſcous tranſparent liquor, which is indurated into the ſubſtance of the *teeth*, there are two lays, one below the other, divided by the ſame membrane which covers all the cavity of the jaw: the uppermoſt lay forms the *teeth* which come out firſt: but about the ſeventh year of age they are thruſt out by the *teeth* made of the undermoſt lay, which then begin to ſprout; and if theſe *teeth* be loſt, they never grow again.

If ſome have been obſerved to ſhed their *teeth* twice, they have had three lays of this viſcous humour, but this hardly ever happens.

The outer ſubſtance of the *teeth* is different from the inner; and that of the body from the root.

The *teeth*, M. de la Hire the younger has found to have all that part which ſtands out beyond the jaw, covered with a peculiar ſubſtance called *enamel*, quite different from and harder than the reſt of the bone.

This enamel, by ſome others called the *perioſteum*, is compoſed, as may be diſcerned through a microſcope, of an infinity of little fibres, which grow to the bone by their roots, much like nails or horns; the radiated extremities of which are turned both inwards and outwards. The roots have ſome ſmall ſhare of it, but not near ſo much as the bodies. It is of ſo ſolid a nature, than nothing can deſtroy it but the file or corroſive liquors.

This compoſition is very diſcernible in a broken *tooth*, where the origin and ſituation of theſe fibres are apparent. M. de la Hire is perſuaded, that the growth of theſe fibres is performed much like that of nails. If by any accident a little part of this enamel be broken off, ſo that the bone is left bare, that is, if the very roots of the fibres be taken away, the bone, in that part, will grow carious, and the *tooth* inevitably periſh; there being no BONE in the body that can bear the air.

Indeed, in ſome perſons the enamel is very much wore and injured, by rubbing them much with dentrifices, &c. ſo that the bone appears through, and yet the *tooth* keeps ſound; but the reaſon is, that the bone is not quite bare, but there is ſtill a thin lay of the enamel which preſerves it; but this lay being thin enough to be tranſparent, the yellow bone is ſeen through it.

Sometimes alſo a *tooth* breaks, and the bone is left bare, yet the perſon does not find any pain or aching from it: the reaſon is, that the hole in the root or ſang of the *tooth* through which a little branch of a nerve enters that renders the *tooth* ſenſible, being quite ſtopped up by age, or the like, has pinched off the nerve, and taken away all communication between the *tooth* and the origin of the nerves, and, by conſequence, all ſenſibility.

It alſo happens in ſome *teeth*, that the fibres are only in little ſheaves, or bundles, whoſe upper extremities meet, but not their lower; as is the caſe in moſt of the grinders, where the ſeparation of the bundles is apparent. Here, if the upper extreme of the fibres chance to be broken, or wore off, the ſeparation between two of the bundles often enlarges itſelf, ſo as to admit ſome hard particle of the food, by which means ſome little aperture being made through the enamel, the bone is laid bare, and the *tooth* ſoon rots. This inconvenience is remedied a little by ſtopping up the hole with lead, which prevents the ſharp pungent parts of the food from penetrating to the bone, and there occaſioning pain.

The inner ſubſtance of the *teeth* is the ſame with that of the other bones, only harder than any of them, except the apophyſis petroſa of the os temporis.

What we have ſaid is illuſtrated by the figures in *Tab. Anat.* *(Oſteol.) fig.* 14. where ACFH expreſſes the extremity of the jaw the *teeth* are ſet it; AEC and FGH the roots or fangs of the *teeth* encloſed in the jaw; ADCB and FLHII the enamel compoſed of little fibres ranged aſide of each other, which cover all that part of the *tooth* without-ſide the jaw; II ſeveral threads joined at the upper extremity, but apart at the lower; MM holes through which the nerves enter the roots of the *teeth*; NN a *tooth* cloſed up.

The *teeth*, Dr. Derham obſerves, furniſh us with a notable inſtance of the wiſdom and goodneſs of the Creator: their peculiar hardneſs is very remarkable, conſidering the tender ſubſtance they are formed of.

The ancients, and even Riolanus among the moderns, have held them to be incombuſtible, and the only part of the body that was ſo; on which account they were placed with great care in the urns among the aſhes of the deceaſed: but the opinion is falſe, there having only been two found in the tombs of Weſtphalia, one of which was half calcined.

Another popular error is, that the *teeth* continue growing for ever, even in old people, to the hour of their death. M. de la Hire obſerves, it is only the enamel or poliſh that grows, which is a ſubſtance very different from the *teeth*.

Others, however, have obſerved, that this enamel, which is formed before the *teeth* appear above the gums, thickens, hardens, and is poliſhed until the age of twenty or twenty-five, and is afterwards incapable of being repaired or renewed, but gradually wears by continued uſe. The *teeth*, conſidering their ſize, are plentifully ſupplied with nerves and blood-veſſels, which enter through a ſmall hole at the point of each root, and after paſſing through a ſharp channel as far as the crown, are divided and diffuſed all over their ſubſtance. The arteries proceed from the internal carotids; the veins return to the jugulars, and the nerves are branches of the fifth pair.

In general, the *teeth* ſerve for maſtication or chewing. In particular, the inciſors tear and cut the food; the canini break it to pieces; and the molares cruſh and grind it.

The *teeth*, eſpecially the inciſores, contribute likewiſe to the articulation of ſounds.

The form, diſpoſition, and order of the *teeth*, are admirable: the foremoſt are weak and far from the centre, as being only preparers to the reſt; the others being to grind and mince, are accordingly ſtronger, and placed near the centre of motion.

Galen puts the caſe, that the order of the *teeth* ſhould have been inverted, and the grinders, e. gr. put in the place of the inciſores; and aſks, what uſe *teeth* had then been of, and what confuſion would not have ariſen by ſuch a ſlight overſight merely in the diſpoſal of them? Upon which he argues, that if any perſon ſhould diſpoſe a company of thirty-two men, the number of the *teeth*, in a juſt order, we ſhould judge him an intelligent perſon; why then ſhould we not judge the ſame of the Creator? &c.

Again, their various forms, in various creatures, are no leſs conſiderable, being all curiouſly adapted to the peculiar food and occaſions of the ſeveral ſpecies of animals: thus in the rapacious they are fitted for the catching, holding, and tearing the prey; in herbaceous, for the gathering and comminution of vegetables; and in ſuch as have no *teeth*, as birds, the bill ſupplies the defect.

Add, that the temporary defect of them is no leſs obſervable in ſome: that children, for inſtance, ſhould have none while they are not able to uſe them, but to hurt themſelves, or the mother; and that at the very age when they can take in more ſubſtantial food, and live without the breaſt, and begin to need *teeth* for the ſake of ſpeech; that then their *teeth* ſhould begin to appear, and gradually grow as they more and more ſtand in need of them.

Some perſons are born with all their *teeth*, as Marcus Curius Dentatus, and Cneius Papirius Carbo: others have only had one continued *tooth*, reaching the whole length of the jaw, as Pyrrhus king of Epirus, and Pruſias, ſon of the king of Bithynia.

Mentzelius, a German phyſician, aſſures us, that he ſaw an old man at Cleves, in 1666, aged one hundred and twenty years, who had a new ſet of *teeth* two years before, which were cut with great pain; and he ſaw an Engliſhman at the Hague, who cut a new ſet of *teeth* in his one hundred and eighteenth year. To the ſame purpoſe, Dr. Slare mentions the caſe of a relation, who
had

had all his *teeth* at eighty years of age, and afterwards ſhed them all in two or three years, and had a new ſet quite round. Phil. Tr. Abr. vol. v. p. 353.

When the *teeth* are ſubject to be overſpread with a black or yellow cruſt, it is a very good method to rub them well every day with a mixture of tincture of gum-lac, honey of roſes, and ſpirit of ſalt or vitriol, which will not only whiten the *teeth*, but render the gums more firm.

The world is fond of tooth-powders, and a moderate uſe of them may do ſervice; but the daily rubbing with them does more harm to the *teeth* than wholly neglecting them. Powders of this kind may be prudently uſed once in ſix or ſeven days, and will render the *teeth* white and ſplendid. The common powders prepared for this purpoſe, are too hard, and wear away the gums; ſofter ſubſtances ſhould be employed, and when the gums are furred, a few drops of ſome acid ſpirit may be added to the powder. The following is a very efficacious and ſafe powder: take chalk in powder, myrrh, burnt hartſhorn levigated, and Florentine orrice-root, of each two drams; ſpirit of ſalt, ſix drops; mix all into a powder.

Notwithſtanding the danger that attends the powders, tinctures, electaries, that have been too commonly uſed, it is very deſirable to preſerve the beauty and ſoundneſs of the *teeth* from infancy to old age. For this purpoſe, as ſoon as the ſecond *teeth* appear, children ſhould be accuſtomed to waſh their *teeth* every morning with common water, and a convenient tooth bruſh: and after meals to rince the mouth, and rub the *teeth* with their fingers, when a bruſh cannot be conveniently uſed. Thoſe who conſtantly obſerve ſuch inſtructions may expect to be free from tartarous matter, putrid ſlough, ſuperficial diſcolouring, flaccid gums, and from the pain and looſeneſs of the *teeth*, ariſing from theſe cauſes. When the *teeth* have been neglected at firſt, and tartarous matter has already faſtened to them, this ſhould be removed by inſtruments, and then the *teeth* ſhould be rubbed with a fine teſtaceous powder, in order to remove any remaining diſcolouring matter: and when the enamel is become perfectly clean, white, and poliſhed, even this fine powder ſhould be uſed very ſparingly at diſtant intervals, and the colour and ſweetneſs are to be preſerved by frequent bruſhing and waſhing.

The common trick of mountebanks, and other ſuch practiſers, is to uſe various waſhes for the *teeth*, the ſudden effects of which, in cleaning and whitening the *teeth*, ſurpriſe and pleaſe people; but the effects are very pernicious. All the ſtrong acid ſpirits will do this. As good a mixture as any thing can be, on this occaſion, is the following: take plantane-water, an ounce; honey of roſes, two drams; ſpirit of ſalt, ten drops; mix the whole together, and rub the *teeth* with a piece of linen rag dipped in this, every day, till they are whitened. The mouth ought to be well waſhed with cold water, after the uſe of this or any other acid liquor; and indeed the beſt of all *teeth*-waſhes is cold water, with or without a little ſalt; the conſtant uſe of this will keep them clean and white, and prevent them from aching. Heiſter's Survey, vol. ii. p. 27. Berdmore, on the Teeth and Gums, &c. ch. vi. p. 226, &c. See DENTRIFICE and TOOTH-*ach*.

A Daniſh phyſician, named Hagerup, maintains in certain theſes, that one may hear with the *teeth*.

As to animals, there are ſome fiſhes which have *teeth* on their tongues, as trouts; others have them at the bottom of the gullet, as the cod-fiſh; ſome, as the great ſea-dog or ſhark, called *canis carcharias*, have three, four, or five rows of *teeth* on the ſame jaw; the crocodile three, and thoſe all inciſors: vipers have two large crooked canine *teeth*, which are moveable, and ordinarily lie flat, only being raiſed when they would bite. And the rana piſcatrix, ſea-frog, or ſea-devil, has whole rows of the like moveable *teeth*.—The toad and cuttle-fiſh have no *teeth*, and yet they can bite. See TEETH *of fiſh*.

TEETH, *artificial*, are thoſe ſet in lieu of natural ones which are wanting. They are uſually made of ivory, or the tooth of the ſea lion; but in regard ivory, in a little time, grows yellow in the mouth, Fabricius adviſes them to be made of the ſhin-bone of a bullock, which preſerves its colour.

The cuſtom of wearing ivory *teeth*, and of binding them in with a gold wire, is very ancient: Lucian and Martial ſpeak of it as practiſed among the Romans. But ligatures of wire have been found to hurt the natural *teeth*, with which the artificial are connected: whereas ſilken twiſt cannot affect them to any conſiderable degree for ſeveral years.

Guilleman gives us the compoſition of a paſte for making *artificial teeth*, which ſhall never grow yellow: the compoſition is white wax granulated, and melted with a little gum elemi, adding powder of white maſtic, coral, and pearl.

When ſeveral *teeth* are out in the ſame place, it is beſt to make a ſet, or the number wanted, out of one piece, all adhering together, which may be faſtened to the two next of the ſound or natural *teeth*. And even the whole ſet of artificial *teeth* may be made for one or both jaws, ſo well fitted to admit of the neceſſary motions, and ſo conveniently retained in the proper ſituation, by means of ſprings, that they will anſwer every purpoſe of natural *teeth*, and may be taken out, cleaned, and replaced by the patient himſelf with great eaſe. Heiſter, &c. p. 31. Berdmore, &c. p. 262.

TEETH, *canine*, *Canini Dentes*, in *Anatomy*, are two ſharp-edged teeth in each jaw; one on each ſide, placed between the inciſores and molares.

They are ſo called, becauſe they are naturally a little pointed, and appear longer than the reſt, almoſt in the ſame manner as in dogs. They might likewiſe be called angular, becauſe they make a ſort of angle, by which the inciſores are ſeparated from the grinders.

The two ſuperior have been named eye-*teeth* from their ſituation. The bodies of the *dentes canini* are thicker, and more prominent than thoſe of the inciſores; they are convex, and a little rounded on the outſide, and end in a ſhort triangular point, one of the ſides of which is a continuation of the convexity of the outſide, and the other two are flatter and turned inwards.

Theſe points are often worn out by maſtication: their roots are commonly larger, thicker, longer, and more pointed than thoſe of the inciſores, and ſometimes perforate the bottom of the maxillary ſinus. Winſlow's Anatomy, p. 43.

For the peculiar uſe of the canine *teeth*, ſee TEETH *ſupra*. *Tab. Anat. Oſteol. fig.* 2. *lit. e.*

TEETH, *cutting*, *dentes inciſores*, have this name from their uſe; and are by ſome authors called *riſorii*, becauſe they appear in laughing: the four upper *inciſores* are larger and broader than the four lower; and of the upper, the two in the middle are larger than the other two: the bodies of theſe *teeth* reſemble large cutting wedges, and their roots are pointed. Their bodies are ſo diſpoſed that their ſharp ends lie all in a line, making one uniform edge; each body has properly four ſides; one anterior a little convex, one poſterior a little concave, and two lateral much narrower than the former, and almoſt flat: the anterior and poſterior ſides decreaſe in breadth towards the collar, the lateral ſides towards the edge, ſo that they repreſent in ſome degree four triangles, with their apices and baſes reciprocally oppoſite.

Theſe *teeth* have long roots, the lateral ſides of which are broad and flat, the anterior and poſterior narrow: they terminate by degrees in a point, in which a ſmall hole is obſervable, in children pretty conſiderable, but obliterated in old age. Winſlow. For the particular uſe of theſe, ſee TEETH, *ſupra*. *Tab. Anat. Oſteol. fig.* 2. *lit. d.*

TEETH, *grinding*, *dentes molares*. See MOLARES.

TEETH-*ach*, ſee TOOTH-*ach*.

TEETH, *clenched*. The *teeth* are in ſome caſes found ſo cloſely and firmly ſhut, that they cannot be opened ſufficiently to give the perſon liberty to eat or ſpeak. This generally ariſes from a ſpaſm or cramp of the elevating muſcles of the lower jaw. The cauſe of this ſpaſm is various, ſometimes it ariſes from a wound or blow, even from injuries of the nerves and tendons in different parts of the body; as after an amputation of an arm or leg. Sometimes alſo it is owing to an inflammation of the fauces themſelves.

When this diſorder ariſes from a wound, the firſt thing to be done is to ſearch whether there be not ſome extraneous body left in it, which excites theſe ſpaſms; if this be found to be the caſe, they always ceaſe immediately, upon the pulling out ſuch offending matters. If there be no ſuch bodies in the wound, and medicines give no relief to the convulſions, you may be ſure that ſome nerve is wounded; and the method then is to cut the nerve in two, if that may be done, and immediately the ſpaſms will ceaſe. Sometimes, however, the nerve lies inacceſſible, or cannot be divided without danger of the patient's life; which is a very deplorable caſe, and generally brings on a neceſſity of amputating the limb. Theſe ſpaſms when from amputations are leſs to be dreaded, ſince they generally go off on untying the ligatures about the veſſels, and taking away the vitriol or other cauſtic applied to reſtrain the hæmorrhage.

When an inflammation of the tonſils or jaw excites this ſpaſm, theſe are to be treated in the common method; and the cauſe being removed, as in the other caſes, the effect will ceaſe. But if this diſorder be of ſo long continuance as to threaten the patient with ſtarving, he is to be ſupplied with broths and other liquid food, which may be ſucked through the *teeth*.

The ſurgeons have an inſtrument, which they call SPECULUM *oris*, made to force open the mouth on theſe occaſions, and ſome adviſe the breaking out a *tooth*, to give room for food and medicines; but both theſe practices are wholly to be rejected, as making the ſpaſms more violent and obſtinate. Heiſter's Surg. vol. ii. p. 26.

TEETH-*drawing*. See TOOTH-*drawing*.

TEETH, *hollow*. The *teeth* which are hollow and decayed are uſually carious, and admit ſome parts of the food into their cavities, which by degrees putrefies, becomes acrimonious, and not only farther deſtroys the *teeth* themſelves, but irritates the internal perioſteum and nerves of the *teeth*, ſo as often to cauſe intolerable pain.

Many methods have been contrived for relief in theſe caſes: one is to clean the cavity, and then fill it up with maſtic as often as there is occaſion; and another is the filling up the cavity with a piece of lead or gold. The cavity may alſo be filled at times with oil of cloves, and the like, or cauterized with a red-hot iron; this generally proves a laſting remedy, and is attended with very little additional pain, if carefully performed, and no part of the mouth burnt. If all theſe methods fail, the laſt relief is the taking out the *tooth*, and afterwards replacing it again. Heiſter's Surg. p. 27. See TOOTH-*drawing*.

TEETH, *ſupernumerary*. Theſe are ſometimes the cauſe of great diſorders, and may form the tumors which, without careful examination, are ſometimes miſtaken for exoſtoſes or ſcirrhuſes of the palate. See Med. Eſſ. Edinb. vol. v. art 16. See, on the formation and prevention of *ſupernumerary teeth*, the article DENTITION.

TEETH, *mark of*, in the *Manege*. See MARK and EYE *of a bean*. See alſo TOOTH.

TEETH *of fiſh*, *dentes piſcium*. The *teeth* in the fiſh-kind are ſo very various in their ſhape, and alſo ſo variouſly diſpoſed, that they make a very notable mark of diſtinction among the ſeveral genera.

As to ſituation, they are, 1. Sometimes placed only in the fauces and orifice of the ſtomach, the reſt of the mouth being entirely ſmooth: we have examples of this in the cyprini, and the ammodytæ or ſand-eels, and many other fiſh. 2. In ſome the *teeth* are placed only in the jaws; the tongue, the palate, and the inner part of the mouth being ſmooth. 3. In ſome they are placed in the jaws, and on the tongue, the reſt of the mouth being ſmooth. 4. In ſome the tongue, the palate, and the jaws have *teeth*, but the back part of the mouth is ſmooth; the herring has them diſpoſed in this manner. 5. Some have the fauces, tongue, palate, and jaws, all beſet with *teeth*, as the ſalmons, &c. 6. Some have them in the fauces and jaws only, the tongue and the palate being ſmooth: this we have inſtances of in the pleuronecti. And finally, 7. Some fiſhes have *teeth* in the jaws, fauces, and palate, and the tongue only remains ſmooth: this we ſee in the mackrel, &c. And all theſe are very eſſential marks and diſtinctions never varying in the ſame fiſh, and may ſerve as characters much better than the colours, and other ſuch more obvious, but leſs eſſential things, remarked by the old authors.

The differences in the ſhape of the *teeth*, are as many as thoſe in their ſituation, and may ſerve to as much purpoſe in their diſtinctions. 1. They are in ſome acute and ſharp at the ends; this is the caſe in moſt fiſh. 2. In ſome they are obtuſe, and as it were flatted at the end, as in the cyprini. 3. In ſome fiſh they are of a conic ſhape, as thoſe in the upper jaw of the thymallus. 4. They are in ſome compreſſed or flatted at the ſides, as in the gadi and eſoces. 5. They are ſmooth and even at the ſides, as in the greater part of fiſhes: or, 6. They are ſerrated or notched at the ſides, as in the ſhark-kind, and ſome others. 7. They are in ſome ſtraight, as in the common acus or needle-fiſh of Oppian. And, 8. They are ſometimes crooked inwards, as in the oſmeri, &c. Finally, they are ſometimes convex on one ſide, and flat on the other, as in the capriſcus.

The *teeth* of fiſh differ in proportion alſo. 1. In ſome they are all of the ſame ſize in the ſame fiſh, as in the cottus, &c. 2. In ſome they are of very different ſizes in the ſame mouth; we have inſtances of this in the pike, the lucioperca, and many of the gadi. 3. They differ alſo in number and arrangement, for in ſome fiſh they are placed only in ſingle rows in the jaws, and other places allotted for them; but in others they are aggregated into ſeveral rows; the firſt is the caſe in the ſalmons, &c. the other in the cotti, and other fiſh. Artedi Ichthyology.

TEETH, *Mammoth's*, ſee MAMMOTH'S *Teeth*.

TEEH, *Wolf's*, ſee WOLVES *Teeth*.

TEETHING, ſee DENTITION.

TEFTERDAR, the name of an office of dignity in the eaſtern nations. In Egypt he is lord high-treaſurer of the tribute paid out of the lands to the grand ſignior. He is named for a year by the Porte; but is generally continued in his office many years. This office is ſometimes given to one of the poorer beys, to help him to ſupport his dignity; and frequently to a quiet one, who is not likely to enter into intrigues. For one party never cares that a ſtirring man of the oppoſite party ſhould be inveſted with an office of this dignity. See DEFTARDAR.

TEGS, a term uſed in ſome part of the kingdom by the farmers, to expreſs lambs of a year old. Among ſportſmen it denotes a doe of two years old. When a flock of ewes and lambs are turned into a turnep-field, the young lambs of three weeks old will immediately fall to eating the turneps, and ſcoop them very prettily; but theſe *tegs* will not touch them for ſeveral days. They uſually ſtay till almoſt ſtarved to death before they begin, but when they have begun they ſoon grow fat.

TEGUMENT. See INTEGUMENT.

TEICHOPŒUS, τειχοποιος, among the Athenians, an officer who had the care of the city walls; their number was the ſame with that of the tribes, every tribe having the choice of one.

TEINTS, and *Semi*-TEINTS, in *Painting*, denote the ſeveral colours uſed in a picture, conſidered as more or leſs high, or bright, or deep, or thin, or weakened, and diminiſhed, &c. to give the proper relievo, or ſoftneſs, or diſtance, to the ſeveral objects. See COLOURING.

The word is pure French, where it ſignifies the ſame.

TEIRCE, or TEIRS. See TIERCE.

TEITEI, in *Ornithology*, the name of a Braſilian bird, a ſpecies of TANAGRA, in the Linnæan ſyſtem, called alſo *guiranheemegeta*, and *guroundi*.

It is of the ſize of our red-breaſt, and beautifully coloured.

It ſings very ſweetly, and is kept in cages, five or ſix together in the ſame cage. Marcgraves's Hiſt. Braſil.

TEJUGUACU, in *Zoology*, the name of a ſpecies of lizard, common in the Braſils, and called alſo TEMAPARA.

It much reſembles the iguana, in its general figure, but differs from it in that its whole body is black, only variegated with ſome white ſpots. It lives principally on the ſucking of eggs, but it is capable of bearing hunger a long time; Marcgrave having kept one alive ſeven months without eating. This ſpecies afforded alſo a certain teſtimony to that author, of the reproduction of the tail when cut off. Ray.

TEIUNHANA, in *Zoology*, the name of a ſmall American lizard. It is about the thickneſs of one's little finger, and has a ſharp noſe. Its tail is very ſlender, ſix fingers breadth long, and terminates in a point almoſt as ſharp as a needle. Its head is covered with ſcales; and its back, ſides, and legs, with a tender ſkin as ſoft as ſattin to the touch; and its tail is covered with extremely minute ſcales, of a ſquare figure. Ray.

TEKUPHÆ, or THEKUPHÆ, in the *Jewiſh Chronology*, are the times wherein the ſun proceeds from one cardinal point to the next.

The ſame term is alſo applied to the moment wherein the ſun enters a cardinal point: theſe four terms, or *tekuphæ*, into which the Jews divided their ſolar year, are obſerved among the Jews with a great deal of ceremony; the reaſon, as we are informed by Munſter, is this:

That people have a notion, that in each *tekupha* the ſun has a ſeparate angel appointed to guard and direct it; and that in the very point wherein the ſun finiſhes one *tekupha*, and enters upon another, before the one director has taken place of the other, the devils have a power to exerciſe all kinds of tyranny in the water.

And hence, they fancy, that if any body drinks the ſmalleſt quantity of water at that time, he will infallibly have a dropſy, or ſome other grievous diſtemper.

The *tekupha* of Tiſri correſponded to the autumnal equinox, that of Tebeth to the winter ſolſtice, that of Niſan to the vernal equinox, and that of Tamuz to the ſummer ſolſtice.

TELAMONES, a name given by the Romans to what the Greeks called *Atlantes*; viz. the figures of men ſupporting entablatures, and other projectures. See ATLAS.

The word, according to ſome, is derived from the Greek τελαμων, from τελαω, or τλαω, *I bear*.

Among the Greek they were called *atlantes*, ατλαντες, which comes from the ſame word ταλαω, or τλαω, by the figure metatheſis.

TELAMONES is alſo uſed by the chirurgical writers ſometimes for lint, and ſometimes for the fillets or bandages, which they apply over their dreſſings.

TELAUGIA, in *Natural Hiſtory*, the name of a genus of SCRUPI, of a glittering appearance, uſually containing flakes of talc, and emulating the ſtructure of the granites. Hill.

Of this genus we have twelve ſpecies.

TELE, Τελη, among the Athenians, thoſe revenues that were brought in by lands, mines, woods, and other public poſſeſſions, ſet apart for the uſe of the common-wealth; as alſo tributes paid by ſojourners and freed-ſervants, and the cuſtoms laid upon certain trades and goods.

TELEOLOGY, formed of τελος, *end*, and λογος, *diſcourſe*, the ſcience of the final cauſes of things. This is an ample and curious field of inquiry, though pretty much neglected by philoſophers.

TELEPHIUM, *true orpine*, in *Botany*, a genus of the *pentandria trigynia* claſs; its characters are, that the empalement is permanent, compoſed of five oblong leaves; the flower has five oblong petals, and five awl-ſhaped ſtamina, with a three-cornered acute germen, which turns to a ſhort three-cornered capſule, with one cell, opening with three valves, containing many round ſeeds. There are two ſpecies.

TELESCOPE, formed of τηλε, *far*, and σκοπεω, *I obſerve*, an optical inſtrument, conſiſting of ſeveral glaſſes, or lenſes fitted into a tube; through which remote objects are ſeen as if nigh at hand; or more generally, a *teleſcope* is an optical inſtrument, which ſerves for diſcovering and viewing diſtant objects, either directly by glaſſes, or by reflection, by means of ſpecula or mirrors.

In refracting *teleſcopes*, the lens or glaſs turned towards the object, is called the *object-glaſs*; and that next the eye, the *eye-glaſs*; and if the *teleſcope* conſiſts of more than two lenſes, all but that next the object are called *eye-glaſſes*.

The invention of the *teleſcope* is one of the nobleſt and moſt uſeful theſe ages have to boaſt of: by means hereof, the wonders of the heavens are diſcovered to us, and aſtronomy is brought to a degree of perfection, which former ages could have no notion of.

Indeed, the diſcovery was owing rather to chance than to thought; ſo that it is the good fortune of the diſcoverer, rather than his ſkill or ability, we are indebted to: on this account it concerns us the leſs to know, who it was firſt hit on this admirable invention. It is certain it muſt be caſual, ſince the theory it depends on was not then known.

Johannes Baptiſta Porta, a noble Neapolitan, is aſſerted by Wolfius to be undoubtedly the firſt that made a *teleſcope*: from this paſſage in his *Magia Naturalis*, printed in 1560. "If you do but know how to join the "two (viz. the concave and convex glaſſes) rightly to-"gether, you will ſee both remote and near objects, "much larger than they otherwiſe appear, and withal "very diſtinct. In this way we have been of good help "to many of our friends, who either ſaw remote things "dimly or near ones confuſedly; and have made them "ſee every thing perfectly."

But it is certain, Porta did not underſtand his own invention, and therefore neither troubled himſelf to bring it to greater perfection, nor ever applied it to celeſtial obſervation. What is more, the account Porta gives of his concave and convex lenſes is ſo dark and indiſtinct, that Kepler who examined it by particular command of the emperor Rudolphus, declared to that prince, that it was perfectly unintelligible.

Thirty years afterwards, or in 1590, a *teleſcope* ſixteen inches long, was made, and preſented to prince Maurice of Naſſau, by a ſpectacle-maker of Middleburg; but authors are divided about his name. Sirturus, in a treatiſe of the *teleſcope*, printed anno 1618, will have him to be John Lipperſheim: and Borellus, in an expreſs volume on the inventor of the *teleſcope*, publiſhed in 1655, ſhews him to be Zacharias Janſen, or, as Wolfius has it, Hanſen.

The invention of Lipperſheim is fixed by ſome in the year 1609, and by others in 1605; Fontana, in his *Novæ Obſervationes cæleſtium et terreſtrium Rerum*, printed at Naples, in 1646, claims the invention in the year 1608. But Borellus's account of the diſcovery of *teleſcopes* is ſo circumſtantial, and ſo well authenticated, as to render it probable than Janſen was the original inventor.

In 1620, James Metius, of Alcmaer, brother of Adrian Metius, profeſſor of mathematics at Franeker, came with Drebel to Middleburg, and there bought *teleſcopes*, of Zachary's children, who had made them public; and yet Adr. Metius has given his brother the honour of the invention; in which he is miſtakenly followed by Deſcartes.

But none of theſe artificers made *teleſcopes* of above a foot and half. Simon Marius in Germany, and Galileo in Italy, firſt made long ones fit for celeſtial obſervations.

Le Roſſi relates, that Galileo, being then at Venice, was told of a ſort of optic glaſs made in Holland, which brought objects nearer: upon which, ſetting himſelf to think how it ſhould be, he ground two pieces of glaſs into form as well as he could, and fitted them to the two ends of an organ-pipe; and with theſe ſhewed, at once, all the wonders of the invention to the Venetian nobleſſe, on the top of the tower of St. Mark. That author adds, that from this time Galileo devoted himſelf wholly to the improving and perfecting of the *teleſcope*; and that he thereby almoſt deſerved all the honour uſually done him, of being reputed the inventor of the inſtrument, and of its being denominated from him *Galileo's tube*. Galileo himſelf, in his *Nuncius Sidereus*, publiſhed in 1610, acknowledges, that he firſt heard of the inſtrument from a German; and that, being merely informed of its effects, firſt by common report, and a few days after by letter from a French nobleman, James Badovere, at Paris, he himſelf diſcovered the conſtruction by conſidering the nature of refraction. He adds in his *Saggiatore*, that he was at Venice when he heard of the effects of prince Maurice's inſtrument, but nothing of its conſtruction; that the firſt night after his return to Padua, he ſolved the problem, and made his inſtrument the next day, and ſoon after preſented it to the doge of Venice, who, in honour of his grand invention, gave him the ducal letters, which ſettled him for life in his lectureſhip at Padua, and doubled his ſalary; which then became treble of what any of his predeceſſors had enjoyed before. Accordingly Galileo may juſtly be conſidered as the ſecond inventor of the *teleſcope*.

F. Mabillon, indeed, relates, in his Travels through Italy, that in a monaſtery of his own order, he ſaw a manuſcript copy of the works of Commeſtor, written by one Conradus, who lived in the XIIIth century; in the third page whereof was ſeen a portrait of Ptolemy, viewing the ſtars through a tube of four joints or draws: but that father does not ſay that the tube had glaſſes in it. In effect, it is more than probable, that ſuch tubes were then uſed for no other purpoſe but to preſerve and direct the ſight, or to render it more diſtinct, by ſingling out the particular object looked at, and ſhutting out all the foreign rays reflected from others, whoſe proximity might have rendered the image leſs preciſe.

This conjecture is verified by experience; we having often obſerved, that without a tube, by only looking through the hand, or even the fingers, or a pin-hole in a paper, objects ſhall appear more clear and diſtinct than otherwiſe.

Be this as it will, it is certain the optical principles, whereon *teleſcopes* are founded, are contained in Euclid, and were well known to the ancient geometricians; and it is for want of attention thereto, that the world was ſo long without that admirable invention; as, no doubt, there are numerous others lying hid in the ſame principles, only waiting for reflection or accident to bring them forth.

To the preceding abſtract of the Hiſtory of the Invention of the *Teleſcope*, it will be proper to add ſome particulars relating to the claims of our own celebrated countryman, friar Bacon, who died in 1294. Mr. W. Molyneux in his Dioptrica Nova, p. 256, expreſſes his opinion, that Bacon did perfectly well underſtand all ſorts of optic glaſſes, and knew likewiſe the way of combining them, ſo as to compoſe ſome ſuch inſtrument as our *teleſcope*: and his ſon, the honourable Samuel Molyneux, aſſerts more poſitively, that the invention of *teleſcopes*, in its firſt original, was certainly put in practice by an Engliſhman, friar Bacon; although its firſt application to aſtronomical purpoſes may be juſtly attributed to Galileo. The paſſages to which Mr. Molyneux refers, in ſupport of Bacon's claims, occur in his Opus Majus, p. 348, and p. 357. Jebb's ed. 1733. The firſt is as follows: *Si vero non ſint corpora plana, per quæ viſus videt, ſed ſphærica, tunc eſt magna diverſitas: num vel concavitas corporis eſt verſus oculum vel convexitas:* whence it is inferred, that he knew what a concave and convex glaſs was. The ſecond is compriſed in a whole chapter, where he ſays, *De viſione fracta majora ſunt; nam de facili patet per canones ſupra dictos, quod maxima poſſunt apparere minima, et e contra, et longe diſtantia videbuntur propinquiſſime, et e converſo. Nam poſſumus ſic figurare perſpicua, et taliter ea ordinare reſpectu noſtri viſus et rerum, quod frangentur radii, et flectentur quorſumcunque voluerimus, ut ſub quocunque angulo voluerimus, videbimus rem prope vel longe, &c. Sic etiam faceremus ſolem et lunam et ſtellas deſcendere ſecundum apparentiam hic inferius, &c.* i. e. Greater things than theſe may be performed by refracted viſion; for it is eaſy to underſtand by the canons above mentioned, that the greateſt things may appear exceeding ſmall, and on the contrary: alſo, that the moſt remote objects may appear juſt at hand, and on the contrary; for we can give ſuch figures to tranſparent bodies, and diſpoſe them in ſuch order with reſpect to the eye and the objects, that the rays ſhall be refracted and bent towards any place we pleaſe; ſo that we ſhall ſee the object near at hand or at a diſtance, under any angle we pleaſe, &c. So that thus the ſun, moon, and ſtars, may be made to deſcend hither in appearance, &c. Mr. Molyneux has alſo cited another paſſage out of Bacon's Epiſtle ad Pariſienſem, of the Secrets of Art and Nature, cap. 5. to this purpoſe, *Poſſunt etiam ſic figurari perſpicua, ut longiſſime poſita appareant propinqua, et è contrario: ita quod ex incredibili diſtantia legeremus literas minutiſſimas, et numeraremus res quantumque parvas, et ſtellas faceremus apparere quo vellemus:* i. e. glaſſes, or diaphanous bodies may be formed, that the moſt remote objects may appear juſt at hand, and contrarily; ſo that we may read the ſmalleſt letter at an incredible diſtance, and may number things though never ſo ſmall, and may make the ſtars appear as near as we pleaſe.

Moreover, Dr. Jebb in the dedication of his edition of the Opus Majus, produces a paſſage from a manuſcript (Op. iii. ad Clement. MS. Cotton. Tib. c. v. fol. 6.) to ſhew that Bacon actually applied *teleſcopes* to aſtronomical purpoſes; *Sed longe magis quam hæc*, ſays he, *oporteret homines haberi, qui bene, immo optime, ſcirent perſpectivam et inſtrumenta ejus—quia inſtrumenta aſtronomia non vadunt niſi per viſionem ſecundum leges iſtius ſcientiæ.*

From theſe paſſages, it is not unreaſonable to conclude that Bacon had actually combined glaſſes, ſo as to have produced the effects which he mentions, though he did not complete the conſtruction of *teleſcopes*. Dr. Smith, however, to whoſe judgment particular deference is due, is of opinion, that the celebrated friar wrote hypothetically, without having made any actual trial of the things he mentions: to which purpoſe he obſerves, that this author does not aſſert one ſingle trial or obſervation upon the ſun or moon (or any thing elſe), though he mentions them both: on the other hand, he conceives ſome effects of *teleſcopes* that cannot poſſibly be performed by them. He adds, that perſons unexperienced in looking through *teleſcopes* expect, in viewing any object, e. gr. the face of a man at the diſtance of one hundred yards, through a *teleſcope* that magnifies one hundred times, that it will appear much larger than when they are cloſe to it; this, he was ſatisfied, was Bacon's notion of the matter; and hence he concludes, that he had never looked through a *teleſcope*. Smith's Optics, Rem. p. 22. 41.

Dr. Birch, in his Hiſtory of the Royal Society, vol. iv. p. 156. informs us, that at one of the meetings of this Society, Dr. Hooke read a paſſage, which he had met with in Digges's Stratioticos, wherein he affirms, that his father had a method of diſcovering all objects pretty far diſtant, which lay round about in the country; and that this was by the help of a book or manuſcript of Roger Bacon of Oxford, who, he conceived, was the only man beſides his father, who knew it: this was the more remarkable, becauſe this Stratioticos was printed in 1579, more than thirty years before Metius or Galileo made their diſcovery of thoſe glaſſes; and therefore it ſeemed evident, that Roger Bacon was the firſt inventor of *teleſcopes*, and Leonard Digges the next reviver of them, both Engliſhmen. Mr. Aubrey likewiſe remarked on the ſame occaſion, that there was a paſſage in the preface of Leonard Digges's Pantometria, which mentions the ſame thing to be known by him, and that he had ſhewn it to ſeveral; which book was printed before the Stratioticos: but really, ſays Dr. Birch, twelve years after, or in 1591. To whomſoever we aſcribe the honour of firſt inventing the *teleſcope*, the rationale of this admirable inſtrument, depending on the refraction of light in paſſing through mediums of different forms, was firſt explained by the famous John Kepler, (though ſomething of the ſame kind is alſo ſaid to have been done by Maurolycus, whoſe treatiſe, De Lumine et Umbra, was publiſhed in 1575), who alſo pointed out methods of conſtructing others, of ſuperior powers, and more commodious application than that firſt uſed.

The principal effects of *teleſcopes* depend upon this plain maxim, viz. that objects appear larger in proportion to the angles which they ſubtend at the eye; and the effect is the ſame, whether the pencils of rays by which objects are viſible to us, come directly from the objects themſelves, or from any place nearer to the eye, where they may have been united, ſo as to form an image of the object; becauſe they iſſue again from thoſe points in certain directions, in the ſame manner as they did from the correſponding points in the objects themſelves. In fact, therefore, all that is effected by a *teleſcope* is firſt to make ſuch an image of a diſtant object, by means of a lens or mirror, and then to give the eye ſome aſſiſtance for viewing that image as near as poſſible; ſo that the angle, which it ſhall ſubtend at the eye, may be very large, compared with the angle which the object itſelf would ſubtend in the ſame ſituation. This is done by means of an eye-glaſs, which ſo refracts the pencils of rays, as that they may afterwards be brought to their ſeveral foci, by the natural humours of the eye. But if the eye was ſo formed as to be able to ſee the image, with ſufficient diſtinctneſs, at the ſame diſtance, without any eye-glaſs, it would appear to him as much magnified as it does to another perſon who makes uſe of a glaſs for that purpoſe, though he would not in all caſes have ſo large a field of view.

If no image be actually formed by the foci of the pencil without the eye, yet if by the help of any eye-glaſs, the pencils of rays ſhall enter the pupil, juſt as they would have done from any place without the eye, the viſual angle will be the ſame as if an image had been actually formed in that place. Prieſtley's Hiſtory of Light, &c. p. 69, &c.

The firſt perſons who diſtinguiſhed themſelves in grinding teleſcopic glaſſes, were two Italians, Euſtachio Divini at Rome, and Campani at Bologna, whoſe fame was much ſuperior to that of Divini, or that of any other perſon of his time; though Divini himſelf pretended, that in all the trials that were made with their glaſſes, his of a great focal diſtance performed better than thoſe of Campani, and that his rival was not willing to try them fairly, viz. with equal eye-glaſſes. However, it is generally ſuppoſed, that Campani really excelled Divini, both in the goodneſs and the focal length of his object-glaſſes.

It was with *teleſcopes* made by Campani, that Caſſini diſcovered the neareſt ſatellites of Saturn. They were made by the expreſs order of Lewis XIV. and were of 86, 100, and 136 Paris feet focal length.

Campani's laboratory was purchaſed, after his death, by pope Benedict XIV. who made a preſent of it to the academy called the *Inſtitute*, eſtabliſhed in that city; and by the account which M. Fougeroux has given, we learn that (except a machine, which M. Campani conſtructed, to work the baſons on which he ground his glaſſes) the goodneſs of his lenſes depended upon the clearneſs of his glaſs, his Venetian tripoli, the paper with which he poliſhed his glaſſes, and his great ſkill and addreſs as a workman. It does not appear, that he made many lenſes of a very great focal diſtance. Accordingly Dr. Hooke, who probably ſpeaks with the partiality of an Engliſhman, ſays that ſome glaſſes, made by Divini and Campani, of thirty-ſix and fifty feet focal diſtance, did not exceed *teleſcopes* of twelve or fifteen feet made in England. He adds, that ſir Paul Neille made *teleſcopes* of thirty-ſix feet pretty good, and one of fifty, but not of proportional goodneſs. Afterwards Mr. Reive firſt, and then Mr. Cox, who were the moſt celebrated in England, as grinders of optic glaſſes, made ſome good ones of fifty or ſixty feet focal diſtance, and Mr. Cox made one of one hundred, but how good Dr. Hooke could not aſſert. Borelli, alſo, in France, made object-glaſſes of a great focal length, one of which he preſented to the Royal Society. But, with reſpect to the focal length of *teleſcopes*, theſe and all others were far exceeded by M. Auzout, who made one object glaſs of ſix hundred feet focus; but he was never able to manage it ſo as to make any uſe of it. Hartſoeker is even ſaid to have made ſome of a ſtill greater focal length. Phil. Tranſ. Abr. vol. i. p. 193. Hooke's Exp. by Derham, p. 261. Prieſtley *ubi ſupra*, p. 211, &c. See GRINDING.

Teleſcopes are of ſeveral kinds, diſtinguiſhed by the number and form of their lenſes, or glaſſes, and denominated from their particular uſes, &c. ſuch are the *terreſtrial* or *land teleſcope*, the *celeſtial* or *aſtronomical teleſcope*; to which may be added, the *Galilean* or *Dutch teleſcope*, the *reflecting teleſcope*, and the *aerial teleſcope*.

Galileo's, or the *Dutch* TELESCOPE, *tubus Batavus*, is a *teleſcope* conſiſting of a convex object-glaſs, and a concave eye-glaſs.

This, of all others, is the moſt ancient form, being the only kind made by the inventors, Galileo &c. or known, before Huygens.

The firſt *teleſcope*, which Galileo conſtructed, magnified only three times: but he ſoon made another, which magnified eighteen times, and afterwards, with great trouble and expence, he conſtructed one that magnified thirty-three times, and with this he diſcovered the ſatellites of Jupiter, and the ſpots of the ſun. The conſtruction, perfections, imperfections, &c. of Galileo's *teleſcope*, are delivered in what follows.

Conſtruction of Galileo's, or the *Dutch* TELESCOPE. In a tube prepared for the purpoſe (the ſtructure whereof ſee under TUBE) at one end is fitted a convex object-lens, either a plain convex, or convex on both ſides, but a ſegment of a very large ſphere: at the other end is fitted an eye-glaſs, concave on both ſides, and the ſegment of a leſs ſphere; ſo diſpoſed, as to be at the diſtance of the virtual focus before the image of the convex lens.

Let AB (*Tab.* VI. *Optics*, *fig.* 122.) be a diſtant object, from every point of which pencils of rays iſſue, and falling upon the convex glaſs, D E, tend to their foci at F S G. But a concave lens, H I, (the focus of which is at F G) being interpoſed, the converging rays of each pencil are made parallel when they reach the pupil; ſo that, by the refractive humours of the eye, they can eaſily be brought to a focus on the retina, at P R Q. The pencils, alſo, themſelves diverging, as if they had come from X, MXO is the angle under which the image will appear, which is much larger than the angle under which the object itſelf would have appeared. Such is the *teleſcope* that was at firſt diſcovered, and uſed by philoſophers: the great inconvenience of which is, that the field of view, which depends not on the breadth of the eye-glaſs, as in the *aſtronomical* TELESCOPE, but upon the breadth of the pupil of the eye, is exceedingly ſmall: for ſince the pencils of the rays enter the eye very much diverging from one another, but few of them can be intercepted by the pupil; and this inconvenience increaſes with the magnifying power of the *teleſcope*, ſo that philoſophers way now well wonder at the patience and addreſs, with which Galileo and others, with ſuch an inſtrument, made the diſcoveries they did. And yet no other *teleſcope* was thought of for many years after the diſcovery. Des Cartes, who wrote thirty years after, mentions no other as actually conſtructed, though Kepler had ſuggeſted ſome.

Theory of Galileo's TELESCOPE. Now, in an inſtrument thus framed, all people, except myopes, or thoſe ſhort-ſighted, muſt ſee objects diſtinctly in an erect ſituation, and increaſed in the ratio of the diſtance of the virtual focus of the eye-glaſs, to the diſtance of the focus of the object-glaſs.

But for myopes to ſee objects diſtinctly through ſuch an inſtrument, the eye-glaſs muſt be ſet nearer the object-glaſs, ſo that the rays of each pencil may not emerge parallel, but may fall diverging upon the eye; in which caſe the apparent magnitude will be altered a little but ſcarce ſenſibly. The reaſon of theſe effects will appear from what follows:

For, 1°, ſince they are far diſtant objects that are to be viewed with a *teleſcope*, the rays proceeding from the ſame point of the object, will fall on the object-glaſs parallel; and, conſequently, by their refraction through the convexity, will be thrown converging on the eye-glaſs; but by their refraction through the concavity hereof, they will be again rendered parallel, and in ſuch diſpoſition they will enter the eye.

But all, excepting myopes, ſee objects diſtinctly by parallel rays. Therefore the firſt point is clear.

2°, Suppoſe A (*Tab.* VI *Optics*, *fig.* 123.) to be the focus of the object-glaſs BC; and ſuppoſe A C the fartheſt ray on the right hand of the object that paſſes through the tube: after refraction, this ray or C E will become parallel to the axis B I; and conſequently after a ſecond refraction through the concave lens, will diverge from the virtual focus. Wherefore, ſince all the rays coming from the ſame extreme to the eye placed behind the concave lens, are parallel to L E; and thoſe from the middle of the object, parallel to F G (as obſerved in what went before); the middle point of the object will be ſeen in the axis G A; and the right extreme, on the right ſide; viz. in the line L N; or parallel to it; that is, the object will be erect; which is the ſecond point.

3°, Since all right lines parallel to L N cut the axis under the ſame angle, the ſemidiameter of the object will be ſeen through the *teleſcope*, under the angle A F N or E F I; the rays L E and G I entering the eye in the ſame manner, as if the pupil were placed in F. If now the naked eye were in A, it would ſee the diameter of the object under the angle c A b or C A B. But ſince the object is ſuppoſed very remote, the diſtance A F in reſpect to this diſtance is nothing; and therefore the naked eye, even in F, would ſee the ſemidiameter of the object, under an angle equal to A; i. e. drawing F M parallel to AC, under the angle IFM.

The ſemidiameter of the object, therefore, ſeen with the naked eye, is to that ſeen through the *teleſcope*, as I M to I E. But it is demonſtrated, that I M : I E : : I F : A B; that is, the ſemidiameter ſeen with the naked eye, is to that viewed through the *teleſcope*, in the ratio of the diſtance of the virtual focus of the eye-glaſs F I, to the diſtance of the focus of the object-glaſs A B; which was the third point.

Laſtly, myopes have their retina too far from the cryſtalline humour; and diverging rays concur at a greater diſtance than parallel ones; and thoſe that were parallel become diverging by bringing the eye-glaſs nearer the object-glaſs; by means of ſuch approach, myopes will ſee objects diſtinctly through a *teleſcope*; which is the fourth point.

Hence. 1°, To have the whole object viſible, the ſemidiameter of the pupil muſt not be leſs than the diſtance of the rays L E and G I; and therefore the more the pupil is dilated, the greater field of compaſs will be taken in by the *teleſcope*, and *vice verſa*; ſo that coming out of a dark place, or ſhutting the eye for ſome time before you apply it to the glaſs, you will take in a greater field at firſt glance than afterwards, when the pupil is again contracted by the increaſe of light. See PUPIL.

2°, Since the diſtance of the rays E L and I G is greater, at a greater diſtance from the lens, the compaſs taken in by the eye at one view, will be greater as the eye is nearer the concave lens.

3°, Since the focus of a plano-convex object-lens, and the virtual focus of a plano-concave eye-lens, are at the diſtance of the diameter; and the focus of an object-glaſs convex on both ſides, and the virtual focus of an eye-glaſs, concave on both ſides, are at the diſtance of a ſemidiameter; if the object-glaſs be plano-convex, and the eye-glaſs plano-concave, the *teleſcope* will increaſe the diameter of the object, in the ratio of the diameter of the concavity to that of the convexity; if the object-glaſs be convex on both ſides, and the eye-glaſs concave on both ſides, it will magnify in the ratio of the ſemi-diameter of the concavity to that of the convexity; if the object-glaſs be plano-convex, and the eye-glaſs concave on both ſides, the ſemidiameter of the object will be increaſed in the ratio of the diameter of the convexity to the ſemidiameter of the concavity; and, laſtly, if the object-glaſs be convex on both ſides, and the eye-glaſs plano concave, the increaſe will be in the ratio of the diameter of the concavity to the ſemidiameter of the convexity.

4°, Since the ratio of the ſemidiameters is the ſame as that of the diameters, *teleſcopes* magnify the object in the ſame manner, whether the object-glaſs be plano-convex, and the eye-glaſs plano-concave, or whether the one be convex on both ſides, and the other concave on both.

5°, Since the ſemidiameter of the concavity has a leſs ratio to the diameter of the convexity than its diameter has, a *teleſcope* magnifies more if the object-glaſs be plano-convex, than if it be convex on both ſides. The caſe is the ſame, if the eye-glaſs be concave on both ſides and not plano-concave.

6°, The greater the diameter of the object-glaſs, and the leſs that of the eye-glaſs, the leſs ratio has the diameter of the object, viewed with the naked eye, to its ſemidiameter, viewed with a *teleſcope*, and conſequently the more is the object magnified by the *teleſcope*.

7°, Since the ſemidiameter of the object is increaſed in the ratio of the angle E F I, and the greater the angle E F I is, the leſs part of the object does it take in it at one view; the *teleſcope* exhibits ſo much a leſs part of the object, as it increaſes its diameter more.

And this is the reaſon that determined the mathematicians to look out for another *teleſcope*, after having clearly found the imperfection of the firſt, diſcovered by chance. Nor were their endeavours vain, as appears from the *aſtronomical teleſcope* hereafter to be deſcribed.

If the ſemidiameter of the eye-glaſs have too ſmall a ratio to that of the object glaſs, an object through the *teleſcope* will not appear ſufficiently clear, becauſe the great divergency of the rays will occaſion the ſeveral pencils repreſenting the ſeveral points of the object on the retina, to conſiſt of too few rays.

This too is ſound, that equal object-lenſes will not bear the ſame eye-lenſes, if they be differently tranſparent, or there be a difference in their poliſh. A leſs tranſparent object-glaſs, or one leſs accurately ground, requires a more ſpherical eye-glaſs than another more tranſparent, &c.

Hence, though it be ſound by experience, that a *teleſcope* is good, if the diſtance of the focus of the object-glaſs be ſix inches, and the diameter of the plano-concave eye-glaſs be one inch and one line, or of one equally concave on both ſides one inch and a half; yet it is by no means expedient to recommend to the maker either this, or any particular combination, but to try ſeveral eye-glaſſes, both greater and ſmaller, with the ſame object-glaſs, and take that through which objects appear moſt clear and diſtinct.

Hevelius recommends an object-glaſs convex on both ſides, whoſe diameter is four Dantzick feet; and an eye-glaſs concave on both ſides, whoſe diameter is $4\frac{1}{2}$ digits or tenths of a foot. An object-glaſs, equally convex on both ſides, whoſe diameter is five feet, he obſerves, will require an eye-glaſs of $5\frac{1}{2}$ digits; and adds, that the ſame eye-glaſs will alſo ſerve an object-glaſs of eight or ten feet.

Hence, as the diſtance of the object-glaſs and eye-glaſs is the difference between the diſtance of the virtual focus of the eye-glaſs, and the diſtance of the focus of the object-glaſs; the length of the *teleſcope* is had by ſubtracting that from this. That is, the length of the *teleſcope* is the difference between the diameters of the object-glaſs and eye-glaſs, if that be plano-convex, and this plano-concave; or the difference between the ſemidiameters of the object-glaſs and eye glaſs, if that be convex on both ſides, and this concave on both; or the difference between the ſemidiameter of the object-glaſs, and the diameter of the eye-glaſs, if that be convex on both ſides, and this plano-concave; or the difference between the diameter of the object-glaſs, and the ſemidiameter of the eye-glaſs, if that be plano-convex, and this concave on both ſides.

Thus, e. gr. if the diameter of an object-glaſs convex on both ſides be four feet, and that of an eye-glaſs concave on both ſides be four and a half digits or tenths of a foot; the length of the *teleſcope* will be one foot, $7\frac{1}{2}$ digits.

Teleſcope, *aſtronomical*, is a *teleſcope* conſiſting of an object-glaſs, and an eye-glaſs, both convex.

It has its name, from its being wholly uſed in aſtronomical obſervations.

The perſon, who ſuggeſted the firſt idea of this *teleſcope*, was Kepler, who alſo explained the rationale, and pointed out the advantages of it in his Catoptrics, in 1611; but the firſt perſon who actually made an inſtrument of this conſtruction, was father Scheiner, who has given a deſcription of it in his Roſa Urſina, publiſhed in 1630. To this purpoſe he ſays, if you inſert two ſimilar lenſes, both convex, in a tube, and place your eye at a convenient diſtance, you will ſee all terreſtrial objects, inverted indeed, but magnified and very diſtinct, with a conſiderable extent of view. He afterwards ſubjoins an account of a *teleſcope* of a different conſtruction, with two convex eye-glaſſes, which again reverſes the images, and makes them appear in their natural poſition. Father Rheita, however, ſoon after propoſed a better conſtruction uſing three eye-glaſſes inſtead of two.

Teleſcope, *conſtruction of the aſtronomical.*—The tube being prepared, an object-glaſs, either plano-convex, or convex on both ſides, but a ſegment of a large ſphere, is fitted in at one end, and an eye-glaſs convex on both ſides, which is the ſegment of a ſmall ſphere, is fitted into the other end; at the common diſtance of the foci.

Thus, the rays of each pencil iſſuing from every point of the object ABC, (*Tab. VI. Optics, fig.* 124.) paſſing through the object-glaſs DEF, become converging, and meet in their foci at IHG, where an image of the object will be formed. If then another convex lens, KM, of a ſhorter focal length, be ſo placed, as that its focus ſhall be in IHG, the rays of each pencil, after paſſing through it, will become nearly parallel, ſo as to meet upon the retina, and form an enlarged image of the object at RST. If the progreſs of the rays be traced, it will preſently be perceived, that this image muſt be inverted. For the pencil that iſſues from A, has its focus in G, and again in R, on the ſame ſide with A. But as there is always one inverſion in ſimple viſion, this want of inverſion produces juſt the reverſe of the natural appearance. The field of view in this *teleſcope* will be large, becauſe all the pencils that can be received on the ſurface of the lens KM, being converging after paſſing through it, are thrown into the pupil of the eye, placed in the common interſection of the pencils at P.

Teleſcope, *theory of the aſtronomical*—An eye, placed near the focus of the eye-glaſs, of ſuch a *teleſcope*, will ſee objects diſtinctly, but inverted, and magnified in the ratio of the diſtance of the focus of the eye-glaſs to the diſtance of the focus of the object-glaſs.

For, 1°, Since they are very remote objects that are viewed through theſe *teleſcopes*, the rays from any point of the object fall parallel on the object-glaſs; and, conſequently, after refraction, will meet in a point behind the glaſs, which point is the focus of the eye-glaſs. From this point they begin to diverge, and fall diverging on the eye-glaſs, where being refracted, they enter the eye parallel.

Hence, as all but myopes ſee diſtinctly by parallel rays, a *teleſcope*, thus diſpoſed, will exhibit remote objects diſtinctly. Suppoſe the common focus of the lenſes in F (*fig.* 1. 25); and make AB = BF. Since one of the rays AC, proceeding from the right ſide of the object, paſſes through A; the ray CE will be parallel to the axis AI; and therefore, after refraction in the eye-glaſs, will fall in with it in its focus G.

Since, then, the eye is placed near it, and all the other rays proceeding from the ſame point of the object with EC are refracted parallel to it; the point in the right ſide of the object will be ſeen in the right line EG.

After the like manner it appears, that the middle point of the object is ſeen in the axis GB, ſo that the object appears inverted.

3°, From what has already been ſhewn, it appears, that the ſemidiameter of the object will be ſeen through the *teleſcope*, under the angle EGI, which to the naked eye placed in A, is ſeen under the angle bAc, or BAC. Suppoſe, now, IF equal to the diſtance of the focus IG; ſince the right angles at I are equal, EGF = EFI. Therefore drawing FM parallel to AC, we ſhall have IFM = BAC. The ſemidiameter, therefore, viewed with the naked eye, is to that viewed through the *teleſcope*, as IM to IE. Draw KE parallel to FM; we ſhall have IM : IE : : IF : IK. But by reaſon of the paralleliſm of the lenſes, CE = BI = BF + FI = AB + FI; and by reaſon of the paralleliſm of the right lines CA, and EK, CE = AK; therefore BI = AK; conſequently AB = IK. And therefore IM : IE : : IF : AB; that is, the ſemidiameter, ſeen with the naked eye, is to the ſemidiameter viewed through the *teleſcope*, in the ratio of the diſtance of the focus of the eye-lens IF, to the diſtance of the focus of the object-glaſs AB. *Q. E. D.*

This may be otherwiſe demonſtrated by means of *fig.* 124; for, neglecting the length of the *teleſcope*, as bearing no ſenſible proportion to the diſtance of an object, the angle under which the object is viewed is AEC = KEM; but the angle with which the pencils, that form the image, come to the eye, is KPM = ILG (the pencil MP being refracted parallel to GL, and KP to IL), and theſe angles are to one another as LH to HE.

The magnifying power of *Galileo's* **teleſcope** may be alſo eſtimated by the ſame rule; the only difference between them being this, that the pencils by which the extremities of any object are ſeen in this caſe enter the eye diverging, whereas in the other they enter it converging; but if the ſphere of concavity in the eye-glaſs of the Galilean *teleſcope* be equal to the ſphere of convexity in the eye-glaſs of another *teleſcope*, their magnifying power will be the ſame.

The concave eye-glaſs, however, being placed between the object-glaſs and its focus, the Galilean *teleſcope* will be ſhorter than the other, by twice the focal length of the eye-glaſs.

Conſequently, if the length of the *teleſcopes* be the ſame, the Galilean will have the greater magnifying power. Viſion is alſo more diſtinct in theſe *teleſcopes*, owing, perhaps, in part, to there being no intermediate image between the eye and the object. Beſides, the eye-glaſs being very thin in the centre, the rays will be leſs liable to be diſtorted by irregularities in the ſubſtance of the glaſs. Whatever be the cauſe, we can ſometimes ſee Jupiter's ſatellites very clearly in a Galilean *teleſcope*, not more than twenty-inches, or two feet long, when one of four or five feet, of the common ſort, will hardly make them viſible.

From what has been above delivered, it appears, 1°, As the *aſtronomical teleſcope* exhibits objects inverted; it ſerves commodiouſly enough for obſerving the ſtars (it mattering little, whether they be ſeen erect or inverted); but, for terreſtrial objects, it is much leſs proper, as the inverting frequently prevents their being known.

2. If between the eye-glaſs and its focus G, (*fig.* 125.) be a plain well-poliſhed metal ſpeculum LN, of the length of an inch, and of an oval figure, inclined to the axis under an angle of 45°, the rays EP and MQ will be reflected in ſuch a manner as that concurring in *g*, they make an angle P*g*Q, equal to PGQ; for LPE = *g*PQ = GPQ, and IQP = GQN = *g*QN, and therefore, PQG = PQ*g*, and conſequently PGQ = P*g*Q; and therefore the eye being placed in *g*, will ſee the object of the ſame magnitude as before, only in an erect ſituation. By the addition therefore of ſuch a ſpeculum, the *aſtronomical teleſcope* is rendered fit to obſerve terreſtrial objects.

3. Since the focus of the glaſs convex on both ſides is diſtant from the glaſs itſelf a ſemidiameter, and that of a plano-convex glaſs, a diameter; if the object-glaſs be convex on both ſides, the *teleſcope* will magnify the

ſemidiameter of the object, in the ratio of the ſemidiameter of the eye-glaſs to the ſemidiameter of the object-glaſs; but if the object-glaſs be a plano-convex, in the ratio of the ſemidiameter of the eye-glaſs, to the diameter of the object-glaſs.

4. Wherefore, ſince the ſemidiameter of the eye-glaſs has a greater ratio to the ſemidiameter of the object-glaſs than to its diameter; a *teleſcope* magnifies the ſemidiameter of the object more, if the object-glaſs be a plano-convex than if convex on both ſides.

For the ſame reaſon a *teleſcope* magnifies more when the eye-glaſs is convex on both ſides than when it is plano-convex.

5. The ratio of the ſemidiameter of the eye-glaſs to the diameter or ſemidiameter of the object-glaſs, is the leſs, as the eye-glaſs is a ſegment of a leſs ſphere, and the object-glaſs of a greater. A *teleſcope* therefore magnifies more the diameter of the object, as the object-glaſs is a ſegment of a greater, and the eye-glaſs of a leſſer ſphere. And yet the ratio of the ſemidiameter of the eye-glaſs to the object-glaſs muſt not be too ſmall; if it be, it will not refract rays enough to the eye from each point of the object; nor will it ſeparate thoſe coming from different points ſufficiently; by which means the viſion will be rendered obſcure and confuſed. To this may be added what we have ſhewn, of the ratio of the object-glaſs to the eye-glaſs in the Dutch *teleſcope*.

De Chales obſerves, that an object-lens of $2\frac{1}{4}$ feet will require an eye-glaſs $1\frac{1}{2}$ digit or tenth of a foot; and an object-glaſs of eight or ten feet, an eye-glaſs of four digits; in which he is confirmed by Euſtachio de Divinis.

TELESCOPE, *to ſhorten the aſtronomical*, i. e. to conſtruct a *teleſcope* ſo, as that, though ſhorter than the common one, it ſhall magnify as much.

1. Having provided a drawing-tube, fit in an object-lens E O (*fig.* 126.) which is a ſegment of a moderate ſphere; let the firſt eye-glaſs B D be concave on both ſides, and ſo placed in the tube, as that the focus of the object-glaſs A may be behind it, but nearer to the centre of the concavity G. Then will the image be thrown in Q, ſo as that GA : GI :: AB : QI. Laſtly, fit in another object-glaſs, convex on both ſides, and a ſegment of a leſſer ſphere, ſo as that its focus may be in Q.

This *teleſcope* will magnify the diameter of the object more than if the object-glaſs were to repreſent its image at the ſame diſtance E Q; and conſequently a ſhorter *teleſcope*, conſtructed this way, is equivalent to a longer in the common way. The demonſtration may be ſeen in Wolfius. Elem. Math. vol. iii. p. 245.

Sir Iſaac Newton furniſhes us with another method of contracting the *teleſcope*, in his catoptrical, or reflecting *teleſcope*; the conſtruction whereof ſee hereafter. See *Achromatic* TELESCOPE.

TELESCOPE, *aerial*, a kind of *aſtronomical teleſcope*, the lenſes whereof are uſed without a tube.

In ſtrictneſs, however, the *aerial teleſcope* is rather a particular manner of mounting and managing long *teleſcopes* for celeſtial obſervation in the night-time, whereby the trouble of long unwieldy tubes is ſaved, than a particular kind of *teleſcope*: the contrivance we owe to the noble Huygens.

This invention was ſucceſsfully practiſed by himſelf and others, particularly with us by Dr. Pound and Dr. Bradley, with an object-glaſs 123 feet focal diſtance, and an apparatus belonging to it, made and preſented by Huygens to the Royal Society, and deſcribed in his Aſtroſcopia Compendiaria Tubi Optici Molimine Liberata, printed at the Hague in 1684.

For although ſir Iſaac Newton's reflecting *teleſcopes* are now made in ſuch great perfection, that one of five feet is equivalent to the Huygenian glaſs of 123 feet, yet there is one conſiderable advantage in theſe dioptric *teleſcopes*, which the catoptric ones have not, viz. in applying a micrometer. For the diameters of the pictures of objects in both *teleſcopes* being as their lengths, the ſame micrometer will meaſure the larger image more exactly than the ſmaller, in the proportion of the lengths of the *teleſcopes*.

TELESCOPE, *conſtruction of the aerial*. 1. A tall pole or maſt, A B (*fig.* 127.) nearly of the length of the propoſed tube, is fixed perpendicularly in the ground. Before the pole is erected, one ſide is planed ſmooth, and upon it two rulers or ledges are fixed parallel to each other, an inch and half apart, including a kind of groove or channel between them, reaching from the top almoſt to the bottom. At the top of the pole, over againſt this long channel, is fixed a little pulley A, moveable on its axis, and over it is drawn a cord G *g*, double the length of the pole, and near half an inch thick, returning into itſelf, and furniſhed with a piece of lead H, equal in weight to the lens, and a moveable arm to be ſuſtained thereby.

Then a wooden lath C D, two feet long, is framed ſo as that it may ſlide freely in the channel, and in the middle thereof is affixed a wooden arm E, ſtanding out a foot from the pole, and on its extremity bearing another, F *f*, a foot and half long, fixed to it at right angles, and both of them parallel to the horizon.

2. An object-glaſs is included in a hollow cylinder I K, four inches long; to this cylinder is fixed a ſtaff K L, near an inch thick, and a foot long, which reſts on a braſs ball M, that moves freely in its cup or ſocket underneath; only, on occaſion, the ball and ſocket are fixed by a ſcrew. That the lens, thus equally balanced, may be moved with a ſmall force, a weight N of about a pound, is ſuſpended by a ſtrong wire N F, by bending of which the common centre of gravity of the weight and the lens, is eaſily made to coincide with that of the ball. To the ſtaff K L, is fixed a braſs ſtyle L, which is bent downwards, till its point be as much below the centre of the ſtaff as the centre of the ball is. To the point is tied a fine ſilken thread, L V, which of conſequence will be parallel to the ſtaff K L.

3. An eye-glaſs O, is included in a ſhort cylinder, and the ſtaff P V is fixed to the ſame. To this is hung a little weight S, ſufficient to make a balance. In Q is fixed a handle R, which carries a tranſverſe axis to be held in the obſerver's hand; and the ſtaff P V, directed toward the object-glaſs, is tied to the thread L V. The thread paſſed through a hole V, is wound about a little peg T, fixed in the middle of the ſtaff, by the turning whereof the thread is ſhortened or lengthened at pleaſure.

4. That the obſerver may be able to hold the eye-glaſs ſteady, he has a fulcrum or prop under his arm, the ſtructure whereof appears from inſpection of the figure. Laſtly, to keep off the feeble light flowing from the air upon the eye, it is conveniently covered with a circle Y, perforated in the middle, fitted on to a moveable and flexible arm.

In order to find a ſtar in the *teleſcope*, when the nights are dark, a lanthorn is uſed, which collects the light into a ſtream either by tranſmiſſion through a convex lens, or by reflection from a concave ſpeculum. For by directing this ſtream of light till it falls upon the object-glaſs, and makes it viſible, it is eaſy for the obſerver to change his place, till he finds the ſtar is covered by the middle of the object, and then to apply his eye-glaſs, which is ſooner done than with a *teleſcope* conſiſting of a long tube. By moonlight the object-glaſs is viſible without the help of the lanthorn.

M. de la Hire has contrived a little machine for managing the object-glaſs, which he has deſcribed Mem. de l'Acad. 1715. See Smith's Optics, book iii. chap. 10.

Hartſocker, who made *teleſcopes* of a very conſiderable focal length, contrived a method of uſing them without a tube, by fixing them at the top of a tree, a high wall, or the roof of a houſe. Miſcel. Berol. vol. i. p. 261.

Huygens's great *teleſcope*, wherewith Saturn's true face, and one of his ſatellites, were firſt diſcovered, conſiſts of an object-glaſs of 12 feet, and an eye-glaſs of little more than three inches; though he frequently uſed a *teleſcope* of 23 feet long, with two eye-glaſſes joined together, each in diameter $1\frac{1}{2}$ inch; ſo that the two were equal to one of the three inches.

The ſame author obſerves, that an object-glaſs of 30 feet requires an eye glaſs of $3\frac{3}{10}$ inches; and give us a table of proportions for the conſtructing of *aſtronomical teleſcopes*, an abridgment whereof we ſhall here give the reader.

Diſt. of Foc. of Obj. Glaſs.	Diam. of Apert.	Diſt. of F. of E. Glaſs.	Magn. Diam. or Power.	Diſt. of Foc of Obj. Glaſs.	Diam. of Apert.	Diſt. of F. of E. Glaſs	Magn. Diam. or Power.
Rhinland Feet.	Inch & Dec.	Inch. & Dec.		Rhinland Feet.	Inch. & Dec.	Inch. & Dec	
1	0.55	0.61	20	70	4.58	5.04	166
2	0.77	0.85	28	80	4.90	5.39	178
3	0.95	1.05	34	90	5.20	5.72	189
4	1.09	1.20	40	100	5.48	6.03	200
5	1.23	1.35	44	120	6.00	6.60	218
6	1.34	1.47	49	140	6.48	7.12	235
7	1.45	1.60	53	160	6.93	7.62	252
8	1.55	1.71	56	180	7.35	8.09	267
9	1.64	1.80	60	200	7.75	8.53	281
10	1.73	1.90	63	220	8.12	8.63	295
15	2.12	2.33	77	240	8.48	8.83	308
20	2.45	2.70	89	260	8.83	9.71	321
25	2.74	3.01	100	280	9.16	10.08	333
30	3.00	3.30	109	300	9.49	10.44	345
40	3.46	3.81	120	400	10.95	12.05	400
50	3.87	4.26	141	500	12.25	13.47	445
60	4.24	4.66	154	600	13.42	14.76	488

Dr. Smith (Rem. p. 78.) obſerves, that the magnifying powers of this table are not ſo great as Huygens himſelf intended, or as the beſt object-glaſſes now made will admit of. For the author (in his Aſtroſcopia Compendiaria) mentions an object-glaſs of 34 feet focal diſtance, which, in aſtronomical obſervations, bore an eye-glaſs of $2\frac{1}{2}$ inches focal diſtance, and conſequently magnified 163 times. According to this ſtandard, a *teleſcope* of 35 feet ought to magnify 166 times, and of one foot 28 times; whereas the table allows but 118 times to the former, and but 20 to the latter. Now $\frac{166}{118}$ or $\frac{28}{20} = 1.4$; by which if you multiply the numbers in the given column of magnifying powers, you will gain a new column, ſhewing how much thoſe object glaſſes ought to magnify if wrought up to the perfection of this ſtandard.

The new apertures and eye-glaſſes muſt alſo be taken in the ſame proportions to one another as the old ones have in the table; or the eye-glaſſes may be found by dividing the length of each *teleſcope* by its magnifying power. And thus a new table may be eaſily made for this or any other more perfect ſtandard when offered.

The rule for computing this table depends on the following theorem, viz. that in refracting *teleſcopes* of various lengths, a given object will appear equally bright and equally diſtinct, when their linear apertures and focal diſtances of their eye-glaſſes are ſeverally in a ſubduplicate ratio of their lengths or focal diſtances of their object-glaſſes; and then alſo their linear amplifications will be in a ſubduplicate ratio of their lengths.

The rule is as follows: multiply the number of feet in the focal diſtance of any propoſed object-glaſs by 3000, and the ſquare root of the product will give the breadth of its aperture in hundredth parts of an inch. And the ſame breadth of the aperture, increaſed by a tenth part of itſelf, gives the focal diſtance of the eye-glaſs in hundredth parts of an inch. And the magnifying powers are as the breadths of the apertures.

Huygens's ſtandard *teleſcope* was 30 feet long, and bears an aperture whoſe breadth is 3 inches, and an eye-glaſs whoſe focal diſtance is $3\frac{3}{10}$ inches. Conſequently, ſince the ſtandard *teleſcope* has 30 feet focal diſtance of its object-glaſs, put F for the number of feet in any other focal diſtance, and ſay by the theorem, as $\sqrt{30}$ to $\sqrt{F}$, ſo is the ſtandard aperture 3 inches, or 300 centeſimals, or $\sqrt{300 \times 300}$, to the aperture ſought; which, therefore, is $\sqrt{3000F}$ in centeſimals of an inch. The focal diſtance of the eye-glaſs of the ſtandard *teleſcope* is $3\frac{3}{10}$ inches, i. e. a tenth part more than the breadth of the aperture of the object-glaſs; conſequently the focal diſtance of the new eye-glaſs muſt be a tenth part more than the linear aperture of the new object-glaſs.

N. B. The Rhindland foot is to the Engliſh foot as 139 to 135; ſo that taking the lengths of the refracting *teleſcopes* of as many Engliſh feet, their apertures and eye-glaſſes, and linear amplifications ſhould be ſeverally diminiſhed in the ſubduplicate ratio of 139 to 135, i. e. nearly in the ratio of 139 to 137, or about $\frac{1}{69}$ or $\frac{1}{70}$th part of the whole. See APERTURE.

If in two or more *teleſcopes*, the ratio between the object and eye-glaſs be the ſame, the object will be magnified the ſame in both.

Hence ſome may conclude the making of large *teleſcopes* a needleſs trouble. But it muſt be remembered, as we have already laid down, that an eye-glaſs may be in a leſs ratio to a greater object-glaſs than to a ſmaller: thus, e. gr. in Huygens's *teleſcope* of 25 feet, the eye-glaſs is three inches. Now, keeping this proportion in a *teleſcope* of 50 feet, the eye-glaſs ſhould be ſix inches; but the table ſhews $4\frac{1}{2}$ are ſufficient. Hence, from the ſame table it appears, that a *teleſcope* of 50 feet magnifies in the ratio of 1 : 141; whereas that of 25 feet only magnifies in the ratio of 1 : 100.

Since the diſtance of the lenſes is equal to the aggregate of the diſtance of the foci of the object and eye-glaſſes; and the focus of a glaſs convex on each ſide is a ſemidiameter's diſtance, and that of a plano-convex, a diameter's diſtance from the lens; the length of a *teleſcope* is equal to the aggregate of the ſemidiameters of the lenſes; if the object-glaſs be convex on both ſides; and to the ſum of the ſemidiameter of the eye-glaſs, and of the diameter of the object-glaſs, if the object-glaſs be a plano-convex.

But as the ſemidiameter of the eye-glaſs is very ſmall, in reſpect of that of the object-glaſs, the length of the *teleſcope* is uſually eſtimated from the diſtance of the object-glaſs; i. e. from its ſemidiameter, if it be convex on both ſides, or its diameter if plano-convex. Thus a *teleſcope* is ſaid to be 12 feet, if the ſemidiameter of the object-glaſs, convex on both ſides, be 12 feet, &c.

Since myopes ſee near objects beſt; for them the eye-glaſs is to be removed nearer to the object-glaſs, that the rays refracted through it may be the more diverging.

To take in the larger field at one view, ſome uſe two eye-glaſſes, the foremoſt whereof is a ſegment of a larger ſphere than that behind; to this it muſt be added, that if two lenſes be joined immediately together, ſo as one touch the other, the focus is removed to double the diſtance which that of one of them would be at.

Land TELESCOPE, or *Day* TELESCOPE, a *teleſcope* conſiſting of more than two lenſes, commonly of a convex object-glaſs, and three convex eye-glaſſes; or a *teleſcope* that exhibits objects erect, yet different from that of Galileo.

It has its name from its being uſed to view objects in the day-time, on or about the earth.

In this *teleſcope*, after the rays have paſſed the firſt eye-glaſs, H I (*fig.* 128.) as in the former conſtruction, inſtead of being there received by the eye, they paſs on to another equally convex lens, ſituated at twice its focal diſtance from the other, ſo that the rays of each pencil, being parallel in that whole interval, thoſe pencils croſs one another in the common focus, and the rays conſtituting them are tranſmitted parallel to the ſecond eye-glaſs L M; after which the rays of each pencil converge to other foci at N O, where a ſecond image of the object is formed, but inverted with reſpect to the former image in E F. This image, then, being viewed by a third eye-glaſs, Q R, is painted upon the retina at XZY, exactly as before, only in a contrary poſition: for the pencil that iſſues from A, after coming to a focus in F and N, forms the image of that point at laſt at Y, in the ſame poſition as it would have done without the intervention of any lens at all. For this conſtruction we are indebted to father Rheita.

To conſtruct a Land or Day TELESCOPE. A tube being provided, fit in at one end an object-glaſs, which is either convex on both ſides, or plano-convex, and a ſegment of a large ſphere; to this add three eye-glaſſes, all convex on both ſides, and ſegments of equal ſpheres; diſpoſing them in ſuch manner as that the diſtance of any two may be the aggregate of the diſtances of their foci.

Theory of a Land TELESCOPE. Then will an eye applied to the laſt lens, at the diſtance of its focus, ſee objects very diſtinctly, erect, and magnified in the ratio of the diſtance of the focus of one eye-glaſs L K (*fig.* 129.) to the diſtance of the focus of the object-glaſs A B.

For, 1. The rays, from what has been already ſaid, falling on the object parallel, the image of the object will be repreſented invertedly at the diſtance of the principal focus; wherefore, ſince this image is in the focus of the firſt eye-glaſs, the rays, after a ſecond refraction, will become parallel; and thus falling on the third lens, after a third refraction, they exhibit the inverted image invertedly, that is, an erect image of the object.

Since then this image is in the focus of the third eye-glaſs, the rays, after a fourth refraction, will become parallel; and in this diſpoſition the eye will receive them, and conſequently there will be diſtinct viſion, and the object will appear erect.

2. If $IQ = IK$, that is, equal to the diſtance of the focus of the object-glaſs, an eye placed in M will ſee the ſemidiameter of the object increaſed in the ratio of L M to K I; but the ray A Q, proceeding from the focus Q of the object-lens A B, after refraction, becomes parallel to the axis I L; conſequently the firſt eye-lens C D joins it to the axis in M, the diſtance of a ſemidiameter. And ſince the focus of the ſecond eye-glaſs E F is alſo in M, the ray F H, after refraction, will be parallel to the axis N O; and therefore the third eye-glaſs will join it at the axis in P; but the ſemidiameters of the lenſes G H and C D are ſuppoſed equal; therefore $PO = LM$. Wherefore, ſince the right angles at O and L are equal, as alſo $HO = CL$, the angle O P H is equal to C M L. The ſemidiameter of the object therefore appears the ſame in P as in M, and is conſequently magnified in the ratio of L M, or P O to K I.

Hence, 1°, An *aſtronomical teleſcope* is eaſily converted into a *land teleſcope*, by uſing three eye-glaſſes for one; and the *land teleſcope*, on the contrary, into an *aſtronomical* one, by taking away two eye-glaſſes, the faculty of magnifying ſtill remaining the ſame.

2°, Since the diſtance of the eye-glaſſes is very ſmall, the length of the *teleſcope* is much the ſame as if you only uſed one.

3°, From the conſtruction, it is evident, that the length of the *teleſcope* is found by adding five times the ſemidiameter of the eye-glaſſes to the diameter of the object-glaſs, if a plano convex; or to its ſemidiameter, if convex on both ſides.

Huygens firſt obſerved, both in the *aſtronomical* and *land teleſcope*, that it contributes conſiderably to the perfection of the inſtrument, to have a ring of wood or metal, with an aperture, a little leſs than the breadth of the eye-glaſs, fixed in the place where the image is found to radiate upon the lens next the eye: by means hereof the colours, which are apt to diſturb the clearneſs and diſtinctneſs of the object, are prevented, and the whole compaſs taken in at a view, perfectly defined.

We may here obſerve, in general, concerning viſion through glaſſes, that the apparent diſtinctneſs, or confuſion, of an object depends upon the mutual inclination of the rays in any one pencil to each other, when they fall upon the eye; the apparent magnitude depends upon the real ſituation of the extreme pencils; and laſtly the apparent brightneſs, or obſcurity, depends upon the quantity of rays in every pencil.

Some make *land teleſcopes* of three lenſes, which yet repreſent objects erect and magnified as much as the former. But ſuch *teleſcopes* are ſubject to very great inconveniences, both as the objects herein are tinged with falſe colours, and as they are diſtorted about the margin.

Some, again, uſe five lenſes, and even more; but ſince ſome part of the rays is intercepted by paſſing every lens, objects are hereby exhibited dim and feeble.

Teleſcopes of this kind, longer than twenty feet, will be of hardly any uſe in obſerving terreſtrial objects, on account of the continual motion of the particles of air, which by theſe long and magnifying *teleſcopes* become viſible, and give a tremulous motion to the objects themſelves.

The length of dioptric *teleſcopes*, adapted to any important aſtronomical purpoſe, rendered them extremely inconvenient for uſe; as it was neceſſary to increaſe their length in no leſs a proportion than the duplicate of the increaſe of their magnifying power: ſo that, in order to magnify twice as much as before, with the ſame light and diſtinctneſs, the *teleſcope* required to be lengthened four times, and to magnify thrice as much, nine times, and ſo on. This unwieldineſs of refracting *teleſcopes*, poſſeſſing any conſiderable magnifying power, was one cauſe why the attention of aſtronomers, &c. was directed to the diſcovery and conſtruction of *reflecting teleſcopes*. And, indeed, a refracting *teleſcope*, even of a thouſand feet focus, ſuppoſing it poſſible to make uſe of ſuch an inſtrument, could not be made to magnify with diſtinctneſs more than one thouſand times; whereas a reflecting *teleſcope*, not exceeding nine or ten feet, will magnify twelve hundred times. The perfection of refracting *teleſcopes*, it is well known, is very much limited by the aberration of the rays of light from the geometrical focus: and this ariſes from two different cauſes; that is, from the different degrees of the refrangibility of light, and from the figure of the ſphere, which is not of a proper curvature for collecting the rays in a ſingle point. Till the time of ſir Iſaac Newton, no optician had imagined that the object-glaſſes of *teleſcopes* were ſubject to any other error beſides that which aroſe from their ſpherical figure, and, therefore, all their efforts were directed to the conſtruction of them, with other kinds of curvature: but Newton had no ſooner demonſtrated the different REFRANGIBILITY of the rays of light, than he diſcovered in this circumſtance a new and a much more conſiderable cauſe of error in *teleſcopes*. Since, therefore, the pencils of each kind of light have their foci in different places, ſome nearer, and ſome farther from the lens, it is evident that the whole beam cannot be brought into any one point, but that it will be drawn the neareſt to a point in the middle place between the focus of the moſt and leaſt refrangible rays, ſo that the focus will be a circular ſpace of a conſiderable diameter. Thus, let a beam of light (*fig.* 130.) paſs through a lens, and the moſt refrangible of the rays have their focus at F, and the leaſt refrangible at *f*. From the figure it is evident, that the ſmalleſt ſpace into which the light can be drawn is a circle, the diameter of which is *i* I, paſſing through G the middle point between F and *f*.

Newton ſhews that this ſpace is about the fifty fifth part of the aperture of the *teleſcope*, and that the focus of the moſt refrangible rays is nearer to the object-glaſs than the focus of the leaſt refrangible ones, by about the 27½ part of the diſtance between the object-glaſs, and the focus of the mean refrangible rays. But he ſays, that if the rays flow from a lucid point, as far from the lens on one ſide as their foci are on the other, the focus of the moſt refrangible rays will be nearer to the lens than that of the leaſt refrangible, by more than the fourteenth part of the whole diſtance. Hence, he concludes, that if all the rays of light were equally refrangible, the error in *teleſcopes*, ariſing from the ſpherical figure of the glaſs, would be many hundred times leſs than it now is; becauſe the error ariſing from the ſpherical figure of the glaſs, is to that ariſing from the different refrangibility of the rays of light as 1 to 5449. See ABERRATION.

Upon the whole he obſerves, that it is a wonder that *teleſcopes* repreſent objects ſo diſtinctly as they do. The reaſon of which is, that the diſperſed rays are not ſcattered uniformly over all the circular ſpace mentioned above, but are infinitely more denſe in the centre than in any other part of the circle; and that, in the way from the centre into the circumference, they grow continually rarer and rarer, and at their circumference are infinitely rare; ſo that theſe diſperſed rays are not copious enough to be viſible except in the centre of the circle, or very near it.

If we ſuppoſe the little circle of aberrations ariſing from unequal refrangibility to be two hundred and fifty times narrower than the circular aperture of the object-glaſs, it would contain all the orange and yellow, which are the moſt luminous of the priſmatic colours, and permit the other fainter and darker colours to paſs by it, which perhaps ſcarce affect the ſenſe; and yet, even in this caſe, the aberration cauſed by the ſpherical figure, would be to the aberration cauſed by the unequal refrangibility, in a one hundred feet *teleſcope*, with an aperture of four inches, only as one to twelve hundred; which, however, ſufficiently ſhews, that it is not the ſpherical figure of the glaſſes, but the different refrangibility of the rays of light, which hinders the perfection of *teleſcopes*. He alſo mentions another argument to prove, that the different refrangibility of the rays of light is the true cauſe of the imperfection of *teleſcopes*. For the diſperſions of the rays ariſing from the ſpherical figures of object-glaſſes are as the cubes of their apertures; and therefore, to make *teleſcopes* of various lengths magnify with equal diſtinctneſs, the apertures of the object-glaſſes, and the charges or magnifying powers, ought to be as the cubes of the ſquare roots of their lengths, which doth not anſwer to experience. But the errors of the rays ariſing from the different refrangibility are as the apertures of the object-glaſſes, and thence to make *teleſcopes* of various lengths to magnify, with equal diſtinctneſs, their apertures and charges ought to be as the ſquare roots of their lengths; and this anſwers to experience. For a *teleſcope* of ſixty-four feet in length, with an aperture of two inches and two thirds, magnifies about one hundred and twenty times, with as much diſtinctneſs as one of a foot in length, with one third of an inch aperture, magnifies fifteen times.

If it were not for this different refrangibility of the rays, *teleſcopes* might be brought to a ſufficient perfection, by compoſing the object-glaſs of two glaſſes, with water between them. For by this means the refractions on the concave ſides of the glaſſes will very much correct the errors of the refractions on the convex ſide, ſo far as they ariſe from their ſpherical figure: but on account of the different refrangibility of different kinds of rays, Newton did not ſee any other means of improving *teleſcopes* by refraction only, except by increaſing their length. Newton's Optics, p. 73, 83, 89. ed. 3.

This important deſideratum in the conſtruction of dioptic *teleſcopes*, has been ſince diſcovered by the ingenious Mr. Dollond; of which we ſhall give an account in the next article.

TELESCOPE, *achromatic*, is a name given to the refracting *teleſcope* invented by Mr. Dollond, and ſo contrived as to remedy the aberration ariſing from colours, or the different refrangibility of the rays of light. See ACHROMATIC.

The principles of Mr. Dollond's diſcovery and conſtruction have been already explained under the article ABERRATION: the improvement made by Mr. Dollond in his *teleſcopes*, by making two object glaſſes of crown-glaſs, and one of flint, which was tried with ſucceſs when concave eye-glaſſes were uſed, was completed by his ſon, Mr. Peter Dollond; who, conceiving that the ſame method might be practiſed with ſucceſs when convex eye-glaſſes were uſed, found, after a few trials, that it might be done. Accordingly, he finiſhed an object-glaſs of five feet focal length, with an aperture of three inches and three fourths, compoſed of two convex lenſes of crown-glaſs, and one concave of white flint glaſs. Afterwards, apprehending that the apertures might be admitted ſtill larger, he completed one of three feet and a half focal length, with the ſame aperture of three inches and three fourths. Phil. Tranſ. vol. lv. p. 56.

But beſides the obligation we are under to Mr. Dollond, for correcting the aberration of the rays of light in the focus of object-glaſſes, ariſing from their different refrangibility, he made another conſiderable improvement in *teleſcopes*, viz. by correcting, in a great meaſure, both this kind of aberration, and alſo that which ariſes from the ſpherical form of lenſes, by an expedient of a very different nature, viz. increaſing the number of eye-glaſſes. If any perſon, ſays he, would have the viſual angle of a *teleſcope* to contain twenty degrees, the extreme pencils of the field muſt be bent or refracted in an angle of ten degrees; which, if it be performed by one eye-glaſs, will cauſe an aberration from the figure, in proportion to the cube of that angle: but if two glaſſes are ſo proportioned and ſituated, as that the refraction may be equally divided between them, they will each of them produce a refraction equal to half the required angle; and therefore, the aberration being in proportion to the cube of half the angle taken twice over, will be but a fourth part of that which is in proportion to the cube of the whole angle; becauſe twice the cube of one is but one fourth of the cube of two: ſo the aberration from the figure, where two eye-glaſſes are rightly proportioned, is but a fourth of what it muſt unavoidably be, where the whole is performed by a ſingle eye-glaſs. By the ſame way of reaſoning, when the refraction is divided between three glaſſes, the aberration will be found to be but the ninth part of what would be produced from a ſingle glaſs; becauſe three times the cube of one, is but one ninth of the cube of three. Whence it appears, that by increaſing the number of eye-glaſſes, the indiſtinctneſs, which is obſerved near the borders of the field of a *teleſcope*, may be very much diminiſhed, though not entirely taken away.

The method of correcting the errors ariſing from the different refrangibility of light is of a different conſideration from the former: for, whereas the errors from the figure can only be diminiſhed in a certain proportion to the number of glaſſes, in this they may be entirely corrected, by the addition of only one glaſs; as we find in the aſtronomical *teleſcope*, that two eye-glaſſes, rightly proportioned, will cauſe the edges of objects to appear free from colours quite to the borders of the field. Alſo, in the day-*teleſcope*, where no more than two eye-glaſſes are abſolutely neceſſary for erecting the object, we find, by the addition of a third, rightly ſituated, that the colours, which would otherwiſe confuſe the image, are entirely removed: but this muſt be underſtood with ſome limitation; for though the different colours, which the extreme pencils muſt neceſſarily be divided into by the edges of the eye-glaſſes, may in this manner be brought to the eye in a direction parallel to each other, ſo as, by the humours thereof, to be converged to a point in the retina, yet if the glaſſes exceed a certain length, the colours may be ſpread too wide to be capable of being admitted through the pupil or aperture of the eye; which is the reaſon that, in long *teleſcopes*, conſtructed in the common manner, with three eye-glaſſes, the field is always very much contracted.

Theſe conſiderations firſt ſet Mr. Dollond on contriving how to enlarge the field by increaſing the number of eye-glaſſes, without any hindrance to the diſtinctneſs or brightneſs of the image: and though others had been about the ſame work before, yet obſerving, that the five-glaſs *teleſcopes*, ſold in the ſhops, would admit of farther improvement, he endeavoured to conſtruct one with the ſame number of glaſſes in a better manner; which ſo far anſwered his expectations, as to be allowed by the beſt judges to be a conſiderable improvement on the former. Encouraged by this ſucceſs, he reſolved to try if he could not make ſome farther enlargement of the field, by the addition of another glaſs, and by placing and proportioning the glaſſes in ſuch a manner as to correct the aberrations as much as poſſible, without any detriment to the diſtinctneſs: and at laſt he obtained as large a field as is convenient or neceſſary, and that even in the longeſt *teleſcopes* that can be made. Theſe *teleſcopes*, with ſix glaſſes, having been well received both at home and abroad, the author has ſettled the date of the invention in a letter addreſſed to Mr. Short, and read in the Royal Society, March 1, 1753. Phil. Tranſ. vol. xlviii. art. 14.

Of the *achromatic teleſcopes*, invented by Mr. Dollond, there are ſeveral different ſizes, from one foot to eight feet in length, made and ſold by his ſons, Meſſrs. P. and J. Dollond. In the ſeventeen inch approved *achromatic teleſcope*, the object-glaſs is compoſed of three glaſſes, viz. two convex of crown-glaſs, and one concave of white flint-glaſs: the focal diſtance of this combined object-glaſs is about ſeventeen inches, and the diameter of the aperture two inches. There are four eye-glaſſes contained in the tube, to be uſed for land-objects; the magnifying power with theſe is near fifty times; and they are adjuſted to different ſights, and to different diſtances of the object, by turning a finger ſcrew at the end of the outer tube. There is another tube, containing two eye-glaſſes that magnify about ſeventy times, for aſtronomical purpoſes. The *teleſcope* may be directed to any object by turning two ſcrews in the ſtand on which it is fixed, one giving a vertical, and the other an horizontal motion. The ſtand may be encloſed in the inſide of the braſs tube.

The object-glaſs of the two feet and a half and three feet and a half *teleſcopes* is compoſed of two glaſſes, one convex of crown-glaſs, and the other concave of white flint-glaſs. The diameter of the aperture of the leaſt is two inches, and that of the other two inches and three fourths. Each of them is furniſhed with two tubes; one for land objects, containing four eye-glaſſes, and another with two eye-glaſſes for aſtronomical uſes. They are adjuſted by buttons on the outſide of the wooden tube; and the vertical and horizontal motions are given by joints in the ſtands. The magnifying power of the leaſt of theſe *teleſcopes*, with the eye-glaſſes for land objects, is near fifty times, and with thoſe for aſtronomical purpoſes eighty times; and that of the greateſt for land objects is near ſeventy times, and for aſtronomical obſervations eighty and one hundred and thirty times; for this has two tubes, either of which may be uſed as occaſion requires. This *teleſcope* is alſo moved by a ſcrew and rack-work, and the ſcrew is turned by means of a Hooke's JOINT.

Theſe opticians alſo conſtruct an achromatic pocket perſpective-glaſs, or Galilean *teleſcope*, ſo contrived that all the different parts are put together, and contained in one piece, four inches and a half in length. This ſmall *teleſcope* is furniſhed with four concave eye-glaſſes, the magnifying powers of which are 6, 12, 18, and 28 times. With the greateſt power of this *teleſcope*, the ſatellites of Jupiter and the ring of Saturn may be eaſily ſeen. They have alſo contrived an achromatic *teleſcope*, the ſliding tubes of which are made of very thin braſs, which paſs through ſprings or tubes; the outſide tube being either of mahogany or braſs. Theſe *teleſcopes*, which from their aptitude for gentlemen in the army are called *military teleſcopes*, have four convex eye-glaſſes, whoſe ſurfaces and focal lengths are ſo proportioned as to render the field of view very large. They are of four different lengths and ſizes, uſually called one foot, two, three, and four feet: the firſt are fourteen inches when in uſe, and five inches when ſhut up, having the aperture of the object-glaſs one inch and a tenth, and magnifying twenty-two times: the ſecond twenty-eight inches for uſe, nine inches ſhut up, the aperture one inch and ſix tenths, and magnifying thirty-five times; the third forty inches, and ten inches, with the aperture two inches, and magnifying forty-five times; and the fourth fifty-two inches, and fourteen inches, with the aperture 2.75 inches, and magnifying fifty-five times.

Mr. Euler, who, in a memoir of the Academy of Berlin for the year 1757, p. 323, &c. had calculated the effects of all poſſible combinations of lenſes in *teleſcopes* and microſcopes, publiſhed another long memoir on the ſubject of theſe *teleſcopes*, ſhewing with preciſion of what advantages they are naturally capable. See Miſcellanea Taurinenſia, vol. iii. part ii. p. 92.

Mr. Caleb Smith having given much attention to the ſubject of ſhortening and improving *teleſcopes*, thought that he had found it poſſible to rectify the errors which ariſe from the different degrees of refrangibility, on the principle that the ſines of refraction of rays differently refrangible are to one another in a given proportion, when their ſines of incidence are equal; and the method which he propoſed for this purpoſe was to make the ſpecula of glaſs, inſtead of metal, the two ſurfaces having different degrees of concavity. The ſcheme, however, ſeems never to have been executed. For a particular account of it, ſee Phil. Tranſ. N° 456. p. 326. or Abr. vol. viii. part i. p. 113, &c.

Mr. Ramſden has lately deſcribed a new conſtruction of eye-glaſſes for ſuch *teleſcopes* as may be applied to mathematical inſtruments. The conſtruction which he propoſes, is that of two plano convex lenſes, both of them placed between the eye, and the obſerved image formed by the object-glaſs of the inſtrument, and thereby correcting not only the aberration ariſing from the ſpherical figure of the lenſes, but alſo that ariſing from the different refrangibility of light. One plano-convex lens is placed with its plane ſide near the image of an object, formed by the object-glaſs of a *teleſcope*; and the magnified image is thus, from the poſition of the lens, free from colour; but the reſpective foci of a lens ſo placed, being very near each other, and on the ſame ſide, the emergent pencils of light diverge on the eye, and give indiſtinct viſion; this is remedied by placing a ſecond plano-convex lens a little within the focus of the former, the combined foci of the two lenſes being in the place of the image, and the rays are thereby made to fall parallel on the eye to ſhew the object diſtinctly. For a more particular account of this conſtruction, its principle and its effects, ſee Phil. Tranſ. vol. lxxiii. part i. art. 5.

A conſtruction, ſimilar at leaſt in its principle to the preceding, is aſcribed in the Synopſis Optica Honorati Fabri to Euſtachio Divini, who placed two equal narrow plano-convex lenſes, inſtead of one eye-lens, to his *teleſcopes*, which touched at their vertices; the focus of the object-glaſs, and the centre of the plano-convex lens next it coinciding. And this, it is ſaid, was done in order to make the rays that came parallel from the object fall parallel upon the eye, to exclude the colours of the rain-bow from it, to augment the angle of ſight, the field of view, the brightneſs of the object, &c. This was alſo known to Huygens, who ſometimes made uſe of the ſame conſtruction, and gives the theory of it in his Dioptrics. See Hugenii Opera varia, vol. iv. ed. 1728.

TELESCOPE, *reflecting*, or *catoptric*, or *catadioptric*, is a *teleſcope* which, inſtead of lenſes, conſiſts chiefly of mirrors, and exhibits remote objects by reflection inſtead of refraction.

The *reflecting teleſcope* is an inſtrument of ſuch importance and uſe, that it will not be improper to introduce in this place a brief account of the hiſtory of its invention. Mr. James Gregory of Aberdeen has been commonly conſidered as the firſt inventor of this *teleſcope*: but the firſt thought of a reflector ſeems to have been ſuggeſted by Merſennus, about twenty years before the date of Mr. Gregory's invention. A hint to this purpoſe occurs in the ſeventh propoſition of his Catoptrics, which was printed in 1651: and it appears from the twenty-ninth and third letters of Des Cartes, in vol. ii. of his Letters, which are ſaid to have been written in 1639, though they were not publiſhed till the year 1666, that Merſennus propoſed a *teleſcope* with ſpecula to Des Cartes in that correſpondence; though indeed in a manner ſo very unſatisfactory, that Des Cartes who had given particular attention to the improvement of the *teleſcope*, was ſo far from approving the propoſal, that he endeavoured to convince Merſennus of its fallacy. This point has been largely diſcuſſed by M. le Roi in the Encyclopedie, art. *Teleſcope*, and M. Montucla in his Hiſt. des Mathem. tom. ii. p. 643.

Whether Gregory had ſeen the treatiſe of Merſennus on optics and catoptrics, and whether he availed himſelf of the hint ſuggeſted by the author or not, it is impoſſible to determine. He was led, however, to the invention, in ſeeking to correct two imperfections of the common *teleſcope*: the firſt was its too great length, which made it leſs manageable; and the ſecond the incorrectneſs of the image. It had been already demonſtrated, that a pencil of rays could not be collected in a ſingle point by a ſpherical lens; and alſo, that the image tranſmitted by ſuch a lens would be in ſome degree incurvated. Theſe inconveniences, he apprehended, might be obviated by ſubſtituting for the object-glaſs a metallic ſpeculum, of a parabolic figure, to receive the image and to reflect it towards a ſmall ſpeculum of the ſame metal: this again was to return the image to an eye-glaſs placed behind the great ſpeculum, which, for that purpoſe, was to be perforated in its centre. This conſtruction he publiſhed in 1663, in his Optica Promota. But as Gregory, according to his own account, poſſeſſed no mechanical ſkill, and could find no workman capable of realizing his invention, after ſome fruitleſs trials, he was obliged to give up the thoughts of bringing *teleſcopes* of this kind into uſe. Sir Iſaac Newton, however, interpoſed to prevent this excellent invention from periſhing, and to bring it forward to maturity. Having applied himſelf to the improvement of the *teleſcope*, and imagining that Gregory's ſpecula were neither very neceſſary, nor likely to be executed, he began with proſecuting the views of Des Cartes; who aimed at making a more perfect image of an object, by grinding lenſes, not to the figure of a ſphere, but to that of one of the conic ſections. But, in the year 1666, having diſcovered the different refrangibility of the rays of light, and finding that the errors of *teleſcopes*, ariſing from that cauſe alone, were much more conſiderable than ſuch as were occaſioned by the ſpherical figure of lenſes (ſee the preceding article), he was conſtrained to turn his thoughts to reflectors. The plague, however, interrupted his progreſs in this buſineſs; ſo that it was towards the end of 1668, or in the beginning of 1669, when deſpairing of perfecting *teleſcopes* by means of refracted light, and recurring to the conſtruction of reflectors, he ſet about making his own ſpecula, and early in the year 1672 completed two ſmall reflecting *teleſcopes*. In theſe he ground the great ſpeculum into a ſpherical concave, being unable to accompliſh the parabolic form propoſed by Gregory; but though he then deſpaired of performing that work by geometrical rules, yet (as he writes in a letter that accompanied one of theſe inſtruments, which he preſented to the Royal Society) he doubted not but that the thing might in ſome meaſure be accompliſhed by mechanical devices. With a perſeverance equal to his ingenuity, he, in a great meaſure, overcame another difficulty, which was to find a metallic ſubſtance that would be of a proper hardneſs, have the feweſt pores, and receive the ſmootheſt poliſh: this difficulty he deemed almoſt inſurmountable, when he conſidered that every irregularity in a reflecting ſurface would make the rays of light deviate five or ſix times more out of their due courſe than the like irregularities in a refracting ſurface. After repeated trials he at laſt found a compoſition that anſwered in ſome degree, and left it to thoſe who ſhould come after him to find a better. Theſe difficulties have been lately obviated by Mr. Mudge, who was honoured with ſir Godfrey Copley's medal from the Royal Society, for the paper communicated to the Society, containing directions for making the beſt compoſition for the metals of *reflecting teleſcopes*, together with a deſcription of the proceſs for grinding, poliſhing, and giving the great ſpeculum the true parabolic form. See GRINDING and SPECULUM.

Sir Iſaac Newton, having ſucceeded ſo far, communicated to the Royal Society a full and ſatisfactory account of the conſtruction and performance of his *teleſcope* The Society, by their ſecretary Mr. Oldenburgh, tranſmitted an account of the diſcovery to Mr. Huygens, celebrated as a diſtinguiſhed improver of the refractor; who not only replied to the Society in terms expreſſing his high approbation of the invention, but drew up a favourable account of the new *teleſcope*, which he cauſed to be publiſhed in the Journal des Sçavans of the year 1672, and by this mode of communication it was ſoon known over Europe. See Hugenii Opera varia, tom. iv.

Notwithſtanding the excellence and utility of this contrivance, and the honourable manner in which it was announced to the world, it ſeems to have been greatly neglected for near half a century. Indeed, when Newton had publiſhed an account of his *teleſcopes* in the Philoſophical Tranſactions, M. Caſſegrain, a Frenchman, in the Journal des Sçavans of 1672, claimed the honour of a ſimilar invention, and ſaid, that before he heard of Newton's improvement, he had hit upon a better conſtruction, by uſing a ſmall convex mirror inſtead of the reflecting priſm. This *teleſcope* which was the Gregorian *teleſcope* diſguiſed, the large mirror being perforated, and which, it is ſaid, was never executed by the author, is much ſhorter than the Newtonian; and the convex mirror, by diſperſing the rays, ſerves greatly to enlarge the image made by the large concave mirror. Newton made many objections to Caſſegrain's conſtruction, but ſeveral of them equally affect that of Gregory, which has been found to anſwer remarkably well in the hands of good artiſts.

Dr. Smith took the pains to make many calculations of the magnifying power both of Newton's and Caſſegrain's *teleſcopes*, in order to their farther improvement, which may be ſeen in his Optics, Rem. p. 79, &c.

Mr. Short is alſo ſaid to have made ſeveral *teleſcopes* on the plan of M. Caſſegrain's.

Dr. Hooke conſtructed a reflecting *teleſcope* (mentioned by Dr. Birch in Hiſt. of R. S. vol. iii. p. 122.) in which the great mirror was perforated, ſo that the ſpectator looked directly towards the object, and it was produced before the Royal Society in 1674. On this occaſion it was ſaid that this conſtruction was firſt propoſed by Merſennus, and afterwards repeated by Gregory, but was thought never to have been actually executed before it was done by Dr. Hooke. A deſcription of this inſtrument may be ſeen in Hooke's Experiments by Derham, p. 269.

The Society alſo made an unſucceſsful attempt, by employing an artificer to imitate the Newtonian conſtruction; however, about half a century after the invention of Newton, a reflecting *teleſcope* was produced to the world, of the Newtonian conſtruction, which the venerable author, ere yet he had finiſhed his much diſtinguiſhed courſe, had the ſatisfaction to find executed in ſuch a manner, as left no room to fear that the invention would longer continue in obſcurity. This effectual ſervice to ſcience was accompliſhed by John Hadley, eſq. who, in the year 1723, preſented to the Royal Society a *teleſcope*, which he had conſtructed upon Newton's plan. The two *teleſcopes* which Newton had made were but ſix inches long, were held in the hand for viewing objects, and in power were compared to a ſix feet refractor. But the radius of the ſphere to which the principal ſpeculum of Hadley's was ground was ten feet five inches and one-fourth, and conſequently its focal length was ſixty-two inches and five eighths. In the Phil. Tranſ. Abr. vol. vi. p. 133, &c. may be ſeen a drawing and deſcription of this *teleſcope*, and alſo of a very ingenious, but complex apparatus by which it was managed. One of theſe *teleſcopes*, in which the focal length of the large mirror was not quite five feet one fourth, was compared with the famous Huygenian *teleſcope*, the focal length of whoſe object-glaſs is one hundred and twenty-three feet; and it was found, that the former would bear ſuch a charge, as to make it magnify the object as many times as the latter with its due charge; and that it repreſented objects as diſtinctly, though not altogether ſo clear and bright. With this reflecting *teleſcope* might be ſeen whatever had been hitherto diſcovered by the Huygenian, particularly the tranſits of Jupiter's ſatellites, and their ſhades over the diſk of Jupiter, the black liſt in Saturn's ring, and the edge of the ſhade of Saturn caſt on his ring. The five ſatellites of Saturn were alſo obſerved with this *teleſcope*, and it alſo afforded other obſervations on Jupiter and Saturn, which confirmed the good opinion which Mr. Pound and Dr. Bradley had conceived of it.

Mr. Hadley, after finiſhing two *teleſcopes* of the Newtonian conſtruction, applied himſelf to make them in the Gregorian form, in which the large mirror is perforated. This ſcheme he completed in the year 1726.

Dr. Smith prefers the Newtonian conſtruction to that of Gregory; but if long experience is allowed to be the final judge in ſuch matters, we muſt adjudge the ſuperiority to the latter; as that is now, and has been for ſeveral years paſt, the only inſtrument of the kind in requeſt.

Mr. Hadley ſpared no pains, after having completed his conſtruction, to inſtruct Mr. Molyneux and Dr. Bradley; and when theſe gentlemen had made a ſufficient proficiency in the art, being deſirous that theſe *teleſcopes* ſhould become more public, they liberally communicated to ſome of the principal inſtrument-makers of London, the knowledge they had acquired from him: and thus, as it is reaſonable to imagine, reflectors were completed by other and better methods than even thoſe in which they had been inſtructed. Mr. James Short, in particular, ſignalized himſelf as early as the year 1734, by his work in this way. He firſt made his ſpecula of glaſs; but finding that the light reflected from the beſt glaſs ſpecula was conſiderably leſs than the light reflected from metallic ones, and that glaſs was very liable to change its form by its own weight, he applied himſelf to improve metallic ſpecula; and, by giving particular attention to the curvature of them, he was able to give them greater apertures than other workmen could do; and by a more accurate adjuſtment of the ſpecula, &c. he very much improved the whole inſtrument. By ſome which he made, in which the larger mirror was fifteen inches focal diſtance, he, and ſome other perſons, were able to read in the Philoſophical Tranſactions at the diſtance of five hundred feet; and they ſeveral times ſaw the five ſatellites of Saturn together, which very much ſurpriſed Mr. Maclaurin, who gave this account of it, till he found that M. Caſſini had ſometimes ſeen them all with a ſeventeen-feet refracting *teleſcope*. Mr. Short's *teleſcopes* were all of the Gregorian conſtruction. Mr. Short is ſuppoſed to have diſcovered a method of giving the parabolic figure to his great ſpeculum; a point of perfection which Gregory and Newton had wiſhed for, but deſpaired of attaining, and which Hadley had never, as far as is known, attempted, either in his Newtonian or Gregorian *teleſcope*. However, the ſecret of working that configuration, whatever it was, as far as it then appeared, died with that ingenious artiſt. But it has lately been diſcovered, as we have already obſerved, by Mr. Mudge. See on the Hiſtory of Reflecting *Teleſcopes*, Dr. Gregory's Elem. of Catoptr. and Dioptr. Appendix by Deſaguliers. Smith's Optics, book iii. c. 2. Rem. on Art. 489, and ſir John Pringle's excellent diſcourſe on the invention, &c. of the Reflecting *Teleſcope* in his ſix diſcourſes publiſhed by Dr. Kippis, 1783. p. 203, &c.

Conſtruction of a reflecting TELESCOPE *of the Newtonian form.* Let ABCD (*fig.* 131.) be a large tube, open at AD and cloſed at BC, and of a length, at leaſt, equal to the diſtance of the focus from the metallic ſpherical concave ſpeculum GH placed at the end BC. The rays EG, FH, &c. proceeding from a remote object PR, interſect one another ſomewhere before they enter the tube, ſo that EG, *eg* are thoſe that come from the lower part of the object, and *fh*, FH from its upper part: theſe rays, after falling on the ſpeculum GH, will be reflected, ſo as to converge and meet in *mn*, where they will form a perfect image of the object. But as this image cannot be ſeen by the ſpectator, they are intercepted by a ſmall plane metallic ſpeculum KK, interſecting the axis at an angle of 45°, by which the rays tending to *m*, *n*, will be reflected towards a hole LL in the ſide of the tube, and the image of the object will thus be formed in *q*S; which image will be leſs diſtinct, becauſe ſome of the rays which would otherwiſe fall on the concave ſpeculum GH, are intercepted by the plane ſpeculum: nevertheleſs it will appear in a conſiderable degree diſtinct, becauſe the aperture AD of the tube, and the ſpeculum GH are large. In the lateral hole LL is fixed a convex lens, whoſe focus is at S*q*; and, therefore, this lens will refract the rays that proceed from any point of the image, ſo at their exit they will be parallel, and thoſe that proceed from the extreme points S, *q*, will converge after refraction, and form an angle at O, where the eye is placed; which will ſee the image S*q*, as if it were an object, through the lens LL; conſequently the object will appear enlarged, inverted, bright, and diſtinct. In LL lenſes of different convexities may be placed, which by being moved nearer to the image or farther from it, would repreſent the object more or leſs magnified, provided that the ſurface of the ſpeculum GH be of a perfectly ſpherical figure. If, in the room of one lens LL, three lenſes be diſpoſed in the ſame manner with the three eye-glaſſes of the refracting *teleſcope*, the object will appear erect, but leſs diſtinct than when it is obſerved with one lens. On account of the poſition of the eye in this *teleſcope*, it is extremely difficult to direct the inſtrument towards any object: Huygens, therefore, firſt thought of adding to it a ſmall refracting *teleſcope*, the axis of which is parallel to that of the reflector. This is called a *finder* or *director*. The Newtonian *teleſcope* is alſo furniſhed with a ſuitable apparatus for the commodious uſe of it.

In order to determine the magnifying power of this *teleſcope*, it is to be conſidered, that the plane ſpeculum KK is of no uſe in this reſpect: let us then ſuppoſe, that one ray, proceeding from the object coincides with the axis GLIA (*fig.* 132.) of the lens and ſpeculum; let *bb* be another ray, proceeding from the lower extreme of the object, and paſſing through the focus I of the ſpeculum KH; this will be reflected in the direction *bid*, parallel to the axis GLA, and falling on the lens *d*L*d*, will be refracted to G, ſo that GL will be equal to LI, and $dG = dI$. To the naked eye the object would appear under the angle $Ibi = bIA$; but by means of the *teleſcope*, it appears under the angle $dGL = dIL = Idi$: and the angle Idi is to the angle $Ibi :: bI : Id$; conſequently, the apparent magnitude by the *teleſcope* is to that by the naked eye as the diſtance of the focus of the ſpeculum from the ſpeculum, to the diſtance of the focus of the lens from the lens.

Conſtruction of the Gregorian Reflecting TELESCOPE.

Let TYYT (*fig.* 133.) be a braſs tube, in which L*ld*D is a metallic concave ſpeculum, perforated in the middle at X; and EF a leſs concave mirror, ſo fixed by the arm or ſtrong wire RT, which is moveable by means of a long ſcrew on the outſide of the tube, as to be moved nearer to, or farther from the larger ſpeculum L*ld*D; its axis being kept in the ſame line with that of the great one. Let AB repreſent a very remote object, from each part of which iſſue pencils of rays, e. g. *cd*, CD, from A the upper extreme of the object, and IL, *il*, from the lower part B; the rays IL, CD from the extremes croſſing one another before they enter the tube. Theſe rays, falling upon the larger mirror LD, are reflected from it into the focus KH, where they form an inverted image of the object AB, as in the Newtonian *teleſcope*. From this image the rays, iſſuing as from an object, fall upon the ſmall mirror EF, the centre of which is at *e*, ſo that after reflection they would meet in their foci at QQ, and there form an erect image. But ſince an eye at that place could ſee but a ſmall part of an object, in order to bring rays from more diſtant parts of it into the pupil, they are intercepted by the plano-convex lens MN, by which means a ſmaller erect image is formed at PV, which is viewed through the meniſcus SS, by an eye at O. This meniſcus both makes the rays of each pencil parallel, and magnifies the image PV. At the place of this image all the foreign rays are intercepted by the perforated partition ZZ. For the ſame reaſon the hole near the eye O is very narrow. When near objects are viewed by this *teleſcope*, the ſmall ſpeculum EF is removed to a greater diſtance from the larger LD, ſo that the ſecond image may be always formed in PV: and this diſtance is to be adjuſted (by means of the ſcrew on the outſide of the great tube) according to the form of the eye of the ſpectator. It is alſo neceſſary, that the axis of the *teleſcope* ſhould paſs through the middle of the ſpeculum EF, and its centre, the centre of the ſpeculum LL, and the middle of the hole X, the centres of the lenſes MN, SS, and the hole near O. As the hole X in the ſpeculum LL can reflect none of the rays iſſuing from the object, that part of the image which correſponds to the middle of the object, muſt appear to the obſerver more dark and confuſed than the extreme parts of it. Beſides, the ſpeculum EF will alſo intercept many rays proceeding from the object; and, therefore, unleſs the aperture TT be large, the object muſt appear in ſome degree obſcure.

The magnifying power of this *teleſcope* is eſtimated in the following manner. Let L D (*fig.* 134.) be the larger mirror, having its focus at G, and aperture in A, and F F the ſmall mirror with the focus of parallel rays in I, and the axis of both the ſpecula and lenſes MN, S S, be in the right line DIGAOK. Let *b b* be a ray of light coming from the lower extremity of a very diſtant viſible object, paſſing through the focus G, and falling upon the point *b* of the ſpeculum L D; which, after being reflected from *b* to F in a direction parallel to the axis of the mirror D A K, is reflected by the ſpeculum F ſo as to paſs through the focus I in the direction F I N to N, at the extremity of the lens M N, by which it would have been refracted to K; but by the interpoſition of another lens S S is brought to O, ſo that the eye in O ſees half the object under the angle T O S. The angle G *b* F, or A G *b*, under which the object is viewed by the naked eye, is to S O T, under which it is viewed by the *teleſcope*, in the ratio of G *b* F to I F *i* = *n* I N, of *n* I N to N K *n*, and of N K *n* to S O T. But G *b* F : I F *i* : : D I : G A ; and *n* I N : *n* K N : : *n* K : I *n*; and N K *n* : S O T : : T O : T K: therefore G *b* F : S O T : : D I × *n* K × T O : G A × I *n* × E K. Muſchenbroek's Introd. vol. ii. p. 819, &c.

In *reflecting teleſcopes* of various lengths, a given object will appear equally bright and equally diſtinct, when their linear apertures and alſo their linear amplifications, are as the ſquare-ſquare roots of the cubes of their lengths; and conſequently when the focal diſtances of their eye-glaſſes are alſo as the ſquare-ſquare roots of their lengths. See the demonſtration of this propoſition in Dr. Smith's Optics, art. 361.

Hence he has deduced a rule, by which he has computed the following table for *teleſcopes* of different lengths, taking the middle eye-glaſs and aperture of Hadley's reflecting *teleſcope*, deſcribed in Phil. Tranſ. N° 376 and 378, for a ſtandard: the focal diſtances and linear apertures being given in thouſandth parts of an inch.

Length of the *Tel.* or foc. Diſt. of the Conc. Feet.	Foc. Diſt. of the Eye-glaſs. Mill. Inch.	Linear Amplification or magnif. Power.	Linear Apert. of the Concave Metal. Mill. Inch.
½	0.167	36	0.864
1	0.199	60	1.440
2	0.236	102	2.448
3	0.261	138	3.312
4	0.281	171	4.104
5	0.297	202	4.848
6	0.311	232	5.568
7	0.323	260	6.240
8	0.334	287	6.888
9	0.344	314	7.536
10	0.353	340	8.160
11	0.362	365	8.760
12	0.367	390	9.360
13	0.377	414	9.936
14	0.384	437	10.488
15	0.391	460	11.040
16	0.397	483	11.592
17	0.403	506	12.143

Mr. Hadley's *teleſcope*, the admirable performances of which have been already mentioned in the preceding part of this article, magnified between 228 and 230 times; but we are informed that an object-metal of 3¼ feet focal diſtance was wrought by Mr. Haukſbee to ſo great a perfection as to magnify two hundred and twenty-ſix times, and therefore ſeems to be ſcarce inferior to Mr. Hadley's of 5¼ feet. If Mr. Haukſbee's *teleſcope* be taken for a new ſtandard, it follows that a ſpeculum of one foot focal diſtance ought to magnify ninety-three times, whereas the above table allows it but ſixty. Now $\frac{93}{60} = 1.55$, and the given column of magnifying powers multiplied by this number, gives a new column, ſhewing how much the object-metals ought to magnify if wrought up to the perfection of Mr. Haukſbee's. And thus a new table may be eaſily made for this or any other more perfect ſtandard, taking alſo the new eye-glaſſes and apertures in the ſame ratio to one another as the old ones have in this table. Smith's Optics, Rem. p. 79.

Dr. Smith has given the following dimenſions of one of Mr. Short's *teleſcopes* of the Gregorian form: the focal diſtance of the larger ſpeculum was 9.6 inches; its breadth or aperture 2.3; the focal diſtance of the leſſer ſpeculum 1.5; its breadth 0.6; breadth of the hole in the larger ſpeculum 0.5; diſtance between the leſſer ſpeculum and the next eye-glaſs 14.2; diſtance between the two eye-glaſſes 2.4; focal diſtance of the eye-glaſs next the metals 3.8; and focal diſtance of the eye-glaſs next the eye 1.1 inch. By experiment the *teleſcope* was found to magnify ſixty times in diameter, and by the time of the tranſits of ſtars over the viſible area, to take in an angle of nineteen minutes at the naked eye; therefore the magnified angle of viſion was 60 × 19′ = 19°. Rem. p. 104.

The magnifying power of any *teleſcope* may be eaſily found by experiment, viz. by looking with one eye through the *teleſcope* upon an object of known dimenſions, and at a given diſtance, and throwing the image upon another object ſeen with the naked eye. Dr. Smith has given a particular account of the proceſs, Rem. p. 79.

But the eaſieſt method of all is to meaſure the diameter of the aperture of the object-glaſs, and that of the little image of it, which is formed at the place of the eye. For the proportion between theſe gives the ratio of the magnifying power, provided no part of the original pencil be intercepted by the bad conſtruction of the *teleſcope*. For in all caſes the magnifying power of *teleſcopes* or microſcopes is meaſured by the proportion of the diameter of the original pencil to that of the pencil which enters the eye. Prieſtley's Hiſt. of Light, &c. p. 747.

The moſt conſiderable, and indeed truly aſtoniſhing magnifying powers, that have been uſed, are thoſe of Dr. Herſchel's Newtonian ſeven-feet reflector. Some account of theſe, and of the diſcoveries made by them, has been already introduced under the article STAR. For his method of aſcertaining them, ſee Phil. Tranſ. vol. lxxii. part i. p. 173, &c.

Dr. Herſchel obſerves, that though opticians have proved that two eye-glaſſes will give a more correct image than one, he has always (from experience) perſiſted in refuſing the aſſiſtance of a ſecond glaſs, which is ſure to introduce errors greater than thoſe we would correct. "Let "us reſign," ſays he, "the double eye-glaſs to thoſe who "view objects merely for entertainment, and who muſt "have an exorbitant field of view. To a philoſopher, "this is an unpardonable indulgence. I have tried both "the ſingle and double eye-glaſs of equal powers, and "always found that the ſingle eye-glaſs had much the "ſuperiority in point of light and diſtinctneſs. With "the double eye-glaſs I could not ſee the belts in Saturn, "which I very plainly ſaw with the ſingle one. I would, "however, except all thoſe caſes where a large field is "abſolutely neceſſary, and where power joined to diſtinctneſs is not the ſole object of our view." Phil. Tranſ. vol. lxxii. part i. p. 95.

Mr. Green has lately added both to the reflecting and refracting *teleſcope* an apparatus, which fits it for the purpoſes of ſurveying, levelling, meaſuring angles and diſtances, &c. See his Deſcription and Uſe of the improved reflecting and refracting *Teleſcopes*, and Scale of Surveying, &c. 1778.

TELESCOPE, *binocular*. See BINOCLE.

TELESCOPE, *equatoreal*. See EQUATOREAL.

TELESCOPE, *meridian*, is a *teleſcope* fixed at right angles to an axis, and turned about it in the plane of the meridian. The vulgar uſe of it is to correct the motion of a clock or watch, by obſerving day after day the exact time, when the ſun or a ſtar comes to the meridian. It ſerves alſo for a variety of other uſes. The tranſverſe axis is placed horizontal by a ſpirit level, faſtened in a ſlender braſs box with a very hard cement. For the farther deſcription and method of fitting this *teleſcope* by means of its level, &c. ſee Smith's Optics, p. 321, &c. See TRANSIT *inſtrument*.

TELESCOPE *ſhell*, in *Conchology*, the name of a ſpecies of TURBO, with plane, ſtriated, and numerous ſpires.

TELESCOPICAL *ſtars*, are ſuch as are not viſible to the naked eye; but diſcoverable only by the help of a *teleſcope*. See STAR.

All ſtars leſs than that of the ſixth magnitude, are *teleſcopic* to a middling eye.

TELESPHORUS, in *Mythology*, a deity invoked by the Greeks for health, together with Eſculapius and Hygeia.

The figures of theſe three divinities occur on ſeveral medals; and on ſome we have *Teleſphorus* with Eſculapius alone, and on others with Hygeia.

The figure of *Teleſphorus* is invariably the ſame, viz. that of an infant clothed with a ſort of cloke without ſleeves, which infolds its arms, deſcends below the knees, and has a kind of hood or cowl covering its head.

Montfaucon has given a particular deſcription of this deity, the worſhip of which is ſuppoſed to have paſſed from Epidaurus to Rome, with that of Eſculapius. Encycl.

TELETÆ, among the *Ancients*, were ſolemn rites performed in honour of Iſis.

TELICARDIOS, in *Natural Hiſtory*, the name given by ſome authors to a ſtone found in the ſhape of a heart.

It owes this figure to its having been found in the ſhell of ſome large bivalve of the cockle kind; and is more uſually known among authors under the name of BUCARDITES.

TELIPHANO, in *Botany*, a name uſed by ſome authors for the doronicum, or leopard's bane.

TELLA *paſhnum*, in *Natural Hiſtory*, a name given by the people of the Eaſt-Indies to a kind of white arſenic, or rat's-bane, found native among them.

It is well known to be a fatal poiſon, and uſed to deſtroy vermin. It lies in the cliffs of rivers among ſtrata of ſtone in large white irregular lumps; when held to the fire, it emits copious fumes ſmelling ſtrongly of garlic and ſulphur, but it does not readily melt or run.

TELLA *ſagrum*, in *Natural Hiſtory*, a name given by the natives of the Eaſt-Indies to a kind of earth which they uſe externally to dry up ulcers, and internally in caſes of coughs and colds. It is of the nature of the finer clays, and is found at the bottom of ſome of their rivers.

TELLER, an officer in the exchequer, of which there are four; whoſe buſineſs is to receive all monies due to the crown, and thereupon to throw down a bill through a pipe into the tally-court, where it is received by the auditor's clerks, who attend there to write the words of the ſaid bill upon a tally, and then deliver it to be entered by the clerk of the pells, or his clerk.

The tally is then ſplit or cloven by the two deputy chamberlains, who have their ſeals; and while the ſenior deputy reads the one part, the junior examines the other part with the other two clerks.

The *tellers* places are in the king's gift, and they have beſides their chief clerk or deputy, three other clerks for the diſpatch of buſineſs.

TELLINA, in *Natural Hiſtory*, a ſea-ſhell, by ſome of the lateſt writers on theſe ſubjects referred to the genus of MUSCLES. Linnæus makes the *tellina* a diſtinct genus of the claſs of *vermes*, and order of TESTACEA. Its characters are; that its animal is a *tethys*; the ſhell a bivalve, generally ſloping down on one ſide; with three teeth at the hinge. He enumerates twenty-nine ſpecies.

In Da Coſta's Conchology the *tellinæ* form the ninth family of bivalve SHELLS; and he defines them to be ſhells more broad than long, rather flat, the hinge of which has two teeth ſet cloſe together; of this family he reckons two genera, viz. the *tellinæ*, or ſhells with ſimilar ſides, whoſe beak and hinge are central, containing few ſpecies; and the cunei, or ſhells with diſſimilar or unequal ſides, whoſe beak and hinge are placed near to, or quite at one end; of this laſt genus there are ſeveral foſſil ſpecies, which are not yet diſcovered recent, or living from the ſea, ſome of which are very elegant and curious; as the ſtudded, the reticulated, the ſulcated, &c. Elem. of Conchol. p. 269.

Theſe ſhell-fiſh do not naturally live on the ſurface of the bottom of the ſea, but bury themſelves in the mud or ſand, in the manner of the chamæ, keeping a communication with the water above by means of the ſame ſort of tubes or pipes as thoſe fiſh are poſſeſſed off; but as the tubes of the *tellinæ* are very ſhort, the fiſh can only bear to be buried to a ſmall depth. Mem. Acad. Par. 1710.

TELLONIUM. See THELONIUM.

TELLUS, *terra*, ⊕, in *Aſtronomy*. See EARTH.

TELON, a name given by the chemiſts to fire.

TELONÆ, τελωναι, among the Athenians, farmers of the public revenues; for the ſeverity with which they were handled, in caſe they failed, ſee Potter, Archæol. Græc. lib. i. cap. 14. tom. i. p. 81.

TELONIUM. See THELONIUM.

TEMACHIS, in *Natural Hiſtory*, the name of a genus of foſſils, of the claſs of the gypſums; the characters of which are theſe: it is of a ſofter ſubſtance than many of the other genera, and of a very bright and glittering hue. The name is derived from the Greek τεμαχος, *fruſtulum*, a ſmall irregular fragment; the bodies of this genus being compoſed of an aſſemblage of multitudes of irregular flaky fragments, as are all the gypſums; but no genus of them ſo viſibly ſo as theſe. See GYPSUM.

There are but three known ſpecies of this genus.

We have not this ſpecies in England ſo far as is yet known. Hill's Hiſt. of Foſſ. p. 113, 114, 115, 116.

TEMAPARA, in *Zoology*, the name of a peculiar ſpecies of lizard, called alſo TEJUGUACU.

It approaches much to the nature of the IGUANA, but is black, ſpotted with white.

TEMBUL, in *Botany*, a name uſed by ſome authors, for the plant called BETEL.

TEMELO, in *Ichthyology*, a name uſed by ſome for the fiſh called in Engliſh the GRAYLING, and in ſome places the *umber*.

TEMPATLAHOAC, in *Ornithology*, the name of a broad-bellied bird, of the Weſt-Indies, deſcribed by Nieremberg; and by him eſteemed a ſpecies of duck. It is of the ſize of the common duck; is common on the lakes of Mexico, and is a good eatable bird. Ray.

TEMPER, in a *Phyſical Senſe*. See TEMPERAMENT.

TEMPER, in a *Muſical Senſe*. See TEMPERAMENT *in Muſic*.

TEMPER, in a *Mechanical Senſe*. See TEMPERING.

TEMPERAMENT, TEMPERAMENTUM, TEMPERATURE, in *Phyſics*, that habitude or diſpoſition of body, ariſing from the proportion of the primary four elementary qualities it is compoſed of.

The notion of *temperament* ariſes from that of mixture, where different elements, as earth, water, air, and fire (or, to ſpeak more juſtly in the Peripatetic way, hot, cold, moiſt, and dry), are blended together; by their oppoſition, they tend mutually to weaken and encroach on each other: and from the whole ariſes a ſort of temperate craſis, or coalition of them all in this or that proportion, whence, according to the quality that prevails or predominates, we ſay a *hot* or *cold*, a *moiſt* or *dry temperament*.

It is controvered among the ſchoolmen, whether the *temperament* properly comprehends all the four primary qualities? or, whether thoſe do not all ceaſe, and a new one, a fifth, ſimple quality, reſult from the total alteration made in the other four, by their mutual action on each other?

Authors diſtinguiſh two kinds of *temperaments*, viz. *uniform* and *difform*: the firſt is that wherein all the qualities are mixed in an equal degree; the ſecond, where they are mixed in an unequal degree.

The uniform *temperament* can only be one; the difform admits of eight different combinations, ſince either any one, or any two of the qualities may prevail; whence *hot* and *moiſt*, *cold* and *moiſt*, &c. Farther, ſome, conſidering that the qualities which do prevail, may not be in equal degree; and the like of thoſe which do not prevail; make ſeveral other combinations or *temperaments*; and add twelve more to the number. In effect, as there are infinite degrees between the higheſt and loweſt pitch of any one of the elements, the different *temperaments* may be ſaid to be infinite.

TEMPERAMENT, in *Medicine*, is more particularly underſtood of the natural habitude and conſtitution of the body of man, or the diſpoſition of the animal humours in any ſubject.

The notion of *temperament* ariſes hence, that the blood flowing in the veins and arteries is not conceived to be a ſimple fluid, but a ſort of an imperfect mixt, or an aſſemblage of ſeveral other fluids: for it does not only conſiſt of the four ſimple, or primary qualities, but of four other ſecondary ingredients compounded thereof, into which it is ſuppoſed to be reſolvable, viz. *cholor*, *phlegm*, *melancholy*, and *blood*, properly ſo called.

Hence, as this or that ingredient humour prevails in a perſon, he is ſaid to be of a choleric, phlegmatic, melancholic, ſanguine, &c. *temperament*.

The ancient phyſicians brought theſe animal *temperaments* to correſpond with the univerſal *temperament* above deſcribed: thus the *ſanguine temperament* was ſuppoſed to coincide with *hot* and *moiſt*, the *phlegmatic* with *cold* and *moiſt*, the *melancholic* with *dry* and *cold*, &c.

Galen introduced the doctrine of *temperaments* into phyſic from the Peripatetic ſchool, and made it, as it were, the baſis of all medicine; aſſerting, that the whole of curing diſeaſes conſiſted in *tempering* the degrees of the qualities, humours, &c.

In the preſent ſtate of medicine, the *temperaments* are much leſs conſidered. The mechanical writers retrench the greater part of the Galenic doctrine, as uſeleſs and uncertain; and conſider the *temperaments* as no other than thoſe diverſities in the blood of different perſons, whereby it becomes more apt to fall into certain combinations in one body than another, whether into choler, phlegm, &c. whence, according to them, people are denounced *choleric*, *phlegmatic*, &c.

The ancients diſtinguiſhed two kinds of *temperaments* in the ſame body: the one *ad pondus*, in reſpect of weight; the other *ad juſtitiam*.

The firſt is that where the elementary qualities are found in equal quantities, and in equal proportion; ſuch as they are ſuppoſed to be in the ſkin of the fingers, without which thoſe parts would want the power of diſtinguiſhing objects with ſufficient accuracy.

The ſecond is, that which contains unequal portions of thoſe qualities, but yet in ſuch proportion as is neceſſary for the diſcharge of the function proper to the part. Such is the *temperament* in a bone, which contains more earthy than aqueous parts, to make it more hard and ſolid for its office of ſuſtaining.

Galen obſerves, that the *temperament ad pondus* is only imaginary; and that, though it were real, it could not ſubſiſt above one moment.

Dr. Pitcairn looks on the *temperaments*, or conſtitutions, as ſo many native diſeaſes; according to him, any one endued with whatever *temperament* has the ſeeds of a real diſeaſe within him; a particular *temperament* ſuppoſing, that ſome ſecretions are in greater proportion than is proper for life indefinitely long.

As the diverſities of *temperaments* are no other than diverſities of proportion in the liquids, which may be diverſified infinite ways; ſo there may be an infinite number of *temperaments:* though authors have only ſuppoſed four. The ſanguine, which is uſually reckoned a *temperament*, the ſame author ſays, is no other than a plethora.

Temperament, Temperamento, in *Muſic*, generally denotes a rectifying or amending the falſe or imperfect concords, by transferring to them part of the beauty of the perfect ones.

The degrees of the octave, which may be called its *elements*, as being the ſmalleſt intervals it is reſolvable into, are two greater ſemitones, two leſs tones, and three greater tones.

Now the different ſituation of theſe elements, with reſpect to each other, occaſions that intervals or concords of the ſame name, as thirds, fourths, &c. do not conſiſt of the ſame degrees or elements, though there be always the ſame number of them: but one fourth, for inſtance, is agreeable and perfect, and another not.

To mend theſe imperfect concords, the muſicians have bethought themſelves to *temper*, i. e. give them part of the agreeableneſs of perfect ones. In order to this, they take a medium between the two, and this they call a *temperament*; which neceſſarily produces a new diviſion of the octave, or, which amounts to the ſame, new elements.

For inſtance, whereas naturally its elements are the greater ſemitone, and the greater and leſs tone; they take a middle tone formed of the greater and the leſs: and the only elements now are the greater ſemitone, and this mean tone, which renders the five intervals that are tones equal, and thoſe that are ſemitones leſs unequal to theſe.

One might alſo divide each of the five tones of the octave into ſemitones, which, joined to the two it naturally has, would make twelve: in which caſe, the whole octave would be divided into twelve equal parts, which would be mean ſemitones.

It is eaſy to form various other kinds of *temperaments:* all the difficulty is to find ſuch as are free from two great inconveniences, i. e. which do not alter either all the concords too much, or, at leaſt, ſome of them.

All ſuch diviſions of the octave are called *tempered* or *temperative ſyſtem.*

The *temperature* does, indeed, according to the definition above given, and conſidered in one view, correct ſome falſe concords, yet, in other reſpects, it ſpoils and falſifies both perfect and imperfect concords, and renders diſcords more harſh than they would otherwiſe be, if the intervals were juſtly taken. To explain this, we muſt conſider that all the intervals are founded on the primary proportions ariſing from the numbers 2, 3, and 5, that is, if we do not exceed the compaſs of an octave, $\frac{5}{4}$, $\frac{3}{2}$, and $\frac{2}{1}$. See Interval.

The nearer we come in practice to the true intervals, the more perfect the melody and harmony will be; and it is certain, that the human voice, and ſome inſtruments, as violins, &c. which have no ſtops nor frets, will execute muſic to a great degree of exactneſs; but the caſe is not the ſame with fixed or fretted inſtruments, as harpſichords, organs, lutes, viols, &c. Accuracy is here impoſſible, unleſs we would content ourſelves with always playing in the ſame key, without any tranſition or tranſpoſition whatſoever. In this caſe, indeed, the harpſichord or organ might vie with the accuracy of the voice or violin. For inſtance; if we were to compoſe or play in the key of C, then we might make the ſeveral intervals of that key, to be in the following true proportions, 1. $\frac{9}{8}$. $\frac{10}{9}$. $\frac{16}{15}$. $\frac{9}{8}$. $\frac{10}{9}$. $\frac{9}{8}$. $\frac{16}{15}$. that is, in whole numbers,
C. D. E. F. G. A. B. C.
24 . 27 . 30 . 32 . 36 . 40 . 45 . 48.
and the inſtrument tuned in this manner, would perform any piece of muſic in C, juſtly compoſed, with great beauty and exactneſs, taking for granted, that every key, fundamental note, or ſound ought to have its true fifth and fourth, and that theſe ought alſo to have their true fifths and thirds.

Now this being premiſed, it will preſently appear, that in making any tranſpoſition or tranſition from C, we ſhall find ſome falſe concord. Thus, for inſtance, if we proceed to G, and conſider it as a key, or fundamental ſound, we ſhall have the following ſeries of numbers for the octave of G, viz.
G . A . B . C . D . E . F . g
36 . 40 . 45 . 48 . 54 . 60 . 64 . 72.
But here the interval between 40 and 54 is falſe, being a comma too much, for the ſecond of a key muſt make a true fifth with the fifth of the ſame key. In like manner, if we were to proceed from C to A, as a new key, we ſhould find the following ſeries for the octave of A,
A . B . C . D . E . F . G . a.
40 . 45 . 48 . 54 . 60 . 64 . 72 . 80,
where the interval between A 40 and its fourth D 54 is falſe, being too great by a comma. If any other tranſition were examined, we ſhall always find ſome note falſe; as in F, the ſixth would be redundant by a comma: and in D the fifth would be deficient by a comma. All which ſhews the impoſſibility of truth and exactneſs of muſic on fixed inſtruments. Yet as theſe inſtruments have their uſe and convenience in ſome reſpects, it was proper to endeavour to find out a method of making them tolerable.

It has been obſerved under the head Interval, that the tone major exceeds the tone minor by a comma. Their difference is neceſſary for the truth and perfection of muſic; but yet if theſe tones were rendered equal, the ear would not be offended. And this has ſuggeſted the means of tempering fixed inſtruments. If we were to make all tones equal to the tone major, as ſome imagine the ancients did, then we ſhould find the ditonus, or third, exceeding a true third major by one comma, which would be intolerable. In like manner, if all tones were to be minor, we ſhould have thirds major defective by a comma, which would alſo be intolerable, not to mention other falſe intervals that muſt neceſſarily ariſe from ſuch a ſuppoſition.

Suppoſing then one tone increaſed, and the others diminiſhed by half a comma, we ſhould have our thirds major remain perfect. But ſtill it would be neceſſary to examine what fifths this ſuppoſition would give. Now it is evident that a tone major added to an octave, makes juſt two fifths, thus $\frac{2}{1}\times\frac{9}{8}=\frac{9}{4}=\frac{3}{2}\times\frac{3}{2}$. But the tone here added is a tone major, and the tone we have aſſumed is a temperate tone deficient from the tone major by half a comma; hence the ſum of the two fifths, on this ſuppoſition, will fall ſhort of the truth by $\frac{1}{2}$ of a comma, and conſequently one fifth will be deficient $\frac{1}{4}$ of a comma. Which difference, although it be ſenſible, yet experience ſhews, that fifths ſo diminiſhed are tolerable.

This *temperature* is what is called the common or vulgar *temperature*, and conſiſts, as has been ſaid, in diminiſhing the fifth by $\frac{1}{4}$ of a comma, in preſerving the third major perfect, and dividing it into two equal tones. Which being ſuppoſed, it follows that the fourth muſt exceed the truth by $\frac{1}{4}$ of a comma; that the third minor will be deficient by the ſame quantity; that the ſixth minor will be perfect, and the ſixth major redundant by $\frac{1}{4}$ of a comma; and laſtly, that the ſemitone major will exceed the truth by $\frac{1}{4}$ of a comma. If we introduce chromatic notes, or flats and ſharps, the ſemitone minor will alſo exceed the truth by $\frac{1}{4}$ of a comma, and conſequently the difference between the two ſemitones, or the dieſis enharmonica, will be preſerved.

If then we had a harpſichord or organ, with each feint or half note divided, we ſhould have the following notes or ſounds, viz. . . C C❋ . D^b . D . D❋ . E^b . E . F❋ . G^b. G . G❋ . A^b . A . A❋ . B^b . B . c. in the compaſs of an octave. Yet this ſyſtem of notes, numerous as they ſeem, would not be ſufficient for all tranſitions and tranſpoſitions. For though a piece of muſic tranſpoſed to any of the natural keys C . D . E . F . G . A . B . and to the flats, as E^b and B^b, and ſome others, would do well; yet, in tranſpoſing to ſharps, as to C❋, we ſhould not find a true third major, unleſs we introduced E❋. And even in flats, as A^b and E^b, we ſhould not find a true third major in deſcending, or a ſixth minor in aſcending, unleſs we introduced F^b and C^b. And in like manner, tranſpoſitions to G❋ and E^b would oblige us to introduce B❋ and C^b. Nor would even this ſuffice, for if neceſſity required a tranſpoſition from the key of C to that of D❋, we ſhould not find a true third major without introducing F❋❋ and *c*. So that at laſt we ſhall come to a temperate ſyſtem, where, in aſcending, the notes C, D, F, G, A, would each have its ſharp and double ſharp, and the notes B and E each a ſingle ſharp. In deſcending, the notes E, D, B, A, G would each have their flat and double flat, and the notes F and C each a ſingle flat. And thus the octave would be divided into 31 intervals, whoſe deſignations are
C . D^{bb} . C❋ . D^b . C❋❋ . D . E^{bb} . D❋ . E^b . D❋❋ . E .
1 . 2 . 3 . 4 . 5 . 6 . 7 . 8 . 9 . 10 . 11
F^b . E❋ . F . G^{bb} . F❋ . G^b . F❋❋ . G . A^{bb} . G❋ .
12 . 13 . 14 . 15 . 16 . 17 . 18 . 19 . 20 . 21
A^{bb} . G❋❋ . A . B^{bb} . A❋ . B^b . A❋❋ . B . C .
. 22 . 23 . 24 . 25 . 26 . 27 . 28 . 29 . 30 .
B❋ . C .
. 31
Where the letters C . D . E . F . G . A . B. ſignify the common diatonic notes; thoſe marked with a ſingle

ſingle ✱ or b are the chromatic, and thoſe marked with a double ✱✱ or bb are enharmonic notes; ſo called, becauſe the interval between them and the next diatonic note is an enharmonic dieſis; for which reaſon the notes E✱. F^b. and B✱. C^b are alſo enharmonic.

But even in this diviſion of the octave, all the notes would not have a third major in aſcending and deſcending: thus, for inſtance, D✱✱ has no third major; for this would be F✱✱✱, which is not in the ſcale, nor can any number of additional notes ſuffice in all caſes. But this inconvenience is eaſily remedied, and the ſyſtem conſiderably improved by making all the 31 intervals equal. We have already obſerved, that in the common temperature the ſemitones major and minor exceed the truth by $\frac{1}{4}$ of a comma, and that the enharmonic dieſis is preſerved true. Hence it follows, that the hyperoche, or difference between the chromatic and enharmonic dieſis; for example, the interval between F^b and E✱, or D^{bb} and C✱, &c. will alſo exceed the truth by $\frac{1}{4}$ comma. Now the hyperoche, by our table under INTERVAL, is equal to 1 . 37695, to which adding $\frac{1}{4}$ comma = 0 . 25000, we have 1 . 62695, which differs from the enharmonic dieſis 1 . 90917 only by 0 . 28222, or about $\frac{7}{25}$ of a comma. Neglecting this ſmall difference, let us ſuppoſe all the 31 intervals of the octave equal, it will follow that tranſpoſitions to all the notes of the ſyſtem, whether diatonic, chromatic, or enharmonic, will be equally good, and differ only in pitch or tone, as they ought, but not in accuracy, which muſt next be examined.

The diviſion of the octave into 31 parts may be conveniently done by logarithms. Under the head INTERVAL, I find the logarithm of the octave = 55 . 79763 commas; conſequently each dieſis, or diviſion of the octave = 1 . 79992 commas; hence the fifth, being 18 dieſes, will be 32 . 399 commas. Now the true fifth being 32 . 640, the fifth conſequently in this *temperature* is deficient by 0 . 241 parts of a comma, which is leſs than $\frac{1}{4}$ of a comma, by $\frac{1}{110}$ part; and therefore this fifth will, ſtrictly ſpeaking, be better than that of the vulgar *temperature* by $\frac{1}{10}$ of the comma; but this is inſenſible. Next, proceeding to examine the third, we ſhall find it equal to 10 dieſes or diviſions, that is 17 . 999 commas; and the true third major being 17 . 963 commas, the difference is 0 . 036, that is about $\frac{1}{28}$ of a comma. Now as the ear can bear a fifth, altered by $\frac{1}{4}$ of a comma, it will much more eaſily bear the alteration of $\frac{1}{28}$ of a comma in a third major. Again, in this *temperature*, the third minor is, indeed, ſtrictly ſpeaking, worſe than in the vulgar, which differs from the truth but by $\frac{1}{4}$ comma, whereas here it differs by about $\frac{1}{37}$ of a comma more; but then this difference is inſenſible.

Thus we have been led from the conſideration of the vulgar *temperature*, to the invention of the *temperature* which divides the octave into 31 equal intervals, commonly called, *Huygens's temperature.* This great mathetician was, indeed, the firſt who gave a diſtinct account of it, and ſhewed its uſe and accuracy. But here, as in many other inventions, we find the hint of the thing much older than the true knowledge of it. See Huygenii Opera omnia, vol. i. p. 748, 749. edit. 1. Lugd. Batav. 1724.

The diviſion of the octave into 31 parts was invented in Italy about 200 years ago, by Don Nicola Vincentino. The title of his book is L'Antica Muſica Riddotta alla Moderna Prattica, &c. Roma, 1555. fol. and an inſtrument, called *archicembalo*, was made upon this ſcheme, as Salinas informs us, who at the ſame time condemns it, as very diſagreeable in practice. But this could be owing to nothing but its not being tuned according to the intention of the inventor. For if all the thirds major of this inſtrument were made perfect, and the fifths diminiſhed by $\frac{1}{4}$ of a comma, it is evident that the inſtrument would be equally exact with any tuned according to the vulgar *temperature*, and would ſuffice for tranſportations to any diatonic or chromatic notes, though not to all the enharmonic, as D✱✱, &c. becauſe we ſhould not find its third major. And if the inſtrument were tuned according to Mr. Huygens's ſcheme, of making all the diviſions equal, it would then have all the 31 keys equally good, and very near the truth. See Salinas, lib. iii. The title of his work is Franciſci Salinæ Burgenſis de Muſica Libri Septem, Salmanticæ, 1577, folio. Merſennus's work is intitled Harmonicorum, Libri XII. authore F. M. Merſenno Minimo, Lutetiæ Pariſiorum, 1648, fol. He publiſhed another book before this, the title of which is Harmonie Univerſelle, contenant la Theorie & la Pratique de la Muſique. Paris, 1636, fol. 2 vol.

Hence it is plain, Salinas and Merſennus had not ſufficiently examined this matter.

The uſe of this *temperature* of Mr. Huygens deſerves to be introduced into the practice of muſic, as it will facilitate the execution of all the genera of muſic, whether diatonic, chromatic, or enharmonic; nor does the multiplicity of its parts render it impracticable, the author aſſuring us, that he had a harpſichord made at Paris with ſuch diviſions, which was approved of and imitated by ſome able muſicians. Merſennus alſo gives a ſcheme for this purpoſe; and Salinas ſays, he ſaw and played upon ſuch an inſtrument. See alſo Don Vincentino before cited, lib. v. p. 99, &c.

Mr. Huygens, to facilitate the tuning of inſtruments with ſuch diviſions, has given us a table of the parts of an octave, according to his ſyſtem, together with their logarithms. The table is as follows:

The diviſion of the octave into 31 equal parts. I.	II.	III.	IV.	V.	The diviſion of the octave according to the common *temperament*. VI.
N. 97106450					
4,6989700043	50000	Ut^2	C^2	50000	4,6989700043
4,7086806493	51131				
4,7183912943	52278				
4,7281019393	53469	Si	B^x	53499	4,7283474859
4,7378125843	54678				
4,7475232293	55914	Sa	B	55902	4,7474250108
4,7572338743	57179	*	*	57243	4,7577249674
4,7669445193	58471				
4,7766551643	59794	La	A	59814	4,7768024924
4,7863658093	61146				
4,7960764543	62528	*	*	62500	4,7958800173
4,8057870993	63942	Sol^x	G^x	64000	4,8061799740
4,8154977443	65388				
4,8252083893	68666	Sol	G	66874	4,8252574989
4,8349190343	68378				
4,8446296793	69924				
4,8543403243	71506	Fa^x	F^x	71554	4,8546349804
4,8640509693	73122				
4,8737616143	74776	Fa	F	74767	4,8737125054
4,8834722593	76407				
4,8931829043	78196				
4,9028935493	79964	Mi	E	80000	4,9030899870
4,9126041943	81772				
4,9223148393	83621	Ma	E^b	83592	4,9221675119
4,9320254843	85512	*	*	85599	4,9324674685
4,9417361293	87445				
4,9514467743	89422	Re	D	89443	4,9515949935
4,9611574193	91444				
4,9708680643	93512	*	*	93459	4,9706225184
4,9805787093	95627	Ut^x	C^x	95702	4,9809224750
4,9902893543	97789				
4,9999999993	100000	Ut	C	100000	5,0000000000

The ſecond column of this table contains the numbers expreſſing the length of chords making 31 equal diviſions, the longeſt anſwering to C, being ſuppoſed to be divided into 100,000 parts.

In the third column are the ſyllables by which the notes are uſually named in France; and the aſteriſc * ſhews ſome enharmonic notes, of which that near *ſol* is moſt neceſſary.

In the fourth column are the letters commonly uſed to denote the ſounds of the octave.

The numbers of the ſecond column were found by means of thoſe in the firſt, which are their reſpective logarithms; and theſe were found by dividing 0.301029995 66 the logarithm of 2 by 31. The quotient 97106450 is marked N. and being continually added to the logarithm of 50000, that is to 4,6989700043, gives all the logarithms of the firſt column to the greateſt 4,9999999993, which being extremely near to 5.0000000000 the logarithm of 100000, ſhews the operation to have been rightly performed.

The fifth column ſhews the lengths of the chords in the common *temperament*; and the ſixth column contains their reſpective logarithms. Vide Huygenii Opera, vol. i. p. 752, 753.

The learned author of this *temperature* has not given the notes anſwering to all the diviſions of the octave; but that may eaſily be ſupplied from what has been ſaid above, when we derived this *temperature* from the conſideration of the common.

As Huygens has not given the names of all the intervals that occur in his *temperate* ſcale, we ſhall here inſert them in the octave, from C to *c*, with their reſpective meaſures in the commas, and tenths of a comma.

Intervals.	Names.	Meaſures.
From C to D^{bb}.	1. Diminiſhed ſecond, extreme flat ſecond, or enharmonic dieſis.	1.8.
C✱.	2. Semitone minor, or chromatic dieſis,	3.6.
D^b.	3. Flat ſecond, or ſemitone major,	5.4.

C✱✱.	4.	Double ſemitone minor,	7.2.
D.	5.	Second, or tone,	9.0.
E^{bb}.	6.	Diminiſhed third, or extreme flat third,	10.8.
D✱.	7.	Superfluous ſecond	12.6.
E^{b}.	8.	Third minor, or flat third,	14.4.
D✱✱.	9.	Extreme ſuperfluous ſecond,	16.2.
E.	10.	Third major, or ſharp third,	18.0.
F^{b}.	11.	Diminiſhed fourth,	19.8.
E✱.	12.	Superfluous third,	21.6.
F.	13.	Fourth,	23.4.
G^{bb}.	14.	Extreme diminiſhed fifth,	25.2.
F✱.	15.	Falſe fourth, or tritonus,	27.0.
G^{b}.	16.	Falſe fifth, or ſemidiapente,	28.8.
F✱✱.	17.	Extreme ſuperfluous fourth,	30.6.
G.	18.	Fifth,	32.4.
A^{bb}.	19.	Diminiſhed ſixth, or extreme flat ſixth,	34.2.
G✱.	20.	Superfluous fifth,	36.0.
A^{b}.	21.	Flat ſixth, or ſixth minor,	37.8.
G✱✱.	22.	Extreme ſuperfluous fifth,	39.6.
A.	23.	Sharp ſixth, or ſixth major,	41.4.
B^{bb}.	24.	Diminiſhed ſeventh, or extreme flat ſeventh,	43 2.
A✱.	25.	Superfluous ſixth,	45.0.
B^{b}.	26.	Flat ſeventh, or ſeventh minor,	46.8.
A✱✱.	27.	Extreme ſuperfluous ſixth,	48 6.
B.	28.	Sharp ſeventh, or ſeventh major,	50.4.
c^{b}.	29.	Diminiſhed octave,	52.2.
B✱.	30.	Superfluous ſeventh,	54.0.
c.	31.	Octave,	55.8.

The *temperate* dieſis enharmonica of Huygens being 1.8. comma, nearly, which is eaſily remembered, the meaſure of any interval in the octave may be found by multiplying it by the number denoting the place of that interval. Thus the ſixth minor, being the twenty-firſt interval, will be $= 1.8 \times 21 = 37.8$. The octave being the thirty-firſt, will be $= 31 \times 1.8 = 55.8$, which does not differ from the truth by more than 0.00237, that is, not by $\frac{1}{400}$ of a comma, and therefore perfectly inſenſible. See INTERVAL.

All the intervals in the foregoing table, either have received names, or at leaſt might receive them, from a perfect analogy to the names in uſe among practical muſicians; but many of theſe intervals are as yet unheard of among practitioners. Perhaps, if all the genera of ancient muſic were reſtored, every interval here mentioned might be of uſe, either in melody or harmony, and thereby greatly add to the variety of compoſition.

We have already mentioned the advantages of Mr. Huygens's ſyſtem; but its excellency will better appear by comparing it with the ſchemes of others. We may diſtinguiſh and name the different *temperatures* by the number of equal parts into which the octave is ſuppoſed to be divided. The *temperatures* that occur in books are *temperatures* of 12, 19, 31, 43, 50, 53, and 55 parts, of which in order.

The *temperature* of 12 parts is founded on the ſuppoſition that the ſemitones major and minor may be made equal. Hence the octave will be divided into 12 equal ſemitones, 7 of which will make the fifth, 4 the third, and 3 the third minor.

The *temperature* of 19 parts goes upon the ſuppoſition that the ſemitone-major is the double of the ſemitone-minor. Hence the tone will be 3, and the third major 6. The dieſis enharmonica will be 1, and conſequently the octave, being 3 thirds major and a dieſis, will be 19. The fifth contains 11 parts. The harpſichord, in this ſcheme, will have every feint cut in two, one for the ſharp of the lower note, and the other for the flat of the higher. Between B and C, and between E and F, will be interpoſed keys, which muſt ſerve for the ſharps of B and E, and the flats of C and F reſpectively.

The *temperature* of 31 parts is Mr. Huygens's already deſcribed; here the ſemitones are as 3 to 2. The third major is 10, and the fifth 18.

The *temperature* of 43 is Mr. Sauveur's, and by him very fully deſcribed in the Memoirs of the Royal Academy of Sciences, ann. 1701, 1702. He ſuppoſes the proportion of the ſemitones to be as 4 to 3. Hence his tone is 7, the third major 14, the fifth 25, and the octave 43. What muſical foundation this learned gentleman went upon in the inveſtigation of this *temperature*, is not known: but it ſeems liable to inſuperable difficulties; for here the dieſis enharmonica is but the half of the difference between it and the chromatic dieſis: whereas, in truth, this difference, inſtead of being double of, is really leſs than the enharmonic dieſis, as was long ago objected to him by Mr. Henfling, and appears from the table under INTERVAL. Miſcel. Berolin. tom. i. p. 285, 286.

Beſides, his enharmonic dieſis falls greatly ſhort of the truth, being but 1.27 of a comma, which is an error of 0.64 or near $\frac{2}{3}$ of a comma. Whereas, in Mr. Huygens's *temperature*, the error of the dieſis is almoſt inſenſible, being but $\frac{1}{10}$ of a comma. Nor are the practical advantages of Mr. Sauveur's ſyſtem any ways comparable to Huygens's. His fifth is, indeed, ſtrictly ſpeaking, better; but ſo little, that the difference is not ſenſible, not being $\frac{1}{20}$ of a comma. On the other hand, his thirds are ſenſibly worſe, the major being $\frac{1}{5}$ and the minor $\frac{2}{5}$ of a comma falſe. Whereas Huygens's third major does not differ ſenſibly from the truth, and the minor has no ſenſible difference from the third minor deficient by $\frac{1}{4}$ comma of the common *temperature*, which ought to be deemed the limit of the diminution of concords. If we add to this, that the much greater number of parts in Mr. Sauveur's octave, makes it much more intricate than Mr. Huygens's, and that theſe parts would be falſe or uſeleſs, even ſuppoſing the enharmonic genus reſtored, no muſician will long heſitate which he ought to prefer.

The *temperature* of 50 parts is propoſed by Mr. Henfling, in the Miſcellan. Berolin. above cited: he takes the proportion of the ſemitone as 5 to 3; hence his tone is 8, the third major 16, the fifth 29, and the octave 50. The third major, and fifth in this ſyſtem, will be worſe than Huygens's, though the third minor be a little better. The third major is here leſs than the true, and the fifth deficient by more than $\frac{1}{4}$ comma, which is a fault, not to mention the inconveniency ariſing from dividing the octave into 50 parts; beſides 5 : 3, the proportion of the ſemitones here aſſumed, although expreſſed in greater numbers, is not ſo near the truth as Mr. Huygens's of 3 : 2. See RATIO.

The *temperature* of 53 parts is mentioned by Merſennus. Here the tones will be unequal, 9 being the tone-major, and 8 the minor. Hence the third major will be 17, and the fifth 31, which laſt does not differ from the truth by above $\frac{1}{333}$ part of a comma. The third minor is alſo more perfect than in Mr. Huygens's ſyſtem, But the multiplicity of parts in the octave of this ſyſtem, renders it too intricate; and the diſtinction of tones-major and minor upon fixed inſtruments, is impracticable.

The laſt *temperature* we have mentioned is that of 55 parts, which Mr. Sauveur calls the *temperature* of practical muſicians. Its foundation lies in aſſuming the proportion of the ſemitones, as 5 to 4; ſo the tone will be 9, the third 18, and the fifth 32. The fifth, in this ſyſtem, as in that which makes the ſemitones equal, is nearer the truth than Mr. Huygens's, but this advantage is not $\frac{1}{13}$ of a comma; and on the other hand the thirds both major and minor, are here greatly miſ-tuned, as will appear by the annexed table, exhibiting the thirds and fifths of theſe ſeveral *temperatures*, as alſo the thirds and fifths of the common *temperature*, and two mentioned by Salinas, marked 1ſt. Salin. 2d. Salin. The letter V. ſtands for the fifth; III. for the third major, and 3. for the third minor. The fifths are all deficient, but the thirds are ſometimes leſs than the true; the firſt are marked +, the others —.

Temperatures	V. Com.	Error	III Com.	Error	3. Com.	Error.
of 12 parts.	32.549	0.091	18.59[illegible]	0.636+	13.950	0.727—
19	32.304	0.336	17.620	0.343—	14.684	0.0[illegible]7+
31	32.399	0.241	17.999	0.036+	14.400	0.277—
43	32.44[illegible]	0.200	18.167	0.204+	14.273	0.404—
50	32.303	0.277	17.855	0.108—	14.508	0.169—
53	32.637	0.00	17.897	0.066—	14.740	0.063+
55	32.464	0.176	18.261	0.298—	14.203	0.474—
Com. Temp.	32.390	0.250	17.963	0.000	14.427	0.2[illegible]0—
1ſt. Salin.	32.307	0.333	17.630	0.333—	14.677	0.000
2d. Salin.	32.354	0.286	17.520	0.143—	14.434	0.143—
True Scale.	32 640	0.000	17.963	0.000	14.6[illegible]7	0.000

Temperatures formed by the diviſion of the octave into equal parts, may be called geometrical *temperatures*. The common, and the two mentioned by Salinas, do not proceed upon this foundation. The intention of the firſt inventors not having been to make tranſpoſitions to every note of the ſyſtem equally good; but only to make the moſt uſual tranſitions in the courſe of a piece of muſic tolerable. Hence the parts of the octave, in their ſuppoſition, were not all equal.

The common *temperature*, as we have ſaid, preſerves the third major perfect. The firſt of Salinas preſerves the third minor perfect. In the ſecond of Salinas, the ſemi-

C✱✱.	4.	Double ſemitone minor,	7.2.
D.	5.	Second, or tone,	9.0.
E^{bb}.	6.	Diminiſhed third, or extreme flat third,	10.8.
D✱.	7.	Superfluous ſecond	12.6.
E^{b}.	8.	Third minor, or flat third,	14.4.
D✱✱.	9.	Extreme ſuperfluous ſecond,	16.2.
E.	10.	Third major, or ſharp third,	18.0.
F^{b}.	11.	Diminiſhed fourth,	19.8.
E✱.	12.	Superfluous third,	21.6.
F.	13.	Fourth,	23.4.
G^{bb}.	14.	Extreme diminiſhed fifth,	25.2.
F✱.	15.	Falſe fourth, or tritonus,	27.0.
G^{b}.	16.	Falſe fifth, or ſemidiapente,	28.8.
F✱✱.	17.	Extreme ſuperfluous fourth,	30.6.
G.	18.	Fifth,	32.4.
A^{bb}.	19.	Diminiſhed ſixth, or extreme flat ſixth,	34.2.
G✱.	20.	Superfluous fifth,	36.0.
A^{b}.	21.	Flat ſixth, or ſixth minor,	37.8.
G✱✱.	22.	Extreme ſuperfluous fifth,	39.6.
A.	23.	Sharp ſixth, or ſixth major,	41.4.
B^{bb}.	24.	Diminiſhed ſeventh, or extreme flat ſeventh,	43.2.
A✱.	25.	Superfluous ſixth,	45.0.
B^{b}.	26.	Flat ſeventh, or ſeventh minor,	46.8.
A✱✱.	27.	Extreme ſuperfluous ſixth,	48.6.
B.	28.	Sharp ſeventh, or ſeventh major,	50.4.
c^{b}.	29.	Diminiſhed octave,	52.2.
B✱.	30.	Superfluous ſeventh,	54.0.
c.	31.	Octave,	55.8.

The *temperate* dieſis enharmonica of Huygens being 1.8. comma, nearly, which is eaſily remembered, the meaſure of any interval in the octave may be found by multiplying it by the number denoting the place of that interval. Thus the ſixth minor, being the twenty-firſt interval, will be $=1.8\times21=37.8$. The octave being the thirty-firſt, will be $=31\times1.8=55.8$, which does not differ from the truth by more than 0.00237, that is, not by $\frac{1}{300}$ of a comma, and therefore perfectly inſenſible. See INTERVAL.

All the intervals in the foregoing table, either have received names, or at leaſt might receive them, from a perfect analogy to the names in uſe among practical muſicians; but many of theſe intervals are as yet unheard of among practitioners. Perhaps, if all the genera of ancient muſic were reſtored, every interval here mentioned might be of uſe, either in melody or harmony, and thereby greatly add to the variety of compoſition.

We have already mentioned the advantages of Mr. Huygens's ſyſtem; but its excellency will better appear by comparing it with the ſchemes of others. We may diſtinguiſh and name the different *temperatures* by the number of equal parts into which the octave is ſuppoſed to be divided. The *temperatures* that occur in books are *temperatures* of 12, 19, 31, 43, 50, 53, and 55 parts, of which in order.

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The *temperature* of 19 parts goes upon the ſuppoſition that the ſemitone-major is the double of the ſemitone-minor. Hence the tone will be 3, and the third major 6. The dieſis enharmonica will be 1, and conſequently the octave, being 3 thirds major and a dieſis, will be 19. The fifth contains 11 parts. The harpſichord, in this ſcheme, will have every feint cut in two, one for the ſharp of the lower note, and the other for the flat of the higher. Between B and C, and between E and F, will be interpoſed keys, which muſt ſerve for the ſharps of B and E, and the flats of C and F reſpectively.

The *temperature* of 31 parts is Mr. Huygens's already deſcribed; here the ſemitones are as 3 to 2. The third major is 10, and the fifth 18.

The *temperature* of 43 is Mr. Sauveur's, and by him very fully deſcribed in the Memoirs of the Royal Academy of Sciences, ann. 1701, 1702. He ſuppoſes the proportion of the ſemitones to be as 4 to 3. Hence his tone is 7, the third major 14, the fifth 25, and the octave 43. What muſical foundation this learned gentleman went upon in the inveſtigation of this *temperature*, is not known: but it ſeems liable to inſuperable difficulties; for here the dieſis enharmonica is but the half of the difference between it and the chromatic dieſis: whereas, in truth, this difference, inſtead of being double of, is really leſs than the enharmonic dieſis, as was long ago objected to him by Mr. Henſling, and appears from the table under INTERVAL. Miſcel. Berolin. tom. i. p. 285, 286.

Beſides, his enharmonic dieſis falls greatly ſhort of the truth, being but 1.27 of a comma, which is an error of 0.64 or near $\frac{2}{3}$ of a comma. Whereas, in Mr. Huygens's *temperature*, the error of the dieſis is almoſt inſenſible, being but $\frac{1}{10}$ of a comma. Nor are the practical advantages of Mr. Sauveur's ſyſtem any ways comparable to Huygens's. His fifth is, indeed, ſtrictly ſpeaking, better; but ſo little, that the difference is not ſenſible, not being $\frac{1}{20}$ of a comma. On the other hand, his thirds are ſenſibly worſe, the major being $\frac{1}{5}$ and the minor $\frac{2}{5}$ of a comma falſe. Whereas Huygens's third major does not differ ſenſibly from the truth, and the minor has no ſenſible difference from the third minor deficient by $\frac{1}{4}$ comma of the common *temperature*, which ought to be deemed the limit of the diminution of concords. If we add to this, that the much greater number of parts in Mr. Sauveur's octave, makes it much more intricate than Mr. Huygens's, and that theſe parts would be falſe or uſeleſs, even ſuppoſing the enharmonic genus reſtored, no muſician will long heſitate which he ought to preſer.

The *temperature* of 50 parts is propoſed by Mr. Henſling, in the Miſcellan. Berolin. above cited: he takes the proportion of the ſemitone as 5 to 3; hence his tone is 8, the third major 16, the fifth 29, and the octave 50. The third major, and fifth in this ſyſtem, will be worſe than Huygens's, though the third minor be a little better. The third major is here leſs than the true, and the fifth deficient by more than $\frac{1}{4}$ comma, which is a fault, not to mention the inconveniency ariſing from dividing the octave into 50 parts; beſides 5 : 3, the proportion of the ſemitones here aſſumed, although expreſſed in greater numbers, is not ſo near the truth as Mr. Huygens's of 3 : 2. See RATIO.

The *temperature* of 53 parts is mentioned by Merſennus. Here the tones will be unequal, 9 being the tone-major, and 8 the minor. Hence the third major will be 17, and the fifth 31, which laſt does not differ from the truth by above $\frac{1}{333}$ part of a comma. The third minor is also more perfect than in Mr. Huygens's ſyſtem, But the multiplicity of parts in the octave of this ſyſtem, renders it too intricate; and the diſtinction of tones-major and minor upon fixed inſtruments, is impracticable.

The laſt *temperature* we have mentioned is that of 55 parts, which Mr. Sauveur calls the *temperature* of practical muſicians. Its foundation lies in aſſuming the proportion of the ſemitones, as 5 to 4; ſo the tone will be 9, the third 18, and the fifth 32. The fifth, in this ſyſtem, as in that which makes the ſemitones equal, is nearer the truth than Mr. Huygens's, but this advantage is not $\frac{1}{13}$ of a comma; and on the other hand the thirds both major and minor, are here greatly miſ-tuned, as will appear by the annexed table, exhibiting the thirds and fifths of theſe ſeveral *temperatures*, as alſo the thirds and fifths of the common *temperature*, and two mentioned by Salinas, marked 1ſt. Salin. 2d. Salin. The letter V. ſtands for the fifth; III. for the third major, and 3. for the third minor. The fifths are all deficient, but the thirds are ſometimes leſs than the true; the firſt are marked +, the others —.

Temperatures	V. Com.	Error	III Com.	Error	3. Com.	Error.
of 12 parts.	32.549	0.091	18.590	0.636+	13.950	0.727—
19	32.304	0.336	17.620	0.343—	14.684	0.017+
31	32.399	0.241	17.999	0.036+	14.400	0.277—
43	32.440	0.200	18.167	0.204+	14.273	0.404—
50	32.303	0.277	17.855	0.108—	14.508	0.169—
53	32.637	0.003	17.897	0.066—	14.740	0.063+
55	32.464	0.176	18.261	0.298—	14.203	0.474—
Com. Temp.	32.390	0.250	17.963	0.000	14.477	0.200—
1ſt. Salin.	32.307	0.333	17.630	0.333—	14.677	0.000
2d. Salin.	32.354	0.286	17.520	0.143—	14.434	0.143—
True Scale.	32.640	0.000	17.963	0.000	14.670	0.000

Temperatures formed by the diviſion of the octave into equal parts, may be called geometrical *temperatures*. The common, and the two mentioned by Salinas, do not proceed upon this foundation. The intention of the firſt inventors not having been to make tranſpoſitions to every note of the ſyſtem equally good; but only to make the moſt uſual tranſitions in the courſe of a piece of muſic tolerable. Hence the parts of the octave, in their ſuppoſition, were not all equal.

The common *temperature*, as we have ſaid, preſerves the third major perfect. The firſt of Salinas preſerves the third minor perfect. In the ſecond of Salinas, the ſemitone minor is perfect. The foundation of his firſt *temperature* is making the temperate tone equal to the tone-minor and $\frac{1}{3}$ of a comma, or the tone-major leſs $\frac{2}{3}$ of a comma. Hence his fifth and third major will be deficient by $\frac{1}{3}$ of a comma; and the third minor conſequently will be true. The ground of his ſecond ſcheme is, to add $\frac{3}{7}$ of a comma to the tone-minor, or take $\frac{4}{7}$ from the tone-major, for his temperate tone. Hence the fifth will be deficient by $\frac{}{7}$ of a comma, and the thirds major and minor each deficient by $\frac{1}{7}$ of a comma. Conſequently, the ſemitone, being their difference, will be preſerved.

As to Mr. Salmon's ſcale in the Philoſophical Tranſactions, there is nothing true in it, but the diatonic ſcale of C. His ſcale for A is falſe, the fourth being erroneous by a comma; moſt of his ſemitones are likewiſe falſe. In ſhort, it can neither be conſidered as a true ſcale, nor as a *temperature*.

Before we cloſe this article, it may be proper to add a few words about the method of invention of the foregoing geometrical *temperatures*. Mr. Huygens having had the hint of a diviſion of the octave into 31 parts, had nothing farther to do but to examine it by logarithms. But, ſuppoſing no ſuch hint had been given, he might have inveſtigated it directly by the method laid down by himſelf, and alſo by Dr. Wallis, and Mr. Cotes, for approximating to the value of given ratios, in ſmaller numbers. We have given Mr. Cotes's method under RATIO. The application of that method to the preſent purpoſe is thus: the ratio of the octave to the third major is 55.79763 to 17.96282, and the approximating ratios will be.

1. Greater than the true 28 : 9, 87 : 28, &c.
2. Leſs than the true 3 : 1, 31 : 10, 59 : 19, 205 : 66, &c.

The ratios greater than the true muſt all be rejected; becauſe they give the third major leſs than true, and conſequently the tone (its half) deficient by above $\frac{1}{2}$ comma; which gives the fifth deficient above $\frac{1}{4}$ of a comma; but this ought not to be. The firſt of the ratios leſs than true is 3 : 1, or 12 : 4, which is the *temperature* of 12 parts before deſcribed, and too inaccurate. The next is 31 : 10, or Mr. Huygens's. The reſt divide the octave into too many parts.

The ſame may be alſo found thus: the ratio of the octave to the common temperate fifth, deficient by $\frac{1}{4}$ of a comma, is 56.79763 to 32.38952. The approximating ratios to which are,

1. Greater than the true 2 : 1, 7 : 4, 19 : 11, 50 : 29, &c.
2. Leſs than the true 1 : 1, 3 : 2, 5 : 3, 12 : 7, 31 : 18, 205 : 119. Where we have the *temperatures* of 12, 19, 31, and 50 parts, before examined.

And here all ratios greater than the true ought to be rejected, becauſe they give the fifth leſs than true, that is, in this caſe, deficient by more than $\frac{1}{4}$ a comma.

If we inveſtigate the approximating ratios to the ratio of the ſemitones major and minor, or 5.19529 to 3.28612, we ſhall have the ratios 1 : 1, 2 : 1, 3 : 2, 5 : 3, which reſpectively give the *temperatures* of 12, 19, 31, and 50 parts, before deſcribed.

Again, inveſtigating the approximating ratios of the fifth to the third major, we ſhall find 7 : 4, 9 : 5, 11 : 6, 29 : 16, which will alſo give the *temperatures* 12, 19, 31, 50, as before.

Laſtly, the approximated ratios of the octave to the true fifth are 12 : 7 and 53 : 31 greater than the true. The others being of no uſe, ſince the fifth muſt neceſſarily be diminiſhed. Here we find the *temperature* of 53 parts. As to the *temperatures* of 43 and 55, being deſtitute of any muſical foundation, it is no wonder they do not appear by this method of inveſtigation.

Mr. Huygens, in his Coſmotheoros, ſays, that the tone or pitch of the voice cannot be preſerved, unleſs the conſonants be tempered, ſo as to deviate a little from the higheſt perfection. For the proof of this aſſertion he brings a melody conſiſting of the following ſounds, C, F, D, G, C; where, if the intervals were to be ſung perfect, by taking the interval from C to F a true fourth aſcending, from F to D a third minor deſcending, from D to G a true fourth aſcending, and laſtly, from G to C a true fifth deſcending, we ſhould fall a comma below the C from whence we began. Therefore, if we were to repeat this ſeries of notes nine times, we ſhould at laſt fall near a tone major below our firſt ſound.

Mr. Huygens's ſolution of this difficulty is, that we remember the note from whence we ſet out, and return to it by a ſecret *temperature*, thereby ſinging the intervals a little imperfect; which, he ſays, will be found neceſſary in almoſt all ſongs or melodies.

A like difficulty is mentioned in the Memoirs of the Royal Academy of Sciences; and is there urged for the neceſſity of a *temperature*, even for ſinging in the ſame key. And Mr. Huygens's ſolution of the difficulty is there approved of. Ann. 1707, p. 264.

But the ſolution of theſe learned gentlemen is, as yet, far from being deciſive. No experiment has yet been brought to ſhew that the human voice ſings tempered notes; not even when accompanied by tempered inſtruments. It ſeems to us, on the contrary, that an exerciſed voice guided by a good ear, ſings true, even though accompanied by a miſ-tuned inſtrument, as harpſichords moſt frequently are, eſpecially in tranſpoſed keys. And were theſe inſtruments always as well tuned as art could make them, yet their tones would be equal; and it ſeems evident to the ear, that the human voice ſinging naturally two tones in ſucceſſion, as C, D, E, never makes them equal; and cannot, without great difficulty, and by means of a variation of harmony, be brought to make them equal.

Another ſolution, therefore, of Mr. Huygens's difficulty, muſt be ſought for. The truth ſeems to be, that the ſecond of the key muſt be the true tone-major above the key, and therefore the third between the ſecond and fourth of the key muſt be ſung deficient by a comma. Thus in the key of C, from C to D will be a tone-major $=\frac{9}{8}$, and from D to F will be a deficient third $=\frac{32}{27}$. See INTERVAL.

Mr. Huygens's melody therefore, will ſtand thus:

C, F, D, G, C.

$\frac{4}{3}\times\frac{27}{32}\times\frac{4}{3}\times\frac{2}{3}=1$. And the voice would ſing the interval F, D, juſt as if the note E had been interpoſed; in which caſe the notes would be C, F, E, D, G, C.

$$\frac{4}{3}\times\frac{15}{16}\times\frac{9}{10}\times\frac{4}{3}\times\frac{2}{3}=1.$$

Theſe notes all come within the diatonic ſcale of C; and the voice naturally falls upon the note from whence it ſet out. The ſame anſwer will hold in the example mentioned in the Memoirs of the Academy of Sciences; where the intervals ♭B, G, E, C, occur. And here the interval from ♭B to G ſhould be taken $=\frac{27}{32}=\frac{15}{16}\times\frac{9}{10}$, as in the former example; and for the ſame reaſon, the key being F.

There ſeems therefore no repugnancy between the practice and theory of muſic, while the melody is confined to one key: but it muſt be owned, that in tranſitions from key to key, eſpecially where ſeveral parts are to make harmony with each other, there ſtill remain difficulties, not mentioned by Mr. Huygens, or any other writer we know of, which might deſerve a farther examination.

We muſt not omit mentioning, that the learned Dr. Smith, in his Harmonics, has not only carried the theory of *temperaments*, or *temperatures*, far beyond all the authors that preceded him; but has ſhewn how to tune an inſtrument according to any propoſed *temperament*, by the ear only, which is certainly a moſt ingenious diſcovery.

This learned author prefers what he calls the *temperament* of equal harmony, which differs inſenſibly from the diviſion of the octave into fifty parts, to all others; and inſiſts, that it labours under the feweſt defects, and is of all others the moſt agreeable in practice. In the ſyſtem of equal harmony the *temperaments* of the fifth, third major and third minor, are reſpectively, $\frac{5}{18}$ and $\frac{2}{18}$ and $\frac{3}{18}$ of a comma leſs than the truth.

It would be impoſſible here to do juſtice to the learned author's reaſonings on this ſubject; we ſhall only add, that he eſtabliſhes, contrary to the common opinion, that the leſs ſimple conſonances, generally ſpeaking, will not bear ſo great *temperaments* as the ſimpler conſonances.

Dr. Smith mentions a *temperament* communicated to him by the ingenious Mr. Harriſon, which conſiſts in making the proportion between the octave and third major equal to that of the circumference of a circle to its diameter. In this *temperament* the third major is diminiſhed by $\frac{2}{3}$ of a comma, but the third minor is very near the truth, and extremely beautiful.

A late author ſeems to think the diviſion of the octave into thirty-one parts, not to be of modern invention, but neceſſarily implied in the doctrine of the ancients. At firſt ſight it would ſeem, as if the ancients made but twenty-four dieſes or diviſions in the octave, viz. ten to each fourth, and four to the tone; which (the octave being equal to two fourths and a tone) gives twenty-four dieſes to the octave. But the author juſt quoted contends, that this diviſion is to be underſtood only in one tenſion, that is either aſcending or deſcending; but that accurately ſpeaking, if we conſider all the dieſes or diviſions of the fourth, both aſcending and deſcending, we ſhall find thirteen; five to each tone, and three to the ſemi-tone major; and conſequently thirty-one diviſions in the octave. Theſe indeed are not all naturally equal; but if we make them ſo, we ſhall have a *temperature* known by the moderns under the name of Huygens's *temperature*. Dr. Pepuſch, in Phil. Tranſ. N° 481, p. 273. See the article DIESIS.

TEMPERATE *Zone*, ſee ZONE.

TEMPERATURE, in *Phyſics*, ſee TEMPERAMENT.

TEMPERATURE, or CLIMATE for plants. The difference of *climate*, or *temperature* of the air, has a very great effect on plants. The different degree of heat is the great cauſe of theſe changes, and the different degree of moiſture ſomewhat aſſiſts in it. The American and Aſian plants, famous in medicine when of the growth of their native ſoils, yet when removed into our *climate*, though they grow and even produce their flowers and ripen their ſeeds, which ſeems the laſt perfection of a plant, when put to the trial, have been always found to want their proper medicinal virtues.

Many of thoſe plants and trees, which, though natives of another *climate*, will endure the open air with us, and grow in our gardens; yet loſe much of their ſtrength, and become dwarfs, in proportion to what they were when in their proper *climate*. But much leſs violent changes than theſe are able to produce the like effects, at leaſt in ſome degree. The ſeveral parts of Europe are able to alter the quality of the ſame plant, even while it grows natural in them. Thus the blue aconite or napellus, the root of which is a terrible poiſon in the ſouth of France; yet in Britany, a northern province of the ſame kingdom, the root of the ſame plant, though it ſeems to grow with equal vigour there, and is equally large and ſucculent, has no bad effects; but has been eaten by old people and by children, without any injury.

In general, the farther north we go, the leſs and leſs hurtful this plant becomes. It is common to almoſt all Europe, and we find the inhabitants of ſome places dreading it, and that with great juſtice, as a fatal poiſon; while thoſe of others eat the leaves in their ſallads, and even eſteem them good to reſtore the appetite.

The common woad which ſucceeds well in many parts of England, is not ſo certain in France; but the different *climates* in different parts of that great kingdom, make ſtrange alterations in its juices. In Upper Languedoc they raiſe great quantities of it, and it makes an extremely fine blue dye for ſtuffs of all kinds; but in Britany, though the plant grows as high, and ſeems to flouriſh as well, yet the leaves are never ſo ſucculent, and the colour obtained from them is not of ſo fine a blue, but is duſky and browniſh.

This effect of the different *climates*, in changing the nature of things produced in them, is not confined to plants; but the animal kingdom ſhares in it. The whole ſerpent-kind, are in general larger and more venomous, as we approach the hotter *climates*. The tarantula, ſo poiſonous in the hot countries, is found greatly leſs ſo as it is found in more cold regions; and the ſcorpion, whoſe ſting is fatal in ſome parts of Africa, is little more miſchievous than the waſp or hornet in ſome of the coldeſt places where it lives. Nay, the Philoſophical Tranſactions inform us, that the bite of the tarantula, even in thoſe very places where moſt miſchievous, does not exert its power in cold weather; but that a perſon bitten at ſuch a time feels not the effect of the bite till the next ſultry hot day, though that may not happen till after two or three weeks.

The differences made by variety of *climates* upon plants, are not limited to diſtance of place, but even in the ſame province the *climate* differs greatly in different years, by means of accidents, and more or leſs heat; and more or leſs moiſture will do as much violence to plants ſometimes, as change of place, which only operates by means of the ſame agents. Our farmers complain of great miſchiefs from long droughts; and the French huſbandmen, in many of the provinces, always find, that when there has fallen very much rain, or thick fogs have been very frequent, all the bread-corn of every kind degenerates; the wheat and barley are poor and thin in the ear, and the grain ſmall; but the rye becomes ſo altered, that it is pernicious to uſe it in making of bread; and the poor, who are obliged to eat the bread made with it, are ſubjected to many diſeaſes by it. They call the rye thus vitiated *ergot*, and *ble cornu*. Deſland's Trait. Phyſ.

TEMPERING, in the *Mechanic Arts*, the preparing of STEEL and IRON, ſo as to render them more compact, hard and firm; or even more ſoft and pliant; according to their reſpective occaſions.

Theſe metals are *tempered* by plunging them, while red-hot, in ſome liquor prepared for the occaſion: ſometimes pure water is uſed for that purpoſe; our lockſmiths, &c. ſcarce uſe any other.

Sometimes a compoſition of divers juices, liquors, &c. is uſed; which is various according to the opinion and experience of the workman; as vinegar, mouſe-earwater, nettle, or Spaniſh radiſh-water, the water ouſing from broken glaſſes, ſuet, ſalt, oil, ſoot, diſtilled wine, ſal armoniac, urine, &c.

To harden and *temper* Engliſh, Flemiſh, and Swediſh ſteel, you muſt give them a pretty high heat; then ſuddenly quench them in water to make them hard; but Spaniſh and Venetian ſteel will need only a blood-red heat before they be quenched.

In conſequence of this operation all the qualities of *ſteel* are changed; ſo that from being very ductile and ſoft, it becomes ſo hard and ſo ſtiff, that it is no longer capable of being cut by the file, but is itſelf capable of cutting or piercing very hard bodies, and that it does not yield to the hammer, but may be ſooner broken in pieces than extended. It becomes alſo ſonorous, brittle, very elaſtic, and capable of acquiring the moſt beautiful poliſh. This hardneſs and ductility of *ſteel* may be diverſified by varying the *temper*. The hotter the *ſteel* is when tempered, and the colder the water into which it is plunged, the greater hardneſs it acquires, but at the ſame time, it becomes ſo much more brittle. The coldneſs of the water may be increaſed by diſſolving ſalts in it: obſerving that water is always colder while the ſalts continue diſſolving; and that the *ſteel* will cool ſooner by being ſtirred about or placed in a ſtream, ſo as to come in contact with water not already made warm. On the contrary, the leſs hot the *ſteel* is when tempered, and the hotter the water is in which it is tempered, the leſs hard it becomes, and alſo the greater ductility it retains: and the proper degree of heat is always relative to the uſe for which the tools made of the *ſteel* are intended.

If the ſteel be too hard or brittle for an edge-tool, &c. let it down by rubbing a piece of grindſtone or whetſtone hard upon the work, to take off the black ſcurf: then brighten, or heat it in the fire; and as it grows hotter, you will ſee the colour change by degrees, coming firſt to a ſtraw, or light goldiſh colour, then to a darker goldiſh colour, and at laſt to a blue colour. Chooſe ſuch of theſe colours as the work requires; then quench it ſuddenly in water.

The light gold colour is for files, cold chiſſels, and punches that punch iron and ſteel: the dark goldiſh colour is for punches to uſe on braſs, &c. The blue colour gives the *temper* for SPRINGS, &c. See STEEL.

The *tempering* of files and needles is performed in a peculiar manner.

Steel is uſually ſold tempered, becauſe in many manufactures, the cuſtom is to *temper* it as ſoon as it is made, probably that the purchaſers of it may be better able to judge of its quality. When this *ſteel* is to be uſed, it muſt be untempered by heating it more or leſs, and letting it cool ſlowly, that it may be extended, filed and receive the neceſſary form: after which every workman *tempers* it again in his own way.

M. Berthoud, in his treatiſe on marine clocks, recommends hardening the ſteel-balance-wheel, by daubing it over with ſoot (of wood) moiſtened with urine, putting it into a ſmall box of thin iron-plate, and covering it over with the ſame compoſition. This box with its contents, is to be heated to a blood-red, and then the wheel taken out ſuddenly and quenched.

Mr. Harriſon and M. Berthoud ſeem to agree upon the whole, that the balance-ſpring of time-pieces ſhould be hardened and tempered after it has been coiled up in its proper form; and not tempered firſt and coiled up afterwards, as is the practice in making the main-ſpring.

Some curious workmen, in order to equally *temper* ſmall ſteel inſtruments, employ melted lead as an intermedium. A plate of iron floats upon the melted lead, and receives from it, in all its parts, an equal heat: the pieces of ſteel, laid upon this plate, acquire all at once the ſame degree of heat, and are at once quenched in water; the blue, or other colours which they ſucceſſively aſſume, affording ſure marks of the proper points of heat at which they are to be quenched, according to the different degrees of hardneſs required in them. Lewis's Com. Phil. Techn. p. 32.

For the method of *tempering* ſteel bars for artificial magnets, practiſed by Mr. Canton, ſee *Artificial* MAGNET.

The ancients appear to ſome to have had a better method of *tempering* than any of the moderns are acquainted withal; witneſs their works in PORPHYRY; a ſtone ſo hard one diviſions in the octave. Theſe indeed are not all naturally equal; but if we make them ſo, we ſhall have a *temperature* known by the moderns under the name of Huygens's *temperature*. Dr. Pepuſch, in Phil. Tranſ. N° 481, p. 273. See the article DIESIS.

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TEMPERATURE, in *Phyſics*, ſee TEMPERAMENT.

TEMPERATURE, or CLIMATE for plants. The difference of *climate*, or *temperature* of the air, has a very great effect on plants. The different degree of heat is the great cauſe of theſe changes, and the different degree of moiſture ſomewhat aſſiſts in it. The American and Aſian plants, famous in medicine when of the growth of their native ſoils, yet when removed into our *climate*, though they grow and even produce their flowers and ripen their ſeeds, which ſeems the laſt perfection of a plant, when put to the trial, have been always found to want their proper medicinal virtues.

Many of thoſe plants and trees, which, though natives of another *climate*, will endure the open air with us, and grow in our gardens; yet loſe much of their ſtrength, and become dwarfs, in proportion to what they were when in their proper *climate*. But much leſs violent changes than theſe are able to produce the like effects, at leaſt in ſome degree. The ſeveral parts of Europe are able to alter the quality of the ſame plant, even while it grows natural in them. Thus the blue aconite or napellus, the root of which is a terrible poiſon in the ſouth of France; yet in Britany, a northern province of the ſame kingdom, the root of the ſame plant, though it ſeems to grow with equal vigour there, and is equally large and ſucculent, has no bad effects; but has been eaten by old people and by children, without any injury.

In general, the farther north we go, the leſs and leſs hurtful this plant becomes. It is common to almoſt all Europe, and we find the inhabitants of ſome places dreading it, and that with great juſtice, as a fatal poiſon; while thoſe of others eat the leaves in their ſallads, and even eſteem them good to reſtore the appetite.

The common woad which ſucceeds well in many parts of England, is not ſo certain in France; but the different *climates* in different parts of that great kingdom, make ſtrange alterations in its juices. In Upper Languedoc they raiſe great quantities of it, and it makes an extremely fine blue dye for ſtuffs of all kinds; but in Britany, though the plant grows as high, and ſeems to flouriſh as well, yet the leaves are never ſo ſucculent, and the colour obtained from them is not of ſo fine a blue, but is duſky and browniſh.

This effect of the different *climates*, in changing the nature of things produced in them, is not confined to plants; but the animal kingdom ſhares in it. The whole ſerpent-kind, are in general larger and more venomous, as we approach the hotter *climates*. The tarantula, ſo poiſonous in the hot countries, is found greatly leſs ſo as it is found in more cold regions; and the ſcorpion, whoſe ſting is fatal in ſome parts of Africa, is little more miſchievous than the waſp or hornet in ſome of the coldeſt places where it lives. Nay, the Philoſophical Tranſactions inform us, that the bite of the tarantula, even in thoſe very places where moſt miſchievous, does not exert its power in cold weather; but that a perſon bitten at ſuch a time feels not the effect of the bite till the next ſultry hot day, though that may not happen till after two or three weeks.

The differences made by variety of *climates* upon plants, are not limited to diſtance of place, but even in the ſame province the *climate* differs greatly in different years, by means of accidents, and more or leſs heat; and more or leſs moiſture will do as much violence to plants ſometimes, as change of place, which only operates by means of the ſame agents. Our farmers complain of great miſchiefs from long droughts; and the French huſbandmen, in many of the provinces, always find, that when there has fallen very much rain, or thick fogs have been very frequent, all the bread-corn of every kind degenerates; the wheat and barley are poor and thin in the ear, and the grain ſmall; but the rye becomes ſo altered, that it is pernicious to uſe it in making of bread; and the poor, who are obliged to eat the bread made with it, are ſubjected to many diſeaſes by it. They call the rye thus vitiated *ergot*, and *ble cornu*. Deſland's Trait. Phyſ.

TEMPERING, in the *Mechanic Arts*, the preparing of STEEL and IRON, ſo as to render them more compact, hard and firm; or even more ſoft and pliant; according to their reſpective occaſions.

Theſe metals are *tempered* by plunging them, while red-hot, in ſome liquor prepared for the occaſion: ſometimes pure water is uſed for that purpoſe; our lockſmiths, &c. ſcarce uſe any other.

Sometimes a compoſition of divers juices, liquors, &c. is uſed; which is various according to the opinion and experience of the workman; as vinegar, mouſe-ear-water, nettle, or Spaniſh radiſh-water, the water ouſing from broken glaſſes, ſuet, ſalt, oil, ſoot, diſtilled wine, ſal armoniac, urine, &c.

To harden and *temper* Engliſh, Flemiſh, and Swediſh ſteel, you muſt give them a pretty high heat; then ſuddenly quench them in water to make them hard; but Spaniſh and Venetian ſteel will need only a blood-red heat before they be quenched.

In conſequence of this operation all the qualities of *ſteel* are changed; ſo that from being very ductile and ſoft, it becomes ſo hard and ſo ſtiff, that it is no longer capable of being cut by the file, but is itſelf capable of cutting or piercing very hard bodies, and that it does not yield to the hammer, but may be ſooner broken in pieces than extended. It becomes alſo ſonorous, brittle, very elaſtic, and capable of acquiring the moſt beautiful poliſh. This hardneſs and ductility of *ſteel* may be diverſified by varying the *temper*. The hotter the *ſteel* is when tempered, and the colder the water into which it is plunged, the greater hardneſs it acquires, but at the ſame time, it becomes ſo much more brittle. The coldneſs of the water may be increaſed by diſſolving ſalts in it: obſerving that water is always colder while the ſalts continue diſſolving; and that the *ſteel* will cool ſooner by being ſtirred about or placed in a ſtream, ſo as to come in contact with water not already made warm. On the contrary, the leſs hot the *ſteel* is when tempered, and the hotter the water is in which it is tempered, the leſs hard it becomes, and alſo the greater ductility it retains: and the proper degree of heat is always relative to the uſe for which the tools made of the *ſteel* are intended.

If the ſteel be too hard or brittle for an edge-tool, &c. let it down by rubbing a piece of grindſtone or whetſtone hard upon the work, to take off the black ſcurf: then brighten, or heat it in the fire; and as it grows hotter, you will ſee the colour change by degrees, coming firſt to a ſtraw, or light goldiſh colour, then to a darker goldiſh colour, and at laſt to a blue colour. Chooſe ſuch of theſe colours as the work requires; then quench it ſuddenly in water.

The light gold colour is for files, cold chiſſels, and punches that punch iron and ſteel: the dark goldiſh colour is for punches to uſe on braſs, &c. The blue colour gives the *temper* for SPRINGS, &c. See STEEL.

The *tempering* of files and needles is performed in a peculiar manner.

Steel is uſually ſold tempered, becauſe in many manufactures, the cuſtom is to *temper* it as ſoon as it is made, probably that the purchaſers of it may be better able to judge of its quality. When this *ſteel* is to be uſed, it muſt be untempered by heating it more or leſs, and letting it cool ſlowly, that it may be extended, filed and receive the neceſſary form: after which every workman *tempers* it again in his own way.

M. Berthoud, in his treatiſe on marine clocks, recommends hardening the ſteel-balance-wheel, by daubing it over with ſoot (of wood) moiſtened with urine, putting it into a ſmall box of thin iron-plate, and covering it over with the ſame compoſition. This box with its contents, is to be heated to a blood-red, and then the wheel taken out ſuddenly and quenched.

Mr. Harriſon and M. Berthoud ſeem to agree upon the whole, that the balance-ſpring of time-pieces ſhould be hardened and tempered after it has been coiled up in its proper form; and not tempered firſt and coiled up afterwards, as is the practice in making the main-ſpring.

Some curious workmen, in order to equally *temper* ſmall ſteel inſtruments, employ melted lead as an intermedium. A plate of iron floats upon the melted lead, and receives from it, in all its parts, an equal heat: the pieces of ſteel, laid upon this plate, acquire all at once the ſame degree of heat, and are at once quenched in water; the blue, or other colours which they ſucceſſively aſſume, affording ſure marks of the proper points of heat at which they are to be quenched, according to the different degrees of hardneſs required in them. Lewis's Com. Phil. Techn. p. 32.

For the method of *tempering* ſteel bars for artificial magnets, practiſed by Mr. Canton, ſee *Artificial* MAGNET.

The ancients appear to ſome to have had a better method of *tempering* than any of the moderns are acquainted withal; witneſs their works in PORPHYRY; a ſtone ſo hard, that ſcarce any of our tools make any impreſſion upon it.

TEMPEST, Tempestas, a ſtorm or violent commotion of the air, with or without rain, hail, ſnow, &c.

TEMPLARS, Templers, or *Knights of the* Temple, a religious military order, firſt eſtabliſhed at Jeruſalem, in favour of pilgrims travelling to the Holy Land.

The original of this order, the firſt military one in the world, is this: in 1118, ſome pious and noble perſons devoted themſelves to the ſervice of God, in the preſence of the patriarch of Jeruſalem; promiſing to live in perpetual chaſtity, obedience, and poverty, after the manner of canons.

The two principal perſons were Hugo de Paganis, and Geoffry of St. Omers. Baldwin II. then king of Jeruſalem, gave them an apartment in his palace, near the temple at Jeruſalem, not far from the ſepulchre of our Saviour; whence their denomination *Templars.*

Soon afterwards, the canons of the temple gave them a piece of ground near the ſaid temple, on which to build regular houſes; and the king, the lords, the patriarch, and the prelates, each gave them ſomewhat out of their revenue, for food and cloaths.

Their firſt undertaking, and what they had firſt in view at their inſtitution, was, to guard the highway againſt robbers, &c. chiefly for the ſafety of pilgrims and croiſes.

The principal articles of their rule were: that they ſhould hear the holy office throughout every day; or that, when their military duties ſhould prevent this, they ſhould ſupply it by a certain number of pater noſters: that they ſhould abſtain from fleſh four days in the week, and on Fridays from eggs and milk-meats: that each knight might have three horſes, and one eſquire: and that they ſhould neither hunt, nor fowl.

In the year 1228, this order acquired ſtability, by being confirmed in the council of Troyes, and ſubjected to a rule of diſcipline drawn up by St. Bernard.

In every nation they had a particular governor, called *maſter of the Temple*, or of the *militia of the temple.* Their grand-maſter had his reſidence at Paris.

The order of *Templars* flouriſhed for ſome time, and acquired by the valour of its knights, immenſe riches, and an eminent degree of military renown: but as their proſperity increaſed, their vices were multiplied, and their arrogance, luxury, and cruelty roſe at laſt to ſuch a monſtrous height, that their privileges were revoked, and their order ſuppreſſed with the moſt terrible circumſtances of infamy and ſeverity. Their accuſers were two of their own body, and their chief proſecutor Philip the Fair of France, who addreſſed his complaints to Clement V. The pope, though at firſt unwilling to proceed againſt them, was under the neceſſity of complying with the king's deſire, ſo that, in the year 1307, upon an appointed day, and for ſome time afterwards, all the knights, who were diſperſed throughout Europe, were ſeized and impriſoned. Such of them as refuſed to confeſs the enormities of which they were accuſed, were put to death; and thoſe who, by tortures and promiſes, were induced to acknowledge the truth of what was laid to their charge, obtained their liberty. In 1312, the whole order was ſuppreſſed by the council of Vienne. A part of the rich revenues they poſſeſſed was beſtowed upon other orders, eſpecially on the knights of St. John, now of Malta, and the reſt confiſcated to the reſpective treaſuries of the ſovereign princes, in whoſe dominions their poſſeſſions lay.—The knights *Templars*, in order to juſtify the ſeverity with which they were treated, were charged with apoſtaſy to the Saracens, and holding correſpondence with them, with inſulting the majeſty of God, turning into deriſion the Goſpel of Chriſt, and trampling upon the obligation of all laws human and divine. Candidates, it is ſaid, upon admiſſion to this order, were commanded to ſpit, in token of contempt, upon an image of Chriſt, and after admiſſion to worſhip either a cat, or a wooden head crowned with gold. It is farther affirmed, that, among them, the odious and unnatural act of ſodomy was a matter of obligation; and they are charged with other crimes too horrible to be mentioned, or even imagined. However, though there be reaſon to believe, that in this order, as well as others of the ſame period, there were ſhocking examples of impiety and profligacy; yet that the whole order was thus enormouſly corrupt, is ſo far from being proved, that the contrary may be concluded even from the acts and records, yet extant, of the tribunals before which they were tried and examined. If to this we add, that many of the accuſations advanced againſt them, flatly contradict each other, and that many members of this unfortunate order, ſolemnly avowed their innocence, while languiſhing under the ſevereſt tortures, and even with their dying breath; it would ſeem probable, that king Philip ſet on foot this bloody tragedy, with a view to gratify his avarice, and glut his reſentment againſt the *Templars*, and eſpecially againſt their grand-maſter, who had highly offended him. The principal cauſe of this invincible hatred againſt them was, that, in his quarrel with Boniface VIII. the knights eſpouſed the cauſe of the pope, and furniſhed him with money to carry on the war. Moſheim's Eccl. Hiſt. vol. iii. p. 208, ed. 8vo. Bower's Hiſt. of the Popes, vol. vi. p. 393.

TEMPLE, *templum*, a public building, erected in honour of ſome deity, either true or falſe; and wherein the people meet to pay religious worſhip to the ſame.

The word is formed from the Latin *templum*, which ſome derive from the Greek τεμενος, ſignifying the ſame thing; and others from τεμνω, *abſcindo, I cut off, I ſeparate*, in regard a *temple* is a place ſeparated from common uſes; others with more probability derive it from the old Latin word *templare*, to *contemplate*. It is certain, the ancient augurs gave the name *templa* to thoſe parts of the heavens which were marked out for the obſervation of the flight of birds. Their formula was this: *Templa teſqua ſunto.*

Temples were originally all open, and hence received their name. See Phil. Tranſ. N° 471. ſect. 5. where we have an account of the ancient *temple* in Ireland of the ſame ſort as our famous Stonehenge.

The word *templum*, in its primary ſenſe among the old Romans, ſignified nothing more than a place ſet apart, and conſecrated by the augurs, whether encloſed or open; in the city, or in the fields.

Clemens Alexandrinus and Euſebius refer the origin of *temples* to the ſepulchres built for the dead. This notion has been lately illuſtrated and confirmed by a variety of teſtimonies by Mr. Farmer, in his Treatiſe on the Worſhip of Human Spirits, p. 373, &c. Herodotus and Strabo will have the Egyptians to have been the firſt who built *temples* to the gods. The firſt erected in Greece is aſcribed to Deucalion, by Apollonius, Argonaut. lib. iii. In antiquity we meet with many people who would not build any *temples* to their gods, for fear of confining them to too narrow bounds. They performed their ſacrifices in all places indifferently, from a perſuaſion, that the whole world is the *temple* of God, and that he required no other. This was the doctrine of the magi, followed by the Perſians, the Scythians, the Numidians, and many other nations mentioned by Herodotus, lib. i. Strabo, lib. xv. and Cicero in his ſecond oration againſt Verres.

The Perſians, who worſhipped the ſun, believed it would wrong his power, to encloſe him in the walls of a *temple*, who had the whole world for his habitation; and hence, when Xerxes ravaged Greece, the magi exhorted him to deſtroy all the *temples* he met with.

The Sicyonians would build no *temple* to their goddeſs Coronis; nor the Athenians, for the like reaſon, erect any ſtatue to Clemency, who, they ſaid, was to live in the hearts of men, not within ſtone walls.

The Bithynians had no *temples*, but the mountains, to worſhip on; nor had the ancient Germans any other but the woods.

Even ſome philoſophers have blamed the uſe and building of *temples*, particularly Diogenes, Zeno, and his followers the Stoics. But it may be ſaid, that if God hath no need of *temples*, men have need of places to meet in for the public offices of religion: accordingly, *temples* may be traced back even into the remoteſt antiquity. See Hoſpinian, de Origine Templorum.

The Romans had ſeveral kinds of *temples*; whereof thoſe built by the kings, &c. conſecrated by the augurs, and wherein the exerciſe of religion was regularly performed, were called, by way of eminence, *templa, temples.* Thoſe that were not conſecrated, were called *ædes.* The little *temples*, that were covered or roofed, they called *ædiculæ.* Thoſe open, *ſacella.* Some other edifices conſecrated to particular myſteries of religion, they called *fana* and *delubra.*

All theſe kinds of *temples*, Vitruvius tells us, had other particular denominations, according to the form and manner of their conſtruction; as will be hereafter ſpecified. Indeed, the Romans outdid all nations with regard to *temples*: they not only built *temples* to their gods, to their virtues, to their diſeaſes, &c. but alſo to their emperors, and that in their life-time; inſtances whereof we meet with in medals, inſcriptions, and other monuments. Horace compliments Auguſtus hereupon, and ſets him above Hercules, and all the heroes of fable; in that thoſe were only admitted into *temples* after their death, whereas Auguſtus had his *temples* and altars while living.

> *Præſenti tibi maturos largimur honores;*
> *Jurandaſque tuum per nomen ponimus aras.*
> Epiſt. ad Aug.

Suetonius, on this occaſion, gives an inſtance of the modeſty of that emperor, who would allow of no *temples* being erected to him in the city; and even in the provinces, where he knew it was uſual to raiſe *temples* to the very proconſuls, refuſed any but thoſe erected in the name of Rome as well as his own. Vide Suet. in Octav. cap. 52.

The moſt celebrated *temples* among the Romans were the CAPITOL and PANTHEON. They had alſo the *temple* of Saturn, which ſerved for the public treaſury; and the *temple* of JANUS.

TEMPLE, *Delphian*. See DELPHOS.

TEMPLE, *Jewiſh*, at *Jeruſalem*, was an edifice erected much after the model of the TABERNACLE, but in a much more magnificent and expenſive manner. According to the opinion of ſome, there were three different *temples*; the firſt built by David and Solomon; the ſecond, by Zerubbabel and Joſhua the high prieſt; and the third by Herod; this laſt, however, the Jews will not allow to be a new *temple*, but only the ſecond rebuilt. The expence of building Solomon's *temple* was prodigious: the gold and ſilver employed for this purpoſe amounted to upwards of eight hundred millions ſterling (1 Chron. xxii. 14. xxix. 4, 6, 7.), which, ſays Dr. Prideaux, was ſufficient to have built the whole *temple* with ſolid ſilver. But as the book of chronicles was written after the return from the Babyloniſh captivity, it is probable that the Jews might compute by the Babyloniſh talent, which was little more than half the Moſaic talent, or perhaps by the Syriac talent, which was but one-fifth of the Babyloniſh; and thus the whole quantity of gold and ſilver would be reduced to a comparatively moderate quantity, and yet ſufficient for the purpoſe.

Joſephus (lib. vii. xiv. ii.) acquaints us, that the two firſt ſums were only one-tenth part of what is expreſſed in the preſent Hebrew; and Dr. Kennicott (State of the Hebrew Text, vol. ii. p. 355.) thinks it probable, that a cipher was added to them both in ſome very ancient Hebrew copy.

This *temple* was ſurrounded, except at the front or eaſt end, with three ſtories of chambers, each five cubits ſquare, which reached to half the height of the *temple*, and the front was graced with a magnificent portico, which roſe to the height of a hundred and twenty cubits. It was plundered by Nebuchadnezzar king of Babylon, and at length deſtroyed, after it had ſtood, according to Joſephus, four hundred and ſeventy years, ſix months, and ten days, from its dedication. Others, however, as Calviſius and Scaliger, reduce the number of years to four hundred and twenty-ſeven, or four hundred and twenty-eight, and Uſher to four hundred and twenty-four years, three months, and eight days.

The ſecond *temple* was built by the Jews, after their return from the Babyloniſh captivity, under the direction and influence of Zerubbabel their governor, and of Joſhua the high prieſt, with the leave and encouragement of Cyrus the Perſian emperor, to whom Judæa was now become a tributary kingdom. According to the Jews, this *temple* was deſtitute of five remarkable appendages, which were the chief glory of the firſt *temple*; viz. the ark and mercy-ſeat, the Schechinah, the holy fire on the altar, which had been firſt kindled from heaven, the urim and thummim, and the ſpirit of prophecy. This *temple* was plundered and prophaned by Antiochus Epiphanes, who alſo cauſed the public worſhip in it to ceaſe; and afterwards purified by Judas Maccabæus, who reſtored the divine worſhip; and after having ſtood five hundred years rebuilt by Herod, with a magnificence approaching to that of Solomon's. Tacitus calls it *immenſæ opulentiæ templum*; and Joſephus ſays, it was the moſt aſtoniſhing ſtructure he had ever ſeen, as well on account of its architecture as its magnitude, and likewiſe the richneſs and magnificence of its various parts, and the reputation of its ſacred appurtenances. This *temple*, which Herod began to build about ſixteen years before the birth of Chriſt, and ſo far completed in nine years and a half as to be fit for divine ſervice, was at length deſtroyed by the Romans on the ſame month and day of the month, on which Solomon's *temple* was deſtroyed by the Babylonians.

The Jewiſh *temple* itſelf conſiſted of the portico, the ſanctuary, and the holy of holies; and it was ornamented with ſpacious courts, making a ſquare of half a mile in circumference. The firſt court was called the court of the Gentiles, becauſe they were allowed to come into it, but no farther. Within this was a leſs court, into which none but Iſraelites might enter, divided into the court of the women, and the inner court, in which the *temple* and altar ſtood, and into which the prieſts and all male Iſraelites might enter. Jennings's Jew. Ant. vol. ii. book ii. cap. i.

TEMPLE, in *Architecture*. The ancient *temples* were diſtinguiſhed, with regard to their conſtruction, into various kinds; as,

TEMPLE *in antæ*, *Ædes in antis*. Theſe, according to Vitruvius, were the moſt ſimple of all *temples*, having only angular pilaſters, called *antæ*, or *paraſtatæ*, at the corners, and two Tuſcan columns, on each ſide of the doors.

TEMPLE, *tetraſtyle*, or ſimply *tetraſtyle*, was a *temple* that had four columns in front, and as many behind. Such was the *temple* of Fortuna Virilis at Rome.

TEMPLE *proſtyle*, that which had only columns in its front, or foreſide. As that of Ceres at Eleuſis, in Greece.

TEMPLE, *amphiproſtyle*, or *double proſtyle*, that which had columns both before and behind, and which was alſo tetraſtyle.

TEMPLE, *periptere*, that which had four rows of inſulated columns around, and was exhaſtyle, i. e. had ſix columns in front; as the *temple* of Honour at Rome. See PERIPTERE.

TEMPLE, *diptere*, that which had two wings, and two rows of columns around, and was alſo octoſtyle, or had eight columns in front; as that of Diana at Epheſus.

TEMPLE, *pſeudo-diptere*. See PSEUDO-*diptere*.

TEMPLE, *hypæthros*. See HYPÆTHROS.

TEMPLE, *monoptere*. See MONOPTERE.

TEMPLES, among us, denote two inns of court, thus called, becauſe anciently the dwelling-houſe of the *knights Templars*.

At the ſuppreſſion of that order they were purchaſed by ſome profeſſors of the common law, and converted into hoſpitia, or inns of courts.

They are called the *Inner* and *Middle Temple*, in relation to Eſſex-houſe, which was alſo a part of the houſe of the *Templars*, and called the *Outer Temple*, becauſe ſituate without Temple-Bar.

In the *Middle Temple*, during the time of the *Templars*, the king's treaſure was kept: as was alſo that of the kings of France in the houſe of the *Templars* at Paris.

The chief officer was the maſter of the *Temple*, who was ſummoned to parliament in 49 Hen. III. And from him the chief miniſter of the *Temple* church is ſtill called *Maſter of the Temple*.

TEMPLERS. See TEMPLARS.

TEMPLES, *tempora*, in *Anatomy*, a double part of the head, reaching from the forehead and eyes to the two ears. See HEAD.

The *temples* are chiefly formed of two bones, called *oſſa* TEMPORIS or PETROSA.

Theſe parts, according to phyſicians, were called *tempora*, from their ſhewing the age or time of man, by the colour of the hair, which turns white in this part before any other; which Homer ſeems to have been aware of, by his calling ſome men *poliocrotaphi*, q. d. *grey-templed*.

TEMPLUM *Soſtrati*, the name of a kind of chirurgical bandage, deſcribed by Galen. He alſo deſcribes another under the name of *templum parvum Apollonii Tyrii*.

TEMPO *di gavotta*, in *Muſic*. See *Tempo di* GAVOTTA.

TEMPORAL, *temporalis*, a term frequently uſed for *ſecular*. In which ſenſe it ſtands oppoſed to *eccleſiaſtical*.

Pope Boniface wrote to Philip the fair of France, that he was ſubject to him, both in ſpirituals and *temporals*. At preſent all the doctors on this ſide the Alps own the ſupremacy of kings in temporals.

TEMPORAL *action*. See ACTION.

TEMPORAL *augment*. See AUGMENT.

TEMPORALIS, in *Anatomy*, a muſcle, which reſembles the quadrant of a circle, and occupies all the ſemicircular or ſemi-oval plane of the lateral region of the cranium, the *temporal* foſſa, and part of the zygomatic. From this ſituation it has its name, and likewiſe that of *crotaphites*. Through all the circumference of this ſemicircular plane, the pericranium is divided into two laminæ. The internal lamina, which is ſometimes taken for a particular perioſteum, covers immediately all the bony parts of this region; the external lamina ſeparated from the other, is ſpread out like an aponeurotic, or ligamentary tent, by means of its adheſions to the external angular apophyſis of the os frontis, to the poſterior edge of the ſuperior apophyſis of the os malæ, and to the upper edge of all the zygomatic arch all the way to the root of the maſtoide apophyſis.

This muſcle is compoſed of two planes of fleſhy fibres fixed to the two ſides of a tendinous plane, nearly of the ſame breadth with them by which they are ſeparated; it being ſpread quite through the muſcle, like a concealed middle tendon; and the body of the muſcle thus formed, is encloſed between the two aponeurotic or ligamentary laminæ, in the following manner.

The internal fleſhy plane is fixed by a broad radiated inſertion to all the ſemicircular plane of the cranium by the intervention of the internal lamina of the perioſteum. Thus it is fixed to the lateral and external part of the os frontis, and to its external angular apophyſis, to the lower part of the os parietale, to the ſquamous portion of the os temporis, to the great ala or temporal apophyſis of the ſphenoidal bone by which the temporal foſſa is formed, and a little to the backſide of the internal orbitary apophyſis of the os malæ, which forms part of the zygomatic foſſa.

The external fleſhy plane is fixed in the ſame radiated manner to the inſide of the external lamina, of the pericranium, from the great ſemicircular circumference, all the way to a ſmall portion of this lamina, more or leſs ſemicircular, above its inſertion in the zygomatic arch; here the fleſhy fibres leave the external lamina, and the void ſpace is commonly filled with fat. The middle tendinous plane continues to contract by degrees, and ends at length in a very conſiderable tendon, the extremity of which, which is in a manner double, encloſes the coronoide apophyſis of the lower jaw. There is another ſmall plane, reckoned by ſome to be a portion of this muſcle, but in reality is no more than the third portion of the maſſeter. Winſlow. See *Tab. Anat. (Myol.) fig.* 1. *n.* 12. *fig.* 6. *n.* 2. *fig.* 7. *n.* 1.

When the *temporal* muſcles are wounded, at the ſame time that there is a contuſion of the cranium, which is frequently the caſe, the patient will be attended with great diſorders; not only as theſe muſcles are neceſſary for the offices of dividing the food, and for forming of ſpeech, but becauſe they are furniſhed with nerves, tendons, and arteries, all very conſiderable, which will partake of the injury. Where there is no violent ſymptom attending wounds on the external parts of the head, they are eaſily cured by the common methods uſed to freſh wounds, and there will be no occaſion for ſutures, for ſticking plaſters will always anſwer the purpoſe; but the dreſſings muſt always be finiſhed with all poſſible expedition; the medicines muſt be always applied warm, and the air kept in a moderate heat with hot coals.

If there be any great degree of hæmorrhage from the wounded veſſels, dry lint, or the ſtyptic powders, are to be uſed, and the whole kept on by compreſſes and a proper bandage; and after the hæmorrhage is ſtopped, the wound muſt be dreſſed with mel roſarum, or ſome digeſtive medicines, till ſufficiently deterged, and then with a vulnerary balſam, or dry lint, till it is healed. Heiſter.

TEMPORALITIES, or TEMPORALTIES, the temporal revenues of an eccleſiaſtic; particularly, ſuch lands, tenements, or lay-fees, tithes, &c. as have been annexed to biſhops ſees by our kings, or other perſons of high rank in the kingdom. See REVENUE.

The *temporalities* of a biſhop, &c. ſtand oppoſed to his ſpiritualities. See VACATION.

The canoniſts on the other ſide the Alps, anciently gave the pope a power over the *temporalities* of kings. Yet pope Clement V. owned frankly, that his predeceſſor Boniface VIII. had exceeded the juſt bounds of his authority, in meddling with the *temporalities* of the king of France. Fevret.

TEMPORALIUM *cuſtos*. See CUSTOS and VACATION.

TEMPORALIUM *reſtitutione*. See RESTITUTIONE.

TEMPORARY *fortification*. See FORTIFICATION.

TEMPORARY *hours*. See HOUR.

TEMPOREGIATO, in the *Italian Muſic*, ſometimes ſignifies, that the muſicians who accompany the voice, or the perſon who beats time, ſhould prolong ſome particular part thereof, to give the actor or ſinger room to expreſs the paſſion he is to repreſent, or to introduce ſome graces by way of ornament to the piece.

TEMPOREGIATO is alſo uſed in a different ſenſe, for *à tempo*, or *à tempo giuſto*.

TEMPORIS *os*, *temple-bone*, a bone on each ſide the head: thus denominated from its ſituation in the the temples. See *Oſſa* PETROSA, and TEMPLES.

The figure of each of the *oſſa temporum* is partly ſemicircular, and partly like a ſhapeleſs rock, ending in ſeveral points. Each is divided into two portions; one ſuperior, termed ſquamous from its figure; the other called apophyſis petroſa, or the rock, from its hardneſs. They are alſo divided into two ſides, one external and convex, the other internal and concave. Their external eminences are, the maſtoide apophyſis in the lower and poſterior part of the bone; the zygomatic apophyſis in the anterior part; the ſtyloide apophyſis under the bone, which ſeems originally to have been an epiphyſis; the capſular apophyſis, in which the bony ſtilet ſeems as it were to be ſet; the articular eminence of the zygomatic apophyſis, the lambdoidal angle, and the lower ſide of the apophyſis petroſa.

Its external cavities are, the articular one immediately behind the eminence, called by the ſame name; and which, with that, ſerves for the articulation of the lower jaw: the crack in the articular cavities; the maſtoide notch, in which the digaſtric muſcle is inſerted; the opening of the external *meatus auditorius*; the anterior indented border of that opening; the ſtylomaſtoide, or anterior maſtoide hole, which is the orifice of the paſſage of the *portio dura* of the auditory nerve, called from its form the aqueduct; the orifice or inferior hole of the carotide canal in the apophyſis petroſa, which alters its direction upward and forward, and ends at the point of the rock near the *ſella ſphenoidalis*; a portion of the jugular foſſa, and a portion of the *foramen lacerum*.

Among the external cavities we are likewiſe to reckon a portion of the *ductus palatinus* of the ear, commonly called the Euſtachian tube, and by ſome the aqueduct; but by no means to be confounded with the other aqueduct, or ſtylomaſtoide; the zygomatic notch; the parietal notch; the ſphenoidal notch; one or more little ſulci, which receive the ramifications of the temporal artery; the groove in the apophyſis petroſa, by which it is connected to the great apophyſis of the *os occipitis*; the poſterior maſtoide hole; but this hole is ſometimes formed between this bone and the *os occipitis*, and is ſometimes entirely wanting in one of the bones, and ſometimes in both; and there is beſide theſe, in ſome ſubjects, a ſmall maſtoide hole, which loſes itſelf in the ſubſtance of the bone.

In examining the internal eminences and cavities, we muſt diſtinguiſh the ſquamous portion from the apophyſis petroſa. In the former we ſee the radiated indentations of the ſemicircular edge, which with the parietal bone forms the ſquamous future; a portion of the middle foſſa of the baſis cranii on the ſame ſide, and ſeveral inequalities in that foſſa.

The apophyſis petroſa, or rock, is a ſort of pyramidal body, with three ſides ſituated obliquely, ſo that its baſis is turned backward and outward, and its apex forward and inward toward the *ſella turcica*. Of the three ſides, one is ſuperior and inclined a little forwards, the ſecond poſterior, and the third inferior: this laſt belongs to the outſide of the whole bone. The upper ſide aſſiſts in forming the middle foſſa of the baſis cranii; and we obſerve here a ſmall irregular hole appearing to be double, and partly covered by a ſmall bony plate; this is a kind of break, or interruption in the duct, through which the *portia dura* of the auditory nerve paſſes.

In the back-ſide of the rock we ſee the internal auditory hole, and a portion of the foſſa for the cerebellum; ſmall, indeterminate and pretty deep depreſſions are ſometimes ſeen in it in children; but theſe are gradually obliterated as they grow up. At the baſis of this apophyſis we ſee a portion of the groove for the lateral ſinus, formed partly in this baſis, partly in the lambdoidal angle; as alſo a portion of the *foramen lacerum*, and a ſmall point which as it were divides this hole in two, and diſtinguiſhes the paſſage of the jugular vein, from that of the eighth pair of nerves.

As this apophyſis has three ſides, three angles ought to be obſerved in it; the firſt ſuperior between the upper and back-ſides, the ſecond poſterior between the back and lower-ſides, and the third anterior between the lower and fore-ſide. The ſuperior angle, which is the moſt apparent, has a groove for the ſmall ſinus of the dura mater. The poſterior angle is in a manner interrupted near the middle by the *foramen lacerum*, and from it proceeds the little bony point, which divides this hole; at the end of it is a groove by which it is connected with the great apophyſis of the *os occipitis*. Between the apex of the apophyſis petroſa, and the ſuperior opening of the carotid canal, we ſometimes meet with a ſmall bone alſo of the ſeſamoide kind, mentioned long ſince by Riolan. Almoſt the whole ſubſtance of the *oſſa temporum* is compact; the ſquamous portion is thin and tranſparent; the maſtoide apophyſis is hollowed by conſiderable cells; the apophyſis petroſa is very hard and ſolid, with ſeveral internal cavities for the organ of hearing contained in it. Winſlow. See alſo *Tab. Anat. (Oſteol.) fig.* 2. *lit. b.* & *fig.* 13. *lt. a.*

TEMPTATION, *tentatio*, in *Theology*, an induction, or ſolicitation to evil; whether ariſing from the world, the fleſh, or the devil.

TEMPTATION, *tentatio*, in our *Ancient Law-books*, is uſed for a trial, proof, or aſſay. *Tentatio panis fiat bis in anno.* Chart. Edw. I. See ASSAY, &c.

TENABLE, formed from Fr. *tenir*, and that from the Latin *tenere*, *to hold*, in the *Military Art*, ſomething that may be defended, kept, and held, againſt aſſailants.

Tenable is little uſed, but with a negative: when a place is open on all ſides, and its defences all beaten down, it is no longer *tenable*. When the enemy has gained ſuch an eminence, this poſt is not *tenable*.

TENACIOUS *bodies*. See TENACITY.

TENACITY, in *Natural Philoſophy*, that quality of bodies by which they ſuſtain a conſiderable preſſure or force without breaking. Mem. Acad. Berlin 1745. p. 47.

Tenacity is the oppoſite quality to fragility or BRITTLENESS.

TENACULUM, in *Surgery*, an inſtrument uſed in amputation, for pulling out bleeding veſſels that are to be tied by ligatures. See *Tab.* II. *Surgery*, *fig.* 19.

TENAILLE, in *Fortification*, a kind of out-work, conſiſting of two parallel ſides, with a front, wherein is a re-entering angle.

In ſtrictneſs, that angle, and the faces which compoſe it, are the *tenaille*.

The *tenaille* is of two kinds; *ſimple* and *double*.

TENAILLE, *ſimple*, or *ſingle*, is a large outwork, conſiſting of two faces or ſides, including a re-entering angle. See *Tab.* II. *Fortif. fig.* 21. *lit. d.*

TENAILLE, *double*, or *flanked*, is a large outwork, conſiſting of two ſimple *tenailles*, or three ſaliants, and two re-entering angles. See *Tab.* II. *Fortif. fig.* 21. *lit. e.*

The great defects of *tenailles* are, that they take up too much room, and on that account are advantageous to the enemy; that the re-entering angle is undefended; the height of the parapet hindering the ſeeing down into it, ſo that the enemy can lodge there under covert; and the ſides are not ſufficiently flanked.

For theſe reaſons, *tenailles* are now excluded out of fortifications by the beſt engineers, and never made, but where there wants time to form a HORN-*work*.

TENAILLE *of the place* is the front of the place, comprehended between the points of two neighbouring baſtions; including the curtain, the two flanks raiſed on the curtain, and the two ſides of the baſtions which face one another.

So that the *tenaille*, in this ſenſe, is the ſame with what is otherwiſe called the FACE *of a fortreſs*.

TENAILLE *of the ditch*, is a low work raiſed before the curtin, in the middle of the foſs or ditch; the parapet of which is only two or three feet higher that the level ground of the ravelin.

There are three different ſorts (*Tab.* VIII. *Fortification*, *fig.* 57.) The firſt are thoſe which are made in the direction of the lines of defence, leaving a paſſage of three toiſes between their extremities and the flanks of the baſtions, and likewiſe another of two toiſes in the middle for a bridge of communication to the ravelin. The ſecond (*fig.* 58.) are thoſe, whoſe faces are in the lines of defence; and ſixteen toiſes long, beſides the paſſage of three toiſes between them and the flanks of the baſtions: their flanks are found by deſcribing arcs from one ſhoulder of the *tenaille* as a centre through the other, on which are ſet off ten toiſes for the required flanks. The third ſort (*fig.* 59.) comprehends thoſe whoſe faces are ſixteen toiſes, as in the ſecond ſort, and the flanks parallel to thoſe of the baſtions.

The uſe of *tenailles*, in general, is to defend the bottom of the ditch by a grazing fire, and likewiſe the level ground of the ravelin, and eſpecially the ditch before the redoubt within the ravelin, which cannot be ſo conveniently defended from any other place. The firſt ſort do not defend the ditch ſo well as the others, becauſe they are too oblique a defence; but as they are not ſubject to be enfiladed, M. Vauban has generally preferred them in the fortifying of places. Thoſe of the ſecond ſort defend the ditch much better than the firſt, and add a low flank to thoſe of the baſtions; but as theſe flanks are liable to be enfiladed, they have not been much uſed. This defect, however, might be remedied, by making them ſo as to be covered by the extremities of the parapets of the oppoſite ravelins, or by ſome other work. Thoſe of the third ſort have the ſame advantage with the ſecond, and are ſubject to the ſame inconveniences; and, therefore, they may be uſed with the ſame precaution.

Tenailles are eſteemed ſo neceſſary, that there is hardly any place fortified without them, and it is not without reaſon; for when the ditch is dry, the part behind the *tenailles* ſerves as a place of arms, from which the troops may ſally, deſtroy the works of the enemy in the ditch, oppoſe their deſcent, and retire with ſafety; and the communication from the body of the place to the ravelin becomes eaſy and ſecure, which is a great advantage; for by that means the ravelin may make a much better defence, as it can be ſupplied with troops and neceſſaries at any time. And if the ditch is wet, they ſerve as harbours for boats, which may carry out armed men to oppoſe the paſſage over the ditch whenever they pleaſe; and the communication from the *tenailles* to the ravelin becomes likewiſe much eaſier than it would be without them. Muller's Elem. of Fort. p. 34. See FORTIFICATION.

The RAMSHORN is a curved *tenaille*, raiſed in the foſs before the flanks, and preſenting its convexity to the covered way. This work ſeems preferable to either of the other *tenailles*, both on account of its ſimplicity, and the defence for which it is conſtructed.

TENAILLONS, in *Fortification*, are works conſtructed on each ſide of the ravelin, much like the LUNETTES: they differ, as one of the faces of a *tenaillon* is in the direction of the ravelin, whereas that of the lunette is perpendicular to it.

Tenaillons are conſtructed by producing the faces of the ravelin beyond the counterſcarp of the ditch, at a diſtance MN (*Tab.* VIII. *Fortif. fig.* 60.) of thirty toiſes, and taking on the counterſcarp of the great ditch fifteen toiſes from the re-entering angle p to q, and drawing N q; then q N M p will be the *tenaillon* required; its ditch is twelve toiſes, or the ſame as that of the ravelin. Sometimes there is made a retired battery, in the front of the *tenaillons*, as at B; this battery is ten toiſes from the front, to which it is parallel, and fifteen toiſes long. There are commonly entrenchments made in the *tenaillons*, ſuch as O; their parapets are parallel to the fronts MN, or rather perpendicular to the ſide N q; and biſect the ſide q N; the ditch before this retrenchment is three toiſes, and there is a banquette before the parapet, next to the ditch, of about eight feet, called BERM, ſerving to prevent the earth of the parapet (which ſeldom has any revetement) from falling into the ditch. The ravelin, before which *tenaillons* are conſtructed, muſt have its ſaliant angle much greater than the former conſtruction makes them; otherwiſe the ſaliant angles of the *tenaillons* become too acute; for which reaſon the capital of this ravelin is made forty-five toiſes, and the faces terminate within three toiſes of the ſhoulders. Muller's Elem. Fort. p. 37.

A *tenaillon* is a work capable of affording great defence to the beſiegers; as at the ſiege of Liſle in 1708, where the beſiegers were twice or thrice drove out of a *tenaillon* they had taken and retaken.

TENANCY, a habitation, or houſe to live in, or a tenement or poſſeſſion held of another.

TENANCY, *entire*. See ENTIRE.

TENANCY, *in tail*. See FEE-*tail*.

TENANT, or **TENENT**, *tenens*, in *Law*, one that holds or poſſeſſes lands and tenements of ſome lord or landlord, by any kind of right, either in fee, for life, years, or at will.

The term *tenant* is uſed with divers additions. Thus, *tenant in dower*, is ſhe that poſſeſſes lands by virtue of her dower.

Tenant per ſtatute-merchant, he that holds lands forfeited to him by virtue of a ſtatute. See STATUTE-*merchant*.

Tenant in frank marriage, is he that holds lands or tenements by virtue of a gift thereof, made to him upon marriage, between him and his wife. See FRANK-*marriage*.

Tenant by courteſy holds for his life, by reaſon of a child begotten by him of his wife, being an inheritrix, and born alive. See COURTESY.

Tenant by elegit holds by virtue of the writ called an ELEGIT.

Tenant in mortgage holds by means of a MORTGAGE.

Tenant by verge, in ancient demeſne, is he who is admitted by the rod in court to lands in ancient demeſne. See VERGE.

Tenant by copy of court-roll is one admitted *tenant* of any lands, &c. within a manor, which, time out of mind, have been demiſed according to the cuſtom of the manor. See COPYHOLD.

Tenant paravail. See PARAVAIL.

Tenant by charter, is he that holdeth by feoffment in writing, or other deed. See CHARTER, and FREEHOLD.

Tenant in capite, or *chief*, holdeth of the king in right of his crown. See CAPITE.

Tenant of the king, is he that holdeth of the perſon of the king.

TENANTS, *joint*, thoſe who have equal right in lands or tenements, by virtue of one title. See JOINT *tenants*.

TENANTS *in common*, thoſe who have equal right, but hold by divers titles.

TENANT, *particular*, he that holds only for his term.

TENANT, *ſole*, is he who has no other joined with him.

TENANT *by execution*, is he who holds by virtue of an execution upon any ſtatute, recognizance, &c.

TENANTS, *cuſtomary*. See CUSTOMARY.

TENANT, *terre*. See TERRE-*tenant*.

TENANT, *very*. See VERY.

Anciently, there were alſo *tenant by knight-ſervice*, *tenant in burgage*, *tenant in ſocage*, *tenant in frank-fee*, *tenant in villenage*. And there are ſtill *tenant* in FEE-*ſimple*, *tenant in* FEE-*tail*, *tenant upon* SUFFERANCE, &c.

TENANT *in tail after poſſibility of iſſue extinct*. See TAIL.

TENANT *to the praecipe*, in *Law*, is he againſt whom the writ of præcipe is to be brought in ſuing out a recovery.

Tenant, or **Tenan**, in *Heraldry*, is uſed for ſomething that ſuſtains, or holds up, the ſhield, or armory; and is generally ſynonymous with the word SUPPORTER.

The difference which ſome authors make between the two is, that *tenants* are ſingle, and *ſupporters* double, one placed on each ſide the ſhield. But the proper diſtinction ſeems to conſiſt in this, that *tenants* are human figures, and ſupporters figures of beaſts.

There are various forms of *tenants*, as well as of ſupporters, viz. angels, maids, religious, ſavages, Moors, &c.

The firſt *tenants*, F. Meneſtrier obſerves, were trunks, or branches of trees; to which the eſcutcheons were faſtened by ſtraps and buckles. Afterwards, the knights were repreſented as holding their own eſcutcheons, which were either hung to their neck, or elſe they leaned on them.

The origin of *tenants* and ſupporters is, by many, referred to the ancient tournaments, wherein the cavaliers had their arms borne by ſervants diſguiſed like ſavages, Moors, fabulous deities, bears, lions, &c. See SUPPORTER.

TENAR, in *Anatomy*. See THENAR.

TENCH, in *Ichthyology*, the Engliſh name of the *tinca* of the modern authors, the *fullo* and *gnapheus* of the ancients.

It is, according to the Artedian and Linnæan ſyſtem, a ſpecies of the cyprinus, and is diſtinguiſhed by Artedi by the name of the blackiſh, mucous, or ſlimy cyprinus, with the end of the tail even. See *Tench* FISHING.

TEND, in our *Old Writers*, ſeems to ſignify as much as *tender* or offer; as to *tend* a traverſe, an averment, &c.

TENDER, in a *Legal Senſe*, ſignifies as much as to offer, or endeavour, the performance of any thing, in order to ſave the penalty, or forfeiture, incurred by non-performance.

Thus, to *tender* rent, is to offer it at the time and place when and where it ought to have been paid; which will ſave the condition of that time, though the landlord refuſe to accept it.

Tender, in the *Sea Language*, is a veſſel attending on ſome other larger and more conſiderable one. It is employed in the king's ſervice on various occaſions: as to receive volunteers and impreſſed men, and to convey them to a diſtant place; to attend on ſhips of war or ſquadrons; and to carry intelligence or orders from one place to another, &c.

TENDERLING, a name given to the ſoft tops of deer's horns, when they begin to ſhoot forth.

TENDING, in *Sea Language*, denotes the movement by which a ſhip turns or ſwings round her anchor in a tideway, at the beginning of the flood or ebb. Thus, if the flood ſets northerly, it is evident that the ſhip, unleſs when moored head and ſtern, will fall into the line of the current, turning her head to the ſouthward, and *vice verſa*. This tranſition from one ſituation to the other is called *tending* or ſwinging. Falconer.

TENDINOSUM *centrum*. See CENTRUM.

TENDON, *tendo*, in *Anatomy*, that hard, white, extreme part of a muſcle, whereby it is faſtened to the bone.

Moſt muſcles have, at leaſt, two *tendons*, one at each extreme: that faſtened to the part toward which the motion is to be performed, is called the *head of a muſcle*; and that faſtened to the part drawn toward the other, the *tail of the muſcle*.

The fibres, whereof the *tendons* conſiſt, have been ſuppoſed to be nervous; but they are now found to be no other than productions of the ſame fibres, which make the belly or body of the muſcle. All the difference between them is, that in the belly of the muſcle they are lax, and at a diſtance from each other; whereas, in the *tendon*, they are more cloſely and firmly connected.

Their whiteneſs proceeds wholly from the blood's being excluded, by the tightneſs of their contexture: in effect, there is the ſame difference between them, that there is between a ſkein of thread, and a cord made of the ſame thread.

The fibres of the *tendons* undergo no contraction, or dilatation, as thoſe of the belly of the muſcle do: they act as mere cords, to draw the parts towards each other; and by ſome late obſervations ſeem to be wholly inſenſible. See Med. Obſ. vol. iv. art. 27, 28.

Tendons, *puncture of the*. See BLEEDING, and PUNCTURE.

Tendons, *ſuture of*, in *Surgery*, is an operation performed, in order to join them when they have been cut aſunder.

When a *tendon* is wounded or divided, the part to which it belongs loſes its motion; but if it is divided only in part, the ſymptoms produced are much the ſame with thoſe ariſing from a nerve wounded in the ſame manner. The operation of joining the divided *tendons* by ſuture may be performed without much difficulty, when they are ſeated ſuperficially, or near the ſkin. The operation ſucceeds beſt when the wound is recent, or lately inflicted, but may be undertaken with ſucceſs on the ſecond, third, or fourth day after the accident. And though the difficulty is greater, when it has been ſo long neglected as to let the wound heal, yet even in this caſe it is practicable. In ſome caſes, however, a ſuture is impracticable, and in others unneceſſary. If a conſiderable part of a *tendon* is cut off or deſtroyed, or its parts recede much from each other, and lie concealed betwixt the adjacent muſcles, ſo that the two ends cannot be brought together, it will be in vain to attempt the operation. Nor can the ſuture of a *tendon* ſucceed well, if its ends are violently contuſed, as the conſequent inflammation, ſuppuration, and other malignant ſymptoms, will prevent their uniting and healing, and the ſymptoms be exaggerated by a ſuture. In this caſe it is beſt to wait till the inflammation and other forbidding ſymptoms are removed, and to promote a ſeparation of the unſound parts before the needle is uſed: beſides, ſome *tendons*, as thoſe of the extenſors in the back of the hand, may be generally united without ſuture, by bringing and retaining the divided ends to each other; the fingers being extended out a little backwards with bandage and compreſs. The divided *tendons* of the flexors and extenſors of the fingers and toes may be brought to unite by retaining them together with ſplints, compreſs, and bandage. But when a *tendon* is punctured, contuſed, or half divided, and convulſions, with other malignant ſymptoms, enſue; if they cannot be removed by proper remedies, as oil of turpentine, with a few drops of diſtilled oil of amber or lavender, it will then be neceſſary to make a total diviſion of them, and, when the ſymptoms ſubſide, to join them again together by ſuture.

The method of uniting divided *tendons* is as follows: the wounded member is to be inflected or extended, that the two extremities of the *tendon* may meet each other; but if the upper end of the *tendon*, attached to its muſcle, be contracted or drawn under the ſkin, ſo that it cannot be drawn down or entered by the needle, in that caſe an inciſion is to be made to take hold of it with the pliers, drawing it gently downwards. Garengeot, however, adviſes to draw down the *tendon* by paſſing a needle and waxed thread through it.

There are two methods of making the ſuture, either with one, or with two needles. The firſt method is by threading a ſmall, ſtraight, and common needle, either flat or round at the point, with ſlender but ſtrong double thread or ſilk, waxed, armed with a large knot at the end: this needle and thread are to be paſſed through a bit of leather up to the knot, that the knot may not eaſily ſlip through the *tendon*. The divided ends of the *tendons* being made to meet, the armed needle is to be paſſed through the middle of the upper end of the *tendon*, a little more than the tenth of an inch from the edge where it was divided; and applying a ſtitch quill or cannula to the oppoſite ſide of the *tendon*, the needle is to be entered from without towards the internal part, after which it is to be paſſed in like manner through the lower end of the ward; then placing a ſmall compreſs of linen, ſilk, or ſoft leather, either dry or ſpread with cerate, under the thread, as in the knotted ſuture, the thread is to be tied thereon with a ſingle knot, and then with another ſlip knot. After the wound has been cleanſed, it is to be dreſſed with balſ. capiv. or ſome other vulnerary balſam, applied warm with lint and compreſſes; faſtening under the whole a ferula, or a piece of ſtiff paſteboard, adapted to the form of the hand with compreſſes, to elevate the fingers; and concluding the operation with a proper bandage.

The kind of ſuture for *tendons* deſcribed by Dionis is the moſt ſimple; which is to paſs a convenient needle, furniſhed with a ſimple waxed thread, through the middle of the upper end of the divided *tendon* from without inwards, and then to paſs it through the other end from within outwards at one ſtitch: after which, the needle being removed, the thread is to be drawn ſo as to join together the two ends of the *tendon*, and then tied upon a round compreſs. But the preceding method, ſays Heiſter, is generally preferred. The other ſuture with two needles, was firſt deſcribed by Nucke; who directs that a thread of ſtrong and thick waxed ſilk is to be paſſed through the eyes of two ſlender and common needles, both which are to be paſſed inward through the upper part of the *tendon*, and outward through the lower end; but the two needles are paſſed through on each ſide the edge of each part of the *tendon*: then removing the needles, a knot is made with the thread upon a compreſs of leather, as before. When the ſuture is finiſhed, ed, he ſprinkles *pulv. ex. tereb. coct.* and dreſſes the wound with *linimentum arcæi* or common digeſtive, and ſecures the parts from being diſplaced by compreſs, ſplints, and bandage.

After the ſuture, the parts are to be firſt dreſſed with lint, dipped in *ol. tereb.* or *balſ. Capiv.* over which is to be applied a compreſs, dipped and expreſſed out of warm ſpirits of wine. The palm of the hand is to be expanded, and ſupported upon a ſtiff paſteboard, with compreſſes and bandage, and the whole arm is to be fomented with ſpirit of wine, or oxycrate, and wrapped up in linen cloths dipped therein. The parts are to be thus retained till the divided *tendon* appears to be united, which may be known on the looſeneſs of the retaining threads, which as well as the compreſs ſhould then be removed, and the hand ſuſtained in the paſteboard till the wound is healed with vulnerary balſams, or ſcraped lint. Heiſter's Surg. vol. ii. p. 335.

TENDO *Achillis*, in *Anatomy*, is ſometimes more peculiarly denominated *chorda Achillis* and *chorda magna*, or the great *tendon*. See ACHILLES.

It is on the diſtance of the *chorda Achillis* from the point of ſupport, that the ſtrength of the foot depends. The farther this tendon is from the articulation, the ſtronger the part is found. Hence it is obſerved, that animals which run, or leap with the greateſt eaſe, are thoſe in which this *tendon* is fartheſt removed. And men with long heels are better able to walk than others; and ſtill the longer the foot, the more neceſſary is the length of the heel. Petit, in Mem. de l'Acad. R. des Scienc. 1722, p. 75.

The *tendo Achillis* is formed by an intimate union of the *tendons* of two muſcles; now if theſe two *tendons* are both broken, the rupture of the *tendon* is judged complete; if one only is torn, and the other remains whole, the caſe is then called an imperfect or incomplete rupture of that *tendon*.

There is a great difference between the complete and the incomplete ruptures of this *tendon*. The pain in the incomplete rupture is exceſſively great; whereas in the perfect one there is ſcarce any pain at all. When a *tendon* is wholly divided, the two ends draw back different ways, like the ſtring of a bow when cut, and this produces no pain, or any farther bad ſymptom than the loſs of the *tendon*; which is ſo true, that, in order to take off the pain and other bad ſymptoms which attend the wounding, or imperfectly dividing a *tendon*, the beſt means is to cut it wholly aſunder.

The *tendo Achillis* is placed in a ſort of ſocket, where it plays freely every way, and has no connection or adherence with the adjacent parts; and hence a complete rupture of it is without pain. This, however, is not the caſe when only one of the two *tendons* which compoſe it is divided, for then the ſeparated ends of this retiring back as far as poſſible, cannot but violently affect the remaining entire *tendon*, which with them formed the *tendo Achillis*; and as the union of theſe two is very ſtrict, the pain ſucceeding the ſeparation of one, and the retraction of its ends, cannot but be proportionably violent and great.

The pain felt in the diviſion of one of theſe *tendons*, or the imperfect rupture of the *tendo Achillis*, is only perceived upwards or above the wound, not below it; the reaſon of which is, that the upper part of the divided *tendon* is forcibly drawn up by the muſcle by which it is contracted, while it is alſo drawn downward at the ſame time by the *tendon* to which it is intimately and firmly united, and which yet remains whole; and this contrary force muſt produce the moſt exquiſite pain in the fibres which reſiſt; while the inferior portion, having no force applied to it but what tends to draw it downwards, eaſily yields to that, and is in no condition to ſuffer a like pain. This difference between the ſenſation of the two extremities is, however, only to be felt at firſt; ſince, after ſome time, the inflammation ſpreading, affects the neighbouring parts, and the lower extremity muſt feel its ſhare; though even then the pain is much leſs acute in that portion than in the upper.

In caſe of a complete rupture of this *tendon*, the foot may be bent without cauſing any pain to the patient; the only effect is the increaſing the ſpace which is betweeen the divided ends of the *tendon*: but the caſe is far otherwiſe in an imperfect rupture of this *tendon*; the foot then cannot be bent without the utmoſt pain and agony, becauſe the ſpace between the divided ends of the *tendon*, which muſt be enlarged by this bending, cannot be enlarged without a tearing, and violently forcing the imperfectly divided parts.

In the imperfect rupture of this *tendon*, the patient may walk, though it is with very violent pain; but in the perfect rupture, the perſon cannot walk, though he ſuffers no pain at all. In walking, at every ſtep that we take, the whole weight of the body is ſuſtained by the hinder foot; now the *tendo Achillis* is the only ſupport by means of which the foot can ſuſtain that weight, or regulate its preſſure; and therefore when that *tendon* can no more perform its office, we can no more walk. Theſe are the ſeveral ſymptoms by which the imperfect ruptures of this *tendon* may be known from the complete ones; a knowledge highly neceſſary to all who are to undertake their cure. Memoirs Acad. Par. 1728.

From the grievous ſymptoms and excruciating pains that attend an imperfect rupture of this *tendon*, the ancients ſeem to have derived their notion, that wounds of the *tendo Achillis* muſt be mortal, or at leaſt highly dangerous; eſpecially as they had read or heard, that Achilles died of a wound in this part. If this *tendon* ſhould be imperfectly divided, and malignant ſymptoms intervene, they will diſappear upon cutting it quite through; and then it muſt be joined again by ſuture, which will not excite any of thoſe malignant ſymptoms. Inſtances have occured of this *tendon* being conjoined, after diviſion, without ſuture. But if a ſuture be thought neceſſary, it may be performed much in the ſame manner with that of the *tendons* of the hand already deſcribed; except that the needle and thread are to be proportionably larger and ſtronger than for the ſmaller *tendons*. See Heiſter's Surgery, vol. ii. p. 339, &c.

Mr. Cowper (in the Philoſophical Tranſactions) gives us an account of a cure of the *great tendon*, or *tendon of Achilles*, above the heel, after an entire diviſion, by ſtitching.

TENDON, in the *Manege*, a ſort of griſtle that ſurrounds one part of the horſe's foot, and is ſeated between the hoof and the coffin-bone, near the coronet. When a horſe has a quitter-bone, the matter that gathers between the coffin-bone and the hoof, ſpoils the *tendon*, and makes it black; and the cure of ſuch a quitter-bone conſiſts in cutting and extirpating the *tendon*.

TENDRILL, a name given to the young ſhoots of the vine.

TENEBRÆ, *Darkneſs*, in the *Romiſh Church*, a ſervice performed on the Wedneſday, Thurſday, and Friday, before Eaſter, in commemoration of the agony of our Saviour in the garden; and the darkneſs that overſpread the earth, at the time of this crucifixion.

TENEBRIO, in *Zoology*, a genus of the *coleoptera* order of inſects, including thirty-three ſpecies. See *Stinking* BEETLE.

TENEMENT, TENANCY, in *Law*, an houſe or lands, depending on a manor, or lordſhip; or a fee, or farm held of a ſuperior lord, and which he may recall, when the term or condition is expired.

TENEMENT, *frank*, is any lands, houſe, office, or the like, wherein a man has eſtate for life, or in fee.

TENEMENT, *baſe*, is where a man holds lands, &c. at the will of the lord.

Yet Kitchin, Briton, &c. make *frank tenement* and *baſe tenement* oppoſites; on which footing, *frank tenement* ſhould be where the tenant is at liberty to quit it when he pleaſes.

TENEMENTARY *Lands*, among our anceſtors, were the outlands of manors, which the Saxon thanes, or nobles, let out to tenants under arbitrary rents and ſervices.

TENEMENTIS *Legatis*, in *Law*, a writ which lies in London, and other places, where the cuſtom is to deviſe *tenements* by laſt will as well as perſonal goods and chattels, for the hearing of any cauſe relating thereto.

TENENDUM, in *Law*, is a clauſe in a deed, wherein the tenure of the land is created and limited. The office of a *tenendum* is to limit and appoint the tenure to the land which is held, and how, and of whom it is to be held. The *tenendum* ſeems now to be incorporated with the *habendum*, for we ſay, to have and to hold, in which clauſe the eſtate is limited, &c.

TENENTES *nativi*. See NATIVI.

TENENTIBUS *in aſſiſa non onerandis*, a writ which lies for him to whom a diſſeiſor has made over land, whereof he diſſeiſed another; requiring that he be not diſturbed in aſſize, for the damages awarded, if the diſſeiſor have wherewithal to ſatisfy them.

TENESMUS, Τεινεσμος, in *Medicine*, a continual painful inclination to go to ſtool, yet without voiding any thing unleſs, ſometimes, a little purulent or bloody ſlime.

The word is formed from the Greek τεινειν, *tendere*, to *ſtretch*, *bend*; in regard thoſe attacked with this diſeaſe feel a continual tenſion in the fundament.

This diſorder is uſually attended with ſome tumor, ſometimes with a very conſiderable one in the part. This is properly no primary diſeaſe, but merely a ſymptomatic one, and differs in degree according to the diſeaſe on which it is an attendant.

Signs of it. Theſe are a titillation and itching about the anus, attended with a violent burning pain, and a deſire of compreſſing and voiding ſomething, and this attended uſually either with no excrement, or only a pulpous and mucous matter, and very often a procidentia ani, or falling down of the rectum.

Perſons ſubject to it. This diſeaſe very often happens to people labouring under hæmorrhoidal diſorders, eſpecially when the diſcharges attending them do not ſucceed regularly, though nature gives all the neceſſary motions for their excretion. It happens alſo to people who are ſubject to void an acrid and bilious matter by ſtool, and not unfrequently to thoſe who have a ſtone in the bladder. Women in the latter part of their time, in going with child, have alſo very often terrible fits of it, attended with conſiderable ſwelling; this happens to them, from the preſſure of the uterus, with its burden, upon the rectum and hæmorrhoidal veins. The procidentia ani happens alſo to all theſe ſubjects, and, beſide theſe, is very familiar to infants, from their voiding an acrid matter by ſtool, and to all perſons who are ſubject to great coſtiveneſs, and void their ſtools with great difficulty and pain; and finally, people who have paralytic weakneſſes of the ſphincter of the anus, incur this troubleſome diſorder after a time.

Cauſes of it. The cauſes of a *teneſmus*, beſide thoſe already mentioned, of ſuppreſſions of the hæmorrhoidal diſcharges, and voiding acrid matter by ſtool, are the aſcarides, a ſmall ſort of worms which uſually infeſt the rectum, and occaſion a continual itching and tickling there; the abuſe of reſinous purging medicines; and, among theſe, the reſinous parts of aloes, and black hellebore, are, above all, moſt ſubject to remain in the rectum, and bring on this complant: much riding will alſo ſometimes occaſion it; and many people have been thrown into it by wiping their backſide with paper in which pepper, ginger, or other hot and acrid things have been kept. The procidentia ani is owing uſually to the ſame general cauſes, as alſo to the relaxation of the nervous and glandulous coat of the rectum, occaſioned by long continued diarrhœas.

Thoſe affected with the ſtone are alſo ſubject to the *teneſmus*, from the communication, or conſent, between the bladder and the rectum.

Tenesmus, *prognoſtics in a.* When a hiccough comes on upon a perſon in a *teneſmus*, it is uſually a bad omen; a violent *teneſmus* coming upon women with child, ſometimes occaſions them to miſcarry. In the mildeſt ſymptoms of the falling down of the anus, which is a frequent attendant on a *teneſmus*, it is a very troubleſome and painful diſorder, eſpecially when it continues ſome time, as it often does: and when there happens a tumor, and coldneſs in the part that is fallen, it very often becomes dangerous, threatening inflammation and mortification. In common caſes, and where the diſtemperature has not before been frequent, the reducing the inteſtine to its place is uſually an eaſy thing; but when there is any thing paralytic in the origin it is more difficult both to reſtore it, and to prevent relapſes.

Method of cure. As the *teneſmus* is merely a ſymptomatic diſeaſe, the primary diſorder is to be examined, and treated, in order to a cure. Thus, when it is occaſioned by aſcarides, worm-medicines are to be given, and clyſters of a proper kind injected, ſuch as decoctions of tanzy, worm-wood, and myrrh: when the worms are by this means deſtroyed, the *teneſmus*, which was no more than a ſymptom, naturally ceaſes. In caſes where it is cauſed by a flux of bilious matter by ſtool, or by a retention of the hæmorrhoidal diſcharges, it will be proper to give medicines to obtund the acrimony of the humours, and take off the ſpaſtic motions occaſioned by them. To this purpoſe powders of nitre, crabs-eyes, and cinnabar, are to be given, and jellies of hartſhorn, and the like, with gum-arabic, tragacanth, and ſuch other agglutinants. The vapours of turpentine, and of the carminative ſeeds, received on the part, are alſo of great benefit; and hot fermentations of decoctions of the herbs of marſhmallows and pellitory, and chamomile flowers. Theſe ingredients may alſo be applied as a cataplaſm; for beyond all things, external heat is of the moſt immediate ſervice. The ſitting over the ſteam of hot water is a very good thing, and the rubbing the part with an ointment made of mucilage of quince-ſeeds, with oil of mullein, and the yolk of an egg. In caſes where there is a procidentia ani, the gut is to be replaced as ſoon as poſſible; the perſon is, to this end, to be laid upon his belly, and a moderate force to be uſed in putting it back, the fingers being firſt rubbed over with oil of ſweet almonds, before they touch the gut. If this is not to be done at the firſt attempt, the patient muſt be ſuffered to lie down again in a natural poſture, and ſpunges wetted with aſtringent decoctions, are to be applied to the part; powder of maſtich, with a very ſmall quantity of alum among it, is alſo uſeful to be ſprinkled on the gut on this occaſion. The ſitting upon a bag of oatmeal, boiled to the conſiſtence of pap, and ſprinkled over with a ſmall quantity of alum, is alſo a very good method. And ſo long as the inteſtine remains out of its place, it muſt be carefully kept warm, for fear of a mortification. If there is an inflammation attending it, this muſt be firſt carefully diſcuſſed by epithems of ſcordium, ſage, chamomile, and roſe and elder-flowers; and, after this, the uſual methods of attempting a reduction are to be employed. And finally, when the ſphincter has a paralytic weakneſs, the ordinary methods are to be aſſiſted by bandages, to prevent its return; but in a caſe of this kind, all that is to be done, is ſimply palliative, ſince the cure is not to be expected. In caſes where the *teneſmus* is owing to bilious ſtools, or to the ſuppreſſions of the hæmorrhoidal diſcharges, the patients are carefully to abſtain from all medicines in which aloes is an ingredient, as the elixir proprietatis, and the like.

In caſes of the *teneſmus* from the preſſure of the womb in women with child, there is no cure but delivery; but the method before propoſed will palliate and give eaſe. When milk is given in clyſters, in theſe caſes, there muſt be great care taken that it is perfectly freſh, not the leaſt turned ſour. If there be a colic attendant on the *teneſmus*, provided that it be not a bilious one, it is always proper to inject clyſters with a ſmall quantity of common ſalt, to abſterge the mucous humours; and when powders of the aſtringent kind are uſed, they muſt always be extremely fine, leſt their particles, ſticking to the inner coats of the inteſtine, ſhould increaſe, inſtead of mitigating the diſeaſe. Alum muſt be added, but in very ſmall quantities, to theſe powders, leſt it aſtringe too violently, and by that means prevent inſtead of forwarding the reduction of the part. Hartman commends the beetles found in horſe-dung, dried and powdered, as a very powerful remedy in all caſes of this kind. Junk. Conſp. Med. p. 583, ſeq.

The cure of a *teneſmus*, depends on proper evacuations and aſtringents, the former always preceding the latter; ſuch are bleeding, if plethoric; and gentle cathartics, eſpecially of the powder of rhubarb, &c.—An emetic of the Indian root *ipecacuanha* has been found of great ſervice in a long ſtanding *teneſmus*; for the augmenting one evacuation, is the leſſening of another; and, in this particular, becomes ſo much the more ſerviceable, as they happen to be contraries.

The reſtringents are ſuch as are of uſe in other fluxes.

TENET, a particular opinion, dogma, or doctrine, profeſſedly held by ſome divine, philoſopher, &c.

The diſtinguiſhing *tenets* of the ſeveral ſects in religion, and philoſophy, ſee under the names of the ſects themſelves.

TENGA, in *Botany*, a name by which ſome authors have called the coco-nut-tree, or palma Indica nucifera of other writers.

TENIA. See Tænia.

TENMENTALE, or **Tenmantale**, in *our Ancient Cuſtoms*, originally ſignifies the number of ten men, which number, in the time of the Engliſh Saxons, was called a decennary; and ten decennaries made what we call an hundred.

Theſe ten men were bound for each other to preſerve the public peace; and if any of them was found guilty of a breach thereof, the other nine were either to make ſatisfaction, or to bring the criminal before the king.

Tenmentale was alſo uſed for a duty, or tribute, paid to the king, conſiſting of two ſhillings for each ploughland; probably thus called, becauſe each perſon of the decennary was bound to ſee it paid.

TENNE', **Tenny**, or **Tawny**, in *Heraldry*, a bright colour, made of red and yellow mixed; ſometimes alſo called *bruſk*, and expreſſed in engraving by diagonal lines drawn from the dexter to the ſiniſter ſide of the ſhield, traverſed by perpendicular lines from the chief; and marked with the letter T.

In the coats of all below the degree of nobles, it is called *tenny*; but, in thoſe of nobles, it is called *hyacinth*; and, in princes coats, the *dragon's head*.

TENON, in *Building*, &c. the ſquare end of a piece of wood, or metal, diminiſhed by one-third of its thickneſs, to be received into a hole in another piece, called the *mortiſe*, for the jointing or faſtening the two together. Among joiners, &c. the *tenon* is made in various forms, ſquare, dove-tailed, for double mortiſes, &c.

Vitruvius calls the *tenons*, *cardines*; dove-tail'd *tenons* he calls *ſubſcudes*, or *ſecuriculæ*.

Tenon-*ſaw*. See Saw.

TENOR, Tenour, the purport or contents, or tranſcript, of a writing, or inſtrument in law, &c.

Warrants iſſued for the confirmation of ſentences, expreſs, that they ſhall be executed according to their form and *tenor*.—It was impoſſible to retain ſo long a ſpeech word for word, but the ſubſtance, or the *tenor*, is this.

Tenor, Tenore, in *Muſic*, the firſt mean or middle part, or that which is the ordinary pitch, or *tenor*, of the voice, when not either raiſed to the treble, or lowered to the baſes.

The *tenor* is frequently marked, in thorough-baſſes, with the letter T.—The *tenor* is a part which almoſt all grown perſons can ſing. But as ſome have a greater compaſs of voice upwards, others downwards; others are confined to a kind of medium; and others can go equally either higher or lower; hence the French muſicians make a variety of *tenors*,—as, a *counter-tenor*, a *mean-tenor*, a *natural-tenor*, and an *upper-tenor*; to which is alſo added, a *re-acting tenor*, *viol tenor*, *violin tenor*, &c. The Italians uſually diſtinguiſh no more than two kinds of *tenors*, viz. *tenore primo*, or 1° or I°, which anſwers to our *upper tenor*; and *tenore ſecundo*, or 2° or II°, which is our *natural tenor*; confounding the *counter-tenors*, &c. under the name *baritono*.

Tenor, or **Tenorista**, is alſo uſed for a perſon who ſings the *tenor* part in concert; and alſo for any inſtrument proper to play it.

TENORE *Indictamenti mittendo*, is a writ whereby the record of an indictment, and the proceſs thereupon, are called out of another court into the king's bench.

TENOUR. See Tenor.

TENSE, Time, in *Grammar*, an inflexion of verbs, whereby they are made to ſignify, or diſtinguiſh, the circumſtance of time of the thing they affirm, or attribute.

The affirmations made by verbs are different as to point of time; ſince we may affirm a thing *is*, or *was*, or *will be*: hence, a neceſſity of a ſet of inflexions, to denote thoſe ſeveral times; which inflexions our Engliſh grammarians call by a barbarous word *tenſes*: from the French *temps*; moſt other languages call them ſimply *times*.

There are but three ſimple *tenſes*: the *preſent*, as *I love*, *amo*; the *preter*, *preterit*, or *paſt*, as, *I have loved*, *amavi*; and the *future*, as, *I will love*, *amabo*.

But, in regard that in the *preter-tenſe* one may either expreſs the thing as juſt done or paſt, or indefinitely and barely that it was done: hence, in moſt languages, ariſe two kinds of *preterite*; the one *definitive*, marking the thing to be preciſely done; as, *I have written*, *I have ſaid*: and the other *indefinite*, or *aoriſt*, denoting a thing done indeterminately; as, *I wrote*, *I went*.

The future *tenſe* admits alſo of the ſame variety.

Beſides the three ſimple *tenſes*, others have been invented, called *compound tenſes*; expreſſing the relation of the ſimple ones to each other.—The firſt expreſſes the relation of the *paſt* to the *preſent*, and is called the *preterimperfect tenſe*, becauſe it does not mark the thing ſimply and properly, as done, but as imperfect, and preſent with reſpect to anther thing paſt; as, *I was at ſupper when he entered*; *Cum intravit*, *cœnabam*.

The ſecond compound *tenſe* marks the time paſt doubly, and is therefore called, the *pluſquamperfect tenſe*; as, *I had ſupped*, *cœnaveram*.

The third compound *tenſe* denotes the future with reſpect to the paſt; as, *I ſhall have ſupped*, *cœnavero*.

The ſeveral *tenſes*, or times, it is to be obſerved, are properly denoted in the Greek and Latin by particular inflexions; in the Engliſh, French, and other modern tongues, the auxiliary verbs *to be*, and *to have*, *être*, and *avoir*, are called in. As to the Oriental languages, they have only two ſimple *tenſes*, the *paſt*, and *future*, without any diſtinctions of imperfect, more than perfect, &c. but this renders thoſe languages ſubject to abundance of ambiguities, which others are free from.

The ingenious Mr. Harris, in his Hermes, p. 119, &c. propoſes the following theory of *tenſes*. The *tenſes*, he ſays, are uſed to mark preſent, paſt, and future time, either indefinitely without reference to any beginning, middle, or end; or elſe definitely, in reference to ſuch diſtinctions. If indefinitely, then we have three *tenſes*, an aoriſt of the preſent, an aoriſt of the paſt, and an aoriſt of the future. If definitely, then we have three *tenſes* to mark the beginnings of theſe three times: three to denote their middle; and three to denote their ends; in all nine. The three firſt of theſe *tenſes* he calls the inceptive preſent, the inceptive paſt, and the inceptive future. The three next, the middle preſent, the middle paſt, and the middle future. And the three laſt, the completive preſent, the completive paſt, and the completive future. Thus the *tenſes* in their natural number appear to be twelve; three to denote time abſolute, and nine to denote it under its reſpective diſtinctions. The following examples will illuſtrate the application and uſe of each *tenſe*. Aoriſt of the preſent, γράφω, *ſcribo*, *I write*: aoriſt of the paſt, ἔγραψα, *ſcripſi*, *I wrote*: aoriſt of the future, γράψω, *ſcribam*, *I ſhall write*. Inceptive preſent, μέλλω γράφειν, *ſcripturus ſum*, *I am going to write*: middle, or extended preſent, τύγχάνω γράφων, *ſcribo* or *ſcribens ſum*, *I am writing*: completive preſent, γέγραφα, *ſcripſi*, *I have written*. Inceptive paſt, ἔμελλον γράφειν, *ſcripturus eram*, *I was beginning to write*: middle or extended paſt, ἔγραφον or ἐτύγχανον γράφων, *ſcribebam*, *I was writing*: completive paſt, ἐγεγράφειν, *ſcripſeram*, *I had done writing*. Inceptive future, μελλήσω γράφειν, *ſcripturus ero*, *I ſhall be beginning to write*: middle or extended future, ἔσομαι γράφων, *ſcribens ero*, *I ſhall be writing*: completive future, *ſcripſero*, *I ſhall have done writing*. The author has particularly ſhewn what traces are diſcoverable in favour of this ſyſtem, either in languages themſelves, or in thoſe authors who have written upon this part of grammar, or in the nature and reaſon of things. Dr. Ward enumerates ſeven *tenſes*, viz. the preſent, paſt, and future imperfect; the paſt indefinite; the preſent, paſt, and future imperfect. See his Four Eſſays upon the Engliſh Language, p. 84.

TENSION, Tensio, the ſtate of a thing bent, or the effort made to bend it.

Animals only ſuſtain and move themſelves by the *tenſion* of their muſcles and nerves. A chord, or ſtring, gives an acuter or deeper ſound, as it is in a greater or leſs degree of *tenſion*.

Tension, *Tenſio*, Τασις, in the *Ancient Muſic*, was uſed to ſignify any pitch of ſound, whether produced by intenſion or remiſſion. Vide Ariſtoxen. p. 10, 13. edit. Meibom.

Ariſtoxenus obſerves, there are five things to be conſidered about ſounds, viz. τασις, tenſion; ἐπιτασις, intenſion; ἀνεσις, remiſſion; οξυτης, acumen; and βαρυτης, gravitas.

TENSOR, in *Anatomy*, ſee Extensor.

Tensor *Tympani*, in *Anatomy*, a name given by Albinus to one of the muſcles of the ear, called by Cowper, *internus auris*, and by others, *internus mallei*.

TENT, Tabernacle, a pavilion, or portable lodge, under which to ſhelter in the open field, from the injuries of the weather. See Tabernacle.

The word is formed from the Latin *tentorium*, of *tendo*, *I ſtretch*; in regard *tents*, are uſually made of canvas, ſtretched out, and ſuſtained by poles, with cords and pegs.

Armies encamp under *tents*: theſe are made of canvas, and are of various ſizes. A captain's *tent* and marquee is generally 10½ feet broad, fourteen deep, and nine high; thoſe of the ſubalterns are a foot leſs; the major's and lieutenant colonel's a foot larger; and the colonel's two feet larger. The ſubalterns of foot lie two in a *tent*, and thoſe of the horſe one. The *tents* of private men are 6½ feet ſquare, and five feet high, and accommodate five ſoldiers. The *tents* for the horſe are ſeven feet broad, and nine feet deep; they hold five men, and their horſe-accoutrements.

Tents, *bell*, are ſo called from their reſemblance to a bell, and ſerve to ſhelter the fire-arms from rain.

To *pitch* the *tents*, is to fix them up ready for habitation, by the aſſiſtance of a ridge-pole, two ſtandards, and a number of *tent*-pins.

Moſt of the Tartars and Arabs are wandering people, that always lodge under *tents*.

The Hebrews lodged forty years under *tents* in the deſarts; which gave occaſion to the Scenopegia, or feaſt of tabernacles.

Tent, *dark*. See Dark.

Tent, Turunda, in *Surgery*, is a roll of lint, made in a particular form, in the ſhape of a nail, with a broad flat head, and put into wounds whoſe ſuppuration is not perfect, and where there is a quantity of matter contained in the tumor, more than what comes out at the firſt dreſſing.

They are chiefly uſed in deep wounds and ulcers, and are of ſervice, 1. To convey medicines to the inmoſt receſſes and ſinuſes of the wound. 2. To prevent the lips of the wound from uniting before it is healed from the bottom. And 3. By their aſſiſtance grumous blood, ſordes, and other foulneſſes, are readily evacuated.

They are to be made extremely ſoft, that the cure of the wound may not be retarded, by the pain they would otherwiſe bring on; but, that the wound may not be kept open too long, it is adviſeable, as ſoon as the part is ſufficiently cleanſed, and the ſinuſes are found to heal up, to leſſen the ſize of the *tents* by degrees, and, as ſoon as ſafely and conveniently may be, to leave then entirely off.

Many ſurgeons of great note have entirely forbid the uſe of *tents*, from the frequent obſervation of the ill effects ariſing from the ſurgeon's neglecting, or not knowing theſe neceſſary cautions.

There are, however, beſide theſe *tents* of ſcraped lint. another kind, made of linen rags not ſcraped, worked up into a conical form, to the baſis of which is faſtened a ſtrong thread; the apex of it muſt be a little unravelled, to make it ſofter, that it may not become painful. The thread is faſtened to the baſis, that it may be recovered with the greateſt eaſe, if by any accident it ſhould be forced into the cavity of the thorax, or abdomen; for theſe ſorts of *tents* are chiefly uſed to keep open wounds that penetrate into the thorax or abdomen; in order to make way for the proper diſcharge of blood, matter, &c. by the mouth of the wounds.

There is a third ſort of *tents*, whoſe office is not only to keep open, but to enlarge by degrees, the mouth of any wound, or ulcer, which ſhall be thought too ſtrait, by which means a freer paſſage may be procured for the blood or matter that was confined; and that the proper medicines may find more ready admittance.

Theſe *tents* are uſually called *ſponge-tents*, and are made either of ſponge, or of the roots of gentian, calamus aromaticus, &c. for theſe kinds of things imbibe the matter that flows to them, and being enlarged, by that means, dilate the lips of the wound. Heiſter's Surg. Introd. p. 19.

Several chirurgical writers, and particularly the author of the *Hoſpital-Surgeon*, give us numerous inſtances wherein the uſe, eſpecially of hard *tents*, has proved prejudicial in protracting the cure; bringing on inflammations, ſinuſes, mortifications, &c. in wounds and ulcers.—To remedy this, he propoſes, that the liniments, &c. be made of a liquid conſiſtence, either naturally, or by warming them; and that where *tents* may ſeem indiſpenſably neceſſary, as in large cavities, the orifice may be enlarged, and ſoft doſſils put inſtead of them; which will prevent the miſchiefs commonly attending *tents*.

TENTATIVE is ſometimes uſed adjectively: thus we ſay, a *tentative method*, meaning a kind of unartful or indirect method, which only proceeds by trying

Tentative is alſo uſed ſubſtantively, for an eſſay or effort, whereby we try our ſtrength, or ſound an affair, &c. to ſee whether or no it will ſucceed.

In the French univerſities TENTATIVE is the firſt theſis, or act, which a ſtudent in the theology-ſchool holds, to ſhew his capacity: if he anſwers well in this, the degree of bachelor is conferred on him.

TENTER, Trier, or Prover, a machine uſed in the cloth manufactory, to ſtretch out the pieces of cloth, ſtuff, &c. or only to make them even, and ſet them ſquare.

It is uſually about four feet and an half high, and, for length, exceeds that of the longeſt piece of cloth.—It conſiſts of ſeveral long, ſquare pieces of wood, placed like thoſe which form the barriers of a manege; ſo, however, as that the lower croſs-pieces of wood may be raiſed or lowered, as is found requiſite, to be fixed at any height, by means of pins.—Along the croſs-pieces, both the upper and under one, are hooked nails, called *tenter-hooks*, driven in from ſpace to ſpace.

To put a piece of cloth on the Tenter: while the piece is yet quite wet, one end is faſtened to one of the ends of the *tenter*; then it is pulled by force of arms towards the other end, to bring it to the length required: that other end being faſtened, the upper liſt is hooked on to the upper croſs piece, and the loweſt liſt to the loweſt croſs-piece, which is afterwards lowered by force, till the piece have its deſired breadth.—Being thus well ſtretched, both as to length and breadth, they bruſh it with a ſtiff hair-bruſh, and thus let it dry.—Then they take it off; and, till they wet it again, it will retain the length and breadth the *tenter* gave it.

TENTH, in *Engliſh Hiſtory*, ſee Land-*tax*. *Tenths* are ſaid to have been firſt granted under Henry II. who took advantage of the faſhionable zeal for croiſades to introduce this new taxation, in order to defray the expence of a pious expedition to Paleſtine, which he really or ſeemingly had projected againſt Saladine, emperor of the Saracens; whence it was originally denominated the Saladine *tenth*. But afterwards FIFTEENTHS were more uſually granted than TENTHS.

Tenth, *decima*. See First-*fruits*, and Tithe.

Tenth *pair of nerves*. See Nerve.

TENTHREDO, in *Natural Hiſtory*, the name of a fly of the ſtinging kind. It is of the ſize and ſhape of the bee, but of the colour of the waſp. It loves to be among meat, as in kitchens and larders; it is a very gregarious animal, but makes no honey, though whole ſwarms live together.

The *tenthredo*, in the Linnæan ſyſtem, is a genus of the *hymenoptera* order of inſects. Its characters are, that the mouth has maxillæ without a proboſcis; the wings are plane and tumid; the ſting conſiſts of two lamina, that are ſerrated, and a little prominent; and the ſcutellum is formed of two grain-like bodies ſeparate from each other. Linnæus enumerates fifty-five ſpecies, diſtinguiſhed by the form of their antennæ.

Tenths, *office of*, is kept in the Temple, under the direction of a receiver and his clerks.

TENTORES, among the *Romans*, were perſons appointed to hold the cloaths of the charioteers that contended in the circus.

TENUIROSTRÆ, in *Ornithology*, the name of a genus of ſmall birds, which feed on inſects, and have ſlender and ſharp beaks; of this genus are the lark, ſwallow, red-breaſt, and a number of others. Ray's Ornithology, p. 148.

TENURE, Tenura, in *Law*, the manner or condition wherein a tenant holds lands, or tenements, of his lord; or the ſervices performed to the lord, in conſideration of the uſe and occupancy of his lands.

The kinds of ſervice, and, conſequently, of *tenures*, are almoſt infinite. See Service.

Thoſe for lands held of the king, are either *great*, or *petty ſergeanty*, *in capite*, *knight's ſervice*, &c.

Thoſe held of the lords were very various, *baſe*, *frank*, &c. by *homage*, *ſocage*, &c. See Base, Frank, &c.

The common *tenures*, at this day, are fee-ſimple, fee-tail, by courteſy, in dower, for life, or for years, or by copy of court-roll.

Tenure, *barons by ancient*. See Baron.

Tenure, *diſturbance of*, in *Law*, is a ſpecies of injury which conſiſts in breaking that connection, which ſubſiſts between the lord and his tenant, and to which the law pays ſo high a regard, that it will not ſuffer it to be wantonly diſſolved by the act of a third perſon. If, therefore, there be a tenant at will of any lands or tenements, and a ſtranger either by menaces or threats, or by unlawful diſtreſſes, or by fraud and circumvention, or other means, contrives to drive him away, or inveigle him to leave his tenancy, this the law very juſtly conſtrues to be a wrong and injury to the lord; and gives him a reparation in damages againſt the offender by a ſpecial action on the caſe Blackſt. Com. vol. iii. p. 242.

TEPAPA. See Taroataihetoomo.

TEPETOTOTL, in *Ornithology*, the name of a Braſilian bird, of the gallinaceous kind, more uſually called MITUPORANGA.

TEPHRIA, in the *Natural Hiſtory of the Ancients*, a name given to the grey OPHITES.

TEPHROMANTIA, τεφρομαντεια, in *Antiquity*, a ſpecies of divination, performed with aſhes; for which ſee Potter, Archæol. Græc. tom. i. p. 353.

TEPID, in *Natural Hiſtory*, a term uſed by writers on mineral waters, to expreſs ſuch of them as have a leſs ſenſible cold than common water.

They diſtinguiſh all the medicinal ſprings into three kinds; the hot, the *tepid*, and the cold; but the middle term might eaſily be miſunderſtood to mean a great deal more than they expreſs by it; all that have what can be called the leaſt ſenſible warmth, are called *hot*: and the *tepid* are diſtinguiſhed from the abſolutely cold, only by their being leſs cold.

Some of this claſs of mineral waters, and ſome few alſo of the cold ones, have a ſharpiſh vinous taſte, which is never obſerved in any of the hot ones. This taſte is loſt on giving the waters the ſlighteſt heat, and is therefore very difficult to be gueſſed at as to its origin. It is not only found in the aluminous and vitriolate waters, but alſo in thoſe which are manifeſtly nitrous, and which abound in ſulphureous ſalts, quite different in their nature from acids. It is therefore an additional ſomewhat, quite diſtinct from the ſaline properties of the fluid, and as eaſily connected with one kind of that as with the others.

The cauſe of heat in the mineral waters remains yet wholly unknown, notwithſtanding all that has been written concerning it. It is hard to believe, that there are continual ſubterranean fires near enough the ſurface, to give a heat that preſerves itſelf in ſo great a degree to the very place of their eruptions; and it is equally hard to conceive, that there can be beds of fermenting mineral matters, ſufficient in quantity and force to have given the ſame degree of heat to waters for ſo many ages, as ſome of our hot ſprings are known to have ſubſiſted. Duclos's Exam. des Eaux Miner.

TEPIDARIUM, among the Romans, a *tepid*, or blood-warm bath, which was joined to the cold and hot baths, and was a medium between the two; ſo that if any perſon wanted to go from the hot to the cold bath, or *vice verſa*, he always took the *tepid* bath in his way.

TERATOSCOPIA, formed of τερας, *prodigy*, and σκοπεω, *I conſider*, a kind of divination by the appearance and view of monſters, prodigies, ſpectres, and phantoms.

TERBEDH, in the *Materia Medica*, a name given by Avicenna to the *turbith*, a purging drug, mentioned by all the authors of his time; but, in general, in a very confuſed manner.

Garcias tells us, that the Indians uſe it to purge phlegm, and that they add ginger to it by way of corrective; and Avicenna ſays the ſame thing of its uſe in his time.

TERDINA, in the *Materia Medica*, a name by which Paracelſus, and ſome other authors, have called the *great garden-valerian*. Ger. Emac. Ind. 2.

TEREBELLA, in the Linnæan ſyſtem of *Natural Hiſtory*, a genus of the *molluſca* order of worms. Its characters are: that the body is filiform, and from the mouth iſſues a tubuloſe gland; and the tentacula about it are numerous and capillary. There is one ſpecies, found in the clifts of the rocks in the Mediterranean ſea.

TEREBINTHUS, in *Botany*. See Mastich-*tree*.

TEREBINTHINA, in *Medicine*, *Natural Hiſtory*, &c. See Turpentine.

TEREBOTIN, a word uſed by Paracelſus for the common turpentine.

TEREBRA, the name of a chirurgical inſtrument, uſed for the perforation of bones, or for the extracting of bullets, or other the like extraneous bodies, out of wounds. See Trepan.

TEREBRATULA, in *Natural Hiſtory*, a name given by Mr. Lhuyd and Gualtieri to ſome ſpecies of the ſmooth conchæ anomiæ, which have near the head of the ſhell a ſmall hole, which looks as if bored by art. See Conchæ *anomiæ* and Shells.

TEREDO, a name given by naturaliſts, to a ſpecies of ſea-worm, which eats its way into the bottoms of ſhips, lining the hole it makes with a kind of ſhelly matter.

In the Linnæan ſyſtem, the *teredo* is a genus of the *teſtacea* order of worms, the animal of which is a *terebella*; the two maxillæ are calcareous, hemiſpherical, cut off before, and angulated below; the ſhell is round, bending, and capable of penetrating wood. There is one ſpecies, called by Linnæus *calamitas navium*.

The head of this creature is well prepared by nature for the hard offices it is to undergo, being coated with a ſtrong armour, and furniſhed with a mouth like that of the leech; by which it pierces wood; as that animal does the ſkin; a little above this it has two horns which ſeem a kind of continuation of the ſhell; the neck is as ſtrongly provided for the ſervice of the creature as the head, being furniſhed with ſeveral ſtrong muſcles; the reſt of the body is only covered by a very thin and tranſparent ſkin, through which the motion of the inteſtines is plainly ſeen by the naked eye; and by means of the microſcope, ſeveral other very remarkable particulars become viſible there.

This creature is wonderfully minute, when newly excluded from the egg, and at its utmoſt bigneſs is a foot long; three or four inches are however its more frequent length.

When the bottom of a veſſel, or any other piece of wood conſtantly under water, is inhabited and injured by ever ſo great a number of theſe worms, there is no ſign of the damage to be perceived on the ſurface, nor are the creatures viſible till the outer part of the wood is cut or broken away; then their ſhelly habitations come in ſight: theſe lie ſo near the ſurface, however, as to have an eaſy communication with the water, and there are a multitude of little perforations in the very ſurface through which the inhabitant-inſects throw out the extremities of their little ſhelly horns; theſe are of a reddiſh colour, and may be diſtinguiſhed by an accurate obſerver in form of ſo many red prominent points; they all are retracted on the leaſt touch, and are thrown out again as ſoon as all is quiet. From theſe points, or the ſmall apertures which give them a way out, are the cells of the *teredines* to be traced. They are compoſed of a pearly or ſhelly matter, which forms a long tube with various windings and turnings, which mark the abode of the creature; but which uſually neither adheres to the body of the animal, nor to the wood. Theſe caſes or tubes are always more or leſs looſe in the wood, and there is ever a large ſpace within them, for the body of the animal to be ſurrounded every way with water. They are very ſmooth on the inner ſurface, and ſomewhat rougher without; and are much harder and firmer in the cells of the older and larger animals than in thoſe of the young ones.

Theſe ſhelly tubes are compoſed of ſeveral rings, or annular parts; but theſe differ greatly in their length. There is an evident care in theſe creatures, never to injure one another's habitations; by this means each tubule or caſe is preſerved entire, and in ſuch pieces of wood as have been found eaten by them into a ſort of honeycomb, there never is ſeen a paſſage or communication between any two of the tubules, though the woody matter between them often is not thicker than a piece of writing-paper.

The vaſt increaſe of theſe animals, and their ſhelly tubules, naturally lead to a conſideration of the manner of their generation; and when we conſider that each of theſe creatures is, from the time when it is produced from the egg, immediately lodged in a cell, in which it lives without the leaſt poſſibility of getting into that of another animal of its own kind, or receiving one of them into its own, it is not eaſy to account for the propagation of the ſpecies in the common way. This, however, is ſolved by an accurate anatomical obſervation of the animals themſelves, ſince in every individual the parts of generation of both ſexes, and both the ſemen and ovula are found. Each individual therefore evidently ſerves by itſelf for the propagation of the ſpecies; and this is probably very often the caſe in earthworms, and other of the hermaphrodite animals. All the yet known kinds of theſe being ſoft-bodied; and probably, though they often meet one another, and copulate in pairs, yet when they have not opportunity, the parts copulate in the individual.

Eggs are found in great plenty in the bodies of theſe animals in June, and are diſcharged with the water into the ſea, where the far greater part of them, doubtleſs, become food for other ſmall marine animals; and the few that affix themſelves to any piece of wood they are waſhed againſt, hatch and get into its ſubſtance in the manner of their parents.

The kind of wood in which theſe worms are lodged, makes a great difference in the appearance of their cells, as they work much more ſpeedily and ſucceſsfully in ſome kinds than in others. The fir and alder are the two kinds they ſeem to eat with the greateſt eaſe, and in which they grow to the greateſt ſize. In the oak they ſeem to make but a very ſlow progreſs, and uſually appear very ſmall and poorly nouriſhed. The colour of their ſhelly tubules is often brown in this wood; which ſeems plainly owing to the effect of its juices.

Poiſonous ointments are alſo found to be of ſome uſe in deſtroying them, on rubbing over the wood; ſome have thought that burning the ſurface was an effectual way of preſerving them, but this has been found to be otherwiſe. The ſureſt method of avoiding them in particular works, is the uſing bitter or very ſolid woods; the firſt kind they are found never to touch, and in the other they make but ſlow progreſs. Mixtures of lime, ſulphur, and colocynth, with pitch, for covering over the ſurfaces of boards, &c. have been found of ſome uſe.

It ſeems very evident, that boards and other pieces of wood have been ſubject to be eaten by theſe animals, from all times that we have any knowledge of; for the ſtone called *lapis ſyringoides* is evidently no other than wood thus eaten, petrified by long lying in the earth, together with the tubules of the worms. The maſſes of this with the grain of wood yet plain in them, are common in many places among ſea-ſhells, and other marine remains at great depths, and have evidently been brought thither in very diſtant times, and before thoſe changes were made in the ſurface of the earth of which we have no accounts in our earlieſt hiſtories. Sellii Hiſt. Natur. *Teredinis*.

TERENJABIN, in the *Materia Medica* of the ancient Arabians, a word uſed to expreſs a kind of manna called by ſome *manna maſtichina*, from its round globules reſembling the drops of maſtic, and by the phyſicians of many parts of the world at preſent manna *Perſicum*. See farther about this drug in Philoſ. Tranſ. Nº 472.

TERES, in *Anatomy*, a name given to two muſcles of the arms, called alſo *rotundi*; diſtinguiſhed by *major* and *minor*.

Teres, or *rotundus major*, ariſes from the lower angle of the baſis of the ſcapula, and, aſcending obliquely upwards, in a round, ſmooth body, under the head of the longus, is inſerted, with a ſhort flat tendon, below the os humeri. See *Tab. Anat.* (*Myol.*) *fig.* 1. *n.* 40.

The *teres major*, by being inſerted in the os humeri in a direction parallel to the latissimus *dorſi*, becomes a congener to the ſuperior and poſterior portion of that muſcle, and accordingly moves the os humeri in the ſame manner with it. It turns the bone around its axis, when the fore-arm is carried behind the back. It likewiſe pulls the arm directly backward, without moving it round its axis; for which purpoſe this muſcle, as well as the latiſſimus dorſi, needs the aſſiſtance of other antagoniſt muſcles, and particularly of the *teres minor*. The tendons of the *teres major* and latiſſimus dorſi are very near each other; being both inſerted, according to their breadth, in the ſame line, along the edge of the bony channel of the os humeri, oppoſite to the interſection of the pectoralis *major* in the other edge of the ſame channel. Theſe two tendons croſs each other in the ſame plane, ſo that the *teres major* may become a particular antagoniſt to the ſuperior portion of the pectoralis major, and the latiſſimus dorſi to the inferior portion; and both muſcles, taken together, may be a common antagoniſt to the pectoralis major, when that whole muſcle acts at the ſame time. The *teres major* may likewiſe move the ſcapula on the os humeri, by drawing the inferior angle downward, and bringing it nearer the arm; but in order to this, the arm muſt be kept immoveable by ſome conſiderable force. By this action it may likewiſe aſſiſt in raiſing the ſhoulder, or in preventing its ſinking. Winſlow.

The **Teres**, or *rotundus minor*, called alſo *tranſverſalis*, is frequently wanting, or at leaſt, is ſo confounded with the infraſpinatus, that it is loſt therein. It ariſes from the inferior angle of the ſcapula, and, aſcending obliquely in a round fleſhy body, paſſes over the upper head of the former; and is inſerted by a ſhort, flat tendon, below the os humeri.

This muſcle may turn the arm, when depreſſed, round its axis, from before outward; as it happens when the fore-arm being bent, and applied to the fore-part of the breaſt, is removed from thence, without moving the elbow from the ſide. This rotation is in a contrary direction to that performed by the ſubſcapularis and *teres major*. It may alſo pull the arm directly backward, whether raiſed or depreſſed; the ſubſcapularis acting at the ſame time as a moderator to prevent the rotation. Winſlow.

Teres *folium*. See **Leaf**.

Teres *pronator radii*. See **Pronator**.

TERETRON, the name of a chirurgical inſtrument, more uſually called **terebra**.

TERFEZ, in *Natural Hiſtory*, the name given by the Africans to the truffles found in the deſarts of Numidia, and other places in that part of the world, in great abundance.

Theſe are much more delicately taſted than the European truffles, and are white on the outſide. They are called by ſome of the Africans *kema*, and by the Arabian writers *cantha* and *camahe*.

TERGIFOETOUS *plants*, ſuch as bear their ſeeds on the backſides of their leaves. Such are the capillaries. See **Capillary**.

TERM, **Terminus**, the extreme of any thing, or that which bounds and limits its extent. See **Extreme**.

Term, in *Geometry*, is ſometimes uſed for a point, ſometimes for a line, &c. A line is the *term* of a ſuperficies, and a ſuperficies of a ſolid.

This is what the ſchools call *terminus quantitatis*.

Term, in *Law*, ſignifies a boundary, or limitation of time, or eſtate.

In this ſenſe we ſay, a leaſe for *term* of life, for *term* of years, &c.

Terms, **Termes**, **Termini**, in *Architecture*, denote a kind of ſtatues, or columns, adorned a-top with the figure of a man's, woman's, or ſatyr's head, as a capital; and the lower part ending in a kind of ſheath, or ſcabbard. See **Hermes**, and *Tab. Archit. fig.* 39.

Some write the word *thermes*, from *Hermes*, a name the Greeks gave the god Mercury; whoſe ſtatue, made after this manner, was placed in ſeveral of the croſs ways in the city of Athens, &c. Others bring the etymology of the word from the Roman god *Terminus*, the protector of land-marks; whoſe ſtatue (made without hands or feet, that he might not change his place) was uſed to be planted at the bounds of lands, to ſeparate them.

Terms are ſometimes uſed as conſoles, and ſuſtain entablatures; and ſometimes, as ſtatues, to adorn gardens. Of theſe *termini* the architects make great variety; viz. *angelic*, *ruſtic*, *marine*, *double*, in *buſt*, &c.

Terms, *military*, *termini miliares*, among the ancient Greeks, were the heads of certain divinities, placed on ſquare land-marks of ſtone, or on a kind of ſheath, to mark the ſeveral ſtadia, &c. in the roads. Theſe are what Plautus calls *lares viales*.

They were uſually dedicated to Mercury, whom the Greeks believed to preſide over the highways.

Some of them were repreſented with four heads, ſuch as we ſtill ſee in Rome, at the end of the Fabrician bridge; which is hence called, *ponte de quattro capi*. It is known, that Mercury was thus repreſented, and alſo called by the Latins *Mercurius quadrifrons*; as being ſuppoſed the firſt who invented the uſe of letters, muſic, wreſtling, and geometry. See **Hermes**.

Terms are alſo uſed for the ſeveral times or ſeaſons of the year, wherein the tribunals, or courts of judicature, are open to all who think fit to complain of wrong, or to ſeek their rights by due courſe of law, or action; and during which the courts in Weſtminſter-hall ſit and give judgment. But the high court of parliament, the chancery, and inferior courts do not obſerve the *terms*; only the courts of King's-bench, Common Pleas, and Exchequer, which are the higheſt courts at common law. In contradiſtinction to theſe, the reſt of the year is called *vacation*.

Of theſe *terms* there are four in every year, during which time matters of juſtice are diſpatched.

Hilary-term, which, at London, begins the twenty-third day of January, or if that be Sunday, the next day after; and ends the twelfth of February following.

Eaſter-term, which begins the Wedneſday fortnight after Eaſter-day, and ends the Monday next after Aſcenſion-day.

Trinity-term, beginning the Friday next after Trinity-Sunday, and ending the Wedneſday fortnight after.

Michaelmas-term, which begins the ſixth of November, and ends the twenty-eighth of November following.

Each of theſe *terms* have alſo their **returns**.

Theſe *terms* are ſuppoſed by Mr. Selden to have been inſtituted by William the Conqueror; but ſir H. Spelman hath ſhewn, that they were gradually formed from the canonical conſtitutions of the church; being no other than thoſe leiſure ſeaſons of the year, which were not occupied by the great feſtivals or faſts, or which were not liable to the general avocations of rural buſineſs. Throughout all Chriſtendom, in very early times, the whole year was one continual *term* for hearing and deciding cauſes. For the Chriſtian magiſtrates, in order to diſtinguiſh themſelves from the Heathens, who were very ſuperſtitious in the obſervation of their *dies faſti* and *nefaſti*, adminiſtered juſtice upon all days alike; till at length the church interpoſed, and exempted certain holy ſeaſons from being profaned by the tumult of forenſic litigations; as, particularly, the time of Advent and Chriſtmas, which gave riſe to the winter vacation; the time of Lent and Eaſter, which created that in the ſpring; the time of Pentecoſt, which produced the third; and the long vacation, between Midſummer and Michaelmas, which was allowed for the hay-time and harveſt. All Sundays alſo, and ſome peculiar feſtivals, as the days of the Purification, Aſcenſion, &c. were included in the ſame prohibition, which was eſtabliſhed by a canon of the church, A. D. 517, and fortified by an imperial conſtitution of the younger Theodoſius, comprized in the Theodoſian code. Afterwards, when our own legal conſtitution was eſtabliſhed, the commencement and duration of our law *terms* were appointed, with a view to theſe canonical prohibitions; and it was ordered by the laws of king Edward the Confeſſor, that from Advent to the octave of the Epiphany, from Septuageſima to the octave of Eaſter, from the Aſcenſion to the octave of Pentecoſt, and from three in the afternoon of all Saturdays till Monday morning, the peace of God and holy church ſhall be kept throughout the whole kingdom.

And ſo extravagant was afterwards the regard paid to theſe holy times, that though the author of the Mirror mentions only one vacation of conſiderable length, containing the months of Auguſt and September, yet Britton ſays, that in the reign of king Edward I. no ſecular plea could be held, nor any man ſworn on the Evangeliſts, in the time of Advent, Lent, Pentecoſt, harveſt, and vintage, the days of the great litanies, and all ſolemn feſtivals. He adds, that the biſhops and prelates granted diſpenſations for taking aſſizes and juries in ſome of theſe holy ſeaſons, upon reaſonable occaſions; and ſoon after a general diſpenſation was eſtabliſhed in parliament by ſtat. Weſtm. 1. 3 Edw. I. cap. 51. that aſſizes of novel diſſeiſin, *mort d'anceſtor*, and darrein preſentment, ſhould be taken in Advent, Septuageſima, and Lent, as well as inqueſts; at the ſpecial requeſt of the king to the biſhops. The portions of time that were not included within theſe prohibited ſeaſons, fell naturally into a fourfold diviſion; and from ſome feſtival, or ſaint's day, that immediately preceded their commencement, were denominated the *terms* of St. Hilary, of Eaſter, of the Holy Trinity, and of St. Michael: which *terms* have been ſince regulated and abbreviated by ſeveral acts of parliament; particularly Trinity-*term* by ſtat. 32 Hen. VIII. cap. 2. and Michaelmas-*term* by ſtat. 16 Car. I. cap. 6. and again by ſtat. 24 Geo. II. cap. 48. Blackſt. Com. vol. iii. p. 276.

Terms, *Oxford*. *Hilary* or *Lent term* begins January 14, and ends the Saturday before Palm-Sunday. *Eaſter term* begins the tenth day after Eaſter, and ends the Thurſday before Whitſunday. *Trinity term* begins the Wedneſday after Trinity-Sunday, and ends after the act, or 6th of July, ſooner or later, as the vice-chancellor and convocation pleaſe. *Michaelmas term* begins October the 10th, and ends December the 17th.

Terms, *Cambridge*. *Lent term* begins January the 14th, and ends Friday before Palm-Sunday. *Eaſter term* begins the Wedneſday after Eaſter-week, and ends the week before Whitſunday. *Trinity term* begins the Wedneſday after Trinity-Sunday, and ends the Friday after the commencement, or 2d of July. *Michaelmas-term* begins October the 10th, and ends December the 16th.

Terms, *Scottiſh*. In Scotland, *Candlemas-term* begins January the 23d, and ends February the 12th. *Whitſuntide-term* begins May the 25th, and ends June the 15th. *Lammas-term*, begins July the 20th, and ends Auguſt the 8th. *Martinmas-term* begins November the 3d, and ends November the 29th.

Terms, *Iriſh*. In Ireland the *terms* are the ſame as at London except *Michaelmas-term*, which begins October the 13th, and adjourns to November the 3d, and thence to the 6th.

Term, in *Grammar*, denotes ſome word, or expreſſion in a language. See Word.

The word *term*, *terminus*, is borrowed metaphorically, by the grammarians and philoſophers, from the meaſurers or ſurveyors of lands: as a field is defined and diſtinguiſhed by its *termini*, or limits, ſo is a thing or matter ſpoken of, by the word or *term* it is denoted by.

Term, in the *Arts*, or Term *of art*, is a word which, beſides the literal and popular meaning which it has, or may have, in common language, bears a farther and peculiar meaning in ſome art or ſcience. See Art.

Or, a *term* is a word which has one or more meanings beſide its grammatical one; or which has a peculiar force or import in the language of ſome particular ſcience or art.

A word then becomes a *term* when its idea is rendered more complex, conſiſts of more parts, and includes more ſpecial circumſtances, on ſome occaſions than others.

It is this greater complexneſs, this exceſs of conſtituent parts of the idea, that denominates it a *term* in the general.

Farther, as the parts of the idea, ſignified by any word, are arbitrary; and as one may not only add new parts, to thoſe contained in the literal meaning, but alſo ſuperadd others to them, alter them, extend them, and otherwiſe modify them, at pleaſure; hence the ſame word becomes a *term* of this or that art, or both, as the inventors or improvers of thoſe arts have thought fit to adopt it for the common baſis of certain ideas, and to modify and circumſtantiate its meaning to the uſe of their reſpective arts.

See the nature and office of a *term* farther illuſtrated in the preface to this work. See Definition.

Terms, *abſtract*, *complex*, *concrete*, *equivalent*, *equivocal*, *general*, *relative*, *ſynonymous*, *univocal*, ſee the adjectives.

Term, in *Logic*. A proposition is ſaid to conſiſt of two *terms*, i. e two principal and eſſential words, the *ſubject* and the *attribute*.

A syllogism conſiſts of three *terms*, the *major*, *minor* and *concluſion*.

Terms *of an equation*, in *Algebra*. See Equation.

Terms *of proportion*, in *Mathematics*, are ſuch numbers, letters, or quantities, as are compared one with another. See Proportion.

Terms, or courſes, in *Medicine*, the menses, or women's monthly purgations.

TERMES, in the Linnæan ſyſtem of *Natural Hiſtory*, a genus of the *aptera* order of inſects. Its characters are; that it has ſix feet formed for running; two eyes; ſetaceous antennæ and a mouth with two jaws. Linnæus enumerates three ſpecies, one of which is the death-*watch*; another ſpecies is the *termes fatalis*; which he repreſents as the greateſt calamity of both Indies, becauſe of the havoc they make in all kinds of wooden buildings, utenſils, and furniture, as nothing but metal or ſtone can eſcape their deſtructive jaws. The animals of this ſpecies have lately been minutely deſcribed by Mr. Smeathman, from whoſe account the following particulars are extracted.

The *termites*, which have been taken notice of by various travellers in different parts of the torrid zone, and called by the name of *white ants*, reſemble the ants in their manner of living, which is in communities, forming extraordinary neſts in the ſurface of the ground, and various ſubterraneous paſſages, and alſo in their provident and diligent labour; but in both reſpects much ſurpaſs them. This writer obſerves, that the inſect in its perfect ſtate has four wings without any ſting, and ſhould therefore be ranged under the *neuroptera*, and not under the aptera of the Linnæan ſyſtem. The communities of *termites* conſiſt of one male and one female, generally the parents of all the reſt, and of three orders of inſects, apparently of very different, though really of the ſame ſpecies. Thoſe of the firſt order are the working inſects, or labourers; the ſecond comprehends the fighting inſects, or ſoldiers, which do no labour; and the third are the winged ones, or perfect inſects, which are male and female, and capable of propagation, but neither labour nor fight; the kings and queens belong to this order, and within a few weeks after they are elected and elevated to this rank, they migrate, and either eſtabliſh new kingdoms, or periſh within a day or two. The largeſt ſpecies, called *termes bellicoſus*, is the beſt known on the coaſt of Africa; it erects immenſe buildings of well-tempered earth or clay, which are conſtructed with ſignal ingenuity: it does infinite miſchief in one reſpect, and in another it is peculiarly important and uſeful, by deſtroying thoſe vegetable or animal ſubſtances which incumber the earth, and are noxious on account of their putridity. The buildings which theſe inſects erect, are in their general form like ſugar-loaves, and about ten or twelve feet high; and conſiſt of an exterior part, which is large and ſtrong; and an interior, which is the habitable part, divided into many apartments for the reſidence of the king and queen, the nurſing of their progeny, the accommodation of the ſoldiers and labourers, or magazines of proviſion. There are other neſts or habitations conſtructed by other ſpecies, which are in the form of turrets, or upright cylinders, and contain a number of cells: they are of two ſizes, for the accommodation of a larger and ſmaller ſpecies: and again another kind of neſts, which is the habitation of a diſtinct ſpecies; this is generally ſpherical or oval, and built in trees.

Of the three orders above mentioned, the labourers, which are about one fourth of an inch long, are the moſt numerous; the ſoldiers are about half an inch long, and equal in bulk to fifteen of the labourers; the mouth of the latter is evidently calculated for gnawing and holding bodies, whereas that of the former, or ſoldiers, has its jaws ſhaped like two ſharp awls, a little jagged, and as hard as a crab's claws, ſo that they are incapable of any thing but piercing or wounding: in inſects of the third order, which have arrived at their perfect ſtate, the head, thorax, and abdomen, are wholly different from thoſe of the other orders, and they are furniſhed with four large browniſh tranſparent wings; their length is ſix or ſeven tenths of an inch, and each is equal in bulk to thirty labourers: they have now two eyes which are viſible, whereas if they had them before they are not diſtinguiſhable. Theſe inſects are gathered and eat by the inhabitants, and reckoned both delicious and nouriſhing food. The king and queen are lodged in apartments, which are cloſed up, ſo that a paſſage remains merely for the ingreſs and egreſs of the labourers and ſoldiers, but at which neither of the royal pair can come out: and in the buſineſs of propagation the abdomen of the female extends to an enormous ſize, ſo that an old queen's will be fifteen hundred or two thouſand times the bulk of the reſt of her body, and twenty or thirty thouſand times the bulk of a labourer, and by its periſtaltic motion, are protruded eggs to the amount of ſixty in a minute, or eighty thouſand and more in twenty-four hours; the eggs are removed by the attendants into the nurſeries, and after they are hatched, the young are provided with every thing neceſſary till they are able to ſhift for themſelves. It is remarkable of all the different ſpecies of *termites*, that the working and fighting inſects never expoſe themſelves to the open air; but either travel under ground, or within ſuch trees or ſubſtances as they deſtroy, or through pipes made of the ſame materials with their neſts. The *termites* which build in trees, frequently conſtruct their neſts within the roofs and other parts of houſes, to which they do conſiderable damage, unleſs ſoon extirpated; and the larger ſpecies enter under the foundations of houſes, through the floors, or bore through the poſts of buildings, making lateral perforations and cavities, as the proceed. They are equally deſtructive when they get into a trunk containing cloaths and other things, and into ſtores, &c.

There is another ſpecies, called the *marching termites*, which is much larger, and ſeems to be leſs frequent than the other. For an account of thoſe, and many other curious particulars, we muſt refer to Philoſ. Tranſ. vol. lxxi. part i. art. 11. p. 139—192.

TERMINALIA, in *Antiquity*, feaſts celebrated by the Romans, in honour of the god Terminus.

Varro is of opinion, that this feaſt took its name from its being at the *term* or end of the year: but Feſtus is of a different ſentiment, and derives it from the name of the deity in whoſe honour it was held.

In reality, the *Terminalia*, or feaſts of land-marks, were held in honour of Jupiter, conſidered in the capacity of conſervator of land-marks or bounds. Dionyſius Halicarnaſſeus tells us, that it was Numa Pompilius who firſt conſecrated land-marks to Jupiter; and adds, that the ſame prince appointed an anniverſary day wherein the country-people, aſſembling together on the bounds of the lands, ſhould offer ſacrifices in honour of the tutelary gods thereof.

The *Terminalia* were held on the ſeventh, or, as Struvius will have it, on the tenth of the calends of March. No animal is to be ſacrificed herein, it being deemed unlawful to ſtain the land-marks with blood: they only offered ſacrifices of the firſt fruits of the earth; and this in the open air, and on the ſpot where the land-marks were.

TERMINALIA, in *Botany*, a genus of the *polygamia monoecia* claſs. Its characters are: that it has male and hermaphrodite flowers; the calyx of the male is divided into five ſegments; it has no corolla, and ten ſtamina; the hermaphrodite has the flower of the male, a ſingle ſtyle; and the fruit is a boat-ſhaped drupe. There is one ſpecies.

TERMINANDO *et audiendo*. See AUDIENDO.

TERMINANS, *punctum*. See PUNCTUM.

TERMINATION, TERMINATIO, in *Grammar*, the ending of a word, or the laſt ſyllable thereof.

They are the different *terminations* of one and the ſame words on different occaſions, that conſtitute the different caſes, numbers, tenſes, moods, &c.

TERMINATOR, in *Aſtronomy*, a name ſometimes given to the CIRCLE of *illumination*, from its property of terminating the boundaries of light and darkneſs.

TERMINER, in *Law*. See OYER.

TERMINI, in *Architecture*. See TERMS.

TERMINISTS, TERMINISTÆ, in *Eccleſiaſtical Hiſtory*, a ſect or party among the Calviniſts, whoſe particular tenets are reducible to five points:

1°, That there are ſeveral perſons, both in and out of the church, to whom God has fixed a certain term before their death, after which he no longer wills their ſalvation, how long ſoever they live afterwards. 2°, That God has fixed this fatal term of grace by a ſecret decree. 3°, That this term once elapſed, he makes them no farther offer of repentance or ſalvation, but takes away from his word all the power it might have to convert them. 4°, That Pharaoh, Saul, Judas, moſt of the Jews, and many of the Gentiles, were of this number. 5°, That God ſtill bears with ſeveral of this ſort of people, and even confers benefits on them after the terms expired; but that he does not do it with any intention they ſhould be converted.

All the other proteſtants, and particularly the Lutherans, look on theſe articles with abhorrence, as repugnant to the goodneſs of God, and deſtructive to all Chriſtian virtue; and as contrary to Scripture, particularly the following texts, Ezek. xviii. 23, 30, 31, 32. xxxiii. 11. 1 Tim. iv. 1, 16. 2 Pet. iii. 9. Acts xvii. 30, 31. Mat. xi. 28. Iſa. lxvi. 2. Heb. iii. 7. 13. Rom. ii. 5, &c.

TERMINUS, τερμα, ſignifies a bound or limit.

TERMINUS *a quo*, in *Metaphyſics*, denotes the place, from whence any motion commences; in contradiſtinction from the other extreme, which is called the *terminus ad quem*.

The ſchoolmen call privation a *terminus a quo*, in ſpeaking of generation, which they conſider as a ſpecies of motion.

TERMINUM, *ad, qui præteriit*. See AD TERMINUM.

TERMINUM, *infra, quare ejecit*. See QUARE.

TERMITES. See TERMES.

TERMOR, *tenens ex termino*, in *Law*, he that holds lands or tenements for a term of years, or life.

TERN, *brown*, in *Ornithology*, or STERNA *nigra* of Linnæus, is by ſome authors called the *brown* GULL. Mr. Ray deſcribes it as having the whole under-ſide white, the upper brown, the wings partly brown, partly aſh-colour; the head black; and the tail not forked: but Mr. Pennant conjectures, that this bird is the young of the greater *tern*. See STERNA.

TERN, *great*, or *ſea-ſwallow*, *ſterna hirundo* of Linnæus, has the bill and feet of a fine crimſon, the former tipt with black, ſtraight, ſlender, and ſharp-pointed; the crown and hind-part of the head black; the throat and whole under-ſide of the body white; the upper part, and coverts of the wings, a pale grey; the tail conſiſting of twelve feathers, the outer edges of the three outmoſt grey, the reſt white, and the exterior on each ſide two inches longer than the other, and cloſed in flying, ſo as to appear one ſlender feather.

Theſe birds frequent the ſea-ſhores, banks of lakes and rivers; they feed on ſmall fiſh and water inſects, hovering over the water, and ſuddenly darting into it to catch their prey. They breed among ſmall tufts of ruſhes, and lay three or four eggs of a dull olive colour, ſpotted with black. All the birds of this genus are very clamorous. Pennant.

TERN, *black*. See SCARE-*crow*.

TERNA, a word uſed by ſome authors to expreſs an IMPETIGO.

TERNA *folia*, among *Botaniſts*. See LEAF.

TERNARY *meaſure*. See MEASURE.

TERNARY *number*, in *Antiquity*, was eſteemed a ſymbol of perfection, and held in great veneration among the ancient mythologiſts. Whence Virgil,

> ——*Numero Deus impare gaudet.* Ecl. viii. ver. 75.

Servius on this place remarks, that the Pythagoreans aſcribed the *ternary* number to the ſupreme God, as being the beginning, middle, and the end of all things. All the heathen gods had a threefold power attributed to them, as the *tria virginis ora Dianæ*, the three-forked thunderbolt of Jupiter, the trident of Neptune, the three-headed dog of Pluto. Again, the Parcæ were three, the Furies three, Hercules was three nights in begetting, the Muſes were anciently three, the Graces three, &c.

This number was likewiſe uſed in moſt religious ceremonies, but eſpecially in luſtrations; whence Virgil, Æn. lib. xi. ver. 188.

> *Ter circum accenſos, cincti fulgentibus armis,*
> *Decurrere rogos*————

TERNATE, in *Zoology*, a ſpecies of BAT. See VAMPYRE.

TERPENTARIA, in *Botany*, a name uſed by ſome authors for the *betonica aquatica*, or great water-figwort, called *water-betony*.

TERPSICHORE, in *Mythology*, the name of one of the nine MUSES.

TERRA, in *Geography*. }
TERRA, in *Chemiſtry*. } See EARTH.
TERRA, in *Natural Hiſtory*. }

TERRA *alana*, a name given to the yellowiſh white TRIPOLI.

TERRA *adamica*, a name given to the alkaline red MOULD. See ADAMIC *earth*.

TERRA *Armenia*. See *Armenian* BOLE.

TERRA *de Baira*, in *Natural Hiſtory*, the name given by ſome to an earth of a white colour, found about Baira, near Palermo.

It is eſteemed a very great medicine in the cure of malignant fevers, and in the ſtopping hæmorrhages of all kinds. The powder of it is commonly ſold in Italy under the name of CLARAMONT-*powder*; a name it obtained from a perſon who firſt found out its virtues, and communicated them to the world in a treatiſe expreſly written on the ſubject. Boccone, Muſ. de Fiſic.

TERRA *carioſa*. See TRIPOLI.

TERRA, *Chia*, in the *Materia Medica of the Ancients*, an earth of the marle-kind, found in the iſland of Chio, and given internally as an aſtringent; but its chief uſe among them was as a coſmetic, the ladies eſteeming it the fineſt of all things for clearing the ſkin, and ſmoothing wrinkles. What title it has to theſe qualities, the world has not of late ages inquired into; but the ſubſtance is ſtill in being and to be had in any quantities from the ſame place. And the deſcriptions Dioſcorides and Galen have left us of it are ſo accurate, that there is not the leaſt room to doubt but that the earth now found there was the very kind they uſed. It is a denſe compacted earth, yet very ſoft and of a texture eaſily diſunited and broken by water.

TERRA *Cilicia*. See CILICIA.

TERRA, *cimolia*. See CIMOLIA.

TERRA, *cimolia purpuraſcens*. See SOAP-*earth*.

TERRA *Colonienſis*. See COLOGNE-*earth*.

TERRA *damnata*. See CAPUT *mortuum*.

TERRA *foliata tartari*, *foliated earth of tartar*, is a name improperly given to a neutral acetous ſalt, with a baſis of fixed vegetable alkali; or to a combination of the acid of vinegar, ſaturated with the alkali of tartar, or of other vegetable matter. This ſalt has alſo been called *regenerated* TARTAR, becauſe the alkali of tartar is united with an acid, which is in ſome reſpects ſimilar to the acid of tartar, but is in others very different.

The *terra foliata* is made by pouring upon a quantity of alkaline ſalt of tartar, in a glaſs-cucurbit, a ſufficient quantity of good diſtilled vinegar, at different times, to ſaturate all the alkali, or even a little more than is neceſſary for that purpoſe, till the efferveſcence entirely ceaſes. This ſaturated liquor is to be filtrated and evaporated to dryneſs, with a gentle heat. The dry ſalt thus obtained, is to be diſſolved in ſpirit of wine, and the ſolution again evaporated to dryneſs; by which means a ſalt is obtained more or leſs white, of a ſilky appearance and compoſed of ſmall ſcales or leaves, whence it has been called *foliata*. When the ſalt is dried, and while it is hot, it muſt be ſhut up in a well cloſed bottle, becauſe it quickly becomes moiſt by expoſure to air.

When diſtilled vinegar is poured upon ſalt of tartar, little or no efferveſcence is made at firſt, becauſe a part of the alkaline ſalt employed is generally cauſtic, or deprived of its gas, which part unites with the acid preferably

ably to the mild part of the alkali, and abſorbs any gas that is extricated from the latter part; and, therefore, till all the cauſtic part of the alkali be nearly ſaturated, little or no effervеſcence can happen. But when more vinegar is added, the effervеſcence becomes ſo conſiderable, that ſome of the liquor will, without care, flow over the veſſel. This effervеſcence is occaſioned by a large quantity of air that is diſengaged during the ſaturation. When the ſaturation is advanced to a certain degree, the effervеſcence diminiſhes; but the combination of the laſt portions of the acid and alkali may be facilitated by frequently agitating the liquor, which will renew the effervеſcence. The taſte of the foliated earth is ſharp, pungent, a little cauſtic, and partaking at the ſame time of the taſte of vinegar and that of fixed alkali. It is ſoluble in ſpirit of wine, and may be decompoſed merely by the action of fire, and from it may be obtained by diſtillation, a very penetrating and concentrated radical vinegar. It is little uſed except in medicine. Dict. Chem.

Preparations of this kind are given in doſes of ten or twenty grains as mild aperients, and to a dram or two as purgatives and diuretics. Lewis.

Terra *Goltbergenſis*. See Goltbergensis *terra*.

Terra *Japonica*. See Japan *earth*, and Catechu.

Terra *Lemnia*. See Lemnian *earth*.

Terra *Lignicenſis*. See Lignicensis *terra*.

Terra *Livonica*. See Livonica *terra*.

Terra *Melia*. See Melia *terra*.

Terra *Melitenſis*. See Melitensis *terra*.

Terra *merita*, in the *Materia Medica*, a name given by ſome authors to the curcuma, or turmeric-*root*.

It is from a falſe pronunciation of this name *terri merit*, that the Engliſh turmeric has its origin.

Terra *miſcella*. See Thraustomicthes.

Terra *Noceriana*. See Noceriana.

Terra *Samia*. See Samia *terra*.

Terra *Seleneuſiaca*. See Seleneusiaca.

Terra *ſigillata*. See Sigillata.

Terra *ſigillata magni ducis*. See Etrusca *terra*.

Terra *ſigillata fuſca*, a bole of a beautiful brown colour, found in Germany, England, and America.

It is of a denſe texture, makes no fermentation with the ſtrongeſt acids, and if thrown into water, it ſoon ſeparates into a number of thin flakes.

The Germans give it in fluxes and malignant fevers, be-being an excellent aſtringent, and worthy to be introduced into our ſhops.

Terra *Sileſiaca*, *Sileſian earth*, in the *Materia Medica*, a fine aſtringent bole, called by ſome authors *axungia ſolis*.

It is very heavy, of a firm compact texture, and in colour of a browniſh yellow. It breaks eaſily between the fingers, and does not ſtain the hands, is naturally of a ſmooth ſurface, and is readily diffuſible in water, and melts freely into a butter-like ſubſtance in the mouth; it leaves no grittineſs between the teeth, and does not ferment with acid menſtrua. Theſe are the characters by which it is known from all other earths of a like colour; it is found in the perpendicular fiſſures of rocks near the gold-mines at Strigonium in Hungary, and is ſuppoſed to be impregnated with the ſulphur of that metal. It is, however that be, a good aſtringent, and better than moſt of the boles in uſe. Hill.

The *terra Sileſiaca* is alſo called *terra ſigillata Strigonienſis*.

Terra *ſinopica*. See Sinopica *terra*.

Terra *ſolis*, in *Natural Hiſtory*, a name given by the German naturaliſts to a kind of black ſpungy earth, ſomewhat approaching to the nature of that Engliſh black earth which we call *kellow*, but containing gold. It is not properly an ore of gold, but is an earth into which ſome ſmall particles of gold have been waſhed from ſome other place, and there detained. A good microſcope will diſcover theſe particles in the richer pieces of the earth, and they are bright and pure, though very ſmall: the earth is found in fiſſures of the other ſtrata, not in any beds or ſtrata of itſelf. It is not to be had in any great quantity, nor does it contain any large portion of gold.

Terra *Strigonienſis*. See Strigoniensis *terra*.

Terra *Turcica*. See Turcica *terra*.

Terra *virgine aurea*, in *Natural Hiſtory*, the name of a medicinal earth, mentioned by Boccone.

It is found at a place called Sancto Paolo, in the ſtate of Modena; and is thence ſent to Venice, and many other places, where it is eſteemed a very famous medicine.

Its great uſe is in hæmorrhages of all kinds; but it is alſo given with ſucceſs in malignant fevers. Boccone, Muſ. de Fiſic.

Terra *viridis*. See Terre *verte*.

Terra *umbri*. See Umber.

Terra *noica*, a name given to the alkaline red mould, called alſo Adamic *earth*.

Terra *petita*, in *Law*. See Summons.

Terra, in our *Ancient Law-books*, occurs in the ſenſe of land, or ground, joined with divers additions, as,

Terra Normannorum, the lands of ſuch Norman noblemen as were forfeited to the crown, by the owners taking part with the French king againſt Henry III. *Terra fruſca*, ſuch land as had not been lately ploughed. *Terra gilliflorata*, land held by the tenure of paying a gilliflower yearly. *Terra veſtita*, land ſown with corn, and the crop ſtill remaining thereon. *Terra teſtamentalis*, land held free from feudal ſervices, and deviſable by will. *Terra culta*, land that is tilled and manured, in contradiſtinction to *terra inculta*. *Terra affirmata*, land let out to farm. *Terra dominica*, or *indominica*, demeſne land of a manor. *Terra hydata*, was land ſubject to the payment of hydage. *Terra lucrabilis*, land that may be gained from the ſea, or encloſed cut of a waſte or common to particular uſes. *Terra wainabilis*, tillage-land. *Terra warecta*, fallow-land. *Terra boſcalis*, wood-land, &c.

Terra *extendenda*, is a writ directed to the eſcheator, &c. ordering him to inquire and find out the true yearly value of any land, &c. by the oath of twelve men, and certify the extent in chancery.

Terra *firma*, in *Geography*, is ſometimes uſed for a continent, in contradiſtinction to iſlands.

Thus Aſia, the Indies, and South America are uſually diſtinguiſhed into *terra firma's* and iſlands.

Terra *a terra*. Gallies and other veſſels are ſaid to go *terra a terra* when they never go far from the coaſts.

The phraſe is alſo applied, in the manege, to horſes that neither make curvets nor balotades, but run ſmoothly on the ground in a preſſed gallop, only making little leaps or riſings with the fore-feet.

The gallop is the foundation of the *terra a terra*, for in theſe two motions the principle of the action is the ſame, ſince the *terra a terra* is only a ſhortened gallop with the croupe in, and the haunches following in a cloſe and quick time. And as the mezair is higher than the action of *terra a terra*, and lower than that of curvets, it may be concluded that the *terra a terra* is the foundation of the mezair, as well as of curvets.

In the *terra a terra* the horſe ſhould be more together than in the gallop, that he may mark his time and cadence more diſtinctly; although in a true *terra a terra* there are no times to be marked, for it is rather a gliding of the haunches, which comes from the natural ſprings in the limbs of a horſe.

When a horſe works *terra a terra*, he always ought, as in the gallop, to lead with the legs that are within the volte, his two fore-feet being in the air, and the moment they are coming down, his two hind feet following. The action of the gallop is always one, two, three and four; the *terra a terra* is performed upon two lines and in two times.

To work a horſe *terra a terra* upon large circles, take care to keep the body ſtraight, ſteady, and true in the ſaddle, without leaning to one ſide or the other. Lean upon the outward ſtirrup, and keep the outward leg nearer the ſide of the horſe than the other leg, taking care to do it ſo as not to be perceived. If you go to the right, kept your bridle-hand a little on the outſide of the horſe's neck, turning your little finger up without turning your nails at the ſame time; although, if need be, you muſt turn them, in order to make the inner rein work, which paſſes over the little finger. Keep your arms and elbows to your hips; by this means you will aſſure and confine your hand, which ought to accompany, and, as it were, run along the line of the circle with the horſe. Berenger's Art of Horſemanſhip, vol. ii. chap. 17.

The term is alſo applied by the French to dancers, who cut no capers, nor ſcarce quit the ground.

And hence, it is alſo figuratively applied to authors, whoſe ſtyle and direction is low and creeping.

TERRÆ *ager*, *aratrum*, *aratura*, *denariatus*, *legem amittere*, *lex*, *librata*, *obolata*, *quadrantata*, *quadrugata*, *trinoda*, and *uncia*. See the ſeveral articles.

Terræ *filius*, ſon of the earth, a ſtudent in the univerſity of Oxford, formerly appointed in public acts to make jeſting and ſatyrical ſpeeches againſt the members thereof, and to tax them with any growing corruption, &c.

Terræ *oleum*. See Oil, *of the Earth*.

TERRÆJEBIN. See Terenjabin.

TERRACE, or Terras, a walk or bank of earth, raiſed in a garden or court, to a full elevation for a proſpect.

Theſe elevations are ſo neceſſary in gardens, that thoſe gardens which are flat, and have them not, are deficient;

and when they are properly ſituated, their aſcent not too ſteep, and are well made, are great ornaments.

There are ſeveral kinds of *terrace*-walks, as 1. The great *terrace*, which generally lies next the houſe. 2. The ſide, or middle *terrace*, which is commonly raiſed above the parterre, lawn, &c. 3. Thoſe *terraces* which encompaſs a garden.

As to the breadth of ſide *terraces*, this is uſually decided by its correſpondence with ſome pavilion, little jettee, or building; but moſt of all by the quantity of materials to ſpare for this purpoſe.

The ſide *terrace* of a garden ought not to be leſs than twenty feet, and ſeldom wider than forty feet.

The height of *terraces* is greatly ſubject to fancy, but five or ſix feet are a height ſeldom exceeded; but in a ſmall garden, and a narrow *terrace* walk, three feet. For a *terrace* eighteen feet wide, three feet and a half are ſufficient; and four feet for a terrace twenty feet wide. But when the garden is proportionably large, and the *terrace* thirty or forty feet wide, then it muſt be at leaſt five or ſix feet high.

The nobleſt terrace is very deficient without ſhade, for which elm-trees are very proper. Miller's Gard. Dict.

TERRACE, *counter*, is a *terrace* raiſed over another to join two grounds, or raiſe a parterre.

TERRACE is alſo applied to the roofs of houſes that are flat and whereon one may walk; as alſo to balconies that project.

The *terrace* is properly the covering of a building which is in platform; as that of the periſtyle of the Louvre, or that of the obſervatory, paved with flint and mortar. All the buildings of the oriental nations are covered with *terraces*, to take the freſh air on, and even to lie on. See PAVEMENT *of Terrace*.

TERRACE, or TERRAS, uſed for mortar. See TARRACE.

TERRAGE, or TERRAGIUM, anciently ſignified a ſervice, in which a tenant or vaſſal was bound to his lord, to plough and reap the ground for him.

Others will have it to have been money paid for digging or breaking the ground in fairs and markets.

Quieti ſint de thelonio, pavagio, paſſagio, laſtagio, tallagio, carvagio, priſagio, & terragio.

TERRAIGNOL, in the *Manege*, a horſe that cleaves to the ground, that cannot be made light upon the hand, that cannot be put upon his haunches, that raiſes his fore-quarters with difficulty, that is charged with ſhoulders, and, in general, one whoſe motions are all ſhort, and too near the ground.

TERRAIN, in the *Manege*, is the manege ground, upon which the horſe makes his piſte, or tread.

TERRAQUEOUS, compounded of *terra*, and *aqua*, *earth* and *water*, an epithet given to our globe or earth, conſidered as conſiſting of land and water, which together conſtitute one maſs.

Some philoſophers, particularly Dr. Burnet, tax the frame and faſhion of the *terraqueous* globe as rude, unartful, and diſorderly, and conclude it highly abſurd to ſuppoſe it came thus out of the hands of the Creator; and, therefore, have recourſe to the deluge for making it thus.

But others can perceive much art and conveniency, even in this apparent diſorder: Dr. Derham particularly obſerves, that the diſtribution of land and water is admirable; the one being laid over the other ſo ſkilfully through all the world, that there is a juſt equipoiſe or balance of the whole globe. Thus the northern ocean balances the ſouthern, and the American continent is a couterpoiſe to the European, African, and Aſiatic.

And what ſome may object, that the waters occupy too great part of the globe, which they imagine would be of more uſe if it were dry land, he obviates, by ſhewing that this would deprive the world of a due quantity of vapours and rain; for if the cavities which contain the ſea and other waters were deeper, though the quantity of water were the ſame, and only the ſurface leſs and narrower, the evaporations would be ſo much the leſs, inaſmuch as they are made from the ſurface, and conſequently are in proportion to it.

TERRAR. See TERRIER.

TERRAS. See TARRACE and PAVEMENT.

TERRAS, *marble*. See MARBLE.

TERRE-PLEIN, in *Fortification*, the top, platform, or horizontal ſurface of the RAMPART, whereon the cannon are placed, and the defenders perform their office.

It is thus called as lying level, having only a little ſlope outwardly to bear the recoil of the cannon.

It is terminated by the parapet on that ſide towards the champaign; and by the inner talus on that ſide towards the place. Its breadth is from 24 to 30 feet.

TERRE-TENANT, is he who hath the actual poſſeſſion of the land, otherwiſe called the *occupant*. See TENANT and OCCUPANT.

Thus a lord of a manor having a freeholder, who letteth out his freehold to another to be occupied; this occupier who has the actual poſſeſſion is called the *terre-tenant*.

TERRE *verte*, in the *Colour-trade*, the name of a green earth much uſed by painters, both ſingly for a good ſtanding green, and in mixture with other colours.

The name is French, and ſignifies *green earth*.

Is is an indurated clay, of a deep bluiſh-green colour, and is found in the earth, not in continued ſtrata or beds, as moſt of the other earths are, but in large flat maſſes of different ſizes, imbedded in other ſtrata; theſe break irregularly in the cutting, and the earth is generally brought out of the pit in lumps of different ſizes. It is of a fine, regular, and even ſtructure, and very hard. It is of an even and gloſſy ſurface, very ſmooth to the touch, and in ſome degree reſembling the morochthus, or French chalk, but adhering firmly to the tongue. It does not ſtain the hands in touching it; but being drawn along a rough ſurface, it leaves an even white line, with a greeniſh caſt.

It does not ferment with acids, and it burns to a duſky brown colour.

It is dug in the iſland of Cyprus, and in many parts of France and Italy. That from the neighbourhood of Verona has been uſed to be eſtemed the beſt in the world; but of late there has been ſome dug in France that equals it. There is alſo an earth dug on Mendip Hills, in the ſinking for coal, which, though wholly unobſerved, is nearly, if not wholly, of equal value.

When ſcraped, and the finer parts ſeparated, it is ready to be made up with oil for the uſe of the painters, and makes the moſt true and laſting green of any ſimple body they uſe. Hill and Da Coſta. See BERG-*green* and VERDITER.

TERRELLA, *μικρογη*, *little earth*, is a magnet turned of a juſt ſpherical figure, and placed ſo as that its poles, equator, &c. do exactly correſpond with thoſe of the world.

It was thus firſt called by Gilbert, as being a juſt repretation of the great magnetic globe we inhabit.

Such a *terrella*, if nicely poiſed and placed in a meridian like a globe, it was ſuppoſed, would be turned round like the earth in twenty-four hours by the magnetic particles pervading it; but experience has ſhewn this to be a miſtake.

TERRESTRIAL *birds*. See BIRDS.

TERRESTRIAL *globe*. See GLOBE.

TERRESTRIAL *line*. See LINE *Terreſtrial*.

TERRESTRIAL *paradiſe*. See PARADISE.

TERRESTRIAL *roads*. See ROAD.

TERRIER, or TERRAR, in our *Ancient Cuſtoms*, a collection of acknowledgments of the vaſſals or tenants of a lordſhip, containing the rents, ſervices, &c. they owe their lord, and ſerving as a title or claim for demanding and executing the payment thereof.

At preſent, by *terrier* we mean no more than a book or roll, wherein the ſeveral lands, either of a private perſon, or of a town, college, church, &c. are deſcribed. The *terrier* ſhould contain the number of acres, and the ſite, boundaries, tenants names, &c. of each piece or parcel. See DOMES-*day*.

TERRIER alſo denotes the lodge or hole which foxes, badgers, rabbits, &c. dig themſelves under ground, and wherein they ſave themſelves from the purſuit of the hunters. Hence,

TERRIER, *terrarius*, is alſo uſed for a kind of little hound to hunt thoſe animals, which, like a ferret, creeps into the ground, and by that means affrights and bites them; either tearing them with his teeth, or elſe haling them by force out of their holes. See DOG and HOUND.

TERRIFICATIO, a word uſed by ſome chemical writers to expreſs the coalition of the earthy particles of ſome bodies after fermentation, or during the time of it.

TERRIS *bonis & catallis rehabendis poſt purgationem*, a writ for a perſon to recover his lands, goods, or chattels formerly ſeized, after having cleared himſelf of a felony, upon ſuſpicion whereof he was convict, and delivered to his ordinary to be purged.

TERRIS *& catallis tentis ultra debitum levatum*, a writ judicial for the reſtoring lands, or goods to a debtor, who is diſtrained beyond the quantity of the debt. See DISTRESS.

TERRIS *liberandis*, a writ lying for a man convicted by attaint, to bring the record and proceſs before the king, and take a fine for his impriſonment, and deliver him his lands and tenements again, and releaſe him of the ſtrip and waſte.

It is alſo a writ for the delivery of lands to the heir after homage and relief performed; or upon ſecurity taken that he ſhall perform them.

TERRITORY, *diſtrict*, the extent or compaſs of land within the bounds, or belonging to the juriſdiction of any ſtate, city, or other diviſion. See DISTRICT.

It is a maxim, that the church has no *territory*, i. e. it has no temporal juriſdiction; and therefore an eccleſiaſtical judge cannot arreſt any body, not even a prieſt. It is much in this ſenſe that Cujas ſays, the church has an auditory, but no *territory*.

TERROR. The effect of *terror*, or of ſudden frights, in diſeaſes, is often very great.

It is generally obſerved, that people who are moſt afraid of the plague in times of contagion, catch the infection ſooneſt, and that thoſe who are moſt terrified and diſheartened at firſt in the diſeaſe, generally die of it. It is indeed uncertain, whether this be attributed to the *terror*, or whether the *terror* itſelf, as a conſequence of dejection of ſpirits, be not merely a ſymptom of the diſeaſe. Kerkring, Spicileg. Anat.

Sudden frights, in acute diſeaſes, have evidently killed many, by the agitation into which they have thrown the ſpirits, already too much diſordered. We have alſo accounts of perſons abſolutely killed by *terrors*, when in perfect health at the time of receiving the ſhock from them: people ordered to be executed, but with private orders for a reprieve, have expired at the block without a wound.

The general effects of *terror* are a contraction of the ſmall veſſels, and a repulſion of the blood in the large and internal ones, hence proceed the ſuppreſſion of perſpiration, the general oppreſſion, trembling, and anguiſh of the heart and lungs overcharged with blood, &c.

When a perſon is affected with *terror*, the principal endeavour ſhould be to reſtore the circulation to its due order, to promote perſpiration, and to allay the agitation of the patient. For theſe purpoſes he may drink a little warm liquor, as chamomile tea, &c. the feet and legs may be put into warm water, the legs rubbed, and the chamomile tea repeated every ſix or eight minutes, and when the ſkin is warm, and there is a tendency to perſpiration, ſleep may be promoted by a gentle opiate.

TERSION, TERSIO, formed of *tero*, *I wear*, the act of wiping or rubbing a thing. See ABRASION.

TERTHRON, a word properly ſignifying the extreme part of the ſail-yard in ſhipping. Hippocrates uſes it in a metaphorical ſenſe, to expreſs the extremity of a diſeaſe.

TERTIAN, TERTIANA, a fever or ague intermitting every day, ſo that there are two fits in three days.

The medical writers diſtinguiſh this diſeaſe into the ſingle and double; beſides theſe, into the legitimate and ſpurious and ſub-continual.

In the ſpurious *tertian* the cold fits are ſhorter, and the chillineſs leſs intenſe, and the heat ſcarce ever goes off at all; beſide this, it is uſually attended with a cough, and with violent laſſitudes and pains in the limbs after the fits; a vertiginous diſorder in the head, reſtleſſneſs in bed, and a want of appetite.

The ſimple *tertian* is alſo carefully to be diſtinguiſhed from thoſe acute fevers, principally of the epidemic kind, which frequently affect the appearance of it, when they happen in the ſpring-ſeaſon, and the patient is ſubject to crudities in the primæ viæ. Theſe laſt, beſide the appearance of the ſimple *tertian*, always carry with them the certain marks of malignity, and often are attended with petechial ſpots on the fourth day or later. The juſt diſtinguiſhing of all theſe appearances, in diſeaſes that reſemble the ſimple *tertian*, is extremely neceſſary, as the treatment of them, in the way of the ſimple *tertian*, muſt be attended with very bad conſequences.

The ſigns of the ſimple tertian are theſe: it uſually ſeizes people in the morning, frequently about 11 o'clock, and often earlier, and begins with a very remarkable horror and coldneſs, with which the patient trembles violently: this is firſt felt in the region of the loins, and thence propagates itſelf up the back, and ſo to every part of the body; this is ſucceeded by a nauſea, and a ſtraitneſs of the præcordia; and when the *tertian* is legitimate and genuine, this nauſea proceeds to abſolute vomiting, by which there is uſually voided a thick viſcous and mucous matter; but ſometimes a bilious ſaburra; and, in the firſt fits, uſually ſome of the food of the day before, indigeſted. Sometimes there are only violent reachings to vomit, without any thing coming up; and in ſome a diarrhœa comes on in the place of the vomiting. When theſe ſymptoms have continued an hour or two, the coldneſs goes off, and there ſucceeds an univerſal languor and ſoreneſs in the joints; and this is the more violent, as the nauſea has been the leſs ſo. This languor is followed by a violent heat, which ſometimes comes on at once, and ſometimes ſlowly and gradually, and is attended with pains in the head, and a violent thirſt, and bitter taſte in the mouth. Junker's Conſp. Med. p. 364.

As ſoon as the violence of the heat abates a little, a ſweat comes on; but this is not great, and often does not appear at all in the firſt paroxyſms. The more ſtill and quiet the perſon is, the more quickly the heat goes off, and the ſweating comes on. The whole fit rarely continues leſs time than ſix hours; uſually it holds eight, and ſometimes eleven hours; but when it continues longer than this, it may be ſuſpected to be of the ſpurious kind, and to degenerate into a continual one. The fit returns in the ſame manner as at firſt every other day, or, as the medical writers term it, every third, including the days of both paroxyſms; and uſually, while undiſturbed, returns on the patient at the very ſame hour.

The double tertian. The ſigns of this are, that the fits return every day; but then the ſucceeding paroxyſms do not anſwer to one another, but the alternate ones; thus the third fit anſwers to the firſt, the fourth to the ſecond, and ſo on. It is by this that this diſeaſe is diſtinguiſhed, from the quotidian, which has its fits every day coming on at the ſame hour; while, in the double *tertian*, if the firſt fit comes on in the morning, the ſecond comes in the afternoon; then the third comes on in the morning as the firſt, the fourth in the afternoon as the ſecond, and ſo on.

Double tertian, is alſo that fever which returns twice every other day.

The anomalous *tertian* obſerves no regular time of coming on at all, but will begin one day in the morning, another in the evening, a third at noon, and a fourth in the afternoon, and ſo on.

Perſons ſubject to TERTIANS. Young people are much more frequently ſubject to this diſeaſe than older, and men oftener than women. People of an active life are more ſubject to it than thoſe of a ſedentary one: but no people fall ſo eaſily into it as thoſe men who are apt to be ſick after dinner, and make a cuſtom of ſuppreſſing their inclination to vomit.

Cauſes of it. Theſe are the eating immoderately of foods difficult of digeſtion, and eſpecially when this is done againſt the ſtomach, or while that is afflicted with nauſeas, violent commotions of anger, or the other paſſions, immediately after a full meal; and to theſe is to be added, a coldneſs of the abdomen after meals, by which digeſtion is impeded, and the driving back any cutaneous humour.

Prognoſtics and method of cure. It is commonly obſerved, that *tertians*, when not improperly treated, are rather conducive to health than injurious to it; and that people are uſually much better after they are cured of them, than before they were attacked by them. If thoſe who have a *tertian* uſe a moderate diet and good regimen, it often goes off of itſelf, without the aſſiſtance of medicines; but when ill-treated, as by giving violent ſweating medicines in the time of the hot fit, the patients are greatly weakened, and ſometimes very dangerous inflammations of the viſcera, and acute fevers are brought on; and this the more certainly, as the patient is younger, of a more plethoric habit, and uſed to a high diet, and the uſe of wine, or other ſtrong liquors.

The more the gentle ſweat, which ſucceeds the hot fit, is encouraged, the weaker the fit becomes at every period, and the diſeaſe finally goes off much more ſafely by this means, than when violently thrown off at once by aſtringents.

The *double tertian* requires the ſame method of cure with the ſimple one; for which ſee *Intermitting* FEVER and AGUE. Junker's Conſp. Med. p. 366.

Continual TERTIAN, in *Medical Writers*, a term uſed to expreſs a kind of compound fever, which has paroxyſms ſomething like thoſe of the *tertian*, but in which the heat never goes wholly off, but is often ſo extreme as to continue in great violence from one fit to the time of another.

There are three ſpecies of theſe compound fevers; they are all compoſed of the intermittents of the ſeveral periods, and of an acute fever: the firſt is the *continual quotidian*, the ſecond the *continual tertian*, and the third the *continual quartan*.

The firſt of theſe is the ſame with the *catarrhal* FEVER of the benign kind. The ſecond here treated of, is what was called by the ancients, the *extended tertian*. See QUARTAN.

Signs of it. The paroxyſms are begun in the ſame manner as in the ſimple *tertian*, that is, by a ſhaking coldneſs; and this is ſucceeded by a heat which is at firſt very violent, but afterwards grows more and more languid, yet never goes wholly off, but continues, in ſome degree, to the acceſs of the next paroxyſm. In this diſeaſe the appetite is loſt, and the ſtrength fails very ſenſibly,

bly, the ſleep is troubled and unſound, and there is a continual head-ach; there is a quick pulſe at all the times of the fever, and a dryneſs in the mouth and tongue; with great thirſt. Junker's Conſp. Med. p. 396.

Perſons ſubject to it. This fever is very often the conſequence of a common ſimple *tertian*, when injudiciouſly treated, eſpecially when it has been ſuppreſſed by giving hot medicines juſt before the coming on of the fit, or when the patient has been cooled in the time of the ſweat, or has been blooded during the time of the diſeaſe; it ſometimes alſo attacks perſons who have had violent cutaneous humours, as the itch, &c. ſtruck in; and ſometimes the air alone gives it, as being full of fermentative particles.

Prognoſtics in it. When this diſeaſe is of the epidemic kind, and ariſes from faults in the air, it is always attended with greater danger, and has worſe ſymptoms than when proceeding from other cauſes; in this caſe it is ſometimes attended with purple ſpots on the breaſt and other parts. When treated cautiouſly, and with a gentle regimen, it often changes to a common intermitting *tertian*, and is then eaſily cured; but even from this leſs dangerous ſtate it ſometimes changes into a hectic, when it has been treated with large doſes of abſorbents under that form; and finally, when it is treated with the common hot medicines and regimen, it too often degenerates into a violent and dangerous acute, and uſually inflammatory fever.

Method of cure. Before the coming on of every fit, the patient ſhould take a ſcruple of powder, prepared of diaphoretic antimony, oyſter-ſhells ſated with juice of lemons, nitre, and tartarum vitriolatum, each in equal quantities, and while the heat continues violent, he muſt drink plentifully of warm and weak liquors; and when this violent heat is gone off he muſt be kept in a gentle ſweat by the milder alexipharmics till the return of the paroxyſm again.

In caſes where the heat is very violent, and the temperament of the body is hot and plethoric, the acids, ſuch as lemon-juice, and the like, are of very ſingular ſervice. During the whole courſe of the diſeaſe the bowels muſt be kept open by all means: but they muſt not be ſtimulated; and as the force of the diſtemper wears off, more powerfully laxative medicines are to be given, and at ſuch times that their effect may not be over at the time of the acceſs of the paroxyſm.

The bark can properly have no place in the cure of this diſeaſe; and after the cure of it by the means above preſcribed, the patient muſt continue the uſe of ſome of the medicines, and muſt harden himſelf to the air by degrees, for fear of a relapſe. Junker's Conſp. Med. p. 399.

TERTIAN, is alſo an old meaſure, containing eighty-four gallons ſo called becauſe it is the third part of a tun. 1 R. III. cap. 13. 2 H. VI. cap. 11.

TERTIANARIA, in *Botany*, a name given by ſome authors to the *ſcutelleria*, or hooded willow-herb. J. Bauhin, vol. iii. p. 435.

TERTIARY *canons.* See CANONS.

TERTIAS, a word uſed very frequently in the writings of phyſicians, with the addition of *ad*; but it is capable of a double ſignification. *Ad tertias* is often uſed to expreſs how far he liquor is to be boiled away in the medical decoctions; yet it may in this caſe ſignify either the boiling to two thirds, or to one third part, of the whole. The more uſual ſenſe, however, is to boil away one third part of the original liquor, and in the ſame manner to fill a veſſel *ad tertias*, does not ſignify to fill a veſſel one third part full, but two thirds, leaving only one empty.

TERTIATE, in *Gunnery.* To *tertiate* a great gun, is to examine the thickneſs of the metal at the muzzle, whereby to judge of the ſtrength of the piece, and whether it be ſufficiently fortified or not.

This is uſually done with a pair of calliper compaſſes.

The term is alſo applied to any piece of ordnance for finding whether it has its due thickneſs at the vent, trunnions, and neck; if the trunnions and neck are in their due order, and the chaſe ſtraight, &c.

TERTII *internodii pollicis extenſor.* See EXTENSOR.

TERTIO *adjacente, propoſitio de.* See PROPOSITION.

TERTIUM *ſal*, a *third ſalt*, a term uſed in *Chemiſtry* to expreſs a ſalt reſulting from the mixture of an acid and an alkali, which partakes ſo of the nature of both, as to be itſelf neither acid nor alkali, but neutral.

TERTIUS *adducens*, in *Anatomy*, a name given by Spigelius to one of the four muſcles called the *quatuor recti oculi* by authors.

This is the muſcle called the *adductor* by Molinett; and by ſome others the *bibitorius*.

TERTIUS *hyoidis muſculus*, in *Anatomy*, a name given by Fabricius and others to the muſcle generally known by the name of *ſtylohyoidæus*.

TERTIUS *oculum movens*, in *Anatomy*, a name given by Veſalius to one of the muſcles called by Albinus, the *quatuor recti* of the eye; this is the ſame with the firſt of that author, the *attollens oculi*, the *ſuperbus* of others.

TERTIUS *palpebrarum*, in *Anatomy*, a name given by ſome authors to the muſcle, called by Albinus and others, *obliquus ſuperior oculi*.

TERTIUS *ſcalenus.* See SCALENUS.

TERTIUS *thoracis*, in *Anatomy*, a name given by many of the earlier writers to a muſcle now called SERRATUS *poſticus ſuperior*.

TERUNCIUS, in *Antiquity*, a very ſmall braſs coin in uſe among the Romans.

The inconvenience of ſuch very ſmall pieces being ſoon found, the *teruncius* became diſuſed, but its name is ſtill retained in reckoning, and thus it became a money of account.

The *teruncius* at firſt was a quarter of the *as*, or *libra*; hence, as the *as* contained twelve ounces, the *teruncius* contained three, whence the name, which is formed of the Latin, *tres unciæ*.

Teruncius was alſo uſed for the quarter of the denarius, ſo that when the denarius was at ten aſſes, the *teruncius* was worth two and a half; and when the denarius was riſen to ſixteen, the *teruncius* was worth four. See DENARIUS.

TERZETTO, in the *Italian Muſic*, a little tune or air in three parts. See TRIO.

TERZO, in the *Italian Muſic*, ſometimes ſignifies a compoſition conſiſting of three parts, or deſigned for three voices or inſtruments.

It is alſo uſed for a third part of any thing, as *un terzo di battuta*, a third part of the bar. See TRIO.

TERZOLA, in *Botany*, a name by which ſome authors have called the *eupatorium cannabinum*, or water-hemp-agrimony.

TESSARACONTA, τεσσαρακοντα, among the *Athenians*, were forty men who went their circuits round the ſeveral boroughs, and had cognizance of all controverſies about money, if not above ten drachms; as alſo of actions of aſſault and battery. Potter, Archæol. Græc. tom. i. p. 122.

TESSARACONTERIS, in the *Naval Architecture* of the ancients, a word uſed to expreſs a ſort of GALLEY, in which there were no leſs than forty tiers of rowers one above another. See ENNERIS and POLYCROTA.

TESSARACOSTON, τεσσαρακοστον, in *Antiquity*, a ſolemnity kept by women on the fortieth day after childbirth, when they went to the temple, and paid ſome grateful acknowledgments for their ſafe delivery. Pott. Archæol. Græc. tom. i. p. 432. and tom. ii. p. 335.

TESSELÆ, a word uſed in *Pharmacy*, to expreſs lozenges, cut into regular figures.

TESSELARII, among the Romans, artificers of chequered or MOSAIC work.

TESSELATED *pavement*, *pavimentum* TESSELATUM, a rich pavement of MOSAIC work, made of curious ſmall ſquare marbles, bricks, or tiles, called *teſſelæ*, from the form of dies.

Teſſelated pavements were much uſed in the tents of the Roman generals.

TESSARA-COSTA, in our *Ancient Writers.* See QUADRAGESIMA.

TESSERA, in *Roman Antiquity*, denoted in its primary ſenſe a cube or dye; ſo called from the Greek word τεσσαρα, or τεσσερα, *four*; reſpect being had to its number of ſides, diſtinct from the two horizontal planes, above and below. And it was thus diſtinguiſhed from the *talus*, which being round at each end, contained only four planes or faces on which it could ſtand; and therefore, when thrown, had no more than two ſide faces in view. Hence *ludere talis et ludere teſſeris* are ſpoken of by Roman writers as two different games. The ſyllable TES. occurs often in Roman inſcriptions.

The word *teſſera* was applied to many other things, not ſo much from a ſimilitude in the figure, as from the relation they bore to ſome other thing of which they were the ſign or token; as the points on the upper plane of the dye denoted the good or ill ſucceſs of the caſt.

The *teſſera hoſpitalis* was either public or private. As to the former, we find among the inſcriptions publiſhed by Gruter, inſtances of two municipal towns which put themſelves under the patronage of the Roman governor; and the reciprocal engagements between them, engraved on two copper-plates in the form of an oblong ſquare, with a pediment at the top, is called in both *teſſera hoſpitalis*.

The deſign of the latter was to cultivate or maintain a laſting friendſhip between private perſons and their families;

milies; and gave a mutual claim to the contracting parties, and their deſcendants, of a reception and kind treatment at each other's houſes, as occaſion offered. For which end thoſe *teſſeræ* were ſo contrived, as beſt to preſerve the memory of that tranſaction to poſterity. And one method of doing this was by dividing one of them lengthwiſe into two equal parts, upon each of which one of the parties wrote his name, and interchanged it with the other. From this cuſtom came the prevailing expreſſion *teſſeram hoſpitalem confringere*, applied to perſons who violated their engagements.

The *teſſeræ frumentariæ* were ſmall tallies given by the emperors to the populace at Rome, entitling them to the reception of a quantity of corn from the public at ſtated ſeaſons. The perſon who had the inſpection of theſe was called *teſſetarius*. They were made of wood and of ſtone.

There was another kind of *teſſera* which intitled perſons to a ſight of the public games and other diverſions, uſually made in the form of an oblong ſquare.

The *teſſera militaris* was a ſignal given by the general, or chief commander of an army, as a direction to the ſoldiers for executing any duty or ſervice required of them.

This, upon urgent occaſions, was only vocal; but, in ordinary caſes, it was written on a tablet, commonly made of wood. Beſide theſe civil and military *teſſeræ*, there are others which related to religious affairs, and may be called ſacred. Phil. Tranſ. vol. xlv. art. 12.

TEST, in *Metallurgy*, is a veſſel of the nature of a COPPEL, uſed for large quantities of metals at once, and formed of the ſame materials.

The coppels, or ſmall veſſels, ſerve for operations of this kind, when ſmall quantities only are concerned; but when larger are worked on, veſſels of a larger ſize and coarſer texture are employed, which are diſtinguiſhed by the name of *teſts*.

Theſe are uſually a foot and half broad, and are made of wood-aſhes, not prepared with ſo much care as for coppel-making, and mixed with finely powdered brick-duſt; theſe are made into the proper ſhape, either by means of a ſhallow veſſel, made of crucible earth, or caſt iron, of proper dimenſions, or only an iron ring, or hoop, with three bars arched downwards acroſs the bottom, about two inches deep, and of different widths, from three or four inches to fifteen or more, according to the quantity of metal to be teſted at once.

To make them in the firſt manner, an earthen veſſel is to be procured, not glazed within, and by its depth and breadth proportioned to the quantity of metal to be worked; the inſide of this veſſel is to be well moiſtened with fair water, that the aſhes to be put into it may adhere the better. Put into this veſſel, thus prepared, the aſhes and brick-duſt before mentioned, and firſt moiſtened either with water alone, or with water with a little white of an egg mixed in it; let the quantity of this be ſo much as will half fill the veſſel, then preſs the maſs with a wooden indented peſtle, or, if not for a very large *teſt*, with a wooden cylinder, only of an inch thick: when thus preſſed down add freſh aſhes, and preſs them in a ſecond time, as in the making of coppels, and repeat this addition of freſh aſhes till the earthen veſſel be nearly full; then remove the ſuperfluous aſhes with an iron ruler, and let the inequalities remaining at the border be ſmoothed with a wooden or glaſs ball rolled round about. This done, you are to cut the cavity with a bowed iron, that you may have a broad ſpherical ſegment, not very deep; and laſtly, by means of a ſieve, ſtrew this cavity carefully and regularly over with dry aſhes of bones of animals, ground extremely fine, and ſqueeze theſe hard in, by the rotation of the wooden or glaſs ball. Thus you have a *teſt* finiſhed, which, together with its earthen pot, muſt be ſet in a dry warm place.

To make the *teſts* in the other manner, or by means of an iron ring; let a ring of that metal be filled with aſhes mixed with brickduſt, and moiſtened as before mentioned, in ſuch manner that they may riſe conſiderably above the ring; then preſs them ſtrongly either with your hands or with an indented peſtle, and afterwards, with gentle blows of a rammer, preſs the aſhes from the circumference toward the centre, in a ſpiral line, and that in ſuch manner, that, after having been ſufficiently preſſed, they may be a ſmall matter higher than the brink of the ring. If there are now any vacancies in the maſs, empty the ring, and fill it again with more aſhes; for if you ſhould attempt to fill up theſe by adding, were it but ever ſo little aſhes, the ſecond, or additional quantities, will never cohere ſo firmly with the firſt, but that they may probably ſeparate in the operation.

This done, turn the ring upſide down, and on the other ſide, or bottom, take out the aſhes to the quantity of one third part of the depth of the ring, and again fill the vacuity with the ſame aſhes, in ſuch a manner that there may remain no ſenſible cavity.

When the maſs is thus prepared, cut out a cavity in the larger ſurface of the ring, with a bowed iron, as in the former method.

The Germans, have, beſide theſe, another kind of *teſts*; which they call *treibſcherben*. Theſe are a ſort of veſſels which reſiſt the moſt violent fire, and are ſo extremely compact, that they ſometimes will retain not only melted metals, but even the glaſs of lead itſelf.

The figure and ſize of theſe veſſels may be the ſame with that of the coppel, but they are uſually made larger; and the great difference of theſe *teſts* from coppels, and from the ordinary *teſts*, which are indeed only a kind of large and coarſe coppels, is, that the matter of theſe is more compact and coherent.

The matter for making theſe *teſts* is thus prepared: take of the pureſt and fineſt clay a ſufficient quantity, make it into balls, and dry them either in the air, or in the fire; when dried, beat them to powder in a mortar, and pour on the powder a great quantity of warm water; let this mixture reſt a while, and when the clay has ſubſided, pour off the water which ſwims at top; and let this waſhing be ſo often repeated, that all the moſt minute lumps of the clay be broken, and whatever ſalt it contains perfectly waſhed out: then add to this fine clay, of the pureſt ſand, of powder of calcined flints, ground, and well waſhed, of faulty, but clean Heſſian crucibles, or of any incombuſtible ſtones ground very fine, ſuch a quantity as will render the maſs thick, and hardly adhering to the hands in kneading it, or pliant when rolled into a thin lamina.

This is the matter for making this ſort of *teſts*; but, before any quantity of the veſſels be made of this earth, it will be prudent firſt to finiſh a ſingle one, and try it, by putting on it a quantity of glaſs of lead, and expoſing it for an hour or more to the ſtrongeſt fire; by this trial you will be certain whether or not the maſs is capable of making veſſels that will reſiſt both the fire and the glaſs of lead; and by no other means but this trial is it poſſible to determine the due proportion of the mixture of the ingredients for this uſe, on account of the variety of the clays. Nature in ſome places affords a clay ſo well tempered, that it is extremely proper for the making of *teſts* without any preparation, or without the admixture of any other matter. Sometimes this only requires a ſimple waſhing, but commonly it is neceſſary to make it into balls, and powder or waſh them as before directed.

On the trial of a *teſt* made of this, or the former mixed clay, if it runs into glaſs, you muſt add to it of the powder of ſtones, eſpecially ſuch as beſt reſiſt the fire. Great care is to be taken not to add too much powdered chalk to theſe compoſitions, ſince if the matter is tempered with that alone, the *teſts* indeed will reſiſt the fire very well, but being too porous, they will yield a paſſage to litharge, which will ſoften them to ſuch a degree, that they will either fall aſunder of themſelves, or be totally cruſhed when taken hold of with the tongs.

Theſe veſſels are to be made in the following manner: rub over the ſides and bottom of a ſmall mortar, and alſo its peſtle, with oil, or with the fat of bacon; fill it two-thirds full of prepared clay, then make a ſlight impreſſion with your fingers in the middle of the clay; then place the bottom of the peſtle there, and force it down with blows of a hammer, the ſtronger the better. When thus properly hollowed, take it out of the mortar, and pare its edges, and dry it as the coppels are dried, in the air, in a dry warm place.

Teſts thus prepared may be uſed as ſoon as dry, unleſs for ſalts or litharge; but theſe bodies, when melted in veſſels, not firſt baked or hardened in the fire, always make their way through them.

Some of the German writers alſo recommend, both for *teſts* and coppels, a ſort of friable opake ſtone, called white ſpath, which appears to be a ſpecies of gypſum, or of the ſtones from which plaiſter of Paris is prepared. The ſpath is directed to be calcined with a gentle fire, in a covered veſſel, till the ſlight crackling, which happens at firſt, has ceaſed, and the ſtone has fallen in part into powder; the whole is then reduced into ſubtle powder, which is paſſed through a fine ſieve, and moiſtened with ſo much of a weak ſolution of green vitriol as is ſufficient for making it hold together. Gellert, however, finds, that if the ſtone is of the proper kind, which can be known only by trials, calcination is not neceſſary. Theſe *teſts* are liable to ſoften or fall aſunder in the fire, which inconvenience may be remedied, according to Scheffer, by mixing with the uncalcined ſtone ſomewhat leſs than equal its weight, as eight-ninths of ſuch as had been already uſed and penetrated by the ſcoria of the lead, taking that part of the old *teſt* which appears of a green-grey colour, and rejecting the red cruſt on the top. But from his account it appears, that theſe *teſts* are leſs durable than thoſe made of the aſhes of bones, though much ſuperior to thoſe of wood-aſhes. Vegetable aſhes, which ſtand pretty well the teſting of ſilver, can ſcarcely bear any great quantity of gold, which requires a conſiderably ſtronger fire than the other; but bone-aſhes, ſays Dr. Lewis, anſwer ſo effectually, and are among us ſo eaſily procured, that it is unneceſſary for the refiner to ſearch for any other materials. Cramer's Art of Aſſaying, p. 60, 62. Lewis's Com. Ph. Tech. p. 144.

Test-*liquor*, a term uſed by our dealers in brandies, &c. for a liquor which they uſe as a *teſt* of brandy, &c. to prove whether they be genuine, or mixed with home ſpirit. The people who uſe this, place great confidence in it, but it is really a very vague and uncertain thing. They pretend that this liquor will ſhew by the colour which it makes, on its being poured into brandy, whether it be genuine and adulterated; or if not, in what proportion the adulterating ſpirit is mixed with it.

The whole fact is this: if a little common green or white vitriol be diſſolved in ſome fair water, it makes a *teſt-liquor*, a few drops of which being let fall into a glaſs of old French brandy, will turn the whole to a purple, or fine violet-colour; and by the ſtrength or paleneſs of this colour, the dealers judge the brandy to be genuine or mixed, in different proportions, with home ſpirits.

Old French brandy, having long lain in the caſk, takes a dilute tincture of the wood of the caſk, that is, of oak; and this being of the ſame nature with a ſolution or tincture of galls, naturally turns bluiſh or blackiſh with vitriol. A new diſtilled brandy, though wholly foreign, would not give this *teſt*; and a common malt ſpirit, with oak chips infuſed in it, will turn as dark as the fineſt brandy. While our diſtillers indeed had nothing in uſe for the colouring of their ſpirits but burnt ſugar, it was poſſible to make ſome gueſs at an adulteration with them, becauſe the brandy, in this caſe, would not become blackiſh in proportion to its former colour; the ſugar colour not turning to ink with the vitriol like the other; but our diſtillers have of late found a way of uſing an extract of oak for the colouring of their ſpirits, and, ſince that, this *teſt-liquor* is of very little uſe, our common ſpirits, of any kind, turning as deep with it as the foreign brandies.

The very beſt way of making this *teſt-liquor*, is with a calcined vitriol of iron, diſſolved in a dilute or aqueous mineral acid. The liquor, when well made in this manner, is of a fine yellow colour, and will give, for a time, the fineſt blue to any ſpirituous tincture of oak.

The Engliſh were, at one time, very fond of high coloured brandies, and it was then that the uſe of this *teſt-liquor* was moſt eſteemed; afterwards we, as well as other nations, finding that this colour was only owing to the caſk, began to diſlike it, and to favour the pale brandies: at length we fell into the uſe of ſuch as were wholly limpid and colourleſs, and the re-diſtilling of all the old brandies people were poſſeſſed of, took place; on this the *teſt-liquor* was found to be of no uſe at all, and accordingly rejected; but as we are of late again come into the eſteem of coloured brandies, and that with great juſtice, as the colour, when genuine, is a certain mark of the age of the liquor, this *teſt-liquor* is again got into more credit than it deſerves.

The famous Helvetian ſtyptic depended wholly on this accident for its colour; and it was no ſmall mortification to our chemiſts, when, ſome years ago, it was introduced into uſe among us, that they could not make it with our own ſpirits, but muſt be at the expence of true French brandy for it; our own ſpirits, though equally coloured, would never make that violet tincture, becauſe their colour was owing to burnt ſugar, not a tincture of oak. At length this myſtery was explained, and a little ſcrapings of galls made all thoſe quantities of this ſtyptic, which had been ſet by as good for nothing, perfectly fine and well coloured. Shaw's Eſſay on Diſtillery.

TESTA, in *Antiquity*, the ſame with *oſtracon*. See Ostracism.

TEST-*act*, in *Law*, is the ſtatute 25 Car. II. cap. 2. which directs all officers, civil and military, to take the oaths, and make the declaration againſt tranſubſtantiation, in the court of King's Bench or Chancery, the next term, or at the next quarter ſeſſions, or (by ſubſequent ſtatutes) within ſix months after their admiſſion; and alſo within the ſame time to receive the ſacrament of the Lord's ſupper, according to the uſage of the church of England, in ſome public church, immediately after divine ſervice or ſermon, and to deliver into court a certificate thereof, ſigned by the miniſter and churchwarden, and alſo to prove the ſame by two credible witneſſes, upon forfeiture of 500*l.* and diſability to hold the ſaid office. The word *teſt* ſignifies *proof* or *trial*, being formed of *teſtis*, *witneſs*; this act being eſtabliſhed with a view to exclude Roman catholics from any ſhare in the government, though it has operated to the excluſion of Proteſtant diſſenters in general.

It may here be obſerved, that the original deſign of the *teſt*, was not to exclude the Proteſtant diſſenters, but the papiſts. It was brought in by the patriots, in the reign of Charles the Second, under their apprehenſion of popery, and a popiſh ſucceſſor; and when, during the debate in the houſe of commons, it was obſerved, that it was drawn in ſuch a manner as to comprehend the Proteſtant diſſenters, the court greatly endeavoured to avail themſelves of that circumſtance in order to defeat the bill. But the diſſenting members diſappointed them, by declaring, that they had rather confide in the juſtice and generoſity of parliament, to paſs ſome future bill in their favour, than be the occaſion of retarding or defeating the ſecurity, which the preſent bill was calculated to afford to the liberties of their country. Their patriotiſm produced ſoon afterwards a bill for their relief, from the penal laws; but the parliament was prorogued, through the reſentment of the court, to prevent its paſſing: and when notwithſtanding this, a bill in favour of the diſſenters did afterwards paſs both houſes, and lay ready for the royal aſſent, the court ventured upon a very extraordinary expedient: the clerk of the crown was ordered to convey away the bill, and, accordingly, it was never afterwards to be found. The particular *teſt* of receiving the ſacrament according to the rites of the church of England, was calculated to exclude the papiſts rather than the proteſtant diſſenters; as it was no uncommon thing for the latter, at that time, to receive the ſacrament occaſionally in the church of England, in order to expreſs their charity towards it, as a part of the church of Chriſt. If it had been the deſign of the legiſlature to exclude all from civil offices but thoſe who have a real affection for the conſtitution and worſhip of the church, it is apprehended they would have appointed the *teſt* to be, not merely once taking the ſacrament at church, but a ſtated and conſtant conformity to its religious ſervices. Furneaux's Letters, to judge Blackſtone, p. 133.

TESTA *ſepiæ*. See Cuttle-*fiſh-bone*.

TESTACEA, in the Linnæan Syſtem of *Natural Hiſtory*, is a denomination given to the third order of *vermes* or *worms*; the characters of which are, that they are animals of the mollusca or ſoft kind, of a ſimple make, and commonly covered with a calcareous habitation.—This order comprehends the whole tribe of shells, conſiſting of upwards of 800 ſpecies, under thirty-ſix genera, and diſpoſed by Linnæus in a new method.

TESTACEOUS, in *Natural Hiſtory*, an epithet given to thoſe fiſh, which are covered with a ſtrong, thick ſhell; as oyſters, pearl-fiſh, &c.

In ſtrictneſs, however, *teſtaceous* is only applied to fiſh whoſe ſtrong and thick ſhells are entire; thoſe which are ſoft, thin, and conſiſt of ſeveral pieces jointed, as the lobſter, &c. being called crustaceous.

In medicine, all preparations of ſhells, and ſubſtances of the like kind, are called *teſtaceous*.—Such are powders of crabs claws and eyes, pearl, &c.

Dr. Quincy, and others, ſuppoſe the virtue of all *teſtaceous* medicines to be alike; that they ſeldom or never enter the lacteals, but that the chief of their action is in the firſt paſſages; in which however they are of great uſe in abſorbing acidities.

Hence they become of uſe in fevers, and eſpecially in rectifying the many diſtempers in children, which generally owe their origin to ſuch acidities.

TESTAMENT, Testamentum, in *Law*, a ſolemn and authentic act, whereby a perſon declares his will, as to the diſpoſal of his eſtate, effects, burial, &c.

Teſtaments, according to Juſtinian and ſir Edward Coke, are ſo called becauſe they are *teſtatio mentis*; an etymon, ſays judge Blackſtone, which ſeems to favour too much of the conceit, it being plainly a ſubſtantive derived from the verb *teſtari*. The definition of the old Roman lawyers is much better than their etymology; "*voluntatis noſtræ juſta ſententia de eo, quod quis poſt mortem ſuam fieri velit*," i. e. the legal declaration of a man's intentions, which he wills to be performed after his death. It is called *ſententia*, to denote the circumſpection and prudence with which it is ſuppoſed to be made; it is *voluntatis noſtræ ſententia*, becauſe its efficacy depends on its declaring the teſtator's intention, whence in England it is emphatically ſtyled his *will*: it is *juſta ſententia*, that is, drawn, atteſted and publiſhed with all due ſolemnities and forms of law: it is *de eo, quod quis poſt mortem ſuam fieri velit*, becauſe a *teſtament* is of no force till after the death of the teſtator. Blackſtone's Com. vol. ii. p. 500.

A *teſtament* has no effect till after death, and is always revocable till then. As *teſtaments* are acts, of all others the moſt ſubject to deceits, ſurprize, &c. it was found neceſſary to uſe all kinds of precautions to prevent the wills of the deceaſed from being eluded, and the weakneſs of dying perſons from being abuſed. See WILL.

The moſt ancient *teſtaments* among the Romans were made *viva voce*, the teſtator declaring his will in the preſence of ſeven witneſſes; theſe they called *muncupative teſtaments*: but the danger of truſting the will of the dead to the memory of the living ſoon aboliſhed theſe: and all *teſtaments* were ordered to be in writing.

The French legiſlators thought holographic *teſtaments*, i. e. *teſtaments* written wholly with the teſtator's hand, an abundant ſecurity; but the Roman law, more ſevere, did not admit of *teſtaments* without farther ſolemnity.

The eaſieſt, and moſt favourable, is the twenty-firſt law in the *code de teſtamentis*, which permits ſuch as are unwilling to truſt the ſecret of their *teſtaments* to others, to write it with their own hand, and to cloſe it in the preſence of ſeven witneſſes, decaring to them, that it is their *teſtament*; after which it is to be ſigned by all the ſeven witneſſes.

Otherwiſe, to make a ſolemn *teſtament*, it was required to be atteſted by ſeven witneſſes, and ſealed with their ſeals.

Yet the *military teſtament* was not ſubject to ſo many formalities: the ſoldier was ſuppoſed too much employed in defending the laws, to be ſubject to the trouble of knowing them. His tumultuary profeſſion excuſed him from obſerving all the rules. See MILITARY.

Teſtaments, wherein fathers diſpoſed of their eſtates among their children, had particular privileges, and were diſpenſed from moſt of the ordinary formalities.

Probate of a TESTAMENT. See PROBATE.

TESTAMENT, *Old* and *New*, in *Sacred Hiſtory*. See BIBLE and CANON.

TESTAMENTARY *adoption*. See ADOPTION.

TESTAMENTARY *cauſes*, in *Law*, are thoſe that relate to teſtaments, which were originally cognizable in the king's courts of common law, viz. the county-courts; and afterwards transferred to the juriſdiction of the church, by the favour of the crown, as a natural conſequence of granting to the biſhops the adminiſtration of inteſtates effects. This ſpiritual juriſdiction of *teſtamentary* cauſes is a peculiar conſtitution of this iſland; for in almoſt all other (even in popiſh) countries all matters, *teſtamentary*, are of the juriſdiction of the civil magiſtrate. And that this privilege is enjoyed by the clergy in England, not as a matter of eccleſiaſtical right, but by the ſpecial favour and indulgence of the municipal law, and as it ſhould ſeem by ſome public act of the great council, is freely acknowledged by Lindewode, the ableſt canoniſt of the fifteenth century; and about a century before, in a canon of archbiſhop Stratford; alſo by the conſtitutions of cardinal Othobon; and likewiſe by archbiſhop Parker, in the time of queen Elizabeth. At what period of time the eccleſiaſtical juriſdiction of teſtaments and inteſtacies began in England is not aſcertained by any ancient writer. It appears the foreign clergy were early ambitious of this power, though they were curbed by the edict of the emperor Juſtin, which reſtrained the inſinuation or probate of teſtaments (as formerly) to the office of the *magiſter cenſus*: but afterwards by the canon law it was allowed, that the biſhop might compel by eccleſiaſtical cenſures the performance of a bequeſt to pious uſes. And therefore it fell within the juriſdiction of the ſpiritual courts, by the expreſs words of the charter of king William I. which ſeparated thoſe courts from the temporal. And afterwards, when king Henry I. by his coronation-charter directed, that the goods of an inteſtate ſhould be divided for the good of his ſoul, this made all inteſtacies immediately ſpiritual cauſes, as much as a legacy to pious uſes had been before. This therefore, ſays judge Blackſtone, we may poſſibly conjecture, was the æra referred to by Stratford and Othobon, when the king by the advice of the prelates, and with the conſent of his barons, inveſted the church with this privilege.

This juriſdiction is principally exerciſed with us in the conſiſtory courts of every dioceſan biſhop, or in the prerogative court of the metropolitan, originally; and in the arches court, and courts of delegates by appeal. It is diviſible into three branches; the probate of wills, the granting of adminiſtrations, and the ſuing for legacies The two former of which, when no oppoſition is made, are granted merely *ex officio et debito juſtitiæ*, and are then the object of what is called the voluntary, and not the contentious juriſdiction. But when a CAVEAT is entered againſt proving the will or granting adminiſtration, and a ſuit thereupon follows, in order to determine either the valitity of the teſtament, or who hath a right to the adminiſtration, this claim and obſtruction are remedied by the ſentence of the ſpiritual court, either by eſtabliſhing the will, or granting the adminiſtration. Blackſtone's Com. vol. ii. p. 98. See SUBTRACTION of *legacies*.

TESTAMENTARY *Guardian*, *Succeſſion*, and *Tutorage*. See the ſubſtantives.

TESTAMENTS of the *twelve patriarchs*, in *Eccleſiaſtical Hiſtory*, a kind of apocryphal or ſuppoſititious book, in which thoſe patriarchs are introduced, ſpeaking their laſt dying words, containing predictions of things future, and rules of virtue and piety; which they deliver to their ſons as a choice treaſure, to be carefully preſerved, and to be delivered by them to their children. We have ſeveral editions of theſe in Latin; they were firſt publiſhed in Greek, by Grabe, and from his edition republiſhed by Fabricius; and tranſlated into Engliſh by Mr. Whiſton. Cave places the anonymous author of this book in the year 192, or nearer the beginning of the ſecond century. They are cited by Origen, and, therefore, were probably written before his time. Grabe thinks they were written before the time of our Saviour, and afterwards interpolated by a Chriſtian. But Mr. Whiſton aſſerts, that they are really genuine, and one of the ſacred apocryphal, or concealed books of the Old Teſtament. Cave ſuppoſes that this book was written by a judaizing Chriſtian; Grabe apprehends, that it was writ in Hebrew: Beauſobre is of opinion that it was forged at the end of the firſt, or beginning of the ſecond century, by ſome Chriſtian converted from Judaiſm. Dr. Lardner is poſitive, that theſe *teſtaments* are not the real laſt words of the twelve patriarchs; but the clear knowledge of Chriſtian affairs and principles ſhew this book to have been written, or elſe very much interpolated, after the publication of the Chriſtian religion. He ſays, there is nothing in this work that might not have been wrote by a learned Jew of the ſecond century or later, though he thinks that the author was a Chriſtian, and well verſed in the Jewiſh learning; and moreover he is of opinion, that he is placed early enough by Cave, at the year 192. Lardner's Cred. vol. ii. p. 729, &c.

TESTAMENTO *annexo, adminiſtration cum*. If a teſtator makes his will, without naming any executors, or if he names incapable perſons, or if the executors named refuſe to act; in any of theſe caſes, the ordinary muſt grant adminiſtration *cum teſtamento annexo*, to ſome other perſon.

TESTATOR, or TESTATRIX, the perſon who makes his or her will and teſtament.

M. Gillet ſhews, that a perſon incapable of a legacy cannot demand any ſum which the *teſtator* in his teſtament declares himſelf indebted to him in; in regard ſuch a declaration of debt is preſumed a fraud, againſt the intention of the law.

TESTA NEVILLI, or TESTA DE NEVIL, an ancient record kept by the king's remembrancer in the exchequer, containing the king's fees throughout the greateſt part of England, with inquiſitions of land eſcheated, and ſergeanties.

It was denominated from its compiler Johan. de Nevil, one of the itinerant juſtices under king Henry III.

TESTATUM, in *Law*, a writ in perſonal actions; where, if the defendant cannot be arreſted on a capias in the county where the action is laid, but is returned *non eſt inventus* by the ſheriff, this writ ſhall be ſent into any other county, where ſuch perſon is thought to be, or to have wherewithal to ſatisfy the demand.

It is called *teſtatum*, becauſe the ſheriff has before teſtified, that the defendant was not to be found in his bailiwick.

TESTE, a term commonly uſed in the cloſe of a writ, where the date is contained, which begins with *teſte meipſo*, if it be an original writ; or, if, judicial, *Teſte*, the *lord chief juſtice*, &c. according to the court whence it comes.—In ſome ancient formulas, we read *Teſte cuſtode Angliæ*. There muſt be at leaſt fifteen days between the *teſte* and return of every proceſs, awarded from the king's bench into any foreign county. See WRIT.

TESTER. See TESTON.

TESTES, in *Anatomy*, two white, ſoft, oval bodies, ſerving for generation; uſually called, diminutively, *teſticles*. See TESTICLE.

Theſe are wanting in moſt of the fiſh kind. The ſpinoſe fiſhes in general have neither *teſtes* nor paraſtatæ; but all the cetaceous fiſhes have them, and not a few of the cartilaginous kinds. Thoſe fiſh that have them, have always two, as in land-animals; but they differ much in figure and ſituation in the ſeveral kinds, particularly in the whale and flat fiſh.

TESTES of the brain are two little, round, hard bodies, placed between the third and fourth ventricle, near the pineal gland. See BRAIN.

TESTES *ſynodales*. See SYNODALES.

TESTIBUS *hiis*. See HIIS.

TESTICLE, *teſtis*, a double part in animals of the male kind, ſerving for the office of generation. See *Tab. Anat.* *(Splanch.) fig.* 1, *lit. w. w.*

They are called *teſticles*, by diminution of *teſtes*, witneſſes; as giving teſtimony of virility; they are what we properly call *genitores, genitalia.* The Greeks call them *didymi*, or twins.

In man, and moſt animals, the *teſticles* are exterior; in ſome, as fowls, interior.—Some men have only one, ordinarily they have two, and ſome have naturally had three; nay, anatomiſts aſſure us they have known four.

The *teſticles* are ſoft, white bodies, of an oval figure, and about the ſize of a pigeon's egg: from their office, they are defined glandular bodies; and from their compoſition, they are denominated ſpermatic and vaſcular bodies. Each *teſticle* is formed of the ſpermatic artery, the ſpermatic vein, the nutrient veſſel, and the excretory veſſels or tubuli ſeminiſeri, which terminate in the epididymis: it likewiſe conſiſts of a very great, but uncertain number of lymphatic or abſorbent veſſels, and of ſome branches of nerves, belonging to, or derived from, the pelvis of the abdomen, and the loins. In the body of the *teſticle* is diſcoverable a whitiſh compact ſubſtance, called the nucleus, or axis of the *teſticle*, conſiſting of the tubuli ſeminiferi and thoſe intermediate membranes, by means of which theſe tubuli are connected. The extent of theſe tubuli is very conſiderable; they have been reckoned to amount to many ells, by taking the ſum of all their ſeveral portions; and they may be eaſily unfolded by a long maceration, which deſtroys the delicate ſubſtance that connects all their folds and convolutions. The epididymis is a part of each *teſticle*, originating in its ſubſtance by many diſtinct tubuli or excretory ducts, which terminate in it, and at length, form an excretory duct, called vas deferens; and this terminates obliquely in its reſpective veſicula ſeminalis. The epididymis is inſeparably connected, by one extremity, to the *teſtes* of which it is a part; and the other extremity is as firmly connected to the VAS DEFERENS; the body is looſely adherent to the body of the *teſtis*, by the duplicature of a very fine and almoſt tranſparent membrane, which is the continuation of the tunica albuginea and which afterwards inveſts it; and, indeed, the body of the *teſtis*, the nucleus, the tubuli, the epididymis, and the vas deferens, are continuations of each other, though they ſeem to be of different textures, are called by different names, and have different offices aſſigned them.

The *teſticles*, and epididymes or PARASTATÆ, are encloſed in three coats. The firſt is the *cremaſter* or *ſuſpenſorius teſtis*, compoſed of a thin ſeries of muſcular fibres, and called muſculoſa, which ſurround the ſpermatic chord, and deſcend to the *tunica vaginalis teſtis*, upon the upper and external parts of which this muſcular expanſion terminates and becomes loſt. The ſecond is the *tunica* VAGINALIS, which is a continuation or proceſs of the peritonæum. The third, which is proper to the *teſticle*, immediately inveſting it, and having the epididymis for its appendage, is the TUNICA *albuginea*.

The uſe of the *teſtis* is to ſecrete the ſeed from a ſtream of pure blood that is conveyed to it for that purpoſe, by means of the SPERMATIC *artery*; whilſt the refluent blood is returned from the *teſticle* into the courſe of the circulation, by means of the correſponding SPERMATIC vein: the right ſpermatic vein generally diſcharging its contents into the vena cava deſcendens, whilſt the left almoſt always diſcharges itſelf into the left emulgent vein, by which means it eſcapes any inconvenience that might happen from paſſing over the aorta.

The ſemen, when ſeparated, is received or abſorbed by the tubuli ſeminiſeri, and through theſe it is conveyed, in a thin and liquid ſtate, to the epididymis; from thence it is forwarded by the vas deferens, through the extremity of which it is obliquely diſcharged into the cells of the VESICULA *ſeminalis*, where it gradually acquires a viſcid conſiſtence. See SEED.

The uſe of the lymphatics is to abſorb the thinner parts of the blood, called lymph, and to return it, thus abſorbed, into the venal blood. The nerves give a due degree of ſenſibility and irritability to the *teſtis* and the tunica albuginea: and the nutrient veſſel is deſigned to give nouriſhment to the *teſtis* and epididymis.

The common capſula or membrane, including both *teſticles*, is the SCROTUM. Warner's Account of the *Teſticles*, p. 9, &c. Winſlow's Anat. vol. ii. p. 188.

TESTICLES, *tumors in the.* Tumors and inflammations of one or both the *teſticles* are not unfrequently the conſequence of falls, blows, and contuſions, and very often are alſo brought on by venereal diſorders.

The beſt external applications to diſperſe theſe are vinegar of litharge, lime-water, ſpirit of wine camphorated, and ceruſs, tutty, or lapis calaminaris mixed in it. But in the night-time, when the applications of fomentations are not ſo convenient, a plaſter of the mercurial kind, doubly ſated with mercury, or, in ſlight caſes, one of ſimple diachylon, may very properly be kept on. Internal medicines, ſuch as nitre, and the thin decoctions of diſcutient remedies, are to be uſed; and, if occaſion call for it, bleeding in the arm is very proper. Heiſter.

If the inflammation, ſays Mr. Warner, does not take place at the criſis or termination of a dangerous fever, nor appears to be of that livid complexion which indicates, or threatens a tendency to gangrene; ſuch method of treatment ſhould be purſued as may moſt probably tend to its ſpeedy removal by diſcuſſion; ſuch as copious and occaſionally repeated evacuations, by bleeding at the arm; by purges, clyſters, or emetics; by adhering to an abſtemious, liquid diet; by medicines of the cooling kind, and ſuch as promote a moderate and continued perſpiration from the whole body; by a free uſe of acidulated and diluting liquors; and by anodynes, occaſionally adminiſtered. This treatment may be farther aſſiſted by local fomentations every day, once or twice made uſe of for the ſpace of half an hour, joined with embrocations of the ſoft, cooling, anodyne, and moderately repellent kind; together with cataplaſms of the like tendency, made of equal parts of oil and vinegar, mixed with a ſufficient quantity of oatmeal, or linſeed meal, or cataplaſms of ſtrong-beer grounds and oatmeal, to which may be added a ſmall quantity of oil, hogslard, ointment of elder, or butter.

In tumors proceeding from venereal cauſes, it is always neceſſary to give briſk purges, with the addition of a proper doſe of calomel to each, and warm and weak drinks ſhould be taken frequently, and by this means theſe tumors are often diſperſed. But if either remedies are applied too late, or the inflammation is very violent, the tumor generally ends either in a ſuppuration or gangrene. In this caſe the maturating remedies are to be applied, ſuch as warm cataplaſms, and the like; and if the tumor does not break of itſelf at a proper time, from the application of theſe, it muſt be carefully opened with the knife, and the matter being diſcharged, the wound is to be cleanſed by ſome digeſtive ointment, injecting ſome ſtrong ſpirituous fomentations that reſiſt putrefaction, and afterwards healed by the balſams, as that of Peru, or the like.

The taint that occaſioned the tumor is ſometimes wholly eradicated, and the patient freed from it by a proper management of theſe abſceſſes. It not unfrequently happens indeed in them, that the ſcrotum is in part conſumed, ſo as to leave the part bare, but this loſs of ſubſtance may generally be reſtored by proper treatment, with digeſtive and balſamic remedies. Heiſter's Surg. vol. i. p. 209.

Inflammations and tumors of the *teſticles*, &c. ariſing from venereal cauſes, ſays Mr. Warner, are often attended with very acute pain, and a ſymptomatic fever, becauſe they originate in the tunica albuginea and *teſticle* itſelf; they are, in general, ſudden in their attack, and quick in their progreſs, and accompanied with a conſiderable enlargement, tenſion, and induration of the teſtis itſelf, the epididymis, and tunica albuginea. This enlargement and induration of the teſtis, and more frequently of the epididymis, often remain after the inflammation and pain have quite ſubſided; for removing which, it will be neceſſary to apply mercurial ointments, or mercurial ointments mixed with a proper quantity of camphor, by rubbing the parts once or twice a day for ſome minutes, before the fire; or the proportion of half a dram, or one ſcruple, of the unguentum cœruleum fortius, at each time of uſing it; or to apply an adheſive plaſter, combined of ſoap, mercury, and warm gums, ſpread upon thin ſoft leather, or rag, which, in caſes where ſecrecy and employment render it neceſſary, is the moſt eligible as well as the moſt efficacious method for diſcuſſing the tumor. Emetics, occaſionally repeated, will be found very conducive to this purpoſe. If an inflammation and tumor ſhould ariſe at the termination of a long and dangerous fever, the tumor ſhould be conſidered as critical, thoſe methods ſhould be purſued which are moſt likely to promote the formation of matter, by increaſing the ſwelling; ſuch as the cataplaſma maturans of the London diſpenſatory, or a cataplaſm of bread and milk, mixed with a ſmall proportion of yellow baſilicon diſſolved in it, and applied warm to the part affected. It may be obſerved, in general, that cataplaſms, which are propoſed as encouragers of ſuppuration, ſhould be applied as warm as poſſible, and thoſe, that are recommended as diſcutients, may with propriety be applied cold. The patient muſt be ſupported with a generous diet, and with medicines of the cordial kind, adminiſtered at proper intervals; ſuch as the bark in ſubſtance, extract, decoction, or infuſion, the pulvis ſerpent. Virgin. & radicis contrayervæ, in decoction, given alone, or joined with the confectio cardiaca; occaſionally adding opiates, when pain and reſtleſſneſs, or a diſpoſition to a diarrhœa, accompany the progreſs of the tumor; or, on the contrary, in caſes of coſtiveneſs, occaſional clyſters ſhould be adminiſtered, or a ſmall quantity of pulvis Rhei, or of the ſal Rupellenſis, or tartar ſolubilis, or of ſome other gentle purgative, which may be added to each doſe of the cordial medicine, and repeated till this inconvenience be removed. When the abſceſs arrives at a ſufficient degree of maturity, which, in general, may be diſcovered by ſome or all of the following ſymptoms, viz. the ſize and prominence of the ſwelling, the ſoftneſs of the integuments, their ſhining red complexion, the peeling off of the cuticle from the cutis, the mitigation of pain in the part itſelf, an œdematous appearance of the integuments, upon being preſſed, and, above all, the fluctuation of matter under the fingers; the tumor muſt be opened by inciſion on its moſt fluctuating and depending part. When the contents of the tumor are evacuated, fill the wound looſely with ſhort pieces of the moſt ſoft and downy lint, and over the whole continue the poultice, or apply a pledgit of tow or lint, ſpread with ſome emollient ointment, retaining the whole with a proper bandage. The future dreſſings ſhould be compoſed of the yellow baſilicon, linimentum arcæi, or any other efficacious digeſtive, ſpread upon layers of lint; which pledgits may be ſoftened and rendered more effectual by dipping them in freſh ſallad or linſeed oil, made moderately warm; and previous to each dreſſing, which ſhould be renewed twice in twenty-four hours, an emollient fomentation ſhould be uſed for a quarter of an hour or a longer time. If the diſcharge from the wound be thin, ſanious and corroſive, ſprinkle ſome brandy, Hungary water, lavender water, or camphorated ſpirits of wine, upon each fomentation-cloth; and if, after the operation, any conſiderable hardneſs of the integuments remains, continue to apply the ſuppurative poultice at each time of dreſſing, or the pledgits of digeſtive, till the hardneſs be removed. The uſe of the bark alone, or joined with the pulvis rad. ſerpent. Virgin. or a ſtrong decoction of the powder of ſerpentary and contrayerva, with or without the confect. cardiaca, as well as the ſpiritus vitrioli tenuis, mixed in proper quantities, in ſome diluting liquor, and uſed as common drink at proper intervals, will ſerve to ſupport the patient's ſtrength, and to alter the quality and quantity of the diſcharge. If the tumor ſhould have been neglected, and the abſceſs of the ſcrotum has been not only left to break of itſelf, but the wound communicates with the urethra, the judicious introduction and uſe of bougies, made of a proper compoſition, ſize and ſtiffneſs, joined with mercurial frictions, applied upon or near the diſeaſed parts, and continued at proper intervals for due length of time, with ſoft oily purges, and ſoft diluting drinks, will often render every ſevere operation unneceſſary. If the ſuppuration or abſceſs be formed in the body of the teſtis, a ſimple inciſion made with the point of a lancet, on the moſt depending and ſoft part of the tumor, will generally be ſufficient; or the abſceſs may be ſuffered to break of itſelf, obſerving to dreſs the wound in the moſt ſuperficial manner, and continue an emollient and ſuppurating cataplaſm, for removing the ſwelling and hardneſs of the affected part. If the diſeaſe be of the gangrenous ſpecies, we muſt have immediate recourſe to local applications of the antiſeptic kind, ſuch as aromatic and ſpirituous fomentations, repeated twice a day, the cataplaſm è cymino, large enough to cover the whole diſeaſed part, ſcarifications to evacuate the confined air and acrimonious extravaſated fluid, which is ſometimes pent up in the cellular membranes; and theſe ſcarifications muſt be dreſſed with warm ointments, and oils of a ſufficiently deterſive and ſtimulating kind. The patient muſt be allowed wine in his common drinks; and the bark and ſerpentary, mixed in a cordial julep; and if he be faint and languid, one or more bliſters ſhould be applied, and occaſionally repeated; the bowels being kept in a proper ſtate. Warner's account of the *Teſticles*, p. 13, &c. We have an account by Mr. Elſe, of an encyſted tumor in the ſcrotum, which took its origin from the urethra, and contained a great number of calculous concretions as well as urine, in Med. Obſ. vol. v. p. 336. For the method of applying turbith mineral, in the cure of ſwelled *teſticles*, ſee TURBITH *mineral*.

TESTICULATED *roots*, are thoſe compoſed of two tuberoſe knobs, reſembling a pair of teſticles. Of this kind are the orchiſes, &c.

TESTICULI *muſculus*, in *Anatomy*, the name given by Fallopius, and ſome others, to the muſcle now generally known by the name of the CREMASTER.

TESTIMONIAL, a kind of certificate, ſigned either by the maſter and fellows of the college, where a perſon laſt reſided, or by three, at leaſt, reverend divines, who knew him well for three years laſt paſt; giving an account of the conduct, and learning, of the perſon.

Such a *teſtimonial* is always required before holy orders are conferred; and the biſhop even ordinarily demands one of a PRIEST before he admits him to a benefice.

TESTIMONIAL is alſo a certificate under the hand of a juſtice of peace, teſtifying the time and place when and where a ſoldier or mariner landed, and the place of his dwelling, and whither he is to paſs.

TESTIMONY. See EVIDENCE.

Teſtimony is a ſerious intimation from another of any fact or obſervation, as being what he remembers to have ſeen, heard, or experienced. The evidence of *teſtimony* is either oral or written. Some have unreaſonably ſuppoſed, that this kind of evidence is ſolely and originally derived from experience. With regard to this it may be obſerved, that the evidence of *teſtimony* is to be conſidered as ſtrictly logical, no farther than human veracity, in general, or the veracity of witneſſes of ſuch a character, and in ſuch circumſtances in particular, is ſupported, or hath not been refuted by experience. But that *teſtimony*, antecedently to experience, hath a natural influence on belief, is undeniable, in which reſpect it reſembles memory. And in what regards ſingle facts, it is a more adequate evidence than any concluſions from experience. When experience is applied to the diſcovery of the truth in a particular incident, the evidence is called *preſumptive*; whereas ample *teſtimony* is accounted a poſitive proof of the fact. *Teſtimony* is capable of giving us abſolute certainty even of the moſt miraculous fact, or of what is contrary to uniform experience. To this, when we have no poſitive reaſons of miſtruſt or doubt, we are, by an original principle of our nature (analogous to that which compels our faith in memory), led to give an unlimited aſſent. As on memory alone is founded the merely perſonal experience of the individual, ſo on *teſtimony*, in concurrence with memory, is founded the much more extenſive experience, which is not originally our own, but derived from others. See on this ſubject Campbell's Philoſ. of Rhet. vol. i. book i. chap. 5. and Diſſertation on Miracles, part i. ſect. i. and ii. See FAITH.

For the credibility of human *teſtimony*, See CERTITUDE.

TESTING, in *Metallurgy*, denotes the operation of refining large quantities of gold and ſilver, by means of lead, in the veſſel called a TEST. This operation is performed by the deſtruction, vitrification, and ſcorification of all the extraneous and deſtructible metallic ſubſtances with which thoſe noble metals are allayed. It conſiſts in adding to the allayed gold and ſilver, a certain quantity of lead, and in expoſing afterwards this maſs to the action of the fire. The lead, by increaſing the proportion of imperfect metals, prevents them from being ſo well covered and protected by the perfect metals; by uniting with theſe, it communicates to them a property it has of loſing very eaſily a great part of its inflammable principle; and laſtly, by its vitrifying and fuſing property, which it exerciſes with all its force upon the calcined and naturally refractory parts of the other metals, it facilitates and accelerates the fuſion, the ſcorification, and ſeparation of theſe metals. The lead, which in this operation is purified, and ſcorifies along with it the imperfect metals, ſeparates from the metallic maſs with which it is then incapable of remaining united: it floats upon the ſurface of the melted maſs; becauſe by loſing part of its phlogiſton, it loſes alſo part of its ſpecific gravity, and laſtly it vitrifies. The removal of the vitrified matter in the proceſs is procured either by the nature of the veſſel in which the melted matter is contained, and which, being porous, abſorbs and imbibes the ſcorified matter as faſt as it is formed; or by a channel cut in the edge of the veſſel through which the matter flows out.

The proceſs of *teſting* is generally performed in the ſame manner as that of cupellation. See ASSAYING and COPPELLING.

But when great quantities of baſe metal are to be worked off from a little gold, recourſe is had to a more expeditious method, that of *teſting* before the bellows. An oval teſt is placed in a cavity, made in a hearth of a convenient height, and ſome moiſtened ſand or aſhes preſſed round it to keep it ſteady: the noſe of a bellows is directed along its ſurface, in ſuch a manner, that if aſhes are ſprinkled in the cavity of the teſt, the bellows may blow them completely out; ſome have an iron-plate fixed before the bellows, to direct the blaſt downwards. To keep the ſuface of the teſt from being injured in putting in the metal, ſome cloths or pieces of paper are interpoſed. The fuel conſiſts of billets of barked oak, laid on the ſides of the teſt, with others laid croſs-wiſe on theſe: the bellows impels the flame on the metal, clears the ſurface of aſhes or ſparks of coal, haſtens the ſcorification of the lead, and blows off the ſcoria as faſt as it is formed, to one end of the teſt, where it runs out through a notch made for that purpoſe. About two thirds of the ſcorified lead may be thus collected; the reſt being partly abſorbed by the teſt, and partly diſſipated by the action of the bellows. Care muſt be taken not to urge the blaſt too ſtrongly, leſt ſome portion of the gold ſhould be carried away by the fumes impetuouſly forced off from the lead, and ſome minute particles of it entangled and blown off with the ſcoriæ. Chem. Dict. Art. *Refining*. Lewis's Com. Ph. Techn. p. 146.

TESTO, in the *Italian Muſic*, is applied to thoſe words of a ſong, to which ſome air or tune is to be compoſed.

It is a matter of great importance in muſic, to underſtand well how to appropriate or adapt the muſic to the words of a ſong, to expreſs the ſenſe, and make a juſt application of the long and ſhort ſyllables to the notes and times with which they are to be connected.

But this branch of the ſcience, which depends greatly on the knowledge of poetry, has lain a long time almoſt unregarded, and even at preſent very little care is taken with reſpect to this in the modern muſic.

TESTON, *Teſter*, the name of a coin ſtruck in France, by Louis XII. in 1513, and in Scotland, in the time of Francis II. and Mary queen of Scotland, ſo called from the head of the king, which was engraved upon it. The ſilver it contained was eleven deniers eighteen grains, its weight, ſeven deniers 11½ grains, and its value ten ſols. The coinage of it was prohibited by Henry III. in 1575, when the value of it was augmented to fourteen ſols ſix deniers. Encycl.

The *teſton* or teſter among us, was rated at 12*d*. in the reign of Henry VIII. and afterwards reduced to 6*d*.

TESTUDO, in *Antiquity*, was particularly uſed among the poets, &c. for the ancient lyre, or lyre of Amphion; becauſe it was ſaid to have been originally made, by its inventor Mercury, of the black or hollow ſhell of a *teſtudo aquatica*, or ſea-tortoiſe, which he accidentally found on the banks of the river Nile

Dr. Molyneux has an expreſs diſcourſe, in the Philoſophical Tranſactions, to ſhew that the tortoiſe ſhell was the baſis of the ancient lyre, and that the whole inſtrument had thence the denomination *teſtudo*; which account lets ſome light into an obſcure paſſage in Horace, ode iii. lib. 4. miſtaken by all the commentators:

> *O, teſtudinis aureæ*
> *Dulcem quæ ſtrepitum, Pieri, temperas!*
> *O mutis quoque piſcibus*
> *Donatura cygni, ſi libeat, ſonum!*

TESTUDO, *tortoiſe*, in the *Military Art of the Ancients*, was a kind of cover, or ſcreen, which the ſoldiers, e. gr. a whole company, made themſelves of their targets, by holding them up over their heads, and ſtanding cloſe to each other.

Thus, if we ſuppoſe the firſt rank to have ſtood upright on their feet, and the reſt to have ſtooped lower and lower by degrees, till the laſt rank kneeled down on their knees, ſo that every rank covering with their targets the heads of all in the rank before them, they repreſented a tortoiſe ſhell, or a ſort of ſloping-roof.

This expedient ſerved to ſhelter them from darts, ſtones, &c. thrown upon them, eſpecially thoſe thrown from above when they went to the aſſault. It was alſo uſed in field-battles, as well as in ſieges.

TESTUDO, was alſo a kind of large defenſive engine, of an oval figure, compoſed of boards, and wattled up at the ſides with wicker, which moved on ſeveral wheels, ſerving to ſhelter the ſoldiers when they approached the walls to mine them, or to batter them with rams.

TESTUDO, in *Medicine*, denotes a ſoft broad tumor, or gathering of impure humours between the ſkull and the ſkin, called alſo *talpa*, as reſembling the ſubterraneous windings of a tortoiſe or mole.

TESTUDO, in *Zoology*. See TORTOISE.

TESTUDO *veliformis quadrabilis*, an hemiſpherical vault, or cieling of a church, &c. wherein four windows are ſo contrived, as that the reſt of the vault is quadrable, or may be ſquared.

The determination of theſe windows was a problem propoſed to the great mathematicians of Europe, particularly the cultivators of the new calculus differentialis, in the Acta Eruditorum Lipſiæ, by ſig. Viviani, under the fictitious name of A. D. Piollſci puſillo-geometra, which was the anagram of poſtremo Galilæi diſcipulo.

It was ſolved by ſeveral perſons, particularly M. Leibnitz, the very day he ſaw it: and he gave it in the Leipſic Acts in a variety of ways; as alſo did M. Bernouilli, the marquis de l'Hoſpital, Dr. Wallis, and Dr. Gregory.

TETANUS, τετανος, formed from τεινειν, *to ſtretch*, *ſtrain*, in *Medicime*, a kind of tonic ſpaſmus, or convulſion, wherein the anterior and poſterior muſcles of the head, neck and body, are rendered rigid and inflexible; ſo that the patient can neither bend one way nor the other, the head being much retracted. This diſeaſe is compounded of the EMPROSTHOTONOS and OPISTHOTONOS, and frequently ſupervenes in the laſt ſtage of the latter. In the *tetanus* the general ſymptoms are nearly the ſame as in the opiſthotonos, except that, from the firſt attack, the lateral, abdominal, and other anterior muſcles, are equally contracted as the poſterior ones; and the arms become rigid as well as the lower extremities. The abdomen is always flat and rigid, as in the laſt ſtage of the other, and its contents ſeem to be thrown up into the thorax, which at the ſame time appears to be much dilated. There are here alſo ſome intervals between the ſpaſms, in which the cheeks are drawn towards the ears, ſo that all the teeth may be ſeen as in the SPASMUS *cynicus*. Deglutition is more free in this than in the other diſeaſe; and the patient is ſo far from being balanced between the contractions of the opppoſite muſcles, that the head is retracted, and the ſpine is recurvated, though not quite ſo much as in the opiſthotonos. And the ſpaſm, which commences under the ſternum, is likewiſe common to the *tetanus*, which terminates as the other, and on the ſame fatal days. But whoever recover from either, labour long under a general atonia, and cannot for ſome months raiſe themſelves from a ſupine or recumbent poſture without pain, nor without help. The method of cure in the *tetanus* is the ſame with that in the OPISTHOTONOS; and the abdomen may be often fomented with fourfold large flannels, ſqueezed out of an emollient decoction, as the patient lies in bed, taking care to guard the cloaths about him from being damped by the ſteam. See Dr. Chalmer's account of this diſorder in the Med. Obſ. vol. i. art. 12.

Tetanus is alſo a name ſometimes given to a kind of partial ſpaſm, in which the anterior and poſterior muſcles of the head and neck are rendered inflexible, ſo that it can neither bend one way nor the other.

TETARTEMORION, among the *Ancients*, denotes the fourth part of the zodiac.

TETHALASSOMENOS, a term uſed by the old medical writers, to expreſs wine mixed with ſea-water.

TETHYS, in *Mythology*, the daughter of Cœlum and Terra, and wife of Oceanus. Her chariot, which is repreſented as gliding over the ſurface of the waters, was a ſhell of an extraordinary figure, and whiter than ivory.

TETHYS, in *Zoology*, the name of a genus of naked ſea-inſects, the bodies of which are formed, as it were, of two lips, with an oblong cartilaginous body between them. They have four tentacula, ſhaped like ears, and there are two perforations in moſt ſpecies near the tentacula.

There are ſeveral ſpecies of this genus. Vide Hill, Hiſt. Anim. p. 92.

The *tethys*, in the Linnæan ſyſtem, is a genus of the *mollusca* order of worms; the characters of which are, that the body is oblong, fleſhy, and without feet; the mouth terminates in a cylindric proboſcis under the lip; and it has two formina at the left ſide of the neck. Linnæus enumerates two ſpecies.

TETIMIXIRA, in *Ichthyology*, the name of an American fiſh, more uſually known by the name of the PUDIANO.

TETRACERA, in *Botany*, a genus of the *polyandria tetragynia* claſs. Its characters are theſe: the flower has a permanent empalement of ſix roundiſh ſpreading leaves; the three outer are alternate, and ſmaller than the other. It hath ſix ſmall petals which ſoon fall off, and a great number of ſtamina which are permanent, the length of the empalement, and terminated by ſingle ſummits. It hath four oval germina, ſupporting an awl-ſhaped ſtyle, crowned by an obtuſe ſtigma. The germina become four oval reflexed capſules, each having one cell, opening at the ſeam on the upper ſide, and encloſing one roundiſh ſeed. We have but one ſpecies of this ſhrub, which is a native of la Vera Cruz.

TETRACHORD, TETRACHORDON, formed of τετρα, of τετταρα, *four times*, and χορδη, a *chord*, or *ſtring*, in the *Ancient Muſic*, a concord conſiſting of three degrees, tones, or intervals, or four ſounds or terms; called alſo by the ancients διατεσσαρων, and by the moderns a FOURTH. This interval had the name *tetrachord* given it with reſpect to the lyre, and its chords or ſtrings.

Ancient authors make frequent mention of the ſynaphe, or conjunction; and diazeuxis, or disjunction, of *tetrachords*. To conceive their meaning, it muſt be obſerved, that two *tetrachords* were ſaid to be *joined*, when the ſame chord was the higheſt of the firſt, or loweſt inſtrument, and the loweſt of the ſecond; as was the caſe in the two *tetrachords* that compoſe the ancient heptachord, or ſeventh.

But when two *tetrachords* had no common chord; but, on the contrary, had each their different ones to begin and end withal, ſo that between the two there were two intervals of a tone, then the *tetrachords* were ſaid to be *diſjoined*, which was the caſe in the two *tetrachords* that compoſe the octachord or OCTAVE.

The names of the ſounds of a *tetrachord*, conſidered by itſelf, were hypate, parypate, paranete, and nete. Ariſtoxenus calls them hypate, parypate, lichanus, and nete. Wallis's Append. Ptolem. Harm. p. 159, 160.

When *tetrachords* came to be joined, the parypate was ſometimes called *trite*, as being the third from the *nete*; and the paranete was ſometimes called LICHANUS; as in the fore-mentioned place of Ariſtoxenus.

The *tetrachord of Mercury*, contained four ſtrings or chords, in the proportions of 12, 9, 8, and 6; ſo as to give the fourth, fifth, and octave of the loweſt chord. This is the opinion of Boethius, and after him of Zarlino. Vide Wallis's Append. Ptolem. Harm. p. 178.

TETRACTIS, in *Natural Hiſtory*, a name given by Linkius, and other authors, to a kind of ſtar fiſh, compoſed only of four rays, the more common kinds having five.

TETRACTYC *arithmetic*. See ARITHMETIC.

TETRACTYS, in the *Ancient Geometry*. The Pythagoric *tetractys* is a point, a line, a ſurface, and a ſolid.

TETRADIAPASON, *quadruple diapaſon*, a muſical chord, otherwiſe called a quadruple eighth, or a nine-and-twentieth. See DIAPASON.

TETRADECARHOMBIS, in *Natural Hiſtory*, the name of a genus of foſſils, of the claſs of the ſelenitæ.

The word is derived from the Greek τετρας, *four*, δεκας, *ten*, and ῥομϐος, *a rhomboidal figure*, and expreſſes a rhomboidal body conſiſting of fourteen planes.

The characters of this genus are, that the bodies of it are exactly of the ſame form with the common ſelenitæ; but that in theſe each of the end planes is divided into two; and there are by this means eight of theſe planes, inſtead of four. Hill. See SELENITES.

Of this genus there are only three known ſpecies. See *Tab. of Foſſils, Claſs* 2.

TETRADRACHMA of *Tyre*, an ancient coin, which, according to Joſephus, was equal in value to four Attic drachmæ. It is ſuppoſed to have been the ſame with the Jewiſh SHEKEL.

TETRADITÆ, TETRADITES, in *Antiquity*, a name given to ſeveral different ſects of heretics, out of ſome particular reſpect they bore to the number four, called in Greek, τετρα. Thus the Sabbathians were called *tetraditæ*, from their faſting on Eaſter-day, as on the fourth day, or on Wedneſday.

The Manichees, and others, who admitted of a quaternity inſtead of a Trinity in the Godhead, or four perſons in lieu of three, were alſo called *tetraditæ*.

The followers of Petrus Fullenſis bore the ſame appellation of *tetraditæ*, by reaſon of the addition they made to the TRISAGION, to countenance an error they held, that in our Saviour's paſſion it was not any particular perſon of the Godhead, e. gr. the Son that ſuffered, but the whole Deity.

The ancients alſo gave the name *tetraditæ* to children born under the fourth moon, and theſe they believed unhappy.

TETRADYNAMIA, in *Botany*, the fifteenth claſs of plants. See FRUCTIFICATION and ORDER; and *Tab.* I. *Botany*, &c.

The *tetradynamia* of Linnæus include thoſe called by Tournefort *cruciformes*, and by Ray *ſiliquoſæ*, and *ſiliculoſæ*. The general characters of the claſs are theſe: the perianthium is of an oblong figure, and is compoſed of four leaves, which are oval, oblong, hollow, obtuſe, and converging towards one another, and are gibbous at the baſe; theſe all fall off with the flower, and ſtand in pairs; the oppoſite ones being always equal in length; this cup is properly the nectarium of the plant, and it is on this occaſion, that it is gibbous at the baſe. The flower is of that kind called by Tournefort, *cruciform*; it conſiſts of four equal petals, which have ungues of the length of the cup, erect, and flat; the petals are broad at the top, and obtuſe, and ſcarce touch one another at the ſides; and the inſertion of the petals and of the ſtamina is in the ſame place. The ſtamina are ſix ſubulated erect filaments, the two oppoſite ones are of the length of the cup, the other four are ſomething longer, and are of a leſs length however than the petals. The antheræ are oblong and pointed; thick at the baſe and erect, with apices bending ſideways. The nectariferous gland in the different genera of this claſs is differently ſituated. It uſually however is found near the ſtamina, and moſt frequently of all is affixed to ſome ſhort filaments, and ſtands near their baſe. Two of the ſtamina are often curved, that they may not preſs upon this gland; and it is often owing to this, that two are ſhorter than the reſt. The germen of the piſtil is placed above the receptacle, and is every day in its growth raiſed higher and higher. The ſtyle is ſometimes wanting, but in ſuch plants as have it, it is of the length of the longer ſtamina. The ſtigma is always obtuſe.

The fruit or capſule is always a bivalve pod, which often contains two cells; this, when ripe, opens by ſplitting from the apex to the baſe, and it has always a little membranous ſubſtance, ſerving within as a ſeptum, when the pod is bilocular; this ſtands out beyond the apex, and is the rudiment of what was before the ſtyle. The ſeeds are roundiſh, and the pod uſually narrow and oblong.

This is a very natural claſs of plants, and has been received as ſuch, under whatever name, by all the ſyſtematical writers in botany.

The plants of this claſs are generally ſuppoſed to be all antiſcorbutic. This claſs of plants is naturally ſubdivided into two orders; the one containing the ſiliculoſe plants, and the other the ſiliquoſe. The firſt have a ſhort pod, the others a long and ſlender one. The firſt pods uſually have more of the remains of the ſtyle than the others. The firſt order comprehends fourteen, and the ſecond ſeventeen genera.

TETRAEDRON, or TETRAHEDRON, formed of τετρα, *four*, and ἑδρα, *ſide*, in *Geometry*, one of the five regular or Platonic bodies of ſolids, comprehended under four equilateral and equal triangles.

The *tetraedron* may be conceived as a triangular pyramid of four equal faces. Such is that repreſented, *Tab.* V. *Geomet. fig.* 126.

It is demonſtrated by mathematicians, that the ſquare of the ſide of a *tetraedron* is to the ſquare of the diameter of a ſphere, wherein it may be inſcribed, in a ſubſeſquialteral ratio: whence it follows, that the ſide of a *tetraedron* is to the diameter of a ſphere it is inſcribed in, as √ 2 to the √ 3; conſequently they are incommenſurable. See REGULAR *body*.

TETRAETERIS, τετραετηρις, in the Athenian *Chronology*, a cycle of four years; for which ſee Potter, Archæol. Græc. lib. ii. cap. 26. tom. i. p. 459.

TETRAGON, τετραγονος, formed from τετρα, *four*, and γωνια, *angle*, in *Geometry*; a quadrangle, or a figure with four angles.

Thus a ſquare, parallelogram, rhombus, and trapezium, are *tetragonal* figures.

TETRAGON, in *Aſtrology*, denotes an aſpect of two planets with regard to the earth, when they are diſtant from each other a fourth part of a circle, or 90°—as A D (*Tab. Aſtron. fig.* 3.)

The *tetragon* is expreſſed by the character □.

TETRAGONIA, in *Botany*, a genus of the *icoſandria pentagynia* claſs. Its characters are theſe: the flower has a permanent coloured empalement, compoſed of four oval plain leaves, ſitting upon the germen: it has no petals, but about twenty hair-like ſtamina, which are ſhorter than the empalement, terminated by oblong proſtrate ſummits; and a roundiſh four-cornered germen under the flower, ſupporting four awl-ſhaped ſtyles, which are recurved, and as long as the ſtamina, with hairy ſtigmas of the length of the ſtyles; the germen becomes a thick capſule with four cells, having four angles, which have narrow wings or borders, containing one hard oblong ſeed in each. Linnæus enumerates two, and Miller three ſpecies, natives of the Cape of Good Hope.

TETRAGONIAS, a name given to a meteor whoſe head is of a quadrangular figure and its tail or train long, thick, and uniform; this is not much different from the trabs or beam.

TETRAGONISM, τετραγονισμος, a term which ſome authors uſe to expreſs the quadrature of the circle.

TETRAGONOTHECA, in *Botany*. See *Dwarf* SUN-*flower*.

TETRAGONUS, in *Anatomy*, a muſcle, called alſo QUADRATUS *genæ*.

TETRAGRAMMATON, τετραγραμματον, a denomination given by the Greeks to the Hebrew name of God יהוה, *Jehova*, becauſe in the Hebrew it conſiſts of four letters. See ADONAI.

TETRAGYNIA, formed of τετρα, *four*, and γυνη, *wiſe*, a denomination given to ſeveral orders of plants, which have four ſtyles.

TETRALOGIA, in the *Dramatic Poetry of the Ancients*, denoted four dramatic pieces of the ſame author, of which the three firſt were tragedies, and the laſt of the ſatyric kind. Their deſign was to celebrate a victory in the literary conteſts. Æſchylus and Euripides have written ſome pieces of this kind. Encycl.

TETRAMETER, in the *Ancient Poetry*, an iambic verſe conſiſting of four feet.

The word is formed from τετρα, *four*, and μετρον, *meaſure*; q. d. four metres.—We meet with none of theſe but in the comic poets, as Terence, &c.

TETRANDRIA, in *Botany*, the fourth claſs of plants, which have hermaphrodite flowers, with four ſtamina or male parts in each, of equal length. This claſs comprehends three orders, viz. the *monogynia*, of which there are ſixty-two genera, the *digynia*, including ſix genera, and the *tetragynia*, containing ſeven genera. See FRUCTIFICATION, ORDER and *Tab. Botany*.

TETRANDRIA, in *Botany*, is alſo a denomination given to ſeveral orders of plants, which have four ſtamina.

TETRANGURIA, in *Botany*, a name uſed by ſome authors for the citrul, a plant of the gourd-kind, whoſe ſeeds are uſed in medicine.

TETRAO, in the *Linnæan Syſtem of Ornithology*, the name of a genus of birds of the order of the gallinæ; the diſtinguiſhing character of which is, that they have a naked ſpot near the eyes, full of fleſhy tubercles. Of this genus are twenty ſpecies; ſuch as the grouſe, partridge, ptarmigan, quail, &c. See GROUSE, &c.

TETRAODON, in *Ichthyology*, a genus of the *amphibia nantes*; the characters of which are, that the maxillæ are bony, extended, and bipartite at the apex, the aperture is linear, the lower part of the body is full of prickles, and it has no ventral fins. Of this genus there are ſeven ſpecies in the Linnæan ſyſtem, ſeveral of which Artedi has referred to his genus of *oſtracion*. The *mola*, or SUN-*fiſh*, belongs to this genus.

TETRAPETALOUS, in *Botany*, an epithet given to the flowers that conſiſt of four ſingle petala, or leaves placed around the piſtil.

Theſe M. Juſſieu calls *polypetalous* flowers.

Mr. Ray, who calls them *tetrapetalous*, makes them conſtitute a diſtinct claſs, which he divides into, 1°, Such as have an uniform *tetrapetalous* flower, and their ſeed veſſels a little oblongiſh, which he therefore calls *filiquoſe*. 2°, Such as have their ſeed-veſſels ſhorter, which therefore, for diſtinction ſake, he calls *capſulatæ* and *ſiliculoſæ*. 3°. Such as have a ſeeming *tetrapetalous* flower, that is, a monopetalous one, divided deeply into four partitions, which he particularizes alſo as *anomalous*.

TETRAPHARMACUM, τετραφαρμακον, compounded of τετρα, *four*, and φαρμακον, *drug*, or *remedy*, in the general, denotes any remedy conſiſting of four ingredients.

TETRAPHOE, in *Botany*, a name given by the people of Guinea, to a plant, which they give in decoction as a cure for fluxes. This plant grows alſo in Malabar, where they uſe the roots boiled in whey in the piles; and in the colic they give the root in powder, about a ſcruple for a doſe. It is called in this latter place *wellia cadavalli*, and by Petiver *xanthium Malabaricum copitulis lanuginoſis*. The ſtalks of it are woody and hoary, eſpecially about the tops. Its leaves ſtand by pairs on ſhort foot-ſtalks, and while young they are hoary underneath, with a very ſoft and velvety down; the others are rough, like the ſpotted lungwort, but ſeldom are ſo large. The flowers grow in ſpikes, and conſiſt each of fine green leaves filled with ſcarlet filaments; after theſe the fruit ripens, and is a ſort of woolly bur covered with ſoft and hooked prickles, very like the common Engliſh burdock, but not of a third part of the bigneſs. Phil. Tranſ. N° 232.

TETRAPLA, formed from τετραπλος, *quadruplex*, *four-fold*, in *Church Hiſtory*, a Bible diſpoſed by Origen, under four columns, in each whereof was a different Greek verſion, viz. that of Aquila, that of Symmachus, that of the Seventy, and that of Theodotion.

Sixtus of Sienna confounds the *tetrapla* with the hexapla; but the *tetrapla* is a different work, compoſed after the hexapla, and in favour of ſuch as could not have the hexapla.

Some authors are of opinion, that the order wherein the four verſions of the *tetrapla* were ranged, was different from that wherein we have rehearſed them; and particularly, that the Septuagint was in the firſt column; but St. Epiphanius ſays expreſly to the contrary, and places it in the third.—He even gives us Origen's reaſon for putting it there, which was, ſays he, that the beſt verſion might be in the middle, that the others might be the more eaſily confronted therewith, and corrected from it.

Baronius however, in his Annals for the year 231, takes the Septuagint to have been in the third place in the hexapla, but in the firſt in the *tetrapla*; but Epiphanius gives it the ſame place in both. See HEXAPLA.

TETRAPTOTE, TETRAPTOTON, in *Grammar*, a name given to ſuch defective nouns as have only four caſes: ſuch are aſtus, &c.

TETRAPYRAMIDIA, derived from τετρας, *four*, and πυραμις, a *pyramid*, in *Natural Hiſtory*, the name of a genus of ſpars.

The bodies of this genus are ſpars influenced in their ſhape by an admixture of particles of tin; and are found in form of broad-bottomed pyramids of four ſides.

Of this genus there is only one known ſpecies, which is uſually of a browniſh colour, and is found in Saxony; as alſo in Devonſhire, Cornwall, and other counties of England, where there is tin. Hill.

TETRARCH, TETRARCHA, τετραρχης, formed of τετρα, *four*, and αρχη, *rule*, *dominion*, a prince, who holds and governs a fourth part of a kingdom.

Such, originally, was the import of the title *tetrarch*; but it was afterwards applied to any petty king or ſovereign; and became ſynonymous with *ethnarch*, as appears from the following conſiderations: 1°, That Pliny makes mention of ſix *tetrarchies* within the cities of Decapolis. 2°, That Herod's kingdom was only divided into three parts, which yet were called *tetrarchies*, and the ſovereigns thereof, Luke iii. i. *tetrarchs*. 3°, Joſephus Antiq. Jud. lib. xiv. c. 23. tells us, that, after the battle of Philippi, Antony, going into Syria, conſtituted Herod *tetrarch*; and on medals the ſame Herod is called *ethnarch*.

TETRASARIUS, a word uſed by ſome of the medical writers, to expreſs half an ounce.

TETRASPASTON, τετρασπαϛον, in *Mechanics*, a machine in which are four pullies. See PULLEY.

TETRASTICH, τετραϛιχον, a ſtanza, epigram, or poem, conſiſting of four verſes.

TETRASTŒCHON, in *Botany*, a term often uſed by the Greek writers, and generally miſunderſtood by thoſe who copy their accounts. Pliny has made an error in the deſcription of the euonymus, which has confounded two different ſhrubs together ever ſince, by miſtaking the ſenſe of this word, uſed by Theophraſtus in his account of it. He ſays, that the fruit is divided within into four orders or ſeries of ſeeds; this he expreſſes by the word *tetraſtœchon*, which Pliny, ſuppoſing to be the ſame with the word *tetragonon*, has tranſlated into *granum quadrangula figura*.

But this is by no means the ſenſe of the word which was uſed by the Greeks, to expreſs, that a thing had τεταρας ταξεις, four rows, orders, or ſeries of ſeeds in it: nor does it at all expreſs the ſeeds being ſquare, much leſs its being ſingle, for the original derivation of the word was from the term κατα-ϛοιχον, uſed in dances. Theſe were compoſed of ſeveral ſeries of perſons, called ϛοιχοι, *ſtœchi*; and every ſtœchon conſiſted of ſeveral perſons, who all moved together. See SPINDLE-*tree*.

TETRASTYLE, formed from τετρα, *four*, and ϛυλος, *column*, in the *Ancient Architecture*, a building, and particularly a TEMPLE, with four columns in its front.

TETRASYLLABICAL, a word conſiſting of four ſyllables.

TETRATONON, in *Muſic*, the ſuperfluous fifth is ſometimes thus called, as containing four tones.

TETRAX, in *Ornithology*, the name of a bird of the *otis* or buſtard kind, called by ſome authors ANAS *campeſtris*, or the field-duck; and by others, the *canna*.

It is a very common bird in France, where it is called *canne patriere*: it is called anas, from its ſitting on the ground, juſt as the duck does on the water. It is of the ſize of a pheaſant, and has a beak like that of the common hen. It is taken with nets, as the partridge: it runs very ſwiftly, and, like the buſtard, has no hinder toes. Its belly is white, and is back is variegated with grey, red, and black. It feeds on vegetables, and on ſmall inſects.

TETREUMA, in *Botany*, a name given by the people of Guinea to a ſpecies of ſhrub, very common among them, and uſed to cure whitlows. They dry the leaves, and reduce them to powder; and, moiſtening them with any liquor, apply them to the place. Petiver has called this *arbor Guineenſis lauruſtini facie*, from its great likeneſs to the common ſhrub which we call the lauruſtine. The leaves are opake and ſtiff, and are an inch and a quarter broad, and two inches and a half long. Theſe ſtand alternately on all ſides of the ſtalk, and are fixed on ſhort pedicles. The flowers grow out of the boſoms of the leaves, and ſtand in cluſters in the manner of thoſe of the common lauruſtine. Phil. Tranſ. N° 232.

TETTAR, in the *Manege*, is an ulcer almoſt as broad as one's hand, that appears commonly upon a horſe's croupe, ſometimes on his head, and ſometimes on his neck. It proceeds from bilious blood, and conſumes and eats through the hide or ſkin, and cauſes ſuch a violent itching, that it is a hard matter to keep the horſe from ſcratching, and ſo enlarging and ſpreading the ulcer.

TETTIGES, τεττιγες, graſhoppers, in *Antiquity*, a title the Athenians aſſumed to themſelves. See GEGENES.

TETTIGOMETRA, in *Natural Hiſtory*, a name by which the ancients called the nymph of the cicada, or *tettyx*; and they named this nymph, from which they frequently ſaw that fly hatched, *tettigometra*, which ſignifies the *mother of the cicada*. See HARVEST-*fly*, CICADA, and VEGETABLE-*ſly*.

TETTIGONIA, in *Natural Hiſtory*, a word uſed by the ancients to expreſs the ſmaller ſpecies of *cicada*, with which they were acquainted. They called the larger *acheta*.

It is generally ſuppoſed, that the *tettigonia* was the ſame with our ſmalleſt kind, called by the French *cigalon*; but Mr. Reaumur obſerves, that as the ancients knew two kinds of the *cicada*, we know three; and that our middle one ſeems to have been their *tettigonia* or ſmall *cicada*, and that they were not acquainted with our ſmalleſt kind, or cigalon, which is not larger than a hornet. See HARVEST-*fly*.

TEUCHITES, in *Botany*, a name uſed by ſome for the ſcœnanth or ſchœnanth, camel's hay, which ought to be written *teuochitis*. There is a city *Teuochis* in Ægypt near the borders of Arabia, and the geographers all mention a lake in the neighbourhood of this city; in this lake it is probable the *ſchœnanth* might grow; and being gathered there, and ſold in the adjoining city of *Teuchis*, the purchaſers might diſtinguiſh it with an epithet formed of the name of the place where they bought it. See SCŒNANTH.

TEUCHTLACOT-*zanhqui*, in *Zoology*, a name by which the natives of ſome of the American nations call the *Rattle*-SNAKE.

TEUCRIUM. See GERMANDER.

TEUGA, in *Botany*, the name given in the Hortus Malabaricus to a genus of plants, called by Linnæus and others, COCCUS.

TEUTHIS, in *Ichthyology*, a genus of the *abdominal* fiſhes: the characters of which are, that the head is a little truncated on the fore part, that the branchil membrane has five rays, and that the teeth are equal, rigid, and near each other, forming a regular ſeries. Linnæus enumerates two ſpecies.

TEUTHOPHACE, a word uſed by the ancients, to expreſs a ſort of food made of beet-roots and lentils, often preſcribed as a good diet for the ſick.

TEUTONIC, ſomething belonging to the *Teutons*, an ancient people of Germany, inhabiting chiefly along the coaſt of the German ocean. See GOTHIC.

TEUTONIC *language* is the ancient language of Germany, which is ranked among the mother-tongues.

The *Teutonic* is now called the *German* or *Dutch*, and is diſtinguiſhed into *upper* and *lower*.

The *upper* has two notable dialects; viz. 1°, The Scandian, Daniſh, or perhaps Gothic; to which belong the languages ſpoken in Denmark, Norway, Sweden, and Iceland. 2°, The Saxon; to which belong the ſeveral languages of the Engliſh, Scots, Friſian, and thoſe on the north of the Elbe.

To the *lower* belong the Low Dutch, Flemiſh, &c. ſpoken through the Netherlands, &c.

The learned Mr. Whitaker has lately, in his Hiſtory of Mancheſter, controverted the opinion of thoſe who affirm the Engliſh language to be genuine and unmixed *Teutonic*, and aſſerted it to be of Celtic origin. Mr. Drake, in his Eſſay on the Origin of the Engliſh Language, Archæol. vol. v. has endeavoured to ſupport the former opinion, by comparing part of Ulphilas's Gothic verſion of the goſpel of St. John, executed above 1400 years ago, with the ſame in our preſent tranſlation, and evincing the ſtriking affinity between the two languages; notwithſtanding the different mediums through which they have deſcended, and the many ages that have elapſed ſince they have been ſeparated. Every circumſtance, he obſerves, that conſtitutes the true genius of a language is viſibly derived to the Engliſh from the Goths and Saxons. The articles, flexure of the genitive caſe, prepoſitions and auxiliary verbs are all abſolutely *Teutonic*. The Engliſh, he ſays, is clearly the natural deſcendant of the Gothic or *Teutonic*; and he challenges the deepeſt enquirer into the Celtic to produce ſo deciſive a proof of any affinity of that tongue with ours. The Britiſh, he adds, has little or no reſemblance to the Engliſh. Many of their terms may have gained admiſſion among us, as from the vicinity and long intercourſe we have had with that people, may neceſſarily be imagined, but their idioms and genus are as radically and eſſentially different as any two languages can poſſibly be.

TEUTONIC *order*, a military religious order of knights, eſtabliſhed towards the cloſe of the XIIth century; and thus called, becauſe conſiſting principally of Germans, or *Teutons*.

The origin, &c. of this order were thus: the Chriſtians, under Guy of Luſignan, laying ſiege to Acre, or Acon, a city of Syria, on the borders of the Holy Land; at which ſiege were preſent, Richard king of England, Philip Auguſtus of France, &c. ſome Germans of Bremen and Lubec, touched with compaſſion for the ſick and wounded of the army, who wanted common neceſſaries, ſet on foot a kind of hoſpital under a tent, which they made of a ſhip's ſail; and here betook themſelves to a charitable attendance on them.

This ſtarted a thought (about the year 1190) of eſtabliſhing a third military order, in imitation of the Templars, and the Hoſpitalers.

The deſign was approved by the patriarch of Jeruſalem, the archbiſhops and biſhops of the neighbouring places, the king of Jeruſalem, the maſters of the Temple, and the Hoſpital, and the German lords and prelates then in the Holy Land; and, by common conſent, Frederic duke of Suabia, who was then at their head, ſent ambaſſadors to his brother Henry, king of the Romans, to ſolicit the pope to confirm the new order.

Calixtus III. who then governed the church, granted it by a bull of the 23d of February, 1192, and the new order was called, *The order of* Teutonic *knights of the houſe of St. Mary of Jeruſalem*.

The habit of this order was a white mantle, with a black croſs.

The pope granted them all the privileges of the Templars, and the Hoſpitalers of St. John; excepting that they were to be ſubject to the patriarchs, and other prelates; and that they ſhould pay tithe of what they poſſeſſed.

The firſt maſter of the *Teutonic* order, Henry Walpot, elected during the time of the ſiege of Acre, after the taking of that city, purchaſed a garden, wherein he built a church, and an hoſpital, which was the firſt houſe of the *Teutonic order*.

Such is the account given by Peter of Duiſbourg, a prieſt of this order.

Jaques de Vitry differs a little from this account; and relates, that the *Teutonic order* was eſtabliſhed at Jeruſalem before the city of Acre was beſieged.

The order made no great progreſs under the three firſt grand-maſters; but under the fourth, Herman de Salza, it became very powerful; inſomuch that Conrade duke of Mazovia and Cujavia, about the year 1230, ſent an embaſſy to him, to ſolicit his friendſhip and aſſiſtance, offering him and his order the provinces of Culme and Livonia, with all the lands they could recover from the idolatrous Pruſſians, who harraſſed him exceedingly with their continual incurſions, and againſt whom he intended this new militia; his own knights of the order of *Chriſt*, or of Dobrin, inſtituted for the like purpoſe, being found too weak.

De Salza accepted the donation, and Gregory IX. confirmed it; and, to aid the knights in reducing the Pruſſians, Innocent IV. publiſhed a croiſade. With this help, in a year's time, they ſubdued the provinces of Warmia, Natangia, and Barthia; the inhabitants whereof renounced the worſhip of idols; and, in the courſe of fifty years more, they reduced all Pruſſia, Livonia, Samogitia, and Pomerania, &c.

In 1204, duke Albert had founded the order of Sword-bearers, Port-glaives, which now became united to the *Teutonic* knights, and the union was approved by pope Gregory IX.

The order, thus maſters of all Pruſſia, built the cities of Elbing, Marienburg, Thorn, Dantzick, Koningſberg, and ſome others: the emperor Frederic II. permitted them to add to the arms of their order, the imperial eagle; and St. Louis, in 1250, allowed them to quarter the fleur-de-lys.

After the city of Acre had been recovered by the infidels, the grand-maſter of the *Teutonic order* removed his ſeat from that city to Marienburg. As the order grew in power, the knights took more ſtate on them; and at length, inſtead of friers, brothers, as at firſt, would be called *lords*. And though the grand-maſter Conrade Zolnera, of Rotenſteine, oppoſed this innovation, his ſucceſſor Conrade Wallerod not only approved it, but even procured himſelf to be treated with honours only rendered to the greateſt princes.

Diviſions being got into the order, the kings of Poland made their advantage of them: the Pruſſians revolted to them: and after ſeveral wars between the knights and the Poles, the former yielded to king Caſimir the Upper Pruſſia, and did homage to him for the Lower.

At the time of the Reformation, Albert marquis of Brandenburgh, then grand-maſter, becoming Lutheran, renounced the dignity of grand-maſter, diſſolved the commanderies, and drove the knights out of Pruſſia.

Moſt of the knights followed his example, and embraced the reformation: the reſt transferred the ſeat of their order to Margentheim, or Mariendahl, in Franconia, which they ſtill retain.

They there elected Walter of Cromberg, their grand-maſter, formed a proceſs againſt Albert, and the emperor put him to the ban of the empire. The order, however, could never recover their domains: but are now little more than the ſhadow of what they formerly were, having only three or four commanderies, ſcarce ſufficient for the ordinary ſubſiſtence of the grand-maſter, and his knights.

The officers of the *Teutonic order*, when in its ſplendor, were the grand-maſter, who reſided at Marienburg; under him were the grand-commander; the grand-marſhal, who had his reſidence at Koningſberg; the grand-hoſpitaler, who reſided at Elbing; the draper, who took care to furniſh the habits; the treaſurer who lived at the court of the grand-maſter; and ſeveral commanders, as thoſe of Thorn, Culme, Brandenburg, Koningſberg, Elbing, &c.

They had alſo their commanders of particular caſtles and fortreſſes; advocates, proveditors, intendants of mills, proviſions, &c.

Waſſelius, in his annals, ſays, they had twenty-eight commanders of cities, forty-ſix of caſtles, eighty one hoſpitallers, thirty-five maſters of convents, forty ſtewards, thirty-ſeven providetors, ninety-three maſters of mills, ſeven hundred brothers or knights to take the field, one hundred and ſixty-two brothers of the choir, or prieſts, and ſix thouſand two hundred ſervitors or domeſtics.

TEXT, a relative term, contradiſtinguiſhed to *gloſs* or *commentary*; and ſignifying an original diſcourſe, excluſive of any note or interpretation.

Infinite pains have been taken by the critics, to reſtore, reconcile, ſettle, explain, &c. the *text* of the Bible, and that of the claſſics.

Mr. Whiſton accounts for all thoſe miſunderſtandings between the Old and New Teſtament, particularly as to the prophecies in the Old, cited as fulfilled in the New, from the corruption of the *text* of the Old Teſtament; and to obviate objections made againſt Chriſtianity on that head, has publiſhed an *Eſſay towards reſtoring the true* Text *of the Old Teſtament*.

This reſtoration he attempts to effect from the Samaritan Pentateuch, the Roman Pſalter, the Apoſtolical Conſtitutions, &c.

It ſufficiently appears from the learned and acceptable labours of the late Dr. Kennicott, in collating the Hebrew manuſcripts of the Old Teſtament, that the alterations introduced into the *text*, &c. are moſtly of a trivial nature, and by no means affect the authority of the ſacred writings.

TEXT is particularly uſed for a certain paſſage of Scripture choſen by a preacher, to be the ſubject of his ſermon.

Anciently, the lawyers began all their pleadings with like *texts* of Scripture.

A *text-book*, in ſeveral univerſities, is a claſſic author written very wide, by the ſtudents, to give room for an interpretation dictated by the maſter or regent, to be inſerted in the interlines.

In this ſenſe, the French ſay, proverbially, *Gloſſe d'Orleans plus obſcure que le* texte.

The Spaniards gave the name *text* to a kind of little poem, or ſet of verſes placed at the head of a gloſs, and making the ſubject thereof; each verſe being explained, one after another, in the courſe of the gloſs.

TEXT, in *ancient Low Authors*, is appropriated to the book of the Four Goſpels, by way of eminence. Theſe were written in gold letters, and carefully preſerved in the churches.

Codex aurato conſeptus grammate ſcriptus.
Auctus evangelicum conſervat corpore textum.

TEXTUARIES, TEXTUARII, a name given the ſect of the CARAITES, among the Jews.

Hillel ſhone among the traditionaries, and Schammai among the *textuaries*.

The civil and canon lawyers ſometimes alſo call a book containing the bare text, without any gloſs or commentary, a *textuary*, *textuarium*.

TEXTUS *Roffenſis*, is an ancient manuſcript, containing the rights, cuſtoms, tenures, &c. of the church of Rocheſter, granted by the laws of Ethelbert, Hholthere, Eadred, and Withred, kings of Kent, collected by Ernulf, the venerable biſhop of Rocheſter, about the year 1100.

TEXTURE, TEXTURA, formed of *texo*, *I weave*, properly denotes the arrangement and coheſion of ſeveral ſlender bodies or threads interwoven or entangled among each other; as in the webs of ſpiders, or in cloths, ſtuffs, &c.

TEXTURE is alſo uſed in ſpeaking of any union or coheſion of the conſtituent particles of a concrete body; whether by weaving, hooking, knitting, tying, chaining, indenting, intruding, compreſſing, attracting, or any other way.

In this ſenſe, we ſay a cloſe, compact *texture*; a lax, porous *texture*; a regular or irregular *texture*; &c.

A great deal depends on the *texture* of the component parts of a body: hence moſt of its particular properties, its ſpecific gravity, colour, &c.

TFUOI, in the *Chineſe Manufactory of Porcelain*, a word uſed to expreſs a particular ſort of varniſh for that ware, with violet-colour and gold. The uſual method of doing this at firſt, was by mixing gold with the common varniſh, breaking the leaves very ſmall, and then adding the common blue and the powder of calcined agate of a coarſe kind, found in great plenty on the ſhores of their rivers. But they have ſince found, that the brown varniſh called *tſekin* ſucceeds much better, for when the blue is mixed with this, its brown colour is loſt, and the gold lies on much better than it would any other way.

They had once a method of a varied varniſh, which was very beautiful, but is much neglected now; this was the giving a veſſel the brown varniſh on the outſide with a large portion of gold, and the common white varniſh within. They alſo varied the degree of colour on the outſide, by laying on more or leſs of the varniſh; and gave this way a variety, even in the ſame colour. Obſerv. ſur le Coutumes de l'Aſie, p. 308.

THABORITES. See TABORITES.

THACAS, θακας, in *Antiquity*, a general name given to the place or ſeat where the augurs made their obſervations.

THACK *tyles*. See TYLE.

THAIS, a name given by Ægineta, to a coſmetic cerate, intended to give a beautiful red to the face. Galen uſes the ſame word to expreſs a ſort of bandage.

THALAMEGUS, among the *Ancients*, a ſhip of pleaſure, or yacht uſed by princes. It was always provided with a good cabin, or bed-chamber. See SHIP.

THALAMI *nervorum opticorum*, in *Anatomy*, two oblong prominences of the lateral ventricles of the brain; medullary without, but a little cineritious within.

They are thus called, becauſe the optic nerves riſe out of them.

THALAMII, among the *Ancients*, thoſe rowers who ſat in the loweſt part of the ſhip. See THALAMITÆ.

THALAMITÆ, in the *Naval Architecture* of the *Ancients*, a term uſed to expreſs thoſe rowers in the polycrote galleys, or thoſe who contained ſeveral ſeries of rowers, who ſat on the *thalamus* of the veſſel, and made the loweſt row. Theſe moved their oars and hands under the ſeats of the row that ſat next above them. See POLYCROTA.

THALAMIUM, among the *Ancients*, a port-hole, through which the oars of the rowers in the bottom of the ſhip went.

THALAMUS, in *Botany*, a term uſed to expreſs that part of the flower in the capitated or floſculous-flowered plants, where the embryo-fruits of every ſeparate floſcule are lodged, and where afterwards the ſeeds are contained. This is the bottom of the cup, in the central part of which it adheres to the ſtalk.

THALASSOMELI, the name of a medicine uſed as a purge among the ancients. It was compoſed of equal parts of honey, ſea-water, and rain-water, expoſed to the ſun in the dog-days, in a veſſel pitched on the inſide. It purged in the ſame manner that ſea-water alone would do, but only in a milder way.

THALIA, in *Botany*, the name of a genus of plants, of the *monandria monogynia* claſs, called by Plumier, *cortuſa*; the characters of which are theſe: the cup is a ſpatha of an oval figure, terminating in a point, and compoſed of only one valve; the flower is compoſed of five petals, which are of an oblong ovated figure, and are hollowed and undulated at the margin; two of theſe, which are neareſt the cup, are ſmall and convoluted; the others are nearly equal in ſize, and are ſtraight and hollowed; the germen of the piſtil is an ovated figure, and the fruit is a berry of an oval figure, having only one cell, and within that a ſingle bony-ſeed which has two cells, in each of which is a thin kernel. There is one ſpecies.

THALIA, in *Mythology*, one of the nine *Muſes*, who preſided over comedy and paſtorals. She is diſtinguiſhed from the other Muſes by her maſk, and from the tragic Muſe by her ſhepherd's crook; her aſpect is likewiſe meaner than that of MELPOMENE, and her dreſs ſhorter and leſs noble than that of the other Muſes.

THALIA, was alſo the name of one of the GRACES.

THALICTRUM, in *Botany*. See *Meadow* RUE.

THALLOPHORI, ϑαλλοφοροι, in *Antiquity*, the old men and women, who, in the proceſſion of the feſtival *panathenæa*, carried olive-boughs in their hands.

THALYSIA, ϑαλυσια, in *Antiquity*, a ſacrifice offered by the huſbandmen after harveſt. For the origin and ceremonies of which, ſee Potter, Archæol. Græc. tom. i. p. 400.

THAMALAPATHRA. See FOLIUM *Indicum*.

THAMAR, a word uſed by the Arabian phyſicians, to expreſs a date. Hence a pectoral decoction made with dates and other ingredients, was called *diathamyron*; and the word was afterwards corruptly written *dicameron*.

THAME. See TEAM.

THAMMUZ, in *Mythology*, is a name under which the Phœnicians worſhipped ADONIS or OSIRIS.

THAMMUZ, in *Chronology*, a name given by the Jews to the tenth month of the civil year, containing twenty-nine days, and anſwering to our June.

THANE, or THAIN, THANUS, the name of an ancient dignity among the Engliſh, or Anglo-Saxons.

Skene makes *thane* to have been a dignity equal with that of the ſon of an earl: Camden will have it, that *thanes* were only dignified by the offices which they bore.

There were two kinds or orders of *thanes*: the *king's thanes*, and the *ordinary thanes*. The firſt were thoſe who attended our Engliſh-Saxon kings in their courts, and who held lands immediately of the king: whence, in Domeſday-book, they are promiſcuouſly called *thani*, and *ſervientes regis*.

Soon after the conqueſt, this name was diſuſed; and inſtead thereof they were called the *king's barons*, *barones regis*.

Their origin is referred to king Canutus, who, taking the chief of the Daniſh nobility, to the number of three thouſand for his guard, and arming them with battle-axes and ſabres with gilt handles, called them *thing lith*. From the two Daniſh words *theing* or *thein*, *body of nobility*, and *lith*, *order of battle*.

The ordinary *thanes*, or *thani minores*, were the lords of manors, who had particular juriſdiction within their limits, and over their own tenants.

Theſe changed their name for that of barons; and hence their courts are called *courts baron* to this day.

In old authors, charters, &c. we alſo meet with THANE as ſignifying a nobleman; though ſometimes only a freeman, and ſometimes a magiſtrate.

THANE *lands*, were lands granted by charter of the Saxon kings to their *thanes*.

THAPSIA, *deadly carrot*, or *ſcorching fennel*, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe: it has an umbellated flower; the general umbel is large, compoſed of about twenty rays, which are nearly equal, theſe have no involucra, and the general umbel is uniform; the flowers have five ſpear-ſhaped incurved petals, and five hair-like ſtamina, of the length of the petals, terminated by ſingle ſummits; it has an oblong germen ſituated under the flower, ſupporting two ſhort ſtyles, crowned by obtuſe ſtigmas; the germen becomes an oblong fruit, girt with a longitudinal membrane, dividing into two parts, each containing one oblong ſeed pointed at both ends, having plain borders on both ſides. Linnæus enumerates five, and Miller ſix ſpecies.

The roots of the *thapſia*, with a carrot-leaf, were formerly uſed in medicine: there are two kinds of it, the white and the black.

The white *thapſia*, called by ſome alſo *grey turbith*, is the root of a plant ſomewhat reſembling fennel. This is full of a milk-like juice, ſo very ſharp that it will bring off the ſkin, if ſuffered to touch the face. This root has been ſometimes ſold for the turbith-root. They may be diſtinguiſhed, however, by the turbith's being of a reddiſh grey without, and of a whitiſh grey within, and heavy and hard to break; on the contrary white *thapſia* is light, wrinkled, and a ſilvery grey on the outſide, and ſo hot and acrid to the taſte, that, if new, it will bliſter the mouth.

The black *thapſia* is of too duſky a colour to be uſed as an adulteration of turbith, and too hot and acrid to be preſcribed internally.

The roots of this plant purge very violently both upwards and downwards, and are now baniſhed from among the number of medicinal ſimples. Boerhaave ſays, they have the ſame qualities with the euphorbium, burning the bowels, and cauſing a diarrhœa.

Beſide the poiſonous root known by the name *thapſia*, the ancients have deſcribed three other vegetable ſubſtances under it; the lycium-wood uſed at this time, as alſo of old in Crete, as a yellow dye; the *Scythica radix*, or liquorice; and the *luteola*, or dyer's-weed. The Greek *thapſos* ſignifies a pale dead yellow colour, and is applicable either to the ſubſtance, or the juice or tincture of all theſe.

THAPSOS, in the *Materia Medica of the Ancients*, a name given to a kind of wood of a pale yellow colour, uſed of old in dying linen and woollen cloths.

The people of Crete at this time uſe the lycium-wood in dying a yellow colour, and it is probable that the *thapſos* was this very tree. Dioſcorides tells us, that the wood of this tree was alſo uſed in his time to tinge the hair yellow, which was a favourite colour with the Greeks. The lycium is of a colour ſomewhat deeper than our box-wood, and parts with its ſtain ſo eaſily, that it ſeems very proper for ſuch a purpoſe.

THAPSUM, among the *Old Roman Writers*, a common name for the *verbaſcum*, or mullein; but as there were many other plants, very different in their nature, yet whoſe names reſembled this; ſuch as the *thapſia*, or deadly carrot, and the *thapſum* or *geniſtella tinctoria*; it was ſoon found neceſſary to add ſome other name, and it was then called *thapſum barbatum*, or *barbaſſum*.

The reaſon of the geniſtella being called *thapſum*, was, that its flowers were yellow, and were uſed to colour the ladies hair; that being the favourite colour of thoſe days. The flowers of mullein are yellow, and ſeem more fit for the colouring of the hair than thoſe of the geniſtella; their colour being more eaſily ſeparated, and continuing on ſo well, that the glovers of many parts of England uſe them in the ſeaſon for colouring their yellow gloves.

It is probable, that the ladies of old uſed this, as well as the geniſtella for this purpoſe; and it might hence obtain the common name *thapſum*. The other part of its diſtinction, *barbatum*, ſeems owing to the leaves being ſo coloured with a woolly down that they look bearded. And when this word is written *barbaſſum*, it may probably be given as the name of ſome of thoſe ſpecies of mullein, which are not hairy, as our black or ſage-leaved mullein, and be a corruption of the word *verbaſcum*. This black mullein has no leſs title than the white or bearded kind, to the name *thapſum*: its flowers being of a yet finer yellow than thoſe of that kind, and being as fit for the uſe of ſtaining. The glovers of Hertfordſhire uſe this ſpecies for their leather-gloves.

THARGELIA, ϑαργελια, in *Antiquity*, an Athenian feſtival, in honour of the ſun, and his attendants the Hours; or, as others think, of the Delian Apollo and Diana. For an account of the ceremonies of this ſolemnity, ſee Potter, Archæol. Grec. lib. ii. cap. 20. tom. i. p. 400. ſeq.

THARGELION, ϑαργελιων, in *Chronology*, the eleventh month of the Athenian year. It contained thirty days, and anſwered to the latter part of our April, and the beginning of May.

It took its name from the feſtival *Thargelia*, kept in it.

THATCH, a common covering for houſes in moſt parts of the country.

The beſt kind of *thatch* is that called *helm*, or ſtiff unbruiſed wheat ſtraw, with the ears cut off, and bound up in bundles. This being diſpoſed in an uniform and longitudinal order on the roof, is fixed on with laths, withies, or ropes.

THAUGHTS, or THOUGHTS, in a *boat*, are the benches on which the rowers ſit to row.

THAUMATURGUS, formed from ϑαυμα, *wonderful thing*, and εργον, *work*, *worker of miracles*; an appellation which the Romaniſts give to ſeveral of their ſaints, eminent for the number and greatneſs of their miracles.

St. Gregory, called *Thaumaturgus*, or Gregory of Neocæſarea, was a diſciple of Origen, about the year 223, and afterwards biſhop of Cæſarea in Pontus; and in that capacity, he aſſiſted at the firſt council of Antioch, and at that of Epheſus, againſt Paulus Samoſatenus. St. Leo of Catanea is alſo called *Leo Thaumaturgus*. He lived in the eighth century; and his body is ſtill honoured at Rome in the church of St. Martin de Tours. St. Francis Paul, and St. Francis Xavier, are the great *Thaumaturgi* of theſe laſt ages.

THAWING, the reſolution of ice into its former fluid ſtate, by the warmth of the air.

THEA, in *Botany*. See TEA.

THEANDRIC, ϑεανδρικος, *dei-virile*; a term ſignifying divine and human, formed from Θεος, *God*, and ανηρ, *man*.

St. Dionyſius, biſhop of Athens, firſt uſed the word *theandric*, to expreſs a double operation, or two operations united in Jeſus Chriſt; the one divine, the other human. The Monophyſites afterwards abuſed it, to ſignify the one only operation which they admitted in Jeſus Chriſt; in whom they believed there was a mixture of the divine and human nature, whence reſulted a third nature, which was a compound of the one and the other, whoſe operations followed the eſſence and qualities of the mixture, and were neither divine nor human, both at once, or, in one word, *theandric*.

Θεανδρικη ενεργεια, *theandric*, or *dei-virile* operation, in the ſenſe of Dionyſius, and Damaſcenus, is thus exemplified by Athanaſius. When Chriſt healed the perſon who was born blind, the ſpittle he voided was human, but the opening of the eyes was done by his divine power. And thus, in raiſing Lazarus, he called as man, but awaked him from the dead as God.

The term *theandric*, and the dogma of *theandric* operations, were examined with great care and attention, at the council of Lateran, held in 649, where pope Martin ſolidly refuted the notion of *theandric* operations, and ſhewed, that the ſenſe wherein St. Dionyſius firſt uſed the word, was catholic, and quite remote from that of the Monophyſites and Monothelites.

THEANTHROPOS, Θεανθρωπος, formed from Θεος, *God*, and ανθρωπος, *man*, denominated *God-man*; a term ſometimes uſed in the ſchools, to ſignify Jeſus Chriſt, who is God-man; or repreſented by ſome ſcholaſtic theological writers, as comprehending two natures in one perſon.

THEATER, or THEATRE, *theatrum*, formed from ϑεατρον, *ſpectacle*, of ϑεαομαι, *I ſee*, among the *Ancients*, a public edifice, for the exhibiting of ſcenic ſpectacles or ſhews to the people.

Under the word *theater* was comprehended, not only the eminence whereon the actors appeared, and the action paſſed, but alſo the whole area, or extent of the place, common to the actors and ſpectators.

In this ſenſe, the *theater* was a building encompaſſed with porticoes and furniſhed with ſeats of ſtone, diſpoſed in ſemicircles, aſcending gradually over one another; which encompaſſed a ſpace called the *orcheſtra*, in the front whereof was the proſcenium, or pulpitum, whereon the actors performed, and which is what we diſtinctly call the *theater*, or ſtage.

On the proſcenium ſtood the ſcena, a large front, adorned with orders of architecture, behind which was the poſtſcenium, or places where the actors made themſelves ready, retired, &c. So that the ſcena, in its full extent, comprehended all the part belonging to the actors.

In the firſt ages of the Roman commonwealth, *theaters* were only temporary, and formed of wood: the moſt celebrated of theſe was that of M. Scaurus, mentioned by Pliny. The firſt fixed *theater* was erected by Pompey the Great, who built it very magnificently with ſquare ſtone.

In the Greek *theaters*, the orcheſtra made a part of the ſcena, but in the Roman *theaters*, none of the actors ever deſcended into the orcheſtra; which was taken up by the ſeats of the ſenators.

The moſt celebrated *theaters* remaining of antiquity, are the *theater* of Marcellus, and that of Pompey; which are alſo called *amphitheaters*.

At Athens are ſtill ſeen the remains of the temple of Bacchus, which was the firſt *theater* in the world, and was a maſter-piece in architecture. All *theaters* were conſecrated to Venus and Bacchus.

THEATER, among the *Moderns*, more peculiarly denotes the ſtage, or place whereon the drama, or play, is exhibited; anſwering to the proſcenium of the ancients.

In its full latitude, however, the *theater* includes the whole play-houſe: in which ſenſe it is a ſpacious room, or hall, part whereof is taken up by the ſcena, which comprehends the ſtage, the decorations, and the machines; and the reſt is diſtributed into a ſpace, called the *pit*, or *parterre*, which is covered with ſeats, boxes, &c. and terminated with an elevation of one or two galleries, diſpoſed into benches aſcending over one another. See PLAY-*houſe*.

THEATER, is alſo uſed in *Architecture*, chiefly among the Italians, for an aſſemblage of ſeveral buildings, which, by a happy diſpoſition and elevation, repreſents an agreeable ſcene to the eye.

Such are moſt of the vineyards at Rome; but particularly that of Monte Dragone, at Freſcati; and in France, the new caſtle of St. Germain en Laye.

THEATER, *anatomical*, in a ſchool of *Medicine* and *Surgery*, is a hall, with ſeveral rows of ſeats, diſpoſed in the circumference of an amphiteater, having a table, bearing on a pivot, in the middle, for the diſſection of bodies.

Such is the anatomical *theater* of the royal garden at Paris.

The THEATER at Oxford is a beautiful building, erected by archbiſhop Sheldon, for the uſe of ſcholaſtic exerciſes.

THEATINES, an order of nuns, under the direction of the *Theatins*.

There are two kinds of *Theatines*, under the title of *Siſters of the Immaculate Conception*, who form two different congregations, the one engaged by ſolemn vows, and the other only by ſimple vows. Their common foundreſs was Urſula Benincaſa. Thoſe who make the ſimple vows are the moſt ancient, and are called abſolutely *Theatines of the Congregation*: they had their riſe at Naples, in 1583.

The others are called *Theatines of the Hermitage*: the whole buſineſs of theſe is praying in retirement, and an auſtere ſolitude, to which they engage themſelves by ſolem vows.

The *Theatines* of the firſt Congregation take care of the temporal concerns of theſe laſt. Their houſes ſtand together, and communicate by a large hall. Their foundreſs drew up their conſtitutions, and laid the foundation of their houſe at Naples; but died before it was finiſhed.

Gregory XV. who confirmed the new inſtitute under the rule of St. Auguſtine, appointed that they ſhould be under the direction of the *Theatins*. Urban VIII. revoked this article by a brief in 1624, and ſubjected them to the nuncio of Naples: but Clement IX. annulled this brief, and ſubmitted them anew to the *Theatins* by a brief in 1668.

THEATINS, a religious order of regular prieſts: thus called from their firſt ſuperior don John Pietro Caraffa, archbiſhop of Chieti, in the kingdom of Naples, which was anciently called *Theate*.

The ſame archbiſhop became afterwards pope, by the name of Paul IV. after having been a companion of Gaetan, or Cajetan, a Venetian gentleman, the firſt founder of this order, at Rome, in 1524

The *Theatins* were the firſt who aſſumed the title of *regular clerks*. They have not only no lands, or fixed revenues, either in common, or in propriety; but they do not even aſk or beg any thing; but wait for what Providence ſhall ſend them for their ſubſiſtence.

They employ themſelves much in foreign miſſions; and in 1627, they entered upon Mingrelia, where they have an eſtabliſhment: they have had the like in Tartary, Circaſſia, and Georgia; but this they have ſince abandoned.

Their firſt congregation appeared at Rome in 1524, and was confirmed in the ſame year by Clement VII. Their conſtitutions were drawn up at a general chapter in 1604, and approved by Clement VIII. They wear the prieſt's habit.

THEATRE. See THEATER and AMPHITHEATER.

THEATRIC *bandages*, a term uſed by Hippocrates, to expreſs the parade of ſurgery in applying bandages for ſhew, when there was no real uſe in them. All ſuch bandages he called *theatric*, only proper to be looked at.

THEAVE, among country people, denotes an ewe-lamb of the firſt year.

THEBAID, *Thebais*, a famous heroic poem of Statius, the ſubject whereof is the civil war of Thebes between the two brothers Eteocles and Polynices; or Thebes taken by Theſeus.

Statius was twelve years in compoſing his *Thebaid*, which conſiſts of twelve books: he wrote under Domitian. He is cenſured by the beſt critics, as Boſſu, &c. for a vicious multiplicity of fables and actions, for too much heat and extravagance, and for going beyond the bounds of probability.

Several Greek poets had compoſed *Thebaids*, or poems of this name, before him; the principal were Antagoras, Antiphanes of Colophon, Menelaus the Ægean; and an anonymous author mentioned by Pauſanias, lib. ix.

Ariſtotle, praiſing Homer for the ſimplicity of his fable, oppoſes to him the ignorance of certain poets, who imagined that the unity of fable or action was abundantly provided for by the unity of the hero, and who compoſed Theiſeids, Herculeids, &c. in each whereof they collected every thing that had ever happened to their principal perſon.

THEBANUS *ophites*, in *Natural Hiſtory*, a name given by ſome of the ancients to that ſpecies of the OPHITES, or ſerpentine marble, more commonly called *ophites niger*, the black ſerpentine.

THEBET, in *Chronology*, See TEBET.

THEDO, in *Ichthyology*, a name given by Figulus and others, to the TROUT.

THEFT, *furtum*, in *Law*, an unlawful, felonious taking away another man's moveable and perſonal goods, againſt the owner's will, with an intent to ſteal them. See Larceny.

Open *theft* from the perſon, or in the preſence of the owner, is properly called Robbery.

THEFTBOTE, the receiving a man's goods again from a thief, or other amends, by way of compoſition, and to prevent proſecution, that the felon may eſcape unpuniſhed; the puniſhment whereof is now fine and impriſonment.

This is frequently called compounding of felony. By 25 Geo. II. cap. 36. even to advertiſe a reward for the return of things ſtolen, with no queſtions aſked, or words to the ſame import, ſubjects the advertiſer and the printer to a forfeiture of 50*l.* each.

THEIOCRUS, in the *Materia Medica of the Ancients*, a name given by ſome to the Melanteria.

This name *theiocrus* ſignifies only ſulphur-coloured, and was at firſt uſed with the name of vitriol, as expreſſive of the difference of this kind from others; but in time it became common to uſe it alone.

THEISM. See Deism.

THEKUPHÆ. See Tekuphæ.

THELE, a word uſed by ſome to expreſs the nipple, and by others for the whole breaſt.

THELIGONUM, in *Botany*. See *Dog's* Cabbage.

THELONIUM, *telonium*, ſignifies toll.

Among the Romans, *telonium* denoted a cuſtom-houſe, or place where the toll was collected.

Breve eſſendi quieti de Thelonio, a writ lying for the citizens of a city, or burgeſſes of a town, that have a charter or preſcription to free them from toll, agianſt the officers of any town or market, who would conſtrain them to pay it, contrary to the ſaid grant or preſcription.

Thelonio *rationabili habendo pro dominis habendibus dominica regis ad firmam*, a writ lying for him that hath of the king's demeſne in fee-farm to recover reaſonable toll of the king's tenants there, if his demeſne hath been accuſtomed to be tolled.

THEME, *thema*, a ſubject or topic, to write or compoſe on.

Theme, among *Aſtrologers*, denotes the figure they conſtruct when they draw the horoſcope; repreſenting the ſtate of the heavens for a certain point, or moment, required; i. e. the places of the ſtars and planets, for that moment.

The celeſtial *theme* conſiſts of twelve triangles, incloſed within two ſquares, and called the *twelve houſes*.

Theme, in *Grammar*, denotes a verb, conſidered in its primary and abſolute ſenſe, and not limited to any particular mode or tenſe: or it is the verb in its primitive radical ſtate, whence its different formations are derived.

THEMIS, in *Aſtronomy*, a name given by ſome to the third ſatellite of Jupiter.

Themis, in *Mythology*, the daughter of Cœlum and Terra, or of Uranus and Titaia, the eldeſt ſiſter of Saturn, and aunt of Jupiter.

Themis, according to Diodorus, eſtabliſhed divination, ſacrifices, the laws of religion, and every regulation that contributed to maintain order and peace among men. She alſo applied herſelf to aſtrology, iſſued predictions, and after her death temples were erected to her, in which oracles were delivered. She had a temple on mount Parnaſſus, and another in the citadel of Athens.

THENAR, in *Anatomy*, a muſcle whoſe office is to draw the thumb from the fore-finger; whence it is alſo denominated *abductor pollicis manus*.

It is fixed to the bone which ſupports the thumb, and to the neighbouring part of the great internal annular or tranſverſe ligament of the carpus. It is in ſome meaſure bicipital; two diſtinct portions anſwering to the two inſertions. As it runs along the firſt phalanx, theſe two portions unite, and diminiſhing in thickneſs, are both inſerted by one tendon in the lateral internal part of the head of the firſt phalanx, in the lateral part of the baſis of the ſecond, and in the lateral ligament of that joint. The void ſpace between the two portions of this muſcle gives paſſage to the tendon of the *flexor pollicis longus*. That portion which lies neareſt the hollow of the hand, is largeſt; and its tendinous extremity is inſerted in the firſt ſeſamoide bone, ſituated at the baſis of the ſecond phalanx.

There is a ſimilar muſcle belonging to the great toe, ſometimes alſo called *thenar*, or *abductor pollicis pedis*.

The antagoniſts to theſe are called *antithenars*.

Thenar *pedis*, a muſcle made up of ſeveral portions, and lying on the inner edge of the ſole of the foot. It is fixed by three or four fleſhy faſciculi to the lower and inner part of the os calcis, ſcaphoides, and cruciforme majus, and a little in the annular ligament under the inner ancle, which belongs to the tendon of the flexor longus. From all theſe inſertions the faſciculi approach each other, as they advance under the firſt bone of the metatarſus, and are fixed in the internal ſeſamoide bones and inſide of the firſt phalanx near its baſis; and there is another faſciculus fixed by one end to the os ſcaphoides, and cuneiforme majus; and by the other to the external ſeſamoide bone, and outſide of the firſt phalanx of the great toe. Winſlow.

THENOPSYCHITES. See Thnetopsychites.

THENSA, among the Romans, a veil or canopy, uſed in the chariots of games; and likewiſe to cover a ſeat of ſtate.

Thenſæ could not be granted to any but by the expreſs allowance of the ſenate. Hiſt. Acad. Inſcript. vol. i. p. 359.

THEOBROMA, in *Botany*. See *Baſtard* Cedar, and Cacao, which, in the Linnæan diſtribution, form the two ſpecies of this genus. Their diſtinct characters, as given by Miller, may be ſeen under their reſpective titles.

THEOCATAGNOSTÆ, formed from Θεος, *God*, and καταγινωσκω, *I judge*, or *condemn*, a ſect of heretics, or rather of blaſphemers, who preſumed to find fault with certain words and actions of God, and to blame many things in the Scriptures.

Marſhal, in his tables, places theſe heretics in the ſeventh century; for what reaſon we know not. Damaſcenus is the only author that mentions them, but without taking any notice of the time of their appearance.

THEOCRACY, formed from Θεος, *God*, and κρατος, *power*, *empire*, a ſtate governed by the immediate direction of God alone.

According to Joſephus, the ancient government of the Jews was *theocratic*; God himſelf ordering and directing every thing belonging to the ſovereign authority.

By the oracle of Jehovah himſelf, all laws were enacted, war was proclaimed, and magiſtrates were appointed; in which three particulars the *ſumma poteſtas*, or ſovereign authority, of any ſtate, conſiſts. And as Jehovah was the king, as well as the god of Iſrael, the Priests and Levites, who were the ſtated attendants on his preſence, and to whom the execution of the law in many caſes was committed, were properly miniſters of ſtate and of civil government, as well as of religion. The ſacrifices alſo, beſides their religious uſe, were intended for the ſupport of the ſtate, and civil government.

This *theocracy* laſted till the time of Saul; when the Iſraelites, weary thereof, deſired they might have a king like other nations; and thence forward the ſtate became monarchic.

There was alſo a kind of imaginary *theocracy* at Athens: while the ſons of Codrus were diſputing the ſucceſſion, the Athenians, wearied out with the miſeries of an inteſtine war, aboliſhed the royalty, and declared Jupiter the only king of the people at Athens.

THEODOLITE, a mathematical inſtrument, much uſed in ſurveying, for the taking of angles, diſtances, altitudes, &c.

It is made variouſly; ſeveral perſons having their ſeveral ways of contriving it, each attempting to make it more ſimple and portable, more accurate and expeditious, than others. It conſiſts of a braſs circle, about a foot diameter, cut in form of *fig.* 53. *Tab.* III. *Surveying*; having its limb divided into 360 degrees, and each degree ſubdivided either diagonally, or otherwiſe, into minutes.

Underneath, at *c c*, are fixed two little pillars *b b* (*fig.* 54.) which ſupport an axis, whereon is fixed a teleſcope, conſiſting of two glaſſes, in a ſquare braſs tube, for the viewing of remote objects.

On the centre of the circle, moves the index C, which is a circular plate, having a compaſs in the middle, whoſe meridian line anſwers to the fiducial line *a a*; at *b b* are fixed two pillars to ſupport an axis, which bears a teleſcope like the former, whoſe line of collimation anſwers to the fiducial line *a a*. At each end of either teleſcope is fixed a plain ſight for the viewing of nearer objects.

The ends of the index *a a* are cut circularly, to fit the diviſions of the limb B; and when that limb is diagonally divided, the fiducial line at one end of the index ſhews the degrees and minutes upon the limb. The whole inſtrument is mounted with a ball and ſocket, upon a three-legged ſtaff.

Moſt *theodolites* have no teleſcopes, but only four plain ſights, two of them faſtened on the limb, and two on the ends of the index.

The uſe of the *theodolite* is abundantly ſhewn in that of the Semicircle, which is only half a *theodolite*. And in that of the Plain *table*, which is occaſionally made to be uſed as a *theodolite*.

Note, the index and compaſs of the *theodolite* likewiſe ſerve for a circumferentor, and are uſed as ſuch.

This inſtrument is now commonly made uſe of by ſurveyors. One of the beſt of the kind ſeems to be Mr.

Siſſon's lateſt improved *theodolite*; a deſcription of which may be found in Mr. Gardner's Practical Surveying improved; from whence it has been inſerted in a late treatiſe of practical geometry, publiſhed at Edinburgh, 1745, in 8vo. under the care, as it is commonly thought, of the late celebrated Mr. Maclaurin.

In this inſtrument the three ſtaves, by braſs ferrils at top, ſcrew into bell-metal joints, moveable between braſs pillars, fixed in a ſtrong braſs plate; in which, round the centre, is fixed a ſocket with a ball moveable in it, and upon which the four ſcrews preſs that ſet the limb horizontal. Next above is ſuch another plate, through which the ſaid ſcrews paſs, and on which round the centre is fixed a fruſtum of a cone of bell-metal, whoſe axis, being connected with the centre of the ball, is always perpendicular to the limb, by means of a conical braſs ferril fitted to it, whereon is fixed the compaſs-box, and on it the limb, which is a ſtrong bell-metal ring, whereon are moveable three braſs indexes, in whoſe plate are fixed four braſs pillars, that joining at top, hold the centre pin of the bell-metal double ſextant, whoſe double index is fitted in the centre of the ſame plate. Within the double ſextant is fixed the ſpirit-level, and over it the teleſcope.

The compaſs box is graved with two diamonds for north and ſouth, and with 20 degrees on both ſides of each, that the needle may be ſet to the variation, and its error alſo known.

The limbs has two fleurs-de-lys againſt the diamonds in the box, and is curiouſly divided into whole degrees, and numbered to the left-hand at every 10° to twice 180°, having three indexes (with Nonius's diviſions on each for the decimals of a degree) that are moved by a pinion fixed below one of them without moving the limb, and in another is a ſcrew and ſpring under, to fix it to any part of the limb: it has alſo diviſions numbered for taking the quarter girt in round timber; to which a ſhorter index is uſed, having Nonius's diviſions for the decimals of an inch; but an abatement muſt be made for the bark, if not taken off.

The double-ſextant is divided on one ſide from under its centre (when the ſpirit-tube and teleſcope are level), to above 60 degrees each way, and numbered at 10, 20, &c. And the double index (through which it is moveable) ſhews on the ſame ſide the degree and decimal of any altitude or depreſſion to that extent, by Nonius's diviſions: on the other ſide are diviſions numbered for taking the upright height of timber, &c. in feet, when diſtant 10 feet, which at 20 muſt be doubled, and at 30 trebled; and alſo the quantities for reducing hypothenuſal lines to horizontal. It is moveable by a pinion fixed in the double index. See SURVEYING.

The teleſcope is a little ſhorter than the diameter of the limb, that a fall may not hurt it; yet it will magnify as much, and ſhew a diſtinct object as perfect, as moſt of treble its length; in its focus are very fine croſs wires, whoſe interſection is in the plane of the double ſextant, and this was a whole circle, and turned in a lathe to a true plane, and is fixed at right angles to the limb; ſo that whenever the limb is ſet horizontal (which is readily done by making the ſpirit-tube level over two ſcrews, and the like over the other two) the double-ſextant and teleſcope are moveable in a vertical plane, and then every angle taken on the limb (though the teleſcope be ever ſo much elevated or depreſſed) will be an angle in the plane of the horizon, and this is abſolutely neceſſary in plotting an horizontal plane.

THEOGAMIA, Θεογαμια, in *Antiquity*, a Sicilian feſtival, in honour of Proſerpine, which ſeems to have been inſtituted in memory of her marriage with Pluto.

THEOGONY, formed from Θεος, *God*, and γονη, *geniture*, *ſeed*, *offspring*, that branch of the heathen theology which taught the genealogy of their gods.

Heſiod gives us the ancient *theogony*, in a poem under that title. Among the moſt ancient writers, Dr. Burnet obſerves, that *theogony* and coſmogony ſignified the ſame thing. In effect, the generation of the gods of the ancient Perſians, fire, water, and earth, is apparently no other than that of the primary elements.

THEOLOGICAL *criticiſm*. See CRITICISM.

THEOLOGICAL *prebend*. See PREBEND.

THEOLOGIUM, formed from Θεος, and λογος, *ſpeech*, or *diſcourſe*, in the ancient theatre, was a place, or little ſtage, above that whereon the ordinary actors appeared. See THEATRE.

The *theologium* was the place where their gods appeared. It alſo included the machines whereon they deſcended, and from which they ſpoke.

There was a *theologium* required for the repreſentation of the Ajax of Sophocles, the Hippolitus of Euripides, &c. Scal. Poet. lib. i. cap. 1.

THEOLOGY, compounded of Θεος, *God*, and λογος, *diſcourſe*, *Divinity*; a ſcience, which inſtructs us in the knowledge of God, and divine things; or which has God, and the things he has revealed, for its object.

Theology is a ſcience which ſhews us what we are to believe of God, and the manner wherein he would be ſerved. It is divided into two branches, the *natural*, and the *revealed*, or *ſupernatural*.

THEOLOGY, *natural*, is the knowledge we have of God from his works, by the light of nature, and reaſon.

THEOLOGY, *ſupernatural*, is that which we learn from revelation.

THEOLOGY, *poſitive*, is the knowledge of the holy Scriptures, and of the ſignification thereof, conformably to the opinions of the fathers and councils; without the aſſiſtance of any argumentation. But ſome will have it, that this ought to be called *expoſitive*, rather than *poſitive*.

THEOLOGY, *moral*, is that which teaches us the divine laws relating to our manners and actions; in contradiſtinction to

THEOLOGY, *ſpeculative*, which explains and eſtabliſhes the doctrines of religion, as objects of faith.

THEOLOGY, *ſcholaſtic*, or *ſchool*, is that which proceeds by reaſoning; or that derives the knowledge of ſeveral divine things from certain eſtabliſhed principles of faith. See SCHOLASTIC *divinity*.

The ancients, according to Varro, Scævola, and Plutarch, had a three-fold *theology*; the firſt μυθικη, *mythic*, *fabulous*, which flouriſhed among the poets; and was chiefly employed in the theogony, or genealogy, and hiſtory of the gods: to whom all things were attributed, which men, and even the vileſt of men, could be guilty of. Nevertheleſs, the popular religion and worſhip were in a great meaſure founded upon that mythology, which run through the whole of their religion, and was of great authority with the people. Many unexceptionable proofs of this are produced by Dr. Leland, in his Advantage and Neceſſity of the Chriſtian Revelation, vol. i. part i. chap. 6.

The ſecond, ϖολιτικη, *political*, or *civil*, was that eſtabliſhed by the Roman laws, and chiefly embraced by the politicians, prieſts, and people, as moſt ſuitable and expedient to the ſafety, quiet, and proſperity of the ſtate. This, though not the true, was the vulgar *theology*, and conſtituted the public and authorized religion. It was that which the philolophers themſelves, whatever private opinions or ſpeculations they might entertain, or diſpute of in their ſchools, univerſally conformed to in their own practice, and alſo exhorted others to do ſo. Varro informs us, that this *theology* particularly determined what gods they were publicly to worſhip, what ſacred rights they were to obſerve, and what ſacrifices to offer.

Although even the vulgar among the pagans ſeem, in general, to have had ſome notion of one ſupreme GOD, yet their *theology* was properly polytheiſm; and the providence they acknowledged was the providence not of one god, but of many gods. The learned Dr. Cudworth, who ſeems inclined to put the moſt favourable conſtruction upon the pagan *theology*, acknowledges, that the civil *theology*, as well as the poetical, had not only many phantaſtic gods in it, but an appearance of a plurality of independent deities; ſeveral being made ſupreme in their reſpective territories or functions. Ariſtotle (Oper. tom. i. p. 1246. edit. Paris, 1629.) intimates, that according to the laws of cities and countries, that is in the civil or political *theology*, there ſeems to be no one abſolutely powerful or all-perfect being, but a plurality of gods, one of whom is ſuppoſed to be more powerful in one reſpect, and another in another reſpect. Beſides, the public religion was made up partly of the phyſical and partly of the poetical *theology*. Thoſe poetical fables, which Varro cenſures as unworthy of the gods, and as aſcribing to them actions which none but the vileſt of men could be guilty of, were not only permitted to be acted on the public theatres, and heard with pleaſure by the people, but they were regarded as things pleaſing to the gods themſelves, by which they were propitiated and rendered favourable; and accordingly they were taken into the public religion. Games were celebrated, and plays were founded upon them; and the public games and plays were on certain occaſions conſidered as acts of religion, encouraged by their deities, and celebrated in honour of them. It is alſo juſtly obſerved, that the images, forms, habits, and ornaments of their gods, their different ſexes and ages, and the ſacred feſtivals inſtituted to their honour, had all of them a reference to the fables of the poets and mythologiſts, and were founded upon them; ſo that the civil and the fabulous *theology* might each of them be called civil, and each fabulous. Hence proceeded many abſurd and ridiculous, and many immoral and inhuman rites, which were made uſe of in the worſhip of their gods, and which were either preſcribed by the laws, or were eſtabliſhed cuſtoms, countenanced by the magiſtrates, and which had obtained the force of laws, and may, therefore, be regarded as belonging to the public religion of the pagans. See Leland's Chriſtian Revelation, ubi ſupra, cap. 7.

The third, φυσικη, *natural*, was chiefly cultivated by the philoſophers, as moſt agreeable to nature and reaſon. The phyſical or natural *theology* acknowledged one only ſupreme God; to which it added dæmons or ſpirits, as mediators between him and man.

Dr. Leland has urged a variety of conſiderations to prove that, notwithſtanding the high encomiums which have been beſtowed upon the *philoſophical theology* of the pagans, it was of little uſe in leading the people into a right knowledge of God and religion, and for reclaiming them from their idolatry and polytheiſm. To this purpoſe he obſerves, that, if the philoſophers had been right in their own notions of religion, they could have but little influence on the people, for want of a proper authority to enforce their inſtructions. The affected obſcurity of the pagan philoſophers, was another cauſe which rendered them unfit to inſtruct the people in religion: to which it may be added, that ſome of them uſed their utmoſt efforts to deſtroy all certainty and evidence, and to unſettle men's minds as to the belief of the fundamental principles of all religion; and even the beſt and greateſt of them acknowledged the darkneſs and uncertainty they were under, eſpecially in divine matters. The philoſophers themſelves were alſo for the moſt part very wrong in their own notions of the Divinity; they very much corrupted the ancient tradition relating to the one true God and the creation of the world, and endeavoured to account for the formation of all things without the interpoſition of a Deity. And the opinions of thoſe philoſophers who were of a nobler kind, were chargeable with great defects: they generally expreſſed themſelves in the polytheiſtic ſtrain, and inſtead of leading the people to the one true God, they ſpoke of a plurality of gods, even in their moſt ſerious diſcourſes; aſcribing thoſe works to the gods, and directing thoſe duties to be rendered to them, which properly belong to the ſupreme. The philoſophers likewiſe referred the people for inſtruction in divine matters to the oracles, which were managed by the prieſts: this was particularly the caſe with Socrates, Plato, and the Stoics.

It was an univerſal maxim among them, that it was the duty of every wiſe and good man to conform to the religion of his country; and they not only worſhipped the gods of their reſpective countries, according to the eſtabliſhed rites, and exhorted others to do ſo; but when they took upon themſelves the character of legiſlators, and drew up plans of laws and of the beſt forms of government, polytheiſm, and not the worſhip of the one true God, was the religion they propoſed to eſtabliſh. Moreover, they employed their learning and abilities to defend and juſtify the popular idolatry and polytheiſm. The worſhip of inferior deities was recommended by them under pretence that it tended to the honour of the ſupreme. Some of the moſt eminent of them endeavoured to colour over the moſt abſurd part of the pagan poetical *theology* by allegorizing the moſt indecent fables. They apologized for the Egyptian animal worſhip, which the generality of the vulgar pagans in other nations ridiculed. They vindicated idolatry and image-worſhip as neceſſary to keep the people from falling into irreligion and atheiſm; not to add, that ſome of the more refined philoſophers were againſt any external worſhip of the ſupreme God.

Many of the philoſophers, and of the learned and polite pagans, denied a Providence. Of thoſe who profeſſed to acknowledge it, ſome confined it to heaven and heavenly things; others ſuppoſed it to extend to the earth and to mankind, yet ſo as only to exerciſe a general care and ſuperintendency, but not to extend to individuals: others, again, ſuppoſed all things, the leaſt as well as the greateſt, to be under the care of Providence; but they aſcribed this not to the ſupreme God, who, they thought, was above concerning himſelf with ſuch things as theſe, and committed the care of them wholly to inferior deities. See the illuſtration and proof of theſe ſeveral allegations by Dr. Leland, ubi ſupra, cap. 10—17.

Theology, *bachelor in.* See Bachelor.

Theology, *myſtic.* See Mystic.

Theology, *polemical.* See Polemical.

THEOMANTIA, Θεομαντεια, in *Antiquity*, divination by the ſuppoſed inſpiration of ſome deity. For a particular account of which, ſee Potter, Archæol. Græc. lib. ii. cap. 12. tom. i. p. 298.

THEOPASCHITES, *Theopaſchitæ*, a ſect of heretics in the fifth century, the followers of Petrus Fullenſis, or Peter the Fuller, who uſurped the ſee of Antioch; and after having been ſeveral times depoſed, and condemned, on account of his oppoſition to the council of Chalcedon, was at laſt fixed in it, A. D. 482, by the authority of the emperor Zeno, and the favour of Acacius, biſhop of Conſtantinople; whence they are ſometimes alſo denominated *Fulloniani*.

Their diſtinguiſhing doctrine was, that the whole Trinity ſuffered in the paſſion of Jeſus Chriſt.

This hereſy was embraced by the Eutychian monks of Scythia, or, according to La Croze, of Egyyt; who uſing their utmoſt efforts to make it obtain, raiſed great diſorders towards the beginning of the following century.

It was condemned, at its firſt riſe, in the councils of Rome and Conſtantinople, held in 483. It was again revived in the ninth century, and again condemned in a council at Rome, held in 862, under pope Nicholas I.

F. Le Quien, in his notes on Damaſcenus, ſays, that the ſame error had been taught before Fullenſis, by Apollinarius, whoſe diſciples were the firſt that were called *Theopatitæ*, or *Theopaſchitæ*.

THEOPHANIA, Θεοφανεια, formed of Θεος, *God*, and φαινω, *I appear*, in *Antiquity*, a feſtival obſerved by the Delphians upon the day whereon Apollo firſt manifeſted himſelf to them.

THEOPHANY, in *Church Hiſtory*, is ſometimes uſed in the ſame ſenſe with Epiphany.

THEOPHRASTA, in *Botany*, the name of a genus of plants of the *pentandria monogynia* claſs, the characters of which are theſe: the cup is a ſmall perianthium, ſlightly divided into five obtuſe ſegments, and remaining when the flower is fallen; the flower conſiſts of a ſingle petal, in form of a bell, ſlightly divided into five obtuſe ſegments; the ſtamina are five tapering filaments, ſhorter than the flower; the antheræ are ſimple; the germen of the piſtil is of an oval figure; the ſtyle is tapering, and ſhorter than the flower: the ſtigma is acute; the fruit is a very large globoſe capſule, containing only one cell; the ſeeds are numerous and roundiſh, and are affixed to every part of their receptacle, which is looſe. There is one ſpecies.

THEOPHRASTICS, a name given to the followers of Paracelſus, from his name Theophraſtus.

THEOPNEUSTÆ, Θεοπνευϛαι, formed of Θεος, *God*, and πνευω, *I breathe*, an epithet given to enthuſiaſtical diviners.

THEOPROPIA, Θεοπροπια, formed of Θεος, *God*, and πρεπω, *I excel*, a deſignation given to oracles. See Oracle.

THEOPSIA, Θεοπτια, formed of Θεος, *God*, and οπτομαι, *I ſee*, in *Mythology*, denoted the appearance of gods. Cicero, Plutarch, Arnobius, and Chryſoſtom, mention appearances of this kind.

THEORBO, Thiorba, or Tiorba, a muſical inſtrument, made in form of a large lute; except that it has two necks, or juga, the ſecond and longer whereof ſuſtains the four laſt rows of chords, which are to give the deepeſt ſounds.

The word is formed from the French *teorbe*, or *theorbe*, and that from the Italian *tiorba*, which ſignifies the ſame; and which ſome will have to be the name of the inventor.

The *theorbo* is an inſtrument which for many years ſucceeded to the lute, in the playing of thorough baſſes: it is ſaid by ſome to have been invented in France by the ſieur Hotteman, and thence introduced into Italy, &c.

The only difference between the *theorbo* and the lute is, that the former has eight baſs or thick ſtrings twice as long as thoſe of the lute; which exceſs of length renders their ſound ſo exceedingly ſoft, and keeps it up ſo long a time, that it is no wonder many prefer it to the harpſichord itſelf. At leaſt it has this advantage over it, that it is eaſily removed from place to place, &c.

All its ſtrings are uſually ſingle; though there are ſome who double the baſs-ſtrings with a little octave, or the ſmall ſtrings with an uniſon; in which caſe, bearing more reſemblance to the lute than the common *theorbo*, the Italians call it the arcileuto, or *arch-lute*.

THEOREM, in the *Mathematical Method*, a propoſition which terminates in theory, and which conſiders the properties of things already made, or done.

Or, a *theorem* is a ſpeculative propoſition, deduced from ſeveral definitions compared together. Thus, if a triangle be compared with a parallelogram ſtanding on the ſame baſe, and of the ſame altitude, and partly from their immediate definitions, and partly from other of their properties already determined, it is inferred, that the parallelogram is double the triangle; that propoſition is the *theorem*.

Theorem ſtands contradiſtinguiſhed from problem.

There are two things to be chiefly regarded in every *theorem*, viz. the propoſition, and the demonſtration: in the firſt is expreſſed what agrees to ſome certain thing under certain conditions, and what does not.

In the latter, the reaſons are laid down, by which the underſtanding comes to conceive, that it does or does not agree thereto.

Theorems are of various kinds: as

Theorem, *univerſal*, is that which extends to any quantity without reſtriction, univerſally. As this, that the rectangle of the ſum and difference of any two quantities is equal to the difference of their ſquares.

Theorem, *particular*, is that which extends only to a particular quantity. As this: in an equilateral right-lined triangle, each of the angles is ſixty degrees.

Theorem, *negative*, is that which expreſſes the impoſſibility of any aſſertion. As, that the ſum of two biquadrate numbers cannot make a ſquare number.

Theorem, *local*, is that which relates to a ſurface. As, that triangles of the ſame baſe and altitude are equal.

Theorem, *plane*, is that which either relates to a rectilinear ſurface, or to one terminated by the circumference of a circle. As, that all angles in the ſame ſegment of a circle are equal.

Theorem, *ſolid*, is that which conſiders a ſpace terminated by a ſolid line; that is, by any of the three conic ſections. E. gr. this: that if a right line cut two aſymptotic parabolas, its two parts terminated by them ſhall be equal. See Solid.

Theorem, *reciprocal*, is one whoſe converſe is true. As, that if a triangle have two equal ſides, it muſt have two equal angles: the converſe of which is likewiſe true, that if it have two equal angles, it muſt have two equal ſides.

THEORETIC, Theoretical, or Theoric, formed from ϑεωρεω, *I ſee*, or *contemplate*, ſomething relating to *theory*, or that terminates in ſpeculation. In which ſenſe it ſtands oppoſite to *practical*.

The ſciences are ordinarily divided into *theoretical*, as theology, philoſophy, &c. and *practical*, as medicine, law, &c. See Science.

Theoretic, Theoreticus, is an appellation peculiarly given to an ancient ſect of phyſicians contradiſtinguiſhed by it from the empirics.

Theoretic phyſicians were ſuch as applied themſelves to a careful ſtudy and conſideration of what relates to health and diſeaſes; the principles of the human body, and its ſtructure and parts, with their actions and uſes; whatever befals it either naturally or preternaturally; the differences of diſeaſes, their nature, cauſes, ſigns, indications, &c. the textures, properties, &c. of plants, and other medicines, &c. In a word, the *theoretic* phyſicians were ſuch as went on the foot of reaſon, in oppoſition to the empirical phyſicians, who went wholly on experience. See Medicine.

Theoretical *arithmetic* and *philoſophy*. See the ſubſtantives.

THEORI, ϑεωροι, in *Antiquity*, an appellation given to thoſe Athenians who performed the ſolemnity called *theoria*.

THEORIA, ϑεωρια, in *Antiquity*, a ſolemn annual voyage to Apollo's temple in the iſland Delos, performed by the Athenians always in the ſame ſhip in which Theſeus went. For the particularities of this naval proceſſion, ſee Potter, Archæol. Græc. lib. ii. cap. 9. tom. i. p. 284, ſeq.

THEORIC *money*, in *Ancient Authors*, was what was raiſed by way of tax on the people, to defray the expences of theatrical repreſentations, and other ſpectacles.

There were particular queſtors and treaſurers of the *theoric money*. By a law of Eubulus, it was made a capital crime to pervert the *theoric money* to any other uſe; even to employ it in the occaſions of war.

THEORICAL *aſtronomy*, is that part of astronomy which conſiders the true ſtructure and diſpoſition of the heavens, and heavenly bodies; and accounts for their various phenomena therefrom.

It is thus called in oppoſition to that part which conſiders their apparent ſtructure, or their diſpoſition as viewed by the eye, which is called spherical *aſtronomy*.

The ſeveral parts of *theorical aſtronomy*, ſee under System, Sun, Star, Planet, Earth, Moon, Satellite, and Comet.

THEORY, a doctrine which terminates in the ſole ſpeculation, or conſideration, of its object, without any view to the practice or application thereof.

To be learned in an art, &c. the *theory* ſuffices; to be a maſter of it, both the *theory* and practice are required. Machines, many times, promiſe very well in the *theory*, yet fail in the practice.

We ſay, *theory* cf the moon, *theory* of the rainbow, of the microſcope, the camera obſcura, the motion of the heart, the operation of purgatives, &c.

Theories *of the planets*, &c. are ſyſtems or hypotheſes, according to which the aſtronomers explain the reaſons of the phenomena or appearances thereof.

THEOSOPHISTS. See Fire-*philoſophers*.

THEOTOCUS, *Deipara*. See Mother *of God*.

THEOXENIA, Θεοξενια, in *Antiquity*, a feſtival in honour of all the gods, and celebrated in many cities of Greece, but eſpecially Athens.

THEOXINI *malagma*, the name of a ſort of cataplaſm, good againſt pains of the feet.

THERAPEUTÆ, ϑεραπευται, a Greek term ſignifying ſervants, more eſpecially thoſe employed in the ſervice of God. The Greeks gave the appellation *therapeutæ* to ſuch as applied themſelves to a contemplative life, whether it were from the great concern they had for their ſouls, or from the particular mode and manner of their religion; the word ϑεραπευειν, whence *therapeutæ*, ſignifying the care a phyſician takes of his patient, or the ſervice any one renders another.

Philo, in his firſt book of the Contemplative Life, relates, that there were a people ſpread throughout moſt of the known world, but particularly throughout Egypt, and about Alexandria, who renounced their friends, their goods, &c. and who, after diſcharging themſelves of all temporal concerns, retired into ſolitary places, where they had each their ſeparate manſion, called *ſemneium*, or *monaſtery*.

There are two points relating to thoſe *therapeutæ* exceedingly controverted among critics, viz. 1°, Whether they were Jews or Chriſtians; and, 2°, If they were the latter, whether they were monks or ſeculars?

Moſheim affirms, that the *therapeutæ* were neither Chriſtians nor Egyptians, as ſome have erroneouſly imagined: they were undoubtedly Jews; nay, they gloried in that title, and ſtyled themſelves, with particular affectation, the true diſciples of Moſes, though their manner of life was equally repugnant to the inſtitutions of that great lawgiver, and to the dictates of right reaſon, and ſhewed them to be a tribe of melancholy and wrong-headed enthuſiaſts. Eccl. Hiſt. vol. i. p. 37. Eng. ed. 8vo.

Calmet alſo, in his Dictionary of the Bible, alledges a variety of reaſons to prove, that the *therapeutæ* were Jews and not Chriſtians; and that they were not monks in the ſenſe which eccleſiaſtical writers affix to this term. See Essenes.

THERAPEUTICE, Therapeutics, ϑεραπευτικη, formed from ϑεραπευειν, *to attend*, *to nurſe*, *cure*, &c. that part of medicine which is employed in ſeeking out remedies againſt diſeaſes, and in preſcribing and applying them to effect a cure.

Therapeutice teaches the uſe of diet, pharmacy, ſurgery, and the *methodus medendi*.

Therapeutice is alſo uſed figuratively, in ſpeaking of the mind, and of diſcourſes made to correct the errors and defects thereof.

Such is the *therapeutice* or *therapeutics* of Theodoret; being a treatiſe againſt the errors of unwholeſome opinions of the Greeks, i. e. the heathens.

THERAPHIM, or Teraphim, an Hebrew term, which has given great exerciſe to the critics. We meet with it thirteen or fourteen times in Scripture, where it is commonly interpreted *idols*: but the rabbins are not contented to have them ſimply ſignify idols, but will have it denote a peculiar ſort of idols or images intended for the knowledge of futurity, i. e. oracles.

R. David de Pomis obſerves, that they were called *theraphim*, from רפה, *raphah*, to leave, becauſe people quitted every thing to conſult them.

Others hold, that the *theraphim* were brazen inſtruments which pointed out the hours and minutes of future events, as directed by the ſtars.

R. Eliezer tells us the reaſon why the rabbins will have the *theraphim* to ſpeak, and render oracles: it is, ſays he, becauſe it is written in the prophet Zechariah, x. 2. The *theraphim* have ſpoken vain things.

The ſame rabbin adds, that to make the *theraphim*, they killed a firſt-born child, clove his head, and ſeaſoned it with ſalt and oil: that they wrote on a plate of gold the name of ſome impure ſpirit, laid it under the tongue of the dead, placed the head againſt the wall, lighted lamps before it, and prayed to it, and that it then talked with them.

Vorſtius alſo obſerves, that, beſide the paſſage of Zechariah, juſt quoted, it appears likewiſe from Ezekiel xxi. 21. that the *theraphim* were conſulted as oracles.

F. Kircher directs us to ſeek the origin of the *theraphim* in Egypt; adding, that the word is Egyptian. Spencer, in his diſſertation on the *urim* and *thummim*, maintains the word to be Chaldee, and to ſignify the ſame with *ſeraphim*: the Chaldeans being frequently known to change the ש into ת, that is *ſ* into *t*. He adds, that thoſe images were borrowed from the Amorites, Chaldeans, or Syrians; and that the *Serapis* of the Egyptians is the ſame thing with the *theraphim* of the Chaldeans. See Selden de Diis Syris, ſynt. i. cap. 2.

Calmet obſerves, that the figure of a winged ſerpent, called *ſeraph*, whence the name ſeraphim, has given riſe to the appellation *theraphim*, becauſe in the abraxas and other taliſmans of the ancients, which are real *theraphims*, we find the figures of ſerpents both with and without wings; whence he infers, that the *theraphim* of Laban, which were ſtolen by Rachel, were real taliſmans. Jurieu conjectures, that theſe *theraphims* were the penates, or houſhold gods of Laban, which, he ſays, were the ſouls of the heroes of families, deified and worſhipped; and he adds, that the *theraphims* of Laban were the images of Noah, the reſtorer of the human race, and of Shem, the chief of the family of Laban. But Calmet, in reply to this conjecture, obſerves, that it is by no means credible, that the worſhip of the penates and lares was known in the time of Laban; and that it is not likely, that Laban ſhould have ranked among the gods Noah and Shem, who had died ſo near his own time: for Noah died A. M. 2006, and Shem A. M. 2158, about eighty-ſeven years before Jacob came to Meſopotamia after Laban.

THERAPIDION, in *Botany*, a name given by ſome authors to the common oyſter-green, or ſea-laver, a plant of the TREMELLA kind.

THERIACA, θηριακα, TREACLE, in *Medicine*, a name given by the ancients to various compoſitions eſteemed good againſt poiſons; but now chiefly reſtrained to what, by way of diſtinction, we call *theriaca Andromachi*, or *Venice treacle*.

This is a compound of no leſs than ſixty-four drugs, prepared, pulverized, and reduced, by means of honey, into an electuary. The baſis or foundation of the compoſition is viper's fleſh. M. Charas has written a particular hiſtory of the animals, plants, and minerals, which enter the compoſition of this famed remedy.

It is ſaid to be ſovereign againſt the bites of venomous beaſts, and in the wind colic; and is alſo uſed in intermitting fevers, and in caſes requiring perſpiratives and diaphoretics; alſo in continual fevers, eſpecially ſuch as are malignant, and where the pulſe is low and ticking; and in the ſmall-pox and meaſles: and, as moſt of the ingredients thereof are very hot, in all diſeaſes, where the natural heat is weak and languid.

Andromachus, Nero's phyſician, paſſes for the inventor of the *theriaca*; at leaſt it was he who gave the firſt deſcription thereof in elegiac verſes: his ſon did the ſame in proſe, and Democrates in iambics.

Anciently the *treacle* made at Venice had all the vogue: and many ſtill retain the ancient prejudice: but it is now prepared at Montpelier, at Paris, and at London, with as much advantage as at Venice.

There is another vulgar kind of *theriaca*, called DIATESSARON, becauſe it only conſiſts of four ingredients.

Treacle-water and *treacle-vinegar* are found good preſervatives againſt putrid air, whether by only being ſmelt at, or by rubbing the wriſts, temples, and noſe therewith.

THERIACA *ruſticorum*, a name given to GARLIC, from its uſe as an antidote againſt the contagion of peſtilential and other putrid diſorders.

THERMÆ, θερμαι, in *Architecture*, ancient buildings furniſhed with baths, eſpecially of the hot kind.

Among the nobleſt monuments of ancient Rome, are reckoned the *thermæ*, or baths of Diocleſian.

Thermæ, or hot ſprings, it is commonly argued, owe heat to a colluctation, or efferveſcence, of the minerals in them. Though Dr. Woodward aſcribes it to the ſubterraneous heat, or fire, which communicates with them by ſome ſpiracle, or canal, whereby a greater quantity of heat is derived thither than to ordinary ſprings. See BATHS.

THERMASMA, a word uſed by ſome of the ancients to expreſs any thing that warms the body, and by others particularly for a warm fomentation, preſcribed by Hippocrates for removing pains in the ſide, and giving eaſe in pleuriſies.

THERMOMETER, THERMOMETRUM, an inſtrument ſhewing, or rather meaſuring, the increaſe or decreaſe of the heat and cold of the air.

The *thermometer* and THERMOSCOPE are ordinarily accounted the ſame thing: Wolfius, however, makes a difference; but ſhews, at the ſame time, that what we call *thermometers* are, in reality, no more than *thermoſcopes*.

The invention of the *thermometer* is attributed to ſeveral perſons by different authors, viz. to Sanctorio, Galileo, father Paul, and Drebbel. The invention is aſcribed to Cornelius Drebbelius of Alcmar, about the beginning of the ſeventeenth century, by his countrymen Boerhaave (Chem. i. p. 152, 156.) and Muſchenbroeck, Introd. ad Phil. Nat. vol. ii. p. 625.

Fulgenzio, in his life of father Paul, gives him the honour of the firſt diſcovery. Vincenzio Viviani (Vit. de l'Galil. p. 67. See too Oper. di Galil. pref. p. 47.) ſpeaks of Galileo as the inventor of *thermometers*. But Sanctorio himſelf Com. in Galen. Art. Med. p. 736—842. Com. in Avicen. Can. Fen. i. p. 22. 78. 219.) expreſsly aſſumes this invention: and Borelli (De Mot. Animal. ii. prop. 175.) and Malpighi (Oper. Poſth. p. 30) aſcribe it to him without reſerve. Upon which Dr. Martine remarks, that theſe Florentine academicians are not to be ſuſpected of partiality in favour of one of the Patavinian ſchool. But whoever was the firſt inventor of this inſtrument, it was very rude and imperfect; and as the various degrees of heat were indicated by the different contraction or expanſion of air, it was afterwards found to be an uncertain and ſometimes a deceiving meaſure of heat, becauſe the bulk of air was affected, not only by the difference of heat, but likewiſe by the variable weight of the atmoſphere.

There are various kinds of *thermometers*, the conſtruction, defects, theory, &c. of which are as follow.

Conſtruction of the THERMOMETER, *depending on the rarefaction of the air.*

This *aerial thermometer* conſiſts of a glaſs tube B E (*Tab.* III. *Pneumatics*, *fig.* 50.) connected at one end with a large glaſs ball A, and at the other end immerſed in an open veſſel, or terminating in a ball D E, with a narrow orifice at D; which veſſel, or ball, contains any coloured liquor that will not eaſily freeze. Aqua fortis tinged of a fine blue colour with ſolution of vitriol or copper, or ſpirit of wine tinged with cochineal, will anſwer this purpoſe. But the ball A muſt be firſt moderately warmed, ſo that a part of the air contained in it may be expelled through the orifice D; and then the liquor preſſed by the weight of the atmoſphere, will enter the ball D E, and riſe, e. g. to the middle of the tube at C, at a mean temperature of the weather; and in this ſtate the liquor by its weight, and the air included in the ball A, &c. by its elaſticity, will counterbalance the weight of the atmoſphere. As the ſurrounding air becomes warmer, the air in the ball and upper part of the tube, expanding by heat, will drive the liquor into the lower ball, and conſequently its ſurface will deſcend; on the contrary, as the ambient air becomes colder, that in the ball is condenſed, and the liquor preſſed by the weight of the atmoſphere will aſcend: ſo that the liquor in the tube will aſcend or deſcend more or leſs, according to the ſtate of the air contiguous to the inſtrument. To the tube is affixed a ſcale of the ſame length, divided upwards and downwards from the middle C into one hundred equal parts, by means of which the aſcent and deſcent of the liquor in the tube, and conſequently the variations in the cold and heat of the atmoſphere may be obſerved.

A ſimilar *thermometer* may be constructed by putting a ſmall quantity of mercury, not exceeding the bulk of a pea, into the tube B C (*fig.* 51.) thus bent in wreaths, that taking up the leſs height, it may be the more manageable, and leſs liable to harm; divide this tube into any number of equal parts to ſerve for a ſcale.

Here the approaches of the mercury towards the ball A will ſhew the increaſe of the degree of heat. The reaſon is the ſame as in the former.

The defect of both theſe inſtruments conſiſts in this, that they are liable to be acted on by a double cauſe: for, not only a decreaſe of heat, but alſo an increaſe of weight of the atmoſphere, will make the liquor riſe in the one, and the mercury in the other; and, on the contrary, either an increaſe of heat, or decreaſe of weight of the atmoſphere, will make it deſcend.

In winter, for example, the liquor would riſe and ſink too much; for a froſt condenſing the internal air, the liquor would aſcend, but as the air is heavier in froſty weather, its preſſure on the liquor in the veſſel D E, (*fig.* 50.) being increaſed, would raiſe the liquor ſtill higher in the tube, and thus indicate a degree of cold greater than it really is. On the other hand, if the weather grows warm, as it does in rainy weather in winter, the air in the ball will expand, and the liquor deſcend in the tube; but as the weight of the atmoſphere is leſs in foul weather, the liquor in D E will be leſs preſſed than it was, and ſuffer the liquor to deſcend more than it ſhould do, and ſhew a greater degree of warmth than that of the ambient air. The reverſe of this will happen in ſummer: for warm weather being fair weather, and the atmoſphere being then heavier than uſual, the liquor will be made to ſtand higher in the tube than it ſhould do, and ſhew the degree of heat to be leſs than it really is. And as in ſummer, the weather becomes cold with rain; but the weight of the atmoſphere being diminiſhed, the liquor will not aſcend ſo far as it ought to aſcend by the condenſation of the internal air, and therefore indicate the cold to be leſs than it really is: and when the two cauſes, thus contributing to the riſe and fall of the liquor, act equally in oppoſite directions, the liquor would appear neither to aſcend nor deſcend, whatever might be the changes in the temperature of the atmoſphere, on account of equal correſponding variations in its gravity.

Beſides, the air in the ball, &c. is liable to be affected more or leſs in its elaſtic quality by the vapours that detach themſelves from the included liquor according to the degree in which it is heated or cooled. For theſe and other meaſures, *thermometers* of this kind have been long diſuſed. However, M. Amontons, in 1702, with a view of perfecting the aerial *thermometer*, contrived his *univerſal thermometer*. Finding that the changes produced by heat and cold in the bulk of the air were ſubject to invincible irregularities, he ſubſtituted for theſe the variations produced by heat in the elaſtic force of this fluid. This *thermometer* conſiſted of a long tube of glaſs (ſee *fig.* 53.) open at one end, and recurved at the other end, which terminated in a ball. A certain quantity of air was compreſſed into this ball by the weight of a column of mercury, and alſo by the weight of the atmoſphere. The effect of heat on this included air was to make it ſuſtain a greater or leſs weight; and this effect was meaſured by the variation of the column of mercury in the tube, corrected by that of the barometer, with reſpect to the changes of the weight of the external air. This inſtrument, though much more perfect than thoſe in the room of which it was ſubſtituted by its inventor, is nevertheleſs ſubject to very conſiderable defects and inconveniences. Its length of four feet renders it unfit for a variety of experiments, and its conſtruction is difficult and complex: it is extremely inconvenient for carriage, as a very ſmall inclination of the tube would ſuffer the included air to eſcape: and the friction of the mercury in the tube, and the compreſſibility of the air, contribute to render the indications of this inſtrument extremely uncertain. Beſides, the dilatation of the air is not ſo regularly proportional to its heat, nor is its dilatation by a given heat nearly ſo uniform as he ſuppoſed. This depends, as the abbé Nollet has ſuggeſted, much on its moiſture; for dry air does not expand near ſo much by a given heat, as air ſtored with watery particles; which by being converted into ſteam, very much increaſe the ſeeming volume of the air. For theſe, and other reaſons, enumerated by M. de Luc, (Recherches ſur les Mod. de l' Atm. tom. i. p. 278, &c.) this inſtrument was imitated by very few, and never came to be of general uſe.

Conſtruction of the Florentine THERMOMETER. The academiſts del Cimento, about the middle of the ſeventeenth century, conſidering the inconveniences of the air *thermometers* above deſcribed, attempted another, that ſhould meaſure heat and cold by the rarefaction and condenſation of ſpirit of wine; though much leſs than thoſe of air, and conſequently the alterations in the degree of heat likely to be much leſs ſenſible.

The ſpirit of wine was encloſed in glaſs tubes, hermetically ſealed; ſo that theſe *thermometers* could be ſubject to no inconvenience by the evaporation of the liquor, or the variable gravity of the incumbent atmoſphere. Inſtruments of this kind were firſt introduced into England by Mr. Boyle, and they were ſoon univerſally uſed among philoſophers in other countries. The *Florentine thermometer* conſiſts of a ſmall narrow tube BCD (*fig.* 52.) connected with a glaſs ball A. The tube ſhould be procured as cylindric as poſſible; and it may be tried, by putting into one end of it as much mercury as will fill the length of one inch, and letting this quantity of mercury paſs from one part of the tube to another, through its whole length; meaſure with compaſſes the length it occupies in every part of the tube; and if it every where takes up an inch, the tube is cylindric, and a ſcale of equal diviſions will agree with it: otherwiſe it will be longer where the tube is ſmaller, and ſhorter than an inch where the tube is larger; and in this caſe the diviſions muſt be ſuited to the contents of the bore. The glaſs ball may then be joined to the tube, and a ſmall cavity be made at the other end. Fill the ball and tube with rectified ſpirit of wine to a convenient height, as to C, when the weather is of a mean temperature, which may be done by inverting the tube into a veſſel of ſtagnant coloured ſpirit, under a receiver of the air-pump, or by many other ways. The ſpirit may be coloured by pouring a quantity of it on ſmall pieces of turmeric, which will hereby receive a red tincture; and the ſpirit may be repeatedly filtrated through brown paper, in order to ſeparate from it the coarſer particles of the root. Some perſons, in filling the ball and tube, for preventing the ſpirit from wholly deſcending into the ball in winter, recommend putting the ball into a lump of ſnow, mixed with ſalt; or if the inſtrument be made in ſummer, into ſpring-water impregnated with ſaltpetre, that the condenſed ſpirit may ſhew how far it will retire in extreme cold. If it riſes its too great a height from the ball, part of it is to be taken out; and that the tube may not be made longer than neceſſary, it is convenient to immerge the ball, filled with its ſpirit in boiling water, and to mark the fartheſt point to which it then riſes. When the *thermometer* is properly filled, with a lamp heat the little bubble left at the end of D red-hot, and ſeal it hermetically, leaving, as Dr. Deſaguliers recommends, in the *thermometer* only the third part of the air that was in it, which will give room to the dilatation of the ſpirit; and this rarefied air will prevent the air left in the ſpirit, even after the air-pump has been applied, from dividing the ſpirit by its expanſion. To the tube apply a ſcale, divided into one hundred equal parts from C towards D, and alſo from C towards B.

Now, ſpirit of wine rarefying and condenſing very conſiderably; as the heat of the ambient air increaſes, the ſpirit will dilate, and conſequently will aſcend in the tube; and as the heat decreaſes, the ſpirit will deſcend: and the degree or quantity of aſcent and deſcent will be ſeen in the ſcale. Yet as the ratio of yeſterday's heat to to-day's is not hereby diſcovered, this inſtrument is not ſtrictly a *thermometer*, any more than the former.

It is to be here obſerved, 1°, That as the natural gravity of the liquor makes it tend downwards, ſo it reſiſts its aſcent out of the ball into the tube; and that the more, as it riſes higher; for which reaſon, ſome have adviſed to have the tube horizontal.

2°, Since there muſt of neceſſity be ſome air left in the void part of the tube over the liquor, that air, by its elaſticity will tend downwards, and of conſequence will reſiſt the riſe of the liquor, and be compreſſed by it as it does riſe: its elaſticity therefore is thus increaſed.

3°, Since it is found from experience, that a leſs degree of heat is communicated more eaſily to the ſpirit of wine in the ball than a greater, the rarefactions of the ſpirit of wine are not proportionable to their producing cauſes; eſpecially ſince a greater degree of heat finds more liquor in the tube than a leſs does, to which, notwithſtanding, the heat may be more eaſily communicated than to that ſtagnating in the ball.

4°, Spirit of wine is incapable of bearing very great heat or very great cold. It boils ſooner than any other liquor, and, therefore, the degrees of heat of boiling fluids cannot be determined by this *thermometer*. And though it retains its fluidity in pretty ſevere cold, yet it ſeems not to condenſe very regularly in them: and at Torneao, near the polar circle, the winter cold was ſo ſevere, as Maupertuis informs us, that the ſpirits were frozen in all their *thermometers*. So that the latitude of heat and cold, which ſpirit of wine is capable of indicating, is much too limited to be of very great or univerſal uſe.

On theſe accounts, the Florentine *thermemeter*, though it has been much uſed, is far from being an accurate meaſure of heat, &c. to which may be added what Dr. Halley obſerves in the Philoſophical Tranſactions, that he has learned from thoſe who have kept ſpirit of wine long, that it always loſes part of its expanſive force in courſe of time.

This objection, ſuggeſted by Dr. Halley, and often inſiſted on by others, has, according to Dr. Martine, no great weight. Well rectified ſpirit of wine, if ſealed up in a glaſs, is in a conſiderable degree unalterable. It cannot evaporate; and by many years experience its force of expanſion has continued the ſame; as, beſide other obſervations, we know eſpecially from the Annual Regiſters of M. de la Hire's ſpirit *thermometer*, that has been kept in the Obſervatory for many years.

Another great defect of theſe, and other *thermometers*, is, that their degrees are not comparable with each other. They mark, indeed, the different degrees of heat and cold; but each marks only for itſelf, and after its own manner; becauſe they do not proceed from any point of heat, or cold, that is common to them all. It is with them as with two clocks, which for want of having been firſt ſet to the ſame hour by the ſun, will, indeed, mark that one, two, or more hours are paſſed, but not what hour it is by the day. Nor can we be aſſured, that when the liquor is riſen a degree in two different *thermometers*, they have both ſuffered the ſame impreſſion of an equal additional heat; ſince the ſpirit of wine may not be the ſame in both; and, in proportion as the ſpirit is more or leſs rectified, it will riſe more or leſs high by the ſame heat. Nor is this all; for in graduating *thermometers* they often take equal lengths of the tube for equal aſcents of the ſpirit: whereas, ſuppoſing the diameters of the tube equal throughout, which very rarely happens, there are ſo many irregularities within-ſide, that a certain length of tube ſometimes requires double the quantity of liquor to fill it, that the ſame length in another tube of the ſame diameter requires. All which ariſes from the unequal thickneſſes of the parietes of tubes in different places; and from accidental prominences and cavities, always found in the inner ſurfaces of tubes; and eſpecially from their being always bigger at one end than the other.

Beſides, the diviſions of the ſcale cannot accurately indicate the quantity of rarefaction, unleſs the proportion of the cavity of the tube D B to that of the ball A were known. Hence it is, that the compariſon of *thermometers* becomes ſo precarious and defective. Yet the moſt curious and intereſting uſe of *thermometers* is, what ought to ariſe from ſuch compariſon. It is by this we ſhould know the heat or cold of another ſeaſon of another year, another climate, &c. and what is the greateſt degree of heat or cold that men and other animals can ſubſiſt in.

M. de Reaumur contrived a new *thermometer* for the purpoſe; wherein the inconveniences above recited are propoſed to be remedied. He took a large ball and tube, and knowing the content of the ball as well as that of the tube in every part, he graduated the tube, ſo that the ſpace from one diviſion to another might contain a thouſandth part of the liquor, which liquor would contain one thouſand parts, when it ſtood at the freezing point: then putting the ball of his *thermometer*, and part of the tube into boiling water, he obſerved whether it roſe eighty diviſions; and if it exceeded theſe, he changed his liquor, and by adding water lowered it, ſo that on the next trial from the freezing point to the point of boiling water, it ſhould only riſe eighty diviſions: but if the liquor being too low fell ſhort of eighty diviſions, he raiſed it by adding rectified ſpirit to it. The liquor thus prepared ſuited his purpoſe, and ſerved for making a *thermometer* of any ſize, whoſe ſcale would agree with his ſtandard. Such liquor, or ſpirits, being about the ſtrength of common brandy, may eaſily be had any where, or made of a proper degree of denſity by raiſing or lowering it.

The abbé Nollet made many excellent *thermometers* upon M. de Reaumur's principle. Dr. Martine, however, expreſſes his apprehenſions that *thermometers* of this kind are conſtructed on principles, that will by no means be found ſo accurate as were to be wiſhed and expected. The balls or bulbs, being large, as three or four inches in diameter, are neither heated nor cooled ſoon enough to ſhew the variations in the heat of bodies, and in the weather. Small bulbs and ſmall tubes, he ſays, are much more convenient, and may be conſtructed with ſufficient accuracy. Though it muſt be allowed, that Reaumur, by his excellent ſcale, and by depriving the ſpirit of wine of its air, and expelling the air by means of heat from the ball and tube of his *thermometer*, has brought it to as great a degree of perfection as it may poſſibly admit; yet it is liable to ſome of the inconveniencies of ſpirit *thermometers*, and much inferior to the mercurial *thermometers*. *Thermometers* of this kind, and thoſe of mercury do not agree in indicating the ſame degrees of ſevere cold; for when the mercury has ſtoood at 22° below 0, the ſpirit indicated only 18°, and when the mercury ſtood at 28° or 37° below 0, the ſpirit reſted at 25° or 29°. See the deſcription of Reaumur's *thermometer* at large in Mem. de l'Acad. R. des Scienc. an. 1730, p. 645. Hiſt. p. 15. Ib. an. 1731, p. 354. Hiſt. p. 7.

In 1740, M. Micheli du Creſt conſtructed a ſpirit *thermometer*, to which he annexes four ſcales beſides its own, viz. that of the old *thermometer* in the Obſervatory at Paris, Reaumur's, de l'Iſle's and Fahrenheit's. See *Fixed points of* THERMOMETERS.

THERMOMETER, *mercurial*. It is a circumſtance of principal importance in the conſtruction of *thermometers* to procure a fluid that meaſures equal variations of heat by correſponding equal variations in its own bulk or volume: and the fluid which poſſeſſes this eſſential requiſite in the moſt perfect degree is mercury: the variations in its bulk approaching nearer to a proportion with the correſponding variations of its heat than any other fluid. This general propoſition M. de Luc has very elaborately evinced, by ſhewing that the condenſations of fluids, which increaſe in bulk, when they freeze, are not proportional to the diminutions of heat, and that the dilatations of fluids, which are eaſily converted into vapour by heat, are not proportional to the augmentations of heat: whereas the bulk of mercury is not enlarged when it freezes, and it reſiſts evaporation more than every other liquid that has been uſed in the conſtruction of *thermometers*. Beſides, it is of all liquids the moſt eaſily purged of its air. It is alſo the moſt proper for meaſuring very conſiderable variations of heat; for, if a ſcale be graduated with 0 at the point of melting ice, and 80 at that of boiling water, mercury well purged of its air will indicate ſeven times this difference of heat, or 561 degrees in ſuch a ſcale; as it will condenſe without freezing to—261 of this ſcale, and expand without boiling to 300 of the ſame ſcale. Mercury is alſo more ſenſible than any other fluid, air excepted, or conforms more readily to the ſeveral variations of heat. Moreover, as mercury is an homogeneous fluid, it will in every *thermometer* exhibit the ſame dilatation or condenſation by the ſame variations of heat.

In order to render *thermometers* uniform and comparable, it is deſirable, that mercury, ſo excellently adapted for this purpoſe, ſhould be the only fluid uſed in the conſtruction of them, more eſpecially as a *thermometer* with mercury may be more eaſily conſtructed than any others, De Luc's Recherches, &c. vol. i. par. ii. cap. 2. paſſim. Dr. Halley, though appriſed only of ſome of the remarkable properties of mercury above recited, ſeems to have been the firſt who ſuggeſted the application of this fluid to the conſtruction of *thermometers*. Phil. Tranſ. Abr. vol. ii. p. 34.

Boerhaave (Chem. i. p. 720.) ſays, theſe mercurial *thermometers* were firſt contrived by Olaus Roemer; but the claims of Fahrenheit of Amſterdam, who gave an account of his invention to the Royal Society in 1724, Phil. Tranſ. N° 381, or Abr. vol. vii. p. 49) have been generally allowed. And though Prins and others, in England, Holland, France, and other countries, have made this inſtrument as well as Fahrenheit, moſt of the mercurial *thermometers* are graduated according to his ſcale, and are called *Fahrenheit's thermometers*. Theſe are made of different lengths, and with ſome variation in the form of the bulb, according to the purpoſes for which they are deſigned. Inſtead of the ball, uſed in the ſpirit *thermometer*, a cone or cylinder is annexed to the tube, which may be eaſily enlarged or diminiſhed, and made of ſuch a magnitude, that its capacity may have a certain and known proportion to that of the tube; and by this means ſeveral *thermometers* may be conſtructed to the ſame ſcale: beſides the heat more eaſily penetrates and reaches the inmoſt parts of the cylindric bulb, and cauſes the whole content to expand uniformly, and the mercury to riſe almoſt immediately; whereas in *thermometers* with a ſpherical bulb it is ſeen firſt to fall, and then to riſe. This phenomenon has been long ſince noticed both in Florentine and mercurial *thermometers*, when they are ſuddenly plunged into a heated liquor, the ſpirit of wine or mercury firſt deſcends, and then aſcends; and when they are plunged into a cold fluid, the included liquor firſt aſcends and then deſcends; this is the more remarkable in *thermometers* whoſe bulb is made of thick glaſs; and the reaſon of the phenomenon is obvious. The bulb of glaſs is ſooner affected by the heat or cold applied to it than the included fluid; and as the glaſs expands by heat the capacity of the bulb is enlarged, and the liquor deſcends in the tube, but being condenſed by cold and its capacity diminiſhed, the liquor is preſſed upwards in the tube; and both theſe effects continue, till the heat and cold equally affect the encloſed fluid. Hence it follows, that all the variations of aſcent and deſcent, to which the ſpirit or mercury is ſubject in the *thermometer*, are only the difference of the rarefactions and condenſations of glaſs, and of the contained fluid. Hiſt. Ac. Royal, 1705.

The cone, or cylinder, of the *thermometer* is made of glaſs of a moderate thickneſs, leſt, when the exhauſted tube is hermetically ſealed, its internal capacity ſhould be diminiſhed by the weight of the ambient atmoſphere. When the mercury is thoroughly purged of its air and moiſture by boiling, the *thermometer* is filled with a ſufficient quantity of it; and before the tube is hermetically ſealed, the air is wholly expelled by heating the mercury, ſo that it may be rarefied and aſcend to the top of the tube. To the ſide of the tube is annexed a ſcale (ſee *fig.* 53.), which Fahrenheit divided into ſix hundred parts, beginning with that of the ſevere cold which he had obſerved in Iceland in 1709, or that produced by ſurrounding the bulb of the *thermometer* with a mixture of ſnow or beaten ice and ſal ammoniac or ſea-ſalt. This he apprehended to be the greateſt degree of cold, and accordingly he marked this, as the beginning of his ſcale, with 0; the point at which mercury begins to boil, he conceived to ſhew the greateſt degree of heat, and this he made the limit of his ſcale. The diſtance between theſe two points, he divided into ſix hundred equal parts or degrees; of which 32 reckoned from 0, indicates the degree of cold when ſnow or ice thaws naturally, or water begins to freeze, and this is called the *freezing point*: and he marked the heat of boiling water with 212, &c. In order more particularly to explain the diviſions of this ſcale, and to ſhew how the dilatation and condenſation of the mercury are eſtimated by it, we may obſerve that the bulb is ſuppoſed to contain, according to Boerhaave and Muſchenbroek, 11124 parts of quickſilver, which ſtands at the loweſt mark or *gr.* 0, in an intenſe cold, &c. as above determined; if the bulb be immerged in ſnow or ice thawing naturally, or in water beginning to freeze, the quickſilver is dilated, and riſes in the tube 32 of theſe 11124 parts; and therefore the ſpace of the tube from *gr.* 0 to the freezing point *gr.* 32, is divided into thirty-two equal parts. When the *thermometer* is placed in water brought to a ſtrong boiling at a middle ſtate of the atmoſphere in places near the level of the ſea, when the mercury in the barometer ſtands at about 30 inches or a very little under it, the quickſilver is dilated 212 of theſe parts beyond its original bulk of 11124, ſo as now to poſſeſs in the bulb and tube together a ſpace equal to 11336 ſuch parts; and the ſpace from *gr.* 32 to *gr.* 212, is divided into 180 equal parts or degrees of the *thermometer*; which, if the tube be long enough, may be protracted as far as is convenient. It may extend well enough to *gr.* 600, and not much farther, for with a heat but little greater than that the mercury begins to boil.

Dr. Boerhaave, in one place, makes the number of parts into which the mercury in the bulb is ſuppoſed to be divided to be 10782 inſtead of 11124, and in another place ſtates it at 11520, which Dr. Martine apprehends to be nearer the truth, or about 11790 parts; and he thinks the eaſieſt and ſureſt method is to fill the bulb and tube, without being ſolicitous about the bulk of the quickſilver, ſo that in freezing water, or melting ice, the mercury ſhall ſtand at a convenient height, which muſt be very nicely marked *gr.* 32; and then as accurately to obſerve where it ſtands when dilated by the heat of boiling water to *gr.* 212. The intermediate ſpace is then divided into 180 degrees, which ſcale may be protracted upwards or downwards as far as we ſhall judge convenient. *See Fixed Points of* THERMOMETERS.

In the above method of graduating the ſcale, the bore of the tube is ſuppoſed to be perfectly cylindric, which cannot always be obtained. But though it be tapering or ſomewhat unequal, it is eaſy to manage that matter, in the manner propoſed by the abbé Nollet (Leçons de Phyſ. Exp. tom. iv. p. 376.) by making a ſmall portion of the quickſilver, e. g. as much as fills up an inch or half an inch, ſlide backward and forward in the tube; and thus to find the proportions of all its inequalities, and from thence to adjuſt the diviſions to a ſcale of the moſt perfect equality. See *Obſervations on the Conſtruction of* THERMOMETERS.

Other *thermometers* of a ſimilar conſtruction have been accommodated to common uſe, the ſcale of which is only a part of that above deſcribed. They have been made of a ſmall ſize and portable form, and the tube with its annexed ſcale has been encloſed in another thicker glaſs hermetically ſealed, in order to preſerve it from injury. Mr. Ramſden, at the deſire and for the uſe of Mr. Hunter in his experiments on the heat of animals and vegetables, conſtructed very ſmall *thermometers*, ſix or ſeven inches long, and not above two twelfths of an inch thick in the ſtem; having the external diameter very little larger than that of the ſtem, on which was marked the freezing point. The ſtem was embraced by a ſmall ivory ſcale, ſo as to ſlide upon it eaſily, and retain any poſition. Upon the hollow ſurface of this ſcale were marked the degrees which were ſeen through the ſtem. Phil. Tranſ. vol. lxviii. par. i. p. 8.

In 1733, M. de l'Iſle of Peterſburg conſtructed a mercurial *thermometer* (ſee *fig.* 53.) on the principles of Reaumur's ſpirit *thermometer*. In his *thermometer*, the whole bulk of quickſilver, when immerged in boiling water, is conceived to be divided into 10,000, or rather 100,000 parts; and from this one fixed point the various degrees of heat, either above or below it, are marked in theſe parts on the tube or ſcale, by the various expanſion or contraction of the quickſilver in all the imaginable variety of heat. Dr. Martine apprehends it would have been better if Mr. de l'Iſle had made the integer of 100,000 parts, or fixed point at freezing water, and from thence computed the dilatations or condenſations of the quickſilver in thoſe parts. All the common obſervations of the weather, &c. would have been expreſſed by numbers increaſing as the heat increaſed, which is the more natural way; nor would there have been any great incongruity, or inconvenience, in expreſſing after the manner of Reaumur, the few obſervations that occur below ſimple freezing by numbers of contraction below *gr.* 0, or 100,000. However, in practice, it will not be very eaſy to determine exactly all the diviſions from the alteration of the bulk of the contained fluid. And beſides, as glaſs itſelf is dilated by heat, though in a leſs proportion than quickſilver, ſo that it is only the exceſs of the dilatation of the contained fluid above that of the glaſs that is obſervable; if different kinds of glaſs be differently affected by a given degree of heat, this will make a ſeeming difference in the dilatation of the quickſilver in the *thermometers*, conſtructed in the Newtonian method, either by M. de Reaumur's or M. de l'Iſle's rules. Accordingly, it has been found, that the quickſilver in *thermometers*, conſtructed in M. de l'Iſle's way, has ſtood at different degrees of the ſcale when immerged in thawing ſnow. In ſome it was at *gr.* 154, in others at 156, and in another at 158: and it appears by Mr. de l'Iſle's own account, that his *thermometers* diſagree conſiderably from one another. See *Fixed Points of* THERMOMETERS.

THERMOMETER, *metalline*, is a name given to a machine compoſed of two metals, which, whilſt it indicates the variations of cold and heat, ſerves to correct the errors that reſult from hence in the conſtruction of pendulum clocks. Inſtruments of this kind have been contrived by Graham, Le Roy, in 1738, Ellicot, Harriſon, &c. See *Compound* PENDULUM.

We have alſo an account of inſtruments of this kind invented by Mortimer, Frotheringham, and Fitzgerald, in the Phil. Tranſ. vol. xliv. p. 689, vol. xlv. p. 129, and vol. li. p. 823. to which we muſt refer for a particular deſcription of each, illuſtrated by figures.

M. de Luc has likewiſe deſcribed two *thermometers* of metal, which he uſes for correcting the effects of heat upon a barometer, and an HYGROMETER of his conſtruction connected with them. In one of theſe a ſtrong rod of well-hardened braſs, ſupports upon an edge, at a convenient diſtance from the centre of motion, a lever, which holds the ſcale of the barometer ſuſpended, and makes it riſe or fall by the dilatation or condenſation of the braſs rod, as the quickſilver riſes or falls in the barometer, by the correſponding variations of heat. This ſcale of the barometer, when it moves, draws, or looſens a thread of ſilk-graſs, which goes over a ſmall pulley placed upon the ſame axis with a much larger one, to which the ſcale of the hygrometer is hung likewiſe by a ſimilar thread, which thus varies, by the proportion of the diameters of the pulleys, as the heat makes the quickſilver in the hygrometer vary. This inſtrument is convenient for meteorological obſervations: becauſe it ſaves one obſervation and two corrections for the heat; but it is neceſſary from time to time to correct an irregularity in it, which is eaſily perceived by means of an index, carried by the moveable ſcales of the two inſtruments, which, going over immovable ſcales of the ſame ſort, ſhews their difference of height. When this difference is no longer conformable to the indication of the *thermometer*, it is eaſily rectified by turning ſmall pegs, on which is twiſted the thread of ſilk-graſs, which ſerves for the ſuſpenſion of the ſcales. The irregularity juſt mentioned conſiſts in this, that when the heat, after having varied, returns to the ſame point of the quickſilver *thermometer*, the metallic *thermometer* does not return to it exactly, but varies nearly in the following manner: during the ſummer the latter gains conſtantly on the former, i. e. amidſt its variations, it always preſerves a ſmall part of the lengthening, which is at that time its ordinary ſtate. In winter, on the contrary, it becomes inſenſibly a little too ſhort. The other metallic *thermometer*, which is more curious than uſeful, on account of its greater irregularity, conſiſts of a rod of lead, which, communicating by a thread of ſilk-graſs with a ſmall pulley fixed to the ſame axis with a greater one, conducts, by means of another pulley, a needle through whoſe axis, which is bored, paſſes another axis that carries the needle of a pulley barometer. Thus this inſtrument marks the heat and weight of the air upon two concentric circles, by means of two needles turning upon the ſame centre, as in clocks; beſides which, the needle of the *thermometer* points out upon a third circle the correction for the heat, to be made on the barometer. See Phil. Tranſ. vol. lxviii. par. i. p. 437, &c.

THERMOMETERS, *oil.* To this claſs belongs Sir Iſaac Newton's *thermometer*, conſtructed in 1701, with linſeed oil inſtead of ſpirit of wine. This liquor has the advantage of being ſufficiently homogeneous, and capable of a conſiderable rarefaction, not leſs than fifteen times greater than that of ſpirit of wine. It has not been obſerved to freeze even in very great colds, and it is able to bear a great heat, about four times that of water, without boiling. With theſe advantages it was made uſe of by Sir Iſaac Newton, who diſcovered by it the comparative degree of heat for boiling water, melting wax, boiling ſpirit of wine, and melting tin; beyond which it does not appear that this *thermometer* was applied. The method he uſed for adjuſting the ſcale of this *oil-thermometer* was as follows: ſuppoſing the bulb when immerged in thawing ſnow to contain 10,000 parts, he found the oil expanded by the heat of the human body ſo as to take up one thirty-ninth more ſpace, or 10256 ſuch parts; and by the heat of water boiling ſtrongly 10725; and by the heat of melting tin 11516. So that, reckoning the freezing point as a common limit between heat and cold, he began his ſcale there, marking it *gr.* 0, and the heat of the human body he made *gr.* 12; and conſequently, the degrees of heat being proportional to the degrees of rarefaction, or 10256 : 10725 i. e. 256 : 725 : : 12 : 34, the heat of boiling water was expreſſed by *gr.* 34 = $\frac{725 \times 12}{256}$; and that of melting tin by *gr.* 72. Phil. Tranſ. N° 270. or Abr. vol. iv. part ii. p. 3.

Although in this graduation, ſir Iſaac Newton does not ſpecify any degree of cold below that of freezing water, yet it would be eaſy to protract his ſcale downward below *gr.* 0, or the freezing point, and thus to adapt it for eſtimating greater degrees of cold, like other *thermometers.* But there is another inſuperable inconvenience that attends all *thermometers* made with oil, or any other viſcid liquor, viz. that ſuch liquor adheres too much to the ſides of the tube. In a ſudden cold or fall of the oil, much of it ſticks by the way, and only ſinks gradually afterwards, ſo that at firſt the ſurface appears really lower than the preſent temperature requires. And beſides, as at all times ſome of the oil muſt continue to ſtick and moiſten the inſide of the tube, in different degrees of heat and cold, the oil, becoming alternately more or leſs viſcid, will adhere ſometimes more and ſometimes leſs; and will, therefore, inevitably diſturb the regularity and uniformity of the *thermometer.* Martine's Eſſ. Eſſ. iii.

Thermometers, *fixed points of.* Various methods have been propoſed by various authors, for finding a fixed point, or degree, of heat and cold, from which to reckon the other degrees, and adjuſt the ſcale; ſo that obſervations made at the ſame or different times, in different places, might be compared together. For want of this, notwithſtanding all the numerous regiſters of the weather, &c. that have been kept and publiſhed by different authors, we are much at a loſs to determine the comparative differences of heat and cold in different countries and climates, and the reſult of many other obſervations. If all the weather-glaſſes in the world had been made according to one determined ſcale, theſe inconveniences and uncertainties would have been prevented; which, indeed, are now unavoidable, and muſt ſtill continne ſo, till all agree to graduate their *thermometers* in the ſame manner, or at leaſt determine ſome fixed or unalterable points of heat, to which all the different ſcales of thoſe inſtruments may be reduced. The honourable Mr. Boyle was very ſenſible of this inconvenience, and much laments it; and he propoſed the freezing of the eſſential oil of aniſeeds, as a term of heat and cold that might be of uſe in making and judging of *thermometers*, and ſo to graduate them from this point according to the proportional dilatations or contractions of the included ſpirits. He mentioned alſo the coldneſs requiſite to begin the congelation of diſtilled water as another fixed term that might be adopted; for he was perſuaded that among the ordinary waters ſome were apt to freeze more eaſily than others. But he was deterred from proſecuting this ſcheme of fixing a ſtandard for making and graduating all *thermometers* in the ſame way. Experiments, &c. on cold, in his works abridged by Shaw, vol. i. p. 579.

Dr. Halley (Phil. Tranſ. Abr. vol. ii. p. 36.) ſeems to have been fully apprized of the bad effects of the indefinite method of conſtructing *thermometers*, and wiſhed to have them adjuſted to ſome determined points. What he ſeems to prefer for this purpoſe is the degree of temperature, which is found in ſubterranean places, where the heat in ſummer and cold in winter appears to have no influence. But this degree of temperature is ſhewn by Dr. Martine to be a term for the univerſal conſtruction of *thermometers*, both inconvenient, as it cannot be eaſily aſcertained; and a precarious one, as the difference of ſoils and depths may occaſion a conſiderable variation. Another term of heat which he thought might be of uſe in a general graduation of *thermometers*, is that of boiling ſpirit of wine, that has been highly rectified: but a much more convenient term of heat, though leſs inſiſted on by Dr. Halley, is that of boiling water. The firſt trace that occurs of the method of actually applying fixed points or terms to the *thermometer*, and of graduating it, ſo that the unequal diviſions of it might correſpond to equal degrees of heat is the project of Renaldinus, profeſſor of Padua, in 1694: it is thus deſcribed in the Acta Erud. Lipſ. "Take a ſlender tube, about four palms long, with a ball faſtened to the ſame; pour into it ſpirit of wine, enough juſt to fill the ball, when ſurrounded with ice, and not a drop over: in this ſtate, ſeal the orifice of the tube hermetically, and provide twelve veſſels, each capable of containing a pound of water, and ſomewhat more; and into the firſt pour eleven ounces of cold water, into the ſecond ten ounces, into the third nine, &c. this done, immerge the *thermometer* in the firſt veſſel, and pour into it one ounce of hot water, obſerving how high the ſpirit riſes in the tube, and noting the point with unity; then remove the *thermometer* into the ſecond veſſel, into which are to be poured two ounces of hot water, and note the place the ſpirit riſes to with 2: by thus proceeding till the whole pound of water is ſpent, the inſtrument will be found divided into twelve parts, denoting ſo many terms or degrees of heat; ſo that at 2 the heat is double to that at 1, at 3 triple, &c."

But this method, though plauſible, Wolfius ſhews, is deceitful, and is built on falſe ſuppoſitions; for it takes for granted, that we have one degree of heat, by adding one ounce of hot to eleven of cold water; two degrees, by adding two ounces to ten, &c. it ſuppoſes, alſo, that a ſingle degree of heat acts on the ſpirit of wine, in the ball, with a ſingle force; a double with a double force, &c. laſtly, it ſuppoſes, that, if the effect be produced in the *thermometer* by the heat of the ambient air, which is here produced by the hot water, the air has the ſame degree of heat with the water.

Soon after this project of Renaldinus, viz. in 1701, ſir Iſaac Newton conſtructed his oil *thermometer*, and fixed the baſe or loweſt fixed point of his ſcale at the temperature of thawing ſnow, and twelve at that of the human body, &c. in the manner explained under the article *oil* THERMOMETERS.

M. de Luc obſerves, that the ſecond term of his ſcale ſhould have been at a greater diſtance from the firſt, and that the heat of boiling water would have anſwered this purpoſe better than that of the human body.

In 1702, M. Amontons contrived his univerſal *thermometer*, the ſcale of which was graduated in the following manner. He choſe for the firſt term the weight that counterbalanced the air included in his *thermometer*, when it was heated by boiling water: and in this ſtate he ſo adjuſted the quantity of mercury contained in it, till the ſum of its height in the tube, and of its height in the barometer at the moment of obſervation was equal to ſeventy-three inches. Fixing this number at the point to which the mercury in the tube roſe by plunging it in boiling water, it is evident, that, if the barometer at this time was twenty-eight inches, the height of the column of mercury in the *thermometer* above the level of that in the ball was forty-five inches; but if the height of the barometer was leſs by a certain quantity, the column of the *thermometer* ought to be greater by the ſame quantity, and reciprocally. He formed his ſcale on the ſuppoſition that the weight of the atmoſphere was always equal to that of a column of mercury of twenty-eight inches, and divided it into inches from the point 73 downwards, marking the diviſions with 72, 71, 70, &c. and he ſubdivided the inches into lines.

But as the weight of the atmoſphere is variable, the barometer muſt be obſerved at the ſame time with the *thermometer*, that the number indicated by this laſt inſtrument may be properly corrected, by adding or ſubſtracting the quantity of which the mercury is below or above twenty-eight inches in the barometer. In this ſcale then, the freezing point is at $51\frac{1}{2}$ inches, correſponding to *gr.* 32 of Fahrenheit, and the heat of boiling water at 73 inches, anſwering to *gr.* 212 of Fahrenheit's: and thus they may be eaſily compared together.

The fixed points of Fahrenheit's *thermometer* (as we have already obſerved under *mercurial* THERMOMETER) are the congelation produced by ſal ammoniac and the heat of boiling water. The interval between theſe points is divided into 212 equal parts; the firſt of theſe points is marked 0, and the other 212. Reaumur in his *thermometer*, the conſtruction of which he publiſhed in 1730, begins his ſcale at an artificial congelation of water in warm weather, which, as he uſes large bulbs for his glaſſes, gives the freezing point much higher than it ſhould be, and at boiling water he marks *gr.* 80, which point Dr. Martine apprehends to be more vague and uncertain than his freezing point. The ſpirit in the *thermometer*, he obſerves, is abſolutely incapable of ſuch a great heat as Reaumur aſcribed to it, and that not by a ſmall or trifling difference. He finds, that highly rectified ſpirit of wine cannot be heated beyond, *gr.* 175 in Fahrenheit's *thermometer*, while boiling water raiſes the quickſilver 37 degrees higher; and common brandy was able to conceive a heat no greater than about *gr.* 190. So far, he concludes, was Reaumur in the wrong, when he thought that all ſpirits weak and ſtrong, immerged in boiling water, received a given degree of heat, and that equal to the heat of the ſurrounding water. He ſuppoſes his ſtandard heat could take a heat only of about *gr.* 180; leſs by thirty-two degrees than what we reckoned. In order to determine the correſpondence of his ſcale with that of Fahrenheit, it is to be conſidered that his boiling water heat is really only the boiling heat of weakened ſpirit of wine, coinciding nearly, as Dr. Martine apprehends, with Fahrenheit's *gr.* 180. And as his *gr.* $10\frac{1}{4}$, is the conſtant heat of the cave of the obſervatory at Paris, or Fahrenheit's *gr.* 53, he hence finds his freezing point, inſtead of anſwering juſt to *gr.* 32, to be ſomething above *gr.* 34.

The *thermometer* of Mr. de l'Iſle, of which he preſented an account to the Academy of Sciences at Peterſburg in 1733, has only one fixed point, which is the heat of boiling water, and, contrary to the common order, the ſeveral degrees are marked downwards from this point, according to the condenſations of the contained quickſilver, and conſequently by numbers increaſing as the heat decreaſes. In order to determine the extent of the degrees of this ſcale, Mr. de l'Iſle firſt weighed the empty tube, and then weighed it full of mercury; and the difference of theſe two weights gave him that of the mercury. He then expoſed the *thermometer* to the heat of boiling water, and took care to preſerve the mercury, which this increaſe of heat forced out of it: this he accurately weighed, and deducting its weight from the total weight of the mercury, he made the remainder, or that which was left in the *thermometer*, equal to 10,000: he then found by calculation how many 10,000 parts of this reſidue that forced out of the tube contained, and theſe parts formed the diviſions of the ſcale from the point, determined by the condenſation of the mercury to the ſame point at which it ſtood before it was plunged in boiling water, to the upper end of the tube; and theſe diviſions formed the extent of the degrees of Mr. de l'Iſle's ſcale. According to his ſtandards, the freezing point, ſays Dr. Martine, is near to his *gr.* 150, correſponding to Fahrenheit's *gr.* 32, by which means they may be compared; but M. Ducreſt ſays, that this point ought to be marked at leaſt at *gr.* 154.

M. Ducreſt in his ſpirit *thermometer*, conſtructed in 1740, made uſe of two fixed points; the firſt, or 0 indicated the temperature of the earth, and was marked on his ſcale in the cave of the Royal Obſervatory at Paris; and the other was the heat of boiling water, which the ſpirit in his *thermometer* was made to endure, by leaving the upper part of the tube full of air. He divided the interval between theſe points into 100 equal parts; calling the diviſions upwards degrees of heat, and thoſe below 0 degrees of cold.

It is ſaid that he has ſince regulated his *thermometer* by the degree of cold, indicated by melting ice, which he found to be 10 $\frac{2}{5}$.

The Florentine *thermometers* were of two ſorts; in one ſort the freezing point, determined by the degree at which the ſpirit ſtood in the ordinary cold of ice or ſnow (probably in a thawing ſtate) and coinciding with *gr.* 32 of Fahrenheit, fell at *gr.* 20; and in the other ſort at *gr.* 13 $\frac{1}{2}$: and the natural heat of the viſcera of cows and deer, &c. raiſed the ſpirit in the latter, or leſs ſort, to about *gr.* 40, coinciding with their ſummer heat, and nearly with *gr.* 102 in Fahrenheit's, and in their other or long *thermometer*, the ſpirit, when expoſed to the great midſummer heat in their country, roſe to the point at which they marked *gr.* 80.

In the *thermometer* of the obſervatory at Paris, made of ſpirit of wine by M. de la Hire, the ſpirit always ſtands at *gr.* 48, in the cave of the obſervatory, correſponding to *gr.* 53 in Fahrenheit's; and his *gr.* 28 correſponded with 51 inches ſix lines in Amontons's *thermometer*, and conſequently, with the freezing point, or *gr.* 32 of Fahrenheit's.

In the *thermometer* of Poleni, made after the manner of Amontons's, but with leſs mercury, 47 inches correſponded, according to Dr. Martine, with 51 in that of Amontons, and 53 with 59½.

In the ſtandard *thermometer* of the Royal Society, after which *thermometers* were for a long time conſtructed in England, Dr. Martine found that *gr.* 34 ½, anſwered to *gr.* 64 in Fahrenheit's, and *gr.* 0 to 89.

In the *thermometers* graduated for adjuſting the degrees of heat proper for exotic plants, &c. in ſtoves and green houſes, the middle temperature of the air is marked at *gr.* 0, and the degrees of heat and cold are numbered both above and below. Many of theſe are made on no regular and fixed principles. But in that formerly much uſed, called Fowler's regulator, the ſpirit fell, in melting ſnow, to about *gr.* 34 under 0; and Dr. Martine found, that his *gr.* 16 above 0, coincided with nearly *gr.* 64 of Fahrenheit.

Dr. Hales (Statical Eſſays, vol. i. p. 58), in his *thermometer*, made with ſpirit of wine, and uſed in experiments on vegetation, began his ſcale with the loweſt degree of freezing, or *gr.* 32 of Fahrenheit, and carried it up to *gr.* 100, which he marked where the ſpirit ſtood when the ball was heated in hot water, on which wax ſwimming firſt began to coagulate, and this point Dr. Martine found to correſpond with *gr.* 142 of Fahrenheit. But by experience Hales's *gr.* 100 falls conſiderably above our *gr.* 142.

In the Edinburgh *thermometer*, made with ſpirit of wine, and uſed in the meteorological obſervations publiſhed in the Medical Eſſays, the ſcale is divided into inches and tenths. In melting ſnow the ſpirit ſtood at $8\frac{2}{10}$, and the heat of the human ſkin raiſed it to $22\frac{2}{10}$. Dr. Martine found, that the heat of the perſon who graduated it was *gr.* 97 of Fahrenheit.

As it is often of uſe to compare different *thermometers*, in order to judge of the reſult of former obſervations, we have annexed from Dr. Martine's Eſſays, the table by which he compared fifteen different *thermometers*. See *Tab.* III. *Pneumatics*, *fig.* 53.

There is a *thermometer* which has of late been much uſed in London, called the *thermometer* of Lyons, becauſe M. Criſtin brought it there into uſe, which is made of mercury: the freezing point is marked *gr.* 0, and the interval from that point to the heat of boiling water is divided into 100 equal degrees.

From the above abſtract of the hiſtory of the conſtruction of *thermometers*, it appears, that freezing and boiling water have furniſhed the diſtinguiſhing points that have been marked upon almoſt all *thermometers*. The inferior fixed point is that of freezing, which ſome have determined by the freezing of water, and others by the melting of ice; and though the difference between theſe two temperatures is not commonly very conſiderable, yet it is not invariable.

It is now well known, that all, or almoſt all bodies, by changing from a fluid to a ſolid ſtate, or from the ſtate of an elaſtic to that of an unelaſtic fluid, generate heat; and that cold is produced by the contrary proceſs.

In order to obtain this fixed point or limit, melting ice, or ice powdered and mixed with water, will produce the ſame temperature. And though there may be ſome trifling difference between the temperature of ice diſpoſed to melt, and that of melted ice or the water produced by it, this difference, however, has no ſenſible effect on the *thermometer*; conſequently, the temperature of water ſucceſſively produced by ice, and accumulated in its interſtices, or from powdered ice mixed with the water, which is produced by it in melting, affords, as De Luc obſerves, a fixed point, which is eaſily obtained, and which ſhould be adopted in the conſtruction of all *thermometers*.

The ſuperior fixed point of almoſt all *thermometers*, is the heat of boiling water; but this point cannot be conſidered as fixed unleſs the heat be produced by the ſame degree of boiling, and under the ſame weight of the atmoſphere. With regard to the firſt circumſtance, it is obſerved, that water, when it begins to boil, has not attained to its greateſt degree of heat, which is known by its bubbling or foaming from the bottom of the veſſel, and over the whole ſurface of the water, with the greateſt violence which it is capable of acquiring; and in this ſtate the water diſcovers an augmentation of heat more than one degree above the heat it had when it began to boil. The temperature of water which boils with vehemence ſhould, therefore, be the ſtandard of the fixed point of *thermometers*: nevertheleſs, it is to be conſidered farther, that this degree of heat with which water violently boils, is invariably the ſame, only under a given preſſure of the atmoſphere; but if the preſſure be diminiſhed or increaſed, the boiling heat is diminiſhed or increaſed. It is well known that water, placed under the exhauſted receiver of an air-pump, will be converted into ſteam with a degree of heat far inferior to that, which is neceſſary to its boiling in the open air; and under the preſſure of its own vapour, confined in Papin's digeſter, it is ſaid to ſuſtain a degree of heat, without boiling, far exceeding that which, in the open air, would convert it into ſteam. Hence it follows that, in climates where the preſſure of the atmoſphere is liable to conſiderable change, the heat of boiling water, in open air, will be different at different times. Conſequently *thermometers*, made in different ſtates of the barometer, will diſagree; unleſs allowance has been made for the effect of the variation of the barometer upon accurate principles. That the heat of boiling was variable, according to the preſſure of the atmoſphere, ſeems to have been known to Fahrenheit as early as the year 1724. See Phil. Tranſ. N° 385.

Some time after this period, Meſſrs. le Monnier and Caſſini (Mem. de l'Acad. des Sc. for 1740) made ſome deciſive obſervations, in order to ſhew that this quantity was very conſiderable.

M. de Luc, in 1762, made a much more complete ſeries of experiments, which he has deſcribed and reduced into a ſyſtem in his Recherches ſur les Mod. de l'Atmoſphere, vol. i. p. 382, &c. vol. ii. p. 338, &c. and theſe have been ſince verified by ſir George Shuckburgh, in 1775 and 1778. See Phil. Tranſ. vol. lxix. part ii. p. 362, &c.

M. de Luc fixes the boiling point of his *thermometer* when the barometer is at 27 Paris, or 28,75 Engliſh inches, that being its mean height at Geneva. He divides the fundamental interval, i. e. the whole extent of the ſcale, between melting ice and boiling water, after the French manner, into 80 equal parts; and by a great number of experiments on the heat of boiling water, at different heights above the level of the ſea, he hath found, that the height of his *thermometer*, plunged in boiling water, may be expreſſed, in all ſtates of the barometer, by the following formula, viz. $\frac{99}{200000}\log. y - a = T$: in which *y* denotes the height of the barometer in ſixteenths of a Pariſian line, T the height of a *thermometer*, plunged in boiling water, above melting ice, in hundredths of a degree of his ſcale; and *a* the conſtant number 10387.

By logarithms he always means the tabular or Briggian logarithms, and conſiders the ſeven figures given by the tables, beſides the index, as integral figures, i. e. he conſiders the eighth figure of the logarithm as ſtanding in the place of units. But as it is more uſual with mathematicians, and, in general, more convenient, to conſider all the figures after the index as decimals, the number which M. de Luc expreſſes by $\frac{99}{200000}\log. y$, would in that caſe be $\frac{99 \times 100}{2}\log. y$; or $99 \times 50 \log. y$. However, in the ſequel, M. de Luc's notation is retained.

Now if care were taken by the above formula, or in any other way, to adjuſt the boiling point to the main height of the barometer in every country, the inſtruments of the ſame country would always be conſiſtent; but thoſe of different countries would ſtill diſagree; that is, they would expreſs the ſame temperature differently, though their ſimilar intervals ſhould be ſimilarly divided; for in every ſcale, the number of degrees above or below melting ice, by which any given temperature is expreſſed, will be as the value of each degree inverſely; that is, if each be a given part of the fundamental interval, as the value of the fundamental interval inverſely; but if the degrees of different ſcales be different parts of the fundamental intervals, as the value of the fundamental interval inverſely, and the number of degrees contained in it directly.

In order, therefore, to compare the *thermometers* of different countries, the proportions of their fundamental intervals to each other muſt be aſcertained, or we muſt have ſome means of finding, upon one ſcale, the place of the boiling point of another. For this purpoſe a general ſolution is requiſite of the following problem, viz. the fundamental interval being given for a given height of the barometer, to find the fundamental interval for any other given height of the barometer. The ſolution is furniſhed by M. de Luc's reſearches; and his formula, above given, is reduced to Engliſh meaſures, and adapted to Engliſh inſtruments, by Dr. Horſley. As the ſubject is curious and important, we ſhall ſubjoin the proceſs he has purſued for this purpoſe. It is but ſeldom that the barometer in this country ſtands ſo low as 27 Paris inches. Its main height upon the plane country about London is near 30 Engliſh inches. It may, therefore, be proper for the London workmen to fix their boiling point when the barometer is at 30 inches. Fahrenheit's diviſion of the ſcale, which makes 180 degrees between melting ice and boiling water, and places the point 0 at the 32d degree below melting ice, may be retained; and the *thermometer* thus conſtructed is called by Dr. Horſley, Bird's Fahrenheit, becauſe Mr. Bird, he apprehends, is the firſt workman who took the pains to attend to the ſtate of the barometer in making *thermometers*, and has always fixed the boiling point when his barometer has ſtood at 30 inches.

T, then, being put for the height of a *thermometer* plunged in boiling water, above melting ice, in 100ths of a degree of de Luc's ſcale, in any given ſtate of the barometer, ; let Θ denote the ſame height in 100ths of a degree of Bird's Fahrenheit; put *y* for the height of the barometer, in 16ths of a Paris line; *v*, for its height in Paris lines; *x*, in 10ths of a Paris inch; *z*, in 10ths of an Engliſh inch; and for 10387 put *a*; for 16, *b*; for 10, *c*; for 12, *d*; and let E and F repreſent numbers expreſſing the proportion of the Engliſh foot to the French foot.

M. de Luc hath found that, whatever be the value of *y*, $\frac{99}{200000}\log. y - a = T$. But $\log. y = \log. v + \log. b$; and $\log. v = \log. x + \log. d - \log. c$; and $\log. x = \log. z + \log. E - \log. F$; therefore $\log. y = \log. z + \log. E + \log. d + \log. b - \log. F - \log. c$; and $\frac{99}{200000}\log. z + \frac{99}{200000}\overline{\log. E + \log d + \log. b - \log. F - \log. c} - a = T$. But $\frac{99}{200000}\overline{\log. E + \log. d + \log. b - \log. F - \log. c} - a = -4171,55$; the French foot being to the Engliſh as 2,1315 to 2. Therefore $\frac{99}{200000}\log. z - 4171,55 = T$; and $\frac{99}{20000000}\log. z - 41,7155 = \frac{T}{100} =$ the height of the *thermometer*, plunged in boiling water, above melting ice, in degrees of De Luc's ſcale, when the height of the barometer in tenths of an Engliſh inch, is *z*. For *z* write 300: then $\frac{T}{100} = 80,902$; which is therefore the height of the *thermometer*, in boiling water, above melting ice, in degrees of De Luc's ſcale, when the barometer is at 30 inches Engliſh. And in the ſame ſtate of the barometer, the height of the *thermometer* plunged in boiling water, above melting ice, in degrees of Bird's Fahrenheit, or $\frac{\Theta}{100}$, is 180. Hence the numbers T and Θ are in the conſtant proportion of 809 and 1800, whatever be the value of *z*. For the change produced in the heat of boiling water, by any change of *z*, being always the ſame for both *thermometers*, the temperature expreſſed by T in parts of one ſcale is always the ſame, as Θ expreſſes in parts of the other; and therefore putting $\frac{1}{L}$ and $\frac{1}{B}$ for the values of the 100th part of a degree of the ſcales of De Luc and Bird reſpectively, the fractions $\frac{T}{L}$, $\frac{\Theta}{B}$ are always equal, and T, Θ are in the conſtant proportion of the invariable numbers L, B: conſequently, when the proportion of T and Θ is determined for any particular value of *z*, it is found generally for all: conſequently $T : \Theta :: 809 : 1800$. And $T = \frac{809}{1800}\Theta = \frac{899}{2000}\Theta$ very nearly in all values of *z*: and ſubſtituting this value for T in the equation exhibiting the relation between *z* and T, we have, for the relation between *z* and Θ, $\frac{99}{20000000}\log. z - 41,7155 = \frac{899}{2000 \times 100}\Theta$: or, $\frac{99}{10000 \times 899}\log. z - 92,804 = \frac{\Theta}{100} =$ the height of the *thermometer* in boiling water above melting ice, in degrees of Bird's Fahrenheit, when the height of the barometer in 10ths of an Engliſh inch, is *z*. And thus M. de Luc's formula, for the variation of the boiling point, is adapted to Engliſh inſtruments, and reduced to Engliſh meaſures of length.

For *z* write 287,7525, the length of 27 French inches in 10ths of an Engliſh inch, and $\frac{\Theta}{100}$, the height of De Luc's boiling point above melting ice, in degrees of Bird's Fahrenheit, comes out 177,989. Hence M. de Luc's boiling point falls upon 209,989 of Bird's ſcale, i. e. upon 210 very nearly, or inſenſibly more than two degrees below Bird's point of boiling. But as 899 is a troubleſome diviſor, the computation will be more eaſy and expeditious, by writing for $\frac{11}{1000000}\log. z$, *s*. Then $s + \frac{1}{900}s - 92,804 = \frac{\Theta}{100}$ very nearly. Upon theſe principles Dr. Horſley has computed the table following, for finding the heights, to which a good Bird's Fahrenheit will riſe, when plunged in boiling water, in all ſtates of the barometer, from 27 to 31 Engliſh inches; which will ſerve, among other uſes, to direct inſtrument-makers in making a true allowance for the effect of the variation of the barometer, if they are obliged to finiſh a *thermometer*, when the barometer is above or below 30 inches; though it is beſt to fix the boiling point when the barometer is at the height preſcribed.

Equation of the boiling point.

Barometer.	Equation.	Difference.
31.0	+1,57	0,78
30.5	+0,79	0,79
30.0	0,00	0,80
29.5	—0,80	0.82
29.0	—1,62	0.83
28.5	—2,45	0.85
28.0	—3,31	0.86
27.5	—4,16	0.88
27.0	—5,04	

The numbers in the firſt column of this table expreſs heights of the quickſilver in the barometer in Engliſh inches and decimal parts: the ſecond column ſhews the equation to be applied, according to the ſign prefixed, to 212° of Bird's Fahrenheit to find the true boiling point for every ſuch ſtate of the barometer. The boiling point for all intermediate ſtates of the barometer may be had with ſufficient accuracy by taking proportional parts, by means of the third column of differences of the equations. See Phil. Tranſ. vol. lxiv. part i. art. 30. See alſo an excellent paper on this ſubject by Dr. Maſkelyne, in the Phil. Tranſ. vol. lxiv. part i. art. 20. In the following table we have the reſult of fifteen different obſervations made by ſir George Shuckburgh (ubi ſupra) compared with the reſult of M. de Luc's rules.

Height of the barometer reduced to the ſame temperature of 50°.	Mean boiling point by obſervation.	Boiling point by De Luc's rules.	Height of Barometer.	Boiling point by obſervation.	Boiling point by De Luc's rules.
Inch.	°	°	Inch.	°	°
26,498	207,07	208,54	30,008	213,22	213,47
27,241	208,64	208,84	30,207	213,58	213,79
27,954	209,87	210,03	30,489	214,15	214,23
28,377	210,50	210,81	30,763	214,37	214,66
28,699	211,27	211,34	30,847	214,83	214,79
28,898	211,50	211,67	30,957	214,96	214,96
28,999	211,60	211,85			
29,447	212,55	212,74			
29,805	212,95	213,15			

Sir George Shuckburgh has alſo ſubjoined the following general table for the uſe of artiſts in conſtructing the *thermometer*, both according to his own obſervations, and thoſe of M. de Luc.

Height of the barometer	Correct. of the boiling point	Difference.	Correct. accord. to M. de Luc.	Difference.
	°		°	
26,0	—7,09	,91	—6,83	,90
26,5	—6,18	,91	—5,93	,89
27,0	—5,27	,90	—5,04	,88
27,5	—4,37	,89	—4,16	,87
28,0	—3,48	,89	—3,31	,86
28,5	—2,59	,87	—2,45	,83
29,0	—1,72	,87	—1,62	,82
29,5	—0,85	,85	—0,80	,80
30,0	0.00	,85	0,00	,79
30,5	+0,85	,84	+0,79	,78
31,0	+1,69		+1,57	

The Royal Society, fully apprized of the importance of adjuſting the fixed points of *thermometers*, appointed a committee of ſeven gentlemen to conſider of the beſt method for this purpoſe; and their report is publiſhed in the Phil. Tranſ. vol. lxvii. part ii. art. 37. From a variety of experiments and obſervations, relating to this ſubject, the committee have deduced the following practical rules, which they recommend in adjuſting the fixed points of *thermometers*. The moſt accurate way of adjuſting the *boiling point* is, not to dip the *thermometer* into the water, but to expoſe it only to the ſteam, in a veſſel cloſed up in the manner repreſented (*Tab.* III. *Pneumatics*, *fig.* 54.) where A B *b a* is the veſſel containing the boiling water, D *d* the cover, E a chimney made in the cover intended to carry off the ſteam, and M *m* the *thermometer* paſſed through a hole in the cover. In the purſuit of this method the following particulars muſt be regarded: the boiling point muſt be adjuſted when the barometer is at 29.8 inches; unleſs the operator corrects the obſerved point in the manner directed in the ſequel of this article. The ball of the *thermometer* muſt be placed at ſuch a depth within the pot, that the boiling point may riſe very little above the cover; and the ſurface of the water in the pot ſhould be at leaſt one or two inches below the bottom of the ball. Care muſt be taken to ſtop up the hole in the cover through which the tube is inſerted, and to make the cover fit pretty cloſe, ſo that no air ſhall enter into the pot that way, and that not much ſteam may eſcape. A piece of thin flat tin plate muſt alſo be laid on the mouth of the chimney, ſo as to leave no more paſſage than what is ſufficient to carry off the ſteam.

If the artiſt pleaſes, he may tie each corner of this plate by a ſtring to prongs fixed to the chimney and ſtanding on a level with the plate, as it will be thus always kept in its place.

Fig. 55. is a perſpective view of the chimney and tin-plate; A B C D is the plate, E the chimney, F *f*, G *g*, M *m*, and N *n*, the prongs faſtened to the chimney, to which the four corners of the plate are to be tied by the ſtrings AF, BG, CM, and DN; the ends F, G, M, and N of the prongs muſt be on a level with the plate, and the ſtrings ſhould not be ſtretched tight. The chimney ought not to be leſs than half a ſquare inch in area, and not leſs than two or three inches in length. The cover ſhould be made to take on and off eaſily, and a ring of woollen cloth may be placed under it, ſo as to lie between it and the top of the pot. The hole in the cover may be ſtopped up by a cork, with a hole bored through it, big enough to receive the tube, and then cut into two, parallel to the length of the hole. Another method more convenient in uſe, but not ſo eaſily made, is repreſented in *fig.* 56. which exhibits a perſpective view of the apparatus: A *a* is the cover, H the hole through which the *thermometer* is paſſed, B *b* a flat piece of braſs fixed upon the cover, and D *d* E *e* a ſliding piece of braſs, made ſo as either to cover the hole H, or to leave it uncovered as in the figure, and to be tightened in either poſition by the ſcrew *s* ſliding in the ſlit M *m*; a ſemicircular notch being made in the edge B *b*, and alſo in the edge D *d*, to encloſe the tube of the *thermometer*; pieces of woollen cloth ſhould alſo be faſtened to the edges B *b* and D *d*, and alſo to the bottom of the ſliding piece D *d* E *e*, unleſs that piece and the cover are made ſufficiently flat to prevent the eſcape of the ſteam. In order to keep the *thermometer* ſuſpended at the proper height, a clip may be uſed like that repreſented in *fig.* 57. which by the ſcrew *s* muſt be made to embrace the tube tightly, and may reſt on the cover.

Another method, which is rather more convenient, when the top of the tube of the *thermometer* is bent into a right angle, in the manner often practiſed at preſent for the ſake of more conveniently fixing it to the ſcale, is repreſented in *fig.* 58: G *g* F *f* is a plate of braſs ſtanding perpendicularly on the cover, and L *l* N *n* a piece of braſs bent at the bottom into the form of a loop, with a notch in it, ſo as to receive the tube of the *thermometer*, and to ſuffer the bent part to reſt on the bottom of the loop; this piece muſt ſlide in a ſlit K *k*, cut in the plate L *l* N *n*, and be tightened at any height by the ſcrew T.

Moreover, it is beſt to make the water boil pretty briſkly, or otherwiſe the *thermometer* is apt to be a great while before it acquires its full heat, eſpecially if the veſſel is very deep; and the obſerver ſhould wait at leaſt one or two minutes after the *thermometer* appears to be ſtationary, before he concludes that it has acquired its full height.

Another way of adjuſting the boiling point is to try it in a veſſel of the ſame kind as the former, only with the water riſing a little way, viz. from one to three or four inches above the ball; taking care that the boiling point ſhall riſe very little above the cover. In this method there is no need to cover the chimney with the tin-plate, and there is leſs need to make the cover fit cloſe, unleſs to prevent the operator from being incommoded by the ſteam. The height of the barometer in this method is 29½ inches.

It will be convenient to have two or three pots of different depths for adjuſting *thermometers* of different lengths.

A third way of adjuſting the boiling point is to wrap ſeveral folds of linen rags or flannel round the tube of the *thermometer*, and to try it in an open veſſel, taking care to pour boiling water on the rags, in order to keep the quickſilver in the tube as nearly of the heat of boiling water as poſſible. In this method the barometer ſhould be at 29,8 inches; the water ſhould boil faſt, and the *thermometer* ſhould be held upright, with its ball two or three inches under water, and in that part of the veſſel where the current of water aſcends.

Whichever of theſe methods of adjuſting the boiling point is uſed, it is not neceſſary to wait till the barometer is at the proper height, provided the operator will take care to correct the obſerved height according to the following table.

Height of the barometer when the boiling point is adjuſted according to		Correction in 1000ths of the interval between 32° and 212°.		Height of the barometer when the boiling point is adjuſted according to		Correction in 1000ths of the interval between 32° and 212°.	
1ſt. or 3d. method.	2d Method.			1ſt or 3d method.	2d Method.		
	30,64	10	Lower.	29,69	29,39	1	Higher.
	53	9		58	28	2	
30,71	41	8		47	17	3	
59	29	7		36	06	4	
48	18	6		25	28,95	5	
37	07	5		14	84	6	
25	29,95	4		03	73	7	
14	84	3		28,92	62	8	
03	73	2		81	51	9	
29,91	61	1		70		10	
80	50	0		59		11	

In uſing this table, ſeek the height of the barometer in the column anſwering to the method of adjuſting the boiling point, the correſponding number in the third column ſhews how much the point of 212° muſt be placed above or below the obſerved point: e. g. ſuppoſe the boiling point to be adjuſted in them when the barometer is at 29 inches, and that the interval between the boiling and freezing points is 11 inches; the neareſt number to 29 in the left-hand column is 29,03, and the correſponding number in the table is 7 higher, and therefore the mark of 212° muſt be placed higher than the obſerved point by $\frac{7}{1000}$ths of the interval between boiling and freezing, i. e. by $\frac{11\times7}{1000}$, or ,077 of an inch.

This method of correcting the boiling point is not ſtrictly juſt, unleſs the tube is of an equal bore in all its parts; but the tube is ſeldom ſo unequal as to cauſe any ſenſible error, where the whole correction is ſo ſmall. The trouble of making the correction will be abridged by a diagonal ſcale, ſuch as is repreſented in *fig.* 58.

Although it is of no great conſequence what kind of water is uſed in adjuſting the boiling point, ſo that it is not ſalt, or, if it be hard, that it ſhould be kept boiling at leaſt ten minutes before it is uſed; yet the committee recommend, for the adjuſtment of *thermometers* intended for nice experiments, to employ rain or diſtilled water, and to perform the operation in ſteam.

It is obſerved, that though the boiling point be placed ſo much higher on ſome of the *thermometers* now made than on others, yet this does not produce any conſiderable error in the obſervations of the weather at leaſt in this climate; for an error of $1^\circ\frac{1}{2}$ in the poſition of the boiling point, will make an error only of half a degree in the poſition of 92°, and of not more than a quarter of a degree in the point of 62°.

It is only in nice experiments, or in trying the heat of hot liquors, that this error in the boiling point can be of much ſignification.

In adjuſting the *freezing*, as well as the boiling point, the quickſilver in the tube ought to be kept of the ſame heat as that in the ball. When the freezing point is placed at a conſiderable diſtance from the ball, the pounded ice ſhould be piled to ſuch a height above the ball, that the error which can ariſe from the quickſilver in the remaining part of the tube, not being heated equally with that in the ball, ſhall be very ſmall, or the obſerved point muſt be corrected, on that account, according to the following table.

Heat of the Air.	Correction.
42°	,00087
52	,00174
62	,00261
72	,00348
82	,00435

The correction in this table is expreſſed in 1000th parts of the diſtance betwen the freezing point and the ſurface of the ice: e. g. if the freezing point ſtands ſeven inches above the ſurface of the ice, and the heat of the room is 62, the point of 32° ſhould be placed 7 × ,00261, or ,018 of an inch lower than the obſerved point. A diagonal ſcale will facilitate this correction.

The committee obſerve, that in trying the heat of liquors, care ſhould be taken that the quickſilver in the tube of the *thermometer* be heated to the ſame degree as that in the ball; or if this cannot be done conveniently, the obſerved heat ſhould be corrected on that account; for the manner of doing which, and a table calculated for this purpoſe, we muſt refer to their excellent report in the Phil. Tranſ. vol. lxvii. part ii. art. 37.

Several experiments, made by governor Hutchins, at Albany fort, in Hudſon's Bay, in 1782, in purſuance of a method ſuggeſted by Dr. Black and Mr. Cavendiſh, and for which he obtained ſir Godfrey Copley's medal, from the Royal Society in 1783, have not only confirmed the obſervations before made, relative to the ſolid ſtate into which quickſilver can be brought by cold, its metalline ſplendor and poliſh when ſmooth, its roughneſs and cryſtallization where the ſurface was unconfined, its malleability, ſoftneſs, and dull ſound when ſtruck; but have alſo clearly demonſtrated, that its point of congelation is no lower than — 40°, or rather — 39°, of Fahrenheit's ſcale; that it will bear, however, to be cooled a few degrees below that point, to which it jumps up again on beginning to congeal; and that its rapid deſcent in a *thermometer*, through many hundreds of degrees, when it has once paſt the above mentioned limit, proceeds merely from its great contraction in the act of freezing. See Phil. Tranſ. vol. lxxiii. part ii. art. *20, 20, 21.

Obſervations on the conſtruction of THERMOMETERS. It is abſolutely neceſſary that thoſe who would derive any advantage from theſe inſtruments, ſhould agree in uſing the ſame liquor, and in determining, according to the ſame method, the two fundamental points. If they agree in theſe fixed points, it is of no great importance whether they divide the interval between them into a greater or leſs number of equal parts. The ſcale of Fahrenheit in which the fundamental interval between 212°, the point of boiling water, and 32° that of melting ice, is divided into 180 parts, ſhould be retained in the northern countries, where Fahrenheit's *thermometer* is uſed: and the ſcale, in which the fundamental interval is divided into 80 parts, will ſerve for thoſe countries where the *thermometer* of M. de Reaumur is adopted. But no inconvenience is to be apprehended from varying the ſcale for particular uſes, provided care be taken to ſignify into what number of parts the fundamental interval is divided, and the point where 0 is placed.

With regard to the choice of tubes, it is moſt deſirable to have them exactly cylindric through their whole length. See *Mercurial* THERMOMETER.

The capillary tubes are preferable to others, becauſe they require leſs bulbs, and they are alſo leſs brittle, and more ſenſible. Thoſe of the moſt convenient ſize for common experiments are ſuch as have their internal diameter about the fourth of a line; and thoſe made of thin glaſs are better than others, as the riſe and fall of the mercury may be more diſtinctly perceived. The length of nine inches will ſerve for all common occaſions; but for particular purpoſes the length both of the tubes and of the diviſions ſhould be adapted to the uſes for which they are deſigned.

In determining the beſt ſize of the balls or bulbs, it has been uſual to compare new tubes with ſuch *thermometers* as are well proportioned. But M. Durand has propoſed a formula for finding the proportion which the balls ought to bear to their reſpective tubes. With this view he expreſſes the length of the tube, meaſured in diameters of itſelf, by *a*; the whole capacity of the ball and tube by *c*; the capacity of the fundamental interval, expreſſed in the ſame parts with the whole capacity, by *d*; the number of degrees of the fundamental interval by *m*; the number of other degrees which the ſcale is to contain beſides thoſe of the fundamental interval both above and below it by *n*; and the diameter of the ball meaſured in diameters of the tube by *b*: and $b = \sqrt[3]{\frac{3}{2}a\times\frac{cm}{d\times\overline{m+n}}-1}$. For two cylinders having equal baſes being as their heights, $m:n::d:\frac{dn}{m}$, which is the capacity of that part of the tube which exceeds the fundamental interval, to which adding *d*, that interval, we have the total capacity of the tube $=\frac{dn}{m}+d$, or $\frac{dn+dm}{m}$. Subtracting this from *c*, we ſhall have the capacity of the ball $=c-\frac{\overline{dn+dm}}{m}=\frac{cm-dm-dn}{m}$. If this quantity be divided by the capacity of the tube, the quotient will ſhew how often the capacity of the ball contains that of the tube; and this quotient is $=\frac{cm-dm-dn}{dm+dn}$. Conſequently the ball is equal to as many cylinders, having *a* diameters of the tube, for their reſpective height, and 1 diameter for the baſe, as are contained in this laſt quotient; and, therefore, its cylindric ſolidity expreſſed in the cylindric ſolidities of the tube will be $=a\times\frac{cm-dm-dn}{dm+dn}$. But the diameter of this ball is equal to the baſe of the cylinder in which it may be inſcribed, and the ſolidity of this cylinder is equal to $\frac{2}{3}$ the ſolidity of the circumſcribing ſphere. Conſequently the ſolidity of this cylinder will be $=\frac{2}{3}a\times\frac{cm-dm-dn}{dm+dn}$; and the diameter of its baſe, equal to the diameter of the ball, will be $=\sqrt[3]{\frac{2}{3}a\times\frac{cm-dm-dn}{am+dn}}$ or $\sqrt[3]{\frac{4}{3}a\times\frac{cm}{d\times\overline{m+n}}-1}$.

When a proper tube and ball are procured, and their proportion aſcertained, the next object which requires peculiar attention is that of filling the *thermometer*. For this purpoſe the tubes ſhould be clean and dry, and the mercury very pure. See MERCURY and BAROMETER.

The mercury may be introduced into the tube by means of a kind of reſervoir fixed at the top of it, and proportioned in ſize to the bulk of the ball, or by rolling upon the tube a ſlip of fine paper, about two or three inches broad. In order to clear the tube of its air and moiſture, it ſhould be held over a gentle fire, ſo diſpoſed, as that it may heat at once the whole extent of the tube, till its heat becomes too great for the operator's hand to bear, who therefore uſes a glove or nippers for this purpoſe; care being taken that the ball is not heated at the ſame time. After the encloſed air is thus rarefied, and the particles that might obſtruct the free motion of the mercury are made to float in vapours within the bore of the tube, the tube is to be held upright, and the ball ſuddenly heated, by which means the air contained in it will be dilated, and carry off the impurities of the tube, ſo that it will be rendered clean and free from air. When the ball is heated to a conſiderable degree, the mercury may be poured into the reſervoir fixed at the top of the tube, through a ſmall corner of the paper. When the reſervoir is almoſt full, the ball ſhould be withdrawn from the fire, and the air will then be condenſed, and the ſpace left by it will be ſoon occupied by the mercury. By alternately heating and cooling the ball, it may thus be filled with mercury; but when it is nearly full, the mercury contained in it muſt be made to boil, by placing it over burning coals, in order to purge it of its air. However, as a ſmall quantity of air will be left in the ball after this operation, it will be expedient to remove the mercury, which remains in the reſervoir, immediately after the *thermometer* is withdrawn from the fire; and thus the whole column, unſupplied with mercury from the reſervoir, will deſcend into the ball by the condenſation of that which is contained in it, and the tube being empty, the ſmall bubble of air will eſcape. Let the tube be again heated ſucceſſively through its whole length, commencing from the bottom, and preſerving the heat of the ball, that the mercury may occupy it entirely, and no air be allowed to enter. During this operation, when the mercury of the *thermometer* begins to appear in the reſervoir, let the mercury contained in a paper funnel be poured into it in ſuch a quantity as will more than fill the *thermometer*, which is then to be removed from the fire. The mercury of the tube, and that diſcharged from the funnel, will unite, and paſs together into the *thermometer*, and thus it will be wholly filled. In this ſtate it may be left for any time at pleaſure, without any apprehenſion of its imbibing either air or moiſture. Nothing now remains but to get rid of the ſuperfluous quickſilver, and to ſeal the tube. For this purpoſe the *thermometer* is held in the hand and heated, till a drop of mercury falls out of it, and is then left to recover the temperature of the air; by which means there will remain at the top of the tube a ſmall empty ſpace. Then with a blow-pipe and the flame of a candle, let the end of the tube be formed into a fine point, of ſuch a length as will admit of its being properly ſealed. When this preparatory proceſs is completed, let the *thermometer* be gradually plunged into boiling water, ſo that the ſuperfluous mercury may iſſue from it ſlowly; and when it ceaſes to be diſcharged, withdraw the *thermometer* from the boiling water; wipe it dry, and as ſoon as poſſible, put the ball of it over a ſmall fire, covered with aſhes, and previouſly prepared for the purpoſe. In this part of the operation, it is neceſſary to be quick, that the mercury may not have time to condenſe, and the air enter into the tube. In this ſtate the *thermometer* may be left to heat, till it parts with more or fewer drops of the mercury, according to the proportion which the length of the tube bears to that of the ſcale applied to it. The *thermometer* is then ſealed, by melting only the end of the point above mentioned, and at the ſame inſtant withdrawing it from the fire.

The method of filling the *thermometer* with a paper tube, or funnel, is as follows. Let the ball be heated, ſo that the mercury may riſe to the top of the tube; whilſt it approaches it, apply the tube of paper to the end of the tube, ſo that it may ſerve for a reſervoir. The *thermometer* being placed near the fire, ſo that it may always preſerve the ſame degree of dilatation, take ſome well purified mercury in a paper cornet, and communicate a little more heat to the ball. When the mercury riſes, and forms a ſmall drop at the end, pour the mercury of the cornet into the reſervoir of paper, and withdraw the ball from the fire. Having removed the paper reſervoir, place the ball again over the fire, and ſeal the point of the tube at the moment when the mercury riſes to it, and withdraw the *thermometer* from the fire. This operation will be acquired by uſe.

Thermometers that are deſtined for meaſuring great degrees of heat, require to be filled with particular precautions, which M. de Luc has minutely deſcribed.

When the *thermometer* is filled and ſealed, nothing more is neceſſary than to mark the two fixed points, graduate the ſcale, and attach it to a proper frame. See De Luc's Recherches, &c. vol. i. p. 393, &c.

THERMOMETERS, *experiments with.* We ſhall here inſert a table of ſome obſervations made with the *thermometers* of Fahrenheit, Reaumur, ſir Iſaac Newton, and Dr. Hales.

Obſervations by Fahrenheit's *thermometer*.

	Deg.		
at	600	Mercury boils.	According to Muſchenbroeck, the barometer being at 29 Rhinland inches.
	546	Oil of vitriol boils.	
	242	Sprit of nitre boils.	
	240	Lixivium tartari boils.	
	213	Cow's milk boils.	
	212	Water boils.	
	206	Freſh human urine boils.	
	190	Brandy boils.	
	174	Alcohol boils.	
	176	———— according to Muſchenbroeck.	
	156	Serum of blood, and white of eggs hardens.	
	146	Killing heat for animals, in a few minutes.	
	108	A hen hatching eggs, but ſeldom ſo hot.	
from to	107 103	Heat of ſkin in ducks, geeſe, hens, pigeons, partridges, and ſwallows.	
at	106	Heat of ſkin in a common ague and fever.	
from to	103 100	Heat of ſkin in dogs, cats, ſheep, oxen, ſwine, and other quadrupeds.	
from to	99 92	Heat of the human ſkin in health.	
at	97	Heat of a ſwarm of bees.	
	96	A perch died in three minutes, in water ſo heated.	
	80	Heat of the air in the ſhade, in very hot weather.	
	74	Butter begins to melt.	
	64	Heat of the air in the ſhade, in warm weather.	
	48	Temperate air, in England and Holland.	
	43	Oil of olive begins to ſtiffen and grow opake.	
	32	Water juſt freezing, or ſnow and ice juſt thawing.	
	30	Milk freezes.	
	28	Urine and common vinegar freezes.	
	25	Blood out of the body freezes.	
	20	Good Burgundy, ſtrong claret, and Madeira freezes.	
	7	One part of ſpirit of wine mixed with three parts water freezes.	
	5	Greateſt cold in Penſylvania in 1731-2, 40° lat.	
	4	Greateſt cold at Utrecht in 1728-9.	
	0	A mixture of ſnow and ſalt, which is able to freeze oil of tartar, *per deliquium*, but not brandy.	
	—39	Mercury freezes.	

Martine's Eſſays, p. 284, &c.

We muſt here obſerve, that the heat of a hen hatching chickens is placed, by this table, at 108 of Fahrenheit's *thermometer*; but it appears from M. Reaumur's experiments, that eggs will hatch in a heat no greater than that of the human ſkin. See HATCHING.

2. Obſervations by Reaumur's *thermometer*.

	$97\frac{1}{2}$	Anſwers to the heat of boiling water.
	80	Spirit of wine in Reaumur's *thermometer* boils.
at	$29\frac{2}{3}$	Greateſt height of the air in the ſhade, obſerved at Paris in 1706, 1707, 1724.
	$10\frac{1}{4}$	Conſtant heat of the caves of the obſervatory at Paris.
	0	Artificial congelation of water.
	$14\frac{1}{4}$	Lower than (0) greateſt cold at Paris, in 1709.

3. Obſervations by ſir Iſaac Newton's *thermometer*.

34	Water boils vehemently.
$28\frac{6}{11}$	Heat between water boiling and wax melting.
24	Heat of water on which floating wax melts.
$20\frac{2}{11}$	Heat of water on which floating melted wax begins, by cooling, to loſe its fluidity and tranſparency.
17	Heat of a bath ſupportable to the hand at reſt.
$14\frac{2}{11}$	Heat of a bath ſupportable to the hand in motion. The heat of blood juſt let out is almoſt the ſame.
12	Heat of *thermometer*, in contact with a human body. The heat of a bird hatching her eggs much the ſame.
6 5 4	Heats of the air in ſummer.
4 3 2	Heats of the air in ſpring and autumn.
2 1 0	Heat of the air in the winter.
0	Water begins to freeze.

Phil. Tranſ. Abr. vol. iv. part ii. p. 1. 4.

4. Obſervations by Dr. Hales's *thermometer*.

Deg.	
146⅓	Anſwers to the heat of boiling water.
100	Heat of water on which floating wax begins to melt.
88	Hotteſt ſunſhine in 1727.
85	Scorching heat of a hot-bed of horſe-dung, and probably the heat of blood in high fevers.
64	Heat of the blood of animals; whence the heat of the blood to that of boiling water is as 14,27 to 33.
58	Heat of urine.
56	Due healthy heat of a hot-bed of horſe-dung in February, that of the open air being 17°, and nearly the boſom heat, and heat for hatching of eggs.
55	Heat of milk from the cow.
54	External heat of the body.
50	Common noon heat in the ſun in July.
38	Mean heat of the air in the ſhade in July.
from 30 to 17	May and June heat; and the moſt genial heat for moſt plants, in which they flouriſh and grow moſt.
from 20 to 10	Autumnal and vernal heat.
from freezing point to 10	Winter heat.
18	Temperate point.
31	The moſt kindly heat for melon-thiſtle.
29	——————ananas or pine-apple.
26	——————piamento.
24	——————euphorbium.
21½	——————cereus.
19	——————aloe.
16½	——————Indian fig.
14	——————ficoides.
12	——————oranges.
9	——————myrtle.
0	Freſh water juſt freezing.

Hales's Statical Eſſ. vol. i. p. 58, &c.

For other ſimilar obſervations, ſee FREEZING *mixture*, and HEAT.

See on the general ſubject of *thermometers*, Martine's Eſſays, Medical and Philoſophical, printed at London in 1740, 8vo. Deſaguliers's Exp. Phil. vol. ii. p. 289, &c. Muſchenbroeck's Int. ad Phil. Nat. vol. ii. p. 625, &c. ed. 1762. De Luc's Recherches ſur les Modifications de l'Atmoſphere, tom. i. part ii. chap. 2. Nollet's Leçons de Phyſique, tom. iv. p. 375, &c.

THERMOMETERS *for particular Uſes*. In 1757 the right hon. the earl of Cavendiſh preſented to the Royal Society an account of a curious conſtruction of *thermometers*, of two different forms; one contrived to ſhew the greateſt degree of heat, and the other the greateſt cold, that may happen at any time in a perſon's abſence. The firſt conſiſts of a cylinder of glaſs joined to a tube, and differs from the common ſort only in having the top of the ſtem drawn out in a capillary tube, which enters into a glaſs ball C (*Tab.* III. *Pneumatics*, *fig.* 59.) joined on to the ſtem at the place where it begins to be contracted. The cylinder, and part of the tube, are filled with mercury, the top of which ſhews the common degrees of heat as uſual. The upper part of the tube above the mercury is filled with ſpirit of wine, and ſome of the ſame liquor is left in the ball C, ſo as to fill it almoſt to the top of the capillary tube.

When the *thermometer* riſes, the ſpirit of wine will be driven out of the tube, and will fall into the ball C. When the *thermometer* ſinks again, as the ſpirit cannot be returned back from the ball, the top of the tube will remain empty, and the length of the empty part will be proportionable to the fall of the *thermometer*. Conſequently, by means of a proper ſcale, the top of the ſpirit of wine will ſhew how many degrees it has been higher than when obſerved, which being added to the preſent height, will give the greateſt degree of heat it has been at. To fit this *thermometer* for a new obſervation it is neceſſary to fill the upper part of the tube with ſpirits, by inclining the inſtrument till the ſpirits in the ball C cover the end of the capillary tube; for if the cylinder is then heated, by applying the hand to it, or by the flame of a lamp held at ſome diſtance, till the ſpirits riſe to the top of the tube, and run over into the ball C, and is then ſuffered to cool in the ſame poſition, the tube will remain full of ſpirits, and the *thermometer* will be fitted for a new experiment.

The ſcale of degrees at top, which ſhews the deſcent of the *thermometer* from the higheſt point it has arrived at, ought not, in ſtrictneſs, to be the ſame at all times of the year; for theſe degrees exceed the common degrees of heat pointed out by the top of the mercury, as much as the column of ſpirit of wine expands, and therefore are greateſt when that column is ſo; i. e. when the greateſt heat to which the inſtrument has been expoſed is leaſt. A difference of 30 degrees of Fahrenheit's ſcale, in the greateſt riſe of the *thermometer*, would require the ſcale to be altered one ſixtieth part; and the error ariſing from making uſe of the ſame ſcale, will be about one ſixth of a degree, if the *thermometer* is obſerved when it has fallen ten degrees.

In the *thermometer* here deſcribed, the bore of the tube is about 0,027 inches; and one inch of it contains two grains of mercury, and anſwers to about ten degrees, the cylinder containing about 2280 grains. When the ſcale of degrees is large, the cylinder muſt be of a conſiderable bigneſs. The quickſilver in the ball C ſerves to ſupply the tube, in caſe any of it ſhould be driven into the ball by the *thermometer's* being expoſed to too great a heat.

If the weight of the mercury be thought inconvenient, it may be avoided by the conſtruction in *fig.* 60. where the bottom of the tube is bent ſo as to point upwards, and is joined to a ball A, which communicates with a cylinder placed above it. It is in all other reſpects the ſame as the former inſtrument. It is filled with ſpirits of wine and mercury; the quantity of the latter being ſufficient to fill the whole tube and the ball A.

The *thermometer* for ſhewing the greateſt degree of cold that happens in any place during the time the inſtrument is left in it, is repreſented in *fig.* 61. The tube is bent into the ſhape of a ſyphon, of unequal legs, ſtanding parallel to one another; the top of the ſhorter leg is bent to a right angle, and opens into a ball A, which, by means of a ſhort bent tube on the oppoſite ſide, communicates with a cylinder ſtanding parallel to the legs of the ſyphon, and pointed downwards. This cylinder contains the greateſt part of the fluid, and is added only to make the *thermometer* more ſenſible than it would be, if the ball A was made of a ſufficient ſize to contain the proper quantity of fluid. This inſtrument is filled with ſpirit of wine, with the addition of as much mercury as is ſufficient to fill both legs of the ſyphon, and about a fourth or fifth part of the ball A. The common degrees of heat are ſhewn by the top of the mercury in the longeſt leg, or by the top of the ſpirit, in caſe any of it is left above the mercury. When the mercury in the longeſt leg ſinks by cold, that in the ſhorter leg will riſe, and will run over into the ball A; from whence it cannot return back when the *thermometer* riſes again, as the ſurface of the mercury in the ball is below the orifice of the tube *n*. Therefore the upper part of the ſhorter leg will be filled with a column of ſpirits of a length proportional to the increaſe of heat; the bottom of which, by means of a proper ſcale, will ſhew how much the *thermometer* has been lower than it is; which being ſubtracted from the preſent height, will give the loweſt point that it has been at. In order to prevent the mercury from falling into the ball A in large drops, which would affect the accuracy of the inſtrument, the top of the ſhorter leg, cloſe to the ball, is contracted, by being held in the flame of a lamp, and the paſſage farther ſtraitened by a ſolid thread of glaſs placed within the tube, and extending from the bottom of the ſhorter leg to the part near the ball A, where it is moſt contracted. By this means, as ſoon as any ſmall portion of mercury is got beyond the thread of glaſs, it breaks off, and falls into the ball in very ſmall drops.

In order to fill the ſhorter leg with mercury, for a new experiment, it muſt be inclined till the mercury in the ball covers the orifice of the tube *n*. The cylinder being then heated, the mercury will be forced into the ſhorter leg, and will run down the thread of glaſs in drops, which will ſoon unite. Thus ſuch a quantity of mercury muſt be got into the ſhorter leg, as, upon the cooling of the inſtrument, will be ſufficient to drive all the ſpirit of wine into the ball, with a leſs degree of cold than what the *thermometer* is likely to be expoſed to. The ball A muſt always have ſome mercury in it, but never enough to fill it up to the orifice of the tube *n*. It will be beſt to leave a little of the ſpirit above the mercury in the longeſt leg; in which caſe the top of the ſpirit will ſhew the common degrees of heat. The ſcale of degrees on the ſhorter leg will, in different ſeaſons, be liable to an error ſimilar to that which was explained in the firſt mentioned *thermometer*; but it will be leſs conſiderable, as the ſpace between the two ſcales is filled with mercury, whoſe expanſion is about ſix times leſs than that of ſpirit of wine. In the *thermometer* now deſcribed, the bore of the tube is about 0,054 inches; and one inch of it contains eight grains of mercury, and anſwers to ſeven degrees of Fahrenheit's ſcale. The drops of mercury, which fall into the ball A, anſwer to about one-eighth of a degree.

Inſtruments of this kind, with ſome alteration in their conſtruction, would ſerve for finding the temperature of the ſea at great depths, and alſo for finding that of the air at conſiderable heights. Lord Charles Cavendiſh has ſhewn how to adapt them for ſuch purpoſes. See Phil. Tranſ. vol. l. art. 38. p. 300, &c.

Since the publication of Mr. Canton's diſcovery of the compreſſibility (ſee Compression) of ſpirits of wine and other fluids, there are two corrections neceſſary to be made in the reſult given by lord Charles Cavendiſh's *thermometer*. For in eſtimating, e. g. the temperature of the ſea at any depth, the *thermometer* will appear to have been colder than it really was: and beſides, the expanſion of ſpirits of wine by any given number of degrees of Fahrenheit's *thermometer* is greater in the higher degrees than in the lower. For the method of making theſe two corrections by Mr. Cavendiſh, ſee Phipps's Voyage to the North Pole, p. 145.

Inſtruments of this kind, for determining the degree of heat or cold in the abſence of the obſerver, have been invented and deſcribed by others. Van Swinden (Diſſ. ſur la Comparaiſon du *Therm.* p. 253—255) deſcribes one, which, he ſays, was the firſt of the kind, made on a plan communicated by Mr. Bernouilli to Mr. Leibnitz. Mr. Kraft, he alſo tells us, made one nearly like it. Mr. Six has lately, viz. in 1782, propoſed another conſtruction of a *thermometer* of the ſame kind.

This is properly a ſpirit *thermometer*, though mercury is employed in it for the purpoſe of ſupporting a certain index: *a b* (*fig.* 62.) is a tube of thin glaſs, about ſixteen inches long, and $\frac{5}{16}$ths of an inch in diameter; *c d e f g h* is a ſmaller tube, with the inner diameter about $\frac{1}{20}$th, joined to a larger at the upper end *b*, and bent down firſt on the left ſide, and then, after deſcending two inches below *a b*, upwards again on the right, in the ſeveral directions *c d e*, *f g h*, parallel to, and one inch diſtant from it. At the end of the ſame tube at *h*, the inner diameter is enlarged to half an inch from *h* to *i*, which is two inches in length. This glaſs is filled with highly rectified ſpirit of wine to within half an inch of the end *i*, excepting that part of the ſmall tube from *d* to *g*, which is filled with mercury. From a view of the inſtrument it will be readily conceived, that when the ſpirit in the large tube is expanded by heat, the mercury in the ſmall tube on the left ſide will be preſſed down, and cauſe that on the right ſide to riſe: on the contrary, when the ſpirit is condenſed by cold, the reverſe will happen. Fahrenheit's ſcale, which begins with 0 at the top of the left ſide, has the degrees numbered downwards, while that at the right ſide, beginning with 0 at the bottom, aſcends. The diviſions are aſcertained by placing the *thermometer* with a good ſtandard mercurial one in water, gradually heating or cooling, and marking the diviſions of the new ſcale at every 5°. The diviſions below the freezing point are taken by means of a mixture of ſea-ſalt and ice, as deſcribed by Nollet, De Luc, and others. In order to ſhew how high the mercury has riſen in the obſerver's abſence, there is placed within the ſmall tube of the *thermometer*, above the ſurface of the mercury on either ſide, immerſed in the ſpirit of wine, a ſmall index, ſo fitted as to paſs up and down as occaſion may require. One of theſe indexes is repreſented in *fig.* 63; *a* is a ſmall glaſs tube, $\frac{3}{4}$ths of an inch long, hermetically ſealed at each end, encloſing a piece of ſteel wire nearly of the ſame length; at each end *c*, *d*, is fixed a ſhort piece of a tube of black glaſs, of ſuch a diameter as to paſs freely up and down within the ſmall tube of the *thermometer*. The lower end, floating on the ſurface of the mercury, is carried up with it when it riſes, while the piece at the upper end, being of the ſame diameter, keeps the body of the index parallel to the ſides of the thermometrical tube. From the upper end of the body of the index at *c* is drawn a ſpring of glaſs to the fineneſs of a hair, about $\frac{5}{4}$ths of an inch in length, which being ſet a little oblique, preſſes lightly againſt the ſurface of the tube, and prevents the index from following the mercury when it deſcends, or being moved by the ſpirit paſſing up and down, or by any ſudden motion given to the inſtrument; but at the ſame time the preſſure is ſo adjuſted as to permit this index to be readily carried up by the ſurface of the riſing mercury, and downwards, whenever the inſtrument is rectified for obſervation. This index, by not returning with the mercury when it deſcends, ſhews diſtinctly and accurately, how high the mercury has riſen, and conſequently what degree of cold or heat has happened. To prevent the ſpirit from evaporating, the tube at the end *i* is cloſely ſealed. The daily rectification of this inſtrument is performed, by applying a ſmall magnet to that part of the tube againſt which the index reſts; by the action of which the included piece of ſteel-wire, and conſequently the index, is eaſily brought down to the ſurface of the mercury. When this has been done, the inſtrument is rectified for the next day's obſervation, without heating, cooling, ſeparating, or at all diſturbing the mercury, or moving the inſtrument. With a *thermometer* of this ſort, Mr. Six obſerved the greateſt heat and cold that happened every day and night throughout the year 1781. But for the more particular deſcription of this inſtrument, the illuſtration of it by figures, and an account of its advantages, the limits of this work require our referring to Phil. Tranſ. vol. lxxii. part i. p. 72, &c.

M. de Luc has deſcribed the beſt method of conſtructing a *thermometer*, fit for determining the temperature of the air, in the menſuration of heights by the barometer. He has alſo ſhewn how to divide the ſcale of a *thermometer*, ſo as to adapt it for aſtronomical purpoſes in the obſervation of refraction. See Recherches, &c. tom. ii. p. 35, &c. p. 265, &c.

Mr. Cavallo, in 1781, propoſed the conſtruction of a *thermometrical barometer*, which, by means of boiling water, might indicate the various gravity of the atmoſphere, or the height of the barometer. This *thermometer*, he ſays, with its apparatus might be packed up into a ſmall portable box, and ſerve for determining the heights of mountains, &c. with greater facility than with the common portable barometer. The inſtrument, in its preſent ſtate, conſiſts of a cylindrical tin veſſel, about two inches in diameter, and five inches high, in which veſſel the water is contained, which may be made to boil by the flame of a large wax-candle. The *thermometer* is faſtened to the tin veſſel in ſuch a manner as that its bulb may be about one inch above the bottom. The ſcale of this *thermometer*, which is of braſs, exhibits on one ſide of the glaſs tube a few degrees of Fahrenheit's ſcale, viz. from 200° to 216°. On the other ſide of the tube are marked the various barometrical heights, at which the boiling water ſhews thoſe particular degrees of heat which are ſet down in ſir G. Shuckburgh's table. With this inſtrument the barometrical height is ſhewn within one tenth of an inch. The degrees of this *thermometer* are ſomewhat longer than one ninth of an inch, and therefore may be divided into many parts, eſpecially by a Nonius. But the greateſt imperfection of the inſtrument ariſes from the ſmallneſs of the tin veſſel, which does not admit a ſufficient quantity of water; but when the quantity of water is ſufficiently large, e. g. 10 or 12 ounces, and is kept boiling in a proper veſſel, its degree of heat under the ſame preſſure of the atmoſphere is very ſettled; whereas when a *thermometer* is kept in a ſmall quantity of boiling water, the quickſilver in its ſtem does not ſtand very ſteady, ſometimes riſing or falling even half a degree. Mr. Cavallo propoſes a farther improvement of this inſtrument, Phil. Tranſ, vol. lxxi. part ii. p. 524.

The ingenious Mr. Wedgwood, ſo well known for his various improvements in the different ſorts of pottery-ware, has contrived to make a *thermometer* for meaſuring the higher degrees of heat, by means of a diſtinguiſhing property of argillaceous bodies, viz. the diminution of their bulk by fire. This diminution commences in a low red heat, and proceeds regularly, as the heat increaſes, till the clay becomes vitrified. The total contraction of ſome good clays which he has examined in the ſtrongeſt of his own fires, is conſiderably more than one-fourth part in every dimenſion. If therefore, we can procure at all times a clay ſufficiently apyrous or unvitreſcible, and always of the ſame quality in regard to contraction by heat; and if we can find means of meaſuring this contraction with eaſe and accuracy, we ſhall be furniſhed with a meaſure of fire ſufficient for every purpoſe of experiment or buſineſs. Some of the pureſt Corniſh porcelain clays (which, by the analyſis of Mr. Wedgwood appear to contain no calcareous earth nor gypſeous matter, but to conſiſt of pure argillaceous or alum earth, and another indiſſoluble earth, which he apprehends to be of the ſiliceous kind, in the proportion of three parts of the former to two parts of the latter) ſeem the beſt adapted, both for ſupporting the intenſity, and meaſuring the degrees of fire. This material is prepared for uſe by waſhing it over, and whilſt in a diluted ſtate paſſing it through a fine lawn: it is then dried and put up in boxes. The dry clay is to be ſoftened for uſe with about two-fifths its weight of water; and formed into ſmall pieces, in little moulds of metal, $\frac{6}{10}$ths of an inch broad, with the ſides exactly parallel; about $\frac{4}{10}$ths of an inch deep, and one inch long. The moulds are to be oiled and warmed. Theſe pieces, when perfectly dry, are put into another iron mould or gage, conſiſting only of a bottom, with two ſides, $\frac{5}{10}$ths of an inch deep, to the dimenſions of which ſides the breadth of the pieces is to be pared down. For meaſuring the diminution which they are to ſuffer from the action of fire, another gage is made of two pieces of braſs, twenty-four inches long, with the ſides exactly ſtraight, divided into inches and tenths, fixed five-tenths of an inch aſunder at one end, and three-tenths at the other, upon a braſs plate; ſo that one of the thermometric pieces, when pared down in the iron gage, will juſt fit to the wider end. If this piece be ſuppoſed to have diminiſhed in the fire one-fifth of its bulk, it will then paſs on to half the length of the gage; if diminiſhed two-fifths, it will go on to the narroweſt end; and in any intermediate degree of contraction, if the piece be ſlid along till it reſts againſt the converging ſides, the degree at which it ſtops will be the meaſure of its contraction, and conſequently of the degree of heat it has undergone. The thermometric pieces may be formed much more expeditiouſly than in the ſingle mould by means of an inſtrument, conſiſting of a cylindrical iron veſſel, with holes in the bottom, of the form and dimenſions required.—The ſoft clay, put in the veſſel, is forced by a preſs down through theſe apertures, in long rods, which may be cut while moiſt, or broken when dry, into pieces of convenient lengths. After which recourſe ſhould be had to the paring gage for aſcertaining and adjuſting their breadth when perfectly dry.

Each diviſion of the ſcale, though ſo large as a tenth of an inch, anſwers to $\frac{1}{800}$th part of the breadth of the little piece of clay. When one gage is accurately adjuſted to the proportional meaſures above ſtated, two pieces of braſs ſhould be made, one fitting exactly into one end, and the other into the other; which will ſerve as ſtandards for the ready adjuſtment of other gages to the dimenſions of the original, and thus we may be aſſured, that *thermometers* on this principle, though made by different perſons and in different countries, will all be equally affected by equal degrees of heat, and all ſpeak the ſame language. The ſcale, commences at a red heat, fully viſible in day light; and the greateſt heat which Mr. Wedgwood has hitherto obtained in his experiments is 160°. Swediſh copper has been found to melt at twenty-ſeven, ſilver at twenty-eight, and gold at thirty-two degrees of this *thermometer*. Braſs is in fuſion at twenty-one: the welding heat of iron is from ninety to ninety-five, and the greateſt heat that could be produced in a common ſmith's forge one hundred and twenty-five. Caſt iron melted at 130°; and the heat by which iron is run down among the fuel for caſting is 150°. A Heſſian crucible melted into a ſlag-like ſubſtance at about 150°. The fonding heat of glaſs furnaces, or that by which the perfect vitrifications of the materials is produced, was at one of them 114° for flint-glaſs, and 124° for plate-glaſs. Delſt ware is fired by a heat of 40 or 41°; Queen's-ware by 86°, and ſtone-ware by 102°, which degree of heat changes it to a true porcelain texture. The *thermometer* pieces begin to acquire a porcelain texture at about 110°. A piece of an Etruſcan vaſe melted completely at 33°; pieces of other vaſe and Roman ware about 36°; Worceſter china vitrified at 94°; Mr. Sprimont's Chelſea china at 105°; the Derby at 112°; the Bow at 121°; but Briſtol china ſhewed no appearance of vitrification at 135°. The common ſort of Chineſe porcelain does not perfectly vitrify by any fire which Mr. Wedgwood could produce: but began to ſoften about 120°, and at 156° became ſo ſoft as to ſink down and apply itſelf cloſe upon an irregular ſurface underneath. The true ſtone Nankeen does not ſoften in the leaſt, by this ſtrong heat; nor even acquire a porcelain texture. The Dreſden porcelain is more refractory than the common Chineſe, but not equally ſo with the ſtone Nankeen. The cream-coloured or queen's ware bears the ſame heat as the Dreſden. Mr. Pott ſays, that to melt a mixture of chalk and clay in certain proportions, which appear from his tables to be equal parts, is "among the maſter-pieces of art." This mixture melts into a perfect glaſs at 123° of this *thermometer*. For other curious particulars, ſee Phil. Tranſ. vol. lxxii. part ii. p. 305, &c.

THERMOPOLIUM, formed of θερμος, *hot*, and πωλεω, *I ſell*, a name for a ſort of public houſes among the ancients, in which hot liquors were ſold, in the manner of our coffee-houſes.

THERMOSCOPE, an inſtrument ſhewing the changes happening in the air with reſpect to heat and cold.

The word *thermoſcope* is generally uſed indifferently with that of thermometer. There is ſome difference however, in the literal import of the two; the firſt ſignifying an inſtrument that ſhews or exhibits the changes of heat, &c. to the eye; formed from θερμη, *heat*, and σκοπεω, *video*, *I ſee*; and the latter an inſtrument that meaſures thoſe changes, from θερμη, *heat*, and μετρειν, *to meaſure*; on which foundation the thermometer ſhould be a more accurate *thermoſcope*, &c. This difference the excellent Wolfius taking hold of, deſcribes all the thermometers in uſe as *thermoſcopes*; ſhewing, that none of them properly meaſure the changes of heat, &c. none of them do more than indicate the ſame. Though their different heights yeſterday and to-day ſhew a difference of heat; yet, ſince they donot diſcover the ratio of yeſterday's heat to to-day's they are not, ſtrictly, thermometers.

THESEA, or Thesæa, Θησεια, in *Antiquity*, feaſts celebrated, by the Athenians, in honour of Theſeus.

In ſpite of the important ſervices that hero had done his country, in delivering it from a ſhameful tribute of ſo many youths, of either ſex, ſent yearly to be devoured by the Minotaur in Crete (as the fable has it), or ſent as ſlaves to Minos, king of Crete, as the hiſtories have it, from which he freed them, by overturning Taurus, Minos's general; he was baniſhed for ſome time, and retired to Scyro, under the protection of Lycomedes, king of that iſland, who finally ſlew him out of jealouſy.

The gods, it is ſaid, revenged this treatment Theſeus received from the Athenians, by afflicting them with a famine, which the oracle aſſured them ſhould not ceaſe till they had avenged his death.—Upon this they ſlew Lycomedes, brought Theſeus's bones to Athens, placed them in a temple erected to him, and appointed *Theſea* to be held every eighth day of each month, wherein largeſſes were diſtributed to the people, and the day was ſpent, by the rich, in feaſting and rejoicing, and with peculiar ſolemnity on the eighth day of the month Pyanepsion.

Plutarch, however, gives a different account of the origin of this feaſt; he ſays that the Athenians, imagining they ſaw Theſeus at the battle of Marathon under the form of a tutelary deity, conſulted the oracle on this prodigy; and being ordered to collect his bones to the iſland of Scyros, removed them with great pomp to Athens; and depoſited them under a magnificent monument erected in the middle of the city, which became afterwards an aſylum for ſlaves, in commemoration of the ſuccour afforded by this prince to the unfortunate during his life. They alſo erected a temple where they offered ſacrifices, &c. At Rome, Theſeus was held in very different eſtimation, for Virgil (Æn. lib. vi.) places him in Tartarus, among thoſe who were tormented for their crimes.

THESIN.—*Per Arſin* and Thesin. See Per *Arſin*.

THESIS, θεσις, *poſition*, formed from τιθημι, *I put* or *lay down*, in the *Schools*, a general propoſition, which a perſon advances, and offers to maintain.

In the college it is frequent to have placards, containing a number of theſe *theſes* in theology, in medicine, in philoſophy, in law, &c.—The maintaining a *theſis*, is a great part of the exerciſe a ſtudent is to undergo for a degree.

Thesis, in *Logic*, &c.—Every propoſition may be divided into *theſis*, and hypotheſis: *theſis* contains the thing affirmed or denied, and hypotheſis the conditions of the affirmation or negation.

Thus, in Euclid, if a triangle and parallelogram have equal baſes and altitudes (is the hypotheſis), the firſt is half of the ſecond (the *theſis*).

Arſis and Thesis. See Arsis.

Thesis, in *Muſic*, denotes the fall of the hand in beating time. The Latin writers call it *depreſſio*.

THESIUM, *baſtard toad-flax*, in *Botany*, a genus of the *pentandria monogynia* claſs: its characters are, that the calyx, in which the ſtamina are inſerted, is ſingle-leaved; and that it has one ſeed. There are ſeven ſpecies.

THESMOPHORIA, Θεσμοφορια, in *Antiquity*, a feſtival in honour of Ceres, which was celebrated by many cities of Greece; but eſpecially the Athenians obſerved it with great devotion and pomp. For the ceremonies of this ſolemnity, ſee Potter, Archæol. Græc. tom. i. p. 403, ſeq. See Cerealia and Eleusinia.

THESMOTHETÆ, Θεσμοθεται, in *Antiquity*, an appellation given to ſix of the nine Athenian *archons*; the firſt and chief of the nine was called, by way of eminence, archon; the ſecond in dignity was called *baſileus*, the third *polemarchus*, and the other ſix *theſmothetæ*; for an account of whoſe power and juriſdiction, ſee Potter, Archæol. Græc tom. i. p. 77.

THESPHATA, Θεσφατα, in *Antiquity*, an appellation given to oracles. See Oracle.

THESPIADES, in *Mythology*, an appellation given to the Muſes from the city of Theſpis, where they were honoured.

THESPIANA, the name of an antidote intended for internal abſceſſes.

THESSALICUM *ſedile*, the Theſſalian chair, ſo called from Theſſaly, where chairs of this figure were moſt in uſe: it is recommended by Hippocrates, lib. de Art. in place of a machine for reducing a recent luxation of the ſhoulder-bone. The back of this chair is perpendicular to the ſeat, as Galen tells us, by which conſtruction it is diſtinguiſhed, and accommodated to the operation.

THESSALONIANS, *Epiſtles to*, in *Scripture-hiſtory*. See Epistle.

THETA, Θ, among the *Ancients*, one of the Greek letters. It was uſed as a mark on the ballots of judges, by which they condemned the perſon to death, it being the firſt letter of the word Θανατος, *death*. Whence it had the epithet of *niger* and *infelix*, thus:

O multum ante alias infelix litera theta.

THETES, Θητες, in *Antiquity*, the loweſt claſs of people at Athens. Ariſtides repealed Solon's law by which the *thetes* were made incapable of bearing any office in the government.

THETIS, in *Mythology*, the name of the moſt beautiful of the NEREIDS.

THETYS. See TETHYS.

THEVET. See TEBET.

THEURGY, Θεουργια, a name which the ancients gave to that ſacred part of magic which we ſometimes call *white magic*, or the *white art*.

The word is formed from Θεος, *God*, and εργον, *work*; q. d. the art of doing divine things, or things which God alone can do: or the power of working extraordinary and ſupernatural things, by invoking the names of God, ſaints, angels, &c.

Accordingly, thoſe who have written of MAGIC in the general, divide it into three parts: the firſt whereof is called *theurgy*, as operating by divine or celeſtial means; the ſecond, *natural magic*, performed by the powers of nature; and the third, *necromancy*, which proceeds by invoking dæmons.

This *theurgy*, or pretended art of ſo purging and refining that faculty of the mind, which receives the images of things, as to render it capable of perceiving the dæmons, and of perfoming many marvellous things by their aſſiſtance, was adopted by the diſciples of Ammonius towards the cloſe of the ſecond century. Ammonius, the founder of the ſect of modern Platonics (ſee PLATONISM), with a view of reconciling the popular religions of different countries, and particularly the Chriſtian, with his own ſyſtem, turned into mere allegory the whole hiſtory of the gods, and maintained that thoſe beings, whom the prieſts and people dignified with this title, were no more than celeſtial miniſters, to whom a certain kind of inferior worſhip was due. He acknowledged Chriſt to be a moſt excellent man, the friend of God, and the admirable *theurge*; but denied that it was his intention entirely to aboliſh the worſhip of dæmons, and of the other miniſters of divine providence; affirming, on the contrary, that he merely purified the ancient religion, and that his followers had manifeſtly corrupted the doctrine of their divine maſter. Moſh. Eccl. Hiſt. vol. i. p. 142, 8vo.

THEXIS, a word uſed by the old medical writers, ſometimes for wounds made by puncture with ſmall inſtruments, and ſometimes for the operation of the ſuture, or the ſewing together the lips of a wound, to make it heal with a leſs ſcar.

THICK *inteſtines*. See INTESTINES.

THICKET, a buſh or place full of buſhes or brambles. Dict. Ruſt.

THIGH, a part of the body of men, quadrupeds, and birds, between the leg and trunk. See FEMUR.

We have an account in the Philoſophical Tranſactions of a large piece of a young man's *thigh-bone* being taken out, and the place ſo well ſupplied by a callus, that he walked ſtraight. See N° 461. ſect. 2.

THIGH-*bone fractured*. The *thigh-bone*, though the largeſt and ſtouteſt in the whole body, is yet frequently broken, both near its middle, and towards its ends or articulations; but more commonly near that part uſually called its neck, near its articulation with the hip-bone; and when this is the caſe, it is very difficult to ſet it, and retain it in its place. When the bone is broke in two places at once, which ſometimes happens, the danger is yet much greater; and if the patient, in this caſe eſcapes death, which he ſeldom does, he is commonly lame, ever afterwards.

Sometimes this bone is broken tranſverſely, ſometimes obliquely, and at other times the ends ſlip over one another, which makes it a very bad caſe; for the muſcles of this part being very robuſt, and ſtrongly contracted, draw the lower end of the bone with a conſiderable force, upwards, ſo as to make it require great ſtrength to extend and replace it.

The oblique fracture of this bone more frequently ſlips out of its place again than the tranſverſe, and generally leaves the *thigh* ſomewhat ſhorter than the other, notwithſtanding all the caution the ſurgeon can uſe in the ſetting of it. It is therefore neceſſary, in theſe caſes, beſides the means that are common to all the fractures, to uſe a more ſtrict and tight bandage in this than in the tranſverſe fracture, to prevent the bones from being eaſily removed. When the fracture of the *thigh bone* happens in its middle, or towards its lower head, it is to be extended and replaced with the hands like other fractures, except that the extending force required is very great; and where the hands of a ſtrong aſſiſtant are not ſufficient, ſlings, napkins or linen-bandages, are to be bound round each head of the *thigh*, whereby the fractured bone may be extended both ways, by the ſtrength of three or four perſons at once, while the ſurgeon cautiouſly reduces the fracture with his hands, and ſecures it with a proper bandage and dreſſing. There are ſometimes caſes where the joint ſtrength of three or four men, applied in this manner, are not ſufficient to make the neceſſary extenſion; in which caſe the ſurgeon is obliged to have recourſe to ropes and pullies by means of which one man will pull more forcibly and equally than ſeveral can without them. But caſes that require this treatment are not common.

When the neck of the *thigh-bone* is fractured, to which, from its oblique or tranſverſe direction, and ſpungy or brittle ſubſtance, it is very ſubject; it makes a fracture not only very difficult to reduce, but ſuch a one alſo as can ſeldom be cured without leaving the limb ſhorter than it was before. The reaſons of which are, that the fragments cannot but with great difficulty be preſſed into their right places, by reaſon of the great thickneſs and ſtrength of the muſcles which cover them; and that it ſeldom happens that the bones can be retained in their natural poſition, after they have been ever ſo well reduced; becauſe the muſcles which paſs over and are inſerted below the neck of this bone, draw its lower part upwards; and both theſe accidents happen the more naturally and eaſily, becauſe of the oblique poſition of the neck of this bone, which is inſerted into its head in a direction not perpendicular, nor parallel, but as it were ſloping on one ſide; ſo that it is no wonder that lameneſs and other bad accidents, are the conſequences of this ſort of fracture.

To all theſe reaſons we may alſo add, that it is very difficult to diſcover when the neck of the *thigh-bone* is fractured, this caſe being uſually taken for the head of the bone being ſlipped out of its ſocket or acetabulum; and this indeed, till of late, has been almoſt a general error.

When we can think the external force to have been ſtrong enough to have produced a fracture, when the patient cannot bear any ſtreſs upon the limb, by ſetting his foot on the ground, when very acute pains are felt about the articulation itſelf; and when we find the affected limb ſhorter than the ſound one, it being an eaſy matter to turn the foot almoſt round from one ſide to the other, and any cracking or grating of the bones is perceived in that motion, we may reaſonably ſuppoſe the neck of the *thigh-bone* is fractured; the limb muſt then be extended very gently and gradually; till it be brought to the ſame length with the ſound one; this may be eaſily done, either by means of a napkin, or the hands of an aſſiſtant in moſt caſes, in ſuch a manner, that the ſurgeon may be able to rejoin, in ſome meaſure, if not perfectly, the neck of the *thigh-bone* with its head, ſtill firmly remaining in its ſocket: and though a ſhortneſs of the limb, or lameneſs, is generally left behind after this fracture; yet, becauſe there are ſome cured without thoſe misfortunes, it is always beſt to uſe, for that end, ſo ſtrict or tight a bandage, that it may retain the neck and head of the bone together, ſo that they may be in a way of uniting evenly. The bandage called *ſpica inguinalis* is the moſt convenient for this purpoſe, and a large and broad napkin, or other linen-cloth, is, with this, placed between the *thighs* to keep the body of it from ſubſiding; and laſtly, ligatures are put about the knee and ancle, by which the foot is faſtened to the lower part of the bed, to prevent the limb from being contracted upwards.

If the fracture of the *thigh-bone* be accompanied with a wound, it makes the caſe very difficult and dangerous. And if theſe accidents happen to be inflicted on the neighbouring joint, death is generally the conſequence, more eſpecially when any of the large blood-veſſels are alſo wounded, which will be readily enough known by the hæmorrhage. In theſe fractures, with a wound, the eighteen-headed bandage is to be uſed for the dreſſing; and if the wound be much contuſed, ſo that extravaſated blood be lodged under the ſkin, and about its interſtices, it is to be carefully opened by ſeveral inciſions, of a ſufficient depth, that the extravaſated blood, which would in a ſhort time putrefy, may be diſcharged. The injured parts are to be afterwards waſhed with lime-water, mixed with a fourth part of ſpirit of wine camphorated till the contuſed parts are digeſted.

When this kind of fracture is accompanied with no very violent loſs of blood, nor the bone near, the proper dreſſing is dry lint folded up, with which the wound is to be filled. If the flux be greater, rectified ſpirit of wine, or other aſtringent liquors are to be uſed; but if the hæmorrhage be very violent from an artery, the tournequet is to be uſed, and the veſſel ſecured by a ligature. After the blood is ſtopped, and the wound cleanſed, the fragments of the bone are to be re-placed, and the limb carefully bound up with compreſſes, ſplints, and the eighteen-headed bandage, and defended by a caſe of ſtraw. But if the fracture is attended with a violent hæmorrhage, and great ſplintering of the bone, from gun-ſhot wounds, ſo as to indicate the great crural artery to be wounded, the beſt method is to amputate the *thigh*, and tie up the artery in time; for the crural artery is ſo large, that it ſeldom grows together; and if it does, the lower parts are ſoon ſeized with a gangrene. Heiſter, vol. i. p. 143. We have the deſcription and draught of a machine for reducing fractures of the *thigh-bone*, by Mr. Ettrick, in the Phil. Tranſ. N° 459. ſect. 4.

Thigh, *luxated*. It has been formerly imagined, that the head of the *thigh-bone* being diſplaced out of its acetabulum, was a very common caſe; but more knowledge in anatomy and ſurgery has convinced us now, that this accident is very rare. The reaſon why it was before ſuppoſed common, was, that a fracture of the neck of the *thigh-bone* was generally miſtaken for this luxation.

It will eaſily be conceived, that this is the true ſtate of the caſe, and that a real diſlocation of the *thigh-bone* is very rare, if we conſider how very deep the ſinus or acetabulum is, into which the head of this bone is received, with what a broad concave cartilage the head of this bone is covered, how extremely ſtrong the ligaments are with which it is faſtened, how greatly it is defended with thick and ſtrong muſcles, and at the ſame time reflect how very weak and brittle the neck of the *thigh-bone* is, in compariſon of any other part thereof; and from all theſe conſiderations, how vaſtly more eaſy it muſt be for the ſame force to break the bone off juſt under its head, than to diſplace it out of its ſocket. And indeed, when luxations of the *thigh-bone* do happen, it is much more frequently from internal than from external cauſes. For phyſicians have obſerved that the ligaments of the *thigh-bone*, though naturally of extreme ſtrength, may be, by various cauſes, and particularly by a flux of humours, ſo relaxed and weakened as to let the head of that bone ſlip ſpontaneouſly out of its acetabulum or ſocket; ſo that the *thigh*, though not eaſily luxated by external violence, may eaſily happen to be ſo without any external violence, and while the patient lies in his bed. This is an accident, however, that happens much more rarely to adults than to infants.

Whenever the head of the *thigh bone* is thruſt out, it is almoſt always wholly diſplaced; ſo as to make a perfect luxation; the exact roundneſs of this head, with the great ſtrength of the circumjacent muſcles, and the narrowneſs of the ſides of the acetabulum, will not admit the bone to be partially diſlocated or thruſt out of its place a little way only; for as ſoon as the head of the bone is thruſt up to the edge of the acetabulum, it muſt unavoidably either turn quite out, or fall back again into its right place.

The *thigh* is found to be capable of luxation four ways, upward and downward, and backward and forward; but it is moſt frequently diſlocated downward and inward, toward the large foramen in the os pubis. For, beſides that the cartilaginous defence, on the lower part of the acetabulum, is not ſo high as the reſt, the ligamentum rotundum is ever found to give way more readily in that part than any other; and laſtly, the adjacent muſcles are found to be weakeſt in their reſiſtance on this part.—And there is, beſides all theſe, a certain eminence in this edge of the acetabulum, which prevents the head of the bone from falling back again eaſily into its right place, when once it is got this way out of it. But if the head of this bone be diſplaced outwards, it generally ſlips upwards at the ſame time, it being ſcarce poſſible but that the very ſtrong muſcles of the *thigh* muſt then draw the bone upwards; and there is no eminence in this edge of the acetabulum to reſiſt the head of the bone in that paſſage.

When the *thigh* is diſlocated forwards and downwards, which is what uſually happens, the leg hangs ſtradling outward, and is longer than the other; the knee and foot alſo both turn outwards, and the head of the bone itſelf will be felt near the lower part of the inguen and os pubis. Sometimes there is a ſuppreſſion of urine in this caſe, which is occaſioned by ſome nerve which communicates with the bladder being violently compreſſed; in the buttock there alſo may be perceived a cavity from the trochanter major, and the reſt of the bones being diſplaced; and if the *thigh-bone* be not timely reduced into its acetabulum, the whole limb withers ſoon afterwards. The patient, for this reaſon, can bear little or no ſtreſs upon that limb, but muſt always incline and throw the weight of his body upon the other; when he moves forward, he muſt move that limb in form of a ſemicircle, and ſupport his body by crutches under the arms; though there are not wanting particular caſes, where the head of the luxated *thigh-bone* has grown ſo firmly to the adjacent parts, without the acetabulum, as to become in proceſs of time, ſo ſtrong as to ſupport the body without crutches, though the perſon could not, in any of the caſes that have been known of this kind, walk without halting.

If the *thigh-bone* be diſplaced backward, it is uſually drawn upward alſo, as before obſerved, at the ſame time; hence there will be perceived, in this caſe, a cavity behind the inguen, and a tumor upon the buttock; becauſe the head, and trochanter of this bone, will be placed there. The tumor on the buttock being thruſt upward, the limb will become ſhorter than the other, and the foot will be inclined to turn inwards. The heel will not touch the ground, but the perſon ſeem to ſtand upon his toes; and laſtly, the luxated limb will be much more eaſily bent than extended.

It is extremely rare that the *thigh* is luxated forward or backward, without being alſo drawn upward or downward; but if it ſhould ſo happen, it will yet evidently be diſcovered by the rules before given, and by conſidering the nature of the articulation of the bone. As it is, however, at beſt very difficult to diſcover when the *thigh-bone* is diſlocated, and when it is fractured, either by feeling or inſpecting, becauſe of the great thickneſs of the muſcles and integuments, it is therefore a matter of ſome conſequence to propoſe the ſigns by which one of theſe caſes may be known from the other. There is reaſon to judge the *thigh-bone* to be luxated, when we find the ligaments of the bone have been relaxed by ſome preceding congeſtion of humours, when no external violence has been exerted upon it, when neither violent pain, tumors, nor inflammation follow, and laſtly, when the whole limb may be bent, and turned about at the acetabulum, without the ſurgeon's diſcovering any grating or cruſhing of the bones; and the contrary of theſe ſigns, which are what uſually take place in what have been uſed to be called luxations of this bone, are very ſtrong indications of a fracture.

When the bone is found to be really diſlocated, it is to be reduced in a method agreeable to the nature and direction of the diſlocation. When it is diſplaced forward and downward, the patient is to be laid flat upon his back on a table; then a linen napkin, or ſtrong ſling, is to be made faſt over the groin, about the part affected, ſo that one end of the ſling may come over the belly, and the other over the nates and back, to be both tied together in a knot upon the ſpine of the os ilium, and afterwards either faſtened to a hook fixed in ſome poſt, or held firm by ſome aſſiſtance: in like manner at the bottom of the *thigh* a little above the knee, there muſt be faſtened another napkin or ſling, or elſe the girt of Hildanus, with a compreſs between it and the *thigh*; both theſe ſlings being drawn tight, the *thigh* is to be extended, not vehemently; but only ſo much as is ſufficient to draw the bone out of its ſinus, that it may be replaced into its acetabulum by the ſurgeon's hands; to this purpoſe the ſurgeon is, with one hand, to preſs the head of the *thigh-bone* outward, while the other conducts the knee inward. Or, the reduction may be made by napkins faſtened about the *thigh* near its extremities, in the manner of ſlings, and the limb extended that way, the knee being at the ſame time preſſed inward by the hands.

If theſe methods are not ſufficient, it will be neceſſary to have recourſe to the polyſpaſton or pulley, well known to the ſurgeons on theſe occaſions. If the *thigh-bone* is found to be luxated backward, the patient is to be placed flat on a table, with his face downward; the *thigh* is to be extended more ſtrongly than in the former caſe, and the reduction is then to be performed by the ſurgeon's hand, an aſſiſtant all the while extending the limb, and turning it inwards; and by this method the head of the *thigh-bone* generally ſlips very readily from this ſort of diſlocation into its proper place. The limb is then to be ſecured with proper bandages, and the patient to be kept to his bed for three or four weeks. Heiſter, Surg. vol. i. p. 183, &c.

Saltzmannus relates an inſtance of a luxation of the *thigh-bone*, without any fracture of its neck, and confirms what Ruyſch had obſerved of the epiphyſis of the os femoris, being as it were annihilated, or at leaſt changed ſo, as it could not be obſerved, when ſought after in one who had it broken.

Thigh, in the *Manege*. The effect of the horſeman's *thigh* is one of the aids that ſerves to make a horſe work vigorouſly. See **Aid**.

Fore-thigh, or *arm* of a horſe, is that part of the fore-leg that runs between the ſhoulder and the knee: though the *fore-thigh* does not bend or bow, yet we commonly ſay, a horſe goes fine, that bends well the *fore-thigh*, importing thereby, that he bends well his leg.

THILL, the beam or draught-tree of a cart or waggon, upon which the yoke hangs.

THILLER, or **THILL**-*horſe*, the horſe immediately yoked to the *thill*.

THILYPTERIS, in *Botany*, a term uſed by Dillenius to expreſs the common female fern or brakes.

THIMBLE, a cover for the finger, made of braſs, ſteel or ſilver, and uſed by all people who ſew, as taylors, milliners, &c.

THIMBLE, in the *Sea-language*, a ſort of iron ring, the outſide of which is conſiderably hollowed to receive ropes. *Thimbles* are fixed as loops, to prevent the tackle-hook from galling the rope.

THIMHIO, in the *Materia Medica*, a name uſed by ſome authors for a peculiar ſort of lignum-aloes, which is blackiſh and very heavy, and extremely ſweet.

THIN, in the *Materia Medica*, a name given by the Arabian writers to earth of any kind.

Thus the bole Armenic of Galen is called by Avicenna *thin Armeni*; and hence the word *muthin*, an adjective ſignifying earthly, or approaching to the nature of earth; a term applied to many medicines of this kind.

THINA, in *Botany*, a name by which ſome authors have called the larix or larch-tree.

THINKING, *cogitation*, a general name for any act or operation of the mind.

Chauvin, with the Carteſians, will have *thinking* to conſiſt in a certain native, inherent motion or agitation of the human mind, whereof itſelf is conſcious.—*Native* and *inherent*, ſince he conceives it no other than the very eſſence of the mind itſelf, or, at leaſt, its principal and fundamental property: an *agitation*, ſince there is a new modification or change made in the mind, which we ſcarce know how to conceive without motion; add, that the origin and etymology of the word *cogitation*, according to Varro and Feſtus, implies as much; *cogito* being uſed for *coagito*.

When the mind turns its view inwards, upon itſelf, the firſt idea that offers, ſays Mr. Locke, is *thinking*; wherein it obſerves a great variety of modifications, and thereof frames to itſelf diſtinct ideas: thus the perception annexed to any impreſſion on the body, made by an external object, is called *ſenſation*.

When an idea recurs without the preſence of the object, it is called *remembrance*.

When ſought after by the mind, and brought again in view, it is called *recollection*.

When held there long under attentive conſideration, it is called *contemplation*.

When ideas float in the mind without regard or reflection, it is called a *revery*; when they are taken expreſs notice of, and, as it were, regiſtered in the memory, it is *attention*; and when the mind fixes its view on any one idea, and conſiders it on all ſides, it is *ſtudy* and *attention*.

Theſe are the moſt obvious modes of *thinking*; but there are ſeveral others which we know of; and, doubtleſs, the mind is capable of infinite others, whereof we have no notion at all.

The ſchool-philoſophers uſually divide *thinking*, with regard to the objects it is employed about, into underſtanding, *intellectio*; and willing, *volitio*.

And hence, thoſe are ſaid to be the two powers or faculties of the human mind.

Intellectual *thinking* is farther ſubdivided into divers kinds: the firſt, when the mind merely apprehends or takes notice of a thing, called *perception*; the ſecond, when it affirms or denies a thing, called *judgment*; the third, when it gathers or infers a thing from others given, called *reaſoning*; the fourth, when the mind diſpoſes its own thought or ideas in order, called *method*.

Volitive *thinking*, or volition, admits of infinite different modifications, or new determinations.

Some authors extend the idea of *thinking* farther; and conſider it in God, angels, brutes, &c. whence a new diviſion of *thinking*, into divine, angelical, human, and animal or ſenſitive.

But the two firſt we know little or nothing of: the third is that we have already been treating of.—As to the laſt, viz. animal or ſenſitive thought, it is defined to be, an action of the ſoul attending to an external object, affected by means of the animal ſpirits duly agitated in the brain, to excite an idea.

The Carteſians maintain, that *thinking* is eſſential to the human ſoul; and, conſequently, that there is no time when the ſoul does not *think*: but this doctrine has been very vigorouſly attacked by Mr. Locke; who labours to ſhew, that in ſleep, without dreaming, there is an entire ceſſation of the modes of *thinking*.

I think, *cogito*, according to Des Cartes, is the firſt, and moſt certain, of all truths; from which, alone, we draw this conſequence, *therefore I am*, or exiſt, *ſum*.—One might alſo ſay, *cogito, ergo Deus eſt*; *I think, therefore there is a God*.—Logic is defined, the art of *thinking* methodically.

THIR, in *Chronology*, the name of the fifth month of the Ethiopians, which correſponds, according to Ludolf, to the month of January.

THIRD, *tertius*. See NUMBER and NUMERATION.

THIRD, in *Muſic*, a concord reſulting from a mixture of two ſounds containing an interval of two degrees.

It is called *third*, as containing three terms, or ſounds, between the extremes.

The *third*, in Italian *terza*, in French *tierce*, in Latin *tertia*, has no general name in the Greek: it is the firſt of the imperfect concords, i. e. of ſuch as admit of majority and minority, without ceaſing to be concords. And hence it is, that it is diſtinguiſhed into two kinds.

The firſt, which the Italians call *ditono* (from the Greek *ditonos*), or *terza maggiore*, and we the *greater third*, is compoſed diatonically of three terms, or ſounds, containing two degrees, or intervals; one whereof, in the ancient ſyſtem, is a greater tone, and the other a leſſer tone; but in the modern temperate ſyſtem they are both equal; as *ut*, *re*, *mi*, or *ut*, *mi*.

Chromatically it is compoſed of four ſemitones; two whereof are greater, and the third leſs; it takes its form from the ratio ſeſquiquarta, 4 : 5.

The logarithm, or meaſure of the octave $\frac{2}{1}$ being 1.000000, the meaſure of the greater *third* $\frac{5}{4}$ will be, 0.321928. See INTERVAL.

The *third major* is by practitioners often taken for the *third* part of an octave; but this is a great error, ſince three greater *thirds* fall ſhort of the octave by a DIESIS: for $\frac{5}{4}\times\frac{5}{4}\times\frac{5}{4}\times\frac{128}{125}=\frac{2}{1}$; or by logarithms 3×0.321928 + log. dieſis $= 0.965784 + 0.034215 = 0.999999$ or 1.000000, the logarithm of the octave.

The ſecond *third*, which the Italians call *trihemituono*, or *ſemi-ditono*, *terza minore*, and we the *leſſer third*, is compoſed, like the former, of three ſounds or terms, and two degrees or intervals; but theſe degrees, diatonically, are only a greater tone and a ſemitone.

Chromatically it is compoſed of three tones, two greater and one leſs; as *re*, *mi*, *fa*, or *re*, *fa*.

It takes its form from the ratio ſeſquinquinta, 5 : 6.

The logarithm or meaſure of the octave $\frac{2}{1}$ being 1.000000, the meaſure of the *third minor* $\frac{6}{5}$ will be 0.263034. Hence it appears that four leſſer *thirds* exceed the octave. But practical muſicians are apt to ſuppoſe them equal to the octave, as they are apt to confound three greater *thirds* with that interval. Four leſſer *thirds* exceed the octave by a dieſis and a comma; as is eaſily proved by logarithms. See INTERVAL.

Both theſe *thirds* are of admirable uſe in melody; and make, as it were, the foundation and life of harmony.

They are uſed agreeably both aſcending and deſcending; and that either running over all the degrees, as *ut*, *re*, *mi*, or *re*, *mi*, *fa*; or ſkipping the middle degree, as *ut*, *mi*, or *re*, *fa*.

But it is to be obſerved, that the *greater third* has ſomewhat gay and ſprightly in riſing, and ſomewhat heavy and melancholic in falling: the *leſſer third*, on the contrary, has ſomewhat ſoft and tender in riſing, and ſomewhat briſk in falling. For the uſe of the *greater* or *leſſer third* in the ſeries of the ſcale, ſee SCALE.

There are two other kinds of *thirds* that are diſſonant, and vicious; the firſt only compoſed of two greater ſemitones, and, by conſequence, of a ſemitone leſs than the *leſſer third*: this they call the *defective third*. See DIMINISHED *third*.

The ſecond, on the contrary, has a ſemitone more than the *greater third*; and this they call the *redundant third*. See SUPERFLUOUS *third*.

The *defective third* is very frequent in Italian ſongs, eſpecially thoſe compoſed for inſtruments; but is not to be uſed without neceſſity, and a great deal of diſcretion.

The *redundant third* is abſolutely forbidden.

THIRD *borough*, in our *Ancient Law-Books*, denotes a CONSTABLE.

THIRD *earing*, in *Huſbandry*, the tilling or plowing of the ground a *third* time.

THIRD *eſtate*. See ESTATE, COMMONS, &c.

THIRD *night-awn-hynd*. By the laws of Edward the Confeſſor, a gueſt, who had lain three nights in an inn, was reputed a domeſtic, and his hoſt was anſwerable for what offence he ſhould commit.

For one night he was accounted *uncuth*, for two nights *gueſt*, and the *third*, *awn-hynd*, or *hogen-hine*. *Prima nocte incognitus, ſecunda hoſpes, tertia domeſticus cenſetur.*

THIRD, *order*, a ſort of religious order, that obſerves the ſame rule, and the ſame manner of life, in proportion as ſome other two orders inſtituted before.

The *third orders* are not originally religious orders, but aſſociations of ſecular, and even married perſons, who conform, as far as their condition will allow them, to the deſign, intention, and rules, of a religious order, which aſſociates and directs them.

The Præmonſtrantes, Carmelites, Auguſtines, and Franciſcans, diſpute, among themſelves, the honour of having firſt introduced *third orders*; but the pretenſions of the laſt appear to be the beſt founded.

The firſt contend, that the THIRD *order* of Præmonſtrantes began in the life-time of their founder St. Norbert, who died in 1134.

F. Diego de Coria Maldonado, a Spaniſh Carmelite, who has a particular treatiſe on the *third order* of Carmelites, derives them immediately, as well as the Carmelites themſelves, from the prophet Elijah.

The THIRD *order* of Auguſtines, if we credit F. Bruno, was inſtituted by St. Auguſtine himſelf; but the arguments he produces are ſo frivolous, that F. Helyot obſerves, they are not worth the refuting.

The THIRD *order* of Franciſcans was inſtituted by St. Francis, in 1221, in favour of people of both ſexes; who being ſmitten with the preachings of that ſaint, demanded of him an eaſy manner of living a Chriſtian life; upon which he gave them a rule, the conſtitutions whereof are not now extant, as written by himſelf, but only as reduced and confirmed by pope Nicholas IV. ſixty-eight years afterwards.

The firſt order of this ſaint are the monks called *Minor Friers*, comprehending the Cordeliers, Capuchins, and Recollects; the ſecond comprehends the nuns of St. Clare; and the third, ſeveral perſons of both ſexes, who live at liberty; and theſe are what we call the *third order*. See FRANCISCANS, &c.

Of this order, which was only eſtabliſhed for ſecular perſons, ſeveral of both ſexes, to attain the greater perfection, have afterwards commenced religious, and formed various congregations, under various names; as *Religious Penitents of the third order*, &c.

THIRD *point*, or TIERCE-*point*, in *Architecture*, the point of ſection in the vertex of an equilateral triangle.

Arches or vaults of the *third point*, called by the Italians *diterzo acuto*, are thoſe conſiſting of two arches of a circle. meeting in an angle at top. See ARCH.

THIRD *point*, in *Perſpective*. See POINT.

THIRD *rate*. See RATE.

THIRD *ſubſidy duty*. See DUTY.

THIRD *ſounds*, in *Muſic*. See *Third* SOUNDS.

THIRD *year*, *tithe of the*. See TITHE.

THIRDENDALE, a liquid meaſure uſed at Saliſbury, containing three pints.

THIRDINGS, the third year of the corn or grain growing on the ground at the tenant's death, due to the lord for an HERIOT, within the manor of Turfat, in Herefordſhire.

THIRST, a painful ſenſation, occaſioned by a vellication of the nerves of the throat or fauces, and producing a deſire of drinking.

Rohault accounts for *thirſt* thus: the liquor of the ſtomach, which ordinarily reſolves into a thick vapour, and aſcends from the ſtomach up into the throat, to moiſten it, being too much warmed and agitated either from a want of ſome other liquor to temper and dilute it, or from any other cauſe, becoming converted into too thin, ſubtile, and penetrating a vapour, is ſo far from moiſtening and cooling the throat, that, on the contrary, it dries and heats it: and hence that motion in the nerves, the ſenſation whereof we call *thirſt*.

Thirſt ſometimes alſo ariſes from a mere drineſs of the part, and ſometimes from ſharp ſalts more immediately vellicating the fibres of the throat.

There are various kind of liquors which quench *thirſt*: ſome by tempering the ſtomach-liquor; other by diluting, and even diſſolving the ſalt; and others by moiſtening and ſuppling the fibres. Acids are particularly fitted for this end.

It is ſaid, that thoſe who travel through the ſcorching deſarts of Arabia, Perſia, &c. find that brandy, and the ſtrongeſt wines, quench their *thirſt* beſt.

We find warm drugs, as liquorice, ſometimes effectual in allaying *thirſt*: nay pepper will, in ſome caſes, have a like effect, by cauſing a more plentiful flow of the ſaliva.

Thirſt may be ſometimes eluded, by rolling a clean bullet, or a pebble in the mouth, which occaſions an extraordinary iſſue of ſaliva to moiſten the throat, &c.

Mr. Boyle mentions a man who could eaſily abſtain from drinking for nine days, and yet have his diet nothing more liquid than uſual; the ſecretions of urine, ſweat, &c. being performed all the while regularly, and in the ſame quantity as uſual.

In dropſical caſes, where there is not a right ſecretion of the urine by the renal glands, and the veſſels and parts of the body are loaded with too great a quantity of ſerous humours, a great moderation in drinking might be attended with good ſucceſs, provided ſome liquor could be found out to allay that uneaſy ſenſation. Probably this would be beſt performed by mucilages acidulated with ſpirit of vitriol or ſulphur, or jellies with juice of lemon, &c. and that a ſmall quantity of ſuch a compoſition, now and-then uſed, might be of as much real ſervice, in quenching *thirſt*, as draughts of liquors, which increaſe the ſymptoms.

In feveriſh diſorders, the patient is frequently tormented with a violent *thirſt*, which is moderated by acidulating the barley-water, or ſage-tea, with ſpirit of vitriol, or with lemon-juice; but by nothing ſo much, as allowing the patient ſome ſlices of an orange. Pringle, Obſerv. on Diſeaſes of the Army, p. 135.

THISMA, a name uſed by ſome for any ſubterranean vein, or bed of a mineral.

THISTLE, *carduus*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: it has a compound flower made up of many hermaphrodite florets, which are fruitful, and are included in one common ſcaly empalement; the florets are funnel-ſhaped and of one leaf, and have each five ſhort hairy ſtamina; in the centre is ſituated an oval germen crowned with down, which becomes an oblong four-cornered ſeed, crowned with down, and encloſed by the empalement; there are a great number of ſpecies, ſome of which are troubleſome weeds, both to gardens and field. Miller.

Linnæus ennmerates twenty-ſeven ſpecies.

THISTLE, *bleſſed*, *carduus benedictus*, *vel cnicus*, in *Botany*. See CNICUS.

Miller reckons four and Linnæus eight ſpecies.

The *bleſſed thiſtle*, which is the hairy wild *cnicus* of Miller, and the *centaurea benedicta* of Linnæus, is chiefly uſed in INFUSION, as a gentle emetic, in fevers and certain nauſeas.

Dr. Lewis has often obſerved excellent effects from a light infuſion of carduus, in weakneſs of appetite and indigeſtion, where the ſtomach was injured by irregularities or oppreſſed by viſcid phlegm; nor has he found any one medicine of the bitter kind to ſit ſo eaſily on weak ſtomachs, or to heat ſo little. Theſe infuſions, taken freely, promote the natural ſecretion. Drank warm in bed, they commonly increaſe perſpiration or excite ſweat; and as they act with great mildneſs, not heating or irritating conſiderably, they have been uſed, in this intention, in acute as well as chronical caſes. The ſeeds, which, as well as the leaves, have a conſiderably better taſte, have ſomerimes been uſed as ſudorifics or diaphoretics, in the form of an emulſion. Cold water poured on the leaves, extracts, in an hour or two, a light grateful bitterneſs; by ſtanding long upon the plant, the liquor becomes diſagreeable: a ſtrong decoction is very nauſeous and offenſive to the ſtomach. The extracts, obtained by inſpiſſating both the cold infuſion and decoction, have the ſame differences as the liquors themſelves. Rectified ſpirit extracts, in a ſhort time, the light bitter part of this plant, but does not take up the nauſeous near ſo eaſily as water. On keeping the watery extracts for ſome months, a conſiderable quantity of ſaline matter was formed on the ſurface, in ſmall cryſtals, reſembling in ſhape thoſe of nitre, in the taſte bitteriſh, with an impreſſion of coolneſs. Lewis's Mat. Med.

Some diſtil a water from it, which they uſe in cordial and ſudorific potions.

THISTLE, *carline*, *carlina*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: it hath a compound flower, made up of many hermaphrodite florets, which are fruitful, included in a common ſwollen ſcaly empalement; the florets are funnel-ſhaped, cut into five parts at the brim, and have each five ſhort hairy ſtamina; in the centre is ſituated a ſhort germen crown with down, which becomes a ſingle taper ſeed, crowned with a branching plumoſe down. Miller enumerates five, and Linnæus ſeven ſpecies.

The root of the *carlina acaulis* of Linnæus, is ſuppoſed to be diaphoretic, antihyſteric, and anthelmintic. It has been greatly eſteemed by ſome foreign phyſicians, in acute malignant as well as in chronical diſeaſes, and given in ſubſtance from a ſcruple to a dram, and in infuſion from one to two drams and more. It is rarely to be met with in our ſhops. See CARLINÆ *radix*.

THISLTE, *diſtaff*, *atractylis*, a genus of the *polygamia ſyngeneſia æqualis* claſs. Its characters are theſe: it hath a radiated compound flower, compoſed of many hermaphrodite florets, which are included in a common ſcaly empalement having no ſpines; the hermaphrodite florets compoſe the rays or border, and are ſtretched out on one ſide like a tongue; thoſe which compoſe the diſc are funnel-ſhaped, and in them is a ſhort crowned germen, which becomes a turbinated compreſſed ſeed, crowned with a plume of down ſhut up in the empalement. Linnæus enumerates three, and Miller four ſpecies.

The roots of the *atractylis gummifera* of Linnæus, or pine-*thiſtle*, which is a native of Italy and the iſland of Candy, yield, if wounded when freſh, a viſcous milky juice, which concretes into tenacious maſſes, at firſt whitiſh and reſembling wax, but when much handled growing black; ſuppoſed to be the *ixion*, and *acanthina maſtiche* of the ancients. The juice is ſaid to have been formerly chewed for the ſame purpoſes as maſtich, and the root itſelf of the ſame virtue with that of the *carline thiſtle*. Lewis.

THISTLE, *fiſh*, a ſpecies of *carduus* or THISTLE.

THISTLE, *fuller's*, *dipſacus*, in *Botany*. See TEASEL.

THISTLE, *gentle*, a ſpecies of *carduus*.

THISTE, *globe*, *echinops*, in *Botany*, a genus of the *ſyngeneſia polygamia ſegregata* claſs. Its characters are theſe: it has a permanent perianthium, oblong, angular, and imbricated; the flower has one funnel-ſhaped petal, included in an imbricated empalement, divided at thetop into five parts; and has five ſhort hairy ſtamina terminated by cylindrical ſummits; in the bottom of the tube is ſituated an oblong germen, which becomes an oval oblong ſeed, narrowed at the baſe, but obtuſe and hairy at the top. There are four ſpecies.

THISTLE, *golden*, *ſcolymus*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: it hath a flower compoſed of many hermaphrodite florets, included in an oval imbricated empalement, with many looſe ſharp-pointed ſcales; the florets are tongue-ſhaped of one petal, torn, and ſlightly indented in five parts; they have five ſhort hair-like ſtamina, terminated by tubulous ſummits; the germen is ſituated under the floret, ſupporting a ſlender ſtyle longer than the ſtamina, crowned with two reflexed ſtigmas; the germen afterward becomes a ſingle ſeed, which is oblong and triangular, and ripens in the empalement, the ſeeds being ſeparated by plain, roundiſh, indented chaff. There are two ſpecies which grow in the ſouthern parts of Europe.

THISTLE, *hedge-hog*, a ſpecies of *cactus*, or *melon*-THISTLE.

THISTLE, *ladies*, or *milk*, a ſpecies of *carduus*. See THISTLE.

THISTLE, *melon*, *cactus*, in *Botany*, a genus of the *icoſandria monogynia* claſs. Its characters are theſe: the empalement of the flower is of one leaf, tubulous, and cut into ſix parts; the flower is compoſed of ſix petals, which reſt upon the embryo; and it has ſix long ſlender ſtamina, terminated by erect ſummits; the oval germen, which is ſituated below the petals, ſupports a cylindrical ſtyle, and becomes a pyramidal fleſhy fruit with one cell, filled with ſmall angular ſeeds, ſurrounded with pulp. Miller enumerates ſix, and Linnæus twenty-four ſpecies.

The *melon thiſtles* commonly grow upon the ſteep ſides of rocks in the warmeſt parts of America, where they have little or no earth to ſupport them; their roots ſhoot down into the fiſſures to a conſiderable depth, ſo that it is troubleſome to get the plants up, eſpecially as it is ſo very dangerous to handle them on account of their thorns.

The larger kinds of theſe plants are of a peculiar ſtructure; the fruit appears like a large fleſhy green melon, with deep ribs, ſet all over with ſtrong ſharp thorns; and when cut through the middle, their inſide is a ſoft pale green fleſhy ſubſtance, very full of moiſture; they are frequently eaten, and the taſte being an agreeable acid, renders them very grateful in a hot country. In times of drought the cattle are ſaid to repair to the barren rocks which are covered with theſe plants, and after having ripped them up with their horns, ſo as to tear off the thorns and outſide ſkin, they greedily devour all the fleſhy pulp, which affords them both meat and drink.

All the plants of this ſort require a very good ſtove to preſerve them through the winter in England; nor ſhould they be expoſed to the open air in ſummer. If they are plunged into a hot-bed of tanner's bark in ſummer, it will greatly forward their growth; but, in this caſe, there ſhould be ſcarce any water given to the plants. The beſt method to preſerve all the large kinds in winter, is to place the pots, either upon the top of the flues, or very near them, that they may have the warmeſt place of the ſtove, and never to water them; and when they are removed at the proper ſeaſon into a bed of tanners bark, they will grow and recover their verdure. The ſoil in which they are planted ſhould be of a ſandy nature, and if mixed with dry lime rubbiſh, it will be ſtill better. Stones placed in the bottoms of the pots will ſerve to drain off any moiſture. The great ſorts may be propagated by ſeeds; but as the plants which are raiſed from ſeeds in England, are ſome years arriving at any conſiderable ſize, it is the beſt way to procure ſome plants from the Weſt Indies. Miller.

For the ſpecies of cactus, referred by ſome writers to the diſtinct genus of *cereus*, ſee TORCH-*thiſtle*.

THISTLE, *ſow*, *ſonchus*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. The characters of which are, that the receptacle is naked, the calyx imbricated and ventricoſe, and the down hairy. Linnæus enumerates nine ſpecies.

There are many of them weeds in England, ſo are not planted in gardens; for if their ſeeds are once permitted to ſcatter, they will ſoon ſtock it with plants; for this reaſon they ſhould always be extirpated, the ſeeds being furniſhed with a down, and thereby waſted to a conſiderable diſtance.

Sow-thiſtle, is alſo the name of a ſpecies of *prenanthes*. See *Wild* LETTUCE.

THISTLE, *downy ſow*. See ANDRYALA.

THISTLE, *ſtar*, in *Botany*. See CENTAURY.

THISTLE, *torch*, in *Botany*, a ſpecies of *cactus*. See *Melon* THISTLE and TORCH-*thiſtle*.

THISTLE, *woolly*, in *Botany*. See ONOPORDUM.

THISTLE-*fly*, in *Natural Hiſtory*, a ſmall fly produced from a fly-worm, hatching in the protuberances of the carduus hæmorrhoidalis. In the protuberances of this *thiſtle*, while they are cloſed in all parts, the worm of this fly, from whoſe injuring it, at the time of depoſiting the egg from which it was hatched, the protuberances aroſe, undergoes its laſt tranformation. It here makes of its own ſkin a ſhell, in form of an egg, within which it puts on the nymph ſtate. When this nymph becomes a living fly, the leaſt part of its difficulty is the finding its way out of this ſhell; it has a ſtronger priſon than that, and before it can obtain its liberty, muſt force its way through the much more cloſely compacted fibres of the protuberance of the vegetable. It has, however, no other means of doing this difficult work, but that of inflating its head, and throwing out the bladder or muzzle with which all theſe creatures are provided in this ſtate. See MUSEAU and THISTLE-*galls*.

This is a difficult operation, and many of the creatures periſh in the attempt, but what much forwards the ſucceſs of it, in many caſes is, that the ſtalk of the *thiſtle* often becomes naturally half rotten before the time of the fly's egreſs. Reaumur, Hiſt. Inſ. vol. iv. p. 338.

THISTLE-*galls*, a name given by the more accurate authors to the protuberances on the ſtalk of a ſpecies of *thiſtle*, called by authors, *carduus hæmorrhoidalis*, from theſe tubercles, which are ſuppoſed to reſemble thoſe of the hæmorrhoidal veins, in perſons ſubject to the piles. Theſe have been ſuppoſed a natural production of the plant; but they are far otherwiſe. The whole hiſtory of them is, that a certain ſpecies of fly, always depoſits its eggs on the ſtalks; and the young ones, when hatched, gnaw their way into the ſubſtance of the ſtalks, and the copious derivation of the juice, occaſioned by their ſucking, produces the tubercles which are found on it. See *Tab. of Inſects*, N° 28.

Theſe tubercles are of a roundiſh or oblong figure, and are of various ſizes, from that of a pea to the bigneſs of a nutmeg; they are much harder than the reſt of the ſtalk, approaching to a woody ſtructure; when cut open, they are found to contain each ſeveral oblong and narrow cells; theſe have no communication with one another, and are each inhabited by a ſmall white worm, which has two hooks at the head; with theſe it breaks the fibres of the plant, in order to get at its juices. When it has arrived at the time of its change into the nymph-ſtate, it ceaſes to eat, and drawing up its body much ſhorter than uſual, its ſkin hardens, and form a ſhell, under which it changes into a very beautiful two-winged fly; the wings are whitiſh and tranſparent in the middle; and at the edges ſurrounded with black in the form of a chain of figures like the letter Z; the body and breaſt of this fly are of a beautiful black, with ſome ſlight variations of yellow, with which the ſhoulders are ſtreaked; the anterior part of the head is white, and its back-part edged with a yellow down; the antennæ are reddiſh, and the legs are partly black, and partly of a fine clear brown.

In obſerving the changes of the worms of theſe galls, there are often obſerved ſome which go through them in a different manner from the reſt, and finally produce a very different ſpecies of fly. Theſe are the progeny of the eggs of ſome other ſpecies of fly, whoſe worm being carnivorous, is lodged by the art of its parents, while it is yet in the egg-ſtate, in the ſubſtance of this gall, there to prey upon the defenceleſs inhabitants.

There are many ſpecies of galls the inhabitants of which are expoſed to enemies. In thoſe it is common to find the proper inhabitant and the devourer in the ſame cell; the one feeding on the juices of the plant, the other on its juices; but this is not the caſe here, theſe worms immediately deſtroying the proper inhabitants, and being found always alone in their cells. Reaumur, Hiſt. Inſ. vol. vi. p. 221.

Thistle, *order of the*, or of St. Andrew, is a military order in Scotland; inſtituted, as ſome ſay, by Hungus, or Hungo, king of the Picts, after a victory obtained over Athelſtan.

The legend is, that a croſs of St. Andrew (the patron of that kingdom) appearing to him at the time of the engagement, he bleſſed the happy augury, took the figure thereof into his ſtandard in honour of his protector, and inſtituted an order of knights whoſe collar is of gold interwoven with *thiſtle*-flowers and ſprigs of rue.

From the collar hangs a medal, on which is the image of St. Andrew with his croſs on his breaſt, with this motto, *Nemo me impune laceſſet, No body ſhall provoke me unpuniſhed.*

Others give a different account of its origin, and aſſure us, it was inſtituted after the concluſion of a peace between Charles VII. of France, and the then king of Scotland

The abbot Juſtiniani goes up higher, and will have it to have been inſtituted by Achaius I. king of Scotland, in 809, who, after an alliance made with Charlemagne, took for his device the *thiſtle*, with the words *Nemo me impune laceſſet*, which, in effect, is that of the order. He adds, that king James IV. renewed the order, and took St. Andrew for its protector.

The order only conſiſts of twelve knights, beſides the king, who is the chief, or ſovereign. Their ordinary badge is a green ribband, to which hangs a *thiſtle* of gold, in which is the aforeſaid motto.

Thistle, *our Lady of the*, was alſo a military order, inſtituted in 1370, by Louis II. duke of Bourbon. It conſiſted of twenty-ſix knights, whereof that prince and his ſucceſſors were the chiefs. Their badge was a ſky-blue girdle; and, on ſolemn occaſions, a mantle of the ſame colour, with a gold collar, interwoven with flower-deluces; among which was the word *eſperance, hope*, in capitals.

THISTLE-*take*, a cuſtom in the hundred of Halton, in the county of Cheſter, whereby, if in driving beaſts over the common, the driver permits them to graze, or take but a *thiſtle*, he ſhall pay a halfpenny a beaſt to the lord of the fee.

At Fiſkerton, in Nottinghamſhire, by ancient cuſtom, if a native, or cottager, killed a ſwine above a year old, he paid the lord one penny, which was alſo called *thiſtle-take*.

THLASIAS, a term uſed by the ancients to expreſs an eunuch made by a compreſſion or contuſion of the teſticles, not by the cutting them out.

THLASIS, a word uſed by the ancients to expreſs either a contuſion without a wound, or a wound made by ſome blunt inſtrument, which contuſed the parts.

THLASMA, a word ſometimes uſed like *thlaſis*, to expreſs a contuſion either with or without a wound; ſometimes applied particularly to a receſs of the cranium inward without a fracture, an accident principally affecting children.

THLASPEOS *ſemen*, in the *Materia Medica*, the name of a ſeed produced by the common *thlaſpi arvenſe ſiliquis latis*, or common treacle-muſtard. It is an ingredient in ſeveral of our ſhop compoſitions, and is eſteemed attenuating, deterſive, and aperient, and is ſaid to promote urine and the menſes, and to expel the after-birth.

THLASPI, *treacle-muſtard*, in *Botany*. See TREACLE-*muſtard*.

THLASPIDUM, in *Botany*. See *Buckler*-MUSTARD.

THLIBIÆ, in *Antiquity*, a kind of eunuchs. See THLASIAS and CASTRATION.

THLIPSIS, θλιπσις, is uſed, by anatomiſts, for the compreſſion of any veſſel, or aperture, whereby its cavity is leſſened.

THNETOPSYCHITES, compoſed of θνητος, *mortal*, and ψυχη, *ſoul*; a ſect, in the ancient church, who believed the ſoul of man perfectly like that of brutes; and taught that it died with the body. See SOUL.

We meet with no account of theſe heretics any-where but in J. Damaſcenus Hæreſ. 90. unleſs they be the ſame with thoſe Euſebius ſpeaks of, Hiſt. Eccleſ. lib. ix. c. 38. who relates, that, in Origen's time, there were heretics in Arabia, who taught, that the ſoul of man died with the body; but that it ſhould riſe again with it at the end of the world. He adds, that Origen refuted them in a numerous council, and reclaimed them from their errors. St. Auguſtine and Iſidore call them the Arabian heretics.

Marſhal, in his tables, uſes the word *Thenopſychites* inſtead of *Thnetopſychites*.

THOCOS, θωκος, in *Antiquity*, the ſame with THACAS.

THOKES, in *our old Writers*, fiſh with broken bellies, forbid by ſtatute to be mixed or packed with *tale-fiſh*. 22 Ed. IV. cap. 2.

THOLES, in *Sea Language*, denote ſmall pins driven perpendicularly into the upper edge of a boat. In rowing, the oar paſſes between the two *tholes*, in the ſpace called the ROW-*lock*. Sometimes there is only one pin to each oar, as in the boats navigated on the Mediterranean ſea: in that caſe the oar is hung upon the pin by means of a ſtrop.

THOMÆANS, Thomeans, Thomites, or *Chriſtians of St.* Thomas, a people of the Eaſt Indies, in Cochin, and upon the coaſt of Malabar and Coromandel, who, according to tradition, received the Goſpel from the apoſtle St. Thomas. See CHRISTIANS *of St. Thomas*.

It appears by the teſtimony of Coſmas, who writ about A. D. 547, and whoſe work is tranſlated by F. Montfaucon, that Chriſtianity was eſtabliſhed in India in the ſixth century. We alſo find in the ſubſcriptions of the council of Nice, that of a prelate, who calls himſelf biſhop of Perſia. Moreover, an ancient author, cited by Suidas, ſays, that the inhabitants of interior India, (a name which Coſmas gives to the coaſt of Malabar) the Iberians and Armenians, were baptized under the reign of Conſtantine.

The princes of the country, and particularly Serant Peroumal, emperor of Malabar, the founder of the city of Calicut, A D. 825, granted extraordinary privileges to theſe Chriſtians.

When Vaſco de Gama, the Portugueſe admiral, arrived at Cochin with a fleet, in the year 1502, theſe Chriſtians ſent deputies to him, imploring his protection, and that of the king his maſter. The admiral treated them kindly, but was in no condition to afford them any effectual aſſiſtance, in relieving them from the yoke of the Pagan kings to which they were then ſubject. The language they uſe *in ſacris*, is the Syriac, or as ſome ſay, the Chaldee; but their ordinary language is the ſame with that of their neighbours. The firſt miſſionaries, who attempted to proſelyte them to the church of Rome, were Cordeliers, but their endeavours proved ineffectual. The diſtinguiſhing opinions and religious rites of theſe Chriſtians are as follow.

They are charged with an invincible attachment to the doctrine of Neſtorius, and with an obſtinate refuſal to acknowledge, that the Virgin is the mother of God. They have no images in their churches; they believe that the ſouls of the bleſſed are not admitted into the preſence of God till after the day of univerſal judgment. They allow only of three ſacraments, viz. baptiſm, orders, and the euchariſt: they defer the baptiſm of infants for ſome time, as for a month, or even for ſeven, eight, or ten years, after they are born. they make no uſe of holy oil, neither in baptiſm, nor in the adminiſtration of the other ſacraments; but after baptizing their infants, they ſprinkle the oil of a ſpecies of Indian ſaffron all over their bodies: they allow of no auricular confeſſion, treat purgatory as a fable, and their prieſts are permitted to marry. They entertain an extraordinary affection for the Neſtorian patriarch of Babylon, but will not ſuffer any mention of the pope, or of the Romiſh churches in their aſſemblies. Their days of abſtinence are Wedneſday and Friday, and their faſt is very ſevere in Lent, during which time they go to church three times a day. They alſo faſt in the ſame manner during the time of Advent. Beſides theſe two greater faſts, which are enjoined on pain of excommunication, they have ſeveral others of a religious nature. Their women do not enter a church for forty days after their delivery of a male child, nor for eighty days after the birth of a daughter.

Theſe Chriſtians are in general poorly inſtructed, knowing only the Lord's prayer and the angelical ſalutation. Their churches are mean and unadorned buildings, and conſtructed after the manner of the pagodas. They appear to maintain many of the religious opinions and practices received among Proteſtants, and reject either wholly, or in a very great meaſure, thoſe of the church of Rome. They deny the ſupremacy of the pope, and tranſubſtantiation, and exclude from the number of ſacraments, confirmation, extreme unction, and marriage. Such are the errors proſcribed by the ſynod of Diamper, held in 1599 by Aleixo de Meneſes, archbiſhop of Goa, in order to unite the *Thomæans* to the Romiſh church. However, notwithſtanding the temporary ſucceſs that attended the vigorous exertions of the archbiſhop, for which he was recompenſed, after his return to Europe, with the archbiſhoprick of Braga, the viceroyſhip of Portugal, and the preſidency of the council of ſtate at Madrid, theſe Chriſtians, oppreſſed and abuſed by the Jeſuits, relapſed from the church of Rome ſoon after the death of the archbiſhop; and notwithſtanding the endeavours of Alexander VII. to conciliate them by the miſſion of four bare-footed Carmelites, they could no more be reduced to ſubmiſſion. At length when the Dutch took Cochin in 1663, the *Chriſtians of St. Thomas* recovered the liberty which they had formerly enjoyed; but they derived little advantage beſides from their new maſters. Encyclopedie, and Geddes's Hiſtory of the Church of Malabar and Synod of Diamper, in his Tracts, vol. v.

THOMAS. *Chriſtians of St.* THOMAS. See THOMÆANS.

THOMAS's *Hoſpital.* See HOSPITAL.

THOMISM, or THOMAISM, the doctrine of St. Thomas Aquinas, and his followers the *Thomiſts*; chiefly with regard to predeſtination and grace.

There is ſome doubt what the true, genuine *Thomiſm* is: the Dominicans pretend to hold pure *Thomiſm*; but there are other authors who diſtinguiſh the *Thomiſm* of St. Thomas from that of the Dominicans.

Others, again, make *Thomiſm* no other than a kind of Janſeniſm diſguiſed: but Janſeniſm, we know, has been condemned by the popes, which pure *Thomiſm* never was.

In effect, the writings of Alvarez and Lemos, who were appointed, by their order, to lay down and defend before the holy ſee, the dogmata of their ſchool, have ſince been reputed the rule of pure *Thomiſm.*

Thoſe two authors diſtinguiſh fonr claſſes of *Thomiſts*: the firſt, which they reject, deſtroys or takes away liberty; the ſecond and third do not differ from Molina.

The laſt, which Alvarez embraces, admits a phyſical premotion, or predetermination, which is a complement of the active power, whereby it paſſes from the firſt act to the ſecond; that is, from complete and next power, to action.

This premotion, they hold, is offered in ſufficient grace: ſufficient grace is given to all men; and that they have a complete, independent, next power not to act, and even to reject the moſt efficacious grace.

THOMISTS, a ſect of ſchool-divines, who maintain *Thomiſm.*

The avowed antagoniſts of the *Thomiſts* are the SCOTISTS.

THOMITES. See THOMÆANS.

THOPH. See MACHUL and SISTRUM.

THOR, in *Mythology*, a deity worſhipped by the ancient inhabitants of the northern nations; particularly by the ancient Scandinavians and Celts. Julius Cæſar (Com. lib. vi. c. 17.) ſpeaks of a god of the Gauls, who was charged with the conduct of the atmoſphere, and preſided over the winds and tempeſts, under the name of Jupiter: but Lucan gives him a name, which bears a greater reſemblance to that of *Thor*, viz. *Taranis*, a word which to this day, in the Welſh language, ſignifies *thunder.* The authority of this deity extended over the winds and ſeaſons, and particularly over thunder and lightning. In the ſyſtem of the primitive religion, the god *Thor* was probably one of thoſe genii, or ſubaltern deities, ſprung from the union of ODIN, or the Supreme Being, and the Earth. The EDDA calls him the moſt valiant of the ſons of Odin; and in the Icelandic mythology, he is conſidered as the defender and avenger of the gods. He always carried a mace, or club, which as often as he diſcharged it returned to his hand of itſelf; he graſped it with gauntlets of iron, and was poſſeſſed of a girdle which had the virtue to renew his ſtrength as often as was needful. With theſe formidable arms he overthrew the monſters and giants, when the gods ſent him to oppoſe their enemies. *Thor*, *Friga* or *Freya*, and Odin, compoſed the court or ſupreme council of the gods, and were the principal objects of the worſhip and veneration of all the Scandinavians. The Danes ſeem to have paid the higheſt honour to Odin. The inhabitants of Norway and Iceland appear to have been under the immediate protection of *Thor*: and the Swedes choſe for their tutelar deity Freya, or Frey, an inferior divinity, who, according to the Edda, preſided over the ſeaſons of the year, and beſtowed peace, fertility, and riches.

There was a day conſecrated to *Thor*, which ſtill retains his name in the Daniſh, Swediſh, Engliſh, and Low Dutch languages, viz. *Thurſday.* This word has been rendered into Latin by *dies Jovis*, or *Jupiter's day*; for this deity, according to the ideas of the Romans, was the the god of thunder. Mallet's North. Ant. vol. i. p. 95.

THORA, in *Botany.* See WOLF's-*bane* and ANTHORA.

THORACIC, THORACICUS, in *Anatomy*, an epithet given to two branches of the axillary artery, on account of their conveying the blood into ſome parts of the thorax.

The *thoracic* arteries are diſtinguiſhed into *upper* and *lower.*

The upper, or external mammary artery, runs down in a winding courſe on the lateral parts of the thorax, and croſſes the ribs; giving branches to the two pectoral muſcles, to the mamma, muſculus ſubclavius, ſerratus major, latiſſimus dorſi, and to the upper portions of the coraco-brachialis and biceps. The inferior *thoracic* artery runs along the inferior coſta of the ſcapula to the muſculus ſubſcapularis, teres major and minor, infra-ſpinatus, latiſſimus dorſi, ſerratus major, and the neighbouring intercoſtal muſcles, communicating with the ſcapular arteries.

There are likewiſe *thoracic* veins, an *upper* and *under*, deſtined for the reconveyance of the blood from the thorax to the axillary vein.

THORACIC *duct*, *ductus* THORACICUS, or *chyliferus*, is a thin tranſparent canal ariſing from, or rather it is a continuation of, the exit or mouth of the RECEPTACULUM *chyli*, and running along the ſpina dorſi, between the vena azygos and aorta, as high as the fifth vertebra of the back, or higher. From thence it paſſes behind the aorta toward the left hand, and aſcends behind the left ſubclavian vein, where it terminates, in ſome ſubjects, by a kind of veſicula; in others by ſeveral branches united together, and opens into the poſterior ſide of the ſubclavian vein, near the outſide of the internal jugular. It is ſometimes called *Pecquet's duct*, or *ductus Pecquetianus*, from M. Pecquet, ſuppoſed to be the firſt diſcoverer thereof.

Indeed the *thoracic* duct, Dr. Wharton aſſures us, was obſerved by Barthol. Euſtachio in 1563, but its uſe, and communication with the receptaculum chyli, were unknown. And hence it is that Pecquet, a phyſician of Dieppe, is commonly held to have firſt diſcovered it, in 1651, whence its denomination, *ductus Pecquetianus*: though the deſcription he gives of its inſertion is faulty. Van Horne confounds it with the receptaculum, or, as he calls it, *ciſterna chyli.*

In its progreſs through the thorax, it is furniſhed with a proper integument from the pleura, beſides the membrane it has in common with the receptaculum.

Dr. Drake obſerves, that it has valves in different places of its tract; Euſtachio ſays glands. The valves, with which it is plentifully furniſhed, are ſemilunar turned upward. Its opening into the ſubclavian vein is, in the place of valves, covered by ſeveral pelliculæ ſo diſpoſed as to permit the entrance of the chyle into the vein, and hinder the blood from running into the duct. It is ſometimes double, one lying on each ſide, and it is ſometimes accompanied by appendices, called *pampiniformes.* Its uſe is, to carry the chyle and lympha from the receptaculum into the ſubclavian, by which it is forwarded to the cava, and thence to the heart.

THORACICI, in the *Linnæan ſyſtem of Ichthyology*, the name of the third order of bony fiſhes, reſpiring by means of gills only: the character of which is, that the ventral fins are placed underneath the pectoral fins. This order includes ſeventeen genera, and two hundred and eighteen ſpecies. The genera are, the *cepola*, *echeneis*, *coryphæna*, *gobius*, *cottus*, *ſcorpæna*, *zeus*, *pleuronectes*, *chætodon*, *ſparus*, *labrus*, *ſciæna*, *perca*, *gaſteroſteus*, *ſcomber*, *mullus*, and *trigla.*

THORACIS *primus*, in *Anatomy*, a name given by many of the anatomical writers to the muſcle called by the French the *ſouclavier.* See SUBCLAVIUS.

THORACIS *quartus*, in *Anatomy*, a name given by many of the early writers to a muſcle called by the modern writers *ſerratus poſticus inferior.* The ſame authors give the name of *tertius thoracis* to the *ſerratus poſticus ſuperior.*

THORÆ *radix*, in the *Materia Medica*, the name of a root which keeps its place in the catalogues of officinal ſimples, but is ſeldom uſed. See WOLF's-*bane*, and ANTHORA.

The plant which produces it is the *thora valdenſis* of Gerard. It is kept in the gardens of the curious, but grows wild in the mountainous parts of Germany. The root is compoſed of a number of granules or ſmall lumps, like that of the common ranunculus; the leaves are roundiſh and ſtand on ſmall pedicles, and the ſtalks are about ſix inches high, and the flowers yellow, and like thoſe of our common wild ranunculuſes.

The root is acrid and corroſive, and the juice of the leaves is ſaid to poiſon animals, and to have been uſed by the ancients for that purpoſe.

THORAX, ϑωραξ, in *Anatomy*, that part of the human body which forms the capacity of the breaſt, and wherein are included the heart and lungs. See *Tab. Anat. Oſteol. fig.* 3. *n.* 13. 13. *fig.* 7. *n.* 15. 15.

It has its name from the Greek ϑορειν, *ſalire, to leap*; by reaſon of the continual throbbing motion of the heart, which is contained therein. Galen calls it *cithara*, and ſays, it contains the parts that excite to love.

The *thorax* is alſo called the *ſecond* or *middle venter*, and properly the *cheſt.*

It is bounded at top by the clavicles, and at bottom by the cartilago xiphoides, and the diaphragm. Its fore-part is called the *ſternum*, or *breaſt-bone*; its ſide-parts the *coſtæ*, or *ribs*; its hind-parts are, the *ſpina dorſi*, and its *vertebræ*, with the *omoplate*.

Beſides the heart and lungs, the *thorax* likewiſe contains the aſcending cava, the aorta, the pulmonary vein and artery, the trachea, œſophagus, &c.

It is lined withinſide with a membrane called the *pleura*, and divided in the middle by another called the *mediaſtinum*.

Dr. Hoadly thinks it proved from Dr. Hales's experiments, in his Vegetable Statics and Hæmaſtatics, that there is air in the cavity of the *thorax*, between the lungs and the pleura. See his Lectures on Reſpiration, and RESPIRATION.

THORAX, *abſceſſes in the*, or breaſt. One of the moſt remarkable accounts we have ever had of the effects of an abſceſs in the breaſt, is from Mr. Chicoyneau, of the academy of Montpelier, given in the Memoirs of the Academy of Sciences of Paris in 1731.

Mr. le Dran remarks, that whenever any conſiderable quantity of pus is contained in either cavity of the *thorax*, that ſide will appear larger than the other.

THORAX, *wounds of the*. The wounds of the *thorax*, or breaſt, are of three kinds; either the wound is inflicted on the external parts only; or it penetrates into the cavity of the breaſt; or thirdly, the contents of the *thorax* partake alſo of the wound.

It may be diſcovered whether wounds do or do not penetrate into the cavity of the *thorax*, either by the ſight or by the hearing; obſerving whether any ſound proceeds from the wound at the time of inſpiration; by feeling with a probe or a finger, and obſerving whether they paſs into the cavity, or meet with any reſiſtance; by injecting warm water, which if the wound does not penetrate, will return ſtrongly upon you; and laſtly, you will be convinced that it does not, by the abſence of bad ſymptoms, ſuch as difficulty of breathing, fainting, and ſick fits, which always attend a wound that penetrates into this cavity. If the wound is found not to penetrate, it is to be treated as a common ſlight wound. But ſometimes an external wound of this kind runs very deep, and obliquely, between the muſcles and the ribs, and is thereby rendered very difficult to be cleanſed from grumous blood and matter; and the matter in this caſe frequently deſtroys the neighbouring parts, and produces ulcers, and very dangerous or incurable fiſtulæ; nay, ſometimes it makes its way through the pleura, into the cavity of the *thorax*, and forms an empyema, or brings on a phthiſis, and death itſelf.

The great buſineſs in this caſe is to clear the ſinuſes from the blood and matter confined in them; and this is to be done either by preſſure, or by ordering the wound to be ſucked by a healthy perſon, or by drawing it out with a ſyphon, or making farther openings with a knife. A proper ſyringe with its mouth applied to the wound, and a ſtrong ſuction made, often will fill itſelf with the confined blood and matter, and, by repeating the operation, prove of very ſignal ſervice.

In wounds that penetrate into the cavity, when a large quantity of blood is ſpilt into the cavity of the *thorax*, the expanſion of the lungs, the office of reſpiration, and the courſe of the blood through the lungs are impeded, and the blood in the lungs being inſpiſſated by frequently being retarded there, life cannot be ſupported; but where the quantity of extravaſated blood is not ſo large as to occaſion theſe accidents, there ſtill is danger that it ſhould putreſy by degrees, and corrupt either the diaphragm, pleura, or lungs, which muſt occaſion very bad ſymptoms, and finally, in a ſhort time, death itſelf. When blood is extravaſated in the *thorax*, we muſt therefore uſe all diligence to get it away. If the wound is inflicted on the middle or lower part of the *thorax*, and has not a very narrow opening, it will be convenient to lay the patient upon the wounded ſide, and adviſe him to fetch his breath deep, or cough; and if the diſcharge is hindered by lumps of grumous blood ſtopping up the orifice, they muſt be removed with a probe, or with the fingers, or drawn out with a ſyringe. If the blood is become too thick to flow out of the wound, an injection of barley-water, with the addition of a little honey of roſes and a ſmall quantity of ſoap, muſt be uſed; this is to be injected, and the patient made afterwards to lie on the wounded ſide, to let it run out again; and this muſt be repeated, till it happens that all the grumous blood is waſhed away. But if the wound is ſo narrow and oblique that this method cannot be uſed, it muſt be enlarged with the inciſion-knife. Great caution is to be obſerved not to fatigue the patient too much, by attempting to diſcharge all the extravaſated blood at one time. It will be more ſafe to do it by intervals, at different times, eſpecially if he be ſubject to ſwoonings; but the wound muſt be kept open in the mean time, by introducing a ſilver or leaden pipe into it, or at leaſt a large tent with a ſtring faſtened to it. This method of cleanſing the cavity of the *thorax* is to be repeated, till the diſcharge ſhall entirely ceaſe, and the external wound can be conveniently healed.

When a wound is made in the upper part of the breaſt, the patient lying on the wounded ſide cannot at all let out the matter in the cavity; but an opening muſt be made in the lower part of the *thorax*, between the ſecond and third rib, counting upwards, if it is on the left ſide; but if it is on the right ſide, then betwen the third and fourth rib, about a hand's breadth from the ſpine. The place where the opening is to be made ſhould be firſt marked with ink, and the inſtrument generally uſed to make it is the *trocar*, which muſt be driven above the rib into the *thorax* with great caution and gentleneſs: after it has penetrated, the ſteel-inſtrument is to be drawn out, and the pipe left in as a paſſage for the extravaſated blood to be let out by; and if it does not readily make its way out by this, its evacuation may be forwarded by the ſuction of a ſyringe. The trocar is in common uſe on this occaſion; but as the lungs are very liable to be wounded by the paſſing of this inſtrument forcibly into the cavity of the *thorax*, it is better to divide the common integument with an inciſion-knife, as alſo the muſcles and pleura, carefully avoiding the lungs, which are very apt to adhere to the pleura in this part: when this perforation is properly made, it is carefully to be kept open as long as neceſſary, and the wound above to be healed up as ſoon as poſſible.

The cavity of the *thorax* being thus cleanſed, the wound is to be dreſſed once every day, and the dreſſing performed with all poſſible expedition; and the utmoſt diligence uſed to guard the contents of the *thorax* from the injuries of the external air. Heiſter's Surg. vol. i. p. 79. &c.

THORAX, *paracenteſis of the*, is the perforation of this part, uſually made between the ribs in ſeveral diſorders; particularly in the EMPYEMA, EMPHYSEMA, DROPSY of the breaſt, and for diſcharging blood which has been extravaſated into the cavity of *thorax*, in wounds of this part. Before this operation is undertaken, care ſhould be taken to determine whether the patient's ſtrength will admit of it, and his diſorder be hereby relieved. If the diſorder be recent and the patient ſtrong, the *thorax* may be perforated without danger by a ſkilful ſurgeon, who divides only the ſkin, fat, intercoſtal muſcles, and pleura. In order to diſcover in which ſide the peccant matter is contained, the ſurgeon ſhould obſerve in which ſide the pain or inflammation has been, and the weight or fluctuation has been perceived, on which ſide he can lie moſt eaſily, for that is uſually the ſide affected, and where the tumor and inflammatory heat are diſcovered. The operation may then be ſafely performed between the ſecond and third of the ſpurious ribs on the left ſide, or between the third and fourth on the right ſide, counting from below upwards, ſo as to be about five or ſix fingers' breadth from the ſpine of the back, and as much below the angle of the ſcapula. The ſurgeon having marked the place with ink, and taken up the integuments between his own fingers and thoſe of an aſſiſtant, as in cutting iſſues, proceeds to make an inciſion about three inches long, according to the courſe of the ribs: this part is then perforated with the trocar, which being introduced into the cavity of the *thorax*, its bodkin extracted, and the tube left in the wound, whereby the humours are drawn off and diſcharged, as long as the patient's ſtrength will admit. When the patient is near fainting, or the matter appears to be totally evacuated, the cannula of the trocar may be removed, and a flexible tube of ſilver or lead inſerted in its place, and faſtened to the *thorax* with a piece of plaſter and a ligature. Over the mouth of the tube may be applied a compreſs, retained by the bandage, called a *napkin* and *ſcapulary*. Sometimes the trocar is introduced through the integuments and intercoſtal muſcles by one puſh againſt its triangular bodkin: but to prevent injuring the lungs, it is moſt prudent, after having prepared the integuments by inciſion, cautiouſly to divide the intercoſtal muſcles and pleura by a tranſverſe inciſion with a ſcalpel, and having introduced the cannula as before, the contained humours of the *thorax* are thereby diſcharged. The patient, during the operation, ſhould be in an inclined poſture. A ſufficient opening being made into the *thorax*, the finger is to be introduced, in order to ſeparate the lungs from its adheſion to the pleura, and to make way for the peccant humours. Petit recommends, inſtead of tubes, or tents, ſtopping up the orifice of the wound with ſoft linen rolled up, whereby it may be kept open for future diſcharges. Over the wound is to be applied ſoft lint, faſtened to a thread, and retained with plaſter, compreſs, and bandage. After the operation the dreſſing may be applied once or twice a day; the matter being diſcharged and waſhed out, by injecting ſome deterging liquor at each dreſſing. A decoction for this purpoſe may be made of vulnerary herbs, as veronica, ſcabioſa, ſolidago ſaracenica, with honey of roſes and oil of myrrh. Garengeot recommends a decoction ex perſicaria and althæa, when the diſorder ariſes from a pleuriſy or peripneumony: a tincture of ſulphur of antimony, made with ſpirit of wine, is alſo very efficacious in deterging and healing theſe parts. Others extol a mixture of lime-water with honey of roſes. Theſe injections ſhould be continued till they return clean and unmixed with bloody or purulent matter; whereupon the tube or lint may be withdrawn from the perforation of the *thorax*, and the cure completed as in wounds of the *thorax*. Heiſter's Surg. vol. ii. p. 65, &c.

THORN, a name characterizing ſeveral genera of prickly plants. Thus,

THORN-*apple*, *datura*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has one funnel-ſhaped petal, with a long cylindrical tube, which is pentangular, each angle being pointed; the empalement of the flower is five-cornered and tubulous; it has five ſtamina and an oval germen, which becomes an oval capſule with four cells, filled with kidney-ſhaped ſeeds adhering to the partition. Linnæus enumerates ſix, and Miller ſeven ſpecies.

The leaves are accounted cooling, and good for burns, ſcalds, and inflammations in any part. The ſeed of the *datura ſtramonium* is narcotic and ſoporiferous, but is rarely uſed.

Several inſtances are recorded of the bad effects of inadvertently eating it. Emetics and purgatives give the ſpeedieſt relief in caſes of this kind. The plant, which has been long known as a narcotic poiſon, has been introduced into the catalogue of medicines by Dr. Stoerck. An extract made from the expreſſed juice of the leaves is acrid and ſaline to the taſte, and yields cryſtals of nitre on ſtanding. This preparation given in doſes from one to five grains, twice or thrice a day, is ſaid to be a powerful remedy in various convulſive and ſpaſmodic diſorders, epilepſy, and mania. An ointment prepared from the leaves has been found to give eaſe in external inflammations and hæmorrhoids. Lewis.

THORN, *black*, or SLOE-*tree*, a ſpecies of the *prunus*, called *prunus ſylveſtris*. See PLUM-*tree*, and SLOE.

THORN, *box*, *lycium*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower, which hath a ſmall obtuſe empalement, erect, and divided into three parts at top, is funnel-ſhaped, of one petal, with an incurved tube, whoſe brim is cut into five obtuſe ſegments; and it has five awl-ſhaped ſtamina, terminated by erect ſummits; in the centre is ſituated a roundiſh germen, ſupporting a ſingle ſtyle, crowned by a thick bifid ſtigma, and the germen becomes a roundiſh berry, with two cells, encloſing kidney-ſhaped ſeeds, adhering to the partition. Linnæus reckons four, and Miller ten ſpecies. See LYCIUM, under which article occurs an account of the AVIGNON *berry*, which Du Hamel ſays, is the fruit of a ſpecies of *rhamnus*, or BUCKTHORN, gathered green: but Mr. Miller ſays, it is the fruit of the narrow-leaved *alaternus*, referred by Linnæus to the genus of *rhamnus*.

THORN, *buck*, in *Botany*. See BUCKTHORN.

The AVIGNON *berry*, is the fruit of a ſpecies of *buckthorn*. See LYCIUM.

The berries of the common *buck-thorn*, or *rhamnus catharticus* of Linnæus, operate briſkly by ſtool, and occaſion, at the ſame time, a thirſt and dryneſs of the mouth and throat, and not unfrequently ſevere gripes, eſpecially if water-gruel, or other ſoft diluents, are not freely drank ſoon after taking them. The doſe is ſaid to be about twenty of the freſh berries in ſubſtance; twice or thrice that number in decoction; a dram, or a dram and a half of the dried berries; an ounce of the expreſſed juice; or half an ounce of the rob or extract obtained by inſpiſſating the juice. They have been employed with us only in the form of a ſyrup, in which they ſeem to operate more kindly, and which is given by itſelf in doſes of three or four ſpoonfuls, or mixed in ſmaller quantities with other cathartics. The college of Edinburgh directs the ſyrup to be prepared by boiling the depurated juice with ſugar to a due conſiſtence: that of London adds a little cinnamon, ginger, and nutmegs, to cover the ill flavour of the *buckthorn*; but notwithſtanding this improvement, it is ſtill ſo unpleaſant, that it has now almoſt fallen into diſuſe. Lewis.

THORN, *Chriſt*, *paliurus*, in *Botany*. Its characters are theſe: the flower has no empalement, but has five petals, which are ranged circularly, and end in acute points; it has five ſtamina, which are inſerted in the ſcales under the petals, terminated by ſmall ſummits; and a roundiſh trifid germen, ſupporting three ſhort ſtyles crowned by obtuſe ſtigmas; the germen becomes a buckler-ſhaped nut, divided into three cells, each containing one ſeed. We know but one ſpecies.

This plant grows naturally in the hedges near Paleſtine, and is ſuppoſed to be the plant from which the crown of thorns was compoſed, which was put on the head of our Saviour; which, its being one of the moſt common ſhrubs of the country, renders probable. It is kept in gardens as a curioſity, but has little beauty in it; and its ſeed does not ripen in England. Miller.

Linnæus makes this a ſpecies of the *rhamnus*, or BUCKTHORN.

THORN, *cockſpur*, in *Botany*. See *Wild* SERVICE.

THORN, *Egyptian*, a ſpecies of MIMOSA. See ACACIA.

THORN, *evergreen*, a ſpecies of *cratægus*. See *Wild* SERVICE.

THORN, *Glaſtonbury*, a variety of the *hawthorn*. See *Wild* SERVICE.

THORN, *goat's*, a ſpecies of ASTRAGALUS. See alſo GOAT'S-*thorn*.

THORN, *haw*, a name given to different ſpecies of *cratægus*. See *Wild* SERVICE.

THORN, *lily*, *Cateſbæa*, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are theſe: it has a ſmall permanent empalement of one leaf, with five ſharp indentures; the flower is of one petal, funnel-ſhaped, having a very long tube, which gradually widens to the top, where it is four-cornered and ſpreads open; it hath four ſtamina riſing in the neck of the tube; the roundiſh germen is ſituated under the flower, which afterwards becomes an oval berry with one cell, filled with angular ſeeds. We know but one ſpecies of this ſhrub, which was diſcovered by Mr. Cateſby near Naſſau-Town in the iſland of Providence; where he ſaw two of them growing, which were all he ever ſaw; from theſe he gathered the ſeeds, and brought them to England. Miller.

THORN, *purging*, a ſpecies of *rhamnus*. See BUCKTHORN.

THORN, *ſcorpion's*, a ſpecies of ULEX.

THORN, *Spaniſh hedge-hog*, a ſpecies of ANTHYLLIS.

THORN, *white*, a ſpecies of *cratægus*. See *Wild* SERVICE.

THORNBACK, the Engliſh name of a ſpecies of ray-fiſh, the RAIA *clavata* of Linnæus, prickly on the back, and with tuberculoſe teeth, and a tranſverſe cartilage in the belly; the young fiſh have very few ſpines on them, and their backs are often ſpotted with white, and each ſpot incircled with black. This ſpecies frequents our ſandy ſhores, is very voracious, and feeds on all ſorts of flat fiſh, and is particularly fond of herrings and ſand-eels, and ſometimes eats cruſtaceous animals, ſuch as crabs. The *thornbacks* begin to generate in June, and bring forth their young in July and Auguſt, which (as well as thoſe of the ſkate) before they are old enough to breed, are called *maids*. They begin to be in ſeaſon in November, and continue ſo later than ſkate; but the young of both are good at all times of the year. Pennant.

THOROUGH-*baſs*, in *Muſic*, is that baſs which continues quite through the compoſition. See BASS.

THOROUGH-*wax*, in *Botany*. See HARE'S *Ear*.

THOS, THOUS, Θως, in *Zoology*, a name given to an animal of the wolf-kind, but larger than the common wolf, common in Surinam. It is a ſpecies of the CANIS, with a light bent tail, and white belly. It never touches men or cattle, and rather provides its food by cunning than open force; preying chiefly on poultry and water-fowl.

THOUGHT, *ſentiment*, a general name for all the ideas conſequent on the operations of the mind, and even for the operations themſelves.

As, in the idea of *thought*, there is nothing included of what we include in the idea of an extended ſubſtance; and that whatever belongs to body, may be denied to belong to *thought*; we may conclude, that *thought* is not a mode of extended ſubſtance, it being the nature of a mode not to be conceived, if the thing, whereof it is the mode, be denied. Hence we infer, that *thought*, not being a mode of extended ſubſtance, muſt be the attribute of ſome other ſubſtance very different.

F. Malebranche, with the ſpirit of a Carteſian, denies that a man who thinks ſeriouſly on the matter, can doubt but that the eſſence of the mind conſiſts altogether in *thought*, as that of matter does in extenſion; and that, according to the various modifications of *thought*, the mind ſometimes wills, ſometimes imagines, &c. as, according to the various modification of extenſion, matter is ſometimes water, ſometimes wood, fire, &c. By the way, by *thought* he does not mean the particular modifications of the ſoul, i. e. ſuch or ſuch a *thought*, but *thought*, or thinking in the general, conſidered as capable of all kinds of modifications, or ideas; as by extenſion he does not mean ſuch or ſuch an extenſion, as a ſquare, oval, or the like, but extenſion in the abſtract, conſidered as ſuſceptible of all kinds of modifications or figures.

He adds, that he takes it to be impoſſible to conceive a mind which does not think, though it be eaſy to conceive one which does not feel, or imagine, or will; in like manner as it is impoſſible to conceive a matter which is not extended, though it be eaſy to conceive one that is neither earth nor metal, nor ſquare nor round, nor that is even in motion.

Hence it may be concluded, that as it is poſſible there may be matter which is neither earth nor metal; nor ſquare, nor round, nor even in motion; it is alſo poſſible, that a mind may neither perceive heat nor cold, nor joy nor grief, nor imagine any thing, nor will any thing; ſo that theſe modifications are not eſſential to it. Thinking alone, therefore, according to this author, is the eſſence of the mind, as extenſion alone is the eſſence of matter.

But this doctrine is not now generally received. The followers of ſir Iſaac Newton, and the new philoſophy, deny extenſion to be the eſſence of matter; and the followers of Mr. Locke deny *thought* to be the eſſence of the mind.

THOUGHTS, in a *Boat*, a name given by ſeamen to the benches on which the men ſit down to row.

THOWLES, in a *Boat*. See THOLES.

THOYT. See TAAUT.

THOUSAND. See NUMERATION.

THOUSAND *years reign*. See MILLENNIUM.

THRACES, or THRACIANS, in *Antiquity*, were an order of GLADIATORS, reputed to be the moſt fierce and cruel of all. They were ſo called, either becauſe they were natives of Thrace, or wore armour after the manner of that country. The particular weapon they uſed was the *ſica*, or ſaulchion, and their defence conſiſted in a *parma*, or little round ſhield, proper to their country.

THRACIA *gemma*, a ſtone mentioned by Pliny, and deſcribed by him to be of three kinds; the one of a plain green, but a conſiderably deep and ſtrong colour; the other of a paler green without variegation; and the third ſpotted with blood-coloured ſpots. This is a ſhort deſcription, but the ſtone ſeems to have been a jaſper, of the nature of our green oriental jaſper and heliotrope.

THRACIUS *lapis*, in the *Natural Hiſtory* of the ancients, a ſtone often mentioned, and firſt called *Benæ lapis*, from the place where it was firſt found, which was in the neighbourhood of Bina, or Bena, a town in Thrace.

It has been by ſome authors allowed a place in the catalogues of the materia medica; but it is impoſſible for us to ſay, with any certainty, which, of ſeveral ſubſtances now known (which all anſwer in ſome degree to the accounts left us of it) is the real body they meant by that name.

It was an inflammable body, found in mines, and in the beds of rivers; and, in burning, afforded a very offenſive ſmell.

Some of the late authors have ſuppoſed it was our common pit-coal the ancients expreſſed by this name; others, that it was jet; and others, the common cannel-coal. Hill's Theophraſtus, p. 34.

THRANITÆ, in the *Roman Trireme-gallies*, or thoſe which had three rows of rowers; thoſe of the upper row were called by this name, the ſecond the *zygitæ*, and the loweſt *thalamitæ*.

The *zygitæ*, or middle row of men, in theſe veſſels, took up but very little room, having a conveniency of moving their hands and oars under the ſeats of thoſe who ſat next before them. See ENNERIS and POLYCROTA.

THRASHING, or THRESHING, in *Agriculture*, the act of beating the corn out of the ears.

There are two ways of ſeparating corn from the ear; the firſt by beating it with a flail, which is properly what we call *thraſhing*.

Some authors will not, by any means, allow that we ſhould call this by the Roman name *tritura*, or *trituration*; but *flagellatio*, of *flagellum*, a *ſcourge*, or *flail*.

The other manner, ſtill practiſed in ſeveral countries, as we are informed by Liger, is to make mules or horſes trample on it, backwards and forwards. This is, properly, what the ancients called *tritura*, and *trituratio*.

But they alſo uſed oxen therein; witneſs the Hebrews, who ſometimes yoked four oxen together for this purpoſe.

Another way, among the ancients, was with a kind of ſledge made of boards joined together, and loaden with ſtone, or iron, upon which a man was mounted, and the whole drawn over the corn by horſes: this inſtrument was called *traba*, or *tribula*.

It is a rule among huſbandmen, that the ſeaſon for *thraſhing* is as ſoon as the corn has ſweated in the heap, or mow.

THRASOS, a term uſed by Hippocrates, to expreſs a wildneſs and fierceneſs in the eyes of perſons who approach to a delirium.

THRAVE, or THREAVE, *of corn*, in moſt parts of England, is twenty-four ſheaves, or four ſhocks of ſix ſheaves to the ſhock; though, in ſome counties, they only reckon twelve ſhocks to the *thrave*.

King Athelſtan, anno 923, gave by charter, to St. John of Beverley, four *thraves* of corn for every plough-land in the Eaſt-riding of Yorkſhire.

> *Ya ſou* threve *be heaven king*,
> *Of ilka plough of eſt-riding.*

THRAUPIS, in *Ornithology*, a name given by many authors to the bird more commonly called CITRINELLA.

THRAUSMA, a name given by the ancients to a kind of gum ammoniacum, which was drier than the common, and more eaſily crumbled to pieces.

THRAUSTOMICTHES, in *Natural Hiſtory*, the name of a genus of compound earths. The word is derived from the Greek ϑραυστος, *brittle*, and μιχθεὶς, *mixt*.

The bodies of this genus are loams compoſed of ſand and a leſs viſcid clay, and are therefore of a friable or crumbly texture.

The earths of this genus are generally uſed to make bricks; and there are ſeveral ſpecies of them. Hill's Foſſils, p. 424.

THREAD, in the *Linen Manufacture*, a ſmall line or twiſt of flax, the weaving of which compoſes cloth.

There is a ſtronger kind made uſe of to ſow the ſeams of linen garments, or to mend them.

The *thread* of the Laplanders is very fine, white, and ſtrong, but it is of a very different nature from ours; they know nothing of flax or hemp, nor of any other plant whoſe ſtalks might ſupply the place of theſe in making *thread*, but theirs is made of the ſinews of the rein-deer.

They kill of theſe animals a very great number continually, partly for food, partly for the ſkins, which they uſe in cloathing themſelves, covering their huts, and on many other occaſions; the ſinews of all they kill are very carefully preſerved, and delivered to the women, whoſe province it is to prepare this neceſſary matter. They beat the ſinews very well, after having ſteeped them a long time in water, and then they ſpin them out.

The *thread* they thus make is of any degree of fineneſs they pleaſe; but it is never any longer than the ſinew from which it is made. They uſe this in ſewing their cloaths, ſhoes, gloves, &c. and the trappings of their rein-deer. The *threads* of the ſame ſinew are laid up together, and are all of a length, and as the different ſinews afford them very different lengths, they accordingly pick out ſuch as the preſent uſe requires, both in regard to length and fineneſs. This ſort of *thread* is made with much more labour than ours; but it is greatly ſuperior to it on many occaſions, where ſtrength is rather required than beauty.

Theſe people have, beſides this, a way of making a ſort of yarn of ſheeps wool, which they weave into garters and a ſort of ribbands, uſed by way of ornament; but they place no value on it, becauſe of its want of ſtrength. Scheffer's Hiſt. Lapland.

THREAD, in *Botany*, is underſtood of thoſe capillaments uſually found in the middle of flowers, as in the lily, tulip, roſe, &c. There are two kinds, thoſe which ſupport apices, are particularly called STAMINA; and thoſe which have none, PISTILLA.

THREAD, *gold*. See GOLD.

THREAD, *virgins*. See VIRGIN.

THREADY *marble*. See MARBLE.

Air THREADS, a term uſed by ſome to expreſs thoſe fine long white filaments, or thready ſubſtances which we meet with in vaſt numbers floating about in the air in Auguſt and September.

The world has been much perplexed about the generation of theſe, till it was known that they were the work of SPIDERS, and that they ſerved thoſe creatures to move from place to place by. They are long, downy, and very ſoft, and though they hold together when untouched, they ſtick to the fingers in handling, and eaſily break with a ſlight touch.

The general method of theſe creatures ſpinning and weaving the webs, is by letting down the thread, then drawing it after them, and ſo diſpoſing it as they think proper; but in the midſt of their work of this ſort, if they are cloſely obſerved, they will be ſometimes found to deſiſt, and turning the tail to the contrary way of the wind, they will emit a thread with great violence, no leſs than that with which a jet of water is diſcharged from a cock. In this manner they continue darting forth the *thread*, which the wind takes, and carrying it forwards, it ſoon becomes many yards long. Soon after this the creature will throw herſelf off from the web, and truſting herſelf to the air with this long tail, will aſcend ſwiftly, and to a great height with it. The fragments of theſe lines, or the whole lines, and the ſpiders attached to them though unobſerved, make theſe *air-threads*, and the uſe nature deſtines them for, is evidently the wafting of the creature along the air, and giving it an opportunity of preying on gnats, and many other inſects that inhabit the air, out of the reach of theſe creatures by any other means.

When the *threads* are newly ſpun, they are always ſingle, and are generally ſeen aſcending up higher and higher in the air; but when they are ſeen coming down, they are found ſometimes compoſed of three or four others, and either without any ſpider at the ends, or with two or three, or more. It is plain that this happens from the meeting of theſe *threads* one with another in the air, and their tangling together; and this incommodes the creatures, and brings them down.

Theſe are what fill the air with the looſe *threads* we ſee in autumn; and as theſe ſoon entangle together, and bring one another down, it is no wonder that they are more frequent in the lower regions of the air, than thoſe with the ſpiders adhering to them, which uſually riſe to great heights, and ſuſtain themſelves there. And hence the origin of the *threads* was much perplexed among the enquirers, becauſe they were found without any mark of the animal to which they owed their exiſtence. The buſineſs of feeding is not all the uſe of theſe threads, but the creatures evidently ſport and amuſe themſelves by means of them, floating about in the air, and changing height and place at pleaſure.

When a ſpider has once raiſed itſelf from the earth in this manner, it does not deſcend always on the ſame *thread* it aroſe by, but draws that up at times, and winds it up into a hank with its fore-feet, and darts out another by way of ſupport; and the new *thread* is made more or leſs long, as it is intended for a higher or lower flight. Philoſ. Tranſ. N° 50.

THREATENING *letters*, in *Law*. By ſtat. 9 Geo. I. cap. 22. amended by ſtat. 27 Geo. II. cap. 15. knowingly to ſend any letter without a name, or with a fictitious name, demanding money, veniſon, or any other valuable thing, or *threatening* (without any demand) to kill any of the king's ſubjects, or to fire their houſes, out-houſes, barns or ricks, is made felony without benefit of clergy. This offence was formerly high treaſon, by 8 Hen. V. cap. 6.

The offence of ſending letters, *threatening* to accuſe any perſon of a crime puniſhable with death, tranſportation, pillory, or other infamous puniſhment, with a view to extort from him any money or other valuable chattels, is puniſhable by ſtat. 30 Geo. II. cap. 24. at the diſcretion of the court, with fine, impriſonment, pillory, whipping, or tranſportation for ſeven years. Blackſt. Com. book iv. p. 136. 144.

THREATS, in *Law*, a ſpecies of perſonal injury. *Threats* and menaces of bodily hurt, through fear of which a man's buſineſs is interrupted, are comprehended under this deſcription. A menace alone, without a conſequent inconvenience, does not conſtitute the injury; but, to complete the wrong, there muſt be both of them together. The remedy for this is in pecuniary damages, to be recovered by action of treſpaſs, *vi et armis*; this being an inchoate, though not an abſolute violence. Blackſt. Com. book iii. p. 120.

THREAVE. See THRAVE.

THREE-*legged-ſtaff*, an inſtrument conſiſting of *three* wooden legs, made with joints, ſo as to ſhut all together, and to take off in the middle for the better carriage; and uſually having on the top a ball or ſocket; its uſe is to ſupport and adjuſt inſtruments for aſtronomy, ſurveying, &c.

THREE *chapters*. See CHAPTER.

Compaſſes of THREE *legs*. See COMPASSES.

Ombre by THREE. See OMBRE.

Rule of THREE. See RULE.

THRENGI, or THRENGES, in our *Ancient Cuſtoms*, a denomination given to vaſſals, but not thoſe of the loweſt degree, but ſuch who held lands of the chief lord; otherwiſe called *drengi*, or DRENCHES.

Quia vero non erant adhuc tempore regis Willielmi milites in Anglia, ſed threnges; *præcipit rex, ut de eis milites fierent ad defendendam terram: fecit autem Lanfrancus* threngos *ſuo milites, &c.* Somn. Gavelk.

The name was impoſed by the Conqueror; for when one Edward Sharnbourn, of Norfolk, and others, were ejected out of their lands, they complained to the Conqueror, inſiſting that they were always on his ſide, and never oppoſed him; which, upon inquiry, he found to be true; and therefore he commanded that every one ſhould be reſtored to their lands, and be for ever after called *drenches*, or *threnges*. Spelm. Du-Cange.

THRENODY, THRENODIA, formed of ϑρηνος, *mournful*, and ὠδὴ, *ſong*, a mournful, or funeral ſong.

THRESHER, in *Ichthyology*, a name ſometimes given to the *Sea*-FOX.

THREX, among the Romans. See THRACES.

THRIFT, *ſtatice*, in *Botany*, a genus of the *pentandria pentagynia* claſs. Its characters are theſe: the flowers are collected in a roundiſh head, ſurrounded by a common ſcaly empalement; each flower has alſo a funnel-ſhaped empalement of one leaf; the flowers are funnel-ſhaped, the baſe of the petals narrow, the points broad, and ſpreading open; they have five ſtamina, which are ſhorter than the petals, terminated by proſtrate ſummits, and a ſmall germen ſupporting five ſtyles, which ſtand apart, crowned by acute ſtigmas; the germen turns to one ſmall round ſeed, encloſed in the empalement. Linnæus enumerates ſeventeen, and Miller three ſpecies, which have been uſed to be raiſed promiſcuouſly for making the edges of flower-beds, inſtead of box; but the neceſſity of tranſplanting them every year to keep them within due bounds, has made them of late much diſuſed.

They are all propagated by parting their roots: the beſt time for doing which is in autumn, and they will grow with very little trouble, and flower in the May following, continuing in flower about three weeks or a month, if the weather is not too dry.

THRIHING, See TRIHING.

THRIMSA, in *Antiquity*, a ſilver coin, the value of which has occaſioned a variety of conjectures. Lambard, who gave the firſt eſtimate of it, makes it a three-ſhilling piece, in which opinion he is followed by ſir Henry Spelman. Biſhop Nicholſon apprehends, that it was the name of their common coin, and that the *thrimſa*, ſceata, and penny were all of them the ſame. Somner, from the import of the word, and the value given to the *thrimſa* in the Saxon laws, rates it at three pence. Selden, Brady, and Hickes, are of opinion, that this coin was either the laſt tremiſſis of the Franks and Germans, and conſequently four pence, or the third part of the Saxon ſhilling, i. e. three halfpence and one-third of a half-penny in their money. Mr. Clarke adopts, and endeavours to eſtabliſh the opinion of Somner, who obſerved, from the laws of Athelſtan, that the price of a thane's life was, by the Angli, valued at 2000 *thrimſas*, which, by the Mercian eſtimate, was 1200 ſhillings; and if each of theſe ſums denotes the ſame value, which is probable, the *thrimſa* muſt be to the ſhilling as 2000 is to 1200, or three parts in five of a Saxon ſhilling, i. e. three pence.

The *thrimſa* was firſt coined in the reigns before Athelſtan, during their greater affluence in caſh, and deſigned merely for the convenience of exchange, as the moſt proper diviſion that could be made in their money without a fraction, between the ſhilling and the penny. But when the ſhilling was reduced, it was of little uſe, and by degrees entirely laid aſide.

Dr. Hickes obſerves, that the method of computing by *thrimſas* was chiefly uſed in the more mercantile parts of this kingdom, among the Eaſt and Weſt and South Saxons, and poſſibly coined only among them; for it appears that the inland provinces, the Mercians, reckoned generally by the ſhilling. Clark's Conn. of the Roman, Saxon, and Engliſh Coins, p. 229, &c.

THRINIUM-*gild*. See TRINIUM-*gild*.

THRIO, ϑριω, in *Antiquity*, a feſtival in honour of Apollo.

THRIPS, in *Natural Hiſtory*, a name uſed among the ancients to expreſs a ſort of worm hatched from the egg of a beetle; which, while in the worm-ſtate, eats its way into wood, and forms cells and cavities in it of various ſhapes, and in various directions, often reſembling the figures of letters or other things. See ENXYLON.

The ancient Greeks are ſaid to have uſed ſmall pieces of the wood thus eroded in particular forms, as ſeals, before the engraving of theſe utenſils was invented, and indeed they muſt very well have ſerved this purpoſe, ſince it is ſcarce poſſible to conceive how one of theſe pieces of corroded wood ſhould be counterfeited, or the impreſſion imitated.

Lucian mentions his marking his olives with a ſignature of one of theſe pieces of wood greatly eroded, and uſes the word *thrips*, not as the name of the animal, but of the piece of wood eroded by it. Theophraſtus, Pliny, and Ariſtotle, alſo uſe the ſame expreſſion; and we find that the word *thrips* was as frequently uſed to ſignify the pieces of wood eroded, as the animal which eroded them.

In the Linnæan ſyſtem, the *thrips* is of the order of *hemiptera*: the characters are, that the roſtrum is ſmall and obſcure, the antennæ as long as the thorax, the body ſlender, and of equal thickneſs, the abdomen reſlexible, and often bent upwards, the four wings extended, incumbent, narrow, and croſſing one another at ſome diſtance from their baſe; the *thrips* has ſix feet, and the tarſus of each foot has only two articulations. Theſe inſects are common in many plants and flowers, and eſpecially on peaches and nectarines. They may be deſtroyed in the ſame manner as the aphides. See PEACH-*tree*.

THRISSA, in *Ichthyology*, the name given by the Greeks and by the modern Latin writers to the fiſh which we call the SHAD, or the mother of the herrings.

THROAT, the anterior part of an animal, between the head and the ſhoulders, wherein is the gullet.

Phyſicians include, under the word *throat*, all that hollow, or cavity, which may be ſeen when the mouth is wide open.

It is ſometimes alſo called *iſthmus*, becauſe it is narrow, and bears ſome reſemblance to what is called by the geographers *iſthmus*.

THROAT, in *Architecture*, *Fortification*, &c. See GORGE and GULA.

THROAT, in a *Ship*, is a name given to the inner end of a gaff, or to that part which is next the maſt. It is oppoſed to peek, which implies the outer extremity of the ſaid gaff, or that part which extends the ſail behind. Hence the ropes employed to hoiſt up, and lower a gaff, being applied to thoſe parts of it, are called the *throat*, and peek haliards. Falconer.

THROAT, *ſore*, in *Medicine*. See QUINZY.

THROAT-*wort*, *trachelium*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has a ſmall empalement cut at the top in five parts, ſitting upon the germen; it has but one petal, which is funnel-ſhaped, having a long ſlender cylindrical tube, cut at the top into five ſmall oval ſegments, which ſpread open; it has five hair-like ſtamina, of the length of the petal, terminated by ſingle ſummits, and a roundiſh three-cornered germen, ſituated under the flower, ſupporting a long ſlender ſtyle, crowned by a globular ſtigma; the germen turns to a roundiſh obtuſe capſule, with three lobes, having three cells, which are filled with ſmall ſeeds. We have but one ſpecies, which grows naturally in ſhady woods in many parts of Italy.

This plant yields, when wounded, a milky juice in great plenty, and this, if received into a ſhell or other ſmall veſſel, curdles immediately, and the whey runs from the thick part; this whey is of a brown colour, whereas that of the wild lettuce is of a fine purple, and dries into a cake that may be crumbled into a purple powder. The juice of the *throat-wort* ſmells ſour, and its curdled part, being dried, burns like reſin at the flame of a candle. Phil. Tranſ. N° 224.

THROMBUS, ϑρομϐος, a word uſed by ſome medical writers, to expreſs a grume or clot of blood.

THRONE, ϑρονος, a royal ſeat, or chair of ſtate, enriched with ornaments of architecture and ſculpture, made of ſome precious matter, raiſed one or more ſteps, and covered with a kind of canopy.

Such are the *thrones* in the rooms of audience of kings, and other ſovereigns.

THROPPLE, among *Country People*, denotes the windpipe of a horſe.

THROSTLE, or *ſong-thruſh*, *mavis*, or TURDUS *muſicus* of Linnæus, in *Ornithology*, is called by authors the *turdus viſcivorus minor*, to diſtinguiſh it from the larger ſpecies, called in Engliſh the MISSEL-*bird*, and uſually known among us by the ſimple name of *thruſh*. It is called *viſcivorus* by authors, from its reſemblance in colour to the other *viſcivorus*, not from its feeding on the miſletoe-berries as that does.

It reſembles the miſſel-thruſh in colour, except that the inner coverts of the wings are yellow.

It feeds on worms, ſnails, and ſmall inſects, and remains with us the whole year. It builds with moſs and ſtubble, and lines the neſt with mud. On this it lays five or ſix eggs, which are of a bluiſh green, variegated with a few black ſpots. It ſits on hedges and buſhes, and ſings very agreeably.

The *throſtle* is the fineſt of our ſinging-birds, not only for the ſweetneſs and variety of its notes, but for the long continuance of its harmony; as it obliges us with its ſong for near three parts of the year. See TURDUS.

THROSTLING, a diſeaſe of black cattle, proceeding from humours gathering under their throats; by which means their throats are ſo dangerouſly ſwelled, that they will be choaked unleſs ſeaſonably relieved by bleeding.

THROW *the glove*. See GLOVE.

THROWED *ſilk*. See SILK.

THROWSTER, one who prepares raw ſilk for the weaver, by cleanſing and twiſting it. See MILLING.

THRUSH, in *Farriery*. See RUNNING-*thruſh*.

THRUSH, in *Medicine*. See APHTHÆ and INFANT.

THRUSH, in *Ornithology*, is the TURDUS *viſcivorus* of Linnæus, and the largeſt of the genus. See MISSEL-*bird*.

THRUSH, *wind*. See RED-*wing*.

THRUST, in *Fencing*, is an action of which there are three kinds. To *thruſt in carte*, is to throw your hand as far as poſſible on the inſide, with the point of your ſword towards your adverſary's breaſt: to *thruſt ſeconde*, is to have your arm in a perfect oppoſition to your adverſary's, holding your head inſide: to *thruſt tierce*, differs from carte only by the poſition of the hand, which muſt be reverſed.

THRYALLIS, in *Botany*, a name given by Nicander, and ſome other writers, to a ſpecies of mullein, uſed in the coronæ and garlands of the ancients; and, as he expreſsly ſays, different from the common wild mullein.

Dioſcorides ſeems to make this his third ſpecies, and calls it *lychnitis*, from its uſe in lamps; the Greeks beating out its thready ſtalks, and uſing them for the wicks of lamps.

In the Linnæan ſyſtem, *thrya'lis* is a genus of the *decandria monogynia* claſs: the characters of which are, that the calyx is quinque-partite, that it has five petals, and a three-berried capſule. There is one ſpecies.

THUIA, in *Botany*. See TREE *of Life*.

THUMB, *pollex*, in *Anatomy*, one of the members or parts of the HAND.

The firſt phalanx of the bones of the *thumb* is not like thoſe of the other fingers. Ancient authors reckon it among the bones of the metacarpus, which it reſembles very much, and by this means allow only two phalanges to the *thumb*, and make five metacarpal bones. The convex ſide of this phalanx is very much flatted, and is much broader toward the head than toward the baſis. On the concave ſide is a kind of angular line, which in ſome meaſure diſtinguiſhes it into two parts. Its head is like thoſe of the metacarpal bones, only flatted at top. The articular ſide of its baſis is proportioned to the digital ſide of the *os trapezium* of the carpus, and framed in ſuch a manner as that the ſigmoide cavities and eminences in the two bones croſs one another. This articulation has ſomething very particular in it; it is a kind of double ginglymus, which readily allows of flexion and extenſion, adduction and abduction, but with difficulty permits the oblique motions, becauſe then the two ſides run counter to each other.

The ſecond phalanx of the *thumb* is ſhorter than the firſt; its body is convex or ſemi-cylindrical on one ſide, flat on the other, and contracted between the edges. The articular ſide of the baſis is gently concave, and is ſurrounded near the edges by ſmall tuberoſities, as alſo near the angle of the phalanx. The head is a regular portion of a pulley, which projects more on the concave than the convex ſide; and on each ſide of it there is a ſmall foſſula, and ſome inequalities in form of tubercles. On the flat, or concave ſide of the phalanx are two rough lines, one near each edge; they are the impreſſions or marks of the articular vaginæ. The connection of this phalanx with the firſt, is by a kind of arthrodia, or by a flat enarthroſis, which permits a motion in ſeveral directions, though more limited than in other articulations of the ſame kind. It is articulated with the third by a very perfect ginglymus.

The third phalanx of the *thumb* repreſents the half of a ſort of cone, cut lengthwiſe, and by joining it to the ſame bone of the other *thumb*, an entire cone is formed; the convex ſide is more even than the flat ſide, and on each edge there is a tuberoſity near the baſis: the baſis has two hollow ſides, which form a ginglymus with the head of the ſecond phalanx. The head is flat and ſmall, ending with a rough ſemicircular border, which on the flat ſide of the bone repreſents a horſe-ſhoe. Winſlow's Anat. p. 87.

THUMMIM, in the *Scripture learning*. See URIM and THUMMIM.

THUNDER, a noiſe in the loweſt region of the air, excited by a ſudden exploſion of electrical clouds; which, on this account, are called *thunder*-clouds.

Seneca, Rohault, and other authors, both ancient and modern, account for *thunder* by ſuppoſing two clouds impending over one another, the upper and rarer whereof, becoming condenſed by a freſh acceſſion of air raiſed thither by warmth from the lower parts of the atmoſphere, or driven upon it by the wind, immediately falls forcibly down upon the lower and denſer cloud; by which fall, the air interpoſed between the two being compreſſed, that next the extremities of the two clouds is ſqueezed out, and leaves room for the extremity of the upper cloud to cloſe tight upon the under; thus a great quantity of air is encloſed, which, at length eſcaping through ſome winding irregular vent or paſſage, occaſions that noiſe which we call *thunder*.

But this could only reach to the phenomena of *thunder* heard without lightning; and, therefore, recourſe has been had to another ſolution. It has been ſaid, that *thunder* is not occaſioned by the falling of clouds, but by the kindling of ſulphureous exhalations, in the ſame manner as the noiſe of aurum fulminans.

"There are ſulphurous exhalations, ſays ſir Iſaac "Newton, always aſcending into the air when the "earth is dry; there they ferment with the nitrous "acids, and, ſometimes taking fire, generate *thunder*, "lightning, &c."

That, beſides the vapours raiſed from water, &c. there are alſo exhalations carried off from ſulphur, bitumen, volatile ſalts, &c. is paſt all doubt; the vaſt quantity of ſulphurous and bituminous matter all over the ſurface of the earth, and the volatile ſalts of plants and animals, afford ſuch an ample ſtock thereof, that it is no wonder the air ſhould be filled with ſuch particles, raiſed higher or lower, according to their greater or leſs degree of ſubtilty and activity; and more copiouſly ſpread in this or that quarter, according to the direction of the winds.

Now, the effects of *thunder* are ſo like thoſe of fired gunpowder, that Dr. Wallis thinks we need not ſcruple to aſcribe them to the ſame cauſe; and the principal ingredients in gunpowder, we know, are nitre and ſulphur; charcoal only ſerving to keep the parts ſeparate, for their better kindling.

Hence, if we conceive in the air a convenient mixture of nitrous and ſulphurous particles, from the ſources above mentioned; and thoſe, by any cauſe, to be ſet on fire, ſuch exploſion may well follow; and with ſuch noiſe and light, the two phenomena of *thunder*, as is the firing of gunpowder; and being once kindled, it will run from place to place, this way or that, as the exhalations happen to lead it; much as is found in a train of gunpowder.

This exploſion, if high in the air, and remote from us, will do no miſchief, but, if near us, may deſtroy trees, animals, &c. as gunpowder would do in the like circumſtances.

This nearneſs, or diſtance, may be eſtimated by the interval of time between the flaſh and the noiſe. Dr. Wallis obſerves, that, ordinarily, the difference between the two is about ſeven ſeconds, which, at the rate of 1142 feet in a ſecond of time, gives the diſtance about a mile and a half; but ſometimes it comes in a ſecond or two, which argues the exploſion very near us, and even among us. And in ſuch caſes, the doctor aſſures us, he has more than once foretold the miſchiefs that happened.

Upon the whole, that there is in lightning a ſulphurous vapour, has been argued from the ſmell of ſulphur which attends it, and from the ſultry heat in the air which uſually precedes it; and that there is a nitrous vapour along with it, the ſame author concludes hence, that we know of no other body ſo liable to a ſudden and violent exploſion. And as to the kindling of theſe materials, we know that a mixture of ſulphur and ſteel filings, with a little water, will of itſelf break forth into actual flame. Nothing, therefore, is wanting to the exploſion but ſome chalybeate or vitriolic vapour; and, among the various effluvia from the earth, the doctor does not doubt but there muſt be ſome of that kind; but, in proof of what he leaves as a probability, the following facts have been alledged.

In hiſtory, we meet with inſtances of its raining iron in Italy, and iron ſtones in Germany: Jul. Scaliger tells us, he had by him a piece of iron rained in Savoy. Cardan reports 1200 ſtones to have fallen from heaven, ſome of them weighing 30, ſome 40, and one 120 pounds, all very hard, and of the colour of iron.

The matter of fact is ſo well atteſted, that Dr. Liſter, in the Philoſophical Tranſactions, builds a whole theory of *thunder* and lightning on it; maintaining, that they both owe their matter to the vapour, or exhalation of the pyrites.

The noiſe of *thunder*, and the flame of lightning, are eaſily made by art. If a mixture of oil or ſpirit of vitriol be made with water, and ſome filings of ſteel added to it, there will immediately ariſe a thick ſmoak, or vapour, out of the mouth of the veſſel; and if a lighted candle be applied to this, it will take fire, and the flame immediately deſcend into the veſſel, and this will be burſt to pieces with a noiſe like that of a cannon.

This is ſo far analogous to *thunder* and lightning, that a great exploſion and fire are occaſioned by it; but in this they differ, that this matter when once fired is deſtroyed, and can give no more exploſions; whereas, in the heavens, one clap of *thunder* uſually follows another, and there is a continued ſucceſſion of them for a long time. Mr. Homberg explained this by the lightneſs of the air above us, in compariſon of that here, which therefore would not ſuffer all the matter ſo kindled to be diſſipated at once, but kept it for ſeveral returns.

Ever ſince the year 1752, in which the identity of the matter of lightning, and of the electric fluid, has been aſcertained, philoſophers have generally agreed in conſidering *thunder* as a concuſſion produced in the air by an electrical exploſion. For the illuſtration and proof of this theory, ſee LIGHTNING. See alſo ELECTRICITY.

We ſhall here obſerve, that Mr. Henry Eeles, in a letter written in 1751, and read before the Royal Society in 1752, conſiders the electrical fire as the cauſe of *thunder*, and endeavours to account for it on this hypotheſis; and he tells us, that he did not know of any perſon's having made the ſame conjecture. Phil. Tranſ. vol. xlvii. p. 524, &c.

That rattling in the noiſe of *thunder*, which makes it ſeem as if it paſſed through arches, or were broken variouſly, is probably owing to the ſound being excited among clouds hanging over one another, and the agitated air paſſing irregularly between them.

See this phenomenon particularly accounted for under LIGHTNING.

THUNDERBOLT. If what we call lightning acts with extraordinary violence, and breaks or ſhatters any thing, it is called a *thunderbolt*, which the vulgar, to fit it for ſuch effects, ſuppoſe to be a hard body, and even a ſtone.

But that we need not have recourſe to a hard ſolid body to account for the effects commonly attributed to the *thunderbolt*, will be evident to any one, who conſiders thoſe of the pulvis fulminans, and of gunpowder; but more eſpecially the aſtoniſhing powers of electricity, even when collected and employed by human art, and much more when directed and exerciſed in the courſe of nature.

When we conſider the known effects of electrical exploſions, and thoſe produced by LIGHTNING, we ſhall be at no loſs to account for the extraordinary operations vulgarly aſcribed to *thunderbolts*. As ſtones and bricks ſtruck by lightning are often found in a vitrified ſtate, we may reaſonably ſuppoſe with ſignior Beccaria, that ſome ſtones in the earth, having been ſtruck in this manner, firſt gave occaſion to the vulgar opinion of the *thunderbolt*.

Places ſtruck with *thunderbolts* were held ſacred among the ancients. Nigidius has a curious treatiſe on the *thunderbolt*.

The ancient painters and poets have armed Jupiter with a ſort of flaming dart, called a *thunderbolt*. Thus, it is ſaid, he became maſter both of gods and men.

Theſe *thunderbolts* are forged for Jupiter, according to the poets, by the CYCLOPES.

The *thunderbolt*, in antiquity, repreſented ſovereignty, and a power equal to the gods; on this account Apelles painted Alexander, in the temple of Diana of Epheſus, holding a *thunderbolt* in his hand; and on medals, the *thunderbolt* is ſometimes found to accompany the emperors heads, as that of Auguſtus.

Appian informs us, that the *thunderbolt* was the principal divinity of Seleucia; adding, that it was adored, even in his time, with various hymns and ceremonies.

THUNDER-*clouds*, in *Phyſiology*, are thoſe clouds which are in a ſtate fit for producing lightning and *thunder*. From ſignior Beccaria's exact and circumſtantial account of the external appearances of *thunder-clouds*, we ſhall extract the following particulars.

The firſt appearance of a *thunder* ſtorm (which generally happens when there is little or no wind), is one denſe cloud, or more, increaſing very faſt in ſize, and riſing into the higher regions of the air. The lower ſurface is black, and nearly level; but the upper finely arched, and well defined. Many of theſe clouds often ſeem piled one upon another, all arched in the ſame manner; but they keep continually uniting, ſwelling, and extending their arches.

At the time of the riſing of this cloud, the atmoſphere is generally full of a great number of ſeparate clouds, motionleſs, and of odd and whimſical ſhapes. All theſe, upon the appearance of the *thunder cloud*, draw towards it, and become more uniform in their ſhapes as they approach; till, coming very near the *thunder-cloud*, their limbs mutually ſtretch towards one another; they immediately coaleſce, and, together, make one uniform maſs. Theſe he calls *adſcititious* clouds, from their coming in, to enlarge the ſize of the *thunder-cloud.* But ſometimes the *thunder-cloud* will ſwell, and increaſe very faſt, without the conjunction of any adſcititious clouds; the vapours in the atmoſphere forming themſelves into clouds wherever it paſſes. Some of the adſcititious clouds appear like white fringes, at the ſkirts of the *thunder-cloud,* or under the body of it, but they keep continually growing darker and darker, as they approach to unite with it.

When the *thunder-cloud* is grown to a great ſize, its lower ſurface is often ragged, particular parts being detached towards the earth, but ſtill connected with the reſt. Sometimes the lower ſurface ſwells into various large protuberances, bending uniformly toward the earth. And ſometimes one whole ſide of the cloud will have an inclination to the earth, and the extremity of it will nearly touch the earth. When the eye is under the *thunder-cloud,* after it is grown larger, and well formed, it is ſeen to ſink lower, and to darken prodigiouſly; at the ſame time that a number of ſmall adſcititious clouds (the origin of which can never be perceived) are ſeen in a rapid motion, driving about in very uncertain directions under it. While theſe clouds are agitated with the moſt rapid motions, the rain generally falls in the greateſt plenty, and if the agitation be exceedingly great, it commonly hails.

While the *thunder-cloud* is ſwelling, and extending its branches over a large tract of country, the lightning is ſeen to dart from one part of it to another, and often to illuminate its whole maſs. When the cloud has acquired a ſufficient extent, the lightning ſtrikes between the cloud and the earth, in two oppoſite places, the path of the lightning lying through the whole body of the cloud and its branches. The longer this lightning continues, the rarer does the cloud grow, and the leſs dark is its appearance; till, at length, it breaks in different places, and ſhows a clear ſky. When the *thunder-cloud* is thus diſperſed, thoſe parts which occupy the upper regions of the atmoſphere are equally ſpread, and very thin; and thoſe that are underneath are black, but thin too; and they vaniſh gradually, without being driven away by any wind.

Theſe *thunder-clouds* were ſometimes in a poſitive as well as negative ſtate of electricity. The electricity continued longer of the ſame kind, in proportion as the *thunder-cloud* was ſimple, and uniform in its direction, but when the lightning changed its place, there commonly happened a change in the electricity of the apparatus, over which the clouds paſſed. It would change ſuddenly after a very violent flaſh of lightning, but the change would be gradual when the lightning was moderate, and the progreſs of the *thunder-cloud* ſlow. Beccar. Lettere dell' Elletriciſmo, p. 107. or Prieſtley's Hiſt. Electr. vol. i. p. 397, &c. See LIGHTNING.

THUNDER-*houſe*, in *Electricity*, is an inſtrument invented by Dr. James Lind of Edinburgh, for illuſtrating the manner by which buildings receive damage from lightning, and to evince the utility of metallic conductors in preſerving them from it.

A (*Tab.* V. *Electricity, fig.* 43.) is a board about three quarters of an inch thick, and ſhaped like the gable-end of a houſe. This board is fixed perpendicularly upon the bottom board B, upon which the perpendicular glaſs pillar C D is alſo fixed in a hole about eight inches diſtance from the baſis of the board A. A ſquare hole I L K M, about a quarter of an inch deep, and nearly one inch wide, is made in the board A, and is filled with a ſquare piece of wood, nearly of the ſame dimenſions. It is nearly of the ſame dimenſions, becauſe it muſt go ſo eaſily into the hole, that it may drop off, by the leaſt ſhaking of the inſtrument. A wire L K is faſtened diagonally to this ſquare piece of wood. Another wire I H of the ſame thickneſs, having a braſs ball H ſcrewed on its pointed extremity, is faſtened upon the board A: ſo alſo is the wire M N, which is ſhaped in a ring at O. From the upper extremity of the glaſs pillar C D, a crooked wire proceeds, having a ſpring ſocket F, through which a double knobbed wire ſlips perpendicularly, the lower knob G of which falls juſt above the knob H. The glaſs pillar D C muſt not be made very faſt into the bottom board; but it muſt be fixed ſo that it may be pretty eaſily moved round its own axis, by which means the braſs ball G may be brought nearer or farther from the ball H, without touching the part E F G. Now when the ſquare piece of wood L M I K (which may repreſent the ſhutter of a window or the like) is fixed into the hole ſo that the wire L K ſtands in the dotted repreſentation I M, then the metallic communication from H to O is complete, and the inſtrument repreſents a houſe furniſhed with a proper metallic conductor; but if the ſquare piece of wood L M I K is fixed ſo that the wire L K ſtands in the direction L K, as repreſented in the figure; then the metallic conductor H O, from the top of the houſe to its bottom, is interrupted at I M, in which caſe the houſe is not properly ſecured.

Fix the piece of wood L M I K, ſo that its wire may be as repreſented in the figure, in which caſe the metallic conductor H O is diſcontinued. Let the ball G be fixed at about half an inch perpendicular diſtance from the ball H, then, by turning the glaſs pillar D C, remove the former ball from the latter; by a wire or chain connect the wire E F with the wire Q of the jar P, and let another wire or chain, faſtened to the hook O, touch the outſide coating of the jar. Connect the wire Q with the prime conductor, and charge the jar; then, by turning the glaſs pillar D C, let the ball G come gradually near the ball H, and when they are arrived ſufficiently near one another, you will obſerve, that the jar explodes and the piece of wood L M I K is puſhed out of the hole to a conſiderble diſtance from the *thunder-houſe.* Now the ball G, in this experiment, repreſents an electrified cloud, which, when it is arrived ſufficiently near the top of the houſe A, the electricity ſtrikes it, and as this houſe is not ſecured with a proper conductor, the exploſion breaks part of it, i. e. knocks off the piece of wood I M.

Repeat the experiment with only this variation, viz. that this piece of wood I M is ſituated ſo that the wire L K may ſtand in the ſituation I M; in which caſe the conductor H O is not diſcontinued; and you will obſerve that the exploſion will have no effect upon the piece of wood L M; this remaining in the hole unmoved; which ſhews the uſefulneſs of the metallic conductor.

Farther, unſcrew the braſs ball H from the wire H I, ſo that this may remain pointed, and with this difference only in the apparatus repeat both the above experiments, and you will find that the piece of wood I M is in neither caſe moved from its place, nor any exploſion will be heard, which not only demonſtrates the preference of conductors with pointed terminations to thoſe with blunted ones, but alſo ſhews that a houſe, furniſhed with ſharp terminations, although not furniſhed with a regular conductor, is almoſt ſufficiently guarded againſt the effects of lightning.

Mr. Henly, having connected a jar containing 509 ſquare inches of coated ſurface with his prime conductor, obſerved that if it was ſo charged as to raiſe the index of his electrometer to 60°, by bringing the ball on the wire of the *thunder-houſe*, to the diſtance of half an inch from that connected with the prime conductor, the jar would be diſcharged, and the piece in the *thunder-houſe* thrown out to a conſiderable diſtance. Uſing a pointed wire for a conductor to the *thunder-houſe*, inſtead of the knob, the charge being the ſame as before, the jar was diſcharged ſilently, though ſuddenly; and the piece was not thrown out of the *thunder-houſe*. In another experiment having made a double circuit to the *thunder-houſe*, the firſt by the knob, the ſecond by a ſharp-pointed wire, at one and one-fourth of an inch diſtance from each other, but of exactly the ſame height (as in *fig.* 44.) the charge being the ſame; although the knob was brought firſt under that connected with the prime conductor, which was raiſed half an inch above it, and followed by the point, yet no exploſion could fall upon the knob; the point drew off the whole charge ſilently, and the piece in the *thunder-houſe* remained unmoved. Phil. Tranſ. vol. lxiv. part i. p. 136. See POINTS in *electricity*.

THUNDER-*ſtone*, in *Natural Hiſtory*, the ſame with that called by authors BRONTIA.

THUNDER-*ſtorm*. See THUNDER-*clouds*.

THUNDERING *Legion*, *Legio Fulminans*, was a legion in the Roman army, conſiſting of Chriſtian ſoldiers; who in the expedition of the emperor Marcus Aurelius Antoninus againſt the Sarmatæ, Quadi, and Marcomanni, A. D. 174, are ſaid to have ſaved the whole army, then ready to periſh with thirſt, by procuring, with their prayers, a very plentiful ſhower thereon; and at the ſame time, a furious hail, mixed with lightning and thunderbolts, on the enemy, and thus he obtained a deciſive victory.

This is the account commonly given by eccleſiaſtical hiſtorians; and the whole ſtory is engraven in bas-relievos on the Antonine column. And hence aroſe the denomination *thunderers*: though ſome ſay, that the legion thoſe Chriſtians were of, was called the *thundering legion* before.

This deliverance has been thought by many to have been miraculous, owing to the prayers of the Chriſtians, who were in the Roman army; and it has been ſuppoſed, that the emperor wrote a letter to the ſenate on this occaſion, which was very favourable to the Chriſtians; others, however, have thought, that the Chriſtians, by a pious a pious ſort of miſtake, attributed this unexpected and ſeaſonable ſhower, which ſaved the Roman army, to a miraculous interpoſition; and this opinion, ſays Moſheim, is indeed ſupported by the weightieſt reaſon as well as by the moſt reſpectable authorities; and the letter of Marcus Antoninus is allowed even by the defenders of the miracle of the *thundering-legion*, to have in it manifeſt tokens of ſpuriouſneſs, to be the work of a man unſkilful in Roman affairs, and who probably lived in the ſeventh century. Moſheim ſums up the arguments on this ſubject in the following manner; it is certain, he ſays, that the Roman army encloſed by the enemy, and reduced to the moſt deplorable and even deſperate condition by the thirſt under which they languiſhed in a parched deſart, was revived by a ſudden and unexpected rain. It is alſo certain, that both the Heathens and the Chriſtians looked upon this event as extraordinary and miraculous; the former attributing it to Jupiter, Mercury, or the power of magic; the latter to Chriſt, interpoſing, thus unexpectedly, in conſequence of their prayers. It is ſtill farther beyond all doubt, that a conſiderable number of Chriſtians ſerved, at this time, in the Roman army, and it is extremely probable, that in ſuch trying circumſtances of calamity and diſtreſs, they emplored the merciful interpoſition and ſuccours of their God and Saviour. And as the Chriſtians of the time looked upon all extraordinary events as miracles, and aſcribed to their prayers all the uncommon and ſingular occurrences of an advantageous nature that happened to the Roman empire, it will not appear ſurpriſing, that upon the preſent occaſion they attributed the deliverance of Antoninus and his army to a miraculous interpoſition which they had obtained from above. But, on the other hand, it muſt be carefully obſerved, that it is an invariable maxim univerſally adopted by the wiſe and judicious, that no events are to be eſteemed miraculous, which may be rationally attributed to natural cauſes, and accounted for by a recourſe to the ordinary diſpenſations of providence; and as the unexpected ſhower, which reſtored the expiring force of the Romans, may be eaſily explained without riſing beyond the uſual and ordinary courſe of nature, the concluſion is manifeſt; nor can it be doubtful in what light we are to conſider that remarkable event. Eccl. Hiſt. vol. i. p. 125. 8vo. edit.

Mr. Moyle and Mr. King had a curious and intereſting controverſy on the ſubject of the *thundering-legion*. The learned Dr. Lardner has collected into one view every thing relating to it of importance, in his Collection of Jewiſh and Heathen Teſtimonies, vol. ii. chap. xv. ſect. iii p. 221, &c.

THURIBULUM, among the Romans, a cenſer, or veſſel, in which incenſe was burnt at ſacrifices.

THURIFICATI, in *Church-Hiſtory*, a deſignation given to thoſe, who, to avoid the perſecution of the Roman emperors, offered frankincenſe to the heathen gods.

THURSDAY, the fifth day of the Chriſtians week, but the ſixth of that of the Jews. See THOR and WEEK.

THURSDAY, *Holy*. See HOLY.

THURSDAY, *Maunday*. See MAUNDAY *Thurſday*.

THURSIO, in *Ichthyology*, a ſpecies of fiſh mentioned by Pliny, lib. ix. cap. 9. It is thought by ſome to be the *phocæna*, or PORPESS; and by others the STURGEON.

THURUS, in *Natural Hiſtory*, the name of a creature deſcribed by Geſner, and ſome others, as a diſtinct ſpecies of wild bull; but the accounts of it ſeem either fabulous or miſtaken deſcriptions of the wild bull.

THUS. See FRANKINCENSE.

THUS, *Judæorum*, called alſo *caſcarilla* and *cortex eleutheriæ*, in the *Materia Medica*, is the bark probably of the ſhrub deſcribed by Cateſby, under the name of *ricinoides elæagni folio* or *ilathera*, the *croton caſcarilla* of Linnæus, which grows plentifully in moſt of the Bahama iſlands; thence it is brought to us in curled pieces, or rolled up into ſhort quills, about an inch wide; covered on the outſide with a rough whitiſh matter; and browniſh within; and exhibiting when broken, a ſmooth cloſe blackiſh brown ſurface. The bark, freed from the outer coat, has a light agreeable ſmell, and a moderately bitter taſte, accompanied with a conſiderable aromatic warmth. It is eaſily inflammable, and yields, whilſt burning, a fragrant ſmell, ſomewhat reſembling that of muſk. Stiſſer was the firſt who employed this bark as a medicine in Europe; who relates that a tincture of it in alkalized vinous ſpirits, or in dulcified alkaline ſpirits, proved carminative and diuretic, and did ſervice in arthritic and ſcorbutic caſes. In 1694 and 1695, it was employed by Apinus in an epidemic fever of the intermittent kind. The gentlemen of the French academy found this bark of excellent ſervice againſt an epidemic dyſentery in 1719, when the ipecacuanha proved ineffectual. At preſent it is of great eſteem among the Germans, as a warm ſtomachic and corroborant, in flatulent colics, internal hæmorrhages, dyſenteries, the diarrhœa of acute fevers, and, mixed with the Peruvian bark, in common intermittents.—Among us it has been lately received into practice; but its uſe, ſays Dr. Lewis, is not yet become ſo general as it well deſerves to be. Its virtues are partially extracted by water, and totally by rectified ſpirits. Lewis's Mat. Med.

THUS, in *Sea-Language*, the order by which the pilot directs the helmſman to keep the ſhip in her preſent ſituation when ſailing with a ſcant wind, ſo that ſhe may not approach too near the direction of the wind, and thereby ſhiver her ſails, nor fall to leeward, and run farther out of her courſe. Falconer. See STEERING.

THUYA. See TREE *of Life* and LIGNUM *Vitæ*.

THWAITE, in *Ichthyology*. See SHAD.

THWART *the hawſe*, in the *Sea-language*. See ATHWART.

THWART *ſhips*, acroſs the ſhips. See ATHWART.

THWART, in a boat, the ſeat or bench of a boat whereon the rowers ſit to manage the oars. Hence THOUGHTS is uſed in the ſame ſenſe.

THYIA, Θυια, in *Antiquity*, a feſtival in honour of Bacchus, celebrated by the Eleans.

THYITES *lapis*, in the *Materia Medica* of the ancients, the name of an indurated clay, approaching to the nature of a ſtone. It was found in Egypt, and uſed in diſtemperatures of the eyes.

This ſubſtance has been very much miſunderſtood by the late writers, and by moſt of them ſuppoſed to be loſt at this time; but this was wholly owing to their miſtaking the claſs of bodies among which they were to look for it: ſome imagining it to have been a ſpecies of green marble; and others the turquoiſe-ſtone, that Diſcorides meant by this name. It is very plain, however, that it was no other than an indurated clay of the MOROCHTHUS kind, and no more a ſtone than that ſubſtance, that being alſo frequently called *lapis morochthus*.

It is of a ſmooth, even and regular texture, very heavy, of a ſhining ſurface, and of a pale green, without the admixture of any other colour. It does not at all adhere to the tongue, nor ſtain the fingers in handling; but drawn along a rough ſurface, leaves a ſlender white line. It melts ſlowly in the mouth, and is of a ſharp, acrid, and diſagreeable taſte; and when rubbed down with water on a marble, it melts into a milky liquor of a pure white, not the leaſt greenneſs being ſenſible in it. It is found at preſent in the great mine at Goſſelar in Saxony, and ſeems to owe its colour to particles of copper, to which alſo it owes the virtues attributed to it by Dioſcorides, acting as a weak kind of verdigriſe. Hill's Hiſt. of Foſſ. p. 36.

THYLACION, a word uſed by the ancient medical writers, to expreſs the bag formed by the membranes of the fœtus at the orifice of the pudenda, before the birth.

THYLLA, Θυλλα, in *Antiquity*, a feſtival in honour of Venus.

THYMALLUS, in *Ichthyology*. See GRAYLING.

THYMBRA, *Mountain hyſſop*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: it has an empalement of one leaf, cut at its brim into two lips, the upper broad, with three equal points; the under narrow and cut in two parts; the flower is of one petal, of the lip-kind; the upper lip is concave, and cut in two obtuſe ſegments, the lower ends with three almoſt equal points: it has four ſlender ſtamina, terminated by twin ſummits under the upper lip, and a four-pointed germen ſupporting a ſlender half-bifid ſtyle, crowned by obtuſe ſtigmas: the germen becomes four ſeeds, which ripen in the empalement.—There are two ſpecies.

THYME, *Thymus*, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the flower has a permanent empalement of one leaf, divided into two lips, whoſe chaps are hairy and ſhut; the upper lip is broad, plain, erect, and indented in three parts; the under lip ends in two equal briſtles: the flower is of the lip kind, and has one petal, with a tube of the length of the empalement; the chaps are ſmall, the upper lip is ſhort, erect, obtuſe, and indented at the point; the lower lip long, broad and divided into three parts; it has four incurved ſtamina two longer than the other, terminated by ſmall ſummits; and a four-pointed germen, ſupporting a ſlender ſtyle, crowned by a bifid acute ſtigma. The germen turns to four ſmall roundiſh ſeeds, ripening in the empalement. There are nine ſpecies.

We have three or four ſpecies of this plant propagated in our gardens, partly for uſe in the kitchen, and partly for curioſity. They are propagated either by ſowing, or by parting the roots, both which ſhould be done either in March or October.

The ſeeds ſhould be ſown on a bed of light earth, and muſt not be buried too deep. When they come up, they muſt be kept clear of weeds, and watered at times; and in June they ſhould be thinned, leaving the plants at about ſix inches aſunder. After this they will grow very faſt, and will require no farther care.

If they are to be propagated the other way, the roots ſhould be taken up, and parted into as many ſlips as can be, and each planted at ſix or eight inches diſtance, on beds of light earth, watering and ſhading them till they have taken root.

The common garden *thyme* is a moderately warm pungent aromatic. To water it imparts by infuſion its agreeable ſmell, with a weak taſte and yellowiſh or brown colour; in diſtillation, it gives over an eſſential oil, in the quantity of about an ounce from thirty pounds of the herb in flower, of a gold yellow colour, if diſtilled by a gentle fire, of a deep browniſh red if by a ſtrong one, of a penetrating ſmell like that of the *thyme* itſelf, but leſs grateful, and in taſte exceedingly hot and fiery: the remaining decoction, inſpiſſated, leaves a bitteriſh, roughiſh, ſubſaline extract. The *ſerpyllum*, or mother of *thyme*, is an elegant aromatic plant, ſimilar to the preceding ſpecies, but milder, and in flavour rather more grateful. Its eſſential oil is both in ſmaller quantity and leſs acrid, and its ſpirituous extract comes greatly ſhort of the penetrating warmth and pungency of that of the other.—It is ſaid to afford an agreeable diſtilled water, more durable, but leſs active and penetrating, than pepper-mint. Lewis. This has been much extolled as a nervous ſimple. An infuſion of it has been ſaid to do wonders in tumors, lowneſs of ſpirits, and head-achs: and it has been much commended for the cure of the night-mare.

The *lemon-thyme*, which is a variety of the laſt, is leſs pungent than the firſt ſort, but more ſo than the ſecond, and much more grateful than either. Diſtilled with water, it yields a larger quantity than the other ſorts, of a yellowiſh very fragrant oil of the lemon-flavour, containing nearly all the medicinal parts of the plant. It gives over alſo, with rectified ſpirit, its finer odorous matter. Lewis.

Maſtich Thyme, a ſpecies of *Satureia*. See *Herb* MASTICH.

THYMELÆA, in *Botany*. See SPURGE-*laurel*.

THYMELÆÆ *radix*, in the *Materia Medica*, the dried root of the *thymelæa foliis lini* of Tournefort and other authors.

It is a light root of different ſizes, of a reddiſh colour without, and greyiſh within, woody, and full of fibres, and taſtes ſweet at firſt, but is hot as fire when it has been held a little time in the mouth. It loſes however both this fiery taſte, and its acrid quality, in long keeping, and with them its virtues.

It is to be choſen new, well fed, and not worm-eaten. The fruit of this plant is the *granum cnidium* of the ſhops. They are both of an acrid quality, and are not in uſe in the ſhops at preſent. See SPURGE-*laurel*.

THYMELE, in the *Ancient Theatre*, a kind of pulpit, where the ſingers, called THYMELICI, performed.

THYMELICI, among the *Romans*, were muſicians, who ſung in the interludes, or who danced and kept time with their geſtures. The place where they performed was called *thymele*, whence Juvenal vi. 66.

Attendit thymele, thymele nunc ruſtica diſcat.

THYMIAMA, ϑυμιαμα, in *Antiquity*, an offering of INCENSE to God.

THYMIAMA, in the *Materia Medica*, a name by which ſome authors have called the *caſcarilla bark*; called by ſome *cortex thuris*, or Indian bark. See THUS *Judæorum*. The *cortex thymiamatis* of the German ſhops is a bark, in ſmall browniſh grey pieces, intermixed with bits of leaves, brought from Syria, Cilicia, &c. and ſuppoſed to be the produce of the liquid *ſtorax-tree*. It has an agreeable balſamic ſmell, approaching to that of liquid ſtorax, and a ſubacid bitteriſh taſte accompanied with ſome ſlight aſtringency. Cartheuſer and Hoffman report, that it affords an excellent fumigation for œdemas, rheumatiſms, and catarrhs; and that the ſpirituous tincture and extract, and the diſtilled ſpirit, are uſeful anodynes or antiſpaſmodics in convulſive coughs and other diſorders. It is rarely met with in this country. Lewis.

THYMIAMATA, a kind of fumigations among the ancients, the ingredients of which were ſo various, that it appears they always conſulted utility as well as pleaſure, in their compoſition of them. We find the gum ammoniacum of the ancients, which had the ſmell of caſtor, uſed in them: whence it is evident, that the ancients uſed ſalutiferous as well as ſweet-ſcented things in theſe fumigations. Galbanum has a worſe ſmell than ammoniacum, and yet this alſo we find, together with the myrrh, and other gums, is made an ingredient in the oldeſt preſcriptions of this kind.—And Pliny mentions the ammoniacum with the ſchænanth, and other ſweets, uſed for this purpoſe.

THYMIC *artery*, in *Anatomy*, is a branch of the right ſubclavian communicating with the mammaria interna, and ſometimes ariſing from the anterior middle part of the common trunk of the ſubclavian and carotid.

THYMOXALME, in the *Materia Medica* of the ancients, was a compoſition uſed externally in the gout, and many diſorders of the limbs, and was given inwardly in diſtemperatures of the ſtomach, a quarter of a pint for a doſe. It operated as a purge, and was prepared in the following manner: take two ounces of bruiſed thyme, as much ſalt, a little meal, rue, and penny-royal.—Theſe were to be put into a pot, and three pints of water and fourteen ounces of vinegar are to be poured upon them; after which they are to be covered with a coarſe cloth, and ſet in the ſun for ſome time. Dioſcorides, lib. v. cap. 24.

THYMUS, Θυμος, in *Anatomy*, an oblong glandular body, round on the upper part, and divided below into two or three lobes, of which that towards the left hand is the longeſt. The greateſt part of it lies between the duplicature of the ſuperior and anterior portion of the mediaſtinum, and the great veſſels of the heart, whence it reaches a little higher than the tops of the two pleuræ, ſo that ſome part of it is out of the cavity of the thorax; and in the fœtus and in children, it lies as much without the thorax as within it.

The *thymus* is that part which in a breaſt of veal we call the ſweetbread.—This gland is big in infants, and of a white colour, ſometimes mixed with red, but, as they grow in age, it becomes leſs, and generally of a dark colour; its arteries and veins are branches of the carotides and jugulars. It has nerves from the par vagum, and its lymphatic veſſels diſcharge themſelves into the ductus thoracicus. Its particular inward ſtructure and ſecretions are not yet ſufficiently known to determine its uſes, which however ſeem to be deſigned more for the fœtus than for adults.

The learned Dr. Tyſon ſuppoſes the uſe of this gland to be for a diverticulum to the chyle in the thoracic duct of a fœtus; whoſe ſtomach, being always full of the liquor in which it ſwims, muſt keep the thoracic duct diſtended with chyle; becauſe the blood which the fœtus receives from the mother, fills the veins, and hinders the free entrance of the chyle into the ſubclavians.

Mr. Cheſelden obſerves, that where the *thymus* in men is very ſmall, the thyroid glands increaſe proportionably; but, in ſuch brutes as have fallen under his obſervation, it is juſt the contrary: from which he is inclined to believe, that they belong to the ſame lymphatics; and that either of them increaſing as much as both ought to do, if both increaſed, anſwers the ſame end as if both did; and that the reaſon why the *thymus* increaſes rather than the thyroid glands, in brutes, is, becauſe the ſhape of their thorax affords convenient room for it to lodge in; and that in men, the reaſon why the thyroid glands increaſe ſo much, is, becauſe there is no room in that part of the thorax where the *thymus* is ſeated, for a large gland to be lodged.

Dr. Pozzi ſays, that the *thymus* of a calf, ſoftened by maceration, diſcovers a lobe, from which a milky liquor runs out when wounded; and if air is afterwards blown into it, the whole *thymus* is diſtended, and may be dried, when it plainly appears to be compoſed of cells communicating with each other; upon the ſides of which muſcular fibres are to be ſeen: from which ſtructure he concludes, that the *thymus* in fœtuſes ſupplies the uſe of the lungs, ſerving as a receptacle for the chyle to be prepared in.

The *thymus* is thought by ſome to furniſh the liquor found in the thorax of fœtuſes. See Mem. de l'Acad. des Scienc. Par. 1733.

The ingenious Mr. Hewſon (Exp. Enquiries, part iii.) conſiders the *thymus* as an appendage to the *lymphatic glands*, for the more perfect and expeditious formation of the central particles of the blood, in the fœtus and during infancy.

THYMUS, in *Surgery*, is uſed for a kind of wart, growing on the parts of generation, the fundament, and ſeveral other places of the body, with cloven aſperities, like thoſe of the herb *thyme*, whence its name.

The ordinary method of curing a *thymus*, is by ligature, and deſiccative lotions, or by cauſtics; and, if large, by inciſion; taking care firſt to ſecure the greater veſſels, by tying them.

THYNNIA, ϑυννια, in *Antiquity*, a ſacrifice offered to Neptune by the fiſhermen, after a plentiful draught.

The word comes from ϑυννος, a tunny, that being the ſacrifice offered.

THYNNUS, in *Ichthyology*, ſee Tunny.

THYOS, Θυος, in *Antiquity*, an offering of fruits, leaves, or acorns, which were the only ſacrifices at firſt in uſe.

THYRO-*adenoidæus*, in *Anatomy*, a name given by Winſlow to a faſciculus of fibres detached from the *thyropharengæus*, and inſerted laterally in the thyroide gland.

THYRO-*arytenoidæi*, in *Anatomy*, are two very broad muſcles, each of which is ſituated laterally between the thyroides and cricoides; and fixed by a broad inſertion in the inſide of the ala of the thyroide cartilage: the fibres contracting from thence, run from before backward, and from below upward, towards the neighbouring arytenoide cartilage, in which they are inſerted, from the glottis to the angle of the baſis. In ſome ſubjects, theſe muſcles cover almoſt both ſides of the glottis.

The *thyro-arytenoidæi*, acting together, draw both the arytenoide cartilages forward, and conſequently looſen the glottis, and render it capable of the ſmalleſt quaverings of the voice. They may likewiſe probably compreſs the lateral ſinuſes or ventricles of the larynx, and alſo the arytenoide glands. Winſlow.

THYROIDÆI, *crico*. See Crico-thyroidæus.

Thyro-epiglottici, are two muſcles which croſs the *thyro-arytenoidæi*, being inſerted in the inner lateral part of the thyroides, and laterally in the epiglottis.—They ſerve with the *aryteno-epiglottici*, to ſhut any lateral opening that may remain when the epiglottis is depreſſed by the baſis of the tongue; and the *hyo-epiglottici* may pull it a little forward in ſtrong reſpirations, as in ſighing, yawning, &c.

Thyro-*hyoidæi*. See Hyo-*thyroidæi*.

Thyro-*pharyngæi*, in *Anatomy*, are muſcles of the *pharynx*, very broad, and each muſcle inſerted along the outſide of the ala of the cartilago thyroides; whence they run obliquely backward and meeting under the linea alba, they ſometimes appear to be but one muſcle without any middle tendon. They ſerve with the other muſcles of the pharynx, chiefly for deglutition, and perhaps partly in modifying the voice. Winſlow.

Thyro-*Staphylini*, in *Anatomy*, are two ſmall muſcles, which accompany the *pharyngo-ſtaphylini* very cloſely, though their whole courſe, except that their poſterior extremities are fixed in the thyroide cartilages near the other muſcles.

THYROIDÆI *Sterno*. See Sterno-*Thyroidæus*.

THYROIDÆA *Glandula*, Thyroide *Gland*, is a large whitiſh maſs which covers the anterior convex ſide of the larynx. It ſeems at firſt ſight to be made up of two oblong glandular portions, united by their inferior extremities below the cricoide cartilage, in ſuch a manner as to have ſome reſemblance of a creſcent, with the cornua turned upward. It is of a moderate thickneſs, and bent laterally like the thyroide cartilage. The two lateral portions lie on the muſculi thyro-hyoidæi, and the middle or inferior portion on the crico-thyroidæi.—The inferior thyro-pharyngæi ſend fibres over this gland, and they communicate on each ſide by ſome ſuch fibres with the ſterno-thyroidæi and hyo-thyroidæi. This gland ſeems to be of the ſame kind with the other ſalival glands, but more ſolid. Some anatomiſts thought they had diſcovered the excretory duct, but they miſtook, ſays Winſlow, a blood-veſſel for it. There is ſometimes a kind of glandular rope which runs before the thyroide cartilage, and diſappears before the baſis of the os hyoides. Winſlow.

This gland receives nerves from the recurrents, arteries from the carotides, and veins which paſs to the jugulars and lymphatics, and diſcharge themſelves into the thoracic duct.

Its uſe is to ſeparate a viſcid moiſture, ſerving to line and lubricate the larynx, to facilitate the motion of its cartilages, to obtund the acrimony of the ſaliva, and to ſoften the voice.

THYROIDES, Θυρεοειδης, formed from ϑυρσος, *buckler*, and ειδος, *form*, in *Anatomy*, the firſt and largeſt of the five cartilages of the larynx; called alſo *ſcutiformis*.

This cartilage is large and broad, and folded in ſuch a manner as to have a longitudinal convexity on the foreſide, and two lateral portions, which may be denominated alæ: the upper part of its anterior middle portion is formed into an angular notch; the upper edge of each ala makes an arch, and together with the middle notch, theſe two edges reſemble the upper part of an ace of hearts in cards: the lower edge of each ala is more even, and the poſterior edges of both are very ſmooth, being lengthened out both above and below by apophyſes, which Winſlow calls the cornua of the *thyroide* cartilage. The ſuperior apophyſes are longer than the inferior, and the extremities of all the four are rounded like ſmall heads, which in the inferior apophyſes have a ſhining ſurface on the inſide, reſembling an articular eminence. On the outſide of each ala near the edge, is a prominent oblique line, running from behind forward. The upper extremity of this line is near the ſuperior apophyſis or cornua, and both that and the lower extremity terminate in a ſmall tuberoſity, the loweſt being often the moſt conſiderable. Theſe tuberoſities ſerve for the inſertion of muſcles and ligaments. The inſide of the alæ and the convex ſide of the anterior portion are very uniform; and this cartilage oſſifies gradually in old age. Winſlow.

THYRRÆUM *vinum*, a ſort of wine among the ancients remarkable for its thickneſs and dark colour; it was ſweet and luſcious, and not aſtringent.

THYRREUS *lapis*, in *Natural Hiſtory*, the name of a foſſil, which the writers of the middle ages have called *ſyrus*.

It has many virtues aſcribed to it; but all the accounts we have of its real properties are from Pliny, who obſerves, that it ſwam upon the water while whole; but when broken into ſmall pieces, theſe ſunk to the bottom. It ſeems to have been a ſort of bitumen of a ſpongy ſtructure.

THYRSUS, Θυρσος, in *Antiquity*, the ſceptre which the ancient poets put in the hands of Bacchus, and wherewith they furniſh the Mænades in their Bacchanalia.

The *thyrſus* was originally a lance or ſpear, wrapped up in vine leaves; wherewith Bacchus is ſaid to have armed himſelf, and his ſoldiers in his Indian wars, to amuſe and deceive the unpractiſed Indians, and make them ſuſpect no hoſtilities.

Hence it was afterwards borne in the feaſts and ſacrifices of that god; and as the Satyrs, who were Bacchus's ſoldiers, were ſuppoſed to have fought with it, it became a cuſtom to repreſent them therewith.

THYSSELINUM, in *Botany*. See *Milky* Parsley.

TIARA, Τιαρα, an ornament, or habit, wherewith the ancient Perſians covered their heads; and which the Armenians, and kings of Pontus, wear on their medals: theſe laſt, becauſe deſcended from the Perſians.

Latin authors call it indifferently *tiara*, and *cidaris*.

Strabo ſays, the *tiara* was in form of a tower; and the ſcholiaſt on Ariſtophanes's comedy, Αχαρνης, act i. ſcene 2. affirms, that it was adorned with peacocks feathers.—Some moderns, however, fancy the ſcholiaſt is here ſpeaking of the caſque which the ancient Perſians wore in war, rather than of the habit which they wore on the head in the city.

The kings of Perſia alone had the right of wearing the *tiara* ſtraight and erect: the prieſts and great lords wore it depreſſed, or turned down, on the fore-ſide. Xenophon, in his Cyropædia, ſays, that the *tiara* was ſometimes encompaſſed with the diadem, at leaſt in ceremonies; and had frequently the figure of an half-moon embroidered on it: others are of opinion, that the diadem was in figure of a moon; and that it was hence the *tiara* was called *lunata*. Laſtly, others think, that the *tiara* itſelf was made ſometimes in form of a half-moon. From what we have ſaid, it appears, that there were different forms of *tiaras*: and, in effect, Paſchalius, De Coronis, diſtinguiſhes no leſs than five different kinds. See Diadem.

The *tiara* was alſo an ornament belonging to the Jewiſh prieſts. Exod. xxviii. 40. xxxix. 26.

Tiara, is alſo the name of the pope's triple crown; anciently called *regnum*.

The *tiara* and keys are the badges of the papal dignity; the *tiara* of his civil rank, and the keys of his juriſdiction: for, as ſoon as the pope is dead, his arms are repreſented with the *tiara* alone, without the keys.

The ancient *tiara* of the popes was a round high cap. Boniface VIII. firſt incompaſſed it with a crown. Benedict XII. added a ſecond crown; and John XXIII. a third.

TIARELLA, in *Botany*, a genus of the *decandria digynia* claſs. Its characters are theſe: the flower has a permanent empalement divided into five oval acute parts; it has five oval petals, of the length of the empalement; and ten awl-ſhaped ſtamina, terminated by roundiſh ſummits, and a bifid germen, ending with two ſtyles, which become an oblong capſule with one cell, opening with two valves, containing ſeveral oval ſeeds. There are two ſpecies.

TIBERIADES *water*, the water of a hot ſpring near *Tiberiades* in Egypt.

Dr. Perry, when on the ſpot, tried ſome experiments on this water, which give us a much better idea of its nature than we have from any other accounts of it. Half a dram of oil of tartar being mixed with an ounce and half of the water, it becomes turbid and muddy; and after twelve hours, three parts of the whole appear like white wool, only leaving a ſmall portion of clear water at the top. The white woolly matter dried, produced only a ſmall quantity of yellow ochre.

Spirit of vitriol added to the water in the ſame quantity, affords a large unctuous ſediment of a white colour. A ſolution of ſublimate being mixed in the ſame quantity, it became turbid and yellowiſh, and yielded an earthy ſediment in ſmall quantity; whence it ſeems evident, that it contains a ſal murale. Saccharum ſaturni being added in the ſame quantity, the water depoſited a lateritious ſediment in a ſmall quantity. Mixt with ſpirit of ſal ammoniac, it turns to a bluiſh green turbid liquor, and finally yields a woolly ſediment. Sugar of violets mixed with it, turned it to a yellow colour; and the ſcrapings of galls mixed with it, turned it to a deep purple; and on ſhaking, this became as black as ink.

It appears from theſe experiments, that the water contains a good deal of a groſs fixed vitriolic ſalt, ſome alum, and a ſal murale. It is too ſalt and nauſeous for internal uſe; but it muſt be of uſe as a bath in all cutaneous foulneſſes, eſpecially in ſcorbutic and leprous caſes; for it will powerfully deterge, ſcour, and cleanſe the excretory pores, and it may be, by its weight and ſtimulus, reſtore them to their natural ſtate and tone, and reſtore the true ſtate of the vitiated ſolids in general. Phil. Tranſ. Nº 462. p. 52.

TIBIA, in *Anatomy*, the bony part of the leg, between the knee and the ankle.

The *tibia* conſiſts of two bones, called *focils*, the one on the inſide of the leg, called the FIBULA, or *little focil*: the other on the outſide, called by the common name *tibia*, or the *great focil*, to which may be added the PATELLA.

TIBIA, is properly the inner and bigger bone of the leg, called alſo *focile majus*. See *Tab. Anat.* (*Oſteol.*) *fig.* 3. *n.* 22. 22. & *fig.* 7. *n.* 26. 26.

The *tibia* is hard and firm, having a pretty large cavity in its middle, to contain the medulla, or marrow.

This is a long bone irregularly triangular, and much larger at the top than below. It is divided into two extremities and a middle part, or into the head, body and baſis. The upper extremity or head conſiſts of two condyles; the upper part of which is flat and divided into two cartilaginous ſurfaces, almoſt horizontal and a little hollow, one internal, the other external: between theſe lies a cartilaginous tuberoſity, which appears to be double, and has inequalities for the inſertion of ligaments. The two ſurfaces anſwer to the two condyles of the os femoris. The whole head taken tranſverſely is oval, except toward the back part, where is a ſuperficial notch, and the circumference is very rough. The external condyle is more prominent than the internal, and in its lower part there is a ſmall cartilaginous ſurface for the articulation of the fibula. On the fore part of the head there is an unequal tuberoſity, called the ſpine of the *tibia*, for the inſertion of the tendinous ligament of the patella.

The lower extremity is neither ſo thick nor ſo broad as the upper: on its outſide there is a longitudinal depreſſion, broader at the lower than at the upper part, which receives the end of the fibula. On the inſide of this baſis there is an apophyſis called the inner ankle, which runs down lower than any other part, and has towards its poſterior ſide a groove or channel for the paſſage of a particular tendon. The baſis of the *tibia* terminates in a tranſverſe, oblong, cartilaginous, articular cavity, the capacity of which is increaſed on the inſide by the inner ankle, the cartilage being continued over that ſide of it, which is turned toward the cavity.—Through the middle of this cavity runs a ſuperficial eminence, by which it is divided into a right and left portion. The greateſt breadth alſo of the baſis of the *tibia* does not lie in the ſame plane with that of the head; the ankle lying a little more inward than the internal condyle: and this is an obſervation of great conſequence in fractures and luxations.

The almoſt triangular body of the *tibia* is diſtinguiſhed into three ſides, internal, external, and poſterior, and into three angles, one anterior called the criſta of the *tibia*, and two poſterior. The inner ſide is the broadeſt of the three, very equal, gently convex, and turned a little forward: the outer ſide is unequally flat, and narrower than the former: the back ſide is unequally rounded, and the narroweſt of all; however at its upper part it is of a conſiderable breadth, in which is obſerved a long oblique muſcular impreſſion, beginning under the notch in the poſterior part of the head, and from thence running downward toward the inner ſide. Immediately below the extremity of this impreſſion there is another, leſs oblique. The anterior angle, called criſta, is ſharp; prominent about the middle, and almoſt round at the lower part: the internal poſterior angle is ſomewhat rounded: the external is more acute, except toward the upper part, where it is more or leſs flatted.

The *tibia* is connected above with the condyles of the os femoris, by an articulation which is partly a ginglymus, for the extenſion and flexion of the leg, and partly an arthrodia for the rotation of the leg when bent. This is owing to two intermediate cartilages. Winſlow.

Mr. Cheſelden gives an inſtance of a boy of ſeven years of age, where both the epiphyſes at the upper end of the *tibia* were ſo far ſeparated, that no more than half each *tibia* was joined to half the epiphyſis; which made his legs wholly uſeleſs. This had been occaſioned by the nurſe's holding him out to ſtool by the heels and back, when very young; which is, among them (as he obſerves) too common a practice.

Inſtances have occured in which the greater part of the *tibia* has been taken out, and afterwards ſupplied by a callus, and regenerated. Edinb. Med. Eſſ. vol. i. p. 192. vol. v. p. 373.

TIBIA, *cartilages of the*. The *tibia* has four or five proper cartilages, and two additional ones. The two proper cartilages which cover the two ſuperior ſurfaces of the head of the *tibia*, are the thickeſt. Theſe are both gently hollow; but the internal, or that next the other *tibia*, is more depreſſed in the middle than the other.—The third proper cartilage covers the ſmall ſurface which lies on the lower part of the external condyle. The fourth covers the lower ſurface of the baſis of the *tibia*, being continued over the outſide of the inner ankle. There are likewiſe ſuperficial cartilaginous incruſtations on the back part of this baſis, behind the inner ankle, and likewiſe on the backſide of the outer ankle, for the paſſage of tendons.

The additional cartilages of the *tibia* are two in number, called ſemilunar, from their figure; and intermediate, or interarticular, from their ſituation; each of theſe cartilages is in the ſhape of a creſcent, or Roman C.—Their convexity, or greater curvature, is very thick; their concavity, or ſmaller curvature, very thin, and ſomething like the edge of a ſickle. They lie on the two upper ſurfaces of the head of the *tibia*; each cartilage is broad enough to cover about two-thirds of the ſurface of the *tibia* on which it lies, leaving one-third bare in the middle; their under ſides are flat, their upper ſides hollow, and, together with the middle portions of the ſurfaces of the head of the *tibia*, they form cavities proportioned to the convexity of the condyles of the os femoris. Winſlow.

TIBIA, *ligaments of the*. This bone is connected to the os femoris by ſeveral ligaments, two lateral, one poſterior, two middle, and one capſular. The innermoſt and broadeſt of the two lateral ones is fixed pretty low down on the inner ſide of the ſuperior part of the *tibia*. The external, which is narrower and thinner than the former, is fixed partly in the *tibia*, immediately above the fibula, and partly in the upper extremity of the fibula; both theſe liganents lie a little behind the middle of the articulation. The poſterior ligament is fixed by ſeveral expanſions in the poſterior part of the head of the *tibia*. One of the crucial ones is fixed by one end to the internal ſuperficial impreſſion in the notch of the os femoris, and by the other, to the notch in the head of the *tibia*: the other is fixed by one end to the external impreſſion in the notch of the os femoris, and by the other between the anterior portions of the ſuperior ſurfaces of the head of the *tibia*. The cornua of the ſemilunar cartilages degenerate into ligaments, ſhort and ſtrong, by which they are faſtened, and communicate by ſome ſmall portions with the crucial ligaments: they have likewiſe a common ligament, which like an arch runs tranſverſely between their anterior convexities. The patella is faſtened alſo to the tuberoſity or ſpine of the *tibia* by a ſtrong ligament; this runs directly down from the apex of the patella; and, beſides this, it has ſeveral ſmall lateral ligaments fixed in the lower part of its edge on each ſide, and inſerted anteriorly and a little laterally in the edge of the head of the *tibia*.

The capſular ligament is fixed round the edge of the head of the *tibia*, and in the edge of the patella. The crucial ligaments, and thoſe of the ſemilunar cartilages, are encloſed in this capſule; but the lateral and poſterior ligaments, and thoſe of the patella, lie without it. The capſule is alſo joined to a conſiderable portion of the circumference of the ſemilunar cartilages, and is ſtrengthened by many ligamentary fibres. Its inſide is ſmooth, and ſhining; and where it is not covered with tendons, is very thin. There is likewiſe a very thin ligament, fixed by one end to the lower part of the cartilaginous ſide of the patella, and by the other to the anterior part of the great notch between the condyles of the os femoris. The uſe of which ſeems to be, to prevent the articular fat from being compreſſed in the motions of the knee. Winſlow.

TIBIA, *fracture of the.* See LEGS.

TIBIÆ *biceps*, ſee BICEPS.

TIBIÆ *quintus*, in *Anatomy*, a name given by the old authors to a muſcle called the *biceps cruris* by Albinus and Winſlow, and the reſt of the moderns.

TIBIA, in *Muſic*, was originally a FLUTE made of the ſhank, or ſhin bone of an animal; and when the art of boring flutes was diſcovered, they were made of boxtree, laurel, braſs, ſilver, and even of gold.

TIBIA *articularis*. See BAGPIPE.

Dr. Burney (Hiſt. Muſ. vol. i. p. 521.) apprehends that the union of this inſtrument with the ſyrinx ſuggeſted the firſt idea of an organ.

TIBIALIA, among the Romans, a kind of ſwaths with which they uſed to cover their legs.

TIBIALIS, or TIBIÆUS, in *Anatomy*, a name given to two muſcles of the leg; diſtinguiſhed by *anticus*, and *poſticus*.

TIBIALIS *anticus*, is a long muſcle, fleſhy at the upper part, and tendinous at the lower, ſituated on the foreſide of the leg, between the tibia and the extenſor digitorum longus. It is fixed above by fleſhy fibres in the upper third part of the external labium of the criſta tibiæ, and of the inſide of the aponeuroſis *tibialis*, or of that ligamentary expanſion which goes between the criſta tibiæ, and the anterior angle of the fibula. It is likewiſe fixed obliquely in the upper two thirds of the outſide of the tibia, or that next the fibula. From thence it runs down, and ends in a tendon, which firſt paſſes through a ring of the common annular ligament, and then through another ſeparate ring, ſituated lower down; afterwards the tendon is fixed, partly in the inner and upper part of the os cuboides, and partly in the inſide of the firſt bone of the metatarſus.

It ſerves to bend the foot, or to turn the point of the foot toward the leg, by the ginglymoide articulation of the aſtragalus with the tibia and fibula: it likewiſe bends the leg on the foot, or hinders its extenſion. Of this laſt uſe we have an inſtance, whenever we ſtand or walk: when we ſtand, the foot being turned directly forward; this muſcle keeps the leg in equilibrio, and hinders it from falling backward. This uſe is ſtill more evident when we walk backward. Winſlow. See *Tab. Anat. (Myol.) fig.* 1. *n.* 62. *fig.* 2. *n.* 44.

TIBIALIS *poſticus*, is ſituated between the tibia and fibula, on the backſide of the leg, and covered by the extenſor digitorum longus. It is fixed above by fleſhy fibres, immediately under the articulation of the tibia and fibula, to the neareſt part of thoſe two bones, chiefly to the tibia, reaching to the lateral parts of that bone above the interoſſeous ligament, which is here wanting. From thence its inſertion is extended below the oblique line or impreſſion in the tibia, over all the neighbouring parts of the interoſſeous ligament, and through more than the upper half of the internal angle of the fibula. Through all this place it is fleſhy and penniform, and is covered by the extenſor digitorum longus. After this, it forms a tendon which runs down below the inner malleolus through a cartilaginous groove, and an annular ligament, and is inſerted in the tuberoſity of the lower part of the os ſcaphoides. When this muſcle acts alone, it extends the foot obliquely inward. When it acts together with the gaſtrocnemii and ſoleus, it changes the ſtraight direction of their motion into an oblique one. When it acts with the *tibialis anticus*, the ſole of the foot is turned more directly inward, or toward the other foot.—Winſlow.

From the uſe which ſailors make of it, it is called *nauticus*. See *Tab. Anat. (Myol.) fig.* 1. *n.* 69. *fig.* 2. *n.* 53. *fig* 7. *n.* 43.

TIBIALIS *gracilis*, a muſcle of the leg, called alſo PLANTARIS. It is a ſmall pyriform muſcle, ſituated obliquely in the ham, below the external condyle of the os femoris, between the poplitæus, and external gaſtrocnemius; and its tendon which is long, flat, and very ſmall, runs down on the ſide of the gaſtrocnemius internus all the way to the heel. The fleſhy body, which is no more than about two inches in length and one in breadth, is fixed by a ſhort flat tendon above the outer edge of the exterior condyle of the os femoris; from thence it runs obliquely over the edge of the poplitæus, and terminates in a very ſmall, but long flat tendon.—The tendon runs between the body of the gaſtrocnemius externus and ſoleus, all the way to the inner edge of the upper part of the tendo Achillis, and from thence continuing its courſe downwards, it joins this tendon, and is inſerted, together with it, in the outſide of the poſterior part of the os calcis, without communicating with the aponeuroſis plantaris. Sometimes this muſcle is wanting, and in ſome ſubjects it is ſituated lower down. Till the true uſe of this muſcle is evidently diſcovered by ſome fortunate obſervation, there is in the mean time ground to think, ſays Winſlow, that it hinders the capſular ligament of the knee from being compreſſed in the flexion of that joint: both becauſe of its adheſion to that ligament, and becauſe of the obliquity of its courſe, eſpecially as the neighbouring portion of the ſame ligament ſeems to require the ſame aſſiſtance from a tendinous expanſion of the ſemimembranoſus. Winſlow.

TIBICEN, in *Ichthyology*, a fiſh of the *trigla* kind, called by many authors, *lyra*, or the *harp-fiſh*; and in ſome parts of England, the *piper*.

The head of this fiſh runs out into two broad horns, which are ſerrated, or beſet with a ſort of teeth, or ſmall ſpines, all along their edges, which is its principal diſtinction from the hirundo or ſwallow-fiſh. Above the gill-fins it has on each ſide a long and ſharp ſpine. The forehead is elevated into a ſort of eyebrows over the eyes; and at the angles of theſe there are ſmall and ſhort ſpines: which are long and crooked. The ſide lines feel but very little rough to the touch, and the forehead between the eyes is not hollowed. The whole head is covered with a bony cruſt, which runs into two horns or ſpines behind. It has three fingers or filaments on each ſide, from the roots of the gill-fins; and its jaws are rough like files, but have no diſtinct teeth. The tail-fin, and the middle of the back, in this fiſh, are red. It is caught in the Mediterranean, and in ſome other ſeas. In our county of Cornwall it is not unfrequently caught about the ſhores, and from the noiſe it makes when taken out of the water is called the *piper*. Ray and Willughby.

TIBURO, in *Ichthyology*, a fiſh very badly and falſely deſcribed by ſeveral authors, and proving, on a ſtrict inquiry, to be no other than the lamia or *white* SHARK.

The *tiburo* of Linnæus is a ſpecies of SQUALUS, with a very broad and heart-ſhaped head, found in the American ſeas. Linnæus queries, whether it is not a variety of the *zygæna* or *hammer-headed* SHARK.

TICK, in *Natural Hiſtory*, a naſty little animal of a livid colour, with a blunt and roundiſh tail, elevated antennæ, a globoſe-ovate form, and full of blood; which infeſts cows, ſwine, goats, ſheep, and dogs. The *tick* or *ricinus* is, in the Linnæan ſyſtem a ſpecies of *acarus* in the *aptera* order of inſects.

TICK, in the *Manege*, a habit that ſome horſes take of preſſing their teeth againſt the manger, or all along the halter or collar as if they would bite it.

TICKING, in *Huſbandry*, denotes the act of ſetting up turfs in ſuch a manner as that they may be dried by the ſun, and fit for being burnt into aſhes on the land.

TICKLISH, in the *Manege*. A horſe is ſaid to be *ticklifh* that is too tender upon the ſpur, and too ſenſible, that does not freely fly the ſpurs, but in ſome meaſure reſiſts them, throwing himſelf up, when they come near and prick his ſkin. A *ticklifh* horſe has ſomewhat of the ramingues, i. e. the kickers againſt the ſpurs; but with this difference, that the latter put back, leap and kick, and yerk out behind, in diſobeying the ſpurs; whereas a *ticklifh* horſe only reſiſts for ſome time, and afterwards obeys, and goes much better, through the fear of a vigorous ham, when he finds the horſeman ſtretch his leg, than he does upon being actually pricked.

TICKSEED, in *Botany*. See CORISPERMUM.

TICUNAS, *poiſon of*, is an active poiſon prepared by the native Indians, on the borders of the river of the Amazons, in three or four degrees of ſouth latitude, which, together with that of Lamas, Pevas, and Yameos, is extracted by fire from plants, called by the French lianes, and uſed in poiſoning their arrows. See an account of the nature and effects of theſe poiſons by M. Heriſſant, in Phil. Tranſ. vol. xlvii. art. 12. and by M. Fontana, in Phil. Tranſ. vol. lxx. part i. Append. art. 2. and alſo Fontana ſur les Poiſons, &c. Florence, 4to See alſo POISON.

TIDE, the ſame with time, or ſeaſon. The word is originally Saxon, *tid*; which ſignifies the ſame.

TIDE, among *Miners*; denotes the ſpace of twelve hours.

TIDE, *ſhrove*. See SHROVE.

TIDE, *twelfth*. See TWELFTH.

TIDE, *Whitſun*. See WHITSUN-*tide*.

TIDES, two periodical motions of the waters of the ſea; called alſo the *flux* and *reflux*, or the *ebb* and *flow*.

When the motion of the water is againſt the wind, it is called a *windward-tide*—when wind and *tide* go the ſame ward, *leeward-tide*—when it runs very ſtrong, it is called a *tide-gate*.

To tide it over or up into any place, is to go in with the *tide*, either ebb or flood, as long as that laſts; then to ſtay at anchor all the time of contrary *tide*; and thus to ſet in again with the return of the next *tide*.

It is ſaid to *flow tide and half-tide*, allowing ſix hours to a *tide*, when the *tide* runs three hours in the offing longer than it does by the ſhore; but, by *longer*, they do not mean its running more hours; but that, if it be high water aſhore at twelve, it will not be ſo in the offing till three. An hour and a half longer makes *tide* and quarter-*tide*, three-fourths of an hour longer makes *tide* and half-quarter *tide*, &c.

When the moon is in the firſt and third quarter, i. e. when ſhe is new and full, the tides are high and ſwift, and are called *ſpring-tides*—when ſhe is in the ſecond and laſt quarter, the *tides* are lower and ſlower; and called *neap-tides*.

Tides, *phenomena of the*. The ſea is obſerved to flow, for certain hours, from ſouth towards north; in which motion, or flux, which laſts about ſix hours, the ſea gradually ſwells; ſo that, entering the mouths of rivers, it drives back the river-waters toward their heads, or ſprings.

After a continual flux of ſix hours, the ſea ſeems to reſt for about a quarter of an hour; after which it begins to ebb, or retire back again from north to ſouth, for ſix hours more; in which time, the water ſinking, the rivers reſume their natural courſe. Then, after a ſeeming pauſe of a quarter of an hour, the ſea again begins to flow, as before; and thus alternately.

Thus does the ſea ebb twice a day, and flow as often; but not in the ſame hours thereof. The period of a flux and reflux is twelve hours forty-eight minutes; ſo that the *tides* return later and later each day, by forty-eight minutes, or three quarters of an hour three minutes.

Now twelve hours forty-eight minutes is a lunar day; i. e. the moon paſſes the earth's meridian later and later each day, by forty-eight minutes. So that the ſea flows as often as the moon paſſes the meridian, both the arch above, and that below the horizon; and ebbs as often as ſhe paſſes the horizon, both the eaſtern and weſtern point thereof.

This farther agreement we obſerve between the moon and the ſea, that the *tides*, though conſtant, are not equal; but are greateſt, when the moon is in conjunction, or oppoſition to the ſun; and leaſt, when in quadrature thereto.

Laſtly, thoſe tides are the greateſt, which happen in the new and full moon, and the time of the equinoxes.

Add, that the ſame things are obſerved throughout moſt of the coaſts of Europe; only that the tides are ſo much the leſs, and happen the later, as the coaſts are the more northerly.

Theſe phenomena of the *tides* are admirably accounted for, from the principle of gravitation. All we require to their ſolution is, that the earth and moon, and every particle thereof, mutually gravitate towards each other: the reaſonableneſs of which aſſumption, ſee under the article Gravity.

Indeed the ſagacious Kepler, long ago, conjectured this to be the cauſe of the *tides*: "If, ſays he, the earth "ceaſed to attract its waters towards itſelf, all the water "in the ocean would riſe and flow into the moon: the "ſphere of the moon's attraction extends to our earth, "and draws up the water." Thus thought Kepler, in his Introd. ad. Theor. Mart. This ſurmiſe, for it was then no more, is now abundantly verified in the following theory, firſt amply deduced by Dr. Halley from the Newtonian principles.

However we may obſerve with M. de la Lande (Aſtronomie, vol. iv. Paris, 1781.) that ſeveral of the ancients, and among others, Pliny, Ptolemy, and Macrobius, were acquainted with the influence of the ſun and moon upon the *tides*. And Pliny ſays expreſly, that the cauſe of the ebb and flow is in the ſun, which attracts the waters of the ocean; and adds, that the waters riſe in proportion to the proximity of the moon to the earth.

Tides, *theory of the*.—1. It is obvious, that if the earth was entirely fluid, and quieſcent, its particles, by their mutual gravity towards each other, would form themſelves into the figure of an exact ſphere.

Suppoſe then, that ſome power acts on all the particles of this earth with an equal force, and in parallel directions, the whole maſs will be moved by ſuch a power, but its figure will ſuffer no alteration by it; becauſe all the particles, being equally moved by this power in parallel lines, they will ſtill keep the ſame ſituation with reſpect to each other, and ſtill form a ſphere, whoſe centre will have the ſame motion as each particle. Upon this ſuppoſition, if the motion of the earth round the common centre of gravity of the earth and moon was deſtroyed, and the earth was left to the influence of its gravitation towards the moon, the earth falling toward the moon would ſtill retain its ſpherical figure; all the parts being equally carried on, and retaining therefore the ſame ſituation with reſpect to each other. But the effects of the moon's action, as well as the action itſelf, on different parts of the earth, are unequal: thoſe parts, by the general law of Gravity, being moſt attracted which are neareſt the moon, and thoſe being leaſt attracted which are fartheſt from the moon; while the parts that are at a middle diſtance, are attracted by a mean degree of force; beſides, all the parts are not acted on in parallel lines, but in lines directed towards the centre of the moon; and on theſe accounts the ſpherical figure of the earth muſt ſuffer ſome change from the moon's action.

Suppoſing the earth to fall towards the moon, and abſtracting from the mutual gravitation of its parts towards each other, and alſo from their coheſion; it will eaſily appear, that the parts neareſt the moon would fall with the ſwifteſt motion, being moſt attracted, and that they would leave the centre or greater bulk of the earth behind them in their fall, while the more remote parts would fall with the ſloweſt motion, being leſs attracted than the reſt, and be left a little behind the bulk of the earth, ſo as to be found at a greater diſtance from the centre of the earth than at the beginning of the motion. Whence it is manifeſt, that the earth would ſoon loſe its ſpherical figure, and form itſelf into an oblong ſpheroid, whoſe longeſt diameter would point at the centre of the moon.

If the particles of the earth did not gravitate toward each other, but toward the moon only, the diſtances betwixt the parts of the earth that are ſuppoſed to be neareſt the moon, and the central parts, would continually increaſe becauſe of their greater celerity in falling; and the diſtance betwixt the central parts, and the parts that are fartheſt from the moon, would increaſe continually at the ſame time; theſe being left behind by the central parts, which they would follow, but with a leſs velocity. Thus the figure of the earth would become more and more oblong, that diameter of it which pointed toward the moon continually increaſing.

But there is another reaſon why the earth would ſoon aſſume an oblong ſpheroidal form, if its parts were allowed to fall freely by their gravity towards the moon's centre; for the lateral parts of the earth, or thoſe which are at the diſtance of a quarter of a circle from the point which is directly below the moon, and the central parts, deſcending with equal velocities toward the ſame point, viz. the centre of the moon, in approaching to it, would manifeſtly approach, at the ſame time, to each other; and their diſtance becoming leſs, the diameters of the earth paſſing through them would be diminiſhed, ſo that the diameters of the earth that point toward the moon would increaſe, and thoſe diameters of the earth that are perpendicular to the line joining the centres of the earth and moon, would decreaſe at the ſame time, and render the figure of the earth ſtill more oblong for this reaſon.

Let us now allow the parts of the earth to gravitate towards its centre; and, as this gravitation far exceeds the action of the moon, and much more exceeds the differences of her actions on different parts of the earth, the effect, reſulting from the inequalities of theſe actions of the moon, will be only a ſmall diminution of the gravity of thoſe parts of the earth which it endeavoured in the former ſuppoſition to ſeparate from its centre, and a ſmall addition to the gravity of thoſe parts which it endeavoured to bring nearer to its centre; that is, thoſe parts of the earth which are neareſt to the moon, and thoſe which are fartheſt from her, will have their gravity toward the earth ſomewhat abated; whereas the lateral parts will have their gravity increaſed; ſo that, if the earth be ſuppoſed fluid, the columns from the centre to the neareſt, and to the fartheſt parts muſt riſe, till, by their greater height, they be able to balance the other columns, whoſe gravity is either not ſo much diminiſhed, or is increaſed by the inequalities of the action of the moon. And thus the figure of the earth muſt ſtill be an oblong ſpheroid.

Let us now conſider the earth, inſtead of falling toward the moon by its gravity, as projected in any direction, ſo as to move round the centre of gravity of the earth and

and moon; it is manifeſt, that the gravity of each particle toward the moon will endeavour to bring it as far from the tangent, in any ſmall moment of time, as if the earth were allowed to fall freely toward the moon; in the ſame manner as any projectile, at our earth, falls from the line of projection as far as it would fall by its gravity in the perpendicular in the ſame time. Conſequently the parts of the earth neareſt to the moon will endeavour to fall fartheſt from the tangent, and thoſe fartheſt from the moon will endeavour to fall leaſt from the tangent, of all the parts of the earth; and the figure of the earth, therefore, will be the ſame as if the earth fell freely toward the moon; that is, the earth will ſtill affect a ſpheroidal form, having its longeſt diameter directed towards the moon.

In order to underſtand this theory, it muſt be carefully conſidered, that it is not the action of the moon, but the inequalities in that action, that produce any variation from the ſpherical figure: and that, if this action were the ſame in all the particles as in the central parts, and operating in the ſame direction, no ſuch change would enſue.

For the farther illuſtration of the preceding obſervations, we muſt perceive, that the waters at Z, (*Tab. Geography, fig.* 8.) on the ſide of the earth A B C D E F G H, next to the moon M, are more attracted than the central parts of the earth O by the moon, and the central parts are more attracted by her than the waters on the oppoſite ſide of the earth at *n*; and therefore, the diſtance between the earth's centre and the waters on its ſurface, under and oppoſite to the moon, will be increaſed. For let H, O, and D be three bodies, all equally attracted by the body M, and they will all move equally faſt toward it, their mutual diſtances from each other continuing the ſame. If the attraction of M is unequal, then that body which is moſt ſtrongly attracted will move faſteſt, and this will increaſe its diſtance from the other body. Conſequently, by the law of gravitation, M will attract H more ſtrongly than it does O, by which the diſtance between H and O will be increaſed; and a ſpectator in O will perceive H riſing higher toward Z. In like manner O, being more ſtrongly attracted than D, will move farther toward M than D does; and therefore the diſtance between O and D will be increaſed; and a ſpectator in O, not perceiving his own motion, will ſee D receding farther from him toward *n*; all effects and appearances being the ſame, whether D recedes from O, or O from D.

Suppoſe now there is a number of bodies, as A, B, C, D, E, F, G, H, placed round O, ſo as to form a flexible or fluid ring; then, as the whole is attracted toward M, the parts at H and D will have their diſtance from O increaſed; whilſt the parts at B and F, being nearly at the ſame diſtance from M as O is, will not recede from one another; but rather, by the oblique attraction of M, they will approach nearer to O. Hence the fluid ring will form itſelf into an ellipſe Z I B L *n* K F N Z, whoſe longer axis *n* O Z produced, will paſs through M, and its ſhorter axis, B O F, will terminate in B and F. Let the ring be filled with fluid particles, ſo as to form a ſphere round O; then, as the whole moves toward M, the fluid ſphere being lengthened at Z and *n*, will aſſume an oblong or oval form. If M is the moon, O the earth's centre, A B C D E F G H the ſea covering the earth's ſurface, it is evident that, whilſt the earth by its gravity falls towards the moon, the water directly below her at H will ſwell, and gradually riſe toward her; and alſo the water at D will recede from the centre, (or ſtrictly ſpeaking, the centre recedes from D), and riſe on the oppoſite ſide of the earth; whilſt the water at B and F is depreſſed, and falls below the former level. Hence, as the earth turns round its axis from the moon to the moon again in $24\frac{1}{4}$ hours, this oval of water muſt ſhift with it; and thus there will be two tides of flood and two of ebb in that time.

From the above reaſoning it appears, that the parts of the earth directly under the moon, or that have the moon in their zenith, and alſo thoſe in the nadir, or places diametrically oppoſite to each other, will have the flood, or high-water at the ſame time.

Moreover, thoſe parts of the earth, where the moon appears in the horizon, or 90° diſtant from the zenith and nadir, will have the ebbs, or loweſt waters.

It is evident that, by the motion of the earth on its axis, the moſt elevated part of the water is carried beyond the moon in the direction of the rotation. The water continues to riſe after it has paſſed directly under the moon, though the immediate action of the moon there begins to decreaſe, and comes not to its greateſt elevation till it has got half a quadrant farther. It continues alſo to deſcend after it has paſſed at 90° diſtance from the point below the moon, though the force which the moon adds to its gravity begins to decreaſe there. For ſtill the action of the moon adds to its gravity, and makes it deſcend till it has got half a quadrant farther; the greateſt elevation, therefore, is not in the points which are in a line with the centres of the earth and moon, but about half a quadrant to the eaſt of thoſe points in the direction of the motion of rotation. Thus, in open ſeas, where the waters flow freely, the moon M (*fig.* 8.) is generally paſt the north and ſouth meridian, as at *p*, when the high-water is at Z and at *n*: the reaſon of which is plain, becauſe the moon acts with ſome force after ſhe has paſt the meridian, and therefore adds to the libratory or waving motion, which the water acquired when ſhe was in the meridian; and therefore, the time of high water is not preciſely at the time of her coming to the meridian, but ſome time after.

Beſides, the *tides* anſwer not always to the ſame diſtance of the moon from the meridian at the ſame places; but are variouſly affected by the action of the ſun, which brings them on ſooner when the moon is in her firſt and third quarters, and keeps them back later when ſhe is in her ſecond and fourth; becauſe, in the former caſe, the *tide* raiſed by the ſun alone would be earlier than the *tide* raiſed by the moon, and in the latter caſe later.

2. We have hitherto taken notice only of the actions of the moon in producing *tides*; but it is manifeſt that, for the ſame reaſons, the inequality of the ſun's action on different parts of the earth, would produce a like effect, and that this alone would produce a like variation from the exact ſpherical figure of a fluid earth. So that, in reality, there are two *tides* every natural day from the action of the ſun, as there are in the lunar day from that of the moon, ſubject to the ſame laws; and the lunar *tide*, as we have obſerved, is ſomewhat changed by the action of the ſun, and the change varies every day on account of the inequality between the natural and the lunar day. Indeed, the effect of the ſun in producing *tides*, becauſe of his immenſe diſtance, muſt be conſiderably leſs than that of the moon, though the gravity toward the ſun be much greater. For it is not the action of the ſun or that of the moon, but the inequalities in the actions of each, which have any effect. The ſun's diſtance is ſo great, that the diameter of the earth is as a point compared to it, and the difference between the action of the ſun on the neareſt, and that on the fartheſt parts, becomes, on this account, vaſtly leſs than it would be if the ſun was as near as the moon.

However, the immenſe bulk of the ſun makes the effect ſtill ſenſible, even at ſo great a diſtance; and therefore, though the action of the moon has the greateſt ſhare in producing the *tides*, the action of the ſun adds ſenſibly to it when they conſpire together, as in the change and full of the moon, when they are nearly in the ſame line with the centre of the earth, and therefore unite their forces. Thus, in conjunction, or when the ſun and moon are on the ſame ſide of the earth, they both conſpire to raiſe the water in the zenith, and conſequently in the nadir; and when they are in oppoſition, that is, when the earth is between them, whilſt one makes high water in the zenith and nadir the other does the ſame in the nadir and zenith. Conſequently, in the ſyzygies, or at new and full moon, the *tides* are the greateſt, and are what we call the *ſpring-tides*. Moreover the action of the ſun diminiſhes the effect of the moon's action in the quarters, becauſe the one raiſes the water in that caſe where the other depreſſes it; and therefore, in the quadratures the *tides* are the leaſt, and are called *neap-tides*.

Sir Iſaac Newton has calculated the effects of the ſun and moon reſpectively upon the *tides*, from their attractive powers. The augmentation of the gravity of the lateral parts of the earth, produced by the action of the ſun, is a ſimilar effect to an augmentation, eſtimated by him on another occaſion, that is made to the gravity of the moon toward the earth by the ſame action, when the moon is in the quarters; only the addition made to the gravity of the lateral parts is about $60\frac{1}{2}$ times leſs, becauſe their diſtance from the earth's centre is ſo many times leſs than the gravity of the moon from it. The gravity of thoſe parts of the earth that are directly beneath the ſun, and of thoſe oppoſite to it, is diminiſhed by a double quantity of what is added to the lateral parts; and as the diminution of gravity to the one, and augmentation of gravity of the other, conſpire together in raiſing the water under the ſun, and the parts oppoſite to it, above its height in the lateral parts; the whole force that produces this effect is to be conſidered as triple of what is added to the gravity of the lateral parts; and is thence found to be to the gravity of the particles as 1 to 12868200, and to the centrifugal force at the equator as 1 to 44527. The elevation of the waters by this force is conſidered by Newton as an effect ſimilar to the elevation of the equatorial parts above the polar parts of the earth, ariſing from the centrifugal force at the equator; and, being 44527 times leſs, is found to be 1 foot and 11$\frac{1}{30}$ inches, Paris meaſure. This is the elevation ariſing from the action of the ſun upon the water.

Mr. Maclaurin makes this elevation to be 1 foot 10 $\frac{8651}{10000}$ inches, of the ſame meaſure, which differs from the above eſtimate by the $\frac{1}{8}$th part of an inch; and the greateſt elevation, when the ſun is in the equinoctial, 1 foot 11 $\frac{1}{60}$ inches.

In order to find the force of the moon upon the water, Newton compares the *ſpring-tides*, at the mouth of the river Avon, below Briſtol, with the *neap-tides* there, and finds their proportion to be that of 9 to 5; whence, after ſeveral neceſſary corrections, he concludes, that the force of the moon is to that of the ſun, in raiſing the waters of the ocean, as 4,4815 to 1; ſo that the force of the moon is able, of itſelf, to produce an elevation of 8 feet and 7$\frac{5}{22}$ inches, and the ſun and moon together may produce an elevation of about 10$\frac{1}{2}$ feet, in their mean diſtances from the earth, and an elevation of about 12 feet, when the moon is neareſt the earth. The height to which the water is found to riſe, upon coaſts of the open and deep ocean, is agreeable enough to this computation.

Dr. Horſley eſtimates the force of the moon to that of the ſun as 5,0469 to 1. Newton. Princip. lib. iii. ſect. iii. prop. 36, 37, apud Newt. Op. Ed. Horſley, vol. iii. p. 104, &c. and Maclaurin's Diſſ. de Cauſa Phyſica Fluxus and Refluxus Maris apud Phil. Nat. Princ. Math. Comment. le Seur & Jacquier, tom. iii. p. 272.

3. It muſt be obſerved, that the *ſpring-tides* do not happen preciſely at new and full moon, nor the *neap-tides* at the quarters, but a day or two after, becauſe, as in other caſes, ſo in this, the effect is not greateſt or leaſt when the immediate influence of the cauſe is greateſt or leaſt. As e. g. the greateſt heat is not on the ſolſtitial day, when the immediate action of the ſun is greateſt, but ſome time after.

That this may be more clearly underſtood, let it be conſidered, that though the actions of the ſun and moon were to ceaſe this moment, yet the *tides* would continue to have their courſe for ſome time; for the water, where it is now higheſt, would ſubſide, and flow down on the parts that are lower, till, by the motion of deſcent, being there accumulated to too great a height, it would neceſſarily return again to its firſt place, though in a leſs meaſure, being retarded by the reſiſtance ariſing from the attraction of its parts. Thus it would for ſome time continue in an agitation like to that in which it is at preſent. The waves of the ſea, that continue after a ſtorm ceaſes, and every motion almoſt of a fluid, may illuſtrate this.

4. The different diſtances of the moon from the earth produce a ſenſible variation of the *tides*. When the moon approaches the earth, her action on every part increaſes, and the differences of that action on which the *tides* depend, increaſe. For her action increaſes as the ſquares of the diſtances decreaſe; and though the differences of the diſtances themſelves be equal, yet there is a greater diſproportion betwixt the ſquares of leſs, than the ſquares of greater quantities; e. g. 3 exceeds 2 as much as 2 exceeds 1, but the ſquare of 2 is quadruple of the ſquare of 1, whilſt the ſquare of 3 (viz. 9.) is little more than double the ſquare of 2 (viz. 4).

Thus it appears, that, by the moon's approach, her action on the neareſt parts increaſes more quickly than her action on the remote parts; and the *tides*, therefore, increaſe in a higher proportion as the diſtances of the moon decreaſe. Sir Iſaac Newton ſhews, that the *tides* increaſe in proportion as the cubes of the diſtances decreaſe, ſo that the moon, at half her preſent diſtance, would produce a *tide* eight times greater.

The moon deſcribes an ellipſe about the earth, and in her neareſt diſtance produces a *tide* ſenſibly greater than at her greateſt diſtance from the earth: and hence it is, that two great *ſpring-tides* never ſucceed each other immediately; for if the moon be at her neareſt diſtance from the earth at the change, ſhe muſt be at her greateſt diſtance at the full, having, in the intervening time, finiſhed half a revolution; and, therefore, the *ſpring-tide* then will be much leſs than the *tide* at the change was: and for the ſame reaſon, if a great *ſpring-tide* happens at the time of full moon, the *tide* at the enſuing change will be leſs.

5. The *ſpring-tides* are greateſt about the time of the equinoxes, i. e. about the latter end of March and September, and leaſt about the time of the ſolſtices, i. e. toward the end of June and December; and the *neap-tides* are leaſt at the equinoxes and greateſt at the ſolſtices; ſo that the difference betwixt the ſpring and the *neap-tides* is much leſs conſiderable at the ſolſtitial than at the equinoctial ſeaſons. In order to illuſtrate and evince the truth of this obſervation, it is manifeſt, that if either the ſun or moon was in the pole, they could have no effect on the *tide*, for their action would raiſe all the water at the equator to the ſame height; and any place of the earth, in deſcribing its parallel to the equator, would not meet, in its courſe, with any part of the water more elevated than another, ſo that there could be no *tide* in any place.

The effect of the ſun or moon is greateſt when in the equinoctial; for then the axis of the ſpheroidal figure, ariſing from their action, moves in the greateſt circle, and the water is put into the greateſt agitation; and hence it is that the *ſpring-tide*, produced, when the ſun and moon are both in the equinoctial, are the greateſt of any, and the *neap-tides* are the leaſt of any about that time.

But the *tides* produced when the ſun is in either of the tropics, and the moon in either of her quarters, are greater than thoſe produced when the ſun is in the equinoctial, and the moon in her quarters, becauſe, in the firſt caſe, the moon is in the equinoctial, and, in the latter caſe, the moon is in one of the tropics; and the *tide* depends more on the action of the moon than that of the ſun, and is, therefore, greateſt when the moon's action is greateſt.

However, it is neceſſary to obſerve, 6. That, becauſe the ſun is nearer the earth in winter than in ſummer, the greateſt *ſpring-tides* are after the autumnal, and before the vernal equinox.

7. Since the greateſt of the two *tides* happening in every diurnal revolution of the moon, is that wherein the moon is nearer the zenith, or nadir; for this reaſon, while the ſun is in the northern ſigns, the greater of the two diurnal *tides* in our climates, is that ariſing from the moon above the horizon; when the ſun is in the ſouthern ſigns, the greateſt is that ariſing from the moon below the horizon.

In proof of this obſervation, let it be conſidered, that when the moon declines from the equator toward either pole, one of the greateſt elevations of the water follows the moon, and deſcribes nearly the parallel on the earth's ſurface which is under that which the moon, on account of the diurnal motion, ſeems to deſcribe; and the oppoſite greateſt elevation, being antipodal to that, muſt deſcribe a parallel as far on the other ſide of the equator; ſo that while the one moves on the north ſide of the equator, the other moves on the ſouth ſide of it, at the ſame diſtance. Now the greateſt elevation which moves on the ſame ſide of the equator, with any place, will come nearer to it than the oppoſite elevation, which moves in a parallel on the other ſide of the equator; and therefore, if a place is on the ſame ſide of the equator with the moon, the *day-tide*, or that which is produced while the moon is above the horizon of the place, will exceed the *night-tide*, or that which is produced while the moon is under the horizon of the place. It is the contrary if the moon is on one ſide, and the place on the other ſide of the equator; for then the elevation which is oppoſite to the moon, moves on the ſame ſide of the equator with the place, and, therefore, will come nearer to it than the other elevation. This difference will be greateſt when the ſun and moon both deſcribe the tropics; becauſe the two elevations in that caſe deſcribe the oppoſite tropics, which are the fartheſt from each other of any two parallel circles they can deſcribe. Thus it is found, by obſervation, that the evening *tides* in the ſummer exceed the morning *tides*, and the morning *tides* in winter exceed the evening *tides*. The difference is found at Briſtol to amount to fifteen inches, and at Plymouth to one foot. It would be ſtill greater, but that a fluid always retains an impreſſed motion for ſome time; ſo that the preceding *tides* affect always thoſe that follow them. Upon the whole, while the moon has north declination, the greateſt *tides* in the northern hemiſphere are when ſhe is above the horizon, and the reverſe while her declination is ſouth.

To illuſtrate this matter by figures; let N E S Q (*fig.* 10, 11, 12.) be the earth, N C S its axis, E Q the equator, T ♋ the tropic of Cancer, *t* ♑ the tropic of Capricorn, *a b* the arctic circle, *c d* the antarctic, N the north pole, S the ſouth pole, M the moon, F and G the two eminences of water, whoſe loweſt parts are at *a* and *d* (*fig.* 10.) at N and S (*fig.* 11.) and at *b* and *c* (*fig.* 12.) always 90° from the higheſt.

Now, when the moon is in her greateſt north declination at M, the higheſt elevation G under her is on the tropic of Cancer, T ♋, and the oppoſite elevation F on the tropic of Capricorn *t* ♑; and theſe two elevations deſcribe the tropics by the earth's diurnal rotation. All places in the northern hemiſphere ENQ, have the higheſt *tides* when they come into the poſition *b* ♋ Q under the moon; and the loweſt *tides* when the earth's diurnal rotation carries them into the poſition *a* T E, on the ſide oppoſite to the moon; the reverſe happens at the ſame time in the ſouthern hemiſphere ESQ, as is evident to ſight. The axis of the *tides* *a* C *d* has now its poles *a* and *d* (being always 90° from the higheſt elevations) in the arctic and antarctic circles; and, therefore, it is plain, that at theſe circles there is but one *tide* of flood, and one of ebb, in the lunar day. For when the point *a* revolves half round to *b*, in twelve lunar hours, it has a *tide* of flood; but when it comes to the ſame point *a* again in twelve hours more, it has the loweſt ebb. In ſeven days afterward, the moon M comes to the equinoctial circle, and is over the equator EQ, when both elevations deſcribe the equator; and in both hemiſpheres, at equal diſtances from the equator, the *tides* are equally high in both parts of the lunar day. All the phenomena being reverſed, when the moon has ſouth declination, to what they were when her declination was north, require no farther deſcription.

8. Such would the *tides* regularly be, if the earth were all over covered with ſea very deep, ſo that the water might follow the influence of the ſun and moon; but, by reaſon of the ſhoalneſs of ſome places, and the narrowneſs of the ſtreights in others, by which the *tides* are propagated, there ariſes a great diverſity in the effect, not to be accounted for, without an exact knowledge of all the circumſtances of the places; and as the poſition of the land, and the breadth and depth of the channels, direction of the winds, &c. For a very ſlow and imperceptible motion of the whole body of water, where it is (for example) two miles deep, will ſuffice to raiſe its ſurface ten or twelve feet in a *tide's* time; whereas, if the ſame quantity of water were to be conveyed through a channel forty fathom deep, it would require a very great ſtream to effect it in ſo large inlets as are the channel of England, and the German ocean; whence the *tide* is found to ſet ſtrongeſt in thoſe places where the ſea grows narroweſt, the ſame quantity of water being, in that caſe, to paſs through a ſmaller paſſage.

This is moſt evident in the ſtreights between Portland and C. la Hogue in Normandy, where the tide runs like a ſluice: and would be yet more between Dover and Calais, if the *tide*, coming round the iſland, did not check it.

This force, being once impreſſed upon the water continues to carry it above the level of the ordinary height in the ocean, particularly where the water meets a direct obſtacle, as it does in St. Maloes; and where it enters into a long channel, which running far into the land, grows very ſtraight at its extremity, as it does into the Severn ſea at Chepſtow and Briſtol.

This ſhoalneſs of the ſea, and the intercurrent continents, are the reaſons that in the open ocean the *tides* riſe but to very ſmall heights in proportion to what they do in wide-mouthed rivers, opening in the direction of the ſtream of the *tide*; and that high-water is not at the time of the moon's appulſe to the meridian, but always ſome hours after it, as it is obſerved upon all the weſtern coaſts of Europe and Africa, from Ireland to the Cape of Good Hope; in all which a ſouth-weſt moon makes high water; and the ſame is reported to hold in the weſt of America.

So that *tides* happen to different places at all diſtances of the moon from the meridian, and conſequently at all hours of the lunar day.

It is to be conſidered that, in order to allow the *tides* their full motion, the ocean, in which they are produced, ought to be extended from eaſt to weſt 90° at leaſt. Becauſe the places, where the moon raiſes moſt, and moſt depreſſes the water, are at that diſtance from each other. Hence it appears, that it is only in the great oceans that ſuch *tides* can be produced, and why in the larger Pacific Ocean they exceed thoſe in the Atlantic Ocean. Hence alſo it is obvious, why the *tides* are not ſo great in the torrid zone, between Africa and America, where the ocean is narrower, as in the temperate zones on either ſide; and we may hence alſo underſtand, why the *tides* are ſo ſmall in iſlands that are very far diſtant from the ſhores. It is manifeſt, that, in the Atlantic Ocean, the water cannot riſe on one ſhore but by deſcending on the other; ſo that, at the intermediate diſtant iſlands, it muſt continue at a mean height betwixt its elevation on one and on the other ſhore. But when *tides* paſs over *ſhoals*, and through ſtraits into bays of the ſea, their motion becomes more various, and their height depends on many circumſtances.

The *tide* that is produced on the weſtern coaſts of Europe, in the Atlantic, correſponds to the ſituation of the moon already deſcribed. Thus it is high water on the coaſts of Spain, Portugal, and the weſt of Ireland, about the third hour after the moon has paſſed the meridian; from thence it flows into the adjacent channels, as it finds the eaſieſt paſſage. One current from it, e. g. runs up by the ſouth of England, another comes in by the north of Scotland; they take a conſiderable time to move all this way, and it is high-water ſooner in the places to which they firſt come, and it begins to fall at thoſe places, while they are ſtill going on to others that are farther in their courſe. As they return, they are not able to raiſe the tide, becauſe the water runs faſter off than it returns, till, by a new tide propagated from the open ocean, the return of the current is ſtopped, and the water begins to riſe again. The tide, propagated by the moon, in the German Ocean, when ſhe is three hours paſt the meridian, takes twelve hours to come from thence to London Bridge; ſo that, when it is high water there, a new *tide* is already come to its height in the ocean; and, in ſome intermediate place, it muſt be low-water at the ſame time.

Conſequently, when the moon has north declination, and we ſhould expect the *tide* at London to be the greateſt when the moon is above the horizon, we find it is leaſt; and the contrary when ſhe has ſouth declination.

At ſeveral places it is high water three hours before the moon comes to the meridian; but that tide which the moon puſhes, as it were, before her, is only the *tide* oppoſite to that which was raiſed by her when ſhe was nine hours paſt the oppoſite meridian.

It would be endleſs to recount all the particular ſolutions which are eaſy corollaries from this doctrine: as, why the lakes and ſeas, ſuch as the Caſpian ſea and the Mediterranean ſea, the Black ſea and Baltic, have no ſenſible *tides*: for lakes are generally ſo ſmall, that when the moon is vertical ſhe attracts every part of them alike, and therefore, no part of the water can be raiſed higher than another: and having no communication with the ocean, it can neither increaſe nor diminiſh their water, in order to riſe and fall; and ſeas that communicate by ſuch narrow inlets, and are of ſo immenſe an extent, cannot, in a few hours time, receive and empty water enough to raiſe or ſink their ſurface any thing ſenſibly.

To demonſtrate the excellency of this doctrine, the example of the *tides* in the port of Batſha, in the kingdom of Tunquin in the Eaſt Indies, 20° 50′ north lat. which are ſo extraordinary and different from all others we have yet heard of, may ſuffice.

The day in which the moon paſſes the equinoctial, the water ſtagnates there without any motion; as the moon removes from the equinoctial, the water begins to riſe and fall once a day; and it is high-water at the ſetting of the moon, and low-water at her riſing. This daily tide increaſes for about ſeven or eight days, and then decreaſes for as many days by the ſame degrees, till this motion ceaſes, when the moon has returned to the equinoctial. When ſhe has paſſed the equinoctial, and declines toward the ſouth pole, the water riſes and falls again as before; but it is high water now at the riſing, and low-water at the ſetting of the moon.

Sir Iſaac Newton, in order to account for this extraordinary tide, conſiders that there are two inlets to this port of Batſha, one from the Chineſe ocean, betwixt the continent and the Manillas, the other from the Indian ocean betwixt the continent and Borneo. This leads him to propoſe, as a ſolution of this phenomenon, that a *tide* may arrive at Batſha, through one of theſe inlets, at the third hour of the moon, and another through the other inlet ſix hours after, at the ninth hour of the moon. For, while theſe *tides* are equal, the one flowing in as the other ebbs out, the water muſt ſtagnate; now they are equal when the moon is in the equinoctial; but as ſoon as the moon begins to decline on the ſame ſide of the equator with Batſha, it has been ſhewn that the diurnal *tide* muſt exceed the nocturnal, ſo that two greater and two leſſer *tides* muſt arrive at Batſha by turns. The difference of theſe will produce an agitation of the water, which will riſe to its greateſt height at the mean time betwixt the two greateſt *tides*, and fall loweſt at a mean time betwixt the two leaſt *tides*; ſo that it will be high-water about the ſixth hour at the ſetting of the moon, and low-water at her riſing. When the moon has got to the other ſide of the equinoctial, the nocturnal *tide* will exceed the diurnal; and, therefore, the high-water will be at the riſing, and low-water at the ſetting of the moon.

The ſame principles will ſerve to account for other extraordinary *tides*, which, we are told, are obſerved in places whoſe ſituation expoſes them to ſuch irregularities.

When the time of high-water at any place is, in general, mentioned, it is to be underſtood on the days of the ſyzygies, or days of new and full moon; when the ſun and moon paſs the meridian of the place at the ſame time. Among pilots, it is cuſtomary to reckon the time of flood, or high-water, by the point of the compaſs the moon bears on, allowing ¾ of an hour for each point, at that time; thus, on the full and change days, in places where it is flood at noon, the tide is ſaid to flow north and ſouth, or at twelve o'clock; in other places, on the ſame days, where the moon bears 1, 2, 3, 4, or more points to the eaſt or weſt of the meridian, when it high-water, the tide is ſaid to flow on ſuch point; thus, if the moon bears S. E. at flood, it is ſaid to flow S. E. and N. W. or three hours before the meridian, that is, at 9 o'clock; if it bears S. W. it flows S. W. and N. E. or at three hours after the meridian; and in like manner for other points of the moon's bearing.

The times of high-water in any place fall about the ſame hours after a period of about fifteen days, or between one ſpring tide and another; but during that period, the times of high-water fall each day later by about 48 minutes.

From the obſervations of many perſons there have been collected the times when it is high-water on the days of the new and full moon, on moſt of the ſea-coaſts of Europe, and many other places; which are uſually put in a table againſt the names of the places; a ſpecimen of which is ſubjoined.

Names of Places.	Coaſt.	High water	
		H.	M.
Abbrevrak, - France	Engliſh chann.	4	30
Aberdeen, - Scotland	German ocean	0	45
Aldborough, - England	Ditto -	9	45
I. Alderney, - ditto	Engliſh chann.	12	00
R. Amazons, mouth, Am.	Atlantic ocean	6	00
I. Ameyland, Dutchland	German ocean	7	30
Amſterdam, - ditto	Ditto -	3	00
St. Andrew's, - Scotland	Ditto -	2	15
I. Anholt, - Denmark	Sound -	0	00
Antwerp, - Flanders	River Schelde	6	00
Archangel, - Ruſſia	White ſea	6	00
I. Arran, - Ireland	St. Geo. chan.	11	00
R. Aſhley, - Carolina	Atlantic ocean	0	45
St. Auguſtine, - Florida	Ditto -	4	30
Baltimore, - Ireland	Weſtern ocean	4	30
C. Barfleur, - France	Engliſh chann.	7	30
I de Bas, - - ditto	Ditto -	3	45
Bayonne, - - ditto	Bay of Biſcay	3	30
Beachy-head, - England	Engliſh chann.	0	00
N. Bear, } S. Bear, } - Labrador	Hudſon's bay	12	00
Belfaſt, - Ireland	Iriſh ſea	10	00
Belliſle, - France	Bay of Biſcay	3	30
I. Bermudas, Bahama iſles	Atlantic ocean	7	00
Berwick, - England	German ocean	2	30
I. du Bic, - Acadia	R. St. Lawr.	2	00
Blackney, - England	German ocean	6	00
C. Blanco, - Negroland	Atlantic ocean	9	45
Blanchart-race, - France	Engliſh chann.	0	00
Port Louis, - ditto	Bay of Biſcay	3	00
C. Bojador, - Negroland	Atlantic ocean	0	00
Bourdeaux, - France	Bay of Biſcay	3	00
Boulogne, - ditto	Engliſh chann.	10	30
Bremen, - Germany	R. Weſer	6	00
Breeſound, - Dutchland	German ocean	4	30
Breſt, - - France	Bay of Biſcay	3	45
Bridlington-bay, England	German ocean	3	45
Brill, - Dutchland	Ditto -	1	30
Briſtol, - England	St. Geo. chan.	6	45
Buchanneſs, - Scotland	German ocean	3	00
Button's iſles, N. Britain	Hudſon's ſtraits	6	50
Cadiz, - - Spain	Atlantic ocean	4	30
Caen, - - France	Engliſh chann.	9	00
Calais, - - ditto	Ditto -	11	30
I. Caldy, - England	St. Geo. chan.	5	15
Camfer, - Dutchland	German ocean	1	30
I. Canaria, - Canaries	Atlantic ocean	3	00
C. Cantin, - Barbary	Ditto -	0	00
Caſkets, - I. Guernſey	Engliſh chann.	8	15
Caithneſs point, Scotland	Weſtern ocean	9	00
Charles-town, - Carolina	Aſhley river	3	00
I. of Charles, Labrador	Hudſon's ſtraits	10	15
Chignectow, Nova Scotia	Bay of Fundy	0	45
Cherbourg, - France	Engliſh chann.	7	30
C. and R. Churchill, N. Wales	Hudſon's bay	7	20
C. Clear, - Ireland	Weſtern ocean	4	30
Concarneau, - France	Bay of Biſcay	3	00
Conquet, - ditto	Engliſh chann.	2	15
I. Coquet, - England	German ocean	3	00
Corke, - Ireland	St. Geo. chan.	6	30
C. Corſe, - Guinea	Ethiopian ſea	3	30
Cromer, - England	German ocean	7	00
Dartmouth, - ditto	Engliſh chann.	6	30
St. David's Head, Wales	St. Geo. chan.	6	00
Dieppe, - France	Engliſh chann.	10	30
Dort, - Dutchland	German ocean	3	00
Dover, - England	Engliſh chann.	11	30
Dewns, - ditto	German ocean	1	15
Dublin, - Ireland	Iriſh ſea	9	15
Dunbar, - Scotland	German ocean	2	30
Dundee, - ditto	Ditto	2	15
Dungarvan, - Ireland	Atlantic ocean	4	30
Dungeneſs, - England	Engliſh chann.	9	45
Dunkirk, - France	German ocean	0	00
Dunnoſe, - I. of Wight	Engliſh chann.	9	45
Edinburgh, - Scotland	German ocean	4	30
Edyſtone, - England	Engliſh chann.	5	30
R. Elbe mouth, Germany	German ocean	0	00
Embden, - ditto	Ditto	0	00
Enchuyſen, - Dutchland	Zuyder ſea	0	00
Eſtaples, - France	Engliſh chann.	11	00
Falmouth, - England	Ditto	5	30
Flamborough-head, ditto	German ocean	4	00
C Florida, - Florida	Gulf of Mexico	7	30
Fluſhing, - Dutchland	German ocean	0	45
I. Fly, - ditto	Ditto -	7	30
N. Foreland, - England	Ditto -	9	45
S. ditto, - - ditto	Engliſh chann.	9	45
Foulneſs, - ditto	German ocean	6	45
Foye, - ditto	Engliſh chann.	5	15
R. Garonne, - France	Bay of Biſcay	3	00
Gaſpey-bay, - Acadia	Gulf St. Lawr.	1	30
Gibraltar, - Spain	Mediterran. ſea	0	00
C. Good Hope, - Caffers	Indian ocean	3	00
Granville, - France	Engliſh chann.	7	00
Graveline, - ditto	Ditto -	0	00
Graveſend, - England	R. Thames	1	30
Groine, or C. Corunna, Sp.	Bay of Biſcay	3	00
I. Guernſey, - England	Engliſh chann.	1	30
Halifax, - Nova Scotia	Weſtern ocean	7	30
Hamburgh, - Germany	River Elbe	6	00
Haarlem, - Dutchland	German ocean	9	00
Hartlepool, - England	Ditto -	3	00
Harwich, - ditto	Ditto -	11	15
Havre de Grace, France	Engliſh chann.	9	00
C. Henry, - Virginia	Atlantic ocean	11	15
Holyhead, - Wales	Iriſh ſea	1	30
Honfleur, - France	River Seine	9	00
Hull, - - England	River Humber	6	00
R. Humber entrance ditto	German ocean	5	13
Ice Cove, - N. Main	Hudſon's ſtraits	10	00
FortSt John's, Newfoundland	Atlantic ocean	6	00
St. John de Luz, France	Bay of Biſcay	3	30
Port St. Julian, Patagonia	S. Atlantic oc.	4	45
Kentiſh Knock, England	German ocean	0	00
I. Kilduin, - Lapland	North. ocean	7	30
Kinſale, - Ireland	Atlantic ocean	5	15
Land's-end, - England	St. Geo. chan.	7	30
Leith, - Scotland	German ocean	4	30
Leoſtoffe, - England	Ditto -	9	45
Liverpool, - ditto	Iriſh ſea	11	15
I. Lewes, N. Port, Scotland	Weſtern ocean	6	30
Lime - England	Engliſh chann.	7	00
Liſbon, - Portugal	River Tagus	2	15
Lizard, - England	Engliſh chann.	7	30
London, - ditto	R. Thames	3	00
N. London, New England	Weſtern ocean	1	30
Long Iſland, - ditto	Ditto -	3	00
Longſand-head, England	German ocean	10	30
I. Lundy, - ditto	St. Geo. chan.	5	15
Lynn, - ditto	German ocean	6	00
I. Madeira, - Canaries	Atlantic ocean	12	04
R. Maes Mouth, Dutchland	German ocean	1	30
St. Maloe's, - France	Engliſh chann.	6	00
I. Man, weſt end, England	Iriſh ſea	9	00
Margate, - ditto	Engliſh chann.	11	15
Milford, - Wales	St. Geo. chan.	5	15
Mount's Bay, - England	Engliſh chann.	4	30
Nantes, - France	Bay of Biſcay	3	00
Naze, - Norway	Weſtern ocean	11	15
Needles, - England	Engliſh chann.	10	15
Newcaſtle, - ditto	German ocean	3	15
Nieuport, - Flanders	Ditto -	12	00
Nore, - England	R. Thames	0	00
N. Cape, - Lapland	North. ocean	3	00
Orfordneſs, - England	German ocean	9	45
Orkney iſles, limits, Scotl.	Weſtern ocean	3	00
Oſtend, - Flanders	German ocean	12	00
Placentia, Newfoundland	Atlantic ocean	9	00

Names of Places.		Coaſt.	High water	
			H.	M.
Plymouth, -	England	Engliſh chann.	6	00
Portland, -	ditto	Ditto -	8	15
Portſmouth, -	ditto	Ditto -	11	15
Quebec, -	Canada	R. St. Lawr.	7	30
I. of Rhee, -	France	Bay of Biſcay	3	00
Rochefort, -	ditto	Ditto -	4	15
Rochelle, -	ditto	Ditto -	3	45
Rocheſter, -	England	River Medway	0	45
Rotterdam, -	Dutchland	German ocean	3	00
Rouen, -	France	River Seine	1	15
Rye, -	England	Engliſh chann.	11	15
Sandwich, -	ditto	Downs	11	30
Scarborough-head,	ditto	German ocean	3	45
Scilly iſles, -	ditto	St. Geo. chan.	3	45
R. Senegal,	Negroland	Atlantic ocean	10	30
R. Severn, -	England	St. Geo. chan.	6	00
R. Seine, -	France	Engliſh chann.	9	00
Sheerneſs, -	England	R. Thames	0	00
Sierra Leona, -	Guinea	Atlantic ocean	8	15
Shoreham, -	England	Engliſh chann.	10	30
I. Shetland, limits,	Scotland	Weſtern ocean	3	00
I. Sky, -	ditto	Ditto -	5	30
Southampton, -	England	Engliſh chann.	0	00
Spurn, -	England	German ocean	5	15
Start-point, -	ditto	Engliſh chann.	6	45
Stockton, -	ditto	German ocean	5	15
Strongford bay, -	Ireland	Iriſh ſea	10	30
Sunderland, -	England	German ocean	3	30
Swin, -	ditto	Ent. Thames	12	00
Tamarin-town,	Sokotra	Indian ocean	9	00
R. Tees, mouth,	England	German ocean	3	00
I. Teneriffe, -	Canaries	Atlantic ocean	3	00
I. Texel, -	Dutchland	German ocean	7	30
R. Thames, mouth,	Engl.	Ditto -	1	30
Tinmouth, -	ditto	German ocean	3	0
Topſham, -	ditto	Engliſh chann.	6	00
Torbay, -	ditto	Ditto -	5	15
I. Tory, -	Ireland	Weſtern ocean	5	30
St. Valery, -	France	Engliſh chann.	10	30
Vannes, -	ditto	Bay of Biſcay	3	45
I. Uſhant, -	France	Engliſh chann.	4	30
Waterford, -	Ireland	St. Geo. chan.	6	30
Weymouth, -	England	Engliſh chann.	7	00
Whitby, -	ditto	German ocean	3	00
I of Wight, N.S.E. & W. end		Engliſh chann.	0	00
Winchelſea, -	England	Ditto -	0	45
Wintertonneſs, -	ditto	German ocean	9	00
Yarmouth, -	ditto	Ditto -	9	45
York Fort,	New Wales	Hudſon's bay	9	10
New York - -		Atlantic ocean	3	00
Youghall, -	Ireland	St. Geo. chan.	4	30

The following times ſerve for coaſts of conſiderable extent, and nearly for the places on thoſe coaſts, viz. Finmark, or N. N. W. coaſt of Lapland, 1^{h} 30′; Jutland iſles, 0^{h} 0′; Frieſland coaſt, 7^{h} 30′; Zealand coaſt, 1^{h} 30′; Flanders coaſt, 0^{h} 00′; Picardy and Normandy coaſts, 10^{h} 30′; Biſcay, Gallician, and Portugal coaſts, 3^{h} 00′; Iriſh weſt coaſt, 3^{h} 00′; Iriſh ſouth coaſt, 5^{h} 15′; Africa weſt coaſt, 3^{h} 00′; America weſt coaſt 3^{h} 00′; America eaſt coaſt, 4^{h} 30′.

The uſe of the preceding table is to find the time of high-water at any of the places contained in it: for this purpoſe find the time of the moon's ſouthing on a given day, ſee Moon; and then add the time which the moon has paſſed the meridian on the full and change days, to make high-water at that place; and the ſum ſhews the time of high-water on the given day.

E. g. at what time will it be high-water at London on the 25th of December, 1784? Moon ſouths at 9^{h} 36′, to which add 3; the ſum 12^{h} 36′ ſhews that it will be high-water at about 36′ after noon.

See on the ſubject of this article Newton. Princ. Math. lib. iii. prop. 24. and De Syſtem. Mundi, ſect. 38—54. Apud Opera Ed. Horſley, tom. iii. p. 52, &c. p. 203, &c. Maclaurin's Account of Sir I. Newton's Diſcoveries, book iv. chap. 7. Ferguſon's Aſtron. chap. xvii. Robertſon's Navig. book vi. ſect. vii. viii. ix.

Tide-*dial*, is the name of an inſtrument contrived by Mr. Ferguſon, for exhibiting and determining the ſtate of the *tides*. It is repreſented in *Tab.* IV. *Dialling*, *fig.* 42. and the external parts of it conſiſt of 1. an eight-ſided box, on the top of which, at the corners, are ſhewn the phaſes of the moon at the octants, quarters, and full. Within theſe is a circle of 29½ equal parts, which are the days of the moon's age reckoned from the ſun at new moon, round to the ſun again. Within this circle is one of twenty-four hours divided into their halves and quarters. 2. A moving elliptical plate, painted blue, to ſhew the riſing of the *tides* under and oppoſite to the moon, with the words *high-water*, *tide-falling*, *low-water*, *tide-riſing*, marked upon it. To one end of this plate is fixed the moon M by the wire W, which goes along with it. 3. Above this elliptical plate is a round one, with the points of the compaſs upon it, and alſo the names of above two hundred places in the large machine (but only thirty-two in the figure, to avoid confuſion) ſet over thoſe points on which the moon bears when ſhe raiſes the *tides* to the greateſt heights at theſe places, twice in every lunar day; and to the north and ſouth points of this plate are fixed two indexes I and K, which ſhew the times of high-water, in the hour-circle, at all theſe places. 4. Below the elliptical plate are four ſmall plates, two of which project out from below its ends at new and full moon; and ſo, by lengthening the ellipſe, ſhew the *ſpring tides:* the other two of theſe ſmall plates appear at low-water when the moon is in her quadratures, or at the ſides of the elliptic plate, to ſhew the *neap-tides*. When any two of theſe ſmall plates appear, the other two are hid; and when the moon is in her octants, they all diſappear. Within the box are a few wheels for performing theſe motions by the handle H. Turn the handle till the moon M comes to any given day of her age in the circle of 29½ equal parts, and the moon's wire W will interſect the time of her coming to the meridian on that day, in the hour-circle: the XII. under the ſun being mid-day, and the oppoſite XII. mid-night: then looking for the name of any given place on the round plate (which makes 29½ rotations, whilſt the moon M makes only one revolution from the ſun to the ſun again) turn the handle till that place comes to the word *high-water* under the moon, and the index which fails among the forenoon hours will ſhew the time of high-water at that place in the forenoon of the given day: then turn the plate half round, till the ſame place comes to the oppoſite high-water mark, and the index will ſhew the time of high-water in the afternoon at that place. And thus, as all the different places come ſucceſſively under and oppoſite to the moon, the indexes ſhew the times of high-water at them in both parts of the day; and when the ſame places come to the low-water marks, the indexes ſhew the times of low-water. For about three days before and after the times of new and full moon, the two ſmall plates come out a little way from below the high-water marks on the elliptical plate, to ſhew that the *tides* riſe ſtill higher about theſe times: about the quarters, the other two plates come out a little from under the low-water marks toward the ſun, and on the oppoſite ſide, ſhewing that the *tides* of flood riſe not then ſo high, nor do the *tides* of ebb fall ſo low, as at other times. For the deſcription of the inſide work of this machine, and the method of conſtructing it, ſee Ferguſon's Aſtron. p. 297.

Tide-*gage*. See Gage.

Tide-Waiters, or Tide-men, certain officers belonging to the cuſtom-houſe, appointed to watch or attend on ſhips coming from abroad, to ſee that nothing be landed till the cuſtoms be paid.

They are thus called, becauſe they go aboard the ſhips at their arrival in the mouth of the Thames, and come up with the *tide*.

TIER, in the *Sea-language*, the name of the ſeveral ranges of guns mounted on one ſide of a ſhip's deck; which, according as they are placed on the lower, middle, or upper decks, are called the lower, middle, or upper *tier*.

Tier *of the cable*, denotes a range of the fakes or windings of the cable, which are laid within one another in an horizontal poſition, ſo as that the laſt becomes the innermoſt.

Tier, *cable*, is the hollow ſpace in the middle of a cable, when it is coiled.

TIERCE, or Teirce, a meaſure of liquid things, as wine, oil, &c. containing the third part of a pipe, or forty-two gallons.

Tierce, in *Muſic*. See Third.

Tierce, in *Gaming*, a ſequence of three cards of the ſame colour.

Tierce, in *Fencing*. See Guard and Thrust.

Tierce *order*. See Third *Order*.

Tierce *point*. See Third *point*.

TIERCED, Tierce, in *Heraldry*, denotes the ſhield to be divided by any of the partition lines, party, coupy, tranchy, or tailly, into three equal parts, of different colours or metals.

If the chief and baſe be of the ſame colour when divided by a feſſe, they blazon it by expreſſing the colour, and mentioning the feſſe; otherwiſe, they ſay, it is *tierce in feſſe*, and mention each of the colours, or *tierce in pale*, if ſo divided in pale.

TIERCEL, in *Falconry*, a name given to a male hawk, as being a third part leſs in ſize than the female.

TIERCELET. See Tassel.

TIES, *aboard a Ship*, are thoſe ropes by which the yards hang; and when the halliards are ſtrained to hoiſe the yards, theſe *ties* carry them up.

TIFACOUM, a word uſed by ſome of the chemical writers to expreſs quickſilver.

TIFATUM, a word uſed by ſome of the chemical writers to expreſs ſulphur.

TIFFE *de mer*, in *Natural Hiſtory*, a name given by count Marſigli to a ſpecies of ſea-plant, as he ſuppoſes it to be, commonly but erroneouſly reckoned among the ſpunges, and called by authors, a *branched ſpunge*. This author has called it by this name from its reſemblance to the heads of the *typha paluſtris*, or cat's tail, when ripe in the month of September.

The ſpunges muſt be of a lax and cavernous texture; but this ſubſtance is ſmooth and firm, and has no inequalities on its ſurface, excepting a few ſhort hairs, which gives it a velvety look, when firſt taken out of the water. It is a very elegant and beautiful ſubſtance; it grows to two feet in height, and is very elegantly branched; it grows on rocks and ſtones, and, when firſt taken out of the ſea, is full of a viſcous water, as yellow as the yolk of an egg; but when this water is preſſed out, and the ſubſtance dries, it loſes its yellow, and becomes of a duſky brown colour: it is very tough and firm while in the water, but when dry it uſually breaks of itſelf into little pieces, and may be crumbled to powder between the fingers. This is a very ſtrong proof, among others, of its not being of the nature of the ſpunge.

When viewed by the microſcope, the whole ſurface is found to be covered with extremely fine and ſlender hairs; and, amongſt theſe, there are an infinity of little apertures, through which the ſea-water makes its way.

When a branch of it is cut tranſverſely, there are ſeen a number of long and fine canals, by means of which the water, received at theſe ſuperficial apertures, is conveyed to its whole ſubſtance. Marſig. Hiſt. de la Mer, p. 82.

Subſtances of this kind are now known to be of animal and not of vegetable origin. See Coral.

TIGE, in *Architecture*, a French term for the ſhaft or fuſt of a column, comprehended between the aſtragal and the capital.

TIGEGUACU, in *Ornithology*, the name of a ſmall Braſilian bird, of the ſize of a ſparrow, and with a ridged and triangular bill, in which it reſembles the moucherolle; its eyes are of a fine blue, and its legs and feet yellow; it is all over of a deep black, but that it has a large blood-red ſpot on the top of its head; its tail is ſhort and black.

TIGER, *tigris*, in *Zoology*, is a ſpecies of cat, or FELIS *tigris*, with a long tail and body marked with coloured ſtripes, in the Linnæan ſyſtem. See *Tab.* V. *Quadrupeds*, N° 63.

The *tiger* has a ſmooth head and body, and prodigious ſtrength in its limbs; its colour is a pale yellow, beautifully marked with long ſtripes of black, from the back pointing to the belly, with others acroſs the thighs; the tail is a third ſhorter than the body, and annulated with black. This animal is often ſuperior in ſize to a lion: that called the *royal tiger* is of a tremendous bulk. The Chineſe *tiger* varies in colour, ſome being white, ſtriped with black and grey.

The ſkull of this creature, both as to the teeth and other particulars, very much reſembles that of the cat, except that, in the room of the tranſverſe ſutures of the cat's, there is in the *tiger*'s one in the figure of a great Y, ſo cloſe and firm, that the bones ſeem contiguous.

Its tuſks are a little crooked, like thoſe of the dog and cat; their exerted part very white, and the bow of ſome of them very long, not leſs than five inches; its claws are whitiſh and ſemitranſparent, very flat, ſharp, and pointed, and extremely hooked, every way in colour and ſhape like the claw of a cat; uſually on the forepaws of the larger *tigers*, theſe are at the baſis an inch broad, and are two inches and a half long; the bone on which the claw is ſet receives it into a little groove, and is by a double epiphyſis itſelf inſerted into the claw; by which means the claw is firmly held in its place. Grew's Muſ. p. 13.

The *tiger* (formed of גיר *ſagitta, a dart*, whence תגיר) has its name from its ſuppoſed ſwiftneſs, and has been deſcribed by almoſt all authors as one of the ſwifteſt of all the wild carnivorous animals; but this has been contradicted by ſome modern authors, who declare that it is a ſlow and ſluggiſh animal, and is unable to overtake a man, or almoſt any animal that has an opportunity of running away from it. It will give two or three large leaps; but if it do not ſeize its prey in theſe, is but ill qualified to catch it afterwards. However, Mr. Pennant cites the authorities of two travellers of credit, *viz.* Mr. Bell and F. Gerbillon, who confirm the opinion of the *tiger*'s ſpeed.

Margraave deſcribes three ſpecies of American *tigers*, the firſt called *jaguera* by the natives, and by the Portugueſe *onca*; the ſecond diſtinguiſhed by the natives by the name *jaguerete*, but called by the Portugueſe by the ſame name with the other; the third called by the Indians CUGUA-CUARANA, and by the Portugueſe, the *tiger*, which is the FELIS *concolor* of Linnæus. But the two firſt ſeeming to be the ſame with what we know by the name of the *ounce*, and having round, not long variegations, ſeem properly of the panther, and not of the *tiger* kind.

The *tiger* is peculiar to Aſia, though Buffon ſays they are found in the ſouth of Africa. It is found as far north as China and Chineſe Tartary; but the greateſt numbers, the largeſt, and the moſt cruel, are met with in India, and its iſlands. In Sumatra, the natives ſeldom kill them, apprehending that they are animated by the ſouls of their anceſtors. They are the ſcourge of the country, lurking among the buſhes, on the ſides of rivers, and almoſt depopulating many places; they are inſidious, blood-thirſty, and malevolent; and ſeem to prefer preying on the human race rather than any other animals: they do not purſue their prey, but bound on it from their ambuſh, with an elaſticity, and from a diſtance, that are ſcarcely credible; if they miſs the object, they make off; but if they ſucceed, they carry it off with ſuch eaſe, that it ſeems not the leaſt impediment to their flight. If they are undiſturbed, they plunge their heads into the bodies of the animals which they ſeize, up to their eyes, as if it were to ſatiate themſelves with blood, which they exhauſt the carcaſes of before they tear them to pieces. There is, ſays Mr. Pennant, a ſort of cruelty in their devaſtations unknown to the generous lion; as well as a poltroonery in their ſudden retreat on any diſappointment. Hiſt. Quad. vol. i. p. 256.

The manner of carrying off the young brood of this animal is deſcribed by Pliny as follows: the Hircanians and Indians bring up the *tiger*, ſays he, an animal of a dreadful ſwiftneſs, which is moſt put to the proof when going to be taken; the whole brood, which is always very numerous, is carried off upon a horſe as ſwift as poſſible, and often removed to a freſh one. When the mother *tiger* finds the neſt empty, and the brood gone, for the male takes no care of them, ſhe traces the ſcent with furious ſpeed; and when ſhe is arrived within hearing of the perſon who is carrying off her young, he throws down one of them; this ſhe takes up in her mouth, and, as if made more ſwiſt by her load, carries it back, and then returning, is treated in the ſame manner till the perſon gets on board a ſhip, and leaves her to vent her rage on the ſhore. Plin. Nat. Hiſt. lib. viii. cap. 18.

Tiger, *American*. See Onca and Jaguara.

Tiger-*cat*, a ſpecies of cat, about the ſize of the wild cat, with a coat as much ſtriped and varied as that of a *tiger*; its tail is long, ſtreaked with black; the body yellow, with black ſtripes above, and round black ſpots below; the ears are black, each marked with a white lunated ſpot. This animal, briefly deſcribed from its ſkin by Mr. Pennant, has been lately ſcientifically deſcribed by Dr. Forſter. It is found in all parts of Africa, from Congo to the Cape of Good Hope: lives in mountainous and woody tracts, and in its wild ſtate is a great deſtroyer of hares, rabbits, lambkins, young antelopes, and of all the feathered tribe. Its manners and œconomy are perfectly analogous to thoſe of our domeſtic cats. See the deſcription, illuſtrated by a figure, in Phil. Tranſ. vol. lxxi. part i. p. 1. &c.

Tiger, *hunting*, or *leopard*. See Leopard.

Tiger, *man*. See Mantegar.

Tiger, *ſhell*, a name given to the red VOLUTA, with large white ſpots.

In the Linnæan ſyſtem, the *tiger-ſhell* is a ſpecies of the CYPRÆA. See Shells.

TIGH, in *our Old Writers*, a cloſe or incloſure mentioned in ancient charters, and is ſtill uſed in Kent in the ſame ſenſe.

TIGHT, in *Sea Language*, expreſſes the quality whereby a veſſel reſiſts the penetration of any fluid, whether compreſſing its ſurface, or contained within it. Hence a ſhip is ſaid to be *tight*, when her planks are ſo compact and ſolid as to prevent the entrance of the water in which ſhe is immerſed; and a caſk is called *tight*, when the ſtaves are ſo cloſe that none of the liquid contained in it can iſſue through or between them. In both ſenſes *tight* is oppoſed to leaky. Falconer.

TIGILLUM, a word uſed by ſome chemiſts to expreſs the TILE with which they cover the mouth of their crucibles; and, by others, for the crucible itſelf.

TIGLIUM, in *Botany*. See Pinei *nuclei*, &c.

TIGRIS, in *Zoology*. See Tiger.

TIHOL, in *Natural Hiſtory*, a name given by the people of the Philippine Iſlands to a ſpecies of crane very frequent among them, and remarkable for its ſize, being taller than a man, when it ſtands erect, and holds up its neck. They call it alſo ſometimes *tipul*.

TIJEGUACU-*paroara*, in *Ornithology*, the name of a Braſilian bird, of the ſize of a lark; it has a ſhort and thick beak, brown above and whitiſh below; its head, throat, ſides, and the lower part of its neck, are of a fine yellow, variegated with red in the female, and all over of a perfect blood-red in the male; the upper part of the neck, and the whole back are grey, with a mixture of brown; the wings are brown tipped with white; the tail is of the ſame colour; and the ſides of the neck, the breaſt, belly, and thighs, are white. Marggrave's Hiſt. Braſil.

TIJEPIRANGA, in *Ornithology*, the name of a Braſilian bird of the ſparrow kind. It is a little larger than the lark; its whole body, neck, and head, are of a very fine red or blood colour, and its wings and tail black.

There is another ſpecies alſo of this bird, which is of the ſize of a ſparrow, and is of a bluiſh grey on the back, white on the belly, and of a ſea-green on the wings; the legs of this are of a pale grey. Marggrave's Hiſt. Braſil.

TIKE, the Zetland name for an otter, of which there are many to be found about that iſland. Phil. Tranſ. N° 473. ſect. 8.

Tike is alſo uſed for a ſmall bullock or heifer, for a particular ſort of worm, and in Scotland for a dog.

TILBURY-*water*, in *Medicine*, is an acidulous or ſaline water, iſſuing from a ſpring, ſituated near a farm-houſe at *Weſt Tilbury*, near *Tilbury Fort*, in Eſſex. This water is of a ſtraw-colour, ſoft and ſmooth to the taſte, but leaving, after agitation in the mouth, a ſmall degree of roughneſs on the tongue; it throws up a ſcum variegated with ſeveral colours, which feels greaſy; and effervesces with ſpirit of vitriol; it mixes ſmooth with milk, but curdles with ſoap; when boiled, it turns milky, but is fined by a fourth part of mountain-wine, and by acids; it operates chiefly by urine, though it is ſomewhat purgative, and increaſes perſpiration. This water is eſteemed for removing glandular obſtructions, and hence is alſo recommended in ſcurvies and cutaneous diſeaſes; it is good in bloody fluxes, purgings, and the like: in diſorders of the ſtomach ariſing from acidity, in the gravel, fluor albus, and immoderate flux of the menſes. As a diuretic, it is beneficial in dropſical complaints. It gently warms the ſtomach, ſtrengthens the appetite, and promotes digeſtion. The uſual doſe is a quart a-day. This water is ſuppoſed to owe its virtue to a native alkaline ſalt, which may be obtained from it by evaporaton, and to its fixed air, which, however, being very volatile, ſoon exhales when the water is heated or ſtands for ſome time expoſed. Elliot's Account of Mineral Waters, &c. p. 220.

TILE. See Tyle.

Tile, or Tyle, in *Aſſaying*, a ſmall flat piece of dried earth, uſed to cover the veſſels in which metals are in fuſion.

Theſe are made of a mixture of clay and ſand, or powder of flints, or broken crucibles, made into a paſte, and ſpread thin with a rolling-pin, on a table, or flat ſtone. From theſe cakes or plates, pieces are to be cut with a knife, to the ſhape and ſize of the mouths of the veſſels to be cloſed. It is beſt then to pare away the borders of the under ſurface of the piece thus cut off, that this ſurface may immediately touch all the way the edge of the mouth of the veſſel, leaving a prominent rim, by which means the *tile* ſits cloſe upon the veſſel, and is not ſo eaſily diſplaced by accidents, as a touch of the poker, or of the coals put on to mend the fire, as it otherwiſe would be. Finally, put on the middle of the outer ſurface a ſmall bit of the ſame matter, which ſerves as a kind of handle, by means of which it may be conveniently managed by the tongs, and eaſily taken off and put on again at pleaſure. Cramer, Art. Aſſ. p. 66.

TILIA, the *lime-tree*, in *Botany*. See Lime-*tree*.

TILLS, a name given by our farmers to the lentil, a kind of pulſe propagated in ſome parts of the kingdom; they are the ſmalleſt of all pulſe. This is a ſpecies of the ervum. They require but an ordinary ground, but they produce a vaſt quantity, though they lie in a ſmall compaſs. They make a fine ſweet fodder, and are the beſt of all things of this kind for calves, or any other young cattle. They are alſo the beſt of all ſorts of food for pigeons.

TILLÆA, *ſmall annual houſe-leek*, in *Botany*, a genus of the *tetrandria tetragynia* claſs; the characters of which are theſe: the calyx is a flat perianthium, divided into three or four large oval ſegments; the flower is compoſed of three or four flat, oval, pointed petals, ſmaller than the ſegments of the cup; the ſtamina are three ſimple filaments, ſhorter than the cup; the antheræ are ſmall, the piſtillum has three germina; the ſtyles are three, and ſimple; the ſtigmata are obtuſe; the fruit conſiſts of three or four long-pointed capſules, of the ſame length with the flower, bent back, and ſplitting open longitudinally in their upper part; the ſeeds are of an oval figure, and two are contained in each of theſe capſules. There are two ſpecies.

TILLAGE, in *Huſbandry*. See Tilling.

TILLANDSIA, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are, that the calyx is trifid and permanent, the corolla trifid and bell-ſhaped; the fruit a ſingle-celled capſule, and the ſeed downy. There are nine ſpecies.

TILLER, or Tillar, in *Huſbandry*, a little young tree, left to grow till it be fellable.

Tiller, is alſo a term uſed by farmers to ſignify, that the produce of the grain branches out into ſeveral ſtalks. In which ſenſe, it denotes the ſame thing with the Latin word *fruticare*.

Tiller *of a ſhip*, is a ſtrong piece of wood faſtened to the rudder, and employed to turn it in ſteering. See *Tab. Ship*, *fig.* 2. N° 105.

Tiller-*rope*, a kind of tackle, communicating with the ſhip's ſide, and uſually compoſed of untarred rope-yarn, for the purpoſe of traverſing more readily through the blocks or pullies: this tackle ſerves to guide and aſſiſt the operations of the *tiller*, and in all large veſſels is wound about a wheel, which acts upon it with the powers of a crane or windlaſs.

TILLING, Tillage, in *Gardening* and *Agriculture*, a moving or ſtirring of the ground with a plough, ſpade, hoe, or other inſtrument; which, being performed on the ſurface, enters to a certain depth, and makes the lower and upper parts change place: by which means the goodneſs of the earth is kept from being ſpent in feeding uſeleſs plants: and the ground is divided by attrition, as the addition of dung does by fermentation.

The rule, as to gardening in general, is, that hot and dry earth ſhould be tilled in ſummer, either a little before, or while it rains, or ſoon after; and that neither too often, nor too deep: and, in hot weather, it is not to be performed, unleſs watered ſoon after; but for moiſt, cold, and ſtrong earth, it muſt never be tilled in time of rain, but rather in the greateſt heats. As to arable lands, that which is clayey, ſtiff, cold, and moiſt, is generally thrice tilled; in ſpring, ſummer, and at ſeedtime, for wheat; and four times for barley.

Theſe repeated ploughings are very advantageous to the ſoil, both as they deſtroy weeds, and as the ground is hereby laid in ridges, which prevents its being overdrenched in wet ſeaſons; ſaves it much from blights, and bleak weather; and makes the land lighter and fitter for the ſeed to take root in, and to imbibe the nitrous dews and influences of the air. See Hoeing, Husbandry, Ploughing, and *Internal* Superficies *of the Earth*. See alſo Tull's Horſe-hoeing Huſbandry, p. 24, &c. where it is obſerved, that by the pulveriſing and expoſing of the ſoil to good *tillage*, the nature of it may be changed, and the tougheſt clay made as light and friable as common light earth, and as fit for the nouriſhment of the moſt tender plants as any other: though in its natural condition its pores were too ſmall to give way to their tender roots, and had no communication one with another. The principal advantages propoſed by Mr. Tull's new method of huſbandry depend upon the *tillage*: too much of which, he ſays, the farmer can never beſtow on any ſort of ground.

TILMUS, τιλμος, a term uſed by ſome of the medical writers to expreſs the effect of a ſort of delirium, in which people pull the bed-cloaths, or pick out threads from the ſheets. This is uſually eſteemed a dangerous ſymptom.

TILT. See Turnament.

Tilt-Boat, a boat covered with a *tilt*, i. e. a cloth, or tarpawling, ſuſtained by bails or hoops over the ſtern, for the ſheltering of paſſengers. Such are ſome of thoſe which carry paſſengers between London and Graveſend.

TILTH, a country term for tillage, manuring, or improving ground, or for the condition of the ſoil after ploughing, &c.

TIMAR, a tract or portion of land which the grand ſignor grants to a perſon on condition of ſerving him in war, on horſeback.

Some define the *timar* a portion of land aſſigned to a ſpahi, or other perſon fit to ſerve on horſeback, to enjoy, during life, for his ſubſiſtence.

Meninſki deſcribes it as a ſtipend or revenue, granted to old ſoldiers who have deſerved well, in lands, and poſſeſſions of caſtles, towns, villages, fields, or in tithes, and other fruits and incomes; ſometimes with the prefecture, juriſdiction, or ſignory of the ſaid places.

The *timar* is a kind of fief granted for life. The whole Ottoman empire is divided into ſangiackies, or banneries, under which all ſuch as hold *timars,* who are called *timariots,* are bound to liſt themſelves when ſummoned upon any expedition. *Timars* may be reſigned as benefices among us, only obtaining the conſent of the beglerbey, or governor of the province. Indeed, for *timars* of above two thouſand aſpers *per annum,* called *zaim,* the grand vizir alone grants diſpenſations.

TIMARIOTS, thoſe who enjoy lands on the footing and tenure of timars. See Timar.

The *timariots* are obliged to ſerve in war, perſonally, with as many men and horſes for ſervice as their timar, by the eſtimate made thereof, contains two thouſand and five hundred aſpers, or about ſix pounds ſterling; and to maintain them conſtantly mounted and armed after their manner, to be ready to march at all hours when commanded, and that on pain of death; nothing, not even ſickneſs itſelf, being allowed to excuſe them.

Beſides this ſervice, they likewiſe pay an acknowledgment of one tenth of their revenue. If they have any children of age to bear arms, and fit for the ſervice after their deceaſe, or, in defect thereof, if they have any relations that have the leaſt intereſt, the timar is uſed to be continued to them on the ſame conditions, otherwiſe it is transferred to others.

If the revenue thus held of the grand ſignor exceed fifteen thouſand aſpers, or thirty-ſix pounds ſterling, they who hold it are not called *timariots,* but *ſubaſſi,* or *zaims:* theſe always have the adminiſtration of juſtice in the place, under the ſangiac of the province.

The *timariots* have different appointments, from four or five thouſand aſpers, equal to about twelve pounds ſterling, to twenty thouſand aſpers: but unleſs their *timar* exceed eight thouſand aſpers, they are never obliged to march, except when the grand ſignor goes to the army in perſon, on which occaſion none are exempted.

The origin of the *timariots* is referred to the firſt ſultans, who, being maſters of the fiefs or lands of the empire, erected them into baronies or commanderies, to reward the ſervices of their braveſt ſoldiers; and eſpecially to raiſe and keep on foot a number of troops without diſburſing any money.

But it was Solyman II. that firſt eſtabliſhed the order and diſcipline among theſe barons, or knights of the empire; and by his order it was, that the number of horſemen each ſhould maintain was regulated.

This body has heretofore been not only exceedingly powerful, but great and illuſtrious throughout all the empire; but avarice, the ordinary fault of the Orientals, has occaſioned their declenſion of late years.

The viceroys and governors of provinces manage their matters ſo at court, that timars, even out of their juriſdiction, are given to their domeſtics, or to ſuch as will give them the moſt money for them.

There are two kinds of *timariots,* the one appointed by the Port, the other by the viceroy of the country; but the revenues of both are leſs than thoſe of the zaims, and their equipage and tents leſs in proportion.

Thoſe who have their patents from the court, have from five or ſix thouſand aſpers to nineteen thouſand nine hundred and ninety-nine aſpers *per annum*; if they have one aſper more, they become zaims. Thoſe who receive their patents from the viceroys, have from three to ſix thouſand aſpers *per annum.*

This cavalry is better diſciplined than that properly called the *ſpahis,* though the ſpahis be the neateſt and briſkeſt. Theſe laſt only fight in platoons; whereas the zaims and *timariots* are divided into regiments, and commanded by colonels, under the direction of baſhaws. The baſhaw of Aleppo, when in the army, is colonel general of this militia.

TIMBER includes all kinds of felled and ſeaſoned woods, uſed in the ſeveral parts of building; as carpentry, joinery, turnery, &c.

The kinds of Timber are numerous: we ſhall only mention ſome of the moſt uſeful, from Evelyn's Sylva, &c. As,

1. *Oak,* the uſes whereof need no enumeration; to endure all ſeaſons and weathers, there is no wood like it; hence its uſe in pales, ſhingles, poſts, rails, boards, &c. For water-works it is ſecond to none; and where it lies expoſed both to air and water, there is none equal to it.

2. *Elm:* this, felled between November and February, is all ſpine or heart, and no ſap; and is of ſingular uſe in places where it either is always wet, or always dry; its toughneſs likewiſe makes it of uſe to wheelwrights, millwrights, &c. nor muſt it be omitted, that its not being liable to break and fly in chips, makes it fit for dreſſers and planks to chop on.

3. *Beech:* its chief uſe is in turnery, joinery, upholſtery, and the like, as being of a clean, white, fine grain, not apt to bend, nor ſlit; it has been ſometimes, eſpecially of late, uſed for building *timber,* and if it lie conſtantly wet, is judged to outlaſt oak.

4. *Aſh:* its uſe is almoſt univerſal; it is good for building, or other occaſions where it may lie dry; it ſerves the carpenter, cooper, turner, ploughwright, wheelwright, gardener; as alſo it is uſed at ſea for oars, handſpikes, &c.

5. *Fir,* commonly known by the name of *deal,* is of late much uſed in building, eſpecially within doors, for ſtairs, floors, wainſcot, and moſt works of ornament.

6. *Walnut-tree:* this is of univerſal uſe, excepting for the outſides of buildings; none is better for the joiners uſe, it being of a more curious brown colour than beech, and leſs ſubject to worms.

7. *Cheſnut-tree,* next to oak, is the *timber* moſt ſought for by joiners and carpenters: it is very laſting.

8. *Service-tree,* uſed in joinery, as being of a delicate grain, and fit for curioſities: it alſo yields beams of conſiderable bigneſs, proper for building.

9. *Poplar, abel:* this and *aſpen,* differing very little from one another, are much uſed of late inſtead of fir: they look as well, and are tougher and harder.

10. *Alder,* much uſed for ſewers or pipes to convey water: when kept always wet, it grows hard like a ſtone; but where ſometimes wet, and ſometimes dry, it rots preſently.

The uſes of *timber* are ſo many, and ſo great, that the procuring of a ſufficient ſupply of it extremely well deſerves the care of every ſtate; as it muſt be a great diſadvantage to it to be obliged to have recourſe to its neighbours, and purchaſe at a very conſiderable and continually renewed expence, what might, by an eaſy œconomy, be ſufficiently ſupplied at home.

This œconomy, however, muſt be applied in time; for our natural indolence, our love to reap the advantages of every thing ourſelves, and our little care for poſterity, give great room to fear ſucceeding ages will want wood, both for private and public exigencies. All our arts ſhould be employed on this ſubject, with two views, the one to preſerve and cheriſh our growing wood, the other to renew the trees which have been, and are continually cut down.

The quantity of acorns that the oak bears, has made many people ſuppoſe, that nature has taken care for a renewal for us, and that of this vaſt quantity of ſeed, which annually fall, there will be always an over-ſufficient ſupply of young trees, which will grow up in the place of the old ones: but experience proves, that this is by no means the caſe. The greater number of theſe fallen acorns are devoured by many different animals, for whoſe nouriſhment nature has provided that abundance of them: and of thoſe which eſcape this fate, we are to conſider how few can come to good, from the natural accidents they are unavoidably expoſed to; they fall on a covered ground, where dead leaves, and decayed parts of branches of trees, uſually prevent their touching the earth, into which they are to ſhoot; or, if they can ſhoot here, it is merely from the ſurface, where they are, in their ſlow growth, liable, while very tender, to all the inclemencies of froſts; and add to this, that it is very difficult for ſuch tender plants as the young ſeedlings of theſe to find room for growth or nouriſhment among the every-way ſpreading roots of other trees; and the continual ſhade and want of free air, muſt render them very weakly and irregular in their growth, even ſuppoſing them to get over all the other difficulties.

It is very certain that *timber-trees* of oak are frequently met with among the underwood of foreſts; but we ſhall always find this to be the caſe, not in the cloſe places, but in certain ſpots where there has been a vacancy or opening; and that uſually where there are not, nor have at any time been, oaks in the neighbourhood of the ſpot. The acorns that fall from the oaks uſually come to nothing from the before-mentioned accidents; and theſe trees which grow at diſtances, are owing to the acorns brought thither by birds, and accidentally dropped there. This is an inſtance familiarly verified, by obſerving, that there are frequently little buſhes near woods, which, though of white thorn or other trees, are uſually ſurrounded and ornamented with young oaks; the jays and the like granivorous birds are the authors of this crop; for bringing the acorns from the adjoining woods, to eat under theſe buſhes, they drop many by the way, which they do not trouble themſelves to look for on the ground, and which have here a freer ground to ſtrike root into, and an open air to grow in, ſeldom fail of coming to good, unleſs deſtroyed when young.

In order to the preſerving our growing *timber-trees,* it would be a very uſeful law, that all who cut down any number of oaks, ſhould alſo leave a number in good condition for after-cutting; and that no *timber* ſhould be cut down, but at a proper age, in regard to the nature of the ſoil; ſince it is certain that trees grow to their perfection at very different periods of time, in proportion to the depth of ſoil they have to grow in; and that as it is on the one hand, not for the intereſt of the ſtate to ſuffer trees to be cut till at their perfection for ſize and ſoundneſs, ſo after they are arrived at their perfection, it is equally certain that they gradually decay.

The quality of the ſoil the tree ſtands in, may be neceſſary to be obſerved to this purpoſe; but the quantity or depth of it is the great ſubject of enquiry; and a great number of obſervations have proved that the proper ſeaſon for cutting oaks in a ſoil of two feet and a half deep, is at fifty years old; thoſe which ſtand in a ſoil of three feet and a half deep, ſhould not be cut down before ſeventy years; and thoſe which ſtand in a ſoil of four feet and a half deep, or more than that, will increaſe in goodneſs and in ſize till they are a hundred years old: and obſervation has proved, that after theſe ſeveral periods, the trees begin to decay.

This ſeems the beſt rule to eſtabliſh, in regard to the common ſoils; but thoſe which grow in a lighter or more ſandy ſoil, may have their periods changed from theſe to forty, to ſixty, and to eighty years at the greateſt depth; and after theſe times it is always beſt to fell the wood meant for public ſervice, whether then wanted or not, ſince it is much better to keep it in public magazines than to leave it to be daily decaying.

Heaths, and other uncultivated places, where there is no regular growth of wood; but where fern and uſeleſs plants alone ſeem to flouriſh, uſually afford alſo ſome ſtraggling trees of the oak. Theſe probably have had their origin from acorns dropped by birds; but they ſeldom grow tall or regular; ſince, not having been defended from the injuries of cattle, they are uſually browſed on, and ſtunted while young, and ſo become crooked and ſhort-trunked, or pollard-trees. Theſe, though not of ſuch value as the more regular oaks, yet deſerve care, both with reſpect to their preſervation and felling; ſince they afford a number of trees naturally bent, and formed for many parts of ſhip-building.

The little care uſually taken of theſe trees, though on this occaſion of great value, ſeems to threaten a general loſs of them; but as trees, thus naturally crooked, and bent, are of value, it is a laudable attempt to try at the finding of a regular method of producing ſuch; and this is eaſily practicable, by following the ſame methods by which theſe wild ones become ſo. They wholly owe their figure to the cattle's biting off their tops while young, and afterwards biting off again the tops of the ſhoots from the firſt wound. In this manner, if a number of young trees, ſet apart for the experiment, have their tops cut off at two, four, ſix, eight, ten, and twelve feet from the ground, and four years afterwards the ſhoots from theſe ſtunted tops are again cut in the ſame manner, the trees will be found afterwards to grow up in all the irregularly crooked figures that can be conceived, and by this means a ſupply of naturally crooked wood may be raiſed for all the occaſions of ſhip-building, with infinitely greater eaſe, and more certainty than by the method propoſed by ſome, of bending them down with weights tied to their tops while young.

As to the ſupply of young wood in the place of what is cut down, there are ſome circumſtances which have not had the attention paid to them which they deſerve. The ſpring froſts, which come on at a time when the ſhoots, by which nature is to raiſe the ſupply for what is cut down, are juſt preparing to grow, are of prodigious injury, and do not leſs miſchief to theſe than to the young ſhoots of garden plants, though the diſtant hope of the ſucceſſion of the proprietor, and uſually alſo the diſtance of the place, and want of repeated obſervation, occaſion its not being perceived. This, however, may, in a great meaſure, be guarded againſt. Frequent experiments, and repeated obſervations, prove, that the miſchief done by theſe froſts affect in a much greater degree thoſe ſhoots which are expoſed to the ſouth, than thoſe which face the north: and that it is greatly more powerful againſt ſuch as are wholly expoſed to the wind, than againſt ſuch as are ſheltered. Theſe known circumſtances may give the hint to a method of ſaving, at leaſt a great part of the wood to be felled from this deſtruction, to its renewal, by the making it a rule to begin cutting down on the north ſide; and, as the whole felling is a work of ſome years, the ſtanding wood of every ſeaſon will defend the young ſhoots of the newly cut ſtumps the following ſpring, not only from the ſouth expoſure, but will ſhelter them alſo from the wind.

Many prudent managers have made fine eſtates of their coppice-woods, by regularly felling a certain portion every year, and providing for a renewal of the firſt cutting, againſt the felling of the laſt portion, by proportioning the time of growth to the quantity to be cut every year; and there is great intereſt to be made of a true knowledge of the growth of wood in this manner. Whoever obſerves the growth of young trees, will find that the ſecond year's growth is much more conſiderable than that of the firſt; the third year is more than that of the ſecond, and ſo on for many years; the yearly growths of young wood greatly increaſing every ſeaſon up to a certain time or age of the tree, after which the increaſe in bulk, by growth, becomes gradually leſs. The great advantage to be made of coppice-wood, would be, by knowing this intereſting period, and ſeizing on it, always to cut down the trees juſt at that time when they arrived at the end of their quick growth, and ſo ſetting nature to work with new ſhoots, to employ the ſame on enriching again the owner. Regular obſervation and experiment alone can aſcertain this happy period; but any man who has much coppice-wood upon his eſtate, may aſſure himſelf of it, by cutting a given quantity every year, for ten years ſucceſſively, and then carefully reviewing the differences of the yearly produce. Memoirs Acad. Scienc. Ann. 1739.

TIMBER, *hardening of*. See HARDENING *of timber*.

TIMBER, *felling of*. The ſeaſon for this work uſually commences about the end of April, in regard the bark then generally riſes the moſt freely; ſo that where a quantity of *timber* for ordinary uſes is to be felled, the ſtatute (1 Jac. I. cap. 22.) requires it to be done between the firſt of April and the laſt of June, for the advantage of TANNING.

However, the opinions and practices of authors are very different, as to the beſt ſeaſon for felling *timber*: Vitruvius recommends an autumnal fall; others adviſe December and January: Cato was of opinion, that trees ſhould have borne their fruit before felled; at leaſt, that their fruit ſhould be firſt ripe; which falls in with the ſentiment of Vitruvius.

In effect, though *timber* unbarked be moſt obnoxious to worms, yet we find the wild oak, and many other kinds, if felled too late, when the ſap begins to be full, to be very ſubject to worms; whereas about mid-winter, it neither caſts, rifts, nor twines. It were happy, therefore, if a method of tanning without bark could be invented, that trees being felled more early, the *timber* might be the better ſeaſoned.

It is, indeed, the common opinion, that *timber*, which is felled in winter, is ſtronger, and more laſting, as being more firm and cloſe, than that which is felled in ſummer. But M. Leewenhoeck apprehends, that there is no difference, except in the bark, and outermoſt ring of the wood, which in the ſummer are ſofter, and more eaſily pierced by the worm: wood conſiſting of hollow pipes, which, both in ſummer and winter, are full of moiſture, and do not ſhrink in winter; and therefore the wood cannot be cloſer at one time than another, for if otherwiſe it would be full of cracks and clefts. The unexpected and ſudden rotting of ſome *timber*, he conceives to proceed from ſome inward decay in the tree before it was felled: having obſerved all trees to begin to decay at firſt in the midſt or heart of the tree. Phil. Tranſ. N° 213. or Abr. vol. i. p. 592.

The ancients had a great regard to the age of the moon in the felling of their *timber*. If their rules avail aught, they are theſe: fell *timber* in the wane, or four days after new moon; ſome ſay, let it be the laſt quarter. Pliny orders it to be in the very article of the change, which happening on the laſt day of the winter ſolſtice, the *timber*, ſays he, will be immortal: Columella ſays, from the twentieth to the twenty-eighth day: Cato, four days after the full: Vegetius, from the fifteenth to the twenty-fifth, for ſhip-*timber*; but never in the increaſe, trees then moſt abounding with moiſture, the only ſource of putrefaction.

Some even have a regard to the temper and time of the day; the wind to be low, neither eaſt nor weſt, neither in froſt, wet, nor dewy weather, and finally, never in the forenoon.

Laſtly, ſome regard is had to the ſpecies: fir is beſt felled when it begins to ſpring, both, as it then quits its coat beſt, and as the wood, according to Theophraſtus, is by that means rendered wonderfully durable in water. Elm, ſays Mr. Worlidge, is to be felled between November and January, in which caſe it will be all heart, at leaſt the ſap will be very inconſiderable: this, he adds, is alſo the only good ſeaſon for felling aſh. Some authors add farther, that in felling *timber*, care ſhould be taken, firſt, only to cut it into the heart, and ſo to let it ſtand till dry; by which means the moiſture is evacuated in drops which would otherwiſe occaſion putrefaction.

M. de Buffon obſerves, as a circumſtance, which greatly increaſes the ſtrength and ſolidity of *timber*, that the trees intended to be felled for ſervice, ſhould firſt be ſtripped round of their bark, and ſuffered to ſtand and die upon the ſpot before the cutting. The ſappy part, or blea of the oak, becomes by this management as hard and firm as the heart, and the real ſtrength and denſity of the wood has been proved by many experiments to be greatly increaſed by it: nor is this practice detrimental to the proprietor, becauſe the remaining ſtumps of theſe trees ſend up their young ſhoots as vigorouſly, as if they had been cut down in their natural condition. Mem. de l'Acad. Sc. Par. 1739.

When any tree is to be cut down for *timber*, the firſt thing to be taken care of, is a ſkilful diſbranching ſuch limbs as may injure it in its fall. In felling the tree, it ſhould always be cut as cloſe to the ground as poſſible, unleſs it is intended to be grubbed up; and this will be of advantage both to the *timber* and the wood; for *timber* is never ſo much valued, if it be known to grow out of old ſtocks.

Timber, *ſeaſoning of*, a term uſed to expreſs the preparing of *timber* after it is felled, for cutting and working up for uſe.

As ſoon as felled, it ſhould be laid up in ſome dry airy place, but out of the reach of too much wind or ſun, which, when in exceſs, will ſubject it to crack and fly. It is not to be ſet upright, but laid along, one tree upon another, only with ſome ſhort blocks between, to give it the better airing, and prevent its becoming mouldy, which will rot the ſurface, and produce muſhrooms on it. Some perſons daub the trees all over with cow-dung, which occaſions their drying equally, and prevents their cracking, as they are otherwiſe very apt to do.

Some recommend the burying of *timber* in the earth, as the beſt of all ways of ſeaſoning it; and others have found it a fine preſervative to bury their *timber* under the wheat in their granaries; but this cannot be made a general practice.

In Norway, they ſeaſon their *deal* planks, by laying them in ſalt water for three or four days, when new ſawed, and then drying them in the ſun; this is found a great advantage to them; but neither this, nor any thing elſe, can prevent their ſhrinking. And it has been recommended to lay boards, planks, &c. in ſome pool or running ſtream for a few days, to extract the ſap from them, and afterwards to dry them in the ſun or air; by this means, it is ſaid, they will be preſerved from chopping, caſting, or cleaving: but againſt ſhrinking there is no remedy. Mr. Evelyn particularly recommends this method for fir.

The ſeaſoning of *timber* by fire is the beſt way of all, for piles and other pieces that are to ſtand under the earth, or water. The Venetians firſt found out this method, and the way by which they do it is this; they put the piece to be ſeaſoned into a ſtrong and violent flame, in this they continually turn it round by means of an engine, and take it out when it is every way covered with a black coaly cruſt; by this means the internal part of the wood is ſo hardened, that neither earth nor water can damage it for a long time afterwards. This method is practiſed in many places for ſeaſoning the poſts for paling of parks, &c. and has this to recommend it, that in the very oldeſt ruins we have ever been acquainted with, there have been found many times pieces of charcoal, all of which have been found uninjured, though buried in the earth for ever ſo many ages.

Timber, *preſerving of*. When boards, &c. are dried, ſeaſoned, and fixed in their places, care is to be taken to defend and *preſerve* them; to which the ſmearing of them with linſeed oil, tar, or the like oleaginous matter, contributes very much.

The ancients adviſe the ſmoke-drying of all inſtruments made of wood, by hanging them up in the chimnies where wood fires are uſed. The whole benefit ariſing from this ſeems to be that the oil of the burnt wood enters, as it aſcends in the ſmoke, into the pores of that which is propoſed to be preſerved.

The Dutch preſerve their gates, portcullices, draw-bridges, ſluices, &c. by coating them over with a mixture of pitch and tar, whereon they ſtrew ſmall pieces of cockle and other ſhells, beaten almoſt to powder, and mixed with ſea-ſand, which encruſts and arms them wonderfully againſt all aſſaults of wind and weather.

Timber felled before the ſap is perfectly at reſt, is very ſubject to the worms; to prevent or cure which, Mr. Evelyn gives us the following ſecret, as moſt approved: put common ſulphur in a cucurbit, with as much aqua-fortis, as will cover it three fingers deep; diſtill it to a dryneſs, and let it have two or three rectifications.

Lay the ſulphur remaining at bottom on a marble, or in a glaſs, and, with the oil it diſſolves into, anoint the *timber*.

This, he adds, not only infallibly prevents or cures the wormyneſs, but preſerves all kinds of woods, and even many other things, as ropes, nets, and maſts, from putrefaction, either in air, water, or ſnow. See Sulphur.

For ſuch as would go a ſhorter way to work, two or three anointings with linſeed-oil may do very well.

As to the chaps, or clefts green *timber* is liable to, after working, and which is a very great defect in many fine buildings, they are cloſed by anointing, ſuppling, and ſoaking it with the fat of beef-broth, twice or thrice repeated.—Some carpenters uſe greaſe and ſaw-duſt mingled for the ſame purpoſe.—But the former method is excellent. Mortimer's Huſbandry, vol. ii. p. 104.

Timber, *ſtrength of*. The celebrated Monſieur de Buffon has attempted a rational calculation of the ſtrength of *timber*, uſed in building, on the principles of his excellent demonſtration of the growth of trees. See Wood.

He has proved that all wood conſiſts of a ſeries of woody cones, laid in woody beds, all along the tree, and connected by a ſort of reticular work of much leſs ſtrength than their own ſubſtance. He infers hence, very juſtly, that when there are, in any ſpecies of wood, more of theſe cones, which ſhew themſelves in ſo many concentric circles in a tranſverſe ſection of the wood, and conſequently more of theſe weaker reticular ſubſtances which connect them, that wood muſt neceſſarily be weaker than ſuch in which, in an equal thickneſs, there are much fewer of theſe cones, and conſequently fewer of theſe weaker inter-ſpaces.

If the irregularities of the ſtructure of wood were only theſe, it would be eaſy to compute, from the ſtrength of a ſtaff, of an inch diameter, of any wood, what would be that of a beam of the ſame, and of any given ſize; but this is by no means the caſe; for the diſpoſition of the cones, beds, and interſticial matter, is by no means the ſame in a large beam, formed by the workman, as in a little branch in its natural ſtate of growth.

This is eaſily conceived, when we conſider, that, in order to make a beam of *timber*, they ſquare a branch or part of the tree, or cut off four cylindric pieces from it, of what is called the blea. The heart of the wood lies now in the middle of the beam; this is the firſt woody bed, which all the others ſucceſſively cover, in form of ſo many concentric circles: the larger of theſe concentric circles is of the diameter of the whole piece of *timber* now cut, and the circles which naturally ſurrounded this, are now no longer perfect, but form only portions of circles, diminiſhing all the way to the ribs of the beam. A beam, thus ſquared, is, therefore, compoſed of a cylindric complete piece of firm and hard wood, and of four angular portions, cut out of a much leſs ſolid and firm wood. This is the condition of a beam, ſquared out of a large arm of a tree, and made nearly of the diameter of that arm; but a beam of like ſize cut out of the trunk of a larger tree, or out of one ſide of ſuch a trunk, is a very different thing, and is compoſed only of the longitudinal ſegments of the annual woody beds; and theſe ſegments ſometimes lie parallel to one of the ſurfaces of the beam, and ſometimes more or leſs inclined to one or the other ſide; they are alſo ſometimes longer, ſometimes ſhorter; and ſometimes more, ſometimes leſs, cut into the woody beds of the trunk of the tree they were cut from, and the beam is conſequently more or leſs ſtrong accordingly.

There are alſo two poſitions in a beam, the one of which is much ſtronger than the other; for theſe ſegments of the woody beds of the tree form ſo many parallel flats. If you place the beam in ſuch a poſition that theſe planes or flats are vertical, it will reſiſt a much greater force than if they are placed horizontally in the poſition of the beam.

From theſe obſervations, it is is eaſy to ſee how very fallacious the calculations and tables of the ſtrength of different kinds of *timber* muſt be, while the authors have formed all their ſyſtems upon experiments made on pieces of one or two inches in diameter, and have given themſelves no trouble to enquire into either the number or diſpoſition of the woody beds in thoſe pieces, nor the directions in which the ſeveral beds were found on breaking them. Theſe, however, are extremely neceſſary and eſſential circumſtances; nor are theſe the only variations which they have ommitted to obſerve; there are perhaps others equally neglected in all ſuch attempts, and yet equally neceſſary to make them of any real uſe. Young wood has always much leſs ſtrength than the older, and there is a great difference between the pieces cut out of the ſoundeſt part of the body of a tree, and thoſe from the young branches of the ſame tree. A piece cut out of the outer part of the trunk of a tree, near the blea, is alſo much weaker than one of equal diameter, cut out of the centre or heart of the tree. The different age and degree of dryneſs in wood, make alſo great differences in its ſtrength; for a green branch of a tree is always more tough, and leſs eaſily broken, than a dry one: and the time employed in putting wood to the trial, as to its ſtrength, is alſo a circumſtance very neceſſary to be conſidered; ſince a beam of *timber*, which will ſuſtain a certain weight for a few minutes, will not ſuſtain it perhaps for as many hours: and experiment has proved, that wood will often bear, for a ſhort time, a weight it cannot bear for a longer time; a beam having been found to bear a certain weight for one day, and the ſame beam afterwards having been broken in ſix months time by only two thirds of that weight. It is ſeen, from theſe conſiderations, that all the calculations in which theſe conſiderations have been neglected, can be of very little certainty; and that to make ſuch as may be certainly depended on, is a work of great difficulty.

As the advantages reſulting from ſuch calculations are, however, yet greater than the difficulties attending the attempt, this gentleman was encouraged to purſue the enquiry to the utmoſt. He cauſed certain pieces of wood to be broken by a determinate force, and calculating, according to that, what ought to be the force to break ſuch as were much larger; he tried afterwards what was the real force that would break them, and how far his calculations approached to the truth; in this he ever found extremely great differences between calculation and reality; and after many repeated trials, was never able to bring the fact any thing near the calculations. And trying according to the ſame rules, others of greater lengths and thickneſſes, in proportion to the ſtandard piece, he found the calculations as far faulty as before. The diſappointment in theſe attempts determined him, however, to try a complete courſe of experiments, from which a certain table of the force required to break the different kinds of wood might be eſtabliſhed, to which both himſelf, and the reſt of the world, might refer upon occaſion. And this he executed in the following manner.

He began by chooſing in a certain ſpot of one of his own woods a hundred oaks, which were all ſound and lively growing trees, and ſtood as near to one another as they conveniently could. This caution was uſed, that the wood might be all of the growth of the ſame ſoil, ſince it is well known that the growths of different ſoils are, in the ſame ſpecies of wood, of very different ſtrengths; and miſtakes of this might have rendered the whole attempt fruitleſs. Theſe oaks were all of the ſame ſpecies, and were in ſize from two feet and a half to five feet round. They were choſen purpoſely of different growths, or ſizes, that the experiments might be the more ſimilar to the uſual cuſtoms of the workmen.—For when a carpenter has occaſion for a piece of four or five inches ſquare, he does not for this purpoſe cut a tree that might have furniſhed a piece of a foot ſquare, becauſe of the expence; and it too often is their cuſtom to uſe ſuch pieces as have a very large ſhare of the blea on them. Not unfrequently indeed they uſe alſo rafters, ſawed out of large pieces of *timber*; but theſe are, of all the very worſt; and the uſe of them in building ought to be prohibited, the ſmall wood being infinitely more advantageous for theſe purpoſes.

As the degree of dryneſs of wood alters its ſtrength very much, and as it is alſo very difficult to be aſſured with a any degree of certainty, of the degree of drying or ſeaſoning of *timber*, ſince two trees cut down at the ſame time ſhall often be found to dry very differently; it appeared to this gentleman much more eligible to take wood perfectly green for his trials, than that in any degree dried or ſeaſoned.

The trees were felled one by one, and were carried into a proper place; the day after they were felled the carpenters were employed to ſquare them, and the joiners to take their exact dimenſions; and on the day afterwards the pieces were put to the proof; and the following is the method in which moſt of the experiments were made. Two ſtrong treſſels were taken, of ſeven inches ſquare, three feet high, and three feet long, and ſtrengthened in their middle by a very ſtrong piece of *timber*. On theſe two treſſels were placed the two extremities of the piece of wood which was to be broken; there were alſo ready ſeveral ſquare iron buckles, or rings, made of round iron work, the largeſt of which was nine inches wide, and was made of iron of ſeven inches about; the next was ſeven inches wide, and the iron it was made of was five inches round, and others of different degrees below theſe.

The piece of wood deſtined for the experiment was paſſed through theſe rings; the larger of which ſerved for the thicker pieces, the ſmaller for the thinner. Every one of theſe rings had on its upper part and on the inſide, a rib nicely filed, of two or three twelfths of an inch broad.

The intent of this was to prevent the ring from inclining one way or other, when in uſe; and on its under part it had two hooks of iron, of the ſame thickneſs with the ring itſelf; theſe were placed at ſuch a diſtance from each other, as to form another ring of about nine inches in diameter, into which there was to be put a key of wood of the ſame diameter, and of four feet long. This key carried a ſtrong table of fourteen feet long, and ſix feet broad, which was made of rafters of five inches thick, nicely fitted one to the other, and ſecured by ſtrong bars of wood. This was ſuſpended to the ring by means of the large wooden key, and ſerved to place the weights on; theſe conſiſted of three hundred quarters of ſtones, which were all numbered, and weighed from twenty-five to two hundred pounds each. Theſe ſtones were put up on the table, and a heap of ſtones were placed together as long and wide as the table, and as high as was neceſſary for the breaking of the piece.

There was always great care uſed to place the piece and the treſſels on a level; and they were then faſtened, to prevent their diſplacing themſelves. Eight men were employed continually to fill the table, and began by placing in the centre weights, firſt of two hundred, then of a hundred and fifty, next of a hundred; and ſo on to twenty-five pounds. Two men placed on a ſcaffold, ſuſpended in the air by cords, placed the fifty and twenty pound weights, which could not have been otherwiſe done, without danger of the men's being cruſhed to death; four other men held firm the four corners of the table, that they might not ſtir; and another, with a long ruler of wood marked how much the piece bent and gave way, as they loaded it with weights; while another marked the time, and wrote down the weight, which was often twenty, twenty-five, or twenty-ſeven thouſand pounds.

Mr. Buffon cauſed more than a hundred pieces of wood to be broken in this manner; ſome regular ſquare beams, others rafters ſawn out of large trunks, beſide three hundred bars; and this great number was but barely ſufficient to give a regular ſcale of the force and ſtrength of *timber*, in proportion to its length and thickneſſes.

This gentleman obſerved, that a large piece of wood never broke, without firſt giving ſome notice of it; that green wood broke with much more difficulty than ſuch as was dry; and in general, ſuch ſort of wood as had a ſpring, reſiſted more than ſuch as had none. The blea of the wood, the wood of the branches, that of the top of the tree, and in general all the young wood is weaker than that which is older.

The ſtrength of wood is not at all proportioned to its ſize; and a piece which is double or quadruple the thickneſs of another of the ſame length, is much more than of twice or four times it ſtrength; as for example, there required not quite four thouſand weight to break a piece of *timber* of ten feet long, and four inches ſquare; and yet there required ten thouſand to break a piece of double that meaſure; and to break one of four times the meaſure, it required twenty-ſix thouſand weight; that is, to break a piece of ten feet long, and eight inches ſquare.

The ſame obſervation is alſo made good, in regard to the different lengths, as well as to the thickneſſes. The laws of mechanics would inform us, that a piece of *timber* of eight feet long, ought to bear juſt twice the weight of one of ſixteen feet. But experiment ſhews us here alſo that the piece of eight feet long carries much more than the double of the other.

The wood which grows quickeſt, ſuppoſing the land the ſame, is always the ſtrongeſt: that which has grown more ſlowly, and the annual circles of which, that is, its ſeveral woody cones, are thin and ſlender, is always weaker than the wood in which they are thick.

The ſtrength of wood is proportionable to its weight, and a piece of wood of the ſame length and thickneſs with another, but conſiderably heavier than another, is found ſtronger alſo, and that very nearly in the ſame proportion. This is a remark of no ſmall conſequence; and, as the general weight of wood is eaſily known, it may ſave the expence of too much wood in building, as well as the danger from the greater error of uſing too little.

This accurate obſerver takes notice, that ſome may imagine his experiments to be the leſs concluſive, becauſe the *timber* he broke was looſe at the ends; and that in a wall, or building, it is uſually fixed at both ends. But he obſerves, that the difference of this circumſtance is not worth conſidering, becauſe the piece fixed in a wall is liable to bend in the middle, before it breaks; and becauſe the fixtures have no power to retain the ends, when they are pulled by this force.

This gentleman took no notice of any pieces which had faults, as many of thoſe he tried had, and broke with much leſs than their proportion of weight; but confined his obſervations and reaſonings only to ſuch pieces as were perfectly ſound and firm.

It might be ſuppoſed, that ſo great a number of trials as theſe, and that on ſo eaſy a ſubject, ſhould have left nothing farther to be done in it; but the author himſelf freely acknowledges that there is yet much to be known. The proportion of the longitudinal ſtrength of wood to its tranſverſe, is a ſubject deſerving enquiry; as wood in buildings is often uſed in very different poſitions, and where the force acts upon it, not tranſverſely but longitudinally or obliquely in different directions. Mem. Acad. Scienc. Par. 1740. See Beam.

Timber-*trees*, the wood of *timber*, before it be felled, particularly that of oak, &c. See Trees.

For the raiſing, planting, tranſplanting, pruning, &c. of *timber-trees*, ſee Seminary, Nursery, Pruning, and Transplanting.

Timber-*lode*, in our *Old Writers*, a ſervice by which tenants were to carry *timber* from the woods to the lord's houſe.

Timber-*meaſure*.—*Timber* is uſually meaſured and eſtimated by the load or ton, which is a ſolid meaſure, containing forty feet of round *timber*, or fifty of hewn *timber*. The denomination of *load*, &c. we ſuppoſe ariſes hence, that forty or fifty ſolid feet of ſuch *timber* weigh about a ton, i. e. twenty hundred weight, which is uſually accounted a cart-load.

1. *For the meaſuring of round timber:* the practice is to gird the tree about, in the middle of the length; and folding the line twice, to take one length or quarter of the whole, and account that for the true ſide of the ſquare; then, for the length, it is counted from the butt-end of the tree, ſo far up as the tree will hold *half a foot girt*, as they call it, i. e. ſo long as the line, twice folded, is half a foot.

The dimenſions thus taken, the quantity of *timber* is had, either by multiplying the ſide of the ſquare into itſelf, and that product by the length, by the method of croſs multiplication:

Or, more eaſily and ſpeedily, on Gunter's line, by extending the compaſſes from twelve to the ſide of the ſquare, in inches; for that extent turned twice (the ſame way) from the length in feet, will reach to the content in feet.

Or, it may be done better ſtill, on Coggeſhal's ſliding-rule, by ſetting twelve on the girt-line D, to the length in feet on the line C. Then againſt the ſide of the ſquare, on the girt-line D, taken in inches, you have on the line C the content of the *timber* in feet. See *Coggeſhal's* Sliding-*rule*.

Note, 1°. This method of meaſuring round *timber*, though common, is yet erroneous; and the content found hereby, it is demonſtrated, is leſs than the true content of meaſure in the ratio of eleven to fourteen. How to avoid this error, and meaſure it juſtly, we have ſhewn under the uſe of Coggeſhal's *ſliding-rule*.

2°. If the tree have any great boughs that are *timber* as the phraſe is, i. e. which will hold foot girt, they are commonly meaſured, and added to the reſt: the ſolidity of the whole being thus found, they divide it by forty, which brings it into loads.

3°. In meaſuring round *timber* for ſale, they uſually caſt away an inch out of the ſquare for the bark, if oak: ſo that a tree ten inches ſquare, they only account as if nine; but for aſh, elm, beech, &c. an inch is too much.

4°. *For the meaſuring of hewn* or *ſquared timber*; the practice is, to find the middle of the length of the tree, and there to meaſure its breadth, by clapping two rules, or other ſtraight things, to the ſides of the tree, and meaſuring the diſtance between them: in the like manner they meaſure the breadth the other way. If the two be found unequal, they add them together, and take half the ſum for the true ſide of the ſquare. The dimenſions thus taken, the content is found either by croſs-multiplication, Gunter's ſcale, or the ſliding-rule, after the manner already directed.

The content divided by fifty, gives the number of loads.

Note, if the *timber* be unequally ſided, this method of meaſuring it is erroneous, always giving the content more than the truth; and the more ſo, as the difference of the ſides is greater; yet cuſtom has authorized it.

To meaſure ſuch *timber* juſtly, a mean proportional ſhould be found between the unequal ſides, and this mean ſhould be accounted the ſide of the ſquare.

To meaſure round *timber* without the help of inſtruments: let the mean circumference be found in feet and decimals of a foot; ſquare it, multiply this ſquare by the decimal 0.079577 and the product by the length.—For inſtance, let the mean circumference of a tree be 10.3 feet, and the length 24 feet; then $10.3\times 10.3\times 0.079577\times 24=202.615=$ the number of cubical feet in the tree. The foundation of this rule is, that, when the circumference of a circle is 1, the area is 0.0795774715, and that the areas of circles are as the ſquares of their circumferences. According to the method commonly uſed by artificers, the tree of the laſt example would only be computed at 159.13 cubical feet.

For the meaſuring of taper timber, and *timber* of other forms, as cubes, priſms, pyramids, &c. ſee Sliding-*rule*.

Timber, *bearing of*. See Bearing.

Timber-*work*, *caſing of*. See Casing.

Timber, or Timmer *of furs*, as ermins, martens, ſables, and the like, denotes forty ſkins.—Of other ſkins, ſix-ſcore. Ruſt.

Hæc civitas (ſc. Ceſtriæ) nunc reddebat de firma 45 *libras & tres* timbrias *pellium martenarum*. LL. Edw. Conf.

Timbers *of ermin*, in *Heraldry*, denote the ranks or rows of ermin in noblemen's coats.

Timber, in *Falconry*. To *timber*, is to neſtle, or make a neſt, as birds of prey do.

Timber, *prick*, in *Botany*. See Spindle-*tree*.

Timbers, in *Ship-building*, the ribs of a ſhip or the incurvated pieces of wood, branching outward from the keel in a vertical direction, ſo as to give ſtrength, figure, and ſolidity to the whole fabric.

One *timber* in a ſhip is compoſed of ſeveral pieces united into one frame, which accordingly is called by the artificers a frame of *timbers*. The *timbers* whoſe planes are perpendicular to the keel are called ſquare-*timbers*; and thoſe which are placed obliquely on the keel, as at the extremities of a ſhip, are called cant-*timbers*. The foremoſt of thoſe pieces on the ſhip's bow are called the *knuckle-timbers*; and the hindermoſt on the quarter, the faſhion-pieces.

Timber and *Room*, or *room* and *ſpace*, is the diſtance betwixt the moulding edges of two adjoining *timbers*, which muſt always contain the breadth of two *timbers*; and ſometimes two or three inches between them.

TIMBRE, or Timmer, in *Heraldry*, denotes the crest of an armory, or whatever is placed atop of the eſcutcheon, to diſtinguiſh the degree of nobility, either eccleſiaſtical or ſecular.

Such as the papal tiara, cardinal's hat, the croſs, mitre, coronet, mortier, and particularly the caſques or helmets, which the ancients called more eſpecially *timbres*, from their reſembling a kind of bell without a clapper; which the French call *timbre*, or becauſe they reſounded like thoſe *timbres*, when ſtruck. This is the opinion of Loiſeau, who derives the word from the Latin, *tintinnabulum*.

TIMBREL, *Tabret*, or *Tambour de Baſque*, in *Muſic*, is an inſtrument of very high antiquity; having been in uſe among the Hebrews, Greeks and Romans. To therim were hung bells or pieces of metal.

TIME, a ſucceſſion of phenomena in the univerſe; or a mode of duration, marked by certain periods and meaſures; chiefly by the motion and revolution of the ſun.

The idea of time in the general, Mr. Locke obſerves, we acquire, by conſidering any part of infinite duration, as ſet out by periodical meaſures: the idea of any particular *time*, or length of duration, as a day, an hour, &c. we acquire firſt by obſerving certain appearances at regular, and ſeemingly equidiſtant periods.

Now, by being able to repeat thoſe lengths or meaſures of *time* as often as we will, we can imagine duration, where nothing really endures or exiſts; and thus we imagine *to-morrow*, *next year*, &c.

Some of the later ſchool-philoſophers define *time* to be the duration of a thing whoſe exiſtence is neither without beginning nor end: by this, *time* is diſtinguiſhed from eternity.

Ariſtotle, and the Peripatetics, define it, *numerus motus ſecundum prius & poſterius*, or a multitude of tranſient parts of motion, ſucceeding each other, in a continual flux, in the relation of priority and poſteriority.

Hence it ſhould follow, that *time* is motion itſelf, or at leaſt the duration of motion, conſidered as having ſeveral parts, ſome whereof are continually ſucceeding to others: but, on this principle, *time* or temporal duration would not agree to bodies at reſt, which yet nobody will deny to exiſt in *time*, or to endure for a *time*.

To evade this inconvenience, the Epicureans and Corpuſcularians made *time* to be a ſort of flux different from motion, conſiſting of infinite parts, continually and immediately ſucceeding each other, and this from eternity to eternity; but others directly explode this notion, as eſtabliſhing an eternal being, independent of God.—For how ſhould there be a flux before any thing exiſted to flow? and what ſhould that flux be, a ſubſtance, or an accident?

Time may be diſtinguiſhed, like place, into *abſolute*, and *relative*.

Time, *abſolute*, is *time* conſidered in itſelf, and without any relation to bodies, or their motions.—This flows equally, i. e. it never proceeds either faſter or ſlower, but always glides on in a conſtant equable tenor.

Time, *relative* or *apparent*, is the ſenſible meaſure of any duration by means of motion.—For ſince that equable flux of *time* does not affect our ſenſes, nor is any way immediately cognizable thereby, there is a neceſſity for calling the help of ſome nearly equable motion to be a ſenſible meaſure, whereby we may determine its quantity, by the correſpondency of the parts of this with thoſe of that.

Hence as we judge thoſe *times* to be equal, which paſs while a moving body, proceeding with an equable velocity, paſſes over equal ſpaces; ſo we judge thoſe *times* to be equal which flow while the ſun, moon, and other luminaries, perform their revolution, which, to our ſenſes, are equal.

But ſince the flux of *time* cannot be accelerated, nor retarded, whereas all bodies move ſometimes faſter and ſometimes ſlower, and there is, perhaps, no perfectly equable motion in all nature; it appears, hence, to follow, that abſolute *time* ſhould be ſomething truly and really diſtinct from motion. For let us ſuppoſe the heavens and the ſtars to have remained without motion from the very creation: does it hence follow, that the courſe of *time* would have been at a ſtand? or rather, would not the duration of that quieſcent ſtate have been equal to the very *time* now elapſed?

Since abſolute *time* is a quantity uniformly extended, and, in its own nature, moſt ſimple; it hence comes to be repreſented by mathematicians, to the imagination, under the moſt ſimple, ſenſible magnitudes, and particularly, right lines and circles, with which it bears a near analogy, in reſpect of its geneſis, ſimilarity, &c.

It is not, indeed, neceſſary, that *time* ſhould be meaſured by motion; any conſtant periodical appearance in ſeemingly equidiſtant ſpaces, as the freezing of water, the blowing of a plant, &c. returning at ſet periods, might do as well. In effect, Mr. Locke mentions an American people, who count their years by the coming and going away of birds.

Some authors diſtinguiſh *time* into *aſtronomical* and *civil*.

Time, *aſtronomical*, is that taken purely from the motion of the heavenly bodies without any other regard.

Time, *civil*, is the former *time* accommodated to civil uſes, and formed and diſtinguiſhed into *years*, *months*, *days*, &c.

Time makes the ſubject of Chronology.

Time, in *Muſic*, is an affection of ſound, whereby we denominate it *long*, or *ſhort*, with regard to its continuance in the ſame degree of tune.

Time and tune are the great properties of ſound, on whoſe difference or proportions muſic depends: each has its ſeveral charms; where the *time* or duration of the notes is equal, the differences of tune alone are capable of entertaining us with endleſs pleaſure.

And of the power of *time* alone, i. e. of the pleaſure ariſing from the various meaſures of long and ſhort, ſwift and ſlow, we have an inſtance in the drum, which has no difference of notes, as to tune.

Time, in muſic, is conſidered either with reſpect to the abſolute duration of the notes, i. e. the duration conſidered in every note by itſelf, and meaſured by ſome external motion foreign to the muſic; in reſpect to which the compoſition is ſaid to be *quick* or *ſlow*: or it is conſidered with reſpect to the relative quantity or proportion of the notes compared with one another. See Note.

The *ſigns* or characters by which the *time* of notes is repreſented, are ſhewn under the article Characters *in Muſic*, where the names, proportions, &c. are alſo expreſſed.

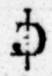
A ſemi-breve, for inſtance, is marked to be equal to two minims, a minim to two crotchets, a crotchet to two quavers, and ſo on, ſtill in a duplicate ratio, i. e. in the ratio of 2 : 1. Now, where the notes reſpect each other thus, i. e. where they are in this ratio, the muſic is ſaid to be in *duple*, i. e. *double* or *common time*.

When the ſeveral notes are triple of each other, or in the ratio 3 : 1, that is, when the ſemi-breve is equal to three minims, the minim to three crotchets, &c. the muſic is ſaid to be in *triple time*.

To render this part as ſimple as poſſible, the proportions already ſtated among the notes are fixed and invariable; and to expreſs the proportion of 3 : 1, a point (.) is added to the right ſide of any note, which is deemed equivalent to half of it; and by this means a pointed ſemi-breve, O. becomes equal to three minims, and ſo of the reſt.

From hence ariſe ſeveral other ratios conſtituting new kinds of triple *time*; as 2 : 3 and 3 : 4, &c. but theſe Mr. Malcolm obſerves, are of no real ſervice, and are not perceived without a painful attention. For the proportions of the *times* of notes, to afford us pleaſure, muſt be ſuch as are not difficultly perceived; on which account the only ratios fit for muſic, beſide that of equality, are the *double* and *triple*.

Time, *common* or *duple*, is of two ſpecies.—The firſt, when every bar or meaſure is equal to a ſemi-breve, or its value in any combination of notes of a leſs quantity.

The ſecond, where every bar is equal to a minim, or its value in leſs notes. The movements of this kind of meaſure are various, but there are three common diſtinctions; the firſt *ſlow*, ſignified at the beginning by the mark C; the ſecond *briſk*, ſignified by ∈; the third *very quick*, ſignified by 

But what that ſlow, briſk, and quick is, is very uncertain, and only to be learned by practice. The neareſt meaſure we know of, is to make a quaver the length of the pulſe of a good watch; then a crotchet will be equal to two pulſes, a minim to four, and the whole meaſure or ſemi-breve to eight. This may be reputed the meaſure of *briſk time*; as for the *ſlow*, it is as long again, and the quick is only half as long.

Some propoſe to meaſure it by imagining the bar as actually divided into four crotchets in the firſt kind, and ſo make the whole as long as one may diſtinctly pronounce theſe four words, *one*, *two*, *three*, *four*, all of equal length: ſo that the firſt crotchet may be applied to *one*, the ſecond to *two*, &c. and for other notes proportionally: and this is made the briſk movement of *common time*.

The whole meaſure then of common *time* is equal to a ſemi-breve, or a minim; but theſe are variouſly ſubdivided into notes of leſs quantities.

Now to keep the *time* equal, we make uſe of a motion of the hand or foot, thus: knowing the true *time* of a crotchet, we ſhall ſuppoſe the meaſure or bar actually ſubdivided into four crotchets for the firſt ſpecies of common *time*; then the half-meaſure will be two crotchets; therefore the hand or foot being up, if we put it down with the very beginning of the firſt note or crotchet, and then raiſe it with the third, and then down to begin the next meaſure; this is called Beating *of time*.

By practice, they get a habit of making this motion very equal, and conſequently of dividing the meaſure or bar into equal parts, up and down; as alſo of taking all the notes in the juſt proportion, ſo as to begin and end them preciſely with the beating. In the meaſure of two crotchets, they beat down the firſt, and the ſecond up. Some call each half of the meaſure in common *time*, *a time*; and ſo they call this the mode or meaſure of *two times*, or the *dupla* meaſure.

Again, ſome mark the meaſure of two crotchets with a 2 or $\frac{2}{4}$, ſignifying it to be equal to two notes, whereof four make a ſemi-breve; and ſome mark it $\frac{4}{8}$ for quavers. Malcolm's Muſic, p. 385, &c.

Time, *for triple*, ſee Triple *Time*.

Time, in *Fencing*. There are three kinds of *time*; that of the ſword, that of the foot, and that of the whole body. All the *times* that are perceived out of their meaſure, are only to be conſidered as appeals, or feints, to deceive and amuſe the enemy. See Fencing.

Time, in the *Manege*, is ſometimes taken for the motion of a horſe, that obſerves meaſure and juſtneſs in performing a manege; and ſometimes it ſignifies the interval between two of his motions. In the manege of a ſtep and a leap, the horſe makes by turns a corvet between two caprioles; and in that caſe the corvet is one *time* that prepares the horſe for the caprioles.

The *times* obſerved in making a ſtop, are nothing but ſo many falcades.

Time alſo ſignifies the effect of one of the aids; thus, we ſay, a good horſeman diſpoſes his horſe for the effects of the heel, by beginning with one *time* of the legs, and never runs precipitately upon his *times*.

Time-*keepers*, in a general ſenſe, denote inſtruments adapted for meaſuring time. See Chronometer.

In a more peculiar and definite ſenſe, *time-keeper* is a term firſt applied by Mr. John Harriſon to his watch, for the performance of which, in determining the longitude, in a voyage to the Weſt Indies, in compliance with the aƈt of the 12th of queen Anne, he obtained from the Britiſh parliament a moiety of the reward of twenty thouſand pounds offered by the ſaid aƈt. See Longitude.

This appellation is now become faſhionable amongſt artiſts, to diſtinguiſh ſuch watches as are made with extraordinary care and accuracy, for nautical or aſtronomical obſervations. The principles of Mr. Harriſon's *Time-keeper* were communicated by him, in writing, to the commiſſioners appointed to receive and publiſh the ſame, A. D. 1765, and are as follow:

“ In this *time keeper* there is the greateſt care taken to avoid friƈtion as much as can be, by the wheels moving on ſmall pivots, and in ruby-holes, and high numbers in the wheels and pinions.

“ The part which meaſures *time* goes but the eighth part of a minute without winding up; ſo that part is very ſimple, as this winding-up is performed at the wheel next to the balance-wheel; by which means, there is always an equal force aƈting at that wheel, and all the reſt of the work has no more to do in the meaſuring of *time*, than the perſon that winds up once a day.

“ There is a ſpring in the inſide of the fuſee, which I will call a ſecondary main-ſpring. This ſpring is always kept ſtretched to a certain tenſion by the main-ſpring, and during the time of winding-up the *time-keeper*, at which time the main-ſpring is not ſuffered to aƈt, this ſecondary-ſpring ſupplies its place.

“ In common watches in general, the wheels have about one-third the dominion over the balance, that the balance-ſpring has; that is, if the power which the balance-ſpring has over the balance be called three, that from the wheel is one: but in this my *time-keeper*, the wheels have only about one-eightieth part of the power over the balance that the balance-ſpring has; and it muſt be allowed, the leſs the wheels have to do with the balance, the better. The wheels in a common watch having this great dominion over the balance, they can, when the watch is wound-up, and the balance at reſt, ſet the watch a-going; but when my *time-keeper*'s balance is at reſt, and the ſpring is wound up, the force of the wheels can no more ſet it a-going, than the wheels of a common regulator can, when the weight is wound up, ſet the pendulum a-vibrating; nor will the force from the wheels move the balance when at reſt, to a greater angle in proportion to the vibration that it is to fetch, than the force of the wheels of a common regulator can move the pendulum from the perpendicular, when it is at reſt.

“ My *time-keeper*'s balance is more than three times the weight of a large ſized common watch balance, and three times its diameter; and a common watch balance goes through about ſix inches of ſpace in a ſecond, but mine goes through about twenty-four inches in that time: ſo that had my *time-keeper* only theſe advantages over a common watch, a good performance might be expeƈted from it. But my *time-keeper* is not affeƈted by the different degrees of heat and cold, nor agitation of the ſhip; and the force from the wheels is applied to the balance in ſuch a manner, together with the ſhape of the balance-ſpring, and (if I may be allowed the term) an artificial cycloid, which aƈts at this ſpring; ſo that from theſe contrivances, let the balance vibrate more or leſs, all its vibrations are performed in the ſame time; and therefore, if it go at all, it muſt go true. So that it is plain from this, that ſuch a *time-keeper* goes entirely from principle, and not from chance.”

We muſt refer thoſe who may deſire to ſee a minute account of the conſtruƈtion of Mr. Harriſon's *Time-keeper*, to the publication by order of the commiſſioners of longitude.

We ſhall here ſubjoin a ſhort view of the improvements in Mr. Harriſon's watch, from the account preſented to the board of longitude, by Mr. Ludlam, one of the gentlemen to whom, by order of the commiſſioners, Mr. Harriſon diſcovered and explained the principles upon which his *time-keeper* is conſtruƈted. The defeƈts in common watches, which Mr. Harriſon propoſes to remedy, are chiefly theſe: 1. That the main-ſpring aƈts not conſtantly with the ſame force upon the wheels, and through them upon the balance: 2. That the balance, either urged with an unequal force, or meeting with a different reſiſtance from the air, or the oil, or the friction, vibrates through a greater or leſs arch: 3. That theſe unequal vibrations are not performed in equal times: and, 4. That the force of the balance-ſpring is altered by a change of heat.

To remedy the *firſt* defeƈt, Mr. Harriſon has contrived that his watch ſhall be moved by a very tender ſpring, which never unrolls itſelf more than one-eighth part of a turn, and aƈts upon the balance through one wheel only. But ſuch a ſpring cannot keep the watch in motion a long time. He has, therefore, joined another, whoſe office is to wind up the firſt ſpring eight times in every minute, and which is itſelf wound up but once a day. To remedy the *ſecond* defeƈt, he uſes a much ſtronger balance-ſpring than in a common watch. For if the force of this ſpring upon the balance remains the ſame, whilſt the force of the other varies, the errors ariſing from that variation will be the leſs, as the fixed force is the greater. But a ſtronger ſpring will require either a heavier or a larger balance. A heavier balance would have a greater friƈtion. Mr. Harriſon, therefore, increaſes the diameter of it. In a common watch it is under an inch, but in Mr. Harriſon's two inches and two tenths. However, the methods already deſcribed only leſſening the errors, and not removing them, Mr. Harriſon uſes two ways to make the times of the vibrations equal, though the arches may be unequal: one is to place a pin, ſo that the balance-ſpring, preſſing againſt it, has its force increaſed, but increaſed leſs when the vibrations are larger: the other to give the pallets ſuch a ſhape, that the wheels preſs them with leſs advantage, when the vibrations are larger. To remedy the *laſt* defeƈt, Mr. Harriſon uſes a bar, compounded of two thin plates of braſs and ſteel, about two inches in length, rivetted in ſeveral places together, faſtened at one end, and having two pins at the other, between which the balance ſpring paſſes. If this bar be ſtraight in temperate weather (braſs changing its length by heat more than ſteel) the braſs ſide becomes convex when it is heated, and the ſteel-ſide when it is cold: and thus the pins lay hold of a different part of the ſpring in different degrees of heat, and lengthen or ſhorten it, as the regulator does in a common watch.

The principles, on which Mr. Arnold's *time-keeper* is conſtruƈted, are theſe: the balance is unconneƈted with the wheel-work, except at the time it receives the impulſe to make it continue its motion, which is only whilſt it vibrates 10° out of 380°, which is the whole vibration; and during this ſmall interval, it has little or no friƈtion, but what is on the pivots, which work in ruby-holes on diamonds: it has but one pallet, which is a plane ſurface formed out of a ruby, and has no oil on it. Watches of this conſtruƈtion, ſays Mr. Lyons, go whilſt they are wound up; they keep the ſame rate of going in every poſition, and are not affeƈted by the different forces of the ſpring; and the compenſation for heat and cold is abſolutely adjuſtable. Phipps's Voyage to the North Pole, p. 230, &c. See Longitude.

Time *of peace*. See Peace.

Time, in *Grammar*. See Tense.

Time, in *Mechanics*. See Motion.

Time, *periodical*. See Period.

Time, *equation of*. See Equation.

Time, *kipper*. See Kipper.

Time, *unity of*. See Unity.

TIMBER. See Timber, and Timbre.

TIMONEER, *timonier*, Fr. in *Sea-language*, the helmſman, or perſon who manages the helm to direƈt the ſhip's courſe.

TIMOROSO, in the *Italian Muſic*, intimates that the ſong is to be played or ſung in ſuch a manner as to expreſs an awe or dread, either to ſhew reſpeƈt, or to repreſent fear.

TIMOROUS, in the *Manege*. See Starting, Skittish, &c.

TIMOTHY-*graſs*, in *Botany*, a ſpecies of the *cat's tail*, or phleum, cultivated in England, of which it is a native: though the ſeeds of it were carried from Virginia by one Mr. Timothy Hanſon to North Carolina, whence it received its name. It thrives moſt in low, damp, marſhy grounds, producing a fine turf in three weeks from the time of ſowing the ſeed. Linnæus ſays, it is a proper graſs to ſow on lands that have been drained. It is very luxuriant, grows to the height of three or four feet, and reſembles wheat or rye, having a broad blade or leaf. All ſorts of cattle are fond of it both green and dry; but for hay it ſhould be mown when in full ſap, and juſt before it flowers. It abounds near London, but is ſcarce in many parts of England, particularly in Herefordſhire, Berkſhire, and Norfolk.

TIN, *Stannum*, *Jupiter*, a whitiſh metal, ſofter, leſs elaſtic, and leſs ſonorous than any other metal, excepting lead. In the Chaldee language טין *tin*, ſignifies *ſlime*, *mud*, or *dirt*; and when the Phœnicians came into

Cornwall, and ſaw this metal in its ancient ſlimy ſtate, they called it "the mud;" and hence, ſome have ſaid, the name *tin*, in Cornu-Britiſh *ſtean*, is derived. Some of the ancients called it plumbum album, white lead, probably to diſtinguiſh it from common lead; not knowing that it was radically another metal.

The chemiſts, &c. hold *tin* a ſpecies of imperfect metal, generated of two different ſeeds, viz. that of ſilver, and that of lead; which render it a kind of compound of both; and they ſay accordingly it is ſometimes found both in lead and ſilver mines.

Tin, however, has alſo its proper mines, of which our counties of Cornwall and Devon are an abundant evidence: the greateſt part of the *tin* conſumed in Europe, is procured from thence; and Camden even ſuppoſes this abundance of *tin*, in thoſe two provinces, to have given the original denomination *Britain* to the whole kingdom. In the Syriac language, *varatanac* or *baratanac* ſignifies *land of tin*; from which Bochart derives the name *Britain*.

The Phœnicians, it is well known, traded for *tin* to the weſt coaſts of Cornwall ſix hundred years before the commencement of the Chriſtian æra. Whether at this early period, and for many ages after any other country produced this metal, we cannot poſitively determine: but if it was then known in other nations, it was eſtimated as a ſtaple only in Cornwall. Pliny ſays, it was found in Gallicia and Luſitania, but not in quantity ſufficient to merit much attention. A tinner in the time of Richard, earl of Cornwall, about the year 1240, upon ſome diſguſt, went over to Germany, and taught the natives to ſeek for *tin*; but at this day their workings for *tin* are inconſiderable, and ſerve only for their own conſumption. The mines of Germany are thoſe of Miſnia, Bohemia, and Carinthia. Whole kingdoms, as Sweden, Denmark, Norway, &c. have no ſuch mines, but are ſupplied with *tin* from England. Alonſo Barba ſays, that they had rich veins of *tin* at Orouro and Potoſi; but their vicinity to the immenſe mines of ſilver, has prevented their being worked to any purpoſe. A conſiderable quantity of *tin* has been imported into Europe in later years from the Moluccas, ſome bars of which are ſaid to be equal to the beſt Corniſh grain *tin*. Mr. Pryce ſtates the average produce of Cornwall to be three hundred weight of *tin* in one hundred ſacks of *tin-ſtuff*; allowing one ſack to weigh one hundred and a quarter, then one hundred ſacks will be ſix tons five hundred weight; conſequently there muſt be one ton of *tin* produced out of forty-one tons thirteen hundred weight. The country has been found to produce, annually, for ſome few years paſt, about three thouſand tons of pure *tin* metal, which multiplied by forty-two tons of *tin*-ſtuff gives the total ſum of one hundred and twenty-ſix thouſand tons of *tin*-ſtuff per annum.

Boerhaave concludes, that ſulphur is a prevailing ingredient in *tin*; and deduces ſeveral of its particular properties therefrom. He adds, that, could the metal be perfectly purged of this heterogeneous ſulphur, it is probable it would be found no other than ſilver.

Several authors alſo had before noted a great conformity, in divers particulars, between theſe two metals; as that both grow bitter, when diſſolved by acids; that, when fuſed together, there is ſcarce any ſeparating them again, not even by lead. Add, that Mr. Boyle, and others, give us ſeveral inſtances of ſilver being actually produced in conſiderable quantity from *tin* ore.

Some naturaliſts judge the analogy greater between *tin* and lead, and contend that *tin* is only lead under a leſs degree of coction; but, if there be ſome marks of agreement between them, there are as many of diſagreement. The calx of lead, for inſtance, eaſily fuſes and vitrifies; but that of *tin* not without the utmoſt difficulty: if *tin* and lead be mixed by a fierce fire, a vehement colluctation enſues, and they both run into a calx: add, that *tin* is eaſily revivified; but lead not without great labour.

The diſtinguiſhing properties of *tin* are as follow: *Tin*, when bent backwards and forwards, occaſions a crackling ſound, as if it was torn aſunder: and like other imperfect metals, has a ſmell and taſte. It is much leſs ductile than ſome harder metals, though it may be beat into very thin leaves. The tenacity of the parts of *tin* is not very conſiderable, ſince a wire of this metal, in diameter $\frac{1}{10}$th of an inch, can ſupport only a weight of $49\frac{1}{2}$ pounds. It is the lighteſt of all metals, as it loſes only $\frac{1}{7}$th part of its weight when immerſed in water. It is very fuſible, and requires for this purpoſe a heat much leſs than is ſufficient to make it red hot.—With the heat neceſſary for this fuſion, it may be alſo calcined, or at leaſt deprived of ſo much of its phlogiſton, that it appears in form of a grey calx, which cannot be entirely reduced to *tin* without the addition of ſome inflammable matter. This calx or aſhes of *tin* may be farther deprived of phlogiſton, by a continued calcination with a more intenſe fire, by which means it becomes more and more white, hard and refractory, called PUTTY, uſually, indeed, prepared with lead and *tin*: and when the calx of *tin* is very white, and well calcined, it forms with fuſible and vitrifiable matters a white ENAMEL, uſed as a white glazing for DELF-*ware*.

Nitre mixed with *tin* may be inflamed, and haſtens conſiderably the calcination of this, as well as other imperfect metals. The vapours which riſe during the ſeveral calcinations of this metal have generally the ſmell of garlick or arſenic; becauſe *tin* generally contains ſome arſenic, as Mr. Margraaf has obſerved. Although *tin* be one of the moſt calcinable metals by means of fire, it is much leſs apt to ruſt by the combined action of air and water, than iron and copper: and, therefore, it is advantageouſly employed in the operation of TINNING.

This metal, expoſed to the focus of a powerful burning-glaſs, melts, and emits a thick white fume, and if held there a long time, wholly diſſipates itſelf in that fume. If, on the contrary, this metal be fuſed in a coppel by the ſame heat, it fumes conſiderably, and its ſurface becomes covered with a white calx, which greatly rarefies and expands, and there finally appear numbers of cryſtalline and bright ſtriæ, like needles, in that calx. If this be continued in the focus on a piece of free-ſtone, theſe cryſtals ceaſe to fume, and remain fixed while the ſtone itſelf melts and runs. And in the coppel there is uſually a part of theſe that run into a reddiſh matter, reſembling a ſort of enamel. If the calx of *tin* (that is, *tin* reduced to a grey powder, by being diveſted of a part of its oil in the fire) be expoſed to the focus of the burning-glaſs, it fumes more than plain tin, and is very ſoon transformed into cryſtalline ſtriæ, or needles. And if theſe are again expoſed to the ſame focus, placed on a piece of charcoal, they readily melt, and again aſſume the form of common *tin*. The charcoal, in this caſe, furniſhes to the calx of *tin* that oily matter, or phlogiſton, which the fire had diveſted it of; and it is well known, that if the calx of *tin* be made red-hot in a crucible, and any fatty or inflammable matter be added to it, it immediately reſumes the form of *tin* again; this reduction is wholly upon the ſame principle with the other, the oil of charcoal doing in the firſt, what the fat does in the laſt.

It appears, upon the whole, that *tin* contains an oily matter or phlogiſton which is eaſily driven off by fire, and very eaſily received again on the mixture of any fat ſubſtance; that the earthy matter, which is the baſis of *tin*, is of a cryſtalline nature, and very hard to fuſe, ſince no common fire can vitrify *tin* alone; and even the focus of the moſt powerful burning-glaſs does it but with great difficulty, and imperfectly; this ſemi-vitrification is what throws the calx into needles, whereas were it perfect, the whole would be one uniform maſs. Mem. Acad. Par. 1709.

Every acid is capable of attacking or diſſolving *tin*; though Dr. Boerhaave ſays, that it is ſcarce diſſoluble by acids, unleſs by the weaker ſorts. Vitriolic acid requires the aſſiſtance of a certain degree of heat to diſſolve *tin* efficaciouſly. Nitrous acid attacks *tin* with great violence, eſpecially when the metal is much divided; but when the acid is very pure, it rather corrodes and calcines, than diſſolves *tin*. The acid of common ſalt diſſolves *tin* perfectly well by the help of heat. But in the ſolutions of *tin* by the nitrous and marine acids, we may obſerve, that the former acid deprives it of all its inflammable principle, but has no action upon its dephlogiſticated earth, and that the effects of the marine acid upon this metal are quite the reverſe. Accordingly, when theſe two acids are united together, forming an aqua regia, they compoſe a menſtruum, which acts very efficaciouſly upon *tin*, on account of the activity of the nitrous acid; but which does not deſtroy the metal, as nitrous acid ſingly does, becauſe the action of this acid is moderated by the marine acid. A good ſolution may be made of *tin* in aqua regia, by gradually adding the *tin* in ſmall quantities, and thus reſtraining the heat; in which caſe the menſtruum may be ſo charged with the metal, that it ſhall be thick and viſcid, like a liquid tranſparent reſin, with a yellow-reddiſh colour. All the ſolutions of *tin* are acid and corroſive, and may be decompoſed by being diluted with much water; and thus the *tin* is copiouſly precipitated in form of a white calx. A ſolution of *tin* mixed with a ſaturated ſolution of gold, and diluted with a large quantity of water, forms the precipitate, called purple powder of Caſſius and employed for painting on enamels and porcelain. See GOLD *precipitate with tin*, and *Chemical Hiſtory of* GOLD.

The ſolution of *tin* in aqua regia, added to the tinctures of cochineal, of gum-lac, and of ſome other red tinctures, heightens the colour of theſe, and changes it from a crimſon or purple to a vivid reddiſh-yellow, or fire-coloured ſcarlet. The new ſcarlet, or Bow dye, is obtained in this manner; and it is ſaid, that our moſt beautiful and laſting coloured fine cloths owe their ſuperlative excellence to the retentiveneſs given by our fine grain *tin*; inſomuch, that the Engliſh ſuperfine broad-cloth, dyed in grain by the help of this ingredient, are become famous in all markets of the known world.

Mr. Pryce apprehends, that the purple-dye of the Tyrians owed its reputation wholly, or in part, to the uſe of our *tin* in the compoſition of their dye-ſtuff, as the *tin* trade was ſolely under their own direction.

This colour, however, ſucceeds only with wool and other animal matters. Attempts have been made, but without ſucceſs, to give this colour to thread, to cotton, and even to ſilk, though this latter ſubſtance has many properties of animal matters. The ſolution of *tin* made with marine acid alone, or with vitriolic acid, does only give to red tinctures a crimſon colour, as alum does. Vegetable acids, as vinegar and cream of tartar, are alſo capable of diſſolving *tin*.

Tin, according to M. Geoffroy's table of affinities, has a ſtronger AFFINITY with the acid of common ſalt than regulus of antimony, copper, ſilver, and mercury; becauſe the combinations of this acid with theſe metals are decompoſed by *tin*, which precipitates them, and unites with the acid.

Sulphur may be united with *tin* by fuſion, and forms with it a brittle maſs, more difficultly fuſible than pure *tin*. *Tin* may be allayed with all metals by fuſion, and in all proportions; but it abſolutely deſtroys their ductility. And it is remarkable, that the moſt ductile metals, as gold and ſilver, are thoſe the ductility of which is moſt injured by *tin*. The ductility of copper is leſs, though conſiderably, injured by *tin* than that of other metals; and in this allay we obſerve, that *tin*, although a very ſoft metal, and not at all ſonorous, augments conſiderably the ſtiffneſs, the hardneſs, and the ſonorouſneſs of copper, as in BELL-*metal*. See alſo BRONZE.

The allay, or amalgamation with mercury, is uſed in the FOLIATING of LOOKING-*glaſſes*. See AMALGAMATION *of tin*.

Tin allayed with an equal quantity of lead forms the SOLDER of plumbers.

The method of getting, preparing, &c. the *tin* in the Corniſh mines, much the beſt and moſt conſiderable in the world, is given us in the Philoſophical Tranſactions, abr. vol. ii. p. 569. &c. and more diſtinctly and fully in Pryce's Mineralogy.

The working of the *tin* mines is very hard and difficult, not only by reaſon of the great depth which the veins deſcend to, even as low as ſixty fathom; but alſo becauſe the rocks, through which paſſages are frequently cut, are extremely hard. Nor is the ſoft ſhaking earth, found in the *tin* mines, much leſs inconvenient to the workmen, both by reaſon of the fetid, malignant, vapours it exhales, and of the current of water often met withal therein: theſe diſadvantages often render it impracticable for the workmen to hold it above four hours together.

The exiſtence of ***native tin*** has been always doubted, and till of late abſolutely denied by all mineraliſts both ancient and modern: however, Mr. Borlace, in his Natural Hiſtory of Cornwall, p. 185. ſuggeſted, that its exiſtence was far from being improbable; but he afterwards diſcovered three ſpecimens of this metal native or pure, of which he preſented an account to the Royal Society. Mr. Mendes da Coſta made ſeveral experiments on one of theſe ſpecimens, with a view of proving that it was really *tin*; from which he infers, that it is perfectly ductile and malleable, and being bent between the teeth gives the ſame crackling noiſe as *tin* always does: in an open fire it melts eaſily, calcines on the ſurface, and ſmokes; but forced in a ſtronger fire with borax, it detonates with ſmall phoſphoreſcent ſparks, which is a property of pure *tin*; and it is only corroded to a white calx in ſpirit of nitre, and oil of tartar per deliquium being added to the ſolution, none of it was precipitated: whence he concludes, that it was pure *tin*. Philoſ. Tranſ. vol. lvi. art. 7. and art. 39. Native *tin* is alſo ſaid to have been found in Saxony and Malacca.

Although *tin* is the lighteſt of all metals, its ore, or *tin* ſtuff, as it is called by the tinners or miners, is, when rich, the heavieſt of all metallic ores, which is probably owing to the quantity of mundick with which it is combined.

The ores of *tin* may be generally claſſed into ſhode, ſtream, and bal or mine *tin*. The ſhode is disjunct, and ſcattered to ſome diſtance from its parent lode, and is pebbly or ſmoothly angular, of various ſizes, from half an ounce to ſome pounds weight. See SHOAD *ſtones*.

Stream-*tin* ore is the ſame as ſhode, but ſmaller ſized, &c. See STREAM-*tin* and STREAMING *of tin*.

Bal or mine *tin* ore often riſes very rich, and inſtances frequently occur, in which it has been diſcovered in the richeſt and pureſt ſtate imaginable. This kind of rich ore conſiſts of the blackeſt grains or cryſtals, and is uſually found at a moderate depth, or within the day-ſide of forty-fathoms.

The *tin-ſtuff*, or ore, being dug and drawn out of the mine, and laid by the ſide of the ſhaft, is firſt ſpalled, or broken into pieces of a middling ſize; and when the beſt parts are ſorted, they are divided into heaps by a hand barrow, containing a ſack and half, or eighteen gallons. Each of theſe ſhares, called *doles*, being turned over, equally levelled and mixed, is then divided with a ſhovel into two equal parts; and after being bruiſed by large ſledges to the ſize of an hazle-nut, is equally levelled and divided into four parts; the bruiſing and diviſions are repeated at pleaſure, till the quantity deſigned for ſampling is well mixed, and made as fine as common ſand.

To make a rough gueſs, or coarſe eſſay, the ſampler takes a handful of it, and waſhes it on a ſhovel, till the impure parts are carried off by the water, and the more ſolid and heavy particles, that are left behind, are bruiſed with a ſledge on the ſhovel, till the whole aſſumes the appearance of mud This is again waſhed, and by a peculiar motion the metallic particles are collected together on the fore-part of the ſhovel. By repeating theſe bruiſings, waſhings, and motions, it becomes clean black *tin*, fit for the ſmelting furnace. This is called a *van* (probably from the French *avant, foremoſt)* as it is thrown upon the point of the ſhovel by the dexterity of the ſample trier. After the *tin* is thus cleaned, it is dried; and if there be as much black *tin* as will cover a ſhilling, or equal the weight of a ſhilling, it is called *a ſhilling van*, which is not rich; but if the van will cover or equal the weight of a crown piece, it is good *tin*-ſtuff, and called a *crown van*. The ſhilling van, the tinners ſay, will produce one hundred avoirdupois weight of block or white *tin*; and the crown van will yield five hundred weight of block *tin*, for every hundred ſacks in meaſure of the reſpective doles from which the ſample or van was taken, and ſo in proportion, to the richeſt *tin*-ſtuff, called *ſcove*, which is reckoned at the rate of ten thouſand of white *tin*-metal for every hundred ſacks But a better judgment may be formed from the meaſure of a wine half pint, than from a handful, which is indeed, accounted a half-pint. When the *tin*, thus meaſured, is reduced clean, and to a proper ſize, by uſing a large ſhovel, and taking off the ſized *tin* on another ſhovel, the van is dried in a ſhovel upon the fire, and then weighed by pennyweights and grains: and for every pennyweight and half the van weights, the produce will be one hundred weight of black *tin* for every hundred ſacks of *tin*-ſtuff; and for three pennyweights two hundred weight, &c. in the ſame proportion; and if it be *tin* worth ten for twenty, or one for two, then the *tin*-ſtuff is valued at five hundred weight of block or white *tin* for every hundred ſacks: if it be worth twelve for twenty, the ſtuff is valued at ſix hundred weight of white *tin* a hundred; or if it be worth only eight for twenty, it is only valued at four hundred weight of white *tin* a hundred, &c. This *black tin* is rather of a liver colour, though called black in contradiſtinction from white *tin*, or the metal produced from this black ore: it is very heavy, and may in general be computed to hold one half clean metal, and ſome of it will produce thirteen, or even fourteen parts in twenty; whence the mode of expreſſing ſo much white *tin* for twenty of black *tin*, i. e. eight for twenty, ten for twenty, twelve for twenty, &c. Thus if the van of one hundred ſacks of *tin*-ſtuff weighs ſix pennyweights, being four hundred weight of black *tin* at twelve for twenty, the white *tin* or metal muſt be two hundred weight one quarter, ſixteen pounds.

In this method of ſampling, the tinners form a near conjecture of the quantity of white *tin*, which their doles of *tin*-ſtuff will produce at the ſmelting-houſe, when it is dreſſed, and brought into black *tin*. But if the black *tin* is combined with any bad mixture, as of mock-lead, copper, or mundick, after the van is bruiſed fine and waſhed, they lay the ſhovel over the fire, and burn the black *tin*, ſtirring it continually, till it has done ſmoaking: they then waſh it again on the ſhovel, and thus the heterogeneous matter, becoming light by being burnt, is carried off by the water: for when black *tin* is calcined or burnt, it ſtill retains its ſpecific gravity; but copper, lead, and other crude minerals, become much lighter by torrefaction, and are eaſily ſeparated from the *tin* by water. In the dreſſing and management of *tin* by ſtamping, &c. there are obtained two ſorts of black *tin*, viz. the crop and rough, or the crop and leavings of *tin*. The firſt is the prime *tin*: immediately ſeparable from the baſer parts by its ſuperior weight and richneſs. The latter is that which is carried off, and mixed with the lighter earthy parts, by being under ſize, and, therefore, more eaſily carried off by the water.

The *tin*-ſtuff, after this previous preparation and adjuſtment, is carried to the ſtamping-mill, in order to be dreſſed; which operation is performed after the manner deſcribed under *dreſſing of* ORES and BUDDLE. After repeated buddlings, the *tin* is carried to a large vat, called a *keeve*, about one third filled with water, where the dreſſer ſtirs round the water with a ſhovel, whilſt it is gradually and gently put into the veſſel; in which it is toſſed and ſtirred till the keeve is almoſt filled. The ſmall remaining waſte is thus made to ſwim about in the water. After this operation, the keeve is beat with mallets at the ſides near the top (which operation is called *packing*) till the whole is ſettled hard; the water is then poured off, and the waſte ſkimmed and laid by, to be again buddled, under the name of the *ſkimpings*. The *tin* is ſifted through a copper-bottom ſieve into another keeve of water, by which the gravelly waſte ſtill remaining is ſeparated from the clean *tin*; and the *tin* that runs through the ſieve, if it requires no farther buddling, may be cleaned by repeatedly toſſing and packing it as before. It it be neceſſary to buddle it again, after it is ſifted, let it be buddled, and diſtributed in three parts, viz. the crop or pureſt, the creaſe or next in purity, and the hind-creaſe or tail, which is the moſt impure. The crop is to be cleanſed by toſſing, &c. and the creaſe muſt be buddled again, and out of this muſt be reſerved as much as may be cleanſed by toſſing and packing. The remainder muſt be cleanſed by an operation called *dilleughing*, from *dilleugh, to let go or ſend away*. A dilleugher is a large fine hair ſieve, which the dreſſer holds in a keeve one third full of water, into which the *tin* is thrown by a ſhovel-full at a time, and which is ſhook ſo as to put the *tin* into motion; one ſide of this dilleugher is dipped in water, and raiſed again in ſuch a manner, that the waſte may run over, which is laid aſide to mix with the ſkimpings, to make the ſamples of low value, called the *rough* (or *row) tin*. This uſually undergoes another operation, in which by a rill of water paſſing over the buddle in which it is placed, it is farther cleanſed, and then dilleughed, ſo as to be fit to mix with the crop-*tin*.

As for the *tin*-ſtuff, which is incorporated with copper, lead, mundick, black-jack, and other ſemi-metals, this muſt be burnt after it is ſtamped, dreſſed, and cleanſed in the manner already deſcribed, in order to make it fit for calcination in the furnace, called *a burning-houſe*, which reſembles a ſmelting-furnace, though in ſome reſpects it is different.

The leavings of *tin*, conſiſting of the ſlime and tails, i. e. of *tin*-mud and *tin*-gravel, are dreſſed by a particular kind of apparatus, for the conſtruction and uſe of which, we muſt refer to Pryce's Min. Corn. p. 226, &c.

Each ſtamping-mill, which has conſtant work and water, will employ one man and five boys; and one hundred ſacks are carried, ſtamped and dreſſed, in the ſpace of a few days, at the average rate of about four pence *per* ſack, or one guinea and a half *per* hundred.

The next operation, pertaining to *tin*-ore, or black *tin*, is that of SMELTING it. The Phœnicians, who traded to Cornwall for *tin* in the earlier ages, probably conducted this proceſs by digging a hole in the ground, and ſtrewing the ore on a charcoal fire, which perhaps was excited by a bellows. But having no idea of confining the fire, and directing its force on the ſubſtance to be ſmelted, they made no uſe of furnaces, either ſimple or reverberatory. Charcoal was long uſed in the operation of ſmelting, till at length neceſſity ſuggeſted the introduction of pit-coal; and in the ſecond year of queen Anne, a patent was granted for ſmelting black *tin* with foſſil coal in iron furnaces. The invention of *reverberatory* FURNACES built with brick, ſtone, ſand, lime, and clay, ſoon followed this diſcovery; the form of which, being ſimple, has admitted of little improvement to the preſent time. The charge for one of the *tin* ſmelting furnaces is from five to ſix hundred weight of black *tin*, well mixed with a tenth or twelfth its weight of culm. The furnace is charged through a hole in its ſide with a ſhovel, and the *tin* levelled over the bottom with an iron rake or paddle. The apertures are then cloſed, and the fire raiſed to a very great ſtrength, in which ſtate it is left for four or five hours, when the door is taken off, and the whole charge well ſtirred together. The ſtate of the metal is examined, and more culm thrown in if neceſſary; the furnace is again cloſed, and the fire kept up till the end of about ſix hours from its receiving the charge; when it is again examined, and if proper, it is then tapped, and the metal let out into a fixed baſon made of clay, and large enough to hold ſomewhat more than the metal of the charge. The ſcoria in the bottom of the furnace is raked out at the mouth into a ſmall pit made for this purpoſe, where it generally forms itſelf into a cake. When cold, it is carried to the ſtamping mill, in order to ſeparate the globules of melted *tin* diſſeminated through the ſcoria or ſlag. This, being broke by hammers to the ſize of gooſe-eggs, is put into the firſt ſtamping-mill, and paſſed through ſmall iron bars; by which means the *pillion* (for ſo all *tin* recovered out of the ſlags is called) of the larger ſize is taken out and prevented from waſte by too much ſtamping. The refuſe of this firſt ſtamping is put into other ſtamping-mills of a ſecond, third, or even fourth ſize. Of the pillion, ſeparated from the ſcoria, all the rough or grainy parts are conſidered as metals, and refined accordingly, by being ſmelted without any flux, and the produce of this ſmelting refined, with the *tin* firſt tapped.

The *tin* in the baſon, or float (as it is called) as ſoon as it comes down to a moderate heat, is laded out into the moulds, in ſlabs or pigs of about three-fourths of a hundred weight.

The next proceſs is that of refining. The furnace having, by the ſide of the ſmall float now deſcribed, a larger one capable of holding twenty, or more blocks, is for this purpoſe ſuffered to cool to a certain degree, and then charged full with the ſlabs juſt mentioned, the tap-hole being kept open, ſo that as the *tin* melts in this moderate fire, it makes its exit through it into the float; where, while running out, it is frequently ſtirred and toſſed by a ladleful at a time held arm-high, letting it fall in a ſtream into the maſs of metal, when the ſcum which ariſes is taken off. While the metal already put into the furnace is melting, more is added, ſo as to be juſt enough to fill the float with good *tin*: and this, after being toſſed and ſkimmed as before, and ſuffered to cool to a proper temper, is carried in iron ladles to moulds holding generally ſomewhat above three hundred weight (then denominated *block-tin*) where they are marked as the ſmelters chuſe with their houſe mark, which may be a pelican, plume of feathers, ſtag, or horſe, by laying braſs or iron ſtamps, in the face of the blocks while the *tin* is in a fluid ſtate, and yet cool enough to ſuſtain the ſtamping iron. The blocks are then ready to be weighed, numbered, and ſent to the neareſt coinage town to be coined.

The privileged towns for coinage of *tin*, were anciently Liſkeard, Loſtwithiel, Truro, and Helſton: but ſoon after the Reſtoration Penzance was added to the number; in which laſt place there is every quarter more *tin* coined than in the towns of Liſkeard, Loſtwithiel, and Helſton, for a whole year. When the *tin* is brought to be coined, the aſſay-maſter's deputy aſſays it by cutting off with a chiſſel and hammer a piece of one of the lower corners of the block about a pound weight, partly by cutting and partly by breaking, in order to prove the roughneſs and firmneſs of the metal. If it is a pure good *tin*, the face of the block is ſtamped with the duchy ſeal, which ſtamp is a permit for the owner to ſell, and at the ſame time an aſſurance that the *tin* ſo marked has been examined and found merchantable. The ſtamping of this impreſſion by a hammer is COINING the *tin*, and the man who does it is called the *hammer-man*. The duchy ſeal is argent, a lion rampant gules, crowned or within a border garniſhed with bezants.

The droſſy part remaining in the furnace is by an increaſing fire wholly melted, which is then tapped into the ſmall float, where the *tin* ſubſiding, and the droſs riſing to the top, the latter is taken off, and the *tin* laded into ſmall ſlabs as at firſt, to be again refined. The *tin* that remains in and about the ſcoria and droſs of the laſt tappings, &c. is recovered by repeating ſmeltings, till at laſt being almoſt entirely drained of that metal, they become what the workmen generally call *hard heads*, and eſteemed of no farther value.

The workmen diſtinguiſh ſeveral kinds of *tin*; as *moor-tin*, which is the beſt ſort, a fool whereof weighs eighty pounds; and *mine-tin*, which is the next, the fool thereof weighing about fifty-two or fifty pounds. The *tin* got from the ſoft, gravelly earth, they call *pryan-tin*, to diſtinguiſh it from that got from the ſtones, which is better by almoſt half. See STREAM-*tin ore*.

Grain-tin denotes the ore of *tin* that is ſometimes dug very rich in the form of grains or pebbles, or elſe in larger pieces, compoſed of many ſuch diſtinct grains, united in one maſs, always of a black or dark roſin colour, pointed like diamonds. *Grain-tin* is alſo uſed to ſignify the pureſt and fineſt block or white *tin*, ſmelted with charcoal in the blaſt or blowing-houſe furnace, which never had any brood or foreign mixture in the mine: whereas the mine-*tin* is uſually corrupted with ſome portion of mundick, or other mineral, and is always ſmelted with a bituminous fire, which communicates a harſh ſulphureous quality to the metal. *Grain-tin* is peculiarly produced from ſtream-work, and is worth ſeveral ſhillings per hundred more than mine-*tin*. See STREAMING *of tin*.

See on this article Chem. Dict. art. *Tin*, and Pryce's Mineralogia Cornubienſis, fol. 1778.

There is a curioſity in the Corniſh mines, which is this: that in digging at the depth of forty or fifty fathoms, they frequently meet with large timber, ſtill entire.

Childrey, in his Natural Hiſtory, goes back as far as the deluge to place them there; but, without having recourſe to ſo great antiquity, they who believe, that the mines, when exhauſted of their ore, or mineral matter, renew and fill again in courſe of time, will ſoon ſolve the difficulty, by ſuppoſing that, in the firſt working of theſe mines, theſe timbers had been let down to ſerve as props and pillars.

But there are other people who will think this renewal of the mines itſelf a difficulty as great as the former. However, what the former author adds, viz. that in ſome places in the mines they likewiſe find pick-axes, &c. with wooden ſhafts, as alſo braſs nails, and that even a medal of Domitian has been found in one, ſeems to countenance the opinion.

For the uſe of *tin* in the compoſition of pewter, ſee PEWTER.

TIN, *method of aſſaying*. To find whether *tin* be ſoft and ductile, or harſh and brittle, there are two kinds of aſſays; the firſt is, by putting the *tin* into a mould of caſt braſs, and there melting it. If the metal be harſh, it will be taken out heavier than before; if otherwiſe it will be lighter. The ſecond is, by caſting the melted *tin* into a little mould, made of a ſoft ſtone. This mould is to have a little canal of moderate length, which conducts the matter into a cavity, capable of containing half a billiard ball: if the *tin* be harſh, it appears whitiſh towards the entry of the mould, otherwiſe it is tinged ſuperficially with a very faint bluiſh brown.

TIN, *refining of*, or *ſeparating it from other metals*. Mr. Groſſe in the Memoirs of the Academy of Sciences of Paris, has delivered a method he had invented of ſeparating *tin* from lead or ſilver. Having tried an experiment on the ſcoriæ of metal, which contained with the *tin* a large quantity of ſilver, it ſeemed to him that one great ſtep toward the ſeparation of the ſilver, was the haſtening of the calcination of the *tin*, and with this view he tried a mixture of charcoal, ſalt-petre, and earth, which he put together into the coppel with the ſcoriæ. It is eaſy to ſee that a detonation would happen from this, and this muſt greatly add to the force of the fire, in acting upon the ſcoriæ, while the ferruginous matter well known to be contained in the charcoal mixed itſelf with the *tin*, and muſt greatly accelerate its calcination, divide its parts, and give the fire a new action over it. The conſequence of this perfectly anſwered expectation, and recovered a large quantity of ſilver from the ſcoriæ, in which the *tin* had before held it firmly imbodied; repeated experiments proved the truth of this obſervation, and it was found to be eaſy by this means at any time to ſeparate ſilver from *tin*, or to purify ſilver without loſs, by means of lead in which *tin* has accidentally been imbodied.

The ſcoriæ in which *tin* is mixed with ſilver, are compoſed of *tin* half calcined, and run into an opake vitrified ſubſtance, which forms a ſort of net-work, in which the ſilver is confined in extremely ſmall particles. If this is thrown into aqua fortis, the whole is diſſolved: but then it requires a very ſtrong fire to make the *tin* loſe its metallic form; finally, if the whole is finely powdered and then put into this menſtruum, the ſilver only is taken up or diſſolved, the *tin* remaining untouched at the bottom of the veſſel.

The ſame gentleman found alſo a method of ſeparating *tin* from ſilver, by means of corroſive ſublimate of mercury. To conceive the manner in which this ſeparation is effected, a piece of fine *tin* need only be caſt into a ſolution of ſublimate; in which caſe the acid of the ſea-ſalt is ſeen to leave the mercury in order to fix upon the *tin*.

And, according to the ſame principle, if ſublimate corroſive be added to a mixture of *tin* and ſilver, the ſame effect is produced, the acid affixes itſelf to the *tin*, and makes with it a butyrum joviale or butter of *tin*, the mercury becomes diſſipated in the mean time by the action of the fire, and the ſilver remains pure and alone; but in this experiment, if too much corroſive ſublimate be added, there is danger of loſing ſome of the ſilver; ſince the abundant acid will prey upon and carry off a part of that metal, making a ſort of luna cornea which diſſipates itſelf in the air, or if the operation be performed in a cloſe veſſel, a butyrum lunare.

Gold may alſo be purified from *tin* in this manner, and in this there is no riſk of loſs, ſince the acid which takes up the *tin* has not the leaſt power over that metal: in all theſe proceſſes, however, the operator muſt avoid the fumes iſſuing from the crucible, for they are very dangerous.

Theſe methods of ſeparating of *tin* from ſilver are very certain and infallible, but they are too expenſive to be employed in common, and in larger works.

The ſeparating of *tin* from lead to be employed in the refining of ſilver is a matter of great importance; and this may be done in the following manner: melt the lead, and when in fuſion throw into it a quantity of filings of iron, then increaſe the fire to a conſiderable degree, and the ſurface of the metal will be covered with a ſort of ſcum, which is no other than the iron and *tin*. At this time there ſhould be a little alkali ſalt thrown in, and by this means the ſcoriæ readily ſeparate themſelves, and the pure lead remains in form of a regulus at the bottom. The ſame method may be uſed to ſeparate *tin* from ſilver in the larger way, but it will be neceſſary for this purpoſe to add ſome lead, ſince otherwiſe the fuſion will be very ſlow and difficult, and the *tin* will calcine without ſeparating from the ſilver. This is a very eaſy and very cheap method, and will obviate moſt of the miſchiefs which happen to the refiners, of which they would have much leſs frequent reaſon to complain, if they nicely examined the lead they were to employ.

But if gold or ſilver be mixed with *tin*, the ſhorteſt method in ſmall quantities is to calcine the whole very briſkly, and in order to complete the vitrification and ſeparation of the *tin*, to caſt in a little glaſs of lead, which will immediately join itſelf with it and carry it off from the maſs.

It may ſeem ſingular that iron being one of the hardeſt of the metals to melt, and *tin* being of all the eaſieſt, they ſhould ſo readily and eaſily unite in theſe experiments; but this ſeems to be the reſult of one of thoſe natural and unexpected alliances which accident frequently diſcovers to us in bodies. There is one conjecture, however, that may be worthy a place in this reſearch, which is, that all *tin* ore contains a quantity of arſenic, and it is well known that iron very readily mixes with arſenic, and is employed to ſeparate the arſenic from other ores, and a regulus may be formed of arſenic and iron. It is eaſy to ſuppoſe, that *tin* is, in its metalline form, not wholly diveſted of the arſenic it contained when in the ore, and if this be allowed, it is no wonder that the two metals are eaſily brought together by the mediation of that principle. Memoirs Acad. Scienc. Par. 1737.

Mr. Cramer gives the practical rules of ſeparating ſilver from *tin*, thus: divide one centner of *tin* into two equal parts; put each of theſe into a ſeparate teſt, and add to each ſixteen centners of granulated lead, and one of copper; put the whole under the muffle, and make a very ſtrong fire; the *tin* will be calcined immediately, and will ſwim upon the lead. Then diminiſh the fire a little, till the aſhes of the *tin* that ſwim upon the ſurface do no longer ſparkle; when you ſee this, add with a ladle two centners of glaſs of lead to each teſt, in ſuch a manner that it may be ſpread wide over the whole ſurface of the rejected calx; the calx will then change its form of powder into that of glaſs; then increaſe the fire to its higheſt degree, ſtir up the whole with an iron rod made warm; and when the ſcorification is perfected, pour out the glaſs into a mould; the ſcoriæ being ſeparated, put both the reguluſes into two coppels well heated; and into a third put ſixteen centners of lead, and one of the ſame copper uſed in the proceſs; examine all theſe beads after the coppelling is over; if the two firſt weigh exactly alike, it is a proof the proceſs has been well performed; and ſubtracting the weight of the bead, ſeparated from the third pan, from the joint weight of the other two, the remainder is the weight of the pure ſilver contained in the quantity of *tin* which was examined. Cramer's Art of Aſſaying, p. 228.

TIN, in *Chemiſtry* and *Medicine*. This ſubſtance, though greatly celebrated by the writers of former times, is not much eſteemed at preſent: more eſpecially ſince Margraaf diſcovered, that *tin* contains more or leſs of an arſenical matter, which probably proceeds from the ores of *tin*, all which contain arſenic.

M. Margraaf reports, that, by a gentle diſſolution in aqua regia, and ſlow evaporation, he obtained cryſtals, which on being expoſed to the fire, with the addition of ſome fixt alkaline ſalt to abſorb their acid, ſublimed into a white concrete, and that this exhaled in the fire in fumes of a ſtrong garlick ſmell, formed with ſulphur yellow and red compounds, and whitened copper.

However, Dr. Lewis obſerves, that, notwithſtanding the arſenical impregnation in *tin*, the metal taken in ſubſtance has not been found to be noxious, though the fumes, which it emits in a red heat, are undoubtedly ſo.

The principal uſe of *tin* in the preſent practice is as an anthelmintic: even the flat WORMS, which too often elude the force of other medicines, are ſaid to be effectually deſtroyed by powdered *tin*. The common doſe of the powder is from a ſcruple to a dram; but Dr. Alſton ſays, that its ſucceſs depends on its being given in much larger quantities. See *Worm* POWDERS.

It is poſſible, ſays Dr. Lewis, that the anthelmintic virtues of *tin* may proceed not ſo much from the pure metal, as from a certain ſubſtance of a different, or arſenical nature, which the pureſt ſorts of *tin* are found to participate of.

The principal preparations of *tin* are as follow:

TIN, *Butter of*, is a name given by ſome chemiſts to a combination of *tin* with the concentrated marine acid of corroſive ſublimate. It is procured by reducing theſe ſubſtances into ſmall parts, and mixing them together; this mixture will, by degrees, be moiſtened by attracting the humidity of the air. The decompoſition of the corroſive ſublimate by the *tin* is more ſpeedily effected by diſtillation.

TIN, *Calx of*, is the metal reduced into powder, either by means of fire, or by being diſſolved in an acid menſtruum, and precipitated with an alkali.

TIN, *Ceruſs of*. See *Spaniſh* WHITE.

TIN, *Diaphoretic of*. See ANTIHECTICUM *Poterii*.

TIN, *Flowers of*, are a kind of white coſmetic, or paint for the complexion, drawn from *tin* with ſal ammoniac, by means of ſublimation.

TIN, *Gold-coloured preparation of*, is made by adding ſix ounces of mercury to twelve of melted *tin*, pulveriſing the cold maſs, mixing with it ſeven ounces of flowers of ſulphur and ſix of ſal ammoniac, and ſubliming in a matraſs.

This preparation is called AURUM *moſaicum*, and as a medicine is little regarded, though formerly much eſteemed againſt hyſterical and hypochondriacal complaints, malignant fevers, and venereal diſorders. Upon experiment, it appears to be little more than calx of *tin*.

TIN, *Salt of*, *Sal Jovis*, is prepared from twelve ounces of calx of *tin*, and four of aqua regia, diluted with twenty-four of water; after digeſtion for two days, the veſſel is to be ſhaken, the more ponderous part of the calx ſuffered to ſettle, the turbid liquor poured off, and evaporated almoſt to dryneſs, and the maſs farther exſiccated on brown paper; to the remaining calx half the quantity of freſh menſtruum is to be added, and the proceſs repeated. Dr. Lewis's experience has not enabled him to pronounce on the virtues of this ſalt, which is in taſte very ſharp and corroſive: he thinks it needleſs to calcine the metal, as *tin* uncalcined diſſolves much more eaſily and plentifully, and the ſolution is in both caſes the ſame. According to Hoffman, the ſolution of *tin* is a ſtrong purgative. Lewis's Mat. Med.

TIN is alſo a word uſed by ſome of the chemical writers to expreſs ſulphur.

TIN-*floors*, a contrivance uſed by our huſbandmen who propagate hops, to dry them after the gathering. See OOST

It is thus done: let a ſquare brick room be built, with a door on one ſide, and a long fire-place of a foot wide in the middle, reaching almoſt acroſs it; let holes be made at the ſides of this fire-place, to let out the heat into the room; and at the height of five feet above this let a floor be made of laths of an inch thick, laid lattice-wiſe. Let this be covered with great plates of double *tin*, taking care that the joinings of the *tin* be well ſoldered, and lie upon the laths, nor over the interſtices, which may be about four inches wide. Let a row of boards be fitted round the edge of this floor, to keep the hops from falling off, then lay on a covering of hops of a foot thick; then make a ſmall fire of charcoal in the mouth of the fire-place, and the hops will dry very quick and very regularly. They may be continually ſtirred about while drying, and, when enough, a part of the boarded edge of the kiln may be taken down, and the dried parcel thruſt out, and a freſh parcel laid on in their place A very ſmall quantity of fuel is ſufficient in this way, and any fuel will do, for the ſmoke never comes at the hops. There is a very great improvement ſtill upon this method of drying hops, uſed by ſome people; this is the making of a wooden cover, of the ſize of the *tin-floor*; this is covered with plates of *tin* nailed on, and is ſuſpended over the kiln in ſuch a manner, that it may be let down at pleaſure, when the lower parts of the hops are dry. This is to be let down within ten inches of their ſurface, and there it acts as a reverberatory, and drives back the heat on the upper ones, ſo that they are dried as ſoon as the lower ones. Thus all the trouble of turning is ſaved, and the hops are much better dried than in any other way. Mortimer's Huſbandry, p. 186. See VENTILATOR.

TIN-*hatch*, in *Mining*, a term uſed by the people of Cornwall, to expreſs the opening into a *tin*-mine. They alſo call it *tin-ſhaft*.

They make ſeveral openings in the ſides of the hills where they ſuſpect veins of ore to be. All theſe, except that which opens on the head of the mine, are called *eſſay-hatches*; but that which does ſo, is made their entrance afterwards, and changes its name to that of the *tin-hatch*. See HATCHES and SHAFT.

TIN-*ore*, called *tin*-ſtuff by the miners in Cornwall, is very ſeldom found pure, but almoſt always mineraliſed, and chiefly by arſenic. The richeſt ore is of an irregular form, of a black or tarniſhed colour, and almoſt the heavieſt of all ores, as it contains much more arſenic than ſulphur, whereas moſt ores contain more ſulphur than arſenic.

The moſt common *tin*-ore is of the colour of ruſt, which proceeds from a quantity of iron, or of iron-ore mixed with it. One kind of *tin*-ore is ſemi-tranſparent, and like ſpar: and ſeveral kinds of garnets are enumerated by mineralogiſts among *tin*-ores, becauſe they actually contain *tin*. All the ores of *tin* are of the calciform kind, except *black* LEAD, which appears to be *tin* mineraliſed by ſulphur and iron.

The calciform ores of *tin* are, 1. *Tin-ſtone*, which is of a blackiſh brown colour, of no determinate figure; and *tin-grains*, or cryſtals of *tin*, which reſemble garnets, and are of a ſpherical or polygonal figure, which they have probably acquired by the attrition of their angles. The *tin*-ſtone ſeems to conſiſt of attrited *tin*-grains. This ore is calx of *tin* united with calx of arſenic, and frequently with calx of iron. 2. GARNETS are ſaid to contain calx of *tin* united with calx of iron. 3. MANGANESE is ſaid alſo to contain *tin*. See TIN *ſupra*, and STREAM *tin ore*.

The firſt proceſs toward the ſeparating of the metal from this ore, is the roaſting it, which the aſſayer performs in this manner; put ſix centners of *tin* ore, in coarſe powder, in a teſt, under a muffle made thoroughly red-hot, ſhutting firſt the veſſel for a few minutes, and then opening it. If the fire is pretty ſtrong, the volatile part will be ſoon expelled in a thick white ſmoke, ſmelling like garlic. When this is over take out the teſt, and when the ore is cold, beat it to powder, and roaſt it again in a ſomewhat ſtronger fire, till it exhales no more arſenic, which may be known by putting upon the teſt, when juſt taken from the fire, a thick cold plate of iron, which will be covered on its under ſurface with a ſmall whitiſh cloud, if the ore exhales any arſenic. Cramer's Art of Aſſaying, p. 332.

When the roaſting is thus finiſhed, the ore may be run into malleable *tin* in the common manner, as the common LEAD-*ore* is, only with this caution, that the fire in the operation be carried on as ſoon as poſſible to the higheſt degree that is neceſſary here, and the veſſel taken out of the fire as ſoon as the operation is judged to be finiſhed.

Upon this aſſay Cramer makes the following remarks:

1. *Tin*-ore, on account of its greater gravity, admits better of being ſeparated, by elutriation or waſhing, from earth, ſtones, and lighter ores.

2. A moſt exact ſeparation of earths and ſtones ought to be made, becauſe the ſcorification of theſe by fluxes requires ſuch a heat as would deſtroy the reduced *tin*.

3. The iron ought to be ſeparated by a magnet.

4. By a previous roaſting the arſenic is diſſipated, which would otherwiſe carry off a great deal of *tin* along with it in a melting heat, would change another part of it into aſhes, and would vitiate the remaining *tin*.

5. The aſſay of *tin* is very precarious and uncertain; becauſe *tin* once reduced is eaſily deſtructible by the fire, and by the ſaline fluxes requiſite for the reduction.

Mr. Gellert directs, that ores of *tin* ſhould be aſſayed in the following manner: mix a quintal of *tin*-ore, waſhed, pulveriſed, and twice roaſted, with half a quintal of calcined borax, and half a quintal of pulveriſed pitch; theſe are to be put into a crucible, moiſtened with charcoal-duſt and water, and the crucible placed in an air-furnace: after the pitch is burnt, give a violent fire during a quarter of an hour, and then withdraw the crucible. If the ore be not very well waſhed from the earthy matter, as it ought to be, a larger quantity of borax is requiſite, with ſome powdered glaſs, by which the too quick fuſion of the borax is retarded, and the precipitation of the earthy matter is prevented. If the ore contains iron, to the above mixture may be added ſome alkaline ſalt. See MOOR-*ſtone*

The method of aſſaying *tin*-ore, ſays Mr. Pryce, is very eaſy; for in its form and ſize of black *tin* (which is the ore dreſſed by ſtamping, ſeveral waſhings, and calcination, if mineraliſed with vitriolic, arſenical, or ſulphureous pyrites) great part of the work is done, and little more remains than fuſion, which is accompliſhed by a red heat in the following proceſs: take four or five ounces of black *tin* as emptied from the ſacks, mix it well with about one fifth part of its weight of powdered culm; put the mixture in a black-lead crucible, on the wind-furnace, and, in about twenty minutes, the metal will be found precipitated to the bottom of the crucible, the culm and ſcoria floating on the *tin*. On the ſurface of this matter there will be globules of *tin*; and therefore the mixture ſhould be ſtirred with an iron-rod, to make them fall into the *tin* at the bottom. Cloſe the furnace, and let the whole remain in fuſion from three to five minutes. Keep in readineſs an iron or braſs mortar, and an ingot-mould about ſix inches long; pour the *tin* into the ingot, and empty the culm and ſcoria into the mortar, ſcraping off what remains in and about the crucible with a ſharp iron. As ſoon as cold put them into another mortar, and pulverize them gently, ſo as to ſeparate the ſcoria from the largeſt of the globules of *tin*. Select the larger globules, and pulverize the remainder a ſecond time; then put this ſtuff twice powdered on a ſhovel, and paſſing it often through water, in the ſame manner as the lighter parts are waſhed from ores in vanning, and the ſmaller globules will remain on the ſhovel; and theſe, with the larger (both together being generally called *pillion-tin*), being added to, and weighed with the ingot, ſhew the produce in metal of the four or five ounces aſſayed. See Chem. Dict. Engliſh ed. and Pryce's Min. Corn. p. 269.

TIN-*plates*, an article of manufacture very common among us, and vulgarly called *tin*. It is iron plated over with *tin*. The French call it *fer blanc*, *white iron*, as we ſometimes do in England. It was once known under a diſtinct name, LATTIN, under which article the proceſs of manufacturing it is deſcribed.

We ſhall here add, with regard to the hiſtory of this manufacture, that in the year 1681 *tin* plates were made in England by one Andrew Yarranton, who was ſent to Bohemia to learn the manner of making them. But the manufacture was diſcontinued by his employers, and afterwards ſo much diſregarded as to be reckoned among the projects, called bubbles of the year 1720; however it was revived, and brought to ſuch perfection about the year 1740, that very little of it was imported from foreign parts; our own plates being of a finer gloſs, or coat, than that made beyond ſea, the latter being hammered, and ours being drawn under a rolling-mill. And. Hiſt. Com. vol. ii. p. 175, 361.

TINA, a name given by the old medical writers to a bath made of a ſtrong decoction of many carminative ingredients to be uſed in the colic.

TINCA, the *tench*. See TENCH.

TINCA-*marina*, the *ſea-tench*, in *Ichthyology*, a name given by ſome authors to the common *turdus*, called in Engliſh the WRASSE, and PHYCIS.

TINCAL, is a name given to BORAX in the crude ſtate in which it is brought from India, and before it is refined. It conſiſts of ſmall cryſtals of a yellowiſh colour, and it has a greaſy or unctuous touch.

According to M. Cadet, it contains a larger quantity of the peculiar vitreſcible earth of borax than the refined ſalt commonly ſold does. See BAURAC.

TINCTORUM *rubia*. See MADDER.

TINCTURE, TINCTURA, in *Pharmacy* and *Chemiſtry*, a ſeparation of the finer and more volatile parts of a mixed body, made by means of a proper menſtruum diſſolving the ſame.

TINCTURE is more particularly uſed for an extract of part of the ſubſtance of a body, eſpecially its flavour and colour, which are hereby communicated to the menſtruum.

We have cephalic *tinctures*, antiſcorbutic *tinctures*, ſtomachic *tinctures*, anticolic *tinctures*, invigorating *tinctures*, &c. and *tinctures* drawn from roſes, from coral, &c.

To make a *tincture*, the matter is uſually bruiſed, put into a mattraſs, and the menſtruum, which commonly is ſpirit of wine, poured on it, to the height of two or three fingers above it. Then the glaſs is cloſed, and ſet for digeſtion, in a ſand-heat, during five or ſix days, or till the ſpirit is well impregnated, and has received a high colour.

Thus are *tinctures* of odoriferous vegetables, as cinnamon, &c. drawn; and the ſame method ſerves for thoſe of metals and minerals.

A general rule for the properly making of light *tinctures* may be taken from the following bitter. Take half an ounce of Seville orange-peel ſhaved thin, half a dram of gentian-root thin ſliced, a ſcruple of the tops of Roman wormwood, half a dram of cardamom-ſeeds, and the ſame quantity of cochineal, each of them lightly bruiſed; put theſe ingredients into a pint of French brandy, let them ſteep for one night, and filter the liquor the next morning, and thus you have a fine light bitter.

Theſe bitters are of the number of many other ſubſtances, where the goodneſs of a *tincture* does not more depend upon the choice of the ingredients than upon the manner of their being infuſed; for if ſuch be ſuffered to remain too long in the menſtruum, or if heat be uſed in extracting the *tincture*, the groſs, terreſtrial, and nauſeous parts of the ingredients will be fetched out, and the *tincture* will thus be loaded with a heavy indolent matter of little virtue. Shaw's Lectures, p. 202.

If, however, a greater ſtrength be required in the *tincture* that can be procured by ſo ſlight an infuſion, when the ingredients are of this nature the matter ſhould never be ſuffered to be heated, or ſtand long on the ſame ingredients, but ſhould be, when ſtrained off, poured on freſh ones, and ſo on till of any ſtrength deſired, yet perfectly free from the groſſer parts.

Apothecaries uſually commit the ſame error in their finer *tinctures* that they do in their cordial waters, ſaturating the liquor in both caſes with the groſſer and more uſeleſs part of the ingredients; whence the cordial waters of the ſhops too often abound with a groſs heavy oil, and the *tinctures* with a groſs heavy earth, or kind of bituminous matter, inſtead of the briſk, lively, and invigorating ſpirit, which alone is the thing required in both caſes.

To extract the *tinctures* of hard, reſinous, or gummy bodies, however, requires a different treatment, and muſt be effected in another manner. See LACCA.

Rectified ſpirit is the direct menſtruum of the reſins and eſſential oils of vegetables, and totally extracts theſe active principles from various ſubſtances, which yield them to water, either not at all, or only in part. It diſſolves, likewiſe, thoſe parts of animal ſubſtances in which their peculiar ſmells and taſtes reſide.

Hence the *tinctures* prepared with rectified ſpirits form an elegant and uſeful claſs of medicines, poſſeſſing many of the moſt eſſential virtues of ſimples, without being clogged with their inert or uſeleſs parts. Water, however, being the proper menſtruum of the gummy, ſaline, and ſaccharine parts of medicinal ſubſtances, it will be neceſſary, in the preparation of ſeveral *tinctures*, to make uſe of a weak ſpirit, or a compoſition of rectified ſpirit and water. Buchan's Dom. Med. Appendix.

A great variety of *tinctures* may be given to common water, and many remarkable things occur in their changes on the addition of common menſtruums. Take a large ſpoonful of the ſyrup of pomegranate-flowers, mix it with five ſpoonfuls of water; the mixture will be of a very lively and brilliant red: for a violet colour, take the ſame quantity of ſyrup of violets and the ſame of water. When theſe *tinctures* are thus prepared, have at hand a vial, in which is a ſmall portion of oil of tartar, which will only look like water remaining after the waſhing of the vial. Pour the red or the violet *tincture* into this vial, and it immediately becomes a fine graſs green. Diſſolve the quantity of a walnut of crude ſal ammoniac in a glaſs of water, pour all out except three or four drops at the bottom, and pour into this glaſs the fine red liquor, and it immediately becomes black as ink. In order to change the purple liquor red, only have a ſmall quantity of ſpirit of vitriol in the bottom of a vial, and pour into this the violet water; it immediately on this becomes of a florid red.

Steep Braſil-wood in common water, or in white wine, twenty hours, the liquor will then look of the colour of red-wine; pour this into a glaſs waſhed with vinegar, and it becomes of a fine yellow, like ſack. If this experiment be made with white wine, the wood and the vinegar make ſo little alteration in it, that it may be drank afterwards, and the whole proceſs ſeems a way of turning red port into ſack. Into this liquor, when yellow, drop a few drops of a *tincture* of benjamin made in ſpirit of wine, and it immediately loſes its yellow colour and becomes white. Beat ſome galls to fine powder, and rub the powder on a towel, then put into a baſon of water, in which any perſon is going to waſh their hands and face, a ſmall piece of common green vitriol, or copperas; after the perſon has waſhed, let them have this towel to wipe on, and the hands and face will be as black as if waſhed with the common writing-ink: the copperas in the water and the galls on the towel making real ink where they mix. This does no laſting injury to the ſkin, but will come off again upon waſhing with ſoap. Phil. Tranſ. Nº 238, p. 88.

The *tinctures* of metals, ſo much talked of by the chemiſts and alchemiſts, are not proper *tinctures*; they are only diſſolutions, wherein the metal is divided and attenuated to a greater degree than it is in its natural and ordinary diſſolvents.

If the *tincture* were irreducible, that is, if the metal were diſſolved to ſuch a degree as that it could not be brought back again into metal; or, which comes to the ſame, if the principles which compoſe it were diſunited; it would be what the chemiſts have ſo long and ſo earneſtly wiſhed for, and ſought with ſuch infinite pains, eſpecially with regard to gold; the irreducible *tincture* whereof is what ſhould be called *aurum potabile*.

But no ſuch *tincture* has ever yet been diſcovered; the potable gold, deſcribed by them, being only gold extremely divided; and the caſe is the ſame with the *tinctures* of other metals.

The intention of metalline *tinctures* is, to rarefy and extend the ſulphur of metal as much as poſſible, and ſo to render the fixed and earthy parts as ſubtle and volatile as may be; and if they are deſigned to be of uſe in medicine, ſome harmleſs and agreeable medium is to be uſed. See TINCTURE *of Metals*.

The alchemiſts give the name *grand mineral tincture* to the philoſophers-ſtone; from an opinion, that all required to their operation is, to give the colour or *tincture* of gold to fixed mercury.

Marble, alabaſter, and bones, receive *tinctures* from lixiviums and ſharp juices; and Mr. Boyle thinks there is reaſon to hope the ſame may be done with precious ſtones: rock-cryſtal, it is certain, is tinged by ſubterraneous juices, and all the other coloured gems, even the ſapphire itſelf. See GEMS.

TINCTURE *of Amber*. See AMBER.

TINCTURE *of Ambergris* is prepared, under the direction of the faculty of Paris, by digeſting two ſcruples of ambergris in two ounces of a highly rectified ſpirit impregnated with roſes.

They have alſo a compound *tincture* made from the ſame quantity of ambergris, with half as much muſk, ten grains of civet, ſix drops of oil of cinnamon, and four drops of oil of rhodium, digeſted together in 4 ½ ounces of a ſpirit impregnated with roſes and orange-flowers. This is a very high perfume.

The moſt advantageous mode of preparing theſe *tinctures*, with regard to the ambergris, is to make the ſpirit boil or ſimmer with it firſt, that this ingredient may be completely diſſolved before the more ſoluble ones are added. Lewis. See AMBERGRIS.

TINCTURE *of Antimony*, *tinctura antimonii*, is thus made: take ſalt of tartar, a pound; antimony, half a pound; rectified ſpirit of wine, a quart; reduce the antimony to powder, and mix it with the ſalt by fuſion over a ſtrong fire. When it is cold powder it, and pour on the ſpirit of wine; digeſt them together in a ſand-heat, and then filtre off the clear *tincture* for uſe. The ſalt of tartar yields a *tincture* as well as antimony. It is a diaphoretic and attenuant.

This *tincture*, on an empty ſtomach, is ſaid to have ſometimes proved emetic.

TINCTURA *antiphthiſica*. See TINCTURA *ſaturnina*.

TINCTURE, *aromatic*, may be prepared by infuſing two ounces of Jamaica pepper in two pints of brandy, without heat, for a few days, and then ſtraining off the *tincture*. This will anſwer all the intentions of the more coſtly preparations of this kind. Buchan.

TINCTURE *of the Bark* is made by macerating for ſome hours, without heat, four ounces of the powder in a quart or 2 ½ pounds of proof ſpirit, which will acquire a conſiderable degree both of bitterneſs and aſtringency; on applying heat the taſte becomes ſtronger, the colour darker, and the liquor ſomewhat turbid.

Spirit of ſal ammoniac, made with fixt alkaline ſalt, in the preparation of volatile *tincture* of bark, by maceration with powdered bark in the above proportion, receives from it very little taſte and colour. The ſpirit prepared with quick-lime, and the dulcified ſpirit, extract, in a few hours, a very deep colour, and become ſtrongly impregnated with its virtue. Lewis.

A compound *tincture* of the bark may be made by powdering two ounces of the bark, and bruiſing half an ounce of Seville orange-peel, and the ſame quantity of cinnamon; then, infuſing the whole in a pint and a half of brandy for five or ſix days in a cloſe veſſel, and afterwards ſtraining off the *tincture*.

This *tincture* is not only beneficial in intermittent fevers, but alſo in the ſlow, nervous, and putrid kinds, eſpecially toward their decline. The doſe is from one dram to three or four, every fifth or ſixth hour; which may be given in any proper liquor, occaſionally ſharpened with a few drops of the ſpirit of vitriol. Buchan.

TINCTURE *of Caſſia*. See CASSIA.

TINCTURA FOETIDA, the ſtinking *tincture*, a form of medicine in the late London Diſpenſatory prepared in this manner; take aſſa fœtida, four ounces; rectified ſpirit of wine, a quart; digeſt them together for ſome time, and then ſtrain off and filtre the *tincture* through paper.

The *tinctura fœtida* of the Edinburgh Pharmacopœia of 1783, is made by diſſolving two ounces of aſſa fœtida in a pound of dulcified ſpirit of ſal ammoniac.

This *tincture* is beneficial in hyſteric diſorders, eſpecially when attended with lowneſs of ſpirits and fainting. A tea-ſpoonful may be taken in a glaſs of wine or a cup of penny-royal tea.

TINCTURE *of Gold*. See AURUM *potabile*, and *Chemical Hiſtory of* GOLD.

TINCTURE *of Gum Guaiacum, volatile*, is made by infuſing four ounces of the gum in a pint of volatile aromatic ſpirit, without heat, in a veſſel well ſtopped, for a few days, and then ſtraining off the *tincture*. In rheumatic complaints a tea ſpoonful of this may be taken in a cup of the infuſion of water-trefoil, twice or thrice a day. Buchan. See GUAIACUM.

TINCTURE *of black Hellebore*. See HELLEBORE.

TINCTURE, *Japonic*. See JAPAN *Earth*.

TINCTURE *of Lacca*. See LACCA.

TINCTURA *Martis cum ſpiritu ſalis*, a medicine thus prepared: take filings of iron, half a pound; Glauber's ſpirit of ſea-ſalt, three pounds; digeſt all together without heat, as long as the ſpirit will work upon the filings; then, after the fæces have ſubſided, pour off the clear liquor, evaporating it to one pound, and adding of rectified ſpirit of wine three pints.

Some combine the acid and inflammable ſpirits firſt, and digeſt three ounces of iron filings in a quart of the dulcified compound. A few drops of this *tincture* are a ſufficient doſe.

This *tincture* is good in all the caſes in which the SAL *martis* is ſo.

TINCTURE *of Martial Flowers*. See IRON.

TINCTURE *of Metals*, called *Lilly of Paracelſus*, may be prepared by melting together in a crucible two parts of martial regulus of antimony, one part of fine tin, and one part of pure copper. The allay thus compounded is to be powdered, when cold, and mixed with thrice its weight of purified nitre. The mixture is to be thrown, at different times, into a red-hot crucible, where it detonates, and is expoſed to a violent fire, till the metals be perfectly reduced to calces. The matter is to be taken from the crucible, while red-hot, and immediately thrown into a heated iron mortar, where it is quickly powdered. The powder, while hot, is to be put into a matraſs, and upon it ſome rectified ſpirit of wine is to be poured to a height equal to the breadth of four fingers. The digeſtion is continued during ſome days, or till the ſpirit of wine has acquired a very deep yellowiſh-red colour. The ſpirit is to be decanted and kept in a bottle.

This *tincture*, although no part of the metals, reduced by calcination almoſt to the ſtate of pure earths, can be diſſolved by the ſpirit of urine, has a ſpirituous, ſaponaceous, acrid, and alkaline character, and has been ſucceſsfully uſed when the fibres and veſſels require to be excited and animated, as in apoplexies, palſies, and dropſies. It is alſo capable of accelerating the motion of the blood, and of increaſing certain ſecretions and excretions, particularly ſweat and urine. The doſe is from ſix or twelve drops to forty, or even more, and muſt be adminiſtered in ſome proper cordial. Dict. Chem.

TINCTURE *of Muſk* is directed, in the Edinburgh Pharmacopœia of 1783, to be made by diſſolving two drams of MUSK in a pound of rectified ſpirit.

TINCTURE *of Myrrh*. See MYRRH.

TINCTURE *of Myrrh and Aloes* is prepared by pulveriſing an ounce and a half of myrrh, and one ounce of hepatic aloes, and infuſing them in two pints of rectified ſpirits, for ſix days, in a gentle heat, and ſtraining the *tincture*. This is principally uſed by ſurgeons for cleanſing foul ulcers, and reſtraining the progreſs of gangrenes. It is alſo recommended by ſome, as a proper application to green wounds. Buchan.

TINCTURE *of Rhubarb*. See RHUBARB.

TINCTURA SACRA, a *tincture* of aloes, called alſo *hiera picra*.

This *tincture* is made by digeſting five ounces of the powder, called *hiera picra* in the London Diſpenſatory, or a powder formed of eight parts of aloes and two of canella alba, in five pints of mountain wine; or one ounce of aloes, with one dram of the leſſer cardamom ſeeds, and the ſame quantity of ginger, in two pounds of the ſame wine. Lewis.

Dr. Buchan directs this *tincture* to be made by infuſing an ounce of Socotrine aloes in powder, and two drams of Virginia ſnake-root, and as much ginger, in a pint of mountain wine and half a pint of brandy, for a week, frequently ſhaking the bottle, and ſtraining off the *tincture*. This, he ſays, is a ſafe and uſeful purge for perſons of a languid and phlegmatic habit; but it is thought to have better effect when taken in ſmall doſes as a laxative. The doſe, as a purge, is from one to two ounces.

Tincture *of ſaffron.* See Saffron.

Tincture *of Salt of Tartar*, is made by pouring ſome rectified ſpirits of wine, to a height equal to the breadth of three or four fingers, into a heated matraſs, that contains ſome hot ſalt of tartar, which has been previouſly fuſed in a crucible and powdered. The matraſs is to be cloſed, and the digeſtion continued for ſeveral days with a gentle heat, or till the ſpirit of wine has acquired a fine reddiſh-yellow colour.

This is eſſentially the ſame as tincture of *metals*, their medicinal qualities being the ſame.

Tinctura Saturnina, the lead *tincture*, a name given in the late London Diſpenſatory to the *tincture* before called *tinctura antiphthiſica*, becauſe it was uſed to check the immoderate ſweats in hectic complaints.

It is made of ſugar of lead and green vitriol, of each two ounces; and of rectified ſpirit, a quart. The ſalts are ſeparately to be reduced to powder, and then put into the ſpirit, then the whole is to ſtand ſome days without heat to extract the *tincture*, and afterwards filtered through paper.

Many perſons have found great perplexity in making this *tincture*, it having at firſt begun to ſhew a good colour, but afterwards loſt it; this accident is owing to heat uſually employed in making the *tincture*.

This *tincture* is a powerful ſtyptic, and is often uſed with good ſucceſs in hectic fevers, ſpitting of blood, heat of the kidneys, ſimple gonorrhœas, fluor albus, and tabes dorſalis.

It was firſt recommended by Etmuller; who, from its effect, gave it the name of *tinctura antiphthiſica*, which our college of phyſicians have changed to that of *tinctura ſaturnina*. We alſo find it in the Pharmacopœia of Edinburgh, which directs it to be made of three ounces of the ſugar and two of the vitriol, to a quart of ſpirit, and in the beſt of the foreign ones. Mr. Boyle recommends it, and our moſt eminent phyſicians uſe it, notwithſtanding that ſome authors conſider it as a dangerous medicine, on account of its principal ingredient, the *ſaccharum ſaturni*, which ſome call a ſlow poiſon. Whether it be ſo or not when given in ſubſtance, it is certain that there is a great difference between a corroſive ſalt ſo given, and a *tincture* made of the ſame, in ſpirit of wine, and given in ſmall doſes, as Dr. Mead obſerves; who adds, that in ſlow hectic fevers attended with a looſeneſs, profuſe ſweats, and a colliquation of the humours, he reckons two or three drams, given at different times, in cooling liquors, every twenty-four hours, to be a convenient doſe. But the uſual doſe is from fifteen to thirty drops in Briſtol water, or ſome temperate or cool julep.

Concerning the danger of ſaturnine preparations, when applied to the purpoſes of internal medicine, ſee ſir George Baker's Farther Obſervations on the Poiſon of Lead, in Med. Tranſ. vol. ii. p. 446, &c. See alſo Colica *Dammoniorum*, Lead, Saccharum *Saturni*, and Vinegar of *Lead*.

Tincture *of ſena*, is prepared by digeſtion for ſome days, with or without heat, in proof ſpirit. The proportions in the London Pharmacopœia are three ounces of ſena to a quart of the ſpirit, to which are added four ounces of ſtoned raiſins, three drams of carraway-ſeeds, and one dram of leſſer cardamom-ſeeds huſked: in the Edinburgh, two ounces of ſena to three pounds and a half of the ſpirit, with the addition of one ounce of jalap, half an ounce of coriander-ſeeds, and four ounces of white ſugar-candy in powder, which laſt is to be diſſolved in the *tincture*, after ſtraining it from the other ingredients. Theſe *tinctures* are agreeable and uſeful carminative purgatives, eſpecially to thoſe who have accuſtomed themſelves to ſpirituous liquors; and anſwer all the purpoſes of the elixir *ſalutis* and Daffy's elixir.

Tinctura *Serpentariæ*, or *Tincture of ſnake-root.* See Snake-*root*.

Tincture *of Soot.* See Soot.

Tincture *of Spaniſh Flies*, *tinctura cantharidum*, is made by bruiſing a little two drams of the cantharides, and digeſting them two or four days in a pint and a half or two pints of proof ſpirit, with or without the addition of half a dram or more of cochineal, as a colouring ingredient.

Theſe *tinctures* are uſually given from fifteen to thirty or more drops, twice a day, beginning with the ſmaller doſe, and increaſing it by two or three drops at a time, till a little uneaſineſs is perceived in making water, then intermitting it for a day or two, and diminiſhing the doſe, and continuing it juſt below the quantity which produced that effect. This is the ſafeſt and moſt commodious form for taking cantharides internally. Lewis.

Tinctura *ſtyptica*, a form of medicine made with very little trouble and apparatus, and ſerving to ſupply the place of that elaborate preparation the *tincture* of Helvetius; it is preſcribed in the late London Pharmacopœia, and is to be made by mixing a dram of calcined *green* vitriol with a quart of French brandy *tinctured* by the caſk; this is to be ſhook together that the brandy may turn black, and then ſtrained off for uſe.

Tincture *of Sulphur.* See Sulphur.

Tinctura *thebaica*, a name now given to the *tincture* of opium, commonly called *laudanum*.

The method of making this is alſo much altered, as well as the name in the late London Diſpenſatory, where the ſaffron being looked on as an uſeleſs ingredient, is wholly left out, and the medicine ordered to be prepared in the following manner: take of opium ſtrained, two ounces; of cinnamon and cloves, each a dram; mountain wine, a pint; infuſe without heat a week, and ſtrain off the wine through paper.

The college of Edinburgh orders the ſame quantity of crude opium to be digeſted for four days in a pound and a half of ſpirituous cinnamon water. Of the firſt of the above *tinctures* twenty drops, and of the latter twenty-five drops, are reckoned to contain one grain of opium.

Tincture *of the Balſam of Tolu*, is made by infuſing an ounce and a half of the balſam in a pint of rectified ſpirit of wine in a gentle heat, till the balſam is diſſolved, and ſtraining the *tincture*.

This *tincture* poſſeſſes all the virtues of the balſam; and in coughs, and other complaints of the breaſt, a teaſpoonful or two of it may be taken in a bit of loaf-ſugar.

But it is beſt uſed in ſyrup. An ounce of the *tincture*, properly mixed with two pounds of ſimple ſyrup, will make what is commonly called the *balſamic ſyrup*. Buchan.

Tincture *of Valerian.* See Valerian.

Tincture is alſo applied by the *Heralds* to the colours uſed in eſcutcheons, or coats of arms; under which, with them, are likewiſe reduced the two metals, *or* and *argent*, becauſe often repreſented by yellow and white.

Tincture comprehends colours and furrs.

The writers on heraldry have had great diſputes, which of theſe colours or *tinctures* are the moſt honourable. All agree in giving the pre-eminence to the metals gold and ſilver, that is to the yellow and white colours; as to the others, ſome eſteem them more noble as they approach more to light, that is to whiteneſs. Upton on this account ranges them thus; azure or blue, gules or red, purpure or purple, vert or green, ſable or black; others wholly diſſent from this, and prefer thoſe colours moſt which can be ſeen at the greateſt diſtance; with theſe, ſable or black is the moſt honourable or firſt colour; and they alledge the imperial black eagle, placed in a white field, as an inſtance of this. Leigh prefers the red to the blue, as the red has ſome alliance to gold, and the blue to ſilver; the ſable is generally preferred to green and purple, by thoſe who give the red and blue the firſt places: it is in this eſteem on account of its ſtrong appearance; and green is preferred to purple, becauſe the latter is but of very late uſe in heraldry, and is called a new colour.

All the precedence given to *tinctures* muſt however be conſidered with this ſpecial proviſo, that there is no particular reaſon for bearing them otherwiſe in the arms of kingdoms and families. In all coats of arms there ſhould be two colours or *tinctures*; and it is the general rule that the field ſhould be of a nobler colour than the figures placed upon it: thus in the arms of Scotland the field is yellow, and the lion placed upon it red: and if the field conſiſts of two different colours parted by feſs or by pale, then the nobleſt colour muſt always be in the beſt place, as on the upper part, or ou the right hand of the ſhield; but all theſe rules are to be underſtood with this limitation, that there are no other ſpecial reaſons in the family for the contrary. Neſbit's Heraldry, p. 19.

TINE, denotes a tooth, or ſpike; hence the common phraſe among huſbandmen, of giving two or three *tinings*, which ſignifies drawing the harrow twice or thrice over the ſame ſpot of ground.

TINEA, in *Medicine*, a diſeaſe called by the Arab writers *ſahaſati*, and in Engliſh uſually a *ſcald-head*: it is nearly akin to achor.

The *tinea* is a diſeaſe of the leprous kind: authors uſually reckon three ſpecies of it, viz. dry, and moiſt, and *lupi-*

nous; but theſe, in reality, are only ſo many degrees of the ſame diſeaſe.

Turner defines the *tinea* an ulcer ariſing in the heads of children, from a vicious, corroſive, or ſaline humour, which, preying on the cutaneous glands, in time deſtroys their texture. It has its name *tinea*, q. d. *moth*, from the ſimilitude it bears to the holes eaten by that inſect in paper, &c. In the firſt ſtage it is covered with a white, dry, ſcurfy, or ſquamous matter: in the ſecond the ſubjacent fleſh appears granulated; and in the third it is ulcerous.

The internal remedies proper for the *tinea* are, mercurials, proper cathartics, and dietetics, with edulcorants; and ſometimes a ſalivation, eſpecially by unction, has been found efficacious, after all other methods have proved vain. The externals are fomentations made of roots of oxylapathum, birth-wort, horſe-radiſh, wormwood, &c. boiled in water, and ſtrained; to which are added, ſpitits of wine camphorated, &c. alſo liniments of hog's lard, white precipitate, mercurial ointments, with powdered brimſtone; and ſometimes powder of Roman and white vitriol, red precipitate, &c. but theſe laſt muſt be uſed with great caution.

Dr. Buchan ſays, that he has often known children ſeized with internal diſorders, of which they died ſoon after their ſcabbed heads had been healed by the application of drying medicines. The cure, he obſerves, ought always to be firſt attempted by keeping the head very clean, cutting off the hair, combing and bruſhing away the ſcabs, &c. If this be not ſufficient, let the head be ſhaved once a week or oftener, and waſhed daily with ſoap-ſuds, or lime-water. If theſe fail, a plaſter of black pitch may be applied, in order to pull out the hair by the roots; and if there be proud fleſh, it ſhould be touched with a bit of blue vitriol, or ſprinkled with a little burnt alum. In the progreſs of theſe operations, the patient may be confined to a regular diet, the body kept gently open, and cold, as far as poſſible, avoided. To prevent any conſequence from ſtopping this diſcharge, eſpecially in children of a groſs habit, it will be proper to make an iſſue in the neck or arm, which may be kept open till the patient becomes more ſtrong, and the conſtitution ſomewhat mended. Dom. Med. p. 605 ed. 5.

TINEA, in *Natural Hiſtory*. See MOTH, &c.

TINEMAN, in our *Old Writers*, a petty officer in the foreſt, who had the nocturnal care of vert and veniſon, and other employments in the foreſt.

TINET, *tinettum*, in our *Old Writers*, is uſed for bruſhwood and thorns to make and repair hedges. In Herefordſhire to *tine* a gap in a hedge is to fill it up with thorns, that cattle may not paſs through it.

TINEWALD, the parliament or annual convention of the people of the iſle of Man, of which this account is given: the governor and officers of that iſland do uſually ſummon the twenty-four keys, being the chief commons thereof, once every year, viz. upon Midſummer-day at St. John's chapel, to the court kept there, called the *tinewald*-court; where, upon a hill near the ſaid chapel, the inhabitants of the iſland ſtand round about the plain adjoining; and here the laws and ordinances, agreed upon in the chapel of St. John, are publiſhed and declared unto them. At this ſolemnity the lord of the iſland ſits in a chair of ſtate with a royal canopy over his head, and a ſword held before him, attended by the ſeveral degrees of the people, who ſit on each ſide of him, &c.

TIN-GLASS, a name frequently given to the ſemi-metal BISMUTH.

TINKLING *of the ear*. See TINNITUS.

TINNING, the covering or lining any thing with mlteed *tin*, or with *tin* reduced to a very thin leaf.

Looking-glaſſes are foliated or *tinned* with thin leaves of beaten *tin*, applied and faſtened thereto by means of quickſilver. See LOOKING-GLASS.

Kitchen utenſils are *tinned* with melted *tin*; and locks, bits, ſpurs, &c. with leaf-*tin*, by the help of fire.

For the method of *tinning* iron-plates, ſee LATTIN.

Copper and braſs are covered over with *tin* by the help of ſal ammoniac, the acid of which cleans the ſurface of the metals to be *tinned*, and the oily matter contained in it furniſhes the phlogiſton that is neceſſary in this operation. The copper, or braſs, being made hot enough to melt *tin* laid upon it, is ſtrewed over with ſal ammoniac, and the melted tin rubbed about the plate. The ſal ammoniac takes up the droſs of the tin, and leaves the tin to flow freely upon the metal. As the ſurface of copper is continually altered by the mere action of the air, the workmen, before the *tinning* of any veſſel, ſcrape its ſurface with a ſteel inſtrument till it be clean and bright; then they place the veſſel upon kindled coals, and heat it to a certain degree: as ſoon as it is hot, in ſome proceſſes of *tinning*, they rub it with pitch, and apply the melted tin, which they ſpread upon the ſurface of the copper by means of hards. For this purpoſe pure tin is ſeldom uſed; but generally two parts of tin are allayed with one part of lead.

The pitch uſed in this latter mode of *tinning* is quite neceſſary, becauſe the degree of heat given to the copper is ſufficient to calcine its ſurface in ſome degree: and this alteration, however ſlight, would prevent the perfect adheſion of the tin, unleſs by means of the pitch the phlogiſton was reſtored to it at the very inſtant of the application of the tin. The pitch alſo prevents the ſlight calcination which would happen on the ſurface of the tin, or revives the ſmall particles of calx which are formed during the operation. In either way, or in the method of *tinning* iron plates, the ſucceſs of the operation depends on the facility with which tin unites with theſe metals, which incorporates with them, diſſolves in ſome meaſure their ſurface, and forms a kind of allay, at leaſt when the *tinning* is well performed; and moreover, on the cleanneſs of the ſurfaces, both of the melted tin and of the copper or iron to which it is applied, for the metals cannot perfectly unite unleſs they are in a metallic ſtate, and free even from their own earth or calx.

It has been alleged that COPPER veſſels, ſo pernicious in themſelves, are not perfectly preſerved from ruſt or verdigriſe by *tinning*; and, beſides, tin itſelf is combined with arſenic, and lead is alſo uſed in *tinning*. M. Malouin has, therefore, propoſed in his Memoirs on Zinc (Mem. de l' Acad. Sc. 1742.) to ſubſtitute that ſemimetal in place of lead and tin, for the *tinning* of iron and copper veſſels: the greater hardneſs of the zinc, it is thought, would render it leſs liable to be worn, and the dangerous effects of lead and tin would be avoided. Dict. Chem. Engl. ed.

The plumbers, on ſome occaſions, *tin* or whiten their ſheets of lead: in order to which they have a *tinning* furnace, filled with live coal, at the two ſides whereof two men are placed, who hold up the ſheets over the fire to heat: and the tin leaves being laid over them, as faſt as the ſheets grow hot, and the tin melts, they ſpread it, and make it take by rubbing it with tow and reſin.

TINNITUS *auris*, TINKLING or *buzzing of the ear*, a diſeaſe pretty frequent in the ear, conſiſting in the perception of a ſound which is not, or at leaſt is not external; and the ear being thus filled with a certain ſpecies of ſound, cannot admit other ſounds, unleſs they are very violent.

This perception may be occaſioned by the beating of an artery in the ear, by an inflammation or abſceſs of the tympanum, or the labyrinth, by the admiſſion of foreign bodies, by commotion of the cranium, or blows on the ear, &c. Extraordinary and irregular motion of the animal ſpirits are alſo found to occaſion the *tinnitus*, as we find in deliriums, phrenſies, vertigoes, &c. The *tinkling* of the ear is reckoned one of the diagnoſtic ſigns of the plague.

The ancients imagined that this ſymptom was produced by the motion and agitation of the air which was included in the ear, and ſuppoſed this agitation to be occaſioned by flatulencies and vapours being conveyed into the ear, and that thoſe flatulencies aroſe either from the whole body, as in fevers; or from any particular part, as the ſtomach or brain; or from pituitous humours lodged in the cavities of the ear; and from the differences of theſe they attempted to account for all the various noiſes heard in this diſorder, as if they were in ſome ſort real: but when we conſider the nature of the noiſes heard in this diſtemperature of the ear, ſuch as the loud roaring, or the murmuring of waters, and the jangling of bells, we ſhall eaſily conceive theſe can be no real ſounds; and it is indeed very evident that they do not ariſe from either wind, or any other matter, ſtriking the membranes externally.

As *tinnitus* conſiſts in the hearing of a ſound which either is not real or exiſts only within the ear, in order to conceive the meaning of this, we are to conſider that the action of hearing conſiſts in the agitation of the immediate organ appointed for that purpoſe; and it is ſufficient to produce a ſound that the organ is agitated, whether it be by the air or not. In order to determine what may be the cauſe of this agitation, we need only examine what are the diſorders in which a *tinnitus* uſually occurs; we ſhall find theſe to be inflammations, and abſceſſes of the tympanum and labyrinth, and the diſorders of the meatus auditorius. Inflammations of the tympanum and labyrinth neceſſarily produce agitations in the ſpiral lamina and in the ſemicircular ducts, either by tenſion of the membrane, or by the vapours which tranſpire, and mix themſelves with the air in the tympanum.

Acrid ſubſtances, worms, extraneous bodies, a conſtriction of the meatus ſucceeding a diſtenſion of the glands, and in general every thing that can cauſe in the meatus auditorius, pain, and the other ſymptoms before deſcribed, agitate the membrane of the meatus, and the membrana tympani; and this agitation is able to communicate itſelf to the immediate organ of hearing.

The ſecond ſpecies of *tinnitus* is when we perceive a real ſound which is formed within the ear itſelf: thus we hear a humming noiſe when we ſtop our ears. This noiſe is cauſed by the friction of the hand, or by the compreſſion which influences the ſkin and cartilages, whoſe parts being put into motion may produce an agitation there. The elaſticity of the air alſo and the tranſpired matter from the hand, mixing with the internal air in the meatus, may alſo ſtrike the organ, though not ſtrongly, yet ſufficiently to occaſion a noiſe, as the offending matter is ſo near.

Commotions of the cranium, and diſorders which contract the meatus, may alſo cauſe a *tinnitus* in the ear. Several perſons alſo are ſubject to a peculiar noiſe in the ear, which is plainly a pulſation; this uſually affects them moſt after exerciſe, and may very often be heard by other perſons, who place their heads near the diſeaſed perſon's ear: this is unqueſtionably the true pulſation of a dilated artery, ſince it always regularly keeps time with the heart.

There ſeem alſo to be ſome ſpecies of *tinnitus*, in which though the humming noiſe is very ſtrong, yet the organ of hearing is itſelf no way diſtempered; ſuch are thoſe of perſons in deliriums in fevers, and of ſuch as are ſubject to epileptic fits; theſe laſt uſually hear a humming in their ears, before they are attacked with a fit, and this ſeems wholly produced by the agitated ſpirits, which diſturb thoſe parts of the brain where the extremities of the auditory nerve terminate.

The *tinnitus* are therefore of two kinds, the one proceeding from a diſtemperature of the organ of hearing, the other from a diſorder of the brain; and the cure is to be attempted accordingly. In thoſe of the ſharper kind, which are uſually occaſioned by inflammations and pains in the ear, where the parts are uſually very tenſe and dry, we muſt uſe the ſame means as in acute pains, and tenſions of the membrana tympani; but in dull humming heavy noiſes, which are uſually occaſioned by rheums and ſuppurations, where the membranes are relaxed, we are to uſe the ſame remedies which give relief in pains occaſioned by cold: after which it will be no difficulty to chuſe the moſt proper, while we have a due regard to the circumſtances, from which the more juſt indications may be taken.

TINNUNCULUS, in *Ornithology*, the name of one of the long-winged hawks, called by others *cenchris*, by Linnæus FALCO *tinnunculus*, and in Engliſh, *keſtrel*, *ſtannel*, or *windhover*.

It is about the ſize of a common pigeon. Its bill is ſhort, crooked, and very ſharp, and covered with yellow ſkin at the top; near this the bill is white, elſewhere it is blue; its tongue is bifid; its mouth very wide, and its palate blue; its head is large and flatted, and is of an aſh-colour, with longitudinal ſtreaks of black; its back and wings are brown, variegated with black ſpots; its rump is grey, with ſome tranſverſe black ſpots; and its breaſt and belly of a pale ruſt-colour, with a few longitudinal ſtreaks of black; its tail is long and pointed, its tip of a pale ferruginous hue, with a broad tranſverſe ſtreak of black over it; and the reſt of the tail is a mixed grey and brown, with black ſpots and ſtreaks; its legs and feet are of a fine yellow.

The female of this ſpecies is larger than the male; the colours of the back and wings are leſs bright, and it differs alſo in the colours of the head and tail; the former being of a pale reddiſh brown, ſtreaked with black; the latter of the ſame colour, marked with numerous tranſverſe black bars; the breaſt is of a dirty yellowiſh white, and the middle of each feather has an oblong duſky ſtreak pointing downwards.

The *tinnunculus*, or keſtrel, breeds in the hollows of trees, in the holes of high rocks, towers, and ruinated buildings: it lays four eggs, which are white, variegated with a number of red ſpots: its food is field-mice, ſmall birds, and inſects.

This is the hawk which we ſo frequently obſerve in the air fixed in one place, and as it were fanning with its wings, at which time it is watching for its prey. It flings up the indigeſted fur and feathers in form of a round ball. When FALCONRY was uſed in Great Britain, this ſpecies was trained for catching ſmall birds and young partridges. Ray and Pennant.

TINTINNABULUM, among the *Ancients*. See BELL.

TINUS, in *Botany*, a genus of the *enneandria monogynia* claſs. Its characters are: that the calyx is divided into five ſegments; the corolla is alſo divided in the ſame manner; the nectarium is pitcher-ſhaped, including the germen; and the fruit a three-celled berry, containing ſingle ſeeds. There is one ſpecies.

TIPHCA *princeps*, one of the Hebrew ACCENTS, ſometimes ſerving for a comma, and marked under a letter thus (ˏ).

TIPHLE, in *Ichthyology*, a name by which ſome authors expreſs the acus, or tobacco-pipe fiſh.

TIPIOCA, a name given by ſome authors to a ſort of cream or flour made from the yucca or manihot-root, by maceration of it in water, after expreſſing the juice.

TIPSTAVES, officers appointed by the marſhal of the king's-bench, to attend the judges with a rod or ſtaff tipped with ſilver, and take charge of ſuch perſons as are either committed, or turned over at the judge's chambers.

The denomination is alſo ſometimes given to thoſe more frequently called *baſtons*; who are the wardens of the Fleet's officers, attending the king's court with a painted ſtaff, for the taking into cuſtody ſuch priſoners as are committed by the court; and to attend ſuch priſoners as go at large by licence.

TIPUL, in *Natural Hiſtory*, a name given by the people of the Philippine iſlands, to a ſpecies of crane common there, and ſo tall, that when it ſtands erect, it can look over a man's head. See DONGON.

TIPULA, in *Natural Hiſtory*, the name of a genus of fly, remarkably for the great length of its legs, and uſually called by us the *long-legs*. See CRANE-*fly*.

In the Linnæan ſyſtem this is a genus of the *diptera* order of inſects: the characters of which are, that the head is long, and the upper jaw arched; that it has two bending feelers longer than the head, and a very ſhort recurved proboſcis. Linnæus enumerates fifty-eight ſpecies. Mr. Ray, in his Hiſtory of Inſects, deſcribes fourteen ſpecies of this fly found in England.

The ſmaller ſpecies of this genus ſo much reſemble gnats that the generality of authors, not excepting even Goedart and Swammerdam, have confounded the two genera, and deſcribed theſe among the gnats.

The long form of the body, the poſition of the wings, and the length and poſition of the legs, are the circumſtances that make the reſemblance between the gnats and *tipulæ*; but the ſtructure and organs of the head are alone a very ſufficient diſtinction.

As the *tipulæ* differ from the gnats in the figure of the mouth, and in being without a trunk, they differ as much from the other flies of that character, by their reſembling the gnat in the ſhape of their body. They differ alſo in the conformation of the mouth, and its ſeveral parts and organs. The opening of the mouth is a ſlit extending itſelf from the fore-part of the head toward the hinder-part, and its lips cannot be called upper and lower; but they are lateral ones. When the body of the creature is preſſed, this mouth opens, and ſhews what ſeem to be a ſecond pair of lips within. Theſe are more firmly cloſed than the others, and reſemble only certain duplications of the fleſh. The exterior lips are cartilaginous, and are furniſhed with ſhort hairs, the interior are perfectly ſmooth, and of a fleſhy texture. The head of the *tipulæ* is of a long and ſlender figure; the lips are articulated at the extremity of this head, and on each ſide there ſtands, on the upper part, a ſort of beard, which, when nearly examined, is found to be articulated in the manner of the antennæ of inſects. Theſe two beards, in their uſual poſition, are placed cloſe together, and bent forwards over the head; their office ſeems to be the covering of the aperture of the mouth. Theſe ſeem conſtantly to be found in all ſpecies of the *tipulæ*, and placed exactly in the ſame manner.

The largeſt ſpecies of *tipulæ* are uſually found in our meadows, and theſe are in no danger of being confounded with the gnat kind, their ſize alone being a ſufficient obvious diſtinction. Theſe are often found of nearly an inch in length from head to tail; but their bodies are very ſlender, and are compoſed of only nine rings. The male *tipula* is eaſily diſtingiſhed, at ſight, from the female; it is much ſhorter in the body, and is thicker at the tail than any where elſe; this tail alſo uſually turns upwards, whereas that of the female is placed in the ſame line with the body, and is ſlender, and compoſed of ſeveral ſcaly parts, proceeding from the laſt ring of the body. Theſe creatures are found in our meadows through the whole ſummer; but the end of September and beginning of October is the time when they are moſt of all plentiful.

The legs of theſe creatures are greatly diſproportioned to the body, according to the common rules of nature, eſpecially the hinder pair, which are in the larger ſpecies uſually three times the length of the body.

This large ſpecies is a creature of no great beauty; its body is of a browniſh colour, and its corcelet is ſo elevated, that the creature ſeemed hump-backed; the head is ſmall, and the neck very ſhort: the reticulated eyes are ſo large, that they cover almoſt the whole ſurface of the head; theſe are of a greeniſh colour, with a caſt of purple, when viewed in ſome lights. Reaumur ſuppoſes that two very lucid ſpecks, on the anterior part of the breaſt, are eyes, though placed in ſo very ſingular a manner; the wings of this creature are long, but very narrow, and ſeem ſcarce well proportioned to the ſize of the animal; they are tranſparent, but have a ſlight caſt of brown; and their ribs, when viewed by the microſcope, appear beſet with ſcales, or feathers, in the manner of thoſe of the gnat kind. Some ſpecies of the *tipulæ* have them alſo fringed, with theſe ſcales at the edges; there are no ailerons, or petty wings, at the origin of theſe, but in the place of them there are two very fine balancers or mallets; theſe have long pedicles, and roundiſh or oval heads; the ſtigmata of the corcelet are four; one pair are placed immediately underneath theſe balancers, and the other immediately below the firſt pair of legs; the firſt pair are very long, the others ſmall, and thoſe on the rings of the body, if there be any, are too ſmall for our ſight, even with good glaſſes. Each ring of the body is compoſed of two half cylinders, which are joined into one, by means of a membrane, which gives them room to diſtend or cloſe up at the creature's pleaſure. The large *tipulæ* all carry two antennæ, or horns, upon their head; but theſe are of no remarkable ſtructure, they are only compoſed of a great number of joints, each covered with a fine downy hairineſs; and at the joining of each to the next, there is a tuft of longer and more ſtiff hairs. This is the deſcription of the common large *tipulæ* which we find in the meadows; and, in almoſt all its parts, is applicable to the generality of the larger ſpecies of theſe inſects.

The ſmaller kinds are very numerous, and of great variety. Theſe are frequent in all places, and at all ſeaſons of the year: the ſpring ſhews us immenſe clouds of them, and even the coldeſt winter's day ſhews a great number of them in the ſun-ſhine about noon. Theſe creatures fly much better than the large *tipulæ*; they ſeem indeed to be almoſt continually upon the wing, and their manner of flight is very ſingular; they are continually mounting and deſcending again, and that without quitting the direction of the line they go forward in; this they will often do for many hours together. In tracing theſe flies from their origin, they are all found to be produced from worms which have no legs, and have a regular ſcaly head. Thoſe from which the larger *tipulæ* are produced, live under ground; they are moſt fond of marſhy places, but any ground will do that is not often diſturbed. They uſually are found at about an inch under the ſurface, and are ſo plentiful in ſome places, as greatly to injure the herbage.

Theſe creatures do not find it neceſſary to their living, that plants ſhould be upon the ſurface of the earth in which they live. There is frequently found in the hollow of the ſtumps of old trees, a ſort of earth which ſeldom produces any vegetables; yet the female flies of this ſpecies well know that their young will find a proper ſubſiſtence there; and there are uſually found great numbers of them in all theſe places. The hollow elms and willows, ſo common in our hedges, and by ditch ſides, afford innumerable proofs of this: but it muſt be obſerved, that they are only found in ſuch earth of this kind, as is continually ſomewhat moiſt.

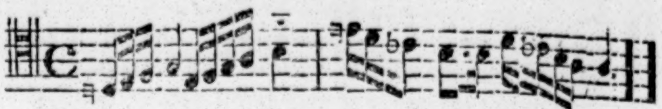
Mr. Reaumur mentions a very ſingular ſpecies of large *tipulæ*, which was produced with him from one of the worms found in the earth of an old elm; this was of the larger kind, and had ſome beautiful ſpots on the wings. It had alſo a very elegant tufted antenna; whereas, in the common large *tipulæ*, theſe are plain and ſimply granulated ones, as well in the males as females. Reaumur's Hiſt. Inſ. vol. ix. p. 7, &c.

TIPULA, *waſp*. See WASP *tipula*.

TIRATA, in the *Italian Muſic*, is uſed to expreſs, in general, any quantity of notes, of whatever kind, provided they be of equal value, moving either upwards or downwards in conjoint degrees; thus they ſay, *tirata di ſemiminime*, when there are many crotchets, following one another in the manner above mentioned; *tirata di ligature*, when there are many notes of the ſame value following one another, among which the laſt of one bar, and the firſt of the next, are tied together by a ſemicircle, thus, ⌒ or ‿.

Tirata is particularly uſed for a ſeries of quavers, or, in the modern notation, of demi-quavers or demi-ſemiquavers, aſcending or deſcending by gradual intervals.

Theſe *tiratæ* often, though not neceſſarily, begin with an unaccented note, and end on ſome accented one of greater duration. See the example annexed.



Muſicians diſtinguiſh ſeveral kinds of *tirata*, thus:

1. *Tirata mezza*, or *mezza tirata*, is that compoſed of three or four quick notes to aſcend, or deſcend to a note, a fourth, or fifth, higher or lower than the note from whence the *tirata* begins; as in the examples before given.

2. *Tirata defectiva* is when theſe running notes go beyond the fifth, but do not reach the octave.

3. *Tirata perfecta*, is when it runs through the notes of a whole octave, aſcending or deſcending.

4. *Tirata aucta*, or *excedens*, is when it goes beyond the compaſs of an actave.

The French call the *tirata*, *tirade*, and ſome call them *roulades*, but improperly, ſays Broſſard.

TIRE, or, as the ſeamen pronounce it, *teer of guns*. See TIER.

TIRING, in *Falconry*, is the giving a hawk the leg or pinion of a fowl to pluck at. Dict. Ruſt.

TIRSIO, in *Ichthyology*, a name given by Gaza and ſome other authors to the phocæna of Willughby and others, the PORPESSE, or *marſum*. Pliny, Bellonius, and many others call it TURSIO.

TIRSITES, a word uſed by ſome to expreſs foſſilecoral.

TISIPHONE, in *Mythology*, one of the three FURIES. She is repreſented by the poets, with vipers, ſometimes as looſe ſerpents, intermixed with her hair, and ſometimes as ſerpents growing from her head inſtead of hair. As ſhe is one of the chief of all the infernal executioners, her robe is deſcribed either as dropping with freſh blood, or ſtiff with human gore: this robe is faſtened round her with a ſerpent inſtead of a girdle; and ſhe has ſometimes vipers twiſted round her arms inſtead of bracelets. They ſometimes give her a torch in her hand, wet with blood; ſometimes a torch in one hand and a ſerpent in the other; and ſometimes ſerpents in both. Statius, Theb. i. v. 91. v. 111. v. 113. Theb. vii. v. 467. Ovid. Met. iv. v. 483. v. 490. v. 495. v. 510.

TISRI, or TIZRI, in *Chronology*, the firſt Hebrew month of the civil year, and the ſeventh of the eccleſiaſtical or ſacred year.

The Hebrews call it *raſh-haſhanna*, that is, the beginning of the year. It anſwered to part of our September and October. On the firſt day of this month was kept the feaſt of Trumpets, becauſe the beginning of the year was then proclaimed by ſound of trumpets. On this day they refrained from all ſorts of ſervile buſineſs, and offered in ſacrifice a calf, a ram, and ſeven lambs. Levit. xxiii. 24. Numb. xxix. 1.

The tenth day of this month was the great day of expiation, and on the fifteenth the feaſt of Tabernacles began, which laſted till the twenty-ſecond day incluſively. See SCENOPEGIA.

TITANS, TITANES, Τιτανες, in the *Ancient Mythology*, the ſons of Uranus or Cœlus, and Veſta, i. e. of heaven and earth, according to Heſiod and Apollodorus; or, which comes to the ſame thing, of Æther and Tellus, according to Hyginus. Apollodorus reckons ſix *Titans*; Oceanus, Cœlus, Hyperion, Crius, Iapetus, and Saturn or Cronus: Hyginus alſo reckons ſix, viz. Briareus, Gyges, Sterope, Atlas, Hyperion, and Cottus; but he ſeems to include the hundred-handed giants in the number, which Apollodorus, and the generality of mythologiſts, diſtinguiſhed from the *Titans*.

The tradition is, that Cœlus, by the ſame wife, Veſta, had Briareus, Gyges, and Cottus, the hundred-handed giants, and had chained them up in Tartarus: Veſta, the earth, their mother, reſenting this treatment, raiſed the *Titans* againſt their father, her huſband: all, excepting Oceanus, made war upon him, and dethroned him, ſetting up Saturn in his place.

Saturn, it ſeems, proved no more favourable to them than his father; but continued the giants in their priſon. Upon this Jupiter revolted againſt Saturn; ſerving him as he had done Cœlus; and reſcued the three giants; who afterwards proved of great ſervice to him in the war which the *Titans* waged againſt him.

This war laſted ten years: but at length the *Titans* were vanquiſhed: Jupiter remained in peaceable poſſeſſion of heaven, and the *Titans* were buried under huge mountains thrown on their heads.

Hyginus gives another origin of the *Titans*: he derives them from *Titan*, Saturn's eldeſt brother, by Cœlus and Veſta; who, though preſumptive heir of heaven, yet finding his father and mother more inclined for Saturn than for him, ſurrendered to him his right of ſucceſſion, on condition he ſhould not bring up any male child, that the empire of heaven might revert to his own iſſue the *Titans.*

But Jupiter, Neptune, and Pluto, having been afterwards ſaved by the artifice of Ops, *Titan*, and his ſons the *Titans*, made war on Saturn, vanquiſhed and impriſoned him; thus he continued in the power of his enemies, till Jupiter being grown up, made war on the *Titans*, and delivered his father.

F. Pezron, in his Antiquity of the Celtæ, makes that people to be the ſame with the *Titans*; and their princes the ſame with the giants in Scripture. According to him the *Titans* were the deſcendants of Gomer, the ſon of Japhet. He adds, that the word *Titan* is perfect Celtic, and derives it from *tit*, *earth*, and *den* or *ten*, *man:* and hence it was the Greeks alſo called them very properly γηγενεις, q. d. *terriginæ*, *earth-born.*

The *Titans*, according to the learned Mr. Bryant, were thoſe Cuthites, or ſons of Chus, called *giants*, who were employed in building the tower of Babel, and who were afterwards diſperſed. See DISPERSION *of Mankind.*

He ſuppoſes that they were denominated from their religion and place of worſhip, *Titæa*, which is repreſented as the mother of theſe people, being compounded of *Tit-aia*, and ſignifying literally *a breaſt of earth*, analogous to τιτθος αιας of the Greeks, and therefore expreſſing the figure as well as the materials of the ancient altars, which conſiſted of a conical hill of earth, in the ſhape of a woman's breaſt. Theſe altars were alſo called *Tit-an* and *Tit-anis*, from the great fountain of light, ſtyled *An* and *Anis*. Hence many places were called *Titanis* and *Titana*, where the worſhip of the ſun prevailed; for *Anes* and *Hanes* ſignified the *fountain of light* or *fire.* Titana was ſometimes expreſſed Tithana, and by the Ionians Tithena, and Tithena was ſaid to be the nurſe of the *Titans.* But Titæa their mother, and Tithena their nurſe, were all of the ſame nature, viz. altars raiſed of ſoil. Heſiod, in his account of the diſperſion of the *Titans*, and of the feuds which preceded (Theogon. ver. 676, &c.), ſays, that the Deity at laſt interpoſed, and put the *Titans* to flight, and condemned them to reſide in Tartarus at the extremities of the earth; but Mr. Bryant obſerves, that he has confounded the hiſtory by ſuppoſing the giants and *Titans* to have been different perſons. The ſons of Chus, he ſays, were the aggreſſors in thoſe acts of rebellion, deſcribed by the poets as the war of the giants, who were alſo repreſented under the character of the *Titanians.* The fictions of the poets with regard to the baniſhment of the *Titans* after their war againſt heaven, took their riſe from this true hiſtory. A large body of *Titanians*, after the diſperſion, ſettled in Mauritania upon the Atlantic ocean, which is the region ſtyled Tartarus, and repreſented as the realms of night, becauſe it was ſituated in reſpect to Greece towards the regions of the ſetting ſun. The term ζοφος, by which it was expreſſed, ſignified both the weſt and darkneſs; as did alſo Ereb, ערב, whence Erebus, which was alſo another name for Tartarus, to which the poets condemned the *Titans* and giants. The firſt war of the *Titans*, according to this ingenious writer, conſiſted in acts of apoſtacy and rebellion againſt heaven: and this refers to that part of the hiſtory of the ſons of Chus, which repreſents them as building a mighty city in the region, which they had uſurped, and erecting a lofty tower, to prevent their being ſcattered abroad: but there was another war in which they were engaged with men, which happened in conſequence of the diſperſion. This was no other than the war mentioned by Moſes, which was carried on by four kings of the family of Shem, againſt the ſons of Ham and Chus, to avenge themſelves of theſe enemies by whom they had been greatly aggrieved. See Bryant's Analyſis of Ancient Mythology, vol. iii. p. 48, &c. p. 71, &c.

The word *Titan* is alſo uſed by the poets for the ſun—— in which caſe it is likewiſe Celtic, though from another root, being formed from *ti*, *houſe*, or *habitation*, and *tan*, *fire.*

Heſychius obſerves, that *Titan* is likewiſe uſed for ſodomite. He adds, that it is alſo one of the names of antichriſt; in which ſenſe it muſt be written *Teitan* in Greek, to contain the numeral letters of 666, which in the Apocalypſe xiii. 18. is the number of the beaſt.

TITANIA, τιτανια, in *Antiquity*, a feſtival in memory of Titanes.

TITANOS, a word uſed by ſome authors to expreſs lime; by others for the calx of burnt gypſum or plaiſter of Paris, and by others a lixivium of quicklime.

TITE. See TIGHT.

TITHENIDIA, τιθηνιδια, in *Antiquity*, a Spartan feſtival, ſo called from τιθηναι, *nurſes*, who at this time carried the male infants committed to their charge to the temple of Diana Corythallia. For the ceremonies obſerved on this occaſion, ſee Potter, Archæol. Græc. lib. ii. cap. 20. tom. i. p. 432, ſeq.

TITHES, TYTHES, TENTHS, *decimæ*, or *dixmes*, the tenth part of the increaſe, yearly ariſing and renewing from the profits of lands, the ſtock upon lands, and the perſonal induſtry of the inhabitants; allotted to the clergy, for their maintenance.

Tithes, with regard to their ſeveral kinds or natures, are *perſonal*, *predial*, and *mixt.*

TITHES, *perſonal*, are thoſe due or accruing from the profits of labour, art, trade, navigation, and induſtry of men; and of theſe only the tenth part of the clear gains and profits is due.

TITHES, *predial*, are thoſe which ariſe merely and immediately from the ground; as grain of all ſorts, hay, wood, fruits, herbs; for a piece of land or ground, being called in Latin *prædium* (whether it be arable, meadow, or paſture), the fruit or produce thereof is called *predial.*

TITHES, *mixt*, are ſuch as ariſe from beaſts, and other animals fed with the fruits of the earth; as cheeſe, milk, wool, lambs, calves, fowls, &c.

Tithes, with regard to their value, are divided into *great* and *ſmall.*

TITHES, *great*, are thoſe of corn, hay, and wood.

TITHES, *ſmall*, are the *predial tithes* of other kinds, together with thoſe that are called *mixt* and *perſonal.* It is ſaid, that this diviſion may be altered by cuſtom, which will make wood a *ſmall tithe* in the endowment of the VICAR; by quantity, which will convert a *ſmall tithe* into *great*, if the pariſh is generally cultivated with it; and by change of place, which makes the ſame things, e. g. hops in gardens, *ſmall tithes*, in fields *great tithes.* But it has been admitted, that the quantity of land within any pariſh, that is cultivated for a particular produce, cannot change the nature of the *tithe:* and, according to this opinion, the law is now ſettled, that the *tithes* are to be denominated *great* or *ſmall*, according to the nature and quality thereof, and not according to the quantity. It is a general rule, that of common right *tithes* are to be paid for every thing that yields an annual increaſe; but this rule admits of exceptions, e. g. *tithe* is due from ſaffron, though gathered but once in three years, and on wood that is felled or lopped, called *ſylva cadua*, though it is not renewed every year: and on the other hand, *tithes* ſhall be paid for the produce of ſeeds, as of clover, ſown on the ſame ground, though renewed oftener than once a year. No *tithes* ſhall be paid of common right for any thing that is of the ſubſtance of the earth, or which is not of annual increaſe, as ſtone, lime, coal, tin, lead, and ſuch like; nor for creatures that are feræ naturæ, or of a wild nature, as deer, hawks, fiſh, &c. whoſe increaſe ſo as to profit the owner is not annual, but caſual; unleſs *tithes* in either of theſe caſes are payable by cuſtom. Lands, and their occupiers, may be exempted or diſcharged from the payment of *tithes*, either in part or totally, by a real compoſition, or by cuſtom or preſcription.

A real compoſition is when an agreement is made between the owner of the lands, and the parſon or vicar, with the conſent of the ordinary or patron, that ſuch lands ſhall for the future be diſcharged from payment of *tithes*, by reaſon of ſome land, or other real recompence given to the parſon, in lieu and ſatisfaction thereof. But theſe compoſitions are now reſtrained by the diſabling ſtatute 13 Eliz. cap. 10. See LEASES *by ſtatute.*

A diſcharge by cuſtom or preſcription is, where time out of mind ſuch perſons, or ſuch lands, have been either partially or totally diſcharged from the payment of *tithes.* This cuſtom, or preſcription, is either *de modo decimandi*, (ſee MODUS *decimandi*) or *de non decimando.* A preſcription *de non decimando*, is a claim to be entirely diſcharged of *tithes*, and to pay no compenſation in lieu of them. Thus the king by his prerogative is diſcharged of all *tithes.* So a vicar ſhall pay no *tithes* to the rector, nor the rector to the vicar: but theſe privileges are perſonal to both the king and the clergy; for their tenant or leſſee ſhall pay *tithes* of the ſame land, though in their own occupation it is not tithable. And, generally ſpeaking, it is an eſtabliſhed rule, that, in lay hands, *modus de non decimando non valet.* But ſpiritual perſons or corporations, as monaſteries, abbots, biſhops, and the like, were always capable of having their lands totally diſcharged of *tithes*, by various ways, as, 1. By real compoſition; 2. By the pope's bull of exemption; 3. By unity of poſſeſſion, as when the rectory of a pariſh, and lands in the ſame pariſh, both belonged to a religious houſe, thoſe lands were diſcharged of *tithes* by this unity of poſſeſſion: 4. By preſcription, having never been liable to *tithes* by being always in ſpiritual hands: 5. By virtue of their order, as the knights Templars, Ciſtercians, and others, whoſe lands were privileged by the pope with a diſcharge of *tithes*. Though, upon the diſſolution of abbeys by Henry VIII. moſt of theſe exemptions from *tithes* would have fallen with them, and the lands become tithable again, if they had not been ſupported and upheld by the ſtatute 31 Hen. VIII. cap. 13. which enacts, that all perſons who ſhould come to the poſſeſſion of the lands of any abbey then diſſolved, ſhould hold them free and diſcharged of *tithes*, in as ample a manner as the abbeys themſelves formerly held them. And from this original have ſprung all the lands, which being in lay hands do at preſent claim to be *tithe*-free: for if a man can ſhew his lands to have been ſuch abbey lands, and alſo immemorially diſcharged of *tithes* by any of the means before mentioned, this is now a good preſcription *de non decimando*. But he muſt ſhew both theſe requiſites; for abbey-lands, without a ſpecial ground of diſcharge, are not diſcharged of courſe; neither will any preſcription *de non decimando* avail in total diſcharge of *tithes*, unleſs it relates to ſuch abbey-lands.

The things that are tithable are, for the moſt part, as follow: corn is a great predial *tithe*, and tithable according to the cuſtom of the place, commonly by the tenth ſhock, cock, or ſheaf. Beans and peaſe, expended in the houſe, are ſubject to no *tithes*, but if they are gathered to be ſold, or to feed hogs, they are tithable, and are in their nature great *tithes*. Hay is a predial great *tithe*, and is to be tithed in ſwathes or cocks, according to the cuſtom of the place. Clover, rape, and woad, are ſmall *tithes*: heath, furze, and broom are alſo tithable. The *tithe* AGISTMENT is a ſmall *tithe*, and due of common right. Wood is a predial *tithe*, but whether great or ſmall hath been queſtioned; but it has been reſolved, that if a vicar be only endowed with the ſmall *tithes*, and has always had *tithe*-wood, in ſuch caſe it ſhall be accounted a ſmall *tithe*, otherwiſe it is to be accounted among the great *tithes*. Timber fit for building of houſes and ſhips, and comprehending oak, elm, and aſh, are exempted from *tithes*, by 45 Edw. III. cap. 3. but *timber* trees, cut and corded for fuel, have been adjudged to pay *tithes*, as well as underwood; however, no *tithe* ſhall be paid for the roots of trees, for wood cut for huſbandry or fuel, for hurdles of ſheep, for hop-poles, and for making of bricks, and alſo fruit trees. When the wood is tithable, it is ſet out while ſtanding by the tenth acre, pole, or perch; or, when cut down, by the tenth faggot or billet. The *tithe* of flax and hemp is a ſmall *tithe*, and by ſtatute this is charged at 5*s.* per acre, 11 & 12 Will. cap. 16. The *tithe* of madder is alſo a ſmall *tithe*, and charged at 5*s.* per acre, by 31 Geo II. cap. 12. The *tithe* of hops is predial, and reckoned among ſmall *tithes*; it is not to be paid till after they are picked, and before they are dried, every tenth meaſure. Out of gardens is paid *tithe* of all garden herbs and plants, which are ſmall *tithes*, and may be demanded in kind: potatoes and turnips are alſo ſmall *tithes*, as is likewiſe tobacco and ſaffron. However, in lieu of the *tithes* of gardens, a certain conſideration in money is paid, either by cuſtom, or by agreement with the parſon. Fruits of trees, as apples, pears, plums, cherries, and the like, are predial *tithes*, to be paid in kind when they are gathered, unleſs there is ſome modus, or rate *tithe* paid in lieu of them. The tenth calf is due to the parſon of common right; and if there are ſeven, he ſhall have one; if under ſeven, a halfpenny, or what cuſtom ſhall direct, for each calf. Colts and pigs are tithable in the ſame manner as calves; and the time of payment of theſe *tithes* is when they are ſo old that they may be weaned. Wool and lamb are generally reckoned mixt ſmall *tithes*. Milk is a mixt *tithe*; where *tithe* milk is paid in kind, no *tithe* cheeſe is due, and where *tithe* cheeſe is paid in kind, no *tithe* milk is due. Deer and conies, being feræ naturæ, are not tithable of common right, but by ſpecial cuſtom. Of fowls, which are domeſtic, as geeſe, hens, and ducks, *tithes* are to be paid, either by paying the tenth egg, or the tenth of their young, according to cuſtom. It hath been adjudged, that the paying of thirty eggs in Lent, is a good modus for all *tithes* of eggs. Bees are free of *tithes*, but the wax and honey are chargeable at the rate of the tenth meaſure of honey, and the tenth weight of wax. By the books of common law it appears, that ſome *tithe* or other is due for a mill. Fiſh in ponds and private fiſheries, and in common rivers, are tithable only by cuſtom. Fiſh taken in the ſea are chargeable by cuſtom as a perſonal *tithe*. Perſonal *tithes* are regulated by ſtat. 2 & 3 Edw. VI. cap. 13. but perſonal *tithes* are now ſcarce any where paid in England, unleſs for mills or fiſh caught in the ſea, and then payable where the party hears divine ſervice, and receives the ſacraments. *Tithes* are recoverable in the ſpiritual court by the canon law, and by divers ſtatutes, as the ſtatute of CIRCUMSPECTE *agatis*. 13 Edw. I. ſt. 4. the ſtatute of articuli cleri, 9 Edw. II. ſtat. 1. cap. 1. 18 Edw. III. ſtat. 3. cap. 7. 1 Rich. II. cap. 13, 14. 27 Hen. VIII. cap 20. 32 Hen. VIII. cap. 7. 2 & 3 Edw. VI. cap. 13. 7 & 8 Will. III. cap. 6. 34. 1 Geo. ſtat. 2. cap. 6. 27 Geo. II. cap. 20.

Tithes in London are ſubject to particular regulations. By a decree made in 1545, according to the ſtatute 37 Hen. VIII. cap. 12. it is ordered, that the citizens and inhabitants of London and its liberties, ſhall yearly pay their *tithes* to the parſons, vicars, and curates, after the rate of 16½*d.* for every 10*s.* annual rent, and 2*s.* 9*d.* for every 20*s.* rent, and ſo above the rent of 20*s.* by the year, aſcending from 10*s.* to 10*s.* according to the ſaid rate. The wife, children, ſervants, or others of their family, taking the rites of the church at Eaſter, ſhall pay 2*d.* for their four offering days yearly, &c. Notwithſtanding the ſettlement of this decree, divers preſcriptions for the payment of leſſer rates than the parſons might require by it (as to pay 10*s.* for the *tithe* of a houſe, although its rent was 40*l.* a year, or more) have been gained and allowed. But by 22 & 23 Ch. II. cap. 15. after the fire of London, annual certain *tithes*, or ſums of money in lieu of *tithes*, for fifty-one churches, were appointed to be raiſed by aſſeſſments, in the manner preſcribed by the ſaid act. For the ſtipends of the miniſters of the fifty new churches, proviſion is made by the ſeveral acts of parliament relating to them, to be raiſed from the duties on coals. There are alſo particular ſtatutes for particular churches, in London and in other places.

Original and Hiſtory of Tithes.

The cuſtom of giving or paying *tithe* is very ancient; in Gen. xiv. 20. Abraham gives Melchiſedech the tenth of all the ſpoils he had taken from the four kings he had defeated: in Gen. xxviii. 22. Jacob makes a vow at Bethel, to give the tenth of all the riches he ſhall gather in that ſojourn, to God.

But theſe *tithes* were free and voluntary, and, beſides, differed in divers other reſpects from what was afterwards called *tithe*: what Melchiſedech received, was only the tenth of the ſpoils, not of Abraham's poſſeſſions; and this once, not annually; and beſide, not as maintenance, which Melchiſedech wanted not, but as homage: add, that this was only from one prieſt to another; for Abraham had not only a prieſt in his loins, but was a prieſt himſelf. And as to Jacob, who was alſo a prieſt, what he did was the effect of a vow, voluntarily taken, to offer the tenth of all he ſhould poſſeſs; not to any other prieſt, but to God himſelf upon an altar.

Tithe was firſt legally enjoined by Moſes, Lev. xxvii. 30. Numb. xviii. 21. Deut. xiv. 22. That legiſlator obliged the Iſraelites to the payment of ſeveral kinds of *tithes*; as,

1. The firſt *tithe* מעשר הראשון, which was a *tithe* of all the fruits given to the Levites: this was not taken till after the oblation called תרומה, *terumah*, which was a tenth part allotted to the prieſts, had been made.

2. The *ſecond tithe* was a tenth part of the nine remaining after payment of the firſt *tithe*. This *tithe* was ſet apart in each family; and the maſter of the family was obliged to carry it to Jeruſalem, and to uſe it there; or, in caſe he could not, he was to redeem it, or convert it into money: in which caſe he was to add a fifth to it, and carry the money to Jeruſalem.

3. The *tithe of the tithe*, was the tenth part of all the *tithes* that had been given to the Levites by the people: for the Levites after they had got all their *tithes* of the people, divided the whole into ten parts; and in their turn gave a *tithe* to the prieſts.

4. The *tithe of the third year* was another kind of *tithe*, not much different from the ſecond *tithe*, excepting that it was leſs troubleſome; becauſe they did not carry it to Jeruſalem either in kind, or in money, but kept it by them to be ſpent by the Levites, the ſtrangers, the fatherleſs, and the widows of the place, Deut. xiv. 28, 29. This was alſo called the *tithe of the poor*, and the *third tithe*; and theſe third years when it was paid, were called the *tithe years*. Several learned Jews and Chriſtians, however, conceived, that this was not a diſtinct *tithe*, but the ſame as the ſecond; ſo that, as Mr. Mede apprehends, what was wont in other years to be ſpent in feaſting, was every third year ſpent upon the poor. All theſe *tithes* are calculated to amount to above one ſixth of the revenue of each perſon.

Theſe matters are all farther explained in the Talmud, wherein are two books on *tithes*, alſo in the book of benedictions, ברכינ, in the commentaries of Bartenora, Maimonides, R. Schelomoh Jarrhi, in Scaliger, Amama, Selden, Friſchmuth, Quenſted, Varenius, Hottinger, Sigonius, Cunæus, Godwyn, Leidecker, &c.

Under the new law *tithes* are not eſtabliſhed by Jeſus

Chriſt, or Chriſtian diſpenſation, as they were under the old law by the miniſtry of Moſes; the Chriſtian prieſts, and the miniſters of the altar of the new covenant, lived at firſt, wholly of the alms and oblations of the devout.

In after-times the laity gave a certain portion of their revenues to the clergy, but voluntarily, and not out of any conſtraint or obligation; the firſt inſtances we have of this, are in the fourth and fifth centuries.

This gift was called *tithe*, not that it was really a tenth part of their income, or near ſo much: but only in imitation of the *tithes* of the old law.

In the following age, the prelates in their councils, in concert with the princes, made an expreſs law to the purpoſe; and obliged the laity to give a full tenth part of their revenues, their fruits, &c. to the eccleſiaſtics.

This the church enjoyed without diſturbance for two or three centuries; but in the eighth century the laity got hold of part of theſe *tithes*, either by their own authority, or by grants and donations of the princes; and appropriated them to their own uſes.

Some time afterwards they reſtored them, or applied them to the founding of monaſteries or chapters, and the church conſented, at leaſt tacitly, to this reſtitution.

In 1179, the third council of Lateran, held under Alexander III. commanded the laymen to reſtore all the *tithes* they yet held to the church.

In 1215, the fourth council of Lateran, held under Innocent III. moderated the matter a little; and, without ſaying any thing of the *tithes* which the laity already poſſeſſed, forbad them to appropriate or take any more for the future.

We may obſerve, that, upon the firſt introduction of *tithes*, though every man was obliged to pay *tithes* in general, yet he might give them to what prieſts he pleaſed, which were called *arbitrary conſecrations of tithes*: or he might pay them into the hands of the biſhop, who diſtributed among his dioceſan clergy the revenues of the church, which were then in common. But when dioceſes were divided into PARISHES, the *tithes* of each pariſh were allotted to its own particular miniſter; firſt by common conſent, or the appointments of lords of the manors, and afterwards by the written law of the land. However, arbitrary conſecrations of *tithes* took place again afterwards, and became in general uſe with us till the time of king John. This was probably owing to the intrigues of the regular clergy, or monks of the Benedictine and other rules, and will account for the number and riches of the monaſteries and religious houſes, which were founded in thoſe days, and which were frequently endowed with *tithes*. But, in proceſs of years, the income of the laborious pariſh-prieſts being ſcandalouſly reduced by theſe arbitrary conſecrations of *tithes*, it was remedied by pope Innocent III. about the year 1200, in a decretal epiſtle, ſent to the archbiſhop of Canterbury, and dated from the palace of Lateran, which enjoined the payment of *tithes* to the parſons of the reſpective pariſhes, where every man inhabited, agreeably to what was afterwards directed by the ſame pope in other countries. This epiſtle, being reaſonable and juſt, and correſpondent to the ancient law, was allowed of, and became *lex terræ*. This put an effectual ſtop to all the arbitrary conſecrations of *tithes*; except ſome footſteps which ſtill continue in thoſe *portions of* TITHES, which the parſon of one pariſh hath, though rarely, a right to claim in another: for it is now univerſally held, that *tithes* are due, of common right, to the parſon of the pariſh, unleſs there be a ſpecial exemption. This PARSON of the pariſh, may be either the actual incumbent, or elſe the appropriator of the benefice: APPROPRIATIONS being a method of endowing monaſteries, which ſeems to have been deviſed by the regular clergy, by way of ſubſtitution to arbitrary conſecrations of *tithes*.

Fa. Paolo, in his Treatiſe of beneficiary matters, is of opinion, that the cuſtom of paying *tithes*, under the new law, began in France; and affirms, that there are no inſtances of it before the eighth and ninth centuries: but he muſt be miſtaken; for in the ſecond council of Matiſcona, held in 585, it is ſaid expreſly, that the Chriſtians had a long time kept inviolate that law of God, whereby *tithe* of all their fruits was enjoined to be given to holy places, &c.

In effect, Origen, Hom. xi. on Numb. thinks, that the old laws of Moſes, touching the firſt-fruits and *tithes*, both of cattle, and of the fruits of the earth, are not abrogated by the goſpel; but ought to be obſerved on their ancient footing.

The Vth canon of the council of Matiſcona orders *tithe* to be paid to the miniſters of the church according to the law of God, and the immemorial cuſtom of the Chriſtians, for the uſe of the poor, and the redemption of captives, and that upon penalty of excommunication: which is the firſt penalty we find impoſed on ſuch as would not pay *tithe*. On which grounds it is that many among the modern clergy hold their *tithes* to be *jure divino*.

Others, on the contrary, plead, that the recompence to be given church miniſters, is differently ordained by God, according to the differences he has put between his two great diſpenſations, the law and the goſpel: under the law he gave them *tithes*; under the goſpel, having left all things in his church to charity, and Chriſtian freedom, he has given them only what ſhall be given them freely, and in charity. That the law of *tithes* is in force under the goſpel, all the proteſtant divines, except ſome among the Engliſh, deny; for though hire to the labourer be of moral and perpetual right, yet that ſpecial kind of hire, the *tenth*, can be of no right or neceſſity, but to the ſpecial labour for which God ordained it: that ſpecial labour was the Levitical and ceremonial ſervice of the tabernacle, Numb. xviii. 21, 31, which was aboliſhed: the right therefore of the ſpecial hire muſt be aboliſhed too.

That *tithes* were ceremonial, is evident from their not being given to the Levites till they had been firſt offered as an heave-offering to the Lord, ver. 24, 28.

He, then, who by the law brings *tithes* into the goſpel, brings in likewiſe a ſacrifice, and an altar; without which, *tithes*, by the law, were unſanctified and polluted, ver. 32. And therefore they were never thought of in the firſt Chriſtian times, till ceremonial altars and oblations had been brought back.

The Jews, themſelves, ever ſince their temple was deſtroyed, though they have rabbies, and teachers of the law, yet pay no *tithes*, as having no proper Levites to whom, nor any altar whereupon to hallow them; which argues, that the Jews themſelves never looked on *tithes* as moral, but merely ceremonial. Add, that *tithes* were not allowed to the prieſts and Levites merely for their labour in the tabernacle; but in conſideration of this likewiſe, that they were not allowed to have any other part or inheritance in the land, ver. 20. 24. and, by that means for a tenth, loſt a twelfth.

Beſides, it has been urged, that the prieſts and Levites were properly the officers and miniſters of ſtate under God, as king of Iſrael; and the Iſraelites paying through their hands one-tenth to him, was agreeable to the cuſtom of almoſt all nations to pay one-tenth to their king. *Tithes*, therefore, are to be conſidered as an appendage to the theocracy, and it has been ſaid, that it will be extremely difficult to prove, that Chriſtian miniſters have a divine right to demand them, from this circumſtance of a conſtitution peculiar to the Jewiſh nation. As to the original of *tithes*, judge Blackſtone obſerves, that he will not put the title of the clergy to them upon any divine right; though ſuch a right certainly commenced, and, as he apprehends, as certainly ceaſed, with the Jewiſh theocracy; yet an honourable and competent maintenance for the miniſters of the goſpel is, undoubtedly, *jure divino*; whatever the particular mode of that maintenance may be. Accordingly all municipal laws have provided a liberal and decent maintenance for their national prieſts or clergy: ours in particular have eſtabliſhed this of *tithes*, probably in imitation of the Jewiſh law; and perhaps, conſidering the degenerate ſtate of the world in general, it may be more beneficial to the Engliſh clergy to found their title on the law of the land, than upon any divine right whatſoever, unacknowledged and unſupported by temporal ſanctions.—But however beneficial this appointment may be to the clergy, it has been complained of as impolitic in a variety of reſpects, and peculiarly burthenſome to the ſtate. It is a great diſcouragement to the improvement of land, that a tenth part of the clear produce, without any deduction for the advanced expence of raiſing that produce, ſhould be alienated from the cultivator of the land to any other perſon whatever. Some have propoſed, as a better method for raiſing a revenue for the clergy, to lay an equivalent tax upon all eſtates, cultivated or not cultivated. It is well known and has often been lamented, even by the clergy themſelves, that this method of raiſing a revenue for their ſubſiſtence, is a continual ſource of diſpute between the clergy and their pariſhioners, and contributes to obſtruct the uſefulneſs of their miniſtry. In Holland, and ſome other Proteſtant countries, the civil magiſtrates have adopted what ſome have thought a better plan, by allowing their miniſters a fixed ſtipend, paid out of the public funds.

In effect, for the firſt three hundred years after Chriſt, no mention is made in all eccleſiaſtical hiſtory of any ſuch thing as *tithes*; though, in that time, altars and oblations had been recalled, and the church had miſerably judaized in many other things. The churchmen confeſſedly lived all that time on free-will offerings: nor could the defect of paying *tithe* be owing to this, that there were wanting civil magiſtrates to enjoin it; ſince Chriſtians, having lands, might have given out of them what they pleaſed; and the firſt Chriſtian emperors, who did all things by advice of the biſhops, ſupplied what was wanting to the clergy, not out of *tithes*, which were never propoſed, but out of their own imperial revenues.

The firſt authority produced, ſetting aſide the Apoſtolical Conſtitutions, which few of the patrons of *tithes* will inſiſt on, is a provincial ſynod at Cullen in 356, where *tithes* are voted to be God's rent: but before that time, divers other abuſes and complaints had got ground, as altars, candles at noon, &c. And thus one complaint begot another: as it is certain, that *tithes* ſuppoſe altars.

It is not eaſy to aſcertain the time when *tithes* were firſt introduced into this country. About the year 794, Offa king of the Mercians, made a law, whereby he gave to the church the *tithes* of all his kingdom, in order, as it is ſaid, to atone for the death of Ethelbert, king of the Eaſt Angles, whom, in the preceding year, he had cauſed to be baſely murdered. But that they were paid in England before this time by way of offering, according to the ancient uſage and decrees of the church, appears from the canons of Egbert, archbiſhop of York, about the year 750, and from an epiſtle of Boniface, archbiſhop of Mentz, written about the ſame time to Cuthbert, archbiſhop of Canterbury, and from the 17th canon of the general council held for the whole kingdom at Chalcuth, in the year 787. But the law of Offa firſt gave the church a civil right to them in this land by way of property and inheritance, and enabled the clergy to recover them as their legal due, by the coercion of the civil power. However, this eſtabliſhment of Offa reached no farther than to the kingdom of Mercia, over which he reigned; until Ethelwulph, about ſixty years after, enlarged it for the whole realm of England. See REVENUE.

Judge Blackſtone ſays, that poſſibly *tithes* in this country were cotemporary with the planting of Chriſtianity among the Saxons, by Auguſtin the Monk, about the end of the 6th century. But the firſt mention of them, which he has met with, in any written Engliſh law, is in a conſtitutional decree, made in a ſynod held A. D. 786, wherein the payment of *tithes* in general is ſtrongly enjoined. This canon or decree, which did not at firſt bind the laity, was effectually confirmed by two kingdoms of the heptarchy, in their parliamentary conventions of eſtates, reſpectively conſiſting of the kings of Mercia and Northumberland, the biſhops, dukes, ſenators, and people. This was a few years later than the time when Charlemagne eſtabliſhed the payment of them in France, A. D. 778, and made the famous diviſion of them into four parts; one to maintain the edifice of the church, the ſecond to ſupport the poor, the third the biſhop, and the fourth the parochial clergy.

The next authentic mention of them is in the Fœdus Edwardi et Guthruni, or the laws agreed upon between king Guthrun the Dane, and Alfred and his ſon Edward the Elder, ſucceſſive kings of England, about the year 900. This treaty may be found at large in the Anglo-Saxon laws, and it not only enjoins the payment of *tithes* but adds a penalty upon non-obſervance; which law is ſeconded by the laws of Athelſtan (cap. i.) about the year 930. This, he ſays, is as much as can be certainly traced out, with regard to their legal original. Blackſt. Com. b. ii. c. iii. ſect. 2. Burn's Eccl. Law, vol. iii. article *Tithes*.

The cuſtom of paying *tithe*, or of offering a tenth of what a man enjoys, or of what he reaps from it, has not only been practiſed under the old and the new law, but we alſo find ſomething like it among the heathens.

Xenophon, in the fifth book of the expedition of Cyrus, gives us an inſcription upon a column, near the temple of Diana, whereby the people were warned to offer the tenth part of their revenues every year to that goddeſs.

The Babylonians and Egyptians gave their kings a tenth of their revenues: ſee Ariſtotle in his Oeconomics, lib. ii. Diodorus Siculus, lib. v. and Strabo, lib. xv.—Afterwards the Romans exacted of the Sicilians a tenth of the corn they reaped; and Appian tells us, that thoſe who broke up, or tilled, any new grounds, were obliged to carry a tenth of their produce to the treaſury.

The Romans offered a tenth of all they took from their enemies, to the gods; whence the name of Jupiter Prædator: the Gauls, in like manner, gave a tenth to their god Mars, as we learn in the Commentaries of Cæſar.—And Feſtus, de Verb. Signif. aſſures us, that the ancients uſed to give *tithe* of every thing to their gods: *Decima quæque veteres diis ſuis offerebant.*

Authors have been ſtrangely perplexed, to find the original of a cuſtom eſtabliſhed among ſo many people of different manners and religions, to give a *tenth* to their kings, their gods, or their miniſters of religion. Grotius takes it to ariſe hence, that the number ten is the moſt known, and the moſt common, among all nations; by reaſon of the number of fingers, which is ten. On this account he thinks it is, that the commandments of God were reduced to ten, for people to retain them with greater eaſe; that the philoſophers eſtabliſhed ten categories, &c.

Extra-parochial TITHES denote *tithes* which are not within the compaſs of any diſtinct pariſh. By the canon law, theſe were to be diſpoſed of at the diſcretion of the biſhop; but by the law of England, all extra-parochial *tithes*, as in ſeveral foreſts, belong to the king, and may be granted to whom he pleaſes. Accordingly they have been adjudged to him, not only by ſeveral reſolutions of law, but alſo in parliament 18th Edw. I. But extra-parochial waſtes and marſh lands, when improved and drained, are by 17th Geo. II. c. 37, to be aſſeſſed to all parochial rates in the pariſh next adjoining.

TITHES *impropriated and appropriated*, called alſo *infeodated tithes*, are thoſe alienated to ſome temporal or eccleſiaſtical lord, united to their fee, and poſſeſſed as ſecular goods. See APPROPRIATION and IMPROPRIATION.

By the council of Lateran, held under Alexander III. in 1179, the alienation or infeodation of *tithes* is prohibited for the future: whence all infeodations made ſince that time are generally held, by the canoniſts, illegal.

Some attribute the original of theſe impropriated *tithes* to Charles Martel; and hold him damned for firſt giving the revenues of benefices to ſecular nobles: but Baronius will have this a fable, and refers their origin to the wars in the Holy Land; which is alſo the opinion of Paſquier.

The tribute, it ſeems, which the Romans impoſed on all the provinces of their empire, was a tenth part of all the fruits: hence ſeveral authors obſerve, that the Franks having conquered the Gauls, and finding the impoſition eſtabliſhed, they kept it on foot, and gave thoſe *tithes* in fee to their ſoldiers: and this, ſay they, was the origin of infeoffed, or impropriated or appropriated *tithes*. But the truth is, they are not ſo ancient; nor do we find any mention of them before the reign of Hugh Capet; even the very council of Clermont, held in 1097, as hot as it was in the intereſts of the church, does not ſay one word of them; which yet would undoubtedly have made loud complaints of ſuch an uſurpation, had it been then known.

TITHES, *portion of*, denotes *tithes* which the parſon of one pariſh hath a right to claim in the pariſh of another. Theſe portions, which might probably, at leaſt in part, have been owing to the lord of a manor's eſtate extending into diſtricts which are now apportioned into diſtinct pariſhes, are in law ſo diſtinct from the rectory, that if one who hath them purchaſes the rectory, the portion is not extinct, but remaineth grantable. The cognizance of theſe belongs like that of other *tithes*, to the eccleſiaſtical court.

TITHE-*rate*. See RATE-*tithe*.

TITHES, *ſubtraction of*. See SUBTRACTION.

TITHING, *decenna*, or *decury*, a number or company of ten men, with their families, knit together in a kind of ſociety, and all bound to the king, for the peaceable behaviour of each other.

Anciently no man was ſuffered to abide in England above forty days, unleſs he were enrolled in ſome *tithing*.—One of the principal inhabitants of the *tithing* is annually appointed to preſide over the reſt, being called the *tithing-man*, the head-borough, and in ſome countries the borſholder, or borough's elder, being ſuppoſed the diſcreeteſt man in the borough, town, or *tithing*. The diſtribution of England into *tithings* and hundreds is owing to king Alfred. See DECINERS, FRANK-*pledge*, and FRIBURGH.

TITHYMALUS, in *Botany*, ſee SPURGE.

TITILLARES *venæ*, a name given by ſome authors to the iliac veins.

TITILLATION, TITILLATIO, the act of *tickling*, i. e. exciting a ſort of pleaſurable idea, by a gentle application of ſome ſoft body, upon a nervous part; and which uſually tends to produce laughter.

TITILLICUM, a word uſed by ſome anatomical writers for the arm-pit.

TITLARK, in *Ornithology*, ſee Lark.

TITLE, Titulus, an inſcription put over any thing, to make it known.

The word is more particularly uſed for the inſcription in the firſt page of a book, expreſſing the ſubject thereof, the author's name, &c.

What tortures abundance of authors, is to find ſpecious *titles* for their books: a *title* ſhould be ſimple, and yet clear: theſe are the two genuine characters of this kind of compoſition. Aſſuming *titles* are prepoſſeſſion againſt the authors.

Title, Titulus, in the *Civil* and *Canon Law*, denotes a chapter or diviſion of a book.

A *title* is ſubdivided into paragraphs, &c.—Each of the fifty books of the Digeſt conſiſts of a number of *titles*; ſome of more, others of leſs.

Title is alſo an appellation of dignity, diſtinction, or pre-eminence, given to perſons poſſeſſed of the ſame.

The *titles* of order or dignity, Loyſeau obſerves, ſhould always come immediately after the name, and before the *titles* of office.

The king of Spain has a whole page of *titles*, to expreſs the ſeveral kingdoms and ſignories he is maſter of. The king of England takes the *title* of *king of Great Britain, France, and Ireland*: the king of France, the *title* of *king of France and Navarre*: the king of Sweden intitles himſelf *king of the Swedes and Goths*: the king of Denmark, *king of Denmark and Norway*: the king of Sardinia, among his *titles*, takes that of *king of Cyprus and Jeruſalem*: the duke of Lorrain, the *title* of *king of Jeruſalem, Sicily*, &c.

The cardinals take *titles* from the names of ſome churches in Rome: as of St. Cecilia, St. Sabina, &c. and they are called cardinals of the *title of St. Cecilia*, &c.

The emperor can confer the *title* of prince, or count of the empire; but the right of ſuffrage in aſſemblies of the empire depends on the conſent of the eſtates.

The Romans gave the *titles* of Africanus, Aſiaticus, Macedonicus, Numidicus, Creticus, Parthicus, Dacicus, &c. in memory of the victories obtained over the people of thoſe countries.—The king of Spain, after the like manner, gives honourable *titles* to his cities, in recompence for their ſervices, or their fidelity.

Title expreſſes alſo a certain quality aſcribed by way of reſpect to certain princes, &c.

The pope has the *title* of *holineſs*; a cardinal prince of the blood, that of *royal highneſs*, or *moſt ſerene highneſs*, according to his nearneſs to the throne; other cardinal princes, *moſt eminent highneſs*; an archbiſhop, *grace* and *moſt reverend*; a biſhop, *right reverend*; abbots, prieſts, religious, &c. *reverend*.

As to ſecular powers, to the emperor is given the *title* of *imperial majeſty*; to king, *majeſty*; to the king of France, *moſt chriſtian majeſty*; to the king of Spain, *catholic majeſty*; to the king of England that of *defender of the faith*; to the Turks, *grand ſignor* and *highneſs*; to the prince of Wales *royal highneſs*; to the dauphin of France, *ſerene highneſs*; to electors, *electoral highneſs*; to the grand duke, *moſt ſerene highneſs*; to the other princes of Italy and Germany, *highneſs*; to the doge of Venice, *moſt ſerene prince*; to the republic or ſenate of Venice, *ſignory*; to the grand-maſter of Malta, *eminence*; to nuncios, and to ambaſſadors of crowned heads, *excellency*.

The emperor of China among his *titles*, takes that of *tien-ſu*, ſon of heaven. The Orientals, it is obſerved, are exceedingly fond of *titles*: the ſimple governor of Schiras, for inſtance, after a pompous enumeration of qualities, lordſhips, &c. adds the *titles* of *flower of courteſy*, *nutmeg of conſolation*, and *roſe of delight*.

Title, in *Law*, denotes a right which a perſon has to the poſſeſſion of any thing.

A *title* to lands is thus defined by ſir Edward Coke: *titulus eſt juſta cauſa poſſidendi id quod noſtrum eſt*, or it is the means whereby the owner of lands hath the juſt poſſeſſion of his property. There are ſeveral ſtages or degrees requiſite to form a *complete title* to lands and tenements. The loweſt and moſt imperfect degree of *title* conſiſts in the mere naked poſſeſſion, or actual occupation of the eſtate, without any apparent right, or any ſhadow or pretence of right, to hold and continue ſuch poſſeſſion. See Disseisin.

The next ſtep to a good and perfect *title* is the right of poſſeſſion, which may reſide in one man, while the actual poſſeſſion is either in himſelf or another. The third circumſtance attending a *title* is the mere right of property, the *jus proprietatis*, without either poſſeſſion or even the right of poſſeſſion. It is poſſible that one man may have the poſſeſſion, another the right of poſſeſſion, and a third the right of property. But in the union of theſe three qualifications conſiſts a complete *title* to lands, tenements, and hereditaments. For it is an ancient maxim of the law, that no *title* is completely good, unleſs the right of poſſeſſion be joined with the right of property; which right is then denominated a double right, Jus *duplicatum*, or *droit droit*. And when to this double right the actual poſſeſſion is alſo united, when there is, according to the expreſſion of Fleta, *juris et ſeiſinæ conjunctio*, then, and then only is the *title* completely legal.

The ſtatute 32 Hen. VIII. c. 9. hath provided, that no one ſhall ſell or purchaſe any preſented right or *title* to land, unleſs the vender hath received the profits thereof for one whole year before ſuch grant, or hath been in actual poſſeſſion of the land, or the reverſion or remainder; on pain that both the purchaſer and vendor ſhall each forfeit the value of ſuch land to the king and the proſecutor.

A *title* to things perſonal may be acquired or loſt by occupancy, by prerogative, by forfeiture, by cuſtom, by ſucceſſion, by marriage, by judgment, by gift, by contract, by bankruptcy, by teſtimony, and by adminiſtration. Blackſt. Com. b. ii. p. 195, &c. p. 400, &c.—See Possession and Property.

Title is alſo an authentic inſtrument, whereby a man can prove and make appear his right.

There muſt be at leaſt colourable *title* to come into poſſeſſion of a benefice, otherwiſe the perſon is deemed an intruder. For preſcription with *title*, ſee Prescription.

Title, in the *Canon Law*, is that by virtue whereof a beneficiary holds a benefice: ſuch is the collation of an ordinary, or a proviſion in the court of Rome founded on a reſignation, permutation, or other legal cauſe.

The *title* of a benefice, or beneficiary, is either a true, or a colourable one. A true or valid *title* is that which gives a right to the benefice: ſuch is that received from a collator who has a right to confer the benefice on a perſon capable thereof, the uſual ſolemnities being obſerved. See Collation, &c.

Colourable *title* is a ſeeming one; i. e. ſuch an one as appears valid, and is not. Such would that be founded on the collation of a biſhop, in caſe the benefice in queſtion were not in his collation.

By the canons, a colourable *title*, though falſe, produces two very conſiderable effects. 1. That, after peaceable poſſeſſion for three years, the incumbent may defend himſelf by the rule *de triennali poſſeſſione*, againſt ſuch as would diſpute the benefice with him. 2. That in caſe he be proſecuted within three years, and obliged to ſurrender the benefice, he ſhall not be obliged to reſtore the produce of it, during the time he poſſeſſed it.

Title, is alſo uſed in ſeveral ancient ſynods and councils, for the church to which a prieſt was ordained, and where he was conſtantly to reſide.

Nullus in preſbyterum, nullus in diaconum, niſi ad certum titulum *ordinetur*. Concil. Londin. ann. 1125.

There are many reaſons why a church might be called *titulus*, *title*: the moſt probable Cowel takes to be this, that in ancient days the name of the ſaint to whom the church was dedicated was engraved on the porch, as a token that the ſaint had a *title* to that church: whence the church itſelf became afterwards to be called *titulus*.

Titles, or Titular *churches*, M. Fleury obſerves, were formerly the denomination of a particular kind of churches at Rome.

In the ſixth and ſeventh centuries, there were four ſorts of churches in that metropolis; viz. *patriarchal*, *titular*, *diaconal* and *oratorial*. The *tituli*, *titular*, were as it were, pariſhes, each aſſigned to a cardinal-prieſt, with a certain diſtrict or quarter depending thereon, and a font for the adminiſtration of baptiſm in caſe of neceſſity.

Title, *clerical* or *ſacerdotal*, denotes a yearly revenue or income of the value of fifty crowns, which the candidates for prieſthood were anciently obliged to have of their own, that they might be aſſured of a ſubſiſtence.

By the ancient diſcipline there were no clerks made, but in proportion as they were wanted for the ſervice of the church, which is ſtill obſerved with regard to biſhops; none being conſecrated, but to fill ſome vacant ſee.

But for prieſts, and other clerks, they began to make vague ordinations in the Eaſt as early as in the fifth century: this occaſioned the council of Chalcedon to declare all vague and abſolute ordinations null.

Accordingly the diſcipline was pretty well obſerved till towards the end of the eleventh century; but then it began to relax, and the number of prieſts was exceedingly increaſed;

creaſed; either becauſe the people became deſirous of the privileges of the clericate, or becauſe the biſhops ſought to extend their juriſdiction.

One of the great inconveniencies of theſe vague ordinations was poverty, which frequently reduced the prieſts to ſordid occupations, and even to a ſhameful begging. To remedy this, the council of Lateran laid it on the biſhops to provide for the ſubſiſtence of ſuch as they ſhould ordain without *title*, till ſuch time as they had got a place in the church that would afford them a ſettled maintenance.

There was alſo another expedient found out to elude the canon of the council of Chalcedon; and it was appointed, that a prieſt might be ordained on the *title* of his patrimony; that is, it was not neceſſary he had any certain place in the church, provided he had a patrimony ſufficient for a creditable ſubſiſtence.

The council of Trent retrieved the ancient diſcipline in this reſpect, forbidding all ordination, where the candidate was not in peaceable poſſeſſion of a benefice ſufficient to ſubſiſt him; and allowing nobody to be ordained on patrimony or penſion, unleſs where the biſhop declares it to be expedient for the good of the church: ſo that the benefice is the rule, and the patrimony the exception. See ORDINATION.

But this rule is not regarded, even in ſome catholic countries, partcularly France, where the patrimonial *title* is the moſt frequent; and the *title* is even fixed to a very moderate ſum.

As to religious, the profeſſion they make in a monaſtery ſerves them for a *title*, in regard no convent is obliged to maintain them: and as to mendicants, they are maintained upon the *title of poverty*.

Thoſe of the houſe and ſociety of the Sorbonne are alſo ordained without any patrimonial *title*, and on the ſole *title* of poverty; it being ſuppoſed a doctor of the SORBONNE can never want a benefice.

TITLE *for orders*. See DEACON.

TITMOUSE, *parus*, in *Ornithology*, a diſtinct genus of birds, according to Linnæus, of the order of the *paſſeres*; the diſtinguiſhing characters of which are theſe; the extremity of the tongue is truncated, or as it were cut off, and terminated by three or four briſtles; and the beak is entire, and covered with briſtly feathers at the baſe. There are fourteen ſpecies.

The general characters of the *parus* kind, according to Mr. Ray, are, that they are very ſmall, and are fond of climbing about trees, where they feed on the ſmall inſects they find in their bark; though ſome of them will alſo eat ſeeds. They are always reſtleſs; their beaks are ſhort, and their tails long; they make a conſiderably loud noiſe, ſome of them ſinging very agreeably; and all lay a great number of eggs.

TITMOUSE, *American*. See GUIRACENOIA.

TITMOUSE, *bearded*, *parus biarmicus*, called by ſome *leaſt butcher-bird*, has a ſhort, ſtrong and very convex bill, of a box colour, the head of a fine grey; on each ſide of the bill, beneath the eye, a long triangular tuſt of feathers; the chin and throat white; the middle of the breaſt fleſh-coloured; the ſide and thighs of a pale orange; and the hind part of the neck and back of an orange-bay.—The vent feathers of the male are of a pale-black; thoſe of the female of a dull orange; the legs are of a deep ſhining black. The female wants the black mark on each cheek, and the fine fleſh-colour on the breaſt; the crown of the head is of a browniſh ruſt-colour, ſpotted with black: the outmoſt feathers of the tail, which in the male are of a deep orange-colour, are black tipt with white. Pennant.

TITMOUSE, *black*, *parus ater*. See COLEMOUSE.

TITMOUSE, *blue*, *parus cæruleus*, called alſo NUN, is a beautiful ſpecies, with a ſhort duſky bill, a fine blue crown of the head; a black line from the bill to the eyes; the forehead and cheeks white; yellowiſh-green back; lower ſide of the body yellow; the wings and tail blue, the former being marked tranſverſely with a white bar, and the legs of a lead colour. This bird frequents gardens, and does great injury to fruit-trees by ſearching for inſects: it breeds in holes of walls, and lays about twelve or fourteen eggs. Pennant.

TITMOUSE, *great*. See FRINGILLAGO.

TITMOUSE, *long-tailed*, *parus caudatus*, has a black, very ſhort, thick, and very convex bill; the top of the head white, mixed with a few dark grey feathers, and ſurrounded with a broad ſtroke of black, riſing on each ſide of the upper mandible, paſſing over each eye, and uniting at the hind part of the head, and continuing along the middle of the back to the rump. The tail of this bird is the longeſt in proportion to the bulk of any Britiſh bird, being in length three inches, and of a white and black colour. The cheeks and throat are white: the breaſt and under ſide white, with a caſt of red; the legs, feet and claws are black. It forms an elegant neſt of an oval-ſhape, with moſſes and wool, and lays from ten to ſeventeen eggs. Pennant.

TITMOUSE, *marſh*, *parus paluſtris*, frequents wet places in woods, and early in February unites two notes, not unlike the whetting of a ſaw. It is bigger than the COLEMOUSE, wants the white ſpot on the head, has a larger tail, its under ſide white, leſs black under the chin, and wants the white ſpot on the coverts of the wings, though not always. Pennant.

TITUBATION, in *Aſtronomy*. See TREPIDATION.

TITULAR, or TITULARY, denotes a perſon inveſted with a title, in virtue whereof he holds an office or benefice, whether he performs the functions thereof or not. In this ſenſe the term is uſed in oppoſition to ſurvivor, and to a perſon only acting by procuration, or commiſſion. An officer is always reputed *titular* till he hath reſigned his office, and the reſignation hath been admitted.

TITULAR is alſo ſometimes applied adjectively to a perſon who has the title and right of an office or dignity, but without having poſſeſſion, or diſcharging the function thereof.

It is ſometimes alſo uſed abuſively for a perſon who aſſumes and pretends a title to a thing, without either a right thereto, or a poſſeſſion thereof.

TITULAR *Churches*. See TITLES.

TIZRI, in *Chronology*. See TISRI.

TIZZONAIOS, in the *Glaſs Art*, are two apertures, one on each ſide the working furnace, by which a ſervitor night and day puts on coals to maintain the fire.

TLACOOZELOTL, in *Zoology*. See OCELOT.

TLAM, or SLAM, in the *Alum Works*, a word uſed by the workmen, to expreſs a ſort of mud or foulneſs which does great hurt to the alum, rendering it foul and coarſe. The *ſlam* is a muddy ſubſtance ſettling to the bottom of the veſſels; but in the boiling of the liquor it gives a reddiſh colour, and diſorders the whole works when in any great quantity. They always paſs their liquor over four parcels of the alum-rock, and the laſt if not carefully calcined, generally gives it this diſadvantageous mixture. Phil. Tranſ. N° 142.

TLAQUACUM, in *Zoology*, the name given by the Spaniards, and ſome others to a very remarkable animal in America, commonly known among us by the name of the *poſſum* or OPOSSUM.

TLAQUATZIN, in *Zoology*, a name by which the natives in ſome parts of America call the OPOSSUM.

TLAQUATZIN *ſpinoſum*, in *Zoology*, the name by which Hernandez has called the cuanda, a ſort of *Braſilian* PORCUPINE.

TLANHQUACHUL, in *Ornithology*, the name of a Braſilian bird, very much approaching to the nature of the European platea, or SPOONBILL.

It is a very voracious bird, and feeds on live fiſh, but will not take or meddle with dead ones, and is all over of a beautiful red. It has a black ring round the upper part of its neck, and is common about the ſhores of the ſea and rivers.

TLAYOTIC, in *Natural Hiſtory*. See COLIC-*ſtone*.

TLEUQUECHOLTOTOTL, in *Ornithology*, the Mexican name of a bird of the wood-pecker kind, deſcribed by Nieremberg, under the name of the *avis ſalutiferus*; the feathers of a red creſt it carries on its head being ſuppoſed a remedy for head-achs.

TMESIS, τμησις, formed from τεμνω, *I cut*, in *Grammar*, a figure whereby a compound word is ſeparated into two parts, and one or more words interpoſed between them.

Thus, when Terence ſays, *quæ meo cunque animo libitum eſt facere*, there is a *tmeſis*; the word *quæcunque* being divided by the interpoſition of *meo*.

Lucretius abounds in *tmeſes*; as *ſæpo ſalutantum tactu præterque meantum*: or, *diſſidio potis eſt ſejungi, ſeque gregari*; and *diſpectis diſque gregatis*.

TOAD, *rubeta*, *rana bufo*, of Linnæus, in *Zoology*, creature ſufficiently known. It is larger than the frog, its body is thick, its back broad, and its belly ſwelled, and looking as if inflated, and its legs ſhort, whence it is too heavy and unwieldy to hop about as the frog does; its ſkin is conſiderably thick, and full of tubercles, of a duſky and blackiſh colour on the back, and ſpotted on the belly; and is naturally a loathſome and diſagreeable object. Nevertheleſs it has been obſerved, that it has fine eyes.

It feeds on the ſame things that the frog does, worms, ſnails, flies and other inſects; it ſeems alſo that they are able to live on much lighter food, ſince there have been many inſtances of *toads* being found in the ſolid bodies of trees in holes, juſt big enough for them to turn about in; and where there could be no nouriſhment conveyed to them, except what they found in the juices of the tree. There are not wanting alſo inſtances of their having been found in the ſame manner in blocks of ſolid ſtone, if we can credit the generality of authors. Ray's Syn. Quad. p. 252.

The *toad* has been generally conſidered as a poiſonous animal, but Mr. Pennant apprehends without ſufficient reaſon. They have been taken up in the naked hand without the leaſt injury, and quacks have even eaten them, and drank their juices without damage. Beſides, they are a common food to many animals, as buzzards, owls, Norfolk plovers, ducks, and ſnakes; of late, indeed, live *toads* have been applied to cancers, with a view of curing them: facts have been alledged in proof of their efficacy for this purpoſe. The mode of applying them has been to put the animal into a linen bag, and to hold its head preſſing out of the bag, to the part, which it has ſoon laid hold of and ſucked with greedineſs till it dropped off dead. The creature has ſwelled and appeared to be in great pain; often ſweats much and turns pale; and ſometimes diſgorges, recovers and becomes lively again. For other particulars, we muſt refer to Mr. Pennant's appendix *ubi infra*. The time, when *toads* propagate, is early in ſpring; at which ſeaſon the females are ſeen crawling about oppreſſed by the males, who continue on them for ſome hours, and adhere ſo faſt as to tear the ſkin from the part to which they ſtick. They impregnate the ſpawn as it is drawn out in long ſtrings, like a necklace. And the female is aſſiſted by the male, in diſcharging the ſpawn, who with his hinder feet pulls out the eggs, whilſt his fore-feet embraces her breaſt. The eggs are included each in a membranous coat that is very firm, in which is contained the embryo, and theſe eggs, faſtened to one another by a ſhort but ſtrong cord, form a kind of chaplet, the beads of which are diſtant from each other about half their length. The male by drawing this cord with his paw, performs the functions of a midwife, and acquits himſelf in it, it is ſaid, with a dexterity which could not be expected from ſo lumpiſh an animal. Pennant's Brit. Zool. vol. iii. p. 14. p. 385, &c.

The *toad* of Surinam, or *rana pipa* of Linnæus, has long been an object of attention to the curious, on account of its enormous bulk and ugly form. Dr. Fermin, in his Traité des Maladies les plus frequentes a Surinam, &c. publiſhed at Maeſtricht, in 1764, has given ſome remarks on its mode of generation. Having put three males and a female into an open veſſel of water, he obſerved that one of them had ſeveral ſpots on its back, which were eggs, each containing an embryo. At the end of three weeks, the animal ſeemed much agitated, and one of the cells on his back burſting open, a young one crept out of it. In five days no leſs than thirty-five of theſe cells opened in the ſame manner and produced as many animals. On the back of one of theſe which was diſſected, there were no leſs than one hundred and twenty of theſe cells, each of which he conſiders as a real matrix, in which its eggs are lodged and fecundated; and, indeed, in one of them he diſcovered an embryo completely formed, inveloped in a kind of placenta, accompanied by two thin tranſparent membranes ſeemingly analogous to the chorion and amnios in other animals.

Mr. Pennant has deſcribed a ſpecies of *toad*, called by ſome *natter jack*, the RANA *rubeta* of Linnæus, which frequents dry and ſandy places: the upper part of the body is yellow, clouded with brown and covered with porous pimples; and on the back is a yellow line: the upper ſide of the body is of a paler hue, marked with black ſpots; on the fore-feet are four divided toes, and on the hind five, a little webbed.

TOAD-*fiſh*, *rana piſcatrix*, in *Ichthyology*, ſee SEA *devil.*

TOAD-*flax*, *linaria*, in *Botany*, ſee FLAX.

TOAD-*ſtone*, ſee BUFONITÆ.

The more obvious properties of the *toad-ſtone* are, that it is of a browniſh grey, and granulated texture, with ſeveral cavities filled with cryſtallized ſpar: it does not ſtrike fire with ſteel, and melts to a black glaſs. The mode of its ſtratification has been fully and accurately deſcribed by Mr. Whitehurſt, in his Inquiry into the original State and Formation of the Earth, 4to. 1778.

From the experiments of Dr. Withering on this ſtone with different acids, alkalies, and by fuſion, it appears, that one hundred parts of it conſiſt of 63½ parts of ſiliceous earth, 16 of calciform iron, 7½ of calcareous earth, and 14⅘ of earth of alum. The aggregate of theſe ingredients is found to weigh 1⅘ parts more than the original maſs, which is aſcribed to the ſubſtance capable of uniting with fixable air, not having been fully ſaturated with it, as they would be after their precipitation by the earth of alum. Phil. Tranſ. vol. lxxii. part ii. p. 335. This ſubſtance differs little from baſaltes: it is ſofter, contains a ſmaller proportion of iron, and a larger of ſilex.

TOBACCO, *Nicotiana*, in *Botany*, a genus of the *pentandria monogynia* claſs; its characters are theſe: the empalement of the flower is permanent, of one leaf, cut into five acute ſegments; the flower has one funnel-ſhaped petal, with a long tube, ſpread open at the brim, ending in five acute points; it has five awl-ſhaped ſtamina, of the length of the tube, a little inclined, and terminated by oblong ſummits; and an oval germen ſupporting a ſlender ſtyle, crowned by an indented ſtigma; the germen turns to an oval capſule, with two valves, having two cells which open at the top, and filled with rough ſeeds, growing from the partition. Linnæus enumerates ſix, and Miller eleven ſpecies.

Tobacco was not known in Europe till after the diſcovery of America by the Spaniards, and firſt imported about the year 1560.

The Americans of the continent call it *petun*, thoſe of the iſlands *yoli*. The Spaniards, who gave it the name *tobacco*, took it from Tabaco, a province of Yucatan, where they firſt found it, and firſt learned its uſe; or as ſome ſay, it derived its name from the iſland of Tabago, or Tobago.

The French, at its firſt introduction among them, gave it various names; as *Nicotiana*, or the *ambaſſadors herb*, from John Nicot, then ambaſſador of Francis II. in Portugal, who brought ſome of it with him from Liſbon, and preſented it to a grand prior of the houſe of Lorrain, and to queen Catharine de Medicis; whence it was alſo called *queen's herb*, and *grand prior's herb*.—They alſo gave it other names, which are now all reduced to the original name of *tobaco*, or *tobacco*, from *Tabaco*, given it by Hernandez de Toledo, who firſt ſent it into Spain and Portugal.

TOBACCO, *culture and preparation of*. *Tobacco* is cultivated in ſeveral parts of America, particularly in the Caribbee iſlands, Virginia, &c. where they are forced to mix aſhes with the ſoil, to prevent its riſing too thick. After ſowing, they water it every day, and on very hot days cover it up, to prevent its being ſcorched by the ſun.

When it is riſen to a convenient pitch, they tranſplant it, much as we do lettuces, only at a diſtance of three feet, and in a ſoil prepared with great care; when replanted, it is kept continually weeded, the ſtem frequently cleanſed, and the loweſt leaves, and the ſuckers it puts forth, taken off, that ten or fifteen of the fineſt leaves may have all the nouriſhment.

The leaves thus reſerved being ripe, which is known by their breaking when bent, the ſtalks are cut, and left to dry two or three hours in the ſun; after which they are tied two by two, and hung up on ropes under a ſhed, to be dried by the air. When the leaves are ſufficiently dried, they are pulled from off the ſtalks, and made up in little bundles; which, being ſteeped in ſea-water, or, for want thereof, in common water, are twiſted in manner of ropes, and the twiſts formed into rolls, by winding them with a kind of mill around a ſtick. In this condition the *tobacco* is imported into Europe, where it is cut by the tobacconiſts for ſmoking, or formed into ſnuff, and the like.

The principal kinds of *tobacco* imported into England are, the Maryland, called Oroonoko, and the Virginia *tobacco*. The former is not ſo agreeable to the Britiſh taſte as the ſweet-ſcented *tobacco* of the latter colony; but the northern nations of Europe are ſaid to like it better.

Beſides the *tobacco* of the Weſt Indies, there are conſiderable quantities cultivated in the Levant, the coaſts of Greece, and the Archipelago, the iſland of Malta, and Italy. The marks of good twiſt *tobacco*, are a fine ſhining cut, an agreeable ſmell, and that it has been well kept.

In the iſland of Ceylon, there are two kinds of *tobacco* cultivated for profit. They call both kinds *dunkol*, which ſignifies a leaf, the uſe of which is to be ſmoked. The one kind they call *bingele dunkol* or *ſingele dunkol*, for they make no difference between the letters S and H in their pronunciation; the other they call *dunkol kappada*; *kappada* ſignifies gelding, and is a word of Portugueſe origin. This *kappada-tobacco* is much ſtronger and more intoxicating than the other; but both kinds are the produce of the ſame plant; only the ſingle *tobacco* has very little care taken of it, being, after the ſowing in a manner left to itſelf, while the other has great pains beſtowed upon it during the whole time of its growth, and till it is fit for uſe, in the following manner: they clear a little piece of ground, in which they ſow the ſeed of the *tobacco*, and againſt the time that the young plants have got three leaves a-piece, they chooſe out another piece of ground into which to tranſplant them: this they hedge round, and turn their horned cattle into it, that their dung may fall upon it, and ſufficiently enrich it.—The ground is then dug with a ſharp hoe, or ſpade, in the form of a pick-ax, and the dung, by this means, thoroughly worked into it. When the earth is thus prepared, they take up the young plants, and ſet them in this new ground, at about a foot ſquare diſtant from one another.

The manner of giving more or leſs ſtrength to this *tobacco*, is by ſuffering the plants to grow to a greater or leſs height before they top them, or cut off the ſtalk at the ſummit. The uſual way is to cut off the top when the plant has fifteen leaves. If they intend the *tobacco* to be a little ſtronger, they do this when it has only thirteen; and when they would have it ſtrongeſt of all, they do it when there are only eleven or twelve leaves. On the contrary, when they would have a milder *tobacco*, they cut it not off till there be eighteen or twenty leaves; but in this way of counting the leaves, they never reckon the three or four loweſt, which do not grow ſo large and fine as the others. The cutting off of the top prevents the juice of the plant from being waſted in flowers and ſeeds, which are of no value; and, in conſequence of it, all being, after this time, employed to furniſh the growth of the leaves, they grow four times as large and thick as they otherwiſe would do.

To prevent all unneceſſary waſting of the ſap, theſe plants are tended every day; and as the young ſprouts appear in the joining of the leaves and ſtalk, they are continually cut off: this is done once in three days, till the leaves have their full bigneſs, which is about the time when the flowers would have been ripe, had the plant been ſuffered to grow in its natural way: they are immediately to be gathered when they are full grown, otherwiſe they waſte and decay. They cut down the whole plant, and bring them into their houſes, laying them in a heap. When they have lain a little time together, they begin to ſweat and grow hot: when they have been a little while fermenting, they turn them, bringing thoſe which were in the middle to the ſurface, and placing thoſe which were at the ſurface in the middle; by this means the whole quantity of leaves ferments equally. The longer they lie in this manner, the darker coloured the *tobacco* becomes. When they have left it thus to ſweat as long as they judge neceſſary, they hang every ſtalk ſeparately in cords; and when the whole is thoroughly dry, they carefully take off the leaves and lay them by in bundles, till they have occaſion for them. This is the manner of their preparing the *kappada*.

The ſingle *tobacco* is ſown in the ſame manner with this; but it is never tranſplanted nor tended, it grows without particular attention, and when the flowers are ripe, it is cut down, and laid careleſsly in heaps, where ſome of it ferments too much, and ſome too little. This is much weaker, therefore, than the *kappada*; and as both kinds are common in the place, the natives ſmoke them either ſeparately or together, mixed in different proportions, as they like. Some of the Ceyloneſe chew this ſtrong *tobacco* with their betel, and ſome, who ſmoke it alone, uſe no pipe, but, taking a long leaf of it, they roll it up into a long form, and cover it with the leaf of the wattukan-tree; they then light one end of it, and ſmoke by the other, till the whole is conſumed. Phil. Tranſ. N° 278, p. 1143.

There are four or five kinds of *tobacco* frequently raiſed by the curious in England. They are to be ſown in March, upon a moderate hot-bed, and when the plants are come up, they ſhould be tranſplanted to another hot-bed of moderate warmth, and ſet at four inches diſtance, watering and ſhading them till they have taken root: and as they grow ſtronger, giving them as much air as the ſeaſon will permit. In the beginning of May the plants will grow ſo large as to touch one another; and they are then to be taken up with a large ball of earth about their roots, and removed to a rich light ſoil, where they are to be planted in rows four feet aſunder, and the plants at the diſtance of three feet in the rows: watered till they have taken root; and when they ſhow their flower-ſtems, their tops ſhould be taken off; and in Auguſt they will be full grown, and ſhould be cut for uſe.

Tobacco is either taken by way of ſnuff as a ſternutatory, or as a maſticatory by chewing it in the mouth, or by ſmoking it in a pipe.

It is ſometimes alſo taken in little longiſh pellets put up the noſe, where it is found to produce very good effects, to attract a deal of water or pituita, unload the head, reſolve catarrhs, and make a free reſpiration; for the ſubtle parts of the *tobacco* in inſpiration are carried into the trachea and lungs, where they looſen the peccant humours adhering thereto, and promote expectoration. Some have left this *tobacco* in their noſes all night; but this is found to occaſion vomiting uſually on the next morning. Another thing charged on this way of application, is, that it weakens the ſight.

Tobacco is held a firſt rate narcotic or opiate. When taken in great quantities in the way of ſnuff, it is found to prejudice the ſmelling: it alſo greatly diminiſhes the appetite, and in time often gives riſe to a phthiſis.

That, taken in the way of ſmoke, often alſo dries and damages the brain. Borrhi, in a letter to Bartholine, mentions a perſon who, through exceſs of ſmoking, had dried his brain to that degree, that after his death there was nothing found in his ſkull but a little black lump, conſiſting of mere membranes.

The leaves of *tobacco* have a ſtrong diſagreeable ſmell, and a very acrid burning taſte: diſtilled in a retort, without addition, they yield an acrid empyreumatic, poiſonous oil. They give out their acrid matter both to water and ſpirit, but moſt perfectly to the latter; the aqueous infuſions are of a yellow or brown colour, the ſpirituous of a deep green. The ſeveral ſorts of *tobacco* imported from abroad are ſtronger in taſte than that of our own growth, and the extracts made from them much more fiery, but in leſs quantity.

Tobacco, taken internally, even in a ſmall doſe, or decoctions of it uſed as a clyſter, prove virulently cathartic and emetic, occaſioning extreme anxiety, vertigoes, ſtupors, and diſorders of the ſenſes: ſome have, nevertheleſs, ventured upon it both as an evacuant, and in minuter quantities as an aperient and alterant, in epilepſies and other obſtinate chronical diſorders; a practice, which, though in ſome caſes it may have been ſucceſsful, appears much too hazardous to be followed, particularly in the more irritable, hot, dry, and bilious conſtitutions. By long boiling in water, its deleterious power is abated, and at length deſtroyed: an extract made by long coction, is recommended by Stahl and other German phyſicians, as the moſt effectual and ſafe aperient, detergent, expectorant, diuretic, &c. but the medicine muſt neceſſarily be precarious in ſtrength, and has never come into uſe among us. Lewis, Mat. Med.

Bates and Fuller give ſome receipts, in which *tobacco* is an ingredient, with mighty encomiums in aſthmatic caſes. A ſtrong decoction of *tobacco*, with proper carminatives and cathartics, given clyſter-wiſe, ſometimes proves of good effect in what is uſually called the *ſtone colic*, and alſo in the iliac paſſion.

The ſmoke of *tobacco*, received by the anus, is ſaid to be of ſingular efficacy in obſtinate conſtipations of the belly. Hoffman obſerves, that horſes have often been relieved by this remedy, but in human ſubjects it has been rarely tried; and ſays he has known ſome of the common people, who laboured under excruciating pains of the inteſtines, freed in an inſtant from all pain by ſwallowing the ſmoke. Both the decoction and the ſmoke have not unfrequently been injected in caſes of incarcerated herniæ, and often with ſucceſs. The ſmoke thus applied is recommended as one o fthe principal means for the revival of perſons apparently dead from DROWNING or other ſudden cauſes; but ſome ſuſpect the narcotic power of *tobacco* as unfavourable in theſe caſes. *Tobacco* is ſometimes employed externally in unguents and lotions, for cleanſing foul ulcers, deſtroying cutaneous inſects, and other like purpoſes: it appears to be deſtructive to almoſt all kinds of inſects, to thoſe produced on vegetables as well as on animals.—Lewis.

A ſtrong decoction of the ſtalks, with ſharp-pointed dock, and alum, is ſaid to be of good ſervice, uſed externally, in cutaneous diſtempers, eſpecially the itch; ſome boil them for that purpoſe in urine. The ſame decoction is ſaid to be infallible in curing the mange in dogs.

Tobacco beat into a maſh with vinegar or brandy, and laid on the ſtomach, has ſometimes good effects in removing hard tumors of the hypochondria. We have the hiſtory of two cures made by ſuch applications in the Medic. Eſſ. Edinb. vol. ii. p. 41.

The juice of this plant is ſaid to be good againſt ulcers and mortifications. Boyle's Works, abr. vol. i. p. 56.

Some caution, however, Dr. Lewis obſerves, is requiſite even in the external uſes of *tobacco*, particularly in ſolutions of continuity: there are inſtances of its being thus tranſmitted into the blood, ſo as to produce violent effects.

A drop or two of the chemical oil of *tobacco* being put on the tongue of a cat, produces violent convulſions, and death itſelf in the ſpace of a minute; yet the ſame oil uſed in lint, and applied to the teeth, has been found of ſervice in the tooth-ach; though it muſt be to thoſe that have been uſed to the taking of *tobacco*, otherwiſe great ſickneſs, reaching, vomiting, &c. happen; and even in no caſe is the internal uſe of it warranted by ordinary practice. See experiments on the effects of oil of *tobacco* on pigeons by M. Fontana, in which he found vomiting to be a conſtant effect of this poiſon, as he calls it, and the loſs of motion in the part to which it is applied an occaſional or accidental effect, in Phil. Tranſ. vol. lxx. part i. append. p. 38, or Fontana ſur les Poiſons, &c. Florence, quarto.

Sim. Paulli, phyſician to the king of Denmark, in an expreſs treatiſe on *tobacco*, obſerves that the merchants frequently lay it in bog-houſes, to the end that, becoming impregnated with the volatile ſalt of the excrements, it may be rendered the briſker, more fetid, and ſtronger.

Amurath IV. emperor of the Turks, the grand duke of Muſcovy, and the emperor of Perſia, have prohibited the uſe of *tobacco* in their ſtates. Our king James I. wrote a treatiſe expreſly againſt it, intitled, A Counterblaſt to *Tobacco*. By a bull of pope Urban VIII. ſuch are excommunicated as take *tobacco* in churches.

Tobacco is not to be planted in England, on forfeiture of forty ſhillings for every rod of ground thus planted; but this ſhall not extend to hinder the planting of *tobacco* in phyſic gardens, in quantities not exceeding half a pole of ground, and alſo on forfeiture of 10*l.* for every rod. 15 Car. II. c. 7. 12 Car. II. c. 34. And juſtices of peace have power to iſſue warrants to conſtables, to ſearch after and examine whether any *tobacco* be ſown or planted, and to deſtroy the ſame, which they are to do under penalties, &c. 22 and 23 Car. II. c. 26. 5 Geo. c. 11. No perſon ſhall cut walnut-tree leaves, or other leaves (not being *tobacco* leaves) or colour them ſo as to reſemble *tobacco*; or ſhall ſell the ſame mixed or unmixed for *tobacco*; under a penalty of forfeiting 5*s.* a pound: and ſuch leaves, or engines for cutting, may be ſeized by the officers of the cuſtoms, &c. Alſo ſervants employed therein may be committed to gaol, or the houſe of correction, for any time not exceeding ſix months. 1 Geo. ſt. 2. c. 46.

Tobacco ſtalks or ſtems, ſtripped from the leaf, that are imported, ſhall be forfeited and burnt, and the officer ſeizing the ſame ſhall be allowed 1*d.* a pound; and perſons aſſiſting in unſhipping them, &c. ſhall forfeit treble value, with the veſſels, horſes, &c. which may be proſecuted and determined before two juſtices near the place where the ſeizure was made. 12 Geo. c. 28. 5 Geo. III. c. 43. 8 Geo. c. 18. By 24 Geo. II. c. 41. and 26 Geo. II. c. 13. no *tobacco* or ſtalks exceeding 24lb. weight, nor any ſnuff exceeding 10lb. ſhall be conveyed by land, without proper certificates, under penalty of forfeiture, together with horſes and carriages, and commitment of the carrier to the county gaol for one month by one juſtice. The ſeizure of horſes and carriages may be determined by two juſtices near the place where the ſeizure was made. The duty on Maryland *tobacco* imported is 1*s.* $2\frac{79}{80}$*d.* and on Virginia *tobacco* 1*s.* $4\frac{3}{80}$*d.* which is allowed as a drawback on exportation.

TOBACCO, *Engliſh*, *Nicotiana minor* or *Nicotiana ruſtica* of Linnæus, is a ſpecies of *tobacco*, which was originally a native of America, but now propagates itſelf plentifully in England and other parts of Europe. The flowers are of an herbaceous yellow colour, appearing in July, and are ſucceeded by roundiſh capſules filled with ſmall ſeeds, which ripen in autumn. The leaves are ſaid by ſome to be of the ſame quality with thoſe of henbane; but by others, to be ſimilar to the preceding, but weaker. They have been ſometimes ſubſtituted in our markets, inſtead of the true *tobacco*; but are eaſily diſtinguiſhed by their ſmallneſs and oval ſhape, and by being furniſhed with pedicles. Lewis.

TOBACCO, *kanaſter*. See KANASTER.

TOBACCO-*pipe*. See PIPE.

TOBACCO-*pipe-clay*. See CIMOLIA.

TOBACCO-*pipe-fiſh*, the Engliſh name of the ACUS or the SYNGNATHUS *acus* of Linnæus. See *Tab.* III. *of Fiſh*, No. 25. See alſo PETIMBUARA.

TOBACTLI, in *Ornithology*, a name which Nieremberg ſays is often given to the American bird more commonly called HOACTLI.

TOBIANUS, in *Ichthyology*, a name given by Schoneveldt and others, to the AMMODYTES, or ſand-eel.

TOBIS, in *Ichthyology*, a name given by the Swedes to the AMMODYTES, or ſand-eel.

TOCCATA, in the *Italian Muſic*, is much the ſame as *ricercata* or *phantaſia*, *taſtatura*, &c. But what diſtinguiſhes the *toccata* from the other kinds of ſymphonies, is, firſt, its being uſually played on inſtruments that have keys, as organs, ſpinnets, &c. Secondly, that it is commonly compoſed to exerciſe both hands. Thus, ſometimes the baſs holds out a ſound, while the other part makes diminutions, paſſages, or tiratas; and afterwards this part does the ſame, while the baſs moves in its turn.

TOCCATINA, in the *Italian Muſic*, a ſhort reſearch, or *ricerata*. See TOCCATA and RESEARCH.

TOCCAVIENSIS *bolus*, *bole of Tokay*, in the *Materia Medica*, a fine medicinal earth, dug about Tokay in Tranſylvania, and eſteemed a powerful aſtringent.—Kentman calls it the *bolus Pannonica vera*; and Crato, *bolus Hungarica*.

This laſt author eſteemed it ſuperior even to the bole armenic of Galen, and had a great opinion of it in malignant fevers. It is a fine and pure earth, and very heavy, moderately compact in its texture, but not very hard; and in colour of a conſiderably deep and ſtrong yellow. It is naturally of a ſmooth ſurface, and does not ſtain the fingers in handling. It ferments violently with acid menſtrua, and does not become red in burning. Hill. See BOLE.

TOCKAY, in *Zoology*, the name of a ſpecies of Indian lizard, diſtinguiſhed from the other kinds, by being ſpotted all over.

TOCMOL, in *Natural Hiſtory*, a name given by ſome to the common turtle.

TOD *of wool* is mentioned in the ſtatute 12 Car. II. c. 32. as a weight containing twenty-eight pounds, or two ſtone.

Some will have the word derived from the French, *toilet*, a *wrapper*, within which, by uſage, two ſtone of wool are folded.

TODDA-*panna*, in *Botany*, the name by which many authors call the *palma farinifera*, or ſago-tree.

TODDI. See PALM *wine*.

TODDY *tree*. See MAMMEE-*tree*.

TODTENVOGEL, in *Ornithology*, a name by which Geſner and ſome other authors have called that ſpecies of œnanthe, known in England by the name of the STONE-*chatter*, *ſtone-ſmich*, or *moor-titling*.

TODY, *Todus*, in *Ornithology*, a genus of the *picæ*; the characters of which are, that the bill is awl-ſhaped, depreſſed, obtuſe, ſtraight, and beſet with briſtles; and the feet are formed for walking. Linnæus enumerates two ſpecies, the green with a red breaſt, found in America; and the aſh-coloured with the under part of the body yellow, found in Surinam.

TOES, by *Anatomiſts* called *digiti pedis*, are the extreme diviſions of the feet; anſwering to the fingers of the hand, and reſembling them in figure, and make the third part of the FOOT.

TOES, *adheſions of the*. It is a frequent thing to meet with new-born infants with their fingers or *toes* cohering or growing together, either by a ſtrict adheſion of the fleſh, or elſe by ſome looſe productions of the ſkin, as in the feet of ducks and geeſe; and a diſorder of the ſame kind is alſo ſometimes found in adults, from accidents; as when the fingers or *toes* have been neglected, after an excoriation of them by burns or wounds. In both theſe caſes the ſurgeon's aſſiſtance is neceſſary, partly to remove the deformity, and partly to reſtore the proper uſe of the fingers.

Theſe adheſions, according to the nature of the diſorder, are to be ſeparated by cutting out the intermediate ſkin, or elſe barely by dividing them from each other with a pair of ſciſſars. When this is done, to prevent their coheſions again, each finger muſt be inveſted ſeparately with a ſpiral bandage about an inch broad, dipped in lime-water and ſpirit of wine.

Sometimes the fingers, inſtead of adhering to each other, grow to the palm of the hand, from wounds or burns, ſo that they cannot be by any means extended, or drawn back to open the hand. The method of relieving this diſorder is firſt very carefully to ſeparate the fingers from the adheſions of the palm, without injuring their tendons, then dreſs them with a vulnerary balſam, and ſcraped lint, and extend them on a ferula or thick paſteboard; and let them remain in this extended poſture, ſeparately to be dreſſed till they are perfectly healed; but at every dreſſing they muſt be gently moved, to prevent a rigidity or ſtiffneſs of the joints. Heiſter.

TOES, *bones of the*. Each of the *toes*, except the greater one, conſiſts of three phalanges. The great *toe* indeed has but two, whereas the thumb has three; but then there are five metatarſal bones, whereas there are but four metacarpal. The baſes of the phalanges remain for a long time epiphyſes. The firſt phalanx of the great *toe* is very like the ſecond of the thumb; but its baſis is more hollow, anſwerable to the convexity of the firſt bone of the metatarſus, by which it is ſupported; its head is in form of a pulley, as in the thumb, but much broader: the ſecond, or laſt phalanx of the great *toe*, is like the third of the thumb, but bigger and broader, eſpecially at its baſis. The tuberoſity, in form of a horſe-ſhoe, which terminates this bone, is alſo more unequal and more flat than in the thumb.

The firſt phalanges of the other *toes* are the longeſt, but they are ſhorter and more convex than thoſe of the fingers. Their bodies are very narrow, and contracted in the middle; the baſes are generally excavated, and the heads made after the ſame manner as in the fingers.— Their articulation with thoſe of the metatarſus is orbicular, and allows motion in different directions. The ſecond phalanges are very ſhort, and almoſt without ſhape; both their baſes and heads are formed for articulations by ginglymi, but they are very imperfect. The bodies are of ſome length in the ſecond and third *toes*; but they are very ſhort in the other two, eſpecially in the little *toe*, in which the body is broader than it is long. The third phalanges are nearly of the ſame figure with thoſe of the fingers, but much ſhorter and thicker in proportion. In the two laſt *toes* they are often united with the ſecond phalanges, which is owing, perhaps, to the continual action and compreſſion occaſioned by ſhoes. The articulation of the ſeſamoide bone is by a kind of ginglymus. See SESAMOIDEA *oſſa*.

Toes, *cartilages of the*. See *Cartilages of the* FOOT.

Toes, *fractures and luxations of the*. See *Fractures of the* FOOT. See alſo FINGERS.

Toes, *ligaments of the*. The firſt phalanges of the *toes* are tied to the heads of the metatarſal bones, by a ſort of orbicular ligament, ſet round the edges of the cartilaginous portions of the head, and thoſe of the baſes of the phalanges. In the four leſſer *toes* of each foot, the inferior part of this ligament is very thick, and is cruſted over as it were, with a cartilaginous ſubſtance, fixed to the baſes of the phalanges, and from thence continued over the head of the metatarſal bone next it. This ſubſtance grows hard with age like a ſeſamoide bone.

Of theſe ſeſamoide bones, as they are called, the great *toe* has two belonging to the firſt phalanx, which are largeſt, ſooneſt formed, and moſt conſiderable of all.— The ſecond and third phalanges of all the *toes* being articulated by ginglymi, have lateral ligaments which go between the ſides of the baſes, and thence to the ſides of the heads: at the inferior edges of all theſe baſes there is a cartilaginous matter joined to theſe ligaments, which hardens with age in the ſame manner with thoſe of the firſt phalanges. Winſlow.

Toe, in the *Manege*, is the ſtay of the hoof upon the fore-part of the foot comprehended between the quarters.

We commonly ſay the *toe* before, and the heel behind, in French *pince devant et talon derriere*; implying, that in horſes the *toe* of the fore-feet is ſtronger than the *toe* of the hind-feet: and, on the other hand, that the heels behind are ſtronger than thoſe before; and accordingly, in ſhoeing we drive higheſt in the *toes* of the fore-feet and in the heels of the hinder-feet.

A horſe that does not reſt his hinder-feet all equally upon the ſhoe, but raiſes his heels, and goes upon the *toes* of his hind-feet, is called in French RAMPIN.

Toe-*ſhell*, in *Conchylology*, ſee POLLICIPES.

TOFT, TOFTUM or TOFTA, in our *Law-books*, a parcel of land, or a place where a meſſuage hath ſtood, but is decayed, or caſually burnt, and not re-edified.

Toft, alſo ſignifies a grove of trees.

TOGA, in *Antiquity*, a wide woollen gown, or mantle, without ſleeves, uſed among the Romans, both by men and women.

In proceſs of time, none wore the *toga* but lewd women: whence that of Horace, *in matrona, ancilla, pecceſve togata*. Lib. i. ſat. ii. ver. 63.

The *toga* was of divers colours, and admitted of various ornaments: there was that called *toga domeſtica*, worn within-doors; *toga forenſis*, worn abroad; *toga militaris*, uſed by ſoldiers, tucked up after the Gabinian faſhion; and *toga picta* or *triumphalis*, wherein the victorious triumphed: this was embroidered with palms: that without any ornaments was called *toga pura*.

The *toga picta*, &c. was an ancient habit of the Etruſcans, and not brought to Rome till after Tarquinus Priſcus had ſubdued the twelve ſtates of that nation.

The *toga* was ſometimes worn open, and called *aperta*; ſometimes girt or tucked up, called *præcincta*; and this cincture or girding, again, according to Sigonius, was of three kinds; *laxior*, or the looſe kind, where the tail trailed on the ground; *adſtrictior*, the cloſe kind, wherein it did not reach ſo low as the feet; and *Gabinia*, where one of the ſkirts or lappets was girt round the body.

Sigonius diſtinguiſhes the ſeveral *togæ*, or Roman gowns, into *pura, candida, pulla, picta, prætexta, trabea*, and *paludamentum*. See PRÆTEXTA, PALUDAMENTUM, &c.

The *toga pura* was alſo called *virilis*. Kennet's Rom. Ant. part ii. c. 8.

Toga, is ſometimes uſed metaphorically for peace. See TROPE.

Togæ, *jus*, or privilege of the *toga*, was the ſame with the privilege of a Roman citizen, i.e. the right of wearing a Roman habit, and of taking, as they explain it, fire and water through the Roman empire.

TOGETHER, in *Sea-language*, the order given to the men in the exerciſes of heaving, rowing, twiſting, &c. to act all in concert, or at the ſame inſtant.

TOGGEL, in a *ſhip*, a ſmall wooden pin, about five or ſix inches long, and uſually tapering from the middle toward the extremities. It is uſed to fix tranſverſely in the lower part of a tackle, in which it ſerves as a hook whereby to attach the tackle to a ſtrop, ſlings or any body in which the effort of the tackle is to be employed. There are alſo *toggels* of another kind, employed to faſten the top-gallant ſheets to the ſpan, which is knotted round the cap at the top-maſt-head. Falconer. See BECKETS.

TOGULA, among the *Romans*, a narrow kind of TOGA, uſed by the poorer ſort of people.

TOILES, ſnares, or nets, ſet by hunters for catching of wild beaſts; as deer, &c.

TOILET, a fine covering, of linen, ſilk, or tapeſtry, ſpread over the table in a bed-chamber, or dreſſing-room, to undreſs and dreſs upon.

The dreſſing-boxes, wherein are kept the paints, pomatums, eſſences, patches, &c. the pin-cuſhion, powder-box, bruſhes, &c. are eſteemed parts of the equipage of a lady's *toilet*.

That of the men conſiſts of comb-caſe, bruſhes, &c.— To make a viſit to one at his *toilet*, is to come to entertain him while he is dreſſing or undreſſing.

Sattin, lace, velvet, brocade, point de France, &c. are now ordinarily uſed for *toilets*: anciently they were made much plainer: whence the name, which is formed from the French, *toillette*, a diminutive of *toile*, any thin ſtuff.

TOISE, a French meaſure, containing ſix of their feet, or a fathom. It is, however, of different length in different places.

TOISON *d'Or*, a term in *Heraldry* for a GOLDEN-*fleece*, which is ſometimes borne in a coat of arms.

TOKAY-*wine*, derives its name from the town or village of Hungary, where it is produced. The vine-yards extend beyond the forty-eighth degree of northern latitude; the ſoil where the vines grow is a yellow clayiſh earth, extremely deep and interſperſed with large looſe lime-ſtones: the expoſures moſt inclining to the ſouth, the ſteepeſt declivities and the higheſt parts of theſe, produce the beſt wine. This wine, ſo far from its being found in ſo ſmall a quantity as never to be genuine, unleſs when given in preſents by the court of Vienna, is a common deſert wine in all the great families at Vienna and in Hungary, and is very generally drank in Poland and Ruſſia: nor is the *Tokay* wine altogether the property of the crown, but many of the German and Hungarian nobility, as well as gentlemen, and even peaſants, have vine-yards at *Tokay*. The grapes are all white, and the vintage commonly begins about the twenty eighth of October, ſometimes as late as the eleventh of November. There are four ſorts of wine made from the ſame grapes, diſtinguiſhed at *Tokay* by the names of eſſence, auſpruch, maſslach, and the common wine.— The eſſence is made by picking out the half-dried and ſhrivelled grapes, and putting them into a perforated veſſel, where they remain as long as any juice runs off by the mere preſſure of their own weight. This is put into ſmall caſks. The auſpruch is made by pouring the expreſſed juice of the grapes from which the former had been picked on thoſe that yielded the eſſence, and treading them with the feet. The liquor thus obtained ſtands for a day or two to ferment, and then is poured into ſmall caſks, which are kept in the air for about a month, and afterwards put into caſks. The ſame proceſs is again repeated by the addition of more juice to the grapes which have already undergone the two former preſſures, and they are now wrung with the hands; and thus is had the maſslach. The fourth kind is made by taking all the grapes together at firſt, and ſubmitting them to the greateſt preſſure: this is chiefly prepared by the peaſants. The eſſence is thick, and very ſweet and luſcious: it is chiefly uſed to mix with the other kinds. The auſpruch is the wine commonly exported, and which is known in foreign countries by the name of *Tokay*.— The goodneſs of it is determined by the following rules. The colour ſhould neither be reddiſh nor very pale, but a light ſilver: in trying it, the palate and tip of the tongue ſhould be wetted without ſwallowing it, and if it manifeſt any acrimony to the tongue, it is not good; but the taſte ought to be ſoft and mild: when poured out, it ſhould form globules in the glaſs, and have an oily appearance: when genuine, the ſtrongeſt is always of the beſt quality: when ſwallowed, it ſhould have an earthy aſtringent taſte in the mouth, which is called the taſte of the root. All *Tokay* wine has an aromatic taſte, which diſtinguiſhes it from every other ſpecies of wine. It keeps to any age, and improves by time: but is never good till about three years old. It is the beſt way to tranſport it in caſks; for when it is on the ſeas, it ferments three times every ſeaſon, and thus refines itſelf. When in bottles, there muſt be an empty ſpace left between the wine and the cork, otherwiſe it would burſt the bottle. A little oil is put upon the ſurface, and a piece of bladder tied over the cork. The bottles are always laid on their ſides in ſand. Phil. Tranſ. vol. lxiii. part ii. p. 292, &c.

TOKENS, in *Peſtilential Caſes*, thoſe livid ſpots which appear in the ſeveral ſtages of the diſeaſe, and are certain fore-runners of death. They generally appear only under the moſt deſperate circumſtances, and when the patient would otherwiſe be declared dying; but Hodges gives us inſtances where they appeared before any other ſymptoms of the diſeaſe, and came out without any pain or trouble; yet even in theſe caſes the perſon always died. Theſe *tokens* are the mark by which the ſearchers conclude of the cauſe of the death of the perſon, and are the rule for ordering the houſe to be ſhut up, to prevent the ſpreading of the diſeaſe. But the nurſes, and other crafty people, have a way of diſguiſing the ſymptom after death, by covering the body with wet and cold ſheets Theſe ſtrike in the ſpots, ſo that the perſon may be thought to have died by ſome other diſeaſe.

Falſe TOKENS, in *Law*. See FALSE.

TOL, in *Law*, a term ſignifying to defeat, or take away. From the Latin, *tollere*, which ſignifies the ſame.

Thus, to *tol the entry*, is to take away the right of entry.

TOL-BOOTH, or TOLL-BOOTH, a place in a city, where goods are weighed, to aſcertain the duties or import thereon.

TOLCESTER, *tolceſtrum*, in our *Old Writers*, an old exciſe, or duty paid by the tenants of ſome manors to the lords, for liberty to brew and ſell ale.

TOLERATION, in *Religion*, a term which has made a great figure in the diſputes among proteſtants, who have been exceedingly divided about the meaſures of *toleration*, or the degrees to which heretics and ſchiſmatics are, or are not, to be ſuffered.

Many of the church of England have zealouſly oppoſed the *toleration* of preſbytery, &c. nor has the church of Scotland been behind-hand with them in their zeal againſt epiſcopacy.

But all who have reaſoned conſiſtently from the principles of the Reformation, have been for *toleration*; as well perceiving they had no right to oblige any body to follow their particular ſentiments; but the difficulty is, the ſetting of bounds to this *toleration*.

M. Baſnage, and ſome others, diſtinguiſh *civil toleration* from *eccleſiaſtical*. The latter allows of different, and even oppoſite ſentiments in the church; and the firſt permits them in civil ſociety.

By *civil toleration*, is meant impunity and ſafety in the ſtate for every ſect which does not maintain any doctrine inconſiſtent with the peace and welfare of the ſtate. This civil, or political *toleration*, implies a right of enjoying the benefit of the laws, and of all the privileges of the ſociety, without any regard to difference of religion.

Eccleſiaſtical toleration is an allowance of certain opinions, which, not being fundamentals, do not hinder thoſe who profeſs them from being eſteemed members of the church. But as to the quality and number of theſe fundamental points, they never could, nor in all probability ever will be agreed upon.

In order to diſcover the genuine principles of *toleration*, it is neceſſary to conſider that, antecedently to the formation of civil ſocieties, mankind poſſeſs certain rights, independent of all human grant, not derived from any compact, and which are therefore to be acknowledged as the rights of human nature. A right to judge for themſelves in points of religion is one of theſe rights; which, whilſt it authorizes every individual to claim the exerciſe of this privilege to himſelf, obliges him to allow it in the ſame extent to all about him, and eſtabliſhes one uniform regulation for his behaviour toward others, and their behaviour toward him: e. g. no apprehenſions of the truth and certainty of any perſon's religious ſentiments can juſtify him in attempting to impoſe them on his neighbour; for the ſame right of judgment, which any *one* can claim, belongs, on the ſame principle, equally to *all*, and ought to be equally ſacred and inviolable in all; and no reaſon can be alledged by him for taking the religious liberty of others from them, but what will, at the ſame time, equally deſtroy his own title to it.

The injuſtice of ſimilar encroachments upon *him* from *others* follows from the ſame principle, and with the ſame evidence.

Whether the claim of ſuch a liberty of judgment in religion for ourſelves is weakened by men's entering into civil ſociety, is the next object of conſideration.

The great end of government is to protect the ſubjects of it from the injuries to which they were expoſed in a ſtate of nature; and as all injuries imply rights of which they are violations, and the care taken to guard againſt the violation of theſe rights is an acknowledgment of the reality and importance of them; it evidently follows, that when they enter into ſociety, if the primary and leading view of government be to prevent or reſtrain thoſe injuries, to which men were expoſed for want of its protection, they carry theſe rights with them; that they continue to retain them; and that, inſtead of ſuppoſing themſelves to be deprived of them, the very deſign with which they put themſelves under the authority of government is to ſecure them the more firmly. With this view they entruſt the preſervation of them to common guardians, by whoſe intervention, it is preſumed, they will be more vigorouſly aſſerted and more effectually protected, than it is poſſible they ſhould be in a ſtate where there is no common umpire to check the evils of oppreſſion on the one hand, and reſtrain the no leſs formidable evils of immoderate reſentment on the other.

If we conſider what are the rights which men give up to government, when they enter into civil ſocieties, they will be found to be, not thoſe which may moſt properly be ſtyled the primary rights of human nature; not the right which every man has to live undiſturbed, to enjoy the advantages which he juſtly poſſeſſes, and to be left to his freedom in all things not injurious to his fellow-creatures; but the conſequential, though equally real and certain right which, where men are not ſubject to government, every perſon has to take the aſſertion of all his rights into his own hands, and correct the infringers of them by the inflicting of ſuch pains, or the uſe of ſuch other methods of deterring the authors of the wrong, as reaſon ſhall warrant for his future ſecurity: and, ſpeaking preciſely, even theſe rights are not abſolutely extinguiſhed and utterly loſt, but ſuſpended by ſuch limitations as the order and well-being of ſociety require, and ſo long as the ſuccours of government ſhall be effectual. The primary rights of liberty, ſafety, and protection from oppreſſion, ſtill ſubſiſt in their full vigour. To ſuppoſe them abandoned, renounced, and annihilated, or that government can have any right to deſtroy them, is aſcribing to it a right to defeat the end for which it is eſtabliſhed, and betray the truſt repoſed in it. It is, indeed, totally inverting the principle upon which the power of rulers ſtands, and by which the acts of it ought to be guided.

Man was not made for government, but government for man; and the great object, to which all the operations of it ſhould be directed, is to guard, as much as poſſible, the equal, impartial eaſe and freedom of all the ſubjects of it. To this purpoſe judge Blackſtone obſerves, that the principal aim of ſociety is to protect individuals in the enjoyment of thoſe abſolute rights, which were veſted in them by the immutable law of nature, but which could not be preſerved in peace without that mutual aſſiſtance and intercourſe, which are gained by the inſtitution of friendly and civil communities: ſo that the primary end of human laws is to maintain and regulate theſe abſolute rights of individuals. See GOVERNMENT and *Civil* LIBERTY.

Now, of all the rights inherent in human nature, that of thinking for ourſelves, and following the conviction of our own judgments in relation to the object of our faith, worſhip, and religious obedience, is the moſt ſacred, inconteſtible, and in every view of it, intitled to the moſt careful protection. The preſervation of theſe is one of the chief, perhaps the firſt end for which civil ſocieties are inſtituted, and the rulers of them inveſted with power: and therefore, in all governments, the rights of conſcience ſhould have a principal place aſſigned them in the care of thoſe, to whom the protection of their fellow-creatures is committed. If the ſecuring of equal, impartial liberty, in all thoſe inſtances of it in which it is not injurious to others, be ſo much the object of every equitable, wiſe, and well-conſtituted ſyſtem of laws, that all needleſs encroachments upon it are deviations from the ſpirit, which ought to be diffuſed through all laws, and impair the benefit which they ought to confirm,

firm, can it be ſuppoſed that the rights of conſcience ought not to be guarded from violation? Rights of this kind are the laſt which men can ever be imagined to give up to be modelled at the pleaſure of others; nor (as it is argued) is there any one principle connected with their ſubmiſſion to governors in other reſpects, that can require or juſtify ſuch a ſurrender. Does it follow that, becauſe the magiſtrate is entruſted with authority to decide diſputes between us and our fellow-citizens concerning property, he is to determine points which lie only between God and our own conſciences? Becauſe it is allowed to be his office to guard the peace of his ſubjects, and to inflict puniſhments for this purpoſe on thoſe who unjuſtly diſturb it; is it to be taken for granted, that he is to dictate to them what rule of faith they ſhall adopt, and in what manner they are to worſhip the Deity; when it is allowed on all hands, that of theſe things the will of God is the only rule, and that no worſhip can be acceptable to him, but what is accompanied with the ſincere conviction of him who offers it? Beſides, it is argued, that ſuch is the nature of this right, and it ſo ſtands upon a foundation peculiar to itſelf, and is diſtinguiſhed from every other right, that it *cannot* be given up. Property may be reſigned, transferred, or ſubmitted to the regulation of others; a man may relinquiſh his eaſe and ſubject himſelf to inconveniences, and be not only innocent but laudable; nay, he may ſacrifice life itſelf, and merit the higheſt applauſe; but his conſcience he cannot reſign.

To prove all things, and hold faſt that which is good, is not only a privilege but a duty; an obligation laid upon him by the very nature of religion and virtue, and from which he cannot diſcharge himſelf without departing from the principles of both. It muſt always remain entire to him; nor, while the principles of the moſt reaſonable liberty are allowed to ſubſiſt in their due extent, can any attempt be conſiſtently made to take it from him.

From theſe principles it has been inferred, that *toleration*, ſo far from being a matter of mere grace or favour, which government has a right to withhold, grant, abridge, or reſume at pleaſure, is the acknowledgment and confirmation of a right: not one of thoſe adventitious rights, which are ſubſequent to the eſtabliſhment of civil ſocieties, and ariſe out of the peculiar forms and conſtitution of it; but of thoſe higher rights which belong to men as ſuch, and which ought to be preſerved under all ſtates and governments whatever, as effectually, univerſally, and impartially as any other right. With regard to the extent of *toleration*, it is urged, that if liberty of conſcience be a right eſſential to human nature, all penalties in caſes merely of a religious nature muſt be an infringement of a right, and a degree of oppreſſion, though inflicted by a law. Farther, the inquiry concerning the perſons entitled to *toleration* does not depend on the ſuppoſed truth or error of the ſentiments which men may adopt, but upon the common right, which all men have, to be led in theſe points by the light of their own minds, and to enjoy all the ſecurities and benefits of ſociety, while they fulfil the obligations of it. All who can give good ſecurity to the government under which they live, and to the community to which they belong, for the performance of the duties of good ſubjects and good citizens, have an undoubted claim to it, and cannot with any juſt reaſon be deprived of it. It is not error, but injury to the ſtate, or the individuals who are under the care of it, which juſtifies the animadverſion of the magiſtrate; and all to whom this cannot be juſtly imputed, are the objects of his protection. See on this ſubject Fownes's Enquiry into the Principles of *Toleration*, &c. 8vo. 1772. Locke's Letters concerning *Toleration*, in his Works, vol. ii. p. 231, &c. Hoadley's Rights of Subjects, paſſim.

To the account above given of the general principles of *toleration*, it will be proper to add a few words concerning the ſtate of *toleration* in our own country. With regard to the proteſtant diſſenters in general, ſee Dissenters, Non-conformists, and Quakers. See alſo Conventicle, Corporation-act, Sheriff, and Test.

As for diſſenting teachers, or miniſters in particular, they were prohibited by 17 Car. II. cap. 2. from coming within five miles of a city, town-corporate, or borough, unleſs only in paſſing upon the road, or unleſs required by legal proceſs, without taking an oath of allegiance therein mentioned, on pain of 40*l.* and of commitment by two juſtices, on oath of the offence, for ſix months. And by 22 Car. II. cap. 1. preaching in any meeting or conventicle, in other manner than according to the practice of the church of England, incurred a forfeiture of 20*l.* for the firſt offence, and for every other offence 40*l.* Moreover, by 13 & 14 Car. II. cap. 4. no perſon ſhall preſume to conſecrate and adminiſter the ſacrament before he be ordained prieſt, according to the form of the church of England, on pain of 100*l.* But now by 1 W. cap. 18. commonly called the act of *toleration*, which, by 19 Geo. III. cap. 44. is declared to be a public act, they are exempted from the penalties of thoſe ſtatutes, upon taking the oaths of allegiance and ſupremacy, and ſubſcribing the declaration againſt popery; and alſo, by 1 W. cap. 18. ſubſcribing the articles of religion mentioned in the ſtat. 13 Eliz. cap. 12 (which only concern the confeſſion of the Chriſtian faith and the doctrine of the ſacraments) with an expreſs exception of thoſe relating to the government and powers of the church, and to infant baptiſm; or if they ſcruple ſubſcribing the articles, upon making and ſubſcribing the declaration preſcribed by ſtat. 19 Geo. III. cap. 44. profeſſing themſelves to be Chriſtians and Proteſtants, and that they believe the Scriptures of the Old and New Teſtament, as commonly received among Proteſtant churches, to contain the revealed will of God, and that they receive the ſame as the rule of their doctrine and practice; for the regiſter of which they ſhall pay 6*d.* to the officer of the court and no more, and 6*d.* for a certificate thereof ſigned by ſuch officer.

Any preacher or teacher, duly qualified, ſhall be allowed to officiate in any congregation, although the ſame be not in the county where he was ſo qualified, provided that the place of meeting hath been duly certified and regiſtered, and ſuch teacher or preacher ſhall, if required, produce a certificate of his having ſo qualified himſelf, and before any juſtice of ſuch county where he officiates, make and ſubſcribe ſuch declaration, and take ſuch oaths as aforeſaid, if required. 10 Ann. cap. 2. And every ſuch teacher, having taken the oaths, and ſubſcribed as above, ſhall from thenceforth be exempted from ſerving in the militia, or on any jury, or from being appointed to bear the office of churchwarden, overſeer of the poor, or any other parochial or ward office, or other office in any hundred, city, town, pariſh, diviſion, or wapentake. For the ſtate of diſſenting ſchool-maſters, ſee School-*maſter*.

For the laws relating to papiſts, ſee Papists. See alſo Trinity.

In conſequence of the *toleration*-act, non-conformity is no longer a crime in the eye of the law, and the penalties to which it was obnoxious, are not only ſuſpended, but abſolutely annulled with regard to thoſe diſſenters who are qualified as the act directs. See Furneaux's Letters to Judge Blackſtone, letter i.

TOLL, Telonium, a Saxon term, though derived originally from the Latin *tollere*, to *take away*, or rather the Greek τηλος, *tribute*, *tax*. It has two acceptations, denoting, 1. A liberty to buy and ſell within the bounds of a manor: and, 2.

Toll is alſo uſed for a tax or cuſtom paid for paſſage, or for vending goods in a market, fair, or the like.

Some records make mention of *toll thoro*, or *thorough toll*, which is money paid for paſſage in or through ſome highways, or over ferries, bridges, &c. *Toll travers*, for paſſing or driving cattle over a private man's ground. And *toll-turn*, or *turn-toll*, which is paid at the return of beaſts from fairs and markets, though they are not ſold.

By the ancient laws, the buyers of corn and cattle in fairs or markets were made to pay *toll* to the lord of the market, in teſtimony of the contract there lawfully made in open market, becauſe privy contracts were held unlawful.

Some interpret *toll* a liberty, as well to take, as to be free from *toll*; for that they who are infeoffed with *toll* are cuſtom-free.

Of this freedom from *toll* the city of Coventry boaſts an ancient charter, granted them by Leofrick, or Luriche, earl of the Mercians, in Edward the Confeſſor's time, who, at the importunity of Godeva, his lady, granted this freedom to the city.

TOLLENON, among the *Romans*, a warlike machine, formed in this manner: one beam was fixed very deep in the earth, and on the top of it another more than half as long, and moveable upon a centre. On one end of this croſs-beam was placed a covering of hurdles or planks, within which a few ſoldiers were put, and, by pulling down the other end with ropes, theſe were raiſed above the walls of a beſieged town.

Tollenon, was alſo an engine for raiſing water out of a draw-well.

TOLLES, or **Tolæ**, names given by ſome to the tonſils, and by others to the glandular abſceſſes ſometimes affecting the limbs.

TOLLING *a Bell*. See Ring.

TOLSEY, in *our Old Writers*, denotes the places where merchants meet in a city or town of trade.

The word is compounded of the Saxon *tol*, *tributum*, and *ſee*, *ſedes*.

TOLT, in *Law*, a writ whereby a cauſe depending in a court-baron is removed into the county-court. Old Nat. Br. 4. See PONE.

TOLTERCAIZTLI, in *Natural Hiſtory*, the American name of a ſtone, much reſembling the novacularum lapis, but variegated with red and black ſpots. They uſe the powder of this ſtone, and cryſtal calcined together, for diſeaſes of the eyes.

TOLU *Balſam*. See BALSAM.

TOLU-*tree*, *balſam of*, *tolviſera*, a genus of the *decandria monogynia* claſs; its characters are theſe: the flower has a bell-ſhaped empalement of one leaf, which is ſlightly indented in five parts at the brim; it has five petals inſerted in the receptacle of the flower, four of which are narrow and equal, being a little longer than the empalement; the fifth is much larger, and almoſt heart-ſhaped, having a tail the length of the empalement; it has ten ſhort ſtamina, terminated by oblong erect ſummits, and a roundiſh germen ſupporting a very ſhort ſtyle, crowned by an acute ſtigma; the germen turns to a roundiſh fruit with four cells, each containing one oval ſeed. We know but one ſpecies of this tree, which grows naturally near Carthagena in America.

This tree may be propagated by ſeeds, and will ſucceed by the ſame treatment required for the coffee-tree.

TOMAN, or TOUMAN, a kind of imaginary money uſed among the Perſians in the keeping of their books, and to facilitate the reduction of money in the payment of conſiderable ſums.

The *toman* conſiſts of fifty abaſſis, or a hundred mamoudis, or two hundred ſhahees, or ten thouſand dinars; which amount to about three pounds ſix ſhillings and eight pence ſterling.

D'Herbelot derives the word from the language of the Moguls, where it ſignifies the number of ten thouſand. Eben Arabſchah ſays, that the word *touman*, when uſed to expreſs a weight, or money, contains ten thouſand ſilver Arab drachmas, called *mehtkal*; which are a third lighter than the Attic.

The Moguls, &c. frequently uſe *toman* for ten thouſand men; and ſay, e. gr. that the city Samarcand contains ſeven *tomans* of people fit to bear arms; and that of Andechan nine *tomans*.

TOMATO, the Portugueſe name for the fruit of the LYCOPERSICON, or *love-apple*; a fruit cultivated in gardens for the ſingularity of its appearance, and eaten either ſtewed or raw by the Spaniards and Italians, and by the Jew families in England.

TOMB, includes both the grave or SEPULCHRE, wherein a defunct is interred, and a MONUMENT erected to preſerve his memory.

The word is formed from the Greek, *τυμϐος*, *tumulus*, ſepulchre; or, according to Menage, from the Latin, *tumba*, which ſignifies the ſame.

Among the Romans, none but the emperors, veſtals, and perſons ſignalized by great actions, were allowed to have *tombs* in the cities, the reſt were all in the country, near the high roads; whence thoſe common words, *Siſte, & abi, viator*, which are ſtill retained in the inſcriptions of our monuments, though ſet up in churches, &c.

At Anchiale was anciently ſeen the *tomb* of Sardanapalus, with this inſcription in verſe: "Sardanapalus built "Anchiale and Tarſus in one day: go paſſenger, eat, "drink, and be merry; the reſt is nothing." Vide Strab. Geog. lib. 14.

The Romans had a kind of empty *tomb*, called *cenotaphium*, an *honorary tomb*, wherein the body of the deceaſed was not laid. See CENOTAPH.

The occaſion hereof was a ſuperſtitious notion, that the ſouls of thoſe who had not funeral honours, wandered a hundred years by the banks of the rivers of hell, before they were admitted to paſs over. The *κενολαφιον* being made, the ſame ceremonies were practiſed as at real funerals.

The cenotaphia were inſcribed with the words *ob honorem*, or *memoriæ ſacrum*, whereas other *tombs*, wherein the aſhes were really depoſited, were inſcribed D. M. S. q. d. *ſacred to the manes*. When the words *tacito omine* were added, it declared the aſhes encloſed therein belonged to a perſon infamous for ſome crime.

TOMB-*ſtones*, *characters on*. See CHARACTER.

TOMB-*ſtones*, *epitaphs on*. See EPITAPH.

TOMBAC, a name given by the French to a yellow metal, very nearly approaching to what we call *prince's*-METAL, and made by mixing and fuſing together a large quantity of zinc with a ſmaller of copper. See GOLD-*coloured metal*.

TOME, τομος, a bound book, or writing that makes a VOLUME.

TOMEION, formed from τομη, *ſection*; a general name uſed to expreſs any ſharp or cutting inſtrument, uſed either in ſurgery or in the mechanic arts.

TOMENTOSE-*leaf*, among *Botaniſts*. See LEAF.

TOMENTUM, properly ſignifies flocks, or locks of wool; but by botaniſts is uſed for that ſoft downy matter which grows on the leaves of ſome plants, hence denominated *tomentoſe*; as *verbaſcum tomentoſum*, *carduus tomentoſus*, &c.

Mr. Winſlow obſerved a kind of *tomentum* in the ſecretory veſſels of the glands; and from this accounts for the ſecretion of the various fluids from the blood. See GLAND and SECRETION.

TOMEX, in *Botany*, a genus of the *tetrandria monogynia* claſs: its characters are, that the calyx is ſingle-leafed and cylindric, the ſtamina are long, the ſtigma emarginated, and the fruit a berry. There is one ſpecies.

TOMIAS, τομιας, in *Antiquity*, an appellation given to the ſacrifice offered at the ratification of ſolemn leagues. It was ſo called becauſe they cut out the teſticles of the victim, and took the oath ſtanding upon them.

TOMIN, in our *Old Writers*, a weight of twelve grains, uſed by goldſmiths and jewellers.

TOMINEIO, in *Ornithology*, a name by which ſome authors have called the guainumbi, or HUMMING-*bird*, the ſmalleſt of all birds.

The name ſeems derived from the Spaniſh *tomino*, a grain weight, as if they would call it a bird of a grain weight.

TOMOTOCIA, a word uſed by ſome authors to expreſs the Cæſarian ſection.

TOMOU, in *Modern Hiſtory*, the name of a head-dreſs which the women wear at Otaheite, conſiſting of human hair plaited in threads, ſcarcely thicker than ſewing ſilk, ſome of which are above a mile in length, without a knot. Hawkeſworth's Voy. vol. ii. p. 193.

TON. See TUN.

TOMKIN *and* TOMPION. See TAMPION.

TONDIN, or TANDINO, in *Architecture*. See TORE.

TONE, or TUNE, in *Muſic*, a property of ſound, whereby it comes under the relation of *grave* and *acute*; or, the degree of elevation any ſound has, from the degree of ſwiftneſs of the vibrations of the parts of the ſonorous body.

For the cauſe, meaſure, degree, difference, &c. of *tones*, ſee TUNE.

The variety of *tones* in human voices ariſes partly from the dimenſions of the wind-pipe, which, like a flute, the longer and narrower it is, the ſharper the *tone* it gives; but principally from the head of the larnyx, or knot of the throat; the *tone* of the voice being more or leſs grave, as the rima, or cleſt thereof, is more or leſs open.

The word *tone* is taken in four different ſenſes among the ancients: 1. For any ſound 2. For a certain interval, as when it is ſaid the difference between the diapente and diateſſaron is a *tone*. 3. For a certain *locus* or compaſs of the voice; in which ſenſe they uſed the Dorian, Phrygian, Lydian *tones*. 4. For tenſion, as when they ſpeak of an acute, grave, or a middle *tone*. Wallis's Append. Ptolem. Harm. p. 172.

TONE is more particularly uſed, in *Muſic*, for a certain degree or interval of tune, whereby a ſound may be either raiſed or lowered from one extreme of a concord to the other, ſo as ſtill to produce true melody.

In tempered ſcales of muſic the *tones* are made equal, but in a true and accurate practice of ſinging they are not ſo. Dr. Pepuſch, in Phil. Tranſ. Nº 481. p. 274.

Muſicians, beſide the concords, or harmonical intervals, admit three leſs kinds of intervals, which are the meaſures and component parts of the greater, and are called *degrees*; the nature, origin, uſe, &c. whereof, ſee under the article DEGREES.

Of theſe degrees, two are called *tones*, and the third a *ſemitone*; their ratios in numbers are 8 : 9, called a *greater tone*; 9 : 10, called a *leſſer tone*; and 15 : 16, a *ſemitone*.

The *tones* ariſe out of the ſimple concords, and are equal to their differences; thus the *greater tone* 8 : 9 is the difference of a fifth and a fourth: the *leſs tone* 9 : 10 the difference of a leſs third and fourth, or of a fifth and ſixth greater; and the *ſemitone* 15 : 16, the difference of a greater third and fourth.

Of theſe *tones* and *ſemitones* every concord is compounded, and conſequently every one is reſolvable into a certain number thereof. Thus the leſs third conſiſts of one *greater tone*, and one *ſemitone*. The greater third of one *greater tone*, and one *leſs tone*. The fourth of one *greater tone*, one *leſs tone*, and one *ſemitone*. The fifth of two *greater tones*, one *leſs tone*, and one *ſemitone*.

It is uſual in the modern practice of muſic to divide the *tone*, whether major or minor, into two *ſemitones*. But a late learned muſician contends, that the diviſion of the *tone-major* is harſh and inelegant; ſo that, in dividing the fourth into its different ſpecies, the *tone-major* ought either to be an undivided interval, or make part of one. Phil. Tranſ. ubi ſupra. See SPECIES.

According to Mr. Euler, the *tone* contains two *ſemitones*, taken in a larger ſenſe; that is, including the greater and leſſer limma, under the term *tone*. Thus the *tone-minor* is the ſum of the *ſemitone-major* and leſſer limma; as alſo the ſum of the leſſer *ſemitone*, and greater LIMMA. And the *tone-major* is the ſum of the greater and leſſer *ſemitones*. Laſtly, the greateſt *tone*, *tonus maximus*, is the ſum of two greater *ſemitones*. Euler, Tentam. Nov. Theor. Muſ. p. 109.

But what Mr. Euler calls *tonus maximus*, is more commonly known by muſicians under the name of a diminiſhed third. For thus they call the interval, for inſtance, between G* and B^{b}; it being compoſed of two diatonic intervals G* to A, and A to B^{b}.

TONE-*major*. Six *tone-majors* exceed the octave by more than a comma. Euler, Tent. Nov. Theor. Muſ. p. 308.

For the uſe of *tones*, &c. in the conſtruction of the ſcale of muſic, ſee SCALE.

TONE, in *Rhetoric*, denotes a certain inflection or modulation of the voice, ſometimes called ACCENT, which correſponds to, and expreſſes the ſenſations and emotions of the mind. The ſkill and ſucceſs of a reader or ſpeaker very much depend on the proper management of theſe *tones*. See GESTURE, PRONUNCIATION,, and VOICE.

TONE, *Diazeuctic*. See DIAZEUCTIC.

TONGUE, *Lingua*, in *Anatomy*, an oblong member, whoſe form and ſituation are ſufficiently known, and whoſe uſe is to be the organ of taſte, and the principal inſtrument of ſpeech and deglutition.

It is faſtened to the os hyoides, the larynx, and to the fauces, by means not only of muſcles, but alſo of ligaments, which are for the moſt part membranous; the principal of which is that running along the lower ſide of it, about half way, called the FRÆNUM.

The other ligaments are the ſmall membranous fold, which runs along the middle of the convex ſide of the epiglottis to the baſis of the *tongue*, and the membranous folds, which cover the inferior half arches of the ſeptum palati. The aponeurotic ligaments of the ſtyloglossus may be conſidered as true lateral ligaments of the *tongue*, and they adhere a little to the lower part of the muſculus pterygoidæus internus, or anterior.

The *tongue* is chiefly compoſed of very ſoft fleſhy fibres, intermixed with a particular medullary ſubſtance, and diſpoſed in various ways. Many of theſe fibres are confined to the *tongue*, without going any farther; the reſt form ſeveral muſcles, which go out from it in different ways, and are inſerted in other parts. The upper ſide of the *tongue* is covered with a papillary nervous ſubſtance, over which are ſpread two membranes. The outer of theſe membranes is pretty thick, and full of papillæ, of a pyramidical figure, eſpecially towards the tip, which papillæ ſtand pointing towards the root of the *tongue* in a bending poſture, which makes their figure to be concavo-convex. Theſe apices, or papillæ, are ſo very minute and ſlender in men, that they make the coat appear on the upper part villous, eſpecially as they approach nearer to the root. The figure of the papillæ, in human *tongues*, is not ſo plainly diſcernible to the naked eye as not to need the microſcope. In brutes they are generally larger, ſtiffer, and more conſpicuous; and in ſome almoſt cartilaginous, as may be felt in the *tongues* of cats and oxen, but more ſenſibly in lions. On the upper ſide, at a little diſtance from the tip, this membrane becomes thin, ſmooth, and glabrous, and, as it were, poliſhed by the lower parts of the mouth whereon it ſlides.

Under this lies a thin, ſoft, reticular kind of coat, punched through with innumerable holes, and always lined with a thick and white, or yellowiſh mucus. This membrane is ſo exceedingly tender, and full of mucus, that it is not to be examined by the naked eye, unleſs boiled; by which it grows tough, and eaſily ſeparable from the external membrane, and from the nervous part of the *tongue*, which lies immediately under it. After boiling, it appears like a kind of gauze, between whoſe threads innumerable holes appear, through which the apices of the papillary body underneath it are exerted. This membrane on the upper ſide, next the outward, appears white, with a caſt towards yellow, but is black on the ſide next the *tongue*.

Many authors do not allow this to be a membrane, and will only have it to be a mucus hardened by boiling; but ſince it has ſo much of the reſemblance of a membrane, and that authors agree in allowing two membranes to the *tongue*, Dr. Drake does not ſcruple to number it among them, ſince there does not appear to be any other ſecond membrane; reckoning, with Malpighi, the ſmooth part under the *tongue* a part of the outer membrane; ſome however, have conſidered it as a continuation of a diſtinct membrane, which covers that of a papillary texture.

Immediately under this appears a nervous papillary body ſpreading itſelf to a moderate thickneſs over the whole ſurface of the *tongue*. This body, on the under ſide, is every where level and ſmooth, except in ſome few places, where it is connected to the ſubjacent muſculous part by ſome nervous twigs which it ſends into it. Malpighi diſtinguiſhes the papillæ, which make the principal part hereof, into three kinds, from their different magnitudes and figures when obſerved with the microſcope; of which thoſe ſeated on the ſides and tip are very ſingular, reſembling little round pyramids, with globes on their tips like the horns of ſnails. All theſe papillæ, which are the immediate organs of taſting, ſend their apices, or extremities, through the mucous membrane into the pyramidal papillæ of the outer membrane, which are hollow to receive them, and ſeem to be nothing elſe but a kind of caſes to defend theſe nervous papillæ from injuries, which the ſalts and aſperities of thoſe bodies which we might take into our mouths might do them.

The reſt, and much the greateſt part, of the body of the *tongue* is muſculous, conſiſting of planes of fibres in different directions, which may be termed the intrinſic muſcles of the *tongue*, and are the ſame which Spigelius named muſculi linguales; the firſt, or external plane, conſiſts of ſtraight, or longitudinal fibres, which cover the *tongue* from one extreme to the other, and ſeem to be partly expanſions of the muſculi ſtylo gloſſi, hyogloſſi, and genio-gloſſi. When theſe contract, they ſhorten it. Under this are ſeveral other planes, running from the under to the upper ſide, which ſerve to make it broad and thin. Theſe two kinds of fibres lie *ſtratum ſuper ſtratum*, a plate of the one, and then a plate of the other.

The vertical fibres ſeem to be in part produced by the genio-gloſſi, and the tranſverſe by the mylo-gloſſi.

To diſcover all theſe different fibres, it is neceſſary only to cut the *tongue* longitudinally, after it has been boiled, or long macerated in ſtrong vinegar.

Authors are not agreed about the number of muſcles which compoſe the *tongue*; ſome, confounding thoſe of the os hyoides with thoſe of the *tongue*, reckon eight, others nine, others ten, and more pairs. Some number thoſe proper to the *tongue* only ſix pair, others five, others four, and ſome no more than three. Of this laſt opinion is our accurate Mr. Cowper, who allows no more than three genuine pair of muſcles to the *tongue*; viz. the *genio-gloſſum*, which pulls the *tongue* forwards, and puts it out of the mouth; the *cerato-gloſſum*, which draws it into the mouth, or pulls it on one ſide; and the *ſtylo-gloſſum*, which draws the *tongue* up in the action of deglutition.

Winſlow reckons four pair, viz. MYLO-*gloſſi*, STYLO-*gloſſi*, HYO-*gloſſi*, and GENIO-*gloſſi*.

The *genio-gloſſi* ſerve, by their poſterior ſtraight fibres, which go to the baſis, to draw the *tongue* out of the mouth, and bring it back again by their anterior bent fibres, which go to the point. They can either ſucceſſively, or all at once, make the *tongue* longitudinally hollow, or like a groove; and they can at the ſame time contract it by the lateral expanſion of the middle fibres. For the uſe of the *ſtylo-gloſſi*, ſee STYLO-*gloſſi*.

When all the parts of the *hyo-gloſſi* act together, they ſhorten the *tongue*. They likewiſe turn the point of the *tongue* between the teeth and the under-lip, and make it paſs over that lip. The ſuperior fleſhy plane of the body of the *tongue* bends it upward toward the palate, and makes it paſs along, or lick the upper lip.

The *mylo-gloſſi* ſerve as a frænum to one ſide of the baſis, while the point is turned to the other ſide. The ligamenta ſuſpenſoria of the *ſtylo-gloſſi* may anſwer the ſame purpoſe, and even ſupply the want of the *mylo-gloſſi*.

Beſides theſe muſcles, the *tongue* is alſo moved by a bone ſituated at its root, and making, as it were, its baſis, called *os hyoides*.

Down the middle of the *tongue*, lengthwiſe, runs a ſeam, called *linea mediana*, which divides it to the bottom into two equal parts, but not ſo effectually but that the blood-veſſels of one ſide communicate with thoſe of the other. Theſe veſſels are arteries from nthe carotides and veins called *ranulæ*, and are very coſpicuous about the frænum

num under the *tongue*, ſerving to re-convey the blood to the external jugulars. Theſe veins are frequently opened in the angina, and are the laſt reſort of old women in this caſe. See RANULARES and SUBLINGUAL.

Four nervous ropes are obſerved to go very diſtinctly to the baſis of the *tongue*, and to continue their courſe through its whole ſubſtance to the point. Two of theſe ropes are rami of the inferior maxillary nerves, or of the third branch of the fifth pair from the medulla oblongata; the other two are nerves of the ninth pair. The two firſt are called by Mr. Winſlow linguales, or *hypogloſſi minores*, and the other two linguales, or HYPO*gloſſi majores*. The latter are inferior and internal, the former ſuperior and external, or lateral. The ſmall portion, or firſt branch of the nervus ſympatheticus medius, or of the eighth pair, ſends likewiſe a nerve to each ſide of the *tongue*. The great lingual nerve on each ſide runs forward between the muſculus mylo-hyoidæus and hyo-gloſſus, under the genio-gloſſus, and is diſtributed to the fleſhy fibres all the way to the point of the *tongue*. Afterwards, ſeparating more and more from the trunk, it paſſes under the lateral part of the *tongue*, over the ſublingual gland. It ſupplies the neareſt parts of the *tongue* as it paſſes, and then, entering its ſubſtance, terminates at the point, having ſent a great number of filaments to the papillary membrane. It communicates with the lingualis major, and with the nerve from the eighth pair. This lingual nerve, ſoon after it leaves the maxillaris inferior, is accompanied by a ſmall diſtinct nerve, which runs upward and backward toward the articulation of the lower jaw, paſſes through the tympanum by the name of CHORDA *tympani*, and, afterwards, perforating the poſterior ſide of the tympanum, unites with the portio dura of the auditory nerve. The lingual nerve of the eighth pair, which is its firſt branch, runs firſt on the inſide of the digaſtric muſcle of the lower jaw, and ſupplies the genio-hyoidæi, the neighbouring muſcles of the baſis of the *tongue*, and thoſe of the pharynx. After ſending out ramifications, and forming ſeveral communications, it goes to the lower part of the *tongue*, where it communicates with the lingual ramus of the fifth pair, and with the lingual ramus of the ninth. Winſlow. See NERVES.

However neceſſary an organ the *tongue* be in ſpeech, &c. yet inſtances have occurred, in which perſons, who have loſt their *tongues*, have ſpoken diſtinctly.

We have had in England an inſtance of this kind in one Margaret Cutting. See Philoſ. Tranſ. N° 464. or Abr. vol. ix. p. 126. Idem, vol. xliv. p. 621.

Another occurs in Lamberti's Memoirs, and another in the Memoirs of the Academy of Sciences.

To the inſtances briefly mentioned above, we may add the following account of a man at Montagu, in the Bas Poictou, who being ſeized with the ſmall-pox in his fifth or ſixth year, loſt his whole *tongue* by gangrene, or putrefaction; yet, notwithſtanding, performed in perfection the five actions belonging to the *tongue*, viz. ſpeaking, taſting, ſpitting, chewing, and ſwallowing; nature having, with infinite artifice, given a new conformation to the mouth, proper to ſupply the want of the laſt organ. See Jac. Rolandi Agloſſiomographia, ſive Deſcriptio Oris ſine Lingua quod perfecte loquitur et reliquas ſuas Functiones naturaliter exercet; firſt publiſhed in French at Saumur, in 1630, tranſlated into Latin by Car. Ruygerus, and publiſhed in the Ephem. German. D. an. 3.

For ſpeech, inſtead of the ordinary proviſion, the little fleſhy part of the *tongue* remaining was inflected in the middle towards the palate, the teeth inverted, and long inwards, the muſculi buccinatores eaſily contracting between the dentes molares. In fine, there was a diſpoſition in all the organs to produce ſpeech without a *tongue*; for the breath iſſuing at the oval aperture of the larynx, was farther broken, and rendered vocal by the inflation of the fleſhy body, the motion of the lips, the retraction of the buccinatores, the tremulous agitation of the uvula, and the commotion of the lower jaw. Laſtly, by the inverſion of the teeth, the depreſſion of the palate, the abundance of ſaliva, and the capacity of the mouth, the ſound was ſtill farther modified and determined, ſo as to render it articulate. Habit, too, and the repeated attempts to ſpeak at an age when the parts were eaſily flexible, had contributed greatly to the diſtinctneſs of it.

For taſting, it is evident from this, as well as other conſiderations, that the *tongue* is not the only organ of it, but that the palate is alſo a ſeat of this ſenſe. For chewing, the office of turning the meat in the mouth was here performed by the lips and cheeks, the muſcles whereof repelled towards the maxillares ſuch parts, as in maſtication, might fall from one ſide to the other. For the firſt morſel he took he could only chew on that ſide into which he put it with his hand; the ſecond he put in like manner on the other ſide, and thus varied and ſupplied each alternately. For ſwallowing, the gravity of the food contributed ſomething to this, which he farther promoted by ſtretching out his neck, inclining his head, and drawing back the buccinatores within his teeth; all which were ſeconded by the mouth and fauces being well moiſtened with plenty of ſaliva. In effect, divers animals, as the tortoiſe and the crocodile, ſtork, &c. ſwallow without any *tongue*; and fiſh, though their *tongue* is fixed immovable to their palate. For ſpitting, it was performed by the lips, aided by the internal contraction of the mouth, and the retraction of the buccinatores over the grinders.

Roland's inſtance was ſingular at that time, but a parallel one has been ſince obſerved in a girl at Liſbon, fifteen years old; of which an account was given, in 1718, to the Royal Academy of Sciences, by M. de Juſſieu. Upon inſpecting the mouth of this girl, there appeared nothing in all that part ordinarily poſſeſſed by the *tongue*, but a little eminence in form of a papilla, between three and four lines high, in the middle of her mouth, ſcarce perceivable by the eye. Upon preſſing this with the finger, a kind of motion of contraction and dilatation was perceived in it, which ſhewed, that though the *tongue* was wanting, the muſcles of which it was formed, and which were deſtined to give it motion, were nevertheleſs there. With the help of theſe ſhe ſpoke as diſtinctly and eaſily as if nothing had been wanting: ſhe diſtinguiſhed taſtes like other people. For maſtication, it was chiefly effected by the motion of the lower jaw, which ſhe drew nearer to, or farther from the grinders of the upper, under which the food to be chewed was. In this action ſhe ſometimes alſo made uſe of her fingers, but much more in the action of ſwallowing, in order to protrude the maſticated food towards the orifice of the œſophagus. For drinking, ſhe performed it like other people, excepting the attention ſhe employed to prevent the liquor going down too faſt; in order to which ſhe kept her head a little inclined forwards. Laſtly, the action of ſpitting was ſupplied by the muſcles of the papilla, which filled the lower part of her mouth; theſe riſing almoſt to a level with the teeth of the lower jaw, and the buccinatores approaching towards both jaws, expreſſed the ſaliva, and conducted it to the ſphincter of the lips, from whence the air, driven with violence from the larynx, ſerved as a vehicle to expel it out of the mouth. Mem. de l'Acad. Scienc. ann. 1718, p. 6—16. Juſſieu, loc. cit. p. 7, ſeq.

Dr. Mortimer, from a MS. account of the life of the rev. Mr. Henry Wharton, chaplain to archbiſhop Sancroft, informs us, that he was born with two *tongues*. Phil. Tranſ. vol. xlv. p. 232.

TONGUE-*grafting*. See ENGRAFTING.

TONGUE-*tied*, the popular name for a diſtemperature of the *tongue* in children, when it is tied down too cloſe to the bottom of the mouth, by a ligament connected all along its middle, and called its frænulum, which requires to be divided to give the *tongue* its proper motion.

This is ſometimes the caſe in adults, but oftener in children, who cannot then exert their *tongues* to ſuck. This is, however, by no means ſo common as the women uſually imagine; not ſo much as one child in a thouſand being afflicted with it; nor is the operation in cutting it of little conſequence, ſince often bad accidents follow it, and ſometimes the loſs of a child's life. When the infant can put its *tongue* out of its mouth, the frænulum wants no inciſion; but when the *tongue* cannot be extended beyond the teeth, the operation is neceſſary.

To perform this, the end of the *tongue* ſhould be covered with a linen rag, and held with the fingers to prevent its ſlipping, and the ligament of the *tongue* running between the ranular veins and internal ſalival ducts, is to be divided by a pair of obtuſe pointed ſciſſars, till it gives room enough for ſucking or ſpeaking, but in doing this, great care muſt be taken not to wound the ſalival ducts, or the proper veins and arteries of the *tongue*; for children have been known to periſh upon the ſpot from cutting the ranular veins in this operation. Midwives often tear this ligament with their fingers as ſoon as the child is born; but this is a dangerous and bad practice. Heiſter.

TONGUE *wounded*. The *tongue* is frequently bit in fits of the epilepſy, and in violent falls; and is ſometimes wounded by a bullet.

If the wound is not very large, it will eaſily heal by the application of oil of almonds and ſugar-candy mixt together, or of honey of roſes and oil of myrrh made *per deliquium*; but large wounds of the *tongue* will not unite without the aſſiſtance of the ſuture. It is therefore no wonder that wounds near the root of the *tongue* always leave a fiſſure in the part, ſince their ſituation does not allow the uſe of the needle. To prevent the loſs of ſpeech enſuing upon large wounds on the fore-part of the *tongue*, the divided parts ſhould be brought together with a needle as ſoon and as neatly as poſſible, and afterwards anointed with oil of almonds and ſugar-candy, or honey of roſes and oil of myrrh, ſince ſticking-plaſters cannot take place here. Gun-ſhot wounds on the *tongue* can only be healed with thoſe unctions, ſince the ſuture can be of no uſe in them; the patient ſhould be kept from talking, and live upon ſpoon-meats during the cure, but more particularly at the time when the wound is about to unite. Heiſter.

Tongue *of fiſh*. All fiſh have either a perfect *tongue* or the rudiments of one in their mouth; but this organ is very different in the various ſpecies, in its figure, mobility, and other qualities and properties; as to the figure, it is in ſome pointed before, as in the clupeæ; in others it is rounded in this part, as the perch and clariæ have it; and in others it is ſomewhat bifid, as in the pike. In ſome it is ſmooth on the upper part, as in the gadi, cyprini, and mackerel; in others it is rough and dentated in this part, as in the ſalmon, mullet, &c. In many fiſh, the *tongue* is immoveable, adhering firmly to the bottom of the mouth, as in the perch, cyprinus, and, indeed, in the greater part of fiſh; in others it is looſe, as in the whale.

In the cetaceous fiſh, the *tongue* being looſe, as in quadrupeds, it is uſed by the animal in the ſame manner; but in other fiſhes it is of no uſe in the moving of the food about in the mouth, nor is it the genuine organ of taſte, being in many a cartilaginous ſubſtance, and therefore not proper for receiving the notices of that ſenſe. The principal uſe of the *tongue* in theſe fiſh ſeems to be in its ſerving as an aſſiſtant organ of ſwallowing, its being more elevated than the other parts of the mouth, rendering it fit for the toſſing of the food down the throat. The true uſe of the *tongue* in thoſe fiſh which have it dentated, is that it ſerves to retain the prey from running out of the mouth, and afterwards in the ſwallowing of it; what renders them more fit for this uſe is, that they have always the prickles turning inwards. It is the opinion of Mr. Ray, that the *tongues* of the cartilaginous kinds have ſome ſenſe of taſte, and this is more probable than that the more hard and rigid ones ſhould have any ſuch ſenſe. Artedi, de Piſcib.

Tongue *of a muſcle*. What is vulgarly called the *tongue* in this fiſh from its ſhape, is truly an organ, by means of which it ſpins a ſort of threads in the manner of ſpiders or caterpillars, to fix itſelf to the rocks by. See Muscle.

Tongue, in the *Manege*. The aid of the *tongue* or voice, is a ſort of agreeable clacking, or a certain ſound formed by the cavalier, in ſtriking his *tongue* againſt the roof of his mouth, when he means to animate the horſe, and ſuſtain him, and make him work well in the manege. See Aid.

Tongue, *to ſwallow the*, in the *Manege*. A horſe is ſaid to draw in, or ſwallow his *tongue*, when he turns it down his throat, which makes him wheeze as if he were ſhort-winded. This fault is cured by giving him a bit with a Liberty for the *tongue*.

Tongue, *Serpent's*, in *Botany*. See Adder's *tongue*.

Tongues, *Serpent's*, in *Natural Hiſtory*. See Serpent's *tongues* and Glossopetra.

Tongues, *Confuſion of*. See Confusion.

TONIC, τονικος, formed from τεινειν, *to ſtretch*, in *Medicine*, is applied to a certain motion of the muſcles, wherein the fibres being extended, continue their extenſion in ſuch manner, as that the part ſeems immoveable, though in reality it be in motion. See Muscle.

Such is the caſe of a man ſtanding, of birds planing or ſwimming through the air, &c. Galen, ſays, that the muſcles act even when at reſt; for after having made any contraction to fix themſelves in a certain ſtate or diſpoſition, the preſerving of that contraction is what we call the *tonic motion*.

Tonic, in *Muſic*. See Genus.

Tonic *accent*. See Accent.

TONICAL *echo*. See Echo.

TONNAGE. See Tunnage.

Tonnage, *duty of*. See Duty.

Tonnage *of a ſhip*. See Burden *of a ſhip*.

TONNING. See Tunning.

TONOS, a word uſed by Hippocrates, to expreſs in general any nerve, whether ariſing from the brain or ſpinal marrow. It is alſo uſed to expreſs a tenſion in any part.

TONQUIN *Medicine*. See Madness.

TONSÆ, among the *Romans*, the blades of oars, or that part of them which beats againſt the water.

TONSILS, Tonsillæ, in *Anatomy*, two round glands, ſituate near the root of the tongue, on each ſide the uvula, under the common membrane of the ſauces, with which they are covered; they are called alſo *amygdalæ*, or Almonds *of the ears*.

Tonsils, *inflammation of the*. This is a very common complaint from taking cold, and in its different degrees requires different methods of cure: in general, the ſame means are to be uſed as in quinſeys, except that ſuch copious bleedings are not neceſſary; nor, indeed, is there occaſion for bleeding at all, unleſs the patient is of a plethoric habit, or the inflammation be very violent; for, in that caſe, the taking away of a moderate quantity of blood often prevents its coming to ſuppuration. The patient is firſt to be purged with an infuſion of tamarinds, ſena, and cream of tarar, and this repeated to the third or fourth doſe, if there be occaſion; in the intermediate times the diaphoretic, attemperating, and nitrous medicines are to be given in powders, and a large quantity of diluting liquors allowed, which ſhould be gently acidulated, and have a ſmall quantity of nitre diſſolved in them. Gargariſms made of decoction of biſtort-root, red roſes, and other gentle aſtringents, are to be frequently uſed; and the frequent waſhing of the feet in warm water often has a very remarkably good effect.

If after four or five days the diſtemper is found not to give way to theſe means, but the tumor ſtill remains, there is then but little hope to be had of its reſolution, and a very different end is to be attempted; emollient gargariſms are now to be uſed, and maturating plaſters externally applied, ſuch as diachylon with the gums, and the like; and ſuppurating cataplaſms are to be applied to the whole neck and throat: theſe methods are to be continued till the tumor either burſts of itſelf, or is ſo ripe to be fit for opening by the hand of a ſurgeon. After this has been done, and the matter is diſcharged, gargariſms muſt be uſed of decoctions of ſome vulnerary herb, or common green tea, ſweetened with honey of roſes, may be uſed to ſerve the purpoſe. The mouth and throat are to be frequently waſhed with this till the part is healed. It is to be obſerved, however, that the reſolution of theſe tumors is never to be deſpaired of, not even during the uſe of the ſuppurating medicines, for it is often ſeen that the tumor has been wholly diſcuſſed even during the uſe of theſe means, the reſolution often being extremely ſlow.

This is a very troubleſome complaint, and with ſome perſons is apt to return very frequently: the beſt preſervative againſt it is a moderate diet and bleeding about the time of the equinoxes, either in the arm or foot. Some have found it neceſſary to open an iſſue in the arm in this caſe, and have been by this means perfectly cured, but, on its drying up have always found the diſeaſe return. Heiſter's Compend. Med. p. 131.

Tonsils, *ulcers of the*. See Ulcers.

TONSURE, formed from *tondere*, *to ſhave*, the art or act of cutting the hair, and ſhaving the head. See Hair.

The *tonſure* was anciently a mark of infamy in France; inſomuch that, when they would render any prince incapable of ſucceeding to the crown, they cut off his hair and ſhaved him. See Beard.

Tonsure, in the Romiſh church, is uſed for the entrance, or admiſſion, into holy orders.

In propriety, *tonſure* is the firſt ceremony uſed for devoting a perſon to God and the church, by preſenting him to the biſhop, who gives him the firſt degree of the clericate, by cutting off part of his hair, with certain prayers and benedictions.

Some hold the *tonſure* a particular order; others, as Loyſeau, only the mark and form of eccleſiaſtical orders in general.

The *tonſure* ſuffices to make a clerk; the reſt is only to qualify him for the holding of benefices. A perſon is capable of the *tonſure* at ſeven years of age; thence a benefice of ſimple *tonſure* is ſuch a one as may be enjoyed by a child of ſeven years old. The *tonſure* is the baſis of all the other orders.

Tonsure is alſo uſed for the corona, which prieſts, &c. wear, as the mark of their order, and of the rank they hold in the church. See Crown.

The barbers have the meaſures and dimenſions of the different kinds of *tonſure*, or clerical crowns, to be practiſed according to the different degrees and orders. A clerk's *tonſure*, a ſubdeacon's *tonſure*, a deacon's *tonſure*, a prieſt's *tonſure*, are each ſucceſſively bigger than other.

TONTINE, denotes annuities on ſurvivorſhip. The name is derived from an Italian, called *Tonti*, who is ſaid to have firſt formed the ſcheme of theſe life annuities. Encyclopedie.

TOOLS, ſimple and popular inſtruments, uſed in the more obvious operations, and particularly in the making of other more complex inſtruments.

Tools are divided into *edge-tools*, *ſpring-tools*, *pointed-tools*, &c.

TOOTH, *Dens*, in *Anatomy*. See TEETH.

TOOTH, *wolf*. See WOLVES-*teeth*.

TOOTH, in the *Manege*. It is by a horſe's *teeth*, chiefly, that his age is known.

The *teeth* of a horſe are of four kinds, viz. twenty-four *jaw-teeth*, or *grinders*, at the bottom of the mouth, beyond the bars; twelve on each ſide the channel, ranged ſix above, and as many below; which never fall, nor are they uſed for the diſtinction of age: twelve *foal-teeth*, or *milk-teeth*, four *tuſhes*, twelve gatherers, divided into *nippers*, the two foremoſt above, and as many below; *middle-teeth*, or *ſeparaters*, one on each ſide of the nippers above and below, and *outward*, or *corner teeth*, which are next the *tuſhes* above and below. See AGE in *Horſemanſhip*, EYE *of a bean*, and MARK.

TOOTH-ACH, a very common diſeaſe, by phyſicians called *odontalgy*.

As there are various cauſes of the *tooth-ach*, the method of relief ſhould, as far as poſſible be adapted to theſe cauſes. This diſorder often ariſes from defluxions falling on the gums, the neighbouring perioſteum and bone, particularly after catching cold: in this caſe, recourſe is commonly had to chewing of acrid aromatic ſubſtances, as ginger, galangal, Florentine orris root, cloves, all-ſpice, mace, camphor, orange-peel, &c. in various forms, which being applied to the ſeat of inflammation, and the diſtracted irritable fibres, increaſe the repletion, tenſion, and pain. Chemical oils, as thoſe of origanum, cloves, tobacco, &c. have been of ſervice, but the free and continued uſe of them injurious.

The true and rational method of cure is comprehended under four general indications, viz. to leſſen the velocity, quantity, and inflammatory tendency of the blood, which is done by bleeding and purging, and frequent repetitions of nitrous draughts; to relax the affected parts by moiſtening them with emollient attenuating liquors, ſuch as decoctions of marſh-mallows, comfrey, or ſatyrion roots, or of columbine, or quince ſeeds, with a little nitre; by applying poultices of bread and milk to the affected cheek externally, and boiled or roaſted figs internally; and alſo by ſcarification of the gums; to make a revulſion by the uſe of bliſters applied to the ears and nape of the neck; and, laſtly, to leſſen the ſenſibility of the pained parts by the external and internal uſe of ſedatives, for which purpoſe opium ſhould be added pretty freely to the above mentioned emollient liquors, and given in proper doſes at night, to procure reſt. Liniments of ointments of marſhmallow, elder, &c. mixed with rum, brandy, or ſpirit of wine camphorated, applied externally, ſerve to abate the ſwelling.

The *tooth-ach* is ſometimes owing to an obſtruction or inflammation of the nerves and vaſcular parts of the tooth itſelf, for relieving which acrid maſticatories, formed chiefly of the ſubſtances already mentioned, are often of conſiderable ſervice; burning the ear with a hot iron has alſo been practiſed, as it is ſaid, with ſucceſs; but the more effectual and rational means are bliſters behind the ears, and on the nape of the neck, and ſedatives uſed externally and internally; and if theſe fail, extraction is the laſt reſource. When this diſorder ariſes from purulent or acrid matter generated in the gums, perioſteum, and veſſels of the teeth and ſockets, in conſequence of inflammation, extravaſation, or acrimony of the fluids, one or more inciſions ſhould be made to the bottom of the cavity in which the matter lodges, for giving it free paſſage, and the wound frequently dreſſed with ſtimulating balſamics, ſuch as balſam copaibæ, or tincture of myrrh, on a doſſil of lint; and when it is almoſt healed, the mouth ſhould be waſhed four or five times a day with ſome aſtringent gargle, as the decoction of tormentil, of biſtort-root, &c. and if the pain be conſiderable, ſolutions of opium and camphor ſhould be added to the dreſſings and to the aſtringent waſhes. When the teeth are become looſe in their ſockets by the ſcurvy, &c. it is neceſſary to extract them.

The *tooth-ach* ariſing from fungous excreſcences and ulcers of the gums, may be relieved by removing the excreſcences with a knife, or ſciſſars, and dreſſing the wound as above; or by treating the ulcers of the gums when they do not touch the teeth, or form cavities, with balſamic applications, and then with aſtringents, ſuch as tincture of myrrh, ſang. dracon. tormentil, biſtort, &c. as ſoon as they are diſpoſed to heal. The pain may be mitigated by opiate and camphorated applications; but if the inflammation and ſoreneſs are conſiderable, emollient gargles, ſuch as decoction of quince ſeeds, barley-water, or milk and water, with a few drops of the thebaic tincture, ſhould be conſtantly kept in the mouth, till the ſtate of the parts admits of the above treatment. In ſome caſes, the *tooth-ach* is owing to the receſs of the gums occaſioned by ſcorbutic, venereal, or putrid diſorders, by which the roots of the teeth are expoſed to external air and injury. If the expoſed roots are become carious, extraction is the only cure; otherwiſe, the original diſeaſe ſhould be removed by a due courſe of medicine, and the mouth often waſhed with antiſeptic and aſtringent liquors, as infuſion of roſes, betony, granate peel, biſtort, and tormentil-roots, aciduated with the juice of lemon or vinegar: the affected gums ſhould be pricked and ſcarified; and in the courſe of the cure, opiates, ſolution of camphor, or a few drops of the nitrous ether in common ſpirits may be cautiouſly uſed. If the diſorder proceeds from tartar of the teeth, this ſhould be removed by bruſhing and waſhing them, and rubbing them with proper teſtaceous powders, or by particular inſtruments uſed by dentiſts, and the other ſymptoms require the treatment already mentioned.

The *tooth-ach* owing to the looſeneſs of the teeth is often relieved by making them faſt and ſteady with ligatures, and by the uſe of aſtringent waſhes. The *tooth-ach* ſometimes proceeds from injuries by injudicious extraction, in which caſe, if a portion of the root is left behind, it is beſt relieved by extracting the ſtump; or the pain may ſometimes be removed by burning the nerve, or applying a ſmall bit of lint dipped in eſſential oil of cinnamon over the hollow part of the ſtump, or by introducing a bit of paſte made of opium, camphor, and eſſential oil of peppermint; a paſte made of ſoft bread, and the ſeed of ſtramonium, laid on the affected tooth, ſerves to abate the pain; as does alſo a compoſition of equal quantities of opium, myrrh, and camphor, made into a paſte with brandy or ſpirits of wine, when put into a hollow tooth in the quantity of a grain or two.

When the gums are bruiſed and torn, the method of cure conſiſts in replacing them, removing the inflammation, diſpoſing the part to heal, preſerving it from outward air and the relics of food, mitigating the pain, and uſe of ſuitable aſtringents. The *tooth-ach* occaſioned by exceſſive cold air, and the ſudden change of hot and cold liquors, is cured by keeping the mouth filled as long as poſſible with warm water, or ſpirituous peppermint-water, &c. In the *tooth-ach* ariſing from ſympathy with a diſordered tooth, the diſeaſe of the faulty tooth affecting ſound ones is generally caries or hollowneſs, which is to be treated with filing, burning, cleaning, acrid, camphorated, or ſedative applications, or filling it with lead or gold, as circumſtances require: or if theſe methods fail, the diſordered tooth muſt be extracted. When matter is collected in the maxillary ſinuſes, it will be neceſſary to draw a tooth immediately under the affected part, and then to pierce through the bottom of the ſocket into the ſinus, or antrum maxillare, with a triangular-pointed inſtrument, ſo as to give a free vent to the corrupted matter, and then to waſh with balſamic, ſpirituous, and detergent injections:– keeping a little lint wetted in any mild balſam in the ſocket to prevent the acceſs of external air. In caſe of an exoſtoſis of the bones which form the ſockets, the ſoft parts that lie over it muſt be divided quite to the bone, by a crucial inciſion, and the exoſtoſis cut away with a knife or cautery, or broken with pliers, and the wound treated as in caſes where a bone is expoſed. When a caries commences in the ſubſtance of the bone, the bone is to be laid bare, the cariated cruſt pierced through to the bone, an exfoliation promoted, and the wound healed. See CARIES.

When the enamel of the teeth is deſtroyed, and the nervous bony ſubſtance of them is expoſed, all that can be done is to uſe palliatives, or apply the inſtrument at once. See DENTITION. Berdmore's Treatiſe on Diſorders, &c. of Teeth.

Mr. Cheſelden mentions one cured of the *tooth-ach* by applying a ſmall cauterizing iron to the anthelix of the ear, after he had undergone bleeding, purging, ſalivation, ſetons, &c. to no purpoſe; the caſe was very remarkable; for when he was ſeized with it, a convulſion of the whole ſide of his face followed, whenever the pain became acute, or whenever he attempted to ſpeak.

There are ſeveral methods of cauterizing: ſome uſe a cautery prepared on purpoſe, others only a common ſmall iron nail, or a piece of iron-wire, and others heat a ſcalpel red-hot and plunge it into the part; others alſo affirm that as much ſervice is to be done by cutting there without cauterizing, ſuppoſing that the operation deſtroys a nerve going thence to the *tooth*, which is the occaſion of the ſenſe of pain in it. But it is to be doubted whether this ſevere remedy be as certain of ſucceſs as ſome pretend.

Scookius, in his treatiſe of butter, maintains, that there is no better means of keeping the teeth fair and ſound, than by rubbing them over with butter: a medicine much leſs diſtaſteful than that of the Spaniards, who waſh their teeth every morning with urine.

To prevent and cure the ſcurvy in the gums, it is recommended to waſh the mouth every morning with ſalt and water; and to hinder the teeth from ſpoiling or growing carious, ſome uſe only powder of hartſhorn to rub the teeth with, and then waſh the mouth with cold water; it is alledged, this is preferable to other dentrifices, on this account, becauſe their hard-particles are apt to abrade that fine ſmooth poliſh, with which the ſurface of the teeth is covered, and which is their preſervation from the ill effects of air, aliment, liquors, &c. which occaſion aliments of the teeth when worn off. See DENTRIFICE and TEETH.

TOOTH-ACH-*tree*, *Zanthoxylum*, in *Botany*, a genus of the *dioecia pentandria* claſs. Its characters are: that it has male and female flowers, neither of which have any corolla; the calyx in both divided into five ſegments; the female have five piſtils, and as many monoſpermous capſules. There are two ſpecies.

TOOTH-*drawing*, according to Cicero, (De Nat. Deorum, lib. iii. cap. 22.) was invented by Eſculapius, in whoſe temple the ancients hung up a pair of leaden pincers, very properly ſignifying that no *teeth* were to be pulled out, but ſuch as might be removed with a leaden forceps, that is ſuch as were looſe and ready to fall out of themſelves; for they very little conſult their own welfare, who pull out their *teeth* while firm and ſound: for drawing the *teeth* is not only a painful operation, but often brings on bad accidents, and ſometimes even hazards the patient's life.

Tooth-drawing, however wrong in many caſes, yet is certainly right and neceſſary in others. 1. In children for the removing of their lacteal or deciduous *teeth*, for when theſe are left too long in their ſockets, they diſplace the new ones and turn them awry. 2. In infants it is alſo neceſſary to draw ſuch *teeth* as grow out of the palate, or out of improper parts of the mouth, and are placed ſo as to impede their ſpeaking or ſucking. 3. In the *tooth-ach* proceeding from a *tooth*'s being carious, and giving way to no medicines, drawing is the laſt reſort, and is abſolutely neceſſary. 4. Thoſe *teeth* ought to be drawn, which, by their irregular figure and poſition, lacerate the gums and lips, and cannot be brought into ſhape by the file. And, laſtly, it is ſometimes neceſſary to draw a *tooth* for the curing of a fiſtula, or ulceration, of the gums near the roots of the *teeth*.

The regular method of drawing them is this: if the *tooth* is in the lower jaw, the patient muſt be ſeated on a low ſeat on the floor, and if in the upper jaw, he muſt be placed on a high ſtool or table; then the proper inſtrument is to be ſelected, and the *tooth* carefully drawn as a nail out of a piece of wood. But this muſt never be done while the gums are inflamed, ſwelled, or otherwiſe diſtempered.

The inſtruments for extracting *teeth* are ſo various, that almoſt every operator is furniſhed with a particular one of his own; ſuch are the PELICAN, FORFEX, CROW'S *bill*; and for drawing ſtumps the goat's foot, and others deſcribed by Heiſter, Surgery, vol. ii. p. 30, &c.

The key inſtrument for drawing teeth in general, is exhibited in *Tab.* III. *Surgery*, *fig.* 47.

The paces uſed for extracting teeth that ſlightly adhere to the gums, &c. after being looſened from the ſocket of the jaw, are repreſented in *Tab. Surgery*, *fig.* 13.

TOOTHPICK, in *Botany*, a ſpecies of daucus. See CARROT.

TOOTH-WORT, *dentaria*, in *Botany*, a genus of the *tetradynamia ſiliquoſa* claſs. Its characters are theſe: the empalement of the flower is compoſed of four oblong oval leaves, which fall off; the flower has four obtuſe petals placed in form of a croſs; and ſix ſtamina, four of which are as long as the empalement, the other two ſhorter: in the centre is ſituated an oblong germen, ſupporting a ſhort thick ſtyle, crowned by an obtuſe ſtigma; the germen becomes a long taper pod with two cells, divided by an intermediate partition opening with two valves, including many roundiſh ſeeds. Linnæus enumerates three and Miller four ſpecies.

TOOTH-*wort* is alſo a name given to a ſpecies of *plumbago*. See LEAD-*wort*.

TOP *of a ſhip*, a ſort of platform, ſurrounding the lower maſt head, from which it projects on all ſides like a ſcaffold. Its principal intention is to extend the topmaſt ſhrouds, ſo as to form a greater angle with the maſt, and thereby giving additional ſupport to the latter. It is ſuſtained by the TRESSEL-*trees* and CROSS-*trees*. The *top* is alſo convenient for containing the materials neceſſary for extending the ſmall ſails, and for fixing or repairing the rigging machinery. In ſhips of war it ſerves as a kind of redoubt, and is accordingly fortified for attack and defence, being furniſhed with ſwivels, muſquetry, and other fire-arms, and guarded by a thick fence of corded hammocs. It is alſo uſed as a place for looking out, either in the day or night. The frame of the *top* is either cloſe-planked like a platform, or open like a grating. In all ſhips of war, and in the largeſt merchantmen, the *top* is fenced on the aft-ſide by a rail about three feet high, ſtreching acroſs and ſupported by ſtanchions, between which a netting is uſually conſtructed.

The outſide of this netting is generally covered with red bays, or red painted canvas, extended from the rail down to the edge of the top, and called the *top-armour*. By this name it ſeems to have been conſidered as a ſort of blind, behind which the men may conceal themſelves from the aims of the enemy's fire-arms in time of action, whilſt they are charging their own muſkets, carabines, or ſwivels. The dimenſions of *tops* in the royal navy are as follow: the breadth of the *top* athwart ſhips is one third of the length of its correſponding *top*-maſt: the length of all *tops*, from the foremoſt to the after-edge, is equal to three-fourths of their breadth athwart; and the ſquare-hole in the middle is five inches to a foot of thoſe dimenſions. The treſſel-trees and croſs-trees extend nearly to the edge of the tops. Falconer.

TOP-*armour*, in a *ſhip of War*. See TOP, *ſupra*.

TOP-*block*. See BLOCK.

TOP-*chain*, a chain to ſling the ſail-yards in the time of battle, in order to prevent them from falling down when the ropes by which they are hung, happen to be ſhot away, or rendered incapable of ſervice. Falconer.

TOP-*lanthorn*, a large lanthorn placed in the after-part of the top, and ſupported on each ſide by iron-braces, in any ſhip where an admiral or commodore is aboard. Falconer.

TOP-*maſt*, the ſecond diviſion of a MAST, or that part which ſtands between the upper and lower pieces.

TOP-*gallant-maſts*, in a *ſhip*, are two, *viz.* MAIN-*top-gallant-maſt*, and FORE-*top-gallant-maſt*, which are ſmall round pieces of timber, ſet on their reſpective *top-maſts*; on the top of which maſts are ſet the flag-ſtaffs, on which the colours, as flags, pendants, &c. hang.

TOP-*rope*, in a *Ship*, a rope employed to ſway-up a *top*-maſt, or *top*-gallant-maſt, in order to fix it in its place; or to lower it in tempeſtuous weather, or when it is no longer neceſſary. The rope uſed on this occaſion for the *top*-maſts is furniſhed with an aſſemblage of pullies, at its lower end, called the *top-tackle*; the effort of which in erecting the *top* maſt is communicated from the head of the lower maſt to the foot of the *top*-maſt; and the upper end of the latter is accordingly guided into, and conveyed up through the holes between the treſſel-trees and the cap. For this purpoſe, the *top-rope*, paſſing through a block which is hooked on one ſide of the cap, and afterwards through the holes, furniſhed with a ſheave or pulley, in the lower end of the top-maſt, is again brought upwards on the other ſide of the maſt, where it is at length faſtened to an eye-bolt in the cap, which is always on the ſide oppoſite to the top-block. To the lower end of the *top-rope* is fixed the top-tackle, the effort of which being tranſmitted to the *top-rope*, and thence to the heel of the top-maſt, neceſſarily lifts the latter upward, parallel to the lower maſt. When the top-maſt is raiſed to its proper height, the lower end of it becomes firmly wedged in the ſquare-hole, between the treſſel-trees. A bar of wood or iron, called the FID, is then thruſt through a hole in the heel of it, acroſs the treſſel-trees, by which the whole weight of the top-maſt is ſupported. In the ſame manner, the top-gallant-maſt is erected, and fixed at the head of the top-maſt. Falconer.

TOP-*ſail-lifts*, on *board a Ship*. See LIFTS.

TOP-*ſails*, and TOP-*gallant-ſails*, in *a Ship*, are thoſe belonging to the *top*-maſts, and *top*-gallant-maſts. The former are extended acroſs the top-maſt by the *top-ſail*-yard above, and by the yard attached to the lower maſt beneath; being faſtened to the former by *rebands*, and to the latter by means of two blocks fixed on its extremities, through which the *top-ſail* ſheets are inſerted, paſſing from thence to two other blocks fixed on the inner part of the yard, cloſe by the maſt; and from theſe latter the ſheets lead downwards to the deck, where they may be ſlackened or extended at pleaſure. The *top-gallant ſails* are expanded above the *top-ſail* yard in the ſame manner. Falconer. See SAIL.

TOP-*a-ſtarboard* and TOP *the yard-arms*. See TOPPING.

TOPAN, in *Ornithology*, a name by which ſome have called the horned-beaked Indian raven, more uſually known by the name of the RHINOCEROS-*avis*.

TOPARCHY, formed from τοπος, *place*, and αρχη, *government*; a little ſtate, or ſignory; conſiſting only of a few cities, or towns; or a petty country, governed and poſſeſſed by a *toparch*, or lord.

Judæa was anciently divided into ten *toparchies*. See Pliny, lib. v. cap. 14. and Joſeph. lib. iii. cap. 2. de Bel. Jud. & lib. v. &c.

Procopius only gives the quality of *toparchy* to the kingdom of Edeſſa; to Abgarus, the *toparch* or lord whereof, there is a tradition, that Jeſus Chriſt ſent his picture, with a letter.

TOPAZ, a gem, or precious ſtone, eſteemed the fourth in hardneſs after the diamond.

The *topaz* is tranſparent; its colour a beautiful yellow, or gold colour; it is very hard, and takes a fine poliſh; its texture is foliaceous; its form cubic, parallelipedal, or priſmatic; its ſpecific gravity from 3.46 to 4.56; it loſes its colour only in a very ſtrong heat, and of the uſual fluxes it yields to only borax and microcoſmic ſalt. According to Bergman, one hundred parts of it contain forty-ſix of argill, thirty-nine of ſiliceous earth, eight of mild calcareous, and ſix of iron.

It is the true CHRYSOLITE of the ancients, and is found in ſeveral parts of the Indies, in Ethiopia, Arabia, Peru, and Bohemia.

It is always found in a pebble-like form; roundiſh or oblong, and flatted on one ſide, and an irregular and uneven ſurface, but uſually bright and of a good natural poliſh, unleſs where fouled by accidents. It is never found in a columnar or cryſtal-like form, notwithſtanding that our dealers in gems carry on a large trade with what they call *topazes*, which are of this ſhape: but all theſe, when brought to the wheel, are found to be no more than common cryſtals, accidentally tinged to a yellow colour, as is very common for the cryſtals and ſpars to be, in and about mines, from an admixture of metalline particles; and almoſt all the common *topazes* worn in rings, are of this falſe kind.

The colour of the *topaz* is ever a pure yellow; but, like the other gems, it has this in very different degrees: the fineſt *topazes* are of a true and exact gold-colour, and are of great ſplendor, but they vary from this in degree, up to the deepeſt ſaffron-colour, and down to that of the paleſt amber.

The oriental *topazes* are moſt eſteemed; their colour borders on the orange: thoſe of Peru are ſofter, but their colour much the ſame: the yellow of thoſe of Bohemia is a little cloudy; and they are the ſofteſt of all, and their poliſh the coarſeſt; and deſerve to be conſidered merely as rock-cryſtals coloured yellow, under a priſmatic and hexagonal form.

Thoſe of Madagaſcar were once in much eſteem, but are now held good for little.

The Saxon *topaz* is found in Voigtland near Aberbach, on a mountain called *Schneckenberg*: it is commonly of the colour of a light white wine, and in the form of priſmatic cryſtals, compoſed of four unequal ſides. It is ſaid, that theſe *topazes* are not inferior to thoſe of the Eaſt in luſtre or hardneſs. Mr. Pott has made ſome curious experiments on the Saxon *topaz*. He found that the moſt violent fire could not melt it; and that it could not be fuſed with even eight times its weight of fixed alkali; but that it was vitrifiable by addition of half its weight of borax, or thrice its weight of chalk. It was alſo fuſed by calces of lead or of copper, and fuſible ſpar, but not by nitre. M. Guetard informs us, that the *topazes* of Braſil, put in a crucible, and ſurrounded with aſhes, loſe their yellow colour and become red, and are thus transformed into rubies. Whence it may be inferred, that the colour of the *topaz* is owing to iron, which by calcination is developed and made red. The Oriental *topaz*, treated in the ſame manner, does not change its colour. The art of converting *topazes* into rubies is practiſed (ſay the authors of the Paris Encyclopedie) by many jewellers. Mr. Canton, in 1760, found that the Braſil *topaz* has the electrical properties of the TOURMALIN.

Tavernier mentions a *topaz*, in the poſſeſſion of the great Mogul, weighing one hundred and fifty-ſeven carats, which coſt 20,300*l.* ſterling: and Boetius de Boot, in his treatiſe of precious ſtones, affirms to have ſeen in the cabinet of the emperor Rudolphus, whoſe phyſician he was, a *topaz* above three feet long, and ſix inches broad. Probably, it might be ſome other ſtone a little tranſparent, of a *topaz* colour.

The *topaz* is eaſily counterfeited; and there are factitious ones, which, to the eye, do not come behind the natural ones.

To counterfeit the *topaz* in glaſs, ſee GLASS *reſembling Topaz*.

To counterfeit the oriental *topaz* in paſte: take cryſtal prepared, two ounces; ordinary minium or red lead, ſeven ounces; put theſe into a crucible luted, and bake them twenty-four hours in a potter's kiln. If the maſs is not ſufficiently clear and fine, cover it up again, and give a ſecond baking, and it will come out of a fine *topaz* colour. See PASTE.

If we might believe the ancients, the *topaz* has very notable virtues; but thoſe are now in diſcredit. See GEM.

Some ſay, it takes its name *topaz* from an iſland in the Red Sea, of the ſame name, where it was firſt found by Juba, king of Mauritania; but it was known to the Hebrews before, as appears from the 118th Pſalm.

TOPE, in *Ichthyology*, an Engliſh name for a ſpecies of the ſqualus, according to the Artedian ſyſtem, the SQUALUS *galeus* of Linnæus, diſtinguiſhed from the other ſquali by the noſtrils being placed extremely near the mouth, and by certain foramina, or apertures near the eyes. It is the fiſh called by the ancients γαλεος κυων, *galeus* CANIS and *canicula*.

TOPHUS, in *Medicine*, a ſtony or chalky concretion in any part of an animal body; as in the bladder, kidneys, &c. or in the joints.

Dr. Rutty, in his Treatiſe of the Urinary Paſſages, takes the ſtone to ariſe from the attraction between volatile ſaline particles; of which particles the ſtone, when viewed with a teleſcope, ſeems to be made up: he thinks the fault of theſe aggregates of ſaline particles ought generally to be ſuppoſed to begin in, or proceed from, the papillæ of the kidneys, and not from the ſediment of urine in the bladder.

The reaſon why wine-drinkers are more ſubject to the ſtone, and other concretions, than malt or water-drinkers, he ſuppoſes to be, that volatile and ſaline or earthy particles are contained in the wine in greater quantities than in the ale, &c. A calculus, he obſerves, reduced to a caput mortuum, will, upon the effuſion of warm water, diſſolve, and entirely mix; but in ſhort time will again ſettle, and the particles thereof ſo cloſely unite or attract, as that, by repeated effuſions, they cannot be brought again to diſſolve. See STONE.

TOPHUS, in *Natural Hiſtory*, is a ſpecies of ſand-ſtone, called alſo *porus*, moſtly of a grey colour; but it is alſo found of other colours, as whitiſh, browniſh, &c. according to the ſoil in which it is imbedded. It much reſembles the PUMICE in texture, being rough and brittle, and compoſed of a large angular grit, cemented by a very coarſe terrene cryſtalline ſubſtance. It is too ſoft to ſtrike fire with ſteel. It is common in Italy and in Germany, where it is uſed for building, chiefly for cellars and turning arches. Da Coſta's Hiſt. Foſſils, p. 136.

TOPIARIA, in *Botany*, a name by which ſome authors have called the *acanthus*, or bear's-breech, a plant common in the gardens of the curious.

TOPIC, in *Rhetoric*, a probable argument, drawn from the ſeveral circumſtances and places of a fact, &c. See ARGUMENT and LOCUS.

TOPICE, τοπικη, TOPICA, expreſſes the art or manner of inventing and managing all kinds of probable argumentations.

The word is formed from the Greek τοπικος, of τοπος, *place*, its ſubject being the places, which Ariſtotle calls the *ſeats* of arguments.

Ariſtotle has written *Topics*; and Cicero a kind of comment on them, to his friend Trebatius, who, it ſeems, did not underſtand them. But the critics obſerve, that the *topica* of Cicero agree ſo little with theſe eight books of *Topics* which paſs under the name of Ariſtotle, that it follows neceſſarily, either that Cicero was much miſtaken, which is not very probable; or that the books of *Topics*, now attributed to Ariſtotle, are not wholly his.

Cicero defines *topica*, or *topice*, to be the art of finding arguments, *diſciplina inveniendorum argumentorum*.

Rhetoric is ſometimes divided into two parts; judgment, called alſo *dialectice*; and invention, called *topice*.

TOPICS, formed from τοπος, *place*, or TOPICAL *remedies*, in *Medicine*, are commonly uſed for what we otherwiſe call *external remedies*, i. e. ſuch as are applied outwardly to ſome particular diſeaſed and painful part.

Such are plaſters, cataplaſms, bliſters, unguents, ſalves, collyriums, &c.

Topics are ſuch medicines, as by the ſmallneſs and mobility of their particles, attended for the moſt part with gentle acrimony, are able to make their way into the ſubſtance of the parts to which they are applied, without eroding or wounding any of the ſolids; and thence are juſtly called *penetrating topics*.

It may be a queſtion how *topics* in medicine act. It is commonly ſaid, that this or that medicine penetrates the pores; but the ideas annexed to ſuch expreſſions do not ſeem very diſtinct. Writers on this ſubject have ſeldom been at the pains to tell us what pores they mean. We have an eſſay on this ſubject in the Medic. Eſſ. Edinb.

vol. ii. art. 4. by Dr. Armſtrong, who thinks that the effects of ſuch medicines are not owing to the particles entering the orifices of the abſorbent veins; nor to the opening of the exhalent veſſels on the ſurface of the body by theſe medicines; nor will he allow the particles of penetrating *topics* to force their way through the coats of the veſſels; but he ſuppoſes, that ſubtle medicines are conveyed by the exhalent veſſels of the ſkin, to thoſe parts of the ſmaller arteries, where the circulation is choaked by obſtruction.

The gout is never cured by *topics*; they may aſſuage the pain for a time; but, for a cure, the ſource of the evil muſt be attacked with internals.

TOPOGRAPHY, formed from τοπος, *place*, and γραφω, *I deſcribe*, a deſcription or draught of ſome particular place, or ſmall tract of land; as that of a city or town, manor or tenement, field, garden, houſe, caſtle, or the like; ſuch as ſurveyors ſet out in their plots, or make draughts of, for the information and ſatisfaction of the proprietors.

Topography differs from CHOROGRAPHY, as a particular from a more general.

TOPPING *the lifts*, aboard a *Ship*, the ſame as haling the top-ſail-*lifts*, by ſlackening one of them, and pulling upon the oppoſite one, ſo as to place the yard at a greater or leſs obliquity with the maſts. See LIFTS.

TOPPING-*lift*, in a *Ship*, a large and ſtrong tackle, employed to ſuſpend or top the outer end of a gaff, or of the boom of a main-ſail and fore-ſail; ſuch as are uſed in brigs, ſloops, or ſchooners. Falconer.

TORADOR. See BULL-*fighting*.

TORCH-*thiſtle*, *cereus*, in *Botany*, a ſpecies of plants belonging to the *cactus* genus.

Mr. Miller makes a diſtinct genus of the *cereus*, or *torch-thiſtle*. The characters of which are theſe: it hath an oblong ſcaly empalement, covered with ſpines, and ſitting upon the germen; the flower is compoſed of many narrow-pointed petals, which ſpread open like the ſun's rays: it has a great number of declining ſtamina, inſerted in the baſe of the petals, and terminated by oblong ſummits: the germen, ſituated under the empalement, ſupports a long cylindrical ſtyle, crowned with a multifid ſtigma, in form of a head; the germen afterward becomes an oblong ſucculent fruit, with a prickly ſkin, full of ſmall ſeeds encloſed in the pulp. The upright long cereus with ſix angles, which are far diſtant, is the moſt common in the Engliſh gardens; it grows naturally in Surinam, whence it was brought to Holland in 1681, and thence moſt parts of Europe have been ſupplied with it. The uſual time of its flowering with us is in July; but the flowers of this ſpecies are never ſucceeded here by fruit: nor indeed do the plants often produce their flowers. They may be preſerved in a green-houſe, but ſhould have no water in winter. As they naturally grow on dry rocky places, they ſhould be planted neither in large pots nor in rich ſoil: the beſt compoſt for them is one-third of light earth from a common, a third of ſea-ſand, and the other part ſifted lime rubbiſh. The ſtem of this plant is twenty, thirty, or more feet high, and about five inches in diameter. See a particular deſcription of it in Phil. Tranſ. Nº 416.

Other ſpecies of *cereus* have been brought from the Britiſh iſlands of America, where they grow naturally: there is one ſort, which is trained up, by the inhabitants of Barbadoes, againſt their houſes, for the ſake of its fruit, which is about the ſize of a bergamot pear, and of a very delicious flavour.

The propagation of all the kinds of this remarkable plant is by cuttings, which muſt be laid in a dry place ten days or a fortnight before they are planted, or if it be three weeks, there is leſs danger of their miſcarrying. They are to be planted in ſmall pots, filled with the mixture of earth above deſcribed, laying ſome ſtones at the bottoms of the pots to drain off the moiſture. The pots are then to be placed in a gentle bed of tanner's bark, and once a week to have a gentle watering; this is beſt done in June, or July: toward the middle of Auguſt, they muſt have air given them by degrees, and at the end of September they muſt be removed into the ſtove or green-houſe, where they are to remain the winter. They ſhould always have a dry ſituation, and ſhould never be expoſed to the open air even in the middle of ſummer. When the top of an old plant has been cut off for propagating, it always throws out ſeveral young ſhoots from its angles, which may all be eaſily propagated in the ſame manner, and it will continue to do this in ſuch a manner, that there will be a continual ſupply even from one ſtock. They may be brought in ſmall pieces from the Weſt Indies packed up in ſtraw, and will grow when planted here, as well as if cuttings from our own plants. Miller's Gardener's Dict.

TORCH, *tæda*, a ſort of luminary, properly, a ſtick of fir, or other reſinous and combuſtible matter, as pine, linden, &c. more or leſs thick, and long; encompaſſed at one end with ſix wax candles, which, being lighted, yield a kind of gloomy brightneſs.

Torches are uſed in ſome church ceremonies, particularly at the proceſſions of the holy ſacrament in the Romiſh church, and at the interments of the poorer people. Formerly they were uſed at the funerals of thoſe of the firſt rank; but tapers and flambeaux are now introduced in their ſtead; and frequently alſo called by their name.

TORCHENES, in the *Manege*, a long ſtick with a hole at the end of it, through which a ſtrap of leather is run, the two ends of which being tied together, ſerve to ſtraiten and cloſely tie up a horſe's noſe as long as the ſtick is ſtayed upon the halter or ſnaffle. This is done to keep the horſe from being unruly, when he is dreſſed, or upon any other occaſion.

TORCULAR, or TORCULARIS, among *Surgeons*, a contrivance for ſtopping bleedings in amputations.

TORCULAR *Herophili*, in *Anatomy*, a name given to a part in the duplicatures of the dura mater; formed of a concourſe of a branch of the longitudinal ſinus with the lateral ſinuſes.

It has its name *torcular* from its reſembling a preſs, or ſcrew: *Herophili* is added from the diſcoverer's name.

TORDINO, in *Ornithology*, a name by which the Venetians call a bird of the lark kind, common in their markets, and called by authors SPINOLETTA.

TORDO *marino*, in *Ornithology*, the name of a bird of the ſtarling kind, called alſo the *codiroſſo maggiore*, or *ruticilla major*, and by the Auſtrians the *ſtein-rotling*. Aldrovandus has named it the *merula ſaxatilis*, or *rock-blackbird*. It is of the ſize of our ſtarling, and much reſembles it in figure; its breaſt is greyiſh, and has a black tranſverſe ſtreak, and behind that the whole is of a yellowiſh hue; its head and back are of a blackiſh hue with ſome ſlight variegations of grey, from the tip of the feathers being of that colour; the tail is long and of a reddiſh orange colour, and the under-feathers of the wings are of the ſame hue; the females are of a leſs elegant colour than the males, viz. a mouſe-colour, variegated with white on the back, and aſh-colour on the belly; what is yellow in the male birds, is alſo very pale in the females; it is not uncommon in Germany, and may be taught like the ſtarling to imitate the human voice. Ray.

TORDYLIUM, in *Botany*. See HART-*wort*.

TORGOCH, in *Ichthyology*. See CHARR.

TORE, TORUS, in *Architecture*, a large round moulding, uſed in the baſes of columns.

Daviler derives the word from the Greek τορος, *a cable*, whereof it bears ſome reſemblance; or from the Latin *torus*, *a bed*, as being ſuppoſed to repreſent the edge of a bed or quilt, ſwelled out with the weight of the incumbent column.

The *tore* is alſo called *gros baton*, and *tondin*. It is the bigneſs that diſtinguiſhes the *torus* from the aſtragal.

The baſes of Tuſcan and Doric columns have but one *tore*, which is between the plinth and the liſtel. In the Attic baſe there are two; the *upper*, which is the ſmaller; and an *under*, or bigger. See *Tab. Architect. fig.* 3. & *fig.* 24. & *fig.* 27.

TORENIA, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are: that the calyx is bilabiated, the upper lip being formed with three points; and the capſule bilocular. There is one ſpecies.

TOREUMATOGRAPHY, a Greek term, ſignifying the knowledge, or rather deſcription, of ancient ſculptures, and baſſo-relievos.

The invention of *toreumatography* is owing to Phidias, and its perfection to Polycletus: the Italian gravers have let a great deal of light into the *toreumatography*.

TOREUTICE, τορευτικη, formed from the Greek τορνος, *lath*, of τορεω, *terebro*, *perforo*, that part of ſculpture called *turning*.

TORGAW, *convocation of*. See *Form of* CONCORD.

TORIES, or TORYS, a party or faction in England, oppoſite to the whigs.

Theſe two celebrated parties, which have ſo long divided our country, will make a conſiderable article in the Engliſh hiſtory, nothing inferior, in many reſpects, to that of the Guelfs and Gibellins. The diviſion has gone ſo deep, that it is preſumed, no Engliſhman, who has any concern or principles at all, but inclines more to one ſide than the other: for which reaſon, we ſhall borrow our account of them from the mouths of foreigners, who may be ſuppoſed more impartial; and particularly from M. de Cize, a French officer, ſome time in the ſervice of England, who has written the Hiſtory of Whiggiſm and Toryiſm, printed at Leipſic, anno 1717, and M. Rapin, whoſe Diſſertation ſur les Weighs & les Torys, printed at the Hague the ſame year, is well known; and reprinted at the cloſe of the ſecond volume of his hiſtory of England, fol. ed.

During the unhappy war, which brought king Charles I.

to the ſcaffold, the adherents of that king were firſt called *cavaliers*, and thoſe of the parliament *round-heads*; which two names were afterwards changed into thoſe of *tories* and *whigs*, on the following occaſion.

A kind of robbers, or banditti, in Ireland, who kept on the mountains, or in the iſlands formed by the vaſt bogs of that country, being called *tories*, a name they ſtill bear indifferently with that of rapparees; the king's enemies accuſing him of favouring the rebellion in Ireland, which broke out about that time, gave his partiſans the name of *tories*; and on the other hand, the *tories*, to be even with their enemies, who were cloſely leagued with the Scots, gave them the name of WHIGS, who living in the fields and woods, fed much on milk; *whig* ſignifying *whey*. But for a more probable etymology of *whig*, ſee WHIGS.

The cavaliers, or *tories*, had then principally in view the political intereſts of the king, the crown, and the church of England: and the round-heads, or whigs, propoſed chiefly the maintaining of the rights and intereſts of the people, and of proteſtantiſm. Nor have the two factions yet loſt their firſt views; though their firſt names, *cavalier* and *round-head*, be now entirely diſuſed.

This is the moſt popular account; and yet it is certain the names *whig* and *tory* were but little known till about the middle of the reign of king Charles II. M. de Cize relates, that it was in the year 1678, that the whole nation was firſt obſerved to be divided into *whigs* and *tories*; and that on occaſion of the famous depoſition of Titus Oates, who accuſed the catholics of having conſpired againſt the king, and the ſtate—the appellation *whig* was given to ſuch as believed the plot real: and *tory* to thoſe who held it fictitious.

We ſhould here confine ourſelves to the *tories*: and for what regards the *whigs*, refer to that article; but ſince, by comparing and confronting the two parties together, both the one and the other will appear in the ſtronger light, it would be imprudent to ſeparate them, ſo that we rather chooſe to ſay the leſs under the word *whigs*, and refer thence hither.

The factions we are ſpeaking of, may be conſidered either with regard to the *ſtate*, or to *religion*. The *ſtate tories* are either violent or moderate: the firſt would have the ſovereign to be abſolute in England, as in other countries, and his will to be a law. This party, which is not very numerous, has yet been conſiderable; 1. On account of its leaders, who have been lords of the firſt rank, and generally miniſters and favourites. 2. In that, being thus in the miniſtry, it engaged the church *tories* to maintain ſtiffly the doctrine of paſſive obedience. 3. Becauſe they have been frequently ſupported by the crown.

The moderate *tories* would not ſuffer the king to loſe any of his prerogatives: but neither would they ſacrifice thoſe of the people.

The *ſtate whigs*, again, are republican or moderate: the firſt, according to our author, are the remains of the long parliament, who took in hand to change the monarchy into a commonwealth: theſe make ſo ſlender a figure, that they only ſerve to ſtrengthen the party of the other *whigs*. The *tories* would perſuade the world, that all the *whigs* are of this kind; as the *whigs* would make us believe, that all the *tories* are violent.

The moderate *ſtate whigs* are much in the ſame ſentiments as the moderate *tories*; and deſire the government may be maintained on its ancient foundation, and that the king may be reduced to an incapacity of abuſing his power, by leaving him the poſſeſſion of his juſt rights; all the difference is, that the moderate *tories* lean a little more to the ſide of the king, and the moderate *whigs* to that of the parliament and people.

Before we conſider our two parties with regard to religion, it muſt be obſerved, that the reformation, as carried on to a greater or leſs length, divided the Engliſh into epiſcopalians, and preſbyterians or puritans: the firſt contended, that the epiſcopal juriſdiction ſhould be continued on the ſame footing, and the church in the ſame form, as before the Reformation: the latter maintained, that all miniſters or prieſts had equal authority; and that the church ought to be governed by preſbyteries, or conſiſtories of prieſts and lay-elders. See PURITANS.

After long diſputes, the more moderate of each party relaxed a little of their ſtiffneſs; and thus formed two branches of moderate *whigs*, and moderate *tories*, with regard to religion; but there were others who kept to their principles with inconceivable firmneſs: and theſe conſtituted two branches of rigid epiſcopalians and preſbyterians, compriſed under the general names of *whigs* and *tories*; in regard the firſt join the *tories*, and the latter the *whigs*.

The former conſiſted of rigid churchmen, who were againſt the leaſt change in the diſcipline of the church, while the more moderate among the eccleſiaſtical *tories* were leſs ſcrupulous and obſtinate, and may be called the low or moderate churchmen. See *High* CHURCH and NON-JURORS.

The latter were the rigid preſbyterians, who would be contented with nothing leſs than the deſtruction of the hierarchy, while the more moderate among them would have been ſatisfied with much leſs, and put up, ſays Mr. Rapin, with a bare toleration.

From what has been obſerved, we may conclude, that as the names *tory* and *whig* have a regard to two different objects, they are equivocal, and of conſequence ought never to be applied without expreſſing in which ſenſe it is done—for the ſame perſon may be, in different reſpects, both *whig* and *tory*.

For the reſt, the general motives that have formed and kept up the two parties, appear, in the main, to be no other than the private motives of particular perſons: ſelf-intereſt is the primum mobile of their actions; ever ſince the riſe of theſe factions, each has ſtruggled earneſtly to get the advantage over the other; inaſmuch as from ſuch ſuperiority accrue places, and honours, and promotions, &c. which the prevailing party uſually diſtributes among its own members, excluſive of the contrary party.

There are, however, men belonging to each of theſe parties, though the diſtinction is almoſt worn out, who act from conviction: ſome of whom are for the extenſion, and others for the limitation of royal prerogative, with a view to the good of the ſtate, as their principles lead them to form different notions of the moſt effectual method of promoting it. The names, it is true, are almoſt ſunk into oblivion; but the operation of the diſtinguiſhing ſentiments of *whigs* and *tories* is diſcoverable in every period of the Engliſh hiſtory: and the true intereſt of a limited monarchy, always inſeparably connected with the rights of the people, renders the diſtinction of importance, and ſhould prevent its ever being diſregarded.

It is with the *whigs* and *tories* on thoſe points, which have diſcriminated the two parties, ſays Dr. Gregory Sharpe, as it is with all other ſects of men under the agitation of hope and fear, ambition and intereſt; they tighten or relax their principles as ſuits beſt their convenience. When the *tories* have had the exerciſe of the powers of the prerogative, they have been eager to extend thoſe powers; when the edge has been turned againſt them, they have been as eager in the defence of popular liberty: and in like manner the *whigs*, who withſtood the ſtorm, have melted in the ſun-ſhine, ſo that in point of court complaiſance, the adminiſtrations of the one have differed very little from thoſe of the other. Holberg's Int. to Univerſal Hiſtory, by Sharpe, p. 260.

As to the characters commonly attributed to the *whigs* and *tories*; the *tories*, ſays M. Rapin, appear fierce and haughty: they treat the *whigs* with the greateſt contempt, and even ſometimes with rigour, when they have the advantage over them: they are very hot and vehement, and proceed with a rapidity which yet is not always the effect of heat and tranſport, but has its foundation ſometimes in good policy: they are very ſubject to change their principles, as their party prevails, or is humbled.

If the rigid preſbyterians prevailed in the *whig* party, it would not be leſs hot and zealous than that of the *tories*; but it is ſaid they have not the direction thereof; which gives room to affirm, that thoſe at the head of the *whig* party are much more moderate than the chiefs of the *tories*: add, that they uſually conduct themſelves on fixed principles, proceed to their end gradually, and without violence; and their ſlowneſs is not leſs founded on good policy than the haſtineſs and precipitation of the *tories*. Thus much, ſays our author, may be ſaid to the advantage of the moderate *whigs*, that, in the general, they maintain a good cauſe, viz. the conſtitution of the government as by law eſtabliſhed.

TORMENTIL, *tormentilla*, in *Botany*, a genus of the *icoſandria polygynia* claſs. Its characters are theſe: the flower has a plain empalement of one leaf, divided into eight ſegments at the top; it has four oval heart-ſhaped petals, whoſe tails are inſerted in the empalement; and many awl-ſhaped ſtamina alſo inſerted in the empalement, terminated by ſingle ſummits; it has eight ſmall germina collected in a head, which have ſlender ſtyles the length of the germina, inſerted in their ſides, and crowned by obtuſe ſtigmas; the germina turn to a fruit, containing many ſmall naked roundiſh ſeeds included in the empalement. There are two ſpecies.

The common *tormentil*, with an erect ſtalk, grows on dry paſtures and commons in moſt parts of England;

and the roots have been frequently uſed for tanning leather, in places where oak bark is ſcarce.

It is a ſmall trailing plant, and the leaves grow about ſeven at a joint; the flowers are ſmall but of a lively yellow; the root is generally crooked and knotty, brown or blackiſh without and within, of a very aſtringent taſte, and to be choſen from the druggiſts large, plump, and freſh dried. It is a cordial and a very valuable aſtringent; it makes a very good addition to the common white drink, changing it to a red colour and increaſing its virtue. It gives out its aſtringency both to water and rectified ſpirit, but moſt perfectly to the latter: the extracts, particularly the ſpirituous, obtained by inſpiſſation, are intenſely ſtypic. It is generally given in decoction: an ounce and a half of the powdered root may be boiled in three pints of water to a quart, adding, toward the end of the boiling, a dram of cinnamon: of the ſtrained liquor, ſweetened with an ounce of any agreeable ſyrup, two ounces or more may be taken four or five times a day. Lewis.

TORMINA, in *Medicine*, a term ſometimes uſed to expreſs pains in the general; but more particularly a ſpecies of pain, called *tormina ventris*, or *alvi*, in Engliſh, the GRIPES.

Young children are very often troubled with gripes; it is upon this account, that nurſes, in order to prevent or remedy them, uſually mix with their ſpoon-meats, a little brandy, or ſome carminative ſeeds, as caraway-ſeeds, &c.

Some children breed their teeth with violent gripes, which are apt to bring on convulſions of the bowels. See *Diſtemperatures of* INFANTS.

In adults, the dry gripes are uſually cured by the exhibition of warm cathartics, ſuch as tincture of hiera picra, elixir ſalutis, tincture of rhubarb, &c. with the aſſiſtance of opiates.

TORNADO, or TURNADO, a ſudden and violent guſt of wind riſing ſuddenly from the ſhore, and afterwards veering round all points of the compaſs like a hurricane; very frequent on the coaſt of Guinea. See WHIRLWIND.

TORNESOL. See TURNESOL.

TORPEDO, *cramp-fiſh*, or *electric ray*, the RAJA *torpedo* of Linnæus, in *Ichthyology*, a ſea-fiſh, famed both among the ancient and modern naturaliſts, for a remarkable numbneſs wherewith it ſtrikes the arm of ſuch as touch it.

The *torpedo* is a flat fiſh, much of the figure of the thornback; its greateſt breadth is generally about two thirds of its length, though the proportion varies in thoſe of different places; the weight of one, that meaſured four feet in length and two feet and a half in breadth, was fifty-three pounds avoirdupois; they are found, however, of different ſizes, uſually from ten to ſixty, ſeventy, and even eighty pounds weight on our own ſhores; the tail is pretty thick and round; the caudal fin broad and abrupt; the head and body indiſtinct, but nearly round; thick in the middle and attenuating to extreme thinneſs on the edges; below the body, the ventral fins form on each ſide a quarter of a circle; the two dorſal fins are placed on the trunk of the tail; the eyes are ſmall and placed near each other, behind each is a round ſpiracle, with ſix ſmall cutaneous rays on their inner circumference; the mouth ſmall, and teeth minute and ſpicular; there are five openings on the gills, as in others of the ſame genus; the ſkin is every where ſmooth, cinereous, brown above, and white beneath. See *Tab.* V. *of Fiſh*, Nº 59.

This ſpecies is found in the Mediterranean, on the Atlantic coaſt of France, in the Engliſh ſeas, particularly at Torbay, near Waterford on the coaſt of Ireland, and in other places. See Anſon's Voyage, p. 266.

It is generally taken with the trawl, but an inſtance occurs of its taking a bait, which vindicates a fine account which Oppian has left us of this fiſh. It commonly lies in water about the depth of forty fathoms, in company with the congenerous rays; but its more frequent and favourite ſituation is the ſand, in which it will bury itſelf by flapping its extremities, and throwing the ſand in a light ſhower over its back. In this ſituation the *torpedo* gives his moſt forcible ſhock, which throws down the aſtoniſhed paſſenger, who inadvertently treads upon him. The food of the *torpedo* is fiſh, and they probably ſtupify their prey by the ſhock they give them; and yet the ſea-leech and common ſea-crab will venture to annoy them.

This fiſh is ſo far amphibious as to live in air twenty-four hours, and but little longer in freſh water. The beſt method of preſerving them is in well-boats kept in ſalt water, and not put into much motion.

Rondelet ſpeaks unfavourably of the *torpedo* as food, and tells us, that at Venice the prefect of health forbids it to be ſold in the market; but in deeming it wholeſome food we have the ſanction of Hippocrates and Galen, and it is ſold in the markets of France. The electrical organs, indeed, which make one half of the animal, though wholeſome, are an inſipid mucilage; but its muſcular part is, at leaſt, as palatable as the fleſh of the other rays: among theſe the old and overgrown are always in little requeſt.

The *torpedo* brings forth its young at the autumnal equinox, as affirmed by Ariſtotle, though queſtioned by Lorenzini. In one diſſected at La Rochelle, on the tenth of September, were found in the matrices ſeveral of the fœtuſes quite formed, and nine eggs in no ſtate of forwardneſs; ſuperfetation ſeems to be, therefore, a property of this fiſh: the eggs ſeemed to be deſtined for the ſpring brood, as they produce about the vernal as well as the autumnal equinox. There may be alſo another production at midſummer, but it principally takes place at the two equinoxes.

Upon touching this fiſh with the fingers, it frequently, though not always, happens, that the perſon feels an unuſual painful numbneſs, which ſuddenly ſeizes the arm up to the elbow, and ſometimes to the very ſhoulder and head.

The pain is of a very particular ſpecies, and is not to be deſcribed by any words; yet meſſieurs Lorenzini, Borelli, Redi, and Reaumur, who all felt it ſeverely, obſerve it to bear ſome reſemblance to that painful ſenſation felt in the arm, upon ſtriking the elbow violently againſt a hard body: though M. Reaumur aſſures us, this gives but a very feint idea of it.

Its chief force is at the inſtant it begins; it laſts but a few moments, and then vaniſhes entirely. If a man do not actually touch the *torpedo*, how near ſoever he holds his hand, he feels nothing: if he touch it with a ſtick, he feels a feint effect: if he touch it through the interpoſition of any pretty thin body, the numbneſs is felt very conſiderably; if the hand be preſſed very ſtrong againſt it, the numbneſs is the leſs, but ſtill ſtrong enough to oblige a man ſpeedily to let go.

Oppian affirms, that it will benumb the aſtoniſhed fiſherman, even through the whole length of line and rod. See the paſſage cited and tranſlated by Pennant, Brit. Zool. vol. iii. p. 39.

But great as are the powers of this fiſh when in vigour, they are impaired as it declines in ſtrength, and totally ceaſe when it expires. The ſhocks in water are apprehended to be near a fourth of the force of thoſe at the ſurface of the water, and not much more than a fourth of thoſe entirely in air. This ſtrange power, with which the *torpedo* is endued, and which we ſhall preſently explain, ſeems to have a double uſe: the one, when it is exerted as a means of defence againſt voracious fiſh, who are by a touch deprived of all power of ſeizing their prey; the other is well explained by Pliny, who tells us, that by the ſame powers it attains its end with reſpect to thoſe fiſh which it wiſhes to enſnare; for, concealing itſelf in the mud, and benumbing the fiſh that are careleſsly ſwimming about, it makes a ready prey of them.

M. Reaumur, having no fiſhes alive to examine what the *torpedo* would do to them, ſhut up a drake in water with it, and after ſome time it was taken out dead.

We ſhall now proceed to give a brief recital of the different theories that have been adopted in order to account for the extraordinary effects of the *torpedo*. This fiſh was early known to the Greeks; it is mentioned, as an eſculent fiſh, by Hippocrates, under the name ναρκη, which ſhews that the ancients had ſome knowledge of its torporific qualities. Plato alſo was acquainted with them, as appears by the humorous compariſon of Socrates to that animal, which he puts into the mouth of Menon. Ariſtotle likewiſe treats of the benumbing or ſtupefying qualities of this fiſh, though he ſeems to have no idea of their being communicated by the intervention of a ſtick, rope, or water.

Theophraſtus, according to Athenæus, obſerved that the *torpedo* conveyed the benumbing ſenſation through ſticks and ſpears into the hands of the fiſhermen that held them. Diphilus, of Laodicea, takes notice that the torpor was occaſioned, not by the whole, but by certain parts of the body of this fiſh: and Hero of Alexandria mentions it as emitting effluvia through braſs and iron, and other ſolid bodies.

Pliny's account, though partly true, is mingled with the marvellous and falſe. Plutarch is more full and juſt; for he repreſents the *torpedo* as not only benumbing all that touch it, but ſtriking a numbneſs through the net into the hands of the fiſhermen, and as even diminiſhing the feeling of thoſe who poured water upon it, if it happened to be laid on the ground alive. He adds, that whilſt the *torpedo* ſwims round his prey, he emits certain effluvia like darts, that firſt affect the water, and then the fiſhes in it, which are thus diſabled from defending themſelves or eſcaping.

Before the days of Galen the *torpedo* was placed alive to parts affected, and particularly for the cure of an obſtinate head-ach, as appears from Scribonius Largus, who lived under Claudian, and from Dioſcorides, who flouriſhed ſoon after. Galen conceived that the *torpedo* acted by a frigorific principle, for as cold occaſions a numbneſs in an animated body, ſo does the ſhock given by that animal. Paulus of Ægina, one of the Galenic ſchool, recommends the oil of the dead fiſh for tempering the hot humour of the gout, and for other ailments that required cooling applications.

Such are the unſatisfactory accounts of the philoſophers and phyſicians of antiquity.

The Abyſſinians, it is ſaid, uſe *torpedos* for the cure of fevers, by tying down the patient to a table, and applying the fiſh ſucceſſively upon all his members, which puts him to cruel torment, but effectually removes his diſeaſe. Bellonius aſſures us, that our own *torpedos* applied to the ſoals of the feet, have proved ſucceſsful againſt fevers.

Oppian, like Diphilus, diſtinguiſhes the parts where the powers of this fiſh peculiarly reſide; theſe he calls λαγονες, the flanks, from which he imagined the animal had a faculty of darting upon other fiſhes certain ſubſtances, called by a name κερκιδες, the meaning of which is obſcure. In the ſixteenth century, ſome members of the Academia del Cimento availed themſelves of their vicinity to the ſea to make experiments on the *torpedo*. Redi began, and was afterwards aſſiſted by Borelli, and Steno the Dane; and Lorenzini, his ſcholar, engaged in the ſame purſuit, and publiſhed a curious treatiſe upon the ſubject. Redi, having endeavoured to diſtinguiſh between the real properties of the *torpedo*, and thoſe erroneouſly aſcribed to it, proceeded to the anatomy of it; and was the firſt who with any accuracy deſcribed thoſe crooked ſubſtances lying on each ſide of the ſpine, near the head, which he conſidered as muſcles (from thence named *muſculi falcati*) that projected, according to him, certain effluvia, occaſioning the ſenſation of numbneſs more or leſs, as the animal was excited to put theſe organs into action. This hypotheſis of the tranſmiſſion of effluvia was immediately embraced by Lorenzini, and afterwards by Claude Perrault. Borelli, not admitting the emiſſion of benumbing particles, referred the ſenſation produced by this fiſh to a certain briſk undulation of the parts touched, which the animal could excite at will.

In 1714, M. Reaumur, being on the coaſt of Poitou, took an opportunity of making ſome experiments on the *torpedo*, which, with the reſult, he communicated to the Royal Academy of Sciences at Paris. His hypotheſis, which was generally received by the ingenious naturaliſts over all Europe, is not very different from that of Borelli; for inſtead of the undefined vibrating parts of the latter, M. Reaumur ſubſtituted muſcles (the *muſculi falcati* of Redi and Lorenzini) which, by the vivacity of their action, impreſſed upon the hand, that touched theſe parts, a ſenſation of numbneſs, owing to the ſtoppage of the progreſſion of the nervous fluid, or a repulſion of the ſame. But he denied, that this impreſſion of numbneſs could be communicated through water, a net, or any other ſoft and yielding ſubſtance; nay, through a ſtick, except a very ſhort one; whereas, it is certain, that the ſhocks of the *torpedo* are not leſs conducted through ſuch media than thoſe from a charged electrical phial.

We have been lately furniſhed, by the experiments and obſervations of John Walſh, eſq. with a theory, much more plauſible and juſt than any above recited, which conſiders the electric fluid as the efficient cauſe of the amazing qualities of the *torpedo*. We ſhall be led to a brief account of the facts on which this theory is founded by the following preliminary remarks.

Soon after the diſcovery of the LEYDEN *phial*, the celebrated profeſſor Allemand applied to M. s' Graveſande, governor of Eſſequibo, for an account of a fiſh in Surinam, reſembling a conger-eel, and poſſeſſing properties ſimilar to thoſe of the *torpedo*; this account was received in 1754, and publiſhed in the ſecond volume of the tranſactions of the ſociety at Haerlem. From this account it appears, that the ſhocks of the fiſh, which were ſo violent, when the fiſh was ſtrong and lively, as to throw a perſon who touched it to the ground, were like thoſe of the electrical fire, but unaccompanied with ſparks of fire; and that the fiſh was a ſpecies of the *gymnotus* of Artedi. In the ſixth volume of the ſame work, we have a more ample relation of the exertions of this animal by M. Vander Lott, dated from Rio Eſſequibo, in 1761. M. Adanſon, about the ſame time with the diſcovery of M. s' Graveſande in America, met with the ſame, or a ſimilar fiſh in the river of Senegal in Africa. The earlieſt account we have of this kind of eel is by M. Richer, recorded by M. du Hamel, in his Hiſtory of the Royal Academy of Sciences for 1677. In the iſland of Cayenne, ſays M. du Hamel, there is a fiſh, not unlike a conger-eel, which, touched with the finger, or even with the end of a ſtick, affects the arm with a numbneſs, and the head with giddineſs, and the eyes with a dimneſs of ſight, which M. Richer had himſelf felt upon making the experiment. See GYMNOTUS.

We are indebted to Mr. Walſh for not only the firſt, but for a numerous ſeries of experiments on the *torpedo*, in order to aſcertain its electrical nature; together with ſome correct and elegant drawings of the entire animal, and of ſome of its principal organs that appeared upon diſſection. Theſe experiments were made in the year 1772, partly at the iſle of Rhé, and partly at Rochelle, in the preſence of the members of the Royal Academy of Sciences at that place. They were conducted in a ſcientific manner, and properly diverſified, and the reſult of them ſatisfactorily eſtabliſhed the *torpedo* in the rank of an electrician, furniſhed with a power over the electric matter; by means of which, he can, without any foreign machinery, and almoſt in an inſtantaneous manner, collect, condenſe, and at his will diſpenſe it to neighbouring bodies, through any of thoſe ſubſtances that are known to be conductors of the electric fluid. The ſenſations occaſioned by the *torpedo* and Leyden phial, in the human frame, are preciſely ſimilar: not only the ſhock, but the numbing ſenſation ſometimes given by the animal, may be exactly imitated with the phial, by means of Lane's electrometer; the regulating rod of which, to produce the latter effect, muſt be brought almoſt into contact with the prime conductor which joins the phial. The firſt experiment of Mr. Walſh diſcovered the electrical quality of the *torpedo*, by his conveying its effects through the ſame conductors with his electricity, ſuch as metals, water, and animal fluids, and by intercepting it by the ſame non-conductors, as glaſs and ſealing-wax. Beſides, one of the moſt brilliant of his diſcoveries was, that this animal not only could accumulate in one part a large quantity of electrical matter, but was furniſhed with a certain organization, diſpoſed in the manner of the Leyden phial: thus, while one ſurface of the electrical part (e. g. that on the back) was charged with this matter, or in a poſitive ſtate, the other ſurface (that on the belly) was deprived of it, or in a negative ſtate; ſo that the equilibrium could be reſtored, by making a communication between the two ſurfaces by water, the fluids of the human body or metals, in the ſame manner as by forming a circuit between the inſide and outſide ſurfaces of the Leyden phial. A living *torpedo* was laid on a table, upon a wet napkin; round another table ſtood five perſons inſulated; and two braſs wires, each thirteen feet long, were ſuſpended from the ceiling by ſilken ſtrings. One of the wires reſted by one end upon the wet napkin, the other end was immerſed in a baſon full of water, placed on a ſecond table, on which ſtood four other baſons full of water. The firſt perſon put a finger of one hand into the water in which the wire was immerſed, and a finger of the other hand into the ſecond; and ſo on ſucceſſively till all the five perſons communicated with one another by the water in the baſons. In the laſt baſon one end of the ſecond wire was dipped, and with the other end Mr. Walſh touched the back of the *torpedo*, when the five perſons felt a ſhock, differing in nothing from that of the Leyden experiment, except in being weaker. Mr. Walſh, who was not in the circuit, was not affected. This experiment was ſucceſsfully repeated ſeveral times, even with eight perſons From this experiment it is evident, that the action of the *torpedo* is communicated through metals and water, or, in general, through the ſame media that tranſmit the electrical concuſſion. It follows, likewiſe, that the upper and under parts of the animal, like the upper and under ſurfaces of an electrified plate of glaſs, are in different ſtates; for a perſon who touches only the upper or the under ſurface of the electric organs, will not receive the ſhock of the *torpedo*. This action evidently depends on the will of the animal, who, however, ſcarce exhibits any other ſenſible motion or effort at the time of exerting it than a depreſſion or winking of his eyes. The ſame motion is obſerved likewiſe to accompany his fruitleſs attempts to tranſmit a ſhock through non-conductors. The ſtock of electrical matter which the *torpedo* poſſeſſes appears to be very conſiderable: a *torpedo*, when inſulated, has given to Mr. Walſh, inſulated likewiſe, no leſs than fifty ſhocks in the ſpace of a minute and a half.

Such are the operations performed by the *torpedo* in air. When a large fiſh, very liberal of his ſhocks, was held in water, with one hand on his breaſt and another on his back, he gave the operator ſhocks of the ſame kind as before, but about one fourth of the ſtrength of thoſe given in air. At the very inſtant of raiſing him out of the water, he conſtantly gave a very violent ſhock, and another, nearly as violent, when his lower ſurface firſt touched the water on dipping him into it. On briſkly and alternately plunging him a foot deeper into water, and raiſing him an equal height into air, beſides one or two ſhocks which he gave during the ſhort time he was wholly in the water, and thoſe which he gave at the ſurface, he conſtantly gave at leaſt two when he was wholly in air: ſo that Mr. Walſh eſtimates that he gave above one hundred ſhocks during the minute in which the experiment was performed. The concluſions drawn from Mr. Walſh's experiments were farther confirmed by ſome experiments made on the *torpedo* at Leghorn, by Dr. Ingenhouz in 1773.

Mr. Walſh obſerves, that the electricity of the *torpedo* reſides in thoſe parts that are called his electric organs; the parts bordering on theſe acting, more or leſs, as conductors, either through their ſubſtance, or by their ſuperficies: and of theſe, the parts which conduct the beſt are the two great lateral fins bounding the organs outwardly, and the ſpace lying between the two organs inwardly. All below the double tranſverſe cartilages ſcarcely conduct at all, unleſs when the fiſh is juſt taken out of water and is ſtill wet, the mucus, with which he is lubricated, ſhewing itſelf, as it dries, to be of an inſulating nature; and the organs themſelves, when uncharged, appeared to be, not interiorly but rather exteriorly, as Mr. Walſh ſuppoſes, conductors of a ſhock.

We are indebted to Mr. John Hunter for an accurate anatomical deſcription of the *torpedo*, accompanied with two excellent drawings, who has thus ſupplied us with a valuable addition to the anatomical examination of this animal by Redi, Steno, and Lorenzini. From his account we learn, that the electric organs are placed on each ſide of the cranium and gills, reaching from thence to the ſemicircular cartilages of each great fin, and extending longitudinally from the anterior extremity of the animal to the tranſverſe cartilage, which divides the thorax from the abdomen; and within theſe limits they occupy the whole ſpace between the ſkin of the upper and under ſurfaces, being thickeſt at the edges near the centre of the fiſh, and becoming gradually thinner towards the extremities. Each organ, at its inner longitudinal edge, is unequally hollowed, and the outer longitudinal edge is a convex elliptical curve. The anterior extremity of each makes the ſection of a ſmall circle, and the poſterior extremity makes nearly a right angle with the inner edge. Each organ is attached to the ſurrounding parts by a cellular membrane, and alſo by ſhort and ſtrong tendinous fibres, which paſs directly acroſs from its outer edge to the ſemicircular cartilages. Each organ conſiſts of a congeries of columns, irregularly hexagonal, or pentagonal, or quadrangular, placed parallel to each other, divided by horizontal partitions, and extending from the breaſt, on both ſides, perpendicularly upwards, to the back of the animal. Mr. Hunter, in the diſſection of theſe electric organs, obſerved an uncommonly liberal diſtribution of nerves to theſe parts; ramifying in every direction between the columns, and ſending ſmall branches upon each of the numerous partitions into which every one of them is divided. Nerves are given to parts either for ſenſation or action; but the extraordinary number and magnitude of theſe nerves, which do not ſeem neceſſary for any ſenſation that can be ſuppoſed to belong to the electric organs, and which cannot be thought ſubvervient to muſcular action, as they exceed the proportion allowed to the moſt active animals, induce him to conclude, that they are in ſome manner concerned in the formation, collection, or management of the electric fluid.

Although Mr. Walſh's experiments leave little room to doubt, that the ſhock given by the *torpedo* is produced by the ſame agent that gives the ſhock in an electrical exploſion; yet there are ſome circumſtances which it is difficult to reconcile to the ſuppoſition that it is produced by the electric fluid. One of theſe difficulties is, that the fiſh is able to give a ſhock when he is in the water, and conſequently ſurrounded by a medium, through which the electric fluid is known to be tranſmitted with the greateſt facility. It has likewiſe been difficult to conceive why the ſhock of the *torpedo*, ſuppoſing it to be produced by the electric fluid, ſhould not, like that of an electrified jar, be accompanied with the appearance of light or ſparks, or ſhould not exhibit ſome ſigns of attraction or repulſion. But from Mr. Walſh's experiments it appears, that no light could poſſibly accompany the ſhock of the *torpedo*, becauſe this ſhock could never be made to paſs through the leaſt ſenſible ſpace of air, or the ſmalleſt interruption made in the circuit; not even through the imperceptible interval between the links of a ſlender braſs chain, apparently in contact with each other, nor over an almoſt imperceptible interval or ſlit formed by cutting through a ſlip of tin-foil paſted on ſealing wax, which conſtituted part of the circuit; nor are the moſt delicate pith-balls, or other light bodies, in what manner ſo ever applied, in the leaſt degree affected, at the time of the ſhock. Mr. Walſh obſerves that, with reſpect to the pith-balls, it is not ſurpriſing that no motion could be diſcovered in them, as all his experiments fully ſhewed that there was no gradual accumulation of the electric fluid, as in the caſe of charged glaſs; but that it was collected or condenſed in the very inſtant of the exploſion, by a ſudden energy of the animal. He alſo explains this and the other differences between the phenomena of the Leyden phial, and of the *torpedo*, or the abſence of light and ſound, in the experiments made with the latter, by the following conſiderations.

In a large fiſh, the number of columns above mentioned, contained in one electric organ, was found to be no leſs than eleven hundred and eighty-two. This immenſe collection of cylinders Mr. Walſh conſiders as ſomewhat analogous to a large number of jars in an electric battery, and as containing a very large area in conſequence of the great number and extenſive ſurface of the columns. Now it is known, from experiments made with artificial electricity, that though the electric matter violently condenſed, or crouded into a very ſmall phial highly charged, is capable of forcing a paſſage through an inch of air, and that it will afford, in a very conſpicuous manner, the phenomena of light, ſound, attraction, and repulſion; yet if the quantity, thus condenſed, be expanded and rarefied, by communicating it to, or dividing it amongſt a large number of jars, whoſe coated ſurfaces conſtitute a ſpace, e g. four hundred times larger than that of the phial: this ſame quantity of electric matter, thus dilated, will now yield only the fainter, or, if they may be ſo called, the negative phenomena of the *torpedo*. It will not now be capable of paſſing over the one hundredth part of that inch of air, which, in its condenſed ſtate, it before ſprung through with eaſe; it will not now be able to jump over the little gap made in its track by the interſection of the tin-foil; no ſpark, ſound, or attraction of light bodies, will now be perceived: and yet this portion of electric matter, in this dilated ſtate, and with its elaſticity thus diminiſhed, will, like that of the *torpedo*, to effect its equilibrium, run through a conſiderable circuit of different conductors, perfectly continuous, and will communicate a ſenſible ſhock.

The hon. Mr. Cavendiſh has endeavoured to remove the difficulties above ſtated, firſt by ſome ingenious reaſonings *a priori*, and afterwards by others drawn from the phenomena preſented by an artificial *torpedo* which he conſtructed, and by means of which he has imitated the effects produced by the living animal. With reſpect to the difficulty of conceiving how the *torpedo* can give a ſhock in water, he obſerves that thoſe electricians are miſtaken, who ſuppoſe that the electric fluid will only paſs along the ſhorteſt and beſt conductors. When different circuits are made (e. g. by means of iron wire, and the human body) between the poſitive and negative ſides of a charged jar, ſome parts of the electric fluid will paſs along each of them; though the greater quantity will paſs through thoſe in which it meets with the leaſt reſiſtance. Thus, a perſon may receive a part of the ſhock given by the *torpedo* in water, by holding one hand on the lower ſurface of an electric organ, and the other on the upper, or by applying his hands to other parts of the fiſh, or by dipping them into the water, ſo that one hand is nearer to the upper ſurface of the electric organs than the other; and yet the greater part of the ſhock or charge may paſs at the ſame time in all directions over the ſurface of the fiſh, or through the ſubſtance of its body, or through the water contiguous to it. With reſpect to the other difficulties, he ſolves them by reaſonings ſimilar to thoſe urged by Mr. Walſh, and by concurring experiments. Mr. Cavendiſh has confirmed theſe reaſonings by means of his artificial *torpedo*, which is a piece of wood ABCFGDE (*Tab. V. Electricity, fig.* 45.), of which the part ABCDE is cut into the ſhape of the *torpedo*, and is 16 ¼ inches long from A to D, and 10 ¾ inches broad from B to E: the part CFGD is forty inches long, and ſerves for a handle. MN*nm* is a glaſs tube let into a groove cut in the wood: W*w* is a piece of wire paſſing through the glaſs tube, and ſoldered at W to a thin piece of pewter, R*r*, lying flat on the wood, and intended to repreſent the upper ſurface of the electric organs: on the other ſide of the wood there is placed ſuch another glaſs tube, with a wire paſſing through it, and ſoldered to another piece of pewter like R*r*, intended to repreſent the lower ſurface of thoſe organs. The whole part ABCDE is covered with a piece of ſheepſkin leather. In making experiments with this apparatus,

ratus, after thoroughly ſoaking it in water of the ſaltneſs of the ſea, made by diſſolving one part of common ſalt in thirty of water, the end of one of the wires is faſtened to the negative ſide of a large battery, and when it is ſufficiently charged, the poſitive ſide is touched with the end of the other wire; by which means the battery will be diſcharged through the *torpedo*. In experiments with this *torpedo* under water, Mr. Cavendiſh uſes a trough, ABCDE (*fig.* 46.) the length BC of which is nineteen inches, the depth AB fourteen inches, and the breadth thirteen inches. The battery, which he uſed, was compoſed of forty-five jars, of very thin glaſs, diſpoſed in ſeven rows, and ſo contrived, that he could uſe any number of rows at pleaſure. Mr. Cavendiſh was enabled, by means of this apparatus, when immerſed in water, to give ſhocks much reſembling thoſe given by the living animal. He felt ſimilar concuſſions likewiſe when he dipt his hands in the water, at the diſtance of two or three inches from it: and as it is affirmed, that a perſon accidentally treading on the living fiſh, when buried in the ſand, is ſometimes ſhocked by it, he imitated this experiment with his artificial *torpedo*, and received ſhocks from it. The events, indeed, in the greater part of his experiments, too numerous to be recited in this place, with this artificial fiſh, relative to the ſhock, ſeem to agree ſufficiently with thoſe made by Mr. Walſh with the living animal. The experiments which Mr. Cavendiſh made with this machine, relative to the circumſtance of the ſhock of the real *torpedo* not being able to paſs through any ſenſible ſpace of air, appear likewiſe to correſpond with Mr. Walſh's trials. A piece of ſealing wax covered with tin foil freely conducted a ſhock from the artificial *torpedo*; but on making as ſmall a ſeparation as poſſible through the metal with a penknife, the ſhock would not paſs. See on the ſubject of this article for Mr. Walſh's papers, Phil. Tranſ. vol. lxiii. part ii. p. 461. Id. vol. lxiv. part ii. p. 464. For Mr. Hunter's paper, Id. vol. lxiii. part ii. p. 481. For Dr. Ingenhouſz's, Id. vol. lxv. part i. p. 1. For Mr. Cavendiſh's, Id. vol. lxvi, part i. p. 169. See alſo ſir John Pringle's Six Diſcourſes, &c. by Dr. Kippis, p. 45, &c.

TORQUATA, in *Zoology*, a name given by many authors to the common or water-ſnake, from the remarkable ring it has about its neck. See Natrix.

TORQUE, in *Heraldry*, a round roll of cloth twiſted and ſtuffed; ſuch is the bandage frequently ſeen in armories about the heads of Moors, ſavages, &c.

It is always of the two principal colours of the coat. The *torque* is the leaſt honourable of all the enrichments worn on the helmet by way of creſt.

TORQUILLA, in *Ornithology*, the name of a ſpecies of wood-pecker, more commonly known by the name of *jynx*, and called in Engliſh the wry-*neck*.

TORREFACTION, formed of *torrefacere*, *to roaſt*, in *Metallurgy*. See Roasting.

Torrefaction, in *Pharmacy*, a kind of roaſting, or aſſation, wherein a drug is laid to dry on a metalline plate placed over or before coals, till it become friable to the fingers.

Torrefaction is particularly uſed, when, after reducing ſome drug, as rhubarb, or myrobalan, into powder, it is laid on an iron or ſilver plate, and that placed over a moderate fire till the powder begins to grow darkiſh; which is a mark, that thoſe remedies have loſt their purgative virtue, and have aquired a more aſtringent one.

Formerly they uſed to *torrefy* opium, to get out ſome malignant parts fancied to be in it, before they dared uſe it in medicine; but the effect was, that its volatile ſpirits and ſulphur, wherein its greateſt virtue conſiſts, were hereby evaporated.

TORRENT, Torrens, in *Hydrography*, a temporary ſtream of water, falling ſuddenly from mountains wherein there have been great rains, or an extraordinary thaw of ſnow; ſometimes making great ravages in the plains.

TORRICELLIAN, a term very frequent among phyſical writers, uſed in the phraſes, *Torricellian tube*, or *Torricellian experiment*, on account of the inventor, Torricelli, a diſciple of the great Galileo.

Torricellian *tube*, is a glaſs tube, open at one end, and hermetically ſealed at the other, about three feet long, and one tenth of an inch in diameter.

Torricellian *experiment*, is performed by filling the *Torricellian* tube with mercury, then ſtopping the open orifice with the finger, inverting the tube, and plunging that orifice into a veſſel of ſtagnant mercury. This done, the finger is removed, and the tube ſuſtained perpendicular to the ſurface of the mercury in the veſſel.

The conſequence is, that part of the mercury falls out of the tube into the veſſel, and there remains only enough in the tube to fill from twenty-eight to thirty-one inches of its capacity, above the ſurface of the ſtagnant mercury in the veſſel.

Thoſe twenty-eight, &c. inches of mercury are ſuſtained in the tube by the preſſure of the atmoſphere on the ſurface of the ſtagnant mercury; and according as the atmoſphere is more or leſs heavy, or as the winds, blowing upwards or downwards, heave up or depreſs the air, and ſo increaſe or diminiſh its weight and ſpring, more or leſs mercury is ſuſtained from twenty-eight inches to thirty-one.

There is a caſe, however, firſt taken notice of by Huygens (Journal de Sçavans, 1672, p. 111.) in which, if a glaſs tube of a ſmall bore ſeventy or eighty inches in length, be well cleaned, and filled with mercury well purged of air, &c. in the manner deſcribed under *barometer*, and then carefully inverted into a veſſel of ſtagnant mercury, the mercury, inſtead of coming down to the height juſt mentioned, at which the preſſure of the atmoſphere is able to ſuſtain it, will continue to fill the tube, and ſtand at the height of ſeventy-five inches: but by ſtriking the tube, or gently ſhaking it, the mercury will deſcend and ſettle at its proper height, as in the common barometer. This phenomenon is explained on the principles of the attraction of cohesion, which acts moſt powerfully in contact: for when the tube is clean, and the mercury well purged of air, many parts of the mercury, which, by the interpoſition of ſmall air-bubbles, would be kept from touching the tube, are brought into contact with it, and thoſe particles that are in the middle of the column, adhere to thoſe that are next to the ſides of the tube, and thus form a compact column. Beſides, the increaſe of attracting ſurface at the arched top of the tube, by means of which a greater number of mercurial particles may come into contact with the glaſs than thoſe that recede from the contact of one to another, will alſo give an advantage to the attraction of the glaſs, and cauſe the mercury, immediately in contact with it, to adhere to it. That the attraction of coheſion, as already explained, is the cauſe of this phenomenon is plain, becauſe the experiment will not ſucceed when the mercury is not well purged of its air, nor even then if the bore of the tube is large.

The *Torricellian experiment* makes what we now call the barometer.

Torricellian *vacuum*, is the vacuum produced by filling a tube with mercury, and allowing it to deſcend to ſuch a height as is counterbalanced by the preſſure of the atmoſphere, as in the *Torricellian experiment* and barometer. For the method of rendering this vacuum luminous by electricity, ſee Electricity, Exp. 17.

TORRID *Zone*. See Zone.

TORT, in *Law*, denotes injuſtice, or injury, as *de ſon tort meme, in his own wrong, &c.*

Hence, alſo *tort-feaſor*, &c. The word is pure French, where it ſignifies the ſame.

Actions upon *torts*, or wrongs, are all *perſonal* actions for treſpaſſes, nuiſances, aſſaults, defamatory words, and the like.

Tort, *executor de ſon*. See Executor.

TORTOISE, *teſtudo*, in the Linnæan ſyſtem of *Zoology*, makes a diſtinct genus of animals, of the claſs of *amphibia*, and order of *reptiles*: the characters of which are, that the body has four feet, is defended by a thick cruſt, and is furniſhed with a tail; the mouth has naked mandibles without teeth.

The *tortoiſe* is a well known animal, of which Linnæus enumerates fifteen ſpecies, among which are the coriaceous *ortoiſe*, the green turtle, hawks-bill turtle, common Grecian or African *tortoiſe*, teſſelated *tortoiſe*, &c. The ſhell, which covers this creature's body, is compoſed of a number of variouſly ſhaped pieces, uſually pentangular; theſe are affixed to a bony ſubſtance, like the ſkulls of ſome animals, which ſurrounds the animal, and has two apertures; one before, which gives way to the going out of the head and the fore-legs; and the other behind, through which the hinder legs and thighs are protruded.

This bony ſubſtance is, in different parts, of very different thickneſſes, in ſome places an inch and half, in others not an eighth part of an inch. It is compoſed of two pieces, the one covering the creature's back, the other its belly; theſe are joined at the ſides with very ſtrong ligaments, but not ſo rigidly cloſed but that they eaſily give way to the creature's motions. Ray's Syn. Quad. p. 253.

This is the general order of nature in the ſtructure of the ſhell of this creature; of which we have ſeveral ſpecies in different parts of the world, the ſhells of which are of different value.

The ſea *tortoiſe* is generally called *turtle*, which ſupplies a well-known delicious food. Dr. Parſons has remarked a ſingularity in the ſtructure of the wind-pipe of the *land-tortoiſe*, which for a few inches from the epiglottis is ſingle, but ſoon divides into two; and as it deſcends with the œſophagus, forms a folded ring outward on each ſide, and turns down again to enter the lungs; ſo that this animal has the advantage of a double aſpera arteria, with a volution in each; which ſhews that this proviſion is intended to contain a greater portion of air than ordinary, while he is under-ground in winter. It has been obſerved likewiſe, that the principal uſe of the lungs in *tortoiſes* is to render them ſpecifically lighter or heavier in the water, by their inflation and compreſſion at pleaſure, as fiſhes do by their ſwimming bladders; and ſuch a power of long inſpiration ſeems to be as neceſſary in the land-*tortoiſe* as in that of the ſea; becauſe, in many countries where they breed, they are known to go into the ground, and lie concealed for ſeveral months, and ſeveral ſpecies of land-*tortoiſes* go into ponds or canals in gardens, where they are kept, and remain long under water. Phil. Tranſ. vol. lvi. p. 213.

In generation, Rondeletius obſerves, that the embraces of the male and female *ſea-tortoiſes* continue for a whole lunar month; and that they ſquirt water out of the noſtrils in the ſame manner as the dolphin. On the Braſilian ſhore they are ſaid to be ſo big as ſometimes to dine fourſcore men; and that in the Indian ſea the ſhells ſerve the natives for boats. De Laet notes, that in the iſland of Cuba they are of ſuch a bulk, that they will creep along with five men on their backs.

TORTOISE-*ſhell*, the ſhell, or rather ſcales of the teſtaceous animal, called a TORTOISE; uſed in inlaying, and in various other works, as for ſnuff-boxes, combs, &c. Mr. Cateſby obſerves, that the hard ſtrong covering, which encloſes all ſorts of tortoiſes, is very improperly called a ſhell; being of a perfect bony contexture; but covered on the outſide with ſcales, or rather plates, of an horny ſubſtance: which are what the workmen call *tortoiſe-ſhell*. Phil. Tranſ. N° 438, p. 117.

There are two general kinds of *tortoiſes*, viz. the land, and *ſea-tortoiſe*; *teſtudo terreſtris*, and *marina*.

The *ſea-tortoiſe*, again, is of ſeveral kinds, but it is the caret, or *teſtudo imbricata* of Linnæus alone, which furniſhes that beautiful ſhell, ſo much admired in Europe.

The ſhell of the caretta, or hawkſbill tortoiſe, is thick; and conſiſts of two parts, the upper, which covers the back, and the lower the belly: the two are joined together at the ſides by ſtrong ligaments, which yet allow of a little motion. In the fore-part is an aperture for the head and fore-legs, and behind for the hind legs and tail. It is the under-ſhell alone that is uſed: to ſeparate it, they make a little fire beneath it, and, as ſoon as ever it is warm, the under ſhell becomes eaſily ſeparable with the point of a knife, and is taken off in laminæ or leaves. The whole ſpoils of the caret conſiſt in thirteen leaves or ſcales, eight of them flat, and five a little bent: of the flat ones, there are four large ones, ſometimes a foot long, and ſeven inches broad.

The beſt *tortoiſeſhell* is thick, clear, tranſparent, of the colour of antimony, ſprinkled with brown and white; when uſed in marquetry, &c. the workmen give it what colour they pleaſe by means of coloured leaves, which they put underneath it.

Tortoiſe-ſhell colour may be given to horn, by firſt preſſing the horn into proper plates or ſcales, and tempering two parts of quick-lime and one of litharge to the conſiſtence of a ſoft paſte with ſoap-ley. Let this paſte be laid over all the parts of the horn, except ſuch as are proper to be left tranſparent, and thus let it remain till it be thoroughly dry; when the paſte being bruſhed off, the horn will be found partly opake and partly tranſparent, like *tortoiſe ſhell*. Semi-tranſparent parts may be added, by mixing whiting with ſome of the paſte to weaken its effect in particular places, by which means ſpots of a rediſh brown will be produced, which will increaſe the beauty of the work as well as its reſemblance of real *tortoiſe-ſhell*. Handmaid to the Arts, vol. i. p. 518.

TORTOISE, in the *Military Art*. See TESTUDO.

TORTURA, a word appropriated by many medical writers, to expreſs only the diſtortions of the face, and particularly of the mouth, in convulſions.

TORTURE, a grievous pain inflicted on a criminal, or perſon accuſed, to make him confeſs the truth.

The forms of *torture* are different in different countries. In ſome they uſe water, in others iron, in ſome the wheel or rack, in ſome the boot, thumbkins, &c. See RACK, BOOT, &c.

In England the uſe of all *torture* is aboliſhed, both in civil and criminal matters, and even in caſes of high-treaſon.

In France the *torture* is not generally practiſed in civil matters; but by an ordonnance of 1670, if a perſon be accuſed of a capital crime, he may be put to the queſtion, i. e. to the *torture*, if there be a conſiderable proof againſt him, and yet not proof enough to convict him.

There are two kinds of *torture*: the one *preparatory*, appointed before ſentence paſſed; the other *definitive*, decreed by a ſentence of death.

The *preparatory torture* is ordered *manentibus indiciis*; ſo that, if the accuſed doth not confeſs, he cannot be condemned to death, but only *ad omnia citra mortem*.

The *definitive torture* is that which a condemned criminal is put to, to make him confeſs his accomplices. The ordinary *torture* is given at Paris with ſix pots of water, and the little treſtle; and the extraordinary, with ſix other pots, and the great treſtle.

The *torture*, ſays M. Bruyere, is a ſure expedient to deſtroy an innocent perſon of a weak complexion, and to ſave a criminal of a robuſt one. It was a noble ſaying of an ancient, *They who can bear the torture will lie, and alſo they who cannot bear it.*

The marquis Beccaria (chap. 16) with exquiſite raillery propoſes this problem: the force of the muſcles and the ſenſibility of the nerves of an innocent perſon being given, it is required to find the degree of pain neceſſary to make him confeſs himſelf guilty of a given crime.

TORUS, in *Architecture*. See TORE.

TORUSCULA, a word uſed by ſome medical writers to expreſs a drop.

TORY. See TORIES.

TORYNE, in *Pharmacy*, the name of a kind of ſpatula intended for the ſtirring up of the ingredients of decoctions while boiling.

TORYNETOS, a name given by ſome to a mixture of bread and water boiled together, whether meant as a kind of a panada, or for a pultice.

TOTANO, or TOTANUS, in *Ornithology*, the name of a bird, common in the Italian markets, and more uſually known by the name of VETOLA.

The *totanus* of Linnæus is a ſpecies of SCOLOPAX, and the CREX of other authors. See RAIL.

TOTANUS is alſo uſed by ſome for the LIMOSA.

TOTAQUESTAC, in *Ornithology*, the name of a beautiful American bird, deſcribed by Nieremberg from Antonius Herrera. It is ſaid to be ſomething ſmaller than a pigeon, and all over of a moſt beautiful green; its tail-feathers are of a very great length, and are greatly eſteemed. The Indians value the bird ſo highly that it is death by their laws to kill it, ſo that when it is caught they only ſtrip it and let it go again. Ray.

TOTTAVILLA, in *Ornithology*, a name by which ſome authors have called the *alauda arborea*, or common wood-lark. See LARK.

TOTTED; a good debt to the king is, by the foreign apposer, or other officer, in the exchequer, noted for ſuch by writing the word *tot*, q. d. *tot pecuniæ regi debentur*; whence it is ſaid to be *totted*. Alſo that which is paid is to be *totted*.

TOUCAN, otherwiſe called *anſer Americanus*, in *Aſtronomy*, a modern conſtellation of the ſouthern hemiſphere, conſiſting of nine ſmall ſtars.

The ſituation, longitude, latitude and magnitude of which are as follows:

Situation.	Sign.	Longitud.			Latitude.			Magnit.
		°	′	″	°	′	″	
At the end of the bill	♒	5	38	55	45	27	53	3
In the head		16	32	55	47	48	45	3
In the corner of the left wing ſuperior		17	51	17	54	32	11	5
Ditto, inferior		16	27	47	55	33	21	5
In the middle of the wing		18	8	45	57	36	04	3
Preceding the former		14	50	15	56	35	22	4
In the back		22	43	32	57	15	38	3
In the tail		20	14	19	59	46	53	5
In the leaf, or nutmeg		3	16	34	49	50	44	4

TOUCAN, RAMPHASTOS, in *Ornithology*, is a genus of birds of the order of *picæ*: the characters of which are, that the bill is very large, convex, and ſerrated on the edges; both mandibles are bent at the apex; the noſtrils are near the baſe of the bill; the tongue is feathered about the edges; and the feet are in moſt formed for climbing. Linnæus enumerates eight ſpecies, moſt of which are inhabitants of South America.

The *toucan* of Braſil, deſcribed by Ray, has a large head, black on the crown, but elſewhere as well as the neck and back variegated with white, its breaſt of a bright orange colour, its belly and thighs of a bright red, and the tail black but red at the end. This bird is ſingularly beautiful; it is ſaid that it feeds on pepper; and Thevet affirms that it devours it greedily and returns it again undigeſted, and that the natives gather up the pepper, and uſe it in their food, as leſs hot and acrid than the freſh pepper. See *Tab. V. of Birds*, N° 57.

TOUCH, in *Muſic*. An organ is ſaid to have a good *touch*, or ſtop, when the keys cloſe, and lie down well, being neither too looſe, nor too ſtiff.

TOUCH *the wind*, in the *Sea-language*, is when the ſteerſman at the helm is bid to keep the ſhip as near the wind as may be. See TOUCHING.

TOUCHING is ſometimes uſed for the ſenſe of FEELING. This ſenſe may be injured by any thing that obſtructs the nervous influence, or prevents its being regularly conveyed to the organs of *touching*, as preſſure, extreme cold, &c. alſo by too great a degree of ſenſibility, when the nerve is not ſufficiently covered with the ſcarf-ſkin, or where there is too great tenſion, or it is too delicate. Whatever diſorders the functions of the brain and nerves, hurts the ſenſe of *touching* ; and as it proceeds from the ſame general cauſes as palſy and apoplexy, it requires nearly the ſame method of treatment. In a defect of *touching*, which ariſes from an obſtruction of the cutaneous nerves, the patient muſt be firſt purged, and then ſuch medicines as excite the action of the nerves or ſtimulate the ſyſtem may be uſed ; for which purpoſe ſpirit of hartſhorn, ſal volatile oleoſum, horſe radiſh, &c. may be taken inwardly ; and the diſordered parts often rubbed with freſh nettles or ſpirit of ſal ammoniac.

Bliſtering plaſters and ſinapiſms applied to the parts will likewiſe be of uſe, as alſo warm bathing, eſpecially in the natural hot baths. Buchan's Dom. Med. p. 507.

TOUCHING, in *Geometry*. See TANGENT.

TOUCHING, in *Sea-language*, denotes the ſtate of a ſhip's ſails when they firſt begin to ſhiver, with their edges in the direction of the wind. It is either occaſioned by a ſudden alteration of the ſhip's courſe, or by a change of the wind, in which it blows more obliquely along the ſurface of the ſails, inſtead of falling into their cavities from behind, according to its uſual direction. Falconer. See FULL-*and-by*.

TOUCHING-*at*, denotes the circumſtance of ſtopping, or anchoring occaſionally, at ſome intermediate port, in the courſe of a voyage.

TOUCH-*hole*, or VENT, in *Gunnery*, is the ſmall hole at the end of the cylinder of a gun or muſquet, by which the fire is conveyed to the powder in the chamber.

In a firelock, carabine, or piſtol, it is called the *touch-hole*, but in a piece of cannon it is more properly called the VENT.

TOUCH-*needles*, ſmall maſſes of gold, ſilver, and copper, each pure, and ſimple, and in all the different combinations, proportions, and degrees of mixture, prepared for the trying of gold and ſilver by the *touch-ſtone* ; by compariſon with the mark they leave on it.

The metals uſually tried by the *touch-ſtone*, are gold, ſilver, and copper, either pure, or mixed with one another in different degrees, and proportions, by fuſion. In order to find out the purity, or quantity of baſer metal in theſe various admixtures, when they are to be examined, they are compared with theſe needles, which are mixed in a known proportion, and prepared for this uſe. The metals of theſe needles both pure and mixed, are all made into laminæ or plates, one twelfth of an inch broad, and of a fourth part of their breadth in thickneſs, and an inch and half long ; theſe being thus prepared, you are to engrave on each a mark indicating its purity or the nature and quantity of the mixture in it.

The manner of making the *touch-needles* is by the proportions of the mark, a weight of half a pound, or eight ounces, being divided into ſixteen half ounces, the half ounces each into four drams, the dram into four penny-weights, and this into two half penny-weights.

TOUCH-*needles*, *ſilver* ; theſe muſt be only tempered with copper, and the proportion determined by the mark divided into half ounces and grains.

You muſt uſe therefore for this purpoſe one mark of ſuch a weight that it may conſtitute a ſufficient maſs of metal for the making of one needle, let it weigh for inſtance one dram, then weigh ſuch a mark of the pureſt ſilver, wrap it up in a ſmall paper, and upon this write ſixteen half ounces, which will ſignify that the whole mark of this metal is the pureſt ſilver, and make the firſt needles of this maſs.

Next weigh fifteen half ounces of pure ſilver, and one half ounce of pure copper, wrap theſe both in a paper, and write on it fifteen half ounces, which will ſignify that there are in that ſmall maſs fifteen parts of pure ſilver, and one part of pure copper ; make of this the ſecond needle. In the ſame manner go on with the reſt, add two half ounces of copper to fourteen half ounces of ſilver, mark it fourteen half ounces, make the third needle of this ; and in the ſame manner proportion the ſmall maſſes of ſilver and copper for making the other needles, and put inſcriptions upon every one in the following manner.

For the needle	half oz. of ſilver	half oz. copper.
1.	16	0
2.	15	1
3.	14	2
4.	13	3
5.	12	4
6.	11	5
7.	10	6
8.	9	7
9.	8	8
10.	7	9
11.	6	10
12.	5	11
13	4	12
14	3	13
15.	2	14
16.	1	15

When you have the metals in each of their due proportions, each being wrapped up in its ſeparate paper ; put each, ſeparately, into a new crucible never uſed for any operation, and, adding a little borax, melt them together in a very quick fire, which muſt be well kindled before with bellows : or, what is yet better, throw them ſuddenly into a hot crucible, and as ſoon as they melt, ſtir them with a dry wooden peg, burnt at the end, and pour them immediately into an ingot. When this is done, wrap up each maſs, when cold, in its own paper again, and weigh them ſingly, in a nice balance ; if they ſtill weigh a whole mark, they are good : but if there is any conſiderable deficiency in their weight, it is a ſign that your fire having been too weak, or of too long duration, has conſumed as much copper as is wanting in the weight ; therefore this maſs muſt be eſteemed uſeleſs, and another made in its place in the ſame proportion.

When this is all finiſhed, make with hammer out of each theſe ſmall maſſes, a *needle*, making them a little hot ; then engrave on each of theſe *needles*, the number of half ounces it contains, as before marked on its paper ; that is, upon the firſt ſixteen, upon the ſecond fifteen, and ſo on, and then pierce them at one end, and running a ſilver wire through their eyes, collect them in order according to their different numbers. Theſe are the *ſilver touch-needles*, made of the different alloys of ſilver and copper.

In Holland, they make uſe of the mint mark, divided into grains for the making of their *needles*. The firſt *needle* made of pure ſilver is ſaid to be of twelve penny-weights. The ſecond is made of eleven penny-weights, and eighteen grains, by the addition of ſix grains of copper. The third is made of eleven penny-weights and twelve grains, by the addition of twelve grains of copper ; and ſo on, the proportion of ſilver decreaſing always ſix grains, that is, one quarter of a penny-weight at a time, and that of the copper being always increaſed in the ſame proportion, till at laſt the weight of the ſilver is reduced to one penny-weight, and that of the copper increaſed to eleven penny-weights, which proportion conſtitutes the laſt *needle*.

It is needleſs, however, to go through the whole ſeries of the *needles*, by ſo ſmall progreſſions to the very laſt, for very delicate proportions cannot be very accurately diſtinguiſhed in the operation.

TOUCH-*needles*, *gold*. Theſe muſt be mixed either with ſilver alone, or with ſilver and copper, variouſly intermixed.— This mixture is called allowing or carating, and is determined with a mark divided into twenty-four carats, or weights of two ſixth parts of an ounce. There is nothing to be obſerved about the making of theſe *needles*, beſide what has been already ſaid in regard to the *ſilver needles* ; except that the proportions of the weights are determined in another manner. Theſe *needles* are made according to the following diviſion and order ; and they all weigh one mark.

The firſt is entirely of pure gold, or of 24 carats.

	pure gold	pure ſilver
2	23 Car. 6 Gr.	6 Gr.
3	23 Car.	1 Car.
4	22 Car. 6 Gr.	1 Car. 6 Gr.
5	22 Car.	2 Car.
6	21 Car. 6 Gr.	2 Car. 6 Gr.
7	21 Car.	3 Car.
8	20 Car. 6 Gr.	3 Car. 6 Gr.
9	20 Car.	4 Car.
10	19 Car.	5 Car.
11	18 Car.	6 Car.

The decreaſe goes on thus, by whole carats, till the weight of the gold is arrived at one carat, and that of the ſilver at twenty-three ; for after the ninth *needle* you cannot make ſo exact a diſtinction of the half carats.

N. B. The carat is divided into twelve grains.

This mixture of the gold and ſilver is called the white alloy; but when copper together with ſilver enters into the mixture of the gold, then it is called a mixt alloy. The *needles* for trial of pieces thus debaſed, are made of mixtures analogous to the former, except only that thoſe portions, which in the firſt caſe were pure ſilver, here conſiſt of copper and ſilver mixt. Therefore you have a double ſeries; for the mixture is either of two parts of ſilver, and one of copper, or of two parts of copper and one of ſilver. For inſtance,

The firſt is of pure gold.

	of pure gold.	of pure ſilver.	of pure copper.
2	23 Car. 6 Gr.	4 Gr.	2 Gr.
3	23 Car.	8 Gr.	4 Gr.
4	22 Car. 6 Gr.	1 Car.	6 Gr.
5	22 Car.	1 Car. 4 Gr.	8 Gr.
6	21 Car. 6 Gr.	1 Car. 8 Gr.	10 Gr.
7	21 Car.	2 Car.	1 Car.
8	20 Car. 6 Gr.	2 Car. 4 Gr.	1 Car. 2 Gr.

and ſo on as in the foregoing.

If in this table you take pure copper inſtead of pure ſilver, and ſilver inſtead of copper, this gives you a third ſeries of golden *needles*. And you may have a fourth by mixing with gold equal quantities of ſilver and copper in the ſame proportion. Theſe alloys of gold are much in uſe, but workmen may eaſily employ a number of other variations, which, compared with thoſe already mentioned, will be diſtinguiſhed into a thouſand different ways by an experienced perſon, ſo that it is neither poſſible, nor neceſſary to imitate them all.

But that theſe *golden needles* may not be too expenſive, they may be made much ſhorter than thoſe of ſilver, and afterwards ſoldered to plates of copper, that may be ſufficiently long for uſe.

The uſe of theſe *needles* is by means of the touch-ſtone; and ariſes hence, that every metal when pure muſt have its ſpecific colour, that diſtinguiſhes it from the reſt: but metals being the moſt opake of all known bodies, the ſpecific colour of every one appears moſt diſtinctly when you rub it againſt a very black hard ſtone; and if the colours of two or more metals are expreſſed by large lively ſpots, made near each other on the ſame plane, by rubbing them againſt the ſurface of the ſtone, you will by that means eaſily diſcern their difference, or their likeneſs.

The ſtone adapted to this uſe, and called from its office the *touch-ſtone*, muſt have the following qualities. It muſt be of the deepeſt black, leſt the tincture of the metal ſhould be altered by ſpurious rays of light ſhining among it: it muſt be capable of being pretty well poliſhed, for when too rough, the colours of the metals rubbed againſt it cannot be nearly or regularly diſtinguiſhed; and if it is too ſmooth, the metals are but faintly, and too ſlowly abraded or ſcraped by it, eſpecially when gold is tried. It muſt alſo be neither too hard, nor too ſoft. Tripoli, coal-duſt, and tin aſhes are uſed in rubbing off the thin metalline cruſts, and in a ſhort time the ſtone when very hard is apt to acquire too ſmooth a ſurface; and when it is too ſoft it eaſily wears, throws off a duſt, and contracts furrows.

The ſtone is made in the form of a quadrangular priſm, about an inch thick, and two or three inches long.

If the proper ſtone cannot be procured, moderately ſmooth pieces of flint are the beſt ſubſtitutes; and the more they approach in colour to the other, the better.

The method of uſing your *needles* and the ſtone is this: the piece of gold to be examined, being well cleaned in ſome convenient part of its ſurface, a ſtroke is to be made with it on the ſtone; and another, cloſe by it, with ſuch of the *touch-needles* as appear to come the neareſt to it in colour. If the colour of both, upon the ſtone, is exactly the ſame, it is judged that the given maſs is of the ſame fineneſs with the *needle*: if different, another and another *needle* muſt be tried, till ſuch a one is found as exactly correſponds to it. To do this readily, practice only can teach.

In making the ſtrokes, both the given piece, and the *needle* of compariſon, are to be rubbed ſeveral times backwards and forwards upon the ſtone, that the marks may be ſtrong and full, not leſs than a quarter of an inch long, and about a tenth or an eighth of an inch broad: both marks are to be wetted before the examination of them, their colours being thus rendered more diſtinct. A ſtroke, which has been drawn ſome days, is never to be compared with a freſh one, as the colour may have ſuffered an alteration from the air; the fine atoms, left upon the *touch-ſtone*, being much more ſuſceptible of ſuch alterations than the metal in the maſs. If the piece is ſuppoſed to be ſuperficially heightened by art in its colour, that part of it, which the ſtroke is deſigned to be made with, ſhould be previouſly rubbed on another part of the ſtone, or rather on a rougher kind of ſtone than the common *touch-ſtones*, that a freſh ſurface of the metal may be expoſed. If it is ſuſpected to be gilt with a thick coat of metal finer than the internal part, it ſhould be raiſed with a graver, to ſome depth, that the exterior coat may be broken through: cutting the piece in two is a leſs certain way of diſcovering this abuſe; the outer coat being frequently drawn along by the ſheers or chiſſel, ſo as to cover the divided parts.

The metallic compoſitions, made to reſemble gold in colour, are readily known by means of a drop or two of aqua fortis, which has no effect upon gold, but diſſolves or diſcharges the marks made by all its known imitations. See Touch-*ſtone*.

If gold is debaſed by an admixture of any conſiderable quantity of theſe compoſitions, aqua fortis will in this caſe alſo diſcharge ſo much of the mark as was made by the baſe metal, and leave only that of the gold, which will now appear diſcontinued or in ſpecks. Silver and copper are in like manner eaten out from gold on the *touch-ſtone*, and hence ſome judgment may thus be formed of the fineneſs of the metal from the proportion of the remaining gold to the vacuities.

Ercker obſerves that hard gold appears on the *touch-ſtone* leſs fine than it really is. It may be preſumed that this difference does not proceed from the ſimple hardneſs: but from the hardneſs being occaſioned by an admixture of ſuch metallic bodies, as debaſe the colour in a greater degree than an equal quantity of the common alloy. Silver and copper are the only metals uſually found mixed with gold whether in bullion or in coins; and the only ones, whoſe quantity is attempted to be judged of by this method of trial.

The Chineſe are ſaid to be extremely expert in the uſe of the *touch-ſtone*, ſo as to diſtinguiſh by it ſo ſmall a difference in the fineneſs as half a touch, or a two hundredth part of the mixt. The *touch-ſtone*, ſays Dr. Lewis, is the only teſt, by which they regulate the ſale of their gold to the European merchants; and in thoſe countries it is ſubject to fewer difficulties than among us, on account of the uniformity of the alloy, where there is almoſt always ſilver; the leaſt appearance of copper being uſed in the alloy gives a ſuſpicion of fraud. As an eſſay of the gold is rarely permitted in that commerce, it behoves the European trader to be well practiſed in this way of examination: by carefully attending to the above directions, and by accuſtoming himſelf to compare the colours of a good ſet of *touch-needles*, it is preſumed he will be able to avoid being impoſed on, either in the touch itſelf, or by the abuſes ſaid to be ſometimes committed, of covering the bar or ingot with a thick coat of finer metal than the interior part, or of including maſſes of baſe metal within it. A ſet of *needles* may be prepared, for this uſe, with ſilver alloy, in the ſeries of the Chineſe touches; or the *needles* of the European account may be eaſily accommodated to the Chineſe, by means of a table formed for that purpoſe on the principles already explained. It may be obſerved, that the gold ſhoes of China have a depreſſion in the middle, from the ſhrinking of the metal in its cooling, with a number of circular rings, like thoſe on the balls of the fingers, but larger: Dr. Lewis ſays that when any other metallic maſs is included within, the fraud is diſcoverable at ſight, by the middle being elevated inſtead of depreſſed, and the ſides being uneven and knobby; but that the ſame kind of fraud is ſometimes practiſed in the gold bars, where it is not diſcoverable by any external mark. See Cramer's Art of Aſſaying, p. 116, &c. Lewis's Com. of Arts, p. 122, &c. See alſo Assaying.

Touch *me not*, in *Botany*, See Balsamine.

Touch-*ſtone*, a black, ſmooth, gloſſy ſtone, uſed to try metals ûpon.

The ancients called it *lapis* Lydius, the *Lydian ſtone*, from Lydia, a country of Aſia Minor, whence it was brought. See Touch-*needles*.

Touch-*ſtone*, *Iriſh*, called *baſanus Hibernicus*, by Molyneux and ſome others, is a black ſtone, found in the county of Antrim, in that kingdom, in angular columns, forming that amazing pile called by the vulgar, the Giant's *cauſeway*. See Basaltes and Marmaro-*proſera*.

The baſaltes being an excellent *touch-ſtone*, authors have confounded it with the *touch ſtone* of the ancient Greeks, called by them *baſanos*, *baſanites*, *lapis Lydius* or *Heraclius*, &c. which were, probably, only black jaſpers; and they have derived *baſanos* and *baſaltes* from the ſame Greek word, *βασανιζω*, *to try* or *prove*: but the *baſaltes* was not known to the Greeks, and Pliny expreſly tells us, that it is an Ethiopic or Egyptian name: whence it is probable that *baſaltes* is a corruption of the Hebrew word ברזל, *barzel*, which ſignifies iron, a very proper name for a ſtone, which they deſcribe to be of the colour and hardneſs of iron. Many authors affirm, that the *touch-ſtone* is a kind of black marble, or that moſt black marbles may ſerve for *touch-ſtones:* black marbles, it is true, take the colours of metals, and may be uſed as *touch-ſtones* in the ancient manner mentioned by Theophraſtus and Pliny; i. e. by touching them with needles of different alloys, which manner is ſtill practiſed in Germany and other countries: but in the manner of trying them with aqua fortis, it is abſurd to uſe any calcareous ſubſtances, as the acid will immediately deſtroy the ſubſtance of the ſtone, and conſequently affect and ſomewhat deface the ſtrokes of the metals. For a good *touch-ſtone*, choice ſhould be made of a black ſtone of the genus of *marmaroproſera* or of the jaſper genus, on which the aqua fortis will only diſſolve the copper, ſilver, &c. without touching the gold, or affecting the ſtone. The firſt genus ſhould be preferred, as a nice *touch-ſtone* ſhould only have a certain degree of poliſh, and ſhould be of a compact fine texture, and neither too hard nor too ſoft; whereas the jaſpers are too hard, and do not ſhow with ſufficient exactneſs the different degrees of alloy; for the touches of the metal give them a higher luſtre than their natural poliſh, and that luſtre injures the diſtinctneſs of the ſtrokes made upon it. Coſta's Hiſt. Foſſ. p. 264. See TOUCH-*needles*.

TOUCH-*wood*, in *Botany*, a name given to SPUNK or AGARIC of the oak, on account of its readily taken fire.

TOUMAN. See TOMAN.

TOURMALIN, in *Natural Hiſtory*, a name given, as Dr. Watſon has evinced, to the *lyncurium* of the ancients. See LYNCURIUS *lapis*.

This ſtone is very common in ſeveral parts of the Eaſt Indies, particularly in the iſland of Ceylon, where it is called *tournamal*. The firſt account of this ſtone, that occurs of late years, is in the Hiſtory of the Royal Academy of Sciences at Paris, for 1717, where we are told that Mr. Lemery exhibited an uncommon ſtone, brought from Ceylon, which attracted and repelled ſmall light bodies. Linnæus, in his Flora Zeylonica, calls this ſtone *lapis electricus*, and takes notice of Lemery's experiments. Mr. Æpinus, having been informed of the attractive power of the *tourmalin* by Mr. Lechman, and furniſhed by him with two ſtones, made many experiments, the reſult of which was publiſhed in the Hiſtory of the Academy of Sciences, and Belles Lettres, at Berlin for 1756. The ſubſtance of his memoir is as follows: the *tourmalin* has always, at the ſame time, a poſitive and a negative electricity; the one of its ſides being in one ſtate, and the other in the oppoſite; and this does not depend on the external form of the ſtone. Theſe electricities he could excite in the ſtrongeſt degree by plunging the ſtone in boiling water.

If one ſide of the *tourmalin* be heated more than the other (as if it had lain upon a hot cake of metal) each of the ſides acquires an electricity oppoſite to that which is natural to it; but if left to itſelf, it will return to its natural ſtate.

If one of the ſides of the *tourmalin* be rubbed, while the other is in contact with ſome conductor communicating with the ground; the rubbed ſide is always poſitive, and the other negative. If neither ſide be in contact with a conductor, both become poſitive. If, in the former of theſe caſes, the *tourmalin* be rubbed, ſo as to acquire a ſenſible heat, and the ſide which is naturally poſitive be made negative, it will upon ſtanding to cool, return to its natural ſtate; but if it have acquired no ſenſible heat, it will not return to its natural ſtate while any kind of electricity remains. If it be heated, even when it is rubbed and inſulated (in which caſe both ſides become poſitive), it will ſtill return to its natural ſtate upon cooling.

The duc de Noya, who, in 1758, procured two of theſe ſtones in Holland, and made a number of experiments with them, an account of which he publiſhed, mentions the experiments of Mr. Æpinus, but does not admit of a *plus* and *minus* electricity belonging to the *tourmalin* when heated. On the contrary, he ſays, that both the ſides are electrified *plus*, but one of them more than the other. The *tourmalin* was introduced to the notice of the Engliſh philoſophers by Dr. Heberden, who procured one (and indeed, the only one known in England at that time) for Mr. Wilſon; whoſe experiments confirmed the opinion of its poſitive and negative power, advanced by Mr. Æpinus. Dr. Franklin, likewiſe, in a letter to Dr. Heberden, in 1759, informs him of experiments on one of theſe ſtones, ſufficient for eſtabliſhing the ſame theory. About this time Dr Heberden procured ſome of theſe ſtones from Holland, and put them into the hands of Mr. Wilſon and Mr. Canton, gentlemen particularly converſant with the ſubject of electricity, and capable of uſing them with the greateſt advantage to this branch of ſcience. Mr. Wilſon's experiments and obſervations are very numerous; the reſult of which was, in the main, the ſame with that of Mr. Æpinus, eſtabliſhing the opinion of the two different powers of this ſtone; but he differs from him in aſſerting, that when the ſides of the *tourmalin* are unequally heated, it exhibits that ſpecies of electricity which is natural to the hotter ſide; i. e. the *tourmalin* is *plus* on both ſides, when the *plus* is the hotteſt, and *minus* on both ſides when the *minus* ſide is the hotteſt. Both theſe gentlemen repeated their experiments, and each retained his own opinion; but Mr. Wilſon's apparatus was better calculated for the purpoſe of accurate experiments than that of Mr. Æpinus, and he uſed a greater variety of methods for communicating heat to his *tourmalin*. Mr. Wilſon imagined that this ſtone, as well as glaſs, was permeable to the electric fluid, and that the reſiſtance to its entering the ſubſtance of it was leſs on what he calls the negative than on the poſitive ſide; for rubbing the poſitive ſide of the ſtone ſtrongly, he found both ſides electrified *plus*, by rubbing the negative ſide in the ſame manner, both ſides were electrified *plus*, more ſtrongly than before. Several experiments led Mr. Wilſon to conclude, that the *tourmalin* reſiſted the exit and entrance of the electric fluid conſiderably leſs than glaſs, or even than amber; and he infers upon the whole, that this ſtone differs in nothing from other electric bodies but in acquiring electricity by heat. Mr. Wilſon alſo conceived, that the *tourmalin* ſuffered the electric fluid to paſs through it only in one direction, bearing in this reſpect ſome analogy to the load-ſtone, and having as it were two electric poles, which are not eaſily deſtroyed or altered. He alſo apprehended, that the electric fluid, flowing through all the ſtones and gems, which reſemble the *tourmalin* in their electrical properties, moves in that direction in which the grain happens to lie; the reſiſtance, as he ſuppoſes, which the fluid meets with, being leſs in that direction than in any other.—Notwithſtanding the attention given to this ſubject by Mr. Æpinus and Mr. Wilſon, the moſt important diſcovery relating to the electricity of the *tourmalin* was reſerved for Mr. Canton, who, in a paper read before the Royal Society in December 1759, obſerves, that the *tourmalin* emits and abſorbs the electric fluid only by the increaſe or diminution of its heat; for if the *tourmalin*, he ſays, be placed on a plain piece of heated glaſs or metal, ſo that each ſide of it, by being perpendicular to the ſurface of the heated body, may be equally heated; it will, while heating, have the electricity of one of its ſides poſitive, and that of the other negative. This will, likewiſe, be the caſe, when it is taken out of boiling water, and ſuffered to cool; but the ſide, which was poſitive while it was heating, will be negative while it is cooling, and the ſide which was negative will be poſitive. In the Gentleman's Magazine for September 1759, (vol. xxix. p. 424.) he publiſhed the reſult of ſome experiments which he had made on a *tourmalin* procured from Holland in a ſeries of propoſitions, compriſing the principal part of what is known on this ſubject. They are as follow: 1. When the *tourmalin* is not electrical or attractive, heating it, without friction, will make it ſo; and the electricity of one ſide of it (diſtinguiſhed by A) will be poſitive, and that of the other ſide (B) will be negative. 2. The *tourmalin* not being electrical, will become ſo by cooling; but with this difference, that the ſide A will be negative, and the ſide B poſitive. 3. If the *tourmalin*, in a non-electrical ſtate, be heated, and ſuffered to cool again, without either of its ſides being touched; A will be poſitive, and B negative, during the whole time of the increaſe and decreaſe of its heat. 4. Either ſide of the *tourmalin* will be poſitive by friction, and both may be made ſo at the ſame time. He ſuggeſts that, if air be endued with ſimilar properties, or be capable of becoming electrical by the increaſe or diminution of its heat (as is probable by attending to its ſtate before and after a thunder-ſtorm), thunder clouds, both poſitive and negative, as well as thunder-guſts, may be eaſily accounted for. Mr. Canton, with the *tourmalins* which he received from Dr. Heberden, made other new and curious experiments, firſt publiſhed by Dr. Prieſtley. He put one of them, which was of the common colour, into the flame from a blow-pipe and burnt it white; when he found that its electrical property was entirely deſtroyed. The electricity of another was only in part deſtroyed by fire. He joined two others, made ſoft by fire, without deſtroying their electrical property. The virtue of another was improved by being melted at one end; and he found (contrary to what Mr. Wilſon had obſerved of another *tourmalin*, heated in the ſame manner) that one *tourmalin* retained its electrical property,

perty, after it had been frequently made red-hot, and, in that ſtate, put into cold water. But the moſt curious experiment was made on a large irregular *tourmalin*, about ½ an inch long, which he cut into three pieces; taking one part from the poſitive and another from the negative end. Trying theſe pieces ſeparately, he found the outer ſide of the piece cut from the end that was negative, when cooling, was likewiſe negative when cooling, and that the outer ſide of that piece which was cut from the end that was poſitive when cooling was likewiſe poſitive when cooling; the oppoſite ſides of both pieces being, according to the general law of the electricity of the *tourmalin*, in a contrary ſtate. The middle part of the ſame ſtone was affected as it had been when it was entire; the poſitive end remaining poſitive and the negative end negative.

Dr. Prieſtley, about the cloſe of year 1766, directed his attention to the *tourmalin*: being in poſſeſſion of Dr. Heberden's large poliſhed one, which weighed one hundred and twenty grains, of an oval form, plain on one ſide and convex on the other, and which had paſſed through the hands of Mr. Wilſon and Mr. Canton, he purſued his inveſtigation of the properties of this ſtone in a variety of experiments. Several of them were undertaken with a view of determining whether the *tourmalin* collected its electricity from the neighbouring air: he was led to this conjecture from the conſideration of Mr. Wilcke's experiments on the production of ſpontaneous electricity, by melting one ſubſtance within another; and his experiments ſeem to prove that his conjecture was juſt. He alſo diſcovered a method of reverſing all the experiments made upon the *tourmalin*, making that ſide which is poſitive in heating or cooling to be negative, and that which is negative to be poſitive: ſo that the kind of electricity ſhall be juſt what the operator ſhall direct, by the application of proper ſubſtances to the ſtone. Dr. Prieſtley not only tried how the *tourmalin* would be affected by being heated or cooled in contact with various ſubſtances, to which only one of its ſides was expoſed at once, but he alſo made other experiments in which the ſtone was entirely ſurrounded by them. Having covered the ſtone to the thickneſs of about a crown-piece with ſealing-wax, he found it to act nearly, if not quite as well, through this coating of wax, as if it had been expoſed to the air: hence, if a *tourmalin* be concealed in a ſtick of ſealing-wax, the wax will ſeem to have acquired the properties of the *tourmalin*. See on this article Phil. Tranſ. vol. li. p. 308, &c. p. 394, &c. vol. liii. p. 436, &c. Franklin's Letters, &c. p. 376. Prieſtley's Electricity, vol. i. p. 347, &c. vol. ii. p. 308, &c. 8vo. ed.

The *tourmalin*, according to Mr. Kirwan, is a ſiliceous earth imperfectly united with from 1,05 to 1,47 of its weight of argil, from 0,3 to 0,4 of its weight of mild calcareous earth, and from 0,15 to 0,243 of its weight of iron. This ſtone has hitherto been found only in Ceylon, Brazil, and the Tyrol: a ſpecimen of each has been examined by Mr. Bergman: that of Ceylon is of a dark brown, or yellowiſh colour, its ſpecific gravity 3,065 or 3,295: that of Brazil is green, blue, red or yellow, and its ſpecific gravity 3,07, or 3,18: that of Tyrol, by reflected light, is of a blackiſh brown, but by refracted light, yellowiſh, or in thin pieces, green; its ſpecific gravity 3,05. In fire none of them decrepitate: but thoſe of Ceylon and Tyrol melt per ſe into a black frothy ſlag. That of Brazil forms only a brittle ſcoria. Bergman's Eſſ. by Cullen, vol. ii. p. 120, &c. 1784. Kirwan's Elem. Mineral. p. 131.

In the Memoirs of the Royal Academy of Sciences at Berlin, for 1780, we have the following directions by Mr. Magraaf, for forming a compoſition, ſimilar to the *tourmalin*. Take magneſia, or that earth which is the baſis of the ſal catharticus amarus; mix it with chalk, which has been diſſolved in ſpirit of nitre, and precipitated from thence by a ſolution of ſalt of tartar, and then well edulcorated; add to this mixture equal quantities of flint and clay (taking a ſcruple of each of the four ingredients) and four grains of the precipitate of ſublimate of fuſible ſpar, or what is here called the fluor cruſt, i. e. the earth which is not only ſublimed from the fluor, or Derbyſhire ſpar, on heating it with oil of vitriol, but may alſo be precipitated from thence, and from the acid liquor in the receiver, by the addition of a ſolution of ſalt of tartar.

To two drams of the above mixture add five grains of crocus martis, calcined according to the method of Kunckel, during four months, in a glaſs-houſe furnace, and the reſult will be the formation of a vitreous ſtone, ſimilar to the *tourmalin*.

TOURNAMENT. See TURNAMENT.

TOUR, *turn*, a French term, often uſed among Engliſh writers for a journey. Thus we ſay the *tour* of Paris, of Rome, &c.

TOUR *of hair*, a treſs or border of hair, going round the head, which, mingled dextrouſly with the natural hair, lengthens and thickens it.

Theſe *tours* are for men. The women likewiſe uſe *tours*, and falſe hair, either to hide their age, or to ſupply the thinneſs of their natural hair on the forehead and temples.

The form is different according to the mode, ſometimes raiſed and curled, ſometimes ſtraight, and laid flat along the forehead.

TOURN, in *Law*. See TURN.

TOURNEFORTIA, in *Botany*, a genus of the *pentandria monogynia* claſs; its characters are theſe: the empalement of the flower is permanent, of one leaf, cut into five ſmall ſegments at the top. The flower is of one petal, of the globular bell-ſhape, cut at the brim into five acute points, which ſpread open horizontally; and it has five awl-ſhaped ſtamina, the length of the tube, terminated by ſingle ſummits; and a globular germen, ſupporting a ſingle ſtyle the length of the ſtamina, crowned by a ſingle ſtigma. The germen becomes a ſpherical ſucculent berry, encloſing four oblong oval ſeeds, reſting upon the empalement. There are eight ſpecies.

TOURNIQUET, in *Surgery*, an inſtrument made of rollers and compreſſes with the help of a ſmall ſtick, and uſed to ſtop the effuſion of blood from large arteries in amputations by forcibly tying up the limb. The things neceſſary for this are a roller of a thumb's breadth, and of an ell in length, a ſmall cylindrical ſtick, a conglomerated bandage two fingers thick and four long, ſome compreſſes of a good length, and about three or four fingers breadth, to ſurround the legs and arms, and a ſquare piece of ſtrong paper or leather about four fingers wide.

The manner of applying this inſtrument is this; the rolled bandage is to be applied to the trunk of the wounded artery length-ways, covering it in a contrary direction with compreſſes ſurrounding the leg, foot, or arm, as it were with a ring; the roller muſt be paſſed twice round theſe applications, and faſtened in a knot, but ſo looſely that you may eaſily introduce your hand between it and the part: the leather or thick paper muſt now be nicely placed under it, upon the external part of the leg, and the roller tightened by degrees by turning round the ſtick, which is to be introduced into the knot; this is to be done till the hæmorrhage is entirely ſtopped: the ſtick muſt now be kept in this ſituation till the wound is properly treated, and the return of the hæmorrhage prevented. When this end is acquired, the *tourniquet* is to be looſened, or entirely taken off, as ſhall be judged moſt convenient: but where it is applied to the arm, the rolled bandage is to be placed near the *axilla* in the internal part of the *humerus*, and the ſtick in this caſe is to be faſtened to the oppoſite ſide, the ſituation of the artery there requiring this poſition; and when it is to be applied to the thighs, the bandage is to be put as the caſe ſhall require, either to the upper part of the thigh, or juſt over the knee. Heiſter's Surgery, p. 51. See AMPUTATION aud *Tab.* II. *Surgery*, *fig.* 15.

M. Petit, a ſurgeon at Paris, invented another *tourniquet*, which is ſaid to have this advantage, that it will preſerve its ſituation without requiring the attendance of an aſſiſtant; and that it may be left upon the limb for any given time, without impeding the circulation of the blood; whereas the common one cannot be kept on long on this account. This is deſcribed, with improvements, by Heiſter; as are alſo other *tourniquets* by Morand, &c.

In a pamphlet entitled The Conductor and containing Splints, publiſhed in 1781, we have an account of two *tourniquets* upon a new conſtruction, intended as improvements of Petit's, by Mr. Jonathan Wathen.

TOUT *temps priſt & encore eſt*, that is, always ready, and ſo at the preſent time: a kind of plea in way of excuſe or defence for him that is ſued for any debt or duty belonging to the plaintiff.

TOUT *enſemble*, in the *Arts*. See ENSEMBLE.

TOUT, *per my & per*. See PER MY.

TOW, *to*, derived from the Saxon *teon*, or *teohan*, to *draw*, in *Sea-language*, is to draw a ſhip forward in the water, by means of a rope attached to another veſſel or boat which advances by the effort of rowing or ſailing.—*Towing* is practiſed either when a ſhip is diſabled, and rendered incapable of carrying ſail at ſea; or when her ſails are not fixed upon the maſts as in a harbour; or when they are deprived of their force of action by ceſſation of the wind. When a ſhip of war is diſmaſted, or otherwiſe diſabled from carrying ſail at ſea, ſhe is uſually *towed*

towed by a cable reaching from her bow to another ſhip a-head. In a harbour, *towing* is practiſed by one or more boats, wherein the force of all the oars is exerted to make her advance. Falconer.

Tow-*chain*, in *Huſbandry*, a name given by our farmers to a chain, that makes a part of the ſtructure of the PLOUGH, faſtening the plough-tail to what they call the plough-head.

Tow-*line*, in *Sea-language*, a ſmall hauſer generally uſed to remove a ſhip from one part of a harbour or road to another, by means of anchors, capſterns, &c. It is alſo employed occaſionally to moor a ſmall veſſel in a harbour, conveniently ſheltered from the wind and ſea.

Tow-*rope* is the name given to any cable or rope uſed in towing.

TOWAGE, is a term uſed for money, or other recompence, given by bargemen to the owner of the ground next the river where they *tow* a barge, or other veſſel, for the liberty of paſſing along the ſide thereof.

TOWER, TURRIS, a high building, conſiſting of ſeveral ſtories, and uſually of a round form, though ſometimes ſquare or polygonal.

Before the invention of guns, they uſed to fortify places with *towers*, and to attack them with moveable *towers* of wood, mounted on wheels, to ſet the beſiegers on a level with the walls, and drive the beſieged from under the ſame.

Theſe *towers* were ſometimes twenty ſtories, and thirty fathom high: they were covered with raw ſkins, and a hundred men were employed to move them.

Towers are alſo built to enable people, by their elevation, to view to a great diſtance. Theſe are of all figures, as ſquare, round, pentagonal, &c. See PHAROS. In China is a famous *tower* of porcelain, whereof the Dutch relate wonders.

Towers are alſo built for fortreſſes, priſons, &c. as the *tower* of London, the *towers* of the Baſtile, &c.

The *tower* of London is not only a citadel to defend and command the city, river, &c. but alſo a royal palace where our kings with their courts have ſometimes lodged. It contains a royal arſenal, wherein are arms and ammunition for 80000 ſoldiers; the offices of ordnance, a treaſury for the jewels and ornaments of the crown; a mint for coining of money; the great archive, wherein are preſerved all the ancient records of the courts of Weſtminſter, &c. and is the chief priſon for ſtate criminals.

In the midſt of it is the great ſquare white *tower*, built by William the Conqueror, about the year 1079.—Within the *tower* is a parochial church, founded by king Edward III. and dedicated in the name of St. Peter in Chains, exempt from all juriſdiction of the archbiſhop, and a royal chapel, now diſuſed.

The chief officer of the *tower* is a conſtable, or chief governor, with an annual ſalary of 1000*l.* under whom is the lieutenant-governor, who acts by his direction, and in his abſence. He has, by grant of ſeveral of our kings, *unam lagenam*, two gallons and a pint of wine before, and as much behind the maſt of all wine ſhips that come to London; and a certain quantity out of every boat laden with lobſters, oyſters, and other ſhell-fiſh, and double the quantity out of every alien's boat paſſing by the *tower*. His ſalary is 200*l.* per annum, and his perquiſites are large, which make his appointment 700*l.* a year. His uſual fee for every priſoner ſent to the *tower* is 20*l.* and 3*l.* a week for an earl, and 5*l.* for a knight; for a baron or a degree higher 50*l.* at his entrance; to whom the king allows weekly 10*l.* two parts of which go to the priſoner, and the other third to the lieutenant for lodging and diet: and 50*l.* to the lieutenant upon the priſoner's diſcharge. Under the conſtable, beſides the lieutenant, are a deputy-lieutenant, at 365*l.* per annum, a *tower* major at 182*l.* 10*s.* per annum, a chaplain at 121*l.* 13*s.* 4*d.* a year, a phyſician at 182*l.* 10*s.* *per ann.* gentleman-porter at 84*l.* 6*s.* 8*d.* *per ann.* gentleman-goaler at 70*l.* *per ann.* ſurgeon at 45*l.* 12*s.* 6*d.* *per ann.* and forty warders. The gentleman-porter has charge of the gates to lock and unlock them, and deliver the keys every night to the conſtable or lieutenant, and receive them of him the next morning: he commands the warders in waiting, and at the entrance of a priſoner has for his fee *veſtimenta ſuperiora*, or elſe a compoſition for the ſame. The gentleman-gaoler has alſo a fee of 40*s.* for a gentleman, and 5*l.* for a knight.

For the yeomen warders of the *tower*, ſee WARDER.

In the *tower* is likewiſe kept a court of record by preſcription, for the liberty of the *tower*, of debt, treſpaſs, and other actions of any ſum.

The *tower-liberty*, ſubject to no juriſdiction but that of the *tower* itſelf, includes both the *tower-hills*, part of Eaſt Smithfield, Roſemary-lane, Well-cloſe-ſquare, Little-Minories; Artillery-ſtreet, French-alley, Duke-ſtreet, Steward-ſtreet, Gun-ſtreet, Fore-ſtreet, and the other courts and alleys within their compaſs, in Spitalſields.

Tower, in *Glaſs-making*. See LEER.

Tower-*baſtions*, in *Fortification*, are ſmall *towers*, made in the form of baſtions by M. Vauban in his ſecond and third method; with rooms or cellars underneath, for accommodating men and guns. See FORTIFICATION.

Tower, *hollow*, in *Fortification*. See HOLLOW *Tower*.

Towers, *inclined*, are thoſe whoſe tops hang ſo far over, as to appear in danger, to people walking below. Such is that of Piſa, 138 feet high, whoſe top overhangs the baſe 15 feet; and that of Bologna, 130 feet high, whoſe top overhangs the baſe 9 feet; and the reaſon why they do not fall is, that their centres of gravity are ſupported or the lines of direction in them fall within their baſe. But if *towers* of this kind, that incline, were to be elevated in height by any additional weight on their tops; in that caſe the centres of gravity would be raiſed and their lines of direction fall without the baſe, and the *towers* themſelves muſt fall.

Tower *Muſtard* and *Baſtard* Tower *Muſtard*, in *Botany*. See MUSTARD.

TOWN, a place inhabited by a conſiderable number of people, of an intermediate magnitude and degree between a city, and a VILLAGE, &c.

It is hard to give a tolerable definition of a *town*, becauſe the idea is a little arbitrary and unfixed. A *town* is generally without walls, which is the character that uſually diſtinguiſhes it from a city; but this does not hold univerſally.

Tithings, *towns*, and villages have the ſame ſignification in law; and are ſaid to have had, each of them, originally a church and celebration of divine ſervice, ſacraments, and burials; though that ſeems to be rather an eccleſiaſtical than a civil diſtinction. The word *town* or vill is, indeed, by the alteration of times and language, now become a generical term, comprehending under it the ſeveral ſpecies of cities, boroughs, and common *towns*. A CITY is a *town* incorporated, which is or hath been the ſee of a biſhop; a BOROUGH is now underſtood to be a *town*, either corporate or not, that ſends burgeſſes to parliament: other *towns* there are to the number, according to ſir Edward Coke, of 8803, which are neither cities nor boroughs; ſome of which have the privileges of markets, and others not; but both are equally *towns* in law. To ſeveral of theſe *towns* there are ſmall appendages belonging, called HAMLETS.—Entire vills, ſir H. Spelman conjectures, conſiſted of ten freemen, or frank-pledges, demi-vills of five, and hamlets of leſs than five. Theſe little collections of houſes are ſometimes under the ſame adminiſtration as the *town* itſelf, ſometimes governed by ſeparate officers; in which laſt caſe they are, to ſome purpoſes in law, looked upon as diſtinct townſhips. Theſe *towns* contained each originally but one pariſh and one tithing, though many of them now, by the increaſe of inhabitants, are divided into ſeveral pariſhes and tithings; and ſometimes there is but one pariſh where are two or more vills or tithings. Blackſt. Com. b. i. p. 114.

We have ſeveral kinds of *towns*, borough-*towns*, market-*towns*, county-*towns*, &c. See BOROUGH, &c.

Town-*clerk*, or *Common Clerk*, an officer in the city of London, who keeps the original charters of the city, the books, rolls, and other records, wherein are regiſtered the acts and proceedings of the city. He is to attend the lord mayor and aldermen at their courts.

Town-*houſe*. See HOUSE.

Town, *freedom of a*. See FREEDOM.

Towns, *Hanſe*. See HANSE.

Town-*adjutant*, in *Military language*, is an aſſiſtant to the *town*-major.

Town-*major*. See MAJOR.

TOXICODENDRON, in *Botany*. See POISON-*wood*.

It has been debated between Mr. Miller and Mr. Ellis, whether our poiſon aſh, or winged-leaf American *toxicodendron* be the true Japan varniſh tree: Mr. Miller maintains the affirmative, and Mr. Ellis the negative: for the arguments on both ſides, ſee Phil. Tranſ. vol. xlix. p. 160. p. 866. vol. l. p. 430 p. 441. See VARNISH.

TOXICUM, τοξικον, a word particularly uſed to expreſs a ſort of poiſon, ſaid to be uſed by the Indians to their arrows, in order to render wounds made by them incurable.

The word, in a more general ſenſe, ſignifies any poiſon.

The Indians are ſuppoſed to poiſon their arrows, daggers, &c. with the virus of vipers, the miſchievous effects whereof continue a long time after the matter is quite dried up.

TOXICUS, in *Botany*, a name by which ſome authors have called the *arundo farcta*, of which walking-canes are made.

TOXOTÆ, τοξόται, among the Athenians, bowmen, a ſort of inferior officers, or rather ſervants, who attended the lexiarchi.

They were much like the Roman lictors: there were a thouſand of them in the city of Athens, that lived in tents, erected firſt in the forum and afterwards in the areopagus. See Lexiarchi.

TOZZIA, in *Botany*, a name given by Micheli, and continued by Linnæus to a genus of plants, of the *didynamia angioſpermia* claſs; the characters of which are theſe: the perianthium is very ſhort; it conſiſts of one leaf of a tubular figure, divided into five ſegments at the end, and remaining when the flower is fallen; the flower is one-leaved and open; the tube is cylindric, and longer than the cup; the extremity forms two lips; the upper lip is bifid and the lower trifid, and all the ſegments are nearly equal in ſize and of a roundiſh figure. The ſtamina are four filaments hid under the upper lip of the flower; the antheræ are roundiſh; the germen of the piſtil is oval; the ſtyle is capillary, of the length of the ſtamina; and the ſtigma is capitated; the fruit is a globoſe univalve capſule, having only one cell, in which is contained a ſingle oval ſeed. There is one ſpecies.

TRABEATION, Trabeatio, in the *Ancient Architecture*, the ſame with Entablature.

TRACE, a mark or impreſſion which any thing leaves behind it in paſſing over another.

Traces *of the brain*, among the Carteſian philoſophers, are thoſe impreſſions more or leſs deep, which, they ſay, ſenſible objects make on the fine fibres of the brain, by means of the organs of ſenſe.

Theſe impreſſions are alſo called *traces of the object*; the courſe of the animal ſpirits, they ſay, ſerves to keep them up, and to renew them.

The vivacity of the imagination, they ſay, ariſes from the prodigious quantity of *traces* of different objects in the brain; which are ſo linked together, that the ſpirits cannot be ſent into one of them, but they run into all the reſt; by which means the ideas occaſioned by the application of the ſpirits to thoſe ſeveral *traces*, are all excited, as it were, at once.

Memory, according to the ſame, conſiſts in the *traces* which the animal ſpirits have impreſſed.

Trace *of a hare*, among *Hunters*, is her footing in the ſnow; diſtinct from other treadings, called *doubling*, and *pricking*, &c.

Traces alſo denote the tracts of ravenous beaſts, as wolves, wild beaſts, &c.

Traces, *Lady's*, in *Botany*, ſee Orchis.

TRACHEA, in *Anatomy*, a large arterial veſſel, called alſo ASPERA *arteria*, and popularly the WIND-PIPE, being the canal or tube which carries the air into the lungs, for the uſe of reſpiration and ſpeech. See *Tab. Anat. (Splanch) fig.* 14, *lit. c c. e e. d d.* &c.

Galen gave it the name *trachea*, τραχεια, becauſe of its being rough and uneven; on which account the Latins alſo call it *aſpera*.

Tracheæ, in *Botany*, are certain air-veſſels evident in many plants, but in none more beautifully or diſtinctly obſervable than in the melon. See *anatomy of* Plants.

Mr. Bulfinger obſerved that in cutting the root of the common melon tranverſely, there appeared, beſide the bark and other commonly known parts of the root, a multitude of foramina, which were larger or ſmaller as the portions of the root were cut from a thicker or a thinner part. Theſe are eaſily viſible to the naked eye, for they are arranged into a number of faſciculi, which ſurround the axis of the root: there are uſually three circles of theſe diſtinguiſhable in the ſmaller parts of the root, and four in the larger; and the matter in which they are placed is different from that which ſurrounds it, being much harder and more firm than that.

Moſt of theſe faſciculi or foramina finally become divided into two or three portions, and the interſtitial matter in that caſe is always the ſame with that which ſurrounds them. If any number of theſe faſciculi are examined, the order and diſpoſition of the foramina, and even their numbers, are found the ſame in all; they are ſo regularly continued along the root, that air, and light fluids, may be ſucked into the mouth through pieces of the root from two to nine inches long, and this even when they are contorted and crooked in their growth; the caſe is the ſame alſo, whether the piece be cut from the root or from the ſtalk of the plant, or from both; for when ſuch a piece is cut, half of which is root and half ſtalk, the continuation of theſe foramina is found to be the ſame, and the air paſſes, whether it be blown in at one end or the other: this is plainly ſeen on immerſing one end in water, and blowing in at the other, the bubbles of air ariſing readily and in great quantities. Comment. Petropolit. vol. iv. p. 182.

Nothing ſhews the *tracheæ* of plants in ſo beautiful a manner as a tranſverſe ſegment of a young ſhoot of the vine. They may be in this diſcovered in a good light even by the naked eye; but with the help of but a ſmall magnifying glaſs they appear very beautiful and diſtinct. In the generality of other trees, theſe *tracheæ* are ſo ſmall, that even the largeſt magnifiers in our microſcopes cannot well diſtinguiſh them: ſo that Fontenelle and many other great men have doubted their exiſtence: but even where theſe are ſmalleſt of all, as in the petiola or middle ribs of the leaves of plants, they may, though wholly imperceptible to the ſight, be proved to exiſt, by experiments. If a ſmall cylindric glaſs be filled with water, and have all its air exhauſted from it by the air-pump, and the middle rib of a leaf be then cleared from the other parts, and cut off at both ends, and plunged at one end into this water, while yet in the exhauſted ſtate, the bottom of the petiolum being ſupported from touching the bottom of the glaſs, the ſituation and number of the *tracheæ* in it will be eaſily diſtinguiſhed by a ſtring of bubbles, which ariſing from each of them will make a row of beads, as it were riſing in a continued chain to the ſurface. Act. Erudit. Ann. 1722. p. 24.

TRACHEAL *artery*, in *Anatomy*, a branch of the right ſubclavian, running up from it in a winding courſe, along the aſpera arteria, to the glandulæ thyroideæ and larynx, detaching ſmall arteries to both ſides; one of which runs to the upper part of the ſcapula. The *tracheal* artery may likewiſe be called *gutturalis inferior*.

TRACHELAGRA, formed of τραχηλος, *neck*, and αγρα, *ſeizure*, a term uſed by ſome medical writers to expreſs the gout in the neck.

TRACHELIUM, in *Botany*. See Throat-*wort*.

TRACHELO-MASTOIDÆUS, in *Anatomy*, a name given by Albinus to a muſcle, called by Winſlow and others the *complexus minor*, or *maſtoidæus lateralis*.

TRACHELOS, a word uſed by ſome anatomical authors to expreſs the neck.

TRACHIDNA, in *Ichthyology*, a name given by Jovius and and ſome others to the DRACO *marinus* of the old authors, called by us the WEEVER.

TRACHINUS, in the Linnæan ſyſtem of *Ichthyology*, the name of a genus of fiſh, of the order of the *jugulares*: the characters are, that the head is compreſſed and not ſmooth; the membrane of the gills has ſix rays, and the lower lamina of the opercula is ſerrated; and the anus is near the breaſt. Linnæus mentions one ſpecies, viz. the DRACO: Artedi refers the URANOSCOPE alſo to this genus.

The name is originally Greek, the word τραχεινος ſignifying rough, ſharp, or prickly. It was given to this fiſh from the rays of its back-fin, being remarkably rigid, and ſharp like prickles.

Trachinus *lapis*, a ſtone mentioned by the writers of the middle ages, as poſſeſſing many great medicinal virtues. It ſeems to have been a kind of *lapis nephriticus*, being deſcribed as bright, but not tranſparent, and being of two kinds, the one blackiſh, and the other green.

TRACHOMA, τραχωμα, in *Medicine*, a roughneſs or aſperity of the inner part of the palpebræ, attended with an itching and redneſs, and frequently with puſtules reſembling millet ſeeds.

Its degrees are the ſycoſis, and tyloſis, or rather theſe are higher diſorders, into which the *trachoma* is liable to degenerate.

TRACHURUS, in *Ichthyology*, the name of a fiſh of the *ſcomber* kind, called in Engliſh a *ſcad*, and by ſeveral authors, *ſuro*, *ſaurus*, and *acertus marinus*. See *Horſe*-MACKREL.

Trachurus *Braſilienſis*, a name given by Mr. Ray to a fiſh of the ſcomber kind, the *ſcomber cordyla* of Linnæus, known among writers on theſe ſubjects by its Braſilian name GUARATEREBA.

TRACING, in *Huſbandry*, a term uſed by our planters for the method of preſerving the MAIZE, or Indian corn.

This being a large grain, is apt to ſpoil, if not carefully preſerved.

Some thraſh out the corn as ſoon as the ears are gathered, and lay it up in holes of the earth, which are their granaries: but thoſe who have not opportunities of doing this, *trace* it, that is, they leave it in the ear, and weave, or faſten together a great number of ears by the ends of the huſks: theſe *traces* of corn they hang up within doors, on ſuch ſupports as will keep them from one another; and they will, in this manner, keep good the whole winter.

This is a method of our introducing; but their own, of burying the clean corn, was at leaſt as good, and was the ſame practiſed by the Egyptians of old, and by all the wiſeſt nations of the Eaſt at this time. But whether we have improved their huſbandry in this particular, or not, it is certain that we have greatly aſſiſted them in the planting of this corn, which we do by the plough, inſtead of the troubleſome method they had of doing it with the hoe. The manner of our planting it is this: we plough ſingle furrows the whole length of the field, and at about ſix feet diſtance one from another; we then plough others acroſs at the ſame diſtance, and then, wherever the furrows meet, the corn is thrown in; it is then covered either by the hoe, or by running another furrow behind it with the plough; and when the weeds begin to overtop the corn, they plough the ſpaces again, and by this means deſtroy and turn in all the weeds, and give the earth a ſtirring, that greatly aſſiſts vegetation.

The famous method of horſe-hoeing huſbandry, ſo celebrated by Mr. Tull, in a book written on that ſubject, is no other than a bringing home this method of our American planters, in the culture of the maize, and applying it to our European corn. The Indians, and our planters, join in the method of raiſing a hill of earth round every ſtalk of the maize; and when the ground is poor, or out of heart, they bury two or three fiſh, of a kind called by them the *aloofe*, under every hill, and by this means they have a crop double to what would otherwiſe have been produced. The Engliſh have learned this manure from the Indians; and in New England, where they are near the fiſhing-ſtages, they bury the heads and garbage of the cods, which ſucceeds as well as the aloofe, and coſts nothing but the carriage.

The lands on which the maize or Indian corn has grown, are as well fitted for our European corn as if they had been laid fallow. The reaſon of this is, that the plants of the Indian corn ſtanding at ſix feet diſtance from each other, the far greater part of the ground has remained unoccupied, and at the ſame time has had the advantage of often ploughing to kill the weeds, which is a benefit equal to that of dung and reſt. All this, though it tends to prove the doctrine of horſe-hoeing huſbandry not new, yet it ſtrengthens the ſyſtem greatly. Phil. Tranſ. Nº 142.

Tracing, among *Miners*. See Training.

Tracing-*line*, in *Sea-language*, a ſmall cord generally paſſing through a block or thimble, and uſed to hoiſt up any object to a higher ſtation, in order to render it leſs inconvenient. Such are the *tracing*-lines of the awnings, and thoſe of the yard-tackles, which, by hanging down in a cavity or bight, would be aukward and incommodious. Falconer.

TRACK *of a ſhip*. See Wake.

TRACKING, denotes the art of pulling any veſſel or floating body along the ſtream of a canal or river, by means of a rope extending from the veſſel, &c. to the adjacent ſhore, and drawn along the banks of the river, by men or horſes. Whence,

Track-*ſcout*, a veſſel employed to carry goods or paſſengers up and down the rivers or canals in Holland, and the countries bordering on the Baltic ſea. It is uſually tracked by a horſe, who trots along the margin to a limited diſtance, after which he is relieved by another. Falconer.

TRACT, Tractus, properly denotes an extent of ground, or a portion of the ſurface of the terraqueous globe.

Tract, or Tractate, Tractatus, does alſo ſignify a ſmall treatiſe, or written diſcourſe, upon any ſubject.

Tract, in *Hunting*, denotes the trace or footing of a wild beaſt.

TRACTION, *drawing*, the act of a moving power, whereby the moveable is brought nearer to the mover, called alſo attraction.

TRACTORIÆ, among the *Romans*, were diplomas or tickets given by the emperor to ſuch as he ſent into, or called out of the provinces; whereby they were entitled to the uſe of the public poſt, and to be maintained at the expence of the government.

TRACTRIX, in *Geometry*, a curve line, called alſo catenaria.

TRADE, *traffic*, *commerce*, the act, or art, of dealing, buying, ſelling, exchanging, &c. of commodities, bills, money, &c.

For the origin, progreſs, &c. of *trade*, ſee Commerce, and Navigation.

The offences againſt *trade*, conſidered in a legal view, are *owling* or the offence of tranſporting wool or ſheep out of this kingdom, to the detriment of its ſtaple manufacture, (ſee owler), smuggling, fraudulent bankruptcy, usury, *cheating*, (ſee cheats), forestalling, *regrating*, (ſee regrator), engrossing, monopoly, exerciſing a *trade* in any town, without having previouſly ſerved as an apprentice for ſeven years, puniſhable by ſtatute 5 Eliz. c. 4. with the forfeiture of 40*s. per* month; and tranſporting and ſeducing our artificers and manufacturers to ſettle abroad.

Trade, *balance of*. See Balance.

Trade, *board of*. See Board.

Trade-*winds* denote certain regular winds at ſea, blowing either conſtantly the ſame way, or alternately this way and that; thus called from their great uſe in navigation, and the Indian commerce.

The *trade-winds* are of different kinds, ſome blowing three or ſix months of the year one way, and then the like ſpace of time the oppoſite way: theſe are very common in the Indian ſeas, and are called monsoons.

Others blow conſtantly the ſame way: ſuch is that general wind between the tropics, which off at ſea is found to blow all day long from eaſt to weſt. For the phenomena of each, with their phyſical cauſes, ſee Wind.

Dr. Liſter has a conjecture in the Philoſophical Tranſactions, Nº 156, that the tropical or *trade-winds* ariſe, in great part, from the daily and conſtant exhalations of a ſea-plant, called the *ſargeſſa*, or *lenticula marina*, which grows in vaſt quantities from 36° to 18° north latitude, and elſewhere upon the deepeſt ſeas. For the matter of wind, coming from the breath of one only plant, muſt needs be conſtant and uniform; whereas the great variety of trees and plants at land furniſhes a confuſed matter of winds. Hence, he adds, it is, that theſe winds are briſkeſt about noon; the ſun quickening the plant moſt then, and cauſing it to breathe faſter, and more vigorouſly. Laſtly, the direction of this wind of eaſt to weſt, he attributes to the general current of the ſea; for a gentle air is obſerved to be conſtantly led along with the ſtream of the river: nor muſt it be omitted, that every plant is, in ſome meaſure, an heliotrope, and bends itſelf, and moves after the ſun, and conſequently emits its vapour thitherward; ſo that the direction of the *trade-wind* is, in ſome meaſure, alſo owing to the courſe of the ſun.

Dr. Gordon has another hypotheſis: the atmoſphere, which ſurrounds the earth, and moves along with it in its diurnal motion, he ſuppoſes to keep pace therewith; that part of it, at leaſt, which is near the earth, if the remoter part ſhould be judged to loſe ground.

If then there were no changes in the atmoſphere's gravity, he ſuppoſes it would always go along with the earth from weſt to eaſt in an uniform motion, altogether inſenſible to us: but the portion of the atmoſphere under the line being extremely rarefied, its ſpring expanded, and ſo its gravity and preſſure much leſs than the neighbouring parts of the atmoſphere, it is incapable of the uniform motion towards the eaſt, and muſt therefore be preſſed weſtwards, and make the continual breeze from eaſt to weſt, between the tropics.

TRADESCANTIA, *Virginian Spider-wort*, in *Botany*, a genus of the *hexandria monogynia* claſs; its characters are theſe: the flower hath a diſordered ſheath; the proper empalement is permanent, and compoſed of three oval concave leaves; the flower has three roundiſh equal petals which ſpread open, and ſix hairy ſlender ſtyles, terminated by kidney-ſhaped ſummits, and an oval obtuſe germen with three corners, ſupporting a ſlender ſtyle, crowned by a three-cornered blunt ſtigma; the germen afterward turns to an oval capſule ſhut up in the empalement, having three cells containing a few angular ſeeds. There are five ſpecies. Tournefort called this genus *ephemerum*, becauſe the flower continued but one day before it faded; but Linnæus denominated it *tradeſcantia* after John Tradeſcant, who brought the plant from Virginia, where it grows naturally.

Trading *ſociety*. See Society.

TRADITA *nexu*. See Abalienation.

TRADITION, Traditio, the act of delivering a thing into the hands of another. The ſale of a moveable is completed by a ſimple *tradition*.

Tradition, in *Matters of Religion*, is applied to thoſe laws, doctrines, relations, &c. which have been handed down to us from our forefathers, without being written.

Taking *tradition* in this ſenſe, for every thing relating to faith, or the rites and ceremonies of religion thus derived down to us from the primitive church, there are two kinds, viz. *apoſtolical* and *eccleſiaſtical tradition*.

Tradition, *apoſtolical*, which is what we properly call *tradition*, is defined by the Romaniſts to be the unwritten word of God, deſcended from the apoſtles to us, through a continual ſucceſſion of the faithful.

By this *tradition*, ſay they, it is, that the Holy Scriptures have been kept entire, both as to the letter, i. e. the text and as to the ſpirit or ſenſe thereof. This tradition the council of Trent declares to have the ſame authority with the Holy Scripture itſelf, and pronounces every one who rejects in an heretic.

Traditions, *eccleſiaſtical*, are certain ſtatutes and regulations regarding the rites, cuſtoms, and circumſtances of religion, introduced ſince the time of the apoſtles, by councils, popes, &c. and continued to our time through a conſtant obſervance of the church.

The Romaniſts make another diviſion of *tradition*, viz. into *written* and *unwritten*.

Tradition, *written*, is that whereof we find ſome traces in the ancient fathers and doctors.

Tradition, *unwritten*, is that whereof there appear no ſigns or ſteps in any of the fathers extant.

The church of Rome pretends to be the depoſitary of each kind; *tradition* ſhe holds to be abſolutely neceſſary in the church, grounding this neceſſity on the promiſe of infallibility which Jeſus Chriſt is pretended to have made her.

Yet others of that communion deny *tradition*, how excellent ſoever it may be for the reclaiming of heretics, to be abſolutely neceſſary; maintaining, that the church would not be leſs infallible, nor leſs the rule of doctrine, &c. if the fathers had never written at all.

TRADITIONARY, **Traditionarius**, a name given among the Jews, to ſuch of them as acknowledge tradition, follow it, and explain the Scriptures thereby: in oppoſition to the Caraites, who refuſe any thing but the pure Scriptures themſelves.

The *traditionaries* are what we more uſually call rabbins and rabbiniſts, or talmudiſts. Hillel ſhone among the *traditionaries*, and Schammai among the textuaries.

TRADITORES, a name given in the firſt ages of the church to ſuch Chriſtians, as, in times of perſecution, to avoid death and martyrdom, delivered up the ſacred writings to the perſecutors.

The enemies of religion, even under the old law, made their utmoſt efforts to deprive the world of the Holy Scriptures: in that cruel perſecution which Antiochus raiſed againſt the Jews, the books of the law were very ſolicitouſly ſought after, torn, and burnt, and ſuch as kept them were put to death; as we read in the firſt book of Maccab. chap. i. ver. 56, 57.

Diocleſian renewed the ſame impiety, by an edict publiſhed in the nineteenth year of his empire, commanding all the ſacred books to be brought to the magiſtrates and burnt.

Many weak Chriſtians, and even ſome biſhops, overcome by the fear of puniſhment, carried in their books to the perſecutors; which the church deteſting, made very ſevere laws againſt them, and gave them the infamous name of *traditores*, from *trado, I deliver, betray*.

As the great pretence of the ſchiſm of the Donatiſts was, that the Catholics tolerated the *traditores*, it was decreed in the council of Arles, held in 314, that ſuch as ſhould be found guilty of having delivered up any of the holy books or veſſels, ſhould be depoſed from the order of the clergy, &c.

TRADUCIANS, **Traduciani**, a name which the Pelagians anciently gave the catholics, becauſe of their teaching, that original ſin was tranſmitted from father to children, or that it was communicated to the children by the father in the way of generation.

The word is formed of the Latin, *tradux*, which was made uſe of to expreſs that communication; and which comes from *traduco, I tranſmit*, or *propagate* from one to another.

At preſent ſome give the appellation *traduciani*, to ſuch as hold, that the ſouls are tranſmitted to the children by the father.

TRADUCTION, formed of *trans, beyond*, and *duco, I lead, draw*, the act of tranſlating, or turning out of one language into another. See Translation.

TRAFFICK. See Trade and Commerce.

The word is formed from the French, *trafic*, and that from the Italian, *traffico*, which is again borrowed from the Arabic.

The principal *traffick* in Muſcovy and the North is in furs and ſkins: the great *traffick* of the Dutch in the Eaſt is in ſpices: the *traffick* of money is moſtly carried on at the Exchange.

TRAFINE. See Trepan.

TRAGACANTH, or **Adracanth**, or *gum-dragon*, τραγακανθα, formed of τραγος, *goat*, and ακανθα, *thorn*, a kind of gum ouſing out at certain fiſſures in the trunk and larger branches of a prickly plant or little ſhrub of the ſame name, growing in many parts of the Levant.

For its botanical characters, ſee Goat's-*thorn*.

This plant is the astragalus *tragacantha* of Linnæus.

The naked hillocks of mount Ida in Candia, M. Tournefort tells us, produce much of the plant *tragacantha*, or goat's-thorn, which gives the gum ſpontaneouſly towards the end of June, and in the following months, when the nutricious juice of the plant, thickened by the heat, burſts moſt of the veſſels in which it is contained.

This juice coagulates in threads, which make their way into the pores of the bark, where being puſhed forwards by new juice, they get through the bark, and are at length hardened in the air, either into little lumps, or into twiſted pieces in form of little worms, more or leſs long, according to the quantity of the matter they are formed of.

It ſhould ſeem too, that the contraction of the fibres contributes to the expreſſion of the gum: thoſe fine fibres, like the fibres of hemp, laid bare and trampled under foot by men and horſes, contract themſelves, and facilitate the expreſſion of the extravaſated juice. The plant grows alſo in ſeveral places of the Levant, particularly about Aleppo.

There are ſeveral other ſpecies of the *tragacantha*, beſides that deſcribed by Tournefort, which are ſaid to yield this gum; and particularly that of Marſeilles, from whence the gum is often brought into England. But it is brought to us chiefly from Turkey.

The gum is of different colours and qualities, ſome being white, other ſome greyiſh, ſome reddiſh, and ſome almoſt black. The white is the beſt: it muſt be choſen clear, ſmooth, and twiſted, or vermicular. It is dry, and yet ſomewhat ſoft to the touch.

Gum-*tragacanth* differs from all the other known gums, in giving a thick conſiſtence to a much larger quantity of water; and in being much more difficultly ſoluble, or rather diſſolving only imperfectly. Put into water, it ſlowly imbibes a great quantity of the liquid, ſwells into a large volume, and forms a ſoft but not fluid mucilage; with the addition of more water, a fluid ſolution may be obtained by agitation, but the liquor appears turbid and wheyiſh, and on ſtanding the mucilage ſubſides.

It is ſmooth and ſoftening, and therefore is good to obtund the acrimony of any humours; which makes it of ſervice in ſuch coughs as proceed from catarrhs, and defluxions of rheum. It is alſo very ſtrengthening in ſome ſeminal weakneſſes, and is prevalent againſt the whites in women.

Tragacanth is uſually preferred to the other gums for making up torches, and other ſuch purpoſes, and is ſuppoſed likewiſe to be the moſt effectual as a medicine; but on account of its imperfect ſolubility is unfit for liquid forms. It is commonly given in powder with the addition of other materials of ſimilar intention: thus to three parts of gum-*tragacanth* are added three of gum arabic, three of marſhmallow root, one of liquorice, one of ſtarch, and ſix of ſugar. Lewis.

TRAGACANTHUM *venereum Indicum*, in *Natural Hiſtory*, a name given by ſome writers to the birds *neſts* ſo famous in ſoops in China, and in ſome parts of Europe, for their cordial, reſtorative, and provocative virtues. They are the neſts of a kind of Indian ſea-ſwallow, and are made up of a ſubſtance reſembling gum-tragacanth, and, like it, melting in a jelly in any warm liquor.

TRAGASIAN *ſalt*, a term uſed among the ancients for a ſort of ſea-ſalt, very little different from the common kind, being made by the evaporation of the water of ſome ſalt ponds near the ſea-ſhores.

TRAGEA, in *Pharmacy*, an aromatic powder groſly beaten and mixed with ſugar; taken by way of carminative.

TRAGEDY, a dramatic poem, repreſenting ſome ſignal action performed by illuſtrious perſons, and which has generally a fatal iſſue or end.

Ariſtotle more ſcientifically defines *tragedy*, the imitation of one grave and entire action, of a juſt length, and which, without the aſſiſtance of narration, by raiſing of terror and compaſſion, refines and purges our paſſions.

This definition has given the critics ſome perplexity; and Corneille declares he cannot reconcile Ariſtotle with himſelf: the inſtances Ariſtotle cites, he thinks, defeat his own definition. He even denies the purging of our paſſions to be the end of *tragedy*.

Our Engliſh authors are more favourable to the definition; by the purging of our paſſions, they underſtand not the extirpating of them, but the reducing of them to juſt bounds; for by ſhewing the miſeries that attend a ſubjection to them, they ſay it teaches us to watch them more narrowly; and by ſeeing the great misfortunes of others, it leſſens the ſenſe of our own.

Tragedy, in its original, M. Hedelin obſerves, was only an hymn ſung in honour of Bacchus by ſeveral perſons, who, together, made a chorus of muſic with dances and inſtruments.

As this was long, and might fatigue the fingers, as well as tire the audience, they bethought themſelves to divide the ſinging of the chorus into ſeveral parts, and to have certain recitations in the intervals.

Accordingly, Theſpis firſt introduced a perſon to ſpeak upon the ſtage with this view: Æſchylus, finding one perſon inſufficient, introduced a ſecond to entertain the audience more agreeably by a kind of dialogue: he alſo clothed his perſons more decently, and firſt put on them the buſkin.

The perſons who made their recitations on the ſcene, were called *actors*; ſo that *tragedy* at firſt was without many actors. And what they thus rehearſed, being things added to the ſinging of the chorus, whereof they were no neceſſary part, were called *epiſodes*.

Sophocles found that two perſons were not enough for the variety of incidents; and accordingly he introduced a third: and here the Greeks ſeem to have ſtopped; at leaſt, it is very rare that they introduce four ſpeakers in the ſame ſcene.

Tragedy and comedy were at firſt confounded with each other; but they were afterwards ſeparated; and the poets in general applied themſelves to the cultivating of *tragedy*, neglecting comedy.

When *tragedy* was got into a better form, they changed the meaſure of its verſe, and endeavoured to bring the action within the compaſs of a day, or of a revolution of the ſun.

For the ſeveral parts of *tragedy*, ſee ACT, SCENE, ACTION, FABLE, CHARACTER, and MANNERS.

The Engliſh received the firſt plan of their drama from the French, among whom it had its firſt riſe towards the end of the reign of Charles V. under the title of the *chant-royal*; which conſiſted of pieces in verſe compoſed in honour of the Virgin, or ſome of the ſaints, and ſung on the ſtage: they were called by the title *chant-royal*, becauſe the ſubject was given by the king of the year, or the perſon who had borne away the prize the year preceding.

The humour of theſe pieces took wonderfully among the people, inſomuch that in a little time there were formed ſeveral ſocieties, who began to vie with each other in them: and one of theſe, to engage the town from the reſt, began to intermix various incidents or epiſodes, which they diſtributed into *acts* and *ſcenes*, and had as many different perſons as were neceſſary for the repreſentation.

Their firſt eſſay was in the Bourg St. Maur, and their ſubject the paſſion of our Saviour. The prevot of Paris prohibiting their continuing of it, they made application to court; and to render it the more favourable to them, erected themſelves into a friery, or fraternity, under the title of *Brothers of the Paſſion*; which title has given ſome occaſion to ſuſpect them to have been an order of religious.

The king, on ſeeing and approving ſome of their pieces, granted them letters of eſtabliſhment in 1402, upon which they built a theatre, and for an age and an half acted none but grave pieces, which they called *moralities*; till the people growing weary of them, they began to intermix farces or interludes taken from profane ſubjects. This mixture of farce and religion diſpleaſing many, they were re-eſtabliſhed by an arret of parliament in 1548, on condition of their acting none but profane, yet lawful and decent ſubjects, without intermeddling with any of the myſteries of religion; and thus were the Brothers of the Paſſion deſpoiled of their religious character: upon which they mounted the ſtage no more in perſon, but brought up a new ſet of comedians, who acted under their direction.

Thus was the drama eſtabliſhed, and on this foundation arrived in England. In proceſs of time, as it was improved, it became divided into two branches, agreeable to the practice of the ancients, and the nature of things, viz. into *tragedy* and comedy properly ſo called; and this laſt again was ſubdivided into pure comedy and farce. See each under its proper head, COMEDY, &c.

TRAGEDY, *hilaro*. See HILARO-*tragœdia*.

TRAGELAPHUS, in *Zoology*, the name of an animal of the GOAT-kind, of which there are two ſpecies, the one deſcribed by Geſner, the other by Bellonius. See MUSIMON.

TRAGIA, in *Botany*, a genus of the *monoecia triandria* claſs: the characters of which are theſe: it produces male and female flowers on the ſame plant; in the male the perianthium is divided into three ſegments, which are ovated, acute, and expanded; there are no petals; the ſtamina are three capillary filaments, of the length of the cup, and the antheræ are roundiſh; Plumier makes this cup a monopetalous funnel-faſhioned flower; but this does not appear to be really the caſe; in the female flowers the cup is divided into five ſegments, which are ovated and hollow: the germen of the piſtil is roundiſh, and furrowed with three lines; the ſtyle is ſingle, erect, and longer than the cup; the ſtigma is trifid and expanded; the fruit is a very large tricoccous three celled capſule, of a roundiſh figure; the ſeeds are ſingle and roundiſh. There are five ſpecies.

TRAGI-COMEDY, a kind of dramatic piece, repreſenting ſome action paſſed among eminent perſons, the event whereof is not unhappy or bloody, and wherein is ſometimes admitted a mixture of leſs ſerious characters.

The ancients, M. Dacier obſerves, knew nothing of ſuch compoſitions, wherein the ſerious and comic are blended; nor does the epithet M. Corneille gives them of heroic comedies, excuſe their irregularity.

Their foundation is certainly bad; for, endeavouring both to make us laugh and cry in their turns, they endeavour at contrary emotions, which the heart can never undergo; every thing that diſpoſes for the one, indiſpoſing for the other.

The *tragi-comedy* was formerly very common on the Engliſh ſtage; there was ſcarce ſuch a thing in the ſeventeenth century as a pure tragedy without a ſpice of comedy or farce to make the people laugh. Now, that the ſtage and our taſte are brought nearer to the model of nature, and the ancients, the *tragi-comedy* is diſuſed.

Tragi-comedy is the only caſe, wherein comedy is allowed to introduce kings and heroes.

TRAGIC-*dance*, in *Antiquity*. See EMMELIA.

TRAGICUS *muſculus*, in *Anatomy*, a name given by Albinus to one of the muſcles of the eye, called by Santorini and Winſlow, *muſculus tragi*.

TRAGIUM, in *Botany*, a name by which ſome authors have called the fraxinella, or baſtard-dittany, the root of which is uſed in medicine.

TRAGIUM *Germanicum*, in *Botany*, a name given by ſome authors to the *atriplex olida*, or ſtinking orach.

TRAGO *orchis*, in *Botany*. See SATYRION.

TRAGO-ORIGANUM, in *Botany*, a name given by ſome authors to the *marum Syriacum*, or Syrian herb maſtic.

TRAGOPOGON, in *Botany*. See GOAT's *Beard*.

TRAGOSELINUM, in *Botany*. See *Burnet* SAXIFRAGE.

TRAGULA, among the Romans, a ſtrong kind of javelin, with a barbed head.

TRAGUM, in *Ichthyology*, the name given by Ariſtotle, and others of the old Greek writers, to the *trugum* of Ælian, Athenæus, and Oppian. Both names are uſed to expreſs the fiſh called by authors the PASTINACHA *marina*, and by us the *fire-flaw*, or *fire-flaire*.

TRAGUS, τραγος, in *Anatomy*, one of the protuberances of the auricle, or external ear; called alſo *hircus*, becauſe uſually hairy.

The *tragus* is that protuberance next the temple. That on the oppoſite ſide, to which the ſoft lobe of the ear is annexed, is called the ANTITRAGUS.

TRAJAN *column*, a famous hiſtorical column, erected in Rome, in honour of the emperor *Trajan*. See COLUMN, *coloſſal*.

TRAJECTORY of a comet, is its path or orbit, or the line it deſcribes in its motion.

This, Hevelius, in his Cometographia, will have to be very nearly a right line; but Dr. Halley concludes it to be a very excentrical ellipſis.

Sir Iſaac Newton, in prop. xli. of his third book, ſhews how to determine the *trajectory* of a comet from three obſervations; and, in his laſt propoſition, how to correct a *trajectory* graphically deſcribed.

This term is often uſed, in general, for the path of any body moving either in a void, or in a medium that reſiſts its motion; or even for any curve paſſing through a given number of points. Thus Newton, Princip. lib. i. prop. 22. propoſes to deſcribe a *trajectory* that ſhall paſs through five given points.

TRAIL-*board*, in a *Ship*, is a carved board on each ſide of her beak, which reaches from the main ſtem to the figure, or the brackets. See *Tab. Ship. fig.* 2 *n.* 4.

TRAIN, the attendance of a great perſon, or the trail of a gown, or robe of ſtate.

In *Falconry*, it denotes the tail of a hawk.

TRAIN is likewiſe uſed for the number of beats which a watch makes in an hour, or any other certain time. See WATCH-*work*, &c.

TRAIN is alſo uſed for a line of gunpowder laid to give fire to a quantity thereof, in order to do execution, by blowing up earth, works, buildings, &c.

TRAIN, or TRAILE *of artillery*. See ARTILLERY.

TRAIN *oil*, the oil procured from the blubber of whales, by boiling. See WHALE and *Whale*-FISHERY.

TRAIN *bands*, or TRAINED-*bands*, a name given to the MILITIA of England, particularly to thoſe of the city of London.

TRAINING, or TRACING, in *Mineralogy*, a term uſed by our miners to expreſs the tracing up of the mineral appearances on the ſurface of the earth to their head or original place, and there finding a mine of the metal they contain: or, *training* or *tracing* a lode, denotes the ſame with backing of it; that is, laying open the bryle and diſcovering the back of the lode, by many pits for ſeveral fathoms in length, eaſt and weſt. The bryle of a lode is that mineraliſed ſubſtance, which lies looſely upon the top of it under the looſe mould and rubbiſh of the earth.

The principle on which this practice depends, is the change wrought in the face of the earth by the deluge, of the effects of which theſe remains are a very great proof The ſuperficial, or upper part of veins, or lodes of ore, is always the pooreſt, the richer ores lying deeper down, the poor ones only ſerving to lead the way. Theſe poor ores, or ſtones impregnated with the metalline matter of the mine, and called by our workmen, SHOAD-*ſtones*, were, probably, at the creation of the earth, brought regularly up to the ſurface, and ſhewed the place of the metals below. But at the time of the covering of the earth by the waters of the deluge, they were, with the reſt of the ſurface waſhed off, and carried with the deſcent of the water, down into the plains, or into the beds of rivers, and there carried many miles down the ſtream. This being an allowed truth, the art of *training* a mine is eaſy; for though this carrying of the ſhoad-ſtones and poor ore, was done ſo many ages ago, yet all the way that ſome pieces were carried on, others would be depoſited by the way, and the heavieſt and richeſt falling firſt, the lighteſt would always be carried fartheſt, and there would be always left a ſtream of the matter all the way from the place where it was firſt produced, that is, where the mine now is; for the breaking of the ſurface of the earth, at this great cataſtrophe, was not ſo deep as to reach that; and this ſtream or train of matter will be found richer and richer as it approaches the mine, and finally will ſtop at the place where it is.

Where there is ſuppoſed to be a mine of any metal, the hills and country all about are diligently ſearched; the ſituations and deſcent of the lands, and the earth, ſtones, and other foſſile bodies, are examined, particularly the colour and nature of the various ſorts of earths and ſtones which are found on the hills where the mine is ſuſpected to lie, that they may be readily known again if any of them are found in the neighbouring valleys. The ſtones which denote the lodes, and are called *ſhoad-ſtones*, are found two, three, four, or even five miles from the hills, where they originally lay, but if the ſame ſort of ſtones are remembered on the hills, the train is to be made out. After any great land-flood, in which it is ſuppoſed there are uſually ſome new frets made in the banks of the rivers, theſe are carefully examined, to ſee whether any metalline ſtones may be found in their ſides and bottoms, all being then ſo clean, that the ſmalleſt ſhoad-ſtone may uſually be ſeen. If no ſtones of this kind are found, it ſometimes is of uſe, in order to farther reſearches, to examine whether any pieces of earth, of a different colour and nature from that of the reſt of the bank, be found; for theſe being, if any ſuch are found, waſhed alſo from the neighbouring hills, afford a great direction which ſide of the hill to ſearch into.

If no ſhoad-ſtone or grewt of a different nature from the reſt be found in theſe frets or newly worn banks, the miners leave the place for the preſent. For though the bed of the river afford many metalline ſtones, they never regard them, the continual change of place they receive from the current of the water rendering them only tokens that there is metal ſomewhere in the country; but they confound and perplex rather than inſtruct in the ſearch after the places where it is.

If there be found indeed ſtones of the ſhoad-kind, full of protuberances, or having ſharp angles, as if newly broken, it may be worth while to ſee whether they are not waſhed out of ſome part of the neighbouring banks by the late floods; as this ſort of appearance is a token of their having been newly taken into the bed of the river. But if they are rounded and ſmooth, it may be concluded they have been long ſubject to the action of the water, and brought, perhaps, many miles from the places where they were originally lodged in the earth, and where only they could have been of any uſe to the *tracer* of the mine.

When the frets in the ſides of rivers have been traced in vain, the ſearcher after a mine goes up to the ſides of the hills moſt ſuſpected to have mines in them, and there ſeeks for a convenience of bringing a little ſtream of water to run down. When this is found, he cuts a trench about two feet over, and as deep as the ſhelf. The water is turned into this cut, and after two or three days running in it, all the filth will be waſhed away, and the looſe part of the earth cleared off; and if any ſhoad-ſtones are lodged within the whole courſe of this cut, they will be found. If any ſuch are found, it is an unqueſtionable proof that there is ore in the higher parts of the hill; this encourages the work, and there is always found a mine, or at leaſt a ſquat, which will, without much danger, repay the expence and trouble. The ſquats are flat parcels of the ore, lying in different and diſtinct places of the hills, and not communicating with one another.

Sometimes a great deal of this labour is ſaved, and the ſhoad-ſtones are found on the ſurface of the ground, either turned up by the plough, or thrown up in ſmall quantities in mole-hills, or raiſed by ſome other accident, for they are ſeldom found naturally lying on the very ſurface of the earth; for the putrid remains of vegetable and animal ſubſtances, and other adventitious matter, has raiſed the ſurface of the earth in all places, ſince the time of the flood, and made indeed a ſort of new ſurface. Theſe ſtones were certainly laid bare on the ſurface of the ground, at the time of their being carried down from the mines; but this adventitious matter has buried them in this long tract of time, and they are generally found under about a foot of a ſort of vegetable mould. If, by any of theſe ſearches, a ſhoad is found, the miners have nothing to do but to follow it to its head, and there make the opening; but if no ſuch direction can be had, nor any ſhoad found, and there is yet ſuſpicion that there is a mine in the hill, the method is to make an *eſſay-hatch*, as it is called: this is ſunk near the foot or bottom of the hill, and is an opening of about ſix feet long, and four feet broad, made in ſearch of a vein as deep as the ſhelf; this is a caution that muſt be always carefully obſerved, for if they are made leſs deep than this, they may miſs of the vein, though there is one. And the ſinking thus deep is always attended with certainty, for if no ſhoad is found on this, it may be concluded there is none there; except that ſometimes it is found that the ſhoad has been waſhed clean away, within two or three feet from the land; and then the load or vein is two feet farther or thereabouts up in the hill. If any ſhoad is found in the eſſay hatch, there is a certainty of a vein of ore; neither doth it add a little toward the making of a conjecture how high up the hill, or how far off the vein-ſtring, or bonny is, carefully to mark how deep from the ſurface of the earth the ſhoad lies, for this is held an infallible rule, that the nearer the ſhoad lies to the ſhelf or faſt ground, the nearer the vein itſelf is, and *vice verſa*.

When there is no ſhoad or appearance of a mine found in the firſt eſſay hatch, if the conjecture of a mine being in the hill has any tolerable foundation, the *tracing* it does not end here; but they go ten or twelve fathom up the hill, and there open a ſecond eſſay-hatch, and if no ore or ſhoad-ſtone is found in this, they go as many fathom on each hand at the ſame height with the ſecond hatch; and there open a third and a fourth hatch, of the ſame depth and dimenſions with the firſt; if in neither of theſe there is found any ſhoad-ſtone, they aſcend proportionably with three more hatches, if the ſpace of ground require, at every ten or twelve fathom, and in this manner open them three abreaſt, at twelve fathom diſtance up to the top of the hill. If no ſhoad is found in any of theſe, it is concluded then that there is no *tracing* of a mine there, and the hill is left.

If any ſhoad is found in any of theſe hatches or openings, the aſcending hatches from this are kept on in a direct line, and the deeper the ſhoad lies the nearer the vein is. The ſhoad grows gradually deeper from the ſurface, but nigher the ſhelf as they approach the mine; as ſuppoſe it be but half a foot from the ſhelf and ſeven feet from the ſurface, the vein is then concluded to be within a fathom or two; and on this the firſt proportion of twelve fathom between every hatch is leſſened, to ſix, four, two, one, or even leſs than that, as the vein is conjectured to be more and more near.

It often happens, for want of a good gueſs in this matter, that the diggers over-ſhoot the lode; that is, they open their next hatch too high up the hill, or above the lode or vein: this is a miſtake eaſily diſcovered and eaſily rectified. If a ſhoad is found lying near the ſhelf in one hatch, and in the hatch above there is no ſhoad at all, it is a proof that the hatch is too high, and the remedy is only to ſink a hatch at a middle diſtance between the laſt two, which will probably fall upon the very point of the lode, and finiſh the work of *tracing*.

Sometimes it happens, that in continuing the *tracing* of the firſt ſhoad, a ſecond or new one is found; it is not uncommon for two ſhoads to be thus found in one hatch, and this is eaſily diſcovered without any danger of miſtake; for ſuppoſe in the laſt hatch the ſhoad which they *trace* lay at eight feet deep, and in this it lies at ten feet, and beſide this there is a ſhoad found at two feet depth: it is very certain that the ſhoad at ten feet deep is the ſame they were before *tracing*, and this is a new one pointing to another vein or lode, which is now firſt diſcovered ſo near the ſurface of the earth. This has generally gravel or earth mixed with it, and is to be carefully examined; when the higher hatches are opened, this is continually found as well as the old lode; and when the firſt is *traced* to the point of the vein, this ſecond is to be continued in the ſame manner, by other hatches opened at the ſame diſtances above; it often happens that in tracing this ſecond ſhoad, the hatches dug for it diſcover another new one, or a third ſhoad; all theſe are to be *traced* one over the other by the ſame hatches, and will all be found worth the ſeeking after.

The old writers on mineralogy agree with us in this obſervation, and tell us, it is not uncommon in ſome places to find as far as ſeven lodes lying parallel to one another in the ſame hill. In theſe caſes, however, there is uſually one maſter-lode, or a grand vein; the other ſix, that is, three on each ſide, being the leſſer or concominant veins. Five in the ſame manner, ſometimes lie in this order, the grand lode in the middle and two on each ſide, but the more common method is three, a large one, and two ſmaller.

Every lode has a peculiar coloured earth or grewt about it, which is found alſo with the ſhoad, and this always in a greater quantity the nearer the ſhoad lies to the lode, and becomes leſſened by degrees to the diſtance of about a quarter of a mile, farther than which that peculiar grewt is never found in any quantity with the ſhoad; ſo that this is a proof that the lode or vein is near, when it is found in quantity.

A valley may chance to lie at the foot of three ſeveral hills, in ſuch a manner, as to contain three ſeveral grewts, or that earth which was moved with the ſhoad in the concuſſion of the ſtrata at the deluge, with as many different ſhoads or *trains* of ſhoad-ſtones in the midſt of each: in this caſe it will be very neceſſary to know the caſt of the country, and of each hill in reſpect to its grewt, for the ſurer *training* of them one after another as they lie in order: according to the foregoing rules of eſſay-hatching, the uppermoſt in this caſe always directs which hill to begin with firſt.

It ſometimes happens, that after having *trained* the ſhoad found in a valley up to the upper parts of a hill, there is only a ſquatt, or bonny, found inſtead of a right vein of ore, for theſe detached parcels of ore have their ſhoads as well as the right veins. Theſe are uſually about two or three fathoms long, and a fathom broad, few of them are larger, moſt leſs, and they never communicate with any other load or vein, nor ever ſend forth any of their own. The extremities of theſe beds of ore terminate without ſending out any ſtrings, not lying within walls as the lodes; but though they are in the ſhelf or faſt ground, not moved by the flood, their ſurface is equal every where with that of the imaginary ſhelfy one, and they go down five or ſix fathoms deep, and there terminate at once. The ore contained in theſe is rich, and they are always wrought out to the conſiderable advantage of the owners.

Theſe are the general rules of *tracing* mines, and though ſomewhat tedious and expenſive, they are certain, and never liable to the error and diſappointment the other ſhorter ways, as they are called, are liable to These ſhort ways are by the VIRGULA *divinatoria*, or the hazel-wand, whoſe bending in certain places without any external viſible force, is to point out where the place the vein of ore lies: the waters thought to iſſue from the particular lodes, are alſo uſed by ſome as a ſhort means of finding the veins; other of theſe ways are alſo by mineral ſtreams and effluvia, by the barrenneſs of the ſoil, and the pitching of nocturnal lights on the ſuppoſed orifices of mines. But theſe methods are too extravagant or too uncertain to be uſed in caſes of ſo much conſequence.

Another way of diſcovering lodes is by working DRIFTS acroſs the country, as it is called, that is, from north and ſouth, and *vice verſa*.

When the mine is found by the more certain rules of *tracing*, the DIGGING of it is a matter of leſs difficulty. Phil. Tranſ. Nº 69. See MINERALOGY, and Pryce's Mineral. Cornub. book iii. cap. 1.

TRAITOR. See TRAYTOR.

TRAITTE. See FOREIGN *traitte*.

TRAM, in the *Silk Trade*. See SILK.

TRAMBLING *of tin ore*, among *Miners*, is the waſhing of it very clean: which is done with a ſhovel, and in a frame of boards. See TIN.

TRAMEL, an inſtrument or device, ſometimes of leather, more uſually of rope, fitted to a horſe's legs, to regulate his motion, and form him to an amble.

It is alſo taken in many places for an iron moveable inſtrument in chimneys, to hang pots over the fire.

TRAMEL-*net*, or TRAMMEL, is a long net wherewith to take fowl by night in champain countries, much like the net uſed for the low-bell both in ſhape, bigneſs, and meſhes.

The word comes from the French *tremail*, formed of the Latin *tremaculum*, or *tremaclum*; of *tres* and *macula*, becauſe it is compoſed of three rows of meſhes.

To uſe it, they ſpread it on the ground, ſo as the nether or farther end, fitted with ſmall plumbets, may lie looſe thereon: then the other part being borne up by men placed at the fore-ends, it is thus trailed along the ground. At each ſide are carried great blazing lights, by which the birds are raiſed: and as they riſe under the net, they are taken. See LARK.

TRAMELLED, in the *Manege*. A horſe is ſaid to be *tramelled*, that has blazes or white marks upon the fore and hind foot of one ſide; as the far foot before and behind. He is ſo called from the reſemblance the white foot bears to a half *tramel*.

TRAMELLED-*horſe, croſs*, is one that has white marks in two of his feet that ſtand croſs-ways, like St. Andrew's croſs; as in the far fore-foot, and the near hind-foot, or in the near-foot before, and the far-foot behind.

TRAMMELS, in *Mechanics*, an inſtrument ſo called by the joiners, and uſed by them for drawing ovals upon boards. One part of it conſiſts of a croſs with two grooves at right angles; the other is a beam carrying two pins which ſlide in thoſe grooves, and alſo the deſcribing pencil. All the engines for turning ovals are conſtructed upon the ſame principles with the *trammels*: the only difference is, that in the *trammels* the board is at reſt, and the pencil moves upon it: in the turning engine, the tool, which ſupplies the place of the pencil, is at reſt, and the board moves againſt it. See a Demonſtration of the principal properties of theſe inſtruments, by Mr. Ludlam, in Phil. Tranſ. vol. lxx. part ii. p. 378. &c.

TRAMIS, a word uſed by ſome medical writers, to expreſs the line running along the middle of the *ſcrotum*, from the *penis* to the *anus*.

TRAMONTANE, or TRAMONTAIN, formed from the Italian *tra*, of the Latin *trans*, which ſignify *beyond*; and *mons* or *mont*, *mountain*; ſomething beyond, or on the farther ſide, the mountains.

The term is particularly applied, by the Italian painters, to all ſuch as live on the other ſide the Alps, i. e. all out of Italy; as the Germans, Flemiſh, French, &c.

The French lawyers give the ſame title of *tramontane*, or *ultramontane* doctors, to the Italian canoniſts, Gomez, Hoſtienſis, Panorm, &c. who go upon rules and maxims too favourable to the court of Rome, and contrary to thoſe of France, &c. On the Mediterranean, and in Italy, a north wind is called *tramontane*, a *tramontane wind*.

Some alſo call the pole ſtar, *tramontana*. Hence the proverb, to *loſe the tramontane*, that is, to be out of one's aim, to be diſconcerted.

TRANCHE′, or TRENCHE′, is uſed by the French armoriſts, to expreſs that manner of partition called among us, *party per bend dexter*.

A ſcutcheon is ſaid to be *tranché* cut, when it is divided in two diagonally, the diviſion coming from the dexter angle of the chief to the ſiniſter angle of the point. When it is divided contrariwiſe, it is ſaid to be *taillé*, or *party per bend ſiniſter*.

TRANGLE, in *Heraldry*, the diminutive of a feſſe, commonly called a *bar*.

TRANSACTION, TRANSACTIO, in the *Civil Law*, an ACCOMMODATION of ſome buſineſs or diſpute between two parties, by a mutual and voluntary agreement or contract between them.

TRANSACTIONS, *Philoſophical*, are a kind of journal of the principal things that come before the Royal Society of London. The *tranſactions* contain the ſeveral diſcoveries and hiſtories of nature and art, made by the members of the ſociety, or communicated by them from their correſpondents, with the ſeveral experiments, obſervations, &c. made by them, or tranſmitted to them, &c.

They were firſt ſet on foot in 1665, by Mr. Oldenburg, ſecretary of the ſociety, and were continued by him till the year 1677. Upon his death, they were diſcontinued till January 1678, when Dr. Grew reſumed the publication of them, and continued it for the months of December 1678, and January and February 1679, after which they were intermitted till January 1683. During this laſt interval they were ſupplied in ſome meaſure by Dr. Hooke's Philoſophical Collections. They were alſo interrupted for three years, from December 1687 to January 1691, beſide other ſmaller interruptions amounting to near one year and a half more, before October 1695, ſince which time the *Tranſactions* have been regularly carried on.

They were for many years publiſhed in numbers, and the printing of them was always, from time to time, the ſingle act of the reſpective ſecretaries, till the year 1752, when the ſociety thought fit that a committee ſhould be appointed to reconſider the papers read before them, and to ſelect out of them ſuch as they ſhould judge moſt proper for publication in the future *Tranſactions*. The members of the council conſtitute a ſtanding committee for this purpoſe. They meet on the firſt Thurſday of every month, and no leſs than ſeven members of the committee (of which number the preſident, or in his abſence, a vice-preſident, is always to be one) are allowed to be a *quorum*, capable of acting in relation to ſuch papers. The queſtion with regard to the publication of any paper, is always decided by the majority of votes taken by ballot.

They are publiſhed annually in two parts, at the expence of the ſociety, and each fellow is entitled to receive one copy *gratis*, of every volume publiſhed after his admiſſion into the ſociety.

The *Philoſophical Tranſactions* to the end of the year 1700, were abridged in three volumes, by Mr. John Lowthorp: thoſe from the year 1700 to 1720 were abridged in two volumes, by Mr. Henry Jones: thoſe from 1719 to 1733, were abridged in two volumes, by Mr. John Eames and Mr. John Martyn; Mr. Martyn continued the abridgement of thoſe from 1732 to 1744, in two volumes: and thoſe from 1743 to 1750, in two volumes.

TRANSCENDENT, or TRANSCENDENTAL, ſomething raiſed or elevated beyond other things; or which paſſes or *tranſcends* the nature and circumſtances of other inferior beings, ſo as not to be intimately and eſſentially included under them.

The term is particularly applied to the object of metaphyſics, which conſiders beings in general, or *tranſcendental* beings, as God and angels, and truths conſiſting in pure ſpeculation.

Logicians and metaphyſicians give the name of *tranſcendental terms* to thoſe which are ſo general, and of a ſignification ſo extenſive and univerſal, that they paſs through all the categories, and agree to all kinds of things. Such are the terms *ens*, *unum*, *verum*, *bonum*, *res*. See ENS, &c.

TRANSCENDENTAL *art*. See ART.

TRANSCENDENTAL *perfection*. See PERFECTION.

TRANSCENDENTAL *quantities*, among *Schoolmen*. See QUANTITY.

TRANSCENDENTAL *quantities*, among *Geometricians*, are indeterminate ones; or ſuch as cannot be expreſſed or fixed to any conſtant equation. Such is a *tranſcendental* curve, or the like.

M. Leibnitz has a diſſertation in the Acta Erud. Lipſ. wherein he endeavours to ſhew the origin of ſuch quantities; viz. why ſome problems are neither plain, ſolid, nor ſur-ſolid, nor of any certain degree, but to *tranſcend* all algebraical equations.

He alſo ſhews how it may be demonſtrated without calculus, that an algebraic quadratrix for the circle or hyperbola is impoſſible: for if ſuch a quadratrix could be found, it would follow, that, by means thereof, any angle, ratio, or logarithm, might be divided in a given proportion of one right line to another, and this by one univerſal conſtruction; and conſequently the problem of the ſection of an angle, or the invention of any number of mean proportionals, would be of a certain finite degree.

Whereas the different degrees of algebraical equations, and therefore the problem, underſtood in general of any number of parts of an angle, or mean proportionals, is of an indefinite degree, and *tranſcends* all algebraical equations.

TRANSCENDENTAL *curve*, in the *Higher Geometry*, is ſuch a one as cannot be defined by any algebraical equation; or of which, when it is expreſſed by an equation, one of the terms is a variable quantity. See CURVE.

Theſe curves are the ſame with what Deſcartes, and, after his example, ſeveral others, call *mechanical curves*, and which they would have excluded out of geometry; but ſir Iſaac Newton and M. Leibnitz are of another ſentiment. For, in effect, in the conſtruction of geometrical problems, one curve is not to be preferred to another, as it is defined by a more ſimple equation, but as it is more eaſily deſcribed than that other. See GEOMETRICAL *line*.

And ſome of theſe *tranſcendental*, or mechanical curves, are found of greater uſe than all the algebraical ones together, except the circle.

Add, that M. Leibnitz, in the Acta Eruditor. Lipſ. gives us a kind of *tranſcendental* equations, whereby theſe *tranſcendental* curves are actually defined, and which are of an indefinite degree; that is, are not always the ſame in all the points of the curve.

Whereas algebraiſts uſe to aſſume ſome general letters or numbers of the quantities ſought, in theſe *tranſcendental* problems; M. Leibnitz aſſumes general or indefinite equations for the lines ſought; e. gr. putting x and y for the abſciſs and ordinate, the equation he uſes for a line ſought, is $a + bx + cy + exy + fxx + gyy$, &c. $= 0$. By the help of which indefinite equation, which in reality is finite, for it may always be determined how far ſoever it is necaſſary to raiſe it, he ſeeks the tangent; and comparing that which reſults, with the given property of tangents, he finds the value of the aſſumed letters a, b, c, and thus defines the equation of the line ſought.

If the compariſon above mentioned do not proceed, he pronounces the line ſought not to be an algebraical, but a *tranſcendental* one.

This ſuppoſed, he goes on to find the ſpecies of tranſcendency; for ſome *tranſcendentals* depend on the general diviſion or ſection of a ratio, or upon the logarithms, others upon the arcs of a circle, and others on more indefinite and compound inquiries.

Here, therefore, beſides the ſymbols x and y, he aſſumes a third, as v, which denotes the *tranſcendental* quantity; and of theſe three forms a general equation of the line ſought, from which he finds the tangent according to the differential method, which ſucceeds even in *tranſcendental* quantities. What he finds he compares with the given properties of the tangent, and ſo diſcovers not only the value of a, b, c, &c. but alſo the particular nature of the *tranſcendental* quantity.

And though it may ſometimes happen, that the ſeveral *tranſcendentals* are ſo to be made uſe of, and theſe of different natures too one from another; alſo though there be *tranſcendents*, or *tranſcendentals*, and a progreſſion of theſe *in infinitum*, yet we may be ſatisfied with the moſt eaſy and uſeful one, and for the moſt part may have recourſe to ſome peculiar artifices for ſhortening the calculus, and reducing the problem to as ſimple terms as may be.

This method being applied to the buſineſs of quadratures, or to the invention of quadratrices, in which the property of the tangent is always given, it is manifeſt not only how it may be diſcovered, whether the indefinite quadrature may be algebraically impoſſible, but alſo how, when this impoſſibility is diſcovered, a *tranſcendental* quadratrix may be found; which is a thing which had not before been ſhewn. So that it ſeems that geometry is by this method carried infinitely beyond the bounds to which Vieta and Deſcartes brought it; ſince, by this means, a certain and general analyſis is eſtabliſhed, which extends to all the problems which are of no certain degree, and conſequently not comprehended within algebraical equations.

Again, in order to manage *tranſcendental* problems, (wherever the buſineſs of tangents or quadratures occurs) by a calculus, there is hardly any that can be imagined ſhorter, more advantageous or univerſal, than the differential calculus, or analyſis of indiviſibles and infinites.

By this method we may explain the nature of *tranſcendental* lines by an equation; e. gr. Let a be the arc of a circle, and x the verſed ſine: then will $a = \frac{\int dx}{\sqrt{2x - xx}}$, and if the ordinate of the cycloid be y, then will $y = \sqrt{2x - xx} + \frac{\int dx}{\sqrt{2x - xx}}$, which equation perfectly expreſſes the relation between the ordinate y and the abſciſs x; and from it all the properties of the cycloid may be demonſtrated.

Thus is the analytical calculus extended to thoſe lines which have hitherto been excluded, for no other cauſe but that they were thought incapable of it.

TRANCHEFILE, in the *Manege*, the croſs chain of a bridle, that runs along the bit-mouth, from one branch to the other.

TRANSCOLATION, in *Pharmacy*, the ſame with FILTRATION, or PERCOLATION.

TRANSCRIPT, a copy of any original writing, particularly that of an act, or inſtrument, inſerted in the body of another.

In this ſenſe we ſay, *tranſcript of a fine*, &c. See FINE and DUPLICATE.

TRANSCRIPTO *recognitionis factæ coram juſtitiariis itinerantibus*, &c. is a writ for certifying a RECOGNIZANCE into chancery, taken before the juſtice in eyre.

TRANSCRIPTO *pedis finis levati mittendo in cancellariam*, is a writ a writ for certifying the foot of a **fine** levied before juſtices in eyre, &c. into chancery.

TRANSEAT, in the *Schools*, &c. a term purely Latin, ſignifying, *let it paſs*, or ſuppoſe a propoſition to be true, without granting it.

Hence the proverb, *tranſeat, Græcum eſt, non legitur:* the phraſe is ſaid to have taken its riſe from ſome ancient commentators, or gloſſographers of the civil law, who, not underſtanding Greek, paſſed over all the words that occurred in that language without explaining them.

In the Roman chancery, a *nil tranſeat* is a kind of oppoſition made to the ſealing of a bull, or to the delivery of ſome other inſtrument, till the parties, againſt whoſe intereſt it is directed, have been heard againſt it.

TRANSELEMENTATION, in the *Schools*, a change of the elements or principles of one body into thoſe of another.

Such is that which Roman catholics contend for in the euchariſt, where the elements of bread and wine, they ſay, are changed into thoſe of fleſh and blood. See **Transubstantiation.**

Tranſelementation, wherever it happens, is always allowed miraculous, or an effect beyond the ordinary powers of nature.

TRANSFER, in *Commerce*, &c. an act whereby a perſon ſurrenders his right, intereſt, or property, in any thing moveable or immoveable, to another.

The ſale or donation of an inheritance, &c. *transfers* the property, rights, &c. thereof.

The term is principally uſed in the commerce of ſtocks; for the aſſigning and making over of ſubſcriptions or ſhares therein to ſuch as purchaſe them of the proprietors. In the South Sea company, the Bank, Eaſt India, &c. *transfers* are made by entering the ſtock under the name of the purchaſer, under his proper letter of the alphabet.

A counterfeit in this caſe is by act of parliament made a capital crime.

TRANSFIGURATION, among *Divines*, that miraculous change wrought by Jeſus Chriſt, in preſence of St. Peter, St. James, and St. John, on mount Thabor, where he appeared in his glory, in company with Moſes and Elias. See the deſcription thereof in St. Matthew chap. xvii.

The term is alſo applied to a feaſt held in the Romiſh church on the 6th of Auguſt, in commemoration of that miracle.

TRANSFORMATION, a metamorphoſis, or change of form.

The chemiſts have been a long time ſeeking the *transformation* of metals, that is, their *tranſmutation*, or the manner of changing them into gold.

Among the myſtics, by *transformation* is underſtood a change of the contemplative ſoul, whereby it is in ſome meaſure deified, or converted into the ſubſtance of God, and wherein it is, as it where, loſt and ſwallowed up in the divinity, ſo as not to perceive its own diſtinction from God.

The word *transformation* is very liable to be abuſed: but many of the myſtics uſe it innocently enough; meaning no other by it than what St. Paul did, *Vivo ego, jam non ego, vivit vero in me Chriſtus.*

Transformation is alſo ſometimes uſed for what we more properly call **Transubstantiation.**

Transformation *of equations*, in *Algebra*, is a method of changing equations into others of a different form, but of equal value. This operation is neceſſary in order to prepare equations for a more eaſy ſolution. We ſhall ſubjoin ſome examples of the moſt common and uſeful kind under this head. The affirmative roots of an equation are changed into negative roots of the ſame value, and *vice verſa*, by only changing the ſigns of the terms alternately, beginning with the ſecond.

Thus, the roots of the equation $x^4-x^3-19x^2+49x-30=0$ are $+1$, $+2$, $+3$, -5; whereas the roots of the ſame equation having only the ſigns of the ſecond and fourth terms changed, viz. $x^4+x^3-19x^2-49x-30=0$, are -1, -2, -3, $+5$.

If it be required to transform an equation into another that ſhall have its roots greater or leſs than the roots of the propoſed equation by ſome given difference, the method is as follows. Let the propoſed equation be the cubic $x^3-px^2+qx-r=0$; and let it be required to transform it into another, whoſe roots ſhall be leſs than the roots of this equation by ſome given difference (e), i. e. ſuppoſe $y=x-e$, and conſequently $x=y+e$; then, inſtead of x and its powers, ſubſtitute $y+e$ and its powers, there will ariſe this new equation.

$$\text{(A)}\ \left.\begin{array}{r} y^3+3ey^2+3e^2y+e^3 \\ -py^2-2pey-pe^2 \\ +qy+qe \\ -r \end{array}\right\}=0$$

whoſe roots are leſs than the roots of the preceding equation by the difference (e).

To find an equation whoſe roots ſhall be greater than thoſe of the propoſed equation by the quantity (e), ſuppoſe $y=x+e$, and $x=y-e$, and the equation will have this form.

$$\text{(B)}\ \left.\begin{array}{r} y^3-3ey^2+3e^2y-e^3 \\ -py^2+2pey-pe^2 \\ +qy-qe \\ -r \end{array}\right\}=0.$$

If the propoſed equation be in this form $x^3+px^2+qx+r=0$, then by ſuppoſing $x+e=y$, there will ariſe an equation agreeing in all reſpects with the equation (A), but that the ſecond and fourth terms will have contrary ſigns.

$$\text{(C)}\ \left.\begin{array}{r} y^3-3ey^2+3e^2y-e^3 \\ +py^2-2pey+pe^2 \\ +qy-qe \\ +r \end{array}\right\}=0.$$

By ſuppoſing $x-e=y$, there will ariſe an equation agreeing with (B) in all reſpects, but that the ſecond and fourth terms will have contrary ſigns to what they have in (B): as

$$\text{(D)}\ \left.\begin{array}{r} y^3+3ey^2+3e^2y+e^3 \\ +py^2+2epy+pe^2 \\ +qy+qe \\ +r \end{array}\right\}=0.$$

Hence we ſee how the ſecond, or other intermediate term may be taken away out of an equation; for, in the equation (A), whoſe ſecond term is $\overline{3e-p}\times y^2$, if we ſuppoſe $e=\frac{1}{3}p$, and conſequently $3e-p=0$, the ſecond term will vaniſh. In the equation (C), whoſe ſecond term is $-\overline{3e+p}\times y^2$, ſuppoſing $e=\frac{1}{3}p$, the ſecond term alſo vaniſhes. But the equation (A) was deduced from $x^3-px^2+qx-r=0$, by ſuppoſing $y=x-e$, and the equation (C) was deduced from $x^3+px^2+qx+r=0$, by ſuppoſing $y=x+e$; whence may be deduced the following rule for exterminating the ſecond term out of any cubic equation; viz. add to the unknown quantity of the given equation the third part of the co-efficient of the ſecond term with its proper ſign, viz. $\mp\frac{1}{3}p$, and ſuppoſe this aggregate equal to a new unknown quantity y. From this value of y find a value of x by tranſpoſition, and ſubſtitute the value of x and its powers in the given equation, and there will ariſe a new equation wanting the ſecond term. E. g. let the equation be $x^3-9x^2+26x-34=0$; ſuppoſe $x-3=y$, or $y+3=x$, and ſubſtituting according to the rule, we ſhall have,

$$\left.\begin{array}{r} y^3+9y^2+27y+27 \\ -9y^2-54y-81 \\ +26y+78 \\ -34 \end{array}\right\}=0$$

$$\overline{y^3\ *\quad -y\quad -10}=0,$$ an equation wanting the ſecond term.

If the equation propoſed be of any number of dimenſions (n), and the co-efficient of the ſecond term with its ſign prefixed be $-p$, then ſuppoſing $x-\frac{p}{n}=y$, and $x=y+\frac{p}{n}$, and ſubſtituting this value for x in the given equation, there will ariſe a new equation that ſhall want the ſecond term; whence the ſecond term may be exterminated out of any given equation by the following rule. Divide the co-efficient of the ſecond term of the propoſed equation by the number of dimenſions of the equation; and aſſuming a new unknown quantity y, add to it the quotient having its ſign changed: then, ſuppoſe this aggregate equal to x, the unknown quantity in the propoſed equation; and for x and its powers, ſubſtitute the aggregate and its powers, and the new equation will want its ſecond term.

Let the propoſed equation be a quadratic, as $x^2-px+q=0$, then ſuppoſe $y+\frac{1}{2}p=x$ according to the rule, and ſubſtituting this value for x, we ſhall have,

$$\left.\begin{array}{r} y^2+py+\frac{1}{4}p^2 \\ -py-\frac{1}{2}p^2 \\ +q \end{array}\right\}=0$$

$$\overline{y^2\quad *\quad -\tfrac{1}{4}p^2+q}=0.$$ Having found the value of y, that of x may be had by means of $y+\frac{1}{2}p=x$: e. gr. ſince $y^2+q-\frac{1}{4}p^2=0$, $y^2=\frac{1}{4}p^2-q$, and $y=\pm\sqrt{\frac{1}{4}p^2-q}$, and therefore $x=y+\frac{1}{2}p=\frac{1}{2}p\pm\sqrt{\frac{1}{4}p^2-q}$.

If the propoſed equation is a biquadratic, as x^4-px^3+q

$x^2 - rx + s = 0$, then by ſuppoſing $x - \frac{1}{4}p = y$, or $x = y + \frac{1}{4}p$, an equation ſhall ariſe having no ſecond term. And if the propoſed equation is of five dimenſions, we muſt ſuppoſe $x = y \pm \frac{1}{5}p$, &c. It is plain, that in a quadratic equation wanting the ſecond term, there muſt be one root affirmative and one negative, and theſe muſt be equal to one another. In a cubic equation wanting the ſecond term, there muſt be either two affirmative roots equal, taken together, to a third root that muſt be negative; or two negative equal to a third that muſt be poſitive.

Let an equation $x^3 - px^2 + qx - r = 0$ be propoſed, and let it be required to exterminate the third term. By ſuppoſing $y = x - e$, the co-efficient of the third term in the equation of y is found (ſee equation A ſupra) to be $3e^2 - 2pe + q$. Suppoſe that co-efficient equal to nothing, and by reſolving the quadratic equation $3e^2 - 2pe + q = 0$, you will find the value of e, which ſubſtituted for it in the equation $y = x - e$, will ſhew how to transform the propoſed equation into one that ſhall want the third term.

The quadratic $3e^2 - 2pe + q = 0$, gives $e = \frac{p \pm \sqrt{p^2 - 3q}}{3}$; ſo that the propoſed cubic will be transformed into an equation wanting the third term by ſuppoſing $y = x - \frac{p - \sqrt{p^2 - 3q}}{3}$, or $y = x - \frac{p + \sqrt{p^2 - 3q}}{3}$.

If the propoſed equation is of n dimenſions, the value of e, by which the third term may be taken away, is had by reſolving the quadratic eqation $e^2 + \frac{2p}{n} \times e + \frac{2q}{n \times n - 1} = 0$, ſuppoſing $-p$ and $+q$ to be the co-efficients of the ſecond and third terms of the propoſed equation. The fourth term of any equation may be taken away by ſolving a cubic equation, which is the co-efficient of the fourth term in the equation when transformed. The fifth term may be taken away by ſolving a biquadratic, &c.

There are other tranſmutations of equations that on ſome occaſions are uſeful. An equation, as $x^3 - px^2 + qx - r = 0$, may be transformed into another that ſhall have its roots equal to the roots of this equation multiplied by a given quantity, as f, by ſuppoſing $y = fx$, and $x = \frac{y}{f}$; and ſubſtituting this value for x in the propoſed equation, there will ariſe $\frac{y^3}{f^3} - \frac{py^2}{f^2} + \frac{qy}{f} - r = 0$, and multiplying all by f^3, $y^3 - fpy^2 + f^2qy - f^3r = 0$, where the co-efficient of the ſecond term of the propoſed equation, multiplied into f, makes the coefficient of the ſecond term of the transformed equation, and the following co-efficients are produced by the following co-efficients of the propoſed equation (as q, r, &c.) multiplied into the powers of f (f^2, f^3, &c.) Therefore, to transform any equation into another whoſe roots ſhall be equal to the roots of the propoſed equation multiplied by a given quantity f, you need only multiply the terms of the propoſed equation, beginning at the ſecond term, by f, f^2, f^3, &c. and putting y inſtead of x, there will ariſe an equation having its roots equal to the roots of the propoſed equation multiplied by f as required.

Let it be required to transform an equation, the higheſt term of which has a co-efficient different from unity, into one that ſhall have the co-efficient of the higheſt term unit. If the equation propoſed is $ax^3 - px^2 + qx - r = 0$, then transform it into one whoſe roots are equal to the roots of the propoſed equation multiplied by a: i. e. ſuppoſe $y = ax$, or $x = \frac{y}{a}$, and there will ariſe $\frac{ay^3}{a^3} - \frac{py^2}{a^2} + \frac{qy}{a} - r = 0$; ſo that $y^3 - py^2 + qay - ra^2 = 0$: whence we deduce the following rule; change the unknown quantity x into another y, prefix no coefficient to the higheſt term, paſs the ſecond, multiply the following terms, beginning with the third, by a, a^2, a^3, &c. the powers of the co-efficient of the higheſt term of the propoſed equation, reſpectively. Thus, the equation $3x^3 - 13x^2 + 14x + 16 = 0$ is transformed into the equation $y^3 - 13y^2 + 14 \times 3 \times x + 16 \times 9 = 0$, or $y^3 - 13y^2 + 42x + 144 = 0$. Then finding the roots of this equation, it will eaſily be diſcovered what are the roots of the propoſed equation; ſince $3x = y$, or $x = \frac{1}{3}y$: and therefore, ſince one of the values of y is -2, it follows that one of the values of x is $-\frac{2}{3}$. By this rule an equation is eaſily cleared of fractions.

Suppoſe the equation propoſed is $x^3 - \frac{p}{m}x^2 + \frac{q}{m}x - \frac{r}{e} = 0$. Multiply all the terms by the product of the denominator, you find $mne \times x^3 - nep \times x^2 + meq \times x - mnr = 0$. Then *transforming* the equation into one that ſhall have unit for the coefficient of the higheſt term, you find $y^3 - nep \times y^2 + m^2e^2nq \times y - m^3n^3e^2r = 0$. Or, neglecting the denominator of the laſt term $\frac{r}{e}$, you need only multiply all the equation by mn, which will give $mn \times x^3 - np \times x^2 + mq \times x - \frac{mnr}{e} = 0$, and then, $y^3 - np \times y^2 + m^2nq \times y - \frac{m^3n^3r}{e} = 0$. After the values of y are found, it will be eaſy to diſcover the values of x; ſince, in the firſt caſe, $x = \frac{y}{mne}$; in the ſecond, $x = \frac{y}{mn}$. E. g. the equation $x^3 * - \frac{4}{3}x - \frac{146}{27} = 0$ is firſt reduced to this form $3x^3 * - 4x - \frac{146}{9} = 0$, and then transformed into $y^3 * - 12y - 146 = 0$.

Sometimes, by theſe *transformations*, ſurds are taken away. E. g. the equation $x^3 - p\sqrt{a \times x^2} + qx - r\sqrt{a} = 0$, by putting $y = \sqrt{a \times x}$, or $x = \frac{y}{\sqrt{a}}$, is transformed into this equation $\frac{y^3}{a\sqrt{a}} - p\sqrt{a} \times \frac{y^2}{a} + q \times \frac{y}{\sqrt{a}} - r\sqrt{a} = 0$; which, by multiplying all the terms by $a\sqrt{a}$, becomes $y^3 - pay^2 + qay - ra^2 = 0$, an equation free of ſurds. But in order to make this ſucceed, the ſurd $\sqrt{a}$ muſt enter the alternate terms beginning with the ſecond.

An equation, as $x^3 - px^2 + qx - r = 0$, may be transformed into one whoſe roots ſhall be the quantities reciprocal of x, by ſuppoſing $y = \frac{1}{x}$, and $y = \frac{z}{r}$, or by one ſuppoſition $x = \frac{r}{z}$, becomes $z^3 - qz^2 + prz - r^2 = 0$.

By this *transformation*, the greateſt root in the one is transformed into the leaſt root in the other: for ſince $x = \frac{1}{y}$, and $y = \frac{1}{x}$, it is plain that when the value of x is greateſt, the value of y is leaſt, and converſely. See on this ſubject Maclaurin's Algeb. part ii. chap. iii. iv. Saunderſon's Algeb. vol. ii. p. 687, &c. See REDUCTION of *Equations*.

TRANSFUGA, in *Antiquity*, a deſerter. Among the Romans, deſerters were commonly puniſhed by cutting off their hands, it being thought, that living in ſuch a miſerable truncated condition would ſtrike more terror than death itſelf.

We find, however, that deſerters were likewiſe crucified, burnt alive, thrown from the Tarpeian rock, or expoſed to wild beaſts at public ſhews.

TRANSFUSION, TRANSFUSIO, compounded of the prepoſition *trans*, *beyond*, *farther*, and *fundo*, *I pour*, the act of pouring a liquor out of one veſſel into another.

In the preparations of chemiſtry and pharmacy there are frequent *transfuſions* of liquors, ſyrups, &c.

TRANSFUSION *of the blood*, is particularly uſed for the letting out of the blood of one animal, ſo as to be immediately received into the body of another.

Dr. Lower is uſually accounted the inventor of this *transfuſion*; and the experiment is ſaid to have been firſt publicly made by him at Oxford in 1665, and the deſcription thereof publiſhed in his excellent book De Corde.

Yet we are informed from good authority, that it had been propoſed at Paris in 1658; that another of our countrymen had had the idea before; and that it had been known in Germany ſeveral years. It is certain there is a paſſage in Libavius, wherein the *transfuſion* is exactly deſcribed as ſince practiſed: it is true he diſapproves it, and only mentions it to ridicule it.

Inſtances of this practice occur even among the ancients, for which Martiniere (Opuſcules Lettr. a M. de Colbert) refers to the hiſtory of the ancient Egyptians; to the book of the wiſdom of Tanaquila, wife of Tarquin the Elder; to Herophilus's Treatiſe of Anatomy; to the works of Pliny, Celſus, and many others, who condemn it; to the Metamorphoſis of Ovid, &c.

This writer alſo aſſures us, that Marſil Ficinus, the abbé Trithemius, Aquapendente, Harvey, and Fra. Paolo, had tried this practice.

The French ſeem to have been the firſt who ventured to make trial of this operation on human ſubjects; in which they were followed by Meſſrs. Riva and Manfredi, in Italy, in 1668.

The uſe moſt naturally expected from the operation is, that one animal may live by the blood of another; ſo that thoſe which want blood, or have corrupt morbid blood, may be ſupplied from others with a ſufficient quantity, and of ſuch as is good and laudable.

However, it is certain, the operation has no place in the preſent practice of phyſic; but whether that be the fault of the operation itſelf, or only owing to the indolence and averſeneſs of people to run into new methods, we will not undertake to ſay.

The principal advocate for the ſafety and advantage of this operation was M. Denis, whoſe arguments were examined and refuted in a diſſertation written by M. Pierre Petit, under the title of Eutyphron.

The method of *transfuſing* Dr. Lower gives us to the following effect: take up the carotid artery of the dog, or other animal, whoſe blood is to be *transfuſed* into another of the ſame, or a different kind; ſeparate it from the nerve of the eighth pair, and lay it bare above an inch. Make a ſtrong ligature on the upper part of the artery; and an inch nearer the heart another ligature with a running knot, to be looſened and faſtened as occaſion requires. Draw two threads between the two ligatures, open the artery, put in a quill, and tie up the artery again upon the quill by the two threads, and ſtop the quill by a ſtick.

Then make bare the jugular vein of the other animal for about an inch and half in length, and at each end make a ligature with a running knot; and in the ſpace between the two knots, draw under the veins two threads, as in the other. Open the vein, and put into it two quills, one into the deſcending part of the vein, to receive the blood from the other dog, and carry it to the heart: the other quill put into the other part of the jugular, towards the head, through which the ſecond animal's own blood is to run into diſhes. The quills thus tied faſt, ſtop them up with ſticks till there be occaſion to open them.

Things thus diſpoſed, faſten the dogs on their ſides towards one another, in ſuch manner, as that the quills may go into each other; then unſtop the quill that goes down into the ſecond dog's jugular vein, as alſo that coming out of the other dog's artery; and by the help of two or three other quills put into each other, as there ſhall be occaſion, inſert them into one another.

Then ſlip the running knots, and immediately the blood runs through the quills as through an artery, very impetuouſly.

As the blood runs into the dog, unſtop the quill in the upper part of his jugular, for his own blood to run out at, though not conſtantly, but as you perceive him able to bear it, till the other dog begins to cry and faint, and at laſt die.

Laſtly, take both quills out of the jugular, tie the running knot faſt, and cut the vein aſunder, and ſew up the ſkin: the dog, thus diſmiſſed, will run away as if nothing ailed him.

In the Philoſophical Tranſactions we have accounts of the ſucceſs of various *transfuſions* practiſed at London, Paris, in Italy, &c. Sir Edmund King *transfuſed* forty-nine ounces of blood out of a calf into a ſheep; the ſheep, after the operation, appearing as well and as ſtrong as before.

Mr. Coxe *transfuſed* fourteen or ſixteen ounces of a mangy into a ſound dog: the effect was that no alteration was obſerved in the ſound dog, but the mangy one was cured.

M. Gayant *transfuſed* the blood of a young dog into the veins of an old one almoſt blind with age, and ſcarce able to ſtir, which yet, two hours afterwards, leaped and friſked about.

Mr. Denis *transfuſed* the blood of three calves into three dogs, which all continued briſk, and eat as well as before. The ſame perſon *transfuſed* the blood of four wethers into a horſe twenty-ſix years old, which thence received much ſtrength, and a more than ordinary appetite.

Soon after this operation was introduced at Paris, viz. in 1667 and 1668, M. Denis performed it on five human ſubjects, two of whom recovered of diſorders under which they laboured, one being in perfect health ſuffered no inconvenience from it; and two perſons who were ill, and ſubmitted to the operation, died: in conſequence of which the magiſtrates iſſued a ſentence, prohibiting the *transfuſion* on human bodies under pain of impriſonment.

At St. Griſſomi's, at Udine, the blood of a lamb was *transfuſed* into the veins of a ſpaniel thirteen years old, which had been quite deaf for three years, and ſo feeble as ſcarce to be able to walk at all. After the operation he leaped from the table, and went about the houſe to ſeek his maſter. Two days afterwards he ran up and down the ſtreets with other dogs; and his ſtomach grew ſtrong, and he recovered his hearing.

TRANSGRESSION, Transgressio, compounded of *trans, beyond,* and *gradire, to go,* an offence againſt ſome law, or a breach or violation thereof.

The term is chiefly uſed in reſpect of the laws of God. In the doctrine of original ſin, all mankind are ſuppoſed to ſhare with Adam in the guilt of his firſt *tranſgreſſion.* Moſes threatens the *tranſgreſſors* of his law with abundance of temporal puniſhments.

Transgressione, in our *Law,* a writ, uſually called a *writ,* or *action of treſpaſs.*

Of this Fitzherbert has two ſorts; one *vicountiel,* thus called becauſe directed to the ſheriff, and not returnable, but to be determined in the country. Its form differs from that of the other, as wanting the words *quare vi & armis,* &c. See Vicountiel.

The other is termed a *writ of treſpaſs,* and to be ſued in the Common Pleas and King's-Bench. See Trespass.

TRANSIENT *action.* See Action.

Transient *air.* See Air.

TRANSIRE, in ſtat. anno 14 Car II. cap. 11. is uſed for a cuſtom-houſe warrant, or let paſs; from the verb *tranſeo, I paſs forth.*

TRANSIT, Transitus, from *tranſire,* to *paſs over,* formed of *trans* and *eo, I go beyond,* in *Aſtronomy,* ſignifies the paſſage of any planet, juſt by, or over a fixed ſtar, or the ſun; and of the moon, in particular, covering or moving over any other planet.

Mercury and Venus, &c. in their tranſits over the ſun, appear like dark ſpecks. See Meridian and Parallax.

Transit *Inſtrument,* in *Aſtronomy,* is a teleſcope (ſee *Meridian* Telescope) about $2\frac{1}{2}$ feet long, fixed at right angles to an horizontal axis about 15 inches long; which axis muſt be ſo ſupported, that the line of collimation may move in the plane of the meridian.

The axis, to the middle of which the teleſcope is fixed, ſhould gradually taper toward its ends, and terminate in cylinders well turned and ſmoothed; and a proper balance is to be put on the tube, ſo that it may ſtand at any elevation when its axis reſts on the ſupporters. Two upright poſts of wood or ſtone, firmly fixed at a proper diſtance, are to ſuſtain the ſupporters to this inſtrument; theſe ſupporters are two thick braſs plates, having well ſmoothed angular notches in their upper ends to receive the cylindrical arms of the axis; each of the notched plates is contrived to be moveable by a ſcrew, which ſlides them upon the ſurfaces of two other plates immoveably fixed to the two upright poſts; one plate moving in a vertical, and the other in an horizontal direction, adjuſt the teleſcope to the planes of the horizon and meridian; to the plane of the horizon, by a ſpirit level hung in a parallel poſition to the axis, and to the plane of the meridian in the following manner. Obſerve the times by the clock when a circumpolar ſtar, ſeen through this inſtrument, *tranſits* both above and below the pole; and if the times of deſcribing the eaſtern and weſtern parts of its circuit are equal, the teleſcope is then in the plane of the meridian; otherwiſe the notched plates muſt be gently moved till the time of the ſtar's revolution is biſected by both the upper and lower *tranſits,* taking care at the ſame time of the horizontality of the axis.

When the teleſcope is thus adjuſted, a mark muſt be ſet at a conſiderable diſtance (the greater the better) in the horizontal direction of the interſection of the croſs-wires, and in a place where it can be illuminated in the night-time by a lanthorn hanging near it, which mark, being on a fixed object, will ſerve at all times afterwards to examine the poſition of the teleſcope, by firſt adjuſting the tranſverſe axis by the level.

In order to adjuſt the clock by the ſun's tranſit over the meridian, note the times by the clock, when the preceding and following edges of the ſun's limb touch the croſs-wires: the difference between the middle time and twelve hours, ſhews how much the mean, or clock-time, is faſter or ſlower than the apparent, or ſolar, time for that day; to which the equation of time being applied, and it will ſhew the time of mean noon for that day, whereby the clock may be adjuſted.

TRANSITION, in *Muſic,* is when a greater note is broken into leſs, to ſoften the roughneſs of a leap, by a gradual paſſing to the note next following.

This is commonly called the *breaking of a note.*

Transition, in *Rhetoric,* a kind of connection in diſcourſe, whereby the ſeveral different parts and members thereof are joined, ſo as to conſtitute one regular whole:

or, as Voſſius defines it, it is a form of ſpeech by which the ſpeaker, in a few words, tells his hearers both what he has ſaid already, and what he next deſigns to ſay. Sometimes, however, in paſſing from one thing to another, a general hint of it is thought ſufficient to prepare the hearers, without particularly ſpecifying what has been ſaid, or is next to follow.

Some place *tranſition* in the number of figures; others, with Quintilian, exclude it from that rank.

F. de Colonia makes two kinds of *tranſitions*, the one *perfect*, and the other *imperfect*.

Transition, *Perfect*, is that wherein we briefly intimate what is ſaid, and what remains to be ſaid. As, *now that we have ſpoken of war, there remains ſomething to be ſaid of peace. Satis multa de turpitudine: dicam deinceps, quod propoſui, de periculo. Uni epiſtolæ reſpondi: venio ad alteram. Sed hæc vetera; illud recens: Cæſarem meo conſilio interfectum.*

Transition, *Imperfect*, is that wherein only one of theſe is expreſſed. As, *let us now conſider the conſequences of, &c. Poſtularet hic locus, ut dicerem de—ſed finis ſit; neque enim præ lacrymis jam loqui poſſum; & hic ſe lacrymis defendi negat.*

TRANSITIVE, in *Grammar*, an epithet given to ſuch verbs, as ſignify an action which paſſes from the ſubject that does it, to, or upon, another ſubject which receives it. Under the head of verbs *tranſitive*, come what we uſually call verbs active and paſſive: other verbs, whoſe action does not paſs out of themſelves, are called *neuters*, and by ſome grammarians *intranſitives*.

In the Hebrew, the verb היה, *hajah*, in the Greek, ειμι, and in the Latin *ſum*, are verbs purely neuter, or intranſitive; or, as the Latin and Greek grammarians more uſually expreſs it, verbs ſubſtantive, ſignifying the mere exiſtence of the thing, without the active or *tranſitive* conjugations.

TRANSITORY, in *Common Law*, ſtands oppoſite to local. See Action.

Transitory *choſe*. See Chose.

Transitory *treſpaſs*. See Trespass.

TRANSLATION, formed of *trans*, *beyond*, and *latio*, of *ferre*, *to carry*; the act of transferring or removing a thing from one place to another.

We ſay, the *tranſlation* of a biſhop's ſee, a council, a ſeat of juſtice, a parliament; the *tranſlation* of the relics of a ſaint, the *tranſlation* of the empire, &c.

The *tranſlations* of biſhops from one ſee to another are prohibited by the council of Nice, which declares them null, and appoints the tranſlated biſhop to return to his former church. The council of Sardica excludes *tranſlated* biſhops from communion. It has been obſerved, that no biſhop was ever removed from a greater church to a leſſer; and that thoſe who thus quitted their churches, only did it out of ambition, or avarice.

This diſcipline was generally obſerved for nine hundred years; and the firſt inſtance of any *tranſlation* of note, was that of Pope Formoſus, who was biſhop of Porto. One of his ſucceſſors took hold of this pretence to have him dug out of his grave; and a council, held ſoon after, forbad this *tranſlation* to be made a precedent.

However, the ſame church allowed of ſome legitimate cauſes of *tranſlations*; as, the apparent advantage of the church; under which pretence, *tranſlations* ſoon became ſo frequent, that for five or ſix hundred years laſt paſt, they have been eſteemed a kind of common law.

The *tranſlation* of a religious from one order to another cannot be effected without the conſent of the pope; it is added, that it is not allowed to *tranſlate* from a ſeverer rule to a laxer one.

Translation is alſo uſed for the verſion of a book or writing, out of one language into another.

TRANSMARINE, Transmarinus, ſomething that comes from, or belongs to the parts beyond ſea.

TRANSMIGRATION, the removal or tranſlation of a whole people into another country, by the power of a conqueror. See Migration.

Transmigration is particularly uſed for the paſſage of a ſoul out of one body into another; the ſame with what we otherwiſe call metempsychosis.

The Siameſe, F. Tachard informs us, from a belief of the *tranſmigration* of ſouls into other bodies, forbear killing any beaſts; leſt, by that means, they ſhould diſpoſſeſs the ſouls of their deceaſed relations.

Transmigration, *Ionic*. See Ionic.

TRANSMISSION, in *Optics*, &c. denotes the property of a tranſparent body, by which it ſuffers the rays of light to paſs through its ſubſtance; in which ſenſe, the word ſtands oppoſed to reflection.

Tranſmiſſion is alſo frequently uſed in the ſame ſenſe with refraction; becauſe moſt bodies, in *tranſmitting* the rays, do alſo refract them.

For the cauſe of *tranſmiſſion*, or the reaſon why ſome bodies *tranſmit*, and others reflect, the rays, ſee Transparency and Opacity.

The rays of light, ſir Iſaac Newton obſerves, are ſubject to fits of eaſy *tranſmiſſion* and reflection. See Light and Reflection.

TRANSMUTATION, the act of transforming or changing one nature into another.

The term is chiefly uſed in chemiſtry and medicine. It has been greatly queſtioned, whether the *tranſmutation* of ſilver into gold, and of tin into ſilver, ſo much ſought by the chemiſts, be poſſible or not.

The pureſt and ſubtileſt parts of the food are *tranſmuted* or aſſimilated into the proper ſubſtance of the body. See Nutrition.

Nature, ſir Iſaac Newton obſerves, ſeems delighted with *tranſmutations*: he goes on to enumerate ſeveral kinds of *natural tranſmutations*; groſs bodies and light, he ſuſpects, may be mutually *tranſmuted* into each other: and adds, that all bodies receive their active force from the particles of light which enter their compoſition.

For all fixed bodies, when well heated, emit light as long as they continue ſo; and, again, light intermingles itſelf and inheres in bodies as often as its rays fall on the ſolid particles of thoſe bodies.

Again, water, which is a fluid, volatile, taſteleſs, ſalt, is, by heat, *tranſmuted* into vapour, which is a kind of air; and, by cold, into ice, which is a cold, tranſparent, brittle ſtone, eaſily diſſolvable; and this ſtone is convertible again into water by heat, as vapour is by cold.

Earth, by heat, becomes fire, and, by cold, is turned into earth again: denſe bodies, by fermentation, are rarefied into various kinds of air; and that air, by fermentation alſo, and ſometimes without it, reverts into groſs bodies.

Quickſilver ſometimes puts on the form of a fluid metal; ſometimes it appears in ſhape of a pellucid, fragile ſalt, called *ſublimate*; ſometimes of a pellucid, volatile, white, taſteleſs earth, called *mercurius dulcis*; by diſtillation it becomes vapour; and by agitation *in vacuo* it ſhines like fire, &c.

All bodies, beaſts, fiſhes, inſects, plants, &c. with all their various parts, grow and increaſe out of water, and aqueous and ſaline tinctures; and, by putrefaction, all of them revert into water, or an aqueous liquor, again.

Farther, water, expoſed a while to the open air, puts on a tincture which, in proceſs of time, has a ſediment and a ſpirit; and, before putrefaction, yields nouriſhment both for animals and vegetables.

Transmutation, in *Alchemy*, denotes the act of changing or exalting imperfect metals into gold or ſilver.

This is alſo called the *grand operation*; and, they ſay, it is to be effected with the philosopher's *ſtone*.

The trick of *tranſmuting* cinnabar into ſilver, is thus: the cinnabar, being bruiſed groſly, is ſtratified in a crucible with granulated ſilver, and the crucible placed in a great fire; and, after due time for calcination, taken off, then the matter, being poured out, is found to be cinnabar turned into real ſilver, though the ſilver grains appear in the ſame number and form as when they were put into the crucible; but the miſchief is, coming to handle the grains of ſilver, you find them nothing but light friable bladders, which will crumble to pieces between the fingers.

Mr. Boyle, in his Sceptical Chymiſt, tells us, that two friends of his did, by urging mercury in a ſkilfully managed fire, turn it, almoſt weight for weight, into water; but he does not ſay what was the ſpecific gravity of the produced water, nor of the remaining *untranſmuted* maſs of mercury. He likewiſe aſſures us, that rain-water, being diſtilled and re-diſtilled, by a friend of his, near two hundred times, did, after diſtillation leave at the bottom of the glaſs body, a conſiderable quantity of a white earth; and that more plentifully in the latter diſtillations, than the former.

This he believed to be a certain quantity of water actually *tranſmuted* into earth, adding, that it was above twice as heavy ſpecifically as common water, and of ſo fixed a nature, that it lay a conſiderable time, in a red-hot crucible, without loſing any thing of its weight, or even emitting any ſmoke.

For the *tranſmutation* of iron into copper, ſee Copper and Vitriol.

Transmutation, in *Geometry*, denotes the reduction or change of one figure or body into another of the ſame area or ſolidity, but of a different form; as a triangle into a ſquare, a pyramid into a parallelepiped, &c.

Transmutation, in the *higher Geometry*, is uſed for the converting of a figure into another of the ſame kind and order,

der, whoſe reſpective parts riſe to the ſame dimenſions in an equation, admit the ſame tangents, &c.

If a rectilinear figure be to be *tranſmuted* into another, it is ſufficient that the interſections of the lines which compoſe it be transferred, and lines drawn through the ſame in the new figure.

If the figure to be *tranſmuted* be curvilinear, the points, tangents, and other right lines, by means whereof the curved line is to be defined, muſt be transferred.

TRANSMUTATION *of colours.* The change of colour of a decoction of the nephritic wood, according to the different lights it was viewed in, long perplexed thoſe who attempted to account for it; but Wolfius has carried the experiments on this decoction much farther, and found a way of giving it its colours again, after taking them wholly away. If this decoction be held between the eye and the light, it appears of a blue colour; but if the eye be placed between it and the light, it appears then of a yellowiſh or a red colour. If a few drops of oil of vitriol be dropped into it, it will appear of a gold yellow in whatever light it is viewed; but if too much of this oil be added, the whole becomes foul and obſcure; and if a few drops do not produce the effect, it is a ſign that the decoction is too ſtrong, and that it muſt be diluted with water. See COLOURS.

Oil of vitriol has the ſame effect upon many other decoctions of the woods, particularly on that of Braſil wood, which is of a fine red, but immediately becomes yellow on dropping a ſmall quantity of this acid into it. And as in the other inſtance, ſo in this, it is neceſſary to the ſucceſs of the experiment, that the tincture be not over ſtrong. A few drops of oil of tartar added to this yellow liquor turn it red again as at firſt; and if more oil of tartar be added, the colour becomes bluiſh, with a tinge of red, much ſtronger than the colour of the nephritic wood at firſt, when held between the eye and the light. In all experiments of this kind, the weakneſs of the tincture produces the greateſt beauty; and therefore it is beſt, inſtead of making a decoction, to make only a cold infuſion, by putting a ſmall quantity of the chips of the wood into water, and letting this ſtand cold for ſome time.

A tincture of red roſes, made with common water and oil of vitriol, is well known to be of a very beautiful red colour, yet when the water has ſtood ever ſo long on the roſes alone, it has ſcarce any colour; if it be ſtrained off in this colourleſs ſtate, and the oil of vitriol then added, the red colour is produced as ſtrongly as if this acid had been dropped into the water, while the roſes were yet in it. When the liquor is of this fine red colour, a ſmall quantity of oil of tartar makes it immediately green; and if more oil of vitriol be added to this green liquor, it becomes red again, but is muddy, and not ſo well coloured as before. If a few drops of a ſolution of corroſive ſublimate be added to this, it does not at all change colour; and on adding more water, with ſalt of tartar diſſolved in it, the liquor became red again, but of a very different red from what it was before in its muddy ſtate, being now clear and deeper. When the tincture of roſes has ſcarce any colour, a ſmall quantity of ſalt of tartar makes it green, but a large quantity makes it yellow. A few drops of oil of vitriol added to this yellow liquor, turned it to a pale red, and this could never be made green again by oil of tartar. Alum-water, added to a ſolution of ſalt of tartar, makes a white and opake fluid, though they are both ſeparately pellucid.

What is moſt obſervable in theſe experiments on the infuſion of woods is, that oil of tartar, and a ſolution of ſalt of tartar in water, have a very different effect. Thus an infuſion of Braſil-wood is red, and on dropping into it a few drops of oil of vitriol, it becomes yellow. If oil of tartar be added to this liquor, it only makes it yet more yellow; but if a ſolution of ſalt of tartar in water be added to this, it makes it red again. Act Erudit. ann. 1718. p. 322.

The ſolution of verdigriſe, which is green, becomes colourleſs by the affuſion of ſpirit of nitre or ſpirit of vitriol, and by the affuſion of the oil of tartar it becomes green again. The ſpirit of ſal ammoniac gives it a purple colour, and oil of vitriol makes it pellucid. The ſolution of galls with vitriol gives black, the affuſion of oil of vitriol deſtroys the blackneſs, and it becomes pellucid as before.

M. Muſchenbroek thought it to be univerſally true, that yellow vegetables, diſſolved in ſpirit of wine, gave yellow tinctures, which are either not at all, or very little changed by acid, alkaline, or any other ſalts; but he thought there were ſome exceptions, and ſays, that when oil of vitriol is put to yellow paint, called *orleon*, it becomes of a beautiful blue, which is deſtroyed by water or any ſalt. A ſmall quantity of an aſtringent ſubſtance, with iron, gives a black colour; a greater quantity of the aſtringent produces blue, more of it makes a violet, and more ſtill produces purple.

There are ſome tinctures, the colours of which depend upon the external air: ſuch is the red tincture made of Canarian lichen, called *orſeille*, and water, a diluted ſpirit of wine, with lime and an urinous ſalt. For, if this tincture be put into a glaſs tube, hermetically ſealed, in a few days it becomes colourleſs; and when the tube is opened the colour returns. The abbé Nollet made a variety of experiments with this tincture. To the ſame claſs may be referred the *ſympathetic* INKS.

Colours may be produced in liquors which originally have no colour: thus, ſpirit of wine with red roſes, upon which, whilſt it is yet white, any ſaline acid ſpirit is poured, in ſo ſmall a quantity that the acid can hardly be perceived, produces a florid red. Many other red flowers hardly give any colour to ſpirit of wine in a ſhort time, yet give a red colour by the addition of any of the acids. A ſolution of mercury and oil of tartar gives orange; a ſolution of ſublimate and lime-water produces yellow. The tincture of red roſes with oil of tartar per deliquuium, or with ſpirit of ſal ammoniac gives green. In like manner, the tincture of many red flowers it changes into green by an alkali. The tincture of red roſes and ſpirit of wine gives blue. The ſolution of copper and ſpirit of ſal ammoniac gives purple. The ſolution of ſublimate and ſpirit of ſal ammoniac gives white. The ſolution of ſaccharum Saturni and that of vitriol, alſo the tincture of red roſes, or many other red flowers, and the ſolution of copperas in water, and likewiſe the ſolution of galls and copperas, produce black. The following table exhibits the colours ariſing from different mixtures.

1.	Yellow Red	Tincture of red roſes Ticture of crocus	produces	green.
2.	Green Brown	Tincture of violets Spirit of ſulphur		carmine.
3.	Red Brown	Tincture of red roſes Spirit of hartſhorn		blue.
4.	Blue Blue	Tincture of violets Solution of copper		violet.
5.	Blue Blue	Tincture of violets Solution of Hungarian vitriol		purple.
6.	Blue White	Tincture of cyanus Spirit of ſal ammoniac		green.
7.	Blue Brown	Solution of Hungarian vitriol Lixivium		yellow.
8.	Blue Red	Solution of Hungarian vitriol Tincture of red roſes		black.
9.	Blue Green	Tincture of cyanus Solution of copper		red.
10.	Violet Tranſparent	Tincture of dipſacum, or iris, or any other flowers that give a violet colour in water Alum diſſolved in water.		blue.

Muſchenbroeck's Introd. ad Phil. Nat. tom. ii. p. 738, &c.

The reſult of a variety of mixtures to produce colours, was recited before the Royal Society by Dr. Goddard in 1661, and may be ſeen in Birch's Hiſtory, vol. i. p. 11.

Mr. Melville has made many obſervations on the *tranſmutation* of colours by means of the light of different burning bodies. Bodies of all the principal colours, viz. red, yellow, green, and blue, are very little altered, he obſerves, when they are ſeen by the light of burning ſpirits; but if ſalts be continually mixed with them, during the burning, different changes enſue. When ſal ammoniac, pot aſh, or alum are infuſed, the colour of red bodies appears ſomewhat faded and dirty. Green and blue appear much the ſame as in candle light, both being faint, and hardly diſtinguiſhable. White and yellow are hardly at all affected.

When nitre, or ſea-ſalt is plentifully mixed with the burning ſpirits, and the whole is ſtirred about briſkly, the brighteſt red bodies, ſeen by the light then emitted, are reduced to a dirty tawny brown, which ſeems to have nothing of redneſs in it. Green is transformed into another ſort of brown, only diſtinguiſhable from the former by a certain inclination to a livid olive colour. When nitre is mixed with the ſpirits, one may ſtill ſee ſome remains of greeniſh colour, unleſs it be poured in very plentifully. Dark blue is hardly to be known from black, except that it appears the deeper black of the two. Light blue is changed into a very light brown, of a peculiar kind. White aſſumes a livid yellowiſh caſt; and yellow alone appears unaltered, and extremely luminous.

Theſe experiments he made with different ſorts of richly coloured bodies, as ſilks, cloths, and paints. Poliſhed copper,

per, which had contracted from the air a high flaming colour, was reduced, by the ſame light, to the appearance of yellow braſs. The faces and hands of the ſpectators appeared like thoſe of a dead corpſe; and other mixed colours, which had red or green in their compoſition, underwent the like changes.

Having placed a paſteboard, with a circular hole in it, between his eye and the flame of the ſpirits, in order to diminiſh and circumſcribe this object, he examined the conſtitution of thoſe different lights with a priſm, holding the refracting angle upwards; and found that, in the firſt caſe, viz. when ſal ammoniac, alum, or pot-aſh fell into the ſpirits, rays of all kinds were emitted, but not in equal quantities, the yellow being much more copious than all the reſt put together, and the red being more faint than the green and blue.

In the light of ſpirits mixed with nitre, or ſea-ſalt he could obſerve ſome blue, though exceedingly weak and diluted. With the latter the green was equally faint, but with the former pretty copious. But when either of theſe ſalts were uſed, he could hardly perceive any trace of red, eſpecially when they were mixed in great plenty, and the ſpirits conſtantly agitated. At every little intermiſſion, indeed, the red rays would ſhew themſelves very manifeſtly below the hole, and red bodies ſeen by that light reſumed ſomewhat of their ordinary colour; and it was entertaining to obſerve how both would vaniſh again at once, when the ſalting and ſtirring were renewed.

The proportion in which the bright yellow exceeded the other colours in this light, was ſtill more extraordinary than in the former: in ſo much that the hole, ſeen through the priſm, appeared uniformly of that yellow, and as diſtinctly terminated as through a plane glaſs; except that there was adjoining to it, on the upper ſide, a very faint ſtreak of green and blue. White bodies illuminated with it, appeared alſo through the priſm perfectly well defined, both which, he ſays, are very ſurpriſing phenomena to thoſe who have been accuſtomed to the uſe of the priſm in heterogeneous lights, where it never fails to throw confuſion on the extremities of all viſible objects.

Upon examining bubbles of ſoap and water, in the ſame light, he could only obſerve luminous ſtreaks, ſeparated by dark ones, the green and blue being too weak to affect his eye. Edinb. Eſſays, vol. ii. p. 32.

Transmutation *of plants.* See Seeds and Degeneration.

TRANSOM, among *Builders*, the piece that is framed acroſs a double-light window.

Transom, among *Mathematicians*, denotes the vane of a cross-*ſtaff*; or a wooden member fixed acroſs it, with a ſquare whereon it ſlides, &c.

Transoms, in a *Ship*, are beams or timbers extended acroſs the ſtern-poſt of a ſhip, to fortify her after-part, and give it the figure moſt ſuitable to the ſervice for which ſhe is calculated. See *Tab. Ship. fig.* ii. *n.* 109.

The general figure or curve, given to the ſhip by the diſpoſition of the arms of the *tranſoms*, which are gradually cloſer in proportion to their diſtance from the wing-*tranſom* downwards, in conſequence of which it becomes extremely narrow from the counter towards the keel, is called the *flight* of the *tranſoms.* Athough theſe pieces are extremely different in their figures according to the extent of the angles formed by their branches or horns, each of them has nevertheleſs a double curve, which is partly vertical, and partly horizontal, with regard to its ſituation in the ſhip. The former of theſe is called, by the artificers, the *round-up*, and the latter the *round-aft.*

As the *tranſoms* fill up the whole ſpace comprehended between the head of the ſtern-poſt above, and the aftmoſt floor-timbers below, it is neceſſary to diſtinguiſh them by particular names. Thus the higheſt is called the *wing-tranſom*; the next, the *deck-tranſom*; and afterwards follow the firſt, ſecond, and third *tranſoms*, together with the intermediate ones. See Ship.

The higheſt *tranſoms* are connected to the ſhip's quarter by knees, which are bolted to thoſe pieces, and to the after-timbers. See Sleepers. Falconer.

TRANSPARENCY, *diaphaneity*, in *Phyſics*, a quality in certain bodies, whereby they give paſſage to the rays of light.

The *tranſparency* of natural bodies, as glaſs, water, air, &c. ſome have imputed to the great number and ſize of the pores or interſtices between the particles of thoſe bodies: but this account is exceedingly defective; for the moſt ſolid and opake body in nature, we know, contains a great deal more pores than it does matter; a great deal more, ſure, than is neceſſary for the paſſage of ſo infinitely fine and ſubtle a body as light.

Ariſtotle, Des Cartes, &c. place *tranſparency* in the rectitude or ſtraightneſs of the pores; by means of which, ſay they, the rays are enabled to make their way through, without ſtriking againſt the ſolid parts, and being reflected back again: but this account, ſir Iſaac Newton ſhews, is imperfect; the quantity of pores, in all bodies, being ſufficient to tranſmit all the rays that fall on them, howſoever thoſe pores be ſituated with reſpect to each other.

The cauſe, then, why all bodies are not *tranſparent*, muſt not be aſcribed to their wanting rectilinear pores; but either to the unequal denſity of the parts, or to the pores being filled with ſome foreign matters, or to their being quite empty, by means of which the rays, in paſſing through, undergoing a great variety of reflections and refractions, are perpetually diverted this way and that, till, at length, ſalling on ſome of the ſolid parts of the body, they are extinguiſhed and abſorbed.

Thus cork, paper, wood, &c. are opake; whereas glaſs, diamonds, &c. are *tranſparent*; the reaſon is, that in the neighbourhood of parts equal in denſity, ſuch as thoſe of glaſs, water, diamonds, &c. are, with reſpect to each other; the attraction being equal on every ſide, no reflection or refraction enſues: but the rays, which entered the firſt ſurface of the bodies, proceed, without interruption, quite through the body, thoſe few only excepted which chance to meet with the ſolid parts: but in the neighbourhood of parts that differ much in denſity, ſuch as the parts of wood and paper are, both in reſpect of themſelves, and of the air, or the empty ſpace in their pores; as the attraction will be very unequal, the reflections and refractions muſt be very great; and therefore the rays will not be able to make their way through ſuch bodies, but will be properly deflected, and at laſt quite ſtopped. See Opacity.

TRANSPARENT *column.* See Column.

TRANSPIRATION, the inſenſible, or almoſt inſenſible, paſſage of an excrementitious matter through the pores of the ſkin, called alſo perspiration.

Transpiration is alſo uſed, by ſome authors, for the ingreſs or entrance of the air, vapours, &c. through the pores of the ſkin into the body.

Cardan, by this kind of *tranſpiration*, accounts for the prodigy of a woman, whoſe daily urine weighed twenty-ſeven pounds, though all the food ſhe took, both dry and liquid, did not exceed four pounds. Dr. Baynard alſo ſuſpects ſome ſuch *tranſpiration* to be the caſe in hydropical perſons.

Transpiration *of Plants.* See *Perſpiration of* Plants.

TRANSPLANTATION, in *Agriculture* and *Gardening*, the act of removing trees or plants from the places where they are ſowed or raiſed, and planting them in others. See Planting.

In the transplanting of foreſt trees, care is to be taken to preſerve the roots, and even the fine hairs or filaments thereof, with the earth that ſticks thereto; theſe filaments being the mouths that ſuck the nouriſhment, and transfuſe it to the tree.

The pits, or foſſes, into which trees are *tranſplanted*, ſhould be left open for ſome time before hand, that the rain, froſt, and ſun, may diſſolve the compacted ſalt, render the earth friable, and qualify it for nouriſhing the tree. The ſame may be effected, in ſome meaſure, by burning ſtraw in the new pits, and drenching the mould with water in dry ſeaſons, and by enriching the ground with manure.

Pliny was of opinion, no tree ſhould be removed under two, or above three years old; Cato would have none *tranſplanted* when leſs than five fingers in diameter: but we are now able to *tranſplant* trees of all ages, and ſizes, without danger.

To *tranſplant* old trees, was reckoned ſo difficult, that *Veterem arborem tranſplantare* was become a proverb for a difficult enterprize; and yet we are informed of a grove of ſix hundred cocoa-trees, of eighty years growth, and ſixty feet high to the loweſt bough, *tranſplanted*, by count Maurice, to his paradiſe of Friburg; and a great perſon in Devonſhire, Mr. Evelyn tells us, *tranſplanted* oaks, as big as twelve oxen could draw, to ſupply a defect in an avenue; and the thing is now, indeed, become quite common.

For the *tranſplantation* of grown trees, Mr. Evelyn gives the following method, as practiſed, with good ſucceſs, by the lord Fitzharding: chooſe trees about the thickneſs of a man's thigh; remove the earth from about them; cut through all the ſide-roots, till the tree may be, by force, brought down on one ſide, ſo that the tap-roots may be conveniently come at to be cut off with the ax: then redreſs the tree, and let it ſtand covered with the mould, from which it was looſened, till the next year, or longer; and, by that time, it will have ſhot new tender roots fit for *tranſplanting*, and may be taken up at a fit ſeaſon.

Otherwiſe, for very large trees, before the hard froſts come on, make a trench about the tree, at ſuch diſtance from the ſtem, as you judge ſufficient for the root; dig ſo deep, as almoſt to undermine it; place blocks, and quarters of wood, to ſuſtain the earth, and caſt in as much water as may fill the trench, or ſufficiently wet it, unleſs the ground were very moiſt before: thus let it ſtand till ſome hard froſt bind it firmly to the roots, and then convey it to its new ſtation, which may be preſerved from freezing by placing ſtore of warm litter in it: ſo cloſe the mould the better to the ſtraggling fibres, and place the earth taken out of the pit, about the root of the new-planted tree.

The common rules for *tranſplanting* are, 1°. The lighter the ſoil is, the deeper are the trees to be planted. 2°. If the ſoil be gravel, or ſand, mix clay with it, and *vice verſa*. 3°. The beſt ſeaſon is either October, or February; in warm, moiſt, clear weather. 4°. The large roots are to be abated, to prevent the neceſſity of digging too deep; but the ſmall fibrous ones to be ſpread. 5°. In taking up the trees, to obſerve how the roots grow; and, in *tranſplanting*, to diſpoſe them in the ſame order, and place the tree to the ſame aſpect. 6°. To defend young trees, after *tranſplantation*, both from the wind and ſun, till the roots be fixed, and they begin to ſhoot. 7°. If the ſoil you *tranſplant* into be good, do not top the trees, but lop all the boughs to a ſingle one, the moſt upright and promiſing among them; but if the ſoil be poor, top them, and when they are ſhot out again, lop off all the branches, to one.

TRANSPLANTING *of fruit trees*. After a ſummer's growth of fruit-ſeedlings in the ſeminary, ſuch are pulled up as are about a foot high, and *tranſplanted* into a nurſery; the reſt are to be left in the ſeed-plot till another year.

When drawn up, the ſprigs are to be cut off from about the top, the ſtrings from the roots, and the extremities, both of the top, that it may not run too faſt upwards; and of the tap or heart-root, that it may not paſs directly downwards; leſt it go beyond the good ſoil. The holes, or pits, are to be ſo deep, as that the plants may ſtand ſomewhat deeper in the ground than when in the ſeed-plot; cloſe the mould about them, and, if it be a dry time, water them the firſt day, and cover the ſoil with old fern.

Mr. Bradley gives us a new method of *tranſplanting* trees, of all kinds and ages, with ſafety, either while they are in bloſſom, or with fruit upon them, thus: the holes to receive the trees are to be prepared before the trees are taken up, and the earth which comes out of the holes is to be made very fine, and put into large tubs, and mixed with water, till it be about the conſiſtence of thin batter; then the holes, wherein the trees are to be planted, are to be filled with this thus tempered earth, before the earthy parts have time to ſettle.

The advantage hereof is, that the trees, thus planted, have their roots immediately cloſed, and guarded from the air; and the warm ſeaſon of the year diſpoſing every part of the tree for growth and ſhooting, it will loſe very little of its vigour. In winter this method does not ſucceed.

The ſame author adds, that in conſideration of the circulation of the ſap, it is as neceſſary to preſerve the veſſels of trees entire, as thoſe in animal bodies; and therefore, in *tranſplanting* trees in the ſummer ſeaſons, it is not proper to cut off any of the branches, or wound any of the veſſels, till they have renewed their roots, which it is of abſolute neceſſity to wound in *tranſplanting* them. For the wounded roots, he has provided a plaſter of a mixture of gums, to prevent the canker and rot, and promote their healing.

TRANSPLANTATION, in *Natural Magic*, is uſed for a ridiculous ſuppoſed method of curing diſeaſes by transferring them from one ſubject to another; which was much in vogue among certain chemical, or rather ſympathetical phyſicians, ſome ages ago.

This *tranſplantation* was effected, either by the uſe of a certain medium, called, on that account, a *magnet*; or, without that, only by ſimple contact.

Tranſplantation, by means of the magnet, was of five kinds, viz. *inſemination*, *implantation*, *impoſition*, *irroration*, and *ineſcation*; but the whole practice is now deſervedly laughed out of the world.

TRANSPORT-*ſhip* is a veſſel uſed to convey proviſions, warlike ſtores, ſoldiers, &c. from one place to another.

TRANSPORTATION, the act of conveying or carrying a thing from one place or country to another.

In matters of commerce, *tranſportation* is of equal import with re-exportation, viz. the taking up of commodities in one foreign ſtate or kingdom, bringing them hither, and paying duties for them; and then conveying them into ſome other foreign ſtate: by which it is diſtinguiſhed from IMPORTATION, and EXPORTATION; where the commodities are either carried originally out of, or brought finally into our own kingdom.

TRANSPORTATION, in *Law*, is alſo a kind of puniſhment; or, more properly, an alleviation or commutation of puniſhment, for criminals convicted of felony; who, for the firſt offence, unleſs it be an extraordinary one, are ordinarily *tranſported* to ſome foreign country for a term of years or for life; within which if they return, they are executed without farther trial than aſcertaining their identity.

This is made felony without benefit of clergy by ſtatutes 4 Geo. I. cap. 11. 6 Geo. I cap. 23. 16 Geo. II. cap. 15. and 8 Geo. III. cap. 15. as is alſo the aſſiſting tranſports to eſcape from ſuch as are conveying them to the port of *tranſportation*.

Exile and *tranſportation* are puniſhments at preſent unknown to the common law; and whenever the latter is now inflicted, it is either by the choice of the criminal himſelf, to eſcape a capital puniſhment, or elſe by the expreſs direction of ſome modern act of parliament. Accordingly, it was enacted by the ſtatutes 4 Geo. I. cap. 11. and 6 Geo. I. cap. 23. that when any perſons ſhall be convicted of any larceny or felony, who by the law ſhall be entitled to the *benefit* of CLERGY, and liable only to the penalties of burning in the hand or whipping, the court in their diſcretion, inſtead of ſuch burning in the hand or whipping, may direct ſuch offenders to be tranſported to America (or, by ſtatute 19 Geo. III. cap. 74. to any other parts beyond the ſeas) for ſeven years. And by the ſubſequent ſtatutes 16 Geo. II. cap. 15. and 8 Geo. III. cap. 15. many wiſe proviſions are made for the more ſpeedy and effectual execution of the laws relating to *tranſportation*, and the conviction of ſuch as tranſgreſs them. But now, by the ſtatute 19 Geo. III. cap. 74. all offenders liable to *tranſportation* may, in lieu thereof, at the diſcretion of the judges, be employed, if males (except in the caſe of petty larceny) in hard labour for the benefit of ſome public navigation; or, whether males or females, may, in all caſes, be confined to hard labour in certain penitentiary houſes, to be erected by virtue of the ſaid act, for the ſeveral terms therein ſpecified, but in no caſe exceeding ſeven years; with a power of ſubſequent mitigation, and even of reward, in caſe of their good behaviour: but if they eſcape and are retaken, for the firſt time an addition of three years is made to the term of their confinement; and a ſecond eſcape is felony without benefit of clergy.

Tranſportation is ſaid to have been firſt inflicted as a puniſhment by 39 Eliz. cap. 4. Blackſt. Com. vol. iv. p. 370, &c. Burn's ed.

TRANSPORTATION *of plants*, is the removal of them from one country to another: with reſpect to which great caution is neceſſary. The plants ſent from a hotter country to a colder ſhould be tranſported in the ſpring of the year, that the heat of the ſeaſon may be advancing as they approach the colder climates; and, on the contrary, thoſe which are ſent from a colder country to a hotter ſhould be ſent in the beginning of winter.

The beſt way of packing up plants for a voyage, if they be ſuch as will not bear keeping out of the earth, is to have boxes with handles, and holes bored in their bottoms to let out the moiſture, filling them with earth, and planting the roots as cloſe together as may be; the plants ſhould be ſet in theſe boxes a fortnight or three weeks before they are to be put on board, and in good weather they ſhould be ſet upon the deck, and in bad removed or covered with a tarpaulin.

If they are going from a hotter country to a colder one, they muſt have very little moiſture; if, on the contrary, they are going from a colder to a warmer, they may be allowed water more largely, and being ſhaded from the heat of the ſun, they will come ſafe.

Very many plants, however, will live out of the earth a great while; as the ſedums, euphorbiums, ficoides, and other ſucculent ones. Theſe need no other care than the packing them up with moſs in a cloſe box; and there ſhould be a little hay put between them, to prevent them from wounding or bruiſing one another, and holes bored in the boxes to keep them from heating and putrefying. In this manner they will come ſafe from a voyage of two, or three, or even four or five months.

Several trees alſo will come ſafely in the ſame manner, taking them up at a ſeaſon when they have done growing, and packing them up with moſs. Of this ſort are oranges, olives, capers, jaſmines, and pomegranate-trees. Theſe, and many others, are annually brought over thus from Italy; and though they are three or four months in the paſſage, ſeldom miſcarry. And the beſt way of ſending over ſeeds, is in their natural huſks, in a bag, or packed up in a gourd-ſhell, keeping them dry, and out of the way of vermin. Miller. See SEED.

Thoſe who are deſirous of particular inſtructions with regard to the beſt means of collecting both ſeeds and plants in diſtant countries, and of preſerving them during a voyage hither in a vegetating ſtate, may conſult Mr. Ellis's Directions for bringing over Seeds and Plants from the Eaſt-Indies, and other diſtant Countries, in a State of Vegetation, &c. 4to. 1770.

TRANSPORTING, in *Sea Language*, the act of removing a ſhip from one place to another, by the help of anchors and ropes. See WARP.

TRANSPOSITION, in *Algebra*, the bringing any term of an equation over to the other ſide.

Thus, if $a + b = c$, and you may make $a = c - b$; b is ſaid to be *tranſpoſed*. See REDUCTION *of Equations*.

TRANSPOSITION, in *Grammar*, a diſturbing or diſlocating of the words in a diſcourſe; or a changing of their natural order of conſtruction, to pleaſe the ear, by rendering the contexture more eaſy, ſmooth, and harmonious. A *tranſpoſition*, which renders the ſenſe perplexed, is vicious. The conſtruction of the ancient languages, being much more artful than that of the modern ones, allowed of much greater, and more frequent *tranſpoſitions*. The Engliſh, French, &c. ſcarce ever allow of them but in oratory and poetry; in which caſes, they ſerve to give a force and energy to the diſcourſe, or the verſe, and to prevent their languiſhing.

TRANSPOSITION, in *Muſic*, is a changing of the notes of a piece of muſic, or the ſhifting a ſong from its former ſituation, to ſet it higher or lower, or in another octave. Of this there are two kinds; the firſt with reſpect to the CLEF, the ſecond with reſpect to the KEY.

TRANSPOSITION *with reſpect to the clef*, conſiſts in changing the places or ſeats of the notes or letters among the lines and ſpaces; but ſo, as that every note is ſet at the ſame letter.

This is done either by removing the ſame clef to another line, or by uſing another clef, but with the ſame ſignature; becauſe the piece is ſtill in the ſame key.

The practice is eaſy in either caſe. In the firſt, you take the firſt note at the ſame diſtance above or below the clef note, in its new poſition, as before, and all the reſt of the notes in the ſame relations or diſtances from one another; ſo that the notes are all ſet on lines and ſpaces of the ſame name.

In the ſecond, or ſetting the muſic to a different clef, it is to be obſerved, that the places of the three clef-notes are invariable in the ſcale, and are to one another in theſe relations, viz the mean a fifth above the baſs, and the treble a fifth above the mean. Now to *tranſpoſe* to a new clef, e. gr from the treble to the mean, wherever that new clef is ſet, we ſuppoſe it the ſame individual note, in the ſame place of the ſcale, as if the piece were that part in a compoſition to which this new clef is generally appropriated; that ſo it may direct to the ſame notes we had before *tranſpoſition*: now, from the fixed relations of the three clefs in the ſcale, it will be eaſy to find the ſeat of the firſt *tranſpoſed* note; and then all the reſt are to be ſet at the ſame mutual diſtances they were at before. See SCALE.

Suppoſe. e. gr. the firſt note of a ſong be *d*, a ſixth above the baſs clef, the piece being ſet with that clef; if it is tranſpoſed and ſet with the mean clef, then, wherever that clef is placed, the firſt note muſt be the greater 2d above it; becauſe a greater 2d above the mean is a greater 6th above the baſs clef, the relation of thoſe two being a 5th. So that the firſt note will ſtill be the ſame individual *d*. Let a piece be ſet with the treble-clef, and the firſt note be *e*, a leſſer 3d below the clef; if we tranſpoſe this to the mean clef, the firſt note muſt be a greater 3d above it, which is the ſame individual note *e* in that ſcale, for a leſſer 3d, and greater third make a 5th, the diſtance of the treble and mean clefs.

The uſe of this *tranſpoſition* is, that if a ſong being ſet with a certain clef, in a certain poſition, the notes go far above or below the ſyſtem of five lines; they may, by the change of the place of the ſame clef in the particular ſyſtem, or by taking a new clef, be brought more within the compaſs of the lines.

TRANSPOSITION *from one key to another*, is a changing of the KEY, or ſetting all the notes of the ſong at different letters, and performing it, conſequently, in different notes upon an inſtrument.

The deſign hereof is, that a ſong which, being begun in one note, is too high or low, or otherwiſe inconvenient, for a certain inſtrument, may be begun in another note, and from that carried on in all its juſt degrees and intervals.

The clef, and its poſition, here remain the ſame; and the change is of the notes themſelves, from one letter, and its line or ſpace to another.

In the former *tranſpoſition* the notes were expreſſed by the ſame letters, but both removed to different lines, and ſpaces: in this, the letters are unmoved, and the notes of the ſong transferred to, or expreſſed by other letters, and, conſequently, ſet upon different lines and ſpaces, which, therefore, requires a different ſignature of the clef. See Malcolm's Muſic, ch. xi. ſect. 4.

TRANSTRUM, in the *Naval Architecture of the Ancients*, a term uſed to expreſs a ſort of croſs or tranſverſe ſeats that were placed in the polycrote gallies of thoſe times, and ſerved for the places of ſeveral of the rows of men, who could move and work their oars under the ſeats of the other or lateral rowers of the next tire.

Meibomius, who has written expreſsly on the naval architecture of the ancients, has better underſtood the places and uſe of theſe *tranſtra*, than any other author of late times; by a proper arrangement of theſe ſeats, and the lateral ones above and below each, he has taken off greatly from the height allowed by Scaliger, and others, to the polycrote veſſels.

TRANSUBSTANTIATION, TRANSUBSTANTIATIO, in the *Roman Theology*, the ſuppoſed converſion or change of the ſubſtance of the bread and wine, in the euchariſt, into the body and blood of Jeſus Chriſt.

Tranſubſtantiation, taken in its general and literal ſenſe, implies any change of one ſubſtance into another. Thus the change of Moſes's rod into a ſerpent; of the waters of the Nile into blood; of Lot's wife into a pillar of ſalt; were preternatural *tranſubſtantiations*: and the change of the food we eat, into the ſubſtance of our bodies, is a natural *tranſubſtantiation*.

But the word, in its proper and technical ſenſe, is reſtrained to the miraculous change which the Romiſh church holds is wrought in the ſacrament, by the conſecration of the prieſt.

One of the great articles of that church, rejected by the reformed, is that of *tranſubſtantiation*; the latter maintaining the *tranſubſtantiation* to be only figurative, and the former affirming it to be real.

This doctrine was eſtabliſhed in the fourth general Lateral council, under pope Innocent III. in 1215, who is ſaid to have introduced and eſtabliſhed the uſe of the term *tranſubſtantiation*, which was hitherto abſolutely unknown; though ſome ſay that Stephen, biſhop of Autun, firſt uſed this term. Burnet on the Articles, p. 312.

The reformed interpret *eſt*, *is*, in the text *Hoc eſt corpus meum*, *This is my body*, by *ſignificat*; q. d. *This ſignifies my body*: but the council of Trent ſtand up ſtrenuouſly for the literal ſenſe of the verb. Thus, in can. 1. ſeſſ. 13. of that council, it is expreſsly decreed, that, in *tranſubſtantiation*, the body and blood of our Lord Jeſus Chriſt are truly, really, and ſubſtantially, under the ſpecies of bread and wine.

It is added, that, by *truly*, we mean *properly*; and not only by ſignification, as if the euchariſt were no more that a ſign of the body and blood of Jeſus Chriſt: that by *really*, we mean *in fact*, and not only in figure, as if the euchariſt were only a figure and repreſentation of the body and blood of the Saviour of the world; and that by *ſubſtantially*, we mean *in ſubſtance*, and not only in virtue and energy. Thus is *truly* oppoſed to a ſimple ſign, *really* to a figure, and *ſubſtantially* to energy or virtue.

TRANSUBSTANTIATION, *declaration againſt*. See DECLARATION.

TRANSUMPTION, TRANSUMPTIO, in the *Schools*, a ſyllogiſm by conceſſion or agreement, uſed where a queſtion propoſed is transferred to another, with this condition, that the proof of this latter ſhall be admitted for a proof of the former.

Thus Ariſtotle, in his book De Cœlo, undertaking to ſhew, that all the ſtars are round, transfers the queſtion to the moon, and proves her rotundity from her increaſing and waining; ſuppoſing it a thing admitted by his opponents, that the ſtars are all alike.

TRANSVERSALIS, in *Anatomy*, a name given to ſeveral muſcles, &c. in reſpect of their ſituation, progreſs, &c. as the

TRANSVERSALIS *abdominis*, a muſcle which lies under the obliqui, ſo called from the direction of its fibres; fixed to the ribs above; below, to the os ilium and ligamentum Fallopii; before to the linea alba; and behind to the vertebræ. Its upper part is fixed to the lower part of the cartilaginous ſurface of the two loweſt true ribs, and of all the five falſe ribs, by fleſhy digitations; the fibres of which become tendinous, as they approach the linea alba; the middle part is fixed to the three firſt vertebræ of the loins, by a double aponeuroſis or two tendinous planes; the internal and external planes having encloſed in their duplicature the muſculus ſacrolumbaris, and quadratus,

dratus lumborum, unite in one ſtrong aponeuroſis at the edges of thoſe muſcles; the inferior part of this muſcle is fixed by an inſertion wholly fleſhy to the internal labium of the criſta of the os ilium, and a great part of the ligamentum Fallopii. Winſlow.

The *tranſverſales* ſeem to have no other uſe than that of bracing or girding the abdomen in different degrees, either by their whole plane, or by different portions thereof. See *Tab. Anat. Myol. fig.* 2. *n.* 29. *fig.* 7. *n.* 39.

This, with the obliqui, unites its tendons, as it approaches the linea alba, and is the only muſcle that is cut in the operation of the bubonocele. It has a fine and thin membrane that cloſes exactly its ring, or hole, through which the veſſels paſs. See Obliquus.

Transversalis *anticus primus capitis*, a ſmall, pretty thick, and wholly fleſhy muſcle about the breadth of a finger, ſituated between the baſis of the *os occipitis* and the tranſverſe apophyſis of the firſt vertebra.

It is fixed by one end in the anterior part of that apophyſis, and from thence running up a little obliquely, it is inſerted by the other end in a particular impreſſion between the condyle of the *os occipitis* and the maſtoide apophyſis of the ſame ſide, behind the apophyſis ſtyloides, and under the edge of the jugular foſſula. Winſlow.

Transversalis *anticus capitis ſecundus*, a ſmall muſcle, ſituated between the tranſverſe apophyſes of the two firſt vertebræ of the neck. It is fixed by one extremity very near the middle of the ſecond apophyſis, and by the other near the root or baſis of the firſt.

Transversalis *colli major*, is a long thin muſcle, placed along all the tranſverſe apophyſes of the neck, and the fourth, fifth, or ſixth upper apophyſes of the back, between the complexus major and minor, lying, as it were, on the inſertions of the firſt of theſe muſcles. It is compoſed of ſeveral ſmall muſcular faſciculi, which run directly from one or more tranſverſe apophyſes, and are inſerted ſometimes in others more remote, the ſeveral faſciculi croſſing each other between the inſertions of the two complexi, which are likewiſe croſſed by them.

They have ſometimes a communication with the *longiſſimus* dorsi, but this is not uniform. Winſlow.

Transversalis *colli minores*, very ſmall and ſhort muſcles, found in the interſtices of ſeveral tranſverſe apophyſes in which they are inſerted, and called by ſome alſo inter-transversales.

Transversalis *gracilis*, or *collateralis colli*, a long thin muſcle, reſembling the *tranſverſalis* major in every thing but ſize, and ſituated on the ſide of that muſcle.

It is commonly taken for a portion or continuation of the ſacrolumbaris. Diemerbroek diſtinguiſhed it by the name of *cervicalis deſcendens*; and Stone, and others after him, have called it *acceſſorius muſculi ſacrolumbaris*.

The *tranſverſalis major*, *tranſverſalis gracilis*, and *tranſverſales minores*, acting on one ſide, can have no other uſe but to bend the neck laterally, and to hinder its inflexions when they act on both ſides. The ſmall *tranſverſales* may likewiſe preſerve the capſular membranes of the joints from being compreſſed, or otherwiſe hurt by the motions of the apophyſes. Winſlow.

Transversalis *dorſi major*, a name given to certain faſciculi fixed in the tranſverſe apophyſes of the back from the firſt to the ninth incluſively, and ſituated between the extremities of the *tranſverſalis major colli*, and of the *longiſſimus dorſi*, with which they communicate at or about the third vertebra.

Transversales *dorſi minores*. Some particular muſcles of this kind are found fixed to the extremities of the three loweſt tranſverſe apophyſes of the back; the reſt are all in ſome meaſure continuations of the *tranſverſalis major*; but theſe few which are diſtinct, and lie in the interſtices between two apophyſes may juſtly enough be called *inter-tranſverſales*.

Tranversalis *digitorum pedis*, a ſmall muſcle which lies tranſverſely under the baſis of the firſt phalanges, and which at firſt ſight appears to be a ſimple muſcular body, fixed by one end to the great toe, and by the other end to the little toe. When carefully examined, it is found to be fixed by a very ſhort common tendon to the ouſide of the baſis of the firſt phalanx of the great toe, conjointly with the antithenar, and by three digitations to the interoſſeous ligaments which connect the heads of the four metatarſal bones next the great toe. The three digitations are very ſlender, and gradually cover each other. This muſcle might be reckoned a ſecond antithenar. It may ſerve to aſſiſt the metatarsus in contracting the ſole of the foot, and increaſing the convexity of the upper ſide. Winſlow.

Transversalis *penis*, in *Anatomy*, a name given by ſome writers, particularly Cowper, to a muſcle called by others *virgæ lateralis parvus*, and by Albinus the *tranſverſus perinæi*. Winſlow calls it *tranſverſus urethræ*.

The *muſculi tranſverſi*, called alſo *triangulares*, are two long narrow, fleſhy faſciculi, inſerted each by one extremity in the root or beginning of the ramus of the os iſchium; from whence they run tranſverſely along the edge of the interoſſeous ligament of the oſſa pubis, as far as the apex of the proſtates, where their other extremities meet, and form commonly a kind of digaſtric muſcle, the middle of which gives inſertion to the muſcles of the urethra, and to the cutaneous ſphincters of the anus. Winſlow.

They help to preſs the veins, upon the back of the penis, againſt the os pubis; which is the cauſe of erection.

Transversalis *lumborum*. See Sacer and Transverso-*ſpinalis lumborum*, and Spinales.

Transversalis *femoris*. See Quadratus.

Transversalis is alſo a name given to a future of the cranium, becauſe of its traverſing or croſſing the face from one ſide to the other.

It ariſes at one of the leſſer angles of the eye, and paſſing along the bottom of its orbit, and the root of the noſe, terminates in the other leſſer angle.

TRANSVERSE, ſomething that goes acroſs another from corner to corner.

Thus bends and bars, in heraldry, are *tranſverſe* pieces, or bearings: the diagonals of a parallelogram, or a ſquare, are *tranſverſe* lines.

Lines which make interſections with perpendiculars, are alſo called oblique or *tranſverſe* lines.

Transverse *axis*, or *diameter*, called alſo the *firſt* or *principal axis*. See Axis, Diameter, and Latus-*tranſverſum*.

The *tranſverſe* axis of an ellipsis is the longer axis, or that which *tranſverſes* it lengthwiſe, in contradiſtinction from the conjugate one.

The *tranſverſe* axis of the hyperbola is the line DK. *Tab. Conics, fig.* 17. cutting the curve in the points D and K.

Transverse *muſcles*, in *Anatomy*, are certain muſcles ariſing from the *tranſverſe* proceſſes of the vertebræ of the loins.

TRANSVERSO-SPINALIS *colli*. See Semi-spinalis *colli*.

Transverso-spinalis *dorſi*. See Semi-spinalis.

Transverso-spinalis *lumborum*, called by ſome sacer, a muſcle compoſed of ſeveral oblique converging or tranſverſo-ſpinal muſcles, in the ſame manner as in the back and neck.

It lies between the ſpinal and oblique apophyſes of the loins, reaching to the os ſacrum. The loweſt of theſe muſcles are fixed to the ſuperior lateral parts of the os ſacrum, to the ligamentum ſacro iliacum, and to the poſterior ſuperior ſpine of the os ilium. The reſt are fixed to the three loweſt tranſverſe apophyſes, and to the four loweſt oblique apophyſes of the loins, and to their lateral tuberoſites; from thence they run up to all the ſpinal apophyſes of theſe vertebræ: the external, or thoſe that appear firſt, being longer than the internal, eſpecially toward the lower part. The *tranſverſo-ſpinales*, being oblique, converging, vertebral muſcles, are aſſiſtants to the ſacro-lumbaris and longiſſimus dorſi, which they croſs on each ſide. Winſlow.

TRANSVERSUM *latus*. See Latus.

Transversum, *ſeptum*. See Septum.

TRANSVERSUS *auriculæ*, in *Anatomy*, a name given by Albinus to a muſcle of the ear, not allowed to be ſuch by other authors; but deſcribed by Santorini, and others, under the name of *fibræ tranſverſæ in gibbo auriculæ*, and *fibræ in convexa conchæ partæ*.

Transversus *naſi*, in *Anatomy*, a name given by Santorini, and others, to the muſcle of the noſe, called by Winſlow *tranſverſalis ſive inferior*; and by Albinus, the compressor *naris*.

TRANSUM, in *Gunnery*, is a piece of wood which goes acroſs the cheeks of a gun-carriage, or of a gun, to keep them fixed together; each *tranſum* in a carriage is ſtrengthened by a bolt of iron. See Carriage.

TRANTERY, in ſome *Cuſtoms*, denotes the money ariſing by amerciaments of ale-ſellers and victuallers for breaking the aſſize of bread and ale; particularly at Luſton, and other manors in Herefordſhire.

TRAPA, *water caltrops*, in the *Linnæan Syſtem of Botany*, a genus of the *tetrandria monogynia* claſs, the characters of which are theſe: the cup is a perianthium compoſed of one leaf, divided into four at the edges, and remaining when the flower is fallen; the flower is compoſed of four petals larger than the ſegments of the cup, and placed vertically; the ſtamina are four filaments of the length of the cup; the antheræ are ſimple; the germen of the piſtillum is of an oval figure; the ſtyle is ſimple, and of the length of the cup, and the ſtigma is headed, and has a ridge round it; the fruit is an oval oblong ſtony capſule, containing only one cell, and armed with four thorns placed oppoſitely on the ſides; theſe are thick and pointed, and are what were originally the leaves or ſegments of the cup; the ſeed is a nut of an oval figure. There is one ſpecies.

TRAPEZIUM, in *Geometry*, a plain figure contained under four unequal right lines.

Trapezium *os*, in *Anatomy*, is one of the bones of the CARPUS or WRIST: it is the firſt bone of the ſecond row, and has its name from its figure, which is a ſort of unequal ſquare; its outer ſurface is rough, and makes a part of the outer or convex ſide of the carpus; on its inner ſurface is an oblong eminence, which makes one of the four eminences on the concave ſide of the carpus: and on the ſame ſide it has a groove or channel; there is likewiſe a ſmall tubercle on its outer ſurface.

This bone has ſeveral articular cartilaginous ſides, viz. one brachial, or digital, and two cubital; the brachial ſide, which is hollow, is articulated with the os ſcaphoides; the digital with the phalanx of the thumb; one of the cubital with os trapezoides, and the other with the bone of the metacarpus; the ſide which is articulated with the firſt phalanx of the thumb, appears to be made up of two ſuperficial ſigmoide, or ſemilunar half-ſides, diſtinguiſhed by an eminence of the ſame figure, being each more hollow towards the ſides than at the middle, which makes a portion of a ſort of a ſuperficial pulley, with the edges much worn. One of the cubital ſides, which is articulated with the os trapezoides, is large; and the other, which joins the firſt metacarpal bone, is ſmall. Winſlow's Anat. p. 83.

TRAPEZIUS, in *Anatomy*, is a muſcle, called alſo CUCULARIS, which is a large, broad, thin, fleſhy plane, ſituated between the occiput and lower part of the back, and thence extending to the ſhoulder, in figure of a large irregular ſquare, and, together with the *trapezius* of the other ſide, it forms a kind of lozenge. Above, it is fixed in the ſuperior tranſverſe line of the os occipitis, by a thin ſeries of fleſhy fibres, reaching to the muſculus occipitalis, and ſeeming to cover that muſcle by a kind of aponeuroſis. Behind, it is fixed to the five ſuperior ſpinal apophyſes of the neck, by means of the poſterior cervical ligament, and immediately to the extremities of the two loweſt ſpinal apophyſes of the neck, and of all thoſe of the back. From all theſe inſertions the fibres run in different directions, and terminate by one continued inſertion in about one third part of the clavicula, in the poſterior edge of the acromium, and through the whole ſuperior labium of the ſpine of the ſcapula, all the way to the ſmall triangular ſurface in that ſpine, over which ſurface the fibres ſlide and paſs freely, without being fixed therein. This muſcle covers immediately the ſplenius or maſtoidæus ſuperior, part of the complexus major, the angularis, rhomboides, and part of the latiſſimus dorſi. The common inſertion of the two trapezii in the cervical ligament, is the reaſon that in pulling either of them toward one ſide of the neck, the other will follow it a little beyond the ſpinal apophyſes.

The uſe of the *trapezius*, regard being had to the direction and inſertion of its fibres, is to raiſe the ſhoulders, or rather to turn the top of the ſcapula upward, and to hinder it from ſinking. But it is too thin, and conſiſts of too few fibres, to be able to overcome or bear up againſt ſome reſiſtances, without the co-operation of the SERRATUS *major*. Winſlow.

TRAPEZOID, in *Geometry*, a plane irregular figure, having four ſides, no two of which are parallel to each other.

TRAPEZOIDES *os*, in *Anatomy*, is the ſecond bone of the ſecond row in the CARPUS, or WRIST. It has its name from its figure, ſuppoſed to approach that of an unequal ſquare; but it might much more properly have been called os pyramidale, being in figure rather a kind of a pyramid, with its point broken off. Its baſis makes a portion of the outer or convex ſide of the carpus, and its truncated point a part on the concave ſide.

It has ſeveral articular ſides, one brachial which is the leaſt of all, and is articulated with the os ſcaphoides; one digital, of a conſiderable length, notched on each ſide, and divided into two halves by a ſort of middle line or angle, which gives it the appearance of a pulley, articulated with the baſis of the firſt metacarpal bone; one radial, irregularly triangular, and articulated with the os trapezium; and one cubical, a little hollow, and articulated with the os magnum. Winſlow's Anat. p. 84.

TRAPEZUNTINA *laurus*, a name uſed by ſome botanical authors, for the *lauroceraſus*, or common laurel.

TRAPPE, *monks of La*, in *Eccleſiaſtical Hiſtory*, monks of the CISTERCIAN order, belonging to an abbey beautifully ſituated in a large valley in the province of Le Perche, on the confines of Normandy, in France. The abbey was founded in 1140 by Rotrou, count of Perche, and dedicated under the name of the Bleſſed Virgin, in 1214, by Robert, archbiſhop of Rouen. This abbey was ſubjected to a very rigorous diſcipline by the abbé Rance in 1664. Encyclop.

TRAPPINGS. Among the ancients ſome will have the horſe-*trappings* to have been placed on their breaſts; others, on their forehead; and others again, on their cheeks; that on the breaſt was a ſmall kind of ſhield, finely poliſhed.

TRAQUENADE, in the *Manege*. See ENTREPAS.

TRASCINA, in *Ichthyology*, a name by which ſome authors have called the fiſh more uſually known by the name of the DRACO *marinus*, and araneus.

TRAVAIL, in the *Manege*. See TRAVICE.

TRAVE, among *Farriers*, the ſame with TRAVICE.

TRAVELLER, in a *Ship*, a ſort of thimble, whoſe diameter is much longer, in proportion to the breadth of its ſurface, than the common ones. It is furniſhed with a tail formed of a piece of rope, about three feet in length, one end of which encircles the ring, to which it is ſpliced. Theſe machines are principally intended to facilitate the hoiſting or lowering of the top-gallant-yards at ſea: for which purpoſe, two of them are fixed on each back-ſtay, whereon they ſlide upwards and downwards like the ring of a curtain upon its rod; being thus attached to the extremities of a top-gallant-yard, they prevent it from ſwinging backwards and forwards, by the agitation of the ſhip, whilſt the yard is hoiſting or lowering at ſea. Falconer.

TRAVELLER's *joy*, in *Botany*. See VIRGIN's-*bower*.

TRAVERSE, or TRANSVERSE, ſomething that goes athwart another, i. e. that croſſes and cuts it obliquely.

TRAVERSE is particularly uſed for a piece of wood or iron, placed tranſverſely, to ſtrengthen and fortify another; ſuch are thoſe uſed in gates, windows, &c.

To plane a board againſt the grain, is alſo called, among joiners, &c. to *traverſe* it.

TRAVERSE, in *Gunnery*, ſignifies to turn or point a piece of ordnance, which way one pleaſes, upon her platform.

The laying or removing of a piece of ordnance, or a great gun, in order to bring it to bear, or lie level with the mark, is alſo called *traverſing the piece*. See GUNNERY.

TRAVERSE, in *Fortification*, denotes a trench with a little parapet, ſometimes two, one on each ſide, to ſerve as a cover from the enemy that might come in flank. See GLACIS and *Tab.* VII. *Fortification*, *fig.* 41, in which *v*, *v* repreſent *traverſes*, conſtructed at the extremities of the places of arms, which ſerve to encloſe them: theſe *traverſes* are three toiſes thick, and as long as the COVERT-*way* is broad, and a paſſage is cut in the glacis round them about ſix or eight feet, in order to have a free communication with the reſt of the covert-way.—There are alſo *traverſes* of the ſame dimenſions before every ſaliant angle of the baſtion and out-works, and they are in the ſame direction of the faces of thoſe works produced; and the thickneſs lies at the ſame ſide as the parapets. The paſſages round theſe laſt *traverſes* are likewiſe from ſix to eight feet wide. The ſecond covert-way has alſo *traverſes* every where, in the ſame manner as the firſt.

Traverſes are ſometimes covered over-head with planks, and loaded with earth. Each *traverſe* is furniſhed with a foot-bank, and a row of palliſades planted on the foot-bank; and the paſſage round its end ſhould be furniſhed with klinkets or doors, to ſhut them up when neceſſary. They are very commodious for ſtopping an enemy's way, and to prevent being enfiladed: they likewiſe make a good defence, in a dry foſs, in making the parapet on the ſide next the oppoſite flank.

TRAVERSE, in a *wet foſs*, is a ſort of *gallery*, made by throwing ſauciſſons, joiſts, faſcines, ſtones, earth, and other things, into the foſs, over-againſt the place where the miner is to be put to the foot, or the wall, in order to fill up the ditch, and make a paſſage over it.

TRAVERSE alſo denotes a wall of earth, or ſtone raiſed acroſs a work which is commanded, in order to cover the men.

TRAVERSE alſo ſignifies any retrenchment, or line fortified with faſcines, barrels or bags of earth, or gabions.

TRAVERSE, in *Navigation*, is the variation or alteration of a ſhip's courſe, occaſioned by the ſhifting of the winds, currents, &c. or, a *traverſe* is a compound courſe, wherein ſeveral different courſes and diſtances are known.

Traverſe ſailing is uſed when a ſhip, having ſet ſail from one port towards another, whoſe courſe and diſtance from the port ſailed from is given or known, is, by reaſon of contrary winds, or other accidents, forced to ſhift and ſail on ſeveral courſes, which are to be brought into one courſe, to learn, after ſo many turnings and windings, the true courſe and diſtance made from the place ſailed from, and the true point or place where the ſhip is; that ſo, the wind coming fair, it may be known how, afterwards, to ſhape a courſe for the place intended.

This may be performed geometrically two ways: the firſt, by drawing new meridians, through the extremity of every courſe, parallel to the firſt meridian, or north and ſouth line at firſt made, and ſetting off every courſe with a ſweep of ſixty, as if it were a queſtion in plain ſailing: you may alſo let fall perpendiculars to every new meridian, from the point that the ſhip ſailed to upon that courſe; by which you have the courſe, diſtance, difference of latitude, and departure, to every courſe.

To illuſtrate this by an example: a ſhip, being bound for a port diſtant 120 miles N. E ½ E ſails S. S. E. 30 miles, then N. E. by N. 40, then E. by N. 25, then N. N. E 44: it is required to find the courſe, and diſtance made good, and alſo the courſe and diſtance to the port bound for?

Draw the line H K (*Tab.* II. *Navigation*, *fig.* 56,) at pleaſure, for a meridian, or north and ſouth line, and therein aſſume a point, as A, for the port ſailed from: then, with 60 of the chords, and one foot in A, draw the arch L m, upon which ſet off two points (becauſe the courſe is S. S. E.) from L to *m*, and draw the line A m, upon which ſet off the diſtance 30 from A to B; then is the ſhip at B: thus letting fall the perpendicular B K, A K, 27° 7′ is the difference of latitude, and B K 11° 5′, the departure of the firſt courſe.

For the ſecond courſe, with the diſtance K B draw the parallel B N, and thereby with the chord of 60, as before, ſet off the ſecond courſe and diſtance, N. E. by N. 40, from B to C, and let fall the perpendicular C L; then is the ſhip at C, the difference of latitude upon the courſe is B L 33: 3, and departure C L 22: 2.

Proceed in the ſame manner for the third courſe, with the parallel C O, ſet off E. by N. 25, from C to D, and draw the line D P, from which ſet off the laſt courſe, N. N. E. 44; then is your ſhip at E.

Since, then, the ſhip came from A, and is now at E, the line A E, meaſured on the ſame equal parts upon which all the other diſtances were taken, will be found 91 miles; and the arch R Q, meaſured on the rhumbs, five points; viz. N. E. by E. ſo that the ſhip is now 91 miles N. E. by E. from the port ſailed from.

To find her courſe and diſtance to the port bound for, ſet off four half-points upon the arch R Q, from R to S, and from A through S draw the line A S F; upon which ſet off 120, the diſtance from the port ſailed from, to the port bound for, from A to F; then is F the port bound for: now the port bound for being at F, and the ſhip being but at E, the line E F, meaſured on the ſame equal parts that the reſt was taken from, will be found to be 31; and the arch T V meaſured on the chords, is 35°, 12′, or N. E. by N. ſomewhat eaſterly, &c. This method is uſeful, where the courſes tend generally one way, without interſecting one another; but if they often croſs, it is beſt to have recourſe to the ſecond method; which is without new meridians.

In order to this, obſerve how many points are between the point next to be laid down, and the point oppoſite to the courſe laſt laid down; for that is the point for laying down: then, with the chord of 60, and one foot in the point the ſhip is laſt come to, deſcribe an arch; upon which ſet off the points found by the abovesaid rule, and through that draw the line for the next courſe, &c. For an example.

Draw a north and ſouth line, as in the former, as the line R M, *fig.* 57. in which aſſume a point, as at A, for the port ſailed from; then from A ſet off the firſt courſe and diſtance, viz. N. N. W. 68, from A to B; and for the ſecond courſe, with the chord of 60, and one foot in B, draw the arch in T W, upon which to ſet off the next courſe S. S. W. 70, obſerve the rule above delivered; viz. to take the number of points between the point oppoſite to the laſt courſe ſailed, and the point you are next to ſail on. The reaſon of which rule is this; if from A to B, your courſe be N. N. W. then back from B to A, muſt needs be S. S. E. the oppoſite point; and then if you were to ſail S. by E. it muſt be one point to the ſouthward of that S. S. E. line; if ſouth, it is two points; and, conſequently, the next courſe being S. S. W. you are to ſet off 4 points, upon which ſet off 70 miles, from B to C, and then is your ſhip at C: for the third courſe, if from B to C be S. S. W. then from C to B is N. N. E. but the next courſe being E. half N. the points between N. N. E. and E. half N. are five points and an half; and therefore, with the chord of 60, and one foot in C, draw the arch X Y, upon which ſet off five points and a half from X to Y; and through Y draw the line C D, upon which ſet off 90 miles from C to D: then is your ſhip at D.

After the ſame manner lay down all the reſt, as D E, which is W. N. W. half N. 70, then E F, ſouth 25, then F G, E. half S. 45; then laſtly G H, ſouth 30, which is the laſt courſe.

Thus your ſhip being at H, and the port ſailed from at A, the line A H, 28 miles, is the diſtance made good; and the angle A is four points; viz. S. E. but the port intended for being S. W. 55. ſet it from A to K; and the ſhip being at H, the line H K, 62 miles, is the diſtance from the ſhip to the port bound for; and the courſe is found by meaſuring the angle at H 71° 48′, or W. S. W. more than a quarter weſterly, &c.

To work a TRAVERSE *by the tables of difference of latitude and departure.* This is the principal uſe thoſe tables are intended for; and the way of working a *traverſe* hereby is equal to the beſt for exactneſs, and ſuperior in point of expedition.

Make a little table with ſix columns, the firſt for the courſe, the ſecond for the diſtance, the third for the northing, the fourth for the ſouthing, the fifth for the eaſting, the ſixth for the weſting. Then find the difference of the latitude, and the departure of every courſe, and ſet them in their proper columns; as, where the courſe is northerly, ſet the difference of the latitude under northing, or in the north column; and where the courſe is ſoutherly, ſet the difference of latitude in the ſouth column.

Again, where the courſe is eaſterly, ſet the departure in the eaſt column, and when weſterly, ſet it in the weſt column: then adding up each column by itſelf, ſubtract the north and ſouth columns, the leſs from the greater, the remainder is the northing or ſouthing made good. Alſo ſubtract the eaſt and weſt columns, the leſs from the greater, the remainder is the eaſting or weſting made good; then have you the difference of latitude and departure given to find the courſe and diſtance.

In the firſt example above ſpecified, the firſt courſe is S. S. E. 30 miles, or two points 30 miles; for which I find the difference of latitude 27: 7. Now the courſe being between ſouth and eaſt, I place my difference of latitude in the ſouth column, and my departure 11: 5 in the eaſt column, leaving the north and weſt columns blank.

Then for the ſecond courſe N. E. by N. or three points 40 miles, my difference of latitude, 33: 3 is to be placed in the north column, and the departure 22: 2 in the eaſt column, becauſe the courſe is between the north and eaſt.

Then the third courſe being E. by N. or ſeven points, 25 miles, I place my difference of latitude 4: 9, in the north column; and departure 24: 5, in the eaſt column.

And ſo for the fourth courſe N. N. E. or two points 44 miles, I place my difference of latitude 40: 6, in the north column; and my departure 16: 8, in the eaſt column; then adding up each column, the ſum of the northern column is 78: 8, and the ſum of the ſouthing column is 27: 7; which, ſubtracted from the northing 78: 8, the remainder 51: 1, is the difference of latitude made good, which is northing, becauſe the northing was the greater number.

Again, the ſum of the eaſting column was 75: 0, which, becauſe there is no weſting to ſubtract from it, is the eaſting made good. Thus you have the northing 51: 1, and the eaſting 75: 0, given, to find courſe and diſtance; and though you cannot find in the table the exact number of 51: 1, and 75: 0 together, yet find the neareſt you can, which is 75: 4, and 50: 9, over which, at the top, you find 34 degrees for the courſe, which is N. E. by N. 0° 15′ eaſterly, and the diſtance is 91 miles.

To reſolve a *traverſe* by the ſcales on GUNTER's *Scale*, improved by Mr. Robertſon: e. g. A ſhip in 40 north latitude, and 5° 14′ weſt longitude, ſails firſt S. E. by S. 68 min. then S. W. by W. 55 min. and then W. N. W. 75 min. What is her difference of latitude and departure in this general run?

The proportions are, for

First courſe.

As rad. : Diſt. : : S. Co. cour : Diff. lat. : : S. co. : Depart.
S. 8 pts. : 68′ : : S. 5 pts. : 57′. S. : : S. 3 pts. : 38′ E.

Second courſe.

S. 8 pts. : 55′ : : S. 3 pts. : 30′. 6 S. : : S. 5 pts. : 46′ W.

Third courſe.

S. 8 pts. : 75′ : : S. 2 pts. : 28′. 8 N. : : S. 6 pts. : 69. 5 W.

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viz. departure made good in this day's run.

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With the compaſſes, take the extent from 8 points on the ſine rhumbs to 68 on the numbers; the ſaid extent laid the ſame way from ſine 5 points will reach to 57 on the num. and the ſame extent laid the ſame way will reach to 38 on the num. as before: and in like manner may the reſt, and all others of the like kind, be wrought with eaſe and diſpatch. See Mountaine's deſcription of the Lines drawn on Gunter's Scale, as improved by Mr. J. Robertſon, and executed by Meſſrs. Nairne and Blunt, p. 32, &c.

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It is not cuſtomary, nor agreeable to the general courſe of proceedings, unleſs by conſent of parties, to try perſons indicted of ſmaller miſdemeanors at the ſame court in which they have pleaded *not guilty*, or *traverſed* the indictment. But they uſually give ſecurity to the court, to appear at the next aſſizes or ſeſſions, and then and there to try the *traverſe*, giving notice to the proſecutor of the ſame.

TRAVERSE *of an office*, is the proving that an inquiſition made of lands or goods is defective, and untruly made. See OFFICE.

No perſon ſhall *traverſe* an office, unleſs he can make to himſelf a good right and title: and if one be admitted to *traverſe* an office, this admiſſion of the party to the *traverſe* ſuppoſes the title to be in him, or elſe he could have no cauſe to *traverſe*.

TRAVERSE is ſometimes uſed in *Heraldry*, for a partition of an eſcutcheon, of the figure repreſented in *Tab.* II. *Herald. fig.* 85, which they blazon parti per pale, *traverſe*, argent and gules.

TRAVERSE, in the *Manege*. A horſe is ſaid to *traverſe*, when he cuts his tread croſs-wiſe; throwing his croupe to one ſide, and his head to another.

TRAVERSE-*board*, in *a ſhip*, a little round board hanging up in the ſteerage, and bored full of holes upon lines ſhewing the points of the compaſs upon it by moving of a little peg from hole to hole, the ſteerſman keeps an account how many glaſſes, that is half hours, the ſhip ſteers upon any point.

This implement is particularly uſeful in light and variable winds. Thus, if the wind is northerly at the beginning of the watch, the ſhip, being cloſe-hauled on the larboard-tack, will ſteer W. N. W. If, after the firſt half hour the wind changes to N. by W. the ſhip will fall off to W. by N. both theſe courſes are marked by the helmſman upon the *traverſe-board*, by putting in one peg for every half hour in which ſhe ſteers the ſame courſe; as one peg into W. N. W. and two pegs into W. by N. if ſhe ſails an hour on the latter courſe; and ſo on. The lee-way and variation of the compaſs are afterwards allowed by the pilot, on ſumming up the whole.

TRAVERSE-*table*, in *Navigation*, is the ſame with a table of difference of latitude and departure; being only the difference of latitude and departure ready calculated to every degree, point, half-point, and quarter-point of the quadrant; and for any diſtance under one hundred miles, though it may conveniently ſerve for greater diſtances, by taking their halves, thirds, fourths, &c. and doubling, tripling, quadrupling, &c. the difference of latitude and departure found to thoſe parts of the diſtance.

This table is one of the moſt neceſſary things a navigator has occaſion for; for by it he can readily reduce all his courſes and diſtances, run in the ſpace of twenty-four hours, into one courſe and diſtance; whence the latitude he is in, and his departure from the meridian may be found.

See a table of this kind, in which the diſtances are continued to one hundred and twenty, for the ſake of more eaſy ſubdiviſions, and which is divided into two parts; the firſt containing the whole points and quarter-points in a quadrant, and the ſecond part fitted to every degree and quarter of a degree in the quadrant; in Robertſon's Navigation, at the cloſe of b. 7.

TRAVERSE *the yard*, on board a ſhip, is to brace it aft.

TRAVERSE *tyles*. See TYLE.

TRAVESTY, or TRAVESTI, a term which ſome late authors have introduced into poetry: it is originally French, being a participle of the word *traveſtir*, to diſguiſe one's ſelf, or to appear in maſquerade. Hence *traveſty* comes to be applied to the diſguiſing of an author, or the tranſlating him into a ſtyle and manner different from his own; and is generally applied to pieces of humour.

G. Battiſta Lalli has *traveſtied* Virgil, or turned him into Italian burleſque verſe. Scarron has done the ſame in French; and Cotton and Philips in Engliſh verſe.

Caſtalio is, by ſome, charged with having *traveſtied* the ſacred text, by reaſon of the difference of air and ſtyle between his verſion and the original.

TRAVICE, in the *Manege*, is a ſmall encloſure or oblong quadrangle placed before a farrier's ſhop, and conſiſting of four pillars or poſts, kept cloſe together by croſs poles. This encloſure is deſigned for holding and keeping in a horſe that is apt to be unruly or diſorderly in the time of ſhoeing, or of any operation.

This, in ſome of the remoter parts of England, goes by the name of a *break*; and is called in French, *travail*.

TRAUMATICS, Τραυματικα, *Vulneraries*, or medicines good for the healing of wounds. See VULNERARY and AGGLUTINANT, HEALING, and CONSOLIDATION.

TRAUMATICUM, *balſamum*. See BALSAMUM *Traumaticum*.

TRAYL-BASTON, or TRAIL-BASTON. Edward I. in his 32d. year, ſent out a new writ of inquiſition, under this denomination, againſt the intruders on other men's lands, who, to oppreſs the right owner, would make over their lands to great men; againſt batterers hired to beat men, breakers of peace, raviſhers, incendiaries, fighters, falſe aſſiſors, and other malefactors: which inquiſition was ſo ſtrictly executed, and ſuch fines taken, that it brought in much treaſure to the king.

Hence, alſo, *juſtices of trayl-baſton*, a denomination given to the juſtices appointed to execute this commiſſion, either by reaſon of their ſevere and ſummary way of proceeding, or becauſe a ſtaff was delivered them as the badge of their office, and the offenders were dragged before this juriſdiction.

TRAYTOR, TRAITOR, TRADITOR, a betrayer of his king and country, or one guilty of high-treaſon. See TREASON.

TRAYTOROUS, or TRAITEROUS *Poſition*, is particularly underſtood of a tenet, which ſome formerly held, of the legality of taking arms, by the king's authority, againſt his perſon, and thoſe commiſſioned by him: which is condemned by ſtatute 14 Car. II. c. 3.

TREACLE, in *Pharmacy*, &c. See THERIACA.

The word *treacle* is alſo popularly uſed for melaſſes; and in this ſenſe it is that Dr. Shaw, in his Eſſay on Diſtillery, has endeavoured to bring into uſe ſeveral ſorts of *treacles*, which might be made at home, and would ſerve very conveniently for the diſtillation of ſpirits, or the making of potable liquors. Theſe are the inſpiſſated juices or decoctions of vegetables: ſuch as the ſweet juice of the birch, or ſycamore, procured by tapping or piercing the trees in ſpring, and the common wort made from malt, or from other vegetable ſubſtances treated in the ſame manner. Theſe liquors are ſeverally to be boiled down in a copper till they begin to inſpiſſate, and then to be poured into a balneum Mariæ, when the remainder of the evaporation may be finiſhed without burning the inſpiſſated juices: thus prepared it may be at any time reduced to the ſtate of wort, only by adding a ſufficient quantity of warm water.

TREACLE *muſtard*, *thlaſpi*, or *mithridate*, in *Botany*, a genus of the *tetradynamia ſiliculoſa* claſs; its characters are theſe: the empalement of the flower is compoſed of four oval concave leaves, which fall off; the flower has four oval petals, double the ſize of the empalement, placed in form of a croſs: it has ſix ſtamina, half the length of the petals, two of which are ſhorter than the others, terminated by acute ſummits. It has a roundiſh compreſſed germen, ſupporting a ſingle ſtyle, the length of the ſtamina, crowned by an obtuſe ſtigma; the germen becomes an oval, heart-ſhaped, compreſſed, little pod, with an acute border, divided into two cells, by an intermediate partition containing two or three ſeeds in each. Linnæus enumerates ten, and Miller eight ſpecies.

The ſeed enters into the compoſition of the theriaca, and externally uſed, cleanſes all ſorts of ulcers; and is alſo a ptarmic, but not very common. It is reckoned an enemy to pregnant women, becauſe it kills the fœtus. James. See THLASPEOS *ſemen*.

TREACLE *muſtard*, is alſo a name given to the CLYPEOLA.

TREACLE-*water*, *Aqua Theriacalis*, a compound cordial, or ſpirituous water, diſtilled with a ſpirituous menſtruum, from many cordial and ſudorific drugs and herbs, with a mixture of ſome of the theriaca Andromachi, or Venice *treacle*; whence its name.

TREAD, in the *Manege*. See PISTE.

TREASON, TREACHERY, the act or crime of infidelity to one's lawful ſovereign.

Treaſon is a general appellation made uſe of by the law, to denote not only offences againſt the king and government, but alſo that accumulation of guilt which ariſes whenever a ſuperior repoſes a confidence in a ſubject or inferior, between whom and himſelf there ſubſiſts a natural, civil, or even a ſpiritual relation; and the inferior ſo abuſes that confidence and ſo forgets the obligation of duty, ſubjection, and allegiance, as to deſtroy the life of any ſuch ſuperior or lord. Whence,

Treaſon, in our laws, is of two ſorts, *high* and *petty*.

TREASON, *high*, or TREASON-*paramount*, (which is equivalent to the *crimen læſæ majeſtatis* of the Romans, as Glanvil denominates it alſo in our Engliſh law) is an offence committed againſt the ſecurity of the king or kingdom, whether by imagination, word, or deed.

In order to prevent the inconveniences which aroſe in England from a multitude of conſtructive *treaſons*, the ſtatute 25 Edw. III. c. 2. was made; which defines what offences only for the future ſhould be held to be *treaſon*: and this ſtatute comprehends all kinds of *high treaſon* under ſeven diſtinct branches.

1. "When a man doth compaſs or imagine the death of our lord the king, of our lady his queen, or of their eldeſt ſon and heir." A queen pregnant is alſo within the words of the act, though it does not extend to the huſband of ſuch a queen. And the king here intended is the king in poſſeſſion, without any reſpect to his title: conſequently a king, who has reſigned his crown, ſuch reſignation being admitted and ratified in parliament, is no longer the object of *high-treaſon*: and the ſame reaſon holds, in caſe the king abdicates the government; or by actions ſubverſive of the conſtitution, virtually renounces the authority which he claims by that very conſtitution. As the compaſſing or imagination, expreſſed by this ſtatute, is an act of the mind, it cannot poſſibly fall under any judicial cognizance, unleſs it be demonſtrated by ſome open, or *overt* act. The ſtatute expreſsly requires, that the accuſed "be thereof upon ſufficient "proof attained of ſome open act by men of his own "condition." Thus to provide weapons or ammunition for the purpoſe of killing the king, is held to be a palpable overt act of *treaſon* in imagining his death: to conſpire to impriſon the king by force, and move towards it by aſſembling company, is an overt act of compaſſing the king's death: and taking any meaſures to render treaſonable purpoſes effectual, as aſſembling and conſulting on the means to kill the king, is a ſufficient overt act of *high-treaſon*. It now ſeems clearly to be agreed, that, by the common law and the ſtatute of Edward III. words ſpoken amount only to a high miſdemeanor, and no *treaſon*. If the words be ſet down in writing, it argues more deliberate intention; and it has been held, that writing is an overt act of *treaſon*; for *ſcribere eſt agere*. But even in this caſe, the bare words are not the *treaſon*, but the deliberate act of writing them. It was formerly held, that the publication of a treaſonable writing was a ſufficient overt act of *treaſon* at the common law; though of late even that has been queſtioned.

2. The ſecond ſpecies of *treaſon* is, "if a man do violate "the king's companion, or the king's eldeſt daughter "unmarried, or the wife of the king's eldeſt ſon and "heir." By the king's companion is meant his wife, and by violation is underſtood carnal knowledge, as well without force, as with it; and this is *high-treaſon* in both parties, if both be conſenting.

3. The third ſpecies of *treaſon* is, "if a man do levy "war againſt our lord the kind in his realm." And this may be done by taking arms, not only to dethrone the king, but under pretence to reform religion, or the laws, or to remove evil counſellors, or their grievances, whether real or pretended.

4. "If a man be adherent to the king's enemies in his "realm, giving to them aid and comfort in the realm, "or elſewhere," he is alſo declared guilty of *high-treaſon*. This muſt likewiſe be proved by ſome overt act, as by giving them intelligence, by ſending them proviſions, by ſelling them arms, by treacherouſly ſurrendering a fortreſs, or the like.

5. "If a man counterfeit the king's great or privy ſeal," this is alſo *high-treaſon*.

6. The ſixth ſpecies of *treaſon* under this ſtatute is, "if "a man counterfeit the king's money; and if a man "bring falſe money into the realm counterfeit to the "money of England, knowing the money to be falſe, "to merchandize and make payment withal." Counterfeiting the king's money is *treaſon*, whether the falſe money be uttered in payment, or not. Alſo if the king's own minters alter the ſtandard or alloy eſtabliſhed by law, it is *treaſon*. But gold and ſilver money only are held to be within this ſtatute. With regard likewiſe to importing foreign counterfeit money, in order to utter it here; it is held that uttering it, without importing it, is not within the ſtatute.

7. The laſt ſpecies of *treaſon* aſcertained by this ſtatute is, "if a man ſlay the chancellor, treaſurer, or the king's "juſtices of the one bench or the other, juſtices in eyre, "or juſtices of aſſize, and all other juſtices aſſigned to "hear and determine, being in their places doing their "offices." This ſtatute extends only to the actual killing of them, and not to a wounding, or a bare attempt to kill them. The barons of the exchequer are not within the protection of this act; but the lord keeper or commiſſioners of the great ſeal now ſeem to be within it, by virtue of the ſtatute 5 Eliz. c. 18. and 1 W. and M. c. 21.

The new *treaſons*, created ſince the ſtatute 1 M. c. 1. and not comprehended under the deſcription of ſtatute 25 Edw. III. may be compriſed under three heads. The firſt ſpecies relates to PAPISTS: the ſecond to falſifying the coin (ſee *Britiſh* COINS) or other royal ſignatures, as falſely forging the SIGN *manual*, privy SIGNET or PRIVY SEAL, which ſhall be deemed *high-treaſon*. 1 M ſt. ii. c. 6. The third new ſpecies of *high-treaſon* is ſuch as was created for the ſecurity of the Proteſtant ſucceſſion in the houſe of Hanover. For this purpoſe, after the *act* of SETTLEMENT was made, it was enacted by ſtatute 13 and 14 W. III. c. 3. that the pretended prince of Wales, aſſuming the title of king James III. ſhould be attainted of *high-treaſon*; and it was made *high-treaſon* for any of the king's ſubjects to hold correſpondence with him or any perſon employed by him, or to remit money for his uſe. And by 17 Geo. II. c. 39. it is enacted, that if any of the ſons of the pretender ſhall land or attempt to land in this kingdom, or be found in the kingdom or any of its dominions, he ſhall be adjudged attainted of *high-treaſon*; and correſponding with them or remitting money to their uſe, is made *high-treaſon*. By 1 Ann. ſtat. 2. c. 17. The offence of hindering the next in ſucceſſion from ſucceeding to the crown, is *high-*

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Traverse *of an indictment or preſentment* is the contradicting or denying ſome chief point of it, and taking iſſue thereon. See Indictment, and Presentment.

Thus, in a preſentment againſt a perſon for a highway overflowed with water, for default of ſcouring a ditch, &c. he may either *traverſe the matter*, by alledging, that there is no highway, or that the ditch is ſufficiently ſcoured; or he may *traverſe the cauſe*; viz. by alleging, that he hath not the land, or that he and they whoſe eſtate, &c. have not uſed to clean the ditch.

It is not cuſtomary, nor agreeable to the general courſe of proceedings, unleſs by conſent of parties, to try perſons indicted of ſmaller miſdemeanors at the ſame court in which they have pleaded *not guilty*, or *traverſed* the indictment. But they uſually give ſecurity to the court, to appear at the next aſſizes or ſeſſions, and then and there to try the *traverſe*, giving notice to the proſecutor of the ſame.

Traverse *of an office*, is the proving that an inquiſition made of lands or goods is defective, and untruly made. See Office.

No perſon ſhall *traverſe* an office, unleſs he can make to himſelf a good right and title: and if one be admitted to *traverſe* an office, this admiſſion of the party to the *traverſe* ſuppoſes the title to be in him, or elſe he could have no cauſe to *traverſe*.

Traverse is ſometimes uſed in *Heraldry*, for a partition of an eſcutcheon, of the figure repreſented in *Tab.* II. *Herald. fig.* 85, which they blazon parti per pale, *traverſe*, argent and gules.

Traverse, in the *Manege*. A horſe is ſaid to *traverſe*, when he cuts his tread croſs-wiſe; throwing his croupe to one ſide, and his head to another.

Traverse-*board*, in *a ſhip*, a little round board hanging up in the ſteerage, and bored full of holes upon lines ſhewing the points of the compaſs upon it by moving of a little peg from hole to hole, the ſteerſman keeps an account how many glaſſes, that is half hours, the ſhip ſteers upon any point.

This implement is particularly uſeful in light and variable winds. Thus, if the wind is northerly at the beginning of the watch, the ſhip, being cloſe-hauled on the larboard-tack, will ſteer W. N. W. If, after the firſt half hour the wind changes to N. by W. the ſhip will fall off to W. by N. both theſe courſes are marked by the helmſman upon the *traverſe-board*, by putting in one peg for every half hour in which ſhe ſteers the ſame courſe; as one peg into W. N. W. and two pegs into W. by N. if ſhe ſails an hour on the latter courſe; and ſo on. The lee-way and variation of the compaſs are afterwards allowed by the pilot, on ſumming up the whole.

Traverse-*table*, in *Navigation*, is the ſame with a table of difference of latitude and departure; being only the difference of latitude and departure ready calculated to every degree, point, half-point, and quarter-point of the quadrant; and for any diſtance under one hundred miles, though it may conveniently ſerve for greater diſtances, by taking their halves, thirds, fourths, &c. and doubling, tripling, quadrupling, &c. the difference of latitude and departure found to thoſe parts of the diſtance.

This table is one of the moſt neceſſary things a navigator has occaſion for; for by it he can readily reduce all his courſes and diſtances, run in the ſpace of twenty-four hours, into one courſe and diſtance; whence the latitude he is in, and his departure from the meridian may be found.

See a table of this kind, in which the diſtances are continued to one hundred and twenty, for the ſake of more eaſy ſubdiviſions, and which is divided into two parts; the firſt containing the whole points and quarter-points in a quadrant, and the ſecond part fitted to every degree and quarter of a degree in the quadrant; in Robertſon's Navigation. at the cloſe of b. 7.

Traverse *the yard*, on board a ſhip, is to brace it aft.

Traverse *tyles*. See Tyle.

TRAVESTY, or Travesti, a term which ſome late authors have introduced into poetry: it is originally French, being a participle of the word *traveſtir*, to diſguiſe one's ſelf, or to appear in maſquerade. Hence *traveſty* comes to be applied to the diſguiſing of an author, or the tranſlating him into a ſtyle and manner different from his own; and is generally applied to pieces of humour.

G. Battiſta Lalli has *traveſtied* Virgil, or turned him into Italian burleſque verſe. Scarron has done the ſame in French; and Cotton and Philips in Engliſh verſe.

Caſtalio is, by ſome, charged with having *traveſtied* the ſacred text, by reaſon of the difference of air and ſtyle between his verſion and the original.

TRAVICE, in the *Manege*, is a ſmall encloſure or oblong quadrangle placed before a farrier's ſhop, and conſiſting of four pillars or poſts, kept cloſe together by croſs poles. This encloſure is deſigned for holding and keeping in a horſe that is apt to be unruly or diſorderly in the time of ſhoeing, or of any operation.

This, in ſome of the remoter parts of England, goes by the name of a *break*; and is called in French, *travail*.

TRAUMATICS, Τραυματικα, *Vulneraries*, or medicines good for the healing of wounds. See Vulnerary and Agglutinant, Healing, and Consolidation.

TRAUMATICUM, *balſamum*. See Balsamum *Traumaticum*.

TRAYL-BASTON, or Trail-Baston. Edward I. in his 32d. year, ſent out a new writ of inquiſition, under this denomination, againſt the intruders on other men's lands, who, to oppreſs the right owner, would make over their lands to great men; againſt batterers hired to beat men, breakers of peace, raviſhers, incendiaries, fighters, falſe aſſiſors, and other malefactors: which inquiſition was ſo ſtrictly executed, and ſuch fines taken, that it brought in much treaſure to the king.

Hence, alſo, *juſtices of trayl-baſton*, a denomination given to the juſtices appointed to execute this commiſſion, either by reaſon of their ſevere and ſummary way of proceeding, or becauſe a ſtaff was delivered them as the badge of their office, and the offenders were dragged before this juriſdiction.

TRAYTOR, Traitor, Traditor, a betrayer of his king and country, or one guilty of high-treaſon. See Treason.

TRAYTOROUS, or Traiterous *Poſition*, is particularly underſtood of a tenet, which ſome formerly held, of the legality of taking arms, by the king's authority, againſt his perſon, and thoſe commiſſioned by him: which is condemned by ſtatute 14 Car. II. c. 3.

TREACLE, in *Pharmacy*, &c. See Theriaca.

The word *treacle* is alſo popularly uſed for melaſſes; and in this ſenſe it is that Dr. Shaw, in his Eſſay on Diſtillery, has endeavoured to bring into uſe ſeveral ſorts of *treacles*, which might be made at home, and would ſerve very conveniently for the diſtillation of ſpirits, or the making of potable liquors. Theſe are the inſpiſſated juices or decoctions of vegetables: ſuch as the ſweet juice of the birch, or ſycamore, procured by tapping or piercing the trees in ſpring, and the common wort made from malt, or from other vegetable ſubſtances treated in the ſame manner. Theſe liquors are ſeverally to be boiled down in a copper till they begin to inſpiſſate, and then to be poured into a balneum Mariæ, when the remainder of the evaporation may be finiſhed without burning the inſpiſſated juices: thus prepared it may be at any time reduced to the ſtate of wort, only by adding a ſufficient quantity of warm water.

Treacle *muſtard*, *thlaſpi*, or *mithridate*, in *Botany*, a genus of the *tetradynamia ſiliculoſa* claſs; its characters are theſe: the empalement of the flower is compoſed of four oval concave leaves, which fall off; the flower has four oval petals, double the ſize of the empalement, placed in form of a croſs: it has ſix ſtamina, half the length of the petals, two of which are ſhorter than the others, terminated by acute ſummits. It has a roundiſh compreſſed germen, ſupporting a ſingle ſtyle, the length of the ſtamina, crowned by an obtuſe ſtigma; the germen becomes an oval, heart-ſhaped, compreſſed, little pod, with an acute border, divided into two cells, by an intermediate partition containing two or three ſeeds in each. Linnæus enumerates ten, and Miller eight ſpecies.

The ſeed enters into the compoſition of the theriaca, and externally uſed, cleanſes all ſorts of ulcers; and is alſo a ptarmic, but not very common. It is reckoned an enemy to pregnant women, becauſe it kills the fœtus. James. See Thlaspeos *ſemen*.

Treacle *muſtard*, is alſo a name given to the clypeola.

Treacle-*water*, *Aqua Theriacalis*, a compound cordial, or ſpirituous water, diſtilled with a ſpirituous menſtruum, from many cordial and ſudorific drugs and herbs, with a mixture of ſome of the theriaca Andromachi, or Venice *treacle*; whence its name.

TREAD, in the *Manege*. See Piste.

TREASON, Treachery, the act or crime of infidelity to one's lawful ſovereign.

Treaſon is a general appellation made uſe of by the law, to denote not only offences againſt the king and government, but alſo that accumulation of guilt which ariſes whenever a ſuperior repoſes a confidence in a ſubject or inferior, between whom and himſelf there ſubſiſts a natural, civil, or even a ſpiritual relation; and the inferior ſo abuſes that confidence and ſo forgets the obligation of duty, ſubjection, and allegiance, as to deſtroy the life of any ſuch ſuperior or lord. Whence,

Treaſon, in our laws, is of two ſorts, *high* and *petty*.

Treason, *high*, or Treason-*paramount*, (which is equivalent to the *crimen læſæ majeſtatis* of the Romans, as Glanvil denominates it alſo in our Engliſh law) is an offence committed againſt the ſecurity of the king or kingdom, whether by imagination, word, or deed.

In order to prevent the inconveniences which aroſe in England from a multitude of conſtructive *treaſons*, the ſtatute 25 Edw. III. c. 2. was made; which defines what offences only for the future ſhould be held to be *treaſon*: and this ſtatute comprehends all kinds of *high treaſon* under ſeven diſtinct branches.

1. "When a man doth compaſs or imagine the death of our lord the king, of our lady his queen, or of their eldeſt ſon and heir." A queen pregnant is alſo within the words of the act, though it does not extend to the huſband of ſuch a queen. And the king here intended is the king in poſſeſſion, without any reſpect to his title: conſequently a king, who has reſigned his crown, ſuch reſignation being admitted and ratified in parliament, is no longer the object of *high-treaſon*: and the ſame reaſon holds, in caſe the king abdicates the government; or by actions ſubverſive of the conſtitution, virtually renounces the authority which he claims by that very conſtitution. As the compaſſing or imagination, expreſſed by this ſtatute, is an act of the mind, it cannot poſſibly fall under any judicial cognizance, unleſs it be demonſtrated by ſome open, or *overt* act. The ſtatute expreſsly requires, that the accuſed "be thereof upon ſufficient "proof attained of ſome open act by men of his own "condition." Thus to provide weapons or ammunition for the purpoſe of killing the king, is held to be a palpable overt act of *treaſon* in imagining his death: to conſpire to impriſon the king by force, and move towards it by aſſembling company, is an overt act of compaſſing the king's death: and taking any meaſures to render treaſonable purpoſes effectual, as aſſembling and conſulting on the means to kill the king, is a ſufficient overt act of *high-treaſon*. It now ſeems clearly to be agreed, that, by the common law and the ſtatute of Edward III. words ſpoken amount only to a high miſdemeanor, and no *treaſon*. If the words be ſet down in writing, it argues more deliberate intention; and it has been held, that writing is an overt act of *treaſon*; for *ſcribere eſt agere*. But even in this caſe, the bare words are not the *treaſon*, but the deliberate act of writing them. It was formerly held, that the publication of a treaſonable writing was a ſufficient overt act of *treaſon* at the common law; though of late even that has been queſtioned.

2. The ſecond ſpecies of *treaſon* is, "if a man do violate "the king's companion, or the king's eldeſt daughter "unmarried, or the wife of the king's eldeſt ſon and "heir." By the king's companion is meant his wife, and by violation is underſtood carnal knowledge, as well without force, as with it; and this is *high-treaſon* in both parties, if both be conſenting.

3. The third ſpecies of *treaſon* is, "if a man do levy "war againſt our lord the kind in his realm." And this may be done by taking arms, not only to dethrone the king, but under pretence to reform religion, or the laws, or to remove evil counſellors, or their grievances, whether real or pretended.

4. "If a man be adherent to the king's enemies in his "realm, giving to them aid and comfort in the realm, "or elſewhere," he is alſo declared guilty of *high-treaſon*. This muſt likewiſe be proved by ſome overt act, as by giving them intelligence, by ſending them proviſions, by ſelling them arms, by treacherouſly ſurrendering a fortreſs, or the like.

5. "If a man counterfeit the king's great or privy ſeal," this is alſo *high-treaſon*.

6. The ſixth ſpecies of *treaſon* under this ſtatute is, "if "a man counterfeit the king's money; and if a man "bring falſe money into the realm counterfeit to the "money of England, knowing the money to be falſe, "to merchandize and make payment withal." Counterfeiting the king's money is *treaſon*, whether the falſe money be uttered in payment, or not. Alſo if the king's own minters alter the ſtandard or alloy eſtabliſhed by law, it is *treaſon*. But gold and ſilver money only are held to be within this ſtatute. With regard likewiſe to importing foreign counterfeit money, in order to utter it here; it is held that uttering it, without importing it, is not within the ſtatute.

7. The laſt ſpecies of *treaſon* aſcertained by this ſtatute is, "if a man ſlay the chancellor, treaſurer, or the king's "juſtices of the one bench or the other, juſtices in eyre, "or juſtices of aſſize, and all other juſtices aſſigned to "hear and determine, being in their places doing their "offices." This ſtatute extends only to the actual killing of them, and not to a wounding, or a bare attempt to kill them. The barons of the exchequer are not within the protection of this act; but the lord keeper or commiſſioners of the great ſeal now ſeem to be within it, by virtue of the ſtatute 5 Eliz. c. 18. and 1 W. and M. c. 21.

The new *treaſons*, created ſince the ſtatute 1 M. c. 1. and not comprehended under the deſcription of ſtatute 25 Edw. III. may be compriſed under three heads. The firſt ſpecies relates to papists: the ſecond to falſifying the coin (ſee *Britiſh* Coins) or other royal ſignatures, as falſely forging the sign *manual*, privy signet or privy seal, which ſhall be deemed *high-treaſon*. 1 M ſt. ii. c. 6. The third new ſpecies of *high-treaſon* is ſuch as was created for the ſecurity of the Proteſtant ſucceſſion in the houſe of Hanover. For this purpoſe, after the *act* of settlement was made, it was enacted by ſtatute 13 and 14 W. III. c. 3. that the pretended prince of Wales, aſſuming the title of king James III. ſhould be attainted of *high-treaſon*; and it was made *high-treaſon* for any of the king's ſubjects to hold correſpondence with him or any perſon employed by him, or to remit money for his uſe. And by 17 Geo. II. c. 39. it is enacted, that if any of the ſons of the pretender ſhall land or attempt to land in this kingdom, or be found in the kingdom or any of its dominions, he ſhall be adjudged attainted of *high-treaſon*; and correſponding with them or remitting money to their uſe, is made *high-treaſon*. By 1 Ann. ſtat. 2. c. 17. The offence of hindering the next in ſucceſſion from ſucceeding to the crown, is high-

treaſon: and by 6 Ann. c. 7. if any perſon ſhall maliciouſly, adviſedly, and directly, by writing, or printing, maintain, that any other perſon hath any right to the crown of this realm, otherwiſe than according to the act of ſettlement, or that the kings of this realm with the authority of parliament, are not able to make laws to bind the crown and its deſcent; ſuch perſon ſhall be guilty of *high-treaſon*.

The puniſhment of *high-treaſon* in general is very ſolemn and terrible. 1. That the offender be drawn to the gallows, and not be carried or walk; though uſually (by connivance, at length ripened by humanity into law) a ſledge or hurdle is allowed, to preſerve the offender from the extreme torment of being dragged on the ground or pavement. 2. That he be hanged by the neck, and then cut down alive. 3. That his entrails be taken out, and burned, while he is yet alive. 4. That his head be cut off. 5. That his body be divided into four parts. 6. That his head and quarters be at the king's diſpoſal.

The king may, and often doth, diſcharge all the puniſhment, except beheading, eſpecially where any of noble blood are attainted. For beheading being part of the judgment, that may be executed, though all the reſt be omitted by the king's command. But where beheading is no part of the judgment, as in murder or other felonies, it hath been ſaid that the king cannot change the judgment, although at the requeſt of the party, from one ſpecies of death to another. See EXECUTION.

In the caſe of coining, the puniſhment is milder for male offenders; being only to be drawn, and hanged by the neck till dead. But in *treaſons* of every kind, the puniſhment of women is the ſame, and different from that of men: for, as the decency due to the ſex forbids the expoſing and publicly mangling of their bodies, their ſentence is to be drawn to the gallows, and there to be burnt alive.

The conſequences of the judgment pronounced upon a traitor are ATTAINDER, FORFEITURE, and CORRUPTION *of blood.*

It is a maxim, that, *in majori proditione, omnes ſunt principales*, there are no ACCESSORIES in *high-treaſon*, all are accounted principals.

Alſo, that *voluntas non reputabitur pro facto, niſi in cauſa proditionis*, the will is never taken for the deed in any caſe, but in that of *high treaſon*. See INDICTMENT.

TREASON, *petty* or *petit*, according to the ſtatute 25 Edw. III. c. 2. may happen three ways: by a ſervant killing his maſter, a wife her huſband, or an eccleſiaſtical perſon (either ſecular or regular) his ſuperior, to whom he owes faith and obedience. A ſervant, who kills his maſter whom he has left, upon a grudge conceived againſt him during his ſervice, is guilty of *petit treaſon:* ſo if a wife be divorced *a menſa & thoro*, ſtill the *vinculum matrimonii* ſubſiſts; and if ſhe kill ſuch divorced huſband, ſhe is a traitreſs: and if a clergyman is underſtood to owe canonical obedience to the biſhop who ordained him, to him in whoſe dioceſe he is beneficed, and alſo to the metropolitan of ſuch ſuffragan or dioceſan biſhop; and therefore to kill any of theſe is *petit treaſon.*

A perſon indicted of *petit treaſon* may be acquitted thereof, and found guilty of manſlaughter or murder; and in ſuch caſe, it ſhould ſeem that two witneſſes are not neceſſary, as in caſe of *petit treaſon* they are. See INDICTMENT.

The puniſhment of *petit treaſon,* in a man, is to be drawn and hanged; and in a woman, to be drawn and burnt: the idea of which latter puniſhment, ſays judge Blackſtone, ſeems to have been handed down to us by the laws of the ancient Druids, which condemned a woman to be burnt for murdering her huſband; and it is now the uſual puniſhment for all ſorts of *treaſons* committed by thoſe of the female ſex. Perſons guilty of *petit treaſon,* were firſt debarred the benefit of clergy by ſtat. 12 Henry VIII. c. 7. which has been ſince extended to their aiders, abettors, and counſellors, by ſtat. 23 Hen. VIII. c. 1. and 4. and 5 P. and M. c. 4.

This kind gives FORFEITURE of lands by ESCHEAT to the lord of the fee.

TREASON, *Accumulative.* See ACCUMULATION. Blackſt. Com. vol. iv. p. 75, &c. p. 203, &c,

TREASON, *appeal of high.* It was anciently permitted, that any ſubject might appeal another ſubject of *high treaſon,* either in the courts of common law, or in parliament, or (for *treaſons* committed beyond the ſeas) in the court of the high conſtable and marſhal. The cognizance of appeals in the latter ſtill continues in force; and ſo late as 1631, there was a trial by battle awarded in the court of chivalry, on ſuch an appeal of *treaſon*; but that in the firſt was *virtually* aboliſhed by the firſt ſtat. 5 Ed. III. c. 9 and 25 Edw. III. c. 24. and in the ſecond *expreſly* by ſtat. 1 Hen. IV. c. 14. So that the only appeals now in force, for things done within the realm, are appeals of felony and mayhem. Blackſt. Com. vol. iv. p. 314. Burn's ed.

TREASON, *conſtructive*, an offence raiſed, by forced and arbitrary conſtruction, into the crime and puniſhment of *treaſon*, which never was ſuſpected to be ſuch: a multitude of theſe exiſted before the inconvenience was remedied by 25 Edw. III. c. 2. Conſtructive *treaſons* were alſo numerous in the reign of Richard II. and afterwards between the reign of Henry IV. and queen Mary, and particularly in the bloody reign of Henry VIII all which were abrogated by the ſtat. 1 Mary, c. 1. which once more reduced all *treaſons* to the ſtandard of the ſtat. 25 Edw. III.

TREASON, *Miſpriſion of.* See MISPRISION.

TREASURE, *Theſaurus*, ϑησαυρος, a ſtore, or ſtock of money, in reſerve.

TREASURE-*trove*, q. d. *treaſure found*, *theſaurus inventus*, in *Law*, is when money, gold, ſilver, plate, or bullion, is found in the ground, in any place, and none knows to whom it belongs.

This ſhould naturally fall to the finder, to whom it formerly belonged, as was the rule of the civil law: but particular nations have made particular proviſions for it. The Jews give it to the proprietor of the place where it was found: the Roman juriſprudence was various with regard hereto; ſometimes it was given to the maſter of the grounds, ſometimes to the finder, and ſometimes it was adjudged to the public treaſury.

In England, and alſo in Germany, France, Spain, and Denmark, the general uſage is, to have ſuch *treaſure* ſequeſtered to the king, unleſs where the benefit thereof is expreſsly granted or made over by the king to ſome other, as the lord of the manor: and that the prince ſhall be intitled to this hidden *treaſure*, is now become, according to Grotius, *jus commune & gentium.* If, indeed, he that hid it be known, or afterwards ſound out, the owner, and not the king, is intitled to it. Alſo, if it be found in the ſea, or upon the earth, it doth not belong to the king, but the finder, if no owner appears. So that it ſeems it is the hiding, not the abandoning of it, that gives the king a property.

In ſome places in France it is divided into three parts, one for the king, one for the proprietor of the land, and one for the finder.

Briton ſays, it is every ſubject's part, as ſoon as he hath found any *treaſure* in the earth, to make it known to the coroner of the county, &c.

The puniſhment for concealing *treaſure* found in England, was formerly no leſs than death; but now it is only impriſonment and fine; but if any mine of metal be found in any ground, it always appertains to the lord of the ſoil, except it be a mine of gold or ſilver, which anciently always belonged to the king, in whoſe ground ſoever it were found; but, by an act of parliament, the king hath now only the pre-emption.

TREASURER, an officer to whom the treaſure of the prince, or corporation, is committed to be kept, and duly diſpoſed of, in payment of officers, and other expences. See TREASURY.

Of theſe there is a great variety. His majeſty of Great Britain, in quality of elector of Brunſwick, is *arch-treaſurer* of the Roman empire. In the ſtates of Poland are two *grand-treaſurers*, that of the kingdom of Poland, and that of the duchy of Lithuania.

In England, the principal officers under this denomination are, the *lord high-treaſurer*, the *treaſurer of the houſhold*, *treaſurer of the navy*, of *the king's chamber*, &c. Anciently, we had likewiſe a *treaſurer of the exchequer*, *treaſurer of war*, &c. In the Romiſh countries, the title *treaſurer* is alſo given, ſomewhat abuſively, to an eccleſiaſtic, who has the keeping of the relics, and of the charters and archives of a church or monaſtery. This dignity ſucceeds, in ſome meaſure, to that of the ancient deacons, who had the like charge in the primitive church.

TREASURER of *England, Lord high*, is the principal officer of the crown; under whoſe charge and government is all the king's revenue kept in the EXCHEQUER.

He receives the office by delivery of a white ſtaff to him from the king, and holds it during the king's pleaſure: anciently he received it by delivery of the golden keys of the *treaſury.*

He has the cheque of all the officers any way employed in collecting impoſts, cuſtoms, tributes, or other revenues of the crown. He has the gift of all the cuſtomers, comptrollers, and ſearchers places, in all the ports of London; and the nomination of the eſcheators in every county.

He alone (or others in commiſſion with him) lets leaſes of all the crown-lands, gives warrants to certain perſons of quality to have their wine cuſtom-free, &c.

Killing the lord-*treaſurer* in the execution of his office, is *high*-TREASON.

The office of lord treaſurer is now in commiſſion.

The number of lords-commiſſioners is five; one of whom is the firſt lord, whoſe annual ſalary was formerly 383 *l.* but is now 4000 *l.* and who, unleſs he be a peer, is alſo chancellor of the exchequer, and prime miniſter in the government of this country; the other lords commiſſioners have an annual ſalary of 1600 *l.* each.

TREASURER *of England, under.* See UNDER-*treaſurer.*

TREASURER *of the houſhold,* is an officer who, in the abſence of the lord-ſteward, has power with the comptroller, and other officers of the green-cloth, and the ſteward of the Marſhalſea, to hear and determine treaſons, felonies, and other crimes committed within the king's palace. See HOUSHOLD.

There is alſo a *treaſurer* belonging to the eſtabliſhment of her majeſty's houſhold, &c.

TREASURER *of the navy* is an officer who receives money out of the exchequer, by warrant from the lord high-*treaſurer*, or the lords commiſſioners executing that place; and pays all charges of the navy, by warrant from the principal officers of the navy. See NAVY.

TREASURER *of the county,* he that keeps the county ſtock.

There are two of them in each county, choſen by the major part of the juſtices of the peace, &c. at their general quarter-ſeſſion; under previous ſecurity given for the money entruſted with them, and the faithful execution of the truſts repoſed in them.

The juſtices may continue or remove theſe *treaſurers* at pleaſure, and allow each of them a ſalary of 20 *l.* a year.

The county ſtock, of which this officer hath the keeping, is raiſed by rating every pariſh yearly; and is diſpoſed of to charitable uſes, for the relief of maimed ſoldiers and mariners, priſoners in the county-goals, paying the ſalaries of governors of houſes of correction, and relieving poor alms-houſes, &c. And the duty of theſe *treaſurers*, with the manner of raiſing the ſtock, and how it ſhall be diſpoſed of, is ſet forth particularly in the ſtatutes of 43 Eliz. cap. 2. Jac. I. cap. 4. 11 & 12 W. III. cap. 18. 5 Ann. cap. 32. 6 Geo. I. cap. 23. See particularly 11 Geo. II. cap. 20, and 12 Geo. II. cap. 29.

TREASURER, in *Cathedral Churches*, an officer whoſe buſineſs was to take charge of the veſtments, plate, jewels, relics, and other treaſures belonging to the ſaid churches.

At the time of the Reformation, the office was extinguiſhed as needleſs in moſt cathedral churches; but it is ſtill remaining in thoſe of Saliſbury, London, &c.

TREASURY, the place wherein the revenues of a prince are received, preſerved, and diſburſed.

In England the *treaſury* is a part of the exchequer; by ſome called the *lower exchequer*.

The officers of his majeſty's *treaſury*, or the lower exchequer, are the lords commiſſioners, one of whom is chancellor, two joint ſecretaries, private ſecretary to the firſt lord, two chamberlains, an auditor, four tellers, a clerk of the pells, uſhers of the receipt, a tally-cutter, &c. See each officer under his proper article, CHANCELLOR, TELLER, TALLY, &c.

At Rome, under the emperors, there were two kinds of *treaſuries*, the one called *ærarium*, wherein the monies deſtined to ſupport the charges of the government were kept; the other *fiſcus*, wherein were preſerved thoſe intended for the particular ſubſiſtence of the emperor and his court. In effect, the ærarium belonged to the people, and the fiſcus to the prince. See ÆRARIUM and FISCUS.

We have ſtill a reſemblance of this difference among us; but it is confounded in France, &c. where the king diſpoſes abſolutely of the public treaſure, &c.

The Athenian *treaſury* was ſacred to Jupiter Σωτηρ, or the *Saviour*, and to Plutus the god of riches. Beſides the public monies, there were always a thouſand talents kept in it, which it was capital to touch, unleſs on the moſt preſſing occaſions. See OPISTHODOMUS.

The funds among the Athenians which ſupplied their *treaſury* were four, viz. the *tele*, τελη; the *phori*, φοροι; the *eiſphoræ*, εισφοραι; and the *timemata*, τιμηματα.

The public *treaſury* was divided into three parts, according to the uſe it was applied to; as 1. The χρηματα της διοικήσεως, or that expended in civil uſes. 2. The ϛρατιωτικα χρηματα, or money deſigned to defray the charges of war. 3. The θεωρικα, or money intended for pious uſes, in which they included the expences at plays, public ſhews, and feſtivals, &c. Potter, Archæol. Græc. tom. i. p. 82.

To each of theſe branches of the public revenue there was a *treaſurer* appointed, as ταμιας της διοικησεως, των ϛρατιωτικων, and θεωρικων.

TREASURY, *Lords of the.* In lieu of one ſingle director and adminiſtrator of his majeſty's revenues, under the title of lord-high-treaſurer, it is frequently thought proper to put that office in commiſſion, i. e. to appoint ſeveral perſons to diſcharge it, with equal authority, under the title of lords commiſſioners of the *treaſury*. See *Lord-high*-TREASURER.

TREAT, in our *Old Law Books*, ſignifies as much as *taken out*, or *withdrawn*. Thus a juror was challenged, becauſe he could not diſpend 40 *l.* and therefore was *treat* by the ſtatute, or diſcharged.

TREATISE, TRACTATUS, a ſet diſcourſe in writing, on any ſubject.

A *treatiſe* is ſuppoſed more expreſs, formal, and methodical, than an eſſay; but leſs ſo than a ſyſtem.

TREATY, a covenant between ſeveral nations; or the ſeveral articles or conditions ſtipulated and agreed upon between ſovereign powers.

For the ſolemn manner in which the Romans uſed to conclude *treaties*, ſee Liv. lib. i. cap. 24. The ceremonies obſerved by the Greeks in making *treaties* may be ſeen in Potter, Archæol. Græc. lib. ii. cap. 6. tom. i. p. 252, ſeq.

In general, it appears that the ancients were very religious, grave and ſolemn in making *treaties*; which were always confirmed by ſacrifices and mutual oaths, with horrid imprecations on the party that ſhould break the terms of agreement.

There are *treaties* of peace, of marriage, of confederacy, of neutrality, of capitulation, and of commerce and navigation.

The celebrated *treaties* are thoſe of Nimeguen, of Munſter, of the Pyrenees, of Weſtphalia, of Ryſwick, of Utrecht, of Hanover, Vienna, &c.

Treaties of commerce are uſually followed by various tarifs, to adjuſt the duties of exportation and importation of merchandizes into the reſpective dominions of the contracting powers.

The great *treaty* of peace, commerce, navigation, &c. between England and France, was ſigned at Utrecht, the 1ſt of April, 1713, and conſiſts of 39 articles.

It is the king's prerogative to make *treaties*, leagues, and alliances, with foreign princes and ſtates; and yet, leſt this plenitude of authority ſhould be abuſed to the detriment of the public, the conſtitution has interpoſed a check, by the means of parliamentary impeachment, for the puniſhment of ſuch miniſters as from criminal motives adviſe or conclude any treaty, which ſhall afterwards be judged to derogate from the honour and intereſt of the nation.

TREATY, *Guarantee of a.* See GUARANTY.

TREBELLIANICA, or TREBELLIAN *fourth*, in the *Roman Juriſprudence*, a right belonging to an heir inſtituted by teſtament. If the teſtator, after appointing a full and general heir, ſpent and diſpoſed of all his affects in legacies; or if he went *ultra dodrantem*, beyond three fourths thereof; in that caſe, the heir was allowed to retrench and detain one fourth part of the legacies to his own uſe. This was called the *trebellianica*.

In like manner, if the teſtator charges his heir with a feoffment of truſt, and to reſtore the inheritance to another; in that caſe the heir might likewiſe retain a fourth of the whole ſucceſſion, that the quality of heir might not be rendered wholly vain and fruitleſs.

TREBIUS, in *Ichthyology*, a name given by Joannes Cuba and ſome other writers, to the fiſh called PHYCIS by Ariſtotle, Ælian, and Pliny.

TREBLE, in *Muſic*, the higheſt or acuteſt of the four parts in ſymphony, or that which is heard the cleareſt and ſhrilleſt in a concert.

In the like ſenſe we ſay, a *treble* violin, *treble* hautboy, &c.

In vocal muſic, the *treble* is uſually committed to boys and girls. Their part is the *treble*.

The *treble* is divided into firſt or higheſt *treble*, and ſecond or baſs *treble*. The half *treble* is the ſame with the counter-tenor.

TREBUCHET, *Trebucket*, or *Trebuchetum*, a tumbler, ducking, or cucking-ſtool. See CUCKING-STOOL and SCOLDS.

TRECHEDIPNA, τρεχεδειπνα, formed of τρεχω, .. *un*, and δειπνον, *a ſupper*, in *Antiquity*, a kind of livery, or diſtinguiſhing habits worn by paraſites; the wearing of which was a ſufficient paſſport to the tables of their patrons whoſe livery it was.

TRECHON, one of the many names by which the chemical writers have called quickſilver.

TREDECILE. See ASPECT.

TREDDLE, or TREADLE, *chalaza*, in *Natural Hiſtory*, a part of an egg. See CHALAZA.

TREE, *arbor*, the firſt and largeſt of the vegetable kind, conſiſting of a ſingle trunk, out of which ſpring forth branches and leaves. See PLANT.

Trees *in full air*, or *Standards*, are ſuch as naturally riſe a great height, and are not topped. For the choice of trees of this kind, to be tranſplanted out of a nurſery, Quintiney recommends us to ſuch as are ſtraight, ſix feet high at leaſt, and five or ſix inches thick at bottom, and three or four at top: the bark pretty ſmooth and ſhining, as a token of their youth, and of the good ſoil they grew in.

Trees, *dwarf*, are ſuch as are kept low, and never ſuffered to have above half a foot of ſtem. Theſe are uſed to be kept vacant, or hollow in the middle, that the branches, ſpreading round about the ſides, may form a kind of round bowl, or buſh. See Dwarf-*trees*.

Trees, *wall*, are thoſe whoſe branches are ſtretched out, and nailed againſt walls.

For dwarf and wall-*trees*, ſuch are to be choſen out of the nurſery for tranſplantation as are ſtraight, and conſiſt of a ſingle ſtem, and a ſingle graft, rather than two or three grafts in ſeveral branches: their thickneſs at bottom, when removed, ſhould be two or three inches.

Trees, *fruit*, are ſuch as bear *fruit*. See Fruit-*trees*.

Trees, *timber*, are thoſe whoſe trunks are tall and ſtraight, whereof beams, maſts, &c. are uſed to be made.

Trees that are nine inches girt about a yard from the ground, are commonly reckoned timber-*trees*, but none under this ſize. See Timber.

Mr. Ray, and other authors, ſpeak of ſeveral *trees* of prodigious bulk.

The Jeſuit, D'Acoſta, in his hiſtory of the Indies, lib. iv. cap. 3, mentions a hollow *tree* at Tlacocharaya, three leagues from Gauxa, in New Spain, nine fathom withinſide near the ground, and ſixteen withoutſide. He adds, that it is under this *tree* the barbarians aſſembled to perform their religious ceremonies, dance round their idols, &c. Herrera mentions another, which ſixteen men, joining hands, could not fathom. And F. Kircher, in his Latium, p. 50, affirms, he has ſeen a *tree*, near Gonzano, which would lodge a whole family of twenty-five perſons in its cavity. The common people had a tradition, that this was planted by Auguſtus.

There are foreſts of very large cheſnut-*trees*, growing out of the lava of Mount Ætna, in Sicily. One of theſe, called the Caſtagno di Cento Cavalli, is much the moſt celebrated. It meaſures 204 feet round, and though ſaid to be united below in one ſtem, it is a buſh of five large trees growing together. The hollow of one of theſe cheſnut-*trees* is ſaid to contain a hundred ſheep, and it is alſo related, that thirty people have been in it on horſeback. Brydone's Letters, vol. i. p. 109, &c.

In the Indies there are very large foreſts formed from a ſingle *tree*, whoſe branches, bending to the ground, take root, and put forth new *trees*: the Indian fig-*tree* and paretuvier are of this kind.

M. Lonvillers mentions *trees* in Peru, one part of whoſe branches produce fruit one half the year, and the other part the other half. In China there is a *tree* which bears Tallow, whereof that nation make their candles.

There are two or three very remarkable phenomena in the growth of *trees*, which have eſcaped the obſervation of the naturaliſts of all ages, except thoſe of our own: theſe are the Perpendicularity of their trunks or ſtems to the horizon, and the paralleliſm of their tufts to the ſpot of earth they grow on.

For the planting, tranſplanting, ſemination, pruning, felling, grafting, ſhrowding, barking, &c. of *trees*, ſee Planting, &c.

Mr. Ray diſtinguiſhes the *trees* and ſhrubs of our native growth of England, into, I. Such as *have their flower disjoined and remote from the fruit*: which are,

1. *The nuciferous* Trees, or ſuch as bear nuts; as the walnut-*tree*, the hazle-nut-*tree*, the beech, the cheſnut, and the common oak.

2. *Coniferous* Trees, or ſuch as bear a ſquammous or ſcaly fruit, of a conical figure, and a woody or hard ſubſtance, in which are many ſeeds, which, when they are ripe, the cone opens or gapes in all its ſeveral cells or partitions, and lets drop out: of this kind are the Scotch firs, male and female; the pine, which, in our gardens, is called the Scotch fir; the common alder-*tree*, and the birch-*tree*.

Theſe *trees* are alſo called reſiniferous, by reaſon that *coniferous trees* are generally covered with a bark that abounds in reſin.

3. *Bacciferous* **Trees**, are ſuch as bear berries, as the juniper and yew-*tree*.

4 *Lanigerous* Trees, or ſuch as bear a woolly, downy, ſubſtance; as the black, white, and trembling poplar, and willows and oſiers of all kinds.

5. Trees *which bear their ſeeds* (having an imperfect flower) *in leafy membranes and caſes*; as the horn-beam, or hard-beam, called, in ſome places, the horn-beech.

II. Such *as have their fruits and flowers contiguous*; which are either with the flower placed on the top of the fruit, or adhering to the baſe or bottom of the fruit. Of the former kind, ſome are *pomiferous*, as apples and pears; and ſome *bacciferous*, as the ſorb, or ſervice-*tree*, the whitethorn, or hawthorn, the wild roſe, ſweet-briar, currants, the great bilberry-buſh, honey-ſuckle, ivy, &c.

The latter kinds are either ſuch as *have their fruit moiſt and ſoft when ripe*; as 1. *Pruniferous* ones, whoſe fruit is pretty large and ſoft, with a ſtone in the middle; as the black-thorn, or ſloe-*tree*, the black and white bullace-*tree*, the common wild cherry, the black cherry, &c.

2. *Bacciferous* Trees, as the ſtrawberry-*tree*, common in the weſt of Ireland, miſletoe, water-elder, the dwarf or ſpurge-laurel, the viburnum, or wayfaring-*tree*, the dogberry-*tree*, the ſea black-thorn, the berry-bearing elder, the privet, barberry, common elder, the holly, the buckthorn, the berry-bearing heath, the bramble, and the ſpindle-*tree* or prickwood.

Or ſuch as *have their fruit dry when ripe*; as the bladder-nut-*tree*, the box-*tree*, the common elm and aſh, the maple, the gaule, or ſweet willow, common heath-broom, dyers weed, furze or gorſe, and the lime-*tree*.

Heat is ſo eſſential to the growth of *trees*, that we ſee them grow larger and ſmaller in a ſort of gradation as the climates in which they ſtand are more or leſs hot. The hotteſt countries yield, in general, the largeſt and talleſt *trees*, and thoſe alſo in much greater beauty and variety than the colder do; and even thoſe plants which are common to both, arrive at a much greater bulk in the ſouthern than in the northern climates; nay, there are ſome regions ſo bleak and chill, that they raiſe no vegetables at all to any conſiderable height. Greenland, Iceland, and the like places, afford no *trees* at all; and what ſhrubs grow in them are always little and low.

In the warmer climates, where *trees* grow to a moderate ſize, any accidental diminution of the common heat is found very greatly to impede vegetation; and even in England, the cold ſummers we ſometimes have, give us an evident proof of this; for though the corn and low plants have ſucceeded well enough, and gooſeberries, currants, raſberries, or other low ſhrubs, have brought forth fruit in ſufficient plenty, yet the production of taller *trees* have been found very much hurt; and walnuts, apples, and pears, have been very ſcarce among us.

Heat, whatever be the producing cauſe, acts as well upon vegetation one way as another. Thus the heat of dung, and the artificial heat of coal-fires in ſtoves, is found to ſupply the place of the ſun.

Great numbers of the Indian *trees*, in their native ſoil, flower twice in a year, and ſome flower and bear ripe fruit all the year round; and it is obſerved of theſe laſt, that they are at once the moſt frequent and the moſt uſeful to the inhabitants; their fruits, which always hang on them in readineſs, containing cool juices, which are good in fevers, and other of the common diſeaſes of hot countries.

Plantations of uſeful *trees* might be made to very great advantage in many places in every country, and the country greatly enriched by it, while the public would be alſo benefited by it, ſince it would raiſe a continual ſupply of timber uſed in ſhip-building, and on other public as well as private occaſions.

We have in many places heaths, and other barren and uncultivated lands, of very great extent; and how great an advantage would it be to the public to bring theſe to be truly valuable. Many, if not all of theſe heaths, would be found on trial capable of producing *trees*; and ſome of them are truly the remains of deſtroyed foreſts; and though the profit to be reaped from the planting of them would come late, yet the expence of doing it would be very trifling in compariſon of that profit, and the means eaſy.

The authors who have given rules for planting, having employed themſelves only about ſmall ſpots of ground, the eſtabliſhing of orchards or parks, are by no means to be ſuppoſed proper guides in attempts of this kind; and Monſ. de Buffon, who had a great opinion of the knowledge of our Evelyn and Miller, who ſeem to ſpeak of every thing from their own experience, found, when he ſet about large plantations, that their opinions and rules were erroneous; and was obliged to have recourſe to experience only, which he varied a thouſand ways; and though many of them proved unſucceſsful, yet they all gave hints towards others, by which the attempt might afterwards be brought to ſucceed.

This ſagacious enquirer into the operations of nature in the growth of vegetables, having ſet apart a conſiderable quantity of land for the trial, and procured a number of young *trees*, firſt divided the whole quantity into a number of ſmall ſquares, and having made a plan of it, examined the nature, depth, and other circumſtances of the ſoil in each, and minuted the whole down on a proper part of the plan; that himſelf, or whoever ſucceeded him, might judge from the different growths of a number of trees planted in the ſame ſtate in theſe different ſoils, the different advantages and diſadvantages of every circumſtance in the depth and nature of the ground, in regard to the growth of uſeful *trees*. Different numbers of labourers were employed upon different ſpots of this ground, and the acorns for the young growth planted at different ſeaſons: but the reſult in general was, that what ſhould ſeem the beſt methods ſucceeded the worſt; and thoſe pieces where many labourers had been employed, and the acorns planted before winter, were much thinner of young oaks than thoſe where the leaſt labour had been beſtowed upon the ground, and where the acorns had been planted in the ſpring: but thoſe places which ſucceeded beſt from the ſowing, were thoſe which had the acorns planted in holes made by a pick-ax, without any preceding culture of the ground. And thoſe where the acorns had only been laid upon the earth, under the graſs, afforded a great number of vigorous young *trees*, though the greater part had been carried away by birds and other devouring animals. Thoſe ſpots of ground where the acorns were ſet at ſix inches depth were much worſe furniſhed with young ſhoots, than thoſe where they had been buried but at an inch deep; and in ſome places where they were buried at a foot deep not one ſhoot appeared, though in others, where they had been buried at nine inches, there were many.

Thoſe acorns which had been ſteeped for eight or nine days in wine lees, and in the water of the common ſewers, appeared out of the ground much earlier than thoſe which were put in without this previous management.

But the moſt ſucceſsful of all the trials, was that of planting in the ſpring ſuch acorns as had been ſown together in another place, and had time to ſhoot there; of theſe ſcarce any one failed, and the plantation was perfectly flouriſhing, though the growth of theſe young ſhoots was not ſo quick or vigorous as thoſe of the acorns which had remained when firſt ſown; which was probably owing to the injury the tender radicles received in tranſplanting.

Thus ſucceeded the experiments by ſowing, while of thoſe made by planting young *trees*, ſuch as had been brought out of woods and places under covert, ſucceeded much worſe than thoſe which had grown in more expoſed places.

The young *trees* of the ſeveral parts of the plantation kept on their growth in the manner they had begun to ſhoot, thoſe of the more laboured parts continuing more weak, and lower than thoſe of the leſs laboured.

Thus were a number of neceſſary experiments carefully tried, and the reſult of the whole was, that to make a plantation of oaks, on a ſoil of the common clayey or loamy kind, the moſt ſucceſsful method is this: the acorns muſt be preſerved during the winter in the earth in this manner; let there be made a bed of earth of ſix inches deep; on this place a layer of acorns, two inches deep, over theſe lay a bed of another half foot of earth, over that another layer of acorns, and ſo on ſucceſſively, till as many are employed as there will be occaſion for; the whole is then to be covered with a foot depth of earth to preſerve all from the froſt. In the beginning of March theſe beds are to be opened, and the acorns, which will by that time have ſhot out, and are then in reality ſo many young oaks, are to be planted out at a foot diſtance each, and the ſucceſs of a plantation of this kind need not be feared. This is a manner of planting that is done at a ſmall expence, and even that might be in a great meaſure ſpared, were it not for the birds and other devouring animals; ſince, could the acorns be defended from theſe, they might be only laid on the ſurface of the ground under the graſs in autumn, and they would infallibly ſhew themſelves in ſo many young oaks the ſucceeding ſpring.

It is eaſy to continue the carrying of the acorns, when taken out of their winter's bed, to the place where they are to be planted, without doing them much injury; and the ſmall ſtop the tranſplanting puts to their growth is in reality rather an advantage than an injury, ſince it only retards the young ſhoots for about three weeks, or leſs than that; and by that means ſecures them from the few cold mornings that may be expected about the time of their natural appearance. Mem. Acad. Scienc. Paris, 1739. See TIMBER.

Trees in corn-fields are a worſe enemy than any weeds, as they ſuck up the nouriſhment from the corn about them, even to a great diſtance; nor is it peculiar to corn to ſuffer by them. Mr. Tull gives an inſtance of a ſingle *tree* ſtanding in a field of turneps, which ſpoiled no leſs than half an acre of the crop. It has been ſuppoſed, that *trees* injured theſe lower herbs by their ſhadow; and ſome thought that the miſchief they ſaw from them was owing to their droppings; but by this inſtance, it is plain both theſe conjectures are erroneous; the ſouth ſide of the tree, where no ſhadow comes, is found to ſuffer as much as any other; and the droppings reaching only as far as the boughs, and the miſchief ſo much farther, it is plain that the miſchief is owing to neither of theſe cauſes, but to the *tree*'s drawing all the nouriſhment, by extending its roots ſo far, and in ſuch numbers, on every ſide the extent of ground through which the turneps were thus injured, probably ſhewing the extent of the roots of the *tree*, which are found by this to run farther than is uſually ſuppoſed.

On felling of *trees*, letters have ſometimes been found in the midſt of them. We have inſtances of this kind mentioned in the Philoſ. Tranſ. Nº 454, ſect. 16. where the trunk of a beech being ſawed, diſcovered ſeveral letters in the wood, about one inch and a half from the bark, and near the ſame diſtance from the centre of the trunk. It ſeems theſe letters had been formerly cut into the bark, and in proceſs of time theſe might be covered.

In the ſame Tranſactions, we have an account of the horn of a deer found in the heart of an oak. Crucifixes have alſo been found in *trees*, and were to be ſure ſhewn as miraculous to the ignorant. See p. 236 of the ſaid Tranſactions in the Remarks.

For the puniſhment of ſtealing *trees*, ſee LARCENY.

By ſtat. 1 Geo. I. cap. 48. maliciouſly to ſet on fire any underwood, wood, or coppice is made ſingle felony. By the BLACK-ACT, to cut down or deſtroy any *trees* planted in an avenue, or growing in a garden, orchard, or plantation, for ornament, ſhelter, or profit, is felony without benefit of clergy; and the hundred ſhall be chargeable for the damages, unleſs the offender be convicted. By 6 Geo. III. cap. 36. and cap. 48. wilfully to ſpoil or deſtroy any timber or other *trees*, roots, ſhrubs, or plants, is, for the two firſt offences, liable to pecuniary penalties; and for the third, if in the day-time, and even for the firſt, if at night, the offender ſhall be guilty of felony, and liable to tranſportation for ſeven years.

TREES are often found buried in the earth. See MORASS, *Foſſil*-WOOD, and *Bog*-WOOD.

How TREES may be injured by froſt. See FROST.

Fruit-TREES. See FRUIT-*trees*.

Diſtemperature of TREES. See DISEASES *of Plants*.

Hollowneſs of TREES. See HOLLOWNESS.

Juices of TREES. See JUICE and SAP.

Felling of TREES. See FELLING and TIMBER.

TREES in a *Ship*, are of ſeveral ſorts, as *cheſs-trees*, *croſs-trees*, *roof trees*, *waſte-trees*, *treſſel-trees*. See CHESS-*trees*, &c.

Cork-TREE. See CORK and OAK.

Chaſte-TREE. See AGNUS *Caſtus*.

Diana's TREE, in *Chemiſtry*. See ARBOR.

TREE-*frog*. See RANUNCULUS *viridis*.

Germander-TREE. See GERMANDER.

Dormant-TREE. See DORMANT.

TREE *of Life*, *arbor vitæ*, *thuya*, in *Botany*, a genus of the *monoecia adelphia* claſs: its characters are theſe; it has male and female flowers in the ſame plant; the male flowers are produced in an oval katkin, placed oppoſite upon the common foot-ſtalk, each flower embracing it with its baſe; theſe come out of an oval concave ſcale; they have no petals, but have four ſtamina, which are ſcarce diſcernible; their ſummits adhere to the baſe of the ſcale of the empalement; the female flowers are collected in a common almoſt oval cone, two flowers ſtanding oppoſite in each ſcale; they have no petals, but have a ſmall germen ſupporting a ſlender ſtyle, crowned by a ſingle ſtigma; theſe are ſucceeded by an oblong oval cone, opening longitudinally, whoſe ſcales are almoſt equal, convex on the outſide, and obtuſe, each containing an oblong ſeed with a membranaceous wing. Linnæus enumerates four, and Miller two ſpecies, viz. the occidental and oriental. The occidental, which grows naturally in Canada and other northern countries, is uſed, according to profeſſor Kalm, for many medicinal purpoſes. It is much extolled for rheumatic pains; with this intention the freſh leaves are pounded in a mortar, and mixed with hog's greaſe or any other greaſe; this is boiled together, till it becomes a ſalve, which is ſpread on linen, and applied to the part where the pain is. This ſalve gives certain relief in a ſhort time.

Againſt violent pains which move up and down in the thighs, and ſometimes ſpread all over the body, they recommend $\frac{4}{5}$ of the leaves of polypody (*polypodium fronde pinnata*, &c.) and $\frac{1}{5}$ of the cones of the *thuya*, reduced ſeparately to a coarſe powder, and afterwards mixed. With this powder, and milk-warm water, they make a poultice, which they ſpread on linen and wrap round the body; but they commonly lay a cloth between it and the body, otherwiſe it would burn and ſcorch the ſkin.

The decoction of thuya leaves is uſed as a remedy for the cough; and they uſe this at Saratoga for the intermitting fever.

TREE-*louſe*. See APHIS.

TREE *of Mars*, in *Chemiſtry*. See ARBOR *Martis*.

Mealy-TREE, or WHITE *leaf*. See WAYFARING-*tree*.

TREE-*moſs*, a ſpecies of *lichen*. See LIVER-*wort*.

Parallelíſm of rows of TREES. See PARALLELISM.

TREET, *triticum*, in *our Statutes*, is uſed for fine wheat. See ſtat. 51 Hen. III. Hence *treet*-bread. See BREAD.

To TRE-FALLOW, in *Huſbandry*, is to plough land the third time before ſowing.

TREE-*nails*, or TREENELS, in a *Ship*, are long cylindrical wooden pins, employed to connect the planks of a ſhip's ſide and bottom to the correſponding timbers.

The *tree-nails* are juſtly eſteemed ſuperior to ſpike-nails or bolts, which are liable to ruſt and looſen, as well as to rot the timber: but it is neceſſary that the oak of which they are formed ſhould be ſolid, cloſe, and replete with gum, to prevent them from breaking and rotting in the ſhip's frame. They ought alſo to be well dried, ſo as to fill their holes when ſwelled with moiſture. They have uſually one inch in thickneſs to 100 feet in the veſſel's length; ſo that the *tree-nails* of a ſhip that is 100 feet long, are one inch in diameter, and one inch and a half for a ſhip of 150 feet.

TREFOIL, *trifolium*, in *Botany*, a genus of the *diadelphia decandria* claſs: its characters are theſe; the flower has a tubulous permanent empalement of one leaf; it is of the butterfly kind, and is frequently permanent, drying in the empalement; the ſtandard is reflexed, the wings ſhorter than the ſtandard, and the keel ſhorter than the wings; it has ten ſtamina, nine joined, and one ſeparate, terminated by ſingle ſummits, and an almoſt oval germen, ſupporting an awl-ſhaped ſtyle, crowned by a ſingle ſtigma; the germen becomes a ſhort pod, with one valve, containing a few roundiſh ſeeds. Miller enumerates twelve, Linnæus forty ſpecies.

The ſpecies commonly cultivated in the open fields for the food of cattle are the red Dutch clover, the white Dutch clover, and the hop-clover.

The *common red clover* is well known, though it has been ſometimes confounded with the red meadow *trefoil*, which is a diſtinct ſpecies. The ſeeds of the common clover have, in conſequence of the extenſive cultivation of it for many years, been ſpread over moſt of the Engliſh paſtures, ſo that there are few of them which have not clover mixed with the other graſſes; and hence ſome botaniſts have been led to ſuppoſe, that the meadow *trefoil* has been improved to this by dreſſing of the land.

Since the red clover has been cultivated in England, our clay-lands, which before produced little but rye-graſs and other coarſe bents, have been greatly improved; for by being ſown with red clover, they have produced more than ſix times the quantity of fodder they uſed to do, whereby farmers have been enabled to feed a much greater ſtock of cattle, and the ground has been enriched and prepared for corn. Where the land is kept in tillage, it is the uſual method among farmers, to lay down their ground with clover, after having had two crops of corn, whereby there is a conſtant rotation of wheat, barley, clover, or turneps, on the ſame land. The clover-ſeed is commonly ſown with barley in the ſpring, and when the barley is taken off, the clover ſpreads and covers the ground, and this remains two years, after which the land is ploughed again for corn. If the land be very dry, ſome recommend ſowing it with black oats as early in the ſpring as poſſible, that it may get up while the ſpring rains laſt, and acquire ſtrength before the dry weather ſets in. Some ſow it with wheat or rye at Michaelmas; this gives it an opportunity of ſhedding its ſeed on the ground, and thus the crop of the next year is rendered much ſtronger than it would have been made by any other means; but in this caſe it is beſt to ſow it upon dry lands, which will bear the ſowing both of wheat and rye upon broad ridges, which is uſually very ſucceſsful, if a mild winter follows; but if there are long and ſevere froſts, or deep ſnows, it is very hazardous.

Some farmers ſow rye-graſs with the corn at Michaelmas, and, early in the ſpring, they ſow clover, which they only cover by rolling it. The beſt management ſeems to be the feeding of it bare before winter comes on, and then it is ſafe; for the froſts, though they often deſtroy the leaves of the clover, yet never hurt its roots, unleſs they happen to lie bare.

Clover is a biennial plant, whoſe roots decay after they have produced ſeeds; but by eating it down, or mowing it when it begins to flower, the roots are made to ſend out new ſhoots, and the plant is continued longer than it would naturally. The common allowance of ſeeds for an acre of ground is ten pounds. In the choice of the ſeed, that which is of a bright yellow colour inclining to brown, ſhould be preferred, and the pale-coloured thin ſeed rejected. The goodneſs of the ſeed may be eaſily determined by throwing it into a glaſs of water; that which ſinks is good, but that which ſwims is bad, and will never vegetate. Clover delights moſt in a rich warm ſoil, and always thrives beſt in thoſe lands which have been well dunged or manured; but the clay-lands, which are long in ſwarding, or acquiring a coat of graſs, and are little ſubject to weeds, are the beſt land for clover; becauſe in thoſe light lands, where the common graſs grows ſpeedily, it ſoon eats out the clover. Beſides, the ſoil in theſe light lands is eaſily waſhed away from the roots of the clover after ſhowers of rain, and then the roots, thus left bare, are killed by the firſt froſt that happens. In good ground clover will bear crops for three or four years, but not longer even in the moſt proper ſoil, and with all the neceſſary cautions.

The clover-ſeed, when ſown with barley, ſhould be ſown after the barley is harrowed in, otherwiſe it will be buried too deep; and the ground ſhould be afterwards rolled, in order to preſs the ſeeds into the ground; but this ſhould be done in dry weather, leſt the ſeeds ſhould burſt, or adhere to the roller.

Such is the method generally practiſed in the ſowing of this ſeed with corn; but Mr. Miller and others recommend ſowing it alone; for the corn prevents the growth of the plants until it is reaped and removed, ſo that one whole ſeaſon is loſt, and a great crop of corn ſpoils the clover; whereas, when it is ſown without any other ſeed, the plants will come up more uniformly and much quicker than that which was ſown the ſpring before under corn. Mr. Miller, therefore, adviſes to ſow the ſeeds in Auguſt, when there is a proſpect of rain, which will cauſe the plants to ſpring, and thus they will get ſtrength before winter. In October, when the ground is dry, the clover ſhould be well rolled, which will preſs the ſoil cloſe to the roots, and cauſe the plants to ſend out more ſhoots; the ſame operation ſhould be repeated in March. Mr. Miller prefers this ſeaſon for ſowing the ſeeds rather than the ſpring, becauſe in the ſpring the ground is cold and wet, and if much rain fall after the ſeeds are ſown, they will rot, and when they are ſown late, they often will not grow.

About the middle of May the clover will be fit for mowing, when great care ſhould be obſerved in making it, as it will require more labour and time to dry than common graſs, and will ſhrink into leſs compaſs; but if it be not too rank, it will be found exceeding rich food for cattle. The time for cutting it is when it begins to flower; for if it ſtands much longer, the lower part of the ſtems, and the under leaves, will begin to dry, and yield a leſs quantity of hay, and that not ſo well flavoured. Some perſons cut three crops in one year of this graſs; but the beſt way is to cut but one in the ſpring, and feed it the remaining part of the year, whereby the land will be enriched, and the plants grow much ſtronger.

One acre of clover will feed as many cattle as four or five acres of common graſs; but care ſhould be taken to let them feed upon it gradually at firſt, leſt it burſt them. For this purpoſe they ſhould be allowed to eat it only for half an hour or an hour in the middle of the day, when there is no dew upon the graſs; and ſo every day they may remain a longer time, till they are fully ſeaſoned to it. But they ſhould never be fed on clover in wet weather; when they have been accuſtomed to it, they ſhould be turned out at night, and be ſupplied with hay or ſtraw, which will prevent the pernicious conſequences of the clover. Some ſow rye-graſs among the clover, in order to check the richneſs of the crop; but this is not adviſeable, as the rye-glaſs will obſtruct the growth of the clover, and the ſeeds ſcatter and fill the ground with bents. See HOVEN.

When cattle are fed with the hay of clover, the beſt way is to put it in racks, otherwiſe they will tread a great quantity of it down with their feet. Clover is much better for moſt other cattle than for milch-cows, which ſhould rarely have any of it; though when it is dry, it is much leſs injurious to all cattle than when it is green.

When clover is preſerved for ſeed, the firſt crop in the ſpring ſhould ſtand till the ſeeds are ripe, which may be known by the ſtalks and heads changing to a brown colour; then it ſhould be cut in dry weather, and houſed till winter, when it may be threſhed; or if the ſeeds are wanted for immediate ſowing, it may be threſhed out before it be houſed or ſtacked. In either caſe it ſhould be well dried, or otherwiſe the ſeeds will not quit their huſks. By proper precaution two buſhels of ſeed may be procured out of an acre of good land where the clover has throve.

The *white Dutch clover* grows naturally in moſt of the paſtures in England, and is generally known by the name of white honeyſuckle graſs. It is an abiding plant, and ſends out roots from every joint, ſo that it makes the cloſeſt ſward of any of the ſown graſſes, and it is the ſweeteſt feed for all ſorts of cattle yet known. In land deſigned for continued paſture, a quantity of ſeeds of this plant ſhould be ſown with the graſs-ſeeds. See PASTURE.

It ſhould never be ſown with corn; but if it be ſown in the ſpring without corn, it will afford a crop of hay fit for being mowed by the middle or latter end of July, and a much better after-feed for cattle the following autumn and winter, than the graſs which is ſown with corn will produce the ſecond year. The ſeed may alſo be ſown with graſs-ſeeds in autumn, as before directed for the common red clover; and this autumnal ſowing will afford a good early crop of hay the following ſpring; and if, after the hay is taken off, the ground is well rolled, it will cauſe the clover to form a thick ſward.

The ſeeds of this ſort of clover are annually imported from Flanders, by the way of Holland, whence it is called Dutch clover.

In this country the ſeeds have not been long collected for ſowing; but this ought to be done by the farmer, who ſhould ſow an acre or two of this white clover by itſelf for ſeeds.

The *hop-clover*, or yellow meadow *trefoil*, grows naturally among the graſs in moſt of the upland paſtures in this country; but the ſeeds are frequently ſold in the ſhops, and are mixed with the other ſorts of clover and graſs-ſeeds, for laying down ground to paſture. There are two ſorts which grow naturally in England, one called the *hop-clover*, becauſe the flowers are collected into oval imbricated heads, with naked empalements, lying over each other like ſcales, in a manner reſembling the flowers of hops; the other ſort is the *leaſt yellow hop-trefoil*, called none-ſuch, or black-ſeed, and as the plants of this ſort are not abiding, they are not proper to be ſown where the ground is deſigned to continue in paſture; but in ſuch places where one or two crops only are taken, and the land is ploughed again for corn, it may do well enough when mixed with other ſeeds, though the cattle are not very fond of it when green, unleſs it be very young. The large ſort is the moſt profitable, though it is often mixed with the ſmaller kind, and alſo with the ſmaller melilot, which is commonly called none-ſuch, and ſometimes black-ſeeds. But theſe ſeeds deſtroy the beauty of the verdure as they form unſightly yellow patches.

The *hop-clover* is greatly recommended by the following circumſtances. 1. It not only grows, but flouriſhes in the moſt barren lands, and therefore muſt be a very proper graſs to cultivate on ſuch unfertile ſoils where any other graſs that is worth notice will not grow at all. 2. It is not apt to ſwell cattle as the red clover does. 3. In good ground it will continue long, and bear a very good feed or crop, as Mr. Tull, though prejudiced againſt clovers, allows; and by its flouriſhing both on ſands and clay, which have not been ploughed for many years, it ſeems likely to continue long in any ſoil. They commonly allow twelve pounds of ſeed to an acre.

The fifth ſort, or *greater hairy meadow trefoil*, with a whitiſh ſulphur, or copper-coloured flower, grows naturally in chalky lands in many parts of England, and in ſome counties the ſeed is ſown after the ſame manner as the common red clover, eſpecially on chalky ground, where it will thrive, and produce a better crop than clover. It flowers and ripens its ſeeds about the ſame time as the common clover. This is known by the name of *trefoil* in the places where it is cultivated, but the ſeedſmen ſell the hop-clover by that name. This ſort of *trefoil* is much cultivated in that part of Eſſex which borders on Cambridgeſhire.

The ſixth ſort, or *trefoil* with an oblong red ſpike, grows naturally in Spain and Italy; but being an annual plant it is not proper for ſowing with graſs, though it makes good fodder.

The ſeventh ſort, or *trefoil* of the mountains, with very long red ſpikes of flowers, is an annual plant, which grows naturally in the ſouth of France and Italy.

The eighth ſort, or ſpiked mountain *trefoil*, with the narroweſt leaves, grows naturally in Spain and Italy.

The ninth ſort, or common hare's-foot *trefoil*, grows naturally upon dry gravelly land in moſt parts of England, and is a ſure indication of the ſterility of the ſoil.

The tenth ſort, or ſtrawberry *trefoil*, grows naturally on arable land in many parts of England. Theſe ſorts are frequently preſerved in gardens for the ſake of variety, and are eaſily propagated by ſeeds, which may be ſown on an open bed of ground, either in autumn or ſpring.

The eleventh ſort is the common MELILOT: and the twelfth, or ſweet *trefoil*, grows naturally in Bohemia and Auſtria, and has been long cultivated in England as a medicinal plant, though now rarely uſed. The whole plant has a ſtrong ſcent like fenugreek; and if the ſeeds of theſe two laſt ſorts are permitted to ſcatter, the plants will riſe without care. Miller's Gard. Dict. Mortimer's Huſb. p. 32, &c.

Bean TREFOIL, a ſpecies of *cytiſus*. See *Baſe* TREFOIL.

Stinking bean TREFOIL. See ANAGYRIS.

TREFOIL, *bird's-foot*, *lotus*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the empalement of the flower is of one leaf, permanent, and cut at the top into five parts; the flower is of the butterfly kind; the ſtandard roundiſh, and reflexed backward; the wings are broad, roundiſh, and ſhorter than the ſtandard, cloſing together at the top; the keel is cloſed on the upper ſide, and convex on the under; it has ten ſtamina, nine joined, and one ſeparate, terminated by ſmall ſummits, with an oblong taper germen, ſupporting a ſingle ſtyle, crowned by an inflexed ſtigma; the germen becomes a cloſe cylindrical pod, with one cell opening with two valves, having many tranſverſe partitions, in each of which is lodged one roundiſh ſeed. Linnæus enumerates nineteen, and Miller ſeventeen ſpecies.

The fruit of the *lotus* was, by the ancients, imagined to be endowed with the virtue of making ſtrangers forget their native country.

TREFOIL, *marſh*. See *Bog*-BEAN.

TREFOIL, *moon*. See *Snail*-TREFOIL.

TREFOIL, *ſhrub*, *ptelea*, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are theſe: the empalement of the flower is ſmall, and cut into four acute parts: the flower has four oval ſpear-ſhaped petals, which ſpread open flat; it hath four awl-ſhaped ſtamina, terminated by roundiſh ſummits, and an orbicular compreſſed germen, ſupporting a ſhort ſtyle, crowned by two obtuſe ſtigmas; the germen afterward becomes a roundiſh membranaceous capſule with two cells, each containing one obtuſe ſeed. There are two ſpecies.

The ſecond ſpecies of this genus, or the *ptelea* with ſingle leaves, was formerly ſhewn for the tea-tree in many of the European gardens, where it many years paſſed for it among thoſe who knew no better.

TREFOIL, *ſnail*, *medicago*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the flower hath a cylindrical erect empalement of one leaf, cut at the brim into five equal acute ſegments; the flower is of the butterfly kind, having an oval erect ſtandard, whoſe borders are reflexed; the wings are oblong, oval, reflexed, and fixed to the keel by an appendix; the keel is oblong, bifid, obtuſe, and reflexed; it has ten ſtamina, nine of which are joined, the other ſingle, terminated by ſmall ſummits, and an oblong germen, which ſits on a ſhort ſtyle, and is involved with the ſtamina, by the keel, crowned by a very ſmall ſtigma; it afterward turns to a long compreſſed pod, twiſting into the form of a ſnail, incloſing many kidney-ſhaped ſeeds. There are many ſpecies which grow naturally in the warm parts of Europe. Miller. See LUCERNE.

TREFOIL *of Candia*, *thorny*. See FAGONIA.

TREFOIL, *baſe tree*, *cytiſus*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: it has a butterfly flower, with a ſhort bell-ſhaped empalement of one leaf, divided in two lips, the upper being bifid and acute, the other indented in three parts; the ſtandard of the flower is riſing, oval, and reflexed on the ſides; the wings are obtuſe, erect, and the length of the ſtandard; the keel is bellied and acute; it has ten ſtamina, nine joined, and one ſtanding ſeparate, terminated by riſing ſummits; and an oblong germen ſupporting a ſingle ſtyle, crowned by an obtuſe ſtigma; the germen becomes an oblong blunt pod, narrow at the baſe, filled with kidney-ſhaped flat ſeeds. Linnæus enumerates eleven, and Miller ſixteen ſpecies.

The common broad leaved laburnum, is a ſpecies of this genus; it grows to be a large tree, the wood of it is very hard, of a fine colour, and poliſhes very well; it approaches nearly to green ebony. They grow very faſt, are very hardy, and therefore may be well worth planting on poor ſhallow ſoils, and expoſed ſituations. If their ſeeds are permitted to ſcatter in winter, the plants will riſe in great plenty the following ſpring; ſo that a few trees will ſoon ſupply a ſufficient quantity. Miller.

It has been much diſputed among botaniſts, to what genus the *cytiſus* of Virgil, Columella, and the old writers in huſbandry, ought to be referred; they mention it as an extraordinary plant, and worthy of cultivation for fodder. Although it is hard to determine, which, among the ſeveral ſpecies of *cytiſus*, is the legitimate *cytiſus* of the ancients, yet the moſt ſkilful, ſays Miller, take it to be that which Maranthus has deſcribed, which is our *medica*, ranged under the genus of *cytiſus* by moſt writers before Tournefort, who eſtabliſhed the genus of *medicago*, on account of the ſeed-veſſel being like that of medica, or ſnail-*trefoil*. Miller's Gard. Dict. art. *Medica*.

The ancient botaniſts ſeem to have been acquainted with two very different ſhrubs, under the name *cytiſus*; and there have been no ſmall errors about the true meaning of ſeveral paſſages in Dioſcorides and Theophraſtus, on occaſion of the miſtaking one of theſe things for another Dioſcorides deſcribes the *cytiſus*, as being a ſhrub with leaves white and hoary, both on the upper and under ſide, and of no uſe, or value, to mankind: as to its wood, Pliny tranſlates this account, and adds to it from Hyginus, that it was a very hardy, and ſtrong ſhrub, not being affected by heat, or cold, ſnow, or hail, or any other injuries of the weather, nor of its enemies, as Pliny expreſſes it, (*hoſtium*). It is not very eaſy to conceive what enemies theſe ſhould be; but the moſt probable conjecture, as to this odd paſſage is, that Pliny had tranſcribed it in his uſual careleſs way, and that what is called *hoſtium* ſhould be the word *noſtrum*.

The ſenſe then is clear enough; the author had juſt before ſaid that the wood was good for no uſe to mankind; and therefore, when he was ſpeaking of the trees ſtanding a long time, and fearing the injuries of no weather, he might very well add, nor of us; for the wood being good for nothing, men would not be at the trouble of cutting it up. It is plain, however, that Theophraſtus means quite a different ſhrub by this name *cytiſus*; for, as Dioſcorides ſays that the wood of his was white throughout, and very light, Theophraſtus obſerves, that it was black at the heart, and as heavy and ſolid as ebony; and, in many places, where he ſpeaks of the hard and elegant woods uſed for inlaying, he mentions the *cytiſus* wood, coupling it with the ebony, heart of oak, and other the hardeſt, and moſt elegant woods known in his time.

Pliny mentions no other *cytiſus* than that of Dioſcorides, which was the common kind cultivated by the Greeks and Romans, as a food for cattle: he ſays, it was raiſed by ſeed, and came to its perfection in three years, and that it was gathered in the ſpring juſt after the time of its flowering; he adds, that this was uſually the office of children, or old women, unfit for other work, and was the cheapeſt of all the offices of huſbandry. It is eaſy to conceive, that ſuch a ſhrub as the *cytiſus* of Theophraſtus, with a wood as firm as the heart of oak, and hard as ebony, did not come to perfection in three years from the ſowing; nor could any more be cut up by boys and old women, than eaten by cattle when taken up. There were, therefore, two kinds of *cytiſus* among the ancients, the one ſown and cultivated as food for cattle, the other a wild tree, or ſhrub, growing in woods, and being larger than the ſown kind. Dioſcorides and Pliny deſcribe the firſt, and Theophraſtus alone the latter, except that Pliny has now and then taken a ſentence from Theophraſtus, when he mentions the *cytiſus* occaſionally among other hard woods, and placed it to the account of his manured *cytiſus*.

Ovid, indeed, where he mentions the cytiſus as a wild wood ſhrub, certainly means this kind mentioned by Theophraſtus:

Nec tenuis cytiſus curtave tinus abeſt.

And Columella acknowledges both kinds. It may ſeem a natural objection that culture could never make ſuch a difference in this plant, as that it ſhould be hard and black in the wood, in its wild ſtate, and ſoft and white in the cultivated kind. But we are not to ſuppoſe that the cultivated and wild cytiſus were the ſame ſpecies of ſhrub, only altered by theſe two ſtates. The ancients were not ſo accurate in their names as later botanical writers have been; and if a wood-ſhrub, in ſome reſpects, reſembled their manured cytiſus, they would call it by that name, though it had not all the generical characters to make it the ſame. Columella, de R. R. lib. ix. cap. 4.

TRELLIS, an aſſemblage of wooden bars, croſſing one another, either in a ſtraight line, or ſlopewiſe, deſigned to ſupport wall-trees.

There is another kind of *trellis*, made of iron-wire.

TRELOOBING, in *Mining*, denotes a ſtirring and working the loobs or ſlimy earth of tin, &c. in a ſlime pit, that the mud may be partly waſhed off with the water, and the ore ſettle at bottom.

TREMBLANT *of an organ*. See ORGAN.

TREMELLA, in *Botany*, the name of a genus of the *cryptogamia algæ* claſs, the characters of which are theſe: they are a kind of plants ſeemingly of a ſort of a middle nature between the *alga* and *conferva*, which produce flowers ſcarce perceptible, in a jelly-like ſubſtance, but are throughout of one uniform and tender texture, pellucid and membranaceous, and jelly-like or leafy. Linnæus enumerates nine, but Dillenius recounts ſeventeen ſpecies of this plant, among which he reckons the LAVER. See ULVA. See *Tab*. XIII. *of Botany*, N° 3.

The ſtar-fall, tar-ſlough, or *tremella noſtoc* of Linnæus, is found in paſtures after rainy ſeaſons, in gravelly ſoils, on the top of hills, and on gravel walks, in ſpring and autumn. Micheli deſcribes the ſeeds as lying in the form of little ſtrings of beads coiled up within the folds of the plant, and diſcoverable only by the microſcope. This is ſuppoſed by the country people to be the remains of a meteor or falling ſtar. There are other ſpecies found in the bark of trees, on walls and hedges in the ſhade, in woods, on moſs, on heaths, on ſtones, in brooks and rivers, on ſea-river weeds, on the decayed bark and branches of trees and rotten wood, on ſavine, and in wine-vaults. See Withering's Bot. Arrangement, vol. ii. p. 731, &c.

TREMOLANTE, in the *Glaſs Trade*, a name for the preparation of calcined braſs, otherwiſe called *orpello*, uſed either for a ſky-blue, or a ſea-green.

TREMOR, TREMBLING, in *Medicine*, a diſeaſe near akin to a convulſion, wherein there is ſomething of a convulſive motion or ſhaking, accompanying a voluntary or natural motion.

A *tremor* is frequently found to ariſe upon the more violent paſſions, particularly anger, gluttony, venery, &c. but this is accidental and tranſitory.

A *tremor* is ſometimes apt to degenerate into other worſe diſeaſes, viz. palſy, apoplexy, lethargy, ſpaſmus, &c.

Medical writers diſtinguiſh this *tremor* into the active and paſſive; the active is that which happens in violent paſſions of terror, anger, joy, &c. or in intermittent fevers, and is to be referred to the ſemi-convulſive motions; the paſſive are owing to a privative cauſe, and are allied to the ſemi paralytic affections.

The paſſive *tremors* of the limbs, when conſidered as a diſeaſe, are to be diſtinguiſhed from thoſe which are cauſed by external accidents, ſuch as the being plunged into cold water, the drinking tea, coffee, or other warm liquors, in many conſtitutions, and other ſuch accidental cauſes. The perſons ſubject to *tremors* of the limbs are principally old people, in whom the vital principle is weak and languid.

Cauſes. The internal cauſes, are a flaccidity of the nerves and remiſſion of the tone of the parts; the external and accidental ones are the omiſſion of accuſtomed evacuations, a diaphoretic regimen, and an abuſe of ſpirituous liquors.

Prognoſtics and method of cure. This is uſually in old people a very obſtinate complaint, and the more it is confirmed by being grown habitual, the more difficult is the cure; but if a caſe of this kind be taken in hand, as ſoon as it ſeizes the patient, and be treated in a rational manner, it is often perfectly cured. In order to this, the firſt ſtep muſt be the perfectly cleanſing of the *primæ viæ*, by repeated doſes of rhubarb, or of an extract of black hellebore; if any habitual evacuation have been omitted, as bleeding or the like, this muſt be reſtored in the accuſtomed manner; and if any natural flux of blood by the hæmorrhoids or otherwiſe have ſtopped, this alſo muſt be recalled by proper medicines, or by the application of leeches: after this the due tone of the parts is to be reſtored by nervine medicines, as by wine impregnated with ſerpyllum, lavender, ſaſſafras, guaiacum, and the like ingredients; and externally by rubbing the parts with ſpirit of caſtor and ſerpyllum, and bathing them in decoctions of tanzy, ſavin, feverfew, and the like herbs. One great rule in the cure of this diſeaſe is, that the patient is to abſtain from all hot things, otherwiſe an atrophy is eaſily brought on, and proves a much worſe thing than the original diſorder. Junker's Conſp. Med. p. 681.

The medicine commonly made uſe of in *tremors*, and other nervous diſtempers, by the name of *palſy drops*, is no other than the compound ſpirit of LAVENDER. The moſt ſucceſsful way of uſing it is, by taking thirty or forty drops twice or thrice a day, dropt on loaf ſugar or a little bread. It is ſuppoſed, that, by this way, the moſt ſpirituous and efficacious parts make their way directly by the nerves of the palate, &c. without undergoing the courſe of the circulation, as it muſt do when taken in a liquid vehicle.

TREMOR *of the heart*. See PALPITATION.

TRENCH, a ditch cut or dug in the ground, to drain off the waters in a meadow, a moraſs, or the like; or to divert the courſe of a river.

Many of the bogs in Ireland have been drained, and made good ground, by only digging *trenches* around them.

TRENCHES, in *Fortification*, are ditches which the beſiegers cut, to approach more ſecurely to the place attacked; whence they are alſo called *lines of* APPROACH. See *Tab. Fortif. fig.* 21. *n.* 11. &c. and PARALLELS.

They ſay, *mount the trenches*, that is, go upon duty in them. To *relieve the trenches*, is to relieve ſuch as have been upon duty there.

The enemy is ſaid to have *cleared the trenches*, when they have driven away, or killed, the ſoldiers who guarded them.

TRENCH, *tail of the*, is the place where it was begun: and the *head*, that to which it was carried.

Trenches are of ſeveral ſorts, according to the nature of the ſoil: if the adjacent territory be rocky, the *trench* is only an elevation of bavins, gabions, woolpacks, or epaulements of earth, caſt round about the place—but where the ground may be eaſily opened, the *trench* is dug therein, and bordered with a parapet on the ſide of the beſieged.

The breadth of the *trenches* is from eight to ten feet, and the depth from ſix to ſeven: they are cut in talus, or aſlope.

The *trenches* are to be carried on with winding-lines, in ſome manner parallel to the works of the fortreſs, ſo as not to be in view of the enemy, nor to expoſe their length to the enemy's ſhot: for then they will be in danger of being enfiladed, or ſcoured by the enemy's cannon: this carrying of the *trenches* obliquely, they call carrying them by *coudees*, or returns. See PARALLELS.

TRENCHES, *opening of the*, is when the beſiegers begin to work upon the line of approaches; which is uſually done in the night; ſometimes within muſquet ſhot, and ſometimes within half, or only whole cannon-ſhot of the place, if there be no riſing ground about it, the garriſon ſtrong, and their cannon well ſerved.

The workmen, that open the *trenches*, are always ſupported by bodies of men againſt the ſallies of the beſieged; and ſometimes thoſe bodies lie between them and the place, as alſo on their right and left.

The pioneers ſometimes work on their knees: and the men, that are to ſupport them, lie flat on their faces, in order to avoid the enemy's ſhot; and the pioneers are likewiſe uſually covered with mantelets, or ſauciſſons.

TRENCH-*guard*. See GUARD.

To TRENCH *the ballaſt*, is a ſea-phraſe, ſignifying to divide the ballaſt into ſeveral *trenches* in a ſhip's hold.

TRENCHE', in *Heraldry*. See TRANCHE'.

TRENCHING-*plough*, in *Agriculture*, is an inſtrument for cutting out the ſides of *trenches* and drains, or the ſides of turf, &c. See PLOUGH.

TRENCHMORE, the name of an old Engliſh dance; of which nothing certain is now known, but that it was a lively movement.

TRENT, *council of*, in *Eccleſiaſtical Hiſtory*, denotes the council aſſembled by Paul III. in 1545, and continued by 25 ſeſſions till the year 1563, under Julius III. and Pius IV. in order to correct, illuſtrate, and fix with perſpicuity, the doctrine of the church, to reſtore the vigour of its diſcipline, and to reform the lives of its miniſters.

But it has been a matter of complaint by many, both in and out of the communion of the church of Rome, that this aſſembly, inſtead of reforming ancient abuſes, rather gave riſe to new enormities. It is alledged, that opinions of the ſcholaſtic doctors on intricate points, which had been left undecided, were by this council abſurdly adopted as articles of faith, and impoſed with violence upon the conſciences of the people, under pain of excommunication; that there is an ambiguity in the decrees and declarations of this council, which renders the diſputes and diſſenſions, that had rent the church, more intricate and perplexed, and which really multiplies and propagates, inſtead of leſſening and ſuppreſſing them: that matters were decided in this aſſembly, according to the deſpotic will of the Roman pontiff, without regard to the dictates of truth, or the authority of ſcripture: and that the few wiſe and pious regulations, that were made in this council, were never ſupported by the authority of the church, but ſuffered to degenerate into a mere lifeleſs form or ſhadow of law, which was treated with indifference, and tranſgreſſed with impunity. It will not, therefore, appear ſurpriſing, that there are certain doctors in the Romiſh church, who, inſtead of ſubmitting to the deciſions of the council of *Trent*, as an ultimate rule of faith, maintain that theſe deciſions are to be explained by the dictates of ſcripture and the language of tradition: nor can we wonder that this council has not every where the ſame degree of credit and authority, even in thoſe countries that profeſs the Roman catholic religion. Some countries, indeed, ſuch as Germany, Poland, and Italy, have adopted implicitly and abſolutely the decrees of this council, without the leaſt reſtriction. But in other places it has been received and acknowledged on certain conditions, which modify, not a little, its pretended authority. Among theſe latter we may reckon the Spaniſh dominions, which, during many years, diſputed the authority of this council, and at length acknowledged it only ſo far as it could be adopted without any prejudice to the rights and prerogatives of the king of Spain. In other countries, ſuch as France and Hungary, it has never been ſolemnly received or publicly acknowledged. Indeed in the former of theſe kingdoms, thoſe decrees of *Trent*, that relate to points of religious doctrine, tacitly and imperceptibly through the power of cuſtom, acquired the force and authority of a rule of faith; but thoſe, which regard external diſcipline, ſpiritual power, and eccleſiaſtical government, have been conſtantly rejected, both in a public and private manner, as inconſiſtent with the authority and prerogatives of the throne, and prejudicial to the rights and liberties of the Gallican church.

Notwithſtanding the preceding remarks, the decrees of the council of *Trent*, together with the creed of pope Pius IV. contain a ſummary of the principal heads of the Roman catholic religion. See POPERY.

However in theſe decrees and confeſſion of faith, many things are expreſſed in a vague and ambiguous manner, with a view to the inteſtine diviſions then prevalent in the church: and ſeveral tenets are omitted in both, which no Roman catholic is allowed to deny, or even to queſtion. But it muſt be acknowledged, that in theſe decrees, and in this confeſſion, ſeveral doctrines and rules of worſhip particularly pertaining to the doctrine of purgatory, the invocation of ſaints, and the worſhip of images and relics, are inculcated in a much more rational and decent manner, than that in which they appear in the daily ſervice of the church, and in the public practice of its members: and it is to be obſerved, that in deducing a juſt notion of the doctrine of Rome from the decrees of the *council of Trent*, regard ought to be had, not ſo much to the terms made uſe of in theſe decrees as to the real ſignification of theſe terms, which muſt be drawn from the cuſtoms, inſtitutions, and obſervances, that are, every where, in uſe in the Romiſh church.—Moſh. Eccl. Hiſt. vol. iii. p. 451. Eng. ed. 8vo.

TRENT, *council of, congregation for interpreting the decrees of the*, is a CONGREGATION, the plan of which was formed by Pius IV. and afterwards inſtituted and confirmed by Sixtus V. It was authorized to examine and decide, in the name of the pope, all matters of ſmall moment relating to eccleſiaſtical diſcipline; while every debate of any conſequence, and particularly all diſquiſitions concerning points of faith and doctrine, were left to the deciſion of the pontiff alone, as the great oracle of the church. Hence it was, that the approbation of Innocent XI. was refuſed to the artful and inſidious work of Boſſuet, biſhop of Meaux, entitled, an Expoſition of the Doctrine of the Catholic Church, until the author had ſuppreſſed entirely the firſt edition of that work; and made corrections and alterations in the ſecond. See POPERY.

But though the court of Rome, and all thoſe who favour the deſpotic pretenſions of its pontiff, maintain, that he alone, who governs the church as Chriſt's vicegerent, is entitled to explain and determine the ſenſe of ſcripture and tradition, in matters pertaining to ſalvation, and that a devout and unlimited obedience is due to his deciſions; yet it has been impoſſible to perſuade the wiſer part of the Roman catholic body to acknowledge this excluſive authority in their head. And accordingly, the greater part of the Gallican church, and a conſiderable number of learned men of the popiſh religion in other countries, think very differently from the court of Rome on this ſubject. They maintain, that all biſhops and doctors have a right to conſult the ſacred fountains of ſcripture and tradition, and to draw from thence the rules of faith and manners for themſelves and their flock; and that all difficult points and debates of conſequence are to be referred to the cognizance and deciſion of general councils. Moſh. Eccl. Hiſt. vol. iii. p. 450. See INFALLIBLE.

TRENTAL, TRIGINTAL, or TRICENNAL, a Romiſh office for the dead, conſiſting of thirty maſſes, rehearſed for thirty days ſucceſſively after the party's death.

The *trental* is thus called from the Italian, *trenta*, *triginta*, *thirty*.—It is mentioned anno primo Edw. VI.

TREPAN, *Trephine*, TREPANUM, a ſurgeon's inſtrument, ſerving to perforate a bone, eſpecially that of the cranium, and uſed in the operation of *trepanning*.

It is alſo called *abaptiſton*, *anabaptiſton*, *modiolus*, *terebra*, *terebellum*. *Abaptiſton*, from α primitive, and βαπτιζω, *to dip*; as having a broad circle over its point, to prevent it, in the operation of trepanning, from penetrating through the membranes that inveſt the brain. *Modiolus*, from *modus*, a *meaſure*; being contrived to enter only to a certain depth. *Terebra*, &c. from τερεω, *to bore*.

It is in form of a terebellum, or ſmall wimble, only that it is indented, and made ſomewhat in manner of a round ſaw.

It ſerves for the cure of wounds, contuſions, and fractures, of the cranium, when they do not go beyond the ſecond table; for by means hereof, an amputation or exfoliation is made of what part, or quantity, of a bone one pleaſes; and a way is opened for the raiſing of depreſſions.

It has uſually a ſharp point in the middle of its circumference, ſerving to keep it firm and ſteady during the operation, in which caſe it is called the *male trepan*, but when the ſaid point is removed, it is termed *female*.

The *trepan* ſhould alſo have a kind of cope to riſe and fall as occaſion requires, that it may not go deeper than is neceſſary.

See the *trepan* repreſented in *Tab.* III. *Surgery*, *fig.* 39. its pin in *fig.* 40. and the key for taking away the pin when the ſaw hath made an impreſſion deep enough to be worked without the help of it, in *fig.* 41.

We have the deſcription and figure of a *trepan*, differing from and turning more equally than the common, by Mr. Monro, in the Med. Eſſ. Edinb. vol. v. art. 41.

There are alſo two-pointed *trepans*, others triangular, quadrangular, and hexagonal, made for the cure of a caries of the bones, perforative *trepans*, and exfoliative ones. See EXFOLIATION.

TREPANNING, in *Surgery*, the operation of relieving cuts, contuſions, caries, and fractures in the ſkull, by means of an inſtrument called the *trepan*.

The other inſtruments uſed in this operation, beſide the TREPAN, are the SCALPEL, (*Tab.* III. *Surgery*, *fig.* 38.) ELEVATORS, *fig.* 35, 36, 37. the RASPATORY, which Mr. Sharp recommends for ſcraping bones in order to promote granulations of fleſh, *fig.* 42. a FORCEPS for taking out the circular piece of bone, when it does not ſtick to the ſaw of the trephine, *fig.* 43. and the LENTICULAR, to ſcrape the lower edge of the orifice of the cranium, in caſe any ſplinters ſhould remain after the operation, and the button at its extremity receives the duſt that it may not fall on the brain, *fig.* 44.

This operation was performed by the ancients, not only in fractures and depreſſions of the cranium, but alſo in other obſtinate diſorders of the head and brain, which could not be relieved by internal medicine, and the uſe of iſſues upon the coronal ſuture: but the modern ſurgeons never uſe the trepan for internal diſorders of the head, though they ſeldom neglect it in fractures and depreſſions of the cranium. The operation is uſeful in ſuch caſes for elevating the depreſſed parts of a fractured bone, and alſo in preſſures of the cranium for diſcharging the extravaſated blood through an aperture made by this inſtrument. The ſooner this inſtrument be applied the better: nevertheleſs, the operation ſhould be performed ſlowly and carefully; as it is extremely difficult, if not impoſſible, to take out a piece of the cranium with the trepan, without injuring the adjacent dura mater, to which it is cloſely attached. Accordingly, Heiſter adviſes, with Celſus and moſt of the moderns, to try firſt the uſe of other remedies, both external and internal, as phlebotomy, purging, clyſters, diſcutient bags, &c. rather than ſubject the patient to the danger of the trepan, before it appears to be abſolutely neceſſary. In ſome caſes, however, the danger is ſo urgent, that immediate recourſe ſhould be had to this inſtrument for the prevention of fatal conſequences.

The part of the cranium in which it will be proper to apply the trepan will, in general, be that where the fiſſure appears, if nothing indicates the contrary; but, in fractures, it will be adviſeable to trepan a little below the injured part, that the extravaſated humours may be more eaſily diſcharged. Heiſter adds, that there are ſeveral places in the cranium, which ought not to be, in any caſe, trepanned; as 1. Upon the ſutures, eſpecially the ſagittal ſuture; becauſe, in theſe parts, the dura mater is more ſtrongly attached to the cranium, and under the ſagittal-ſuture runs the longitudinal ſinus of the dura mater, which, by *trepanning* in this place, might eaſily be injured to the hazard of the patient's life: however in caſes of abſolute neceſſity the *trepan* may be uſed upon the coronal ſuture, and ſometimes upon others. 2. It is equally dangerous to *trepan* the cranium in the middle of the os frontis, eſpecially in that part which forms the fontanel; becauſe under theſe is ſeated the forementioned ſinus of the dura mater, which might eaſily be wounded by the inſtrument. 3. The *trepan* muſt not be applied upon any of the ſinuſes of the os frontis: to this purpoſe Mr. Cheſelden obſerves, that the ſinuſes and ſpine of the os frontis make it very dangerous, if not impracticable, to apply a *trepan* to the middle and lower part of the forehead. 4. The *trepan* ought not to be uſed where any large vein or artery ſpreads itſelf. 5. If the fractured part of the bone, upon which the *trepan* is fixed, is looſe or carious, it might injure the brain. 6. It has been judged improper to *trepan* in the lower parts or baſis of the cranium, which are inveſted with muſcles, as upon the occiput and temples; unleſs the muſcles have been previouſly forced from them. 7. Laſtly, it will be improper to *trepan* upon the cruciform eminence of the os occipitale.—Notwithſtanding theſe cautions, if a violent fracture ſhould happen in or near the forementioned places, the *trepan* ſhould be applied as near them as poſſible; and if the fracture has paſſed acroſs the ſutures, you muſt *trepan* within a finger's breadth of the ſuture on each ſide.—Sometimes it is impoſſible to diſcover the particular part of the cranium which is injured; the patient in the mean time being affected with the moſt urgent and dangerous ſymptoms. In theſe caſes it will be neceſſary to *trepan* firſt on the right ſide, then on the left, afterwards upon the forehead, and laſtly upon the occiput, and ſo round till you meet with the ſeat of the diſorder. After having pitched upon the part to be *trepanned*, and the inſtruments, dreſſings, &c. being provided, your next buſineſs is to ſhave the ſcalp; and the head being held ſteady in a convenient poſture, make an inciſion through the integuments to lay bare the cranium. The wound may be enlarged, and the hæmorrhage ſtopped, after the integuments and perioſteum are ſeparated and elevated from the cranium with the ſcalpel, by inſerting a large quantity of ſcraped lint; and a compreſs dipped in camphorated ſpirit of wine muſt be applied and retained by the kerchief bandage. Thus the patient is to be left, if the diſorder will permit, for a few hours, that the blood may be ſtopped before the *trepan* is applied. The operator proceeds, after having placed the patient in a proper poſture, having removed the dreſſings and cleanſed the wound, to fix the point of the *male trepan* in the ſkull; and holding the inſtrument faſt with the left hand, he turns it round with the right, till the ſaw has made a circular cut of ſufficient depth in the cranium: he then takes a *female trepan*, which has no point in the middle, or takes out the point or central pin of the other, and turns it round as before; in the mean time, bruſhing off the duſt or ſmall portions of the bone that proceed from the perforation. The *trepan* is uſed in this ſtate till the bony duſt becomes bloody, which denotes that the diploe is penetrated; in ſome ſkulls, however, the diploe is wanting; but when the duſt becomes bloody, the inſtrument is to be laid aſide and the blood waſhed away with a ſponge dipped in ſpirits of wine. As ſoon as the piece of bone is looſe, it is taken out with the forceps, and if the lower edge of the perforation is rough, it is ſmoothed with the lenticular: the depreſſed piece of ſkull is then raiſed with the elevator, which is now made with fulcra to reſt on the ſound bone: and if extravaſated matter ſeems to be lodged under the dura mater, it is diſengaged by an opening made with a lancet. After the operation is finiſhed, and the fragments of bone and extravaſated matter removed, the membranes may be dreſſed with the ointment of gum elemi ſoftened with the balſam capivi, applying it warm with a feather, and ſoft lint lightly over it, dreſſing the other parts as in wounds of the head: after which the whole head may be embrocated with a mixture of oil and vinegar, and a plaſter of the white cerate applied to it, with a gentle compreſs and bandage. Heiſter ſays, that the dreſſings are to be made with a round pledgit of dry lint laid next to the dura mater, with a thread faſtened to it, and hanging out of the aperture, that it may be placed under and drawn out from beneath the cranium; upon which pledgit is afterwards poured ſome honey of roſes diluted with a little ſpirit of wine: over this is laid another pledgit of lint, furniſhed with a ſtring, with other doſſils, till the cavity is replete. The cranium and wound itſelf muſt alſo be dreſſed with lint, ſpread with ſome mild digeſtive ointment or honey of roſes, upon which is laid a ſquare compreſs dipt in warm ſpirit of wine, and the whole ſecured without a plaſter, by the head bandage. In the ſubſequent dreſſings, which muſt be repeated once or twice every day, all fat and oily applications muſt be avoided. The wound being conſtantly dreſſed with balſamic and healing topics, you will have an exfoliation of a thin plate from the trepanned margin of the bones, uſually within forty or fifty days, which ought not to be pulled away by force. The exfoliation being obtained, there will appear new fleſh and callus, ſhooting up from the clean bone and dura mater, ſo as at length to fill up the whole cavity. When the cavity is about half filled, the ſprouting fleſh and callus muſt be moderately compreſſed by ſcraped lint and bandage, to prevent it from being too ſoft and lax; and when it is arrived even with the ſurface of the bones of the cranium, attempts muſt be made to conjoin and extend the integuments over it, by the aſſiſtance of ſticking plaſters; that the new-formed ſubſtance may intimately unite with the ſuperior dried ſkin. This ſubſtance becomes gradually more and more indurated, eſpecially in young ſubjects; however the weaker reſiſtance of theſe cartilaginous parts ſubjects perſons that have been *trepanned* to diſorders in their heads, which may be partly remedied by conſtantly keeping the place armed with a plate of ſilver. Sometimes a fungus proves troubleſome; but it is prevented by applying a plate of lead, invented and deſcribed by Belloſte. Heiſter's Surg. vol. i. p. 379, &c.

Where it is ambiguous whether there be an extravaſation of liquors, or a depreſſion of the ſkull, the operation of the *trepan* is ſaid to be the ſafeſt method. Mr. Queſnay gives us ſome hiſtories of the *trepan* being performed ſeveral times with ſucceſs, for the ſame diſeaſe; and of large parts of the ſkull being taken away, without loſs of the patient's life. See Mem. de l'Acad. de Chirurg.

Not only the head, but the STERNUM, is ſometimes neceſſarily the ſubject of this operation, as abſceſſes are ſometimes formed under the ſternum between the membranes of the mediaſtinum, by fall or blow, an inflammation, or other cauſes; in which caſes, there is hardly a poſſibility of diſcharging the matter by any other method.

The great difficulty is to determine when, and when not, this is neceſſary; that is, when there really is an abſceſs formed there. When this is known to be the caſe, the operation is to be performed in the following manner: the patient is to be inclined backward, and a crucial inciſion made in the integuments upon the lower part of the ſternum, where the abſceſs ſometimes makes a point; then the integuments being freed from the ſternum, the *trepan* is to be applied, and worked in the ſame manner as in *trepanning* the cranium; and when the perforation is made, the patient is to be ſtooped forward, and ordered to cough or breathe hard, in order to promote the diſcharge of the matter; and the abſceſs is afterwards to be cleanſed with detergent injections, and healed in the uſual way. Heiſter's Surgery, vol. ii. p. 68.

TREPIDATION, in *Medicine*. See TREMOR.

The firſt ſymptom of madneſs, in dogs, is a *trepidation* of the limbs.

TREPIDATION, in the *Ancient Aſtronomy*, denotes what they called a libration of the eighth ſphere; or a motion which the Ptolemaic ſyſtem attributed to the firmament, to account for certain almoſt inſenſible changes and motions obſerved in the axis of the world; by means whereof the latitudes of the fixed ſtars come to be gradually changed, and the ecliptic ſeems to approach reciprocally, firſt towards one pole, then towards the other.

This motion is alſo called the motion of the firſt LIBRATION.

TREPIGNER, in the *Manege*, the action of a horſe who beats the duſt with his fore-feet in managing, without embracing the volt; and who makes his motions and times ſhort, and near the ground, without being put upon his haunches. This is generally the fault of ſuch horſes as have not their ſhoulders ſupple, and at liberty, and withal have ſcarce any motion with them. A horſe may *trepigner*, in going upon a ſtraight line.

TRESAYLE, in *Law*, the name of a writ (now obſolete) to be ſued, on ouſter, by abatement, on the death of the grandfather's grandfather.

TRESPASS, in *Law*, ſignifies any tranſgreſſion of the law, under treaſon, felony, or miſpriſion of either.

TRESPASS, however, is moſt commonly uſed either for that wrong or damage which is done to the king in his foreſt, or by one private man to another.

In this ſenſe, it is of two ſorts: *treſpaſs general*, otherwiſe called *treſpaſs vi & armis*, where force or violence is uſed; to which belong THREATS, ASSAULT, BATTERY, MAYHEM, &c. and *treſpaſs ſpecial*, otherwiſe called *treſpaſs upon the caſe*; which ſhould be that done without force, or where the injury is only conſequential. See ACTION *on the caſe*.

But the two ſpecies are ſometimes confounded.

Treſpaſs on lands denotes an outcry on another man's ground without lawful authority, and doing ſome damage, however inconſiderable, to his real property. Every ſuch unwarrantable entry on another's ſoil, the law entitles a *treſpaſs* by breaking his CLOSE. But in order to be able to maintain an action of *treſpaſs*, a man muſt have property in the ſoil, and actual poſſeſſion by entry: or at leaſt it is requiſite that the party have a leaſe and poſſeſſion of the veſture and herbage of the land. But before entry and actual poſſeſſion, one cannot maintain an action of *treſpaſs*, though he hath the freehold in law. However, by 4 Geo. II. c. 28. and 11 Geo. II. c. 19. in caſe after the determination of any term of life, lives, or years, any perſon ſhall wilfully hold over the ſame, the leſſor is entitled to recover by action of debt, either a rent of double the annual value of the premiſes, in caſe he himſelf hath demanded and given notice in writing to deliver the poſſeſſion; or elſe double the uſual rent, in caſe the notice of quitting proceeds from any tenant having power to determine his leaſe, and he afterwards neglects to carry it into due execution.

A man is anſwerable not only for his own *treſpaſs*, but that of his cattle alſo. See DAMAGE *feaſant*.

In ſome caſes *treſpaſs* is juſtifiable; or, rather, entry on another's land and houſe ſhall not in thoſe caſes be accounted *treſpaſs*; as if a man comes there to demand or pay money, there payable; or to execute, in a legal manner, the proceſs of the law. A man may alſo juſtify entering into an inn or public houſe, without the leave of the owner: a landlord may juſtify entering to diſtrain for rent: a commoner to attend his cattle, commoning on another's land; and a reverſioner to ſee if any waſte be committed on the eſtate. It hath alſo been ſaid, that by the common law and cuſtom of England, the poor are allowed to enter and glean upon another's ground after the harveſt, without being guilty of *treſpaſs*; which humane proviſion ſeems borrowed from the Moſaical law, Lev. chap. xix. ver. 9. chap. xxiii. ver. 22. Deut. chap. xxiv. ver. 19. In like manner, the common law warrants the hunting of ravenous beaſts of prey, as badgers and foxes, in another man's land. But in caſes where a man makes an ill uſe of the authority with which the law entruſts him, he ſhall be accounted a treſpaſſer *ab initio*; as if one comes into a tavern and will not go out in reaſonable time: ſo if a landlord diſtrained for rent, and wilfully killed the diſtreſs, this made him a treſpaſſer *ab initio*: and ſo would any other irregularity have done, till the ſtatute 11 Geo. II. c. 19. which enacts that no ſubſequent irregularity of the landlord ſhall make his firſt entry a *treſpaſs*; but the party injured ſhall have a ſpecial action on the caſe for the real ſpecific injury ſuſtained, unleſs tender of amends hath been made. But ſtill, if a reverſioner, who enters on pretence of ſeeing waſte, breaks the houſe or ſtays there all night; or if the commoner, who tends his cattle, cuts down a tree; in theſe and ſimilar caſes the law judges that he entered for this unlawful purpoſe; and therefore, as the act which demonſtrates ſuch his purpoſe is a *treſpaſs*, he ſhall be deemed a treſpaſſer *ab initio*. So alſo in the caſe of hunting the fox or the badger, a man cannot juſtify breaking the ſoil, and digging him out of his earth.

A man may juſtify an action of *treſpaſs*, on account of the freehold and right of entry being in himſelf; and this defence brings the title of the eſtate in queſtion.—And this is one of the ways deviſed, ſince the diſuſe of real actions, to try the property of eſtates: though not ſo uſual as that by ejectment, which being a mixed action, gives damages for the ejection, and poſſeſſion of the land: whereas in *treſpaſs*, which is a perſonal ſuit, the right can be only aſcertained, but no poſſeſſion delivered; nothing being recovered but damages for the wrong committed.

In an action of *treſpaſs* the plaintiff always ſues for damages, or the value of the hurt done him by the defendant.

In order to prevent trifling and vexatious actions of *treſpaſs*, as well as other perſonal actions, it is *(inter alia)* enacted by ſtatutes 43 Eliz. c. 6. and 21 Jac. I. c 16. and 22 and 23 Car. II. c. 9. that where the jury who try an action of *treſpaſs* give leſs damages than 40*s*, the plaintiff ſhall be allowed no more coſts than damages; unleſs the judge ſhall certify under his hand, that the freehold or title of the land came chiefly in queſtion, or that an actual battery, and not aſſault only, was proved. And by ſtatute 4 and 5 W. and M. c. 23. and 8 and 9 W. III. c. 11. if the *trepaſs* were committed in hunting or ſporting by an inferior tradeſman, or if it appear to be wilfully and maliciouſly committed, the plaintiff ſhall have full coſts, though his damages as aſſeſſed by the jury amount to leſs than 40*s*. Blackſt. Com. vol. iii. p. 120, &c. p. 208, &c.

Treſpaſs is alſo divided into *local* and *tranſitory*.

Trespass *local* is that which is ſo annexed to the place certain, that if the defendant join iſſue upon a place, and traverſe the place mentioned in the declaration, and aver it, it is enough to defeat the action.

Trespass *tranſitory* is that which cannot be defeated by the defendant's traverſe of the place, becauſe the place is not material.

The action of *treſpaſs, quare clauſum fregit*, ought to be local.

TRESSEL, or Trestle-*trees*, in a *Ship*, two ſtrong bars of timber fixed horizontally on the oppoſite ſides of the lower maſt-head, to ſupport the frame of the top and the weight of the top-maſt.

TRESSURE, in *Heraldry*, a diminutive of an orle, uſually ſuppoſed to be half the breadth thereof.

It is uſually borne flory, and counterflory; and ſometimes double, as in *Tab.* II. *Herald. fig.* 86, and ſometimes triple.

TRESTLE, Tressel, or Trussel, is explained, by Minſhieu, to be a three-footed ſtool; or, more particularly, a wooden frame or ſtand to bear up tables, ſcaffolds, or the like.

TRET, in *Commerce*, an allowance made for the waſte, or the duſt, that may be mixed with any commodity; which is always four pounds in every 104 pounds weight. See Tare.

TREWIA, in *Botany*, a genus of the *polyandria monogynia* claſs; the characters of which are theſe: the perianthium is permanent, and is compoſed of three oval reflex and coloured leaves; there are no petals; the ſtamina are numerous capillary filaments, of the length of the cup; the antheræ are ſimple; the germen of the piſtil is placed under the cup; the ſtyle is ſimple, and of the length of the ſtamina, and the ſtigma is ſimple; the fruit is a three-ſquare, turbinated, coronated capſule, formed of three valves, and containing three cells; the ſeeds are ſingle, and are in figure convex on the one ſide, and angular on the other. There is one ſpecies.

TRIA *prima*, among *Chemiſts*, the three hypoſtatical principles, viz. ſalt, ſulphur, and mercury; of which they hold all bodies to be primarily made, and into which they are all held reſolvable by fire.

TRIAD, Trias, τριας, ſee Ternary, Trias, and Trinity.

TRIAL, in *Law*, the examination of any cauſe, civil or criminal, according to the laws of the realm, before a proper judge.

Of this there are divers kinds: both in civil and in criminal caſes. In civil caſes there are ſeven ſpecies of *trial*, viz. by record: by *inſpection* or *examination*, when for the greater expedition of a cauſe, in ſome point or iſſue being either the principal queſtion, or ariſing collaterally out of it, but being evidently the object of ſenſe, the judges of the court, upon the teſtimony of their own ſenſes, ſhall decide the point in diſpute; as in caſe of a ſuit to reverſe a fine for non age of the cognizor, or to ſet aſide a ſtatute or recognizance entered into by an infant, the king's juſtices determine by view of the age of the party; alſo if a defendant pleads in abatement of the ſuit that the plaintiff is dead, and a perſon, calling himſelf the plaintiff, appears, the judges ſhall determine by inſpection whether he be the plaintiff or not; likewiſe in the caſe of an idiot; in the appeal of mayhem; and in determining circumſtances relative to a day paſt by inſpection of an almanac: by certificate, as for matters without the realm, and alſo within the realm; the cuſtoms of the city of London are tried by the certificate of the mayor and aldermen, certified by the mouth of their recorder; marriage, baſtardy, excommunication and orders and other ſuch matters are tried by the biſhop's certificate; ability of a clerk preſented, admiſſion, inſtitution and deprivation of a clerk ſhall be tried by certificate from the ordinary or metropolitan; and the cuſtoms of courts by certificate from the proper officers, &c. by witnesses: by *wager* of battle: by wager of law: and by jury. In criminal matters, there was formerly, the *trial* by ordeal and by corsned; theſe two methods of *trial* were chiefly in uſe among our Saxon anceſtors and are now antiquated; the next, which ſtill remains in force, though very rarely in uſe, was introduced among us by the princes of the Norman line, and is the *trial* by battle, duel, or *ſingle* combat: the fourth method of *trial* uſed in criminal caſes is that by the peers of Great Britain, in the court of parliament, or the court of the *lord high* steward, when a peer is capitally indicted: but that which moſt commonly occurs is the *trial* by jury, or the country, ſecured to every Engliſhman, as the great bulwark of his liberties, by the great Charter. Backſt. Com. vol. iii. p. 330, &c. vol. iv. p. 336, &c.

Before *trial*, in a criminal caſe, it is uſual to aſk the criminal how he will be tied? which was anciently a very pertinent queſtion, though not ſo now; in regard there were formerly ſeveral ways of *trial*; viz. by *battle*, *ordeals*, and *jury*.

When the criminal anſwered, by God and his country, it ſhewed he made choice to be *tried* by a jury. But there is now no other way of *trial*. This is alſo called *trying per pais*, or *per patriam*.

Trial, *New*, in *Law*, is a re-hearing of the cauſe before another jury, with as little prejudice to either party, as if it had never been heard before. The cauſes of granting a new *trial* are ſuch as theſe: want of notice of *trial*; or any flagrant miſbehaviour of the party prevailing towards the jury, which may have influenced their verdict; or any groſs miſbehaviour of the jury among themſelves: alſo if it appears by the judge's report, certified to the court, that the jury have brought in a verdict without or contrary to evidence, ſo that he is reaſonably diſſatiſfied therewith; or if they have given exorbitant damages; and if the judge himſelf has miſdirected the jury, ſo that they found an unjuſtifiable verdict: for theſe, and other reaſons of the like kind, it is the practice of the court to award a new, or ſecond, *trial*. But if two juries agree in the ſame or a ſimilar verdict, a third *trial* is ſeldom awarded; for the law will not readily ſuppoſe, that the verdict of any one ſubſequent jury can countervail the oaths of two preceding ones. There are inſtances of new *trials* in the yearbooks of the reign of Edward III. Henry IV. and Henry VII. &c. Blackſt. Com. vol. iii. p. 387, &c.

TRIANDRIA, in *Botany*, the third claſs of plants which have hermaphrodite flowers, with three ſtamina or male parts in each. See Fructification, and *Tab.* I. and III. of *Botany*, *Claſs* 3. Of this claſs there are three orders; viz. *monogynia*, comprehending ſuch plants as have but one ſtyle, which contain twenty-nine genera, diſtinguiſhed into ſuch whoſe flowers have no ſpatha or amentum, of which there are thirteen; ſuch as have ſpathaceous flowers and a trilocular capſule, of which there are ten; and ſuch as have an imbricated amentum, and are gymnomonoſpermous, of which there are ſix: *digynia*, comprehending ſuch plants as have two ſtyles, which contain twenty-nine genera: and *trigynia*, comprehending ſuch plants as have three ſtyles, which contain eleven genera. See Order.

Triandria, is alſo the title of ſeveral orders of plants, which have three ſtamina. See Order.

TRIANGLE, in *Geometry*, a figure comprehended under three lines, or ſides, and which of conſequence has three angles.

If the three lines or ſides of the *triangle* be all right, it is ſaid to be a *plain* or *rectilinear triangle*.

If all the three ſides of the *triangle* be equal (as A B C, *Tab.* III. *Geometry*, *fig.* 68,) it is ſaid to be *equilateral*.

If only two of the ſides of the *triangle* be equal (as in DEF, (*fig* 57,) it is called an isosceles, or *equicrural triangle*.

If all the ſides of the *triangle* be unequal to each other as in A C B, (*Tab.* V. *Geometry*, *fig.* 127,) the *triangle* is ſaid to be scalenous.

If one of the angles, as K (*fig.* 128.) of a *triangle* KML be a right angle, the *triangle* is ſaid to be rectangular.

If one of the angles, as N (*fig.* 129,) be obtuſe, the *triangle* is ſaid to be obtusangular or *amblygonous*.

If all the angles be acute, as in A C B (*Tab.* III. *Geometry*, *fig.* 68,) the *triangle* is ſaid to be acutangular, or *oxygonous*.

If the three lines of the *triangle* be all curves, the *triangle* is ſaid to be curvilinear.

If ſome of the ſides be right, and others curve, the triangle is ſaid to be *mixtilinear.*

If the ſides be all arches of great circles of the ſphere, the *triangle* is ſaid to be SPHERICAL.

TRIANGLES, *ſimilar,* ſee SIMILAR.

TRIANGLE, *characteriſtic,* of a *curve,* ſee CURVE.

TRIANGLE, *baſe, canon, hypothenuſe, legs, and reſiſtance of a.* See the ſeveral articles.

TRIANGLES, *conſtruction of.* 1. Two ſides, as A B and A C, (*Tab.* V. *Geometry, fig.* 130.) being given in numbers, or otherwiſe, together with the quantity of the angle intercepted between them, A; to conſtruct a *triangle:*—aſſume A B as a baſe; and in A make the given angle: on the other leg ſet off the other given line A C; laſtly, draw B C: then will A B C be the *triangle* required.

Hence, two ſides with the intercepted angle being determined, the whole *triangle* is determined. Wherefore, if in two *triangles* A C B and $a\,c\,b$; $a = A$; and $a\,b : a\,c :: AB : AC$, the *triangles* are determined in the ſame manner, and are therefore ſimilar; conſequently $c = C$, and $b = B$, $a\,b : b\,c :: AB : BC$, &c.

2. Three ſides, A B, B C, and C A, (*Tab.* III. *Geometry, fig.* 68.) being given, any two whereof, as A C, A B, taken together, are greater than the third: to conſtruct a *triangle.* Aſſume A B for a baſe; and from A, with the interval A C, deſcribe an arch y; and from B, with the interval B C, deſcribe another arch x: draw the right lines A C and B C. Thus is the *triangle* conſtructed.—Hence, as of any three given right lines, only one *triangle* can be conſtructed; by determining the three ſides, the whole *triangle* is determined.

Wherefore, if in two *triangles* A C B and $a\,c\,b$ (*Tab.* V. *Geometry, fig.* 130.) $AC : AB :: a\,c : a\,b$; $AC : CB :: a\,c : b\,c$; the *triangles* are determined in the ſame manner, and conſequently are ſimilar, and therefore mutually equiangular.

3. A right line, as A B, and two adjacent angles A and B, which, taken together, are leſs than two right ones, being given; to deſcribe the *triangle* A B C. On the given line A B make the two given angles A and B: continue the ſides A C and B C till they meet in C.—Then will A B C be the *triangle* required.

Hence, one ſide and two angles being given, the whole *triangle* is determined. Wherefore, if in two *triangles* $A = a$ and $B = b$, the *triangles* are determined after the ſame manner, and therefore are ſimilar.

TRIANGLES, *menſuration of.* To find the area of a *triangle,* multiply the baſe A B, (*fig.* 131.) by the altitude $C\,d$; half the product is the area of the *triangle* A B C.

Or thus, multiply half the baſe A B by the altitude $C\,d$; or the whole baſe by half the altitude; the product is the area of the *triangle.*

E. gr.	$AB = 342$	$AB = 342$	$\frac{1}{2} AB = 171$	
	$Cd = 234$	$\frac{1}{2} Cd = 117$	$Cd = 234$	
	1368	2394	684	
	1026	342	513	
	684	342	342	
	2)80028(	40014	40014	area
area	40014	See QUADRATURE.		

Or, the area of any *triangle* is had by adding all the three ſides together, and taking half the ſum; and from that half ſum, ſubtracting each ſide ſeverally, and multiplying that half ſum and the remainder continually into one another, and extracting the ſquare root of the product.

Hence, 1. If between the baſe, and half the altitude, or between the altitude, and half the baſe, be found a mean proportional; it will be the ſide of a ſquare equal to the *triangle* 2. If the area of a *triangle* be divided by half the baſe, the quotient is the altitude.

TRIANGLES, *properties of plain.* 1. If in two *triangles* A B C and $a\,b\,c$ (*fig.* 130.) the angle A be $= a$; and the ſides $AB = a\,b$, and $AC = a\,c$; then will the ſide B C $= b\,c$, and the angles $C = c$, and $B = b$; and therefore the whole *triangles* will be equal and ſimilar.

2. If one ſide of a *triangle* A B C, (*fig.* 132.) be continued to D, the external angle D A B will be greater than either of the internal oppoſite ones B or C.

3. In every *triangle,* the greateſt ſide is oppoſed to the greateſt angle, and the leaſt to the leaſt.

4. In every *triangle,* any two ſides taken together are greater than the third.

5. In two *triangles,* if the ſeveral ſides of the one be reſpectively equal to the ſides of the other, the angles will likewiſe be reſpectively equal; and conſequently the whole *triangles* will be equal and ſimilar.

6. If any ſide, as B C (*fig.* 133.) of a *triangle* A C B be continued to D, the external angle D O A will be equal to the two internal oppoſite ones y and z taken together.

7. In every *triangle,* as A B C, the three angles A, B, C, taken together, are equal to two right ones, or 180°.

Hence, 1. If the *triangle* be rectangular, as M K L (*fig.* 128.) the two oblique angles M and L, taken together, make a right angle, or 90°; and therefore are half right, if the *triangle* be iſoſceles. 2. If one angle of a *triangle* be oblique, the other two taken together are oblique likewiſe. 3. In an equilateral *triangle,* each angle is 60°. 4. If one angle of a *triangle* be ſubtracted from 180°, the remainder is the ſum of the other two; and if the ſum of two be ſubtracted from 180°, the remainder is the third. 5. If two angles of one *triangle* be equal to two of another, either together or ſeparately, the third of the one muſt be likewiſe equal to the third of the other. 6. Since in an iſoſceles *triangle,* D F E, (*Tab.* III. *fig.* 57.) the angles at the baſe y and u are equal; if the angle at the vertex be ſubtracted from 180°, and the remainder be divided by 2, the quotient is the quantity of each of the equal angles: in like manner, if the double of one of the angles at the baſe y be ſubtracted from 180, the remainder is the quantity of the angle at the vertex. See ISOSCELES *triangle.*

8. If in two *triangles,* A B C, and $a\,b\,c$ (*Tab.* V. *Geometry, fig.* 130.) $AB = a\,b$, $A = a$, and $B = b$; then will $AC = a\,c$, $BC = b\,c$, $C = c$, and the *triangle* A C B equal and ſimilar to the *triangle* $a\,b\,c$.—Hence, if in two *triangles,* A C B and $a\,c\,b$, $A = a$, $B = b$, and $BC = b\,c$; then will $C = c$; conſequently, $AC = a\,c$, $AB = a\,b$; and the *triangle* $ACB = a\,c\,b$.

9. If in a *triangle* D F E the angles at the baſe y and u, (*Tab.* III. *Geometry, fig.* 57.) be equal, the *triangle* is iſoſceles: conſequently, if the three angles be equal, it is equilateral.

10. If in a *triangle* A B C, (*Tab.* V. *Geometry, fig.* 130.) a right line D E be drawn parallel to the baſe A C, then will $BA : BC :: BD : BE :: AD : EC$. And $BA : AC :: BD : DE$. Conſequently the *triangle* B D E ſimilar to B A C. And, *vice verſâ,* a right line, which divides two ſides of a *triangle* proportionally, is parallel to the remaining ſide. Moreover, if another right line F G be alſo drawn parallel to the baſe A C, the intercepted parts D F, E G are in the ſame ratio with the whole ſides A B, C B: *i. e.* $DF : EG :: AB : BC$: and if any number of lines be drawn parallel to the baſe, cutting the ſides of a *triangle,* every two correſponding ſegments will have the ſame ratio.

11. Every *triangle* may be inſcribed in a CIRCLE.

12. The ſide of an equilateral *triangle,* inſcribed in a circle, is in power triple of the radius.

13. *Triangles* on the ſame baſe, and having the ſame height, that is, being between the ſame parallel lines, are always equal. See PARALLELOGRAM.

14 Every *triangle,* as C A D, (*Tab.* III. *Geometry, fig.* 66.) is one half of a parallelogram A C D B on the ſame, or an equal baſe C D, and of the ſame altitude, or between the ſame parallels: or a *triangle* is equal to a parallelogram upon the ſame baſe, but half the altitude; or half the baſe, and the ſame altitude. See PARALLELOGRAM.

15. In every *triangle,* as well plain as ſpherical, the ſides or ſines of the ſides are proportional to the ſines of the oppoſite angles. See SINE.

16. In every plain *triangle,* as the ſum of two ſides is to their difference, ſo is the tangent of half the ſum of the oppoſite angles, to the tangent of half their difference. See TANGENT.

17. If a perpendicular be let fall upon the baſe of an oblique-angled *triangle,* the difference of the ſquares of the rectangle under the ſum and difference of the ſides is equal to double the rectangle under the baſe, and the diſtance of the perpendicular from the middle of the baſe.

18. The double of the ſquare of a line drawn from the vertex biſecting the baſe of any *triangle,* together with double of the ſquare of the ſemi-baſe, is equal to the ſquares of both the ſides taken together.

19. A whole *triangle* is to a *triangle* cut off by a right line, as the rectangle under the cut ſides is to the rectangle of the other two ſides.

20. In a right lined *triangle,* A D E, (*Tab.* III. *Geometry, fig.* 74.) a line D B drawn from the right angle of the vertex, perpendicular to the hypothenuſe, divides the *triangle* into two other right-lined *triangles,* A D B, D B E, which are ſimilar to the firſt *triangle,* and alſo to one another.

Hence it follows: 1. That E B : B D : : B D : B A; and A E : E D : : E D : E B; and A E : A D : : A D : A B. See Proportional. Whence, 2. As the angle in a ſemicircle is a right angle, it follows that, if from any point D in the periphery of a ſemicircle A D E, a perpendicular D B be let fall upon the diameter A E, and from the ſame point D, to the extremities of that diameter, two chords D A, D E, be drawn; the ſquare of that perpendicular will be equal to a rectangle under the two ſegments of the diameter; and the ſquare of each chord equal to a rectangle under the whole diameter and its adjacent ſegment: i. e. $BD^2 = EB \times BA$; $ED^2 = EB \times EA$; and $AD^2 = AB \times EA$.

21. In every right-angled *triangle*, the ſquare of the hypothenuſe is equal to the ſum of the ſquares of the other two ſides. See Hypothenuse and Subtense.

22. If any angle of a *triangle* be biſected, the biſecting line will divide the oppoſite ſide, in the ſame proportion as the legs of the angle are one to another.

23. If the vertical angle of any *triangle* be biſected, the difference of the rectangles, made by the ſides and the ſegments of the baſe, is equal to the ſquare of the line that biſects the angle. Thus, if a right line B E (*Tab.* V. *Geom. fig.* 134.) biſect an angle A B C of a *triangle*, the ſquare of the ſaid line $BE = AB \times BC - AE \times EC$.

24. To divide a *triangle* into any given number of equal parts; divide the baſe C D, (*fig.* 135.) into as many equal parts as the figure is to be divided into; and draw the lines A 1, A 2, &c.

25. If in ſimilar *triangles* from any two equal angles to the oppoſite ſides two right lines be drawn, making equal angles with the homologous ſides; thoſe right lines will have the ſame ratio as the ſides on which they fall, and alſo divide thoſe ſides proportionally.

26. If in two *triangles* having one ſide common to both, from any point in that ſide, two lines reſpectively parallel to two contiguous ſides be drawn, terminating in the two remaining ſides, thoſe lines will have the ſame ratio as the ſides to which they are parallel. Hence, if theſe ſides are equal, thoſe lines will be alſo equal.

27. If through any point within a *triangle* three right lines be drawn, from the angular points to cut the oppoſite ſides, the ſegments of any one ſide will be to each other, as the rectangles under the ſegments of the other ſides taken alternately. Hence if the former ſegments be equal, the forementioned rectangles will be equal, and therefore the ſides of the triangle cut proportionally, and a line connecting the points of diviſion will be parallel to the baſe.

28. *Triangles* having one angle in the one equal to one angle in the other, are in the ratio of the rectangles contained under the ſides, including the equal angles. Hence, if the rectangles be equal, or the ſides reciprocally proportional, the *triangles* will be equal.

Triangles, *properties of ſpherical.* See Spherical *Triangle.*

Triangle, in *Trigonometry.* The ſolution, or analyſis of *triangles*, is the buſineſs of TRIGONOMETRY.

The ſeveral caſes thereof are reducible to the following problems.

Triangles, *ſolution of plane.* 1. Two angles A and C (*Tab. Trigonometry, fig.* 28.) being given, together with a ſide A B oppoſite to one of them, C; to find the ſide B C oppoſite to the other, A. The rule or canon is this: as the ſine of the angle C is to the given ſide A B, oppoſite to the ſame; ſo is the ſine of the other angle A, to the ſide required. The ſide B C, therefore, is commodiouſly found by the logarithms, from the rule given for finding a fourth proportional to 3 numbers given. See Logarithm.

For an example: ſuppoſe C = 48° 35′, A = 57° 28′, A B = 74. The operation will ſtand thus:

Log. of ſine of C 9.8750142
Log. of A B 1.8692317
Log. of ſine of A 9.9258681

Sum of log. of A B and of ſine of A } 11.7950998
Log. of B C 1.9200856. The neareſt number correſponding to which, in the table of logarithms, is 83, the quantity of the ſide ſought.

If the hypothenuſe B C of a right-angled *triangle* A B C (*fig.* 29.) were given, together with the angles, either of the ſides might be had by the following proportion: as the log. of the whole ſine, or radius, is to the hyp. B C, ſo is the ſine of B to A C, or the ſine of C to A B.

If the angles were given, and one ſide e. gr. A B, the hypothenuſe B C may be had by the following proportion: as the log. of ſine of C to A B, ſo is the log. of the whole ſine or radius to the hypothenuſe B C.

2. Two ſides A B and B C, together with the angle C, oppoſite to one of them given; to find the other angles A and B. The rule is this: as one ſide, A B is to the ſine of the given angle oppoſite thereto C; ſo is the other ſide B C, to the ſine of the angle required oppoſite thereto.

E. gr. Suppoſe A B = 94, B C = 69, C = 72° 15′.

Log. of A B 1.9731279
Log. of ſine of C 9.9788175
Log. of B C 1.8388491

Sum of log. of ſine of C and of B C } 11.8176666
Log. of ſine of A 9.8445387.

The neareſt number to which in the table of logarithmic SINES, is 44° 21′. Now, the given angle C being 72° 15′, the ſum of the two 116° 36′ ſubtracted from 180, the ſum of the three, gives 63° 24′, for the other angle ſought, B. The ſide A C may be found by the firſt caſe.

In like manner, ſuppoſe, in a right-angled *triangle* (*fig.* 29.), that beſide the right angle A, is given the hypothenuſe B C, 49, and the cathetus A C, 36, to find the angle B; then will the operation ſtand thus:

Log. of B C 1.6901961
Log. of whole ſine 10.0000000
Log. of A C 1.5563025

Log. of ſine of B 9.8661064. The correſponding number to which, in the table of logarithmic SINES, is 47° 16′; conſequently, C = 42° 44′. The other ſide A B may be eaſily found by the firſt caſe.

3. Two ſides B A and A C, together with the included angle A, being given; to find the two remaining angles.

1. If the *triangle* A B C be rectangular; take one of the ſides including the right angle, as A B, for radius: then will C A be the tangent of the oppoſite angle B: the rule then is—As one leg A B, is to the other A C; ſo is the whole ſine, or radius, to the tangent of the angle B.

E. gr. Suppoſe B A, 79, and A C, 54;

Log. of B A 1.8976271
Log. of A C 1.7323938
Log. of whole ſine 10.0000000

Log. of tang. of B 9.8347667. The neareſt correſponding number to which, in the table of logarithmic SINES, &c. is 34° 21′; conſequently, the angle C is 55° 39′. Having the angles and two legs, the hypothenuſe may be eaſily found by the firſt caſe.

2. If the angle A be oblique (*fig.* 28.) the rule is, as the ſum of the given ſides A B and A C is to their difference; ſo is the tangent of half the ſum of the ſought angles C and B, to the tangent of half the difference. Adding, therefore, the half difference, to the half ſum; the aggregate will be the greater angle C; and ſubtracting the half difference from the half ſum, the remainder is the leſs angle B.

E. gr. Suppoſe A B = 75, A C = 58, A = 108° 24′; then

will A B = 75   A B = 75   A + B + C = 180° 00′
A C = 58   A C = 58   A = 108 24

Sum. 133 differ. 17   B C = 71 36

$\frac{1}{2}(B+C) =$ 35 48

Log. of A B + A C, 2.1238516
Log. of A B — A C, 1.2304489
Log. of tan. $\frac{1}{2}(B+C)$ 9.8580694

Sum of log. 11.0885183
Log. of tang. $\frac{1}{2}(C-B)$ 8.9646667. The neareſt correſponding number to which is 5° 16′.

$\frac{1}{2}(B+C) = 35° \; 48′$ $\frac{1}{2}(B+C) = 35° \; 48′$
$\frac{1}{2}(C-B) = 5° \; 16′$ $\frac{1}{2}(C-B) = 5° \; 16′$

C = 41° 4′   B = 30° 32′

If the other ſide C B were required, having found the angles that may be eaſily had by the firſt caſe.

4. The three ſides, A B, B C, and C A (*fig.* 30.) being given, to find the angles, A, B, and C. From the vertex of the angle A, with the extent of the leaſt ſide A B, deſcribe a circle: then will C D be = the ſum of the legs A C and A B; and C F their difference. The rule then is,

As the baſe B C is to the ſum of the legs C D, ſo is the difference of the legs C F, to the ſegment of the baſe C G. This ſegment, thus found, being ſubtracted from the baſe C B, the remainder is the chord G B. Then, from A to the chord G B let fall the perpendicular A E; thus will $BE = EG = \frac{1}{2} GB$.

Thus in a rectangled *triangle*, A E B, the ſides A B and BE being given; or, in a rect-angled *triangle*, ACE, the ſides AC and CE being given: the angles B and A are found.

E. gr. Suppoſe AB = 36, AC = 45, BC = 40
AC = 45 AC = 45
AB = 36 AB = 36

AC + AB = 81 FC = 9
Log. of BC = 1.6020600
Log. of AC + AB = 1.9084850
Log. of FC = 0.9542425

Sum of log. = 2.8627275

Log. of CG = 1.2606675. The neareſt correſponding number to which, in the tables, is 18.22.

BC = 40.00 EG = 10.89
CG = 18.22 CG = 18.22

BG = 21.78 CE = 29.11

BE = 10.89
Log. of AB = 1.5563025
Log. of whole ſine = 10.0000000
Log of EB = 1.0370279

Log. of ſine of EAB = 9.4807254. The correſponding number to which, in the tables, is 17° 36′: conſequently, the angle ABE 72° 24′.

Log. of AC = 1.6532125
Log. of the whole ſine 10.0000000
Log. of CE = 1.4640422

Log. of ſine of EAC = 9.8108297. To which the neareſt correſpondent number, in the tables, is 40° 18′; therefore ACE 49° 42′; and CAB 57° 54′

Solution of right-angled ſpherical TRIANGLES, *by the common rules.* 1. In a right-angled ſpherical *triangle*, any two parts, beſide the right angle, being given, to find any of the reſt.

1. Conſider whether the parts, which come to the queſtion, be conjunct or diſjunct (ſee PART). If the disjunct be oppoſite to each other; as, if the hypothenuſe BC, and the angle C (*fig.* 31), be given, to find the oppoſite leg AB; then the rule is—As the whole ſine is to the ſine of the hypothenuſe BC, ſo is the ſine of the angle C, to the ſine of the oppoſite leg AB. 2. If the disjunct parts be not oppoſite to each other; as, if AB, and the adjacent angle B, be given for the oppoſite angle C; the ſides of the *triangle* are to be continued one way, till they become quadrants, that you may thus have a new *triangle*; wherein the parts that come into the queſtion are mutually oppoſite to each other; as, in our caſe, the *triangle* EBF wherein we have given BF, the complement of the leg AB, and the angle B for EF, the complement of the angle C. The rule then is, as the whole ſine is to the ſign of BF; ſo is the ſine of the angle B to the ſine EF, or co-ſine of C. 3. If the hypothenuſe be not among the conjunct parts, as if the legs AB and AC be given for an angle oppoſite to one of them; the rule is—as the ſine of AC is to the whole ſine; ſo is the tangent of AB to the tangent of C.

4. But if the hypothenuſe be found among the conjunct parts, as if the hypothenuſe BC, and the angle C, be given, to find the adjacent ſide AC; the ſides of the *triangle* are to be continued one way till they become quadranats, that we may have a new *triangle*, wherein the hypothenuſe is not among the parts that come into the queſtion; e. gr. in our caſe, the *triangle* EBF, wherein are given the complement EB of the hypothenuſe BC, and the complement of the angle C, and the angle F the complement of the leg AC. Since then, in the *triangle* EFB, the hypothenuſe does not come in the queſtion, the rule is as before:

As the ſine of EF, or co-ſine of C, is to the whoſe ſine; ſo is the tangent of EB, or co-tangent of BC, to the tangent of F, or co-tangent of AC.

5. When the ſides of a *triangle* are to be continued, it is the ſame thing which way ſoever they be produced, provided no acute angle come into the queſtion, otherwiſe the ſides are to be continued through the other oblique one. And if both be in the connection, the ſides are to be continued through that adjacent to the ſide in queſtion.

By this means a *triangle* is always obtained wherein the thing required is found, either by the rule of ſines or tangents.

Solution of right-angled ſpherical TRIANGLES, *by one catholic rule.* Conſider, as before, whether the parts that come in queſtion be conjunct or disjunct. See PART.

If either one, or both the ſides, including the right angle, come into the queſtion; for it, among the data, write its complement to a quadrant. Since then by the catholic rule, delivered under the article TRIGONOMETRY; the whole ſine, with the ſine complement of the middle part, muſt be equal to the ſines of the disjunct parts, and the co-tangents of the conjunct parts; from the ſum of thoſe data ſubtract the third datum; the remainder will be ſome ſine or tangent, the ſide or angle correſponding to which, in the artificial canon of *triangles*, is the ſide or angle ſought.

This univerſal rule being of great ſervice in trigonometry, we ſhall apply it to the various caſes thereof, and illuſtrate it with examples; which examples, in the caſe of disjunct or ſeparate parts, will at the ſame time illuſtrate the common method; but in the caſe of contiguous parts they admit of other ſolutions. 1. Given the hypothenuſe BC, 60°, and the angle C, 23° 30′; to find the oppoſite leg AB (*fig.* 22). Since AB is the middle part, C and BC are disjunct (ſee PART); the product of the whole ſine, into the co-ſine of the compelment AB, i. e. the ſine itſelf of AB, is equal to the product of the ſines of C and BC.

Therefore from the log. ſine of C 9.6006997
+ Sine of BC 9.9375306

Sum 19.5382303
Subtract whole ſine 10.0000000
Remains ſine of AB 9.5382303. The neareſt correſponding number to which, in the canon, is 20° 12′.

2. Given the hypothenuſe BC, 60°, and the leg AB, 20° 12′; to find the oppoſite angle C. It is evident from the preceding problem, that from the ſum of the whole ſine, and the ſine of the leg AB, the ſine of the hypothenuſe BC is to be ſubtracted, the remainder is the ſine of the angle C. The example therefore of the former caſe is eaſily converted into an example of this.

3. Given the leg AB, 20° 12′, and the oppoſite angle C 23° 30′; to find the hypothenuſe BC. It is evident from the firſt caſe, that from the ſum of the whole ſine, and the ſine of AB, is to be ſubtracted the ſine of the angle C, and the remainder is the ſine of the hypothenuſe BC.

4. Given the hypothenuſe BC, 60°, and one leg AB, 20° 12′; to find the other leg. Since BC is a mean part, and AB and AC are disjunct parts, the product of the whole ſine, into the co-ſine of the hypothenuſe BC, is equal to the product of the ſines of the complements, i. e. the co-ſines of the legs AB and AC.

Therefore from the whole ſine 10.0000000
Co-ſine of BC 9.6989700

Sum 19.6989700
Subtract co-ſine of AB 9.9724310

Remains co-ſine of AC 9.7265390. The correſponding number to which, in the canon, is 32° 11′; therefore AC = 57° 49′.

5. Given the legs AC, 57° 49′, and AB, 20° 12′; to find the hypothenuſe BC. It is evident from the preceding caſe, that the whole ſine is to be ſubtracted from the ſum of the co-ſines of the legs AB and AC; the remainder is the co-ſine of the hypothenuſe BC. The example, therefore, of the preceding caſe is eaſily applied to this.

6. Given the legs, AC, 57° 49′, and the adjacent angle C, 23° 30′; to find the oppoſite angle B. Since B is a middle part, and A and C are disjunct parts; the product of the whole ſine, by the co-ſine of B, is equal to the product of the ſine of C, and the ſine of the complement, i. e. the co-ſine of AC.

Therefore from the ſine of C 9.6006997
Co-ſine AC 9.7265310

Sum 19.3272307
Subtract whole ſine 10.0000000

Remains co-ſine of B 9.3272307. The neareſt number correſponding to which, in the canon, is 12° 15′; therefore B = 77° 45′.

7. Given the leg AC, 57° 49′, and the oppoſite angle B, 77° 45′, to find the adjacent angle C. It is evident from the preceding caſe, that the co-ſine of AC is to be ſubtracted from the ſum of the whole ſine, and the co-ſine of B; the remainder is the ſine of C. The former example, therefore, is eaſily accommodated to the preſent caſe.

8. Given the oblique angles B, 77° 45′, and C, 23° 30′; to find the leg adjacent to the other, AC. From problem the ſixth, it is evident, that the ſine of C is to be ſubtracted from the ſum of the whole ſine, and the co-ſine of B; and that the remainder is the co-ſine of AC.

The example of the ſixth problem may be eaſily applied to this.

9. Given the leg AC, 57° 49′, and the adjacent angle C, 23° 30′; to find the oppoſite leg AB. Since AC is a mean part, and C and AB conjunct parts, the product of the whole ſine, by the ſine of AC, is equal to the product of the co-tangent of C, and the tangent of AB.

Therefore from the whole ſine 10.0000000
Sine of AC 9.9275490

Sum 19.9275490
Subtract co-tangent of C 10.3616981
Remains tangent of AB 9.5658519. To which the neareſt correſponding number, in the canon, is 20° 12′.

10. Given the leg AB, 20° 12′, and the oppoſite angle C, 23° 30′, to find the adjacent leg AC. From the ſum of the co-tangent of C, and the tangent of AB, ſubtract the whole ſine; the remainder is the ſine of AC.

11. Given the legs AB, 20° 12′, and AC, 57° 49′; to find the angle C, oppoſite to one of them. From the ſum of the whole ſine, and ſine of AC, ſubtract the tangent of BA; the remainder is the co-tangent of C.

12 Given the hypothenuſe BC, 60°, and the oblique angle C, 23° 30′, to find the adjacent leg AC. Since C is a middle part, and BC and AC conjoint parts; the product of the whole ſine, into the co-ſine of C, will be equal to the product of the co-tangents of AC and BC.

Therefore from the whole ſine 10.0000000
Co-ſine of C 9.9623978

Sum 19.9623978
Subtract co-tangent of BC 9.7614394
Remains tangent of AC 10.2009584. The neareſt number correſponding to which, in the tables, is 57° 49′.

13. Given the leg AC, 57° 49′, and the adjacent angle C, 23° 30′; to find the hypothenuſe BC.

From the ſum of the whole ſine, and the co-ſine of C, ſubtract the tangent of AC, the remainder is the co-tangent of BC.

14. Given the hypothenuſe BC, 608, and the leg AC 57° 49′, to find the adjacent angle C.

From the ſum of the co-tangent of BC, and tangent of AC, ſubtract the whole ſine; and the remainder is the co-ſine of C.

15. Given the hypothenuſe BC, 60°, and one angle C, 23° 30′; to find the other, B.

Since BC is the middle part, and B and C disjunct parts, the product of the whole ſine, into the co-ſine of BC, will be equal to the product of the co-tangents of B and C; and

Therefore from the whole ſine 10.0000000
Co-ſine of BC 9.6989700

Sum 19.6989700
Subtract co tangent of C 10.3616981
Remains co-tangent of B 9.3372719. The neareſt correſponding number to which, in the canon, is 12° 16′; therefore B is 77° 44′.

16. Given the oblique angles B, 77° 44′, and C, 23° 30′, to find the hypothenuſe BC. From the ſum of the co-tangents of C and B, ſubtract the whole ſine; the remainder is the co-ſine of BC.

Solution of oblique-angled ſpherical TRIANGLES. 1. In an oblique-angled ſpherical *triangle* ABC (*Tab. Trigonometry, fig.* 32.) two ſides AB and BC being given, together with an angle A, oppoſite to one of them, to find the other C: the rule is,

As the ſine of the ſide BC is to the ſine of the oppoſite angle A; ſo is the ſine of the ſide BA to the ſine of the oppoſite angle C.

Suppoſe, for example, BC, 39° 29′; A, 43° 20′; BA, 66° 45′; then will

Sine of BC 9.8033572
Sine of A 9.8364771
Sine of BA 9.9632168

19.7996939
Sine of C 9.9963367. The neareſt correſponding number to which, in the tables, is 82° 34′.

2. Given two angles C, 82° 34′, and A, 43° 20′, together with the ſide AB, 66° 45′, oppoſite to one of them C; to find the ſide BC oppoſite to the other of them A; ſay, as the ſine of the angle C is to ſine of the oppoſite ſide AB, ſo is the ſine of the angle A to the ſine of the oppoſite ſide BC. The former example may ſuffice for the preſent caſe.

3. Given two ſides AB, 66° 45′, and BC, 39° 29′, together with an angle oppoſite to one of them A, 43° 20′, to find the angle included by them B. Suppoſe the angle C to be acute, ſince the other, A, is alſo acute, the perpendicular BE falls within the *triangle*. In the rectangled *triangle* ABE, therefore, from the given angle A, and ſide AB, find the angle ABE. Since BE is aſſumed as a lateral part in the *triangle* AEB, the angle EBC is a middle part, and the ſide BC muſt be a conjoint part: the co-ſine of the angle EBC will be found by ſubtracting the co-tangent of AB from the ſum of the co-ſine of the angle EBE, and the co-tangent of BC. If then the angles ABE and EBC be added together, or in caſe the perpendicular fall without the *triangle*, be ſubtracted from each other, you will have the angle required B.

E. gr. whole ſine 10.0000000
Co-ſine of AB 9.5963154

Sum 19.5963154
Co-tang. of A 10.0252805

Co-tang. of ABE 9.5710349. The neareſt number correſponding to which, in the tables, is 20° 26′. ABE, therefore, is 69° 34′.
Co-ſine of ABE 9.5429713
Co-tang. of BC 10.0841529

Sum 19.6271242
Co-tang. of AB 9.6330985

Co ſine of EBC 9.9940257. The neareſt number correſponding to which, in the tables, is 9° 29′; therefore ABC is 79° 3′.

4. Given two angles A, 43° 20′, and B, 79° 3′, together with the adjacent ſide AB, 66° 45′; to find the ſide BC oppoſite to one of them.

From one of the given angles B, let fall a perpendicular EB to the unknown ſide of AC; and in the rectangled *triangle* ABE from the given angle A, and hypothenuſe AB, find the angle ABE; which, ſubtracted from the angle ABC, leaves the angle EBC. But if the perpendicular ſhall fall without the *triangle*, the angle ABC ſhould have been ſubtracted from ABE. Since as the perpendicular BE is taken for one of the lateral parts, the middle part in the *triangle* ABE is the angle B, and the conjoint part AB; in the *triangle* EBC the middle part is the angle B, and the conjunct part BC: the co-tangent of the ſide BC is found by ſubtracting the co-ſine of EBA from the ſum of the co-tangent of AB, and the co-ſine of EBC. The example of the preceding caſe is eaſily applied to this.

5. Given two ſides AB, 66° 45′, and BC, 39° 29′, with the angle A oppoſite to one of them, 43° 20′; to find the third ſide AC.

Letting fall, as before, the perpendicular BE; in the rectangled *triangle* ABE, from the given angle and hypothenuſe AB, find the ſide AE. Since aſſuming BE for a lateral part in the *triangle* AEB, AB is the middle part, and AE is the ſeparate part; and in the *triangle* BEC, BC is the mean part, and EC a disjunct part; the co-ſine of EC is found by ſubtracting the co-ſine of AB from the ſum of the co-ſines of AE and CB. If then the ſegments AE and EC be added together, or in caſe the perpendicular fall without the *triangle*, be ſubtracted from each other, the ſide AC will be had.

6. Given two ſides AC, 65° 31′, and AB, 66° 45′; together with the included angle A, 43° 20′; to find the third ſide BC oppoſite thereto.

Letting fall the perpendicular BE, find, in the rectangled *triangle*, the ſegment AE; which, ſubtracted from AC, leaves EC. If the perpendicular fall without the *triangle*, AC is to be ſubtracted from AE. Since by aſſuming the perpendicular BE for a lateral part in the *triangle* AEB, AB becomes a middle part, and AE a ſeparate part: in the *triangle* EBC, CB is the middle part, EC a ſeparate part: the co-ſine of BC is found by ſubtracting the co-ſine of AE from the ſum of the co-ſines of AB and EC.

7. Given two angles A, 43° 20′, and B, 79° 3′, together with the ſide CB, 39° 29′, oppoſite to one of them; to find the ſide AB adjacent to both.

Letting fall the perpendicular CD from the unknown angle C, to the oppoſite ſide AB; and that falling within the *triangle*; from the given angle B, and the hypothenuſe BC, ſeek in the rectangled *triangle* BCD for the ſegment BD. Since, aſſuming the perpendicular CD for a lateral part in the *triangle* CDB, BD is the mean part, and the angle B a conjunct part; and in the *triangle* CDA, AD is the middle part, and the angle A a conjunct part: the ſine of the ſegment AD is found by ſubtracting the co-tangent of the angle B from the ſum of the ſine of DB, and the co-tangent of the angle A. If then the ſegments AD and DB be added, or in caſe the perpendicular fall without the *triangle*, be ſubtracted from each other, the reſult will be the ſide AB required.

8. Given two ſides A B, 66° 45′, and B C, 39° 29′, with the included angle 79° 3′; to find the angle A oppoſite to one of them.

Letting fall the perpendicular C D, find the ſegment B D, as in the preceding problem. This, ſubtracted from A B, leaves A D. If the perpendicular fall without the *triangle*, A B is to be added to DB. And ſince by aſſuming the perpendicular C D for a lateral part in the *triangle* CDB, B D is the middle part, and the angle B a conjoint part; and in the *triangle* C D A, A D is the middle part, and the angle A a conjoint part, the co-tangent of the angle A is formed by ſubtracting the ſine of D B from the ſum of the co-tangent of the angle B, and of the ſine of AD.

9. Given two angles A, 43° 20′, and B, 79° 3′, together with the adjacent ſide A B, 66° 45′; to find the angle C oppoſite to the ſame.

From one of the given angles B, letting fall the perpendicular B E, to the oppoſite ſide A C; in the rectangled *triangle* A B E, from the given angle A, and hypothenuſe A B, we find the angle A B E; which, ſubtracted from A B C, leaves the angle E B C. In caſe the perpendicular fall without the *triangle*, A B C is to be ſubtracted from A B E. Since, by aſſuming B E for a lateral part in the *triangle* C E B, the angle C is a middle part, and the angle C B E a disjunct part, and in the *triangle* A B E, the angle A is the middle part, and the angle A B E the disjoint part: the co-ſine of the angle C is found by ſubtracting the ſine of the angle A B E, from the ſum of the co-ſine of the angle A, and the ſine of E B C.

10. Given two angles A, 43° 20′, and C, 82° 34′, together with the ſide B A, 66° 45′, oppoſite to one of them; to find the other angle.

From the ſought angle B, let fall a perpendicular B E; and in the right-angled *triangle* A E B, from the given angle A, and hypothenuſe B A, find the angle A B E. Since, aſſuming the perpendicular E B for a lateral part in the *triangle* E C B, the angle C is the middle part, and the angle C B E a disjunct part; and in the *triangle* A B E, the angle A is the middle part, and the angle A B E is a disjunct part: the ſine of the angle E B C is found by ſubtracting the co-ſine of A from the ſum of the co-ſine of C, and of the ſine of A B E. If then A B E and E B C be added, or in caſe the perpendicular fall without the *triangle*, be ſubtracted from each other, the reſult will be the angle required A B C.

11. Given the three ſides, to find an angle oppoſite to one of them. 1. If one ſide A C (*fig.* 19.) be a quadrant, and the leg A B be leſs than a quadrant, find the angle A. Continue A B to F, till A F become equal to a quadrant; and from the pole A draw the arch C F, to cut the arch B F at right angles in F. Since in the rectangled *triangle* C B F, we have given the hypothenuſe B C, and the ſide F B, or its complement A B to a quadrant; we ſhall find the perpendicular C F, which being the meaſure of the angle C A B, that angle is found of courſe.

2. If one ſide A C be a quadrant, and the other A B greater than a quadrant, ſeek again the angle A: from A B ſubtract the quadrant, A D, and from the pole A deſcribe the arch C D, cutting the arch A B at right angles in D. Since in the rectangled *triangle* C D B, the hypothenuſe B C, and ſide D B, or exceſs of the ſide A B beyond a quadrant, is given, the perpendicular C D will be found as before, which is the meaſure of the angle A required.

3. If the *triangle* be iſoſceles, and A C = C F; and the angle A C F be required; biſect A F in D, and through D and C draw the arch D C. Since D C is perpendicular to A F, the angles A and F, and A C D, and D C F, are equal; from the hypothenuſe A C, and leg A D, given in the rectangled *triangle* A C D, we find the angle A C D; the double whereof is the angle required A C F: and from the ſame data may the angle A or F be found.

4. If the *triangle* be ſcalenous, and the angle A (*fig.* 32.) be required; from C let fall the perpendicular C D, and ſeek the ſemi-difference of the ſegments A D and D B, by ſaying, as the tangent of half the baſe A B is to the tangent of half the ſum of the legs A C and C B; ſo is the tangent of their ſemi-difference to the tangent of the ſemi-difference of the ſegments A D and D B: add then the ſemi-difference of the ſegments to the half baſe, to find the greater ſegment; and ſubtract the ſame from the ſame for the leſs. Thus having in the rectangled *triangle* C A D, the hypothenuſe A C, and the ſide A D, the angle A is found thence. After the ſame manner is B found in the other C D B, from C B and D B given.

12. Given the three angles A, B, and C, to find any of the ſides. Since in lieu of the given *triangle*, another may be aſſumed, whoſe ſides are equal to the given angles, and the angles to the given ſides; this problem is reſolved after the ſame manner as the preceding one.

Triangle, Triangulum, in *Aſtronomy*, a name which is common to two conſtellations; the one in the northern hemiſphere, called ſimply *triangulum*, or *triangulum cœleſte*; the other in the ſouthern hemiſphere, called *triangulum auſtrale*.

The ſtars in the northern *Triangle* in Ptolemy's Catalogue are 4; in Tycho's as many; in Hevelius's 12; in the Britannic 16; the longitudes, latitudes, magnitudes, &c. whereof, are as follow:

Names and ſituations of the ſtars.	Bayer's Char.	Signs.	Longitud.			Latitude.			Magnitude.
			°	′	″	°	′	″	
That preceding the vertex	d	♉	0	05	17	17	39	08	6
Vertex of the triangle	α		2	30	51	16	48	23	4
That following the vertex	ε		6	00	25	19	28	00	6
Firſt of three in the baſe	β		7	59	44	20	34	17	4
			7	18	45	17	06	18	7
5.									
Firſt of 3 inform. under triangle	ι		6	52	35	15	59	02	6
Contig. to the laſt of the baſe	η		8	42	40	18	34	12	6
Middle one of the baſe	δ		9	09	43	19	21	32	5
Laſt of the baſe	γ		9	10	21	18	56	07	4
S. of inform. under the triangle	a		7	38	31	13	55	26	6
10.									
	d		10	32	52	16	16	32	7
Laſt of theſe informes	c		9	59	34	14	14	03	6
A former contiguous to it			10	12	15	14	24	24	7
			13	08	28	20	00	37	6
			13	15	01	18	26	18	7
15.									
			12	56	17	8	12	12	7

The ſtars in the ſouthern *Triangle*, in Mr. Sharp's catalogue are five, the longitudes, latitudes, magnitudes, &c. of which are as follow.

Names and ſituations of the ſtars.	Signs.	Longitud.			Latitude.			Magnitude.
		°	′	″	°	′	″	
In the vertex	♐	17	01	49	46	04	51	2.3
North of the baſe		8	04	26	41	50	10	3
Following this		11	01	33	41	32	41	5
South of the baſe		5	35	03	48	01	32	3
In the middle of the baſe		6	40	17	45	12	48	5.
5.								

Triangle, *arithmetical*, a kind of numerical *triangle* invented by M. Paſcal, and formed in the following manner:

1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5
1 6 15 20 &c.
1 7 21 &c.
1 8 &c.
1 9

The firſt vertical column contains unit; the ſecond a ſeries of the natural numbers 1, 2, 3, 4, 5, &c. the third a ſeries of **triangular** *numbers*, 1, 3, 6, 10, &c. the fourth a ſeries of **pyramidal** *numbers*, &c. The numbers taken horizontally are the co-efficients of the different powers of a **binomial**.

M. Paſcal wrote a treatiſe on the *arithmetical triangle*, which is contained in the fifth volume of his works, publiſhed at Paris and the Hague in 1779, in five volumes, 8vo. In this publication we have alſo a deſcription, taken from the firſt volume of the French Encyclopedie, art. **Arithmetique** *machine*, of that admirable machine invented by Paſcal at the age of nineteen, which furniſhes an eaſy and expeditious method of making all ſorts of arithmetical calculations, without any other aſſiſtance than the eye and the hand.

Triangular *battalion*, in the *Military Art*. See **Battalion**.

Triangular *canon*. See **Canon** and **Sine**.

Triangular *compaſſes*, are ſuch as have three legs or feet, whereby to take off any triangle at once: theſe are much uſed in the conſtruction of maps, globes, &c. See **Compasses** *of three legs*.

Triangular *fort*. See **Fort**.

Triangular *leaf*, in *Botany*. See **Leaf**.

Triangular *numbers*, are a kind of polygonal numbers; being the ſums of arithmetic progreſſions, the difference of whoſe terms is 1.

Thus, Of arithmetical progreſs 1 2 3 4 5 6
are formed *triang. numb.* 1 3 6 10 15 21.

For the rationale and management of theſe numbers, ſee Malcolm's Arith. book v. ch. 2.

TRIANGULAR *quadrant*, is a SECTOR furniſhed with a looſe piece, whereby to make it an equilateral triangle.

The calendar is graduated thereon, with the ſun's place, declination and other uſeful lines; and by the help of a ſtring and a plumbet, and the diviſions graduated on the looſe piece, it may be made to ſerve for a QUADRANT.

TRIANGULAR *winding-ſtairs.* See STAIR.

TRIANGULARIS, in *Anatomy*, a name given to two muſcles, in reſpect of their figure.

The *triangularis pectoris*, which has ſometimes the appearance of three or four diſtinct muſcles, ariſes from the inſide of the ſternum, and is implanted into the cartilages which join the four loweſt true ribs to the ſternum.

The action of this muſcle is very obſcure, ſince both the origination and inſertion are at parts, not moveable, but together. Dr. Drake conjectures it may conduce towards forming the neceſſary incurvation of the ſternum, and by its over-tenſion in children, while the cartilages are ſoft, may occaſion that morbid acumination of the ſternum ſeen in rickety children. Others ſuppoſe it may contract the cavity of the thorax in expiration. See PECTORALIS and STERNOCOSTALES.

TRIANGULARIS *coccygis*, in *Anatomy*, a name given by Santorini, and others, to the muſcle now generally called ſimply COCCYGÆUS.

TRIANGULARIS *labii*. See DEPRESSOR *labii ſuperioris*.

TRIANGULARIS *penis*, in *Anatomy*, a name given by Morgagni, and others, to a ſuppoſed muſcle, called alſo by ſome *dilatator penis*, and *dilatator poſticus urethræ*; and by others *levator ani*.

It is truly no diſtinct muſcle, but a proceſs of the SPHINCTER *ani* running into the perinæum. See TRANSVERSALIS *penis*.

TRIANGULARIS *piſcis*, in *Ichthyology*, the name of a ſea-fiſh of a very remarkable figure, called in Engliſh the *coney-fiſh*, of which there are two ſpecies, the one having two horns, the other wanting that character.

The horned kind is uſually ſix or ſeven fingers breadth long, and about three fingers broad; the tail ends in a longiſh fin; the mouth is ſmall, having twelve ſtrong ſerrated teeth in the upper jaw, and eight larger ones in the lower; the head riſes gibbouſly from the mouth to the horns, and the back is humped in the middle; it has only one ſmall fin near the tail; its eyes are large and placed near the horns; beſide the fin near the tail, it has four others; the tail being one, and one more being ſituated on the back, and two on the belly; it has two horns like cocks ſpurs, growing ſtraight out of its forehead, and two others in a contrary direction, out of its belly near the tail; it has no ſcales, but has a hard ſkin, white on the belly, and brown every where elſe, and wonderfully marked with trigonal, tetragonal, and pentagonal and hexagonal figures.

The ſpecies which has no horns, has a broader belly, a longer tail, and is marked all over its body only with hexangular figures, and innumerable ſmall tubercles; its belly is yellowiſh, and the reſt of its body of a greyiſh or browniſh yellow; the mouth is narrow, and the teeth ſmall, five in the lower and eleven in the upper jaw; the eyes are large and round; it is hollow, and has very little fleſh. See *Tab.* V. *of Fiſhes*, N° 60.

Both theſe ſpecies, which belong to the genus OSTRACION in the Linnæan ſyſtem, are caught among the rocks, on the ſhores of the iſland of Java, and are ſometimes eaten by the inhabitants, being firſt ſkinned. Cluſ. Exot. lib. ii. cap. 27. Willughby's Hiſt. Piſc. p. 150.

TRIANGULARIS *ſplenii*, in *Anatomy*, a name given by Spigelius and others, to a muſcle of the head called by Winſlow, the upper portion of the SPLENIUS, or *ſuperior maſtoidæus*, and by Albinus, the *ſplenius capitis*. The old authors have deſcribed it under the name of the *primus caput moventium*.

TRIANTHEMA, *horſe-purſlane*, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the calyx is ſharp-pointed at the apex; it has no corolla; the germen is blunted, and the capſule is cut tranſverſely. There are three genera.

TRIARII, in the *Roman Militia*, a kind of infantry, armed with a pike, ſhield, a helmet, and a cuiraſs; they were thus called, becauſe they made the third line of battle.

The *triarii* were alſo called *poſtſignani*, becauſe ranged behind the principes who bore the ſtandard in a legion.

Polybius diſtinguiſhes four kinds of forces in the Roman army: the firſt, called *pilati*, or *velites*, he ſays were a raw ſoldiery, lightly armed. The *haſtati*, or ſpear-men, were a degree older, and more experienced. The third, called *principes*, princes, were ſtill older, and better ſoldiers than the ſecond. The fourth were the oldeſt, the moſt experienced, and the braveſt; theſe were always diſpoſed in the third line, as a corps de reſerve, to ſuſtain the other two, and to reſtore the battle, when the others were broken or defeated.

Hence their name of *triarii*: and hence the proverb, *Ad triarios ventum eſt*, to ſhew that one is at the laſt and hardeſt ſtruggle.

TRIAS *harmonica*, or the *harmonical* TRIAD, in *Muſic*, a compound of three radical ſounds, heard all together; two whereof are a fifth and a third above the other, which is the fundamental.

The triad is properly a conſonance formed of a third and fifth; which, with the baſe, or fundamental ſound, makes three different terms, whence the name *trias*. That of *harmonical* is doubtleſs given it from that wonderful property of the FIFTH, which divides itſelf naturally into two thirds, both excellent, and perfectly harmonical; ſo that this one ſound, diſpoſed between two others, makes two thirds at once, and of conſequence a double harmony.

Hence it is, that in *trios*, particularly, this concord is preferred to that which divides the octave into a fifth and a fourth; in regard here, if there be a concord on one ſide, there is a diſcord on the other; whereas in the former caſe the harmony is complete on both ſides.

Of the three ſounds which compoſe the harmonical *triad*, the graveſt is called the *fundamental*, or *baſs*; the acuteſt, i. e. that which makes the fifth, and which terminates the concord upwards, is called the *excluded* or *higheſt* ſound; and that which divides the fifth ſo agreeably into two thirds, is called the *harmonical mean*.

The diviſion of the fifth into two thirds may be performed two ways, viz. 1. Harmonically, when the greater third is loweſt, and the leſs above; in which caſe the *triad* is perfect and natural.

2. Arithmetical, when the leſs third is loweſt, and the greater above, in which caſe the *triad* is imperfect and flat. Both are good; but the latter is not to be often uſed.

TRIBE, TRIBUS, in *Antiquity*, a certain quantity or number of perſons; when a diviſion is made of a city or people into quarters, or diſtricts.

The city of Athens was divided into ten *tribes*. The Jewiſh nation into thirteen *tribes*, the deſcendants of the twelve ſons of Jacob, viz. the *tribes* of Judah, of Reuben, Gad, Aſher, Dan, Naphthali, Ephraim, Manaſſeh, Simeon, Levi, Iſſachar, Zebulun, and Benjamin; the poſterity of Joſeph being divided into two *tribes*, that of Manaſſeh, and that of Ephraim.

There were ten of theſe *tribes* that revolted, and followed Jeroboam. The other two, viz. thoſe of Judah and Benjamin adhered to the houſe of David, and to the worſhip of the true God, whilſt the other *tribes* declared for idolatry.

The Roman people were at firſt only divided into three *tribes*; and from this number *three*, *tres*, it was that the word *tribe*, *tribus*, took its riſe. This diviſion was accommodated by Romulus to the ſeveral nations he had united; the firſt conſiſted of the Albans, the ſecond of the Sabines, and the third of a mixture of fugitives, who came to ſeek an aſylum at Rome.

Servius Tullus, fearing this partition might occaſion ſeditions, divided the inhabitants of Rome by cantons, not by nations: accordingly, he diſtributed the city into four quarters, or *tribes*; and by reaſon a great number of citizens had retired into the country about, of thoſe he compoſed twenty-ſix other *tribes*; ſo that from this time the Roman people conſiſted of thirty *tribes*.

In after times, the number of *tribes* was increaſed to thirty-five; but they then ceaſed to be ranged according to the quarters of the city. The diſtribution depended on the cenſors, who formed their liſt at diſcretion, frequently confounding the country *tribes* with thoſe of the city.

A man was never abſolutely a Roman citizen, unleſs he had the *jus tribus*, i. e. till he were intitled to the honours of the magiſtrature, as alſo a right of voting in aſſemblies of the people; and this is what they called *jus quiritium*. Hence, the inhabitants of the municipal cities were only imperfect citizens, as being of no *tribe*.

The freed-men were obliged to purchaſe this *right of tribe*, which did not otherwiſe belong to them, though they were citizens of Rome.

The names of the thirty-five *tribes* were, 1. the Palatina, 2. the Suburrana; 3. the Collina; 4. the Eſquilina; 5. the Romilia; 6. the Æmilia; 7. the Cruſtumina; 8. the Cornelia; 9. the Fabia; 10. the Galeria; 11. the Lemonia; 12. the Mentian, or Menenia; 13. the Ocriculana; 14. the Papiria; 15. the Pollia; 16. the Popilia; 17. the Pupinia; 18. the Sergia; 19. the Veientina;

tina; 20. the Voltinia; 21. the Claudia; 22. the Stellatina; 23. the Tromentina; 24. the Arnenſis; 25. the Sabatina; 26. the Pomptina; 27. the Publilia; 28. the Mæcia; 29. the Scaptia; 30. the Oufentina; 31. the Falerina; 32. the Anienſis; 33. the Terentina; 34. the Velina; 35. the Quirina. In ancient authors, and inſcriptions, we meet with the names of others, viz. the Pinaria, Sappinia, Camilla, Ceſtia, Cluentia, &c.

TRIBOMETER, formed of τριϐω, *I rub*, and μετρω, *I meaſure*, in *Mechanics*, a term applied by Muſchenbroeck to an inſtrument invented by him for eſtimating the friction of metals. It conſiſts of an axis formed of hard ſteel, paſſing through a cylindric piece of wood; the ends of the axis, which are highly poliſhed, are made to reſt on the poliſhed ſemicircular cheeks of various metals, and the degree of friction is eſtimated by means of a weight ſuſpended by a fine ſilken ſtring or ribband over the wooden cylinder. For a farther deſcription and figure of this inſtrument, and the reſult of various experiments performed with it, ſee Muſchenb. Int. ad Phil. Nat. vol. i. p. 151, &c.

TRIBRACHYS, formed from τρεις, *three*, and βραχυς, *ſhort*, in the *Ancient Proſody*, a foot of verſe, conſiſting of three ſyllables, and thoſe all ſhort—as, *Mĕlĭŭs*.

Some of the ancients call this foot *trochæus*.

TRIBUCH, and TREBUCHET, a tumbrel, ducking or CUCKING-*ſtool*. See SCOLDS.

TRIBULASTRUM, in *Botany*, a name given by Juſſieu to a genus of plants, ſince called by Linnæus NEURADA.

TRIBULOIDES, in *Botany*, the name of a genus of plants, the ſame with the TRAPA of Linnæus.

TRIBULUS, *caltrop*, in *Botany*. See CALTROPS.

TRIBULUS *marinus*, the *caltrop-ſhell*, in *Natural Hiſtory*, the name of a peculiar ſpecies of the PURPURA. It is of a whitiſh colour, and has three rows of ſpines.

TRIBUNAL, *judgment-ſeat*, the ſeat of a JUDGE.

The *tribunal*, in a court of juſtice, is properly the ſeat or BENCH whereon the judge, and his aſſociates, are placed, for the adminiſtration of juſtice, &c.

The word is Latin, and takes its origin from a ſeat raiſed from the ground, wherein the *tribune* of the Roman people was placed to adminiſter juſtice.

TRIBUNAL, among the *Ancients*, was alſo a place from whence the people were harangued.

Among the Romans, it was an eminence in a temple, or a forum, as that called *pro roſtris*, where the people were harangued in *tribes*.

The French architects likewiſe uſe the word *tribune* for a gallery or eminence in a church, or any other place, wherein the muſic is placed for a ſymphony or concert.

Tribune, or *tribunal*, is alſo uſed for a room or hall, in which juſtice is adminiſtered; ſuch, e. g. as the courts at Weſtminſter. See *Tab. Architecture*, *fig.* 40.

TRIBUNE *of the people*, TRIBUNUS *plebis*, in *Antiquity*, a Roman magiſtrate, choſen out of the commons, to protect them againſt the oppreſſions of the great, and to defend the liberty of the people againſt the attempts of the ſenate and conſuls.

The tribunes of the people were firſt eſtabliſhed in the year of Rome 260. The firſt deſign of the creation was to ſhelter the people from the cruelties of uſurers, and to engage them to quit the Aventine mount, whither they had retired in diſpleaſure.

Their number, at firſt, was but two; and the next year, under the conſulate of A. Poſthumus Aruncius and Caſſius Viſcellinus, there were three more added; and this number of five was afterwards increaſed by L. Trebonius to ten.

The appellation *tribune* was given them, becauſe they were at firſt choſen out of the *tribunes* of the army. See the article following.

The *tribunes* were, as it were, the heads and guardians of the people. They called aſſemblies of the people when they pleaſed; and in theſe aſſemblies they frequently annulled the decrees of the ſenate. Nothing could be concluded without their conſent, which they expreſſed by ſubſcribing the letter T at the bottom of the decree. They had it alſo in their power to prevent the execution of any decree, without giving any reaſon for it, and merely by ſubſcribing *Veto*. This interpoſition was called *interceſſio*. They ſometimes even called the conſuls and dictator to account for their conduct, before the people.

The *tribunes of the people*, by virtue of their office, claimed and exerciſed a power of ſummoning the ſenate at any time, whenever the affairs of the people required it, though the conſuls themſelves were in the city. It has been taken for granted, on the authority of Valerius Maximus, that the *tribunes* of the people, on their firſt creation, were not admitted into the ſenate, but had ſeats placed for them before the door in the veſtibule. But we may reaſonably conclude, that a magiſtrate ſo ambitious and powerful, who could controul by his ſingle negative, whatever paſſed within doors, would not long be content to ſit without. Dionyſ. Halic. x. 31. Middlet. of Rom. Senat. p. 129. Val. Max. lib. ii. cap. 27.

A. Gellius ſays, that they were not made ſenators before the law of Atinius, who is ſuppoſed to be C. Atinius Labeo, *tribune* of the people, A. U. 623; but that cannot poſſibly be true, ſince it is evident from the authority of Dionyſius, that near four centuries before, the *tribunes*, by the mere weight and great power of their office, had gained an actual admiſſion into the ſenate, within two years after their firſt creation; in which we find them debating and enforcing, with great warmth, the demands of the commons, for a liberty of intermarriages with the nobles, and the choice of a plebeian conſul. So that the intent of this Atinian law could not be, as it is commonly underſtood, that the *tribunes* ſhould be ſenators in virtue of their office, for that they had been from the beginning; but that for the future they ſhould always be choſen out of the body of the ſenate, or, which is the ſame thing, out of thoſe who had already borne the office of quæſtor. A. Gell. xiv. 8. Vide Pighil. Annales, A. U. 623. Dionyſ. lib. x. 11. Dionyſ. xi. 57. Middleton of Rom. Sen. p. 45.

Sylla, the dictator, was the firſt who preſumed to put a ſtop to the encroachments of the *tribunes*, A. U. 672; but under Cotta, the conſul, they recovered part of their power, A. U. 679, and in 683, Pompey the Great reeſtabliſhed them in the poſſeſſion of their ancient privileges. Their power ſubſiſted till the time of Julius Cæſar. And in the year of Rome 731, the ſenate by a decree transferred the whole authority of *tribunes* of the people to Auguſtus and his ſucceſſors, ſo that they had little more than the name and form of magiſtrates; whence the emperors were ſaid to be *tribunitia poteſtate donati*. Accordingly, Auguſtus himſelf was *tribune* for thirty-ſeven years; Tiberius aſſumed the ſame quality; as likewiſe did his ſucceſſor, ſignifying the year of their *tribunate* on their medals and coins: but their deſign herein was only to poſſeſs themſelves of all the authority, that there might be nobody to oppoſe them.

In the time of the emperors Nerva and Trajan, the dignity of *tribune of the people* was a mere title without office and honour; and thus it continued till the reign of Conſtantine the Great, after which there occurs no mention of this magiſtrate.

TRIBUNE *of the ſoldiers*, TRIBUNUS *militum*, or *militaris*, an officer in the Roman army, who commanded in chief over a body of forces, particularly a diviſion of a legion; and was much the ſame with our colonel, or the French meſtre de camp.

There is a diſtinction of the *tribunes* into *laticlavii* and *anguſticlavii*: thoſe borne of noble families were allowed, after they were made *tribunes* of a legion, to take the *latuſclavus*. The reſt were only to wear the *anguſtuſclavus*; whence Suetonius takes care to inform us, that his father was *tribunus laticlavius* of the thirteenth legion. Over theſe *tribunes* of legions and cohorts, there were other *tribunes* who commanded in the abſence of the conſuls, and who were inveſted with a conſular authority. Budæus will have theſe to be much the ſame as the marſhals of France, or, at leaſt, as our lieutenants-general.

Romulus likewiſe eſtabliſhed a *tribune* of the cavalry, *tribunus equitum*, who was the ſame with the *magiſter equitum* under the dictators, the firſt officer after the kings.

The *tribunes* of the ſoldiery were of an elder ſtanding than thoſe of the people; thoſe latter being elected out of the former. Varro will have it they were called *tribunes*, becauſe, at firſt, they were only three in number in each legion, when the legion conſiſted of three thouſand men, taken out of the three tribes then on foot. In proportion as the legion was increaſed, the number of *tribunes* was likewiſe increaſed to the number of ſix.

At firſt, the nomination lay in the general of the army; but in the year of Rome 391, it was appointed, that the people ſhould nominate one part, and the general another: the latter were call *Ruſuli*, from Rutilius Rufus, who paſſed that law.

Thoſe choſen by the people in the comitia, were called *comitiati*; they were indifferently either patricians or plebeians; and they had the ſame marks of honour as the conſuls themſelves. The *tribune of the pretorian cohorts* was the captain of the guards.

TRIBUNE was alſo an appellation given to various other officers; as the *tribuni ærarii*, *tribunes of the treaſury*. *Tribune of the celeres*, or Roman light-horſe, the officer who commanded them. *Tribuni fabricarum*, thoſe who had the direction of the making of arms. *Tribuni marinorum*, *tribuni nelanorum*, and *tribuni voluptatum*, mentioned in the Theodoſian Code, as intendants of the public ſhews, and other diverſions.

The title of TRIBUNE, TRIBUNUS, was alſo given to the chief of each tribe.

TRIBUNITIAN, Tribunitius, a term among antiquaries and medalliſts. The *tribunitian power* was the dignity, office, or authority of a tribune of the people.

This power was aſſumed by the emperors, and makes one of the chief titles they bear on their medals: the quality was firſt introduced by Auguſtus, to keep the ſovereign authority over the other magiſtrates, without either taking that of dictator or king. Indeed, it was offered to Julius Cæſar, but he deſpiſed it. Auguſtus is the firſt who uſed it, and his ſucceſſors followed his example. They reckon the years of their empire on their medals by thoſe of their *tribunitian power*.

This power was ſometimes given them for a certain number of years, and ſometimes for ever. Sometimes the emperors would communicate the power to ſuch as they aſſociated, or as they intended to ſucceed them: and Tiberius held it fifteen years with Auguſtus. But this practice only obtained till the time of Valerian and Gallienus. After them we only find TR. P. II. in Claudius; TR. P. V. in Aurelian; and TR. P. in Probus. This, however, is only to be underſtood of medals; for in inſcriptions we find it after that time.

Cardinal Norris and F. Pagi have diſputed about this *tribunitian* power, wherein it conſiſted. The firſt maintains, that it did not at all differ from that of the ordinary tribunes, which conſiſted in three things: 1. In the right of oppoſing all the acts and reſolutions of the other magiſtrates. 2. In that it rendered their perſons ſacred and inviolable. 3. In a power of making edicts and laws.

F. Pagi aſſerts, that it made an addition to the power of the tribunes; that the privilege it conferred of making edicts, was more ample than that of the ordinary tribunes; beſides, that it carried with it a power of convening the ſenate at pleaſure.

M. Spanheim is of F. Pagi's opinion; he believes, that the *tribunitian power* had much the advantage of the tribunate: 1. In that it was peculiar to the patricians, and did not reduce the perſon who held it to the degree of a plebeian. 2. In that it was not confined to the city of Rome alone, like the other; but that it extended throughout the empire, as well as the proconſular power, which was uſually annexed to it. 3. That the dignity of the tribunes was inferior to that of the pretors; whereas the *tribunitian power* of the Cæſars conferred, according to Tacitus, a ſovereign authority over all magiſtrates, and rendered ſuch as it was communicated to, equal to the emperors, and even made them their colleagues in the empire; beſides the power of oppoſing the enterprizes of all the other magiſtrates; and that it rendered their perſons ſacred, and gave them a right to aſſemble and diſmiſs the ſenate; which were privileges the *tribunitian power* had in common with the tribunes.

F. Hardouin thinks we ſhould diſtinguiſh two *tribunitian powers*; the one civil, the other military; but the proof he brings thereof is very weak. M. Spanheim ſays, his diſtinction is only founded on vain conjectures, none of which deſerves notice.

The learned are greatly divided as to the month and day whereon the *tribunitian power* commenced: Sigonius and Petavius will have it begin on the 1ſt of January: others, as Perozinius, on the fifth of the calends of July: M. Toinard on the fourth of the ides of December: Onuphrius, cardinal Noris, F. Pagi, &c. on the day of the emperor's acceſſion to the empire; with this difference, that F. Pagi takes it to be on the fifth of the calends of the month wherein the emperor was proclaimed; and that this day was, for this reaſon, held ſacred among the Romans.

F. Hardouin thinks, that on medals the *tribunitian power* commences on the anniverſary of the building of Rome, viz. the eleventh of the calends of May, excepting on the Greek medals, where it begins in September, in regard this month, which began the Greek year, was near the time when the *tribunitian power* was firſt conferred.

Of all theſe ſentiments the moſt probable is that of Onuphrius, &c. ſetting aſide the reſtriction of F. Pagi. See M. Spanheim, Diſſert. xii. tom. ii. p. 429.

TRIBUTA *comitia*. See COMITIA.

TRIBUTARY, Tributarius, one who pays TRIBUTE to another, in order to live in peace with him, or to ſhare in his protection.

The republic of Raguſa is *tributary* to the grand Turk; ſo alſo is the cham of Little Tartary, &c.

TRIBUTE, Tributum, a tax, or impoſt, which one prince or ſtate is obliged to pay to another, as a token of dependence; or in virtue of a treaty, and as a purchaſe of peace.

The Romans made all the nations they ſubdued, pay them *tribute*. Mahomet laid it down as a fundamental of his law, that all the world ſhould pay him *tribute*.

In the ſtates of the grand ſignor, Chriſtian children are taken, in way of *tribute*, to make AGEMOGLANS, JANIZARIES, &c.

Tribute is ſometimes alſo uſed for a perſonal contribution, which princes levy on their ſubjects by way of capitation, or poll-money.

In this it differs from an impoſt, which is properly what is laid on merchandizes.

TRICENNAL. See TRENTAL.

TRICEPS, in *Anatomy*, a muſcle of the thigh, having three originations, and as many inſertions; and which may therefore be conveniently divided into three muſcles, all ariſing from the os pubis, and inſerted into the linea aſpera of the thigh-bone, whereof they poſſeſs the greateſt part. See *Tab. Anat (Myol.) fig.* 1. *n.* 53. *fig.* 2. *n.* 36. *fig.* 6. *n.* 36. *fig.* 7. *n.* 26. They alſo ſerve as adductores, and draw the thighs together, and move them inward; as when in riding we preſs the thighs cloſe againſt the ſaddle; when in ſitting, we hold any thing cloſe between the knees; when we croſs the thighs; or when in ſtanding we bring the legs cloſe together, in order to jump.

Triceps *primus*, a fleſhy and flat muſcle ſituated between the os pubis and the whole length of the os femoris; the firſt and ſecond croſs each other in ſuch a manner, as that the muſcle which is the firſt on the os pubis, becomes the ſecond on the os femoris, and *vice verſa*; but the third keeps its rank.

The *triceps primus* is fixed above by a ſhort tendon to the tuberoſity or ſpine of the os pubis, and to the neighbouring part of the ſymphyſis, its fibres mixing a little with thoſe of the pectineus. From thence it runs down, increaſing in breadth, and is inſerted by fleſhy fibres interiorly in the middle portion of the linea femoris aſpera. At the lower part of this inſertion a portion of the muſcle ſeparates from the reſt, and ſends off a long tendon, which, together with a like tendon of the *triceps tertius*, is inſerted in the inner condyle of the extremity of the os femoris. Winſlow.

Triceps *ſecundus*, a fleſhy and flat muſcle, fixed above by fleſhy fibres below the ſuperior inſertion of the *triceps primus* in all the outſide of the inferior ramus of the os pubis, as low as the foramen ovale; but ſeldom ſo low as the ramus of the os iſchium. This inſertion is broader than that of the former muſcle. From thence it runs down, and is inſerted in the upper part of the linea aſpera, between the pectineus and *triceps primus*, mixing a little with each of thoſe muſcles. This inſertion appears ſometimes divided. Winſlow.

Triceps *tertius*, a fleſhy and flat muſcle, fixed above by fleſhy fibres to the anterior part of all the ſhort ramus of the iſchium, and to a ſmall part of the tuberoſity of that bone; this inſertion covers ſome part of the tendon of the ſemi-membranoſus, and is covered by that of the ſemi-nervoſus; q. d. *tria capita*; from thence it runs down and is inſerted by fleſhy fibres in the linea aſpera, almoſt from the little trochanter down to the middle of the os femoris.

It goes down lower than the firſt *triceps*, ſending off a ſeparate portion, like that of the ſecundus. Theſe two portions join together and form a common tendon, which running down to the lower extremity of the os femoris is inſerted in the back part of the tuberoſity of the inner condyle; this ſeparate portion is ſometimes large enough to be miſtaken for a diſtinct muſcle, making a quadriceps inſtead of a *triceps*. In all this progreſs this muſcle is joined to the vaſtus internus by a perforated aponeuroſis, through which the blood-veſſels paſs. Winſlow.

Triceps, in *Mythology*, a ſurname given to Mercury, becauſe he exerciſes his functions in heaven, on earth, and in the infernal regions, and is exhibited under three different forms, according to the three different places in which he is employed.

TRICHECUS, in *Zoology*, a genus of the order of *bruta*, and claſs of *mammalia*, in the Linnæan ſyſtem: the characters of which are; that it has no cutting teeth; that it has tuſks only in the upper jaw; that the grinders on both ſides are formed of a rugged bony ſubſtance, that the lips are geminated, and the hinder feet formed into fins. There are two ſpecies, viz. the manati, or SEA-*cow*, and the MORSE or WALRUS.

TRICHERIÆ, in *Natural Hiſtory*, the name of a genus of foſſils, of the claſs of the fibrariæ; the characters of which are, that they are not elaſtic, and are compoſed of ſtraight and continuous filaments. See *Tab. of Foſſils*, *Claſs* 1.

The word is derived from the Greek τριχες, capillaments or fibres. The bodies of this genus are divided into thoſe which have narrower filaments; and there are ſix known ſpecies of it; all which burn very readily to a fine plaſter, like the gypſums; and ſome of them are found in particular places in ſuch great abundance, that it would be very advantageous to collect and burn them. Hill's Hiſt. of Foſſils, p. 90.

TRICHESTRUM, in *Natural Hiſtory*, the name of a genus of foſſils, of the claſs of the ſelenites, but differing extremely in figure and ſtructure from the common kinds.

The word is derived from the Greek τριχες, *hairs* or *filaments*, and αστηρ, *a ſtar*, and expreſſes a ſet of bodies, compoſed of filaments arranged into the form of a ſtar.

The ſelenitæ of this genus are compoſed of filaments ſcarce any where viſibly arranged into plates or ſcales, but diſpoſed in form of a radiated ſtar, made of a number of disjunct ſtriæ. See *Tab. of Foſſils, Claſs* 2.

Of this genus there is only one known ſpecies, which is of a pale brown, and is compoſed of extremely fine and ſlender filaments. It is formed like the lepaſtrum in the accidentally open cracks in the ſeptaria, or ludus Helmontii, and is no other way different from the bodies of that genus, than as in all the ſelenitæ the plates they are compoſed of are made up of filaments nicely arranged: in this as in ſome other of thoſe bodies, the filaments have never arranged themſelves into plates at all, but are diſpoſed into the form of a ſtar compoſed of ſingle threads. This body very readily and regularly ſplits according to the arrangements of the fibres; and is in ſome pieces tolerably pellucid.

It is found only in one place, ſo far as is yet known, which is under the cliffs of Sheppy-iſland, in Kent; where it is conſiderably plentiful, and makes a very elegant figure on the broken maſſes of ſeptaria, which are in immenſe numbers ſtrewed upon the ſhore. Hill's Hiſt. of Foſſ p. 150.

TRICHIASIS, in *Surgery*, the name of a diſtemperature of the eyes, in which the eye-lids are inverted, and in which the eye-laſhes hurt and irritate the eyes.

The cilia or margins of the eye-lids are ſometimes inverted ſo as greatly to irritate the ſenſible coats of the eye, and bring on intenſe pains and inflammation, which, without timely aſſiſtance, may greatly injure, if not totally deſtroy the ſight. This diſorder is generally owing to accident, as the irregular cicatrix left on the part from a burn, the ſmall-pox, an ulceration or wound, or ſome other external injury. But ſometimes a relaxation of the ſkin, and a paralytic diſorder of the eye-lids, are the chief cauſes of it.

Whatever cauſe it is from, it is always difficult enough to be remedied; for it is hardly poſſible for the ſurgeon to remove it, ſo as to prevent its returning, without extirpating the offending hairs; and if theſe be cut off cloſe, it will be to no purpoſe, becauſe the rigid ſtumps of the hairs will irritate the eye even worſe than the whole hairs did before. It is a very nice operation alone that can make a cure; here the hair muſt be pulled up ſingly by the roots, and the places of their inſertion ſingly cauterized with a hot broad-pointed needle; but this the patient will ſeldom ſubmit to, and the only remaining method then, is to fill up the ſinuſes out of which they were extracted with the lapis infernalis. But in this the greateſt care muſt be taken, that no part of that application get into the eye. The eaſieſt method is the touching of the cavities, out of which the hairs have been pulled up, with a pencil-bruſh dipped in a mixture of ſpirit of ſal ammoniac and highly rectified ſpirit of wine, by which means they will cloſe up, and no more hairs will grow from them. Heiſter's Surgery, p. 369.

TRICHIDES, in *Ichthyology*, a name uſed by the ancients, for a fiſh of the harengi-form kind, probably the PILCHARD, which they called alſo *ſardinia* and *ſardella*.

TRICHILIA, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are, that the calyx is quindentated; it has five petals, a cylindric nectarium, bearing antheræ at its opening, a three-celled and three-valved capſule, and berried ſeeds. There are four ſpecies.

TRICHIURUS, in *Ichthyology*, a genus of the order of *apodes*, the characters of which are; that the head is extended, with lateral opercula; that the teeth are enſiform, and ſemi-ſagittated at the apex; that it has ſeven branchioſtegous rays; that the body is compreſſed and enſiform, and the tail ſubulated, without any fin: whence it is called LEPTURUS, and in Engliſh *needle-tail.* There is one ſpecies, viz. the *Indian* EEL of Willughby, or MUCU of Braſil.

TRICHOMANES, in the Linnæan ſyſtem of *Botany*, the name of a genus of capillary plants, belonging to the order of *filices*, and claſs of *cryptogamia*, deſcribed by Plumier; the characters of which are theſe: on the margin of the leaves ſtands a ſingle erect turbinated cup, and a ſtylus in the manner of a briſtle terminates at the capſule; the plants of this genus are very different from what other authors call the *trichomanes*; which, according to Linnæus, is not a diſtinct genus of plants, but is a ſpecies of aſplenium. Linnæus enumerates eleven ſpecies.

The fruit of the *trichomanes* is a roundiſh capſule, of a membranaceous texture, and covered with a ſort of ſcales; theſe are ſurrounded with an elaſtic ring, by the contraction of which they are burſt, and the ſeeds thrown out. Tour. Inſt. p. 539.

The *trichomanes*, or *Engliſh maiden-hair*, which is the ASPLENIUM *trichomanes* of Linnæus, ſerves with us as a ſuccedaneum for the true adiantum, or maiden-hair, which is not a native of England, and by the careleſſneſs of our druggiſts is ſeldom brought over to us; the whole plant, ſtalks and leaves together, are uſed, and the virtues are in their greateſt perfection, if it be gathered in the month of September.

This plant is perennial, and grows wild in ſhady grounds and old walls; it has a mucilaginous, ſomewhat ſweetiſh and roughiſh taſte, and little or no particular flavour. It is accounted ſerviceable in diſorders of the breaſt, particularly in tickling coughs and hoarſeneſs from thin acrid defluxions; and in theſe intentions it is very little, if at all, different in quality from the adiantum. It is uſually directed in infuſion or decoction, with the addition of a little liquorice; a pectoral ſyrup is prepared in the ſhops from an infuſion of five ounces of the dry leaves, and four of liquorice root in five pints of boiling water. Lewis.

TRICHOSANTHES, *ſerpent-cucumber*, in *Botany*, a genus of the *monoecia ſyngeneſia* claſs. Its characters are theſe: it has male and female flowers, at ſeparate diſtances, on the ſame plant; the male flowers have a long ſmooth empalement on one leaf, cut into five ſmall ſegments, which are reflexed; the petal is plain, ſpreading and cut into five parts, ending in long branching hairs; they have three ſhort ſtamina ariſing from the point of the empalement, terminated by cylindrical erect ſummits joined in a bed, and three ſmall ſtyles faſtened to the empalement; the female flowers ſit upon the germen, and have empalements and petals like the male flowers, but have no ſtamina; they have a long ſlender germen ſituated under the flower, ſupporting a ſtyle the length of the empalement, crowned by three oblong ſtigmas; the germen afterward turns to a long ſucculent fruit, having three cells, encloſing many compreſſed ſeeds. Linnæus enumerates four ſpecies. We have but one ſpecies of this genus in the Engliſh gardens, which grows naturally in China; it is annual, and of the cucumber tribe.

TRICHOSTEMA, in *Botany*, a genus of the *didynamia gymnoſpermia* claſs. Its characters are theſe: the flower has a lipped empalement; the upper lip twice as large as the under, and cut into three equal acute ſegments, the under lip in two; the flower is of the lip-kind, and has a very ſhort tube, the upper lip is compreſſed and hooked, the under is cut into three parts, the middle one being the leaſt; it has four hair-like ſtamina which are long and incurved, two of them being a little ſhorter than the other, terminated by ſingle ſummits, and a four-pointed germen, ſupporting a ſlender ſtyle, crowned by a bifid ſtigma; the germen afterward turns to four roundiſh ſeeds encloſed in the ſwoln empalement of the flower. There are two ſpecies.

TRICHOURI, in *Natural Hiſtory*, a term uſed by ſome authors to expreſs ſuch flies, as have one or more hairs growing out at their tails; theſe are called alſo SETICAUDÆ.

TRICHRUS, in *Natural Hiſtory*, the name of a ſtone deſcribed by the ancients, and ſaid to yield three colours: in their common way of preparing bodies of this kind for medicinal uſe (which was by rubbing them down on a porphyry, or other hard ſtone with water) this firſt coloured the water black, then red, and laſtly white. It ſeems to have been a kind of hæmatites, or blood-ſtone.

TRICIPITIS *caput primum*, in *Anatomy*, a name given by many authors to a muſcle of the thigh, called by Albinus *abductor femoris*; Douglas calls it *abductor primus femoris*, and Winſlow the *muſculus primus tricipitis.* It is the *pars octavi femoris* of Veſalius; that author and indeed many others of the earlier anatomiſts, not eſteeming it a diſtinct muſcle. See TRICEPS.

TRICLARIA, formed of τρεις, *three*, and κληρος, *heritage*, in *Mythology*, a ſurname of Diana, aſcribed to her becauſe ſhe was honoured by three cities of Achaia, viz. Aroe, Anthia, and Meſſatis, with an annual feaſt; the preceding night being ſpent in devotion. Encycl.

TRICLINIUM, in *Antiquity*, the name given by the Romans to the room in which they eat; and alſo to the beds upon which they reclined at meat, ſo called, becauſe it was contrived to accommodate three perſons.

TRICOR, a name by which ſome of the chemical writers have called gold.

TRICUSPIDES, in *Anatomy*, an epithet given to three valves ſituated at the entrance of the vena cava into the heart.

They open from without inwards, ſo as to let the blood of the cava paſs into the heart, but prevent its reflux into the cava.

They are thus called from their figure, which is triangular; ſor which reaſon they are alſo called by the Greeks τριγλωχινες.

TRIDACNÆ, in *Natural Hiſtory*, a genus of bivalve SHELLS.

TRIDAX, in *Botany*. See *American* STAR-WORT.

TRIDE, in the *Manege*, ſignifies ſhort and ſwift; thus a *tride pace*, is going of ſhort and quick motions, though united and eaſy. A *tride career*, is a very faſt gallop, with the times or motions ſhort and nimble; and ſo of other motions. Some apply the word only to the motion of the haunches.

TRIDENT, TRIDENS, an attribute of NEPTUNE; being a kind of SCEPTRE which the painters and poets put in the hand of that god. It is in form of a ſpear or fork with three prongs, whence the word.

The poets tell us, that Neptune makes the earth open whenever he ſtrikes it with his *trident*.

TRIDENT, among *Mathematicians*, is uſed for a kind of PARABOLA, by which Des Cartes conſtructed equations of ſix dimenſions.

TRIEDROSTYLA, derived from τρις, *thrice*, εδρα, *a ſide*, and συλος, *a column*, in *Natural Hiſtory*, the name of a genus of ſpars.

The bodies of this genus are ſpars, in form of trigonal columns, adhering by one end to ſome ſolid body, and terminated at the other by a trigonal pyramid. Of this genus there are four known ſpecies. Hill.

TRIEMERUS, the *three-day fly*, in *Natural Hiſtory*, a fly ſomewhat like the butterfly; it has four large yellowiſh wings, and a long body, with a head furniſhed with long antennæ, large eyes, and a ſpiral trunk. It is found among the nettles and mallows.

TRIEMIMERIS, τρημιμερις, *ſemiternaria*, a kind of cæſura in Latin verſe, wherein, after the the firſt foot of the verſe, there remains an odd ſyllable, which helps to make up the next foot.

As in, *Ille latus niveum molli ſultus hyacintho.*

TRIENNIAL, an epithet applied chiefly to offices or employments which laſt for three years.

Thus we ſay, a *triennial* government; moſt regular monaſteries have *triennial* ſuperiors; that is, they elect new ones at the end of each three years.

In 1695, an act was made for *trienniul* parliaments, i. e. for parliaments which ſhould be diſſolved, and the members be elected anew, every three years. Till that time, the king had it in his power to prorogue and continue his parliament as long as he pleaſed. This opened a door to corruption, which the *triennial* bill was intended to prevent.

The *triennial* act has, from ſome other views, been ſince repealed; for the great ſtruggles uſed at elections, the great ferment it uſually put the nation into, the great expences upon that occaſion, with other conſiderations, determined the legiſlature, in 1717, to change *triennial* parliaments for ſeptennial ones. See *Diſſolution of* PARLIAMENT.

TRIENS, in *Antiquity*, a copper-money, of the value of one third of an as, which on one ſide bore a Janus's head, and on the other a water-rat.

This was the piece of money uſed to be put in the mouths of the deceaſed, to pay Charon his fare for their paſſage into the other world.

TRIENS, or TRIENTAL, was alſo uſed for a drinking cup, and that which is ordinarily uſed. It contained four cyathi.

TRIENTALIS, in *Botany*, the name of a genus of plants of the *heptandria monogynia* claſs: the characters of which are theſe: the perianthium is compoſed of ſeven leaves, and is permanent; the leaves are narrow, pointed, and wide expanded; the flower is of the ſtellated kind, and is compoſed of ſeven petals, which ſtand flat and open, and adhere together very ſlightly at the top, theſe are a little longer than the leaves of the cup; the ſtamina are ſeven capillary filaments of the length of the cup, but inſerted into the flower; the antheræ are ſimple; the germen of the piſtil is globular; the ſtyle is capillary, and of the length of the ſtamina; and the ſtigma is headed; the fruit is a dry berry, of a globular form, formed of an extremely thin cruſt, and having only one cell; the ſeeds are few in number, and are of an angular figure; the receptacle is large enough to hold a great number of them; the number of the leaves of the cup ſometimes varies. There is one ſpecies.

TRIERARCHI, τριηραρχοι, among the *Athenians*, commiſſioners choſen annually out of the richeſt citizens, who are obliged to provide all ſorts of neceſſaries for the fleet, and to build ſhips at their own charge. See Potter, Archæol. Græc. lib. i. cap. 15. tom. i. p. 86.

TRIERS, in *Law*. See TRIORS.

TRIETERIS, τριετηρις, in the *Ancient Chronology*, a cycle of three years.

Thales, it is ſaid, obſerving that the lunar revolution never exceeded thirty days, appointed twelve months of thirty days each; ſo that the year conſiſted of three hundred and ſixty days; and in order to reduce theſe months to an agreement with the revolution of the ſun, he intercalated thirty days at the end of every two years, whence that ſpace of time was called a *period of three*, becauſe the intercalation was not made till after the expiration of full two years, though really it was only a period of two years; as we are informed by Cenſorinus, de Die Natali, cap. 18.

TRIETERIA, in *Antiquity*, feaſts which the Bœotians and Thracians held every three years, in honour of Bacchus, and in remembrance of his expedition into India, which laſted three years.

TRIEXAHEDRIA, formed of τρις, *thrice*, εξ, *ſix*, and εδρα, *a ſide*, in *Natural Hiſtory*, the name of a genus of ſpars.

The bodies of this genus are perfect and pellucid cryſtalliform ſpars, conſiſting of thrice ſix planes, being compoſed of an hexangular column, terminated at each end by an hexangular pyramid; of this genus there are three known ſpecies. Hill.

TRIFAX, among the *Romans*, a javelin three cubits long, which was thrown by the catapulta.

TRIFOLIUM, TREFOIL, denotes ſeveral three-leafed plants. See TREFOIL.

That moſt uſed in medicine is the *trifolium paluſtre*, MENYANTHES *trifoliata* of Linnæus, or BUCK-BEAN.

This plant is perennial, grows wild in marſhy places, and flowers in May. The leaves have a bitter penetrating taſte, which they impart both to watery and ſpirituous menſtrua; without any remarkable ſmell or flavour. They have of late years come into common uſe, as an alterative and aperient, in impurities of the humours, and ſome hydropic or rheumatic caſes. They are uſually taken in the form of infuſion, with the addition of ſome of the acrid antiſcorbutic herbs, which in moſt caſes improve their virtue, and of orange-peel, or ſome other grateful aromatic, to alleviate their ill-taſte: they are ſometimes, among the common people, fermented with malt liquors, for an antiſcorbutic diet-drink. Their ſenſible operation is by promoting urine, and ſomewhat looſening the belly. Lewis.

TRIFOLIUM *acidum*, in *Botany*, a name given by many authors to the oxys, or *wood*-SORREL, from its having its leaves always three on a ſtalk, and being of an acid taſte.

TRIGA, in *Antiquity*, a kind of car, or chariot, with three horſes.

The *triga*, in reality, was only drawn by two horſes; ſo that it was properly a BIGA; but it had, beſides, a third horſe tied to the others, like a led horſe, for change. Statius calls the third horſe, *equus funalis*; Heſychius, παρηορος; and Dionyſius Halicarnaſſeus, σειραιος.

We do not find the *triga* on any ancient monument; but it was a long time in uſe among the Romans, at their ludi Circenſes. The Greeks, who firſt introduced it, ſoon abandoned it.

TRIGAMY, a third marriage; or the ſtate of a perſon who hath been married three times.

In the ancient church, *trigamy* was only allowed to ſuch as had no children by their former marriages.

If, having children by one or both the former, they married again, after forty years of age, they were excluded from communion for five years. If they were only forty years old, the penance was but four years. See BIGAMY.

TRIGEMINI *tertius*, in *Anatomy*, a name given by Spigelius and others, to a muſcle called by Winſlow the COMPLEXUS *minor* or *maſtoidæus lateralis*; and by Cowper and Albinus, *trachelo-maſtoidæus*.

TRIGINTAL. See TRENTAL.

TRIGLA, in *Ichthyology*, the name of a genus of fiſh, of the order of the *thoracici*; for the diſtinguiſhing characters of which, ſee GURNARD. Linnæus enumerates nine ſpecies, as the LYRA, GURNARD, &c.

The characters of this genus, according to Artedi, are theſe: the branchioſtege membrane contains ſeveral bones; the head is very declivious, from the eyes to the end of the ſnout, and is large, aculeated, and as it were ſquare; the head is the broadeſt part of the fiſh, it thence grows gradually narrower, till it ends in a very ſmall tail: in many of the ſpecies of this fiſh, there are two or three articulated appendices growing under the pectoral fins; the eyes ſtand on the top of the head, and are covered with a ſkin; there are two back-fins, the firſt of which is prickly; the pectoral fins in ſome of the ſpecies are very large.

Many of theſe fiſh are capable of making a noiſe; and ſome of them, by the help of their pectoral fins, can ſuſtain themſelves for a time out of the water, and fly to ſome diſtance. The appendices of the pylorus are from five to twenty.

Of thoſe *triglæ*, which have continuous, obtuſe, and undivided ſnouts, there are ſeven ſpecies, among which is the red *trigla*, with the ſnout divided into two little horns, and with the opercula of the gills ſtriated: this is the *cuculus*, and *lyra* of ſome authors. The fiſh grunts when taken out of the water, and the noiſe has been ſuppoſed to be like that of a cuckow, whence the name.

Of thoſe *triglæ*, which have the ſnout very deeply divided, and opened into two very broad parts, there are three ſpecies. Artedi Gen. Piſc. p. 32.

TRIGLOCHIN, *arrow-headed graſs*, in *Botany*, a genus of the *hexandria trigynia* claſs: the characters are theſe; it has a three-leaved calyx, three cup-ſhaped petals, no ſtyle, and a capſule opening at the baſe. There are two ſpecies, the ſea and the marſh *triglochin*.

TRIGLYPHS, formed from τριγλυφος, q. d. *three engravings*, from γλυφω, *ſculpo*, in *Architecture*, a ſort of ornaments repeated at equal intervals in the Doric FREEZE. Each *triglyph* conſiſts of two entire gutters, or channels, cut to a right angle, called *glyphes*, and ſeparated by three interſtices, called by Vitruvius *femora*, from each other, as well as from two other half-channels which are at the ſides. See *Tab. Archit. fig.* 28, N° 8.

The ordinary proportion of *triglyphs*, is to be a module broad, and one and a half high. But this proportion, M. le Clerc obſerves, ſometimes occaſions ill proportioned intercolumnations in the porticoes; for which reaſon he chuſes to accommodate the proportion of his *triglyphs* to that of the INTERCOLUMNATION.

The intervals between the *triglyphs* are called *metopes*.— Under the channels, or glyphes, are placed guttæ, or drops.

The *triglyphs* make the moſt diſtinguiſhing character of the Doric order. Some imagine them originally intended for the conveyance of the guttæ that are underneath them: others fancy they bear ſome reſemblance to a lyre, and thence conjecture the ornament to have been originally invented for ſome temple ſacred to Apollo. See Doric.

Triglyph, *capital of a*. See Capital.

TRIGON, Trigonus, formed from τριγωνος, *triangle*, in *Geometry*, a triangle.

Trigon, in *Aſtrology*. See Triplicity.

Trigon, in *Aſtronomy*, denotes an aſpect of two planets, wherein they are 120 degrees diſtant from each other; this is called alſo *trine*.

The *trigons* of Mars and Saturn are by aſtrologers held malific aſpects.

Trigon, Trigonon, was alſo a muſical inſtrument, uſed among the ancients.

The *trigon* was a kind of triangular lyre, or harp, and was invented by Ibycus.

It was uſed at feaſts, and played on by women, who ſtruck it either with a quill, or beat it with ſmall rods of different lengths and weights, to occaſion a diverſity in the ſounds. See Hawkin's Hiſt. Muſ. vol. i. p. 247.

Trigon, or Triangle *of ſigns*, is the name of an inſtrument uſed for drawing the arcs of the ſigns upon dials: it may be made of braſs or any other ſolid matter, and of any ſize at pleaſure. This inſtrument is conſtructed after the following manner: firſt draw the line *a b* (*Tab.* IV. *Aſtronomy*, *fig.* 95.) repreſenting the axis of the world, and *a c* perpendicular to it, repreſenting the radius of the equinoctial; and about the point *a* deſcribe the circular arc *d c e* at pleaſure. Then reckon 23° ½ both ways from the point *c* upon the ſaid arc for the ſun's greateſt declination, and draw the two lines *a d*, *a e* for the ſummer and winter tropics: likewiſe draw the line *d e*, which will be biſected by the radius of the equinoctial in *o*; about which point, as a centre, draw a circle, whoſe circumference paſſes through the points *d* and *e* of the tropics, and divide the circumference into 12 equal parts, beginning from *d*: through each point of diviſion equally diſtant from *d* and *e*, draw occult lines parallel to the radius of the equinoctial circle: theſe lines will interſect the arc *d c* in the points, through which and the centre *a*, lines being drawn, will repreſent the beginnings of the ſigns of the zodiac at 30° diſtance from each other. But to divide the ſigns into every 10th or 5th degree, the circumference muſt be divided into 36 or 72 equal parts. The characters of the ſigns are annexed as in the figure; and when the *trigon* is divided into every 10th or 5th degree, the letter of the month is placed to the firſt 10° of each ſign agreeing with it. However this inſtrument may more readily be made by means of a table of the ſun's DECLINATION; for having drawn the two lines *a b* and *a c* at right angles, lay the centre of a protractor on the point *a*, with its limb towards the point *c*; and keeping it fixed, count 23° ½ on both ſides of the radius *a c* for the tropics of ♋ and ♑, 20° 12′ for the beginnings of the ſigns ♌, ♊, ♐, and ♒, and 11° 30′ for ♉, ♍, ♏, and ♓. And thus the ſpaces for each ſign may be graduated in every 10th and 5th degree by means of a table. The equinoctial points of ♈ and ♎ are placed at the end of the radius of the equinoctial *a c*.

Trigon *of diurnal and nocturnal arcs*. Theſe are drawn upon ſun-dials by curve-lines, like the arcs of the ſigns, and by means of them the ſhadow of the ſtyle ſhews how many hours the ſun is above the horizon, in any given day, &c.

The *trigon* of ſigns is the ſame for all latitudes, the ſun's declination being the ſame for the whole earth; but the diurnal arcs are different for every particular latitude, and as many of theſe arcs are drawn upon a dial, as there are hours of difference between the longeſt and ſhorteſt days of the year. For the conſtruction of this ſort of *trigon*, draw the right line R Z (*fig.* 96.) for the radius of the hour-line of 12, or of the equinoctial; and about the point R, with any opening of the compaſſes at pleaſure, deſcribe the circular arc T S V, and lay off both ways on it from the point S 2 arcs, S V, ST, each equal to the complement of the latitude. — Then draw the right line TXV, and about the point X, as a centre, deſcribe the circumference of a circle T Z V Y, which divide into 48 equal parts by dotted lines, drawn parallel to the radius of the equinoctial R Z: then theſe lines will interſect the diameter T X V in points, through which and the point R you may draw the radii of the hours. The angles which all the radii make at the point R may be found trigonometrically by the following proportion: as radius is to the co-tangent of the latitude ſo is the tangent of the difference between the ſemidiurnal arc at the time of the equinox and the arc propoſed to the tangent of the ſun's required declination.

The *trigon* of *ſigns* may be annexed to a rule or index A (*fig.* 97.) in order to draw the arcs of the ſigns upon great dials. The diurnal arcs may be drawn likewiſe upon this *trigon*, but the arcs of the ſigns and diurnal arcs too muſt not be drawn upon one and the ſame dial, for avoiding confuſion. In the centre of the index there is a ſmall hole, through which is put a pin, that the inſtrument may turn about the centre of a dial. The *trigon* ſlides along the index, and may be fixed in any part of it by means of the ſcrew B. The arcs of the ſigns with their characters are round about the circumference, and there is a fine thread fixed in the centre, in order to extend over the radii quite to the hour-lines of a dial.— For a farther account of theſe inſtruments and their uſe, ſee Bion's Conſtr. and Uſe of Math. Inſtr. by Stone, p. 231, &c.

TRIGONAL-*leaf*, among *Botaniſts*. See Leaf.

Trigonal *numbers*. See Triangular *numbers*.

TRIGONELLA, in *Botany*. See Fenugreek.

Trigonella *foſſilis*, in *Natural Hiſtory*, the name of a foſſil ſhell, of the cockle kind, but approaching to a triangular figure, having a broad bottom to which it deſcends, almoſt in ſtraight lines: on each ſide from the head or cardo, theſe are uſually found ſmall but there are ſome met with of four or five inches round: they are found at different depths, in ſtone quarries, bedded in the matter of the ſtrata; and that often in the hardeſt ſtone. In ſome inſtances, the ſhells are found remaining in their native ſtate; but moſt frequently the ſhell itſelf is periſhed and gone, and there is a ſtony or ſparry matter depoſited in its place. Hill's Hiſt. of Foſſ. p. 646.

TRIGONOMETER *armillary*. See Armillary *Trigonometer*.

TRIGONOMETRY, the art of finding the dimenſions of the parts of a triangle unknown, from the other parts known: or the art whereby, from any three parts of a triangle given, all the reſt are found. See Triangle.

Thus, e. gr. from two ſides A B and A C, and an angle B, we find, by *trigonometry*, the two other angles A and C, with the third ſide B C, *Tab. Trigonometry*, *fig.* 5.

The word literally ſignifies the *meaſuring of triangles*, formed from the Greek, τριγωνος, *triangle*; and μέτρον, *meaſure*. Yet does not the art extend to the meaſuring of the area or ſurface of triangles, which comes under geometry: *trigonometry* only conſiders the lines and angles thereof.

Trigonometry is of the utmoſt uſe in various mathematical arts: it is by means hereof that moſt of the operations of geometry and aſtronomy are performed; without it the magnitude of the earth and the ſtars, their diſtances, motions, eclipſes, &c. would be utterly unknown.—*Trigonometry,* therefore, muſt be owned an art, whereby the moſt hidden things, and thoſe remoteſt from the knowledge of men, are brought to light. A perſon ignorant of this part of the mathematical ſciences can make no great progreſs in mixed mathematics; but will often be puzzled, even in natural philoſophy, particularly in accounting for the phenomena of the rainbow, and other meteors.

Trigonometry, or the ſolution of triangles, is founded on that mutual proportion which ſubſiſts between the ſides and angles of a triangle; which proportion is known by finding the proportion which the radius of a circle has to certain other lines, called *chords, ſines, tangents,* and *ſecants.*

This proportion of the ſines and tangents to their radius, is ſometimes expreſſed in common or natural numbers, which conſtitute what we call the *tables of natural ſines, tangents,* &c. Sometimes it is expreſſed in logarithms, and in that caſe conſtitutes the table of *artificial ſines,* &c. See a table under SINE.

Laſtly, ſometimes the proportion is not expreſſed in numbers; but the ſeveral ſines, tangents, &c. are actually laid down upon lines of ſcales; whence the *line of ſines, tangents,* &c. See SCALE.

Trigonometry is divided into *plain* and *ſpherical:* the firſt conſidering rectilinear triangles; and the ſecond ſpherical ones. The firſt is of obvious and continual uſe in navigation, meaſuring, ſurveying, and other operations of geometry. See MEASURING, SURVEYING, SAILING, &c.

The ſecond is only learned, with a view to aſtronomy and its kindred arts, geography and dialling. It is generally eſteemed exceeding difficult, by reaſon of the vaſt number of caſes wherewith it is perplexed; but the excellent Wolfius has removed moſt of the difficulties.—That author has not only ſhewn how all the caſes of rectangled triangles may be ſolved the common way, by the rules of ſines and tangents; but has likewiſe laid down an univerſal rule, whereby all problems, both in plain and ſpherical rectangled triangles, are ſolved; and even oblique-angular triangles he teaches to ſolve with equal eaſe. His doctrine ſee under TRIANGLE. See alſo PART and CIRCULAR PARTS.

TRIGONOMETRY, *plain,* is an art whereby, from three given parts of a plain triangle, we find the reſt.

The great principle of *plain trigonometry* is, that in every plain triangle, the ſides are, as the ſines of the oppoſite angles. See this principle applied to the ſolution of the ſeveral caſes of plain triangles, under TRIANGLE.

TRIGONOMETRY, *ſpherical,* is the art whereby from three given parts of a ſpherical triangle, we find the reſt. E. gr. whereby from two ſides, and one angle, we find the two other angles, and third ſide.

The principles of *ſpherical trigonometry,* according to the doctrine of Wolfius, are as follow: 1. In every rectangled ſpherical triangle A B C, rectangular at A, the whole ſine is to the ſine of the hypothenuſe, B C, (*Tab. Trigonom. fig.* 33.) as the ſine of either of the acute angles, C, is to the ſine of the leg oppoſite thereto A B; or as the ſine of the angle B, to the ſine of its oppoſite leg A C: whence we deduce, that the rectangle of the whole ſine into the ſine of one leg, is equal to the rectangle of the ſine of the angle oppoſite thereto, into the ſine of the hypothenuſe.

2. In every right-angled ſpherical triangle A B C (*fig.* 31.) neither of whoſe ſides is a quadrant; if the complements of the legs A B and A C to a quadrant, be conſidered as the legs themſelves; the rectangle of the whole ſine into the co-ſine of the middle part, is equal to the rectangle of the ſines of the disjunct parts, or extremes.

Hence, 1. If the ſines be artificial, that is the logarithms of the natural ones; the whole ſine, with the co-ſine of the middle part, will be equal to the ſum of the ſides of the disjunct parts. 2. Since, in the rectilinear triangle A B C (*fig.* 34.) the whole ſine is to the hypothenuſe B C, as the ſine of the angle B or C to the ſine of the oppoſite leg A C or A B; if, inſtead of the ſines of the ſides, we take the ſides themſelves; here, too, the whole ſine, with the co-ſine of the middle part A C or A B, will be equal to the ſum of the ſines of the disjunct parts B or C and B C; i. e. to the ſine of B or C, and B C itſelf.

This Wolfius calls *regula ſinuum catholica,* or the firſt part of the catholic rule of *trigonometry;* by means whereof all the problems of either *trigonometry* are ſolved, when the thing is affected by ſines alone. Lord Napier had the firſt thought of ſuch a rule; but he uſed the complements of the hypothenuſe B C (*fig.* 22.) and of the angles B and C for the hypothenuſe, and angles themſelves: ſo that the tenor of his catholic rule of ſines is this:

The whole ſine, with the ſine of the middle part, is equal to the co-ſines of the disjunct, or, as he calls them, oppoſite parts. But, in this, that harmony between plain and ſpherical *trigonometry,* viſible in Wolfius's rule, does not appear.

3. In the rectangled ſpherical triangle A B C (*fig.* 31.) neither of whoſe ſides is a quadrant; as the whole ſine is to the ſine of the adjacent leg A C; ſo is the tangent of the adjacent angle C to the tangent of the leg A B.

Whence, 1. As the co-tangent of the angle C is to the whole ſine, as the whole ſine is to the tangent of the angle C, ſo is the ſine of A C to the tangent of A B; therefore the co-tangent of the angle C will be to the whole ſine, as the ſine of the leg adjacent thereto, A C, is to the tangent of the oppoſite one A B. 2. The rectangle, therefore, of the whole ſine, into the ſine of one leg A C, is equal to the rectangle of the tangent of the other leg A B, into the co tangent of the angle C, oppoſite to the ſame. And, in like manner, the rectangle of the whole ſine, into the ſine of the leg A B, is equal to the rectangle of the tangent of the leg A C into the co-tangent of the angle B.

4. In every right-angled ſpherical triangle, ABC, neither of whoſe ſides is a quadrant; if the complements of the legs A B and A C to a quadrant, or their exceſſes beyond a quadrant, be conſidered as the legs themſelves; the rectangle of the whole ſine, into the co-ſine of the middle part, will be equal to the rectangle of the co-tangents, of the conjunct parts. Hence, 1. If the ſines and tangents be artificial; the whole ſine with the co-ſine of the middle part, is equal to the ſum of the co-tangents of the contiguous parts. 2. Since in the rectilinear, right-angled triangle, we uſe the tangents, when from the legs A B and A C (*fig.* 34.) given, the angle C is to be found; and in that caſe the whole ſine is to the co-tangent of C, i. e. to the tangent of B, as A B to A C; therefore, alſo in the rectilinear triangle, if for the ſines and tangents of the ſides be taken the ſides themſelves; the whole ſine, with the co-ſine of the middle part, i. e. with A C, is equal to the ſum of the co-tangents of the conjunct parts, i. e. to the co-tangent of C, or the tangent of B and the ſide A B.

This Wolfius calls *regula tangentium catholica,* and conſtitutes the other part of the catholic rule of *trigonometry;* whereby all problems in each *trigonometry,* where tangents are required, are reſolved.

Lord Napier's rule to the like effect, is thus: that the whole ſine, with the ſine of the middle part, is equal to the ſum of the tangents of the contiguous parts.

It is, therefore, a catholic rule, which holds in all *trigonometry,* that in a right angled triangle (*notatis notandis,* i. e. the complements of the legs A B and A C being conſidered as legs themſelves, and, in rectilinear triangles, the ſides themſelves being taken for the ſines and tangents of the ſides) the whole ſine, with the co-ſine of the mean or middle part, is equal to the ſum of the ſines of the disjunct or ſeparate parts, or the ſum of the co-tangents of the conjunct or contiguous parts.

For an illuſtration and application of this rule, in the ſolution of the various caſes of ſpherical triangles, ſee TRIANGLE.

TRIGONOMETRY, *characters in.* See CHARACTER.

TRIHING, THRIHING, or TRITHING, from the Saxon, *drihinge,* an extent containing three or four hundreds, or the third part of a ſhire, or province. See TITHING. Mr. Thoreſby thinks the word ought to be written *Thrithing.* See Thoreſb. Ducatus Leodenſ. p. 85.

Theſe *thrithings* ſtill ſubſiſt in the county of York, where by an eaſy corruption they are denominated RIDINGS.

The word is alſo uſed for a court held within that circuit, which was the ſame with what we now call a *court-leet,* which is above a court-baron, and inferior to the county-court.

TRILATERAL, a term applied to all three-ſided figures. See TRIANGLE.

TRILL, in *Muſic,* a plain ſhake upon a ſingle note, formed by a beating in the throat on the vowel o, or by the ſhaking of the palate on the throat in one ſound upon a note: this grace is uſually made in cloſes or cadences, and when on a long note exclamation or paſſion is expreſſed, the *trill* is made in the latter part of ſuch note; but moſt commonly on binding notes and ſuch as precede the cloſing note. Playford. See TRILLO.

Trill-*hooks*, thoſe uſed to hold the ſides of a cart up to the horſe.

TRILLETTO, in the *Italian Muſic*, a little ſhort ſhake or quaver; it differs from *trillo* only in point of continuance, being its diminutive.

TRILLION, in *Arithmetic*, the number of a billion of billions.

After billions, we reckon by *trillions*, which makes a claſs of numeration, and is divided, like the other claſſes, into three places: thus we ſay, *trillions*, *tens of trillions*; *hundreds of trillions*, &c.

TRILLIUM, in *Botany*. See *Herb* Paris of *Canada*.

TRILLO, in the *Italian Muſic*, is often found marked with a ſingle Γ; or *tr*, and often alſo by a ſmall *t*, as well in vocal as inſtrumental parts. It is deſigned to intimate, that you beat quick upon two notes in conjoint degrees, as *e f*, or *d e*, alternately; beginning with the higheſt, and ending with the loweſt. This makes what the French improperly call *cadence*, and properly *tremblement*. But it is alſo very often found in the Italian muſic to give notice, that the ſame ſound be ſtruck many times over, beginning a little ſlow, and ending with all the quickneſs, that the throat or finger can form them. Thus, ſuppoſing the firſt two or three quavers, then as many ſemi-quavers, and then ending with demi-ſemi-quavers, all in the ſame pitch or tune.

The manner wherein we have deſcribed this, comes far ſhort of what able maſters can ſhew in practice: this *trillo* is more particularly uſed, after a note has been long held out, to eaſe the voice; which ſo long a tenſion had weakened. Broſſard.

TRILOBOUS *leaf*, among *Botaniſts*. See Leaf.

TRILOCULAR *capſule*, among *Botaniſts*. See Capsule.

TRIM, in *Carpentry*, is to fit one piece into another.

Trim *of a ſhip*, is her beſt poſture, proportion of ballaſt, arrangement of her ſails, and poſition of her maſts for ſailing.

Thus the *trim* of the hold denotes the moſt convenient arrangement of the various materials contained in it, with relation to the ſhip's motion or ſtability at ſea.

Trim, when applied to the ſails, denotes the general arrangement which is beſt calculated to accelerate the ſhip's courſe, according to the direction of the wind.

Trim, when expreſſed of the maſts, denotes their poſition with regard to the ſhip and to each other, ſo that they ſhould not be too far forward or aft, nor too near nor too far a-part: and, according to the ſituation or quality which communicates a greater velocity to the veſſel, they ſhould either be upright, or inclining aft or forward.

Hence, to find the beſt way of making a ſhip ſail ſwiftly, is to find her *trim*.

To Trim *a boat*, is to ſet the paſſengers ſo as to keep the boat even on both ſides. See Boat.

To Trim *the ſails*. See Tack.

TRIMACRUS, or Trimacer, in the *Ancient Proſody*, a foot in verſe, conſiſting of three long ſyllables.

TRIMILCHI, a name by which the Engliſh Saxons called the month of May; becauſe they always milked their cattle three times a day in that month.

Trimmed, *ſharp*, in *Sea-Language*, denotes the ſituation of a ſhip's ſails in a ſcant wind.

TRIMMERS, in *Architecture*, pieces of timber framed at right angles to the joints, againſt the ways for chimneys, and well-holes for ſtairs.

TRIMODIA, among the Romans, a bag like an inverted cone, in which ſowers carried their ſeed. It was ſuſpended from their neck, and was ſo called from its containing three buſhels.

TRIMONEER, a corruption of Timoneer.

TRINE, *dimenſion*, or *threefold dimenſion*, includes length, breadth, and thickneſs.

The *trine* dimenſion is peculiar to bodies or ſolids.

Trine, in *Aſtrology*, is the aspect or ſituation of one ſtar with regard to another, when they are diſtant 120 degrees.

It is alſo called trigon, and is uſually ſignified by the character Δ.

TRINGA, Sand-piper, in *Ornithology*, the name of a diſtinct genus of birds, of the order of the *grallæ*: the diſtinguiſhing characters of which are, that the beak is roundiſh, and of the length of the head, the noſtrils linear, and that the feet have each four toes, the outmoſt being generally connected at bottom by a ſmall membrane. Linnæus enumerates twenty-three ſpecies; among which are the *pugnax* ruffe, the vanellus, or lapwing, the gambetta, the turn-*ſtone*, the phalarope, the stint, the knot, &c.

TRINGLE, in *Architecture*, a name common to ſeveral little ſquare members, or ornaments; as reglets, liſtels, and platbands.

The word is French, where it ſignifies the ſame.

Tringle is more particularly uſed for a little member fixed exactly over every triglyph, under the platband of the architrave; from whence hang down the guttæ, or pendant drops.

TRINITARIANS, a term uſed very variouſly, and arbitrarily: frequently it ſtands, as a common name for all perſons who have ſentiments on the myſtery of the Trinity, different from thoſe of the catholic church.

Sometimes it is more immediately reſtrained to ſome one or other particular claſs of ſuch perſons.

It is now applied to the orthodox themſelves, in contradiſtinction to the others who are then called *Antitrinitarians*, who deny or impugn the doctrine of the Trinity.

Thus the Socinians and others called the Athanaſians, *Trinitarians*.

The *Trinitarians* of the preſent age, and eſpecially thoſe, who, in England, have written on the ſubject of the Trinity, are far from being agreed in their opinions, and therefore ought to be claſſed very differently from one another.

A late writer (Prieſtley's Hiſt. Corrupt. of Chriſtianity, vol. i. p. 147.) thinks that they are all reducible to two claſſes, viz. that of thoſe who believe, that there is no proper divinity in Chriſt, beſides that of the Father; and the claſs of Tritheists, who maintain that there are three equal and diſtinct Gods. Dr. Waterland and the reſt of the Athanaſians aſſert three proper diſtinct perſons, entirely equal to and independent upon each other, yet making up one and the ſame being. Mr. Howe (Works, vol. ii. p. 560—568) ſeems to ſuppoſe that there are three diſtinct eternal ſpirits, or diſtinct intelligent hypoſtaſes; each having his own diſtinct, ſingular, intelligent nature, united in ſuch an inexplicable manner, as that upon account of their perfect harmony, conſent and affection, to which he adds their mutual ſelf-conſciouſneſs, they may be called the one God, as properly as the different corporeal, ſenſitive, and intellectual natures united may be called one man. Biſhop Pearſon (on the Creed, p. 134, &c. 322, &c.) Biſhop Bull (Serm. vol. iv. p. 829) and Dr. Owen (on the Heb. i. 3. p. 53, &c.) are of opinion, that though God the Father is the fountain of the Deity, the whole divine nature is communicated from the Father to the Son, and from both to the Spirit; yet ſo as that the Father and Son are not ſeparate, or ſeparable from the divinity, but do ſtill exiſt in it, and are moſt intimately united to it. Dr. Thomas Burnet (Script. Doctr. p. 173.) maintains one ſelf-exiſtent and two dependent beings; but aſſerts, that the two latter are ſo united to and inhabited by the former, that by virtue of that union divine perfections may be aſcribed and divine worſhip paid to them. In this opinion Dr. Doddridge is ſaid to have concurred. Dr. Wallis (Lett. on the Trin.) thought, that the diſtinction between the three perſons was only modal; which ſeems, ſays Dr. Doddridge, to have been the opinion of archbiſhop Tillotſon. Tillotſ. Serm. vol. i. p. 492—494. Dr. Watts (Diſſ. Nº 7.) maintained one ſupreme God dwelling in the human nature of Chriſt, which he ſuppoſes to have exiſted the firſt of all creatures; and ſpeaks of the divine Logos, as the wiſdom of God, and the Holy Spirit, as the divine power, or the influence and effect of it; which, he ſays, is a ſcriptural perſon, i.e. ſpoken of figuratively in ſcripture under perſonal characters. Doddridge's Lectures, p. 402, &c.

Trinitarians alſo denotes an order of religious, inſtituted in honour of the Trinity, for the redeeming of Chriſtian captives from the infidels; vulgarly called Mathurins, and brothers of the *redemption*.

They are clothed in white, and bear on the ſtomach a croſs, partly red, and partly blue; by which three colours, white, red, and blue, is ſuppoſed to be repreſented the myſtery of the Trinity, but the habit of this order is different in different provinces.

The *Trinitarians* made it their buſineſs to go and ranſom Chriſtians held in ſlavery in the republics of Algiers, Tunis and Tripoly, and the ſtates of Morocco. They have a rule peculiar to themſelves; though ſeveral hiſtorians rank them among the obſervers of the rule of St. Auguſtine.

The order had its riſe in 1198, under the pontificate of Innocent III. The founders were John de Matha and Felix de Valois; the firſt of Faucon in Provence; the ſecond, not of the royal family of Valois, as ſome have imagined, but thus called, in all probability, as being a native of the country Valois.

Gauthier of Chatillon was the firſt who gave them a place in his lands to build a convent; which afterwards became the chief of the whole order: Honorius III. confirmed their rule. And Urban IV. appointed the biſhop of Paris and others to reform them: they did it; and the reform was approved in 1267, by Clement IV.

This order poſſeſſes about 250 convents, divided into thirteen provinces; whereof ſix are in France, three in Spain, one in Italy, and one in Portugal. And formerly there was one in England, another in Scotland, and a third in Ireland.

Broughton, and ſome other writers, make a diſtinction between the order of the redemption of captives, and the *fraternity of the holy* TRINITY.

TRINITARIANS, *barefooted*, are a reform of this order, made in Spain, in a general chapter, held in 1594, where it was reſolved, that each province ſhould eſtabliſh two or three houſes, where the primitive rule ſhould be obſerved, and where the religious ſhould live up to a greater auſterity, uſe coarſer cloaths, &c. and yet ſhould have the liberty of returning to their ancient convent when they thought fit.

Don Alvares Baſan, intending to found a monaſtery at Valdepegnas, and deſiring to have it occupied by barefooted religious, it was agreed to add nudity of feet to the reform, that the *Trinitarians* might have the benefit of that eſtabliſhment. The reform afterwards grew into three provinces, and was at length introduced into Poland and Ruſſia, and thence into Germany and Italy.

There are alſo *barefooted Trinitarians* in France, eſtabliſhed by F. Jerom Hallies, who, being ſent to Rome to ſolicit the firſt reform mentioned above, not content therewith, carried it farther, and obtained a permiſſion of pope Gregory, to add a coarſe habit, and nudity of feet, thereto. He began with the convent of St. Dionyſius at Rome, and thoſe of Aix in Provence.

In 1670, there were houſes enough of this reform to make a province; and, accordingly, they held their firſt general chapter the ſame year.

There are alſo nuns of the TRINITARIAN order, eſtabliſhed in Spain by St. John de Matha himſelf, who built them a convent in 1201. Thoſe who firſt took the habit were only oblatæ, and made no vows; but in 1201, the monaſtery was filled with real religious, under the direction of the infanta Conſtantia, daughter of Peter II. king of Arragon, who was the firſt religious, and the firſt ſuperior of the order.

There are alſo barefooted nuns of this order, eſtabliſhed at Madrid about the year 1612, by Frances de Romero, daughter of Julian de Romero, a lieutenant-general in the Spaniſh army.

Laſtly, there is a THIRD *order* of *Trinitarians.*

TRINITY, TRINITAS, TRIAS, TRIAD, in *Theology*, the ineffable myſtery of three perſons in one God, Father, Son, and Holy Spirit.

It is an article in ſome ſyſtems of theology, that there is one God, an unity in nature and eſſence, and a *Trinity* of perſons. The term *Trinity* implies the unity of three, the unity of three divine perſons really different, and the identity of an indiviſible nature: the *Trinity* is a ternary of divine perſons of the ſame eſſence, nature, and ſubſtance.

Perſon is defined an individual, reaſonable, or intellectual ſubſtance; or an intellectual and incommunicable ſubſtance.

The HYPOSTASIS, or ſubſtance, is what conſtitutes the perſon. There are then in the Holy *Trinity* three perſons, Father, Son, and Holy Spirit, which have all things in common, except their relations; whence that axiom in theology comes to have place, in the divine perſons there is no diſtinction where there is no oppoſition of relation.

The Father is the firſt perſon in the Holy *Trinity*, by reaſon the Father alone produces the Word, by the way of *underſtanding*; and with the Word produces the Holy Spirit, by way of *will*.

Here is to be obſerved, that the Holy Spirit is not thus called from his ſpirituality, that being common and eſſential to all the three perſons; but from the paſſive ſpiration (as ſome popiſh ſchoolmen expreſs the manner in which the perſonality of the Holy Spirit is derived from the Father and Son), which is peculiar to him alone.

Add, that when one perſon in the Holy *Trinity* is called *firſt*, another *ſecond*, and another *third*, it muſt not be underſtood of a priority of time, or of nature, which would imply ſome dependence; but of a priority of origin and emanation, which conſiſts in this, that one perſon produces the other, in ſuch manner, as that the perſon which produces cannot be, or be conceived, without that produced.

Thoſe who maintain the doctrine of the *Trinity* allege, that the ſame titles, attributes, works, and worſhip are aſcribed by the ſacred writers to the Father, Son, and Holy Spirit: nevertheleſs they contend, in different ways, for the proper unity of the divine nature. For the ſentiments of ſome of the chief modern *Trinitarians*, ſee TRINITARIANS: and for the ſentiments of others, who have rejected what has been uſually denominated the orthodox doctrine of the *Trinity*, ſee ARIANS, MACEDONIANS, NOETIANS, SABELLIANS, SEMI-ARIANS, SOCINIANS, and UNITARIANS. See alſo TRITHEISM.

It is obſerved by Dr. Waterland, and many other writers, that the term *Trinity* firſt occurs in the works of Theophilus, biſhop of Antioch, about the year 180. Theoph. ad Autolyc. lib. ii. cap. 14. p. 148. 150, ed. Wolfii.

But at this time the words, perſons and ſubſtance, were not in uſe; however, they were introduced on occaſion of the diſputes with Praxeas, Noetus, and Sabellius, either by Clemens of Alexandria, or by Tertullian.

For the puniſhment inflicted by the Engliſh law on thoſe who deny the *Trinity*, ſee HERESY.

Many of the heathens ſeem to have had a notion of a *Trinity*. Steuch. Eugub. de Peren. Philoſ. lib. i. cap. 3. obſerves, that there is nothing in all theology more deeply grounded, or more generally allowed by them, than the *myſtery* of the *Trinity*. The Chaldæans, Phœnicians, Greeks, and Romans, both in their writings, and their oracles, acknowledged that the Supreme Being had begot another Being from all eternity, which they ſometimes called the *Son of God*, ſometimes the *Word*, ſometimes the *Mind*, and ſometimes the *Wiſdom of God*, and aſſerted it to be the creator of all things.

Among the ſayings of the Magi, the deſcendents of Zoroaſter, this is one, Πανλα εξετελεσε πατηρ καινῳ παρεδωκε δευτερῳ: *the Father finiſhed all things, and delivered them to the ſecond Mind.* The Egyptians called their *Trinity*, *hemptha*, and repreſented it by a globe, a ſerpent, and a wing, diſpoſed into one hieroglyphic ſymbol. Kircher, Gale, &c. ſuppoſe the Egyptians learned their doctrine of the *Trinity* from Joſeph and the Hebrews.

The philoſophers, ſays St. Cyril, owned three hypoſtaſes, or perſons; they have extended their divinity to three perſons, and even ſometimes uſed the word *Trias*, *Trinity*: they wanted nothing but to admit the conſubſtantiality of the three hypoſtaſes, to ſignify the unity of the divine nature, in excluſion of all triplicity with regard to difference of nature; and not to hold it neceſſary to conceive any inferiority of hypoſtaſes.

We learn from Dr. Cudworth, that, beſides the inferior Gods, generally received by all the Pagans (viz. animated ſtars, dæmons, and heroes), the more refined of them, who accounted not the world the ſupreme deity, acknowledged a *Trinity* of divine hypoſtaſes ſuperior to them all. This doctrine, according to Plotinus, is very ancient, and obſcurely aſſerted even by Parmenides. Some have referred its origin to the Pythagoreans, and others to Orpheus, who adopted three principles, called Phanes, Uranus, and Cronus. Dr. Cudworth apprehends, that Pythagoras and Orpheus derived this doctrine from the theology of the Egyptian Hermes; and, as it is not probable that it ſhould have been firſt diſcovered by human reaſon, he concurs with Proclus in affirming, that it was at firſt a theology of divine tradition or revelation, imparted firſt to the Hebrews, and from them communicated to the Egyptians and other nations, among whom it was depraved and adulterated. Cudw. Intell. Syſtem, book i. chap. 4.

Plato, and ſome of his followers, ſpeak of a *Trinity* in ſuch terms, that the primitive fathers have been accuſed of borrowing the very doctrine from the Platonic ſchool; but F. Mourgues, who has examined the point, aſſerts, that nothing can be more ſtupid than to ſuppoſe the Platonic *Trinity* brought into the church; and to have recourſe to the Platoniſm of the fathers to diſcredit their authority with regard to this dogma.

Friery, or fraternity of the Holy TRINITY, is a ſociety inſtituted at Rome, by St. Philip Neri, in 1548, to take care of pilgrims coming from all parts of the world to that capital, to viſit the tombs of St. Peter and St. Paul.

In 1558, pope Paul IV. gave the fraternity the church of St. Benedict, to which they gave the title of the *Holy Trinity*. Since that time, they have built cloſe by it a very ample hoſpital for pilgrims, and perſons on the recovery.

The fraternity is now very conſiderable, and moſt of the nobleſſe of Rome, of either ſex, have done it the honour to be members of it.

Congregation of the Holy TRINITY, is a congregation of twelve prieſts eſtabliſhed in the hoſpital of the fraternity juſt mentioned, to take care of pilgrims, and others entertained therein.

Order of the Holy TRINITY. See TRINITARIAN.

TRINITY-*Sunday*, is the next Sunday after Whitſunday;

thus called, becauſe, on that day, was anciently held a feſtival (as it ſtill continues to be in the Romiſh church), in honour of the Holy *Trinity*. The obſervation of this feſtival was firſt enjoined by the ſixth canon of the council of Arles, in 1260; and John XXII. who diſtinguiſhed himſelf ſo much by his opinion concerning the beatific viſion, is ſaid to have fixed the office for this feſtival in 1334.

Trinity-*herb*, in *Botany*. See Violet.

Trinity-*houſe*, is a kind of college at Deptford, belonging to a ſociety of ſeaſaring perſons, founded for the regulation of ſeamen, and ſecurity and convenience of ſhips and mariners on our coaſts.

This ſociety was incorporated by Henry VIII. in 1515, who confirmed to them not only all the ancient rights and privileges of the mariners of England, but alſo their ſeveral poſſeſſions: which, together with various grants of queen Elizabeth and king Charles II. were confirmed by letters patent of the 1ſt of James II. in 1685; under the name of the maſter, wardens, and aſſiſtants of the guild or fraternity of the moſt glorious and undivided *Trinity*, and of St. Clement, in the pariſh of Deptford Strand, in the county of Kent.

This corporation is governed by a maſter, four wardens, eight aſſiſtants, and eighteen elder brethren; the inferior members of the fraternity, denominated younger brethren, and choſen among the maſters and mates expert in navigation, are of an unlimited number, and ſerve for ſupplying vacancies among the thirty-one elder brethren. The maſter, &c. of this corporation, are inveſted by charter with a power to examine the mathematical children of Chriſt's Hoſpital, to examine the maſters of his majeſty's ſhips, to appoint pilots for conducting ſhips in and out of the river Thames, and to amerce ſuch as ſhall act as maſters or pilots without their approbation, in a fine of 20*l.* to ſettle the ſeveral rates of pilotage, and erect light-houſes, and other ſea-marks, on the ſeveral coaſts of the kingdom, for the ſecurity of navigation; to prevent aliens from ſerving on board Engliſh ſhips, without their licence, under penalty of 5*l.* for each offence; to puniſh ſeamen for deſertion or mutiny in the merchant ſervice; to hear and determine the complaints of officers and ſeamen in this ſervice, under an appeal to the court of admiralty; and to grant licences to poor ſeamen (non-freemen) to row on the river Thames.

To this company belongs the ballaſt-office, for cleaning and deepening the river Thames, by taking from it a ſufficient quantity of ballaſt for the ſupply of all ſhips that ſail out of the river; in which ſervice ſixty barges, of the burden of thirty tons, and two men each, are conſtantly employed: all ſhips taking in ballaſt pay to them 12*d.* a ton.

This corporation is impowered by charter to purchaſe lands, &c. to the amount of 500*l.* *per annum*, and alſo to receive charitable benefactions to the like amount. They have alſo light-houſes, to which all ſhips pay one halfpenny a ton.

Out of the income of this corporation about three thouſand poor ſeamen, their widows, and orphans, are annually relieved, at the expence of about 6000*l.*

The houſe, in which the brethren of this corporation uſually meet for the diſpatch of buſineſs, is in Water-lane; and for the choice of maſter they meet at their houſe at Deptford. They have three hoſpitals, two at Deptford, and one at Mile-end, which laſt is deſigned for decayed ſea-officers, maſters of veſſels, pilots, and their widows.

Trinity-*term*. See Term.

TRINIUMGELD, or Thriniumgild, a compenſation uſed among our Saxon anceſtors for great crimes, which were not abſolved but by paying a fine thrice nine times. See Geld.

TRINK, in our *Statutes*, is uſed for a fiſhing-net. 2 Hen. VI. cap. 15. Blount.

TRINODA *neceſſitas*, in our *Ancient Cuſtoms*, a threefold neceſſary tax, to which all lands are liable; viz. *expeditio, & reparatio pontis, & arcis*; going to the wars, and repairing of bridges and of caſtles.

Theſe were the three exceptions anciently inſerted in the king's grants of land to the church, after the words that freed them from all ſecular ſervice.

TRINODA, or Trinodia *terræ*, in ſome *Ancient Writers*, denotes a quantity of land containing three perches.

TRINOMIAL, or Trinominal *root*, in *Mathematics*, is a root conſiſting of three parts, or monomes, connected together by the ſigns +, or −.

Such is $x+y+z$, or $a+b-c$. See Involution.

TRIO, in *Muſic*, a part of a concert wherein three perſons ſing; or, more properly, a muſical compoſition, conſiſting of three parts.

Trios are the fineſt kind of compoſition, and theſe are what pleaſe moſt in concerts.

TRIOCTILE, in *Aſtrology*, an aſpect, or ſituation, of two planets, with regard to the earth, when they are three octants, or eight parts of a circle, i. e. 135 degrees diſtant from each other.

This aſpect, which ſome call the *ſeſquiquadrans*, is one of the new aſpects ſuperadded to the old ones by Kepler.

TRIONES, in *Aſtronomy*, a ſort of conſtellation, or aſſemblage of ſeven ſtars in the Urſa Major, popularly called *Charles's Wain*.

From the *Septem Triones* the north pole takes the denomination *Septentrio*.

TRIONUM, in *Botany*, was formerly ranked by Linnæus as a diſtinct genus; but is now referred to *hibiſcus*. See *Syrian* Mallow.

TRIOPTHALMUS, formed of τρεις, *three*, and οφθαλμος, *eye*, a name given by authors to ſuch pieces of agate, or other ſemi-pellucid ſtones, as happen to have three ſmall circular ſpots, reſembling eyes upon them; theſe are of the nature of the common agate, &c. The ſpots are mere accidental varieties in the diſpoſitions of the veins, and do not make a diſtinct ſpecies of ſtone.

TRIOPTERIS, in *Botany*, a genus of the *decandria trigynia* claſs, the characters of which are theſe: the perianthium is very ſmall and permanent, and is compoſed of one leaf divided into five ſegments; the flower is compoſed of ſix equal petals of an oval figure, and theſe are ſurrounded by three other ſmaller petals, which are alſo of an equal ſize one with another; the ſtamina are two filaments, beyond the petals of the flower, and are fixed to the cup; the external ones are ſomewhat ſhorter than the interior, and the antheræ are ſimple; the germen of the piſtil is divided into three parts; there are three erect and ſimple ſtyles; and the ſtigmata are obtuſe; there is no fruit to encloſe the ſeeds, but they ſtand naked, and are three in number, and are hollowed at the back, and edged with alæ, which, when newly produced, have the appearance of petals. Indeed, what are called petals in this deſcription, are not ſo, but are the alæ of the germen, for the ſtamina are placed without them; but as they very much reſemble petals, a young botaniſt will more eaſily diſtinguiſh the genus by their being taken for ſuch, than by any other means. There is one ſpecies.

TRIORCHIS, a word uſed by ſome, to expreſs a man who has three teſticles.

It is alſo uſed as the name of a buzzard; and of a plant, called ladies-traces.

TRIORS, or Triers, in *Law*, ſuch as are choſen by the court to examine whether a Challenge made to the panel of jurors, or any of them, be juſt or no.

The *triors*, in caſe the firſt man called be challenged, are two indifferent perſons named by the court; and if they try one man and find him indifferent, he ſhall be ſworn; and then he and the two *triors* ſhall try the next; and when another is found indifferent and ſworn, the two *triors* ſhall be ſuperſeded, and the two firſt ſworn on the jury ſhall try the reſt.

TRIOSTEOSPERMUM, in *Botany*. See *Falſe* Ipecacuanha.

TRIOSTEUM, in *Botany*. See *Falſe* Ipecacuanha.

TRIP, a ſea-term; a ſhip is ſaid to bear her topſails *a-trip*, when ſhe carries them twiſted up to the higheſt.

Trip is alſo a cant-term, denoting an outward-bound voyage, particularly in the coaſting navigation. It alſo denotes a ſingle board in plying to windward.

TRIPARTITE, Tripartitus, ſomething divided into three parts, or made by three parties; as an Indenture *tripartite*, &c.

TRIPARTITION is a diviſion by three, or the taking of the third part of any number or quantity.

TRIPELA. See Tripoli.

TRIPENTAHEDRIA, derived from τρὶς, *thrice*, ϖέντε, *five*, and ἕδρα, a *ſide*, in *Natural Hiſtory*, the name of a genus of ſpars.

The bodies of this genus are ſpars, compoſed of thrice five planes; being made of a pentangular column, terminated at each end by a pentangular pyramid. Of this genus we only know one ſpecies; this has a moderately long column, and very ſhort and broad pyramids; it is found in Derbyſhire, Yorkſhire, and Cornwall, and is very frequent about Goſſelaer in Saxony. Hill's Hiſt. of Foſſ. p. 205.

TRIPETALOUS *flowers*, ſuch which conſiſt of three leaves, which are called petals, to diſtinguiſh them from the leaves of plants.

TRIPHARMACUM, an ointment in the late London Diſpenſatory, ſo called from its being compoſed of three ingredients; the preſcription is this: take common plaſter four ounces; oil olive two ounces; vinegar one ounce; ſet them over a gentle fire, and ſtir them continually till they become an ointment.

TRIPHTHONGUE, in *Grammar*, an aſſemblage, or concourſe, of three vowels in the ſame ſyllable; as in *quae*.

Quintilian, lib. i. cap. 6. denies the exiſtence of *triphthongues*; and aſſerts, that there never was any ſyllable of three vowels, but that one of them was always turned into a conſonant: Scioppius aſſerts the contrary. However this may be in the Latin and Greek, which were the only languages Quintilian underſtood, it is certain there are ſeveral languages in Europe where *triphthongues* are in uſe.

TRIPLARIS, in *Botany*, a genus of the *triandria trigynia* claſs: its characters are; that the calyx is very large and tripartite; it has no corolla; the antheræ are linear; the fruit is a three-cornered nut, included within the ovated baſe of the calyx. There is one ſpecies.

TRIPLE, threefold. See RATIO and SUB-TRIPLE.

TRIPLE, in *Muſic*, is one of the ſpecies of meaſure, or time.

Triple-time conſiſts of many different ſpecies, whereof there are in general four, each of which has its varieties. The common name of *triple* is taken hence, that the whole, or half meaſure, is diviſible into three equal parts, and is beaten accordingly.

The firſt ſpecies is called the *ſimple triple*, wherein the meaſure is equal to three ſemibreves, three minims, three crotchets, three quavers, or three ſemi-quavers, which are marked thus, $\frac{3}{1}$, or $\frac{3}{2}$, $\frac{3}{4}$, $\frac{3}{8}$, $\frac{3}{16}$; but the laſt is not much uſed, except in church muſic.

In all theſe the meaſure is divided into three equal parts, or times, called thence *triple time*, or the meaſure of *three times*; whereof two are beat down, and the third up.

The ſecond ſpecies is the *mixt triple*; its meaſure is equal to ſix crotchets, or ſix quavers, or ſix ſemi-quavers, and accordingly it is marked $\frac{6}{4}$, or $\frac{6}{8}$, or $\frac{6}{16}$; but the laſt is ſeldom uſed.

Some authors add other two; viz. ſix ſemibreves and ſix minims, marked $\frac{6}{1}$, or $\frac{6}{2}$; but theſe are not in uſe.

The meaſure here is uſually divided into two equal parts, or times, whereof one is beat down and one up: but it may alſo be divided into ſix times; whereof the firſt two are beat down, and the third up; then the next two down, and the laſt up; i. e. each half of the meaſure is beat like the *ſimple triple* (on which account it may be called *compound triple*); and becauſe it may be thus divided either into two or ſix times (i. e. two *triples*), it is called *mixed*; and, by ſome, the *meaſure of ſix times*.

The third ſpecies is the *compound triple*, conſiſting of nine crotchets, or quavers, or ſemi-quavers, or marked $\frac{9}{4}$, $\frac{9}{8}$, $\frac{9}{16}$: the firſt and laſt are little uſed; and alſo add $\frac{9}{1}$, $\frac{9}{2}$, which are never uſed.

This meaſure is divided into three equal parts, or times, whereof two are beat down, and one up; or each third part may be divided into the times, and beat like the *ſimple triple*; on which account it is called the *meaſure of nine times*.

The fourth ſpecies is a componnd of the ſecond ſpecies, containing twelve crotchets, or quavers, or ſemi-quavers, marked $\frac{12}{4}$, $\frac{12}{8}$, $\frac{12}{16}$; to which ſome add $\frac{12}{1}$, and $\frac{12}{2}$, which are never uſed; nor are the firſt and third much uſed, eſpecially the latter.

The meaſure here may be divided into two times, and beat one down, and one up; or each half may be divided, and beat as the ſecond ſpecies, either by two or three; in which caſe it will make in all twelve times, and hence is called *the meaſure of twelve times*.

The French and Italian authors make a great many more ſpecies and diviſions of *triple* time, unknown, or at leaſt unregarded by our Engliſh muſicians, and therefore not ſo neceſſary to be dwelt upon here.

TRIPLE *quartan fever*. See FEVER.

TRIPLE *inciſion*. See ENGRAFTING.

TRIPLICATE *Ratio*, is the ratio which cubes bear to each other.

This ratio is to be diſtinguiſhed from *triple* ratio, and may be thus conceived. In the geometrical proportionals 2, 4, 8, 16, 32, as the ratio of the firſt term (2) is to the third (8) duplicate of that of the firſt to the ſecond, or of the ſecond to the third: ſo the ratio of the firſt to the fourth is ſaid to be *triplicate* of the ratio of the firſt to the ſecond, or of that of the ſecond to the third, or that of the third to the fourth, as being compounded of three equal ratios.

TRIPLICATIO, TRIPLICATION, in *Civil Law*, is the ſame with SUR-REJOINDER, in common law.

TRIPLICITY, or TRIGON, among *Aſtrologers*, is a diviſion of the ſigns, according to the number of the elements; each diviſion conſiſting of three ſigns.

Triplicity is frequently confounded with *trine aſpect*; though, ſtrictly ſpeaking, the two are very different things: *triplicity* is only uſed with regard to the ſigns, and *trine*, on the contrary, with regard to the planets. The ſigns of *triplicity* are thoſe which are of the ſame nature, and not thoſe which are in trine aſpect. Thus Leo, Sagittary, and Aries, are ſigns of *triplicity*, becauſe thoſe ſigns are, by theſe writers, all ſuppoſed fiery.

TRIPLOIDES, a ſurgeon's inſtrument, with a threefold baſis, uſed in the reſtoring of great depreſſions of the ſkull. Blanc.

TRIPOD, TRIPOS, in *Antiquity*, a famed ſacred ſeat or ſtool, ſupported by three feet, whereon the prieſts and ſibyls were placed to render oracles.

It was on the *tripos* that the gods inſpired the Pythians with that divine fury and enthuſiaſm wherewith they were ſeized at the delivering of their predictions.

M. Spanheim obſerves, that, on Roman medals, the *tripod* expreſſes ſome prieſthood, or ſacerdotal dignity. A *tripod*, with a raven and a dolphin, is alſo the ſymbol of the duumviri, deputed for keeping of the ſibylline oracles, and for conſulting them on occaſion.

TRIPODIUM. In the laws of Hen I. occurs this paſſage —*In quibus vero cauſis triplicem ladam haberet, ferat judicium* TRIPODII, i. e. 60 ſolid. The meaning whereof according to ſome, is, that, as for a ſmall offence, the compoſition was twenty ſhillings; ſo for a great offence, which was to be purged *triplici lada*, the compoſition was three times twenty ſhillings, and this was called *tripodium*.

TRIPOLI, in *Natural Hiſtory*, the name of an earthy ſubſtance, uſed by the lapidaries to poliſh ſtones, and by the braſiers, and other the like artiſts to clean metalline veſſels. It is of ſeveral kinds, diſtinguiſhed by its various colours.

The *tripoli* of a white colour is of a looſe friable texture, light, moderately hard, and of a harſh, rough, duſty ſurface; it ſlightly colours the hands, adheres to the tongue, breaks immediately in the mouth into a coarſe and very hard powder; thrown into water it makes a ſlight ebullition, and, after ſome time, falls into powder.

It is not acted upon by acids, and in the fire acquires ſome hardneſs without any change of colour.

It is dug in Saxony, in the duchy of Schwartzburg, and on the Blockeſberg, in the duchy of Brunſwick; and a variety of it is dug near Cork, in Ireland, where it is much uſed.

Hill has erroneouſly affirmed this ſpecies of *tripoly* to be the ARGENTARIA *creta* of the ancients, but Da Coſta has evinced this to be the common chalk.

The yellowiſh-white kind is called by authors *alana gleba*, *tripolis*, and *terra tripolitana*; this is the produce of Germany, Saxony, Poland, and France; there is alſo of it in the neighbourhood of Venice, but it is found in greateſt plenty in many parts of Africa. It is light chalk, of a very pale yellowiſh white, of a firm texture, and moderately hard. It is of a harſh dry ſurface, and colours the hands; it does not adhere to the tongue; it breaks pretty freely in the mouth, make no efferveſcence with aqua fortis, and is ſlowly diffuſible in water. In the fire it acquires ſome hardneſs, and a pale roſy colour.

The reddiſh *tripoli* is of our own production, though not peculiar to ourſelves; it is found in great abundance on Mendip-hills in Somerſetſhire, nor leſs plentifully in many parts of Germany. This is well known in the ſhops as a ſubſtance of great uſe in poliſhing braſs, but is not applied to any of the other uſes of the yellowiſh kind: this, like the former, is moſt frequently found in detached maſſes, and while in the earth is tolerable ſoft, and eaſily falls into flakes. When dry it becomes of a conſiderable hardneſs, and is of a fine pale reddiſh white, of a looſe open texture, compoſed of a multitude of extremely thin plates or flakes laid evenly on one another, and conſiderably heavy; it is of a ſmooth and ſomewhat gloſſy ſurface; it adheres very firmly to the tongue, is dry and harſh to the touch, too hard to be broken between the fingers, and does not ſtain the hands; it makes no efferveſcence with acids, and burns to a paler colour, with ſome additional hardneſs.

There are likewiſe browniſh *tripolis*, particularly the *terra carioſa*, or *tripela fuſca levis*, vulgarly called *rotten-ſtone*; this is of an aſhen-brown colour, moderately hard, of a looſe but regular texture, of a harſh, dry, duſty ſurface, and colours the hands. It does not adhere to the tongue, breaks freely in the mouth, makes no efferveſcence with aqua fortis, and in water is eaſily pulveriſed. It is chiefly procured from Derbyſhire, and much uſed by braſiers and lapidaries. See Hill's Hiſt. Foſſ. p 67 68. Da Coſta's Hiſt. Foſſ. p. 76 85. 87.

Mr. Hubner infers from ſome obſervations relating to the production of the *terra tripolitana*, or *tripoli*, made in Upper Brittany, where this ſubſtance abounds, that it is a wood wholly petrified, and afterwards calcined by the ſubterraneous fire; the mountain of Poligné, in the interior of which it is found, has been, and is perhaps yet, he ſays, a volcano. He obſerves, however, that there are *tripolis* of various kinds, as well as of ſeveral degrees of goodneſs; among which there may be ſuch as are not otherwiſe than a real or native foſſil, deprived by fire of its primitive hardneſs and weight; but he thinks that the *tripoli*, which has its original from petrified wood, muſt be the beſt, becauſe it naturally ought to be the fineſt, ſofteſt, and the beſt calcined.

Mr. Da Coſta, however, is of opinion, that the operation ſuppoſed by Mr. Hubner, is only a partial and local origin of this ſubſtance, by the concurring circumſtances of wood and *tripoli* being buried together in the bowels of a volcano: the layers of foſſil wood in the mountain having been ſaturated with the *tripoline* particles; which alſo abound in it, compoſed a ſtone, or third body; and theſe *tripoline* particles were again reduced, by ſubterraneous fire, to their priſtine ſtate. Phil. Tranſ. vol. li. p. 186, &c.

Some have apprehended, that *tripoli* is a powder formed by the decompoſition or mouldering of jaſper; others have conſidered it as an argillaceous earth. Neumann ſays, that by diſtilling two ounces of it, he obtained two ſcruples of a weak marine acid, and a ſmall portion of ſal ammoniac; that by diſtilling a mixture of this earth and nitre, he obtained aqua regia; and that of ſixty grains of *tripoli*, one grain was ſoluble in concentrated vitriolic acid, two in diluted vitriolic acid, three in ſpirit of ſalt, five in ſpirit of nitre, eleven in aqua regia, and ſeven grains in cauſtic fixed alkali.

According to M. d'Arcet, *tripoli* is vitrifiable *per ſe*, in a porcelain heat long continued; and, according to Mr. Bergman, it yields to borax and microcoſmic ſalt, but ſcarcely to fixed alkali. Mr. Haaſe, who has lately analyſed it, found 100 parts of it to contain 90 of ſiliceous earth, 7 of argil, and 3 of iron. According to Mr. Gerhard, magneſia has been ſometimes extracted from it. Mr. Kirwan ſays, that it is evidently a volcanic product. Elem of Mineral. p. 82, 1784.

The rotten-ſtone of Derbyſhire is, according to Mr. Ferber, a *tripoli* united with calcareous earth.

Stahl has found that *tripoli* is aſtringent and deſiccative, like all martial ſubſtances.

For the method of imitating gems by means of *tripoli*, ſee GEMS.

TRIPOLIUM, in *Botany*, a ſpecies of *aſter*. See STAR-*wort*.

TRIPPING, in *Heraldry*, denotes the quick motion of all ſorts of deer, and of ſome other creatures, repreſented with one foot up, as it were, on a trot.

In ſpeaking of lions, they ſay *paſſant*, inſtead of *tripping*.

TRIPPING, in *Sea Language*, denotes the movement by which an anchor is looſened from the bottom by its cable or buoy-ropes. See ATRIP.

TRIPSACUM, in *Botany*, a genus of the *monoecia triandria* claſs: its characters are; that it has male and female flowers; the calyx of the male is a four-flowered glume, and the corolla a membranaceous glume; the calyx of the female is a glume with perforated hollows; the corolla a bivalve glume; the ſtyles two, and the ſeed ſingle. There are two ſpecies.

TRIPTHONG. See TRIPHTHONGUE.

TRIPTOTES, compounded of τρεις, *three*, and ϖτωσις, *caſe*, in *Grammar*, defective nouns, which have only three caſes; ſuch is *fors*, *fortis*, *forte*; or *dica*, *dicam*, *dicas*.

TRIPUDIUM, in *Antiquity*, a ſpecies of divination, in which omens were drawn from the rebounding of corn thrown to chickens.

TRIPYRAMIDES, derived from τρεις, *thrice*, and ϖυραμις, a *pyramid*, in *Natural Hiſtory*, the name of a genus of ſpars.

The bodies of this genus are ſpars compoſed of ſingle pyramids, each of three ſides, ſtanding on no column, but affixed by their baſes to ſome ſolid body.

Of this genus there are only two known ſpecies: 1. A ſhort and thick one, found on the ſides of the ſtacks of ſtone in Northamptonſhire, and elſewhere; but this is not common, and is uſually ſmall. 2. A long one with a narrow baſe: this is not found in England, but is common in the German mines. Hill's Hiſt. of Foſſ. p. 266.

TRIQUETRA *oſſa*, triangular bones found in ſome craniums.

TRIQUETRUM *folium*, among *Botaniſts*. See LEAF.

TRIREME, or TRIREMIS, in *Antiquity*, a GALLEY with three ranks of oars on a ſide. See ENNERIS.

TRISACRAMENTARIANS, or TRISSACRAMENTARIANS, an appellation given to a ſect in religion, who admit of three ſacraments, and no more.

There have been ſeveral *Triſacramentarians* who allowed of baptiſm, the euchariſt, and abſolution for ſacraments. The Engliſh are often miſrepreſented by foreigners as *triſacramentarians*, from an opinion, that they allow ordination to be a ſacrament.

TRISACTIS, in *Natural Hiſtory*, the name of a genus of STAR-*fiſh*, compoſed of a body and three rays, the more uſual number being five.

TRISAGION, or TRISAGIUM, τρισαγιον, compounded of τρεις, *three*, and ἁγιος, *ſanctus*, *holy*, in *Church Hiſtory*, a hymn, wherein the word *holy* is repeated three times.

The proper *Triſagion* is thoſe words, *holy*, *holy*, *holy*, *Lord God of Sabbath*, which we read in Iſaiah vi. 3. and in the Apocalypſe. From theſe words the church formed another *Triſagion*, which is rehearſed in Latin and Greek, in the reſpective churches, to this effect, *Holy God, Holy Mighty, Holy Immortal! have mercy upon us.* Petrus Fullenſis to this *Triſagion* added, ο ϛαυρωθεις δι ἡμας, *Thou who waſt crucified for us—have mercy*, &c. thus attributing the paſſion, not to the Son alone, but to all the three perſons of the Trinity; and he pronounced anathema to all ſuch as would not ſay the ſame. See THEOPASCHITE.

The uſe of the ſecond *Triſagion* (excluſive of the addition of Fullenſis) began in the church of Conſtantinople, from whence it paſſed into the other churches of the Eaſt, and afterwards into thoſe of the Weſt. And ſtill ſubſiſts in its primitive purity, both in Latin, Greek, Ethiopic, and Mozarabic offices.

TRISCÆDECACTIS, in *Natural Hiſtory*, a name given by Linkius, and ſome other authors, to a kind of branched ſtar-fiſh, or aſtrophyte, whoſe rays are thirteen in number, where they firſt leave the body, and each divides into many more.

TRIS DIAPASON, *triple diapaſon*, in *Muſic*, what is otherwiſe called a *triple eighth*.

TRISE, at *Sea*, the ſeamen's word for haling up of any thing with a dead rope, or one that doth not run in a block, but is pulled by hand or by main ſtrength: thus if any caſk, cheſt, or other goods, hath only a rope faſtened to it, and ſo without a tackle be pulled up into a ſhip by hand, they ſay it is *triſed up*.

TRISECTION, or TRISSECTION, the dividing of a thing into three.

The term is chiefly uſed in *Geometry*, for the diviſion of an angle into three equal parts.

The *triſection of an angle* geometrically, is one of thoſe great problems whoſe ſolution has been ſo much ſought by mathematicians for two thouſand years; being, in this reſpect, on a footing with the quadrature of the circle, and the duplicature of the cube angle.

Several late authors have written of the *triſection* of the angle, and pretend to have found out the demonſtration thereof; but they have all committed paralogiſms.

TRISETÆ, the *three-haired flies*, a term uſed by the writers in *Natural Hiſtory*, to expreſs a certain genus of the SETICAUDÆ, or briſtle-tailed flies, which are diſtinguiſhed from the reſt, by having three hairs or briſtles growing from the tail; there are ſeveral kinds of theſe flies, found frequently among our hedges.

TRISEUS, in *Ichthyology*, a name given by Salvian, Benedictus Jovius, and others, to that ſpecies of the gadi which we call the EELPOUT, and authors in general the *muſtela fluviatilis*.

TRISMEGISTUS, formed from τρεις, *thrice*, and μεγιϛος, *greateſt*, an epithet, or ſurname, given to one of the two Hermeſes, or Mercuries, kings of Thebes, in Egypt, who was contemporary with Moſes.

Mercury, or Hermes *Triſmegiſtus*, is the latter of the two Hermeſes; the former having reigned about the time of the deluge. They are both of them repreſented as authors of many of the arts and inſtitutions of the Egyptians.

TRISMOS, τρισμος, or τριγμος, a convulſion of the muſcles of the temples, cauſing the teeth to gnaſh.

TRISOLYMPIONICA, τρισολυμπιονικης, compounded of τρεις, *three*, Ολυμπια, *Olympic games*, and νικη, *victory*, among the *Ancients*, a perſon who had thrice borne away the prize at the Olympic games.

The *triſolympionicæ*, or *triſolympionics*, had great privileges and honours allowed them. Statues were erected to them, of the kind called *iconicæ*, which were modelled to the ſize and form of their perſons.

They were alſo exempted from all taxes and incumbrances, and could never be marked with infamy

TRISPAST, TRISPASTON, compounded of τρεις, *three*, and σπαω, *I draw*, in *Mechanics*, a machine with three pullies,

lies, or an aſſemblage of three pullies, for raiſing great weights.

The *triſpaſton* is a ſpecies of POLYSPASTON.

TRISPERMUM, in *Pharmacy*, the name of a cataplaſm, or pultice, conſiſting of three ingredients; theſe are cummin and opium ſeed, and bay-berries.

TRISSA, in *Ichthyology*, a name uſed by ſome authors for the fiſh more commonly known by the name of alauſa, and called in Engliſh, SHAD, or the mother of herring.

TRISSACRAMENTARIANS. See TRISACRAMENTARIANS.

TRISTO, a word uſed by Paracelſus, to expreſs what he calls the material fire, lodged in the matter of all the four elements, and exerting upon occaſion its influence, under the form of the proper effects of each element.

TRISTRA, TRUSTRA, or TRISTA, in our old *Law Books*, an immunity, whereby a man is excuſed from attending on the lord of the foreſt, when he is diſpoſed to chace within the foreſt; ſo that he cannot be compelled to hold a dog, follow the chace, nor ſtand at the place appointed, which otherwiſe he might be, under pain of amercement.

Sint quieti, &c. de chevagio, hondepenny, buckſtol, & triſtis, & de omnibus miſericordiis, &c. Privileg. de Semplingham.

TRISYLLABLE, TRISSYLLABLE, in *Grammar*, a word conſiſting of three ſyllables.

TRITÆOPHYES, a word uſed by the medical writers of the ancients, to expreſs a kind of fever, much of the nature of the tertian, and taking its riſe from it.

TRITE, τριτη, in *Muſic*, the third muſical chord in the ſyſtem of the ancients.

There are three ſtrings under this denomination in the ancient diagramma, viz. the *trite hyperbolæon*, *trite diazeugmenon*, and *trite ſynemmenon*.

This chord of the ancient tetrachord was ſo named from its being the third from the NETE; and hence we might call it the anti-penultimate. It was otherwiſe, in ſome tetrachords, called PARYPATE. See DIAGRAM and INTERVAL.

TRITE *diezeugmenon*, in the *Greek Muſic*, was the antipenultimate note of the diezeugmenon tetrachord, and anſwers to Guido's c, ſol, fa, ut.

TRITE *hyperbolæon*, in the *Greek Muſic*, was the anti-penultimate note of the hyperbolæon tetrachord, and anſwers to Guido's f, fa, ut.

TRITE *ſynemmenon*, in the *Greek Muſic*, was the anti-penultimate note of the ſynemmenon tetrachord, and anſwers to Guido's b, fa. Wallis's Appen. Ptolem. Harm. p. 257. See DIAGRAM.

TRITHEISM, the opinion of the *Tritheiſts*, or the hereſy of believing three Gods.

Tritheiſm conſiſts in admitting not only of three perſons in the Godhead; but of three ſubſtances, three eſſences, or hypoſtaſes, and indeed three Gods.

Several people, out of fear of giving into *Tritheiſm*, have become Sabellians; and ſeveral others, to avoid Sabellianiſm, have commenced *Tritheiſts*; ſo delicate and ſubtile is the diſtinction.

In the famous controverſy between Dr. South and Dr. Sherlock, the firſt is judged to have run into Sabellianiſm, by a too rigorous aſſerting the unity of a Godhead, and the latter into *Tritheiſm*, by a too abſolute maintaining the Trinity.

John the Grammarian, ſurnamed Philoponus, lover of labour, is held the author of the ſect of the *Tritheiſts*, under the emperor Phocas; at leaſt it appears, that he was a zealous advocate thereof.

The chief of this ſect, according to Moſheim, Eccl. Hiſt. vol. i. p. 473, was John Aſcuſnage, a Syrian philoſopher, and a Monophyſite. He imagined in the Deity three natures or ſubſtances, abſolutely equal in all reſpects and joined together by no common eſſence.

TRITHEITÆ, TRITHEISTS, in *Church Hiſtory*, a name given to ſuch heretics, as admit not only of three perſons, but of three diſtinct ſubſtances and natures, in the Holy Trinity. See TRINITY and TRITHEISM.

TRITHING. See TRIHING.

TRITICUM, in *Botany*. See WHEAT.

TRITON, in *Poetry*, a ſea demigod, held by the ancients to be an officer, or trumpeter, of Neptune, attending on him, and carrying his orders and commands from ſea to ſea.

The poets and painters repreſent him as half-man, half-fiſh, terminating in a dolphin's tail, and bearing in one hand a ſea-ſhell, which ſerved him as a trumpet.

Some of the ancients make him the ſon of Neptune, and the nymph Salacia; Heſiod, of Neptune and Amphitrite; Numenius, in his book De Piſcationibus, makes him the ſon of Oceanus and Tethys; and Lycophron, the ſon of Nereus.

But though Heſiod and the mythologiſts only ſpeak of one *Triton*, the poets have imagined ſeveral; giving ſome of them for trumpeters to all the ſea-gods, particularly to Neptune and Venus; accordingly they were frequently introduced on the ancient theatre, and in the naumachia.

In effect, the *Tritons* not only officiated as trumpeters in Neptune's retinue, but were alſo ſuppoſed to draw his chariot, i. e. the ſea ſhell wherein he rode over the waters; as we find in Virgil, Æneid x. 209. Ovid. Metam. I. 333, and on a medal of Claudius.

The fable of the *Tritons*, no doubt, took its riſe from what are called the ſea-men, or mermen; for that there are ſuch things as ſea-men has been believed in many ages. See MERMAID and SEA-*cow*.

The poets ordinarily attribute to *Triton* the office of calming the waves, and of making tempeſts ceaſe. Thus, in the firſt of the Metamorphoſes, we read, that Neptune, deſiring to recall the waters of the deluge, commanded *Triton* to ſound his trumpet, at the noiſe whereof the waters all retired.

TRITON, in the Linnæan ſyſtem of *Natural Hiſtory*, a genus of the *molluſca* order of worms: the characters of which are, that the body is oblong, the tongue ſpiral, the tentacula twelve in number, and bipartite, ſix on each ſide, and the three hinder ones cheliferous. There is one ſpecies, which is found in the clefts of ſubmarine rocks.

TRITON *avis*, in *Ornithology*, a name under which Nieremberg has deſcribed a bird of the Weſt Indies, famous for its fine ſinging, and found in Hiſpaniola; it is ſaid to have three different notes, and to be able to give breath to ſounds of all three kinds at the ſame time; it is alſo ſaid to be a very beautiful bird. Ray.

TRITONE, TRITONO, in *Muſic*, a falſe concord, conſiſting of three tones, or a greater third, and a greater tone.

Its ratio, or proportion in numbers is, of 45 to 32. In dividing the octave we find, on one ſide, the falſe fifth, and the *tritone* on the other.

The *tritone* is a kind of redundant fourth, conſiſting of three tones, whence its name; or, more properly, of two tones with a greater ſemitone, and a leſſer, as of *ut* to *fa*, ſharp; of *fa* to *ſi*, flat, &c. But it is not, as many imagine, a greater fourth; for the fourth is a perfect interval, which does not admit of any majority or minority; nor muſt the *tritone* be confounded with the falſe fifth; for the *tritone* only comprehends four degrees, viz. *ut*, *re*, *mi*, *fa*, ſharp; whereas the falſe fifth comprehends five, viz. *fa*, ſharp, *ſol*, *la*, *ſi*, *ut*; beſides that, among the ſix ſemitones, which compoſe the *tritone* chromatically, there are three greater and three leſs; whereas, among the ſix ſemitones, which compoſe the falſe fifth, there are only two leſs and four greater. See FOURTH, FIFTH, &c.

TRITOPATORIA, τριτοπατορεια, in *Antiquity*, a ſolemnity in which it was uſual to pray for children, to the θεοι γενεθλιοι. or *gods of generation*, who were ſometimes called τριτοπατορες.

TRITORIUM, in *Chemiſtry*, a veſſel generally made of glaſs, uſed for the ſeparation of liquors of different denſities, as oil and water. Its largeſt diameter is in the middle, and it terminates with an aperture at each of the two extremities. The lower extremity, the aperture of which is very narrow, is dipped into the mixed liquor, and when it is ſufficiently filled, the upper orifice is to be ſtopped cloſe, by preſſing the thumb upon it, by which means the liquor contained will not run out at the lower aperture, when the veſſel is raiſed from the mixed liquor. When the fluids, of which this liquor, conſiſts, have perfectly ſeparated according to their reſpective denſities, by removing the thumb, the heavier fluid will run out at the lower extremity, and the ſeparation will be thus effected. Dict. Chem.

TRITTYARCHI, τριττυαρχοι, among the *Athenians*, were magiſtrates who had the command or government of the third part of a tribe. See PHYLARCHUS.

TRITURATION, TRITURA, or TRITUS, formed from *triturare*, to *thraſh*, of *tero*, *I wear*, *rub*, or *grind*, in *Pharmacy*, *grinding*; the act of reducing a ſolid body into a ſubtile powder, called alſo *levigation*, *pulverization*, &c.

The *trituration* of woods, barks, minerals, and other hard and dry bodies, is performed in metalline mortars and in mills.

The ſame term is alſo applied to the comminuting, bruiſing, and dividing, of humid-matters into little parts.

The *trituration* of moiſt bodies is performed in marble or ſtone mortars, with peſtles of wood, glaſs, ivory, &c. The word *trituration* is generally applied to denote the diviſion that is made of ſeveral bodies together, to unite them with each other; as, e. g. the extinction of mercury in the operation of Æthiops mineral, and others ſimilar.

Trituration, Boerhaave obſerves, has a wonderful force to diſſolve ſome bodies, and will render them as fluid as if they were fuſed by the fire. Thus if you grind the powder of myrrh and ſalt of tartar together, they will diſſolve each other. By rubbing new and bright filings of iron in a mortar, with double their weight of clean ſulphur, the iron will be diſſolved, ſo as by diluting it with water to afford the vitriolum Martis.

Gold long ground in a mortar, with ſalt of tartar, will yield a kind of tincture; and rubbed with mercury in a mortar of glaſs, it entirely diſſolves into a purple liquor, and becomes a moſt powerful medicine.

Dr. Langelotte has written a curious treatiſe of the great effects of *trituration* in chemiſtry, and deſcribes a peculiar way he employed to grind gold, whereby he ſays, he could render it as fluid as the fire does, and make an aurum potabile, by the bare motion of a mill.

This author, in the Philoſophical Tranſactions, mentions his way of grinding gold, and deſcribes two engines, or philoſophical mills, for the purpoſe; with one of which, in the ſpace of fourteen natural days, he reduced a leaf of gold to a duſky powder, and, putting it into a ſhallow retort, placed in a ſand-heat, he thence obtained by gradually increaſing the fire, and giving a ſtrong one at laſt, a very few red drops, which, digeſted *per ſe*, or with tartarized ſpirit of wine, afforded a pure and genuine aurum potabile.

The ſucceſs of this operation the doctor attributes, in a great meaſure, to the ſalt of the air, which, in grinding, plentifully mixes and unites itſelf with the gold.

TRITURATION is alſo uſed, in *Medicine*, for the action of the ſtomach on the food, whereby it is fitted for nutritriment. See DIGESTION, where the doctrine is laid down at large.

TRIVERBIAL *days*, in the *Roman Calendar*, denoted judicial days, or ſuch as were allowed to the prætor for hearing cauſes.

They were otherwiſe called *dies* FASTI, *in quibus licebat prætori fari tria verba, do, dico, addico.*

Of theſe court-days the Romans had only twenty-eight in the whole year; whereas, with us, one fourth of the year is TERM time, in which three courts conſtantly ſit for the diſpatch of buſineſs; beſides the cloſe attendance of the court of chancery for determining ſuits in equity, and the numerous courts of aſſize and niſi prius that ſit in vacation for the trial of matters of fact.

TRIVIUM, a term invented in the times of barbariſm to expreſs the three ſciences that were firſt learned in the ſchools, viz. grammar, rhetoric, and logic; and the ſchools in which theſe ſciences were taught were called *triviales*.

The *quadrivium*, to which the ſcholar next proceeded in his way to the ſummit of literary fame, comprehended the four mathematical ſciences, viz. arithmetic, muſic, geometry, and aſtronomy.

TRIUMFETTA, in *Botany*, a genus of the *dodecandria monogynia* claſs. Its characters are theſe: the flower has no empalement, but has five linear, erect, obtuſe petals, which turn inward; it has ten awl-ſhaped riſing ſtamina, the length of the petals, terminated by ſingle ſummits; and a roundiſh germen, ſupporting a ſtyle the length of the ſtamina, crowned by an acute bifid ſtigma; the germen becomes a globular capſule, ſet with long prickles on every ſide, having four cells, each containing one ſeed, which is convex on one ſide and angular on the other. Linnæus enumerates four ſpecies, but Miller mentions only one, which is a native of the Weſt India iſlands.

TRIUMPH, TRIUMPHUS, a ceremony, or ſolemnity, practiſed among the ancient Romans, to do honour to a victorious general, by affording him a magnificent entry into their city.

The *triumph* was the moſt pompous ſpectacle known among the ancients: authors uſually attribute its invention to Bacchus, and derive the term from θριαμβος, one of his titles; and tell us, that he firſt triumphed upon the conqueſt of the Indians; and yet this ceremony was only in uſe among the Romans.

As long as the ancient diſcipline of the republic continued, no general could pretend to a *triumph* who had not extended the limits of the empire, and ſlain at leaſt five thouſand of his enemies in battle, without any conſiderable loſs on his own part; to this purpoſe an expreſs law was eſtabliſhed, and he was obliged to make oath before the quæſtors, that the account delivered to the ſenate was true. But this law became obſolete, and intrigue and faction procured a *triumph* in favour of generals whoſe merit was not very conſiderable.

The general who vaniſhed his enemies in a naval engagement, had alſo the honour of a naval triumph. Theſe were firſt granted to C. Duillius, in the year 449, after his defeat of the Carthaginians.

The *triumph* was of two kinds, the *leſs* and the *greater*. The *leſs triumph* was granted upon a victory over ſome unequal and unworthy enemy, as over pirates, ſlaves, &c. This they called OVATIO, becauſe the only ſacrifices offered herein were ſheep.

The *greater triumph*, called alſo *curulis*, and ſimply the *triumph*, was decreed by the ſenate to a general upon the conquering of a province, or gaining a ſingle battle.

The order and œconomy of the *triumph* were thus: the general having diſpatched couriers with tidings of his ſucceſs, the ſenate met in Bellona's temple to read the letters: this done they ſend him the title *imperator*, with orders for him to return, and bring his victorious troops along with him.

When he was arrived near the city, the general and principal officers took oath of the truth of the victory; and the day of *triumph* was appointed.

The day being arrived, the ſenate went to meet the conqueror without the gate called Capena, or Triumphalis, and marched in order before him to the Capitol. He was richly clad in a purple robe, embroidered with figures of gold, ſetting forth his glorious atchievements; his buſkins were beſet with pearl, and he wore a crown, which at firſt was only laurel, but afterwards was gold; in one hand he bore a laurel branch, and in the other a truncheon. He was drawn in a car or chariot, adorned with ivory and plates of gold, drawn uſually by two white horſes; though ſometimes by other animals, as that of Pompey, when he triumphed over Africa, by elephants; that of Mark Antony, by lions; that of Heliogabalus, by tygers; that of Aurelian, by deer; and that of Nero, by hermaphrodite mares, &c.

At his feet were his children, or ſometimes on the chariot-horſes. It is added, that the public executioner was behind him, to remind him, from time to time, that theſe honours were tranſitory, and would not ſcreen him from the ſeverity of the laws, if he ſhould ever be found delinquent.

The cavalcade was led up by the muſicians, who had crowns on their heads; after them came ſeveral chariots, wherein were plans of the cities and countries ſubdued, done in relievo: they were followed by the ſpoils taken from the enemy, their horſes, arms, gold, ſilver, machines, tents, &c. After theſe came the kings, princes, or generals ſubdued, loaded with chains, and followed by mimics and buffoons, who inſulted over their misfortunes. Next came the officers of the conquering troops, with crowns on their heads.

After theſe appeared the *triumphal* chariot, before which, as it paſſed, they all along ſtrewed flowers, and the muſic played in praiſe of the conqueror amidſt the loud acclamations of the people, crying, *Io triumphe!*

The chariot was followed by the ſenate, clad in white robes; and the ſenate by ſuch citizens as had been ſet at liberty or ranſomed.

The proceſſion was cloſed by the prieſts, and their officers and utenſils, with a white ox led along for the chief victim.

In this order they proceeded through the triumphal gate, along the Via Sacra, to the Capitol, where the victims were ſlain.

In the mean time all the temples were open, and all the altars loaden with offerings and incenſe; games and combats were celebrated in the public places, and rejoicings appeared every where.

What was horrible amidſt all this mirth was, that the captives, when arrived at the form, were led back to priſon and ſtrangled; it being a point of religion with them, not to touch the victims till they had taken full revenge of their enemies. The rites and ſacrifices over, the *triumpher* treated the people in the Capitol, under the porticoes, and ſometimes in Hercules's temple.

The moſt conſiderable *triumphs* were thoſe of Cæſar after the taking of Utica, and of Auguſtus after the victory of Actium. Cæſar had four *triumphs*, which laſted four days, and were conducted with the moſt extraordinary ſplendor and magnificence. The firſt was the *triumph* of the Gauls, on which occaſion there were preſented to the view of the Romans the names of three hundred nations and eight hundred cities ſubdued by the death of a million of enemies, which Cæſar had defeated in ſeveral battles. The ſecond *triumph* was that of Egypt: the third repreſented the defeat of Pharnaces; and the fourth exhibited pictures of Scipio, Petreius, and Cato.

The *triumph* of Auguſtus laſted three ſucceſſive days, and was not leſs magnificent than the former.

After Auguſtus the honour of a *triumph* became an appendage of ſovereignty. Encycl.

TRIUMPHAL *arch*, *car*, and *column*. See the articles.

Triumphal *crown*, or *garland*. See Crown.

This is ſaid to have been taken from Apollo's crowning his head with a laurel after killing the Delphian ſerpent.

Triumphal *gown*, *toga triumphalis*. See Toga.

TRIUMPHANT *church*. See Church.

TRIUMVIR, one of three perſons who govern abſolutely, and with equal authority, in a ſtate.

The word is little uſed but in the Roman Hiſtory. Cæſar, Craſſus, and Pompey were the firſt *triumvirs*, i. e. the firſt who divided the government of the republic among them.

There were alſo other officers, called *triumvirs*, *triumviri*; as the *triumviri*, or *treſviri capitales*, created in the year of Rome 463, to take care of priſoners, and ſuperintend the execution of criminals.

Triumviri monetales, who were magiſtrates created at the ſame time to ſuperintend the coinage of the money; whence that mark, ſtill extant on many ancient coins, IIIVIRI. Theſe officers were very conſiderable, and were choſen out of the knights. They made a part of the *centumviri*. The title they bear on medals is IIIVIR AAÆFF, *triumviri, auro*, *argento*, *ære*, *flando*, *feriendo*, which ſignifies, that they had the direction of caſting and ſtriking of gold, ſilver, and braſs.

There were alſo *triumviri ædibus reficiendis*, officers appointed to look at the reparation of temples; *triumviri colonis deducendis*, for the conducting and ſettling of colonies; *triumviri*, for the raiſing of troops; *nocturnal triumviri*, to prevent or extinguiſh fires; *triumviri* to review the forces, &c.

In the Acilian family we read of one M. Acilius IIIVIR VALETU; that is, *triumvir of health*, or a magiſtrate of health. M. Spanheim takes him to have been a magiſtrate eſtabliſhed to perform ſacrifices to the gods of health, to dedicate their temples, &c.

Oruphrius and Vaillant read *tirumvir valetudinis*; Patin, *triumvir valetudinarius*; but M. Spanheim, with much more reaſon, reads *triumvir valetudo*; in like manner. as on a medal of the Aquilian family, we read IIIVIR VIRTUS; ſignifying that one M. Aquilius had been made *triumvir* to repair the temple of Virtue, and Acilius that of Health.

TRIUMVIRATE, Triumviratus, an abſolute goverment adminiſtered by three perſons, with an equal authority.

There are two famous *triumvirates* at Rome; Pompey, Cæſar, and Craſſus eſtabliſhed the firſt; and Auguſtus, Mark Antony, and Lepidus, the ſecond.

This latter *triumvirate* gave the laſt blow to the liberty of the republic. Auguſtus having vanquiſhed Lepidus and Antony, the *triumvirate* ſunk into a Monarchy.

TRIUNE, *tres in uno*, three in one; a term ſometimes applied to God, to expreſs the unity of the Godhead, in a Trinity of perſons.

TROADENSE *marmor*, a name given by the ancients to a ſpecies of white marble, dug in Mount Ida, and greatly uſed in building.

TROAT, among *Sportſmen*, the cry of a buck in rutting time.

TROCHAIC, Trochaicus, in the *Latin Poetry*, a kind of verſe, conſiſting of trochees, or wherein that foot predominates; as the iambus does in the iambic.

The 18th ode of the 2d book of Horace's Odes, conſiſts of ſtrophes of two verſes, the firſt whereof is *trochaic* dimeter catalectic, i. e. *trochaic*, compoſed of three trochees, and a ſyllable at the end, or wanting a ſyllable in the firſt foot; which ſome call the *Euripidean trochaic*.

——Nōn | *ĕbūr* | *nĕque āu* | *rĕūm*
Largiora | *flagito*

Long verſes of fifteen half feet, which are more particularly diſtinguiſhed by the name of *trochaic*, are nothing more than tetrameter iambics or of eight feet, the firſt of which wants a ſyllable; as there are others where it is wanting at the end. Thus,

—*Prō* | *pĕccā* | *tō măg* | *nō*, *pāu* | *lūm ſŭp* | *plĭcĭī* | *ſătĭs* | *ĕſt pătrī* Ter.

TROCHANTER, τροχαντηρ, in *Anatomy*, a name given to two apophyſes ſituate in the upper part of the thighbone. See Apophysis.

The largeſt, which is above, is called the *great trochanter*; and the ſmaller, beneath, the *leſs trochanter*. See *Tab. Anat. (Oſteol.) fig*. 7. *n*. 23. *fig*. 3. *lit. t.* and *lit. u. fig*. 7. *n*. 24. See alſo Femur.

The word literally ſignifies *rotator*, or *roller*, formed from the Greek τροχαω, *roto*, *I run*, *I turn round*. That appellation was given them becauſe they receive the tendons of moſt of the muſcles of the thigh, among which are the obturators, which move it round. See Obturator.

TROCHAR, or Trocar, in *Surgery*, an inſtrument conſiſting of a triangular-pointed ſteel bodkin, included in a ſilver cannula, ſerving for Tapping, or perforating the abdomen and ſcrotum of dropſical patients. See *Tab*. II. *fig*. 24. and *Tab*. III. *fig*. 45 and 46.

Mr Petit has contrived a cannula with a long ſlit in its upper part, for the more ready diſcharge of the water, together with a plate made hollow, like a gutter, by which the water is conveyed away to ſome proper receptacle.

Mr. Andrée has lately propoſed a new conſtruction of the *trochar*, for Tapping both the Hydrocele and the abdomen.

The elaſtic *trochar* for tapping the hydrocele conſiſts of two parts, viz. the ſtilet or perforator, and the cannula. The whole of the ſtilet, except its point, is contained within the cannula, which is flat, but ſomewhat convex on each ſurface, and has two ſharp edges. The cannula is formed of two pieces of well tempered elaſtic ſteel, ſo accurately fitted together at their edges as to form a complete cannula, and cloſely embrace the body of the ſtilet. When the inſtrument has been paſſed into the part affected, on withdrawing the ſtilet with the ſmalleſt degree of force, the cannula opens juſt wide enough to allow of its exit, and afterwards, by its own elaſticity, cloſes immediately; being then a complete cannula, open at each end. The inſtrument is repreſented in *Tab*. III. *Surgery*, *fig*. 47. No. 1, 2, 3. A (No. 1.) repreſents the end of the ſtilet, *a a a* its point and edges, which are made to cut no farther than the lower *a a:* the cannula encloſing the ſtilet is ſeen at B; and C is that end in which its halves are joined by ſcrews: D is the upper junction of the cannula and ſtilet, the latter being wider than the former: E is the handle of the inſtrument; and *e e e* are marks, ſhewing that this ſide anſwers to the ſcrew ſide of the cannula. In No. 2. the ſtilet is repreſented complete, without the cannula; and No. 3. ſhews the inſide of one half of the cannula; the inſide from B to C is repreſented grooved, ſo as to form the half of a tube. The principal advantages propoſed by this new conſtruction is performing the operation at any period of the diſeaſe, and with leſs pain than with the common *trochar*.

A ſimilar *trochar* of a larger ſize may alſo be uſed for the aſcites, or water-dropſy of the belly, and will be found to have the ſame advantages.

Mr. Sharpe, in his Operations of Surgery, deſcribing the *trochar* for the belly, obſerves, that the perforator ſhould exactly fill up the cavity of the cannula; for unleſs the extremity of this lies quite cloſe and ſmooth on the other, the introduction of it into the abdomen will be very painful: that it may ſlip in the more eaſily, the edge of the extremity ſhould be thin and ſharp; and he recommends a cannula of ſteel, ſilver being too ſoft a metal, and liable to become jagged or bruiſed at its extremity, with very little uſe. See Andrée's Account of an Elaſtic *Trochar*, &c 8vo. 1781.

M. le Cat has contrived a new *trochar* for the puncture of the Hydrocephalus, and for other evacuations which are neceſſary to be made at different times. For a deſcription, illuſtrated with figures, ſee Phil. Tranſ. vol. xlvii. p. 267, &c.

TROCHE, Trochiscus, in *Pharmacy*, a form of medicine, made to be held in the mouth to diſſolve gradually.

The *troche* is properly a dry compoſition, the chief ingredients whereof, after having been brought into a very fine powder, and mixed with ſugar, are incorporated with ſome proper liquor, as diſtilled waters, wine, vinegar, or mucilages, and reduced into a maſs, which is moulded into little cakes, or balls of any form, at pleaſure, and dried in the air, far from the fire.

There are *troches* of various kinds, and for various intentions: as, *purgative*, *alterative*, *aperitive*, *corroborative*, &c. *troches*

Latin authors call them *paſtilli*, *rotulæ*, *placentulæ*, *orbes*, and *orbiculi*; and the Engliſh, frequently, *lozenges*.

The chief *troches*, now in uſe, are thoſe of myrrh and liquorice, and thoſe of the teſtaceous powders for the heart-burn. Thoſe of coloquintida are called *troches of albandal*, from the Arabs, who called coloquintida *handal*

TROCHES of *japan earth*, of *nitre*, of *ſcammony*, of *ſquills*, and of *ſulphur*, ſee the ſeveral articles.

TROCHEE, **Trochæus**, formed of τρεχω, *I run*, becauſe it moves quickly, in Greek and Latin *Poetry*, a kind of foot, conſiſting of two ſyllables, the firſt long, the latter ſhort: ſuch as the words *vādĕ* and *mūſă*.

The *trochee* is the reverſe of the iambus, and has juſt a contrary effect; the latter being light and ſprightly, and the former weak and languid, as all thoſe meaſures are which move from a long to a ſhort ſyllable.

Some called the *trochee*, *choreus*, becauſe it is proper for ſongs and dances. Theſe give the denomination *trochæus* to the TRIBACHYS. Quint. lib. x. cap. 4.

TROCHILUS, in *Architecture*, a hollow member, more uſually called, by modern architects, the SCOTIA; and, by our Engliſh workmen, the *caſement*. See *Tab. Archit. fig.* 4.

Trochilus, *Honey-ſucker*, or *Humming-bird*, in the Linnæan ſyſtem of *Ornithology*, is a genus of the picæ; for the characters, &c. of which, ſee HUMMING-*bird*.

This genus comprehends the *polytmus* and *melliſuga* of Briſſon, the former including ſixteen, and the latter twenty ſpecies.

Trochilus, is alſo a name uſed by Ariſtotle, Pliny, and others of the ancient naturaliſts, for the *regulus criſtatus*, or, as we call it, the golden-crowned WREN.

Trochilus is alſo the name of a remarkable water-bird, being very long-legged, yet web-footed.

It is a very ſwift runner on the ground, and is thence called by the Spaniards *corriza*. Its beak is ſtraight and black at the end, and the opening of its mouth very wide; it has black eyes, ſurrounded by a white naked membrane, and that by a brown one. On its under part it is white; its back, ſhoulders, and wings, are of a ferruginous colour; its running is ſo very ſwift as to equal the flight of moſt birds. Aldrovand. de Avib. lib. xix. cap. 35.

TROCHING, the ſmall branches on the top of a deer's head.

TROCHITÆ, or **Trochites**, in *Natural Hiſtory*, a kind of figured foſſil ſtones, reſembling parts of plants; vulgarly called *St. Cuthbert's beads*.

They are uſually of an opake, browniſh colour: they break like ſpar, gloſſy and ſhining, and are eaſily diſſolved in vinegar. Their figure is generally cylindrical, ſometimes a little tapering, the circumference ſmooth, and both the flat ſides covered with fine radii drawn from a certain hole in the middle to the circumference.

Two or three, or more, of the ſimple *trochitæ*, joined together, conſtitute what the naturaliſts call an ENTROCHUS.

In theſe the *trochitæ*, or ſingle joints, are ſo ſet together, that the rays of the one enter into furrows in the other, as in the ſutures of the ſkull. They are found in great plenty in the bodies of the rocks at Braughton and Stock, two villages in Craven, at all depths under ground; alſo in Mendip-hills, &c. ſometimes only ſprinkled here and there, and ſometimes in large ſtrata, or beds, of all magnitudes, from the ſize of the ſmalleſt pin, to two inches about.

They are often found ramous or branchy, ſeveral rudiments of large branches ariſing from the ſtem, or cylinder, and ſometimes ſtill ſmaller from theſe. The branches being deeply inſerted into the ſtem, the tearing them off leaves great holes therein. See ENTROCHUS *ramoſus*.

Dr. Liſter has diſcovered a ſort of little fragments among them, which he takes to have been the apices of them; and another ſort, which he ſuppoſed to have been the roots: for he ſuppoſes them to be a ſort of rock plants.

M. Beaumont, in the Philoſophical Tranſactions, aſſures us, that he has found, that all the cliffs in ſome mines, are made up of theſe *entrochi*, ſome whereof have been converted into a reddiſh matter; while others, becoming white ſpar, compoſe bodies of that ſubſtance: and conſidering that all the cliffs, for a very large circumference in ſome places, conſiſt almoſt wholly of theſe ſtones, it has been thought by ſome, who ſuppoſe them plants, that there have been, and ſtill are, whole fields or foreſts of theſe under ground, as there are of coral in the Red-ſea. In the courſes between the cliffs are found of theſe foſſils, at all ſtages and degrees of maturity, growing up in the gritty clay, and rooted in the rake-mold ſtones, many of them of the form and dimenſions of a tobacco-pipe, with the evident beginnings of circles and ſutures; and others full grown, formed of perfect ſpar, and at their point of maturity.

The central matter, in many, continues ſtill white and ſoft, as the whole ſubſtance is, by ſome, thought to have been at firſt; and is continually refreſhed by the mineral ſtreams and moiſture, which have free acceſs to it through five hollow ſlits, or feet, in the figured roots, or through the maſs of clay uſually lying under the plain roots. From the curioſity of their make, and from this accidental reſemblance of plants, many have thought them to be ſuch; and affirm, that they may vie with moſt of the vegetable kingdom, and are ſhaped and formed like them; having ſtem, branches, roots, an inward pith, as likewiſe joints and runnings in their grit, and ſometimes cells to ſupply the place of veins and fibres.

Others have thought it highly probable, theſe rock-plants are lapides ſui generis, and not parts of animals or plants petrified, as many authors have imagined. If the figured roots, whereon they ſometimes grow, give any ſuſpicion they might have belonged to an animal, particularly a ſpecies of the ſtella arboreſcens, the trunks ſeem to them to evince the contrary: nor are they reducible to any known ſpecies of vegetables. Mr. Beaumont tells us, that he had by him above twenty different ſpecies of *trochites*, all of them wonderfully regular, and not to be paralleled by any vegetable he knows of in nature: and it is inconceivable how ſo many ſpecies, diffuſed through many parts of the earth, ſhould come to be loſt. They are certainly, indeed, not vegetable remains, but are truly parts of the ſtellà arboreſcens petrified. See farther Keppellus, Eſſai de Entroch. and the articles ENTROCHUS, STAR-*fiſh*, and STAR-*ſtone*. See *Tab.* III. *Foſſils, Claſs* 10.

TROCHITIFER *glans*, ſee GLANS *trochitifera*.

TROCHLEA, τροχηλια, one of the mechanical powers, uſually called a PULLEY.

Hence the cavity in the bone of the arm or ſhoulder, whereinto, when the arm is ſtretched forth, the proceſs of the undermoſt and leſſer of the long bones of the cubitus enters, is called *trochlea*.

TROCHLEARES, in *Anatomy*, a name given to the oblique muſcles of the eye; becauſe they ſerve to pull the eye obliquely upwards and downwards, as it is turned like a pulley.

The OBLIQUUS *major* is particularly called *trochlearis*, becauſe it paſſes through a ſmall cartilaginous ring, as over a *trochlea* or pulley.

TROCHOID, **Trochois**, or **Trochoides**, formed from τροχος, *wheel*, and ειδος, *form*, in *Geometry*, a curve, whoſe geneſis may be thus conceived: if a wheel or circle be moved with a two-fold motion, at the ſame time, the one in the right line, and the other circularly about its centre, and theſe two motions be equal, i. e. deſcribe two equal lines in the ſame time: and if in the radius, which at the beginning of the motion reaches from the centre of the wheel, or the firſt point of the line which deſcribes the circumference: if, I ſay, in this radius, a point be taken any where, except in the centre, this point will deſcribe a curve, one part whereof will be below the line deſcribed by the centre, and the other above it. This line, thus deſcribed by the point taken in the radius, is called the *trochoid*.

The right line which joins the two extremities of the *trochoid*, and which is either the path the wheel makes, or a line parallel to that path, is called the *baſis of the trochoid*.

The *axis of the trochoid* is the diameter of the wheel, perpendicular to the baſe in the middle of the motion; or that part of the radius between the *trochoid* and its baſe. The point wherein the axis is cut into two parts by the line deſcribed by the centre of the wheel, is called the *centre of the trochoid*; the uppermoſt point of the axis the *vertex of the trochoid*; and the plane comprehended between the *trochoid* and its baſe, the *trochoidal ſpace*.

The *trochoid* is the ſame with what we otherwiſe call the *cycloid*; for the properties, &c. of which, ſee CYCLOID.

TROCHUS, in *Antiquity*, denotes the exerciſe or game of the hoop. The hoop was of iron, five or ſix feet in diameter, ſet on the inſide with a number of iron rings. The boys and young men uſed to whirl this along, as our children do their hoops, directing it with a rod of iron, having a wooden handle: which rod the Grecians called ελατηρ, and the Romans *radius*. The clattering of the ring ſerved partly to the diverſion, and partly as a notice for perſons to keep out of the way. Horace de Art. Poet. ranks this exerciſe among other manly ſports:

> *Ludere qui neſcit, campeſtribus abſtinet armis,*
> *Indoctuſve, pilæ, diſcive, trochive quieſcit.*

Trochus, in *Natural Hiſtory*, the name given by authors, to a genus of ſhells; ſome of the ſpecies of which reſemble the figure of the *trochus*, or top, which boys play with. As there are many ſpecies of this ſhell, however, which are flatted and have nothing of this form, the whole ſeries of them are much better named, by a denomination taken from the ſhape of the mouth, which is of an oval figure, and is alike in all theſe ſpecies, and different from all other ſhells. They are therefore aptly charactered by a late French writer under the name of COCHLEA *ore depreſſo*. See *Tab.* III. *Foſſils, Claſs* 9.

The characters of this genus, according to Linnæus, are, that the animal is a ſlug; the ſhell univalve, ſpiral, and conical; the aperture ſubtetragonous, angular or roundiſh, and the columella or axis oblique. He enumerates twenty-ſix ſpecies The *trochi* or tops form the fifteenth family of SHELLS in Da Coſta's arrangement; and he defines them to be ſhells of a conic or pyramidal ſhape, the top being broad and flattiſh, and gradually tapering thence to a very ſharp point; the aperture or mouth is moſt generally angular, low, and narrow. This is a numerous family, and abounds with curious and fine ſhells.

There is a foſſil ſpecies of *trochus*, not yet diſcovered recent. It is a large kind, flattiſh, and like a cochlea-helix, generally about two inches in diameter, much wrinkled, with ſharp prominent edges like plates, which are ſpiked at regular diſtances, running acroſs the ſpires; and the whole ſhell is likewiſe ſtriated. This *trochus* is found in the lime ſtone of Coalbrook-dale, in Shropſhire, and Dudley, in Staffordſhire.

TROCTUS, in *Ichthyology*, a name given by Ariſtotle, Ælian, Athenæus, and others of the Greek writers, to the fiſh called *amia* by Pliny, and moſt other of the later as well as ancient Latin writers; but by ſome, *lechia* and *glaucus*. It is properly a ſpecies of the ſcomber, and is diſtinguiſhed from the others by the name of the ſcomber with two fins on the back, and with the laſt ray of the hinder fin very long.

TROGLODYTES, TROGLODYTÆ, formed of τρωγλη, *caverna*, and δυω, *I enter*, in the *Ancient Geography*, a people of Ethiopia, ſaid to have lived in caves under ground.

Pomp. Mela gives a ſtrange account of the *Troglodytes*.—He ſays, they did not ſo properly ſpeak as ſhriek; and that they lived on ſerpents, &c. Tzetzes calls them *Ichthyophagi*. Montanus takes them to be the ſame with thoſe called, in Scripture, *Ghanamim*. Pintianus in Strabo will have the name written without the *l*, *Trogoditæ*.

TROGLODYTES is alſo an appellation given to a ſect of Jewiſh idolaters.

The prophet Ezekiel relates, chap. viii. ver. 8, 9, 10, &c. that God, among other abominations of the Iſraelites, which he ſet before him, ſhewed him ſeventy old men, who, with their cenſors in their hands, adored ſecretly all kinds of animals and reptiles painted on the wall.

Philaſtrius, on this viſion of the prophet, erects theſe idolaters into a ſect of Iſraelites, who, hiding themſelves under-ground, and in caves, adored all kinds of idols.

And yet the prophet plainly ſhews, that it was in ſecret parts of their houſes, and not in ſubterraneous caverns, that theſe ſeventy Iſraelites idolatrized. The name *Troglodytes*, then, is feigned; and ſo, probably, is the ſect.

TROGLODYTES, in *Ornithology*. See WREN.

TROGON, *curucui*, in *Ornithology*, a genus of the *picæ*; the characters of which are, that the bill is ſhorter than the head, cultrated, hooked, and ſerrated at the margin of the mandibles; and the feet are formed for climbing, having two toes forward, and two backward; of this genus there are three ſpecies; one of which is the CURUCUI of Braſil.

TROIA, or TROJAN *games*, *ludi* TROJANI, were games inſtituted by Aſcanius, ſon of Æneas; and which afterwards paſſed to the Romans, and were celebrated in the Circus by the youth of Rome.

One of the number, who preſided over the ſolemnity, was called *princeps juventutis*; and was always of one of the firſt families in Rome.

At firſt, it is ſuppoſed, they only engaged on foot, and on horſeback; becauſe Virgil, who deſcribes theſe games in the Æneid, lib. v. only ſpeaks of horſes and cavaliers, without any mention of bigæ and quadrigæ, which were not in uſe in Rome till long after Aſcanius. And yet Dion, ſpeaking of Cæſar's games, ſays, the youth there combated in chariots: but it is thought by ſome, that theſe were not the *Trojan* games, but races and combats, of a different kind, proper for young people, of a more advanced age.

The *Trojan games* were renewed by Auguſtus, after the victory at Actium, A. U. 726; began to decline under Tiberius, and terminated under Claudius.

TROIL, among *Tinners*, denotes a feaſt, or occaſion of merriment, by eating and drinking; called alſo a *duggle*.

TROIS *cinque*, in the *French Diſtillery*, a term uſed to expreſs their brandy, when of a peculiar ſtrength, conſiſting of five parts alcohol, and three parts phlegm.

The method of diſtilling the wines into brandy in France, is exactly the ſame with that uſed with us to draw the ſpirit from our waſh or fermented liquor of malt, treacle, ſugar, or whatever other kind. They only obſerve more particularly to throw a little of the natural lee into the ſtill, along with the wine; and the pooreſt wines are found to ſucceed beſt on the trial, making by much the fineſt brandies. We are apt to wonder that we cannot from the wines of particular countries diſtil their particular brandies; but the whole myſtery conſiſts in this, that they do not ſend us over the ſame wines which they uſe in diſtilling, becauſe theſe latter would not be liked as wines, nor would keep in the bringing over. Sometimes in Scotland they meet with the poor and pricked wines, the ſame that the French diſtil their brandies from; and from theſe they diſtil a ſpirit, not to be known from the brandy diſtilled in France.

The lee, which the French add in the diſtillation, gives the brandy that high flavour, for which we ſo much eſteem it: but they themſelves like it ſo much the worſe for it. The French notion of a proof ſtrength, determined by the chaplet or crown of bubbles, is the ſame with ours; and all their fine ſpirits are found of this ſtrength.

But they have one particular expedient for thoſe brandies, which prove foul and feedy, or retain the taſte of certain weeds which grow among the wines; they draw them over again, with a deſign to free them from that adventitious flavour. In this operation they always leave out the faints, or rather they change the receiver as ſoon as ever the ſtream comes proof; then mixing together all that run off before, they make a brandy ſtronger than the ordinary kind, and this is what they call *trois-cinque*.

The diſtillers in France ſcarce ever bring their brandies higher than this; for they have the art to perſuade the foreign merchant, that the phlegm of French brandy is natural and eſſential to it: but the truth is, that the ſpirit alone contains the flavour and excellence of the brandy, and it might as well be reduced to half its bulk for exportation, and ſent over in the ſtate of alcohol, and then lowered with common water, to the proof ſtrength.

The French uſe no art in colouring their *trois-cinque*, any more than their common proof brandy, nor do they add any thing to give them an additional flavour. The thing which they principally value themſelves upon, both in regard to brandies and wines, being to make them perfectly natural: ſo that all the colour we find in their brandies, is acquired from the caſk, and the time they are left in it. This is often twelve or eighteen months, ſometimes two or three years; in this time they acquire a brown colour, and loſe their acrid taſte.

The greateſt adulteration of brandies is in England; the French have no temptation to do it, they having no cheaper ſpirit, ſince the prohibition of molaſſes in their country. The Dutch are in the ſame condition, having no molaſſes ſpirit; and only a very coarſe and nauſeous ſugar ſpirit, and a yet worſe malt ſpirit of their own manufacture; a ſingle gallon of which would ſpoil a whole piece of brandy. The French brandy alſo paying no duty in Holland, is as cheap, or nearly ſo there as in France itſelf. The duties being high upon brandy in England, it is greatly adulterated, and that with all ſorts of ſpirits; as malt, molaſſes, cyder, and ſugar ſpirits; and when this is done in a dexterous and ſparing manner, the cheat is not eaſily found out. Shaw's Eſſay on Diſtillery.

TROLLING, among *Anglers*. To *troll*, is to fiſh for pikes with a rod whoſe line runs on a reel. See *Pike*-FISHING.

TROLLIUS, *globe Ranunculus*, in *Botany*; a name ſometimes given to HELLEBORE *with a globoſe flower*.

TROMBA, in the *Italian Muſic*, either denotes the common TRUMPET, the BUCCINA of the ancients, or the modern SACKBUT, but more properly our trumpet.

TROMBETTA, in *Ichthyology*, a name given by the Italians to the fiſh commonly called *ſcolopax* by authors. See TRUMPET-FISH.

TROMBETTA, in the *Italian Muſic*, a ſmall trumpet, being the diminutive of TROMBA.

TROMBONE, in the *Italian Muſic*, a SACKBUT.

TROMBONE *picciolo*, *groſſo*, *primo*, *ſecundo*, &c. See SACKBUT.

TROMPE, in the *Manege*. See DECEIVED.

TRONNAGE, TRONAGIUM, an ancient cuſtom, or toll, paid for the weighing of wool.

The word comes from *trona*, an old name for a beam uſed in weighing.

TRONATOR, an officer of the city of London, whoſe buſineſs it was to weigh the wool brought into that city.

TRONCO *per grazia*, in the *Italian Muſic*, by the French called *coup de grace*; is uſed to intimate to the voices as well as inſtruments, that they are not to draw out the ſound to its natural length, but cut it ſhort; that is, only continue it long enough to be heard, by which means there is a ſmall ſilence between each ſound;

which has a very good effect in expreſſions of grief, to make ſigns; and alſo in expreſſions of wonder and ſurprize, &c.

TRONCONNEE, or TRONCONNE', in *Heraldry*, denotes a croſs, or other thing, cut in pieces, and diſmembered; yet ſo as that all the pieces keep up the form of a croſs, though ſet at a ſmall diſtance from one another.

TRONE *weight* was the ſame with what we now call *Tory* WEIGHT.

TRONE-*pound*, in Scotland, contains twenty Scotch ounces. But becauſe it is uſual to allow one to the ſcore, the *trone-pound* is commonly twenty-one ounces.

TRONE-*ſtone*, in Scotland, according to ſir John Skene, contains 19½ pounds.

TROOP, a ſmall body of horſe, or dragoons, uſually about fifty or ſixty; commanded by a captain, captain-lieutenant, cornet, quarter-maſter, and three or four corporals, who are the loweſt officers in a *troop*; anſwering to a company of foot.

TROOP, *independent*, is a *troop* that is not imbodied in, or joined with, any regiment.

TROOP, *to beat the*, is the ſame with beating the ASSEMBLY.

TROOPS *of the houſhold*. See HOUSHOLD.

TROOPER, in the *Military Art*, a private man in a troop of horſe.

TROPÆA, in *Mythology*, a name given to JUNO, becauſe ſhe was thought to preſide over triumphs; and in theſe ceremonies ſacrifices were offered to her.

TROPÆOLUM, in *Botany*. See *Indian* CRESSES.

TROPE, TROPUS, in *Rhetoric*, a word or expreſſion uſed in a different ſenſe from what it properly ſignifies.—Or, a word changed from its proper and natural ſignification to another, with ſome advantage.

As when we ſay an *aſs*, for a *ſtupid perſon*; *thunderbolt of war*, for a *great captain*; to *waſh the blackamoor white*, for a *fruitleſs undertaking*.

This change of ſenſe is never to be uſed, but where it gives a force and dignity, or renders the diſcourſe more ſignificant, weighty, and graceful.

It is called *trope*, *προπος*, from the Greek, *τρεπω*, *verto*, *I change*; becauſe the words are here tranferred from the things they properly import, to others which they only import indirectly: and that *tropes* only ſignify the things they are applied to, by reaſon of the connexion and relation thoſe things have with thoſe others, whoſe proper names they are.

This change, or inverſion, is performed various ways: but chiefly four: whence ariſe four principal *tropes*; viz. the METAPHOR, METONYMY, SYNECDOCHE, and IRONY, &c.

Some authors confound *trope* with figure; but they are very different things. Moſt authors, as F. De Colonia, &c. make figure the genus, and *trope* a ſpecies; defining figure to be, an ornament in diſcourſe, whereby it is raiſed above the common language; and *trope* to be that peculiar kind of ornament which conſiſts in the change of the ſenſe, &c.

But Voſſius makes *trope* and figure to be two collateral and independent things; defining *trope* to be, the change of the ſenſe, &c. and figure to be any ornament, except what becomes ſo by ſuch change, &c. See FIGURE.

With regard to the difference between *tropes* and figures we may obſerve, that *tropes* moſtly affect ſingle words, but figures whole ſentences: a *trope* conveys two ideas to the mind by means of one word; but a figure throws the ſentence into a different form from the common and uſual manner of expreſſion: and beſides, *tropes* are chiefly deſigned to repreſent our thoughts, but figures our paſſions. The reaſons which have occaſioned the introduction of *tropes* are, according to Quintilian, three: viz. neceſſity, emphaſis, and beauty. *Tropes* were firſt introduced from neceſſity, becauſe no language contains a ſufficient number of proper words to expreſs all the different conceptions of our minds. *Tropes* do alſo on many occaſions expreſs things with greater force and evidence than can be done by proper words; thus when Virgil, (Æn. lib. vi. v. 842.) calls the Scipios, two thunderbolts of war, he gives us a more lively image of the rapid force, and ſpeedy ſucceſs of their arms than could have been conveyed by a long deſcription in plain words. And moreover, beauty and ornament have been another cauſe of the uſe of *tropes*: and it is the buſineſs of an orator to entertain his hearers, at the ſame time that he inſtructs them. Accordingly ſome ſubjects require a more florid and elegant addreſs than others, and variety of expreſſion is alſo pleaſing in a diſcourſe.

The following directions, however, are proper to be obſerved in the choice of *tropes*. As every *trope* gives us two ideas, one of the word expreſſed, and another which by means of that the mind connects with it; it is neceſſary, that the relation between theſe two ſhould appear very plain and evident; for an obſcure *trope* is always faulty, unleſs where ſome particular reaſon makes it neceſſary; and therefore *tropes* ought not to be too far fetched, leſt they ſhould thus be rendered obſcure.—Again, as a *trope* ought to be very plain and evident, ſo likewiſe ſhould it bear a due proportion to the thing it is deſigned to repreſent, ſo as neither to heighten nor diminiſh the juſt idea of it. Poets, however, are allowed a greater liberty in this reſpect than orators. Farther, as a moderate uſe of *tropes*, juſtly applied, beautifies and enlivens a diſcourſe, ſo an exceſs of them cauſes obſcurity, by running it into abſtruſe allegories and riddles. Moreover, as one uſe of *tropes* is pleaſure and entertainment, we ſhould endeavour to make uſe of ſuch as are ſmooth and eaſy; and if it ſhould be neceſſary to uſe a harſh *trope*, it is proper to ſoften it by ſome precaution.—Finally, care ſhould be taken how we transfer *tropes* from one language into another. It was cuſtomary for the Roman ſoldiers to carry their money in their girdles; hence it was the ſame thing with them to ſay, *a perſon had loſt his girdle* (Hor. Ep. lib. ii. ep. 2.) as that *he had loſt his money*. And becauſe the Romans wore the TOGA in time of peace, and a different garb, when engaged in war, their writers ſometimes uſe the word *toga* to ſignify peace. But as neither of theſe cuſtoms is in uſe among us, ſo neither would the *tropes* ſuit our language, or be generally underſtood by us. There is alſo a beautiful *trope* in the account of St. Paul's ſhip-wreck, in the uſe of the word αντοφθαλμειν (Acts ch. xxvii. v. 15.) which we tranſlate to *bear up* into the wind, but which properly ſignifies to *look* or *keep its eyes againſt* it: to this purpoſe Plutarch ſays of Demoſthenes, that he could not ἀντοφθαλμεῖν τῶ αργυριω, *look againſt*, or *reſiſt the power of money*. Ward's Orat. vol. i. lect. 25. See alſo on this ſubject. Blair's Lect. vol. i. lect. 14.

Beſides the four capital *tropes* above mentioned, there are ſeveral inferior ones. When the *trope* is too bold, it is called an *hyperbole*; when continued, it is an *allegory*; when too obſcure, an *ænigma*; when it ſhocks us, or is too remote, a *catachreſis*.

Add to theſe, other *tropes*: as the metalepſis, antonomaſia, and litotes, or extenuation. See METALEPSIS, &c.

Some alſo refer the ſix kinds of ſcoffing, or deriſion, to the *tropes*; viz. the ſarcaſm, diaſyrm, charientiſm, aſteiſm, myctoriſm, and mimeſis; but this without ſufficient reaſon. See SARCASM, IRONY, &c.

TROPÆUS, in *Mythology*, a name given to JUPITER for the ſame reaſon that TROPÆA was given to Juno.

TROPER, in our *Old Writers*, is uſed for a book of alternate turns and reſponſes in ſinging maſs. Lindewode calls it *liber ſequentiarum*.

TROPHIS, in *Botany*, a genus of the *dioecia tetrandria* claſs; its characters are, that it has male and female flowers; the male have no calyx, and a corolla with four petals; the female flowers have neither calyx nor corolla; but a bipartite ſtyle, and a ſingle-ſeeded berry.—There is one ſpecies.

TROPHONIUS, *oracle of*, in *Ancient Mythology*, a famous ORACLE in Bœotia, which was conſulted with greater ceremony than thoſe of any deity, and ſubſiſted long after all thoſe of Greece ceaſed. *Trophonius*, from whom the oracle took its name, was the ſon of Erginus, king of the Orchomenians, who, as well as his brother, were famous architects, and built the temple of Apollo at Delphi. The tomb of *Trophonius* had been altogether diſregarded and forgotten, when the Bœotians, on occaſion of a great drought, conſulting the oracle of Apollo, were directed to have recourſe to *Trophonius* at Lebadea.—They purſued the direction of the oracle, and obtained an anſwer, that ſuggeſted the means of removing their calamity. In conſequence of this event, they conſecrated to *Trophonius* the wood in which he was interred, and in this wood erected a temple to him, with his ſtatue executed by Praxiteles. The oracle of *Trophonius* was upon a mountain, within an encloſure of white ſtones, on which are elevated obeliſks of braſs. In this encloſure there was a cavern, in the form of an oven, cut out of the mountain by human art and labour. Within this was another ſmall cavern, with a very ſtrait entrance, into which thoſe who conſulted the oracle were to paſs with a variety of ceremonies.

TROPHY, TROPÆUM, among the *Ancients*, a pile or heap of arms of a vanquiſhed enemy, raiſed by the conqueror in the moſt eminent part of the field of battle.

The word is formed from the Latin *trophæum*, or *tropæum*, which Voſſius deduces from the Greek *τροπη*, the flight of an enemy.

The word is alſo uſed for an artificial repreſentation of ſuch a pile, in marble, ſtone, or other matter. Such were the *trophies* of Marius and Sylla, in the Capitol, &c.

The ancient *trophies* conſiſt of Greek and Roman arms: and the modern ones of arms of the various nations now in uſe: as in thoſe inſulated ones near Blenheim, in the Fauxbourg S. Antoine, and in the caſtle of Verſailles. Some are done in baſſo-relievo; as thoſe of the Trajan column, and the Attic of the court of the Louvre.

Trophies are likewiſe frequently exhibited on medals of the emperors, ſtruck on occaſion of victories; wherein, beſides arms and ſpoils, are frequently ſeen one or two captives by the ſides of the *trophy*.

Trophies, M. Vaillant obſerves, were, originally, nothing but trunks of trees, which the victor planted on the moſt eminent part of the conquered province, and hung them with the ſpoils of the enemy, to perpetuate the memory of the defeat.

Trophy, in *Architecture*, an ornament which repreſents the trunk of a tree, charged or incompaſſed all round about with arms or military weapons, both offenſive and defenſive.

Trophy-*money*, a duty paid annually by the houſekeepers, in the ſeveral counties of England, towards providing harneſs, drums, colours, &c. for the militia.

TROPICS, **Tropici**, in *Aſtronomy*, two immoveable circles of the ſphere, drawn through the ſolſtitial points, parallel to the equator.

Such are the circles M E and N L, *Tab. Aſtronomy*, *fig.* 52.

The *tropics* may be defined, two circles parallel to the equator, at ſuch diſtance from it, as is equal to the ſun's greateſt receſs from the equator towards the poles; or to the ſun's greateſt declination; or the obliquity of the ecliptic.

Of the two *tropics*, that drawn through the beginning of Cancer E, is called the *tropic of Cancer*.

And that through the beginning of Capricorn, the *tropic of Capricorn*.

They have their name from the Greek τροπη, *turn*, *converſion*; as being the limits of the ſun's way, or declination towards north and ſouth: ſo that, when the ſun is arrived at either of them, he turns the other way.

Hence, 1. Since the declination of the ecliptic is the arch E A, or L D; E N will be the diſtance of the *tropics*; which is double the greateſt declination.

2. Wherefore, if the ſun's meridian altitude be obſerved, both in the winter and ſummer ſolſtice, and the latter be ſubtracted from the former; the remainder will be the diſtance of the *tropics*; half whereof is the greateſt declination of the ecliptic.

Tropics, in *Geography*, are two leſſer circles of the globe, drawn parallel to the equator, through the beginnings of Cancer and Capricorn.

Theſe *tropics* are the planes of the celeſtial tropics, and at at the diſtance of 23° 29′ from the equator, which is the ſun's greateſt declination.

Tropic-*bird*, in *Ornithology*, a ſpecies of the PHAETON, called *lepturus* by Briſſon, on account of the ſlenderneſs of its tail.

It is found within the *tropics*, and thence has its name. This bird is of the ſize of a common duck; its beak is red, about two fingers breadth long, ſomewhat crooked and ſharp at the point; it has on each ſide of the head a long white line, extended from the angles of the beak; its belly is white, as is alſo its back, but this is beautifully variegated with oblong black ſtreaks; its wings are very long, and their feathers partly black and partly white; its legs are white, its feet black, the toes connected together by a membrane, and its tail ſeems extremely ſingular, appearing to conſiſt of only two long feathers. Ray. See *Tab.* V. *Birds*, N° 58.

TROPICAL-*winds*. See **Trade**-*winds* and **Wind**.

Tropical *year*. See **Year**.

TROPISTS, or **Tropici**, the name of a ſect. St. Athanaſius, in his letter to Serapion, gives this appellation to the **Macedonians**, who were alſo called *Pneumatomachi* in the Eaſt, and *Patripaſſians* in the Weſt.

The reaſon of the name *Tropiſt* was, that they explained the Scripture altogether by tropes and figures of ſpeech.

The Romaniſts alſo gave the appellation *Tropiſts* to thoſe of the reformed religion; in regard to their conſtruing the words of the euchariſt figuratively.

TROPITES, **Tropitæ**, a ſect who, according to Philaſtrius, maintained, that the Word was turned or converted into fleſh, or into man.

This opinion they founded on that paſſage of St. John, miſunderſtood, *The Word was made fleſh*; as if it imported, that the Word was converted into fleſh; and not that he was clothed with our fleſh and our nature.

TROSSULI, among the Romans, a name given by ſome to the guards that attended the kings of Rome, otherwiſe called CELERES.

TROT, in the *Manege*, one of the natural paces of a horſe, performed with two legs in the air, and two on the ground, at the ſame time, croſs-wiſe, and continuing ſo alternately, to raiſe the hind-leg of one ſide, and the fore-leg of the other ſide at once; leaving the other hind and fore-leg upon the ground till the former come down.

This action of his legs is the ſame as when he walks, except that in the *trot* his motions are more quick.

In this motion, the nearer the horſe takes his limbs from the ground, the opener, the evener, and the ſhorter his *trot* will be. If he takes up his feet ſlovenly, it is a ſign of ſtumbling and lameneſs; if he tread narrow, or croſs, it betokens interfering or falling; if he tread long, it ſhews over-reaching; if he ſteps uneven, he indicates toil and wearineſs.

Three qualities are eſſentially neceſſary to make the *trot* uſeful. It ought to be extended, ſupple, and even or equal; theſe three qualities mutually depend upon each other; ſo that you cannot paſs to the ſupple *trot* without having firſt worked upon the extended *trot*; and you can never arrive at the even and equal *trot* without having practiſed the ſupple. The *extended trot* is that in which the horſe *trots* out without retaining himſelf, being quite ſtraight, and going directly forwards; and this, conſequently, is the kind of *trot* with which you muſt begin. The *ſupple trot* is that in which the horſe, at every motion he makes, bends and plays all his joints, *viz.* thoſe of his ſhoulders, his knees and feet, which no colts, or raw horſes, can execute, who have not had their limbs ſuppled by exerciſe, and who always *trot* with a ſurpriſing ſtiffneſs and aukwardneſs, without the leaſt ſpring or play in their joints. The *even* or *equal trot* is that in which the horſe makes all his limbs and joints move ſo equally and exactly, and his legs never cover more ground one than the other, nor at one time more than another. To do this, the horſe muſt neceſſarily unite and collect all his ſtrength, and, if the expreſſion may be allowed, diſtribute it equally through all his joints. To go from the extended *trot* to the ſupple, you muſt gently and by degrees hold in your horſe; and when by exerciſe he has attained ſufficient eaſe and ſuppleneſs to manage his limbs readily, you muſt inſenſibly hold him in ſtill more and more, and by degrees you will lead him to the equal *trot*. All horſes that are inclined to be RAMINGUE ſhould be kept to the extended *trot*. A horſe of a ſluggiſh and cold diſpoſition, which has, nevertheleſs, ſtrength and bottom, ſhould likewiſe be put to this *trot*; as he grows animated, and begins to go free, keep him together by little and little, in order to lead him inſenſibly to the ſupple *trot*; but if, while you keep him together, you perceive that he ſlackens his action and retains himſelf, give him the aids briſkly, and puſh him forward, keeping him, nevertheleſs, gently in hand; by this means he will be taught to *trot* freely and equally at the ſame time.

The only proof, or rather the moſt certain ſign of your horſe's trotting well is, that when he is in his *trot*, and you begin to puſh him a little, he offers to gallop. The principal effects of a *trot* are to make a horſe light and active, and to give him a juſt appuy.

The manner of trotting a colt who has never been backed is as follows: put a plain ſnaffle in his mouth; fit a caveſon to his noſe, to the ring of which tie a longe of a reaſonable length. Let a groom hold this longe, who, having got at ſome diſtance from the colt, muſt ſtand ſtill in the middle of the circle which the horſe will make. Let another follow him with a long whip or chambriere, in his hand. The colt, being alarmed, will be forced to go forward, and to turn within the length of the cord; the groom muſt hold it tight in his hand; by this means he will draw *in*, or towards the centre, the head of the colt, and his croupe will of conſequence be without the circle. See **Foal** and *backing of a* **Horse**.

In working a young horſe after this manner, do not preſs or hurry him. Let him walk firſt, and afterwards put him to the *trot*. If you neglect this method, his legs will be embaraſſed; he will lean on one ſide, and be more upon one haunch than the other; the inner fore-foot will ſtrike againſt the outer one, and the pain which this will occaſion will drive him to ſeek ſome means of defence, and make him diſobedient. If he refuſes to *trot*, the perſon who holds the chambriere will animate him, by trotting him, or ſtriking the ground with it. If he offers to gallop inſtead of trotting, the groom muſt ſhake or jerk the cord that is tied to the caveſon, and he will fall into his *trot*. Berenger's Art of Horſemanſhip, vol. i. ch. 4.

TROUBADOURS, a name given to the ancient poets of Provence, who wrote, ſet, and ſung their own verſes. See **Provençal** *Poets*.

Some will have the word borrowed from *trouver*, *to find*, by reaſon of their inventions, whence they are called *trou-*

trouverres; though others take them to have been called *trombadours*; by reaſon they ſung their poems to an inſtrument called a *trompe* or *trumpe*.

The poetry of the *troubadours* conſiſted in ſonnets, paſtorals, ſongs, ſyrventes, or ſatires, which were much to their taſte; and in tenſons, which were love-diſputes.

Jean De Notre Dame, commonly called Noſtradamus, a procureur in the parliament of Provence, wrote an ample diſcourſe of theſe poets. He makes their number ſeventy-ſix.

Paſquier tells us, he had an extract of an ancient book, belonging to cardinal Bembo, entitled, Los Noms daquels qui firent Tenſons & Syrventes, which made their number ninety-ſix; among which was an emperor, viz. Frederic I. and two kings, viz. Richard I. of England, and a king of Arragon; with a dauphin, ſeveral counts, &c. not that all theſe had compoſed entire works in Provençal; ſome of them had not brought forth any thing beyond epigrams.

Petrarch ſpeaks, with applauſe, of ſeveral *troubadours*, in the fourth chapter of the Triumph of Love. The Italian poets are ſaid to have borrowed their beſt pieces from the *troubadours*. Paſquier declares expreſsly, that Dante and Petrarch are, indeed, the fountains of Italian poetry; but fountains which have their ſources in the Provençal poetry.

Bouche, in his Hiſtory of Provence, relates that, about the middle of the twelfth century, the *troubadours* began to be eſteemed throughout Europe; and that their credit and poetry were at the higheſt about the middle of the fourteenth. So that they flouriſhed in Europe about two hundred and fifty years, viz. from 1120 or 1130 till the year 1382. He adds, that it was in Provence that Petrarch learned the art of rhyming, which he afterwards practiſed, and taught in Italy.

Strolling muſicians, under the appellation of *jongleurs*, abounded in France ſo early as the time of Charlemagne, who forbids their admiſſion into convents; and in the firſt capitulary of Aix la Chapelle, this prince ſpeaks of them as perſons branded with infamy. They continued, however, to amuſe the great in private, as well as the people in public, as a diſtinct body of men, till the *troubadours* introduced poetry into France, in the dialect of that country. Their licentiouſneſs was frequently repreſſed, and their conduct regulated by the police; and during the reign of Philip Auguſtus, the *troubadours* and minſtrels, or jongleurs, were involved in the ſame diſgrace, and for ſome time baniſhed the kingdom; which left ſuch a ſtigma upon their order, as no efforts of genius, or auſterity of manners, could entirely efface, though they were afterwards recalled, and in ſome degree reſtored to public favour.

It is obſerved by a late elegant French writer, that though the proſcription of muſic and poetry, and the kind of inquiſition which Philip eſtabliſhed againſt the jongleurs in France, may have originated from the laudable intention of repreſſing thoſe diſorders, which the abuſe of their profeſſion had occaſioned; yet, if he had reflected that the fate of letters was at that time in the hands of the *troubadours*, and that among every people approaching towards civilization, the progreſs of virtue is generally proportioned to the cultivation of arts and literature, he would have inflicted a leſs ignominious puniſhment on the objects of his diſpleaſure; for ſuch is the empire of prejudice, that the anathema it pronounces againſt the abuſe of a profeſſion remains in full force, even after the reformation of thoſe who exerciſe it. This author ventures to pronounce the jongleurs, or *troubadours* and minſtrels, notwithſtanding the contempt with which they are named at preſent, to have been the fathers of literature in France: they, ſays he, baniſhed ſcholaſtic quarrels and ill-breeding, and poliſhed the manners, eſtabliſhed the rules of politeneſs, enlivened the converſation, and purified the gallantry of its inhabitants. That urbanity, continues he, which diſtinguiſhes us from other people, was the fruit of their ſongs; and if it is not from them we derive our virtues, they at leaſt taught us how to render them amiable. Tableau Hiſtorique de Gens des Lettres, par l'Abbé de Longchamps, tom. v. cited by Dr. Burney in his Hiſt. of Muſic, vol. ii. p. 267.

TROVE, in *Law*. See Treasure-*trove*.

TROVER, in *Law*, an action which a man hath againſt one that, having found any of his goods, refuſeth to deliver them upon demand, but converts them to his own uſe; from which finding and converting, it is called an action of *trover* and *converſion*.

Actions and detinue are frequently turned into actions upon the caſe, *ſur trover* and *converſion*.

The injury in this caſe, lies in the converſion: and, therefore, the fact of the finding, or *trover*, is now totally immaterial; for the plaintiff needs only ſuggeſt (as words of form) that he loſt ſuch goods, and that the defendant found them; and if he proves, that the goods are his property, and that the defendant had them in his poſſeſſion, it is ſufficient. But a converſion muſt be fully proved; and then in this action the plaintiff ſhall recover damages equal to the value of the thing converted, but not the thing itſelf; which nothing will recover but an action of DETINUE or REPLEVIN. See RESTITUTION *of ſtolen Goods*.

TROUGH, a hollow wooden veſſel for kneading bread in, or to beat apples in for cyder; alſo a piece of the trunk of a tree made hollow, to feed ſwine in, or an open pipe or channel, made of boards, for the conveyance of water.

TROUGH *of the ſea*, is the hollow cavity made between two waves, or billows, in a rolling ſea.

When a ſhip lies down there, they ſay, ſhe lies in the *trough of the ſea*; in which caſe ſhe rolls heavieſt, becauſe the ſetting of the ſea is always produced by the wind, and, conſequently, the waves, and the *trough* between them, will be at right angles with the direction of the wind.

TROUSSEQUIN, in the *Manege*, a piece of wood, cut archwiſe, raiſed above the hinder bow of a great ſaddle, and ſerving to keep the bolſters firm.

TROUS-*de loup*, in *Field Fortification*, are round holes, about ſix feet deep, and pointed at the bottom, with a ſtake placed in the middle. They are frequently dug round a redoubt, to obſtruct the enemy's approach. At top they are circular, and about four feet and a half in diameter.

TROUSSEQUEUE, in the *Manege*. See DOCK.

TROUT, *ſalmo fario* of Linnæus, in *Ichthyology*, a very valuable river-fiſh, the diſtinguiſhing characters of which are theſe. Its body is long; its head ſhort and roundiſh; the end of its noſe or ſnout obtuſe and blunt; its tail is very broad; its mouth large; and each jaw furniſhed with one row of ſharp teeth; and in its palate there are three parcels of teeth, each of an oblong figure in the congeries, and all meeting in an angle near the end of the noſe; and the tongue has ſix, eight, or ten teeth alſo on it; and its ſides are beautifully variegated with red ſpots. See *Trout*-FISHING.

The colours of the *trout*, and its ſpots, vary greatly in different waters, and in different ſeaſons; yet each may be reduced to one ſpecies. In Llyndivi, a lake in South-Wales, are *trouts* called *coch y dail*, marked with red and black ſpots, of the ſize of ſix-pence; others unſpotted, and of a reddiſh hue, that ſometimes weigh near ten pounds, but are bad taſted. In Lough Neagh, in Ireland, are *trouts* called *buddaghs*, ſome of which weigh thirty pounds; and others of a much ſuperior ſize are taken in Hulſe-water, a lake in Cumberland, ſuppoſed to be the ſame with the *trouts* of the lake of Geneva. In the river Eynion, not far from Machynlleth in North-Wales, and in one of the Snowdon lakes, is found a variety of *trout*, naturally deformed, having a ſtrange crookedneſs near the tail.

The ſtomachs of the *common trouts* are uncommonly thick, and muſcular; as they feed on the ſhell-fiſh of lakes and rivers, as well as on ſmall fiſh; and take into their ſtomachs gravel or ſmall ſtones, to aſſiſt in comminuting the teſtaceous parts of their food. The *trouts* of certain lakes in Ireland, ſuch as thoſe of the province of Galway, and ſome others, are remarkable for the great thickneſs of their ſtomachs, which, from ſome ſlight reſemblance to the organs of digeſtion in birds, are called *gizzards*; and the ſpecies that have them are called *gillaroo*, or *gizzard trouts*. The hon. Mr. Daines Barrington ſuggeſts, that *gillaroo* may be either a corruption of Killaloe, the name of a town near which theſe *trouts* are caught, or formed of the Welſh, *cylla*, q. d. *ſtomach*, and the Iriſh *ruadh*, q. d. *ſtrong*; ſo that *gillaroo* may be the ſame as ſtrong ſtomach. From the obſervations both of Dr. Watſon and Mr. J. Hunter, there is no reaſon for conſidering the ſtomach of theſe *trouts* as gizzards, but as true ſtomachs. That of the Engliſh *trout* is of the ſame kind with the ſtomach of the gillaroo *trout*, but its coat is not ſo thick by two-thirds: and, therefore, the difference in the thickneſs of the ſtomach, which may be occaſioned by the nature of the waters, or adapted to the purpoſes of comminuting a greater quantity of ſhell-fiſh than the ſtomachs of our *trouts*, does not warrant its being claſſed as a diſtinct ſpecies. The ſtomach even of the gillaroo *trout* can poſſeſs ſcarcely any power of grinding, as the whole cavity is lined with a fine villous coat, the internal ſurface of which appears every where to be digeſtive, and by no means fitted for maſtication. Theſe ſtomachs are ſometimes ſerved up at table in Ireland, under the name of gizzards. See on this ſubject, Phil. Tranſ. vol. lxiv. part i. p. 116. 121. 310.

Trouts are a very voracious fiſh, and afford excellent diverſion to the angler: they ſhift their quarters to ſpawn, and, like a ſalmon, make up towards the heads of rivers to depoſit their roes. The under jaw of the *trout* is ſubject, at certain times, to the ſame curvature as that of the ſalmon.

Mr. Pennant has deſcribed a ſpecies that migrates out of the ſea into the river Eſk, in Cumberland, from July to September, and called from its colour the *whiting*. When dreſſed its fleſh is red, and moſt delicious eating. On their firſt appearance from the ſalt water, they have the ſalmon-louſe adhering to them. They have both melt and ſpawn, but no fry has as yet been obſerved. The Scots call this fiſh *phinocs*; they never exceed a foot in length; the upper jaw is a little longer than the lower; in the firſt are two rows of teeth, in the laſt one; and on the tongue are ſix teeth; the back is ſtraight; the whole body of an elegant form; the lateral line ſtraight; the colour between that and the top of the back, duſky and ſilvery intermixed, beneath the line of an exquiſite ſilvery whiteneſs; firſt dorſal fin ſpotted with black; the tail black and much forked; the firſt dorſal fin has eleven rays; the pectoral thirteen; the ventral nine, and anal nine. Pennant's Brit. Zool. vol. iii. p 302.

TROUT-*coloured*. A horſe is ſaid to be of this colour, when he is white, and ſpeckled with ſpots of black, bay, or ſorrel; eſpecially about the head and neck.

TROUT-*fiſhing*. See *Trout*-FISHING.

TROUT, *ſalmon*. See SALMON-*trout*.

TROWEL. See BRICKLAYER.

TROWLE, or *trole* the *bowl*, in *Engliſh Antiquity*, was a common phraſe in drinking for paſſing the veſſel about, as appears from ſeveral of our old catches.

TROWSERS, among *Sailors*, a ſort of looſe breeches of canvas worn by ſeamen, &c.

TROY, *epocha of the deſtruction of*. See EPOCHA.

TROY, *white*, *white of Orleans*, or *Spaniſh white*, is a name given to a preparation of chalk, which is finely powdered, formed into cakes, and uſed in the arts. This chalk is found in great abundance at a village called Villeloup, about four leagues from Troyes in France. It is dug out of the earth in ſmall lumps, and after having been expoſed to the air, is bruiſed and reduced into a groſs powder, which is paſſed through a ſieve: when it is perfectly dry, it is diluted with ſoft water, and formed into a kind of paſte, which, being well-tempered, is ground very fine in a mill; and uſed by painters, gilders, &c. and the qualities that peculiarly recommend that ſubſtance are, its being very white, friable, and free from all mixture of adventitious earth and ſtone. The white of Orleans is prepared at Cavereau, a ſmall village about nine leagues from Orleans, and is reckoned inferior in value to the former. Mem. Acad. Sc. An. 1754. Ephemerid. Troyennes, an. 1759.

The artificial *Troy white*, called alſo *Spaniſh white*, is chalk neutralized by the addition of water in which alum is diſſolved, and afterwards waſhed over. It is uſed by ſome in water-colours as a white, and may be thus prepared: take a pound of chalk, and ſoak it well in water; then waſh over all the fine part; and having poured off the firſt water, add another quantity, in which two ounces of alum are diſſolved. Let them ſtand for a day or two, ſtirring the chalk once in ſix or eight hours: waſh the chalk again over, till it be rendered perfectly fine, and pour off as much of the water as can be ſeparated from the chalk by that means, taking off the remainder of the diſſolved alum, by ſeveral renewed quantities of freſh water. After the laſt water is poured off, put the chalk into a cullender-filtre, with a linen cloth over the paper; and, when the moiſture has been ſufficiently drained off from it, lay it out in lumps to dry on a proper board. Handm. to the Arts, vol. i. p. 137.

TROY *weight*, anciently called *trone weight*. See WEIGHT.

TROY *pound*. See WEIGHT.

TRUCE, TREUGA, a ſuſpenſion of arms; or a ceſſation of hoſtilities between two parties at war.

The word, according to Menage, &c. comes from the Latin *treuga*, which ſignifies the ſame; and which Caſeneuge derives further, from the German *traue*, or *treue*, which ſignifies truſt.

Truces are frequently concluded, between princes, in order to come to a peace. *Truces* of many years ſerve in lieu of treaties of peace between princes, whoſe differences cannot be finally adjuſted.

TRUCE *of God*, *treuga Dei*, is a phraſe famous in the hiſtories of the eleventh century, when the diſorders and licences of private wars between particular lords and families obliged the biſhops of France to forbid ſuch violences within certain times, under canonical pain.

Thoſe intervals they called *treuga Dei*, *treve de Dieu*, q. d. *truce of God*, a phraſe frequent in the councils ſince that time. The firſt regulation, of this kind, was in a ſynod held in the dioceſe of Elno in Rouſſillon, anno 1072, where it was enacted, that, throughout that county, no perſon ſhould attack his enemy from the hour of nones on Saturday, to that of prime on Monday, that Sunday might have its proper honour; that nobody ſhould attack, at any time, a religious prieſt walking unarmed, nor any perſon going to church, or returning from the ſame, or walking with women; that nobody ſhould attack a church, or any houſe within thirty paces around it. The whole under penalty of excommunication, which, at the end of three months, was converted into an anathema.

Theſe quarrels had prevailed even in the time of Charlemagne, and much more after his death; ſo that the church found it neceſſary to interpoſe. The moſt early of theſe interpoſitions, now extant, is towards the end of the tenth century.

In 990, ſeveral biſhops aſſembled in the ſouth of France, and publiſhed regulations to reſtrain the violence and frequency of private wars, ordaining that the tranſgreſſor ſhould be excluded from all Chriſtian privileges during his life, and be denied Chriſtian burial after his death. To the ſame purpoſe a council was held at Limoges, A. D. 994; and ſeveral other councils iſſued their decrees for reſtraining the evil. But the authority of councils was inſufficient; and, therefore, a biſhop of Aquitaine, A. D. 1032, pretended that an angel from heaven had appeared to him with a writing, enjoining men to ceaſe from their hoſtilities, and be reconciled to each other. Accordingly, a general ceſſation took place, and laſted for ſeven years; and a reſolution was formed, that no man ſhould attack or moleſt his adverſaries from the evening of Thurſday in each week, to the morning of Monday in the week enſuing, the intervening days being peculiarly holy; our Saviour's paſſion having happened on one of them, and his reſurrection on another. This ſudden change was conſidered as miraculous, and the reſpite from hoſtilities ſubſequent to it was called the *truce of God*.

This from being a regulation in one kingdom became a general law in Chriſtendom, and was confirmed by the authority of the pope, and the violators were ſubjected to the penalty of excommunication. The council of Toulujes in Rouſſillon, A. D. 1041, iſſued an act, containing all the ſtipulations required by the *truce of God*. The nobles, however, diſregarding the *truce*, purſued their quarrels without interruption. Toward the end of the twelfth century, a new revelation was pretended, and, in conſequence of it, an aſſociation formed under the title of the *Brotherhood of God*. At length Philip Auguſtus, or St. Louis, publiſhed an ordonnance, A. D. 1245, prohibiting any perſon to commence hoſtilities until forty days after the offence which cauſed the quarrel, and the tranſgreſſor was to be tried and puniſhed by the judge as a traitor. This was called the *royal truce*, and the regulation was productive of good effects. This was farther enforced by an ordonnance of Philip the Fair, A. D. 1296. See Roberſon's Hiſt. of Charles V. vol. i. p. 335, &c. 8vo.

TRUCE, *breaking of*. See PASSPORT.

TRUCE, *conſervator of*. See CONSERVATOR.

TRUCHMAN, *dragoman*, or *drogman*, in the countries of the Levant, an interpreter.

TRUCK, in a *Ship*, a piece of wood, at the top of a maſt, to put the flag-ſtaff in. See *Tab. Ship. fig.* 1. *n.* 34. 79. 96. 121. 145.

Trucks are conical, cylindrical, ſpherical, or ſpheroidical. Thus, the *trucks* fixed on the ſpindle of a maſt-head, called ACORNS, are in the form of a cone; thoſe which are employed as wheels to the gun-carriages are cylinders; the *trucks* of the PARRELS aſſume the figure of a globe, and thoſe of the FLAG-*ſtaves* reſemble an oblate ſpheroid. *Trucks* of the ſhrouds are nearly ſimilar to thoſe of the parrels: they are faſtened to the SHROUDS about twelve or fourteen feet above the deck; the hole in the middle being placed perpendicularly to contain ſome rope which paſſes through it. The intention of theſe, is to guide the ſailors to the particular rope, which might otherwiſe be eaſily miſtaken for ſome other of the ſame ſize, eſpecially in the night. Falconer.

TRUCKING, in *Commerce*. See PERMUTATION, EXCHANGE, and COMMERCE.

TRUCKS, among *Gunners*, round pieces of wood, in form of wheels, fixed on the axletrees of carriages, to move the ordnance at ſea, and ſometimes alſo at land. See CARRIAGE.

TRUE, ſomething agreeable to the reality of things, or to truth.

In this ſenſe we ſay, the *true* God, the *true* religion, *true* gold, &c. in oppoſition to falſe or pretended ones.

TRUE *love*, in *Botany*. See *Herb* PARIS.

TRUE *love of Canada*. See *Herb* PARIS *of Canada*.

TRUE *place of a planet*, or *ſtar*, in *Aſtronomy*. See PLACE.

TRUE *altitude*, *anomaly*, *aſthma*, *horizon*, *propoſition*, *recovery*, *ribs*, and *future*. See the ſeveral articles.

TRUFFLES, formed from *truffe*, or *truffle*, of the Latin *tuber*, or *tuberculum*, *tubera terræ*, in *Natural Hiſtory*, a ſort of ſubterraneous vegetable production, or a kind of MUSHROOM, the characters of which are theſe: they are of a fungous fleſhy ſtructure, and are of a roundiſh figure, growing ſometimes ſingle, ſometimes many together, and always remaining under ground.

In the Linnæan ſyſtem, this is a ſpecies of the *lycoperdon*, or PUFF-*ball*.

The ſpecies of *truffles* are only two: 1. The common *truffle*; and, 2. The teſticulated *truffle*. Tourn. Inſt. p. 565.

Bradley calls them *under-ground edible muſhrooms*, or *Spaniſh trubbes*, and *under-ground deer's-balls*, or *muſhrooms*.

The ancients, it is evident from their writings, were not acquainted with the ſort of *truffles* which we have in uſe at preſent; they deſcribe theirs to have been of a reddiſh colour, and ſmooth on the ſurface; we at preſent know this kind very well; it is common in Italy, and is called the wild *truffle*, and diſregarded. They had indeed the white African *truffle*, ſometimes brought to them, and held it in great eſteem for its flavour. The Romans called it the Lybian *tuber*, and the Greeks the Cyrenian *miſy*.

Avicenna recommends thoſe *truffles* as the beſt, which were of a whitiſh colour within; and this not being a clear white, he expreſſes himſelf by a word which ſignifies ſand-coloured, alluding to duſky white ſand, in common uſe at that time.

It is certain that the fineſt *truffles* were called by ſome authors by this epithet *arenoſa*, with a very different meaning, only expreſſing that they were produced in ſandy countries: the European *truffles* both then were, and now are, moſtly produced in dry ground on the ſides of hills; but the Lybian were produced only in the burning ſands of that country, and theſe were therefore called *ſand-truffles*. Serapio tells us, that the beſt of all *truffles* were thoſe produced in ſand; and Martial alludes to theſe, where he deſcribes the fineſt *truffles* as breaking the ſurface of the earth into cracks, and by that means directing people where to ſearch for them. To which purpoſe Leo Africanus ſays of the Lybian *truffle*, that the places where they are may be known by the earth's being raiſed into hillocks, and breaking into numerous cracks.

The *truffle* is moſt abundantly produced in dry fields of a reddiſh loamy earth, not too poor, according to Pliny, chiefly after rains and thunders in autumn; and they are found to flouriſh moſt near the roots of elms, the ilex, and ſome other trees. They do not well bear the ſeverity of hard winters, but are uſually ſcarce all the ſeaſon after ſuch. The ſmalleſt are found about the bigneſs of a pea, reddiſh without and whitiſh within, and they grow from this ſize ſometimes to a pound weight, but ſuch are not common; what are taken up in the ſpring are diſtinguiſhed by their white colour, and inſipidity to the taſte, and are commonly called white *truffles*: thoſe taken up in autumn are of a variegated colour within, and are called marble *truffles*; the inner ſubſtance having ſwelled extremely and changed colour, and the white part now remaining only in form of a number of pipes or tubules, which ſeem in many places to run to the extremity, and terminate in the chaps and wrinkles of the back. The greyiſh ſubſtance, which is wrapped up among theſe tubules, when examined by the microſcope, appears to be a tranſparent parenchyma, compoſed of little bladders or hollow veſſels, in the midſt of which may be ſeen ſmall round bodies, which are unqueſtionably the ſeeds of the *truffle*.

What confirms the opinion of their coming from ſeed is, that there have been *truffles* diſcovered in England, and this, at firſt, only in Northamptonſhire, and even only in one place thereof, viz. near Ruſhton, a place ſtocked with trees formerly brought from Languedoc; and it is only ſince then, that any *truffles* have been there obſerved; whence it is concluded, that the ſeed of theſe *truffles* was brought from France among the roots of the trees brought thence.

Theſe Engliſh *truffles* were firſt diſcovered by Dr. Hatton. Dr. Tancred Robinſon aſſures us, they are the true French *truffes*, the Italian *tartuffi* or *tartuffole*, and the Spaniſh *turmos de tiera*, being not before noted by Mr. Ray as ever known on Engliſh ground: indeed he adds, that he has ſeen them thrice as large at Florence, Rome, &c.

Thoſe obſerved in England are all included in a ſtudded bark or coat, and the inner ſubſtance is of the conſiſtence of the fleſhy part of a young cheſnut, of a paſte-colour, a rank or hircine ſmell, and unſavoury.

When the *truffles* are arrived at ſuch a degree of maturity as to yield ſeeds, which is generally in Auguſt, they are of a fine high flavour and agreeable ſmell; and the heat and rains at this ſeaſon greatly promoting their growth, has been the occaſion of the old error, that thunder produced them; after this they continue good till the middle of winter, and ſometimes even till March; but thoſe gathered from this time till the end of July are ſmall and only white, never marbled nor of their high taſte.

If the *truffles* are not taken up when fully ripe, they always rot and burſt; whence it is plain, that they are an annual plant, which lives no longer than till they have perfected their ſeeds. And if the place where the old ones have rotted and burſt be examined, the ſeeds will be found after ſome time to have vegetated, and a great number of young *truffles* to be produced in the place: theſe, if not deſtroyed by the froſts, are what in the enſuing ſpring furniſh the younger white *truffles*.

The *truffle* is very apt to be pierced and eaten within by a worm, and this, though a damage to the particular *truffle*, is of ſome ſervice to the people, who make it their buſineſs to ſeek for them: for this worm, after a proper time paſſed in that ſtate, changes into a chryſalis ſtate in the body of the *truffle*; whence he ſoon after comes out, in the ſhape of a beautiful violet-coloured fly; and wherever theſe flies are found, they are an indication that there are beds of *truffles* near, as they are never bred in any other root.

Theſe communicate a bitterneſs to the whole *truffle*, and make it unfit for the table; though if the whole be carefully ſearched into, the part eaten by the worm, and the hole by which it made its way in, will be found to be in reality the only bitter parts, and the reſt of the *truffle*, when theſe are cut out, as good as ever: but, beſides theſe deſtroyers, the microſcope uſually diſcovers on the ſurface of the *truffle* a multitude of other devourers, which are ſmall animalcules, continually eating, and ſearching the cracks of the bark, as the places where the pulp is moſt eaſily come at; theſe ſomewhat reſemble mites.

The earth that produces *truffles* rarely affords any other plants, theſe taking up all the nouriſhment it can afford: the earth all about them ſmells ſo very ſtrongly of them, that they are eaſily found out by it, by the animals which carry their noſes near the ground: and thoſe who ſought after them ſoon found the way of uſing hogs to ſearch them out; but theſe being a ſort of unmanageable animals, dogs were found which would ſupply their place with more certainty, and much leſs trouble. Mem. Acad. Scienc. Paris, an. 1711.

By a chemical analyſis, *truffles* are found to abound in a volatile alkali ſalt mixed with oil, upon which their ſmell, &c. depend. They never riſe out of the ground, but are found, uſually, half a foot beneath the ſurface thereof.

Dr. Hatton has obſerved ſeveral little fibres iſſuing out of ſome *truffles*, and inſinuating themſelves within the ſoil, which, in all probability, do the office of roots. The *truffles* grow tolerably globular, as receiving their nouriſhment all around them; which they ſuck in through the pores of their bark or rind.

They are tendereſt and beſt in the ſpring, though eaſieſt found in autumn; the wet ſwelling them, and the thunder and lightning diſpoſing them to ſend forth their ſcent, ſo alluring to the ſwine: hence ſome of the ancients called them *ceraunia*, q. d. *thunder-roots*.

The ancients were exceedingly divided as to the uſe of *truffles*; ſome affirming them to be wholeſome food, and others pernicious: Avicenna, particularly, will have them to cauſe apoplexies. For my own part, ſays Mr. Lemery, I am of opinion, they have both good and evil effects: they reſtore and ſtrengthen the ſtomach, promote the ſemen, &c. but when uſed too freely, they attenuate and divide the juices immoderately, and, by ſome volatile and exalted principles, occaſion great fermentations, &c. though the pepper and ſalt, with which they are ordinarily eaten, do doubtleſs contribute greatly to thoſe effects: their rich taſte is owing to their not putting forth any ſtalk; in effect, their principles being united, and, as it were, concerted into a little bulb, muſt yield a richer and more delicious flavour than if the juices were diſperſed by vegetation through the ſeveral parts of the common plant. Some roaſt *truffles* under the aſhes; and others mix them in ſauces.

In Italy France, England, &c. they eat them as a great dainty, either in fried ſlices with oil, ſalt, and pepper, or boiled thoroughly in their own broth. The hogs are exceedingly fond of them, and are frequently the means of diſcovering the places where they are; whence the common people call them *ſwine-bread.* See MISY and UDNON.

TRUFFLE-*worms*, in *Natural Hiſtory*, a ſpecies of fly-worm which is found in *truffles*, and lives in and feeds on them, till the time it undergoes the common metamorphoſis of theſe creatures, for the production of a fly, like that from the egg of which it was hatched.

They are very ſmall, and have two brown ſpots, eaſily diſtinguiſhable near their hinder end, which are the two poſterior ſtigmata. They are all over white and very tranſparent; and one may very eaſily diſtinguiſh the two black ſtocks of their two hooks, with which they tear the ſubſtance of the *truffle*, as the other ſpecies do their food: when they have arrived at their full growth, which is uſually in a few days, then they leave the *truffle*, and go to ſeek ſome proper place, where they may reſt during the time of their transformation; they enter the earth for this purpoſe, and twelve hours after they have gone into it they are transformed into an egg-ſhaped ſhell, of a cheſnut-brown, of the ſame ſort with that of the blue fleſh-fly.

Theſe are the worms in a manner peculiar to the *truffles*; but, beſide theſe, they often furniſh nouriſhment to another ſpecies, very common in muſhrooms of the ordinary eatable kind, and which has a yellow body and a black cruſtaceous head. Reaumur's Hiſt. Inſ. vol. iv. p. 374

TRUG, or TRUG-*corn*, TRUGA *frumenti*, in our *Ancient Cuſtoms*, denotes a meaſure of wheat. *Tres* trug *frumenti vel avenæ faciunt two buſhels, inter præbendum de Hunderton eccleſia Heref.* MS de temp E III.

At Lempſter, the vicar has *trug-corn* allowed him for officiating at ſome chapels of eaſe; as Stoke and Dockley, within that pariſh

TRUG, is alſo a country word for a milk tray, or hod to carry mortar in.

TRULLIZATION, in the *Ancient Architecture*, the art of laying on ſtrata or layers of mortar, gypſum. or the like, with the trowel, in the inſide of vaults, ceilings, &c.

TRULLUM, a barbarous word, formed from *trulla*, *cap*, and ſignifying *dome*; chiefly uſed in the phraſe, *Council in trullo.*

This was a council aſſembled, in the year 692, againſt the Monothelites, in the dome of the palace of Conſtantinople, called *trullum*; the name whereof it has retained. It was alſo called the QUINISEXTUM.

The *trullum* was properly a hall in the palace of the emperors of Conſtantinople, where they uſually conſulted of matters of ſtate. This council, held in *trullo*, was the ſixth œcumenical or general council.

TRUMPE, in *Ichthyology*, a name given by ſome of the Engliſh writers to that ſpecies of whale, called by the generality of authors *cete*, and *balæna major*. This is the PHYSETER *microps* of Linnæus, or blunt-headed CACHALOT. The Dutch call it the pot-whale-fiſh.

TRUMPET, a muſical inſtrument, the moſt noble of all portable ones of the wind kind; uſed chiefly in war, among the cavalry, to direct them in the ſervice. Each troop of cavalry has one. The cords of the *trumpets* are of crimſon, mixed with the colours of the facings of the regiments.

The word is formed from the French *trompette.* Menage derives it from the Greek *ςρομβος*, *turbo*, a ſhell anciently uſed for a trumpet. Du-Cange derives it from the corrupt Latin *trumpa*, or the Italian *tromba*, or *trombetta*; others from the Celtic *trompill*, which ſignifies the ſame. It is uſually made of braſs, ſometimes of ſilver, iron, tin, and even wood. Moſes, we read, made two of ſilver, to be uſed by the prieſts, Numb. x. and Solomon made two hundred like thoſe of Moſes, as we are informed by Joſephus, lib viii. which ſhews abundantly the antiquity of that inſtrument.

As to the invention of the *trumpet*, ſome Greek hiſtorians aſcribe it to the Tyrrhenians; but others with greater probability to the Egyptians, from whom it might have been tranſmitted to the Iſraelites. The *trumpet* was not in uſe among the Greeks at the time of the Trojan war; though it was in common uſe in the time of Homer. According to Potter (Arch. Græc. vol. ii. cap. 9.) before the invention of *trumpets*, the firſt ſignals of battle in primitive wars were lighted torches; to theſe ſucceeded ſhells of fiſhes, which were ſounded like *trumpets.* And when the *trumpet* became common in military uſe, it may well be imagined to have ſerved at firſt only as a rough and noiſy ſignal of battle, like that at preſent in Abyſſinia and New Zealand, and perhaps with only one ſound. But even when more notes were produced from it, ſo noiſy an inſtrument muſt have been an unfit accompaniment for the voice and poetry; ſo that it is probable the *trumpet* was the firſt ſolo inſtrument in uſe among the ancients.

In the ninety-ſixth Olympiad, before Chriſt 396, a prize was inſtituted at the Olympic games for the beſt performer on the *trumpet*; and the firſt perſon who gained the prize was Timæus of Elis; and Herodotus of Megara, a famous trumpeter, who lived about the 120th Olympiad, or three hundred years before Chriſt, was victor at the different games of Greece no leſs than ten, or, as ſome ſay, fifteen ſeveral times. Theſe performers on the *trumpet* appear to have been heralds and public cryers; who not only gave the ſignals at the games for the combatants to engage, and announced their ſucceſs, but proclaimed peace and war, and ſounded ſignals of ſacrifice and ſilence, at religious ceremonies. Burney's Hiſt. of Muſ. vol. i. p. 376.

Among the Romans, there were various inſtruments of the *trumpet* kind; as the *tuba*, *cornua*, *buccina*, and *lituus.* The *tuba* is ſuppoſed to have been exactly like our *trumpet*, widening gradually in a direct line to the orifice; the *cornua* were bended almoſt round; and the BUCCINA was ſomewhat leſs; the *lituus*, which was almoſt ſtraight, but crooked at the extremity, in the form of the augural ſtaff, whence its name, was a ſpecies of CLARION, or octave *trumpet*, made of metal, and extremely loud and ſhrill, uſed for horſe, as the ſtraight *trumpet* was for foot. Horace diſtinguiſhes it from the *tuba* or *trumpet.* Od. I. l. 23.

> *Multos caſtra juvant, et lituo tubæ*
> *Permiſtus ſonitus,—*

As Claudian does from the flute:

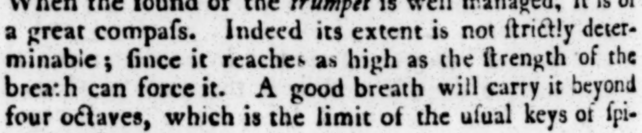
> Tibia *pro* lituis, *et pro clangore tubarum*
> *Molle lyræ, fauſtumque canant*

The *tuba*, or long *trumpet*, called by the Hebrews the *trumpet of the jubilee*, may be ſeen in ſeveral pieces of ancient ſculpture at Rome, particularly on the arch of Titus, on Trajan's pillar, and in a baſſo relievo at the Capitol, repreſenting the triumph of Marcus Aurelius.

The modern *trumpet* conſiſts of a mouth piece, near an inch broad, though the bottom be only one-third ſo much. The pieces which convey the wind are called the *branches*; the two places where it is bent, *potences*; and the canal between the ſecond bend and the extremity, the *pavilion:* the places where the branches take aſunder, or are ſoldered, the *knots*; which are five in number, and cover the joints.

When the ſound of the *trumpet* is well managed, it is of a great compaſs. Indeed its extent is not ſtrictly determinable; ſince it reaches as high as the ſtrength of the breath can force it. A good breath will carry it beyond four octaves, which is the limit of the uſual keys of ſpinets and organs.

The uſual ſounds of the *trumpet* are repreſented by the following muſical notes.



Here the loudeſt ſound being denoted by 1, the pitch of the reſt, or the number of their reſpective vibrations, during the time that C vibrates once, will be expreſſed by the numbers denoting the order of their ſounds, 2, 3, 4, 5, &c. The ſounds expreſſed by the muſical numbers, that is, by 2, 3, 5, and their compoſites, which are 4, 6, 8, 9, 10, 12, 15, 16, are all perfectly in tune; but the ſounds expreſſed by numbers not muſical, as 7, 11, 13, 14, are falſe. Three of theſe, viz. Bb, its octave, and A, diſtinguiſhed by *ſ* placed over them, are too flat; and the remaining note F, marked with an S, is too ſharp. See MUSICAL *Numbers.*

The reaſon of which is, that B♭ ought to be a tone major below C; that is, its pitch to that of C will be as 8 to 9; but the proportion given by the *trumpet* is as 7 to 8; which being a leſs proportion than that of 8 to 9, it follows that B♭ will be too flat. The ſame holds true of its octave. And A being a tone minor above G, it ought to be to G as 10 to 9: but in the *trumpet*, it is to G as 13 to 12; which being leſs than the proportion of

10 to 9, it follows that A will be too flat. On the other hand, F ought to be a ſemitone major above E; that is, F ought to be to E, as 16 to 15: but in the *trumpet*, F is to E, as 11 to 10; which being a greater proportion than that of 16 to 15, it follows that F is too high or too ſharp.

This ſyſtem of *trumpet*-notes is an effectual confutation of thoſe who are for introducing 7, 11, 13, and other primes into muſic.

In war there are eight principal manners of ſounding the *trumpet:* the firſt, called the *cavalquet*, uſed when an army approaches a city, or paſſes through it in a march. The ſecond the *bout-ſelle*, uſed when the army is to decamp, or march; at which time the drums beat a *general*, when the troopers boot, ſaddle, and get ready. The third is when they ſound to horſe, when the *aſſembly* begins to beat, on which the troopers mount; and then to the ſtandard. The fourth is the *charge*, in the day of battle. The fifth the *watch*. The ſixth is called the *double cavalquet*. The ſeventh the *chamade:* and the eighth the *retreat*. Beſides theſe, there are various flouriſhes, voluntaries, &c. uſed in rejoicings.

There are alſo people who blow the *trumpet* ſo ſoftly, and draw ſo delicate a ſound from it, that it is uſed not only in church-muſic, but even in chamber-muſic; and it is on this account, that, in the Italian and German muſic, we frequently find parts entitled *tromba prima*, or Ia, firſt *trumpet*; *tromba* IIa, *ſegonda*, IIIa, *terza*, ſecond, third *trumpet*, &c. as being intended to be played with *trumpets*.

There are two very great defects in the *trumpet*, obſerved by Mr. Roberts, in the Philoſophical Tranſactions for 1692, Nº 195. The firſt is, that it will only perform certain notes within its compaſs, commonly called *trumpet-notes*; the ſecond, that though its ordinary compaſs is from double C-*fa-ut* to C-*ſol-fa* in alt, yet there are four notes, the 7th, 11th, 13th, and 14th, in this progreſſion, viz. B*b*, *f*, *a a*, and *b b*, which are not exact in tune. The ſame defects are found in the TRUMPET-*marine*; and the reaſon is the ſame in both. Phil. Tranſ. Ab. vol. i. p. 607.

TRUMPET-MARINE, is a muſical inſtrument, conſiſting of three tables, which form its triangular body. It has a very long neck with one ſingle ſtring, very thick, mounted on a bridge, which is firm on one ſide, but tremulous on the other. It is ſtruck by a bow with one hand, and with the other the ſtring is preſſed or ſtopped on the neck by the thumb.

It is the trembling of the bridge, when ſtruck, that makes it imitate the ſound of a *trumpet*, which it does to that perfection, that it is ſcarce poſſible to diſtinguiſh the one from the other. And this is what has given it the denomination of *trumpet-marine*, though, in propriety, it be a kind of monochord. Of the ſix diviſions marked in the neck of the inſtrument: the firſt makes a fifth with the open chord, the ſecond an octave, and ſo on for the reſt, correſponding with the intervals of the military *trumpet*.

The *trumpet-marine* has the ſame defects with the *trumpet*, viz. that it performs none but *trumpet*-notes, and ſome of thoſe either too flat or too ſharp. This Mr. Fr. Roberts *(ubi ſupra)* accounts for, only premiſing the common obſervation of two uniſon ſtrings; that if one be ſtruck, the other will move: the impulſes made on the air by one ſtring ſetting another in motion, which lies in a diſpoſition to have its vibrations ſynchronous to them; to which it may be added, that a ſtring will move, not only at the ſtriking of an uniſon, but alſo of that of an 8th or 12th; there being no contrariety in the motions to hinder each other.

Now in the *trumpet-marine* you do not ſtop cloſe, as in other inſtruments, but touch the ſtring gently with your thumb, whereby there is a mutual concurrence of the upper and lower part of the ſtring to produce the ſound. Hence it is concluded, that the *trumpet-marine* yields no muſical ſound, but when the ſtop makes the upper part of the ſtring an aliquot part of the remainder, and, conſequently, of the whole; otherwiſe the vibrations of the parts will ſtop one another, and make a ſound ſuitable to their motion, altogether confuſed. Now the aliquot parts, he ſhews, are the very ſtops which produce the *trumpet*-notes.

TRUMPET, *Harmonical*, is an inſtrument which imitates the ſound of a *trumpet*, and which reſembles it in every thing, excepting that it is longer, and conſiſts of more branches. It is uſually called a SACKBUT.

TRUMPET, *Liſtening* or *hearing*, is an inſtrument invented by Joſeph Landini, to aſſiſt the ear in hearing of perſons who ſpeak at a great diſtance, without the aſſiſtance of any ſpeaking *trumpet*.

Inſtruments of this kind, repreſented in *Tab. Muſic. fig.* 14, 15, are formed of tubes, with a wide mouth A A, and terminating in a ſmall canal B, which is applied to the ear: the conſtruction of theſe inſtruments evidently ſhews how they contribute to aſſiſt the hearing; for the weak and languid pulſes of the air being received by the large end of the tube, and reflected ſeveral times from its ſides in paſſing to B, the ſmall end, are condenſed, and entering the ear in this condenſed ſtate, ſtrike the tympanum with a greater force than they could have done without the intervention of the tube. Hence it appears, that a *ſpeaking* TRUMPET may be applied to the purpoſe of a hearing *trumpet*, by turning the wide end towards the ſound, and putting the ear to the narrow end.

TRUMPET, *Speaking*, is a tube from ſix to fifteen feet long, made of tin, perfectly ſtraight, and with a very large aperture; the mouth-piece being big enough to receive both lips.

The mouth being applied to it, carries the voice to a very great diſtance, ſo that it may be heard diſtinctly a mile, or more; hence its uſe at ſea.

The invention of this *trumpet* is held to be modern, and is commonly aſcribed to ſir Samuel Moreland, who called it the *tuba ſtentorophonica*.

Of this inſtrument an account was publiſhed at London in 1671, in a work entitled Tuba Stentoro-phonica, wherein the author relates ſeveral experiments made by him with this inſtrument; the reſult of which was, that a *ſpeaking-trumpet* conſtructed by him, 5 feet 6 inches long, 21 inches diameter at the greater end, and two inches at the ſmaller, being tried at Deal-caſtle, was heard at the diſtance of three miles, the wind blowing from the ſhore.

But Ath. Kircher ſeems to have a better title to the invention; for it is certain he had ſuch an inſtrument before ever ſir S. Moreland thought of his.

Kircher, in his Phonurgia Nova, publiſhed in 1673, ſays, that the tromba, publiſhed laſt year in England, he invented twenty-four years before, and publiſhed in his Muſurgia: he adds, that Jac. Albanus Ghibbiſius, and Fr. Eſchinardus, aſcribe it to him; and that G. Schottus teſtifies of him, that he had ſuch an inſtrument in his chamber in the Roman college, with which he could call to, and receive anſwers from the porter.

Indeed, conſidering how famed Alexander the Great's tube was, wherewith he uſed to ſpeak to his army, and which might be diſtinctly heard a hundred ſtadia or furlongs, it is ſomewhat ſtrange the moderns ſhould pretend to the invention; the ſtentorophonic horn, or tube of Alexander, whereof there is a figure preſerved in the Vatican, being almoſt the ſame with that now in uſe. See STENTOROPHONIC.

The principle upon which this inſtrument is conſtructed is obvious; for as ſound is ſtronger in proportion to the denſity of the air, it muſt follow, that the voice paſſing through a tube or *trumpet*, muſt be greatly augmented by the conſtant reflection and agitation of the air through the length of the tube, by which it is condenſed, and its action on the external air greatly increaſed at its exit from the tube.

In order to eſtimate the effect of this inſtrument, let us ſuppoſe A B (*Tab. Muſic, fig.* 16.) to be ſuch a length of tube as admits one reflection of the ſound, emitted by the ſpeaker, from the ſide B B; let A F be another length, in which the ſound or voice is reflected five times by the ſides, viz. in B, C, D, E, and F: the ſound ſtriking the metal tube in B is the ſame as that at F; but the number of parts forming the periphery of the circle in B is to that in F, as the diameter B B is to the diameter F F; and therefore the intenſities, with which the parts of the metal will be moved in theſe peripheries will be in the inverſe ratio of the peripheries, or of the diameters B B, FF. But the parts of the metal move the air contained within the peripheries of the circle, or conſtituting their reſpective areas, which are as the ſquares of the diameters: i. e. the air agitated in B is to that agitated in F, as BB^2 to FF^2; and conſequently, the intenſity of the ſame ſound in the tube of the length A B, is to that in the length A F, as BB^2 to FF^2, and the inverſe ratio of the diameter B to F: or, the intenſity in A B is to that in A F $:: FF \times BB^2 : BB \times FF^2$, i. e. dividing the laſt ratio by $BB \times FF :: BB : FF$. But the intenſity of the ſound increaſes the more frequently it is reflected from the ſides: let then the number of reflections of the ſound in B be n, in F it will be $5n$, and therefore the whole intenſity of the ſound in B is to that in F as $n \times BB$ to $5n \times FF$. Conſequently, the longer the tube the more numerous will be the reflections, and the greater will be the increaſe of the ſound, and the farther may it be heard.

A man, ſpeaking through a tube 4 feet in length, may be underſtood at the diſtance of 500 geometrical paces; with a tube $16\frac{2}{3}$ feet, at the diſtance of 1800 paces; and with a tube 24 feet long, at a greater diſtance than 2500 geometrical paces.

The ſound will be alſo heightened by having the remoter aperture of the tube wide more than if it were narrow. However, the effect of the tube in magnifying ſound, either for ſpeaking or hearing, depends principally upon its length: nevertheleſs ſome advantages may be derived from its particular form and ſhape.

Some have propoſed the figure which is made by the revolution of a parabola about its axis, as the beſt; where the mouth-piece is placed in the focus of the parabola, and conſequently the ſonorous rays will be reflected parallel to the axis of the tube. But Mr. Martin obſerves, that this parallel reflection is by no means eſſential to the magnifying of ſound; on the contrary, it prevents the infinite number of reflections and reciprocations of ſound, in which, according to ſir I. Newton, its augmentation principally conſiſts: the augmentation of the impetus of the pulſes of air being proportional to the number of repercuſſions from the ſides of the tube, and therefore to its length, and to ſuch a figure as is moſt productive of them. Hence he infers, that the parabolic *trumpet* is the moſt unfit of any for this purpoſe.

He obſerves, that there is one thing more which contributes to the augmentation of the agitations of air in the tube; viz. the proportion which the ſeveral portions of air bear to each other when divided by tranſverſe ſections, at very ſmall, but equal diſtances, from one end of the tube to the other.

Thus, let thoſe ſeveral diviſions be made at the points a, b, c, d, e, &c. (*fig.* 17.) in which let the right lines nk, bl, cm, dm, &c. be taken in geometrical proportion. Then will the portions of air contained between B and a, a and b, b and c, c and d, &c. be very nearly in the ſame proportion, as being in the ſame ratio with their baſes, when the points of diviſion are indefinitely near together. But it is known, that when any quantity of motion is communicated to a ſeries of elaſtic bodies, it will receive the greateſt augmentation when thoſe bodies are in geometrical proportion. Therefore, ſince the force of the voice is impreſſed upon, and gradually propagated through a ſeries of elaſtic portions of air in a geometrical ratio to each other, it eaſily receives the greateſt augmentation poſſible.

And ſince by conſtruction $Ba = ab = bc = cd$, &c. and $ak : bl :: bl : cm :: cm : dn$, &c. the points k, l, m, n, o, p, q, r, s, A will form the LOGARITHMIC or LOGISTIC curve: whence Mr. Martin concludes, that a *trumpet* formed by the revolution of this curve about its axis, will augment the ſound in a greater degree than any other figured tube whatever.

Caſſegrain alſo is of opinion, that an hyperbola, having the axis of the tube for an aſymptote, is the beſt figure for this inſtrument. Muſchenb. Int. ad. Phil. Nat. tom. ii. p. 926, 4to. Martin's Phil. Brit. vol. ii. p. 248, 3d edit.

For other conſtructions of ſpeaking *trumpets* by Mr. Conyers, ſee Phil. Tranſ. N° 141. for 1678.

TRUMPETS, *Feaſt of*, in *Eccleſiaſtical Hiſtory*, one of the menſtrual feaſts among the Jews, kept with greater ſolemnity than the reſt, on the firſt day of the month Tiſri. Num. xxix. 1—6. Levit. xxiii. 24, 25. The day of this feaſt was the new year's day with the Jews, in which the people were ſolemnly called to rejoice in a grateful remembrance of God's benefits to them through the laſt year, which might be intended by blowing the *trumpets*, as well as to implore his bleſſing upon them for the enſuing year, which was partly the intention of the ſacrifices offered on this day.

The modern Jews have a notion, which they derive from the Miſchna, that on this day God judges all mankind; and therefore, according to Baſnage, their zealots ſpend, ſome a whole month, others four days, and eſpecially the eve of this feaſt, in confeſſing their ſins, beating their breaſts, and ſome in laſhing their bare backs, by way of penance, in order to procure a favourable judgment on this deciſive day.

TRUMPET *fiſh*, *ſcolopax*, in *Ichthyology*, a fiſh called alſo the *bellows-fiſh*. In the Linnæan ſyſtem it is a ſpecies of the CENTRISCUS; but in the Artedian, a ſpecies of BALISTES. Pliny calls it SERRA.

It is a very ſmall fiſh, caught very frequently in the Mediterranean, and common in the markets of Rome, Venice, and elſewhere. Its common length is about three inches; its body is flat, and of about one finger's breadth, and covered with rough and harſh ſcales; the ſnout is extremely long, and is hard, ſtraight, and made all of one bone, broad at the head, and narrow at the end, and opening there tranſverſely with a membrane affixed to the under jaw, and ſerving to open and ſhut it at pleaſure; the eyes are large, and their iriſes of a pale red; it has a thin fin at each of the gills; the anterior part of the belly is formed into a ſharp edge, and has two bony ſubſtances inſtead of fins, and another lower on the belly, which is longer and notched; behind the anus there is a long fin reaching to the tail, and on the back two others, one near the tail, and the other a long and large bony ſpine, ſet in a joint, and moveable at pleaſure; before this there is another fine prickle, and behind it three more, which make the whole a ſort of fin. Geſner de Piſc. p. 1008.

RUMPET-*flower*, or *ſcarlet jaſmine*, *bignonia*, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the empalement is cup-ſhaped, quinquefid, and of one leaf; the flower is of the ringent or grinning kind, tubulous, with long, ſwelling, bell-ſhaped chaps, divided into five parts at the top; and it has four awl-ſhaped ſtamina ſhorter than the petal, two longer than the other, having oblong reflexed ſummits; in the centre is an oblong germen, ſupporting a ſlender ſtyle, crowned by a roundiſh ſtigma; the germen becomes a bivalve pod, with two cells filled with compreſſed winged ſeeds, lying over each other imbricatim. Miller enumerates fifteen, and Linnæus ſeventeen ſpecies.

TRUMPET-*honeyſuckle*. See HONEYSUCKLE.

TRUMPET-*ſhell*, or *whelk*, *buccinum*, in *Natural Hiſtory*, the name of a large genus of ſhells, the characters of which are theſe: they are univalve ſhells of the form of a *trumpet*, according to old pictures, with a wide belly, and a large, broad, and elongated mouth; they have a diſtinct and regular tail, uſually long, though ſometimes ſhort; they have a crooked beak, and the clavicle is often elevated, though ſometimes depreſſed and contabulated. In the Linnæan ſyſtem, the characters of this genus are, that its animal is a ſlug, the ſhell univalve, ſpiral, and gibbous, the aperture oval, ending in a ſhort canal or gutter. Linnæus enumerates fifty-one ſpecies.

For the arrangement of the *buccina*, according to the ſyſtem of Da Coſta, ſee SHELLS.

The family of the *buccina*, when examined ever ſo ſtrictly, is very large; but according to the general cuſtom of authors, of confounding together ſeveral genera under the name, it is uſually made to appear much larger than it really is. Liſter has made it comprehend a vaſt number of ſhells, by confounding with it the families of the *murex* and *purpura*.

It is not indeed peculiar to this author, to have confounded theſe genera: thoſe who went before him have done the ſame; and Pliny has compriſed the *buccinum*, *murex*, and *purpura*, under the general name *ceryx*.

To avoid the general confuſion, which ariſes from not diſtinguiſhing the families of the *buccinum*, *murex*, *purpura*, and *vis*, or ſcrew-ſhell, it will be proper to obſerve, that there are regular characters, which diſtinguiſh them all, one from another: the characters are theſe: the *buccinum* differs from the *purpura*, in that it has a very long mouth of an oval figure, and has an elevated head; whereas the purpura has a round mouth, and a head ſomewhat flatted; the tail of the purpura is alſo uſually furrowed, and is ſhorter than that of the buccinums.

The buccinum differs alſo from the murex in having a longer tail, by the ſmoothneſs and variety of colours of its coat, and by having a larger mouth leſs furniſhed with teeth; the *murex* having a ſmaller and longer ſhaped mouth, its ſurface covered with points or ſpires, and ſeveral teeth.

It is eaſier to diſtinguiſh the buccinum from the ſcrew-ſhell, as this is always more long and ſlender than the buccinum; it has alſo a flat mouth, and has rarely any tail.

The moſt ſingular ſpecies of the buccinum claſs, is one that has its mouth turned the contrary way to all other ſhells: this has been thence called by authors, the *unique* and the *ſans pareille*.

The buccina generate in the warm months, and ſome ſpecies of them are ſeen very frequently remaining in pairs together, upon the rocks deſerted by the tide on that occaſion. Theſe have been thence ſuppoſed to be of a different genus, and have been called *buccina littoralia*; they are uſually found in copulation early in the morning. Rumphius de Teſt. Aldrovand de Teſt. lib. iii. cap. 231. Liſter, Hiſt. Animal. Angl. p. 158.

The ſpecies of the *buccina* being very numerous, they are arranged under ſeveral diſtinct heads, according to certain obvious diſtinctions, and are as follow: of the *buccina*, with long diſtinct tails and oblong mouths, there are thirteen ſpecies; of thoſe with a ſhort tail and a wide mouth, we have twelve ſpecies; of thoſe with long erect clavicles, there are eleven ſpecies; and of thoſe with leſs erect clavicles, and crooked roſtra, there are alſo eleven ſpecies.

It appears from the writings of the ancients, that the famous purple dye, which they obtained from a ſhell-fiſh was not peculiar to any one ſpecies; but was found in ſeveral of the ſmaller kinds of *buccina*; ſome of which they called *murices*, from the hollow ſpines, or long and ſlender proceſſes, which run in different directions from their ſhells. See PURPURA.

Mr. Reaumur, when on the coaſts of Poitou, found certain eggs of fiſhes arranged in regular order, and in great numbers, on the rocks and ſalted banks, which had the ſame property with the purple-dying liquor of the *buccinum*; it is not yet known to what particular fiſh they belong, or what uſes they may hereafter be brought to ſerve. Mem. Acad. Par. 1711.

Pliny ſeems to derive the name *buccinum* from *buccina*, a kind of muſical inſtrument; but it is more probable that inſtrument took its name from the ſhell to which it bore reſemblance, and of which it might probably have been anciently made. Plin. Hiſt. Nat. lib. ix. cap. 36. Phil. Tranſ. Nº 282. p. 1277.

Buccina are of ſome uſe in phyſic; when calcined they have a drying cauſtic quality. See *Tab. of Shells*, Nº 9, and *Tab.* III. *of Foſſils*, *Claſs* 9.

Buccinum lapidoſum is a figured ſtone, ſhaped like the former, and probably only a petrifaction of the ſhell above mentioned.

Ray ſpeaks of a *buccinum* which was not only petrified, but after petrifaction was converted into a PYRITES.

TRUMPETER, in *Ornithology*, a name given in England, to a particular ſpecies of pigeon, called by Moore the *columba tibicen*.

This ſpecies is of the middle ſize of the common pigeon, and made conſiderably like it; but it is pearly eyed; is of a mottled black, and is feathered down the legs and feet, and is turn-crowned like the nun, and ſome of the other ſpecies; ſometimes like the finnikin, but much larger: this ſeems to be the beſt ſort, as being the moſt melodious. The beſt character to know them by, is a tuft of feathers growing at the root of the beak; and the larger this tuft is, the more they are eſteemed; the reaſon of their name is, that they imitate in their cooing the ſound of the trumpet; but to be often entertained with their melody, it is neceſſary to feed them frequently with hemp-ſeed. Moore's Columbarium, p. 45.

Trumpeter is alſo a name given by Mr. Pennant to the PSOPHIA of Linnæus; becauſe it makes a ſtrong noiſe with its mouth, which it anſwers by a different noiſe from its belly, as if it came from the anus.

TRUMPETER, in a *Man of War*, one whoſe office is always to attend the captain's command, and be ready at the entertainment of ſtrangers. In the time of an engagement his proper ſtation is on the poop.

TRUMPETER, in *Anatomy*. See BUCCINATOR.

TRUNCATED *leaf*. See LEAF.

TRUNCATED *pyramid*, or *cone*, is one whoſe top or vertex is cut off by a plane parallel to its baſe. See PYRAMID and CONE.

The word is formed of the Latin *truncare*, to cut off a part from the whole; whence alſo *truncus*, *truncheon*, &c. In *Heraldry* they ſay TRUNKED.

A *truncated* cone, or the fruſtum of that body, is ſometimes alſo called a *curty-cone*. See FRUSTUM. See alſo GAUGING.

TRUNCATED *roof*. See ROOF.

TRUNCHEON, of the French *troncon*, and the Latin *truncus*, a BATTOON; or a kind of ſhort ſtaff uſed by kings, generals, and great officers, as a mark of their command.

In our military language, it denotes a ſtaff of command borne by a general officer.

TRUNCHEONS, *columns in*. See COLUMN.

RUNDLE, is a kind of carriage with low wheels, whereon to draw heavy cumberſome burdens.

TRUNDLE-*ſhot* is an iron-ſhot about ſeventeen inches long, ſharp-pointed at both ends, with a round bowl of lead caſt upon it, about an hand-breadth from each end.

TRUNGIBIN, in *Natural Hiſtory*, a name given by Rawwolf, Tournefort, and others to a ſort of manna collected from the *alhagi maurorum*, as the common manna is from the aſh; and uſed in the eaſtern parts of the world as a purge. It is what we call the *manna Perſicum*, and though in itſelf a very fine and clean kind of manna, yet it is uſually ſo careleſly collected, and mixed with ſo much filth, that it requires to be given in three times the doſe of ours, in order to purge. The name ſeems very evidently to be a corruption of *tereniabin* or *terenjabin* of the Arabians, which was the word uſed by all their authors to expreſs the *manna Perſicum*.

TRUNK, a ſtrong cheſt or box of a roundiſh form, at leaſt on the upper ſide.

TRUNK, *Truncus*, in *Botany*, a ſtem or body of a tree; or that part between the ground and the place where it divides into branches.

In lopping of trees, nothing is left but the *trunk*.

TRUNK is alſo uſed for the ſtump, or that part left over the root in ſelling. Large trees, when felled, ſhoot out from the *trunk*, and make a copſe or underwood.

It is by means of the *trunks* left rotting in the ground, that the waſtes in foreſts are diſcovered.

TRUNK, in *Anatomy*, is uſed for the buſto of the human body, excluſive of the head and limbs.

The *trunk* is divided into three parts, viz. one common, called the SPINE, and two proper, viz. the THORAX or BREAST, and the PELVIS.

TRUNK, *truncus*, is alſo uſed for the main body of an artery, or vein, in contradiſtinction to the branches and ramifications thereof.

The word is particularly applied to certain parts of the aorta and cava. See *Tab. Anat.* (*Angeiol.*) *fig.* 5. *lit. a.*

TRUNK, in *Architecture*, is uſed for the fuſt or ſhaft of a column. Alſo, for that part of the pedeſtal between the baſe and the cornice, otherwiſe called the *dye*. See *Tab. Archit. fig.* 24. *lit. y.*

TRUNK, in *Mining*, is a ſtrek, or ſtrakes (q. d. ſtream) with a very ſmall ſtream or dribble of water, to waſh the ſlime of tin or copper ore, whereby the lighter earthy parts are carried off with the water. The operation is called *trunking the ſlimes*.

TRUNK is alſo popularly uſed for the ſnout of an elephant, by naturaliſts called the PROBOSCIS thereof.

TRUNK, in *Natural Hiſtory*, a pointed, hollow, ſlender, and oblong body; joined to the fore-part of the heads of many inſects, and ſerving them for ſucking the blood or juices of the animals, or vegetables, on which they feed.

The *trunks* of flies ſerve for diſtinguiſhing many genera of thoſe little animals, from their different form and other accidents. Some of theſe are a tube formed all of one ſimple piece, and others compoſed of ſeveral ſhorter pieces, nicely joined together: ſome are thin and as it were ſhelly, others thick and fleſhy; thoſe of ſome flies are terminated by a ſort of broad foot, or by a ſort of thick lips; and thoſe of others have no lips, or at leaſt no ſenſible ones; and others are made in form of a ſpindle hollowed at the end.

It is often neceſſary to have recourſe to the microſcope, to diſtinguiſh with nicety and exactneſs between theſe.

Without the aſſiſtance of glaſſes, however, it is eaſy to diſtinguiſh among the flies of different genera, three different manners of carrying this organ when in a ſtate of inaction. Many flies have *trunks* which they can ſhorten, when they are not uſing them; theſe are fixed in the fore-part of the creature's head, where there is a cavity deſtined to receive them when they are not in uſe. In many ſpecies, this cavity is no more than a mere ſinus or hole, in the fore-part of the head; but in others it is more nicely contrived, the anterior part of the head lengthening itſelf, and forming a kind of arched vault for its reception. Other flies have *trunks*, which in the time of inaction are turned, or ſomewhat folded from above downwards; the *trunks* of bees are of this kind.

There are others alſo, which have their *trunks* contained entirely in a ſort of caſe, where they lie ſtraight at length, without being either turned or folded; but they are able to incline them in any direction, in regard to the poſition of their legs; of this kind are the *trunks* of the cicadæ, gnats, &c.

Among the butterfly claſs, a great number are furniſhed with a *trunk*; but there are alſo a great number that have it not: the fly of the ſilk-worm, and many, as well larger as ſmaller kinds, are without this organ. Thoſe ſpecies which have it, ſhew it to the firſt view; it is placed in the middle of the head directly between the two eyes. And though in ſeveral ſpecies it is very long, yet it takes up even in theſe but very little room; when it is not in uſe, it is always rolled up in a ſpiral form, in the manner of the ſpring of a watch; and even the ſhorteſt of them are thus turned as well as the longeſt.

There are among the butterflies, ſome which never ſettle upon any thing, but are eternally upon the wing in the manner of ſwallows: theſe feed on the wing as thoſe birds do. We often ſee them buzzing about a flower in the manner of a bee, and in that caſe they ſuſtain themſelves in the air with their wings, while they unrol their *trunk*, and thruſt its extremity into the flower, to ſuck from its bottom the honey-dew, which is the common food of them, of the bees, and of many other inſects.

It has been much diſputed, among the curious obſervers of nature, whether the *trunk* be originally compoſed of two parts, or two *trunks* laid cloſe to one another; or whether it were owing to its tender ſtructure, that it was eaſily ſplit by breaking its parts.

Mr. Bonani was of the firſt opinion, and Mr. Riget agreed with him at firſt, but he afterwards became of the contrary ſentiment; and thought that they really broke in this ſplitting, being originally only one: but Reaumur has determined the queſtion in favour of Bonani; having, by repeated obſervations, found them compoſed of two parallel *trunks*, nicely and evenly laid ſidewiſe together.

The action of the *trunk* in ſucking is eaſily ſeen on giving a piece of ſugar to a butterfly, that has been kept without food for ſome days, after its being produced out of the chryſalis; many of the ſpecies will in this caſe feed on the ſugar in the ſame manner that they would on the juices of flowers, and will ſhew that the uſe of their rolling up their *trunk* at times, is the ſwallowing what they have received into it. The *trunks* of the ſeveral ſpecies of butterflies are as different in colour as in ſhape; ſome are black, others reddiſh, many of a cheſnut colour; ſome are alſo of a pale brown, and ſome of a beautiful yellow; many of them alſo are hairy on the under ſide, and many are ſmooth. The thicker *trunks* are always ſhorter than the flat ones, and have only one canal. Reaumur, Hiſt. Inſect. vol. i. p. 287, 293, 309.

Trunk *of gnats*, the inſtrument by means of which the gnat ſtrikes the fleſh, and ſucks the blood from animal bodies.

This is a machine well worth an attentive obſervation. As fine and ſmall as this inſtrument appears, it is nevertheleſs of a very complex ſtructure. The piercer, or more properly the piercers of this inſtrument, are all entirely hid in the ſheath which makes what we call the *trunk*; and is the only part we naturally have offered to our view. This *trunk* appears to be cylindric in the greater part of its length, and is covered with ſcales reſembling ſmall leaves. Near its end it has an oblong button, furniſhed with an aperture, out of which is occaſionally thruſt a fine point which is complex, being made up of a great number of pointed bodies.

The beſt way to get a regular ſight of the *trunk* of this creature, and of its manner of uſing it, is to ſuffer a gnat to ſettle upon the hand, and not diſturb him in the operation; but with a magnifying-glaſs in the other hand, to obſerve all his motions. In this caſe, we may firſt ſee a ſmall and ſlender point thruſt out at the end of the caſe, and the fly trying ſeveral different parts of the ſkin with this ſharp inſtrument; when it has done this, it chooſes that part which is moſt eaſily pierced; and where lies a veſſel underneath, capable of furniſhing as much blood as it will have occaſion to ſuck. As ſoon as he has made his choice, the wound is given; and ſince the point of the compound piercer cannot be protruded ſo far out of the caſe as is neceſſary for ſtriking to a proper depth, the uſe of the ſlit in this caſe is ſeen; for while the button at the end of this remains firmly applied to the orifice of the wound, where the piercer is introduced, and ſupports that delicate and feeble inſtrument from bending, the caſe opens at the ſlit, and its two ſides bend to give room for the piercer to penetrate, and at length, when the piercer is ſunk to its utmoſt depth, the two extremities of each piece touch, and the ſides are brought cloſe together.

The ſeveral ſpecies of gnats have great variety in their *trunks*; and in the obſerving of many kinds the true ſtructure of that organ in all will be moſt regularly and eaſily found. Some have the caſe of the piercers only one ſingle tube ſplit lengthwiſe along its upper part; others have this ſlit made by the junction of two caſes, which cover cloſely a great part of its circumference, and others have the two tubes ſo well adjuſted, and nicely fitted to one another, that a good glaſs cannot diſcover them from the reſt of the *trunk*, when in a ſtate of reſt; but in others this ſtructure is eaſily diſcoverable, as the extremity of one of them, when beſt fixed, is ſtill to be diſcovered ſomewhat ſeparated from the *trunk*, and adorned with a pencil of ſmall hairs, like thoſe of the antennæ. The male gnats, which have their antennæ feathered, are thoſe which have the plumes at the extremities of theſe additional pieces of the caſe of the *trunk*; and theſe have not the beards which are found ſituated over the *trunks* of the other ſpecies of gnats.

In ſome gnats, four darts are thruſt out occaſionally from the opening ſide, one of which ſerves as a ſheath to the other three. The ſides of them are extremely ſharp, and they are barbed or indented towards the point.

Out of the immenſe number of gnats that one ſees in ſummer, in wet places, it is eaſy to determine that very few have any chance, even once in their lives, to ſuck the blood of larger animals. The reſt, however, are far from being doomed to perpetual famine; the herbs of the field afford them a ſufficient nouriſhment; for theſe, like many other of the inſect tribes, are partly carnivorous, partly otherwiſe, and feed equally on fleſh and vegetables. Reaumur, Hiſt. Inſect. vol. iv. p. 580, ſeq. Baker's Micr. 1743. p. 205.

Trunk-*manna*. See Manna.

Fire-**Trunk**, in a *Fire-ſhip*. See Fire-*ſhip*.

Trunk-*roots* of a plant, are little roots which grow out of the *trunks* of plants.

These are of two kinds: 1. Such as vegetate by a direct deſcent, the place of their eruption being ſometimes all along the *trunk*, as in mints, &c. and ſometimes only in the utmoſt point, as in ſome other plants and trees.

2. Such as neither aſcend nor deſcend, but ſhoot forth at right angles to the *trunk*, which, therefore, though, as to their office, they are true roots, yet, as to their nature, are a medium between a *trunk* and a root.

TRUNKED, among *Heralds*, is applied to trees cut off at each end, which are ſaid to be *trunked*, or *truncated*.

TRUNNIONS, or **Trunions**, of a piece of ordnance, thoſe knobs or bunches of metal in a gun, mortar, or howitzer, which project from the piece, and bear it up on the cheeks of the carriage.

Trunnion-*ring*, is the ring about a cannon, next before the *trunnions*.

Trunnion-*plates*, are two plates in travelling carriages, mortars, and howitzers, which cover the upper parts of the ſide-pieces, and go under the *trunnions*.

TRUSS, **Trussa**, a bundle, or a certain quantity of hay, ſtraw, &c.

A *truſs* of hay is to contain fifty-ſix pounds, or half a hundred weight: thirty-ſix *truſſes* make a load.

In June, July, and Auguſt, a *truſs* of new hay muſt weigh ſixty pounds.

A *truſs* of forage is as much as a trooper can carry on his horſe's crupper.

Truss *of flowers*, is uſed by floriſts to ſignify many flowers growing together on the head of a ſtalk; as in the cowſlip, auricula, &c.

Truss is alſo uſed for a ſort of bandage or ligature, made of ſteel, leather, linen, or other fit material, and of various forms, according to the nature of the caſe, or the contrivance of the maker, wherewith to keep up the parts in thoſe who have hernias or ruptures. See Hernia, &c.

TRUSSED, in the *Manege*. A horſe is ſaid to be *well truſſed*, in French *bien gigote*, when his thighs are large and proportioned to the roundneſs of the croupe. On the contrary, a horſe with thin thighs, that bear no proportion to the breadth of the croupe, is ſaid to be *ill-truſſed*.

TRUSS, in a *Ship*, a machine, employed to pull a yard home to its reſpective maſt, and retain it firmly in that poſition. As the *truſs* is generally uſed inſtead of a parrel, it is rarely employed except in flying top-gallant-ſails, which are never furniſhed with parrels. It is no other than a ring or traveller, which encircles the maſt, and has a rope faſtened to its after-part, leading downward to the top or decks; by means of which the *truſs* may be ſtraightened or ſlackened at pleaſure. The halliards of the top-gallant-ſail being paſſed through this ring, and the ſail being hoiſted up to its utmoſt extent; it is evident, that the yard will be drawn cloſe to the maſt, by pulling down the *truſs* cloſe to the upper part of the ſail. For, without the *truſs*, the ſail and its yard would be blown from the maſt, ſo as to ſwing about by the action of the wind, and the rocking of the veſſel; unleſs the yard were hoiſted cloſe up to the pulley wherein the halliards run; which ſeldom is the caſe in flying-top-gallant-ſails, becauſe they are uſually much ſhallower than thoſe which are fixed or ſtanding. Falconer.

Truss-*parrel*. See Parrel.

TRUSSING, in *Falconry*, is a hawk's raiſing any fowl or prey aloft, ſoaring up, and then deſcending with it to the ground.

TRUST. See Cestui *qui truſt*.

TRUSTEE, one who has an eſtate, or money, put, or truſted in his hands for the uſe of another. See Fidei *commiſſum*.

TRUSTRA. See Tristra.

TRUTH, *veritas*, a term uſed in oppoſition to *falſhood*; and applied to propoſitions which anſwer or accord to the nature and reality of the thing whereof ſomething is affirmed or denied.

Thus, when we ſay that 4 is the fourth part of twice 8, that propoſition is true, becauſe agreeable to the nature of thoſe numbers.

Truth, according to Mr. Locke, conſiſts in the joining or ſeparating of ſigns, as the things ſignified by them do agree or diſagree one with another. Now the joining or ſeparating of ſigns, is what we call making of propoſitions. *Truth*, properly, belongs only to propoſitions, whereof there are two ſorts, mental and verbal; as there are two ſorts of ſigns commonly made uſe, viz. ideas and words.

Mental propoſitions are thoſe wherein the ideas in our underſtanding are put together, or ſeparated, by the mind perceiving or judging of their agreement or diſagreement.

Verbal propoſitions are words put together or ſeparated, in affirmative or negative ſentences. So that propoſition conſiſts in joining or ſeparating of ſigns; and *truth* conſiſts in putting together or ſeparating thoſe ſigns, according as the things they ſtand for agree or diſagree.

Truth, therefore, as well as knowledge, may come under the diſtinction of *verbal* or *real*; that being only *verbal truth*, where terms are joined according to the agreement or diſagreement of the ideas they ſtand for, without regarding whether our ideas were ſuch as really have, or are capable of having, any exiſtence in nature. But it is then they contain *real truth*, when theſe ſigns are joined as our ideas agree; and when our ideas are ſuch as we know are capable of having an exiſtence in nature; which, in ſubſtances we cannot know, but by knowing that ſuch have exiſted.

Truth is the marking down in words the agreement or diſagreement of ideas, as it is. Falſhood is the marking down in words the agreement or diſagreement of ideas, otherwiſe than it is; and ſo far as theſe ideas, thus marked by ſounds, agree to their archetypes, ſo far only is the *truth* real.

The knowledge of this *truth* conſiſts in knowing what ideas the words ſtand for, and the perception of the agreement or diſagreement of thoſe ideas, according as it is marked by thoſe words.

Beſides *truth*, taken in the ſtrict ſenſe before mentioned, which is alſo called *logical truth*, there are other ſorts of *truths*: as

Truth, *Moral*, which conſiſts in ſpeaking things according to the perſuaſion of our own minds, called alſo *veracity*: and, in a more general ſenſe, comprehending alſo *faithfulneſs*, which is a conformity of our actions to our words.

Truth, *Metaphyſical* or *tranſcendental*, which is nothing but the real exiſtence of things conformable to the ideas which we have annexed to their names.

In which ſenſe a clock may be ſaid to be *true*, when it anſwers the idea or intention of the perſon who made it. Others will have metaphyſical *truth* to conſiſt in the agreement of a thing with the idea thereof in the divine underſtanding.

TRUTINA *hermetis* is uſed, among *Aſtrologers*, for an artificial method of examining and rectifying a nativity, by means of the time of conception.

TRUTINATION, formed from *trutina*, *a pair of ſcales*, the act of weighing or balancing a thing.

TRUTTACEOUS, in *Ichthyology*, the name of a genus of fiſh, of the trout kind, which are diſtinguiſhed from all other fiſh by a ſmall fat fin, which they all have near the extremity of the back, and which has no rays or nerves. Of the fiſh of this genus, ſome live only in freſh waters, never entering the ſea or ſalt rivers; others frequent both the freſh and ſalt waters, and are therefore called *anadromi*, or *catanadromi*. Theſe leave the freſh waters while young, and go into the ſalt waters to feed and grow, and again return into the freſh rivers at the time of their full growth and ſpawning, that their offspring may have the ſame advantages themſelves have had, of being hatched into life in freſh water.

The *truttaceous* fiſh are divided into two orders, thoſe which have, and thoſe which have not teeth. Of the edentulous kind, or ſuch as have no teeth, are the lavaretus, ferra, thymallus, oxyrinchus, and albula; and of the toothed kind, are the ſalmo, umbra, trutta, carpio, &c. In diſſection, the *truttaceous* fiſh have all apophyſes to the pylorus, and are all a high-taſted and fine fiſh for the table. Ray's Ichthyology, p. 182.

TRYAL. See Trial.

To TRY, in the *Sea Language*. See Trying.

TRYBLION, a word uſed by the old medical writers, to expreſs the pot or diſh in which the medicines uſed in fumigations were placed at the time of uſe.

TRYCHNUS, in *Botany*, the ſame as *ſtrychnus*, the name of nightſhade.

TRYGUM, in *Ichthyology*, the Greek name given by Ælian, Athenæus, and Appian, to the fiſh which we call the PASTINACA *marina*, or fire-flaire. Ariſtotle and ſome others write it *tragum*.

TRYING, in *Pharmacy*, the purifying of fat ſubſtances by means of melting, and ſeparating them from their membranes, &c.

In the college diſpenſatory, the method laid down for the purifying of lard, ſuet, &c. is this: melt them at a gentle fire, with the addition of a little water intermixed, and, when melted, ſtrain them from the membranes. The addition of water in this keeps the fat from burning and becoming black, which it would otherwiſe do; for the water not being capable of receiving any greater degree of heat than that of boiling, will keep the bottom of the veſſel from growing too hot, much better than the niceſt management of the fire could do.

Trying, in *Sea Language*, denotes the ſituation in which a ſhip lies nearly in the TROUGH, or hollow of the ſea, in a tempeſt, particularly when it blows contrary to her courſe. In *trying*, as well as in SCUDDING, the ſails are always reduced in proportion to the increaſe of the ſtorm. Thus, in the former ſtate, the ſhip may lie by the wind under a whole main-ſail, a whole fore-ſail, or a whole mizen; or under any of thoſe ſails when diminiſhed by the reef or balance. As the leaſt poſſible quantity of ſail uſed in ſcudding is the gooſe-wings of the fore-ſail, ſo, in *trying*, the ſmalleſt portion is generally the mizen-ſtay-ſail, or main-ſtay-ſail; and in either ſtate, if the ſtorm is exceſſive, ſhe may lie with all the ſails furled, or, according to the ſea-phraſe, under bare poles.

The intent of ſpreading a ſail at this time is to keep the ſhip more ſteady, and, by preſſing her ſide down in the water, to prevent her from rolling violently; and alſo to turn her bow towards the direction of the wind, ſo that the ſhock of the waves may fall more obliquely on her flank than when ſhe lies along the trough of the ſea. While ſhe remains in this ſituation, the helm is faſtened cloſe to the lee-ſide, or, in the ſea language, hard-a-lee, to prevent her as much as poſſible, from falling off. But as the ſhip is not then kept in equilibrio by the effort of her ſails, which at other times counterbalance each other at the head and ſtern, ſhe is moved by a ſlow, but continual vibration, which turns her head alternately to windward and leeward, forming an angle of three or four points in the interval. That part where ſhe ſtops, in approaching the direction of the wind, is called her coming-to, and the contrary exceſs of the angle to leeward is termed her falling-off. Thus, ſuppoſe the wind northerly, and a ſhip *trying* with her ſtarboard ſide to windward: if, in turning her head towards the ſource of the wind, ſhe arrives at N. W. $\frac{1}{2}$ N. or N. 39° W. and then declines to the leeward as far as W. $\frac{1}{2}$ S. or S. 84° W. the former will be called her coming-to, and the latter her falling-off. In this poſition ſhe advances very little, according to the line of her length, but is driven conſiderably to leeward. Falconer.

TRYPHERA, τρυφερα, in *Pharmacy*, a denomination given to divers medicines, eſpecially of the opiate kind. The great *tryphera* is compoſed of opium, cinnamon, cloves, and ſeveral other ingredients: it is uſed to fortify the ſtomach, to ſtop fluxes, and is good for ſome diſeaſes of the womb.

The word is formed from the Greek τρυφερος, *delicate*, on account of their gentle and pleaſant operation, or, according to others, becauſe they make thoſe who uſe them reſt. The Saracenic *tryphera*, and Perſian *tryphera*, thus called, becauſe firſt introduced, the one by the Saracens, and the other by the Perſians, were both of them gentle purgatives.

TSAPHARI, in the *Materia Medica* of the ancients, a name given by ſome to the cadmia, called by Dioſcorides, *placitis*, and by others of the Greek writers, *zonitis* and *onychitis*. It was a flat kind, forming a ſort of coat or cruſt on the walls or ſides of the furnace; hence it had the name *placitis*, or *cruſtaceous*; and it was called *onychitis* and *zonitis*, becauſe, when broken tranſverſely, it appeared made up of ſeveral ſucceſſive plates, which had the appearance of ſo many belts or zones. Serapio tells us, that this and the bortryoide cadmia were dug out of the mines; that is, that they were natural productions; but this is erroneous, and contrary to all the accounts of the ancients.

TSCHIRNHAUSIANA *quadratrix*. See QUADRATRIX *Tſchirnhauſiana*.

TSHINKA, in the *Materia Medica*, a name by which ſome authors have called the clove-tree, the tree which produces the ſpice of that name.

TSIA, in *Botany*, a name taken from the Japoneſe, and uſed by ſome authors for the tea-tree.

TSJAKELA, H. M. *Ficus Malabarica, ſemel in anno fructifera, fructa minima*, a ſpecies of fig-tree growing in Malabar. Of the bark of this tree they make ſtrings for their bows, and prepare a red colour for dying the Cambayan cloths.

TSIAM *pangam*, in *Botany*, a name uſed by ſome authors for the tree whoſe wood is the log-wood, uſed in dying and in medicine.

TSIANA *eua*, in the *Materia Medica*, a name given by ſome authors to the coſtus root.

TSI-CHU, in *Botany*, the name of a Chineſe tree, which furniſhes the liquor of which they make their celebrated varniſh.

TSIN, in *Natural Hiſtory*, the name given by the Chineſe to a ſtone which they make great uſe of in their manufacture of porcelain ware. It is of a deep blue colour, much reſembling Roman vitriol in appearance, and is found in lead-mines, and ſuppoſed to contain ſome particles of lead; its effects being the ſame in the porcelain manufacture as thoſe of ceruſs or white lead, in making the other colours penetrate into the ſubſtance of the veſſels. The deep violet colour that we ſee ſo beautiful on the China ware, is uſually made with this ſtone. They find it about Canton and Pekin; but the latter place affords the beſt, and it ſells at greatly the beſt price.

The painters in enamel melt this ſtone in their way, and uſe it very much; they form many beautiful works, by laying it upon ſilver; but it is apt to come off in time. When the *tſin* is uſed in the porcelain manufacture, it is only uſed to the vaſes that paſs a ſecond baking, and are intended as the beſt kinds.

The *tſin* is prepared by only beating it to powder, not roaſting it in the common way. They mix the powder with large quantities of water, and ſtirring it together, they let it ſubſide a little to ſeparate any earthy or extraneous matter that might be among it. They then let the powder ſubſide. The water which is thrown away has no colour from this matter, and the powder itſelf is not of that fine blue it was in the lump, but of a pale aſh-colour; but this recovers all its beauty when it is laid on the China and baked. The ſettlement taken from the water is dried and preſerved in powder, and when it is to be uſed, they only mix it up with gum-water, or a ſolution of glue, and lay it on with a pencil. Obſerv. ſur les Coutumes de l'Aſie.

TUB, is uſed as a kind of meaſure to denote the quantity of divers things. A *tub* of tea is a quantity of about 60 pounds. A *tub* of camphor is a quantity from 56 to 80 pounds.

TUB-*fiſh*, in *Ichthyology*, an Engliſh name given to a ſpecies of *trigla*, ſometimes called the *flying-fiſh*. See *Sapphirine* GURNARD.

TUB-*man*, in the *Court of Exchequer*. See PRECEDENCE.

TUBA, in *Antiquity*. See TRUMPET.

TUBA, in *Natural Hiſtory*, a name by which many old authors call the buccinum.

TUBBER, in *Mining*, a name given in Cornwall to that mining inſtrument, which is in other parts of England called a BEELE.

TUBBER-*men*, in *Cornwall*, the people who work with this tool, and who are, from its other name of *beele*, called in other places *beel-men*.

TUBE, TUBUS, pipe, conduit, or canal; a cylinder, hollow withinſide, either of lead, iron, wood, glaſs, or other matter, for the air, or ſome other fluid, to have a free paſſage or conveyance through.

The term is chiefly applied to thoſe uſed in phyſics, aſtronomy, anatomy, &c. On other ordinary occaſions, we more uſually ſay *pipe*.

In the Memoirs of the French Academy of Sciences, M. Varignon gives a treatiſe on the proportions neceſſary for the diameters of *tubes*, to give preciſely any determinate quantities of water. The reſult of his piece turns upon theſe two analogies; that the diminutions of the velocity of water, occaſioned by its friction againſt the ſides of *tubes*, are as the diameters; the *tubes* being ſuppoſed equally long: and the quantities of water iſſuing out at the *tubes*, are as the ſquare roots of their diameters, deducting out of them the quantity each is diminiſhed.

For the *tubes* of barometers and thermometers, ſee BAROMETER and THERMOMETER. For the aſcent of liquors in capillary *tubes*, ſee ASCENT and CAPILLARY.

TUBE, *alimentary*. See DUCT.

TUBE, *glaſs*. See GLASS *Tube*.

TUBE, *Fallopian*, *Stentorophonic*, and *Torricellian*, ſee the adjectives.

TUBE *of a flower*. See PETAL.

TUBES, in *Artillery*, are inſtruments uſed in quick firing, made with us of tin; their diameter is $\frac{2}{10}$ of an inch, ſo as juſt to enter into the vent of the piece; their length is about five or ſix inches, with a cap above, and cut ſlanting below in the form of a pen, and the point is ſtrengthened with ſome ſolder, that it may pierce the cartridge.

Through each tube is drawn a QUICK-*match*, and the cap is furniſhed with mealed powder, moiſtened with ſpirits of wine. To prevent the mealed powder from falling out by carriage, a cap of paper is tied over it, which is taken off when uſed; but of late this cap is made of flannel, ſteeped in ſpirits of wine, and with ſaltpetre diſſolved in it; and there is no occaſion to take it off, becauſe it takes fire as quick as looſe powder.

The French uſe a ſmall reed, to which is fixed a wooden cap, and they are about two inches long, filled with mealed powder, moiſtened with ſpirits of wine; and a ſmall hole is made through them of the ſize of a needle, through which the fire darts with great violence, and gives fire to the cartridge, which muſt be pierced beforehand with the priming iron.

Theſe *tubes* may be kept a great while without being ſpoiled; but piercing of the cartridge retards the quickneſs of firing. Muller's Art. p. 293.

TUBE, in *Aſtronomy*, is ſometimes uſed for TELESCOPE; but more properly for that part thereof into which the lenſes are fitted, and by which they are directed and uſed.

The goodneſs of the tube being of great importance to that of the teleſcope, we ſhall here add its ſtructure.

*The conſtruction of a draw-*TUBE *for a teleſcope.* The chief points to be regarded here are, that the *tube* be not troubleſome by its weight, nor liable to warp and diſturb the poſition of the glaſſes: ſo that any kind of *tube* will not ſerve in every caſe: but

1. If the *tube* be ſmall, it is beſt made of thin braſs plates covered with tin, and formed into pipes or draws, to ſlide within one another.

2. For long *tubes*, braſs or iron would be too heavy; for which reaſon ſome chuſe to make them of paper, thus: a wooden cylinder is turned, of the length of the paper to be uſed; and of a diameter equal to that of the ſmalleſt draw. About this cylinder is rolled and paſted paper, till it be of a ſufficient thickneſs: when one *tube* is dry, provide others after the ſame manner; ſtill making the laſt ſerve for a mould for the next, till you have enough for the length of the *tube* deſired. Laſtly, to the extremes of the draws are to be glued wooden ferrils that they may be drawn forth the better.

3. Since paper draws are apt to ſwell with moiſt weather, ſo as to ſpoil their ſliding; and in dry weather to ſhrink, which renders them looſe and tottering; in both which caſes, the ſituation of the lenſes is eaſily diſturbed; the beſt method of making *tubes* is as follows: glue parchment round a wooden cylinder, and let the parchment be coloured black, to prevent the reflected rays making any confuſion. Provide very thin ſlits of beech, and bending them into a cylinder, glue them carefully to the parchment; cover this wooden caſe with white parchment, and about its outer extreme make a little ring or ferril: after the ſame manner make another draw over the former; and then another, till you have enough for the length of the *tube*.

To the inner extremes of each draw, fit a wooden ferril, that the ſpurious rays, ſtriking againſt the ſides, may be intercepted and loſt. In thoſe places where the lenſes are to be put, it will be proper to furniſh the ferrils with female ſcrews. Provide a wooden cover to defend the object-glaſs from the duſt, and putting the eye-glaſs in its wooden ferril, faſten it by the ſcrew to the *tube*. Laſtly, provide a little wooden *tube* of a length equal to the diſtance the eye-glaſs is to be from the eye, and fit it to the other extreme of the *tube*.

TUBEL, a word uſed by ſome chemical writers to expreſs ſcales of copper or braſs.

TUBER, or TUBERCLE, in *Botany*, a kind of round turgid root, in form of a knob or turnep.

The plants which produce ſuch roots are hence denominated *tuberoſe*, or *tuberous plants*.

TUBER, or TUBEROSITY, in *Surgery*, is uſed for a knob or tumor growing naturally on any part; in oppoſition to tumors which riſe accidentally, or from a diſeaſe.

The ſame term is alſo uſed for a knot in a tree.

TUBERA *terræ*. See TRUFFLES.

TUBERCULES, TUBERCLES, little tumors, which ſuppurate and diſcharge pus, often found in the lungs. See PHTHISIS.

TUBEROSE, in *Botany*. See POLIANTHES.

TUBEROUS, or TUBEROSE, an epithet given to ſuch roots as are round and conſiſt of an uniform fleſhy ſubſtance, having neither ſkins nor ſhells, as bulbous roots have.

Such are the roots of the iris, piony, and the like. See ROOT.

TUBILUSTRIUM, compounded of *tubus*, *trumpet*, and *luſtro*, *I purify*, in *Antiquity*, a feaſt or ceremony in uſe among the Romans. This denomination was given to the day whereon they purified their ſacred trumpets, as alſo to the ceremony of purifying them. It was held on the fifth and laſt day of the feaſt of Minerva, called *quinquatrus*, or *quinquatria*, which was performed twice a year

TUBIPORA, *red tubular coral*, in *Natural Hiſtory*, a name given by Linnæus to a genus of *lithophyta*, in the claſs of worms: the characters of which are, that its animal is a NEREIS, and that it is a CORAL, conſiſting of cylindric, hollow, erect, and parallel tubes. He enumerates four ſpecies.

TUBOR *terræ*, a name uſed by ſome botanical authors for the cyclamen or ſow-bread.

TUBULARIA, in *Natural Hiſtory*, the name of a genus of *zoophytes*, in the claſs of worms, according to the Linnæan diſtinction; the characters of which are theſe: that it has the flowers of the HYDRA, placed ſingly at the extremities, and that the ſtem is radiated, filiform, and tubulous. Linnæus enumerates five ſpecies, ſome of which belong to the *tubular* CORALLINES of Ellis.

TUBULARIA *foſſilis*, in *Natural Hiſtory*, the name of a ſpecies of coral found very often foſſil in Germany and Italy, and compoſed of a great number of tubes, or longitudinal pipes, often reſembling ſo many worms ranged perpendicularly in the maſs. See *Tab.* II. *of Foſſils*, *Claſs* 7.

They are uſually found either in maſſes of a lax ſtone, or in ſingle tubules in thoſe of the harder and firmer texture. In theſe two ſtates this foſſil makes two very different appearances; and, according to the different directions in the maſs, or the different views of them that the ſections of it place them in, they make a number of very elegant figures. Hill's Hiſt. of Foſſ. p. 641.

TUBULATED *flower*, *tubulatus floſculus*, in *Botany*, a term uſed by authors to expreſs thoſe ſmaller flowers, a great number of which go to compoſe one large compound flower. Theſe are called *tubulated* by way of diſtinction from another kind of them, which are, from their ſhape, called ligulated. The *tubulated* floſcules generally compoſe the diſk, and the ligulated ones the radius of the compound flowers. The *tubulated* ones are formed into a hollow cylinder, which expands into a mouth at the top, and is divided into five equal ſegments, which ſtand expanded, and in ſome meaſure bent backward.

TUBULI *concamerati*, in *Natural Hiſtory*, the name of a genus of the TUBULUS *marinus*, diſtinguiſhed abundantly from all the others by its figure and inner ſtructure.

They are long ſhelly bodies, uſually either of a conic or cylindric form, or elſe reſembling the dentales in ſhape; and ſometimes, but that very rarely, they have their ſmaller end bent and twiſted round. They are compoſed within a number of hollow compartments, each of which communicates with the next by means of a ſiphunculus, which runs through the whole length in the manner of the thick nautilus, or the cornu ammonis. We know not theſe in their recent ſtate at this time, but frequently meet with them foſſil in the ſtones brought from Sweden for pavements, and in ſome others.

Some authors have called theſe by the name *alveoli*, confounding them with the conic body found in the belemnitæ. See ALVEOLUS.

Others have called them *pyramidal entrochi*, others *obeliſci marmorei alveolares*; and they are the bodies deſcribed by Geſner and Aldrovand, under the names of *lapides caudæ cancri*, or *cancrites*. Some late authors have called them alſo *polythalamii*, and other *cone-ſtones*. Klein. de Tubul. p. 7.

TUBULI *foſſiles*, in *Natural Hiſtory*, the name given by authors to the caſes or *tubules* of ſea-worms, found buried in the earth.

They are in their native ſtate of very various kinds, but by different accidents attending them in their accidental one, they are ſubject to a multitude of other appearances. They are found of very various ſizes, ſometimes complete, and buried in the ſtrata of earth or ſtone; ſometimes they are more or leſs perfect, and are immerſed in maſſes of the *ludus Helmontii*, or *ſeptariæ*, and in this ſtate they make one kind of *lapis ſyringoides*, or pipe-ſtone; but the moſt beautiful *ſyringoides*, or pipe-ſtones, are the parts of the bottoms of ſhips, or poſts fixed in the ſea which have been pierced, in their original ſtate of wood, by theſe ſea-worms, and afterwards petrified with the caſes or *tubuli* of the worms remaining in them.

Of theſe there are many beautiful ſpecimens on the ſhore of the iſland of Sheppey, and in our clay-pits about London and Richmond.

Thoſe *tubuli*, called *dentalia & entalia*, are not leſs frequent, and found of various kinds in the clay-pits about London and the hills of Yorkſhire; but they are more frequent in ſimilar places in France and Italy.

TUBULI *lactiferi*, in *Anatomy*, is a name uſed by ſome writers for thoſe ſmall tubes through which the milk flows to the nipples of the mammæ or breaſts.

TUBULI *ſeminiferi*. See TESTICLE.

TUBULI *vermiculares*, a name ſometimes uſed by naturaliſts for certain ſmall oblong and hollow ſea-ſhells reſembling worms.

TUBULUS *marinus*, or *canalis*, in *Natural Hiſtory*, the name of a genus of univalve ſhell-fiſh; the characters of which are theſe: it is of an oblong figure, terminating in a point, and hollow within, ſo that it reſembles a tube or horn. Theſe are alſo called by the old writers *dentalia*, from their reſembling the tooth of a dog. See DENTALIUM and SHELLS.

It has been a common error of authors to confound under the general name of *tubulus marinus*, theſe ſhells, and thoſe very different ones of the *vermiculi marini*, which make a number of pipes or tubes joined together; theſe, by their number and joinings, have induced a late French author to place them among the multivalve ſhells, while the *canales* are uſually ſingle and ſeparate, and can have no title to any claſs but the tubular univalve one. Aldrovand obſerves, that the *tubuli* called *dentalia*, and thoſe called *antalia*, differ only in ſize; and he thinks they have no title to the name *conchæ*, ſince they are neither of the nature of the common bivalve, nor univalve ſhells, ſuch as the patella and *auris marina*; but this is very idle, ſince by this rule the ſnails, and many other families, might be excluded as well as theſe. This author ſays, in another place, that the *antale* is formed of many circumvolutions; whence he ſeems to have taken in the *buccina* under this name; but later writers have more nicely diſtinguiſhed in theſe caſes. The ſea-pencil is evidently of this genus, though extremely different from all the other ſpecies of it, in having its head pierced with a multitude of holes, in the manner of the head of a watering-pot. Some authors, from the figure of the ſhell, call this *phallus marinus*, and the French call it *le priape*. Aldrovand. de Teſtac. lib. lii. p. 382.

Of this general claſs of the *tubuli* or *canales*, there are four ſubordinate diſtinctions, including ſeveral ſpecies. Hiſt. Nat. Eclairc. part ii. p. 245. See PENICILLI *marini*, DENTALIS, BELEMNITES, and TUBULI *concamerati*. See *Tab.* III. *Shells*, N° 25, and *Tab.* III. *Foſſils*, *Claſs* 9.

TUBULOSE *leaf*, among *Botaniſts*. See LEAF.

TUCANA, in *Ornithology*, a name given by ſome to the TOUCAN.

TUCK *of a ſhip*, a name given to that part of the ſhip where the ends of the bottom planks are collected together, immediately under the ſtern or counter. When this part, inſtead of being incurvated, and forming a convex ſurface, aſſumes the ſhape of a vertical or oblique plane, it is ſaid to be ſquare; and a ſquare *tuck* is accordingly terminated above by the wing-tranſom, and below, and on each ſide, by the faſhion-pieces. Falconer.

TUE-*iron*, in *Smithery*, the iron through which a ſmith's bellows blow.

TUEL, among *Sportſmen*, denotes the fundament of a horſe, or wild beaſt.

TUESDAY. See HOKE *day*, TUISCO, TYR, and WEEK.

TUFA, in *Natural Hiſtory*, a name given to a ſtone, formed of volcanic aſhes, concreted with various other ſpecies of ſtone, in which argil predominates. It is harder than TERRAS, but ſtill porous and ſpungy.

TUFECSI, a body of the ſpahis, or horſe, in the ſervice of the grand ſignor.

TUFFO, in *Botany*, a name given by the people of Guinea to a plant common in that country, and uſed in decoction to waſh ſore eyes with. It is of the ſun-flower kind, and is called by Petiver, *flos ſolis Guineenſis folio ſcabro flore minore*. It much reſembles ſome of the American ſun-flowers. Phil. Tranſ. N° 232.

TUFT, a term uſed by ſome authors for the buſhy part of trees; or that part ſet with branches, leaves, &c.

TUFTS *of trees, paralleliſm of the*. All trees are obſerved naturally to affect to have their *tufts* parallel to the ſpot of ground they ſhadow; for an account of which phenomenon ſee PARALLELISM.

TUFTED *duck*, in *Ornithology*, the Engliſh name for the CAPO *negro*. See *Tufted* DUCK.

TUGPINS, in *Artillery*, are the iron pins which paſs through the fore-ends of the ſhafts of the army carts, to faſten the draught chains for the fore-horſes.

TUGUS, in *Botany*, the name of a ſweet aromatic plant, growing up ſometimes to eight or nine cubits, much eſteemed in the eaſtern parts of the world, and ſuppoſed by father Camelli, who very ſtrictly compared it with the accounts given by Dioſcorides and the ancients of their amomum, to be that very plant. The cluſtered manner of growing of the fruit, together with its oblong ſhape, and the aromatic taſte of the ſeeds, ſeem greatly to countenance this opinion.

Each fruit of the *tugus* contains five or ſeven ſeeds; theſe of an oblong figure, of a reddiſh colour, and of an agreeable aromatic taſte, but not too acrid. They are much ſought after by birds, inſects, and field-mice.

The natives ſeem as fond of theſe as the ancients were of the amomum; and the young women ſtring them on threads, and wear them as bracelets; ſometimes they make the bracelets of the ſeeds alone; but more uſually they ſtring them alternately with pearls, and pieces of red coral: theſe bracelets they call *caropi*, as well as the fruit itſelf.

They are ſuppoſed, when worn by way of a necklace, to keep off the effects of a bad air, and to preſerve them from the bites of ſerpents or the centipes. If not a preſervative, they are, however, found, upon experience, to be a very good remedy in the laſt caſe, the common application for the bite of this animal being ſome of the ſeeds of the *tugus* chewed in the mouth to a ſort of paſte.

The cluſter of fruit of the *tugus*, or true amomum, when newly formed and unripe, ſomewhat reſembles the pſeudo-amomum of Garcias; but this likeneſs wears off as they ripen. For Camelli's accurate deſcription of this plant, illuſtrated by a figure, ſee Phil. Tranſ. N° 248, p. 2.

TUI, in *Ornithology*, a name by which ſome call the *paroquette*.

The word is originally Braſilian; and the names of ſeveral of the Braſilian ſpecies of this bird, deſcribed by Marcgrave, have the word *tui* as a part of them; as the *tuiete*. the *tuipara*, the *tuitirica*, and the *tuiaputejuba*. See TUIETE, &c.

TUIAPUTEJUBA, in *Ornithology*, the name of a Braſilian ſpecies of paroquette, all over of a green colour, but in different ſhades, very deep on the wings, very pale, and ſomewhat yellowiſh on the belly, and of a faint colour all over the reſt of the body; its tail is very long; it is about the ſize of a ſwallow; its eyes are large and black, and have a circle of yellowiſh green feathers round them, and over the beak, which is black and crooked; and on his head he has one ſpot of gold-yellow feathers.

TUIETE, in *Ornithology*, the name of a Braſilian ſpecies of paroquette, of the ſize of a lark, and all over of a pale green colour, variegated with blue; the origin of its wings is blue, as are alſo the ends of the wing-feathers, ſo that when the bird ſits ſtill, there is, as it were, a blue line ſeen running down each ſide; on its rump there is alſo a blue ſpot; its tail is but ſhort; its beak is ſmall, crooked, and of a pale red; and its legs and feet grey.

TUILERIE, or TYLERY, French; formed from *tuile*, *tile*, a *tile-work*. a large building with a drying-place, covered atop, but furniſhed with apertures on all ſides, through which the wind having admittance, dries the tiles, bricks, &c. in the ſhade, which the ſun would crack, before they be put in the kiln.

The garden of the Louvre is called the *Tuileries*, as being a place where tiles were anciently made, &c. But the term *Tuileries* does not only include the garden, but alſo a magnificent palace, whoſe front takes up the whole length of the garden.

The palace of the *Tuileries* is joined to the Louvre by a large gallery, which runs along the banks of the river Seine, and has its proſpects thereon.

The *Tuileries* was begun in 1564, by Catharine de Medicis, wife of Henry II. in the time of her regency; it was finiſhed by Henry IV. and magnificently adorned by Louis XIV. The garden of the *Tuileries* was much improved by Louis XIII.

TUISCO, or TUISTO, in *Mythology*, a name given by the ancient Germans to a celebrated perſon, whom they regarded as the founder of their nation, and whom they repreſented to be the ſon of the earth, becauſe they were ignorant of his origin. He gave them laws, poliſhed them, eſtabliſhed religious ceremonies among them, and obtained ſuch a high degree of reputation, that after his death they ranked him among the gods. One of the principal ceremonies of his worſhip conſiſted in ſinging ſongs in praiſe of him. Cæſar thought that Pluto was honoured under this appellation. Encycl.

Some have aſcribed the origin of the name of Tueſday to this deity. See WEEK.

TUITIRICA, in *Ornithology*, the name of a Braſilian paroquette, which is a little larger than the common kind; all over of a fine beautiful green, but deeper on the back and wings than elſewhere; its beak is very hooked, and of a pale red; its eyes black, and its feet blue; its tail is but a little longer than the wings when cloſed. This is a ſpecies much eſteemed in the Braſils, as it eaſily learns to talk, and becomes ſo tame as to eat out of any one's mouth.

TULACUM, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a ſpecies of the yellow orpiment, of the coarſer kind, variegated with red. They prepare this by ſeveral calcinations, and then give it internally in fevers, and many other diſorders, eſteeming it a ſort of panacea. They ſay that gold may be extracted from it, which is not improbable; for it is well known, that ſome of the Roman emperors did actually procure gold from one of the other kinds of orpiment, which is now found at Goſſelaer in Saxony.

TULIP, *tulipa*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the flower has no empalement; it is of the bell ſhape, compoſed of ſix oblong, oval, concave, erect petals; it has ſix awl-ſhaped ſtamina, which are ſhorter than the petals, terminated by oblong, four-cornered ſummits, and a large, oblong, taper, three-cornered germen, having no ſtyle, crowned by a triangular, three-lobed, permanent ſtigma; the germen afterward turns to a three-cornered capſule, having three cells, which are filled with compreſſed ſeeds, lying over each other in a double order. Miller reckons two, and Linnæus three ſpecies.

The characters of a good *tulip* are theſe: 1. It muſt have a tall and ſtrong ſtem. 2. The flower ſhould conſiſt of ſix leaves, three within, and three without; and the former ſhould be larger than the latter. 3. The bottom of the flower ſhould be proportioned to the top, and the ends of the leaves ſhould be rounded, not pointed. 4. The leaves, when opened, ſhould neither turn inward, nor bend outward, but ſtand erect; and the whole flower ſhould be of a middling ſize, neither too large nor too ſmall. 5 The ſtripes muſt be ſmall and regular, and ſhould ariſe from the bottom of the flower: the chives alſo ſhould not be yellow, but of a brown colour.

Tulips are generally divided into three claſſes, according to their times of flowering; the early, the middling, and the late.

The early ones are not near ſo fair nor ſo high as the late, but they are valued for their earlineſs, as they flower in February. The roots of theſe are to be planted in the beginning of September, in a warm border, near a wall, pale, or hedge. The proper ſoil for them is paſture-land, with the turf rotted among it, and a mixture of one fourth part of ſea-ſand; this ſhould be laid about ten inches deep, and ſhould be renewed every year. The roots need not be planted more than four or five inches deep. If the weather is very ſevere when they firſt appear, they ſhould be covered with mats; as alſo at nights, when they are in flower, if it be very froſty, and likewiſe in the heat of the day. When their flowering is over, they ſhould not be permitted to ſeed; and when their leaves decay, the roots ſhould be taken up and laid in a dry place, and afterwards cleaned and laid up in a ſafe place from vermin, till the September following.

The late blowers are propagated from what they call breeders, or flowers produced from ſeeds, which are brought over principally from Flanders, which is the great mart for flower-roots; and theſe, by culture, are changed into ſtriped and variegated ones. They are alſo propagated by ſowing the ſeeds; but this requires great care, as in the raiſing of all the other fine flowers from ſeeds.

The ſeeds muſt be ſaved from the choiceſt flowers, and ſowed in ſhallow pans or boxes of earth, with holes at the bottom for draining off the moiſture, in September. The ſpring following they appear like the leaves of graſs, or young onions, and after ſtanding two or three months theſe decay. The boxes are to be kept clear of weeds, and removed to different ſituations, where they may enjoy the morning ſun, and be defended from ſharp winds and froſts; at the Michaelmas of the following year they are to be removed out of the boxes into beds of freſh ſandy earth, with tiles under them, to prevent the roots from ſhooting downward, where they ſhould be planted two inches deep, and at two inches diſtance from one another. In October, an inch depth of new earth ſhould be ſifted on them, and they are to remain two years in theſe beds; after which the bulbs muſt be taken up, and planted in freſh beds, four inches aſunder, and as many deep, and have the ſame culture for two years more; at the end of this time they will flower, and the beſt of them muſt be marked with ſticks, that their roots may be diſtinguiſhed when the leaves are decayed.

But there is no judgment to be paſſed either on *tulips*, or any other flowers, on their firſt flowering; becauſe the next year the good ones are often found to have degenerated, and the bad to have improved; after this, however, they may be concluded good or bad.

The breeders, as they are called, being thus raiſed, are to be ſhifted every year into freſh earth, and they will in time break out into very fine ſtripes. The earth they are planted in ſhould be every year of a different kind, and the beſt general ſoil is made of a third part of paſture-land, with the graſs rotted in it, a third part fine ſea-ſand, and a third part lime-rubbiſh; theſe ſhould be mixed half a year before they are uſed, and often turned. The beds muſt be laid eighteen inches deep with this earth; and on this the roots ſhould be placed in regular order, and at even diſtances, of ſix inches; and then ſix or eight inches of earth ſhould be laid over theſe, the top of the bed being a little rounded to throw off the wet. Thus they are to remain till the buds appear, and then if the nights are very ſevere they are to be ſheltered by covering them with mats. The flowers which break out into fine ſtripes here ſhould be ſeparated afterwards from the reſt, and if they hold on their beauty to the laſt, which the floriſts call dying well, they will never return to plain flowers again; and the off-ſets from the roots of theſe will always produce ſuch flowers, and often more beautiful than thoſe of the parent root.

When the *tulips* have flowered, their heads ſhould be broken off to prevent their ſeeding, which would make them flower much the worſe the next year. Miller's Gardener's Dict.

The Dutch have always been admirers of flowers, and before the preſent faſhion of cultivating the auriculas and carnations came up among them to the height it now is at, they took the ſame care of *tulips*. The prices they ſold theſe at among one another, are amazing. Munting tells us, that in the year 1634, and the four or five following, they not only purchaſed them at extravagant rates beyond credibility, but many of the burghers, ſhopkeepers, and tradeſmen, quitted their ſhops and trades, and addicted themſelves ſolely to the culture and care of their *tulips*. The fineſt of them were then valued above gold or gems; and there is an account of one bargain for the purchaſe of that *tulip* which they call the viceroy, preſerved: the perſon who purchaſed this, not having money, paid for it the following things: two laſts of wheat, four laſts of rye, four fat oxen, twelve fat ſheep, eight fat hogs, two hogſheads of wine, four tons of beer, two ton weight of butter, a thouſand pound weight of cheeſe, a bed, a ſuit of cloaths, and a large ſilver beaker; the whole valued at two thouſand five hundred gilders. We have another account about the ſame time, of twelve acres of good land offered for one *tulip* root; and at a public ſale of a private perſon's collection there were produced ninety thouſand gilders. This madneſs would have run yet higher among them; but the States at length took it into conſideration, and finding it very detrimental to ſubſtantial and neceſſary trade, put a ſtop to it, and reduced the price. Munting. de Plant.

TULIP, *chequered*. See **FRITILLARY**.

TULIP-*flower*. See **TRUMPET**-*flower*.

TULIP, *African*. See **BLOOD**-*flower*.

TULIP-*tree*, *tulipifera*, or *liriodendron*, in *Botany*, a genus of the *polyandria polygynia* claſs. Its characters are theſe: the proper involucrum of the flower is compoſed of two angular leaves, which fall off; the empalement is compoſed of three oblong plain leaves, like petals, which fall away; the flower is nearly of the bell-ſhape, and has nine petals, which are obtuſe, and channelled at their baſe; the three outer fall off; it has a great number of narrow ſtamina, which are inſerted into the receptacle of the flower, having long narrow ſummits faſtened to their ſide, and many germina diſpoſed in a cone, having no ſtyle, crowned by a ſingle globular ſtigma; the germina afterward become ſcaly ſeeds, lying over each other like the ſcales of fiſh, and form the reſemblance of a cone. Linnæus mentions two ſpecies, and Miller one, which is a tree commonly found wild in all the northern parts of America, where its timber is of very great uſe. The flowers are not in reality much like thoſe of the *tulip*, though vulgarly ſaid to be ſo. The flowers are ſucceeded by canes, which are often ſent over from America; and the trees are frequently raiſed with us from the ſeeds contained in them. The ſeeds muſt be taken out of the canes in ſpring, and ſown in pots of light earth, which muſt be placed in a gentle hot-bed, and covered with mats, and frequently refreſhed with a little water. When the young plants appear, they ſhould be placed, during ſummer, in a ſhady ſituation; and in winter they ſhould be put into a frame, where they may have the benefit of the open air in mild weather, and be ſheltered from ſeverity of froſts. In the ſpring following, the plants ſhould be tranſplanted into nurſery beds, and taken the ſame care of for two or three years, as while they were in the ſeed-pots; after this they will be ſtrong enough to tranſplant finally into the places where they are to remain: they ſhould be planted on a light loamy ſoil, not too dry, nor indeed too moiſt, leſt their roots ſhould be rotted. Some raiſe them from layers, but they are two or three years before they take good root, and then never make ſuch ſtraight and regular trees. Miller.

TULIP-*tree*, *laurel-leaved*, *magnolia*, in *Botany*, a genus of the *polyandria polygynia* claſs. Its characters are theſe: the empalement is compoſed of three oval, concave leaves, which ſoon fall away; the flower is compoſed of nine oblong, concave, blunt petals; it hath a great number of ſhort ſtamina, which are inſerted into the germina, terminated by linear ſummits, and many oblong, oval germina, faſtened to the receptacle, ſupporting recurved, contorted, ſhort ſtyles, with hairy ſtigmas; the germina afterward become oval cones, with imbricated capſules, having one cell opening with two valves, encloſing one kidney-ſhaped ſeed, hanging by a ſlender thread from the ſcale of the cone. There are four ſpecies.

The firſt ſort, or ſmall *magnolia* tree, grows pretty common in Virginia and Carolina, and other parts of North America. In moſt places it grows to about fifteen or ſixteen feet high, with a ſlender ſtem. The wood is white and ſpungy, the bark is ſmooth and white, the branches are garniſhed with thick ſmooth leaves, reſembling thoſe of the bay, but are of an oval ſhape, ſmooth on their edges, and white underneath; the flowers are produced in May, and riſe in ſucceſſion for two months, at the extremity of the branches, which are white, and compoſed of ſix concave petals, and have an agreeable ſweet ſcent. After theſe are paſt, the fruit increaſes in ſize to be as large as a walnut with its cover, but of a conical ſhape, having many cells round the outſide; in each of which is lodged a flat ſeed, about the ſize of a ſmall kidney-bean; the fruit is at firſt green, afterwards red, and when ripe of a brown colour: the ſeeds when ripe are diſcharged from their cells, and hang by a ſlender thread.

When theſe trees are tranſplanted from the places of their growth into dry ground, they make handſomer trees, and produce a great number of flowers. This is to be underſtood of America; for in Europe they do not thrive ſo well in a dry ſoil as in moiſt loamy land.

The greater *magnolia* grows in Florida and Carolina to the height of eighty feet or more, with a ſtraight trunk two feet in diameter, and a regular head; the leaves reſemble thoſe of common laurel, but are larger, and continue all the year, ſo that this is one of the moſt beautiful evergreen trees yet known. The leaves of the third ſort, or umbrella tree, which riſes in Carolina to ſixteen or twenty feet, are large, and produced in horizontal circles, whence its name.

All theſe ſorts are beſt propagated by ſeeds, produced from the places of their natural growth, and brought over in ſand. Miller.

TULOS, a word uſed by ſome medical writers to expreſs a callus.

TUMBABA, a word uſed by chemiſts, to expreſs *ſulphur vivum*, or crude ſulphur.

TUMBALA, a word uſed by ſome authors, to expreſs the *ſquamæ*, or ſcales of any metal.

TUMBLER, a name given to a particular ſpecies of pigeon, called by Moore the *columba revolvens*.

It has its name from its peculiar property of *tumbling*, when it is in the air, which they are very fond of doing; and effect exactly in the ſame manner as our poſture-maſters do it; by throwing themſelves over backward. It is a very ſmall pigeon, and is always ſhort-bodied, full-breaſted, thin-necked, narrow-beaked, and has a ſmall ſhort head; the iris of the eye in this ſpecies is uſually of a bright pearl-colour.

The Engliſh *tumbler* is uſually of one plain colour; black, blue, or white: the Dutch is much of the ſame make, but has different colours, and is feathered on the legs ſometimes; it has alſo a larger head, and thin ſkin round the eye. Some of the fineſt pigeons of this ſort are bred from a mixture of the Dutch and Engliſh kinds.

Theſe pigeons are remarkable for the height they fly to; they never ramble far from home, but will riſe almoſt perpendicularly, till they appear no larger than a ſparrow, or become quite out of ſight; they will often keep at this height five or ſix hours, and then come gradually down again: they never tumble when they are at any great height, but only as they aſcend or come down again. There are particular times alſo, at which theſe birds will take much higher flights than at others; but they ought to be kept by themſelves, and practiſed to it by the company of one of their own ſpecies; for if they mix while young with other pigeons, they will learn to fly as they do: a flight of a dozen of theſe birds ſent out together, will keep ſo cloſe, as to be all in a compaſs that might be covered with a handkerchief; but they ſhould never be turned out in foggy weather, or in high-winds; in the firſt caſe, they loſe ſight of their home, and perhaps never find it again; and in the others, they are blown away; and if they return it is not till another day; in the mean time lying out, they are in danger of cats, and other accidents.

Laſtly, the hen ſhould never be turned out with egg, for ſhe is then ſick, and not fit for flying; and beſide often drops her egg, and the breed is loſt by it. Moor's Columbarium, p. 39.

Tumbler is alſo a ſort of dog, called in Latin *vertagus*, from his quality of tumbling and winding his body about, before he attacks and faſtens on the prey.

This ſpecies took its prey by mere ſubtlety, depending neither on the ſagacity of its noſe, nor its ſwiftneſs; if it came into a warren, it neither backed nor ran on the rabbits; but by a ſeeming neglect of them, or attention to ſomething elſe, deceived the object till it got within reach, ſo as to take it by a ſudden ſpring.

Theſe dogs are often leſs than hounds; being lanker, leaner, and ſomewhat pricked-eared; and by the form of their bodies, they might be called mungrel greyhounds, if they were a little bigger. They ſeem to anſwer to our modern lurchers.

TUMBLING-*home*, with reſpect to a *Ship*, denotes that part of her ſide which falls inward above the extreme breadth, ſo as to make the ſhip gradually narrower from the lower deck upwards. In all our old ſea-books, this narrowing of a ſhip from the extreme breadth upwards, is called houſing-in. Falconer

TUMBREL, *tumbrellum*, a ducking or cucking-*ſtool*, an engine of puniſhment, which ought to be in every liberty, that has a view of frank-pledge, for the correction and cooling of scolds, and unquiet women.

Tumbrel, in *Artillery*, is a kind of carriage with two wheels, uſed to carry the tools of the pioneers and miners, and ſometimes likewiſe the money of the army.

Tumbler is alſo a common name for a dung-cart.

TUMEFACTION, the act of ſwelling, or riſing into a tumor.

Inflammations and *tumefactions* of the teſtes frequently happen in the gonorrhoea; either from the weakneſs of the veſſels, violent motion, unſeaſonable uſe of aſtringents, a neglect of purging, or the like.

TUMEX, in the *Materia Medica of the Ancients*, a name given by authors to a ſort of tutty, the ſame with the cadmia *placitis* of Dioſcorides and the Greeks. This was a worſe kind than the botrytis. See Tsaphari.

TUMOR, or Tumour, in *Medicine*, &c. a preternatural riſing or eminence on any part of the body.

Tumor is defined by the phyſicians, a ſolution of continuity, ariſing from ſome humour collected in a certain part of the body, which disjoins the continuous parts, inſinuates itſelf between them, and deſtroys their proper form.

This has given occaſion to the Arabs to define a *tumor* to be an indiſpoſition compoſed of three kinds of diſeaſes; viz an intemperature, an ill conformation, and a ſolution of continuity; all which they compriſe under the name *apoſtem*, from the Greek αποϛημα.

Tumors may proceed from various cauſes. The maſs of blood throwing off or diſcharging itſelf of any particular humour, as ſometimes happens in the criſis of a fever, pleuriſy, empyema, bubo, &c will give riſe to it. And according to the nature of the humour ſo diſcharged, whether ſanguineous, watery, bilious, &c. the *tumor* is different.

Other *tumors* there are, occaſioned by flatulency, as the tympany, after the ſame manner as hydropical *tumors* are occaſioned by a collection of the lympha, or ſerum, in a particular part. Ruptures of the inteſtines, or their ſtarting from their places, will likewiſe cauſe a *tumor*.

External injuries are another general cauſe of *tumors*.—Thus a contuſion, or a violent ſtricture of any part, a wound, fracture, diſlocation, &c. will make it ſwell or riſe above its natural level. And the ſame thing may likewiſe happen from the bites of venomous creatures, &c.

Tumors, properly ſo called, i. e. *humoral tumors*, or thoſe which contain a fluid matter, ariſe either from a ſtagnation, i. e. an obſtruction of the paſſage of ſome fluid, occaſioning a ſlow congeſtion, or from the tranſlation or fluxion of an humour from ſome other parts; or from the generation of ſome new humour.

Tumors of the *firſt* kind are very numerous, and are uſually divided, with regard to the particular humours they are filled with, into phlegmons, which come from the blood; eryſipelaſes, which come from the bile; œdemas, filled with pituita; and ſcirrhuſes. To which may be added, flatulencies, filled with wind. See Flatulency, &c.

Of the *ſecond* kind are *critical tumors*.

And of the *third* kind are cancers, ganglions, and all *tumors* contained in a cyſtis or bag.

Tumors alſo frequently acquire peculiar denominations from the part affected; as, ophthalmia, if in the eye; parotis, about the ears; paronychia, in the fingers, &c.

With reſpect to the cure, all *tumors* are diviſible into *ſimple* and *compound*, i. e. into ſuch as are of a kindly nature, and go off, or are cured, in a reaſonable time, by the uſe of common means, without the appearance of any violent or dangerous ſymptoms; and ſuch as are more malignant, or prove difficult of cure, and are attended with bad ſymptoms, and affect the adjacent parts, or the whole body. When a *tumor* is formed by fluxion, a ſudden pain, heat, tenſion, and pulſation, are felt in the part, and manifeſt ſigns of a fever appear.

In thoſe formed by congeſtion, the ſwelling riſes ſlowly, and the pain and other ſymptoms come on gradually, and prove leſs violent; unleſs it happen in the joints, and other of the more ſenſible parts.

All *tumors*, except thoſe from ruptures, terminate, or are removed, either by diſcuſſion, ſuppuration, putrefaction, induration, or tranſlation.

When a *tumor* is diſcuſſed the part that was affected appears relaxed, or reduced to its natural ſize and figure, and is free from pain and hardneſs.

When a *tumor* haſtens to ſuppuration, a conſiderable degree of heat, pain, and pulſation, is felt in the part; and if the *tumor* be large, or lie deep, a fever generally comes on: when the matter is formed, theſe ſymptoms commonly decreaſe, and ſometimes totally vaniſh. And now, if the ſituation of the parts permit it, the *tumor* appears drawn to a point, or becomes conical in the middle, or moſt depending part, where the matter collected commonly proves white. At this time likewiſe the *tumor* appears to be more contracted, and the ſkin of the part more ſhrivelled or flaccid, than before; and now, upon preſſure, if the *tumor* be ſuperficial, or by vibrating it between the fingers, the matter may be felt to quaſh from ſide to ſide.

Tumors in the fleſhy parts of the body tend to their ſtate, or ſuppurate, faſter than *tumors* in the joints, glands, &c.

When a *tumor* is reſolved by induration, the ſwelling of the part, and the pain, decreaſe as the hardneſs comes on. When it terminates in putrefaction or mortification, the part grows ſenſeleſs, and turns black and fetid. See Mortification.

But when a *tumor* goes off by repulſion, or a return of the matter into the blood, it diſappears at once; upon which a fever, or ſome other acute diſeaſe, uſually enſues. See Inflammation. See alſo the following articles.

Tumors *of the bones*. See Spina *ventoſa*.

Tumors *of the breaſts*, *mammarum* Tumores. *Tumors* and inflammations of the breaſts are a diſorder that very frequently afflicts child-bearing women, and almoſt conſtantly happens, in ſome degree, a few days after their delivery. See *Women's*-Milk.

If the milk be impelled into the breaſts ſo plentifully and forcibly, which frequently happens at that time, and the mother be at the ſame time ſeized with a violent cold, or indeed be but affected by any violent paſſions, the veſſels become obſtructed, and the breaſts tumefied, with great heat, redneſs, reſiſtance, and violent pain. The ſame thing happens alſo very frequently to women who give ſuck after their lying-in, and often to ſuch whoſe milk is very ſmall in quantity. Women at other times are alſo ſubject to them, and even men have been known to have the ſame diſorder, from no other cauſe than a great fright. One breaſt of a man, opened on ſuch an occaſion, has afforded above two pounds of matter. This ſort of abſceſs is uſually attended with a fever, thirſt, head-ach, and difficult reſpiration, and is often preceded by ſhiverings.

Tumors of this kind are generally prevented in thoſe who do not intend to ſuckle their children, by applying, ſoon after their delivery, plaſters of ſpermaceti warm, all over the breaſts, but perforated with a hole for the nipples. A moderate tight bandage ſerves alſo as a help to keep away milk; and cooling plaſters are of ſervice to the ſame purpoſe, applied between the ſhoulders. But if the lying-in woman intends to ſuckle the child, there is no better way to prevent theſe *tumors* than very carefully to avoid colds, and violent paſſions of the mind, and to let the child ſuck very frequently, to prevent the milk from ſtagnating. Plenty of ſmall broth, and thin fluids, muſt alſo be taken, which will prevent the milk, for the firſt two or three weeks, from being too abundant, or from ſtagnating in the breaſts; the diet being ſo ordered, that the diſcharge by urine may be increaſed, and the bowels kept lax. But when the milk has once ſtagnated, and a *tumor* is begun, all endeavours are to be uſed to diſcuſs what has ſtagnated in the ſmall veſſels, with all poſſible expedition, both by internal and external remedies, in order to prevent the *tumor* from running to a ſuppuration, or into a ſcirrhus.

The beſt external application, on theſe occaſions, is the ſpermaceti plaſter, covered with a warm bag, or cataplaſm of ſalt and bran, or of chamomile, elder, and melilot flowers. The carminative ſeeds of fennel, aniſe, &c. are alſo very good external applications over a plaſter, on theſe occaſions. A calf's bladder, filled with a warm decoction of elder and chamomile flowers in milk, applied to the breaſt, and renewed as often as neceſſary, is alſo found of excellent ſervice. Theſe not proving ſufficient, recourſe muſt be had to Venice treacle, rob of elder, litharge-vinegar, cummin-vinegar, and lime-water, which muſt be all applied hot to the breaſts by means of linen cloths dipped into them, and put to the breaſts as warm as can be conveniently borne.

If the breaſts are very full of milk, part of it muſt be diſcharged by ſucking, or by a glaſs-pipe; and this, with the other means, often repeated, till the pain and *tumor* diſappear.

When an inflammation has taken place, it may alſo be proper to bleed, to order a thin ſpare diet and laxatives, and to apply the following embrocation, by means of linen rags, moiſtened with it as often as they dry; viz. half an ounce of ſpirit of ſal ammoniacum vol. and an ounce and a half of camphorated wine, well mixed. If this is too irritating, half an ounce of olive oil may be added to it.

If the *tumor*, however, proves large, and will not be diſperſed in four or five days by theſe methods, or when, as it very frequently happens, the ſurgeon is called in too late to put this method in practice, the beſt method is to forward its maturation and ſuppuration as quick as poſſible, leſt it turn to a ſcirrhus or cancer by delay. The plaſter of diachylon, with the gums, or ſome other ſuch ripening plaſter, ſhould be applied forthwith; and with all convenient ſpeed the proper cataplaſms are to be uſed, to digeſt the matter; theſe are to be applied hot to the breaſts, and very frequently renewed, keeping them on with large compreſſes and bolſters, the better to retain the heat. The ſafeſt application is a poultice of bread and milk, ſoftened with oil or freſh butter, which may be renewed twice a day, till the *tumor* be either diſcuſſed (if that be practicable), or brought to ſuppuration. The uſe of repellents in this caſe is very dangerous, as they occaſion fevers, and ſometimes cancers; whereas a ſuppuration is ſeldom attended with any danger, and has often the moſt ſalutary effects. The *tumor*, when the matter is ripe, will by this means either break of itſelf, or elſe it muſt be opened by the ſcalpel, the inciſion being always made in the lower part of the breaſt; and after the matter is all diſcharged, the wound is to be cleanſed with the common digeſtives, incarned with the ſarcotic, and healed with the balſam of Peru, or ſome other ſuch vulnerary balſam. But where the ſuppuration has run very deep, the wound muſt be waſhed by means of a ſyringe, with vulnerary decoctions; and to prevent the opening from cloſing, before the bottom is healed, and filled up with new fleſh, a ſort of tent of ſcraped lint muſt be introduced, which may be ſhortened every dreſſing, as the wound fills up, and at length wholly laid aſide. Heiſter's Surgery, vol i. p. 206, &c. See INFLAMMATION.

TUMORS, *encyſted*, *tumors* ariſing in different parts of the body, but contained in certain membranous coats: theſe are ſometimes harder, ſometimes ſofter, of a paliſh colour, and uſually attended with little pain. Theſe *tumors* ariſe from obſtructions either in the glands, or in the adipoſe membrane, more eſpecially about the face and neck, where they occaſion great deformity.

The membranous coat, with which theſe *tumors* are inveſted, is often of a conſiderable thickneſs, and is uſually the coat of the diſordered gland, or ſome of the adipoſe cells. At their beginning they are uſually very ſmall and moveable; but increaſing by ſlow degrees, they grow ſometimes to an enormous bulk.

The conſiſtence of ſome of theſe *tumors* is ſoft and fluctuating, and of others more hard and firm. They are of all ſhapes and ſizes, and ſome of them become hard as a callus, and unmoveable, while others are, for the generality, ſoft and moveable.

They are diſtinguiſhed according to the conſiſtence of their contents; ſome are called *atheromata*, from their contents reſembling paſte; others, which have them of the conſiſtence of honey, are called *meliceres*; but if they are of a fatty ſubſtance, like ſuet or lard, they are called *ſteatomata*. M. Littre, in Mem. de l'Acad. des Scienc. adds a fourth kind, which he calls *lipoma*, becauſe it is formed of ſoft fat. If they happen in a gland which becomes indurated, they are called *ſcirrhous*; and laſtly, when they are of a fleſhy conſiſtence, they are called *ſarcomata*. Some of theſe *tumors* have been found alſo full of hair.

They are diſtinguiſhed by others according to the places where they are ſituated. Thoſe ſeated under the ſcalp are called *talpa*, *teſtudo*, or *lupia*. Thoſe in the neck, *ſtrumæ* or *ſcrophulæ*; and thoſe in the hands and feet, eſpecially if among the tendons, are called *ganglions*.

There is no general method for the cure of them; but the ſurgeon, according to their different circumſtances, attempts this by diſcuſſion, ſuppuration, or extirpation. Heiſter's Surgery, p. 345. See WEN.

TUMORS, *fungous*, in *Surgery*, are a ſort of ſwellings much approaching to the nature of the OEDEMA, and are often diſorders of very bad conſequence.

Theſe are *tumors* of a limb, taking their riſe at the joint; they look pale, are void of heat and pain, eaſily yield to the preſſure of the fingers, but riſe again inſtantly on removing the finger, leaving no pit or impreſſion behind. Though no joint of the upper or lower limbs can be ſaid to be ſecure from this diſorder, yet the knees are ever moſt ſubject to it, and that becauſe they abound in fat and glandular bodies, which are concealed among the ligaments and tendons. It is what we commonly know by the name of *white ſwellings* or ſcrophulous *tumors* in the joints, and is of ſeveral ſpecies; for ſome *tumors* of of this kind are larger, ſome ſmaller, ſome ſofter, ſome harder; and with regard to the ſtate of the inſpiſſated fluid, ſome are more, ſome leſs glutinous. The noxious humours are uſually ſituated without the joint, and are, in that caſe, properly what we are here treating of. But in ſome they are collected and retained in the joint itſelf, as the ſerum is contained in the teſticle in an hydrocele. This laſt diſorder is not improperly to be called a DROPSY *of the joint*; and this may be commonly diſtinguiſhed from the external fungous *tumors* of the joints, by the enlargement which appears all round the joint; whereas the fungous *tumor* is uſually ſituated more on one or the other ſide of it.

The proximate cauſe of theſe *tumors* is, doubtleſs, the viſcidity of the ſerum about the ligaments of the joints, which is apt to ſtagnate after the ligaments have received any conſiderable violence from a fall or a blow. The *tumor* ſometimes riſes in the external parts, ſometimes in the articulation itſelf, by which the ligaments being weakened, the part loſes its natural motion: and when the nerves or blood-veſſels are greatly preſſed upon by the *tumor*, the parts below are uſually deprived of nouriſhment; and while the joint, by degrees, becomes greatly enlarged, the parts below it diminiſh and waſte.

In order to render the cure of recent and milder *tumors*, of this kind, the more eaſy, by diſperſing remedies, it will be proper to rub the diſordered part with warm cloths every day, fomenting it afterwards with tartarized ſpirit of wine; and this method is carefully to be purſued, till the natural ſtrength and form of the limb are reſtored. Purmannus's fomentation is excellent for this purpoſe. It is made of ſix ounces of roch alum, an ounce and half of Roman vitriol, and two handfuls of ſage leaves, boiled in a quart of herring-pickle, mixed with a pint of the ſharpeſt vinegar; it is to boil together for about half an hour, and then to be uſed as the before mentioned.

When the *tumors* begin to diſperſe, and the parts to recover their ſtrength, it will be a great forwarding of the cure to foment the limb well ſeveral times every day with tartarized ſpirit of wine, or with the fetid oil of tartar, laying the bandages carefully on every time afterwards, to defend it from the injuries of the external air, of which it is very ſuſceptible; and laſtly, the following is an application by which many of theſe *tumors* have been perfectly and happily cured. Take litharge, half a pound; bole armenic, an ounce; maſtic and myrrh, of each half an ounce; white wine vinegar, a pint; mix theſe together, and let them boil for a quarter of an hour, and let coarſe linen rags be dipped in this liquor, or fine ones often doubled, and applied morning and night in bed to the part; and at the ſame time the patient is not to omit the proper internal remedies, which are the attenuants and ſudorifics.

But if the *tumor* be of long ſtanding, and will not give way to any of theſe remedies, all the hope left is to make an inciſion into the dependent part of it, taking great care to avoid wounding the ligaments or tendons of the joint; and by this means the ſtagnating ſerum, if contained in one cavity, is inſtantly evacuated, and if it be lodged in ſeveral different cells, it will yet make its eſcape through the ſame orifice in the ſpace of a few days. Before the inciſion is made in this caſe, the *tumor* ſhould be pulled down as low as may be with the fingers, and a tight bandage made above to retain it in that ſituation; by this means the moſt convenient part for the inciſion to be made in will lie fair, and when the opening is made, the ſerum will readily burſt forth like blood on the opening of a vein; or lymph in the tapping for the hydrocele or aſcites. When this is done, if any *tumor* ſtill remains, the part is to be dreſſed with diachylon or oxycroceum plaſters, and waſhed with lime-water or ſpirit of wine. By continuing the applications, what remains inſpiſſated in the *tumor* will entirely diſperſe. When the limb is reſtored to its natural ſhape, the wound is to be healed with vulnerary balſams, diligently avoiding the uſe of fatty or oily medicines, as they are hurtful to the tendons and ligaments, with which thoſe parts abound.

If the ſerum, contained in the *tumor*, is ſo glutinous that it cannot diſcharge itſelf for want of fluidity, throw up attenuating injections at every dreſſing. The beſt for this purpoſe are thoſe prepared from a decoction of agrimony, birthwort, or ladies mantle, mixed with honey, in which roſemary or celandine have been infuſed. Notwithſtanding that ſuch of theſe *tumors* as are opened by the knife are ſooneſt diſcharged and healed, yet ſome ſurgeons prefer the application of cauſtic medicines to the knife, diſcharging the ſerum upon the falling off of the eſchar. In either caſe it would be proper to warm and invigorate the ligaments and tendons, eſpecially when the diſorder falls upon the knee, by the uſe of ſome nervous ointment, or aromatic ſpirit.

It too frequently happens, however, that after the wound has been cauterized, the inſpiſſated ſerum having been firſt ever ſo carefully evacuated, that there will be a freſh collection of a vitiated fluid in the part. In order to prevent therefore an accident of this kind, let the patient be kept in a ſtrict courſe of purging, ſudorific, and attenuating medicines, and the wound be kept open with tents, cleanſing it thoroughly every day, by throwing up an injection, ſuch as has been before directed. It may be proper alſo ſometimes to inject lime-water, and afterward to cover up the part with a warm plaſter, or foment it with ſome liquor of the ſame intention. It is, however, finally to be obſerved, that it is not every fungous *tumor* of the joints that can be opened with ſafety; for if the *tumor* is of a very long ſtanding, hard, or of a very large ſize, or the patient is of an infirm, weakly habit of body, the knife muſt not be thought of, as it would occaſion diſorders worſe than the firſt; to wit, caries, fiſtulas, and gangrene. Heiſter's Surgery, p. 257.

We have an acount of a very extraordinary *tumor* in the knee of a perſon, whoſe leg was taken off by Mr. Pierce at Bath. The leg and foot weighed ſixty-nine pounds. Phil. Tranſ. N° 452. ſect. 4.

See Remarks on the White Swelling of the Knee by Mr. Monro, and alſo by Dr. Simpſon, in Med. Ed. Ed. vol. iv. p. 242. 246; by Dr. Reimarus, in his Theſis; or Diſſ. Inaug. De *Tumore* Ligamentorum circa Articulos, &c. Leidæ, 1757; and Mr. Cheſton, in his Philoſophical Inquiries and Obſervations in Surgery, &c. 4to.

Dr. Falconer obſerves, that white ſwellings, when beginning, and before the formation and collection of matter, are often diſcuſſed by pumping upon them the Bath waters, without coming to that criſis which is almoſt always productive of the loſs of the motion of the joint, and often of the loſs of the limb itſelf, where it is formed. Eſſ. on Bath Waters, vol. ii. p. 301. See SPINA *ventoſa*.

TUMORS, *œdematous.* See OEDEMATOUS.

TUMORS *of the parotids.* See PAROTIDES.

TUMORS, *peſtilential.* See BUBO and CARBUNCLE.

TUMORS *of the teſticles.* See TESTICLES.

TUMORS, *windy.* Theſe *tumors* are formed by the air encloſed under ſome membrane, which is dilated more or leſs by that air, according to its quantity, and from within which it cannot eſcape, at leaſt not for a certain time. Theſe *tumors* are uſually round, circumſcribed, or determinate, and if they are ſtruck with a finger, they give a ſound like that of a blown bladder. They have no particular ſeat in any part of the body, but almoſt every part is more or leſs liable to them.

The great difficulty in accounting for theſe *tumors*, is to ſay how the air comes to be collected there; but the moſt probable cauſes ſeem to be the collecting together of a quantity of a fluid in ſome adjoining part where there is ſome obſtruction. The air, which is naturally mixed with all the fluids in the human body, always remains in them while they continue in their fluidity, and in their natural motions; but when they are amaſſed together in any particular part, and their fluidity and motion become impaired, the air that was in them becomes immediately in a ſtate of diſengaging itſelf from them; and it uſually does ſo diſengage itſelf. The membranes of the part where this collection of the fluids is made, are relaxed by it, and their pores conſequently enlarged, and the air which has diſengaged itſelf, eſcapes eaſily by theſe pores, while the fluids are much too thick to be able to follow it, ſo that it eſcapes alone.

The air, thus ſeparated, runs under ſome other adjoining membrane, which it immediately elevates and diſtends. As the liquors amaſſed in the other place are not yet ſo far altered, but that part of them are continually received again into the road of circulation, and conſequently more freſh fluids left in their place; theſe freſh fluids contain more air, which is, by degrees, ſeparated from them, as from the others, and finds its way, in the ſame manner, to the place where the reſt of the air is; and hence is the continual increaſe of the *tumors*; and it is very evident, that when a *tumor* is once formed in this manner, it cannot go down, even though the firſt extravaſation, which occaſioned it, ſhould wholly diſappear, and all the fluids be again received into their veſſels; but, in fine, the air included in the *tumor* may dilate the membrane which encloſes it, ſo far, that its pores may be ſufficiently opened to let it eſcape; this, however, wholly depends on its quantity, and on the cloſer or laxer texture of the membrane.

Thoſe acute pains which we call ſtitches in the ſide, and which are principally felt on the ſides, and about the region of the breaſt, may poſſibly be ſometimes occaſioned by acrid humours, which prick the nervous fibres; and the pain, in this caſe, is ſometimes very acute, and even attended with a ſharp fever; but very often this pain is occaſioned only by air included between the fibres, where it occaſions a violent tenſion and pain; but often the relief from this is ſudden, the natural elaſticity of the parts reſtoring all to their priſtine ſtate, and the air being condenſed again almoſt as ſoon as dilated. Very often the natural ſpring of the parts either entirely ſends off the air, or elſe drives it to another place; and this is the reaſon why pains of this kind are often found to ſhift about and change place ſo ſuddenly.

But of all the effects of air in the body, none is ſo great as that found in the bodies of thoſe who have died by loſs of blood, whether that has been occaſioned by wounds or natural hæmorrhage. There may, in this caſe, often be perceived, through the coats of ſome of the veins, little bubbles of air floating on the ſurface of the blood contained in them; and this is no way to be wondered at, ſince as a great part of the blood has been loſt out of the body by the hæmorrhage, the remainder has been by this much injured in its power of motion, as well by loſs of quantity to impel it, as of animal ſpirits to enliven it; and by want of ſtrength in the arteries to perform their pulſations, in order to the keeping it in motion; the conſequences of theſe joint-cauſes, according to the principles before laid down, muſt be, that the air muſt eſcape out of the blood, and appear freed as we ſee it.

If we perceive this only in the veins, the reaſon is plain, ſince there is no blood any where but in the veins of perſons who have died in this manner, the arteries having been already drained; whereas in other bodies there always remains ſome blood, though but little, in the arteries. Another conſequence of dying by a hæmorrhage is, that the ventricles of the heart are always found empty of blood; which is not the caſe in thoſe who have died by other means. The cauſe of this is, that the force with which the veins drive up the blood from their extremities toward their larger trunks, and thence to the heart, is much weaker than that by which the arteries throw the blood they contain toward the extremities. This being allowed, a great loſs of blood cannot but diminiſh the force of the arteries and veins both; but its effect will certainly be greater on the veins; ſo that they may wholly loſe their force before the arteries have loſt theirs; and theſe laſt making at length one general contraction, may throw off all their contents into the veins; while they, having already loſt all their power, can no longer move it forwards; ſo that, in this caſe, it all remains there, and conſequently what blood remains in the body, muſt, on opening it, be found lodged in the veins.

It is ſometimes obſerved in bodies which have died of hæmorrhages, that the ſmaller veſſels, at conſiderable diſtances from the heart, have been all full and diſtended with wind; in this ſtate it is not impoſſible that they may have been ſometimes miſtaken for lymphatic veſſels; but in tracing them up to their trunks, they ſoon diſcover what they really are. After a large quantity of blood has been loſt, it is plain that there can be but little in the lungs, while the quantity of air is always equal there; and as the air always eaſily diſengages itſelf from the blood, when it is leſs fluid, and in ſmaller quantity than before, the air may, in this caſe, paſs from the lungs to the heart with the blood, without being ſo intimately mixed with it as at other times; when the arteries have, after this, not power enough to impel the blood into the veins, their power may yet be ſufficient to drive this wind into them, it being much lighter, and more ſuſceptible of motion; and this alone ſeems a very natural and eaſy ſolution of this phenomenon. This ſuppoſes, indeed, that the motion of the blood being ſtopped, death comes on, as well by this means, as by the ſtoppage of reſpiration. Mem. Acad. Par. 1714.

TUMPING, the making of a kind of fence in the fields, by ſetting trees almoſt on the ſurface of the ground, and covering their roots with mould.

TUN, or TON, originally ſignifies a large veſſel or caſk, of an oblong form, biggeſt in the middle, and diminiſhing towards its two ends, girt about with hoops, and uſed to put up ſeveral kinds of merchandizes in, for their better carriage; as brandy, oil, ſugar, ſkins, hats, &c.

Some derive the word from *autumnus*, in regard it is then *tuns* are moſt needed. Du-Cange deduces it from *tunna* or *tonna*, words uſed in the baſe Latin for the ſame thing; whence alſo *tunnare, to tun*.

The term is alſo uſed for certain veſſels of extraordinary bigneſs, ſerving to keep wine in for ſeveral years. In Germany there are many which are ſcarce ever emptied: the Heidelberg *tun* is famous.

The *tun* we frequently, though improperly, call a *hogſhead*.

TUN, or TON, is alſo a certain MEASURE for liquids; as wine, oil, &c.

The Engliſh *tun* contains two pipes, or four hogſheads, or two hundred and fifty-two gallons.

The *tun* of Amſterdam contains ſix æms or awms; and the æm four ankers, the anker two ſtekans, the ſtekan ſixteen mingles: twelve ſtekans are equal to an Engliſh barrel, or thirty-ſix gallons.

The *tun* of Bourdeaux and Bayonne contains four barrels, equal to three Paris muids. At Orleans and Berry it is about two Paris muids.

The *tun* of Malaga, Alicant, Seville, &c. is two bottas, equal to about thirty-ſix or thirty-ſeven ſtekans. The *tun* of Liſbon is two Portugueſe bottas, and is equal to twenty-five ſtekans.

The great *tun* or Rheniſh wine-veſſel of Heidelberg, made in 1343, contained ſix hundred and ſeventy-two urnæ, of 4½ Engliſh gallons each; being in all 2690 Engliſh gallons, or about forty-two hogſheads, or twenty-one pipes of wine.

TUN is alſo a certain weight, whereby the burden of ſhips, &c. is eſtimated.

The *ſea tun* is computed to weigh two thouſand pounds, or twenty quintals or hundred weight (amounting to 2440 pounds avoirdupois); ſo that when we ſay a veſſel carries two hundred *tuns*, we mean it is able to carry two hundred times the weight of two thouſand pounds, i. e. four hundred thouſand pounds: it being found by a curious obſervation, that the ſea-water, whoſe room the veſſel fills when full loaden, weighs ſo much.

To find the burden and capacity of a ſhip, they meaſure the hold or place where ſhe is loaden; allowing forty-two cubic feet to the *ſea tun*. See BURDEN.

The price of freight, or carriage of merchandizes, is ordinarily ſettled on the foot of the *ſea tun*: and yet, though the *tun* is regularly twenty hundred weight, there is ſome difference made therein either on account of the cumberſomeneſs, or bulk of the commodities, the ſpace they take up, or the like. See FREIGHT.

Accordingly, at Bourdeaux four barrels of wine are held a *tun*, five barrels of brandy are eſtimated two *tuns*, three of ſyrup are one *tun*, four barrels of prunes one *tun*, two dozen of walnut-tree tables one *tun*, a dozen of planks one *tun*; twenty buſhels of cheſnuts are accounted one *tun*; and the like of wheat, or other grain; and ten bales of cork, five bales of feathers, and eight of paper, make each one *tun*.

A *tun* or load of TIMBER is forty ſolid feet, if the timber be round: if it be hewed or ſquare, fifty-four.

TUNS, in *Natural Hiſtory*, a family of univalves. See SHELLS.

TUN, TON, in the ends of words or names of places, ſignifies a town, village, or dwelling-place:—from the Saxon, *tun*, *ſepes*, *vallum*, *villa*, *vicus*, *oppidum*; and this form *don*, or *dun*, *a hill*, where they formerly built towns.

TUNBRIDGE-*water*. See *Tunbridge*-WATER.

TUN-GREVE, a name anciently uſed for a reeve or bailiff, *qui in villis, & quæ dicimus maneriis, domini perſonam ſuſtinet, ejuſque vice omnia diſponit & moderatur*.—Spelman.

TUN-HOOF, in *Botany*, ſee GROUND-*ivy*.

TUNA, in *Botany*, the name by which ſome authors have called the *opuntia*, the Indian fig, or *ficus indicus*, as it is uſually called.

TUNALLUS, in *Ichthyology*, a name given by Albertus, and ſome others, to the GRAYLING, or *umber*.

TUNE, or TONE, in *Muſic*, is that property of SOUNDS, whereby they come under the relation of *acute* and *grave* to one another. See GRAVITY, &c. See alſo TONE.

Though gravity and acuteneſs be mere terms of relation, yet the ground of the relation, the *tune* of the ſound, is ſomething abſolute; every ſound having its own proper *tune*, which muſt be under ſome determinate meaſure in the nature of the thing.

The only difference then between one *tune* and another is in degrees, which are naturally infinite; i. e. we conceive there is ſomething poſitive in the cauſe of ſound, which is capable of leſs and more, and contains in it the meaſure of the degrees of *tune*; and becauſe we do not ſuppoſe a leaſt or greateſt quantity of this, we conceive the degrees depending on thoſe meaſures to be infinite.

If two or more ſounds be compared together in this relation, they are either equal or unequal in the degree of *tune*. Such as are equal are called UNISONS.

The unequal conſtitute what we call INTERVALS, which are the difference of *tune* between ſounds.

Cauſe and meaſure of TUNE, *or that whereon the* tune *of a ſound depends.* Sonorous bodies, we find, differ in *tune*: 1. According to the different kinds of matter; thus the ſound of a piece of gold is much graver, than that of a piece of ſilver of the ſame ſhape and dimenſions; in which caſe, the *tones* are proportional to the ſpecific gravities.

2. According to the different quantities of the ſame matter in bodies of the ſame figure; as a ſolid ſphere of braſs, one foot in diameter, ſounds acuter than a ſphere of braſs, two feet in diameter; in which caſe the *tones* are proportional to the quantities of matter. See GRAVITY.

Here then are different *tunes* connected with different ſpecific gravities, and different quantities of matter: yet cannot the different degrees of *tune* be referred to thoſe quantities, &c. as the immediate cauſe. In effect, the meaſures of *tune* are only to be ſought in the relations of the motions that are the cauſe of ſound, which are no where ſo diſcernible as in the vibration of chords.

Sounds, we know, are produced in chords by their vibratory motions; not, indeed, by thoſe ſenſible vibrations of the whole chord, but by the inſenſible ones, which are influenced by the ſenſible, and, in all probability, are proportional to them. So that ſounds may be as juſtly meaſured in the latter, as they could be in the former, did they fall under our ſenſes: but even the ſenſible vibrations are too ſmall and quick to be immediately meaſured. The only reſource we have, is to find what proportion they have with ſome other thing: which is effected by the different tenſions, or thickneſs, or lengths of chords, which, in all other reſpects, excepting ſome one of thoſe mentioned, are the ſame.

Now, in the general, we find that in two chords, all things being equal, excepting the tenſion, or the thickneſs, or the length, the *tones* are different; there muſt therefore be a difference in the vibrations owing to thoſe different tenſions, &c. which difference can only be in the velocity of the courſes and recourſes of the chords, through the ſpaces wherein they move to and again. Now, upon examining the proportion between that velocity, and the things juſt mentioned, whereon it depends, it is found to a demonſtration, that all the vibrations of the ſame chords are performed in equal times.

Hence, as the *tone* of a ſound depends on the nature of thoſe vibrations, whoſe differences we can conceive no otherwiſe than as having different velocities; and as the ſmall vibrations of the ſame chord are all performed in equal time; and as it is found true in fact, that the ſound of any body ariſing from one individual ſtroke, though it grows gradually weaker, yet continues in the ſame *tone* from firſt to laſt; it follows, that the *tone* is neceſſarily connected with a certain quantity of time in making every ſingle vibration; or that a certain number of vibrations, accompliſhed in a given time, conſtitutes a certain and determinate *tone*: for the frequenter thoſe vibrations are, the more acute is the *tone*; and the ſlower and fewer they are in the ſame ſpace of time, by ſo much the more grave is the *tone*; ſo that any given note of a *tune* is made by one certain meaſure of velocity of vibration; i. e. ſuch a certain number of courſes and recourſes of a chord or ſtring, in ſuch a certain ſpace of time, conſtitutes a determinate *tone*. See Sound.

This theory is ſtrongly ſupported by our beſt and lateſt writers on muſic, Dr. Holder, Mr. Malcolm, &c. both from reaſon and experience. Dr. Wallis, who owns it very reaſonable, adds, that it is evident the degrees of acuteneſs are reciprocally as the lengths of the chords; though, he ſays, he will not poſitively affirm, that the degrees of acuteneſs anſwer the number of vibrations, as their only true cauſe: but his diffidence ariſes hence, that he doubts whether the thing has been ſufficiently confirmed by experiment. Indeed, whether the different number of vibrations in a given time be the true cauſe, on the part of the object, of our perceiving a difference of *tone*, is a thing which we conceive does not come within the reach of experiment; it is ſufficient the hypotheſis is reaſonable.

TUNG, in *Natural Hiſtory*, the name given by the Indians to a little inſect, called by the Spaniards *pique*, which is very common, and very troubleſome, in ſome parts of the Eaſt and Weſt Indies.

It is of the ſize of a ſmall flea; its place of laying its eggs is within the ſkin of the human body, and it diligently ſearches opportunities of doing this, and often ſucceeds in the attempt, to the great pain and trouble of the perſon who ſuffers it.

The creature, knowing that it ſhall be ſoon cruſhed to death under the ſkin, generally makes its way either under the nails, or where there is ſome callus on the ſurface; there it eats its way along, and, in fine, lays its eggs, which hatch into ſo many young ones, and ſpread themſelves between the fleſh and ſkin all over the finger and hand, if not prevented by taking out the old one in time.

The perſon often does not perceive the creature's getting in, it enters ſo gradually and eaſily; but he is ſoon advertiſed of the place where it is by a violent gnawing pain, the creature really eating its way as it goes along. The only remedy in this caſe is, to enlarge the orifice at which it entered, and take it out whole; the wound ſoon heals up, and there is an end of the matter. This may often be done with the point of a needle; but if not, it is much better to ſubmit to the opening it with a lancet than to the ill conſequences which otherwiſe will attend it. Obſerv. ſur les Coutumes de l' Aſie, p. 184.

TUNGSTEN, *lopis ponderoſus*, in *Natural Hiſtory*, a calcareous ſtone combined with the *tungſten* acid. When pure it is of a grey colour and lamellar texture, gives fire with ſteel, and is very heavy; its ſpecific gravity being from 4,99 to 5,8. It is inſoluble in acids, except by peculiar management; when powdered and digeſted with the nitrous or marine, it aſſumes a yellow colour, as Mr. Woulfe firſt obſerved: (Phil. Tranſ. vol. lxix. pt. i. for 1779, p. 26.) when heated, it burſts, becomes reddiſh, melts very difficultly per ſe; and according to Mr. Bergman, it is unfuſible with the blow-pipe, and not totally fuſible even with the aſſiſtance of fixed alkali, but eaſily by borax and without efferveſcence. It alſo eaſily melts with its own weight of fluor. Its conſtituent parts were diſcovered by Mr. Bergman and Mr. Scheele, nearly at the ſame time, but firſt publiſhed by the latter in the Swediſh Memoirs for 1781. It appears to contain about half its weight of calcareous earth, and the remainder a peculiar acid of an earthy appearance, and iron. This acid, which has hitherto been found only in this ſtone, is ſeparated from its earthy baſis, by digeſting the powdered ſtone in three times its weight of nitrous acid, and after pouring off this acid, and edulcorating the reſiduum, digeſting it again in cauſtic volatile alkali; after ſome time the alkali is poured off, and the reſiduum being edulcorated, is again digeſted in nitrous acid, and afterwards in volatile alkali; theſe ſucceſſive digeſtions are continued till the greater part of the ſtone diſappears, the nitrous acid conſtantly taking up the calcareous earth, and the volatile alkali uniting to the *tungſten* acid: at laſt this acid is precipitated from the volatile alkali in the form of a white powder, by ſaturating the alkali with any other acid. This powder is ſoluble in twenty times its weight of boiling water, and then reddens litmus, has an acid taſte, and with lime-water produces a regenerated *tungſten*: its ſpecific gravity is about 3,6.

TUNICA, a kind of waiſtcoat, or under garment, worn by the ancients, both at Rome, and in the Eaſt.

The common people ordinarily wore only a *tunica*; but thoſe of better faſhion wore a *toga* or gown over it. The philoſophers wore a gown without a *tunica*, as profeſſing to go half naked.

The *tunica* was peculiar to the men; the under-garment of the women not being called *tunica*, but *ſtola*.

The ſenators wore their *tunica* enriched with ſeveral little pieces of purple, cut in form of large nails; whence it was called LATICLAVIA: the knights had leſs nails on their *tunica*, which was hence called ANGUSTICLAVIA: the common people wore their *tunica* without any *clavi* at all. And it was by theſe three different ſorts of *tunicas*, that the three different orders of the Roman people were diſtinguiſhed in habit.

It has been a common opinion, that the *anguſticlavia* diſtinguiſhed the knights from the common people, in the ſame manner as the *laticlavia* did the ſenators from thoſe of the equeſtrian rank. But Rubenius avers, that there was no manner of difference between the *tunics* of the knights and thoſe of the commons. As to the perſons who had the honour of wearing the *laticlavia* it may be maintained, ſays Kennet (Ant. of Rome, p. 308.) that the ſons of thoſe ſenators who were patricians had the privilege of uſing this veſt in their childhood together with the prætexta. But the ſons of ſuch ſenators as were not patricians did not put on the *laticlavia*, till they applied themſelves to the ſervice of the common-wealth, and to bearing of offices. Yet Auguſtus changed this cuſtom and gave the ſons of any ſenators leave to aſſume the *laticlavia* preſently after the time of their putting on the toga virilis, though they were not yet capable of honours. And by the particular favour of the emperors, the ſame privilege was allowed to the more ſplendid families of the knights.

In the declenſion of the empire, the *tunics* did not only reach down to the ancles, whence they were called *talares*, but had ſleeves too coming down to the hands, whence they were called chirodotæ. And now it was counted as ſcandalous to appear without ſleeves, as it had been hitherto to be ſeen in them: and, therefore, in the writers of that age, we commonly find the accuſed perſons at a trial habited in the *tunic* without ſleeves, as a mark of diſgrace and infamy. Beſides the different ſorts of *tunica* above mentioned, there was alſo the *tunica palmata* worn by generals in a triumph, and perhaps always under the toga picta. It hath its name either from the great breadth of the clavi, equal to the palm of the hand, or elſe from the figures of palms, embroidered upon it.

Among religious, the woollen ſhirts, or under garments, are ſtyled *tunicas*, or *tuniques*.

Tunica, or Tunic, in *Anatomy*, is applied to the membranes which inveſt the veſſels, and divers others of the leſs ſolid parts of the body. See *Tab. Anat.* (*Angeiol.*) *fig.* 7. *a a*, *b b*, *c*, *d*.

The eye conſiſts principally of a number of humours contained in *tunics* ranged over one another: as the *tunica albuginea*, the *tunica cornea*, the *tunica retiformis*, &c. See Eye, Albuginea, &c.

Tunica *albuginea*, the name of the membrane that covers the body of the TESTICLES. See Albuginea.

The *tunica albuginea*, ſo named from its complexion, is a compact, firm, white, ſtrong, and ſmoothly poliſhed membrane, having a tendinous appearance. It very cloſely adheres to, embraces, and immediately contains the body of the teſtis and epididymis: it likewiſe looſely connects the middle part of the epididymis with the body of the teſticle, by means of a thin and fine membrane formed by a duplicature of the *tunica albuginea*, making a kind of ligament for this purpoſe. It ſerves alſo to confine the growth of the teſtis and epididymis within certain limits; and, by cloſely embracing theſe parts, it gives them a due degree of firmneſs, and enables them to perform their proper functions. Warner on the Teſticles, p. 8. See alſo on this article Phil. Tranſ. N° 53.

Tunica *vaginalis*. See Vaginalis.

TUNICATED *roots*, among *Bataniſts*, ſuch as are formed of a multitude of coats ſurrounding one another. See Root.

TUNNAGE, or Tonnage, a duty or cuſtom due for merchandize brought or carried in *tons*, and ſuch-like veſſels, from or to other nations; thus called, becauſe rated at ſo much *per tun*.

Tunnage is properly a duty impoſed on liquids according to their meaſures; as poundage is that impoſed on other commodities according to their weight. See Poundage and Customs.

This duty at firſt was 4*l.* 10*s.* ſterling *per tun*, for French wines brought into the port of London by the Engliſh, and only three for that brought into the other ports. For the ſame wine imported by ſtrangers to London, this duty was 6*l.* and that brought into the other ports 4*l.* 10*s.* ſterling.

Rheniſh wine, in virtue of the ſame act, paid 7*l.* 10*s.* ſterling; and Spaniſh, Portugueſe, Malmſey, and Greek wines, the ſame as French wines.

But there have been divers additional duties impoſed ſince.

As the *additional duty of the old ſubſidy, ſignorage, duty of ancient impoſt of* tunnage, *duty of additional impoſt, orphans money, new ſubſidy,* &c.

TUNNAGE is alſo uſed for a certain duty paid the mariners, by the merchants, for unloading their ſhips arrived in any haven, after the rate of ſo much *per tun.*

TUNNEL, or **FUNNEL**, an inſtrument through which any liquor is poured into a veſſel.

Part of a draught of a chimney, above the mantle piece, is alſo called by the ſame name.

TUNNEL-*Net* is a kind of net much uſed for the catching of partridges; thus called from its form, which is a cone fifteen or eghteen ſeet long.

This net muſt be made of three-twiſted thread, and muſt not be too thick: it ſhould be dyed green, that the colour may give no ſuſpicion to the birds, and the meſhes ſhould be about two inches and a half broad.

Into the hind meſhes, at the larger end, there muſt be put a ſmooth wooden rod, about the bigneſs of a gun-rammer; of this muſt be made a ſort of hoop, both ends being tied together; and at different diſtances from one another, there muſt be placed many more ſuch, which are to be rounded in the ſame manner, and are to ſupport the net its whole length in the *tunnel* form. Two ſtakes, or ſtrong pegs, muſt be faſtened at the ſides of the entrances into the net, and one at the farther end, or narrower part; the two firſt are to keep the mouth of the net ſufficiently extended, and the laſt is to keep it pulled out lengthwiſe to its full dimenſions, the hoop preventing its falling in.

There muſt be uſed with this net two others of that kind, which they call *halliers.* Theſe are long and ſtraight nets, and are to be faſtened down to the mouth of the *tunnel-net* on each ſide, extending ſeven or eight fathoms on each ſide from it, ſo as to take in fourteen or ſixteen fathoms in front, beſide the breadth of the mouth of the *tunnel-net,* and to direct all that ſhall move forward within that compaſs into the net.

In order to uſe this net, a covey of partridges is to be found, and then the net is to be placed at a conſiderable diſtance behind them: when this is fixed, the ſportſman is to take a compaſs, and get before the birds with a ſtalking horſe or ſtalking ox, and then to move forward, driving them towards the net. This is to be done gently and carefully; they are not to be driven at once ſtraight forwards, but the ſportſman is to wind and turn about, and at times to ſtand ſtill, as if the horſe was grazing. If the partridges, in the time of driving, make a ſtand, and look at the machine, it is a ſign they ſuſpect it, and are ready to take wing: in this caſe the ſportſman muſt ſtand ſtill, or even go back a little; and when they are become compoſed again, he is again to advance upon them. If any ſingle bird lies remote from the reſt, the ſportſman muſt take a compaſs round him, and fetch him in; for if he takes wing the reſt will all follow; in this manner, with patience and caution, the whole covey may be driven like a flock of ſheep up to the nets. A real horſe, trained to the purpoſe, is, however, much better than a ſtalking machine. The halliers, or wings of the *tunnel,* muſt not be pitched ſtraight, but in a ſort of ſemicircle; and the birds, when they ſtop their march, will run along them to the middle, where the mouth of the *tunnel* is open.

When they come to the mouth of the *tunnel,* the old ones will make a ſtand, as if to conſider what was before them; but on preſſing gently on them with the horſe, the young ones will run in, and then all the reſt will follow.

The ſportſman muſt then make all the haſte he can to the mouth of the net, to ſecure them from coming back again.

TUNNING, or **TONNING**, a part of the proceſs of brewing, or rather an operation which is the ſequel thereof.

The *tunning* of beer, &c. is performed various ways; ſome being of opinion it is beſt *tunned* as it cools, or begins to come; while others let it ſtand longer to become riper.

The moſt regular method is, to cleanſe and *tun* juſt as it comes to a due ferment, and gets a good head; for then it has the moſt ſtrength to clear itſelf. What works out of the caſk is to be ſupplied with freſh beer of the ſame brewing.

TUNNY, in *Ichthyology*, a name given by us to the Spaniſh mackrel, a larger fiſh of the ſcomber kind, called by authors *thynnus* and *arcynnus*, by Salvian *limoſa*, and *pelamis* by Ariſtotle, Ælian, and the other old writers.

It is properly a ſpecies of the SCOMBER, and the *ſcomber thunnus* of Linnæus, and is expreſſively named by Artedi, the ſcomber with eight or nine fins in the hinder part of the back, riſing out of a furrow; and a furrow at the place of the belly-fins. It is common in the Mediterranean, and other ſeas, and ſometimes, though not frequently, caught on the Engliſh coaſts.

The *tunny* was a fiſh well known to the ancients, and made a conſiderable branch of commerce: the time of its arrival in the Mediterranean from the ocean was obſerved, and ſtations for taking them eſtabliſhed in places that were moſt frequented by them. And at this time there are very conſiderable *tunny* fiſheries on the coaſt of Sicily, as well as ſeveral other parts of the Mediterranean, where they are cured, and ſupply a great article of proviſion in the adjacent kingdoms. They are caught in very large quantities along the ſhores in nets. In the lochs on the weſtern coaſts of Scotland they are alſo found in purſuit of herrings, and ſold to people, who either carry them freſh to the country markets, or ſalt and preſerve them in large caſks. The pieces, when freſh, look like raw beef, but when boiled turn pale, and have ſomewhat the flavour of ſalmon. One of them has been found to weigh four hundred and ſixty pounds. The *tunny* grows ſometimes to ſeven or eight feet in length; it has a rounded and thick body, growing gradually ſmaller towards the tail, till it is at length extremely ſlender; the irides are of a pale green, and the teeth very ſmall; the ſkin on the back is ſmooth, thick, and black, or if held in ſome lights, is of a ſhining blue or greeniſh hue; its belly and half its ſides are of a ſilvery whiteneſs, tinged with cœrulean and pale purple; near the tail marbled with grey; its ſcales are very ſmall; the tail in form of a creſcent. See *Tab.* V. *Fiſh*, N° 61. Ray and Pennant.

TUNUPOLON, in *Zoology*, the name of an Eaſt Indian ſpecies of viper, found principally in the iſland of Ceylon; it is of a ſmall ſize, and of a fine ſattin-like gloſs, beatifully variegated with ſhades of brown. Ray.

TUPELO *tree, nyſſa,* in *Botany*, a genus of the *polygamia diœcia* claſs. Its characters are theſe: it has hermaphrodite and male flowers on the ſame plant; the male flowers have an open, ſpreading empalement, cut into five parts; no petal, but ten awl-ſhaped ſtamina, with twin ſummits as long as the ſtamina; the hermaphrodite flowers have empalements like the male, which ſit upon the germen; they have no petals, but five awl-ſhaped ſtamina, terminated by ſingle ſummits; the oval germen ſituated under the flower ſupports an awl-ſhaped, incurved ſtyle, crowned by an acute ſtigma; the germen becomes an oval berry of one cell, encloſing an oval, acute-pointed nut, with rough, angular, irregular furrows. Linnæus mentions one, and Miller two ſpecies, natives of North America.

TURBAN, **TURBANT**, the head-dreſs of moſt of the eaſtern and Mahometan nations; conſiſting of two parts, viz. a cap, and a ſaſh of fine linen, or taffety, artfully wound in divers plaits about the cap.

The word is formed from the Arabic דאר *dur*, or דור *dur*, or דאל *dal*, or דול *dul*, which ſignifies *to encompaſs*, and בנר *band* or *bend*, which ſignifies *ſaſh*, or *ſcarf*, or *band*; ſo that *durbant*, or *turbant*, or *tulbant*, only ſignifies a *ſcarf*, or *ſaſh*, tied round; it being the ſaſh that gives the denomination to the whole *turban*.

The cap is red or green, without any brim, pretty flat, though roundiſh a-top, and quilted with cotton, but does not cover the ears. About this is wrapped a long piece of fine thin linen or cotton, in ſeveral wreaths variouſly diſpoſed.

There is a good deal of art in giving *turbans* the fine air; and the making of them up conſtitutes a particular trade, as the making of hats does among us.

The emirs, who pretend to be deſcended of the race of Mahomet, wear their *turbans* green: thoſe of the other Turks are ordinarily red, with a white ſaſh. The genteel people have frequent changes of *turbans*. M. de Tournefort obſerves, that the *turban*, all things conſidered, is a very commodious dreſs; and that he even found it more eaſy to him than his French habit.

The grand ſignor's *turban* is as big as a buſhel, and is ſo exceedingly reſpected by the Turks that they dare ſcarce touch it. It is adorned with three plumes of feathers enriched with diamonds and precious ſtones: he has a miniſter on purpoſe to look to it, called *tulbentoglan*. See CROWN.

That of the grand vizir has two plumes; ſo have thoſe of divers other officers, only ſmaller one than another: others have only one, and others none at all. The *turban* of the officers of the divan is of a peculiar form, and called *mugenezek*.

The ſaſh of the Turks *turban*, we have obſerved, is white linen; that of the Perſians is red woollen. Theſe are the diſtinguiſhing marks of their different religions; Sophi, king of Perſia, who was of the ſect of Ali, being the firſt who aſſumed that colour, to diſtinguiſh himſelf from the Turks, who are of the ſect of Omar, and whom the Perſians eſteem heretics.

TURBAN, or *clavicle*, in *Conchology*, denotes the aggregate, or whole ſet of the whirls of a ſhell, and forms its lower part. The flat, or helix *turban*, is one ſo ſlightly prominent,

minent, as to be nearly on a level. There are alſo the ſhort *turban*, the produced *turban*, and the long *turban*.

TURBAN-*top*, *helvella*, in *Botany*, a genus of the *cryptogamia fungi*, the fungus of which is *turban*-ſhaped. Linnæus enumerates two ſpecies.

TURBAN-*ſhell*, *cidaris*, in *Natural Hiſtory*, the name of a genus of the echinodermata, which are of a hemiſpheric or ſpheroidal figure, and have their name from the Latin *cidaris*, a Perſian *turban*, as in ſome degree reſembling that head-dreſs. See *Tab. of Teſtaceous and Cruſtaceous Animals*, N° 1, 2, 3, 4.

Of this there are ſeveral genera, and ſubordinate ſpecies. This claſs of the echinodermata is made out by the aſſiſtance of the foſſil, as well as the recent animals; many of the kinds being now unknown on any ſhores. Klein's Echinod. p. 17. See ECHINODERMA.

TURBARY, *turbaria*, a right to dig turf in another man's ground; from *turba*, an old Latin word for a turf.

TURBARY, *common of*, is a liberty which ſome tenants have by preſcription to dig on the lord's waſte.

TURBARIA is ſometimes alſo taken for the ground where turfs are digged.

TURBARIA *bruaria*, more particularly denotes flaw-turf, or heath-turf; mentioned in the charter of Hammon de Maſſy.

TURBINATA *oſſa*. See NOSE.

TURBINATED, is a term applied by naturaliſts to ſhells which are ſpiral, or wreathed, conically, from a larger baſis to a kind of apex.

TURBINATUM, a name given by ſome to the glandula pinealis.

TURBINES, in *Natural Hiſtory*. See TURBO.

TURBINITÆ, foſſil ſhells of the turbo kind, or ſtones found in thoſe ſhells.

TURBIT, in *Ichthyology*, the ſame with TURBOT.

TURBIT *pigeon*, a particular ſpecies of pigeon, remarkable for its ſhort beak, and called by the Dutch *cort bek*, that is, *ſhort beak*. Moore calls it in Latin, *columba fimbricata*; and its Engliſh name ſeems no other than a bad pronunciation of its Dutch one. It is a ſmall and ſhort bodied pigeon, and has a beak no longer than that of a partridge; the ſhorter this is, the more the pigeon is eſteemed. It has a ſhort round head, and the feathers upon the breaſt open, and reflect both ways, ſtanding out like the frill of the boſom of a ſhirt. This is called by many, the *purle*, and the more the bird has of it, the more it is eſteemed; the tail and back are generally of one colour, as blue, black, red, yellow, or dun, and ſometimes chequered; the flight feathers, and thoſe of all the reſt of the body, are white; they are a light nimble pigeon, and, if trained to it, will take very high flights, in the manner of the tumblers.

TURBITH, or TURPETH, TURPETHUM, a medicinal root, brought from the Eaſt Indies, particularly from Cambaya, Surat, and Goa; though others will have it, that the true *turbith* comes chiefly from Ceylon.

It is the cortical part of the root of a ſpecies of CONVOLVULUS, viz. the *convolvulus turpethum* of Linnæus.

The *turbith* of the moderns bears ſo little reſemblance to that of the ancients, that it is difficult to ſuppoſe them the ſame. That ſold by our druggiſts is a longiſh root about the thickneſs of the finger, reſinous, heavy, and of a browniſh hue without, and whitiſh within. It is brought to us cloven in the middle, lengthwiſe, and the heart or woody matter taken out. The beſt is ponderous, not wrinkled, eaſy to break, and diſcovers to the eye a large quantity of reſinous matter.

This root, on the organs of taſte, makes at firſt an impreſſion of ſweetneſs; but when chewed for ſome time, betrays a nauſeous acrimony. It is accounted a moderate ſtrong cathartic, but does not appear to be of the ſafeſt or moſt certain kind; the reſinous matter, in which its virtue reſides, being very unequally diſtributed; inſomuch, that, as it is ſaid, ſome pieces, taken from a ſcruple to a dram, purge violently, whilſt others in larger doſes have very little effect. Lewis.

It is commonly ſuppoſed to take its name *turbith* from *turbare*, on account of the violence of its operation, as diſturbing the whole œconomy; and has accordingly been uſed in the dropſy, palſy, and apoplexy.

It yields a deal of reſinous matter in a ſpirituous menſtruum, which Quincy obſerves does not affect the larger paſſages much; but is very active in the ſmaller veſſels, and glandulous contorſions, which it wonderfully clears of all viſcid adheſions.

Some apothecaries, either through ignorance or parſimony, ſubſtitute white THAPSIA, which they call *grey turbith*, or *turbith garganicum*, for the true *turbith*; though both as to taſte, colour, and qualities, they are very different.

TURBITH *mineral*, TURPETHUM *minerale*, is a name which the chemiſts give to a yellow precipitate of mercury.

The method of preparing it is thus: on the dry powder gained by diſſolving mercury in twice or equal its weight of oil of vitriol, pour a proper quantity of warm water, and the powder will immediately turn of a yellow colour. This dry ſaline powder, which is a combination of mercury with vitriolic acid, may be obtained by pouring upon mercury in a glaſs retort an equal weight of concentrated vitriolic acid, or more, according to the degree of its concentration, and diſtilling theſe matters together in a ſand-bath, till nothing but the powder remains in the retort. When by affuſion of warm water, the yellow powder has been precipitated, continue to waſh it by repeated affuſions of water, till the liquor comes away as inſipid and colourleſs as it was poured on, and there will be left a beautiful yellow calx at the bottom of the veſſel, which is called by the name of *turbith mineral*.

Turbith mineral may alſo be made by precipitating mercury from its ſolution in nitrous acid by means of vitriolic acid, or of ſome vitriolic ſalt. For this purpoſe the nitrous acid muſt be well ſaturated with mercury.

We may obſerve that *turbith mineral* becomes yellow only by being deprived of the adhering vitriolic acid, and that it remains white till it has been waſhed with a large quantity of water; and, in general, the more perfectly it is deprived of acid, the deeper yellow colour it acquires. Some chemiſts have ſuppoſed, that a portion of vitriolic acid remains united with the *turbith*, though not enough to render it ſoluble in water: M. Beaumé affirms, that when ſufficiently waſhed it contains no acid; but the later experiments of M. Bayen prove the contrary.

This powder is called *mineral turbith* from the reſemblance it bears to the vegetable *turbith* of the Arabians, in ſtrongly purging the moſt internal receſſes of the body; for though it be inſipid upon the tongue, yet it is poſſeſſed of very conſiderable virtues. Being boiled with water, it loſes more of its ſalts, and thereby grows milder, and more ſafe; ſo it does alſo by being deflagrated twice or thrice, or diſtilled with ſpirit of wine.

The powder, prepared in the manner above deſcribed, proves, though not corroſive, ſtrongly emetic; operating, in this intention, the moſt effectually of all the mercurials that can be given with ſafety. It is uſed chiefly in virulent gonorrhœas, and other venereal caſes accompanied with a great flux of humours to the parts: it is ſaid likewiſe to have been employed with ſucceſs in robuſt conſtitutions, againſt leprous diſorders, and obſtinate glandular obſtructions. The doſe, as an emetic, is from two grains to ſix or eight; though ſome conſtitutions, habituated to mercurials, can bear larger quantities. It may be given in ſmaller doſes, as half a grain or a grain, as an alterative, after the ſame manner as the red calx of MERCURY; and even when intended as an evacuant, it may perhaps, as Malouin obſerves, be moſt adviſeable to give only a ſmall quantity at a time, as one grain, and repeat the doſe every hour till the vomiting ſucceeds. Lewis's Mat. Med. and Dict. Chem. Art. *Turbith mineral*.

Turbith mineral appears to have been the grand ſecret of Paracelſus, which, in his ſcarce German book of hoſpital medicines, he praiſes ſo extravagantly for the venereal and all chronical diſeaſes. Sydenham alſo commends it in venereal caſes, given in the quantity of ſix or eight grains, in ſtrong habits of body, ſo as to prove emetic; but when imprudently uſed, it is apt to bring on a dyſentery.

Turbith mineral has been uſed as a ſternutatory, and is ſaid to have made wonderful cures in diſtempers of the eyes. Mr. Boyle relates a cure of this ſort, performed by the famous empiric Adrian Glaſs-maker on Mr. Vatteville, a Swiſs officer of diſtinction in the French ſervice, and totally blind. This gentleman was ordered to ſnuff about a grain of *turbith* up each noſtril, which immediately operated in a violent manner, by vomit, ſtool, ſweat, ſalivation, and the lacrymal glands, for twelve hours together; and alſo cauſed his head to ſwell greatly; but within three or four days after this ſingle doſe had done working, he recovered his ſight. Boyle's Works Abr. vol. i. p. 103.

We read of this preparation being given to the quantity of ten grains, with the ſame quantity of camphor, and fifteen grains of the *pilul. ex duob.* to remove the ſwelling of the teſticles. This medicine, which in the beginning vomited and purged, at laſt operated chiefly as an alterative. It is ſaid to be ſucceſsful in obſtinate venereal and ſcrophulous diſorders. See Medic. Eſſ. Edinb. vol. iv. art. 4.

Turbith-mineral is an exceſſive bright true yellow, of a great body like vermillion; will ſtand equally well, and work with oil or water much in the ſame manner. Theſe qualities (ſays the author of the Handmaid to the Arts, vol. i. p. 107.) render it very valuable for many purpoſes; as it is much brighter than any other yellow uſed in oil, except king's yellow, and is free from its nauſeous ſmell, and cooler. Mixed with Pruſſian blue it yields a much finer green than from the king's yellow without ultramarine. As it is now procured, it requires levigation in water before it be uſed.

TURBO, the *ſcrew-ſhell*, in *Natural Hiſtory*, the name of a genus of ſhell-fiſh, the characters of which are theſe: they are univalve ſhells, with a long, wide, and depreſſed mouth, in ſome ſpecies approaching to a round ſhape, and in ſome having teeth, in others not. They all grow narrow toward the baſe, and are auriculated, and terminate in a very long and ſharp point. See *Tab. of Shells*, N° 11.

Aldrovand, and many others of the old authors, make no difference between the *turbines* and ſcrew-ſhells, though the diſtinction of the genera is very obvious; the ſcrew-ſhells having a long, large, and dentated mouth, which terminates toward the baſe in a narrower aperture than elſewhere; and the ſhell itſelf always runs to a very ſharp point at the end: whereas the *turbines* terminate in a leſs ſharp point, and have thicker bodies, and always much wider mouths. The ſcrew-ſhells are indeed very eaſily confounded with the buccina; and it requires more accuracy to diſtinguiſh them, than has fallen to the ſhare of the generality of writers on theſe ſubjects an age or two ago. Aldrovand and Rondeletius have confounded theſe genera, and have brought in a third among them, by the epithet *muricatum*, which, when applied to the buccinum, is generally obſerved to bring into that family a ſhell of the murex claſs, and which might have been very properly called by that ſhorter name.

For the ſake of diſtinguiſhing theſe, it may be obſerved, that the ſcrew-ſhell is of a very long and ſlender ſhape, terminating in a very ſharp point, with its ſpires running on imperceptibly, without any great cavity, and the baſe ſmall and flat, as well as the mouth.

Turbo, in the Linnæan ſyſtem, is a genus of the *teſtacea* order of worms. Its characters are: that its animal is a ſlug, the ſhell univalve, ſpiral, and ſolid, and the aperture ſtraightened, orbiculated, and entire. Linnæus enumerates fifty ſpecies.

In Da Coſta's ſyſtem the *turbo* is a genus of ſnails with a lengthened clavicle or turban; which have generally a perfect round mouth; the columella, or inner lip, not much faced outwards, and the body ſpire very bellied, ſo that the turban is ſuddenly, and not inſenſibly produced from it. See SHELLS.

The moſt remarkable ſpecies of the *turbo*, or ſcrew-ſhell, is that called *ſcalare* by Rumphius, from its ſpires running up hollow, or with a ſpace between them. This is a very ſcarce and valuable ſhell when large, but is often found ſmall in the Adriatic.

The ſpecies of the *turbo* are ſo numerous, that it is proper to arrange them under different heads.

1. The *turbines*, which have a long and toothleſs mouth, and a wrinkled columella, of which there are ſeven ſpecies.
2. Thoſe *turbines* which have dentated mouths and a wrinkled columella, including two ſpecies.
3. Thoſe *turbines* which are of a pyramidal figure, and have depreſſed mouths; comprehending five ſpecies.
4. Thoſe *turbines* which have long and erect mouths, containing four ſpecies.
5. Thoſe *turbines* which have a flat mouth, and are of a longer ſhape, including two ſpecies.
6. Thoſe *turbines* which have a large oval mouth, including three ſpecies.
7. The round-mouthed *turbines*, comprehending ſix ſpecies. See Hiſt. Nat. Eclairc. p. 271.

TURBO *cochlea*, in *Natural Hiſtory*, a name by which ſome authors have called the Perſian ſhell, a ſpecies of *concha globoſa*, or DOLIUM.

Many have been puzzled with this ſhell, not knowing in what claſs to rank it; and Aldrovand has placed it at the end of his work, ſaying, that it would ſeem to belong to the turbinated kinds, but that it wants the *turbo*.

TURBOT, in *Ichthyology*, a name given to the fiſh, which in the ſyſtems of Artedi and Linnæus, is a ſpecies of PLEURONECTES, being the *pleuronectes* of the former, with the eyes on the left ſide, and a rough body, and the *pleuronectes maximus* of the latter, and the *rhombus maximus aſper non ſquamoſus* of Ray. This is a well known fiſh, of a remarkable ſquare form; the colour of the upper part of the body is cinereous, marked with numbers of black ſpots of different ſizes; the belly is white; the ſkin is without ſcales, but greatly wrinkled, and mixed with ſmall ſhort ſpines, diſperſed without any order.

Turbots grow to a large ſize, ſome of them weighing from twenty-three to thirty pounds. They are taken chiefly off the north coaſt of England, and others off the Dutch coaſt. The large *turbots* (as well as ſeveral other kinds of flat fiſh) are taken by the hook and line, for they lie in deep water; the method of taking them in weirs, or ſtaked nets being very precarious. When the fiſhermen go out to fiſh, each perſon is provided with three lines, which are coiled on a flat oblong piece of wicker-work; the hooks being baited, and placed regularly in the centre of the coil. Each line is furniſhed with fourteen ſcore of hooks, at the diſtance of ſix feet two inches from each other. The hooks are faſtened to the lines upon ſneads of twiſted horſe-hair, twenty-ſeven inches in length. When fiſhing, there are always three, men in each COBLE, and conſequently nine of theſe lines are faſtened together, and uſed as one line, extending in length near three miles, and furniſhed with 2520 hooks. An anchor and a buoy are fixed at the firſt end of the line, and one more of each at the end of each man's lines; in all four anchors, which are common perforated ſtones, and four buoys made of leather or cork. This line is always laid acroſs the current. The tides of flood and ebb continue an equal time upon our coaſt, and, when undiſturbed by winds, run each way about ſix hours; they are ſo rapid that the fiſhermen can only ſhoot and haul their lines at the turn of tide, and therefore the lines always remain upon the ground about ſix hours; during which time the MYXINE *glutinoſa* of Linnæus will frequently penetrate the fiſh that are on the hooks, and entirely devour them, leaving only the ſkin and bones. The ſame rapidity of tides prevents their uſing hand-lines; and therefore two of the people commonly wrap themſelves in the ſail, and ſleep while the other keeps a ſtrict look out, for fear of being run down by ſhips, and to obſerve the weather. For ſtorms often riſe ſo ſuddenly, that it is with extreme difficulty they can ſometimes eſcape to the ſhore, leaving their lines behind. Beſides the coble, the fiſhermen have alſo a five-men boat, which is forty feet long, and fifteen broad, and of tweny-five tons burthen; it is ſo called, though navigated by ſix men and a boy, becauſe one of the men is commonly hired to cook, &c. and does not ſhare in the profits with the other five.

This boat is decked at each end, but open in the middle, and has two large lug-ſails.

All our able fiſhermen go in theſe boats to the herring-fiſhery at Yarmouth, in the latter end of September, and return about the middle of November. The boats are then laid up till the beginning of Lent, at which time they go off in them to the edge of the Dogger, and other places, to fiſh for *turbot*, cod, ling, ſkates, &c. They always take two cobles on board, and when they come upon their ground, anchor the boat, throw out the cobles, and fiſh in the ſame manner as thoſe do who go from the ſhore in a coble; with this difference only, that here each man is provided with double the quantity of lines, and inſtead of waiting the return of the tide in the coble, return to their boat and bait their other lines; thus hawling one ſet, and ſhooting another every turn of tide. They commonly run into harbour twice a week to deliver their fiſh.

The beſt bait for all kinds of fiſh is freſh herring cut in pieces of a proper ſize; the five-men boats are always furniſhed with nets for taking them. Next to herrings are the leſſer LAMPREY. The next baits in eſteem are ſmall haddocks cut in pieces, ſand-worms, and limpets, here called *ſlidders*, and when none of theſe can be had, they uſe bullock's liver. The hooks are two inches and a half long in the ſhank, and near an inch wide between the ſhank and the point. The line is made of ſmall cording, and is always tanned before it is uſed.

Turbots, and all the rays, are extremely delicate in their choice of baits; for if a piece of herring or haddock has been twelve hours out of the ſea, and then uſed as bait, they will not touch it. Pennant's Brit. Zool. vol. iii. p. 234, &c.

TURCICA *ſella*. See SELLA.

TURCICA *terra*, *Turkey earth*, in the *Materia Medica*, a very fine bole or medicinal earth, dug in great plenty in the neighbourhood of Adrianople, and uſed by the Turks as a ſudorific and aſtringent, and famous among them in peſtilential diſeaſes. It is ſometimes brought over to us alſo, made up into flattiſh orbicular maſſes, of two or three drams weight, and ſealed with ſome Turkiſh characters. The earth is of a ſomewhat lax and friable texture, yet conſiderably heavy, of a greyiſh red colour, but always redder on the ſurface than within; extremely ſoft and naturally of a ſmooth ſurface. It breaks eaſily between the fingers, and melts freely in the mouth, with a conſiderably ſtrong aſtringent taſte. It adheres but ſlightly to the tongue, raiſes no efferveſcence with acids, and burns to a duſty yellow colour. Hill's Hiſt. of Foſſ. p. 15.

Many authors who have written of the materia medica, and of foſſils in general, have indiſcriminately called the various kinds of Lemnian earth by this name; but the true *terra Turcica*, deſcribed by Schroder, Wormius, &c. is a different ſubſtance, though not ſufficiently characteriſed by thoſe authors to diſtinguiſh it from all the other earths.

TURCOIS, or TURQUOIS, in *Natural Hiſtory*, a precious ſtone of the opake kind, of a beautiful blue colour.

The Greeks and Latins ſeem to have known it under the name *callais*: and it appears to have had a place in the rationale of the high-prieſt of the Jews.

There are *turcoiſes* both oriental and occidental, of the new rock and of the old. The oriental partakes more of the blue tincture than the green; and the occidental more of the green than the blue. Thoſe of the old rock are of a finer blue, and thoſe of the new rock are often whitiſh, and do not keep their colour.

The oriental ones come from Perſia, the Indies, and ſome parts of Turky; and ſome even ſuppoſe, that it is hence they derive their modern name *turcois*. The occidental are found in various parts of Europe, particularly in Germany, Bohemia, Sileſia, Spain, and France.

Turcoiſes often grow of a round or oval figure; they cut eaſily, and beſides ſeals, which are frequently engraved on them, ſome are formed into crucifixes, or other figures, near two inches high; though De Boodt miſtakenly affirms, that none have been known to exceed the bigneſs of a walnut; for the ſpecimen exhibited by Mr. Mortimer to the Royal Society was twelve inches long, five inches broad, and in ſome places near two inches thick.

This gem has many virtues attributed to it; but all that we know of it at preſent is, that, like other bodies which contain copper, it is a violent emetic, and not at all fit to be received into practice.

The *turcois* is eaſily counterfeited; and that often is done ſo perfectly, that it is impoſſible to diſcover the deceit, without taking it out of the collet.

In the Memoirs of the Academy of Sciences for the year 1715, we have a very curious account of the formation of the *turcois*, and the manner of managing its naturally irregular colour, by M. Reaumur. The *turcois*, he obſerves, is one of the ſofteſt of precious ſtones, its hardneſs uſually not coming up to that of a cryſtal, or a tranſparent pebble; though ſome are much harder than others: and ſtill the harder, *cæteris paribus*, the more valuable, by reaſon of the vivacity of the poliſh, which is always proportionable to the hardneſs.

Roſnel, a jeweller, and the author of a ſcarce treatiſe, called Mercure Indien, eſtimating the ſeveral precious ſtones, ſets a hard *turcois*, whoſe blue is neither bright nor deep, on the foot of the moſt perfect emeralds, that is, nearly on a level with a diamond; but ſuch are ſcarce ever met with. Thoſe with any defect he only values at a French crown the carat.

Tavernier affirms, but erroneouſly, there are but two mines of *turcoiſes* known in all the earth, and thoſe are both in Perſia; the one called the *old rock*, near a town called Necabourg, three days journey to the north-eaſt of Meched; the other called the *new rock*, is five days journey from it. The ſtones from the latter, he adds, are but little valued; and the king of Perſia hath for many years prohibited the digging in the former for any but himſelf. M. Reaumur takes the old rock to be now exhauſted; in effect, the common diviſion of *turcoiſes* into the old rock, or oriental, and new rock, or occidental, is very arbitrary and precarious. All the beſt, and moſt perfect, grow where they will, in India or Europe, are reckoned among the former, and the reſt among the latter. Near Simore, in the Lower Languedoc, there are ſeveral conſiderable mines of *turcoiſes*; but that fine blue colour, admired in the *turcois*, is not natural to thoſe of theſe rocks; the prevailing colour being ſometimes white, and ſometimes much like that of tripoli of Venice. Other precious ſtones are dug out of the mine with all their colour, to the force whereof nothing can be added, though it may frequently be diminiſhed, as we ſee fire bring down the too deep colour of the ſapphire, and quite take away that of a pale ſapphire; theſe *turcoiſes*, on the contrary, are naturally whitiſh, or yellowiſh, of a colour as ordinary as that of a free-ſtone; and by oppoſing them for ſome time to the action of the fire they aſſume a blue colour.

It ſeems a paradox, and yet M. Reaumur has attempted to prove, that *turcoiſes* are originally the bones of animals. In the mines in France, pieces have ſeveral times been found in the figure of teeth, bones of the legs, &c. And *turcoiſes* which are yet imperfect, or half formed, are apparently compoſed of laminæ, or leaves like thoſe of bones, between which ſome petrifying juice, inſinuating itſelf, binds them cloſe together; and ſtill, the ſofter, and more imperfect the ſtones are, the more diſtinguiſhable are the different directions of the fibres and laminæ, with their interſections, and the greater reſemblance they bear to fractured bones, and the leſs to any kind of ſtones known.

To give them a blue colour, they dry them a-while in the air, then heat them gradually in a furnace made after a particular manner. If they be heated too haſtily, the humidity between the laminæ wanting time to evaporate, the whole will ſeparate into ſcales or flaws. Some of the ſtones require a greater degree of heat to bring them to their colour than others; and even in large pieces, the ſeveral parts ordinarily require ſeveral degrees of heat.

On this account a great deal of care is to be taken in the heating them; for the fire, which gives them their blue by degrees, if they be expoſed beyond a certain degree, takes it away again.

M. Reaumur accounts for their taking a blue colour by heat very well; when freſh cut out of the rock, it ſeems, their ſubſtance is found ſprinkled and ſtreaked all over with ſpots, veins, little circles, &c. of a dark blue colour; theſe he takes to be ſources of a deep bluiſh matter, which the fire rarefying, ſpreads and diffuſes throughout the whole ſubſtance of this ſtone. This matter, again, he concludes to have been either originally the juice contained in the bones, ſince mixed and coagulated with the petrifying juice, or ſome other mineral matter inſinuated into the pores of the ſtone.

Mr. Kirwan is alſo of opinion, that *turcois* is the tooth of the animal, penetrated with the blue calx of copper; its ſpecific gravity is from 2,5 to 2,908. The copper may be extracted from it by diſtilled vinegar. Elem. of Min. p. 262.

According to M. Reaumur's Mem. Par. 1715, nitrous acid will not diſſolve that of Perſia, though it will that of France, which ſhews a difference between them.

Dr. Woodward maintains, that the *turcois*, or *callais* of Pliny, is nothing elſe but foſſil ivory, tinged with copper; but Mr. Mortimer, who produced a ſpecimen of the *turcois* to the Royal Society, is of opinion, that thoſe, which authors call ſtones of the old rock, and in which the colour is permanent, are real mineral ſtones; the form and ſize of the ſample which he produced evince this; for its ſhape ſhews that it could not be part of any animal bone, but its botryoid form ſeems to prove, that it is the product of fire, which has once melted this ſubſtance, and that when it cooled, its ſurface was formed into bliſters and bubbles, in the ſame manner as the hæmatites botryoides, or blood-ſtone, whoſe ſurface conſiſts of knobs, reſembling a bunch of grapes. He apprehends the elephas ερυκτος, or ebur foſſile of Theophraſtus to be what Dr. Woodward calls the *turcois*, and ſuſpects that it is what De Boodt calls the new rock. He thinks that, for diſtinction ſake, all theſe ſtones of ivory origin ſhould be called *pſeudo-turcheſiæ*, or *baſtard turquois*. By a chemical analyſis he found, that his ſtone was a rich copper ore; ſome of it pounded and diſſolved in ſpirit of hartſhorn gave a deep blue; in aqua fortis a fine green; and an iron wire put into it was in an hour's time incruſted with copper; ſome of it being calcined, without any flux in a crucible, ran to a ſlag, or half-vitrified ſubſtance; whereas the ſame heat, if it had been ivory or bone, would have reduced it to a white aſh like bone aſhes, for it was expoſed to a fire that vitrified the tile which covered it. Its hardneſs and reſiſtance to an engraver's tool ſeemed to be the ſame as that of common white marble; its colour was not improved by heat, and it became brittle when red-hot.

Sir Hans Sloane had ſeveral ſpecimens of theſe oriental *turcoiſes*, which are all botryoid, and ſeem to be copper ores; and in his muſeum there are alſo ſamples of *turcoiſes* from Spain and the South of France, which are ſmall and ſeem to be pieces of ivory tinged with copper. Phil. Tranſ. vol. xliv. art. 17.

The great defect of *turcoiſes* in general is, that in time they loſe their blue colour, and become green; and then ceaſe to be of any value.

The pale blue of the natural *turcois* gem, is a very favourite colour in the glaſs-trade, and is given to glaſs in the following manner. Firſt calcine common ſea-ſalt, and beat it to a fine powder; then make a pot of the ſea-green glaſs, of a ſair and full colour; to this, when in fuſion, throw in at times the powder of ſalt, till the maſs has loſt all its tranſparence, and is become paler and opake; then add, by very ſmall quantities at a time, more and more ſalt, till the colour is exactly that of the *turcois*-gem; and when it is ſo, work it immediately, for the ſalt is ſoon burnt off, and the glaſs becomes tranſparent, and of its green colour. If it become tranſparent while working, more ſalt muſt be thrown in, and that will reduce it to the ſame opacity again. Neri's Art of Glaſs, p. 57. See GLASS.

For the method of making an enamel exactly of the colour of the *turcois* gem, and very much reſembling it in many reſpects, ſee ENAMEL.

For making a paſte reſembling the *turcois*, ſee PASTE.

TURDUS, *thruſh*, in the *Linnæan Syſtem of Ornithology*, the name of a genus of birds, of the order of the *paſſeres*.

The diſtinguiſhing characters of this genus are that the tongue is jagged, and has a rim or margin round it; the bill is of a conic pointed figure, the upper mandible bent at the apex, and emarginated; the noſtrils naked, but half covered above with a ſmall membrane, and the chaps ciliated. Linnæus enumerates twenty-eight ſpecies.

The diſtinguiſhed characters of this genus, according to Mr. Ray, are theſe: they are of a middle ſize between the pigeon and the lark; their beak is moderately long and thick, and is a little bent downwards; their mouth yellow within; their tail long; and their food both vegetable ſubſtances, and inſects in common. Moſt of theſe birds ſing very melodiouſly, and may be taught to imitate the human voice in ſpeaking. Ray's Ornithol. p. 137.

We have four ſpecies of thruſh in England: 1. The *turdus viſcivorus major*, or miſſel-bird. 2. The *viſcivorus minor*, or ſong-thruſh, or throſtle. 3. The *turdus piliaris*, or field-fare. And, 4. The ſwine-pipe, or red-wing. See BLACK-*bird*, FIELD-*fare*, MISSEL-*bird*, *Ring*-OUZELL, *Roſe-coloured* OUZELL, RED-*wing*, and THROSTLE.

TURDUS *chiappæ*, in *Ornithology*, the name of a bird of the Weſt Indies, called alſo PASSER *faber*.

TURDUS, in *Ichthyography*, the name of a genus of fiſhes according to Mr. Ray, of the claſs of thoſe which have only one back-fin, the anterior rays of which are prickly; the hinder ones ſoft and ſmooth.

Of theſe fiſh there are ſeveral ſpecies, which may properly be divided into two orders; the firſt, of thoſe which are ſmaller and broad: the ſecond, of thoſe which are larger and oblong.

Of the firſt order are the *tinca marina*, or WRASSE; the MERULA, or *turdus niger*; the LEPRAS, and PIRA *pixanga*; and the *turdus viridis*, or VERDONE. Ray's Ichthyogr. p. 320.

Of the ſecond order are the *pavo*, or PEACOCK-*fiſh*; and the *turdus viridis major*, and *turdus fuſcus maculoſus*.

The *turdus viridis major*, or great green *wraſſe*, is of a fine green on its back and ſides, even to the ſide lines; and the lower part of the ſides and belly are of a pale whitiſh yellow, variegated with greyiſh and pale blue ſpots; its body is long, and not much unlike that of the pike in figure; its back fin is long, and has thirty-two ribs, the anterior nineteen of which are rigid and prickly, the hinder twelve ſoft, flexile, and ramoſe; the ſcales are large, the eyes ſmall, and the teeth very large and ſtrong.

The *turdus fuſcus maculoſus*, or brown ſpotted *wraſſe*, ſcarce at all differs from the others, except in colour. It is of a duſky hue on the back and ſides, variegated with blue ſpots; and on the belly blue, with lines and ſpots of red. All the fins, except thoſe of the gills, are of a red colour, ſpotted with blue; the tail alſo is of this colour, and the gill-fins are yellow. Ray's Ichthyogr. p. 322.

TURF, *peat*, a blackiſh ſulphureous earth, uſed in ſeveral parts of England, Holland, and Flanders, as fewel.

Turf, as diſtinguiſhed from peat, conſiſts of mould interwoven with the roots of vegetables; when thoſe roots are of the bulbous kind, or in a large proportion, they form the looſer and worſe kind of *turf*; but when mixed with a conſiderable proportion of peat, they form what is called *ſtone-turf*; it at firſt hardens, but at laſt crumbles by long expoſure to the air. Of *peat* or *geanthrax*, there are two ſorts: the firſt and principal is of a brown, yellowiſh brown, or black colour, found in moory grounds, and, when freſh, of a viſcid conſiſtence, but hardens by expoſure to the air; it conſiſts of clay mixed with calcareous earth and pyrites, and ſometimes contains common ſalt; when diſtilled, it affords water and oil and volatile alkali, and its aſhes contain a ſmall proportion of fixed alkali. They are either white or red, according as it contains more or leſs ochre or pyrites. This ſort of peat is ſound in Scotland, Holland, and Germany. Another ſort is found near Newbury, in Berkſhire: it contains but little earth, and conſiſts chiefly of wood-branches, twigs, roots of trees, with leaves, graſs, ſtraw, and weeds. Phil. Tranſ. ſor 1757, p. 110. Kirwan's Elem. of Miner. p 219.

In Flanders their *turf* is dug or pared from off the ſurface of the earth, and cut in form of bricks. The ſedge, or ſpecies of graſs, growing very thick on the *turf* earth, contributes greatly, when dry, to the maintenance of the fire.

The Dutch take their *turf* from the bottom of the dikes or canals which run acroſs moſt of their lands; by which means they not only ſupply the defect of wood, which is very great in moſt of the United Provinces, but alſo keep their dikes clear and navigable: this *turf*-earth is very black. As they take it up from the bottom of the dikes, they ſpread it about the edges, of ſuch a thickneſs as that it may be reduced to three inches when moderately dried. In this condition they cut it into pieces of *turf* ſeven or eight inches long, and three broad; and to complete the drying, lay them up in heaps, and at laſt in ſtacks.

In the north of England, Scotland, &c. *turf* or peat is dug out of ſoft, moiſt, rotten earth, called *peat-moſs*; for the formation whereof ſee MORASS.

They dig horizontally from the ſurface, to the depth of about four feet, with a ſpade, which at once faſhions and takes them out in parallelepipeds, nine or ten inches long, and three ſquare, which are ſpread on the ground to drain as faſt as dug, and then ſet up on end three or four againſt each other, for the wind to blow through them, and at laſt they are ſtacked or houſed. The pits or dikes in a few years fill up again, and afford a freſh crop.

TURF-*ſweating*, an Indian method of curing diſeaſes, which has been found to ſucceed very happily on many trials.

Paul Dudley, eſq. gives an account of a man of ſeventy-four years old in New England, who drinking cold water when very hot, had a pain ſettled in one ſide and arm, which baffled all art to remove; till after nine weeks confinement to his bed, when he was given over by every body, it was propoſed to try this method of cure upon him.

An oven full of *turf* was ordered to be cut; the *turfs* were of about eighteen inches ſquare each, and were of the nature of the Engliſh *turf* uſed in gardens.

The Indian doctor, before the *turf* was put into the oven, rubbed over their graſſy ſide with ſome ſort of oil or ſpirit, and then putting the two graſs ſides together, placed them in the oven. When they had been two hours there, and were well baked, he took them out, and made a bed upon the floor, the place for the head being a little raiſed; the old man was then taken out of bed without his ſhirt, but wrapped in a ſheet, and being laid on the *turf* bed, ſuch another parcel of the hot *turf* was laid over him. The *turf* was laid thickeſt on that ſide where the pain was, but none of it was put on his breaſt or head.

He was then covered with a blanket to keep in the heat, and while he was in this warm bath, he was continually ſupplied with warm cordials to keep him from fainting, of which he was in great danger. After he had laid in this bath about three quarters of an hour, which was as long as he could bear it, he was put into a bed very well warmed, without his ſhirt, where he ſoon fell aſleep, and ſweated to that degree, that it run through the pillow and bed on the floor. After about two hours ſweat they rubbed and dried him, and put on his cloaths, and the old gentleman found himſelf much eaſed and refreſhed. The operation was performed in the morning, and before night he walked about the houſe comfortably, his pain being almoſt all gone. The cordials were, after this, repeated, and, on the fourth day, the ſweating was performed again; the day after which the old gentleman was well enough to go about his buſineſs. He lived eleven years afterwards in perfect health, and free from pain.

Great care is to be taken in this operation that the patient do not lie too long in the *turf*: in many caſes a quarter of an hour is found to be long enough; and the general rule is, that as ſoon as the patient begins to fetch his breath ſhort or faint, he muſt be put to bed immediately, and the cordials muſt by no means be omitted, for the life of the patient is endangered without them. Phil. Tranſ. N° 384. p. 129.

TURFING-*ſpade*, among *Huſbandmen*, is an inſtrument uſed to undercut the *turf*, after it is marked out with a trenching-plough.

TURGESCENCE, TURGESCENCY, a ſwelling, or growing bloated.

TURIONES, the firſt young tender ſhoots which plants annually put forth.

TURK's-*cap*, a name given to a ſpecies of LILY.

TURK's-*head*, a name ſometimes given to the *Melon* THISTLE.

TURK's *Turban*, a name given to a ſpecies of RANUNCULUS.

TURKEY, *meleagris*, in *Ornithology*, a diſtinct genus of birds, of the order of the *gallinæ*; the diſtinguiſhing characters are, that its head and neck are covered with a naked tuberoſe fleſh, with a long fleſhy appendage hanging from the baſe of the upper mandible: to which we may add from Mr. Pennant's deſcription of this genus, that the bill is convex, ſhort, and ſtrong; the noſtrils open, pointed at one end, and lodged in a membrane; the tongue is ſloped on both ſides towards the end, and pointed; and the tail is broad, conſiſting of eighteen feathers, and extenſible. Linnæus enumerates three ſpecies; the firſt of which is the *gallo-pavo*, or wild *turkey*, which has in the breaſt a long tuft of coarſe black hairs; the plumage is dark, gloſſed with variable copper colour and green; the coverts of the wings and the quill-feathers are barred with black and white; the tail conſiſts of two orders, the upper, or ſhorter, having the ground colour a bright bay, and the middle feather marked with numerous bars of ſhining black and green; the exterior feathers are moſtly marked with three broad bands of mallard green, the two next coloured like thoſe of the middle, with the end plain and croſſed with a ſingle bar like the exterior; the longer, or lower order of feathers, are of a ruſty white colour, mottled with black, and croſſed with numerous narrow-waved lines of the ſame colour, and near the end with a broad band.

Wild *turkies* preſerve a ſameneſs of colouring; the tame varying, but the black approaching neareſt to the original ſtock. Of late a beautiful kind has been introduced into England of a ſnowy whiteneſs, finely contraſting with its red head. The uſual weight of the wild *turkey* is about 30*lb*.

The paſſions of the males are ſtrongly expreſſed by the change of colours in the fleſhy ſubſtance of head and neck, which alters to red, white, blue, and yellowiſh, as they are differently affected. One cock ſerves many hens, who retire to an obſcure place in order to ſit, the cock being apt to break the eggs. The females are very affectionate to their young, and though the eggs addle, will almoſt periſh with hunger, unleſs they are removed, before they will quit the neſt.

Turkies delight much in the ſeeds of nettles, but thoſe of the purple fox-glove are fatal to them. They are ſtupid, quarrelſome, and cowardly birds; they are ſwift runners, but indifferent flyers; they love to perch on trees, and, in a wild ſtate, get ſo high as to be beyond the reach of the muſquet.

In the ſtate of nature they go in flocks, even of five hundred, and feed much on the ſmall red acorns, frequenting the ſwamps of their native country, where they rooſt, but at ſun-riſing repair to the dry woods in ſearch of acorns and berries. The fleſh of the wild *turkey* is ſaid to be preferable to that of the tame, but redder.

Wild *turkies* are now very rare in the inhabited parts of America, but are found in numbers in the diſtant and moſt unfrequented ſpots.

The Indians make a very elegant cloathing of the feathers, twiſting the inner webs into a ſtrong double thread of hemp, or inner bark of the mulberry-tree, and working it like matting: it appears rich and gloſſy, and as fine as a ſilk ſhag. They alſo make fans of the tail, and the French of Louiſiana were wont to make umbrellas by the junction of four of the tails.

Turkies are natives only of America, or the New World, and of courſe unknown to the ancients: this is a point which Mr. Pennant has eſtabliſhed by an elaborate induction of various particulars in the hiſtory of theſe birds; evincing that they are natives neither of Europe, Aſia, nor Africa. The firſt preciſe deſcription of them is given by Oviedo, 1525; they are alſo mentioned as natives of the main land of the warmer parts of America, by Fernandez, phyſician to Philip II. who wrote between the years 1555 and 1598: they were alſo frequently ſeen, both in their wild and tame ſtate, by Dampier, in the province of Yucatan, now a part of Mexico.

In North America they were obſerved by the firſt diſcoverers. They were firſt introduced into Europe from Mexico or Yucatan, and imported into England, probably from Spain, as early as the year 1524. Since that period they have been ſucceſsfully cultivated in this kingdom, ſo that in the year 1585 they made a diſh even in our rural feaſts. But in France they were ſo rare, that the firſt which was eaten in that kingdom appeared at the nuptial feaſt of Charles IX. in 1570. Phil. Tranſ. vol. lxxi. part i. p. 67. &c.

TURKEY-*ſtone.* See OIL-*ſtone.*

TURKEY *Wheat.* See MAIZE.

TURKEY *Baum.* See DRAGON's *head.*

TURKEY *Company and Silk.* See COMPANY and SILK.

TURKISH *coins*, *meaſures*, and *year*, ſee the ſubſtantives.

TURLUPINADE, a term uſed chiefly among the French for a low jeſt, or witticiſm. The occaſion of the name is ſaid to be derived from a famous comedian at Paris, called *Turlupin*; whoſe talent conſiſted chiefly in raiſing a laugh by miſerable puns and quibbles.

TURLUPINS, TURLUPINI, a denomination given to the BRETHERN *of the free ſpirit*; whoſe external aſpect and manners carried a very ſhocking air of lunacy and diſtraction.

They called their ſect the *fraternity of the poor*, and ſpread themſelves over England and France. They are ſaid by ſome to have had their name *turlupines, quod ea tantum habitarent loca, quæ lupis expoſita erant.*

They attempted to ſettle themſelves at Paris in 1372, but were a great part of them burnt, with their books; as is related by Gaguin and du Tillet in the life of Charles V.

TURMERIC, or *Indian ſaffron*, *curcuma*, in *Botany*, a genus of the *monandria monogynia* claſs. Its characters are theſe: the flowers have each ſeveral ſpathæ which are ſingle and drop off; the flower hath one petal with a narrow tube, cut at the brim into three ſegments; it hath an oval pointed nectarium of one leaf, inſerted in the ſinus of the largeſt ſegment of the petal; it hath five ſtamina, four of which are barren and one fruitful, ſituated within the nectarium, and having the appearance of a petal, with a bifid point, to which the ſummit adheres; it hath a roundiſh germen ſituated under the flower, ſupporting a ſtyle of the length of the ſtamina, crowned by a ſingle ſtigma; the germen afterward becomes a roundiſh capſule having three cells, which are filled with roundiſh ſeeds. There are two ſpecies.

TURMERIC, *curcuma*, in the *Materia Medica*, a medicinal root, being the root of the *curcuma longa* of Linnæus, uſed likewiſe by the dyers, to give a yellow colour.

It is externally greyiſh, and internally of a deep lively yellow or ſaffron colour, very hard, and not unlike, either in figure or ſize, to ginger.

It is brought chiefly from the Eaſt Indies; though the iſland Madagaſcar does likewiſe afford it. You are to chuſe that which is big, new, reſinous, hard to break, and heavy.

Some people have miſtakenly imagined, that there was a native red *turmeric*; their error was owing to this, that the yellow root as it grows old, turns brown; and when pulverized, is reddiſh. It is much uſed by the glovers, &c. to dye their gloves. The Indians uſe it to dye their rice, and other foods, of a yellow colour: whence ſome call it *Indian ſaffron*.

Our dyers do not find that it gives ſo ſteady a yellow as the luteola or weld; but it is admirable to brighten and heighten the red colours dyed with cochineal or vermilion; as ſcarlets, &c.

Turmeric has a ſlight aromatic, and not very agreeable ſmell, and a bitteriſh ſomewhat warm taſte. It readily gives out its active matter both to aqueous and ſpirituous menſtrua; communicating to the former its own deep yellow, and to the latter a fine yellowiſh red tincture. Diſtilled with water, it yields a ſmall quantity of a gold-coloured eſſential oil, of a moderately ſtrong ſmell and pungent taſte: the remaining decoction inſpiſſated, leaves a bitteriſh, conſiderably ſaline maſs. The inſpiſſated extract from rectified ſpirit is moderately warm and bitter, and not a little nauſeous. In the eaſtern countries, this root, beſides its uſe in colouring and ſeaſoning their food, is much recommended as a medicine; being accounted one of the moſt effectual remedies in obſtructions of the viſcera and meſentery, which are there frequent; in uterine diſorders, difficulties of urine, and affections of the kidneys. Among us it has alſo been employed by way of decoction, infuſion, and powder, as a deobſtruent, in hypochondriac, leuco-phlegmatic, and cachectical conſtitutions; and eſteemed by ſome as a ſpecific in the jaundice: the doſe in ſubſtance is from a ſcruple to a dram; in decoction or infuſion twice as much. It tinges the urine of a deep yellow colour. Lewis.

A plaſter of *turmeric*, well bruiſed, top and roots, is thought to be good againſt the bite of the rattle-ſnake. See Phil. Tranſ. N° 479. p. 144.

Turmeric *Waſh*, is the gum of the *turmeric*-root diſſolved in water.

The qualities and uſes of it are much the ſame as thoſe of the *yellow*-BERRY waſh for water-painting; but it is a brighter and cooler yellow: for which purpoſe it ſhould be diſſolved in ſpirit of wine inſtead of water, by putting two ounces of proof-ſpirit, and one ounce of water, in a phial, with two drams of powdered *turmeric*-root, ſhaking them well together, and letting them ſtand, with a repetition of the ſhaking, for three or four days.

TURN is uſed for a circular motion; in which ſenſe it coincides with *revolution*.

Turn, in a *Clock* or *Watch-work*, particularly denotes the revolution of a wheel or pinion.

In calculation, the number of *turns* which the pinion hath in common arithmetic, thus 5)60(12, where the pinion 5, playing in a wheel of 60, moves round 12 times in one *turn* of the wheel. Now, by knowing the number of *turns*, which any pinion hath in one *turn* of the wheel it works in, you may alſo find how many *turns* a wheel or pinion has at a greater diſtance;

as the contrat-wheel, crown-wheel, &c. by 5) 55 (11
multiplying together the quotients, and the 5) 45 (9
number produced is the number of *turns*, as 5) 40 (8
in this example:

The firſt of theſe three numbers has 11 *turns*, the next 9, and the laſt 8. If you multiply 11 by 9, it produceth 99; that is, in one *turn* of the wheel 55, there are 99 *turns* of the ſecond pinion 5, or the wheel 40, which runs concentrical or on the ſame arbor with the ſecond pinion 5. If you multiply 99 by the laſt quotient 8, it produces 792, which is the number of *turns* the third pinion 5 hath. See CLOCK-*work* and PINION.

Turn, in *Mining*, is a pit ſunk in ſome part of a drift. If the mine be deep, there are many of theſe *turns* one below another.

Turn-*houſe*. When a drift is driven acroſs the country N. and S. to cut a lode, the miners make a right angle from their drift, and work on the lode itſelf; which, as it is in a contrary direction to their paſt drift, they call *turning-houſe*, in order to work on the courſe of the lode.

Turn, in the *Manege*, is a term commonly uſed in directing to change hands. See CHANGE and ENTIER.

Turn, in the *Sea Language*. See LAND *turn*, TACK and TURNING.

Turn, or **Tourn**, is alſo uſed for the ſheriff's COURT, kept twice a year in every hundred within his county, viz. a month after Eaſter, and within a month after Michaelmas.

From this court none are exempted but archbiſhops, biſhops, earls, barons, religious men and women, and all ſuch as have hundreds of their own to be kept.

It is a court of record in all things that pertain to it; and is alſo the king's leet through all the county, whereof the ſheriff is judge; this court being incident to his office. The attendance on it is called *ſecta regalis*, or *ſuit-royal*.

It is called the *ſheriff's turn*, becauſe he takes a *turn* or circuit for this purpoſe through the ſhire, holding the ſame in ſeveral places.

TURNADO. See TORNADO.

TURNAMENT, or **Tournament**, a martial ſport or exerciſe, which the ancient cavaliers uſed to perform, to ſhew their bravery and addreſs.

The firſt *turnaments* were only courſes on horſeback, wherein the cavaliers tilted at each other with canes in manner of lances; and were diſtinguiſhed from *juſts*, which were courſes or careers, accompanied with attacks and combats, with blunted lances and ſwords.

Others ſay, it was a *turnament* when there was only one quadril or troop; and that where there were ſeveral to encounter each other, it was a JUST. But it is certain the two became confounded together in proceſs of time; at leaſt we find them ſo in authors.

The prince who publiſhed the *turnament*, uſed to ſend a king at arms with a ſafe-conduct, and a ſword, to all the princes, knights, &c. ſignifying, that he intended a *turnament* and a claſhing of ſwords, in the preſence of ladies and damſels; which was the uſual formula of invitation.

The firſt engaged man againſt man, then troop againſt troop; and after the combat, the judges allotted the prize to the beſt cavalier, and the beſt ſtriker of ſwords; who was, accordingly, conducted in pomp to the lady of the *turnament*; where, after thanking her very reverently, he ſaluted her and likewiſe her two attendants.

The *turnament* made the principal diverſion of the thirteenth and fourteenth centuries. Munſter ſays, it was Henry the Fowler, duke of Saxony, and afterwards emperor, who died in 936, that firſt introduced them; but it appears from the chronicle of Tours, that the true inventor of this famous ſport, at leaſt in France, was one Geoffry, lord of Preuilli, about the year 1066.

It is difficult to fix the epocha of their inſtitution, as many nations have laid claim to it. Nithard relates, that at the interview of Charles the Bald, king of France, who ſucceeded to the throne in the year 840, and his brother Lewis of Germany, at Straſburg, the gentlemen of the retinue of both princes fought on horſeback, to diſplay their courage and ſkill.

Du-Cange ſays, that theſe ſports were ſo peculiar to the French, that they were called *conflictus Gallici*, or French combats. To this purpoſe Matthew Paris, under the year 1179, ſays, *Henricus rex Anglorum junior mare tranſiens in conflictibus Gallicis, et profuſioribus expenſis, triennium peregit, regiaque majeſtate depoſita, totus eſt de rege tranſlatus in militem.*

The Hiſtoria Byzantina tells us, that the Greeks and Latins borrowed the uſe thereof from the Franks; and we find mention made of them in Cantacuzenus, Gregorias, Beſſarion, and others of the late Greek authors.

Inſtances of them occur among the Engliſh in the reign of king Stephen, about the year 1140; but they were not much in uſe till Richard's time, towards the year 1149. After which period theſe diverſions were performed with extraordinary magnificence in the *Tilt-yard* near St. James's, Smithfield, and other places. At laſt, however, they were found to be productive of bad effects; and the occaſion of ſeveral fatal misfortunes, as in the inſtance of Henry II. of France, and of the *tilt* exhibited at Chalons, which from the numbers killed on both ſides, was called the little war of Chalons. Theſe and other inconveniences, reſulting from theſe dangerous paſtimes, gave the popes occaſion to forbid them, and the princes of Europe gradually concurred in diſcouraging and ſuppreſſing them.

Budæus derives the word *tournament* from *Trojana agmina*; others from *Trajamentum, quaſi ludus Trojæ*. Menage deduces it from the Latin *tornenſis*, or the French *tourner*, becauſe the combatants rode in rings and circles, and were obliged to make many turnings with their horſes, as the laws of the game required.

M. Paris call them in Latin *haſtiludia*; Neubrigenſis, *meditationes militares*; other *gladiaturæ*, others *decurſiones ludicræ*, &c.

It is natural, however, to conclude *ex vi termini*, that although the ſport itſelf may owe its riſe to the Trojan game, yet that its name is of French extraction, and not only given with great propriety, but ſeems to be a tacit agreement of its ſuperior antiquity among that people, whoſe hiſtorians aſſert that it was firſt known in France. Berenger's Art of Horſemanſhip, vol. i. p. 104, &c.

Pope Eugenius II. excommunicated thoſe who went to *turnaments*, and forbad them burial in holy ground. K. Henry II. of France died of a wound received at a *turnament*. One Chiaoux, who had aſſiſted at a *turnament* under Charles VIII. ſaid very wiſely, *If it be in earneſt, it is too little; if in jeſt, too much.*

It is to the exerciſe of *turnaments* that we owe the firſt uſe of armories; of which the name blazonry, the form of the eſcutcheons, the colours, principal figures, the mantlings, labels, ſupporters, &c. are undeniable evidences.

In Germany, in was anciently a cuſtom to hold a ſolemn *turnament* every three years, to ſerve as a proof of nobility. For the gentleman who had aſſiſted at two, was ſufficiently blazoned and publiſhed; i. e. he was acknowledged noble, and bore two trumpets by way of creſt on his *turnament* caſque. Thoſe who had not been in any *turnaments* had no arms, though they were gentlemen.

TURNEP, or *turnip*, *rapa*, in *Botany*. Its characters are theſe: the empalement of the flower is three-leaved, coloured, and erect; the flower hath four plain ſpreading petals, which are narrow at their baſe, and entire; it has four oval honey glands, ſituated between the ſtamina and ſtyle, and ſix erect awl-ſhaped ſtamina, the two which are oppoſite, are of the length of the empalement, the other four are longer, terminated by erect acute-pointed ſummits; it hath a taper germen, ſupporting a ſhort thick ſtyle, crowned by an entire headed ſtigma; the germen afterwards becomes a long taper pod, depreſſed on the ſides, opening in two cells, which are filled with roundiſh ſeeds. There are three ſpecies, viz. the garden-*turnep* with a white root; the *turnep* with an oblong root, or female *turnep*, and the *turnep* with a ſpindle-ſhaped root or garden naphew with a white root, commonly called French *turnep*. The *turnep* is a ſpecies of BRASSICA in the Linnæan ſyſtem.

The firſt ſpecies is the *turnep* commonly cultivated in the fields, of which there are the following varieties, viz. the round red or purple top, the green top, the yellow, the black-rooted, and the early Dutch *turneps*; the laſt ſort is commonly ſown early in the ſpring, to ſupply the markets in May and June, and ſhould be drawn up young, otherwiſe it becomes ſtrong and rank, but is never cultivated for a general crop. The red-rooted *turnep* was formerly more cultivated in England than at preſent, inſtead of which the larger green-top *turnep* has been introduced and preferred to it. It grows more above ground than any other, which renders it better for feeding cattle, and its roots are the ſofteſt and ſweeteſt, and continue good for the longeſt time, and therefore are moſt eſteemed for the table. The next to this is the red or purple-top *turnep*, though its roots are apt to become ſtringy. The long-rooted, the yellow, and the blackiſh-rooted *turneps*, are now rarely cultivated in England, neither of them being ſo good either for the table, or for feed, as the red and green-top *turneps*. The French *turnep* is not much cultivated in England, but in France and Holland is much eſteemed, eſpecially for ſoups.

Turneps delight in a light, ſandy, loamy ſoil, which muſt not be rich, otherwiſe they become rank and ſticky; but if it be moiſt, they will thrive the better in ſummer, eſpecially in freſh land, where they are always ſweeter than upon an old worn-out, or a rich ſoil. The common ſeaſon for ſowing them is any time from the beginning of June to the middle of Auguſt: however, about London they are ſown ſucceſſively from March to Auguſt, for the conſtant ſupply of the markets; but thoſe that are ſown early in a dry ſeaſon, are in danger of being deſtroyed by the fly, and ſhould be watered; and they always ſucceed beſt in a moiſt ſoil. The ſeeds ſhould always be ſown upon an open ſpot of ground; for near hedges, walls, buildings, or trees, they will draw up, and be long topped, but have ſmall roots.

It is but of late years that the farmers have brought *turneps* into uſe, as an improvement of their fields. This is the more extraordinary, as Columella, an ancient writer on huſbandry, recommends the plentiful cultivation of *rapa*; becauſe, ſays he, thoſe roots which are not wanted for the table, will be eaten by the cattle.

All ſorts of land, when made fine either by dung and tillage, or by tillage alone, will produce *turneps*, but not all equally.

Chalky land is too dry for them, and they are ſo long on it before they get into the rough leaf, that the fly often takes them, and they are deſtroyed. Sometimes, however, they ſucceed well in this ſort of land, though rarely. Charlock is a weed very apt to infeſt *turnep* lands, and when the *turneps* and this are both young, they are ſo alike, that there have been inſtances of the people ſent to weed, miſtaking one for the other, and cutting up all the *turneps*, and leaving all the charlock.

Sandy and gravelly land are found to be the beſt for *turneps*, becauſe theſe ſoils are moſt eaſily pulverized, and have a warmth that makes the *turneps* grow much faſter than they would in a colder ground. By this means they are preſerved from the danger of the fly, which only infeſts them while not yet grown into the rough leaf; and this ſort of ſoil, when well tilled and hoed, never wants moiſture even in the hotteſt weather. The dews reach as deep as the plough or hoe penetrates, which is ſix or eight inches; and the ſun's heat with us is never ſo great as to exhale it wholly from that depth.

The land upon which *turnep*-ſeed is ſown, ſhould be ploughed in April, and twy-fallowed in May; the ſeed ſhould be ſown thin, two pounds being fully ſufficient for an acre, though one pound is the common allowance; as ſoon as it is ſown, it muſt be harrowed in with a ſhort-tined harrow, and the ground rolled with a wooden roll, in order to break the clods and make the ſurface even. However, Mr. Reynolds, an ingenious practical farmer, obſerves, (Mem. Agriculture, vol. i. p. 437.) that the common practice of rolling down *turnep*-ground, when finiſhed, is injurious to theſe young ſeed-plants; becauſe the clods of earth are uſeful in ſcreening the plants from the ſun, and in quickening their growth. If rolling ſhould become neceſſary, as ſoon as the flies appear, the unrolled ground will have much the advantage of the rolled in deſtroying them; becauſe, being rough, the roller will, by breaking the clods, bury and cruſh, as well as lick up the greater part of thoſe inſects.

When the plants begin to come up, in about ten days or a fortnight after ſowing, they will be in danger of being deſtroyed by the fly; in which caſe the ground, being firſt harrowed, muſt be re-ſown. When the plants have four or five leaves, they ſhould be hoed both for deſtroying the weeds and thinning them, the remaining plants being left about ſix or eight inches aſunder each way; but in the ſecond hoeing, about three weeks or a month after the firſt, they ſhould be left at the diſtance of fourteen or ſixteen inches; for thus the roots will be proportionably large, and anſwer better the purpoſe of feeding cattle; but for kitchen uſe, the diſtance of ten inches or a foot will be ſufficient.

When *turneps* are ſowed by hand, and hoed by hand-hoers, the plants grow too cloſe, and the operation is never half performed, the workers uſually leaving one half of the land unhoed, and covering it with the earth they cut up from the other plants; ſo that the weeds there being only buried an inch or two deep, grow more vigorouſly than before. The beſt method, which has been lately much practiſed, is to ſow the ſeed in rows with the drill-plough, and horſe-hoe, or hand-hoe them afterwards. By this means, the plants are kept at a proper diſtance, and the earth opened between them. The effect of this, upon a fair trial, has been proved to be (ſays Mr. Tull) that the drilled *turneps*, when gathered, have been twice the quantity of the ſown ones, upon an equal quantity of ground, though the hand hoeing of the latter had coſt at the rate of ten ſhillings an acre.

The late lord viſcount Townſhend made an accurate trial of theſe two methods of huſbandry, by equally dividing the ſame fields into different lands, which were alternately ſown in drills, and the intermediate lands in broad-caſt: the latter were hoed by hand, in the common method, and the other cultivated by the hoeing plough; and when the roots were grown, his lordſhip had an equal quantity of land, which had been ſown in different methods meaſured, and the roots drawn up and weighed, and thoſe roots, which had been cultivated by the plough, were ſo much larger than the other, that the crop of one acre weighed a ton and a half more than that of one acre in the other huſbandry.

From the experiments of ſir Digby Legard, in 1762, an account of which was communicated to the Society of Arts, &c. (ſee Mem. Agr. vol. i. p. 350.) it appears, that one pound of *turnep*-ſeed, ſown on four acres, and cultivated by the drill-huſbandry, produced ſixty tons of *turneps*, and ten pounds of ſeed ſown on ſeven acres, and cultivated by the common huſbandry, produced one hundred and forty tons of *turneps*. *Turneps*, he ſays, are particularly ſuited to the ſyſtem of Mr. Tull; but, if introduced as an intermediate crop, ſhould be ſown early, viz. in the beginning of June, that they may attain their full growth, and be removed or fed off in time, to give the ground a due preparation for wheat; he generally drilled a ſingle row of *turneps* on five feet ridges, and the produce was from fifteen to thirty-two tons, according to the goodneſs of the ſoil and the ſeaſon. And twenty tons, he thinks, may be reckoned the mean produce on land worth 15*s.* an acre. From a compariſon of both methods, as ſtated by another writer, it appears, that the drilled crop, with intervals of five feet, was greater than the broad-caſt crop upon an acre, by three tons, ſixteen hundred, three quarters, and fourteen pounds weight.

In the method of drilling, the plants are ſure to come up quickly, becauſe in every row half the ſeed is planted at four inches deep, from which, or even a greater depth, this ſeed will come up well; and the other half is planted exactly over that, at half an inch depth, falling in upon the earth that has covered the firſt half. Thus planted, if the ſucceeding weather be ever ſo dry, the deep half of the ſeed will certainly come up; and if it chance to rain much ſoon after the ſowing, then the ſhallow half will be up firſt. The plants may alſo be made to come up at four ſucceſſive times, by mixing the ſeed half new and half old, for the new will be ſure to come up two days, or thereabouts, before the old.

Turnep-ſeed ſhould always be ſown in this manner, in order to its eſcaping the danger of the fly, which otherwiſe often deſtroys whole fields of the young plants; but theſe four chances ſecure it; for though one coming up ſuffers, another eſcapes it, it being often found, that the ſeed ſown over night had been ruined by the fly, while that ſown the next morning has wholly eſcaped.

When the fly is found likely to devour them, they may be horſe-hoed; this will bury the greateſt part of thoſe animals; or they may be drilled in another row, without new ploughing the land. This fly feeds only on the two firſt or ſeed-leaves of the *turnep*, which are very ſweet; the following leaves are rough, and do not ſuit its taſte; ſo that if the plants eſcape being eaten up while in the ſeed-leaves, they eſcape entirely.

The moſt infallible of all methods of preventing the miſchief from this fly, is to make the ground very fine, and then roll it with a heavy roller acroſs the ridges, after it is drilled; this method cloſes up the cavities in the earth, and prevents the fly's entrance or exit to lay the eggs, hatch, or bring forth the young ones, to prey upon the *turneps*. This rolling always diſappoints the fly, but it ſometimes alſo diſappoints the owner, if he has ſown the crop by hand in a ſcattering manner. Theſe ſeeds, lying near the ſurface, are injured, and the ground, hardened by the roller, will not let them grow well, but they become yellow, dwindle, and come to no perfection, unleſs they have a thorough hoeing, as ſoon as the rough leaves appear. The drilled *turneps*, being in ſingle rows, with ſix-foot intervals, may be rolled without danger; for, be the ground ever ſo hard, the hand-hoe will eaſily ſingle them out to a proper diſtance, at the expence of ſix pence an acre, or leſs, if not in harveſt; and the horſe-hoe will plough in thoſe wide intervals to great advantage, whether the ſeaſon be wet or dry. Three or four ounces of ſeed in the drill way, anſwer for as much land as three or four pounds in the hand-ſowing; and there is this other advantage, that the plants, all ſtanding in rows, will be eaſily diſtinguiſhed, and properly ſingled out to their due diſtances, while very young; which is a thing of great advantage, as they thrive much the better for being early ſeparated from their uſeleſs neighbours. The ſix-foot ridges, whereon *turneps* are drilled in ſingle rows, may be left higher than for double-rowed crops; becauſe there will be more earth in the intervals, as the ſingle rows take up leſs.

Mr. Tull for ſome time drilled his *turnep*-ſeed upon ſix feet ridges, a ſingle row on the middle of each, and found that, in this way, his crops were better than on three feet ridges; but upon farther trial, he found four feet ridges were more proper than ſix; and at the end of his table of the contents of the Horſe-hoeing Huſbandry he adviſes thoſe who have the engine for drilling *turnep*-ſeed to ſow in ſingle rows, on high four feet ridges; but where they are deſigned for ſeed, in ſix feet ridges.

There is no prefixed time for planting *turneps*, becauſe the nature of the ſoil muſt be conſulted; ſome land will bring them as forward when planted in Auguſt, as other land will when planted in May; but the uſual time is the middle between theſe, that is, about Midſummer. It is a practicable ſcheme, when *turneps* are planted in rows, with theſe large intervals, to ſow wheat between. In the latter end of September, when the *turneps* are full grown, a ridge is to be ploughed in the middle of each of the intervals, taking the earth to the ridge in ſuch quantity, as only to leave enough with the *turneps* to keep them alive; wheat is to be drilled on this ridge. Toward ſpring the *turneps* are, in this caſe, to be pulled up, and carried off the ground. The wheat being now left alone, the land is to be well horſe-hoed in the intervals. In ſpring the wheat may be ſown in treble rows, and will afford a good crop. If the *turneps* ſtand ſo thick in theſe ſingle rows as to touch one another, when half grown, provided the intervals between the rows be well horſe-hoed, they will yet attain to their full bigneſs; and they are often found to have thruſt one another out of ſhape, and become oval inſtead of round.

Sir Digby Legard informs us, that he has generally ſown *turneps* in the intervals of his drilled barley, immediately after the laſt horſe-hoeing, about the beginning of July. The land is then reduced to excellent tilth; and nothing more is neceſſary than to ſow the ſeed pretty thick. The firſt ſhower of rain waſhes it into the ground, and covers it, without the aid of the harrow. The young plants enjoy the benefit of the freſh tilled earth, and, the corn being reaped ſoon afterwards, the whole field is left for the *turneps* to extend their roots in it. He adds, that he has had nearly as good crops of *turneps* in this way as when the land was occupied by that plant alone.

Mr. Philpot Chambers, a correſpondent of the Society of Arts, having in the beginning of March ſown a piece of land with long-podded beans, which were both horſe-hoed and hand-hoed, as uſual, in the ſummer-time, ſowed *turneps* among them towards the end of the July following, and hoed the beans, which ſerved both to clear them of weeds, and to cover the *turnep*-ſeed. When the *turneps* were up, and ſufficiently ſecured from the fly by the ſhade of the beans, theſe were pulled up, and the *turneps* hoed out. The time, he ſays, of ſowing the *turneps*, muſt be left to the diſcretion of the farmer. About three weeks before the beans are fit to pull is a good time for it; for thus the *turneps* will be ſtrong, and out of danger of the fly: though he never knew any *turneps* eaten by the fly, which were ſown among beans. Mem. Agr. vol. i. p. 328. vol. ii. p. 358.

It is beſt to give the firſt hoeing alternately; that is, to hoe only every other interval; this keeps them from being ſtinted, and proves better thus to give them their food at twice, than to do it all at once.

In horſe-hoeing it is not well to come nearer than within three inches of the ſides of the rows; but where the *turneps* are planted in double rows, as ſoon as their roots are grown as large as a finger, the prong-hoe is to be uſed between the plants; and even in that little ſpace of three inches, left by the horſe-hoe, when they are in ſingle rows. Four of the alternate hoeings in the intervals are found, on trial, to be equal in uſe to four whole hoeings, though they are done at half the expence; for this half-hoeing furniſhes the *turneps* with as much nouriſhment as they require, and it is in vain to give more.

Dry weather is very injurious to *turneps*, when ſown in the common way, and only hand-hoed; becauſe the hoe, in this caſe, does not penetrate deep enough to keep the ground moiſt; but in horſe-hoeing the earth is cut ſo deep, that it is always kept moiſt, and a dry ſeaſon does the crop no hurt. Dung and tillage will, in all caſes, do their buſineſs quicker than tillage alone. On this principle, *turneps* have more occaſion for dung than any other plants, becauſe they have leſs time to grow.

Twelve pound weight may be eſteemed the middle ſize for the great *turneps*, and they ſometimes grow to ſixteen or nineteen pound weight. The farmers great intereſt in them is their ſize; and it ſeems evident that every *turnep* in a field may be made to grow to its full ſtandard, or the largeſt ſize that nature has allotted it, provided it be properly managed, and nouriſhment ſupplied in a due manner. The greateſt inconvenience that attends *turnep* huſbandry, is, that when they are to be eaten off in the ſpring, which is their chief uſe, they do not leave time for bringing the land in tilth for barley; and the loſs of a crop of this is more than the gain by the *turneps*; but this is wholly remedied by the horſe-hoeing huſbandry, in which the land may be almoſt as well tilled before the *turneps* are eaten off, as afterwards. When the ground has been thus ſtirred in every part, one ploughing will be ſufficient, after the *turneps* are eaten, for the ſowing of barley, or any other crop.

If the *turneps* be ſown in June, the moſt experienced farmers will have only thirty plants left to a ſquare perch in the hand-hoeing, finding that if more are left, they ſtarve one another, and the crop will be worſe; but in drilling the rows at ſix foot intervals, there will be at leaſt ſixty left to the perch, and theſe will thrive well, if the ſoil be rich, and well broken.

Sixty *turneps* to a ſquare perch, at five pound each, which is but a third part of the ſize of ſheep-*turneps* at their full growth, will make a crop of above eighty quarters to an acre.

When *turneps* are planted late upon poor ground, they may be left more numerous; becauſe they will not have the advantage of heat for the hoeing, that would make them grow larger, when ſet out at great diſtances.

The greateſt *turnep* improvement of the farmer is for his cattle in winter; one acre of *turneps*, at this ſeaſon, will maintain more than fifty of meadow or paſture land. Moſt cattle will eat *turneps*, and they breed milk better than any other food whatever. Sheep always refuſe them at firſt, and, unleſs they have eaten them while lambs, they will be ready to ſtarve before they will touch them; but as ſoon as hunger compels them to fall to, they are ſoon fattened by them. Lambs of three weeks old will ſcoop and eat them; while thoſe of a year old, which are called *tegs*, will not touch them for three or four days, till almoſt famiſhed.

In ſome places, the greateſt uſe of *turneps*, except for fattening oxen and ſheep, is for ewes and lambs in the ſpring, when natural graſs is not grown up on poor grounds. Sometimes the farmers are obliged to keep their ewes and lambs upon them till April, though they were run up to ſeed in the mean time.

There are three manners of ſpending *turneps* with ſheep. See SHEEP.

It is a common miſtake, ſays Mr. Miller, that the mutton of ſheep fatted with *turneps* is rank and ill-taſted; whereas the beſt mutton which this country affords is thus fatted, and the rank mutton, the fat of which is yellow, is produced by the low marſhy lands of Lincolnſhire, and other rank paſtures. *Turneps* are always carried off the field, when they are intended to fatten the larger ſort of cattle, and they ſhould be cut in pieces, leſt they choke themſelves with the whole ones. Inſtruments of a peculiar ſtructure have been contrived, with this view, for ſlicing *turneps*. Theſe roots ſerve for feeding and fattening, not only ſheep, oxen, and cows, but likewiſe hogs, which will eat them greedily, and thrive apace: they will eat them raw, but it is better to boil them when the hogs are to be fattened.

In order to ſave good *turnep*-ſeeds, ſome of the faireſt roots ſhould be tranſplanted in February, at the diſtance of two feet, and the ground cleared from weeds: as the ſeed ripens, it ſhould be well guarded from birds, and when ripe, the plants may be cut and dried in the ſun; after which it may be threſhed out, and preſerved for uſe.

There have been many receipts for preſerving *turneps* from the fly: the following have been tried by Mr. Miller with ſucceſs; viz. ſteeping the ſeeds in water, mixed with flour of brimſtone, ſo as to make it ſtrong of the brimſtone; or ſteeping it in water mixed with a quantity of the juice of horſe-aloes. The ſowing of ſoot or tobacco-duſt over the young plants, as ſoon as they appear above the ground, has been found ſerviceable; and, indeed, whatever will add vigour to the young plants will prevent their being deſtroyed by the fly, which never attacks them till they are ſtinted in their growth. Some have ſcattered ſlacked lime over them every morning before the dew was off. Mr. Reynolds recommends mixing the *turnep*-ſeed with long-top radiſh ſeed, which the flies much admire; the reddiſh leaves will ſupply theſe inſects till the *turnep* plants are ſufficiently grown to eſcape them. But if they are numerous, he adviſes to run a light roller over them night and morning, whilſt the dew remains, which will either lick them up or deſtroy them. Crops of *turneps* are ſometimes deſtroyed by caterpillars, when they are grown ſo large as to have ſix or eight leaves on a plant. The ſureſt method of deſtroying theſe is to turn a flock of hungry poultry early in the morning into the field, which will devour the inſects, and clear the *turneps*. Thoſe *turneps* that are ſown in drills are leſs in danger than others, becauſe the ground between the rows being well ſtored, the plants will be kept growing, and be in no danger of ſuffering from theſe inſects, which attack only ſuch as are ſtinted. Tull's Horſe-hoeing Huſbandry, p. 44, &c. Miller's Gard. Dict.

Turneps are accounted a ſalubrious food; demulcent, detergent, ſomewhat laxative and diuretic, but liable in weak ſtomachs to produce flatulencies, and prove difficult of digeſtion; the liquor, preſſed out from them after boiling, is ſometimes uſed medicinally, in coughs and diſorders of the breaſt. The ſeeds have been accounted alexipharmic or diaphoretic; they have no ſmell, but diſcover to the taſte a mild acrimony, ſeemingly of the ſame nature with that of muſtard-ſeed, though far weaker. Lewis.

Stealing or otherwiſe deſtroying *turneps*, when growing, is by ſtatute puniſhable criminally, by whipping, ſmall fines, impriſonment, and ſatisfaction to the party wronged, according to the nature of the offence. By 13 Geo III. c. 32. the offender ſhall, on conviction before one juſtice, by confeſſion on oath of one witneſs, forfeit ſuch ſum, not exceeding 10*s*. over and above the value of the goods ſtolen, as to the juſtice ſhall ſeem meet; and in default of payment, be committed to hard labour, for a time not exceeding one month.

TURNEP, *French*, the name by which ſome call the *napus* of botanical writers. See NAPUS, and TURNEP.

TURNEP-*cabbage*, in *Botany*. See CABBAGE.

TURNEP-*rooted cabbage*. See CABBAGE.

TURNER'S *cerate*. See CERATUM *epuloticum*.

TURNERA, in *Botany*, a genus of the *pentandria trigynia* claſs. Its characters are theſe: the empalement of the flower is funnel-ſhaped, of one leaf, having an oblong, cylindrical, angular tube, and is cut into five ſegments; the flower has five heart-ſhaped, pointed, plain petals, inſerted in the tube of the empalement, terminated by acute-pointed, erect ſummits, and a conical germen, ſupporting three ſlender ſtyles, crowned by hairy, many-pointed ſtigmas; the germen afterward turns to an oval capſule with one cell, which opens at the top with three valves, and contains ſeveral oblong, obtuſe ſeeds. Miller enumerates two, and Linnæus four ſpecies.

TURNESOLE, or TURNSOLE, *heliotropium*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the empalement of the flower is of one leaf, tubulous at the bottom, and cut into five ſegments at the brim; the flower hath one petal, with a tube of the length of the empalement, ſpreading flat above, where it is cut into five parts, which are alternately larger than the other; the chaps of the tube are cloſed, and have five prominent ſcales, joined in form of a ſtar; it hath five ſhort ſtamina, terminated by ſmall ſummits, and four germina at the bottom of the tube, with one ſlender ſtyle of the length of the ſtamina, crowned by an indented ſtigma; the germina afterward become ſo many ſeeds ſitting in the empalement. Linnæus enumerates eight, and Miller eleven ſpecies.

Some have tranſlated *turneſole* by the Engliſh word *ſunflower*, which has lead many to ſuppoſe that the great yellow ſun-flower, which we keep in gardens, was the plant that afforded the *turneſole* colour: but this is a miſtake; and it is to be obſerved, that the true *turneſole* plant, or *heliotropium tricoccum*, is very common in the fields of France, eſpecially about Montpelier, and in Germany, but does not grow wild with us in England.

The juice of the berries of the *turneſole*, rubbed upon paper or cloth, at the firſt appears of a freſh lovely green, but preſently changes into a kind of bluiſh purple. It is ſaid that the common blue paper receives its colour from this juice. The ſame cloth, afterwards wet in water, and wrung out, will turn the water into a claret-colour; and it is to be obſerved, that the rags of cloth tinctured by this juice, and turned red by acids, are uſually called *turneſole* in the druggiſts ſhops, and employed for colouring wines and other liquors. M Niſſole, of the French Academy of Sciences, ſays, that the colouring juice is obtained, not from the berries, but from the tops of the plant, gathered in Auguſt, ground in mills, and then committed to the preſs. The juice is expoſed to the ſun about an hour; the rags dipt in it, dried in the ſun moiſtened by the vapour which ariſes during the ſlacking of quicklime with urine, then dried again in the ſun, and dipt again in the juice. The Dutch, and others, are ſaid to prepare theſe rags and *turneſole* in the maſs from other ingredients, of which ARCHIL is a principal one. Boyle's Works abr. vol. ii. p. 19. Neumann's Chem. by Lewis, p. 433.

The principal uſe of this plant is in dying: in order to which, the juice is inſpiſſated and prepared with calx and urine, into blue cakes; which are uſed alſo with ſtarch, inſtead of ſmalt.

The lixivium of this plant in lime-water and urine, or in the volatile ſpirit of wine, turns marble blue. See *Colouring of* MARBLE.

TURNETUM, in our *Old Law-Books*, a duty paid to the ſheriff for holding his TURN, or county-court.

TURNING, a branch of ſculpture; being the art of faſhioning hard bodies, as braſs, ivory, wood, &c. into a round, or oval form, in a lathe.

Turning is performed by putting the ſubſtance to be *turned* upon two points, as an axis, and moving it about on that axis; while an edge-tool, ſet ſteady to the outſide of the ſubſtance, in a circumvolution thereof, cuts off all the parts that lie farther off the axis, and makes the outſide of that ſubſtance concentric to the axis.

The invention of *turning* appears to be very ancient.—Some indeed, to do honour to late times, will have it brought to perfection by the moderns; but if what Pliny, and ſome other ancient authors relate, be true, that the ancients *turned* thoſe precious vaſes, enriched with figures and ornaments in relievo, which we ſtill ſee in the cabinets of the curious; it muſt be owned, that all that has been added in theſe ages, makes but a poor amends for what we loſt of the manner of *turning* of thoſe times.

The principal inſtruments uſed in *turning*, beſide the lathe, are chiſſels and mandrels of various forms; the deſcription whereof ſee under their proper articles.

TURNING-*evil*, in *Cattle*, a diſeaſe that cauſes them frequently to turn round in the ſame place. It is alſo called the *ſturdy*.

The common remedy, recommended by Mr. Markham, is to throw the beaſt down, and bind him; then to open his ſkull, and take out a little bladder, filled with water and blood, which uſually lies near the membrane of the brain, and then gradually heal the wound. Boyle's Works abr. vol. i. p. 87.

TURNING *paliſades*. See PALISADE.

TURNING *to windward*, in *Sea Language*, denotes that operation in ſailing wherein a ſhip endeavours to make a progreſs againſt the direction of the wind, by a compound courſe, inclined to the place of her deſtination. This method of navigation is otherwiſe called *plying*. See TACKING.

TURN-*up compaſſes*. See COMPASSES.

TURNO *vicecomitum*, a writ that lies for thoſe that are called to the *ſheriff's turn*, out of their own hundred.

TURNPIKE, a gate ſet up acroſs a road, watched by an officer for the purpoſe, in order to ſtop travellers, waggons, coaches, &c. to take toll of them, or money towards repairing or keeping the roads in repair.

There are ſeveral ſtatutes, which have eſtabliſhed regulations relating to *turnpike* roads, the principal of which, beſides thoſe recited under HIGHWAY, are as follow. No perſon ſhall be capable of acting as a truſtee in ſuperintended *turnpike*-roads, who is not poſſeſſed of lands, &c. of the clear yearly value of 40*l*. or perſonal eſtate to the value of 800*l*. to which purpoſe he makes oath before two truſtees, or heir apparent of a perſon poſſeſſed of an eſtate in land of the clear yearly value of 80*l*. No alehouſe keeper, nor perſons retailing liquors of any kind, are capable of acting as truſtees, or holding any place under them, or collecting the toll; but they are not precluded from farming the tolls, provided ſome other perſon collects them. No gate-keeper, or perſon renting the tolls, and reſiding in the toll-houſe, ſhall gain a pariſh ſettlement, nor ſhall the tolls, or toll-houſe, be aſſeſſed to the poor rate, or any other public or parochial levy. Any gate-keeper, permitting a violation of the orders pertaining to carriages and horſes, and not proceeding within one week for the recovery of forfeitures, ſhall forfeit 40*s*.; and both he, and the ſurveyor, ſhall render upon oath, when required by written notice from the truſtees, an account of all money received, on pain of 5*l*.; and all officers ſhall deliver up their books, &c. relating to the execution of their offices, within ten days after written notice, on pain of 20*l.*; and all perſons concerned in the execution of acts relating to *turnpike*-roads, neglecting their duty, ſhall forfeit 10*l.* The truſtees, whoſe meetings are aſſembled by ten days notice affixed on the toll gates, or other conſpicuous places, and adjourned for no longer time than three calendar months, or any five of them, may cauſe weighing engines to be erected at the toll-gates, order the weighing of carriages and their loads, and take an additional toll for every hundred weight, over and above the following weights; viz. for every four-wheel carriage, having the fellies of the wheel ſixteen inches broad, eight tons in ſummer, and ſeven in winter; for every waggon and wain, with axles of different lengths, having the diſtance of the nearer pair of wheels on the ground not more than four feet two inches, and the diſtance of the other pair ſuch, that the fore and hind wheels ſhall roll only a ſingle ſurface ſixteen inches wide at the leaſt on each ſide of the carriage, and the fellies nine inches from ſide to ſide, ſix tons ten hundred in ſummer, and ſix tons in winter; for every four-wheeled carriage, having the bottom of the fellies of the wheels nine inches broad, ſix tons in ſummer, and five tons ten hundred in winter; for every cart, having fellies of nine inches, three tons in ſummer, and two tons fifteen hundred in winter; for every waggon, having the fellies of the wheels ſix inches broad, four tons five hundred in ſummer, and three tons fifteen hundred in winter; for every waggon, rolling a ſurface of eleven inches, five tons ten hundred in ſummer, and five tons in winter; for every cart of the ſame dimenſions, two tons twelve hundred in ſummer, and two tons ſeven hundred in winter; for every waggon, having the bottom of the fellies of the wheels of leſs breadth than ſix inches, three tons ten hundred in ſummer, and three tons in winter; and for every cart of the ſame dimenſions, one ton ten hundred in ſummer, and one ton ſeven hundred in winter: ſummer, in all theſe caſes, being determined from May 1 to October 31, and winter from November 1, to April 30. The additional toll ſhall be as follows; viz. for the firſt and ſecond hundred of over-weight, the ſum of 3*d.* for each hundred; for every hundred above two, and not exceeding five hundred, 6*d.*; for every hundred above five, and not exceeding ten hundred, 2*s.* 6*d.*; for every hundred above ten, and not exceeding fifteen hundred, 5*s.*; and for every hundred above fifteen hundred, 20*s.* The truſtees, however, of the ſeveral *turnpike*-roads within ten miles of London, Weſtminſter, and Southwark, are allowed to lower theſe additional tolls at pleaſure. The toll-taker offending againſt theſe regulations, incurs a forfeiture of 5*l*; but the preceding regulations of weight do not extend to any carriage employed in huſbandry, and carrying manure for land, hay, ſtraw, fodder, or corn unthraſhed; except hay or ſtraw carried for ſale; nor ſhall any toll be taken for horſes belonging to officers or ſoldiers upon their march, or upon duty, or for any horſes, cattle, or carriages, employed in carrying their arms or baggage, &c. It is required, that a table of the ſeveral tolls be put up at every toll-gate. For the encouragement of broad wheels, the truſtees are empowered to reduce the toll of carriages, having wheels ſix inches broad, ſo that it may not be greater than that which is taken for four-wheeled carriages drawn by four horſes; and for carts, having the fellies of their wheels ſix inches broad, no more than for carts drawn by three horſes; but for every carriage, having the fellies of their wheels of leſs breadth than ſix inches at the bottom, and for the horſes, &c. one half more than the tolls payable for the ſame reſpectively, except carriages carrying corn in the ſtraw, hay, ſtraw, fodder, dung, lime for the improvement of land, or other manure, and implements of huſbandry. The fellies of the wheels of carriages, entitled to the above exemptions, and the tire upon them, are required to be ſo flat, as not to deviate more than one inch from a flat ſurface. And all carriages, moving upon rollers ſixteen inches broad on each ſide, with flat ſurfaces, ſhall pay only ſo much toll as ſhall not exceed half of the full toll payable for carriages having the fellies of the wheels ſix inches broad, and not rolling a ſurface of ſixteen inches on each ſide; and half toll ſhall be paid for waggons having the fellies of the wheels nine inches broad, and rolling a ſurface of ſixteen inches on each ſide. Theſe regulations do not extend to any chaiſe marine, coach, landau, berlin, chariot, chaiſe, chair, calaſh, or hearſe; nor to the carriage of ammunition or artillery for his majeſty's ſervice; nor to any carriage drawn by one horſe or two oxen; nor to any carriage having the fellies of the wheels nine inches broad, and laden with one block of ſtone or marble, one cable rope, and one piece of metal or timber; and no toll ſhall be paid at any *turnpike*-gate for carriages employed in carrying materials for the repair of any *turnpike*-road, or public highway. No four-wheeled carriage, having the fellies of the wheels of leſs breadth than ſix inches, ſhall paſs on any *turnpike*-road with more than four horſes. For other regulations, relating to the number of horſes, ſee HIGHWAY. Any carriage may be drawn with any number of horſes upon a *turnpike*-road, where a weighing engine ſhall be erected, provided the carriage be weighed at ſuch engine; and the truſtees may allow for hills, the riſe of which ſhall be more than four inches in a yard, ſuch number of horſes as they ſhall think neceſſary, not exceeding ten for waggons with nine-inch wheels, nor ſix for carts with nine-inch wheels; and not exceeding ſeven for waggons with ſix-inch wheels, nor five for carts with ſix-inch wheels; and not exceeding five for waggons with wheels of leſs breadth than ſix inches, nor four for carts of ſuch dimenſions. There is alſo an exception in favour of carriages that are drawn in deep ſnow or ice. No carriages, with the fellies of the wheels of leſs breadth than nine inches, ſhall be allowed to paſs upon any *turnpike*-road, if the ſame ſhall be drawn by horſes in pairs; except ſuch, having the breadth of the fellies ſix inches, authorized by ſeven or more truſtees, and carriages drawn by two horſes only. The penalty on conviction, by confeſſion or oath of one witneſs, is a forfeiture not exceeding 5*l.* nor leſs than 10*s.* The penalty of evading the tolls, by unloading goods, is 5*l.*; by turning out of the road, for the owner, any ſum not exceeding 5*l.* nor leſs than 20*s.*; but for the driver, if he be not the owner, any ſum not exceeding 50*s.* nor leſs than 10*s.*; by taking out horſes, 5*l.*; or by taking the benefit of any exemptions fraudulently, a ſum not exceeding 5*l.* nor leſs than 40*s.* Exemptions in favour of cattle going to or from water, or paſture, ſhall extend only to ſuch as ſhall be driven from one pariſh to the next adjoining, or that ſhall not paſs upon the *turnpike*-road more than the ſpace of two miles. *Turnpike*-roads are kept in repair by the ſtatute-duty, required by the ſeveral acts, or if this be inſufficient, by contracting for labour, &c. The ſurveyor of any *turnpike*-road, who ſhall ſuffer to remain in any part, within ten feet on either ſide of the middle of it, for four days, any heap of ſtones, rubbiſh, &c. obſtructing the paſſage of it, ſhall forfeit 40*s.*; and any perſon encroaching on it by a ditch, fence, &c. ſhall forfeit 40*s.*; and the truſtees may direct proſecution by indictment for any nuiſance, at the expence of the tolls. See HIGHWAY.

If any perſon ſhall wilfully or maliciouſly deſtroy any *turnpike*-gate, poſt, rail, wall, chain, bar, or other fence, ſet up to prevent paſſengers from paſſing without paying toll, or any houſe erected for the uſe of ſuch gate, or any weighing engine, or reſcue any perſon in cuſtody for ſuch offences, he ſhall be found guilty of felony, and tranſported for ſeven years, or committed to priſon for any time not exceeding three years. The indictment for ſuch offences may be inquired of, heard, and determined in any adjacent county; and the hundred ſhall anſwer damages, as in caſes of robbery. If the truſtees erect a gate where they have no power, the juſtices upon complaint may order the ſheriff to remove it. As for direction ſtones, &c. ſee HIGHWAY.

The truſtees are empowered to let the tolls to farm, in conſequence of public notice, to the beſt bidder; and if the farmer of the tolls ſhall take a greater or leſs toll than he ought to do, he ſhall forfeit 5*l.* and the contract; and every other gate-keeper, offending in the ſame way, ſhall forfeit 40*s.* The truſtees may alſo leſſen the tolls during ſuch time as they ſhall think proper, provided that the perſons entitled to five-ſixths of the money remaining due upon ſuch tolls conſent. The penalty for obſtructing the execution of any *turnpike* act is a forfeiture of a ſum not exceeding 10*l.* nor leſs than 40*s.* to be paid to the ſurveyor for the uſe of the road, or commitment to the common gaol, or houſe of correction, for any time not exceeding three months, unleſs the money be ſooner paid. Perſons aggrieved by proceedings in the execution of *turnpike* acts may appeal with previous notice, to the general quarter-ſeſſions, when the juſtices ſhall determine the appeal, and award coſts, &c. But all actions are limited to thirty-three calendar months after the fact committed, and to the county where the defendant reſides, or the fact was done; and the defendant may plead the general iſſue, and if he prevails in the action, have treble coſts. 13 Geo. III. cap. 84. 14 Geo. III. cap. 82. 16 Geo. III. cap. 39. 17 Geo. III. cap. 16. 18 Geo. III. cap. 28. cap. 63. Burn's Juſtice, art. *Highways.*

The firſt *turnpike* road erected by law was A. D. 1663. 16 Car. II. cap. 1.

TURNPIKE is alſo uſed, in the *Military Art*, for a beam ſtuck full of ſpikes, to be placed in a gap, or breach, or at the entrance of a camp, to keep off an enemy. See CHEVAL *de friſe.*

TURNSOLE. See TURNESOLE.

TURNSPIT, *verſator*, in *Zoology*, a variety of the DOG, which belonged, in the arrangement of Dr. Caius, to the claſs of degeneres, curs, or mongrels.

TURNSTONE, in *Ornithology*, the Engliſh name of a bird, the TRINGA *morinellus* of Linnæus, called by authors *morinellus marinus*, or ſea-dotterel.

It is a little larger than the blackbird; its head moderately thick, and its body of a longiſh ſhape; its beak a finger's breadth long, thick and whitiſh at the baſe, and ſharp and black at the point; and its head, neck, ſhoulders, wings, and the upper part of its breaſt, are of a browniſh colour; its throat and forehead are aſh-coloured; the back and rump are white; the middle of its back is marked with a very large triangular black ſpot; the tail conſiſts of twelve feathers, the lower half white, the upper black, and the tips white; the quill-feathers are duſky, but from the third or fourth the bottoms are white, increaſing to about the nineteenth, when the feathers are entirely of that colour; its legs are ſhort, and of a reddiſh-yellow or orange colour.

Theſe birds take their name from their method of ſearching for food, by turning up ſmall ſtones with their ſtrong bills, to get at the inſects that lurk under them. Ray and Pennant.

Mr. Pennant mentions another ſpecies, which is the *turnſtone* from Hudſon's Bay, and the TRINGA *interpres* of Linnæus; often ſhot in the north of Scotland and its iſlands, and alſo in North America. This bird is of the ſize of a thruſh; the forehead, throat, and belly, are white; the breaſt black; the neck ſurrounded with a black collar, whence another bounds the ſides of the neck, and paſſes over the forehead; the head and lower part of the neck behind white; the firſt ſtreaked with duſky lines; the back ferruginous, mixed with black; the coverts of the tail white, croſſed with a black bar; the tail black, tipt with white; and legs rather ſhort, and of a full orange.

TURONILLA, in *Ichthyology*, a name given by ſome authors to the common little prickly fiſh called the STICKLEBACK, or *barnſtickle*.

TURPENTINE, *terebinthina*, a tranſparent ſort of reſinous juice, flowing either naturally, or by inciſion, from ſeveral unctuous and reſinous trees: as the terebinthus, larch, pine, fir, &c.

Medical writers diſtinguiſh four kinds of *turpentines*; as that of Chio, or Cyprus, that of Venice, that of Straſburg, and the common *turpentine*.

The *turpentine* of Chio, or Cyprus, which is the fineſt genuine kind, and that which gives the denomination to all the reſt, is generally about the conſiſtence of thick honey, very tenacious, clear, and almoſt tranſparent, of a white colour, with a caſt of yellow, and frequently of blue, of a warm, pungent, bitteriſh taſte, and a fragrant ſmell, more agreeable than that of any of the other *turpentines*.

This is the produce of the common terebinth, or *piſtachia terebinthus* of Linnæus (ſee MASTICH-*tree*), an evergreen bacciferous tree or ſhrub, growing ſpontaneouſly in the eaſtern counties, and in ſome of the ſouthern parts of Europe. The *turpentine* brought to us is extracted in the iſlands whoſe name it bears, by wounding the trunk and branches a little after the buds have come forth: the juice iſſues thin and clear as water, and by degrees thickens into the conſiſtence in which we meet with it. A like juice, exuding from this tree in the Eaſt, inſpiſſated by a ſlow fire, is ſaid by Kæmpfer to be uſed as a maſticatory by the Turkiſh women, for preſerving the teeth, ſweetening the breath, and promoting appetite.

The *turpentine* of Venice is uſually thinner than any of the other ſorts, of a clear whitiſh or pale yellowiſh colour, a hot, pungent, bitteriſh, diſagreeable taſte, and a ſtrong ſmell, without the aromatic flavour of the Chian kind. The true Venice *turpentine* is ſaid to be obtained from the LARCH-*tree*, or *pinus larix* of Linnæus, growing in great abundance on the Alps and Pyrenees, and not uncommon in the Engliſh gardens. For this purpoſe inciſions are made at about two or three feet from the ground into the trunk of the trees, and into theſe they fix narrow troughs, about twenty inches long. The end of theſe troughs is hollowed like a ladle; and in the middle is a ſmall hole bored, through which the *turpentine* runs into a receiver placed below it. The people who gather it viſit the trees morning and evening, from the end of May to September, to collect the *turpentine* out of the receivers. When it flows out of the tree, it is clear, like water, and of a yellowiſh white; but as it grows older, it thickens, and becomes of a citron colour. Though this kind of *turpentine* bears the name of Venice, it is not the produce of the Venetian territories: it is brought from ſome parts of Germany, and one greatly reſembling it, as it is ſaid, from New England. It is alſo procured in great abundance in the neighbourhood of Lyons, and in the valley of St. Martin, near Lucern, in Switzerland.

The *turpentine* flowing naturally, and called by the peaſants *bijon*, is a kind of balſam, not inferior in virtue to that of Peru. That drawn by inciſion, after the tree has ceaſed to yield ſpontaneouſly, is alſo of conſiderable uſe in ſeveral arts, and it is even of this that varniſh is chiefly made. It muſt be choſen white and tranſparent; and care ſhould be taken it have not been counterfeited with ſome other *turpentine*.

In the ſhops *turpentine* of Venice is often ſupplied by a compoſition of roſin, and the diſtilled oil of common *turpentine*.

Turpentine of Straſburg is generally of a middle conſiſtence between the two former, more tranſparent, and leſs tenacious than either, in colour yellowiſh brown, in ſmell more agreeable than any of the other *turpentines*, except the Chian; in taſte the moſt bitter, yet leaſt acrid. This juice is extracted, in different parts of Germany, from the ſilver and red fir, by cutting out, ſucceſſively, narrow ſtrips of the bark, from the height which a man can reach, to within two feet of the ground. In ſome places, a reſinous juice is collected from certain knots, under the bark: this, called *lacryma abiegna*, and *oleum abietinum*, is accounted ſuperior to the *turpentine*. Neither this *turpentine*, nor any thing under its name, is at preſent common in the ſhops.

Common turpentine is about the conſiſtence of honey, of an opake, browniſh, white colour, the coarſeſt, heavieſt, and in ſmell and taſte the moſt diſagreeable, of all the kinds of *turpentine*. It is obtained from the wild PINE, which is extremely reſinous; inſomuch that, if not evacuated of its juice, it often ſwells and burſts. The juice, as it iſſues from the tree, is received in trenches made in the earth, and afterwards freed of its groſſer impurities by colature through wicker baſkets. The cones of the tree appear to contain a reſinous matter, of a more grateful kind than that of the trunk; diſtilled while freſh, they are ſaid to yield a fine eſſential oil, called by the Germans *carpathicum oleum*, much ſuperior to that of the *turpentines*.

All theſe juices diſſolve totally in rectified ſpirit, but give out little to watery menſtrua: they become miſcible with water into a milky liquor, by the mediation of the yolk or white of an egg, and more elegantly by mucilages. Diſtilled with water, they yield a conſiderable quantity of a ſubtile, penetrating, eſſential oil, vulgarly called ſpirit. Neumann ſays, that ſixteen ounces of Venice *turpentine*, being diſtilled with water, yielded four ounces and three drams of eſſential oil; and the ſame quantity, diſtilled without water, yielded with the heat of a water bath, two ounces only. The eſſential oil cannot without great difficulty be diſſolved in ſpirit of wine: one part of the oil may be diſſolved in ſeven parts of rectified ſpirit of wine; but on ſtanding a while, the greateſt part of the oil ſeparates, and falls to the bottom. After diſtillation of *turpentine* with water, a yellow or blackiſh reſin remains in the ſtill, which is the common ROSIN of the ſhops. See *Burgundy* PITCH.

The eſſential oil, rediſtilled by itſelf in a retort, with a very gentle heat, becomes more ſubtile, and in this ſtate is called ethereal; a thick matter remaining behind, called balſam of turpentine. A like balſam is alſo obtained by diſtilling, with a ſtronger fire, the common reſin; from which there ariſes, firſt, a thin yellow oil, and afterwards the thicker dark-reddiſh balſam, a blackiſh reſin, called COLOPHONY, remaining in the retort.

All the *turpentines* are hot ſtimulating corroborants and detergents. They are given, where inflammatory ſymptoms do not forbid the uſe of them, from half a ſcruple to half a dram and upwards, for cleanſing the urinary paſſages, and internal ulcerations in general, and in laxities of the ſeminal and uterine veſſels. They ſeem to act in a peculiar manner on the urinary organs, impregnating the water with a violet ſmell, even when applied externally, particularly the Venice ſort. This laſt is accounted the moſt powerful as a diuretic and detergent, and the Chio and Straſburg as corroborants. They all looſen the belly, but the Venice moſt; and on this account they are ſuppoſed by Riverius and others to be leſs hurtful than ſuch irritating diuretics,, as are not accompanied with that advantage. Dr. Cullen remarks, that terebinthinate glyſters, in obſtinate coſtiveneſs, are much preferable to ſaline, as being more certain and durable. The common *turpentine*, as being the moſt offenſive, is rarely given internally; its principal uſe is in ſome external applications, among the farriers, and for the diſtillation of the oil.

The oil is a moſt potent, ſtimulating, detergent diuretic. It is ſometimes given, in doſes, of a few drops, in rheumatiſms and fixed pains of the joints; and ſome have ventured on much larger quantities. Cheyne recommends (Eſſ. on the Gout, p. 119. ed. 10.), as a perfect cure for SCIATICAS, though of many years ſtanding, from one to four drams of the ethereal oil, to be taken with thrice its quantity of honey, in a morning faſting, with large draughts of ſack-whey after it, and an opiate at bed-time: this medicine is to be repeated, with the occaſional intermiſſion of a day, if daily repetitions cannot be borne, for four or five days, or eight at fartheſt. It appears, however, ſays Dr. Lewis, highly imprudent to venture on ſuch large doſes at once of a medicine ſo very hot and ſtimulating. Boerhaave, after recounting, not without ſome exaggeration, its ſtyptic, anodyne, healing, antiſeptic, and diſcutient virtues, when applied hot externally, and its aperient, warming, ſudorific, and diuretic qualities, when taken internally, adds, that it muſt be uſed with great caution; that when taken too freely, it affects the head, excites heat and pain therein, and, violently urging a diabetes, brings on a flux of the ſemen and of the liquor of the proſtates: and that in venereal runnings, in which it has by ſome been commended, it tends to inflame the parts, and increaſe the diſorder.

The *oil of turpentine*, taken in too large a doſe, hath often very bad conſequences; ſuch as ſtrangury, bloody urine, and its total ſuppreſſion, with a fever, violent thirſt, and vomiting.

In the Medic. Eſſ. Edinb. vol. ii. art. 5. we have an account of ſuch ſymptoms produced by the taking of two drams of this oil in warm ale. The patient was cured by a warm bath, and drinking plentifully of Fuller's *emulſio Arabica*.

This oil is generally uſed as a drier, to mix with the other oils; for which purpoſe it has greatly the advantage of *drying* OIL, with regard to colour, as it is perfectly tranſparent and white. It is uſed without any other preparation than mixing it, either alone or together with drying oil, with the other oils and colours.

Turpentine is ſometimes uſed with other bodies, to render ſpirit of wine a fit vehicle for colours.

The balſam and the inſpiſſated reſins are uſed chiefly externally: the balſam is leſs pungent than the oil, and the reſins much leſs ſo than the *turpentines* in ſubſtance. The common yellow reſin, in taſte conſiderably bitter, is ſometimes given as an internal corroborant, in preference to the *turpentines* themſelves, as being diveſted of the ſtimulating oil. Lewis's Mat. Med.

Turpentine may be of uſe to preſerve the bodies of inſects. Mr. Boyle took clear Venice *turpentine*, and evaporating to two thirds, obtained a reddiſh tranſparent gum, clear of bubbles, eaſily ſoluble by heat, and as eaſily rendered brittle by cold. Having firſt pulverized it, he melted it for uſe, with a gentle heat, and dipped the body to be preſerved ſeveral times therein, till it acquired a caſe of due thickneſs.

TURPENTINE, *balſam, oil, and ſpirit of.* See TURPENTINE *ſupra*.

TURPENTINE-*tree*. See MASTICH-*tree*.

This tree, beſides its proper fruit which ſucceeds the flowers in the uſual way, is remarkable for producing what authors of little curioſity have named another fruit, called its *horn*. This horn is a membranous production, of the length and thickneſs of man's finger; and what ſurpriſed thoſe authors who eſteemed it a ſort of pod, was to find that it produced not ſeeds, but living animals, which they called flies.

The true hiſtory of this horn is, that it grows from the ſurface of the leaves, not from the ſtalks in the manner of fruit, and is no natural production of the tree, but a mere accidental thing, occaſioned by the wound of an inſect on the leaf.

A certain ſpecies of animals called pucerons, is peculiarly fond of the juices of the *turpentine*-tree, and always takes its abode upon its leaves: and theſe horns are produced in the ſame manner with the galls of other plants. See PUCERON.

TURPETH. See TURBITH.

TURQUOIS. See TURCOIS.

TURREBA, the *earth-apple*, in *Natural Hiſtory*, a name given by the people of Guinea, and ſome other parts of Africa, to a very fine kind of truffle, which they find in great plenty in their barren deſarts, four or five inches under the ſand.

TURRETS, *moveable*, in the *Roman Art of War*, were of two ſorts, the leſs and the greater: thoſe of the leſſer ſort were about 60 cubits high, with ſquare ſides 17 cubits broad; they had five or ſix, and ſometimes ten ſtories or diviſions, each, of which were open on all ſides The greater *turrets* were 120 cubits high and 23 cubits ſquare, containing ſometimes 15, ſometimes 20 diviſions. They were of great uſe in making approaches to the walls, the diviſions being able to carry ſoldiers with engines, ladders, caſting bridges, and other neceſſaries. The wheels on which they moved were contrived to be within the planks, to defend them from the enemy, and the men who were to drive them forwards ſtood behind, where they were moſt ſecure; the ſoldiers within were protected by raw hides thrown over the *turrets*, and guarding thoſe parts that were moſt expoſed.

TURRITIS, *tower-muſtard*, in *Botany*. See *Tower*-MUSTARD.

TURSIO, in *Ichthyology*, a name by which Bellonius, Scaliger, and ſeveral others, have called the *phocæna* or PORPESSE, diſtinctively from the dolphin, with which it is confounded by the vulgar.

TURTLE, in *Ornithology*. See DOVE.

TURTLE, in *Ichthyology*, the name by which we commonly call the great ſea-TORTOISE.

TURTLE-*ſhell*. See TORTOISE and TORTOISE-*ſhell*.

TURTUR, in *Ornithology*. See DOVE.

TURTUR, in *Ichthyology*, a name given by Paulus Jovius, and ſome other writers, to the fiſh called the PASTINACHA *marina*.

TURTUR, the *turtle-ſhell*, in *Natural Hiſtory*, the name given by the collectors of ſhells to a very beautiful ſpecies of MUREX, common in the cabinets, but not found any where on the ſhores. This is owing to its having greatly altered its appearance in poliſhing; for it is no other than the white and brown-mouthed murex, which is common in its rough ſtate, with its outer coat taken off.

TURUNDA, in *Medicine* and *Surgery*, *tent*, *pellet*, or *pencil*; a piece of lint thruſt into a wound, ulcer, or other cavity. See TENT.

TUSCAN, in *Architecture*, the firſt, ſimpleſt, and moſt maſſive of the ORDERS. See *Tab. Archit. fig.* 24.

The *Tuſcan order* takes its name from an ancient people of Lydia, who, coming out of Aſia to people Tuſcany, firſt executed it in ſome temples, which they built in their new plantations.

Vitruvius calls the *Tuſcan* the *ruſtic order*, with whom agrees M. de Cambray, who, in his Parallel, ſays, it ought never to be uſed but in country-houſes and palaces. M. le Clerc adds, that in the manner Vitruvius, Palladio, and ſome others have ordered it, it does not deſerve to be uſed at all. But in Vignola's manner of compoſition, he allows it a beauty, even in its ſimplicity; and ſuch as makes it proper not only for private houſes, but even for public buildings, as in the piazzas of ſquares and markets, in the magazines and granaries of cities, and even in the offices and lower apartments of palaces.

The *Tuſcan* has its character and proportions, as well as the other orders; but we have no ancient monuments to give us any regular *Tuſcan* pillar for a ſtandard.

M. Perrault obſerves, that the characters of the *Tuſcan* are nearly the ſame with thoſe of the Doric; and adds, that the *Tuſcan* is, in effect, no other than the Doric made ſomewhat ſtronger, by ſhortening the ſhaft of the column; and ſimpler, by the ſmall number, and largeneſs of the mouldings.

Vitruvius makes the whole height of the order 14 modules, wherein he is followed by Vignola, M. le Clerc, &c. Serlio only makes it 12. Palladio gives us one *Tuſcan* profile, much the ſame as that of Vitruvius; and another too rich; on which ſide Scamozzi is likewiſe faulty. Hence it is, that that of Vignola, who has made the order very regular, is moſt followed by the modern architects. See COLUMN.

Of all the orders, the *Tuſcan* is the moſt eaſily executed, as having neither triglyphs nor dentils, nor modillions to cramp its intercolumns. On this account the columns of this order may be ranged in any of the five manners of Vitruvius, viz. the pycnoſtile, ſyſtile, euſtile, diaſtile, or aræoſtile. For the parts and members of the *Tuſcan* order, their proportions, &c. ſee CAPITAL, BASE, PEDESTAL, FREEZE, &c.

TUSCULAN, in *Matters of Literature*, is a term which frequently occurs in the phraſe *Tuſculan queſtions*. Cicero's *Tuſculan Queſtions* are diſputations on ſeveral topics in moral philoſophy, which that great author took occaſion to denominate from *Tuſculum*, the name of a country ſeat, or villa, where they were compoſed, and where he lays the ſcene of the diſpute.

They are compriſed in five books; the firſt on the contempt of death; the ſecond of enduring pain; the third on aſſuaging grief; the fourth on the other perturbations of the mind; and the laſt, to ſhew, that virtue is ſufficient to a happy life.

TUSHES, in the *Manege*, are the fore-teeth of a horſe, ſeated beyond the corner teeth, upon the bars, where they ſhoot forth on each ſide of the jaws, two above, and two below, about the age of three, three and a half, and ſometimes four; and no milk or ſoal-teeth ever come up in the place where they grow. See TEETH.

TUSK, in *Carpentry*, a bevel-ſhoulder, made to ſtrengthen the iron of the joiſt, which is let into the girder.

TUSK, in *Zoology*, is uſed to denote the long tooth of a fighting animal; and in the ſame ſenſe with TUSHES, as applied to other animals beſides horſes.

TUSSILAGO, *Coltsfoot*, in *Botany*. See COLTSFOOT.

TUSSIS. See COUGH.

TUT, in *Armory*, &c. an imperial enſign of a golden globe, with a croſs on it.

TUT-*bargain*, among the *Miners*, denotes a bargain by the lump; as when they undertake to perform a piece of work at a fixed price, however it may prove.

TUTELARY, TUTELARIS, one who has taken ſomething into his patronage and protection.

It is an ancient opinion, that there are *tutelary* angels of kingdoms and cities, and even of particular perſons, called *guardian angels*.

The ancient Romans, it is certain, had their *tutelary* gods, whom they called PENATES. And the Romiſh church to this day, hold an opinion not much unlike it: they believe that every perſon, at leaſt every one of the faithful, has, from the time of his birth, one of thoſe *tutelary* angels attached to his perſon to defend him from all temptations; and it is on this, principally, that their practice of invoking angels is founded.

F. Antony Macedo, a Portugueſe Jeſuit of Coimbra, has publiſhed a large work in folio on the *tutelary* ſaints of all the kingdoms, provinces, and great cities of the Chriſtian world; Divi Tutelares Orbis Chriſtiani, at Liſbon, 1678.

TUTENAG, a name given in India to the ſemi-metal ZINC. It is alſo ſometimes applied to denote a white metallic compound, brought from China, called alſo *Chineſe*, or *white* COPPER, the art of making which is not known in Europe. It is the beſt imitation of ſilver which has been made: it is very tough, ſtrong, malleable, may be eaſily caſt, hammered, and poliſhed; and the better kinds of it, when well manufactured, are very white, and not more diſpoſed to tarniſh than ſilver is.

Three ingredients of this compoſition may be diſcovered by analyſis, viz. copper, zinc, and iron.

TUTOR, in the *Civil Law*, is one choſen to look to the perſon and eſtate of children left by their fathers and mothers in their minority. See GUARDIAN.

By the cuſtom of Normandy, the father is the natural *tutor* of his children. A perſon nominated *tutor*, either by teſtament, or by the relations of the minor, is to decline that office, if he have five children alive; if he have any other conſiderable *tutorage*; if he be under twenty-five years of age; if he be a prieſt, or a regent in an univerſity; or if he have any law-ſuit with the minors, &c.

The marriage of a pupil, without the conſent of his *tutor*, is invalid. *Tutors* may do any thing for their pupils, but nothing againſt them; and the ſame laws which put them under a neceſſity of preſerving the intereſt of the minors, put them under an incapacity of hurting them. See PARENT.

TUTOR, *honorary*. See HONOURARY.

TUTOR is alſo uſed in our univerſities, for a member of ſome college or hall, who takes on him the inſtructing of young ſtudents in the arts and faculties.

TUTORAGE, TUTELA, in the *Civil Law*, a term equivalent to guardianſhip in common law, ſignifying an office impoſed on any one, to take care of the perſon and effects of one or more minors. See GUARDIAN.

By the Roman law there are three kinds of *tutorage*. *Teſtamentary*, which is appointed by the father's teſtament. *Legal*, which is given by the law to the neareſt relation. And *dative*, which is appointed by the magiſtrate.

But in all cuſtomary provinces, as France, &c. all *tutorages* are dative and elective; and though the father have by teſtament nominated the next relation to his pupil, yet is not that nomination of any force unleſs the choice be confirmed by that of the magiſtrate, &c.

By the *Roman* law, *tutorage* expires at fourteen years of age; but in France not till twenty-five years. A minor quits his *tutorage*, and becomes free by marriage; in which caſe a curator is given him.

TUTSAN, in *Botany*, &c. See St. JOHN's *wort*.

TUTTI, in the *Italian Muſic*, is uſed to ſignify that all the parts are to play together, or to make a full concert.

In this ſenſe *tutti* ſtands oppoſed to *ſoli* or SOLO.

It is often found expreſſed by *omnes*, *ripieno*, *da capello*, *choro*, &c.

TUTTY, TUTIA *Alexandrina*, or *Lapis* TUTIÆ, an argillaceous ore of zinc, found in Perſia, formed on cylindrical moulds into tubulous pieces, like the bark of a tree, and baked to a moderate hardneſs. This account of its original is ſupported by the authority of Teixeira and Douglas; and by its chemical properties. That the common opinion of its being a ſublimate produced in the European founderies where zinc is melted with other metals, is erroneous, appears from hence, that *tutty* is not found, upon ſtrict enquiry, to be known at thoſe founderies; and by its conſiſting in great part of an earth not capable of riſing in ſublimation. This however, is probable, that ſublimates, or the common ores of zinc are often mixed with argillaceous earths, and baked hard, in imitation of the genuine oriental *tutty*.

Bontius, in his animadverſions upon Garcias ab Orta, informs us, that it is made of a glutinous or argillaceous earth, like clay, found in great quantities in a province of Perſia, called Kirmon, which the Indians, who gather it, put into earthen pots made on purpoſe, and, adding water to it, ſtir it with a ſtick; theſe pots are then placed in furnaces till the water is evaporated; afterwards removing the dregs which remain at the bottom, they pick off from the ſides of the pots the calcined earth or *tutty*, which they carefully preſerve for ſale. He adds, that it is uſed in India as a coſmetic for deſtroying hair, more eſpecially by the women, when they bathe.

Tutty is generally of a browniſh colour, and full of ſmall protuberances on the outſide, ſmooth and yellowiſh within, ſometimes whitiſh, and ſometimes with a bluiſh caſt. Like other argillaceous bodies, it becomes harder in a ſtrong fire; and after the zinc has been revived and diſſipated by inflammable additions, or extracted by acids, the remaining earthy matter affords with oil of vitriol, an aluminous ſalt.

Tutty, levigated into an impalpable powder, is, like the lapis calaminaris and calces of zinc, an uſeful ophthalmic, and frequently uſed as ſuch in ointments and collyria.

Ointments for this intention are prepared in the ſhops, by mixing the levigated *tutty* with ſo much viper's fat as is ſufficient to reduce it to due conſiſtence, or, by adding one part to five parts of a ſimple liniment made of oil and wax. Lewis.

TUTULUS, among the *Romans*, a manner of dreſſing the hair, by gathering it up on the forehead into the form of a tower.

TUTULUS likewiſe ſignifies a woollen cap with a high top.

TWA-NIGHTS *Geſte*, in our *Ancients Cuſtoms*. See THIRD-*night awn Hynde*.

If the *twa-night's geſte* did any harm to any, his hoſt was not anſwerable for it, but himſelf.

TWAITE, in *Ichthyology*. See SHAD.

TWAITE, in our *Old Writers*, a wood grubbed up and converted into arable land.

TWELFTH-HIND, in our *Ancient Cuſtoms*, imports much the ſame with *thane*.

Among the Engliſh Saxons, thoſe who were worth 1200*s*. were called *twelve-hindi*, and if any injury was done to them, ſatisfaction was to be made accordingly. See HINDENI.

TWELTH-DAY, or TWELFTH-*tide*, the feſtival of the Epiphany, or the manifeſtation of Chriſt to the Gentiles, ſo called, as being the *twelfth-day*, excluſive, from the Nativity, or Chriſtmas-day.

TWELVE MEN, *duodecim homines legales*, otherwiſe called *jury*, or *inqueſt*, is a number of *twelve* perſons, or upwards, as far as twenty-four; by whoſe oath, as to matters of fact, all trials paſs, both in civil and criminal caſes, through all courts of the common law in this realm. See JURY.

TWELVE *Tables*, *laws of the*. See TABLE.

TWELVE-MONTH, the ſpace of a year, according to the calendar months.

TWENTY-*four men*; men choſen every half year to redreſs the grievances of the mines and miners; but every man generally ſerves his year when choſen.

TWI-FALLOWING, or *Twy-fallowing of ground*, in *Huſbandry*, is the tilling or laying of it fallow a ſecond time.

TWI-HINDI, or TWYHINDI, among our Saxon anceſtors, were men valued at 200*s*. See HINDENI.

Theſe men were of the loweſt degree; and if ſuch were killed, the mulct was 30*s*. Thus in Leg, H. I. cap. 9. *de* twihindi *homines interfecti*, *vera debet reddi ſecundum legem*. Where note, that this was not an introduction of a new law, but a confirmation of the old, made in the reign of king Alfred.

TWILIGHT, in *Aſtronomy*, denotes the dubious or faint light which is reflected to us by means of the atmoſphere, for ſome time before the ſun riſes, and after he ſets. See CREPUSCULUM and ATMOSPHERE.

The following table ſhews the duration of *twilight* in different latitudes: it is calculated on a ſuppoſition that the *twilight* begins and ends when the ſun is 18° below the horizon: the letters c. d. ſignify that it is then continual day; c. n. continual night; w. n. that the *twilight* laſts the whole night.

Alt. Pole	0	10	20	30	40	45	50	52½	55	60	65	70	75	80	85	90
⊙ enters	H. ′	H. ′	H. ′	H. ′	H. ′	H. ′	H. ′	H. ′	H. ′	H. ′	H. ′	H. ′	H. ′	H. ′	H. ′	H. ′
♋	1 18	1 21	1 28	1 41	2 8	2 39	w.n	w. n	w. n.	w. n.	w. n	c. d.	c. d.	c. d.	c. d.	c. d.
♊ ♌	1 16	1 19	1 25	1 36	1 58	2 19	3 3	w. n.	w. n.	w. n.	w. n.	c. d.	c. d.	c. d.	c. d.	c. d.
♉ ♍	1 13	1 15	1 20	1 28	1 43	1 55	2 12	2 25	2 41	3 55	w: n.	w. n.	w. n.	c. d.	c. d.	c. d.
♈ ♎	1 12	1 13	1 17	1 24	1 35	1 44	1 55	2 2	2 10	2 33	3 8	4 18	w. n.	w. n.	w. n.	w. n.
♓ ♏	1 13	1 14	1 18	1 24	1 35	1 43	1 54	2 0	2 8	2 27	2 56	3 41	5 2	17 32	w. n.	w. n.
♒ ♐	1 16	1 17	1 21	1 28	1 40	1 49	2 1	2 8	2 18	2 43	3 26	11 38	11 14	10 32	8 38	c. n.
♑	1 18	1 19	1 23	1 30	1 43	1 53	2 6	2 15	2 26	2 57	4 4	10 24	9 30	7 46	c. n	c. n.

Long's Aſtron. vol. i. p. 258.

TWINKLING *of the ſtars*, denotes that tremulous, vibratory, intermitting motion, which is obſerved in the light proceeding from the fixed ſtars: Alhazen, an Arabian philoſopher, of the twelfth century, conſiders refraction as the cauſe of this phenomenon.

Vitellio, in his Optica, publiſhed in 1270, p. 449, aſcribes the *twinkling* of the ſtars to the motion of the air in which the light is refracted; and he obſerves, in confirmation of this hypotheſis, that they twinkle ſtill more when they are viewed in water put into motion.

Dr. Hooke (Microgr. p. 231, &c.) very reaſonably attributes this phenomenon to the inconſtant and unequal refraction of the rays of light occaſioned by the trembling motion of the air and interſperſed vapours, in conſequence of variable degrees of heat and cold in the air, producing correſponding variations in its rarity or denſity, and alſo of the action of the wind, which muſt cauſe the ſucceſſive rays to fall upon the eye in different directions, and conſequently upon different parts of the retina at different times, and alſo to hit and miſs the pupil alternately; and this is alſo the reaſon, he ſays, why the limbs of the ſun, moon, and planets appear to wave or dance.

Theſe tremors of the air are manifeſt to the eye by the tremulous motion of ſhadows caſt from high towers; and by looking at objects through the ſmoke of a chimney, or through ſteams of hot water, or at objects ſituated beyond hot ſands, eſpecially if the air be moved tranſverſely over them. But when ſtars are ſeen through teleſcopes that have large apertures, they twinkle but little, and ſometimes not at all. For, as ſir Iſaac Newton has obſerved (Opt. p. 98.) the rays of light which paſs through different parts of the aperture, tremble each of them apart, and by means of their various, and ſometimes contrary tremors, fall at one and the ſame time upon different points in the bottom of the eye, and their trembling motions are too quick and confuſed to be ſeparately perceived. And all theſe illuminated points conſtitute one broad lucid point, compoſed of thoſe many trembling points confuſedly and inſenſibly mixed with one another by very ſhort and ſwift tremors, and thereby cauſe the ſtar to appear broader than it is, and without any trembling of the whole.

Dr. Jurin, in his Eſſay upon Diſtinct and Indiſtinct Viſion, has recourſe to ſir Iſaac Newton's hypotheſis of fits of eaſy refraction and REFLECTION for explaining the *twinkling* of the ſtars; thus, he ſays, if the middle part of the image of a ſtar be changed from light to dark, and the adjacent ring be at the ſame time changed from dark to light, as muſt happen from the leaſt motion of the eye towards or from the ſtar, this will occaſion ſuch an appearance as *twinkling*.

Mr. Michell (Phil. Tranſ. vol. lvii. p. 262.) ſuppoſes, that the arrival of fewer or more rays at one time, eſpecially from the ſmaller or more remote fixed ſtars, may make ſuch an unequal impreſſion on the eye, as may, at leaſt, have ſome ſhare in producing this effect: ſince it may be ſuppoſed, that even a ſingle particle of light is ſufficient to make a ſenſible impreſſion upon the organs of ſight; ſo that very few particles arriving at the eye in a ſecond of time, perhaps not more than three or four, may be ſufficient to make an object conſtantly viſible. See LIGHT.

Hence, he ſays, it is not improbable, that the number of the particles of light which enter the eye in a ſecond of time, even from Sirius himſelf, may not exceed three or four thouſand, and from ſtars of the ſecond magnitude they may, therefore, probably not exceed a hundred. Now the apparent increaſe and diminution of the light, which we obſerve in the *twinkling* of the ſtars, ſeem to be repeated at not very unequal intervals, perhaps about four or five times in a ſecond. He, therefore, thought it reaſonable to ſuppoſe, that the inequalities which will naturally ariſe from the chance of the rays coming ſometimes a little denſer, and ſometimes a little rarer, in ſo ſmall a number of them, as muſt fall upon the eye in the fourth or fifth part of a ſecond, may be ſufficient to account for this appearance. An addition of two or three particles of light, or perhaps a ſingle one, upon twenty, eſpecially if there ſhould be an equal deficiency out of the next twenty, would, he ſuppoſed, be very ſenſible, as he thought was probable from the very great difference in the appearance of ſtars, the light of which does not differ ſo much as is commonly imagined. The light of the middlemoſt ſtar in the tail of the Great Bear does not, he thinks, exceed the light of the very ſmall ſtar that is next to it, in a greater proportion than that of about 16 or 20 to 1; and M. Bouguer found, that a difference in the light of objects, of one part in ſixty-ſix, was ſufficiently diſtinguiſhable.

Since theſe obſervations were publiſhed, Mr. Michell (as we are informed by Dr. Prieſtley, Hiſt. of Light, p. 495.) has entertained ſome ſuſpicion, that the unequal denſity of light does not contribute to this effect in ſo great a degree as he had imagined; eſpecially in conſequence of obſerving that even Venus does ſometimes *twinkle*. This he once obſerved her to do remarkably when ſhe was about 6 degrees high, though Jupiter, which was then about 16 degrees high, and was ſenſibly leſs luminous, did not *twinkle* at all. If, notwithſtanding the great number of rays, which, without doubt, come to the eye from ſuch a ſurface as this planet preſents, its appearance be liable to be affected in this manner, it muſt be owing to ſuch undulations in the atmoſphere, as will probably render the effect of every other cauſe altogether inſenſible.

M. Muſchenbroek (Introd. ad Phil. Nat. vol. ii. ſect. 1741, p. 707.) ſuſpects, that the *twinkling* of the ſtars ariſes from ſome affection of the eye, as well as the ſtate of the atmoſphere. For, he ſays, that in Holland, when the weather is froſty, and the ſky very clear, the ſtars twinkle moſt manifeſtly to the naked eye, though not in teleſcopes; and ſince he does not ſuppoſe there is any great exhalation, or dancing of the vapour at that time, he queſtions whether the vivacity of the light, affecting the eye, may not be concerned in the phenomenon.

But this philoſopher might have ſatisfied himſelf with reſpect to this hypotheſis, by looking at the ſtars near the zenith, when the light traverſes but a ſmall part of the atmoſphere, and therefore might be expected to affect the eye moſt ſenſibly. For he would not have perceived them to twinkle near ſo much as they do near the horizon, when much more of their light is intercepted by the atmoſphere.

Some aſtronomers have lately endeavoured to explain the *twinkling* of the fixed ſtars, by the extreme minuteneſs of their apparent diameter; ſo that they ſuppoſe the ſight of them is intercepted by every mote that floats in the air. To this purpoſe Dr. Long obſerves (Aſtron. vol. i. p. 170.) that our air near the earth is ſo full of various kinds of particles, which are in continual motion, that ſome one or other of them is perpetually paſſing between us and any ſtar which we look at, and this makes us every moment alternately ſee it and loſe ſight of it: and this *twinkling* of the ſtars, he ſays, is greateſt in thoſe which are neareſt the horizon, becauſe they are viewed through a great quantity of thick air, where the intercepting particles are moſt numerous; whereas ſtars that are near the zenith do not twinkle ſo much, becauſe we do not look at them through ſo much thick air, and therefore the intercepting particles, being fewer, come leſs frequently before them.

With reſpect to the planets, it is obſerved, that they, becauſe they are much nearer to us than the ſtars, have a ſenſible apparent magnitude, ſo that they are not covered by the ſmall particles floating in the atmoſphere, and therefore do not twinkle, but ſhine with a ſteady light. The fallacy of this hypotheſis appears from the obſervation of Mr. Michell, that no object can hide a ſtar from us that is not large enough to exceed the apparent diameter of the ſtar, by the diameter of the pupil of the eye; ſo that if a ſtar was a mathematical point, the interpoſing object muſt ſtill be equal in ſize to the pupil of the eye: and, indeed, it muſt be large enough to hide the ſtar from both eyes at the ſame time.

The principal cauſe, therefore, of the *twinkling* of the ſtars is now acknowledged to be, the unequal refraction of light, in conſequence of inequalities and undulations in the atmoſphere.

Beſides a variation in the quantity of light, it may here be added, that a momentary change of colour has likewiſe been obſerved in ſome of the fixed ſtars. Mr. Melville (Edinb. Eſſ. vol. ii. p. 81.) ſays, that when one looks ſtedfaſtly at Sirius, or any bright ſtar, not much elevated above the horizon, its colour ſeems not to be conſtantly white, but appears tinctured, at every *twinkling*, with red and blue. Mr. Melville could not entirely ſatisfy himſelf as to the cauſe of this phenomenon; obſerving, that the ſeparation of the colours by the refractive power of the atmoſphere is, probably, too ſmall to be perceived. Mr. Micheli's hypotheſis above mentioned, though inadequate to the explication of the *twinkling* of the ſtars, may pretty well account for this circumſtance. For the red and blue rays being much fewer than thoſe of the intermediate colours, and therefore much more liable to inequalities, from the common effect of chance, a ſmall exceſs or defect in either of them, will make a very ſenſible difference in the colour of the ſtars.

TWINS, two young ones delivered at a birth by an animal which ordinarily brings forth but one.

It has been greatly diſputed, which of two *twins* is to be eſteemed the elder? The faculty of Montpelier have given it, that the latter born is to be reputed the elder, becauſe firſt conceived: but by all the laws which now obtain, the firſt-born enjoys the privilege of ſeniority; and the cuſtom is confirmed by the Scripture inſtance of Eſau and Jacob.

But if two *twins* be born ſo intermixed, that one cannot diſtinguiſh which of the two appeared firſt, it ſhould ſeem that neither the one nor the other can pretend to the right of primogeniture, which ought to remain in ſuſpence by reaſon of their mutual concourſe. In ſuch caſe ſome would have the deciſion left to the father, and others to the chance of a lot.

TWINS, in *Aſtronomy*. See GEMINI.

TWIST *of a rope, cord*, &c. See ROPE.

TWIST, again, is uſed for the inſide, or flat part of a man's thigh, upon which a true horſeman reſts when on horſeback.

To TWIST *a horſe*, is violently to wring or twiſt his teſticles twice about, which cauſes them to dry up, and deprives them of nouriſhment, and reduces the horſe to the ſame ſtate of impotency with a gelding.

TWISTED *column*. See COLUMN.

TWISTED *ſilks*. See SILK.

TWITE. See LINNET.

TWOPENCE, *Herb*, a ſpecies of *lyſimachia*. See LOOSE-*ſtriſe*.

TWO *thirds ſubſidy*. See DUTY and SUBSIDY.

TWYBLADE, *ophrys*, in *Botany*, a genus of the *gynandria diandria* claſs. Its characters are theſe: it has a ſingle ſtalk with a vague ſpatha; the flower hath no empalement; it conſiſts of five oblong petals, which join ſo as to form a helmet, and the under one is bifid; the nectarium is dependent, and keel-ſhaped, behind; it hath two ſhort ſtamina, ſitting on the pointal, with erect ſummits faſtened to the interior border of the nectarium; it hath an oblong contorted germen ſituated under the flower, with a ſtyle adhering to the inner border of the nectarium, crowned by an obſolete ſtigma; the germen afterwards turns to an oval, three-cornered, obtuſe capſule, with one cell opening with three valves, filled with ſmall ſeeds like duſt. Linnæus enumerates nineteen, and Miller nine ſpecies.

The common *twyblade*, or *ophrys bifolia*, grows in woods and moiſt paſtures, in ſeveral parts of England, and flowers in May.

It has been reckoned aſtringent and agglutinating, good to conſolidate ruptures, and heal wounds, though it is but ſeldom uſed.

TYCHONIC *ſyſtem*, or *hypotheſis*, is an order or arrangement of the heavenly bodies, of an intermediate nature between the Copernican and Ptolemaic, or participating alike of them both. See SYSTEM.

TYE, in *Mining*. See STREAMING.

TYE, in *Sea Language*, denotes a ſort of runner, or thick rope, uſed to tranſmit the effort of a tackle to any yard or gaff, which extends the upper part of a ſail.

The *tye* is either paſſed through a block fixed to the maſt-head, and afterwards through another block moveable upon the yard or gaff intended to be hoiſted; or the end of it ſimply faſtened to the ſail, yard, or gaff, after communicating with the block at the maſt-head. Falconer. See JEERS.

TYGER. See TIGER.

TYING, in *Muſic*. See LEGATE-*note* and SYNCOPE.

TYLE, or TILE, in *Building*, a ſort of thin, factitious, laminated brick, uſed on the roofs of houſes, or, more properly, a kind of fat clayey earth, kneaded and moulded of a juſt thickneſs, dried and burnt in a kiln, like a brick, and uſed in the covering and paving of houſes.

It is thus called from the French *tuille*, of the Latin *tegula*, which ſignifies the ſame.

Tyles are made, ſays Mr. Leyburn, of better earth than brick-earth, and ſomething nearer a kin to the potter's earth.

According to ſtat. 17 Ed. IV. cap. 4. the earth for *tyles* ſhould be caſt up before the 1ſt of November, ſtirred and turned before the 1ſt of February, and not made into *tyles* before the 1ſt of March; and ſhould likewiſe be tried and ſevered from ſtones, marle, and chalk.

Any perſon ſetting to ſale *tyles* made otherwiſe than this act directs, ſhall forfeit to the buyer double value of the *tyles*, and make fine and ranſom at the king's will. Juſtices may aſſeſs upon the offender no leſs fine than for every 1000 plain *tyles* 5*s*. for every 100 roof *tyles*, 6*s*. 8*d*. and for every 100 corner, or gutter *tyles*, 2*s*.

Searchers ſhall be appointed to preſent defaulters, who ſhall have for their labour of the *tyle*-makers, for every 1000 plain *tyles* ſearched, 1*d*. for every 100 of roof-*tyles*, ½*d*. and for every 100 of corner and gutter-*tyles*, ¼*d*. and ſearchers neglecting their duty, forfeit 10*s*.

By 17 Geo. III. cap. 42. all combinations for enhancing the price of *tyles* and bricks, ſhall be void; and every *tyle*-maker, or brick-maker, offending, ſhall forfeit 20*l*. and every clerk, agent, or ſervant, 10*l*. half to the poor, and half to him who ſues within ſix calendar months. By 24 Geo. III. cap. 24. the following duties ſhall be raiſed on all BRICKS and *tyles*, made in Great Britain, from September 1, 1784, to be paid by the maker, viz. for all bricks, 2*s*. 6*d*. *per* 1000, and in proportion for a greater or leſs quantity; for plain *tyles*, 3*s*. *per* 1000; for pan or ridge-*tyles*, 8*s*. *per* 1000; for ſmall paving-*tyles*, not exceeding 10 inches ſquare, 1*s*. 6*d*. *per* 100; and for large paving-*tyles*, exceeding 10 inches ſquare, 3*s*. *per* 100; and for all other *tyles*, 3*s*. *per* 1000, and in proportion for a greater or leſs quantity.

Brick or *tyle*-makers are required to give notice at the next office of exciſe, of their names and places of abode, &c. before they begin making, on forfeiture of 100*l*. The bricks and *tyles* are to be charged with the duty while they are drying, and before they are removed to the kiln; and the penalty of obſtructing officers is 50*l*.

Ten bricks or *tyles* are allowed in every 100 for waſte, &c. And the penalty of removing bricks or *tyles* to the kiln before the officer has charged the duties, is a forfeiture of the ſame, and alſo 50*l*. Thoſe that are not ſurveyed, are to be kept ſeparate from others; and the penalty of concealing bricks or *tyles*, while making, is 20*l*. and forfeiture of the ſame.

The makers are required to enter, every ſix weeks, at the proper office, all bricks and *tyles* made by them, and to pay the duties within ſix weeks after entry, under a penalty of forfeiting double the ſum of the duties; and removal of any for which the duties have not been paid, incurs a forfeiture of 50*l*.

Bricks and *tyles*, for which the duties have been paid, may be exported, with a drawback of the duties; but the penalty of re-landing ſuch as are ſhipped for exportation, in any part of Great Britain, is a forfeiture of the ſame, or their value, together with the penalty of the bond.

From September 1, 1784, the following additional duties are to be paid on the importation of bricks and *tyles*, viz. for bricks, 2*s*. 6*d*. *per* 1000; for plain *tyles*, 3*s*. *per* 1000; for pan-*tyles*, 8*s*. *per* 1000; for paving-*tyles*, ſmall, 1*s*. 6*d*. *per* 100, and large, 3*s*. *per* 100; and for all other *tyles*, 3*s*. *per* 1000. The ſaid duties ſhall alſo be liable to the additional 5 *per cent*. impoſed by 19 Geo. III. cap. 25. and 5 *per cent*. thereon by 22 Geo. III. cap. 66.

For the method of burning them, ſee BRICK.

As to the applying of *tyles*, ſome lay them dry, as they come from the kiln, without mortar, or any thing elſe; others lay them in a kind of mortar made of loam and horſe-dung. In ſome parts, as in Kent, they lay them in moſs.

There are various kinds of *tyles* for the various occaſions of building; as *plain*, *thack*, *ridge*, *roof*, *creaſe*, *gutter*, *pan*, *crooked*, *Flemiſh*, *corner*, *hip*, *dorman* or *dormar*, *ſcallop*, *aſtragal*, *traverſe*, *paving*, and *Dutch tyles*.

TYLES, *plain*, or *thack*, are thoſe in ordinary uſe for the covering of houſes. They are ſqueezed flat, while yet ſoft, in a mould. They are of an oblong figure, and by ſtat. 17 Edw. IV. cap. 4. are to be 10½ inches long, 6¼ broad, and half an inch and half quarter thick. But theſe dimenſions are not ſtrictly obſerved.

Plain *tyles* are not laid in mortar, but only pointed in the inſide.

TYLES, *ridge*, *roof*, or *creaſe*, are thoſe uſed to cover the ridges of houſes, being made circular, breadth-wiſe, like a half cylinder. Theſe are what Pliny calls *laterculi*, and are by ſtatute to be 13 inches long, and of the ſame thickneſs with the *plain tyles*.

TYLES, *hip* or *corner*, are thoſe which lie on the hips or corners of roofs. As to form, they are firſt made flat, like *plain tyles*, but of a quadrangular figure, whoſe two ſides are right lines, and two ends, arches of circles; one end being a little concave, and the other convex: the convex end is to be about ſeven times as broad as the concave end; ſo that they would be triangular, but that one corner is taken off; then, before they are burnt, they are bent on a mould, breadth-wiſe, like *ridge tyles*. They have a hole at their narrow end to nail them on by, and are laid with their narrow end upwards. By ſtatute they are to be 10½ inches long, and of a convenient breadth and thickneſs.

Theſe, as well as the ridge *tyles*, are to be laid in mortar, becauſe they ſeldom lie ſo cloſe as not to admit any water to paſs between them.

TYLES, *gutter*, are thoſe which lie in gutters or vallies in croſs-buildings. They are made like *corner-tyles*, only the corners of the broad end are turned back again with two wings. They have no holes in them, but are laid with the broad end upwards, without any nailing. They are made in the ſame mould as *corner-tyles*, and have the ſame dimenſions on the convex ſides. Their wings are each 4 inches broad, and 8 long.

Theſe *tyles* are ſeldom uſed where lead is to be had.

TYLES, *pan*, *crooked*, or *Flemiſh*, are uſed in covering of ſheds, ſtables, out-houſes, and all kinds of flat-roofed buildings. They are in form of an oblong parallelogram, as *plain tyles*, but are bent breadth-wiſe forwards and backwards in the form of an S, only one of the arches is at leaſt three times as big as the other, which biggeſt arch is almoſt laid uppermoſt, and the leſs arch of another *tile* lies over the edge of the great arch of the former. They have no holes for pins, but hang on the laths by a knot of their own earth. By 17 Geo. III. cap. 42, they are to be, when burnt, not leſs than 13½ inches long, 9½ inches wide, and ½ an inch thick, on pain that the maker ſhall forfeit 10s. for every 1000.

Pan-*tyles* are laid in mortar, becauſe the roof being flat, and many *tyles* being warped in the burning, they will not cover the roof ſo well as that no water paſs between them.

TYLES, *dormar*, or *dorman*, conſiſt of a plain *tyle*, and a triangular piece of a plain one, ſtanding up at right angles to one ſide of the plain *tyle*, and ſwept with an arch of a circle from the one end, which end terminates in a point. Of theſe *tyles* there are two kinds, the triangular piece, in ſome, ſtanding on the right, in others on the left ſide of the plain *tyle*. And of each of theſe, again, there are two kinds, ſome having a whole plain *tyle*, others but half a plain *tyle*. But in them all, the plain *tyle* has two holes for the pins, at that end where the broad end of the triangular piece ſtands.

Their uſe is to be laid in the gutters, betwixt the roof and the cheeks or ſides of the dormars, the plain part lying on the roof, and the triangular part ſtanding perpendicularly by the cheek of the dormar. They are excellent to keep out the wet in thoſe places, and yet they are hardly known any where but in Suſſex. The dimenſions of the plain *tyle* part are the ſame as thoſe of a plain *tyle*, and the triangular part is of the ſame length, and its breadth at one end 7 inches, and at the other nothing.

TYLES, *ſcallop* or *aſtragal*, are, in all reſpects, like plain *tyles*, only their lower ends are in form of an aſtragal, viz. a ſemi-circle, with a ſquare on each ſide. They are uſed in ſome places for weather *tyling*.

TYLES, *traverſe*, are a kind of irregular plain *tyles*, having the pin-holes broken out, or one of the lower corners broken off. Theſe are laid with the broken end upwards, upon rafters, where pinned *tyles* cannot hang.

TYLES, *Flemiſh* or *Dutch*, are of two kinds, *ancient* and *modern*. The *ancient* were uſed for chimney foot-paces; they were painted with antic figures, and frequently with poſtures of ſoldiers, ſome with compartments, and ſome with moreſque devices; but they came greatly ſhort, both as to the deſign and colours, of the modern ones.

The *modern Flemiſh tyles* are commonly uſed plaſtered up in the jaumbs of chimneys, inſtead of chimney-corner-ſtones. Theſe are better glazed, and ſuch as are painted (for ſome are only white) are much better performed than the ancient ones.

But both kinds ſeem to be made of the ſame whitiſh clay as our white-glazed earthen-ware. The ancient ones are five inches and a quarter ſquare, and about three quarters of an inch thick; the modern ones ſix inches and a half ſquare, and three quarters of an inch thick.

When theſe tyles are ſet with good mortar, they look beautiful, and caſt a greater heat than ſtone; for, being very ſmooth and glazed, the rays of heat ſtriking upon them are all reflected into the work, eſpecially when the ſides of the chimnies are oblique, or in the form of circular arches. But they are little uſed.

Tyling is meaſured by a ſquare of 100 ſquare feet; and the number of *tyles* required for ſuch a ſquare depends on the diſtance of the laths, which, when 6 inches, requires 800: when 6½ inches, 740; when 7 inches, 690; when 7½ inches, 640; and when 8 inches, 600 *tyles*.

TYLE, in *Aſſaying*. See TILE.

TYLER, one that covers or paves with tyles.

Tylers and *bricklayers* were *incorporated* 10 Eliz. under the name of maſter and wardens of the ſociety of freemen of the myſtery and art of *tylers* and *bricklayers*. See COMPANY.

TYLERY. See TUILERIE.

TYLOS, in *Ornithology*, a name by which many authors have called the *turdus iliacus*, or REDWING.

TYLWITH, in matters of *Heraldry* and *Deſcent*, is ſometimes uſed for a tribe or family branching out of another, which the modern heralds more uſually call the *ſecond* or *third houſe*.

TYMBER *of ſkins*. See TIMBER.

TYMPAN, or TYMPANUM, in *Architecture*, the area of a pediment, being that part which is in a level with the naked of the freeze. Or it is the ſpace included between the three cornices of a triangular pediment, or the two cornices of a circular one. See *Tab. Archit. fig.* 40. E.

Sometimes the *tympan* is cut out, and the part filled with an iron lattice to give light; and ſometimes it is enriched with ſculpture, in baſſo-relievo, as in the weſt front of St. Paul's, in the temple of Caſtor and Pollux, at Naples, &c

Tympan is alſo uſed for that part of a pedeſtal called the *trunk* or *dye*.

TYMPAN, among *Joiners*, is alſo applied to the pannels of doors.

TYMPAN *of an arch* is a triangular ſpace or table in the corners or ſides of an arch, uſually hollowed and enriched, ſometimes with branches of laurel, olive-tree, or oak; or with trophies, &c. ſometimes with flying figures, as fame, &c. or ſitting figures, as the cardinal virtues.

TYMPAN, in *Anatomy*, *Mechanics*, &c. See TYMPANUM.

TYMPAN, among *Printers*, is a double frame belonging to the preſs, covered with parchment, on which the blank ſheets are laid in order to be printed off. See PRINTING *preſs*.

TYMPANA, τυμπανα, among the *Athenians*, a capital puniſhment, wherein the criminal, being affixed to the pole, was beaten to death with cudgels. Potter, Archæol. Græc. lib. cap. 25. tom. i. p. 134.

TYMPANITES, in *Medicine*. See TYMPANY.

TYMPANOTRIBA, among the *Ancients*, a deſignation given to an effeminate perſon, who could do nothing but play on the tympanum.

TYMPANUM, τυμπανον, *drum*; a muſical inſtrument, which, among the ancients, conſiſted of a thin piece of leather or ſkin, ſtretched upon a circle of wood or iron, and beaten with the hand, or with a rod of iron or braſs.

TYMPANUM, TYMPAN, in *Mechanics*, is a kind of wheel placed round an axis, or cylindrical beam, on the top of which are two levers, or fixed ſtaves, for the more eaſy turning the axis about, in order to raiſe a weight required.

The *tympanum* is much the ſame with the peritrochium; but that the cylinder of the axis of the peritrochium is much ſhorter and leſs than the cylinder of the *tympanum*. See AXIS *in Peritrochio*.

TYMPANUM of a machine is alſo uſed for a hollow wheel, wherein one or more people, or rather animals, walk to turn it; ſuch as that of ſome cranes, calenders, &c.

TYMPANUM, in *Anatomy*. *Membrana* TYMPANI, is a thin tender ſkin or membrane, ſtretched upon a bone or circle, in the meatus auditorius of the ear, which it ſhuts, and ſuppoſed to be the immediate organ of hearing. See *Tab. Anat. (Oſteol.) fig.* 13. *lit. e*.

The *tympanum*, or barrel of the ear, is a cavity irregularly ſemicircular, the bottom of it being turned inward, and the mouth joined to the circular groove of the external auditory paſſage. It has both eminences and cavities obſervable in it. The remarkable eminences are three in number, a large tuberoſity lying in the very bottom of the barrel, a little toward the back part, and a ſmall a ſmall irregular pyramid, ſituated a little above the tuberoſity, and a little more backward; the apex of it is perforated by a ſmall hole, and on one ſide of the baſis, two ſmall bony filaments are often found in a parallel ſituation. They are ſeldom found to be wanting, on a careful inveſtigation, though their tender ſtructure expoſes them to be very often broken. In the third eminence is a cavity ſhaped like the mouth of a ſpoon, ſituated at the upper, and a little toward the anterior part of the bottom of the *tympanum*. This cavity is part of a half canal, and, at a very ſmall diſtance from its point, is a little bony ridge, which goes from one edge of it to the other, but is ſometimes not entire. The principal cavities are the opening of the cells of the maſtoide ſinuoſities, the opening of the Euſtachian tube, the bony half canal, the feneſtra ovalis and rotunda; and to theſe may be added the ſmall hole in the pyramid. The opening of the maſtoide cells is at the poſterior and upper part of the edge of the barrel; the cells themſelves which end there are dug in the ſubſtance of the maſtoide proceſs, being very irregular and full of windings and turnings. The opening of the Euſtachian tube is at the anterior, and a little toward the upper part of the edge of the barrel. This tube, which in France, is uſually termed the aqueduct, runs from the *tympanum* toward the poſterior openings of the naſal foſſæ and arch of the palate. The bony part of it, the only part ſpoken of here, is dug in the apophyſis petroſa along the duct of the carotide apophyſis, and when it leaves that, it is lengthened out by the ſpinal apophyſis of the os ſphenoides. Theſe two cavities, the maſtoide cells, and the Euſtachian tube, are, in ſome meaſure, prolongations of the *tympanum*, one anterior, the other poſterior. The bony half canal, of which the cavity, like the mouth of a ſpoon, is the extremity, lies immediately above the Euſtachian tube, towards the upper ſide of that apophyſis petroſa, or rather in the very ſubſtance of the upper ſide, and in a natural ſtate a ſmall muſcle is lodged in it. Winſlow's Anat. p. 47. See EAR.

Within the *cavitas tympani*, Vieuſſens has diſcovered a very fine thin membrane, ſerving to ſhut the door of the labyrinth, and prevent the internal air from having any communication with the external. The *membrana tympani* has a remarkable branch of a nerve paſſing on its internal ſurface between the incus and malleolus, called the *chorda tympani*.

The *tympanum* Dr. Willis takes to be a kind of preparatory inſtrument to HEARING, and its office to be, to receive the firſt impreſſions of ſounds, or the ſenſible ſpecies, and to convey them duly modified and proportioned to the ſenſorium. See DRUM.

Its office, in effect, with reſpect to the ſenſe of hearing, ſeems to be the ſame as that of the pupil of the eye with regard to ſeeing; each of them prevents the ingreſs of too many rays, tempers and ſoftens them, and delivers them, as it were, commenſurate to the ſenſory; upon which, if they ſhould fall immediately, they might be apt to ſpoil its delicate conſtitution.

The *tympanum*, it is true, does not hear; but it contributes to the better and ſafer hearing. That it may do the office of a porter the better, it is neceſſary its expanſe ſhould, like the pupil, be contracted and relaxed on occaſion; and to this purpoſe ſerve the four little bones, called *malleolus*, *incus*, *ſtapes*, and *os orbiculare*, which have the ſame uſe in ſtraining and relaxing, as the braces of the war-drum have in that inſtrument. By means of this extenſion and retraction, the *tympanum* is made to correſpond to all ſounds loud or languid, juſt as the pupil does to all the degrees of light. The ingenious Dr. Holder has improved on this theory. He conceives that the action of the muſcle, whereby the *tympanum* is ſtretched and relaxed, does ordinarily and conſtantly draw it to a moderate tenſion; but when we have occaſion to liſten, and give a particular attention to any ſound, the action of that muſcle is then more intenſe, and the drum is drawn to more than ordinary tenſion, to facilitate the paſſage of the ſound. See ATTENTION.

Upon theſe conſiderations, that author having a young gentleman, who was born deaf, put into his hands, and perceiving the great defect to lie in the want of a due tenſion of the *tympanum*, he adviſed his mother to conſult with phyſicians, whether by ſome aſtringent fumes, or otherwiſe, it might not be reſtored to a due tenſion.

In the mean time he thought of a temporary way by the means of any vehement ſound, as of a drum beaten near him; which ſound, during its continuance, muſt needs give the *tympanum* a tenſion, by driving and ſwelling it outwards, as a freſh gale of wind fills the ſails of a ſhip: and the experiment ſucceeded according to expectation; for ſo long as he beat a drum faſt and loud by him, he could hear thoſe that ſtood by him call him gently by his name. But when the drum ceaſed, he could no longer hear the ſame perſons call him very loudly.

But what makes the uſe of the *tympanum* appear the leſs conſiderable is, that there are inſtances where the hearing has been perfect, without any uſe of a *tympanum*. Mr. Cheſelden relates, that he broke the *tympanum* in both ears of a dog, yet did not deſtroy his hearing; though for ſome time afterwards, he received ſtrong ſounds with great horror: he adds, that Mr. St. André aſſured him, that a patient of his had the *tympanum* deſtroyed by an ulcer, and the auditory bones caſt out, yet without deſtroying his hearing.

TYMPANUM, in *Architecture*. See TYMPAN.

TYMPANI, *chorda*. See CHORD.

TYMPANY, TYMPANIES, or TYMPANITES, in *Medicine*, a flatulent tumor, or ſwelling of the abdomen or belly, very hard, equable, and permanent; whereby the ſkin is ſtretched ſo tight, that, when ſtruck, it gives a ſound like that of a drum. See FLATULENCY and *Windy* TUMORS.

The *tympanites* is a ſpecies of dropſy, by ſome called *dry dropſy*; but what the cauſe and ſeat of the diſeaſe are, or what the morbific matter is that occaſions the tumor, phyſicians are not at all agreed.

Wind certainly makes a principal part of the morbid matter; but this is ſcarce ever found without water, excepting at the beginning, ſo that ſome will not allow of any difference between the *tympany* and the *aſcites*; but though it is often productive of, or complicated with an aſcites, yet it is in itſelf a perfectly diſtinct diſeaſe, and accompanied with no extravaſation of water in the abdomen: perſons who have died of it having been found, on opening the body, with the abdomen as dry as in a ſtate of health; but the ſtomach has been found, in ſome, greatly diſtended with flatulencies, and containing a viſcid humour, though in no great quantity. The inteſtines are alſo uſually found diſtended, and, as it were, pellucid, and, on being pricked, they collapſe, without the appearance of any water. And, in ſome caſes, on opening the abdomen, the whole ſwelling has ſubſided, on the excluſion of a groſs flatulence which had diſtended it. The inteſtines have, in ſome ſubjects, been found diſtended to the bigneſs of a man's thigh, in ſome parts, and in others lower down, ſo contorted and twiſted together, that there could be no paſſage either for the wind or the excrements. It is not uncommon, alſo on diſſection, to find great numbers of worms, of the common long kind, in the inteſtines.

A *tympany*, without a dropſy, is moſt incident to women after labour, when the lochia have been ſuppreſſed by colds or otherwiſe, or diſcharged in too ſmall quantities; a bad regimen during the lying-in, and the omitting to ſwathe the belly properly down, has alſo often a bad effect this way. In caſes of this kind, women find ſoon afterwards the abdomen inflated, with a conſiderable uneaſineſs, a difficulty of breathing, coſtiveneſs, and an unaccountable anxiety. Theſe are the breeding ſymptoms of the approaching *tympany*; and the ſame often happens after unſkilful treatment in abortions, and after the leaving of a part of the lochia behind, or the injuring of the uterus in delivery.

Children are alſo ſubject to *tympanies* when violently afflicted with worms, and ſometimes after the meaſles and ſmall-pox; and if due care is not taken of theſe caſes, at their beginning, the ſuperior parts ſoon become extenuated, and the patients die. Extreme voracity of children alſo, and their eating great quantities of food at a time when the ſtomach is weak, ſometimes bring on this diſorder.

Some ſuppoſe it to ariſe from a watery humour extravaſated, and rarefied into vapour; and, by a property common to it with common air, corrupting the parts. But this Boerhaave makes a particular kind of *tympanites*, or wind-dropſy; and adds, that it is cured like the aſcites, or watery-dropſy, by tapping, &c.

Others will have the *tympanites* to ariſe from the air's inſinuating itſelf through perforations in the diſtempered inteſtines. A *tympanites* from this cauſe, Boerhaave, who makes it a peculiar claſs, obſerves, is almoſt always incurable.

Willis ſets aſide this latter cauſe, and accounts for the diſeaſe from an irregularity in the animal ſpirits belonging to the viſcera, which, ruſhing tumultuarily into the nervous fibres, bloat them up: thus the peritonæum is inflated, the inteſtines are diſtended, and the meſentery and other viſcera, rendered turgid; and while this is doing, that the vacuities left in the tumefied viſcera may be filled up, a quantity of the humour contained in them is rarefied into vapour, which preſently ſpreads in blaſts through the vacant places. Others account for the *tympanites* from a convulſion of the muſcles of the abdomen, &c.

M. Littre has propoſed a new ſyſtem of the *tympanites*, built on a great number of obſervations. According to him, it does not proceed from any convulſion of the abdominal muſcles, nor from any air contained in the cavity thereof, or in the thorax, the meſentery, or epiploon; but from the air encloſed in the ſtomach and inteſtines, which ſwells them exceſſively.

This air, always carried into thoſe parts with the food, maintains a kind of equilibrium therein; oppoſing, on the one hand, the too great preſſure on that long canal, when empty of food; and naturally finding, on the other ſide, in the ſpring of the coats of the ſtomach and inteſtines, an obſtacle capable of preventing its too great dilatation.

If this equilibrium chance to be deſtroyed by the irritation of the fibres, whoſe ſpring in that caſe prevails over that of the air, this latter is expelled either upwards or downwards, or both ways (whence belching, &c.) But if the equilibrium come to be broken by the force of the air, rendered ſuperior to that of the fibres, by thoſe latter being left deſtitute of ſpirits, as from the blood's being impoveriſhed after a long ſickneſs; in that caſe, the air rarefying itſelf beyond meaſure, ſwells the cavities it is contained in.

If it be demanded, why, when the ſtomach and inteſtines are ſo full of wind, none of the wind eſcapes either through the anus or by the mouth, which uſes to be expelled by thoſe paſſages?

Mr. Mery ſolves the paradox thus: according to this theory the fibres, both of the ſtomach and inteſtines, have loſt their ſpring, at leaſt in part, and are in an imperfect palſy; but the winds, evacuated either by the anus or mouth, are winds which thoſe viſcera expel out of their cavities, by putting them in a ſtate of contraction capable of ſurmounting the forces which oppoſe the egreſs of the matters contained in thoſe cavities. Theſe forces are two ſphincters, one whereof ſhuts the upper orifice of the ſtomach, and the other the anus; but paralytic viſcera, i. e. viſcera deſtitute of ſpirits, in which alone conſiſts the ſtrength of the muſcles, cannot overcome the reſiſtance of thoſe two muſcles; whence the wind, therefore, cannot eſcape through its uſual outlets.

The *tympany* is juſtly accounted one of the moſt dangerous kinds of diſeaſes, ſince the perſons afflicted with it much oftener die than recover. When it is accompanied with a dropſy, it is ſcarce ever cured; and a ſimple *tympany* in women and children, if neglected at firſt, degenerates into a chronic diſorder, and hardly admits of a cure. Some, indeed, have gone ſo far as to ſay, they never knew a patient, afflicted with a *tympany*, recover; but this ſeems too raſh a judgment. That deſtination of the abdomen, which is properly called a flatulent colic, is by ſome accounted a ſpecies of *tympany*; but this is not naturally dangerous, and is eaſily cured, except when it is attended with ſpaſms of the viſcera, in which caſe the medicines given to reſtore the due tone of the inteſtines, are by no means proper in regard to the ſpaſms.

In curing flatulencies of the ſtomach and inteſtines, the proper method is to promote the diſcharge of the vapours by the anus, and to attenuate and carry off by ſtool the viſcid matter which is the occaſion of them. To this purpoſe diſcutient and evacuating glyſters are very ſerviceable: theſe ſhould be prepared of chamomile, hyſſop, juniper-berries, and the carminative ſeeds, a little quantity of ſal gem, crude ſal ammoniac, or Epſom ſalt, in veal broth. After theſe, laxative medicines are to be given, with balſamic and carminative ingredients; and then the powders of zedoary, orange-peel, tartarum vitriolatum, are to be given; and, when neceſſary, the pilula de ſtyrace, at proper intervals. In the mean time much ſervice may alſo be done by external applications; ſuch as the oils of mint, rue, nutmeg, and the like, with balſam of Peru; and the rubbing of the belly with Hungary-water is often of immediate relief: by theſe means the ſlighter inflations of the ſtomach and inteſtines are uſually cured with eaſe, and often beginning *tympanies* yield to continuance of them. Hoffman. Opera, tom. iv.

The *tympanites* rarely kills of itſelf; but it frequntly degenerates into an aſcites. Cathartics rather aggravate than alleviate it; antihyſterics, antiſcorbutics, chalybeats, and ſtrengtheners are of uſe, before it be commenced an aſcites. Equal quantities of leek and elder-leaves mixed, are a famed empirical medicine in this diſeaſe, which has often proved effectual when every thing elſe had failed.

It is uſual to apply carminatives to the belly, as the emplaſter of cummin-ſeeds, &c. and alſo to uſe carminatives mixed with cathartics, diuretics, &c. internally; but if the diſeaſe proceed from a paralytic cauſe, deſtroying the tone of the fibres of the firſt paſſes, what is of uſe in rectifying paralytic diſorders, where the tenſion of the fibres is inſufficient, will doubtleſs for the ſame reaſon be of uſe here.

In the caſe of a *tympany* mentioned by Mr. Monro, the patient took ſeveral doſes of purgatives, which operated ſufficiently, but brought little or no wind away with the fæces, and altered the ſtate of her belly very little. On account of her being irregular in her menſtrua, and a ſuſpicion of pituita in the primæ viæ, ſhe was next ordered ſome doſes of calomel, which produced little change; and for two months ſhe was conſtantly taking large doſes of the antihyſteric medicines, either by themſelves or mixed with purgatives; the antihyſteric plaſter was kept always applied to her whole belly, and once or twice the ſemicupium was uſed, but without any proſpect of cure. Some time before the eruption of the menſes, purgatives were again given more ſparingly, and doſes of the ſtrongeſt antihyſterics, ſuch as aſſa fœtid. ol. c. c. &c. mixed with ſoap, were enlarged and given more frequently, and accompanied with the hotter antiſcorbutics, e. g. rad. raphan. ruſtic. recent. zinziber, &c. infuſed in ſtrong ale with ſteel. The patient was alſo ordered to uſe frequent and ſtrong frictions to the trunk and extremities of her body, and to exerciſe moderately. Immediately before the menſes began to flow, clyſters of the ſame kind of medicines were injected. When her courſes, which were in ſufficient quantity, ceaſed, her ſaponaceous, antihyſteric, and antiſcorbutic medicines being continued for two days, ſhe had very violent exploſions of wind upward and downward; her belly became leſs and ſofter than it had been from the firſt attack of the diſeaſe: her medicines, with a doſe of ſyrup. de rhamno, at proper intervals, were ſtill continued, and the proportion of ſteel increaſed, and her flatulent diſcharge went ſucceſſively on, till at length, after uſing her medicines ſeveral months, ſhe was diſcharged, cured, and continued in good health. Edinb. Eſſ. Med. vol. i. art. 31.

TYNDARIDÆ, in *Mythology*, a name given by the poets to Caſtor and Pollux, the ſons of Jupiter and Leda.

Though, according to the fable, Pollux and Helena proceeded from the egg which Leda had conceived by Jupiter, and were therefore immortal; whereas, out of another egg, which ſhe conceived by Tyndarus, her huſband, came Caſtor, and Clytemneſtra, who were mortal. See CASTOR and *Pollux*.

TYPE, TYPUS, formed from τυπος, *form*, *figure*, a copy, image, or reſemblance, of ſome model.

The term *type* is leſs in uſe than its compounds PROTOTYPE and ARCHETYPE, which are the originals that are made without models.

TYPE is alſo a ſcholaſtic term, much uſed among divines, ſignifying a ſymbol, ſign, or figure, of ſomething to come.

In this ſenſe the word is commonly uſed with relation to ANTITYPE, αντιτυπος, which is the thing itſelf, whereof the other is a *type* or figure.

Thus Abraham's ſacrifice, the paſchal lamb, &c. were *types* or figures of our redemption; and the brazen ſerpent was a *type* of the croſs, &c.

Types are not mere conformities, or analogies, which the nature of things holds forth between them; nor arbitrary images ariſing merely from the caſual reſemblance of things; but there is farther required a particular inſtitution of God to make a *type*, and a particular declaration of his that it is ſo.

Gale divides *types* into *hiſtorical* and *prophetical*. The firſt are thoſe uſed by the ancient prophets in their agitations and viſions: the ſecond, thoſe wherein things done, or ceremonies inſtituted, in the Old Teſtament, prefigure Chriſt, or things relating to him in the New Teſtament.

The ancient fathers, as well as the modern critics, have been greatly divided about the nature and uſe of *types* and *typical* repreſentations in the Old Teſtament; and it is this makes one of the greateſt difficulties in underſtanding the ancient prophecies, and in reconciling the New and Old Teſtament together.

There is no denying but that there were ſome *types* which the divine wiſdom inſtituted to be the ſhadows and figures of things to come; and yet people run into an exceſs that way; ſome looking for *types* in every thing, like Origen, who diſcovered myſteries in the very caldrons of the tabernacle. A prudent man ſhould be contented with the more ſenſible and obvious ones, nor propoſe any without proving them as much as poſſible, and ſhewing that they were really intended for *types*, in order to juſtify the ſolidity of the reaſoning of the apoſtles, who argued from them.

An author, in reference to this ſubject, maintains, that not the fathers only, but St. Paul himſelf, was of the opinion, "that Chriſtianity was all contained in the Old Teſ"tament, and was implied in the Jewiſh hiſtory and law; "both which are to be reputed *types* and ſhadows of Chriſti"anity." In order to which, he quotes Hebrews viii. 5. x. 1. and Coloſ. ii. 16, 17. He adds, "That the ritual "laws of Moſes, being in their own nature no other "than *types* and ſhadows of future good things, are to "be conſidered as having the effect of prophecies." This is likewiſe the ſenſe of Mr. Whiſton, and others; but the ſame author even quotes our Saviour ſpeaking in behalf of this *typical* reaſoning in that paſſage, Matth. xi. 13. where he affirms that, "The law propheſies; "and that he came to fulfil the law as well as the goſ"pel." Matth. v. 17. Diſc. of the Grounds, &c.

An ingenious divine takes this occaſion to obſerve, that had the ancients, with the modern retainers to the *typical* way, expreſly deſigned to have expoſed Chriſtianity, they could not have done it more effectually than by thus making every thing *types* and prophecies.

Not that he denies the reality of ſuch things as *types*. It is manifeſt there were many under the Old Teſtament, ſuch were Zechariah's ſtaves, beauty, and bands, chap. xi. 7, 10, 14; ſuch was Hoſea's adulterous wife, chap. i. 2, and ſuch were his children, ver. 4, 6. The prophets deſigned by theſe to prefigure future events; but in theſe inſtances the reader is at once, by the declaration of the prophet, made to underſtand as much, and not left to his own conjectures about them after the events are over.

In effect, all that is urged from Scripture for the *typical* or allegorical interpretations of the Jewiſh law, hiſtory, ceremonies, &c. it is aſſerted, may be ſet aſide, without any violence to the Sacred Text, which may be explained on more natural and intelligible principles, and more conſiſtently with grammar.

The word τυπος, we have obſerved, literally denotes no more than a copy or impreſſion of any thing; and accordingly, in our tranſlation, we find it ſometimes rendered by *print*, ſometimes by *figure*, ſometimes by *faſhion*, and ſometimes by *form*.

Hence alſo the word is figuratively applied to denote a moral pattern; in which ſenſe it ſignifies no more than *example* and *ſimilitude*.

Again, the word αντιτυπος, *antitype*, in Scripture, ſignifies any thing formed according to a model or pattern; and thus, in the Epiſtle to the Hebrews, the tabernacle, and holy of holies, being made according to the pattern ſhewn to Moſes, are ſaid to be *antitypes*, or figures of the true holy places. In the like ſenſe, St. Peter, ſpeaking of the flood and the ark, whereby eight perſons were ſaved, calls baptiſm an *antitype* thereto; by which he expreſſes no more than a ſimilitude of circumſtances.

The other words uſed in Scripture to imply a future event, prefigured by ſome foregoing act, are,—ὑποδειγμα, rendered by *imitation* and *example*; and σκια, ſhadow.

Such being the import of all the terms uſed in the New Teſtament writers, ſeeming to imply any prefiguration of future events under the Goſpel, it is obſerved,

1. That to argue from *types*, is only to argue from examples or ſimilitudes; and, conſequently, that all inferences drawn from ſuch reaſonings are no farther concluſive than reaſonings from ſimilitudes are. The intent of ſimilitudes is only to help to convey ſome ideas more clearly or ſtrongly; ſo that to deduce conſequences from a ſimile, or infer any thing from other parts of the ſimile, than what are plainly ſimilar, is abſurd.

The ſame author alſo alledges, 2. That it cannot be proved, that the ceremonies of the Moſaic law were ever deſigned to preſigure any future events in the ſtate of the Meſſiah's kingdom. No ſuch declared prefigurations are mentioned in the writings of the Old Teſtament, whatever notions prevailed among the writers who immediately followed. It is granted, that the apoſtles argued from the rites in the Moſaic inſtitution; but this (he ſays) appears to have only been by way of illuſtration and analogy.

There is certainly a general likeneſs in all the diſpenſations of Providence; an analogy of things in the natural as well as the moral world, from which it is eaſy arguing by way of parity, and it is very juſt and uſual ſo to do; but that one of theſe diſpenſations was therefore given to preſignify another that was future, can never be proved, unleſs it be expreſly declared.

It is the ſame way of ſimilitude (he maintains) we are to underſtand St. Paul, where he ſays, "That Chriſt our paſſover is ſacrificed for us." And thus we are to underſtand John the Baptiſt, when he calls our Saviour the "Lamb of God." There was this ſimilitude of circumſtance, that Chriſt was ſlain on the ſame day with the paſchal lamb; that he died about the ſame time of the day when the prieſts began their hillel; that not a bone of the one or the other was broken. Add, that as the paſchal lamb was without blemiſh, ſo was Chriſt without ſin. From theſe, and other circumſtances, the apoſtle applied the term *paſſover* to Chriſt.

Thus, alſo, we are to account for what St. Paul calls the baptiſm of the children of Iſrael in the cloud, and in the ſea; and for the compariſon betwixt the high-prieſt entering the holy place every year, and Chriſt entering into heaven. Sykes's Eſſay on the Truth of the Chriſtian religion, 1725.

TYPE, τυπος, is alſo a name given to an edict of the emperor Conſtans II. publiſhed in 648, to impoſe a general ſilence both on the orthodox and the Monthothelites.

It had the name of *type*, as being a kind of formulary of faith; or rather a form whereon men were to regulate their conduct.

The *type* owed its original to Paul, patriarch of Conſtantinople, who perſuaded that emperor to take away the ECTHESIS, compiled and hung up in all the public places by Heraclius (as occaſioning great complaints from the orthodox, by its favouring the Monothelites); and to publiſh an edict to impoſe ſilence on both parties.

But ſuch kinds of pacifications are held inexcuſable in matters of religion; accordingly pope Theodore ſoon procured the patriarch Paul to be depoſed; the *type* was examined in the council of Rome, conſiſting of a hundred and five biſhops, in 649. and condemned; and an anathema was pronounced againſt all ſuch as admitted either the impious ecthesis or *typus*.

TYPE, TYPUS, is alſo uſed to denote the order obſerved in the intenſion and remiſſion of fevers, pulſes, &c.

TYPE, among *Letter-founders* and *Printers*, denotes the ſame with letter.

TYPHA, *Reed Mace*, in *Botany*, a genus of the *monoecia triandria* claſs. Its characters are, that it has male and female flowers; the male flowers form a cylindric catkin; the calyx is obſolete and conſiſts of three leaves; the female flowers have the ſame kind of catkin with the male, and neither have any corolla; the calyx is ſoft and hairy; the ſeed is ſingle, inſident upon hairy down. There are two ſpecies, one of which called the great cat's tail, grows on the banks of rivers and fiſh ponds; the other, or narrow-leaved cat's-tail, grows in ditches and ponds, is eat by cows, but refuſed by ſwine.

TYPHIUM, in *Botany*, a name uſed by ſome authors for coltsfoot.

TYPHLE, or TYPHLINE, a name by which ſome authors have called the fiſh more uſually known by the name of the ACUS.

TYPHLINUS, in *Zoology*, the name by which the Greeks, and from them ſome others, have called the *cæcilia*, or SLOW-*worm*.

TYPHODES, τυφωδης, or τυφος, in *Medicine*, a kind of ardent, or burning fever, uſually attendant on eryſipelaſes of any of the viſcera.

This diſeaſe is deſcribed by Hippocrates and the old writers, and by them diſtinguiſhed into five kinds.

The firſt kind is a legitimate and continual fever, impairing the perſon's ſtrength, and accompanied with pains in the abdomen, and a preternatural heat and weakneſs of the eyes, and a failure of ſpeech.

The ſecond kind begins with a tertian or quartan fever, and is attended with a pain in the head, and a large diſcharge of ſaliva, and ſometimes worms. The feet, and other parts of the body, are afflicted with ſoft ſwellings, the eyes are painful, and the voice tremulous and faint, from the ſticking of the ſaliva in the throat. The belly and back are alſo often in pain.

The third kind is diſtinguiſhed by the intenſe pains it occaſions in the joints, and ſometimes over the whole body, and often attended with a lameneſs.

The fourth is known by the violent tenſion and pain of the abdomen which attends it; this is uſually followed by a diarrhæa, and ſometimes by a dropſy.

The fifth kind is diſtinguiſhed by an unnatural paleneſs all over the body, and a ſort of tranſparence, as if the whole ſkin was only a bladder, containing a watery juice, though not inflated; the eyes are hollow in this caſe, and the patient is continually feeling about the bedcloaths, as if picking out threads. There is always an uneaſineſs after eating, and frequent nocturnal pollutions.

The word *typhos* is alſo uſed in a more general ſenſe for *typus*, *typos*, to import the remiſſions and exacerbations of diſeaſes.

TYPHOMANIA, τυφομανια, formed from τυφος, *ſmoke*, and μανια, *madneſs*, in *Medicine*, a diſeaſe of the brain, wherein the patient not being able to ſleep, though greatly inclined thereto, lies with his eyes ſhut, talks abſurdly, and flings himſelf this way and that.

If he be pulled, or the like, he juſt opens his eyes, looks about, and ſinks again into a kind of dozing, which is interrupted by a train of diſagreeable imaginations.

The *typhomania* is a kind of combination of a phrenſy with a lethargy. It is alſo called a COMA *vigil*.

TYPHON, or TYPHOEUS, in *Mythology*, the name of one of the *rebel* GIANTS.

TYPHON, or TYPHO, in *Phyſics*. See WHIRLWIND.

TYPIC *fevers*, an appellation given by medical writers to thoſe fevers which are regular in their attacks, and in their general period: they are thus called by way of diſtinction from the erratic, which obſerve no regular type, or determinate appearance.

TYPOGRAPHY, formed from τυπος and γραφη, *writing*, the art of PRINTING.

TYPOLITES, or TYPOLITHUS, formed of τυπος, *type*, and λιθος, *ſtone*, in *Natural Hiſtory*, names given to ſtones or foſſils, on which are impreſſed the figures of various animals and vegetables. See STONES, *Adventitious* FOSSILS, &c.

TYR, in the *Ethiopian Calendar*, the name of the fifth month of the Ethiopean year. It commences on the 25th of December of the Julian year.

TYR, in *Mythology*, a name given to a warrior deity, the protector of champions and brave men, invoked by the ancient northern nations.

The third day of the week was conſecrated to *Tyr*, from whom, it is ſaid, the name given to it in moſt of the northern languages is derived: it is called in Dan. *Tyrſdag*, or *Tiſdag*; in Sued. *Tiiſdag*; in Engliſh, *Tueſday*; in Low Dutch, *Dings-tag*; and in Latin, *Dies Martis*: whence it is inferred, that *Tyr* anſwered to Mars.

The Germans, in High Dutch, call this day *Erichs-tag*, from the word *heric* or *harec*, a *warrior*, which comes to the ſame thing.

Tyr muſt be diſtinguiſhed from another deity called THOR. Mallet's North. Ant. vol. i. p. 99.

TYRANNICIDE, formed of *tyrannus* and *cædo*, *I kill*, denotes the act of killing a tyrant.

TYRANNUS, in *Ornithology*, a name given by ſome to the lanius, or BUTCHER-*bird*, a ſpecies of hawk, not larger than a thruſh, but a very fierce and fatal enemy to the ſmall birds.

TYRANNY, in *Political Government*, is the exerciſe of power beyond right, which nobody can have a right to; and thus it is diſtinguiſhed from USURPATION, or the exerciſe of power which another hath a right to: and it is the uſe of power which any one poſſeſſes, not for the good of thoſe who are ſubject to it, but for his own private ſeparate advantage; when the governor, however intitled, makes not the law, but his will the rule; and his command and actions are not directed to the preſervation of the property of his people, but the ſatisfaction of his own ambition, revenge, covetouſneſs, or any other irregular paſſion.

It is a miſtake to think this fault peculiar to monarchies; other forms of government are liable to it as well as that. For, wherever the power that is put in any hands for the government of the people, and the preſervation of their property, is applied to other ends, and made uſe of to impoveriſh, harraſs, or ſeduce them to the arbitrary irregular commands of thoſe that have it, there it becomes *tyranny*, whether thoſe who thus uſe it are one or many.

Accordingly we read of the thirty tyrants at Athens, as well as one at Syracuſe; and the intolerable dominion of the decemviri at Rome was nothing better. Every wanton and cauſeleſs reſtraint of the will of the ſubject, whether practiſed by a monarch, a nobility, or popular aſſembly, is a degree of *tyranny*.

Whenever the conſtitution of a ſtate veſts in any man, or body of men, a power of deſtroying at pleaſure, without the direction of laws, the lives or members of the ſubject, or of alienating their property, or of depriving them of their liberty at pleaſure, ſuch conſtitution is tyrannical. In a word, wherever law ends, *tyranny* begins, if the law be tranſgreſſed to another's harm. And whoſoever in authority exceeds the power given him by the law, and makes uſe of the force he has under his command, to compaſs that upon the ſubject which the law allows not, ceaſes in that to be a magiſtrate, and, acting without authority, may be oppoſed as any other man, who by force invades the right of another. The end of government, whatever be its name or nature, is the good of mankind: and upon this principle, whoſoever uſes force without right, as every one does in ſociety who does it without law, puts himſelf into a ſtate of war with thoſe againſt whom he uſes it; and in that ſtate all former ties are cancelled, all other rights ceaſe, and every one has a right to defend himſelf, and to reſiſt the aggreſſor.

If it be aſked, who ſhall be judge; whether the prince or legiſlative act contrary to their truſt? The anſwer is obvious, the people ſhall be judge; for who ſhall be judge whether the truſtee or deputy acts well, and according to the truſt repoſed in him, but he who deputes him, and muſt, by having deputed him, have ſtill a power to diſcard him when he fails in his truſt? If this be reaſonable in particular caſes of private men, why ſhould it be otherwiſe in that of the greateſt moment, where the welfare of millions is concerned; and alſo, where the evil, if not prevented, is greater, and the redreſs very difficult, dear, and dangerous? Locke, of Civil Government, ch. xviii. and xix. in his Works, vol. ii. p. 214, &c.

TYRANT, TYRANNUS, among the *Ancients*, denoted ſimply a king or monarch.

But the ill uſe ſeveral perſons inveſted with the character made of it, has altered the import of the word, and *tyrant* now carries with it the idea of an unjuſt and cruel prince, who invades the people's liberty, and rules in a more deſpotic manner than the laws of nature, or the country, do allow of.

The term *tyrant*, we are told, became odious among the Greeks, thoſe zealous lovers of liberty, almoſt as ſoon as introduced; but Donatus aſſures us, it was never taken ſo among the Romans till the latter ages of that empire.

The motto of a *tyrant* is, *Oderint dum metuant*. Rowland contends, that this word, as well as the correſpondent Greek and Latin, is derived from *tir*, Welch and Erſe, *land*, and *rhanner*, Welch, *to ſhare*; q. d. *tirhanner*, a ſharer or divider of land among his vaſſals. Johnſon.

TYRANTS, *thirty*, an appellation under which the thirty perſons, eſtabliſhed by the Lacedæmonians in Athens, in order to enſlave and keep it in ſlavery, are denominated. Thraſybulus formed the generous deſign of driving them from Athens, and ſucceeded; upon which event Cornelius Nepos has remarked, that many have deſired, and few had the happineſs to reſcue their country from a ſingle *tyrant!* but Thraſybulus delivered his from thirty.

One of the means which theſe *tyrants* uſed for carrying on their ſcheme of enſlaving the Athenians, was the ordering of the ſuffrages of the Areopagites to be public, that they might manage them as they pleaſed. See Monteſquieu's Spirit of Laws, vol. i. p. 17.

TYRBE, τυρβη, in *Antiquity*, a feſtival celebrated by the ancients in honour of Bacchus.

TYRIUM *marmor*, a name given by the ancients to a ſpecies of marble of a beautiful white, ſometimes free from veins, and ſometimes variegated with duſky blackiſh grey ones. When pure, it was little inferior to the Parian, and often was uſed inſtead of it by the ſtatuaries. See MARBLE.

TYRO. See TYROCINIUM.

TYROCINIUM, TYROCINY, formed of *tyro*, a *raw beginner*, a noviciate or apprenticeſhip in any art or ſcience.

We have ſeveral writings under the title of *tyrociniums*, *tyrocinium chymicum*, *tyrocinium chirurgicum*, &c. containing the rudiments of thoſe arts, accommodated to the apprehenſions of beginners.

TYROSIS, τυρωσις, formed of τυρος, *cheeſe*, in *Medicine*, a coagulating or curdling of milk in the ſtomach, after the manner of cheeſe.

TYRUS, a word uſed by ſome of the barbarous writers for a ſerpent or viper.

TYSHAS, among the *Ethiopians*, the name of the fourth month of their year, commencing the 27th of November in the Julian year.

TYTH, or rather TITHE. See TITHE.

TYTHING, and TYTHING-*man*. See TITHING, DECINERS, TENMENTALE, HUNDRED, WAPENTAKE, &c.

TZANATL, in *Ornithology*, the name of an American bird deſcribed by Nieremberg, which, he ſays, has all over very long and beautiful feathers, of a fine green, and of the ſhining gloſs of the feathers of the peacock. The upper ſide of the wings is black, but their under part is of a very fine and ſhaded green; it has a very beautiful creſt on its head; its throat and breaſt are of fine ſcarlet; the wing-feathers are very long, and very beautifully variegated with ſeveral colours. The Indians eſteem the feathers of this bird more valuable than gold; they dreſs up the images of their gods with them. Ray's Ornithol. p. 303.

TZANGÆ, among the *Ancients*, a kind of Parthian garments, according to ſome; but others will have them to have been ſhoes ſet with precious ſtones, formed into the figure of eagles, and deſigned for the emperor's uſe.

TZANPAU, in *Ornithology*, the name of an American bird, deſcribed by Nieremberg, and famous for the modulations of its voice, and is by many eſteemed the female of the POLYGLOTTA *avis*, or cencontlatolli of the Indians.

TZICATLINA, in *Zoology*, a ſpecies of ſerpent, ſaid to be found in America, and reckoned among the moſt beautiful of that kind of animals. It is nine inches long, about the thickneſs of a man's little finger, and variegated with alternate ſwaths of white and red croſſing its body. It is likewiſe one of the harmleſs kind of ſerpents.

The name ſignifies the *ſerpent of ants*, becauſe it lives always in their neſts, and comes out along with them.

TZINITZIAN, in *Ornithology*, the name of a very beautiful American bird, deſcribed by Nieremberg, of the ſize of a ſmall pigeon, and ornamented with variouſly-coloured feathers. The beak is ſhort, crooked, and of a pale colour; the head and neck are like thoſe of the pigeon; the breaſt and part of the belly are red; but that part which is next the tail, is of a fine elegant blue, and a bright white, beautifully intermixed with one another; the tail is green on the upper part and black underneath; the wings are variegated with white and black; the feet and legs are grey, and the ſhoulders of a very beautiful green. It is moſt frequent near the South Sea, and feeds on vegetables. It is kept in cages for its beauty, but never ſings. The Indians make ſeveral beautiful works of its feathers. Ray's Ornithol. p. 303.

TZTACTZON, in *Ornithology*, an American name under which Nieremberg has deſcribed a ſpecies of duck, remarkable for the variable and beautiful colours of its head, which are purple, blue, white, and green, and ſhine like ſattin; its body is variegated with black, grey, and white; its legs are red, and is eaten as the other water-fowl. It is common in the lakes of Mexico, and has feet much more adapted to ſwimming than to walking. Ray's Ornithol. p. 299.

U.

U, The twentieth letter in the alphabet, and the fifth vowel.

Beſides the vowel *u*, there is a conſonant of the ſame denomination, wrote *v* or v.

V conſonant and U vowel ought to be conſidered as two letters; but as they were long confounded while the two uſes were annexed to one form, the old cuſtom ſtill continues to be followed.

U, the vowel, has two ſounds; one clear, expreſſed at other times by *eu*, as *obtuſe*; the other cloſe, and approaching to the Italian *u*, or Engliſh *oo*, as *obtund*.

V, the conſonant, has a ſound nearly approaching to thoſe of *b* and *f*. With *b* it is by the Spaniards and Gaſcons always confounded, and in the Runic alphabet is expreſſed by the ſame character with *f*, diſtinguiſhed only by a diacritical point. The ſound in Engliſh is uniform: it is never mute.

V is alſo a numeral letter, and ſignifies *five*; according to the verſe.

> V *vero quinque dabit tibi, ſi recte numerabis.*

When a daſh was added at top, $\overline{\text{V}}$, it ſignified 5000.

V. R. among the Romans, ſtood for *uti rogas*, as you deſire: which was the mark of a vote, or ſuffrage for the paſſing of a law.

The following abbreviations ſometimes occur, viz. V. A. for veterani aſſignati; V. B. vero bono; V. B. A. viri boni arbitratu; V. B. F. vir bonæ fidei; V. C. vir conſularis; V. C. C. F. vale, conjux chariſſime, feliciter; V. D. D. voto dedicatur; V. G. verbi gratia; V. L. videlicet; V. N. quinto nonarum.

V, on the French coins, denotes thoſe that were ſtruck at Troyes.

V, in *Muſic*, is often uſed to ſhew that a piece is deſigned for the violin; and VV, for two violins, or more.

V. S. is an abbreviation for VOLTI *ſubito*.

VACANCY, in *Philoſophy*. See VACUUM.

VACANCY, in *Law*, &c. a poſt or benefice wanting a regular officer, or incumbent.

The canoniſts hold, that the kind of *vacancy* is to be expreſſed in the impetration of a benefice.

A future *vacancy*, or voidance of a ſpiritual living, ſome writers call *vacatura*. *Devolution* is a ſpecies of canonical *vacancy*.

VACANCY of the *throne*. See *Right* of CROWN and REVOLUTION.

VACANT *effects*, *prædia* VACATA, or VACUA, are ſuch as are abandoned for want of an heir, after the death or flight of their former owner.

In our law-books, *vagantes terræ*, for *vacantes*, expreſſes forſaken, or uncultivated lands.

A Romiſh benefice is ſaid to be *vacant in curia Romana*, when the incumbent dies in Rome, or within twenty leagues thereof; though it be only by accident that he was there. The pope nominates to all benefices *vacant in curia Romana*, excepting thoſe of the neighbouring biſhopricks.

VACANT *cylinder*, in *Gunnery*. See CYLINDER.

VACATING *records*, in *Law*. See IMBEZZLE.

VACATION, *non term*, in *Law*, all the time included between the end of one term, and the beginning of the next ſucceeding one. See TERMS.

This intermiſſion was called by our anceſtors *pax Dei*, and *eccleſiæ*; and ſometimes, the *time* or *days of the king's peace*. Among the Romans, it was called *juſtitium* or *feriæ*, or *dies nefaſti*.

The time from the death of a biſhop, or other ſpiritual perſon, till the biſhoprick, or other dignity, be ſupplied by another, is alſo called *vacation*.

During the *vacation* of a biſhoprick, the dean and chapter are GUARDIANS of the *ſpiritualities*, by the canon law; and of common right they are ſo at this day in England, and the archbiſhop hath this privilege only by preſcription or compoſition, to whom with us, during the vacancy of any ſee within his province, all epiſcopal rights of the dioceſe belong; and all eccleſiaſtical juriſdiction is exerciſed by him and his commiſſioners. But when an archiepiſcopal ſee is vacant, the dean and chapter of his dioceſe are guardians of the ſpiritualities, and exerciſe the ſpiritual juriſdiction of his province. And the perquiſites that happen by the execution of ſuch power belong to the guardian, but the new-elected biſhop may by law, after election and confirmation, execute the ſame. See CUSTOS *ſpiritualium*.

The cuſtody of the temporalities of every archbiſhoprick and biſhoprick within the realm, in the time of *vacation*, belongs to the KING by his prerogative; and upon the filling of a void biſhoprick, the king, and not the new biſhop, hath the temporalities thereof, from the time that the ſame became void to the time that the new biſhod ſhall receive them from the king: which the king *ex gratia* may grant him by his letters patent after his confirmation, and before his conſecration: but after he is conſecrated, inveſted, and inſtalled, he may ſue for his temporalities out of the king's hands by a writ directed to the eſtreator; the metropolitan teſtifying the time of conſecration. See CUSTOS *temporalium*.

During the *vacation* of a benefice, the profits, by the common law of the church, were to be laid out for the benefit of the church, or reſerved for the ſucceſſor; and by ſpecial privilege or cuſtom the biſhop or archdeacon might have the ſame, wholly or in part: and it is ſaid, the king might take the profits of a free chapel, and the patron thoſe of a donative. But by ſtatute 28 Hen. VIII. c. 11. it is enacted, that the tithes and profits of ſpiritual promotions, offices, benefices and dignities, during the time of their *vacation*, ſhall belong to the perſon next preſented, promoted, inſtituted, inducted, or admitted, towards the payment of his firſt fruits. Anciently, upon the death of an incumbent, the rural dean, without any formal ſequeſtration, took the vacant benefice into his cuſtody; but in proceſs of time, the chancellors of biſhops, or their archdeacons, laid claim to this juriſdiction, and by forms of ſequeſtration aſſigned vacant churches to the œconomi or lay guardians of the church; and now the ordinary way of managing the profits of *vacation* is by ſequeſtration granted to the church-wardens, who are to manage all the profits and expences of the benefice for the ſucceſſor; whoſe right to the profits commences from the avoidance of the benefice, and to whom the ſequeſtrators are to account for ſuch as they have received, deducting their reaſonable expences, and thoſe of ſupplying the cure, during the *vacation*. By 28 Hen. VIII. c. 11. an incumbent before his death may make his teſtament of all the profits of the corn growing upon glebe lands which he has manured and ſown: but if his ſucceſſor is inducted before the ſeverance of it from the ground, the ſucceſſor ſhall have the tithe of it; otherwiſe, if the parſon dies after the ſeverance of it, and before it is carried off, the ſucceſſor ſhall have no tithe. Where there is no proper leaſe of tithes, the perſon who receives them ſhall be accountable to the executor for thoſe received by him, and which became due before the incumbent's death, and to the ſucceſſor for tithes which he received, and which became due after the incumbent's death: but glebe lands, and tithes demiſed or leaſed are comprehended under ſtatute 11 Geo. II. c. 19. which enacts, that the executors or adminiſtrators of a tenant for life may, in an action upon the caſe, recover of the under tenant, if ſuch tenant for life die on the day on which the rent was made payable, the whole, or if before ſuch day, a proportion of ſuch rent, according to the time ſuch tenant for life lived, of the laſt year, or quarter of year, or other time in which the ſaid rent was growing due. As to modus in lieu of tithes, which, if taken in kind, would have been due before the death of the incumbent, whereas the modus for the ſame is not due till after his death, it ſeems that the executors are not intitled to the ſaid modus, nor any part thereof, but that the whole ſhall go to the ſucceſſor.

Cicero, in his *orations*, mentions a law, whereby the prieſts were exempted from ſervice in all wars, except only in uproars, and civil tumults; which exemptions he calls *vacationes*.

VACCA, in *Zoology*, the female of the ox-kind. See Cow.

VACCA *marina*. See SEA *cow*.

VACCARY, *vaccaria*, in our *Old Writers*, a houſe, or place to keep cows in; a dairy-houſe, or cow-paſture.

VACCINIUM, in *Botany*, a name by which ſome authors have called the great bilberry, or *vitis idea magna* of other writers. See WHORTLE-*berry*.

VACERRI. See DRUIDS.

VACUNALIA, among the *Romans*, a feſtival kept in honour of the goddeſs Vacuna, who preſided over thoſe that were unemployed or at reſt.

It was celebrated in December by the country labourers, after the fruits were gathered in, and the land tilled.

Ovid ſpeaks of it in his Faſti, lib. vi.

Nam quoque cum fiunt antiquæ ſacra vacunæ,
Ante vacunales ſtantque, ſedentque focos.

The worſhip of *Vacuna* was very ancient in Italy, and eſtabliſhed among the Sabines long before Rome was founded. Some take her for Diana, Venus, or Ceres, and others for Bellona or Victory. Varro thinks ſhe was Minerva.

VACUUM, VACUITY, in *Phyſics*, a ſpace empty or devoid of all matter, or body.

Whether there be any ſuch thing in nature as an abſolute *vacuum*; or whether the univerſe be completely full, and there be an abſolute PLENUM; is a thing that has been controverted by the philoſophers of all ages.

The ancients, in their controverſies, diſtinguiſhed two kinds: a *vacuum coacervatum*, and a *vacuum interſperſum*, or *diſſeminatum*.

VACUUM *coacervatum*, is conceived as a place deſtitute of matter: ſuch, e. gr. as there would be, ſhould God annihilate all the air, and other bodies within the walls of a chamber.

The exiſtence of ſuch a *vacuum* is maintained by the Pythagoreans, Epicureans, and the Atomiſts, or Corpuſcularians; moſt of whom aſſert ſuch a *vacuum* actually to exiſt without the limits of the ſenſible world. But the modern Corpuſcularians, who hold a *vacuum coacervatum*, deny that appellation; as conceiving, that ſuch a *vacuum* muſt be infinite, eternal, and uncreated.

According, then, to the later philoſophers, there is no *vacuum coacervatum* without the bounds of the ſenſible world; nor would there be any other *vacuum*, provided God ſhould annihilate divers contiguous bodies, than what amounts to a mere privation, or nothing; the dimenſions of ſuch a ſpace, which the ancients held to be real, being by theſe held to be mere negations; that is, in ſuch a place, there is ſo much length, breadth, and depth wanting, as a body muſt have to fill it. To ſuppoſe, that when all the matter in a chamber is annihilated, there ſhould yet be real dimenſions, is to ſuppoſe corporeal dimenſions without body; which is abſurd.

The Carteſians, however, deny any *vacuum coacervatum* at all; and aſſert, that if God ſhould immediately annihilate all the matter, v. gr. in a chamber, and prevent the ingreſs of any other matter, the conſequence would be, that the walls would become contiguous, and include no ſpace at all. They add, that if there be no matter in a chamber, the walls can be conceived no otherwiſe than as contiguous; thoſe things being ſaid to be contiguous, between which there is not any thing intermediate: but if there be no body between, there is no extenſion between: extenſion and body being the ſame thing: and if there be no extenſion between, then the walls are contiguous; and where is the *vacuum*?

But this reaſoning is founded on a miſtake, viz. that body and extenſion are the ſame thing. See MATTER.

VACUUM *diſſeminatum*, or *interſperſum*, is that ſuppoſed to be naturally interſperſed in and among bodies, in the pores of the ſame body, and in the interſtices between different bodies.

It is this kind of *vacuum* which is chiefly diſputed among the modern philoſophers; the Corpuſcularians ſtrenuouſly aſſerting it; and the Peripatetics, and Carteſians, as tenaciouſly impugning it. See CARTESIAN and LEIBNITZIAN.

The great argument the Peripatetics urge againſt a *vacuum interſperſum*, is, that there are divers bodies frequently ſeen to move contrary to their own nature and inclination; and that for no other apparent reaſon, but to avoid a *vacuum*: whence they conclude, that nature abhors a *vacuum*; and give us a new claſs of motions aſcribed to the FUGA *vacui*, or nature's flying a *vacuum*. Such, they ſay, is the riſe of water in a ſyringe, upon the drawing up of the piſton; ſuch alſo is the aſcent of water in pumps, and the ſwelling of the fleſh in a cupping-glaſs, &c. But ſince the weight, elaſticity, &c. of the air have been aſcertained by ſure experiments, thoſe motions and effects are univerſally aſcribed to the gravity and preſſure of the atmoſphere.

The Carteſians deny not only the actual exiſtence, but even the poſſibility, of a *vacuum*: and that on this principle, that extenſion being the eſſence of matter, or body, wherever extenſion is, there is matter; but mere ſpace, or vacuity, is ſuppoſed to be extended; therefore it is material. Whoever aſſerts an empty ſpace, they ſay, conceives dimenſions in that ſpace, i. e. he conceives an extended ſubſtance in it; and therefore he denies a *vacuum*, at the ſame time that he admits it.

Des Cartes, if we may believe ſome accounts, rejected a *vacuum* from a complaiſance to the taſte which prevailed in his time, againſt his own firſt ſentiments; and among his familar friends uſed to call his ſyſtem his philoſophical romance.

On the other hand, the corpuſcular authors prove, not only the poſſibility, but the actual exiſtence of a *vacuum*, from divers conſiderations; particularly from the conſideration of motion in general; and that of the planets, comets, &c. in particular; from the fall of bodies; from the vibration of pendulums; from rarefaction and condenſation; from the different ſpecific gravities of bodies; and from the diviſibility of matter into parts.

1°, It is argued, that motion could not be effected without a *vacuum*. This is what Lucretius urged long ago. *Principium quoniam cedendi nulla daret res—undique materies quoniam ſtipata fuiſſet.*

The force of this argument will be increaſed from the two following conſiderations, viz. firſt that all motion is either in a ſtraight line, or in a curve, which returns into itſelf, as the circle, and ellipſis; or in a curve that does not return into itſelf, as the parabola, &c. And, ſecondly, that the moving force muſt always be greater than the reſiſtance.

For, hence it follows, that no force, even though infinite, can produce motion where the reſiſtance is infinite; conſequently, there can be no motion either in a ſtraight line, or a non-returning curve; becauſe, in either of thoſe caſes, the protruſion, and conſequently the reſiſtance, would be infinite. There remains, therefore only the motion of a revolving curve practicable; this muſt either be a revolution upon an axis, or an annular motion round a quieſcent body; both which are, again, impoſſible in an elliptic curve; and conſequently, all motion muſt be in circles geometrically true; and the revolving bodies muſt either be ſpheres, ſpheroids, cylinders, or portions of them, exactly geometrical; otherwiſe, the revolutions in a plenum would be impoſſible: but ſuch motions, or ſuch figured bodies, we do not know in nature. Therefore there is a *vacuum*.

2°, The motions of the planets and comets demonſtrate a *vacuum*: thus ſir Iſaac Newton—"That there is no "ſuch fluid medium as æther," (to fill up the porous parts of all ſenſible bodies, as the air and interſtellar parts, and ſo make a plenum), "ſeems probable; be" cauſe the planets and comets proceed with ſo regular "and laſting a motion, through the celeſtial ſpaces, both "from and to all parts; for hence it appears, that thoſe "celeſtial ſpaces are void of all ſenſible reſiſtance, and "conſequently of all ſenſible matter. For the reſiſting "force of fluid mediums ariſes partly from the attrition "of the parts of the medium, and partly from the in" activity of matter. Now, that part of the reſiſtance of "any medium, which ariſes from the tenacity or attri" tion of its parts, may be leſſened by dividing the mat" ter into ſmaller parts, and rendering thoſe parts "more ſmooth and ſlippery: but that part of the reſiſt" ance which ariſes from the inactivity of matter, is al" ways in proportion to the denſity of the matter; nor "can it be diminiſhed by dividing the matter, nor by "any other means, except by diminiſhing the denſity "thereof.

"Conſequently, if the celeſtial regions were as denſe as "water, or as quickſilver, they would reſiſt almoſt as "much as water or quickſilver; but if they were per" fectly denſe, without any interſperſed vacuity, though "the matter were ever ſo fluid and ſubtle, they would "reſiſt more than quickſilver does: a perfectly ſolid "globe, in ſuch a medium, would loſe above half its "motion, in moving three lengths of its diameter; and "a globe not perfectly ſolid, ſuch as the bodies of the "planets and comets are, would be ſtopped ſtill ſooner. "Therefore, that the motion of the planets and comets "may be regular and laſting, it is neceſſary the ce leſtial ſpaces be void of all matter, except perhaps ſome few, and much rarefied effluvia of the planets and comets, and the paſſing rays of light.”

3°, The ſame great author deduces a *vacuum* alſo from the conſideration of the weights of bodies; thus: “All bodies about the earth gravitate towards the earth; and the weights of all bodies, equally diſtant from the earth's centre, are as the quantities of matter in thoſe bodies. If the æther, therefore, or any other ſubtile matter, were altogether deſtitute of gravity, or did gravitate leſs than in proportion to the quantity of its matter; becauſe (as Ariſtotle, Deſcartes, and others, argue) it differs from other bodies only in the form of matter; the ſame body might, by the change of its form, gradually be converted into a body of the ſame conſtitution with thoſe which gravitate moſt in proportion to the quantity of matter: and, on the other hand, the moſt heavy bodies might gradually loſe their gravity, by gradually changing their form; and therefore the weights would depend upon the forms of bodies, and might be changed with them; which is contrary to all experiment.”

4°, The deſcent of bodies proves, that all ſpace is not equally full; for the ſame author goes on, “If all ſpaces were equally full, the ſpecific gravity of that fluid, with which the region of the air would, in that caſe, be filled, would not be leſs than the ſpecific gravity of quickſilver or gold, or any other the moſt denſe body; and therefore neither gold, nor any other body, could deſcend therein. For bodies do not deſcend in a fluid, unleſs that fluid be ſpecifically lighter than the body. But, by the air-pump, we can exhauſt a veſſel, till even a feather ſhall fall with a velocity equal to that of gold in the open air: the medium, therefore, through which this feather falls, muſt be much rarer than that through which the gold falls in the other caſe.

“The quantity of matter, therefore, in a given ſpace, may be diminiſhed by rarefaction: and why may not it be diminiſhed in infinitum? Add, that we conceive the ſolid particles of all bodies to be of the ſame denſity, and that they are only rarefiable by means of their pores: and hence a *vacuum* evidently follows.”

5°, “That there is a *vacuum*, is evident from the vibrations of pendulums: for ſince thoſe bodies, in places out of which the air is exhauſted, meet with no reſiſtance to retard their motion, or ſhorten their vibrations; it is evident there is no ſenſible matter in thoſe ſpaces, or in the occult pores of thoſe bodies.”

As to what Des Cartes urges of his materia ſubtilis, that its tenuity prevents its reſiſtance from being ſenſible; and that a ſmall body, ſtriking againſt a greater, cannot in the leaſt move, or reſiſt the motion of that other; but is reflected back again with all its momentum; it is contrary to all experience. For ſir Iſaac proves, that the denſity of fluid mediums is proportionable to their reſiſtances, very nearly; and that they are exceedingly miſtaken, who ſuppoſe the reſiſtance of projectiles to be infinitely diminiſhed by dividing the parts of the fluid, even in infinitum (Princip. lib. ii. prop. 38.): when, on the contrary, it is clear the reſiſtance is but little diminiſhed by the ſubdiviſion of the parts (ibid. Prop. 40.) and that the reſiſting forces of all fluids are nearly as their denſities—For why ſhould not the ſame quantity of matter, whether divided into a great number of ſubtle parts, or into a few larger ones, have the ſame reſiſting force? If then there were no *vacuum*, it would follow, that a projectile moving in the air, or even in a ſpace whence the air is exhauſted, ſhould move with as much difficulty as it would in quickſilver; which is contrary to experience.

Nor will it avail to ſuppoſe the particles of the ſubtile fluid, conſtituting a plenum, to move conſtantly and equally in all directions; and by favour of this hypotheſis, to imagine that they act but do not reſiſt. Becauſe the motion of a fluid favours the motion of a body in it, only as far as it is in the ſame direction; and an inteſtine motion of the parts of the fluid, equal in all directions, cannot make the reſiſtance leſs then if there was no motion of the parts. It is ſuppoſed by many that the particles of common fluids, e. g. water or air, are in a conſtant inteſtine motion; but this does not hinder thoſe fluids from reſiſting in proportion to their denſity.

If it ſhould be alledged, that by ſuppoſing this denſe fluid which repleniſhes ſpace to penetrate the pores of bodies with the utmoſt freedom, (as light paſſes through tranſparent bodies, and the magnetic and electric effluvia through moſt kinds of bodies), its reſiſtance will then be incomparably leſs than in proportion to its denſity; the reſiſtance in this caſe not being meaſured by the denſity of the fluid, becauſe the greater part paſſes through the pores of the body in motion freely, without reſiſtance: yet even on this hypotheſis, the reſiſtance of a golden ball in a plenum would be ſtill very great. For this ſubtle fluid, how penetrating ſoever it be, muſt reſiſt the ſolid parts of the ball; which cannot move in the fluid without diſplacing its parts, and loſing as much motion as muſt be communicated to thoſe parts; and this reſiſtance depends on the quantity of ſolid parts in the ball; whereas the reſiſtance which the ſame ball meets with in quickſilver (which we ſuppoſe to have no paſſage through the ball), depends on the quantity of the ſolid parts in an equal bulk of the quickſilver, which muſt be moved to make way for the ball. And this being leſs than the quantity of ſolid parts in an equal bulk of the golden ball, in proportion as the ſpecific gravity of quickſilver is leſs than that of gold, it follows that the reſiſtance of a golden ball, moving in ſuch a ſubtile penetrating plenum, would ſtill be greater than its reſiſtance in quickſilver. The reſiſtance of a golden ball in a plenum (how freely ſo ever the matter conſtituting it paſs through the pores of the ball, and how large or numerous ſo ever theſe pores may be) muſt correſpond to the ſolid matter in the ball; which is greater than the ſolid matter in any equal bulk of any of our fluids, upon which their reſiſtance depends.

6°, That there are interſperſed vacuities, appears from matter's being actually divided into parts, and from the figures of thoſe parts: for, on ſuppoſition of an abſolute plenitude, we do not conceive how any part of matter could be actually divided from that next adjoining, any more than it is poſſible to divide actually the parts of abſolute ſpace from one another: for by the actual diviſion of the parts of a continuum from one another, we conceive nothing elſe underſtood, but the placing of thoſe parts at a diſtance from one another, which, in the continuum, were at no diſtance from one another: but ſuch diviſions between the parts of matter muſt imply vacuities between them.

7°, As for the figures of the parts of bodies, upon the ſuppoſition of a plenum, they muſt either be all rectilinear, or all concavo-convex; otherwiſe, they would not adequately fill ſpace; which we do not find to be true in fact,

8°, The denying a *vacuum* ſuppoſes what it is impoſſible for any one to prove to be true; viz. that the material world has no limits.

However we are told by ſome, that it is impoſſible to conceive a *vacuum*. But this ſurely muſt proceed from their having imbibed Des Cartes's doctrine, that the eſſence of body is conſtituted by extenſion; as it would be contradictory to ſuppoſe ſpace without extenſion. To ſuppoſe that there are fluids penetrating all bodies and repleniſhing ſpace, which neither reſiſt nor act upon bodies, merely in order to avoid admitting a *vacuum*, is feigning two ſorts of matter, without any neceſſity or foundation; or is tacitly giving up the queſtion.

Since then the eſſence of matter does not conſiſt in extenſion, but in ſolidity, or impenetrability, the univerſe may be ſaid to conſiſt of ſolid bodies moving in a *vacuum:* nor need we at all fear, leſt the phenomena of nature, moſt of which are plauſibly accounted for from a plenitude, ſhould become inexplicable when the plenum is ſet aſide. The principal ones, ſuch as the tides; the ſuſpenſion of the mercury in the barometer; the motion of the heavenly bodies, and of light, &c. are more eaſily and ſatiſfactorily accounted for from other principles. See TIDES, &c.

VACUUM, or *vacuum Boyleanum*, is alſo uſed, ſomewhat abuſively, to expreſs the approach to a real *vacuum*, which we arrive at by means of the air-pump.

Thus, any thing put in a receiver ſo exhauſted, is ſaid to be put *in vacuo:* and thus, moſt of the experiments with the air-pump are ſaid to be performed *in vacuo*, or *in vacuo Boyleano*. Some of the principal phenomena, obſerved of bodies *in vacuo*, are; that the heavieſt and lighteſt bodies, as a guinea and a feather, fall here with equal velocity:—that fruits, as grapes, cherries, peaches, apples, &c. kept for any time *in vacuo*, retain their nature, freſhneſs, colour, &c. and thoſe withered in the open air recover their plumpneſs *in vacuo:*—all light and fire become immediately extinct *in vacuo:*—the colliſion of flint and ſteel *in vacuo*, produces no ſparks:—no ſound is heard, even from a bell rung *in vacuo:*—a ſquare phial, full of common air, well cloſed, breaks *in vacuo*; a round one does not:—a bladder half full of air will heave up forty pound weight *in vacuo:*—cats, and moſt other animals, ſoon expire *in vacuo*.

By experiments made in 1704, Dr. Derham found, that animals which have two ventricles, and no foramen ovale, as birds, dogs, cats, mice, &c. die in leſs than half a minute; counting from the firſt exſuction; a mole died in one minute, a bat lived ſeven or eight. Inſects as waſps, bees, graſhoppers, &c. ſeemed dead in two minutes; but, after being left *in vacuo* twenty-four hours, they came to life again in the open air: ſnails continued twenty-four hours *in vacuo*, without appearing much incommoded.

Seeds planted *in vacuo* do not grow:—Small beer dies, and loſes all its taſte, *in vacuo*:—lukewarm water boils very vehemently *in vacuo*:—and air, ruſhing through mercury into a *vacuum*, throws the mercury in a kind of ſhower upon the receiver, and produces a great light in a dark room.

The AIR-PUMP can never produce a perfect *vacuum*; as is evident from its ſtructure, and the manner of its working: in effect, every exſuction only takes away a part of the air: ſo that there will ſtill be ſome left after any finite number of exſuctions. Add, that the air-pump has no longer any effect than while the ſpring of the air remaining in the receiver is able to lift up the valves: when the rarefaction is come to that degree, you can come no nearer to a *vacuum*. Sir Iſaac Newton, obſerving that a thermometer ſuſpended *in vacuo*, and in that ſtate removed to a warm or a cold room, receives the heat or cold, and riſes, or falls, almoſt as ſoon as another in open air; takes thence occaſion to ſuſpect, that the heat of the warm room is conveyed through the *vacuum*, by the vibrations of a much ſubtiler medium than air, which remained in the *vacuum* after the air was drawn out. (Opt. p. 323.)

Vacuum, *Torricellian*. See Torricellian.

VADARI, in the *Civil Law*, denotes a perſon to pledge, undertake, or give ſecurity, in behalf of another, that he ſhall, on a certain day, appear in court, to proſecute, or anſwer.

If he fails, his ſurety has an action *vadimonii deſerti* againſt him; that is, an action for deſerting his bail. See Wager.

Properly ſpeaking, *vadari reum*, among the Romans, was the act of the plaintiff himſelf, who here demanded ſurety, or bail from the defendant, that he wonld appear before the prætor on a certain day.

VADELECT. See Valet.

VADE-MECUM, or a Veni-mecum, a Latin phraſe, uſed in Engliſh, to expreſs a thing that is very familiar; and which any one uſually carries about with him: it is chiefly applied to ſome favourite book.

Some make Virgil, others Horace, their *vade-mecum*; others an Epictetus, &c.

This is what the Greeks call εγχειριδιον, or *manual*. The Arabs have a phraſe of equal import; viz. *Habib al ſeir*, *comes itineris*, companion of the journey. In Latin it is beſt expreſſed by *comes*; as *comes theologicus*, *comes ruſticus*, &c.

VADIATION. See Vadari.

VADIMONIUM, in the *Civil Law*, a promiſe, or bond, given for appearance before the judge upon a day appointed.

VADIUM. See Gage and Pone *per Vadium*.

VA-EMBU, in the *Materia Medica*, a name given by ſome authors to the *acorus Aſiaticus*, or Aſiatic ſweet flag.

VAGABOND, a perſon that wanders about, having no certain dwelling; or a ſturdy beggar, &c. mentioned in divers ſtatutes.

De vagabundis, *& aliis hominibus mendicantibus, qui ſe nominant*—Travelling men, *&c.* Charta 22. Hen. VI.—*Item utemur, quod nullus* vagabundus *vegetur ſeu deambulet de nocte in villa ſeu ſuburbio poſt pulſationem campanæ noſtræ communis, vocatæ Coverſeu: & ſi aliquis ibidem capiatur poſt pulſationem dictæ campanæ, ducatur ad gaulam domini regis, & ibi morabitur uſqua in craſtinum, ut notitia perſonæ ſuæ habeatur*, &c. MS. Cod. de Leg. & Stat. Burgi villæ Mountgomer. temp. Hen. II.

All itinerant beggars, fortune-tellers, collectors for gaols, fencers, bearwards, players of interludes, minſtrels, jugglers, gypſies, &c. ſhall be reputed *vagabonds*, rogues and ſturdy beggars, 39 Eliz. c. 4.

The court of Areopagus at Athens puniſhed idleneſs, and exerciſed a right of examining every citizen in what manner he ſpent his time. The civil law expelled all ſturdy beggars from the city: and, in our own law, all idle perſons or *vagabond*, (whom our ancient ſtatutes deſcribe to be "ſuch as wake in the night, and ſleep in the day, and haunt cuſtomable taverns, or alehouſes, and routs about; and no man wot from whence they come or whither they go;" or ſuch as are more particularly deſcribed by ſtatute 17 Geo. II. c. 5. called the *vagrant act*, and divided into three claſſes, (*idle and diſorderly* perſons, *rogues* and *vagabonds*, and *incorrigible rogues*;) are offenders againſt the good order, and blemiſhes in the government of any kingdom. They are therefore all puniſhed by the ſtatute laſt mentioned: i. e. idle and diſorderly perſons with one month's impriſonment in the houſe of correction; rogues and *vagabonds* with whipping and impriſonment not exceeding ſix months; and incorrigible rogues with the like diſcipline and confinement, not exceeding two years; the breach and eſcape from which confinement in one of an inferior claſs, rank him among incorrigible rogues; and in a rogue (before incorrigible) make him a felon, and liable to be tranſported for ſeven years. Perſons harbouring vagrants, are liable to a fine of 40*s.* and to pay all expences brought on the pariſh thereby; in the ſame manner as, by our ancient laws, whoever harboured any ſtranger, for more than two nights, was anſwerable to the public for any offence which his inmate might commit. Black. Com. vol. iv. p. 170.

VAGINA, a Latin term, literally ſignifying a *ſheath*, or *ſcabbard*; uſed on divers occaſions. As,

Vagina, in *Architecture*, is uſed for the lower part of a TERMINUS; becauſe reſembling a ſheath, out of which the ſtatue ſeems to iſſue. See Terms.

The *vagina* is that long part between the baſe, and the capital; and is formed in divers manners, and with divers ornaments.

Vagina, in *Anatomy*, denotes a canal, or cavity, leading from the pudendum to the uterus of women.

The *vagina*, called alſo CERVIX *uteri*, is a membranous paſſage, extended from the rima, or aperture of the labia, to the neck of the womb. See *Tab. Anat. (Splanch.) fig.* 9. *lit. h. fig.* 11. *lit. a.*

It is ſituated below the urethra, and above the extremity of the inteſtinum rectum, a little obliquely, being more raiſed in the inner and back part than in the outer and fore-part: its inner or poſterior extremity joins the extremity of the body of the uterus, and ſurrounds its orifice much as the duodenum ſurrounds the pylorus, or as the ilium is ſurrounded by the cæcum and colon: the anterior extremity forms the great orifice, which lies under that of the urethra, and above the foſſula of the inferior commiſſure of the alæ; and is commonly bordered by a circular membranous fold, called HYMEN; and each ſide of this anterior portion is covered externally by a thin, broad, cavernous, and vaſcular plexus, called the plexus retiformis of this canal, being compoſed of veſſels which come chiefly from the hypogaſtricæ; and this plexus is ſtrictly united to the muſcular portions commonly taken for accelerators or conſtrictors, and may be inflated by air like the ſpongy ſubſtance of the clitoris, with which it ſeems to have ſome communication: the length of the *vagina* is ordinarily ſeven or eight inches. The body of the canal is chiefly made up of a ſpongy nervous ſubſtance, interwoven with numerous blood-veſſels exquiſitely ſenſible, and it is commonly longer and narrower in virgins than in married women.

Through the whole courſe of its inner ſurface, it is covered by a particular membrane, and is full of rugæ, or wrinkles; formed by oblong narrow eminences, incurvated like portions of arches; which arches the uſe of venery renders leſs apparent, and frequent parturition obliterates: this ſhews, that they were intended to render the part more eaſile diſtendible for parturition.

Along the whole tract of the *vagina* there are pores, or oſtia, or little ducts ſeen, which are the extremities of glands, that, in the act of venery, emit a liquid by many miſtaken for ſeed. See Lacunæ.

The *vagina* has a conſtrictory muſcle, inſerted under the clitoris; which, with a broad ſeries of fibres, embraces and conſtringes the lower part of the *vagina*, and puts the dimenſion of the part, in ſome meaſure, in the power of the mind.

The uſe of the *vagina* is to receive the penis in coition, and to emit from the womb the menſtrual diſcharges, the fœtus, ſecundines, and lochia.

The *vagina* is liable to an inflammation after delivery, occaſioned by the head of the child being long retained in the pelvis. If the ſwelling and inflammation are not very great, they are generally removed by the diſcharge of the lochia; but if the internal membrane of the *vagina* be inflamed, emollient injections muſt be occaſionally uſed, and a piece of prepared ſponge ſhould be introduced to prevent its coaleſcing. The ſponge may be thus prepared: take a piece of a proper ſize for keeping the *vagina* open, when it is expanded; ſoak it in warm water; then roll it tight from end to end with a ſtring; cut off any hard lumps, and lay it to dry; then take off the ſtring; anoint it with lard, and introduce it into the *vagina*, the moiſture of which will expand it. If the preſſure on this part was ſo long continued, as to obſtruct the circulation in it, a mortification will enſue, which may be either total or partial: if it be total, the patient will die; if partial only, the mortified parts will ſlough off. This may be known by great pain after delivery; a fetid ſmell, and a diſcharge of ſharp ichor at firſt from the *vagina*, then pus and matter. When this is the caſe, emollient fomentations may be thrown up from time to time; doſſils of lint may be dipped in ſome proper balſam,

ſam, and applied to the parts in order to deterge and heal them; and when the ſloughs are all caſt off, great care ſhould be taken to prevent the vagina from growing together, either by introducing doſſils of lint, or pieces of ſponge into it. Motherby.

Vaginæ *procidentia* See Procidentia.

Vaginæ *femoris tenſor*, in *Anatomy*, a name given by Albinus to a muſcle in the thigh, called by others the MEMBRANOSUS, and the *muſculus faſciæ latæ*; and by ſome *muſculus* APONEUROTICUS.

Vaginæ *uteri ſphincter*. See Sphincter *vaginæ*, &c.

VAGINALIS *gulæ*, in *Anatomy*, a name ſome anatomiſts give to the muſculous coat of the gula; as ſuppoſing it a proper muſcle, conſpiring with the œſophagus in thruſting the aliment down, when entered.

Vaginalis *tunica*, the ſame with what we otherwiſe call ELYTROIDES.

The *tunica vaginalis* is common to the ſpermatic chord, and the teſticle; the *tunica* of the latter being a continuation of that of the former, which is a proceſs of the peritonæum. The *tunica vaginalis* of the ſpermatic chord is compoſed of two diſtinct membranous laminæ, ſituated upon one another; the upper being extended downwards, and dilated in its progreſs towards the teſticle and epididymis, ſo as to form a bag or ſheath for the reception of theſe and the tunica albuginea. On the poſterior part the epididymis is connected to the internal ſurface of the *tunica vaginalis*. Its internal lamina is attached to the ſpermatic rope, a little above the teſticle, by a thin, fine membrane, with which it is lined; and thus a tranſverſe partition is formed betwixt the ſuperior and inferior parts: the *tunica vaginalis* of one teſticle has no connection with that of the other; ſuch connection being prevented by the ſeptum ſcroti. The outer ſurface of this tunica is rough; the inner ſmooth and lubricated by a ſmall quantity of extravaſated lymph, furniſhed by the extremities of exhaling, lymphatic, or ſecretory veſſels, which fluid, in a proportional quantity, is occaſionally returned into the courſe of circulation by inhaling or abſorbent veſſels. See Hydrocele.

VAGINANS *folium*, among *Botaniſts*. See Leaf.

VAGRANTS, in *Law*. See Vagabond.

VAGUM, in *Anatomy*, a name given to the eighth pair of nerves of the medulla oblongata, called the *par vagum*, becauſe diſperſed to divers parts of the body. See *Tab. Anat.* (*Oſteol.*) *fig.* 5. *lit. q. q.* See Nerve.

VAI-*bio*, in the *Materia Medica*, a name uſed by ſome authors for a kind of lignum aloes, which is brought from China, and is very black, and ſcented.

VAIR, in *Heraldry*, a kind of fur, or doubling, conſiſting of divers little pieces, argent and azure, reſembling a Dutch U, or a bell-glaſs. See *Tab.* II. *Heraldry*, *fig.* 87.

Vairs have their point azure oppoſite to their point argent, and the baſe argent to the azure.

When there are only two or three *vairs*, the ancient heralds call it *great vair*; and when there are more, *ſmall vair*.

Vair is intended to repreſent a kind of ſkin, uſed anciently by the kings of France, in lieu of a fur, and wherewith the gowns of the preſidents à mortier, the counſellors of the court, the herald's coats, &c. were lined till the fifteenth century.

It was properly the ſkin of a kind of ſquirrel, called alſo in French *vair*, and in Latin *ſcriveus*; which was white underneath, and of dove-colour at top. It is deſcribed by Aldrovandus, under the name of *ſcriveo vario*, and is the ſame, according to Geſner, with the *mus Ponticus* of Ariſtotle and Pliny; which the Latins call *varus*, or *varius*, from the variety of its colour. Its two ſkins, joined together, make the figure of the *vairs* in armories; being naturally white and azure.

Vair, Colombiere obſerves, is the ſecond ſort of fur anciently uſed as a lining of the garments of great men; conſiſting of little pieces, ſewed by the furriers on white ſkins: and becauſe theſe pieces were uſually blue, thoſe who firſt ſettled the rules of heraldry, decreed, that this fur, in its natural blazon, ſhould always be argent and azure. So, if it be abſolutely ſaid, ſuch a family bears *vair*; it is ſuppoſed to be argent and azure.

Regularly there muſt be but four rows or ranks of *vair* in the ſhield; if there be either more or leſs, the number muſt be ſpecified. The ſmalleſt number, being three rows, is called *beffroy de vair*; and the moſt, being five or ſix is called *menu*, or *ſmall vair*.

The *beffroy* is alſo known by the firſt figure on the dexter-ſide of the eſcutcheon, being always of metal, and in form of a belt; whereas that of menu *vair* is in ſhape of a glaſs.

Vair, *counter*. See Counter-*vair*.

VAIRY, Vaire, Verry, or Varry, is applied to a coat, or the bearings of a coat, when charged, or chequered, with *vair*.

When the colours are argent and azure, or white and blue, it is *vairy proper*: if it be otherwiſe, the colours are to be expreſsly named; *vairy* of ſuch a colour or metal. He bears *vairy*, or and vert; this is particularly called *vair compoſed*. The bearings are likewiſe ſaid to be *vairy*, when they are charged with *vairs*.—When chiefs, croſſes, pales, feſſes, &c. happen to be *vairy*, the number of ranks are to be ſpecified.

Vairy gowns are obſerved, by Julius Pollux, to have been the habit of the ancient Gauls, as ermines were of the Armenians.

Vairy *cuppy*, or Vairy *taſſy*, or *potent* COUNTER, COUNTER-*potent*, is a bearing in heraldry, compoſed of pieces repreſenting the tops of crutches, or potents counterplaced. See *Tab.* II. *Herald. fig.* 88.

In blazon, the colours muſt be expreſſed; as, azure, argent, &c.

VAISSEAUX *enfilez*, a term uſed by the French writers in *Chemiſtry*, for the veſſels uſed in diſtilling in an open fire, or in ſand, which do not conſiſt in the common way of a retort, joined immediately to a receiver, but have a receiver with a double opening, and a neck at each end, placed between the retort and the ordinary receiver. The neck of the retort is let into one of the necks of this middle veſſel, and its other neck is thruſt into that of the receiver; by this means the receiver, into which the liquor is to fall, ſtands at a greater diſtance than it otherwiſe would from the fire, and the vapours are more eaſily condenſed in it by its coolneſs, while they have alſo a double or treble ſpace to expand in, and by that means are not ſo likely to burſt the veſſel.

VALANTIA, in *Botany*. See Cross-*wort*.

VALDENSES. See Vaudois.

VALDIA, in *Botany*, a name given by Plumier to a genus of plants, ſince called by Linnæus, OVIEDA.

VALE *of a pump*, at *Sea*, a term for the trough by which the water runs from the pump along the ſhip-ſides, to the ſcupper-holes.

VALENTIAM. See Cape *ad Valentiam*.

VALENTINIANS, in *Eccleſiaſtical Hiſtory*, an ancient and famous ſect of Gnostics; thus called from their leader *Valentinus*, an Egyptian by birth, who was eminently diſtinguiſhed by the extent of his fame, and the multitude of his followers. His ſect, which took riſe at Rome towards the cloſe of the ſecond century, grew up to maturity in the iſle of Cyprus, and ſpread itſelf through Aſia, Africa, and Europe, with amazing rapidity. His principles were much the ſame with thoſe of the Gnoſtics, though, in many reſpects, he entertained opinions peculiar to himſelf. He placed in the pleroma, as the Gnoſtics called the habitation of the Deity, thirty ÆONS, half male and half female: to theſe he added four others, which were of neither ſex, viz. Horus, Chriſt, the Holy Goſt, and Jeſus. The youngeſt æon, called Sophia, or Wiſdom, conceived an ardent deſire of comprehending the nature of the ſupreme Being, and by the force of this propenſity, brought forth a daughter, named Achamoth: who being exiled from the pleroma, fell down into the undigeſted maſs of matter and arranged it; and, by the aſſiſtance of Jeſus, produced the DEMIURGE, the lord and creator of all things. This demiurge ſeparated the animal from the terreſtrial matter; and out of the former created the ſuperior world, or viſible heavens: and out of the latter the inferior world, or the terraqueous globe. He alſo made man, uniting in his compoſition the animal and terreſtrial matter, to which Achamoth added a ſpiritual and celeſtial ſubſtance. The demiurge, according to Valentine, arrogating the honours of God alone, ſent prophets to the Jewiſh nation to urge his claims; and his ambition was imitated by the other angels that preſide over the different parts of the univerſe. In order to chaſtiſe this lawleſs arrogance, and to illuminate the minds of rational beings with the knowledge of the true and ſupreme Deity, Chriſt appeared on earth, compoſed of an animal and ſpiritual ſubſtance, and clothed, moreover, with an aerial body. The Redeemer, in deſcending upon earth, paſſed through the womb of Mary; and Jeſus, one of the ſupreme æons, was united to him when he was baptized by John in Jordan. The creator of this world, perceiving that the foundations of his empire were ſhaken, cauſed him to be apprehended and nailed to the croſs: but before Chriſt ſubmitted to this puniſhment, not only Jeſus the Son of God, but the rational ſoul of Chriſt, aſcended up on high; ſo that only the animal ſoul and the etherial body ſuffered crucifixion. Thoſe, who abandoning the ſervice of falſe deities and the worſhip of the God of the Jews, live according to the precepts of Chriſt, and ſubmit the animal

mal and ſenſual ſoul to the diſcipline of reaſon, ſhall be truly happy; and when all the parts of the divine nature, or all ſouls, are purified thoroughly and ſeparately from matter. then a raging fire ſhall ſpread its flames through the univerſe, and diſſolve the frame of the corporeal world. Such is the doctrine of Valentine and the Gnoſtics: and ſuch, in general, are the tenets of the ORIENTAL *philoſophy*. The ſect of the *Valentinians* was divided into many branches. See PTOLEMAITES, SECUNDIANS, HERACLEONITES, and MARCOSIANS. Moſheim's Ecc. Hiſt. vol. i. p. 186. &c, 8vo edit.

VALERE. See PERINDE *Valere*.

VALERIAN, VALERIANA, in *Botany*, a genus of the *triandria monogynia* claſs. Its characters are theſe: the flower has either no or a ſmall empalement, and one tubulous petal, cut into five obtuſe ſegments at the brim, with a gibbous honey-gland on the inſide; it has three ſmall erect awl-ſhaped ſtamina the length of the petals, terminated by roundiſh ſummits; the germen is ſituated under the flower, ſupporting a ſlender ſtyle crowned by a thick ſtigma; it turns to a crowned capſule which falls off, and in it is formed a ſingle ſeed. There are ſeveral ſpecies of it, which grow naturally in England, and other parts of Europe. Miller enumerates twelve, and Linnæus nineteen ſpecies.

The *valerians* may be known, when not in flower, by their roots being ſcented, and their leaves always ſtanding two at a ſtalk.

There are various kinds of *valerian*; but thoſe chiefly in uſe, are the large garden *valerian*, *valeriana hortenſis*; called by Dioſcorides, *phu, folio oluſatri*; and the *valeriana ſylveſtris*, or great wild *valerian*.

The former is an ingredient in Venice treacle; its chief uſe is in diſorders of the nerves: in which reſpect, however, it is held inferior to the latter.

The *wild valerian*, *valeriana officinalis* of Linnæus, or *valeriana ſylveſtris major montana* of Bauhine, is perennial, and grows wild in dry mountainous places. The root conſiſts of tough ſtrings with numerous ſmaller threads, matted together, iſſuing from one head, of a duſky browniſh colour approaching to olive. Cows eat the leaves, and cats are very fond of the roots. Another ſpecies, or variety, of *wild valerian* is met with in moiſt watery grounds, diſtinguiſhable by the leaves being broader, and of a deep gloſſy green colour. Both ſorts have been uſed indiſcriminately; but the mountain ſort is much the moſt efficacious, and is, therefore, expreſly ordered for the officinal ſpecies by the London college.

The *mountain valerian* root has a ſtrong, not agreeable, ſmell, and an unpleaſant, warm, bitteriſh, ſubacrid taſte: the ſtrength of the ſmell and taſte is the only certain teſt of its genuineſs and goodneſs. It is a medicine of great eſteem in the preſent practice againſt obſtinate hemicraniæ, hyſterical, and the different kinds of nervous diſorders, and is commonly conſidered as one of the principal antiſpaſmodics. Columna reports, that he was cured by it of an inveterate epilepſy after many other medicines had been uſed in vain.

M. Marchant, in the Memoirs of the Academy of Sciences, has confirmed this virtue, by many inſtances within his own knowledge: and what is very remarkable, is, that in the two obſervations he enlarges moſt upon, the patients, on taking it, voided great quantities of worms. His cuſtom was, always to purge before he adminiſtered it.

On more extenſive trials it has been found, in ſome epileptic caſes, to effect a cure, in ſeveral to abate the violence or frequency of the fits, and in many to prove altogether ineffectual; oftentimes it either purges, or operates by ſweat or by urine, or brings away worms, before it prevents a fit. The doſe of the root in powder is from a ſcruple to a dram or two, which may be repeated, if the ſtomach will bear it, two or three times a day. Dr. Withering ſays, that in habitual coſtiveneſs it is an excellent medicine; and frequently looſens the bowels when other ſtronger purgatives have been tried in vain. A remarkable inſtance of its efficacy in a catalepſy is given by Mr. Mudge (on the *vis vitæ*, &c.); doſes of half an ounce of the powder were exhibited twice a-day, and a leſs quantity was found ineffectual.

The powdered root, infuſed in water, or digeſted in rectified ſpirit, impregnates both menſtrua ſtrongly with its ſmell and taſte, and tinges the former of a dark brown, and the latter of a browniſh red colour. Water diſtilled from it ſmells conſiderably of the root, but no eſſential oil ſeparates: the extract obtained by inſpiſſating the watery infuſion, which is about one fourth the weight of the root, has a pretty ſtrong taſte, diſagreeably ſweetiſh, and ſomewhat bitteriſh: the ſpirituous extract, which is about one-eighth the weight of the root, is leſs diſagreeable, and more perfectly reſembles the root itſelf. Tinctures of it are prepared in the ſhops, by digeſting four ounces of the powdered *valerian* in a quart of proof ſpirit, in the ſame quantity of the volatile aromatic ſpirit, or of the dulcified ſpirit of ſal ammoniac. The root in ſubſtance, however, is generally found to be more effectual than any preparation of it: and its flavour may beſt be covered with mace. Lewis.

VALERIAN, *Greek*, or JACOB'S *Ladder*, *polemonium*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has a permanent empalement which is cut into five ſegments, and it has one wheel-ſhaped petal; the tube is very ſhort, and the upper part is divided and ſpreads open; it has five ſlender ſtamina inſerted in the valves of the tube, which are ſhorter than the petal, and are terminated by roundiſh ſummits; in the bottom of the tube is ſituated an acute oval germen, ſupporting a ſlender ſtyle equal with the petal, crowned by a revolving trifid ſtigma; the germen becomes a three-cornered oval capſule, having three cells filled with irregular acute-pointed ſeeds. Linnæus enumerates four, and Miller two ſpecies.

VALERANELLA, a ſpecies of VALERIAN, called lamb's lettuce, or corn-ſallad; it is common in corn-fields; and the young leaves in ſpring and autumn are eaten as ſallad, and are very little inferior to young lettuce.

VALESIANS, VALESIANI, in *Eccleſiaſtical Hiſtory*, ancient ſectaries, ſo called from one *Valeſius*, a perſon unknown to Epiphanius, who, however, makes mention of this ſect, Hær. 58. though he owns he knew but very little of them; only this, that they admitted none into their ſociety but eunuchs; at laſt, if any were admitted before caſtration, they obliged them not to eat any meat till the operation was performed. For then, being no longer ſubject to the motions of the fleſh, they allowed them to eat any kind of meats. Whiſton ſays of them, that they ſprung up about the year 240, and that they rejected the law and the prophets.

VALET, or VALECT, a French term, anciently written *varlet*.

In France, *valet* is a common name for all domeſtic ſervants, employed in the lower, and more ſervile offices; including what we call *grooms*, *footmen*, *coachmen*, *bailiffs*, &c. But the word is not uſed among us in this ſenſe, nor any otherwiſe than in the phraſe *valet de chambre*; which is a ſervant, whoſe office is to dreſs and undreſs his maſter, to look to his bed-chamber, wait on him at table, &c. the ſame with what we otherwiſe call his *gentleman*.

In the hiſtory of Lewis XII. by Seiſel, we always find *varlet de chambre du roy*, *varlet de la garderobe*, &c. But *varlet*, like *knave*, and divers other words, is now degenerated into a term of reproach.

Valet, *valect*, *vadelect*, *vadlet*, and *vallet*, Camden obſerves, were anciently uſed at our court, for a gentleman of the privy-chamber.

Selden, in his Titles, relates, that *valets* anciently ſignified young gentlemen, and heirs of great eſtate and quality; eſpecially ſuch as were to be knighted.

In the accounts of the Inner Temple, *valet* is uſed for a bencher's clerk, or ſervant. The butlers of the houſe ſtill call them *varlets*.

VALET, in the *Manege*, a ſtick armed at one end with a blunted point of iron, to prick and aid a leaping horſe.

Formerly a *valet* was called, *aiguillon*, i. e. goad, and ſome of them had ſpur-rowels upon them, only the points beaten down; and when a horſe was firſt begun round a pillar, without a rider, they uſed to prick his flanks with the *valet* to make him know the ſpur, and obey it, without reſiſting. At preſent the *valet* is not uſed for that purpoſe, and the name of *goad* is ſuppreſſed, as being only proper for oxen.

VALETUDINARY, VALETUDINARIUS, a term ſometimes uſed by the writers of medicine, for a perſon of a weak, ſickly conſtitution, who is very frequently out of order, &c.

Dr. Cheyne, by all means, directs the weakly, the ſtudious, the ſedentary, and the *valetudinary*, to a low, ſpare regimen.

VALID, a term applied to acts, tranſactions, expeditions, &c. which are clothed in all the formalities requiſite to their being put into execution, and to their being admitted to a court of juſtice.

A contract by a minor is not *valid*, or is *invalid*: a marriage is not *valid*, unleſs performed with the ſolemnities enjoined.

VALIGA, a name given by ſome medical writers to an infuſion or tincture of jalap in ſpirit of wine, or ſpirit of citron, with the addition of a little ſaffron.

VALLAR, VALLARIS, formed from *vallum*, a ſtake with branches, whereof they made the paliſade of a camp, called *lorica*, in *Antiquity*, an epithet given to a kind of crown, which the Roman generals beſtowed on him, who, in attacking the enemy's camp, firſt broke in upon the lines or paliſades.

The *corona vallaris* was the ſame with what was otherwiſe called *corona caſtrenſis*, from *caſtra*, a camp. Aulus Gellius aſſures us, that it was of gold, as the mural and naval crowns alſo were: yet though they were made of that precious metal, they were not the moſt valued; for Pliny, lib. xxii. cap. 3. gives the preference to the corona obſidionalis, which yet was only of gramen, or graſs. See CROWN, and *Tab.* III. *Heraldry*, *fig.* 98.

VALLEY, VALE, in *Geography*. See MOUNTAIN.

VALLEYS, in *Building*, denote the gutters over the ſleepers in the roof of a building.

VALLISPERIA, in *Botany*, a genus of the *dioecia diandria* claſs. Its characters are theſe: it has male and female flowers: the ſpatha of the male is bipartite, the ſpadix is covered with floſcules, and the corolla is tripartite; the ſpatha of the female is biſid and uniflorous; the calyx tripartite; the corolla has three petals, and three ſtyles; the capſule is unilocular and polyſpermous. There is one ſpecies.

VALLOR, VALLOW, or VALE, among country people, a hollow mould, in which a new made cheeſe is preſſed.

VALLUM, in *Roman Antiquity*, denotes a kind of parapet with which they fortified their camps. In the *vallum* ſome diſtinguiſh two parts, the *agger*, which was no more than the earth caſt up to ſorm the *vallum*; and the *ſudes*, which were a ſort of wooden ſtakes to ſecure and ſtrengthen it.

VAL *ombroſo* gives its name to a congregation of Benedictine monks, founded in the Apennines by Gualbert of Florence, in the 11th century; who, in a ſhort ſpace of time propagated their diſcipline in ſeveral parts of Italy.

VALOR *beneficiorum*, in *Law*. See FIRST-FRUITS.

VALORE *maritagii*, VALUE *of marriage*, a writ which anciently lay for the lord, after having proffered ſuitable marriage to an infant who refuſed the ſame: to recover the value of the marriage. See GUARDIAN.

VALVASOR, or VALVASOUR. See VAVASOUR.

VALUE, VALOR, in *Commerce*, the price or worth of any thing.

VALUE, *intrinſic*, denotes the proper, real, and effective worth of any thing: and is uſed chiefly with regard to money: the popular *value* whereof may be raiſed and lowered at the pleaſure of the prince; but its real or *intrinſic value*, depending wholly on its weight and fineneſs, is not at all affected by the ſtamp, or impreſſion thereon.

It is generally on the foot of this *intrinſic value*, that ſpecies are received in foreign countries; though in the places where they are coined, and where the ſovereign power makes them current, they ſometimes paſs for much more.

It is, in good meaſure, on the difference of thoſe two *values*, one whereof is, as it were, arbitrary, and the other, in ſome ſort, natural, that the difference of exchanges depends; and thoſe ſtill riſing and falling, as the rate at which a ſpecies is current, comes nearer or farther off the juſt price of the metal whereof it conſiſts.

VALUE, in *Bills of Exchange*, is uſed to ſignify the nature of the thing (as ready money, merchandizes, bills, debts, &c.) which is given, as it were, in exchange for the ſum ſpecified in the bill.

From four different manners of expreſſing this *value*, ſome diſtinguiſhed four kinds of bills of exchange.—The firſt bears *value received*, ſimply, and purely, which comprehends all kinds of *value*; the ſecond, *value received in money*, or *merchandize*; the third, *value of myſelf*; and the fourth, *value* underſtood.

The firſt is dangerous, and the fourth but little uſed: accordingly, to have the *value* well expreſſed, and to prevent the ill conſequences of overſights therein, it is well provided by the French ordonnance of 1673, that bills of exchange ſhould contain the name of the perſon to whom the contained ſum is to be paid; the time of payment; the name of him who has given the *value*; and whether it was received in money, merchandize, or other effects.

VALUE, VALOR, or VALENTIA, in *Law*. Weſt gives us a nice difference between *value* and *price*; the *value* (ſays he) of things in which offences are committed, is uſually compriſed in indictments; which ſeems neceſſary in theft, to make a difference from petty larceny; and in treſpaſs, to aggravate the fault, and increaſe the fine.

But no price of things *feræ naturæ* may be expreſſed, as of deers, hares, &c. if they be not in parks or warrens. And where the number of things taken is to be expreſſed in the indictment, as of young doves in a dove-houſe, there muſt be ſaid *pretii*, or *ad valentiam*: but of divers dead things, *ad valentiam*, and not *pretii*: of coin not current, it ſhall be ſaid *pretii*; but of coin current, neither *pretii*, nor *ad valentiam*; the price and *value* being certain.

VALVE, VALVULA, formed from *valvæ*, *folding-doors*, in *Hydraulics*, *Pneumatics*, &c. is a kind of lid, or cover of a tube, or veſſel, ſo contrived, as to open one way; but which the more forcibly it is preſſed the other way, the cloſer it ſhuts the aperture: ſo that it either admits the entrance of a fluid into the tube, or veſſel, and prevents its return; or admits it to eſcape, and prevents its reentrance.

Valves are of great uſe in the air-pump, and other wind-engines; in which they are ordinarily made of pieces of bladder.

In hydraulic engines, as the emboli of pumps, they are frequently of leather; their figure round, and they are fitted to ſhut the apertures of the barrels or pipes.

Sometimes they are made of two round pieces of leather encloſed between two others of braſs; having divers perforations, which are covered with another piece of braſs, moveable upwards and downwards, on a kind of axis, which goes through the middle of them all.

Sometimes they are made of braſs, covered over with leather, and furniſhed with a fine ſpring, which gives way upon a force applied againſt it: but, upon the ceaſing of that, returns the *valve* over the aperture. See PUMP. See alſo for the conſtruction of different ſorts of *valves* for the buckets of pumps, Deſaguliers, Exp. Phil. vol. ii. p. 156, &c. and for the deſcription of a new *valve*, by M. Belidor, ibid. p. 180

VALVE, VALVULA, in *Anatomy*, a thin membrance, applied, like a door or ſhutter, on divers cavities and veſſels of the body; to afford a paſſage to ſome humour, or other matter, going one way, and prevent its reflux towards the part whence it came.

The veins and lymphatics have *valves*, ſituate from ſpace to ſpace, which open towards the heart, but keep cloſe on that ſide towards the extremities; i. e. they let the blood and lymph paſs towards the heart, but prevent their returning to the extreme parts, whence they came.

The heart has alſo its *valves*, placed at the entrance of the veſſels ariſing out of it. Thoſe at the entrance of the vena cava, and pulmonary vein, let the blood paſs on to the heart, and prevent its return: on the contrary, thoſe at the entrance of the aorta, and pulmonary artery, let the blood paſs out of the heart, and prevent its flowing back again.—See *Tab. Anat.* (*Angeiol.*) *fig.* 1. *lit. A.* See HEART, MITRALES, SEMILUNAR, and TRICUSPIDES.

"In the jejunum, and ileum, the inner tunic, being "larger than the outer, is much corrugated: the looſe "folds of this have been thought, in ſome meaſure, to "do the office of *valves*; and have therefore been called "*valvulæ conniventes*." Drake, Anat p. 49.

"The lacteals, opening into the inteſtines, receive the "prepared fluid part of the chyle; and appear at inter-"vals, as it were girt and ſtreightened; and when "preſſed, do not admit of a reflux towards the inteſ-"tines; though the liquor be eaſily propelled towards "the glands: which argues, that there are *valves* "in them, though they be too minute to be ſenſible to "the eye." Id. ibid. p. 56.

The COLON has a thick *valve*, to prevent the excrements from paſſing into the ileon; and ſeveral other *valves*, to retard the deſcent of the excrements.

Conſtantine Varolius, a Bologneſe, and phyſician of Gregory XIII. who died in 1570, was the firſt that obſerved the *valve* in the colon. Bart. Euſtachio, a native of San Severino in Italy, diſcovered about the ſame time, the *valve* at the orifice of the coronary vein; and that remarkable one at the orifice of the lower trunk of the vena cava, near the right auricle of the heart: though he did not take it for a *valve*, but merely for a membrane. Sig. Lanciſi, phyſician to pope Clement XI. who firſt publiſhed Euſtachio's works, takes the uſe of this *valve* to be to prevent the blood of the upper vena cava from ſtriking with too much violence againſt that of the lower: and Mr. Winſlow, who has conſidered it very diligently in the Memoirs of the Royal Academy of Sciences, is much of the ſame opinion.

But as it gradually dwindles in children, and at length becomes quite loſt in adults, ſtill diminiſhing as the foramen ovale does, it ſhould ſeem to have ſome other office, and that chiefly regarding the circulation of the blood in the fœtus.

In effect, by means hereof M. Winſlow reconciles the two oppoſite ſyſtems of the circulation of the blood in the fœtus. See *Circulation of the* BLOOD and FOETUS.

VALVE, *great*, *valvula major*, is the upper part, and as it were, the lid of the iſthmus between the teſtes, and the firſt vermicular proceſs of the cerebellum: its ſubſtance is medullary. Its uſe is to prevent the lymph from falling on the nerve at the baſe of the cranium.

VALVULÆ *conniventes*. Mr. du Vernoi is of opinion, that the *valvulæ conniventes* of the inteſtines are formed by the arched veſſels and fat in the internal cellular coat, and covered by the villous or nervous coat. See Comment. Acad. Petrop. tom. iv. p. 192.

VAMPYRE, a name given to an imaginary demon, which, it is pretended ſucks the blood of perſons during the night, and thereby deſtroys them. Theſe *vampyres* were ſuppoſed to animate the bodies of dead perſons, which when dug up were found freſh, florid, and full of blood. Thoſe who were killed by *vampyres* were ſaid to become *vampyres* themſelves: the way to deſtroy them, was to drive a ſtake through them, at which time they would give a horrid groan; and to burn the body to aſhes. This ſpecies of ſuperſtition occaſioned, ſome years ago, great diſturbances in Hungary and other places.

VAMPYRE, in *Zoology*, the *veſpertilio vampyrus* of Linnæus, called alſo *ternate*, and by Buffon *la rouſſette* and *la rougette*, is a ſpecies of BAT, with large canine teeth, four cutting teeth above, and the ſame below; ſharp black noſe; large naked ears; tongue pointed, and terminated by ſharp aculeated papillæ; exterior toe detached from the membrane; the claw ſtrong, and hooked; five toes on the hind feet; talons very crooked, ſtrong, and compreſſed ſideways; no tail; the membrane divided behind quite to the rump; varying in colour, ſome being entirely of a reddiſh brown and others duſky, and alſo in ſize, ſome having the extent from tip to tip of the wings four feet, others five feet four inches; and others extending farther than a man can reach with his extended arms. This animal inhabits Guinea, Madagaſcar, and all the iſlands from thence to the remoteſt in the Indian ocean. They are alſo found in New Holland, the Friendly Iſlands, the New Hebrides, and New Caledonia. They fly in flocks, obſcuring the air with their numbers; beginning their flight from one neighbouring iſland to another immediately on ſun-ſet, and returning in clouds from the time it is light till ſun-riſe, and during the day lodging in hollow trees: they live on fruit, and are ſo fond of the juice of the palm-tree, that they will intoxicate themſelves with it till they drop on the ground. In New Caledonia, the natives uſe their hair in ropes, and in the taſſels of their clubs. The Indians eat them, and declare the fleſh to be very good. The French, who live in the Iſle de Bourbon, boil them in their bouillon, to give it a reliſh. While they are eating, they make a great noiſe; their ſmell is rank; and their bite, reſiſtance, and fierceneſs very great when taken. The ancients had ſome knowledge of theſe animals, and M. de Buffon apprehends, that from the account of them the poets formed their fictions of harpies. Linnæus calls this ſpecies *vampyre*, conjecturing it to be the kind which draws blood from people in their ſleep. The bat is ſo dexterous a bleeder, as to inſinuate its aculeated tongue into the vein without being perceived, and then ſuck the blood till it is ſatiated; all the while fanning with its wings, or agitating the air ſo as to caſt the ſufferer into a ſtill ſounder ſleep. In certain parts of America they have deſtroyed all the great cattle introduced there by the miſſionaries. Pennant's Hiſt. Quadrupeds, vol. ii. p. 548, &c.

VAMPYRE is alſo a name given by M. de Buffon to the *veſpertilio ſpectrum* of Linnæus, or BAT, with a long noſe, large teeth, long, broad, and upright ears; with a long, conic, erect membrane at the end of the noſe, bending at the end, and flexible; hair on the body cinereous, and pretty long; wings full of ramified fibres; a membrane extending from one hind leg to the other; no tail, but three tendons extending from the rump, and terminating at the edge of the membrane. This animal inhabits South America, lives in the palm-trees, and grows very fat. Buffon ſuppoſes it to be the ſpecies that ſucks human blood. Pennant. See ANDIRA.

VAN, VANT, or VAUNT (of the French *avant*, or *avaunt*, *before*), is a term uſed in compoſition with ſeveral words in our language. As,

VAN-COURIERS, are light armed ſoldiers, ſent before armies to beat the road, upon the approach of an enemy.

VAN-FOSSE, a ditch dug without the counterſcarp, and running all along the glacis; uſually full of water.

VAN, or VANT, or VAUNT-*corps*. See CORPS.

VAN, or VAN-GUARD. See GUARD.

VAN-*lay*. See VAUNT.

VAN, in *Sea Language*, denotes the foremoſt diviſion of any naval armament, or that part which uſually leads the way to battle, or advances firſt in the order of ſailing. See ENGAGEMENT and FLEET.

VAN, in *Mining*. To *make* a *van* is to take a handful of the ore or tin-ſtuff, and bruiſe, waſh, and cleanſe it on a ſhovel; then by a peculiar motion of the ſhovel, to ſhake and throw forth upon the point of it almoſt all the ore that is freed from waſte. This operation being repeated, the ore is collected and reſerved, and from thence they form an eſtimate how many tons of copper ore, or how many hundred weight of block tin, may be produced out of one hundred ſacks of that ſtuff, of which the *van* is made. Pryce's Mineral. Com. p. 330. See TIN and VANNING-*ſhovel*.

VANDELLIA, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the calyx is divided into four ſegments; the corolla is ringent; there are two filaments proceeding from the diſc of the lip of the corolla; the antheræ are joined; and the capſule is unilocular and polyſpermous. There is one ſpecies.

VANDOSIA, in *Ichthyology*, a name by which ſome authors have called the *leuciſcus*, the common DACE.

VANEERING. See VENEERING.

VANE, in a *Ship*, is a thin ſlip of bunting hung to the maſt-head, or ſome other conſpicuous place, to ſhew the direction of the wind. It is commonly ſewed upon a wooden frame, called the ſtock, which contains two holes, whereby to ſlip over the ſpindle, upon which it turns about as the wind changes.

VANE, *Dog*, in *Sea Language*, is a ſmall light *vane*, formed of a piece of pack-thread of about two feet in length, upon which are fixed five or ſix thin ſlices of cork ſtuck full of light feathers. It is uſually faſtened to the top of a ſtaff, two yards high, which is placed on the top of the ſhip's ſide, on the quarter-deck, in order to ſhew the direction of the wind to the helmſman, particularly in a dark night, or when the wind is extremely feeble. Falconer.

VANES, on *Mathematical Inſtruments*, are ſights made to move and ſlide upon croſs-ſtaves, fore-ſtaves, quadrants, &c.

VANES, or FANES *of Feathers*. See FEATHER.

VANES, *Weather*. See WEATHER.

VANES *of Windmills*. See WINDMILL.

VANELLUS, in *Ornithology*, a name given by many to the LAPWING, more commonly known by the name *capella*.

VANGS, in *Sea Language*, are a ſort of braces to ſupport the mizen-gaff, and keep it ſteady. They are fixed on the outer-end or peek, and reach downwards to the aftmoſt part of the ſhip's ſide, where they are hooked and drawn tight, ſo as to be ſlackened when the wind is fair; and drawn in to windward when it becomes unfavourable to the ſhip's courſe. Falconer.

VANILLA, *Epidendrum*, in *Botany*, a genus of the *gynandria diandria* claſs. Its characters are theſe: it has a ſingle ſtalk; the flowers are included in ſheaths ſitting upon the germen, and have no empalement; they have five oblong petals which ſpread open very wide, with turbinated nectariums, whoſe baſes are tubulous, ſituated on the backſide of the petals, their brims are oblique and bifid; the upper lip is ſhort and trifid; the under one runs out in a long point; they have two very ſhort ſtamina ſitting upon the pointal, and the ſummits are faſtened to the upper lip of the nectarium; they have a long, ſlender, contorted germen, ſituated under the flower, ſupporting a ſhort ſtyle faſtened to the upper lip of the nectarium, crowned by an obſolete ſtigma; the germen afterwards becomes a long, taper, fleſhy pod, including many ſmall ſeeds. Miller enumerates two ſpecies, but Linnæus reckons thirty ſpecies of *epidendrum*.

The plant which produces the fruit called *vanilla* or *banilla* by the Spaniards, or the *epidendrum vanilla* of Linnæus, has a trailing ſtem, ſomewhat like the common ivy, but not ſo woody, which faſtens itſelf to any tree that grows near it by ſmall fibres or roots produced at every joint; theſe attach themſelves to the bark of the tree; and by them the plants are often nouriſhed, when they are cut, or broken off, from the root, at a conſiderable height from the ground, as is the caſe with the ivy in England. The leaves are as large as thoſe of the common laurel, and are produced alternately at every joint. It riſes to the height of eighteen or twenty feet, and the flowers are of a greeniſh yellow mixed with white, which, when fallen, are ſucceeded by the fruit, which is ſix or ſeven inches long.

The ſort which is manufactured, grows not only in the bay of Campeachy, but alſo at Carthagena, at the Caraccas, Honduras, Darien, and Cayan, at all which places the fruit is gathered and preſerved; but it is rarely found in any of the Engliſh ſettlements, though it might be eaſily propagated in them: for the ſhoots are ſo full of juice, that they will continue freſh, out of the ground, for ſeveral months.

When theſe plants are intended for propagation in the warm parts of America, nothing more is required than to make cuttings of three or four joints in length, which ſhould be planted cloſe to the ſtems of trees in low marſhy places, and the ground about them kept clear of weeds.

The method uſed to preſerve the fruit is, when it turns of a yellow colour, and begins to open, to gather it, and lay it in ſmall heaps to ferment two or three days, in the ſame manner as is practiſed for the cocoa pods; then they ſpread them in the ſun to dry, and when they are about half dried, they flat them with their hands, and afterwards rub them over with the oil of palma Chriſti, or of the cocoa; then they expoſe them to the ſun again to dry, and afterward they rub them over with oil a ſecond time; then they put them in ſmall bundles, covering them with the leaves of the Indian reed to preſerve them.

Theſe plants produce but one crop of fruit in a year, which is commonly ripe in May, fit for gathering, for they do not let them remain on the plants to be perfectly mature. When they are about half changed yellow, they eſteem them better for keeping than when thoroughly ripe; at which time the fruit ſplits. While the fruit is green it affords no remarkable ſcent, but as it ripens it diffuſes a moſt grateful aromatic ſmell; but when it begins to open, the birds attack them, and devour the ſeeds greedily.

The fruit which is brought to Europe is of a dark brown colour, about ſix inches long, and ſcarcely an inch broad; wrinkled on the outſide, and full of a vaſt number of black ſeeds, like grains of ſand, of a pleaſant ſmell like balſam of Peru.

This fruit is only uſed in England as an ingredient in chocolate, to which it gives an agreeable flavour to ſome palates, though it is diſagreeable to others; but the Spaniſh phyſicians uſe it in medicine, and eſteem it grateful to the ſtomach and brain, good for expelling wind, for provoking urine, reſiſting poiſon, and curing the bite of venomous animals. Miller's Gard. Dict.

The *vanillas*, or *vanilloes*, have an unctuous aromatic taſte, and a fragrant ſmell like that of ſome of the finer balſams heightened with muſk. They are uſed chiefly in perfumes: ſcarcely ever among us in any medical intention; though they ſhould ſeem to deſerve a place among the principal medicines of the nervous claſs. By diſtillation, they impregnate water ſtrongly with their fragrance, but give over little or nothing with pure ſpirit. By digeſtion, ſpirit totally extracts their ſmell and taſte; and in great meaſure covers or ſuppreſſes the ſmell. Lewis.

VANNING-*ſhovel*, among *Miners*, an inſtrument uſed for waſhing the ores of any metal, after being reduced to powder, thereby to diſcover the richneſs and other qualities of the ore. See SHOAD, TIN, and VAN.

VANSIRE, in *Zoology*, a ſpecies of *weaſel*, with ſhort ears; the hair brown at the roots, barred above with black, and ferruginous; the tail of the ſame colour; the length from nine to about fourteen inches, and the tail near ten. This animal inhabits Madagaſcar.

VANT, or VAUNT. See VAN.

VAPORARIUM, or VAPOROSUM *Balneum*, *Vapour-Bath*, in *Chemiſtry*, a term applied to a chemiſt's bath, or heat, wherein a body is placed, ſo as to receive the fumes of boiling water.

The *balneum vaporoſum* conſiſts of two veſſels diſpoſed over one another in ſuch manner, as that the vapour raiſed from the water contained in the lower, heats the matter encloſed in the upper.

The *vapour-bath* is very commodious for the diſtilling of odoriferous waters, and the drawing of ſpirit of wine. On this ſubject, ſee BATH *in Chemiſtry*.

We alſo uſe the term *vapour-bath*, when a ſick perſon is made to receive the vapours ariſing from ſome liquid matter placed over a fire.

Many contrivances have been propoſed for this purpoſe; and their expediency and utility are beſt known to thoſe who are converſant in this buſineſs. A late writer has ſuggeſted a new conſtruction of *vapour-baths*; and the whole apparatus is reduced to a tin boiler, tin pipes wrapped in flannel, and a deal box with a cotton cover, for the reception of the body and circulation of the vapour. See Playfair's Method of conſtructing *Vapour-Baths*, at a ſmall Expence, for the Uſe of private Families, 8vo. 1783.

VAPORATION, VAPORATIO, in *Chemiſtry*, a term applied to the action of a fume, or vapour.

VAPORATION is a kind of bathing, or rather of fomentation, whereby the warmth, or humidity, of a vapour, is made to act on ſome other body, that is to be warmed, or moiſtened.

VAPOROSUM *balneum*. See VAPORARIUM.

VAPOUR, VAPOR, in *Meteorology*, a thin veſicle of water, or other humid matter, filled or inflated with air; which, being rarefied to a certain degree by the action of heat, aſcends to a certain height in the atmoſphere, where it is ſuſpended, till it returns in form of rain, ſnow, or the like. An aſſemblage of a number of particles, or veſicles of *vapour*, conſtitutes what we call a CLOUD.

Some uſe the term *vapour* indifferently, for all fumes emitted, either from moiſt bodies, as fluids of any kind; or from dry bodies, as ſulphur, &c. But ſir Iſaac Newton, and other authors, better diſtinguiſhed between humid and dry fumes, calling the latter *exhalations*.

For the manner wherein VAPOURS *are raiſed, and again precipitated*, ſee CLOUD, DEW, RAIN, BAROMETER, and particularly EVAPORATION.

We ſhall here add, with reſpect to the principles of ſolution adopted to account for evaporation, and largely illuſtrated under that article, that Dr. Halley, about the beginning of the preſent century, ſeems to have been acquainted with the ſolvent power of air on water; for he ſays, that, ſuppoſing the earth to be covered with water, and the ſun to move diurnally round it, the air would of itſelf imbibe a certain quantity of aqueous *vapours*, and retain them like ſalts diſſolved in water; and that the air, warmed by the ſun, would ſuſtain a greater proportion of *vapours*, as warm water will hold more diſſolved ſalts; which would be diſcharged in dews, analogous to the precipitation of ſalts on the cooling of liquors. Phil. Tranſ. Abr. vol. ii. p. 127.

Mr. Eeles, in 1755, endeavoured to account for the aſcent of *vapour* and exhalation, and their ſuſpenſion in the atmoſphere, by means of the electric fire. The ſun, he acknowledges, is the great agent in detaching *vapour* and exhalations from their maſſes, whether he acts immediately by himſelf, or by his rendering the electric fire more active in its vibrations: but their ſubſequent aſcent he attributes entirely to their being rendered ſpecifically lighter than the lower air, by their conjunction with electrical fire: each particle of *vapour*, with the electrical fluid that ſurrounds it, occupying a greater ſpace than the ſame weight of air. Mr. Eeles alſo endeavours to ſhew, that the aſcent and deſcent of *vapour*, attended by this fire, are the cauſe of all our winds, and that they furniſh a ſatisfactory ſolution of the general phenomena of the weather and barometer. Phil. Tranſ. vol. xlix. p. 124, &c.

Dr. Darwin, in 1757, publiſhed remarks on the theory of Mr. Eeles, with a view of confuting it; and attempted to account for the aſcent of *vapours*, by conſidering the power of expanſion which the conſtituent parts of ſome bodies acquire by heat, and alſo that ſome bodies have a greater affinity to heat, i. e. acquire it ſooner and retain it longer than others. On theſe principles, he thinks, it is very intelligible how water, whoſe parts appear from the æolipile to be capable of immeaſurable expanſion, ſhould by heat alone become ſpecifically lighter than the common atmoſphere. A ſmall degree of heat is ſufficient to detach or raiſe the *vapour* of water from the maſs to which it belongs; and the rays of the ſun communicate heat only to thoſe bodies by which they are refracted, reflected, or obſtructed, whence, by their impulſe, a motion or vibration is cauſed in the parts of ſuch bodies. Hence he infers, that the ſphericles of *vapour* will, by refracting the ſolar rays, acquire a conſtant heat, though the ſurrounding atmoſphere remain cold. If it be aſked, how clouds are ſupported in the abſence of the ſun? it muſt be remembered, that large maſſes of *vapour* muſt for a conſiderable time retain much of the heat they have acquired in the day; at the ſame time reflecting, how ſmall a quantity of heat was neceſſary to raiſe them, and that doubtleſs even a leſs will be ſufficient to ſupport them; as from the diminiſhed preſſure of the atmoſphere at a given height, a leſs power may be able to continue them in their preſent ſtate of rarefaction; and laſtly, that clouds of particular ſhapes will be ſuſtained or elevated by the motion they acquire from winds. Phil. Tranſ. vol. l. p. 246.

For the effect of VAPOUR *in the formation of ſprings*, &c. ſee SPRING, and RIVER.

The quantity of *vapour*, raiſed from the ſea by the warmth of the ſun, is far greater than one would imagine. Dr. Halley has attempted to eſtimate it. For the reſult of his eſtimate, ſee EVAPORATION.

VAPOURS *fiery*, *halitus ignei*, a term uſed by ſome to expreſs thoſe exhalations from the earth, which either take fire of themſelves on their burſting forth into the air, or are readily inflammable on the bringing of a candle to them. See DAMPS, and AIR *inflammable*.

Many of the ſuppoſed burning lakes are owing to theſe fumes burſting up through the water, and not to any quality of the water itſelf. Our famous burning-well at Wigan, in Lancaſhire, is of this kind. The common people affirm, that the water of this ſpring burns like oil; but there is nothing of truth in this. There burſts up a *vapour* through the earth in this place, which keeps the water bubbling, as if boiling over in the fire, though it is not warm; and the ſtream of this breath may be felt iſſuing up in theſe places like a ſtrong wind. This breath alone is inflammable, and takes fire at the approach of a candle, burning with conſiderable violence for ſome time. There are coal-pits in the neighbourhood, and the air is certainly of the ſame kind with that inflammable *vapour*, often met with in thoſe places, and which may alſo be prepared from iron diſſolved in a proper menſtruum. The water itſelf, taken from the place, does not burn; and if the bottom be made dry, the *vapour* which aſcends from it will burn as ſtrongly as if the water were there. The flame is not diſcoloured like that of ſulphureous bodies, nor has it any bad ſcent; and the fumes, as they are felt burſting out of the earth, by the hand held over the place, are hot. Phil. Tranſ. N° 20.

VAPOUR-*bath.* See VAPORARIUM, and BATH.

VAPOURS, in *Medicine*, a diſeaſe popularly called the *hypo*, or the HYPOCHONDRIAC diſeaſe; and in men particularly, the *ſpleen*.

Vapours, ſuppoſed to be emitted from the womb, in women, are what we otherwiſe call HYSTERIC *affections*, or *ſuffocations*, or *fits of the mother*.

VAPPA, a word uſed by the ancients to expreſs dead wine, or wine deprived of all its ſpirituous part.

The word is alſo metaphorically applied to a peculiar ſtate of the blood, when it is in a low, diſpirited condition, as is the caſe even in healthy perſons, when worn out with exceſſive labour, and in cachectic and ſcorbutic perſons.

VARA, in *Commerce.* See *Spaniſh* MEASURE.

VARANGI. See ACOLUTHI.

VARI, in *Medicine*, little, hard, ruddy, tumors, whitiſh about the tips, and of the ſize of a hemp-ſeed; frequently found on the face and neck of young people; chiefly of ſuch as are much addicted to venery.

If the red be very lively, the cure is ſomewhat difficult; and though the puſtules be taken away, the redneſs remains. To this if an inflammation and hoarſeneſs be added, it is a ſymptom of a leproſy.

VARI, in *Zoology*, a name given to the MAUCUACO, or LEMUR *catta* of Linnæus, with his tail marked with rings of black and white; it is about the ſize of a cat, and inhabits Madagaſcar and the neighbouring iſles. The *vari* of Buffon is the ruffed maucuaco of Pennant, the black maucuaco of Edwards, and LEMUR *caudatus niger, collari barbato*, of Linnæus. It has orange-coloured irides; long hair round the ſides of the head, ſtanding out like a ruff; long tail; the colour wholly black, but ſometimes white, ſpotted with black; the feet black. It inhabits Madagaſcar; is very fierce in a wild ſtate; and makes ſo violent a noiſe in the woods, that the noiſe of two may be eaſily miſtaken for that of a hundred: when tamed, gentle and good-natured. Pennant. See *Tab.* V. *Quadrupeds*, N° 64.

VARIA, in *Zoology*, a name by which ſome authors have called the LEOPARD, or *pardalis*, from the beautiful variegations it is marked with.

VARIABLE, in *Geometry* and *Analytics*, is a term applied by mathematicians, to ſuch quantities as either increaſe or diminiſh, according as ſome other quantity either increaſes or diminiſhes.

Thus, the ſemiordinates and abſciſſes of an ellipſis, &c. are *variable quantities*; becauſe, if the one increaſe, the others increaſe likewiſe.

They are thus called, in contradiſtinction to *conſtant*, or *given*, or *ſtable quantities*; which are always the ſame though others change: as the ſemidiameter of a circle, which remains the ſame, though the abſciſſes and ſemiordinates increaſe.

Variable quantities are uſually denoted by the laſt letters of the alphabet, x, y, z.

Some authors, inſtead of *variable* and conſtant quantities, uſe the terms *fluent*, and *ſtable* quantities.

The infinitely ſmall quantity whereby a *variable* quantity is continually increaſing, or diminiſhing, is called the increment or decrement, or *difference*; and the velocity with which it increaſes or decreaſes at any given point, is called its *fluxion*; the calculation whereof is the ſubject of the new *methodus differentialis*, or *doctrine* of FLUXIONS.

VARIABLE *Wind.* See WIND.

VARIANCE, VARIANTIA, in *Law*, an alteration or change of condition in a perſon, or thing, after ſome former concern or tranſaction, therewith.

Thus, if the commonalty of a town make a compoſition with a lord, and afterwards bailiffs be granted by the king to the ſame town, there, if the lord commence any ſuit for breach of the compoſition, he muſt *vary* from the word *commonalty*, uſed in the compoſition, and uſe *bailiffs* and *commonalty*.

VARIANCE is alſo uſed for an alteration of ſomething formerly laid in a plea: or where the declaration in a cauſe differs from the writ, or from the deed upon which it is grounded.

VARIATION *of quantities*, in *Algebra*. See CHANGES, and COMBINATION.

VARIATION, in *Aſtronomy*—The *variation of the moon*, called, by Bullialdus, the *reflexion of her light*, is the third inequality obſerved in the moon's motion; whereby when out of the quadratures, her true place differs from her place twice equated. See PLACE, EQUATION, &c.

Sir Iſaac Newton takes the moon's *variation* to ariſe partly from the form of her orbit, which is an ellipſis; and partly from the inequality of the parts of ſpace, which the moon deſcribes in equal times, by a radius drawn to the earth.

To find the greateſt variation, obſerve the moon's longitude in the octants; and, for the time of obſervation, compute the moon's place twice equated: the difference between the computed, and the obſerved place, is the greateſt *variation*.

Tycho makes the greateſt *variation* 40′ 30″: Kepler makes it 51′ 49″: ſir Iſaac Newton makes the greateſt *variation*, at a mean diſtance, between the ſun and the earth, to be 35′ 10″: at the other diſtances, the greateſt *variation* is in a ratio compounded of the duplicate ratio of the times of the moon's ſynodical revolution directly, and the triplicate ratio of the diſtance of the ſun from the earth inverſly. And, therefore, in the ſun's apogee, the greateſt *variation* is 33′ 14″, and in his perigee, 37′ 11″; provided that the eccentricity of the ſun be to the tranſverſe ſemi-diameter of the orbis magnus, as $16\frac{15}{11}$ to 1000. Or, taking the mean motions of the moon from the ſun, as they are ſtated in Dr. Halley's tables, and the greateſt *variation* at the mean diſtance of the earth from the ſun will be 35′ 7″, in the apogee of the ſun 33′ 27″, and in his perigee 36′ 51″. Phil. Nat. Princ. Math. prop. XXIX. lib. iii. apud Horſley's Newtoni Opera, vol. iii. p 71.

VARIATION, in *Geography*, *Navigation*, &c. a term applied to the deviation of the magnetic needle, or compaſs, from the true north point, towards either eaſt or weſt; called alſo the *declination*.

The *variation*, or declination, of the needle, is properly defined, the angle which a magnetic needle, ſuſpended at liberty, makes with the meridian line on an horizontal plane; or an arch of the horizon, comprehended between the true and the magnetical meridian.

In the ſea-language, the *variation* is uſually called *north-eaſting*, or *north-weſting*.

All magnetic bodies, we find, range themſelves, in ſome ſort, to the meridian; but it is rare, that they fall in preciſely with it: in one place, they decline from the north to the eaſt, and from the ſouth to the weſt; and in another place, on the contrary, from the north to the weſt, and from the ſouth to the eaſt; and that too, differently, at different times.

The *variation* of the compaſs could not be long a ſecret, after the invention of the compaſs itſelf: accordingly, Ferdinand, the ſon of Columbus, in his life written in Spaniſh, and printed in Italian at Venice in 1571, aſſerts, that his father obſerved it on the 14th of September, 1492: though others ſeem to attribute the diſcovery of it to Sebaſtian Cabot, a Venetian, employed in the ſervice of our king Henry VII. about the year 1500.

And as this *variation* differs in different places, Gonzales d'Oviedi found there was none at the Azores; whence ſome geographers have thought fit in their maps to make their firſt meridian paſs through one of theſe iſlands; it not being then known, that the *variation* altered in time. See Gilbert de Magnete, Lond. 1600 p. 4 and 5: or Purchas's Pilgrims, Lond. 1625. book ii. ſect. 1. See *Variation of the* MAGNET.

Various are the hypotheſes framed to account for this extraordinary phenomenon: we ſhall only mention ſome of the later, and more probable, only premiſing that Mr. Robert Norman, the inventor of the DIPPING-*needle*, diſputes againſt Cortes's notion, that the *variation* was cauſed by a point in the heavens, contending that it ſhould be ſought for in the earth, and propoſes how to diſcover its place.

The firſt is that of Gilbert (de Magnete, lib. iv. p. 151, &c.), which is followed by Cabeus, &c.

This notion is, that it is the earth, or land, that draws the needle out of its meridian direction; and hence they argue, that the needle varied more, or leſs, as it was more or leſs diſtant from any great continent; conſequently, that if it were placed in the middle of an ocean, equally diſtant from equal tracts of land on each ſide, eaſtward and weſtward, it would not decline either to the one, or the other, but point juſtly north and ſouth. Thus they ſay, in the Azores iſlands, which are equally diſtant from Africa on the eaſt, and America on the weſt, there is, in effect, found no *variation*: but as from the Azores you ſail towards Africa, the needle begins to decline from the north to the eaſt; and that ſtill more and more, till you reach the ſhore.

If you ſtill proceed eaſtward, the declination gradually diminiſhes again, by reaſon of the land left behind on the weſt, which continues to draw the needle.

The ſame holds till you arrive at a place where there are equal tracts of lands on each ſide; and there again there is no *variation*.

The obſervations of our mariners, in their Eaſt India voyages,

ages ſeem to confirm this ſyſtem; as they proceed towards the cape of Good Hope the *variation* is ſtill eaſtward; at length arriving at the cape De las Aguillas, q. d. of the Needles, the meridian line, then dividing Africa into two equal parts, there is no *variation* at all; but as they proceed farther, and leave the African coaſt on the weſt, the *variation* becomes weſtward.

But the misfortune is, the law does not hold univerſally; in effect, a great number of obſervations of the *variations*, in various parts, made and collected by Dr. Halley, overturn the whole theory.

Others, therefore, have recourſe to the frame and compages of the earth, conſidered as interwoven with rocks and ſhelves, which being generally found to run towards the poles, the needle comes to have a general tendency that way; but which ſeldom going perfectly in the direction of the meridian, the needle, of conſequence, has commonly a *variation*.

Others hold various parts of the earth to have various degrees of the magnetic virtue, as ſome are more intermixed with heterogeneous matters, which prevent the free action or effect thereof, than others.

Others aſcribe all to magnetic rocks and iron mines, which, affording more of the magnetic matter than other parts, draw the needle more.

Laſtly, others imagine earthquakes, or high tides, to have diſturbed and diſlocated ſeveral conſiderable parts of the earth, and ſo changed the magnetic axis of the globe, which originally was the ſame with the axis of the globe itſelf.

But ſtill, that great phenomenon, the *variation of the variation*, i. e. the continual change of the declination, in one and the ſame place, which the modern obſervations do abundantly evince, is not accountable for, on any of theſe foundations, nor even is it conſiſtent with them.

Dr. Hooke communicated to the Royal Society, in 1674, a theory of the *variation*, the ſubſtance of which is, that the magnet has its peculiar pole, diſtant 10 degrees from the pole of the earth about which it moves, ſo as to make a revolution in 370 years; whence the *variation* (he adds) hath altered of late about 10 or 11 minutes every year, and will probably ſo continue to do for ſome time, till it begins to become ſlower and ſlower, and will at length be ſtationary and retrograde, and in probability may return. Birch's Hiſt. of the Royal Society, vol. iii. p. 131.

Dr. Halley has given us a new ſyſtem, the reſult of a great number of obſervations; and even of a great number of voyages made at the public charge on this account; the light that excellent author has let into this obſcure part of natural hiſtory, is very great, and the conſequences thereof in navigation, &c. are very conſiderable. Add that he has reduced the divers *variations* of divers places to a preciſe rule, or order, which before appeared all precarious and arbitrary.

His theory, therefore, will deſerve a more ample detail. The obſervations it is built on, as laid down in the Philoſophical Tranſactions, Nº 148. or Abr. vol. ii. p. 610, &c. are as follow:

Obſervations on the *variations* of the needle in divers places, and at divers times.

Names of Places.	Longitude from London.	Latitude.	Year of Obſervat.	Variation obſerved.
	° ′	° ′		° ′
London	0 0	51 32 N	1580	11 15 E
			1622	6 0 E
			1634	4 5 E
			1672	2 30 W
			1683	4 30 W
Paris	2 25 E	48 51 N	1640	3 0 E
			1666	0 0
			1681	2 30 W
Uraniburg	13 0 E	55 54 N	1672	2 35 W
Copenhagen	12 53 E	55 41 N	1649	1 53 E
			1672	3 45 W
Dantzick	19 0 E	54 23 N	1679	7 0 W
Montpelier	4 0 E	43 37 N	1674	1 10 W
Breſt	4 25 W	48 23 N	1680	1 45 W
Rome	13 0 E	41 50 N	1681	5 0 W
Bayonne	1 20 W	43 30 N	1680	1 20 W
Hudſon's Bay	79 40 W	51 0 N	1668	19 15 W
In Hudſon's Streights	57 0 W	61 0 N	1668	29 30 W
In Baffin's Bay, at ſir Th. Smith's Sound	80 0 W	78 0 N	1616	57 0 W
At ſea	57 0 W	38 40 N	1682	7 30 W
At ſea	31 30 W	43 50 N	1682	5 30 W
At ſea	42 0 W	21 0 N	1678	0 40 E
Cape St. Auguſtine	35 30 W	28 0 S	1670	5 30 E
At ſea off the mouth of R. Plata	53 0 W	39 30 S	1670	20 30 E
Cape Frio	41 10 W	22 40 S	1670	12 10 E
Eaſt entrance of Magellan Straits	68 0 W	52 30 S	1670	17 0 E
Weſt entrance	75 0 W	53 0 S	1670	14 10 E
Baldivia	73 0 W	40 0 S	1670	8 10 E
Cape Aguillas	16 30 E	4 50 S	1622	2 0 W
			1675	8 0 W
At ſea	1 0 E	34 30 S	1675	0 0
At ſea	20 0 W	34 0 S	1675	10 30 E
At ſea	32 0 W	24 0 S	1675	10 30 E
St. Helena	6 30 W	16 0 S	1677	0 40 E
I. Aſcenſion	14 30 W	7 50 S	1678	1 0 E
Johanna	44 0 E	12 15 S	1675	19 30 W
Mombaſa	40 0 E	4 0 S	1675	16 0 W
Zocatra	56 0 E	12 30 N	1674	17 0 W
Adea, in the mouth of the Red S.	47 30 E	13 0 N	1674	15 0 W
Diego Roiz	61 0 E	20 0 S	1676	20 30 W
At ſea	64 30 E	0 0	1676	15 30 W
At ſea	55 0 E	27 0 S	1676	24 0 W
Bombay	72 30 E	19 0 N	1676	12 0 W
C. Comorin	76 0 E	8 15 N	1680	8 48 W
Ballaſore	87 0 E	21 30 N	1680	8 10 W
Fort St. George	80 0 E	13 15 N	1680	8 10 W
Weſt point of Java	104 0 E	6 40 S	1676	3 10 W
At ſea	58 0 E	39 0 S	1677	27 30 W
I. S. Paul	72 0 E	38 0 S	1677	23 30 W
At Van Diemen's	142 0 E	42 25 S	1642	0 0
At New Zealand	170 0 E	40 50 S	1642	9 0 E
At Three King Iſle in New Zeal.	169 30 E	34 35 S	1642	8 40 E
I. Rotterdam in the South Sea	184 0 E	20 15 S	1642	6 20 E
On the coaſt of New Guinea	149 0 E	4 30 S	1643	8 45 E
At the weſt point of New Guinea	126 0 E	0 26 S	1643	5 30 E

From theſe obſervations, the learned author infers, 1. That, throughout all Europe, the *variation*, at this time, is weſt, and is more in the eaſtern parts thereof than the weſtern, increaſing that way.

2. That, on the coaſt of America, the *variation* is weſterly, increaſing all the way as you go northerly along the coaſt, ſo as to be above 20° at Newfoundland, nearly 30° in Hudſon's Streights, and not leſs than 57° in Baffin's Bay: and that, as you ſail eaſtward from this coaſt, the *variation* conſtantly diminiſhes. Hence he argues, that ſomewhere, between Europe and the north part of America, there muſt be an eaſterly *variation*, or at leaſt, no *variation*.

3. That on the coaſt of Braſil, there is an eaſt *variation*, increaſing as you go to the ſouthward, ſo as to be 12° at cape Frio, and 20° and a half over againſt Rio Plata; and thence ſailing ſouth-weſterly, to the Streights of Magellan, it decreaſes to 17°; and, at the weſt entrance, it is about 14°.

4. That eaſtward of Braſil, this eaſterly *variation* decreaſes, ſo as to be very little at St. Helena and Aſcenſion, and to be quite gone, and the compaſs point true, about 18° longitude weſt from the cape of Good Hope.

5. That, to the eaſtward of the aforeſaid places, a weſtward *variation* begins and governs in all the Indian ſea, riſing to 18° under the equator, about the meridian of the northern part of Madagaſcar; and 27° ½, in 39° ſouth latitude, near the ſame meridian: eaſterly from thence, the weſt *variation* decreaſes, ſo as to be not much above 8° at cape Comorin, and about 3° upon the coaſt of Java; and about the Molucca iſlands to be quite gone, as alſo a little to the weſtward of Van Diemen's land.

6. That, to the eaſtward of the Moluccas and Van Diemen's land, in ſouth latitude, there ariſes another eaſterly *variation*, which ſeems not ſo great as the former, nor of ſo large extent; becauſe, at the iſle of Rotterdam, it is ſenſibly leſs than upon the eaſt coaſt of New Guinea; and at the rate it decreaſes, it may well be ſuppoſed, that about 20° farther eaſtward, or 205° eaſt longitude from London, in the latitude of 20° ſouth, a weſterly *variation* begins.

7. That the *variation*, taken at Baldivia, and at the weſt entrance of the ſtreights of Magellan, ſhews, that the eaſt *variation*, noted in the third obſervation, is decreaſing apace; and that it cannot well extend many degrees into the South Sea, from the coaſt of Peru and Chili; leaving room for a ſmall weſterly *variation*, in that tract of the unknown world that lies in the midway between Chili and New Zealand, and between Hound's Iſland and Peru.

8. That in ſailing north-weſt from St. Helena, by Aſcenſion, as far as the equator, the *variation* continues very ſmall eaſt, and, as it were, conſtantly the ſame; ſo that, in this part of the world, the courſe, wherein there is no *variation*, is evidently no meridian, but rather north-weſt.

9. That the entrance of Hudſon's Streights, and the mouth of Rio Plata, being nearly under the ſame meridian, at the one place the needle varies 29½° weſt; at the other 20½° eaſt.

This, he ſays, demonſtrates the impoſſibility of reconciling theſe *variations* by the theory of Bond (for which ſee Phil. Tranſ. vol. viii. Nº 95. p. 6065, for June, 1673.) which is by two magnetical poles and an axis inclined to the axis of the earth; whence it would follow,

low, that under the ſame meridian, the *variation* ſhould be in all places the ſame way.

VARIATION *of the needle, theory of the.* From the circumſtances above rehearſed, the learned author takes occaſion to aſſert, "That the whole globe of the earth "is one great magnet, having four magnetical poles, "or points of attraction: near each pole of the equator "two; and that in thoſe parts of the world which lie "nearly adjacent to any one of theſe magnetical poles, "the needle is governed thereby; the neareſt pole be-"ing always predominant over the more remote."

The pole which at preſent is neareſt to us, he conjectures to lie in or near the meridian of the Land's-end of England, and not above 7° from the Arctic pole: by this pole the *variations* in all Europe and Tartary, and the North Sea, are principally governed; though ſtill with ſome regard to the other northern pole, whoſe ſituation is in the meridian paſſing about the middle of California, and about 15° from the north pole of the world, to which the needle has chiefly reſpect in all North America, and in the two oceans on either ſide thereof, from the Azores, weſtwards, to Japan, and farther.

The two ſouthern poles, he imagines, are rather farther diſtant from the ſouth pole of the world; the one about 16° therefrom, in a meridian 20° to the weſtward of Magellan Streights, or 95° weſt from London: this commands the needle in all South America, in the Pacific Sea, and the greateſt part of the Ethiopic Ocean. The other ſeems to have the greateſt power, and the largeſt dominion of all, as it is the moſt remote from the pole of the world, being little leſs than 20° diſtant therefrom, in the meridian which paſſes through New Holland, and the iſland Celebes, about 120° eaſt from London; this pole is predominant in the ſouth part of Africa, in Arabia, and the Red Sea, in Perſia, India, and its iſlands, and all over the Indian Sea, from the Cape of Good Hope eaſtwards, to the middle of the Great South Sea that divides Aſia from America.

Such ſeems to be the preſent diſpoſition of the magnetical virtue throughout the whole globe of the earth. It remains to ſhew how this hypotheſis accounts for all the *variations* that have been obſerved of late, and how it anſwers to the ſeveral remarks drawn from the table.

1. Then, it is plain that, as our European north pole is in the meridian of the Land's End of England, all places more eaſterly than that will have it on the weſt ſide of the meridian; and, conſequently, the needle, reſpecting it with its northern point, will have a weſterly *variation*, which will ſtill be greater as you go to the eaſtwards, till you come to ſome meridian of Ruſſia, where it will be the greateſt, and from thence will decreaſe again. Accordingly, in fact, we find, that at Breſt the *variation* is but $1\frac{1}{4}$°; at London $4\frac{1}{2}$° (in 1683.); and at Dantzick 7° weſt. Again, to the weſtward of the meridian of the Land's End, the needle ought to have an eaſterly *variation*, were it not that, by approaching the American northern pole (which lies on the weſt ſide of the meridian, and ſeems to be of greater force than this other), the needle is drawn thereby weſtward, ſo as to counterbalance the direction given by the European pole, and to make a ſmall weſt *variation* in the meridian of the Land's End itſelf. Yet, about the iſle of Tercera, it is ſuppoſed our neareſt pole may ſo far prevail as to give the needle a little turn to the eaſt, though but for a very little ſpace; the counterbalance of thoſe two poles admitting no conſiderable *variation* in all the eaſtern parts of the Atlantic Ocean, nor upon the weſt coaſts of England and Ireland, France, Spain, and Barbary. But to the weſtward of the Azores, the powers of the American pole overcoming that of the European, the needle has chiefly reſpect thereto, and turns ſtill more and more towards it as we approach it. Whence it comes to paſs, that on the coaſt of Virginia, New England, Newfoundland, and in Hudſon's Streights, the *variation* is weſtward, that is, it decreaſes as you go from thence towards Europe; and that it is leſs in Virginia and New England than in Newfoundland and Hudſon's Streights.

2. This weſterly *variation*, again, decreaſes as you paſs over North America; and about the meridian of the middle of California, the needle, again, points due north; and from thence weſtward to Yedzo and Japan, it is ſuppoſed the *variation* is eaſterly, and half-ſea over, not leſs than 15°; and that this eaſt *variation* extends over Japan, Yedzo, Tartary, and part of China, till it meets with the weſterly, which is governed by the European north pole, and which is the greateſt ſomewhere in Ruſſia.

3. Towards the ſouth pole the effect is much the ſame, only that here the ſouth point of the needle is attracted. Whence it will follow, that the *variation* on the coaſt of Braſil, at the river of Plata, and ſo on to the Streights of Magellan, ſhould be eaſterly, if we ſuppoſe a magnetical pole, ſituate about 20° more weſterly than the Streights of Magellan. And this eaſterly *variation* extends eaſtward over the greateſt part of the Ethiopic Sea, till it be counterpoiſed by the virtue of the other ſouthern pole, as it is about mid-way between the Cape of Good Hope and the iſles of Triſtan d'Alcunha.

4. From thence eaſtwards, the Aſiatic ſouth pole becoming prevalent, and the ſouth point of the needle being attracted thereby, there ariſes a weſt *variation*, very great in quantity and extent, becauſe of the great diſtance of this magnetical pole from the pole of the world. Hence it is, that in all the Indian Sea, as far as Hollandia Nova, and farther, there is conſtantly a weſt *variation*; and that, under the equator itſelf, it riſes to no leſs than 11°, where it is moſt. And that, about the meridian of the iſland of Celebes, being likewiſe that of this pole, this weſterly *variation* ceaſes, and an eaſterly one begins, which reaches to the middle of the South Sea, between Zelandia Nova and Chili, leaving room for a ſmall weſt *variation*, governed by the American ſouth pole.

5. From the whole it appears, that the direction of the needle, in the temperate and frigid zones, depends chiefly upon the counterpoiſe of the forces of two magnetical poles of the ſame nature; as alſo why, under the ſame meridian, the variation ſhould be in one place $29\frac{1}{2}$° weſt, and in another $20\frac{1}{2}$° eaſt.

6. In the torrid zone, and particularly under the equinoctial, reſpect muſt be had to all four poles, and their poſitions muſt be well conſidered, otherwiſe it will not be eaſy to determine what the *variation* ſhall be, the neareſt pole being always ſtrongeſt; yet not ſo as not to be counterbalanced, ſometimes, by the united forces of two more remote. Thus, in ſailing from St. Helena, by the iſle of Aſcenſion, to the equator, on the north-weſt courſe, the *variation* is very little eaſterly, and in that whole tract is unalterable; becauſe the South American pole (which is conſiderably the neareſt in the aforeſaid places), requiring a great eaſterly *variation*, is counterpoiſed by the contrary attraction of the North American and the Aſiatic ſouth poles; each, whereof, ſingly, is, in theſe parts, weaker than the American ſouth pole: and upon the north-weſt courſe, the diſtance from this latter is very little varied; and as you recede from the Aſiatic ſouth pole, the balance is ſtill preſerved by an acceſs towards the North American pole. In this caſe no notice is taken of the European north pole; its meridian being a little removed from thoſe of theſe places, and of itſelf requiring the ſame *variations* which we here find.

After the ſame manner may the *variations* in other places under and near the equator, be accounted for, upon Dr. Halley's hypotheſis.

VARIATION, *or declination of the needle, to obſerve the.* Draw a meridian line, as directed under MERIDIAN, then, a ſtyle being erected in the middle thereof, place a needle thereon, and draw the right line which it hangs over. Thus will the quantity of the *variation* appear.

Or thus: as the former method of finding the declination cannot be applied at ſea, others have been thought of, the principal whereof follow: ſuſpend a thread and plumbet over the compaſs, till the ſhadow paſs through the centre of the card; obſerve the rhumb, or point of the compaſs, which the ſhadow touches when it is the ſhorteſt. For the ſhadow is then a meridian line; conſequently the *variation* is ſhewn.

Or thus: obſerve the rhumb wherein the ſun, or ſome ſtar, riſes and ſets; biſect the arch intercepted between the riſing and ſetting; the line of biſecting will be the meridian line; conſequently the declination is had as before. The ſame may be had from two equal altitudes of the ſame ſtar, obſerved either by day or night.

Or thus: obſerve the rhumb wherein the ſun, or a ſtar, riſes and ſets; and from the latitude of the place find the eaſtern or weſtern amplitude; for the difference between the amplitude, and the diſtance of the rhumb obſerved, from the eaſtern rhumb of the card, is the *variation* ſought.

Or thus: obſerve the altitude of the ſun, or ſome ſtar, SI (*Tab.* II. *Navigation*, *fig.* 58.) whoſe declination is known; and note the rhumb in the compaſs, to which it then correſponds. Since then, in the triangle ZPS we have three ſides; viz. PZ, the complement of the elevation of the pole PR; SP, the complement of the declination DS; and ZS, the complement of the altitude SI; the angle PZS is found by ſpherical trigonometry; the contiguous one to which, viz. AZS, meaſures the azimuth HI. The difference, then, between the azimuth, and the diſtance of the rhumb obſerved from the ſouth, is the *variation* ſought. See *Azimuth* Compass.

Note, to have the eaſtern or weſtern amplitude accurately, regard muſt be had to the refraction; the laws whereof are delivered under REFRACTION.

For the more commodious obſerving in what rhumb of the compaſs the ſun, or a ſtar, is ſeen, it will be proper to have two little apertures, or glaſs windows, oppoſite to each other, under the limb thereof, with a teleſcope-ſight fitted to one of them, and to the other a fine thread.

The uſe of the *variation* is to correct the courſes a ſhip has ſteered by the compaſs: e. g. given the courſe ſet, and the *variation* of the compaſs, and let it be required to find the true courſe the ſhip ſteers: if the *variation* is weſt, call the N. W. quarter the 1ſt. the S. W. the 2d. the S. E. the 3d. and the N. E. the 4th; but if the *variation* be eaſt, call the N. E. quarter the 1ſt. the S. E. the 2d. the S. W. the 3d. and the N. W. the 4th. Then, if the courſe be ſet in the 1ſt or 3d quarters, add the *variation* to the points or degrees in the given courſe; but if in the 2d or 4th quarters, ſubtract, and the ſum in the former, or the difference in the latter caſe, will be the courſe corrected by the *variation*.

Variation *of the* Variation, is the change in the declination of the needle, obſerved, at different times, in the ſame place.

This *variation* was firſt diſcovered by Mr. Henry Gellibrand (ſee *Variation of the* Magnet) by comparing the obſervations made at different times near the ſame place by Mr. Burrough, Mr. Gunter and himſelf: and the diſcovery was ſoon known abroad; for Kircher, in his treatiſe intitled Magnes, firſt printed at Rome in 1641, ſays, that our countryman Mr. John Greaves had informed him of it, and then gives a letter of the famous Merſennus, containing a very diſtinct account of it.—Indeed, in the Hiſtory of the Royal Academy of Sciences at Paris, for 1712, p. 19. it is ſaid by M. de Fontenelle, that the learned Gaſſendi was the principal diſcoverer of this property: but Gaſſendi himſelf acknowledged that he had before received information of Gellibrand's diſcoveries. Gaſſendi Oper. vol. ii. ſect. 3. l. 3. c. 5. p. 132. Lugdun. 1658.

That this change is gradual and univerſal, will appear by the following examples.

At Paris, Orontius Finæus, about the year 1550, reckoned it about 8° or 9° E.; in 1640, it was 3° E. in 1666, the needle had no *variation*; and in 1681, it was 2 3′ W. M. de la Lande (Expoſition du Calcul Aſtronomique) obſerves, that the *variation* at Paris, in 1759, was 18° 10′ W. and in 1760, 18° 20′; and that the *variation* has changed 26° 20′ in the ſpace of 150 years, allowing that in 1610, the *variation* was 8° E: and ſince 1740, the needle, which was always uſed by M. Maraldi, is more than 3° advanced toward the weſt, beyond what it was at that period; and this makes a change of 9′ in one year.

At Cape d'Agulhas, in 1600, it had no *variation*; whence the Portugueſe gave it its name; in 1622, it was 2° W. in 1675, 8° W. and in 1692, 11° W.

At St. Helena, in 1600, the *variation* was 8° E. in 1623, 6° E. in 1677, 40′ E; and in 1692, 1° W. At Cape Comorin, in 1620, the *variation* was 14° 20′ W. in 1680, 8° 48′ W. and in 1688, 7° 30′ W.

At London, in 1580, the *variation* was 11° 15′ E.: in 1622, 6° E. in 1634, 4° 5′ E. in 1657, 0°; in 1672, 2° 30′ W. in 1692, 6° W. in 1723, 14° 17′ W. in 1747, 17° 40′ W. ſo that during the courſe of 167 years elapſed ſince the year 1580 to the end of the year 1747, the magnetic needle at London has moved to the Weſtward, 28° 55′. See Phil. Tranſ. N° 148, and N° 383, or Abr. vol. ii. p. 615. and vol. vii. p. 290. and Phil. Tranſ. vol. xlv. p. 280.

The *variation*, as it appears in the Meteorological journals of the Royal Society publiſhed annually in their Tranſactions, in 1774 was 21° 16′ W. in 1775, 21° 43′; in 1776, 21° 47′; in 1777, 22° 12′; in 1778, 22° 20′ ¼, or by certain corrections mentioned in vol. lxix. pt. i. p. 322, and vol. lxvi. p. 385, &c. 21° 55′ ½; in 1779, 22° 28′, or allowing 15′ ½ for the magnetiſm of the building, 22° 4½′; in 1780, 22° 41′. The hon. Mr. Cavendiſh obſerves, that on comparing the obſervations of the years 1774 and 1775 together, the *variation* appears, after allowing for the error of the inſtrument, to have been 27′ greater in 1775 than in 1774; though Dr. Heberden, who has made obſervations of this kind for ſeveral years paſt, informed him, that the annual alteration of the *variations* has, in general, been not more than 10′. See Phil. Tranſ. vol. lxvi. pt. ii. p. 393.

According to Dr. Halley's theory the *variation* of the *variation* of the compaſs is ſuppoſed owing to the difference of velocity of the motions of the internal and external parts of the globe.

Theory of the Variation *of the* Variation. From the obſervations above recited, under the head VARIATION, it ſeems to follow, that all the magnetical poles have a motion weſtward: but if it be ſo, it is evident, that it is not a rotation about the axis of the earth; for then the *variations* would continue the ſame in the ſame parallel of latitude (the longitude only changed) as much as the motion of the magnetical poles: but the contrary is found by experience; for there is no-where, in the latitude of 51 and an half north, between England and America, a *variation* of 11 degrees eaſt, at this time; as it was once here at London. Wherefore it ſeems, that our European pole is become nearer the arctic pole than it was heretofore; or elſe, that it has loſt part of its virtue.

But whether theſe magnetic poles move altogether with one motion, or with ſeveral; whether equally, or unequally: whether circular or libratory; if circular, about what centre; if libratory, after what manner; are things yet unknown.

This theory ſeems yet ſomewhat obſcure and defective: to ſuppoſe four poles in one magnetical globe, in order to account for the *variation*, is a little unnatural; but to conceive thoſe poles to move, and that by ſuch laws as to ſolve the *variation* of the *variation*, is ſtill more extraordinary. In effect, the ſolution appears not much leſs implicit and arbitrary than the problem.

The learned author of the theory, therefore, found himſelf, under a neceſſity to ſolve the phenomena of his ſolution; and with this view, he preſented the following hypotheſis. The external parts of the globe he conſiders as the ſhell, and the internal as a nucleus, or inner globe; and between the two, he conceives a fluid medium. That inner earth, having the ſame common centre and axis of diurnal rotation, may turn about with our earth each twenty-four hours. Only the outer ſphere having its turbinating motion ſome ſmall matter either ſwifter or ſlower than the internal ball; and a very minute difference in length of time, by many repetitions, becoming ſenſible; the internal parts will, by degrees, recede from the external; and not keeping pace with one another, they will appear gradually to move, either eaſtward, or weſtward, by the difference of their motions.

Now, ſuppoſe ſuch an internal ſphere, having ſuch a motion, the two great difficulties in the former hypotheſis are eaſily ſolved; for if this exterior ſhell of earth be a magnet, having its poles at a diſtance from the poles of diurnal rotation; and if the internal nucleus be likewiſe a magnet, having its poles in two other places, diſtant alſo from the axis; and theſe latter, by a gradual and ſlow motion, change their place in reſpect of the external, we may then give a reaſonable account of the four magnetical poles afore-mentioned, as likewiſe of the changes of the needle's *variation*.

The period of its motion being wonderfully great, and there being hardly a hundred years ſince theſe *variations* have been duly obſerved, it will be very hard to bring this hypotheſis to a calculus; eſpecially ſince, though the *variations* do increaſe and decreaſe regularly in the ſame place, yet in different places at no great diſtance, there are found ſuch caſual changes thereof, as can no ways be accounted for by a regular hypotheſis; but ſeem to depend upon the unequal and irregular diſtribution of the magnetical matter, within the ſubſtance of the external ſhell, or coat of the earth, which deflect the needle from the poſition it would acquire from the effect of the general magnetiſm of the whole. Of which the *variations* at London and Paris give a notable inſtance; for the needle has been conſtantly about 1½° more eaſterly at Paris than at London: though it be certain that, according to the general effect, the difference ought to be the contrary way; notwithſtanding which, the *variations*, in both places, do change alike.

Hence, and from ſome other things of like nature, it ſeems plain, that the two poles of the external globe are fixed in the earth; and that if the needle were wholly governed by them, the *variations* thereof would be always the ſame, with ſome irregularities, upon the account juſt now mentioned. But the internal ſphere having ſuch a gradual tranſlation of its poles does influence the needle, and direct it variouſly, according to the reſult of the attractive or directive power of each pole, and, conſequently, there muſt be a period of the revolution of this internal ball; after which the *variations* will return again as before. But if it ſhall in future ages be obſerved otherwiſe, we muſt then conclude, that there are more of theſe internal ſpheres, and more magnetical poles, than four; which, at preſent, we have not a ſufficient number of obſervations to determine, and particularly in that vaſt Mar del Zur, or South Sea, which occupies ſo great a part of the whole ſurface of the earth.

If, then, two of the poles be fixed, and two moveable, it remains to aſcertain, which they are that keep their place.

The author thinks it may be ſafely determined, that our European north pole is the moveable one of the two northern poles, and that which has chiefly influenced the *variations* in theſe parts of the world; for, in Hudſon's Bay, which is under the direction of the American pole, the change is not obſerved to be near ſo faſt as in theſe parts of Europe, though the pole be much farther removed from the axis. As to the ſouth poles, he takes the Aſiatic pole to be fixed, and, conſequently, the American pole to move.

This granted, it is plain, that the fixed poles are the poles of this external ſhell, or cortex, of the earth; and the other the poles of the magnetical nucleus, included and moveable within the other. It likewiſe follows, that this motion is weſtwards, and, by conſequence, that the aforeſaid nucleus has not preciſely attained the ſame degree of velocity with the exterior parts in their diurnal revolution; but ſo very nearly equal it, that, in 365 revolutions, the difference is ſcarce ſenſible. That there is any difference of this kind ariſes hence, that the impulſe whereby the diurnal motion was impreſſed on the earth, was given to the external parts; and from thence, in time, communicated to the internal; but not ſo as yet perfectly to equal the velocity of the firſt motion impreſſed on, and ſtill conſerved by, the ſuperficial parts of the globe.

As to the preciſe period we want obſervation to determine it, though the author thinks we may, with ſome reaſon, conjecture, that the American pole has moved weſtward 46°. in 90 years, and that the whole period thereof is performed in about 700 years.

Mr. Whiſton, in his New Laws of Magnetiſm, raiſes ſeveral objections againſt this theory. See MAGNETISM.

M. Euler, the ſon of the celebrated geometrician of that name, has alſo controverted and cenſured the above theory: he thinks that two magnetic poles, placed on the ſurface of the earth, will ſufficiently account for the *variation*; and he then endeavours to ſhew, how we may determine the declination of the needle, at any time, and on every part of the globe, from this hypotheſis. But we muſt refer for the particulars of this reaſoning to the Hiſtoire de l'Academie Royal des Sciences & Belles Lettres of Berlin, for 1757.

Dr. Halley having collected, as we have already mentioned under the article VARIATION, a great multitude of obſervations made on the *variation* of the needle in many parts of the world, was enabled, by knowing the latitude and longitude of the places where the obſervations were made, to draw on a Mercator's chart certain lines, ſhewing the *variation* of the compaſs in all thoſe places over which they paſſed, in the year 1700, which was the time when he publiſhed the firſt chart of this kind, called the *variation chart*.

From the conſtruction of this chart it appears, that the longitude of any of thoſe places may be found by it, provided that its latitude and the *variation* in that place be given. For, having found the *variation* of the compaſs, draw a parallel of latitude on the chart through the latitude found by obſervation; and the point where it cuts the curved line, whoſe *variation* is the ſame with that obſerved, will be the ſhip's place. E. g. a ſhip finds, by a good obſervation, that ſhe is in the latitude of 18° 20′ N. and that the *variation* of the compaſs is 4° W. let it be required to determine the ſhip's place. For this purpoſe take from the graduated meridian the diſtance between the equator, and the latitude of 18° 20′ N.: lay a ruler along the equator, and ſlide one point of the compaſſes along its edge till the other point cuts the curve of 4° W. *variation*, and the interſection gives the ſhip's place, whoſe longitude will be found to be about 27° 10′ W. from London.

This method, however, is attended with two inconveniences: 1ſt. That wherever the *variation* lines run eaſt or weſt, or nearly ſo, this way of finding the longitude becomes imperfect: but among all the trading parts of the world, this imperfection is at preſent found chiefly on the weſt coaſts of Europe, between the latitudes of 45° and 53°; on the eaſtern ſhores of North America, and in ſome parts of the Weſtern Ocean and Hudſon's Bay, lying between the ſaid ſhores: therefore, for the other parts of the world, a *variation* chart may be eſteemed as of the greateſt uſe. But the *variation* curves, even when they run eaſt and weſt, may be ſometimes applied to good uſe in correcting the latitude, when meridian obſervations cannot be had, as it frequently happens on the northern coaſt of America, in the Weſtern Ocean, and about Newfoundland; for if the *variation* can be obtained exactly, then the eaſt and weſt curve, anſwering to that *variation* on the chart, will ſhew the latitude.

2dly. As the deflection of the magnetical meridian from the true one is ſubject to continual alteration, therefore, a chart to which the *variation* lines are fitted for any year muſt in time become uſeleſs, unleſs new lines, ſhewing the ſtate of the *variation* at that time, be drawn on that chart: but as the change in the *variation* is very ſlow, therefore new *variation* charts publiſhed every ſeven or eight years, will anſwer the purpoſe required.

Hence it has happened, that Dr. Halley's *variation* chart, ſo well adapted, notwithſtanding its defects, to the ſervice of moſt mariners, has become uſeleſs, for want of encouragement to renew it from time to time.

However, in the year 1744, Mr. William Mountaine and Mr. James Dodſon publiſhed a new *variation* chart, fitted for that year, which was well received; and ſeveral inſtances of its great utility having been communicated to them, they fitted the *variation* lines anew for the year 1756, and, in the following year, publiſhed the third *variation* chart, and alſo preſented to the Royal Society a curious paper concerning the *variation* of the magnetic needle, with a ſet of tables annexed, containing the reſult of upwards of fifty thouſand obſervations, in ſix periodical reviews, from the year 1700 to 1756, incluſive, and adapted to every five degrees of latitude and longitude in the more frequented oceans; which paper and tables were printed in the Tranſactions for the year 1757.

It is much to be wiſhed, that charts of this kind ſhould be occaſionally printed, like the Nautical Almanack, at the expence of the public.

In the account that accompanies the tables above mentioned, there occur the following facts and obſervations that are particularly worth reciting.

According to the obſervations of captain Snow, the *variation* at Barbadoes ſeems nearly at a ſtand; for in the road, in 1752, it was 5° E. and by Halley's draught 5½°: in 1747, at Port Royal keys, in Jamaica, the *variation* was 7° 20′ E. and on the coaſt of Carthagena, off the high land of Sancta Martha, 7° 45′ E. nearly ſouth of Port Royal: therefore theſe curves are not much altered; and the curve at Jamaica nearly at a ſtand; and the ſouth part of them, with the reſt, dropping to the weſtward.

Under the equator, in longitude 40° E. from London, the higheſt *variation*, during the whole 56 years, appears to be 17¼° W. and the leaſt 16½° W. and in latitude 15° N. longitude 60° W. from London, the *variation* has been conſtantly 5° E. but in other places the caſe has been widely different; for in the latitude 10° S. longitude 60° E. from London, the *variation* has decreaſed from 17° W. to 7¼° W.: and in latitude 10° S. longitude 5° W. from London, it has increaſed from 2¼° W. to 12¼° W.; and in latitude 15° N longitude 20° W. it has increaſed from 1° W. to 9° W.

But there is ſtill a more extraordinary appearance in the Indian Seas: for inſtance, under the equator.

Longitude from London.	*Variation* in 1700.	*Variation* in 1756.	Longitude from London.	*Variation* in 1700.	*Variation* in 1756.
Degrees.	Degrees.	Degrees.	Degrees.	Degrees	Degrees.
40 E	16¼ W.	16¾ W	75 E	9¼ W	1 W
45 E	17¼ W	14½ W	80 E	7¼ W	0¼ E
50 E	17½ W	11¼ W	85 E	5½ W	1¼ E
55 E	16½ W	8¼ W	90 E	4¼ W	1 E
60 E	15¼ W	6 W	95 E	3¼ W	0½ W
65 E	13½ W	4½ W	100 E	2½ W	1 W
70 E	11½ W	3¼ W			

Where the weſt *variation* in the longitude 40° E. is the ſame in both the above years; and, in 1700, the weſt *variation* ſeemed to be regularly decreaſing from longitude 50° E. to the longitude 100° E.; but, in 1756, we find the weſt *variation* decreaſing ſo faſt, that we have eaſt *variation* in the longitude 80°, 85°, and 90° E.; and yet, in the longitude 95° and 100° E. we have weſt *variation* again.

Such are the irregularities that experience hath ſhewn us in the *variation* of the magnetic needle, which appear ſo conſiderable, that we cannot think it wholly under the direction of one general and uniform law; but rather conclude, with the learned and judicious Dr. Gowen Knight, Fellow of the Royal Society, in the 87th prop. of his Treatiſe upon Attraction and Repulſion, that it is influenced by various and different magnetic attractions, in all probability occaſioned by the heterogeneous compoſitions in the great magnet, the *earth*. Phil. Tranſ. vol. xlviii. p. 875. Vol. l. p. 329, &c.

We have many obſervations on the *variation* of the magnetic needle in the Phil. Tranſ. See particularly vol. lvi. p. 220. Vol. lxi. part ii. p 422, where we have lieutenant Cook's obſervations in his voyage round the world.

There is a ſmall *variation* of the *variation* of the magnetic needle, amounting only to a few minutes of a degree in the ſame place, at different hours of the ſame day, which is diſcoverable by accurate obſervations. Mr. George Graham made ſeveral obſervations of this kind in the years 1722 and 1723, profeſſing himſelf altogether ignorant of the cauſe of the *variation* which he obſerved. Phil. Tranſ. N° 383, or Abr. vol. vii. p. 290, &c.

About the year 1750, Mr. Wargentin, ſecretary of the Royal Academy of Sciences in Sweden, took notice both of the regular diurnal *variation* of the needle, and alſo of its being diſturbed at the time of the aurora borealis, as recorded in the Phil. Tranſ. vol. xlvii. p. 126, &c.

About the year 1756, Mr. Canton commenced a ſeries of obſervations amounting to near 4000, with an excellent *variation*-compaſs, of about 9 inches diameter. The number of days on which theſe obſervations were made was 603, and the diurnal *variation* on 574 of them was regular, i. e. the abſolute *variation* of the needle weſtward was increaſing from about 8 or 9 o'clock in the morning till about 1 or 2 in the afternoon, when the needle became ſtationary for ſome time; after that, the abſolute *variation* weſtward was decreaſing, and the needle came back again to its former ſituation, or near it, in the night, or by the next morning. The diurnal *variation* is irregular when the needle moves ſlowly eaſtward in the latter part of the morning, or weſtward in the latter part of the afternoon; alſo when it moves much either way after night, or ſuddenly both ways in a ſhort time. Theſe irregularities ſeldom happen more than once or twice in a month, and are always accompanied, as far as Mr. Canton obſerved, with an aurora borealis.

Mr. Canton lays down and evinces by experiment the following principle, viz. that the attractive power of the magnet (whether natural or artificial) will decreaſe while the magnet is heating, and increaſe while it is cooling He then proceeds to account for both the regular and irregular *variation*. It is evident, he ſays, that the magnetic parts of the earth in the north on the eaſt ſide, and the magnetic parts of the earth in the north on the weſt ſide of the magnetic meredian, equally attract the north end of the needle. If then the eaſtern magnetic parts are heated faſter by the ſun in the morning than the weſtern, the needle will move weſtward, and the abſolute *variation* will increaſe: when the attracting parts of the earth on each ſide of the magnetic meridian have their heat increaſing equally, the needle will be ſtationary, and the abſolute *variation* will then be greateſt; but when the weſtern magnetic parts are either heating faſter, or cooling ſlower than the eaſtern, the needle will move eaſtward, or the abſolute *variation* will decreaſe; and when the eaſtern and weſtern magnetic parts are cooling equally faſt, the needle will again be ſtationary, and the abſolute *variation* will then be leaſt.

By this theory, the diurnal *variation* in the ſummer ought to exceed that in winter; and accordingly it is found by obſervation, that the diurnal *variation* in the months of June and July is almoſt double that of December and January.

The irregular diurnal *variation* muſt ariſe from ſome other cauſe than that of heat communicated by the ſun; and here Mr. Canton had recourſe to ſubterranean heat, which is generated without any regularity as to time, and which will, when it happens in the north, affect the attractive power of the magnetic parts of the earth on the north end of the needle. That the air neareſt the earth will be moſt warmed by the heat of it, is obvious; and this has been frequently taken notice of in the morning, before day, by means of thermometers at different diſtances from the ground. Phil. Tranſ. vol. xlviii. p. 526.

Mr. Canton has annexed to his paper on this ſubject a complete year's obſervation; from which it appears, that the diurnal *variation* increaſes from January to June, and decreaſes from June to December. Phil. Tranſ. vol. li. p. 398, &c.

It has alſo been obſerved, that different needles, eſpecially if touched with different load-ſtones, will differ a few minutes in their *variation*. See Poleni Epiſt. Phil. Tranſ. N° 421.

We ſhall here ſubjoin a method practiſed by M. du Hamel, who was one of thoſe who attempted, and ſucceeded in the preparation of atificial magnets, for enlarging the ſcale of the *variatien*. At each extremity of the needle, compoſed of two magnetic bars, and which is 14 inches long, a ſlender pointed piece of ſteel is erected perpendicularly; and at the diſtance of 52 feet, in the direction of the needle, he has placed on two pillars, and in a line perpendicular to that direction, a graduated limb 6 feet long; being a ſegment of a ſuppoſed circle, deſcribed from the centre on which the needle turns. The obſerver, placing himſelf ſo as to bring the two pieces of ſteel at the extremities of the bar, into a line with the eye, obſerves where that line prolonged, or the viſual ray, points to the graduated arch. As, at this diſtance, each of theſe degrees meaſures a foot, the true direction of the needle is aſcertained with the greateſt preciſion; and leſt the obſerver's eyes may not be good enough to enable him to ſee diſtinctly the particular diviſions at that diſtance, an aſſiſtant occaſionally moves a certain index conformably to his direction. Hiſt. del' Acad. Roy. des Scienc. Paris, for 1772, part ii. Mem. 2.

Variation *of curvature*, in *Geometry*, is uſed for that inequability, or change, which happens in the curvature of all curves, except the circle. And this *variation* or inequability conſtitutes the quality of the curvature of any line.

Sir Iſaac Newton makes the index of the inequability, or *variation* of curvature, to be the ratio of the fluxion of the radius of curvature to the fluxion of the curve; and Mr. Maclaurin, to avoid the perplexity that different notions, connected with the ſame terms, occaſion to learners, has adopted the ſame definition; but he ſuggeſts, that this ratio gives rather the *variation* of the ray of curvature, and that it might have been proper to have meaſured the *variation* of curvature rather by the ratio of the fluxion of the curvature itſelf to the fluxion of the curve; ſo that the curvature being inverſely as the radius of curvature, and, conſequently, its fluxion as the fluxion of the radius itſelf directly, and the ſquare of the radius inverſely, its *variation* would have been directly as the meaſure of it, according to ſir Iſaac Newton's definition, and inverſely as the ſquare of the radius of curvature.

According to this notion, it would have been meaſured by the angle of contact contained by the curve and circle of curvature, in the ſame manner as the curvature itſelf is meaſured by the angle of contact contained by the curve and tangent. The reaſon of this remark may appear from this example. The *variation* of curvature, ac-according to ſir Iſaac Newton's explication, is uniform in the logarithmic ſpiral, the fluxion of the radius of curvature in this figure being always in the ſame ratio to the fluxion of the curve; and yet, while the ſpiral is produced, though its curvature decreaſes, it never vaniſhes, which muſt appear a ſtrange paradox to thoſe who do not attend to the import of ſir Iſaac's definition. Newton's Meth. of Flux. and Inf. Series, p 76. Maclaurin's Fluxions, art. 386. Phil. Tranſ. N° 468. ſect. 6. p. 342.

The *variation* of curvature at any point of a conic ſection, is always as the tangent of the angle contained by the diameter that paſſes through the point of contact, and the perpendicular to the curve at the ſame point, or to the angle formed by the diameter of the ſection, and of the circle of curvature. Hence the *variation* of curvature vaniſhes at the extremities of either axis, and is greateſt when the acute angle, contained by the diameter, paſſing through the point of contact and the tangent, is leaſt.

When the conic ſection is a parabola, the *variation* is as the tangent of the angle, contained by the right line drawn from the point of contact to the focus, and the perpendicular to the curve. See Curvature.

Variation, in the *Italian Muſic*, is underſtood of the different manners of playing or ſinging a tune or ſong: whether by ſubdividing the notes into ſeveral others of leſs value, or by adding graces, &c. This is to be done in ſuch manner, however, as that one may ſtill diſcern the ground of the tune through all theſe enrichments, which ſome call *embroideries*.

Thus, e. g. the divers couples of chacons, Spaniſh folies, gavots, French paſſecaillies, &c. are ſo many *variations*: ſo alſo many diminutions of courants, gavots, and other pieces for the lute, harpſichord, &c. are real *variations*.

VARICES, of *varix*, formed from *variare*, becauſe of the turns of the veins which the tumor in this diſeaſe ſometimes takes, in *Surgery*, a name given to thoſe unequal or knotty and livid protuberances of the veins, which are formed in all parts of the body, but moſt frequently in the legs, near the ankles, and often near the knees, or in the thighs, ſcrotum, abdomen, and ſometimes the head.

Varices are ſometimes confined to one ſingle branch of a vein, and ſometimes they extend to ſeveral; and ſometimes run crooked, and bent in various knots and circumvolutions.

They happen ofteneſt to the crural and hæmorrhoidal veins; ſometimes alſo to thoſe in the teſtes, and frequently to thoſe in the abdomen and breaſts of pregnant women, and ſuch as give ſuck. They are ſuppoſed owing to the great abundance or thickneſs of the blood, or to the relaxation of the membranes of the veins, immoderate labour, ſprains, cramps, too great preſſure or ſtricture by bandages. Stagnations of the blood, from a plethora, cacochymia, &c. may alſo give occaſion to them. Women with child are the moſt liable to this diſorder in the thighs and legs, on account of the fœtus compreſſing the iliac veins, and preventing the reflux of the blood to the heart; but it alſo frequently happens to plethoric men, or to thoſe who are hypochondriacal, and who have an inſpiſſated or viſcid blood, and an obſtruction, or ſcirrhoſity of their liver.

Varices happening ſpontaneouſly, and proving of a moderate ſize, are rarely dangerous; they are even allowed ſerviceable in the caſe of hæmorrhoids. When immoderate, they ſometimes occaſion a cachexy, dropſy, or conſumption.

The larger theſe protuberances are, ſo much the more painful and troubleſome they prove, by the greater diſtention of the coats or membranes of the veſſel, which are ſometimes quite ruptured, and occaſion a profuſe hæmorrhage or an ulcer.

In order to prevent this diſorder from increaſing, it may be proper to bleed the patient, preſcribe a proper regimen, and apply an expulſive bandage cloſe to the diſordered legs.

Dr. Harris thinks that tincture of myrrh is a very powerful remedy for *varices*, if it be often applied with a feather, and the part covered with emplaſt. diaſulp. Rulandi, which will ſtill ſucceed better with a bandage or ſtrait ſtocking. When they are much enlarged, and attended with bad ſymptoms, it will be neceſſary to lay open the worſt of them by a longitudinal inciſion with the ſcalpel, or a lancet, and take away eight or ten ounces of the grumous and viſcid blood, dreſſing the wound with bole armenic and vinegar, applied on ſcraped lint, and retained with a plate of lead, compreſs, and bandage; and thus the vein will unite and form a cicatrix ſtrong enough to reſiſt any farther dilatation.

The ancients cured *varices* by inciſion or cauterization, as Celſus obſerves, lib. vii. cap. 36.

For preventing their return, the patient ſhould carefully avoid groſs and plentiful feeding, and uſe frequent exerciſe, with frictions of the legs and occaſional bleeding. Heiſter's Surgery, part ii. p. 343.

VARICIFORMES *paraſtatæ*, in *Anatomy*, a name which ſome authors give to two veſſels near the bladder; by reaſon of their many turnings, ſerving to work and prepare the ſeed the better. See PARASTATÆ and DEFERENTIA *Vaſa*.

VARICOCELE, in *Surgery*, a name given to one of the ſpurious HERNIÆ, which conſiſts in a dilatation of the blood-veſſels of the ſcrotum. Theſe are of different ſizes, in different people, and like the veſſels in other parts of the body, are liable to become varicoſe; but are ſeldom ſo much enlarged as to be troubleſome, unleſs ſuch enlargement is the conſequence of a diſeaſe, either of the teſticle, or of the ſpermatic chord. When this is the caſe, the original diſeaſe ſhould engage the attention of the ſurgeon, and not this ſimple effect of it; and therefore, conſidered abſtractedly, the *varicocele* is a diſeaſe of no importance. Pott's Chirurgical Works, vol. ii. p. 423, 1779.

VARICOMPHALUS, in *Surgery*, a kind of umbilical rupture, or EXOMPHALUS, ſo denominated from the nature of the particular humour of which it is formed.

VARICOSA *Hernia*. See HERNIA *Varicoſa* and CIRSOCELE.

VARICOSUM *Corpus*, in *Anatomy*, the ſame as *corpus* PYRAMIDALE.

VARICOUS *ulcers*. See ULCER.

VARICULA, a diminutive of the word *varix*, a term applied by ſome authors to the intumeſcence of the veins of the tunica adnata in the eye, ariſing from thick blood.

VARIEGATION, among *Botaniſts* and *Floriſts*, the act of ſtreaking or diverſifying the leaves, &c. of plants and flowers, with ſeveral colours.

Variegation is either *natural* or *artificial*. Of *natural variegation* there are four kinds; the firſt ſhewing itſelf in yellow ſpots here and there in the leaves of plants; called by gardeners the *yellow blotch*.

The ſecond, called the *white blotch*, marks the leaves with a great number of white ſpots, or ſtripes; the whiteſt lie next the ſurface of the leaves, uſually accompanied with other marks of a greeniſh white, that lie deeper in the bodies of the leaves.

The third, and moſt beautiful, is, where the leaves are edged with white, being owing to ſome diſorder, or infection, in the juices, which ſtains the natural complexion, or verdure of the plant.

The fourth kind is that called the *yellow edge*.

All *variegation* is, in itſelf, a diſeaſe; and theſe are only ſo many ſpecies, or rather degrees thereof. In the yellow, the diſeaſe is the ſlighteſt; but the white is a ſure ſign of a deep infection, and weakneſs in the plant: which is farther evinced by this, that no two leaves are ever marked exactly alike. The former ſometimes degenerate into the third, or edge kind; which is a total and immoveable diſeaſe, that lays hold not only of the leaves but of the wood, and even the fruit, ſeed, &c.

In the two firſt kinds, when accidental, there is a poſſibility of recovering the plants to their native verdure by inarching them into a healthful ſtock of the ſame ſpecies, and letting the ſtock ſtand a year or two joined together; by which means the juices of the ſtrong ſtock, overpowering the diſtemper, throw off the morbid humours by perſpiration; but the third kind is incurable: no art can recover the edged plant to produce plain green leaves again.

Artificial variegation is performed by inarching, or inoculating, a ſtriped or *variegated* plant into a plain one of the ſame ſort; as a *variegated* common jeſſamin, into a plain, common, Spaniſh, Brazil, or Indian jeſſamin.

A ſingle bud, or eye, Mr. Bradley obſerves, being placed in the eſcutcheon of a diſtempered tree, wherein it can only receive nouriſhment from the vitiated juices, will become *variegated*, proportionably to the nouriſhment it draws; and will partake more of the white or yellow juice, than if a branch ſhould be inarched; the bud having nothing to nouriſh it but the juices of the plant it is inoculated on; whereas a cyon inarched is fed both by the ſtriped plant, and the healthful one.

As to the natural ſtripes, or *variegations*, there are ſome particular circumſtances to be obſerved: 1. That ſome plants only appear *variegated*, or blotched in the ſpring and autumn; the ſtains diſappearing as they gather ſtrength in ſummer; inſtances of this kind are ſeen in rue, thyme, and pot-marjoram.

2. Some plants are commonly blotched in the ſpongy part of their leaves; the ſap-veſſels, all the time, remaining of a healthful green: ſuch are the alaternus, orange-mint, &c. which, being ſtrengthened by rich manure, or being inarched into healthful plants, always throw off the diſtemper.

3. In other plants the diſeaſe is ſo rooted and inveterate, that it is propagated with the ſeed: ſuch are the archangel, water-betony, bank-creſs, borrage, ſtriped celery, and ſycamore; the ſeeds of all which produce ſtriped plants.

VARIETIES, in *Natural Hiſtory*, a word uſed to expreſs an accidental change in ſome body which is not eſſential to it, and therefore does not conſtitute a different ſpecies.

The naturaliſts of former ages have run into great errors, in miſtaking the accidental *varieties* of plants, animals, and minerals, for diſtinct ſpecies. Many of them have called a plant a new ſpecies, becauſe its flower, which ſhould have been blue or red, is white, on account of the poorneſs of the ſoil, or ſome other ſuch reaſon. Mr. Ray has eſtabliſhed a very good teſt for *varieties* in botany; he allows every thing to be a diſtinct plant which will propagate itſelf in its own form by its ſeeds; but ſuch, as when ſown, loſe their difference, and run back to the old ſtandard, he accounts *varieties*, however great their diſtinctions may appear. In the hiſtory of fiſh as much confuſion has been introduced, by miſtaking *varieties* for diſtinct ſpecies, as in botany. Artedi is the only author who has rationally attempted to bring this part of natural hiſtory into order in this reſpect, and to ſettle regularly the rules by which to diſtinguiſh real and eſſential, from accidental differences.

The principal grounds of the error of ſuppoſing *varieties* diſtinct ſpecies of fiſh, have been theſe: the variable and inconſtant colour of fiſh have been miſtaken for a ſpecific difference; in this manner Rondeletius has deſcribed many *varieties* of the turdi, labri, and other fiſh, under the names of diſtinct genera.

Others have paid the ſame too great regard to the more conſtant *varieties* of colour, which are found only to differ in degree, in the ſeveral individuals of the ſame ſpecies, and their differences to be only in the degrees of the ſame colour, which is much more intenſe in ſome, and more remiſs in others. Theſe differences can only make *varieties* of the ſame fiſh, the ſpecies remaining always the ſame. Of the ſame kind are the miſtakes of thoſe who eſteem ſize or magnitude a ſpecific character; and thus, out of the *varieties* of the ſame fiſh, occaſioned by ſcarcity or plenty of food, or other ſuch occaſions, make larger or ſmaller ſpecies. The place, where fiſh are caught, is alſo another cauſe of making new ſpecies with theſe authors: thus, though the *perca fluviatilis* of Bellonius, and the *perca marina* of other authors be the ſame fiſh, yet they are pretended to be different ſpecies. The time of ſpawning is alſo with ſome made a diſtinction of ſpecies; and thus we find the common pike divided into three ſpecies, according to its ſpawning, in ſpring, ſummer, and autumn, which it does according to the heat or coldneſs of the climate. See SPECIFIC *names*.

All theſe differences are falſe and frivolous, and the utmoſt they can do, is to make what are properly called *varieties*, though few of them are ſufficient even for that. A ſalmon caught at ſea, is not different from one of the ſame brood caught in a river; and if the *perca marina*, falſly ſo called, be a little different from the *perca fluviatilis*, yet if its ſpawn will produce regular *percæ fluviatiles*, its difference can only amount to a *variety*, not a diſtinct ſpecies.

The time of ſpawning is no eſſential difference; for we daily ſee the change of climate make changes of that kind in all creatures; and even in the ſame climate, and under the ſame circumſtances, the ſame ſpecies of birds will afford ſome individuals much earlier or later in laying their eggs than others. Artedi Ichthyol.

VARIOLÆ, or VARIOLI, a contagious diſeaſe, popularly called the *ſmall*-POX.

It is called *variolæ*, as ſhewing itſelf in puſtules, or little tumors, like VARICES; or as variegating the ſkin.

VARIORUM, in *Matters of Literature*, a term or phraſe of abbreviation, uſed for an edition of a claſſic author, printed in Holland, with the notes of divers authors thereupon: *Cum notis variorum*, or *cum ſelectis variorum obſervationibus*.

In this ſenſe, we ſay, *Plautus variorum*; a ſet of Dutch *variorums*, &c. Many of the *variorum* are valuable editions.

The word is the genitive plural of the Latin *varius*; *different, divers*.

VARIUS, in *Ichthyology*, a name uſed by moſt authors for a ſmall freſh-water fiſh, common in brooks and running waters, and well known in England by the name of the MINOW.

VARIUS *mus*, in the old authors of *Zoography*, a name uſed for the ſame creature they otherwiſe called *mus ponticus*; which ſeems to have been no other than the *European flying* SQUIRREL.

VARIX, in *Surgery*. See VARICES.

VARLET. See VALET.

VARNISH, or VERNISH, *vernix*, a thick, viſcid, gloſſy liquor, uſed by painters, gilders, and various other artificers, to give a gloſs and luſtre to their works, as alſo to defend them from the weather, duſt, &c.

There are divers kinds of *varniſhes*; ſome of the principal of which are as follow.

VARNISH, *amber*, is prepared in the following manner: put four ounces of amber into a crucible, and melt it with a ſmall degree of heat, and pour it out upon an iron plate; when cold, reduce it to powder, and add to it two ounces of drying oil, that is, linſeed oil thickened by boiling it up with litharge, and one pint of oil of turpentine, and diſſolve the whole together into a liquid *varniſh*.

This ſimple *amber varniſh* is of great uſe for many purpoſes, and is ſaid to be the baſis of the fine *varniſhes* which we ſee on coaches, and may be prepared without drying oil, by boiling the powder of amber in linſeed oil, or in a mixture of linſeed oil and oil of turpentine. Drying oil is commonly uſed by the workmen; but Dr. Lewis thinks it more eligible to take the oil unprepared, that the boiling, requiſite for giving it the drying quality, may be employed at the ſame time in making it act upon the amber. It has generally been thought, that amber will not at all diſſolve in oils, till it has ſuffered a degree of decompoſition by fire; but Hoffman relates an experiment, in his Obſervationes Phyſico-Chemicæ, which diſcovers the ſolubility of this concrete in its natural ſtate. Powdered amber, with twice its quantity of oil olive, was put in a wide-mouthed glaſs; and a digeſtor, or ſtrong copper veſſel, being filled about one third with water, the glaſs was placed in it, the cover of the digeſtor ſcrewed down tight, and a moderate fire continued an hour or more: when cold, the amber was found diſſolved into a gelatinous, tranſparent maſs. In Dr. Stockar's Specimen Inaugurale de Succino, printed at Leyden, in 1760, we have an account of other experiments made by himſelf, in conjunction with Mr. Ziegler, of Winterthur; from which we learn, that by continuing a ſimmering heat twelve hours, and confining the vapour as much as ſtone-ware veſſels would bear, without burſting (the danger of which was avoided by making a ſmall notch in the cork-ſtoppers), powdered amber diſſolved perfectly in expreſſed oils, in turpentine, and in balſam of copaiba: a ſtrong copper veſſel, with a cover ſcrewed on it, ſeems moſt eligible; and for the greater ſecurity, a valve may be made in the cover, kept down by a ſpring, that ſhall give way before the confined vapour is of ſufficient force to endanger burſting the veſſel. Moreover, by digeſtion for a week in cloſe-ſtopped glaſs veſſels, in which the compreſſure could not be very great, ſolutions equally perfect were obtained. The ſolution in rape-ſeed oil, and in oil of almonds, was of a fine yellowiſh colour; in linſeed oil, gold-coloured; in oil of poppy-ſeeds, yellowiſh red; in oil olive, of a beautiful red; in oil of nuts, deeper coloured; and in oil of bays, of a purple red. The ſolutions made with turpentine, and with balſam of copaiba, were of a deep red colour, and on cooling, hardened into a brittle maſs of the ſame colour. All the ſolutions mingled perfectly well with ſpirit of turpentine. Thoſe made with the oils of linſeed, bays, poppy-ſeeds, and nuts, and with balſam of copaiba and turpentine, being diluted with four times their quantity of ſpirit of turpentine, formed hard, tenacious, gloſſy *varniſhes*, which dried ſufficiently quick, and appeared greatly preferable to thoſe made in the common manner from melted amber.

An amber *varniſh* may alſo be made by boiling down ſome colophony, or turpentine, till it becomes black and friable, and melting this in a glazed earthen veſſel, ſprinkling in by degrees thrice as much amber in fine powder, with the addition of a little ſpirit or oil of turpentine now and then. When the amber is melted, ſprinkle in the ſame quantity of ſarcocolla, continuing to mix them, and to add more ſpirit of turpentine, till the whole becomes fluid; then ſtrain out the clear through a coarſe hair bag, preſſing it gently between hot boards. This *varniſh*, mixed with ivory black in fine powder, is applied, in a hot room, on the dried paper paſte, of which the PAPIER MACHE' is made; which is then ſet in a gently-heated oven, next day in a hotter oven, and the third day in a very hot one, and let ſtand each time till the oven is grown cold. The paſte thus varniſhed is hard, durable, gloſſy, and bears liquors hot or cold. Lewis's Com. Phil. Techn. p. 367.

An amber *varniſh* may be otherwiſe made, by melting eight ounces of Chio turpentine, and when fluid, pouring into it by degrees a pound of fine powdered amber, and ſtirring it; and when it is properly mixed, ſetting it on a fire for half an hour, taking it off, and ſtirring it well, and adding to it two ounces of the white colophony. It is again to be put on a briſk fire, and covered cloſe; when the maſs is perfectly fluid, and taken off to cool, a pound of linſeed or poppy oil, made drying, is to be poured in boiling hot, and ſtirred till it be incorporated with the maſs; and then a quart of hot turpentine is to be added, and the whole well ſtirred. Let it then cool, and ſtrain it off for uſe; when, if it has been properly made, it will be quite clear. See GILDING *on enamel and glaſs*.

VARNISH, *black*, for JAPANNING on wood or leather, is prepared by mixing lamp-black or ivory-black with a proper quantity of a ſtrong ſolution of gum lac in ſpirit of wine. The lamp-black is commonly preferred to the ivory-black, on account of its uniting better with the fluid, and working ſmoother. The thicker part of the *varniſh*, which ſettles at the bottom, is uſed with the lamp-black for the firſt coatings, and the mixture applied at different times, in a hot room, one layer after another is dry, till a full body of colour is obtained; after which, the piece is waſhed over in the ſame manner ſeveral times, with the finer part of the *varniſh*, juſt tinged with the black, ſo as to make a coating of ſufficient thickneſs to bear poliſhing with tripoli. Iron ſnuff-boxes, mourning buckles, &c. are coloured black, by making them conſiderably hot, and applying on them in this ſtate a thick mixture of lamp-black with a certain *varniſh* called gold-ſize, conſiſting of drying oil, turpentine, and the pigment called Naples yellow; but the yellow might be omitted, and the *varniſh* formed at once by mixing lamp-black and a proper quantity of turpentine and drying oil. The workmen, as Dr. Lewis ſays, frequently employ, as *varniſh* for metals, a mixture of lamp-black, with the ſcummings, &c. of different oil paints: the mixture is applied with a pencil, and the piece afterwards baked in an oven with a heat ſomewhat greater than is uſed for the papier maché. Naples yellow, a ſuperfluous ingredient in the black *varniſh*, is the baſis of the dark-brown which we ſee on ſome iron ſnuff-boxes; this pigment changing to a brown in baking with the *varniſh*. Lewis. See LACQUER.

The excellent black *varniſh* of China and Japan, which has been hitherto but imperfectly imitated in Europe, and which was formerly thought to be an artificial compoſition of reſinous bodies coloured with black pigments, has been diſcovered by the later travellers into thoſe countries, to be a native juice, exuding from inciſions made in the trunks of certain trees. Mr. Miller, in conſequence of a letter from the abbé Mazeas to Dr. Hales, containing a communication of the diſcovery of a plant by the abbé de Sauvages, which he calls *toxicodendron Carolinianum foliis pinnatis, floribus minimis herbaceis*, and the black juice of which adheres, without the leaſt acrimony, to cloth with more force than any other known preparation, takes occaſion to ſhew, that this American toxicodendron is the ſame ſpecies of plant from which the inhabitants of Japan procure the *varniſh* with which they ſtain all their utenſils; adding, that the calicuts are alſo painted with the juice of this ſhrub. This American toxicodendron (ſee POISON-*tree*) is the ſame plant, as he affirms, which is mentioned by Kæmpfer, in his Amœnitates Exoticæ, by the title of *arbor vernacifera legitima, folio pinnato juglandis, fructu racemoſe ciceris facie*, i. e. the true *varniſh* tree, with a walnut-tree leaf, and a branching fruit like cicers. It is called by the inhabitants of Japan *ſitz*, or *leſitz-dſju*, and alſo *urus*, or *urus noki*. Kæmpfer has alſo deſcribed the wild or ſpurious *varniſh* tree, called *faſi-no-ki* by the natives, which he ſays agrees with the other in every part, except that the lobes of the leaves are narrower; but Mr. Miller is of opinion, that this is a diſtinct ſpecies, if not a different genus from the true ſort; and ſays, that the *varniſh* yielded by it is of little eſteem. The account which the Jeſuits at China have given of the manner in which the *varniſh* is procured, is as follows: they firſt ſlit the back of the branches of the ſhrub, in different places, with a knife; and thus there flows out a white clammy juice, which is received into wooden veſſels; and when theſe become dry, they tap the ſtems of the ſhrubs near the roots, ſo that all the juice is drawn out of them. The ſhrubs are then cut down to the ground, and from their roots new ſtems ariſe, which in three years will be fit for tapping. The juice turns black when expoſed to the air; it heats without turning ſour; but being of a poiſonous nature, it is dangerous to handle it. This native *varniſh* wants hardly any preparation; but if any dirt ſhould happen to mix with it, it is cleanſed by being ſtrained through coarſe gauze, put into wooden veſſels, and covered with an oil called *toi*, and a ſkin, in order to prevent its evaporating. In this ſtate it is carried over to China and Japan for ſale. The ſhrub is chiefly cultivated in the provinces of Tſi-Kocko, and Figo; and the beſt *varniſh*, according to Kæmpfer's account, is produced about the city Jaſſino; but there is an ordinary ſort of *varniſh*, called *nam rak*, brought from Siam, which is collected in the province of Corſama, and in the kingdom of Cambodia, from the tree anacardus, called by the inhabitants *tong* or *tue-rak*, the fruit of which is called in our ſhops anacardium. To collect this liquor, they bore a hole in the trunk, and inſert a tube. By this method they procure as much of it as is ſufficient not only to varniſh all the utenſils of China, Tonquin, and Japan, but it is even exported in cloſe wooden veſſels to Batavia, and other parts of India. This *varniſh*, ſays Kæmpfer, is not only ſold quite pure, but likewiſe coloured, with Chineſe native cinnabar, and a kind of red earth, which the Dutch formerly, but now the Chineſe bring them, and alſo with the materials of which they make their common Japan ink. Mr. Ellis has controverted the opinion of Mr. Miller, and endeavoured to ſhew that the American toxicodendron is not the ſame with Kæmpfer's arbor vernicifera legitima; alledging, that Kæmpfer's deſcription of the true *varniſh*-tree does not agree with this toxicodendron; and he inclines to the opinion, that the Carolina pinnated toxicodendron, or poiſon-aſh, is the ſame with the *faſi-no-ki*, or ſpurious *varniſh*-tree of Kæmpfer. Mr. Ellis alſo thinks it is not improbable, that the *varniſh* mentioned by Kæmpfer, as obtained from the oriental anacardium, is the ſame with that mentioned by father d'Incarville, in the Phil. Tranſ. vol. xlviii. p. 254. called *toeng-yeou*; which is ſo univerſally uſed in China for preſerving and ornamenting their furniture. See this controverſy between Mr. Miller and Mr. Ellis at large, in Phil. Tranſ. vol. xlix. part i. p. 157—166. part ii. p. 806—876. vol. l. p. 430—456. See POISON-*tree*, LINEN, and JAPANNING.

VARNISH, *brown, for metals*. See *Black* VARNISH, ſupra.

VARNISH, *copal oil*, called in France *vernis martin*, is made by pouring into a well-glazed ſtrong earthen pot, in ſhape reſembling a chocolate pot, and in ſize large enough to hold about a gallon, and made warm, four ounces of Chio or Cyprus turpentine, and when this is diſſolved, eight ounces of finely powdered amber; mingling them well, and ſetting them on the fire for a quarter of an hour; take off the pot, and pour gently into it a pound of copal, finely bruiſed, but not powdered; ſtir the maſs, and add four ounces of Chio turpentine, and a gill of warm turpentine oil; then ſet it on a briſk fire for about half an hour, and taking it off, ſtir the contents well, and add two ounces of the fineſt and whiteſt colophony. Let the pot be put on a very briſk fire, and remain till the whole is diſſolved, and become as fluid as water; let it be removed from the fire, and remain for a few minutes, and then gradually pour in twenty-four ounces of poppy, nut, or linſeed-oil, made drying, and boiling hot, and ſtir the maſs with a deal ſtick. When the gums and oil are thoroughly incorporated, ſet them over the fire for a few minutes, ſtill ſtirring them about, and let them boil once up; and having taken off the pot, pour into it a quart of hot turpentine; ſtir them together, and give them one boil up; take off the pot, and pour into it a pint more of hot turpentine, ſtill ſtirring it well. If the gums are thoroughly melted, and well incorporated, the *varniſh* is made; which, being cool, is ſtrained through a cloſe cloth into another veſſel, and if it be too thick, thinned with oil of turpentine, till it becomes of the conſiſtence of linſeed-oil; ſtrain it a ſecond time, bottle it for uſe, and let it ſtand a month at leaſt, before it is uſed. This *varniſh* is uſed for coaches, cabinets, &c. and the piece, whatever it be, after having been varniſhed ſmoothly, and dried in the intervals, half a dozen times, and ſuffered thoroughly to dry, muſt be rubbed with a wet coarſe rag, dipped in pumice-ſtone, powdered and ſifted, till the ſtreaks of the bruſh and all blemiſhes are removed. When it is perfectly ſmoothed, waſhed, and dried, the coats of *varniſh* are to be repeated, for ten or twelve times, till there be a ſufficient body. After having again uſed the powdered pumice-ſtone, and waſhed it off as before, let it be rubbed with fine emery, till the ſurface becomes even and ſmooth as glaſs; then with powder of fine rotten ſtone, till by paſſing the palm of the hand two or three times over the ſame place, you diſcover a gloſs equal to that of glaſs: having dried it clean, dip a rag, or piece of flannel, in ſweet oil, and rub the ſurface a few times over, and clear it off with fine dry powder, flour, or the hand; and a piece of fine flannel, dipped in flour, and rubbed over it, when cleared of the oil, will give it an excellent luſtre. Between every coat of *varniſh* it will be adviſeable, if the ſubject admits of it, to ſet it in a warm oven; or to heat the varniſhed pieces by ſtoves. See COPAL.

VARNISH, *gold-coloured*. See LACQUER.

The compoſition of a gold-coloured *varniſh*, uſed by the Engliſh artiſts for braſs and ſilver, was communicated to ſome of the French academicians in 1720, by Mr. Scarlet, and in 1738 by Mr. Graham, and publiſhed in the volume of the French Memoirs for 1761. It is as follows: take two ounces of gum lac, two ounces of yellow amber, forty grains of dragon's blood in tears, half a dram of ſaffron, and forty ounces of good ſpirit of wine; infuſe and digeſt in the uſual manner, and then ſtrain through a linen cloth. The piece to be varniſhed muſt be heated before the liquid is applied: it receives from the *varniſh* a gold colour, and may be cleaned, when ſullied, with warm water.

VARNISH *for preſerving poliſhed iron from ruſt*. See IRON.

VARNISH, *lacca*, is made of gum LACCA, and ſpirit of wine, frequently ſhaken till the gum be diſſolved, then ſtrained, and the clear liquor decanted off.

The lacca ought to be of the kind called ſeed lacca. Three ounces of this, well purified by repeated ablution of water, dried and powdered groſsly, ſhould be put into a bottle with a pint of rectified ſpirit of wine, ſo as to fill about two-thirds of it, and the bottle placed in a gentle heat; proceeding as above: though for varniſhing ordinary woods, ſhell lacca is often uſed. For this purpoſe, five ounces of the beſt ſhell-lacca ſhould be groſsly powdered, and put into a bottle, holding about three pints or two quarts, with one quart of rectified ſpirit of wine; and placed in a gentle heat: the mixture muſt be filtered through a flannel bag. To this *varniſh*, the colours uſed in *varniſh* painting may be added, and properly diluted with rectified ſpirit, and kept in phials, or tin veſſels cloſely ſtopped for uſe. But this will not ſtand againſt the weather.

For various preparations of this kind, ſee JAPANNING and LAQUER.

VARNISH, *maſtich*, is made by putting five ounces of powdered maſtich into a proper bottle, with a pound of ſpirit of turpentine, and ſetting them to boil in balneo Mariæ, till the maſtich be diſſolved, and ſtraining the ſolution through flannel. This *varniſh* may be converted into a proper *varniſh* for painting, by grinding one ounce of gum animе on a ſtone with water, till it becomes an impalpable powder; then drying it, and grinding it again with half an ounce of turpentine, and afterwards with the proper colours, and moiſtening it with the maſtich *varniſh*, till the mixture be of a due conſiſtence for working with the pencil. It muſt then be kept in phials or tin veſſels, and diluted, as there may be occaſion, with ſpirit of turpentine.

Varnish *for preſerving paintings*. See Picture.

For this purpoſe ſome have recommended the following compoſition; viz. half a pound of gum ſandarac; an ounce and a half of Venice turpentine; three quarters of an ounce of each of the gums anime and copal; half an ounce of maſtich; benzoin, gum elemi, and white reſin, each two drams, and one pound of rectified ſpirit. The benzoin and gum anime powdered, are put with the Venice turpentine into a phial, with eight ounces of the ſpirit of wine; the copal and reſin powdered are alſo put in a phial with ſix ounces, and the powdered gum elemi, with two ounces of ſpirit of wine. The ſeveral phials are frequently ſhaken, till the gum, &c. are diſſolved; then the ſolutions are ſtrained through a fine linen in one bottle, and when the mixture has ſtood ſome days, it is decanted off clear, and kept in a ſeparate bottle for uſe. Some have ſubſtituted the ſarcocolla for the copal. Another compoſition is formed, by diſſolving maſtich and ſandarac, groſly powdered, of each ſix ounces, and Venice turpentine, half an ounce, in a quart of highly rectified ſpirit of wine, and ſtraining off the ſolution. If it be required harder, an equal weight of the gums anime and copal, may be added, and the quantity of ſpirit of wine doubled. In the uſe of this *varniſh*, the painting ſhould be thoroughly dry, and it ſhould be ſpread very gently with a pencil. The *varniſh* ſhould be laid on in a very warm place, or the picture itſelf warmed to a moderate degree, in order to prevent the *chilling* of the *varniſh*; in which caſe another coat ſhould be added. And, indeed, two or three coats are neceſſary to preſerve the painting, and to bring out a due effect of its colours, if they are in that ſtate called *ſunk in*, occaſioned by the attraction of the cloth on the oils mixed with them. An oil of turpentine *varniſh* may be added by groſsly powdering maſtich and ſandarac, of each four ounces; two ounces of white reſin, and ſarcocolla, anime, copal, and olibanum, of each one ounce, and putting them into a phial with two pounds of oil of turpentine, ſtopping the phial gently, and placing it in any heat, ſo that the maſs may not boil, and ſtraining off the ſolution for uſe. Or, a *varniſh* more ſimple, and equally good, may be made by powdering two ounces of ſandarac, maſtich and olibanum, of each an ounce and half; or three ounces of maſtich, and Venice turpentine, half an ounce; and diſſolving them in half a pound of oil of turpentine, and proceeding as before. Handmaid to the Arts, vol. ii. p. 227, &c.

Varnish *for paper-hangings*. See Paper-*hangings*.

Varnish *for printers ink*. See Printing-*ink*.

Varnish, *white*, is uſually made of gum ſandarac, and gum maſtich, diſſolved in ſpirits, left to ſettle two days, then ſtrained through a linen cloth, and, after ſtanding ſome time, the clear poured off, and bottled for uſe.

The more curious artiſts diſſolve the two gums ſeparately; and having made a ſeparate *varniſh* of each, mix them occaſionally, as their work requires a ſtiffer or a ſofter *varniſh*.

But for the *beſt white varniſh* more gums are required; viz. Venice turpentine, gum copal, elemi, benzoin, anime, and white reſin.

Beſides theſe, there are *hard* and *ſoft varniſhes*, or grounds, uſed by the etchers and engravers. See Etching.

Varnish is alſo uſed for a kind of gloſſy coat, wherewith potter's ware, Delf-*ware*, China ware, &c. are covered, to give them a ſmoothneſs and luſtre. Some preparation of lead is the *varniſh* ordinarily uſed for the firſt; and earths for the ſecond. See Glazing and Pottery.

The true *varniſh* uſed by the Chineſe and Japaneſe, to give that inimitable luſtre to their porcelain, is one of the grand ſecrets in that manufacture; and is one of the great things wanting, to make Delf and French ware vie with the Chineſe. Several have deſcribed the preparation thereof, particularly Kircher: but none ever ſucceeded in the trial. See Porcelain and Varnish, *ſupra*.

Varnish is alſo a term applied to the colours which antique medals acquire in the earth.

The value of a medal is heightened by a beauty, which nature alone was able to give, and art has never yet attained to counterfeit: we mean, the colour or *varniſh* with which certain ſoils tinge the medal; ſome with a blue, almoſt as beautiful as that of a turquoiſe; others with an inimitable vermilion colour; and others with a gloſſy ſhining brown, infinitely beyond any of our figures in bronze.

The moſt uſual *varniſh*, however, is a fine green, which hangs to the moſt delicate ſtrokes without effacing them; much more accurately than the fineſt enamel does on metals. Braſs alone is ſuſceptible of it; for as to ſilver, the green ruſt that gathers on it, always ſpoils it; and it muſt be ſcoured off with vinegar, or lemon juice.

There is alſo a *falſe*, or *modern varniſh*; which the falſifiers of medals give to their counterfeits, to give them the air of antiquity: it is diſcovered by its being ſofter than the natural *varniſh*, which is hard as the metal itſelf.

Some lay their ſpurious medals under-ground, where they contract the degree of *varniſh*, that they impoſe on the leſs knowing: others uſe ſal ammoniac, mixed with vinegar; others the acid ſpirit of nitre, &c.

VAROLI *pons*. See Pons.

VARRONIA, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are, that the corolla is divided into five ſegments, and that the fruit is a drupe, containing a nut with four cells. There are ſix ſpecies.

VARRONIAN *ſatire*. See Satire.

VARVELS, in *Falconry*, ſmall ſilver rings about a hawk's leg, with the owner's name on them.

VAS, *veſſel*. See Vessel, Vesicula, and Angeiology.

Hence, in the ſtyle of anatomiſts, the *vaſa adipoſa*, *præparantia*, &c.

Vas *breve*, *ſhort veſſel*, in *Anatomy*, a veſſel at the bottom of the stomach: thus called from its ſhortneſs.

It ſends divers little branches from the bottom of the ſtomach to the ſpleen; or, according to the uſe the ancients imagined it to be of, from the ſpleen to the ſtomach: for their notion was, that, by means of this veſſel, the ſpleen ſupplied the ſtomach with an acid juice; which, acting on the inner nervous membranes of the ſtomach, cauſed the ſenſation of hunger; and at the ſame time mixing with the foods contained therein, aſſiſted, by its acid quality, in the diſſolution thereof.

But upon examining the little branches of this veſſel more accurately, it is found, that they do not pierce into the ſtomach, and that they are no more than branches of veins, ſerving to return the blood into the ſplenic vein; whence it paſſes into the vena porta.

Vasa *concordiæ*, among *Hydraulic Authors*, are two veſſels, ſo conſtructed, as that one of them, though full of wine, will not run a drop; unleſs the other, being full of water, do run alſo. Their ſtructure and apparatus may be ſeen in Wolfius, Element. Matheſ. tom. ii. Hydraul.

Vasa *deferentia*, in *Anatomy*. See *Vaſa* Deferentia.

VASCULAR, *vaſcularis*, in *Anatomy*, is applied to any thing conſiſting of divers veſſels, veins, arteries, &c.

We ſay, the *vaſcular* and valvular texture of the lungs. All the fleſh, in an animal body, is found to be *vaſcular*, none of it parenchymous, as the ancients imagined.

Vascular, *glands*. See Gland.

Vascular, *vaſcularius*, in *Antiquity*, was the denomination of a kind of artificers among the ancient Romans; who made ſilver and gold veſſels without relievos, or figures imboſſed thereon.

Hence, according to Salmaſius, it is, that Cicero, in his ſixth oration againſt Verres, diſtinguiſhed *vaſcularius* from *cælator*, *engraver*.

In the art called by the Greeks εμπαιστικη, which was the art of ſuperadding ornaments of precious ſtones, or rich metals, to vaſes of other metals; the *vaſcularii* and cælatores were different; the firſt being the goldſmiths who made the vaſe; the ſecond, the ſculptors who added the ornaments. But in the art called τορευτικη, or the art of cutting bas reliefs, or ſtamping figures on metal; the *vaſcularii* were alſo cælators, or engravers; that is, they who made the vaſe, made alſo the relievos, or figures, wherewith it was enriched.

VASCULIFEROUS *plants*, among *Botaniſts*, ſuch as have a peculiar veſſel or caſe to contain the ſeed; which is ſometimes divided into cells. See *Syſtems of* Plants.

VASE, a term of equal import with the Latin *vas*, whence it is formed; and with the Engliſh vessel.

It is applied to the ancient veſſels dug from under ground, or otherwiſe found, and preſerved in cabinets, &c. as veſſels of ſacrifice, urns, &c. and to other more modern veſſels, which are rather of curioſity and ſhew than uſe; as thoſe of cryſtal, porcelain, &c.

In the curious collection of ornamental works, made by Meſſrs. Wedgwood and Bentley, after the antique, there are *vaſes* of various kinds; ſome formed of a compoſition of *terra cotta*, reſembling agate, jaſper, porphyry, and other variegated ſtones, of the vitreſcent or cryſtalline kind; others of black porcelain, or artificial baſaltes, highly finiſhed, with bas-relief ornaments; others of the painted Etruſcan kind; and others again ornamented with ENCAUSTIC paintings. The art of painting *vaſes* in the manner of the Etruſcans has been loſt for ages: however, theſe ingenious manufacturers ſet themſelves to revive it; and, having carefully examined the original Etruſcan *vaſes*, and having peruſed with attention the writings of the late count Caylus upon Etruſcan antiquities, they were convinced that the colours of the figures could not be ſucceſsfully imitated with enamel: that their ſucceſs muſt chiefly depend upon the diſcovery of a new kind of enamel colours, to be made upon other principles, and to have effects eſſentially different from thoſe that were then in uſe, and are of the nature of glaſs: the Etruſcan colours being burnt in, ſmooth and durable, but without any glaſſy luſtre. In conſequence of this obſervation, and by a great variety of experiments, they invented a ſet of encauſtic colours, not only ſufficient to imitate the paintings upon the Etruſcan *vaſes*, but to give the beauty of deſign the advantages of light and ſhade in various colours; and to render paintings durable, without the defect of a varniſhed or glaſſy ſurface. Theſe encauſtic colours may be applied with great eaſe and certainty; they change very little in the fire, are not liable to run out of drawing, are perfectly durable, and not glaſſy, and poſſeſs the advantages of enamel, without its eſſential defects. Catalogue of Cameos, &c. by Wedgwood and Bentley, 1773.

Vases, in *Architecture*, are ornaments of ſculpture, placed on ſocles, or pedeſtals, repreſenting the veſſels of the ancients; particularly thoſe uſed in ſacrifice, as the præfericulum, ſimpulum, incenſe-pots, flower-pots, &c. and occaſionally enriched with baſſo-relievos.

They are commonly placed there to crown or finiſh façades, or frontiſpieces. They are frequently alſo called *acroteria*; and are uſually inſulate.

In forming and decorating *vaſes*, fancy has great ſcope. Many excellent inventions of theſe ornaments are tranſmitted to us from the ancients; among which, that repreſented in *Tab. Architecture*, *fig.* 40. M. is much eſteemed. A *vaſe* differs from an URN, as it is in general of a more elegant contour, and is lofty; whereas an urn ſhould be low and wide, and always covered.

Vitruvius mentions a kind of *theatrical vaſes*, made of braſs, or earthen-ware, called *echea*, ηχεια; which they diſpoſed in private places, under the ſteps and ſeats of the theatres, to aid and increaſe the reflexion and reſonance of the actors voices, &c. It is ſaid, there are alſo *vaſes* of this kind in the cathedral church of Milan.

Vase is particularly uſed, in *Architecture*, to ſignify the body of the Corinthian and Compoſite capital; called alſo the *tambour*, or *drum*; and ſometimes the *campana*, or *bell*. See *Tab. Archict. fig.* 21.

Vase is alſo ſometimes uſed, among *Floriſts*, for that they otherwiſe call the CALYX.

The *vaſe*, or rather calyx of a tulip, is the top or head of a tulip; the leaves whereof form a kind of *vaſe*, or cup.

Goldſmiths, braſiers, &c. alſo uſe *vaſe* for the middle of a church candleſtick; which is uſually of a roundiſh figure, bordering ſomewhat on that of a *vaſe*.

VASSAL, *vaſſallus*, in our *Ancient Cuſtoms*, a perſon who vowed fidelity and homage to a lord, on account of ſome land, &c. which he held of him, in fee.

Du-Cange will have the word to come from *vaſſus*, which anciently ſignified a *ſervant*, or *domeſtic* of a prince, and ſometimes alſo the *comites*, or *aſſeſſores*, in public trials. Menage, after Cujas, takes *vaſſal* to have been formed of *geſſel*, an ancient German word, ſignifying *companion*. Caſeneuve derives it from the Gauliſh *geſſus*, a *brave man*, from *geſſo*, or *geſſum*, or *jæſum*, a kind of javelin uſed among them. Voſſius derives *vaſſal* from *vas*, *vadis*, *pledge*; whence alſo he will have it to be, that they are ſometimes called *fideles*.

The *vaſſal* was alſo called *piratus*, *lord's-man*, and *feeman*; but now the denomination is changed into that of *tenant in fee*.

Accordingly the *vaſſal*, or FEUDATORY, was only another name for the tenant or holder of the lands; though, on account of the prejudices we have juſtly conceived againſt the doctrines that were afterwards grafted on this ſyſtem, we now uſe the word *vaſſal* opprobriouſly, as ſynonymous to ſlave or bondman. The manner of the grant, on the part of the proprietor or lord, who retained the dominion of ultimate property of the FEUD or FEE, was by words or gratuitous and pure donation, *dedi et conceſſi*; which are ſtill the operative words in our modern infeodations, or deeds of feoffment. This was perfected by the ceremony of corporal inveſtiture, or open and notorious delivery of poſſeſſion, in the preſence of the other *vaſſals*, which perpetuated among them the æra of the new acquiſition, at a time when the art of writing was very little known; and, therefore, the evidence of property was repoſed in the memory of the neighbourhood; who, in caſe of a diſputed title, were afterwards called upon to decide the difference, not only according to external proofs, adduced by the parties litigant, but alſo by the internal teſtimony of their own private knowledge.

They ſometimes alſo uſed the term *vaſſeur* for *vaſſal*; whence *vavaſour*.

If a *vaſſal* offended his lord grievouſly, either in perſon, or in honour, he committed the crime of felony; which carried with it a confiſcation of his fee.

Vassal, *a rear*, is he who holds of a lord, who himſelf is *vaſſal* of another lord.

Vassal was anciently uſed for ſoldier; by reaſon fees, at firſt, were given to none but military men.

VASSALAGE, the ſtate of a vaſſal; or a ſervitude and dependency on a ſuperior lord.

Anciently, they diſtinguiſhed between *liege vaſſalage*, and *ſimple vaſſalage*.

Liege vaſſalage only belonged to the king; as carrying with it an obligation on the ſide of the vaſſal, to ſerve his lord in war, againſt all perſons whatever. See LIEGE.

In all *ſimple vaſſalage*, the fealty, or *liege vaſſalage*, was ſtill reſerved to the king.

Some alſo diſtinguiſh *active vaſſalage*, and *paſſive*: the firſt is the right of fealty reſiding in the lord; the ſecond, the ſervice and duties incumbent on the tenant.

VASTO, in *Law*, a writ that lies againſt the tenant for life, or years, for making waſte.

VASTUS, in *Anatomy*, a name common to two muſcles of the leg, diſtinguiſhed into *internal* and *external*: thus called from their largeneſs; both of them ſerving to extend the leg.

Vastus *externus* is a large fleſhy muſcle, almoſt as long as the os femoris, broad at the extremities, and thick in the middle, lying on the outſide of the thigh. Its upper inſertion being ſomething tendinous, is in the poſterior or convex rough ſurface of the great trochanter. It is likewiſe fixed by a fleſhy inſertion along the outſide of the os femoris, for above two-thirds of its length downward, in the correſponding part of the linea aſpera, and in the neighbouring portion of the faſcia lata. From all this extent, the fleſhy fibres running downward, and a little obliquely forward, towards the rectus anterior, terminate inſenſibly in a kind of ſhort aponeuroſis, which is fixed in all the neareſt edge of the tendon of the rectus, in the ſide of the patella, in the edge of the ligament of that bone, and the neighbouring lateral part of the head of the tibia. The body of this muſcle is bigger than its extremities, and its lower fibres run a little behind the rectus. Winſlow. See *Tab. Anat. (Myol.) fig.* 1. *n.* 60. *fig.* 2. *n.* 41. *fig.* 6. *n.* 35.

Vastus *internus* is very like the former, and ſituated in the ſame manner on the inſide of the os femoris. It is fixed above by a ſhort flat tendon in the anterior rough ſurface of the great trochanter, and by fleſhy fibres in that oblique line, which terminates the baſis of the collum femoris anteriorly, on the foreſide of the inſertions of the pſoas and iliacus; in the whole inſide of the os femoris, and in the linea aſpera on one ſide of the inſertions of the three tricipites, almoſt down to the internal condyle. From all this extent, the fibres run downward, and a little obliquely forward, and the body of the muſcle increaſes in bulk like the former; it terminates below in an aponeuroſis, which is fixed in the edge of the tendon of the rectus anterior, in the ſide of the patella, and of its tendinous ligament, and in the ſide of the head of the upper extremity of the tibia. Winſlow. See *Tab. Anat. (Myol.) fig.* 1. *n.* 35. *fig.* 2. *n.* 39. *fig.* 7. *n.* 42.

VAT. See Fat.

Vat, or Vate, in *Mineralogy*, denotes a ſquare hollow place on the back of a calcining ſurface, wherein they lay the next ſerving of tin-ore to dry, before it is let down into the furnace, into which it paſſes through a plughole in the bottom of this *vat*, or *dry*.

VATERIA, in *Botany*, a genus of the *polyandria monogynia* claſs; the characters of which are theſe: the perianthium is ſmall, acute, and permanent, and is compoſed of one leaf, divided into five ſegments; the flower conſiſts of five oval expanded petals; the ſtamina are numerous filaments, ſhorter than the flower; the antheræ are ſimple; the germen of the piſtil is roundiſh; the ſtyle ſimple and ſhort, and the ſtigma is headed;

the fruit is a trivalved, ſingle-ſhelled capſule, containing three ſeeds. There is one ſpecies.

VATES, in *Mythology*, the name of a claſs of DRUIDS.

VATICAN, *Vaticanus*, is properly the name of one of the ſeven hills whereon Rome ſtands: on the foot hereof is the famous church of St. Peter, hence called the *Vatican*; and a magnificent palace of the pope, which has the ſame denomination. Hence ariſe divers figurative expreſſions; as *the thunderbolt of the Vatican*, q. d. the pope's anathema, &c.

The word, according to Aulus Gellius, is derived from *vaticinium, prophecy*; by reaſon of the oracles and predictions which were uſed to be delivered there by the inſpiration of an ancient deity, called *Vaticanus*; who was ſuppoſed to unbind the organs of ſpeech in new-born children; and whom others will have to be no other than Jupiter, conſidered in that capacity.

VATICAN, *the library of the*, is one of the moſt celebrated in the world: it is particularly remarkable for its manuſcripts. It was firſt erected, according to Petavius (Rat. Temp. lib. ix. cap. 9.) by pope Nicholas V. who ſucceeded to the papal chair in 1447. It was re-eſtabliſhed, after the books had been diſperſed, under the pontificate of Calixtus III. by Sixtus IV. and after having been almoſt entirely deſtroyed by the army of Charles V. it was not only reſtored to its former ſtate by Sixtus V. but greatly enriched with books and manuſcripts. It was finally fixed in the *Vatican*, under the pontificate of Martin V.

Towards the beginning of the laſt century, it was greatly augmented by the addition of that of the elector Palatine. It is open to all the world, three or four times a week. In it are ſhewn a Virgil, Terence, &c. above a thouſand years old; as alſo the manuſcript whereon the edition of the Septuagint was made; and abundance of rabbinical manuſcripts.

VATICAN *Manuſcript*, is one of the moſt celebrated manuſcripts of the Greek verſion of the Bible now extant in the world. It was publiſhed at Rome by cardinal Caraſa, at the command of Sixtus Quintus, in 1587; and in the preface, it is ſaid to have been written *ante milleſimum ducenteſimum annum*, i. e. before 387; but Blanchini ſuppoſes it a few years later. A Latin edition from this manuſcript, with notes, was printed at Rome in 1588, by Flam. Nobilius; and an edition, with the Greek and Latin, with the diviſion of the verſes, according to the Vulgate, and Nobilius's Latin notes, and the Greek ſcholia of Caraſa, by J. Morinus, at Paris, in 1628. This manuſcript is written in large or text letters, and has no diſtinguiſhing chapters, verſes, words, nor any marks of accents. It is mutilated both at the beginning and end; and wants the firſt forty-ſix chapters of Geneſis, thirty-two Pſalms, viz. from the 105th to the 137th, and the latter part of the Epiſtle to the Hebrews, from chap. ix. ver. 14. with the other Epiſtles of Paul to Timothy, Titus, and Philemon, and the whole book of Revelation. It appears alſo, that the whole manuſcript has been repaired, with freſh ink laid over the letters, which were diſappearing through age. In the edition of Caraſa, the mutilated paſſages have been ſupplied from other copies.

It has been aſſerted, by two eye-witneſſes, that this manuſcript has undergone ſome alterations by a later hand. See Le Long's Biblioth. Sacra, cap. 3. ſect. 4. and Wetſtein's Prolegomena, Nov. Teſt. p. 24.

It is difficult to eſtimate the comparative value of this and the Alexandrian manuſcript, in which thirty Pſalms, a few chapters, and a few verſes, are now loſt, as well as parts of verſes in different places; and in which there have been ſome raſures and inſertions, as Grabe allows. If, as Grabe ſtates it, that manuſcript be the moſt reſpectable, which comes the neareſt to the Hexaplar copy, the Alexandrian manuſcript ſeems to claim that merit in preference to its rival. But if it be thought a matter of ſuperior honour, to come nearer the old Greek verſion, unaltered by Origen, that merit ſeems to belong to the *Vatican*. For farther particulars, ſee the Prolegomena of Walton, Grabe, Wetſtein, Mills, and Le Long, *ubi ſupra*.

VATICANÆ *pilulæ*, the name of an old form of medicine, intended as a purge. The recipe is in the old London Pharmacopœia; but the late ones have diſcarded it.

VATICINATION, *vaticinatio*, the act of propheſying, or divining. See DIVINATION, and PROPHECY.

VAVASOR, VALVASOR, VAVASOUR, or VALVASOUR, in our *Ancient Cuſtoms*, a diminutive of *vaſſel* or *vaſſour*; ſignifying a *vaſſal of a vaſſal*, or one who held a fee of another vaſſal.

Yet Camden, and others, hold *vavaſor* to be a dignity, next below that of a baron: he adds, that the word was formed of *vas ſortitum ad valetudinem*, a veſſel choſen for ſafety and health. Others derives it *à valvis, quaſi obligatus ſit adſtare ad valvas domini, vel indignus ſit eas intrare*; as being a perſon obliged to wait at his lord's door, or as unworthy to enter thereat; but this etymology is ridiculous enough.

Du-Cange diſtinguiſhes two ſorts of vaſſals under this denomination: the great, called *valvaſores*, who held of a king: ſuch were counts and barons.—And the *leſſer*, called *valvaſini*, who held of the former.

The *valvaſors* are mentioned by our ancient lawyers as *viri magnæ dignitatis*;; and ſir Edward Coke ſpeaks highly of them. But they are now quite out of uſe; and our legal antiquarians are not agreed upon even their original or ancient office.

VAVASORY, *vavaſoria*, the quality of the land, or fee held by a VAVASOR.

Quod dicitur de baronia non eſt obſervandum in vavaſoria, *vel aliis minoribus feodis qaam baronia, quia caput non habent ſicut baronia.* Bract. lib. ii. cap. 39.

There are *baſe vavaſories*, and *frank*, or *noble vavaſories*; according as it has pleaſed the lord to make his *vavaſor*. *Baſe vavaſories* are thoſe for which the lord of the fee owes ſummage, light-horſe, rents, or other ſervices.—*Free vavaſories* are ſuch as are exempt from theſe ſervices.

VAUDOIS, VALDENSES, or WALDENSES, in *Eccleſiaſtical Hiſtory*, a name given to a ſect of reformers, who made their firſt appearance about the year 1160.

Of all the ſects that aroſe in this century, none was more diſtinguiſhed by the reputation it acquired by the multitude of its votaries, and the teſtimony which its bittereſt enemies bore to the probity and innocence of its members, than that of the *Waldenſes*, ſo called, ſays Moſheim, from their parent and founder *Peter Waldus*. They were alſo called *Leoniſts*, from Leona, the ancient name of Lyons, where the ſect took its riſe. The more eminent perſons of that ſect manifeſted their progreſs towards perfection by the ſimplicity and meanneſs of their external appearance: hence, among other things, they wore wooden ſhoes, which in the French language are termed *ſabots*, and had imprinted upon theſe ſhoes the ſign of the croſs, to diſtinguiſh themſelves from other Chriſtians; and on theſe accounts they acquired the denomination of *Sabbatati* and *Inſabbatati*.

The origin of this famous act, according to Moſheim, was as follows: Peter, an opulent merchant of Lyons, ſurnamed Valdenſis, or Validiſius, from Vaux, or Waldum, a town in the marquiſate of Lyons, being extremely zealous for the advancement of true piety and Chriſtian knowledge, employed a certain prieſt, called Stephanus de Eviſa, about the year 1160, in tranſlating from Latin into French the four Goſpels, with other books of holy Scripture, and the moſt remarkable ſentences of the ancient doctors, which were ſo highly eſteemed in this century. But no ſooner had he peruſed theſe ſacred books with a proper degree of attention, than he perceived that the religion, which was now taught in the Roman church, differed totally from that which was originally inculcated by Chriſt and his apoſtles. Struck with this glaring contradiction between the doctrines of the pontiffs, and the truths of the Goſpel, and animated with zeal, he abandoned his mercantile vocation, diſtributed his riches among the poor (whence the *Waldenſes* were called *poor men of Lyons)*, and forming an aſſociation with other pious men, who had adopted his ſentiments and his turn of devotion, he began, in the year 1180, to aſſume the quality of a public teacher, and to inſtruct the multitude in the doctrines and precepts of Chriſtianity.

Beza, and other writers of note, who are followed by Dr. Macleane, the learned tranſlator of Moſheim's Hiſtory, give different accounts of the origin of the *Waldenſes*; alledging, that it ſeems evident from the beſt records, that *Valdus* derived his name from the true *Valdenſes* of Piedmont, whoſe doctrine he adopted, and who were known by the names of *Vaudois* and *Valdenſes*, before he or his immediate followers exiſted. If the *Valdenſes* or *Waldenſes* had derived their name from an eminent teacher, it would probably have been from *Valdo*, who was remarkable for the purity of his doctrine in the eleventh century, and was the cotemporary and chief counſellor of Berengarius. But the truth is, that they derive their name form their *vallies* in Piedmont, which in their language were called *vaux*, and hence *Vaudeis*, their true name: hence alſo Peter, or, as others call him, John of Lyons, was called in Latin *Valdus*, becauſe he had adopted their doctrine; and hence the term *Valdenſes* or *Waldenſes* uſed, by thoſe who write in Engliſh or Latin, in the place of *Vaudois*. The bloody inquiſitor, Reinerus Sacco, who exerted ſuch a furious zeal for the deſtruction of the *Waldenſes*, lived but eighty years after Valdus of Lyons, and muſt, therefore, be ſuppoſed to know whether or not he was the real founder of the *Valdenſes* or *Leoniſts*; and yet it is remarkable, that he ſpeaks of the *Leoniſts* as a ſect that had flouriſhed above five hundred years; and mentions authors of note to make their antiquity aſcend to the apoſtolic age. See the account given of Sacco's book by the jeſuit Gretſer, in the Bibliotheca Patrum. See alſo Leger's Hiſtoire Gen. des Egliſſes *Vaudoiſes*, cap. 2. 25, 26, 27.

But to return to the hiſtory of *Peter Valdus*. Soon after Peter had aſſumed the exerciſe of his miniſtry, the archbiſhop of Lyons, and the other rulers of the church in that province, vigorouſly oppoſed him. However, their oppoſition was unſucceſsful; for the purity and ſimplicity of that religion which theſe good men taught, the ſpotleſs innocence that ſhone forth in their lives and actions, and the noble contempt of riches and honours, which was conſpicuous in the whole of their conduct and converſation, appeared ſo engaging to all ſuch as had any ſenſe of true piety, that the number of their followers daily increaſed. They accordingly formed religious aſſemblies in France, and afterwards in Lombardy, from whence they propagated their ſect throughout the other provinces of Europe with incredible rapidity, and with ſuch invincible fortitude, that neither fire, nor ſword, nor the moſt cruel inventions of mercileſs proſecution, could damp their zeal, or entirely ruin their cauſe.

The attempts of *Peter Waldus*, and his followers, were neither employed nor deſigned to introduce new doctrines into the church, nor to propoſe new articles of faith to Chriſtians. All they aimed at was, to reduce the form of eccleſiaſtical government, and the manners both of the clergy and people, to that amiable ſimplicity, and primitive ſanctity, that characterized the apoſtolic ages, and which appear ſo ſtrongly recommended in the precepts and injunctions of the divine Author of our holy religion. In conſequence of this deſign, they complained, that the Roman church had degenerated, under Conſtantine the Great, from its primitive purity and ſanctity. They denied the ſupremacy of the Roman pontiff; and maintained, that the rulers and miniſters of the church were obliged, by their vocation, to imitate the poverty of the apoſtles, and to procure for themſelves a ſubſiſtence by the work of their hands. They conſidered every Chriſtian as, in a certain meaſure, qualified and authorized to inſtruct, exhort, and confirm the brethren in their Chriſtian courſe, and demanded the reſtoration of the ancient penitential diſcipline of the church, i. e. the expiation of tranſgreſſions by prayer, faſting, and alms, which the new-invented doctrine of indulgences had almoſt totally aboliſhed. They, at the ſame time, affirmed, that every pious Chriſtian was qualified and entitled to preſcribe to the penitent the kind or degree of ſatisfaction or expiation that their tranſgreſſions required; the confeſſion made to prieſts was by no means neceſſary, ſince the humble offender might acknowledge his ſins, and teſtify his repentance to any true believer, and might expect from ſuch the counſel and admonition which his caſe demanded. They maintained, that the power of delivering ſinners from the guilt and puniſhment of their offences belonged to God alone; and that indulgences, of conſequence, were the criminal inventions of ſordid avarice. They looked upon the prayers, and other ceremonies that were inſtituted in behalf of the dead, as vain, uſeleſs, and abſurd, and denied the exiſtence of departed ſouls in an intermediate ſtate of purification; affirming, that they were immediately, upon their ſeparation from the body, received into heaven, or thruſt down to hell. Theſe, and other tenets of a like nature, compoſed the ſyſtem of doctrine propagated by the *Waldenſes*. It is alſo ſaid, that ſeveral of the *Waldenſes* denied the obligation of infant-baptiſm, and that others rejected water-baptiſm entirely; but Wall has laboured to prove, that infant-baptiſm was generally practiſed among them. Hiſt. of Infant-Baptiſm, p. 387, &c.

Their rules of practice were extremely auſtere; for they adopted, as the model of their moral diſcipline, the ſermon of Chriſt in the mount, which they interpreted and explained in the moſt rigorous and literal manner, and, conſequently, prohibited and condemned in their ſociety all wars, and ſuits of law, and all attempts towards the acquiſition of wealth, the inflicting of capital puniſhments, ſelf-defence againſt unjuſt violence, and oaths of all kinds.

The government of the church was committed by the *Waldenſes* to biſhops, called alſo majorales or elders, preſbyters, and deacons; for they acknowledged, that theſe three eccleſiaſtical orders were inſtituted by Chriſt himſelf. But they thought it abſolutely neceſſary that theſe orders ſhould reſemble the apoſtles of Chriſt, and be like them, unlearned, poor, and furniſhed with ſome laborious trade or vocation, in order to gain by conſtant induſtry their daily ſubſiſtence; and indeed moſt of the *Waldenſes* gained their livelihood by weaving; whence in ſome places the whole ſect was called the *ſect of the weavers*. The laity were divided into two claſſes, viz. the perfect and the imperfect Chriſtians: the former diveſted themſelves of all worldly poſſeſſions, manifeſted in the wretchedneſs of their apparel, their extreme poverty, and emaciated their bodies by frequent faſting: the latter were leſs auſtere, and approached nearer to the method of living generally received, though they abſtained from all appearance of pomp and luxury.

The *Waldenſes* were not without inteſtine diviſions; for ſuch of them as lived in Italy differed conſiderably in opinion from thoſe who dwelt in France, and the other European nations. The former conſidered the church of Rome as the church of Chriſt, though much corrupted; they acknowledged, moreover, the validity of its ſeven ſacraments, and ſolemnly declared they would continue always in communion with it, provided that they might be allowed to live as they thought proper, without moleſtation or reſtraint. The latter affirmed, on the contrary, that the church of Rome had apoſtatized from Chriſt, was deprived of the holy ſpirit, and was, in reality, that whore of Babylon mentioned in the Revelations of St. John. They were alſo divided in their ſentiments concerning the poſſeſſion of worldly goods. In the fourteenth century the *Waldenſes*, though they were every where expoſed to the fury of the inquiſitors and monks, baffled all the attempts that were made to extirpate them. Many of them fled out of Italy, France, and Germany, into Bohemia, and other adjacent countries, where they afterwards aſſociated with the HUSSITES, and other ſeparatiſts, from the church of Rome. In the fifteenth century they ſubſiſted in ſeveral European provinces, more eſpecially in Pomerania, Brandenburg, the diſtrict of Magdeburg, and Thuringia, where they had a conſiderable number of friends and followers; though, it is ſaid, that many adherents of this ſect, in the countries now mentioned, were diſcovered by the inquiſitors, and delivered over by them to the civil magiſtrates, who committed them to the flames. After the Reformation, in the ſixteenth century, the deſcendants of the *Waldenſes*, who lived ſhut up in the vallies of Piedmont, were naturally led, by their ſituation in the neighbourhood of the French, and of the republic of Geneva, to embrace the doctrines and rites of the reformed church. So far down, however, as the year 1630, they retained a conſiderable part of their ancient diſcipline and tenets; but being much reduced by the plague in that year, and deprived of many of their clergy, they applied to the French churches for ſpiritual ſuccour; and the new teachers, ſent from thence, introduced ſeveral changes into the diſcipline and doctrine of the *Waldenſes*, and rendered them conformable, in every reſpect, to thoſe of the proteſtant churches in France. In this century they ſuffered much from the perſecution of Philibert Emanuel, duke of Savoy, who at the ſolicitation of the pope reſolved to force his ſubjects to return to the communion of the church of Rome; and in 1561 ſent a Dominican friar, as an inquiſitor, with forces to effect his purpoſe. After ineffectual ſupplications, they took up arms, and ſo far prevailed, after enduring very ſevere diſtreſs, as to obtain ſome degree of liberty and peace.

During the greateſt part of the ſeventeenth century, thoſe of them who lived in the vallies of Piedmont, and who had embraced the doctrine, diſcipline, and worſhip of the church of Geneva, were oppreſſed and perſecuted, in the moſt barbarous and inhuman manner, by the miniſters of Rome. This perſecution was carried on with peculiar marks of rage and enormity in the years 1655, 1656, and 1696, and ſeemed to portend nothing leſs than the total extinction of that unhappy nation. The moſt horrid ſcenes of violence and bloodſhed were exhibited in this theatre of papal tyranny; and the few *Waldenſes* that ſurvived, were indebted for their exiſtence and ſupport to the interceſſion made for them by the Engliſh and Dutch governments, and alſo by the Swiſs cantons, who ſolicited the clemency of the duke of Savoy in their behalf. Moſheim's Eccl. Hiſt. vol. ii. p. 450, &c. vol. iii. p. 190. 272. vol. iv. p. 104. p. 488. Eng. ed. 8vo. Dupin's Eccl. Hiſt. of the Sixteenth Century, vol. ii. p. 414.

VAULT, *fornix*, in *Architecture*, an arched roof, ſo contrived, as that the ſeveral ſtones whereof it conſiſts, do, by their diſpoſition, ſuſtain each other.

Vaults are to be preferred, on many occaſions, to ſoffits, or flat cielings, as they give a greater riſe and elevation; and, beſides, are more firm and durable.

The ancients, Salmaſius obſerves, had only three kinds of *vaults*: the firſt, the *fornix*, made cradle-wiſe; the ſecond, the *teſtudo*, tortoiſe-wiſe, called by the French *cul de four*, or oven-wiſe; the third, the *concha*, made ſhell-wiſe.

But the moderns ſubdivide theſe three ſorts into a great many more, to which they give different names, according to their figures and uſe: ſome are *circular*, others *elliptical*, &c.

The ſweeps of ſome, again, are larger, and others leſs portions of a ſphere: all above hemiſpheres are called *high*, or *ſurmounted vaults*; all that are leſs than hemiſpheres, are *low*, or *ſurbaſed vaults*, &c.

In ſome, the height is greater than the diameter; in others, it is leſs: there are others, again, quite flat, only made with haunſes; others oven-like, or in form of a cul de four. &c. and others growing wider, as they lengthen, like a trumpet.

Of *vaults*, ſome are *ſingle*, others *double*, *croſs*, *diagonal*, *horizontal*, *aſcending*, *deſcending*, *angular*, *oblique*, *pendent*, &c. There are likewiſe *Gothic vaults*, with *pendentives*, &c.

Vaults, *maſter*, are thoſe which cover the principal parts of buildings; in contradiſtinction to the *leſs*, or ſubordinate *vaults*, which only cover ſome little part; as a paſſage, a gate, &c.

Vault, *double*, is ſuch a one as, being built over another, to make the exterior decoration range with the interior, leaves a ſpace between the convexity of the one, and the concavity of the other: as in the dome of St. Paul's at London, and that of St. Peter's at Rome.

Vaults *with compartiments*, are ſuch whoſe ſweep, or inner face, is enriched with pannels of ſculpture, ſeparated by platbands: theſe compartiments, which are of different figures, according to the *vaults*, and are uſually gilt on a white ground, are made with ſtucco, on brick *vaults*; as in the church of St. Peter's at Rome; and with plaſter, on timber *vaults*.

Vaults, *theory of*. A ſemicircular arch, or *vault*; ſtanding on two piedroits, or impoſts, and all the ſtones that compoſe it, being cut and placed in ſuch manner as that their joints, or beds, being prolonged, do all meet in the centre of the *vault*; it is evident, all the ſtones muſt be in form of wedges, i. e. they muſt be wider and bigger at top than at bottom; by virtue of which they ſuſtain each other, and mutually oppoſe the effort of their weight, which determines them to fall.

The ſtone in the middle of the *vault*, which is perpendicular to the horizon, and is called the *key of the vault*, is ſuſtained on each ſide by the two contiguous ſtones, juſt as by two inclined planes; and of conſequence, the effort it makes to fall, is not equal to its weight.

But ſtill, that effort is greater, as the inclined planes are leſs inclined; ſo that, if they were infinitely little inclined, i. e. if they were perpendicular to the horizon, as well as the key, it would tend to fall with its whole weight, and would actually fall, but for the mortar.

The ſecond ſtone, which is on the right or left of the key-ſtone, is ſuſtained by a third; which, by virtue of the figure of the *vault*, is neceſſarily more inclined to the ſecond, than the ſecond is to the firſt; and, of conſequence, the ſecond, in the effort it makes to fall, employs a leſs part of its weight than the firſt.

For the ſame reaſon, all the ſtones, reckoning from the key-ſtone, employ ſtill a leſs and leſs part of their weight to the laſt; which, reſting on an horizontal plane, employs no part of its weight; or, which is the ſame thing; makes no effort to fall; as being entirely ſupported by the impoſt.

Now, in *vaults*, a great point to be aimed at is, that all the ſeveral ſtones make an equal effort in order to fall: to effect this, it is viſible that as each (reckoning from the key to the impoſt) employs a ſtill leſs and leſs part of its whole weight; the firſt, for inſtance, only employing one half; the ſecond, one third; the third, one fourth, &c. there is no other way to make thoſe different parts equal, but by a proportionable augmentation of the whole; i. e. the ſecond ſtone muſt be heavier than the firſt; the third, than the ſecond, &c. to the laſt; which ſhould be vaſtly heavier.

M. de la Hire demonſtrates what that proportion is, in which the weights of the ſtones of a ſemicircular arch muſt be increaſed, to be in equilibrio, or to tend with equal forces to fall; which gives the firmeſt diſpoſition a *vault* can have.

Before him, the architects had no certain rule to conduct themſelves by; but did all at random. Reckoning the degrees of the quadrant of the circle from the key-ſtone to the impoſt; the extremity of each ſtone will take up ſo much the greater arch, as it is farther from the key.

M. de la Hire's rule is, to augment the weight of each ſtone above that of the key-ſtone, as much as the tangent of the arch of the ſtone exceeds the tangent of the arch of half the key. Now, the tangent of the laſt ſtone, of neceſſity, becomes infinite, and of conſequence its weight ſhould be ſo too; but as infinity has no place in practice, the rule amounts to this, that the laſt ſtones be loaded as much as poſſible, that they may the better reſiſt the effort which the vault makes to ſeparate them; which is called the *ſhoot*, or *drift of the vault*.

M. Parent has ſince determined the curve, or figure, which the extrados, or outſide of a *vault*, whoſe intrados, or inſide, is ſpherical, ought to have, that all the ſtones may be in equilibrio. See Arch.

Vault, *key of a*. See Key and Vouſſoir.

Vault, *reins*, or *fillings up of a*, are the ſides which ſuſtain it.

Vault, *pendentive of a*. See Pendentive.

Vault, *impoſt of a*, is the ſtone whereon the firſt vouſſoir, or arch-ſtone of the *vault*, is laid. See Imposts.

Vault, in the *Manege*. To *vault* a horſe-ſhoe, is to forge it hollow, for horſes that have high and round ſoles; to the end that the ſhoe, thus hollow or *vaulted*, may not bear upon the ſole that is higher than the hoof; but after all, this ſort of ſhoe ſpoils the feet; for the ſole being tenderer than the ſhoe, aſſumes the form of the ſhoe, and becomes every day rounder and rounder. In Mr. Solleyſel's Complete Horſeman, may be ſeen the true method of ſhoeing for high and round ſoles.

Vault, or **Volte**, in the *Manege*. See Volte.

Vault, *going to the*, a term uſed by ſportſmen for a hare's taking the ground like a coney, which ſhe ſometimes does.

VAUNING, in *Mineralogy*. See Van, Vanning-*ſhovel*, and Tin.

VAUNT, or **Vant**. See Van.

Vaunt-*Lay*, among *Hunters*, a ſetting of hounds, or beagles, in a readineſs where the chaſe is to paſs; and caſting them off before the reſt of the kennel come in.

VAYVODE, or **Vaivode**. See Waywode.

VAZABU, in the *Materia Medica*, a name by which ſome authors have called the *acorus Aſiaticus*, or Aſiatic ſweet flag.

UBIQUISTS, **Ubiquitaries**, or **Ubiquitarians**, formed from *ubique*, *every where*, in *Eccleſiaſtical Hiſtory*, a ſect of Lutherans, which roſe and ſpread itſelf in Germany; and whoſe diſtinguiſhing doctrine was, that the body of Jeſus Chriſt is every where, or in every place.

Brentius, one of the earlieſt reformers, is ſaid to have firſt broached this error, in 1560. Luther himſelf, in his controverſy with Zuinglius, had thrown out ſome unguarded expreſſions, that ſeemed to imply a belief of the omnipreſence of the body of Chriſt; but he became ſenſible afterwards, that this opinion was attended with great difficulties, and particularly that it ought not to be made uſe of as a proof of Chriſt's corporal preſence in the euchariſt. Luther. Oper. tom. viii. p. 375. ed. Jenenſ. However, after the death of Luther, this abſurd hypotheſis was renewed, and dreſſed up, in a ſpecious and plauſible form, by Brentius, Chemnitius, and Andræas, who maintained the communication of the properties of Chriſt's divinity to his human nature.

Melancthon declared againſt it; maintaining that it introduced, with the Eutychians, a kind of confuſion into the two natures of Jeſus Chriſt; and proteſted, that he would oppoſe it as long as he lived.

On the other hand, Andræas, Flacius Illyrius, Schmidelin, Oſiander, &c. eſpouſed Brentius's party; and aſſerted the body of Jeſus Chriſt to be every where.

The univerſities of Leipſic and Wirtemberg, and the generality of Proteſtants, ſet themſelves againſt this new hereſy, but in vain: the *Ubiquitarians* grew ſtronger and ſtronger. Six of their leaders, Andræas, Selneccer, Muſculus, Chemnitius, Chytræus, and Cornerus, having a meeting in 1576, in the monaſtery of Berg, they there compoſed a kind of credo, or formula of faith, called the *Form of* Concord; wherein the *ubiquity* was eſtabliſhed as an article.

Muſculus, one of theſe leaders, and the moſt zealous advocate of the *ubiquity*, expreſly maintains, that the aſcenſion of Chriſt into heaven was nothing more than a ceaſing to be viſible, and that it is not performed by any phyſical motion, or change of place: and in 1575 he publiſhed a book to prove that it is by no means neceſſary that the glorious body of Chriſt ſhould phyſically fill up any ſpace. And he declares in a ſermon, in 1564, that they who teach that Jeſus Chriſt died only as to his human nature, belong to the devil both body and ſoul; and that the true doctrine is, that he died both as to his human and divine nature. Hoſpin. Hiſtor. Sacram. part ii. p. 492. ad ann. 1561. Idem ibid. p. 553. ad ann. 1564. Idem ibid. p. 600. Bayle, art. *Muſculus*.

All the *Ubiquiſts*, however, are not agreed: ſome of them, and among the reſt the Swedes, hold that Jeſus Chriſt, even during his mortal life, was every where: others maintain, that it is only ſince his aſcenſion that his body is every where.

G. Hornius only allows Brentius the honour of being the firſt propagator of *ubiquitiſm*; its firſt inventor, according to him, was John of Weſtphalia, or Weſtphalus, a miniſter of Hamburg, in 1552.

But according to Hoſpinian, Weſtphalus oppoſed the opinion concerning the *ubiquity* advanced by Brentius and Schmidelin. Bayle, art. *Weſtphalus*.

UBIQUIST, in the *Univerſity of Paris*, is a term applied to ſuch doctors in theology, as are not reſtained to any particular houſe; either to that of Navarre, or Sorbonne.

The *Ubiquiſts* are called, ſimply, *doctors in theology*; whereas the others add, *of the houſe of Sorbonne*, or *Navarre*, &c. See SORBONNE.

UBIQUITY, *omnipreſence*; an attribute of the Godhead, whereby he is always intimately preſent to all things; gives the eſſe to all things; and knows, preſerves, and does all in all things.

For ſince God cannot be ſaid to exiſt in all places, as placed therein (becauſe, then, he would need ſomething to his exiſtence, viz. place; and would have extenſion, parts, &c.) he muſt be conceived to be every where, or in all things, as a firſt, univerſal, efficient cauſe, in all his effects.

He is preſent, therefore, to all his creatures, as a pure act, or an exerciſe of an active virtue, which knows, preſerves, governs, &c. every thing. Nor are even finite minds preſent otherwiſe than by operation. See GOD.

UBIQUITY *of the king*. See KING.

UBIRRE, in *Ichthyology*, a name given by ſome to the anguilla marina, or ſmall *ſea-*EEL.

UCKEWALLISTS, in *Eccleſiaſtical Hiſtory*, a ſect of rigid Anabaptiſts, ſo called after its founder *Uke Walles*, a native of Frieſland. This ſectary not only exhorted his followers to maintain the primitive and auſtere doctrine of Menno, but took it into his head to propagate, in connection with one John Leus, in 1637, a ſingular opinion concerning the ſalvation of Judas, and the reſt of Chriſt's murderers: alledging, that the period of time, which extended from the birth of Chriſt to the deſcent of the Holy Ghoſt, and was, as it were, the diſtinctive term that ſeparated the Jewiſh from the Chriſtian diſpenſation, was a time of profound ignorance, during which the Jews were deſtitute both of light and divine ſuccour; and that, conſeqently, the ſins and enormities, that were committed during this interval, were in a great meaſure excuſable, and could not merit the ſevereſt diſplays of the divine juſtice. This idle fiction met with no indulgence either from the Mennonites, who excluded its inventor from their communion, or from the magiſtrates of Groningen, who baniſhed him from the city. In Eaſt Frieſland he drew after him a conſiderable number of diſciples, whoſe deſcendants ſtill ſubſiſt in the neighbourhood of Groningen, Frieſland, and alſo in Lithuania and Pruſſia, and have their own religious aſſemblies, ſeparate from thoſe of the other MENNONITES. They re-baptize all who leave other Chriſtian churches to embrace their communion: they ſtudiouſly avoid every appearance of elegance or ornament; ſuffering their beards to grow to an uncommon length, and their hair to lie uncombed over their ſhoulders: their countenances are marked with melancholy; and their houſes only adapted to anſwer the demands of neceſſity. Their inſpectors or biſhops, whom they diſtinguiſh from the miniſters whoſe office is to teach, are choſen by an aſſembly compoſed of all the congregations of the ſect. The ceremony of waſhing the feet of ſtrangers is conſidered by them as a rite of divine inſtitution. They carefully avoid even the aſpect of learning and ſcience, and thus prevent all attempts to alter or modify their religious diſcipline. Moſheim. Ecc. Hiſt. vol. v. p. 48. 8vo.

UDDER, UBER, in *Comparative Anatomy*, that part of brutes wherein the milk is prepared; anſwering to the mammæ, or breaſts, in the human kind.

UDAL. See ODHAL.

UDNON, in *Botany*, the name by which Theophraſtus and Dioſcorides have called the truffle commonly uſed at table in their times: but we find that they were not acquainted with a better kind of truffle, which we cultivate at preſent.

This ſmooth reddiſh-coated truffle is common in Italy at this time, and is eſteemed of no value, and called the wild truffle: the ſort that is eaten there, and in all other parts of Europe, is the blackiſh and rough-coated kind. In Africa they have a yet finer kind than ours, it has a white coat, and is of the moſt delicious flavour. The Greeks were alſo acquainted with this, and denominated it Cyrenean, as they did almoſt all the things they had from Africa: they alſo gave it the name MISY.

UDO, in the *Materia Medica*, a name given by the Portugueſe to the lignum ALOES.

It ſeems only a corruption of the monoſyllable *ud*, by which the Arabian phyſicians have called that drug; and even this *ud* poſſibly was only a contraction of the orthography of the word *heud*; which ſeems to have been the original name of this drug among the Arabs.

VEADAR, in *Chronology*, the 13th month of the Jewiſh eccleſiaſtical year, anſwering commonly to our March; this month was intercalated, to prevent the beginning of *Niſan* from being removed to the end of February.

VECTIS, in *Mechanics*, one of the powers, more uſually called the LEVER.

VECTIS, *Heterodromus*. See HETERODROMUS.

VECTOR, in *Aſtronomy*, a line ſuppoſed to be drawn from any planet moving round a centre, or the focus of an ellipſis, to that centre, or focus.

This, by ſome writers of the new aſtronomy, is called *vector*, or RADIUS *vector*, becauſe it is that line by which the planet ſeems to be carried round its centre: and with which it deſcribes areas proportional to the times.

VEDAM. See VIEDAM.

VEDETTE, in the *Military Art*, a ſentinel on horſeback, detached from the main body of the army, to diſcover and give notice of the enemy's deſigns.

VEER, a *Sea-Term*, variouſly uſed.—*Veering out the rope*, denotes the letting it go by hand, or letting it run out of itſelf: thus, they ſay, *Veer more cable*; that is, let more run out.

VEER is alſo uſed in reference to the wind: for when it changes often, and ſuddenly, they ſay, *the wind veers*.—Or, the wind is ſaid to *veer* and *haul*, when it alters its direction, and becomes more or leſs *fair*: thus it is ſaid to *veer* aft, and to haul forward.

To **VEER** and *haul*, in *Sea-language*, is to pull a rope tight, by drawing it in and ſlackening it alternately, till the body to which it is applied requires an additional motion, like the increaſed vibration of a pendulum, ſo that the rope is ſtraitened to a greater tenſion with more facility and diſpatch. This method is particularly uſed in hauling the bow-lines. Falconer.

VEERING, in *Sea-Language*, denotes the operation by which a ſhip, in changing her courſe from one board to the other, turns her ſtern to windward. Hence it is uſed in oppoſition to TACKING, wherein the head is turned to the wind, and the ſtern to leeward. A ſhip, having made the neceſſary diſpoſitions to *veer*, bears away gradually before the wind, till it blows obliquely upon the oppoſite ſide, which was before to leeward; and as the ſtern neceſſarily yields to this impreſſion of the wind, aſſiſted by the force of the helm, and the action of the waves upon the ſame quarter, the ſide which was before to leeward ſoon becomes to windward. Since, by this movement, a ſhip loſes ground conſiderably more than by tacking, it is rarely practiſed except in caſes of neceſſity or delay; as, when the violence of the wind and ſea renders tacking impracticable; or when her courſe is ſlackened to wait for a pilot, or ſome other ſhip in company, &c.

When it becomes neceſſary to *veer* the ſhip, the ſails towards the ſtern are either furled or brailed up, and made to ſhiver in the wind; whilſt thoſe near the head are ſpread abroad, ſo as to collect the whole current of air which their ſurfaces can contain. Hence, while the whole force of the wind is exerted in the fore-part of the ſhip to turn her about, its effect is conſiderably diminiſhed, or altogether deſtroyed, on the ſurfaces of the after-ſails. The fore-part, accordingly, yields to the above impulſe, and is put in motion; and this movement, conſpiring with that of the wind, puſhes the ſhip about as much as is neceſſary to produce the effect required. When ſhe is turned ſo that the wind will act upon that quarter which was formerly to leeward, her circular motion will be accelerated by extending ſome of the ſails near the ſtern, as the mizen, and by placing thoſe at the prow more obliquely, which will wheel the veſſel round with her bow to the windward; in the ſame ſituation, with regard to the wind, as when cloſe-hauled or tacking. When the tempeſt is ſo violent as to prevent the uſe of ſails, the effort of the wind operates almoſt equally on the oppoſite ends of the ſhip, ſo that the maſts and yards ſituated at the head and ſtern counterbalance each other. The effect of the helm is alſo conſiderably diminiſhed, becauſe the head-way, which gives vigour to its operations, is at this time feeble and ineffectual. Hence it is neceſſary to deſtroy this equilibrium which ſubſiſts between the maſts and yards afore and abaft, and to throw the balance forward, in order for *veering*. This is accordingly performed by bracing the foremoſt yards acroſs the direction of the wind, and arranging thoſe on the main-maſt and mizen-maſt directly in the line of the wind. If this expedient proves unſucceſsful, and it is abſolutely neceſſary to *veer*, in order to ſave the ſhip from deſtruction, by overſetting or running aſhore, the mizen-maſt muſt be inſtantly cut away and even the main-maſt, if ſhe yet remains incapable of anſwering the helm by bearing away before the wind. Falconer.

Veering, in *Huſbandry*, a term borrowed of the ſailors, and uſed for the turning of two furrows toward each other, as they muſt do to begin a ridge; they therefore call the top of a ridge a *veering*; and they call the two furrows that are turned from each other at the bottom between two ridges, a *henting*, that is, an ending, becauſe it makes an end of plowing ridges.

VEGETABLE, Vegetabile, in *Phyſiology*, a term applied to all plants, conſidered as capable of growth, i. e to all natural bodies which have parts organical, formed for generation and accretion, but not ſenſation. See PLANT.

In *vegetables*, there is ſuppoſed to be a principal of life, commonly called the *vegetative* SOUL. See alſo VEGETATIVE.

The vaſcular ſtructure of *vegetables* is rendered very apparent by an experiment of Mr. Willughby. Cutting off ſome pretty big branches of birch, and making a ſort of baſon, or reſervoir, on the end thereof, with ſoft wax; upon filling this with water, and holding the branch upright, the water, in a few minutes, ſunk into the veſſels of the wood, and, running quite through the length, dropped out conſiderably faſt at the other end; continuing ſo to do as long as the water was poured on. The ſame ſucceeds in the ſycamore, walnut-tree, &c. though the flux here is not ſo copious. Phil. Tranſ. N° 70.

In a dietetical view, it is to be obſerved, that *greens* as well as fruit are but a flatulent diet, and therefore ought to be eaten with moderation in bilious diſorders. However, on account of their antiſeptic quality, they are eſteemed good for preventing putrid and contagious diſeaſes. Pringle, Obſerv. on the Diſeaſes of the Army, p. 210. 294.

Vegetables, ſays Mr. Henry Cavendiſh, ſeem to conſiſt almoſt entirely of fixed and phlogiſticated air, united to a large proportion of phlogiſton and ſome water; ſince by burning in the open air, in which their phlogiſton unites to the phlogiſticated part of the atmoſphere and forms water, they ſeem to be reduced almoſt entirely to water, and thoſe two kinds of air. As plants, that grow in water without earth, can receive nouriſhment only from the water and air, they muſt, therefore, in all probability abſorb their phlogiſton from the water. It is known alſo that plants growing in the dark do not thrive well, and grow in a very different manner from what they do when expoſed to the light. Mr. Cavendiſh apprehends that plants, when aſſiſted by the light, deprive part of the water ſucked up by their roots of its phlogiſton, and turn it into dephlogiſticated air, while the phlogiſton, which light enables them to abſorb from the water, unites to, and forms part of the ſubſtance of the plants. Phil. Tranſ. vol. lxxiv. part i. p. 147, &c.

Vegetables, according to the analyſes made of them by chemiſtry, are diſtinguiſhable into two grand tribes, the acid and the alkaline; the firſt affording a volatile acid, and the ſecond a volatile alkali, upon a dry diſtillation: thus guaiacum, cedar, box, cinnamon, cloves, ſorrel, mint, baum, &c. afford an acid; but garlick, leeks, onions, horſe-radiſh, ſcurvy-graſs, muſtard, &c. afford an alkali, which, when rectified, is hardly diſtinguiſhable from that of animal ſubſtances, ſo as nearly to reſemble the ſpirit and ſalt of hartſhorn.

For the analogy between the animal and *vegetable* world, ſee PLANTS, and VEGETATION *infra*.

There are ſecrets whereby the growth of *vegetables* is ſurpriſingly promoted. Mr. Boyle mentions a virtuoſo, who entertained his friends at the end of their meal with a ſallad of lettuces, which he ſowed in their preſence, immediately before they ſat down to table. For the preſervation of *vegetables*, ſee PRESERVATION of *Vegetables* and FLOWERS.

The chemiſts alſo furniſh us with an extraordinary ſort of what they call *vegetables*. See *Artificial* VEGETATION. The water uſed by many in this proceſs, the chemiſts call *flint-water*; the ſecret whereof has been communicated by Rhodocanaſſes, a Greek chemiſt.

Vegetable *acid*. See ACID, and VINEGAR.

Vegetable *aſhes*. See ASHES, *aſhes* of PLANTS, and POT-*aſhes*.

Vegetable *earth*. See EARTH.

Vegetable *fly*, in *Natural Hiſtory*, an inſect found in the iſland Dominica, and (excepting that it has no wings) reſembling the drone in ſize and colour. In the month of May this inſect buries itſelf in the earth, and begins to vegetate. By the latter end of July the tree is arrived at its full growth, and reſembles a coral branch; being about three inches high, and bearing ſeveral little pods, which dropping off become worms, and afterwards flies, like the Engliſh caterpillar. Dr. Hill, in his account of this production, to whoſe examination it was ſubmitted, obſerves, that the CICADA is common in Martinique, and in its nympha ſtate, in which the old authors called it TETTIGOMETRA, it buries itſelf under dead leaves to wait its change; but when the ſeaſon is unfavourable, many periſh: and that the ſeeds of the CLAVARIA *ſobolifera*, which is a fungus producing ſoboles or ſhoots from its ſides and growing in putrid animal bodies, find a proper bed on this dead inſect and grow. This, he ſays, is the fact; though the untaught inhabitants ſuppoſe a fly to vegetate, and though there exiſts a Spaniſh drawing of the plant's growing into a trifoliate-tree; and it has been figured with the creature flying with this tree upon its back. Phil. Tranſ. vol. liii. p. 270, &c.

Vegetable *oil*. See OIL.

Vegetable *ſalt*. In the Philoſophical Tranſactions we have ſome very curious proceſſes and obſervations, by Redi, on the ſubject of the ſalt of *vegetables*. Burn any wood, herb, fruit, or flower to aſhes; make a ley with theſe aſhes with common water, not heated; filtre this through paper till it is clear as rock-water; then evaporate this ley to a proper degree in a balneum Mariæ, in a glaſs veſſel. This degree of evaporation muſt be carefully obſerved, according as the congelation of the ſalt is intended to be haſtened or retarded. In the common way of evaporating lixiviums of this kind in earthen veſſels over a naked fire, a great quantity of the ſalt is always loſt; part of this is carried off with the vapours raiſed too haſtily in this manner, and part penetrates the ſides and bottom of the veſſel, though it be ever ſo well glazed. The quantity of water neceſſary, is, in moſt caſes, about five pints to two pounds weight of the aſhes. After all the ſalt that can be got is extracted by this operation, the aſhes, being calcined again in a kiln, will afford more ſalt of the ſame kind, but in a much ſmaller quantity.

Though the lixivial ſalt of every plant thus treated hath its own peculiar figure, when diſſolved, and regularly ſhot again; yet, as in the ſea-ſalt, and ſome other natural ſalts, there appear, on cryſtallization, maſſes of different figures, ſo in ſome of theſe the ſame ſalt will have two or three different figures, all peculiar however to itſelf.

Beſides the diverſity of figures in many of the kinds of ſalts, there is one kind of cryſtals which run through the ſalt of almoſt all the kinds, in a greater or leſſer proportion: theſe are certain cubic grains or cryſtals. It is probable, that theſe are cryſtals of ſea-ſalt, which is a ſalt found mixed among many others, and is naturally of this cubic figure in its firſt or ſimple concretions. It ſeems alſo a general rule, that the different parts of the ſame plant form cryſtals of a different figure; for the leaves of laurel form cryſtals very differently ſhaped from thoſe procured from the wood of the ſame tree; and the figure of the cryſtals in the ſalt of the pulp of a gourd are very different from thoſe of the ſalts made from the rind of the ſame fruit. See *Tab of Microſcopical Objects, Claſs* 3.

Many ſalts, made from different ſubſtances, have either abſolutely the ſame or very ſimilar figures in their cryſtals.

In order to obtain theſe ſeveral cryſtals of the lixivial ſalts, determinate and exact in their figures, and not mixing one with another, it is neceſſary to uſe great caution in the evaporating of the ley.

Nothing but practice and experience can dictate when to ſtop the evaporation; but when this has been learned, the veſſel is to be taken out of the balneum Mariæ, and the clear liquor is to be poured out of it into ſeveral ſmall vials. Theſe are to be ſtopped to keep out duſt and moiſture; and, after a time, the ſalts will congeal into cryſtals, which will be fixed to the ſides and bottoms of the vials, in the true and proper ſhapes, and in the likeneſs of rock-cryſtal, as to brightneſs and tranſparency.

Different plants and trees yield aſhes, which are impregnated in a different degree with ſalts. The ſame plants, at different ſeaſons of the year, contain alſo different quantities; and all theſe varieties make it neceſſary to attend carefully to the time of ſtopping the evaporation.

It was obſerved, that all theſe ſalts, thus cryſtallized, had a purging virtue, from whatever plant they were made; and the ſalt drawn from pomgranate peels, or other aſtringents, is as ſtrongly purgative as that from the moſt purgative drugs. The doſe, in which theſe ſalts are to be taken, is from half an ounce to an ounce, diſſolved in warm water; and it is all the ſame thing what *vegetable* they are made from; the ſharp-pointed cryſtals and the blunt ones having the ſame degree of virtue. Garlick, and the like ſhop *vegetables*, yield no ſalt at all of this kind,

kind. Phil. Tranſ. Nº 245. p. 296. See *Fixed* SALTS, *Lixivious* SALTS, and *Soluble* TARTAR.

VEGETABLES, *muſcles of*. See MUSCLE.

VEGETATION, VEGETATIO, the act whereby plants and other living bodies, receive nouriſhment, and grow. Plants, we learn from the microſcope, conſiſt of different parts, veſſels, &c. analogous to thoſe of animals: and each kind of veſſel is ſuppoſed to be the vehicle of a different humour, or juice, ſecreted from the maſs of ſap; which is conſidered as the blood, or common fund of them all.

Dr. Grew aſſigns the offices of the ſeveral veſſels: thoſe placed on the inner verge of the bark, he calls *lympheducts*, and ſuppoſes them deſtined for the conveyance of the moſt aqueous or watery liquor: theſe Mr. Bradley calls the *new forming veſſels*, which are annually produced, and help to increaſe the bulk of the tree.

Thoſe in the middle of the bark, Dr. Grew calls *lactiferous*, or *reſiniferous* veſſels; their uſe, according to Bradley, is to return the ſuperfluous ſap: theſe veſſels, Grew obſerves, are the principal viſcera of plants; and adds, that as the viſcera of animals are but ſuch veſſels conglomerated, ſo the veſſels of a plant are viſcera drawn out at length.

The proceſs of nature in the *vegetation* of plants is very accurately delivered by the excellent Malpighi, and others, to the effect following.

The ſeed of the plant, after it has dropt from the ovarium, called the pod or huſk, may be conſidered as an impregnated ovum, within which the embryo plant is ſecurely lodged. In a few days after it has been committed to the earth, we may diſcern the rudiments of the future plant. Every part appears to exiſt in miniature. The nutritive juices of the ſoil inſinuate themſelves between the original particles of the plant, and bring about an extenſion of its parts; and this is called the growth of the vegetable body; with regard to this increaſe by addition and extenſion, there ſeems to be a great analogy between the animal and vegetable kingdoms. Every one knows that animals, inſtead of being ſtrengthened, are enfeebled by a ſupply of improper nouriſhment. This caſe is the ſame with regard to vegetables; but with this difference, that animals refuſe whatever is improper. While vegetables, from their paſſive nature, muſt be content with what we give them. The impregnated ovum of every animal, after it has paſſed down the Fallopian tube, and fixed itſelf to the bottom of the uterus, is found to contain the tender embryo within two membranes called chorion and amnion. In this ſituation the embryo could not long ſubſiſt without a ſupply of nouriſhment. Nature has, therefore, beſtowed upon it a placenta and umbilical chord, through which the blood and juices of the mother are tranſmitted, for its preſervation and increaſe. Seeds are diſpoſed by providence nearly in the ſame manner: they have two coverings, anſwering to the chorion and amnion, and two lobes, which perform the office of the placenta. Theſe lobes conſtitute the body of the ſeed, and, in the farinaceous kinds, they are the flower of the grain. Innumerable ſmall veſſels run through the ſubſtance of the lobes, which, uniting as they approach the ſeminal plant, form a ſmall chord to be inſerted into the body of the grain. Through this the nutriment ſupplied by the placenta or lobes is conveyed for the preſervation and increaſe of the embryo plant. Here it may be obſerved, that the lobes of farinaceous grains are fixed in the earth; they are, therefore, improperly termed SEMINAL *leaves*, being rather the placenta or cotyledons of the plant. On the contrary, vegetables that have an oily ſeed, as rape, hemp, line, and turnip, carry their lobes upward, and ſpread them upon the ſurface in the form of broad leaves. Theſe, though they perform the office of a placenta, are properly ſeminal leaves. See SEED.

To illuſtrate the ſubject of *vegetation*, let us take a view of what happens to a bean, after it has been committed to the earth. In a few days, ſooner or later, according to the temperature of the weather and diſpoſition of the ſoil, the external coverings open at one end, and diſcloſe to the naked eye part of the placenta or body of the grain. This ſubſtance conſiſts of two lobes, between which the ſeminal plant is ſecurely lodged. Soon after the opening of the membranes, a ſharp-pointed body appears, which is the root. By a kind of principle which ſeems to bear ſome appearance of inſtinct, it ſeeks a paſſage downward, and fixes itſelf into the ſoil. At this period the root is a ſmooth and poliſhed body, and has, perhaps, but little power to abſorb any thing from the earth, for the nutriment of the germ. The two lobes now begin to ſeparate, and the germ, with its leaves, may be plainly diſcovered. As the germ increaſes in ſize, the lobes are farther ſeparated, and the tender leaves, being cloſely joined, puſh themſelves forward in the form of a wedge. Theſe leaves take a contrary direction to the root. They ſeek a paſſage upward, which having obtained, they lay aſide their wedge-like form, and ſpread themſelves in an horizontal direction, as being the beſt adapted for receiving the rains and dew. The radicle, every hour increaſing in ſize and vigour, puſhes itſelf deeper into the earth, from which it now draws ſome nutritive particles. At the ſame time the leaves of the germ, being of a ſucculent nature, aſſiſt the plant, by attracting from the atmoſphere ſuch particles as the tender veſſels are fit to convey. Theſe particles, however, are of a watery kind, and have not in their own nature a ſufficiency of nutriment for the increaſing plant. Vegetables, as well as animals, during their tender ſtate, require a large ſhare of balmy nouriſhment. As ſoon as an animal is brought into life, the milk of its mother is ſupplied in a liberal ſtream, while the tender germ ſeems only to have the crude and watery juices of the earth for its ſupport. This, however, is not the caſe: for the vegetable lives upon a ſimilar fluid, though differently ſupplied. For its uſe the farinaceous lobes are melted down into a milky juice, which, as long as it laſts, is conveyed to the tender plant by means of innumerable ſmall veſſels, which are ſpread through the ſubſtance of the lobes. Theſe veſſels uniting into one common trunk, enter the body of the germ, and perform the office of an umbilical chord. Without this ſupply of balmy liquor, the plant muſt inevitably have periſhed, its roots being then too ſmall to abſorb a ſufficiency of food, and its body too weak to aſſimilate it into nouriſhment.

Turnips, and all the tribe of braſſicas, in oppoſition to the leguminous and farinaceous plants, ſpread their ſeminal leaves upon the ſurface: theſe leaves contain all the oil of the ſeed, which, when diluted by the moiſture of the atmoſphere, forms an emulſion of the moſt nouriſhing quality; and on account of its ſweetneſs, the ſeminal leaves are greedily devoured by the fly. A grain of wheat, as ſoon as the germ has made its appearance, ſhews the milky liquor to the naked eye; but the umbilical chord, with its ramifications, can only be diſcovered by the aſſiſtance of the niceſt glaſſes. As the plant increaſes in ſize, the balmy juice diminiſhes, till at laſt it is quite exhauſted. The umbilical chord then dries up, and the external covering of the grain appears connected with the root in the form of a ſhrivelled bag. In the proceſs of *vegetation*, there is no mortality; from the moment that the ſeed is lodged in its parent earth, the vegetative ſoul begins its operations, and in the whole ſucceſſive gradation of them illuſtrates the wiſdom, power, and bounty of providence. It is worthy of obſervation, that farinaceous vegetables and oviparous animals are nouriſhed in their tender ſtate, nearly in the ſame manner. The embryo plant is ſupported by the farina melted down into a milky liquor, and conveyed into its body by means of an umbilical chord, at a time when the radicle was unable to ſupply a ſufficiency of nutriment. An oviparous animal, from the time that it is brought into light, ſeems to receive all its nouriſhment from without; but this is only in appearance. The yolk of the egg, remaining entire during incubation, is received into the body of the animal, and in a manner ſimilar to the paſſage of the milky juice of the vegetable, is ſlowly conveyed into the veſſels of the tender chick: and thus a ſweet nouriſhment is prepared at a time when neither the induſtry of the animal, nor the attention of its mother, could have procured a ſufficient ſupply. Evelyn's Sylva, by Dr. Hunter, p. 33, &c. note. Hales's Statics, vol. i. and Miller's Gard. Dict. art. *Vegetation*.

For other circumſtances of *vegetation*, ſee PLANTS; under which article their nature, anatomy, œconomy, generation, nutrition, perſpiration, &c. are particularly illuſtrated. See alſo PARALLELISM, PERPENDICULARITY, PLUME, RADICLE, SEED, &c.

VEGETATION, *artificial*. Many of the proceſſes and operations in chemiſtry afford productions, whether of ſalts or metals, or of whatever other ſubſtance, which very much reſemble plants of one kind or other, whence they have been called *metallic vegetation*. But though many have been hence induced to believe, that theſe productions were formed in the manner of vegetables, there is not the leaſt ground for ſuch an opinion from reaſon or experiment.

Mr. Homberg, who has treated very accurately of the ſeveral kinds of theſe *chemical vegetations*, divides them into three different claſſes.

Thoſe of the firſt claſs are ſuch as conſiſt of a pure maſſy metal, without the mixture of any foreign matter whatever. Thoſe of the ſecond claſs are compoſed of a diſſolved metal, which, though it has concreted afterwards, yet retains a part of the menſtruum in it: and the third claſs contains thoſe which have no metal in them, but are merely compoſed of ſalts, oils, or earths, or of combinations of theſe.

All the productions of the firſt kind are made without the admixture of any liquor, and are merely owing to the force of fire. Theſe are of a firm and ſolid texture, and may be taken out of the veſſels in which they were made, without danger of breaking them. On the other hand, the *vegetations* of the ſecond kind are all formed in a fluid, and are all ſo brittle, that they are not to be touched without breaking. Of the third kind, ſome are formed or will ſubſiſt at leaſt, in the dry air; others are very tender, and are formed only in fluids, the very ſtirring about of which deſtroys them. See ARBOR.

VEGETATION *of ſalts*, a name given by Mr. Petit, of the academy of Paris, to the concretions which ſalts form, after ſolution in water, when ſet in the air to evaporate.

Theſe concretions always appear round the ſurface of the liquor, affixed to the ſides of the veſſel, or ariſing above its top, and are very different in the different ſalts, and in moſt of them very beautiful.

One of the moſt ready and moſt beautiful of all the ſaline *vegetations* is that formed by a ſolution of the ſalts in the caput mortuum of aqua-fortis, with common water. If a pint of water be put to half a pound of this caput mortuum, and the whole boiled together, that the ſalts may be diſſolved, and the liquor afterwards filtrated, and expoſed in an earthen veſſel, there will be formed, in about eight and forty hours, *vegetations* wholly like thoſe from the mixture of ſpirit of nitre and oil of tar, except that theſe from the caput mortuum are more ramified and more beautiful. When the ſolution is expoſed in a glaſs veſſel, they form themſelves on the ſurface into very beautiful figures of trees, ſhrubs, and buſhes; and this not only on the ſurface, but on both the inſide and outſide of the glaſs. Theſe can be compared to no known concretion, except to the *vegetations* of iron, deſcribed by Mr. Lemery; they differ indeed in nothing from theſe, but that the *vegetations* of the metal are of a browniſh colour, whereas thoſe of the ſalt are white.

This impregnation ſucceeds beſt in dry weather, for in a moiſt ſeaſon the *vegetations* form themſelves more ſlowly, and are much leſs beautiful. Glaſs veſſels are alſo eſſential to the *vegetations* being formed in their greateſt beauty; they are never nearly ſo beautiful in earthen ones; and even in the former the *vegetations* ſucceed much better in ſome ſort of glaſs, than in others. The caput mortuum of aqua-fortis alſo is very different, from the different diſtillations; and all of it does not ſucceed alike in this *vegetation* of the ſalt. That which looks lighteſt, and of the reddeſt colour, ſeems the beſt for this purpoſe. An impregnation of this caput mortuum in red-wine produces no *vegetations*, but only forms a cruſt with ſmall eminences on the ſides of the veſſel; and ſalt-petre, diſſolved in the impregnation of this caput mortuum in water, produces a much more beautiful *vegetation* than that of ſalt-petre alone; but at the ſame time much leſs beautiful than that of the impregnation alone. Salt water, diſſolved in the ſame impregnation, ſometimes will produce beautiful *vegetations*, but ſometimes only a rough cruſt. Common rough ſalt-petre forms no *vegetations*, but only cruſts over the veſſel; as is the caſe with the ſolutions of many of the metals in different acid menſtruums. And the ſame is the caſe in ergard to many ſalts from which it might be natural to expect concretions of this kind. Memoirs Acad. Par. 1722.

VEGETATIVE, VEGETATIVUS, a term applied to that principle, or part, in plants, by virtue whereof they receive nouriſhment, and grow, or vegetate.

The philoſophers ſpeak of three kinds of ſouls, the *vegetative*, *ſenſible*, and *rational*. See SOUL.

The *vegetative* ſoul is that principle whereby trees and plants live, grow, and produce their kinds.

This *vegetative* principle is differently ſeated, in different plants: an ingenious author obſerves, that, generally ſpeaking, its place is exactly between the trunk and root; at leaſt this appears to be the place in moſt of the annual tribe; which, if cut down near this place, rarely ſhoot again.

In other vegetables, as the elm, and many edible plants, it ſeems to reſide wholly in the roots; which, if cut into ever ſo many parts, yet thoſe being planted in the ground, ſoon grow.

In others, as the willow-kinds, it ſeems to be diffuſed all over the root, trunk, and branches; inſomuch that, if cut into a thouſand pieces, there is no deſtroying them without ſplitting them in the middle; and ſcarcely then.

Laſtly, in others as the cereuſes, ficuſes, &c. it is ſeated in the body, branches, and leaves; any of which, being put into the ground, ſtrike root immediately, and grow.

The office of this *vegetative* principle is to concoct the nutritive matter which is imbibed by the roots and flowers, and to aſſimilate it to the nature of the plant. See *Food of* PLANTS.

VEGETO-*mineral water* of Goulard, in *Medicine*. See *Water of* LEAD.

VEGI, or UGI, the names given by the Arabian phyſicians to the acorus. Theſe writers ſeem not to have been acquainted with the plant itſelf in its growing ſtate. but only to have known that part of it which was uſed in medicine in their time; but the Greeks deſcribed the plant in ſome ſort.

VEHICLE, VEHICULUM, in *its literal ſenſe*, ſignifies ſomewhat that carries, or bears a thing along. See CARRIAGE, WAGGON, WHEEL, &c.

Thus, in *Anatomy*, the ſerum is ſaid to be the *vehicle* that conveys the globules of the blood.

In *Pharmacy*, any liquid ſerving to dilute another with, or to adminiſter it in, more agreeable to a patient, is called a *vehicle*.

In *Painting*, *vehicles* denote certain fluids, which are added to colours, in order to give them an unctuous conſiſtence while uſed, that they may be laid on and ſpread properly, adhere to the grounds on which they are laid, acquire a proper degree of tenacity when dry, and defend them from being injured by accidents. The principal *vehicles* hitherto uſed are oils, water, ſpirit of wine, and turpentine. But as water and ſpirit of wine want the unctuous conſiſtence neceſſary for ſpreading the colours, and dry away totally without leaving any glutinous ſubſtance to bind and fix ſuch of the pigments as are of an earthy or incohering texture; gums, ſize, ſugar, and other ſuch viſcid ſubſtances have been ſuperadded to ſupply their defects, and render them of a due conſiſtence and body.

VEIENTANA *gemma*, in *Natural Hiſtory*, the name of a gem deſcribed by Pliny, and ſaid to be found in Italy; he ſays it was black, but ſurrounded with a circle of white; it was probably a ſtone of the camea kind.

VEIL, VELUM, a piece of ſtuff, ſerving to hide, or prevent the ſight of any thing.

In this ſenſe, we read of a large *veil*, or curtain, in the temple of Jeruſalem, miraculouſly rent at the paſſion of our Saviour. In the Roman churches, in time of Lent, they have *veils* or curtains, over the altar, crucifix, images of the ſaints, &c.

VEIL is alſo uſed for a large piece of crape, worn on the head by nuns, as the badge of their profeſſion. Whence, to *take the veil*, ſignifies to commence religious.

The novices wear white *veils*; and thoſe who have made the vows, black ones.

The prelate, before whom the vows are made, bleſſes the *veil*, and gives it to the religious.

VEIN, VENA, in *Anatomy*, a name given ro ſeveral veſſels or canals, which receive the blood from the divers parts of the body, to which the arteries had conveyed it from the heart; and carry it back to the heart again. See *Tab. Anat.* (*Angeiol.*) *fig.* 6, 7.

The *veins* are only a continuation of the extreme capillary arteries, reflected back again towards the heart.

In their progreſs, uniting their channels as they approach the heart, they, at laſt, all form three large *veins*, or trunks, called by anatomiſts *vena cava*, *vena portæ*, and *vena pulmonaris*. The *vena cava* carries back to the right auricle of the heart the blood conveyed by the aorta to all the partsof the body, except what goes by the arteriæ coronariæ cordis. See CORONARY.

The *vena cava* goes out from the right auricle of the heart by two large ſeparate trunks, in a direction almoſt perpendicularly oppoſite to each other, one running upward called *vena cava ſuperior* or *deſcendens*, which is diſtributed chiefly to the thorax, head, and upper extremities, and but very little to the parts below the diaphragm, and which bring the blood back from all the parts above the heart: the other running downward called the *vena cava inferior*, or *aſcendens*, which is diſtributed chiefly to the abdomen and lower extremities, and but very little to the parts above the diaphragm, and which brings the blood from all the parts below the heart. See CAVA.

The trunks of each of theſe two veins ſends off a certain number of principal branches, which are afterwards ramified in different manners. Each trunk terminates by a bifurcation, or a diviſion into two ſubordinate trunks, each of which gives off other principal branches, ending in a great number of ſmall trunks, rami, and ramifications. The ſuperior *vena cava* runs up from the right auricle of the heart, almoſt in a direct courſe, for about two fingers breadth, lying within the pericardium, in the right ſide of the trunk of the aorta, but a little more anteriorly. As it goes out of the pericardium it is inclined a little to the left hand; and then runs up as high as the cartilage of the firſt true rib, and a little higher than the curvature of the aorta. Here it terminates by a bifurcation or diviſion into two large ſubordinate trunks, one of which runs towards the left hand, the other toward the right; and theſe branches are called *ſubclaviæ*. See SUBCLAVIAN.

The trunk of the *ſuperior cava*, from the pericardium to the bifurcation, ſends out anteriorly ſeveral ſmall branches, called the *vena mediaſtina*, *pericardia diaphragmatica ſuperior*, *thymica*, *mammaria interna*, and *trachealis*, which ſometimes ariſe ſeparately, and ſometimes by ſmall common trunks. Poſteriorly, a little above the pecardium, the trunk of the *ſuperior cava* ſends out a capital branch, called *vena* AZYGOS, which runs down on the right ſide of the bodies of the vertebræ dorſi, almoſt to the diaphragm; giving off the greateſt part of the *venæ intercoſtales* and *lumbares ſuperiores*.

The portion of the *vena cava inferior*, or *aſcendens*, contained in the pericardium, is very ſmall, being ſcarcely the twelfth part of an inch on the fore part, and not above a quarter of an inch on the back part. From thence it immediately perforates the diaphragm, to which it gives the *venæ diaphragmaticæ inferiores* or *phrenicæ*. It paſſes next behind the liver, through the great ſinus of that viſcus, to which it furniſhes ſeveral branches, termed *venæ hepaticæ*. In this courſe it inclines a little toward the ſpina dorſi and aorta inferior, the trunk and ramifications of which it afterwards accompanies in the abdomen, all the way to the os ſacrum; the arteria cœliaca, and the two meſentericæ only excepted. Thus the inferior *cava* ſends out on each ſide, in the ſame manner with the aorta, the *venæ adipoſæ*, *renales*, *ſpermaticæ*, *lumbares* and *ſacræ*. Having reached the os ſacrum, it loſes the name of *cava*, and terminating by a biſurcation, like that of the deſcending aorta, it forms the two *venæ iliacæ*. See ILIAC *Veſſels*.

The *vena portæ* receives the blood carried to the floating viſcera of the abdomen by the arteria cœliaca, and the two meſentericæ, and conveys it to the *vena hepatica*, and from thence to the *vena cava*. See PORTA.

The *vena pulmonaris* conveys to the pulmonary ſinus, or left auricle of the heart, the blood carried to the lungs by the arteria pulmonaris. See PULMONARY. See alſo HEART.

To theſe three *veins* two others might be added, viz. thoſe which belong particularly to the heart and to its auricles, and the ſinuſes of the dura mater. Winſlow's Anat. vol. ii. ſect. v.

The anaſtomoſis, or inoſculation of the *veins* and arteries, was firſt ſeen by the microſcope, in the feet, &c. of frogs, and other amphibious animals, by Leewenhoeck: but has ſince been obſerved in other animals, particularly the omentum of a cat, by Mr. Cowper, &c.

The coats of the *veins* are four, the ſame with thoſe of the arteries; only the muſcular coat is thin in all the *veins*, as it is in the capillary arteries; the preſſure of the blood againſt the ſides of the *veins* being leſs than that againſt the ſides of the arteries, becauſe the force of the heart is much broken in the capillaries. See *Tab. Anat.* (*Angeiol.*) *fig.* 7. *a. a. b. b. c. d.*

In the *veins* there is no natural pulſe, becauſe the blood is thrown into them with a continual ſtream, and becauſe it moves from a narrow channel to a wider. But they have a periſtaltic motion, which depends on their muſcular coat.

The *capillary veins* unite with one another, as has been ſaid of the capillary arteries; only their courſe is directly oppoſite to that of thoſe; for inſtead of a trunk diſtributed into branches and capillaries, a *vein* is a trunk, formed out of a concourſe of capillaries.

In all the *veins*, which are perpendicular to the horizon, excepting thoſe of the uterus, and the porta, there are ſmall membranes, or valves; ſometimes there is only one, ſometimes there are two and ſometimes three, placed together, like ſo many half-thimbles ſtuck to the ſides of the *veins*, with their mouths towards the heart. Theſe, in the motion of the blood towards the heart, are preſſed cloſe to the ſides of the *vein*; but ſhut the *veins*, againſt any reflux of the blood that way from the heart; and thereby they ſuſtain the weight thereof in the great trunks.

The *veins* are diſtinguiſhed, with reſpect to their ſituation, into *ſuperior*, and *inferior*; *aſcending*, and *deſcending*; *right*, as the meſenteric; and *left*, as the ſplenic branch; *internal*, as the baſilica: and *external*, as the humeral. Many of them, likewiſe, acquire denominations from the parts wherein they are found; as, *the jugulars*, *phrenitic*, *renal*, *iliac*, *hypogaſtric*, *epigaſtric*, *axillary*, *crural*, *umbilical*, *ſciatica*, *ſaphena*, *mediana*, *cephalic*, *thoracic*, *ſubclavian*, *intercoſtal*, *coronal*, *diaphragmatic*, *hæmorrhoidal*, *cervical*, *thymal*, *mammillary*, *gaſtric*, *ſtomachic*, *epiploic*, *ſplenic*, &c.

They are alſo diſtinguiſhed, from their particular offices, into *ſpermatic*, *emulgent*, &c. all which ſeem exhibited in *Tab. Anat.* (*Angeiol.*)—and their particular deſcriptions under their proper articles.

VEINS, *pulſations of the.* The pulſations of the arteries are well known; but though no ſuch motion be natural to the *veins*, yet there have not been wanting inſtances in which a morbid ſtate has been able to produce them. The pulſations of the arteries anſwer to the motion of the heart, that throws the blood into them; but when this fluid has once got into the *veins*, it uſually returns through them to the heart again in an uniform and equable motion; and this is not only the caſe in the human body, but alſo in other animals, whether they be in health or in ſickneſs. One of the inſtances in which the contrary has been obſerved, and where the *veins* have had a pulſation, is a caſe related by Mr. Homberg to the Paris Academy. The patient was a lady of about thirty-five years old, afflicted with a grievous aſthma, a pain in the head, a continual want of reſt, and terrible palpitations of the heart.

On opening her body after death, the heart was found of twice its natural dimenſions, its cavities very large, and its ſides very thin; and in each trunk of the arteries there was a fleſhy polypus fixed to their internal ſurface. That in the trunk of the aorta was found to be two feet long, and plainly of a fibrous fleſhy ſubſtance, for ſix or ſeven inches of its length; but from that downwards, it became only like clotted blood.

At the time that this lady was moſt violently afflicted with her aſthma, the veins of her arms and neck were plainly perceived to have a pulſation wholly like that of the arteries, and plainly followed the motion of the heart: ſhe had, in the latter time of her life, uſually two of theſe fits in four-and-twenty hours; and when they were over, the pulſations in the *veins* ceaſed. Mem. Acad. Par. 1704.

VEINS *of plants*, a term uſed by Dr. Liſter, to expreſs certain veſſels in plants, which are analogous to the *veins* of animals, and have been obſerved in ſome degree, by the naturaliſts of almoſt all ages, though differently deſcribed by authors. Pliny has deſcribed theſe parts of a plant under the name of *venæ* and *pulpæ*; and Dr. Grew calls them *fibres* and inſertments on the ligneous body, interwoven with that ſubſtance which he takes to be the cortical body, that is, the ſeveral diſtinctions of the grain. This author alſo calls them the pores of the ligneous body; but that they are not merely ſuch, may be plainly ſeen in cutting off a tranſverſe piece of the ſtalk of ſome large wild plant, as the great wild angelica, or the like. In the cut ſtalk of this plant, the *veins* every where ſhew themſelves to be diſtinct from fibres, obſervable in the parenchyma of the ſame cortical body with themſelves, the milky juice always riſing beſide the fibres, not in any fibre: alſo in a tranſverſe cut of the root of the common burdock; the like juice ſprings on both ſides of the ſeveral radii of the woody circle, that is, in the cortical body, and the pith only.

Again, where there is no pith, there is none of this juice to be obſerved, and conſequently none of theſe *veins*, as in the roots of plants, and trunks of trees, but even in the bark of either. The ſphondylium, the cicutaria, and many of the thiſtle kind, are inſtances of this. Dr. Grew deſcribes pores in the cortical body, and pith; but theſe veſſels are not of the number of the things deſigned by thoſe pores; theſe pores are extended by the breadth of the plant; but the pores of this juice are extended lengthwiſe. The pith of a dried fennel-ſtalk will ſhew theſe very beautifully, and with due care, they may be traced all along the whole length of that pith.

The primary uſe of theſe *veins* is certainly to carry the nutritious juice of plants; and this appears plainly in that where they are not, there is no vegetation, as is ſeen if an engrafted branch or arm is bared, or the clay ſtripped off; in this caſe, all the courſe of the vegetation will appear to have been made only by the bark, the wood having had no ſhare in it. The bark is the place where theſe *veins* lie, not the wood; and therefore, it is no wonder that the vegetation, if dependent on theſe *veins*, is carried on only where theſe *veins* are. The vegetable drugs of our ſhops are all of this nature, the juices contained in theſe *veins* being evidently what give them their virtue. Phil. Tranſ. N° 79.

VEIN is alſo applied to the ſtreaks, or waves, of divers colours, appearing on ſeveral ſorts of woods, ſtones, &c.

as if they were really painted; and which the painters frequently imitate in painting wainſcots, &c.

Marble is generally full of ſuch *veins*.

Lapis lazuli has *veins* like gold. Ovid, ſpeaking of the metamorphoſis of men into ſtones, ſays—*Quæ modo* vena *fuit, ſub eodem nomine manſit.*

Veins, in ſtones, are often a defect, proceeding uſually from an inequality in their conſiſtence, as to hard and ſoft: which makes the ſtone crack, and ſhiver in thoſe parts.

Vein is alſo applied, in the ſame ſenſe with *ſtratum*, to the various diſpoſitions and kinds of earth met with in digging. Thus, we ſay, a *vein* of ſand, another of rock, &c. A *vein* of ochre, vitriol, alum, calamine, coal, &c. Mineral waters acquire their different qualities, by paſſing through *veins* of vitriol, ſulphur, &c.

In the ſame ſenſe, we ſay, a *vein* of gold, ſilver, quickſilver, &c. meaning certain parts of the earth, wherein the ore or glebe of theſe metals is found; and which is diſtributed into divers branches, like the *veins* of the body. Tavernier gives a deſcription of the *veins* in the diamond-mines in Golconda, with the manner of digging them.

In digging of coal-pits, they meet with a variety of *veins*, the order, &c. of which is different, in different places: in the Philoſophical Tranſactions, Nº 360, the *veins* in thoſe famous coal-mines at Mendip, in Somerſetſhire, are obſerved to be (below the turf, or loam, or malm) a reddiſh fire-ſtone; the coal clives, which is blackiſh rock; the *ſtinking vein*, a hard coal for mechanic uſes; five feet below which is the *catſhead vein*, twenty-two feet thick, intermixed with lumps of ſtone; at a like diſtance below which is the *three-coal vein*, divided into three kinds of coal, and about three feet thick. The *veins* hitherto mentioned are frequently worked in the ſame pit. The next is the *peaw vein*, which is intermixed with cockle-ſhells, and fern-branches, uſually wrought in a ſeparate pit; though its depth below the *three-coal vein* be only about five feet, yet the cliff between is very hard, and liable to water: this *vein* is about a yard thick; and at the like diſtance below it is the *ſmith's coal vein:* beneath which is the *ſhelly vein*; and under that, a *vein* of ten inches, which is little worth, and ſeldom wrought. The ſame *veins* are found in a place ſeven or eight miles diſtant. All the *veins* lie obliquely, or ſhelving: the obliquity, or *pitch*, as they term it, is about twenty-two inches in a fathom; which, when it riſes to the land, is called *crop*, and in ſome places *baſſeting*.

In digging to the ſouth-weſt, they oft meet with ridges, which cauſe the *vein* to *trap up*; i. e. being cut off by the ridges, they find it over their heads, when they are through the ridge: on the contrary, working through a ridge to the north-eaſt, they ſay, it *traps down*, i. e. they find it under their feet.

Vein, among *Miners*, is that ſpace which is bounded with woughs, and contains ore, ſpar, canck, clay, chirt, croil, brown-hen, pitcher-chirt, cur, which the philoſophers call the mother of metals, and ſome times ſoil of all colours. When it bears ore, it is called a *quick vein*; when no ore, a *dead vein*. Houghton's Comp. Miner. in the Explan. of the Terms. See Mineralogy, and Training.

VEJOURS, or Viewers, Visores, in *Law*, are perſons ſent, by the court, to take a view of any place in queſtion, for the better deciſion of the right.

It is alſo uſed for thoſe ſent to view ſuch as eſſoin themſelves *de malo lecti*, whether, in truth, they be ſuch as that they cannot appear, or whether they counterfeit.

VELAMEN is uſed, by ſome *Surgeons*, for the bag, ſkin, or bladder, of an impoſthume, or ſwelling.

VELAMENTUM *bombycinum*, a name which ſome anatomiſts give to the velvet membrane, or inner ſkin of the inteſtines.

VELARIUS, in *Antiquity*, an officer in the court of the Roman emperors, being a kind of uſher, whoſe poſt was behind the curtain, *vela*, in the prince's apartment; as that of the chancellors, *cancelli*, was at the entry of the baluſtrade, and that of the *oſtiarii* at the door.

The *velarii* had a ſuperior, of the ſame denomination, who commanded them; as we find in two inſcriptions, quoted by Salmaſius in his notes on Vopiſcus, and, by a third in Gruter.

VELEZIA, in *Botany*, a genus of the *pentandria digynia* claſs. Its characters are theſe; the corolla is ſmall, and has five petals; the calyx is filiform, and divided into five points; the capſule is ſingle-celled, and the ſeeds are very numerous. There is one ſpecies.

VELITES, in the *Roman Army*, one of the four kinds of ſoldiers that compoſed their legions, who were armed lightly with a javelin, a caſque, cuiraſs, and ſhield.

Theſe were commonly young men of mean condition, and took their name *a volando*, or *a velocitate*, from their ſwiftneſs and expedition.

They ſeem not to have been divided into any diſtinct bodies or companies, but to have hovered in looſe order before the army.

The other claſſes of the Roman infantry were the *haſtati*; *principes*, and triarii. See Battle.

VELITIS, in the *Natural Hiſtory of the Ancients*, the name of a peculiar ſort of ſand uſed in the manufacture of glaſs; for which purpoſe they always choſe ſuch as was found waſhed clean on the banks of rivers; and this they therefore called glaſs-ſand, or *velitis*, or *hyalitis*.

VELLA, in *Botany*. See *Spaniſh* Cresses.

VELLEITY, Velleitas, in the *School Philoſophy*, is uſually defined a languid, cold, and remiſs will.

Others ſay, it implies an impotency of obtaining what we require. Others will have it, a ſlight deſire for ſomething, which a perſon does not eſteem much or is too indolent to ſeek; as *Catus amat piſcem, ſed non vult tangere lympham.*

VELLIA, in *Ornithology*, a name uſed by ſome authors for the *lanius minor*, or *lanius tertius* of Aldrovand, called in England the flusher.

VELLICATION, among *Phyſicians*, the act of twitching or ſtimulating. The word is more particularly applied to a ſort of ſudden convulſions that happen to the fibres of the muſcles.

VELLICULA, or Forficula. See Ear-*wig*.

VELLING, a term uſed by huſbandmen in the Weſt of England, for ploughing up by the turf.

VELLUM. See Velom.

VELOCE, in the *Italian Muſic*, is uſed for quick.

VELOCISSAMENTE, or Velocissimo, in the *Italian Muſic*, is uſed for very quick, or with great rapidity. It is ſeldom met with; *preſto*, or *preſtiſſimo*, being moſtly uſed in its ſtead.

VELOCITY, in *Mechanics*, *ſwiftneſs*; that affection of motion, whereby a moveable is diſpoſed to run over a certain ſpace in a certain time.

It is alſo called celerity, and is always proportional to the ſpace moved.

Huygens, Leibnitz, Bernouilli, Wolfius, and the foreign mathematicians, hold, that the momenta, or forces, of falling bodies, at the end of their falls, are as the ſquares of their *velocities* into the quantity of matter; the Engliſh mathematicians, on the contrary, maintain them to be as the *velocities* themſelves into the quantity of matter. See Motion.

Velocity is conceived either as *abſolute* or *relative:* the *velocity* we have hitherto conſidered, is *ſimple* or *abſolute*, with reſpect to a certain ſpace, moved in a certain time.

Relative, or *reſpective velocity*, is that wherewith two diſtant bodies approach each other, and come to meet in a longer or leſs time; whether only one of them moves towards the other at reſt, or whether they both move; which may happen two ways, either by two bodies naturally approaching each other in the ſame right line, or by two bodies moving the ſame way in the ſame line, only the foremoſt ſlower than the other; for, by this means, this will overtake that; and, as they come to meet, in a greater or leſs time, the *relative velocity* will be greater or leſs.

Thus, if two bodies come nearer each other by two feet in one ſecond of time, their reſpective *velocity* is double that of two others, which only approach one foot in the ſame time.

Velocity is alſo *uniform* or *equal*, when a moving body paſſes through equal ſpaces in equal times; or *unequal*, when in equal times it paſſes through unequal ſpaces; in which caſe it is either *accelerated* or *retarded*; and this acceleration, or retardation, may alſo be equal or unequal. See Acceleration and Motion.

In the doctrine of fluxions it is uſual to conſider the *velocity* with which magnitudes flow, or are generated. Thus the *velocity*, with which a line flows, is the ſame as that of the point, which is ſuppoſed to deſcribe or generate the line. The *velocity*, with which a ſurface flows, is the ſame as the *velocity* of a given right line, that, by moving parallel to itſelf, is ſuppoſed to generate a rectangle, always equal to the ſurface. The *velocity* with which a ſolid flows may be meaſured by the *velocity* of a given plain ſurface, that, by moving parallel to itſelf, is ſuppoſed to generate an erect priſm, or cylinder, always equal to the ſolid. The *velocity*, with which an angle flows, is meaſured by the *velocity* of a point, ſuppoſed to deſcribe the arc of a given circle, which ſubtends the angle, and meaſures it. See Macl. Fluxions, book i. chap. 1.

All theſe *velocities* are meaſured at any term of the time of the motion, by the ſpaces which would be deſcribed in a given point of time, by theſe points, lines, or ſurfaces, with their motions continued uniformly from that term.

The *velocity* with which a quantity flows at any term of the time, while it is ſuppoſed to be generated, is called its FLUXION.

VELOCITIES *of bodies moving in curves.* According to Galileo's ſyſtem of the fall of heavy bodies, which is now admitted by all philoſophers, the *velocities* of a body falling vertically are, each moment of its fall, as the roots of the heights from whence it has fallen; reckoning from the beginning thereof. Hence that author inferred, that if a body fall along an inclined plane, the *velocities* it has, at the different times, will be in the ſame ratio; for ſince its *velocity* is all owing to its fall, and it only falls as much as there is perpendicular height in the inclined plane, the *velocity* ſhould be meaſured by that height as if it were vertical. See *Inclined* PLANE.

The ſame principle, likewiſe, led him to conclude, that if a body fall through two contiguous inclined planes, making an angle between them, much like a ſtick when broken, the *velocity* would be regulated after the ſame manner, by the vertical height of the two planes taken together; for it is only this height that it falls; and from its fall it has all its *velocity*.

This concluſion was univerſally admitted till the year 1693, when M. Varignon demonſtrated it to be falſe. From his demonſtration it ſhould ſeem to follow, that the *velocities* of a body falling along the cavity of a curve, for inſtance, of a cycloid, ought not to be as the roots of the heights, ſince a curve is only a ſeries of an infinity of infinitely little contiguous planes, inclined towards one another; ſo that Galileo's propoſition would ſeem to fail in this caſe too; and yet it holds good, only with ſome reſtriction.

All this mixture of truth and error, ſo near akin to each other, ſhewed, that they had not got hold of the firſt principle; M. Varignon, therefore, undertook to clear what related to the *velocities* of falling bodies, and to ſet the whole matter in a new light. He ſtill ſuppoſes Galileo's firſt ſyſtem, that the *velocities*, at the different times of a vertical fall, are as the roots of the correſpondent heights. The great principle he makes uſe of to attain his end, is that of compound motion.

If a body fall along two contiguous inclined planes, making an obtuſe angle, or a kind of concavity between them; M. Varignon ſhews, from the compoſition of thoſe motions, that the body, as it meets the ſecond plane, loſes ſomewhat of its *velocity*, and of conſequence, that it is not the ſame at the end of the fall, as it would be, had it fell through the firſt plane prolonged; ſo that the proportion of the roots of the heights aſſerted by Galileo does not here obtain.

The reaſon of this loſs of *velocity* is, that the motion, which was parallel to the firſt plane, becomes oblique to the ſecond, ſince they make an angle: this motion, which is oblique to the ſecond plane, being conceived as compounded, that part perpendicular to the plane is loſt, by the oppoſition thereof, and part of the *velocity* along with it; conſequently, the leſs of the perpendicular there is in the oblique motion, or, which is the ſame thing, the leſs the two planes are from being one, i. e. the more obtuſe the angle is, the leſs *velocity* does the body loſe.

Now all the infinitely little, contiguous, inclined planes, whereof a curve conſiſts, making infinitely obtuſe angles among themſelves; a body falling along the concavity of a curve, the loſs of *velocity* it undergoes each inſtant is infinitely little; but a finite portion of any curve, how little ſoever, conſiſting of an infinity of infinitely little planes, a body moving through it loſes an infinite number of infinitely little parts of its *velocity*: and an infinity of infinitely little parts makes an infinity of a higher order, i. e. an infinity of infinitely little parts make a finite magnitude, if they be of the firſt order or kind, and an infinitely little quantity of the firſt order, if they be of the ſecond, and ſo in infinitum. Therefore if the loſſes of *velocity* of a body, falling along a curve, be of the firſt order; they will mount to a finite quantity in any finite part of the curve, &c.

The nature of every curve is abundantly determined by the ratio of the ordinates to the correſpondent portions of the axis; and the eſſence of curves in general may be conceived as conſiſting in this ratio, which is variable in a thouſand ways. Now this ſame ratio will be, likewiſe, that of two ſimple *velocities*, by whoſe concurrence a body will deſcribe any curve; and, of conſequence, the eſſence of all curves, in the general, is the ſame thing as the concourſe or combination of all the forces, which, taken two by two, may move the ſame body. Thus we have a moſt ſimple and general equation of all poſſible curves, and of all poſſible *velocities*.

By means of this equation, as ſoon as the two ſimple *velocities* of a body are known, the curve, reſulting from them, is immediately determined. It is obſervable that, according to this equation an uniform *velocity*, and a *velocity* that always varies according to the roots of the heights, produce a parabola, independent of the angle made by the two projectile forces that give the *velocities*; and, conſequently, a cannon-ball, ſhot either horizontally or obliquely to the horizon, muſt always deſcribe a parabola. The beſt mathematicians, hitherto, had laboured much to prove, that oblique projections formed parabolas as well as horizontal ones.

To have ſome meaſure of *velocity*, the ſpace is to be divided into as many equal parts as the time is conceived to be divided into; for the quantity of ſpace, correſponding to that diviſion of time, is the meaſure of the *velocity*.

For an inſtance; ſuppoſe the moveable A paſſes through a ſpace of 80 feet in 40 ſeconds of time: dividing 80 by 40, the quotient 2 ſhews the *velocity* of the moveable to be ſuch, as that it paſſes over an interval of two feet in one ſecond; the *velocity*, therefore, is rightly expreſſed by $\frac{80}{40}$; that is, by 2.

Suppoſe, again, another moveable B, which, in 30 ſeconds of time, travels 90 feet; the index of the celerity will be 3. Wherefore, ſince in each caſe the meaſure of the ſpace is a foot, which is ſuppoſed every where of the ſame length, and the meaſure of time a ſecond, which is conceived every where of the ſame duration; the indices of the *velocities* 2 and 3 are homogeneal, and therefore the *velocity* of A is to the *velocity* of B, as 2 to 3.

Hence, if the ſpace be $=s$, and the time $=t$, the *velocity* may be expreſſed by $\frac{s}{t}$; the ſpace being in a ratio of the time and the *velocity*. See MOTION.

VELOCITY, *Circular.* See CIRCULAR.

VELOCITY, *Initial*, in *Gunnery*, denotes the *velocity* with which military projectiles iſſue from the piece by which they are diſcharged. This is now known to be much more conſiderable than was formerly apprehended. For the method of eſtimating it, and the reſult of a variety of experiments by Mr. Robins, Dr. Hutton, &c. ſee GUN, GUNNERY, PROJECTILE, and RESISTANCE.

We ſhall here add, that Mr. Thompſon has lately publiſhed the reſult of a variety of experiments upon gunpowder, and alſo an account of a new method of determining the *velocities* of all kinds of military projectiles. From the equality of action and re-action it appears, ſays Mr. Thompſon, that the momentum of a gun muſt be preciſely equal to the momentum of its charge; or that the weight of the gun, multiplied into the *velocity* of its recoil, is juſt equal to the weight of the bullet and of the powder (or the elaſtic fluid that is generated from it) multiplied into their reſpective *velocities*: for every particle of matter, whether ſolid or fluid, that iſſues out of the mouth of a piece, muſt be impelled by the action of ſome power, which power muſt re-act with equal force againſt the bottom of the bore.

It is eaſy to determine the *velocity of the recoil* in any given caſe, by ſuſpending the gun in a horizontal poſition by two pendulous rods, and meaſuring the arc of its aſcent by means of a ribbon, according to the method which Mr. Thompſon has deſcribed, and this will give the momentum of the gun, its weight being known, and conſequently the momentum of its charge.

But in order to determine the *velocity* of the bullet from the *recoil*, it will be neceſſary to find how much the weight and *velocity* of the elaſtic fluid contribute to it. That part of the recoil which ariſes from the expanſion of this fluid is always very nearly the ſame, whether the powder is fired alone, or whether the charge is made to impel one or more bullets, as Mr. Thompſon has determined by various experiments.

If, therefore, a gun ſuſpended according to the method propoſed, is fired with any given charge of powder, but without any bullet or wad, and the recoil is obſerved, and if the ſame piece is afterwards fired with the ſame quantity of powder, and a bullet of a known weight, the exceſs of the *velocity* in the latter caſe above that in the former will be proportional to the *velocity* of the bullet; for the difference of theſe *velocities*, multiplied into the weight of the gun, will be equal to the weight of the bullet multiplied into its *velocity*.

Accordingly, if W is put for the weight of the gun, U for the *velocity* of its recoil, when it is fired with any given charge of power, without any bullet; V, for the *velocity* of the recoil when the ſame charge is made to impel a bullet; B, for the weight of the bullet, and v for its *velocity*, we ſhall have $v = \frac{\overline{V-U} \times W}{B}$. Let $B = 580$ grains, $W = 336000$ grains; and therefore, $B : W :: 580 : 336000$, i. e. $:: 1 : 579{,}31$ nearly, and $\overline{V-U}$

is found by experiment to be equal to 1,8522; and conſequently $v = 1,8522 \times 579,31 = 1073$ feet in a ſecond; which is very near 1083 feet in a ſecond, the mean of the *velocities* determined by the pendulum after the manner of Mr. Robins.

But the theorem will be rendered more ſimple by putting c for the chord of the recoil in Engliſh inches, when the piece is fired with powder only, and C for the chord when a bullet is diſcharged by the ſame charge; and then $C - c$ will be as $V - U$; and conſequently, as $\frac{V-U\times W}{B}$, which meaſures the *velocity* of the bullet, the ratio of W to B remaining the ſame.

Suppoſing, therefore, $C - c = 1$ inch, and the *velocity* of the bullet to be computed from that chord; the *velocity* in any other caſe, wherein $C - c$ is greater or leſs than one inch, will be found by multiplying the difference of the chords C and c by the *velocity* that anſwers to a difference of one inch. Or the *velocity* of the bullet, expreſſed in feet *per* ſecond, may in all caſes be found by multiplying the difference of the chords C and c by 118,35; the weight of the barrel, the length of the ſuſpending rods, and the weight of the bullet remaining the ſame, whatever be the charge of powder or its ſtrength.

According to this rule Mr. Thompſon has computed by ſeveral experiments the *velocities* of bullets from the recoil, and compared them with the *velocities* obtained by the pendulum. The reſult, making the neceſſary allowances for the difference in the concluſions ariſing from theſe two methods, leads Mr. Thompſon to infer, that there is the greateſt probability that the *velocities* of bullets may in all caſes be determined by the recoil with great accuracy; and if this method ſucceeds with muſquet-ballets, it may alſo be applied as well to cannon-balls and bomb-ſhells of the largeſt dimenſions: he apprehends alſo, that it will be much preferable to any other method hitherto known, not only as it may be applied indifferently to all kinds of military projectiles, with little trouble or expence, but alſo becauſe by this method the *velocities* with which bullets are actually projected are determined; whereas, by the pendulum, their *velocities* can only be aſcertained at ſome diſtance from the gun, after they have loſt a part of their *initial velocities* by the reſiſtance of the air through which they are obliged to paſs to arrive at the pendulum.

Thoſe who advert to what has been delivered under the article GUNNERY, will find that, according to Mr. Robins's theory, farther confirmed by Dr. Hutton's experiments, when bullets of the ſame diameter, but different weights, are diſcharged from the ſame piece by the ſame quantity of powder, their *velocities* ſhould be in the ſubduplicate ratio of their weights.

But this theory, ſays Mr. Thompſon, is founded upon a ſuppoſition, that the action of the elaſtic fluid, generated from the GUN-*powder*, is always the ſame in every given part of the bore when the charge is the ſame, whatever may be the weight of the bullet; and as no allowance is made for the expenditure of force required to put the fluid itſelf in motion, or for the loſs of it by the vent, he concludes that the theory is defective. And from a variety of experiments, made with a view of aſcertaining this point, he infers, that the ratio of the *velocities* of bullets to their weights is different from that which Mr. Robins's theory ſuppoſes; and from other experiments he finds, that the *velocities* computed, according to the reciprocal ſub-triplicate ratio of the weights, agree much better with the concluſions deduced from thoſe experiments than thoſe computed upon Mr. Robins's principles; though, in this mode of computation, the difference between the actual and computed *velocities* was in ſome of the experiments inconſiderable. But as the powder itſelf is heavy, it may be conſidered as a weight put in motion along with the bullet; and if the denſity of the generated fluid be ſuppoſed always uniform from the bullet to the breech, the *velocity* of the centre of gravity of the powder, or of the elaſtic fluid, and the groſs matter generated from it, will be juſt half as great as the *velocity* of the bullet; putting, therefore, P to denote the weight of the powder, B the weight of the bullet, and v its *initial velocity*; then $Bv + \frac{1}{2}Pv = \overline{B + \frac{1}{2}P} \times v$ will expreſs the momentum of the charge at the inſtant when the bullet quits the bore. Inſtead, therefore, of aſcertaining the relation of the *velocities* to the weights of the bullets, he propoſes to add half the weight of the powder to the weight of the bullet, and to compute the *velocities* from the reciprocal ſub-triplicate ratio of the quantity $\overline{B + \frac{1}{2}P}$: and the reſult of ſeveral experiments ſhews an agreement between the actual and computed *velocities* that is very remarkable.

We ſhall only add, that Mr. Thompſon diſputes the juſtneſs of Mr. Robins's concluſion with reſpect to the force of GUN-*powder*, which makes it 1000 times greater than the mean preſſure of the atmoſphere; whereas, from the reſult of one of his experiments, its force appears to be at leaſt 1308 times greater than the mean preſſure of the atmoſphere. Phil. Tranſ. vol. lxxi. part ii. p. 229—321.

VELOCITY, *Meaſure of*. See MEASURE.

VELOCITY of *Light*, *Sound*, *Wind*, &c. See LIGHT, SOUND, WIND, &c.

VELOM, or VELLUM, is a kind of PARCHMENT, that is finer, evener, and more white than the common parchment.

The word is formed from the French *velin*, of the Latin *vitulinus*, *belonging to a calf*. See ABORTIVE.

By 9 Ann. cap. 11. and 10 Ann. cap. 26, there is a duty for all *vellum* made in Great Britain of 3*s.* a dozen; and for all parchment made in Great Britain, 1*s.* 6*d.* a dozen.

Alſo by the ſame ſtatutes, and 4 W. cap. 5. additional duties are laid on *vellum* and parchment imported, over and above what they are charged with in the book of rates. See STAMP.

For regulations relating to makers of *vellum*, ſee TANNERS.

By 24 Geo. III. cap. 41. every maker of *vellum* or parchment ſhall take out a yearly licence at 1*l.*

VELVET, a rich kind of ſtuff, all ſilk, covered on the outſide with a cloſe, ſhort, fine, ſoft ſhag, the other ſide being very ſtrong and cloſe.

The word is formed of the French *velours*, which ſignifies the ſame, and which comes from *velu*, a thing covered with hair.

The knap or ſhag, called alſo the *velveting*, of this ſtuff, is formed of part of the threads of the warp, which the workman puts on a long narrow channelled ruler, or needle, or wire; and which he afterwards cuts, by drawing a ſharp ſteel tool along the channel of the needle to the ends of the warp.

The principal and beſt manufactories of *velvet* are in France and Italy, particularly at Venice, Milan, Florence, Genoa, and Lucca; there are others in Holland, ſet up by the French refugees, whereof that at Haerlem is the moſt conſiderable.

Velvets are now made to great perfection at Mancheſter and other parts of England.

There are ſome brought from China, but they are the worſt of all.

There are *velvets* of various kinds, as *plain*, that is, uniform and ſmooth, without either figures or ſtripes.

VELVET, *figured*, that is, adorned and worked with divers figures, though the ground be the ſame with the figures; that is, the whole ſurface *velveted*.

VELVET, *ramage*, or *branched*, repreſenting long ſtalks, branches, &c. on a ſattin ground, which is ſometimes of the ſame colour with the *velvet*, but more uſually of a different one. Sometimes, inſtead of ſattin, they make the ground of gold and ſilver, whence the denominations of *velvets with gold grounds*, &c.

VELVET, *uncut*, is that wherein the threads, that make the *velveting*, have been ranged over the channelled ruler, or wire, but not cut there.

VELVET, *ſtriped*, is that wherein there are ſtripes of divers colours running along the warp; whether thoſe ſtripes be partly *velvet* and partly ſattin, or all *velveted*.

VELVET, *cut*, is that wherein the ground is a kind of taffety, or gros de Tours, and the figures *velvet*.

Velvets are likewiſe diſtinguiſhed, with regard to their different degrees of ſtrength and goodneſs, into *velvets* of four threads, three threads, two threads, and a thread and a half; the firſt are thoſe where there are eight threads of ſhag, or *velveting*, to each tooth of the reed; the ſecond have only ſix, and the reſt four.

In general, all *velvets*, both worked and cut, ſhorn and flowered, are to have their warp and ſhag of organzine, ſpun and twiſted, or thrown in the mill, and their woof of ſilk well boiled, &c. They are all of the ſame breadth.

VELUM, in *Eccleſiaſtical Writers*, the ſame with what is otherwiſe called BRANDEUM.

VELUM *quadrageſimale*, a veil or piece of hangings, anciently drawn before the altar in Lent, as a token of mourning and ſorrow.

VENA, VEIN, in *Anatomy*. See VEIN.

VENA *cava*. See CAVA and VEIN.

VENA *porta*, &c. See *Tab. Ant.* (*Splanch.*) *fig.* 5. *lit. i.* See alſo PORTA and VEIN.

VENA *pulmonis*. See PULMONARY and VEIN.

VENABULUM, in *Antiquity*, a long kind of ſpear uſed in hunting wild beaſts.

VENÆ-SECTIO, the opening of a vein, alſo called *phlebotomy*, and popularly BLEEDING.

VENÆ *lacteæ*. See LACTEALS.

VENÆ *lymphaticæ*. See LYMPHATICS.

VENAL, or **VENOUS**, among *Anatomiſts*, ſomething that bears relation to a VEIN.

The extremities of the cava and pulmonary veins, where they enter the auricles of the heart, are called *venous ſinuſes*.

VENAL, formed from *venalis*, *to be ſold*, is alſo uſed for ſomething bought with money, or procured by bribes.

Thus, we ſay, *venal* bards; courtezans and flatterers are *venal*; even juſtice, in Turkey, is *venal*, and muſt be bought of the baſhaws.

In England, there are ſeveral offices in the revenue, policy, &c. *venal*; but this venality of offices is no where ſo conſiderable as in France, where all offices of judicature are bought of the king, and only municipal officers are elected. Offices in England are *venal* only by a kind of connivance; in France it is a thing ſolemn and authorized. The venality was firſt introduced by Louis XII. who, to clear thoſe immenſe debts contracted by his predeceſſor Charles VIII. without burdening his people with new taxes, bethought himſelf to ſell the offices of finance; and, in reality, he made a vaſt ſum thereby; but he forbad, by an edict in 1508, the ſale of offices of judicature. Francis I. made an advantage of the ſame expedient to get money, and ſold his poſts, not excepting the offices of judicature, openly; under this king, it was only accounted a kind of loan; but that loan was no more than a name to diſguiſe a real ſale. However, it is ſaid, that the ſale of offices of judicature was eſtabliſhed by edicts of Charles IX. and that military offices were ſold under the reign of Henry III.

The parliament, not being able to reliſh the venality of offices, always made the buyer take an oath, that he did not buy his poſt, either directly or indirectly; but there was a tacit exception made, of monies lent the king for being put into them. At length the parliament, finding its oppoſitions were in vain, and that the traffick of offices was publicly authorized, aboliſhed the oath in 1597.

VENCU, in *Botany*, the Chineſe name for an excellent fruit found in that country, which the Portugueſe call *jamboa*, and the Dutch *pompebinoes*. It grows on prickly trees, like the limon-tree, only larger. Its flowers are white, exactly the ſame in ſhape with thoſe of the limon, and have an exceeding ſweet ſmell; a very fragrant water is diſtilled from them. The fruit itſelf far exceeds the citron in bulk, being in ſize equal to, and ſometimes exceeding a man's head; the rind is like that of the golden rennet; the pulp is of a reddiſh colour, and its taſte partakes of ſweet and acid, reſembling that of grapes not fully ripe. A liquor is preſſed from it, as in Europe from apples, pears, &c. It will keep for a whole year.

VENDEE, in *Law*, the perſon to whom any thing is ſold, in contradiſtinction to vendor or the ſeller.

VENDITIONI *exponas*, is a judicial writ, directed to the ſheriff, commanding him to ſell goods, which he has formerly, by commandment, taken into his hands, for the ſatisfying of a judment given in the king's court.

VENDITOR *regis*, the *king's ſaleſman*, or perſon who expoſed to ſale goods or chattels ſeized or diſtrained to anſwer any debt to the king. This office was granted by king Edward I. to Philip de Lardimer, in the county of York, *Ita quod ipſe, vel certus ſuus attornatus, ibit ad mandatum vicecomitis de loco in locum infra com. præd. ſumptibus ſuis, ad venditiones faciendas, & capiat de unaquaque venditione pro feodo ſuo xxxii. den.*; but the office was ſeized into the king's hands for the abuſe thereof, anno 2 Ed. II.

VENEERING, **VANEERING**, or **FINEERING**, a kind of marquetry, or inlaying, whereby ſeveral thin ſlices, or leaves of fine wood, of different kinds, are applied and faſtened on a ground of ſome common wood.

There are two kinds of inlaying: the one, which is the more ordinary, goes no farther than the making of compartiments of different woods; the other requires much more art, and repreſents flowers, birds, and the like figures.

The firſt kind is what we properly call *veneering*, the latter we have already deſcribed under MARQUETRY.

The wood intended for *veneering* is firſt ſawed out into ſlices, or leaves, about a line thick: in order to ſaw them, the blocks or planks are placed upright, in a kind of ſawing-preſs: the deſcription whereof may be ſeen under the article PRESS.

Theſe ſlices are afterwards cut into ſlips, and faſhioned divers ways according to the deſign propoſed; then the joints being carefully adjuſted, and the pieces brought down to their proper thickneſs, with ſeveral planes for the purpoſe, they are glued down on a ground, or block of dry wood, with good ſtrong Engliſh glue.

The pieces thus joined and glued, the work, if ſmall, [illegible] put in a preſs; if large, it is laid on the bench, covered with a board, and preſſed down with poles, or pieces of wood, one end whereof reaches to the cieling of the room, and the other bears on the boards.

When the glue is quite dry, they take it out of the preſs and finiſh it, firſt with little planes, then with divers ſcrapers, ſome whereof reſemble raſps, which take off dents, &c. left by the planes.

When ſufficiently ſcraped, the work is poliſhed with the ſkin of a ſea-dog, wax, and a bruſh and poliſher of ſhave-graſs: which is the laſt operation.

VENELLIS. See VICIS & *venellis mundandis*.

VENENUM *cocci*, a term uſed by many of the ancients for the purple tinge, which the kermes berry, as it is uſually called (ſee KERMES), gave to linen, or other things.

The word *venenum* being generally underſtood to expreſs poiſon, it has been ſuppoſed by many, that the kermes was eſteemed poiſonous, or that there were two ſorts of this drug; the one a harmleſs medicine, the other poiſonous. But there is no warrant for this in any of the old writers, and the whole ſeems indeed but a miſtake about the ſenſe of the word *venenum*, which we find by many paſſages of the beſt authors, ſignified a ſtain, as well as a poiſon.

The ancients called the veſtments dyed ſcarlet with the kermes indifferently, by the names of *flammæa* or *venenatæ*. Servius tells us, that in certain ſacred ceremonies, it was neceſſary that the prieſt ſhould be clothed in a ſcarlet robe; and he uſes the word *venenato* to expreſs it in ſome places, and *flammeo* in others.

VENER, one of the many names by which the chemiſts call Mercury.

VENEREA *concha*, in *Natural Hiſtory*, the name of a very large and elegant genus of ſhells, more uſually called *porcellanæ*. See PORCELAIN-*ſhell*.

VENEREAL, ſomething belonging to VENUS.

A *venereal* perſon is one addicted to venery, or *venereal* pleaſures. *Venereal medicines* are called *aphrodiſiacs*, *provocatives*, &c.

VENEREAL *diſeaſe*, *lues* VENEREA, the *French diſeaſe*, *foul diſeaſe*, *French pox*, or *great pox*, is a contagious malady, contracted by ſome impure humour, generally received in coition; and diſcovering itſelf in ulcers and pains about the genital, and other parts.

It is uſually ſaid to have made its firſt appearance in Europe in the year 1494, though others will have it much older, and contend for its being known to the ancients, only under other names.

Mr. Becket particularly (Phil. Tranſ. N° 355. N° 365, 366, or Abr. vol. v. p. 381. and vol. viii. p. 652. 663, &c.) has attempted to ſhew, that it is the ſame with what, among our forefathers, was called the *leproſy*, and which, in many of our ancient Engliſh writings, charters, &c. is called *brenning*, or *burning*.

In order to prove this point he has ſearched the records relating to the ſtews anciently kept on the Bank ſide, Southwark, under the juriſdiction of the biſhop of Wincheſter.

Among other conſtitutions of theſe ſtews, dated 1162, it was appointed, "That no ſtew-holder ſhould keep any "woman that hath the perilous infirmity of BURNING."

And in another vellum manuſcript, now in the cuſtody of the biſhop of Wincheſter, dated 1430, it is again ordered, "That no ſtew-holder keep any woman within his "houſe that hath any ſickneſs of BRENNING, but that "ſhe be putte out upon the peyne of making a fine "unto the lord of a hundred ſhillings."

To confirm this account, Mr. Becket quotes a deſcription of the diſeaſe from a manuſcript of John Arden, eſq. ſurgeon to king Richard II. and king Henry IV. Arden, who wrote about the year 1360, defines the diſeaſe called *brenning*, *incendium*, to be a certain inward heat and excoriation of the urethra; which definition, Mr. Becket obſerves, gives us a perfect idea of what we now call a *clap*, agreeable to the lateſt and moſt exact anatomical diſcoveries, and free of all the errors of Platerus, Rondeletius, Bartholin, Wharton, and other later writers on this diſeaſe.

As to the leproſy being the ſame with this *venereal diſeaſe*, it muſt be owned, there are a good many ſymptoms in the one diſeaſe which quadrate well enough with thoſe in the other; but then the ſymptoms in each are ſo precarious, that a great deal of ſtreſs cannot be laid hereon.

The common tradition is, that the *venereal diſeaſe* firſt broke out in the French army, when it lay encamped before Naples, and that it was owing to ſome unwholeſome food; on which account the French call it the *Neapolitan diſeaſe*, and the Italians the *mal Franceſe*.

But others go much higher, and ſuppoſe this to be the ulcers Job complained of ſo grievouſly; and accordingly, in a Miſſal, printed at Venice in 1542, there is a maſs in honour of St. Job, to be ſaid by thoſe recovered of this diſeaſe, as being ſuppoſed to owe their deliverance to his interceſſion.

But the opinion which prevails moſt among the more knowing of our phyſicians is, that the diſeaſe is of Indian extraction, and that it was brought hither by the Spaniards from the American iſlands, where it was very common before ever the Spaniards ſet footing there; whence the Spaniards call it *ſerva des India*, or *las buvas*, notwithſtanding what Herrera ſays, that the Spaniards carried it to Mexico, inſtead of bringing it from thence.

To this purpoſe ſir Hans Sloane obſerves (Nat. Hiſt. Jamaica, Introd. p. 2.) that Columbus brought into Europe, in his firſt voyage in 1493, the pox, which ſpread ſo quickly all over Europe, that Antonius Benivenius, a famous phyſician at that time at Florence, in the firſt chapter of his book De Abditis nonnullis ac mirandis Morborum, & Sanationum Cauſis, tells us, that the *lues venerea*, then beginning in Spain, had ſpread itſelf through Italy and France, and that in 1496 it had poſſeſſed many people in all the provinces of Europe. Dodonæus likewiſe tells us, that this diſeaſe raged very much in the war which Charles VIII. king of France had with Alphonſus, king of Naples, in 1494; and yet he is of opinion, that Gulielmus de Saliceto, who lived in 1270, Valeſcus de Taranta, who lived in 1418, and Bernardus de Gerdonio, who died in 1305, give us an account of ſome of its ſymptoms. Sir Hans Sloane apprehends, notwithſtanding what theſe writers have ſaid, and ſome other leſs material paſſages in ancient hiſtorians and writers, and what Arden has written, and likewiſe what Stow ſays of the public ſtews in Southwark, that this was a diſtemper altogether new in Europe, Africa, and Aſia, before it was brought from the Weſt Indies. The diſeaſes mentioned by the authors juſt cited are, in his opinion, very different from that diſtemper, both in ſymptoms and cure, although communicated perhaps ſomewhat after the ſame manner; and he adds, that he has ſeen ſome ſuch ſingular caſes, attended with conſiderable inconveniencies and fears, which have not been at all of the venereal kind. By communicating this dreadful malady, the ſevereſt ſcourge with which, in this life, Heaven chaſtens the indulgence of criminal deſire, the Americans, ſays an excellent hiſtorian, have not only amply avenged their own wrongs, but by adding this calamity to thoſe which formerly embittered human life, they have, perhaps, more than counterbalanced all the benefits which Europe has derived from the diſcovery of the new world. Robertſon's Hiſt. Amer. vol. ii. p. 87. 8vo.

Liſter, and ſome others, take it to have had its firſt riſe from ſome of the ſerpentine kind, either from a bite thereof, or from ſome of their fleſh taken as food. This is pretty certain, that men, bitten or ſtung by ſcorpions, are greatly eaſed by coition; but the woman, Pliny aſſures us, receives a great deal of damage thereby; which they think no ſlender argument of the diſeaſe ariſing from ſome perſon ſo poiſoned.

Liſter adds, there is no room to doubt, but that the lues aroſe from ſome ſuch cauſe; for, upon any venomous bite, the penis becomes vehemently extended; and the patient, being ſeized with a ſatyriaſis, breathes nothing but rage and luſt; nature, in effect, ſeeming to direct him to coition for a remedy.

But what proves a remedy to the wounded perſon, proves a diſeaſe to the woman; and from women, thus infected, other men, who have to do with them, they ſay, become infected in their turns; and thus has the diſeaſe been propagated.

Antonio Sanchez Riberio, a learned phyſician, publiſhed a diſſertation in the year 1765, in which he endeavours to prove, that this diſeaſe was not introduced from America, but took its riſe in Europe, and was brought on by an epidemical and malignant diſorder. A ſecond edition of this diſſertation has been ſince publiſhed, containing ſeveral additional facts in confirmation of Dr. Sanchez's opinion, which is ſupported with ſuch plauſible arguments, as render it a ſubject of inquiry well deſerving the attention of learned phyſicians. It muſt be acknowledged, that the rapid communication of this diſeaſe from Spain over Europe ſeems to reſemble the progreſs of an epidemic rather than that of a diſeaſe tranſmitted by infection. Robertſon's Hiſt. Am. vol. ii. p. 482. 8vo.

The firſt ſymptoms generally ariſing after intercourſe with an infected perſon, are a heat, ſwelling, and inflammation, about the penis, or vulva, with a hotneſs of urine. The infection, generally within eight or ten days after it has been received, ſometimes in two or three days, and at other times not before the end of four or five weeks, brings on a gonorrhœa, or dripping, which denominates it a CLAP; and which, in a few days more, is often followed by a CHORDEE, or PRIAPISM, and other diſtortions of the penis. See GONORRHOEA and GLEET.

Though ſometimes there is no gonorrhœa, or clap; but the poiſon rather makes its way through the cutis, to the groin; and there raiſes buboes, with various malignant puſtules, in all parts of the body. See *Venereal* BUBOES.

Sometimes, alſo, there happen callous ulcers, called CHANCRES, in the ſcrotum and perinæum; and ſometimes a cancerous and callous ulcer between the prepuce and glans; and, in ſome, the teſticles ſwell.

Chancres may happen either with or without a gonorrhœa; they are commonly ſeated about the glans; and firſt appear in form of ſmall red pimples, which ſoon become pointed at top, and are filled with a whitiſh matter, inclining to yellow. Theſe pimples are hot, and generally itch before they break; they afterwards degenerate into obſtinate ulcers, the bottom of which is uſually covered with a viſcid mucus, and whoſe edges become gradually hard and callous; ſometimes the firſt appearance reſembles a ſingle excoriation of the cuticle, which, however, ſoon becomes a true chancre. The chancre is ſometimes a primary affection, but much oftener ſymptomatic, and the mark of a confirmed lues. Primary chancres diſcover themſelves ſoon after impure coition, and are generally ſeated in parts covered with a thin cuticle, as the lips, the nipples of women, the glans penis of men, &c. and when venereal ulcers are ſeated in the lips, the infection may be communicated by kiſſing. When a chancre appears ſoon after impure coition, its treatment is in every reſpect ſimilar to that of the *virulent* GONORRHOEA. The patient muſt obſerve the cooling regimen, loſe a little blood, and take ſome gentle doſes of ſalts and manna. The parts affected ought to be often bathed, or ſoaked, in warm milk and water, and, if the inflammation be great, an emollient poultice, or cataplaſm, may be applied; and by this courſe the inflammation will commonly abate, and the patient be prepared for the uſe of mercury. Symptomatic chancres are commonly accompanied with ulcers in the throat, nocturnal pains, ſcurfy eruptions about the roots of the hair, and other ſymptoms of a confirmed lues. They uſually appear upon the private parts, or the inſide of the thigh, though occaſionally in any of the parts above mentioned; and are leſs painful, but frequently much larger and harder than primary chancres: their cure depends upon that of the pox. See *Venereal* ULCERS.

The ſwelled teſticle may either proceed from infection lately contracted, or from the venereal poiſon lurking in the blood: the latter is not very common; but the former frequently happens both in the firſt and ſecond ſtages of the GONORRHOEA, particularly when the running is unſeaſonably checked by cold, hard drinking, ſtrong draſtic purges, violent exerciſe, the too early uſe of aſtringent medicines, &c. In the inflammatory ſtage bleeding is neceſſary, which muſt be repeated according to the urgency of the ſymptoms. The food muſt be light, and the drink diluting. High-ſeaſoned food, fleſh, wine, and every thing of a heating nature, muſt be avoided. Fomentations are of ſingular ſervice. Poultices of bread and milk, ſoftened with freſh butter or oil, ought alſo to be applied when the patient is in bed; and when he is up, the teſticle ſhould be kept warm, and ſupported by a bag or truſs. If this courſe fails, mercurial ointment ſhould be rubbed on the part, if free from pain, or on the thighs, and the patient muſt be confined to bed, if neceſſary, for five or ſix weeks, ſuſpending the teſticle, and ſupplying him inwardly with ſtrong decoctions of ſarſaparilla. If theſe means do not ſucceed, and there ſhould be reaſon to ſuſpect a ſcrophulous or cancerous habit, either of which may ſupport a ſcirrhous induration, after the venereal poiſon is corrected, the parts ſhould be fomented daily with a decoction of hemlock, the bruiſed leaves of which may be added to the poultice, and the extract at the ſame time taken inwardly. Fordyce aſſures us, that by this method he has cured diſeaſed teſticles of two or three years ſtanding, even when ulcerated, and when the ſcirrhus had begun to be affected with pricking and lancing pains. See SARCOCELE, and *Tumors of the* TESTICLES.

Another occaſional attendant of the *venereal diſeaſe* is the STRANGURY; which may be owing either to a ſpaſmodic conſtriction, or an inflammation of the urethra and parts about the neck of the bladder. In the former caſe, known by the patient's beginning to void his urine with tolerable eaſe, but by a ſudden conſtriction, when it touches the galled or inflamed urethra, and its being voided by ſpirts or drops, ſuch medicines as tend to dilute and blunt the ſalts of the urine, will be proper. For this purpoſe, beſides the common diluting liquors, ſoft and cooling emulſions, ſweetened with the ſyrup of poppies, may be uſed; and if theſe do not give relief, bleeding and emollient fomentations will be neceſſary. In the latter caſe, when there are a conſtant heat and uneaſineſs about the neck of the bladder, a perpetual deſire to make water, while the patient can only diſcharge a few drops, and a troubleſome teneſmus, or conſtant inclination to go to ſtool, bleeding muſt be more liberally performed, and repeated according to the urgency of the ſymptoms. After bleeding, if the ſtrangury continues, ſoft clyſters may be adminiſtered, and emollient fomentations applied to the region of the bladder. The patient may, at the ſame time, take every four hours a tea-cup of barley-water, to a pint of which, ſix ounces of the ſyrup of marſhmallows, four ounces of the oil of ſweet almonds, and half an ounce of nitre, may be added. If, notwithſtanding theſe means, a total ſuppreſſion of urine ſhould come on, bleeding muſt be repeated, and the patient ſet to his middle in a warm bath: the diuretics ſhould be diſcontinued, and the water drawn off with a catheter, or mild bougies may be uſed. See PHIMOSIS and PARAPHIMOSIS.

When the *venereal* poiſon is actually received, by means of the lymphatics into the blood, and, circulating with it through every part of the body, mixes with the ſeveral ſecretions, and renders the whole habit tainted, the diſeaſe becomes a confirmed lues. According to Boerhaave, the ſeat of the *venereal lues* is the MEMBRANA *adipoſa.*

The ſymptoms of a confirmed lues are buboes in the groin, pains of the head and joints, which are peculiarly troubleſome to the patient at night and in bed; ſcabs and ſcurf in various parts of the body, eſpecially on the head, of a yellowiſh colour, reſembling honeycomb; corroding ulcers, generally commencing about the throat, and gradually aſcending by the palate toward the cartilage of the noſe, which they deſtroy; excreſcences or exoſtoſes in the middle of the bones, and brittleneſs at their ſpungy ends, and ſometimes ſoftneſs of the bones, ſo that they bend like wax; hardneſs and calloſity of the conglobate glands, forming in the neck, arm-pits, groin, and meſentery, hard moveable tumors, like the king's evil; tumors of different kinds in the lymphatic veſſels, tendons, ligaments, and nerves, as the gummata, ganglia, nodes, tophs, &c. itching, pain, and redneſs of the eyes, and ſometimes total blindneſs; ſinging noiſe, pain, and deafneſs of the ears, together with exulceration and caries of their internal ſubſtance: at length all the animal, vital, and natural functions are depraved; the face becomes pale and livid; the body emaciated and unfit for motion; and the miſerable patient falls into an atrophy or waſting conſumption.

Women have ſometimes ſymptoms peculiar to the ſex; as cancers of the breaſt; a ſuppreſſion or overflow of the menſes; the whites; hyſteric affections; an inflammation, abſceſs, ſcirrhus, gangrene, cancer, or ulcer of the womb: they are alſo generally barren, or ſubject to abortion; or if they bring forth children, they have an univerſal eryſipelas, are half rotten, and covered with ulcers. All theſe ſymptoms, however, are rarely to be met with in the ſame perſon, or at the ſame time. It has been obſerved, that in perſons of a thin habit, the ſymptoms and cure are worſe and more difficult to manage than in the fat and plethoric; and in children this diſorder is worſe than in adults.

The *venereal diſeaſe*, Sydenham obſerves, is communicated by copulation, lactation, handling, ſaliva, ſweat, the genital mucus, and the breath; and in whatever part it is received, it there diſcovers itſelf firſt. Thus, when the infection is received along with the milk from the nurſe, it commonly ſhews itſelf in ſoreneſs and ulcers of the mouth.

The method of cure is various, according to the various ſymptoms and ſtages: for the firſt ſtage, viz. a gonorrhœa virulenta, or clap, Dr. Pitcairn's method is this: after two or three vomits, he directs mercurius dulcis, for ſome days, twice a day; when the mouth grows ſore, let alone the mercury for there or four days, and purge every other day; as the mouth grows well again, repeat the uſe of mercury; and thus alternately, till the ſymptoms ceaſe. See GONORRHOEA.

For a confirmed lues, mercurial ſalivation produced either by FUMIGATION, or friction, or taking mercury internally, was ſome time ago held the only effectual cure: though mercurial frictions, applied in ſuch quantity, and at ſuch intervals, as not to raiſe a ſalivation, are held, by ſome, to be not only eaſier and ſafer, but even more ſucceſsful, in this diſeaſe, than ſalivation itſelf. See SALIVATION.

Dr. Sydenham tells us, he uſed to ſalivate immediately, without any preliminary evacuation, or preparation of the body, at all. His method was this: he preſcribes an unguent of two ounces of axung. porcin. i. e. hogs-lard, and one ounce of mercury; with a third part of this he orders the patient to anoint his arms and legs, for three nights ſucceſſively, with his own hands, ſo as not to touch either the arm-pits, the groin, or the abdomen. After the third unction, the gums uſually ſwell, and a ptyaliſm comes on. If it does not come in this time, he directs turbith mineral, eight grains, in conſerve of red roſes; which, occaſioning a vomiting, ſoon raiſes the ptyaliſm. And if, afterwards, the ſalivation abate before the ſymptoms have quite diſappeared, he orders it to be promoted with a freſh doſe of mercurius dulcis. The diet, and other regimen, is to be the ſame as in a catharſis.

Dr. De Sault, in his treatiſe on this diſeaſe, recommends frequent frictions with large quantities of mercurial ointment made with one third of quickſilver; to wit, from two or three drams to an ounce, or an ounce and a half, every night, or every other night, taking care to keep the belly in a purging way, by clyſters, laxatives, or the ſtronger purgatives, if the mercury begins to affect the mouth. He ſays this method is ſure, and altogether ſafe, and he relates ſeveral hiſtories of cures performed by it, not only in the *lues venerea*, but in many other diſeaſes, particularly in obſtructed hardened glands, the liver, teſtes, &c.

Mr. Douglas greatly commends De Sault's method, and it is ſaid that it has been practiſed with ſucceſs in ſome of the hoſpitals of London. See a Letter on the Cure of the *Venereal Diſeaſe*. Dr. Werlhoff prefers frequently repeated ſmall doſes of mercury to a ſalivation, for the cure of the *lues venerea*. Commerc. Norimb. 1235. Hebd. 13. ſect. 4.

Indeed, it was formerly thought impoſſible to cure a confirmed lues without a ſalivation; but this method is now pretty generally laid aſide, and mercury is found to be as efficacious, or rather more ſo, in expelling the venereal poiſon, when adminiſtered in ſuch a manner as not to run off by the ſalival glands. Various preparations of mercury have been extolled at different times, by different authors, for the cure of the *venereal* diſeaſe. Mr. Plenck of Vienna, in a treatiſe tranſlated by Dr. W. Saunders, in 1767, recommends a mixture of quickſilver and gum arabic, in preference to every other mercurial preparation (ſee MERCURY); but Dr. Lewis ſays, that he has known it given, without much benefit, in caſes which were afterwards cured in a ſhort time by ſolution of ſublimate; and that in ſome of our hoſpitals, ſmaller doſes than thoſe which Mr. Plenck has preſcribed, have on the third day brought on a ptyaliſm. After all it has been found, that the moſt ſimple forms, in which it can be introduced in the ſyſtem, generally ſucceed as well as the moſt elaborate chemical preparations. Thus, an ointment or pill, prepared by triturating common quickſilver with greaſe, reſin, or mucilage, will, if uſed for a ſufficient length of time, remove the moſt obſtinate *venereal* ſymptoms, unleſs the conſtitution be ſo far deſtroyed as to render a cure impoſſible. Theſe may be uſed in the ſame manner as for the *virulent* GONORRHOEA; and if any ſymptoms of a ſalivation ſhould appear, they muſt be diſcontinued for ſome days, and a purge or two taken. It is impoſſible to determine *à priori* either the exact quantity of medicine that muſt be taken, or the time required for a cure: this is beſt judged of by the abatement and ceaſing of the ſymptoms. Aſtruc obſerves, that commonly not leſs than two ounces of the ſtrong mercurial ointment is ſufficient, and not more than three or four ounces are neceſſary. The corroſive ſublimate of mercury was ſome years ago brought into uſe for the *venereal* diſeaſe in Germany, and it was ſoon after introduced into Britain by the late ſir John Pringle. For the method of preparing and adminiſtering it, ſee *Corroſive ſublimate of* MERCURY. See Obſervations and Caſes relative to the Efficacy of this Medicine, in London Med. Obſ. and Inq. vol. i. p. 365. vol. ii. p. 70, p. 88. 256.

Dr. Smith recommends the following conciſe method of managing a confirmed *lues venerea*. Give mercury only by way of alterative, and adminiſter it as follows: ℞ merc. calcin. gr. i. ad iii. Sulph. ant. precip. gr. ii. ad iv. Extract. Theb. gr. ß. ad gr. i. Conſ. roſar. ℞ q. s. f. bol. omn. noct. hor. decubitus ſumend. During the uſe of the mercurial bolus, the patient ſhould take half a pint of the following decoction four times a day. ℞ rad. ſarſaparil. ℥ iii. laureolæ ʒ ii. coq. ex aq. font. ℔ iii. ad ℔ ii. & cola. During the cure, he directs that the patient be kept warm, uſe a light diet, drink plenty of broth and other thin liquors, and go frequently into a warm bath.

Several roots, woods, and barks, have been recommended for curing the *venereal* diſeaſe; but though none of theſe can be depended upon alone, yet when joined with mercury, ſome of them are found to be very beneficial in promoting a cure. One of the beſt is SARSAPARILLA, of which a decoction may be made by ſlicing and bruiſing two ounces of the freſh root, and boiling with it one ounce of ſhavings of guaiacum in three quarts of water, over a ſlow fire, to one; adding towards the end half an ounce of ſaſſafras wood, and three drams of liquorice; and ſtraining the decoction. This may be either employed as an aſſiſtant to a courſe of mercurial alteratives, or taken after the mercury has been uſed for ſome time; and the quantity may be from a pint and a half to two quarts in the day. The following decoction is ſaid to be ſimilar to that uſed by Kennedy, in the cure of the *venereal* diſeaſe: take of ſarſaparilla, two ounces; liquorice and mezereon root, of each half an ounce; ſhavings of guaiacum and ſaſſafras wood, of each one ounce; crude antimony, powdered, an ounce and a half: infuſe theſe ingredients in eight pints of boiling water for twenty-four hours; then boil them, till one half of the water is conſumed, and ſtrain the decoction, which may be uſed in the ſame manner as the preceding. See an attempt to diſcover the virtues of the ſarſaparilla root in the *venereal* diſeaſe, by Mr. W. Fordyce, in Lond. Med. Obſ. and Inq. vol. i. p. 149, &c.

The mezereon root is likewiſe found to be a powerful aſſiſtant to the ſublimate, or any other mercurial. It may be either uſed, as above directed, along with the ſarſaparilla, or in the manner preſcribed under SPURGE-*laurel*. The natives of America, it is ſaid, cure the *venereal* diſeaſe in every ſtage by a decoction of the root of a plant called LOBELIA, which is uſed either freſh or dried; the patient takes a large draught of the decoction early in the morning, and continues to uſe it for his ordinary drink through the day: they waſh the ulcers with the ſame decoction, and dry them with the pulverized root of the *geum floribus nutantibus*, or aquatic HERB *bennet*, with nodding flowers. Kalm informs us, that they ſometimes uſe a decoction of the root of CEANOTHUS, to which they ſometimes join that of the *rubus caule aculeato*.

Dr. Cheyne, in his Engliſh Malady, aſſirms the ſufficiency of a total milk and ſeed diet, ſtrictly adhered to, for the certain cure and eradication of this diſtemper in all its ſtages.

We may obſerve, that the Peruvian bark is a neceſſary addition in all caſes where the patient's ſtrength is diminiſhed, where inflammation attends, and where there are œdematous ſwellings. Moreover, the condition of a patient ſhould be conſidered previous to his entering upon a courſe of mercury. It would be raſh and dangerous to adminiſter mercury to a perſon labouring under any violent acute diſeaſe; as a putrid fever, pleuriſy, peripneumony, or the like; and alſo in ſome chronic caſes, as a ſlow hectic fever, or the laſt ſtage of a conſumption; though if theſe diſeaſes proceed from a confirmed lues, mercury will be neceſſary. Mercury ought not to be adminiſtered to women during the menſtrual flux, or when the period is near at hand; neither ſhould it be given in the laſt ſtage of pregnancy: however, if the woman be not near the time of her delivery, mercury may be given in ſmaller doſes, and at greater intervals than uſual. In the London Med. Obſ. and Inq. vol. ii. p. 256, &c. we have two inſtances of pregnant women cured of the *lues venerea* by the ſolution of corroſive ſublimate in French brandy, taken inwardly, and waſhing the *venereal* warts with the ſame ſolution; together with the ſubſequent uſe of the decoction of ſarſaparilla. Mercury ſhould be adminiſtered to infants, and alſo to aged perſons, with great caution; and alſo to hyſteric and hypochondriac perſons, and ſuch as are ſubject to an habitual diarrhœa or dyſentery, or to frequent and violent attacks of the epilepſy, or who are afflicted with the ſcrophula or the ſcurvy.

The moſt proper ſeaſons for entering upon a courſe of mercury are the ſpring and autumn; at other times, the warmth of the patient's chamber ſhould be adapted to the ſeaſon of the year. Bleeding, and repeated purges, ſhould alſo be recommended, previous to the adminiſtration of mercury, and when convenient the patient ſhould bathe once or twice a day, for a few days, in lukewarm water; his diet ſhould be light, moiſt, and cooling; and he ſhould carefully avoid wine, and all heating liquors, violent exerciſe, and great exertions of mind. During a courſe of mercury, a proper regimen is of great importance; for a much leſs quantity of mercury will be ſufficient for the cure of a perſon who lives low, keeps himſelf warm, and avoids all manner of exceſs, than that of ſuch as cannot reſtrain their appetites. Cleanlineſs is alſo of peculiar moment: to this purpoſe Dr. Gilchriſt has given an account of a ſpecies of the *lues venerea* which prevails in the weſt of Scotland, called by the natives *ſibbins* or *ſivvins*; the ſpreading of which is chiefly owing to neglect of cleanlineſs; and he ſeems to think, that by due attention to this circumſtance it might be extirpated. The treatment of this diſeaſe is ſimilar to that of a confirmed lues or pox; and the YAWS, a diſeaſe which is now very common both in America and the Weſt India iſlands, may alſo be cured in the ſame manner.

When the *venereal* diſeaſe has been neglected, or improperly treated, it often becomes a diſorder of the habit: in which caſe, the cure muſt be attempted by reſtoratives, as a milk diet, the decoction of ſarſaparilla, and ſuch like, to which mercury may be occaſionally added. In the cure of this diſeaſe, the patient ſhould never leave off taking medicines immediately upon the diſappearing of the ſymptoms, but continue them for ſome time after, gradually leſſening the quantity, till it is entirely eradicated. It does not appear from obſervation, that the moſt robuſt conſtitution is able to overcome the virulence of the *venereal* contagion, after it has got into the habit: in this caſe, a proper courſe of medicine is always indiſpenſably neceſſary.

Although it is impoſſible, ſays Dr. Buchan, to lay down fixed and certain rules for the cure of this diſeaſe, yet the following general plan will always be found ſafe, and often ſucceſsful; viz. to bleed and adminiſter gentle purges, with diuretics, during the inflammatory ſtate, and as ſoon as the ſymptoms of inflammation are abated, to adminiſter mercury, in any form that may be moſt agreeable to the patient. The ſame medicine, aſſiſted by the decoction of ſarſaparilla, and a proper regimen, will not only ſecure the conſtitution againſt the farther progreſs of a confirmed pox, but will generally perform a complete cure. Buchan's Dom. Med. chap. xlvii. See GRANDGOR.

VENERIS *œſtrum, the ſtimulus or incentive of venery*, is an appellation given, by ſome anatomiſts, to the CLITORIS.

VENERIS *œſtrum* is alſo uſed, by others, for the tranſport of love, or the utmoſt ecſtacy of deſire or enjoyment in coition.

Some are of opinion, that infectious women are the moſt apt to communicate the poiſon when they are thus excited with deſire; whereas, with indifference, they may admit the ſame intercourſe, without giving the infection.

VENERIS *ens*. See ENS.

VENERY is uſed for the act of copulation, or coition, of the two ſexes.

Its takes its name from *Venus*, the ſuppoſed deity of the paſſion of love.

VENERY alſo denotes the arts or exerciſe of hunting wild beaſts; which are alſo called *beaſts of venery*, and *beaſts of the foreſt*.

Such are the hare, hart, hind, boar, and wolf. See BEAST, GAME, and HUNTING.

VENETA *bolus*, a fine red earth uſed in painting, and called in the colour-ſhops *Venetian red*. See RED.

It is improperly denominated a bole, being a genuine ſpecies of red ochre. It is of a fine bright, and not very deep red, approaching, in ſome degree, to the colour of minium, or red-lead, and is moderately heavy, and of an even and ſmooth texture, yet very friable, and of a duſty ſurface: it adheres firmly to the tongue, is very ſmooth, and ſoft to the touch, eaſily crumbles to pieces between the fingers, and very much ſtains the ſkin in handling. It has a ſlight aſtringent taſte, effervеſces conſiderably with aqua fortis, and in water immediately breaks into a fine powder.

It is dug in Carinthia, and ſent from Venice into all parts of the world, being an excellent colour, and very cheap; our colour-men, however, find too many ways of adulterating it. Hill, and Da-Coſta.

VENEW. See VENUE.

VENGOLINA, in *Ornithology*, an African bird, which ſeems not to have been deſcribed by any of the ornithologiſts. According to the hon. Daines Barrington's account, it is of the *finch* tribe, and about the ſame ſize with our aberdavine, or ſiſkin; the colours are grey and white, and the cock hath a bright yellow ſpot upon the rump; it is a very familiar bird, and ſings better than any of thoſe which are not European, except the American mocking-bird. Phil. Tranſ. vol. lxiii. part ii. p. 254.

VENIA, among our *Ancient Writers*, denotes a kneeling, or low proſtration, to the ground; uſed by penitents. See GENUFLEXION.

Walſingham, p. 196. *Rege interim proſtrato in longa venia. Per venias, centum verrunt barbis pavimentum.*

VENIAL, a term in the Romiſh *Theology*, applied to ſlight ſins, and ſuch as eaſily obtain pardon.

In confeſſing to the prieſt, people are not obliged to accuſe themſelves of all their *venial* ſins. The thing that gives the greateſt embarraſs to the Romiſh caſuiſts is, to diſtinguiſh between *venial* and mortal ſins. See POPERY.

The reformed reject this diſtinction of *venial* and *mortal* ſins; and maintain, that all ſins, how grievous ſoever, are *venial*; and all ſins, how ſlight ſoever, may be mortal; and the reaſon they urge is, that all ſins, though of their own nature mortal, yet become *venial*, or pardonable, by virtue of our Saviour's paſſion, to all ſuch as fulfil the conditions on which it is offered in the Goſpel.

To which the Romaniſts anſwer, that the chief of theſe conditions is confeſſion.

VENIRE *facias*, in *Law*, is a judicial writ, lying where two parties plead, and come to iſſue; directed to the ſheriff, to cauſe twelve men, of the ſame neighbourhood, to meet to try the ſame, and recognize the truth upon the iſſue taken.

Afterwards a compulſive proceſs is awarded againſt the jurors, called *habeas corpora juratorum*, or *diſtringas*, that they may appear upon the day appointed. See JURY.

VENIRE *facias* is alſo the name of a writ, which is the proper proceſs in an indictment for any petty miſdemeanor, or on a penal ſtatute, and which is in the nature of a ſummons, to cauſe the party to appear. And if by the return to ſuch *venire* it appears, that the party hath lands in the county whereby he may be diſtrained, then a *diſtreſs infinite* ſhall be iſſued from time to time till he appears. But if the ſheriff returns that he hath no lands in his bailiwick, then, upon his non-appearance, a writ of *capias* ſhall iſſue; and if he cannot be taken upon the firſt *capias*, a ſecond and a third ſhall iſſue, called an *alias*, and a *pluries capias*.

VENIRE *facias tot matronas*. See VENTRE *inſpiciendo*.

VENISON, *venaiſon*, the fleſh of beaſts of game, or of animals to be caught in the way of game, i. e. by hunting, &c. as deer, hare, &c.

The word is French, *venaiſon*; formed of the Latin *venatio, hunting*.

The old huntſmen have determined, that every beaſt of the foreſt, that is food for man, is *veniſon*. In many parts of the world the bears are as regularly hunted as the hare and buck, &c. are with us, and there are called *veniſon*; but with us, at preſent, the word *veniſon* ſeems limited to the fleſh of the hart, the hind, the buck, the doe, and the other creatures of that kind.

Some have extended the ſignification of the word to the beaſts of the foreſt which were chaſed as game, and afforded the diverſion of hunting, whether their fleſh were eaten or not: thus, in ſome places, the wolf and the fox are reckoned among the *veniſon* beaſts.

VENOM, *venenum*. See POISON.

The terms *venom* and *poiſon* only differ from each other in this, that the latter is more frequently uſed where the noxious matter is taken inwardly, as in foods, drinks, &c and the former, where it is applied outwardly, as in ſtings and bites of ſerpents, ſcorpions, vipers, ſpiders, &c.

The pike is ſaid to have a *venomous* tooth. All *venomous* beaſts, in the general, have that quality in a greater degree, when bred in mountainous and dry places than when in wet and marſhy places; and the ſouthern more than the northern; thoſe hungry and enraged, more than others; and all of them in ſummer more than winter. See VIPER.

VENOSA *arteria*. See ARTERIA *venoſa*.

VENOSE *leaf*, *venoſum folium*, among *Botaniſts*. See LEAF.

VENOUS, *venoſus*. See VENAL.

VENT, formed from *ventus*, *wind*, *vent-hole*, or *ſpiracle*, a little aperture left in the tubes or pipes of fountains, to facilitate the air's eſcape; or, on occaſion, to give them air; as in froſty weather, &c. for want of which they are apt to burſt.

A *vent*, taken in this ſenſe, is properly the end of a pipe, placed erect, and reaching above the ground; uſually ſoldered to the turns, or elbows, of pipes. The *vents* of large pipes are to be as high as the ſuperficies of the reſervoir, unleſs there be a valve in them.

VENT is alſo uſed for a little hole, pierced in veſſels of wine, beer, &c. that are on tap; and which admits air enough to make the liquor run, but not ſo much as to corrupt and ſpoil it.

VENT, again, is applied to the covers in wind-furnaces, whereby the air enters, which ſerves them for bellows; and which are ſtopped with regiſters, or ſlices, according to the degree of heat required: as in the furnaces of glaſs-houſes, aſſayers, &c.

VENT is alſo uſed for a pipe of lead, or other matter; one end whereof opens into the cell of a neceſſary-houſe, and the other reaches to the roof of the houſe, to give room for the corrupt fetid air to exhale.

There are alſo *vents*, or apertures, made in the walls which ſuſtain terraſſes, to furniſh air, and give a paſſage for the waters.

This kind of *vent* the Italians, and we from them, call a *barbacane*.

VENT, in *Gunnery*. See TOUCH-*hole*.

The common method of placing the *vent* is within about a quarter of an inch from the bottom of the chamber or bore. Some, however, have thought, that if the *vent* was to come out at the middle of the charge, the powder would be inflamed in leſs time than in any other caſe; but Mr. Muller, by firing mortars with two *vents* one at the bottom, and the other in the middle, and ſo contrived that one was ſhut whilſt the other ſerved to fire, found always the range of the ſhell greater when the lower *vent* was uſed than when the powder was fired by the middle one. Artillery, p. 83.

Mr. Thompſon has lately made a number of experiments, in order to determine the beſt poſition of the *vent*; from the reſult of which it appears, that the effect of placing the *vent* in different poſitions with reſpect to the bottom of the chamber is different in different charges; but the difference in the force exerted by the powder, which aroſe from the particular poſition of the *vent*, was in all caſes ſo inconſiderable, as to afford occaſion for concluding, that any given charge of powder exerts nearly the ſame force, whatever is the poſition of the *vent*. He infers, upon the whole, that in the formation of fire-arms no regard need be had to any ſuppoſed advantages that gunſmiths and others have propoſed to derive from particular ſituations for the *vent*: ſuch as diminiſhing the recoil, increaſing the force of the charge, &c. but the *vent* may be indifferently in any part of the chamber where it will beſt anſwer upon other accounts; and he thinks there is little doubt but the ſame thing will hold good in great guns, and all kinds of heavy artillery.

Workmen in general agree, that the *vent* in fire-arms ſhould be as low or far back as poſſible, in order, as they conceive, to leſſen the recoil: accordingly ſome make the bottom of the chamber flat, and bring the *vent* out even with the end of the breech-pin, others make the *vent* ſlanting through the breech-pin, in ſuch a manner as to enter the bore juſt in its axis; others again make the bottom of the chamber conical; and there are thoſe who make a little cylindric cavity in the breech-pin, of about two-tenths of an inch in diameter, and near half an inch in length, coinciding with the axis of the bore, and bring out the *vent* even with the bottom of this little cavity.

The objection to the firſt method is, that the *vent* is apt to be ſtopped up by the foul matter that adheres to the piece after firing, and which is apt to accumulate, eſpecially in damp weather. The ſame inconvenience in a greater degree attends the other methods, with the addition of another, ariſing from the increaſed length of the *vent*; for the *vent* being longer, is not only more liable to be obſtructed, but it takes a longer time for the flame to paſs through it into the chamber; in conſequence of which the piece is ſlower in going off, or, as ſportſmen term it, is apt to hang fire. Mr. Thompſon propoſes, that the bottom of the bore ſhould be in form of a hemiſphere; and that the *vent* ſhould be brought out directly through the ſide of the barrel, in a line perpendicular to its axis, and pointing to the centre of the hemiſpheric concavity of the chamber. In this caſe the *vent* would be the ſhorteſt poſſible; it would be the leaſt liable to be obſtructed, and the piece would be more eaſily cleaned. Similar advantages, he apprehends, would be gained by making the bottom of the bore and *vent* of great guns in the ſame manner. Phil. Tranſ. vol. lxxi. part ii. p. 272, &c.

From a variety of experiments made by order of the king of Pruſſia in 1765 and 1766, it appears, that the concave chamber produced the greateſt ranges, and that the bottom of the chamber is the beſt place for the *vent*.

VENT-*aſtragal*, is that part of a GUN or HOWITZ which determines the *vent-field*.

VENT-*field* is the part of a gun or howitz between the breech mouldings and the aſtragal.

VENT, *port*. See PORT-*vent*.

VENTAROLI, a name given in Sicily, &c. to grottoes formed under their houſes, from which iſſues a conſtant extreme cold wind, and at times with impetuoſity, and a noiſe like water daſhing upon rocks. Theſe are ſhut up with doors like cellars, and made uſe of as ſuch, as alſo to keep proviſions freſh, and to cool liquors. At Ceſi, in the Roman ſtate, there are many ſuch *ventaroli*; and the inhabitants of that town, by means of leaden pipes, conduct the freſh air from theſe into the rooms of their houſes, ſo that by turning a cock they can cool them to any degree. Some who have refined ſtill more upon this luxury, by ſmaller pipes, bring cold air under the dining table, ſo as to cool the bottle of liquor upon it. On mount Ætna and Veſuvius, and in the iſland of Iſchia, there are many caverns of this kind. Phil. Tranſ. vol. lxx. part i. p. 73.

VENTER, *belly*, in *Anatomy*, a cavity in the body of an animal, containing viſcera, or other organs, neceſſary for the performance of divers functions.

Phyſicians divide the human body into three *venters*, regions, or cavities: the firſt, the HEAD, containing the brain, &c.

The ſecond, the BREAST, or THORAX, as far as the diaphragm, containing the organs of reſpiration.

The third, which is what we more commonly call the *venter*, or *belly*, is that wherein the inteſtines and the organs of generation and digeſtion are contained; this is called, by anatomiſts, the ABDOMEN.

Venter, or *belly*, is alſo popularly uſed for the exterior part of the lower *venter*. In which ſenſe we ſay, the navel is in the middle of the *venter*, &c.

Venter is alſo uſed for the ventricle, or STOMACH; becauſe that part is encloſed in the cavity thereof. In this ſenſe it is, that Jonah is ſaid, in Scripture, to have been three days in the whale's *venter*, or belly.

Venter is alſo uſed for the womb, or uterus, of women. And hence the writ *de* VENTRE *inſpiciendo*.

Hence, alſo, in the civil law, we ſay, *partus ſequitur ventrem*, the child follows the belly; meaning, that its condition is either free or ſervile, according to that of its mother.

They alſo ſay, to *appoint a curator for the belly*, with regard to poſthumous children, yet in the mother's womb. With regard to princes, the *venter*, or belly, has been ſometimes crowned in form.

Venter is alſo uſed, in ſpeaking of a partition of the effects of a father and mother, among children born, or accruing, from different marriages.

This partition is ſo ordered, as that a ſingle child of one marriage, or *venter*, takes as much as ſeveral of another marriage, or *venter*: in order to which, the eſtate is divided into ſo many parts as there have been *venters*, or marriages.

Venter, or *belly*, of a muſcle. See BELLY *of a muſcle*.

Venter *draconis*, *dragon's belly*, in *Aſtronomy*. See *Dragon's* BELLY. See alſo DRAGON, in *Aſtronomy*.

Venter *equi*, *horſe's belly*, among *Chemiſts*, denotes horſe-dung, or a dunghill, whereon are encloſed certain veſſels for particular operations, to be performed by means of the gentle heat thereof.

VENTIDUCTS, in *Building*, are ſpiracles, or ſubterraneous places, where freſh cool winds, being kept, are made to communicate, by means of tubes, funnels, or vaults, with the chambers, or other apartments of a houſe, to cool them in ſultry weather.

Theſe are much in uſe in Italy, where they are called *ventidotti*. Among the French they are denominated *priſons des vents*, and *palais d'Eole*. See VENTAROLI.

VENTILATOR, a machine by which the noxious air of any cloſe place, as an hoſpital, gaol, ſhip, chamber, &c. may be diſcharged and changed for freſh.

The noxious qualities of bad air have been long known; and no one has taken greater pains to ſet the miſchiefs ariſing from foul air in a juſt light than Dr. Hales; who has alſo propoſed an eaſy and effectual remedy by the uſe of his *ventilators*; his account of which was read to the Royal Society in May 1741. In the November following Mr. Triewald, military architect to the king of Sweden, informed Dr. Mortimer, ſecretary to the Royal Society, that he had in the preceding ſpring invented a machine for the uſe of his majeſty's men of war, in order to draw out the bad air from under their decks, the leaſt of which exhauſted 36172 cubic feet of air in an hour, or at the rate of 21732 tons in twenty-four hours. In 1742 he ſent one of them, formed for a ſixty-gun ſhip, to France; which was approved of by the Royal Academy of Sciences at Paris; and the king of France ordered all the men of war to be furniſhed with the like *ventilators*.

The *ventilators* invented by Dr. Hales conſiſt of a ſquare box A B C D (*Tab.* IV. *Pneumatics*, *fig.* 64.) of any ſize; in the middle of one ſide of this box a broad partition, or midriff, is fixed by hinges X, and it moves up and down, from A to C, by means of an iron rod Z R, fixed at a proper diſtance from the other end of the midriff, and paſſing through a ſmall hole in the cover of the box up to R. Two boxes of this kind may be employed at once, and the two iron rods may be fixed to a lever F G (*fig.* 65.) moving on a fixed centre O; ſo that by the alternate raiſing and preſſing down of the lever F G, the midriffs are alſo alternately raiſed and depreſſed, whereby theſe double bellows are at the ſame time both drawing in air, and pouring it out through apertures with valves made on the ſame ſide with, and placed both above and below the hinges of the midriffs. In order to render the midriffs light, they are made of four bars lengthwiſe, and as many acroſs them breadthwiſe, the vacant ſpaces being filled up with thin pannels of fir-board; and that they may move to and fro with the greater eaſe, and without touching the ſides of the boxes, there is an iron regulator fixed upright to the middle of the end of the box A C (*fig.* 64.) from N to L, with a notch cut into the middle of the end of the midriff at Z, ſo that the midriffs, in riſing and falling, ſuffer no other friction than what is made between the regulator and the notch. Moreover, as the midriff Z X moves with its edges only one twentieth of an inch from the ſides of the box A B C D F E, very little air will eſcape by the edges, and, therefore, there will be no need of leathern ſides as in the common bellows. The end of the box at A C is made a little circular, that it may be better adapted between A and C to the riſing and falling midriff; and at the other end X of the midriff a ſlip of leather may be nailed over the joints, if needful. The eight large valves, though which the air is to paſs, are placed at the hinge-end of the boxes B K (*fig.* 65.) as at 1, 2, 3, &c. The valve 1 opens inward to admit the air to enter, when the midriff is depreſſed at the other end, by means of the lever F G. And at the ſame time the valve 3 in the lower *ventilator* is ſhut by the compreſſed air which paſſes out at the valve 4. But when that midriff is raiſed, the 1 valve ſhuts, and the air paſſes out at the valve 2. And it is the ſame with the valves 5, 6, &c. of the other box; ſo that the midriffs are alternately riſing and falling, and two of the *ventilators* drawing in air, and two blowing it out; the air entering at the valves 1, 3, 6, 8, and paſſing out at the valves 2, 4, 5, 7. Before theſe laſt valves there is fixed to the *ventilators* a box Q Q N M (*fig.* 66.) as a common receptacle for all the air which comes out of theſe valves: which air paſſes off by the trunk P, through the wall of a building.

For a farther account of this machine we refer to the author himſelf, who gives a full detail of it, and of its manner of working. See Deſcription of *Ventilators*, by Stephen Hales, D. D. Lond. 1743. 8vo.

The doctor has ſhewn the uſe of his *ventilators* very fully. As to ſhips, in particular, he obſerves, that the wind-ſail, made uſe of at ſea to introduce freſh air between decks, is far from being ſufficient for that purpoſe; nor can it be uſed with equal ſafety to the ſick, and thoſe who are ſleeping, by means of the ſtrength of the wind which conveys the air with too much violence. But when the foul air is carried off by means of *ventilators*, notwithſtanding the great velocity with which they throw out the air, which they may do at the rate of ſixty tuns in a minute, yet the motion of it downwards into the hold, to ſupply what is carried off, is ſo very gentle, that it cannot be perceived; becauſe the ſum of all the open paſſages for it through the deck exceeds the opening of the trunk of the *ventilator*, in ſo great a proportion as 100 to 1, or more. Beſides, in a calm the wind-ſail can do little or no good; nor when the ſhip is under ſail, at which time the wind-ſail is not uſed. And it is to be obſerved, that it is not the *ventilating* of a ſhip now and then with a wind-ſail, when wind and weather ſerve, that will ſuffice; it ought to be done daily, if due regard be had to the health of the ſhip's crew. The great quantity of rancid noxious vapours, which are inceſſantly exhaling from a number of living human bodies, the ſtench that inceſſantly ariſes from the bilge water, and from the hot, ſtagnant, putrid air in the hold, makes it very adviſeable to refreſh ſo bad an air continually, either with the wind-ſail, when that can be properly uſed, or elſe with *ventilators*, which are intended to ſupply the defects of the wind-ſail.

Ventilators muſt alſo be of particular ſervice in new ſhips, which are obſerved to be more unhealthy, on account of a greater quantity of ſappy wreak which ariſes from new timber, and makes the confined air the more unwholeſome.

They will alſo be an effectual preſervative of horſes in tranſports, where they are ſometimes ſuffocated, when in a ſtorm there is a neceſſity to ſhut the hatches down.

Theſe *ventilators* will alſo drive out of the hold of a ſhip that dangerous vapour which ariſes from corn, which is ſo noxious, that ſometimes they dare not venture into the hold, till after the hatches have been opened for ſome time.

Ventilation will not only be of ſervice to preſerve ſeveral kinds of goods, but alſo the timbers and planks of the hold itſelf, when laid up in ordinary, as well as when in uſe, and will make the air in the hold leſs noxious, though it will ſtill be offenſive to the ſmell, by reaſon of the bilge water. But this may be made leſs offenſive, by often letting in ſweet water from the ſea, and then pumping it out; which good practice ought to be continued, notwithſtanding the uſe of the *ventilators*.

What is here ſaid of the foul air of ſhips may be applied to that of mines, gaols, workhouſes, barracks, and hoſpitals. In mines, *ventilators* may guard againſt the ſuffocations, and other terrible accidents ariſing from DAMPS. The air of gaols has been often known to be infectious; and we had a fatal proof of this, by the accident that happened ſome years ago at the ſeſſions at the Old Bailey. To guard againſt the like for the future, as well as to preſerve the health of the priſoners, a worthy magiſtrate, in 1752, had *ventilators* placed in Newgate, which were wrought by a windmill; and in the beginning of the year 1753, Dr. Hales gave an account of the good ſucceſs attending the uſe of theſe machines, by a remarkable decreaſe in the uſual mortality and ſickneſs of that place.

Although the old priſon at Newgate is now taken down, and a much more commodious one erected near the ſame ſpot, it may not be improper to give a brief account of the manner in which the *ventilators* of Dr. Hales were conſtructed, and how they were moved by the windmill annexed to them. The midriffs *h h (fig.* 67.) of theſe two *ventilators*, two pair of which were laid upon one another, were each nine feet long, and four and a half wide, and moved up and down by the flat iron rods *e f*, paſſing through the lower and upper *ventilators*, and through an iron plate at *z*, about three inches ſquare; over which is another broader iron plate, with a wide hole in its middle, to give room for the iron rod at *g* to move ſideways to and fro, with the under plate, the hole of which exactly fits the iron rod, ſo that no air can eſcape at *g*; and there are the like plates at *i*, the top of the *ventilator*; and at *f*, *g* are joints, where the iron rods are fixed to the midriffs, by which means both are moved up and down at the ſame time; and the iron rods of both ſides of the *ventilators* being fixed to one common lever at *e e*, all the four midriffs are thereby alternately worked up and down at the ſame time. The valve-holes *v v x x*, &c. are twenty-three inches long, and ſix and a half wide, covered with buckram glued on them, and move on liſts of tanned ſheep-ſkin, and fall on liſts of woollen cloth nailed round the vale-holes. A very large noſe (*fig.* 68.) is fixed with iron hooks *k k* to the *ventilators l l*; and this noſe is divided into three ſpaces, the middle and largeſt of which, *m m*, receives, all the foul air blown into it from the eight middle valves *x x x x (fig* 67.), whence it paſſed through a trunk *t t*, ſixteen inches wide, through the leads of the priſon, into the open air; the top of this trunk being covered with weather-boards to keep the rain out, and the middle valves hanging ſo as to open outwards. The two other outer ſpaces of the noſe *p p* receive the foul air, drawn into them, from the ſeveral wards, through the trunks *p p*, and paſſing off into the *ventilators*, through the eight outer valve-holes *v v v v*, whoſe valves open inwards. In theſe outer partitions of the noſe there are two holes at *z z (fig.* 68.) covered with boxes, in the bottom of each of which there is a large moveable valve, opening upwards, and towards the *ventilators*: theſe are made of ſuch a weight, as to open only when all the trunks to the ſeveral wards are ſhut; whereby the *ventilators* will always be ſupplied with air, ſo as not to endanger the breaking of the midriffs for want of it. Theſe *ventilators*, about eighteen inches deep in the clear, were fixed in an upper room of Newgate, in order to be near the windmill on the leads, which worked them. From each of the outer noſtrils there went a trunk, twelve inches in the clear withinſide, and from theſe trunks, which deſcended through all the floors as far as a little below the cieling of the ground rooms, leſſer trunks, ſix inches ſquare within, branched off, near the cieling of every room; and extended more or leſs into the ſeveral wards; ſo that when the foul air was drawn out of any ward, the freſh air might enter on the oppoſite ſide, and drive out all the foul air before it. By other contrivances with ſliding ſhutters and handles, the ſeveral wards might be ventilated at ſuch a time, or in ſuch a degree, as was found neceſſary. In the caſe of a priſon that is built with an open area in the middle, Dr. Hales obſerves, that the ſide of the priſon which is oppoſite to the ſide where the *ventilators* are, may be commodiouſly ventilated in its turn, by having a round brick air-gutter under ground; through which the foul air of thoſe wards might eaſily be drawn.

The windmill for working the *ventilators* was contrived to move with a ſmall degree of wind, and to obtain a ſufficient power in a ſmall compaſs. In *fig.* 69. *c* is one of the croſs-trees which ſupport the mill-poſt *d*, and the braces *e e*; the croſs-trees reſt on the blocks *a*, *a*, and are fixed to the floor by ſtrong iron bolts. The mill-poſt *d*, being hollow, admits the iron rod *b* to paſs through from the crank of the iron axle-tree *i*; the turning frame *g n* moves on the girdle *f*, on which lies a broad circular iron plate, where is the bearing of the braſs friction-wheels, whoſe iron axle-trees move in braſs collars: the turning frame *g n* carries the axle-tree *i i*; and the ſails *l k*, which are turned ſo as always to face the wind, by the vane *h*; the frame is kept from wracking by iron braces *q r*, repreſented by the double pricked lines. The crank *z* is ſix inches and a half long, and therefore gives a ſtroke of thirteen inches; but the lower end of the rod *x* is fixed to the lever of the *ventilator (fig.* 67.) at ſuch a diſtance from the centre of its motion, as to raiſe and fall the midriffs fifteen inches. The iron axle-tree extends forward, about two feet and a half beyond the face of the ſails; from the extremity of which, *s*, eight iron braces, *l*, *l*, go to each arm, to which they are faſtened by iron ſcrew-bolts, which bind them and the iron circle of pricked lines *m m (fig.* 70.) faſt together; the diameter of this circle is ſix feet, and the ſweeps or arms of the mill *k k* are ſeven feet three inches long, and they are mortiſed into the drum *y y*. A void ſpace of about ſix inches breadth is left between the ſails, as repreſented in the figure, that the direct current of the wind, as it paſſed through, might give a turn to the courſe of the wind; which otherwiſe, being driven obliquely from the face of the preceding ſail, would be forced to act on the back of the following ſail, and thereby abate the force, and retard the motion of the mill. The brake-pole (*fig.* 69.) is *n*; and the ſingle pricked line *t* at the end of it is the ſword which is to claſp round the nave to ſtop the mill, by pulling the rope *w*: *o o* is the bottom ſheer-tree of the turning frame; and *p* expreſſes the manner of ſcrewing the braſs collars of the axle-tree nearer and nearer, as they wear away. For a farther account of this machine, ſee Hales's Treatiſe of *Ventilators*, part ii. 1758, p. 32, &c.

Dr. Hales farther ſuggeſts, that *ventilators* might be of uſe in making ſalt, in order to which there ſhould be a ſtream of water to work them, or they might be worked by a windmill, and the brine ſhould be in long narrow canals, covered with boards or canvas, about a foot above the ſurface of the brine, in order to confine the ſtream of air, ſo as to make it act upon the ſurface of the brine, and carry off the water in vapours. Thus it might be reduced to a dry ſalt, with a ſaving of fuel, in winter and ſummer, or in a rainy or dry ſtate of the air. *Ventilators*, he apprehends, might alſo ſerve for drying linen hung in low, long, narrow galleries, eſpecially in damp, rainy weather, and alſo in drying woollen cloths, after they are fulled or dyed, and in this caſe they might be worked by the fulling water-mill. *Ventilators* might alſo be an uſeful appendage to malt and hop-kilns; in which caſe it would be beſt to have the air-trunk enter the kiln about eighteen or twenty-four inches from the ground, and juſt oppoſite to the fire; but in order to prevent the air's blowing too ſtrongly on the fire, a ſkreen of brick-work might be formed about a yard diſtant from the hole of the air-trunk, and a yard ſquare; for thus the air from the *ventilators* would be better diffuſed through the whole kiln.

Dr. Hales is alſo of opinion, that a ventilation of warm dry air from the adjoining ſtove, with a cautious hand, might be of ſervice to trees and plants in green-houſes; where it is well known that an air full of the rancid vapours, which perſpire from the plants, is very unkindly to them, as well as the vapours from human bodies are to men. For freſh air is as neceſſary to the healthy ſtate of vegetables as of animals.

The larger kinds of *ventilators*, uſed by the doctor, are ten feet long, five feet broad, and two feet high, in the clear within. Thoſe he uſed by way of experiment on board the Captain, a ſeventy-gun ſhip, were ten feet long, four feet three inches wide in the clear within, and thirteen inches deep; one inch of which being occupied by the midriff, there remained a foot depth for it to riſe and fall in. A *ventilator* of theſe dimenſions will, through a trunk of a foot ſquare, drive the air at the rate of twenty-five miles in an hour, which is double of what Mariotte aſſigns for the velocity of a pretty ſtrong WIND.

But beſides theſe large *ventilators*, the doctor made a ſmaller ſort, four feet in length, ſixteen inches in breadth, and thirteen inches deep, all in the clear within. This ſmaller *ventilator* may be very uſeful in preſerving the bread, in the bread-room of a ſhip, ſweet and dry. Peaſe alſo, and oatmeal, which are apt to heat and ſpoil in caſks, may be preſerved, by putting them into a large bin, with a falſe bottom of hair-cloth laid on bars, whereby freſh air may be blown upwards through them with theſe ſmall *ventilators*.

Ventilators are alſo of excellent uſe for the drying of corn, hops, and malt. See GRANARY.

Gunpowder may be thoroughly dried, by blowing air up through it by means of *ventilators*.

What advantage dry gunpowder has over that which is damp, may be ſeen by the experiment mentioned in the article **Gunpowder**.

Theſe ſmall *ventilators* will alſo ſerve to purify moſt eaſily, and effectually, the bad air of a ſhip's well, when there is occaſion for perſons to go down into it, by blowing air through a trunk, reaching within a yard of the bottom of the well, both for ſome time before, and during their ſtay there. They may be alſo made uſe of at ſea to ſweeten ſtinking water, &c. See *Sea*-**Water**.

Dr. Hales made alſo ſeveral trials for curing ill-taſted milk by ventilation.

For theſe and other uſes to which they might be applied, as well as for a particular account of the conſtruction and diſpoſition of *ventilators* in ſhips, hoſpitals, priſons, &c. and the benefits attending them, ſee Hales's Treatiſe on *Ventilators*, part ii. paſſim; and Phil. Tranſ. vol. xlix. p. 332, &c.

The *ventilators* in large ſhips, ſince the order for ventilating the fleet, iſſued by the lords of the admiralty in 1756, are fixed in the gunner's fore-ſtore-room, and generally a-head of the ſail-room. The foul air is carried up through the decks and fore-caſtle, near the fore-maſt, ſometimes afore it, and ſometimes abaſt it, but more frequently on its ſtarboard ſide; the lever, by which the *ventilators* are worked, is under the fore-caſtle in two-deck ſhips, and between the upper and middle decks in three-deckers; ſometimes the lever is hung athwart ſhips; in ſome ſhips afore and aft; and in others oblique. The iron rod, which communicates the motion from the lever, paſſes through the partners of the fore-maſt, and is connected with another lever, ſuſpended at or near the middle; in ſome ſhips over the *ventilators*; in others under them, when it is found neceſſary to fix them up to the deck. The beſt method to ſave room is to place the *ventilators* over one another, with their circular ends together; the air-trunk ſhould be ſo high above deck, that the men on deck may not be incommoded by the foul air which blows out of it; and therefore the trunk comes through the upper deck, near and behind the fore-maſt. Dr. Hales has calculated the following table for the ſizes of *ventilators*, &c. adapted to ſhips of war.

	Guns.	Feet.	Inch.	Feet.	Inch.	Feet.	Inch.		Inches.
Three decks.	100	10	0 long	4	6 broad	2	0 deep	Trunk	12 ſquare
	90	Ditto		Ditto		1	10		11½
	80	Ditto		Ditto		1	8		11
	70	Ditto		Ditto		Ditto			Ditto
	60	Ditto		Ditto		Ditto			Ditto
	50	9	0	4	3	1	6		10
	40	8	6	4	0	Ditto			9½
	20	8	0	Ditto		Ditto			9

The conſtruction of twenty-gun ſhips being various, the ſizes of *ventilators* for theſe muſt be left to the direction of the officers of the yard.

When the hold is to be ventilated from one end to the other, the three doors of the gang-way into the gunner's ſtore-room muſt be opened, and all the gratings on the gun-deck be covered with tarpaulins, leaving all doors open whoſe rooms want ventilation, on the orlop and the ſteward-room hatch. But when it is thought proper to ventilate between decks, then the doors of the gang-way into the gunner's ſtore-room muſt be ſhut, and the ſcuttle in the headmoſt trunk or pipe upon the gun-deck muſt be opened and all the gratings of the middle deck, if the ſhip be a three-decker, or of the upper deck, if it be a two-deck ſhip, be laid with tarpaulins; and, if poſſible, one of the ſtern-poſts opened, or the aftermoſt hatch-way, or a ſcuttle on purpoſe, through the deck, as near the ſtern as poſſible. Hales's Treat. part ii. p. 97, &c.

The method of drawing off air from ſhips by means of fire-pipes, which ſome have preferred to *ventilators*, was publiſhed by ſir Robert Moray in the Phil. Tranſ. for 1665. Theſe are metalline pipes, about two inches and a half in diameter, one of which reaches from the fire-place to the well of the ſhip; the other three branches go to other parts of the ſhip; the ſtoke-hole and aſh-hole being cloſed up, the fire is ſupplied with air through theſe pipes. The defects of theſe, compared with *ventilators*, are particularly examined by Dr. Hales, ubi ſupra, p. 113. See *Air*-**Pipe** and **Ship**.

Mr. Eraſmus King propoſed to have *ventilators* worked by the fire-engines, in mines; and Mr. Fitzgerald has ſuggeſted an improved method of doing this, which he has alſo illuſtrated by figures. See Phil. Tranſ. vol. l. p. 727, &c.

There are various ways of ventilating the air of rooms: Mr. Tidd contrived to admit freſh air into a room, by taking out the middle upper ſaſh-pane of glaſs, and fixing in its place a frame box, with a round hole in its middle, about ſix or ſeven inches diameter; in which hole are fixed, behind each other, two or three ſmall twirling windmills, with ſails of very thin broad copper-plates, which ſpread over and cover the circular hole, ſo as to make the air which enters the room to ſpread round in thin ſheets ſideways; and thus not to incommode perſons, by blowing directly upon them, as it would do if it were not hindered by the ſails, which turn on the ſame axle tree, each leſs than the other. See **Æolus**.

This method of refreſhing rooms is much approved of, and uſed by many, not only in England, but alſo in other countries. For other methods of ventilating ſhips, buildings, rooms, &c. ſee **Air**-*chamber*, **Bellows**, *Air*-**Pipe**, *Centrifugal* **Wheel**, and **Wind**-*ſail*.

VENTININA, a term uſed by Paracelſus and his followers, to expreſs the art of divining, or knowing by the winds and their courſes the good or ill effects of ſeaſons.

VENTOSA *ſpina*. See **Spina** *ventoſa*.

VENTOSITY, in *Medicine*. See **Flatulency**, *Windy* **Tumors**, and **Tympany**.

VENTRE *inſpiciendo*, a writ for the ſearch of a widow that ſays ſhe is with child, and thereby holds land from him that is, otherwiſe, next heir at law. See *Jury of* **Matrons**.

VENTRICLE, *ventriculus*, q. d. *little belly*, in *Anatomy*, a diminutive of **Venter**; ſignifying a cavity, ſmaller than what we expreſs by a venter; or, rather, a diviſion of a venter; or ſome ſmaller cavity contained in a larger.

There are two cavities in the heart, adjoining to the auricles, and four in the brain, called *ventricles*; which ſee explained under the articles **Heart**, and **Brain**.

The right *ventricle* of the heart, in relaxing, admits the blood, by the right auricle, from the cava; and, in contracting, drives it out into the pulmonary arteries; the *left*, receiving the blood by the left auricle, from the lungs, drives it out into the aorta. See *Tab. Anat.* (*Angei l.*) *fig.* 9. *lit. c.*

Ventricle, or **Ventriculus**, by way of eminence thus called, is the ſame with the **Stomach**.

For the action of the **Ventricle** *in vomiting*, ſee **Vomiting**.

VENTRICULI *ardor*. See **Ardor**.

VENTRICULUS *ſuccenturiatus*, in *Medicine*, a name given by ſome to the duodenum, when very large. Med. Eſſ. Edinb. abr. vol. ii. p. 34.

VENTRILOQUOUS, **Ventriloquus**, compounded of *venter*, *belly*, and *loquor*, *I ſpeak*, *gaſtriloquus*, or *engaſtrimythus*, a term applied to perſons who ſpeak inwardly; having a pecular art of forming ſpeech, by drawing the air into the lungs; ſo that the voice, proceeding out of the thorax, to a by-ſtander ſeems to come from ſome diſtance, or in any direction. See **Engastrimythus**.

Such a perſon we had formerly in London, a ſmith by profeſſion, who had the faculty in ſuch perfection, that he could make his voice appear, now, as if it came out of the cellar; and the next minute, as if in an upper room; and nobody preſent could perceive that he ſpoke at all. Accordingly, he has frequently called a perſon firſt up, then down ſtairs; then out of doors, then this way, then that; and all this without ſtirring from his ſeat, or appearing to ſpeak at all.

We cannot forbear making a few extracts on this curious ſubject from a work, publiſhed in 1772, entitled, Le Ventriloque, &c. or the Ventriloquiſt, by M. de la Chapelle, cenſor royal at Paris, member of the Academies at Lyons and Rouen, and F. R. S. Some faint traces of the art or faculty of *ventriloquiſm* are to be found in the writings of the ancients; but many more are to be diſcovered there, if we adopt this author's opinion, that the reſponſes of many of the ancient oracles were actually delivered by perſons poſſeſſing this quality, ſo very capable of being applied to the purpoſes of prieſtcraft and deluſion. The abbé de la Chapelle, having heard many ſurpriſing circumſtances related concerning one M. St. Gille, a grocer at St. Germain-en Laye, near Paris, whoſe powers as a *ventriloquiſt* had given occaſion to many ſingular and diverting ſcenes, formed the reſolution of ſeeing him. Being ſeated with him on the oppoſite ſide of a fire in a parlour on the ground-floor, and very attentively obſerving him, the abbé, after half an hour's converſation with M. St. Gille, heard himſelf called, on a ſudden, by his name and title, in a voice that ſeemed to come from the roof of a houſe at a diſtance; and whilſt he was pointing to the houſe from which the voice had appeared to him to proceed, he was yet more ſurpriſed by hearing the words "it was not from that quarter," apparently in the ſame kind of voice as before, but which now ſeemed to iſſue from under the earth, at one of the corners of the room. In ſhort, this factitious voice played, as it were, every where about him, and ſeemed to proceed from any quarter, or diſtance, from which the operator choſe to tranſmit it to him. To the abbé, though conſcious that the voice proceeded from the mouth of M. St. Gille, he appeared abſolutely mute, while he was exerciſing this talent; nor could any change in his countenance be diſcovered. He obſerved, however, that M. St. Gille preſented only the profile of his face to him, while he was ſpeaking as a *ventriloquiſt*. On another occaſion, M. St. Gille ſought for ſhelter from a ſtorm in a neighbouring convent; and finding the community in mourning, and enquiring the cauſe, he was told, that one of their body much eſteemed by them had lately died. Some of the religious attended him to the church, and ſhewing him the tomb of their deceaſed brother, ſpoke very feelingly of the ſcanty honours that had been beſtowed on his memory; when ſuddenly a voice was heard, apparently proceeding from the roof of the choir, lamenting the ſituation of the defunct in purgatory, and reproaching the brotherhood with their want of zeal on his account. The whole community being afterwards convened into the church, the voice from the roof renewed its lamentations and reproaches, and the whole convent fell on their faces, and vowed a ſolemn reparation. Accordingly they firſt chaunted a *de profundis* in full choir, during the intervals of which the ghoſt occaſionally expreſſed the comfort he received from their pious exerciſes and ejaculations in his behalf. The prior, when this religious ſervice was concluded, entered into a ſerious converſation with M. St. Gille, and inveighed againſt the abſurd incredulity of our modern ſceptics and pretended philoſophers, on the article of ghoſts and apparitions; and M. St. Gille found it difficult to convince the fathers that the whole was a ludicrous deception.

Another inſtance of his extraordinary powers occurred in preſence of a large party, conſiſting of commiſſaries from the Royal Academy of Sciences at Paris, and other perſons of the higheſt quality, together with a certain lady, who was not in the ſecret, and who was only told, that an aerial ſpirit had lately eſtabliſhed itſelf in the foreſt of St. Germain en-Laye, and that they were aſſembled to enquire into the reality of the fact. When the party ſat down to dinner, the aerial ſpirit began to addreſs the lady with a voice that ſeemed to be in the air over their heads; ſometimes he ſpoke to her from the trees around them, or from the ſurface of the ground at a great diſtance, and at other times from a conſiderable depth under her feet. The lady, being thus addreſſed for more than two hours, was firmly perſuaded that this was the voice of an aerial ſpirit; and it was ſome time before ſhe was undeceived.

Several other inſtances of M. St. Gille's talent are related; and the abbé, in the courſe of his inquiries, was informed, that the baron de Mengen, a German nobleman, poſſeſſed this art in a very high degree. He alſo relates, from Brodeau, a learned critic in the ſixteenth century, one of the ſingular feats performed by a capital *ventriloquiſt* in his time, who was called Louis Brabant, and was valet de chambre to Francis I. Our countryman Dickenſon ſpeaks of him particularly, in his tract, entitled Delphi Phœnicizantes, printed in duodecimo at Oxford, in 1655. Louis had fallen in love with a beautiful and rich heireſs, but was rejected by the parents as an unſuitable match, on account of his low circumſtances. However, the father dying, he viſits the widow; and on his firſt appearance in the houſe, ſhe hears herſelf accoſted in a voice reſembling that of her dead huſband, and which ſeemed to proceed from above. "Give my daughter in marriage to Louis Brabant, who is a man of great fortune, and excellent character; I now endure the inexpreſſible torments of purgatory, for having refuſed her to him; obey this admonition, and I ſhall be ſoon delivered; you will provide a worthy huſband for your daughter, and procure everlaſting repoſe to the ſoul of your poor huſband." The dread ſummons, which had no appearance of proceeding from Louis, whoſe countenance exhibited no change, and whoſe lips were cloſe and motionleſs, was inſtantly complied with; but the deceiver, in order to mend his finances for the accompliſhment of the marriage contract, applies to one Cornu, an old and rich banker at Lyons, who had accumulated immenſe wealth by uſury and extortion, and was haunted by remorſe of conſcience. After ſome converſation on demons and ſpectres, the pains of purgatory, &c. during an interval of ſilence, a voice is heard like that of the banker's deceaſed father, complaining of his dreadful ſituation in purgatory, and calling upon him to reſcue him from thence, by putting into the hands of Louis Brabant, then with him, a large ſum for the redemption of Chriſtians in ſlavery with the Turks; threatening him at the ſame time with eternal damnation, if he did not thus expiate his own ſins. Upon a ſecond interview, in which his ears were ſaluted with the complaints and groans of his father, and of all his deceaſed relations, imploring him for the love of God, and in the name of every ſaint in the Calendar, to have mercy on his own ſoul and others, Cornu obeyed the heavenly voice, and gave Louis ten thouſand crowns, with which he returned to Paris, and married his miſtreſs. The miſer, being afterwards undeceived, was ſo mortified, that he took to his bed and died.

The abbé de la Chapelle takes occaſion to account for all the circumſtances attending Saul's conference with the WITCH *of Endor*, and endeavours to ſhew that the ſpeech, ſuppoſed to be addreſſed to Saul by the ghoſt of Samuel, actually proceeded from the mouth of the reputed ſorcereſs, whom he ſuppoſes to have been a capital *ventriloquiſt*. On theſe grounds he explains that tranſaction, and reconciles all its circumſtances to the relation given of it in Scripture; where, it is to be obſerved, that Saul is not ſaid to have ſeen Samuel, but only to have heard a voice, which a *ventriloquiſt* can produce and tranſmit from any quarter, and with any degree of ſtrength whatever. He afterwards brings many inſtances to prove, that the ancient oracles principally ſupported their credit, and derived their influence, from the exerciſe of this particular art. Many other learned men have given the ſame account of the witch of Endor. Though ſhe is ſaid to have a *familiar ſpirit*, yet the Hebrew word *ob*, and the plural *oboth*, is generally rendered by the LXX. ἐγγαστριμυθος, *ventriloquiſt*. Thus it is rendered Iſaiah xix. 3. It appears from Plutarch (De Defect. Orac. tom. ii. p. 414.) Suidas (tom. i. ad voc. ἐγγαστριμυθος, p. 667.) and Joſephus (Antiq. lib. xiv. p. 354.) that thoſe who were anciently called *ventriloquiſts* had afterwards the name of *Pythoneſſes*, which implies a pretence to divination. Accordingly *Python* is the word uſed by the Vulgate verſion, 1 Sam. xxviii. 7, 8. though not, as Voltaire ſeems to intimate, in the Hebrew; and therefore there is no ground for the concluſion which he draws, viz. that the hiſtory was not written till the Jews traded with the Greeks, after the time of Alexander, i. e. for determining the date of a Hebrew book from the uſe of a word in a Latin tranſlation, made many hundred years after it, and not to be found in the original.

From baron de Mengen's account of himſelf, and the obſervations made by M. de la Chapelle in his frequent examinations of M. St. Gille, it ſeems that the factitious voice produced by a *ventriloquiſt* does not (as the etymology of the word imports) proceed from the belly, but is formed in the inner parts of the mouth and throat. The art, according to this author, does not depend on a particular ſtructure or organization of theſe parts, peculiar to a few individuals, and very rarely occurring, but may be acquired by almoſt any ardently deſirous of attaining it, and determined to perſevere in repeated trials. The judgments we form concerning the ſituation and diſtance of bodies, by means of the ſenſes mutually aſſiſting and correcting each other, ſeem to be entirely founded on experience (ſee Reid's Inquiry into the Human Mind, p. 79. edit. 2.); and we paſs from the ſign to the thing ſignified by it immediately, or at leaſt without any intermediate ſteps perceptible to ourſelves. Hence it follows, that if a man, though in the ſame room with another, can by any peculiar modification of the organs of ſpeech produce a ſound, which in faintneſs, tone, body, and every other ſenſible quality, perfectly reſembles a ſound delivered from the roof of an oppoſite houſe, the ear will naturally, without examination, refer it to that ſituation and diſtance; the ſound which the perſon hears being only a ſign, which from infancy he has been accuſtomed, by experience, to aſſociate with the idea of a perſon ſpeaking from a houſe top. A deception of this kind is practiſed with ſucceſs on the organ and other muſical inſtruments, and there are many ſimilar optical deceptions.

Rolandus, in his Agloſſoſtomographia, mentions, that if the mediaſtinum, which is naturally a ſingle membrane, be divided into two parts, the ſpeech will ſeem to come out of the breaſt; ſo that the by-ſtanders will fancy the perſon poſſeſſed.

VENTURINE, or ADVENTURINE, is ſometimes uſed for the fineſt and ſlendereſt gold wire, uſed by embroiderers, &c.

When reduced into powder, as fine as it can be clipped, or filed, this powder may be ſtrewed on the firſt layer of pure varniſh, made uſe of in JAPANNING, after the varniſh is dry, in order to lay any colour over it.

VENUE, or VENEW, in *Law*, a neighbouring or near place. *Locus quem vicini habitant.*

Thus we ſay, twelve of the aſſizes ought to be of the ſame *venue* where the demand is made.

In tranſitory actions the courts will very often change the *venue*, or county, wherein the cauſe is to be tried. The ſtatute 6 Ric. II. cap. 2. having ordered all writs to be laid in their proper counties, this, as the judges conceived, impowered them to change the *venue*, if required, and not to inſiſt rigidly on abating the writ, which practice began in the reign of James I. and this power is diſcretionally exerciſed, ſo as not to cauſe, but prevent a defect of juſtice. Therefore the court will not change the *venue* to any of the four northern counties, previous to the ſpring circuit; becauſe there the aſſizes are holden only once a year, at the time of the ſummer circuit. And it will ſometimes remove the *venue* from the proper juriſdiction (eſpecially of the narrow and limited kind) upon a ſuggeſtion, duly ſupported, that a fair and impartial trial cannot be had therein. Blackſt. Comm. book iii. p. 294.

VENUS, in *Aſtronomy*, one of the inferior planets; denoted by the character ♀.

Venus is eaſily diſtinguiſhed by her brightneſs and whiteneſs, which exceeds that of all the other planets; and which is ſo conſiderable, that in a duſky place, ſhe projects a ſenſible ſhadow. Her place is between the earth and Mercury.

She conſtantly attends the ſun, and never departs from him above 47 or 48 degrees. See ELONGATION.

When ſhe appears weſt of the ſun, that is, from her inferior conjunction to her ſuperior, ſhe riſes before him, and is called *Phoſphorus*, or *Lucifer*, or the *Morning ſtar*; and when ſhe appears eaſt of the ſun, that is, from her ſuperior conjunction to her inferior, ſhe ſets after him, or ſhines in the evening after he ſets, and is called *Heſperus*, or *Veſper*, or the *Evening ſtar*: being each in its turn for two hundred and ninety days. The diameter of *Venus* is to that of the earth as $11\frac{7}{10}$ to 10 nearly, her apparent diameter equal to 59″, and real diameter equal to 9330 miles: her horizontal parallax about 30″: her diſtance from the ſun is to that of the earth from the ſun as 72333 to 100000, and her real diſtance is 68,891,486 miles: her excentricity is $\frac{7}{1000}$ths of her mean diſtance from the ſun: the inclination of her orbit to the plane of the ecliptic 3° 23′; the points of their interſection or nodes are 14° of Gemini and Sagittarius: her periodical courſe round the ſun is performed in two hundred and twenty-four days ſeventeen hours; and her motion round her own axis in twenty-three hours, or, according to the obſervations of Bianchini, in twenty-four days eight hours. See DIAMETER, DISTANCE, EXCENTRICITY, PARALLAX, and PERIOD. See alſo PLANETS.

Venus, when viewed through a teleſcope, is rarely ſeen to ſhine with a full face, but has phaſes juſt like thoſe of the moon; being now gibbous, now horned, &c. and her illumined part is conſtantly turned towards the ſun, i. e. it looks towards the eaſt, when *Phoſphorus*; and towards the weſt, when *Heſperus*.

Theſe different phaſes of *Venus* were firſt obſerved by Galileo; who thus fulfilled the prediction of Copernicus: for when this excellent aſtronomer revived the ancient Pythagorean ſyſtem, aſſerting, that the earth and planets moved round the ſun, it was objected that in ſuch a caſe the phaſes of *Venus* ſhould reſemble thoſe of the moon; to which Copernicus replied, that ſome time or other that reſemblance would be found out. Galileo ſent an account of the firſt diſcovery of theſe phaſes in a letter, written from Florence in 1611, to William de Medici, the duke of Tuſcany's ambaſſador at Prague; deſiring him to communicate it to Kepler. The letter is extant in the preface to Kepler's Dioptrics, and a tranſlation of it may be ſeen in Smith's Optics, p. 416.

Having recited the obſervations which he had made, he adds, "we have hence the moſt certain, ſenſible deciſion and demonſtration of two grand queſtions, which to this day have been doubtful and diſputed among the greateſt maſters of reaſon in the world. One is, that the planets in their own nature are opake bodies, attributing to Mercury what we have ſeen in *Venus*: and the other is, that *Venus* neceſſarily moves round the ſun; as alſo Mercury and the other planets; a thing well believed indeed by Pythagoras, Copernicus, Kepler, and myſelf, but never yet proved, as now, by ocular inſpection upon *Venus*." He cloſes with explaining the cypher that had been ſent in the following words, *Hæc immatura à me fruſtra leguntur, o, y,* i. e. *Cynthiæ figuras æmulatur mater amorum*, or Venus *imitates the phaſes of the moon*.

De la Hire, in 1700, through a teleſcope of ſixteen feet, diſcovered ſpots in *Venus*; which he found to be larger than thoſe in the moon.

And Caſſini, and Campani, in the years 1665 and 1666, diſcovered ſpots in her face: from the appearances of which he aſcertained her motion round her axis: concluding, with diffidence, that *Venus* revolved about an axis in leſs than a day; or at leaſt, that the bright ſpot which he obſerved, finiſhed its period either by revolution or libration in that time, or in about twenty-three hours. The next obſervations of the ſame kind that occur are thoſe of ſignior Bianchini at Rome, in 1726, 1727, 1728, who with Campani's glaſſes, diſcovered ſeveral dark ſpots in the diſk of *Venus*, of which he gave an account and repreſentation in his book entitled Heſperi & Phoſphori Nova Phenomena, publiſhed at Rome in 1728. From ſeveral ſucceſſive obſervations, Bianchini concludes, that a revolution of *Venus* about her axis was not completed in twenty-three hours, as Caſſini imagined, but in $24\frac{1}{3}$ days; that the north pole of this revolution faced the 20th degree of Aquarius, and was elevated 15° above the plane of the ecliptic, and that the axis kept parallel to itſelf, during its revolution about the ſun. Caſſini the ſon, though he admits the accuracy of Bianchini's obſervations, diſputes the concluſion drawn from them, and ultimately obſerves, that if we ſuppoſe the period of the revolution of *Venus* to be 23 h. 20′, it agrees equally well with the obſervations both of his father and Bianchini; but if it revolves in 24 d. 8 h. then his father's obſervations muſt be rejected as of no conſequence.

M. Maraldi made ſeveral obſervations on *Venus* in 1729, but could perceive no ſpot: and, therefore, thoſe obſerved by Bianchini muſt either have diſappeared, or the air at Paris was not ſo clear as at Rome.

Martin Folkes, eſq. formerly preſident of the Royal Society, ſpoke of Bianchini with reſpect, as too accurate to make any miſtakes in aſtronomical obſervations, and too honeſt to publiſh any thing that was not exactly agreeable to truth.

Sometimes *Venus* is ſeen in the diſk of the ſun, in form of a dark, round ſpot. This happens when the earth is about her nodes at the time of her inferior conjunction. Theſe appearances, called TRANSITS, happen but ſeldom. We have had two in this century, viz. one in June, 1761, and another in June, 1769. The next will not occur before the year 1874. See PARALLAX.

Except ſuch tranſits as theſe, *Venus* exhibits the ſame appearances to us regularly every eight years; her conjunctions, elongations, and times of riſing and ſitting, being very nearly the ſame, on the ſame days, as before.

In 1672, and 1686, Caſſini, with a teleſcope of 34 feet, thought he ſaw a ſatellite moving round this planet, and diſtant from it about $\frac{3}{5}$ of *Venus*'s diameter. It had the ſame phaſes as *Venus*, but without any well defined form; and its diameter ſcarce exceeded $\frac{1}{4}$ of that of *Venus*. Dr. Gregory (Aſt. lib. vi. prop. 3.) thinks it more than probable, that this was a ſatellite; and ſuppoſes the reaſon why it is not uſually ſeen, to be the unfitneſs of its ſurface to reflect the rays of the ſun's light; as is the caſe of the ſpots in the moon: of which if the whole diſk of the moon were compoſed, he thinks, that planet could not be ſeen as far as to *Venus*.

Mr. Short, in 1740, with a reflecting teleſcope of $16\frac{1}{2}$ inches focus, perceived a ſmall ſtar near *Venus*; with another teleſcope of the ſame focus, magnifying fifty or ſixty times, and fitted with a micrometer, he found its diſtance from *Venus* about 10°: with a magnifying power of 240 he obſerved the ſtar aſſume the ſame phaſes with *Venus*: its diameter ſeemed to be about $\frac{1}{3}$, or ſomewhat leſs, of the diameter of *Venus*; its light not ſo bright and vivid, but exceeding ſharp and well defined. He viewed it for the ſpace of an hour, but never had the good fortune to ſee it after the firſt morning. Phil. Tranſ. N° 459. p. 646. or Martyn's Abr. vol. viii. p. 208.

M. Montaigne, of Limoges in France, we are told in the Encyclopedie, art. *Venus*, preparing for obſerving the tranſit of 1761, diſcovered in the preceding May a ſmall ſtar about the diſtance of 20′ from *Venus*, and its diameter was about $\frac{1}{4}$ of the planet. He made other obſervations for ſeveral days, which were communicated to M. Baudouin, who read two memoirs on the ſubject to the Royal Academy of Sciences, in which he endeavoured to ſtate the elements of the orbit of this ſatellite: but it is to be conſidered, that Montaigne's teleſcope had no micrometer, and that his diſtances muſt be very vague and uncertain. After all, it muſt be acknowledged, that *Venus* may have a ſatellite, though it is difficult for us to ſee it. Its enlightened ſide can never be fully turned towards us, but when *Venus* is beyond the ſun; in which caſe *Venus* appears little bigger than an ordinary ſtar, and therefore her ſatellite may be too ſmall to be perceived at ſuch a diſtance. When ſhe is between us and the ſun, her full moon has her dark ſide turned towards us, and when *Venus* is at her greateſt elongation, we have but one half of the enlightened ſide of her full moon towards us, and even then it may be too far diſtant to be ſeen by us. But it was preſumed, that the two tranſits of 1761, and 1769, would afford opportunity for determining this point; and yet we find that, although many obſervers directed their attention to this object, no ſatellite was ſeen in the ſun's diſk; and therefore it is reaſonable to conclude, that *Venus* has no ſatellite.

The phenomena of *Venus* evidently ſhew the falſity of the Ptolemaic ſyſtem: for that ſyſtem ſuppoſes, that *Venus*'s orb, or heaven, encloſes the earth; paſſing between the ſun and Mercury. And yet all our obſervations agree, that *Venus* is ſometimes on this ſide of the ſun, and ſometimes on the other; nor did ever any body ſee the earth between *Venus* and the ſun: which yet muſt frequently happen, if *Venus* revolved round the earth in an heaven below the ſun.

Dr. Deſaguliers contrived a planetarium to repreſent the phenomena of *Venus*, according to the diſcoveries of Bianchini; as did alſo Mr. Ferguſon an orrery for the ſame purpoſe. The principal properties of theſe machines are the following: that the angle of the axis of the globe repreſenting *Venus* makes, with the ecliptic, an angle of 15°; that the tropics are 75° from the equator; that the tropics are 15° from the equator; that the plane of a ſolar horizon for the longeſt day cuts the plane of the equator at an angle of 15°; that the ſun's greateſt declination is 75°; that there are but $9\frac{1}{4}$ days in every revolution round the ſun; and that to bring the days to an even reckoning, every fourth year muſt be a leap year, which, taking in the four quarters of a revolution, will make the leap year in *Venus* conſiſt of ten of her days, equal to $7\frac{1}{2}$ months of our time; and that the long day for the north pole will contain $4\frac{5}{8}$ apparent diurnal revolutions of the ſun. For a detail and illuſtration of the phenomena reſulting from theſe properties; ſee Deſaguliers's Exp. Phil. vol. ii. p. 552, &c Phil. Tranſ. vol. xliv. p. 127, &c. &c. Ferguſon's Aſtron. p. 8, &c.

VENUS, in *Chemiſtry*, is uſed for the metal COPPER.

Its character is ♀; which, ſay the adepti, expreſſes it to be gold, only joined with ſome corroſive and arſenical menſtruum; which removed, copper would be gold.

Venus is univerſally allowed, by the chemiſts, &c. to be one of the moſt powerful medicines in nature: of this, is ſaid to have been compoſed the famous Butler's ſtone, which cured moſt diſeaſes by only licking it. Of this is compoſed that noble remedy of Van Helmont, viz. the ſulphur of vitriol, or ens vitrioli, fixed by calcination and cohobation. Of the ens vitrioli of *Venus* is likewiſe compoſed Mr. Boyle's arcanum, the colcothar vitrioli.

It is certain, copper is a powerful emetic, and an antidote againſt poiſons; for it is no ſooner taken than it exerts its force: whereas other vomitories lie a good while in the ſtomach: but one ſingle grain of ruſt of *Venus* immediately vomits. Hence ſyrups, that have ſtood over night in copper veſſels, create a vomiting.

However pure copper, in its metallic ſtate, or calcined by fire, appears to be indiſſoluble, and of no conſiderable effect, in the bodies of animals: but diſſolved in the nitrous or marine acids, and cryſtallized or exſiccated by heat, it proves a ſtrong cauſtic. Preparations of this kind, though formerly uſed, are now laid aſide. Copper, combined with the vitriolic acid, or with vegetable acids, or corroded by the air, acts outwardly, as an efficacious detergent and a gentle eſcharotic, and internally as a virulent emetic and cathartic. Some have ventured on ſmall doſes, as quick emetics for expelling poiſons; but the end may be obtained by leſs dangerous means.

It has been alſo reckoned an excellent medicine in chronical caſes: hence a famous phyſician is recorded to have cured Charles V. of a dropſy by the uſe of copper.

A ſaturated ſolution of the metal in volatile ſpirits is recommended by Boerhaave in diſorders proceeding from an acid, weak, cold, phlegmatic cauſe. He ſays, that if three drops be taken in the morning in a glaſs of mead, and the doſe doubled every day to twenty-four drops, it proves attenuating, warming, and diuretic; that by this medicine he once cured a confirmed aſcites; though in other ſimilar caſes it failed; that it is the only preparation of copper which does not prove emetic; and that it may be tried with ſafety. Dr. Lewis, however, is of opinion, that in conſiderable doſes it would exert the ſame virulent operation with the other ſoluble preparations or ſolutions of copper. A ſolid preparation of this kind, made by rubbing together in a glaſs mortar two parts of blue vitriol, and three of the volatile ſalt procured from ſal ammoniac, till all efferveſcence has ceaſed, and then gently drying the concrete, is ordered in the laſt Edinburgh Pharmacopœia, under the name of *cuprum ammoniacum*. It has frequently been given with ſucceſs in epileptic and convulſive diſorders. Lewis. See SAPPHIRINA *aqua*, and AQUA *vitriolica cœrulea*.

Venus is diſſoluble by all the ſalts known, both acid, alkaline, and nitrous; nay, even by water and air, conſidered as they contain ſalt.

It is from this common reception of all menſtruums, that copper is called *Venus*, q. d. *meretrix publica*, a common proſtitute: though others take the denomination to have been occaſioned by its turning of a ſea green colour, when diſſolved by acid. It muſt be given internally, with great caution.

VENUS, *cryſtals of*. See CRYSTAL, and VERDEGREASE.

VENUS, *ſpirit of*. See SPIRIT of *Venus*.

VENUS, in *Mythology*, the goddeſs of love, thus invoked by Lucretius:

> *Tu dea, tu rerum naturam tota gubernas,*
> *Nec ſine te quicquam des in luminis oras*
> *Exoritur, neque fit lætum, nec amabile quicquam.*

She is repreſented by the poets, painters, and ſtatuaries of antiquity, in a variety of alluring forms: with her hair ſometimes waving over her naked ſhoulders, and ſometimes negligently tied behind in golden treſſes; with a mantle, exhibiting all the colours of the rainbow and glittering with diamonds, ſometimes flowing looſely, and at other times bound with a girdle or belt, called CESTUS, of which it is ſaid that, *in eo deliramenta omnia incluſa erant; ibi inerat amor, inerat deſiderium, inerat et amantium colloquium, itinerat et blanda loquentia quæ furtim mentem prudentium ſubripit*: accompanied by two Cupids, the three Graces, and followed by the beautiful Adonis, who held up her train; and riding in a chariot of ivory, finely carved, and beautifully painted and gilt, and drawn by ſwans, doves, or ſwallows. She is ſometimes exhibited like a young virgin riſing from the ſea, and riding in a ſhell; at other times with a ſhell in her hand, and her head crowned with roſes; ſometimes with a mirror in her hand, and golden ſandals and buckles on her feet; ſometimes with poppy in one hand, and an apple in the other; and at Elis ſhe was repreſented as treading on a tortoiſe; the tortoiſe being an emblem of reſerve and modeſty.

According to Cicero (de Nat. Deorum, lib. iii.) there were four principal deities under the denomination of *Venus*; one, the daughter of Cælum and Dies, called *Venus Urania*, who had a temple at Cythera, and alſo at Elis, with a ſtatute of gold and ivory, executed by Phidias: the ſecond, produced from the froth of the ſea, called by the Greeks APHRODITE’ and ANADUOMENE’, whoſe cradle was a ſhell in which ſhe was driven by Zephyrus upon the iſland Cyprus, and received by the Hours or *Horæ*, who educated her and preſented her to the gods, and who was at length, as ſome ſay, married to Vulcan: the third, born of Jupiter and Dione, and as Cicero ſays, married to Vulcan: and the fourth, born of Syria and Tyrus, called Aſtarte, and ſaid to have been married to Adonis. *Venus* was known under ſeveral appellations and characters. Accordingly we read of the *Venus Amica*, *Armata*, *Apaturia* or *Deſidioſa*, *Barbata*, *Cypria*, *Cytherea*, *Calva*, *Cluacina*, *Erycina*, *Ridens*, *Improba*, *Hortenſis*, *Marina*, *Paphia*, *Verticordia*, *Victrix*, &c. Praxiteles executed two ſtatues of *Venus*, one clothed, bought by the inhabitants of Cos, and another naked, which he ſold to the Cnidians. See ANADUOMENE’, and VENUS *de Medicis*.

The *Venus* of M. Maffei ſeems to have been formed in conformity to the well-known paſſage of Terence,

> *Sine Cerere & Baccho friget* Venus.

We have on medals the *Venus Urania*, or *Cæleſtis*, with a ſtar or ſun; and the *Venus Paphia* almoſt naked, leaning on a column, with a helmet and the arms of Mars in her hands, bearing an inſcription *Veneri Victrici*, or *Veneri Genetrici*. There is alſo a picture of the *Venus Deſidioſa* in the Barbarini palace at Rome, which is one of the fineſt-coloured pictures that is left us by the ancients; the air of whoſe head may be compared with Guido's, and the colouring of the fleſh reminds us of Titian. Part of this picture is loſt, and part reſtored by Carlo Marat. *Venus* is deſcribed by Statius (lib. i. ſylv. v. 56) much in the ſame manner as ſhe is repreſented in the Barbarini picture.

We ſhall only add, that *Venus* is ſometimes deſcribed by the poets of the third age under the character of the goddeſs of jealouſy, rather than as the goddeſs of love; in which Valerius Flaccus (Argon. ii. v. 106.) and Statius (Theb. v. v. 69.) have drawn two very terrible pictures of her. Spence's Polymetis, p. 74.

VENUS *de Medicis*, in the hiſtory of *Ancient Sculpture*, a famous ſtatue of white marble, about five feet high, brought from the Medicis palace at Rome to Florence, by order of duke Coſmo III. and now ſtanding in the great duke's palace. The hips, legs, and arms, were broken off by the removal of this ſtatue; but they have been rejoined with an art, that renders their former ſeparation imperceptible. The inſcription on the baſe intimates that this was the work of Cleomenes, an Athenian, the ſon of Apollodorus: the pedeſtal is modern; the ſtatue ſeems to bear a little forward; the right knee advances a little, the left hand is placed before that part which diſtinguiſhes the ſexes, and the right acroſs her breaſts; yet without touching the body. The head inclines a little to the left ſhoulder; ſo that her face ſeems to be turned away a little from the obſerver: and from this circumſtance ſome have taken occaſion to remark, that the air of the head of this *Venus* expreſſes three different paſſions; as you firſt approach her, you perceive averſion or denial in her look; as you advance a ſtep or two nearer, ſhe ſhews compliance; and one ſtep more to the right, it is ſaid, turns into a little inſidious and inſulting ſmile: but Mr. Spence does not allow that this account is juſtified by the ſtatue itſelf.

The attitude of the *Venus* de Medici is peculiarly graceful: that attitude may be deſcribed in two verſes of Ovid, Art. Am. v. 614.

Ipſa Venus *pubem, quoties velamina ponit,*
Protegitur læva ſemireductâ manu.

The bloom of youth, the pleaſing ſoftneſs of her look, and her beauty and modeſty ſeem to rival each other in the charms of her countenance. Her perſon is ſomewhat plump, and the fleſh is ſo admirably executed, that it ſeems ſo ſoft as if it would yield to the touch. Time has given to the white marble a yellowiſh hue, though ſtill in the ſun-ſhine it is almoſt tranſparent: her hair is brown, which may be no more than the faded gilding not unuſual among the ancients. The head, which is ſaid to be too ſmall in proportion to the other parts, is ſuſpected by ſome not to have been executed by the ſame artiſt who made the body: this will ever be the ſtandard of female beauty and ſoftneſs: the breaſts are alſo the fineſt that can be conceived, ſmall, diſtinct, and delicate, ſuggeſting an idea of ſoftneſs, which no copies can imitate, and alſo of firmneſs: from the breaſts, her ſhape begins to diminiſh gradually down to her waiſt; but with an exquiſite fineneſs of ſhape, the *Venus* of Medici has what the Romans call corpus ſolidum, and the French the embonpoint; and her waiſt in particular is not repreſented as ſtinted by art, but as exactly proportioned by nature to all the other parts of her body. There is alſo a tenderneſs and elegance in every other part of her form: her legs are neat and ſlender: the ſmall of them is finely rounded, and her feet are little, white, and pretty: ſo that ſhe poſſeſſes all thoſe leſſer beauties which the poets have marked out in the female make; the *teretes ſuræ* (Hor. lib. ii. od. iv. ver 21.) and the *pes candidus* (id. lib. iv. od. i. v. 27.) and *exiguus* (Ovid. Am. lib. ii. el. iii. ver. 7.) And one may well ſay of this ſtatue, what one of the perſons in Plautus's Epidicus (act. v. ſc. 1) ſays of a complete beauty:

Ab unguiculo ad capillum ſummum, eſt feſtiviſſima.

Though the *Venus* of Medici has not eſcaped cenſure, with regard to the ſmallneſs of her head and hips, the largeneſs of the noſe, the depth of the partition along the vertebræ of the back, the length of the fingers, which, excepting the little finger on the left hand, are without joints; and though in comparing the parts ſeparate, as the head, noſe, &c. of this ſtatue, with thoſe of others, the ſimilar parts might be found, even of ſuperior workmanſhip; yet for ſuch a combination of beauties, the delicacy of ſhape and attitude, and ſymmetry of the whole, it is univerſally allowed that the world doth not afford its equal. This incomparable ſtatue ſtands between two others, which in any other place would be eſteemed admirable pieces: that on the right of the *Venus* de Medici is twice as big, with the golden apple in her hand, and is called *Venus Victrix*; the other by Hercules Ferrata is diſtinguiſhed by the name of *Venus Urania*. Spence's Polymetis, p. 6, &c. Keyſler's Travels, vol. i. p. 434.

VENUS'S *comb*, in *Botany*, the Engliſh name of a genus of plants, called by botanical writers *ſcandix*. See SHEPHERD'S *needle*.

VENUS'S *looking-glaſs*, a name ſometimes uſed for the CAMPANULA, or bell-flower.

VENUS'S *navel-wort*, the name by which ſome call the *omphalodes*, or *cynogloſſum*. See HOUND'S *Tongue*.

VENUS, in *Heraldry*, is uſed for the colour VERT.

VENUS, in the Linnean ſyſtem of *Natural Hiſtory*, a genus of the *teſtacea* order of worms. Its characters are, that the animal is a *tethys*, the ſhell is bivalve, the legs are incumbent at the anterior margin, the hinge has three teeth, diverging at their apex; the anus and vulva diſtinct. Linnæus enumerates thirty-nine ſpecies.

VENUS, *mount of*, *Mons* VENERIS, among *Anatomiſts*, is a little hairy protuberance in the middle of the PUBES of women; occaſioned by the collection of fat under the ſkin in that place.

Among chiromancers, the *mount of Venus* is a little eminence in the palm of the hand, at the root of one of the fingers.

VER-*puceron*, in *Natural Hiſtory*, a name given to a kind of inſects which are fond of eating the PUCERON, and deſtroy them in vaſt numbers.

They are thus called, as the ant-eater is, *formica leo*, from their deſtroying great numbers of them.

Theſe *ver-pucerons* are a ſort of worms produced from the eggs of flies, and are of two principal kinds; the one having legs, the other none.

When we obſerve the vaſt number of young produced by every puceron, and the quick progreſs they make in their multiplication, we are apt to wonder, that every plant and tree in the world is not covered with them; but on the contrary, when we obſerve the devaſtation theſe devourers make among them, we are apt to wonder how any of them eſcape at all, to perpetuate the ſpecies. Theſe worms indeed ſeem created for no other purpoſe but to deſtroy them; and this they do in ſo violent a manner as is ſcarce to be conceived. As the flies of many kinds lay their eggs on meat and other ſubſtances, which they know will afford food for the young ones, when hatched from them: ſo the parents of theſe worms lay their eggs on the branches and leaves of trees loaded with pucerons, on which they know they will feed. The worms produced from them are devourers from the very inſtant they are hatched, and find themſelves placed in the midſt of prey, being every way ſurrounded by a nation of creatures which are their proper food, and which are furniſhed with no weapons, either offenſive or defenſive, and which never ſo much as attempt to fly from them, but ſeem wholly ignorant of their danger, till ſeized upon by the devourers. Reaumur's Hiſt. of Inſects, vol. vi. p. 111. See *Tab. Inſects*, N° 24.

The flies, which are produced from theſe worms, are all of the two-winged kind; but there are ſeveral different ſpecies of them; the generality of them reſemble waſps, and have a very flat body. Geodart, who has deſcribed ſome of theſe flies, was ſurpriſed to ſee them very ſmall, when firſt produced from the chryſalis, yet growing very large in a quarter of an hour's time, and that without taking any nouriſhment; but this was only owing to their ſeveral parts having been ſqueezed while in the chryſalis, and expanding themſelves when they were at liberty from the compreſſion. Theſe are the changes of this kind of *leo-puceron*; but the other devourer of theſe creatures, which has ſix legs, is of a different kind, and indeed is in itſelf reducible to ſeveral ſpecies, ſome of theſe ſix-legged worms becoming four-winged flies, and others a kind of beetles. Theſe, from their near reſemblance to the formica-leo, are by Reaumur diſtinctly called *puceron*-LIONS.

VER-*polype*, in *Natural Hiſtory*, a name given by Reaumur, and ſome other authors, to a ſpecies of water-worm, by no means to be confounded with the creature called ſimply the POLYPE, and which is ſo famous for its reproduction of parts cut off, and for many other ſingular properties.

This *ver-polype* is a ſpecies of water-worm, produced from the egg of a tipula, and had this name given it from ſome remarkable production, placed at the anterior and poſterior parts of the body, which are ſuppoſed to have ſome analogy with the parts of the ſea-fiſh called the *polypus*. Theſe worms are found in muddy ditches, uſually either crawling upon, or buried in the mud. Reaumur's Hiſt. Inſects, vol. ix. p. 49.

VERA *billa*. See BILLA.

VERANO *ave*, or *ave de* VERANO, in *Ornithology*, the name by which the Portugueſe in the Brazils call a large bird of the thruſh kind, approaching to the ſize of a ſmall pigeon, remarkable for its loud noiſe; and more commonly known by its American name GUIRAPANGA.

VERATRUM, in *Botany*. See HELLEBORE.

VERB, in *Grammar*, a word ſerving to expreſs what we affirm of any ſubject, or attribute to it; or, it is that part of ſpeech, by which one thing is attributed to another, as to its ſubject; as the words, *is*, *underſtands*, *hears*, *believes*, &c.

The *verb* is thus called of the Latin *verbum*, word, by way of eminence; as being the principal word of a SENTENCE.

The common definition given by grammarians, is, that a *verb* is a word which betokens *being*, *doing*, or *ſuffering*.

To conceive the origin and office of *verbs*, it may be obſerved, that the judgment we make of any thing, as when I ſay *the earth is round*, neceſſarily includes three terms. The firſt, called the *attribute*, is the thing we affirm of, e. gr. earth. The ſecond, called the *attribute*, is the thing affirmed, e. gr. round. The third, *is*, connects thoſe two terms together, and expreſſes the action of the mind, *affirming* the attribute of the ſubject.

This laſt is what we properly call the *verb*; and which ſome of our later grammarians, particularly the Port Royaliſts, chooſe to call by a more ſignificant word, *affirmation*. The reaſon is, that its principal uſe is to ſignify *affirmation*; that is, to ſhew the diſcourſe, wherein that word is uſed, is the diſcourſe of a man who does not only conceive things, but judges and affirms ſomewhat of them.

By this circumſtance, a *verb* is diſtinguiſhed from nouns, which alſo ſignify an affirmation, as *affirmans affirmatio*; thoſe only ſignify affirmation, as that, by a reflection of the mind, is rendered an object of thought: ſo that they do not ſhew, that the perſon who uſes them *affirms*, but only that he conceives *an affirmation*.

Though the principal uſe of *verbs* be to ſignify affirmation, they alſo ſerve to expreſs the other motions of the ſoul; as to deſire, pray, command, &c. but this they only do, by changing the mood, or inflexion.

Here, we only conſider the *verb* in its primary ſignification, which is that it has in the indicative mood. On this footing, the *verb* ſhould have no other uſe, but to mark the connection which we make in the mind, between the two terms of a propoſition; but the *verb eſſe, to be*, is the only one that has retained this ſimplicity: nor, in ſtrictneſs, has this retained it, but in the third perſon, as *eſt, is*.

In effect, men being naturally inclined to ſhorten their expreſſions, to the affirmation, they have almoſt always added other ſignifications, in the ſame word: thus, e. gr. they add that of ſome attribute, ſo as that two words make a propoſition; as in *Petrus vivit*, Peter lives: where *vivit* includes both the attribute and affirmation; it being the ſame thing to ſay *Peter lives*, as that *Peter is living*. And hence the great variety of *verbs* in every language.

For, if people had been contented to give the *verb* its general ſignification, without any additional attribute, each language would only have needed one *verb*, viz. the *verb* ſubſtantive, *eſt, is*.

Again, on ſome occaſions, they alſo ſuperadd the ſubject of the propoſition, as *ſum homo*, I am a man: or *vivo*, I live; and hence the diverſity of perſons in *verbs*.

Again, we alſo add to the *verb*, a relation to the time, with regard to which we affirm; ſo that one ſingle word, as *cœnaſti*, ſignifies that I attribute to the perſon I ſpeak the action of ſupping, not for the preſent time, but for the paſt; and hence the great diverſity of tenſes in moſt *verbs*.

The diverſity of theſe ſignifications, or additions in the ſame word, has perplexed and deceived many of our beſt authors, in the nature of a *verb*; and has led them to conſider it, not according to what is eſſential to it, which is to affirm; but according to ſome of theſe its accidental relations.

Thus, Ariſtotle, taking up with the third of thoſe additional ſignifications, defines *verb* to be *vox ſignificans cum tempore*; a word ſignifying ſomething with time.

Others, as Buxtorf, adding the ſecond relation, define it, *vox flexilis cum tempore & perſona*; a word admitting of divers inflexions, in reſpect of time and perſon.

Others, taking up with the firſt of the additional ſignifications, which is that of the attribute, and conſidering that the attributes men ordinarily add to the affirmation, were actions and paſſions, have ſuppoſed the eſſence of a *verb* to conſiſt in ſignifying *actions* or *paſſions*.

Laſtly, Scaliger imagined he had made a great diſcovery in his book of the Principles of the Latin Tongue, in ſaying, that the diſtinction of things into *permanentes*, and *fluentes*, into what remain, and what paſs away, is the proper ſource of the diſtinction between *nouns*, and *verbs*; the firſt being to ſignify what remains, and the ſecond what paſſes.

But from what we have ſaid, it is eaſy to perceive, that theſe definitions are all falſe; and that the only true definition is, *vox ſignificans affirmationem*: this definition includes all that is eſſential to the *verb*: but if one would likewiſe include its principal accidents, one might define it, *vox ſignificans affirmationem, cum deſignatione perſonæ, & temporis*; a word which ſignifies an affirmation, with a deſignation of perſon, number, and tenſe: which is what properly agrees to the *verb* ſubſtantive *eſt*.

For, as to other *verbs*, conſidered as becoming different by the union of certain attributes, one may define them thus; *vox ſignificans affirmationem alicujus attributi, cum deſignatione perſonæ, numeri, & temporis*; a word which expreſſes the affirmation of ſome attribute, with a deſignation of perſon, number, and time.

Verbs, according to Mr. Harris, are thoſe ATTRIBUTIVES, which have a complex power of denoting both an attribute and an aſſertion; thoſe which take the attribute alone without the aſſertion are PARTICIPLES; and all other attributives are included under the general name of ADJECTIVES. And as ſome attributes have their eſſence in motion, e. g. to *walk*, to *live*, &c. others in the privation of motion, e. g. to *reſt*, to *die*, &c. and others again in ſubjects, which have nothing to do with either motion or its privation, as *great* and *little*, *white* and *black*, &c. theſe laſt are adjectives, and thoſe which denote motion or its privation are either *verbs* or participles. But motions and their privation, comprehended under the general term energy, imply time as their concomitant, and hence, he ſays, *verbs*, which denote them, come to denote time alſo. See TENSE. See alſo MOOD.

Every energy has a reference, ſays this ingenious writer, to ſome energizing ſubſtance, and is converſant about ſome ſubject; and hence he derives the diſtinction between *verbs* ACTIVE and PASSIVE: and as every energy reſpects an energizer or a paſſive ſubject: hence appears the reaſon why every *verb*, whether active or paſſive, has in language a reference to ſome noun for its nominative caſe. When among the infinite ſubjects, to which the energy refers, that happens to occur, which is the energizer alſo, as *Brutus* loved *himſelf*, ſlew *himſelf*, &c. in ſuch caſe the energy hath to the ſame being a double relation, both active and paſſive: and this gave riſe among the Greeks to that ſpecies of *verbs*, called *verbs middle*; but in other languages the *verb* ſtill retains its active form, and the paſſive ſubject *(ſe* or *himſelf)* is expreſſed like other accuſatives. Again, in ſome *verbs* it happens that the energy always keeps within the energizer, and never paſſes out to any foreign ſubject, becauſe the energizer and the paſſive ſubject are united in the ſame perſon; and then we obtain that ſpecies of *verbs*, called by grammarians *verbs neuter*, as if they were void both of action and paſſion, though they may rather be ſaid to imply both. Of the above ſpecies of *verbs*, the middle cannot be called neceſſary, becauſe moſt languages have done without it; thoſe remaining are, therefore, the *active*, the *paſſive*, and the *neuter*, which ſeem eſſential to all languages whatever. Mr. Harris obſerves, that though the greater part of *verbs* denote attributes of energy and motion; there are ſome which appear to denote nothing more than a mere ſimple adjective, joined to an aſſertion, as *ισαζει* in Greek, *equalleth* in Engliſh, *albeo* and *tumeo* in Latin; and there are alſo *verbs*, which are formed out of nouns, or in which the ſubſtantive is converted into an attributive. There are other ſuppoſed affections of *verbs*, beſides moods and tenſes, ſuch as number and perſon. But theſe are, in fact, the properties not of attributes, but of ſubſtances. Hermes, chap. vi. viii. and ix.

Verbs are variouſly divided: with reſpect to the ſubject or ſignification, they are divided into *active*, *paſſive*, *neuter*, &c. with reſpect to their conſtruction, into *tranſitive* and *intranſitive*; with reſpect to their formation or inflexions, into *regular* and *irregular*; *perſonal*, and *imperſonal*; *auxiliary*, *ſubſtantive*, &c.

VERB *active*, is a *verb* which expreſſes an action that falls on another ſubject or object. It is called alſo TRANSITIVE, becauſe the action paſſeth over to the object, or hath an effect upon ſome other thing. See ACTIVE.

VERB *paſſive*, is that which expreſſes a paſſion; or which receives the action of ſome agent, and neceſſarily implies an object acted upon, and an agent by which it is acted upon: it is conjugated in the modern tongues, with the auxiliary *verb*, *I am*, *je ſuis*, *je ſono*, &c.

Some do not allow of any *verbs paſſive* in the modern language: the reaſon is, what we call *paſſive* is nothing but the participle of the *verb*, joined with the auxiliary *verb*, *to be*; whereas the *verbs paſſive* of the Latin, &c. have their particular terminations. See PASSIVE.

VERB *neuter*, is that which ſignifies an action that has no particular object whereon to fall; but which, of itſelf, takes up the whole idea of the action: or a *verb neuter* expreſſes being, or a ſtate or condition of being; when the agent and the object acted upon coincide: as, *I ſleep, thou yawneſt, he ſnores, we walk, you run, they ſtand.*

The Latins call them *neuters*, becauſe they are neither active nor paſſive; though they have the force and ſignification of both; as, *I languiſh*, ſignifies as much as, *I am languiſhing*; *I obey*, as much as *I exerciſe obedience.* &c. only that they have no regimen to particularize this ſignification. The *verb neuter* is called INTRANSITIVE; becauſe the effect is confined within the agent, and doth not paſs over to any object.

The diſtinction between *verbs* abſolutely neuter, as, *to ſleep*, and *verbs* active intranſitive, as, *to walk*, though founded in nature and truth, is of little uſe in grammar; the conſtruction of both is the ſame. Lowth's Gram. p. 62.

Of theſe *verbs*, there are ſome which form their tenſes by the auxiliary *verb*, *to have*; as, *as I have ſlept, you have run.* Theſe, grammarians call *neuter active*.

Others there are, which form their compound parts by the auxiliary, *to be*; as, *to come, to arrive*, &c. for we ſay, *I am come*, not *I have come*, &c. Theſe are called *neuters* PASSIVE.

The *neuter verb* is varied like the active; but, having ſomewhat of the nature of the paſſive, admits in many inſtances of the paſſive form, retaining ſtill the neuter ſignification; chiefly in ſuch *verbs* as ſignify ſome ſort of motion, or change of place or condition; as, *I am come, I was gone*, &c.

In Engliſh, many *verbs* are uſed both in an *active* and *neuter* ſignification, the conſtruction only determining of which kind they are.

Verb *ſubſtantive*, is that which expreſſes the being, or ſubſtance, which the mind forms to itſelf, or ſuppoſes in the object; whether it be there, or not: as, *I am, thou art.*

Exiſtence, ſays Mr. Harris, may be conſidered as an univerſal genus, to which all things of all kinds are at all times to be referred. The *verbs*, therefore, which denote it, claim precedence of all others, as being eſſential to the very being of every propoſition in which they may ſtill be found, either expreſt, or by implication; expreſs, as, when we ſay, *the ſun is bright*; by implication, as when we ſay, *the ſun riſes*, which means, when reſolved, *the ſun is riſing*. The *verbs is, groweth, becometh, eſt, fit,* ὑπάρχει, ἐστὶ, ϖέλει, γίγνεται, are all uſed to expreſs this general genus; and are called by the Latins *verbs ſubſtantive*, and by the Greeks ῥήματα ὑπαρκτικὰ, *verbs* of *exiſtence*, a name more apt, as being of greater latitude, and comprehending equally as well attribute as ſubſtance. The principal of theſe *verbs* is the *verb*, ἐστὶ, *eſt, is.* All exiſtence is either abſolute, as when we ſay, *B is*; or qualified, as when we ſay, *B is an animal*, *B is black*, &c. And with reſpect to this difference, the *verb*, *is*, can by itſelf expreſs abſolute exiſtence, but never the qualified, without ſubjoining the particular form; conſequently when *is* only ſerves to ſubjoin ſome ſuch form, it has little more force than that of a *mere aſſertion.* Under the ſame character, it becomes a latent part in every other *verb*, by expreſſing that aſſertion, which is one of their eſſentials: e. g. *riſeth* means IS *riſing*, &c. Moreover, as to exiſtence in general, it is either mutable, as in the objects of ſenſation, or immutable, as in the objects of intellection and ſcience. All mutable objects exiſt in time, and admit the ſeveral diſtinctions of preſent, paſt, and future: but immutable objects know no ſuch diſtinction, but rather ſtand oppoſed to all things temporary. And hence reſult two different ſignifications of the *ſubſtantive verb* IS, as it denotes mutable, or immutable being: e. g. if we ſay, *this orange is ripe*, IS meaneth that it exiſteth ſo now at this preſent, in oppoſition to paſt time, when it was green, and to future time when it will be rotten: but if we ſay, *the diameter of the ſquare is incommenſurable with its ſide*, we do not intend by IS that it is incommenſurable *now*, having been *formerly* commenſurable, or being to become ſo hereafter: on the contrary, we intend that perfection of exiſtence, to which time and its diſtinctions are utterly unknown. Under the ſame meaning, we employ this *verb*, when we ſay, *truth is*, or, *God is*: the oppoſition is not of time preſent to other times, but of neceſſary exiſtence to all temporary exiſtence whatever. Hermes, p. 88. &c.

Verbs, *auxiliary*, or *helping*, are thoſe which ſerve in conjugating active and paſſive *verbs*; ſuch are, *I am, I have*, &c.

The abbot de Dangeau diſtinguiſhes all *verbs* into two general kinds; *auxiliary verbs*, and *verbs* which make uſe of auxiliaries.

This diſtinction ſome may tax as not very juſt: in regard *auxiliary verbs* ſometimes makes uſe of auxiliaries themſelves: but this does not deſtroy the diviſion: it only ſhews, that the *auxiliary verb* has two formalities, or two different qualities, under which it is to be conſidered; in virtue whereof, it conſtitutes, as it were, two ſorts of *verbs*.

The *verbs* which make uſe of auxiliaries, he divides into *active*, *neuter*, and *pronominal*. *Verbs neuter*, he farther diſtinguiſhes into *neuters active*, and *neuters paſſive*. *Pronominals* he diſtinguiſhes into *identic*, *reciprocal*, *neutrized*, and *paſſived*. But ſeveral of theſe are peculiar to the French language. See Auxiliary *Verbs*.

When an auxiliary is joined to the *verb*, the auxiliary goes through all the variations of perſon and number; and the *verb* itſelf continues invariably the ſame. When there are two or more auxiliaries joined to the *verb*, the firſt of them only is varied according to perſon and number. The auxiliary *muſt* admits of no variation.

Verbs, *regular*, are thoſe which are conjugated after ſome one manner, rule, or analogy.

Verbs, *irregular*, or *anomalous*, are thoſe which have ſomething ſingular in the terminations or formations of their tenſes. See Anomalous *Verbs*.

The formation of *verbs* in Engliſh, both regular and irregular, is derived from the Saxon. The *irregular verbs* in Engliſh are all monoſyllables, unleſs compounded; and they are for the moſt part the ſame words which are *irregular verbs* in the Saxon. The firſt claſs of irregulars comprehends thoſe that are become ſo from ſome kind of contraction: thus, ſome *verbs* ending in *d* or *t* have the preſent, the paſt time, and the participle perfect and paſſive, all alike without any variation, as *beat, burſt, caſt*, &c. which are contractions from *beated, burſted, caſted*, &c. becauſe of the diſagreeable ſound of the ſyllable *ed* after *d* or *t*. Others in the paſt time and participle perfect and paſſive, vary a little from the preſent, by ſhortening the diphthong, or changing the *d* into *t*, as *lead, led, meet, met, bend, bent*, &c. Others not ending in *d* or *t* are formed by contraction: as *have, had*, for *haved*; *flee, fled*, for *flee-ed*, &c. The following, beſide the contraction, change alſo the vowel: *ſell, ſold*; *tell, told*; *clothe, clad*. The ſecond claſs of *irregulars* are thoſe that end in *ght*, both in the paſt time and participle, and change the vowel or diphthong into *au* or *ou*: they are taken from the Saxon, in which the termination is *hte*: as, *bring, brought*; *buy, bought*; *ſeek, ſought*, &c. The third claſs of *irregulars* form the paſt time by changing the vowel or diphthong of the preſent; and the participle perfect and paſſive, by adding the termination *en*: theſe alſo derive their formation from the Saxon: ſuch are; *fall, fell, fallen*; *ſhake, ſhook, ſhaken*; *draw, drew, drawn*; *ſlay, ſlew, ſlain*, &c. &c. When *en* follows a vowel or liquid, the *e* is dropped. Some *verbs*, which change *i* ſhort into *a* or *u*, and *i* long into *ou*, have dropped the termination *en* in the participle; as, *begin, began, begun*; *ſing, ſang* or *ſung, ſang*, &c. To this third claſs belong the defective *verbs*, *be, been*; *go, gone*, i. e. *goen*.

The whole number of *verbs* in the Engliſh language, regular, and irregular, ſimple and compounded, taken together, is about four thouſand three hundred. See in Dr. Ward's Eſſays on the Engliſh Language the catalogue of Engliſh *verbs*. The whole number of irregular *verbs*, including the defective, is about one hundred and ſeventy-ſeven. Lowth's Gram. p. 85. See Conjugation.

Verbs, *defective*, are thoſe which are not only for the moſt part irregular, but are alſo wanting in ſome of their parts. Such are the *auxiliary* verbs, moſt of which are of this number. They are in uſe only in ſome of their tenſes and moods; and ſome of them are a compoſition of tenſes of ſeveral defective *verbs* having the ſame ſignification.

Verbs *inchoative*. See Inchoative.

Verbs *imperſonal*. See Impersonal.

There are alſo *reduplicative verbs*; as, *reſound, recall*, &c. and *frequentative verbs*, &c.

Verbs, *tranſitive*. See Transitive, and Verb *active ſupra*.

VERBAL, ſomething that belongs to *verbs*, or even to words ſpoken with the mouth.

Verbal nouns, are thoſe formed from verbs.

A *verbal contract*, is that made merely by word of mouth, in oppoſition to that made in writing.

Verbal *accident*. See Accident.

VERBASCULUM, in *Botany*, a name given by many authors to the primroſe, and with the title of *odoratum* to the cowſlip.

VERBASCUM, *mullein*, in *Botany*. See Mullein.

VERBENA, in *Botany*. See Vervain.

VERBERATION, formed from *verbero*, *I ſmite*, in *Phyſics*, a term uſed to expreſs the cauſe of ſound, which ariſes from a *verberation* of the air, when ſtruck, in divers manners, by the ſeveral parts of the ſonorous body firſt put into a vibratory motion.

VERBESINA, *naked-headed hemp agrimony*, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs. Its characters are theſe: the common empalement of the flower is concave, and compoſed of a double order of channelled leaves; the flower is made up of hermaphrodite florets in the diſk, and female half-florets in the border or rays; the hermaphrodite florets are funnel-ſhaped, and cut into five parts at the brim; they have ſhort hair-like ſtamina, terminated by cylindrical ſummits, and a germen of the ſame figure as the ſeed, ſupporting a ſlender ſtyle, crowned by two reflexed ſtigmas; the germen becomes a thick angular ſeed, crowned by three-pointed chaff: the female half-florets have no ſtamina, but a germen, ſtyle, and two ſtigmas, like the hermaphrodite florets, and ſucceeded by ſeeds like thoſe. Miller enumerates ſix, and Linnæus ten ſpecies.

VERDEGREASE, VERDIGREASE, VERDEGRIS, or VERDIGRISE, a kind of ruſt of copper, formed from the corroſion of copper by a fermented vegetable, and into a bluiſh green ſubſtance, of great uſe among painters for a green colour.

The word is formed from the Latin, *viride æris*: it is alſo called *ærugo*. Others call it the *flower*, and others the *vitriolic ſalt of copper*; though, in reality, it is rather the proper ſubſtance of the metal.

The greateſt quantities of *verdigriſe* have been manufactured at Montpellier, the wines of Languedoc being very proper for this preparation; and it has been exported thence in cakes, each weighing about twenty-five pounds. The following proceſs for making it is deſcribed by M. Monet, of the Royal Society of Montpellier, and is publiſhed in the Memoirs of the Academy for the years 1750, and 1753. Vine-ſtalks, well dried in the ſun, are ſteeped during eight days in ſtrong wine, and afterwards drained. They are then put into earthen pots, and wine is poured upon them; the pots are carefully covered; the wine undergoes the acetous fermentation, which in ſummer is finiſhed in ſeven or eight days, but requires longer time in winter, although the operation is always performed in cellars. When the fermentation is ſufficiently advanced, which may be known by obſerving the inner ſurface of the lids of the pots, which during the proceſs of the fermentation is continually wetted by the moiſture of the riſing vapours, the ſtalks are then to be taken out of the pots: theſe ſtalks are by this method impregnated with the acid of the wine, and the remaining liquor is but a very weak vinegar. The ſtalks are to be drained during ſome time in baſkets, and layers of them are to be put into earthen pots with plates of Swediſh copper, ſo diſpoſed, that each plate ſhall reſt upon, and be covered with layers of ſtalks. The pots are to be covered with lids, and the copper is thus expoſed to the action of the vinegar, during three or four days or more, in which time the plates become covered with *verdigriſe*. The plates are then to be taken out of the pots, and left in the cellar three or four days; at the end of which time they are to be moiſtened with water, or with the weak vinegar above mentioned, and left to dry. When this moiſtening and drying of the plates have been thrice repeated, the *verdigriſe* will be found to have conſiderably increaſed in quantity, and it may be then ſcraped off for ſale.

A ſolution or eroſion of copper, and conſequently a *verdigriſe*, may be prepared by employing ordinary vinegar inſtead of wine, as directed in the above proceſs. But it will not have the unctuoſity of ordinary *verdigriſe*, which is neceſſary in painting. Good *verdigriſe* muſt be prepared by means of a vinous acid or ſolvent, half acid and half ſpirituous. Accordingly, the ſucceſs of the operation depends chiefly on the degree of fermentation to which the wine employed has been carried; for this fermentation muſt not have been ſo far advanced that no ſenſibly vinous or ſpirituous part remained in the liquor. Dict. Chem. art. *Verdigriſe*.

The Society of Arts, &c. offered a premium in 1756 for the making of *verdigriſe* in England; and in 1760 intimated, that it might be made by moiſtening with the cheapeſt and worſt ſort of cyder, the marc or remains of apples, peas, gooſeberries, currrants, ſloes, crabs, blackberries, or any fruits deprived of their juice by expreſſion, proceeding afterwards by the proceſs above deſcribed. The premiums offered by the ſociety were ſeveral times claimed and allowed; and it was reſolved in 1763, that *verdigriſe* actually made of Britiſh materials, and ſubmitted to various trials, was even ſuperior to the foreign. Accordingly, a conſiderable manufactory was eſtabliſhed, and ſucceſsfully carried on for the purpoſe of making *verdigriſe*.

The goodneſs of *verdigriſe* is judged of from the deepneſs and brightneſs of its colour, its dryneſs, and its forming, when rubbed on the hand with a little water or ſaliva, ſmooth paſte free from grittineſs. This concrete is partially diſſoluble in water and in rectified ſpirit, and almoſt totally in vinegar; from the acetous ſolution, well ſaturated and left to exhale ſlowly in a warm air, the greateſt part of the *verdigriſe* may be recovered in a cryſtalline form; called *diſtilled verdigriſe*. See CRYSTALS *of Venus*.

The cryſtals, diſtilled with a ſuitable fire, in a retort or other like veſſel, give over the acetous acid in a highly concentrated ſtate, but ſomewhat altered by the proceſs. See SPIRIT *of Venus*.

The matter which diſtilled vinegar leaves undiſſolved, on being mixed with ſome borax and linſeed oil, and fluxed in a crucible, yields a brittle metallic ſubſtance, of a whitiſh colour, not unlike bell-metal. Neum. Chem. by Lewis, p. 64. n. *a*.

Verdigriſe is employed externally for deterging foul ulcers, and as an eſcharotic. Hoffman recommends it particularly for deſtroying the calloſities of old fiſtulæ: tents of powdered *verdigriſe*, made up with ſaliva, or other liquids, not fat or oily, conſume, he ſays, the hardeſt callus in three or four days, ſo as to render it completely ſeparable. A detergent ointment, called *mel* ÆGYPTIACUM, is prepared by boiling five parts of *verdigriſe* in fine powder with ſixteen of honey, and ſeven of vinegar, till reduced to a clear conſiſtence. The thinner matter which floats on the top of this mixture, after ſtanding for ſome time, is generally uſed; unleſs it be required more acid, in which caſe the thick part which has ſubſided is ſhook up among it.

In the Edinburgh diſpenſatory, an ointment called *unguentum ex ærugine*, is directed, compoſed of white wax and reſin, each two ounces, olive-oil one pint, and *verdigriſe* half an ounce. When theſe kinds of applications are employed for venereal or other ulcerations in the mouth or tonſils, great caution is neceſſary leſt they ſhould paſs into the ſtomach, in which caſe dangerous and even fatal conſequences may enſue.

Verdigriſe is rarely or never given internally. Some recommend it, in the doſe of a grain or two, as an emetic, which produces almoſt inſtantaneous effect, where poiſonous ſubſtances have been taken, for the immediate rejection of them. But warm water, milk, and oils, are much leſs dangerous and more proper. Lewis's Mat. Med.

M. Navier has lately evinced the ſalutary effects of liver of ſulphur, and particularly of liver of ſulphur of Mars, as an antidote againſt the poiſon of *verdigriſe*.

Verdigriſe makes a blue-green colour in paint; but is generally uſed in yellow, which by a proper mixture, renders it a true green. It is bright when good; but ſoon flies when uſed in oil. When diſſolved in vinegar, it is uſed in water painting, and is more durable: it may be alſo diſſolved in the juice of rue, and thus produces a fine full green colour, equally fit for waſhing with that diſſolved in vinegar.

Verdigriſe, with a decoction of logwood, ſtrikes a deep black, which when diluted becomes a fine blue. See DYING.

VERDELLO, in *Natural Hiſtory*, the name of a green marble uſed in Italy as a touch-ſtone, for the trying of gold, &c.

VERDERER, or VERDEROR, formed from *viridarius*, which Ulpian uſed in the like ſignification, a judicial officer of the king's FOREST, whoſe buſineſs is to look to the vert, and ſee it well maintained.

He is ſworn to keep the aſſizes of the foreſt; as alſo to view, receive, and enroll, the attachments and preſentments of all manner of treſpaſſes, relating to vert and veniſon therein.

VERDETER. See VERDITER.

VERDETUM, the name of a green ſubſtance, uſed as a colour in painting. It is a very pure kind of verdigriſe, being an ærugo of copper, produced by the vapour of vinegar.

VERDICT, from *vere dictum*, q. d. *dictum veritatis*, *the dictate of truth*, is the anſwer of the JURY given to the court, concerning the matter of fact, in any cauſe, civil or criminal, committed by the court to their trial and examination.

A *verdict* is either *privy* or *public*: a privy *verdict* is when the judge hath left or adjourned the court; and the jury, being agreed, in order to be delivered from their confinement, obtained leave to give their *verdict* privily to the judge out of court; which is of no force, unleſs afterwards affirmed by a public *verdict* given openly in court, wherein the jury may, if they pleaſe, vary from their privy *verdict*. If indeed the judge hath adjourned the court to his own lodgings, and there receives the *verdict*, it is a public and not a privy *verdict*. In a criminal caſe, no privy *verdict* is allowed.

But the only effectual and legal *verdict* is the public *verdict*; in which they openly declare to have found the iſſue for the plaintiff or for the defendant; and if for the plaintiff, they aſſeſs the damages alſo ſuſtained by the plaintiff, in conſequence of the injury upon which the action is brought. This is either *general*, or *ſpecial*.

Verdict, *general*, is that which is brought into the court in like general terms as the general iſſue: as in action of diſſeiſin, the defendant pleads, no wrong, no diſſeiſin. Then the iſſue is general, whether the fact be wrong, or not: which being committed to the jury, they, upon conſideration of the evidence, come in and ſay, either for the plaintiff, *That it is a wrong diſſeiſin*; or for the defendant, *That it is no wrong, no diſſeiſin*: and in criminal caſes, *guilty*, or *not guilty*.

Verdict, *ſpecial*, is when they ſay at large, that ſuch and ſuch a thing they found to be done by the defendant, or tenant; declaring the courſe of the fact, as in their opinion it is proved; and as to the law, upon the fact, praying the judgment of the court.

The *ſpecial verdict*, if it contains any ample declaration of the cauſe from the beginning to the end, is called a *verdict at large*. This is grounded on the ſtat. Weſtm. 2. 13 Edw. I. cap. 30. in order to avoid the danger of an Attaint. After ſtating the facts, they conclude conditionally, that if upon the whole matter the court ſhall be of opinion that the plaintiff had cauſe of action, they then find for the plaintiff; if otherwiſe, then for the defendant. This is entered at length on the record, and afterwards argued and determined in the court at Weſtminſter, from whence the iſſue came to be tried. Another method of finding a ſpecial *verdict* is when the jury find a *verdict* generally for the plaintiff, but ſubject nevertheleſs to the opinion of the judge, or the court above, on a *ſpecial* caſe. This is attended with much leſs expence, and obtains a ſpeedier deciſion than the other. But as nothing appears upon the record but the general *verdict*, the parties are precluded hereby from the benefit of a writ of error, if diſſatisfied with the judgment of the court or judge upon the point of law. Blackſt. Com. book iii. p. 377, &c. See Jury.

Verdict, *attainder by*. See Attainder.

Verdict, *falſe*. See Attaint.

VERDITER, Verdeter, a kind of mineral ſubſtance ſometimes uſed by the painters, &c. for a blue, but more uſually mixed with yellow for a green colour. See Terre *verte*.

Verditer, according to Savary, ought to be made of the lapis Armenus; or, at leaſt, of an earthy ſubſtance much like it, brought from the mountains of Hungary, &c. only prepared by powdering it, and cleanſing it by lotion.

But this ſtone and earth are very rare; and the *verditer* uſed is not a native, but a factitious ſubſtance, or blue pigment, obtained by adding chalk or whiting to the ſolution of copper in aqua fortis. It is prepared by refiners of ſilver, who employ for this purpoſe the ſolution of copper, which they obtain in the proceſs of Parting, by precipitating ſilver from aqua fortis with plates of copper. It is ſaid, that a fine-coloured *verditer* cannot be obtained from a ſolution of copper prepared by diſſolving directly that metal in aqua fortis; and that the ſilver is neceſſary. According to Dr. Merret's account of the method of preparing it, a quantity of whiting is put into a tub, the copper ſolution poured on it, and the mixture ſtirred every day for ſome hours together, till the liquor loſes its colour. The liquor is then poured off, and more of the ſolution of copper added; and this is is to be repeated till the matter appears of the proper colour; after which it is ſpread on large pieces of chalk, and laid in the ſun to dry. Boyle obſerves, that the proceſs often miſcarried, and that heating the liquor, before it is poured on the whiting, has been ſound to contribute to its ſucceſs. It is ſtill however, Dr. Lewis ſays, very apt to fail in the hands of the moſt ſkilſul workmen; the preparation, inſtead of a fine blue, turning out of a dirty green.

From the liquor poured off in making *verditer*, Mr. Boyle ſays (Works Abr. vol. i. p. 169), that the refiners obtain, by boiling, a kind of ſaltpetre, fit, with the addition of vitriol, to yield them a new aqua fortis.

Some have ſaid that a deeper and brighter kind of *verditer* may be made by uſing a filtered ſolution of pearlaſhes inſtead of the chalk, in the above proceſs.

Verditer, when good, is a cool full blue, but without the leaſt tranſparency either in oil or water. In oil it is ſubject to turn greeniſh, and ſometimes black; and in water it is not always found to hold. It is chiefly uſed for paper hangings and coarſe work, and in varniſh.

VERDONE, in *Ichthyology*, the name of a fiſh of the turdus or wraſſe kind, called by ſome authors *turdus viridis minor*.

It is of a fine green colour in all parts of its body; the back, ſides, and belly, have all plainly the ſame colour; but in different degrees: the back being of the deepeſt dye; the belly has ſomething of yellowneſs with the green, and the ſides are variegated with lines of a fine blue. It has only one long fin on the back, which has thirty rays or ribs, the eighteen foremoſt of which are rigid and prickly, the others ſoft and flexile. It is caught in the Mediterranean, and ſold in the markets in Italy. Salvian de Aquat. p. 88.

VERDOY, in *Heraldry*, is applied to a bordure of a coat of arms, charged with any kinds or parts of flowers, fruits, ſeeds, plants, &c. Of theſe there are eight in number.

VERDURE, the quality of greenneſs. The word is French, formed of *verd*, *green*.

VERGADELLE, in *Ichthyology*, the name of a fiſh of the mullet kind, called by others the Chelon, remarkable for the thickneſs of its lips.

VERGE, Virga, a rod, ſwitch, or yard; particularly a ſtick or wand, which perſons are admitted tenants by holding in their hand, and ſwearing fealty to the lord of the manor.

On this account, they are called *tenants by the verge*.

Verge, among *Gardeners*, generally denotes the edge or outſide of a border; but more particularly, is uſed for a ſlip of graſs adjoining to gravel-walks, and dividing them from the borders in the parterre-garden.

Verge, *dented*. See Dented.

Verge is alſo uſed for the compaſs or extent of the king's court; within which is bounded the juriſdiction of the lord ſteward of the king's houſhold.

It is thus called, from the *verge* or ſtaff which the marſhal bears. It was anciently alſo denominated *pax regis*, or the king's peace.

The lord ſteward, by virtue of his office, without any commiſſion, judges of all tranſgreſſions, as treaſons, murders, felonies, bloodſhed, &c. committed in the court, or within the *verge* thereof; which extends, every way, by 13 Ric. II. ſtat. 1. cap. 3. (in affirmance of the common law) for twelve miles round the king's place of reſidence; only London, by charter, being exempted.

Verge, *court of*. See Court.

Verge, *of land*, *virga terræ*. See Yard-*Land*.

VERGERS, Virgatores, *ſervientes*, are officers who carry white wands before the juſtices of either bench; called alſo, *porters of the verge*.

Vergers *of cathedral* or *collegiate churches*, are inferior officers, who go before the biſhop, dean, &c. with a verge, or rod tipped with ſilver.

VERGILIÆ, a conſtellation, whoſe appearance denotes the approach of the ſpring.

According to the poets, the *Vergiliæ* were the daughters of Atlas; and by the Greeks, were called Pleiades: but the Romans named them *Vergiliæ*.

VERIFICATION, the act of proving, or making a thing appear true.

In the French law, *verifying* is uſed for the recording of the king's edicts and decrees by the parliament.

VERIFICATIONE *relicta*. See Relicta.

VERISIMILITUDE. See Probability.

VERITH, in *Ichthyology*, a name given by Iſidore to the fiſh commonly called by authors, *thriſſa*; by us, the Shad, or the mother of the herrings.

VERJUICE, a juice or liquor drawn from ſour grapes, or wild apples, unfit for wine, or cyder; or from ſweet ones, while yet acid, or unripe.

Its chief uſe is in ſauces, ragouts, &c. though it is alſo an ingredient in ſome medicinal compoſitions; and is uſed by the wax-chandlers to purify their wax.

It has its name from a large ſort of grape, called *verjus*, or *bourdelas*; which is ſaid never to grow perfectly ripe; or rather, which in its utmoſt maturity is too auſtere and ſour to be uſed in wine; whence it is commonly turned into *verjuice*; though in France all unripe grapes are denominated *verjus*.

There is alſo tolerable *verjuice* made of crabs, gathered, and laid in an heap to ſweat, the ſtalks, &c. ſeparated; they are then ſtamped, or ground, and the crab maſh put in a hair bag; the juice ſqueezed in a preſs, then barrelled up cloſe, and ſet in a warm place to work for ten or twelve days.

Verjuice made for ſale ſhall pay the ſame duty as Cyder or perry.

VERKENS *viſch*, in *Ichthyology*, the Dutch name of a fiſh caught in the Eaſt Indies. It is about ſeven inches long, of a blackiſh-green colour, with fins and tail wholly black, and with yellow iriſes to the eyes. It is caught in freſh waters in the Eaſt Indies, and is a very delicate fiſh,

fiſh. It is very nearly related to the capriſcus, or GOAT-*fiſh*, if not the ſame ſpecies.

VERMELHO, in *Ichthyology*, the name of an American fiſh, more uſually known by the name of the PUDIANO

VERMES. See Worms.

VERMICELLI, or Vermichelly, a kind of mixture, prepared of flour, cheeſe, yolks of eggs, ſugar, and ſaffron; and reduced into little long pieces, or threads, like worms, by forcing it with a piſton through a number of little holes in the end of a pipe made for the purpoſe.

The word, in the original Italian, ſignifies *little worms:* they alſo call it *tagliarini*, and *milleſanti*.

It was firſt brought to us from Italy, where it is in great vogue. In effect, it is the great regale of the Italians. Other nations are not eaſily brought to reliſh the taſte of it. It is chiefly uſed in ſoups and pottages, to warm, provoke venery, &c.

VERMICULAR, an epithet given to any thing that bears a relation or reſemblance to worms, *vermiculi*.

Anatomiſts particularly apply it to the motion of the inteſtines and certain muſcles of the body.

The *vermicular*, or PERISTALTIC, motion of the inteſtines is performed by the contraction of the fibres thereof from above downward; as the unnatural, or antiperiſtaltic motion is by their contraction from below upwards.

The contraction happening in the periſtaltic, which others call the *vermicular motion*, as reſembling the motion of worms, does not affect all the parts of the inteſtines at once; but one part after another.

Vermicular, or Vermiculated *work*, *Opus vermiculatum*, in *Sculpture*, a ſort of ornament, conſiſting of frets, or knots, in Moſaic pavements, winding, and repreſenting, in ſome ſort, the tracts made by worms.

Quam lepide lexeis compoſitæ, ut teſſerulæ omnes
Arte pavimento, atque emblemate vermiculato.
Cic. de Orat. lib. iii.

VERMICULARIS *cruſta*, a term uſed by ſome anntomical writers to expreſs the internal hairy and corrugated coat of the inteſtines.

VERMICULUM, a word uſed by ſome chemiſts to expreſs a tincture or elixir.

VERMICULUS *marinus*, the *ſea worm*, in *Natural Hiſtory*, the name of a genus of ſhell-fiſh.

Theſe ſhells are called *vermiculi*, ſea-worms, from the fiſh contained in them, which is always a ſort of worm. They uſually are found in great cluſters together, interwoven oddly with one another.

Bonani calls them ſea-ſerpents, encloſed in ſhells, from the various twiſted forms in which they adhere to ſhips and rocks. The author eſtabliſhes them among the multivalves, becauſe they are never found ſingle, but always in theſe cluſters; in this ſenſe he looks upon the whole cluſter as the ſhell-fiſh under conſideration, not any one of the ſingle tubes: though he acknowledges that each of theſe tubes is a perfect ſhell, independent of the reſt, and has its proper inhabitant. Strictneſs in natural hiſtory therefore would not bear him out, in arranging them among multivalves, for they are certainly an univalve ſhell, though many of them happen always to be found together.

Care muſt be had not to confound theſe with the *dentalia* and *entalia*; for theſe laſt are always found ſingle; and the *vermiculi*, of the kind here treated of, are always found together in great numbers, forming cluſters of ten inches, and often much more in diameter.

Of the *vermiculi*, which are ſtraight, we have ſix ſpecies: of the crooked kind, we have four ſpecies; and of thoſe which are diſpoſed in a ſort of circles, we have nine ſpecies. Hiſt. Nat. Eclair. p. 354.

According to Da Coſta's arrangement, the *vermiculi* or worm-ſhells, conſtitute the third family of univalve SHELLS: and he defines them to be tubular cylindric ſhells, ſingle, in maſſes together, or adherent to other ſhells or bodies; variouſly ſinuous, by winding or twiſting to and fro in a very irregular manner. Of theſe *vermiculi* he reckons two genera, viz. thoſe which have no fixed or regular form, as the common *vermiculi*, of which, though they are found in great abundance, there are not many different ſpecies; and the penecilli or worm-ſhells, which, in the whole, or any particular part, have a determinate regular ſhape or ſtructure. There are few ſpecies of this genus; the watering-pot from the Eaſt Indies is the chief kind, and when perfect, is much valued. There are alſo *vermiculi* which have concamerations, or are divided into chambers by a few or many tranſverſe plates; but they are ſeldom regular, or ſet at equi-diſtant intervals, and are not pierced by a pipe or ſiphunculus, communicating from chamber to chamber, ſo as to permit the fiſh to penetrate more than one chamber or encloſure at a time, in which reſpect they differ from the concamerated ſhells, as the nautili, &c. The *vermiculi* are frequently found in the foſſil ſtate; but there is no ſpecies, that is not known recent, or from the ſea. Da Coſta's Conchol. p. 148.

VERMIFORMIS, in *Anatomy*, a term applied to various parts in the human body; bearing ſome reſemblance to worms. Such are the

Proceſſus, or *Apophyſes* Vermiformes, two extremities of the CEREBELLUM, ſituated near the fourth ventricle of the brain.

Vermiformes *muſculi*, or the four muſcles in each hand and foot, which bring the fingers and toes towards the thumbs and great toes; called alſo LUMBRICALES.

VERMIFUGUS, the ſame with ANTHELMINTIC. See alſo Worm-*ſeed*, and *Worm*-Powders.

VERMILION, a bright, beautiful red colour; in great eſteem among the ancients, under the denomination of MINIUM.

There are two kinds of *vermilion*; the one *natural*, the other *factitious*.

The *natural* is found in ſome ſilver mines in form of a ruddy ſand; which they prepare and purify by ſeveral lotions and coctions. When this is uſed as a colour, no other preparation is neceſſary than a careful levigation with water on a ſtone.

Factitious or common Vermilion is made of *artificial* CINNABAR, ground up (as ſome ſay) with white wine, and afterwards with the white of eggs: in this ſtate it is made into cakes, and left to dry. And to fit it for uſe, they grind it up a ſecond time with water, and whites of eggs. To purify and heighten its colour ſome grind it up with urine, or ſpirits of wine, to which a little ſaffron is added.

Some alſo pretend to make *vermilion* of lead, burnt and waſhed; or of ceruſs, rubified by fire. But theſe are not properly denominated *vermilion*, but *red lead*. See Minium.

It is this laſt, however, that ſeems to be the artificial minium, or *vermilion* of the ancients; and accordingly, apothecaries and painters ſtill give it the name.

The ancient Greek and Latin authors have given divers fabulous accounts of their minium; and ſeveral of the moderns have adopted their dreams: the moſt rational accounts are, that Theophraſtus attributes the firſt invention of making it to Callias the Athenian; who hit upon it in endeavouring to draw gold, by fire, out of a red ſand, found in the ſilver mines, in the year of Rome 249. But Vitruvius ſays, it was diſcovered in the Cilbian fields; where it was drawn from a red ſtone, called by the Greeks *anthrax*.

We have two kinds of *vermilion* from Holland; the one of a deep red, the other pale: but both are in reality the ſame matter; the difference of colour only proceeding from the cinnabar's being more or leſs ground: when fine ground, the *vermilion* is pale; and this is preferred to the coarſer and redder.

It is of conſiderable uſe among the painters in oil, and in miniature; and likewiſe among the ladies, as a fucus, or paint, to heighten the complexion of ſuch as are too pale.

Vermilion is ſometimes alſo, though improperly, uſed for what we otherwiſe call KERMES, or *ſcarlet grain*.

VERMINA. See Vermine, and Vermination.

VERMINATION, Verminatio, the act of breeding worms, and other vermin; particularly bots in cattle, &c.

Vermination is ſometimes alſo uſed among phyſicians, for a ſort of tormina ventris, or wringing of the guts; wherein the patient is affected, as if worms were gnawing his inteſtines.

VERMINE, Vermina, a collective name, including all kinds of little animals, or inſects, which are hurtful or troubleſome to men, beaſts, fruits, &c. as worms, lice, fleas, bugs, caterpillars, ants, flies, &c.

VERMIS, *worm*, in *Natural Hiſtory*. See Worms.

Vermis *aureus*. See Aphrodita.

Vermis *cæruleus*. See Cærulæus.

Vermis *cerebri*, the *worm* in the brain, a name given by ſome writers to an epidemical fever in Hungary, attended with terrible deliriums.

VERMIVOROUS *animals*, are ſuch as feed upon worms.

VERNACULAR is applied to any thing that is peculiar to ſome one country.

Whence, diſeaſes which reign moſt in any particular nation, province, or diſtrict, are ſometimes called *vernacular diſeaſes*; though more frequently ENDEMIC DISEASES.

Such are the *plica Polonica*, *ſcorbutus*, *tarantiſm*, &c.

VERNAL, ſomething belonging to the ſpring ſeaſon. See

Spring. Hence, *vernal leaves* are thoſe leaves of plants which come up in the ſpring, &c.

Vernal *ſigns*, and *equinox*. See Sign and Equinox.

VERNIER *Scale*, a ſcale excellently adapted for the graduation of mathematical inſtruments, thus called from its inventor Peter Vernier, a perſon of diſtinction in the Franche Comté, who communicated the diſcovery to the world, in a ſmall tract, entitled La Conſtruction, l'Uſage, & les Proprietez du Quadrant Nouveau de Mathematique, &c. printed at Bruſſels in 1631. This was an improvement on the method of diviſion propoſed by Jacobus Curtius, printed by Tycho in Clavius's Aſtrolabe, in 1593.

Vernier's method of diviſion, or dividing-plate, has been very commonly, though very erroneouſly, called by the name of Nonius; the method of Nonius being very different from that of *Vernier*, and much leſs convenient. For the hiſtory of this, and other inventions of a ſimilar nature, ſee Robins's Math. Tracts, vol. ii. p. 265, &c.

Vernier's method is derived from the following principle. If two equal right lines, or circular arcs, A, B, are ſo divided, that the number of equal diviſions in B is one leſs than the number of equal diviſions of A, then will the exceſs of one diviſion of B above one diviſion of A be compounded of the ratios of one of A to A, and of one of B to B.

For let A contain 11 parts, then one of A to A is as 1 to 11, or $\frac{1}{11}$. Let B contain 10 parts, then one of B to B is as 1 to 10, or $\frac{1}{10}$. Now $\frac{1}{10}-\frac{1}{11}=\frac{11-10}{10\times 11}=\frac{1}{10\times 11}=\frac{1}{10}\times\frac{1}{11}$.

Or, if B contains n parts, and A contains $n+1$ parts; then $\frac{1}{n}$ is one part of B, and $\frac{1}{n+1}$ is one part of A.

And $\frac{1}{n}-\frac{1}{n+1}=\frac{\overline{n+1}-n}{n\times\overline{n+1}}=\frac{1}{n}\times\frac{1}{n+1}$.

Or thus: let A and B be unequal right lines, or circular arcs; and let any part of A, conſidered as the relative unit, be divided into n parts; and a part of B, equal to $m+1$ parts of A, be divided into m parts; then will $\frac{1}{m}$th of B $=\frac{1}{n}$th of A $=\frac{1}{m}$th of B $\times\frac{1}{n}$th of A.

But n parts of A : 1 unit of A :: $m+1$ parts of A : $\frac{m+1}{n}$ units of A.

But m parts of B $=$ ($m+1$ parts of A $=$) $\frac{m+1}{n}$ units of A.

Then m parts of B : $\frac{m+1}{n}$ units of A :: 1 parts of B : $\frac{m+1}{m\times n}$ units of A.

Therefore $\frac{m+1}{m\times n}-\frac{1}{n}=\left(\frac{m+1}{m\times n}-\frac{1\times m}{n\times m}=\frac{m+1-m}{m\times n}=\frac{1}{n\times m}=\right)\frac{1}{m}\times\frac{1}{n}$.

The moſt commodious diviſions, and their aliquot parts, into which the degrees on the circular limb of an inſtrument may be ſuppoſed to be divided, depend on the radius of that inſtrument.

Let R be the radius of a circle in inches; and a degree to be divided into n parts, each being $\frac{1}{p}$th part of an inch.

Now the circumference of a circle, in parts of its diameter 2 R inches, is $3{,}1415926\times 2R$ inches.

Then $360^\circ : 3{,}1415926\times 2R :: 1^\circ : \frac{3{,}1415926}{360}\times 2R$ inches.

Or, $0{,}01745329\times R$ is the length of one degree in inches.

Or, $0{,}01745329\times R\times p$ is the length of 1°, in pth parts of an inch.

But as every degree contains n times ſuch parts, therefore $n=0{,}01745329\times R\times p$.

The moſt commodious perceptible diviſion is $\frac{1}{8}$ or $\frac{1}{10}$ of an inch.

Example. Suppoſe an inſtrument of 30 inches radius; into how many convenient parts may each degree be divided? how many of thoſe parts are to go to the breadth of the *Vernier*, and to what parts of a degree may an obſervation be made by that inſtrument?

Now $0{,}01745\times R=0{,}5236$ inches, the length of each degree: and if p be ſuppoſed about $\frac{1}{8}$ of an inch for one diviſion; then $0{,}5236\times p=4{,}188$, ſhews the number of ſuch parts in a degree. But as this number muſt be an integer, let it be 4, each being 15′: and let the breadth of the *Vernier* contain 31 of thoſe parts, or $7\frac{1}{4}^\circ$, and be divided into 30 parts.

Here $n=\frac{1}{4}$; $m=\frac{1}{30}$; then $\frac{1}{4}\times\frac{1}{30}=\frac{1}{120}$ of a degree, or 30′. which is the leaſt part of a degree that inſtrument can ſhew.

If $n=\frac{1}{5}$, and $m=\frac{1}{36}$; then $\frac{1}{5}\times\frac{1}{36}=\frac{60}{5\times 36}$ of a minute, or 20″.

The following table, taken as examples in the inſtruments commonly made from 3 inches to 8 feet radius, ſhews the diviſions of the limb to neareſt tenths of inches, ſo as to be an aliquot of 60's, and what parts of a degree may be eſtimated by the *Vernier*, it being divided into ſuch equal parts, and containing ſuch degrees as their columns ſhew.

Rad. inches	Parts in a deg.	Parts in *Vern.*	Breadth of *Vernier*	Parts obſerved.	Rad. inches	Parts in a deg.	Parts in *Vern.*	Breadth of *Vernier.*	Parts obſerved.
3	1	15	$15\frac{1}{4}^\circ$	4′ 0″	30	5	30	$7\frac{1}{2}^\circ$	0′ 20″
6	1	20	$20\frac{1}{4}$	3 0	36	6	30	$5\frac{1}{4}$	0 20
9	2	20	$10\frac{1}{4}$	1 30	42	8	30	$3\frac{7}{8}$	0 15
12	2	24	$12\frac{1}{4}$	1 15	48	9	40	$4\frac{1}{9}$	0 10
15	3	20	$6\frac{1}{4}$	1 0	60	10	36	$3\frac{7}{10}$	0 10
18	3	30	$10\frac{1}{3}$	0 40	72	12	30	$2\frac{7}{12}$	0 10
21	4	30	$7\frac{1}{4}$	0 30	84	15	40	$2\frac{2}{3}$	0 6
24	4	36	$9\frac{1}{4}$	0 25	96	15	60	4	0 4

By altering the number of diviſions, either in the degrees or in the *Vernier*, or in both, an angle can be obſerved to a different degree of accuracy. Thus, to a radius of 30 inches, if a degree be divided into 12 parts, each being five minutes, and the breadth of the *Vernier* by 21 ſuch parts, or $1\frac{3}{4}^\circ$, and divided into 20 parts, then $\frac{1}{12}\times\frac{1}{20}=\frac{1^\circ}{240}=15''$: or taking the breadth of the *Vernier* $2\frac{7}{12}^\circ$, and divided into 30 parts; then $\frac{1}{12}\times\frac{1}{30}=\frac{1^\circ}{360}$, or 10″:

Or $\frac{1}{12}\times\frac{1}{50}=\frac{1^\circ}{600}=6''$; where the breadth of the *Vernier* is $4\frac{1}{4}^\circ$. See Robertſon's Nav. book v. p. 279, &c.

For the method of applying the *Vernier* to a quadrant, ſee *Hadley's* Quadrant. And for the application of it to a teleſcope and the principles of its conſtruction, ſee Smith's Optics, book iii. ſect. 861, &c.

VERNIS *Martin*. See *Copal* Varnish.

VERNISH. See Varnish.

VERONICA, a term abbreviated from *vericonica*, of *vera-icon*, q. d. *true image*, and applied to portraits, or repreſentations of the face of our Saviour on handkerchiefs.

Veronicas are imitations of that celebrated original one, preſerved with great veneration at St. Peter's in Rome; and imagined by ſome to be the handkerchief laid over our Saviour's face in the ſepulchre.

The firſt mention we find of this famous relic is in a ceremonial compiled in 1143, dedicated to pope Celeſtine, by Benedict, a canon of St. Peter's: but there is no mention made of the time when it was brought to Rome. A feaſt is kept in honour thereof in moſt churches, on the Tueſday in Quinquageſima week.

It is to be obſerved, that the name *veronica* is only given to ſuch handkerchiefs as repreſent no more of our Saviour than his face; for ſuch as repreſent his whole body, as that of Beſançon, which ſhews his fore-part at length: and that of Turin, which repreſents both his fore and hind-part, as having covered him all over, were never called by this name.

The painters ſometimes repreſent the *veronica* as held up by an angel, but moſt commonly by a woman, which woman the common people imagine to be a ſaint, called St. *Veronica*; a perſon of that name having been ſuppoſed, about the ninth century, to have preſented her handkerchief to our Saviour as he went to Calvary, to wipe his face, when the picture was miraculouſly impreſſed upon it. This woman, it was added, was the perſon troubled with the flux of blood mentioned in the Goſpel; and accordingly, ſhe was ſoon joined with St. Fiacrius, and invoked together with him againſt the hæmorrhoids. And hence the eſtabliſhment of feaſts in honour of St. *Veronica*, in the churches dedicated to St. Fiacrius.

The milliners have taken St. *Veronica*, or, as they call her, St. *Veniſſe*, or St. *Venecia*, or *Veniſa*, for their tutelary ſaint.

VERONICA, in *Botany*. See SPEEDWELL.

VERONUS, in *Ichthyology*, a name given by many to a ſmall river-fiſh, well known in England by the name of the MINOW.

VERRUCA, in *Medicine*. See WART.

Hence *verrucous* is applied to any excreſcences which have a reſemblance to warts. There are alſo *verrucous* ulcers, &c.

VERRY, in *Heraldry*. See VAIRY.

VERSA. See VICE *verſa*.

VERSCHORISTS, in *Eccleſiaſtical Hiſtory*, a religious ſect, deriving its denomination from Jacob Verſchoor, a native of Fluſhing, who, in the year 1680, out of the tenets of Cocceius and Spinoſa, produced a new form of religion; for the leading tenets of which ſee HATTEMISTS.

The diſciples of *Verſchoor* were alſo called Hebrews, on account of the zeal and diligence with which they applied themſelves to the ſtudy of the Hebrew language.

VERSE, VERSUS, in *Poetry*, a line or part of a diſcourſe, conſiſting of a certain number of long and ſhort ſyllables, which run with an agreeable cadence; the like being alſo reiterated in the courſe of the piece.

This repetition, according to F. Boſſu, is neceſſary to diſtinguiſh the notion of *verſe* from that of proſe; for in proſe, as well as *verſe*, each period and member are parts of diſcourſe, conſiſting of a certain number of long and ſhort ſyllables; only, proſe is continually diverſifying its meaſures and cadences, and *verſe* regularly repeats them.

This repetition of the poets appears even in the manner of writing; for one *verſe* being finiſhed, they return to the beginning of another line to write the *verſe* following: and it is to this return that *verſe* owes its name; *verſus* coming from *vertere*, to *turn* or *return*.

Accordingly, we find the ſame word uſed to ſignify any thing that is placed in a certain regular order: Cicero uſes *verſus* for a line in proſe; Virgil for a row of trees, and even of oars in a galley. But as the regularity of *verſe* carries with it more charms, and requires a greater degree of exactneſs, the word has, in time, become appropriated to poetry.

To make *verſe*, it is not enough that the meaſures and quantities of ſyllables be obſerved, and ſix juſt feet put, one after another, in the ſame line; there are farther required certain agreeable cadences, particular tenſes, moods, regimens, and even ſometimes words unknown in proſe.

But what is chiefly required, is an elevated, bold, figurative manner of diction; this manner is a thing ſo peculiar to this kind of writing, that, without it, the moſt exact arrangement of longs and ſhorts does not conſtitute *verſe* ſo much as a ſort of meaſured proſe.

The Greek and Latin *verſes* conſiſt of a certain number of feet diſpoſed in a certain order. And ſome have attempted to make French and Engliſh *verſes* on the ſame foundation, but without ſucceſs.

Voſſius is very ſevere on the modern *verſe*, and makes it altogether unfit for muſic: our *verſes*, ſays he, run all, as it were, on one foot, without diſtinction of members or parts, and without regard to the natural quantities of ſyllables. We have no rhythmus at all; and we mind nothing, but to have a certain number of ſyllables in a *verſe*, of whatever nature, and in whatever order.

Mr. Malcolm vindicates our *verſe* from this imputation. It is true, he ſays, we do not follow the metrical compoſition of the ancients; yet we have ſuch a mixture of ſtrong and ſoft, long and ſhort ſyllables, as makes our *verſe* flow, ſmooth or rumbling, ſlow or rapid, agreeable to the ſubject. Inſtances of all which we have in the following lines.

"Soft is the ſtrain when Zephyr gently blows.
"The hoarſe rough *verſe* ſhould, like the torrent, roar.
"The line too labours, and the words move ſlow.
"Flies o'er th' unbending corn, and ſkims along the
"main."

By making a ſmall change, or tranſpoſition of a word or ſyllable, in any of theſe *verſes*, any body who has an ear will find, that we make a great matter of the nature and order of the ſyllables.

Voſſius adds, that the ancient odes were ſung, as to the rhythmus, in the ſame manner as we ſcan them; every pes being a diſtinct bar, or meaſure, ſeparated by a diſtinct pauſe, though, in reading, that diſtinction was not accurately obſerved.

Laſtly, he obſerves, that their odes had a regular return of the ſame kind of *verſe*; and the ſame quantity of ſyllables in the ſame place of every *verſe*; whereas, in the modern odes, to follow the natural quantity of our ſyllables, every ſtanza would be a diſtinct ſong.

It is next to impoſſible to write proſe without ſometimes intermixing *verſe* with it; ſo that Vaugelas's rule, which enjoins us to avoid them, is next to impracticable. This may be farther ſaid, that for ſhort *verſes*, they are ſo little perceived, that it is ſcarce worth while to ſtrain one's ſelf to avoid them; and as to long *verſes*, they are chiefly to be avoided in the ends of periods, for, in the middle, they are ſcarce ſelt. In the general, rules of this kind muſt be conſidered as principally regarding numerous *verſes*, and ſuch as are readily diſtinguiſhed by their cadence: thus, in Latin, it is ſcarce poſſible to avoid iambic *verſes*; but hexameters muſt, by all means, be avoided, their cadence being more ſenſible and more ſtudied.

VERSES are of various kinds; ſome denominated from the number of feet whereof they are compoſed, as the *monometer*, *dimeter*, *trimeter*, *tetrameter*, *pentameter*, *hexameter*, *hendecaſyllabum*, &c. Some from the kinds of feet uſed in them; as the pyrrhichian, proceleuſmatic, iambic, trochaic, dactylic, anapæſtic, ſpondaic, or molloſſean, choriambic, iambidactylic, or dactylotrochaic. Sometimes from the names of the inventors, or the authors who have uſed them with moſt ſucceſs: as the Anacreontic, Archilochian, Hipponactic, Pherecratian, Glyconian, Alcmanian, Aſclepiadean, Alcaic, Steſichorian, Phaliſcan, Ariſtophanian, Callimachian, Galliambic, Phalæcian, and Sapphic. Sometimes from the ſubject, or the circumſtances of the compoſition; as the heroic, elegiac, Adonic, &c. See HEXAMETER, PENTAMETER, IAMBIC, &c.

In reckoning the feet of iambics, trochaics, and anapæſtics, each meter is a dipody, or comprehends two feet. In other *verſes* a meter is put a ſingle foot. Hence it is that the iambic trimeter is alſo called *ſenarium*, becauſe compoſed of ſix feet. Serv. Centim. 1817.

The moderns have invented *heroic*, or *Alexandrine verſes*, which conſiſt of twelve or thirteen ſyllables.

The ancients, likewiſe, invented various kinds of poetical devices in *verſe*, as *centos*, *echoes*, and *monorhymes*.

VERSES, *equivocal*, thoſe where the ſame words contained in two lines carry a different ſenſe.

VERSES, *reciprocal*, are thoſe which read the ſame backwards as forwards. See RETROGRADE.

VERSES, *concordant*, *dactylic*, *elegiac*, *feſcennine*, *heroic*, *metrical*, *rhopalic*, *ſerpentine*, and *technical*, ſee the ajectives.

VERSE is alſo uſed for a part of a chapter, ſection, or paragraph, ſubdivided into ſeveral little articles.

The whole Bible is divided into chapters; and the chapters are divided into *verſes*.

The five books of the law are divided into fifty-four ſections. See PARASCHE and PENTATEUCH.

Many of the Jews maintain, that this was one of the conſtitutions of Moſes from Mount Sinai; but others, with greater probability, aſcribe it to Ezra, and ſay, that it was made for the uſe of the ſynagogues, in which one ſection was read every Sabbath-day, and thus the whole law read over every year. When the Jews were forbid, in the time of the perſecution of Antiochus Epiphanes, to read the law, they ſubſtituted in its room fifty-four ſections out of the prophets, which were afterwards continued; and when the reading of the law was reſtored by the Maccabees, the ſection which was read every Sabbath out of the law, ſerved for their firſt leſſon, and that out of the prophets for their ſecond leſſon; and ſo it was practiſed in the time of the apoſtles.

Theſe ſections were divided into *verſes*, which the Jews call *peſukim*. They are marked out in the Hebrew Bibles by two great points at the end of them, called *ſoph-paſuck*, i. e. *the end of the verſe*. If Ezra was not the author of this diviſion, it is certainly very ancient, and was probably invented for the ſake of the Targumiſts or Chaldee interpreters. Mention is made of theſe *verſes* in the Miſchna. Prideaux's Conn. vol. ii. p. 479. For the more modern diviſion, ſee CHAPTERS.

The diviſion of *verſes* in the New Teſtament was firſt made by Robert Stephens; and ſo negligently was it done, that his ſon, Henry Stephens, aſſures us, he worked at it as he travelled from Paris to Lyons. Many learned men find great fault with this diviſion, and yet it is every where followed.

M. Simon obſerves, that the Greeks and Latins meant by *verſe*, a line, containing a certain number of words. He adds, that the authors of thoſe days, to prevent any thing being added or taken away from their works, uſed to mark, at the end, the number of *verſes* they contained; but the books themſelves were written all running, without any diviſion, points, or the like.

VERSE, *neck*. See NECK *verſe*.

VERSED *ſine of an arch*. See *Verſed* SINE.

Co-VERSED *Sine*. See CO-VERSED *Sine*.

VERSIFICATION, the art or manner of making verſe; alſo the tune and cadence of verſe.

Verſification is properly applied to what the poet does more by labour, art, and rule, than by invention, and the genius, or furor poeticus. See POETRY.

The matter of *verſification* is long and ſhort ſyllables, and feet compoſed of them; and its form is the arrangement of them in correct, numerous, and harmonious verſes; but this is no more than a mere tranſlator may pretend to, and which the Catilinarian war, put in meaſure, might merit.

It is with reaſon, therefore, that theſe ſimple matters are diſtinguiſhed from the grand poetry, and called by the name *verſification*.

In effect, there is much the ſame difference between grammar and rhetoric, as there is between the art of making verſes, and that of inventing poems.

VERSIO *chemica*, a term uſed by chemical writers to expreſs a change, wrought by their art, of manifeſt forms into occult ones, which, they ſay, is done by a corruption of the ſpecific form, and the generation of a more general one; that is, by a converſion of decompounded elements into compound bodies, and of impure into ſuch as are perfectly pure.

VERSION, a tranſlation of ſome book, or writing out of one language into another.

For various verſions of the Scriptures, ſee BIBLE and SEPTUAGINT. See alſo HEXAPLA and POLYGLOTT.

VERSO. See FOLIO *verſo*.

VERT, in *Heraldry*, the term for a green colour.

It is alſo called *vert* in the blazon of the coats of all under the degrees of nobles; but in coats of nobles it is called EMERALD; and in thoſe of kings, VENUS.

In engraving, it is expreſſed by diagonals, or lines drawn athwart, from right to left, from the dexter chief corner to the ſiniſter baſe. See *Tab.* II. *Herald. fig.* 89.

In lieu of *vert*, the French heralds uſe *ſinople*, or ſynople.

VERT, or *Green Hue*, in *Foreſt Law*, any thing that grows and bears a green leaf, within the foreſt, that may cover a deer.

This is divided into *over-vert* and *nether-vert*.

Over-VERT is the great woods, which, in law-books, are uſually called *hault-bois*.

Nether-VERT is the under-woods, otherwiſe called *ſub-bois*.

We ſometimes alſo met with *ſpecial* VERT, which denotes all trees growing in the king's woods within the foreſt, and thoſe which grow in other men's woods, if they be ſuch trees as bear fruit to feed the deer.

VERTEBRÆ, in *Anatomy*, a chain of little bones, reaching from the top of the neck, down the back, to the os ſacrum; and forming a third part of the human ſkeleton, called the *ſpina dorſi*. See SPINE.

They have their name *a vertendo*, becauſe it is on them the head and trunk turn; the Greeks call them σπονδυλοι, *ſpondyli*, for the ſame reaſon.

The *vertebræ* are twenty-four in number; ſeven of them belong to the neck, twelve to the back, and five to the loins.

The *falſe vertebræ* are the os ſacrum and the os coccygis.

They lie not in a ſtraight line; thoſe of the neck bend inwards, and thoſe of the back outwards, for enlarging the cavity of the thorax; and thoſe again of the loins bend inwards, and thoſe of the os ſacrum outwards, to enlarge the cavity of the baſon. See SPINE.

The body of each *vertebra* is ſpongy and cavernous, covered with an outer compact ſubſtance, which, in the body of the *vertebræ*, is very thin, but thicker in the proceſſes; having in the middle a large perforation, through which the medulla ſpinalis paſſes, and ſeven apophyſes, or proceſſes.

The fore-part of this body is round and convex; the hind-part ſomewhat concave; its upper and lower ſides are plain, each covered with a cartilage which is pretty thick forwards, but thin backwards; by means whereof it is that we bend the body forwards; the cartilages yielding to the preſſure of the bodies of the *vertebræ*, which, in that motion, come cloſer to one another, which could not be effected, if the hard bodies of the *vertebræ* were cloſe to one another.

The proceſſes of each *vertebra* are of three ſorts, two tranſverſe, or lateral, in each of which there is a tendon of the *vertebral* muſcles inſerted: four oblique, or articular ones, diſtinguiſhed into ſuperior, or aſcending and inferior, or deſcending, each of which has a cartilaginous ſide; by which the *vertebræ* are articulated into one another: and one acute on the hindermoſt part of the *vertebra*, called the ſpinal apophyſis, which ends in a ſmall epiphyſis, and has given the name to the whole ſyſtem of the *vertebræ*. See *Tab. Anat. (Oſteol.) fig.* 10. *lit. a. a. b. b. fig.* 7. *lit. a. a. a. a. fig.* 7. *lit. n. n. o. o. o. r. r. ſ. ſ.* &c. *fig.* 11. *lit. b. b. c. c. fig.* 8. *lit. b. b. a. a.*

The proceſſes, which are peculiarly called the *ſpinas*, form, with the hinder or concave part of the body of the *vertebræ*, a large hole in each *vertebra* between the body and apophyſis, which is part of the *vertebral* or ſpinal canal; and all the holes, anſwering one another, make a channel for the deſcent of the ſpinal marrow, which ſends out its nerves to the ſeveral parts of the body by pairs, through two ſmall holes, formed by the jointing of four notches in the ſides of each ſuperior and inferior *vertebra*; and communicating with the canal.

The *vertebræ* are joined together by their bodies and by their ſmall apophyſes. The bodies, in a natural ſtate, are principally united by a cartilaginous ſymphyſis, that is, by the intervention of a pliable and elaſtic cartilage. This cartilaginous connexion makes the lateral holes of the ſpine larger in the body than the ſkeleton, where theſe cartilages are wanting. Their connexion by the ſmall apophyſes is by arthrodia, and not by ginglymus. Theſe two articulations are ſecured by very ſtrong ligaments. See *Cartilages and Ligaments of the* SPINE.

In the *vertebræ* of the neck, the two firſt and the ſeventh excepted, the body is a little flatted anteriorly, and is thinner and ſhorter than that of all the other *vertebræ* of the ſpine; the upper ſide is a little concave, the lower convex: the breadth of the fore part gradually increaſes as they deſcend, ſo that taken together they repreſent a ſort of pyramid.

The ſpinal apophyſes of theſe *cervical vertebræ* are more or leſs ſtraightened, and forked at the extremity, the firſt excepted, which has no ſuch proceſs. The tranſverſe apophyſes are for the moſt part very ſhort, perforated perpendicularly, concave or grooved on the upper ſide, a little forked, and, as it were, double, except in the firſt and laſt *vertebræ*, in which theſe apophyſes are longer and more pointed.

The articular, or oblique apophyſes, except the firſt, are more oblique than in the other *vertebræ*, and their cartilaginous ſides are ſo inclined, that in each *vertebra* the ſuperior apophyſes are turned backward and upward, the inferior forward and downward. See *Tab. Anat. (Oſteol.) fig.* 3. *n.* 1. 1. *fig.* 7. *n.* 14. 14. *fig.* 8. and *fig.* 9.

The firſt *vertebra*, called ATLAS, has neither body nor ſpinal apophyſes; the hole in it is much larger than in the reſt, and may be divided into two arches, the anterior or largeſt, and poſterior or ſmalleſt; the firſt formed by two thick lateral portions, and a ſmall curve middle part; the lateral portions may be conſidered as a body in two parts, without which the firſt *vertebra* would have been too weak to ſuſtain the articulations; the latter arch having in the middle or its convex ſide a pointed tubercle, marked with muſcular impreſſions, and ſeeming to be in the place of a ſpinal apophyſis.

The tranſverſe apophyſes of the firſt *vertebra* ariſe from the middle of the breadth of the lateral portions, being perforated perpendicularly at their broad origins, and are much longer than thoſe of the five *vertebræ* below them; contracting gradually, they terminate in an obtuſe point.

The ſuperior articular apophyſes are larger than any other of the ſame kind in the whole ſpine; being oblong cartilaginous cavities in the upper ſide of the lateral portions, horizontal in their ſituation, and with their anterior extremities nearer to one another than the poſterior.

The inferior articular apophyſes are leſs hollow, ſhorter, and broader; inclined laterally from within outwards, and from above downwards; directly under the ſuperior, ſo that the articular and tranſverſe apophyſes, and the holes and lateral portions on each ſide, are all in the ſame line.

Between each ſuperior articular apophyſis, and the poſterior arch of the bony ring, there is a long notch or groove, in which the *vertebral* blood-veſſels, in the natural ſtate, make a turn, before they enter the great occipital foramen. There is another more ſhallow notch, on each ſide, between this arch and the inferior apophyſes. In the internal circumference of the great hole of this *vertebra*, in the middle of the great notch, there is a cartilaginous impreſſion for the articulation of the axis of the ſecond *vertebra*; and on each ſide of that notch, there is another ſmall impreſſion for the inſertion of a tranſverſe ligament which ſecures the axis in its place.

The ſecond *vertebra* of the neck, called *epiſtrophæus, axis, cardo*, and *vertebra dentata*, is very different from the firſt; its body is narrower and longer than that of the following *vertebræ*, and its length increaſed on the upper part by an eminence like a pivot or axis, called by the Greeks ODONTOIDES, by the Latins DENTIFORMIS, or ſimply *dens*. In this axis four impreſſions are obſervable, viz. one anterior, which is cartilaginous, for its articulation by a like impreſſion with the great notch in the firſt *vertebra*; one poſterior, for the inſertion of the tranſverſe ligament above mentioned; two ſuperior, which unite at the point of the axis, and ſerve for the inſertion of the ligaments by which the axis is faſtened to the anterior edge of the occipital hole. The ſuperior portion of the axis is a true epiphyſis grafted upon a forked apophyſis. The ſpinal apophyſis is ſhort, broad, and very much forked, and diſtinguiſhed into two lateral parts by a kind of angular criſta. The tranſverſe apophyſes are very ſhort, a little inclined downward, and perforated obliquely; whereas, in all the other *vertebræ* theſe perforations are perpendicular; the apophyſes terminate in a point turned downward. The ſuperior articular apophyſes do not anſwer exactly to the inferior apophyſes of the firſt *vertebræ*, their cartilaginous ſides are inclined outward and downward. The ſuperior apophyſes of this *vertebra*, the tranſverſe proceſſes of the firſt, and their holes, are all in the ſame perpendicular line. The inferior apophyſes are leſs, and ſituated farther back; their cartilaginous ſides are turned backward, and very obliquely, ſo that their ſituation is more vertical than horizontal; they are likewiſe a little hollow. The ſuperior notches are ſuperficial, long, ſituated behind the ſuperior apophyſes, and inſenſibly diſappear toward the ſpinal apophyſes. The inferior notches are ſituated more forward, directly under the tranſverſe apophyſes and their holes. The body of this *vertebra* has a ſmall tubercle on the fore ſide.

The conformation of the third *vertebra* of the neck is not very different from that of thoſe already deſcribed.

The fourth, fifth, and ſixth *vertebræ* are like the third, except that their bodies are gradually more extended, but ſtill hollow in the upper ſide, and convex on the lower; and that the ſpinal apophyſis of the ſixth *vertebra* is longer, thinner, and ſtraighter than in the three above it. The inferior apophyſes of the fourth and fifth *vertebræ*, and the ſuperior of the ſixth, are not ſo much inclined as thoſe above them.

The body of the laſt or ſeventh *vertebra* of the neck is largeſt of all; its lower ſide being almoſt flat. The ſpinal apophyſis is long, almoſt ſtraight, and very prominent, terminating in a ſmall flat head, ſometimes ſmooth and ſometimes a little depreſſed or forked. The tranſverſe apophyſes of this *vertebra* are longer, placed farther back, and leſs grooved than the former. Their holes are ſometimes double, and, in that caſe, leſs than when they are ſingle; and ſometimes there is a break or opening in them like a notch, as is alſo ſometimes obſervable in the ſixth *vertebra.* The ſuperior apophyſes are like thoſe of the other *vertebræ*; but in the inferior the ſides are more inclined and broader, correſponding to the ſuperior apophyſes of the firſt *vertebra* of the back. In the ſix lower *vertebræ* of the neck, the middle holes are much larger than the *vertebræ* of the back: they are in ſome meaſure triangular, being broad on the fore ſide, and contracted on the back ſide.

The *vertebræ* of the back have their bodies longer than thoſe of the neck, and in all of them, except the firſt, the upper ſide of which is a little hollow, both upper and lower ſides are equally flat. From the firſt *vertebra* to the fourth or fifth, their bodies are contracted between the upper and lower ſides, gradually more in the lower *vertebræ*, and growing broader between the fore and back ſides; ſo that viewed on the fore ſide, they repreſent an inverted pyramid or cone, and viewed laterally, they preſent a pyramid in its natural ſituation. From the fourth, or laſt *vertebra*, the ſize of the bodies gradually increaſes, but more between the upper and lower, than between the fore and back ſides. The ſpinal apophyſes are long, ſharp on the upper ſide, and a little hollow on the lower, terminating in a ſort of ſmall pointed head. They are much inclined downward, except the firſt three or four, which are ſtraighter and ſhorter in proportion to their nearneſs to the *vertebræ* of the neck. The three laſt become likewiſe ſtraighter as they deſcend, and are broader and ſhorter than thoſe above them. The articular apophyſes are ſituated almoſt directly above and below the tranſverſe, and their ſides are rather perpendicular than oblique; thoſe of the ſuperior apophyſes are a little convex, and turned backward, the inferior a little concave, and turned forward. The tranſverſe apophyſes are pretty long, diminiſhing in length gradually to the twelfth *vertebra*, in which they are very ſhort and ſmall; they end in a ſort of head ſet upon a narrow neck In the anterior part of theſe heads are cartilaginous cavities correſponding to the tubercles in the ribs, which cavities diminiſh gradually as they deſcend, and in the two laſt *vertebræ* there are ſcarce any to be ſeen. In the upper *vertebræ* they are ſituated more forward than in the following, in which they remove gradually outward. The lateral notches are between the articular apophyſes and bodies of the *vertebræ*, and the inferior are the moſt hollow. Moſt of theſe *vertebræ* have four ſmall cartilaginous impreſſions, two on each ſide of their bodies, which are obliquely hollow, and ſo diſpoſed, that the inferior in the body of one *vertebra*, and the ſuperior in the next below, form a ſort of niche, in which the ends or heads of the ribs are articulated. In the firſt *vertebra* there is commonly an entire niche for the firſt rib, and half of another for the ſecond. The two laſt *vertebræ* have generally but one entire niche on each ſide. Theſe marks are peculiar to the *vertebræ* of the back, and eaſily diſtinguiſh them from the reſt. In the lower articular apophyſes of the laſt *vertebra*, the ſides are turned laterally from within outward, and are likewiſe a little convex; ſo that this *vertebra* is received both above and below, whereas the firſt *vertebra* of the neck receives both ways. Beſides the ſeven ordinary apophyſes, the laſt *vertebra* has often two ſmall ones between the tranſverſe and ſuperior articular apophyſes. The large middle holes in the *vertebræ* of the back become rounder and narrower as they deſcend, eſpecially from the firſt to the tenth, where they begin again to be more flat and extended. All theſe large holes, each of which ſhould be regarded as a portion of a canal, have a notch in the backſide above the ſpinal proceſſes, and between the articular apophyſes; that in the laſt *vertebra* appears to be deeper than any of the reſt. See *Tab. Anat. (Oſteol.) fig.* 3. *n.* 13. 13. *fig.* 7. *n.* 15. 15. *fig.* 10.

The *vertebræ* of the loins are the largeſt in the whole ſpine, and, as they deſcend they increaſe, much more in breadth than in thickneſs: between the upper and lower ſides they are a little contracted in the middle, and their edges are conſequently prominent. The ſpinal apophyſes are ſhort, ſtraight, and broad on each ſide, but narrow on the upper and lower parts. The upper edge is ſharp; the lower divided, as it were, into two labia by a narrow ridge more or leſs prominent; the extremities ſwell a little, and the ſpinal apophyſis of the fifth *vertebra* is ſhorter and narrower than the reſt, and bent a little downward. The tranſverſe apophyſes are longer and more ſlender than in the *vertebræ* of the back, increaſing in length from the firſt to the third, and then diminiſhing to the fifth; they are flat on the back part, and more even on the fore part. The ſuperior articular apophyſes of all theſe *vertebræ* are hollowed lengthwiſe; the inferior are convex lengthwiſe, and placed nearer each other than the ſuperior; the cavities are turned inward, and the convexities outward, and this direction changes as the *vertebræ* deſcend; and thus in the fifth *vertebra* the ſides of the inferior apophyſes are turned a little more forward. Beſides theſe ſeven apophyſes, each *vertebra* has two additional ones near the ſuperior apophyſes. The lower ſide of the body of the laſt *vertebra* is obliquely inclined forward, ſo that it is much longer before than behind. The great foramina in theſe *vertebræ* are larger than in thoſe of the back; they are flatted on the fore ſide, and almoſt angular behind, much like thoſe in the *vertebræ* of the neck. See *Tab. Anat. (Oſteol.) fig.* 2. *n.* 14. 14. *fig.* 7. *n.* 16. 16. *fig.* 11.

The ſpine taken together is the ſupport of all the other bones, and the univerſal director of all the attitudes neceſſary for their different motions. To give a machine both theſe advantages, it muſt have two properties, which, at firſt ſight, appear incompatible, viz. ſtrength and flexibility; and it will be ſtill more perfect if it be alſo light in proportion to its bulk. The author of nature has framed the ſpine, with all theſe advantages, in a manner which is the more wonderful, becauſe it is moſt ſimple. He has made the ſpine flexible by the number of pieces of which it is compoſed; he has made it firm and ſtrong, by diſpoſing theſe pieces, ſo as naturally to ſupport and ſuſtain each other, and by framing them in the moſt convenient manner for that infinite number of cords by which they are bound together; and laſtly, their internal ſtructure renders them very light.

However, the contrivance of this excellent mechaniſm is not the ſame in all the three claſſes of the *vertebræ.* Thoſe of the back and loins ſuſtain each other eaſily enough by the extent and direction of their bodies; and in all of them this diſpoſition is proportioned to the weight they have to bear, the inferior *vertebræ* being larger than thoſe above them; nor does the contraction of this bony pillar, at the fourth or fifth *vertebra* of the back, in the leaſt impair this mechaniſm; for as it is there ſtrengthened by the connexion of the true ribs, large *vertebræ* would have been uſeleſs; whereas, by diminiſhing their ſize, the capacity of the thorax is increaſed for the more commodious reception of the viſcera. In the *vertebræ* of the neck the caſe is different; their bodies are of ſmall extent, and their ſides narrow. The ſituation of the whole row of theſe *vertebræ* is oblique and inclined forward, except the two firſt, which are placed perpendicularly; ſo that this portion of the bony pillar is concave, the upper half being bent forward. In order to judge how far this obliquity extends in a living body, we need only ſtand or ſit, holding the head in a ſtraight poſture, and obſerve the ſituation of the maſtoide apophyſes, becauſe the articulation of the firſt *vertebra* of the neck, with the condyles of the os occipitis, is exactly between the anterior edges of theſe apophyſes. When a man ſtands or ſits in an erect poſture, the oblique diſpoſition of theſe *vertebræ* puts the oblique ſides of their articular apophyſes almoſt in a horizontal ſituation; ſo that they ſupport each other, not only by their bodies, as in the other *vertebræ*, but alſo by their articular apophyſes; the bodies being thus eaſed of part of their burden.

The obliquity of theſe apophyſes facilitates the rotation of the neck; for the natural oblique ſituation of the neck would have made that motion very difficult, without the obliquity of the apophyſes. The diſpoſition of the ſecond and third *vertebra* being more vertical than oblique, the natural inflections of the neck are thereby made more eaſy.

The holes in the tranſverſe apophyſes of the *vertebræ* of the neck form a ſort of canal for the paſſage of the blood-veſſels. The length of this apophyſis in the firſt *vertebra*, enables it to turn more eaſily on the axis of the ſecond; and the ſhortneſs of theſe apophyſes in the other *vertebræ* prevents them from injuring the neighbouring parts in the lateral inflections of the neck.

The length of the ſpinal apophyſis of the ſecond *vertebra* facilitates the rotation of the firſt. The ſmallneſs of this apophyſis, in the three following *vertebræ*, prevents them from compreſſing the neighbouring parts, when the neck is bent backwards; and they are broad and forked ſo as to leave ſufficient room for the inſertion of the muſcles.

The *vertebræ* of the back ſerve principally for the formation of the cavity of the thorax, by ſuſtaining the arches of the ribs; and this cavity is alſo augmented, becauſe the whole row of theſe *vertebræ* is concave on the fore-ſide. The length of their ſpinal apophyſes is proportioned to the great number of muſcles inſerted in them; and their oblique ſituation, and their lying for the moſt part cloſe upon one another, not only prevent the inconveniences of ſo great a length, but hinder the *vertebræ* from being bent backward, and, conſequently, enable them to ſupport great weights without ſinking under them.

The curvature of the tranſverſe apophyſes backward enlarges the capacity of the thorax, and gives to the double articulation of the ribs a peculiar ſort of obliquity, without which it is impoſſible to conceive how, by ſimply raiſing the ribs, all the dimenſions of the thorax ſhould be decreaſed and diminiſhed by lowering them.

The articular apophyſes of the back being almoſt vertical, and nearly in the ſame plane, ſmall degrees of flexion and extenſion are thereby made practicable, as alſo lateral inflexions; but they cannot allow of any rotation. As theſe apophyſes are placed between the tranſverſe, and near the poſterior extremities of the ribs, they are very little expoſed to ſtrains or external injuries; and thereby their ſmall ſize, when compared with the bodies of the dorſal *vertebræ*, becomes ſufficient.

The gentle curvature of the row of lumbar *vertebræ* counterbalances the different directions of the other portions of the ſpine. The ſhortneſs and ſtraightneſs of their ſpinal apophyſes give room to bend the whole ſpine backward to the loins, and their largeneſs affords ſufficient ſpace for the inſertion of muſcles. The length of their tranſverſe apophyſes facilitates the action of the muſcles; but the ſhortneſs of the upper and lower apophyſes prevents their ſtriking againſt the ribs, or oſſa innominata, in lateral inflections.

The ſize of the articular apophyſes is proportioned to the great efforts which they often ſuffer in their motions. The particular direction of theſe apophyſes ſets bounds to the motions of rotation, by their meeting and ſtriking againſt each other; and it is principally on this occaſion that their large ſize becomes neceſſary, to enable them to ſuſtain ſuch ſtrokes without breaking.

The whole canal of the ſpine, from the firſt *vertebra* of the neck to the extremity of the os *ſacrum*, may be regarded as an articulated elongation of the CRANIUM, ſerving to contain a production of the brain called the SPINAL *marrow*, or MEDULLA *ſpinalis*. This canal is larger in the neck and loins than in the back. The lateral holes formed by the notches in each *vertebra* tranſmit the ſame number of nerves. Winſlow's Anat. vol. i. p. 54, &c.

Such are the ſtructure and motion of the *vertebræ*, when in their natural poſition; but we frequently find them variouſly diſtorted. If the *vertebræ* of the back ſtick out, it conſtitutes what we call a *bunched back*; and in ſuch caſes the cartilages between the *vertebræ* are very thin and hard forwards, but conſiderably thick backwards, where the oblique proceſſes of the ſuperior and inferior *vertebræ* are at a conſiderable diſtance from one another, which diſtance is filled up with a viſcous ſubſtance.

This inequality of the thickneſs of the cartilages happens, either by a relaxation, or a weakneſs of the ligaments and muſcles, faſtened to the backſide of the *vertebræ*; in which caſes, their antagoniſts, finding no oppoſition, remain in a continual contraction. See BUNCH and *Curvature of the* SPINE.

The cartilages between the *vertebræ* of the back yield conſiderably to the preſſure of the body, in an erect poſture, and expand themſelves in the night, when perſons lie down. Hence ariſes a very ſingular phenomenon, but a very true one; which is, that a man is conſiderably taller at his riſing in the morning, after the expanſion of theſe cartilages, during the abſence of the preſſure for ſeveral hours, than at night, when they have been preſſed down all the day.

The reverend Mr. Waſſe ſeems to have examined this difference more ſtrictly than any other perſon. He found that ſeveral perſons, enliſted as ſoldiers in a morning, had been diſcharged for want of height, on their being meaſured again before the officers in the evening; and on this occaſion meaſured ſeveral other people, and found the difference in many caſes to be not leſs than an inch. This gentleman obſerved in himſelf, that fixing a bar of iron where he juſt reached it with his head on getting firſt out of bed in the morning, he could loſe near half an inch in an hour, or leſs, if he employed that time in rolling his garden, or any other exerciſe of that laborious kind. He obſerved alſo, that riding often took off the height very ſuddenly; and what was more particular, that in ſitting cloſe to ſtudy five or ſix hours without any motion, he loſt often a whole inch in height.

People who uſe hard labour ſink rather leſs in the whole than thoſe of ſedentary lives; and the height once loſt is never to be recovered that day, not even by the uſe of the cold bath; but a night's lying down alone can reſtore it. Philoſ. Tranſ. N° 383. p. 87.

This difference in height takes place only in the human ſpecies as they are the only creatures who walk erect, and throw the preſſure of their whole weight upon the back-bone. This gentleman meaſured horſes before and after riding, and could find no difference even after the longeſt journies.

The alteration in height is much greater in young people than in thoſe who are more aged. It is evident from this change happening to perſons when they ſit, as well as when they ſtand, that it is brought about merely by the back-bone; and we muſt admire the ſtructure of that part of the body, which owes its giving way thus, to its being formed together in that manner which alone could ſuit it to the ſeveral purpoſes it was intended for. The thickneſs and ſhortneſs of the bones, with the intervening cartilages, aſſiſted by the bony proceſſes, diſpoſe it to a motion peculiar to itſelf; whereas, had the bones been of any conſiderable length, upon bending the body, the articulations muſt have made a large angle upon their inmoſt edges, and the ſpinal marrow would have been continually liable to be injured; and had the cartilages been entirely wanting, it would have been as uſeleſs as if it were but one bone, whereby the trunk of the body, being rendered incapable of bending, muſt have remained for ever in an erect poſture. Another particular, which beſpeaks the utmoſt wiſdom and deſign in the contrivance of this part is, the remarkable difference there is in the cartilages placed betwixt the ſeveral bones of the ſpine.

The *vertebræ* of the back require but little motion, and the cartilages there are for that reaſon ſmall and thin, in compariſon with thoſe of the loins, which being very thick, the loweſt more eſpecially, the motion is much greater there, and much better to be borne. This being the ſtate and diſpoſition of the parts during the whole ſpace of time in which we are uſually employed about our ſeveral buſineſſes, till the time that we diſpoſe ourſelves to reſt, the cartilages of the ſpine will, by their compreſſible and yielding properties, become more cloſe and compact for the preſſure they ſuſtain, and conſequently the ſpine, which is the only ſupport of the trunk of the body, will become ſhorter; but when this ſuperior weight ſhall be entirely removed, by placing the body in an horizontal poſture, as it always is when we are in bed, the compreſſed cartilages will, by their natural elaſtic power, begin gradually to enlarge themſelves, till they, by degrees, recover the expanded ſtate they had before they gave way.

The cartilages between the ſeveral *vertebræ* are twenty-four in number, and every one of theſe is preſſed ſomewhat in our daily employments, ſo that when they all come to expand, the aggregate of their ſeveral expanſions cannot be ſuppoſed leſs than about an inch. Now, if this be the difference occaſioned by the preſſure of the common weight of the body alone upon itſelf, it muſt neceſſarily be much greater in thoſe perſons whoſe conſtant employment it is to carry heavy burdens. The compreſſion and expanſion of the cartilages in older people being leſs than in younger, is a neceſſary conſequence of the cartilages in time of age growing harder, and leſs capable of compreſſion; for they often grow almoſt bony in length of time; and hence it is, that old people are obſerved to loſe ſomewhat of their former height, the cartilages in them ſhrinking to a ſomewhat ſmaller compaſs as they grow bony; and this ſhortening is therefore not imaginary, as many have believed, but real, and owing to this plain cauſe. Phil. Tranſ. Nº 383. p. 90. See *Cartilages of the* SPINE.

The *os ſacrum* has alſo its falſe *vertebræ*; and as the uſe of this bone is to ſuſtain the ſpine, with all that belongs to it, it is neceſſary that it ſhould be ſtrongly connected with, and encloſed by the oſſa innominata, with which it likewiſe ſerves to form the PELVIS.

VERTEBRÆ, *Cartilages and Ligaments of the.* See SPINE.

VERTEBRÆ, *fractured.* When any of the *vertebræ* are fractured without hurting the ſpinal marrow, we may reaſonably ſuppoſe, that the fracture is confined to ſome of the oblique, or ſpinal proceſſes, and therefore the patient will be in no great danger; but when the body of the *vertebra* is either broke or ſplit, and the contiguous ſpinal marrow bruiſed or compreſſed; all parts of the limbs and viſcera beneath that *vertebra* become immoveable and rigid, and death often follows. Laſtly, if the tranſverſe proceſſes of the *vertebræ* are broken, which incline toward the cavity of the thorax, it is ſcarce poſſible that the heads of the ribs, which are connected there, ſhould eſcape being fractured alſo, which makes the caſe very deplorable. When only the proceſſes of the *vertebræ* are broken, it will be the beſt way to reduce the bones into their places with the fingers, placing narrow compreſſes, dipped in warm ſpirit of wine on each ſide of the *vertebræ*, and over them ſlips of thick paſteboard, to be kept on by the proper bandages; for by this means the bones of the *vertebræ*, which are very ſoft and ſpungy, will very quickly and eaſily grow together again. If in theſe fractures the ſpinal marrow be divided, death is generally an inevitable conſequence; all that the ſurgeon can attempt in this caſe is to lay bare the fractured *vertebræ* with the ſcalpel, and replace, or elſe remove, ſuch fragments as injured the ſpinal marrow; and the wound muſt be afterwards gently cleanſed, and treated with the vulnerary balſams, to be kept on with the napkin and ſcapulary bandage, till either the wounds ſhall be terminated by a perfect cure, or by death. Heiſter's Surgery, vol. i. p. 140.

VERTEBRÆ *luxated.* The luxations which happen to the ſpine and *vertebræ* of the back, are generally imperfect ones; for it appears from an accurate conſideration of the ſtructure and articulations of theſe bones, that none of the *vertebræ* can be entirely diſplaced without being fractured, and alſo compreſſing and wounding the ſpinal marrow, which muſt produce danger of inſtant death. Even the imperfect luxations of theſe bones are very dangerous, which happen either between the two ſuperior *vertebræ* of the head and neck, or between the reſt of the *vertebræ*, when they are forced from each other.

Such as have a luxation between the head and upper *vertebra* ſeldom eſcape being carried off by a ſudden death; for, by this means, the tender medulla, which joins immediately with the brain, and is lodged in the ſpine, the brain itſelf, and the nerves which riſe from beneath the occiput are too much diſtended, compreſſed, or lacerated. The two condyloide proceſſes of the occiput uſually ſlide out of their glenoide ſinuſes in the firſt *vertebra* of the neck, when a perſon falls headlong from a high place, or from on horſeback, or when he receives a violent blow upon the neck. People die uſually very ſuddenly by this accident, and are uſually ſaid to have broke their necks, when there is really no more than a bare luxation; though it does ſometimes happen, that the *vertebræ* of the neck are broken. If life ſhould remain after ſuch an accident, which very rarely happens, the head muſt neceſſarily be diſtorted, commonly with the chin cloſe down to the breaſt, ſo that the perſon can neither ſwallow, ſpeak, nor move any part that is below the neck; therefore, if ſpeedy aſſiſtance is not had, death enſues, from the compreſſure, or hurt of the medulla.

In order to reduce this luxation, the patient muſt be laid flat upon the ground; then the ſurgeon, kneeling down with his knees againſt the patient's ſhoulders, muſt bring them together, ſo as juſt to contain the patient's neck between them; this done, he is quickly to lay hold of the patient's head with both his hands, and ſtrongly pulling and extending it, he muſt gently move it from one ſide to another, till he finds, by a noiſe, the natural poſture of the neck, and a remiſſion of the ſymptoms, that the diſlocation is properly reduced.

The imperfect luxations of the *vertebræ* of the back are no more than their two upper and lower proceſſes being diſplaced, and that often but on one ſide; this happens ſometimes to only one of the ſpinal *vertebræ*, ſometimes to more. Theſe luxations are generally very difficult to be reduced; the beſt method of doing it is thus: when the apophyſes of the *vertebræ* are diſlocated on both ſides, the patient is to be laid leaning on his belly over a caſk, drum, or ſome other gibbous body; and then two aſſiſtants are ſtrongly to preſs down both ends of the luxated ſpine on each ſide; by this means the bones of the ſpine will be ſet free from each other, lifted, or puſhed up in form of an arch, and ſo gradually extended; this done, the ſurgeon puſhes down the luxated *vertebræ*, and, at the ſame time, nimbly puſhes the ſuperior part of the body upwards, and by this means the luxated bones are ſometimes happily reduced into their places; if ſucceſs does not attend the firſt attempt in this way, the operation is to be repeated. When the *vertebræ* comes out on one ſide, the patient is to be placed inclining in the prone poſture now mentioned; but ſo, that when the left apophyſis is diſplaced, one aſſiſtant may preſs the lower *vertebræ* inward to the right, and another may depreſs the right humerus, and *vice verſa*. After the *vertebræ* are reduced, the part is to be bathed with ſpirit of wine camphorated, or to have compreſſes dipped in the ſame ſpirit laid on it, and the napkin and ſcapulary bandage are to be applied. Heiſter's Surgery, vol. i. p. 171, &c.

VERTEBRÆ *of fiſh.* The *vertebræ* of fiſh are extremely different in ſhape in the ſeveral kinds, and even vary in number in the different ſpecies of the ſame genus. The anterior *vertebræ* in ſome have three apophyſes, as in the cyprini, eſoces, pleuronecti, &c. and in the clupeæ they have no leſs than ſeven of theſe apophyſes, but they are ſlender and capillary. Artedi Ichthyol.

VERTEBRAL *Artery*, in *Anatomy*, is an artery that goes out from the poſterior and upper ſide of the ſubclavian, and runs up through all the holes in the tranſverſe apophyſes of the vertebræ of the neck; ſending off little twigs, through the lateral notches of theſe vertebræ, to the medulla ſpinalis and its coverings, and giving arteries to the *vertebral* muſcles and others near them. After an incurvated paſſage it ſends off, at its third curvature, a ſmall branch, which is ramified on the outer and poſterior part of the occiput, and communicates with the cervical and occipital arteries. Having afterward reached the great foramen of the os occipitis, it enters the cranium, and pierces the dura mater, ſending ſeveral ſmall ramifications to the back part of the medulla oblongata, and to the corpora olivaria and pyramidalia; it afterward advances to the apophyſis baſilaris of the os occipitis, inclining gradually toward the *vertebral* artery of the other ſide all the way to the extremity of that apophyſis, where they both join in one common trunk, which may be named arteria baſilaris.

VERTEBRAL *Muſcles*, in *Anatomy*, are thoſe which lie along the ſpine, the greateſt part of which ſerve for the motions of the neck, back, and loins.

By *vertebral* muſcles, Steno underſtands thoſe which are fixed in the vertebræ alone; and he diſtinguiſhes them all into recti and obliqui. The recti, which are thoſe that run up parallel to the medulla ſpinalis, or in a longitudinal direction, are middle and lateral: the middle recti being thoſe which are fixed to the ſpinal apophyſes, and the lateral thoſe that are fixed to the tranſverſe apophyſes. He again ſubdivided all theſe into ſimple and compound; the ſimple being thoſe which are fixed in two vertebræ only, and the compound thoſe that are fixed in more than two.

The obliqui are thoſe which run obliquely between the ſpinal and tranſverſe apophyſes; and they are of two kinds; ſome run up from the tranſverſe to the ſpinal apophyſes, approaching each other; and ſome run up from the ſpinal to the tranſverſe apophyſes, diverging from each other: the firſt Steno calls *ad medium vergentes*, or converging muſcles, and the ſecond *a medio recedentes*, or diverging muſcles.

He adds, that ſeveral muſcles of the firſt kind go from one tranſverſe to ſeveral ſpinal apophyſes, and from ſeveral tranſverſe to one ſpinal apophyſis.

According to this account of the *vertebral* muſcles, the ancient terms ſpinales, tranſverſales, and ſemi-ſpinales, may ſtill be applied to them; underſtanding by the firſt thoſe which are wholly fixed in the ſpinal apophyſes; by the ſecond, thoſe which are wholly fixed in the tranſverſe apophyſes; and, by the laſt, thoſe which are fixed in the ſpinal apophyſes by one extremity only.

The two kinds of oblique *vertebral* muſcles, ſays Winſlow, are better expreſſed by the two compound terms tranſverſo-ſpinales and ſpino-tranſverſales. It is, however, neceſſary to retain the general names of vertebrales recti, vertebrales obliqui, &c. becauſe, though the terms already mentioned agree very well to the poſterior obliqui, they cannot be applied to the anterior obliqui, one end of which is fixed, not in the ſpinal apophyſes, but in the bodies of the vertebræ.

The ſmall ſimple muſcles that paſs between two vertebræ may be named vertebrales minores, and the large compound muſcles that reach ſeveral vertebræ, vertebrales majores; both being afterwards divided into ſpinales and tranſverſales majores & minores. The ſmall muſcles are likewiſe called inter-ſpinales and inter-tranſverſales; and as there are ſome ſmall oblique muſcles, which cannot be ſaid to reach either the tranſverſe or ſpinal apophyſes, theſe may be termed ſimply inter-vertebrales.

Beſides the *vertebral* muſcles, properly ſo called, ſeveral other muſcles, not inſerted wholly in the vertebræ, ſerve to move them. Some of the ancients called theſe ſemiſpinales, to diſtinguiſh them from thoſe they termed ſpinales, which included all the *vertebral* muſcles: theſe, ſays Winſlow, may be named ſemi-vertebrales.

The *vertebral* muſcles vary much in their inſertions and reciprocal communications, and they are, therefore, difficultly diſtinguiſhed; but, in general, they are more eaſily diſtinguiſhed in children than in adults, and in adults than in very aged perſons.

The *vertebral* muſcles of the neck, according to the diſtribution of Winſlow, may be reduced to twelve, ſix on each ſide, viz. LONGUS *colli*, TRANSVERSALIS *colli major*, TRANSVERSALIS *gracilis ſive collateralis colli*, SEMI-*ſpinalis ſive tranſverſo-ſpinalis colli*, SPINALIS *colli parvi ſive* INTER-SPINALES, and TRANSVERSALES *colli minores ſive* INTER-TRANSVERSALES. To theſe may be added two, which are ſometimes deſcribed among thoſe of the head, viz. OBLIQUUS *major*, and RECTUS *minor*.

The muſcles which move the vertebræ of the back and loins are reduced to twenty-four, twelve on each ſide, viz. SACRO-*lumbaris*, *longiſſimus* DORSI, SPINALIS *dorſi major*, SPINALES *dorſi minores*, TRANSVERSALIS *dorſi major*, TRANSVERSALES *dorſi minores*, SEMI-*ſpinalis ſive tranſverſo-ſpinalis dorſi*, *ſemi-ſpinalis ſive* TRANSVERSO-*ſpinalis lumborum*, SPINALES & *tranſverſales lumborum*, QUADRATUS *lumborum ſive lumbaris externus*, and *coccygæi* or *muſculi* COCCYGIS.

The vertebræ of the back, and eſpecially thoſe of the loins, may likewiſe be moved by the muſcles of the abdomen; the inferior portion of the LONGUS *colli* may contribute ſomething to the motion of the upper vertebræ of the back; the pſoas, to that of the vertebræ of the loins; and the *glutæus maximus* to that of the os coccygis. Winſlow.

VERTEBRAL *Vein*, in *Anatomy*, ariſes poſteriorly from the SUBCLAVIAN or AXILLARY, ſometimes by two ſtems, and ſometimes by one, which ſoon afterwards divides into two. The firſt and principal ſtem gives out a branch, called vena cervicalis, which is diſtributed to the neighbouring muſcles, and afterwards runs up through the holes of the tranſverſe apophyſes of the vertebræ colli; this cervical branch comes ſometimes from the axillaris. The other ſtem of the *vertebral* vein runs up on the ſide of the vertebræ, and having reached the fourth, or ſometimes higher, it runs in between the tranſverſe apophyſes of that vertebra and the fifth, to join the firſt, or principal ſtem.

The *vertebral* vein accompanies the VERTEBRAL *artery*, ſometimes in one trunk, ſometimes in ſeveral ſtems, through all the holes of the tranſverſe apophyſes of the vertebræ colli to the great foramen occipitale, communicating with the occipital veins, and ſmall occipital ſinuſes of the dura mater; and ſending branches to the anterior muſcles of the neck, and to the ſmall interior muſcles of the head; and alſo other branches to the muſculi tranſverſales and vertebrales colli, and to the great canal of the ſpinal marrow, where ſinuſes are formed communicating with thoſe on the other ſide. Winſlow.

VERTEX, in *Anatomy*, the crown of the head, or that uppermoſt and middle part ſituated between the ſinciput and occiput.

Hence, alſo, *vertex* is figuratively uſed for the top of other things. Thus, the *vertex* of a cone, pyramid, conic ſection, &c. is the point of the upper extremity of the axis, or the top of the figure.

VERTEX *of an Angle*, is the angular point, or the point A, (*Tab.* IV. *Geometry*, *fig.* 91.) wherein the legs meet.

VERTEX *of a Figure*, is the *vertex* of the angle oppoſite to the baſe.

Such is the point M (*Tab. Geometry*, *fig.* 19.) oppoſite to the baſe KL.

VERTEX *of a Curve*, is the point A (*Tab. Geometry*, *fig.* 12.) from which the diameter is drawn; or it is the interſection of the diameter and the curve.

VERTEX *of a Glaſs*, in *Optics*, the ſame with the pole thereof.

VERTEX is alſo uſed in *Aſtronomy*, for the point of heaven perpendicularly over our heads, called the ZENITH.

VERTEX, *Path of the*. See PATH.

VERTIBULUM, a word uſed by ſome writers to expreſs the round head of a bone, which, in its articulation, is inſerted into the ſinus, or cavity of another bone.

VERTICAL *Circle*, in *Aſtronomy*, is a great circle of the ſphere, paſſing through the zenith Z, and the nadir N, (*Tab. Aſtronomy*, *fig.* 6.) and any other given point on the ſurface of the ſphere, as B.

The *vertical circles* are alſo called AZIMUTHS. The meridian of any place is a *vertical circle*. All the *vertical circles* interſect each other in the zenith and nadir.

The uſe of the *vertical circles* is to meaſure the height of the ſtars, and their diſtances from the zenith, which is reckoned on theſe circles; and to find their eaſtern and weſtern amplitude, by obſerving how many degrees the *vertical*, wherein the ſtar riſes or ſets, is diſtant from the meridian.

Prime VERTICAL, is that *vertical* circle, or azimuth, which paſſes through the poles of the meridian; or which is perpendicular to the meridian, and paſſes through the equinoctial points.

Prime VERTICALS, in *Dialling*. See PRIME *Verticals*.

VERTICAL *of the Sun*, is the *vertical* which paſſes through the centre of the ſun at any moment of time.

Its uſe is, in dialling, to find the declination of the plane whereon the dial is to be drawn, which is done by obſerving how many degrees that *vertical* is diſtant from the meridian, after marking the point, or line of the ſhadow upon the plane at any times.

VERTICAL *Angles*. Two angles, as *o* and *x*, (*Tab. Geometry*, *fig.* 18.) are ſaid to be *vertical*, if the legs of one of them, AE and EB, be only continuations of the legs of the other, CE and DE. See *Vertical* ANGLES.

VERTICAL *Plane*, in *Perſpective*. See PLANE and PERSPECTIVE.

VERTICAL *Plane*, in *Conics*, is a plane paſſing through the vertex of a cone, and parallel to any conic ſection.

VERTICAL *Line*, in *Conics*, is a right line drawn on the *vertical plane*, and paſſing through the vertex of the cone.

VERTICAL *Line*, in *Perſpective*. See *Vertical* LINE.

VERTICAL *Dial*. See *Vertical* DIAL.

VERTICAL *Point*, in *Aſtronomy*, the ſame with *vertex*, or *zenith*.

Hence, a ſtar is ſaid to be *vertical*, when it happens to be in that point which is perpendicularly over any place.

VERTICAL *Line*, in *Dialling*, is a line in any plane perpendicular to the horizon.

This is beſt found and drawn on an erect and reclining plane, by holding up a ſtring and heavy plumbet ſteadily, and then marking two points of the ſhadow of a thread on the plane, a good diſtance from one another; and drawing a line through thoſe marks.

VERTICILLATE *Plants*, in *Botany*. See PLANTS.

Mr. Ray makes two diſtinctions of the *verticillate plants*. 1. The *fruticoſæ*, or ſuch whoſe ſuperficies is perennial; theſe, again, have either a plain flower, as the chamædrys vulgaris, teucrium, and the marum Syriacum; or a flower with a lip, which they call a *labiated flower*; or one ſomething in the form of a helmet, which they call *galeated*; as the ſclarea, ſtœchas, hyſſopus, roſmarinus, ſatureia, marum vulgare, thymum vulgare, and the polium montanum.

2. The *herbaceæ*, or ſuch whoſe ſtalks are not perennial; theſe are the menthæ, verbena, dictamnus Creticus, origanum, majorana, ocymum, horminum, galeopſis, nepeta, betonica, prunella, ſtachys, clinopodium vulgare, lamium, moluca, hedera terreſtris, galericulata, calamintha, meliſſa, marrubium commune, nigrum & aquaticum; chamæpitys, ſcordonia, ſcordium, bugula, ſyderitis, and cardiaca.

VERTICILLATE *Flowers*. See FLOWERS.

VERTICITY, is that property of the loadſtone whereby it turns or directs itſelf to ſome peculiar point.

The attraction of the magnet was known long before its *verticity*.

VERTIGO, formed *à vertendo*, from *turning round*, in *Medicine*, an indiſpoſition of the brain, wherein the patient ſees the objects about him as if they turned round, and fancies he turns round himſelf; though he is all the while at reſt.

Phyſicians diſtinguiſh two kinds, or rather two degrees of *vertigoes*. The firſt, called a *ſimple vertigo*, is when the body and external objects appear to turn round, without any great dimneſs of ſight.

The other called *ſcotomia*, or *vertigo tenebroſa*, is when the eyes are alſo darkened, and, as it were, covered with a miſt.

Some make a third ſtage, viz. *vertigo caduca*, wherein the patient actually falls down. But this ſeems ſcarce to differ from an EPILEPSY.

Sometimes the *vertigo* is ſituated in the fore part of the head, and ſometimes in the hind part; the latter is much the more dangerous.

Bellini accounts for the *vertigo* very well, from a preternatural motion in the retina; for it is evident, an object will ſeem to move circularly, if the images thereof, painted on the retina, fall ſucceſſively on different parts of the retina.

This they may do, either by the objects moving while the eye is at reſt, or from the eye moving while the object reſts; or, laſtly, the object and eye being both at reſt, and the rays falling on the ſame place, by the optic nerves being alone in motion. For ſince a right and an oblique incident do not excite the ſame tremors in the nerves, and the ſame ſpecies of motion; if the optic nerve only be moved, and the object be at reſt, it will appear to ſhift its ſituation, by the change of the place in which it was repreſented.

External cauſes of *vertigoes* are a continued turning round of the body, drunkenneſs, too long faſting, immoderate exerciſe, ſurprize, voracity, much uſe of pulſe, onions, leeks, radiſhes, cabbage, muſtard, &c. and, in general, whatever may preſs, diſtend, or contract the arteries.

The firſt ſtep in the cure is bleeding in the jugular, or cupping; then they proceed to an emetic; then a veſicatory on the neck, or a perpetual bliſter, or iſſues, with ſternutatories, and the other medicines that obtain in the apoplexy.

VERTILLAGE, in *Agriculture*, the tilling, or preparing of ground to receive the ſeed, by turning, ſtirring, or toſſing it.

VERTUE. See VIRTUE.

VERTUMNALIA, among the *Romans*, a feſtival celebrated in honour of the god Vertumnus in the month of October.

VERTUMNUS, in *Mythology*, a god who preſided over gardens and orchards, honoured among the Etruſcans, from whom the worſhip of this deity was tranſmitted to the Romans.

Ovid has deſcribed the various forms aſſumed by this deity, in order to obtain the love of Pomona. Some have ſuppoſed that *Vertumnus*, whoſe name they derive *à vertendo*, becauſe he had power to change his form at pleaſure, marked the year and its variations; and thus they ſay he pleaſed Pomona, by bringing the fruits to maturity. Accordingly, Ovid ſays, that he aſſumed the form of a labourer, reaper, vine-dreſſer, and old woman, to repreſent the four ſeaſons, ſpring, ſummer, autumn, and winter.

Vertumnus had a temple near the market-place at Rome, being repreſented as one of the tutelary deities of the merchants.

Vertumnus, ſays an ancient ſcholiaſt, *deus eſt preſes vertendarum rerum*, i. e. *vendendarum ac emendarum*.

At the feaſt inſtituted in honour of him, he was repreſented as a young man crowned with different ſorts of herbs, dreſſed in a robe which reached to his middle; holding fruit in his left hand, and in his right, a cornucopiæ.

The commentators on Ovid ſay, that he was an ancient king of Hetruria, who, by his diligent and ſucceſsful cultivation of fruits and gardens, obtained the honour of being ranked among the gods. Encyclopedie.

VERTUOSO. See VIRTUOSO.

VERU, a comet, according to ſome writers, reſembling a ſpit, being nearly the ſame as the lonchites, only its head is rounder, and its train longer and ſharper pointed.

VERVA, a word uſed by ſome authors to expreſs an ivory amulet to be worn for the epilepſy.

VERVAIN, *verbena*, in *Botany*, a genus of the *diandria monogynia* claſs. Its characters are theſe: the flower has an angular permanent empalement, indented in five parts at the brim; it has one petal with a cylindrical tube, the length of the empalement, which is incurved, and cut into five points at the brim, which ſpread open, and are nearly equal; it has ſometimes two, at other times four, very ſhort briſtly ſtamina within the tube, two of which are ſhorter than the other, with as many incurved ſummits as ſtamina, with a four-cornered germen, ſupporting a ſlender ſtyle the length of the tube, crowned with an obtuſe ſtigma; the germen afterward becomes two or four oblong ſeeds, cloſely ſhut up in the empalement. Miller enumerates eighteen, and Linnæus ſixteen ſpecies.

The common *vervain*, or *verbena officinalis* of Linnæus, is very common on the ſides of roads, foot-paths, and farm-yards, near habitations; for although there is ſcarce any part of England in which this is not found in plenty, yet it is never found above a quarter of a mile from a houſe; which occaſioned its being called *ſimpler's joy*, becauſe, wherever this plant is found growing, it is a ſure token of a houſe being near; this is a certain fact, ſays Miller, but not eaſy to be accounted for. It is rarely cultivated in gardens, but is directed by the College of Phyſicians for medicinal uſe, and is brought to the markets by thoſe who gather it in the fields. It is annual, and flowers in July or Auguſt.

Vervain was uſed among the ancients at their ſacrifices, and was thought to contain ſomething divine. The Romans, in the beginning of the year, made a preſent of this herb to their friends.

It manifeſts a ſlight degree of aſtringency. The root, worn at the pit of the ſtomach, an infuſion, and an ointment prepared from the leaves, are ſaid to produce good effects in ſcrophulous caſes. Morley's Eſſ. on Scrophula.

But this, ſays Dr. Withering, wants confirmation from the more rational, and leſs enthuſiaſtic practitioner.

Its ſenſible qualities, ſays Dr. Lewis, afford little or no foundation for the abundance of virtues for which it has been celebrated.

VERVAIN *Mallow*. See MALLOW.

VERU-MONTANUM, in *Anatomy*, a kind of little valve in the place wherein the ejaculatory ducts enter the urethra.

Its uſe is to prevent the urine, in paſſing the urethra, from getting in at thoſe ducts, and ſo mixing with the ſemen. See URETHRA.

VERY *Lord*, and VERY *Tenant*, are thoſe that are immediate lord and tenant to one another. See LORD and TENANT.

VERZELLINO, in *Ornithology*, the name of a bird common in Italy, and kept in cages for its ſinging, called by authors CITRINELLA, and *thraupis*.

VESICA, in *Anatomy*, a bladder; a membranous or ſkinny part in which any humour is contained.

VESICA *bilaria*. See GALL-*bladder*.

VESICA, among *Chemiſts*, is a large copper veſſel, tinned on the inſide, uſed in diſtilling ardent ſpirits; ſo called, as reſembling the figure of a blown bladder.

VESICÆ *ſphincter*. See SPHINCTER.

VESICATORY, *veſicatorium*. See BLISTER, CANTHARIDES, and EMPLASTRUM.

Veſicatories are a ſtronger ſort of ſinapiſms, and a kind of potential cauteries.

VESICULA, *veſicle*, a diminutive of VESICA; ſignifying a *little* BLADDER.

The lungs conſiſt of *veſiculæ*, or lobules of *veſiculæ*, admitting air from the bronchiæ; and not only air, but alſo duſt, &c.

There are ſeveral parts in the body which bear this appellation; as,

VESICULA *fellis*, *ciſtula fellis*. See GALL-*bladder*.

VESICULÆ *ſeminales*, in *Anatomy*, are ſoft, whitiſh, knotted bodies, about three or four fingers breadth in length, one in breadth, and about three times as broad as thick, ſituated obliquely between the rectum and lower part of the bladder, in ſuch a manner, as that their ſuperior extremities are at a diſtance from each other, and their lower extremities united between thoſe of the vaſa deferentia. They are irregularly round on the upper part, and their breadth gradually decreaſes from thence. By the union of their lower extremities they form a kind of fork, the branches of which are broad, and bent like ram's horns. Theſe extremities are very narrow, and form a ſmall neck, which runs behind the bladder towards its orifice, and continues its courſe in the groove of the proſtates, through the ſubſtance of the contiguous portion of the urethra, till its extremities pierce the caruncula. The inner ſubſtance of the *veſiculæ* is plaited, and diſtinguiſhed into ſeveral capſulæ, by contorted folds. Their external ſurface is covered by a fine membrane, which ſerves for a border and frænum to the folds, and is a true continuation of the cellular ſubſtance of the peritonæum. The *veſiculæ* may be eaſily unfolded, and when their contortions are ſtraightened, they become much longer than in their natural ſtate. Their inner ſurface is villous and glandular, and furniſhes a fluid, which exalts, refines, and perfects the ſemen, which they receive from the vaſa deferentia, and of which they are the reſervatories for a certain time. Beſides the ſeptum formed by the paſſage of the *vaſa* DEFERENTIA into the *veſiculæ*, the lateral union of the extremities of the vas deferens, and *veſicula ſeminalis* on each ſide, forms likewiſe a kind of ſhort ſeptum, terminating in a creſcent, like a ſmall ſemilunar valve, and the extremity of the vas deferens is narrower than that of the *veſicula*. By this mechaniſm, the fluid contained in each vas deferens has liberty to enter the contiguous veſicula, but that contained in the *veſicula* cannot return into the other canals. Winſlow.

See *Tab. Anat. (Splanch.) fig.* 8. *lit. o. o. fig.* 15. *lit. b. b.* See alſo Seed, and Testicles.

Vesiculæ *ſeminales.* Theſe veſſels are very evident in fiſh; the females of moſt fiſh have double ovaria, though in ſome they are ſingle, as in the oſmerus, and perca fluviatilis of Bellonius; but the *veſiculæ ſeminales* in the males are two in number in all fiſh, not excepting the males of theſe here mentioned. They differ, however, very much in regard to their figure and ſituation. As to their ſituation, they in ſome fiſh occupy almoſt the whole length of the abdomen, as in the ſpinoſe kinds in general, and in the petromyzum, accipenſer, and many of the other cartilaginous kinds. In ſome fiſh, they are placed only in the lower part of the abdomen, as in the cetaceous kinds, &c. As to figure, in the generality of fiſh, they are oblong and compreſſed, but in ſome they are round, as in the cetaceous kinds. The other parts of generation are wanting in moſt fiſh. Artedi's Ichthyolog. See Testes.

Vesiculæ *adipoſæ.* See Adeps, and Cellulæ *adipoſæ.*

VESICULAR *glands.* See Glands.

VESP, or Wasp, *veſpa,* in the *Hiſtory of Inſects.* See Wasp.

Vesp-*ichneumon.* See Ichneumon-*waſp.*

Of this inſect, Mr. Ray mentions not leſs than thirty-two ſpecies; the greater part of which are common on the ſides of mud banks in the borders of fields. Theſe have all ſlender bodies, and are armed with ſtings.

The origin of this creature is very ſtrange; it is uſually found iſſuing from the body of the common cabbage caterpillar; the occaſion of which is this: the parent fly ſtrikes her tail through the ſkin of the back of this caterpillar, and depoſits her eggs in the creature's fleſh. The eggs hatch into ſmall maggots of the carnivorous kind; and theſe prey upon the fleſh of the caterpillar till they arrive at their full growth: the creature that ſupports them keeping itſelf alive all this time by the vaſt quantities of nouriſhment it is continually taking in. At length, when theſe worms are arrived at their full growth, they ſpin themſelves a web, under which they change into chryſales, and ſoon after come out in form of the fly that laid the egg. This is not peculiar to this ſingle ſpecies of fly; but many are formed thus in the bodies of caterpillars of ſeveral kinds: ſome of theſe ſpin their webs under the ſkin of the caterpillar, and eat their way through it, when arrived at their perfect ſtate; but others crawl out while yet in their worm ſtate, after having eaten their full time, and bury themſelves under ground in order to ſpin their webs.

VESPER, in *Aſtronomy,* called alſo *Heſperus,* and the *evening ſtar,* is the planet Venus, when ſhe is eaſtward of the ſun, and conſequently ſets after him.

VESPERS, in the *Romiſh Church, evening ſong*; that part of the office which is rehearſed after noon; anſwering to our *evening prayers*; except that it differs more from the office of the morning, called *matins.*

Vespers, *Sicilian,* denote a famous æra in the French hiſtory; or a general maſſacre of all the French in Sicily, in the year 1282, to which the firſt toll that called to *veſpers* was the ſignal.

Some will have it to have happened on Eaſter eve; others, on the day of the Annunciation; but moſt authors aſſign it to Eaſter day. It is aſcribed to one Prochites, a Cordelier, at the time when Charles of Anjou, count of Provence, was king of Naples and Sicily. The women with child by Frenchmen were not ſpared.

After the like manner we ſay, *the matins of Moſcow,* ſpeaking of the Muſcovites aſſaſſinating their prince Demetrius, and all the Poles, his adherents, at Moſcow, the twenty-ſeventh of May 1600, under the conduct of their duke Choutſky, at ſix o'clock in the morning: and *French matins* to the maſſacre of St. Bartholomew in 1572.

VESPERTILIO, in *Zoology.* See Bat.

Vespertilio, in *Conchyliology,* the name of an elegant ſpecies of voluta, ſuppoſed to have ſome reſemblance to the colour of a bat.

VESPERTILIONUM *alæ, bat's wings,* among *Anatomiſts,* two broad membranous ligaments, with which the bottom of the womb is tied to the bones of the ilium; they are ſo called from their reſembling the wings of a bat. See *Tab. Anat. (Splanch.) fig.* 11. *lit. g. g.*

VESPERTINE, *veſpertinus,* in *Aſtronomy,* is when a planet is ſeen deſcending to the weſt after ſun-ſet.

VESPIVORUS *buteo,* in *Ornithology,* a name given by ſome authors to the bird, called in Engliſh the honey-buzzard, from its feeding its young with the maggot worms out of honey-combs. See Apivorus *buteo.*

VESSEL, *vas, vaſe,* a thing proper to hold or contain liquor. See Vas.

Thus, a ton, or hogſhead, &c. are *veſſels* fit to contain ale, wine, &c.

The *chemiſts* uſe a great diverſity of *veſſels* in their operations; as copper alembics, with their refrigeratories; worms, and receivers; alembics of glaſs, ſtone, and earthen ware; adopters, or ſmall receivers with two necks; aludels, balloons, bottles, glaſs jars and baſons of various ſizes; capſules, or diſhes of glaſs, ſtone-ware, cryſtal glaſs, crucible earth, and plate iron; the cone, crucibles, glaſs funnels, ingot moulds, matraſſes, mortars, muffles, pelicans, retorts, receivers, circulatory *veſſels,* ſubliming *veſſels,* &c. See each article. See alſo Laboratory, and *Tables of Chemiſtry.*

Vessel, *double.* See Double.

Among anatomiſts, &c. all the tubes or canals, wherein the blood, and other juices or humours, are ſecreted, conveyed, depoſited, &c. as the veins, arteries, lymphatics, ſpermatics, &c. are called *veſſels.* See *Tab. Anat. P.* 2. *Veſſels of human body.*

Some even extend the word *veſſel* to the nerves; as ſuppoſing them the conduits of the animal ſpirits.

Veſſels conſiſt of membranes, variouſly formed, and diſpoſed for the reception of the fluids; and theſe membranes, again, conſiſt of leſſer veſicles, or veſiculæ; and this, for what we know, without end.

In the new ſyſtem of many modern philoſophers and phyſicians, *veſſel* is a name common to all the ſolid parts of the body.

Theſe authors explain the whole animal œconomy, functions, &c. from the divers liquors diffuſed throughout the body, and the various tubes or *veſſels* which contain thoſe liquors. In effect all we know in the human body, is either *veſſel,* or liquor.

The ancients, it is true, had a notion, that ſome parts of the body, as the heart, ſpleen, &c. are mere parenchymas, i. e. a kind of pulp, or pith, void of all *veſſels*; but the moderns, by the advantage of microſcopes, injections, &c. find that theſe, and all other parts of the body, are mere congeries, or maſſes of *veſſels,* interwoven.

Some philoſophers even extend the modern ſyſtem to all material beings; owning only two elements, viz. a matter infinitely liquid, diffuſed through all nature; and hard, or ſolid parts; which are, as it were, the *veſſels* of that matter.

The number of *veſſels,* ſome of our lateſt and beſt anatomiſts obſerve, is greateſt in embryos, and continually decreaſes as age comes on.

For, in the actions whereby nutrition, &c. are effected, the greater *veſſels* being much diſtended by their humours, the ſmaller veſicles, whereof the membranes or coats of the larger are compoſed, become compreſſed and ſtreightened, and at length quite dry, and void of juices; ſo that, growing together, the fibres become the firmer and ſtronger, by the loſs of the veſicles. And hence the ſtrength, firmneſs, ſtiffneſs, &c. of the ſolid parts.

Vessels, *extraordinary,* in *Anatomy.* It is not uncommon to find in the bodies of diſſected perſons remarkable variations from the common courſe of nature in the ſtructure of the body; and among theſe, ſometimes duplicates of parts naturally ſingle: thus Kerkring mentions a double *vena cava,* and a treble ductus thoracicus in different bodies, as alſo four ſpermatic arteries in one body, with no ſpermatic veins. There are accounts alſo of defects of parts uſually judged eſſential; but it is to be obſerved, that the ends of nature being much more eaſily anſwered by the exceſs than by the defect of parts, the accidents of exceſs are much more common than thoſe of defect. Kerkring's Spicil. Anat.

Vessel, *axis of a, capillary, cervical, phrenic, pulmonary, ſpermatic,* and *umbilical.* See the ſeveral articles.

Vessel, in *Navigation,* is a general name common to all ſorts of ſhips; i. e. all floating machines, or vehicles that move in water; whether they are navigated on the ocean, or in canals and rivers.

Veſſels, in this comprehenſive ſenſe, are frequently diſtinguiſhed into two general claſſes, viz. *high-bottomed,* or *decked veſſels*; which are thoſe that move wholly with wind and ſail, and live in all ſeas; as *pinks, galleons, ſhips,* &c. and *flat-bottomed veſſels,* which go both by oars and ſails; ſuch are *boats, galleys, praams, wherries,* &c.

Floating veſſels are uſually diſtinguiſhed into *boats, lighters, barges, barks, fiſhing veſſels, ſhips of trade,* and *veſſels of war*; of each whereof there are divers kinds and denominations. See Ship.

However, the name *veſſel* is more particularly applied to ſhips or floating machines of the ſmaller kind, furniſhed with one or two maſts. In *Tab.* II. *Ship*, the reader will ſee the principal of thoſe that are moſt frequently employed in European navigation. A snow under ſail is exhibited in *fig.* 9. *fig.* 10. repreſents a ketch at anchor; *fig.* 11. a brig or brigantine; *fig.* 12. a bilander; *fig.* 13. a xebec; *fig.* 14. a schooner; *fig.* 15. a galliot; *fig.* 16. a dogger; all of which are under ſail; *fig.* 17. and 18. two galleys, one of which is under ſail, and the other rowing; and *fig.* 19. a sloop. The ketch, whoſe ſails are furled, is furniſhed with a try-ſail, like the ſnow; and it has a fore-ſail, fore-ſtay-ſail, and jib, nearly ſimilar to thoſe of a ſloop; but the ſails on the main-maſt and mizen-maſt are like thoſe of a ſhip. The main-ſail and main-top-ſail of the brig are like thoſe of the ſchooner; and the fore-maſt is rigged and equipped with ſails in the ſame manner as the ſhip and ſnow. The ſails, maſts, and yards of the xebec, being extremely different, are deſcribed under xebec. In the ſchooner both the main-ſail and fore-ſail are extended by a boom and gaff, as likewiſe is the ſloop's main-ſail; the ſails of the dogger and galliot are ſufficiently expreſſed in the figures; and, finally, the galleys are navigated with lateen-ſails, which are extremely different from thoſe of the *veſſels* above deſcribed. Falconer.

A *veſſel* is ſaid to be *of three or four hundred tons*; meaning, that it will carry three or four hundred times two thouſand weight; or that, when immerged in water, it poſſeſſes the ſpace of three or four hundred tons of water; which are equal to the weight of the *veſſel*, and all the loading it can carry.

A *veſſel* is ſaid to *draw ten or fifteen feet of water*; meaning, that, when loaden, it ſinks ſo deep under water.

The figure of *veſſels* is an object of great importance, with regard to their motion, ſailing, &c. and in the determining what form is moſt commodious, the new doctrine of infinites becomes of apparent ſervice to navigation and commerce.

A body, moving in an immoveable fluid, is obliged to ſever the parts thereof; and they reſiſt ſuch ſeparation.—Now, ſetting aſide a certain tenacity, whereby they are, as it were, glued together, and which is different in different fluids; the whole force of the reſiſtance depends on that of the ſhock, or impulſe: for a body that is ſtruck, ſtrikes at the ſame time; but a perpendicular ſtroke is that which a liquid reſiſts the moſt, as being the greateſt; and for a body to move freely therein, it muſt be of ſuch figure, as to preſent itſelf as obliquely as poſſible. If it were triangular, and moved with the point foremoſt, it is certain all its parts would ſtrike the fluid obliquely; but they would all ſtrike it with the ſame obliquity; and it were more advantageous, that each ſhould ſtrike more obliquely than the next adjacent.

Now, ſuch a perpetual augmentation of obliquity can no where be had but in a curve line; each point whereof is conſidered as an infinitely ſmall right line, always inclined to the other little right lines contiguous to it.

To find what curve it is, whoſe perpetual change of obliquity, or inclination in all its parts, renders it, of all others, the fitteſt to divide the fluid eaſily, is a problem much more difficult than it appears to be, and, in effect, is only to be ſolved by the new geometry: the ſolution was firſt given by ſir Iſaac Newton, in his inveſtigation of the ſolid of the leaſt reſiſtance.

That author, however, did not publiſh his analyſis; yet the marquis de l'Hopital hit upon it; and afterwards M. Fatio reſolved the ſame problem, though by a much longer, and more perplexed way. See *Solid of the leaſt* Resistance.

Vessels, *book of*. See Book.

VESSIGON, in the *Manege*, a wind-*gall*, or ſoft ſwelling, on the in and outſide of a horſe's hough, that is, both on the right and left of it.

VEST, and Vestiture. See Investiture.

VESTA, in *Mythology*, one of the principal deities of the pagans.

Thoſe who have diligently inveſtigated the religion of the Pythagorean philoſophers pretend, that by *Veſta* they meant the univerſe, to which they aſcribed a ſoul, and which they worſhipped as the ſole divinity, ſometimes under the name of το ϖαν, *the whole*, and ſometimes under the appellation of μονας, *unity*. However, fabulous hiſtory records two goddeſſes under the name of *Veſta*; one the mother of Saturn, and wife of Cœlum; and the other, the daughter of Saturn by his wife Rhea. The firſt was *Terra*, or the Earth, called alſo Cybele, and derived her name *Veſta*, according to ſome, from cloathing, becauſe the earth is clothed, *veſtitur*, with plants and fruits, or, according to Ovid, from the ſtability of the earth, becauſe *ſtat vi terra ſua*, or it ſupports itſelf. Hence the firſt oblations in all ſacrifices were offered to her, becauſe whatſoever is ſacrificed ſprings from the earth; and the Greeks both began and concluded their ſacrifices with *Veſta*, becauſe they eſteemed her the mother of all the gods. The ſecond was fire, and *Veſta*, whoſe power was exerciſed about altars and houſes, derives her name, according to Cicero, from ἑστια, *fire* or *hearth*. Accordingly the poets frequently uſe *Veſta* for fire or flame; as they do Jupiter for air, Ceres for corn, &c. An image of *Veſta*, to which they ſacrificed every day, was placed before the doors of the houſes at Rome; and the places where theſe ſtatues were erected were called *veſtibula*, from *Veſta*. This goddeſs was a virgin, and ſo great an admirer of virginity, that when Jupiter her brother gave her leave to aſk what ſhe would, ſhe beſought that ſhe might always be a virgin, and have the firſt oblations in all ſacrifices.

This goddeſs is called by Horace *æterna Veſta*, and it was in honour of her that Numa erected a temple at Rome, and dedicated virgins to keep a perpetual fire upon her altars, *ut ad ſimulacrum cœleſtium ſiderum, cuſtos imperii flamma vigilaret*, as Florus ſays. One way of repreſenting this goddeſs, it is ſaid, was in the habit of a matron, holding in her right hand a flambeau or lamp, and ſometimes a Palladium, or ſmall Victory. Mr. Spence, however, doubts, whether the figures, that are generally looked upon as *Veſtas*, do really repreſent that goddeſs or not. There is nothing, he ſays, which he has ſeen, that would not be as proper for one of the veſtal virgins, as for the goddeſs who preſided over them. To this purpoſe Ovid expreſly ſays (Faſt. vi. ver. 298.) they had no repreſentations of this goddeſs: *effigiem nullam* Veſta *nec ignis habent*. And he explains away another paſſage in the third book of his Faſti, ver. 46. where he ſpeaks of a figure of *Veſta*. Polymetis, p. 82. The titles that are given to *Veſta* upon medals and ancient monuments are, *Veſta* the Happy, the Mother, the Saint, the Eternal, &c. The worſhip of *Veſta* and of fire was brought from Phrygia into Italy by Æneas and the other Trojans who reſorted thither. To this purpoſe Virgil obſerves (Æn. lib. ii.) that Æneas, before he left the palace of his father, had taken away the fire from the ſacred hearth: *Æternumque adytis effert penetralibus ignem*.

The name *Veſta*, called by the Greeks ἑστια, was ſynonymous with the Chaldæan and Perſian *Aveſta*; and hence, according to the learned Hyde, Zoroaſter gave to his famous book on the worſhip of fire, the name of *Aveſta*, or Abesta, i. e. the cuſtody of fire.

VESTALIA, feaſts held in honour of the goddeſs Veſta, on the fifth of the ides of June; i. e. on the ninth day of that month.

On that day, banquets were made before the houſes; and meats were ſent to the veſtals, to be offered by them to the goddeſs. See Vestals.

The aſſes, that turned the mills for grinding corn, were, on this occaſion, led about the city, crowned with flowers, and chaplets formed of pieces of bread; and the mill-ſtones were likewiſe decked with garlands and crowns.

The ladies went barefooted in proceſſion to the temple of Veſta; and an altar was erected to Jupiter *the Baker*, *Jovi Piſtori*, in the Capitol.

The *Veſtalia* had their names from that of their goddeſs Vesta.

VESTALS, *Veſtales*, in *Antiquity*, virgins in ancient Rome, conſecrated to the ſervice of the goddeſs Veſta; and particularly to watch the ſacred fire in her temple.

Numa firſt inſtituted four *Veſtals*; and Plutarch tells us, Servius Tullius added two more; but Dion. Halicarnaſſ. and Valerius Maximus aſcribe this augmentation to Tarquinius Priſcus; which number, ſix, laſted as long as the worſhip of the goddeſs Veſta. The *Veſtals* made a vow of perpetual virginity: their employment was, the ſacrificing to Veſta, and keeping up the holy fire in her temple. If they violated the vows of chaſtity, they were puniſhed with remarkable ſeverity; being ſhut up, or buried, in a deep pit, or cavern, in a place called *agger & ſceleratus campus*, with a lighted lamp, and a little water and milk, and there left to be devoured by hunger. If they let out the fire, they were whipped by the pontifex maximus; and the fire was rekindled by the ſun-beams. It is ſaid, that they always lighted it anew on the firſt of March in every year, whether it had gone out or not.

To be ſecure of their virginity, at their admiſſion, it was provided, that they ſhould not be under ſix, nor above ten years old. They were choſen by lot, out of twenty virgins, carried by the pontiff to the comitia, for that purpoſe.

They were only conſecrated for thirty years; after which time they were at liberty to go out, and be married. If they continued in the houſe after that time, they were only to be aſſiſtants, in point of advice, to the other *Veſtals*.

The firſt ten years they were to employ in learning their functions; the ten following they were to exerciſe them; and the laſt ten, to teach them to others.

Their order was very rich; both on account of the endowments of the emperors, and of legacies of other perſons.

The *Veſtals* had a particular place allotted them at the amphitheatres, and games of the Circus. Their vehicle was the carpentum, or pilentum. The veil, wherein they ſacrificed, was called *ſuffibulum*.

At firſt, they were nominated by the kings; but after the extinction of monarchy, by the pontifex maximus, or high-prieſt. The eldeſt of them was called *maxima*, as the firſt pontiff was maximus.

They had divers privileges; diſpoſed of their effects by teſtament, in their father's life-time; had the ſame gratification as a mother of three children; and whenever they met a criminal going to execution, they had a power to pardon him. Whenever they went abroad they had the faſces carried before them, a conſul, or the prætor, being obliged to give way to them.

The fire, which the *Veſtals* were to watch, was not on an altar, or an hearth, but in little earthen veſſels with two handles, called *capeduncula*.

This fire was held a pledge of the empire of the world. If it went out, it was judged a very unlucky prognoſtic, and was to be expiated with infinite ceremonies. Among the Romans, Feſtus tells us, it was only to be rekindled by the rubbing a kind of wood, proper for the purpoſe. But among the Greeks, Plutarch, in the life of Numa, obſerves, it was to be rekindled by expoſing ſome inflammable matter in the centre of a concave veſſel held to the ſun. For it is to be noted, the Romans were not the only people who kept the perpetual fire of Veſta, in imitation of the celeſtial fires; but the Greeks were poſſeſſed with the ſame ſuperſtition; particularly the Delphians, Athenians, Tenedians, Argives, Rhodians, Cyzicenians, Mileſians, Epheſians, &c.

This order of *Veſtals* is ſaid to have ſubſiſted about a thouſand years, i. e. from the time of Numa to that of the emperor Theodoſius.

VESTED *legacy*. See CONTINGENT *legacy*.

VESTED *remainder*. See REMAINDER.

VESTIARIUS, *veſtiary*, in *Antiquity*, maſter of the wardrobe; an officer under the Greek empire, who had the care and direction of the emperor's apparel, robes, &c.

The *protoveſtiarius*, or *firſt veſtiary*, was the grand-maſter of the wardrobe. But, among the Romans, *veſtiarius* ſimply was only a ſaleſman, or taylor.

VESTIBULE, *veſtibulum*, in the *Ancient Architecture*, a large open ſpace before the door, or entrance of a houſe.

Martinius derives the word from *veſtæ ſtabulum*; becauſe the fore-part of the houſe was dedicated to Veſta. Daviler derives it from *veſtis*, and *ambulo*; becauſe people there begin to let their trains fall.

The Romans had places called *veſtibules*, at the entrance of their houſes, to ſhelter people obliged to ſtand at the door from the weather; and we have ſtill *veſtibules* of the like kind, in many old churches, houſes, &c. called *porches*.

Veſtibules, only intended for magnificence, are uſually between the court and the garden: theſe are ſometimes *ſimple*; that is, have their oppoſite ſides equally enriched with arches; and ſometimes their plan is not contained under four equal lines, or a circular one, but forms ſeveral van-corps, and rear-corps, furniſhed with pilaſters.

VESTIBULE is alſo uſed for a kind of little antichamber before the entrance of an ordinary apartment.

VESTIBULE is alſo an apartment in large buildings, which preſents itſelf at the entrance into a hall or ſuite of rooms, or offices. The area, in which a magnificent ſtair-caſe is carried up, is ſometimes called a *veſtibule*. And alſo when the ends of corridores, or paſſages, terminate in a room, without being ſeparated from them by doors, either to receive light or air, or for appearance; ſuch rooms are called *veſtibules*.

VESTIBULE, *veſtibulum*, in *Anatomy*, denotes the fore-part of the labyrinth of the ear.

The *veſtibule* is a ſmall cavity, of an irregular form, placed immediately above the baſis of the ſtapes; between the ſemicircular canals, and the cochlea.

In it appear divers foramina; as that of the feneſtra ovalis; the five foramina of the ſemicircular canals; that of the cochlea; and five other very ſmall ones, through which ſo many nerves paſs. See EAR.

VESTIGIA, a Latin term, frequently uſed by Engliſh writers, to ſignify the traces or footſteps any thing has left behind it.

The word is particularly applied to the marks remaining of ſomething antique, gone to ruin by time.

VESTIS *angelica*. See ANGELIC *garment*.

VESTMENT. See VESTURE.

VESTRY, *veſtiaria*, a room adjoining to a church, where the prieſts veſtments, and the ſacred utenſils, are kept, and parochial aſſemblies are held.

Hence the term *veſtry* is applied to the parochial aſſembly itſelf. On the Sunday before a *veſtry* is to meet, public notice ought to be given, either in the church, after divine ſervice is ended, or elſe at the church door, as the pariſhioners come out, both of the calling of the ſaid meeting, and alſo the time and place of aſſembling it, and ſometimes of the buſineſs for which it is convened. And it is uſual for half an hour before it begins, to give notice, by tolling one of the church bells. Anciently, at the common law, every pariſhioner who paid to the church rates, or ſcot and lot, and no other perſon had a right to come to theſe meetings, the miniſter excepted, who is reſponſible to the biſhop, whether he be rector or vicar, for his attendance, and who preſides in every pariſh meeting. Out-dwellers alſo, occupying land in the pariſh, have a vote in the *veſtry*, as well as the inhabitants; and when they are met, the major part preſent will bind the whole pariſh. Burn's Eccl. Law, art. *Veſtry*.

VESTRY-*men*, a ſelect number of the principal perſons of every pariſh within the city of London, and elſewhere; who yearly chooſe pariſh-officers, and take care of its concernments.

They are thus called, becauſe they uſually meet in the *veſtry* of the church.

By theſe *ſelect veſtries*, the pariſhioners have in ſome places loſt not only their right to concur in the public management as often as they would attend, but alſo the right of electing the managers. And yet ſuch a cuſtom of the government of pariſhes hath been adjudged a good cuſtom, as the churchwardens accounting to them has been adjudged a good account. In ſome pariſhes, theſe ſelect veſtries have been thought oppreſſive and injurious, and great ſtruggles have been made to ſet them aſide. Preſcription and conſtant immemorial uſage ſeem to be the baſis and only ſupport of theſe *ſelect veſtries*. In the act of the 10 Ann. cap. 11. for building fifty new churches, the commiſſioners are empowered to appoint a convenient number of ſufficient inhabitants to be *veſtry-men*; and from time to time, upon the death or removal, or other voidance, of any ſuch *veſtry-man*, the reſt, or majority of them, may chuſe another. In the ſeveral private acts for building particular churches, ſometimes the miniſter, churchwardens, overſeers of the poor, and others, who have ſerved or paid fines for being excuſed from ſerving theſe offices; ſometimes the miniſter, churchwardens, overſeers of the poor, and all who pay to the poor rate; ſometimes only all who pay a certain ſum to the poor rate; ſometimes all who rent houſes of ſo much a year, are appointed to be *veſtry-men* within ſuch pariſhes, and no other perſons.

VESTRY-*clerk*, an officer who keeps the pariſh accounts.

VESTURE, *veſtment*, a garment, or clothing.

In our law books, it is alſo uſed metaphorically; as in *veſtura terræ*, i. e. *ſegetes quibus terra veſtitur*; the corn wherewith the earth is clothed, or covered.

VESTURE *of an acre of land*, is the produce on it; or the wood, corn, &c. growing on it. It ſhall be enquired how much the *veſture* of an acre of ground, and how much the land, &c. 4 Ed. I. 14 Ed. III. &c.

VESTURE, *veſtura*, alſo ſignifies a poſſeſſion, or ſeiſin.

In which ſenſe it is borrowed from the feudiſts; with whom *inveſtitura* ſignifies a delivery of poſſeſſion by a ſpear, or ſtaff; and *veſtura*, the poſſeſſion itſelf. See INVESTITURE.

VESUVIUS, *eruptions of*. See ERUPTION, and VOLCANO.

VETCH, or TARE, *vicia*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the flower has an erect, tubulous empalement, of one leaf, cut into five equal parts at the brim; the petal is of the butterfly kind; the ſtandard oval, broad at the tail, indented at the point, and the borders are reflexed; the two wings are almoſt heart-ſhaped, and ſhorter than the ſtandard; the keel is ſhorter than the wings; the tail is oblong, and divided into two parts; it has ten ſtamina, nine joined, and one ſeparated, terminated by erect ſummits, with four furrows, and a linear, compreſſed, long germen, ſupporting a ſlender ſtyle, crowned by an obtuſe ſtigma, which is bearded on the under ſide; the germen afterwards turns to a long pod, with one cell, opening with two valves, ending with an acute point, and containing ſeveral roundiſh ſeeds. There are many ſpecies. Miller enumerates five, and Linnæus eighteen. The common *vetch* or *tare* is much cultivated in the fields for fodder; of this there are two varieties, if not diſtinct ſpecies. The firſt, which is the moſt common, has a black ſeed; the other has ſeeds as white, if not whiter, than the whiteſt peaſe: and this difference is permanent, for they are never found to vary. Theſe plants are annual, and periſh ſoon after they have perfected their ſeeds; the ſtalks are angular, ſtreaked, and hairy; they are weak and want ſupport, ſo generally decline where they have nothing near to faſten themſelves to; the leaves are compoſed of ſeveral pair of blunt lobes, and are terminated by tendrils; the flowers come out from the wings of the ſtalk, ſitting very cloſe to the baſe of the foot-ſtalks of the leaves; two of theſe generally ſpring from the ſame joint; they are pretty large, and of the butterfly-ſhape; thoſe of the black-ſeeded ſort are purple, and thoſe of the white-ſeeded white; they appear in June and July, which are ſucceeded by erect pods, containing three or four round ſeeds in each, which ripen in Auguſt or September. The ſort with white ſeed is rather the more ſucculent plant of the two, and therefore better for fodder; and if they are ſown in drills, may be ſo covered, that the rooks cannot find them.

Vetches are generally ſown at two ſeaſons; one is in autumn, and the other early in the ſpring; but the beſt time is in Auguſt; for the ſeeds which are ſown then will come up ſoon, and the plants will have time to get ſtrength before winter, ſo will be in leſs danger of ſuffering by froſt, than thoſe which are ſown later, and will be fit to cut for feed much earlier in the ſpring; for that is the time when green feed is moſt wanted, and if they are deſigned for ſeed, and not to be cut for fodder, thoſe early ſown *vetches* will come ſoon into flower, and the ſeeds will be ripe early, ſo they may be cut and ſtacked in good weather, which is a great advantage; for thoſe which ripen late are often ſtacked or houſed wet, and then the ſeeds frequently ſprout in the mow, and are ſpoiled.

The uſual method of ſowing *vetches* is in broad-caſt, ploughing them lightly in; in this way the common allowance of ſeed for one acre of land, is two buſhels; but there are ſome who ſow two buſhels and a half; this practice may do well enough for thoſe *vetches* which are deſigned to be cut for fodder in the ſpring; but thoſe which are ſown with an intent to ſtand for ſeed, will do much better if they are ſown in drills, in the ſame way as is practiſed for peaſe, and then leſs than half the quantity of ſeed will be ſufficient; for the drills ſhould not be nearer to each other than three feet, that the hoe-plough may have room to go between them, to deſtroy the weeds, and earth up the plants; for by this management they will produce a much greater crop, and ripen earlier in the ſeaſon. Theſe drills ſhould be about the ſame depth as thoſe uſually made for peaſe, and the ſeeds ſhould be ſcattered about the ſame diſtance in the drills. Theſe ſeeds ſhould be carefully covered as ſoon as they are ſown; for if they are left open, the rooks will diſcover them; and when they once find the rows, if they are not carefully watched, they will entirely devour them. Indeed, theſe being ſown early in autumn, will be in leſs danger than thoſe which are ſown late, or in the ſpring, becauſe there is more food for rooks and pigeons in the open fields at this ſeaſon, and the plants will appear much ſooner above ground. Toward the latter end of October the plants will have obtained conſiderable ſtrength, therefore they ſhould be earthed up with the hoeing-plough. This work ſhould be performed in dry weather, and in doing it care muſt be taken to lay the earth up as high to the ſtems of the plant as poſſible, ſo as not to cover the ſtalks, becauſe this will ſecure them againſt the froſt. The whole ſpace of ground between the rows ſhould alſo be ſtirred, in order to deſtroy the weeds, which, if carefully done in dry weather, will lay the land clean till March; at which time the crop ſhould be earthed a ſecond time, and the ground cleaned again between the rows, which will cauſe the plants to grow vigorous, and in a little time they will ſpread ſo as to meet, and cover the ſpaces; whereas thoſe ſown in the ſpring will not grow to half this ſize, and will be much later in flowering.

Some people ſow theſe *vetches*, and when they are fully grown, plough them into the ground to manure it. Where this is deſigned, there will be no occaſion to ſow them in drills at this diſtance, nor to huſband them in the manner before directed; but in this caſe it will be the beſt method to ſow them in autumn, becauſe they will be fit to plough in much ſooner the following year, ſo that the land may be better prepared to receive the crops for which it is intended.

When theſe plants are cultivated for their ſeeds, they ſhould be cut ſoon after the pods change brown; and when they are dry, they muſt be immediately ſtacked; for if they are ſuffered to lie out in the field to receive wet, and there come one hot day after it, the pods will moſt of them burſt, and caſt out the ſeeds. When the ſeeds are threſhed out, the haulm is eſteemed very good for cattle; and ſome have recommended the ſeeds for horſes, and affirm they are as proper for theſe animals as beans; which, if true, will render them more valuable, becauſe theſe will grow on the lighteſt ſandy land, where beans will not thrive.

There is another kind of *vetch*, with a ſmaller black ſeed, cultivated occaſionally, though very rarely, in the fields, becauſe it is more tender than the other, and muſt be always ſown in the ſpring, called in ſome counties rath-ripe *vetch*, and in others pebble or ſummer *vetch*. The *Siberian vetch*, which is a biennial plant, is recommended by Mr. Miller for fodder; becauſe its ſtalks grow to a great length, and are well furniſhed with leaves; they do not decay in autumn, but continue green through the winter, notwithſtanding the ſevereſt froſt, eſpecially if they are kept from trailing on the ground; ſo that in February and March, when there is a ſcarcity of green feed for ewes and lambs, this is of great ſervice. The flowers of this ſpecies are of a light blue colour, and appear in July. This may be ſown in ſpring or autumn; and when the plants come up, they require no other culture, but to be kept clean from weeds. While they are young, this ſhould be done with the Dutch hoe, and afterwards with the hoeing plough; and thus the plants may be earthed up like peaſe and beans, which will ſtrengthen their ſtalks, and make the leaves larger and more ſucculent. Miller's Gard. Dict.

In Glouceſterſhire the common *vetch* or tare is ſown as paſturage for horſes, and eat off early enough to allow of turneps being ſown the ſame year. The ſeeds are excellent food for pigeons.

Tares are rarely uſed in medicine, though the common people boil them in milk, and give the decoction to drive out the ſmall-pox and meaſles.

VETCH, *axe*, in *Botany*. See *Hatchet* VETCH.

VETCH, *bitter*, or *peaſeling*, *orobus*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the empalement of the flower is tubulous, of one leaf; the brim oblique, and indented in five parts; the flower is of the butterfly kind; the ſtandard is heart-ſhaped; the two wings are almoſt as long as the ſtandard, and join together; the keel is bifid, acute-pointed, and riſing upwards; the borders are compreſſed, and the body ſwollen; it hath ten ſtamina, nine joined, and one ſeparate, terminated by roundiſh ſummits; it hath a cylindrical compreſſed germen, ſupporting a crooked riſing ſtyle, crowned by a narrow, downy ſtigma; the germen afterward becomes a long taper pod, ending in an acute point, having one cell, containing ſeveral roundiſh ſeeds. Linnæus enumerates ten, and Miller fourteen ſpecies.

The roots of the tuberous orobus, or wood and heath peaſe, when boiled, are ſavoury and nutritious; ground into powder they may be made into bread. They are much eſteemed by the Highlanders in Scotland, and chewed for preventing hunger. They imagine that they promote expectoration, and are efficacious in curing diſorders of the lungs. They alſo know how to prepare an intoxicating liquor from them. Withering's Bot. Arr. vol. ii. p. 446.

VETCH, *bitter*, and *Corn* VETCH. See ERVUM.

VETCH, *bindweed-leaved*. See VETCHLING.

VETCH, *chichling*, *lathyrus*, in **Botany**, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the flower has a bell-ſhaped empalement of one leaf, cut into five parts at the top; it is of the butterfly kind; the ſtandard is heart-ſhaped, large, and reflexed at the point; the wings are oblong and blunt, the keel half round, and of the ſize of the wings; it hath ten ſtamina, nine of them joined, and one ſeparate, crowned by roundiſh ſummits; it has an oblong, narrow, compreſſed germen, ſupporting a riſing ſtyle with an acute point, crowned by a hairy ſtigma; the germen becomes a long compreſſed pod, ending in a point, having two valves, filled with roundiſh ſeeds. Linnæus reckons twenty-one, and Miller twenty ſpecies, one of which is known by the name of the ſweet-ſcented pea.

The ſweet pea grows naturally in Ceylon, but is hardy enough to thrive in the open air in England. It is an annual plant, with a climbing ſtalk, which riſes from three to four feet high, garniſhed with leaves compoſed of two large oval lobes, whoſe mid-rib is terminated by long claſpers; the footſtalks, which come out at the joints, ſuſtain two large flowers, with dark purple ſtandards, but the keel and wings are of a light blue colour; the flowers have a ſtrong ſweet ſmell, and are ſucceeded by long inflated pots, which are hairy, containing four or five roundiſh ſeeds in each. There are two other varieties of it, one with a pink-coloured ſtandard, and a white keel, the wings of a pale bluiſh colour. This is commonly called the painted-lady pea. The flowers of the other are all white.

Theſe plants require little culture; only where ſown for ornament, they ſhould have ſome ſticks to prevent their trailing on the ground. Miller.

VETCH, *crimſon graſs*, a ſpecies of *lathyrus*. See *Chickling* VETCH.

VETCH, *hatchet*, *ſecuridaca*, in *Botany*. Its characters are theſe: the empalement of the flower is ſhort, compreſſed, and of one leaf, cut into two ſegments; the flower is of the butterfly kind; the ſtandard heart-ſhaped, reflexed on both ſides, and ſcarcely longer than the wings; theſe are oval, joining at the top, but open at the bottom, and the keel is compreſſed and pointed; it has ten ſtamina, nine joined, and one ſeparate, terminated by ſmall ſummits; and an oblong compreſſed germen, with a briſtly ſtyle, crowned by an obtuſe ſtigma; the germen turns to a long, compreſſed, ſword-ſhaped pod, with a thick border on one ſide, plain on the other, opening in two cells filled with ſquare ſeeds. We know but one ſpecies, which grows naturally in the corn-fields in Spain and Italy. Miller.

Linnæus has joined this to the CORONILLA.

VETCH, *Cluſius's foreign hatchet*. See BISERRULA.

VETCH, *horſeſhoe*, *hippocreps*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the empalement of the flower is permanent, divided into five parts, and the flower is of the butterfly kind; the ſtandard hath a narrow baſe, of the length of the empalement, heart-ſhaped above; the wings are oval, oblong, and blunt; the keel is moon-ſhaped and compreſſed; it hath ten ſtamina, nine joined, and one ſeparate, terminated by ſingle ſummits; and an oblong, narrow germen, ſitting on an awl-ſhaped ſtyle, crowned by a ſingle ſtigma; the germen becomes a long, plain, compreſſed pod, cut into many parts from the under ſeam to the upper, each part forming a roundiſh ſinus, with obtuſe, three-cornered joints connected to the upper ſeam, each joint ſhaped like a horſeſhoe, encloſing a ſingle ſeed. There are three ſpecies.

VETCH, *baſtard milk*, *phaca*, in *Botany*, a genus of the *diadelphia decandria* claſs. Its characters are theſe: the flower has a tubulous empalement of one leaf, cut into fine ſmall indentures at the brim; it is of the butterfly kind, having a large oval, erect ſtandard, with two oblong wings, which are ſhorter, and a ſhort, compreſſed, obtuſe keel; it has ten ſtamina, nine of which are joined in one body, the other ſtanding ſeparate, terminated by roundiſh, riſing ſummits; in the centre is ſituated an oblong germen, ſupporting an awl-ſhaped ſtyle, crowned by a ſingle ſtigma; the germen becomes an oblong ſwelling pond, whoſe upper ſuture is depreſſed toward the under, having one cell, containing ſeveral kidney-ſhaped ſeeds. Linnæus enumerates five, and Miller two ſpecies

VETCH, *Venetian*, a ſpecies of *orobus*. See *Bitter* VETCH.

VETCH *graſs*. See GRASS.

VETCH, *kidney*, a ſpecies of *anthyllis*. See LADY's *finger*.

VETCH, *liquorice*, or *wild liquorice*. See ASTRAGALUS.

VETCH, *knobbed-rooted liquorice*. See GLYCINE.

VETCH, *milk*. See ASTRAGALUS.

VETCHLING, a ſpecies of *hedyſarum*. See *French* HONEY-*ſuckle*.

VETCHLING, *yellow*, *aphaca*, in *Botany*. Its characters are theſe: the empalement is of one leaf, ſlightly indented at the top in five parts; the flower is of the butterfly kind, the ſtandard being large and heart-ſhaped, the wings ſhorter and obtuſe; the keel is the length of the wings, and divided ſlightly in the middle; it hath ten ſtamina, nine joined, and one ſingle, crowned by round ſummits; the oval germen, which is ſituated in the centre, ſupporting a ſingle ſtyle, and crowned by a hairy ſtigma, becomes a ſhort pod, containing two or three round ſeeds. We have but one ſpecies, which is found wild on arable land in divers parts of England. Linnæus has joined this ſpecies to his genus of *lathyrus*. See *Chichling* VETCH.

The ſeeds of this, and of all the other ſpecies of *vetchling*, are nutritious, either eaten in broth, or made into bread. Withering.

VETERAN, *veteranus*, in the *Roman Militia*, a ſoldier who was grown old in the ſervice; or who had made a certain number of campaigns; and, on that account, was entitled to certain benefits and privileges.

Theſe privileges conſiſted in being abſolved from the military oath; in being exempted from all the functions of a ſoldier; and in enjoying a certain ſalary or appointment, &c. The time of ſervice fixed by the Roman laws was from ſeventeen to forty-ſix years; and among the Athenians, forty years. The uſe of the term *veteran* was not introduced till about the cloſe of the republic; but its origin may be traced to the firſt diſtribution which Servius Tullius made of the Roman people into claſſes and centuries; under which the *centuria ſeniorum*, or old ſoldiers, were appointed to guard the city. They were afterwards employed to guard the camp, whilſt the *centuriæ juniorum* fought in the field of battle. After they had ſerved ſome years, they were called *veteres*, in contradiſtinction to the *novitii* or *tirones*. In proceſs of time, thoſe who had ſerved a certain number of campaigns were called *veterans*, and were exempt from the obligation of military ſervice, except on urgent occaſions. See EVOCATI.

The rewards conferred on *veterans* were at firſt very inconſiderable, e. gr. a few acres of land in a foreign country, where they eſtabliſhed colonies; but at length they became immenſe. Tiberius Gracchus diſtributed among them the treaſures of Attalus, who had made the Roman people his heirs. Auguſtus alſo beſtowed upon them pecuniary recompence, and almoſt all his ſucceſſors augmented their privileges. Encyclop.

In France, the term *veteran* is ſtill retained to ſuch officers as have held their poſt twenty years, and who enjoy certain of the honours and privileges affixed thereto, even after they have laid them down.

A *veteran* counſellor has a voice and ſeat at audiences, though not at proceſſes by writing. A *veteran* ſecretary of the king acquires the privilege, &c. of nobility, to himſelf, and his children.

VETERINARIA, *Mulo-medicina*, or medicine applied to the diſeaſes of cattle. Whence,

VETERINARIUS, a farrier, or horſe-leech.

VETERNUS is uſed, by ſome phyſicians, for a lethargy, or other drowſy diſeaſe.

VETITUM *Namium*, in *Law*, imports a forbidden DISTRESS. See NAMIUM.

VETO, in *Roman Antiquity*, was the ſolemn word uſed by the tribunes of the people, when they inhibited any decree of the ſenate, or law propoſed to the people, or any act of their magiſtrates. See INTERCESSION.

VETOLA, in *Ornithology*, a name uſed by the Venetians, and from them by many others for a water-bird of the *ſcolopax* kind, called by Aldrovand the *totano*, and by Geſner, the *fedoa ſecunda*. In the Linnæan ſyſtem it is the SCOLOPAX *limoſa*.

It uſually weighs about nine ounces; its beak is ſhaped like that of the woodcock, and is red all over, except at the end, where it is blackiſh; its neck is grey; its belly and breaſt white; its head of a browniſh grey, and its back brown; but its rump has a white ring on it; its tail is compoſed of black and white feathers. Ray's Ornithology, p. 216.

VETTONICA, in *Botany*, the ancient way of ſpelling the word *betonica*, the name of a plant, called in Engliſh BETONY.

It is called *vettonica* by Pliny, who ſays it obtained that name from a people of Italy, ſo called, among whoſe woods it grew.

If any thing certainly can be judged of the *betonica* of the ancients, it is, that it was our SERRATULA.

VEXES. See NE *injuſte vexes*.

VEXILLARII, among the Romans, were veteran ſoldiers, the ſame with thoſe the old Romans called TRIARII. There were ſix hundred of them in every legion.

VI ET ARMIS, q. d. *by force and arms*, a law-term uſed in an indictment; to denote the forcible and violent commiſſion of any crime.

VI LAICA *removenda*, a writ lying where debate being between two parſons, or proviſors for a church, one of them makes a forcible entry into it, with a number of laymen, and holds the other out.

VIA, *way*. See WAY and ROAD.

VIA LACTEA, in *Aſtronomy*, the *Milky Way*, or GALAXY.

VIA MILITARIS, in our *Law Books*, is uſed for a *highway*. *Quæ publica dici poterit, & ducit ad mare, & ad portum, & quandoque ad mercata.* Bracton. lib. iv. cap. 16.

VIA MILITARIS, in *Roman Hiſtory*. See MILITARY *Ways*, and WAY.

VIA REGIA, the *king's highway*, is defined in Leg. Hen. I. to be "that which is always open, and which nobody "may ſhut by any means, as leading to a city, port, or "town."

Its breadth the ſame laws preſcribe to be ſuch, as that two carts may paſs each other, and ſixteen horſemen armed may go abreaſt. See HIGHWAY.

VIA SOLIS, the *ſun's way*, in *Aſtronomy*, is uſed, among ſome aſtronomers, for the ecliptic line; ſo called, becauſe the ſun never goes out of it.

VIÆ PRIMÆ, *firſt paſſages*, among *Phyſicians*, are the œſophagus, ſtomach, and guts, including the whole length of the alimentary duct, or canal, from the mouth to the ſphincter ani.

In this ſenſe, we ſay, an obſtruction in the *primæ viæ*. Purging and emetic medicines operate chiefly on the *primæ viæ*. And ſudorifics, alteratives, cardiacs, &c. ſuſpend their action till after they have paſſed the *primæ viæ*.

VIAL, or PHIAL, a ſmall and thin glaſs bottle. See PHIAL.

VIALES, in *Mythology*, a name given, among the Romans, to the gods who had the care and guard of the roads and highways. Such were Mercury and Hercules.

The *Dii Viales* according to Labeo, were of the number of thoſe gods called *Dii Animales*; who were ſuppoſed to be the ſouls of men, changed into gods: theſe were of two kinds; viz. the *Viales*, and PENATES.

The *Viales* were the ſame with thoſe otherwiſe called LARES; at leaſt, ſome of the *Lares* were denominated *Viales*; viz. ſuch of them as had the more immediate ſuperintendency of the roads.

Hence the two names are ſometimes joined, and thoſe highway-deities are called *Lares Viales*; witneſs that inſcription in Gruter:

FORTUNAE
REDUCI LARI
VIALI ROMAE
AETERNAE
Q. AXIUS AELIA
NUS—VE. PROC.
AUG.

IONI.

VIATICUM, among the ancient Romans, was the allowance or appointment which the republic gave to ſuch of its officers as were ſent into the provinces, to exerciſe any office, or to perform any ſervice, or commiſſion; as alſo to the officers of the army, and even the ſoldiers, &c.

Tacitus makes mention of it, lib. i. Annal. cap. 37. *Viaticum amicorum, ipſiuſque Cæſaris*; meaning the appointments which the republic paid to Germanicus, and his officers.

This *viaticum*, however, did not conſiſt altogether in money: the ring, given to the magiſtrates and officers ſent into the provinces, was part of it; ſo were the cloaths, baggage, tents, and the reſt of the equipage.

Some have alſo given the name of *viaticum* to the piece of gold, ſilver, or copper, which the ancients uſed to put into the mouths of the dead, to pay Charon for their paſſage.

In the Romiſh church, *viaticum* is ſtill the allowance made a religious, to defray the expences of a journey, miſſion, &c.

VIATICUM is alſo uſed for the communion, or euchariſt, which is given to the people in the pangs of death, or who are about to make the voyage of the other world.

The *viaticum* is not to be given to perſons executed in courſe of juſtice.

VIATOR, in *Antiquity*, an officer of juſtice among the Romans. The term, originally, had no other ſignification than that of a public meſſenger, or ſervant, ſent to advertiſe the ſenators and magiſtrates when aſſemblies were to be held, where their preſence was required.

Hence, becauſe, in the firſt ages of that empire, the Roman magiſtrates lived moſtly at their country houſes; theſe officers being obliged to be frequently upon the road, were called *viatores, travellers*; from *via, highway*.

In proceſs of time, the name *viator* became common to all officers of the magiſtrates, lictors, accenſi, ſcribes, ſtatores, and criers; either by reaſon theſe names and offices were confounded in one; or becauſe *viator* was a general name, and the reſt particular ones, ſpecifying the particular functions they diſcharged, as A. Gellius ſeems to inſinuate, when he ſays, that the member of the company of *viatores*, who binds a criminal condemned to be whipped, was called *lictor*.

Be this as it will, the names *lictor* and *viator* are often uſed indiſcriminately for each other; and we as often meet with *Send to ſeek*, or *advertiſe him by a lictor*, as *by a* viator.

None but the conſuls, prætors, tribunes, and ædiles, had a right to have *viatores*. They were not to be Roman citizens, and yet they were required to be free.

VIBEX is ſometims uſed, by *Phyſicians*, for a black and blue ſpot on the ſkin, occaſioned by an afflux, or extravaſation, of blood.

VIBRANT, or VIBRION, in *Natural Hiſtory*, the name of a claſs of flies, commonly known by the name of the *ichneumons*.

The word is derived from the Lation *vibro, to ſhake* or *quiver*, and is applied to theſe flies, from the continual vibrating motion obſerved in their antennæ.

VIBRATION, in *Mechanics*, a regular, reciprocal motion of a body, e g. a pendulum; which, being ſuſpended at freedom, ſwings, or *vibrates*, firſt this way, then that. For the bob being raiſed, falls again by its gravity; and with the velocity thus acquired, riſes to the ſame height on the other ſide; whence its gravity makes it fall again: and thus its *vibrations* are continued.

Mechanical authors, in lieu of *vibration*, frequently uſe the term OSCILLATION.

The *vibrations* of the ſame pendulum are all iſochronal; that is, they are performed in equal time, at leaſt in the ſame climate; for, towards the equator, they are found ſomewhat ſlower. See PENDULUM.

A pendulum 3 feet 3 inches and two tenths of an inch, according to Huygens, or 39,25 inches, according to ſir J. Moor, and lord Brouncker, *vibrates* ſeconds, or makes 3600 *vibrations* in an hour.

The *vibrations* of a longer pendulum take up more time than thoſe of a ſhorter one, in a ſubduple ratio of the lengths. Thus, a pendulum 3 feet long will make 10 *vibrations*, while another 9 inches long makes 20. For 10 is the half of 20, and 3 feet, or 36 inches, are the ſquare of 6 inches; which is double of 3, whoſe ſquare is 9; ſo that 10 is to 20 in a ſubduple ratio of 36 to 9.

The ſame thing is meant when we ſay, that the number of *vibrations* of pendulums, in a given time, is in a reciprocal ſubduple ratio of their lengths.

M. Mouton, a prieſt of Lyons, wrote an expreſs treatiſe, to ſhew, that, by means of the number of *vibrations* of a given pendulum, in a certain time, one might eſtabliſh an *univerſal* MEASURE throughout the whole world; and fix the ſeveral meaſures in uſe among us, in ſuch manner, as that they might be recovered again, if at any time they ſhould chance to be loſt, as is the caſe of moſt of the ancient meaſures; which we now only know by conjecture.

The VIBRATIONS *of a ſtretched chord*, or *ſtring*, ariſe from its elaſticity; which power being of the ſame kind with that of gravity, the *vibrations* of a chord follow the ſame laws as thoſe of pendulums: conſequently, the *vibrations* of the ſame chord equally ſtretched, though they be unequal in length, are equidiurnal, or are performed in equal times: and the ſquares of the times of the *vibrations* are among themſelves, inverſely, as the powers whereby they are equally bent, and inflected. See CHORD, and STRING.

The *vibrations* of a STRING, too, are proportionable to the powers whereby it is bent: theſe follow the ſame laws as thoſe of the chord, or pendulum; and, conſequently, are equidiurnal; which is the foundation of ſpring watches.

VIBRATIONS are alſo uſed in *Phyſics*, &c. and for divers other regular alternate motions. Senſation is ſuppoſed to be performed by means of the *vibratory* motion of the contents of the nerves, begun by external objects, and propagated to the brain.

This doctrine has been particularly illuſtrated by Dr. Hartley, and extended farther by him than by any other writer in eſtabliſhing a new theory of our mental operations. The doctrine of *vibrations*, and its uſe in explaining our ſenſations, are comprized by this writer in the following propoſitions: that the whole medullary ſubſtance of the brain, ſpinal marrow, and the nerves proceeding from them, is the immediate inſtrument of ſenſation and motion: that this white medullary ſubſtance of the brain is alſo the immediate inſtrument, by which ideas are preſented to the mind; or, in other words, whatever changes are made in this ſubſtance, correſponding changes are made in our ideas, and *vice verſâ*: that the ſenſations remain in the mind for a ſhort time after the ſenſible objects are removed: that external objects impreſſed upon the ſenſes occaſion, firſt in the nerves on which they are impreſſed, and then in the brain, *vibrations* of the ſmall, and, as one may ſay, infiniteſimal, medullary particles: that theſe *vibrations* are excited, propagated, and kept up, partly by the æther, i. e. by a very ſubtle and elaſtic fluid, and partly by the uniformity, continuity, ſoftneſs, and active powers of the medullary ſubſtance of the brain, ſpinal marrow, and nerves; which Dr. Hartley ſuppoſes are rather ſolid capillaments, according to ſir Iſaac Newton, than ſmall tubuli, according to Boerhaave: and that the phenomena of ſenſible pleaſure and pain, and alſo thoſe of ſleep, appear to be very ſuitable to the doctrine of *vibrations*. Hence he proceeds to eſtabliſh the agreement of the doctrine of *vibrations* with the phenomena of ideas. Senſations, he ſays, by being often repeated, leave certain veſtiges, types, or images of themſelves, which may be called ſimple ideas of ſenſations; becauſe the moſt vivid of theſe ideas are thoſe where the correſponding ſenſations are moſt vigorouſly impreſſed, or moſt frequently renewed; whereas, if the ſenſation be faint, or uncommon, the generated idea is alſo faint in proportion, and, in extreme caſes, evaneſcent and imperceptible. The exact obſervance of the order of place in viſible ideas, and of the order of time in audible ones, may likewiſe ſerve to ſhew, that theſe ideas are copies and offſprings of the impreſſions made on the eye and ear, in which the ſame orders were obſerved reſpectively: and though it happens, that trains of viſible and audible ideas are preſented in ſallies of the fancy, and in dreams, in which the order of time and place is different from that of any former impreſſions; yet the ſmall component parts of theſe trains are copies of former impreſſions; and reaſons may be given of the varieties of their compoſitions. Senſory *vibrations*, by being often repeated, beget, in the medullary ſubſtance of the brain, a diſpoſition to diminutive *vibrations*, which may be alſo called *vibratiuncles* and miniatures correſponding to themſelves reſpectively: ſo that, if it be allowed, that original impreſſed vibratory motions leave a tendency to miniature ones of the ſame kind, place, and line of direction, this author infers, that ſenſations muſt beget ideas, not only in the ſenſes of ſight and hearing, where the ideas are ſufficiently vivid and diſtinct, but in the three others, ſince their ſenſations are alſo conveyed to the mind by means of vibratory motions.

Any ſenſations, ſays Dr. Hartley, by being aſſociated with one another a ſufficient number of times, get ſuch a power over the correſponding ideas, that any one of the ſenſations, when impreſſed alone, ſhall be able to excite in the mind the ideas of the reſt: and any *vibrations*, by being aſſociated together a ſufficient number of times, get ſuch a power over the correſponding miniature *vibrations*, that any of thoſe *vibrations*, when impreſſed alone, ſhall be able to excite the miniature of the reſt. Hence he argues, that ſimple ideas will run into complex ones, by means of aſſociation, and that when this is the caſe, we are to ſuppoſe, that the miniature *vibrations* correſponding to thoſe ſimple ideas run, in like manner, into a complex miniature *vibration*, correſponding to the reſulting complex idea; ſome of which complex *vibrations*, attending upon complex ideas, may be as vivid as any of the ſenſory *vibrations* excited by the direct action of objects. See ASSOCIATION.

Dr. Hartley alſo applies the doctrine of *vibrations* to the explication of muſcular motion, which he thinks, is performed in the ſame general manner as ſenſation, and the perception of ideas. For a particular account of his theory, and the manner in which it is largely illuſtrated, and the arguments by which it is ſupported, we muſt refer to his Obſervations on Man, vol. i. paſſim.

The ſeveral ſorts and rays of light ſir Iſaac Newton conceives to make *vibrations* of ſeveral bigneſſes; which, according to thoſe magnitudes, excite ſenſations of ſeveral colours; much after the ſame manner as *vibrations* of air, according to their ſeveral magnitudes, excite ſenſations of ſeveral ſounds. See COLOUR.

Heat, according to the ſame author, is only an accident of light, occaſioned by the rays putting a fine, a ſubtile, ethereal medium, which pervades all bodies, into a *vibrative* motion, which gives us that ſenſation. See HEAT. From the *vibrations*, or pulſes, of the ſame medium, he accounts for the alternate fits of eaſy REFLEXION, and eaſy tranſmiſſion of the rays.

In the Philoſphical Tranſactions, it is obſerved, that the butterfly, into which the ſilk-worm is transformed, makes one hundred and thirty *vibrations*, or motions of its wings, in one coition.

VIBRATIUNCLES. See VIBRATIONS *ſupra*.

VIBRISSÆ, a word uſed by medical writers to expreſs the hairs in the noſtrils.

VIBURNUM, in *Botany*. See WAYFARING *tree*.

VIBURNUM, *American*. See LANTANA.

VIBURNUM-*galls*, in *Natural Hiſtory*, the name of a ſpecies of galls, or ſmall protuberances, frequently found on the leaves of the *viburnum*. Theſe are of a very ſingular nature, and ſeem to be compoſed of a different ſubſtance from that of the leaf. They appear in form of brown circular ſpots, of which there are ſometimes forty or more on one leaf: they are about a fifteenth of an inch in diameter, and they riſe a little above the ſurface of the leaf, as well on the under as the upper ſide; each of them has alſo a ſmall prominence in the centre, on each ſide of the leaf, looking like a nipple ſtanding on the breaſt.

Theſe are found in great plenty in the months of June, July, and Auguſt, and, when opened, each contains one inſect, which is a ſmall worm of a white colour, with ſix legs, and two hooks of a brown colour at the head.

Mr. Reaumur found that theſe worms became, in fine, a very ſmall ſpecies of beetle. They were of a cinnamon colour, and had conic and granulated antennæ of a beautiful figure. Reaumur's Hiſt. Inſects, vol. vi. p. 209.

VICAR, VICARIUS, a perſon appointed as deputy of another; to perform his functions in his abſence, and under his authority.

The word is formed from *vicarius*, *qui alterius vices gerit*.

The pope pretends to be *vicar* of Jeſus Chriſt on earth. He has under him a *grand vicar*, who is a cardinal; and whoſe juriſdiction extends over all prieſts, both ſecular and regular; and even, in many caſes, over laymen.

Apoſtolical vicars are thoſe who perform the functions of the pope in churches or provinces, which he has committed to their direction.

Among the ancient Romans, *vicarius*, *vicar*, was a legatus, or a lieutenant, ſent into the provinces where there was no governor; ſo that the *vicarii* were properly the emperor's *vicars*, not thoſe of governors. Cod. de Offic. Vicar.

Italy, in the time of the eaſtern empire, was governed by two *vicarii*: the one, *vicar of Italy*, who reſided at Milan; the other, *vicar of the city*, who reſided at Rome.

Cujas obſerved, that the word *vicar* was ſometimes, though rarely, attributed to the lieutenant-generals of pro-conſuls, or governors of Roman provinces.

VICAR, in the *Canon Law*, denotes a prieſt of a pariſh, the predial tithes whereof are impropriated, or appropriated; that is, belong either to a chapter, religious houſe, &c. or to a layman, who receives them, and only allows the *vicar* the ſmaller tithes, or a convenient ſalary, anciently called *portio congrua*.

He is thus called, *quaſi vice fungens rectoris*, as ſerving for, or in lieu of, rector, who would be entitled to the great tithes.

Hence, the part or portion of the parſonage, allotted to the *vicar*, for his maintenance and ſupport, or the promotion or living which he has under the parſon, is called a *vicarage*.

The ſtipend of *vicars* was formerly at the diſcretion of the appropriators; but, on account of their neglect, it was enacted by 15 Rich. II. c. 6. that in all appropriations of churches, the dioceſan biſhop ſhould ordain (in proportion to the value of the church) a competent ſum to be diſtributed among the poor pariſhioners annually, and that the *vicarage* ſhould be ſufficiently endowed. However the *vicar* was liable to be removed at the pleaſure of the appropriator; and, therefore, by 4 Hen. IV. cap. 12. it is ordained, that the *vicar* ſhall be a ſecular perſon, not a member of any religious houſe; that he ſhall be *vicar* perpetual, not removeable at the caprice of the monaſtery; and that he ſhall be canonically inſtituted and inducted, and be ſufficiently endowed, at the diſcretion of the ordinary, for theſe three expreſs purpoſes, to do divine ſervice, to inform the people, and to keep hoſpitality. The endowments in conſequence of theſe ſtatutes have uſually been by a portion of the glebe, or land belonging to the parſonage, and a particular ſhare of the tithes, called ſmall, or vicarial TITHES. Some, however, were more liberally, and ſome more ſcantily, endowed; and hence many things, as wood in particular, is in ſome countries a rectorial, and in ſome a vicarial tithe. The diſtinction therefore of a PARSON and *vicar* is this: that the parſon has generally the whole of all the eccleſiaſtical dues in his pariſh; but a *vicar* has generally an appropriator over him, entitled to the beſt part of the profits, to whom he is in effect a perpetual curate, with a ſtanding ſalary. Though in ſome places the vicarage has been conſiderably augmented by a large ſhare of the great tithes; which augmentations were greatly aſſiſted by the ſtatute 29 Car. II. cap. 8. enacted in favour of poor *vicars* and curates, which rendered ſuch temporary augmentations (when made by the appropriators) perpetual. See AUGMENTATION. Blackſt. Com. book i. p. 387.

A *vicar* who has a part of the great tithes, and alſo of the glebe, is called a *vicar endowed*.

Theſe *vicars* were anciently called *perpetui vicarii*; becauſe not appointed by the impropriator, and licenſed by the biſhop to read ſervice; but preſented by the patron, and canonical inſtitution given them by the hands of the ordinary; and ſo having conſtant ſucceſſion, or corporations, and never dying.

The canoniſts mention four ſpecies of *vicars*: ſome *perpetual*; others, appointed for a certain time, and on ſome ſpecial occaſion, called *mercenarii*: others, called *ſpeciales*, appointed, not for the whole cure, but for ſome certain place, article, or act: others, *generales*, neither perpetual, nor appointed for any certain act, but for all things in the general.

VICAR-*general* was a title given by king Henry VIII. to Thomas Cromwell, earl of Eſſex; with full power to overſee the clergy, and regulate all matters relating to church-affairs.

VICAR-*general* is now the title of an office, which as well as that of OFFICIAL *principal*, are united in the CHANCELLOR of the dioceſe. The proper work of an OFFICIAL is to hear cauſes between party and party, concerning wills, legacies, marriages, and the like; which are matters of temporal cognizance, but have been granted to the eccleſiaſtical courts by the conceſſions of princes: whereas that of a *vicar-general* is the exerciſe and adminiſtration of juriſdiction purely ſpiritual, by the authority and under the direction of the biſhop, as viſitation, correction of manners, granting inſtitutions, and the like, with a general inſpection of men and things, in order to the preſervation of diſcipline and good government in the church. Theſe two offices have been ordinarily granted together; but Dr. Gibſon wiſhes they might be ſtill kept ſeparate: the office of *vicar-general* to be veſted into the hands of ſome grave and prudent clergyman, uſually reſident within the dioceſe; and that of official (as being converſant about temporal matters), in the hands of a layman, well ſkilled in the civil law.

VICARDI, the name of an office in the iſland of Candia. The word is probably a corruption of the Latin *vicarii.* The *vicardi* is the governor of a village, and is ſometimes the pariſh prieſt; his office is to levy the public taxes, and to ſend offenders to the cadic. This office is always appointed yearly. Pococke's Egypt, vol. ii. part ii. p. 12.

VICARIO *deliberando occaſione cujuſdam recognitionis,* &c. An ancient writ that lies for a ſpiritual perſon impriſoned.

VICE, VITIUM, in *Ethics*, is ordinarily defined an elective habit, deviating, either in exceſs or defect, from the juſt medium wherein virtue is placed.

It is called a *habit* to diſtinguiſh it from *ſin,* which is only an act: hence, a *ſin* is looked upon as ſomething tranſient; and a *vice* as ſomething permanent.

In the common uſe of the terms *vice* and SIN, there is no ground for this ſubtle diſtinction. *Vice,* as oppoſed to VIRTUE, is better defined the diſagreement of the actions of any intelligent being with the nature, circumſtances, and relation of things; hence called the moral unfitneſs of ſuch actions.

Some authors diſtinguiſh three ſtates of *vice:* the firſt *incontinentiæ*, of incontinence, wherein a perſon ſees and approves the good, but is hurried to evil by the violence of his paſſions. The ſecond *intemperantiæ*, of intemperance; wherein even the judgment is depraved and perverted. The third *feritatis*, of obduracy; wherein the perſon is totally immerſed in *vice*, without any ſenſe or feeling thereof.

The ſtate of incontinency is conſidered as infirmity, wherein the perſon feels the ſharpeſt ſtings of conſcience: that of intemperance, as malice, wherein the remorſe is not ſo lively: in that of obduracy there is none.

VICE, in *Smithery*, and other arts employed in metals, &c. is a machine, or inſtrument, ſerving to hold faſt any thing they are at work upon, whether it be to be filed, bent, or riveted, &c.

The parts of the *vice* are, the *face*, or *plane*, which is its uppermoſt part; the *chaps*, which are cut with a baſtard-cut, and well tempered; the *ſcrew-pin*, cut with a ſquare, ſtrong worm; the *nut*, or *ſcrew-box*, which has a ſquare worm, and is braſed into the round box; the *ſpring*, which throws the chaps open; and the *foot*, on which the whole is mounted.

VICE, *hand*, is a ſmall kind of *vice*, ſerving to hold the leſs works in, that require often turning about.

Of this there are two kinds, the *broad-chapt hand-vice*, which is that commonly uſed; and the *ſquare-noſed hand-vice*, ſeldom uſed but for filing ſmall round work.

VICE is alſo a machine uſed by the glaziers, to turn, or draw lead into flat rods, with grooves on each ſide, proper to receive the edges of the glaſs.

This machine conſiſts of two iron chaps, or cheeks, joined with two croſs iron pieces. In the ſpace between the chaps are two ſteel wheels, and their ſpindles, or axes paſſed through the middle, each of which has its nut, or pinion with teeth, that catch into each other; and to the loweſt is fitted a handle, whereby the machine is turned.

There are ſome of theſe *vices* double, and that will draw two leads at once: theſe have three wheels. Some glaziers will turn lead of different ſizes in the ſame *vice*; by changing their cheeks for each ſize.

With another pair of ſpindles, whoſe nuts almoſt meet, they turn lead for *tiers*; which, when it comes out of the *vice*, is almoſt cut aſunder, in two thickneſſes, eaſy to be parted. Before the invention of this *vice*, which is but a late thing, they uſed a plane: accordingly, in all the ancient windows, we find the lead planed and grooved that way.

VICE is alſo uſed in the compoſition of divers words, to denote the relation of ſomething that comes inſtead, or in the place, of another.

In this ſenſe the word is Latin, *vice*, ſtead, place, turn, &c.

VICE-ADMIRAL. See ADMIRAL.

VICE-CHAMBERLAIN, called alſo, in ancient ſtatutes, *under-chamberlain*, is an officer in the court, next under the lord-chamberlain; and who, in his abſence, has command and controul of all officers belonging to that part of the houſhould called the *chamber* above ſtairs.

VICE-CHANCELLOR of an univerſity is an eminent member, choſen annually to manage affairs in the abſence of the CHANCELLOR.

VICE-CONSUL, an officer who diſcharges the duty of a CONSUL, under his orders or during his abſence.

VICE-DOGE is a counſellor of Venice, who repreſents the doge when ſick, or abſent; that the ſignory may never be without a chief.

The *vice-doge* never takes the ducal chair, nor bears the horn, nor is addreſſed under the title of *ſereniſſimo:* yet the foreign ambaſſadors, ſpeaking to the college, uſe the common apoſtrophe of *ſereniſſimo principe:* and he performs all the offices of doge, and gives anſwers to ambaſſadors, without moving his cap.

VICE-DOMINUS, a viſcount, ſheriff, or vidame.

VICE-DOMINUS *Abbatiæ*, or *Eccleſiæ*, in the civil and canon law, an advocate, or protector, of an abbey, or church. See ADVOCATE.

VICE-DOMINUS *Epiſcopi*, in the *Canon Law*, is the COMMISSARY, or VICAR-*general*, of a biſhop.

VICE-GERENT, *Vicegerens*, a vicar, deputy, or lieutenant.

VICE-COMES, in *Law*. See VICOUNT.

Accedas ad VICE-COMITEM. See ACCEDAS.

Reſpectu habendo computi VICE-COMITIS. See RESPECTU.

VICE-LEGATE, an officer whom the pope ſends to Avignon, and ſome other cities, to perform the office of a ſpiritual and temporal governor, at a time when there is no legate, or cardinal, to command there.

All the Gaul Narbonnoiſe, as Dauphiné, Provence, &c. has recourſe to the *vice-legate* of Avignon, for all eccleſiaſtical diſpatches; in like manner as the other provinces addreſs themſelves to Rome. See LEGATE.

VICE-ROY, a governor of a kingdom, who commands therein in the name and ſtead of a king; with full and ſovereign authority.

Thus, when Naples and Sicily were ſubject to Spain, *vice-roys* were ſent thither; and the name is now given to thoſe who govern in Mexico and Peru.

The lord-lieutenant of Ireland is alſo ſometimes called the *viceroy*.

VICE *verſa*, a Latin phraſe, frequently retained in Engliſh writings; ſignifying as much as *on the contrary*.

Thus, as the ſun mounts higher and higher above the horizon, inſenſible perſpiration increaſes; and, *vice verſa*, as he deſcends lower, it diminiſhes.

VICENNALIS, in *Antiquity*, ſomething of twenty years, or that returns after twenty years.

Among the Romans, *vicennalia* was particularly uſed for the funeral feaſts, held on the twentieth day after a perſon's deceaſe.

VICENNALIA, or VICENNALES *Ludi*, were alſo games, feaſts, and rejoicings, held every twentieth year of the reign of a prince.

On medals we frequently meet with *vicennalia vota*; the vows put up on that occaſion, for the ſafety of the emperor and the enlargement of the empire.

Theſe are expreſſed by VOT. X. & XX, in the medals of Tacitus, Gallienus, and Probus; VOT. X. M. XX. in thoſe of Valerius Maximianus, and Galerius Maximianus; VOT. X. MUL. XX, in thoſe of Conſtantine, Valentinian, and Valens; VOT. X. MULT. XX. in thoſe of Dioclesian, Conſtantine, Julian, Valentinian, Theodoſius, Arcadius, Honorius; VOTIS X. MULT. XX. in thoſe of Julian, Valentinian, Gratian; VOT. X. SIC. XX. in thoſe of Valerius Conſtantius; VOT. XII. FEL. XX. in the younger Licinius; VOT. XV. FEL. XX. in Conſtantine.

VICES, a term uſed by the dealers in horſes to expreſs certain faulty habits or cuſtoms in thoſe creatures, which render them troubleſome to the rider, and are never to be worn off, but by attention to the regular methods.

The following are the tricks generally underſtood as *vices* by dealers, and their methods of preventing, correcting, and curing them.

1. If a horſe carry his head or neck awry, ſtrike him twice or thrice with the ſpur on the contrary ſide; but

if he be very ſtiff-necked on the right ſide, and very plying or bending on the left, the rider is to hold the right rein ſhorter than the other, and give him ſudden checks every time he inclines that way, having a ſharp wire faſtened in the reins, that ſtriking in his neck, he may be compelled to hold it ſtraight; but in this care muſt be always taken to check him upwards, for otherwiſe he will get a habit of ducking his head, which will prove very troubleſome.

2. If a horſe is apt to ſhake his head and ears, upon the leaſt occaſion, or move his ears, when he is going to kick or bite, or caſt his rider; the way of curing this, is to ſtrike him on the head with a wand, as ſoon as he ſhews the firſt attempt to it; and, at the inſtant of ſtriking him, he is to be checked with the bridle, and be ſtruck with the ſpur on the contrary ſide; this will put him out of his pace, and he is then to be ſtopped, that he may have leiſure to underſtand the rider's meaning. Every time that he ſtarts or winches, which are ſignals that he is going to bite, or to ſtrike with his heels, the ſame is to be done, and he will, by degrees, be broke of theſe habits.

3. If a horſe is ſubject to ducking down his head frequently, the rider muſt, every time he is guilty of it, check him ſuddenly with his bridle, and at the ſame time ſtrike him with the ſpurs, in order to make him ſenſible of his fault. If he be ſtanding, he is thus to be made to bring his head in the right place as he ſtands; and when he does ſo, he is to be cheriſhed, that he may underſtand the rider's meaning, which, in time, he will certainly do.

4. If a horſe be ſkittiſh, and apt to ſtart, ſo that the rider is never free from danger, while on his back, the cauſe of the malady is firſt to be carefully enquired into: if it be found to proceed from a weak ſight, which repreſents objects to him other than they really are; the method of curing him is, every time he does it, to give him leiſure to view the things, and ſee what they really are; he muſt have time to view them well, and then be rid gently up to them. If, on the contrary, his ſkittineſs depends on his being naturally fearful, and alarmed at every noiſe, he is to be cured of it by the inuring of him to loud noiſes of many kinds, as firing of guns, drums, trumpets, and the like: and he will, in time, come to take delight in what he was before afraid of.

5. If a horſe be reſtive, and refuſe to go forward, the rider is to pull him backwards, and this will often occaſion his going forward; this is uſing his own fault as a means of reclaiming him. The rider is firſt cautiouſly to find whether this *vice* proceeds from real ſtubborneſs, or from faintneſs; if from the latter, there is no remedy but reſt; but if actual ſtubborneſs be the fault, the whip and ſpur, well employed, and perſiſted in, will at length, be found a certain cure.

6. If a horſe rear up an end; that is, if he riſes ſo high before as to endanger his coming over the rider, the horſeman muſt give him the bridle, and bear forwards with his whole weight. As he is going down, he ſhould have the ſpur given him very roundly; but this muſt by no means be done as he is riſing, for then it will make him riſe higher, and probably come over.

7. If a horſe be ſubject to lie down in the water, or upon the ground, there is no better remedy than a pair of ſharp ſpurs reſolutely applied. But there is ſome caution to be uſed in the applying of them, for bad horſemen generally are the occaſion of the faults in horſes, by correcting them out of due time.

The proper moment of ſpurring is juſt when he is going to lie down; but when this has diverted him from the thought of it, he is not immediately to be ſpurred again. For the doing this frightens the creature, and puts him into confuſion to that degree, that he at length becomes reſtive, and thus one fault is only changed for another, and that perhaps a worſe.

8. If a horſe be apt to run away, very cautious means muſt be uſed to break him of it. The rider muſt be gentle, both with a ſlack curb, and keeping an eaſy bridle-hand. He is firſt to be walked without ſtopping him; but only ſtaying him, by degrees, with a ſteady, not a violent hand, and always cheriſhing him when he obeys: when he is thus made very manageable in his walk, he is to be put to his trot, and finally to his gallop; and from theſe he is to be brought into a walk again, always by degrees, and ſtaying him with a ſteady hand. By uſing this method from time to time, with judgment and patience, it is probable he may at length be cured.

9. If a horſe is apt to fly out violently, it is certain, that the more the bridle-rein is pulled, and the more he is hurt by tugging the curb, the faſter he will run: the beſt method is therefore, if there be field-room enough, to let him go, as ſoon as he is going, by ſlackening the bridle, and giving him the ſpur continually and ſharply till he ſlacken of his own accord. Thus, by degrees, he will find that himſelf is the ſufferer, by all his flights, and he will then leave them off, though he could be never broke of them any way elſe.

10. Some horſes will not endure the ſpurs when they are given them, nor ever go forwards; but faſtening themſelves to them, they will ſtrike out and go back; and if they are preſſed more hard, they will fall to ſtaling without ever going out of the place. If the horſe who has this *vice* be a gelding, it will prove very difficult to cure him of it. A ſtone-horſe, or a mare are much eaſier cured; but even theſe will be trying at it again afterwards; and if ever they get the better of their rider, they will not fail to keep it up in this particular.

Every horſe, of whatever kind, that has this fault of cleaving to the ſpurs, as the jockies call it, and not going forwards with them, is to be rejected, in the buying for any gentleman's riding, for it is a ſign of a reſtive nature, and is a fault generally accompanied with many others.

VICESIMATIO, in *Roman Antiquity*. See DECIMATION.

VICIA, in *Botany*. See VETCH.

VICINAGE, and VICINITUM, a neighbourhood. See VENUE.

VICINAGE, *common per cauſe de*. See COMMON.

VICIS & *Venellis mundandis*, a writ lying againſt a mayor, bailiff, &c. for not taking care that the ſtreets be well cleanſed.

VICISSITUDE, VICISSITUDO, the ſucceeding of one thing after another. As, the *viciſſitude* of ſeaſons, fortune, &c.

VICOMAGISTER, among the *Romans*, an officer whoſe buſineſs it was to take care of the ſtreets, that nothing might obſtruct, or render them any wiſe incommodious.

VICONTIEL. See VICOUNTIEL.

VICOUNT, VICE-COMES, in our *Law* books, ſignifies the ſame with SHERIFF; between which two words there ſeems to be no other difference, but that the one came from our conquerors, the Normans; and the other from our anceſtors, the Saxons.

VICOUNT, or VISCOUNT, is alſo uſed for a degree of nobility, next below a count or earl, and above a baron.

Camden obſerves, that this is an ancient name or office, but a new one of dignity never heard of among us till Henry VIth's days, who, in his eighteenth year, created, in parliament, John lord Beaumont, *viſcount Beaumont*: but it is much more ancient in other countries.

Du-Cange, indeed, will have the dignity to have had its firſt riſe in England; but it is much more probable, it was firſt brought over hither by the Normans.

The privileges of a *viſcount* are, that he may have a cover of aſſay held under his cup when he drinks, and may have a travers in his own houſe. And a *viſcounteſs* may have her gown borne up by a man, out of the preſence of her ſuperiors; and, in their preſence, by a woman.

VICOUNTIELS, VICONTIELS, VICECOMITALIA, in our *Law Books*, denote things belonging to the ſheriff; particularly certain farms, for which the ſheriff pays a rent to the king, and makes what profits he can of them.

Writs VICOUNTIEL are ſuch as are triable in the county or ſheriff's court, and which are not returned to any ſuperior court, till finally executed by him. Of which kind are divers writs of nuiſance, the writ of ADMEASUREMENT *of paſture*, &c.

VICOUNTIEL, or VICONTIEL *juriſdiction*, is that juriſdiction belonging to the officers of a county; as ſheriffs, coroners, eſcheators, &c.

VICTIM, VICTIMA, ſo called either becauſe *vincta percuſſa cadebat*, or becauſe *vincta ad aras ducebatur*, a bloody ſacrifice, offered to ſome deity, of a living thing; either a human perſon, or a beaſt, which is ſlain to appeaſe his wrath, or to obtain ſome favour. See SACRIFICE.

The Greeks offered Iphigenia, at Aulis, for a *victim* to obtain a favourable wind. The gods of the heathens had each their proper *victims*: thus, the goat was Bacchus's *victim*; and the horſe, Neptune's.

Artificial or *factitious* VICTIM, denotes a *victim* made of baked paſte in the form of an animal, which was offered to the gods, when they had no natural *victims* or no opportunity of offering them. Thus, according to Porphyry, Pythagoras offered a ſacrifice of an ox in paſte; Empedocles is alſo ſaid by Athenæus to have done the ſame. Pythagoras derived the practice from Egypt, where it was very ancient, and where it was uſed in the time of Herodotus. Encycl.

VICTIMARIUS, a miniſter, or ſervant of the prieſt, whoſe office was to bind the *victims*, and prepare the water, knife, cake, and other things, neceſſary for the ſacrifice. See SACRIFICE.

To the *victimarii* it alſo belonged to knock down, and kill, the victims: in order to which, they ſtood cloſe by the altar, naked to the waiſt, but crowned with laurel; and holding a hatchet or a knife up, aſked the prieſt leave to ſtrike; ſaying, *Agone? Shall I ſtrike?* Whence they were called *agones*, and *cultellarii*, or *cultrarii*.

When the victim was killed, they opened it; and, after viewing the entrails, took them away, waſhed the carcaſe, and ſprinkled the flour on it, &c.

The ſame *victimarii* alſo lighted the fire, wherein books were condemned to be burnt. See Liv. lib. xl. cap. 29. and A. Gellius, lib. i. cap. i. extr. 12.

VICTORIAN *period*, in *Chronology*. See PERIOD.

VICTORIATUS, among the *Romans*, a coin with Victory repreſented on one ſide, equal in value to half the DENARIUS.

VICTORIOLA, in *Botany*, a name uſed by ſome authors for the hippogloſſum, called in Engliſh the *Alexandria-laurel*, *horſe-tongue*, or *double-tongue*.

VICTORY, VICTORIA, the overthrow, or defeat, of an enemy, in war, combat, duel, or the like. See WAR, COMBAT, DUEL, CHAMPION, &c.

Among the Romans, crowns, triumphs, &c. were decreed to their generals, for the *victories* they gained.

Actian VICTORY, denotes the *victory* which Auguſtus, or rather his general, gained over Mark Anthony after the capture of Actium; in commemoration of which he built the city of Nicopolis, and re-eſtabliſhed with peculiar magnificence the ACTIAN *games*.

Games of VICTORY, were public games celebrated on account of a *victory*; they were called by the Greeks επινικιοι αγωνες, and in Latin inſcriptions they are denominated *ludi victoriæ*. Of theſe the Roman hiſtory recites, thoſe in honour of Auguſtus, after the battle of Actium; thoſe of Septimius Severus, after the defeat of Peſcenius Niger; thoſe in honour of Lucius Verus and Marcus Aurelius, on their return from the expedition againſt the Parthians, recorded on the marble of Cyzicus, &c.

VICTORY, in *Mythology*, was perſonified and made a deity both by the Greeks and Romans. According to Varro, ſhe was the daughter of Cœlum and Terra; but Heſiod makes her the daughter of Styx and Pallas. Temples, ſtatues, and altars, were conſecrated to this deity. At Athens there was a temple dedicated to *Victory*, in which was placed her ſtatue without wings. The firſt temple built in honour of her by the Romans was during the Samnite war, under the conſulate of L. Poſthumius and M. Attilius Regulus. With them ſhe was repreſented as a winged deity, ſometimes almoſt in the attitude of flying, and with her robe carried back with the wind; holding a laurel crown in her hand, which was anciently the peculiar reward of ſucceſsful generals and great conquerors. The poets inform us, that her wings were white, and her robe of the ſame colour. They ſometimes deſcribe her hovering between two armies engaged in battle, as doubtful which ſide ſhe ſhall chooſe, and ſometimes ſtanding fixed by one ſhe is reſolved to favour, as ſhe is often ſeen on the medals of the Roman emperors. This goddeſs is often repreſented in a chariot, drawn rapidly along by two horſes. Pliny ſpeaks of a picture of *Victory* in Rome, in which ſhe was aſcending to heaven, in a chariot with four horſes, as ſhe appears on the Antonine pillar, carrying thither ſome hero, and with a palm-branch in her hand. This, and the crown of laurel, were her general attributes; and a third was a trophy, and ſometimes two, one on each ſide of her. Sometimes ſhe is ſeen mounted on a globe.

VICTUALLER, one that ſells victuals; and we now call all common alehouſe-keepers *victuallers*. See ALEHOUSE.

Victuallers ſhall ſell their victuals at reaſonable prices, or forfeit double value; and *victuallers*, fiſh-mongers, poulterers, &c. coming with their victuals to London, ſhall be under the regulation of the lord-mayor, and aldermen; and ſell their victuals at prices appointed by juſtices, &c. 23 and 31 Edw. III. cap. 6. 7 Rich. II. 13 Rich II.

If any *victuallers*, butchers, brewers, poulterers, cooks, &c. conſpire and agree together not to ſell their victuals, but at certain prices, they ſhall forfeit for the firſt offence 10*l.* for the ſecond 20*l.* and for the third offence 40*l.* ſtat. 2 and 3 Edw. VI. cap. 15. See FORESTALLING.

VICTUALLER, *agent*. See AGENT.

VICTUALLING-*office*, an office kept on Tower-hill, for furniſhing his majeſty's navy with *victuals*.

It is managed by ſeven commiſſioners, at a ſalary of 400l. a year each, who have their inferior officers; as ſecretaries, clerk, &c. beſides AGENTS in divers parts of Great Britain, Ireland, &c.

VICTUS *ratio*, among *Phyſicians*, a particular manner of living, for the preſervation of health, and prevention of diſeaſes.

VICUNNA, in *Zoology*, a name given to the PACOS.

VIDAME, *Vice-Dominus*, was anciently uſed for the biſhop's deputy in temporals; as, *comes*, or *vice-comes*, was the king's.

The word, according to Nicod, comes from *vicarius*; or according to Paſquier, from *vice-dominus*; *dom* ſignifying *dominus*, or *lord*. See DOM.

The original inſtitution of *vidames* was for the defence of the temporalities of biſhopricks, while the biſhops themſelves were taken up in prayer, and other ſpiritual functions. They alſo led the biſhops forces, when they were obliged to go to war, either to defend their temporalities, or for the arrier-ban.

They alſo managed, and pleaded, their cauſe in courts of juſtice; diſtributed juſtice among their tenants; and prevented any body's pillaging, or damaging, the houſes of deceaſed biſhops, &c. In effect, they repreſented the biſhop, conſidered as a temporal lord.

In ſome ancient charters, the *vidames* are called *advocates*, or *advowees*.

VIDAME is ſtill a title of ſignory, or lordſhip; attributed to ſeveral gentlemen in France: as the *vidame of* Chartres, of Amiens, &c.

The ancient *vidames*, Paſquier ſays, were the biſhops temporal judges; and they had the ſame privileges as the vicounts.

By degrees, the *vidames* converted their office into a fee; and the biſhops their *vidames*, or judges, into vaſſals, as kings did their counts, dukes, &c. Accordingly, the *vidame* of Chartres, &c. ſtill hold lands of the biſhops of thoſe places. See VALVASOR.

VIDIMARUM, in *Botany*, the name of the tree which bears the ſebeſtens, a medicinal plum, of Aſia and Ægypt.

VIEDAM, or VEDAM, the name of a ſacred book of law and religion, written, according to M. de Sainte Croix, by the SAMANEANS in the Samſcretan or SHANSCRIT language, and held in great veneration by the BRAHMINS of Hindoſtan, from a notion that Bramha their legiſlator received it from the Deity himſelf. This writer gives us an account of four *Viedams*, from Indian memoirs and relations: and other writers have ſaid, that the *Viedam* is divided into four parts, diſtinguiſhed by different names. The firſt is called *rogo*, *roukou*, or *oroukou*, and treats of the firſt cauſe and the firſt matter; of angels; of the ſoul; of the rewards deſtined to the good, and the puniſhment of the wicked; of the production and deſtruction of beings; of ſin, and the method of obtaining pardon, &c. The ſecond part, called *jadara* or *iſſure-vedam*, is a treatiſe on government and the power of ſovereigns. The third part, called *ſama-vedam*, is a treatiſe of morality, deſigned to inſpire men with a love of virtue and hatred of vice. The fourth part, called *addera-vedam*, *brama-vedam*, or *latharvana-vedam*, treats of external worſhip, ſacrifices, the ceremonies which are to be practiſed in the temples, the feaſts that are to be celebrated, &c. The reſpect entertained by the Brahmins for the *Viedam* is the reaſon why they are averſe from communicating copies of it; and M. St. Croix ſays, that there are few, even of them, who underſtand the language in which it is written. However, the miſſionary Jeſuits obtained a copy of it from a converted Brahmin, which was lodged by Calmet in the king's library at Paris in 1733. M. de Sainte Croix ſpeaks alſo of the *Pouranams*, which were religious books of an inferior order, and which ſome of the Brahmins reject, as others do the *Viedam*. The *Baga Viedam*, which contains the doctrine of the Indians concerning the Deity, happineſs, a contemplative life, the hiſtory of the creation, preſervation, and deſtruction of the univerſe, the origin of the inferior gods, men, giants, &c. is one of the *Pouranams*. After theſe, he ſays, come the *Shaſters* or *Shaſtah*, which he repreſents as an explication of the *Viedams*.

The *Viedams*, according to this writer, were publiſhed in the tenth century of the Chriſtian æra, and the *Pouranams* in the fifteenth. All theſe books contain the moſt ſublime and elevated ideas of the Supreme Being, mingled with the moſt abſurd fables, the greateſt materialiſm, and the moſt monſtrous fancies.

The *Ezour-Vedam* is a commentary on the *Viedam*, which, as M. Voltaire pretends, is more ancient than the age of Alexander the Great: but M. de Sainte Croix refutes this opinion, by an argument to which there is no reply, viz. that mention is made in this book of the Mahometans and Moors. Mod. Univ. Hiſt. vol. vi. 8vo. St. Croix's Ezour-Vedam, &c. in two vols. 12mo. Paris, 1779. For an account of different opinions with regard to the *Viedam*, ſee SHASTAH.

VIDIMUS, in *Law*, the ſame with *innoteſcimus*; being letters patent of a charter of feoffment, or ſome other inſtrument, not of record.

VIDUITATIS *profeſſio*, the making a ſolemn profeſſion of living a chaſte widow; a cuſtom heretofore obſerved in England, and attended with divers ceremonies.

VIE. See CESTUI *qui vie*.

VIELLE, in *Muſic*. See VIOL.

VIELLE *ridée*, the *wrinkled old woman's ſhell*, a name given by the French authors to a ſpecies of *chama* of the mutilated kind, very much reſembling the famous *concha Veneris*, but longer, and without that peculiarly-ſhaped oval aperture to which that ſhell owes its name.

It has ſeveral ſpines about the lips, as the *concha Veneris* has, but they are ſhorter and more obtuſe than in that ſhell. The whole ſurface of this ſpecies is deeply and irregularly wrinkled. It is of a whitiſh colour, variegated with brown.

VIELLEUR, in *Natural Hiſtory*, the name of a ſpecies of fly common in Surinam, and ſome other places. It is moderately large, though leſs ſo than the lanthorn fly, ſo common in that place, and has a long head, and ſome other particulars, in which it reſembles that creature. Mrs. Merian has given a figure of it, and reports it as the opinion of the natives, that it changes at length into a LANTERN-*fly*.

VIEW, VISUS, in *Law*, the act of *veiors*, or *viewers*.

This is called by Bracton, *Res quaſi ſacra, quia ſolam perſonam regis reſpicit, & introducta pro pace, & communi utilitate.*

When a real action is brought, and the tenant knows not well what the land is, that the demandant aſks; he may pray the *view*: which is, that the jury may *ſee* the land which is claimed.

This courſe of proceeding we received from the Normans, as appears by the *Grand Cuſtomary*. It is uſed in various caſes; as in aſſize of rent-ſervices, rent-charge, rent-ſec; in a writ of nuiſance; in a writ quo jure; in the writ de rationabilibus diviſis, &c. See JURY.

VIEW *of Frank pledge*, VISUS *franci plegii*, is the office which the ſheriff in his county-court, or the bailiff in his hundred, performs; in looking to the king's peace, and ſeeing that every man be in ſome pledge. See COURT-*leet*, and FRANK-*pledge*.

VIEW, in matters of *Optics*, *Perſpective*, &c. See VISION.

VIEW, *point of*. See POINT.

VIEW, among *Hunters*, the track, or print of the feet, of a fallow deer on the ground.

To VIEW *a place*, in the *Military Art*, is to ride about it, before the laying of a ſiege, in order to obſerve the ſtrength or weakneſs of its ſituation and fortification.

VIEWERS, or VEIORS, in *Law*. See VEIOURS.

VIGESIMA, among the *Romans*, a tax of the twentieth part of the yearly incomes of all inheritances. It was firſt eſtabliſhed by Auguſtus.

VIGESIMA was likewiſe a cuſtom paid for ſlaves ſold, as alſo for one made free.

VIGESIMARIUS, among the *Romans*, an officer who had the management of collecting the VIGESIMA.

VIGIL, or EVE, in *Church-Chronology*, the day before any feaſt, &c.

Though the civil day begins at midnight, yet the eccleſiaſtical, or ſcriptural, day, begins at ſix o'clock in the evening, and holds till ſix in the evening the enſuing day.

Hence, the collect for every Sunday and holiday, by order of the church, is to be read, at the preceding evening ſervice, that is, at ſix o'clock the day before; from which time the religious day was ſuppoſed to begin.

And this firſt part of the holiday, from ſix o'clock the day before, was, by the primitive Chriſtians, ſpent in hymns, and other devotions; and, being often continued till late in the night, was called *vigil*.

Theſe *vigils* came by degrees to be ſo enlarged, that, at laſt, all the day preceding the holiday was called by the name.

The origin of *vigils* is deduced by Forbes from a cuſtom in the ancient church, for the people, both men and women, to meet together in the evening before Eaſter-day, and watch and pray, as expecting the coming of our Lord, who was to riſe early in the morning. This practice, Tertullian obſerves, *ad uxorem*, afterwards got to other feaſts, and ſaints days. But abuſes creeping in, they were forbid by a council, in 1322, and, in lieu thereof, faſtings were inſtituted on the day before, though ſtill called by the ancient name of *vigils*. See WAKES.

VIGIL, *coma*. See COMA.

VIGILIA, in *Ancient Chronology*. See WATCH.

VIGILIA, that ſtate of an animal which is oppoſite to ſleep, and is popularly called *waking* or *watching*. See SLEEP, and WATCHING.

VIGILIÆ, in *Antiquity*, denote the watches and guards among the Roman ſoldiers, who performed duty by night, in contradiſtinction to the *excubiæ*, who kept guard by day, either in the camp, or at the gates and intrenchments: of theſe laſt there ſeem to have been aſſigned one company of foot and one troop of horſe to each of the four gates every day; and it was a moſt unpardonable crime to deſert their poſt, and to abandon their corps of guards. In the camp, there was allowed a whole manipulus to attend before the prætorium, and four ſoldiers to the tent of every tribune. The night-guards aſſigned to the general and tribunes were of the ſame nature as thoſe in the day. But the proper *vigils* were four in every manipulus, keeping guard three hours, and then relieved by four others; ſo that there were four ſets in the night, according to the four watches, which took their name from this cuſtom. The night guard was ſet by a tally or teſſera, with a particular inſcription given from one centurion to another through the army, till it came again to the tribune who firſt delivered it. Upon the receipt of this, the guard was immediately ſet. But becauſe this regulation was not ſufficient, they had the *circuitio vigilium*, or a viſiting of the watch, commonly performed about four times in the night by ſome of the horſe. Upon extraordinary occaſions the tribunes and lieutenant-generals, and ſometimes the general himſelf, made theſe circuits in perſon, and took a ſtrict view of the watch in every part of the camp. Kennet's Ant. Rom. p. 206.

VIGILIÆ *florum*, in *Botany*, a term uſed by Linnæus to expreſs a peculiar faculty, belonging to the flowers of ſeveral plants, of opening and cloſing their petals at certain hours of the day. Previous to the explanation of this phenomenon, it is neceſſary to obſerve, that the flowers of moſt plants, after they are once opened, continue ſo night and day, until they drop off, or die away. Several others, which ſhut in the night-time, open in the morning ſooner or later, according to their reſpective ſituation in the ſun or ſhade, or as they are influenced by the manifeſt changes of the atmoſphere. But the claſs of flowers, to which this article refers, open and ſhut regularly at certain hours, excluſive of any manifeſt changes in the atmoſphere. This property is ſo evident in one of our common Engliſh plants, the *tragopogon luteum*, that our country people have called it *John-go-to-bed-at-noon*. Linnæus's obſervations in the Philoſophia Botanica, p. 273. extend to near fifty ſpecies, which are ſubject to this law: ſuch are the male pimpernel, the blue-flowered pimpernel with narrow leaves, the little blue convolvulus or bindweed, the day-lily, the proliferous pink, the common purſlain, the white-water-lily, the garden lettuce, the dandelion, the rough dandelion, ſeveral ſpecies of hawkweeds, wild ſuccory, wild marygold, &c. See an account of this phenomenon by Dr. Pulteney, in Phil. Tranſ. vol. l. p. 506, &c.

VIGILIUM *prefectus*. See PREFECT.

VIGINTIVIRATE, a dignity among the ancient Romans, eſtabliſhed by Cæſar.

This dignity comprehended four others; for of the *vigintiviri*, or twenty men which compoſed the company, there were three who ſat and judged all criminal affairs; three others had the inſpection of the coins and coinage; four took care of the ſtreets of Rome; and the reſt were judges of civil affairs.

VIGNETTE, in the art of *Printing*, is a French word, now often uſed among Engliſh artiſts and writers, to denote the flouriſh or ornament, placed at the beginning of a book, preface, or dedication. Theſe *vignettes* or head-pieces are very various in their form and ſize. See the deſcription of PRINTING-*preſs*.

VIGOROSO, or VIGOROSAMENTE, in the *Italian Muſic*, is uſed to direct a performer to ſing or play with vigour, ſtrength, and firmneſs.

VILL, VILLA. See VILLAGE.

VILLA *Regis*, or *Regia*, a title anciently given to thoſe *villages* where the kings of England had a royal ſeat, and held the manor in their own demeſne; having there commonly a free chapel exempt from the biſhop's juriſdiction.

VILLÆ *prepoſitus*. See PREPOSITUS.

VILLAGE, VILLA, or VILL, an aſſemblage of houſes, inhabited chiefly by peaſants and farmers, having uſually a church but no market.

The word is French, formed of *vil*, or *vilis*, *low*, *mean*, *contemptible*: or rather, from the Latin, *villa*, *a country-houſe*, or *farm*.

The want of a market diſtinguiſhes a *village* from a *town*, as the church does from a *green*, *ſtreet*, &c. Among our Saxon anceſtors, *vill*, or *village*, was uſed in the ſenſe of the Roman *villa*; viz. for a country farm, or ſeat, furniſhed with convenient outhouſes, &c. for repoſiting the fruits thereof. Afterwards it came to be taken for a manor: and then for part of a pariſh, or the pariſh itſelf.

Hence, in ſeveral ancient law-books, *vill* and *pariſh* are the ſame thing: accordingly, Forteſcue de Laudibus Leg. Ang. writes, "That the boundaries of *villages* are "not by houſes, ſtreets, or walls; but by a large circuit "of ground, within which may be divers hamlets, wa- "ters, woods, &c."

Fleta makes this difference between a *manſion*, a *village*, and a *manor*; that a manſion may conſiſt of one, or more houſes; though there is only to be one dwelling-place, without any other very near it: for if other houſes be contiguous, it is then a *village*. A manor may conſiſt of one or more *villages*.

For the better government of *villages*, the lord of the ſoil has uſually a power to hold a court-baron every three weeks.

The ſtatute of Exeter 14 Edw. I. makes frequent mention of entire-*vills*, demi-*vills*, and hamlets.

Entire-*vills* ſir H. Spelman conjectures to have conſiſted of ten freemen, or frank-pledges, demi-*vills* of five, and hamlets of leſs than five. See TOWN.

VILLAIN, or VILLEIN, VILLANUS, in *our Ancient Cuſtoms*, the ſame with BONDMAN: called alſo, in Domeſday-book, *ſervus*, *ſlave*.

A *villain* was one who held lands in *villenage*, or on condition of rendering baſe ſervices to his lord.

Under the Saxon government, there was, as ſir William Temple ſpeaks, a ſort of people in a condition of downright ſervitude, employed in the moſt ſervile works, and belonging, they, their children and effects, to the lord of the ſoil, like the reſt of the cattle or ſtock upon it. Theſe ſeem to have been thoſe who held what was called the FOLK-*land*, from which they were removeable at the lord's pleaſure. On the arrival of the Normans here, it ſeems not improbable, that they, who were ſtrangers to any other than the feodal ſtate, might give ſome ſparks of enfranchiſement to ſuch wretched perſons as fell to their ſhare, by admitting them, as well as others, to the oath of FEALTY, which conferred a right of protection, and raiſed the tenant to a kind of ſtate ſuperior to downright ſlavery, but inferior to every other condition. This they called VILLENAGE, and the tenants *villains*, either from the word *vilis*, or elſe, as ſir Edward Coke tells us, *a villa*, becauſe they lived chiefly in villages, and were employed in ruſtic works of the moſt ſordid kind: hence they were alſo denominated *pagenſes* and *ruſtici*. Theſe *villains*, belonging principally to lords of manors, were either *villains* REGARDANT, by the civilians called GLEBÆ *addicti* or ASCRIPTITII, that is, annexed to the manor or land; or elſe they were *in* GROSS, or at large, that is, annexed to the perſon of the lord, and transferrable from one owner to another. They could not leave their lord without his permiſſion; but if they ran away, or were purloined from him, might be claimed and recovered by action, like beaſts or other chattels. They held indeed ſmall portions of land by way of ſuſtaining themſelves and families; but it was at the mere will of the lord, who might diſpoſſeſs them whenever he pleaſed; and it was upon *villain* ſervices, that is, to carry out dung, to hedge and ditch the lord's demeſnes, and any other the meaneſt offices; and their ſervices were not only baſe, but uncertain both as to time and quantity. A *villain* could acquire no property either in lands or goods: but if he purchaſed either, the lord might enter upon them, ouſt the *villain*, and ſeize them to his own uſe, unleſs he contrived to diſpoſe of them again before the lord had ſeized them; for the lord had then loſt his opportunity. In many places alſo, a fine was payable to the lord, if the *villain* preſumed to marry his daughter to any one without leave from the lord; and by the common law, the lord alſo might bring an action againſt the huſband for damages in thus purloining his property. For the children of *villains* were alſo in the ſame ſtate of bondage with their parents; whence they were called in Latin NATIVI, whence the female appellation of a *villain*, who was called a NEIFE. In caſe of a marriage between a freeman and a neife, or a *villain* and a free-woman, the iſſue followed the condition of the father, being free if he was free, and *villain* if he was *villain*; but no baſtard could be born a *villain*. The law, however, protected the perſons of *villains*, as the king's ſubjects, againſt atrocious injuries of the lord; for he might not kill, or maim his *villain*; though he might beat him with impunity, ſince the *villain* had no action or remedy at law againſt his lord, but in caſe of the murder of his anceſtor, or the maiming of his own perſon. Neifes indeed had alſo an appeal of rape, in caſe the lord violated them by force.

Villains might be enfranchiſed by MANUMISSION.—Hence, and by other means, they gained in proceſs of time conſiderable ground on their lords; and in particular ſtrengthened the tenure of their eſtates to that degree, that the came to have in them an intereſt in many places full as good, in others better than their lords. For the good nature and benevolence of many lords of manors having, time out of mind, permitted their *villains*, and their children, to enjoy their poſſeſſions without interruption, in a regular courſe of deſcent, the common law gave them title to preſcribe againſt their lords; and, on performance of the ſame ſervices, to hold their lands, in ſpite of any determination of the lord's will. For though, in general, they are ſaid to hold their eſtates at the will of the lord; yet it is ſuch a will as is agreeable to the cuſtoms of the manor; which cuſtoms are preſerved and evidenced by the rolls of the ſeveral courts-baron in which they are entered, or kept on foot by the conſtant immemorial uſage of the ſeveral manors in which the lands lie. And, as ſuch tenants had nothing to ſhew for their eſtates but theſe cuſtoms, and admiſſions in purſuance of them, entered on thoſe rolls, or the copies of ſuch entries witneſſed by the ſteward, they now began to be called *tenants by copy of a court-roll*, and their tenure itſelf a COPY-HOLD. Copy-holders are, therefore, in truth no other but *villains*, who, by a long ſeries of immemorial incroachments on the lord, have at laſt eſtabliſhed a cuſtomary right to thoſe eſtates, which were before held abſolutely at the lord's will. Theſe incroachments at length became ſo univerſal, that when tenure in villenage was virtually aboliſhed (though copy-holds were reſerved) by the ſtatute of Charles II. there was hardly a *pure villain* left in the nation. To this purpoſe ſir Thomas Smith teſtifies, that in all his time (and he was ſecretary to Edward VI.) he never knew any *villain in groſs* throughout the realm; and the few *villains regardant* that were then remaining were ſuch only as had belonged to biſhops, monaſteries, and other eccleſiaſtical corporations, in the preceding times of popery. By ſeveral means the generality of *villains* in the kingdom have long ago ſprouted up into COPY-HOLDERS; their perſons being enfranchiſed by manumiſſion or long acquieſcence; but their eſtates in ſtrictneſs, remaining ſubject to the ſame ſervile conditions and forfeitures as before; though, in general, the *villain* ſervices are uſually commuted for a ſmall pecuniary QUIT-RENT.—Blackſt. Com. book ii. p. 92, &c. See VILLENAGE.

VILLAIN *eſtate*, or *condition*, is contradiſtinguiſhed to *free eſtate*. See BASE *Tenure*, and VILLENAGE.

VILLAINAGE. See VILLENAGE.

VILLAINOUS *judgment* is that which caſts the reproach and ſtain of villany and ſhame on him againſt whom it is given. As that againſt a conſpirator, &c. See CONSPIRACY.

Lambard calls it *villainous puniſhment*; and ſays, it may well be called *villainous*, in regard the judgment, in ſuch caſe, ſhall be like the ancient judgment in attaint, viz. that the criminals ſhall not be of any credit afterwards; nor ſhall it be lawful for them, in perſon, to approach the king's court: that their lands and goods ſhall be ſeized into the king's hands, their trees rooted up, their bodies impriſoned, &c.

This *villainous* judgment is now become obſolete; it not having been pronounced for ſome ages: but inſtead thereof the delinquents are uſually ſentenced to impriſonment, fine, and pillory.

VILLANELLA, in the *Italian Muſic*, a ſort of air or tune to which the peaſants of that country dance. There are ſome of theſe *villanellas* very agreeable, having ſomething gay and enlivening in them, well adapted to their deſign. The firſt couplet is uſually played plain and ſimple, afterwards come an infinity of variations, diminutions, &c.

VILLARUM *nomina*. See NOMINA.

VILLEIN *fleeces*, in *our Statutes*, are bad fleeces of wool, ſhorn from ſcabby ſheep. 31 Edw. 3. cap. 8.

VILLENAGE, or VILLAINAGE, VILLANIA, the quality or condition of a VILLAIN.

Villenage is more particularly uſed for a ſervile kind of tenure of lands, or tenements; whereby the tenant was bound to do all ſuch ſervices as the lord commanded, or were fit for a villain to perform: which Bracton expreſſes by *Sciri non poterit veſpere, quale ſervitium fieri debet mane*.

Villenage is divided into that *by blood*, and that *by tenure*. Tenure, in *villenage*, could make no freeman a villain, unleſs it were continued time out of mind; nor could free land make a villain free.

Villenage is alſo divided, by Bracton, into *pure villenage*, where the ſervices to be performed were baſe in their nature, and indeterminate and arbitrary as to time and quantity, as above expreſſed, from which ancient tenures have ſprung our preſent COPY-HOLD tenures: and *ſocage* or *privileged villenage*, where the ſervice was baſe in its nature, but reduced to a certainty: which was to carry the lords dung into his fields, to plough his ground on certain days, to ſow and reap his corn, &c. and even to empty his jakes: as the inhabitants of Bicton were bound to do to the lord of Cluncaſtle, in Shropſhire; which was afterwards turned into a rent, now called *Bicton ſilver*; and the villainous ſervice excuſed.

This laſt ſpecies of *villenage*, ſays Bracton, is ſuch as has been held of the kings of England from the Conqueſt downwards; that the tenants herein *villana faciunt ſervitia, ſed certa & determinata*; that they cannot alien or transfer their tenements by grant or feoffment any more than pure *villains* can; but muſt ſurrender them to the lord or his ſteward, to be again granted out and held in *villenage*. From theſe circumſtances, ſays judge Blackſtone, we may collect, that what he thus deſcribes is no other than an exalted ſpecies of copyhold ſubſiſting at this day, viz. the tenure in *ancient demeſne*: to which, as partaking of the baſeneſs of *villenage* in the nature of its ſervices, and the freedom of ſocage in their certainty, he has given the compound name of *villanum ſocagium*. This ancient demeſne, or DEMAIN, conſiſts of lands or manors, which, though now perhaps granted out to private ſubjects, were actually in the hands of the crown in the time of Edward the Confeſſor, or William the Conqueror; and ſo appear to have been by the great ſurvey called Doomſday book. Some of the tenants of theſe lands continued for a long time pure and abſolute *villains*, dependent on the will of the lord; and thoſe who ſucceeded them in their tenures now differ from common copyholders in a few points. Others were in a great meaſure enfranchiſed by royal favour; being only bound in reſpect of their lands to perform ſome of the better ſort of villain ſervices, and thoſe determinate and certain; as, to plough the king's land, to ſupply his court with proviſions, and the like; all of which are now changed into pecuniary rents; and in conſideration hereof they had many privileges and immunities granted to them; as to try the right of their property in a peculiar court of their own, called a court of ancient demeſne, by a peculiar proceſs, denominated a writ of *right cloſe*; not to pay toll or taxes; not to contribute to the expences of knights of the ſhire; not to be put on juries, and the like. Theſe tenants, though their tenure be abſolutely copyhold, have an intereſt equivalent to a freehold; for their ſervices were fixed, and they could not be compelled (like pure villains) to relinquiſh theſe tenements at the lord's will, or to hold them againſt their own; and *ideo*, ſays Bracton, *dicuntur liberi*. Briton alſo, from this their freedom, calls them abſolutely *ſokemans*, and their tenure *ſokemanries*. The ſame name is alſo given them in Fleta. Lands holden by this tenure are a ſpecies of copyhold, and as ſuch preſerved and exempted from the operation of the ſtatute of Cha. II. yet they differ from common copyholds, principally in the privileges before mentioned: as alſo they differ from freeholds by one ſpecial mark and tincture of *villenage*, noted by Bracton, and remaining to this day, viz. that they cannot be conveyed from man to man by the general common law conveyances of feoffment, and the reſt; but muſt paſs by ſurrender to the lord or his ſteward, in the manner of common copyholds: yet with this difference, that, in the ſurrenders of theſe lands in ancient demeſne, it is not uſed to ſay "*to hold at the will of the lord*" in their copies; but only "*to hold according to the cuſtom of the manor*." Blackſt. Com. book ii. p. 99, &c.

VILLI, *coarſe-hair*, in *Anatomy*, is ſometimes uſed in the ſame ſenſe, as *fibres*, or *fibrillæ*. See FIBRE.

VILLI, in *Botany*, denote a ſort of tomentum or down, like the grain or ſhag of pluſh; with which, as a kind of excreſcence, ſome trees and plants do abound.

VILLOUS, VILLOSA, is particularly applied to one of the coats or membranes of the ſtomach, called CRUSTA *villoſa*. See *Tab. Anat. (Splanch.) fig.* 2. *lit. h*.

It takes its name from innumerable *villi*, or fine fibrillæ, wherewith its inner ſurface is covered.

VILTRUM, a word uſed ſometimes alone to expreſs a FILTRE, inſtead of the word *filtrum*. But *viltrum* is more commonly joined with the word *philoſophorum*, and then expreſſes the common alembic for diſtillation.

VIMMALA, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a kind of pyrites, of a braſſy appearance, and of a cubic figure.

They alſo give it in the ſame places to the *pyritæ* in general, when ſmall, and of a ſimple internal ſtructure.

VINAGO, in *Ornithology*, a name given by ſome authors to the wood-pigeon, from the colour of its breaſt, ſhoulders, and wings, reſembling that of red wine. Its more uſual name among authors is OENOS.

VINALIA, in *Antiquity*, a name common to two feaſts among the ancient Romans; the one in honour of Jupiter, and the other of Venus.

The firſt was held on the nineteenth of Auguſt; and the ſecond on the firſt of May. The *Vinalia* of the nineteenth of Auguſt were called *Vinalia ruſtica*; and were inſtituted on occaſion of the war of the Latins againſt Mezentius; in the courſe of which war, that people vowed a libation to Jupiter, of all the wine in the ſucceeding vintage.

On the ſame day likewiſe fell the dedication of a temple of Venus; whence ſome authors have fallen into a miſtake, that theſe *Vinalia* were ſacred to Venus. But Varro, LLL. V. and Feſtus, in *verbo Ruſtica*, diſtinguiſh between the two ceremonies; and expreſly aſſert the *Vinalia* to be a feaſt of Jupiter.

VINCA, in *Botany*. See PERIWINKLE.

VINCETOXICUM, in the *Materia Medica*. See SWALLOW-*wort*.

VINCULO *matrimonii, divorce à*. See DIVORCE.

VINCULUM, in *Algebra*, a character in form of a line, or ſtroke drawn over a factor, diviſor, dividend, when compounded of ſeveral letters, or quantities; to connect them, and ſhew, that they are to be multiplied, or divided, &c. together, by the other term.

Thus, $d \times \overline{a+b-c}$, ſhews, that d is to be multiplied into $a+b-c$.

VINDEMIATING, formed of *vindemia*, *vintage*, the gathering of grapes, or other ripe fruits; as apples, pears, cherries, &c.

VIADEMIATRIX, or VINDEMIATOR, a fixed ſtar of the third magnitude, in the northern wing of the conſtellation Virgo; whoſe longitude, latitude, &c. ſee among the reſt of thoſe of VIRGO.

VINDICATION, *claiming*, in the *Civil Law*, an action ariſing from the property a perſon has in any thing: or a permiſſion to take or ſeize a thing, as one's own, but of the hands of a perſon, whom the law has doomed not to be the true proprietor.

VINDICATORY *part* of *a Law*. See LAW.

VINDICTA, among the *Romans*, the prætor's rod or ſwitch, with which he touched a ſlave's head when he was enfranchiſed.

VINE, VITIS, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has a ſmall empalement, indented in five parts; it has five ſmall petals, which drop off, and five awl-ſhaped ſtamina, which ſpread and fall away, terminated by ſingle ſummits; it has an oval germen, having no ſtyle, crowned by a headed obtuſe ſtigma; which turns to an oval or roundiſh berry with one cell, including five hard ſeeds or ſtones. Linnæus reckons ſeven ſpecies.

Vines have been denominated, either from the ſoil and place where they grow, as the *Bourguignon*, *Bourdelas*, *Italian*, *Mantua*, &c. *vines*; or from the form, colour, taſte, &c. of their grapes, as the *acorn*, *apricot*, *damaſk*, *bird-bill*, *muſcadine*, &c. *vines*. We ſhall here ſubjoin, from Mr. Miller's Dictionary, thoſe ſorts of grapes which ripen pretty well in this country, or that merit a little aſſiſtance to bring them to perfection by artificial heat.

The *July* grape, called by the French, *Morillon noir hatif*, is a ſmall, round, black berry, growing looſe on the bunches: the juice is ſugary, but has little flavour: it ripens in the beginning of Auguſt.

The *black ſweet water* is a ſmall roundiſh berry, growing cloſe in the bunches, which are ſhort: the ſkin is thin; the juice very ſweet; and the birds and flies are apt to devour them, if they are not guarded: this ripens ſoon after the other.

The *white ſweet water* is a large roundiſh berry, in perfection, but very different in ſize on the ſame bunch, and therefore not much eſteemed: the juice is ſugary, but not vinous: this ripens about the ſame time as the other.

The *chaſſelas blanc*, or *royal muſcadine*, is an excellent grape; the bunches are generally large, and at the upper part divide with two ſmaller ſide-bunches; the berries are round, and when perfectly ripe, turn of an amber colour; the juice is rich and vinous; it ripens in September, but, if carefully preſerved, will hang very late, and become excellent.

The *chaſſelas muſque*, or *le cour* grape, by ſome called the *Frankindal*, is an exellent grape, and generally ripens well in England on a wall with a good aſpect; the berries are very like thoſe of the former ſhape, ſize, and colour, but are fleſhy, and have a ſlight muſky flavour: this ripens at the ſame time with the former.

The *black cluſter*, or *Munier* GRAPE, is a good fruit, and ripens well here; the bunches are ſhort, the berries oval, and very cloſe to each other; it ripens in September, and is by ſome called the *Burgundy* grape.

The *Anverna*, or true *Burgundy* grape, ſometimes called *black Morillon*, is an indifferent fruit for the table, but is eſteemed one of the beſt ſorts for making wine; the berries are oval, and hang more looſely on the branches than thoſe of the *cluſter* grape, and as they ripen more equally, are preferred.

The *Corinth*, or, as it is vulgarly called, the *currant* grape, is a ſmall roundiſh berry, generally without ſtone, of a deep black colour, and much cluſtered on the branches, which are ſhort; it has a ſugary juice, and ripens in September, but will not laſt long.

The *red chaſſelas* is very like the *white* in ſize and ſhape, but of a dark red colour; it is a very good grape, but ripens later than the white, and is pretty rare in England.

The *white muſcadine* is ſomewat like the *chaſſelas*, but the berries are ſmaller, and hang more looſely on the bunches, which are longer, but not ſo thick as thoſe of the *chaſſelas*; the juice is ſweet, but not ſo rich as that of the *chaſſelas*.

The *black Frontinac*, or *muſcat noir*, is a round berry of good ſize; growing looſely on the bunches, but not ripening equally; the bunches are ſhort, the berries, when fully ripe, are very black, and covered with a meal or flue, like the black plums; the juice is very rich and vinous; it ripens in the end of September or beginning of October.

The *red Frontinac*, or *muſcat rouge*, is an excellent grape when fully ripe, but unleſs the ſeaſon is very warm, rarely ripens without artificial heat in England; the bunches of this ſort are longer than thoſe of the former; the berries are large and round; when fully ripe, of a brick colour, but before, they are grey, with a few dark ſtripes, and frequently taken for a different kind, and commonly called *griſley Frontinac*; but Mr. Miller ſays, it is the ſame grape: the juice of this has the moſt vinous flavour of all the ſorts, and is greatly eſteemed in France.

The *white Frontinac* has larger bunches than either of the former; the berries are round and ſo cloſely cluſtered on the bunches, that they require to be carefully thinned early in the ſeaſon, when the berries are very ſmall, or elſe the ſun and air will be excluded, and they will not ripen, and the moiſture detained in them in autumn will cauſe them to rot; the juice is excellent, and if the fruit is perfectly ripe, inferior to none; this is called by the French *muſcat blanc*.

The *Alexandrian Frontinac*, or *muſcat d'Alexandrie*, is called by ſome *muſcat of Jeruſalem*; the berries of this are oval, and hang looſely on the bunches; they are long and not ſhouldered; there are two ſorts, one with white, and the other with red berries; their juice is very vinous and rich; but they ſeldom ripen in England without artificial heat.

The *red and black Hamburgh*, is called by ſome the *Warner* grape, from the name of the perſon who brought them to England: theſe have middle-ſized berries, inclining to an oval ſhape; the bunches are large, and their juice, when ripe, is ſugary, with a vinous flavour; this ripens in October.

The *St. Peter's* grape has a large oval berry of a deep black colour, when ripe, the bunches are very large, and make a fine appearance at the table, but the juice is not rich, and it ripens late in the year; the leaves of this ſort are much more divided than thoſe of the other ſorts, approaching to thoſe of the *parſley-leaved* grape, and therefore may be diſtinguiſhed before the fruit is ripe.

The *claret* grape, *Bourdelais* or *verjuice* grape, the *raiſin* grape, the *ſtriped* grape, and many other ſorts which never come to perfection here, are not worthy a place in gardens, unleſs for the ſake of variety; for when they have the aſſiſtance of heat to bring them to maturity, their juice is harſh, and without flavour, and therefore they ſhould not occupy the room of better fruit.

Mr. Mortimer ſays, that the grapes beſt adapted to the Engliſh climate, are the ſmall black grape, the white muſcadine, parſley grape, muſcadilla, and white and red Frontinac.

Mr. Bradley recommends the July grape, the early ſweet water-grape, brought from the Canaries, the Arbois or French ſweet water-grape; all which, he ſays, if well managed, are ripe by the middle of Auguſt. He alſo recommends the claret and Burgundy grapes.

All the ſorts of *vines* are propagated either from layers or cuttings. The former is the method uſually practiſed with us, but the latter ſeems much the better.

In order to propagate them by cuttings: theſe muſt be choſen ſuch as are ſtrong and well-ripened ſhoots, of the laſt year's growth, and ſhould be cut from the old *vine*, juſt below the place where they were produced, taking a knot of the two years wood, which ſhould be pruned ſmooth. The upper part of the ſhoot ſhould then be cut off, ſo as to leave the cutting about ſixteen inches long. Theſe cuttings are to be placed with their lower part in the ground, in a dry ſoil, laying ſome litter upon their upper parts, to prevent them from drying. In this place they ſhould remain till the beginning of April, which is the beſt time to plant them. They are then to be taken up and wiped clean, and if they are very dry, they ſhould ſtand with their lower parts in water ſix or eight hours.

In preparing the ground for *vines*, the nature of the ſoil ſhould be conſidered, which, if ſtrong and inclinable to wet, is by no means proper: in this caſe, a trench ſhould be opened where the cuttings are to be planted, which ſhould be filled with lime rubbiſh, in order to drain off the moiſture; and then the border ſhould be raiſed with freſh light earth, about two feet thick, ſo as to be at leaſt a foot above the level of the ground.

Having prepared the beds for the cuttings, they are to be ſet in holes, at about ſix feet diſtance from each other, and making their heads ſlant a little towards the wall. The cutting is to be ſo buried in the ground, that only the uppermoſt bud be upon a level with the ſurface; the earth is then to be well cloſed about the plant, and a little mould heaped up over the eye of the bud, to keep it from drying. After this there is no more trouble neceſſary, but to keep the ground clear from weeds, and to nail up the ſhoot, as it grows to the wall, rubbing off all the ſide-ſhoots.

The Michaelmas following, if the cuttings have produced ſtrong ſhoots, they ſhould be pruned down to two eyes. In the ſpring following, the ground is carefully to be dug up about the ſhoots, and the ſtalks to be earthed up ſo as to cover the old wood, but not ſo deep as to cover either of the eyes of the laſt year's wood. During the ſummer all the lateral ſhoots muſt be rubbed off as they appear, and only the two from the two eyes which were left, muſt be encouraged; theſe, as they grow, are to be nailed up againſt the wall; and in the middle or latter end of July, theſe ſhould be ſhortened by nipping off their tops, and this will greatly ſtrengthen the ſhoot. At the Michaelmas following, or as ſoon as the leaves begin to drop, theſe ſhould be pruned, leaving them each three eyes, if they are ſtrong; but if they are weakly, only two. They ſhould then be faſtened to the wall, ſpreading them out horizontally each way, that there may be room to train the new ſhoots the following ſummer, and in the ſpring, the borders ſhould be dug as before. The third ſeaſon there will be two ſhoots from each ſhoot of the laſt year's wood; but if there ſhould be two from one eye, which is ſometimes the caſe, then the weaker is to be rubbed off. At Midſummer the ends of the ſhoots are to be pinched off as before; all the weak lateral ſhoots are to be diſplaced, as in the preceding ſummer, and the whole management is to be the ſame. This is all the culture neceſſary to young *vines*.

As to the management of grown *vines*, it is to be obſerved, that theſe rarely produce any bearing ſhoots, from wood that is more than one year old; the great care muſt therefore be to have always plenty of this wood in every part of the tree; for the fruit is always produced upon the ſhoots of the ſame year, which come out from buds of the laſt year's wood.

The bearing ſhoots for the following year ſhould be left at the pruning with four eyes each. The under one of theſe does not bear, and conſequently there are only three which do. Many leave more eyes on the ſhoots, that they may have more fruit, which is the conſequence; but then the fruit is much poorer; and this is ſo well known in the wine countries, that there are laws to direct that no more than ſuch a number of eyes are to be left on each ſhoot, for the grapes would elſe be of a poor juice, and deſtroy the reputation of their wine. Each of the three eyes left will produce two or three bunches; ſo that each ſhoot will give ſix or eight bunches, which is as much as it can bring to any perfection. Theſe ſhoots muſt be laid at about eighteen inches aſunder on the wall; for if they are cloſer, when the ſide-ſhoots are produced, there will be no room to train them upon the wall; and the largeneſs of the leaves of the *vine* requires alſo that the ſhoots ſhould be at a proportionable diſtance, that they may not croud or ſhade the fruit.

The beſt ſeaſon for pruning *vines* is about the middle or end of October. The cut is always to be made juſt above the eye, and ſloped backward from it, that if it bleed, the juice may not run upon the bud; and where there is an opportunity of cutting down ſome young ſhoots to two eyes, in order to produce vigorous ſhoots for the next year's bearing, it ſhould always be done. In the latter end of April, or beginning of May, when the *vines* are ſhooting, they ſhould be looked over, and all the ſhoots from the old wood ſhould be rubbed off, as alſo the weaker, whenever there are two produced from one eye. In the middle of May the dangling ſhoots ſhould be rubbed off as before, and the branches muſt be nailed up againſt the wall as they ſhoot; and toward the middle of June, the ends of the bearing branches ſhould be nipped off, which will greatly ſtrengthen the fruit. Thoſe, however, which are to bear the next year, ſhould not be ſtopped before the middle of July.

During the ſummer ſeaſon, the dangling branches ſhould be rubbed off, and the ſhoots trained up regularly to the wall as before; for thus the growth of the fruit will be accelerated, and its flavour improved; but the branches ſhould never be diveſted of their leaves, becauſe the ſkins of the grapes, too much expoſed to the ſun, will be tough, and the fruit will be ſtarved and ſeldom come to any ſize.

When the fruit is all gathered, the *vines* ſhould be pruned, whereby the litter of their leaves is all removed at once, and the fruit will thus be forwarder the ſucceeding year. Miller's Gard. Dict.

For the method of building hot walls, and of forming eſpaliers, of preparing the ground adjoining to them, and planting and pruning, &c. the *vines*, we muſt refer to Mr. Miller's directions, ubi ſupra.

The moſt valuable grapes raiſed againſt hot walls are the red and white muſcat of Alexandria, the red, white, and black Frontinac. Thoſe proper to be planted againſt eſpaliers are the Miller grape, the chaſſelas white, the white muſcadine, the ſweet water, and le cour grapes.

Thoſe kinds of grapes which are thin ſkinned grow ſooner ripe than others, and will thrive in a temperate climate where the others will not. If it happens that grapes are ſtruck with hail at the time that they are large and near ripening, they never become ripe at all, but harden, and ſo remain. Fortzius de Vin. Rhen.

We have in the Philoſophical Tranſactions a remarkable account of the change of colour in grapes of the ſame tree. A muſcadine grape-tree was raiſed from a cutting of a parent-*vine* of this kind, whoſe fruit was white; it was planted againſt an eaſtern wall, where it had the benefit of the ſun from its riſing to half an hour after twelve: the ſoil a ſtiff clay, but rendered fitter for the growth of this ſort of tree by a mixture of rubbiſh of an old wall.

At about five years ſtanding it was ſo pruned, as to make it ſhoot two principal branches, one to the right, the other to the left hand; from hence it ſhot twenty-two inches on each ſide, before it came to a joint. That on the right was a very luxuriant branch, as thick as the body of the tree, the other about half that bigneſs. The leaves on the right hand were alſo of twice the bigneſs of thoſe on the left, and indeed larger than the leaves of the parent-tree; but what is moſt ſingular is, that the luxuriant branch produced annually fine black grapes in large bunches, and the left-hand branch white ones. But the white were often in the greateſt quantity, though the black grew on the much ſtronger branch. It is obſervable, that in all thoſe *vines*, which bear black and blue grapes, that the leaves die red; but in this tree whoſe origin was from a white grape, the leaves on that branch which bore black grapes died white, as well as thoſe on the other. The ſucceeding year, the number of the branches on the right-hand ſhoot were greatly increaſed in number, and the ſucceeding year all bore fine deep black grapes in very large numbers. Phil. Tranſ. N° 366. p. 102. See Raisin.

The *vine* is one of the trees moſt liable to be injured by froſts with us; its trunk is often ſplit in froſty weather, and that moſt frequently when it ſtands in the warmeſt aſpect. In the year 1683, the great froſt ſplit almoſt all our timber-trees; but this was owing to defects in them, by which the ſap was detained in very large quantities in particular places, from their being wind-ſhaken, coltie, or otherwiſe diſtempered; but the *vines* ſuffered the ſame accident, ſeemingly from another cauſe.

Thoſe *vines* were moſt ſplit this year, which were expoſed to a ſouth aſpect, and planted againſt the warmeſt walls. The ſun, their uſual friend, now proved their enemy, and daily thawing the ſap in the trunk, it was again frozen every night. This often bending and unbending, ſoftening and hardening the vivid ſpirituous juice of this plant, deſtroyed it; and the ſap, being the ſame year diſordered, and not gradually ſeaſoned, but even ſtopped before Michaelmas-day, and the freſh ſap wholly detained by the ſucceeding froſts from ariſing, the frozen and hard earth alſo denying its juices, even though the veſſels of the plant had been in a condition to receive them; the trunks and branches of the *vines* were filled only with a thin, watery, and mortified ſap, and this moſt of it extravaſated by the burſting of the veſſels it was frozen in, many of them ſuffered as much as if cut off from the root. Thus periſhed the greater part of the *vines* expoſed to the ſun's action; while the others, which ſtood in more ſhady places, not having their juices thawed and frozen daily, ſuffered but one change, and often eſcaped. It was alſo obſerved this year, that the red grape-trees eſcaped much better than the white, being hardier than they.

Other wall-trees, containing viſcous juices, eſcaped very well, while the *vines* thus ſuffered, even though expoſed in the ſame manner. Among others, the plums, apricots, peaches, and wall-cherries, had very little damage. It is eaſy to conceive why plants with viſcous juices ſhould ſuffer leſs by froſt, than thoſe with more thin ones; and we ſee that this is the caſe between theſe two ſorts of trees, the plums, &c. often exſudating their juices in form of gum-arabic; but the *vines*, when they throw out any, ſhew that theirs is as thin as common water. The different kinds of trees have, doubtleſs, all their different conſiſtences in their juices; and it may have principally been owing to that diverſity in others, as well as in the plum and *vine*, that ſome eſcape, while others periſh by froſts. Phil. Tranſ. N° 165. See Frost.

It is ſaid that *vines* were firſt planted about the rivers Rhine, Maine, and Moſelle, and alſo in Hungary and the northern part of Gaul, about the year 276. But with reſpect to the provinces of Gaul and Spain, which border on the Mediterranean ſea, as well as to Italy, many are of opinion, that *vines* grew ſpontaneouſly there. Julius Cæſar found *vines* growing in Gallia Narbonenſis, i. e. Languedoc and Provence; and Strabo remarks that the ſaid province produced all the kinds of fruit which Italy afforded. The Phœnicians are ſaid in early times to have planted *vines* in the iſles of the Mediterranean ſea, as well as in ſeveral parts of the continent both of Europe and Africa. It appears that there were real vineyards in England in 1140 and 1230. And. Com. vol. i. p. 16, and p. 81.

Vine, *black*. See *Black* Bryony.

Vine, *climbing five-leaved*, of *Canada*, a ſpecies of *hedera*. See Ivy.

Vine, *Spaniſh arbor*, a ſpecies of *ipomoea*. See Quamoclit.

Vine, *wild*, or *White* Vine. See *White* Bryony.

Vine *gall-inſect*, an inſect of the gall-*inſect* claſs, principally found on the *vine*, though capable of living on ſome other trees, and ſometimes found on them. It is much of the ſame ſhape, figure, and manner of life, with the other animals, of this claſs; but differs from them in this, that as they lay their eggs all under their body, and continue abſolutely to cover them, till they are hatched; theſe protrude them from their body, and they are found in prodigious abundance, lodged in a ſort of cottony or ſilken bags all over the ſtalks and branches of the *vines*; the dead animal is ſometimes found covering them in part; but more frequently they are abſolutely naked, and often are ſo numerous as to appear like thin cobwebs hung one over another all over the *vine*. See *Tab. of Inſects*, N°. 32.

Theſe eggs might be eaſily miſtaken for thoſe of ſmall ſpiders; they always hatch well, and come to maturity on the *vines* they are found on; but if removed to others, they ſeldom come to any thing, which is very ſingular, ſince the *gall-inſects* of almoſt all other trees may be removed and propagated either on the ſame or on different trees.

Theſe *vine* inſects are of the boat-faſhioned kind; but, beſide theſe, there are ſome other ſpecies which lodge their eggs in a cottony neſt of the ſame kind. The common thorn affords a ſhorter and more convex kind than this does; theſe are a very ſmall ſpecies; others are ſomething larger; but the oak affords a ſort equal in ſize, if not exceeding thoſe of the *vine*; ſome of theſe are brown, others bluiſh, and others reddiſh; and there are ſome minute differences in their ſhape. Reaumur, Hiſt. Inſ. tom. iv. p. 61.

Vine-*grubs*, in *Natural Hiſtory*, a name given by ſome authors to the pucerons, or little inſects, which are uſually of a green colour, and are found often in prodigious numbers, ſticking to the leaves of trees and plants, and to their young ſtalks.

Mr. Reaumur has been very curious in his inveſtigation of the nature of this inſect; but the manner of propagating its ſpecies was never clearly obſerved, till Mr. Bonet diſcovered it.

Reaumur obſerves, that in every family of pucerons, there are ſome that have wings, and ſome that have not; and that, according to the uſual courſe of nature, the winged ones ſhould be males, and the others females;

but, on the contrary, that both the winged and the unwinged *vine-grubs* are females, all being viviparous, and each kind producing a number of living young; ſo that the males of theſe pucerons were never diſcovered, even by that careful obſerver; nor could he ever find out what it was that impregnated the one and the other kind. He leaves us queries on this ſubject, whether there is no copulation among them? and whether they are all hermaphrodites, each having in itſelf the organs of both ſexes, as is the caſe in the river muſcles?

Mr. Bonet, in order to inform himſelf of the proceſs of nature in theſe creatures, brought up one of them in perfect ſolitude from its birth; he had an opportunity of obſerving it in the place where it was kept, and watched it very ſtrictly for many months together. At the end of twelve days this creature, without having had any copulation with a male, began to breed. She produced in the whole ninety-five young ones, all alive, and conſtantly under the eye of the obſerver. This experiment was repeated ſeveral times with the ſame ſucceſs; and, at length, repeated upon the young ones produced in this manner, and they were found to breed at the ſame period, and in the ſame manner with their parent, without having had any copulation with a male, as far as to the fourth generation.

A haſty obſerver would immediately conclude from this, that there was no copulation among the pucerons; but farther enquiry proves, that this is not the caſe; for the ſame obſerver has found a ſpecies of them in which there is copulation; ſo that both the winged and the unwinged kinds are truly females, and the male is a ſmall fly, of a very different ſhape, as is the caſe in regard to many other inſects. This male is the moſt ſalacious creature imaginable, copulating a vaſt many times ſucceſſively, with the ſame, and with different females. As this is the caſe in regard to one ſpecies of this creature, it doubtleſs is ſo alſo in regard to the reſt, though that has not yet been obſerved: and the ſingularity ſeems to be this, that after the male has copulated with the female, ſhe not only becomes prolific, but her young ones are born ready impregnated, as far as the fourth generation; after which, probably, there is a neceſſity for the copulation with the male again.

There is another very ſingular obſervation alſo in the production of the young pucerons; the females are properly viviparous, and uſually bring forth live young; but they ſometimes produce only a ſort of fœtuſes, which are laid in long ſeries one beſide the other, as the caterpillar eggs are laid by the butterfly; and they are left to hatch, as it were afterwards, by the heat of the ſun. Phil. Tranſ. N° 469.

VINEÆ, in the Roman *Art of War*, were defenſive engines, compoſed of wicker hurdles, laid for a roof on the tops of poſts, which the ſoldiers who went under it for ſhelter, bore up with their hands. Some ſay that they had two roofs; the firſt and lower of planks, and the upper roof of hurdles, to break the force of any blows, without diſordering the machine. See MANTELETS.

VINEGAR, *acetum*, an agreeable, acid, penetrating liquor, prepared from wine, cyder, beer, and other liquors: and of conſiderable uſe, both as a medicine, and a ſauce: or, *vinegar* is a vegetable acid liquor, produced by the ſecond degree of fermentation, or that which ſucceeds the ſpirituous and is called the acid or acetous FERMENTATION. Every liquor, which has completely undergone the ſpirituous fermentation, is ſpontaneouſly and neceſſarily diſpoſed to the acid fermentation. Accordingly, every vinous liquor does continually tend to become *vinegar*, and is actually changed into it, ſooner or later, according to circumſtances; unleſs this change be prevented by ſome obſtacle to fermentation in general.

The word is French, *vinaigre*; formed from *vin*, *wine*, and *aigre*, *ſour*.

The method of making *vinegar* has long been kept a ſecret among the people of that profeſſion; who, it is ſaid, oblige themſelves to each other by oath not to reveal it; but, notwithſtanding this, the Philoſophical Tranſactions, and ſome other late writings, furniſh us with approved accounts thereof.

VINEGAR, *method of making cyder.* The cyder (the meaneſt of which will ſerve the purpoſe) is firſt to be drawn off fine into another veſſel, and a quantity of the muſt, or pouze of apples, to be added; the whole is then to be ſet in the ſun, if there be a conveniency for the purpoſe; and, at a week or nine days end, it may be drawn off.

VINEGAR, *method of making beer.* Take a middling ſort of beer, indifferently well hopped; into which, when it has worked well, and is grown fine, put ſome rape, or huſks of grapes, uſually brought home for that purpoſe; maſh them together in a tub; then, letting the rape ſettle, draw off the liquid part, put it into a caſk, and ſet it in the ſun as hot as may be; the bung-hole being only covered with a tile, or ſlate ſtone; and in about thirty or forty days it will become a good *vinegar*, and may paſs in uſe as well as that made of wine, if it be refined, and kept from turning muſty.

Or *vinegar* may be made thus. To every gallon of ſpring-water, add three pounds of Malaga raiſins; which put into an earthen jar, and place them where they may have the hotteſt ſun from May till Michaelmas; then preſſing all well, tun the liquor up in a very ſtrong iron-hooped veſſel, to prevent its burſting; it will appear very thick and muddy, when newly preſſed; but it will refine in the veſſel, and be as clear as wine. Thus let it remain untouched for three months, before it be drawn off, and it will prove excellent *vinegar*.

VINEGAR, *to make wine.* Any ſort of vinous liquor, being mixed with its own fæces, flowers, or ferment, and its tartar firſt reduced to powder: or elſe with the acid and auſtere ſtalks of the vegetable from whence the wine was obtained, which hold a large proportion of tartar; and the whole being kept frequently ſtirring in a veſſel which has formerly held *vinegar*, or ſet in a warm place full of the ſteams of the ſame, will begin to ferment anew, and conceive heat, and will grow ſour by degrees, and ſoon after turn into *vinegar*.

The remote ſubjects of acetous fermentation are the ſame with thoſe of vinous; but the immediate ſubjects of it are all kinds of vegetable juices, after they have once undergone that fermentation which reduces them to wine; for it is abſolutely impoſſible to make *vinegar* of muſt, the crude juice of grapes, or other ripe fruits, without the previous aſſiſtance of vinous fermentation.

The proper ferments for this operation, whereby *vinegar* is prepared, are, 1. The fæces of all acid wines. 2. The lees of *vinegar*. 3. Pulverized tartar; eſpecially that of Rheniſh wine, or the cream or cryſtals thereof. 4. *Vinegar* itſelf. 5. A wooden veſſel well drenched with *vinegar*, or one that has long been employed to contain it. 6. Wine that has often been mixed with its own fæces. 7. The twigs of vines, and the ſtalks of grapes, currants, cherries, or other vegetables of an acid auſtere taſte. 8. Bakers leaven, after it is turned acid. 9. All manner of ferments, compounded of thoſe already mentioned.

Vinegar is no production of nature, but a mere creature of art: for verjuice, the juices of citrons, lemons, and the like native acids, are improperly ſaid to be *natural vinegars*; becauſe, when diſtilled, they afford nothing but vapid water; whereas it is the property of *vinegar* to yield an acid ſpirit by diſtillation.

The wine which is generally converted into *vinegar*, and which for its cheapneſs is commonly employed for this purpoſe, is ſuch as has already become ſour; although the better and the more ſpirituous the wine, and alſo the more of the vinous ſpirit that can be retained in the *vinegar*, the better and ſtronger it will be. Beccher ſays, in his Phyſica Subterranea, that having digeſted wine in order to convert it into *vinegar* in a bottle hermetically ſealed, he found, that although a longer than the ordinary time was required, the *vinegar* produced was much ſtronger than when free air is admitted. Mr. Cartheuſer alſo aſſirms, that the ſtrength of *vinegar* may be much increaſed by adding ſome aqua vitæ to the wine, before it is expoſed to the acetous fermentation. Nothing more ſeems requiſite in the preparation of good *vinegar* than to employ good wine, and to conduct the fermentation in the moſt advantageous method; the principal part of the operation being performed by nature.

VINEGAR *in France, method of making.* The French uſe a method of making *vinegar* different from that above deſcribed. They take two very large oaken veſſels, the larger the better, open at the top; in each whereof they place a wooden grate, within a foot of the bottom: upon theſe grates they firſt lay twigs, or cuttings of vines, and aftewards the ſtalks of the cluſters of grapes, without the grapes themſelves, or their ſtones, called the rape, till the whole pile reaches within a foot of the brim of the veſſels; then they fill one of theſe veſſels with wine to the very top, and half fill the other; and with liquor drawn out of the full veſſel, they fill up that which was only half full before; daily repeating the ſame operation, and pouring the liquor back from one veſſel to the other; ſo that each of them is full and half full by turns.

When this proceſs has been continued for two or three days, a degree of heat will ariſe in the veſſel which is then but half full, and will increaſe for ſeveral days ſucceſſively, without any appearance of the like in the veſſel which happens to be full during thoſe days: the liquor whereof will ſtill remain cool; and as ſoon as the heat ceaſes in the veſſel that is half full, the *vinegar* is prepared; which, in the ſummer, happens on the fourteenth or fifteenth day from the beginning; but, in the winter, the fermentation proceeds much ſlower; ſo that they are often obliged to forward it by artificial warmth, or the uſe of ſtoves.

When the weather is exceeding hot, the liquor ought to be poured off from the full veſſel into the other twice a day; otherwiſe, the liquor would be over-heated, and the fermentation would prove too ſtrong; whence the ſpirituous parts would fly away, and leave a vapid wine, inſtead of *vinegar*, behind.

The full veſſel is always to be left open at top; but the mouth of the other muſt be cloſed with a cover of wood, in order the better to keep down and fix the ſpirit in the body of the liquor; for, otherwiſe, it might eaſily fly off in the heat of fermentation. The veſſel that is only half full ſeems to grow hot, rather than the other, becauſe it contains a much greater quantity of the vine-twigs and ſtalks than that, in proportion to the liquor; above which the pile riſing to a conſiderable height, conceives heat the more, and ſo conveys it to the wine below. Boerhaave's Elem. of Chemiſtry, part iii. p. 143, &c. Phil. Tranſ. vol. ii. p. 657.

There is another method, by which a very good *vinegar* is commonly made at Paris from the lees of wine. For this purpoſe all the wine contained in the lees is preſſed out, and put into large caſks, the bung-holes of which are left open. Theſe caſks are put into a hot place; and if the fermentation proceeds too faſt, it muſt be checked by adding more freſh wine

In both the vinous and acetous fermentations, an inteſtine motion, a ſwelling, a hiſſing noiſe, and an ebullition, may be perceived; but the heat produced by the former is ſcarcely ſenſible, whereas that produced by the latter is very conſiderable. Moreover, the vapour which exhales from *vinegar*, during fermentation, is not noxious, like that of fermenting wine: on the contrary, as the acid of *vinegar* diſengages itſelf it ſeems to acquire more power to bind and retain the inflammable principle, which is the truly dangerous part of theſe vapours. Beſides, *vinegar* does not depoſit tartar as wine does, even though it has been made with wine that had not depoſited its tartar; but the ſediment of *vinegar* is a viſcid, oily, and very putreſcent matter; which is uſed to cover the grape-ſtalks that are employed in the making of *vinegar*, in order to promote the fermentation. The acid of the grape-ſtalks, which are waſhed clean and preſerved to promote the fermentation of more *vinegar*, acts powerfully as a leaven or ferment. The caſks, which have been uſed, are alſo to be cleanſed from the viſcid matter juſt mentioned, and kept for the ſame uſe, as they are fitter for the purpoſe than new caſks. When the acetous fermentation is finiſhed, the nature and character of the liquor that has undergone it, are totally changed. The taſte and ſmell of wine are partly ſpirituous and partly acid; though in good wine the latter is ſcarcely perceptible: the taſte and ſmell of *vinegar* are alſo acid and ſpirituous; but the former quality prevails ſo much as almoſt totally to conceal the latter. The properties of wine and *vinegar* prove, that the acetous fermentation unfolds in a very ſingular manner the acid parts of wine, and intimately combines them with the inflammable ſpirit; ſo that by changing wine into *vinegar*, the ardent ſpirit is no longer perceptible, ſo that it cannot affect the head and intoxicate; and if it be diſtilled, the firſt liquor that riſes with a heat leſs than that of boiling water is not an ardent ſpirit, as when wine is diſtilled, unleſs the *vinegar* be too new, and the acetous fermentation has not been completely finiſhed; but when old *vinegar* is diſtilled, the liquor that firſt riſes is a ſlightly acid phlegm, which contains the moſt volatile, the moſt odoriferous, and the moſt ſpirituous part of the *vinegar*.

When *vinegar* has run a little beyond the acetous ſtate, and begun to enter on the putrefactive, the putrefaction may be ſtopped by quenching a red-hot iron in the liquor; and the acid, which has been loſt, may in ſome meaſure be reſtored, by the addition of a little ſpirit of wine, rye-bread, muſtard-ſeed, &c. The putrefaction of *vinegar* may alſo be prevented, by racking it off from the feculencies, and keeping it in a cloſe-ſtopped veſſel in a cool place. However, ſuch as has once ſuffered a conſiderable heat, cannot long be preſerved from corruption.

In England the duty on *vinegar* is as follows; viz. for every ton of *vinegar* imported, 13*l.* and if imported by ſtrangers, 30*s.* more; and by 18 Geo. II. cap. 9, and 3 Geo. III. cap. 12. 16*l.* more for French *vinegar*, and other *vinegar* 8*l.* and by 18 Geo. III. cap. 27. an additional duty of 8*l.* 8*s.* for French *vinegar*, and other *vinegar* 4*l.* 4*s.* and again by 20 Geo. III. cap. 30. an additional duty of 8*l.* on French *vinegar*, and other *vinegar* 4*l.* The duty on home *vinegar* is, for every barrel (at 34 gallons to the barrel) of *vinegar*, *vinegar*-beer, or liquors preparing for *vinegar*, made for ſale, that for making white lead excepted, 8*s.* 9*d.* 10 & 11 W. cap. 21. and 8 Ann. cap. 7. *Vinegar* is alſo ſubject to an additional duty of three *five per cents.* by 19 Geo. III. cap. 25. 21 Geo. III. cap. 17. and 22 Geo. III. cap. 66. By 24 Geo. III. cap. 41. every maker of *vinegar* for ſale is required to take out a licence at the annual expence of 10*l.*

VINEGAR, *chemical properties of.* *Vinegar* is not a pure or ſimple acid, like thoſe of the mineral kingdom: in open veſſels it becomes vapid, ropy, and putrid, while the mineral acids remain unchanged. Diſtilled by a moderate heat, it yields firſt a phlegmatic liquor, afterwards a ſlightly acid one, which is ſucceeded by ſtronger and ſtronger acids, till the matter in the diſtilling veſſel becomes thick and unctuous like honey: the *vinegar* prepared from malt liquors, contains more of this viſcous ſubſtance than that of wine, and is, therefore, more diſpoſed to become ropy and ſlimy in keeping. This reſiduum, urged with a ſtronger fire, gives over an empyreumatic oil, and a penetrating acid ſpirit, tainted with the ill ſmell and yellow colour of the oil. Then there remains a black coal, which, burnt into white aſhes, yields a conſiderable proportion of fixt alkaline ſalt. Pure fixt alkaline ſalt, ſaturated with the colourleſs diſtilled liquors, and afterwards exſiccated, contracts a yellowiſh or brown tinge, and thus diſcovers that the acid ſtill retains a portion of the oil. On gently melting the dry ſalt, the oily matter burns to a black coal, which ſeparates on diſſolution in water: the ſolution, exhaled to dryneſs, leaves a perfectly white neutral ſalt, containing the pure acetous acid combined with the alkali. On adding to this compound a little oil of vitriol, the acetous acid is diſengaged, and may be collected by diſtillation, in a highly concentrated ſtate, and of a very pungent volatile ſmell. The quantity of fixt alkaline ſalt, which *vinegar* is capable of ſaturating, is one of the ſureſt criterions of its ſtrength. The beſt of the German *vinegars*, according to Stahl, ſaturate little more than one fortieth of their own weight; the French *vinegars*, examined by Geoffroy, above one thirty-fifth; and ſome of them no leſs than one twelfth; the common diſtilled *vinegar* of our ſhops about one twentieth. By congelation, and diſtillation from alkalis, and from ſome metallic bodies, particularly copper, the acid may be ſo far concentrated as to ſaturate nearly equal its own weight. The beſt way of judging of the ſaturation, according to Dr. Lewis, is by trying the liquor from time to time with certain coloured vegetable juices, or on paper ſtained with them. For this purpoſe a thick writing paper may be ſtained pale blue on one ſide with the blue preparation of archil, commonly called lacmus; and pale red on the other ſide by a mixture of the ſame infuſion with ſo much diluted ſpirit of ſalt as is juſt ſufficient to redden it. If a ſmall ſlip of this paper be dipped occaſionally into the liquor to be tried, or a drop of the liquor be applied on both ſides of the paper, the red ſide turns blue as long as any of the alkali remains unſaturated; the blue ſide turns red, when the acid begins to prevail; and no change at all is produced when the ſaturation is complete. Where lacmus cannot be procured, the paper may be coloured with the juices of violets, iris, cyanus, &c. or with the blue juice preſſed out from ſcrapings of the cortical part of common raddiſh roots; with which it is ſufficient to ſtain the paper on one ſide; this one colour diſcovering both acidity and alkaleſcence, the former changing it red, and the latter green.

The acetous acid differs eſſentially from all the others: from the native vegetable acid, in ſubtility and volatility; not being obtainable in the form of a concrete ſalt, which moſt, perhaps all, of the native ones are, and riſing in diſtillation with a moderate heat, which very few of the native ones have been found to do: from the mineral acids, in its habitude to different bodies, and the nature of the compounds which it forms with them, being much weaker than the mineral acids: thus, whatever alkaline, earthy, or metallic ſubſtance, the acetous acid be combined with, the addition of any mineral acid will disjoin them, the mineral taking the place of the acetous; neutral ſalts, compoſed of the acetous acid and fixed alkalis, diſſolve totally and plentifully in rectified ſpirit of wine, whilſt thoſe, compoſed of the ſame alkalis and mineral acids, are not at all ſoluble in that menſtruum: in this property, the acetous acid differs alſo from moſt, perhaps from all, of the acids of its own kingdom; and from all acids in general, in its peculiar odour.

The acid of *vinegar* diſſolves all ſubſtances upon which other acids can act, and forms with them neutral ſalts, all which may be called *acetous* SALTS. With calcareous earth it forms ſalts, which in cryſtallizing ſhoot into ſilky ramifications and vegetations: theſe ſalts are named, from their earthy baſes, ſalt of chalk, ſalt of crabs eyes, &c. The ſolubility of calcareous earth in this acid, and its precipitability by that of vitriol, afford a ready method of diſcovering the ſophiſtication of *vinegar*, ſaid to be ſometimes practiſed, with vitriolic acid. If a ſaturated ſolution of any calcareous earth, as chalk, made in ſtrong *vinegar*, be added to ſuch as is ſuſpected of containing vitriolic acid, no change will enſue if the *vinegar* was pure; but if it contained even a minute portion of that acid, the mixture will immediately become milky, and on ſtanding for a little while depoſit a milky ſediment: if the calcareous ſolution be gradually dropt in, ſo long as it produces any milkineſs or cloudineſs, all the vitriolic acid will be abſorbed by the chalk; and as this new compound is very ſparingly diſſoluble, nearly the whole of it will precipitate, ſo as to leave the *vinegar* almoſt pure. With fixed vegetable alkali the acid of *vinegar* forms a very pungent and very deliqueſcent ſalt, called *regenerated* TARTAR, or TERRA *foliata tartari*. With fixed mineral alkali it forms a neutral cryſtalizable ſalt. With volatile alkali it forms an acetous ammoniacal ſalt, called *ſpirit of Mindererus.*

Vinegar diſſolves, among metallic bodies, zinc, iron, copper, tin, lead, biſmuth, and regulus of antimony; the two laſt, however, in ſmall quantity, but ſufficient to give a ſtrong impregnation to the *vinegar*; and united with copper it forms a VERDIGRISE and CRYSTALS *of Venus*. With lead it forms CERUSSE, and *ſalt* or *ſugar of* LEAD; diſſolving it more eaſily when reduced to a calx than in its metallic ſtate; boiled even with the glaſs of lead, or in the common glazed earthen veſſels, in the GLAZING of which this metal is a principal ingredient, it extracts ſo much as to become ſtrongly tainted with the pernicious qualities of the lead. Gold, platina, ſilver, and quickſilver, are not affected by *vinegar* in their metallic ſtate; the two firſt have not been obſerved in any ſtate to be affected by it. Silver precipitated from the nitrous acid, and thoroughly edulcorated with water, and mercury treated in the ſame manner, or changed by fire into a red powder, ſlowly and ſparingly diſſolved in it. Of the affinities of this acid to different metals, or its forſaking one to unite with another, few experiments have been made. Dr. Lewis obſerves, that it depoſits lead and copper upon adding iron (See *Tables of* AFFINITY.) It diſſolves the vegetable inſpiſſated juices, and ſeveral of the gummy reſins, and extracts the virtues of ſundry plants in tolerable perfection, ſuperadding at the ſame time a virtue of a different kind. However, it excellently aſſiſts and coincides with ſome drugs, as garlic, ſquills, and ammoniacum; and in many caſes, where this acid is principally to be depended upon, it may be advantageouſly impregnated with the flavour of certain vegetables. *Vinegar* very much concentrated, as the rectified SPIRIT *of Venus*, or *radical* VINEGAR, being diſtilled with equal parts of highly rectified ſpirit of wine, furniſhes a liquor which has all the eſſential characters of ÆTHER, and is called *acetous æther*. It was diſcovered by the count de Lauraguais. (See Hiſt. Acad. Scienc. Par. 1759.) It mingles equally with blood and its ſerum, and with moſt of the fluids of animals; not thickening or coagulating them, like the acids of the mineral kingdom, but tending rather, as Boerhaave juſtly obſerves, to attenuate and reſolve coagulations. It is likewiſe, when taken internally, leſs ſtimulating than the mineral acids, and leſs diſpoſed to affect the kidneys. Profeſſor Cullen obſerves, that it is leſs liable to undergo changes in the firſt paſſages than the native vegetable acids, which have yet to go through the proceſs of fermentation.

VINEGAR, *medicinal properties of*. This mild, unctuous acid, is a medicine of great uſe in the different kinds of inflammatory and putrid diſtempers, both internal and external. Nothing is more extolled in many caſes of putrefaction, and as an antidote againſt venomous bites, by Dioſcorides and Hippocrates, than OXYCRATE; and *vinegar*, when applied to ſores in animal bodies, is known to ſtimulate and reſiſt putrefaction. When weak, it poſſeſſes the virtues of water; when ſtrong, its effects approach to thoſe of ſalts and acid ſpirit. Med. Eſſ. Edinb. vol. v. art. 24.

It is one of the moſt certain antiphlogiſtics and ſudorifics in high fevers, and one of the beſt preſervatives againſt peſtilential and other putredinous contagions. Accordingly Boerhaave informs us, that Franciſcus de la Boe Sylvius viſited his patients in the plague with ſafety, by drinking firſt an ounce or two of *vinegar*. And it is now a common practice to waſh and ſprinkle the rooms of hoſpitals, the decks of ſhips, &c. with *vinegar*, in order to purify the air. Dr. Hales (Ventilators, part i. p. 46.) recommends dipping many cloths in *vinegar*, and hanging them up in all proper vacancies between the decks of ſhips, and in the chambers of ſick perſons, whereby great quantities of *vinegar* would intermix and float in the air; and he found by an experiment, mentioned in his Statical Eſſays, vol. i. p. 266. that an air which paſſes through ſuch cloths, could be breathed to and fro as long again, as the like quantity of air, which was not impregnated with *vinegar*. Fainting, vomiting, lethargic, and hyſteric paroxyſms, are likewiſe frequently relieved by *vinagar*, applied to the mouth and noſe, or received into the ſtomach. Lethargic perſons are often found to be excited more effectually by *vinegar* blown into the noſe than by the far more pungent volatile ſpirits. Boerhaave obſerves, that this acid counteracts, in a peculiar manner, the effects of ſpirituous liquors. The daily uſe of *vinegar* with food is ſalutary in hot, bilious diſpoſitions, and where there is a tendency to inflammation or putrefaction. It is prejudicial to children, to aged, hyſterical, and hypochondriacal perſons; in cold, pale, phlegmatic habits, where the veſſels are lax, the circulation languid, and the power of digeſtion weak. It tends in all caſes, if uſed freely, to prevent corpulence: Hoffman ſuſpects that it produces this effect by impeding the formation of chyle, or deſtroying the union of the unctuous and ſerous fluids of which chyle is compoſed: an effect common to all acids, as appears from their coagulating milk and artificial emulſions. Dr. Lewis obſerves, that he has known great corpulence reduced by the liberal uſe of *vinegar*, but not with impunity: diſeaſes ſucceeding, which eluded the power of medicines, and proved at length fatal.

Combinations of *vinegar* with different earthy bodies, differ in virtue according to the nature of the earth. A ſolution of the aluminous earth in this acid, is ſtrongly ſtyptic; of vegetable earths, or magneſia alba, bitteriſh, and gently purgative: both theſe ſolutions are milder, and leſs ungrateful, that thoſe of the ſame earths made in the mineral acids; and though as yet unknown in practice, certainly deſerve (as Dr. Lewis ſays) to be introduced. Solutions of different animal and the calcareous mineral earths, are bitteriſh and ſubauſtere, in various degrees, and ſuppoſed to act as mild reſolvents, ſubaſtringents, or diaphoretics. Combinations of *vinegar* with fixed alkaline ſalts are uſeful aperients, diuretics, and cathartics. Dr. Lewis has known two drams of the alkali, diſſolved in as much *vinegar* as was ſufficient to ſaturate it, occaſion ten or twelve copious watery ſtools, and a plentiful diſcharge of urine, without griping or fatiguing the patient. Mixtures of alkali and diſtilled *vinegar*, evaporated to a dry ſalt, are kept in the ſhops; either in a browniſh oily ſtate, as obtained by ſimple evaporation, or purified to perfect whiteneſs, by gentle fuſion and ſolution in water. Theſe preparations are given in doſes of ten or twenty grains as mild aperients, and to a dram or two as purgatives and diuretics. See TARTAR *regeneratus*, SAL *diureticus*, TERRA *foliata*, and ARCANUM *tartari*.

Combinations of *vinegar* with volatile alkaline ſalts, commonly made with diſtilled *vinegar*, added gradually to the ſalt, till the efferveſcence ceaſes, ſcarcely yield any ſolid ſalt; the ſaline matter evaporating with the watery fluid, or even before it: on diſtilling the mixture in a retort, a ſalt ſometimes concretes about the ſides of the receiver, but liquefies again as the veſſels grow cold. Theſe mixtures, called *ſpiritus Mindereri*, have little purgative virtue, but operate powerfully as aperients; by urine, if the patient walks about in the cool air; by perſpiration or ſweat, if kept warm in bed. They are principally made uſe of in this laſt intention, in doſes of half an ounce; and, as they act without irritation, they have place in inflammatory caſes, where the warm ſudorifics, if they fail of exciting a ſweat, aggravate the diſtemper. *Vinegar* and honey, or OXYMEL, of the conſiſtence of a ſyrup, ſwallowed warm, is very good in many caſes of ſore throats ariſing from colds. A very important medicinal virtue has been attributed to *vinegar*, namely, that of curing the canine madneſs. See HYDROPHOBIA, and MADNESS *from the bite of enraged animals*.

Mr. Buchoz, in a work, entitled, an Hiſtorical Treatiſe of Plants growing in Lorraine, &c. affirms, that ſeveral ſucceſsful trials have aſcertained the efficacy of *vinegar* againſt the ill effects ariſing from the bite of mad dogs, when it is given in the quantity of a pound each day, divided into three doſes; one to be taken in the morning, another at noon, and a third in the evening. See on the ſubject of this article, Boerhaave's Elem. Chem. by Dallowe, part iii. p. 146, &c. Neumann's Chem. by Lewis, p. 458, &c. Dict. Chem. and Lewis's Mat. Med.

VINEGAR *of antimony*, is an acid ſpirit, beſt made by diſtillation from the ore of antimony.

Its uſe is commended in continued and malignant fevers.

VINEGAR, *diſtilled*, is the ſpirituous acid of *vinegar* obtained by diſtillation. The proceſs of diſtilling *vinegar* is very ſimple. A quantity of good ordinary *vinegar* is put into a large cucurbit or ſtill, which ought to be made of ſtone-ware, and not of metal, as the acid of *vinegar* is capable of acting upon moſt metals. This cucurbit is ſunk in a deep furnace, ſo that five or ſix fingers' breadth only near its neck appears. The neck is to be carefully luted with clay all round the furnace, that the capital may not be heated too much. A capital and a glaſs receiver are then to be fitted, and the diſtillation is to be begun with a very gentle heat. The acid ſpirituous liquor paſſes by drops into the receiver. This liquor is white, tranſparent, penetrating, ſomewhat empyreumatic, and diſengaged from an acid, but not ſpirituous ſubſtance, and alſo from an extractive ſaponaceous matter, both which are contained in ordinary *vinegar*. Theſe latter ſubſtances remain in the ſtill with the colouring matter, and form together an extremely acid extract of *vinegar*. This reſiduum contains alſo ſome tartar, and by incineration yields much fixed alkali, as all matters belonging to vines, grapes, and wine, do. See *Chemical Properties of* VINEGAR, *ſupra*.

The thicker *vinegar* is, the leſs fit it proves for diſtillation, as there is always the greater danger of an empyreuma, or burnt ſmell, which would ſpoil the whole proceſs, and as it uſually in this caſe comes over oleaginous. And the pureſt white ſalt of tartar, ſaturated with this diſtilled *vinegar*, being afterwards ignited, turns black, and yields a ſmell extremely like that of crude tartar in the calcination. Shaw's Chemical Eſſays.

On the other hand, the more the *vinegar* is diluted immediately before diſtillation, the leſs danger there is of burning; and if the thick remaining maſs, when the thinner part is diſtilled from it, be again diluted with water, it may, by a ſecond diſtillation, be brought to afford an acetous ſubſtance; though this latter be by no means comparable to this former volatile part. This Vigani juſtly ſuſpects to be a thing known but to very few. And even when the *vinegar* is diſtilled with the utmoſt labour and care, it ſtill has this effect in a higher degree, and contains an immenſe quantity of phlegm, in proportion to its acid ſalt.

In this caſe, the method of condenſation by freezing is of the utmoſt ſervice; firſt of all ſeparating the more aqueous part, and in the next place, that which is ſomewhat acetous, though not comparable to what remains behind; ſo that, by this means, a moſt concentrated and ſubtle ſpirituous diſtilled *vinegar* may be produced, viz. by freezing the whole parcel of diſtilled phlegm and diſtilled *vinegar* together, a thing of great moment to the curious in the *chemia ſublimior*, and particularly to thoſe who underſtand Hollandus. And when the *vinegar* is froze without diſtillation, by this means you have a noble rob, or a rich concentrated *vinegar*, freed from its diſtillating aqueous and uſeleſs part. Vigani, Medull. Chem.

VINEGAR, *concentrated*. See CONCENTRATION.

VINEGAR *of lead* is a liquor formed by digeſting CERUSSE or LITHARGE, with a ſufficient quantity to diſſolve it perfectly. This is called the *acetum lithargyrites*, and is prepared by digeſting four ounces of litharge about three days in a ſand heat, with a pint of ſtrong vinegar, now and then ſhaking the veſſel. The liquor, filtered, will receive a ſtrong impregnation from the litharge, and will be found to have diſſolved about one tenth of it. When a ſaturated ſolution is required, the ceruſſe is preferred to the litharge. This *vinegar* is of the ſame nature with ſolutions of SACCHARUM *ſaturni*, and when diluted with a large quantity of water, it abates external inflammations, the itching and other uneaſineſſes in cancerous ulcers; and before Mr. Goulard's practice it was uſed for bathing inflammations in ſcirrhous tumors, to prevent their becoming cancerous. Inflammations and inflammatory tumors, in general, are diſperſed by it. Dr. William Saunders has obſerved, that the *acetum lithargyrites*, or Goulard's extract, is not the ſame in its operation and powers as the *ſaccharum ſaturni*, as medical practitioners have generally ſuppoſed. In the preparation of the former, the acid is fully ſaturated with lead; but in that of the latter, the acid is in a much greater proportion to the lead. The former, when diluted by the pureſt diſtilled water, gives out a copious precipitation, which he finds, by experiment, to be ceruſſe. The latter remains diſſolved in diſtilled water, and is, therefore, applied topically in a ſtate more immediately active, both on account of its greater proportion of acid, and its preſerving its ſolubility under high degrees of dilution. He has alſo found by experiment, that, by adding a very ſmall proportion of diſtilled *vinegar* to the *aqua ſaturnina* of Goulard, the white precipitate is rediſſolved, and that the ſolution procured in this manner is more active, but leſs adapted to remove inflammation, and abate irritation, as a ſedative, than the *aqua ſaturnina* itſelf. Dr. Saunders, however, is perfectly convinced, that no degree of dilution of *ſaccharum ſaturni* will anſwer the many valuable purpoſes obtained from the uſe of the *acetum lithargyrites*. Water alone, in the caſe of the *aqua ſaturnina*, proves a precipitant of lead, by attracting the acid, and reducing the preparation to a ſtate of ceruſſe, an intermediate ſtate between lead and the *ſaccharum ſaturni*; ſo that ceruſſe diffuſed in water more nearly reſembles the *aqua ſaturnina* of Goulard than a ſolution of the *ſaccharum ſaturni* does. The *ſaccharum ſaturni* may be conſidered as an union of ceruſſe with *viengar*; whereas Goulard's *acetum lithargyrites* is an union of lead with *vinegar*. See Percival's Phil. Med. and Exp. Eſſ. 1776. Append. p. 323, &c.

VINEGAR, *portable*, a name given by the chemiſts to a ſort of *vinegar*-powder, or *vinegar* in a dry form. It is a preparation of tartar with *vinegar*, and is made in this manner: take white tartar, half a pound; let it be carefully waſhed, then dried and powdered; infuſe this powder in the ſtrongeſt wine-*vinegar*; then dry it, and infuſe it again, repeating this operation ten times. After this the dry powder is to be kept for uſe; at any time a ſort of extemporaneous *vinegar* may be made by diſſolving a ſmall quantity of this powder in any proper liquor.

VINEGAR, *radical*, is a name given to the acid of *vinegar* highly concentrated, by diſtilling verdigriſe, or cryſtals of verdigriſe, &c. See SPIRIT *of Venus*.

M. de Laſſone has lately found, that in the proceſs of diſtilling verdigriſe for this purpoſe, a fluid eſcapes of the nature of thoſe called by the ancient chemiſts *gas*, and by the moderns *fixed air*; and he alſo obſerved, that if the diſtillation be ſuſpended the moment before the acid concentrated vapours appear under a white form, copperiſh flowers are obtained: before this period the radical *vinegar* contains no copper: it only begins to contain ſome, when the copperiſh flowers, carried along by the acid vapours, mix themſelves with this *vinegar*: if it is then rectified by a new diſtillation, theſe flowers are no more ſublimed, and, therefore, a radical *vinegar*, exempt from copper, may be extracted from verdigriſe. The copperiſh flowers are in a high degree cauſtic, and may be conſidered as a violent poiſon. Hiſt. Acad. Sc. Par. 1777.

VINEGAR *of roſes*. See ACETUM *roſatum*.

VINEGAR, *eels in*. The common opinion, from the diſcovery of eels in *vinegar*, that its ſharpneſs to the taſte was occaſioned by theſe animals, occaſioned the accurate Leewenhoeck to attempt a careful examination of it by the microſcope.

Some of the ſtrongeſt and ſharpeſt *vinegar*, after having been expoſed for ſome hours to the air, and afterwards examined by the microſcope, entertains the ſight with a number of corpuſcles, called the ſalts of *vinegar*, which are acute at both extremities, and have many of them in the middle an oblong figure of a browniſh colour, and others were altogether clear, pellucid, and bright as cryſtal. Others of theſe particles appeared of an oval figure, and ſome of the half of ſuch a figure, hollowed like a ſmall boat, or the half of a nut-ſhell. The more perfect figures, pointed at both ends, and pellucid, are ſo very minute, that ſome thouſands of them are comprehended in a ſmall drop.

Theſe ſeem to be what affect the tongue with the acid ſharpneſs, when we taſte *vinegar*; and it is very probable, that beſide theſe, minute as they are, there are multitudes of others equally pointed, and infinitely ſmaller than theſe.

If *vinegar* be placed in an open glaſs, and ſuffered to remain ſome weeks, the ſurface of it will be found, on examination with good glaſſes, to be full of the ſame figures, double-pointed, and very pellucid; and in theſe, very often, there may be cavities plainly diſcovered; but examining the liquor a little deeper down, there are found numbers of minute eels; yet theſe, though minute, are prodigiouſly larger than the ſalt particles, and can never be ſuppoſed to be the occaſion of the ſharpneſs of *vinegar* to the taſte, by any who rightly conſider, ſince it is not all *vinegar* that contains them; nay, the much greater part of *vinegar* is wholly without them, and in winter they all die; yet *vinegar* is not leſs ſharp at that ſeaſon than in the ſummer.

Mr. Mentzelius was ſo lucky as to ſee theſe undergo their laſt metamorphoſis, and change into ſmall flies; and though this is a ſingle inſtance, in regard to the microſcopical world of animalcules, yet it is highly probable that the whole race of thoſe, whoſe appearance in medicated fluids we have been ſo long puzzled to account for, may, like theſe, be the worm-ſtate of ſome winged aerial inſect, and have owed their origin, where we ſee them, to the eggs of parent flies, too ſmall for our ſight. Reaum. Hiſt. Inſ. vol. iv. p. 404.

If *vinegar* be impregnated with crab's-eyes, or any other alkaline ſubſtance, which blunts, and in a great meaſure deſtroys its acidity, theſe double-pointed figures are no longer found in it, on a microſcopical inſpection; but in their places we find others with an oblong quadrangular baſe, from which they ſhoot up into pyramids, and appear like poliſhed diamonds. Theſe are alſo ſo very minute, that ſix thouſand of them are computed to be contained in a drop of the liquor, no larger than two corns of barley; and theſe will be uſually found all of the ſame ſize, or very nearly ſo, which is by no means the caſe with the other ſalts of *vinegar* in its natural ſtate. See *Microſcopic* EELS.

VINEYARD, *vinetum*, a plantation of vines. See **VINE**.

Vineyards were formerly common in England, but for a conſiderable time the cultivation of them has been altogether neglected. There was a famous *vineyard* at Bath, planted with white Muſcadine and black cluſter grapes, which, at one time, yielded ſixty hogſheads of wine at a vintage, though, in 1721, it only yielded three hogſheads.

Bradley alſo mentions a ſmall *vineyard* of a private perſon at Rotherhithe, conſiſting only of a hundred vines, which yielded at a vintage ninety-five gallons of wine, that had the true Burgundy flavour, as being made of that ſort of grape, and exceeded any made on this ſide of Paris.

Mr. Miller apprehends, that renewed trials, conducted with judgment, might be attended with a ſucceſs beyond the expectations that are now generally entertained. With this view particular attention ſhould be given to the ſoil, ſituation, &c. The beſt ſoil, he ſays, for a *vineyard* in England is ſuch, whoſe ſurface is a light ſandy loam, and not above a foot and a half or two feet deep above the gravel or chalk: the moſt deſirable ſituation is that on the north ſide of a river, upon an elevation inclining to the ſouth, with a ſmall gradual deſcent for draining the moiſture; always open to the eaſt, defended from the north and north-weſt wind by hills with a chalky ſurface, and ſurrounded by an open hilly country.

In order to prepare the ground for planting, it ſhould be ploughed in the ſpring as deep as the ſurface will admit, turning the ſward to the bottom, then well harrowed, and afterwards conſtantly ploughed and harrowed for at leaſt one year: in March the ground ſhould be again ploughed, and when the ſurface is made even, marked with rows from ſouth-eaſt to north-weſt, at the diſtance of ten feet from each other, which rows ſhould be again croſſed at five or ſix feet diſtance; and thus the places in which each plant ſhould be ſet will be marked, ſo that the vines will be ten feet row from row, and about five or ſix feet aſunder in the rows.

The next object is the choice of the proper grapes, which ſhould not be thoſe which are the moſt palatable for eating. The moſt likely to ſucceed in England is the Auvernat, or true Burgundy grape, cuttings of which ſhould be provided and planted about the beginning of April. See VINE.

The ground between the rows may be planted with any kind of eſculent plants, which do not grow tall, and this huſbandry continued three or four years, till the vines come to bearing; after which no crop ſhould be put between them in ſummer; but when the grapes are gathered, there may be a crop of coleworts, for ſpring uſe, planted between the rows, which, by occaſioning the ſoil to be ſtirred, will be ſerviceable to the vines: in England they will require no watering, as there is no danger of their miſcarrying by drought.

When the cuttings begin to ſhoot, each of them ſhould be faſtened to a ſtick about three feet long; the lateral ſhoots being diſplaced, and the ground between the vines always kept clean.

At Michaelmas, when the vines have done ſhooting, they ſhould be pruned, and the earth drawn up in a hill about each plant to guard them from the froſt. At the beginning of the following March, the ground between the vines ſhould be well dug, in order to looſen and clean it, and the earth laid up again in a hill about each plant, without burying the two young eyes of the former year's ſhoot. At the beginning of May, when the vines are ſhooting, there ſhould be two ſtakes fixed down to the ſide of each plant, taller and ſtronger than thoſe of the former year, to which the two ſhoots, if ſo many are produced ſhould be faſtened, and the lateral ſhoots diſplaced. In the autumn following they ſhould be pruned, cutting down thoſe that have two ſhoots of equal vigour to three eyes each; and thoſe with one ſtrong ſhoot to two eyes. In the next ſpring, about the beginning of March, the ground between the vines ſhould be dug, and two ſtakes placed by thoſe that have two ſhoots, ſo that the ſhoots may be drawn out on each ſide to the ſtakes of an angle of about 45° with the ſtem. In May, when the vines ſhoot, all the weak dangling ſhoots ſhould be rubbed off, and thoſe which are produced from ſtrong eyes faſtened to the ſtakes. This management ſhould be repeated at leaſt every three weeks, from the beginning of May to the end of July, and the ſoil conſtantly kept clean.

In the autumn of the third year from planting, the vines ſhould be pruned in the following manner: if the two ſhoots of the former year, which were ſhortened to three eyes, have each of them produced two ſtrong branches in the laſt ſummer, then the uppermoſt ſhoot on each branch ſhould be ſhortened down to three good eyes, without including the lower, which is ſituated juſt above the former year's wood, and the lower ſhoots ſhould be ſhortened down to two good eyes each; theſe being deſigned to produce vigorous ſhoots for the ſucceeding year, and the former for bearing fruit; but when the vines are weak, and have not produced more than two or three ſhoots the laſt ſeaſon, there ſhould be but one of them left with three eyes for bearing; the other muſt be ſhortened down to two, or if weak, to one good eye. In the ſucceeding March the ground between the vines ſhould be well dug, and the horizontal roots produced on or near the ſurface of the ground pruned off cloſe to the places where they were produced; and on each ſide of every vine a ſtake ſhould be put in at about ſixteen inches diſtance from the root, to which the two branches, which were pruned to three eyes for bearing, ſhould be faſtened obliquely; and another taller ſtake ſhould be placed down near the foot of the vine, to which the two ſhoots pruned down to two eyes ſhould be faſtened, provided they are long enough; but if not, when their eyes begin to ſhoot, theſe muſt be trained upright to the ſtakes, in order to prevent their trailing on the ground, hanging over the fruit branches, or being broken by the wind. In May all weak lateral branches ſhould be rubbed off as they are produced; and thoſe ſhoots, which ſhew fruit, muſt be faſtened with baſs to the ſtakes to prevent their being broken, till they are extended to three joints beyond the fruit, when they ſhould be ſtopped; but the ſhoots, which are deſigned for bearing the following ſeaſon, ſhould be trained upright to the middle ſtake, by which method the fruit branches will not ſhade theſe middle ſhoots, nor will theſe middle ſhoots ſhade the fruit. This proceſs ſhould be repeated every fortnight or three weeks, from the beginning of May to the middle of July; the dangling ſhoots being conſtantly diſplaced, and the leaves ſuffered to remain, in order to ſcreen the fruit.

When the fruit is ripe, if the ſtalks of the bunches are cut half through a fortnight before they are gathered, it will cauſe the juice to be much better, becauſe ſo great a quantity of nouriſhment will not enter the fruit, and the watery particles will have time to evaporate, and the juice be better digeſted. And when the fruit is cut, if it be hung up in a dry room upon ſtrings, ſo as not to touch one the other, for a month before it is preſſed, the watery juices will evaporate, and the wine will thus acquire additional ſtrength. The wine produced by *vineyards* that are young will not be ſo good as it will be after they have been planted ten or twelve years, and it will be conſtantly improving till they are fifty years old. When a *vineyard* is in a bearing ſtate, there ſhould not be too many branches left upon a root, nor ſhould theſe be too long: the number of branches generally left by the Italians upon a ſtrong vine is four; two of the ſtrongeſt having four eyes, and the two weaker being ſhortened to two eyes each. The ground between the vines ſhould be kept clean, carefully dug every ſpring, and manured every third year with ſuch manure as beſt ſuits the nature of the ſoil. The digging and manuring ſhould be performed about the beginning of March, when the ſuperficial or dry roots, as they are called, ſhould be cut off: the ſtakes ſhould be placed down, one on each ſide of the vines, and about ſixteen inches from their ſtems, to which the longeſt bearing branches ſhould be faſtened, and one ſtake cloſe to the ſtem, to which the two ſhorter branches ſhould be trained, to furniſh wood for the ſucceeding year. In the ſummer, all weak dangling ſhoots ſhould be rubbed off, and the good ones trained regularly to the ſtakes; thoſe of them that have fruit ſtopped in June, about three joints beyond the bunches, and the upright ſhoots, which are deſigned for bearing the following year, muſt not be ſtopped till the middle of July, when they may be left about five feet long. All the ſummer dreſſing ſhould be performed with the thumb and finger, and not with knives; becauſe the wounds made by inſtruments in ſummer do not heal ſo ſoon as when they are ſtopped by gently nipping the leading bud; which if it be done before the ſhoot is become woody, may be effected with great eaſe. Miller's Gard. Dict.

VINNET, in our *Statutes*, is uſed for a flower or border which printers uſe to ornament printed leaves of books. See VIGNETTE.

VINOUS, *vinoſus*, ſomething that relates to WINE; or that has the taſte and ſmell thereof.

All vegetables, by a due treatment, afford a *vinous* liquor; as corn, pulſe, nuts, apples, grapes, &c.

A ſecond fermentation, duly managed, turns any *vinous* liquor into an acetous one.

The proper character and effect of fermentation are, to produce either a *vinous*, or an acetous quality in the body fermented.

Some of our countrymen, bound on a voyage to the Eaſt Indies, having filled ſeveral caſks with Thames water, to carry along with them, obſerved an inteſtine motion in it when they came to the equator; and found it afterwards turned into a kind of *vinous* liquor, capable of affording an inflammable ſpirit by diſtillation. See PUTREFACTION *of water*.

VINTAGE, the crop of wine, or what is got from the vines each ſeaſon.

The word is alſo uſed for the time or ſeaſon of gathering, or preſſing the grapes.

In France, a decree or ordinance of the proper judge, and a ſolemn publication thereof, are required, before the *vintage* can be begun.

VINUM, a liquor, or drink, popularly called WINE.

VINUM, in *Medicine*, *vinum medicatum*, is particularly applied to ſeveral medicated wines, i. e. medicinal preparations, whereof wine is the baſis. Some of theſe are denominated from the ingredients uſed in them; ſome from the intentions with which they are preſcribed; and ſome from their qualities, &c. Such are the

VINUM *abſynthites*, or *wormwood wine*; made of the great or little *abſynthium*, by taking the apices, or tops, with the flowers, putting them in a ſacculus, or bag, and ſuſpending it in the middle of a veſſel of wine; which, fermenting, extracts the taſte, ſmell, and virtues, of the wormwood. See ABSINTHITES.

VINUM *aloeticum alkalinum*, a form of medicine in the late London Diſpenſatory, intended to ſtand in the place of Helmont's elixir proprietatis. It is prepared in this manner: take of bay fixed alkaline ſalt, eight ounces; aloes, myrrh and ſaffron, of each an ounce; purified ſal ammoniac, ſix drams; white wine, a quart; infuſe them together without heat for a week, or longer, and then filtre the wine through paper for uſe.

VINUM *amarum*, *bitter wine*, is an infuſion of certain bitter ſtomachic herbs, as gentian-root, juniper-berries, tops of centaury, orange and lemon-peel, in wine. This wine may be made by infuſing for a week, without heat, gentian-root, and yellow rind of lemon-peel, of each one ounce, and two drams of long-pepper, in two pints of mountain wine, and ſtraining out the wine for uſe. For other preparations, ſee GENTIAN-*root*.

In complaints ariſing from weakneſs of the ſtomach, or indigeſtion, a glaſs of this wine may be taken an hour before dinner and ſupper.

VINUM *anthelminticum*, *anthelminthic wine*, may be made by infuſing, without heat, half an ounce of rhubarb, and an ounce of worm-ſeed, bruiſed, in two pints of red Port wine, for a few days, and ſtraining off the wine.

As the ſtomachs of perſons afflicted with worms are always debilitated, red wine alone will often prove ſerviceable: it muſt, however, have ſtill better effects when joined with bitter and purgative ingredients, as in the above form. A glaſs of this wine may be taken twice or thrice a day.

VINUM *antimoniale*, *antimonial wine*, is made by digeſting, without heat, half an ounce of glaſs of antimony, reduced to a fine powder, in eight ounces of Liſbon wine, for three or four days, occaſionally ſhaking the bottle, and afterwards filtering the wine through paper. The doſe of this wine varies according to the intention. As an alterative and diaphoretic, it may be taken from ten to fifty or ſixty drops. In a larger doſe it generally proves cathartic, or excites vomiting.

VINUM *aromaticum*, made by infuſing aromatics, or ſpices in new wine, or muſt.

VINUM *benedictum*, the *bleſſed wine*, is made of crocus metallorum and mars, infuſed in wine. This was formerly a celebrated emetic, but is now almoſt out of uſe, on account of its roughneſs.

VINUM *chalybeatum*, *chalybeate wine*, is thus prepared: take filings of iron, four ounces; cinnamon and mace, of each half an ounce; of Rheniſh wine, two quarts; infuſe a month without heat, often ſhaking the veſſel; then filtre it off for uſe. Some ſuperadd a reddiſh colour, by uſing a ſmall quantity of cochineal. This is the preſcription of the New London Diſpenſatory, and is vaſtly preferable to that of the former, where only ſaffron was ordered. Fine iron wire, cut in pieces, is more eligible than the filings, as we may always depend on the wire being pure iron; and as it expoſes a larger ſurface to the fluid, it is more eaſily acted upon.

This wine is an excellent ſtomachic and aperient; it may be drank in the quantity of a common ſpoonful, or even of a moderate glaſs, once or twice a day, or mixed in apozems of the aperient vegetables.

In obſtructions of the menſes, this preparation of iron may be taken in the doſe of half a wine-glaſs twice or thrice a day. Dr. Buchan ſays, that the medicine would probably be as good if made with Liſbon wine, ſharpened with half an ounce of the cream of tartar, or a ſmall quantity of the ſpirit of vitriol.

VINUM *cydonites*, *quince-wine*; made of ſlices of that fruit, ſteeped in muſt, or new wine.

VINUM *emeticum*, *emetic wine*, is wine wherein the glaſs or regulus of antimony, or crocus metallorum, have been ſteeped. See EMETIC.

This only takes a certain degree of efficacy from the matters; nor is it found any ſtronger at three months end, than at the end of eight days. It purges both upwards and downwards.

VINUM *enulatum*, *elecampane wine*, is an infuſion of the root of that plant, with ſugar and currants, in white port. It cleanſes the viſcera, prevents diſorders, and obſtructions of the lungs, and is good in aſthmatic caſes, cachexies, &c. See ELECAMPANE.

VINUM *Hippocraticum*. See HIPPOCRAS.

VINUM *ipecacuanhæ*. See IPECACUANHA.

VINUM *marinum*, *ſea-wine*, is made by caſting ſea-water on the grapes in the vat.

VINUM *millepedum*. See MILLEPEDES.

VINUM *pectorale*, *pectoral wine*, is prepared by liquorice, ſaffron, coriander ſeeds, caraway, aniſe, ſalt of tartar, penny-royal, and hyſſop leaves, digeſted with Canary wine, and ſtrained. It is a good expectorant, helping to deterge and cleanſe the lungs, &c.

VINUM *picatum*, *pitched wine*, is made of pitch infuſed in muſt.

VINUM *roſatum*, *roſe-wine*, is made by ſteeping roſes for three months in wine.

VINUM *ſcilliticum*. See SQUILLS.

VINUM *ſtomachicum*, *ſtomachic wine*, is prepared by infuſing an ounce of Peruvian bark, groſly powdered, cardamon-ſeeds, and Orange-peel, bruiſed, of each two drams, in a bottle of white port or Liſbon wine for five or ſix days, and ſtraining off the wine. This wine is not only of ſervice in laxity and debility of the ſtomach and inteſtines, but may alſo be taken as a preventive, by perſons liable to the intermittent fever, or who reſide in places where this diſeaſe prevails. It will be of uſe to thoſe who recover ſlowly after fevers of any kind, as it aſſiſts digeſtion, and helps to reſtore the tone and vigour of the ſyſtem. A glaſs of it may be taken two or three times a day.

VINUM *ſtrobilites* denotes pine-apple wine.

VINUM *e tartaro antimoniali*, is made by diſſolving tartar emetic in white wine, in the proportion of twenty-four grains to a pound.

VINUM *viperinum*. See VIPER-*wine*.

VINUM *eſſatum*, in *Chemiſtry*. See ESSENCE *of wine*.

VINUM *extemporaneum*, a name given by Dr. Shaw and others, to a ſort of extemporaneous vinous liquor, made without fermentation, from the melaſſes ſpirit, lemons, water, and ſugar, in the following manner. Some good ſound lemons are to be cut into ſlices, rind and all, and put into a quantity of pure and fine melaſſes ſpirit; when they have ſtood in infuſion three or four days, the liquor is to be ſtrained clear off, and filtered; and having before prepared a very thin ſyrup of the fineſt ſugar diſſolved in ſpring-water, the two liquors are to be mixed together. The proportions of this mixture can only be hit by repeated trials, but when once found, it will be eaſy to continue them; and a vinous liquor will thus be prepared not inferior to many foreign wines.

VIOL, *viola*, a muſical inſtrument, of the ſame form with the *violin*, but larger, and having ſix ſtrings; and ſtruck, like that, with a bow.

The *viol* played with a bow was very early in favour with the inhabitants of France, and is very different from the *vielle*, whoſe tones are produced by the friction of a wheel, which performs the part of a bow.

There are *viols* of divers kinds. The firſt, and principal, among us, is the BASS-*viol*, called by the Italians *viola di gamba*, or the *leg-viol*; becauſe held between the legs. It is the largeſt of all, and is mounted with ſix ſtrings. Its neck is divided in half-notes, by ſeven frets fixed thereon. Its ſound is very deep, ſoft, and agreeable. The tablature, or muſic for the *baſs-viol*, is laid down on ſix lines, or rules.

What the Italians call *alto viola*, is the counter-tenor of this; and their *tenore viola*, the tenor. They ſometimes call it, ſimply, the *viol*: ſome authors will have it the *lyra*, others the *cithara*, others the *chelys*, and others the *teſtudo*, of the ancients.

2. The *love viol*, *viola d'amore*, which is a kind of triple *viol*, or violin; having ſix braſs or ſteel ſtrings, like thoſe of the harpſichord. This yields a kind of ſilver ſound which has ſomething in it very agreeable.

3. A *large viol*, with forty-four ſtrings, called, by the Italians, *viola di bardone*; but little known among us.

4. *Viola baſtarda* or *baſtard viol*, of the Italians; not uſed among us. Broſſard takes it to be a kind of *baſe-viol*, mounted with ſix or ſeven ſtrings, and tuned as the common one.

5. What the Italians call *viola di braccio*, arm *viol*; or ſimply, *braccio*, *arm*; is an inſtrument anſwering to our counter-tenor, treble, and fifth violin.

6. Their *viola prima*, or *firſt viol*, is really the counter-tenor violin; at leaſt, they commonly uſe the cliff *c ſol ut* on the firſt line, to denote the piece intended for this inſtrument.

7. *Viola ſecunda*, is much the ſame with our tenor violin; having the cliff of *c ſol ut* on the ſecond line.

8. *Viola terza*, is nearly our fifth violin; the cliff *c ſol ut* on the third line.

9. *Viola quarta*, or *fourth viol*, is not known in England, or France; though we frequently find it mentioned in the Italian compoſitions; the cliff on the fourth line.

Laſtly, their *violetta*, or little *viol*, is, in reality, our triple *viol*; though ſtrangers frequently confound the term with what we have ſaid of the *viola prima*, *ſecunda*, *terza*, &c.

Viol is alſo a term uſed among mariners, when a hawſer, or ſtrand-rope, is bound faſt with nippers to the cable, and brought to the jeer-capſtan, for the better weighing of the anchor, where the main-capſtan proves inſufficient.

VIOLA, in *Botany*. See Violet.

Viola, in *Ichthyography*, a name by which ſome authors have called the smelt.

Viola *ſerotina*, the *late violet*, a name given by the ancients to a garden-flower, not properly of the *violet* kind, but to which we, as well as they, have connected the name *violet*, though with a diſtinctive epithet, we call it *viola matronalis*, or *dame's* violet.

Pliny is very expreſs in this diſtinction, but is not ſufficiently attended to in it; and by this means is miſunderſtood in ſome other parts of his works, where he alludes to this flower in his deſcription of the colour called by the Romans *conchylius*, or *conchyliaceus color*; he ſays that the deepeſt degree of it was that of the flower of the *viola ſerotina*. The commentators on his work have generally explained this into his ſaying, that the deepeſt colour of this name was a blue purple, like that of the *violet*; but he only means that it is of a deeper red than the colour of the mallow flower, and with a proportionate mixture of purple, as there is in that flower.

VIOLARIS *lapis*, in *Natural Hiſtory*, a foſſile body, called by the Germans *violſtein*, and by many authors *lapis odore violarum*, from its having a ſweet ſmell when freſh broken, which has been ſuppoſed to reſemble that of the *violet*.

The Germans have many ſtones which have more or leſs of a ſweet ſmell when freſh broken, as they have many which ſtink very ſtrangely; the latter of theſe they call all by the common name of *ſwine-ſtone*, and the former, all by that of *violet-ſtone*. The ſubſtance, however, which poſſeſſes this quality in the higheſt degree of all others, and is therefore moſt proper to be called diſtinctly by this name, is a ſpecies of talc, of the genus of the bractearia, called by Dr. Hill *bractearium niveum lucidiſſimum bracteis undulatis*, or the ſnow-white ſhining bractearium, with undulated ſcales. This is found in maſſes of an extremely rude and irregular ſtructure, but very compact and firm, uſually of a roundiſh, or oblong figure: theſe are of various ſizes, from an inch or two, to a foot in diameter, and are compoſed of almoſt an infinite number of thin, extremely beautiful, and ſnow-white plates, which are all broad, thin, and flaky, and of various ſizes, and perfectly irregular in ſhape and figure, and are naturally waved, bent, and curled: its ſmell, when broken, is not like that of any of the known perfumes, but is a ſort of mixed one, reſembling that of roſes and *violets* together: it is very heavy, and will neither give fire with ſteel, nor ferment with acid menſtruums. It is common on the ſhores of rivers in Italy, and in the mountains in Germany. Hill's Hiſt. of Foſſ. p. 83.

VIOLATION, the act of *violating*, i. e. forcing a woman, or committing a rape upon her.

Amnon, David's ſon, *violated* his ſiſter who was avenged by Abſalom: Tereus *violated* his ſiſter-in-law Philomela. To *violate* the queen, the king's eldeſt daughter, or the princeſs of Wales, is high treaſon.

Violation is alſo uſed, in a moral ſenſe, for a breach or infringement of a law, ordinance, or the like.

Thus, we ſay, a *violation* of the law of nature, of the law of nations, of a treaty of peace, of one's oath, &c.

Violation is alſo uſed for a profanation. In which ſenſe we ſay, to *violate* a church, &c.

VIOLENT, in the *Schools*, a thing done by force. In which ſenſe it ſtands oppoſed to spontaneous.

A thing is ſaid to be *violent*, when affected by ſome external principle; the body that undergoes it contributing nothing thereto, but ſtruggling againſt it.

The body, in ſuch caſe, is ſaid to *ſtruggle*, becauſe whatever is *violent*, diſcompoſes and diſtracts a thing from its natural conſtitution, and tends to deſtroy it.

The ſchoolmen all allow, that man, as being endued with reaſon, is capable of ſuffering ſuch *violence*; but brute and inanimate bodies are not: *in brutum*, &c. violentum *non cadet*.

Violent *motion*. See Motion.

VIOLET, *viola*, in *Botany*, a genus of the *ſyngeneſia monogamia* claſs. Its characters are theſe: the flower has a ſhort, permanent empalement of five leaves, which are differently ranged in the different ſpecies; the flower is of the ringent kind, and is compoſed of five unequal petals; the upper is broad, obtuſe, and indented at the point, having a horned nectarium at the baſe; the two ſide petals are oppoſite; the two lower are larger and reflexed; it has five ſmall ſtamina, which are annexed as appendages to the entrance of the nectarium, terminated by obtuſe ſummits, which are ſometimes connected, and a roundiſh germen, ſupporting a ſlender ſtyle, which ſtands out beyond the ſummits, and is crowned by an oblique ſtigma; the germen afterwards turns to an oval three-cornered capſule with one cell, opening with three valves, including many oval ſeeds. Miller reckons eleven, and Linnæus twenty-five ſpecies.

The common *violets* are eaſily propagated, by parting of their roots: this may be done at two ſeaſons. The firſt or moſt common ſeaſon for the removing and parting of theſe roots, is at Michaelmas, that the young plants may be well rooted before winter: this is generally practiſed where the plants are put on the borders of wood-walks in large plantations; but in the gardens where they are cultivated for their flowers, the gardeners tranſplant and part their plants, ſoon after the flowering ſeaſon is over. Theſe will have all the remaining ſummer to grow and get ſtrength, ſo will produce a greater quantity of flowers the following ſpring than thoſe which are removed in autumn; but this is not to be practiſed where they cannot be ſupplied with water till they have taken new root, unleſs in moiſt ſeaſons.

Violets may alſo be propagated by ſeeds, which ſhould be ſown ſoon after they are ripe, or about the end of Auguſt; and, in ſpring, tranſplanted to ſhady borders to grow till autumn, and then they may be planted where they are to remain; but the double-flowering *violets* do not produce ſeeds. Miller.

The common *violet*, or *viola odorata* of Linnæus, is perennial, grows wild in hedges and ſhady places, and flowers in March. The flowers of the hairy, ſcentleſs March *violets*, are often ſubſtituted for the other in our markets; but this ſort may be eaſily diſtinguiſhed; the herb, by its having ſtalks, which trail on the ground, and bear both leaves and flowers, and by the young leaves being hairy; the flower, by the three lower petals being ſpotted with white, and by their want of ſmell. The officinal *violet* flowers have a very agreeable ſmell, and a week, mucilaginous, bitteriſh taſte. Taken to the quantity of a dram or two, they are ſaid to be gently laxative or purgative; and the ſeeds, which have more taſte than the flowers, to be more purgative, and ſometimes emetic. The flowers give out to water both their virtue and their fine colour, but ſcarcely impart any tincture to rectified ſpirit, though they impregnate the ſpirit with their fine flavour, and probably alſo with their purgative quality. An infuſion of two pounds of the freſh flowers in five or eight pints of boiling water, paſſed through a fine linen cloth without preſſure, is made in the ſhops into a ſyrup, which proves an agreeable laxative for children. Both the flowers and the ſyrup loſe their colour in being long kept; acids change them inſtantly into a red; alkalis, and ſundry combinations of acids with earthy and metallic bodies, to a green; perfect neutral ſalts, or thoſe compounded of an acid and alkali, make no alteration.

That ſpecies of *violet*, called panſies, or heart's *eaſe*, or *viola tricolor* of Linnæus, has lately been recommended by Dr. Strack, a German phyſician, as a ſpecific in the cruſta lactea of children. He directs a handful of the freſh, or half a dram of the dried leaves, to be boiled in half a pint of milk, which is to be ſtrained for uſe. This doſe is repeated morning and evening. He obſerves, that when it has been adminſtered eight day, the eruption uſually increaſes conſiderably, and the patient's urine acquires a ſmell like that of cats. When the medicine has been taken a fortnight, the ſcurf begins to fall off in large ſcales, leaving the ſkin clean. The uſe of the remedy is to be perſiſted in, till the ſkin has reſumed the natural appearance, and the urine ceaſes to have any particular ſmell. Lewis.

VIOLET, *bulbous*, a name ſometimes given to the SNOW*drop*, a plant which Linnæus makes a diſtinct genus under the name *galanthus*; but which Tournefort comprehends among the *narciſſo-leucoiums*.

VIOLET, *calathian*, the name of a ſpecies of GENTIAN.

VIOLET, *corn*, a name ſometimes given to the CAMPANULA, or bell-flower.

VIOLET, *dame's*, ROCKET, or *queen's* GILLIFLOWER, *heſperis*, in *Botany*, a genus of the *tetradynamia ſiliquoſa* claſs. Its characters are theſe; the flower is compoſed of four oblong petals, in form of a croſs, whoſe baſe or tails are narrow, and ſituated in a four-leaved empalement, which falls away; it has ſix awl-ſhaped ſtamina as long as the tube of the flower, two of which are much ſhorter than the other, terminated by narrow, erect ſummits, reflexed at their points; it has a honey gland ſituated between the two ſhort ſtamina, and a four-cornered germen of the length of the ſtamina, but no ſtyle, with a ſtigma, ſitting on the germen, divided into two parts, which join at their points; the germen becomes a plain, long, compreſſed pod with two cells, encloſing many oval compreſſed ſeeds. Linnæus enumerates ſeven, and Miller ten ſpecies.

This plant is an antiſcorbutic and diaphoretic, and is very ſerviceable in the aſthma, coughs, and convulſions. The outward uſe of it is recommended in inflammations, cancers, gangrenes, ſphacelus, and contagious diſeaſes. Bruiſed, it very potently reſiſts putrefactions; and applied to peſtilential buboes in the arm-pits, it ripens and ſoftens them. James from Boerhaave.

VIOLET, *dog's tooth*, the name by which ſome call the *dens canis* of botanical writers. See DOG'S *tooth*.

VIOLET, *water, hottonia*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower has one petal, with a tube of the length of the one-leaved empalement, cut above into five oblong, oval ſegments, ſpreading open, and indented at their extremity; it has five ſhort awl-ſhaped ſtamina, ſtanding on the tube of the petal, terminated by oblong ſummits; in the centre is ſituated a globular germen, ending in a point, ſupporting a ſhort ſlender ſtyle, crowned by a globular ſtigma; the germen becomes a capſule of the ſame form, with one cell, filled with globular ſeeds, ſitting upon the empalement. We know but one ſpecies, which grows naturally in ſtanding waters in many parts of England. Linnæus enumerates two ſpecies.

VIOLIN, *violino, fiddle*, a muſical inſtrument, mounted with four ſtrings, or guts; and ſtruck, or played, with a bow.

It has long been a diſpute among the learned, whether the *violin*, or any inſtrument of that kind, as now played with a bow, was known to the ancients. The little figure of Apollo, playing on a kind of *violin*, with ſomething like a bow, in the grand duke's tribuna at Florence, which Mr. Addiſon and others ſuppoſed to be antique, has been proved to be modern by the abbe Winckelmann and Mr. Mings. So that as this was the only piece of ſculpture reputed ancient, in which any thing like a bow could be found, nothing more remains to be diſcuſſed relative to that point. With reſpect to an inſtrument with a double neck, beſides that on the broken obeliſk at Rome, and one from a ſepulchral grotto in the ancient city of Tarquinia, there is an antique painting in the collection of William Locke, eſq. which conſiſts of a ſingle figure, ſuppoſed to be a muſe, with an inſtrument nearly in the form of a modern *violin*, but the neck is much longer, and neither bow nor plectrum are diſcoverable near it. This, as Dr. Burney apprehends, may have been a CHELYS, which was a ſpecies of GUITAR, either thrummed by the fingers, or twanged with a quill. The ancients had, indeed, inſtead of a BOW, the PLECTRUM; but in all the repreſentations which painting and ſculpture have preſerved of this implement, it appears too clumſy to produce from the ſtrings tones that had either the ſweetneſs or brilliancy of ſuch as are drawn from them by means of the bow or quill. Dr. Burney ſuppoſes, though it is repreſented ſo maſſive, that it was a quill, or piece of ivory in imitation of one, rather than a ſtick or blunt piece of wood or ivory; and, indeed, Virgil tells us, Æn. vi. 647, that it was made of ivory. Burney's Hiſt. Muſ. vol. i. p. 515.

The *violin* conſiſts, like moſt other inſtruments, of three parts; the *neck*, the *table*, and the *ſoundboard*.

At the ſide are two apertures, and ſometimes a third towards the top, ſhaped like a heart.

Its bridge, which is below the apertures, bears up the ſtrings, which are faſtened to the two extremes of the inſtrument; at one of them by a ſcrew, which ſtretches or looſens them at pleaſure.

The ſtyle and ſound of the *violin* are the gayeſt and moſt ſprightly of all other inſtruments; and hence it is, of all inſtruments, the fitteſt for dancing. Yet there are ways of touching it, which render it grave, ſoft, languiſhing, and fit for church or chamber muſic.

It generally makes the treble, or higheſt parts in concerts. Its harmony is from fifth to fifth. Its play is compoſed of baſs, counter-tenor, tenor, and treble; to which may be added, a fifth part: each part has four fifths, which riſe to a greater ſeventeenth.

In compoſitions of muſic, *violin* is expreſſed by V: two V V denote two *violins*.

The word *violin*, alone, ſtands for *treble violin*: when the Italians prefix *alto, tenore*, or *baſſo*, it then expreſſes the counter-tenor, tenor, or baſs-*violin*.

In compoſitions, where there are two, three, or more different *violins*, they make uſe of *primo, ſecundo, terzo*, or of the characters I° II° III°, or 1° 2° 3°, &c. to denote the difference.

The *violin* has only four ſtrings, each of a different thickneſs, the ſmalleſt whereof makes the *e ſi mi* of the higheſt octave of the organ; the ſecond, a fifth below the firſt, makes the *a mi la*; the third, a fifth below the ſecond, is *d la re*; laſtly, the fourth, a fifth below the third, is *ge re ſol*. Moſt nations, ordinarily, uſe the cliff *ge re ſol* on the ſecond line, to denote the muſic for the *violin*; only, in France, they uſe the ſame cliff as the firſt line at bottom: the firſt of theſe methods is beſt, where the ſong goes very low; the ſecond where it goes very high.

Merſennus ſpeaks of the tenor and contratenor *violin*, which, he ſays, differ only in magnitude from the treble *violin*. But we have at preſent no ſuch inſtrument in uſe as the contratenor *violin*; the part proper to it being with eaſe performed on the *violin*; and accordingly in concertos, overtures, and other inſtrumental compoſitions of many parts, the ſecond *violin* is in reality the counter-tenor part. It is much to be doubted, ſays ſir John Hawkins (Hiſt. Muſ. vol. iv. p. 115.) whether the counter-tenor *violin* ever came into England. Anth. Wood, ſpeaking of the band of Charles II. makes no mention of the contratenor *violin*. Before the reſtoration of Charles II. ſays he, and eſpecially after, viols begun to be out of faſhion, and only *violins* uſed, as treble *violin*, tenor and baſs *violin*; and the king, according to the French mode, would have twenty-four *violins* playing before him while he was at meals, as being more airy and briſk than viols.

A ſmall pocket *violin* is called a KIT.

The VIOLONCELLO of the Italians is properly our fifth *violin*, which is a little baſs *violin*, half the ſize of the common baſs *violin*, and its ſtrings juſt half as thick, and half as long; which renders the ſound juſt an octave higher than the ſame.

The VIOLONE is a double baſs, almoſt twice as big as the common baſs *violin*, and the ſtrings bigger and longer, in proportion; and conſequently, its ſound an octave lower than that of our baſs *violin*; which has a noble effect in great concertos: but this depends upon the number of ſtrings, and the manner of tuning them; ſome performers uſing four ſtrings, and others three; and in the tuning of theſe there is a conſiderable difference. The true uſe of the *violone* is to ſuſtain the harmony, and in this reſpect it has a noble effect: divided baſſes are improper for it, the ſtrings not anſwering immediately to the percuſſion of the bow: theſe can only be executed with a good effect on the VIOLONCELLO, the ſounds of which are more articulate and diſtinct.

VIPER, *vipera*, in *Natural Hiſtory*, a kind of SERPENT, the COLUBER *berus* of Linnæus, famed not only for the exceeding venomouſneſs of its bite, which is one of the moſt dangerous poiſons in the animal kingdom, but alſo for the great uſefulneſs of its fleſh in medicine; whence *vipers* come to make a conſiderable article in the materia medica.

Its ſize is uſually two feet in length; though Mr. Pennant ſays he once ſaw a female (which is nearly a third larger than the male) which was almoſt three feet long; the ground colour of the *viper* is a dirty yellow; that of the female deeper; its back is marked through the whole length with a ſeries of rhomboidal black ſpots, touching each other at the points; the ſides with triangular ones; the belly entirely black, and covered with long black ſcales, placed tranſverſely; the tail does not run to more than a fifth part of the length of the body beyond the anus, and is terminated in a very ſharp point. There is a variety; viz. the *coluber preſter* of Linnæus, and called by Petiver the *vipera Anglica nigricans*, which is wholly black; but even in this the rhomboidal marks are very conſpicuous, being of a deeper and more gloſſy hue than the reſt. The head of the *viper* is inflated, which diſtinguiſhes it from the common ſnake; the ſnout not unlike that of a hog; the tongue is forked; the teeth, which are ſixteen in each jaw, ſmall and immoveable; beſides the four canine teeth, which are placed two on each ſide the upper jaw, and are the inſtruments of poiſon; theſe are long, crooked, and moveable, and can be raiſed and depreſſed at pleaſure; theſe are hollow from near the point to the baſe, near which is a gland that ſecretes, prepares, and lodges the poiſon; and the ſame action that gives the wound, forces from this gland, through the tooth, the fatal juice into it. The *viper* has only one row of teeth; whereas many others of the ſerpent kind have two; its body is not at all fetid: whereas the inner parts of the bodies of other ſerpents are intolerably ſo; it creeps but ſlowly, and never leaps like other ſerpents; though it is nimble enough to bite when provoked.

Vipers are found in many parts of this iſland; but the dry, ſtony, and, in particular, the chalky countries, abound with them. They are ſaid to ſwarm in many of the Hebrides.

Wormius ſays, the *viper* feeds on herbs; but this aſſuredly is not its only diet, ſince there are frequently found in its ſtomach, frogs, toads, lizards, mice, beetles, moles, ſmall birds, and the like; many of which are often found whole; and it is ſurpriſing to conceive how they were ſwallowed, ſince they are often three times as thick as the whole neck of the ſerpent, which muſt, therefore, be capable of a very extraordinary diſtenſion. The *viper* is capable of ſupporting very long abſtinence; ſome of them have been kept in a box ſix months without food, and yet with unabated vivacity. They feed only for a ſmall part of the year, but never during their confinement, except, as it is ſaid, females with young; for if mice, their favourite diet, ſhould at that time be thrown into their box, though they will kill, they will not eat them. The poiſon decreaſes in proportion to the duration of their confinement; and the virtues of its fleſh are at the ſame time conſiderably leſſened. Theſe animals, when at liberty, remain torpid through the winter; but when confined have never been obſerved to take their annual repoſe.

The male and female have the organs of generation very perfect; the female *viper* brings forth her young living; whereas all other ſerpents lay eggs, and hatch them; on which account the *viper* is ranked among the viviparous animals. See Philoſ. Tranſ. N° 84. p. 138.

Though *vipers* are viviparous, they are of that claſs of animals of whoſe generation Ariſtotle (De Gen. Anim. lib. iii. cap. 2.) ſays, that they conceive a perfect egg within, but bring forth their young alive.

The ſpecies is far from being prolific, more than eleven eggs not being found in one *viper*, which are, as it were, chained together, and each about the ſize of a blackbird's egg. They copulate in May, and are ſuppoſed to be about three months before they bring forth. It is ſaid, that the young of the *viper*, when terrified, will run down the throat of the parent, and ſeek ſhelter in its belly, in the ſame manner as the young of the OPOSSUM retire into the ventral pouch of the old one; whence ſome have erroneouſly imagined, that the *viper* devours its own young.

The method of catching *vipers* is by putting a cleft-ſtick on or near their head, after which they are ſeized by the tail, and put into a bag. Ray and Pennant.

Dr. Mead obſerves, that the ancients eſteemed the *viper* ſacred; and that the kings of the Eaſt Indies cauſed cottages to be built for their entertainment, and their killers to be puniſhed with death. On medals, the *viper* is frequently repreſented as a ſymbol of divine power; and, as ſuch, given by way of attribute to the ancient phyſicians.

The ſtory of the *rattle*-SNAKE's charming its prey has been laughed at by many, and by others the effects of the animal's fear have been ſuppoſed the reſult of a previous bite; but we have a great deal of reaſon to believe, that this ſort of faſcination is juſt what it is related to be, from an experiment mentioned in the Philoſophical Tranſactions, of a like thing in regard to a *viper*. It is well known that no *viper* will feed while in confinement, except a female which is with young, but that ſuch a one will. A *viper*-catcher, who had more than ſixty living *vipers* in a cheſt, put a living mouſe in among them; there happened to be one female big with young among theſe, none of the others at all regarded the mouſe, but ſhe raiſed up her head a little, and looked furiouſly at it. The mouſe was terrified, and ſtood ſtill for a conſiderable time, though the *viper* continued rolled up in a ſpiral, only raiſing up its head and looking at it, and vibrating its tongue; the mouſe at length recovered of its fright, and began to move, but without running away, only walking in a terrified manner round and round the *viper*, and often ſqueaking; at length ſhe came before the head of the creature, which was ſtill raiſed, and the mouth open. The mouſe, after ſome time, went up to the creature, and crept into its mouth, where ſhe was gradually ſwallowed without the *viper*'s altering its poſture.

By Mr. Boyle's experiments made upon *vipers in vacuo*, it appeared, that on the withdrawing of the air from the veſſel where the *viper* was put, ſhe began to ſwell, and after ſome time, ſhe opened her mouth very wide, and frequently; but, on continuing two hours and a half in the receiver, ſhe did not appear to be quite dead. The gaping of the jaws was attended with a loſs of the ſwelling, obſerved at firſt in her whole body; but after every time cloſing them ſhe ſwelled again, and thus became lank and plump reciprocally many times in an hour. During the firſt moments this creature crawled about, as if in ſearch of air, and afterwards foamed at the mouth.

The neck and body continued ſwelled longer in a ſecond experiment with another *viper*, and a bliſter appeared on the back. This creature lived an hour and a half. The mouth remained vaſtly diſtended after death, and the internal parts of it were much diſtorted, and thruſt forwards. After the admitting of the air the mouth cloſed, and opened again after a time; and, in fine, on pinching the tail there was ſome motion perceived in the body that ſeemed to argue life. The common ſnake bears the exhauſted receiver better than the *viper*, and, after many hours remaining in it, and ſeeming dead, will give ſigns of life on being warmed by bringing the glaſs to the fire; but a longer continuance in the rarefied air abſolutely kills it, as it does all other creatures. Phil. Tranſ. N° 62.

As to the manner wherein the *viper* conveys its poiſon, authors are a little diſagreed. Franciſco Redi, and Moiſe Charras, have each of them written very curious pieces on the ſubject; but their reſult is very different. See BITE.

Redi maintains, that all the venom of the *viper* is contained in the two veſiculæ, or bags, which cover the baſe of the two canine teeth; whence, upon biting, a yellowiſh liquor is ſqueezed out into the wound; where, mixing with the blood, and other juices, it produces thoſe dreadful ſymptoms. This hypotheſis he maintains by a good number of experiments; as of animals, viz. cocks, &c. being bit with *vipers*, after theſe veſiculæ and their juice had been taken out, without any ſigns of poiſon, or any ill conſequence at all.

Charras, on the other hand, maintains, that this yellow liquor is not poiſonous; that he has given it to pigeons as food, without their being at all diſordered thereby; that the *viper*'s bite he has always found mortal to animals, even after the bag has been taken clear out, as well as before; and laſtly, that the poiſon muſt lie in the irritated ſpirits of the *viper*, which it exhales in the ardor of its biting, and which are ſo cold, that they curdle the blood, and ſtop the circulation.

The controverſy between theſe two ingenious authors is very extraordinary; their ſyſtems are oppoſite, yet both are maintained by a great number of well atteſted experiments.

Dr. Mead ſuppoſes the ſentiment of ſig. Redi to be the true one, in his eſſay on the poiſon of the *viper*, and adds to Redi's account, that the poiſon in the *viper*'s bag is ſeparated from the blood by a conglomerate gland, lying in the lateral interior part of the os ſincipitis, behind the orbit of the eye; from which gland there is a duct that conveys the poiſon to the bags at the teeth. The teeth, he adds, are tubulated for the conveyance and emiſſion of the poiſon into the wound; but their hollowneſs does not reach to the apex, or tip of the tooth, but ends in a long ſlit below the point, out of which ſlit the poiſon is emitted.

Theſe ſlits, or perforations of the teeth, Galen tells us, the mountebanks of his days uſed to ſtop with ſome kind of paſte; after which they would publicly expoſe themſelves to be bitten without danger.

The abbé Fontana, in a treatiſe on the poiſon of the *viper*, firſt publiſhed in Italian, in 1765, and, in 1776, tranſlated into French by M. Darcet, who has made ſeveral additions to it, has given the reſult of no leſs than ſix thouſand experiments, in which upwards of four thouſand animals were bitten, and moſt of them killed by the *vipers*.

The *viper*, he ſays, has ſometimes four, ſeldom three, but generally two canine teeth in each jaw, falcated and inſerted and fixed in a ſocket; at their baſes, and behind

hind them, are ſix or ſeven ſmaller teeth, adhering by a membrane, which, it is thought, are intended to ſupply the place of the larger teeth, ſometimes loſt in the act of biting. A ſimilar conjecture, with reſpect to the uſe of the ſame kind of teeth in the rattleſnake, was made by Dr. Bartram. Phil. Tranſ. N° 456. p. 358. or Abr. vol. ix. p. 60.

Each of theſe has two cavities; one tubular, beginning near the baſe, and proceeding along the convex ſide nearly to the end, and open at each end; the aperture near the baſe being almoſt elliptical, and the other longitudinal; the other cavity, ſituated behind the former, and never before obſerved, is broad at the baſe, and diminiſhes as it approaches toward the point. It has only one aperture at the inſertion in the gum, through which the nerves and blood-veſſels of the tooth are admitted. The fibrous ſheath, that covers all theſe teeth, ſeems to be a continuation of the external membrane of the palate, being always open near the points of the teeth.

The receptacle of the venom is a ſmall bladder, a ſpongy gland, ſituated under the muſcles of the ſide of the upper jaw, and ſeldom containing more than three or four drops of a yellow fluid, which is conveyed thence by an excretory duct to the ſocket of the canine teeth, whence it enters the lower aperture of the tube, and finds its way out again at the longitudinal orifice, near the point, into the internal part of the wound occaſioned by the bite: this fluid receives its impulſe from a conſtrictor muſcle, which, however, never propels at once the whole of the contents of the gland.

Effects of the bite of the VIPER. The ſymptoms following the bite of a *viper* are, an acute pain in the place wounded; ſwelling, firſt red, afterwards livid, ſpreading by degrees; great faintneſs; a quick, low, and ſometimes interrupted pulſe; ſickneſs at the ſtomach; bilious convulſive vomiting; cold ſweats; ſometimes pains about the navel; and death itſelf, if the ſtrength of the patient, or ſlightneſs of the bite, do not prevent it.

If he overcomes it, the ſwelling continues inflamed for ſome time; and the ſymptoms abating, from the wound runs a ſanious liquor, little puſtules are raiſed about it, and the colour of the ſkin is as if the patient were icterical.

But the violence of the ſymptoms depends much on the ſeaſon of the year, the difference of the climate, the ſize or rage of the animal, or the depth and ſituation of the wound.

By the microſcope, the virus, according to Dr. Mead, was found to conſiſt of minute ſalts in continual motion; after which a number of ſpicula or darts appeared, reſembling, but much finer, a ſpider's web. This, when mixed with ſyr. violar. inclined it to red, no ways to green; ſo that the juice is not alkalious: but Mr. Boyle, and Dr. Pitcairn, prove the blood to be only an alkali. Such a ſmall quantity of the virus ſeems to have ſo great an effect, partly by wounding the fibres, and partly by altering the coheſion of the globules of blood, which, by the elaſtic matter thereof, proves a nimble vehicle to carry the viperine ſpicula almoſt every where ſuddenly. Theſe will ſtimulate and fret the ſenſible membranes; whereupon a more than uſual afflux of the animal juices may be carried to the parts.

The venomous quality of this yellow fluid does not depend, according to the abbé Fontana, *ubi ſupra*, on the irritation of the *viper*, but is rather its peculiar and ſpecific character. It is neither acid nor alkaline, nor of the nature of any ſalt: it has no determinate taſte nor ſmell, excites no inflammation on the tongue; nor does it exhibit any acrid or cauſtic appearance. When dried upon a glaſs, it contracts into a number of molecules, with interſtices between them, which Mead took for cryſtals, and hence aſcribed to the virus a ſaline nature. The fluid ſubſides in water; is not inflammable; when freſh rather viſcous, and when dry of a conſiſtency ſimilar to that of pitch; in which ſtate it is partly ſoluble in water, but not in ſpirit of wine: by various teſts it was found to be of a gummy nature, and ſo far as it has been examined, it may be called an animal gum.

Among two hundred *vipers* which the abbé diſſected, he found two whoſe veſicles contained none of the yellow poiſon, and five in which, inſtead of the poiſon, he found a white, opake, viſcous matter, which in two of them, was perfectly innocent, and, in the other three, retained ſome venomous quality.

Dr. Mead aſſerts, that the bite of the *viper* is fatal to its own ſpecies; but this, ſays the abbé, is a miſtake; nor, ſays he, is there an inſtance of an animal furniſhed with an excretion deleterious to its own kind.

The virus of *vipers* is not a poiſon for all kinds of animals, it having been found harmleſs when applied to leeches, ſnails, and ſome other animals of cold blood: there is reaſon to apprehend, if applied in a ſufficient quantity in proportion to the ſize of the animal, it always proves fatal to the hot-blooded animals. The one thouſandth part of a grain was found ſufficient to kill a ſparrow; five or ſix times that quantity was neceſſary to kill a pigeon; and thus, comparing the weight of theſe animals, the abbé inferred from calculation, that three grains will be required to kill a man, and twelve to deſtroy an ox: and therefore, as a *viper* of a moderate ſize contains ſeldom more than two grains of virus, and *vipers* are known to emit but a ſmall proportion of their venom at every bite, he concludes, that a man cannot be killed by leſs than five or ſix *vipers* wounding him nearly at the ſame time, and in parts the moſt ſuſceptible of the infection, and that an ox will require twenty to produce that effect.

The abbé Fontana found, after a ſeries of experiments for aſcertaining which are the parts of an animal moſtly affected by this poiſon, that it was never noxious unleſs it had penetrated the cellular membrane; that it had no effect upon the nerves, bones, the marrow, the brain, the tongue, or palate; and, in general, the operation of this poiſon was found to be the moſt rapid and fatal when it affected thoſe parts of the animal that abound with blood, e. g. the more ſanguineous muſcles, the liver, and all the viſcera and inteſtines; and its effect is never more rapid than when injected immediately into the blood.

On diſſecting an animal killed by the venom of two *vipers* injected into its jugular vein, the whole maſs of the blood in the heart and larger veſſels was found coagulated and black; and yet blood out of the circulation, even whilſt warm, and at the inſtant when it leaves the vein, is no ways affected by it. The abbé alſo mentions experiments, which prove, that, contrary to the opinion of Redi, Celſus, and ſeveral others, this poiſon is mortal when taken in a proportionate quantity into the ſtomach.

There have been various opinions with reſpect to the cauſe of the death of animals bitten by *vipers*. Some have thought that it is occaſioned by the immediate coagulation of the blood; and others, by a ſudden inflammation of the whole frame.

Hoffman, and his diſciples, attribute this death to an univerſal ſpaſm. Dr. Mead, as we have ſeen above, to the effects of the cauſtic ſaline property of the virus: Buffon, who diſcerns organic molecules in all animated nature, aſſerts, that they exiſt in this venom, and conſtitute its deleterious property. Baker maintains, that this poiſon affects the figure and ſolidity of the red globules of the blood, and that a ſingle atom of it is ſufficient to corrupt the whole maſs of that fluid. But the abbé Fontana, apprehending that the life of an animal is wholly dependent on the irritability of its muſcular fibres, aſcribes the deleterious property of the poiſon of *vipers*, to its effect upon that irritability which it deſtroys, diſpoſing the parts to a very rapid putrefaction; or rather, this loſs of irritability is the conſequence of the change produced in the blood by the venom.

This tendency of the poiſon to promote putrefaction ſeems to indicate, as the abbé imagines, that its uſe in the animal œconomy of the *viper* is its operating as a menſtruum to promote digeſtion.

The cure of the venomous bites of *vipers* ſeems very unſettled: Mr. Boyle found a hot iron held near the place very ſucceſsful; but it proved otherwiſe with Mr. Charras. Again, the ſnake-root from the Eaſt Indies, immediately applied to the place, is much commended; but ſignor Redi, and M. Charras, found it of no uſe; yet Baglivi and Dr. Havers give inſtances of its good ſucceſs.

Dr. Mead adds, that the ſnake-ſtone directly applied to a pigeon, when bitten, ſaved its life four hours; whereas moſt of the other pigeons bitten died in half an hour.

This ſtone is not natural, but factitious; its virtue lies in its poroſity, which is ſuppoſed to imbibe the virus.

The *viper*-catchers, Dr. Mead adds, have a ſpecific, in which they can ſo far confide as not to be afraid of being bitten.

That ſpecific is, the axungia of the viper preſently rubbed into the wound; which, conſiſting of clammy, viſcid, penetrating, and active parts, ſheathes the ſalts of the virus.

The ſame author applying it to the noſtrils of a dog bitten, found the creature well the next day: when this is not timely applied, and the virus has inſinuated into the blood, the ſal. *viper* is excellent, given and repeated till ſweats be produced. This ſucceeded well with M. Charras; and Dr. Mead relates, that it recovered one after the virus had induced an univerſal icterus.

The bite of the *viper* having been ſuppoſed certainly curable by oil of olives, vulgarly called ſallad-oil, alone, and a *viper*-catcher in England having ſuffered himſelf to be bitten by one of theſe creatures, and having recovered after many dangerous ſymptoms, and the cure being attributed to the oil alone, though other medicines were given him internally; in conſequence of which Dr. Vater tried the ſame remedy with ſucceſs at Dreſden; Meſſ. Geoffroy and Hunauld, of the Royal Academy of Sciences at Paris, made a number of experiments, in which this oil proved ineffectual; and added to their accounts, ſome others of perſons bitten, in which all the dreadful conſequences of that poiſon are ſhewn, and the remedies by which they were cured are mentioned. Philoſ. Tranſ. N° 443, 444, 445. or Abr. vol. ix. p. 60.

Their firſt inſtance is in the caſe of Mr. Piron, who was bitten at the end of the fore-finger by an enraged *viper*; there immediately iſſued a drop of blood from the wound, and the firſt application made to it was the covering up of the whole finger with a quantity of Venice treacle; the finger however, ſwelled violently, and was ſcarified in ſeveral places, and the patient was made to eat the body of the *viper* boiled, and drank after it a glaſs of wine with ſome Venice treacle, and with a few drops of the volatile ſpirit of *vipers*; and the finger was wrapped round with compreſſes and bandages wetted in aqua vitæ. Soon after this the patient began to have inclinations to vomit, he vomited very plentifully, the ſwelling increaſed, and his arm, which was now very much diſtended, was ſcarified in twenty places, and compreſſes of linen, dipped in aqua vitæ, laid on the wounds; he afterwards took volatile ſalt of *vipers* in repeated doſes, had more ſcarifications made on his arm, and he drank in the ſpace of an afternoon and evening a quart of ſtrong wine. He ſlept very ſound after this, and the ſymptoms all diſappeared; he was almoſt recovered by ſix o'clock the next morning, only the ſcarifications took two months to heal, and, after that time he enjoyed a perfect ſtate of heath.

A ſecond inſtance is that of a young lad, of a robuſt conſtitution bitten by a *viper*, enraged, and kept for ſome time in a very hot place near the fire; he felt a pain like that of oil of vitriol dropped on a wound, but without delay he cut off the head of the *viper*, bruiſed it, and applied it to the wound, and tied the finger, on which he was bitten, very tight round with a binder: he, after this, had ſome ſcarifications made, and rubbed into them a quantity of the fat of the *viper*; he killed four *vipers*, and uſed all their fat, and took three drams of Venice treacle in ſome wine. His whole arm ſwelled, he perceived a violent heat over his whole body, and the other hand was ſo ſwelled at length that he could ſcarce ſhut it: on this he took a large doſe of Venice treacle, camphor, volatile ſalt of *vipers*, of amber, and of ſal ammoniac, and a dram of volatile ſpirit of ſal ammoniac, and ſal volatile oleoſum; this he repeated at ſome diſtance of time; he was blooded in the oppoſite arm; the patient vomited violently; and, an inciſion being made, all along the finger, there followed no blood. The hand, arm, and breaſt were embrocated with a mixture of ſpirit of lavender, camphor, Venice treacle, and the fat of *vipers*. After having vomited plentifully, and been embrocated with this warm mixture, he found himſelf much eaſier; at eight o'clock at night he took another doſe of his volatile medicines, and ſlept till four in the morning, he then took a large glaſs of wine, and ſlept till ſix, and at ſeven eat a part of a chicken with a good appetite. The ſurgeons would have made more ſcarifications on the arm, but he would not ſuffer it; and three days afterwards an eriſipelas appeared, to which he applied a mixture of aqua vitæ and ointment of marſhmallows, and finally was perfectly recovered.

Theſe are two inſtances in which the ſymptoms of the bite appeared much in the ſame manner with thoſe of the man who ſuffered himſelf to be bitten in England, in order to be cured by the oil. The ſleep came on in all the ſame circumſtances, and they were all cured, as well he who uſed no unctuous application at all, as he who uſed the fat of the *vipers*, or the Engliſhman who depended upon oil. The internal medicines given to them all were of much the ſame kind; and all that can be concluded from the whole is, that either theſe bites would not have proved mortal in themſelves, or that the cordial medicines, which they took internally, were the remedies that prevented the miſchief that would have enſued; and theſe ſeem to have acted not as ſpecifics againſt the bite of this animal, but merely as medicines that would ſtop the ſpreading of a gangrene; the unprevented increaſe of which is the thing that proves fatal from the creature's bite.

The diſſections of the animals which had died by the bite of the *viper*, whether they had or had not been rubbed with oil, afforded all the ſame appearances. The limb which had received the wound was in all ſwelled and livid, and theſe ſymptoms were uſually carried along the thigh to the belly, and ſometimes up to the breaſt. Inciſions made along theſe parts always diſcovered the cellules of the membrana adipoſa full of bloody-coloured water, and the membrane itſelf was ſwelled, blackiſh and gangrened. And this appeared always more plainly in the belly than in any other part; the membrana adipoſa in all other parts of the body was in its natural ſtate. The injured parts often had a cadaverous ſmell; the muſcles of the wounded limb were alſo found of a browniſh colour, and their fibres had loſt their conſiſtence, and ſeemed ready to give way to the approaching gangrene. Nor is this effect confined to the external parts alone: a gooſe that had been bitten had three gangrenous ſpots on its heart, and all the indications of a beginning gangrene in other parts of it; the concave ſide of the liver was alſo gangrened, and had wholly loſt its conſiſtence; and the lungs of a fowl, that had been bitten on the wing, were found in part gangrened. The effects, however, were different in degree, from the bite of the ſeveral *vipers*; and there ſeems no reaſon to doubt, but that the bites of different animals, though of the ſame ſpecies, under different circumſtances, either in regard to the creature wounding, or the creature wounded, may be followed with very different conſequences; ſo that remedies are not to be depended on from their ſucceſs in one or two trials. Mem. Acad. Scienc. Par. 1737.

The poiſon of the *viper* is only noxious when immediately conveyed into the blood. Nor is it mortal to eat the fleſh of creatures killed by *vipers*, or to drink the wine in which they have been drowned, or to ſuck the parts they have wounded. On the contrary, ſignior Redi ſays, ſucking the wound is a ſovereign remedy againſt the bite of *vipers*. This author denies what has been affirmed by Ariſtotle and Galen, that the ſpittle of a faſting perſon kills *vipers*. Phil. Tranſ. N°9. p. 160.

The practice of ſucking out poiſons is very ancient, and indeed nothing can be more rational. Where the bite cannot be cut out, this is the moſt likely way for extracting the poiſon. There can be no danger in performing this office, as the poiſon does no harm, unleſs it is taken into the body by a wound. The perſon who ſucks the wound, ought, however, to waſh his mouth frequently with ſallad oil, which will ſecure him from the leaſt inconvenience.

The Pſylli in Africa, and the Merſi in Italy, were famed for curing the bites of poiſonous animals, by ſucking the wound; and we are told that the Indians in North America practiſe the ſame at this day.

When the wound is well ſucked, it ſhould be afterwards rubbed with warm ſallad oil. A poultice of bread and milk ſoftened with ſallad oil, ſhould likewiſe be applied to it, and the patient ſhould drink freely of vinegar-whey, or water-gruel with vinegar in it, to make him ſweat. Vinegar is, indeed, one of the beſt medicines which can be uſed in any kind of poiſon, and ought to be taken very liberally. If the patient be ſick, he may take a vomit. This courſe, ſays Dr. Buchan, will be ſufficient to cure the bite of any of the poiſonous animals of this country.

Dr. Brookes ſays, that the following remedy, which was the invention of a negro, who, for the diſcovery, obtained his freedom and a penſion for life of 100*l. per annum*, from the general aſſembly of Carolina, has been found effectual for the bite of the *rattle*-SNAKE. The preſcription is as follows: take of the roots of plantain and horehound in ſummer, roots and branches together, a ſufficient quantity; bruiſe them in a mortar, and ſqueeze out the juice, of which give, as ſoon as poſſible, one large ſpoonful; if the patient be ſwelled, force it down his throat. This generally will cure: but if he finds no relief an hour after, give him another ſpoonful, which is ſaid never to fail. If the roots are dried, they muſt be moiſtened with a little water. To the wound may be applied a leaf of good tobacco moiſtened with rum.

Meſſrs Juſſieu and Le Sage ſtrongly recommend the uſe of the volatile fluor alkali as an antidote againſt the venom of *vipers*; but if the proofs alleged by the abbé Fontana, that the poiſon of *vipers* is not of an acid nature be admitted, the utility of the alkali muſt be precluded. The abbé adds, that cantharides, applied outwardly, always did miſchief by increaſing the inflammation; when given inwardly, they operated as an emetic, which is ſometimes beneficial. Scarification produced the ſame effects with the external application of cantharides: Peruvian bark, theriaca, oils, the ſuction of leeches, and of the mouth, were all found ineffectual. He alſo explodes, in this caſe, the boaſted virtue of the Piedra de Cobras, as an alexipharmic. Quicklime alſo, when applied to the wound in pigeons, has ſometimes been of uſe, but not ſo as to juſtify any confidence in the remedy.

Upon the whole this writer infers, that the greateſt ſecurity we have againſt the bite of *vipers* in one ſpecies, is the little probability of its being poiſonous to the degree that has been always imagined, and that has cauſed ſuch dreadful alarms, which alone are ſufficient to irritate a tainted habit. He alſo doubts whether the bite of the rattle-ſnake is actually ſo venomous as is generally imagined. See Fontana ſur les Poiſons et ſur le Corps Animal, &c. in two volumes, 4to. Florence.

Vipers make a conſiderable article in medicine. Moſt authors agree, that there is no part, humour, or excrement, not even the gall itſelf of a *viper*, but may be ſwallowed without harm. Accordingly the ancients, and, as ſeveral authors aſſure us, the Indians, as well as many other people at this day, both of the Eaſt and Weſt, eat them as we do eels.

Caro viperina, *viper*'s fleſh, either roaſted or boiled, the phyſicians have unanimouſly preſcribed as an excellent reſtorative; and it has been particularly recommended in the elephantiaſis, incurable conſumptions, leproſy, &c. and Dr. Mead thinks, they might be leſs ſparing in the quantity than they are; inſtead of a little *viper*'s fleſh, he recommends the broth or jelly of *vipers*; or, as the ancients did, to boil and eat them as fiſh, or at leaſt to drink vinum viperinum, i. e. wine wherein they have been long infuſed.

Viper's fleſh, indeed, appears to be very nutritious, and therefore an uſeful reſtorative in ſome kinds of weakneſſes and emaciated habits; but in ſcrophulous, leprous, and other like diſtempers, the good effects which have been aſcribed to it are more uncertain. Dr. Lewis ſays, that he has known a *viper* taken every day for above a month, in diſorders of the leprous kind, without any apparent benefit.

The form in which they are uſed to the beſt advantage, is that of broth, or jus viperinum, of which an elegant preparation is directed by the London College.

Viper's fleſh is an ingredient in ſeveral of our beſt antidotes, as the theriaca Andromach. &c

The apothecaries alſo formerly ſold the pulvis viperinus, which is only dried *vipers* pulverized, heart, liver, and all, and paſſed through a ſieve. This, to heighten the price, we ſuppoſe, they call *animal* BEZOARD.

The *ſalts of vipers*, whether volatile or fixed, alſo their fat, or axungia, and their oil, chemically daawn, are drugs that have been in conſiderable repute.

The fat of the *viper* is accounted particularly uſeful in diſorders of the eyes; but what advantages it has above other ſoft fats, is by no means clear. It was formerly ſuppoſed to have ſome ſpecific power of reſiſting the poiſon of the *viper*'s bite, by being rubbed immediately on the wounded part; but experience has now ſhewn, that common oil is, in this intention, of equal efficacy. Lewis.

VIPER *Wine*, *vinum viperinum*, is a preparation of *vipers* infuſed in wine. It is commonly made by macerating for a week, with a gentle heat, two ounces of the dried fleſh in three pints of mountain. This has been deemed a great reſtorative, and provocative to venery, and alſo good againſt cutaneous eruptions, &c.

But Dr. Lewis obſerves, that it cannot perhaps be affirmed from fair experience, that this wine has any great virtue.

VIPER's *Bugloſs*, *echium*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the flower hath a permanent epalement, divided into five parts; it has one petal, with a ſhort tube, and an erect broad brim, cut into five irregular parts, with naked chaps; and it has five awl-ſhaped ſtamina, terminated by oblong proſtrate ſummits; in the bottom are ſituated four germina with one ſlender ſtyle, crowned by an obtuſe bifid ſtigma, which become ſo many roundiſh pointed ſeeds, encloſed in the rough empalement. Linnæus enumerates nine, and Miller ſeven ſpecies.

Pliny has made a ſtrange miſtake in his account of this plant: he ſays, the ancients were acquainted with two ſpecies of it, the deſcriptions of which he gives correctly enough from Dioſcorides; but then he adds, that there is a third kind, called by ſome perſonata, a plant with extremely large leaves, and with burs or prickly nodules, by way of fruit.

It is clear from this, that the author confounded the words *arctium* and *echium* together, though ſufficiently unlike both in ſound and orthography, to have been diſtinguiſhed; and his third *echium* is no other than the great arctium or burdock.

The flowers of the *viper's bugloſs* are ſuppoſed to poſſeſs the virtue of cordials, in the ſame degree with the borrage and bugloſs. Some authors greatly recommend a decoction of the dried plant in epilepſies. It is ſaid that very ſingular cures have been done by it.

VIPER's *Graſs*, *ſcorzonera*, in *Botany*, a genus of the *ſyngeneſia polygamia æqualis* claſs. Its characters are theſe: the common empalement is ſcaly, cylindrical, and imbricated; the flower is compoſed of ſeveral hermaphrodite florets, which are narrow, tongue-ſhaped, and indented in five parts; they have five ſhort hair-like ſtamina, terminated by cylindrical ſummits; the germen is ſituated under the floret, ſupporting a ſlender ſtyle, crowned by two reflexed ſtigmas; it turns to a ſingle, oblong, channelled ſeed, crowned with a feathery down. Linnæus enumerates ten, and Miller eight ſpecies.

The roots of the common *viper*'s graſs, or *ſcorzonera Hiſpanica* of Linnæus, have been employed indifferently as alexipharmacs, and in hypochondriacal diſorders, and obſtructions of the viſcera; but at preſent are more properly conſidered as alimentary articles, in general ſalubrious, and moderately nutritious. They abound with a milky juice, of a ſoft ſweetiſh taſte, but which, in drying, contract a ſlight bitterneſs. Extracts made from them by water are conſiderably ſweet and mucilaginous: extracts made by rectified ſpirit have a leſs degree of ſweetiſhneſs, accompanied with a ſlight grateful warmth.

In Cartheuſer's experiments, the ſpirituous extract amounted to one third the weight of the root, and the watery to above one half. Lewis.

VIPERA *pileata*, or *vittata*, in *Zoology*, a name by which ſome authors have called a remarkable ſpecies of Indian ſerpent, more uſually known by the name of COBRA *de capella*.

VIPERARIA, in *Botany*, a name given by ſome authors to the *ſcorzonera*, or VIPER's *graſs*.

VIRAGO, a woman of extraordinary ſtature and courage, and who, with the female ſex, has the mien and air of a man, and performs the actions and exerciſes of men.

The word is pure Latin, formed from *vir*, *man*, and is ſeldom uſed but in the way of diverſion.

Such were Semiramis, and Pentheſilea, among the ancients; and Jeanne la Pucelle, commonly called *the Maid of Orleans*, among the moderns.

In the Vulgate verſion of the Bible, Eve is called *virago*, becauſe made of the rib of man. The Latin tranſlator by this, aimed to preſerve the etymology as it is in the Hebrew, and of *vir*, formed *virago*; as Adam, in the Hebrew text, called Eve *Iſcha*, of *iſch*, *man*.

VIRGA. See YARD.

VIRGA is particularly uſed in law for VERGE, or *rod*, ſuch as ſheriffs and bailiffs carry, as a badge of their office. *Renſ. ap Hewell, præpoſitus de Lantiſſin amerciatus pro eo quod habuit in manu ſua coram juſticiariis hic* virgam *nigram & inhoneſtam, ubi habere debuiſſet* virgum *album & honeſtum certæ longitudinis, prout decet*. In ſeſſ. Itin. de Cardiff. 7 Hen. VI.

VIRGA *aurea*, in *Botany*, ſee GOLDEN *Rod*.

VIRGA *paſtoris*, in *Botany*, a name given by ſome authors to dipſacus.

Where the name *virga paſtoris* occurs in the tranſlation of the Arabian writers, it is not to be ſuppoſed to mean the plant we call *virga paſtoris*.

It is, indeed, the literal tranſlation of the haſſalelrheir of Serapion and Avicenna; but they called the common horſetail by this name, when they applied the adjective female to it; and when they added the male, they meant by it the common knot-graſs.

VIRGA *ſanguinea*, in *Botany*, a name given by Matthiolus, and ſome other authors, to the cornus fœmina, or dogberry buſh, common in our hedges.

VIRGÆ *lateralis minimus*, in *Anatomy*, a name given by ſome writers to a muſcle, called by others, *levator ani parvus*, and by ſome *tranſverſus ani*. It is called by Albinus the *tranſverſus perinæi*, and by ſome *tranſverſalis penis*.

VIRGÆ, in *Phyſiology*, a meteor, called alſo *columellæ*, and *funes tentorii*; being an aſſemblage of ſeveral ſtreams of light, repreſenting a bundle of rods or ropes.

It is ſuppoſed owing to the ſtreaming of the ſun-beams through certain rimulæ, or chinks; at leaſt through the more lax and open parts of a watery cloud, happening chiefly in the morning and evening.

There is alſo another kind, conſiſting not of ſtreams of mere white light, but, as it were, painted of various colours, like thoſe of the rainbow.

VIRGATA *ſutura*, a term uſed by ſome anatomiſts for the ſagittal ſuture of the cranium.

VIRGATA *Terræ*, or VIRGA *terræ*, a YARD-*land*.

VIRGATORES *Servientes*, in Fleta, are vergers, or tipſtaves, who attend the judges. See VERGER, and SERJEANT *at Arms*.

VIRGILIANÆ *Sortes*. See SORTES.

VIRGIN, VIRGO, a female who has had no carnal commerce with a man; or, more properly, who has ſtill the *flos virginis*, or maidenhood.

By the Moſaic law, the prieſts are enjoined to take none to wife but thoſe that are *virgins*; the widow, the divorced, and the harlot, are to be refrained from.

In the Roman breviary there is a particular office for *virgins* departed, anſwering to thoſe of ſaints, martyrs, and confeſſors.

VIRGIN is alſo applied by way of eminence, to Mary the mother of our Saviour.

Many of the fathers, with the modern churches, hold, that the *Virgin* not only conceived, but brought ſorth, or was delivered without breach of her virginity; otherwiſe, ſaith St. Auguſtine, it would be falſe which is ſaid in the creed, that he was born of a *virgin*. It is even alleged that ſhe ſtill remained a *virgin* to the end of her life; whence the Greeks always called her *αειπαρθενος*, *ever virgin Mary*; and after them the Latins, *ſemper virgo*. Though, as this is not recorded in Holy Writ, many have denied it, and held, that ſhe had afterwards to do with Joſeph, and bore other children; and this as early as the time of Origen. Tertullian himſelf is produced as one that denied the perpetual *virginity*; and the like may be ſaid of Apollinaris and Eunomius, with their followers. See ANTIDICOMARIANITES and HELVIDIANS.

VIRGIN, *Charity of the Holy*. See CHARITY.

VIRGIN, *Nativity of the*. See NATIVITY.

VIRGIN, *Preſentation of the*. See PRESENTATION.

VIRGINS *of Love*. See MISSION.

VIRGIN is alſo applied, figuratively, to ſeveral things that retain their abſolute purity, and have never been made uſe of. Thus,

VIRGIN *Wax*. See *Virgin* WAX.

VIRGIN *Oil*. See *Virgin* OIL.

VIRGIN *Gold*. See GOLD.

VIRGIN *Copper*. See COPPER.

VIRGIN *Quickſilver*, is that found perfectly formed, and fluid in the veins of mines; or at leaſt ſuch as is got from the mineral earth, by mere lotion, without fire.

VIRGIN *Parchment*. See PARCHMENT.

VIRGIN *Sulphur*. See SULPHUR.

VIRGIN's *Bower*, *clematis*, in *Botany*, a genus of the *polyandria polygynia* claſs. Its characters are theſe: the flowers have no empalements; they have each four looſe oblong petals, with a great number of ſtamina, and the ſummits adhere to their ſide; they have many roundiſh compreſſed germina, with an awl-ſhaped ſtyle, crowned by a ſingle ſtigma; the germina become ſo many roundiſh compreſſed ſeeds, with the ſtyle ſitting on their top, and are collected into a head; the ſtyles of their ſeveral ſpecies being of different forms. Linnæs enumerates twelve, and Miller ſixteen ſpecies.

The four varieties of that ſpecies of *clematis*, called *virgin's bower*, make a very fine ornament in the quarters of gardens allotted to flowering ſhrubs.

They grow naturally in the woods in Spain and Portugal; they flower in June and July, but their ſeeds ſeldom ripen in England.

They are propagated by laying down their branches; for though the ſingle flowers do ſometimes produce ſeeds in England, yet as theſe ſeeds, when ſown, remain a whole year in the ground before they vegetate, the other is the moſt expeditious method of increaſing theſe plants, and is commonly practiſed.

The beſt time for laying down the branches is July, ſoon after they have made their firſt ſhoots: the branches ſhould be faſtened to the ground, and the young ſhoots laid in the earth, with their tops raiſed upright three or four inches above ground; and after the layers are placed down, if the ſurface of the ground be covered with moſs, rotten tanner's bark, or decayed mulch, the ground will be preſerved from drying, ſo that the layers will not require watering above three or four times at five or ſix days interval. They ſhould be always planted where their climbing branches may be ſupported, as againſt the trellis work of ſeats and arbours, or for concealing any wall or fence; their branches require room to extend, and are, therefore, improper for open borders, nor do they anſwer expectation when intermixed with ſhrubs.

The ſort with double flowers is the moſt beautiful, and ſhould be preferred to thoſe with ſingle flowers. Miller.

The leaves and flowers of the upright *virgin's bower*, or *clematis erecta* of Linnæus, called alſo *flammula Jovis*, and diſtinguiſhed by its pinnated oval leaves and erect ſtalk, are extremely acrid; the former when freſh, raiſing bliſters on the part to which they are applied.

This is one of the new medicines introduced by Dr. Stoerck. He has publiſhed ſeveral caſes of its efficacy in cancerous, venereal, and other malignant ulcers, obſtinate pains of the head and bones, inveterate itch, and other diſeaſes proceeding from peculiar acrimony. It was uſed internally, in infuſion of the flowers or leaves, and extract of the plants; and the powder was ſprinkled on the ulcers externally, where it was found to act as a moſt excellent eſcharotic and detergent.

The medicine is ſaid to have proved diuretic to ſome patients, and ſudorific to others, but rarely to have moved the belly. Small doſes, of only half a grain of the extract, and half a dram of the dried leaves in infuſion, were at firſt exhibited, which were gradually increaſed. Lewis.

VIRGIN's *Milk*, in the *Materia Medica*, is a name given to a ſolution of BENZOIN in ſpirits, mixed with twenty times its quantity, or more of water, which renders it milky.

It is ſaid to be of great ſervice in diſorders of the breaſt, for reſolving obſtructions of the pulmonary veſſels, and promoting expectoration. It is alſo uſed as a coſmetic.

VIRGIN's *Milk*. See *Virgin's* MILK.

VIRGIN's *Thread*, a ſort of meteor that flies in the air, like ſmall untwiſted ſilk, and which falling upon the ground, or open plants, changes itſelf into a ſubſtance like a ſpider's web.

In theſe northern climates it is moſt frequent in ſummer; the days being then temperately warm, the earth not exceeding dry, nor yet overcharged with moiſture.

This has formerly paſſed for a ſort of dew of an earthy ſlimy nature; but naturaliſts are now agreed, that the *virgin's threads* are no other than ſo many ſpiders webs.

VIRGINALE *Clauſtrum*, *in Anatomy*, the ſame as HYMEN.

VIRGINEUS *Morbus*, the *virgin's diſeaſe*; the green-ſickneſs, or CHLOROSIS.

VIRGINIANA *Bolus*, is a pure earth, of a compact texture, hard and heavy, of a pale red or roſe colour, variegated with veins of deep red, and often with large ſpots and veins of bright yellow: it is of a gloſſy ſurface, does not colour the hands, adheres firmly to the tongue, melts with difficulty in the mouth, is of a rough aſtringent taſte, leaves no grittineſs in the teeth, and is diffuſible with difficulty in water. It burns in the fire to an almoſt ſtony hardneſs without any change of colour. It is the product of Penſylvania, and moſt parts of America. This kind of bole has not yet been uſed in medicine.

VIRGINIS, *Spica*. See SPICA.

VIRGINITY, VIRGINITAS, the teſt or criterion of a *virgin*; or that which entitles her to the denomination.

In the firſt ages of the Chriſtian church, *virginity* grew into great honour and eſteem, inſomuch that the women were admitted to make ſolemn vows thereof in public. Yet was it held infamous among the Jews for a woman to die a maid.

The Veſtals among the ancients, and the nuns or religious among the moderns, found guilty of a breach of the vow of *virginity*, are allotted a ſevere puniſhment; the firſt to be buried alive, the latter to be immured.

The phyſicians, both ancient and modern, are exceedingly divided upon the ſubject of *virginity*, ſome holding that there are no certain marks or teſtimonies thereof; and others, that there are. Solomon ſays expreſsly, there are four things too wonderful for him to know; "The "way of an eagle in the air; of a ſerpent on the rock; "of a ſhip in the midſt of the ſea; and the way of a "man in a maid;" which our tranſlators have rendered, leſs juſtly, *the way of a man with a maid*.

Yet Moſes eſtabliſhed a teſt, which was to be concluſive among the Jews. The nuptial ſheets, it ſeems, were to be viewed by the relations on both ſides; and the maid's parents were to preſerve them as a token of her *virginity*, to be produced, in caſe her huſband ſhould ever reproach her on that ſcore.

In caſe the token of *virginity* was not found thereon, ſhe was to be ſtoned to death at her father's door.

This teſt of *virginity* has occaſioned abundance of ſpeculation about the parts concerned; but the niceſt enquiries cannot ſettle any thing certain about them. Dr. Drake ſays expreſsly, that, whatever might be expected among the Jews, there is not the ſame reaſon to expect thoſe tokens of *virginity* in theſe countries; for, beſides that the Hebrews married extremely young, as is the cuſtom in all the Eaſtern countries, there are ſeveral circumſtances which may here fruſtrate ſuch expectations, even in virgins not vitiated either by any male contact, or any wantonneſs of their own.

In effect, in theſe northern climates, the inclemency of the air expoſes the ſex to ſuch checks of perſpiration, as gives a great turn to the courſe of the humours, and drives ſo much humidity through the parts, as may extraordinarily ſupple and relax thoſe membranes from which the reſiſtance is expected; and from which, in hotter countries, it might more reaſonably be depended on.

What moſt commonly paſſes among us for a teſt of *virginity* is the HYMEN; and yet the moſt curious among the anatomiſts are greatly divided, not only about the figure, ſubſtance, place, and perforations of this famous membrane, but even about the exiſtence thereof, ſome poſitively affirming, and others as flatly denying it.

As nice a point as that of *virginity* is among anatomiſts, the midwives and matrons treat it with leſs diffidence. In the ſtatutes of the ſworn matrons, or midwives of Paris, containing likewiſe divers formulas of reports and depoſitions made in court, upon their being called to viſit girls that made their complaint of being deflowered, they lay down fourteen marks whereon to form a judgment.

Laur. Joubart, a famous phyſician of Montpelier, had tranſcribed three of theſe reports; one made to the provoſt of Paris, another in Languedoc, and a third in Bearn. Theſe reports are very conſiſtent with each other, and contain fourteen marks of *virginity*, expreſſed in their proper terms, ſuch as were received among the women of that profeſſion, and authorized in court.

M. Joubart does not explain thoſe terms, nor do we find any explanation of them any where, but in another report, of the 23d of October, 1672, inſerted in the Picture of Love of Vennette, a phyſician of Rochel.

In Peru, and ſeveral other provinces in South America, we are aſſured by Pedro de Cieca, in the hiſtory of the Yncas, &c. that the men never marry but on condition that the next relation or friend of the maid's ſhall undertake to enjoy her before him, and take away her *virginity*. And our countryman, Lawſon, relates the like of ſome of the Indian nations of Carolina. So little is the *flos virginis* valued in ſome places.

VIRGO, in *Aſtronomy*, one of the ſigns or conſtellations of the zodiac, into which the ſun enters in the middle of Auguſt.

The ſtars in the conſtellation *Virgo*, in Ptolemy's catalogue, are 32; in Tycho's 33; in Hevelius's, 50; and in the Britannic, 110. The longitudes, latitudes, magnitudes, &c. whereof, are as follow:

Names and ſituations of the ſtars.	Bayer's Char.	Sign.	Longitud.	Latitude.	Magnitude.
			° ′ ″	° ′ ″	
That Preced. *Virgo*'s head	ω	♍	17 30 05	5 19 13N	6
North. on the top of the head	ξ		19 00 29	6 6 21N	5
South.	ν		19 49 35	4 35 39N	5
Subſeq. and leſs in the top of the head.	ξ		19 37 15	6 21 33N	6
In the bend of the ſouth wing.	β		22 46 14	0 40 47N	3
5.					
	A		21 9 47	7 14 53N	6
	b		24 12 31	3 20 31N	5.6
South. in the face	π		23 13 29	6 8 52N	5
North.	o		23 23 06	8 31 29N	5
	r		27 8 22	2 42 52N	6
10.					
	s		25 39 56	6 19 31N	6
	t		24 38 13	10 44 24N	6.7
	h	♎	0 16 44	1 8 8N	6
			3 38 52	6 14 52 S	6
Preced. in the ſouth. wing.	η		0 30 52	1 22 1N	3
15.					
That in the neck.	e	♍	29 2 17	5 4 22N	4.3
			28 44 18	7 7 9N	6
			26 42 10	15 26 6N	6
			28 6 34	12 44 47N	6
			29 7 51	12 43 22N	6
20.					
	q	♎	7 9 52	5 19 47 S	6
			0 49 45	11 9 52N	6
			1 3 33	11 1 10N	6
			2 4 00	8 49 30N	6
	f		6 42 20	1 35 32 S	6
25.					
Firſt of three under ſouth. arm	χ		7 50 38	3 27 23 S	5
			1 3 5	13 41 37N	6
			8 15 49	2 44 25 S	6
Second of the ſouth. wing	γ		5 52 11	2 48 53N	3
Preced. of 3 in the north. wing	δ		1 10 33	13 32 49N	5
30.					
1 at	d		2 36 14	10 24 45N	6
South. of the north wing	d		3 6 18	11 34 15N	6
			2 28 51	13 22 45N	6.7
			1 42 11	15 39 11N	6
			5 16 0	8 1 40N	6
35.					
			1 10 28	17 47 57N	6
			6 20 30	7 55 50N	6
			9 19 24	2 0 34N	6
			11 31 30	3 3 16 S	6
Middle under the ſouth. arm	ψ		11 52 25	3 25 22 S	5
40.					
			3 3 5	16 43 35N	6
			5 12 10	12 37 27N	6
In the n. ſide againſt the girdle	δ		7 9 54	8 38 27N	3
Third of the ſouth. wing	k		10 52 55	2 21 50N	6
			10 56 32	2 52 55N	5
45.					
			10 54 1	2 23 4N	7
Upper of n. wing vindemiatrix	ε		5 37 40	16 12 54N	6
			11 48 45	2 56 15N	6
Third under the ſouth. arm	g		15 25 9	3 15 24 S	5
			15 41 28	2 42 31 S	6
50.					
Fourth and laſt of the ſouth. wing	θ		13 54 23	1 45 29N	4
			16 4 27	2 21 25 S	5
Firſt of the three under ſpica			18 25 56	7 53 20 S	4.5
			19 46 20	10 12 6 S	5
			20 30 30	11 6 24 S	5
55.					
			16 51 7	2 15 25 S	6
			20 43 20	11 0 50 S	6
			17 27 52	1 58 38 S	6
The following vindemiatrix	e		9 41 3	16 13 7N	6.7
The following north. wing	σ		11 27 17	12 39 30N	5
60.					
Middle under ſpica			20 43 10	9 9 50 S	4.5
			18 28 19	2 35 26 S	6
			21 28 22	8 19 41 S	5.6
			12 39 6	12 48 11N	6
			16 46 0	3 35 51N	6
65.					
			17 8 20	3 27 34N	6.7
In ſouth hand, called ſpica	α		19 31 21	2 1 59 S	1
Underneath ſpica	ι		20 26 48	3 18 24 S	4
Laſt and north. of 3 under ſpica			21 49 15	6 17 54 S	5.6
			10 38 7	21 24 35N	6
70.					
			12 4 17	18 42 49N	6
N. of preced. in ſquare of thigh 1 at	l		18 59 18	2 47 25N	6
			23 52 14	8 26 42 S	6
Second 2 at	l		19 16 27	3 8 55N	6
			22 48 30	5 14 34 S	6
75.					
South of preced. in ſqu. of thigh	b		20 55 51	0 24 7 S	6
			20 6 23	2 0 27N	7
Another following north wing			16 3 48	12 33 1N	6
Under the girdle as in the hip	ζ		17 49 50	8 39 9N	6
Third in ſquare of thigh 3 at	l		19 46 12	4 15 21N	6
80.					
			21 10 24	2 9 20N	6
North of thoſe following in ſquare of girdle	m		22 23 31	1 43 45N	6
			25 26 5	5 6 32 S	6
That over the girdle	o		18 15 4	13 16 45N	6
			25 50 3	4 30 38 S	6
85.					
In ſouth. knee			24 43 6	1 21 46 S	6
			26 59 34	6 18 29 S	6
			23 16 7	4 4 4N	6
			27 39 36	6 21 27 S	5.6
In north. thigh	p		22 52 22	9 37 22N	6
90.					
			21 55 9	11 59 34N	6
			22 21 32	12 9 41N	6
That over the north. thigh	τ		23 24 56	13 4 50N	5
			28 10 30	3 41 48 S	6
			28 25 25	3 19 59N	6
95.					
			29 16 54	2 32 20N	5
			29 57 42	3 15 23N	6
South. of three in the border of garment	κ	♏	0 10 40	2 55 40N	4
Middle in the border		♎	29 27 36	7 15 40N	4
In extrem. of ſouth. foot		♏	2 33 13	6 31 4N	4
100.					
			21 35 23	8 12 20N	6
North. of 3 in the garment 1 at	υ	♎	29 4 40	11 2 57N	5
1 at	υ		29 33 5	11 30 3N	5
			2 14 42	8 4 23N	6
A bright one follow. theſe	φ	♏	1 8 14	11 47 25N	4
105.					
			2 48 1	7 25 56N	6
In extrem. of the north. foot	μ		5 47 23	9 43 8N	4
			4 22 44	15 56 52N	6
			4 10 50	17 7 1N	4
			8 17 42	18 34 15N	6
110.					

VIRGULA *divina*, or *Baculus divinatorius*, a forked branch in form of a Y, cut off an hazle-tree, by means whereof people have pretended to diſcover mines, ſprings, &c. under ground.

The method of uſing it is this : the perſon, who bears it, walking very ſlowly over the places where he ſuſpects mines or ſprings may be, the effluvia exhaling from the metals, or vapour from the water, impregnating the wood, makes it dip or incline, which is a ſign of a diſcovery.

We find no mention made of this *virgula* in any author before the 11th century ; but from that time it has been in frequent uſe. Divers fine names have been invented for it, ſome calling it *caduceus* ; others, *Aaron's rod*, &c.

Some diſpute the matter of fact, and deny it to be poſſible ; others, convinced by the great number of experiments alledged in its behalf, look out for the natural cauſes thereof. The corpuſcles, ſay theſe authors, riſing from the ſprings, or minerals, entering the rod, determine it to bow down, in order to render it parallel to the vertical lines which the effluvia deſcribe in their riſe.

In effect, the mineral or watery particles are ſuppoſed to be emitted by means of the ſubterraneous heat, or of the fermentations in the entrails of the earth : now the *virgula*, being of a light porous wood, gives an eaſy paſſage to thoſe particles, which, withal, are very fine and ſubtile ; the effluvia then driven forwards by thoſe that follow them, and oppreſſed, at the ſame time, by the atmoſphere incumbent on them, are forced to enter the little interſtices at the fibres of the wood ; and, by that effort, they oblige it to incline or dip down perpendicularly, to become parallel with the little columns which thoſe vapours form in their riſe.

A late writer has recited no leſs than ſix hundred experiments, made with all poſſible attention and circumſpection, and ſeveral of which are very curious and extraordinary, in order to aſcertain the facts attributed to the divining rod ; and he has alſo undertaken to unfold their reſemblance to the admirable and uniform phenomena of electricity and magnetiſm. See M. Thouvenel's Memoire Phyſique & Medicinale Montrant des Reports evidens entre les Phenomenes de la Baguette Divinatoire, &c. 12mo. Paris, 1781.

Mr. Pryce has collected ſeveral obſervations on the nature and uſe of the *virgula divinatoria*, in his Mineralog. Cornub. lib. iii. cap. i.

VIRGULA, in *Grammar*, a term which Latin, French, and ſome other authors uſe for a point in writing, uſually called by us, *comma*.

Virgulas, F. Simon obſerves, are an invention of the modern grammarians, to give the greater clearneſs to diſcourſe. The uſe thereof was unknown to the ancient Greeks and Romans, who wrote all without taking off the pen, ſo that their books lie all together without any diſtinction of points and *virgulas*.

VIRGULTUM, in our *Ancient Law Books*, is uſed for an holt, or plantation of twigs, or oſiers.

Sometimes, alſo, for a coppice of young wood. *Et præterea concedo* virgultum *meum, & totam communiam dominii mei*. Mon. Angl.

In another place of the ſame work, *virgultum*, or rather *virgulta*, may be taken for *virgata*, viz. *Dedit prædictæ eccleſiæ unam* virgultum *terræ in manerio de Crumptone*. See YARD *Land*.

VIRIDARIO *eligendo*, a writ that lies for the choice of a VERDEROR in the foreſt.

VIRIDE *æris*, the ſame as ÆRUGO, or VERDIGRISE.

VIRIDELLUS, a word uſed by ſome medical writers to expreſs the epilepſy, and, by ſome of the chemical ones, as a name for the common green vitriol.

VIRILE, ſomething that belongs, or is peculiar to man, or the male ſex.

Thus *virile* member, *membrum virile*, is frequently uſed for the PENIS.

VIRILE *Age*, *ætas virilis*, is the ſtrength and vigour of a man's age, viz. from thirty to forty-five years, which is an age wherein we are equally removed from the extremes of youth and old age. See AGE.

The civil lawyers only make one age of youth and *virility*, and yet their different temperatures ſeem to require a diſtinction, for which reaſon ſome compare youth to ſummer, and *virility* to autumn.

At Rome, the youth quitted the prætexa at fourteen or fifteen years of age, and took the *virile* gown, *toga virilis*, to ſhew, it ſeems, that they then entered on a ſerious age.

M. Dacier will have it, that children do not take the prætexta till thirteen years of age, nor quit it for the *toga virilis* till ſeventeen.

VIRILIA, a man's genitals, or privy members, including the penis and teſtes.

The cutting off the *virilia*, according to Bracton, was felony by common law ; and that whether the party were conſenting or not.

Henricus Hall & A. uxor ejus capti & detenti in priſona de Evilcheſter, eo quod rectati fuerunt, quod ipſi abſciderunt virilia *Johannis Monachi, quem idem Henricus deprehendit cum predicta A. uxore ejus*. Rot. Clauſ. 13 Hen. III.

VIRILIS *teſtis muſculus*, in *Anatomy*, a name given by Veſalius, and others, to the muſcle generally known by the name of the *cremaſter*.

VIRITES, a name by which the writers of the middle ages have called the pyrites.

VIRTSUNGIANUS *Ductus*, or *Ductus* VIRTSUNGII, ſo called from the inventor, *Virtſungius*, a profeſſor at Padua, in *Anatomy*, a canal, more uſually called DUCTUS *pancreaticus*. See PANCREAS and PANCREATIC *Juice*.

VIRTUAL, *Potential*, ſomething that has a power, or virtue, of acting or doing.

The term is chiefly underſtood of ſomething that acts by a ſecret inviſible cauſe, in oppoſition to *actual* and *ſenſible*.

VIRTUAL *Focus*, in *Optics*. See FOCUS.

VIRTUALITY, VIRTUALITAS, in the *Schools*, denotes ſome mode or analogy in an object, which, in reality, is the ſame with ſome other mode, but out of regard to contradictory predicates, is conſidered as if diſtinct therefrom.

And hence ariſe what we call *virtual diſtinctions*, whereby one *virtuality* is diſtinguiſhed from another, not one thing from another.

Thus it is, the divine nature is diſtinguiſhed from the divine perſon ; and the divine underſtanding from the divine will.

VIRTUALLY, VIRTUALITER, in the *Schools*, is applied to a mode of exiſtence. A thing is ſaid to be *virtually* any where, when it is deemed to be there by ſome *virtue*, influence, or other effect, produced by it. Thus the ſun is *virtually* on earth, i. e. by his light, heat, &c.

A thing is alſo ſaid to be *virtually* preſent, when the virtues, or properties, belonging to it, and iſſuing from it, remain. In which ſenſe, the forms of the elements are held to be *virtually* in mixed bodies.

A thing is alſo ſaid to be a cauſe *virtually*, or a *virtual cauſe*, and that two ways : the firſt, when there is no real diſtinction between it and the effect attributed to it ; and yet it is conceived by us as if it were really the cauſe thereof. Thus, immutability in God is the cauſe of eternity.

Secondly, when any effect is not of the ſame kind with the cauſe, and yet the cauſe has the power or virtue of producing the effect ; thus the ſun is not formally, but *virtually* hot ; and fire is not contained formally, but *virtually*, in heat.

VIRTUE, VIRTUS, a term uſed in various ſignifications. In the general, it denotes *power*, or *perfection*, of any thing, whether natural or ſupernatural, animate or inanimate, eſſential or acceſſary. Hence the *virtues*, that is, the powers of God, angels, men, plants, elements, &c.

VIRTUE, in its more proper and reſtrained ſenſe, ſignifies an habit, which improves and perfects the poſſeſſor, and his actions.

In this ſenſe, *virtue* is a principle of acting, or doing well and readily ; and that, either infuſed from above, ſuch as are *theological virtues*, or acquired by our own application, as the *intellectual* and *moral virtues*.

For, as there are two things in man from which all his actions proceed, viz. the underſtanding and the will, ſo the *virtue*, by which he is perfected, or whereby he is diſpoſed to do all things rightly, and to live happily, muſt be two-fold ; the one of the underſtanding, the other of the will. That which improves the underſtanding is called *intellectual*, or *dianoetic* ; and that, the will, *moral*, or *ethic*. For, ſince there are two things required in order to live aright, viz. to know what ſhould be done, and, when known, readily to perform it ; and, ſince man is apt to err various ways in each reſpect, unleſs regulated by diſcipline, &c. he alone can deport himſelf rightly in his whole courſe of life, whoſe underſtanding and will have attained their utmoſt perfection.

Intellectual VIRTUE, then, according to Ariſtotle, is an habit of the reaſonable ſoul, whereby it conceives, or ſpeaks the truth, either in affirming or denying.

The *virtues*, which come under this claſs, are divided into *ſpeculative*, which are thoſe converſant about neceſſary things, that can only be known or contemplated ; and *practical*, which are converſant about contingent things that may likewiſe be practiſed.

Ariſtotle has another diviſion of *intellectual virtue*, fetched from the ſubject; as ſome of them are ſeated in the επιϛημονικη, or *contemplative part*, viz. thoſe converſant about neceſſary things, as *ſcience*, *wiſdom*, *intelligence*: and others in the λογιϛικη, or *practical part*, ſuch as thoſe converſant about contingent things, as *prudence*, *art*, &c.

Moral VIRTUE is defined by Ariſtotle to be an elective habit, placed in a mediocrity, determined by reaſon, and as a prudent man would determine.

The Scotiſts maintain every moral habit to be indifferent, as to good or evil, and capable of becoming, ſucceſſively, either *virtue* or vice; *virtue*, if it have a relation of conformity with right reaſon, and vice if it have not.

According to them, therefore, *virtue* is an habit ſubjectively, but not entitatively good, as it is only a relation of conformity, &c. which is ſeparable from the entity of the habit.

The Thomiſts, on the contrary, aſſert *virtue* to be a habit eſſentially good, nor capable of miniſtring any thing to act poſitively bad. And they philoſophize thus: every habit eſſentially good, inclines to act like thoſe whereby it was acquired: thus, by doing juſtly we become juſt, and by abſtaining from forbidden pleaſures we become temperate.

But *moral virtue* is produced, or acquired, by acts eſſentially good; good, we mean, both in reſpect of our duty, and of the motive and end; therefore *moral virtue* inclines only to good acts.

Others diſallow the Peripatetic notion of *virtue*, as placed in a habit: for a habit, or hability, ſay they, includes two things; a cuſtom, and facility; the firſt as a cauſe, and the ſecond as an effect: ſo that a habit is nothing but a facility acquired by cuſtom. They, therefore, who make *virtue* a habit of doing well, muſt, of neceſſity, aſcribe it to a frequent exerciſe of good actions. But this cannot be; for the *virtue* muſt be before the good actions; and the habit, after them. Indeed, whence ſhould the actions proceed, but from *virtue? Virtue*, therefore, is before the good actions, and, certainly, before a habit, reſulting from a frequency of good actions. Hence, they define *virtue* to be a firm purpoſe, or reſolution, of doing whatever right reaſon demands to be done. For, though a cuſtom of doing well be required, to make a perſon eſteemed good among men: yet it does not follow, that that cuſtom, or habit, is the formal cauſe of that denomination, or the goodneſs itſelf.

Beſides, from the definition of Ariſtotle none can know what *virtue* is; for what mediocrity is, or what an extreme, in which he ſuppoſes VICE to conſiſt, can never be determined, till we know what is agreeable to the nature of things; and, moreover, the definition is faulty, becauſe there are ſome branches of virtue which cannot be carried to an extreme.

We ſhall here ſubjoin as conciſe an account as poſſible of the principal ſyſtems of MORALITY, that have been propoſed by different writers, both ancient and modern, who have treated of this ſubject; from which the reader will be able to diſcover the opinions that have chiefly prevailed with regard to the nature, foundation, and obligation of *virtue*.

It may be proper to premiſe, that *virtue* has been diſtinguiſhed into abſtract or abſolute, and relative or practical *virtue*. *Abſtract virtue* is, moſt properly, a quality of the external action or event; and denotes what an action is, conſidered independently of the ſenſe of the agent; or what, in itſelf and abſolutely, it is right ſuch an agent, in ſuch circumſtances, ſhould do, and what, if he judged truly, he would judge he ought to do. *Practical virtue*, on the contrary, has a neceſſary relation to, and dependence upon, the ſenſe and opinion of the agent concerning his actions: or it ſignifies what he ought to do, upon ſuppoſition of his having ſuch and ſuch ſentiments of things. Agreeably to this diſtinction, good actions have been by ſome divided into ſuch as are *materially* good, and ſuch as are *formally* ſo. The enquiry concerning the foundation of *virtue* refers to *abſolute virtue*: and if it be aſked what the foundation of *virtue* is, we may mean either, what is the true account or reaſon that ſuch and ſuch actions are right, or apprehended as ſuch by us; or, what are the primary principles and heads of *virtue*, i. e. the conſiderations inferring obligation in particular caſes, and rendering particular actions right and fit to be done; or, moreover, what are the motives, cauſes, and reaſons, which engage or attach us to it, and ſupport the practice of it in the world. In this laſt ſenſe the term muſt be uſed by thoſe who repreſent the will of God, ſelf-intereſt, the reaſons of things, and the moral ſenſe, as all diſtinct and coincident foundations of *virtue*.

An ingenious writer, in forming his arrangement of the different ſyſtems of moral philoſophy, of which we ſhall here avail ourſelves, obſerves, that in treating of the principles of morals, there are two queſtions to be conſidered: firſt, wherein does *virtue* conſiſt, or what, in temper and conduct, conſtitutes the excellent and laudable character? and ſecondly, by what power of the mind is this character, whatever it be, recommended to us? The firſt queſtion is examined when we conſider whether *virtue* conſiſts in benevolence, as Dr. Hutcheſon imagines; or in acting ſuitably to the different relations of perſons and things, as Dr. Clarke ſuppoſes; or in the prudent purſuit of our own true happineſs, as others have maintained. In reference to the ſecond queſtion we conſider, whether the virtuous character, whatever it conſiſts in, be recommended to us by ſelf-love, which makes us perceive that this character, both in ourſelves and others, tends moſt to promote our own private intereſt; or by reaſon, which points out to us the difference between one character and another, in the ſame manner as it does that between truth and falſehood; or by a peculiar power of perception, called a moral ſenſe, which this virtuous character gratifies and pleaſes, as the contrary diſguſts and diſpleaſes it; or laſtly, by ſome other principle in human nature, ſuch as a modification of ſympathy, or the like.

The different accounts which have been given of the nature of *virtue*, may be reduced to three different claſſes. According to ſome, *virtue* or the virtuous temper of mind, does not conſiſt in any one ſpecies of affections, but in the proper government and direction of all our affections, which may be either virtuous or vicious, according to the objects which they purſue, and the degree of vehemence with which they purſue them. According to theſe authors, therefore, *virtue* conſiſts in propriety.

According to others, *virtue* conſiſts in the judicious purſuit of our own private intereſt and happineſs, or in the proper government and direction of thoſe ſelfiſh affections which aim ſolely at this end. In the opinion of theſe authors, *virtue* conſiſts in prudence.

Others again make *virtue* conſiſt in thoſe affections only which aim at the happineſs of others, not in thoſe which aim at our own. According to them, therefore, diſintereſted benevolence is the only motive which can ſtamp upon any action the character of *virtue*.

According to Plato, Ariſtotle, and Zeno, *virtue* conſiſts in propriety of conduct, or in the ſuitableneſs of the affection from which we act to the object which excites it. In the ſyſtem of Plato, reaſon is the judging and ruling faculty; and *virtue*, according to him, conſiſts in that ſtate of mind in which every faculty confines itſelf within its proper ſphere without encroaching on that of any other, and performs its proper office with that preciſe degree of vigour which belongs to it: or, in other words, *virtue* conſiſts in propriety of conduct.

Virtue, according to Ariſtotle, conſiſts in the habit of mediocrity, according to right reaſon; every particular *virtue* lying in a kind of medium between two oppoſite vices; and thus, by making *virtue* to conſiſt in practical habits, he probably had in view to oppoſe the doctrine of Plato, who ſeems to have thought that juſt ſentiments concerning what was fit to be done or avoided were of themſelves ſufficient to conſtitute the moſt perfect *virtue*: Ariſtotle, on the contrary, was of opinion, that no conviction of the underſtanding was capable of getting the better of inveterate habits, and that good morals aroſe not from knowledge but from action.

According to Zeno and the Stoics, *virtue* conſiſted in chooſing and rejecting all different objects and circumſtances according as they were by nature rendered more or leſs the objects of choice or rejection; in ſelecting thoſe which were moſt to be choſen, when all could not be obtained; and in ſelecting thoſe which were leaſt to be avoided, when all could not be avoided. This conſtituted the eſſence of *virtue*, and was what the Stoics called to live conſiſtently, to live according to nature, and to obey thoſe laws which nature, or the author of nature preſcribed for our conduct: and in this courſe, they required the moſt perfect apathy, and conſidered every emotion which might in the ſmalleſt degree diſturb the tranquillity of the mind, as the effect of levity and folly.

Beſides theſe ancient there are ſome modern ſyſtems, according to which *virtue* conſiſts in propriety; or in the ſuitableneſs of the affection from which we act, to the cauſe or object which excites it. The ſyſtem of Dr. Clarke, Mr. Balguy, and other writers, which places *virtue* in acting according to the relations of perſons and things, in regulating our conduct according to the fitneſs or incongruity which there may be in the application of certain actions to certain things, or to certain relations: that of Mr. Grove and others, who explain *virtue* by ſaying, that it is the conformity of our actions to reaſon: that of Mr. Wollaſton, which places it in acting according to the truth of things, actions as well as words having a language, ſo that when this action is agreeable to the nature of things, the action is virtuous, and when it implies a falſe aſſertion, vicious: that of lord Shafteſbury, which places it in maintaining a proper balance of the affections, and allowing no paſſion to go beyond its proper ſphere, or in a certain juſt diſpoſition of a rational creature towards the moral objects of right and wrong: are all of them reducible to the ſame fundamental idea of propriety, as it has been explained.

The moſt ancient of thoſe ſyſtems, which make *virtue* conſiſt in prudence, is that of Epicurus, who maintained that bodily pleaſure and pain were the ſole ultimate objects of natural deſire and averſion, and were the ſources of thoſe of the mind; and who placed the moſt perfect happineſs which man was capable of enjoying in eaſe of body, and in tranquillity of mind. According to him, *virtue* did not deſerve to be purſued for its own ſake, nor was itſelf one of the ultimate objects of natural appetite, but was eligible on account of its tendency to prevent pain, and to procure eaſe and pleaſure. Among our modern writers on the ſubject of morality, there have been ſome who have placed all *virtue* in a wiſe regard to our own intereſt: this ſeems to have been the opinion of Dr. Waterland, Dr. Rutherford, &c.

The ſyſtem which makes *virtue* conſiſt in benevolence, ſeems to have been the doctrine of moſt of thoſe philoſophers who, about and after the age of Auguſtus, called themſelves ECLECTICS, who pretended to follow chiefly the opinions of Plato and Pythagoras, and who are commonly known by the name of the later Platoniſts. In the divine nature, according to them, benevolence was the ſole principle of action, and directed the exertion of all the other attributes. The wiſdom of the Deity was employed in finding out the means for bringing about thoſe ends which his goodneſs ſuggeſted, as his infinite power was exerted to execute them. Benevolence, however, was a ſupreme and governing attribute, to which the others were ſubſervient, and from which the whole excellency of the divine operations was ultimately derived. The whole perfection and *virtue* of the human mind conſiſted in ſome reſemblance or participation of the divine perfections, and, conſequently, in being filled with the ſame principle of benevolence, which influenced all the actions of the Deity. This ſyſtem, as it was much eſteemed by many of the ancient fathers of the church, was, after the Reformation, adopted by ſeveral divines of the moſt eminent piety and learning, and of the moſt amiable manners: particularly by Dr. Ralph Cudworth, Dr. Henry More, and Mr. John Smith, of Cambridge. Mr. Bays has alſo more lately conſidered benevolence as the ſpring of the divine actions; whilſt Mr. Balguy referred them all to rectitude, and Mr. Grove to wiſdom. The ſubject was ably canvaſſed by theſe writers, and ſeveral excellent pamphlets publiſhed on the occaſion. But of all the patrons of the ſyſtem of benevolence, the late Dr. Hutcheſon purſued it to the greateſt extent, and with diſtinguiſhed acuteneſs and accuracy. Accordingly, he defines moral goodneſs to be a quality apprehended in ſome actions, which produces approbation and love towards the actor, from thoſe who receive no benefit from the action; and he obſerves, that the mixture of any ſelfiſh motive diminiſhes or altogether deſtroys the merit which would otherwiſe have belonged to any action, and, therefore, that *virtue* muſt conſiſt in pure and diſintereſted benevolence alone. Others, and particularly Dr. Cumberland, in his Law of Nature, have placed the whole of *virtue* in the love of God and our fellow-creatures: to this purpoſe he obſerves, (de Leg. Nat. cap. i. ſect. 4.) the foundation of all natural law is this, that the greateſt benevolence of every rational agent towards all forms the happieſt ſtate of every and of all the benevolent, as far as is in their power, and is neceſſarily requiſite to the happieſt ſtate which they can attain; and, therefore, the common good is the ſupreme law.

The three ſyſtems above recited comprehend the principal accounts which have been given of the nature of *virtue*. To one or other of theſe, all the other definitions or deſcriptions of *virtue*, how different ſoever they may appear, are eaſily reducible. That ſyſtem which places *virtue* in obedience to the will of the Deity, may be counted among thoſe which makes it conſiſt in prudence, or among thoſe which make it conſiſt in propriety. When it is aſked, why we ought to obey the will of the Deity, the queſtion can admit but of two different anſwers. It muſt either be ſaid, that we ought to obey the will of the Deity becauſe he is a being of infinite power, who will recompence or puniſh: or it muſt be ſaid, that independent of any regard to our own happineſs, or to rewards and puniſhments of any kind, there is a congruity and fitneſs that a creature ſhould obey its Creator, and a limited imperfect being ſubmit to one of infinite perfection. In the firſt caſe, *virtue* conſiſts in prudence, or in the proper purſuit of our own final and ſupreme intereſt; ſince it is upon this account that we are obliged to obey the will of the Deity; and in the latter caſe, *virtue* muſt conſiſt in propriety, ſince the ground of our obligation to obedience is the ſuitableneſs or congruity of the ſentiments of humility and ſubmiſſion to the ſuperiority of the object which excites them. That ſyſtem which places *virtue* in utility, coincides too with that which maks it conſiſt in propriety.

All the ſyſtems above recited ſuppoſe, that there is a real and eſſential diſtinction between *virtue* and vice, whatever theſe qualities may conſiſt in. There is a real and eſſential difference between the propriety and impropriety of any affection; between benevolence and any other principle of action; between real prudence and ſhort-ſighted folly or precipitate raſhneſs. And the general tendency of all theſe ſyſtems is to encourage the beſt and moſt laudable diſpoſitions and habits.

There are, however, ſome other ſyſtems, which ſeem altogether to annihilate the diſtinction between vice and *virtue*, and the tendency of which is, therefore, wholly pernicious: ſuch are the ſyſtems of Rochefoucault, and Mandeville, who aſcribes actions commonly accounted virtuous to the frivolous motive of vanity: treating every thing as vanity that has any reference to what are, or ought to be, the ſentiments of others; and by means of ſuch ſophiſtry he eſtabliſhes his favourite concluſion, that private vices are public benefits.

After the enquiry concerning the nature of *virtue*, the next queſtion of importance in moral philoſophy concerns the principle of APPROBATION, or that faculty of the mind which renders certain characters agreeable or diſagreeable to us, makes us prefer one tenor of conduct to another, denominate the one right and the other wrong, and conſider the one as the object of approbation, honour, and reverence, and the other as that of blame, cenſure, and puniſhment. Three different accounts have been given of this principle of approbation. According to ſome, we approve and diſapprove both of our own actions and of thoſe of others, from ſelf-love only, or from ſome view of their tendency to our own happineſs or diſadvantage. According to others, reaſon, the ſame faculty by which we diſtinguiſh between truth and falſhood, enables us to diſtinguiſh between truth and fit and unfit both in actions and affections; according to others, this diſtinction is altogether the effect of immediate ſentiment and feeling, and ariſes from the ſatisfaction or diſguſt with which the view of certain actions or affections inſpires us.

Thoſe who account for the principle of approbation from ſelf-love, differ in their repreſentation of its influence. According to Mr. Hobbes, and many of his followers, man is driven to take refuge in ſociety, not by any natural love which he bears to his own kind, but becauſe without the aſſiſtance of others he is incapable of ſubſiſting with eaſe or ſafety: *virtue* being the great ſupport, and vice the great diſturber of human ſociety, whence the former neceſſarily pleaſes, and the latter is as naturally offenſive. Moreover, a ſtate of nature, according to Mr. Hobbes, being a ſtate of war, ſo that antecedent to the conſtitution of civil government, there could be no ſafe and peacable ſociety among men; to preſerve ſociety was to ſupport civil government, and the ſupport of civil government depends upon the obedience that is paid to the ſupreme magiſtrate; hence it was inferred, that the laws of the civil magiſtrate ought to be regarded as the ſole ultimate ſtandards of what was juſt and unjuſt, right and wrong. See HOBBISM.

In order to confute ſo odious a doctrine, it was neceſſary to prove that, antecedent to all law or poſitive inſtitution, the mind was naturally endowed with a faculty, by which it diſtinguiſhed in certain actions and affections the qualities of right, laudable, and virtuous, and in others, thoſe of wrong, blameable, and vicious. This faculty was reaſon, which pointed out the difference between right and wrong, in the ſame manner in which it did betwen truth and falſhood. Right and wrong, it is argued, denote ſimple ideas, and are, therefore, to be aſcribed to ſome immediate power of perception in the human mind, which power is the underſtanding. Beſides, all actions have a nature; ſome character belongs to them, and there is ſomething that may be affirmed of them, i. e. ſome are right and others wrong. But if our actions are, in themſelves, either right or wrong, or any thing of a moral and obligatory nature, which can be an object to the underſtanding, it muſt follow that in themſelves, they are all indifferent. From ſuch reaſoning it follows, that morality is eternal and immutable: becauſe right and wrong denote what actions are; and whatever any thing is, that it is not by will, or decree, or power, but by nature and neceſſity. No will can render any thing good and obligatory, which was not ſo antecedently and from eternity, or any action right, that is not ſo in itſelf. In this view of it, morality appears not to be, in any ſenſe, factitious, or the arbitrary production of any power, human or divine; but equally everlaſting and neceſſary with all truth and reaſon. Some have ſuppoſed, however, that, in men, the rational principle, or the intellectual diſcernment of right and wrong, ſhould be aided by ſomewhat inſtinctive. Of this number is Dr. Price, who, in his reaſoning concerning the original of our ideas of the BEAUTY and DEFORMITY of actions, obſerves, that in contemplating the actions and affections of moral agents, we have both a perception of the underſtanding, and a feeling of the heart; and that the latter, or the effects in us accompanying our moral perceptions are deducible from two ſprings; they partly depend on the poſitive conſtitution of our natures, but the moſt ſteady and univerſal ground of them is the eſſential congruity or incongruity between the object and faculty; in other words, *placet ſuapte natura—virtus*: Sen. or, *Etiamſi à nullo laudetur, natura eſt laudabile.* Tully. See COMMON SENSE.

This leads us to mention thoſe ſyſtems which make ſentiment the principle of approbation; theſe may be diſtributed into two different claſſes.

According to ſome, the principle of approbation is founded upon a ſentiment of a peculiar nature, upon a particular power of perception exerted by the mind at the view of certain actions and affections; ſome of which affecting this faculty in an agreeable, and others in a diſagreeable manner, the former are ſtamped with the characters of right, laudable, and virtuous; the latter with thoſe of wrong, blameable, and vitious.

This ſentiment being of a peculiar nature, diſtinct from every other, and the effect of a particular power of perception, they give it a particular name, and call it a *moral* SENSE.

Dr. Hutcheſon, having taken great pains to prove that the principle of approbation was not founded on ſelf-love, and that it could not ariſe from any operation of reaſon, ſuppoſed it to be a faculty of a peculiar kind, with which nature had endowed the human mind, in order to produce this particular and important effect. This power, which he called a moral ſenſe, he ſuppoſed to be ſomewhat analogous to the external ſenſes.

According to his ſyſtem, the various ſenſes or powers of perception, from which the human mind derives all its ſimple ideas, were of two different kinds, of which one were called the direct or antecedent, the other the reflex or conſequent ſenſes. The direct ſenſes were thoſe faculties from which the mind derived the perception of ſuch ſpecies of things, e. gr. ſounds and colours, as did not pre-ſuppoſe the antecedent perception of any other quality or object. The reflex, or conſequent ſenſes, were thoſe faculties from which the mind derived the perception of ſuch ſpecies of things as pre-ſuppoſed the antecedent perception of ſome other; ſuch as harmony and beauty.

The moral ſenſe was conſidered as a faculty of this kind. That faculty, which Mr. Locke calls reflection, and from which he derived the ſimple ideas of the different paſſions and emotions of the human mind, was, according to Dr. Hutcheſon, a direct internal ſenſe. That faculty again, by which we perceived the beauty or deformity, the virtue or vice of thoſe different paſſions and emotions, was a reflex internal ſenſe.

Dr. Hutcheſon endeavoured ſtill farther to ſupport this doctrine, by ſhewing that it was agreeable to the analogy of nature, and that the mind was endowed with a variety of other reflex ſenſes exactly ſimilar to the moral ſenſe; ſuch as a ſenſe of beauty and deformity in external objects; a *public* SENSE, by which we ſympathiſe with the happineſs or miſery of our fellow-creatures; a ſenſe of ſhame and honeſty, and a ſenſe of ridicule.

To this ſyſtem it has been objected, that it makes *virtue* an arbitrary thing, depending on the poſitive conſtitution of our minds; that right and wrong are only qualities of our minds and ſenſations, depending on the particular frame and ſtructure of our natures, which have no other meaſure or ſtandard beſides every one's private ſtructure of mind and ſenſations; that it implies, that a creature with intelligence, reaſon, and liberty, could not have performed one good action, without that inſtinctive affection to which Dr. Hutcheſon aſcribes every good action; that it makes brutes capable of *virtue*, becauſe they are capable of affections; that it eſtimates the excellency of characters by the ſtrength of paſſions, by no means in our power; and that, upon the whole, it gives us a much leſs honourable idea of *virtue* than other ſyſtems, which make it to conſiſt in the agreement of the actions of an intelligent being with the nature, circumſtances, and relations of things, and of which reaſon is the judge.

We ſhall only add, that the opinion of thoſe, who maintain our ideas of morality to be derived from ſenſe, is far from being entirely modern. There were, among the ancients, philoſophers, particularly Protagoras and his followers, who entertained a like opinion, but extended it much farther, that is, to all ſcience, denying all abſolute and immutable truth, and aſſerting every thing to be relative to perception.

According to others, who aſcribe the principle of approbation to ſentiment, there is no occaſion for ſuppoſing any new power of perception; nature acting in this, as in all other caſes, with the ſtricteſt œconomy, and producing a multitude of effects from one and the ſame cauſe; and therefore, ſympathy, they ſay, a power which has always been taken notice of, and with which the mind is manifeſtly endowed, is ſufficient to account for all the effects aſcribed to this peculiar faculty. Of this number is Dr. Adam Smith. See SYMPATHY. See alſo Smith's Theory of Moral Sentiments, paſſim; and particularly part i. ſect. 1, 2, 3.

The term, obligation of *virtue*, or moral obligation, frequently occurs among moral writers; and it is very differently defined and explained. Mr. Balguy defines obligation to be a ſtate of the mind into which it is brought by perceiving a reaſon for action; but an excellent writer obſerves, that this is the effect of obligation perceived, rather than obligation itſelf.

Other writers, with Dr. Cumberland, have defined obligation the neceſſity of doing a thing in order to be happy: but if this be the only ſenſe of obligation, what is meant when we ſay, a man is obliged to ſtudy his own happineſs? In this caſe we can only mean, that it is right to ſtudy our own happineſs, and wrong to neglect it.

Dr. Warburton maintains, that moral obligation always denotes ſome object of will or law, or implies ſome obliger; and accordingly, the word obligation ſignifies only the particular fitneſs of obeying the divine will, and cannot properly be applied to any other fitneſs, which is reſtraining the ſenſe of the word in a manner unwarranted by the common uſe of it.

Dr. Hutcheſon ſays, a perſon is obliged to an action, when every ſpectator, or he himſelf, upon reflexion, muſt approve his action, and diſapprove omitting it. Obligation to act, however, and reflex approbation or diſapprobation, do, in one ſenſe, always accompany and imply one another; yet they ſeem as different as an act and an object of the mind, or as perception and the truth perceived. After all, it may be obſerved that, however variouſly and looſely this word may be uſed, its primary and original ſignification coincides with rectitude: right implies duty in its idea, ſo that to perceive an action to be right, is to ſee a reaſon for the doing it in the action itſelf, abſtracted from all other conſiderations whatever; and this perception, this acknowledged rectitude in the action, is the very eſſence of this obligation, or that which commands the approbation and choice, or binds the conſcience of every rational being. See Price's Review of the Principal Queſtions, &c. in Morals, chap. vi and Adams's Sermon on the Nature and Obligation of *Virtue*.

Moraliſts uſually diſtinguiſh four *principal*, or, as they are vulgarly called, *cardinal virtues*, viz. *prudence*, *juſtice*, *fortitude*, and *temperance*: the reaſon of which diviſion is founded in this: that, for a man to live *virtuouſly* and honeſtly, it is neceſſary he know what is fit to be done; which is the buſineſs of *prudence*.

That he have a conſtant and firm will to do what he judges beſt; which will perfect the man, either as it reſtrains too violent perturbations, the office of *temperance*: or, as it ſpurs and urges on thoſe that are too ſlow and languid, which is the buſineſs of *fortitude*: or, laſtly, comparatively, and with regard to human ſociety; which is the object of *juſtice*.

To theſe four all the other *virtues* are referred, either as parts, or as concomitants.

VIRTUES, in the *Celeſtial Hierarchy*, the third rank, or choir, of angels, being that in order between *dominations* and *powers*.

To theſe is attributed the power of working miracles, and of ſtrengthening and reinforcing the inferior angels in the exerciſe of their functions.

VIRTUOSO, an Italian term, lately introduced into Engliſh, ſignifying a man of curioſity and learning; or one who loves and promotes the arts and ſciences.

In Italy, *virtuoſi* are properly ſuch as apply themſelves to the polite arts of painting, ſculpture, mathematics, muſic, &c. A perſon who makes profeſſion thereof is called *virtuoſo, queſto è un virtuoſo.*

Among us, the term ſeems appropriated to thoſe who apply themſelves to ſome curious and quaint, rather than immediately uſeful art or ſtudy; as antiquaries, collectors of rarities of any kind, microſcopical obſervers, &c.

VIRULENT, a term applied to any thing that yields a *virus*, that is, a contagious, or malignant pus.

The GONORRHOEA *virulenta* is what we popularly call a CLAP.

VIS, a Latin word, ſignifying Force or *power*; adopted by phyſical writers, to expreſs divers kinds of natural powers, or faculties.

This is active and paſſive; the *vis activa* is the power of producing motion; the *vis paſſiva*, that of receiving or loſing it. The *vis activa* is again ſubdivided into *vis viva* and *vis mortua*.

Vis *abſoluta*, or *abſolute force*, is that kind of centripetal force which is meaſured by the motion that would be generated by it in a given body, at a given diſtance, and depends on the efficacy of the cauſe producing it.

Vis *acceleratrix*, or *accelerating force*, is that centripetal force which produces an accelerated motion, and is proportional to the velocity which it generates in a given time.

This is different at different diſtances from the ſame central body; and depends not on the quantity of matter that gravitates, being equal in all ſorts of bodies at equal diſtances from the centre. See Acceleration.

Vis *impreſſa* is defined by ſir Iſaac Newton to be the action exerciſed on any body to change its ſtate, either of reſt or moving uniformly in a right line.

This force conſiſts altogether in the action; and has no place in the body after the action is ceaſed. For the body perſeveres in every new ſtate, by the *vis inertiæ* alone.

The *vis impreſſa* may ariſe from divers cauſes; as from percuſſion, preſſion, and centripetal force.

Vis *inertiæ*, or *power of inactivity*, is defined by ſir Iſaac Newton to be a power implanted in all matter, whereby it reſiſts any change endeavoured to be made in its ſtate, i. e. whereby it becomes difficult to alter its ſtate, either of reſt or motion.

This power, then, coincides with the *vis reſiſtendi*, power of reſiſting, whereby every body endeavours, as much as it can, to perſevere in its own ſtate, whether of reſt or uniform rectilinear motion; which power is ſtill proportional to the body, and only differs from the *vis inertiæ* of the maſs, in the manner of conceiving it.

Bodies only exert this power in changes brought on their ſtate by ſome *vis impreſſa*, force impreſſed on them. And the exerciſe of this power is, in different reſpects, both reſiſtance and impetus; reſiſtance, as the body oppoſes a force impreſſed on it to change its ſtate; and impetus, as the ſame body endeavours to change the ſtate of the reſiſting obſtacle. Phil. Nat. Princ. Math. lib. i.

The *vis intertiæ*, the ſame great author elſewhere obſerves, is a paſſive principle, by which bodies perſiſt in their motion, or reſt, receive motion, in proportion to the force impreſſing it, and reſiſt as much as they are reſiſted.

For the effect of the Vis Inertiæ, *in reſiſting and retarding the motion of bodies*, &c. ſee Resistance.

Vis *inſita*, or *innate force* of matter, is a power of reſiſting, by which every body, as much as in it lies, endeavours to perſevere in its preſent ſtate, whether of reſt or of moving uniformly forward in a right line.

This force is ever proportional to that body whoſe force it is, and differs nothing from the *vis inertiæ* but in our manner of conceiving it.

Vis *Centripeta*. See Centripetal *Force*.

Vis *Centrifuga*. See Centrifugal *Force*.

Vis *motrix*, or *moving force*, of a centripetal body, is the tendency of the whole body towards the centre, reſulting from the tendency of all the parts, and is proportional to the motion, which it generates in a given time; ſo that the *vis motrix* is to the *vis acceleratrix* as the motion to the celerity: and as the quantity of motion in a body is eſtimated by the product of the celerity into the quantity of matter, the *vis motrix* ariſes from the *vis acceleratrix*, multiplied by the quantity of matter.

The followers of Leibnitz uſe the term *vis motrix* for the force of a body in motion, in the ſame ſenſe as the Newtonians uſe the term *vis inertiæ*; this latter they allow to be inherent in a body at reſt; but the former, or *vis motrix*, is a force inherent in the ſame body whilſt in motion, which actually carries it from place to place, by acting upon it always with the ſame intenſity in every phyſical part of the line which it deſcribes. See Force and Motion.

Vis *viva*, in *Mechanics*, a term uſed by Leibnitz and his diſciples for FORCE, which they diſtinguiſh into two kinds, *vis mortua*, and *vis viva*; underſtanding by the former any kind of preſſure, or an endeavour to move, inſufficient to produce actual motion, unleſs its action on a body be continued for ſome time, and by the latter, that force or power of acting which reſides in a body in motion.

VISCAGO, in *Botany*, the name of a genus of plants, deſcibed by Dillenius, and ſince called by Linnæus *ſilene*. See *Viſcous* Campion.

Viscago is alſo uſed by ſome pharmaceutic writers, to expreſs a mucilage.

VISCERA, in *Anatomy*, a term of equal import with *entrails*, including the heart, liver, lungs, ſpleen, inteſtines, and other inward parts of the body. See *Tab. Anat.* (*Splanch.*) *P.* 3.

The term is formed of *veſci*, to *feed*; by reaſon eatables, called in Latin *veſca*, undergo divers preparations in the *viſcera*.

The word is alſo frequently uſed ſingularly, *viſcus*, to expreſs ſome particular part of the entrails, becauſe the word *intrails* has no ſingular.

Viscera, *Wounds of the.* If any of the *viſcera* ſituated in the abdomen, as the liver, ſpleen, or kidney, has received a wound from a ſharp inſtrument, at the firſt dreſſing the wound muſt be filled, as tenderly as poſſible, with lint well ſaturated with highly rectified ſpirit of wine, or ſpirit of turpentine, ſecuring the dreſſings with compreſſes and a bandage; by this means the hæmorrhage will be ſtopped, if no large veſſel is divided. When this part is gained, the wound muſt be treated in the common manner, and the patient kept very low; bleeding him, if of a plethoric habit, and giving daily two or three doſes of Lucatellus's balſam; for balſams of this kind are of great ſervice in healing internal wounds. This is the method to be taken with wounds of the *viſcera*, which may be diſcovered by the eye or touch. But in ſuch of them as are hidden, and not to be thus diſcovered, all that can be done is to inject vulnerary decoctions, and keep a paſſage open for the evacuation of ſordes, or grumous blood. Heiſter.

VISCERALIA, a term uſed by phyſicians, to denote ſuch medicines as impart ſtrength and firmneſs to the ſanguineous *viſcera*, ſuch as the liver, ſpleen, &c.

VISCERATIONES, among the *Romans*, a feaſt conſiſting of the entrails of animals, given to the people at the burial of great men in Rome.

VISCIDITY, or Viscosity, the quality of ſomething that is *viſcid*, or *viſcous*, i. e. glutinous and ſticky, like bird-lime; which the Latins call by the name *viſcus*.

Viſcid bodies are thoſe which conſiſt of parts ſo implicated within each other, that they reſiſt, a long time, a complete ſeparation, and rather give way to the violence done them by ſtretching, or extending each way.

The too great *viſcidity* of foods has very ill effects; thus meals, or farinæ not fermented, jellies, &c. of animals, tough cheeſe, or curd too much preſſed, produce a weight, or oppreſſion in the ſtomach; wind, yawnings, crudities, obſtructions of the minuter veſſels in the inteſtines, &c. Hence an inactivity of the inteſtines themſelves, a ſwelling of the abdomen; and hence a *viſcidity* of the blood, from the re-union of the *viſcid* particles; obſtructions of the glands, paleneſs, coldneſs, tremors, &c.

VISCOUNT. See Vicount.

VISCUS, and Viscosity. See Viscera and Viscidity.

VISCUM, in *Natural Hiſtory*, &c. See Misseltoe.

Viscum is alſo uſed for *birdlime*. This was eſteemed a poiſon among the ancient Greeks, and is ſeldom omitted under the claſs of deleterious things enumerated in their writings.

It is called by theſe authors *ixias*; but this word has occaſioned great errors in late writers, the word *ixias* having been applied to the white chamæleon thiſtle, not becauſe of any poiſonous quality it had, for they all declare it to be innocent, but becauſe of its yielding a viſcous, or clammy juice. The black CHAMÆLEON thiſtle was always eſteemed poiſonous among them; and hence ſome have ſuppoſed the word *ixias* to be applied to that, and the poiſon *ixias*, mentioned by the Greeks, to be the root of that plant. Paulus Ægineta, indeed, ſeems to have underſtood it ſo, the poiſon *ixias* being by him placed among the roots; but Galen, who calls it a ſlow poiſon, and ſays, that it kills by ſtopping up and gluing together the inteſtines, plainly enough means *birdlime*, not the root of any plant.

Viscum *caryophylloides*, a name given by ſir Hans Sloane, and many other authors, to a genus of plants of a very peculiar kind.

They are called *viſcum* from their growing upon other trees, in the manner that the miſletoe does with us; and *caryophylloides*, from their leaves, in ſome degree reſembling thoſe of our pinks or carnations; but the plant itſelf, in all its ſpecies, is wholly different, both from the miſletoe and pink, in all other reſpects.

The ſeveral ſpecies of theſe plants differ greatly alſo from one another; the moſt fragrant ſpecies in Jamaica is a very large one, called by the common people the wild pine. See the deſcription of it in Phil. Tranſ. N° 252. p. 114.

VISIBLE, VISIBILE, ſomething that is an object of SIGHT, or VISION; or ſomething whereby the eye is affected, ſo as to produce a ſenſation.

The ſchool philoſophers make two kinds of *viſibles*, or *viſible* objects; the one *proper*, or *adequate*, which are ſuch as are no other way perceivable, but by ſight alone; the other *common*, which are ſubject to divers ſenſes, as the ſight, hearing, feeling, &c.

Again, the firſt, or *proper object of viſion*, is of two kinds, viz. *light* and *colour*; for theſe two are only ſenſible by ſight. The firſt, and primary, viz. *light*, they make the formal, and *colour*, the material object.

The Carteſians think they philoſophize better, when they ſay, that light alone is the proper object of viſion; whether it flow from a luminous body through a tranſparent medium, and retains its firſt name, *light*, or whether it be reflected from opake bodies, under a certain new modification or habitude, and exhibit their images; or, laſtly, whether in being reflected, it is likewiſe refracted, after this or that manner, and affects the eye with the appearance of *colour*.

But, agreeable to ſir Iſaac Newton's ſentiments, colour alone is the proper object of ſight; colour being that property of light whereby the light itſelf is *viſible*, and whereby the images of opake bodies are painted on the retina.

Ariſtotle, De Anima, lib. ii. enumerates five kinds of common *viſibles*, which are uſually received for ſuch in the ſchools, viz. *motion*, *reſt*, *number*, *figure*, and *magnitude*.

Others maintain nine, as in the verſes:

Sunt objecta novem viſus *communia:* quantum,
Inde figura, locus, *ſequitur* diſtantia, ſitus,
Continuumque & diſcretum, motuſque, quieſque.

Authors reaſon very variouſly as to theſe common objects of viſion; there are two principal opinions among the ſchoolmen.

The adherents to the firſt hold, that the common *viſibles* produce proper repreſentations of themſelves, by ſome peculiar ſpecies, or image, whereby they are formally perceived, independently of the proper *viſibles*.

But the ſecond opinion prevails moſt, which imports, that the common *viſibles* have not any ſuch formal peculiar ſpecies to become *viſible* by; but that the proper objects are ſufficient to throw themſelves in this or that place or ſituation, and in this or that diſtance, figure, magnitude, &c. by the circumſtances of their conveyance to the ſenſory.

In effect, ſince theſe common *viſibles* cannot be repreſented alone (for whoever ſaw place, diſtance, figure, ſituation, &c. of itſelf?) but are always conveyed along with the images of light and colour to the organ; what neceſſity is there to conceive any ſuch proper images whereby the common *viſibles* ſhould be formally perceived by the ſoul? It is much more probable, that from the peculiar manner wherein the ſenſitive faculty perceives a proper object, it is appriſed of its being in this or that ſituation or place: in this or that figure, magnitude, &c. How this is effected may be conceived from what follows:

I. The ſituation and place of *viſible* objects are perceived without any intentional ſpecies thereof, merely by the impulſe being made from a certain place and ſituation, either above or below, on the right or left, before or behind, whereby the rays of the proper *viſibles* are thrown upon the retina, and their impreſſion is conveyed to the ſenſory.

For, ſince an object is ſeen by thoſe rays which carry its image to the retina, and in that place to which the viſible power is directed by the rays it receives, as it perceives the impulſe of the rays to come from any place, &c. it is abundantly admoniſhed of the objects being in that place and ſituation. See *Apparent* PLACE.

Philoſophers, in general, had formerly taken for granted, that the place to which the eye refers any *viſible* object, ſeen by reflection or refraction, is that in which the viſual ray meets a perpendicular from the object upon the reflecting or the refracting plane. That this is the caſe with reſpect to plane mirrors is univerſally acknowledged; and ſome experiments with mirrors of other forms ſeem to favour the ſame concluſion, and thereby afford reaſon for extending the analogy to all caſes of viſion. If a right line be held perpendicularly over a convex or concave mirror, its image ſeems to make one line with it. The ſame is the caſe with a right line held perpendicularly within water; for the part which is within the water ſeems to be a continuation of that which is without, at leaſt when it is viewed with no more than common attention, and in ſome poſitions. But Dr. Barrow called in queſtion this method of judging of the place of an object, and thereby opened a new field of inquiry and debate in this branch of ſcience. This, with other optical inveſtigations he publiſhed in his Optical Lectures, firſt printed in 1674. Having, as he imagined, refuted the common hypotheſis concerning the place of *viſible* objects, he ſubſtitutes another rule, by which, he ſays, our judgments are actually directed in this caſe. According to him, we refer every point of an object to the place from which the pencils of light, that give us the image of it, iſſue, or from which they would have iſſued, if no reflecting or refracting ſubſtance intervened. Purſuing this principle, Dr. Barrow proceeded to inveſtigate the place, in which the rays, iſſuing from each of the points of an object, and which reach the eye after one reflection or refraction, meet; and he found, that if the refracting ſurface was plane, and the refraction was made from a denſer medium into a rarer, thoſe rays would always meet in a place between the eye and a perpendicular to the point of incidence.

If a convex mirror be uſed, the caſe will be the ſame; but if the mirror be plane, the rays will meet in the perpendicular, and beyond it if it be concave. He alſo determined, according to theſe principles, what form the image of a right line will take when it is preſented in different manners to a ſpherical mirror, or when it is ſeen through a refracting medium.

Dr. Barrow, however, mentions an objection againſt the maxim which he endeavoured to eſtabliſh, concerning the ſuppoſed place of *viſible* objects, and candidly owns that he was not able to give a ſatisfactory ſolution of it. The objection is this; let an object be placed beyond the focus of a convex lens, and if the eye be cloſe to the lens, it will appear confuſed, but very near to its true place. If the eye be a little withdrawn, the confuſion will increaſe, and the object will ſeem to come nearer; and when the eye is very near the focus, the confuſion will be exceedingly great, and the object will ſeem to be cloſe to the eye. But in this experiment the eye receives no rays but thoſe that are converging; and the point from which they iſſue is ſo far from being nearer than the object, that it is beyond it; notwithſtanding which, the object is conceived to be much nearer than it is, though no very diſtinct idea can be formed of its preciſe diſtance.

The firſt perſon who took much notice of Dr. Barrow's hypotheſis, and the difficulty attending it, was Dr. Berkeley, who, in his Eſſay on a New Theory of Viſion, p. 30. obſerves, that the circle formed upon the retina, by the rays which do not come to a focus, produce the ſame confuſion in the eye, whether they croſs one another before they reach the retina, or tend to it afterwards; and therefore, that the judgment concerning diſtances will be the ſame in both the caſes, without any regard to the place from which the rays originally iſſued; ſo that in this caſe, as, by receding from the lens, the confuſion, which always accompanies the nearneſs of an object, increaſes, the mind will judge that the object comes nearer. See *Apparent* DISTANCE.

M. Bouguer, a late ingenious writer on optics, in his Traité D'Optique, p. 104. adopts the general maxim of Dr. Barrow, in ſuppoſing that we refer objects to the place from which the pencils of rays ſeemingly converge at their entrance into the pupil. But when rays iſſue from below the ſurface of a veſſel of water, or any other refracting medium, he finds that there are always two different places of this ſeeming convergence: one of them of the rays that iſſue from it in the ſame vertical circle, and, therefore, fall with different degrees of obliquity upon the ſurface of the refracting medium, and another of thoſe that fall upon the ſurface with the ſame degree of obliquity, entering the eye laterally with reſpect to one another. Sometimes, he ſays, one of theſe images is attended to by the mind, and ſometimes the other; and different images may be obſerved by different perſons. An object, plunged into water, affords an example, he ſays, of this duplicity of images.

G. W. Krafft has ably ſupported the opinion of Dr. Barrow, that the place of any point ſeen by reflection from the ſurface of any medium, is that in which rays iſſuing from it, infinitely near to one another, would meet and conſidering the caſe of a diſtant object, viewed in a concave mirror by an eye very near to it, when the image, according to Euclid and other writers, would be between the eye and the object, and the rule of Dr. Barrow cannot be applied; he ſays, that, in this caſe, the ſpeculum may be conſidered as a plane, the effect being the ſame, only that the image is more obſcure. Com. Petropol. vol. xii. p. 252. 256. See Prieſtley's Hiſt. of Light, &c. p. 89. 688, &c.

From the principle above illuſtrated, ſeveral remarkable phenomena of viſion are accountable for, as:

1. That if the diſtance between two *viſible* objects be an angle that is inſenſible, the diſtant bodies will appear as if contiguous: whence a continuous body being the reſult of ſeveral contiguous ones; if the diſtances between ſeveral *viſibles* ſubtend inſenſible angles, they will appear one continuous body; which gives a pretty illuſtration of the notion of a continuum.

Hence parallel lines, and long viſtas, conſiſting of parallel rows of trees, ſeem to converge more and more, the farther they are extended from the eye; becauſe the apparent magnitudes of their perpendicular intervals are perpetually diminiſhing, while, at the ſame time, we miſtake their diſtance. When two parallel rows of trees ſtand upon an aſcent, the more remote parts appear farther off than they really are, becauſe the line that meaſures the length of the viſtas now appears under a greater angle than when it was horizontal; the trees, in ſuch a caſe, ſeeming to converge leſs, and ſometimes, inſtead of converging, ſeeming to diverge.

The proper method of drawing the appearance of two rows of trees that ſhall appear parallel to the eye, is a problem that has exerciſed the ingenuity of ſeveral philoſophers and mathematicians. That the apparent magnitude of objects decreaſes with the angle under which they are ſeen, has always been acknowledged: and it is alſo acknowledged, that we learn to form a judgment both of magnitudes and diſtances only by cuſtom and experience; but in the application of theſe maxims to the above mentioned problem, all perſons, before M. Bouguer, made uſe of the real diſtance inſtead of the apparent one, by which only the mind can form its judgment. And it is manifeſt, that if any circumſtances contribute to make the diſtance appear otherwiſe than it is in reality, the apparent magnitude of the object will be affected by it, for the ſame reaſon, that if the magnitude be miſapprehended, the idea of the diſtance will vary. For want of attending to this diſtinction, Tacquet pretended to demonſtrate, that nothing can give the idea of two parallel lines to an eye ſituated at one of their extremities, but two hyperbolical curves, turned the contrary way; and M. Varignon maintained, that, in order to make a viſta appear of the ſame width, it muſt be made narrower, inſtead of wider, as it recedes from the eye. M. Bouguer obſerves, that very great diſtances, and thoſe that are conſiderably leſs, make nearly the ſame impreſſion upon the eye. We, therefore, imagine great diſtances to be leſs than they are, and on this account the ground plan of a viſta always appears to riſe. The viſual rays come in a determinate direction, but as we imagine they terminate ſooner than they do, we neceſſarily conceive that the place from which they iſſue is elevated.

Every large plane, therefore, as A B (*Tab.* VI. *Optics*, *fig.* 137.) viewed by an eye at O, will ſeem to lie in ſuch direction as A *b*, and conſequently lines, in order to appear truly parallel, on the plane A B, muſt be drawn ſo as that they would appear parallel on the plane A *b*, and be from thence projected to the plane A B. To determine the inclination of the apparent ground plane A *b* to the true ground plane A B, M. Bouguer directs us to draw upon a piece of level ground two ſtraight lines of a ſufficient length, making an angle of three or four degrees with one another. Then a perſon placing himſelf within the angle, with his back towards the angular point, muſt walk backwards and forwards till he can fancy the lines to be parallel. In this ſituation, a line drawn from the point of the angle through the place of his eye, will contain the ſame angle with the true ground plane which this does with the apparent one.

M. Bouguer alſo ſhews other more geometrical methods of determining this inclination, and ſays that, by theſe means, he has often found it to be four or five degrees, though ſometimes only two or two and a half degrees; the determination of this angle being variable, and depending upon the manner in which the ground is illuminated, and the intenſity of the light, the colour of the ſoil, the conformation of the eye, and the part of the eye on which the object is painted.

In looking towards a riſing ground, the difference between the apparent ground plane, and the true one, he ſays, will be much more conſiderable, ſo that they will ſometimes make an angle of 25 or 30 degrees. Ac. Par. 1755. M. 156.

2. If the eye be placed above an horizontal plane, objects, the more remote they are, the higher will they appear, till the laſt be ſeen in a level with the eye. Whence it is that the ſea, to perſons ſtanding aſhore, ſeems to riſe higher and higher the farther they look.

3. If any number of objects be placed below the eye, the moſt remote will appear the higheſt; if they be above the eye, the moſt remote will appear the loweſt.

Thus, the remoter parts of an horizontal walk, or long floor, will appear to aſcend gradually; whereas, the cieling of a long gallery appears to deſcend.

M. Bouguer obſerves, that when a man ſtands upon a level plane, it does not ſeem to riſe ſenſibly, but at ſome diſtance from him: the apparent plane, therefore, has a curvature in it, the form of which is not very eaſy to determine; ſo that a man ſtanding upon a level plane of infinite extent, will imagine that he ſtands in the centre of a baſon. The caſe is the ſame with a perſon ſtanding upon the level of the ſea.

4. The upper parts of high objects appear to ſtoop, or incline forwards; as the front of churches, towers, &c. And ſtatues at the tops of buildings, to appear upright, muſt incline, or bend backwards. See farther under the articles of Refraction and Horizon.

II. The mind perceives the diſtance of *viſible* objects, from the different configurations of the eye, and the manner wherein the rays ſtrike the eye, and in which the image is impreſſed thereon. For the eye diſpoſes itſelf differently, according to the different diſtances it is to ſee; viz. for remote objects the pupil is dilated, and the cryſtalline brought nearer the retina, and the whole eye is made more globous; on the contrary, for near objects, the pupil is contracted, the cryſtalline thruſt forwards, and the eye lengthened.

Philoſophers are agreed, that we have a power of altering the form of our eyes, ſo as to make the rays of any pencil to converge at different diſtances from the pupil: and hence we are capable of viewing objects with almoſt equal diſtinctneſs, though they are placed at conſiderably different diſtances; but with regard to the alteration that takes place in the eye, and the mechaniſm by which it is produced, different accounts have been given.

It was the opinion of Kepler, that the contraction of the proceſſus ciliaris changes the form of the eye, and by the elongation of it places the cryſtalline at a greater diſtance from the retina; whereas Des Cartes imagined, that the curvature of the cryſtalline itſelf ſuffers an alteration by the contraction of thoſe ligaments.

M. de la Hire maintained that, in order to view objects at different diſtances, there is no alteration but in the ſize of the pupil, or the aperture of the eye; and he made a curious experiment, which, he thought, proved his aſſertion.

M. Le Roi, a member of the Royal Academy at Montpellier, has lately attempted to defend the opinion of M. de la Hire, which had long been exploded by all philoſophers; and he ſays, that the accommodation of the eye to the view of objects, placed at different diſtances, by the contraction or dilatation of the pupil only, does not conſiſt in the change of the place of the cryſtalline, by means of the ligamenta ciliaria, the ſtrength of which is inadequate to the purpoſe. Beſides, he obſerves, that they are not attached to the edges of the capſula, as has been ſuppoſed, but that they extend a conſiderable way along the interior ſurface of it, without any cloſe adherence to it. He is alſo of opinion, that theſe fibres are not muſcular, but are only ramified veſſels, which, according to all appearance, he ſays, anſwer no other purpoſe than that of ſecreting an aqueous humour, to lubricate the ſurface of the cryſtalline.

That nothing is requiſite but the contraction of the pupil in order to view the neareſt objects with diſtinctneſs, is evident, he ſays, from experiment. For when an object is placed ſo near, that the eye cannot bear as great a degree of contraction as is neceſſary for viewing it diſtinctly, the ſame end is obtained by an artificial pupil. For if a ſmall hole be made in a card, the neareſt object may be viewed through it with the greateſt eaſe and diſtinctneſs.

That the variation of the pupil is ſufficient for the purpoſe of viewing objects at all diſtances, he alſo thought he could demonſtrate by experiment with an artificial eye; for when, with a large aperture, the images of near objects were confuſed, and ill defined upon the retina of this inſtrument, they became very diſtinct, and well defined, by contracting the aperture. Ac. Paris, 1755, M. p. 920.

But the moſt ſatisfactory diſcuſſion of this ſubject we owe to Dr. Porterfield, who proved, by a ſeries of experiments, in which an object was viewed through ſmall ſlits in a thin plate of iron, at a leſs diſtance than the diameter of the pupil (which, therefore, was of no uſe in this caſe), that we are poſſeſſed of a power of changing the conformation of our eyes, and of adapting them to various diſtances; and that this change always follows a ſimilar motion in the axes of viſion, with which it has been connected by uſe and cuſtom. Porterfield on the Eye, vol i. p. 411, 415, 421.

However, among thoſe who ſuppoſe a conformation of the eye for this purpoſe, independent of a variation in the aperture, it is by no means agreed in what it conſiſts. Some have ſaid, that the cryſtalline becomes more or leſs convex for this purpoſe, by the action of certain muſcular fibres which enter into its compoſition. But Dr. Porterfield (ubi ſupra, p. 442.) obſerves that, though the cryſtalline, when dry, appears to conſiſt of many thin concentric laminæ, or ſcales, their diſpoſition is but ill qualified for changing the figure of the cryſtalline; or if they were ſo, it is not eaſy, he ſays, to prove that theſe fibres are muſcular, and capable of contraction.

His own opinion is, that the cryſtalline has a motion by means of the ligamentum ciliare, by which the diſtance between it and the retina is increaſed or diminiſhed, according to the different diſtances of objects. The ſtructure and diſpoſition of the ligamentum ciliare, he ſays, excellently qualify it for changing the ſituation of the cryſtalline, and removing it to a greater diſtance from the retina, when objects are too near for us; becauſe, when it contracts, it will not only draw the cryſtalline forward, but alſo compreſs the vitreous humour lying behind it, ſo that it muſt preſs upon the cryſtalline, and puſh it towards the retina.

He adds, that the cryſtalline, being moved forward, muſt, at the ſame time, preſs the aqueous humour againſt the cornea; by which means that membrane, which is flexible, will be rendered more convex, and enable us ſtill better to ſee near objects diſtinctly.

That the ſituation of the cryſtalline is made uſe of in conforming the eye to the diſtinct view of objects placed at different diſtances, Dr. Porterfield thinks, is very evident from what is obſerved concerning perſons who have cataracts couched; for the ſame lens is not uſeful to them for ſeeing all objects diſtinctly, but they are obliged to make uſe of glaſſes of different degrees of convexity, in proportion to the nearneſs of the object.

To the objection of M. De la Hire, and others, among whom are the celebrated anatomiſts Haller and Zinn, that the ciliary ligament is not muſcular, and conſequently has no power of contraction, he obſerves, that they have been led into this miſtake by apprehending that the colour of muſcles is always red; whereas this is not the caſe univerſally, for the muſcular fibres of the inteſtines and ſtomach have hardly any redneſs in their colour. It is alſo certain, he ſays, that the PUPIL contracts and dilates itſelf according as objects are more or leſs luminous, and yet none of the fibres which perform that action are in the leaſt red. Ubi ſupra, vol. ii. p. 434. 447. 450.

Dr. Jurin (Eſſ. on diſtinct, &c. Viſion, p. 143.) ſuppoſes, that when the eye is to be ſuited to greater diſtances than fifteen or ſixteen inches, the ligamentum ciliare contracts, ſo as to draw part of the anterior ſurface of the capſula of the cryſtalline, into which the fibres of it are inſerted, a little forwards and outwards, on which the water within the capſula muſt flow from under the middle towards the elevated part of it; and the aqueous humour muſt flow from above the elevated part of the capſula to the middle. In conſequence of this, the whole anterior ſurface, within the inſertion of the ciliary ligament, will be reduced to a leſs convexity. When this contraction ceaſes, the capſula will return to its former ſituation, by its own elaſticity. To this hypotheſis it has been objected, that unleſs the water within the capſula has a greater refractive power than the aqueous humour, the retiring of it from one place to another to make room for that humour, will have no effect upon the pencils of rays.

Dr. Jurin, however, not attending to this circumſtance, and ſeeming to conſider the water within the capſula as having the ſame refractive power with the cryſtalline itſelf, attempts to ſhew by calculation, that this change in the convexity of it is quite ſufficient to extend the natural diſtance of diſtinct viſion from fifteen inches to fourteen feet five inches, without the leaſt motion of the cryſtalline itſelf, and a very ſmall one of the anterior ſurface of the capſula.

M. Muſchenbroek, or rather Albinus (whoſe Anatomical Obſervations on the Eye he has publiſhed in his Introd. ad Phil. Nat. vol. ii. p. 759.) ſuppoſes, that the change of conformation in the eye is performed by means of the zona ciliaris, in the following manner. In viewing a very near object, in conſequence of which the pencils of rays tend to a focus beyond the retina, the zona ciliaris, and the anterior membrane of the capſula, as alſo the vitreous humour, being driven forward by the compreſſion of the coats of the eye, puſh the cryſtalline, and make it recede from the retina. At the ſame time the cryſtalline, puſhing the aqueous humour into the cornea, makes it more prominent. Perhaps, alſo, he ſays, the cryſtalline may be made rounder, ſo that, on theſe accounts, the pencils will come to their foci ſooner than otherwiſe. On the other hand, when the object is too remote for diſtinct viſion, ſo that the pencils come to their foci too ſoon, the zona ciliaris becomes tenſe, and, with the anterior membrane of the capſula, puſhes the cryſtalline farther within the vitreous humour. By this preſſure the cryſtalline becomes flatter, ſo that, on theſe ſeveral accounts, the foci of the pencils are carried farther. The zona ciliaris, and the anterior membrane of the capſula, can only puſh the cryſtalline into the vitreous humour one half of its own thickneſs, which, he ſhews, not ſufficient to make viſion diſtinct at a competent diſtance, and therefore concludes, that ſome change muſt take place in the form of the cryſtalline, as, he ſays, Dr. Pemberton has well demonſtrated. He ſuppoſes, that the proviſion for ſuiting the eye to different diſtances is the ſame in all animals, and does not depend on the change of the ſclerotica in any of them, which is hard, and incapable of being compreſſed. Prieſtley's Hiſt. of Light, &c. p. 638—652. See *Apparent* DISTANCE.

The diſtance of *viſible* objects again, is adjudged of by the angle the object makes, from the diſtinct or confuſed repreſentation of the objects; and the briſkneſs or feebleneſs, or the rarity or ſpiſſitude of the rays.

To this it is owing, 1. That objects which appear obſcure, or confuſed, are judged to be more remote; a principle which the painters uſe to make ſome of their figures appear farther diſtant than others on the ſame plane.

2. To this it is likewiſe owing, that rooms, whoſe walls are whitened, appear the ſmaller; that fields covered with ſnow, or white flowers, ſhew leſs than when clothed with graſs; that mountains covered with ſnow, in the night time, appear the nearer, and that opake bodies appear the more remote in the twilight.

III. The magnitude or quantity of *viſible* objects is known chiefly by the angle comprehended between two rays drawn from the two extremes of the object to the centre of the eye. An object appears ſo big as is the angle it ſubtends; or bodies ſeen under a greater angle appear greater; and thoſe under a leſs, leſs, &c. Hence the ſame thing appears now bigger, and now leſs, as it is leſs or more diſtant from the eye. This we call the *apparent* MAGNITUDE.

Now, to judge of the real magnitude of an object, we conſider of the diſtance; for, ſince a near and remote object may appear under equal angles, the diſtance muſt neceſſarily be eſtimated; that if it be great, and the optic angle ſmall, the remote object may be judged great; and *vice verſa*.

The magnitude of *viſible* objects is brought under certain laws, demonſtrated by the mathematicians: as,

1. That the apparent magnitudes of a remote object are as the diſtances reciprocally.

2. That the co-tangents of half the apparent magnitudes of the ſame objects, are as the diſtances; hence the apparent magnitude and diſtance being given, we have a method of determining the true magnitude; the canon is this. As the whole ſine is to the tangent of half the apparent magnitude, ſo is the given diſtance to half the real magnitude. The ſame canon, inverted, will, from the diſtance and magnitude given, determine the apparent one.

3. Objects, ſeen under the ſame angle, have their magnitudes proportional to their diſtances.

4. The ſubtenſe AB (*Tab.* VI. *Optics*, *fig.* 135.) of any arch of a circle appears of equal magnitude in all the points DCEG, though one point be vaſtly nearer than another; and the diameter DG appears to the ſame magnitude in all the points of the periphery of the circle. Hence ſome have derived a hint for the moſt commodious form of theatres.

5. If the eye be fixed in A (*fig.* 136.) and the right line BC be moved in ſuch manner, as that the extremes thereof always fall on the periphery, it will always appear of the ſame magnitude. Hence the eye, being placed in any angle of a regular polygon, the ſides will appear equal.

6. If the magnitude of an object directly oppoſite to the eye be equal to its diſtance from the eye, the whole object will be taken in by the eye, but nothing more. Whence the nearer you approach an object, the leſs part you ſee of it.

IV. The figure of *viſible* objects is eſtimated, chiefly, from our opinion of the ſituation of the ſeveral parts thereof.

This opinion of the ſituation, &c. enables the mind to apprehend an external object under this or that figure, more juſtly than any ſimilitude of the images in the retina, with the object, can; the images being frequently elliptical, oblong, &c. when the objects they exhibit to the mind are circles, ſquares, &c.

The laws of viſion, with regard to the figures of *viſible* objects, are,

1. That if the centre of the pupil be exactly againſt, or in the direction of a right line, the line will appear as one point.

2. If the eye be placed in a direction of a ſurface, ſo that only one line of the perimeter can radiate on it, it will appear as a line.

3. If a body be oppoſed directly towards the eye, ſo as only one plane of the ſurface can radiate on it, it will appear as a ſurface.

4. A remote arch, viewed by an eye in the ſame plane, will appear as a right line.

5. A ſphere, viewed at a diſtance, appears a circle.

6. Angular figures, at a diſtance, appear round.

7. If the eye look obliquely on the centre of a regular figure, or a circle, the true figure will not be ſeen; but the circle will appear oval, &c. See *Apparent* FIGURE.

V. The number of *viſible* objects is perceived, not only by one or more images formed in the fund of the eye; but alſo by ſuch a poſition of thoſe parts of the brain whence the optic nerves ſpring, as the mind has been uſed to, in attending to a certain place; and that either ſingle or manifold.

Accordingly, when either of the eyes, with the contiguous part of the brain, are forced out of their juſt paralleliſm with the other, v. gr. by preſſing it with the finger, &c. all things appear double; but when they are in the requiſite paralleliſm, though there be two images in the fund of the two eyes, yet the object will appear ſingle. Again, one thing may appear double, or even manifold, not only with both eyes, but even with only one of them open; by reaſon the common concourſe of the cones of rays reflected from the object to the eye, either falls ſhort of the retina, or goes much beyond it.

VI. Motion and reſt are ſeen when the images of objects repreſented in the eye, and propagated to the brain, are either moved, or at reſt; and the mind perceives theſe images either moving or at reſt, by comparing the moved image to another, with reſpect to which it changes place; or by the ſituation of the eye to the object being continually changed. So that motion is only perceived, by perceiving the images to be in different places and ſituations; nor are theſe changes perceived unleſs affected in time. So that to perceive motion, a ſenſible time is required. But reſt is perceived by the viſual faculty, from the reception of the image in the ſame place of the retina, and the ſame ſituation for ſome ſenſible time.

Hence the reaſon, why bodies moving exceeding faſt appear at reſt; thus, a live coal, ſwung briſkly round, appears a continual circle of fire; the motion not being commenſurate with *viſible* time, but much ſwifter than the ſame; ſo that, in the time the ſoul requires to judge of any change of ſituation of the image on the retina, or that it is moved from this place to that, the thing itſelf performs its whole circuit, and is in its own place again.

Laws of viſion, with regard to the motion of *viſibles*, are,

1. That if two objects unequally diſtant from the eye, move from it with equal velocity, the more remote one will appear the ſlower; or, if their celerities are proportionable to their diſtances, they will appear to move equally ſwift.

2. If two objects, unequally diſtant from the eye, move with unequal velocities in the ſame direction, their apparent velocities are in a ratio compounded of the direct ratio of their true velocities, and the reciprocal one of their diſtances from the eye.

3. A *viſible* object, moving with any velocity, appears to be at reſt, if the ſpace deſcribed in the interval of one ſecond be imperceptible at the diſtance of the eye. Hence it is, that a near object, moving very ſlowly, as the index of a clock; or a remote one very ſwiftly, as a planet, ſeem at reſt.

4. An object, moving with any degree of velocity, will appear to reſt, if the ſpace it runs over in a ſecond of time be to its diſtance from the eye, as 1 to 1400: nay, in fact, if it be as 1 to 1300.

5. The eye proceeding ſtraight from one place to another, a lateral object, not too far off, either on the right or left, will ſeem to move the contrary way: the eye, in this caſe, being ſenſible of its motion, diſtant objects will ſeem to move the ſame way, and with the ſame velocity.

6. If the eye and the object move both the ſame way, only the eye much ſwifter than the object, that laſt will appear to go backwards.

7. If two or more objects move with the ſame velocity, and a third remain at reſt, the moveables will appear fixed, and the quieſcent in motion the contrary way. Thus, clouds moving very ſwiftly, their parts ſeem to preſerve their ſituation, and the moon to move the contrary way.

8. If the eye be moved with a great velocity, lateral objects at reſt appear to move the contrary way. Thus, to a perſon ſitting in a coach, and riding briſkly through a wood, the trees ſeem to retire the contrary way; and to people in a ſhip, &c. the ſhores ſeem to recede.

9. An object moving very ſwiftly is not ſeen, unleſs it be very luminous. Thus a cannon ball is not ſeen if it is viewed tranſverſely; but if it be viewed according to the line it deſcribes, it may be ſeen, becauſe its picture continues long on the ſame place of the retina, which, therefore, receives a more ſenſible impreſſion from the object.

10. A live coal ſwung briſkly round in a circle, appears a continued circle of fire, becauſe the impreſſions made on the retina of light being of a vibratory, and conſequently of a laſting nature, do not preſently periſh, but continue till the coal performs its whole circuit, and returns again to its former place.

11. If a perſon turns ſwiftly round, without changing his place, all objects about him will ſeem to move round in a circle the contrary way; and this deception continues not only while the perſon himſelf moves round, but, which is more ſurprizing, it alſo continues for ſome time after he ceaſes to move, when the eye as well as the object is at abſolute reſt.

The reaſon why objects appear to move round the contrary way, when the eye turns round, is not ſo difficult to explain; for though, properly ſpeaking, motion is not ſeen, as not being itſelf the immediate object of ſight, yet by the ſight we eaſily know when the image changes its place on the retina, and thence conclude that either the object, or the eye, or both, are moved. But by the ſight alone we can never determine how far this motion belongs to the object, how far to the eye, or how far to both.

If we imagine the eye at reſt, we aſcribe the whole motion to the object, though it be truly at reſt. If we imagine the object at reſt, we aſcribe the whole motion to the eye, though it belongs entirely to the object: and when the eye is in motion, though we are ſenſible of its motion, yet, if we do not imagine that it moves ſo ſwiftly as it really does, we aſcribe only a part of the motion to the eye, and the reſt of it we aſcribe to the object, though it be truly at reſt.

This laſt, ſays Dr. Porterfield, is what happens in the preſent caſe, when the eye turns round; for though we are ſenſible of the motion of the eye, yet we do not apprehend that it moves ſo faſt as it really does; and, therefore, the bodies about appear to move the contrary way, as is agreeable to experience.

But the great difficulty ſtill remains, viz. why, after the eye ceaſes to move, objects ſhould, for ſome time, ſtill appear to continue in motion, though their pictures on the retina be truly at reſt, and do not at all change their place.

This, Dr. Porterfield imagined, proceeds from a miſtake with reſpect to the eye, which, though it be abſolutely at reſt, we nevertheleſs conceive it as moving the contrary way to that in which it moved before; from which miſtake, with reſpect to the motion of the eye, the objects at reſt will appear to move the ſame way which the eye is imagined to move; and conſequently will ſeem to continue their motion for ſome time after the eye is at reſt. Porterfield on the Eye, vol. ii. p. 422. 424.

VISIBLE *horizon*, *place*, and *ſpecies*, ſee the ſubſtantives.

VISIER, or **VIZIER**, an officer, or dignitary in the Ottoman empire, whereof there are two kinds; the firſt, called by the Turks *viſier azim*, that is, *grand viſier*, firſt created in 1370, by Amurath I. in order to eaſe himſelf of the chief and weightier affairs of the government.

The *grand*, or *prime viſier*, is the prime miniſter of ſtate of the whole empire. He commands the army in chief, and preſides at the divan, or great council. Renegado Chriſtians have been ſometimes raiſed to the *viſierate*; ſuch were Khairedain, ſurnamed Barbaroſſa; Ulug Ali, Cuproli, &c.

Next to the *grand viſier*, there are ſix other ſubordinate *viſiers*, called *viſiers of the bench*, who officiate as his counſellors or aſſeſſors in the divan.

VISION, VISIO, the act of ſeeing, or perceiving external objects by the organ of ſight.

Viſion is well defined to be a ſenſation, whereby, from a certain motion of the optic nerve, made in the bottom of the eye by the rays of light emitted or reflected from objects, and hence conveyed to the common ſenſory in the brain, the mind perceives the luminous object, its quantity, quality, figure, &c.

The phenomena of *viſion*, the cauſes thereof, and the manner wherein it is effected, make one of the greateſt and moſt important articles in the whole ſyſtem of natural knowledge. Indeed, a great part of the phyſical, mathematical, and anatomical diſcoveries and improvements of the moderns, terminate here, and only tend to ſet the buſineſs of *viſion* in a clearer light.

Hitherto refer what ſir Iſaac Newton and others have diſcovered of the nature of light and colours; the laws of inflexion, reflexion, and refraction of the rays: the ſtructure of the eye, particularly the retina and optic nerves, &c.

It is not neceſſary we ſhould here give a minute detail of the proceſs of *viſion* from its firſt principles; the greateſt part is already delivered under the reſpective articles. The eye, the organ of *viſion*, we have deſcribed under the article EYE; and its ſeveral parts, tunics, humours, &c. under their proper heads, CORNEA, CRYSTALLINE, &c.

The immediate and principal organ of *viſion*, viz. the retina, according to ſome, and the choroides, according to others, are alſo diſtinctly conſidered; as alſo the ſtructure of the optic nerve, which conveys the impreſſion to the brain; and the texture and diſpoſition of the brain itſelf, which receives them, and repreſents them to the ſoul. See RETINA, CHOROIDES, OPTIC *nerves*, BRAIN, SENSORY, &c.

Again, the nature of light, which is the medium or vehicle, whereby objects are carried to the eye, is laid down at large under the articles LIGHT and COLOURS; and the chief properties thereof concerned in *viſion*, under REFLECTION, REFRACTION, &c. and alſo many of its circumſtances under RAY, MEDIUM, &c. What remains for this article, therefore, is only to give a general idea of the whole proceſs, in which all the ſeveral parts are concerned.

Different opinions or ſyſtems of VISION. The Platoniſts and Stoics held *viſion* to be effected by the emiſſion of rays out of the eyes; conceiving that there was a ſort of light thus darted out; which, with the light of the external air, taking, as it were, hold of the objects, rendered them viſible; and thus returning back again to the eye, altered and new modified by the contact of the object, made an impreſſion on the pupil, which gave the ſenſation of the object.

The reaſons whereby they maintain their opinions, are fetched, 1. From the brightneſs and luſtre of the eye. 2. From our ſeeing a remote cloud, without ſeeing one with which we are encompaſſed (the rays being ſuppoſed too briſk and penetrating to be ſtopped by the near cloud, but growing languid at a greater diſtance, are returned to the eye.) 3. From our not ſeeing an object laid on the pupil. 4. From the eye's being weary with ſeeing; i. e. by emitting great quantities of rays. And laſtly, from animals which ſee in the night, as cats, lions, moles, owls, and ſome men.

Our own countryman, Roger Bacon, diſtinguiſhed as he was in a variety of reſpects, does not heſitate to aſſent to the opinion that viſual rays proceed from the eye; giving this reaſon for it, that every thing in nature is qualified to diſcharge its proper functions by its own powers, in the ſame manner as the ſun, and other celeſtial bodies. Opus Majus, p. 289.

The Epicureans held *viſion* to be performed by the emanation of corporeal ſpecies, or images from objects; or a ſort of atomical effluvia continually flying off from the intimate parts of objects to the eye.

Their chief reaſons are, 1. That the objects muſt neceſſarily be united to the viſive faculty; and ſince it is not united by itſelf, it muſt be ſo by ſome ſpecies that repreſents it, and that is continually flowing from bodies. 2. That it frequently happens, that old men ſee remote objects better than near ones; the diſtance making the ſpecies thinner, and more commenſurate to the debility of their organ.

The Peripatetics hold, with Epicurus, that *viſion* is performed by the reception of ſpecies; but they differ from him in the circumſtances; for they will have the ſpecies (which they call *intentionales)* to be incorporeal.

It is true, Ariſtotle's doctrine of *viſion*, delivered in his chapter De Aſpectu, amounts to no more than this; that objects muſt move ſome intermediate body, that by this they may move the organ of ſight. To which he adds, in another place, that when we perceive bodies, it is their ſpecies, not their matter, that we perceive; as a ſeal makes an impreſſion on wax, without the wax's retaining any thing of the ſeal.

But this vague and obſcure account the Peripatetics have thought fit to improve. Accordingly, what their maſter called *ſpecies*, the diſciples underſtanding of real proper ſpecies, aſſert, that every viſible object expreſſes a perfect image of itſelf, in the air contiguous to it; and this image another, ſomewhat leſs in the next air; and the third, another, &c. till the laſt image arrives at the cryſtalline, which they hold for the chief organ of ſight, or that which immediately moves the ſoul. Theſe images they call *intentional* SPECIES.

The modern philoſophers, as the Carteſians and Newtonians, give a better account of *viſion*. They all agree, that it is performed by rays of light reflected from the ſeveral points of objects received in at the pupil, refracted and collected in their paſſage, through the coats and humours, to the retina; and thus ſtriking, or making an impreſſion, on ſo many points thereof; which impreſſion is conveyed, by the correſpondent capillaments of the optic nerve, to the brain, &c.

Baptiſta Porta's experiments, with the camera obſcura, about the middle of the 16th century, convinced him, that *viſion* is performed by the intermiſſion of ſomething into the eye, and not by viſual rays, proceeding from the eye, as had been the general opinion before his time; and he was the firſt who fully ſatisfied himſelf and others upon this ſubject; though ſeveral philoſophers ſtill adhered to the old opinion.

As for the Peripatetic ſeries or chain of images, it is a mere chimæra; and Ariſtotle's meaning is better underſtood without than with them. In effect ſetting theſe aſide, the Ariſtotelian, Carteſian, and Newtonian doctrines of *viſion* are very conſiſtent; for ſir Iſaac Newton imagines, that *viſion* is performed chiefly by the vibrations of a fine medium, which penetrates all bodies excited in the bottom of the eye by the rays of light, and propagated through the capillaments of the optic nerves, to the ſenſorium. And Deſcartes maintains, that the ſun preſſing the materia ſubtilis, wherewith the world is filled every way, the vibrations and pulſes of this matter reflected from objects are communicated to the eye, and thence to the ſenſory; ſo that the action or vibration of a medium is equally ſuppoſed in all.

Modern theory of VISION. In order to *viſion*, we are certain, it is required, that the rays of light be thrown from the viſible objects to the eye. What befalls them in the eye will be conceived from what follows.

Suppoſe, e. gr. Z the eye, and A B C the object *(Tab. VI. Optics, fig.* 138.); now, though every point of an object be a radiant point, that is, though there be rays reflected from every point of the object to every point of the circumambient ſpace, each carrying with it its reſpective colour (which we falſely imagine to be thoſe of the object), yet, as only thoſe rays which paſs through the pupil of the eye affect the ſenſe, we ſhall here conſider none elſe but theſe.

And again, though there be a great number of rays paſſing from one radiant point, as B, through the pupil; yet we ſhall only conſider the action of a few of them; as B D, B E, B F.

Now, then, the ray B D, falling perpendicularly on the ſurface E D F, will paſs out of the air into the aqueous humour, without any refraction, and proceed right to H, where, falling perpendicularly on the ſurface of the cryſtalline humour, it will go on, without any refraction, to M; where, again falling perpendicularly on the ſurface of the vitreous humour, it will proceed ſtraight to the point O, in the fund or bottom of the eye.

Again, the ray B E, paſſing obliquely out of the air upon the ſurface of the watery humour E D F, will be refracted, and approach towards the perpendicular E P; and thus, proceeding to the point G, in the ſurface of the cryſtalline, it will be there refracted ſtill nearer to the perpendicular. So alſo E G, falling obliquely out of air into an harder body, will be refracted towards the perpendicular G R, and, falling on the point L of the ſurface of the vitreous humour, it will ſtill be brought nearer to M.

Laſtly, G L, falling obliquely out of a denſer, upon the ſurface of a rarer body L M N, will be refracted, and recede from the perpendicular L T; in receding from which, it is evident, it approaches towards the ray B D O, and may be ſo refracted, as to meet the other in O. In like manner, the ray B F, being refracted in B, will turn to I, and thence to N, and thence to the others in O. But the rays between B E and B F, being ſomewhat leſs refracted, will not meet preciſely in the ſame point O.

Thus will the radiant point B affect the fund of the eye, in the ſame manner as if the pupil had no breadth, or as if the radiant itſelf had only emitted one ſingle ray, ſuch as were equal in power to all thoſe between B E and B F.

In like manner, the rays proceeding from the point A, will be ſo refracted in paſſing through the humours of the eye, as to meet near the point X; and the rays from any intermediate point between A and B, will nearly meet in ſome other point in the fund of the eye between X and O.

Upon the whole, it may be aſſerted univerſally, that every point of an object affects one point in the fund of the eye; and, on the contrary, that every point in the fund of the eye only receives rays from one point of the object. Though this is not to be underſtood with the utmoſt rigour.

Now, if the object recede from the eye, in ſuch manner as that the radiant point B does not decline from the line BD; the rays which would proceed from B, not enough divaricated, would be ſo refracted in paſſing the three ſurfaces, as that they would meet before they reached the point O; on the contrary, if the object ſhould be brought nearer the eye, the rays paſſing from the point to the pupil, being too much divaricated, would be refracted ſo, as not to meet till beyond the point O: nay, the object may be ſo near, that the rays proceeding from any point, may be ſo divaricated, as that they ſhall never meet at all. In all which caſes, there would be no point of the object but would move a pretty large portion of the fund of the eye; and thus the action of each point would be confounded with that of the contiguous one.

And this would commonly be the caſe, but that nature has provided againſt it; either by contriving the eye ſo that its bulk may be lengthened, or ſhortened, as objects may be more or leſs diſtant; or, as others will have it, ſo as that the cryſtalline may be made more convex, or more flat; or, according to others, ſo as that the diſtance between the cryſtalline and the retina may be lengthened or ſhortened.

The firſt expedient is the moſt probable; on the footing of which, when we direct our eyes to an object ſo remote, as that it cannot be diſtinctly viewed by the eye in its accuſtomed figure, the eye is drawn back into a flatter figure, by the contraction of four muſcles; by which means the retina, becoming nearer the cryſtalline humour, receives the rays ſooner; and, on the other hand, when we view an object too near, the eye, being compreſſed by the two oblique muſcles, is rendered more globular; by which means the retina, being ſet farther off from the cryſtalline, does not receive the rays of any point before they meet. See VISIBLE.

It may here be added, that this acceſs and receſs of the cryſtalline is ſo neceſſary to *viſion*, that whereas, in ſome birds, the coats of the eye are of ſuch a bony conſiſtence, that muſcles would not have been able to contract and diſtend them; nature has taken other means, by binding the cryſtalline down to the retina, with a kind of blackiſh threads not found in the eyes of other animals. Nor muſt it be omitted, that of the three refractions above mentioned, the firſt is wanting in fiſhes; and that, to remedy this, their cryſtalline is not lenticular, as in other animals, but globular. Laſtly, ſince the eyes of old people are generally worn flatter than thoſe of young ones, ſo that the rays from any point fall on the retina before they become collected into one, they muſt exhibit the object ſomewhat confuſedly; nor can ſuch eyes ſee any but remote objects diſtinctly. In others, whoſe eyes are too globular, the caſe is juſt the reverſe. See PRESBYTA and MYOPS.

From what has been ſhewn, that every point of an object moves only one point of the bottom of the eye; and, on the contrary, that every point in the fund of the eye, only receives rays from one point of the object, it is eaſy to conceive, that the whole object moves a certain part of the retina; that in this part there is a diſtinct and vivid collection of all the rays received in at the pupil; and that as each ray carries its proper colour along with it, there are as many points painted in the fund of the eye, as there were points viſible in the object. Thus is there a ſpecies, or picture, on the retina, exactly like the object: all the difference between them is, that a body is here repreſented by a ſurface, a ſurface frequently by a line, and a line by a point: that the image is inverted, the right-hand anſwering to the left of the object, &c. and that it is exceedingly ſmall; and ſtill the more ſo, as the object is more remote.

What we have ſhewn, under other articles, of the nature of light and colours, readily accounts for this painting of the object on the retina. The matter of fact is proved by an eaſy experiment, long ſince tried by Des Cartes, thus; the windows of a chamber being ſhut, and light only admitted at one little aperture; to that aperture apply the eye of ſome animal newly killed, having firſt dextrouſly pulled off the membranes that cover the bottom of the vitreous humour, viz. the hind-part of the ſclerotica, choroides, and even part of the retina; then will the images of all the objects, without doors, be ſeen diſtinctly painted on any white body, as on an egg-ſhell, that the eye is laid upon. And the ſame thing is better ſhewn by an *artificial* EYE, or a CAMERA *obſcura*.

The images of objects, then, are repreſented on the RETINA; which is only an expanſion of the fine capillaments of the optic nerve, and from which the optic nerve is continued into the brain. Now, any motion or vibration, impreſſed on one extreme of the nerve, will be propagated to the other: hence the impulſe of the ſeveral rays, ſent from the ſeveral points of the object, will be propagated as they are on the retina (i. e. in their proper colours, &c. or in particular vibrations, or manners of preſſure, correſponding thereto), to the place where thoſe capillaments are interwoven into the ſubſtance of the brain. And thus is *viſion* brought to the common caſe of ſenſation.

For ſuch, we know, is the law of the union between the ſoul and body, that certain perceptions of the firſt do neceſſarily follow certain motions of the laſt; but the different parts of the object do ſeparately move different parts of the fund of the eye; and thoſe motions are propagated to the ſenſory: it follows, therefore, that there muſt ariſe ſo many diſtinct ſenſations at the ſame time. See SENSATION.

Hence, 1. We eaſily conceive, that the perception, or image, in the mind, muſt be the clearer, and more vivid, the more rays the eye receives from the object; and conſequently, the largeneſs of the pupil will have ſome ſhare in the clearneſs of *viſion*.

2. Conſidering only one radiant point of an object, we may ſay, that that point would move the ſenſe more weakly, or be ſeen more obſcurely, as it is more remote; becauſe the rays coming from any point, like all qualities propagated in orbem, are always diverging; and therefore the more remote, the fewer of them will be received in at the pupil. But the pupil dilating itſelf more, as the object is more remore, takes in more rays than it would otherwiſe do.

3. The diſtinctneſs of *viſion* is ſomewhat concerned in the ſize of the image exhibited in the fund of the eye. For there ſhould be, at leaſt, as many extremes of capillaments, or fibres of the optic nerve, in the ſpace that image poſſeſſes, as there are particles in the object that ſend rays into the pupil; otherwiſe, every particle will not move its ſeparate capillament; and if the rays from two points fall on the ſame capillament, it will be the ſame as if only one point had fell there; ſince the ſame capillament cannot be differently moved at the ſame time. And hence it is, that the images of very remote objects being very ſmall, they appear confuſed, ſeveral points of the image affecting each capillament; and hence, alſo, if the object be of different colours, ſeveral particles affecting the ſame capillament at the ſame time, only the brighteſt and moſt lucid will be perceived. Thus, a field, furniſhed with a good number of white flowers, among a much greater quantity of green graſs, &c. at a diſtance, appears all white. See *Diſtinct* VISION, infra.

Our ſeeing of objects *ſingle*, though with two eyes, in each of which is a ſeparate image, or picture; and our ſeeing of them *erect*, whereas the picture is really inverted, are two great phenomena in *viſion*; which we have conſidered under the article SEEING.

For the manner of ſeeing and judging of the diſtance and magnitude of objects, ſee VISIBLE, MAGNITUDE, &c.

VISION, in *Optics*. The laws of *viſion*, brought under mathematical demonſtrations, make the ſubject of OPTICS, taken in the greateſt latitude of that word: for, among the writers of mathematics, optics is generally taken, in a more reſtrained ſignification, for the doctrine of *direct viſion*; catoptrics, for the doctrine of *reflected viſion*; and dioptrics, for that of *refracted viſion*.

VISION, *direct*, or *ſimple*, is that performed by means of direct rays; that is, of rays paſſing directly, or in right lines, from the radiant point of the eye. Such is that explained in the preceding article, VISION.

VISION, *reflected*, is that performed by rays reflected from ſpecula, or mirrors. The laws hereof, ſee under REFLECTION, and MIRROR.

VISION, *refracted*, is that performed by means of rays *refracted*, or turned out of their way, by paſſing through mediums of different denſity; chiefly through glaſſes and lenſes. The laws of this, ſee under the article REFRACTION.

VISION, *arch of*. See ARCH.

VISION, *diſtinct*, denotes that by which an object is ſeen diſtinctly. An object is ſaid to be ſeen diſtinctly, when its outlines appear clear and well defined, and the ſeveral parts of it, if not too ſmall, are plainly diſtinguiſhable, ſo that we can eaſily compare them one with another, in reſpect to their figure, ſize, and colour.

In order to ſuch diſtinct *viſion*, it has hitherto been commonly thought, that all the rays of a pencil, flowing from a phyſical point of an object, muſt be exactly united in a phyſical, or, at leaſt, in a ſenſible point of the retina. But it ſeems certain, from the experiments mentioned by Dr. Jurin, that ſuch an exact union of rays is not always neceſſary to *diſtinct viſion*.

Hence the doctor divides *diſtinct viſion* into two ſpecies, viz. into *viſion perfectly diſtinct*, or *perfect viſion*, and *viſion imperfectly diſtinct*; which he calls ſimply by the name of *diſtinct viſion*. The former is that in which the rays of each pencil are collected into a ſingle phyſical, or ſenſible point of the retina; the other ſpecies is that in which thoſe rays occupy ſome larger ſpace upon the retina, yet ſo as the object is diſtinctly perceived.

Perfect *viſion* in a given eye, and a given diſpoſition of that eye, depends only upon the diſtance of the object; it has no dependence upon the magnitude of the object; but diſtinct *viſion*, in a given eye, and a given diſpoſition of the eye, depends upon the diſtance and magnitude of the object jointly. There appearing, therefore, a real difference between perfect *viſion*, and what we call *diſtinct viſion*, the learned doctor has enquired very particularly into the reaſon why an object may be ſeen diſtinctly without perfect *viſion*.

He ſhews that objects may be ſeen with ſufficient diſtinctneſs, though the pencils of rays iſſuing from the points of them do not unite preciſely in the ſame point on the retina; but that ſince, in this caſe, pencils from every point, either meet before they reach the retina, or tend to meet beyond it, the light that comes from them muſt cover a circular ſpot upon it, and will, therefore, paint the image larger than perfect *viſion* would repreſent it. Whence it follows, that every object, placed either too near, or too remote for perfect *viſion*, will appear larger than it is by a penumbra of light, cauſed by the circular ſpaces, which are illuminated by pencils of rays proceding from the extremities of the object. All the varieties occaſioned by this circumſtance he traces with great accuracy, and he applies his obſervations upon it to the explanation of many phenomena in *viſion*. See *Circle of* DISSIPATION.

Dr. Jurin obſerves, that when objects are large, they will appear tolerably diſtinct at a much leſs diſtance than ſmall objects, becauſe the penumbræ will not interfere ſo much; and on this account a large print may be read much nearer to the eye than a ſmall one. In this caſe the former will appear only ill defined, but ſufficiently diſtinct, when the latter is quite indiſtinct, the penumbra of one letter interfering with that of another, and thereby making marks altogether unlike any that are in the book. The diſperſed light of theſe penumbræ, he ſays, is of different denſities; and Mr. Robins, in his Remarks on Dr. Jurin, p. 279, obſerves, that the whole circle made by the confuſed image of any print will be proportioned to the diameter of the pupil of the eye, which limits the whole pencil.

The ſmalleſt diſtance of *perfect viſion*, or that in which the rays of a ſingle pencil are collected into a phyſical point on the retina in the generality of eyes, Dr. Jurin, from a number of obſervations, ſtates at five, ſix, or ſeven inches. The greateſt diſtance of diſtinct and perfect *viſion* he found to be more difficult to determine; but by conſidering the proportion of all the parts of the eye, and the refractive power of each, together with the interval that may be diſcerned between two ſtars, the diſtance of which is known, he fixes it, in ſome caſes, at fourteen feet five inches, though Dr. Porterfield had confined it to twenty-ſeven inches only, with reſpect to his own eye.

When *viſion* is indiſtinct, Dr. Jurin thinks that there are two methods of rendering it diſtinct. One is for the eye to apply the ſame power, whereby it conforms itſelf to the view of objects placed at different diſtances, ſo as to obtain *perfect viſion*; and the other is the contraction of the pupil by the leſſer muſcular ring of the uvea, which is chiefly made uſe of in a ſtrong light, and which will ſometimes render the other means altogether unneceſſary. In a weak light, he ſays, the pupil is ſo far from contracting, that there is rather a neceſſity for dilating it, to take in more light. But upon this Dr. Whytt (Eſſ. on vital and involuntary Motions, p. 133) obſerves, that in the ſame, or a leſs degree of light, the pupil will be contracted, in order to view a nearer or a ſmaller object. For other obſervations on this ſubject, ſee Jurin's Eſſ. on diſtinct and indiſtinct *Viſion*, at the end of Dr. Smith's Optics; and Robins's Remarks on Dr. Jurin, in his Math. Tracts, vol. ii. p. 278, &c.

VISION, *field of*. See FIELD.

VISION, among *Divines*, is uſed for an appearance, which God occaſionally ſent to his prophets and ſaints; either by way of dream, or in reality.

Such were the viſions of Ezekiel, Amos, &c. the *viſion* of St. Paul, lifted up to the third heaven, &c. of Joſeph, by which he was aſſured of the purity of the Virgin, &c.

Some have repreſented our bleſſed Lord's temptation in the wilderneſs, Mat. v. 1, &c. as a *viſion*. Mr. Farmer, in particular, conſiders it as a divine *viſion*, repreſenting the trials he was to endure, and deſigned to prepare him for encountering and vanquiſhing them.

Many among the Romiſh ſaints, have pretended to *viſions*: as St. Thereſa, St. Bridget, St. Catharine de Sienna, &c.

Hence the word has come into diſrepute, and become a common name for all chimeras, or ſpectres, which either our folly or fear poſſeſſes us with: and hence, a perſon that frames to himſelf wild romantic notions, is called a *viſionary*. Quevedo's *Viſions* are deſcriptions of what paſſed in the imagination of that author.

VISION, *beatific*, denotes the act whereby the angels and bleſſed ſpirits ſee God in Paradiſe.

VISIR, VISIER, or VIZIER. See VISIER.

VISITATION, *viſitatio*, an act of juriſdiction, whereby a ſuperior, or proper officer, *viſits* ſome corporation, college, church, or other public or private houſe, to ſee that the laws and regulations thereof be duly obſerved.

Among us, the biſhop of each dioceſe is obliged to hold a *viſitation* every third year, and the archdeacon the other two years; to ſee that the diſcipline be well obſerved, the people well inſtructed, and to take care, that neither the church, nor the paſtors thereof, receive any detriment.

The buſineſs of parochial *viſitation*, in order to inſpect and take account of the fabrics and manſions, ornaments and utenſils, veſtments and books of the church, peculiarly belongs to the archdeacon. In all *viſitations* of parochial churches made by biſhops and archdeacons, the law hath provided, that the charge thereof ſhall be defrayed by the procurations then due, and payable by the inferior clergy; wherein cuſtom, as to the quantum, ſhall prevail. Theſe procurations are due to the perſon viſiting of common right; and although originally due by reaſon of *viſitation* only, yet the ſame may be due without actual *viſitation*. They are ſueable only in the ſpiritual court, and are merely an eccleſiaſtical duty; and they may be levied by ſequeſtration, or other eccleſiaſtical proceſs. Free chapels and donatives (unleſs ſuch donative hath received the augmentation of queen Anne's bounty) are exempt from the *viſitation* of the ordinary: the firſt being viſitable only by commiſſion from the king, and the ſecond by commiſſion from the donor. And there are alſo other churches and chapels exempted, which belonged to the monaſteries; which by 25 Hen. VIII. cap. 21. were made viſitable by the king, or by commiſſion under the great ſeal.

Anciently the regarder's office was expreſſed to be the *viſitation of manners*. See REGARDER.

The lawyers hold it a branch of the king's prerogative, to *viſit* the univerſities; to enquire into the ſtatutes, and the obſervation of them; to expel delinquents, &c. But ſome of the colleges diſallow this privilege, and plead themſelves, by royal charters, exempt from all civil and royal *viſitations*.

With regard to all eccleſiaſtical corporations, the ordinary is their viſitor, ſo conſtituted by the canon law, and thence derived to us. The pope formerly, and now the king, as ſupreme ordinary, is the viſitor of the archbiſhop or metropolitan: the metropolitan has the charge and coercion of all his ſuffragan biſhops; and the biſhops in their ſeveral dioceſes are in eccleſiaſtical matters the viſitors of all deans and chapters, of all parſons and vicars, and of all other ſpiritual corporations. With reſpect to all lay corporations, the founder, his heirs or aſſigns, are the viſitors, whether the foundation be civil or eleemoſynary; for in a lay corporation the ordinary neither can nor ought to viſit. In general, the king being the ſole founder of all civil corporations, and the endower the perficient founder of all eleemoſynary ones, the right of *viſitation* of the former reſults to the king, and of the latter to the patron or endower. The king being conſtituted by law the viſitor of all civil corporations, the law has alſo appointed the place wherein he ſhall exerciſe this juriſdiction; which is the court of king's bench, where, and where only, all miſbehaviours of this kind of corporations are enquired into and redreſſed, and all their controverſies decided. Accordingly this is the meaning of lawyers, when they ſay that theſe civil corporations are liable to no *viſitation*; viz. that the law having by immemorial uſage appointed them to be viſited and inſpected by the king their founder, in his majeſty's court of king's bench; according to the rules of common law they ought not to be viſited elſewhere, or by any other authority.

As to eleemoſynary corporations, by the dotation the founder and his heirs are of common right the legal viſitors, to ſee that property is rightly employed, which might otherwiſe have deſcended to the viſitor himſelf: but if the founder has appointed and aſſigned any other perſon to be viſitor, then his aſſignee ſo appointed is inveſted with all the founder's power, in excluſion of his heir. Eleemoſynary corporations are chiefly hoſpitals, or colleges in the univerſity. With regard to hoſpitals, it has long been held, that if the hoſpital be ſpiritual, the biſhop ſhall viſit; but if lay, the patron. This right of lay patrons was indeed abridged by 2 Hen. V. cap. 1. which ordained, that the ordinary ſhould viſit *all* hoſpitals founded by ſubjects; though the king's right was reſerved, to viſit by his commiſſioners ſuch as were of royal foundation. But the ſubjects right was in part reſtored by ſtat. 14 Eliz. cap. 5. which directs the biſhop to viſit ſuch hoſpitals only, when no viſitor is appointed by the founders thereof; and all the hoſpitals founded by virtue of the ſtat. 39 Eliz. cap. 5. are to be viſited by ſuch perſons as ſhall be nominated by the reſpective founders. But ſtill, if the founder appoints nobody, the biſhop of the dioceſe muſt viſit. Colleges in the univerſities were formerly conſidered by the popiſh clergy, under whoſe direction they were, as eccleſiaſtical, or at leaſt as clerical corporations; and therefore the right of *viſitation* was claimed by the ordinary of the dioceſe. In ſome of our colleges, where no ſpecial viſitor is appointed, the biſhop of that dioceſe, in which Oxford was formerly comprized, has immemorially exerciſed viſitorial authority; which can be aſcribed to nothing elſe but his ſuppoſed title as ordinary to viſit this, among other eccleſiaſtical foundations. And it is not impoſſible, that the number of colleges in Cambridge, which are viſited by the biſhop of Ely, may in part be derived from the ſame original. But, whatever might be formerly the opinion of the clergy, it is now held as eſtabliſhed common law, that colleges are lay corporations, though ſometimes totally compoſed of eccleſiaſtical perſons; and that the right of *viſitation* does not ariſe from any principles of the canon law, but of neceſſity was created by the common law. In a diſputed caſe it was held by lord chief juſtice Holt, that by the common law the office of viſitor is to judge according to the ſtatutes of the college, and to expel and deprive upon juſt occaſions, and to hear all appeals of courſe; and that from him, and him only, the party grieved ought to have redreſs; the founder having repoſed in him ſo entire a confidence that he will adminiſter juſtice impartially, that his determinations are fixed, and examinable in no other court whatſoever.

To this leading caſe all ſubſequent determinations have been conformable. But where the viſitor is under a temporary diſability, then the court of king's bench will interpoſe, to prevent a defect of juſtice. Alſo it is ſaid, that if a founder of an eleemoſynary foundation appoints a viſitor, and limits his juriſdiction by rules and ſtatutes, if the viſitor in his ſentence exceeds thoſe rules, an action lies againſt him; but otherwiſe, where he miſtakes in a thing within his power. Blackſt. Comm. book i. p. 480, &c.

Among the Romaniſts, the general of each religious order is obliged to viſit the ſeveral monaſteries of his order.

In abbeys, that are chiefs of their orders, there are particular officers, called *viſitors*; who are diſpatched into all the houſes and congregations depending on them, to ſee that the regular diſcipline is obſerved.

In Spain there is a *viſitor*, and *inquiſitor general*. The *viſitation* of the cloiſter belongs to the ordinary. At Paris, the parliament viſits the ſeveral priſons and priſoners four times a year.

VISITATION, in a moral and religious ſenſe, is alſo applied to the afflictions that befal mankind; as coming from the hand of God to try or prove them. In which ſenſe, the plague, among us, is frequently called the *viſitation*.

VISITATION *of the Virgin Mary*, is a feaſt inſtituted in memory of the viſit paid by the Virgin to Elizabeth, firſt eſtabliſhed by Bonaventure, general of the order of St. Francis, by the decree of a general chapter, comprehending the churches of his own order, held at Piſa in 1263; and afterwards extended to the whole church, by pope Urban IV. in the year 1379, and ordered to be kept on the ſecond of July.

VISITATION is likewiſe an order of monks founded by Francis de Sales and his mother Chantalia.

VISITORS. See VISITATION, ſupra.

VISITORS *of the Inquiſition*. See INQUISITION.

VISIVE, *viſivus*, in the *School Philoſophy*, a term applied to the power of *ſeeing*. See VISION.

Authors are exceedingly divided about the place where the *viſive faculty* reſides: ſome will have it in the retina; others, in the choroides; others, in the optic nerve; others, as ſir Iſaac Newton, in the place where the optic nerves meet, before they come to the brain; and others, in the brain itſelf.

VISNAGA, in *Botany*. See CARROT and FENNEL.

VISNE, *viſnetum*, in *Law*, a neighbouring place, or a place near at hand. See VENUE.

VISPELLIONES, among the Romans, were ſlaves who could not be manumitted.

VISTAMENTE, in the *Italian Muſic*, is uſed to give notice to play or ſing quick, briſkly, &c.

VISTE, in *Botany*, a name given by ſome authors to the common white mountain coralloides; it is the Lapland name for the ſame plant; the rein-deer and many other creatures feeding on it, when all other vegetables are deſtroyed.

VISTNOU, or **VISTNUM**, in the *Modern Hiſtory of Mythology*, a name given in the theology of the Bramins, to one of the three great gods of the firſt claſs, which are the objects of worſhip to the inhabitants of Hindoſtan; the other two are *Brama* and *Ruddiren*.

According to the VIEDAM, theſe three gods were created by the Supreme Being, to be his miniſters in nature. Brama is repreſented as the creator, *Viſtnou* as the preſerver, and Ruddiren as the deſtroyer of beings. However, there are ſome ſects which maintain, that *Viſtnou* is ſuperior to Brama, and that he gave him exiſtence. *Viſtnou*, it is ſaid, diſtributed mankind into three claſſes, the rich, the poor, and thoſe of middle ſtate; and created many worlds, inhabited by ſpirits deſtined for the preſervation of other beings. *Viſtnou* is moſt reſpected in the kingdom of Carnata, Brama in the Mogul empire, and Ruddiren in Malabar. Un. Hiſt. vol. vi. 8vo.

VISUAL, ſomething belonging to the SIGHT, or SEEING.

VISUAL *rays* are lines of light, imagined to come from the object to the eye. See RAY.

All the obſervations of aſtronomers and geometers are performed by means of the *viſual* rays, received in at the ſights, or pinnulæ, of alhidades.

VISUAL *point*, in *Perſpective*, is a point, in the horizontal line, wherein all the ocular rays unite. See POINT.

Thus, a perſon ſtanding in a ſtraight long gallery, and looking forwards; the ſides, floor, and cieling, ſeem to meet, and touch one another in a point, or common centre.

VISUAL *angle*. See ANGLE.

VISUAL *line*. See LINE.

VISUM. See HABERE *facias viſum*.

VITA, *life*. See LIFE.

VITA, *cui in*. See CUI.

VITÆ, *aqua*. See AQUA.

VITÆ, *arbor*. See TREE *of life*.

VITÆ, *lignum*. See GUAIACUM.

VITA *longa*, a name given by ſome botanical authors to the *piper Æthiopicum*, or Æthiopian pepper.

VITAL, *vitalis*, in *Anatomy*, ſomething that miniſters principally to the conſtituting or maintaining of life in the bodies of animals.

Thus, the heart, lungs, and brain, are called *vital* parts.

VITAL *functions*, or *actions*, are thoſe operations of the *vital* parts whereby life is affected; ſo as that it cannot ſubſiſt without them.

Such are the muſculous action of the heart; the ſecretory action of the cerebellum, the reſpiratory action of the lungs; and the circulation of the blood and ſpirits through the arteries, veins, and nerves. See FUNCTION and ACTION.

VITAL *principle*, or *ſubſtance*, denotes a kind of agent or inſtrument, ſuppoſed by Dr. Grew to be employed under the direction and in ſubordination to the will of the Creator in the production of plants, animals, &c.

This principle correſponds to the PLASTIC nature of Dr. Cudworth. The ſuppoſed exiſtence of theſe principles produced a diſpute between M. Bayle and M. Le Clerc, which the former conceived to favour atheiſm, though he allows that neither Dr. Cudworth, nor Dr. Grew, were aware of the conſequence; but the latter maintains, that the plaſtic or *vital* natures, admitted by theſe writers, cannot in the leaſt favour the atheiſts, becauſe they are only inſtruments in the hand of God, and have no efficacy but what they receive from him, who directs and rules all their actions. Of this diſpute Dr. Warburton obſerves, that Cudworth's plaſtic life of nature is fully overthrown by Bayle, whoſe ſuperiority in the controverſy with Le Clerc is clear and indiſputable. See Grew's Coſmologia Sacra, fol. 1701. p. 31, &c. and Cudworth's Life, prefixed to Birch's edition of the Intellectual Syſtem, vol. i. p. 15, &c.

VITAL *ſpirits* are the fineſt and moſt volatile parts of the blood. See SPIRITS.

VITALBA, in *Botany*, a name given by ſome authors to the viorna, or TRAVELLER's *joy*.

VITALIA, a name given by ſome authors to the cardiac medicines.

VITALIS, in *Botany*, a name given by ſome authors to the common telephium, called the Engliſh *orpine*, and livelong, from its quality of living and flouriſhing a long time after it is taken from the root.

VITELLIANI, in *Antiquity*, a kind of tablet, or pocket-book, wherein people anciently uſed to write down their ingenious, humorous, and even wanton fancies and impertinences: the ſame with what, in Engliſh, we may call a *trifle-book*. See Martial, lib. xiv. epig 8.

Some will have them to take their name from *vitellus*, a yolk of an egg; becauſe the leaves were rubbed therewith. Others derive the name from one *Vitellius*, their inventor.

VITEX, in *Botany*, a genus of the *didynamia angioſpermia* claſs. For the characters, &c. ſee AGNUS *caſtus*.

VITI *chorea*. See VITUS's *dance*.

VITIFERA, in *Ornithology*, a name by which many have called the common œnanthe, a bird well known in England by the name of the WHEAT-*ear*.

VITILIGO, a diſeaſe frequent among the Arabians: it is the ſame with what is otherwiſe called ALPHOS.

VITIS, in *Botany*. See VINE.

VITIS *idæa*. See WHORTLE *berry*.

VITISALTUS, a word uſed by ſome medical writers for the VITUS's *dance*.

VITRAGO, in *Botany*, a ſpecies of plants, reſembling that of which the glaſs is made. It is otherwiſe called HELXINE.

VITREA *tabula*, a name given by ſome authors to the internal table of the cranium.

VITRESCIBLE, or VITRIFIABLE, formed of *vitrum*, *glaſs*, is a denomination applied to all ſtones which, joined to alkaline ſalts, can form glaſs. In the preſent century thoſe ſtones, which had before been called *vitreſcible*, were called ſiliceous by Mr. Pott, and after him by Mr. Cronſtedt. See STONE.

VITREUS *humor*, or *vitreous humour*, in *Anatomy*, denotes the third, or glaſſy homour of the eye; thus called from its reſemblance to melted glaſs. It lies under the cryſtalline; by the impreſſion of which, its fore-part is rendered concave. It greatly exceeds in quantity both the aqueous and cryſtalline humours taken together, and conſequently occupies much the greateſt part of the cavity of the globe of the eye. It is ſolid, gelatinous, very pellucid and without colour, except in the fœtus; conſiſting principally of a congeries of lymphatic veſſels, which are derived from the numerous veſſels of the internal lamina of the choroides. Scheiner ſays, that the refractive power of this humour is a medium between thoſe of the aqueous, which does not differ much from water, and of the cryſtalline, which is nearly the ſame with glaſs. Hawkſbee makes its refractive power the ſame with that of water, and, according to Robertſon, its ſpecific gravity agrees nearly with that of water.

The *vitreous* humour is contained in a very fine membrane or coat, denominated, from its ſituation, *tunica vitrea*, and the delicacy of its texture ARACHNOIDES; the internal lamina of which not only inveſts the ſurface of this humour, as its external lamina does the cryſtalline; but it dips down, inſinuates itſelf into the ſubſtance of the *vitreous* humour, and is ſeparated into a variety of diſtinct cells or bags, in which are depoſited different portions of this humour. This tunic is rendered viſible, by putting the whole of the humour into a glaſs of clear water; but its diſtinct cells cannot be made viſible without the aſſiſtance of an acid liquor to coagulate it. It is grooved on its ſurface, in a variety of places, for the reception of the proceſſus ciliares.

For the office of the *vitreous* humour, ſee VISION.

VITRIFICATION, or VITRIFACTION, the act of converting a body into glaſs, by means of fire.

Of all bodies, ſand, flints, and pebbles, with alkaline ſalts, *vitrify* the moſt eaſily: accordingly, it is of theſe that GLASS is principally made.

Vitrification is performed by fuſing pure and elementary earth, which makes the principal baſis of all *vitrifications*, and is, therefore, called vitrifiable earth, with certain very fuſible ſubſtances, that are capable of uniting intimately with this earth, and of communicating to it ſome of their fuſibility: theſe ſubſtances are the inflammable principle of phlogiſton, and ſeveral ſaline matters. And as all compound bodies partake of the properties of their component parts, factitious cryſtals ought to partake ſo much more of the properties of inflammable and ſaline matters, and ought to be removed ſo much more from thoſe of pure vitrifiable ſtones, as they contain a larger quantity of thoſe matters. Accordingly glaſs is ſo much more perfect, as it poſſeſſes more of the properties of vitrifiable earth. If we could, therefore, produce a fire ſufficiently intenſe, and had furnaces and veſſels capable of ſuſtaining it, we ſhould make glaſs equal to the precious ſtones: whence it is evident, that the moſt important object in *vitrification* is to have furnaces capable of producing the greateſt heat, and pots or crucibles capable of reſiſting, during a long time, this heat, and alſo the action of the vitreſcent matter they contain. See *Glaſs-houſe* FURNACE, and *Glaſs*-POTS.

The FLUXES proper for the proceſs of *vitrification* are, as we have obſerved, the inflammable and the ſaline. In order to obtain the inflammable principle, choice muſt be made of ſuch ſubſtances with which it is found naturally combined; and theſe are particularly metallic earths, which are beſt adapted for conveying phlogiſton into vitreous compoſitions; and of all metallic earths, that of lead is fitteſt for the purpoſe. This metal, which contains a large portion of phlogiſton, is quickly deprived of ſo much of it, that it loſes its metallic ſtate and is eaſily melted into a tranſparent vitreous maſs; but it has, at the ſame time, this remarkable property, that when once it has loſt as much phlogiſton as is neceſſary to diſpoſe it to *vitrification*, its calx ſtrongly retains as much of it as is neceſſary to give it its greateſt degree of vitreſcibility; and that it may be ſooner diſſipated into vapours by the continued action of a very intenſe fire, that it can be changed into an earth totally dephlogiſticated, and conſequently refractory, like the calxes of tin, and of regulus of antimony. Beſides the fuſible earth of lead is one of thoſe that retain the leaſt colour. All theſe qualities render it preferable to any other metallic earth for the purpoſes of *vitrification*.

In whatever manner the calx of lead has been prepared, provided it be really in a calcined, and not in a metallic ſtate, it may be uſed in *vitrification*. Accordingly, the grey calx, or aſhes of lead, maſſicot, red lead, litharge, ceruſſe, and all the precipitates of lead, ſeparated from acids by unmetallic intermediate ſubſtances, being mixed with ſand, or any other vitrifiable ſtone, and expoſed to a ſufficient degree of fire, do always promote the fuſion of theſe matters, and form with them glaſſes more or leſs hard and tranſparent, according to the ſtrength of the fire, and the proportion of the ingredients. See GLASS *of lead*.

The ſaline matters, fit for *vitrification*, are fixed alkalis, vegetable and mineral; nitres, with baſis of fixed alkali; ſedative ſalt and borax; fuſible ſalt of urine, or rather phoſphoric acid. The fixed alkalis, vegetable and mineral, are moſt frequently uſed: theſe are fuſible with a moderate heat; they are ſo fixed, that they can reſiſt, during a ſufficient time, the heat of ordinary *vitrification*; and they act powerfully upon flints, ſands, and other vitrifiable ſtones.

The proportion of alkali to ſand, in order to make good glaſs, is, from one to two parts of the former ingredient, and two parts of the latter. Borax, ſedative ſalt, and the fuſible ſalt of urine, which may be melted, without any earthy addition, into tranſparent vitreous maſſes, and, therefore, contain a larger portion of the earthy principle than nitre or fixed alkali, do nevertheleſs very powerfully promote the *vitrification* of other ſubſtances. They are not employed in the manufacture of large quantities of glaſs, becauſe they are too dear. Borax, however, is ſometimes uſed for making ſmall quantities of ſome particular kinds of fine glaſs. Arſenic may alſo be enumerated among vitrifying fluxes, as it is fuſible and vitreſcible ſingly, and is alſo capable of promoting the fuſion of vitrifiable earths; for which purpoſe it is frequently employed as an ingredient in vitreous compoſitions. As arſenic partakes both of the metallic and ſaline properties, it probably acts in *vitrification* both as a ſalt and a metallic earth; and the quantity neceſſary to promote *vitrification* is, therefore, intermediate betwixt the quantities of the calx of lead, and of ſaline ſubſtances, that are neceſſary for the ſame purpoſe.

Arſenic cannot well be employed as the ſole flux for vitrifiable earth: nitre ſhould be added to the ingredients of the glaſs, and thus the arſenic uniting with the alkaline baſis of the nitre, forms the neutral arſenical ſalt, in which the arſenic is conſiderably fixed. But as this neutral arſenical ſalt is eaſily decompoſed by contact of phlogiſton, therefore no calx of lead, or other ſubſtance containing the inflammable principle, ought to be mixed with arſenic in the compoſition of glaſs. Arſenic is alſo very difficultly manageable in *vitrification*, on account of its property of powerfully corroding and pervading crucibles and pots.

From Mr. Pott's experiments it is known, that vitrifiable, calcareous, and argillaceous earths, each of which are ſingly unfuſible, do reciprocally promote the fuſion of each other, when mixed together nearly in equal proportions, and expoſed to a very violent heat; and that from theſe mixtures matters perfectly vitrified are formed. But the cauſe of this ſingular fuſibility not being known, it is not determined whether it is produced by phlogiſtic or by a ſaline ſubſtance, or by both. Dict. Chem. art. *Vitrification.* See GLASS.

Gold held, by M. Homberg, near the focus of the duke of Orleans's large burning concave mirror, at firſt ſmoaked, then changed, all of it that did not go off in fumes, into glaſs, of a deep violet colour. This glaſs of gold weighs leſs than gold. Memoirs of the Royal Academy, 1702.

All metals, and even almoſt all natural bodies, ſufficiently heated, vitrify; and this *vitrification* is the laſt effect of the fire: after which, the moſt intenſe heat of the largeſt burning-glaſs will make no farther alteration.

VITRIOL, *vitriolum,* in *Chemiſtry,* a ſaline, cryſtalline concrete, compoſed of metal, united with a certain acid, called the *vitriolic* ACID.

Some take the word *vitriolum* to be uſed *quaſi vitri oleum,* becauſe of its ſhining colour; but Menage rather derives it *à vitreo colore:* the Latins call it *atramentum ſutorium;* and the Greeks, *chalcanthus.*

Vitriol is defined, by Boerhaave, a ſaline, metallic tranſparent glebe; diſſoluble in water, and fuſible and calcinable by fire.

It acquires different names, according to the different places where it is dug; and the *vitriols* of thoſe, alſo, differ from each other in denomination and colour; ſome being *white,* others *blue,* and others *green.*

Roman and Cyprus *vitriol,* for inſtance, is blue; and that of Sweden and Germany, commonly called Engliſh *vitriol,* is green; beſides which there is alſo a white kind, called Goſlar *vitriol.*

M. Geoffroy the elder, obſerves, that they all conſiſt of an acid ſalt, like that found in alum and ſulphur; excepting that in alum the acid is mixed with abſorbent earth, or calx: in ſulphur, it is united with certain fatty bituminous parts; and in *vitriols,* with metallic parts.

According to Boerhaave, *vitriol* conſiſts of a metallic part, with a ſulphur adhering, a menſtruous acid, and water. In *blue vitriol,* the metal wherewith the acid, &c. is joined, is copper. In *white vitriol,* it is combined with zinc. In *green vitriol,* the acid is joined with iron.

In five ounces of *green vitriol,* M. Geoffroy the younger has found two of water, two of iron, and one of acid. Vide Hiſt. Acad. Roy. Scienc. an. 1728. p. 45.

According to the analyſis of ſir Torbern Bergman, (Eſſays, by Cullen, vol. i. p. 180.) 100 parts of blue *vitriol,* or vitriolated copper, cryſtallized, contain 26 of copper, 46 of vitriolic acid, and 28 of water. According to Kirwan, 100 parts contain 30 of real acid, 27 of copper, and 43 of water. The taſte is aceſcent, æruginous, and cauſtic; it calcines in heat; one part, in a moderate heat, requires nearly 4 parts of water, but much leſs of boiling water. Of white *vitriol,* or vitriolated zinc, 100 parts contain 20 of zinc, 40 of vitriolic acid, and 40 of water. According to Kirwan, 100 parts contain 22 of acid, 20 of zinc, and 58 of water. In a moderate heat, one part requires more than two of water, but much leſs of boiling water. Its taſte is aceſcent, aſtringent, and cauſtic. Of green *vitriol,* or vitriolated iron, 100 parts contain 23 of iron, 39 of vitriolic acid, and 38 of water. According to Mr. Kirwan, 100 parts of it recently cryſtallized, contain 20 of real acid, 25 of iron, and 55 of water: in moderate heat one part requires ſix of water, but three-fourths of boiling water. In heat it ſplits into a yellow powder; in the fire into a ferruginous powder; the taſte is aceſcent, ſtyptic, and cauſtic.

In order to conceive the formation of *vitriol,* e. g. the *green vitriol,* the reader will conſider, that SULPHUR is compoſed of an acid and phlogiſton; and that IRON is alſo compoſed of an earth and phlogiſton. During the fermentation of a maſs of ſulphur and iron, the phlogiſton, or inflammable part of them both, is diſperſed, and leaves the acid of the ſulphur and the earth of the iron; and the union of theſe conſtitutes the ſalt in queſtion. That this is a true explanation of the origin of this ſalt, will appear evident from the following conſideration. If into a quantity of the acid procured from the burning of ſulphur, you put a piece of iron, the iron will be wholly diſſolved in the acid; and if you ſaturate the acid with iron, and then evaporate and cryſtallize the ſolution, you will obtain a *green vitriol,* ſimilar, in every reſpect, to that obtained from the reſidue above mentioned.

The decompoſition, or analyſis of *green vitriol,* will farther prove, that it conſiſts of the acid of ſulphur united to iron, or more properly to the earth of iron. If you put ſixteen ounces of freſh *green vitriol* into a retort, and diſtil them till nothing more can be forced into the receiver, by the utmoſt violence of a long continued fire, you will find in the receiver about eleven ounces of an acid liquor, ſmelling very ſtrongly of ſulphur; and in the retort you will find about five ounces of an earth, of a deep red or purpliſh colour. The acid liquor, by combining it again with iron, may be made into *vitriol;* and the earth, by being properly melted in conjunction with any matter, which will reſtore to it its inflammable principle, may be made into iron. The proportionable quantities of acid and earth, procurable from *green vitriol* by diſtillation, are expreſſed in terms rather indefinite, becauſe that proportion is ſomewhat variable in different *vitriols.*

It is well known, that natural combinations of iron and ſulphur are ſubject to the ſame ſpontaneous changes obſervable in the artificial mixtures for theſe ſubſtances; and hence we may clearly apprehend the manner in which theſe ſubſtances that are called *native vitriols* are formed in mines and other ſubterraneous cavities. The PYRITES exiſting in theſe places being naturally decompoſed by the ſulphur's parting with its phlogiſton, the water, which is always dipping in mines, diſſolves the *vitriol* generated in the decompoſed pyrites; and being afterwards evaporated, either by the heat or the current of air ſubſiſting in the mine, the *vitriol* is found in its cryſtalline form, either projecting like circles from the top and ſides of the mine, or lying in cavities at its bottom. The cryſtals of *native vitriol* are more or leſs regular, according to the circumſtances attending the evaporation of the water, and they are of different colours, according to the quality of the pyrites; for, together with the ſulphur and iron, the chief conſtituent parts of the pyrites, there is ſometimes combined copper, and other metallic matters, which being diſſolved by the acid of the ſulphur at the ſame time that the iron is diſſolved, a mixed *vitriol* is produced, the colour of which is ſometimes whitiſh; but more generally it conſiſts of different ſhades of green and blue.

Native vitriol is often met with in our coal-mines. From an old cannel coal-pit, near Wigan in Lancaſhire, Dr. Watſon procured a conſiderable quantity of it, very well cryſtallized; and Dr. Rutty has obſerved, that the vitriolic water at Haigh in Lancaſhire, is the ſtrongeſt in Britain, yielding 1920 grains of *vitriol* from a gallon of water. See VITRIOLIC *waters.*

Vitriol is very commonly called by the manufacturers COPPERAS; accordingly, we conſtantly hear of green, blue, and white copperas. The conſtituent parts of the different kinds of *vitriols* were not underſtood by the ancients ſo well as they are at preſent: they ſeem to have had an idea that copper was the baſis of them all: hence the Greek term for *vitriol,* *chalcanthos,* the efflореſcence of copper, and the Latin one, *cuperoſa,* or *cupri roſa,* the flower or efflоreſcence of copper; from which, ſays Dr. Watſon, the French *couperoſe,* and our copperas, are evidently derived. See CABRUSI.

Some moderns take the CHALCITIS, or *chalcanthum* of the ancients, which they ſuppoſed to be a *native vitriol,* that had acquired, according to their opinion, its full perfection in the entrails of the earth, and which is a kind of mineral ſtone, of a reddiſh colour, to be the ſame with that *chalcanthum* brought from Sweden and Germany; the beſt whereof is of a browniſh-red colour, and a vitriolic taſte, and diſſolves eaſily in water; and when broken, is of the colour of ſhining copper. See VITRIOLIC *minerals.*

The *vitriols* which nature prepares are never to be met with in commerce; they ſerve to adorn the cabinets of the curious, but they are neither ſufficiently pure for the purpoſes to which common *vitriols* are applied, nor are they found in ſufficient quantities to anſwer the demand which is made for them.

VITRIOL, *the white,* or *vitriol* of zinc, is found native in the mines of Goſlar, ſometimes in tranſparent pieces, more commonly in white efflореſcences; which are diſſolved in water, and cryſtallized into large irregular maſſes, ſomewhat reſembling fine ſugar; it is alſo found diſſolved in mineral waters, and generally with ſome proportion of the *vitriol* of iron and copper: it is in taſte ſweetiſh, nauſeous, and ſtyptic.

It has been diſputed, whether white *vitriol* is any thing elſe than *green vitriol* calcined. But it ſeems that *white vitriol* is of a quite different ſpecies from either the green or the blue *vitriols.* See Geoffroy, Mat. Med. tom. i. p. 124.

In the condition in which *white vitriol* is uſually bought, it contains ſomewhat both of copper and iron; but being purified by ſolution, filtration, and cryſtallization, it is freed from both theſe metals, and appears to be a native *vitriol ſui generis.* See Cramer, Elem. Art. Docim. vol. i. p. 302. ed. 2. Med. Eſſ. Edinb. Abrid. vol. ii. p. 472.

If four ounces of alum be put in concoction with two parts of *cadmia foſſilis* pulverized, the earth of the alum precipitates, and its acid takes hold of the earth of zinc, ſo that a true *white vitriol* is the reſult.

This *vitriol* being precipitated by an alkaline ley, and dried, after its ſalts are ſeparated in water, and then mixed with charcoal-duſt, it will give ZINC.

The ſame thing happens in mixing *vitriol* of iron with two or three parts of lapis calaminaris; but the operation is eaſier with alum and *vitriol* of copper. Marggraaf, in Mem. de l'Acad. de Berlin, 1746

The *white vitriol* requires little more than twice its weight of water to diſſolve it in the temperature of 60°; its ſpecific gravity is about 2,000. It mixes uniformly with vitriolic neutral ſalts, but precipitates nitrous or marine ſelenites from their ſolutions, which aſcertains its acid principle: it is itſelf precipitated whitiſh by alkalis and earths, but not by iron, copper, or zinc, which ſufficiently indicates its baſis: if it contains any other metallic principle, this may be precipitated by adding more zinc, except iron, which will of itſelf precipitate by expoſure to the air, or boiling in open air. That in common uſe is moſtly prepared at Goſlar, from an ore, which contains zinc, copper, and lead, mineralized by ſulphur and a little iron: the copper ore is firſt ſeparated as much as poſſible, and the reſiduum, after torrefaction and diſtillation, is thrown red-hot into water, and lixiviated: it is never free from iron.

The common *white vitriol* of the ſhops contains a quantity of ferruginous matter; of which, in keeping, a part is extricated from the acid, in an ochery form, ſo as to tinge the maſs of a yellow hue. On diſſolving the whiteſt pieces in water, a conſiderable portion of ochre immediately ſeparates: the filtered ſolution, tranſparent and colourleſs, becomes again turbid, and yellow, on being made to boil, and depoſits a freſh ochery ſediment; and a like ſeparation happens, though much more ſlowly, on ſtanding without heat. Hence, when the ſolution is evaporated to the uſual pitch, and ſet to cryſtallize, the cryſtals generally prove foul; unleſs ſome freſh acid be added (as an ounce of the ſtrong ſpirit or oil of *vitriol* to a pound of the ſalt) to keep the ferruginous matter diſſolved: this addition ſecures the whiteneſs of the cryſtals, and prevents their becoming ſoon yellow in the air. *White vitriol* generally contains alſo a ſmall portion of copper diſtinguiſhable by the cupreous ſtain which it communicates to poliſhed iron immerſed in ſolutions of it, or rubbed with it in a moiſt ſtate. The quantity of copper is, indeed, very ſmall, and may, if it be thought neceſſary, be ſeparated by boiling the ſolution for ſome time, along with bright pieces of iron, which will extricate all the copper: by continued or repeated coction, the greateſt part of the ferruginous matter may alſo be ſeparated. For the uſe of *white vitriol* in medicine and ſurgery, ſee VITRIOL, in *Medicine*, infra.

VITRIOL, *blue*, or *vitriol* of copper, is commonly called Roman or Cyprian *vitriol*, or blue-ſtone. After being long expoſed to the air, it degenerates into a mixture of blue and ruſty yellow. It requires about four times its weight of water to diſſolve it in the temperature of 60°. Its ſpecific gravity is about 2,23. This ſalt rarely occurs cryſtallized, but is often found naturally diſſolved in water, in Hungary, Sweden, and Ireland; from which water *blue vitriol* is generally prepared, by evaporating the water to a proper ſtandard; after which it is let out into coolers, where it ſhoots into regular and beautiful cryſtals of a rhomboidal form. See ZIMENT *water*.

It is alſo occaſionally extracted from ſulphurated copper ores after torrefaction, by the application of water, or waſhed out by rain or ſubterraneous waters. Mr. Cronſtedt ſays, it is ſeldom free from iron and zinc. If a piece of clean poliſhed iron be dipped into the ſolution of this ſalt, it will almoſt immediately be covered with a cupreous coat: this, together with the deep blue colour ariſing from mixing it with a volatile alkali, diſcovers its baſis; as its uniform mixture with other vitriolic ſalts does its acid. Hence it alſo appears, that the acid of *vitriol* has a greater affinity with iron than with copper, becauſe it quits copper to unite itſelf with iron. This fact explains, in a very ſatisfactory manner, the nature of that tranſmutation of iron into copper, which was formerly conſidered as a perplexing phenomenon. Agricola ſpeaks of waters in the neighbourhood of Newſol, in Hungary, which had the property of tranſmuting the iron which was put into them into copper. In the year 1673, our countryman, Dr. Brown, viſited a famous copper-mine at Herrn-Grundt, near Newſol; and he informs us, that he there ſaw two ſprings, called the old and new ZIMENT, which turned iron into copper. The iron in this caſe is taken up by the water, and remains ſuſpended it it, in the place of the copper: ſo that this tranſmutation is nothing but a change of place; and as the copper is precipitated by the iron, ſo the iron might be precipitated by pot-aſh, or any other ſubſtance which has a greater affinity with the acid of *vitriol* than iron has.

The cauſe of the impregnation of theſe copper waters in Germany is not difficult to be explained. Moſt copper-ores contain ſulphur, and when the ſulphur is in any degree decompoſed, its acid unites itſelf to the copper, and forms *blue vitriol*, which is the ſubſtance with which the waters iſſuing from the copper-mines are impregnated. The copper contained in theſe waters has been for ſome centuries collected in Germany, by putting old iron into pits filled with the coppery water; and thus the iron is diſſolved, and the copper is precipitated, and being raked out in the form of mud, it is afterwards melted into very fine copper. The quantity of copper procured by an hundred tons of iron amounts ſometimes to ninety tons, and ſeldom to leſs than eighty-four. Of late years ſome ſucceſsful attempts of this kind have been made in England and Ireland. See COPPER.

In the iſle of Angleſey, near Paris mountain, which abounds in copper ore, the water in which the roaſted ore is waſhed is ſo ſtrongly impregnated with copper, that they have found it uſeful to adopt the German method of precipitating it by means of old iron, and they have obtained in one year near a hundred tons of copper, precipitated from this water. The water, after the copper has been precipitated by means of iron, is at preſent thrown away; whereas, by evaporation, it would yield *green vitriol*; and as above a hundred tons of iron muſt be employed in obtaining the forementioned quantity of copper, Dr. Watſon ſuggeſts, whether a manufactory of *green vitriol* might not be eſtabliſhed at this and at all other places where copper is obtained by precipitation. One hundred tons of iron would yield, at the leaſt, two hundred tons of *vitritol*, which, at the low price of three pounds per ton, would defray the expence of extracting it; more eſpecially as the watery ſolution might be evaporated by a proper application of part of that heat, which is now loſt in all the great ſmelting houſes.

The greateſt part of the *blue vitriol*, now met with in the ſhops, is prepared in England, by artificially combining copper with its ſulphur or its acid. The method of making the preparation by the glaſs-makers is this: take little thin pieces of braſs, and lay them *ſtratum ſuper ſtratum* in a crucible, with powder of brimſtone. When the veſſel is full, ſet it luted and covered in an open wind furnace, with burning coals over it, and let it ſtand two hours; then let the furnace cool of itſelf, and take out the crucible, the maſs within will be of an obſcure blackiſh purple; powder it and ſift it fine, and then mixing with every pound of it ſix ounces of powdered brimſtone, take a round veſſel of earth, that will bear the fire, place it upon iron bars ſet acroſs in an open wind-furnace, fill it with coals, and then put in the powder; keep it burning and ſtirring about till all the brimſtone is burnt up; then take out the pan, and powder the calcined maſs again; ſift it fine, and proceed with it thrice as before; the laſt time let it ſtand on the fire till it become red. Put a pound of this calcined copper into a glaſs body, with ſix pints of water; evaporate two pints or thereabout in a ſand heat; the water is then of a fine blue, and muſt be poured off clear; then filtrate it. Evaporate the water from the remaining ſediment of copper left in the glaſs, and with new ſulphur calcine it again and again; repeat this five or ſix times, and extract the blue tincture with water as before; filtrate all the waters, and put them together. Evaporate all to a fifth part, or thereabouts, and ſet it in a cool place, and fine pointed cryſtals will be formed, reſembling emeralds; ſeparate theſe cryſtals, and evaporate the water again, till all the cryſtals be procured. Then put a pound of them into a glaſs retort, well luted, and fitted to a capacious receiver; let the joints be well cloſed, and make a moderate fire for four hours; then make it violent for twenty hours, or till no more white fumes ariſe. The next day open the receiver, and ſeparate the liquor into a glaſs, where it muſt be kept carefully ſealed up. Neri's Art of Glaſs, p. 50.

Very great things are to be done in the glaſs art by means of this liquor; the remainder in the retort, expoſed to the air for a few days, will acquire a blue colour, and this, mixed with zaffer, will give glaſs a fine ſea-green. The *vitriol* of copper is of an elegant ſapphire blue colour; hard, compact, and ſemitranſparent; when perfectly cryſtallized, of a flattiſh, rhomboidal decahedral figure; in taſte extremely nauſeous, ſtyptic, and acrid. Expoſed to a gentle heat, it firſt turns white, and then of a yellowiſh red, or orange colour; on increaſing the fire, it parts, difficultly, with its acid, and changes at length to a very dark red calx, reducible, by fuſion with inflammable fluxes, into copper.

Some writers hold *vitriol* to be the root or matrix of copper; becauſe, in the copper-mines, they never dig deeper than the glebe, out of which the *vitriol* is drawn. For the uſe of *blue vitriol* in medicine, &c. ſee VITRIOL, in *Medicine*.

VITRIOL, *green*, or *vitriol* of iron, is commonly called Engliſh *vitriol*, or COPPERAS; and it is the Roman *vitriol* of the Italian writers. This *vitriol* is of a greeniſh colour, when perfectly and recently cryſtallized, but effloreſces by expoſure to the air, and becomes yellowiſh; it requires ſix times its weight of water to diſſolve it in the temperature of 60°. Its acid is known by this, that the ſolution of this ſalt mixes without turbidity with the ſolutions of other ſalts that contain the vitriolic acid, as Epſom, ſelenite, tartar vitriolate, &c. but renders the ſolutions of nitrous or marine ſelenite turbid; and its baſis is known by the black colour which the ſolution of galls, or vegetable aſtringents, immediately produce in its ſolution. It is frequently found native, either in coal mines, or in the cavities of pyritaceous mines, or adhering to the ſcaffolds in a ſtalactitical form; and alſo in ſmall round ſtones, called ink-ſtones, of a white, red, grey, yellow, or black colour, which are almoſt entirely ſoluble in water, and contain a portion of copper and zinc; but the greateſt part of that in uſe is prepared from the martial pyrites or mundic. *Vitriol* is formed in theſe ſtones by expoſing them a long time to the action of the air and moiſture, or by torrefaction in open air, and ſubſequent expoſure to its action, which operation in ſome caſes muſt be often repeated, according to the proportion of ſulphur, and nature of the earth: the calcareous pyritæ are thoſe in which it is moſt eaſily formed, and they effloreſce the ſooneſt; good pyritæ, properly treated, yield about two-thirds of their weight of *vitriol*.

The common *green vitriol* is made at Deptford, near London, and other places, from a ſpecies of the pyrites found on Sheppey iſle, the iſle of Wight, and various other parts of the Eſſex, Kentiſh, Suſſex, and Dortſetſhire coaſts. Large quantities of the pyrites are laid in heaps in the open air, on beds properly prepared; in half a year, a year, or two years, ſooner or later, according to its quality, the pyrites acquires a ſpontaneous heat; that heat, without being increaſed to ſuch a degree as to fire the pyrites, inſenſibly diſperſes the inflammable principle of the ſulphur, one of the conſtituent parts of the pyrites; the acid of the ſulphur, thus diſengaged from the inflammable principle, unites itſelf to the other principal conſtituent part of the pyrites, the iron, and forms *green vitriol*. The *vitriol*, thus formed, is waſhed from the bed of pyrites by the rain: the rain-water, which has diſſolved the *vitriol* of the pyrites, cannot ſink into the earth, becauſe the bed on which the pyrites is ſpread is formed of clay; and being made, moreover, in a ſloping poſition, the diſſolved *vitriol* runs into receptacles properly placed to receive it, and being boiled with old iron, till it is of a proper conſiſtence, it runs off into coolers, and left to cryſtallize. After the formation of the cryſtals, there remains a thick, reddiſh, unctuous, ſtyptic, and aſtringent liquor, which M. Geoffroy calls *eau mere de vitriol*, and which we call *mother of vitriol*, as containing all the principles of *vitriol*, though diſunited: this liquor is ſometimes boiled, and evaporated again. In the original liquor, of which *vitriol* is made from the pyrites, there is contained a white, acid, pungent ſalt. This is ſeparated from the mother liquor or brine, when no more *vitriol* will ſhoot, and is called by the chemiſts the SALINE *principle of vitriol*.

Vitriol may be made without the uſe of old iron; but the liquor which drains from the pyrites being often not ſaturated with iron, the iron is added to ſaturate the acid, and at the ſame time to purify it from any particles of copper which it may happen to contain: by this means a pure iron *vitriol* is obtained, which is known in commerce under the name of Engliſh *vitriol*. The quantity of old iron, in ſome works, amounts to two hundred weight in making a ton of *vitriol*.

Much after the ſame manner *vitriol* is made from the pyrites found among coal: there are manufactories of it near Wigan, at Whitehaven, at Newcaſtle upon Tyne, and in ſeveral other parts of the kingdom. But all the *vitriol* works have ſunk in value of late years; the home conſumption of *vitriol* being much diminiſhed, ſince the acid, which uſed to be procured from the diſtillation of *vitriol*, has been obtained from the burning of ſulphur.

It is not eaſy to determine when this method of making *vitriol* was introduced into England. In the beginning of the reign of queen Elizabeth, a patent was granted to Cornelius Devoz for making alum and copperas; but it was not till towards the end of the laſt century, that this art of making *vitriol* was brought to ſo great a perfection as to enable us to export any of it; and indeed Dr. Campbell (Surv. of Brit. vol. ii. p. 21.) aſſures us, that at the latter end of the laſt century we imported annually about five hundred tons of *vitriol*, and that we now export upwards of two thouſand tons. It appears from ſir Charles Whitworth's Regiſter of Trade, Nº 1. that there were exported, from the port of London alone, near four hundred tons of copperas in three months, in 1776. A ſmall quantity of *vitriol*, perhaps to the annual amount of fifty or ſixty tons, is ſtill imported into England; ſome particular dyers, and other artiſts, being of opinion, that the foreign *vitriol*, as containing a little copper, is more uſeful to them than the Engliſh *vitriol*. It may be eaſily known whether *green vitriol* contains any copper, by only rubbing the *vitriol* to be examined upon a moiſtened piece of poliſhed iron; for if there is any copper in its compoſition, the iron will be changed into a copper colour.

Vitriol is alſo prepared from mineral waters that hold copper in ſolution, which is precipitated by iron; this ſolution of iron is afterwards cryſtallized, and always retains ſome copper. In Hungary it is prepared from pyritaceous ſhiſtus, and in many places from a ſpecies of calamine: the *vitriol* of Goſlar commonly contains a portion of zinc, as that of Hungary and Saxony does of copper: the Engliſh and French *vitriols* are purer, and yet ſometimes contain a ſmall proportion of alum. Turf and peat are ſometimes impregnated with *vitriol*; other earths alſo often contain *vitriol* and alum. This *vitriol* is ſometimes found of a white colour on the borders of the mineral lakes of Tuſcany.

Pure *vitriol* of iron is conſiderably tranſparent, of a fine bright, though not very deep, graſs-green colour; of a nauſeous, aſtringent taſte, accompanied with a kind of ſweetiſhneſs. Diſſolved, and ſet to cryſtallize, it ſhoots into thick rhomboidal maſſes, a part generally riſing at the ſame time in effloreſcences about the ſides of the veſſel. The ſolution depoſits, in ſtanding, a conſiderable quantity, and in boiling a much larger one, or the metallic baſis of the *vitriol*, in form of a ruſty calx or ochre: iron ſeems to be the only metallic body that thus ſeparates ſpontaneouſly, in any conſiderable quantity, from the vitriolic acid. On expoſing the *vitriol* itſelf to a moiſt air, a ſimilar reſolution happens on its ſurface; which, ſooner or later, according as the acid is more or leſs ſaturated with the metal, changes its green to a ruſty hue. In a warm dry air, it loſes a part of the phlegm or water, neceſſary to its cryſtalline form, and falls by degrees into a white powder. Expoſed to a gentle fire, it liquefies and boils up; but ſoon changes, on the exhalation of the watery part that rendered it fluid, to a ſolid, opake, whitiſh, or grey maſs: this pulverized, and urged with a ſtronger fire, continues to emit fumes, becomes yellow, being the *vitriolum calcinatum* of the London and Edinburgh Diſpenſatories; afterwards red, and, at length, having parted with moſt of its acid as well as phlogiſton, turns to a deep purpliſh-red calx, called COLCOTHAR *of vitriol*, and the *chalcitis factitia* of the Paris Pharmacopœia, revivable by inflammable ſubſtances into iron. This *colcothar* is ſold at Paris for ten pence a pound, and uſed for giving the laſt poliſh to plate-glaſs, at the great manufactory in the ſtreet St. Antoine. The plate of glaſs when firſt caſt is an inch thick; its aſperities are ground away with a coarſe kind of grit-ſtone, with ſand and emery, of different degrees of fineneſs, and it is at laſt poliſhed by colcothar. Dr. Watſon ſuggeſts to the proprietors of the plate-glaſs manufactory, near Preſcot, in Lancaſhire, and to the patentees for poliſhing marble, at Aſhford in Derbyſhire, that colcothar, which is very cheap, might perhaps render the uſe of putty, or calcined tin, leſs neceſſary. From the colcothar of *vitriol*, is prepared the ENS *veneris*.

From the *green vitriol* the vitriolic ACID has been generally extracted; by diſtilling the calcined *vitriol* in earthen long necks, with a ſtrong fire continued for two days or longer; though it is now moſtly obtained by collecting the vapour of burning ſulphur. See *Spirit* of SULPHUR, and CONCENTRATION.

The diſtilled ſpirit appears of a dark blackiſh colour, and contains a quantity of phlegm, greater or leſs, according as the *vitriol* has been leſs or more calcined. On committing it a ſecond time to diſtillation, in a glaſs retort placed in a ſand-heat, the phlegmatic parts riſe firſt, together with a portion of the acid, and are kept apart under the name of *ſpirit*, or *weak ſpirit of vitriol*, *ſpiritus vitrioli tenuis* of the London Diſpenſatory: at the ſame time the remaining *ſtrong ſpirit*, or *oil*, as it is called, loſes its black colour, and becomes clear; in which ſtate it is the *acidum vitriolicum* of the Edinburgh Diſpenſatory, and the *ſpiritus vitrioli fortis* of that of London; and this is the uſual mark for diſcontinuing the rectification.

The college of Edinburgh now directs a weak vitriolic acid of more certain ſtrength, made by mixing one part of the ſtrong acid with ſeven parts of water: this is called *acidum vitriolicum tenue*, vulgo *ſpiritus vitrioli tenuis*. Mr. Boyle (Works abr. vol. i. p. 142.) informs us, that if the caput mortuum, after the diſtillation of the *oil of vitriol*, be ſuffered to lie for a conſiderable time in the air, it will be ſo impregnated with new ſaline particles, as to be worth a ſecond diſtillation. The ſtrong acid, or *oil of vitriol*, is the moſt ponderous of unmetallic fluids, and the moſt fixed of ſaline ones, yielding no ſmell in the greateſt heat of the atmoſphere, and requiring, to make it boil or diſtil, a heat conſiderably greater than that in which lead melts. Expoſed to the air it imbibes its humidity, ſo as to gain by degrees an increaſe of more than twice its weight. The quantity of water it attracts from the air, in any given time, is not however, in proportion to its own quantity, but to its ſurface; and Mr. Boyle has found by experiment, that if the ſame quantities be expoſed to the ſame air in glaſſes, in the one of which the ſurface is nine times greater than the other, that with the larger ſurface will gain eighteen grains addition in weight, while the other gains only two grains; and ſo in proportion for any longer time.

When the *oil of vitriol* is fully ſatiated in the moiſteſt air, or wetteſt weather, it afterwards retains or loſes its acquired weight, as the air proves more or leſs moiſt. It may therefore be very practicable to make it a means to eſtimate the moiſture and dryneſs of the air. A very eaſy machine may be contrived to anſwer this purpoſe; for even a common pair of ſcales will do very well; and by a ſcale, on which the tongue of the balance ſhould move, would mark out the ſmalleſt changes in the moſt nice and accurate manner.

If a quantity of *oil of vitriol* be expoſed in a wide-mouthed glaſs, till thoroughly ſated with the moiſture of the air, and then put into a ſcale, and in the moiſteſt weather exactly poiſed with a weight in the oppoſite ſcale, it will only continue exactly poiſed ſo long as the weather continues in that moiſt ſtate; but as the air becomes gradually more and more dry, it will weigh leſs and leſs, and mount, while the ſcale with the weights preponderates and ſinks.

The tongue of a balance of but an inch and half long, thus deſcribes an arch of the third of an inch, by the different riſing and falling of the ſcale in which the *oil of vitriol* is; and conſequently if the tongue were a foot long, it would deſcribe an arch of near three inches, which would be a ſufficient ſpace to mark a ſcale of degrees very nicely upon; and, as the tongue is pointed to theſe, it would be an excellent hygrometer.

This balance may be contrived two ways, either ſuch whoſe pin ſhould be in the middle of the beam, with a very ſlender tapering tongue, of a foot or a foot and a half long, pointed to the diviſions on a broad arched plate fixed above; or elſe the ſcale with the liquor may be hung to a point of the beam, very near the pin, and the other extreme made ſo long as to mark a large arch on a board, placed conveniently for that purpoſe; and the ſcale, in either caſe, may very conveniently be a concave glaſs of four or five inches in diameter. On the diviſion of the arches ſhould be inſcribed the different temperature of the air ſhewn by the liquor. Phil. Tranſ. Nº 157.

Oil of vitriol, mixed directly with water, produces a heat ſo great as to render the veſſel intolerable to the hand: glaſs veſſels are apt to crack from the ſuddenneſs of the heat, unleſs the commixture is very ſlowly performed. The moſt ready method of diſtinguiſhing it, in a dilute ſtate, or when mixed with other acids, is by adding a ſolution of ſome calcareous earth, as chalk, made in any kind of acid liquor: this ſolution is, by a minute portion of the vitriolic acid, rendered milky, but ſuffers no change from any other ſpecies of acid. See SELENITES.

This *oil of vitriol* is not always fluid: ſometimes, when it is exceedingly ſtrong, it has been obſerved to become ſolid; and in this ſtate it is denominated *glacial*, or *icy oil of vitriol*. If the long neck, in the extrication of the acid from *vitriol*, happens to crack in the fire, the acid that riſes after this period, called by Stahl *ſpiritus vitrioli volatilis*, is found remarkably changed. It emits in the air ſuffocating vapours like the fumes of burning brimſtone, and riſes in diſtillation with a heat not much greater than that which the hand can bear; to the taſte it diſcovers little corroſiveneſs or acidity. Combined with alkaline ſalts, it loſes its pungent odour; but on the addition of any other acid, it is diſengaged from the alkali, ſo as to riſe again in diſtillation as volatile and ſuffocating as before. It deſtroys or whitens the blue and red colours of the flowers of plants; whereas, in its fixed ſtate, like the other acids, it changes the blue to red, and heightens thoſe which are naturally red. This volatile ſpirit loſes its ſuffocating odour, and reſumes its corroſiveneſs, fixedneſs, and other qualities, by expoſure to the air, which ſeems to carry off the inflammable principle on which its volatility depended. For other preparations of *green vitriol*, and their uſe in medicine, &c. ſee VITRIOL, in *Medicine*.

VITRIOL, in *Medicine* and the *Arts*, has various applications and uſes. *White vitriol* is ſometimes given, from five or ſix grains to half a dram and more, as an emetic, and appears to be one of the quickeſt in operation of thoſe that can be employed with ſafety. Its chief uſe is for external purpoſes, as a cooling reſtringent and deſiccative: a dilute ſolution of it, as ſixteen grains in eight ounces of water, with the addition of ſixteen drops of weak vitriolic acid, or the *aqua vitriolica* of the Edinburgh Diſpenſatory, is an excellent collyrium in defluxions and ſlight inflammations of the eyes; and, after bleeding and purging, in the more violent ones. A ſolution of it with alum, in the proportion of two drams of each to a pint of water, called the AQUA *aluminoſa Bateana*, is uſed as a repellent fomentation for ſome cutaneous eruptions, for cleanſing foul ulcers, and as an injection in the fluor albus and gonorrhœa, when not accompanied with virulence. This *vitriol* is ſometimes likewiſe employed as an errhine, and ſaid to be a very effectual diſſolvent of mucous matters; in which intention it is recommended, in the German Ephemerides, againſt obſtructions of the noſtrils in new-born infants.

Blue vitriol, like the other preparations of copper, acts, in doſes of a few grains, as a moſt virulent emetic. Its uſe is chiefly external, as a detergent, eſcharotic, and for reſtraining hæmorrhages; for which laſt intention a ſtrong ſtyptic liquor is prepared in the ſhops, called AQUA *vitriolica cœrulea*. *Blue vitriol* has of late been conſiderably employed as an emetic by ſome practitioners; and is ſaid to be by no means an unſafe one, as it operates the inſtant it reaches the ſtomach, before it has time to injure by its corroſive quality. The peculiar advantage in uſing it is repreſented to be, that it has no tendency to become alſo purgative, and that its aſtringent power prevents the tone of the ſtomach from being impaired after vomiting with it. It it much recommended in the early ſtate of tubercles in the lungs; and the following method of exhibition directed. (See Simmons on the Treatment of Conſumptions, p. 70.) Let the patient firſt ſwallow about half a pint of water, and immediately afterwards, the *vitriol* diſſolved in a cupfull of water. The doſe may be varied according to age, conſtitution, &c. from two grains to ten, or even twenty; always taking care to begin with ſmall ones. After the emetic is rejected, another half pint of water is to be drunk, which is likewiſe ſpeedily thrown up, and this is commonly ſufficient to remove the nauſea. In ſtill ſmaller doſes, the *blue vitriol* has been much uſed by ſome as a tonic in intermittents, and other diſeaſes.

Pure *green vitriol* is in no reſpect different from the artificial SAL *martis*. It is one of the moſt certain of the chalybeate medicines, ſcarcely ever failing to take effect where the calces, and other indiſſoluble preparations, paſs inactive through the inteſtinal tube. It may be conveniently given in a liquid form, largely diluted with aqueous fluids: two or three grains or more, diſſolved in a pint or quart of water, may be taken in a day, divided into different doſes. This *vitriol* is uſed alſo, eſpecially when calcined, as an external ſtyptic: the STYPTIC of Helvetius, and, as it is ſaid, that of Eaton, is no other than French brandy impregnated with the calcined *vitriol*; a dram of the *vitriol* is commonly directed to a quart of the ſpirit, but only a minute portion of the dram diſſolves in it. As French brandy has generally an aſtringent impregnation from the oaken caſks in which it has been kept, the *vitriol* changes it, as it does the watery infuſions of vegetable aſtringents, to a black colour; but makes no ſuch change in ſpirituous liquors that have not received ſome aſtringent tincture.

The *acid of vitriol*, or ſulphur, largely diluted, is the moſt ſalubrious of all the mineral acids. It is mixed with watery infuſions, ſpirituous tinctures, and other liquids, as an antiphlogiſtic; as a reſtringent in hæmorrhages; and as a ſtomachic and corroborant in weakneſſes, loſs of appetite, and decays of conſtitutions, accompanied with ſlow febrile ſymptoms, brought on by irregularities, or ſucceeding the ſuppreſſion of intermittents by Peruvian bark. In ſeveral caſes of this kind, after bitters and aromatics of themſelves had availed nothing, a mixture of them with the vitriolic acid has taken effect: the form commonly made uſe of is that of a ſpirituous tincture; ſix ounces of *oil of vitriol* are dropt by degrees into a quart of rectified ſpirit of wine; the mixture digeſted for three days in a very gentle heat, and afterwards digeſted for three days longer with an ounce and a half of cinnamon, and an ounce of ginger; this is the *elixir vitroli* of the Edinburgh Diſpenſatory Or, a pint of an aromatic tincture, drawn with proof ſpirit, is mixed with four ounces of the ſtrong acid, ſo as to form the *acid* ELIXIR *of vitriol* of the London Diſpenſatory: theſe liquors are given from ten to thirty or forty drops, in any convenient vehicle, when the ſtomach is moſt empty. A mixture of *oil of vitriol* with ſpirits of wine alone, in the proportion of one part of the former to three of the latter, digeſted together for ſome time, is uſed in France as a reſtringent in gonnorrhœas, female fluors, and ſpittings of blood, under the denomination of *aqua Rabelliana*, and *eau de Rabel*. The *acid of vitriol*, diluted with water, has been given internally with great ſucceſs in the itch. It was firſt uſed for this purpoſe in the Pruſſian army in 1756, and has ſince been much employed in ſeveral parts of Germany. The doſe recommended is from an eighth to a fourth of a dram of the pure acid twice or thrice a day. It is ſaid to ſucceed equally in the dry and moiſt itch; and when given to nurſes, to cure both themſelves and their children.

When *oil of vitriol*, and rectified ſpirit of wine, are long digeſted together, or diſtilled, a part of the acid unites with the vinous ſpirit into a new compound, very volatile and inflammable, of no perceptible acidity, of a ſtrong and very fragrant ſmell, and an aromatic kind of taſte: this dulcified part, more volatile than the reſt, ſeparates and riſes firſt in diſtillation, and may thus be collected by itſelf. The college of London directs this *ſpiritus vitrioli dulcis* to be made by cautiouſly and gradually mixing a pound of *oil of vitriol*, and a pint of rectified ſpirit of wine, and ſetting them to diſtil with a very gentle heat: that of Edinburgh orders the ſame quantity of the *oil of vitriol* to be dropt into four times as much of the vinous ſpirit, and the mixture to be digeſted in a cloſe veſſel, for eight days, previouſly to the diſtillation, with a view of promoting the coalition of the two ingredients. The different proportions of the acid ſpirit to the vinous, in theſe preſcriptions, make no material variation in the qualities of the product, provided the diſtillation be duly conducted; for the ſmalleſt of the above proportions of acid is much more than the vinous ſpirit can dulcify, and all the redundant acid remains in either caſe behind. The true dulcified ſpirit riſes in thin ſubtile vapours, which condenſe upon the ſides of the recipient in ſtraight ſtriæ; theſe are ſucceeded by white fumes, which form either irregular ſtriæ, or large round drops like oil; at the firſt appearance of which, the proceſs is either to be ſtopped, or the receiver changed. The ſpirit which theſe fumes afford, very different from the dulcified one, has a pungent acid ſmell, like the fumes of burning ſulphur: on its ſurface is found a ſmall quantity of oil, called the *ſweet oil of vitriol* of Hoffman, of a ſtrong, penetrating, and very agreeable ſmell, readily diſſoluble in ſpirit of wine, to a large proportion of which it communicates the ſmell and taſte of the aromatic or dulcified ſpirit. The college of Edinburgh, in order to ſecure againſt any acidity in the dulcified ſpirit, order it to be rectified, by mixing it with an equal meaſure of water, in every pint of which a dram of ſalt of tartar has been diſſolved, and drawing off the ſpirit again by a gentle heat. This college, in their laſt Pharmacopœia, have manifeſtly ſhewn how little they conceive the acid to enter as a conſtituent part of this preparation, and at the ſame time have directed an effectual method of preventing its preſence in it. They order the *acidum vitriolicum vinoſum*, vulgò *ſpiritus vitrioli dulcis*, to be made by ſimply mixing one part of vitriolic ether with two of rectified ſpirit.

This ſpirit, taken from ten to eighty or ninety drops, ſtrengthens the ſtomach and digeſtive powers, relieves flatulencies, promotes urine, and, in many caſes, abates ſpaſmodic ſtrictures, and procures reſt. It is not eſſentially different from the celebrated mineral anodyne liquor of Hoffman; to which it is frequently, by the author himſelf, directed as a ſubſtitute. See LIQUOR *mineralis anodynus*.

The dulcified ſpirit is ſometimes uſed as a menſtruum for certain reſinous and bituminous bodies, which are more difficultly and languidly acted upon by pure vinous ſpirits. It is often mixed with aromatic and ſtomachic tinctures, in caſes where the ſtomach is too weak to bear the acid elixirs above mentioned: eight ounces are commonly added to a pint of the officinal aromatic tincture; or the ingredients of the aromatic tincture are infuſed in the dulcified acid, inſtead of common rectified ſpirit, in order to form the *ſweet elixir of vitriol*. A medicine of this kind was formerly in great eſteem, under the name of *Vigani's volatile elixir of vitriol*, prepared by macerating, in ſome dulcified ſpirit of *vitriol*, free from acidity, a ſmall quantity of mint-leaves curiouſly dried, till the ſpirit has acquired a fine green colour: and to prevent the neceſſity of filtration, during which the more volatile parts would exhale, the mint may be ſuſpended in the ſpirit in a fine cloth. If the dulcified ſpirit, rectified from a ſolution of fixed alkaline ſalt, be ſhaken with equal its quantity of a like ſolution, and the mixture ſuffered to reſt, an ethereal fluid riſes to the ſurface, and great part of the dulcified ſpirit may be recovered again from the remainder by diſtillation. Dr. Hadley obtained the largeſt portion of ether, by uſing the ſtrongeſt vitriolic acid of the ſhops with equal its quantity, by meaſure, of ſpirit of wine, and diſtilling immediately by a heat ſufficient to make the mixture boil. By this management, from three pints of *oil of vitriol*, and ſix pints of rectified ſpirit of wine, he obtained two pints and a half of the ether. For other proceſſes, ſee ÆTHER, and *Ætherial* SPIRITS.

The vitriolic acid ſaturates a larger quantity of fixed alkaline ſalts than any of the other acids, and diſlodges from them ſuch other acids as have been previouſly combined with them. Of the ſtrong ſpirit, or *oil of vitriol*, about five parts are ſufficient for eight of the common vegetable fixed alkalis. The neutral ſalt thus obtained is of a bitteriſh taſte, very difficultly ſoluble in water, and ſcarcely fuſible in the fire: in ſmall doſes, as a ſcruple, or half a dram, it is an uſeful aperient: in larger ones, as four or five drams, a mild cathartic. This ſalt has been commonly prepared with the alkali obtained from tartar, and hence called *vitriolated* TARTAR, and ſometimes *ſal* ENIXUM, and ARCANUM *duplicatum*. Some dilute the *oil of vitriol* with ſix times the quantity of warm water, and drop into it a ſolution of the alkaline ſalt till no effervefcence enſues: others uſe *vitriol* in ſubſtance, which being diſſolved in boiling water, any alkaline ſalt, gradually ſuperadded, till the effervefcence ceaſes abſorbs the pure acid, and throws down the metallic baſis of the *vitriol*: one part of the alkali is nearly ſufficient for two of the *vitriol*.

With the mineral fixed alkali, this acid forms compound ſalts of a bitterer taſte, ſomewhat leſs purgative, and much eaſier of ſolution, than that with vegetable alkalis: with volatile alkalis a very pungent ammoniacal ſalt, whoſe medicinal effects are not well known. The ſtrong acid, boiled on argillaceous earths to dryneſs, corrodes a portion of them, and concretes therewith into an auſtere ſtyptic ſalt. Calcareous earths it does not diſſolve into a liquid ſtate, but may be combined with them, by precipitation from other acids, into an indiſſoluble concrete, ſeemingly of no medicinal activity. Among metallic bodies, it diſſolves zinc and iron readily; copper, ſilver, quickſilver, lead, and tin, very difficultly: it is fitted for acting on the two firſt by dilution with three or four times its quantity of water: the others require the undiluted acid, and a heat ſufficient to make it boil; when, the more phlegmatic parts exhaling, ſo much of the pure acid matter remains combined with the metals as to render them, in part at leaſt, diſſoluble in water.

The principal uſe of *green vitriol* is in DYING, and in the making of INK. When the *vitriol* is diſſolved in water, the iron contained in it becomes black by the addition of an infuſion of GALL-*nuts*. Mr. Lemery the younger, in order to account for this blackneſs, imagines, that as the *vitriol*, of which ink is made, is iron diſſolved by an acid, and intimately mixed with it, and as galls are an alkali or abſorbent, this alkali, meeting the acids which hold the iron diſſolved, unites with them, and makes them let the iron looſe; which thereupon revivifies and reſumes its natural blackneſs; ſo that in ſtrictneſs we write with the iron.

In the Swediſh Tranſactions, *vitriol* is recommended as a yellow for houſe-painting: quicklime, made into a paſte with water, is to be diluted with a ſolution of *vitriol*, more or leſs, according as the colour is required deeper or lighter: the mixture appears of a bluiſh green colour, and does not become yellow till it is dry. One part of *vitriol* is ſaid to go as far as two of the dearer yellow ochre. This ſalt is alſo recommended for preſerving wood, as particularly the wheels of carriages, from decay: when all the pieces are fit to be joined together, they are directed to be boiled in a ſolution of *vitriol* for three or four hours, and then kept for ſome days in a warm place to dry. It is ſaid that wood by this preparation becomes ſo hard and compact, that moiſture cannot penetrate it. See on the ſubject of the preceding articles, Neumann's Chem. Works, by Lewis, p. 173, &c. Watſons's Chem. Eſſ. vol. i. eſſ. 6. Lewis's Mat. Med. art. *Vitriolum*. Bergman's Eſſ. vol. i. p. 180, &c. Kirwan's Elem. of Mineral. p. 189, &c.

VITRIOLS, *metallic*. All metals, it is to be obſerved, may be converted into *vitriols*, by diſſolving them with acid ſpirits, and letting them ſtand to cryſtallize.

Factitious vitriols, being only metals diſſolved and cryſtallized in ſaline menſtruums, are frequently called, by way of diſtinction, *metallic vitriols*, and *metallic ſalts*.

VITRIOL *of cobalt* is found native in ſmall pieces, mixed with a greeniſh effloreſcence in cobalt mines : it is difficultly ſoluble in water ; and both it and its ſolution are red, which ſufficiently diſtinguiſhes its baſis. Its acid is known by the ſame taſte as that of the other *vitriols*.

Vitriol *of iron, vitriolum Martis*, is a preparation made by diſſolving iron, or ſteel, in oil or ſpirit of *vitriol*; then evaporating or drawing off the moiſture, and bringing the matter to cryſtallize, by ſetting it in a cool place. This is alſo called SAL *Martis*, or *ſalt of ſteel*.

Vitriol *of lead*. See Lead.

Vitriol *of Luna*, or *the Moon*, is the name given to a ſalt with a metallic baſis, called alſo *vitriol* of SILVER.

Vitriol *of nickel* is found native, effloreſcing on kupfernickel, and generally mixed with *vitriol* of iron. This is difficultly ſoluble in water : both it and its ſolution are of a green colour.

Vitriol *of quickſilver*, the name of a chemical preparation of quickſilver, with acid ſpirits, the proceſs of which is this : let ſo rich a ſolution of quickſilver be made in ſpirit of nitre, or aqua fortis, that no more can be contained ; let this ſolution be made by the aſſiſtance of heat, and the liquor immediately afterwards poured off into a clean and cold glaſs. There will, on this, ſpontaneouſly ſhoot on the bottom of the glaſs a ſaline, white, tranſparent matter, from which the liquor being poured, it is found to be a ſharp, moiſt, ſaline ſubſtance, or true *vitriol* of mercury, ſoluble in water, and not ſafe to be touched. If the liquor, poured off from this, be evaporated half way, and the remainder ſet in a cool place, more cryſtals of the ſame nature with the firſt will ſhoot.

Another method of making the *vitriol* of mercury, is this : reduce to powder ſome decrepitated ſea-ſalt, and with two parts of this mix one part of crude mercury ; diſtil the whole in a glaſs body, with a ſtrong fire, continued five or ſix hours ; when the veſſels are cold, break them, and there will be found a ſolid dry mercury, ſublimed to the top and ſides of the body, in form of *vitriol*. Nay, Boerhaave affirms, that the common mercury ſublimate is a true *vitriol* of mercury, though ſemivolatile. Boerh. Chem. part ii. p. 301.

Vitriol of quickſilver is alſo a name given to a ſalt of mercury, mineralized by vitriolic acid, firſt diſcovered by Mr. Woulfe, together with the marine ſalt of mercury, at Obermoſchel, in the duchy of Deux-Ponts : they have a ſpar-like appearance, and are either bright and white, or yellow or black, mixed with cinnabar in a ſtony matrix : theſe well mixed with one-third of their weight of vegetable alkali, afforded him cubic and octagonal cryſtals, that is, ſalt of Sylvius, and tartar *vitriol*. Phil. Tranſ. vol. lxvi. part ii. p. 618.

Vitriol *of Venus* is a ſolution of copper in ſpirit of nitre, evaporated and cryſtallized, to gain the ſalt ; called alſo *vitriol of copper*.

Vitriol, *liquamen*, or *waſh of*, is a name given to the ochry matter remaining after ſucceſſive evaporations of the mother of *vitriol*, which yields no more *vitriol*. Its taſte is acrid and fiery, and the quantity left from a gallon of the well impregnated liquor from the bed, is about a pound. From this may be procured a white pungent ſalt, by ſubſequent evaporations. This is the ſaline principle of *vitriol*, according to the chemiſts, and is contained in ſo large a quantity, that near thirteen ounces of it may be ſeparated from a pound of the liquor ; the remaining liquor, after this, is what is called *liquamen vitrioli* by ſome chemiſts, but not properly. It will never coagulate into ſalt, but is very fiery and acrid to the taſte, and extremely ponderous, not leſs ſo than oil of *vitriol*, nor leſs pungent ; and is the ſtrongeſt liquor any way obtained from a natural ſubſtance without diſtillation. This liquor being expoſed to the air in a veſſel not cloſed, will in a little time attract double its weight of water from it. All corroſive and ſaline liquors have ſomewhat of this property of imbibing moiſture from the air, and weakening themſelves by it ; but this liquor attracts it faſter and in greater quantity than any other. This liquor receives moſt moiſture, and increaſes moſt quickly in wet weather, leſs ſo in dry ; and this may have given occaſion to that error ſo common among the chemiſts, that ſeveral preparations of *vitriol* derive moiſture from the moon, and have more or leſs of it, according to her different phaſes. The changes of the conſtitution of the air have effected what, in this caſe, they ſuppoſed to be done by the different phaſes of the moon. Phil. Tranſ. N° 103.

Vitriol, *mother of*. See Vitriol, in *Chemiſtry*, ſupra.

Vitrioli, *ros*. See Ros.

Vitriol, *ſaline principle of*. See Saline *principle*.

Vitriol, *emetic ſalt of*. See Gilla.

VITRIOLATED, among *Chemiſts*, turned into *vitriol*, or having *vitriol* infuſed in it.

Vitriolated *tartar*. See Tartar *vitriolated*.

VITRIOLIC, ſomething that has the quality of *vitriol*, or that partakes of the nature of *vitriol*.

Vitriolic *minerals* are compound foſſile ſubſtances, formed of various ſtony and earthy particles, mixed with others of iron and copper, and that either ſeparately or conjunctly ; ſo that, in effect, they are ores of *vitriols*.

The different kinds of theſe minerals are, 1. The chalcites. 2. The miſy. 3. Sory or ruſma. 4 Melanteria. 5. Pyrites, or fire-ſtone. 6. Marcaſites. See Chalcitis, Misy, &c.

In Europe the only uſe made of chalcitis is as an ingredient of Venice-treacle, and even here its place is generally ſupplied with common green *vitriol* calcined to a redneſs. The ancient Greeks uſed it externally in hæmorrhages, and collyriums for the eyes ; alſo for the herpes and eryſipelas ; but never ventured to give it internally.

The ancients uſed *miſy* for the ſame purpoſe as *chalcitis*, being eſteemed milder than this laſt.

At preſent it is no where put to any uſe, nor indeed does it merit it, as containing no other virtues than thoſe of green *vitriol*, though we are not ſure what pernicious ſubſtance it may be mixed with.

Vitriolic *waters*. The countries which abound with mines of copper and iron uſually afford a great many *vitriolic* waters. See *Blue* Vitriol.

One of the moſt remarkable ſprings of this kind, of which we have an account, is that near Paderborn in Germany : this is a ſort of treble ſpring, having three openings, and all three yielding very different waters. Two of theſe openings are not more than a foot and a half diſtant from one another, and yet of ſo different qualities, that the one is limpid, bluiſh, milk-warm, and bubbling, and contains ſal ammoniac, ochre, iron, vitriol, alum, ſulphur, nitre, and orpiment ; all theſe ſubſtances having been ſeparated in its analyſis. The other is cold as ice, and is turbid, whitiſh, and much heavier, and ſtronger to the taſte than the other. This holds much orpiment, with ſome ſalt, alum, nitre, ſal ammoniac, and vitriol. The firſt of theſe waters is taken by the people in the neighbourhood, againſt worms, and diſorders of the ſpleen, as alſo againſt epilepſies ; the other is poiſonous to birds, all that drink of it dying in a very little time. The experiment has been tried on common hens, with the water brought from the ſprings into other places, and given them to drink.

Thoſe to which ſalt is given, after the ſwallowing of this poiſonous water, ſtruggle longer before they die by it ; and vinegar is found to ſave them very often from death, after drinking largely of it ; but in this caſe they are ſickly for ſeven or eight days after it, and have the pip, as the good women expreſs it.

In the diſſecting of thoſe birds which have died by drinking this water, the lungs are always found quite ſhrivelled up.

The people of the country have not been deterred by this bad effect of the water, from uſing it in medicine ; they take ſmall quantities of it diluted in water, to deſtroy the worms, and it performs this very well ; but gives them a grievous ſickneſs while it operates.

The third ſtream, or opening, of this remarkable ſpring, is about twenty paces diſtant from the others ; the water is here very clear, of a greeniſh colour, and of a ſour, but not very diſagreeable taſte. It is of a middle weight, and of middle qualities between the other two, and is evidently formed of the joining of thoſe two ſprings with ſome other freſh water in the way ; for a liquor exactly reſembling this third kind may be prepared, by mixing equal quantities of the other two with a ſufficient quantity of common well-water.

There is a ſpring in Baſil diſcharging its water through the Tanners-ſtreet, or Gerber-gaſſe, which is of a bluiſh colour, and ſomewhat turbid. This holds blue *vitriol*, that is copper, in the form of a ſalt, and with it bitumen and antimony ; but a much larger proportion of the firſt ingredient than of either of the others. The analyſis of it ſhews, that it contains three parts copper to one of bitumen, and two of antimony. It ſerves the tanners of the place to good purpoſes, their ſkins receiving one of their preparations from this native water.

The ſame town affords ſeveral other ſprings of peculiar qualities, all owing to the veins of metalline ores, with which the earth of the place abounds. The one of theſe is called *Bandulph's well*, and affords a water of great uſe in medicine, ſeveral being regularly and perfectly cured of hydropical diſtempers by it. And another very remarkable one contains, as is found by its analyſis, ſulphur, nitre, and ſome gold. Theſe, however, are in ſuch ſmall quantity in it, as not to prevent its being fit for the common uſes of life. It is very agreeable to the taſte, and is much eſteemed for drinking, and ſent for all over the town.

Another *vitriolic* water runs out of a cavern, near Gelſbach,

bach, in Alſace. It is a fattiſh and oily liquor, and is uſed by the country-people for greaſing their wheels; but it is fit for much better purpoſes. If it be boiled to the evaporation of a third part, there will remain very little water, but a fatty bituminous ſubſtance, like tar, will ſubſide to the bottom, and there will ſwim at the top a yellow, thin, and limpid liquor, very much reſembling linſeed-oil; and this, diſtilled in a ſand-heat, yields an oily and watery liquor; the firſt very good for external uſes, for burns and ſcalds; and the other a good internal medicine, in conſumptions, and other diſeaſes of the lungs. Phil. Tranſ. N° 8.

Some time ago there was a water diſcovered in England, that gave, on many experiments, an appearance of containing natural and perfect vitriol. This water was found near Eglingham, in Cumberland; and being examined, by adding galls to it, it became abſolute ink, much deeper than any of the atramentous waters ever do: when one half the quantity was ſlowly evaporated, the remainder retained this quality to a higher degree than before; and on evaporating it yet farther, there concreted in it fair cryſtals of pure and genuine vitriol.

This was an appearance wholly new in England, and not eaſily accounted for, as we have no mineral, except the common pyrites, which contains vitriol; and it is very well known, that there requires a fermentation in the air, before the vitriol, contained in that ſtone, will be diſentangled from its other principles, ſo as to be capable of appearing in its own form; and as this ſtone, lying under water, can never impregnate that water with its vitriol, it did not ſeem eaſy to conceive in what manner a genuine vitriol ſhould be communicated to water, where there was no other ſubſtance which could give it.

The ſuſpicions that theſe thoughts gave the gentleman who examined this water, occaſioned his making a viſit to the place where it was produced, when he found that the ſuppoſed *vitriolic* ſpring was no other than an old drift made for the draining of the water from ſome old wrought coal-pits: the people who had worked in theſe, remembered to have ſeen great quantities of pyrites there. This drift was ſometimes dry for a conſiderable time together, and ſometimes run in a plentiful ſtream; and there is no doubt but that, in theſe dry ſeaſons, the air acted upon the pyrites, and cauſed it to ſhoot its vitriol, which the next tide of water waſhed away, and it came off diſſolved in it, and highly impregnating it.

This proved therefore no better a medicinal ſpring than ſome of a like kind, deſcribed by Mr. Leigh in his Natural Hiſtory of Lancaſhire; and all theſe are very little better than the diſcovery of a medicated water in Old-ſtreet, from the remains of an old colour-ſhop, or Kircher's reckoning the common ſhores of Rome among the medicated ſprings of Italy.

The *vitriolic* ſpring, which has been ſo much talked of near Haigh, in Lancaſhire, is no other than an accidental impregnation of common water, in the ſame manner: it being only the runnings of an old drift, or drain, made to carry off the water from the pits of cannel-coal; and this like the other, as it ſometimes has water, and at other times is dry, gives time for the pyrites to let go its vitriol while dry, and then imparts it to the waters that paſs that way afterwards. Theſe are not to be accounted medicated ſprings, ſince neither natural nor continual, and ſuch may be any day made at home, by laying the common pyritæ of our clay, or coal-pits, out to moulder in the air, and then pouring water upon it, and after a ſhort time ſtanding, taking it off again. Phil. Tranſ. N° 245. p. 380. See ZIMENT, and VITRIOL, in *Chemiſtry*.

VITRUM. See GLASS.

VITRUM, in *Botany*, a name given by ſome of the old writers to the plant we now call *glaſtum* or WOAD.

This plant has always been a native of England, and was in uſe among the ſavage inhabitants of this iſland, for painting their bodies. Thoſe who have not underſtood this to be the name of that plant, have been ſtrangely perplexed to account for theſe people's painting their bodies with *vitrum*, *glaſs*, as they underſtood it: but the whole meaning of this plant obtaining the name of *vitrum*, ſeems to have been its ſtaining the ſkin to a pale blue colour, or, as it was called by many, a glaſs-colour.

VITRUM *antimonii ceratum*, in *Pharmacy*, is thus prepared: take glaſs of antimony, in powder, one ounce; bees-wax, one dram; melt the wax in an iron ladle, then add the powder; ſet them on a ſlow fire without flame, for the ſpace of half an hour, continually ſtirring them with a ſpatula; then take it from the fire; pour it upon a piece of clean white paper, powder it, and keep it for uſe.

The glaſs melts in the wax with a very ſlow fire. After the materials have been about twenty minutes on the fire, they begin to change colour, and in ten more acquire nearly the colour of ſnuff; which is a mark of the medicine's being ſufficiently prepared.

The ordinary doſe for adults is ten or twelve grains; but it is ſufficient to begin with ſix, or even with three or four grains. The quantity of a ſcruple has been given to a ſtrong man, which wrought gently. The doſe for a child of three or four years is two or three grains; and for one of ten, three or four grains.

This medicine has for ſome time been held a ſpecific in dyſenteries; but the preparation and manner of giving it had been kept a ſecret, till Dr. Young generouſly made it public. Dr. afterwards ſir John Pringle, ſays, he tried it in a dyſentery of four years ſtanding, with ſurpriſing ſucceſs; and, indeed, to him we are principally indebted for the general introduction and uſe of this medicine; as he collected and publiſhed ſeveral caſes of its efficacy.

It has been given in dyſenteries, with or without a fever, whether epidemic or otherwiſe, and whether bleeding and vomits have been premiſed, or not. In its operation, it ſometimes makes the patient ſick, and vomits him; it purges almoſt every perſon; but it has been known to cure without any evacuation or ſickneſs. It is to be given with an empty ſtomach, for then it operates moſt mildly. Nothing is to be drank after it for three hours, unleſs the patient is very ſick, and diſpoſed to vomit; in which caſe warm water may be given, as in other vomits.

This medicine ſhould not be given for diarrhœas in the end of conſumptions. Other diarrhœas have been cured with large doſes of it; but in ſuch caſes it fails oftener than in dyſenteries. During the uſe of this powder, fermented liquors ſhould be abſtained from, and a milk diet is proper. It may be given ſafely to women with child, and to children on the breaſt may be given half a grain.

This preparation has alſo been found ſucceſsful in uterine hæmorrhages, both in young and old.

It has alſo been tried in colic pains, from viſcidities in the inteſtines, and found a ſafe and eaſy purgative, and ſometimes a gentle emetic.

The method of giving it is in a bolus, with conſerve of roſes, diaſcordium, or theriaca Edinenſis. An opiate, after the operation, is proper. Med. Eſſ. Edinb. vol. v. art. 15, p. 162, &c. See an account of its efficacy in bloody fluxes, diarrhœas, ſimple looſeneſſes, quartan agues, even the moſt obſtinate, and in certain caſes of the fluor albus, and obſervations on the mode of adminiſtring it, by M. Geoffroy, in Phil. Tranſ. vol. xlvii. p. 273, &c.

VITRUM *Archimedeum*, *Archimedes's glaſs*, a name given by Swedenborg to an inſtrument which he invented for the examination of mixt metals, and by means of which he could diſcover the quantities, without the trouble of the apparatus and calculation commonly uſed for this purpoſe.

VITRUM *morrhinum*, *morrhine*, or *myrrhine glaſs*, a name given by Pliny, and ſome of the ancients, to a ſort of manufacture made in Egypt, which though truly no other than a kind of glaſs diveſted of its tranſparency, yet was made ſo nicely to imitate the *myrra* or *morra* of the Indies, ſo famous among the Romans, under the form of cups and veſſels, called *murrhina vaſa*, that it was called by ſome *murrha altera*, another ſort of *murrha*, and the cups made of it honoured with the name of *murrhine veſſels*. This ſerves to ſhew, that the *myrrhina vaſa*, properly ſo called, were not of any precious ſtone, as vulgarly ſuppoſed, but a ſort of porcelain. See MURRHINE.

VITRUM *Saturni*. See GLASS *of lead*.

VITTA, among the Romans, a fillet with which the women in Rome bound their hair. The matrons wore a double one, to diſtinguiſh them from the virgins, whoſe *vittæ* were ſingle.

Vittæ were alſo worn by prieſts and poets, in which caſe they were made of branches of olive or laurel; the ſtatues of the gods were likewiſe adorned with *vittæ*, as were altars, the doors of temples, victims, and ſuppliants.

VITTA, among *Anatomiſts*, *fillet* or *head-band*, is uſed for that part of the amnios which ſticks to the infant's head when it is juſt born.

VITTA *cærulea*, in *Conchyliology*, a ſpecies of DOLIUM.

VITTA, in *Ichthyology*, a name given by Gaza, and ſome others, to the fiſh called by others TÆNIA, and by the Italians CEPOLE.

VITULUS *marinus*, the *ſea-calf*, in *Zoology*. See SEA-*calf*.

VITULUS, *calf*, in *Zoology*. See CALF.

VITULI *aquatici*, in the *Hiſtory of Inſects*, a name given by the German writers to the worms reſembling animated HORSE-*hairs*. See AMPHISBÆNA *aquatica*.

VITUS's *dance*, or **St. Vitus's** *dance*, in *Medicine*, the name of a peculiar ſort of convulſion, to which young women are principally ſubject, toward the time of the firſt eruption of the menſes.

It ſeems to have had its name from the account which Horſtius gives of ſome women who once every year paid a viſit to the chapel of *St. Vitus*, near Ulm, and there exerciſed themſelves day and night in dancing, being diſordered in mind, till they fell down like people in an extacy. By this means they were always reſtored to health for a whole year, till the return of May, at which time they were again ſeized with a reſtleſſneſs, and diſorderly motion of their limbs, ſo as to be obliged, at the anniverſary of *St. Vitus*, to repair again to the ſaid chapel, for the ſake of dancing. Horſtius, Ep. Med. ſect. vii.

It is the moſt frequent with girls, yet not peculiar to them, attacking boys alſo, from the age of ten to fourteen. It firſt ſhews itſelf by a ſort of lameneſs, or rather unſteadineſs of one of the legs, which the patient draws after him like an idiot, and afterwards affects the hand on the ſame ſide; which being brought to the breaſt, or any other part, can by no means be held in the ſame poſture for a moment, but is diſtorted or ſtretched by a ſort of convulſion to a different poſture and place, notwithſtanding all poſſible efforts to the contrary.

If a glaſs of liquor be put into the patient's hand to drink, before he can get it to his mouth he makes a hundred odd grimaces and geſtures, for not being able to carry it ſtraight, becauſe his hand is drawn different ways by the convulſion, as ſoon as it has reached his lips, he throws it ſuddenly into his mouth, and drinks it very haſtily, as if he meant only to divert the ſpectators. It differs from other convulſions, in that the motions are not painful, nor are any of the extremities or parts forcibly contracted, or extended for any time. Boys and girls are moſt ſubject to this diſeaſe, and that from ten years of age to puberty; though the latter oftener than the former.

It ſometimes precedes the firſt eruption of the menſes; in which caſe, proper cathartics, with calomel and deobſtruents, are generally uſed; otherwiſe evacuations and anti-epileptics, as in other nervous diſtempers.

As this diſorder appears to proceed from ſome ſharp humours thrown upon the nerves, which, by their irritation, excite preternatural motions, it ſeems that the curative indications are to be directed firſt to leſſen thoſe humours by bleeding and purging, and, ſecondly, to ſtrengthen the nervous ſyſtem. Dr. Sydenham therefore propoſes the following method: firſt to take from the arm ſeven or eight ounces of blood, more or leſs, according to the ſtrength of the patient. The next day let him take a gentle purge of rhubarb, ſena, manna, &c. In the evening of this day, let him take a draught, with a ſcruple of Venice treacle, and eight drops of liquid laudanum, mixed in honey and milk-water. This purging and opiate draught is to be repeated at ſome days diſtance, and the bleeding is alſo to be repeated to the fourth time; and in the intermediate days, a cordial and nervous electary is to be given, compoſed of the conſerves of roſemary, orange-peel, and Roman wormwood, with Venice treacle, candied nutmeg, and candied ginger; of this the bigneſs of a nutmeg may be given every morning and afternoon, drink after it a decoction of piony, maſter-wort, and elecampane, and angelica-roots, the leaves of rue, ſage, betony, and other cephalic plants, with orange-peel, and juniper-berries.

Spirit of hartſhorn may alſo be given every night in ſmall doſes, in a nervous julep, and plaſters of gum caranna may be applied to the ſoles of the feet. According as the cure advances, the patient recovers the uſe of his hand and foot, and his amendment may always be diſcovered by letting him attempt to bring a glaſs of any liquor to his mouth in a ſtraight line; though the bleeding ſhould not be repeated beyond the fourth time, yet the alterative and purging medicines ſhould be continued till the patient is quite well; and as people are ſubject to relapſes in this diſorder, it is proper to give the ſame medicines, and to bleed at the return of that ſeaſon of the year.

Dr. Anthony Fothergill recites the particulars of the caſe of a girl, of ten years of age, who had for ſix weeks laboured under violent convulſive motions, which affected the whole frame, and from which ſhe had very ſhort intermiſſions, except during ſleep. At the beginning of the diſeaſe ſhe had ſlight twitchings, attended with running, ſtaggering, and a variety of involuntary geſticulations, diſtinguiſhing the *St. Vitus's dance*; theſe ſymptoms were afterwards ſucceeded by convulſions, which rendered it difficult for two perſons to keep her in bed, which impaired her memory and intellectual faculties, and ſoon deprived her of ſpeech, and the uſe of her limbs. Volatile and fetid medicines were firſt recommended, and the warm bath every other night; but with no other ſucceſs, except that her reſtleſs nights became ſomewhat more compoſed. Bliſters and antiſpaſmodics were directed, and particularly the flowers of zinc, which were continued for almoſt a month, without the leaſt abatement of the ſymptoms. As a dernier reſort, Dr. Fothergill recommended a trial of electricity, under the management of the reverend Mr. Underwood, an ingenious electrician, which in about the courſe of a month effected her perfect cure. The proceſs was as follows: on the fifth of July, ſhe was placed on the glaſs-legged ſtool for thirty minutes; ſparks were drawn from the arms, neck, and head, which cauſed a conſiderable perſpiration, and a raſh appeared in her forehead. She then received ſtrokes through her hands, arms, breaſt, and back; and from this time the ſymptoms abated, her arms beginning to recover their uſes. The coated bottle uſed on this occaſion held near a quart. On the fifteenth of July ſhe ſtood on the ſtool forty-five minutes; and received ſtrong ſhocks through her legs and feet, which from that time began to recover their wonted uſes; alſo four ſtrong ſhocks through the jaws, ſoon after which her ſpeech returned. On the twenty-third of July ſhe ſtood on the ſtool for an hour: ſparks were drawn from her arms, legs, head, and breaſt, which for the firſt time ſhe very ſenſibly felt; and alſo two ſhocks through the ſpine. She could now walk alone; her countenance became more florid, and all her faculties ſeemed wonderfully ſtrengthened, and from this time ſhe continued recovering to a ſtate of perfect health. Every time ſhe was electrified poſitively, her pulſe quickened to a great degree, and an eruption, reſembling the itch, appeared in all her joints. The eruptions, which appeared on the parts electrified, ſoon receded, without producing any return of the ſymptoms, and, therefore, Dr. Fothergill obſerves, could not be called critical, but were merely the effect of the electrical ſtimulus.

Dr. Fothergill mentions another caſe of a boy, who had long had the *St. Vitus's dance*, though in a much leſs degree, and was cured by electricity; and from theſe facts infers, that electricity is entitled to a diſtinguiſhed place in the claſs of antiſpaſmodics. Phil. Tranſ. vol. lxix. part i. p. 1, &c.

The firſt ſymptoms in this diſeaſe are often perceived to come on at the hips and os ſacrum, or extremity of the back-bone; from thence a pain extends itſelf acroſs the navel, and thence the pain runs up to the top of the head: as ſoon as this happens the convulſions uſually begin; theſe often firſt appear in the belly, and are ſo violent, that two or three perſons can ſcarce hold the patient, and are forced to lie upon the bed to prevent him from raiſing up his belly in a ſtrange manner.

After this, in ſome caſes, the nerves of the lungs become affected, and the patient will imitate the barking of a dog, or the ſnarling and howling of that animal when hurt: after this, the nerves of the jaws generally ſuffer, and the teeth are ſnapped violently together, and the mouth foams; perſons have ſometimes beaten out their teeth with the violence of ſnapping them together in theſe agonies.

There is, in the Philoſophical Tranſactions, an account of a caſe of this kind following a fever, in which the patient attempted to bite every body about him, and would have even gnawed his own fleſh, if he had not been prevented; but, though the people about him thought, from all theſe ſymptoms, that he had been bitten by a mad dog, and that this was madneſs, yet, on offering him water, he drank, or rather lapped it greedily; which proved it could be no effect of that bite, becauſe the great ſymptom of ſuch diſorders, the dread of liquids, did not ſhew itſelf in him. Theſe were merely the effect of this *chorea ſancti Viti*, and were attended with twitchings of the arms and legs, which conſtitute that diſtemper; his noiſes alſo were not confined to thoſe of a dog, but in different fits he repreſented the ſounds of different animals, as the roaring of a bull, the grunting of a hog, and the noiſe of a gooſe.

Theſe were not premeditated, or meant by the patient as imitable of ſuch ſounds, but merely proceeded from the forcing out of the air from the lungs in different manners, according to the different power of the convulſion, which affected their nerves. The patient in this caſe was ſpeechleſs, not only in the time of the fits, but for a week together; and the country people fell into the common error of ſuppoſing that he was bewitched, but the phyſician cured them of that belief, by curing the patient of his diſtemper by the common means; as they were convinced, that a diabolical ſpirit could not be caſt out by a regular courſe of phyſic. Phil. Tranſ. Nº 287. p. 1480.

VIVA *pecunia* was anciently uſed for live cattle.

Viva *voce*, q. d. by word of mouth. See Oral.

VIVACE, **Vivacemente**, or **Vivamente**, in the *Italian*

lian Muſic, ſignifies to play with life and ſpirit. It requires a degree of movement between LARGO and ALLEGRO, but neareſt *allegro.*

VIVACISSIMO, in the *Italian Muſic*, denotes a degree or two quicker than *vivace*, and is much the ſame with ALLEGRO.

VIVACITY *of ſtyle*, in *Oratory*, a character of STYLE, depending on the choice of words, their number, and their arrangement. See Campbell's Philoſophy of Rhetoric, vol. ii. p. 158, &c.

VIVARY, *vivarium*, in our *Law Books*, is ſometimes uſed for a park, warren, or fiſh-pond, wherein living creatures are kept.

VIVERRA, in *Zoology*. See FERRET.

VIVERRA, in the Linnæan *Syſtem*, is a diſtinct genus of the order of *feræ*, whoſe characters are, that it has ſix cutting teeth, the intermediate being ſhorter; the grinders are more than three; the tongue bends backward, and is often aculeated, and the nails are extended. This genus includes ſix ſpecies; viz. the ICHNEUMON, or Indian QUIRPELE; the *naſua*, or coati mundi of Braſil, of a reddiſh colour, with the tail annulated with white; the *narica*, of a duſky colour, and the tail ſometimes annulated with black and white, and ſometimes of an uniform duſky colour, which ſome writers make a variety of the former; the *putorius*, or *American* POLE-CAT; the *zibetha*, or CIVET, and the GINETTA.

VIVES, a name given by our farriers to a diſeaſe of horſes, which conſiſts in the growth of certain flattiſh kernels in cluſters, like bunches of grapes, beginning from the ears, and creeping downwards, between the chap and the neck of the horſe toward the throat.

When they are inflamed they ſwell, and become not only painful to the creature, but are even mortal, ſtopping his wind, unleſs a ſpeedy courſe be taken for their cure. The difficulty of breathing, which they occaſion in their progreſs towards this higheſt degree, occaſions many ſymptoms, which being miſunderſtood by the farriers not being well acquainted with the nature of this diſeaſe, are often treated as peculiar diſtempers themſelves, and the creature periſhes by the treatment of them in an improper manner.

The horſe will often lie down, and ſtart up again, and tumble about in a ſtrange manner, and be ſuppoſed to have convulſions, when he has really no other complaint but the difficulty of taking his breath.

The common cauſe of this diſtemper is the drinking of cold water after any violent heat: it is alſo ſometimes ſaid to ariſe from the eating of too much bad corn. The method of cure is to be varied according to the progreſs and ſtate of the diſeaſe, and the immediate danger.

If the tumors be not grown ſo large as to put the horſe in abſolute danger of ſuffocation, the farrier uſually attempts to rot them away, by taking hold of each with a pair of pincers, and beating them gently with the handle of a ſhoeing-hammer, or bruiſing them with the hand alone, till they grow ſoft; this will often make them diſappear; but this method is only to be uſed when they are nearly ripe; for otherwiſe they will return after a time; their being in a proper ſtate for this, is known by the ſeparation of the hair, which eaſily comes off on the taking hold of it between the fingers. If the caſe be more deſperate, and the horſe likely to be immediately ſuffocated, it is beſt to open them with an inſtrument. Whether this, or the other method be taken, the horſe ſhould immediately after be blooded under the tongue, and afterwards in the flanks, and his mouth waſhed with ſalt and vinegar, and ſome of the ſame mixture ſhould be put into his ears, rubbing and ſqueezing them hard to make it penetrate: this will wonderfully aſſuage the pain. After this, the horſe is to take a quart of white wine, with two handfuls of hemp-ſeed bruiſed, two nutmegs ſcraped, and the yolks of ſix eggs, all thoroughly mixed in it. About an hour after this draught he is to have the following clyſter: boil an ounce and half of ſal polychreſtum, finely powdered, in five pints of beer; when this is taken off the fire, two ounces of oil of bays are to be put to it; and the whole is to be thrown up blood-warm. This is a regular method, and ſeldom fails of a cure; but ſome, who are not willing to have ſo much trouble and expence, only cut holes where the kernels are, and pick them out at theſe with a wire; they then fill the hole with ſalt, and at the end of three days it will run; after this they waſh the wound ſome days with the juice of ſage, and heal it with the common green ointment, or with a mixture of honey, butter, and tar.

VIVIFICATION, in *Medicine*, the art of *vivifying*, that is, of contributing to the action that gives life, or maintains life.

The chemiſts alſo uſe the word in ſpeaking of the new force, vigour, and luſtre, which, by their art, they give to natural bodies, particularly to mercury; which, after having been fixed, or amalgamated, they reſtore to its firſt ſtate. See REVIVIFICATION.

VIVIPAROUS, *viviparus*, in *Natural Hiſtory*, an epithet applied to ſuch animals as bring forth their young alive and perfect; in contradiſtinction to ſuch as lay eggs, which are called *oviparous animals.*

The females of all the quadruped claſs are *viviparous*, and thoſe of the bird claſs are all *oviparous.*

The laws of nature in the larger animals are, therefore, in a great meaſure, fixed and certain; but it is not ſo in the inſect tribes, nor in the fiſhes; for of theſe ſome are *viviparous*, and others *oviparous*; and thoſe of genera nearly allied to one another.

Among inſects, the much greater number are *oviparous*; but there are many which are not ſo, as the pucerons, progall inſects, cochineal, &c. The millepedes and ſcorpions are alſo well known to be ſo; all the females of the butterfly, and of ſome other claſſes, lay only eggs; but the moſt ſingular and remarkable inconſtancy in nature, if we may be allowed the expreſſion, is that in the fly kingdom; the ſame claſs of inſects, and even the ſame genus, will furniſh us with ſome which are *viviparous*, and others which are *oviparous*: the two-winged flies give us inſtances of this; but theſe are not ſingular in that reſpect; for among the reptile world, there are other creatures which are ſubject to the ſame varieties; and Swammerdam has obſerved a *viviparous* ſnail.

The ſpecies of *viviparous* two-winged flies are much more rare than the oviparous; and among the four-winged claſs they are yet more uncommon. It is not certain, that any of the latter, beſide the winged pucerons, are of this kind; but among the former there are ſix or ſeven ſpecies which are known always to produce living worms, and probably many more will be diſcovered, by a more cloſe attention than has hitherto been given them.

It is eaſy to find about our houſes one of theſe ſpecies of *viviparous* flies; the creature is always buzzing about the places where meat is kept, and loves to depoſit her young as the common blue fleſh-fly does its eggs, on meat. Its way of carrying its wings is the ſame with that of the blue fly, and its antennæ are of the ſame form. It at leaſt equals the blue fly in length, but its body is leſs thick, and is a little bent at the hinder part; its colour is grey; its legs are black; its petty wings whitiſh, and its reticular eyes reddiſh.

There are, beſide this ſpecies, two other of the *viviparous* flies, which are not uncommon. Both theſe, in a great meaſure, reſemble the former, but their bodies are ſhorter, and, in the whole, they much more than the other approach to the form of the blue fleſh-fly. They are alſo ſmaller than the former ſpecies; the one of them, however, on the whole, is not ſo much ſo, and, though ſhorter, yet is much thicker both in the corcelet and body. They are both, though ſmaller than that kind, yet tolerably large flies, and are bigger than the common horſe-fly.

On the leaves of ivy alſo there are often ſeen, about autumn, two other ſpecies of *viviparous* flies, which are eaſily diſtinguiſhed from all the others. Thoſe of one of theſe ſpecies are larger than the great blue fleſh-fly, and have a ſhorter and thicker body than that kind. The manner of carrying the wings is alſo the ſame in both; but though both have antennæ of the battledore kind. yet they are evidently diſtinguiſhed by this, that the extremities of the one are lenticular, and thoſe of the other priſmatic. Near the origin of each wing theſe have a browniſh ſpot, as have thoſe oviparous flies which uſually have in their body only two large eggs at a time, and which are produced of the yellow worms, ſo common in cow-dung. But theſe *viviparous* ones differ from thoſe flies, in that they are larger, and of a deep, but dead brown; whereas the others are black, or nearly ſo. The other ſpecies is not much unlike this in form, but is ſmaller, being not more than of the bigneſs of the blue fleſh-fly, and of a bluiſh black; ſo that it might eaſily be miſtaken for one of the common fleſh-flies, were it not for the two brown ſpots at the inſertion of the wings; and both this and the former ſpecies are plainly diſtinguiſhed from the cow-dung-fly before deſcribed, by their wanting the gold-coloured down which that has on the fore-part of its head. Reaumur, Hiſt. Inſect. vol. iv. p. 405, ſeq.

Vipers are diſtinguiſhed from ſnakes, in that the latter lay eggs in dunghills, to be hatched by the warmth thereof; but the former are *viviparous*, that is, they keep their eggs within their bellies, and bring forth live vipers.

In the Philoſophical Tranſactions we have an account of a *viviparous fly*, of the œſtrum or gad-kind. Dr. Liſter tells us, he opened ſeveral females of this claſs, and ſound, in each, two bags of live white worms. The like is hinted by Aldrovandus. Liſter even ſuſpects, that all of this tribe are, in ſome meaſure, *viviparous*.

VIVO, in *Architecture*, the ſhaft or fuſt of a column. See *Tab. Architect. fig.* 24.

The term is alſo uſed, in a more particular ſenſe, for the naked of a column, or other part.

VIVUM *linum*. See Linum.

Vivum *ſulphur*. See Sulphur.

VIXEN, or Fixen, among *Sportſmen*, denotes a fox's cub.

VIZARD, or Vizor. See Masque.

VIZIER. See Visier.

ULCER, Ulcus, in *Surgery*, a ſolution or diſcontinuity of texture, or loſs of ſubſtance, in the ſoft parts of the body and ſkin, proceeding from an internal cauſe.

Galen defines *ulcer*, an inveterate eroſion of the ſoft parts of the body; by which, inſtead of blood, they are brought to yield a kind of pus, or ſanies; which prevents the conſolidation.

Etmuller defines an *ulcer*, a ſolution of continuity, from ſome corroſive ſharpneſs or acidity, that takes away from the parts, and turns the proper nouriſhment of the body into a ſanious matter. A like ſolution of continuity, happening in a bony part, is called a Caries.

Galen commonly uſes the word *ulcer* and *wound* indifferently; but the Arabs, and the moderns, after them, diſtinguiſhed between the two.

Spontaneous *ulcers* are generally ſuppoſed to proceed from acrimony, or a corroſive diſpoſition of the humours of the body; whether brought on by poiſons, by the venereal taint, or by other cauſes.

Ulcers are divided into *ſimple*, and *complicated*. They are again divided, with regard to their circumſtances, into *putrid*, or *ſordid*, wherein the fleſh all around is corrupted, and fetid; *verminous*, where the matter, being thick, does not flow away, but generates worms, &c. *virulent*, which inſtead of pus, or ſanies, yield a malignant virus, &c.

They are again diſtinguiſhed, with regard to their form, into *ſinuous*, *fiſtulous*, *varicous*, *carious*, &c.

They are diſtinguiſhed alſo, with regard to their cauſes, into *ſcorbutical*, *venereal*, *cancerous*, &c. with regard to the part of the body which they infeſt, being ſometimes found in the ſkin, fat, and glands, and ſometimes in the muſcular parts; with regard to their ſituation in the body, as *ulcers* of the noſe, fauces, breaſt, anus, &c. with regard to their ſize, ſome ſpreading wide; others occupying but a ſmall ſpace; ſome being deep, and others ſhallow; and alſo with regard to their duration, they are called *recent* or *inveterate*.

When an *ulcer* happens in a good conſtitution, and proves eaſy of cure, it is ſaid to be *ſimple*.

When attended with other concurring ſymptoms, as a cacochymic habit, which greatly retards or obſtructs the cure, it is called a *compound ulcer*.

A *ſimple ulcer* is attended with no other ſign than that of eroſion: but *compound ulcers*, happening in a ſcorbutic, dropſical, or ſcrophulous conſtitution, may be attended with pain, a fever, convulſions, a large and emaciating diſcharge of matter, inflammation and ſwelling of the part, calloſity of the lips, a caries of the bones, &c.

Ulcers may be the conſequence of wounds, bruiſes, or impoſthumes improperly treated; and they may likewiſe proceed from an ill ſtate of the humours, or what may be called a bad habit of the body. In the latter caſe, they ought not to be haſtily dried up, leſt it ſhould prove fatal to the patient.

Ulcers happen moſt commonly in the decline of life, and perſons who neglect exerciſe, and live groſly, are moſt liable to them. They might often be prevented by retrenching ſome part of the ſolid food, or by opening artificial drains, as iſſues, ſetons, or the like.

An *ulcer* may be diſtinguiſhed from a wound by its diſcharging a thin watery humour, which is often ſo acrid as to inflame and corrode the ſkin; by the hardneſs and peculiar ſituation of its ſides or edges, by the time of its duration, &c. The *ulcerative proceſs*, according to the idea of Mr. Hunter, is an action of the abſorbent ſyſtem, whereby, in conſequence of a ſtimulus, it takes up the ſoft parts, and carries them into the circulation.

With regard to the proper treatment and cure of *ulcers* in general, it requires ſkill to determine whether it is expedient and ſafe to dry up an *ulcer* or not. All *ulcers*, which proceed from a bad habit of body, ſhould be ſuffered to continue open, at leaſt till the conſtitution be ſo far changed by proper regimen, or the uſes of medicine, that they ſeem diſpoſed to heal of their own accord. *Ulcers*, which are the effect of malignant fevers, or other acute diſeaſes, may generally be healed with ſafety after the health has been reſtored for ſome time. The cure ought not, however, to be attempted too ſoon, nor at any time without the uſe of purging medicines and a proper regimen.

When wounds or bruiſes have, by wrong management, degenerated into *ulcers*, if the conſtitution be good, they may generally be healed with ſafety.

When *ulcers* either accompany chronical diſeaſes, or come in their ſtead, they muſt be cautiouſly healed.

If an *ulcer* conduces to the patient's health, from whatever cauſe it proceeds, it ought not to be healed; but if, on the contrary, it waſtes the ſtrength, and conſumes the patient by a ſlow fever, it ſhould be healed as ſoon as poſſible.

Mr. Sharp obſerves, that except the callous and the ſinuous *ulcer*, and the *ulcer* with a caries in the bone, the cure of all the other kinds depends chiefly on that of the morbid habit of the body in general. If the body is free from any degree of cacochymy, the healing of an *ulcer* is the work of nature, and the effect of topical applications is merely to maintain the fibres in ſuch a mean ſtate between laxity and rigidity, as will render them moſt capable of carrying on this natural operation. While an inflammatory hardneſs exiſts, an emollient poultice laid over the dreſſings will relieve, after which dry lint generally ſuffices, or at the moſt it may be moiſtened in ſome mild aſtringent, to give a tone to the new fleſh. When a too great laxity, or ſpongineſs is obſerved in *ulcers*, gently ſtimulating and bracing applications take place.

The moſt proper regimen for the cure of *ulcers*, is to avoid all ſpices, ſalted and high-ſeaſoned food, and all ſtrong liquors, and to leſſen the uſual quantity of fleſh-meat. The body ought to be kept gently open by a diet conſiſting chiefly of cooling laxative vegetables, and by drinking butter-milk, whey ſweetened with honey, or the like. The patient ought to be kept chearful, and ſhould take as much exerciſe as he can eaſily bear.

Ulcers, *callous*, are thoſe whoſe internal parts are lined with a hard and almoſt cartilaginous ſubſtance. The cure of callous *ulcers* is attended with very great difficulties, and indeed no cure is to be expected, till the callus is perfectly extirpated. This is to be done three ways; the mildeſt of theſe, which is ſuited to recent calluſes, and ſuch as are not yet become very hard, is by means of corroſive medicines, and of theſe the milder kinds are often ſufficient; burnt alum, or red precipitate, either rubbed on the parts alone, or applied with an equal part either of the common digeſtive or baſilicon, will ſometimes anſwer this purpoſe in theſe caſes, as will alſo Ægyptian ointment, to which a ſmall quantity of red precipitate may be added occaſionally. If the callus will not yield to theſe remedies, it muſt be attacked with the common cauſtic, or with butter of antimony, or with a ſolution of quickſilver in ſpirits of nitre.

Another mild method of extirpating calloſities we are alſo taught by Le Dran. This author adviſes to apply, for four or five days, a plaſter made of the diachylon with the gums, and the mercurial plaſter, with a quadruple proportion of mercury, mixed in equal quantities; this is to be renewed morning and night, in order to ſoften the callous lips as much as poſſible; after this he makes numerous inciſions, ſo deep as to paſs quite through the ſubſtance of the callus, and ſtops the blood which flows from theſe with dry lint; then the ſame plaſter is again applied, and ſo laid on, that it may touch the naked inciſed lips. After about four days of this treatment, the ſcarifications are again repeated, and this to a third or fourth time, if the calloſity be not before deſtroyed.

If callous *ulcers* are attended with fiſtulous ſinuſes, theſe muſt always be laid open, before we can attempt to deſtroy the callus, with any probability of ſucceſs; after this they may be cured as before directed; or, if the uſe of the knife be not ſafe, or the patient dreads it too much, it will be proper to form tents, and thruſt them up the ſinus, firſt anointing them with the Ægyptian or with Wurtz's brown ointment. By theſe methods a callus, that is not of long ſtanding, may be extirpated; if the ends of the tents laſt mentioned be touched with butter of antimony, red precipitate, or the infernal ſtone, the buſineſs in that method will be the more eaſily effected; and, in caſes of this kind, where the callus cannot be reached by the corroſive end of the tent, it is a very good method to inject into the ſinus either the Phagedænic *water*, or a ſolution of the Ægyptian or brown ointment in ſpirit of wine. The opening of the ſinus ſhould be then cloſed, to keep in the injection as long as may be, and the operation frequently repeated.

Sometimes, however, it is found abſolutely neceſſary to uſe the knife, as in callous *ulcers*, or fiſtulæ, that are of very long ſtanding, and that have formed variety of ſinuſes, and when either nothing can be done by corroſive medicines, or elſe that they tear and corrode the nerves, and bring on convulſions, and other bad ſymptoms, before they affect the callus. In theſe caſes the beſt and ſafeſt way is to lay open the ſinus, taking care not to wound the nerves, tendons, and arteries; and, after that, all the calluſes may be eaſily deſtroyed by the common methods. Finally, if even this method ſhould not have the deſired effect; and if the patient has a conſiderable ſhare both of ſtrength and courage, and the ſituation of the nerves and arteries is favourable, the callous parts muſt be all either entirely cut out with the knife, or burned away by the actual cautery. This operation, though a very painful one, is attended with this good conſequence, that it will reduce the moſt inveterate callous *ulcers* to the ſtate of a freſh wound; and unleſs a caries, or bad habit of body, or the pox, ſcurvy, or dropſy, or ſome other conſtitutional complaint, be in the way, it may be cured as eaſily as a freſh wound. Heiſter's Surgery, vol. i. p 271.

ULCERS, *cancerous*. See *Ulcerated* CANCERS.

ULCERS, *carious*, are thoſe in which any neighbouring bone is deprived of its perioſteum, or affected with a caries: in this caſe, the fleſh over the caries is ſoft, flaccid, fungous, and inflated; the lips of the *ulcer* are inverted; the ſanies clear, ſcarce at all glutinous, fetid, and full of ſmall black holes: if the *ulcer* heals, it is only on the ſurface, and ſoon breaks out again; never healing firmly before the cure of the faulty bone, and when that is effected, the *ulcer* ſoon fills up with ſolid fleſh, and is healed. See CARIES.

ULCERS, *cutaneous*. Such of theſe as attack the ſkin of the face, both in infants and adults, approach very much to the nature of the truly phagedænic *ulcers*; for they, like thoſe, ariſe from an acrimony of the blood, and are very apt to ſpread abroad.

In both theſe caſes, therefore, purging medicines, with ſuch as ſweeten the blood, will always prove of ſervice. Decoctions of the woods, or of the ſharp-pointed dock root, or the herb fumitory, ſhould be drank on theſe occaſions, half a pint at a draught, as hot as can well be borne, three or four times a day. And ſome of theſe draughts ſhould be taken in bed, and a gentle ſweating be promoted for ſome time afterwards. And abſorbent and ſweetening powders, as thoſe prepared from antimony and flower of brimſtone, ſhould be taken at the ſame time. When this caſe happens to infants at the breaſt, they can only take ſome ſlight doſes of medicines to open the bowels; but the mothers or nurſes ought to be enjoined proper regimen.

In regard to the external applications, oil of tartar per deliquium will be found of great ſervice; a pencil or feather is to be dipped in this, and rubbed over the parts three or four times a day. This may either be thus uſed alone, or elſe mixed with oil of eggs and wax, and a plaſter laid over it, of the de minio, or any other of the lead plaſters, or one of ſpermaceti and camphor.

If the whole face be affected, which in infants is not unfrequently the caſe, a plaſter would prove highly troubleſome; but, in this caſe, the proper ingredients may be ſpread in a ſofter form over a linen maſk. Lime-water is a medicine of great power and value alſo in theſe caſes, as is likewiſe the water uſed in the waſhing of diaphoretic antimony. The *ulcers* may very properly be waſhed with either of theſe, and the litharge or pompholyx ointment afterwards applied; to which, in very ſtubborn caſes, a little crude mercury may be added; and ſometimes a ſmall admixture of red precipitate is found neceſſary; and finally, if theſe *ulcers* are attended with a large and foul diſcharge, it will be proper to ſprinkle them with ſome of the abſorbent powders, as tutty, lapis calaminaris, ceruſs, chalk, or the like, mixed up occaſionally with a little native cinnabar, or red precipitate; or, if it be found more convenient, theſe powders may conveniently enough be made into an ointment with cream. Heiſter's Surgery, p. 267.

ULCERS, *fiſtulous*, are ſuch as are ſinuous, or winding, and are attended with great calloſity; and diſcharge a thin, ſerous, and fetid matter. See FISTULA.

When it is diſcovered, either by the eye or probe, that *ulcers* are become fiſtulous, though the fiſtulæ or ſinuſes are not yet become callous, the readieſt way of curing them is by laying them open, if that can be conveniently done, down to the bottom with a knife, and, after this, they may be cleanſed and healed. As patients, however, are always averſe to the knife, the cure of theſe may be attempted by injecting them with the decoctions of vulnerary herbs, ſuch as agrimony, birth-wort, or ladies mantle, and dreſſing them with digeſtive ointments or lint. Many ſurgeons are, in theſe caſes, fond of thruſting their dreſſings to the bottom of the ſinus with tents; but they are very apt to do miſchief by their hardneſs and too great length, often bringing on a callus, inflammation, or too great flux of humours on the part. They ought, therefore, either wholly be laid aſide, in theſe caſes, or elſe to be made as ſoft and as ſhort as the nature of the caſe will admit. The next particular, in the cure of theſe fiſtulous ſinuſes, is to preſs the fundus as near to the mouth or opening as poſſible; and when the wound is cleanſed, and the proper dreſſings applied, a ſmall compreſs, or a ſlip of plaſter, doubled up in the form of a ſmall compreſs, muſt be laid on the part where the fundus, or bottom of the fiſtula, is judged to be ſeated, ſecuring all on by a larger compreſs, and the proper bandages. In rolling up, in theſe caſes, the proper method is always to place the beginning of the roller upon the fundus of the fiſtula, or at leaſt to make the preſſure tight upon that part; the continuation of this will urge the contained matter up toward the opening, and the fundus, or bottom of the ſinus, will naturally be the firſt part that heals. When theſe ſinuſes penetrate ſo deep, that there is no coming at their bottoms with the dreſſings, vulnerary injections muſt be frequently uſed; and, of theſe, none are more ſerviceable in theſe caſes than the following; take the common digeſtive, prepared with turpentine, diſſolved in the yolk of an egg, an ounce and half; honey, either ſimple, or the honey of roſes, or of celandine, an ounce; common proof-ſpirit, nine ounces: mix theſe together for an injection. Or take of a decoction of ſcordium, or elſe of ſouthern-wood or agrimony, nine ounces; common proof-ſpirit, four ounces; elixir proprietatis, or eſſence of myrrh and aloes, one ounce; honey of roſes, two ounces; mix all together. Theſe are to be injected at every dreſſing, and the opening of the fiſtula muſt afterwards be kept cloſed, to keep them in its cavity for ſome time, which will much haſten the agglutination of the part. If this method of cure does not ſucceed, recourſe muſt at laſt be had to the knife; and indeed, in very many of theſe caſes, there is no great probability of relief from any other means, particularly where the fundus lies directly downward, or where the fiſtula takes ſuch an irregular courſe, that the fundus of it cannot, with any ſucceſs, be preſſed towards the opening. In this caſe there is no relief to be had, but by laying it open to the bottom. To do this a grooved probe, or director, ſhould be gently paſſed down the fiſtula, and then directing the knife along the groove, the fleſh, and common integuments, are to be laid open as far as is ſafe and neceſſary; a free paſſage is, by this means, given to the corrupted matter, and the part may be come at with the proper dreſſings. If the opening is attended with a large diſcharge of blood, as is frequently the caſe, the wound muſt be, at the firſt dreſſing, filled with dry lint, and afterwards it is to be dreſſed with the common digeſtive, with a ſmall mixture of the Egyptian ointment, or with a little red precipitate, till the wound is perfectly cleanſed, and it may then be eaſily healed in the common way. Heiſter's Surg. p. 264.

Ulcers about the anus are moſt apt to become fiſtulous, and are very difficult to cure. Some indeed, pretend to have found Ward's fiſtula paſte very ſucceſsful in this complaint. It is not a dangerous medicine, and being eaſily procured, it may deſerve a trial: but as the *ulcers* generally proceed from an ill habit of body, they will ſeldom yield to any thing except a long courſe of regimen, aſſiſted by medicines, which are calculated to correct that particular habit, and to induce an almoſt total change in the conſtitution. Buchan's Dom. Med. p. 637.

ULCER, *phagedænic*, is an ulcer of a corroſive nature, eating away the adjacent parts all around; the lips thereof remaining tumefied. When this kind of *ulcer* eats deep, and ſpreads wide, without being attended with a tumor, but putrefies, and grows foul and fetid, it is called *noma*; and both, on account of the difficulty wherewith they heal, are alſo termed *dyſepulota*.

In this kind of *ulcers* the acrimony of the blood is to be moderated by lenient medicines; ſuch as decoctions of the China root, ſarſaparilla, ſcorzonera, ſharp-pointed dock, marſh-mallow, ſanicle, agrimony, white horehound, &c. The ſame directions with regard to diet are to be obſerved as in the caſe of *running* ULCERS. A purging medicine with the addition of mercurius dulcis, occaſionally taken, will not only leſſen the foul diſcharge of the *ulcer*, but alſo deſtroy the acrimony of the blood, and forward the cure. The external remedies are the ſame as in the *running* ULCERS.

In the Lond. Med. Obſ. and Inq. vol. ii. p. 365. &c. we have an account of a *phagedænic ulcer* cured by the ſublimate and ſarſaparilla. The patient took a quart every day, at four doſes, of a ſtrong decoction of ſarſaparilla, with half a grain of corroſive ſublimate diſſolved in it: the ſore began to mend after the patient had taken the decoction for a fortnight, and, in about ſix weeks, was entirely healed. Mr. Underwood, in his Treatiſe on *Ulcers* of the Legs, much extols an aſtringent ſolution of green vitriol, calcined to whiteneſs, in water, in *phagedænic ulcers.* See Phagedænic *Water* and Wort.

Ulcer, *a putrid* or *ſordid*, is that whoſe ſides are lined with a tough viſcous humour, and which is alſo attended with heat, pain, inflammation, and a large flux of humours to the part; with time the ſordes increaſe, and change colour, the *ulcer* corrupts, its matter grows fetid, and ſometimes the part gangrenes. Putrid fevers often give riſe to this kind of *ulcer*.

When *ulcers* become putrid or fetid, this accident ariſes either from a very bad habit of body in the patient, or elſe from the negligence or unſkilfulneſs of the ſurgeon.

The acrimony of the blood is by all poſſible means to be taken off in theſe caſes, and the *ulcer* to be frequently dreſſed, and every time thoroughly cleanſed. When wounds are dreſſed but ſeldom, as will be the caſe after the ſharp engagements in an army, where great numbers have been wounded, it cannot happen, but that the injured parts, in many patients, will be annoyed with heat, putrefaction, or worms.

To prevent and remedy theſe, the wounds muſt be dreſſed with the Egyptian ointment, mixed with Wurtz's brown ointment, or the phagedænic water may be uſed with great ſucceſs, as alſo red precipitate, either alone, or mixed with burnt alum, or with the common digeſtive. Theſe applications are to be continued till the putrid fleſh ſeparates from the bottom of the *ulcer*; and while this is doing, it will be very proper to cover the part with lint dipped in ſpirits of wine, which is a very powerful remedy againſt putrefaction.

When the putrid parts are caſt off, the cure will be perfected by the common means uſed in *ulcers*, adding myrrh to the healing medicines; and where there are worms bred in the *ulcer*, no particular caution need be given againſt them, ſince the ſame applications anſwer the purpoſe, as, whatever reſiſts putrefaction, will alſo be found to deſtroy worms.

Ulcers ſometimes prove, however, ſo very malign and obſtinate, that they will give way to none of theſe remedies; and, in theſe caſes, though there be nothing venereal at the bottom, yet the only relief ſeems from a ſalivation. Heiſter's Surgery, p. 269.

Dr. Percival and Dr. Withering having found, that mephitic, or fixed air, was capable of correcting purulent matter in the lungs in the caſe of a Phthisis *pulmonalis*, it was reaſonably inferred, that it would be equally uſeful when applied externally to foul *ulcers*; and experience is ſaid to have confirmed this concluſion. See Cancers.

Ulcers, *recent and benign*, are thoſe that are attended with no violent ſymptoms; in which the pus is of a moderate conſiſtence, whitiſh, without acrimony, and of no bad ſmell, and the patient otherwiſe healthy, and of a good conſtitution. Theſe, like recent abſceſſes, are not generally difficult to be cured; they may be treated like recent abſceſſes or wounds, being firſt cleanſed, after diſcharging the matter, if deep, by means of an injection, or otherwiſe with lint; and then applying a digeſtive ointment, ſpread upon lint, and ſecuring it on the part with diachylon, or any other ſimilar plaſter, and covering the whole with compreſſes and bandages. When the *ulcer* appears to be thoroughly cleanſed, ſo that the bottom of it appears florid, and acquiring new fleſh, the next object is to fill it with new fleſh, by the medicines, vulgarly called ſarcotics, the beſt of which is the common digeſtive ointment; though ſome uſe different balſamic remedies, as balſam of Arcæus, of Peru, of ſulphur, eſſence of myrrh and aloes, oil of myrrh per deliquium, or other vulnerary balſams of this kind. When the *ulcer* is filled up with new fleſh, it remains to induce a proper cicatrix, by dreſſing the part daily with dry lint till it is formed; and if the fleſh becomes luxuriant, and the *ulcer* moiſt, it muſt be ſprinkled with drying powders, as thoſe of maſtich, frankincenſe, ſarcocolla, colophony, calaminaris, or tutty; but if the luxuriant fleſh has grown above the ſkin, it ſhould be eat down with blue vitriol, or powder of red precipitate mixed with burnt alum; and then the above proceſs ſhould be continued. A proper regimen ſhould accompany every ſtage of the cure. Heiſter's Surg. vol. i. p. 262.

Ulcers, *running*. When *ſtubborn* ulcers are attended with a large diſcharge, there is reaſon to apprehend that the blood abounds with too large a quantity of a thin acrimonious ſerum, which are hence called *rheumatic ulcers*.

This cannot be drawn off any way more properly than by cathartic medicines; theſe and diuretics are to be repeated as often as the ſtrength of the patient will conveniently permit, and he muſt be particularly cautioned againſt drinking too freely.

Millepedes, in any form, are very properly preſcribed to be taken internally in theſe caſes, as are alſo the eſſence of amber, myrrh, balſam of Peru, tincture of ſalt of tartar, tartarized tincture of antimony, and the like; large and frequent draughts of ſmall liquors are frequently the cauſe of theſe diſorders, and are therefore moſt carefully to be avoided; ſtrong ale, or old wine, ſhould be drank ſparingly at meals, and nothing between them.

Such meats are beſt, on theſe occaſions, as have feweſt juices in them, and are very well roaſted; and the external medicines muſt be thoſe which have the greateſt reputation for dryers. The principal of theſe are limewater, lapis calaminaris, tutty, chalk, maſtich, frankincenſe, colophony, and native cinnabar; when any of theſe have been ſprinkled in fine powder upon the *ulcer*, a plaſter of lead, diapompholygos, or calaminaris, is to be laid over it. Heiſter's Surgery, p. 267.

Ulcers, *ſinuous*, are ſuch as run aſlant, or ſideways from their orifice, and may be known either by ſearching with the probe, wax-candle, &c. or by the quantity of matter they diſcharge, in proportion to their apparent magnitude. Theſe ſometimes lie deep, and have ſeveral turnings: they are diſtinguiſhed from fiſtulas only by their want of calloſity, except in the very orifice.

Ulcers, *ſtubborn*, *inveterate*, *and malign*, called in the medical ſchools, *ulcera dyſepulotica*, *chironia*, *cacoethica*, *rebellia*, and *contumacia*, are thoſe which uſually appear in ſubjects of a bad, ſcorbutical, cachectical, and hydropical habit of body, or where the pox, a caries, a callus, a cancer, or very great acrimony of the blood, are the radical cauſes; in which the pus is too fluid, acrimonious, fetid, yellow, brown, green, or blackiſh, or of the conſiſtence of lard. In theſe caſes the cauſes of the diſorder ſhould be explored and extirpated. In *ulcers* of this kind, ariſing merely from a vitiated habit of body, without a fiſtula, callus, caries, putrid fleſh, or worms, the habit ſhould be corrected by internal remedies and a ſtrict regularity of diet; the *ulcers* ſhould be alſo cleanſed daily with proper medicines, and dreſſed with any common ointment, oil, or balſam, covering the dreſſings with any plaſters in uſe, as that of lead or diapompholyx. After they are well cleanſed, they ſhould be dreſſed with digeſtive ointment, to which may be added myrrh, maſtich, or colophony, or a decoction of the æs viride with wine, or a decoction of walnut-tree leaves in water, with a little ſugar; in which laſt a linen cloth being dipped, is to be laid in the *ulcer*, and repeated every ſecond or third day. This ſimple and vulgar medicine, ſays M. Belloſte, ſuppurates, deterges, incarnates, reſiſts putrefaction, &c. more than any other medicine known. In ſome caſes, ſpirit of wine, or limewater, has had great efficacy in healing and drying up *ulcers*. If any ſinuſes or fiſtulæ are diſcovered, they muſt be laid open and cleanſed, and healed with the balſam of Peru, of Copaiba, or terebinthine balſam of ſulphur, or with any other agglutinating medicine; by ſuch means, with the conſtant uſe of internal remedies, the worſt *ulcers* may be generally cured. Heiſter Surg. vol. i. p. 266.

Dr. Whytt ſtrongly recommends the uſe of the ſolution of corroſive ſublimate of mercury in brandy, for the cure of obſtinate ill-conditioned *ulcers*. Dr. Buchan has alſo found this medicine ſucceſsful. The doſe is a tableſpoonful night and morning, at the ſame time waſhing the ſore twice or thrice a day with it. Dr. Whytt obſerved, that waſhing the ſore thrice a day with the ſolution of a triple ſtrength was very beneficial.

When *ulcers* obſtinately reſiſt ſuch treatment, ſome have had recourſe to ſalivation, which ſeldom fails to effect a cure, when all other remedies have been tried in vain.

If the patient be too weak to undergo the fatigue of a thorough ſalivation, it may be moderated and kept up the longer, in proportion to his ſtrength.

Ulcers, *varicous*, are ſuch as, being ſeated in the veins, and becoming painful and inflammatory, ſwell up the part they poſſeſs. Theſe, when recent, being occaſioned by the uſe of corroſives, or proceeding from a ruptured varix, are often attended with an hæmorrhage. The veins adjacent to the *ulcers* are, in this caſe, preternaturally diſtended, and may ſometimes be felt interwoven together, like net-work, about the part.

Ulcers, *venereal*. Theſe are almoſt always ſituated either in the groins, after the ſuppuration of venereal buboes, or elſe in the prepuce, frænum, or glans penis, which is uſually termed a Chancre. In females they are frequently ſituated in the vagina, or labia pudendi, and in either ſex ſometimes in the noſe, palate, lips, fauces, tongue, and uvula; and ſometimes the os frontis, and other bones both of the head and other parts of the body, are ſubject to them.

The great intention, in theſe caſes, is to expel the venereal poiſon by proper remedies; for one *ulcer* of this kind, if neglected or ill-treated, will produce an univerſal pox. The internal medicines are principally calomel, mixed with purging medicines; and, in the intermediate times, decoctions of the woods, with tincture of antimony, and the like; theſe laſt are to be taken before riſing in the morning, to bring on a gentle ſweat, and may be repeated afterwards many times in a day. A ſtrict regimen of diet ought alſo to be obſerved; wine, and all vinous and ſpirituous liquors, are to be forbidden, and all aromatics, ſpices, ſalt, and acrimonious or acid things, are poiſon to perſons in theſe caſes. If ſuch a regimen, and a courſe of theſe medicines, will not effect a cure, ſuch quantities of mercury muſt be conveyed into the blood, as will raiſe a ſalivation, by which both the *ulcers*, and the pox, which was the cauſe of them, will be cured at the ſame time. When the *ulcers* are ſituated in the mouth, uvula, fauces, or tongue, the patient ſhould frequently uſe a gargle, made of decoctions of the woods, and ſweetened with honey of roſes; and the *ulcerated* part ſhould be frequently touched with honey of roſes, acidulated with ſpirit of vitriol, and, after this, they may be healed with eſſence of myrrh, amber, or with oil of myrrh made per deliquium.

When the *ulcers* are on the external parts, they muſt be dreſſed either with the common digeſtive, or with baſilicon, with red precipitate mixed in them; and theſe dreſſings are to be covered, and kept on by a mercurial plaſter; and when they are thoroughly cleanſed, they may be healed in the ordinary way.

Another excellent medicine for cleanſing theſe *ulcers*, is the PHAGEDÆNIC-*water*, or, in its place, lime-water, impregnated with calomel; either of theſe may be applied every day many times, and the parts may be, when neceſſary, touched with the cauſtic, or red precipitate; and when they are thoroughly cleanſed, they may very ſucceſsfully be healed, either with an ointment made only of crude mercury mixed with turpentine, or with the following: take of the diapompholygos ointment, and crude mercury, killed with a ſmall quantity of Venice turpentine, of each equal quantities, mix them in a glaſs mortar into an ointment, or take of the amalgama of lead and tin an ounce, of bole armenic two ounces; mix theſe, and make them into an ointment, by mixing them with a ſufficient quantity of the ointment of roſes, or any other ſimple ointment, in a glaſs mortar. If there be, at the ſame time, a caries of the bone, which is, indeed, too frequently the caſe, that is to be dreſſed with euphorbium, oil of cloves, phagedænic water, or ſpirit of nitre with quickſilver diſſolved in it; or, if it can conveniently and ſafely be done, the actual cautery is of ſignal ſervice.

Sometimes, when theſe *ulcers* fall on a ſoft part of the body, as the groin, they throw out continually ſo large a quantity of lymph, that all the medicines that can be invented or applied, are of no conſequence to ſtop it. This accident is occaſioned either by the rupture or eroſion of ſome of the lymphatic veſſels. In this caſe the ſurgeon ought to try what can be done by proper compreſſes, and a tight bandage; but when theſe, and the other milder applications are of no ſervice, the actual cautery muſt be employed, but with great care and caution, to the vitiated parts.

If venereal *ulcers* of the penis and glans are negligently or unſkilfully treated, an univerſal pox is very frequently the conſequence; the urethra will, in theſe caſes, be often perforated in various places, and the urine will be diſcharged through it, as through a ſieve; and ſometimes the whole glans, or penis itſelf, will be either totally eaten off, or ſo miſerably affected with ſcirrhuſes and cancers, that the ſurgeon is obliged to extirpate them with a knife. When the noſe is affected by theſe *ulcers*, it is very frequently entirely demoliſhed by them; ſometimes the palate, with its bones, are ſo eroded and perforated, that an open communication is made between the mouth and noſtrils, and the fluid part of the aliment, in eating, is thrown out by the noſtrils. Theſe paſſages can ſcarce ever be perfectly covered again by fleſh; but when the extremities and edges of them are healed, they may be cloſed with a ſmall plate of ſilver or gold. The tonſils alſo, the external coat of the uvula, and frequently the whole uvula itſelf, are alſo deſtroyed by the virulence of theſe ulcers: and laſtly, the cranium itſelf, particularly the frontal bone, is frequently ſo eroded and perforated by a caries, that the brain lies bare, and the motion of the pulſation of the arteries may plainly be ſeen. It is no wonder if the worſt of ſymptoms, and even death itſelf, follow this, if neglected or improperly treated. Heiſter's Surgery, p. 270. See VENEREAL *Diſeaſe*.

ULCER *of the bladder* is known by a diſcharge of fetid matter, or blood, and ſometimes a ſort of ſcales, or membranous pellicle, obſerved in the urine. There is alſo a continual dyſury, and a pain in the urinary paſſages. The means of relief are ſimilar to thoſe for an *ulcer in the kidnies.*

Cheſelden obſerves, that an ulcerated bladder very rarely occurs in the bodies that are obtained for diſſection.

ULCERS *of the head.* See HEAD.

ULCER *of the kidnies.* Oribaſius obſerves, that an *ulcer* in the kidnies may be diſtinguiſhed from the ſame diſorder in the bladder, by the following circumſtances; when the bladder is affected, the pain is felt in the pubes and bottom of the belly; but when the kidnies ſuffer, the pain is in the back part of the loins: in the firſt caſe there is a difficulty, if not a ſuppreſſion of urine; but, in the latter, the urine paſſes freely; from the bladder there are voided membranous ſcales, but from the kidnies fibrous pieces of fleſh: and moreover, a violent pain is felt in the bladder when it is ulcerated; but when the *ulcer* is in the kidnies, the pain is of a dull kind. The urine looks like milk, when firſt diſcharged from an ulcerated kidney, but it is not fetid; however, on ſtanding for ſome time, the white matter falls: when the pain is conſiderable in the kidnies, it occaſions a nauſea, and ſometimes a vomiting.

Dr. Hunter obſerves, that though the kidnies are often found waſted, they are hardly ever ſeen ulcerated. For the regimen, &c. to be obſerved in the caſe of ulcerated kidnies, ſee NEPHRITIS.

ULCERS *in the legs.* See LEGS.

Some have recommended in the cure of theſe *ulcers* abſolute confinement and reſt; but it is now found, that moderate exerciſe promotes the circulation, and increaſes that vigour of action, on which the healing of the *ulcer* depends.

In old *ulcers* of the legs, Meſſrs. Elſe and Martin, ſurgeons of St. Thomas's Hoſpital, in conſequence of information relating to the method uſed by Mr. Battiſcomb in the cure of ſuch *ulcers*, determined to try what bandage would do, without adminiſtering any internal medicine, and found it ſo efficacious, as to lead them to conclude it will ſeldom fail where there is no carious bone. If the *ulcer* is foul, they begin by making it clean by the application of bread and milk, or ſome other emollient poultice. They then apply a linen cloth, moiſtened with tincture of myrrh, or Goulard's eau vegetau-minerale, as they find one or other beſt to agree. If theſe ſhould give pain, they then firſt apply dry lint, and upon that a piece of cloth ſpread with the ceratum epuloticum, or ceratum album. Over this they lay a very thin plate of lead, cut to the figure of the ſore, and juſt large enough to cover its edges. This is ſecured upon the part with a bandage drawn as tight as the patient can bear it, even ſo as to make the leg feel numb, which is rolled from the toes to above the knee. In proportion as the ſore contracts, the ſize of the plate is leſſened. When the patients are well, it is recommended to them to keep the leg conſtantly rolled tight in the day-time. When, from the long continuance of the drain furniſhed by a ſore leg, or from bad habit of body, they apprehend ill conſequences from healing the *ulcer*, they content themſelves with bringing it to a better condition, and with keeping it ſo, by a judicious application of the bandage; and even when there is no fear as to the conſequence of healing the *ulcer*, it may be prudent to adviſe an iſſue in the other leg, to order an occaſional doſe of ſome laxative medicines, and to confine the patient to a ſpare diet for ſome time after the ſore is well. But if, notwithſtanding theſe precautions, any diſorder ſhould ſupervene, which may be imputed to the healing of the *ulcer*, ſuch as pulmonic complaints, which are the moſt frequent, they immediately endeavour to open the ſore again.

The intention of curing *ulcers* of the legs by bandage is not new. Wiſeman, in his ſecond book of ſurgery, recommends a laced ſtocking, not only to promote the cure of this diſeaſe, but alſo to prevent a relapſe. Med. Ob. and Inq. vol. iv. art. 29. See alſo Underwood's Treatiſe upon *Ulcers* of the Legs, &c. 1783.

ULCER *in the lungs* occaſions the diſeaſe which we call PHTHISIS *pulmonalis*; for the cure of which Dr. Percival and Dr. Withering have in ſeveral caſes ſucceſsfully adminiſtered fixed air. Dr. Percival directed his patients to inſpire the ſteams of an efferveſcing mixture of chalk and vinegar, or of vinegar and pot-aſh; and obſerved that the hectic fever, in ſeveral inſtances, conſiderably abated, and the matter expectorated became leſs offenſive and better digeſted; though in no inſtance he was happy enough to effect an abſolute cure. Dr. Withering, however, by a ſimilar courſe, was more ſucceſsful.

It is obſerved, that fixed air can only be employed, with any proſpect of ſucceſs, in the latter ſtages of the phthiſis pulmonalis, when a purulent expectoration takes place. Percival's Eſſ. vol. ii. Prieſtley on Air, vol. i. p. 301.

Ulcers *of the palate* proceed moſtly from a ſcorbutic acrimony, or a venereal infection in the blood. See *Venereal* Ulcers.

In the cure of theſe *ulcers*, principal regard ſhould be had to the morbid ſtate of the blood, the venereal or ſcorbutic acrimony of which ſhould be corrected by proper internal medicines. If the palate is not perforated by the *ulcer*, it will be proper firſt to cleanſe the parts by often injecting a deterging gargle made of vulnerary herbs, and mixed either with honey of roſes, Egyptian ointment, or Wurtz's brown ointment, as it is required more or leſs deterging. After ſuch detergents have cleanſed the *ulcer*, it may be dreſſed with honey of roſes, tincture of myrrh, elixir proprietatis, or balſam of Peru, applied with lint. When the bones of the palate are alſo carious, the foul parts will very often ſeparate from the ſound by the uſe of the aforeſaid medicines, eſpecially if the dreſſing be ſometimes performed with honey of roſes acidulated with ſpirit of vitriol. But when theſe prove inſufficient, an actual cautery ſhould be gently applied to the foul bone, after it has been firſt cleanſed and dried with lint, and the tongue is ſecured by the ſpeculum oris, or a ſpatula. After a cauterization, the parts muſt be dreſſed with balſams, till the naked bone is again covered with fleſh. Heiſter's Surg. vol. ii. p. 40.

Ulcers *of the tonſils* are much leſs frequent than perſons commonly ſuppoſe. Dr. Hunter obſerves, that the tonſils have, over their whole ſurface, ſmall orifices, which emit a ſlimy mucus; and that, when they are inflamed, the mucus being purulent and white, and the ſurface irregular, there is the appearance of ulceration, when there is really none. When *ulcers* are actually formed, they may be touched with mixtures of honey, alum, borax, ſpirit of ſalt, &c. as their cauſe, or attending circumſtances require.

Ulcers *in the womb*. Whilſt a viſcid, yellow, or bloody humour is evacuated, the *ulcer* is in a mild ſtate, but when it becomes ſanious, fetid, and attended with pain, a cancer may be ſuſpected, and then palliatives only can be propoſed. In the milder kind the belly ſhould be kept lax with manna, tamarinds, and ſuch cooling purgatives, and an infuſion of elder-flowers in milk and water injected. When the caſe is cancerous, demulcent and lenitive medicines, with anodynes to moderate the pain, are all that can be propoſed. Motherby.

ULCERATED *cancers*. See Cancer.

ULCERATION, Exulceratio, a little aperture, or hole in the ſkin, cauſed by an *ulcer*.

Cauſtic medicines occaſion *ulcerations* in the ſkin. Arſenic always *ulcerates* the part it ſticks to. A ſalivation *ulcerates* the tongue and palate.

ULCEROUS *ſore throat*. See Quinzy.

ULEX, in *Botany*, the name by which Linnæus calls the plant named by Tournefort and other botaniſts, *geniſta ſpartium*. See Furze.

ULIGINOUS, Uliginosus, implies as much as moiſt, mooriſh, fenny.

ULLAGE *of a caſk* is ſo much as a veſſel wants of being full.

ULMARIA, in *Botany*. See Spiræa.

ULMUS, in *Botany*. See Elm.

ULNA, in *Anatomy*, a long hard bone in the arm, with a cavity in the middle; called alſo *focile majus*, and *cubitus*. See *Tab. Anat.* (*Oſteol.*) *fig.* 3. *n.* 8. *fig.* 7. *n.* 10.

The *ulna* lies on the inſide of the fore-arm, reaching from the elbow to the wriſt, is big at its upper end, and grows ſmaller to its lower end.

At its upper it has two proceſſes, which are received into the fore and hind ſinuſes of the extremity of the humerus. The foremoſt proceſs is ſmall and ſhort, and called *corone*, or the coronoide apophyſis; the hindmoſt, called ολεκρανον, is bigger and longer; it ſtays the fore-arm, when it comes to a right line with the arm. See Olecranum.

Betwixt theſe proceſſes it has a ſemicircular ſinus, or large ſigmoide cavity, covered with a ſmooth cartilage, which receives the inner protuberance of the lower end of the humerus, upon which we bend and extend our fore-arm; and along the middle of that there runs a ſmall ridge, by which this bone is articulated to the humerus by ginglymus. Had the articulation here been an arthrodia, the joint muſt have been much weaker; but the hand could have received no more motion from it than it has now from the ſhoulder.

The inſide of this upper end has a ſmall ſinus, or ſigmoide cavity, covered with a cartilage, which receives the circumference of the round head of the radius.

The lower extremity of the *ulna*, which is round and ſmall, is received into a ſinus, in the lower end of the radius; and, upon this extremity, it has a ſhort and ſmall proceſs, from which the ligaments which tie it to the bone of the wriſt ariſe; this proceſs ſerves to keep the bones of the wriſt in their place.

The middle portion, or body, of the *ulna* is divided into three ſides, and three angles. One of the ſides is narrow and rounded, one broad and hollow, and the third flat, and marked with an oblique line on its upper part. The narrow ſide anſwers to the tuberoſity of the olecranum, and is covered only by the common integuments. The other two ſides are diſtinguiſhed from the former by two blunt angles, and they unite in a ſharp angle, which lies oppoſite to the rounded ſide, and anſwers to the point of the coronoide apophyſis. The hollow ſide is even with the ſmall ſigmoide cavity, and the flat ſide oppoſite to it. Theſe two ſides give inſertion to many muſcles, and the ſharp angle to what is called the Interosseous *ligament*. At the top of this angle there is a narrow oblong muſcular impreſſion. The angle common to the rounded and flat ſides, ends below in an oblong uneven muſcular eminence.

The ſubſtance of the *ulna* is much the ſame with that of the os humeri. The tuberoſity of the olecranum, and the ſmall inferior head, with its ſtyloide apophyſis, remain for a long time epiphyſes in ſome ſubjects. It is connected with the pulley of the os humeri by an angular ginglymus, with the two extremities of the radius by a compound lateral ginglymus, and with the hand by ligament, and not by articulation. Winſlow.

Ulna, *cartilages of the*. The two ſigmoide cavities, in the upper extremity of the *ulna*, are covered by a cartilage common to both, which is a little interrupted about the middle of the edges of the cavities, by the tranſverſe notches in this part of this bone. The inferior extremity, or ſmaller head of the *ulna*, is cruſted over by a cartilage round its cylindric border, in the notch near the ſtyloide apophyſis, and for ſome ſpace on the apophyſis itſelf. The cartilage, which covers the head of the radius, is alſo ſtretched over the cylindric border thereof, and a lateral portion of the muſcular tuberoſity, immediately below the neck, is alſo covered by a thin ſhining cartilage. The lateral half grooves, or channels of the baſis of this bone, appear likewiſe to be cruſted over with a cartilaginous matter; but this may poſſibly be only ſome portions of the annular ligaments. Winſlow.

Ulna; *fracture of the*. See Cubitus.

Ulna, *wounds of the*. See *Diſeaſes and Injuries of the* Bones.

Ulna, an ell in meaſure. See Ell and Measure.

Ulna *ferrea*, denotes the ſtandard iron ell, kept in the exchequer.

ULNAGE. See Alnage.

ULNARIS *extenſor*, in *Anatomy*, a muſcle called alſo Extensor *carpi*. See *Tab. Anat.* (*Myol.*) *fig.* 1. *n.* 38.

This is a long muſcle, lying on the outſide of the fore-arm, fleſhy toward the os humeri, and tendinous toward the carpus.

It is fixed above to the external condyle of the os humeri, being there united to the anconæus minor, to the annular ligament of the head of the radius, and to the upper half of the external angle of the *ulna*; from thence it advances and forms a tendon, which paſſes through the external notch, at the lower extremity of this bone, on one ſide of the ſtyloide apophyſis. The tendon, after having paſſed under a particular ligament, ſituated near the os cuneiforme, of the carpus, is inſerted in the outſide of the baſis of the fourth metacarpal bone, ſending ſome tendinous filaments to the baſis of the third metacarpal bone. Winſlow.

This muſcle is alſo called *cubitalis externus*, and it is named by Cowper, *extenſor carpi ulnaris*.

When this muſcle acts with the *ulnaris internus*, it turns the outer edge of the hand toward the olecranum. With the radiales externi, it turns the back of the hand toward the outer condyle. When it acts alone, it brings the outer edge of the hand obliquely toward the olecranum and the external condyle at the ſame time; but this is performed with difficulty.

Ulnaris *gracilis*, a muſcle, called by ſome Palmaris *longus*. It is a ſmall muſcle, lying between the os humeri and the carpus, on the inſide of the fore-arm.

Its body is ſmall and ſlender, and its tendon very long and flat. It is fixed by its fleſhy portion in the ſmall criſta of the inner condyle of the os humeri, ſometimes cloſely united to the *ulnaris internus*; from thence it runs down fleſhy for ſome ſpace, turning a little obliquely toward the middle of the fore-arm, and ends in a long narrow thin tendon. This tendon paſſes down the middle of the fore-arm, over all the other muſcles, to which it ſlightly adheres, and, advancing over the large internal annular or tranſverſe ligament of the carpus, is inſerted in the ſurface thereof, ſending off ſome radiated filaments to the aponeuroſis palmaris. This muſcle is ſometimes fixed to the condyle of the os humeri, by a tendon about a finger's breadth in length, to which the fleſhy body joins toward the middle of the fore-arm. The inferior tendon is alſo ſometimes inſerted in the os ſcaphoides of the carpus, without communicating with the large annular ligament; and ſometimes the aponeuroſis palmaris ariſes from this ligament. From all which variations it may reaſonably be concluded, that that aponeuroſis has no eſſential dependence on this muſcle; and ſometimes the muſcle appears to be only a production from the *ulnaris internus.*

The *ulnaris gracilis* ſeems to be an aſſiſtant to the *ulnaris* and *radialis interni* in bending the wriſt, and it ſeems likewiſe particularly to aſſiſt the radialis internus in the motion of pronation. Winſlow.

ULNARIS *internus*, a long muſcle, fleſhy at its upper extremity, and tendinous at the other, ſituated on the outer part of the *ulna*. It is fixed in its upper part, in the backſide of the long or internal condyle of the os humeri, in that part of the olecranum which is next the condyle, along the upper half of the *ulna* very nearly, and to the middle common tendon of the neighbouring muſcle, commonly termed *profundus*. It runs in the direction of the external angle of the *ulna*, and ends by a long tendon in the os piſiforme, or orbiculare of the carpus, reaching likewiſe to the os unciforme, being united to the ligament common to theſe two bones. *Tab. Anat. (Myol.) fig.* 2. *n.* 24.

When this muſcle acts alone, or as the principal mover, it brings the hand obliquely toward the internal condyle and toward the olecranum, though with difficulty. When it acts together with the radialis internus, it turns the hand equally toward the two extremities of the bones of the fore-arm, and thereby moves not only the carpus in general on the fore-arm, but alſo the ſecond row of the carpus on the firſt, and the metacarpal bones on the ſecond. When it acts with the *ulnaris externus*, it turns the outer edge of the hand toward the olecranum. Winſlow.

This muſcle is alſo called *cubitalis internus*, and is named FLEXOR *cubiti ulnaris* by Cowper.

ULOPHONUS, in *Botany*, a name given by the ancients to a poiſonous plant, ſince called the CHAMÆLEON *thiſtle*, and even at that time known to Dioſcorides, Galen, and others, under the name of the *black chamæleon thiſtle*. See IXIAS.

ULPHA, a term uſed by ſome authors to expreſs the muddy ſubſtance which falls off from whetſtones, grindſtones, and the like, which is ſometimes ordered in medicines among the chemical writers, and is only the comminuted particles of the ſtone, with a very ſmall portion of iron abraded from the things ground on them.

ULPICUM, in *Botany*, a name by which Columella, and ſome other authors have called the *allium*, or *garlic*.

ULRACH, a name given by ſome writers to the *ſanguis draconis*, or *dragon's blood*.

ULTERIOR, in *Geography*, is applied to ſome part of a country or province, which, with regard to the reſt of that country, is ſituate on the farther ſide of a river, mountain, or other boundary, which divides the country into two parts.

Thus Africa, with regard to Europe, is divided by Mount Atlas, into citerior and *ulterior*, i. e. into two portions, the one on this ſide Mount Atlas, and the other on that.

ULTIMA *baſia, laſt kiſſes*, is a phraſe uſed among ſome painters, for the laſt finiſhing touches with the pencil.

ULTRAMARINE, ULTRAMARINUM. See BLUE and *Lapis* LAZULI.

ULTRAMARINE *aſhes* is the name of a pigment which is the reſiduum of the *lapis* LAZULI, after the *ultramarine* has been extracted from it. But as the coloured particles which remain are mixed with thoſe of another kind contained in the lapis lazuli, theſe aſhes muſt of courſe be much leſs valuable than even the worſt *ultramarine*.

Their appearance is that of the *ultramarine*, a little tinged with red, and diluted with white. The adulteration to which they are ſubject, and which gives them a better appearance than that of their genuine ſtate, may be detected by the methods propoſed for diſcovering the ſophiſtication of the *ultramarine*. See *Ultramarine* BLUE.

ULTRAMONTANE, ſomething beyond the mountains. The term is principally uſed in relation to Italy and France, which are ſeparated by the mountains of the Alps.

In France, the opinions of the *ultramontane* canoniſts, i. e. of thoſe of Italy, are not received.

The painters, particularly thoſe of Italy, call all thoſe that are not of that country *ultramontanes*, or ſimply, *tramontanes*. Pouſſin is the only *tramontane* painter that the Italians ſeem to envy.

ULTRAMUNDANE, ULTRAMUNDANUS, *beyond the world*, is that part of the univerſe ſuppoſed to be without, or beyond the limits of our world, or ſyſtem.

ULVA, a name given by ſome botanical authors to a genus of imperfect plants, conſiſting of the common oyſter-green, the ſea-chitterling, and the like, which have been ſince called by Dillenius TREMELLÆ.

Bauhine makes the *ulva* a purple ſea-moſs allied to the alga.

Ulva, or *laver*, in the Linnæan ſyſtem, is a genus of the *cryptogamia algæ* claſs. Its characters are, that the flowers are contained in a ſemi-tranſparent bladder-like membrane, with no appearance of a regular leaf. Linnæus enumerates ten ſpecies, moſt of which grow on rocks and ſtones in the ſea, or on the ſea-ſhore, and ſome in freſh-water ditches. The ſpecies, called the green LAVER, or oyſter-green, is eſteemed by the inhabitants of the ſea-coaſt as a wholeſome and pleaſant food, being gently opening, and antiſcorbutic. It is frequently ſent to London in earthen pots.

ULULA, in *Ornithology*. See *Grey* OWL.

UMBELLA, or UMBRELLA. See PARASOL.

UMBELLÆ, UMBELS, among *Botaniſts*, the round tufts or heads of certain plants, or the extremities of ſtalks or branches, divided into ſeveral pedicles or rays, beginning from the ſame point, and opened in ſuch a manner as to form one inverted cone. When the pedicles, into which the ſtalk is divided, are ſubdivided into others of the ſame form, upon which the flowers or fruits are diſpoſed; the firſt order is called rays, the ſecond pedicles. That *umbel*, which conſiſts of pedicles only, is called a *ſimple umbel*; that which is compoſed both of rays and pedicles is called a *compound umbel*.

Sparſed, or thin *umbellæ*, are thoſe whoſe parts ſtand at a diſtance from one another, and yet are all of an equal height.

UMBELLIFEROUS *plants*, are ſuch as have their flowery tops produced in an *umbel* on the top of the ſtalks, or branch, and ſpread out, like an umbrella, on each little ſubdiviſion of which there is growing a ſmall flower; ſuch as fennel, dill, &c.

This flower is always pentapetalous, and is ſucceeded by two naked ſeeds adjoining to each other, which are the true characteriſtics that diſtinguiſh theſe plants from others.

The *umbelliferous* are a very large claſs of plants, and are diſtinguiſhed by Mr. Ray into,

1. Such as have a compounded leaf, of a triangular and pinnate form. The ſeeds of theſe are either broad, flat, and plain, and edged with membranes, or the ſeeds are more tumid, and leſs compreſſed and flat than the former.

2. Such as have a ſimple or undivided leaf, or at leaſt one only a little jagged. See *Umbelliferous* PLANTS and *Umbelliform* FLOWERS.

UMBER, or UMBRE, in *Natural Hiſtory*, a foſſil brown or blackiſh ſubſtance, uſed in painting, ſo called from *Ombria*, the ancient name of the duchy of Spoleto in Italy, whence it was firſt obtained; diluted with water, it ſerves to make a dark brown colour, uſually called with us an hair-colour.

Dr. Hill and Mr. Da Coſta conſider it as an earth of the ochre kind. It is found in Egypt, Italy, Spain, and Germany; in Cyprus alſo it is found in large quantities: but what we have brought into England is principally from different parts of the Turkiſh dominions. But it might be found in conſiderable plenty alſo in England and Ireland, if properly looked after, ſeveral large maſſes of it having been thrown up in digging on Mendip hills in Somerſetſhire, and in the county of Wexford in Ireland: it is alſo ſometimes found in the veins of lead-ore, both in Derbyſhire and Flintſhire.

The characters by which, they ſay, it is known from other earths, are theſe: it never conſtitutes a ſtratum of itſelf, as the generality of other earths do, but is found ſometimes in ſmall lumps among gravel, and other looſe matter, and ſometimes in the perpendicular fiſſures of the ſolid ſtrata. It is of a cloſe compact texture, yet very light, of a ſmooth ſurface, and of an elegant pale brown, in different degrees; it is ſmooth and ſoft to the touch, and adheres firmly to the tongue, melts ſlowly in the mouth, breaks eaſily between the fingers, and ſtains the hands a little, makes no fermentation with acids, and ſlowly moulders in water. Burnt, it becomes of a deep reddiſh-brown colour, but acquires no hardneſs.

Wallerius ranks the *umber* as a humus or mould, apprehending, by its immediately flaming in the fire, and by the ſmell which it emits, that it owes its colour to an admixture of bituminous parts. But M. le Baron de Hupſel (Berlin, Mem. 1771) has diſcovered it to be a foſſil wood, filled with a bituminous juice. It is found in two different ſtates, firſt, as retaining the form of wood, which it has preſerved by means of a bituminous matter that has prevented the rotting of the wood: and ſecondly, as a powder, like that into which the firſt kind, that ſtill retains the form of the wood, eaſily crumbles.

It is certain, however, ſays Mr. Kirwan, that the name hath been alſo given to a ſort of brown ochre, which becomes red when ſlightly heated, but in a ſtronger heat is again brown and magnetic, and in a ſtill ſtronger, melts into a black glaſs. It does not efferveſce with acids before roaſting, but after that the martial part is ſoluble. Elem. Mineral. p. 78.

This ſubſtance, when burnt, makes a good ſhade for gold. It need only be put into the naked fire in large lumps, which ſhould not be taken out till they be thoroughly red-hot.

UMBER, or OMBRE, in *Ichthyology*, an Engliſh name for a fiſh of the truttaceous kind, more commonly called the GRAYLING, and by the authors in ichthyography, *thymallus*, a freſh-water fiſh of a very fine taſte.

UMBILICAL, UMBILICALIS, in *Anatomy*, ſomething that relates to the *umbilicus*, or navel.

UMBILICAL *region*, is that part of the abdomen lying round the *umbilicus*, or navel.

UMBILICAL *veſſels*, are a ſet or aſſemblage of veſſels belonging to a fœtus; conſtituting what we call the *funiculus umbilicalis*, or navel-ſtring.

Theſe veſſels are two arteries, a vein, and the urachus.

The UMBILICAL *arteries* ariſe from the hypogaſtricæ, run up by the ſides of the bladder, and remain hollow and filled with blood, even in adults, as high as the middle of the bladder, through all which ſpace they likewiſe ſend off ramifications. Afterwards they loſe their cavity, and become ligamentary as they aſcend. At the upper part of the bladder they approach each other, and joining the urachus, form that rope which may be termed the ſuperior ligament of the bladder. See *Tab. Anat.* (*Angeiol.*) *fig.* 1. *n.* 56. 56. *fig.* 3. *lit. e. e. fig.* 16. *lit. g. g.*

The UMBILICAL *vein*, from innumerable capillaries united into one trunk, deſcends from the placenta to the liver of the fœtus, where it is partly diſtributed into the porta, and partly into the cava. See *Tab. Anat.* (*Angeiol.*) *fig.* 4. *lit. c.* (*Splanch.*) *fig.* 3. *lit. i. fig.* 16. *lit. f.*

The urachus is moſt plainly found in brutes; though there is no doubt but it has place likewiſe in the human ſpecies.

The uſe of theſe veſſels is to maintain a continuity and communication between the mother and the fœtus. Some authors will have it, that the fœtus receives its food and increaſe this way, and that it grows, like a vegetable, from the mother as the root, of which the *umbilical veſſels* are the ſtem, and the child the head or fruit of this plant-animal. See FOETUS and NAVEL-*ſtring*.

Dr. Trew aſſerts, contrary to Caſſerius, that the *umbilical* vein enters the liver towards the left part of it; and that there is but one *umbilical* vein, which empties itſelf into the left extremity of the *ſinus venæ portarum*, and ſends no branches to the liver. See Phil. Tranſ. Nº 457. ſect. 7.

Dr. Trew endeavours to ſhew how, after birth, the *umbilical* veins and arteries, ſeparating from the navel, gradually retract within their ſheaths, which they have from the peritonæum, and leave the ſides of the ſheath to grow together, as the ſides of the remains of the veſſels alſo do. Hence he infers, that the hæmorrhages, which ſometimes happen at the navels of adults, muſt not be from the *umbilical* veſſels, but from ſome other. Commerc. Norimb. 1737. Hebd. 12. ſect. 1.

UMBILICALIS *funiculus*, popularly called the *navel-ſtring*, is a kind of ſtring formed of the *umbilical veſſels*, which being tied up in a common coat, or membrane, traverſe the ſecundines, and are inſerted, at one end, into the placenta of the mother, and, at the other, into the abdomen of the fœtus. See *Tab. Anat.* (*Splanch.*) *fig.* 16.

The navel-ſtring is membranous, wreathed, and unequal, ariſing out of the middle of the abdomen, and reaching to the placenta uterina: it is uſually half an ell in length, and as thick as one's finger. It was neceſſary it ſhould be ſo long and lax, that when the fœtus in the womb grows ſtrong, it might not break it by its ſprawling and tumbling about; and that, after it is born, the ſecundine, or after-birth, might be drawn out the better by it. The way that it paſſes from the navel to the placenta is very inconſtant; for ſometimes it goes upon the right hand to the neck, which being encompaſſed, it deſcends to the placenta; and ſometimes it goes on the left hand up to the neck, &c. Sometimes it comes not to the neck at all, but goes firſt a little up towards the breaſt, and then turns round the back, and from thence paſſes to the placenta.

This part, at the birth, is either broken, or cut away, to the navel; ſo that its veſſels, viz. two arteries, a vein, and urachus, become perfectly uſeleſs as veſſels, and, drying up, become impervious, and ſerve only as ligaments to ſuſpend the liver. See NAVEL-*ſtrings*.

UMBILICAL *points*, in *Mathematics*, the ſame with *foci*. See FOCUS.

UMBILICUS, *navel*, in *Anatomy*, the centre, or middle part of the lower venter, or belly, being the place through which the *umbilical* veſſels paſs, out of the fœtus, to the placenta of the mother. See *Tab. Anat.* (*Splanch.*) *fig.* 3. *lit c. fig.* 16. *lit. e.*

The word is formed of *umbo*, the little bunch in the middle of a buckler, by reaſon of its reſemblance to the navel.

UMBILICUS, in *Mathematics*, the ſame with *focus*.

UMBILICUS *marinus*, a name given to a ſmall oval body of a ſhelly matter, from its reſemblance to the human navel. It is properly the operculum of a ſhell-fiſh, ſerving to cloſe up the aperture of the ſhell in the buccinum, and other turbinated ſhells; and to that purpoſe it is fixed to the anterior extremity of the body of the animal; ſo that when it retracts its body into the ſhell, this naturally fills up the mouth of it: it is convex on one ſide, and flat on the other; the convex ſide is plain and white, the flat ſide is yellowiſh or reddiſh, and marked with a ſpiral line.

It is ſaid by authors to have great virtues as an abſorbent and aſtringent; but it is not uſed at preſent in the ſhops, though it holds a place in the catalogues of the materia medica, as well of our own as other nations.

UMBINUS, among the *Ancients*, a kind of coin current in Gallia Narbonenſis.

UMBLA, or, as ſome write it, UMBRA, in *Ichthyology*, the name of a fiſh of the truttaceous kind, and nearly allied to the ſalmon.

It is the *ſalmo umbla* of Linnæus, with the lateral lines bent upward, and a bifurcated tail.

There are four ſpecies of this fiſh mentioned among naturaliſts; but the *umbla prior*, and *umbla altera* of Rondeletius, which are two of them, ſeem only to be the different ſexes of the ſame fiſh. Theſe are conſiderably large, very like the common ſalmon, but have blue backs and yellow bellies. The third is the fiſh commonly called the *ſalvelin*, or *ſalmo ſalvelinus* of Linnæus, with the upper jaw longer than the other: and the fourth is the red CHARR. Willughby's Hiſt. Piſc. p. 198.

UMBO, in *Antiquity*, the round protuberant part of a SHIELD.

UMBONE, or *horn*, among *Floriſts*, ſignifies any pointed ſtyle, or piſtil, in the middle of a flower.

There is alſo an *umbone*, called *double-pointed*, or *biparted*, as in the peony; and ſometimes the *umbone* has four ſharp points, in which caſe it is termed, an *umbone* divided into ſo many heads, or cut into three or four parts.

UMBRA, *ſhadow*. See LIGHT, SHADOW, PENUMBRA, &c.

UMBRA, in *Ichthyology*, the name of a ſea-fiſh caught in the Mediterranean, and brought to the markets in Italy and other places; called by ſome *chromis*, and by the Venetians *corvo*.

Its uſual ſize at market is about twelve or fourteen inches in length; but it grows to fixty pounds weight, and to the length of five or ſix feet. It is of a ſomewhat flatted figure, and its back is ridged and riſes up from the head. It ſomething reſembles the carp in its general figure, but is broader. It is very elegantly coloured, for there are a number of long oblique lines covering its whole ſides, which are alternately of a fine pale blue, and a beautiful yellow. Its ſcales are moderately large, and its coverings of the gills, and great part of its very head, as well as its body, are covered with theſe; its head is moderately large, but its mouth ſmall, and it has a ſingle beard hanging down from its chin. Rondelet. de Piſc. p. 182.

UMBRATILIS *pugna*, the fighting with one's own ſhadow.

This was one of the kinds of exerciſe much recommended by the ancient phyſicians; they ordered the perſon who uſed it, not only to box, but to wreſtle, with his ſhadow; that is, not only to uſe his arms, but his legs alſo, and often to put himſelf into a leaping poſture, and throw his body violently forward, and often to retreat haſtily backwards. The cuſtom ſeems to have been of ancient date; Plato expreſly mentions it, and St. Paul ſeems to allude to it in the paſſage where, glorying in the reality of his conflicts, he ſays, he does not fight as one who beats the air. The phyſicians greatly recommended this exerciſe to people of ſedentary lives, and to thoſe who had weak nerves, and were afflicted with tremors. They eſteemed it uſeful alſo in diſeaſes of the kidneys, and of the thorax.

UMBRE. See Umber.

UMBRELLA. See Umbella.

UMBRINO, in *Ichthyology*, a name uſed by ſome authors for the *coracinus*, or *umbra*, as ſome call it. The *umbrino* has by ſome been eſteemed a diſtinct ſpecies of fiſh from the coracinus; but they ſeem to differ no other way than as the one is the older, the other the younger fiſh. Willughby's Hiſt. Piſc. p. 330.

UMBUNCULUS, in *Natural Hiſtory*, a name given by ancient authors to the ſmall prominences in the ſurface of certain ſtones. It was originally derived from the word *umbo*, which expreſſes the prominent knob, or round lump in the centre of a ſhield; and its firſt uſe that we find in the naturaliſts is, in expreſſing a very ſimilar thing; that is, the prominent part of the zmilampis. This was a ſtone of the nature of what we call *oculus beli*, or *bellochio*, and was of a white ground, and roundiſh figure, ſomewhat reſembling an eye. It was found in the Euphrates, and other rivers, and had always an *umbunculus* of a glaucous or bluiſh colour. This *umbunculus* was a prominent round ſpot, ſuch as we ſee in our *oculi beli*, and call the *pupil*. It was afterwards uſed to expreſs the inequalities on the ſurfaces of flints and agates, which frequently are roundiſh and obtuſe, and repreſent a kind of umbones.

UMPIRE, a third perſon, choſen to decide a controverſy, left to an arbitration, in caſe the arbitrators cannot agree. See Arbitrator.

Minſhew ſuppoſes the word formed of the French *un pere, a father*. Some call him a *ſur-arbitrator*.

UMPLE, in our *Statutes*, ſignifies fine linen. 3 Ed. IV. cap. 5. Blount.

UNANIMITY *of juries*. See Jury.

UNANNEALED *bottles*, or Bologna *bottles*, a kind of *unannealed* glaſs bottles made at Bologna, and many other places, in the year 1742, which, though appearing very ſtrong, yet are to be broken by a fragment of flint, ſcarce larger than a grain of ſand, thrown into them. See *Annealing of* Glass.

UNAROTA, among the *Ancients*, a carriage with only one wheel.

UNBALLAST, *to*, in the *Sea Language*, is to diſcharge the ballaſt of a ſhip.

UNBENDING, in *Sea Language*, generally implies the act of taking off the ſails from their yards and ſtays; of caſting looſe the anchors from their cables, or of untying one rope from another.

UNBITTING, in *Sea Language*, denotes the operation of removing the turns of a cable from off the bits.

UNCASING, among *Hunters*, the cutting up or flaying of a fox.

UNCATA, in *Botany*, a name given by ſome authors to the ſtramonium, or thorn-apple.

UNCEASESATH, in our *Old Writers*, an abſolete word, uſed where one killed a thief, and made oath that he did it as he was flying for the fact, and thereupon *parentibus ipſius occiſi juret* unceaſeſath, viz. that his kindred would not revenge his death; or they ſwore, that there ſhould be no contention about it.

Du-Cange derives the word from the negative particle *un* and the Saxon *ceath*; which laſt ſignifies the ſame with Assithment in the law of Scotland.

UNCERTAIN, in the *Manege*. We call a horſe *uncertain* that is naturally reſtleſs and turbulent, and is confounded in the manege he is put to, ſo that he works with trouble and uncertainty.

UNCIA, a term generally uſed for the twelfth part of a thing. In which ſenſe it occurs in Latin writers, both for a weight called by us an *ounce*, and a meaſure called an *inch*.

Uncia *terræ*, or *agri*, is a phraſe frequently met with in the ancient charters of the Britiſh kings; but what the quantity of ground was is a little obſcure. All that we know for certain is, that it ſignified a large quantity, as much as twelve modii, which modius ſome conjecture to have been an hundred feet ſquare.

UNCIÆ, in *Algebra*, are the numbers prefixed to the letter of the members of any power produced from a binomial, reſidual, or multinomial root; now uſually called Coefficients.

Thus in the fourth power of $a + b$, that is, $aaaa + 4aaab + 6aabb + 4abbb + bbbb$, the *unciæ* are 4, 6, 4.

Sir Iſaac Newton gives a rule for finding the *unciæ* of any power ariſing from a binomial root. Thus: let the index of the power be called m, then will the *unciæ* ariſe from ſuch a continual multiplication as this, viz. $1 \times \frac{m-0}{1} \times \frac{m-1}{2} \times \frac{m-2}{3} \times \frac{m-3}{4} \times \frac{m-4}{5}$, &c. Thus, if the *unciæ* of the biquadrate or fourth power were required; the rule is, $1 \times \frac{4-0}{1} (=4) \times \frac{4-1}{2} (=6) \times \frac{4-2}{3} (=4) \times \frac{4-3}{4} (=1)$; which ſhews that the *unciæ* are 1, 4, 6, 4, 1.

Or thus: The terms of any powers are compounded of certain little factums, with numbers, called *unciæ*, prefixed; and the factums are found by making two geometrical progreſſions; the firſt of them beginning from the required power of the firſt part of the root, and ending in unity; and the ſecond beginning with unity, and ending in the required power of the ſecond part; thus, for a ſixth power of $a + b$;

$a^6\ a^5\ a^4\ a^3\ a^2\ a^1$ firſt ſeries.
$1\ b\ b^2\ b^3\ b^4\ b^5\ b^6$ ſecond ſeries.

And multiplying the terms of the ſame order in either ſeries into one another; as $a^6 + a^5 b + a^4 b^2 + a^3 b^3 + a^2 b^4 + a b^5 + b^6$, out of which the ſixth power of $a + b$ is compounded.

The *unciæ*, then, are found by writing the exponents of the powers of the ſecond ſeries, i. e. of b, under the exponents of the powers of the ſeries, i. e. of a; and taking the firſt figure of the upper ſeries for the numerator, and the firſt of the lower for the denominator of a fraction, which is equal to the *uncia* of the ſecond term, and ſo for the reſt. Thus, for the ſixth power, we have,

$$\begin{array}{cccccc} 6 & 5 & 4 & 3 & 2 & 1 \\ 1 & 2 & 3 & 4 & 5 & 6 \end{array}$$

Accordingly, $\frac{6}{1} = 6$ is the *uncia* of the ſecond term of the ſixth power; $\frac{6.5}{1.2} = \frac{30}{2} = 15$, the *uncia* of the third term;

$\frac{6.5.4}{1.2.3} = \frac{120}{6} = 20$, the *uncia* of the fourth term;

$\frac{6.5.4.3}{1.2.3.4} = \frac{6.5}{1.2} = \frac{30}{2} = 15$, the *uncia* of the fifth term;

$\frac{6.5.4.3.2}{.2.3.4.5} = \frac{6}{1} = 6$, the *uncia* of the ſixth term;

$\frac{6.5.4.3.2.1}{1.2.3.4.5.6} = 1$, the *uncia* of the laſt power. See Binomial *Theorem*.

UNCIAL, Uncialis, an epithet which antiquaries give to certain large-ſized letters, or characters, anciently uſed in inſcriptions and epitaphs.

The word is formed from the Latin *uncia*, the twelfth part of any thing, and which, in geometrical meaſure, ſignified the twelfth part of a foot, viz. an inch; which was ſuppoſed to be the thickneſs of the ſtem of one of theſe letters.

UNCIFORME *os*, in the carpus, is the fourth bone of the ſecond row; it has its name from the Latin *uncus*, a *hook*, and is compoſed of a body, and a hooked, or unciform apophyſis. This apophyſis, which is one of the four eminences on the concave, or inner ſurface of the carpus, is flat, and the hollow ſide of its curvature is turned toward the os magnum. The outer ſurface of its body is rough, and in ſome meaſure triangular; it completes the convex ſide of the carpus, and toward the ulna, terminates in a ſmall tuberoſity, which is all the cubital ſide of this bone.

It has three articular or cartilaginous ſides, one radial, one brachial, and one digital. The radial ſide is double, anſwering to the cubital ſide of the os magnum. The brachial ſide is very oblique, ſome part of it being gently concave, the reſt gently convex, anſwering to the digital ſide of the os cunciforme. The digital ſide is double, or diſtinguiſhed into two halves, by a ſigmoide angular line, for its articulation with the two laſt bones of the metacarpus. Winſlow.

UNCINUS, in *Surgery*, the name of a ſmall hooked inſtrument ſerving to many purpoſes.

UNCORE, or Unques *priſt*, *ſtill ready*, in *Law*, a plea for the defendant, being ſued for a debt due on a bond at a day paſt, to ſave the forfeiture of his bond, &c. by affirming that he tendered the debt at the time and place, and that there was none to receive it; and that he is yet alſo ready to pay the ſame.

UNCTION, UNCTIO, the act of anointing, or rubbing with oil, or other fatty matter.

Mercurial *unction*, properly applied, brings on a ſalivation. The ſurgeons cure divers wounds, ulcers, &c. by repeated *unctions*, with oils, unguents, cerates, &c.

UNCTION, in *Matters of Religion*, is uſed for the character conferred on ſacred things by anointing them with oil.

Anciently in the eaſtern countries, which abounded ſo much in oil, and odoriferous ſpices, it was the cuſtom to ſeparate perſons and things deſigned for extraordinary offices or uſes, by anointing them with ointments compoſed of ſuch ingredients; ſymbolizing thereby, both an effuſion of the neceſſary gifts to qualify them for their office, and a diffuſion of the good and grateful effects expected from them.

There were three ſorts of perſons to whom this *unction*, or conſecration, eſpecially belonged, kings, prieſts, and prophets; who, therefore, are all of them (ſays Barrow) ſtyled in Scripture the *Lord's anointed*.

The *unction* of kings is ſuppoſed to be a ceremony introduced very late among Chriſtian princes: Onuphrius ſays, none of the emperors were ever anointed before Juſtinian, or Juſtin. The emperors of Germany took up the practice from thoſe of the eaſtern empire. King Pepin of France was the firſt king who received the *unction*.

In the Romiſh church, beſides an *unction* at baptiſm, on the forehead, and at confirmation, on the head (ſee CHRISM), they have an *extreme unction*, given to people in the pangs of death, on the parts where the five ſenſes reſide, being the parts by which the perſon is ſuppoſed to have ſinned.

The firſt mention that is made of this ceremony is by pope Innocent I. Sacred oil, indeed, was held in great veneration ſo early as the fourth century, and eſteemed as an univerſal remedy; for which purpoſe it was either prepared and diſpenſed by prieſts and monks, or was taken from the lamps which were kept burning before the relics of the martyrs. But in none of the lives of the ſaints before the ninth century is there any mention made of their receiving extreme *unction*, though their deaths are ſometimes particularly related, and their receiving the euchariſt is often mentioned. But from the ſeventh century to the twelfth, they began to uſe this anointing of the ſick, and a peculiar office was made for it; but the prayer that was uſed in it plainly ſhews that it was with a view to their recovery, for which purpoſe it is ſtill uſed in the Greek church. But becauſe it failed ſo often, that the credit of this rite was in danger of ſuffering much in the eſteem of the world, they began, in the tenth century, to ſay that it did good to the ſoul, even when the body was no better for it; and then they applied it to the ſeveral parts of the body, after having originally applied it to the diſeaſed parts only. In this manner was the rite performed in the eleventh century. In the twelfth, the prayers that had been made before for the ſoul of the ſick perſon, though only as a part of the office (the pardon of ſin being ſuppoſed to be preparatory to their recovery) came to be conſidered as the moſt eſſential part of it. After this the ſchoolmen brought it into ſhape, and then it was decreed to be a ſacrament by pope Eugenius; and it was finally eſtabliſhed at the council of Trent. Burnet on the Articles, p. 268. See EXTREAM *unction*.

UNCTUARIUM, a room in the ancient baths, where people were anointed before they went away.

UNCTORES, among the Romans, ſervants whoſe employment it was to anoint their maſter when he bathed.

UNCUS, among the Romans, an inſtrument uſed in torturing criminals. It was a kind of club bent and inclined to one ſide.

UNCUTH, *unknown*, is uſed in the ancient Saxon laws, for him that comes to an inn, gueſt-wiſe, and lies there but one night. In which caſe, his hoſt was not bound to anſwer for any offence he committed, whereof he was guiltleſs himſelf.

Prima nocte poteſt dici uncuth; *ſecunda vero*, gueſt; *tertia nocte* hogenhine. Bracton, lib. iii. See THIRD *night awn hynd*.

UNDE *nihil habet*, a writ of dower. See DOTE *unde nihil habet*.

UNDECAGON, is a regular POLYGON of eleven ſides.

UNDECIMVIR, a magiſtrate among the ancient Athenians, who had ten other colleagues, or aſſociates, joined with him in the ſame commiſſion.

The functions of the *undecimviri* at Athens were much the ſame as thoſe of the prevots de marechauſſé in France. They took care of the apprehending of criminals; ſecured them in the hands of juſtice; and then they were condemned, took them again into cuſtody, that the ſentence might be executed on them.

They were choſen by the tribes, each tribe naming its own; and as the number of tribes, after Calliſthenes, was but ten, which made ten members, a ſcribe or notary was added, which made the number eleven.—Whence their name, *οι ενδεκα*, or *undecimviri*, as Cornelius Nepos calls them in the life of Phocion. In Julius Pollux they are denominated *επαρχοι*, and *νομοφυλακες*. See NOMOPHYLACES.

UNDE, UNDEE, or UNDY, in *Heraldry*. See WAVED.

UNDER *the ſea*, in the *Sea Language*. A ſhip is ſaid to be ſo; when ſhe lies ſtill, or waits for ſome other ſhips, with her helm laſhed, or tied up a-lee. See LYING *under the ſea*.

UNDER-*current*. See *Under*-CURRENTS.

UNDER-*chamberlains*, or *deputy chamberlains of the exchequer*, officers there, who cleave the tallies, and read the ſame; ſo that the clerk of the pell, and the comptrollers thereof, may ſee that the entries are true.

They alſo make ſearches for all records in the treaſury, and have the cuſtody of Domeſday-book.

UNDERMINING. See SAP.

UNDER-RUN, *to*, in *Sea Language*, is to paſs under, or examine any part of a cable or other rope, in order to diſcover whether it is damaged or entangled. It is uſual to *under-run* the cables in particular harbours, as well to cleanſe them with brooms and bruſhes from any filth, ooze, ſhells, &c. collected in the ſtream, as to examine whether they have ſuſtained any injury under the ſurface of the water; as, from rocky ground, or by the friction againſt other cables or anchors.

To UNDER-RUN *a tackle*, is to ſeparate the ſeveral parts of which it is compoſed, and range them in order, from one block to the other; ſo that the general effort may not be interrupted, when it is put in motion. Falconer.

UNDER-SAIL, in *Sea Language*, denotes the ſtate of a ſhip when ſhe is looſened from her moorings, and under the government of her ſails and rudder.

UNDER-SHERIFF, *ſub-vice-comes*. See SHERIFF.

UNDERSHRUB. See SUFFRUTEX.

UNDER-SITTER, an inmate. See INMATES.

UNDERSTANDING, *intellectus*, is defined, by the Peripatetics, to be a faculty of the reaſonable ſoul, converſant about intelligible things, conſidered as intelligible.

They alſo make it twofold; viz. *active* and *paſſive*.

UNDERSTANDING, *active*, *intellectus agens*, they hold that faculty of the ſoul, by which the ſpecies and images of intelligible things are framed, on occaſion of the preſence of phantaſms or appearances thereof. For, maintaining the intellect to be immaterial, they hold it impoſſible it ſhould be diſpoſed to think by any diſproportionate phantaſms of mere body; and therefore that it is obliged to frame other proportionate ſpecies of itſelf; and hence its denomination *active*.

UNDERSTANDING, *paſſive*, *intellectus patiens*, is that which, receiving the ſpecies framed by the *active underſtanding*, breaks forth into actual knowledge.

The moderns ſet aſide the Peripatetic notion of an *active underſtanding*. The Carteſians define the *underſtanding* to be that faculty, whereby the mind, converſing with, and, as it were, intent on itſelf, evidently knows what is true in any thing not exceeding its capacity.

The Corpuſcular philoſophers define the *underſtanding* to be a faculty, expreſſive of things which ſtrike on the external ſenſes, either by their images, or their effects, and ſo enter the mind. Their great doctrine is, *Nihil eſſe in intellectu, quod non prius fuerit in ſenſu*; and to this doctrine our famous Mr. Locke, and moſt of the lateſt Engliſh philoſophers, ſubſcribe.

The Carteſians exclaim much againſt it; and between theſe and the Corpuſcularians there is this farther difference, that the latter make the judgment to belong to the *underſtanding*; but the former to the will.

Hence, according to the moſt approved opinion of the Corpuſcularians, the *underſtanding* has two offices, viz. *perception*, and *judgment*; according to the Carteſians, it has only one, viz. *perception*.

UNDERSTANDING is alſo uſed for the act, exerciſe, or exertion, of this faculty; or the action whereby the mind knows things, or repreſents them in idea to itſelf.

UNDERTAKERS were anciently ſuch perſons as were employed by the king's purveyors, and acted as their deputies.

At preſent, the name is chiefly uſed for *upholders*, or perſons who furniſh out funerals. And alſo for ſuch as *undertake* any great work, as the draining of fens, &c. Stat. 43 Eliz.

UNDER-TREASURER *of England*, *vice-theſaurarius Angliæ*, an officer mentioned in ſtat. 39 Eliz. cap. 7. and whom ſeveral other ſtatutes confound with treaſurer of the exchequer.

He cheſted up the king's treaſure at the end of every term, and noted the content of money in each cheſt, and ſaw it carried to the king's treaſury in the Tower, for the eaſe of the lord treaſurer, &c.

In the vacancy of the lord treaſurer's office, he alſo did every thing in the receipt, that the lord treaſurer himſelf does. See TREASURER.

UNDERWOOD, *ſub-boſcus*, is coppice, or any wood that is not accounted timber.

In the cutting of the *underwood* of coppices, when the ſtubs are great, they ſhould be ſtubbed up, for they only take up a great deal of room, and ſend up few ſhoots, their cracks and holes letting in water, and uſually half killing them. The taking up of theſe ſhould be performed in winter, and the ſpaces they leave will be ſoon occupied by young trees; if not, a long branch of ſome neighbouring tree may be laid down, and will ſoon ſend up a ſufficient ſupply of ſuckers for the place.

In the felling of the *underwood*, it is always proper to leave young trees enough. The worſt of theſe may be taken down the next fall, eſpecially if any of them grow near a great tree that will be fit to fell the next ſeaſon, becauſe they may be ſpoiled by its fall. When trees are at their full growth, there are ſeveral ſigns of their decay, as the withering or drying of their top branches; their taking in water at ſome of their knots, their being hollow or diſcoloured, and their making but ſmall ſhoots If wood-peckers make holes in the body, it is but a bad ſign, and according to the appearance of one or more of theſe ſymptoms, it is very proper to cut down the tree before it decays farther. Large and ſpreading trees in coppices are often of more miſchief than advantage, as they ſpoil a great deal of the *underwood* by their droppings.

The owner of a coppice muſt be very careful when he fells the wood, ſtanding, by the acre, to mark beforehand what ſtandards are to be left, elſe the purchaſer ſeldom fails to cheat him, by felling ſome of them. Mortimer's Huſbandry, vol. ii. p. 69. See WOOD-*coppices*.

UNDERWOOD, *ſtealing of*. See LARCENY.

UNDERWRITERS are perſons who ſubſcribe their names to policies of inſurance, and become anſwerable for the ſums annexed, in caſe of loſs or damage of the ſhip, goods, &c. thus inſured by them to the owner.

UNDETERMINED, in *Mathematics*, is ſometimes uſed for INDETERMINATE.

UNDIMIA, in *Surgery*, the name of a kind of an œdematous tumor, the matter contained in which is glutinous and ropy, like the white of an egg.

UNDULAGO, in *Natural Hiſtory*, a name given by Mr. Lhuyd to a ſpecies of fungites found foſſile, and uſually of a ſort of undulated figure. See FUNGITE.

UNDULATED *leaf*, among *Botaniſts*. See LEAF.

UNDULATION, in *Phyſics*, a kind of tremulous motion, or vibration, obſervable in a liquid; whereby it alternately riſes and falls, like the waves of the ſea; and hence it is that the term takes its riſe, from *unda*, *wave*. See WAVE.

This *undulatory* motion, if the liquid be ſmooth, and at reſt, is propagated in concentric circles, as moſt people have obſerved upon throwing a ſtone, or other matter, upon the ſurface of a ſtagnant water, or even upon touching the ſurface of the water lightly with the finger, or the like.

The cauſe of theſe circular *undulations* is, that, by touching the ſurface with the finger, there is produced a depreſſion of the water in the place of contact. By this depreſſion the ſubjacent parts are moved ſucceſſively out of their place, and the other adjacent parts thruſt upwards, which, lying ſucceſſively on the deſcending liquid, follow it; and thus the parts of the liquid are alternately raiſed and depreſſed, and that circularly.

When a ſtone is thrown into the liquid, the reciprocal vibrations are more conſpicuous: here the water in the place of immerſion riſing higher, by means of the impulſe or rebound, till it comes to fall again, gives an impulſe to the adjoining liquid, by which means that is likewiſe raiſed about the place of the ſtone, as about a centre, and forms the firſt *undulous* circle; this falling again, gives another impulſe to the fluid next to it farther from the centre, which riſes likewiſe in a circle; and thus, ſucceſſively, greater and greater circles are produced.

UNDULATION, in *Medicine*, the term uſed by ſome to expreſs an uneaſy ſenſation in the heart, of an undulatory motion; which may ſometimes be perceived externally.

UNDULATION, or BEAT, in *Muſic*, is uſed for that rattling, or jarring of ſounds, which is obſerved, chiefly, when diſcordant notes are ſounded together.

The phenomenon is more fully deſcribed thus, by Dr. Smith. In tuning muſical inſtruments, eſpecially organs, it is a known thing, that while a conſonance is imperfect, it is not ſmooth and uniform, as when perfect, but interrupted with very ſenſible *undulations* or *beats*; which, while the two ſounds continue at the ſame pitch, ſucceed one another in equal times, and in longer and longer times, while either of the ſounds approach gradually to a perfect conſonance with the other, till at laſt the *undulations* vaniſh, and leave ſmooth, uniform conſonance. Smith's Harmonics, p. 107.

This learned author obſerves farther, that quicker *undulations* are *beats*, and are remarkably diſagreeable in a concert of ſtrong, treble voices, when ſome of them are out of tune; or in a ring of bells ill tuned, the hearer being near the ſteeple; or in a full organ badly tuned. Nor can the beſt tuning wholly prevent that diſagreeable battering of the ears with a conſtant rattling noiſe of *beats*, quite different from all muſical ſounds, and deſtructive of them, and chiefly cauſed by the compound ſtops called the cornet and ſeſquialter, and by all other loud ſtops of a high pitch, when mixed with the reſt. But if we be content with compoſitions of uniſons and octaves to the diapaſon, whatever be the quality of their ſounds, the beſt manner of tuning will render the noiſe of their *beats* inoffenſive, if not imperceptible.

The doctor has with great ingenuity deduced the theory of theſe *undulations* from his principles, and has applied his doctrine to the tuning of inſtruments; by which he has ſhewn, that a perſon of no ear at all for muſic, may ſoon learn to tune an organ, according to any propoſed temperament of the ſcale, and to any deſired degree of exactneſs, far beyond what the fineſt ear, unaſſiſted by theory, can poſſibly attain to. This may be done by counting the number of *undulations* in a certain time, ſuch as fifteen ſeconds. See the treatiſe before cited, prop. xv. p. 215. and the table, p. 244. plate 20.

From this ingenious theory the learned author has demonſtrated ſeveral errors in what monſieur Sauveur has delivered concerning theſe *undulations* or *beats*. See Harmonics, Scholium 2. p. 115.

In the ſame treatiſe we find ſome curious obſervations relating to the analogy of audible and viſible *undulations*. See p. 128, 273.

UNDULATION is alſo uſed, in *Surgery*, for a motion enſuing in the matter contained in an abſceſs, upon ſqueezing it. A tumor is ſaid to be in a condition for opening when one perceives the *undulation*.

UNDULATORY *motion* is applied to a motion in the air, whereby its parts are agitated after the like manner as waves in the ſea; as is ſuppoſed to be the caſe when the ſtring of a muſical inſtrument is ſtruck.

This *undulatory* motion of the air is ſuppoſed the matter or cauſe of SOUND.

Inſtead of the *undulatory*, ſome authors chooſe to call this a *vibratory motion*.

UNDY, in *Heraldry*. See WAVED.

UNEDO, in *Natural Hiſtory*, a name uſed by the ancients for a fruit which they recommended as cooling and ſubaſtringent.

The generality of the world are led into a common error of believing this to be the fruit of the arbutus or ſtrawberry-tree. Pliny has given occaſion to this error, by ſaying expreſly that the *unedo* is the fruit of the arbutus; but we find this to be contrary to the practice of all the ancient Latin writers, who have always called the fruit by the ſame name with the tree, not by a different one. Varro, De Re Ruſtica, ſpeaking of gathering the autumn fruits, calls them all by the name of the trees; and among them, mentioning the fruit of the arbutus, he expreſſes in the ſame manner, not by the word *unedo*, *decerpendo arbutum mora pomaque*. And both Galen and Paulus Ægineta deny the *unedo* to be the name of the fruit of the arbutus or ſtrawberry-tree, and make it the fruit of the EPIMELIS. Servius explains the word *unedo* by the fruit of the ſtrawberry-tree; but in this he too raſhly follows Pliny's opinion, and plainly errs from the truth

UNEQUAL *courſes*. See MASONRY.

UNEQUAL *hours*. See HOUR.

UNEVEN *number* See NUMBER.

UNGELD, compounded of the negative *un*, and *gildan*, *to pay*, in our *Ancient Cuſtoms*, a perſon out of the protection of the law; ſo that if he were murdered, no *geld*, or fine, was to be paid in the way of compenſation by him that killed him. See GELD, and ÆSTIMATIO *capitis*

Si Frithman, i. e. *homo pacis*, *fugiat & repugnet*, *& ſe nolit indicare*; *ſi occidatur*, *jaceat* ungeld, i. e. no pecuniary compenſation ſhall be made for his death. Skinner.

Ungilda akere, mentioned in Brompton, has much the ſame ſignification; viz. where any man was killed, attempting any felony, he was to lie in the field unburied, and no pecuniary compenſation was to be made for his death.

UNGUENT, *unguentum*, *ointment*, in *Surgery*, a topical remedy, or compoſition, chiefly uſed in the dreſſing of wounds and ulcers.

Unguents, liniments, and cerates, are external forms, applied on divers parts of the body, both to cure, and to eaſe and relieve them. They only differ from each other in their conſiſtence; with regard to which, *unguents* hold the medium; being ſtiffer than liniments, but ſofter than cerates.

Oils are ordinarily the baſes of all three; to which are added wax, axungia, and ſeveral parts of plants, animals, and minerals; both on account of the virtues they furniſh, and to give a conſiſtency to the oils, and to keep them longer on the part, that they may have more time to act.

Many extravagant encomiums have been beſtowed on the efficacy of different preparations of this kind in the cure of wounds, ſores, &c. and yet it is unqueſtionable, that the moſt proper application to a green wound is dry lint. But though ointments do not heal wounds and ſores, they ſerve, however, to defend them from the external air, and to retain ſuch ſubſtances as may be neceſſary for drying, deterging, deſtroying proud fleſh, and ſuch purpoſes.

The principal *unguents*, or ointments, are, *unguentum album*, or *white unguent* of ceruſſe; *populneum*, made of the buds of the poplar tree, &c. *Unguentum baſilicum*, a ſuppurative; *unguentum Ægyptiacum*, a mild cauſtic; *unguentum aureum*, incarnative, and cicatrizing. Pomatums are alſo ranked in the number of *unguents*. See Pomatum.

Unguentum *ex ærugine*. See Verdegriſe.

Unguentum *album*, the *white ointment*, a medicinal preparation, well known by name, and much uſed in families.

The late London Diſpenſatory has made very great alterations in it, and indeed given a new ointment under this name; it is there ordered to be made thus: take olive-oil, a pint; white wax, four ounces; ſpermaceti, three ounces; melt all together with a gentle heat, and ſtir them very briſkly without ceaſing, till they are fully cold.

The ointment formerly known by this name had ceruſſe or white lead for its principal ingredient; but as this is principally intended for frettings of the ſkin, that ingredient was judged dangerous. See Unguentum *Saturninum*.

If a dram and a half of camphor, firſt ground with a few drops of oil, are mixed with a pound and a half of the white ointment, we ſhall have the *unguentum album camphoratum*, uſed for burnings, itchings, and ſerpiginous eruptions on the ſkin.

Unguentum *arcæi*. See Elemi.

Unguentum *baſilicum viride*, a form of medicine preſcribed in the late London Pharmacopœia. It is ordered to be made thus: take of yellow baſilicon, eight ounces; oil of olives, three ounces; verdigriſe, in fine powder, one ounce; mix the whole into an ointment.

Unguentum *baſilicum flavum*, or yellow baſilicon ointment, may be made by melting yellow wax, white reſin, and frankincenſe, of each a quarter of a pound, over a gentle fire; and then adding of hog's lard prepared, one pound; ſtrain the ointment while warm. This is employed for cleanſing and healing wounds and ulcers.

Unguentum *calaminare*, or *epuloticum*, commonly called *Turner's cerate*. See Ceratum *epuloticum*.

In this preparation the college of Edinburgh uſes one part of the calamine to five parts of a cerate, compoſed of oil, wax, and ſpermaceti. This is a very good application in burns, and excoriations from whatever cauſe.

Unguentum *citrinum* is a mercurial ointment, prepared by diſſolving an ounce of quickſilver in two ounces of ſpirit of nitre: the ſolution is poured hot into a pound of lard melted, and juſt beginning to grow ſtiff, and the whole briſkly ſtirred up till an uniform yellow mixture is procured. This *unguent* is uſed for venereal ulcers, &c.

Unguentum *dialthææ*. See Dialthæa, and *Marſh*-Mallow.

Unguentnm *digitale*. See Fox-glove.

Unguentum *emolliens*, or *emollient ointment*, may be made by taking of palm-oil, two pounds; of olive-oil, a pint and a half; of yellow wax, half a pound; and of Venice turpentine, a quarter of a pound; melting the wax in the oils over a gentle fire, then mixing in the turpentine, and ſtraining the ointment. This ſupplies the place of althæa ointment, and may be uſed for anointing inflamed parts, &c.

Unguentum *epiſpaſticum*. See Unguentum *veſicatorium*.

Unguentum *e Japanica terra*. See Japan *earth*.

Unguentum *linariæ*. See *Toad*-Flax.

Unguentum *mercuriale*, or *mercurial ointment*, is commonly prepared by rubbing the mercury with lard, or other fat matters, of a due conſiſtence; three parts of hog's lard, and one of mutton ſuet, make a commodious baſis, with which may be mixed one part or more of mercury, for the mercurial ointment of the London Diſpenſatory.

The *unguentum cæruleum mitius* is made by previouſly extinguiſhing the mercury with a little turpentine, and afterwards mixing it with four times its weight of lard.

The *unguentum cæruleum fortius* is prepared by extinguiſhing the mercury with balſam of ſulphur, and mixing it with twice its weight of lard. The principal intention of theſe ointments is to convey mercury into the blood by being rubbed upon the ſkin. Dr. Lewis obſerves, that the turpentines, in this form, are apt by frequent rubbing to fret the ſkin. The mercury in mercurial ointments muſt not be conſidered merely as diſtributed and intermixed with the parts of the fat: on the contrary, there is an adheſion and even intimate combination between the integrant parts of theſe two ſubſtances; for this fat very quickly becomes rancid, as all oily matters do when combined; and beſides, when mercurial ointment has been made a conſiderable time, all the mercury cannot be ſeparated from it even by fuſion. This fact has been verified by M. Beaumé.

An *unguent*, or pomatum, is directed to be made in the Paris Diſpenſatory, by diſſolving two ounces of mercury in a ſufficient quantity of nitrous acid, and mixing it perfectly in a mortar with two pounds of hog's lard. This pomatum, it is ſaid, by being lighty rubbed on the parts attacked by the itch, ſoon cures this diſorder.

The white precipitates of mercury are alſo uſed in *unguents* for cutaneous eruptions: one part of the mercurial precipitate, three of precipitated ſulphur, and eighteen of the ſimple ointment or pomatum, moiſtened with a little ſtrong alkaline ley, make the common mercurial application for theſe complaints.

Unguentum *nardinum*. See Nardinum *unguentum*.

Unguentum *nutritum*, is the name of an ointment of lead, made by grinding two ounces of litharge, and adding alternately, and by little and little, two ounces of vinegar, and ſix of oil. This *unguent*, though now expunged from our diſpenſatories, is an excellent application in many caſes. It ſhould not be long kept, but made freſh as wanted. Lewis. See Unguentum *Saturninum*.

Unguentum *oculi*, or *eye-ointment*, may be made of hog's lard prepared, four ounces; of white wax, two drams; and of tutty prepared, one ounce: melt the wax with the lard over a gentle fire, and then ſprinkle in the tutty, continually ſtirring them till the ointment is cold. This ointment will be more efficacious, and of a better conſiſtence, if two or three drams of camphor be rubbed up with a little oil, and mixed with it. Another eye-ointment may be made, by taking of camphor and calamine ſtone levigated, of each ſix drams; of verdigriſe well prepared, two drams; of hog's lard and mutton ſuet prepared, of each two ounces; rub the camphor well with the powder; afterwards mix in the lard and ſuet, continuing the triture till they be perfectly united. This ointment has been long in eſteem for diſeaſes of the eyes. It ought, however, to be uſed with caution when the eyes are much inflamed, or very tender.

Unguentum *e pice*, *tar-ointment*, a form of medicine preſcribed in the late London Pharmacopœia, and ordered to be made in the following manner: take of tar and of tried mutton-ſuet, each equal quantities; melt them together, and ſtrain the whole while it is hot.

In the Edinburgh Diſpenſatory it is directed to be made by melting together five parts of tar, and two of yellow wax. This ointment is ſometimes uſed as a digeſtive, and ſaid to be particularly ſerviceable againſt ſcorbutic and other cutaneous eruptions.

Unguentum *populeum*. See Populeum.

Unguentum *ſambucinum*, or *ointment of elder*, is prepared by taking four ounces of the leaves, and the ſame quantity of the inner bark, freſh, thoroughly bruiſing, and boiling them in a quart of linſeed oil till the watery moiſture is conſumed, and the oil tinged of a green colour; the oil is then preſſed out, and brought to the conſiſtence of an ointment by melting it in ſix ounces of white wax. This ointment is celebrated againſt burns and inflammations. An *unguent* is alſo prepared of the flowers, probably of equal efficacy with the other, and preferred by ſome as being more elegant, by melting three pounds of mutton-ſuet with a pint of oil-olive, and boiling in this mixture four pounds of the full blown flowers till they are almoſt criſp.

Unguentum *Saturninum*, a form of medicine preſcribed in the late London Pharmacopœia, and ordered to be made in this manner: take of oil-olive, half a pint; of white wax, an ounce and a half; of ſugar of lead, a quarter of an ounce, firſt brought to a very ſubtle powder, with ſome part of the oil; then add this to the reſt of the oil, with the wax melted in it, and ſtir the whole till it is cold.

The Edinburgh Diſpenſatory directs one part of the ſugar to twenty parts of the ſimple oil and wax ointment. The *unguentum e ceruſſa*, vulgo *album*, of the ſame Diſpenſatory,

tory, is made by mixing one part of ceruſſe with five of the ſimple ointment made with oil and wax. See UNGUENTUM *nutritum*, and UNGUENTUM *tripharmacum*.

Unguents and liniments of this kind are recommended againſt cutaneous heats and excoriations, ſlight ſerpiginous eruptions, and for anointing the lips of wounds or ulcers that itch much, or tend to inflammation.

Dr. Lewis obſerves, that theſe are by no means ſo efficacious as they have been repreſented. The oil and wax ſo cover the metallic ſalt, that its action is prevented; or, if it acts at all, it proves highly ſtimulating, from the undiſſolved ſtate in which it is placed.

UNGUENTUM *ſimplex*, a name given in the London Diſpenſatory to the compoſition commonly called POMATUM.

UNGUENTUM *e ſulphure, ſulphur-ointment.* Take of ſimple ointment, half a pound; of flower of ſulphur unwaſhed, two ounces; eſſence of lemons, a ſcruple. This is the preparation ordered in the late London Diſpenſatory, and expected to be kept ready mixed in the ſhops.

This ſulphureous ointment for the itch, called alſo *unguentum antipſoricum*, is directed by the Edinburgh Pharmacopœia to be prepared by mixing two ounces of the unwaſhed flowers of ſulphur with eight ounces of hog's lard, and a ſcruple of eſſence of lemons. Some recommend an ointment of ſulphur, made of four ounces of hog's lard prepared, an ounce and a half of flowers of ſulphur, two drams of crude ſal ammoniac, and ten or twelve drops of eſſence of lemon.

UNGUENTUM *tripharmacum*, is prepared by boiling and ſtirring over a gentle fire four ounces of the common plaſter, with one of vinegar, and two of oil, where a thick *unguent* is required; or four of oil, for a ſofter liniment. See UNGUENTUM *Saturninum*.

UNGUENTUM *tutiæ.* See UNGUENTUM *oculi*, and TUTTY.

UNGUENTUM *veſicatorium, bliſtering ointment*, a form of medicine preſcribed in the late London Pharmacopœia, and no other than a bliſtering plaſter in a ſofter form. It is made by melting equal quantities of hog's lard and bliſter-plaſter, with a very gentle heat, ſtirring them till they are cold.

The *unguentum epiſpaſticum* e pulvere cantharidum of the Edinburgh Diſpenſatory, is prepared by melting ſeven parts of yellow baſilicon, and then adding one part of powdered cantharides. This ointment is chiefly intended for dreſſing bliſters, in order to keep them open during pleaſure. However, a ſoft extract of cantharides is in many caſes preferable, for external purpoſes, to the ointments and plaſters made with the powdered fly, particularly for the dreſſing of perpetual bliſters; as it acts more uniformly than the compoſitions containing the fly in ſubſtance, and occaſions leſs pain in the dreſſing. Hoffman's mild bliſter, which gives little pain, mentioned occaſionally in his works, ſeems to have been, or to have had for its baſis, a preparation of this kind; and probably the empirical perpetual bliſter is no other. The college of Edinburgh have now received a compoſition on the ſame principle: they direct an ounce of cantharides to be infuſed for a night in four ounces of boiling water, the liquor to be ſtrongly preſſed and ſtrained out, and boiled with two ounces of hog's lard, till the humidity is waſted; after which, an ounce of white reſin, an ounce of yellow wax, and two ounces of Venice turpentine, are to be added, and the whole well mixed, ſo as to form a ſmooth ointment. Lewis's Mat. Med.

UNGUENTUM *viride*, the *green ointment*, a form of medicine preſcribed in the late London Pharmacopœia, and ordered to be made by melting ten ounces of yellow wax in three pounds of the *oleum viride*, or green oil of the ſame Pharmacopœia.

UNGUENTUM *e calce zinci*, is directed by the Edinburgh Diſpenſatory to be made by mixing one part of flowers of zinc with ſix of the ſimple liniment of wax and oil. See ZINC.

UNGUICULI, in *Botany*, is uſed for the ends of the petals of roſes, or other flowers, where they adhere to the plant.

UNGUIN, in *Botany*, a name given by the people of Guinea to a plant, of which they are very fond, on account of its medicinal virtues: they boil it in water, and give the decoction in large draughts for pains in the back. The leaves of this plant grow alternately on pedicles of an inch long, and have the exact ſhape and ſize of thoſe of the common bay-tree; but they have neither its taſte nor ſmell, nor any thing approaching to either. Phil. Tranſ. N° 232.

UNGUIS, a Latin term, ſignifying a NAIL of the hand or foot.

UNGUIS, in *Anatomy*, is applied to two bones of the noſe, which help to complete the internal ſides of the orbit of the eye, to cover the fore-part of the labyrinth of the noſe, and form the lachrymal duct.

They have their name from the Latin *unguis*, a *nail of the hand*, and are alſo, by ſome authors, from their office in forming the lachrymal duct, called *oſſa lachrymalia.* Others call call them *orbitaria oſſa.*

They are each ſituated in the orbit of the lower part of the internal angle; they are the leaſt bones of the face, and are very thin and tranſparent. They are in ſhape ſomewhat longer than broad, and not unaptly reſemble the figure of the finger nails, eſpecially while in their natural places; for, being taken out of the ſkull, their figure becomes ſomewhat more irregular. Each of them is divided, by anatomiſts, into two ſides, the one external, the greateſt part of which appears in the orbit in an entire ſkull; the other internal, which is hid; two extremities, the one upper, the other lower; and two edges, one anterior, the other poſterior. The outſide is ſmooth, and a little concave; toward the anterior edge is a groove full of ſmall holes like a ſieve, called the lachrymal groove. It begins at the upper extremity, and runs down lower than any other part of this ſide of the bone, the lower extremity of it being hid by the os maxillare. It is diſtinguiſhed from the reſt of the outſide by a very ſharp prominent edge. The inſide is rough, and unequally convex, with a perpendicular depreſſion, anſwering to the ſharp prominence of the outſide. On the upper part of this inſide, ſmall portions of cellulous laminæ are ſometimes obſervable, which communicate with the entry of the frontal ſinus; and there are likewiſe ſome about the middle, which complete the anterior ethmoidal cells; and others toward the lower end, which communicate with the rugged portions of the upper border of the ſinus maxillaris: theſe, however, often vary, and are ſometimes wanting. Theſe bones are altogether without diploe; they are connected with the os frontis, and with the os ethmoides, covering a part of the cells in that bone, with the naſal apophyſis of the os maxillare, and with the groove of that bone in ſuch a manner, that the two grooves, joined together, form an entire tube, called the lachrymal duct; they alſo cover a little the opening of the maxillary ſinuſes, and join the inferior conchæ of the nares, of which they appear to be only a continuation in advanced age. Winſlow's Anatomy, p. 36.

UNGUIS, or UNGUICULUS, among *Botaniſts* and *Floriſts*, denotes a little ſpeck, of a different colour from the reſt of the petala, or leaves of flowers.

It has the figure of a nail of the hand: its place is at the origin, or root of thoſe petals; as we ſee in the roſe, poppy-flowers, and divers other petals. See PETAL.

In preparing of medicines, the *ungues*, or *unguiculi*, are pulled off the flowers that enter the ſame.

UNGUIS, in *Natural Hiſtory*, a name given by authors to a genus of ſhells, more uſually called SOLEN.

UNGUIS, in *Surgery*, a diſeaſe of the eye; being a whitiſh ſpeck on the adnata, formed of a nervous excreſcence growing on that coat; beginning at the great canthus, ſomewhat of the ſhape and ſize of a nail of the hand, and ſpreading inſenſibly till it reach the pupil, and at laſt quite cover it.

The *unguis* is much of the ſame nature with the PTERYGIUM, and PANNUS.

The ordinary cauſe of the *unguis* is an exceſſive acrimony in the tears, which corrode the tunica conjunctiva; as is often the caſe in an ophthalmia, or after the ſmall-pox.

UNGUIS *odoratus*, in the *Materia Medica*, a thin, flat, teſtaceous ſubſtance, of an oval or oblong figure, rounded at both ends, and marked on the ſurface with three or four concentric circles, or oval lines. Its colour is a duſky brown, with ſome mixture of the orange, ſometimes of a purpliſh tinge. Its uſual ſize is that of a full grown nail of a man's thumb; and its thickneſs rather leſs than that of the nail. It is tough, flexile, and elaſtic; and has no peculiar ſmell or taſte.

The want of ſmell might ſeem to argue this to be a different ſubſtance from the *unguis odoratus* of the ancients; but the truth is, that their's owed all its ſweet flavour to its being brought over among aromatic drugs.

There were two kinds of it, the largeſt of which they had from the Red Sea, and the other from Babylon; and both were the opercula of two ſpecies of MUREX-*ſhells.*

Dioſcorides tells us, that this *unguis* was the operculum or poma of the ſhell, which ſtopped the mouth at pleaſure, and from under which the creature thruſt out its tongue to feed; and he adds, that the ſhell-fiſh to which it belonged was taken in the marſhes of India, when the waters were dried away; and that the Indian ſpikenard growing in great abundance in theſe marſhes, the creature became ſweet-ſcented in every part, by feeding on it. However, he concludes with telling us, that there were only two kinds brought into Greece in his time, the one from the Red ſea, the other from Babylon.

The truth is, that ſpikenard grows neither in the Red Sea, nor any where about Babylon, but only in India, beyond the Ganges, or about its banks. The ſpikenard alſo does not grow in the water, but only in marſhy places, and therefore can never be in the way of feeding ſhell-fiſh. Avicenna, perceiving the abſurdity and contradiction of Dioſcorides's account, ſays, that the ſhell-fiſh was found in an iſland in the Indies, on which iſland the ſpikenard alſo grew in great abundance. But this account ſuppoſes that the ſhell-fiſh, to which the *unguis odoratus* belongs, may be found on dry land; whereas it is certain, that no ſhell-fiſh, living in the water, can ſubſiſt without ſome means of cloſing up its cavity, ſo as to keep out the water at pleaſure; this is done in the bivalve kinds, by cloſing the two valves; but in the ſtromboide ones, by drawing down this operculum, which is the *unguis odoratus*, to the mouth of the ſhell. A land-ſhell therefore can have no occaſion for ſuch a part as the poma or operculum, and no ſuch drug as the *unguis odoratus* can be found about it. But it is to be obſerved, that Avicenna did not know that the *unguis odoratus* was a covering or operculum of the mouth of a ſhell, but thought that it was only a fragment cut or broken indeterminately from any part of the ſhell. This therefore might appear no abſurdity to him; and the thin and flat *ungues* he ſaw might appear fragments artificially cut from ſome of the thin-ſhelled kind of land-ſnails. See BLATTA *Byzantina*.

UNGULA, in *Geometry*, is the ſection of a cylinder, cut off by a plane paſſing obliquely through the plane of the baſe, and part of the cylindric ſurface.

UNGULA, in *Natural Hiſtory*, the claw, or HOOF, of a quadruped.

UNGULA *alcis*, the elk's claw. See ELK.

UNGULA, or HAMUS, among *Surgeons*, a ſort of hooked inſtrument, wherewith to extract a dead fœtus out of the womb.

UNGULA *oculi*, the name given by ſome to a diſeaſe of the eye, called by others PTERYGIUM.

UNGULUS, in *Antiquity*, a remarkable kind of BRACELET.

UNHALTER, in the *Manege*. A horſe is ſaid to *unhalter* himſelf that turns off his HALTER.

UNICORN, in *Aſtronomy*, See MONOCEROS.

UNICORN, in *Natural Hiſtory*, an animal famous among the Greek authors, under the name of μονοκερως; and among the Latins, under that of *unicorn*.

Both theſe names it takes from its diſtinguiſhing characteriſtic, the having one horn only. See RHINOCEROS.

The firſt author who wrote of the *unicorn*, was one Cteſius, whom Ariſtotle mentions as a very ſuſpicious author. Ælian ſpeaks of it in very doubtful terms. The other writers on the ſubject are Philoſtratus and Solinus; Æneas Sylvius, who is pope Pius II; Marcus Paulus, Aleoſius, Geſner, Garcias ab Orta, And. Marinus, &c. Of theſe, ſome ſay it reſembles a horſe, others an aſs, others a goat, by its beard; others an elephant, others a rhinoceros, others a greyhound, &c.

Munſter and Thevet will have it an amphibous animal, and its horn to be moveable at pleaſure. Others make all its ſtrength to conſiſt in its horn; and add, that when purſued by the hunters, it precipitates itſelf from the tops of the higheſt rocks, and pitches upon its horn; which ſuſtains the whole effort of its fall, ſo that it receives no damage thereby. In reality, the ſeveral authors do all give different accounts of the figure and colour, both of the animal and of its horn, and all its parts. And hence many among the moderns have ſuppoſed it to be a merely fabulous animal.

The legend adds, that it is wonderfully fond of chaſte perſons; and therefore, in order to take it, a virgin is placed in its way; whom when the *unicorn* ſpies, he lies down by her, and lays his head on her lap, and ſoon falls aſleep; upon which the virgin makes a ſignal, the hunters come in, and take the beaſt; which could never be caught any other way, becauſe it would either caſt itſelf headlong from the rock, or die. For an account of the animal to which the appellation of the *unicorn* has been applied, ſee RHINOCEROS.

What ordinarily paſſes among us for *unicorn's horn*, and is ſhewn for ſuch in the collection of curioſities, and uſed for ſuch by ſeveral phyſicians, we are aſſured by Pereyra, in his account of Greenland, &c. is the tooth of a large fiſh of the whale kind, called by the iſlanders *narwal*; frequent enough in the icy ſea. The tooth or horn, turned, channelled, and terminating in a point, as it is, ſprings out of the middle of the fore-part of the upper jaw, where it has a root a foot long, as thick as the horn itſelf: it is the only tooth the animal has in the upper jaw, and ſerves it as a weapon of defence, wherewith it dares to attack the largeſt whale. There is a fine horn of this kind preſerved in the repoſitory of St. Denis at Paris, given by And. Thevet, and pretended to have been a preſent to him from the king of Monomotapa, who carried him to hunt the *unicorn*; which is frequent in that country: this horn ſome have ſuſpected to be an elephants tooth, carved in that manner. At Straſburgh there is another between ſeven and eight feet long. In the repoſitory at Venice there is a good number; all different from each other.

The ancients held the *unicorn's horn*, to be a counter-poiſon; and that the animal uſed to dip it in the water, to purify and ſweeten it, ere it would drink: it is added, that for the ſame reaſon other beaſts wait to ſee this creature drink before them. Thence, as alſo from the rarity of the thing, people have taken occaſion to attribute divers medicinal virtues thereto.

But Amb. Paré has proved it a mere piece of charletanery, and all the virtues attributed to it to be falſe; and yet the price it has borne is almoſt incredible. Andrea Racci, a phyſician of Florence, affirms the pound of ſixteen ounces to have been at one time ſold, in the apothecaries ſhops, for fifteen hundred and thirty-ſix crowns, when the ſame weight of gold was only worth one hundred forty-eight crowns. See RHINOCEROS.

The *unicorn* is one of the ſupporters of the arms of England. This beaſt is repreſented, by heralds, paſſant, and ſometimes rampant. When in this laſt action, as in the Engliſh arms, it is properly ſaid to be *ſaillant*. Argent, an *unicorn* ſejant ſable, armed and unguled, or, borne by the name of *Harding*.

UNICORN, *ſea*, in *Natural Hiſtory*, the name of a fiſh of the whale kind, called alſo, *narhual* or *narwal*, remarkable for having a horn growing out at its noſe, in the manner of the ſuppoſed *unicorn's* horn, as deſcribed by many too credulous authors. It is the only ſpecies of MONODON in the Linnæan ſyſtem.

This fiſh feeds on fleſh, or other fiſh, and is not only found in the main ſea, but ſometimes gets up into large rivers. In the year 1736 there was a large one caught in the river Oſte, near its diſcharging itſelf into the Elbe, in the duchy of Bremen; this place is four German miles from the ſea. The ſkin of this fiſh was ſpotted with dark brown ſpots upon a white ground; the epidermis was tranſparent; and under it was another ſkin very thin and ſpotted; but the true ſkin was brown, and near an inch in thickneſs. On the top of the head there is only a ſemilunar hole, as in the porpoiſes; this hole opens into the two channels, which run through the ſkull to the palate, and are called the ductus hydragogi. The people who examined this creature, were not able to find any aperture in the body for the diſcharge of the excrements; whence it has been generally believed, that the creature voids them through this paſſage in the head.

Authors have differed in the name of the proceſs iſſuing from the head; ſome calling it a horn, others a tooth; ſome are of opinion that it ſerves to break the ice for air; but others pretend that it is an offenſive weapon, with which it wounds the common whale, and other large fiſh; and that when it has plunged it up to the head in the whale's body, it ſucks the juices of that animal.

The fiſh was near twenty feet long, and about four feet in diameter. The horn ſtood on the fore-part of the head, juſt above the mouth, and was ſix feet long, white like ivory, and curiouſly wreathed or twiſted. The body was ſmooth and ſlippery, like that of an eel; the head in proportion to the body was ſmall, not exceeding ſixteen inches in length, and the ſame in diameter; the eyes not larger than a ſix-pence. It had, on each ſide of the neck, two black fins, one above another at a ſmall diſtance; theſe were two feet long, of the breadth of a hand, and about half an inch in thickneſs. See the account of this fiſh by Dr. Steigertahl, and Dr. Hampe, in Phil. Tranſ. N°. 447. p. 157, and p. 149. or Abr. vol. ix. p. 71, &c. See *Tab.* V. *Fiſh*, N° 62.

This *unicorn's horn* has been ſo common in the Daniſh and neighbouring ſeas, that there was a magnificent throne built only of them in that kingdom; the horns are from ten to fifteen feet in length, and are all white, and furrowed with a ſpiral line.

Unicorn's horn has the ſame medicinal virtues with hart's horn and ivory; but at preſent is only kept as an ornament in druggiſts ſhops.

UNICORN, *ſea*, is alſo a name given to two ſorts of ſmall fiſh caught in the American ſeas, and known among authors under the name of MONOCEROS *piſcis*.

UNICORNU *foſſile*, *foſſile unicorn's horn*, the name of a ſubſtance much uſed in medicine in ſome parts of the world, but which ſeems to have been very little underſtood by many who have written of it. Dr. Hill, from the examination of the ſeveral varieties of ſhapes it is found in and trying it by the ſeveral teſts which fix the criterions of foſſils, has determined it to be no other than a terrene cruſtaceous ſpar, not very different from the oſteocolla, and other bodies of that genus, which he has called the *cibdeloplacia*; and has diſtinguiſhed this peculiar ſpecies by the name *cibdeloplacium albido-ſubcinereum*, *friabile*, *ſuperficie lævi*, or the whitiſh-grey friable cruſtaceous ſpar, with a ſmooth ſurface.

It differs principally from the oſteocolla in its ſoftneſs and the ſmoothneſs of its ſurface; but from its having, like many other of the cruſtaceous terrene ſpars, the property of encruſting, and ſometimes even permeating the pores of bodies, and in a manner petrifying them, it has obtained the names of the things it thus lodges itſelf in and about, which being uſually bone, and ſome of them bones of an extraordinary ſize and figure, have been taken for the bones and horns of *unicorns*; and the name and nature of the body itſelf wholly loſt and neglected, and that of the horn, with that of its imaginary animal, only preſerved.

They are, however, now ſenſible in Germany, that it is not the horn, but this ſubſtance which is lodged about it, which is the medicine; for they never uſe the foſſile bones, which are petrified in the common way, but only ſuch as are impregnated with this ſparry ſubſtance; and even uſe all ſubſtances whatever, which are impregnated with this, whether bones or wood, under the ſame name, calling the natural tubular pieces of it, which are very common, and alſo the pieces of branches of trees impregnated with it, by the common name of *unicorn's horn*, while they allow plain bones, petrified in the common way, no ſuch name. So that the word is now become a mere technical term, and ſignifies either this ſpar in its pure ſtate, or any ſubſtance whatever which is impregnated with it.

It is a lax and ſpongy terrene ſpar, and is naturally of a regular form, in ſome degree like that of the oſteocolla, being always found, where it has concreted pure, and not been in the way of any extraneous ſubſtance, an oblong and moderately thick, cylindric, tubular body, frequently narrower at one end than the other, and approaching to a conic form. Uſually its hollow is empty, but ſometimes it is found filled up with a ſubſtance of the ſame nature with itſelf, only compoſed of a larger proportion of earth with leſs ſpar, and therefore more crumbly and ſoft. Theſe are found of various ſizes, from an inch to three feet long. The larger ſpecimens are moſt frequent; and it is very probable, that the ignorance of the firſt ages, which brought it into uſe in medicine, might take theſe natural concretions for *unicorns horns*.

It is found in other parts of the world beſides Germany, and is in great eſteem in many places as a ſudorific and aſtringent; and is given in fevers, attended with diarrhœas, with great ſucceſs. Hill's Hiſt. of Foſſ. p. 361.

Dr. Ebrens, in his Natural Hiſtory of Hartz Foreſt, in Germany, gives a particular account of this foſſile. He ſays, that it is dug up of different ſhapes; ſometimes like a ſtraight horn, ſkull, jaw-bone, ſhoulder-blade, backbone, rib, tooth, thigh-bones, or other bones of men and beaſts; and ſometimes like an unſhaped lump or maſs of ſtone, having no reſemblance to bone. Conrigius, and Otto Guerick, have maintained that this foſſile is petrified bone; others, as Sennertus, Schræder, Bauſchius, &c. not being able to comprehend how bones of ſuch ſize and in ſuch quantities ſhould be collected together, and diſſatisfied with the account given by naturaliſts of the manner of their petrifaction, reckon it among the minerals. Some think, with Libavius, that it is a bituminous earth; others ſay that it is a kind of agate; but Dr. Ebrens apprehends, that it is formed of a clay or fattiſh earth, called *marga* or marl, common in that country, hardened by petrifying water, and aſſuming different ſhapes and ſizes, according to the ſituation in which this earth lies under ground. It is commonly of a light grey, black, or yellowiſh colour, and ſeldom perfectly white; ſometimes it is as hard as a ſtone, and ſometimes ſoft as clay, and hardens by being expoſed to the air. It has commonly neither ſmell nor taſte; though in ſome caſes it has been found with a ſcent like that of quinces, which Dr. Ebrens aſcribes to a bituminous ſubſtance mixed with the petrifying water. The whiteſt and melloweſt is reckoned the beſt for medical purpoſes. It operates, he ſays, like the terra ſigillata, abſorbing, aſtringing, and promoting perſpiration; and is one of the ingredients of the bezoardic powder, deſcribed by Ludovici in his Pharmacopœia Moderno ſæculo applicanda, and produces a very good effect, unleſs a ſymptomatic coſtiveneſs forbids the uſe of it. Externally it ſerves in puſtulary eruptions and eroſions about the pudendum and fundament in children, and in eye-waters. Hoffman adviſes people to try the *foſſile unicorn* firſt upon a dog, before it is uſed in medicine; becauſe he thinks it is ſometimes of a poiſonous nature, but this is never obſerved in any foſſile of this kind found in or near Hartz Foreſt.

UNIFORM, *uniformis*, denotes a thing to be ſimilar, or conſiſtent either with another thing, or with itſelf, in reſpect of figure, ſtructure, proportion, and the like. In which ſenſe it ſtands oppoſed to *difform*.

UNIFORM, in a *Military Senſe*, ſignifies the ornamental parts of a ſoldier's dreſs, by which one regiment is diſtinguiſhed from another. See REGIMENTALS.

UNIFORM, or *equable motion*. See MOTION.

UNIFORM *flowers of plants*. See *Polypetalous* FLOWERS.

UNIFORM *matter*, in *Natural Philoſophy*, that which is all of the ſame kind and texture.

UNIFORM *temperament*. See TEMPERAMENT.

UNIFORMITY, *regularity*, a ſimilitude or reſemblance between the parts of a whole. Such is that we meet with in figures of many ſides, and angles reſpectively equal, and anſwerable to each other.

A late ingenious author makes BEAUTY to conſiſt in *uniformity*, joined or combined with variety.

Where the *uniformity* is equal in two objects, the beauty he contends, is as the variety; and where the variety is equal, the beauty is as the *uniformity*.

UNIFORMITY is particularly uſed for one and the ſame form of public prayers, and adminiſtration of ſacraments, and other rites, &c. of the church of England, preſcribed by the famous ſtat. 1 Eliz. and 13 & 14 Car. II. cap. 4. called the *Act of Uniformity*. See LITURGY.

UNIGENITUS, called alſo *the Conſtitution*, in *Eccleſiaſtical Hiſtory*, a famous bull, deriving its denomination from the firſt word of it, which was iſſued in 1713 by pope Clement XI. and in which Quenel's book, entitled Moral Reflections on the new Teſtament, was condemned, and a hundred and one propoſitions contained in it were pronounced heretical. This bull gave a favourable turn to the affairs of the Jeſuits; but it was highly detrimental to the intereſts of the Romiſh church, as many of the wiſer members of that community candidly acknowledge. For it not only confirmed the proteſtants in their ſeparation, by convincing them that the church of Rome was reſolved to adhere to its ancient ſuperſtitions and corruptions, but alſo offended many of the Roman catholics, who had no peculiar attachment to the doctrines of Janſenius, againſt which this bull was levelled, and were only bent on the purſuit of truth, and the advancement of piety. See JANSENISM.

The diſſenſions and tumults excited in France by this edict were in the higheſt degree violent. A conſiderable number of biſhops, among whom was the cardinal de Noailles, archbiſhop of Paris, and a large body, compoſed of perſons eminently diſtinguiſhed for their piety and erudition, both among the clergy and laity, appealed from the bull to a general council; and hence thoſe who reject the authority of the bull, are called APPELLANTS. However the iſſue of this famous conteſt was favourable to the bull, which was at length rendered valid by the authority of the parliament, and was regiſtered among the laws of the ſtate. Moſheim's Eccl. Hiſt. vol. v. p. 78, &c. 8vo.

UNILOCULAR *capſule*, among *Botaniſts*. See CAPSULE.

UNIOLA, *ſea-ſide oats of Carolina*, in *Botany*, a genus of the *triandria digynia* claſs. Its characters are, that the calyx is multivalve, and the ſmall ſpikes ovated and carinated. There are four ſpecies.

UNION, a junction, coalition, or aſſemblage of two or more different things in one. Philoſophers are exceedingly to ſeek about the manner of the *union* of ſoul and body, or by what medium it is that two ſuch heterogeneous beings are kept cloſely together.

It is one of the great laws of this *union*, that ſuch and ſuch an impreſſion on the brain be followed by ſuch and ſuch a ſenſation, or perception in the ſoul.

UNION, in a philoſophical ſenſe, is uſed by Dr. Grew, for one of the three ways of mixture; being the joining together of atoms, or inſenſible particles, ſo as to touch in a plane: as is ſuppoſed to be the caſe in the cryſtallizations of ſalts and the like bodies.

UNION, among *Painters*, expreſſes a ſymmetry and agreement between the ſeveral parts of a painting; when, e. gr. there is a conſiderable degree of relation and connexion between them, both as to the figuring and the colouring; ſo that they apparently conſpire to form one thing.

UNION, in *Architecture*, may denote a harmony between the colours in the materials of a building.

UNION, in an eccleſiaſtical ſenſe, denotes a combining or conſolidating of two churches into one.

This is not to be done without the conſent both of the biſhop, the patron, and the incumbent.

The canoniſts diſtinguiſh three kinds of *union*: that of *acceſſion*, that of *confuſion*, and that of *equality*.

UNION *of acceſſion* is the moſt uſual; by this the united benefice becomes a member, and acceſſory of the principal.

UNION *by confuſion*, is that where the two titles are ſuppreſſed, and a new one created, including both.

UNION *of equality*, is that where the two titles ſubſiſt, but are equal and independent.

By ſtat. 37 Hen. VIII. cap. 21. it is enacted, that an *union* or conſolidation of two churches may be admitted, provided the annual value of one of them, in the king's books, doth not exceed 6*l*. and the diſtance between them be not above one mile.

And by another ſtat. 17 Car. II. cap. 3. it is enacted, that the *union* of two churches, or chapels, in any city or town, by the biſhop, patron, and chief magiſtrate of the town, ſhall be valid, unleſs the value of the churches ſo united exceed 100*l*.

By the *union* the two churches are become ſo much one, that a ſecond benefice may be taken by diſpenſation within the ſtatute of pluralities. If any queſtion ariſe concerning the *union*, after it is eſtabliſhed, this may not be tried in the temporal, but only in the ſpiritual court; unleſs it be ſuch *union* as is reſtrained by the aforeſaid ſtatutes.

UNION, *hypoſtatical*. See HYPOSTATICAL.

UNION, in the *Manege*, denotes the action by which a horſe draws together and aſſembles the parts of his body, and his ſtrength, in diſtributing it equally upon his fore-legs, and in reuniting and drawing them together; as we ourſelves do when we are going to jump, or perform any other action which demands ſtrength and agility. This poſture alone is ſufficient to ſettle and place the head of the animal, to lighten and render his ſhoulders and legs active, which, from the ſtructure of his body, ſupport and govern the greateſt part of his weight. Being then, by theſe means, made ſteady, and his head well placed, you will perceive in every motion which he makes a ſurprizing correſpondence of the parts of the whole. The legs and ſhoulders of a horſe ſupport, as we have ſaid, the greateſt part of his weight: and, therefore, his fore-part, either when he is in motion, or in a ſtate of reſt, is always employed, and conſequently needs the aſſiſtance of art to eaſe it; and in this conſiſts the *union* or putting together, which, by ſetting the horſe upon his haunches, counterbalances and relieves his fore-part. Beſides, the *union* not only helps and relieves the part of the horſe that is the weakeſt, but it is ſo neceſſary to every horſe, that no horſe that is diſunited can go freely: he can neither leap nor gallop with agility and lightneſs, nor run without being in manifeſt danger of falling, and pitching himſelf headlong; becauſe his motions have no harmony nor agreement with one another. The TROT is very efficacious in bringing a horſe to this *union*; i. e. the trot, in which he is ſupported and kept together, and yet ſupplied at the ſame time: this compels the horſe to put himſelf together, and to collect and unite his ſtrength. In order to ſupport the horſe in this trot, the horſeman ſhould hold his hand near his body, keeping his horſe together a little, and having his legs near his ſides. The effect of the hand is to confine and raiſe the fore-parts of the horſe; the effect of the legs is to puſh and drive forward the hinder parts. Now, if the fore-parts are kept back or confined, and the hinder parts are driven forward, the horſe, in a quick motion, ſuch as the trot, muſt neceſſarily ſit down upon his haunches, and unite and put himſelf together. For the ſame reaſon, the making of your horſe to launch out vigorouſly in his trot, and the quickening of his cadence from time to time, the putting of him to make paſſades, the ſtopping of him, and making him to go backward, will all contribute towards his acquiring the *union*. If your horſe trots, preſs him a little; in the inſtant when he redoubles and quickens his action, moderate and ſhorten the hurry of his pace; and the more he preſſes to go forward, the more will his being checked and confined tend to unite his limbs, and the *union* will be owing to oppoſite cauſes; viz. on the one hand, to the ardour of the horſe who preſſes to go forward, and to the diligence and attention of the horſeman on the other, who, by holding him in, ſlackens the pace, and raiſes the fore-parts of the creature, and at the ſame time diſtributes his ſtrength equally to all his limbs. The action of a horſe, when going backward, is directly oppoſite to his abandoning himſelf upon his ſhoulders; by this he is compelled to put himſelf upon his haunches; and this leſſon is ſo much the more effectual, as the cauſe of a horſe's being diſunited is often owing to the pain he feels in bending his haunches.

The PESADES have not leſs effect, eſpecially upon horſes that are clumſy and heavy ſhouldered; becauſe they are thus taught to uſe them and raiſe them up; and when they raiſe them up, it neceſſarily follows, that their whole weight muſt be thrown upon their haunches. A light and gentle hand, then, and the aids of the legs, judiciouſly managed, are capable of giving a horſe the *union*; but before a horſe is put upon his haunches, his fore-part muſt be lightened, and he muſt acquire that ſuppleneſs, which is the ſource of light and free action. Nothing can ſupple the ſhoulder more than the working of a horſe upon large circles; walk him firſt round the circle, in order to make him know his ground; afterwards try to draw his head in, or towards the centre, by means of your inner rein and inner leg: e. gr. I work my horſe upon a circle; and I go to the right; I draw his head to the right, by pulling the right rein; I bring *in* his outward ſhoulder by means of the left rein; and I ſupport him at the ſame time with my inner leg. Thus the horſe has his head in the centre, although the croupe is at liberty. The right leg croſſes over the left leg; and the right ſhoulder is ſupplied, while the left leg ſupports the whole weight of the horſe in the action. In working him to the left hand, and following the ſame method, the left ſhoulder is ſuppled, and the right is preſſed and confined. When this leſſon, which tends not only to ſupple the ſhoulders, but likewiſe to give an appuy, is well comprehended by the horſe, let him be led along the ſide of the wall. Having placed his head, the horſeman is to make uſe of the inner rein, which draws in his head, and to bring in his outward ſhoulder by means of the other rein. In this poſture the horſeman ſupports him with his inner leg, and he goes along the wall; his croupe being *out*, and at liberty, and his inner leg paſſing over and croſſing his outward leg at every ſtep he makes. By this his neck and ſhoulders are ſuppled, his haunches worked, and he is taught to know the heels. The haunches are thus worked, though the croupe of the horſe is at liberty; becauſe it is from the fore-parts only that a horſe can be upon his haunches. In effect, after having placed his head, draw it *in*, and you will lengthen his croupe: if you raiſe him higher before than behind, his legs come under his belly, and conſequently he bends his haunches. It is the ſame when he comes down hill, his croupe, being higher than his fore-parts, is puſhed under him, and the horſe is upon his haunches; ſince it is evident, that the hinder ſupport all the fore-parts; therefore, in going along the ſide of the wall, by means of the inner rein, the horſe is put together and united. When a horſe has acquired *union*, he becomes able to undertake and execute, with juſtneſs and grace, whatever the horſeman demands of him, conformably to his ſtrength and diſpoſition. Berenger's Art of Horſemanſhip, vol. ii. chap. 7.

UNION, or *the* UNION, by way of eminence, is more particularly uſed, among us, to expreſs the act whereby the two ſeparate kingdoms of England and Scotland were incorporated into one, under the title of *the kingdom of Great Britain*.

The kingdom of Scotland, notwithſtanding the *union* of the crowns on the acceſſion of their king James VI. to that of England in 1603, continued an entirely ſeparate and diſtinct kingdom for above a century more, though an *union* had been long projected; which was judged to be the more eaſy to be done, as both kingdoms were anciently under the ſame government, and ſtill retained a very great reſemblace, though far from an identity, in their laws. By an act of parliament, 1 Jac. I. cap. 1. it is declared, that theſe two mighty, famous, and ancient kingdoms, were formerly one. And ſir Edward Coke obſerves, how marvellous a conformity there was, not only in the religion and language of the two nations, but alſo in their ancient laws, the deſcent of the crown, their parliaments, their titles of nobility, their officers of ſtate and of juſtice, their writs, their cuſtoms, and even the language of their laws: upon which account he ſuppoſes the common law of each to have been originally the ſame. However, ſir Edward Coke, and the politicians of that time, conceived great difficulties in carrying on the projected *union*; but theſe were at length overcome, and the great work was happily effected in the year 1707, by the general conſent of the queen, and the eſtates of each realm.

The act, or treaty of *union*, conſiſts of twenty-five articles; which eleven Engliſh commiſſioners, and eleven Scotch ones, examined, approved, and ſigned on the third of Auguſt 1706. The parliament of Scotland approved it on the fourth of February 1707, and the parliament of England on the tenth of March in the ſame year. On the ſeventeenth following the queen went to parliament, where ſhe approved the ſame treaty, with the act of ratification.

The purport of the moſt conſiderable articles is as follows: 1. That on the firſt of May, 1707, and for ever after, the kingdoms of England and Scotland ſhall be united into one kingdom, by the name of Great Britain. 2.

The ſucceſſion to the monarchy of Great Britain ſhall be the ſame as was before ſettled with regard to that of England. 3. The united kingdom ſhall be repreſented by one parliament. 4. There ſhall be a communication of all rights and privileges between the ſubjects of both kingdoms, except where it is otherwiſe agreed. 9. When England raiſes 2,000,000*l.* by a land-tax, Scotland ſhall raiſe 48,000*l.* 16, 17. The ſtandards of the coin, of weights and of meaſures, ſhall be reduced to thoſe of England, throughout the united kingdoms. 18. The laws relating to trade, cuſtoms, and the exciſe, ſhall be the ſame in Scotland as in England. But all the other laws of Scotland ſhall remain in force, but alterable by the parliament of Great Britain; yet with this caution, that laws relating to public policy are alterable at the diſcretion of the parliament; laws relating to private right are not to be altered, but for the evident utility of the people of Scotland. 22. Sixteen peers are to be choſen to repreſent the peerage of Scotland in parliament, and forty-five members to ſit in the houſe of commons. 23. The ſixteen peers of Scotland ſhall have all privileges of parliament; and all peers of Scotland ſhall be peers of Great Britain, and rank next after thoſe of the ſame degree at the time of the *union*, and ſhall have all privileges of peers, except ſitting in the houſe of lords, and voting on the trial of a peer.

Theſe are the principal of the twenty-five articles of *union*, which are ratified and confirmed by ſtatute 5 Anne, cap. 8. in which ſtatute there are alſo two acts of parliament recited; the one of Scotland, whereby the church of Scotland, and alſo the four univerſities of that kingdom, are eſtabliſhed for ever, and all ſucceeding ſovereigns are to take an oath inviolably to maintain the ſame; the other of England, 5 Anne, cap. 6. whereby the acts of uniformity of 13 Eliz. and 13 Car. II. (except as the ſame had been altered by parliament at that time) and all other acts then in force for the preſervation of the church of England, are declared perpetual; and it is ſtipulated, that every ſubſequent king and queen ſhall take an oath inviolably to maintain the ſame within England, Ireland, Wales, and the town of Berwick upon Tweed; and it is enacted, that theſe two acts ſhall for ever be obſerved as fundamental and eſſential conditions of the *union*.

The great officers of the crown of Scotland, before the *union*, were, the lord high chancellor, lord high treaſurer, or treaſurer, lord privy-ſeal, and lord regiſter, or ſecretary. Their leſs officers of ſtate were, the lord regiſter, lord advocate, lord treaſurer depute, and lord juſtice-clerk.

Since the *union*, the officers of ſtate in Scotland are the keeper of the great-ſeal, lord privy-ſeal, lord-regiſter, lord vice-admiral, lord juſtice general, lord preſident, lord chief baron of the exchequer, lord advocate, lord juſtice clerk, lord high conſtable, heretable royal ſtandard bearer, knight mareſchal, heretable keeper of the king's houſehold, heretable carver, and heretable uſher of the white rod. The privy-council of Scotland is ſunk in the parliament and privy council of Great Britain, and the civil and criminal cauſes are chiefly cognizable by two courts of judicature, viz. the college of juſtice, or the *court of* SESSION, and the JUSTICIARY *court*, under the direction of the lord juſtice general, with an annual ſalary of 2000*l.* the lord juſtice clerk, with 500*l.* per annum, five commiſſioners at 200*l.* each, his majeſty's ADVOCATE, with 1000*l.* per annum, three deputy advocates, a ſolicitor general, &c. Beſides theſe two great courts of law, the Scots, by the articles of *union*, have a COURT *of exchequer*, under the direction of a lord chief baron, with a ſalary of 2000*l.* per annum, and four barons. The court of admiralty in Scotland is a ſupreme court in all caſes competent to its juriſdiction, and under the direction of the lord vice admiral, whoſe ſalary is 1000*l.* per annum, a judge, procurator fiſcal, &c. The courts of commiſſaries in Scotland anſwer to thoſe of the Engliſh dioceſan chancellors; the higheſt of which is kept at Edinburgh, wherein, before four judges, actions are pleaded concerning wills, the right of patronage to eccleſiaſtical benefices, tithes, divorces, and ſuch cauſes. The office of privy ſeal is under the direction of the lord privy ſeal, with a ſalary of 3000*l.* per annum, a deputy, writer to the privy ſeal, and his deputy. The great ſeal office is under the direction of the lord keeper, with 3000*l.* per annum, and deputy and king's writer. The lord regiſter's office is under the ſuperintendance of the lord regiſter, with 2000*l.* per annum, and ſix deputies. The chancery is under the adminiſtration of a director, deputy, and principal clerk. See COLLEGE *of heralds*, and UNIVERSITY.

Under this article of *union* we may obſerve, with reſpect to Wales, that very early in our hiſtory we find its princes doing homage to the crown of England; till at length, in the reign of Edward the Firſt, the line of its ancient princes was aboliſhed; and the king of England's eldeſt ſon became, as a matter of courſe, their titular prince; the territory of Wales being then entirely annexed (by a kind of feudal reſumption) to the dominion of the crown of England. 10 Edw. I. By 12 Edw. I. and other ſubſequent ſtatutes, their provincial immunities were farther abridged; but the finiſhing ſtroke to their independency was given by the ſtatute 27 Hen. VIII. cap. 26. which at the ſame time admitted them to a thorough communication of laws with the ſubjects of England. By this ſtatute it is enacted, 1. That the dominion of Wales ſhall be for ever united to the kingdom of England. 2. That all Welchmen born ſhall have the ſame liberties as the other king's ſubjects. 3. That lands in Wales ſhall be inheritable according to the Engliſh tenures and rules of deſcent. 4. That the laws of England, and no other, ſhall be uſed in Wales; beſides many other regulations of the police of the principality. And the ſtatute 34 & 35 Hen. VIII. cap. 26. confirms the ſame, adds farther regulations, divides it into twelve ſhires, and, in ſhort, reduces it into the ſame order in which it ſtands at this day; differing from the kingdom of England in only a few particulars, and thoſe too of the nature of privileges (ſuch as having courts within itſelf, independent of the proceſs of Weſtminſter-hall), and ſome other immaterial peculiarities, hardly more than are to be found in many counties of England itſelf.

The town of Berwick upon Tweed was originally part of the kingdom of Scotland; and as ſuch was for a time reduced by king Edward I. into the poſſeſſion of the crown of England; and during its ſubjection, it received from that prince a charter, which (after its ſubſequent ceſſion by Edward Baliol, to be for ever united to the crown and realm of England) was confirmed by king Edward III. with ſome additions, particularly that it ſhould be governed by the laws and uſages which it enjoyed before its reduction by Edward I. Its conſtitution was new modelled, and put on an Engliſh footing by a charter of king James I. and all its liberties, franchiſes, and cuſtoms, were confirmed in parliament by the ſtatutes 22 Edw. IV. cap. 8. and 2 Jac. I. cap. 28. Though, therefore, it has ſome local peculiarities, derived from the ancient laws of Scotland, yet it is clearly part of the realm of England, being repreſented by burgeſſes in the houſe of commons, and bound by all acts of the Britiſh parliament, whether ſpecially named or otherwiſe. Accordingly it was declared by ſtatute 20 Geo. II. cap. 24. that, where England is only mentioned in any act of parliament, the ſame notwithſtanding hath and ſhall be deemed to comprehend the dominion of Wales, and town of Berwick upon Tweed. And, though certain of the king's writs or proceſſes of the courts of Weſtminſter do not uſually run into Berwick, any more than the principality of Wales, yet it hath been ſolemnly adjudged, that all prerogative writs (as thoſe of mandamus, prohibition, habeas corpus, certiorari, &c.) may iſſue to Berwick, as well as to every other of the dominions of the crown of England; and that indictments, and other local matters ariſing in the town of Berwick, may be tried by a jury in the county of Northumberland.

As to Ireland, that is ſtill a diſtinct, though a dependent, ſubordinate kingdom. It was entitled the dominion, or lordſhip of Ireland, ſtat. Hiberniæ, 14 Hen. III. and the king's ſtyle was no other than *dominus Hiberniæ*, lord of Ireland, till the thirty-third year of king Henry VIII. when he aſſumed the title of king, which is recognized by act of parliament 35 Hen. VIII. cap. 3. See Blackſt. Comm. vol. i. Int. ſect. 4.

UNION *fire office*. See INSURANCE.

UNIONS, *uniones*, in *Phyſiology*, the ſame with *margaritæ*, or *pearls*. See PEARL.

UNIQUE is ſometimes angliſied, and uſed to denote a thing which is the only one of its kind.

UNISETA, in *Natural Hiſtory*, the name of a ſpecies of fly, found frequently ſitting on the ammi or biſhops weed, and diſtinguiſhed by having one long hair or briſtle growing out at its tail. See HENOTHRIX.

UNISON, in *Muſic*, is the effect of two ſounds, which are equal, in degree of tune, or in point of gravity and acuteneſs.

Uniſon may be defined a conſonance of two ſounds, produced by two ſtrings, or other bodies of the ſame matter, length, thickneſs, and tenſion, equally ſtruck and at the ſame time; ſo that they yield the ſame tone or note.

Or, it is the union of two ſounds, ſo like each other, that the ear, perceiving no difference, receives them as one and the ſame ſound. See SOUND.

What conſtitutes *uniſonance*, is the equality of the number of vibrations of the two ſonorous bodies in equal times;

where there is an inequality in that reſpect, and, of conſequence, an inequality in degree of tune, the unequal ſounds conſtitute an *interval*.

Since iſochronous vibrations produce ſounds that are muſical, and that are ſaid to continue at the ſame pitch, and ſlower vibrations produce graver, flatter or lower, ſounds, and quicker vibrations produce ſounds that are acuter, ſharper, or higher; it follows, that if ſeveral ſtrings, however different in length, thickneſs, denſity, and tenſion, or other ſounding bodies, vibrate all together in equal times, their ſounds will have one and the ſame pitch, however they may differ in loudneſs, or other qualities, and are, therefore, called *uniſons*; and, on the contrary, the vibrations of *uniſons* are iſochronous. This obſervation reduces the theory of all ſorts of muſical ſounds to that of the ſounds of a ſingle ſtring, with reſpect to gravity or acuteneſs. Conſequently the wider and narrower vibrations of a muſical ſtring, or of any other body ſounding muſically, are all iſochronous very nearly; otherwiſe, while the vibrations decreaſe in breadth till they ceaſe, the pitch of the ſound could not continue the ſame as we perceive it does, if the firſt vibrations be not too large; in which caſe the ſound is a little acuter at the beginning than afterwards. In like manner, ſince the pitch of the ſound of a ſtring or bell, or other vibrating body, does not ſenſibly alter, while the hearer varies his diſtance from it; it follows, that the larger and leſſer vibrations of the particles of air, at ſmaller and greater diſtances from the ſounding body, are all iſochronous; and conſequently, that the little ſpaces deſcribed by the vibrating particles are every where proportional to the celerity and force of their motions, as in a pendulum; and this difference of force, at different diſtances from the ſounding body, cauſes a difference in the loudneſs of the ſound, but not in its pitch. It follows alſo, that the harmony of two or more ſounds, according as it is perfect or imperfect at any one diſtance, will alſo be perfect or imperfect at any other diſtance; and this is a known fact, e. gr. in a ring of bells. If two muſical ſtrings (ſee STRING), have the ſame thickneſs, denſity, and tenſion, and differ in length only, mathematicians have demonſtrated, that the times of their ſingle vibrations are proportioned to their lengths. Hence, if a ſtring of a muſical inſtrument be ſtopped in the middle, and the ſound of the half be compared with that of the whole, we may acquire the idea of the interval of two ſounds, whoſe ſingle vibrations (i. e. the times) are in the ratio of 1 to 2; and by comparing the ſounds of $\frac{2}{3}$, $\frac{3}{4}$, $\frac{3}{5}$, $\frac{4}{5}$, $\frac{5}{6}$, $\frac{8}{9}$, $\frac{9}{10}$, &c. of the ſtring with the ſound of the whole, we may acquire the ideas of the intervals of two ſounds, whoſe ſingle vibrations are in the ratio of 2 to 3, 3 to 4, 3 to 5, 4 to 5, 5 to 6, 8 to 9, and 9 to 10, &c. See CHORD. Smith's Harmonics, p. 2, &c.

Uniſon is the firſt and greateſt of concords; and the foundation, or, as ſome call it, the *mother* of all the reſt: yet others deny it to be any concord at all, maintaining it to be only that in ſounds, which unity is in numbers.

Theſe reſtrain the word *concord* to intervals, and make it include a difference of tune; but this is precarious; for as the word *concord* ſignifies an agreement of ſounds, it is certainly applicable to *uniſons* in the firſt degree.

But though *uniſonance*, or an equality of tune, makes the moſt perfect agreement of ſound, it is not true that the nearer any two ſounds come to an equality of tune, they are the more agreeable. The mind is delighted with variety; and the reaſon of the agreeableneſs or diſagreeableneſs of two ſounds muſt be aſcribed to ſome other cauſe than the equality or inequality of the number of their vibrations.

It is a famed phenomenon in muſic, that an intenſe ſound being raiſed, either with the voice, or a ſonorous body, another ſonorous body near it, whoſe tune is either *uniſon*, or octave to that ſound, will ſound its proper note *uniſon*, or octave, to the given note.

The experiment is eaſily tried by the ſtrings of two inſtruments; or by a voice and an harpſichord; or a bell, or even a drinking-glaſs.

This our philoſophers account for thus; one ſtring being ſtruck, and the air put in motion thereby; every other ſtring, within the reach of that motion, will receive ſome impreſſion therefrom: but each ſtring can only move with a determinate velocity of recourſes or vibrations; and all *uniſons* proceed from equal, or equidiurnal vibrations; and other concords from other proportions. The *uniſon* ſtring, then keeping equal pace with the ſounded ſtring, as having the ſame meaſure of vibrations, muſt have its motion continued, and ſtill improved, till its motion become ſenſible, and it give a diſtinct ſound. Other concording ſtrings have their motions propagated in different degrees, according to the frequency of the coincidence of their vibrations with thoſe of the ſounded ſtring: the octave, therefore, moſt ſenſibly; then the fifth: after which, the croſſing of the motions prevents any effect.

This they illuſtrate (as Galileo firſt ſuggeſted) by the pendulum, which being ſet a moving, the motion may be continued and augmented, by making frequent, light, coincident impulſes; as blowing on it when the vibration is juſt finiſhed; but if it be touched by any croſs or oppoſite motion, and this, too frequently, the motion will be interrupted, and ceaſe altogether. So, of two *uniſon* ſtrings, if the one be forcibly ſtruck, it communicates motion, by the air, to the other; and both being equidiurnal in their vibrations, that is, finiſhing them preciſely together, the motion of that other will be improved and heightened, by the frequent impulſes received from the vibrations of the firſt, becauſe given preciſely when the other has finiſhed its vibration, and is ready to return: but if the vibrations of the chords be unequal in duration, there will be a croſſing of motions, leſs or more, according to the proportion of the inequality; by which the motion of the untouched ſtring will be ſo checked, as never to be ſenſible. And this we find to be the caſe in all conſonances, except *uniſon*, octave, and the fifth. See CHORD.

UNIT, UNITE, or UNITY, in *Arithmetic*, the number *one*, or one ſingle individual part of diſcrete quantity. See NUMBER.

If a number conſiſts of four or five places, that which is outermoſt towards the right hand, is called the place of *units*.

Number, in general, is by Euclid defined to be *μοναδων ϖοσοτης*, a multitude, or aggregate of *units*; but, in this ſenſe, *unity* is not a number.

UNITARIANS, in *Eccleſiaſtical Hiſtory*, a name given to thoſe who confine the glory and attribute of divinity to the *One*, only great and ſupreme God, and Father of our Lord Jeſus Chriſt.

This denomination is ſometimes applied to thoſe that are otherwiſe called ARIANS; but it is now more commonly appropriated to the SOCINIANS, who maintain that the Father alone is the God of the univerſe, the only true God; that our Lord Jeſus Chriſt was a mere man, with a reaſonable ſoul and human body, who had no exiſtence before he was born, by the immediate operation and miraculous power of God at Bethlehem, and who, in the courſe of his life and miniſtry, death, reſurrection, and exaltation, was honoured with peculiar and extraordinary tokens of the divine influence and favour; and that the Holy Spirit was not a perſon, or diſtinct intelligent agent, but only the power, influence, and energy of God. Some, in imitation of Socinus, allow that Chriſt is an object of worſhip; but moſt of the modern *Unitarians* reſtrict prayer and divine worſhip to God alone.

For an account of the progreſs of *Unitarianiſm* in our own country, ſee an Hiſtorical View of the State of the *Unitarian* Doctrine and Worſhip from the Reformation to our own Times, by Mr. Lindſey, 8vo. 1783.

UNITAS *Fratrum*, or *United Brethren*, in *Eccleſiaſtical Hiſtory*, a name diſtinguiſhing thoſe Chriſtians who are frequently called abroad HERRNHUTERS and with us MORAVIANS.

Under thoſe articles ſome account has been introduced of this ſect; the account was formed from the authorities particularly cited at the cloſe of the article HERRNHUTERS; but the editor having been favoured, ſince the publication of that article, with ſeveral teſtimonies relating to this denomination of Chriſtians by the Rev. B. la Trobe, a very reputable miniſter among the Moravians in London, and having no object in view but truth, takes this opportunity of declaring his own opinion, that they do not allow, either in principle or practice, of thoſe irregularities which have been charged upon them; and that the charge ſeems to have been principally owing to ſome unguarded expreſſions introduced into their diſcourſes and forms of devotion, which, as Mr. Crantz, their hiſtorian, candidly acknowledges, "being not clear "and determinate enough, and in part overſtrained, "proved offenſive to many divines both in and out of "their congregations." The reader's candour will therefore lead him to diſtinguiſh between the uniform and avowed ſentiments and conduct of thoſe called Moravians, and certain ſallies and extravagancies which they themſelves diſallow and condemn.

To thoſe who are acquainted with the hiſtory of this ſect, it is well known, that their moſt approved writers have taken great pains to derive their origin from thoſe formerly diſtinguiſhed by the appellation of MORAVIAN or *Bohemian Brethren*, and who were afterwards denominated HUSSITES.

Moſheim, however, obſerves, that they may be ſaid with more propriety to imitate the example of that famous community, than to deſcend from thoſe who compoſed it: for, he adds, it is well known, that there are very few Bohemians and Moravians in the fraternity of the Herrnhuters; and it is extremely doubtful, whether even this ſmall number are to be conſidered as the poſterity of the ancient Bohemian brethren that diſtinguiſhed themſelves ſo early by their zeal for the Reformation. But from the Moravian writers, and from Crantz in particular, *ubi infra*, we are furniſhed with a circumſtantial account of the riſe and progreſs of this ſect from the ninth century, when the Bohemians and Moravians, and the whole Sclavonian nation, were firſt proſelyted to the faith of Chriſtianity, to the revival of it by count Zinzendorff. To this purpoſe they allege, that when by the inſtrumentality of Methodius and Cyrillus, two Greek monks, Bogaris, king of Bulgaria, and king Suatopluck, in Moravia, were converted, they and their reſpective countries united with the Greek church; Methodius being the firſt biſhop, and Cyrillus having tranſlated the Bible into the Sclavonian language. After various ſtruggles the Greek Chriſtians were conſtrained to ſubmit to the ſee of Rome. Some few, however, ſtill adhered to the rites of the Greek church, who, in 1176, being joined by the Waldenſes and inſtructed by them, aſſociated in acts of worſhip, and ſent miſſionaries into many countries. In this ſtate they continued for more than two hundred years, till a ſevere perſecution was commenced againſt them in 1391. In the beginning of the next century they acquired the denomination of HUSSITES, and were alſo called at different periods *Fratres Legis Chriſti*, or Brethren of the Law of Chriſt; *Unitas Fratrum*, or the Unity of the Brethren; or *Fratres Unitatis*, United Brethren. Notwithſtanding very ſevere treatment, they maintained ſtrict church-diſcipline among themſelves; and, at the ſynod of Lhota in 1467, choſe twenty, and out of theſe nine perſons, of whom they appointed three by lot for elders.

Having, at this time, no biſhops of the Bohemian church who had not ſubmitted to the ſee of Rome, they obtained conſecration for three of their prieſts of Stephen, biſhop of the Waldenſes in Auſtria, and theſe, on their return, ordained ten co-biſhops, or conſeniors, from among the reſt of the preſbyters. After many intervals of perſecution and of peace, towards the beginning of the ſixteenth century, there were two hundred congregations in Bohemia and Moravia, which had the Bible tranſlated into the Bohemian tongue, firſt from the Vulgate, and afterwards another from the original text.

In 1523, after the dawn of the Reformation, a friendly correſpondence commenced between the *Brethren* and Luther, and afterwards with Calvin, and others of the reformers. This correſpondence involved them in a ſevere perſecution, which greatly oppreſſed and diſpirited them. The diſſenſions alſo that prevailed amongſt themſelves threatened their ruin, which were, at length, happily terminated at the ſynod of Sendomir, in 1570, when the three *Tropuſſes* (i. e. thoſe who held different tenets and rites with regard to non-eſſentials) viz. the epiſcopal brethren, the Lutheran, and reformed, or followers of Calvin, agreed that they would perform divine ſervice and communicate together. In 1575 they obtained an edict for the public exerciſe of their religion, which was confirmed in 1609, when they obtained leave to erect new churches. But, in 1612, a civil war broke out in Bohemia, and, in 1621, a violent perſecution occaſioned the diſperſion of their miniſters, and great diſtreſs to the *Brethren* in general. Among the miniſters was one John Amos Comenius, biſhop of the church of the Brethren. Crantz has given the ſucceſſion of the Bohemian, Moravian, and Poliſh biſhops from Stephen, in 1467, to the renewal of the church of the *United Brethren* in this century. In 1662, Comenius conſecrated Peter Figulus, commonly called Jablonſky, and, in 1699, his ſon, Daniel Erneſt Jablonſky, was conſecrated biſhop; and by him, it is ſaid, the epiſcopal ordination has been committed to the preſent *Unity of the Brethren*, adhering to the Augſburg confeſſion, renewed by the emigration of many out of Bohemia and Moravia. This emigration was ſo conſiderable, and ſuch numbers of others conformed to the rites of the church of Rome, that, at the cloſe of the ſeventeenth century, it was apprehended, that this ancient church was become utterly extinct.

Several, however, it is ſaid, continued in Bohemia and Moravia, and retained their principles in ſecret; and from theſe the Moravian writers derive the preſent church, known by the name of *Unitas Fratrum*, or United Brethren, which, they ſay, is a renewal and continuation of the ancient church. About the year 1720, the revival commenced among the poſterity of the *Brethren* about Fulneck in Moravia, and Leutomiſchel in Bohemia. In Moravia, one Chriſtian David had been the chief inſtrument of the edification of his brethren, and the inſtructions which he received from miniſters whoſe names were Schoefer and Schwedler, he communicated, in 1717, to the deſcendants of the ancient Brethren. But being perſecuted in their native country, ſome of them migrated under the conduct of Chriſtian David, and, in 1722, put themſelves under the protection of Nicholas Lewis, count of Zinzendorff, in Upper Luſatia; where they built houſes upon the hill called the *Hutberg*, i. e. the Watch Hill, and hence the new ſettlement was called *Herrnhut*, i. e. the Watch of the Lord, and the Brethren were denominated *Herrnhuters*. The count ſoon after removed to Betholſdorff, and ſuperintended their riſing ſettlement. In 1724 more emigrants arrived at Herrnhut from Moravia, juſt as the Brethren were beginning to lay the foundation of an edifice intended for the education of the children of the nobleſſe, for printing cheap Bibles, and preparing medicines for their neighbours, in which building was alſo to be a chapel.

It would far exceed our limits to recount the ſucceſſive emigrations to Herrnhut, and the additions that were made by the means of the preaching of the Rev. Mr. Rothe, miniſter at Bertholſdorff, and the zeal of Chriſtian David. Among theſe ſettlers there were perſons of different opinions, which engaged the attention of count Zinzendorff, who endeavoured to eſtabliſh an union among them in the fundamental truths of the Proteſtant religion, and, in 1727, formed ſtatutes for their government in conformity to theſe truths.

From this period in particular, when elders and wardens were choſen, and an union eſtabliſhed between the Brethren from Moravia, both among themſelves, and with their Lutheran and reformed Brethren, the Moravian writers date the renewal of the *Unity of the Brethren*. The whole congregation was divided into claſſes, called choirs, and one of their own ſex and ſtation in life appointed to have the ſpecial care of each choir under the inſpection of the elders. The officers were appointed by lot, which has continued to be the caſe to the preſent day.

From the year 1727 to 1731, deputations were ſent from Herrnhut to Denmark, Sweden, England, Livonia, Switzerland, and other places in Germany, and thus the renewed unity of the Brethren became more known.

In 1729 a deed was ſigned by ſeveral, and ratified by the count and Mr. Rothe, in which they declare that they are neither Separatiſts, nor a new ſect, but deſcendants of the Moravian Brethren, &c.

We acknowledge, ſay they, no viſible congregation of Chriſt, but where the word of God is taught in ſimplicity and purity, and the members lead a holy life; yet we will not ſeparate from any one of any other Chriſtian denomination who truly believes in Chriſt, though he gives a different expoſition to this or the other text of Scripture, &c.

They guard againſt latitudinarianiſm in religion; they determine to maintain their ancient church diſcipline, without forſaking divine ſervice in the Proteſtant pariſh church at Bertholſdorff; they agree to the confeſſion of Augſburg: they will not be called Huſſites or Lutherans, but retain their ancient name, *The Brethren*; thus hoping for the protection of their ſovereign, and that their whole caſe might be examined by government.

The count's journey to Copenhagen to the coronation of Chriſtian VI. in 1731, where he heard of the miſerable condition of the Negroes in the iſland of St. Thomas, was the occaſion of the firſt miſſion of the Brethren among the heathen, ſo that two Brethren went thither in the year 1732, and the miſſion to Greenland commenced in 1733. In 1732 the count determined to devote himſelf to the miniſtry of the Goſpel, and accepted the office of warden, which he had held before, in 1733.

In 1734 the firſt Brethren went to America. The count having been examined and received into the clerical order, by the theological faculty of Tubingen, correſponded with Jablonſky, eldeſt biſhop of the Brethren's unity, about the renewal of epiſcopal ordination; and he conſecrated a biſhop for the church of the Brethren of Berlin, with the concurrence of his colleague, the ſenior, or biſhop of Liſſa, in Poland, in 1735. And, in 1737, the count himſelf was conſecrated a biſhop of the *Unitas Fratrum* by theſe three biſhops; having previouſly obtained the opinion of Dr. Potter, archbiſhop of Canterbury, that the Moravian Brethren were an apoſtolical and epiſcopal church, not maintaining any doctrines repugnant to the thirty-nine articles of the church of England; and he afterwards received a congratulatory letter from the archbiſhop on his conſecration. From this time the count is called the ordinary of the Brethren. The count appears to have been zealous and indefatigable in his labours; and it appears that in 1739, the Brethren were diſperſed in about forty places, moſt of which were miſſionaries among the heathen. New ſettlements were made in Europe and America; inſtitutions for the education of children were eſtabliſhed in many places; and many regulations were adopted for mutual edification, in conformity to the conſtitution of the ancient church of the Brethren. In 1748 a formal and very reſpectable commiſſion, conſiſting of three counts, two doctors of law, and three divines, was appointed to examine the charges that had been urged againſt the principles and practice of the Brethren, the reſult of which was very favourable to them. In conſequence of the report of the commiſſioners, the bailiwick and palace of Barby, where the college and ſeminary of the Brethren are now eſtabliſhed, were ceded in leaſe to count Henry, twenty-eighth Reuſs, and his conſorts, and the chapel of the palace given to the Brethren.

In 1749 a royal mandate was publiſhed, importing, that the congregations of the Proteſtant Moravian Brethren, avowing the unaltered Auguſtan confeſſion, ſhould be received in all Saxony, in the ſame manner as in Upper Luſatia and the county of Barby.

An eminent divine in Saxony, dean of the king's chapel, became this year, with the approbation of the ſovereign, honorary preſident of the Lutheran Tropus in the unity of the Brethren; Dr. Cochius, dean of the king of Pruſſia's chapel was, with the approbation of the king, introduced as honorary preſident of the reformed Tropus in the Unity, to which he had been appointed in 1746, and after his death, in 1749, was ſucceeded in that office by Dr. Thomas Wilſon, biſhop of Sodor and Man.

After the ſtate of the Brethren's church had been deliberately examined by the Britiſh parliament, an act paſſed on the 6th of June, 1749, in behalf of the ancient epiſcopal church known by the name of *Unitas Fratrum.*

In the mean time, as their number increaſed, and their local congregations became more numerous, men of different connections and principles were introduced among them; ſome of whom had imbibed extravagant notions, which they zealouſly propagated. This occaſioned what they called a time of ſifting in doctrine and in conduct. Their phraſeology in expounding divine truths, often bordered upon error, and the paſſions being warmed, a kind of joy took place which produced extravagant actions. Crantz, however, obſerves, that this ſifting did not ariſe from irreligious principles, nor did it end in immoral practices. Many among the Brethren were offended, and their adverſaries took occaſion to reproach them. The count, it is ſaid, interpoſed with ſuch ſucceſs, that in the years 1750 and 1751, almoſt all that had been chargeable with theſe exceſſes, in doctrine and practice, acknowledged their error with ſhame; thoſe who did not retract deſerted them, and thoſe, whoſe relapſe was dreaded, were diſmiſſed from their offices. The conſequence of theſe exceſſes was, indeed, in another reſpect more ſerious and alarming; for the count of Buedingen was ſo prejudiced againſt them, that an edict was publiſhed requiring the inhabitants of Herrnhaag, who would not renounce the count and the miniſters of the Brethren's church, to leave the country; whereas thoſe who complied were allowed to remain in their habitations, under the protection of the reigning count. On this occaſion more than a thouſand perſons, from 1750 to 1753, left a beautiful village, which they had erected at a great expence, and were diſperſed in other congregations in Germany, Holland, England, and America; and the French reformed Brethren and ſiſters, who lived at Herrnhaag, formed a ſettlement at Neuwied, which is now in a flouriſhing condition.

The increaſe of the Brethren, their new ſettlements, and numerous journies and miſſions, involved the ſociety in a great expence, and threatened ruin. Their debts were many and great, diſcouraged their friends, and gave their enemies occaſion for cenſure. The count, however, became ſecurity for their whole debt, which, at a ſtipulated time, was diſcharged. As ſoon as they were extricated from theſe difficulties, new regulations were adopted to prevent future diſtreſs of a ſimilar kind. We can only add, that the count lived to ſee congregations and miſſions ſettled in the four quarters of the globe, and theſe, it has been urged, were the moſt effectual apologies and defences of the principles and practice of the Brethren.

In 1760 the count died, with a memorial among the Brethren of having been their patron, and the inſtrument by whom God reſtored and built up the church of the Brethren.

But though they counted him a diſtinguiſhed ſervant of God, yet they did not regard him as their head; for they acknowledged, from the beginning, no other head and elder but the Lord Jeſus Chriſt, and no other father but the Father in heaven.

At the firſt ſynod of the Unity, after his deceaſe, in 1764, a number of Brethren were choſen to have collectively the ſuperintendency of the whole *Unity*, and, in the following ſynods, the arrangement then made was continued with ſome amendments. This company is called the Elders Conference of the *Unity*, and conſiſts of thirteen Brethren, who are choſen at every ſynod of the whole Unity.

The Brethren appeal to their lives for a refutation of the calumnies that have been circulated againſt them, profeſſing themſelves to be a people who walk in honeſty and godlineſs as followers of the Lord Jeſus Chriſt: and, as to doctrine, they avowedly adhere to the Augſburg, or AUGUSTAN *confeſſion*; and, with reſpect to this, the public, we are informed, may ſoon read an expoſition of Chriſtian doctrine as taught in the church known by the name of *Unitas Fratrum*, now preparing for the preſs.

In England, the congregations belonging to the *Unitas Fratrum* are the following, viz. two in London, one at Bedford, where are houſes belonging to the ſingle Brethren and ſingle Siſters, to which belong their chapels and ſocieties at Northampton, Riſely, &c. one at Ockbrook, near Derby; one at Fulneck, near Pudſey, in Yorkſhire, where are houſes for the ſingle Brethren, and Siſters, and widows, and ſchools for children; to this the members of the ſocieties near Leeds and Bradford belong; one at Wyke, near Halifax, another at Merfield, and another at Little Gummerſal; one at Duckenfield, in Cheſhire, where they have two choir-houſes, one for the ſingle Brethren, and one for the ſingle Siſters; one at Leominſter, in Herefordſhire; one at Briſtol, where are houſes for the ſingle Brethren and Siſters, to which belongs that at Kingſwood; one at Bath; one at Tetherton, in Wiltſhire, to which the chapel at Malmeſbury belongs: a congregation was alſo collected in 1759, at Haverfordweſt, in Pembrokeſhire. Beſides theſe congregations, the Brethren have chapels in ſeveral parts of England; viz. at Apperley, in Glouceſterſhire; Frome, in Somerſetſhire; Plymouth, in Devonſhire; Eden and Culworth, in Northamptonſhire.

For other particulars relating to the ſentiments, diſcipline, mode of worſhip, &c. of the *Unitas Fratrum*, we muſt refer to Crantz's Ancient and Modern Hiſtory of the Brethren, 8vo. publiſhed in 1780, by the Rev. B. la Trobe; and to a Conciſe Hiſtorical Account of the Preſent Conſtitution of the *Unitas Fratrum*, tranſlated from a work intitled Neueſte Religions Geſchichte, by Dr. Walch, of Goettingen, and publiſhed in 1775, by Mr. La Trobe. See alſo Crantz's Hiſtory of Greenland, &c. publiſhed in 2 vols. 8vo. in 1767. A Succinct view of the Miſſions eſtabliſhed among the Heathen by the Church of the Brethren, in a Letter to a Friend, by M. La Trobe, in 1771: and a Brief Account of the Miſſion eſtabliſhed among the Eſquimaux Indians, on the Coaſt of Labrador, in 1774.

UNITE, in the *Manege*. See UNION.

UNITED *affection*. See AFFECTION.

UNITY, UNITAS, the abſtract, or quality, which conſtitutes, or denominates a thing *unum*, or one.

The ſchool philoſophers generally define *unity* by a thing's being undivided in itſelf, and divided from every thing elſe. Others, more accurately, define it a mode of being, whereby it agrees to any particular being, once: theſe make two kinds of *unity*, viz. *unity of ſimplicity*, which is both undivided and indiviſible; ſuch as that of God, angels, and human ſouls: the other, *union of compoſition*, which, though undivided, is diviſible in the being, as conſiſting of divers parts: ſuch is that of man, &c.

Hence, *unity* is alſo divided into that *per ſe*, which agrees to any being whoſe parts are collected into one ſubſtratum: and *unity per accidens*, whoſe parts are not united into one ſubſtratum, as that of a flock of ſheep, &c.

Some alſo make a *ſingular*, or *numerical unity*, and an *univerſal unity*; a *real*, and an *imaginary unity*, &c.

It is diſputed among mathematicians, whether or no *unity* be a number? The generality of authors hold the negative, and make *unity* to be only inceptive of number, or the principle thereof; as a point is of magnitude, and an *uniſon* of concord.

Stevinus is very angry with the maintainers of this opinion: and yet, if number be defined a multitude of units joined together, as many authors define it, it is evident that *unity* is not itſelf a number.

It is to be obſerved in algebra, that *unity* itſelf has three different expreſſions of its cube root, one real, and the other two impoſſible or imaginary. Thus the three cube roots of 1, are 1, $\frac{-1+\sqrt{-3}}{2}$, and $\frac{-1-\sqrt{-3}}{2}$.

This is ſometimes of uſe in finding the cube roots of quantities, appearing under impoſſible expreſſions.

The two impoſſible expreſſions of the $\sqrt[3]{1}$ may be thus found: let $x=1$ then $x^3=1$, or $x^3-1=0$, and $x-1=0$. Divide x^3-1 by $x-1$ the quotient is $xx+x+1=0$, or $xx+x=-1$. Reſolve this quadratic equation, by adding $\frac{1}{4}$ to both ſides. Then $xx+x+\frac{1}{4}=-\frac{3}{4}$, and extracting the ſquare root, $x+\frac{1}{2}=\sqrt{-\frac{3}{4}}=\frac{\sqrt{-3}}{2}$. Therefore $x=-\frac{1}{2}+\sqrt{-\frac{3}{4}}=\frac{-1\pm\sqrt{-3}}{2}$. That is, $x=\frac{-1+\sqrt{-3}}{2}$, and $x=\frac{-1-\sqrt{-3}}{2}$. See Maclaurin's Algebra, p. 128. 226.

Unity, among *Divines*. The Romaniſts, and the reformed, diſpute, whether or no the church be one ſingle body, all the members whereof are joined together, either really, or in inclination; ſo that whatever does not appertain to that body, is no part of the church: which is what they call *the unity of the church*; and which the Romaniſts maintain to be reſtrained to one ſingle ſociety, or one communion, under one viſible head; and out of which the Proteſtants are excluded. Theſe laſt, on the contrary, hold, that the *unity* of the church may ſtill ſubſiſt, without the members being united under any one viſible head; it being ſufficient, that all Chriſtians be united by the bonds of mutual love and charity; and that they be agreed in the fundamental points of religion.

All the difficulty is, to fix what thoſe fundamentals are; ſome inclining to make the door of the church wider than others.

Unity, in *Poetry*. In the drama there are three *unities* to be obſerved; the *unity* of *action*, that of *time*, and that of *place*.

In the epic poem, the great and almoſt only *unity* is that of the action. Some regard, indeed, ought to be had to that of time: but that of place there is no room for. The *unity* of character is not reckoned among the *unities*.

The *unity* of the dramatic action conſiſts in the *unity* of the intrigue in comedy, and that of the danger in tragedy; and this not only in the plan of the fable, but alſo in the fable extended and filled with epiſodes.

The epiſodes are to be worked in, without corrupting the *unity*, or forming a double action; and the ſeveral members are to be ſo connected together, as to be conſiſtent with that continuity of action ſo neceſſary to the body; and which Horace preſcribes, when he ſays, *Sit quodvis ſimplex duntaxat & unum.*

The *unity* of the epic action, M. Dacier obſerves, does not conſiſt in the *unity* of the hero, or in the *unity* of his CHARACTER, and manners; though thoſe be circumſtances neceſſary thereto. The *unity of action* requires, that there be but one principal action, of which all the reſt are to be incidents, or dependencies.

F. Boſſu aſſigns three things requiſite thereto: the firſt, that no epiſode be uſed, but what is fetched from the plan, and ground of the action, and which is a natural member of that body: the ſecond, that theſe epiſodes and members be well connected with each other: the third is, not to finiſh any epiſode, ſo as it may appear a whole action; but to let each be always ſeen in its quality of member of the body, and an unfiniſhed part.

The ſame excellent critic examines the *Æneid*, *Iliad*, and *Odyſſey*, with reſpect to theſe rules, and finds them ſtrictly obſerved. Indeed, it was from the conduct of thoſe divine poems, that he took the hint of the rules themſelves. Inſtances wherein theſe rules are all neglected, he gives us in Statius's *Thebaid*.

To the *unity of time*, it is required, in the drama, that the action be included in the ſpace of a day. Ariſtotle ſays expreſly, it muſt not exceed the time the ſun employs in making one revolution, which is a natural day, under pain of irregularity: ſome critics will even have it included in the ſpace of twelve hours, or an artificial day.

Indeed, the ancient tragic poets ſometimes diſpenſed with this rule; and many of the modern Engliſh ones diſallow it: and very few of them practiſe it.

In the epic poem, the *unity of time* is ſtill leſs eſtabliſhed. In effect, there is no fixing the time of its duration; in regard, the warmer and more violent the action is, the leſs muſt be its continuance; whence it is, that the *Iliad*, repreſenting the anger of Achilles, only contains forty-ſeven days at moſt; whereas the action of the *Odyſſey* holds eight years and a half, and that of the *Æneid* almoſt ſeven years.

But the length of the poem Ariſtotle gives us a rule for; which is, that it be ſuch as that it may be read over in one day: pretending, that if it exceeds that compaſs, the imagination will be bewildered in it, and that one cannot ſee the end, without having loſt the idea of the beginning.

As to the *unity of place* and *ſcene*, neither Horace nor Ariſtotle give us any rules relating thereto. It were to be wiſhed, indeed, that what is preſented to the audience on the ſame ſtage, which is never ſhifted, might be ſuppoſed to have paſſed in the ſame houſe, and the ſame apartment. But as ſuch a conſtraint would cramp the poet too much; and as ſuch an uniformity would ſuit very ill with abundance of ſubjects; it has been agreed, that what paſſes any where in the ſame town or city, ſhall be allowed for *unity of place*. At leaſt, if two different places be unavoidable; yet the place is never to be changed in the ſame act.

Shakſpeare, it is well known, paid no regard to the *unities* of *time* and *place*. On this ſubject Dr. Johnſon obſerves, in the preface to his edition of Shakſpeare's plays, that perhaps a nearer view of the principles on which they ſtand will diminiſh their value, and withdraw from them the veneration which, from the time of Corneille, they have very generally received, by diſcovering that they have given more trouble to the poet than pleaſure to the auditor.

As nothing is eſſential to the fable but *unity of action*, and as the *unities of time and place* ariſe evidently from falſe aſſumptions, and by circumſcribing the extent of the drama, leſſens its variety, Dr. Johnſon does not think we need much lament their not being known or not obſerved by Shakſpeare.

He adds, as the reſult of his enquires, that the *unities of time and place* are not eſſential to a juſt drama; that though they may ſometimes conduce to pleaſure, they are always to be ſacrificed to the nobler beauties of variety and inſtruction; and that a play written with nice obſervations of critical rules, is to be contemplated as an elaborate curioſity, as the product of ſuperfluous and oſtentatious art, by which is ſhewn rather what is poſſible than what is neceſſary.

He that, without diminution of any other excellence, ſhall preſerve all the *unities* unbroken, deſerves the like applauſe with the architect, who ſhall diſplay all the orders of architecture in a citadel, without any deduction from its ſtrength; but the principal beauty of a citadel is to exclude the enemy; and the greateſt graces of a play are to copy nature and inſtruct life.

Unity *of poſſeſſion*, in *Law*, ſignifies a joint poſſeſſion of two rights, by ſeveral titles.

Thus, if I take a leaſe of land upon a certain rent, and afterwards buy the fee-ſimple; this is an *unity of poſſeſſion*, whereby the leaſe is extinguiſhed: by reaſon I, who before had only the occupation for my rent, am now become lord of the ſame, and am to pay rent to none but myſelf.

Unity of poſſeſſion amounts to the ſame with what civilians called CONSOLIDATION.

The *unity* of a joint eſtate is fourfold, viz. *unity* of intereſt, the *unity* of title, the *unity* of time, and the *unity* of poſſeſſion; or, in other words, JOINT-*tenants* have one and the ſame intereſt, accruing by one and the ſame conveyance, commencing at one and the ſame time, and held by one and the ſame undivided poſſeſſion. See Blackſt. Com. book ii. p. 180, &c.

Unity *of a ſentence*, in *Grammar* and *Rhetoric*. See STYLE.

UNIVALVE, in *Natural Hiſtory*, a denomination given to a genus of SHELLS.

UNIVERSAL, ſomething that is common to many things: or it is one thing belonging to many, or all things.

The word, according to ſome, is compounded of *unum verſus alia*.

There are *univerſal inſtruments*, for meaſuring all kinds of diſtances, as heights, lengths, &c. called alſo *pantometers*, and *holometers*.

An *univerſal* DIAL, is that whereby the hour may be found by the ſun all over the earth; or under any elevation of the pole.

Several learned authors have had it in view, to eſtabliſh an *univerſal* CHARACTER; by which the different nations might underſtand each other's writings, without learning their language.

The Romaniſts are divided among themſelves, about the title of *univerſal biſhop*, which ſome of the popes have arrogated to themſelves; though others of them have declined it. Baronius holds the appellation to belong to the pope jure divino; and yet St. Gregory, oppoſing the ſame quality given by a council in 586 to John, patriarch of Conſtantinople, aſſerted expreſly, that it did not belong to any biſhop; and that the biſhops of Rome neither could, nor ought to take it. Accordingly, St. Leo refuſed to accept it, when offered him by the council of Chalcedon; for fear, leſt, giving ſomething particular to one biſhop, they ſhould take from all the reſt; ſince there could not be an *univerſal biſhop*, but the authority of the reſt muſt be diminiſhed.

Universal, Universale, in *Logic*, is either *complex*, or *incomplex*. A *complex univerſal*, is either an *univerſal* propoſition, as, "Every whole is greater than its parts;" or whatever raiſes a manifold conception in the mind; as the definition of a reaſonable animal.

An *incomplex univerſal*, is what produces one only conception in the mind, and is a ſimple thing, reſpecting many; as human nature, which relates to every individual wherein it is found.

Now in an *univerſal*, two things are diſtinguiſhed, the *matter*, called the *material univerſal*, *univerſale materiale*, which is the one nature multipliable into many; as humanity in Peter, Paul, &c. and the *form*, called the *formal univerſal*, which is the unity of that nature.

Wherefore, to conſtitute an *univerſal*, it is requiſite the nature be one, yet multipliable; but what ſuch a nature is has proved matter of great controverſy, both among the ancient and modern philoſophers.

The Platoniſts will have *univerſals* to be nothing but divine ideas. Now by *idea* they mean the pattern or form which the artificer has in view when he makes any thing: but as this is twofold; *internal*, which is a ſort of image of the thing to be done, which the artificer frames in himſelf; and *external*, which is ſomething out of himſelf, which the artificer imitates; the philoſophers have been infinitely perplexed to find which of the two Plato meant. The Peripatetics inſiſt he meant the *external*; but the Platoniſts, and moſt of the Chriſtian divines, hold for the *internal*.

The Stoics and Nominalists maintain this in common with the Platonists, that *univerſals* are not in the things themſelves, but out of them. The Stoics particularly, for *univerſals*, put a kind of formal conceptions, or acts of knowing; by reaſon they repreſent many things at the ſame time: e. gr. knowledge, repreſenting all men, is, according to the Stoics, an *univerſal*.

The Nominaliſts make words *univerſals*; by reaſon the ſame word repreſents many things, as the word *man* repreſents all men; but both Stoics and Nominaliſts make *univerſals* to be ſomething extrinſic to things themſelves; by reaſon whatever exiſts, or is produced, is ſingular; ſo there is no *univerſal* really in things.

The Peripatetics, however, contend, that there are *univerſal* and common natures in things themſelves; or that things and natures like each other form a material *univerſal*. But as to the manner wherein they are *univerſal*, or whence they derive their *univerſality*, that is, their unity and aptitude of being in many, whether from nature, or from our underſtanding, is great matter of diſpute among them. If they derive that unity, wherein their *univerſal* form is placed, from nature, then there is an *univerſal à parte rei*; which is the opinion of the Scotists.

If they do not derive it from nature, but only from our minds or underſtandings, then the doctrine of the Thomists is allowed, who contend, that a formal *univerſal* has no other exiſtence, but by an act of the intellect.

Universal *cauſe*, *characters*, *conſumptions*, *geography*, *gravity*, *joint*, *maps*, *palſy*, *propoſition*, *rheumatiſm*, *ring-dial*, *ſyſtem*, and *theorem*, ſee the ſubſtantives.

UNIVERSALISTS, in *Polemical Divinity*, an appellation given to ſuch as hold an *univerſal* grace; in like manner as the denomination particularists, is given to thoſe who hold a *particular* and *efficacious* grace.

The Arminians are particularly denominated *univerſaliſts*.

Universalists, *hypothetical*, in *Eccleſiaſtical Hiſtory*, an appellation given to thoſe doctors of Saumur who attempted to reconcile the doctrine of predeſtination, as it had been taught at Geneva, and confirmed at Dort, with the ſentiments of thoſe who repreſent the Deity as offering the diſplays of his goodneſs and mercy to all mankind. The firſt perſon who made this attempt was John Cameron (ſee Cameronians) whoſe ſentiments were ſupported, and farther illuſtrated by Moſes Amyraut, a man of uncommon ſagacity and erudition. The latter applied himſelf, from 1634, with ſuch zeal to this work, that he produced no ſmall changes in the doctrine commonly received among the reformed in France. The form of doctrine which he propoſed with this view, may be ſummed up in the following propoſitions; viz. that God deſires the happineſs of all men, and that no mortal is excluded, by any divine decree, from the benefits that are procured by the death, ſufferings, and goſpel of Chriſt; that, however, no one can be made a partaker of the bleſſings of the Goſpel, and of eternal ſalvation, unleſs he believe in Jeſus Chriſt; that ſuch is the immenſe and univerſal goodneſs of the Supreme Being, that he refuſes to none the power of believing; though he does not grant unto all his aſſiſtance and ſuccour, that they may wiſely improve this power to the attainment of everlaſting ſalvation; and that, in conſequence of this, multitudes periſh through their own fault, and not from any want of goodneſs in God. Thoſe who embraced this doctrine, were called *Univerſaliſts*, becauſe they repreſented God as willing to ſhew mercy to all mankind; and *hypothetical univerſaliſts*, becauſe the condition of faith in Chriſt was neceſſary to render them the objects of this mercy. Moſh. Eccl. Hiſt. vol. iv. p. 503. 8vo.

UNIVERSALITY, the quality that denominates a thing *univerſal*.

The Catholics aſſert the *univerſality* of their church, both as to time and perſons; and maintain this to be a note or mark of the true church, which diſtinguiſhes it from all other ſocieties that pretend to the name.

Universality, in the *Schools*. Logicians made two kinds of *univerſality*, the one *metaphyſical*, the other *moral*.

Universality, *metaphyſical*, is that which excepts nothing; as this propoſition, "Every man is mortal."

Universality, *moral*, is that which admits of ſome exception; as, "All old men praiſe the times paſt." In ſuch like propoſitions, it is enough that the thing be ordinarily ſo; it not being ſtrictly required, that every old man ſhould be of that diſpoſition. See Predicable.

UNIVERSE, a collective name, ſignifying the aſſemblage of heaven and earth, with all things therein, called by the Greeks *το παν*, and by the Latins, *mundus*.

The ancients, and after them the Carteſians, imagine the *univerſe* to be infinite. The reaſon they give is, that it implies a contradiction to ſuppoſe it finite or bounded; ſince it is impoſſible not to conceive ſpace beyond any limits that can be aſſigned it; which ſpace, according to the Carteſians, is body, and conſequently part of the *univerſe*. But that the *univerſe* is finite, appears from the two following conſiderations: 1. That whatever conſiſts of parts cannot be infinite, ſince the parts that compoſe it muſt be finite, either in number or magnitude; which, if they be, what they compoſe muſt be ſo too: or, 2dly, they muſt be infinite either in number or magnitude; but an infinite number is a contradiction, and to ſuppoſe the parts infinitely big, is to ſuppoſe ſeveral infinities, one bigger than another; which, though it may paſs among mathematicians, who only argue about infinities, *in poſſe*, or in imagination, will not be allowed in philoſophy.

UNIVERSITY, Universitas, a collective term, applied to an aſſemblage of ſeveral colleges eſtabliſhed in a city, or town, wherein are profeſſors in the ſeveral ſciences, appointed to teach them to ſtudents; and where degrees, or certificates of ſtudy in the divers faculties are taken up.

In each *univerſity* four faculties are uſually taught; theology, medicine, law, and the arts and ſciences.

They are called *univerſities*, or *univerſal ſchools*, becauſe the four faculties are ſuppoſed to make the grand world, or whole compaſs of ſtudy; or rather, becauſe they form one whole out of many individuals.

In the eye of the law, an *univerſity* is held a mere lay body, or community; though, in reality, it be a mixed body, compoſed partly of laymen, and partly of eccleſiaſtics. See Corporation.

The definition of the term *univerſitas*, by foreign civilians, anſwers nearly to our common law term of body politic or corporate; and ſuch towns as had this appellation in Germany, &c. might hold lands and rents in common, and do all other acts as one aggregate body. And in this ſenſe the word *univerſitas* came to be applied to ſuch academies for learning as were incorporated, which archbiſhop Uſher thinks began about the year 1250.

Univerſities had their firſt riſe in the twelfth and thirteenth centuries. Thoſe of Paris and Bologna pretend to be the firſt that were ſet on foot; but then they were on a very different footing from the *univerſities* among us.

The *univerſity* of Paris is ſaid to have commenced under Charlemagne, and to owe its riſe to four Engliſhmen, diſciples of Venerable Bede, who, going to that city, made a propoſal to ſet up and ſell learning, and accordingly held their firſt lectures in places aſſigned them by that prince: ſuch is the account given by Gaguin, Gilles, De Bauvais, &c. Though the authors who wrote in thoſe days, as Eginhard, Aimon, Reginon, Sigebert, &c. make not the leaſt mention of this memorable fact.

Add, that Paſquier, Du Tillet, &c. declare openly againſt the opinion; and aſſert, that the firſt foundations were not laid till the time of Lewis the Young, and Philip Auguſte, in the twelfth century. The earlieſt mention we find made of the *univerſity* of Paris, is in Regordus, who lived in that age, and who was contemporary with Peter Lombard, the maſter of the ſentences, the great glory of that *univerſity*; in memory of whom an anniverſary is to this day obſerved by that body in the church of St. Marcel, where he lies buried.

But it is certain it was not eſtabliſhed all at once; it appears to have been at firſt no other than a public ſchool in the cathedral church; from which it grew, by little and little, under the favour and protection of the kings, into a regular body.

Our own *univerſities*, Oxford and Cambridge, ſeem intitled to the greateſt antiquity of any in the world; and Univerſity, Baliol, and Merton colleges in Oxford, and Peter's in Cambridge, all made colleges in the thirteenth century, may be ſaid to be the firſt regular endowments of this kind in Europe.

For though Univerſity college in Oxford had been a place for ſtudents ever ſince the year 872, yet this, like many of the other ancient colleges beyond ſea, and Leyden to this day, was no proper college; but the ſtudents, without any diſtinction of habit, lived in citizens houſes, having only meeting-places to hear lectures, and to diſpute.

In after-times, there were houſes built for the ſtudents to live in ſociety; only each to be at his own charge, as in the inns of court. Theſe, at firſt, were called *inns*, but now *halls*.

At laſt plentiful revenues were ſettled on ſeveral of theſe halls, to maintain the ſtudents in diet, apparel, &c. and theſe were then called *colleges*.

The *univerſities* of Oxford and Cambridge are governed, next under the king, by a *chancellor*, who is to take care of the government of the whole *univerſity*, to maintain the liberties thereof, &c.

The chancellor's courts in the two *univerſities* enjoy the ſole juriſdiction, in excluſion of the king's courts, over all civil actions and ſuits whatſoever, where a ſcholar or privileged perſon is one of the parties, excepting in ſuch caſes where the right of freehold is concerned. And theſe, by the *univerſity* charters, they are at liberty to try and determine, either according to the common law of the land, or according to their own local cuſtoms, at diſcretion. See *Univerſity* COURTS.

Privileges of this kind are of very high antiquity, being enjoyed by all foreign *univerſities* as well as our own, in conſequence (as judge Blackſtone apprehends) of a conſtitution of the emperor Frederick, A. D. 1158. The oldeſt charter containing this grant to the *univerſity* of Oxford, which the ſame learned judge had ſeen, was 28 Hen. III. A. D. 1244. And the ſame privileges were confirmed and enlarged by almoſt every ſucceeding prince, down to king Henry the VIIIth. in the fourteenth year of whoſe reign the largeſt and moſt extenſive charter of all was granted. One ſimilar to which was afterwards granted to Cambridge, in the third year of queen Elizabeth. All the charters of the two *univerſities* were confirmed by the ſtatute 13 Eliz. cap. 29. This privilege, ſo far as it relates to civil cauſes, is exerciſed at Oxford in the chancellor's court; the judge of which is the vice-chancellor, his deputy, or aſſeſſor. From his ſentence an appeal lies to delegates appointed by the congregation; from thence to other delegates of the houſe of convocation; and if they all three concur in the ſame ſentence, it is final, at leaſt by the ſtatutes of the *univerſity*, according to the rule of the civil law. But if there be any diſcordance or variation in any of three ſentences, an appeal lies in the laſt reſort to judges delegates, appointed by the crown under the great ſeal in Chancery.

This chancellor's court hath alſo authority over all criminal offences, under the degree of treaſon, felony, or mayhem.

Under the chancellor is the *high-ſteward*, whoſe office is to aſſiſt the chancellor, and other officers, when required, in the execution of their offices, and to hear and determine capital cauſes, according to the laws of the land, and the privileges of the *univerſity*.

By the charter of 7 Jun. 2 Hen. IV. confirmed by the ſtat. of 13 Eliz. cap. 29. cognizance is granted to the *univerſity* of Oxford of all indictments of treaſons, inſurrections, felony, and mayhem, which ſhall be found in any of the king's courts againſt a ſcholar or privileged perſon; and they are to be tried before the high-ſteward of the *univerſity*, or his deputy, who is to be nominated by the chancellor for the time being. But when his office is called forth into action, ſuch high-ſteward muſt be approved by the lord high-chancellor of England; and a ſpecial commiſſion under the great ſeal is given to him, and others, to try the indictment then depending. The proceſs of the trial is this: the high-ſteward iſſues one precept to the ſheriff of the county, who thereupon returns a panel of eighteen freeholders; and another precept to the beadles of the *univerſity*, who thereupon return a panel of eighteen matriculated laymen, "*laicos privilegio univerſitatis gaudentes*;" and by a jury formed *de medietate*, half of freeholders, and half of matriculated perſons, the indictment is to be tried in the guildhall of the city of Oxford. And if execution be neceſſary to be awarded, in conſequence of finding the party guilty, the ſheriff of the county muſt execute the *univerſity* proceſs; to which he is annually bound by an oath. Blackſton. Com. book iv. p. 274.

The next officer is the *vice-chancellor*, who officiates for the chancellor in his abſence.

In the *univerſity* of Oxford there are four *pro-vice-chancellors*: in the *univerſity* of Cambridge the *vice-chancellor*, and five others, conſtitute the *caput*, which every *univerſity* grace muſt paſs before it can be introduced into the ſenate.

There are alſo two *proctors*, who aſſiſt in the government of the *univerſity*, particularly in the buſineſs of ſchool-exerciſe, the taking up degrees, puniſhing violators of the ſtatutes, &c.

In the *univerſity* of Cambridge there are alſo two moderators, two ſcrutators, and two taxors. In this *univerſity* there are nineteen profeſſors, beſides lady Margaret's preacher: in that of Oxford there are twenty-one profeſſors, including the readers in anatomy and chemiſtry. Add to theſe a *public orator*, *keeper of records*, *librarians*, *regiſter*, *eſquire* and *yeoman*, *beadles*, *clerk*, and *verger*. See COLLEGE.

For the degrees taken up in each faculty, with the exerciſes, &c. requiſite thereto, ſee DEGREE.

The *univerſities* of Scotland are four, viz. that of St. Andrew's, founded in 1411, under the direction of a chancellor, two principals, and eleven profeſſors: that of Glaſgow, founded in 1454, under the direction of a chancellor, rector, principal, and fifteen profeſſors: that of Aberdeen, founded in 1477, which has two colleges, the King's College and Mariſchal College; the King's College has a principal, ſub-principal, and eight profeſſors; the Mariſchal College has a chancellor, principal, and ſeven profeſſors: and that of Edinburgh, founded in 1582, under the direction of patrons, a principal, and twenty-five profeſſors.

UNIVERSITY *courts*. See *Univerſity* COURTS, and UNIVERSITY, *ſupra*.

UNIVOCAL, in the *Schools*, is applied to two or more names, or terms, that have but one ſignification: in oppoſition to *equivocal*, which is, where one term has two or more ſignifications.

Or, *univocal terms* are ſuch whoſe name, as well as nature, is the ſame; in oppoſition to *equivocals*, whoſe names are the ſame, but their natures very different.

For a thing to be predicated *univocally* of any others, it is to be attributed to all of them alike, and in the ſame proper ſenſe. See PREDICATE and PREDICABLE.

UNIVOCAL *generation*. The doctrine of the ancients, with reſpect to propagation, was, that all perfect animals were produced by *univocal generation*, that is, by the ſole union, or copulation, of a male and female of the ſame ſpecies, or denomination; and that inſects were produced by EQUIVOCAL generation, without any ſeed, and merely of the corruption of the earth exalted, and, as it were, impregnated by the ſun's rays; but this is wholly erroneous.

Some philoſophers make a kind of intermediate generation, between equivocal and *univocal*, which they call *analogous* GENERATION.

UNIVOCAL *action*. See ACTION.

UNIVOCAL *cauſe*. See CAUSE.

UNIVOCALS, called by the Greeks *ſynonyma*, are defined by Ariſtotle to be thoſe things whoſe name is common, and alſo the reaſon correſponding to the name; that is, the definition of the idea affixed to it the ſame.

Thus, under the name and definition of *animal*, man and brute are equally included; and circle and ſquare, in the reaſon or definition of a *figure*.

Here, the word, as *figure*, they uſe to call *univocum univocans*, or *univocating univocal*; and the things included under the *univocal* name, as *circle* and *ſquare*, *univoca univocata*, *univocated univocals*.

UNIVOCATION, in *Logics* and *Metaphyſics*. The ſchoolmen have long diſputed about the *univocation* of being, i. e. whether the general idea of *being* agree in the ſame manner, and in the ſame ſenſe, to the ſubſtance, and the accident, to God and the creature?

UNLACING, in *Sea Language*, the act of looſening and taking off the bonnet of a ſail from its principal part.

UNLAWFUL, *illegal*, ſomething prohibited by, or contrary to the terms of a law, either divine or human.

UNLAWFUL *aſſembly*, the meeting of three or more perſons together, by force to commit ſome unlawful act; as, to aſſault any perſon, to enter his houſe, or land, &c. and thus abiding together, whether they attempt the execution or not. See REBELLIOUS *aſſembly*, RIOT, and ROUT.

By the ſtat. 16 Car. II. if five perſons, or more, ſhall be aſſembled together, above thoſe of the family, at any conventicle or meeting, under colour of any exerciſe of religion, it it *unlawful*, and puniſhable by fines, and otherwiſe, as in that ſtatute is provided. See CONVENTICLE.

UNLIKE *quantities* and *ſigns*, in *Algebra*. See LIKE *Signs and Quantities*.

UNLIMITED, or *indeterminate problem*, is ſuch a one as is capable of infinite ſolutions. As, to divide a triangle given into two equal parts; to make a circle paſs through two points aſſigned, &c. See DIOPHANTINE and INDETERMINATE.

UNLUTING, in *Chemiſtry*, the taking away of the LUTE, loam, or clay, wherewith a veſſel was before cloſed, joined to another, or covered.

To **UNMOOR**, in *Sea Language*, is to reduce a ſhip to the ſtate of riding by a ſingle anchor and cable, after ſhe has been moored or faſtened by two or more cables.

UN POCO, in the *Italian Muſic*, is often put before the terms *allegro*, *adagio*, *preſto*, *piano*, &c where it ſhews that the movement, with their direction, is ſomething leſs than it would otherwiſe have been, had this word been omitted. See POCO.

But if *piu* is put between *un poco*, and the above mentioned terms, then their uſual ſignification is a little increaſed, as *un poco piu allegro* ſignifies a little more briſkly than *allegro* alone requires. The contrary of this happens if, inſtead of *piu*, the word *men*, or *meno*, be uſed, as *un poco meno allegro*, i. e. a little leſs gaily than if *allegro* were alone.

UNQUES *priſt*, *always ready*. See UNCORE *Priſt*.

UNRECLAIMED *hawk*, one that is untamed.

UNREEVING *a rope*. See REEVING.

UNRIGGING *of a ſhip*, is the taking away of the ſtanding and running rigging.

UNSEELING, in *Falconry*, a taking away of the thread that run's through the hawk's eye-lids, and hinders her ſight. See HAWK.

Drawing the ſtrings of the hood, to be in readineſs to pull off, is called *unſtriking the hood*.

UNSUMMED, a term uſed by falconers for a hawk's feathers before they have arrived at their full length.

VOARCHADUMIA, a kind of cabala, or aenigmatic art relative to metals, which propoſes the exaltation of gold by cementations, and other methods; among which, charms made of the Hebrew letters have their place.

VOCA, in *Ichthyology*, a name given by Gaza, and ſome other writers, to the fiſh called BOOPS by the generality of writers. It is a ſpecies of the ſpari, and is diſtinguiſhed from the reſt by having four longitudinal parallel lines of a bright yellow and white colour, reſembling gold and ſilver, on its ſides.

VOCABULARY, VOCABULARIUM, formed of *vocabulum*, *word*, in *Grammar*, denotes the collection of the words of a language, with their ſignifications; otherwiſe called a *dictionary*, *lexicon*, or *nomenclature*.

The *vocabulary* is, properly, a leſs kind of dictionary, which does not enter ſo minutely into the origins, and different acceptations of words. Though the Italian *vocabulary* of the academy de la Cruſca ſeems to be an exception from this diſtinction, as being a copious and exact work, in three volumes folio, ſaid to have been forty years in compiling. And the like holds of the *Vocabulario* Portuguez of F. Bluteau, in ten volumes folio; in the titles of both theſe books the word is uſed in a larger ſenſe.

VOCAL, ſomething that relates to the VOICE or SPEECH. Thus, *vocal prayer* is that ſpoken out, or delivered in words, in contradiſtinction to *mental prayer*.

In our ancient cuſtoms, VOCALIS is frequently uſed for *ſo called: poſt hæc Merganus de tribu Walenſium, &c. alter nomine Madocus* vocalis *princeps eorum*. Matt. Paris.

VOCAL is ſometimes alſo uſed ſubſtantively, in ſpeaking of matters of election, to ſignify a perſon who has a right to vote. Thus the Romaniſts ſay, a man muſt have been a religious a certain number of years to be *vocal*.

VOCAL *muſic*, is muſic ſet to words, eſpecially verſes, and to be performed with the voice: in contradiſtinction to *inſtrumental muſic*, compoſed only for inſtruments, without ſinging.

Poetry then makes a neceſſary part of *vocal muſic*; and this appears to have been the chief, if not the only practice of the ancients, from the definitions which they give us of muſic.

Their *vocal muſic* ſeems to have had ſome advantage over ours, in that the Greek and Latin languages were better contrived to pleaſe the ear than the modern ones. In effect, Voſſius taxes all the latter languages as unfit for muſic; and ſays, "We ſhall never have any good *vocal* " *muſic* till our poets learn to make verſes on the model " of the ancients;" i. e. till the ancient metrical feet and quantities are reſtored.

But it is to be obſerved, that the rhythmus of their *vocal muſic* was only that of their poetry, and had no other forms and mutations than what the metrical art afforded.

Their changes were no other than from one kind of metrum or verſe to another, at from iambic to choraic. See MEASURE and RHYTHMUS.

Their *vocal muſic*, then, conſiſted of verſes ſet to muſical tunes, and ſung by one or more voices, in chorus, or alternately; ſometimes with, and ſometimes without the accompaniments of inſtruments.

As for inſtrumental muſic, in the manner we have defined it, it is not very clear that they ever had any. See SYNAULIA, &c.

VOCATION, *calling*, among *Divines*, the grace or favour which God does any one in calling him out of the way of death, and putting him into the way of ſalvation.

In this ſenſe we ſay, the *vocation of the Jews*, the *vocation of the Gentiles*, &c. There are two kinds of *vocation*, the one *external*, the other *internal*. The firſt conſiſts in a ſimple and naked propoſing of objects to the will. The ſecond is that which renders the firſt effectual, by diſpoſing our faculties to receive thoſe objects.

VOCATION is alſo uſed for a deſtination to any ſtate, or profeſſion. It is a rule that none are to enter the eccleſiaſtic or monaſtic ſtate, without a particular *vocation* or call.

The Romaniſts hold the *vocation* of the reformed divines null and invalid. Among ourſelves, ſome hold an uninterrupted ſucceſſion neceſſary to the validity of the *vocation* of a prieſt.

VOCATIVE, in *Grammar*, the fifth caſe, or ſtate of nouns.

When we name the perſon we are ſpeaking to, or addreſs ourſelves to the thing we are ſpeaking of, as if it were a perſon, the noun or name acquires a new relation, which the Latins and Greeks expreſs by a new termination, called the *vocative*.

Thus, of *Dominus*, *Lord*, in the nominative, the Latins have made *Domine*, *O Lord*, in the *vocative*; of *Antonius*, *Antoni*, &c. But as this was a thing not abſolutely neceſſary, and as the nominative caſe might very well ſerve on ſuch occaſions, this new caſe, or termination, was not univerſal: in the plural, for inſtance, it was the ſame with the nominative; and even in the ſingular it was only practiſed in the ſecond declenſion among the Latins; and in Greek, where it is the moſt common, it is frequently neglected, and the nominative uſed inſtead of it; as in that paſſage in the Greek Pſalms, quoted by St. Paul, *ϑρονος σȣ ο Θεος*, thy throne, O God!

In Engliſh, and moſt of the modern tongues, this caſe is ordinarily expreſſed in nouns that have an article in the nominative, by ſuppreſſing that article; as, *the Lord is my hope.—Lord, thou art my hope!* though, on many occaſions, we uſe an interjection.

VOCATORES, among the *Romans*, were ſervants whoſe buſineſs it was to call the gueſts, receive them, and aſſign every one a place according to his dignity.

VOCE *ſola*, in the *Italian Muſic*, denotes a piece compoſed for a ſingle voice, generally accompanied with a thorough baſs on the harpſichord or organ, without other inſtruments. But if beſides that it is to be accompanied by other inſtruments, they add, *con violini*, with violins; *due violini, e violoncello, e baſſo per l'organo*, i. e. with two violins, a baſs violin, and a thorough baſs on the organ; *con violini e ſtromenti*, i. e. with violins or inſtruments; *parti con, parti ſenza violini*, i. e. part with, part without violins, &c.

VOCIFERATIO, in our *Old Law Books*, the ſame with HUE *and cry*.

—— *Qui furem plegi tum dimiſerit, qui ei obviaverit, & gratis ſine* vociferatione *dimiſerit, &c.* Leg. Hen. I.

VOCONIAN *law*, in *Roman Antiquity*, a teſtamentary law prepared by Q. Voconius, tribune of the people, which prohibited every citizen from making any woman univerſal legatee, not excepting an only daughter, and enjoined a daughter's fortune, after her father's death, to be proportioned to his eſtate, according to the eſtimation of prudent men; and this proportion was uſually one fourth of her father's eſtate; and, moreover, that all the legacies of the teſtator ſhould not exceed one half of his eſtate. This was intended as a ſupplement to the FURIAN law; the time of its paſſing is fixed by Cicero, de Senect. to the year of Rome 584, when Q. Marcius Philippus, and Cn. Servilius Cæpio, were conſuls. It was revoked by Auguſtus in favour of Livia, to whom he was reſolved to deviſe by will a great part of his eſtate. However though, by the abrogation of this law, married women were not reſtrained from receiving any legacies above a certain ſum, yet Auguſtus beſtowed on ſuch women as had vowed perpetual virginity the ſame rewards and privileges as upon mothers.

VOICE, *vox*, a ſound produced in the throat and mouth of an animal, by an apparatus of inſtruments for that purpoſe.

Voices are either *articulate*, or *inarticulate*.

VOICES, *articulate*, are thoſe whereof ſeveral conſpire together to form ſome aſſemblage, or little ſyſtem of ſounds. Such are the *voices* expreſſing the letters of an alphabet, numbers of which, joined together, form words.

VOICES, *inarticulate*, are ſuch as are not organized, or aſſembled into words: ſuch is the barking of dogs, the braying of aſſes, the hiſſing of ſerpents, the ſinging of birds, &c.

The formation of the *human voice*, with all the varieties thereof obſerved in ſpeech, muſic, &c. makes a very curious article of enquiry; and the apparatus and organiſm of the parts miniſtering thereto, are ſomething exceedingly ſurpriſing.

Thoſe parts are, the TRACHEA, or wind-pipe, through which the air paſſes and repaſſes into the lungs; the LARYNX, which is a ſhort cylindric canal, at the head of the trachea; and the GLOTTIS, which is a little oval cleſt, or chink, left between two ſemicircular membranes ſtretched horizontally withinſide the larynx; which membranes, though capable of joining cloſe together, do generally leave an interval, either greater or leſs, between them, called the *glottis*.

The long canal of the trachea, terminated at the top with the glottis, appears ſo like a flute, that the ancients made no doubt but the trachea contributed the ſame to the *voice*, as the body of the flute does to the ſound of that inſtrument. Galen himſelf fell, in ſome meaſure, into the miſtake: he perceived, indeed, that the principal organ of *voice* was the glottis; but he ſtill allowed the trachea a conſiderable ſhare in the production of ſound.

Galen's opinion was followed by all the ancients after him, and even by all the moderns, before M. Dodart. But that author obſerves, that we do not either ſpeak or ſing, when we inſpire, or take in the air, but only when we expire, or expel it; and that the air, coming out of the lungs, paſſes always out of the minuter veſicles of that part into larger; and at laſt into the trachea itſelf, which is the largeſt of all: that thus its paſſage becoming ſtill more free and eaſy, and this more than ever in the trachea, it can never undergo ſuch a violence, and acquire ſuch a velocity in that canal, as is required to the production of ſound; but that, as the aperture of the glottis is very ſmall, in compariſon with the width of the trachea, the air can never get out of the trachea by the glottis, without a vaſt compreſſion, and augmentation of its velocity; and that, by this means, in paſſing, it communicates a briſk agitation to the minute parts of the two lips of the glottis, and gives them a kind of ſpring, and occaſions them to make vibrations; which, communicated to the paſſing air, are what really occaſion the ſound.

This ſound, thus formed, proceeds into the cavity of the mouth and noſtrils, where it is reflected, and reſounds; and on this reſonance, M. Dodart ſhews, it is, that the agreeableneſs of the voice entirely depends. The different conſiſtences, forms, &c. of the divers parts of the mouth, contribute to the reſonance, each in their way; and from this mixture of ſo many different reſonances in their due proportion, there reſults a harmony in the human *voice*, inimitable by any muſician. Hence it is, that when any of theſe parts are diſordered, e. gr. when the noſe is ſtopped, the *voice* becomes diſpleaſing.

This reſonance in the cavity of the mouth does not ſeem to conſiſt in a ſimple reflexion, ſuch as that of a vault, &c. but in a reſonance proportionate to the tones of the ſound ſent into the mouth from the glottis; and, accordingly, we find this cavity to lengthen and ſhorten itſelf, according to the depth, or acuteneſs, of the tone.

Now, for the trachea to effect this reſonance, as it was the common opinion it did, it would be required, that the air, after its being modified, and turned into ſound, by the glottis, inſtead of continuing its courſe from within outwards, ſhould return from without inwards, and thus ſtrike on the ſide of the trachea; which can never happen, except in thoſe who have a violent cough, and in ventriloquous perſons. Indeed, in moſt river-fowl, which have a very ſtrong *voice*, the trachea does reſound; but the reaſon is, that in them the glottis is placed at the bottom of the trachea, and not at the top, as in men.

The canal, then, which at firſt paſſed for the principal organ of *voice*, is now found not to be ſo much as the ſecondary one, i. e. not that which occaſions the reſonance. It does not ſerve the glottis, as the body of the flute does its plug; but, inſtead of that, the mouth ſerves the glottis, as the body of ſome other wind-inſtrument not yet known in muſic. In effect, the office of the trachea is no other than that of the port-vent in an organ; viz. to furniſh wind.

VOICE, *for the cauſe of the different tones of*. As the organs that form the *voice* make a kind of wind-inſtrument, one might expect to find ſome proviſion therein, anſwerable to that which produces the differences of tones in ſome other wind-inſtruments. The tone, therefore, muſt be attributed either to the mouth and noſtrils, which occaſion the reſonance, or to the glottis, which produces the ſound; and as all the different tones are produced in man by the ſame inſtrument, it follows, that the part which produces them muſt be capable of changes anſwerable thereto.

Now, for a grave tone, we know there is more air required than for an acute one. The trachea, therefore, to let this greater quantity paſs, muſt dilate and ſhorten itſelf; by which ſhortening, the external canal, that is, the canal of the mouth and noſe, reckoned from the glottis to the lips, or noſtrils, is lengthened. For, the ſhortening of the internal canal, i. e. of the trachea, brings the larynx and glottis lower down; and, of conſequence, makes its diſtance from the mouth, &c. greater; and there is a change in the length of each canal, for every change of tone and ſemitone. Accordingly, it is eaſy to obſerve, that the knot of the larynx alternately riſes and falls in all quaverings, or ſhakings of the *voice*, how ſmall ſoever the difference of tone may be.

Hence, as the depth of the tone of an hautboy is anſwerable to the length of the inſtrument; the longeſt fibres of the wood, whoſe vibrations make the reſonance, making always the ſloweſt vibrations, and conſequently the deepeſt tone, it may appear probable, that the concavity of the mouth, by its lengthening for grave tones, and ſhortening for acute ones, might ſerve very well for the production of the divers tones; but M. Dodart obſerves, that in that ſtop of the organ called the *human voice*, the longeſt pipe is ſix inches; and yet, with all that length, it does not make any difference of tone; but the tone of the pipe is preciſely that of the plug; whereas the concavity of the mouth of a man of the graveſt *voice*, not being above ſix inches deep, it is evident that cannot modify, vary, and give the tone.

It is the glottis, then, that forms the tone, as well as the ſound; and the manner of forming the various tones is by varying its aperture. A piece of mechaniſm too admirable not to be here particularly inquired into.

The human glottis, then, repreſented in *Tab. Nat. Hiſtory*, *fig*. 18. is only capable of one proper motion; viz. that of an approach of its lips ADB, and ADB. Accordingly, the dotted lines AEB, AFB, AGB, exhibit three different degrees of approach. Theſe different apertures of the glottis anatomiſts uſually attribute to the action of the muſcles of the larynx; but M. Dodart ſhews, from their poſition, direction, &c. that they have other uſes; and that the opening and ſhutting of the glottis is effected by other means; viz. by two tendinous cords, or ſtrings, incloſed in the two lips of that aperture.

In effect, each of the two ſemicircular membranes, whoſe interſtice forms the glottis, is doubled back upon itſelf; and within each duplicature there is a cord, or ſtring, which is faſtened at one end of the fore-part of the larynx, and to the hind-part at the other. It is true, they appear more like ligaments than muſcles, as conſiſting of white and membranous fibres, not of red and fleſhy ones; but the vaſt number of minute changes in this aperture neceſſary to form the vaſt variety of tones, make an extraordinary kind of muſcle, by whoſe contraction they ſhould be effected, abſolutely neceſſary. Common fleſhy fibres, wherein the blood is received in large quantity, had been infinitely too coarſe for ſuch delicate motions.

Theſe ſtrings, which, in their ſtate of relaxation, make each a little arch of an ellipſis, as they contract more and more, become longer, but leſs and leſs curve; and at laſt, with the greateſt contraction they are capable of, they degenerate into two right lines, applied cloſe to each other; ſo cloſe, and ſo firm, that an atom of air cannot eſcape out of the lungs, how full ſoever they may be, and how great an effort ſoever all the muſcles of the lower venter may make againſt the diaphragm, and, by the diaphragm, againſt theſe two little muſcles.

The different apertures of the lips of the glottis, then, produce all the different tones in the ſeveral parts of muſic; viz. *baſe*, *tenor*, *counter-tenor*, *treble-baſe*, and *treble*; and the manner is thus:

The *voice*, we have ſhewn, can only be formed by the glottis; but the tones of the *voice* are modifications of the *voice*; and theſe can only be produced by the modifications of the glottis. Now the glottis is only capable of one modification, which is the mutual approach, or receſs, of its lips: it is this, therefore, that produces the different tones. Now that modification includes two circumſtances; the firſt, and principal, is, that the lips are ſtretched more and more, from the loweſt tone to the higheſt; the ſecond is, that the more they are ſtretched, the nearer they approach.

From the firſt it follows, that their vibrations will be ſo much the quicker, as they come nearer their higheſt tone; and that the *voice* will be juſt, when the two lips are equally ſtretched; and falſe, when they are unequally; which agrees perfectly well with the nature of ſtring-inſtruments.

From the ſecond it follows, that the higher the tones are, the nearer will they approach to each other; which agrees perfectly well with wind-inſtruments governed by reeds or plugs.

The degrees of tenſion of the lips are the firſt and principal cauſe of tones; but their differences are inſenſible. The degrees of approach are only conſequences of that tenſion; but their differences are more eaſily aſſigned.

To give a preciſe idea of the thing, therefore, we had beſt keep to that, and ſay, that this modification conſiſts in a tenſion, from whence reſults a very numerous ſubdiviſion of a very ſmall interval; which yet, ſmall as it is, is capable, phyſically ſpeaking, of being ſubdivided infinitely.

The doctrine is confirmed from the different apertures found in diſſecting perſons of different ages, of both ſexes. The aperture is leſs, and the exterior canal always ſhallower, in the ſex and ages fitteſt to ſing treble. Add, that the reed of a hautboy, ſeparated from the body of the inſtrument, being a little preſſed between the lips, will yield a tone ſomewhat higher than its natural one; and if preſſed ſtill more, will yield another ſtill higher; and thus an able muſician may run ſucceſſively through all the tones and ſemitones of an octave. They are different apertures, then, that produce, or, at leaſt, that accompany, different tones, both in natural wind-inſtruments, and artificial ones; and the diminution of the aperture raiſes the tones both of the glottis, and the reed.

The reaſon why leſſening the aperture heightens the tone, is, that the wind paſſes through it with the greater velocity; and from the ſame cauſe it is, that if any reed or plug, of an inſtrument, be too weakly blown, its tone will be lower than ordinary.

Indeed, the contractions and dilatations of the glottis muſt be infinitely delicate; by an exact calculation of the ingenious author above mentioned, it appears, that, to perform all the tones and ſemitones of a common *voice*, which is computed to reach twelve tones; to perform all the particles and ſubdiviſions of thoſe tones into commas, and other minuter, though ſtill ſenſible parts; to perform all the ſhakes, or the differences in a tone when ſounded more or leſs ſtrong, without changing the tone; the little diameter of the glottis, which does not exceed one-tenth of an inch, but which varies within that extent at every change, muſt be actually divided into 9632 parts; which parts are yet very unequal, and therefore many of them much leſs than the $\frac{1}{963200}$th part of an inch. A delicacy ſcarce to be matched by any thing but a good ear, which has ſo juſt a ſenſe of ſound, as, naked, to perceive differences in all theſe tones; even thoſe whoſe origin is much leſs than the 963200th part of an inch.

VOICE, in *Grammar*, is a circumſtance in verbs, whereby they come to be conſidered as either active, or paſſive, i. e. either as expreſſing an action impreſſed on another ſubject; as, *I beat*; or receiving it from another; as, *I am beaten*.

The Greeks have a third *voice*, called medial, becauſe it has ſometimes an active, and ſometimes a paſſive ſignification.

VOICE, in matters of election, denotes a *vote*, or *ſuffrage*. In this ſenſe a man is ſaid to have a *deliberative voice*, when he has a right to give his advice and opinion in a matter of debate, and his ſuffrage is taken: an *active voice*, when he gives his vote for the election of any one; and a *paſſive voice*, when the ſuffrages may fall on himſelf to be elected: an *excitative voice*, when he may act to procure another to be elected: a *conſultative voice*, when he can only offer reaſons and remonſtrances whereon the chief, or head, determines at his own diſcretion: ſuch the cardinals have, with regard to the pope; and the maſters in chancery, with regard to the lord chancellor, &c.

VOICE, in *Oratory*, is one of the parts of PRONUNCIATION, upon the proper regulation of which much of the orator's ſucceſs depends. For this purpoſe it will be right to obſerve, in general, what nature does, when free and unconſtrained. As perſons are differently affected when they ſpeak, ſo they naturally alter the tone of their *voice*: it riſes, ſinks, and has various inflexions given it, according to the preſent ſtate and diſpoſition of the mind. When the mind is calm and ſedate, the *voice* is moderate and even; when the former is dejected with ſorrow, the latter is languid; and when that is inflamed by paſſion, this is raiſed and elevated. It is the orator's buſineſs, therefore, to follow nature, and to endeavour, that the tone of his *voice* appear natural and unaffected; and for this end, he muſt take care to ſuit it to the nature of the ſubject; but ſtill ſo as to be always grave and decent.

The principal affections or properties of the *voice* may be referred either to *quantity* or *quality*. The quantity of the *voice* conſiſts in its highneſs or lowneſs, ſwiftneſs or ſlowneſs, and the intermediate degrees between them. Every perſon who ſpeaks in public ſhould endeavour, if he can, to fill the place where he ſpeaks; without exceeding the natural key of his *voice*; in which caſe it will be either harſh and rough, or too ſhrill and ſqueaking; nor will he be able to give every ſyllable its full and diſtinct ſound, and to inflect it properly. He ſhould alſo take care, that it does not ſink too low, which will give him pain to raiſe it again to its proper pitch, and be no leſs offenſive to the hearers. The laſt word of a ſentence ought, in a particular manner, to be expreſſed diſtinctly, becauſe the meaning of the whole ſentence often depends upon it. The medium between theſe two is a moderate and even *voice*, which every perſon muſt regulate by the natural key of his own *voice*. But this equality of *voice* muſt be accompanied with a variety of inflexions and changes within the ſame pitch; and the gradations, whether higher or lower, muſt be gentle and regular; the *voice* moving from one key to another, ſo as rather to glide like a gentle ſtream than pour down like a rapid torrent; and the degree of theſe inflexions and various tones of *voice* ſhould differ according to the nature of the ſubject, and deſign of the ſpeaker.

The next property of the *voice* is ſwiftneſs; and with regard to this care ſhould be taken to avoid the two extremes of hurrying precipitately without pauſing, which deſtroys not only the neceſſary diſtinction between ſentence and ſentence, but likewiſe between the ſeveral words of the ſame ſentence; and of ſpeaking ſo ſlowly, as to argue a heavineſs in the ſpeaker, and to render the diſcourſe flat and lifeleſs.

In order to avoid both theſe extremes, the *voice* ought to be ſedate and diſtinct; for which purpoſe it is neceſſary, not only that each word and ſyllable ſhould have its full and juſt ſound, both as to time and accent, but likewiſe that every ſentence, and part of a ſentence, ſhould be ſeparated by its proper pauſe and interval. See PAUSE.

Thoſe properties of the *voice*, that reſpect its *qualities*, are chiefly ſtrength or weakneſs, clearneſs or obſcureneſs, fullneſs or ſmallneſs, ſmoothneſs or roughneſs. Temperance is a great preſervation of the *voice* in all theſe reſpects and all exceſs is highly prejudicial to it.

A ſtrong *voice* is very ſerviceable to the orator, becauſe, if it wants ſome other advantages, he is however able to make himſelf heard; and if he is forced to ſtrain it, he is leſs in danger of its failing him, before he has finiſhed his diſcourſe. But he who has a weak *voice* ſhould be careful not to ſtrain it, eſpecially at firſt: he ought to begin low, and riſe gradually to ſuch a pitch, as the key of his *voice* will carry him, without being obliged to ſink again afterwards. Frequent inflexions of the *voice* will likewiſe relieve him; and he ſhould ſpeak deliberately, and eaſe his *voice*, by allowing due time for reſpiration at all the proper pauſes.

A *voice* is ſaid to be clear, when the organs of ſpeech are ſuited to give every ſingle letter, and all the combinations of them in ſyllables and words, their proper and diſtinct ſound. Such a *voice* is agreeable to the hearers, and advantageous to the ſpeaker; as by ſpeaking moderately, he may be diſtinctly heard, and thus be able to modulate his *voice* at pleaſure.

An obſcure and confuſed *voice* is ſometimes owing to a deficiency in the organ, but often it is the effect of bad habit, acquired either by miſplacing the accent, confounding the ſound of the letters, or huddling the ſyllables one upon another, ſo as to render what is ſaid unintelligible. When this confuſed *voice* ariſes from a natural defect. it may be remedied, as well as weakneſs of *voice*, in the manner purſued by Demoſthenes. See PRONUNCIATION.

But the moſt likely way of mending faults proceeding from bad habit, is to ſpeak deliberately.

A full *voice* is not the ſame as a ſtrong or a loud *voice*; it fills the ear, but it is often not pleaſant; and, therefore, to render it ſo, as well as audible, it ſhould be frequently varied. Thoſe who have the misfortune of a very ſmall *voice* ſhould be cautious of raiſing it to too high a pitch, eſpecially at once; becauſe the ſudden compreſſure of the organ is apt to occaſion a ſqueaking and very diſagreeable ſound. A ſoft and ſmooth *voice* is of all the moſt muſical, eſpecially if it be flexible; and, on the contrary, nothing is leſs harmonious than a *voice* that is harſh and rough.

Upon the whole, we may conclude that *voice* to be the beſt or fitteſt for an orator, which is moderate, diſtinct, firm, clear, and ſmooth, and alſo eaſily flexible to the ſeveral degrees and variations of ſound, which every part of the diſcourſe may require. The different parts of a diſcourſe require correſponding modulations of the *voice*. The orator ſhould ſpeak low at firſt, becauſe this has the appearance of modeſty, engages attention, and is beſt for the *voice*. In the narration, the *voice* ought to be raiſed to ſomewhat a higher pitch. The propoſition, or ſubject of the diſcourſe, ſhould be delivered with a very clear and audible *voice*. The confirmation admits of great variety, both of the *voice* and geſtures: in reaſoning, the *voice* is quick and pungent, and ſhould be enforced with ſuitable actions; and in deſcriptions, whilſt the orator is pointing out the images of things, he ſhould ſo endeavour to adapt both his *voice*, and the motions of his body, particularly the turn of his eyes, and action of his hands, as may beſt help the imagination of his hearers. Where he introduces another perſon ſpeaking, or addreſſes an abſent perſon, it ſhould be with ſome degree of imitation; and in dialogue, the *voice* ſhould alter with the parts. When he diverts from his ſubject by any digreſſion, his *voice* ſhould be lively and cheerful; ſince that is rather deſigned for entertainment than inſtruction. In confutation, the arguments of the adverſe party ought firſt to be repeated in a plain and diſtinct manner, unleſs they appear unworthy of a ſerious anſwer; and then a facetious manner, both of expreſſion and geſture, may be the moſt proper way to confute them. In the concluſion, both the *voice* and geſture ſhould be briſk and ſprightly.

There are ſometimes certain words, which require an EMPHASIS and diſtinction of the *voice*: ſuch are often pronouns, as *this is the man*; and many words that denote the circumſtances and qualities of a thing, ſome of which heightening or magnifying the idea of the thing to which they are joined, elevate the *voice*, and others debaſing or leſſening it, depreſs the *voice*, or at leaſt protract the tone. Some tropes likewiſe, as metaphors, and verbal figures, which conſiſt in the repetition of a ſingle word, ſhould have a particular emphaſis.

In ſentences, regard ſhould be had to their length, and the number of their parts, in order to diſtinguiſh them by proper pauſes. The frame and ſtructure of the period ought likewiſe to be conſidered, that the *voice* may be ſo managed, as to give it the moſt muſical accent. Unleſs there be ſome ſpecial reaſon for the contrary, it ſhould end louder than it begins. In an antitheſis, one contrary muſt be louder than the other; in a climax, or gradation, the voice ſhould riſe with it.

As to the paſſions, it is evident that each of them requires a different *voice* and action. Love and eſteem are expreſſed in a ſmooth and cheerful tone; but anger and reſentment with a rough, harſh, and interrupted *voice*. Joy raiſes and dilates the *voice*; as ſorrow ſinks and contracts it. Fear occaſions a tremor and heſitation of the *voice*; and aſſurance gives it ſtrength and firmneſs. Admiration elevates the *voice*, and ſhould be expreſſed with pomp and magnificence; the expreſſion of it being often accompanied with an elevation both of the eyes and hands: on the contrary, contempt ſinks and protracts the *voice*.

All exclamations ſhould be violent. When we addreſs inanimate things, the *voice* ſhould be higher than when we addreſs animated beings; and appeals to heaven muſt be made in a loftier tone than thoſe to men.

After all, it is impoſſible to gain a juſt and decent pronunciation of *voice* and geſture merely from rules, without practice, and an imitation of the beſt examples. Ward's Orat. vol. ii. lect. 48. and lect. 50.

VOICE, *part of the*, in *Muſic*. See PART.

VOID *ſpace*, in *Phyſics*. See VACUUM, &c.

VOID, in *Common Law*. See ANNULLING.

VOID *baſtion*. See BASTION.

VOIDANCE, *vacancy*, in the *Canon Law*, a want of an incumbent upon a benefice. See VACANCY, &c.

This is twofold; either in law, *de jure*; as when one holds ſeveral benefices that are incompatible: or *de facto*, in deed; as when the incumbent is dead, or reſigns, or is actually deprived.

VOIDED, *vuide*, in *Heraldry*, is underſtood of an ordinary whoſe inner or middle part is cut out, leaving nothing but its edges to ſhew its form; ſo that the field appears through it. Hence, it is needleſs to expreſs the colour, or metal, of the *voided* part; becauſe it muſt, of courſe, be that of the field.

The Croſs VOIDED differs from the croſs *fimbriated*, in that this latter does not ſhew the field through it, as the other does. And the ſame obtains in other ordinaries.

VOIDER, in *Heraldry*, one of the ordinaries, whoſe figure is much like that of the flaſque, or FLANCH; only that it doth not bend ſo much. See *Tab.* II. *Heraldry*, *fig.* 90.

This armoury, they ſay, is properly the reward of a gentlewoman that has well ſerved her prince. It is always borne by pairs.

VOIDING, *evacuating*, in *Medicine*. See EVACUATION.

In the Philoſophical Tranſactions we have an account of one Matt. Milford, who *voided* a worm by urine, ſuppoſed to have come from the kidneys.

Dr. Liſter mentions true caterpillars *voided* by a boy of nine years old. Mr. Jeſſop ſaw hexapods vomited up by a girl. Catharina Geilaria, who died in 1662, in the hoſpital of Altenburg, for twenty years *voided*, they ſay, by vomit and ſtool, toads and lizards. Ephem. German. tom. i. obſ. 103.

In the ſame Ephem. is alſo a ſtory of a kitten, bred in the ſtomach, and vomited up; and others of whelps, frogs, lacertæ aquaticæ, and other animals, bred and *voided* the like way. Bartholine gives us an inſtance of a worm bred in the brain, and *voided* by the noſe of O. W. See WORMS.

VOIR *dire*, in *Law*. When, upon a trial at law it is prayed, that a witneſs may be ſworn upon a *voir dire*, the meaning is, that he ſhall, upon his oath, ſpeak or declare the truth, whether he ſhall get or loſe by the matter in controverſy. If he be unconcerned, his teſtimony is allowed, otherwiſe not.

VOL, among *Heralds*, ſignifies the two wings of a fowl joined together, borne in armoury; as being the whole that makes the flight. Accordingly, a *demi-vol* is a ſingle wing.

VOLA, the palm, or inſide of the hand, comprehended between the fingers and the wriſt.

VOLANS. See DRACO, and PISCIS.

VOLANT, in *Heraldry*, is when a bird, in a coat of arms, is drawn flying, or having its winds ſpread out.

VOLANT, *paſs*. See PASS-VOLANT.

VOLANT, *pont*. See PONT-VOLANT.

VOLATICA, in *Medicine*, a name given by authors to a ſort of wandering pain, attended with a tumor, and affecting, at different times, different parts of the body. It is by ſome accounted a ſpecies of the ſcuvy; by others, of the leproſy.

VOLATILE, in *Phyſics*, is commonly uſed to denote a mixt body, whoſe integral parts are eaſily diſſipated by fire, or heat; but it is more properly uſed for bodies whoſe elements, or firſt component parts, are eaſily ſeparated from each other, and diſperſed in air.

For, as any mixt body is ſaid to be *fixed*, in a double ſenſe; ſo may it be ſaid to be *volatile* two ways; whence the ſame body, e. gr. mercury, is both *volatile* and fixt at the ſame time.

Since, as its integral parts, or thoſe which ſtill retain the nature of mercury, are eaſily ſeparable by fire, and readily fly away, it is ſaid to be *volatile*; and yet, as it is very difficult to deſtroy its contexture, and reſolve it by fire, or any other menſtruum, into its firſt elements, it is ſaid to be *fixt*. The ſame may be ſaid of ſulphur, antimony, &c.

As thoſe bodies which by heat ſuffer no diminution of their weight are ſaid to be FIXED, ſo thoſe which do loſe of their weight are ſaid to be *volatile*; and they are ſaid to be more or leſs *volatile*, according as a greater or leſs degree of heat is requiſite for producing a ſeparation of their parts. Perhaps, indeed, every body is, rigorouſly ſpeaking, *volatile*; but as there are ſome, the volatility of which can be only rendered ſenſible by the action of a fire much more violent than any which we can produce, we conſider theſe bodies as being fixed, or not *volatile*.

Minerals, for the generality, are leſs *volatile* than vegetables; and vegetables are leſs ſo than animals.

The chemiſts diſtinguiſh between *volatile* ſalts and fixt ſalts. The capitals of aludels ſtop and collect the *volatile* parts of ſubſtances in ſublimation, and make what we call *flowers*.

"The particles of fluids which do not cohere very "ſtrongly together, and are of ſuch ſmallneſs as renders "them moſt ſuſceptible of thoſe agitations which keep "liquors in a fluor, are eaſily rarefied into vapour; and, "in the language of the chemiſts, are *volatile*. Thoſe "which are groſſer, and by that means leſs ſuſceptible "of alterations, or which cohere by a ſtronger heat, or, "perhaps, not without fermentation; theſe are what "the chemiſts call *fixt bodies*." Newton's Optics, p. 371.

VOLATILE, in *Chemiſtry*. When the fire decompounds any mixt body, the parts moſt diſpoſed to receive a great motion are ſooneſt looſened, and riſe up in the order which the differences of that diſpoſition give them; the reſt remaining immoveable at the bottom of the veſſel. Thoſe that riſe firſt are called *volatile parts*: ſuch are *phlegm*, *oil*, *ſpirits*, and *ſalts*, both urinous, and alkalious.

The parts remaining, viz. *earth*, and *lixivial ſalts*, are called *fixt*. For the making of fixt ſalts *volatile*, ſee *Fixed* SALTS.

VOLATILE *alkaly*. See ALKALY.

VOLATILE *ſalt of amber*. See AMBER.

Sal **VOLATILE** *oleoſum*. See SAL.

VOLATILE *ſalts*. See SALTS.

It is the opinion of many of the greateſt chemiſts, that our diſtinction of ſalts into fixed and *volotile* is far from juſt, becauſe there are in nature no ſuch things as fixed ſalts. Tartar is generally allowed to contain as much fixed ſalt as any thing, yet this ſubſtance, treated by fermentation, in Langelot's method, yields all in *volatile* ſalt that it would otherwiſe have yielded in fixed, and leaves ſcarce any fixed at all. The ſame proceſs will have the ſame effect on the ſuppoſed fixed ſalts of moſt other ſubſtances; and upon this, and many other conſiderations, it appears highly probable, that our diviſion of ſalts into fixed and *volatile* is unknown to nature; there not being to be formally found in any body, before calcination, any fixed ſalt; but ſalts are in themſelves all *volatile*, though by the action of the fire they are apt to be colliquated among themſelves, and blended with the earthy parts, and by that means rendered fixed.

The diviſion of ſalts into acids and alkalies has much more reaſon for its foundation: theſe are differences which really exiſt in them, and by means of theſe all fermentations, and all motions in natural things, begin. Both theſe ſalts appear to be in their own nature *volatile*, and therefore eaſily reſoluble by the ſupervening ſalt of the air.

It appears that all vegetables, eſpecially the aromatic claſs, if they are any conſiderable time expoſed to the air, loſe their ſalts. The ſoundeſt wood, loſing its ſalts in proceſs of time, in the ſame manner moulders away.

Theſe are proofs that the ſalts of theſe bodies are in themſelves *volatile*, though they are all liable to be rendered fixed by the action of fire, by which means the acid and the alkali are blended together, and the mixture becomes fixed.

We are indebted to the pains of Dr. Cox for a method of procuring a *volatile* ſalt from plants, a thing of conſiderable uſe in medicine, though ſo much out of the common road of the chemical analyſes, that it was not diſcovered till about a century ago, and ſoon after reduced to practice, in a regular manner, by that phyſician.

The method is this: a quantity of the leaves of any plant are to be carefully ſtripped from the ſtalks in ſummer, in dry weather; lay them in a heap, preſſed hard together, and they will ſoon ferment and heat, and will be reduced to a pulpy ſubſtance. This is to be rolled into little balls, and put into a retort, and diſtilled; it will yield a thick liquor of a ſtrong ſmell, and a large quantity of a black oil, of a balſamic conſiſtence. The liquor is to be ſeparated from the oil, and diſtilled over again in a tall glaſs cucurbit; a *volatile* ſpirit ariſes; this is to be rectified two or three times more, and then is not to be diſtinguiſhed from the ſpirit of hartſhorn, urine, or other animal ſubſtances, by any trials. Phil. Tranſ. Nº 101. p. 4.

All plants that have ever been tried in this manner, yield this *volatile* ſalt diſſolved into the form of a ſpirit; and the very loweſt claſs of plants, the moſſes, and common graſs, yield it as well as any other. And it is remarkable, that the veſſels, in which theſe operations are performed, have afterwards a ſmell like muſk, which all the cleanſing in the world, and even the expoſing of them to the air, does not well clean them of. The caput mortuum left in the veſſels is much leſs in quantity than in the common diſtillations of a like quantity of the ſame plant; and if the plants have not been ſufficiently fermented before the diſtillation, there remains, after the firſt rectification of the ſpirituous liquor, a ſour water.

The *volatile* ſalt, thus obtained, is conſiderably more in quantity than the eſſential or the incinerated ſalt would have been in the common ways of preparing them; but thoſe plants which yield moſt fixed ſalt always yield moſt *volatile* ſalt this way. And theſe volatile ſalts, when well rectified, do not differ from one another, though made from ever ſo different plants; but this is not wonderful, ſince the fixed ſalts alſo, and the vinous ſpirits of all plants are alike, when reduced to the ſame degree of perfection and purity. The herb, as it ferments, affords its natural ſmell at firſt, very ſtrongly; after that it yields a mixed ſmell, between its own natural ſcent and an urinous one; and at the end, when it is nearly ready for diſtillation, the ſmell becomes urinous. In this operation, the urinous ſpirit and ſalt come over chiefly toward the end of the diſtillation, and are ſeen in form of white clouds, iſſuing very faſt out of the neck of the retort, and condenſing on the ſides of the receiver into little rivulets, or winding ſtreams of water.

Sage, winter-ſavory, and ſome other of the aromatic plants, yield thin *volatile* ſalt, on the firſt diſtillation, in a dry form, coating over the inſide of the receiver on the upper part, and clogging the neck of the retort; and ſaffron, in digeſtion with ſpirit of wine, has been found to yield its ſalt in the ſame dry form.

It is remarkable, that the very greateſt heat of the fermentation of theſe plants does not prevent their being ſtored with a ſort of maggots, which ſwarm in great numbers in thoſe parts of the fermented maſs, where the heat is ſo great, that a perſon cannot bear his hand in it.

It is to be conſidered, whether theſe animals may not afford the volatile ſalt attributed to the plants. The doctor does not ſeem to have conſidered this; but as they are ſaid to be very numerous in the maſs, it will be very neceſſary to try the effect of a diſtillation of ſome of this fermented matter, without theſe inſects; which might be done by covering the whole from the acceſs of flies; for though the doctor ſeems to think they are equivocally generated there, it is certain that they owe their origin entirely and only to the eggs of flies. The doctor ſeems to think that they will of themſelves yield no *volatile* ſalt or ſpirit; but this is ſo different from the nature of animal bodies in general, that it may be this opinion was founded on too ſlight a trial. If the external air be excluded from plants, they will not ferment; and if they are put into a long-necked glaſs, and left open, they will, in a few weeks, become of a mucilaginous nature; and after ſtanding a year in this manner, they will yield a large quantity of urinous ſalt or ſpirit, but not a drop of oil.

Some moſſes, and other of the plants uſually called imperfect, yield a *volatile* ſalt on diſtillation, without previous putrefaction; and ſome ſeeds, though in themſelves inſipid to the taſte, have the ſame quality.

All theſe ſpirits and ſalts have the ſame properties and effects with the ſpirits of hartſhorn and urine. They change ſyrup of violets, and many other vegetable tinctures, green. They are diaphoretic, diuretic, and deobſtruent, and contrary in their nature to acids. They precipitate all metals diſſolved in acids; by breaking the force of thoſe acids; and when highly rectified, and mixed with ſpirit of wine as highly rectified, they make the offa alba of Helmont; like all other *volatile* alkali ſpirits, they unite with acids, and thereby become ammoniac or neutral ſalts. Phil. Tranſ. Nº 101. p. 4, &c.

Chemical experiments abundantly prove that *volatile* ſalts are obtainable from all kinds of land animals; the amphibious and ſubterraneous tribes, birds, fiſh, and reptiles; from alkaline vegetables, alſo without putrefaction; and from all other vegetables, after putrefaction; as alſo from ſoot, horns, hoofs, and all refuſe animal and vegetable matters, ſuch as the pith of horns, urine, the blood of ſlaughter-houſes, &c. and theſe are as pure and perfect as from hartſhorn; and this affords a hint for the making of *volatile* alkalies and ſal ammoniac cheap in England. Shaw's Lectures, p. 168.

The ſhootings of *volatile* ſalts are not limited, like thoſe of the fixed and common ſalts, to any determinate figures, but, by various accidents, are thrown into a great variety of pleaſing forms. Fanciful people have ſuppoſed the ſhootings of ſalt of hartſhorn, in the tops of the veſſels uſed in ſubliming it, to reſemble the horns of the deers; and that of vipers, to aſſume the figure of little crawling ſerpents; but all this is imaginary, and the things from which the ſalts are obtained have no power to determine their forms, which are governed by more vague principles; ſuch as the peculiar degree of heat, the temperature of the external air, and many other the like uncertain principles.

We have, in the Philoſophical Tranſactions, an account of a whole foreſt of moſt elegant trees painted in perſpective, in the head of a veſſel, by theſe bodies. The ſubſtances employed were ſal ammoniac and pot-aſhes; theſe were mixed in equal quantities, and put into a tall glaſs body, which being placed in ſand, immediately on the approach of the heat, a large quantity of the ſalt was ſublimed in flowers in the common way: this was a proceſs from which nothing particular could be expected; but after ſome time the ſublimed ſalt began to aſſume a regular form, and the head of the cucurbit, which was very large, was filled with the repreſentations of trees ſo perfect and elegant, that a foreſt, delineated by the ableſt hand, could ſcarce come up to it.

The figures, though externally numerous, yet were very regular, and all reducible to three kinds; the pine, the fir, and one other tree. Theſe, though very exact, and beautiful, could have no analogy with the ſubſtances out of which the ſalts were formed, the fir and pine kind yielding ſo little fixed ſalt, that they are never employed for this purpoſe, and the ſal ammoniac belonging to no vegetable production at all. The ſame proceſs repeated ſeveral times afterward, both with the ſame ſalts, and with others of the ſame nature, never arrived at this perfection; and the whole beauty of this was loſt while the ſpectators were gazing on it, by the ſublimation of more of the ſalt, which filled up all the interſtices, and deſtroyed the figure. Phil. Tranſ. N° 105.

VOLATILISATION, or VOLATILIZATION, the act of rendering fixt bodies volatile, or reſolving them, by fire, into a fine, ſubtile vapour, or ſpirit, which eaſily diſſipates, and flies away.

All bodies, even the moſt fixt, as gold, may be *volatilized*, either of themſelves, or with the admixture of ſome volatile ſubſtance, or ſpirit; by diſtillation, or ſublimation.

In the Memoirs of the Royal Academy we have a diſcourſe on the *volatilization* of the fixt ſalts of plants, by M. Homberg. See *Fixed* SALTS.

VOLATILITY, in *Chemiſtry*, is a property that many bodies have of being reduced into light vapours, which exhale when they are expoſed to the action of fire. This quality is oppoſed to FIXITY, and is owing to the greater or leſs dilatability which bodies have, when expoſed to fire. See VOLATILE, SUBLIMATION, &c.

VOLCANO, in *Natural Hiſtory*, a name given to burning mountains, or to vents for ſubterranean fires, that belch or vomit flame, aſhes, cinders, ſtones, liquid ſulphur, and other ſubſtances.

Europe affords five principal openings of this kind. Of theſe, the chief is Ætna, now Gibel, in the iſland of Sicily, a *volcano* famous in all hiſtories. The eruptions of flame and ſmoke from this *volcano* are ſeen, by thoſe that ſail on the Mediterranean, at the diſtance of forty German miles from the ſhore of Sicily. Though fire and ſmoke are continually diſcharged from it, yet it rages at ſometimes with peculiar violence. In 1536 it ſhook all Sicily; the noiſe proceeding from it reſembled that of the firing of great guns, and many houſes were overthrown throughout the whole iſland. After this ſtorm had continued for eleven days, the ground opened in ſeveral places, and diſcharged fire and flame; which in four days conſumed all that were within five leagues of Ætna. Then the funnel, on the top of the mountain, diſgorged a great quantity of aſhes, which were not only diſperſed over the whole iſland, but alſo carried beyond ſea to Italy, ſo that ſeveral ſhips that were ſailing to Venice, at two hundred leagues diſtance, ſuffered damage. Mr. Oldenburg has given an hiſtorical account of the eruptions of mount Ætna, in Phil. Tranſ. N° 48. p. 967. See ERUPTION.

The laſt very great eruption from this mountain happened in 1669; of which the earl of Winchelſea, who was a ſpectator, ſays, that the inundation of fire, cinders, and burning ſtones, advanced into the ſea ſix hundred yards, and a mile in breadth: it deſtroyed in forty days the habitations of twenty-ſeven thouſand perſons; and of twenty thouſand perſons, who inhabited Catania, three thouſand only remained. He adds, that the fiery deluge in its progreſs met with a lake four miles in compaſs, and not only filled it up, though it was four fathoms deep, but raiſed it into a mountain.

Borelli has calculated, that the matter diſcharged at this eruption was ſufficient to fill a ſpace of 93,838,750 cubic paces. Sir William Hamilton, who viſited this mountain in 1769, informs us, that the lava which ran from it, and on which there are as yet no ſigns of vegetation, is fourteen miles in length, and in many parts ſix in breadth, and that it reached Catania, and deſtroyed part of its walls, buried an amphitheatre, an aqueduct, and many other monuments of its ancient grandeur, and ran far into the ſea, ſo as to form a ſafe harbour, which was ſoon after filled up by a freſh torrent of the ſame inflamed matter. There has been no ſuch eruption ſince, though there are ſigns of many, more terrible, that preceded it.

From the higheſt point of Ætna, ſir William counted forty-four mountains in the middle region on the Catanian ſide, and many others on the other ſide of the mountain, all of a conical form, and each having a crater, which, he ſays, have been evidently raiſed by exploſion. He eſtimated the great crater of Ætna to be about two miles and a half in circumference. The laſt eruption of Ætna was in 1766.

The next to this is Veſuvius, near Naples. The firſt ERUPTION of this mountain recorded in hiſtory, is that which happened in the time of Veſpaſian, A. D. 79; on which occaſion, ſays Dion. Caſſius, great quantities of aſhes and ſulphureous ſmoke were carried not only to Rome, but alſo beyond the Mediterranean, into Africa, and even to Egypt. Birds were ſuffocated in the air, and fell down dead upon the ground, and fiſhes periſhed in the neighbouring waters, which were made hot, and infected by it. Sir William Hamilton reckons, that the eruption in 1767 was the twenty-ſeventh from that in the time of Titus, ſince which there have been nine others; that of 1779 being peculiarly violent and alarming.

Biſhop Berkley has given a particular account of the eruption in 1717; for which, ſee Phil. Tranſ. N° 354. p. 708. or the Life of Berkley, in the Biographia Britannica, by Dr. Kippis.

We have an account of mount Veſuvius, and of the eruption from it in 1737, by the prince of Caſſano, in the Philoſophical Tranſactions, N° 435. ſect. 1, 2.

The matter thrown out flowed like melted lead, and moved about half a mile in an hour, which was an unuſual velocity. The trees, touched by this matter, immediately took fire, and fell. Glaſs in houſes was melted into a paſte.

The academy of ſciences of Naples made an analyſis of the matter thrown out in this eruption. From which it appears, that this matter contains iron; that it is ſpongy at top, and denſe towards the bottom; and after growing hard, it retained part of its heat above a month. Damps were afterwards ſeen to ariſe in divers parts of the mountains. An ammoniacal ſalt, which gave an extraordinary coldneſs to water in diſſolving, was alſo found here.

Sir William Hamilton has given an accurate and circumſtantial deſcription of the eruptions in 1766, 1767, and 1779. See Phil. Tranſ. vol. lvii. p. 192. vol. lviii. p. 1, &c. vol. lix. p. 18, &c. vol. lxx. part i. p. 42, &c.

The uſual ſymptoms of an approaching eruption are rumbling noiſes and exploſions within the bowels of the *volcano*, a quantity of ſmoke forcibly iſſuing from its crater, accompanied at times with an emiſſion of red-hot ſcoriæ and aſhes, which gradually increaſe ſo as to exhibit in the night-time the moſt beautiful fire-works that can be imagined. When the eruption of 1779 began, the *volcano* was violently agitated; a white and ſulphureous ſmoke iſſued continually and impetuouſly from its crater, forming clouds reſembling bales of the whiteſt cotton. Such a maſs of theſe was ſoon piled over the top of the *volcano* as exceeded the height and ſize of the mountain itſelf at leaſt four times. In the midſt of this white ſmoke, an immenſe quantity of ſtones, ſcoriæ, and aſhes, were ſhot up to a height not leſs than two thouſand feet; and a quantity of liquid lava was diſcharged, which ran with violence near four miles from the ſpot whence it iſſued. Minute aſhes, of a reddiſh hue, were diſperſed to a great diſtance, and darkened the air; theſe aſhes were mixed with long filaments of a vitrified matter, like ſpun-glaſs; ſeveral birds in cages were ſuffocated by the ſulphureous ſmoke; and the leaves of trees were covered with white ſalts very corroſive. In the progreſs of the eruption, after loud exploſions, a fountain of liquid tranſparent fire began to riſe, and gradually increaſing, arrived at a height not leſs than three times that of Veſuvius itſelf, which riſes perpendicularly near three thouſand ſeven hundred feet above the level of the ſea. Puffs of black ſmoke ſucceeded one another haſtily, and accompanied the red-hot, tranſparent, and liquid lava, within which ſmoke ſir William Hamilton perceived a bright, but pale, electrical fire, briſkly playing about, in zig-zag lines. The liquid lava, mixed with ſtones and ſcoriæ, after having mounted at leaſt ten thouſand feet, in part perpendicularly, and joining that which iſſued from the crater, formed one complete body of fire, not leſs than two miles and a half in breadth, and of the extraordinary height above mentioned, caſting a heat to the diſtance of at leaſt ſix miles around it. The black cloud of ſmoke was charged in its courſe with electrical matter, which darted about it in ſtrong and bright zig-zags, juſt like thoſe deſcribed by Pliny the younger in his letter to Tacitus, and which accompanied the great eruption of Veſuvius that proved fatal to his uncle. This volcanic lightning, however, very rarely quitted the cloud, but uſually returned to the great column of fire, toward the centre of the *volcano*, from whence it originally came. The air, for ſome time after the eruption had ceaſed, continued in a conſiderable degree electrical. Whilſt the eruption laſted, a mixed ſmell, like that of ſulphur, with the vapours of an iron foundery, was ſenſible. The air, after one day's eruption, was filled at night for many hours with meteors, ſuch as are vulgarly called falling ſtars, which ſhot generally in a horizontal direction, leaving behind them a luminous trace, which quickly diſappeared. Many ſmall volcanic ſtones and cinders were afterwards found to have fallen more than thirty miles from Veſuvius, and minute aſhes fell in great abundance at the diſtance of a hundred miles. The number and ſize of the ſtones, or fragments of lava, which were thrown out of the *volcano* in this eruption, were incredible: the largeſt was in circumference no leſs than a hundred and eight feet, and ſeventeen feet high. It was a ſolid block, much vitrified. This was thrown at leaſt a quarter of a mile clear of the *volcano*. For an account of theſe, and many other curious circumſtances attending the eruption of 1779, illuſtrated by a figure. See Phil. Tranſ. vol. lxx. part i. art. 4.

The known qualities and effects of the noxious vapours, called in Italy *mofete*, that are uſually ſet in motion by an eruption of the *volcano*, and that are then manifeſt in the wells and ſubterraneous parts of its neighbourhood, correſpond with thoſe attributed to fixed air. Id. vol. lxi. part i. p. 41.

Water has been alſo obſerved to be mixed with the aſhes that are thrown up by the eruptions of *volcanos*.

Stromboli is another *volcano*, which exiſts in all its force, and it is in its form the moſt pyramidal of all the Lipari iſlands, which have been all formed by exploſion. This *volcano* differs from Ætna and Veſuvius, by its continually emitting fire, and ſeldom any lava.

Hecla alſo, in Iceland, rages ſometimes with as great violence as Ætna, and caſts out great ſtones. The chimæra in Greece is likewiſe a *volcano*.

The *volcanos* of Aſia are not leſs numerous than thoſe in Europe; there are ſeveral in the mountains of Perſia, and in the iſland of Ormuz. The pic of Adam, in the iſland of Ceylon, alſo burns at certain times, but the principal *volcanos* of that part of the world are in the Philippine and Molucca iſlands. Java and Sumatra alſo furniſh ſome in the centre of their largeſt mountains. The iſland of Ternate affords alſo a *volcano* on the top of a mountain very difficult of acceſs, but opening with a vaſt mouth, and very terrible when it burns.

The ſeveral violent eruptions of this mountain have given it, within the mouth or crater, the appearance of an amphitheatre, formed for holding people at the time of ſome public ſhew, ſeveral circles appearing in it one above another, found with a ſort of regularity that is ſurpriſing.

In Japan there are very numerous inſtances of the uſe that mountains ſerve to on this occaſion, many of the higher mountains of that iſland burning almoſt continually; and the little iſlands which lie ſcattered about in the ſame ſea have alſo many of them ſpiracles of the ſame kind in the tops of the mountains, ſeen principally in the night, when the abſence of the ſun's rays gives their faint fire leave to appear.

Whatever may be the number of theſe *volcanos* in Aſia, there is no part of the world that yields ſo many as America. In the kingdom of Chili alone there are fourteen very conſiderable *volcanos*, all placed in a regular order one by the other; and not a leſs number in Peru; theſe all burſt forth from the ſummits of thoſe vaſt mountains the Andes. In New Spain there are three very formidable for the fierceneſs of their burning.

Near Guatimala, in South America, are two mountains; the one called *volcano of fire*, the other of water. Out of the firſt, huge pieces of rocks are frequently hurled, with as much vehemence as balls out of a cannon; and a written letter may be read [illegible] the light of its flames at the diſtance of three miles. Out of the other vaſt quantities of water are continually thrown up.

The moſt extreme parts [illegible] the northern world are not free from theſe ſtore-houſes of fire. Authors tell us of no leſs than four of them in the moſt northern parts of Tartary; and we know that Greenland, and all the neighbouring country, have them. The *volcanos* of the Terra del Fuego are very well known, and it is indeed the general opinion, that farther north than we have yet penetrated, there may be very many undiſcovered ones; and ſome authors have gone ſo far as to declare, that, were the cold no prevention, we ſhould not be able to come much nearer than we do to the ſouthern pole, for the number and fierceneſs of the burning mountains.

Africa alſo has its *volcanos*, in the kingdom of Fez, and other places.

There are alſo ſome *volcanos* which have left off burning, as that on the iſland of Queimoda, upon the coaſt of Braſil, near the mouth of Rio de la Plata; the mountains in Congo or Angola; thoſe in the Azores, eſpecially in Tercera and St. Michael, which formerly uſed to burn, but now only emit occaſionally ſmoke and vapours. The iſlands of St. Helena and Aſcenſion, Iſchia, and the Lipari iſlands, in the Mediterranean ſea; ſeveral of the Molucca iſlands in the Indian ſea; ſeveral of the Azores and Antilles, &c. in the Atlantic ocean; Otaheite and Huaheine, &c. in the Southern ocean; all theſe, and many others, furniſh a variety of volcanic appearances and remains.

Sir William Hamilton has lately given an account of certain traces of *volcanos* on the banks of the Rhine. Phil. Tranſ. vol. lxviii. part i. art. 1.

Ancient extinguiſhed *volcanos* have, indeed, lately been diſcovered in the inland parts of moſt countries; and as *volcanos* now exiſting are generally placed in the neighbourhood of the ſea, ſome have inferred from thence, that the ſea at ſome remote period covered thoſe countries. Submarine *volcanos* have often been obſerved even in our own times. The volcanic mountains, which are of different heights, generally form lofty ſpires internally ſhaped like an inverted cone, placed on a broader baſis. This cone is called the crater of the *volcano*, as the lava commonly paſſes through it, though it ſometimes burſts from the ſides, and even from the bottom of the mountain; ſometimes the crater itſelf falls in, and is defaced; and ſometimes in extinguiſhed *volcanos* it is filled with water, and forms thoſe lakes that are obſerved on the ſummit of ſome mountains.

The effects of *volcanos* in the courſe of many ages muſt be allowed to be very conſiderable; and hence ſome have taken occaſion to account for the formation of mountains, iſlands, and even the immenſe continents in our preſent globe.

That many mountains owe their origin to *volcanos* is an unqueſtionable fact, confirmed by ſeveral obſervations recited by ſir William Hamilton. The mountain called Montagno Novo, near Puzzoli, which is a hundred and fifty feet high, and three miles round, roſe in one night out of the Lucrine lake, in 1538; and he ſays it is not more extraordinary, that Veſuvius itſelf ſhould in many ages riſe above two thouſand feet. All the high grounds near Naples are formed in the ſame manner, as ſir William could not diſcover, in any place, what could be called virgin earth; and if he were to eſtabliſh a ſyſtem, he ſays, it would be, that mountains are produced by *volcanos* and not *volcanos* by mountains.

Dr. Hooke formerly had maintained, that all land was raiſed out of the ſea by earthquakes; and modern philoſophers ſeem to admit his hypotheſis, though not, perhaps, in its utmoſt latitude. Von Troil (Letters on Iceland, p. 222.) is of opinion, that this iſland has been produced by *volcanos* in the courſe of ſeveral centuries. Dr. Forſter, in his Obſervations made during a Voyage round the World, p. 151. after giving an ingenious conjecture concerning the origin of all the tropical low iſles in the South Sea, aſſures us, that of the higher iſles there is hardly one of them which has not ſtrong veſtiges of its having undergone ſome violent alteration by a *volcano*. Some of them have *volcanos*, ſtill ſubſiſting; others, among which are Otaheite and Huaheine, ſeem to have been elevated, in remote ages, from the bottom of the ſea by ſubterraneous fires. Sir William Hamilton is confident, that the iſland of Iſchia, the whole baſis of which is lava, roſe out of the ſea in the ſame manner as ſome of the Azores.

Mr. Whitehurſt, in his Inquiry into the original State and Formation of the Earth, 4to. 1778, apprehends, that ſubterraneous fire muſt at different times have exiſted univerſally in the bowels of the earth, and that in union with water, or by the expanſive power of ſteam, it has produced the immenſe continents, as well as the mountains of our globe, and alſo the univerſal deluge. When theſe fires were firſt kindled, by what ſort of fuel they are ſtill maintained, at what depths below the ſurface of the earth they are placed; whether they have a mutual communication; of what dimenſions they conſiſt, and how long they may continue, are queſtions which do not admit an eaſy deciſion. Some, with M. Buffon, have placed the ſeat of the fire of *volcanos* towards the centre, or near the ſummit of the mountains, which they ſuppoſe to furniſh the matter emitted. But if this were the caſe, that part of the mountain which is ſituated above the ſuppoſed ſeat of the fire, muſt be deſtroyed or diſſipated in a ſhort time; whereas an eruption uſually adds to the height and bulk of a *volcano*; and the matter diſcharged by it for many ages would be ſufficient to form three ſuch mountains as the ſimple cone or mountain of the exiſting *volcano*.

Mr. Gerhard computes, that Veſuvius has ejected from the year 79 to 1783, 309,658,161 cubic feet. Beſides, if the ſeat of the fire of the *volcano* did not lie far below the baſis of the mountain, or general level of the country whence the mountain ſprings, the quantity of matter thrown up would ſoon leave ſo great a hollow under it, that the mountain itſelf muſt ſink and diſappear after a few eruptions. Others have, therefore, with greater probability ſuppoſed, that the earth, at a conſiderable diſtance below its ſurface, is ſurrounded with a ſtratum of ignited matter of a definite thickneſs; or that the whole central part of it is nothing but a maſs of melted minerals, which every where ſtruggling for vent, burſts forth where there is the leaſt reſiſtance, ſhivering into rude fragments the ſuperincumbent cruſt of earth, and deluging with mountainous torrents of liquid fire the adjoining countries. And as iron makes from one-fifth to one-fourth of all theſe diſcharges, ſome have inferred, that the interior parts of the earth conſiſt chiefly of this metal, its ores, or ſtones that contain it; conjecturing alſo, that their greater or leſs dephlogiſtication in different parts may be the cauſe of the variation of magnetic direction.

As for the cauſe of thoſe ſubterraneous fires, that produce *volcanos*, Dr. Liſter is of opinion, that they are owing to that inflammable mineral called PYRITES, a ſubſtance conſiſting of ſulphur and iron, and found in great plenty in all thoſe mountains where the *volcanos* are found to break out.

The quantities of ſulphur continually ſublimed in theſe mountains, in the ſame manner as the common ſulphur is ſeparated by artificial fire from the pyrites in Germany, ſeem to prove this; and what farther evinces it is, that the black or purple cinders thrown out of theſe *volcanos* in their moſt violent eruptions, and wholly differing from the calcined ſtones or pumice, will be attracted by the magnet, and ſhew that the whole is very much the ſame with that caput mortuum of the common pyrites, out of which we have extracted or burnt away the ſulphur.

No ſubject in the whole mineral kingdom is ſo proper for the keeping up a fire for the many ages theſe mountains have been burning, as the pyrites. Nothing is ſo laſting a fuel, and, in general, other fuels become more or leſs laſting, as they partake more or leſs of its nature. Scotch coals have more of the bitumen in them, and leſs of the pyrites than others, and therefore they burn away quickly, and leave only white aſhes, without any remains of the pyrites; and yet it is ſaid, there are ſome collieries on fire now in Scotland, which were on fire in the time of Agricola. The common Newcaſtle coal burns more ſlowly away, becauſe it contains a far larger portion of the pyrites mixed with its bitumen, as is found by the ſulphureous ſmell it yields in burning; and the Sunderland coal, which contains moſt of all of this mineral, burns with a more ſulphureous ſmell indeed, but ſo ſlowly, that it is ſaid proverbially to make three fires. This burns to a heavy reddiſh cinder, much reſembling the caput mortuum of the pyrites, or the ſlags caſt out of the burning mountains, and contains ſo much iron, that it is freely attracted by the magnet.

There is, in Ireland, a ſort of coal more rich in the pyrites than all theſe, and ſeeming indeed to conſiſt in great part of it. This, conſequently, keeps up a much more durable fire than any of the others, and will remain twenty-four hours red-hot in the fire without changing its ſhape. The riſe of the breath or efluvia of theſe pyrites into the air, and their taking fire there, may, Dr. Liſter apprehends, very naturally cauſe lightning and thunder there; and it is remarkable, that even the ſeemingly miraculous accounts of ſtorms, throwing down iron-duſt or iron-ſtones, inſtead of hail or rain, do not wholly diſcredit this ſyſtem: for iron being one part of the conſtituent matter of the pyrites, it is poſſible it may have been raiſed in a vapour with it, and when the ſulphureous part was fixed and burnt away, it may have again concreted into a ſolid form, and in that form have fallen to the earth again. Phil. Tranſ. N° 157.

Mr. Lemery ſeems to have been the firſt perſon who illuſtrated, by actual experiment, the origin of ſubterraneous fires. He mixed twenty-five pounds of powdered ſulphur with an equal weight of iron filings; and having made with water, a paſte of the mixture, he put it into an iron pot, covered it with a cloth, and buried it a foot under ground. In about eight or nine hours time the earth ſwelled, became warm, and cracked; hot ſulphureous vapours were perceived; a flame which dilated the cracks was obſerved; the ſuperincumbent earth was covered with a yellow and black powder; and, in ſhort, a ſubterraneous fire, producing a *volcano* in miniature, was ſpontaneouſly lighted up from the reciprocal actions of ſulphur, iron, and water. See *Artificial* EARTHQUAKES.

The above experiment has been often repeated; and it has been obſerved, that large quantities of the materials are not requiſite to make the experiment ſucceed, provided there be a due proportion of water: half a pound of ſteel filings, half a pound of flowers of brimſtone, and fourteen ounces of water, will, when well mixed, acquire heat enough to make the maſs take fire. But it was known long before the time of Lemery, that natural mixtures of ſulphur and iron would ſpontaneouſly take fire. Theſe ſubſtances, it is well known, are ſupplied by the pyrites; a ſmall quantity of which is ſufficient to kindle a fire; a proper portion of water (for too great a quantity would exinguiſh the ſubterraneous fire) may be derived either from fiſſures and channels communicating with the ſea, or from ſources in the earth, wherein it is known to abound; and air, if it ſhould be thought abſolutely neceſſary to the ſpontaneous firing of the pyrites, may be conceived either to accompany the water, or to deſcend into the innermoſt parts of the earth through the fiſſures which are found on its ſurface. Or, if we ſuppoſe the heated pyrites to have been in contact with black wad and petrol, the flame may ariſe, as it is produced by art, from the deſiccation of that ſubſtance, and its mixture with the mineral oil. That ore when heated affords dephlogiſticated air, of which a very ſmall quantity is ſufficient to produce flame; and the flame when once produced, may be ſupported by dephlogiſticated air from other ores, as Dr. Prieſtley has ſhewn (Obſ. on Air, vol. iv. p. 210, &c.), and the phlogiſton may be ſupplied by pyrites, bituminous ſhiſtus, bitumen, and coal. After the eruption in any place, the *volcanos* themſelves ſerve for ſpiracles or air-holes, by which the ſubterranean fire may receive neceſſary ſupplies; ſo that theſe ſerve to keep the magazines of internal fire in a due ſtate as well as to diſcharge the ſmoke and other matters with which it would otherwiſe be choaked up and extinguiſhed.

It was the opinion of biſhop Berkeley, that a vacuum was made within the body of the earth by a vaſt body of inflammable matter taking fire, and that the water, by communication with the ſea, ruſhed in, and was converted into ſteam. However this be, it is certain, that by the proceſs above explained, a vapour would be produced, whoſe elaſtic force is known to be ſeveral times greater than that of gunpowder; and, therefore, if the ſuperincumbent weight were not too great, it might cauſe earthquakes; and it would propel the matter melted by the ſubterraneous fire laterally towards the mouth of the *volcano*, where meeting with leaſt reſiſtance, it would expel it, together with all the unmelted ſtony maſſes which it found in its paſſage. It is eaſy to conceive, that before the denſe matter is ejected, the dilated air of the *volcano* will be firſt forced out, and carry with it the aſhes and looſer ſtones adhering to the ſides and crater of the *volcano*, in the manner obſerved and deſcribed by ſir William Hamilton.

It is obſerved, that *volcanos* and ignivomous mountains, though ſome of the moſt terrible phenomena in nature, have their uſes; being a kind of ſpiracles, or tunnels, whereby to vent the fire and vapour that would otherwiſe make a more dreadful havock, by convulſions and earthquakes. Accordingly, Dr. Woodward obſerves, there is ſcarce any country much annoyed with earthquake, but has one of theſe fiery vents; which is conſtantly obſerved to be all in flames, whenever an earthquake happens: by which means it ſoon diſgorges that fire, which, while it was underneath, was the cauſe of the diſaſter; and there are not wanting inſtances of countries that have been wholly freed from earthquakes, by the eruption of a new *volcano*.

Dr. Prieſtley (Obſ. on Air, vol. i. p. 263.) thinks it not improbable, that the *volcanos*, with which there are evident traces of almoſt the whole ſurface of the earth having been overſpread, may have been the origin of our atmoſphere, as well as (according to the opinion of ſome) of all the ſolid land. The ſuperfluous phlogiſton of the air, in the ſtate in which it iſſues from *volcanos*, may have been imbibed by the waters of the ſea, which it is probable covered the ſurface of the earth, though part of it might have united with the acid vapour exhaled from the ſea, and by this union have made a conſiderable and valuable addition to the common maſs of air; and the remainder of this overcharge of phlogiſton may have been imbibed by plants as ſoon as the earth was furniſhed with them.

The ſubſtances ejected by *volcanos* are phlogiſticated, fixed, and inflammable air, water, aſhes, pumice-ſtones, ſtones that have undergone no fuſion, and lava. The water proceeds partly from that contained in the *volcano*, partly from the condenſed vapours, and partly, perhaps, from the intimate union of the phlogiſton and dephlogiſticated air; an union which ſome late experiments ſhew to be productive of water in certain circumſtances. From the ſtones, projected to great diſtances, may probably be derived thoſe ſolitary maſſes of granite, which are ſometimes met with in lime-ſtone countries. Some have ſuppoſed that baſaltes, and in many inſtances ſhoal, owe their origin both to fire and water; having been at firſt a lava; but this lava, while in a liquid ſtate, being immerſed in water, was ſo diffuſed or diſſolved in it by the aſſiſtance of heat, as to cryſtallize when cold, or coaleſce into regular forms. Baſaltic mountains, common in Sweden, ſeem to owe their origin to ſubmarine *volcanos*. The immenſe maſſes of lava ejected by *volcanos* are many years in cooling, and many hundred years are required for their decompoſition, which is quicker or ſlower, as they have been more or leſs perfectly melted. According to the obſervations of ſir William Hamilton (Phil. Tranſ. vol. lxi. part i. p. 5, &c.) the lava of Veſuvius forms one or two feet of mould in a thouſand years; this bed of mould being afterwards covered with freſh lava, and this, after mouldering by means of that of ſtill later eruptions, affords ſome ground for calculating the age of the *volcano*, at leaſt within certain limits.

The beds of lava are deepeſt and narroweſt in the proximity of the crater, and broader and ſhallower as they are more diſtant, unleſs ſome valley intervenes; pumice-ſtone and aſhes lie ſtill more diſtant. From theſe obſervations extinguiſhed *volcanos* are traced. Many excellent inveſtigations of this ſort may be ſeen in M. Soulavie's Hiſtory of the South of France. See Watſon's Chem. Eſſ. vol. i. eſſ. 5. Kirwan's Elem. of Mineral. p. 388, &c. Varenius's Geog. vol i. p. 145, &c.

VOLCANOS *in the moon*. Dr. Herſchel, now ſo well known and univerſally celebrated, on account of his various aſtronomical obſervations, has lately (viz. on the fourth of May, 1783) diſcovered a burning *volcano* in the moon. This diſcovery confirms the conjectures formed by M. Æpinus in 1778, and publiſhed in a memoir printed at Berlin in 1781, concerning the volcanic origin of the inequalities in the moon's ſurface. Similar ideas occurred to profeſſor Beccaria of Turin, nearly at the ſame time, and alſo to profeſſor Lichtenberg, of Gottingen. The nephew of profeſſor Beccaria diſcovered, Oct. 11, 1772, a luminous ſpot on the moon, during its total eclipſe of that night, in or near the place marked Copernicus; and from this time the profeſſor mentioned this obſervation in his public lectures, as an evidence that the round cavities on the ſurface of the moon were ſo many craters of diſtinct *volcanos*; adding, that he conſidered thoſe ſtraight radiations, or bright paths, which are obſerved particularly on the place of the moon marked Tycho, as ſo many torrents of the lava, which ſpouted off in ſome former conflagration of a *volcano*.

The reader may ſee this account, given by the profeſſor himſelf, in a letter concerning the luminous appearance obſerved by Don Ulloa on the moon, during the total eclipſe of the ſun, June 24, 1778; in which he maintains, that ſuch a luminous ſpot was an actual burning *volcano*, and not a real hole through the maſs of the moon, as don Ulloa aſſerted it to be. This letter is inſerted in the Journal de Phyſique for the month of June, 1781. M. Æpinus obſerves, that the opinion of *volcanos* in the moon was firſt ſuggeſted by Dr. Hooke, in his Micrographia, printed at London in 1665; in the twentieth chapter of which work he ſpeaks at large concerning this opinion.

Dr. Herſchel, on the fourth of May, 1783, diſcovered two ſmall conical mountains in the very ſame ſpot where he had obſerved the *volcano*: theſe are ſituated in the Mons Porphyrites of Hevelius, juſt by a third mountain, much larger, which Dr. Herſchel had often obſerved before. See Gent. Mag. for Auguſt, 1784, p. 563, &c. On the 19th of April, 1787, the ſame ingenious and indefatigable obſerver diſcovered three *volcanos* in different places of the dark part of the new moon. Two of them were nearly extinct, or in a ſtate ready to break out. The third ſhewed an actual eruption of fire, or luminous matter. From another obſervation he infers, that the diameter of this *volcano* cannot be leſs than 3″, and that the diameter of its burning part is equal to at leaſt twice that of the third ſatellite of Jupiter, with which it was compared. Hence the ſhining or burning matter is computed to be above three miles in diameter. Phil. Tranſ. vol. lxxvii. part i. p. 230.

VOLERY, a great bird-cage, ſo large that the birds have room to fly up and down in it.

VOLITION, the act of willing. See WILL.

VOLI[illegible]. See THINKING.

VOLKAMERIA, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: it has an empalement of one leaf, indented at the brim in five parts; it has one ringent petal, whoſe cylindrical tube is twice the length of the empalement, ſpread open at the brim, which is cut into five equal ſegments; it has four long, ſlender ſtamina, terminated by ſingle ſummits, and a four-cornered germen, ſupporting a ſlender ſtyle, crowned by a bifid ſtigma; the germen turns to a roundiſh capſule, with two cells, including one ſeed in each. Miller mentions only one, but Linnæus enumerates three ſpecies.

VOLLEY, a military ſalute, made by diſcharging a great number of fire-arms at the ſame time.

VOLO, in *Antiquity*, a name which the Romans gave the ſlaves, who, in the ſecond Punic war, offered themſelves to ſerve in the army, upon a want of a ſufficient number of citizens.

The name *volo*, *volones*, they are ſaid to have had from their offering themſelves voluntarily. Feſtus ſays, it was after the battle of Cannæ that this happened. Macrobius, Sat. lib. i. cap. 2. places it before that battle.

Capitolinus tells us, that Marcus Aurelius formed troops, or legions, of ſlaves, which he called *voluntarii*; and that the like forces, in the ſecond Punic war, had been called *volones*. But, before M. Aurelius, Auguſtus had given the name *voluntarii* to forces which he had raiſed out of *liberti*, or freedmen; as we are aſſured by Macrobius, Sat. lib. i. cap. 2.

The *volones* were afterwards called EVOCATI.

VOLTA, in the *Italian Muſic*, ſhews that the part is to be repeated one, two, or more times, according to the numeral adjective joined with it: thus, *ſi replica una volta*, intimates to play that part once over again.

VOLTA is alſo a ſort of dance of Italian origin, in which the man turns the woman ſeveral times, and then aſſiſts her to make a leap or jump. It is a ſpecies of GALLIARD.

VOLTE, in the *Manege*, ſignifies a round or circular motion, conſiſting of a gait of two treads, made by a horſe going ſideways round a centre; the two treads making parallel tracks, one by the fore-feet, larger; and the other by the hind-feet, ſmaller; the ſhoulder bearing outwards, and the croup approaching towards the centre.

VOLTE, *demi*, is a half-round of one tread, or two, made by the horſe at one of the angles, or corners, of the *volte*, or at the end of the line of the paſſade; ſo as when he is near the end of this line, or near one of the corners of the *volte*, he changes hands, to return by a ſemicircle.

VOLTE, *reverſed*, or *inverted*, is a track of two treads, which the horſe makes with his head to the centre, and his croup out; going ſideways upon a walk, trot, or gallop; and tracing out a larger circumference with his ſhoulders, and a ſmaller with his croup. See on this ſubject Berenger's Art of Horſemanſhip, vol. ii. p. 83, &c.

VOLTURNALIA, among the Romans, a feſtival kept in honour of the god Volturnus, on the ſixth of the calends of September, or twenty-ſixth of Auguſt.

VOLVA, among *Botaniſts*, a membranous matter ſurrounding the baſes of many of the fungi; and in many of them, of very ſingular figure and ſtructure.

VOLVA is alſo a word uſed by Scribonius Largus, and ſome other authors, to expreſs the central part, or, as we call it, the core of the apple, in which the ſeeds are placed. He preſcribes this in weakneſſes of the ſtomach, and reachings to vomit.

VOLUBILIS, in *Botany*. See BINDWEED.

VOLUBLE *ſtalk*. See STALK.

VOLVENS *oculi*, in *Anatomy*, a name given by Spigelius and ſome others, to one of the muſcles of the eye called by Cowper and Albinus, *obliquus inferior*.

VOLUME, *volumen*, a book, or writing, of a fit bulk to be bound by itſelf.

The word has its riſe *à volvendo*, *rolling*, or *winding*; the ancient way of making up books being in rolls of bark, or parchment.

This manner laſted till Cicero's time, and long after paper was invented, and books written thereon. The ſeveral ſheets were glewed, or paſted, end to end, written only on one ſide; and at the bottom a ſtick was faſtened, called *umbilicus*; and at the other end a piece of parchment, whereon was the title of the book in letters of gold. And yet, we are aſſured, king Attalus, or rather Eumenes, had, long before, done up ſome of his books in the ſquare form; as having found the ſecret of parchment, which would bear writing on both ſides.

The library of Ptolemy king of Egypt contained, according to Aulus Gellius, three hundred thouſand *volumes*; and, according to Sabellicus, ſeven hundred thouſand.

Raymund Lully wrote about four thouſand *volumes*; whereof we have divers catalogues extant. It is held, that Triſmegiſtus wrote ſix thouſand five hundred twenty-five *volumes*; others ſay, thirty-ſix thouſand five hundred twenty-nine: but it is much more rational to ſuppoſe, with La Croix, that it was the cuſtom with the Egyptians to put all the books they compoſed under the name of *Triſmegiſtus*.

At preſent, *volume* is chiefly uſed in the ſame ſenſe with *tome*, for a part, or diviſion, of a work, bound ſeparately. In this ſenſe we ſay, "The Councils are printed "at the Louvre, in thirty-ſeven *volumes*." See TOME.

VOLUME *of a body* is alſo uſed among foreign philoſophers, for its bulk, or the ſpace incloſed within its ſuperficies.

VOLUMUS, in *Law*, the firſt word of a clauſe in one ſpecies of the king's writs of protection, and letters patent.

VOLUNT, *voluntas*, in *Law*, is when a tenant holds lands, &c. at the will of the leſſor, or lord of the manor.

VOLUNTARY, in the *Schools*. The generality of philoſophers uſe *voluntary* in the ſame ſenſe with SPONTANEOUS; and apply it to any thing ariſing from an internal principle, attended with a due knowledge thereof.

Ariſtotle, and his followers, reſtrain the term *voluntary* to thoſe actions that proceed from an inward principle, which knows all the circumſtances of the action.

There are two things, therefore, required to the *voluntarineſs* of an action: the firſt, that it proceeds from an inward principle; thus, walking for pleaſure-ſake, is a *voluntary* action; as ariſing from the will commanding, and the moving faculty obeying, which are both internal. On the contrary, the motion of a man dragged to priſon is not *voluntary*.

The ſecond, that the action be performed with a perfect intelligence of the end, and circumſtances thereof: in which ſenſe the actions of brutes, children, ſleeping people, &c. are not properly *voluntary*.

Anatomiſts diſtinguiſh between the *voluntary* and natural or *involuntary* motions in the body. Of the latter kind are thoſe of the heart, lungs, pulſe, &c.

VOLUNTARY, in *Muſic*, a piece played by a muſician extempore, according to his fancy. This is often uſed before he begins to ſet himſelf to play any particular compoſition, to try the inſtrument, and to lead him into the key of the piece he intends to perform. See RESEARCH.

In the Philoſophical Tranſactions, Nº 483. ſect. 2. we have a method of writing down extempore *voluntaries*, or other pieces of muſic, as faſt as any maſter can play them on the organ, or harpſichord; and that in a manner expreſſive of all the varieties thoſe inſtruments are capable of. This is performed by a cylinder, turning equally upon its axis, under the keys of an organ, and by having points under the heads of the keys. Hence, when they are preſſed down, they will make a ſcratch or mark on the cylinder, which may ſhew the duration of the note; and the ſituation of this mark on the cylinder will ſhew what note was touched. For farther particulars we refer the curious to the Tranſaction itſelf.

VOLUNTARY *agent*, *eſcape*, *homicide*, *novation*; ſee the ſubſtantives.

VOLUNTEERS, in the *Military Art*, perſons who enter of their own accord to ſerve in the army. See LISTING.

VOLVOX, in the Linnæan ſyſtem of *Natural Hiſtory*, a genus of the order of *zoophytes*, in the claſs of *vermes*. Its characters are, that the body is ſmooth, gelatinous, roundiſh, without joints, and formed for a whirling or vertiginous motion. Its young are roundiſh, and lodged in ſmall holes in different parts of the body. Of this genus, Linnæus enumerates four ſpecies. See BEROE, and GLOBE *animalcule*.

VOLUSPA, q. d. *the oracle of the propheteſs*, in *Mythology*, a poem of about four hundred verſes, forming part of the ancient EDDA.

VOLUTA, the *volute*, in *Natural Hiſtory*, the name of a genus of ſhells, the characters of which are theſe: they are univalve ſhells, and have an oblong mouth, with a clavicle ſometimes erect, ſometimes depreſſed; and they are ſometimes coronated at the top. See *Tab. of Shells*, Nº 10.

In the Linnæan ſyſtem, the *voluta* is a genus of the *teſtacea* order, in the claſs of *vermes*; the characters of which are, that its animal is a ſlug; that the ſhell is univalve and ſpiral, the aperture narrow, without a beak, and the columella, or pillar, plaited. Linnæus enumerates forty-ſix ſpecies, among which are the mitres, Perſian crowns, cylinders, and other univalves, that have their pillar plaited or wrinkled; but he calls the *voluta* of other authors, *conus*.

In the arrangement of Mr. Da Coſta, it is the twelfth family of *univalve* SHELLS.

This genus of ſhells is generally confounded by authors with that of the cylindri. There is indeed a general external reſemblance between theſe two kinds of ſhells at firſt ſight; but when they are a little examined, they will be found very different. The *volutæ* are of a conic figure. One of their extremities is of a pyramidal figure, and the other formed into high ribs, which conſtitute a depreſſed clavicle, or a dentated crown; on the contrary, the cylinder is nearly of an equal ſize at both ends; and it is not neceſſary to have recourſe to the form of the mouth of this ſhell, in order to fix its generical character. Its figure, which is lengthened out into a point in the lower end, ſufficiently characterizes this genus; and to this may be added another very remarkable character, which is, that the head is ſeparated from the body of the ſhell by a high rib.

The moſt remarkable ſpecific character in this genus is in the ſhape of the clavicle, ſome ſpecies having it very much elevated, and others very flat or depreſſed. The corona imperialis, which is a ſhell of this genus, is ſingular in the dentated crown, which terminates its head.

The *volutæ* make the moſt rich and beautiful ſhells of the whole body of ſea productions. Rumphius calls them *eximiæ*; and the admiral and vice-admiral ſhells, ſo famous among the curious, and held at ſo great a price, are both of this genus. The brightneſs of the colours, the perfect white of the enamel, and the elegant ſhape of theſe ſhells, would make them the firſt in eſteem among this claſs of bodies, even were they common; but it happens that their ſcarcity adds immenſely to their value. There is one of theſe ſhells now in Holland, which coſt the poſſeſſor five hundred florins. It is from the bands and faſciæ of theſe ſhells, which reſemble the colours of ſhips, that they have obtained the names of admiral and vice-admiral.

Some of the Hollanders give to another ſhell of this kind the name of extra-admiral; this reſembles the admiral, but has its colours arranged without diviſions of the white enamel. It is a very ſcarce ſhell, but leſs beautiful than either of the two others.

The *cedo nulli* is ſo extremely rare and beautiful, that it is valued at the prodigious ſum of a hundred guineas.

The family of the *volutæ* being numerous, the ſpecies may be aptly ranged under three general heads. 1. Thoſe with an exerted clavicle. 2. Thoſe with a depreſſed clavicle. And, 3. Thoſe with a coronated clavicle. Hiſt. Nat. Eclair. p. 279.

VOLUTE, VOLUTA, in *Architecture*, a kind of ſpiral ſcroll, uſed in the Ionic and Compoſite capitals; whereof it makes the principal characteriſtic and ornament. See *Tab. Archit. fig.* 29. *fig.* 26. *fig.* 27.

Some call it the *ram's horn*, from its figure, which bears a near reſemblance thereto.

Moſt architects ſuppoſe, that the antients intended the *volute* to repreſent the bark or rind of a tree, laid under the abacus, and twiſted thus at each extreme, where it is at liberty: others will have it a ſort of pillow or bolſter, laid between the abacus and echinus, to prevent the latter being broken by the weight of the former, and the entablature over it; and, accordingly, they call it *pulvinus*. Others, after Vitruvius, will have it to repreſent the curls, or treſſes, of a woman's hair.

The number of *volutes* in the Ionic order is four; in the Compoſite, eight.

There are alſo eight angular *volutes* in the Corinthian capital, accompanied with eight other ſmaller ones, called *helices*.

There are ſeveral diverſities practiſed in the *volute*. In ſome, the liſt or edge, throughout all the circumvolutions, is in the ſame line or plane: ſuch are the antique Ionic *volutes*, and thoſe of Vignola. In others, the ſpires or circumvolutions fall back; in others, they project, or ſtand out. Again, in ſome, the circumvolutions are oval; in others, the canal of one circumvolution is detached from the liſt of another, by a vacuity or aperture. In others, the rind is parallel to the abacus, and ſprings out from behind the flower thereof. In others, it ſeems to ſpring out of the vaſe, from behind the ovum, and riſes to the abacus, as in moſt of the fine Compoſite capitals.

The *volute* is a part of great importance to the beauty of the column. Hence, architects have invented divers ways of delineating it. The principal are that of Vitruvius, which was long loſt, and at laſt reſtored by Goldman; and that of Palladio. Daviler prefers the former as the eaſier. The manner thereof is as follows:

Draw the cathetus F C (*Tab. Architecture*, *fig.* 29.) whoſe length muſt be half a module, and from the point C deſcribe the eye of the *volute* A E B D, of which the diameter is to be $3\frac{1}{3}$ minutes; divide it into four equal ſectors by the diameters A B, D E: biſect the radii C A, CB, in 1 and 4; conſtruct a ſquare 1, 2, 3, 4, from the centre C to the angles 2, 3; draw the diagonals C 2, C 3, and divide the ſide of the ſquare 1, 4, into ſix equal parts, at 5, 9, C, 12, 8; then through the points 5, 9. 12, 8, draw the lines 5, 6, 9, 10, 12, 11, 8, 7, parallel to the diameter E D, which will cut the diagonals in 6, 7, 10, 11, and the points 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, will be the centres of the *volute*. From the firſt centre 1, with the interval I F, deſcribe the quadrant F G, from the ſecond centre 2, with the interval 2 G, deſcribe the quadrant G H, and, continuing the ſame operation from all the twelve centres, the contour of the *volute* will be completed.

The centres for deſcribing the fillet are found in this manner: conſtruct a triangle, of which the ſide A F (*fig.* 30), is equal to the part of the cathetus contained between A F, and the ſide F V equal to C 1; on the ſide A F, place the diſtance F S from F towards A, equal to F S, the breadth of the fillet, and through the point S draw the line S T, which will be to C 1 in the ſame proportion as A S is to A F; place this line on each ſide of the centre C, on the diameter of the eye A B; divide it into three equal parts; and through the points of diviſion, draw lines parallel to the diameter E D, which will cut the diagonals C 2, C 3, and you will have twelve new centres, from whence the interior contour of the fillet may be deſcribed, in the ſame manner as the exterior one was from the firſt centres.

Conſoles, modillions, and other ſorts of ornaments, have likewiſe their *volutes*, or ſcrolls.

Volute, *canal of the.* See Canal.

Volute, *eye of the.* See Eye.

VOLVULA, in *Natural Hiſtory*, the name of an extraneous foſſile body, nearly allied to the entrochus, being compoſed of the ſame ſubſtance, and being like that of a cylindric column, made up of ſeveral joints; the commiſſures of the joints are, however, much leſs viſible in the *volvulæ* than in the entrochi, and they are not ſtriated, as in the entrochus, from the centre to the circumference.

The *volvulæ* are of various figures; ſome reſemble in ſhape a little bottle, and are called *volvulæ utriculatæ*, and of theſe ſome have, and others have not, a ſtar marked on their bottom; others of them ſwell out in the middle, and taper a little toward each end; and theſe, from their reſemblance in ſhape to a little barrel, are called *dolioli*, or *volvulæ doliatæ*. There is great reaſon, from the analogy theſe bear to the entrochi, and other foſſils which owe their form to animal remains, to ſuppoſe theſe of the ſame origin; but we yet know not to what animal it is that they have belonged. Hill's Hiſt. Foſſ. p. 653.

VOLVULUS, in *Botany*, a name given by Daleſchamp, and ſome others, to the upright narrow-leaved or toad-flax-leaved bind-weed. See Convolvulus.

Volvulus, in *Medicine*, a name which ſome authors give to the ILIAC *paſſion*, by others called *chordapſus*; and by others *miſerere mei*.

VOMER, in *Anatomy*, a Latin name, ſignifying, literally, a *ploughſhare*; uſed, by authors, to denote the eleventh, or, according to the numeration of others, the thirteenth bone of the upper jaw; by reaſon of the reſemblance it bears to that utenſil.

The *vomer*, or *vomer aratri*, is a thin bone, placed in the middle of the noſe, over the palate, and ſerving to part the two noſtrils from each other.

It is in figure nearly of an oblique ſquare. Anatomiſts divide it into the right and left ſide, both of which are unequally flat; and four edges, the ſuperior, inferior, anterior, and poſterior: the upper edge is an horizontal groove, which receives the ſharp proceſs or roſtrum of the os ſphenoides: this groove is broad, narrower in the fore-part, and ending in a ſtraight line, which divides the bone into two laminæ. The anterior edge is oblique, and very unequal; its poſterior part is ſmall and thin, and ſupports the perpendicular lamina of the os ethmoides; the anterior is larger, with a pretty deep groove, continued from the canal in the upper edge, which ſuſtains the cartilaginous ſeptum of the nares. The lower edge is likewiſe unequal; and near its anterior extremity is an angle, which divides it into two parts; one anterior, very ſhort, which is ſet in the criſta narium; the other poſterior, and much longer, ſet in the common groove of the oſſa maxillaria and palate. The angle by which this edge is divided lies in the notch formed by the criſta narium, and the groove of the maxillary bones. The poſterior edge is oblique and ſharp, becoming inſenſibly more obtuſe as it approaches to the larger groove in the edge. This bone has but very little diploe; it is connected with the os ſphenoides, os ethmoides, oſſa maxillaria, and oſſa palati; its uſe is to form the poſterior part of the ſeptum narium. Winſlow.

Vomer, in *Ichthyology*, a ſpecies of ZEUS, with a forked tail, and ſpine occumbent before the anal and dorſal fin. This is an American fiſh.

VOMICA, in *Natural Hiſtory*, a word uſed by the ancients to expreſs one of the blemiſhes to which cryſtals and the precious ſtones are ſubject. This is a duſky foulneſs lying deep in the ſtone, and giving a duſky colour and tinge to the whole. Both the luſtre and tranſparence of the ſtone are much hurt by this accident. When the *vomica* was of a bluiſh or blackiſh colour, the Romans expreſſed it by the word PLUMBAGO.

Vomica, in *Medicine*, a collection of pus in any part of the body. When this maſs, or collection, is in the lungs, it is called *vomica pulmomum*. When in the kidneys, *vomica renum*, &c.

Vomica *pulmonum*, in *Medicine*, the name of a diſeaſe which is a ſanious collection of matter, or an apoſtem formed in the lungs, and included in its own proper membrane; this ſometimes ſeizes one lobe, ſometimes the other; and ſometimes lies deep in the ſubſtance, ſometimes near the ſurface. It finally breaks, and then diſcovers itſelf by a diſcharge of purulent matter from the lungs. This differs from an EMPYEMA, which is a collection of pus in the cavity of the thorax.

The ſigns of this diſeaſe are at firſt very diſtinct; it generally begins from a hard node, which by ſlow degrees, ripens into a collection of matter. A hectic fever is a conſtant attendant on it, and there is always a dry cough attending it; but this is not very violent. Toward the ripening of the matter, there is a difficulty of breathing, and often the patient complains of a dull heavy pain, ſometimes of a very acute one, in ſome particular part of the breaſt. The face is irregularly red, and a langour grows upon the whole body. The appetite is irregular, and finally a fever comes on; and during this the ſwelling breaks, and the matter is thrown up in ſuch large quantities as to endanger ſuffocation.

The moſt fatal diſeaſes are uſually the moſt rare, and this is of that number, ſeldom being met with, and when it is, too often fatal. The cauſes of it are, ſtagnations of the blood in plethoric habits, in the veſicles of the lungs; and theſe are uſually owing to the ſuppreſſion of natural habitual evacuations, or the omiſſion of artificial ones, as habitual bleedings and the like; to theſe are to be added, external injuries from falls, blows, or wounds of the breaſt; violent running till out of breath, and a ſudden cooling of the breaſt while the body is hot.

If the *vomica* be ſituated at the bottom of the affected lobe of the lungs, and in its internal part, i. e. nearly in the middle of the breaſt, ſome puffineſs or ſwelling may be perceived in ſome bodies, by gently preſſing the pit of their ſtomach; eſpecially when the patient coughs.

The uſual cauſes of the breaking of a *vomica*, when formed, are violent ſucuſſions of the body, loud ſpeaking or calling, violent coughing or ſneezing, and the falling of any ſubſtance in eating into the windpipe.

The breaking of it may be alſo promoted by making the patient receive continually, by his mouth, the vapour of warm water; and by ſwallowing a large quantity of the moſt emollient liquid, ſuch as barley-water, almond milk, light veal broth, or milk and water. Shaking and jolting in a carriage have alſo ſometimes effected a rupture.

Prognoſtics in it. The more ſlowly this diſeaſe advances to its height, the more difficultly it is diſcovered; and the deeper it lies in the ſubſtance of the lungs, the greater is the danger of it; though, when moſt ſuperficial, it is of no ſmall danger; for, breaking externally on the lungs, it diſcharges its matter into the cavity of the thorax, and thus makes an EMPYEMA, a diſtemper little leſs fatal than the other, unleſs the matter be immediately let out by the PARACENTESIS. When the matter has lain deep, there is great danger of the perſon's being ſuffocated either at the firſt diſcharge of it, or at the ſucceeding ones, if they are large, and he be already worn down by a hectic, as is uſually the caſe; and even if he eſcapes this, the apoſtem degenerates into an ulcer, and ſo brings on a phthiſis.

In general, the ſmaller the quantity of matter thrown up, the leſs is the danger. If the matter diſcharged be thick, and the cough and breathing become eaſier, there may be ſome hopes of a cure; the diet at this time ought to be light, but reſtorative, as chicken broths, ſago gruel, rice milk, &c. the drink, butter-milk, or whey ſweetened with honey. This is likewiſe a proper time for the Peruvian bark, as directed under the article PHTHISIS.

Many perſons afflicted with a *vomica* faint away at the inſtant when it breaks. In this caſe ſharp vinegar ſhould be applied to the noſe; and this ſmall aſſiſtance is generally ſufficient, when the burſting of it is not attended with ſuch appearances as ſhew it to be mortal, in which caſe every application is inſignificant.

Method of cure. The ſame general medicines are to be uſed as in a phthiſis. The apoſtem is to be cleanſed and abſterged, which is done by pectorals mixed with diſcutients; ſuch are liquorice, hyſſop, and the ſeeds of carduus Mariæ. Then the ſolution of continuity is, if poſſible, to be repaired. This is to be attempted by balſamics, ſuch as comfrey, plantain, ground-ivy, and the like. The febrile heat is to be allayed, by mixtures of nitre and diaphoretic antimony; and the violence of the cough abated by the uſe of gentle opiates, ſuch as ſtorax pill, and the like, in ſmall doſes.

The bowels are to be kept open by clyſters and gentle purges; revulſion is to be made by bleeding in the foot, and after this, the pectorals, &c. are to be relied on. And during the whole courſe a light diet, tranquillity of body and mind, and moderate exerciſe on horſeback, are to be preſcribed. Junker's Conſp. Med. p. 173, ſeq. Buchan's Dom. Med. p. 199, &c. Tiſſot's Adv. p. 94, &c. See CONSUMPTION and PHTHISIS.

After the rupture and diſcharge of a *vomica*, Dr. Percival obſerves, that fixed air promiſes to be a powerful palliative. Antiſeptic fumigations and vapours have been long employed and much extolled in caſes of this kind. Percival's Eſſ. vol. ii. Prieſtley's Obſ. on Air, vol. i. p. 301. See ULCERS.

VOMICA, *nux*, *Vomic Nut*. See NUX *Vomica*.

VOMIT, *black*, a diſtemper frequent in the Weſt Indies, particularly at Carthagena. The following account of this diſtemper was communicated by a friend.

The city of Carthagena is ſituated in 10° 25′ 48½″ of north latitude. The weather there is always ſultry hot. A thermometer, conſtructed by Monſieur de Reaumur, gave, on the 19th of November, 1735, one of their winter months, the degree of the warmth of the air 1025 diviſions and a half; and this, with little variation, both night and day. The greateſt height to which the ſpirit aſcended at Paris, the ſame year, by a thermometer graduated in the ſame manner, was 1025½ diviſions; ſo that the heat of the cool nights at Carthagena was nearly equal to that of the hotteſt days at Paris.

As the heats in this climate are ſo great without receiving any mitigation from the night, it is no wonder that the perſpiration of the inhabitants is very great. From this it comes about, that all thoſe who make their abode there any time appear pale and weakly, as though newly recovering from a fit of illneſs. You remark in all their actions, even ſo far as in their ſpeaking, a certain idleneſs, and, as our author expreſſes himſelf, a disjointedneſs: notwithſtanding this they are in good health, though their aſpect indicates the contrary. The people who arrive there from Europe, hold their appearance of ſtrength and colour in their countenances during three or four months; but after that time they loſe both one and the other from the quantity of ſweat, until they become like the former inhabitants. Theſe effects are moſt obſervable in younger people: on the contrary, thoſe who are farther advanced in life when they go thither, preſerve their former appearance better, and enjoy ſo good a ſtate of health, that they live commonly to more than eighty years of age.

As the temperament of this country is particular, ſo are ſome of its diſtempers. Theſe may be conſidered of two kinds, viz. thoſe diſtempers to which the Europeans newly arrived there are liable, and they only; and thoſe which are common to all perſons there, as well Criollos as Chapetones.

The diſtempers of the firſt claſs are many, as the reſort of the Europeans there is very great. They are very dangerous, and often mortal. They frequently deſtroy a great part of the people, both ſailors and others, who arrive there from Europe. The continuance of theſe diſtempers is very ſhort: they laſt but three or four days, in which time the ſick either die, or are out of danger. The particular diſtemper to which they are moſt liable, is very little known, though it takes its riſe in ſome from taking cold, in others from indigeſtion; but from whichſoever of theſe, or what other cauſe it takes its riſe, it becomes in the ſhort time before mentioned the *vomito prieto*, or *black vomit*, which is what kills them; it being very rare that thoſe who have it eſcape. It is obſerved that in ſome their delirium is ſo violent, that they are obliged to be tied down in their beds, that they may not tear themſelves to pieces, and they often die raving with the greateſt degree of agony.

It is to be remarked, that thoſe only are ſubject to this diſtemper who are lately arrived from Europe; the inhabitants of the country, as well as thoſe who have lived there any time, are by no means liable to it, and enjoy perfect health during its greateſt violence. As the crews of ſhips are very liable to this diſtemper, and more ſo than the officers and paſſengers, who have a greater variety of food and liquor; it has been conceived that the great exerciſe and labour of theſe people, and their feeding upon ſalt proviſions, prepare their conſtitutions to be liable in this climate to corruption of the blood and humours from whence is ſuppoſed to proceed the *vomito prieto*. What muſt be obſerved is, that although the crews of ſhips ſuffer the greateſt mortality, nevertheleſs paſſengers and others, who go the voyage under the greateſt advantages with regard to the conveniences of life, are not free from being expoſed to it. It muſt be remarked alſo, that thoſe perſons, who after having been uſed to this climate, go from thence, and are abſent even three or four years, are not liable to it at their return, but retain their health like the other inhabitants, although in their way of living they have not obſerved the moſt exact regimen.

The deſire of knowing the cauſe of this terrible calamity has occupied from time to time the minds of the ſurgeons who make this voyage in the galleons, as well as thoſe of the phyſicians of the country; and their opinion has been, that it chiefly takes its riſe from the labour, to which the ſhip's crews are conſtantly expoſed, and their manner of living. There is no doubt but theſe may greatly contribute thereto; but then it will be difficult to conceive why perſons, who are better circumſtanced, are likewiſe liable to it: and it is ſomewhat extraordinary, that notwithſtanding many endeavours have been made towards finding out remedies equal to this diſeaſe, none have been diſcovered either as ſpecifics or preſervatives; for the inconſtancy of the ſymptoms is ſo great, that they are not in the beginning to be diſtinguiſhed from thoſe, which are in common to this with ſlighter diſtempers; but the principal complaints at firſt are a wearineſs and great diſorder in the head.

This diſtemper does not always attack the ſhips of Europe at their arrival in the bay of Carthagena, nor is it very ancient in that country; for what they heretofore called *chapetonada*, ſo denominated, as thoſe from Europe were only liable to it, were indigeſtions; and though they were in that climate always attended with danger, the women of the country, as they do now, cured them with eaſe, eſpecially when they were taken in time. The ſhips afterwards going from Carthagena to Porto Bello, it was there ſucceeded by the great mortality, which was always attributed to the unſeaſonableneſs of the climate, and to the fatigue of the ſhip's crew in unloading their ſhips, and in the buſineſs of the fair there.

The *black vomit* was not known at Carthagena, nor in its neighbourhood, until the years 1729 and 30; when firſt it carried off a great part of the crews of the ſhips of war, which Don Domingo Juſtiniani then commanded, and were then there as guarda coſtas. Theſe ſhips were firſt attacked at Santa Martha, where the ſeverity of this diſtemper, and its great ſlaughter, had caſt a great terror upon their crews. The ſecond attack of this diſtemper was on board the galleons commanded by Don Manuel Lopez Pintado, when its mortality was highly formidable; and death followed the attack ſo quick, that perſons who were one day ſeen walking at large, were next day met carried to their graves.

Our author is of opinion that this, as well as ſome other diſtempers, to which Europeans are liable at, or ſoon after, their arrival at Carthagena, and other places under the ſame circumſtances, ſhould be conſidered as ariſing from the great alteration that happens in their conſtitutions there: and this change, which from the climate is ſoon brought about, makes them ſuffer this and other diſtempers, which either deſtroy them, or generate in them, a diſpoſition to bear the heats; after which, being as it were naturaliſed, they enjoy the ſame ſhare of health with the natives.

Our author remarks, that at Carthagena, when the ſhips from Spain fail in their arrival, the European productions, which at all times are dear and much valued there, are ſometimes quite expended. Theſe more particularly are wine, oil, and raiſins. When this is the caſe with regard to wine, the people there ſuffer much in their heath; as all, except the negroes and thoſe who uſe brandy, accuſtom themſelves to drink it with their food. From the want of this their ſtomachs fail, they grow ſick, and this ſickneſs becomes general. This want of wine happened when our author arrived at Carthagena, and the ſickneſs in conſequence was ſo general in that city, that maſs was celebrated only in one of their churches.

VOMITING, VOMITUS, as a diſeaſe, a violent caſting up, or evacuating by the mouth, what is contained in the ſtomach. See EVACUATION.

This action has been generally allowed to be owing, principally to the contraction of the fibres of the ſtomach, when irritated by the acrimonious quality, or oppreſſed with the quantity of its contents.

But M. Chirac, and after him M. du Verney, and others, ſet aſide the fibres of the ſtomach, and advance, that *vomiting* is produced wholly by the exraordinary motions of the diaphragm, and muſcles of the lower venter. So that the ſtomach is here ſuppoſed deſtitute of all action, and caſts back its contents only by its being compreſſed and flatted, from ſome foreign and accidental cauſes.

However Boerhaave, and moſt of our lateſt writers, allow the ſtomach, the diaphragm, and the muſcles of the abdomen, all to have their ſhare in the action of *vomiting*; accordingly, that diligent author makes *vomiting* to conſiſt in a convulſive and retrograde motion of the muſcular fibres of the gullet, ſtomach, and inteſtines, as well as thoſe of the abdomen, and the ſeptum tranſverſum; which, when in a leſs degree, produce a nauſea, and, in a greater, a *vomiting*.

By the contraction of ſo many parts, the ſtomach comes to be ſqueezed, as in a preſs, whence it is obliged to give up what is contained in its cavity, and the neighbouring parts, juſt as water is forced out from a bladder, or ſponge, when ſqueezed between the hands.

The evacuation, too, muſt be upwards, rather than downwards, by reaſon the paſſage is more open and eaſy that way; and that the inteſtines are preſſed by the diaphragm and the muſcles of the lower venter.

The primary cauſes of *vomiting* are commonly the too great quantity, or too much acrimony, of the contents, foulneſs of the ſtomach, a tranſlation of the morbific matter of ulcers, the gout, the eryſipelas, or other diſeaſes to the ſtomach; a looſeneſs ſuddenly ſtopped; the ſtoppage of any cuſtomary evacuation, as the bleeding piles, menſes, &c. a weakneſs of the ſtomach, the colic, the iliac paſſion, a rupture, a fit of the gravel, worms, &c. It ariſes alſo from poiſons, contuſions, compreſſions, inflammations, and wounds in the brain; inflammations of the diaphragm, ſtomach, inteſtines, ſpleen, liver, kidneys, pancreas, and meſentery; unuſual agitations in coaches, at ſea, &c.

It may be likewiſe excited by violent paſſions: ſometimes it proceeds from a regurgitation of the bile into the ſtomach, in which caſe the matter diſcharged is generally of a yellow or greeniſh colour, and has a bitter taſte.

Perſons who are ſubject to nervous affections are often ſuddenly ſeized with violent fits of *vomiting*; and, moreover, *vomiting* is a common ſymptom of pregnancy, in which caſe it generally comes on about two weeks after the ſtoppage of the menſes, and continues during the firſt three or four months.

The treatment of *vomiting*, as a diſeaſe, muſt therefore be alſo various, according to the different cauſes producing it.

Critical *vomitings*, by which humours of various kinds are diſcharged by the operation of nature alone, are ſalutary, and ſcarce require any care as to their cure; but are, in many caſes, to be promoted; whereas, ſymptomatical *vomitings*, which are leſs ſufficient, or leſs accommodated to the removing of the cauſe, are more carefully to be treated, in order to their cure.

The two principal curative indications to be obſerved are firſt, to quiet and compoſe the convulſive and unruly motion of the ſtomach, and ſecondly, to oppoſe and ſubdue the material cauſes of the diſorder.

The firſt intention is anſwered by corroborating and antiſpaſmodic medicines, ſuch as ſaffron and caſtor, with the teſtaceous powders, as coral, crab's-claws, and oyſter-ſhells; powders compoſed of cinnamon, the leaves of mint, nutmeg, orange-peel, calamus aromaticus, and other ſuch ſimples, are alſo of great ſervice. And if anodynes are found neceſſary, the ſtorax pill, or Sydenhams's laudanum, are to be given.

While theſe medicines are taken internally, there may alſo be applied outwardly, to the region of the ſtomach, ſuch things as have power to repreſs its diſorderly motions; of this kind are the oil of mint, nutmeg, and the like, with balſam of Peru: theſe oils may be reduced to a proper conſiſtence with this balſam, for ſpreading on leather, and lying on for ſome time. Hungary-water, and other the like ſpirits, are of great uſe alſo, rubbed on with the hand; and to theſe may be added yeaſt, and the ſtrongeſt wine-vinegar applied hot to the part. Finally, an excellent application is balſam of Peru alone, reduced to the conſiſtence of a cataplaſm, with crumb of bread.

The methods to be uſed to remove the material cauſes of the *vomiting*, are next to be conſidered: if it be of the pituitous kind, and owing to crudities in the primæ viæ, and a viſcid mucus ſticking to them, it is beſt cured by an emetic: if the *vomiting* of itſelf be found not ſufficient to cary off the ſordes which occaſioned it, and the patient continues, after the fits of *vomiting*, afflicted with a nauſea and heart-burn; in this caſe a large quantity of warm water, or thin gruel, with a little butter, may ſerve the purpoſe; or if this be found inſufficient, a doſe of ipecacuanha is to be given, and worked off with weak chamomile tea.

When infants are afflicted with *vomiting*, from milk coagulated upon their tender ſtomachs, which is a very frequent caſe, the beſt medicine is a mixture of oxymel of ſquills, and ſyrup of rhubarb. See INFANT.

In caſes of bilious *vomitings*, which ariſe from a weakened digeſtion, and have their fomes in the duodenum, the cure is to be begun with the abſorbent and teſtaceous powders; after theſe gentle purges of rhubarb and manna are to be given; and finally, the cure is to be perfected, by reſtoring the ſtrength of the ſtomach and inteſtines.

In *vomitings* which ariſe from an acrid matter adhering to the nerves of the ſtomach, from the retropulſion of the gout, an eryſipelas, or other ſuch diſorder, the mild ſedatives are to be given, and with them ſuch medicines as promote the expulſion of the matter; and all means are to be uſed to remove it to the ſurface of the ſkin, or to the extremities again. All ſweating medicines are good in this intention, as they carry the matter to the ſurface. Camphor taken internally, in moderate doſes, is alſo of great ſervice; add warm baths for the feet often prove highly uſeful. Bleeding, purging, opening iſſues, ſetons, perpetual bliſters, &c. are of ſervice.

In *vomitings* excited by poiſonous ſubſtances, nothing gives ſuch immediate relief as the taking of large quantities of warm milk, and pinguious liquors; for, by means of theſe, the ſpicula of the poiſon are blunted, and afterwards *vomited* up with the liquors. And hence, in contagious and peſtilential caſes, where there is no inflammation of the ſtomach, many phyſicians have very ſucceſsfully given *vomits* of ipecacuanha, and after theſe acid liquors with diaphoretics.

Acrid, acid, and bilious ſordes, falling upon the inteſtines, often occaſion a *vomiting*, attended with colic pains; in this caſe ſmall doſes of oil of ſweet almonds and manna with large draughts of barley-water between the doſes, are found of great ſervice; and ſmall doſes of laudanum, at proper times, ſerve to complete the cure. In perſons of hot habits, ſpirit of vitriol, and mild laxatives, are found of moſt certain relief.

A *vomiting* which proceeds from acidities in the ſtomach is relieved by alkaline purges; the beſt medicine of the kind is magneſia alba, a tea ſpoonful of which may be taken in a diſh of tea, or a little milk, three or four times a day, or oftener, if neceſſary, to keep the body open.

If *vomiting* proceeds from weakneſs of the ſtomach, bitters will be of ſervice. Peruvian bark, infuſed in wine or brandy, with as much rhubarb as will keep the body gently open, is an excellent medicine in this caſe. The elixir of vitriol alſo is a good medicine, and may be taken in the doſe of fifteen or twenty drops, twice or thrice a day, in a glaſs of wine or water.

If *vomiting* ariſes from violent paſſions, or affections of the mind, all evacuants, and eſpecially vomits, muſt be carefully avoided. The patient ſhould be kept eaſy and quiet, have his mind ſoothed, and take ſome gentle cordial, as negus, or a little brandy and water, to which a few drops of laudanum may be occaſionally added.

When *vomiting* proceeds from ſpaſmodic affections of the ſtomach, muſk, caſtor, and other antiſpaſmodic medicines are of uſe. Aromatic plaſters have likewiſe a good effect. The ſtomach plaſter of the London or Edinburgh Diſpenſatory may be applied to the pit of the ſtomach, or a plaſter of theriaca, which will anſwer better. Aromatic medicines may likewiſe be taken inwardly, as cinnamon or mint tea, wine with ſpices boiled in it, &c. The region of the ſtomach may be rubbed with æther, or ſtrong brandy, or other ſpirits. The belly ſhould be fomented with warm water, or the patient immerſed to the breaſt in a warm bath.

The too frequent method of attempting to ſtop a *vomiting* by aſtringents and anodynes, before the peccant matter is removed, is highly blameable; for when the ſpaſmodic motions are allayed, which nature uſed to free herſelf from this matter, and that yet remains behind, there muſt follow worſe ſymptoms. Theſe remedies, which affect the motion only, and not the matter, are only to be uſed when the motion ſubſiſts after the matter is diſcharged, or when the motion is very violent, and the matter to be thrown off but very ſmall in quantity.

Hence, in *vomitings* excited by the chin-cough in children, ſedatives and anodynes are very proper, ſuch as the ſyrup of red poppies, or diacodium, and a little oil of ſweet almonds.

The *vomitings* of pregnant women, ariſing from a regurgitation of the blood to the ſtomach, which is alſo obſerved in women afflicted with a retention of the menſes, and in men who have a ſtoppage of habitual hæmorrhoidal diſcharges, are beſt removed by temperating medicines, mild laxatives, emollient clyſters; and beſt of all by bleeding, or recalling the natural ſecretions of blood, in the two latter caſes. On ſuch occaſions it is highly improper to give emetics, for they ſometimes bring on a *vomiting* of blood, and ſometimes an inflammation of the ſtomach.

The immoderate and long continued *vomitings* of pregnant women, which principally happen in the firſt months,

months of the time, eſpecially in thoſe who indulge themſelves too much in venery, and are plethoric, are by no means to be cured by aſtringents, opiates, or ſpirituous medicines; but are to be removed by repeated bleedings, in ſmall quantities, ſometimes in the ankle, keeping the body gently open by mild purgatives, as ſtewed prunes, manna, or ſena, reſt of the body, and tranquillity of the mind. They ſhould neither allow their ſtomachs to be quite empty, nor eat much at once. And when *vomiting* of this kind is ſo violent as to threaten abortion, it is often ſtopped more effectually by the drinking of cold water than by any medicine whatſoever. If the ſtomach is weak, a little brandy may be added to it. When an analeptic is neceſſary, one ſpoonful of cinnamon-water, with a little marmalade of quinces or oranges, taken after meals, is ſufficient.

In caſes of efforts to *vomit*, or actual *vomitings*, in the morning, which frequently happen to thoſe who uſe too much ſtrong liquors over night, the teſtaceous powders are to be given, and all other things which will abſorb acidities, and, after theſe, the grateful ſtomachics, ſuch as candied orange-peel, and the like.

Chronical *vomitings* ſometimes affect perſons who have been in a long continued ſtate of grief; in this caſe the beſt relief is found in analeptics, and the uſe of cinnamon-water, impregnated with quinces, and the generous wines.

In *vomitings*, which are a ſymptom of fevers coming on, the uſe of a gentle emetic, ſuch as the ipecacuanha, is very proper. In the ſmall-pox, the *vomiting* uſually ceaſes ſpontaneouſly after the eruption of the puſtules, and in theſe and many other caſes, great relief is to be obtained in *vomitings*, by a mixture of ſalt of wormwood and juice of lemons.

In *vomitings* ariſing from fits of the ſtone, the ſpiritus nitri dulcis often proves of great ſervice; and oily clyſters, and oil of ſweet almonds, taken internally, are alſo of great ſervice.

The *vomiting* of perſons in hernias, or the iliaca paſſio, rarely remits till the cauſe ceaſes. Reſt, and lying in bed, contribute greatly to the ſtopping of immoderate *vomitings*, for all motion of the body excites, in theſe caſes, a freſh tendency to *vomiting*. In the beginning of eryſipelaſes, and the like diſorders, *vomitings* often happen, and theſe are by no means to be checked; but the appearance of the diſeaſe externally is to be forwarded by diaphoretics; for, as ſoon as the eruptions appear, the *vomiting* ſtops of itſelf.

The obſtinate *vomitings* of hyſterical patients are not to be ſtopped by opiates or aſtringents; for the conſequence of this is uſually violent convulſions in the limbs, and anxieties and pain in the præcordia; all which ſymptoms diſappear again as ſoon as the *vomiting* returns.

Dr. Buchan obſerves, that the ſaline draughts, taken in the act of efferveſcence, are of ſingular uſe in ſtopping a *vomiting*, whatever be the cauſe from which it proceeds. Theſe may be prepared by diſſolving a dram of the ſalt of tartar in an ounce and a half of freſh lemon-juice, and adding to it an ounce of pepper-mint water, the ſame quantity of ſimple cinnamon-water, and a little white ſugar. This draught muſt be ſwallowed before the efferveſcence be quite over, and may be repeated every two hours, or oftener, if the *vomiting* be violent. After the *vomiting* has ſtopped, the patient muſt avoid all manner of action; the diet muſt be ſuch as will ſit eaſy on the ſtomach. Hoffman, Op. tom. iii. Buchan's Dom. Med. p. 343, &c.

Dr. Percival relieved a patient who had very ſevere convulſive reachings, after various remedies had been adminiſtered without effect, by means of fixed air. Being indulged, at her earneſt deſire, with half a pint of Burton beer in briſk efferveſcence, the *vomitings* ceaſed immediately, and returned no more. To the fixed air, with which fermenting liquors are known to abound, and to the cordial quality of the beer, the favourable effect produced by it may be juſtly aſcribed. Percival's Eſſ. vol. ii. Prieſtley's Obſ. on Air, vol. i. p. 314.

VOMITINGS *in infants*. See INFANT.

VOMITING *of blood*, *vomitus cruentus*, a very dangerous kind of hæmorrhage, conſiſting in bringing up, by *vomit*, of pure and unmixed blood from the ſtomach, and being a method uſed by nature to throw off a portion of the blood, which moleſts the whole in the vena porta, and, by that means, facilitate the circulation of the reſt of the maſs.

This diſtemper ſometimes ariſes from internal cauſes, and is regularly periodical, obſerving the ſtated times of the eruptions of the menſes, or other natural diſcharges; ſometimes it ariſes from accidents, ſuch as the giving of violent purging or emetic medicines, or corroſive ones.

Preceding ſigns of it. Among theſe are to be reckoned a ſenſation of ſtraitneſs and anxiety in the præcordia, with tenſion, and involuntary ſighs, with a nauſea or ſickneſs of the ſtomach, and a ſtraining to vomit, which is more violent than in vomiting on any other occaſion; after this the blood is thrown up pure, and the *vomiting* then ceaſes, till after a ſenſation of more blood being collected in the ſtomach, the efforts to diſcharge it in the ſame manner are again renewed. The quicker the blood is thrown up, after its being diſcharged into the ſtomach, the more fluid and more florid it appears; the longer it is detained there, the blacker and thicker it appears.

Perſons moſt ſubject to it. A *vomiting* of blood is but an uncommon diſorder: it more frequently attacks women than men; among the female ſex it is principally ſeen in thoſe whom the menſes have left too early in life, or who have had violent ſuppreſſions of them for a long time. In men, this diſtemper ſeldom ſeizes any but thoſe who had been uſed to periodical diſcharges from the hæmorrhoidal veſſels, and who have had them ſuddenly ſtopped; and they are then uſually firſt attacked with violent pains in the left hypochondrium. It is often the effect of obſtructions in the liver, the ſpleen, or ſome of the other viſcera. People of ſcorbutic habits, and ſuch as have had quartan agues of long ſtanding, have been ſometimes thus affected. And, beſide theſe natural cauſes, people of all ages and ſexes may vomit blood, from external injuries.

Prognoſtics from it. A *vomiting* of blood is ever a dangerous diſorder, for though the quantity of blood thrown up is ſeldom ſo great as to occaſion immediate death, yet it generally degenerates into a tabes in men, and into a cachectic habit in women. The extravaſated blood lodges in the bowels, and, becoming putrid, occaſions a dyſentery, or putrid fever. It is leſs dangerous to young women than to any other perſons; and when it is periodical, eſpecially when it obſerves the times of the menſtrual diſcharges, is much leſs dangerous than under any other circumſtances.

Method of cure. During the paroxyſm the proper medicines are powders of nitre, cinnabar, and the abſorbent ſubſtances, ſuch as crab's-eyes, or the like; drinking cold water has ſometimes proved a remedy, but it will ſucceed better when ſharpened with the ſpirits of vitriol; and afterwards bleeding, when there are ſigns of inflammation; cupping, emollient clyſters, and gentle purges, and diaphoretics, are to be given for ſome time. Opiates may be of uſe, provided they are given in ſmall doſes, as four or five drops of liquid laudanum twice or thrice a day. The food and drink muſt be of a mild cooling nature, and taken in ſmall quantities. Junker's Conſp. Med. 35. Buchan's Dom. Med. p. 371.

VOMITING *excited by medicines*. The effects of *vomits*, on the motion of the blood, appear by the following experiments: by obſerving the pulſe of ſeveral men after taking a *vomit*, it has been found, that ſo ſoon as a man begins to grow ſick, his pulſe becomes low, quick, and irregular, and, in the action of *vomiting*, is often ſo low as not to be felt; that in the intervals, between the *vomits*, the pulſe is ſtill low and quick, but not near ſo low and quick as in the action of *vomiting*; and that, after the operation is over, the pulſe riſes gradually, and, in the ſpace of half an hour or an hour, becomes fuller than it was before the *vomit* was taken. Hence we ſee the effects of *vomits* on the motion of the blood, they leſſen that motion during the whole time of their operation, and almoſt quite ſtop it in the very act of *vomiting*; and after the whole operation is over, they increaſe the motion of the blood, ſo as to make it greater than it was before.

From theſe effects of *vomits* on the motion of the blood, we diſcover their great uſefulneſs in the cure of many diſeaſes.

For inſtance, *vomits* ſtop hæmorrhages from ſmall veſſels. For when a blood-veſſel is opened, the blood flows faſter through that veſſel, and ſlower through all the reſt of the veſſels, than it did before. And therefore, all that is neceſſary to ſtop an hæmorrhage from a ſmall veſſel, is to ſtop the motion of the blood in that veſſel, and increaſe its motion in all the other veſſels; and both theſe are done by *vomits*, as appears by the foregoing experiments.

The increaſing of the motion of the blood in all the other veſſels, will leſſen the motion in the veſſel ſupplying the hæmorrhage, and thereby effectually prevent a return of the diſcharge. For the ſame reaſon, *vomits* leſſen immoderate diſcharges of the glands and ulcers, for they leſſen the motion of the blood and humours in the parts affected, by increaſing the motion in all the other parts. By increaſing the blood's motion, repeated *vomits*, with a proper diet, have been found to be of great ſervice in diſperſing ſchrophulous tumors; which may be allowed, when it is conſidered that theſe tumors are more incident to children and young bodies, the motion of whoſe blood is ſlow; and that they often diſappear of themſelves, when bodies are grown up, and their blood has acquired a ſtronger motion.

When obſtructions ariſe from too languid a motion of the blood, *vomits* are generally of uſe in removing them. And, when the motion of the blood is too great, and the obſtructions are formed by cold, *vomits*, after large bleeding, will be of great ſervice in removing them. In ſhort, *vomits*, repeated according to the nature and obſtinacy of the diſorder, are generally of ſervice in all irregularities, and diſproportions of the motions of the blood, and other fluids, in different parts of the body.

The ſafety, as well as uſefulneſs, of frequently repeated *vomits*, is evidently ſeen in perſons at ſea, and in women with child. Perſons at ſea, who are ſick, and *vomit* much, are commonly the better for it; and frequent *vomiting* in women with child, is of ſervice, and prevents abortion. As all muſcles grow ſtronger by exerciſe, ſo the muſcular coat of the ſtomach grows ſtronger by *vomiting*. Dr. Br. Robinſon of the Food and Diſcharge of Human Bodies. See Emetic.

Some have pretended to give rules for aſcertaining the doſes of *vomits*. See Purgative.

Vomiting *julep*. See Julep.

VOMITIVES, or Vomitive *medicines*. See Emetics.

VOPISCUS, a Latin term, uſed in reſpect to twins in the womb, for that which comes to the perfect birth; the other being before excluded abortive.

VORTEX, *whirlwind*, in *Meteorology*, a ſudden, rapid, violent motion of the air, in gyres, or circles. See Whirl-*wind*.

Vortex, Vorago, is alſo uſed for an *eddy*, or *whirlpool*, or a body of water, in certain ſeas and rivers, which runs rapidly around, forming a ſort of cavity in the middle.

The ordinary courſe of theſe *vortices* is a gulf or outlet, whereby the water of the ſea, &c. is abſorbed, or precipitates itſelf into ſome other receptacle; ſometimes to ſome other communicant ſea; and ſometimes, perhaps, into the vaſt abyſs of central water.

An artificial Vortex, expreſſive of the phenomena of the natural ones, may be made with a cylindric veſſel placed, immoveable, on an horizontal plane, and filled to a certain height with water. In this water a ſtick being plunged, and turned round as briſkly as may be, the water is neceſſarily put into a pretty rapid circular motion, and riſes to the very edge of the veſſel; and, when there arrived, ceaſes to be farther agitated.

The water, thus raiſed, forms a cavity in the middle, whoſe figure is that of a truncated one; its baſe is the ſame with the upper cavity of the veſſel; and its vertex in the axis of the cylinder.

What raiſes the water at the ſide of the veſſel, which occaſions the cavity in the middle, is its centrifugal force. For the motion of the water being circular, it reſpects a centre taken in the axis of the veſſel; or, which is the ſame, in the axis of the *vortex* formed by the water; the ſame velocity, then, being impreſſed on all the water, the circumference of a ſmaller circle of water, or a circle leſs remote from the axis, has a greater centrifugal force than another that is greater, or more remote from the axis. The ſmaller circle, therefore, drives the greater towards the ſide of the veſſel, and, from this preſſion, or impulſion, which all the circles receive from the ſmaller ones that precede them, and convey to the greater which follows them, ariſes that elevation of the water along the edge of the veſſel to the very top, where we ſuppoſe the motion to ceaſe.

With a *vortex* thus formed, Mr. Saulmon, of the Royal Academy of Sciences, made divers experiments, by putting ſeveral ſolid bodies therein, to acquire the ſame circular motion, with intent to diſcover which of them, in making their revolution round the axis of the *vortex*, approach toward, or recede from it, and with what velocity. The reſult was, that the heavier the body, ſtill the greater was its receſs from the axis.

M. Saulmon's view, in this attempt, was to ſhew how the laws of mechanics produce the celeſtial motions, and that it is probably to thoſe motions that the gravity or weight of bodies is owing. But, unhappily, the experiments ſhew juſt the contrary of what they ſhould do, to confirm the Carteſian doctrine of gravity. See Whirling *Table*.

Vortex, in the *Carteſian Philoſophy*, is a ſyſtem or collection of particles of matter moving the ſame way, and round the ſame axis.

Such *vortices* are the grand machines whereby theſe philoſophers ſolve moſt of the motions, and other phenomena of the heavenly bodies. Accordingly, the doctrine of theſe *vortices* makes a great part of the Carteſian philoſophy.

The matter of the world they hold to have been divided at the beginning into innumerable little equal particles, each endowed with an equal degree of motion, both about its own centre, and ſeparately, ſo as to conſtitute a fluid.

Several ſyſtems, or collections of this matter, they farther hold to have been endowed with a common motion about certain points, as common centres, placed at equal diſtances, and that the matters, moving round theſe, compoſed ſo many *vortices*.

Then, the primitive particles of the matter they ſuppoſe, by theſe inteſtine motions, to become, as it were, ground into ſpherical figures, and ſo to compoſe globules of divers magnitudes; which they call *the matter of the ſecond element*; and the particles rubbed, or ground off them, to bring them to that form, they call *the matter of the firſt element*.

And ſince there would be more of this firſt element than would ſuffice to fill all the vacuities between the globules of the ſecond, they ſuppoſe the remaining part to be driven towards the centre of the *vortex*, by the circular motion of the globules; and that being there amaſſed into a ſphere, it would produce a body like the ſun.

This ſun being thus formed, and moving about its own axis with the common matter of the *vortex*, would neceſſarily throw out ſome parts of its matter, through the vacuities of the globules of the ſecond element conſtituting the *vortex*; and this eſpecially at ſuch places as are fartheſt from its poles; receiving, at the ſame time, in, by theſe poles, as much as it loſes in its equatorial parts. And, by this means, it would be able to carry round with it thoſe globules that are neareſt, with the greater velocity; and the remoter, with leſs. And, by this means, thoſe globules, which are neareſt the centre of the ſun, muſt be ſmalleſt; becauſe, were they greater, or equal, they would, by reaſon of their velocity, have a greater centrifugal force, and recede from the centre.

If it ſhould happen, that any of theſe ſun-like bodies, in the centres of the ſeveral *vortices*, ſhould be ſo incruſtated, and weakened, as to be carried about in the *vortex* of the true ſun; if it were of leſs ſolidity, or had leſs motion, than the globules towards the extremity of the *ſolar vortex*, it would deſcend towards the ſun, till it met with globules of the ſame ſolidity, and ſuſceptible of the ſame degree of motions with itſelf; and thus, being fixed there, it would be for ever after carried about by the motion of the *vortex*, without either approaching any nearer to, or receding from, the ſun; and ſo would become a planet.

Suppoſing then all this, we are next to imagine, that our ſyſtem was at firſt divided into ſeveral *vortices*, in the centre of each of which was a lucid ſpherical body; and that ſome of theſe, being gradually incruſtated, were ſwallowed up by others which were larger, and more powerful, till at laſt they were all deſtroyed, and ſwallowed up, by the biggeſt *ſolar vortex*; except ſome few which were thrown off in right lines from one *vortex* to another, and ſo become comets.

But this doctrine of *vortices* is, at beſt, merely hypothetical. It does not pretend to ſhew by what laws and means the celeſtial motions are really effected, ſo much as by what means they poſſibly might, in caſe it ſhould have ſo pleaſed the Creator. But we have another principle which accounts for the ſame phenomena as well, nay, better than that of *vortices*; and which we plainly find has an actual exiſtence in the nature of things: and this is *gravity*, or the weight of bodies.

The *vortices*, then, ſhould be caſt out of philoſophy, were it only that two different adequate cauſes of the ſame phenomena are inconſiſtent.

But we have other objections againſt them. For, 1°, If the bodies of the planets and comets be carried round the ſun in *vortices*, the bodies of the parts of the *vortex* immediately inveſting them, muſt move with the ſame velocity, and in the ſame direction; and beſides, they muſt have the ſame denſity, or the ſame vis inertiæ. But it is evident, that the planets and comets move in the very ſame parts of the heavens with different velocity, and in different directions. It follows, therefore, that thoſe parts of the *vortex* muſt revolve at the ſame time, in different directions, and with different velocities; ſince one velocity, and direction, will be required for the paſſage of the planets, and another for that of the comets.

2°, If it were granted, that ſeveral *vortices* are contained in the ſame ſpace, and do penetrate each other, and revolve with divers motions; ſince thoſe motions muſt be conformable to thoſe of the bodies, which are perfectly regular, and performed in conic ſections; it may be aſked, How they ſhould have been preſerved entire ſo many ages, and not diſturbed and confounded by the adverſe actions and ſhocks of ſo much matter as they muſt meet withal?

3°. The number of comets is very great, and their motions are perfectly regular, obſerving the ſame laws with the planets, and moving in orbits, that are exceedingly eccentric. Accordingly, they move every way, and to all parts of the heavens, freely pervading the planetary regions, and going frequently contrary to the order of the ſigns; which would be impoſſible, unleſs theſe *vortices* were away.

4°. If the planets move round the ſun in *vortices*, thoſe parts of the *vortices* next the planets, we have already obſerved, would be equally denſe with the planets themſelves: conſequently the *vortical* matter, contiguous to the perimeter of the earth's orbit, would be as denſe as the earth itſelf: and that between the orbits of the earth and Saturn, muſt be as denſe, or denſer. For a *vortex* cannot maintain itſelf, unleſs the more denſe parts be in the centre, and the leſs denſe towards the circumference: and ſince the periodical times of the planets are in a ſequialterate ratio of their diſtances from the ſun, the parts of the *vortex* muſt be in the ſame ratio. Whence it follows, that the centrifugal forces of the parts will be reciprocally as the ſquares of the diſtances. Such, therefore, as are at a greater diſtance from the centre, will endeavour to recede therefrom with the leſs force. Accordingly, if they be leſs denſe, they muſt give way to the greater force, whereby the parts nearer the centre endeavour to riſe. Thus, the more denſe will riſe, and the leſs denſe deſcend; and thus there will be a change of places, till the whole fluid matter of the *vortex* be ſo adjuſted, as that it may reſt in æquilibrio.

Thus will the greateſt part of the *vortex* without the earth's orbit, have a degree of denſity and inactivity, not leſs than that of the earth itſelf. Whence the comets muſt meet with a very great reſiſtance, which is contrary to all appearances. Coteſ. Præf. ad Newt. Princ.

The doctrine of *vortices*, ſir Iſaac Newton obſerves, labours under many difficulties: for a planet to deſcribe areas proportional to the times, the periodical times of the *vortex* ſhould be in a duplicate ratio of their diſtances from the ſun; and for the periodical times of the planets to be in a ſequiplicate proportion of their diſtances from the ſun, the periodical times of the parts of the *vortex* ſhould be in the ſame proportion of their diſtances: and, laſtly, for the leſs *vortices* about Jupiter, Saturn, and the other planets, to be preſerved, and ſwim ſecurely in the ſun's *vortex*, the periodical times of the parts of the ſun's *vortex* ſhould be equal. None of which proportions are found to obtain in the revolutions of the ſun and planets around their axes. Phil. Nat. Princ. Math. apud Schol. Gen. in Calce.

Beſides, the planets, according to this hypotheſis, being carried about the ſun in ellipſes, and having the ſun in the umbilicus of each figure, by lines drawn from themſelves to the ſun, do always deſcribe areas proportionable to the times of their revolutions, which that author ſhews the parts of no *vortex* can do. Schol. prop. ult. lib. ii. Princip.

Again, Dr. Keill proves, in his Examination of Burnet's Theory, that if the earth were carried in a *vortex*, it would move faſter in the proportion of three to two when it is in Virgo than when it is in Piſces; which all experience proves to be falſe.

We have, in the Philoſophical Tranſactions, a phyſico-mathematical demonſtration of the impoſſibility and inſufficiency of *vortices* to account for the celeſtial phenomena by M nſ. de Sigorne. See N° 457. ſect. vi. p. 409. ſeq.

This author endeavours to ſhew, that the mechanical generation of a *vortex* is impoſſible; that it has only an axifugal, and not a centrifugal and centripetal force; that it is not ſufficient for explaining gravity and its properties; that it deſtroys Kepler's aſtronomical laws; and therefore concludes with ſir Iſaac Newton, that the hypotheſis of *vortices* is fitter to diſturb than explain the cœleſtial motions. We muſt refer to the diſſertation itſelf for the proof of theſe aſſertions. See CARTESIAN PHILOSOPHY.

VORTICELLA, in the Linnæan ſyſtem of *Zoology*, a genus of *zoophytes*, the characters of which are, that the flower has a vaſculous calx, that the mouth is contractile and ciliated, and the ſtem fixed, giving a kind of whirling motion to the flower. Linnæus enumerates fourteen ſpecies.

VOTE, or VOICE. See SUFFRAGE, and VOICE.

In the houſe of peers, they give their *votes*, or ſuffrages, beginning at the puiſne, or loweſt baron, and ſo to the reſt, ſeriatim, every one anſwering, apart, *content*, or *not content*.

In the houſe of commons, they *vote* by *yeas* and *noes*, promiſcuouſly. See PARLIAMENT.

Votes of the houſe of commons firſt began to be printed by a reſolution of the laſt parliament of Charles II. at Oxford, in 1681.

VOTIVE *medals*, are thoſe whereon the vows of the people for the emperors, or empreſſes, are expreſſed.

The public vows, made every five, ten, or twenty years, are more often found round the edges of medals, than on the faces thereof, at leaſt under the weſtern empire; for in the eaſtern the caſe is different: witneſs the medal of M. Aurelius the younger, where the reverſe repreſents the vows made at the time of his marriage, VOTA PUBLICA. And on Greek medals, ΔΗΜΟΤΕΥΧΑΙ, which they ſometimes expreſs by the two initial letters, Δ. E. according to F. Hardouin's conjecture, which may be admitted in certain medals, where the ΔΗΜ. ΕΞ. that is, ΔΗΜΑΡΧΙΚΗΣ ΕΞΟΥΣΙΑΣ, does not well agree. Witneſs alſo the medal of Antonine, VOTA SUSCEPTA DECENNALIA.

The origin of *vows*, and *votive medals*, is given by M. Du-Cange, thus: Auguſtus feigning himſelf willing to quit the empire, and having twice, at the prayers of the ſenate, condeſcended to hold it for ten years longer, it grew into a cuſtom, to make freſh public prayers, ſacrifices, and games, for his continuing it, at the ten years end; and theſe they called *decennalia*, or *vota decennalia*.

Under the eaſtern emperors, theſe vows were repeated every five years: hence it is, that, after Diocleſian's time, we find on medals VOTIS V. XV. &c. which practice continued till the time of Theodoſius, when Chriſtianity being well eſtabliſhed, a ceremony that had ſome remains of heatheniſm in it was ſet aſide. So that the VOTIS MULTIS, on a medal of Majorianus, muſt be a very different thing; and no other, doubtleſs, than a kind of acclamation, like that PLURA NATALIA FELICITER.

VOTVE *maſs*. See MASS.

VOTUM, VOW. See VOW.

VOTUM, in our *Ancient Law-Books*, is uſed for *nuptiæ*, or marriage: ſo, *dies votorum*, is the wedding-day, Fleta, lib. iv. cap. 2. part 16. *Si donatarius ad alia* vota *convolaverit*, &c. See MARRIAGE.

VOUCH. A perſon is ſaid to *vouch for another*, when he undertakes to maintain, or warrant him in any thing, or paſſes his word in his behalf.

In law, to *vouch*, is to call ſuch a perſon, or *vouchee*, into court, to make good his warrant

VOUCHEE, a perſon who is to warranty, or *vouch* for another, who, in reſpect hereof, is called *voucher*. See VOUCHER, and WARRANTY.

VOUCHER, in *Law*, the tenant in a writ of right, who calls another perſon into court, bound to warranty him, and either to defend his right againſt the demandant, or to yield him other lands, &c. to the value.

This ſeems in ſome meaſure to agree to the contract in the civil law, whereby the vendee binds the vendor, ſometimes in the ſimple value of the things bought, ſometimes in the double; to warrant the ſecure enjoying of the thing bought. Yet there is this difference between the civil and common law, in this point, that the civil law binds every man to warrant the ſecurity of that which he ſelleth; which the common law doth not, unleſs it be ſpecially covenanted.

The proceſs, whereby the vouchee is called, is a *ſummoneas ad warrantiſandum*; and if the ſheriff return upon that writ, that the party hath nothing whereby he may be ſummoned, then goes out another writ, called *ſequatur ſub ſuo periculo*.

A recovery with a *ſingle voucher*, is when there is but one *voucher*; and with a *double voucher*, is when the vouchee voucheth over; and ſo a *treble voucher*.

There is alſo a *foreign voucher*, when the tenant, impleaded in a particular juriſdiction, voucheth one to warranty in ſome other county, out of the juriſdiction of that court; and prays he may be ſummoned, &c. This were more pertinently called a *voucher of a foreigner*.

VOUCHER alſo ſignifies a ledger-book, or book of accompts, wherein are entered the warrants for the accomptant's diſcharge.

VOUSSOIR, *Vault-ſtone*, or *Key-ſtone*, in *Architecture*, a ſtone proper to form the ſweep of an arch, being cut ſomewhat in the manner of a truncated cone, whoſe ſides, were they prolonged, would terminate in a centre, to which all the ſtones of the vault are directed. See KEY, and VAULT.

VOW, VOTUM, a ſolemn promiſe, or offering of a man's ſelf, or other thing, to God.

A perſon is conſtituted a religious, by taking three *vows*, that of poverty, that of chaſtity, and that of obedience.

Authors are divided as to the antiquity of theſe *vows*. It is agreed, the ancient anchorets, and hermits of the Thebaid, made none; they did not conſecrate themſelves to God by any indiſſoluble obligation, but were at liberty to quit their retirement, and return into the world, whenever the fervor, that drove them out of it, came to abate.

Vows were not introduced till long after; and that to fix the too frequent inconſtancy of ſuch as, after retiring from the world, repented themſelves too ſoon, or too ſlightly; and by that means ſcandalized the church, and diſturbed the quiet of families by their return.

Eraſmus will have it, that ſolemn *vows* were not introduced till the thirteenth century, under the pontificate of Boniface VIII. Others hold them to be as ancient as the council of Chalcedon: but the truth is, before Boniface VIII. there were none but ſimple *vows*, and ſuch as might be diſpenſed withal. Their *vows*, till that time, were not deemed eternal chains; they were not indiſſoluble. It is true, they were obligatory promiſes, as to conſcience; and the inconſtancy of ſuch as violated them was held an odious deſertion: but, as to law, the perſons were not held to be civilly dead, ſo as, upon their return, to render them incapable of all acts of civil ſociety.

The moſt common *vow* was that of poverty, but this only regarded the convent; on account of which, every perſon diveſted himſelf of all property: but the making of *vows* did not at all exclude them from the rights of blood, or render them incapable of inheriting.

No religious, it is true, acquired the property of the effects that fell to him; they all belonged to the monaſtery, in favour of which he had diveſted himſelf of every thing; and the monaſtery only left him the uſufruit and direction of them. The popes have frequently confirmed this privilege to divers orders, and permitted the monks to inherit, as much as if they were ſeculars, and had made no *vows*.

At preſent, the civil death of a religious is dated from the day he makes the *vows*; and from that time he is utterly incapable of inheriting. A religious may reclaim, or proteſt againſt his *vows*, within five years; but, after that, it is no longer admitted. The failures in the profeſſion are eſteemed to be purged, by his ſilence and perſeverance for five years. Indeed, to be relieved from his *vows*, it is not enough the party reclaim within the five years; but he muſt likewiſe prove that he was forced to take the habit.

Vows, Vota, among the *Romans*, ſignify, ſacrifices, offerings, preſents, and prayers, made for the emperors and Cæſars, particularly for their proſperity, and the duration of their empire.

Theſe were, at firſt, made every five years, then every fifteen, and then every twenty, called *quinquennalia*, *decennalia*, and *vicennalia*.

In divers antique medals and inſcriptions, we read, *Vot.* X. *Vot.* XX. *Vot. mult.* ſignifying *votis decennalibus*, *vicennalibus*, *multis*, &c. See Decennalia.

VOWEL, Vocalis, in *Grammar*, a letter which affords a complete ſound of itſelf; or a letter ſo ſimple, as only to need a bare opening of the mouth to make it heard, and to form a diſtinct voice.

Such are *a*, *e*, *i*, *o*, *u*; which are called *vocales*, *vowels*, in contradiſtinction to certain other letters, which, depending on a particular application of ſome part of the mouth, as the teeth, lips, or palate, can make no perfect ſound without an opening of the mouth, that is, without the addition of a *vowel*; and are therefore called *conſonants*.

Though we ordinarily only reckon five *vowels*, yet, beſides that each of theſe may be either long or ſhort, which occaſions a conſiderable variety in the ſound; to conſider only their differences reſulting from the different apertures of the mouth, one might add four or five more *vowels* to the number. For the *e* open, and the *e* cloſe, are different enough to make two *vowels*, as in *ſea*, and *depth*; ſo alſo the *o* open, and *o* cloſe, in *hoſt*, and *organ*. Add, that the *u* pronounced *ou*, as the Latins did, and as the Italians and Spaniards ſtill do, has a very different ſound from the *u*, as pronounced by the Greeks, and, as at this day, by the Engliſh and French. Again, *eo*, in *people*, make but one ſimple ſound, though we write it with two *vowels*.

Laſtly, the *e* mute is, originally, no more than a ſurd joined to a conſonant, when that is to be pronounced without a *vowel*, as when it is immediately followed by other conſonants. This is what the Hebrews call *ſcheva*, eſpecially when it begins the ſyllable: and this *ſcheva* is found in all languages, though overlooked in many of them, particularly in the Engliſh, Latin, &c. by reaſon it has no proper character to denote it; though, in ſome of the vulgar tongues, particularly French and High Dutch, it is expreſſed by the *vowel e* adding its ſound to the reſt.

Thus, without regarding the differences of the ſame ſound or *vowel*, as to length or ſhortneſs, one may diſtinguiſh ten ſeveral *vowels*, expreſſed by the following characters, *a*, *e*, *é*, *i*, *o*, *ô*, *eu*, *ou*, *u*, *e* mute.

To theſe we may add *y*, which, as the learned Dr. Lowth obſerves, is formed by the opening of the mouth, without any motion or contact of the parts, and has every property of a *vowel*, and not one of a conſonant. Lowth's Gram. p. 20. *n.* 1.

Mr. Sheridan, who makes the number of ſimple ſounds in our language to be twenty-eight, reckons nine *vow-*
a a a e o o e i u
-els, viz. hall hat hate beer note nooſe bet fit but. Rhet. Gram. p. 9.

Vowel-*points*, in the *Hebrew Language*. See *Vowel*-Points.

VOX, in *law*. Vocem *non habere*, is a phraſe uſed by Bracton and Fleta, for an infamous perſon; one who is not admitted to be a witneſs.

VOYAGE, denotes a journey by ſea.

VOYAL, in a *Ship*, a large rope uſed to unmoor, or heave up the anchors of a ſhip, by tranſmitting the effort of the capſtern to the cables. This is performed by faſtening one part of the *voyal* to the cable in ſeveral places, and by winding another part thereof three or four times about the capſtern, which anſwers the ſame purpoſe as if the cable itſelf were in that manner wound about the capſtern; and the *voyal*, being much lighter and more pliant, is much more convenient in this exerciſe. If the cable is drawn into the ſhip by the main capſtern, the *voyal* is uſed without any block; but if the capſtern in the fore-part of the ſhip be employed for this purpoſe, the *voyal* uſually paſſes through a large block attached to the main-maſt, and thence communicates with the jear-capſtern. Falconer.

Voyal, *ſhifting the.* See Shifting.

UPHOLDER is uſed in the ſame ſenſe with Undertaker, as the denomination of a tradeſman who provides for funerals.

Upholder, or Upholsterer, denotes alſo a perſon who furniſhes houſes, fitting up apartments with beds, and other furniture. See Appraiser, and Bed.

UP-LAND denotes high ground, or, as ſome call it, *terra firma*: by which it ſtands oppoſed to ſuch as is mooriſh, marſhy, or low.

Or, it is Pasture-land, which lies ſo high, as not to be over-flowed with rivers, or land floods.

Thoſe lands, which lie flat upon the tops of hills, are uſually the drieſt, and thoſe which form the ſlopes or ſides are uſually the moiſteſt, becauſe of the wet that is continually ouzing through them. The chalky, and eſpecially the clayey ſoils in theſe places, are moſt of all ſubject to be wet, eſpecially in winter, becauſe they retain the moiſture a long time; though they have alſo the inconveniencies of the ſandy and rocky lands in the ſame ſituations, chapping in ſummer. The black mould, and the hazely loams in theſe places, are the beſt for corn as well as for paſture, eſpecially if the latter eſcapes the common misfortune of being full of worms. Theſe lands neither are waſhy in winter, nor parched up in ſummer. The *up land* meadows have ſome diſadvantages, as they often need mending or feeding, which thoſe that lie lower do not; but then they make amends for this in their hay, which is always much finer and ſweeter than that of the low-lands.

Mr. Miller has ſuggeſted ſeveral hints for the improvement of *up-land* paſture. He recommends to fence and divide it into ſmall fields of four, five, ſix, eight, or ten acres each, planting timber in the hedge-rows, which will ſhelter the graſs from the drying pinching winds of March. The next object is to make the turf good, by paring off the ſurface and burning it, if it is clayey and cold; or by laying upon it, in conſiderable quantities, proper manures, as chalk, lime, marle, or clay, if it is a hot ſandy ſoil. If the ground is over-run with buſhes or ruſhes, theſe ſhould be grubbed up towards the latter part of the ſummer, dried, and burnt; and the aſhes ſpread over the ground juſt before the autumnal rains: the ſurface of the land ſhould then be levelled, and ſown with graſs ſeed. Mole-hills and ant-hills ſhould be alſo deſtroyed, by ſcattering them over the ground. In the months of February and March, the turf ſhould be rolled with a heavy wood roller, in moiſt weather, which will level the ſurface and thicken the graſs. Another improvement of *up-land* paſtures is the feeding of them every other year, otherwiſe the land muſt be manured at leaſt every third year. The manure ſhould be always adapted to the nature of the ſoil; e. g. all hot ſandy lands ſhould have a cool manure; neat's dung and ſwine's dung are very proper for ſuch lands, as are alſo marle and clay; but for cold lands, horſe dung, aſhes, or ſand, or other warm manure, are proper: and theſe ſhould be laid on in autumn, and carefully ſpread, and early in the ſpring harrowed with buſhes. The weeds ſhould be carefully deſtroyed every ſpring and autumn. By proper attention to *up-land* paſtures, they will yield a fine ſweet graſs for many years without renewing. Miller's Gard. Dict.

UPLOPER, a name given to one particular ſpecies of pigeon, called by Moore, *columba gutturoſa ſaliens.*

It was firſt brought to England from Holland, and much reſembles that kind of pigeon called the Engliſh powter, but that it is ſmaller. Its crop is very round, and in this it buries its bill. Its legs are very ſmall and ſlender, and its toes are ſhort, and cloſe together, on which it treads ſo nicely, that when moving, any ſmall thing might be put under the ball of its foot. The pigeons of this ſpecies are generally all blue, all black, or all white; ſeldom or never pyed. They are very ſcarce in England, and in Holland have been valued at five and twenty guineas a pair.

They have their name from the Dutch word *oplopen*, which ſignifies to leap up, and it was thus named from its manner of approaching the hen, which is always by leaping upon her. Moore's Columbarium, p. 67.

UPPER-*Deck*, in a *ſhip*, the higheſt of thoſe decks which are continued throughout the whole of a ſhip of war, or merchantman, without any interruption of ſteps or irregular aſcents.

UPPER *hemiſphere, ocean, polar dial*, and *region*. See the ſubſtantives.

UPPER *work*, in *Naval Architecture*, a general name given to all that part of a ſhip which is above the ſurface of the water when ſhe is properly balanced for a ſea-voyage: or it is that part which is ſeparated from the bottom by the main wale.

UPRIGHT, in *Architecture*, a repreſentation or draught of the front of a building; called alſo, an *elevation*, or *orthography*.

UPRIGHT, in *Heraldry*, is uſed in reſpect of ſhell-fiſhes, as crevices, &c. when ſtanding erect in a coat. Inaſmuch as they want fins, they cannot, according to Guillim, be properly ſaid to be *hauriant*; that being a term appropriated to ſcaly fiſhes.

UPRIGHT, in *Sea Language*, denotes the ſituation wherein the oppoſite ſides of a ſhip are equally elevated above the ſurface of the water; or when ſhe inclines neither to the right nor left, with regard to the vertical poſition of her ſtem and ſtern-poſt.

UPULUS, in *Botany*, the old Latin name for the *lupulus*, or hop. This word *lupulus* is not old Latin, but a more modern name, formed on the word *upulus.*

UPUPA, in *Ornithology*. See HOOPOE.

URACHUS, ουραχος, in *Anatomy*, a membranous canal in a fœtus, proceeding from the bottom of the urinary bladder through the navel to the placenta, along with the umbilical veſſels, whereof it is eſteemed one. See *Tab. Anat. (Splanch.) fig.* 1. *lit. ſ. ſ. fig.* 3. *lit. e. d. fig.* 8. *lit. n. fig.* 16. *lit. n.*

The termination of the *urachus* in the placenta forms a little oval veſica, or bladder, which ſerves to receive the urine ſecreted in the kidneys of the fœtus, and that could not make its way through the urethra, by reaſon of the reſiſtance of the ſphincter of the bladder, which is not to be overcome, but by inſpiration.

The humour found in the veſica of the *urachus* is ſtill in the greater quantity, the higher coloured, and the more like urine, as the fœtus is nearer the time of the birth.

The *urachus* is moſt plainly found in brutes; but there is no diſpute but that it exiſts in an human fœtus.

M. Drelincourt, a celebrated profeſſor of anatomy at Leyden, and ſome others after him, deny the *urachus* to be hollow: on which ſuppoſition it would not be eaſy to aſſign its uſe, unleſs to keep the bladder ſuſpended to the navel. See URINE.

The uſe of the *urachus* is not yet diſcovered, according to Dr. Trew. Phil. Tranſ. N° 457. ſect. 7. See ALLANTOIS, and FOETUS.

URAN. See OURAN.

URANIA, in *Mythology*, one of the nine MUSES, that preſided over aſtronomy; ſhe is repreſented as clothed with an azure-coloured robe, crowned with ſtars, holding a globe in her hand, or ſometimes with the globe at her feet, and ſurrounded with ſeveral mathematical inſtruments.

URANIBURGH, q. d *the city of the heavens*, a term often heard among aſtronomers, being the name of a celebrated obſervatory, in a caſtle in the little iſland Weenen, in the Sound; built by that noble Dane, Tycho Brahe; and furniſhed with inſtruments for obſerving the courſe and motions of the heavenly bodies.

This famed obſervatory, finiſhed about the year 1580, did not ſubſiſt above ſeventeen years; when Tycho, who little thought to have erected an edifice of ſo ſhort a duration, and who had even publiſhed the figure and poſition of the heavens, which he had choſen for the moment to lay the firſt ſtone in, was obliged to abandon his country.

Soon after this, thoſe to whom the property of the iſland was given, made it their buſineſs to demoliſh *Uraniburgh*: part of the ruins was diſperſed into divers places: the reſt ſerved to build Tycho a handſome ſeat upon his ancient eſtate, which to this day bears the name of *Uraniburgh*. For as to the ancient *Uraniburgh*, there is now no footſtep of it remaining. It was here Tycho compoſed his catalogue of the ſtars.

M. Picart, making a voyage to *Uraniburgh*, found Tycho's meridian line, drawn thereon, to deviate from the meridian of the world; which confirms the conjecture of ſome, that the poſition of the meridian line may vary.

URANOSCOPUS, in *Ichthyology*, the name of a fiſh called in Engliſh the *ſtar-gazer*; and by ſome authors, *callionymus.*

The *uranoſcopus*, in the Linnæan ſyſtem, is a genus of the order of *jugulares*: its characters are, that the head is flat, rough, and large; the mouth has the upper jaw ſhorter than the lower; the branchioſtege membrane has five rays, and is covered with ſmall eminences like teeth; the opercula are membranaceous and ciliated; the anus is in the middle of the body. There is one ſpecies, which is the *trachinus* of Artedi, with many beards on the lower jaw.

It is uſually caught of about ſeven or eight inches in length, but ſometimes it grows to a foot; its head is very large, bony, and rough, and of a ſort of ſquare figure; its body is long and rounded; its upper part is all of an aſh colour; its belly white; its ſcales are very ſmall and thin, inſomuch that many have ſuppoſed it had none. Theſe are diſpoſed in oblique ranges acroſs the body of the fiſh, running toward the tail. The ſide-lines are arched, and riſe to the back-fin. Its face is flat, and ſeems turned upwards; and its eyes are ſmall and prominent, and are ſo placed in the upper part of its head, as naturally to look up to the heavens, whence it has its name.

Many of the flat fiſh have their eyes placed as thoſe of this fiſh; but the pupils in all theſe look ſideways; in this only they are turned ſtraight upward. Its mouth is very large, and opens perpendicularly downward, being placed in the ſame direction with the eyes in the upper part of the head. It has a beard under its chin, like that of a man, and its jaws are furniſhed with very ſharp teeth, as are alſo the inner parts of its mouth. Its whole head is covered with rough tubercles, and it has two fins on the back, and two on the breaſt. It is frequently caught in the Mediterranean, and is by ſome ſaid to be a well-taſted fiſh. Geſner, de Aquat. p. 159. See *Tab.* V. *Fiſh*, N° 63.

The reaſon of the ſituation of the eyes of the *uranoſcopus*, is the providence of nature for a fiſh, which, always keeping at the bottom, has no where to look for prey but in the water above it. But if other fiſh had been well examined, this peculiar name would never have been given to this. The eyes of the *rana piſcatrix* are placed in the ſame manner, and thoſe of a great number of other fiſh, whoſe cuſtom it is to keep at the bottom, are more or leſs alſo thus ſituated.

URBICARY *Provinces*. See SUBURBICARY.

URCEOLUS, in *Eccleſiaſtical Writers*. See AQUÆ-MANILIS.

URCEUS, in *Antiquity*, the name of a meaſure of liquids, which in different places was of different capacity; its moſt uſual ſtandard ſeems to have been between twelve and ſixteen ounces.

URCHIN, a common name given to the *hedge*-HOG.

URCHIN, *ſea*, in *Ichthyology*. The *echinus marinus* of authors, is, in ſome parts of England, called the *ſea-egg*, and in others the *ſea-urchin*, or *hedge-hog*. It is a genus of fiſh, of which there are a great number of ſpecies. See ECHINO-DERMA, and CENTRONIA.

The manner of theſe creatures moving at the bottom of the ſea has been diſputed among naturaliſts; the general opinion of the world has been, that they did it by means of their ſpines or prickles, which ſerved them by way of legs; but ſome of late, particularly Mr. Gandolphe, pretend that the ſpines of the *urchins* are of no uſe to them on this occaſion, but that they move by means of certain legs, like the legs of the ſtar-fiſh, which they occaſionally put out when they walk, and at other times retract them into their body. The world was readily falling into this ſyſtem, particularly as Mr. Gandolphe affirmed, that he had been often an eye-witneſs to it; but the indefatigable Mr. Reaumur tried the experiment himſelf, and often made himſelf an eye-witneſs of the contrary fact, having frequently ſeen them walk at the bottom of a ſhallow baſon of ſea-water, with no other aſſiſtance than that of their ſpines, and even having made them perform the ſame motion, by the ſame means upon his hand.

This curious inquirer into nature did not, however, ſtop here; but took occaſion from hence to enquire accurately into every circumſtance of their progreſſion, which is performed by ſo uncommon means.

It is certain that the *ſea-urchin* does throw out at the lower aperture of its ſhell, when it pleaſes, certain bodies which reſemble not a little the legs of ſtar-fiſh; but theſe ſerve not at all to its motion; but, on the contrary, their real uſe is to keep the creature ſtill, and fixed in the ſame poſition; and, to deſcribe them more exactly, they very aptly reſemble the horns of ſnails; whence M. Reaumur has choſen rather to call them horns than legs. The uſe the *urchin* makes of theſe horns, while it is in motion, is to feel about, and try the ground on which it marches; and they ſerve the creature as a ſtaff does a blind man in his walking, to touch and try every thing that lies in the way; and to make them ſerve to this purpoſe, it is continually extending or retracting them during the time it is moving. Theſe horns are not only placed about the orifice of the ſhell, but they are every where diſperſed among the ſpines, all over the ſurface of the ſhell.

In order to underſtand the poſition of theſe horns, we muſt conſider that the *ſea-urchin* ſhell is a hard body, approaching in form to that of a ſegment of a ſphere, with two apertures, one commonly at the ſummit of the ſhell, and another oppoſite to it at the baſe: the former hole ſerves, as it is ſuppoſed, for diſcharging the excrement, and the latter for the mouth of the animal. The whole external ſurface is divided by protuberances, of different ſizes, into ten ſpherical iſoſceles triangles, which have their vertex at the upper aperture, and their baſe at the lower: five of theſe are large and five ſmall; the larger are ſeparated from the ſmaller by triangular bands pierced with ſmall holes, arranged in a beautiful and regular order. The triangular ſpaces are divided by ſeveral lines, commencing at the upper aperture of the ſhell, and terminating at the lower; theſe lines are marked by ſundry eminences of different ſizes, each of which reſembles a ſort of nipple: on theſe parts the baſe of every ſpine is fixed, and as the baſe is hollow, it is able to turn round each eminence. Of theſe ſpecies Mr. Reaumur found more than two thouſand on every fiſh; and the number of perforations on each ſhell is not leſs than thirteen hundred. From each of theſe perforations, there proceeds a horn, which horns are only viſible when the fiſh is in the water, and even then it puts forth only ſome of them at once: theſe ſerve as anchors to the fiſh, becauſe it glues them faſt to the ſtones, &c.

The ſpines are all capable of aſſiſting the creature in its motions, but thoſe it principally employs are ſuch as are placed near its mouth; as theſe can turn upon their balls every way with equal facility, the creature finds it equally eaſy to move on any ſide; and when it has determined which way it will move, thoſe ſpines which ſtand directly toward that point, and thoſe which are directly oppoſite, are of equal ſervice to it; it draws itſelf forward by means of the firſt, and puſhes itſelf on with the others; to do this, it firſt thruſts out the foremoſt ones as far as poſſible, and preſſing them againſt the bottom, it draws on its body by them; and this is ſucceeded, by drawing up the hinder ones cloſe to its ſhell, and then fixing them againſt the bottom, it puſhes itſelf forward by them. This is the manner of this little creature's marching in the common way, with its mouth downward; but it has this ſtrange ſingularity, that it is not confined to this poſture alone in marching, but can, with equal eaſe, walk with its mouth upwards, or run along ſideways in the manner of a wheel; or in any direction between theſe. The legs and the horns cover all parts of it, and are in every part of it equally able to move ſeparately thirteen hundred horns, and more than two thouſand ſpines, which ſerve for legs. Mem. Acad. Par. 1712.

URDÉ, or **Urdée**, in *Heraldry*. A *croſs urdé* ſeems to be the ſame with what we otherwiſe call Clechée.

UREDO, a word uſed by ſome of the chemical writers to expreſs the virtues of metals communicated to them from the ſun. Pliny uſes the ſame word to expreſs the ſmut affecting fruits; and ſome medical writers have expreſſed by it a very violent and excruciating pain in the head: and others an extreme itching or burning in the ſkin. See Smut, Blast, and Blight.

URENA, in *Botany*. See *Indian* Mallow.

URENTIA, are ſometimes uſed for medicines of a hot or burning quality. See Caustic.

URETERS, ουρητηρες, formed from ουρειν, *meiere*, *to make water*, in *Anatomy*, two long and ſlender canals, which come from the pelvis or baſon of the kidneys; one on each ſide runs down obliquely to the lateral parts of the inner or anterior ſide of the os ſacrum, and paſſing between the rectum and bladder, terminates in the bladder; ſerving to convey the urine, ſecreted in the glands of the kidneys, into the bladder. See *Tab. Anat. (Splanch.) fig.* 1. *lit. g. g. fig.* 4. *lit. f. fig.* 8. *lit. m. m. fig.* 9. *lit. l l.*

The *ureters* are inveſted by the cellular ſubſtance of the muſcular and nervous peritonæum; and, deſcending in the form of an S, they run behind the ſpermatic veſſels, and then behind the lower part of the bladder, approaching each other: each *ureter* lies between the umbilical artery, and vas deferens of the ſame ſide; the artery lying on the outſide of the *ureter*, and the vas deferens on the inſide: afterwards they get between the vaſa deferentia and the bladder, croſſing theſe canals; and then, at about a finger's breadth from each other, they begin to pierce the coats of the bladder. They run a little way between its muſcular and nervous coats, and open into the bladder obliquely, ſomewhat nearer each other than when they firſt entered its coats. Their orifices in the bladder are ſomewhat oval and narrower than the cavity of the *ureters* immediately above them: the edge of the orifices is thin, and ſeems to be formed merely by the union of the internal coat of the bladder with that of the *ureters*.

They are compoſed of three proper coats: the firſt of which, that ſurrounds the reſt, is of a whitiſh colour, and of a very compact filamentary texture: the next coat is of a reddiſh colour, ſtronger than the firſt, and made up of different ſtrata of fibres, which interſect each other, but it is not eaſy to determine, whether they are muſcular, or ſimply membranous: the third, or innermoſt coat is in ſome meaſure ligamentary, and lined by a very fine membrane, which covers a very delicate texture of veſſels. It is ſlightly granulated like ſhorn velvet, and has ſeveral ſmall glands, which ſeparate a ſlimy liquor, to defend it againſt the acrimony of the urine.

The neighbouring parts furniſh them with blood-veſſels; and they have nerves from the intercoſtal, and the vertebræ of the loins. Their cavity is ſometimes contracted in three or four places, eſpecially towards the bladder.

Such as are ſubject to the gravel, and given to exceſſive drinking, have them ſometimes ſo much dilated, that one may put the end of one's little finger into them.

Their obſtruction cauſes a ſuppreſſion of the urine.

URETHRA, ουρηθρα, in *Anatomy*, a tube or canal ariſing from the neck of the bladder, and continued to the pudendum; ſerving to diſcharge, or carry off the urine out of the bladder. See *Tab. Anat. (Splanch) fig.* 8. *lit. u. u. fig.* 15. *lit. d. f. m. m.*

Some will have it to be only a production of the neck of the bladder itſelf. Its length is very different in the two ſexes. In man it terminates in the extremity of the glans, and is ordinarily about a foot long.

The ſubſtance is ſpongy or cavernous, except a ſmall portion next the bladder, and its inner and outer ſurfaces are membranous. It is at firſt no more than a membranous canal continued from the neck of the bladder; but about a finger's breadth and a half from its origin, it joins a cavernous ſubſtance, which ſurrounds it through the whole extent of the inferior groove of the *corpora* cavernosa. This ſpongy ſubſtance, before it begins to ſurround the *urethra*, forms a diſtinct oblong body called the *bulb of the urethra*, which is divided anteriorly by a very fine membranous ſeptum into lateral parts. The firſt portion of the *urethra*, from the bladder to the bulb, is ſuſtained by a large ſolid whitiſh maſs, called the prostatæ. The ſpongy ſubſtance of the *urethra*, having reached the extremity of the corpora cavernoſa, forms a large head called the glans, which next to the *urethra* is perforated by that canal; and this canal continues its direct courſe through the lower flat ſide of it, all the way to the extremity, where it terminates by an oblong orifice. The whole convex ſurface of the glans is covered by a fine villous ſubſtance, and that again by a fine membrane reſembling the red part of the lips. The circumference of the baſis of the glans has a double row of ſmall papillæ, which may be reckoned ſebaceous glands, from which a thick matter is diſcharged. At the bottom of the cavity of the firſt portion of the *urethra*, which lies within the proſtatæ, there is a ſmall oblong oval eminence, called caruncula or veru-montanum.

The inſide of the canal of the *urethra* is lined by a fine membrane, full of capillary blood-veſſels; and its ſurface is perforated by a great number of oblong holes or ſmall lacunæ of different ſizes, which are orifices of the excretory ducts of the ſame number of ſmall glands, diſperſed through the ſubſtance of the *urethra*. From theſe may be expreſſed a mucilaginous liquor, which ſerves to lubricate the *urethra*, and preſerve it from being galled by the urine. A little way from the beginning of the cellular ſubſtance of the *urethra*, we meet with two lacunæ more conſiderable than the reſt, and their ducts are very long: they lead to two glandular bodies, covered entirely by the two muſcles called ACCELERATORES, and commonly called PROSTATÆ *inferiores.*

The cavity of the *urethra* reſembles nearly that of a ſmall writing pen: it is not every where round, and toward the glans becomes broader and flatter, on each ſide, eſpecially in the glans itſelf, where there is a kind of oval or navicular foſſula.

The *urethra* in females has its orifice between the nymphæ, below the glans of the clitoris: the ſides of this orifice are a little prominent and wrinkled, and perforated by ſmall lacunæ, from which a mucilaginous liquor may be ſqueezed. This orifice is ſometimes drawn a little inward in time of pregnancy. Its body is a ſpongy duct of the ſame ſtructure as in males, but much ſhorter, being about two fingers breadth long; it is ſituated directly under the trunk of the clitoris, and above the great canal of the uterus, adhering to each of theſe canals between which it lies by membranous filaments. It paſſes under the cartilaginous arch of the oſſa pubis, and terminates by an oblique opening at the neck of the bladder. The internal membrane of the *urethra* is a little plaited, and perforated by ſmall holes, which communicate with folliculi, lying hid in its ſubſtance, as in males. If we blow into one of theſe holes, we obſerve a ſmall canal to be inflated, which runs from without inwards, and terminates in ſome places by a kind of ſacculus, by compreſſing which a viſcid liquor is diſcharged. The *urethra* in women is uſually called MEATUS *urinarius.* Winſlow.

It is much wider, and more eaſily dilated here, than in the other ſex.

Mr. Cowper gives us an inſtance of a woman, wherein the HYMEN was ſo firm and impervious, that her huſband, finding no paſſage through it, had opened himſelf another through the orifice of the *urethra.*

The hard knots which are ſometimes formed in the corpus cavernoſum *urethræ,* after venereal virulency, are very difficult to cure. Till the pocky matter is all extirpated, it is in vain to attempt the cure of theſe knots, and even then they do not yield to mercury in any ſhape, but are reſolved by embrocations of the waters of Bareges. See Mem. de l'Acad. de Chirurg. tom. i.

Mr. le Cat has given us the figure of the canal of the *urethra,* determined by ſolid injections. See Phil. Tranſ. N° 460. ſect. 5. p. 684.

URETHRÆ *depreſſor,* in *Anatomy,* a name given by Santorini to a muſcle of the pudenda in women, the ſame with that which he calls in men the *elevator urethræ* and *ejaculator.* Winſlow, and the generality of the French anatomiſts, call it the *proſtatique inferieur.* And Albinus, who has given to the *tranſverſalis penis* the name of the *tranſverſus perinæi* calls this alſo the *tranſverſus alter perinæi.*

URETHRÆ *elevator,* in *Anatomy,* a name given by Santorini to a muſcle of the penis, which he calls alſo the *ejaculator*; it is called by Albinus the *tranſverſalis alter perinæi,* to diſtinguiſh it from the muſcle commonly called the *tranſverſus penis*; but which he calls the *tranſverſus perinæi.* The ſame muſcle in women is called the *depreſſor urethræ* by the ſame Santorini.

URETHRAM *dilatans,* in *Anatomy,* a name given by De Graef to a muſcle of the penis called the *urethram trahens* by Spigelius, and by the later writers, the *accelerator penis.* See ACCELERATORES.

URETHRAM *trahens,* in *Anatomy,* a name given by Spigelius and others to a muſcle now generally called the *accelerator.* See ACCELERATORES.

URETHRÆ *triangularis,* in *Anatomy,* the name of a ſuppoſed muſcle of the penis, called alſo *dilatator penis,* and *dilatator urethræ*; it is properly only a proceſs of the ſphincter and continued into the perinæum.

URIBACO, in *Ichthyology,* the name of a Braſilian ſea-fiſh, eſteemed a very well taſted and wholeſome one. It is ſomewhat of the figure of the perch; its back is rigid, and its belly is ſomewhat protuberant. It grows to ten or twelve inches long. Its teeth are ſmall and ſharp, and the ends of its gills and gill-fins terminate in a triangular point: its belly-fins are ſuſtained by a very rigid and ſtrong ſpine: its long fin, behind the anus, is ſupported by flexile and ſhort ſpines: it has only one fin on the back, equally broad, and reaching nearly to the tail, ſupported by prickly rays; its tail is deeply forked; its ſcales are of a fine ſilvery white, with a faint caſt of pale but bright red; its belly-fins are white, and its back-fin and tail reddiſh: its ſide-lines are broad, and of a fine red; over theſe and under them, near the tail, there is on each ſide a large black ſpot. Margraave. Ray's Ichthyol. p. 338.

URIGO, a burning with a cauſtic, or cautery.

URIM *and Thummim,* אורים תמים, q. d. *light and perfection,* the name of a kind of ornament belonging to the habit of the Jewiſh high-prieſt; in virtue whereof he gave oracular anſwers to the people.

The high-prieſts of the Jews, we are told, conſulted God in the moſt important affairs of their commonwealth, and received anſwers by the *urim and thummim.* What theſe were is diſputed among the critics: ſome take them to be the twelve precious ſtones in the breaſt-plate of the high-prieſt, on which were engraven the names of the twelve tribes of Iſrael; and they maintain that the oracle gave its anſwer to any queſtion propoſed, by cauſing ſuch letters in them to ſhine with ſuperior luſtre, or to appear prominent above the reſt, as formed the words of the anſwer: or by an audible divine voice pronouncing the words, the high-prieſt was prevented from miſtaking the anſwer. Joſephus, and ſome others, imagine, the anſwer was returned by the ſtones of the breaſt-plate appearing with an unuſual luſture, when it was favourable, or in the contrary caſe, dim. Others ſuppoſe, that the *urim and thummim* were ſomething encloſed between the folding of the breaſt-plate; this ſome will have to be the tetragrammaton, or the word יהוה, *Jehovah.* Chriſtophorus de Caſtro, and after him Dr. Spencer, maintain them to be two little images ſhut up in the doubling of the breaſt-plate, which gave the oracular anſwer from thence by an articulate voice. Accordingly they derive them from the Ægyptians, who conſulted their lares, and had an oracle, or teraphim, which they called truth. This opinion, however, has been ſufficiently confuted by the learned Dr. Pococke, Comment. on Hoſea, chap. iii. 4. and by Witſius in his Ægyptiaca, lib. ii. cap. 3, 10, 11, 12. The more common opinion among Chriſtians concerning the oracle by *urim and thummim,* and which Dr. Prideaux eſpouſes, is, that when the high-prieſt appeared before the veil, clothed with his ephod and breaſt-plate, to aſk council of God, the anſwer was given with an audible voice from the mercy-ſeat, within the veil: but, it has been obſerved, that this account will by no means agree with the hiſtory of David's conſulting the oracle by Abiathar; 1 Sam. xxiii. 9, 11. chap. xxx. 7, 8. becauſe the ark, on which was the mercy-ſeat, was then at Kirjathjearim; whereas David was in the one caſe at Ziklag, and in the other in the foreſt of Hareth. Braunius and Hottinger have adopted another opinion: they ſuppoſe, that when Moſes is commanded to put in the breaſt-plate the *urim and thummim,* ſignifying *lights* and *perfections* in the plural number, it was meant that he ſhould make choice of the moſt perfect ſet of ſtones, and have them ſo poliſhed as to give the brighteſt luſtre: and on this hypotheſis, the uſe of the *urim and thummim,* or of theſe exquiſitely poliſhed jewels, was only to be a ſymbol of the divine preſence, and of the light and perfection of the prophetic inſpiration: and as ſuch, conſtantly to be worn by the high-prieſt in the exerciſe of his ſacred function, eſpecially in conſulting the oracle. See Prideaux's Connection, vol. i. p. 123, &c. Jennings's Jewiſh Ant. vol. i. p. 233, &c.

Diodorus Siculus relates, that there was alſo a ceremony in uſe among the Egyptians, whoſe principal miniſter of juſtice wore a collar of precious ſtones about his neck, which was called *αληθεια,* or truth.

URINAL, in *Medicine,* a veſſel fit to receive and hold urine; and uſed accordingly for the conveniency of ſick perſons. It is uſually of glaſs, and crooked; and ſometimes it is filled with milk, to aſſuage the pain of the gravel.

URINAL, in *Chemiſtry,* is an oblong glaſs veſſel, uſed for making ſolutions, and ſo called from its reſemblance to the glaſſes in which urine is ſet to ſettle, for the inſpection of the phyſician.

URINARIA, in *Botany.* See DANDELION.

URINARIA *fiſtula* is the ſame as URETHRA; ſo called from its office, to convey the urine.

URINARIA, *veſica.* See BLADDER.

URINARIUS, *meatus.* See MEATUS.

URINARY *bladder.* See BLADDER.

URINARY *paſſage.* See URETHRA.

URINE, URINA, formed from *ȣρον,* which ſignifies the ſame, a liquid excrement, or humour, ſeparated from the blood in the kidneys, conveyed thence into the bladder, and diſcharged by the urethra.

The *urine* is ſecreted from the arterial blood, in the glands of the kidneys, from which ariſe numerous little pellucid pipes, and veins; which, receiving the ſecreted *urine,* at length join into twelve papillæ; out of which the *urine* ouſes into a cavity called the *pelvis,* from whence it runs into the ureters of either ſide, and through them into the bladder; and from that, at length, through the urethra out of the body.

The ſecretion of the *urine,* then, is not performed by any attraction, as ſome will have it; or by any fermentation, as others; or any precipitation, as others: but by the force of the heart, and arteries, whereby the blood is driven through innumerable turnings and windings of the veſſels; attenuated by reſiſtances, oppoſite motions, violent concuſſions, and various mixtures, till the more liquid and ſerous part thereof is forced through canals ſmaller than the blood-veſſels, and ſo collected and diſcharged.

The ſecretion of *urine*, as alſo that of PERSPIRATION, is conſiderably influenced by the paſſions.

It is more than probable, that the blood of the emulgent artery, conveyed through all the little branches that ſpread through the exterior membranes of the veſiculæ, whereof the kidneys are compoſed, being by this means exceedingly divided, and, as it were, attenuated, enters the veſiculæ themſelves, and gives them their red colour: that it is there filtrated, and the ſerous or *urinous* part ſecreted; that this filtration is promoted by the alternate contraction and dilatation of the fleſhy fibres that encloſe the little veſicles; and that, after filtration, the parts that remain blood are reſumed by the capillary branches of the veins; the reſt entering the excretory ducts of the veſiculæ, which are the firſt receptacle of the *urine*. Hiſt. Acad. des Sciences, an. 1705.

M. Morin, in the Memoirs of the Academy of Sciences, marks out a new route or courſe of the *urine*. The ordinary one, which is the paſſage of any liquor we drink through the ſtomach into the inteſtines, thence into the lacteals, thence into the receptacle of the chyle, thence into the ſubclavian vein, thence into the cava, thence into the right ventricle of the heart, thence into the lungs, and thence into the left ventricle of the heart, thence into the aorta, thence into the emulgent artery, thence into the kidneys, thence into the ureters, and at laſt into the bladder, ſeems to him too long and circuitous; conſidering how readily mineral waters paſs, and what a ſpeedy effect aſparagus is found to have on our *urine*. Beſides that, on this principle, the liquors we drink mixing with ſo many other liquors in their way, ſhould be greatly altered thereby; whereas we frequently find a tincture of caſſia rendered by *urine* almoſt as black as when firſt taken; and the like is obſerved of divers other liquors.

M. Morin, therefore, maintains, that a conſiderable part of the liquor we drink, ouſes through the membranes of the ſtomach, and falls into the abdomen; where it enters the bladder through the pores thereof, without getting into the inteſtines, which are lined with too thick and viſcid an humour to allow it ingreſs.

This ſyſtem is confirmed hence, that both the ſtomach and bladder, even of a dead animal, are found eaſily permeable to water.

Accordingly, Dr. Morgan aſſures us, that if the contents of the abdomen be taken out of an animal body, after it is juſt opened, and the ſtomach be filled with warm water, while the parts are yet reeking, the liquor will paſs into the bladder; which will viſibly receive it, and be filled in proportion as the ſtomach empties.

The ſame author adds, that if a ligature be made upon the ureters, while the animal is yet living, and the blood continues to circulate; though this muſt cut off all communication from the kidneys to the bladder; yet any liquor with which the ſtomach is filled, will paſs into the bladder.

From the whole, he ſays, though ſome of our beſt anatomiſts hold, that a circulation of the whole maſs of blood is effected in five minutes, and others in two, which might account for the quick paſſage of the *urine*, it is hard to conceive, but that part of it muſt go immediately from the ſtomach into the bladder.

The general deſign of nature, in this new *urinary* drain, is ſuppoſed to be, to prevent any ſudden plethora, or immoderate diſtention of the veſſels upon drinking.

As a neceſſary conſequence of this ſyſtem, the author eſtabliſhes two kinds of *urine*; the one filtrated immediately out of the ſtomach into the bladder, the other paſſing the long courſe of circulation.

But Dr. Rega endeavours to prove, by an eaſy calculation of the quantity of *urine* ſecreted in the kidneys, that they are capable of furniſhing all the quantity obſerved at any time. And laſtly, he mentions the fullneſs and great frequency of the pulſe, after drinking theſe liquors, as a proof of their being mixed with the blood. Med. Eſſ. Edinb.

The ſpecific gravity of the human *urine*, made in the night-time, has been found greater than that made in the day. Hence Dr. Bryan Robinſon infers, that *urine* draws off more contents from the blood in ſleep than when bodies are awake; and conſequently that natural ſleep is a very good ſign in fevers, in which the blood abounds more with contents than it does in health. Of the Food and Diſcharge of Human Bodies, p. 85.

In the Philoſophical Tranſactions we have an inſtance given us, by Mr. Young, of a boy ſix years old, that diſcharged almoſt all his *urine* by his navel.

In the ſame Tranſactions, Dr. Richardſon gives an account of a boy at North Bierly, in Yorkſhire, who lived to ſeventeen years of age without ever making water; yet was in perfect health. He had conſtantly a diarrhœa on him, but without much uneaſineſs. The obſtruction, that author obſerves, muſt have been in his kidneys; for he had never any inclination to make water.

Urines are of various kinds and properties. After drinking plentifully of any aqueous fluid, the *urine* is crude, inſipid, void of ſmell, and eaſily retained. That yielded by chyle well concocted, is ſharper, more ſaline, leſs copious, ſomewhat fetid, and more ſtimulating. That from chyle already converted into ſerum, is redder, ſharper, ſalter, and more fetid and ſtimulating. And that ſecerned, after long abſtinence, from humours well concocted, and worn off the ſolid parts, is the leaſt copious, ſharpeſt, ſalteſt, reddeſt, moſt fetid, almoſt putrefied, and, of all others, the hardeſt to retain. The *urine*, therefore, contains the watery part of the blood, its ſharpeſt, ſubtileſt, and moſt volatile ſalt, and that neareſt to the alkaline kind; its ſharpeſt, ſmalleſt, and moſt volatile oil, and that neareſt to putrefaction; and its ſmalleſt, moſt volatile earth.

The phoſphorus, in uſe among us, is made from human *urine*. Saltpetre is likewiſe prepared from the *urine*, and other excrements of animals.

The Indians ſcarce uſe any other medicine but cows *urine*.

The Spaniards make great uſe of *urine* to clean their teeth; and ſo did the Celtiberians of old.

Urine is alſo uſed in dying, to ferment and warm the woad. Old *urine* tinges ſilver with a fine gold colour.

The diſorders in the *urine* are various. See STRANGURY, RETENTION, DIABETES, STONE, NUBECULA, &c. and the ſubſequent articles.

URINE, in *Medicine*. The *urine* affords one of the principal criterions, or ſigns, whereby phyſicians judge of the ſtate of the patient, and the courſe of the diſeaſe.

In caſting or examining *urine*, the things to be conſidered are, its *quantity*, *colour*, *ſmell*, *taſte*, *fluidity*, and the matters ſwiming therein.

An *abundance of urine* indicates a looſeneſs of the renal pipes, a diminution of perſpiration, ſweat, ſaliva, an imperfect mixture of the blood, whereby the watery parts ſeparate eaſily from the reſt; a nervous indiſpoſition, a copious drinking of ſome aqueous liquid, or ſome diuretic taken. Such *urine* preſages a thickneſs of what is left behind; and its acrimony denotes thirſt, anxiety, obſtructions, and their effects, a dry and hot conſtitution.

A contrary ſtate of the *urine* indicates the contraries, and preſages future repletions, heavineſs, drowſineſs, convulſive tremors, &c.

A *thin*, *limpid*, *inſipid*, *colourleſs*, *taſteleſs urine*, denotes a great conſtriction of the renal veſſels, and, at the ſame time, a briſk agitation of the humours; a ſtrong coheſion of the oil, ſalt, and earth, in the blood itſelf, and an imperfect mixture of the aqueous parts therewith; ſome grievous indiſpoſition of the mind, an hyſteric or hypochondriac fit; a debility of the viſcera; crudity, pituita, obſtructions of the veſſels, and, in acute diſeaſes, a want of a coction and criſis. Such *urine* portends much the ſame as a too copious *urine*; and in acute, inflammatory diſeaſes, a bad condition of the viſcera, deliria, phrenſies, convulſions, and death.

Ruddy urine, without any ſediment, in acute diſeaſes, indicates a violent motion and attrition among the parts that conſtitute the humours, and between the veſſels and the humours; a cloſe intimate mixture of the oil, ſalt, earth, and water, in the humours; and hence a great crudity of the diſeaſe, and its long duration, and great danger. Such *urine* preſages gangrenous obſtructions of the fineſt veſſels, chiefly thoſe of the brain and cerebellum, and thence death; a difficult coction; a flow, doubtful criſis; and all theſe the worſe, as the *urine* is redder, and freer of ſediment. If there be a heavy copious ſediment, it ſhews a ſtrong antecedent attrition, looſe veſſels, ſharp, ſaline, colliquated blood, unfit for nutrition, intermitting fevers, and ſcurvy.

The preſages are, the durableneſs of the diſeaſe, wearing of the veſſels, weakneſs, colliquative ſweats, ſaliva, atrophy, and dropſy. If the ſediment in ſuch *urine* be branny, ſcaly, filmy, &c. it preſages the like, only worſe.

A *yellow urine*, with a ſediment as before, denotes a jaundice, and the ſymptoms thereof in the cutis, ſtools, &c.

A *green urine*, with a thick ſediment, denotes an atrabilary temperature; and that the matter thereof is reſolved, and now excreted; conſequently anxieties about the præcordia, perturbations of ſtool, and iliac and colic pains.

Black urine denotes the ſame with green, only in a greater and worſe degree.

Blood, pus, caruncles, filaments, hairs, anguillæ, grumæ, ſandy parts of ſtone, and a mucus at the bottom of the *urine*, denote ſome diſorder in the kidneys, ureters, bladder, and urethra.

Fatty urine generally breed ſmall ſands, adhering to ſome viſcid matter; and thus produces a ſort of oily membrane, or pellicle, which denotes an abundance of earth, and a heavy ſalt in the blood; and preſages the ſcurvy, ſtone, &c.

A *fetid urine* denotes the ſalts and oils to be attenuated diſſolved, and almoſt putrefied; whence very great danger, both in chronic and acute diſeaſes.

Urine which, when ſhaken, retains its froth long, denotes a tenacity of the mixture, and thence a difficulty of criſis; and pulmonic diſeaſes, or catarrhs in the head.

But the *urine* is chiefly conſulted in acute fevers, where it is a very ſure ſign: for, 1. *Urine* with a white, light, equable, turbinated, inodorous ſediment, through the whole of the diſeaſe to the criſis, is a very good preſage. 2. Copious, white, ſtrangurious *urine*, with much white ſediment, emitted at the time of the criſis, cures and takes away abſceſſes. 3. A thin, ruddy *urine*, that does not ſubſide; a white, thin, watery *urine*; a thin equable, yellow *urine*; and a turbid *urine*, that does not ſubſide, denote, in very acute diſeaſes, a great crudity, a difficult criſis, and a durable dangerous diſeaſe. See OUROLOGY.

The *urine* of phthiſical people is ſaid to be always ſpecifically heavier than that of people in health, or in any other diſeaſe.

Urine is ſometimes applied externally, boiled with bran, as a reſolvent and diſcutient; in which intentions it is ſaid to be very efficacious.

We have frequent inſtances of people's voiding by *urine* much greater quantities of liquids than they take into the ſtomach in the time; but this, though a ſeeming paradox, is eaſily explained, by conſidering how very ſmall a part only of what we call ſolids, is really ſolid. Chemiſtry ſhews us that the far greater part of our food may be procured in a fluid form by diſtillation; and on this principle alone, ſo long as the quantity of *urine* voided is not more than that of the meat and drink together, the miracle ceaſes. There are, however, inſtances of the quantity of *urine* greatly exceeding that of both. Dr. Wittie, in this caſe, ſuppoſes the converting of air into water to make up the over-proportion; but it is more rationally accounted for by the decreaſe of the patient's fleſh all the time. Our own bodies, as well as the foods we take in for their ſupport, are compoſed of a greater proportion of fluids; and the real ſolid matter is ſo very little, that when, by the courſe of a diſeaſe, thoſe fluids, which ſhould remain locked up in the texture of the ſolids, and increaſe their bulk, are drained and ſeparated from them, it is no wonder that the diſcharge be vaſtly diſproportioned to the ſupplies, when the body itſelf goes off with them. We have indeed accounts not eaſily ſoluble on theſe principles, nor any way but by the ſcheme of converting air into water before mentioned; but till we are certain that the quantities and proportions are accurately noted in them, it will be raſh to conclude any thing from them. See Phil. Tranſ. Nº 52.

When *urine* has been reduced to a rob by condenſation by freezing, it is found to vary very remarkably, according as it was taken, either freſh, or half putrefied, to make the operation. That which was made freſh remains in this ſtate tolerably clear, and of a dull yellow colour, and almoſt without ſmell; but that which was taken half putrefied, remains of a colour between brown and red, or ſomewhat deeper, like the brown ſtrong beer, and becomes intolerably fetid, if ſet for any time in a warm place; but that which was condenſed freſh, is not liable to this accident, but may be kept two or three years in the ſtate of rob, and will never grow fetid, nor ſmell much like *urine*. Stahl, De Concentration. See PHOSPHORUS *of urine*.

Urine is ſtrongly diſpoſed to putrefaction. In ten or twelve hours, when the weather is warm, it acquires a ſtrong ſmell; and in great heats this ſmell may be perceived in five or ſix hours. The beginning of its putrefaction may be perceived by a putrid, diſagreeable, but not pungent ſmell. The ſmell afterwards becomes pungent, and diſcovers a volatile alkali, which is very copiouſly diſengaged in the putrefaction of this liquor. Although the diſagreeable ſmell that is perceived at firſt in *urine* beginning to putrefy has not the pungency of volatile alkali, it nevertheleſs ſeems to be produced by this ſalt; for by mixing any acid with *urine* in this ſtate, its fetid ſmell is immediately deſtroyed. By the ſame means alſo the ſmell of veſſels in which *urine* has been contained may be deſtroyed. On the contrary, by mixing ſome fixed alkali or quick-lime with freſh *urine*, a pungent ſmell of volatile alkali and of putrid *urine* is inſtantly produced. As in ſo ſhort a time no real putrefaction can happen, the diſcharge of volatile alkali muſt be attributed to a decompoſition of a ſal ammoniac, which is contained in the freſheſt *urine*.

From an analyſis of *urine*, recited in the Chemical Dictionary, we may infer, that it is compoſed of a large portion of pure water, in which is diſſolved a conſiderable quantity of earthy matter, that forms the ſediment of *urine*; of two phoſphoric ſalts, one of which is ammoniacal, and the other has a baſis of fixed alkali; of common ſalt; and, laſtly, of a ſaline ſaponaceous matter, which contains a combined oil. In *urine* no gelatinous matter nor uncombined oil are found. However, the compoſition and proportions of the ſeveral conſtituent parts of *urine* are very variable, according to the ſtate of health or of ſickneſs, to the differences of conſtitutions, aliments, exerciſes, diſeaſes, medicines, and perhaps even to the variations of the atmoſphere. A knowledge of the differences of the *urine* in all theſe ſeveral circumſtances is very important, but can only be acquired by a long and zealous obſervation of thoſe phyſicians who are inſtructed in the ſeveral ſciences relative to their profeſſion.

URINE, *bloody, mictus cruentus*, in *Medicine*, the name of a very troubleſome and often dangerous diſeaſe: it is a voiding of pure blood by the urinary paſſages, and takes its origin from a congeſtion of blood in the emulgents, and is the method (though an unhappy one) taken by nature to diſcharge the load of a plethora, and give the maſs of blood freer room to circulate. This is the natural or ſimple *mictus cruentus*; but, beſides this, there is another accidental one, ariſing from an injury of the veſſels of the kidneys or bladder, occaſioned by their being either enlarged, broken, or eroded.

Signs of it. When a *mictus cruentus* is natural, it uſually comes on without any previous ſymptoms; or if there be any, they are only ſome ſenſations of a weight and preſſure upon the loins; but when this is brought on by accidents, as by the rubbing of a ſtone, or the like, it is always preceded by violent pains. When pure blood is voided ſuddenly without interruption, and without pain, it proceeds from the kidneys; but if the blood be in ſmall quantity, of a dark colour, and emitted with heat and pain about the bottom of the belly, it proceeds from the bladder. When bloody *urine* is occaſioned by a rough ſtone deſcending from the kidneys to the bladder, which wounds the ureters, it is attended with a ſharp pain in the back, and difficulty of making water. If the coats of the bladder are hurt by a ſtone, and bloody *urine* follows, it is attended with the moſt acute pain, and a previous ſtoppage of *urine*. The blood voided with the *urine* is florid, and, after a time, ſubſides perfectly from among it; but when there is an exulceration of the kidneys, the blood is altered in its texture and appearance, and ſhews itſelf like worms.

Perſons moſt ſubject to it. Theſe are old men of plethoric habits; but even with theſe it is a rare diſtemper. When young men, or even middle-aged ones, are affected with it, we are to ſeek for its origin in violent and preternatural cauſes. Men are alſo, in general, more ſubject to it than women; but theſe are not wholly free from it.

Cauſes of it. Theſe are uſually a plethora, and an unnatural derivation of the hæmorrhoidal blood to the kidneys, where the veſſels burſt; for it is very rarely, and never but from ſome preternatural cauſes, that they burſt in the bladder. It may alſo proceed from ulcers or eroſions of the bladder, or from a ſtone lodged in the kidneys. The common violent and preternatural cauſes of this diſeaſe are the uſe of violent purges, and of the hot diuretics, of balſam of ſulphur, of oil of amber, and, above all, of cantharides; long and hard riding on horſeback, or any violent motion, falls, the lifting or carrying of heavy burdens, or blows on the region of the loins. In old men, an exceſſive uſe of venery may alſo bring it on, as alſo violent paſſions of the mind, a ſpirituous diet, an exulceration of, or a ſtone in the kidneys; and finally, an omiſſion of habitual diſcharges of blood, whether they have been artificial by bleeding, or natural by the hæmorrhoids, or the like.

Prognoſtics from it. It is a diſtemperature that never can prove of benefit in any caſe, but is often very dangerous; except, indeed, when the diſcharge proceeds from exceſs of blood, in which caſe it is rather to be conſidered as a ſalutary evacuation than a diſeaſe; but if the diſcharge be very great, it may waſte the patient's ſtrength, and occaſion an ill habit of body, a dropſy, a conſumption, &c. Old men who are afflicted with it, rarely live long after it, eſpecially if the diſcharges are not regularly made; and if it be raſhly ſuppreſſed by the uſe of aſtringents in any caſe, it brings on inflammations, fevers, and often dropſies. Ulcers in the kidneys are another very frequent effect of this; and under theſe, blood and purulent matter are voided together, and appear like clouds in the *urine*.

Method of cure. In the time of the fit, the violent emotion of the blood is to be reſtrained by nitre, cinnabar, and ſome of the abſorbent powders; and if theſe are found inſufficient, the milder aſtringents are to be joined with them, coral, crocus martis, and vitriol of iron; and if theſe fail, the aſtringent tinctures of ſteel, and the terra Japonica, are to be given. Some alſo recommend as ſpecifics, the juice of nettles, a decoction of the equiſetum, or horſe-tail, and a tea made of aſparagus-roots. The bowels muſt be kept gently open by clyſters, or the milder purgatives; and after the fit the ſame methods are to be continued, to prevent a return. After this, bleeding in the foot is of great ſervice, and old perſons are not to be excuſed from it on account of their age. It is finally to be conſidered, whether an obſtruction of the menſes, or of the hæmorrhoidal diſcharges, has occaſioned the diſeaſe; and if ſo, they are to be regulated with all due care for the future; and for the firſt the proper medicines are to be given; for the latter, leeches are to be applied to the hæmorrhoidal veſſels. Junker's Conſp. Med. p. 39. 44.

In caſes of *bloody urine*, ſpirit of vitriol, mixed with the patient's drink, has been found ſerviceable. See Med. Eſſ. Edinb. abr. vol. i. p. 68.

When bloody *urine* is owing to a ſtone in the bladder, the cure depends upon an operation. If it be attended with a plethora, and ſymptoms of inflammation, bleeding will be neceſſary. The body muſt likewiſe be kept open by emollient clyſters, or cooling purgative medicines, as cream of tartar, rhubarb, manna, and ſmall doſes of lenitive electary. When it proceeds from a diſſolved ſtate of the blood, it is commonly the ſymptom of ſome malignant diſeaſe, as the ſmall-pox, a putrid fever, or the like. In this caſe the patient's life depends on the liberal uſe of the Peruvian bark and acids. When there is reaſon to ſuſpect an ulcer in the kidneys or bladder, the patient's diet muſt be cool, and his drink of a ſoft, healing, balſamic quality, as decoctions of marſhmallow-roots with liquorice, ſolutions of gum-arabic, &c. Three ounces of marſhmallow-roots, and half an ounce of liquorice, may be boiled in two quarts of water to one; two ounces of gum-arabic, and half an ounce of purified nitre, may be diſſolved in the ſtrained liquor, and a tea-cup-full of it taken four or five times a day.

The early uſe of aſtringents in this diſeaſe has often produced bad conſequences. When the flux is ſtopped too ſoon, the grumous blood, by being confined in the veſſels, may occaſion inflammations, abſceſs, and ulcers. If, however, the caſe be urgent, or the patient ſeems to ſuffer from the loſs of blood, gentle aſtringents may be neceſſary. In this caſe the patient may take three or four ounces of lime-water, with half an ounce of the tincture of Peruvian bark, three times a day. Buchan's Dom. Med. p. 374.

URINE, *incontinence of.* This is a term uſed by medical writers to expreſs an involuntary excretion of this liquor, whether it be inceſſantly, or in larger quantities at different intervals.

This is of two kinds; in the one it is only in the night, in the time of ſleep; and this ariſes merely from careleſſneſs, and a bad habit; in the other, it depends on a paralytic affection of the ſphincter of the bladder; and in this caſe it drops away continually from the patient; and this is therefore called by ſome a *ſtillicidium*.

Authors alſo divide an *incontinence of urine* into the idiopathic and ſymptomatic: the idiopathic is a diſeaſe in itſelf, and depends upon the preceding cauſes: the ſymptomatic happens to different perſons on different occaſions, as a ſymptom of other complaints. It is common to dying perſons; it is alſo very frequent to women who are very big with child, and ſometimes happens from violent ſneezing, coughing, or laughing.

Perſons ſubject to it. The voiding of the *urine* involuntarily, and in the ſleep, in infants, is not to be accounted a diſeaſe; but when this cuſtom continues with them as they grow up, from idleneſs, or ill habit, it is at length to be conſidered as a diſeaſe, as they are by no means able to help it. Women who have ſuffered much in child birth are often ſubject to an *incontinence of urine* afterwards, eſpecially perſons who have had their firſt child at an advanced age. People in years, who are ſubject to paralytic complaints, are alſo often afflicted with this troubleſome complaint; and many who have been cut for the ſtone by perſons not ſufficiently ſkilled in the operation. Perſons ſubject to the piles alſo ſometimes fall into it, from the ſuppreſſions of their uſual diſcharges, and ſometimes from the tumors becoming fiſtulous, and reaching to the neck of the bladder. Impoſthumes of the bladder will alſo occaſion it, and violent external injuries.

Prognoſtics in it. An *incontinence of urine*, which happens only in the night, and is merely cauſed by a bad habit, and not of long ſtanding, uſually admits of a cure; but the ſtillicidiums of *urine*, from paralytic diſorders of the ſphincter of the bladder, are very rarely cured, eſpecially when they have been fixed ſome time upon the perſon.

Method of cure. The involuntary voiding of the *urine* in the night, in children, is to be cured, in a great meaſure, with puniſhment for the neglect, and by denying them much liquids after dinner-time; by a proper diet; the avoiding all diuretics, and the making water immediately before going to bed; and when it has gone ſo far, that the tone of the parts is injured, the uſual ſtrengthening medicines are to be given, as in the following caſes.

When the *incontinence of urine* is occaſioned by a paralytic weakneſs of the ſphincter, nervous and ſtrengthening medicines are the proper methods of curing; in this caſe, maſtic, amber, nutmeg, and cinnabar, are found to be of great ſervice, and pills or powders compounded of them, are an excellent general remedy to be given in ſmall doſes, two or three times a day. Externally, it is very proper to uſe by way of fomentation, decoctions of roſemary, ſage, ſerpyllum, marjoram, and the like warm herbs in red wine.

When the diſeaſe is occaſioned by an impoſthume or ulcer in the neck of the bladder, balſamics are to be given, as maſtic, gum-juniper, and boiled turpentine; but when it is owing to injuries received in child-birth, the manual operation of the ſurgeon is uſually to be preferred to all internal medicines. Junker's Conſp. Med. p. 538. See INCONTINENCE.

Dr. Dickſon recites ſeveral inſtances, in which large bliſters, applied to the region of the os ſacrum, have been of uſe in the cure of *incontinence of urine*, as well as of palſies of the lower extremities, in London Med. Obſ. vol. ii. art. 27. and vol. iii. art. 11.

URINE, *ſuppreſſion of.* See SUPPRESSION *of urine*, and STRANGURY.

URINE *of a cow.* This diſagreeable potion having been much recommended as a medicine both in England and France, Mr. Lemery was at the pains of enquiring how far it might reaſonably be ſuppoſed to poſſeſs the virtues aſcribed to it.

He obſerves, that urine in general is a ſerous liquor, impregnated with a volatile ſalt and oil, both which it has taken up from the blood, in the courſe of its circulation with it. It is eaſy to conceive, that principles ſo active as theſe may give it virtues, and thoſe very great ones. We find that recent human *urine* purges, when taken in a proper quantity; but for all medicinal purpoſes, it muſt be much more proper to take the *urine* of ſome animal which feeds only on vegetables, that being a ſort of extract of the more ſubtle ſaline parts of the herbs on which the creature feeds.

Though the *urine* of any of theſe animals ſeems equally to be recommended, yet that of the cow has, in all times, been preferred to others, from the quantities of it eaſily obtained, and the tame and pacific nature of the animal, which has been ſuppoſed ſo far to influence it, as to occaſion its *urine* to be leſs acrid than in other beaſts.

The ſpring ſeaſon is the propereſt for the uſe of this remedy, and the method of taking it is to drink two or three large glaſſes in a morning faſting, a quarter of an hour after one another: thus taken, it purges both by ſtool and *urine*, and ſometimes vomits; the perſon is to walk about, after taking it; and it has been found, in this manner, to do great ſervice, as an attenuant and deobſtruent, in jaundices, dropſies, rheumatiſms, and aſthmas, as alſo in ſciaticas and vapours.

Mr. Lemery gives ſeveral inſtances of cures performed by it, under his own direction, and afterwards proceeds to give its analyſis.

This *urine* is uſually ſomewhat turbid; and when it has been ſuffered to ſtand by a little, depoſits a ſediment; it is of a pale yellow colour, and of a faint ſmell, greatly different from the urine of the generality of other animals, and reſembling the ſmell of the dung of the ſame creature, only leſs ſtrong, and with ſome mixture of the ſmell of new milk.

The taſte is ſaline, acrid, and bitter; cows kept in cities often have their *urine* very acrid; but thoſe in the fields frequently have it with only a ſlight bitterneſs at firſt, and not ſhewing its ſaline or acrid properties till after it has been made ſome hours. It always readily ferments with acids.

Mr. Lemery put into a cucurbit ſixteen pounds of *urine of a cow*, kept in the country and which had been made two days: this being diſtilled in a cucurbit, purged with leſs violence than before. The purging virtue plainly conſiſts in a volatile ſalt, which the *urine* carries up with it in vapour; for it taſtes ſomewhat acrid and ſaline after diſtillation.

The diſtillation being continued in the ordinary way, there ariſes a large quantity of volatile ſalt and oil, in nothing differing from thoſe of the human *urine*; and the remainder, in the bottom of the veſſel, is a black, light, and ſpongy coal, weighing four ounces: this, being calcined in an unglazed earthen veſſel, over an open fire, and treated in the common way of elixivation, affords three ounces two drams and a half of a fixed, acrid, and highly alkaline ſalt, white, and without ſmell. Mem. Acad. Par. 1707.

Urine, in *Agriculture*, is of excellent uſe as a manure.

The knowing in agriculture and gardening prefer *urine* for land, trees, &c. before dung; as penetrating better to the roots, and removing divers infirmities of plants.

The decay of the ancient Kentiſh pippins is a thing much complained of; and Mr. Mortimer obſerves, they will be quite loſt, unleſs ſome perſons ſet themſelves to the ancient way of culture; which, as all ancient graziers and gardeners know, was by waſhing the moſſy, worm-eaten, cankered, and unſound trees, two or three times in the month of March, with the *urine* of oxen, &c. gathered in earthen veſſels, placed under the planks or the ſtalls wherein they were fatted.

In Holland, and in divers other parts, they preſerve the *urine* of their beaſts, &c. with as much care as their dung. Mr. Hartlib, ſir Hugh Plat, Mr. Mortimer, &c. make a common complaint, that ſo great an improver of land, and ſo remarkable a ſtrengthener of manure, ſhould be ſo much diſregarded among us.

Glauber, indeed, has taught the world to believe, that there is nothing ſo deſtructive to vegetables of all kinds as *urine*, which, he ſays, by means of the ſal ammoniac that it contains, burns up all the roots. This is certainly true of *urine*, and of dung too, when laid on in too great quantities; but it is certain that *urine* is as ſafe as dung, and as profitable, when laid on in a ſparing and proper manner. Dung is of no uſe to land, but by its fermentation; but the beſt of all things to haſten and perfect that fermentation, is *urine*.

Urine, *ſalt of*. See *Fuſible* Salt.

URINOUS *ſalts* are the ſame with what we otherwiſe call *alkali ſalts*, or *alkalis*.

There are two kinds of *urinous ſalts*, the one *fixt*, the other *volatile*. The fixt prevail in plants, and the volatile in animals.

They are called *urinous*, in reſpect of their taſte and ſmell, which bear ſome reſemblance to thoſe of urine.

URN, *urna*, a kind of VASE, of a roundiſh form, but biggeſt in the middle, like the common pitchers; now ſeldom uſed, but in the way of ornament over chimney-pieces, in buffets, &c. or, by way of acroters, at the tops of buildings, funeral monuments, &c.

The great uſe of *urns*, among the ancients, was to preſerve the aſhes of the dead, after they were burnt; for which reaſon they were called *cineraria*, and *urnæ cinerariæ*; and were placed ſometimes under the tomb-ſtone, whereon the epitaph was cut, and ſometimes preſerved in vaults in their own houſes.

Urns were alſo uſed, at their ſacrifices, to put liquid things in. They were alſo of uſe in the *ſortes Præneſtinæ*, or caſting of lots. At Rome, alſo, the cuſtom was, to abſolve or condemn the accuſed, by the ſuffrages, or calculi, which the judges caſt into the *judicatory urn*.

Virgil repreſents Minos, the judge of hell, ſhaking the *urn*, to decide the lots of mankind.—*Quæſitor Minos* urnam *movet*.

The *urn* is ſtill the attribute of rivers, which are painted leaning on *urns*, repreſenting their ſources by the waters flowing therefrom. We find them repreſented, in the ſame manner, on antique medals, and relievos.

Theſe veſſels are frequent in many parts of this kingdom, where there have been Roman ſtations, and are of very various kinds and manner of workmanſhip.

Dr. Liſter, who was very fortunate in his reſearches into the ſtructure and differences of theſe remains of antiquity, obſerved, that in Yorkſhire, where there are great numbers found, there were met with three very different kinds, as to their matter and tempers.

1. A bluiſh-grey ſort, which had a great quantity of coarſe ſand wrought in among the clay. 2. A ſort of the ſame bluiſh colour, but containing a ſand of a much finer kind, and full of mica, and probably made of a clay naturally ſandy, or a fine ſmooth and ſtiff loam. And, 3. A red ſort, made of a fine pure clay, with little or no mixture of ſand. Theſe are throughout of a fine red colour like bole, and many of them are elegantly adorned with figures in baſſo relievo; and uſually theſe have on the bottom, or elſe on the cover, the name of the workman, which ſome have miſtaken for the name of the perſon whoſe aſhes they encloſe; but this muſt be an error, ſince great numbers of pots and *urns* are found with the ſame name. Thoſe are varniſhed all over, both inſide and out, with a varniſh of a bright red colour.

The ſeveral matters of theſe *urns* informed this ingenious enquirer of the place where they were made; which he found to be in the ſame county on ſand-hills, now never uſed as potteries; but, as he well obſerves, the difference is very great between the potteries of thoſe days and of ours, ſince we, who uſe great quantities of clay, and but little ſand, erect theſe works where there is much clay, and bring the ſmall quantity of ſand we uſe to it; whereas the Romans, on the other hand, who uſed much ſand, and but little clay, naturally eſtabliſhed their works where there was plenty of ſand, and brought their clay to it.

The Roman *urns* differ from the earthen-ware made at this time in ſeveral particulars. 1. They have no lead-glazing, which ſeems a modern invention, and is, in many reſpects, a very bad one. See Glazing. 2. They are compoſed of a far larger quantity of ſand than clay. And, 3. They are baked not in an open fire, as our common earthen-ware, but have been encloſed in large earthen veſſels, to defend them from the immediate contact of the flames; and hence it is, that the natural colour of the clay they are made of is not altered in them.

The red *urns* ſeem to have been the maſter-piece of the workmen, and to have employed their greateſt art; the emboſſed work upon them is often very beautiful, and their coral-like glazing is more beautiful than any thing of the modern times, and ſeems to have been done by dipping them all over in ſome appropriated liquor, and afterwards baking them in the cloſe manner before deſcribed. This has certainly been the method they uſed, ſince the fragments of theſe large coffins, or caſes, are found near all the Roman potteries. Hooke's Philoſophical Collections, p. 87.

The Romans, and moſt other nations, contented themſelves to make their funeral *urns* of potters ware, or baked earth; but we find there have been ſome people who have made them of gold, on particular occaſions. In the year 1685, as a peaſant of the iſland of Funen was ploughing a piece of land, which had before lain barren, he turned up no leſs than ſix golden ſepulchral *urns*. They were all full of a greyiſh ſubſtance, which ſome took to be a grey earth; but it was much more probably aſhes.

Theſe are all preſerved at this time in the muſæum of the king of Denmark at Copenhagen; the largeſt of them weighs two ounces and a half, and the others about two ounces and one dram each. Wormius, and ſome others, give accounts, that it was an ancient cuſtom among the northern nations to burn their dead, and when they were great perſons, to collect their aſhes, and bury them in golden *urns*; and the finding of theſe ſeems an evident proof of that account.

Theſe *urns* were very thin, and each had three rings of gold about their necks, and ſeveral circles, one within another, with one common centre carved on the outſide round the body of the *urn*. They held about five ounces of liquids a-piece, or a little more than that; one near ſix ounces.

Sepulchral *urns* of cryſtal were alſo not uncommon; the ſame muſæum has ſome of theſe: they are of a conic figure, and have uſually a gold wire wound round them. Urns of this kind have been found buried in ſome parts of Norway. Another kind of *urns* were thoſe which they called *lachrymales*, or the *tear-urns*: theſe were contrived to receive the tears of the friends of the deceaſed, which were afterwards mingled with the aſhes of the burnt corpſe. Theſe were made of various materials, and of various ſhapes and ſizes, according to the fancy of particular people. Phil. Tranſ. Nº 285.

Urn, *urna*, was alſo a Roman meaſure for liquid things; containing about three gallons and a half of Engliſh wine meaſure.

The *urn* was half the amphora, and four times the congius.

UROCRITERIUM, or Urocrisia, compounded of *ȣρον*, *urine*, and *κριτηριον*, *criterion*, *mark*, *ſign*, *a caſting of water*, or giving judgment on diſeaſes by the ſight of water. See Urine.

Hence, alſo, *uromancy*, *uroſcopy*, &c.

UROGALLUS *major*. See Cock *of the mountain*, and Grouse.

Urogallus *minor*. See Grouse.

UROMASTIX, in *Zoology*, a name uſed by ſome authors for that ſort of lizard called CORDYLUS.

UROPIGIUM, in *Ornithology*, or rump, is that part of birds which is furniſhed with two glands, ſecreting a fattiſh liquor from an orifice in each, and which the birds expreſs with their bills, in order to oil the diſcompoſed parts of their FEATHERS.

VROW-*fiſh*, in *Ichthyology*, the name of a freſh-water fiſh of the malacoſtomous, or, as we call it, the leather-mouthed kind, caught in the lakes and rivers of Germany, and eſteemed a very delicate fiſh.

It is ſomething like the Engliſh rudd or finſcale, but its body is ſomewhat longer, in proportion to its breadth; its back is brown, and its belly yellow; the belly-fins near the anus are a little reddiſh, but all the reſt are brown; the ſcales are large and ſilvery, and the iriſes of the eyes have each, in their lower part, a blood-coloured ſpot; the tail is forked; and its uſual ſize is about ſeven or eight inches, though it is ſometimes caught conſiderably larger. Willughby's Hiſt. Piſc. p. 253.

URRY, in *Natural Hiſtory*, a name given by the people of Cheſhire, and ſome other counties of England, to a black fat earth found in coal-pits, lying immediately over the ſtratum of coal. It is found to be an excellent manure for land, particularly in cold clayey ſoils.

URSA, in *Zoology*. See BEAR, and POLAR *Bear*.

URSA, in *Aſtronomy*, *the Bear*, a name common to two conſtellations of the northern hemiſphere, near the pole; diſtinguiſhed by *Major*, and *Minor*.

URSA *Major*, or *the Great Bear*, according to Ptolemy's Catalogue, conſiſts of 35 ſtars; according to Tycho's, of 56; according to Hevelius's, of 73; but, in the Britannic Catalogue we have 87; the longitudes, latitudes, &c. whereof, are as follow.

Names and ſituations of the ſtars.	Bayer's Char.	Signs.	Longitud.			Latitude.			Magnitude.
			°	′	″	°	′	″	
In the tip of the noſe	ο	♋	18	40	32	40	12	34	4.5
Preceding between the two eyes	A		17	19	15	44	33	0	5
1 at	π		8	1	16	44	35	45	5
2 at	π		18	29	45	43	59	35	6
			21	33	52	42	19	35	5
5.									
			20	38	49	44	55	3	5
	b		22	34	8	41	26	0	6
Preceding of 2 in forehead	S		19	39	10	47	54	45	5
Northern in left foot	ι		28	30	49	29	34	32	4
	n	♌	0	58	22	23	41	47	4
10.									
Second of 2 in forehead 1 at	σ	♋	20	53	6	47	28	50	5
South. in left foot	κ		29	36	58	28	57	10	4
2 at	σ		20	58	26	47	48	10	5
Preceding of 2 in the neck	τ		23	14	30	44	32	57	5
Under the right knee	f		28	47	50	33	25	56	5
15.									
	c		24	56	18	42	48	0	5
			27	37	40	38	35	8	5
Right under the knee	e		28	58	3	36	4	25	5
		♌	6	14	28	17	47	41	6
		♋	26	47	30	41	36	16	7
20.									
		♌	0	35	38	36	36	25	6
		♋	20	3	0	53	16	0	7
Second of 2 in the neck	h		26	28	10	45	7	4	4
In the end of the foremoſt ear	d		22	1	52	51	13	40	4.5
In the left knee	θ	♌	3	0	22	34	56	22	3.4
25.									
			3	6	16	35	20	18	5.6
		♋	20	52	45	53	38	30	6
			28	8	0	46	25	17	5
Northern of two in the breaſt	υ	♌	1	56	49	42	39	6	4
Southern	φ		5	0	17	38	14	10	5
30.									
			7	50	58	34	36	40	6
			1	27	56	49	27	18	5
Firſt of the two in the left hind foot	λ		15	13	42	29	52	22	3.4
Second	μ		16	54	47	28	58	10	3
			2	35	24	50	35	5	6
35.									
			10	15	6	42	30	0	5
			10	12	42	43	45	36	5
			4	6	21	51	24	32	5
			11	30	54	44	28	18	6
			12	5	36	44	23	27	6
40.									
			11	49	28	44	48	58	6.7
			11	5	52	46	48	30	5.6
			13	11	10	44	28	46	6
			15	2	12	42	58	10	6
	ω		22	10	40	33	2	36	4.5
45.									
			27	17	27	24	27	23	6
In the belly, firſt in the quadrilateral	β		24	43	55	31	2	12	6
			15	4	13	45	6	15	2
			25	38	16	30	4	26	6
Upon the ribs, 2d in the quadrilateral	α		10	50	0	49	40	5	1.2
50.									
			26	51	46	29	30	51	7
In the left ham	ψ		24	28	58	35	31	30	3.4
Southern in the right hind foot	ξ	♍	3	0	36	24	46	0	4
Northern	ν		2	18	40	26	8	12	4
		♌	29	51	5	30	45	50	5
55.									
			27	37	44	35	46	22	6
		♍	1	15	28	32	41	32	6
		♌	29	21	20	36	11	48	6
		♍	0	35	46	34	16	47	6
		♌	28	33	20	40	3	51	6
60.									
		♍	6	25	42	29	14	51	6
			7	52	57	27	5	24	6
	χ	♌	29	20	16	41	31	58	4
In the left thigh, 3d in the quadrilateral	γ		26	6	38	47	7	20	2
		♍	1	58	17	41	14	25	7
65.									
		♌	23	52	57	49	38	40	6
		♏	5	43	30	38	58	14	6
		♌	26	3	45	51	21	0	7
In the root of the tail, 4th in the quadrilateral	δ		26	40	55	51	39	40	2.3
			26	42	52	52	45	22	6
70.									
			28	36	6	52	18	16	7
		♍	0	21	33	51	6	10	7
			0	8	50	51	43	6	6
		♌	27	38	39	53	57	20	6
			Unknown			Unknown			6
75.									
			23	50	40	57	55	36	6
Firſt of 3 in the tail from the root	ε	♍	4	33	5	54	19	35	3
			Unknown			Unknown			6
Middle of 3 in the tail	ζ		11	18	23	56	22	47	3
	g		11	28	50	56	33	3	5
80.									
			12	46	50	57	40	40	5.6
1ſt. in the triangle above the laſt of the tail			16	53	5	56	25	50	6
			14	55	24	57	50	24	6
			16	24	23	58	13	34	6
Third in the extremity of the tail	η		22	33	40	54	24	30	3
85.									
			18	51	34	58	25	10	6
Second in the triangle above the laſt of the tail		♍	0	31	5	65	21	38	5

USRA *minor*, the *Little Bear*, called allo *Charles's Wain*; and by the Greeks, *Cynoſura*; by its neighbourhood to the north pole, gives the denomination *αρκτος*, *bear*, thereto. Ptolemy makes it conſiſt of 8 ſtars; Tycho, of 7; Hevelius, of 12; but Mr. Flamſteed of 24; the longitudes, latitudes, magnitudes, &c. whereof as laid down in the Britannic Catalogue, follow.

Names and Situations of the ſtars.	Bayer's Cha.	Signs.	Longitud.			Latitude.			Magnitude.
			°	′	″	°	′	″	
Laſt of the tail, or *Pole-ſtar*	α	♊	24	14	43	66	4	10	3
			21	43	37	65	42	54	6
		♌	7	9	4	70	4	64	6
	b	♋	28	23	24	70	29	38	5
	a	♌	4	1	9	71	25	20	4
5.									
North of the preceding ſquare			16	17	33	72	31	44	7
	β		8	55	8	72	58	20	3
			3	26	50	73	6	34	6
			17	19	48	73	40	40	7
			9	39	20	73	59	44	7
10.									
			17	14	17	74	56	0	5
			Unknown			Unknown			7
Southern of the preced. ſquare	γ		17	10	28	75	13	1	3
			Unknown			Unknown			7
		♋	26	22	26	74	45	48	5
15.									
North. of the ſecond ſquare	ζ		23	2	25	75	6	50	4
			29	47	50	76	42	40	7
			Unknown			Unknown			6
			26	29	28	77	24	15	5
			28	51	45	77	50	55	6
20.									
South. of the ſecond ſquare	η		26	18	22	77	44	15	5
Before the root of the tail	ι		4	55	25	73	53	8	4
Next to the firſt of the tail	δ	♊	26	49	30	69	54	10	3
			27	6	23	69	34	25	6.7

URSULINES, an order of nuns, who obſerve the rule of St. Auguſtine; and are chiefly noted for taking on them the education and inſtruction of young maids.

They take their name from their inſtitutreſs St. Urſula, and are clothed in white, or black.

This inſtitute was firſt eſtabliſhed in Italy by Angelus de Breſcia, in 1537; it was afterwards approved in 1544, by pope Paul III. and united in one nunnery by ſolemn vows, by Gregory XIII. The *Urſulines* of France were founded in 1611 by Magdalen Lhuillier, lady of St. Beuve. Their chief houſe is at Paris, whence they have ſpread through other parts of the kingdom.

URTICA, in *Botany*. See NETTLE. *Dead* NETTLE, in *Botany*. See ARCHANGEL.

URTICA *errans*, in *Zoology*, the name of a ſea-animal of the nature of the common URTICA *marina* in many particulars; but as that is always fixed down to the rocks, this ſpecies is always found looſe.

It has been ſuppoſed that theſe creatures affected the ſkin with a pain like that of the ſtinging of nettles on touching them, and even the eyes of thoſe who only look attentively on them; but Mr. Reaumur, who ſaw prodigious numbers of them on the coaſts of Poictou, declares that he found no ſuch property in any of them, any more than in thoſe fixed to the rocks.

Theſe in ſubſtance ſo much reſemble a ſtiff jelly, that if they were called ſea-jellies, there would want but a ſhort additional deſcription to make them underſtood. Their fleſh, if it may be ſo called, appears of the colour as well as the conſiſtence of a common jelly; and if a piece of one of them be taken up, the mere heat of the hand is ſufficient to make it melt away into plain water. Theſe are notwithſtanding true and perfect animals; and thoſe who have been of a contrary opinion, have not examined them with ſufficient attention. There are very different figures among them; but this is owing to their being of different ſpecies; for all thoſe of the ſame ſpecies are ever exactly of the ſame figure. One great reaſon of people's ſuppoſing them unorganized bodies, is, that what is ſeen of them about the ſhores is very often a fragment of a dead animal, not the whole of a living one; and no wonder if all the neceſſary parts of an animal could not be found in ſuch a piece of one.

Though the generality of theſe animals are of the ſimple colour of a jelly, there are ſome of a greeniſh caſt, and others which have a broad band of a beautifully purple round their extremity; and ſome are beautifully ſpotted with brown. Their figure is very well expreſſed by that of the head of a large muſhroom; their upper ſurface is convex in the ſame manner, and this convexity is greater or leſs in the different kinds, as it is in the different ſpecies of muſhrooms.

If one of theſe animals be dried in the ſun in hot weather, there remains nothing of it but a ſubſtance like a thin parchment; but if one of them be boiled in water, it does not diſſolve away as might have been expected, but only regularly decreaſes in ſize; and when it has become of about one fourth of its natural bigneſs, it there ſtops the decreaſe, and continues nearly of that ſize, and after that will not melt away upon the hand.

All the creatures of this ſpecies, which we ſee thrown upon the ſhores, are found lifeleſs and without motion; but there is nothing wonderful in that, becauſe the violent ſhocks and blows which they muſt have received, in being daſhed againſt the rocks or ſands by the waves, are enough to kill ſo tender an animal. One proof that theſe animals once lived, is, that all thoſe which we find about the ſhores are heavier than the water, and ſink to the bottom; whereas all thoſe, ſeen out at ſea, ſwim upon the ſurface; and this could not be the caſe in regard to any ſubſtance heavier than water, unleſs kept up by ſome voluntary motion. This motion M. Reaumur has obſerved to be a reciprocal contraction and dilatation of the whole body, in the manner of a ſyſtole and diaſtole. In the contraction it elevates the convexity of the body, and in the dilatation it makes it more flat; and by continually repeating theſe motions, it keeps above water as a man does by ſwimming. Mem. Acad. Par. 1710.

URTICA *marina*, in *Zoology*, the name of a remarkable genus of aquatic animals, ſo called from a ſuppoſition of their affecting the ſkin on touching them, with a painful ſenſation like that of the ſtinging of nettles. Theſe are animals of the loweſt claſs, and have by many been reckoned among thoſe creatures called *zoophytes*, or plant-animals, as ſuppoſed to partake of the nature of vegetables and of animals. Some of the ſpecies of this fiſh are found looſe upon the ſmooth ſhores, and ſome fixed to the rocks which are always covered with water. This has given birth to a diſtinction of them into two claſſes, which is as old as Ariſtotle; thoſe of the one being ſuch as move in the open ſea, called by later writers *urticæ ſolutæ*, and referred by Linnæus to the genus of MEDUSA, and denominated by the common people ſea-jellies and ſea-blubbers (ſee URTICA *errans*); and thoſe of the others ſuch as are fixed to rocks, and were ſuppoſed always to remain immoveably in the ſame place, which belong to the ACTINIA of Linnæus. The accurate Mr. Reaumur has obſerved, however, that even theſe laſt have a power of a progreſſive motion; and are not doomed to an eternal reſidence on the ſame ſpot. The motion of theſe creatures is ſo ſlow, that it might eaſily paſs unobſerved by leſs accurate obſervers; this gentleman comparing it to that of the hour-hand of a clock, and adding, that a journey of an inch takes them up commonly between one and two hours. He obſerves alſo, that many of the ſpecies have no property of ſtinging, or cauſing any painful ſenſation on the fleſh.

Dr. Gaertner obſerves, that there is not a ſingle ſpecies of the *urtica marina* poſſeſſed of that ſtinging quality which the ancients aſcribed to them; their tentacula indeed feel rough and clammy, when touched with the finger; but this roughneſs is not perceptible, except when the animal attempts to lay hold of the finger; in which caſe it throws out of the whole ſurface of the feeler a number of extremely minute ſuckers, which, ſticking faſt to the ſmall protuberances of the ſkin, produce the ſenſation of a roughneſs, which is ſo far from being painful, that it even cannot be called diſagreeable.

Theſe creatures occaſionally change their bodies into ſo many different forms, that there is no giving any deſcription of their figure. The moſt natural and general ſhape ſeems that of a truncated cone, the baſe of which is applied to the rock; but this baſe is often round, often elliptic, and often of a perfectly irregular figure. The ſurface of the top of the cone is not flat, but convex, and has in its centre an aperture, which the creature makes larger or ſmaller at pleaſure. In ſome poſitions the whole fiſh not unaptly reſembles a purſe, only with this difference, that the body is not drawn up into any folds or wrinkles by the cloſing of the aperture or mouth. In the middle of this purſe, as we call it, is placed the body of the fiſh, touching this outer covering at the bottom on every ſide, and of a conic figure, as that is. At its top, however, it is looſe, and ſtands every way free from its covering; the ſides are more or leſs diſtant from this free or looſe part of the body, as the aperture at the top of the cone is more or leſs open; when it is nearly ſhut up very little of the body of the animal can be ſeen; but when it opens into different widths, more or leſs of the body becomes viſible, and when it is at the wideſt, every part of it, and all the horns, are ſeen perfectly diſtinct. Theſe horns reſemble in appearance thoſe of the common ſnail; but in their uſe they ſeem much more allied to the pipes or proboſcides of the chamæ kind, the fiſh generally throwing out water at them on being touched. They are placed in three ranges on the internal ſurface of the covering, and are very numerous, their whole number not being leſs than a hundred and fifty.

The creature very often not only opens the outer covering or purſe to the utmoſt width it is capable of, but at the ſame time turns back its extremities; in this caſe the internal part, or body of the fiſh, becomes viſible on the ſurface, and at the ſame time all the horns being, by this bending back of the ſkin on which they grow, thrown into the poſture of ſo many rays, the whole makes a very remarkable figure, and not unaptly reſembles an anemony, or ſome other ſuch flower, when fully open. Very often alſo there is a great addition to the beauty of this appearance, by ſeveral round veſicles of water, which appear blue, or of ſome other lively colour. The general colour of the different ſpecies of this fiſh, or indeed of the ſame ſpecies in different circumſtances, is as variable as the ſhape; ſometimes they are ſeen pellucid and colourleſs, ſometimes white, often yellowiſh, ſometimes of a roſe colour; at other times they are of a beautiful green, and often of various ſhades of brown. In ſome theſe colours are equally diffuſed through every part; in others they are only ſeen in form of ſpots and clouds, or variegations; ſometimes theſe are irregularly diſpoſed, ſometimes more regularly, but always with great beauty. The green ones have uſually a broad line of blue all round their baſe. Neither the colour nor ſhapes of theſe animals can be any marks of different ſpecies; but the firmneſs of their fleſh may: in this they remarkably differ one from another, and this is a difference the more obvious, as their fleſh is always open to the touch, there being no ſhell, nor any other hard ſubſtance to cover it. However ſlow the progreſſive motion of this fiſh is, when examined it is found to depend on a very remarkable mechaniſm, to underſtand which we muſt attentively conſider what is obvious to the eye in the ſtructure of the creature, and remember the compariſon of the whole fiſh to a purſe. We find that what reſembles the bottom of that purſe is flat, and is fixed to the rock, while the body of the fiſh is contained in the reſt of the purſe, but never fills it, unleſs when the mouth of the purſe or covering is cloſe drawn together. The whole covering is a collection of muſcles, which are all tubular. The baſe of the fiſh never appears to us, becauſe always fixed down to the rock; but when the creature is raiſed from that poſition, and the baſe examined, it appears compoſed of a vaſt number of tubes placed one behind another, and running from the centre to the circumference. Theſe tubes are often filled with an aqueous liquor, which may be forced out on preſſing them. Beſides theſe tubes, there are alſo many circular ones ſurrounding one another.

The progreſſive motion ſeems thus performed: when the creature has determined which way it will march, it diſtends all thoſe longitudinal tubes which are on that ſide of its body which is placed toward the point it would move to; this, from its round ſhape at the baſe, gives it an oblong one; that is, it throws the fore-part ſomewhat forward upon the rock; and, at the ſame time, if the longitudinal tubes on the oppoſite ſide of the body be all left empty, and the circular ones diſtended, theſe naturally draw the whole body towards the fore-part, and thus a ſmall advance is made and preſerved, and this, often repeated, is the ſlow progreſſion of this animal. All this is, however, performed ſo very ſlowly, that though there is a continual change going on in the creature, both as to ſhape and place, yet if the eye is kept continually on the object, neither is perceived; but, if taken off for ſome time, and the place and figure both kept in mind, both will be found to be altered on viewing again.

There is a ſpecies of this fiſh alſo which moves by means of its horns; this is known from the reſt by the length of the horns, and their being covered with a glutinous moiſture. This ſpecies lives in the cavities and holes of rocks; and when it has a mind to move, it turns itſelf bottom upwards, and crawls ſlowly on by means of its horns, which then touch the rock.

The food of the *urtica marina* is not leſs wonderful than its ſtructure and motions. It ſhould ſeem very ſtrange that an animal, ſoft like this creature, with no feet nor inſtrument of that kind to help itſelf with, ſhould be able to feed on the fleſh of muſcles, ſea-ſnails, and other ſhell-fiſh; yet theſe are its conſtant food. They find means to take in the ſhell-fiſh whole into the body, and then cloſe the aperture faſt upon it, ſo that it is not to be ſeen that they have any ſuch thing within them; they keep them here as long as they pleaſe, and afterwards throw out the empty ſhells by the ſame aperture, which they can, as before obſerved, widen and contract at pleaſure. By what means the *urtica* is able to get out the body of theſe fiſh, is not known, as it all paſſes in the body; but it very often fails, and the creature is obliged to throw out the ſhell-fiſh alive again, and ſometimes when it has greedily gorged too large a morſel, and it is got into a wrong poſition to be thrown out the ſame way, it is obliged to let it through the baſe, where there is no natural aperture, and where its paſſage muſt be attended with a terrible wound. The manner in which the larger ſhells are thrown out by the mouth, is by opening it extremely wide, and turning it back, ſo that the inſide appears outward for a little way down; and this motion is alſo uſed on another very neceſſary occaſion, the excluding of the young ones, for theſe animals are viviparous. Mem. Acad. Par. 1710.

It has been found that this creature has the remarkable property of the POLYPE, in reproducing ſuch parts as it had loſt. Mr. Reaumur tried many experiments on the various ſpecies of this, and of the ſtar-fiſh kind, and found that whatever parts were cut off, the wound ſoon healed; and Mr. de Villars had opportunities of watching the whole progreſs of the growth of the animals afterwards, and found that they not only ſeemed alive and well after cutting, their wounds ſoon cicatrizing, but that they, in a very little time, regained what had been cut off, and became as perfect as before. See *Sea*-ANEMONIES.

Dr. Gaertner refers the *urticæ marinæ*, or ſea-nettles, to the HYDRA of Linnæus, commonly called the POLYPE; for he ſays, that they agree with that genus in the following general characters, beſides many of its leſs eſſential or accidental qualities; they are of a gelatinous ſubſtance; they have only one opening in their bodies, which gives a paſſage to the food, as well as to the excrements of the animal; and they have alſo a ſet of feelers which ſurround this opening, and ſerve theſe creatures for claws, to catch their prey with, and convey it to their mouths. Phil. Tranſ. vol. lii. art. 13. p. 73, &c.

Theſe animals were known to the Greeks and Romans by the names of ϖνευμα ϑαλασσιος, and pulmo marinus, or ſea-lungs. They attributed medicinal virtues to them. Accordingly Dioſcorides informs us, that if rubbed freſh on the diſeaſed part, they cured the gout in the feet, and kibed heels. Ælian ſays, that they were depilatory, and if macerated in vinegar, would take away the beard. Their phoſphoric quality was noticed by Pliny, who ſays that a ſtick rubbed with them will appear to burn, and the wood to ſhine all over: he alſo adds, that when they ſink to the bottom of the ſea, they portend a continuance of bad weather. Pennant's Brit. Zool. vol. iv. p. 59.

URUBU, in *Ornithology*. See VULTUR.

URUS, in *Natural Hiſtory*, the name of a ſpecies of wild bull, of a very remarkable ſize and ſtrength. Cæſar, in his Commentaries, has deſcribed them as little inferior to elephants in ſize, and reſembling the bull in ſhape, figure, and colour. He adds, that they were very ſwift and fierce, and had horns very much larger, and very different from thoſe of the common bull. And Mentzelius tells us, that it is a vaſt and terrible ſpecies of wild bull, common in Livonia, &c. and that when killed, its brain is found ſcented like muſk. Mr. Ray wiſhes very much, that ſome one, who has an opportunity of ſeeing this creature, would give a more accurate and perfect account than thoſe we already have of it. Ray's Syn. Quad. p. 70.

USAGE, in *Law*. See PRESCRIPTION, and CUSTOM.

USAGE, in *Language*. See LANGUAGE.

USANCE, *uſo*, in *Commerce*, is a determinate time fixed for the payment of bills of exchange, reckoned either from the day of the bills being accepted, or from the day of their date; and thus called, becauſe regulated by the uſage and cuſtom of the places whereon they are drawn. See BILL *of exchange*.

Bills of exchange are drawn at one or more *uſances*, either from ſight, or from date. The Italians ſay, *uſo doppio*, for *double uſance*, or *two uſances*.

This term is longer or ſhorter, according to the different countries. In France, *uſance* is fixed at thirty days. At London, *uſance* is a calendar month; and *double uſance*, two months. In Spain, *uſance* is two months, or ſixty days. At Venice, Genoa, and Leghorn, three months.

At Hamburgh, *uſance* of bills drawn from England, France, and Venice, is two months after date. From Antwerp, and Nuremberg, fifteen days after ſight.

At Venice, *uſance* of bills drawn at Ferrara, Bologna, Florence, Lucca, and Leghorn, is five days after ſight. From Naples, Auſbourg, Genoa, and Vienna, fifteen days after ſight. From Mantua, Modena, and Milan, twenty days after date. From Amſterdam, Antwerp, and Hambourgh, two months after date: and from London, three months after date.

At Milan, *uſance* of bills drawn from Genoa, is eight days after ſight. From Rome, ten days after ſight. And from Venice, twenty days after date.

At Florence, *uſance* of bills drawn from Bologna, is three days after ſight. From Rome, ten days after ſight. From Venice and Naples, twenty days after date.

At Rome, *uſance* of bills of exchange drawn in Italy, was, originally, ten days after ſight; but, by an abuſe, this term has been extended to fifteen.

At Leghorn, *uſance* of bills drawn from Genoa, is eight days after ſight; from Rome, it is ten days; from Naples, three weeks; from Venice, twenty days after date; from London, three weeks; and from Amſterdam, forty days.

At Amſterdam, *uſance* of bills drawn from England and France, is a month after date; from Venice and Madrid, Cadiz and Seville, two months.

At Genoa, *uſance* of bills from Milan, Florence, Leghorn, and Lucca, is eight days after ſight; from Venice, Rome, and Bologna, fifteen days; from Naples, twenty-two days; from Sicily, a month after ſight, or two months after date; from Sardinia, a month after ſight; from Antwerp, Amſterdam, and other places in the Low Countries, three months after date.

USE, *uſus*, in *Law*, denotes the benefit or profit of lands and tenements.

Uſe imports a truſt and confidence repoſed in a man for the holding of lands; that he to whoſe *uſe* or benefit the truſt is intended, ſhall reap the benefit thereof.

A deed conſiſts of two principal parts: the *premiſes*, which include all that comes before the habendum, or limitation of the eſtate; and the *conſequent*, which is the habendum itſelf; wherein are two limitations; the one of the *eſtate*, or property the party ſhall receive by the deed; the other of the *uſe*, expreſſing to or for what *uſe* and benefit he ſhall have the ſame.

Uſes, ſome ſay, were invented upon the ſtat. of Weſtminſter, *Quia emptores terrarum*; before which time, no ſuch *uſes* were known. And becauſe, in courſe of time, many deceits got footing, by ſettling the poſſeſſion in one man, and the *uſe* in another, it was enacted, anno 27 Hen. VIII. cap. 10. that the *uſe* and poſſeſſion of lands ſhould ſtand united, or that the poſſeſſion ſhould be given to him who had the *uſe*.

Hence this ſtatute is called the *ſtatute of uſes*, or, in conveyances and pleadings, the ſtatute *for tranſferring* uſes *into poſſeſſion*.

Use *and cuſtom*, in *Ancient Law Books*, denotes the ordinary method of acting or proceeding in any caſe, which, by length of time, has obtained the force of a law.

Use, *ceſtui que*. See Cestui.

Use, *contingent*. See Contingent.

Use, *reſulting*, is an *uſe* which being limited by the deed, expires, or cannot veſt, and returns back to him who raiſed it, after ſuch expiration, or during ſuch impoſſibility: as if a man makes a feoffment to the *uſe* of his intended wife for life, with a remainder to the *uſe* of her firſt born ſon in tail; here, till he marries, the *uſe* reſults back to himſelf; after marriage, it is executed in the wife for life; and if ſhe dies without iſſue, the whole reſults back to him in fee.

Use, *ſecondary*, or *ſhifting*, is that which, though executed, may change from one to another by circumſtances *ex poſt facto*; as, if A makes a feoffment to the *uſe* of his intended wife and her eldeſt ſon for their lives, upon the marriage the wife takes the whole *uſe* in ſeveralty; and upon the birth of a ſon, the *uſe* is executed jointly in them both. Blackſt. Comm book ii. p. 335.

USER *de action*, in *Law*, is the purſuing or bringing an action in the proper county, &c. See Action.

USES, *covenant to ſtand ſeiſed to*. See Covenant.

Uses *and cuſtoms of the ſea* are certain maxims, rules, or uſages, which make the baſe or ground-work of the maritime juriſprudence; by which the policy of navigation, and commerce of the ſea, are regulated.

Theſe *uſes* and cuſtoms conſiſt in three kinds of regulations. The firſt, called *laws*, or *judgments of* Oleron, were made by order of queen Eleanor, ducheſs of Guienne, at her return from the holy war; and that chiefly from memoirs which ſhe had gathered in the Levant, where commerce was at that time in a very flouriſhing condition. She called them *rolls of Oleron*, becauſe ſhe then reſided in an iſland of that name, in the bay of Aquitaine. Theſe were much augmented, about the year 1266, by her ſon Richard, king of England, on his return from the Holy Land.

The ſecond regulations were made by the merchants of Wiſby, a city in the iſland of Gothland, in the Baltic, anciently much famed for commerce; moſt of the nations of Europe having their particular quarters, magazines, and ſhops, therein. Theſe were compiled in the Teutonic language, and are ſtill the rule in the northern countries. Their date does not appear; but it is probable they were made ſince the year 1288, when the city of Wiſby was deſtroyed the firſt time, and afterwards reſtored by Magnus, king of Sweden.

The third ſet of regulations was made at Lubec, about the year 1597, by the deputies of the Hanse-*towns*.

USHER, *huiſſier*, ſignifies an officer, or ſervant, who has the care and direction of the door of a court, hall, chamber, or the like.

In the king's houſhold there are four *gentlemen uſhers* of the privy-chamber, with an annual ſalary of 200*l*. each, appointed to attend the door, to give entrance, &c. to perſons that have admittance thither: four *gentlemen-uſhers*, waiters, whoſe ſalary is 150*l*. per annum; and an aſſiſtant *gentleman-uſher*, at 66*l*. 13*s*. 4*d*. per annum: and eight *gentlemen-uſhers*, quarter-waiters in ordinary.

There are alſo in the queen's houſhold three *gentlemen-uſhers* of the private chamber, three *gentlemen-uſhers*, daily waiters; each of whom has the ſame annual appointment with thoſe of the king's houſhold; and three *gentlemen-uſhers*, quarterly waiters, at 100*l*. per annum.

In the French court there are two *uſhers* of the antechamber, or hall, where the king dines in public. They wait ſword by ſide, all the year, and open the door to ſuch as are to come in. There are above ſixteen *uſhers* of the chamber, two of the cabinet, and one of the order of the Holy Ghoſt.

The *uſhers* of the Inquiſition in Spain and Portugal, are perſons of the firſt quality, who think themſelves highly honoured, by only looking to the doors of that ſacred tribunal.

Usher is alſo uſed for an officer in the exchequer; of which ſort, three or four attend the chief officers and barons, at the court at Weſtminſter, as alſo juries, ſheriffs, and other accomptants, at the pleaſure of the court. See Exchequer.

Usher *of the black-rod*. See Black-*rod*.

In a chapter held at Whitehall, 13 Car. II. it was ordained, that this office ſhould be fixed to one of the *gentlemen-uſhers*, daily waiters at court; the eldeſt of which always holds the place, and is called *gentleman-uſher*, and *black-rod*.

In relation to the order of the Garter, he is appointed to carry the rod at the feaſt of St. George, and other ſolemnities, which he alſo makes uſe of as an authority to attach delinquents, who have offended againſt the ſtatutes of the order, which he frequently doth by touching them therewith. He wears a gold badge, embelliſhed with the enſigns of the order. He has a houſe in Windſor caſtle, and other privileges.

USNEA, in *Natural Hiſtory*, *muſcus arboreus*, *cupthong*; a ſort of plant of the paraſite or moſs kind, growing like a great beard on the oak, cedar, and divers other trees; the characters of which are theſe: they are wholly deſtitute of leaves, and are compoſed only of long ſlender filaments or ſtalks, which are uſually ſolid, rigid, and of a cylindric figure; the extremities, or other parts of theſe, are at times furniſhed with a ſort of orbicular bodies, dry and deſtitute of uſe, but ſeeming to ſupply the place of flowers; theſe are hollow, in form of cups, but have no rim; the whole plants are fixed in the manner of miſletoe to the barks of trees. Micheli has given accounts of flowers and ſeeds in theſe plants; but Dillenius ſuſpects the accuracy of the obſervation, and adds, that if there are ſuch, they are too minute to be of any ſervice in the general diſtinctions of the plants. Dillen. Hiſt. Muſc. p. 68.

Of this genus of plants Dillenius enumerates nineteen known ſpecies. *Tab.* XIII. *Botany*, N° 4.

Linnæus has referred the *uſneæ* to the genus of lichen, in the order of *algæ*, and claſs of *cryptogamia*.

Usnea *humana* is a ſmall greeniſh moſs, growing on human ſkulls that have lain a long time expoſed to the air. It is ſuppoſed to be very aſtringent, and held proper to ſtop hæmorrhages. It is alſo an ingredient in the weapon-ſalve of Paracelſus and Crollius. It has not a whit the more virtue for the place of its growth; nor is there, indeed, any peculiar moſs of this name; but whatever ſpecies chances to grow on the ſkull, is taken for uſe.

USNEN, in *Botany*, a name given by Avicenna and Serapion to the plant kali, of which the alkali ſalt called *potaſhes*, and uſed in the compounding of our ſoap, is made. There are alſo ſeveral other things called by this name, and, in general, all that were uſed in the ſcouring or cleaning of cloaths. The dung of ſparrows was uſed by ſome people for this purpoſe, as the dung of hogs is at this time, and this was therefore called by ſome *uſnen*. Hyſſop, a plant famous for its cleaning virtue, was alſo called by the ſame name; and ſome have alſo applied it to the ſoldanella, or ſea bind-weed.

Wherever, in the Arabian writers, the word *uſnen* is uſed in any of theſe latter ſenſes, there is ſomething added to diſtinguiſh which of the things before expreſſed is meant by it; but whenever it ſtands alone and unexplained, it is to be underſtood as meaning the kali.

USQUEBAUGH, a ſtrong, rich, compound liquor, chiefly taken by way of dram; its baſis being brandy, or a more ordinary ſpirit.

The manner of making it is ſomewhat various, and the ingredients numerous. We ſhall give a receipt, much commended formerly, as a ſpecimen.

To two gallons of brandy, or ſpirits, put a pound of Spaniſh liquorice, half a pound of raiſins of the ſun, four ounces of currants, three of dates, ſliced; tops of thyme, baum, ſavory, and mint, and tops or flowers of roſemary, of each two ounces; cinnamon and mace bruiſed, nutmegs, aniſeeds, and coriander-ſeeds, bruiſed likewiſe, of each four ounces; citron, or lemon and orange-peel, ſcraped, of each an ounce: all theſe are to be left to infuſe forty-eight hours in a warm place, often ſhaking them together; then ſet them in a cool place, for a week; after which, the clear liquor is to be decanted off, and to it is to be put an equal quantity of net white port-wine, and a gallon of canary. The whole is finally to be ſweetened with a proper quantity of double refined ſugar.

USSAC, in the *Materia Medica* of the Arabians, a name given by Serapio to the gum ammoniacum of the Greek writers. It ſeems no other than a falſe ſpelling of the word *aſſac*, which is the common name of the gum in Avicenna, and other of the writers of that nation; but this does not ſeem to be the ſame drug which we call gum ammoniacum at this time.

USTION, *uſtio*, formed from *urere*, *to burn*, in *Pharmacy*, the preparing of certain ſubſtances, by burning them.

The ancients made uſe of burnt horns, nails, feathers, and other parts of animals, for divers remedies; and the moderns ſtill uſe æs uſtum, which is burnt copper, or copper that has undergone the *uſtion*, with ſulphur.

The *uſtion* of minerals is a more imperfect kind of calcination. It is a degree beyond torrefaction.

USTRINA, among the Romans, the place where they burnt the bodies of the dead. It was commonly in the Campus Martius, or ſome other place in the ſuburbs, and ſometimes in the city for perſons of quality; and for the common people on the Eſquiline mount. See BUSTUM.

USTULATION, *uſtulatio*, a word uſed by pharmaceutic writers to expreſs the roaſting or torrefying of humid or moiſt ſubſtances over a gentle fire, ſo as to render them fit for powdering. The ſame word is alſo uſed by ſome for what we call burning of wine.

USTUM *æs.* See ÆS *uſtum*.

USUCAPTION, *uſucaptio*, in the *Civil Law*, is an acquiſition of the property of a thing, by a poſſeſſion and enjoyment thereof for a certain term of years preſcribed by law.

Some make a difference between PRESCRIPTION and *uſucaption*; maintaining, that the latter is only uſed with regard to moveables, and the former with regard to immoveables. But there is no eſſential difference between them; and, accordingly, *preſcription* and *uſucaption* are generally held ſynonyma.

USUFRUIT, *uſus fructus*, in the *Civil Law*, the temporary uſe or enjoyment of any lands or tenements; or the right of receiving the fruits and profits of an inheritance, or other thing, without a power of alienating or changing the property thereof.

When the *uſufructuary* dies, the *uſufruit* returns to the proprietor. The dower or the jointure of a widow is only an *uſufructuary* due; that is, ſhe only enjoys the *uſufruit* thereof, and cannot diſpoſe of the principal.

All mutual preſents between man and wife, only import the *uſufruit* of the goods of the firſt that dies, to the profit of the ſurvivor. The incumbents of benefices are only *uſufructuary*. An *uſufructuary* has full right over the coppice; but he cannot fell timber-trees.

USURA *maritima*, terms applied to contracts for the repayment of money borrowed, not on the ſhip and goods only, but on the mere hazard of the voyage itſelf; as when a man lends a merchant 1000*l.* to be employed in a beneficial trade, with condition to be repaid with extraordinary intereſt, in caſe ſuch a voyage be ſafely performed. This kind of agreement is ſometimes called *fænus nauticum*. See BOTTOMRY, and RESPONDENTIA.

USURER, a perſon charged with a habit or act of *uſury*.

The laws of our ancient Saxon and Norman kings are very ſevere upon *uſurers*, or letters-out of money upon intereſt. *Uſurarios quoque defendit rex Edvardus* (Confeſſor), *ne remaneret aliquis in toto regno ſuo*; *& ſi quis inde convictus eſſet, quod fænus exegerat, omni ſubſtantia propria careret, & poſtea pro ex lege habeatur*; *quoniam* uſura *radix omnium malorum*. Leg. Edv. Confeſſ. cap. 37.

They were, indeed, allowed to diſpoſe of their goods before conviction, and whilſt they were living; but after their death they were confiſcate, if it could be proved they lent money to *uſe* within a year before their death.

If a clergyman were an *uſurer*, his goods were not to be confiſcated, but to be diſtributed to pious uſes. In thoſe days *uſury* was thus defined:

> *Eſt* uſura *ſuos quiſquis tradit mihi nummos*
> *Spe lucri, fænus duplex* uſura *vocatur.*

USURIOUS *contract* is any bargain, or contract, whereby a man is obliged to pay more intereſt for money than the ſtatute allows.

It is enacted by ſtatute 13 Eliz. cap. 8. that all brokers ſhall be guilty of a *præmunire*, who tranſact any *uſurious* contract where more than ten per cent. intereſt is taken.

USURPATION, in *Law*, an injurious uſing or enjoyment of a thing, for continuance of time, that belongs of right to another. See TYRANNY.

USURPATION, in a more peculiar ſenſe, denotes an abſolute ouſter or diſpoſſeſſion of the patron of a church; and happens when a ſtranger, that hath no right, preſenteth a clerk, and he is thereupon admitted and inſtituted. In which caſe of *uſurpation*, the patron loſt by the common law not only his turn of preſenting *pro hac vice*, but alſo the abſolute and perpetual inheritance of the advowſon, ſo that he could not preſent again upon the next avoidance, unleſs in the mean time he recovered his right by a real action, viz. a writ of right of advowſon. However, becauſe biſhops, in ancient times, either by careleſſneſs or colluſion, frequently inſtituted clerks upon the preſentation of uſurpers, and thereby defrauded the real patrons of their right of poſſeſſion, it was in ſubſtance enacted by the ſtatute Weſtm. 2. 13 Edw. I. cap. 5. ſect. 2. that if a poſſeſſory action be brought within ſix months after the avoidance, the patron ſhall (notwithſtanding ſuch *uſurpation* and inſtitution) recover that very preſentation; which gives back to him the ſeiſin of the advowſon. Yet ſtill, if the true patron omitted to bring his action within ſix months, the ſeiſin was gained by the uſurper, and the patron to recover it was driven to the long and hazardous proceſs of a writ of right. To remedy which, it was farther enacted by ſtatute 7 Ann. cap. 18. that no *uſurpation* ſhall diſplace the eſtate or intereſt of the patron, or turn it to a mere right; but that the true patron may preſent upon the next avoidance, as if no ſuch *uſurpation* had happened. So that the title of *uſurpation* is now much narrowed, and the law ſtands upon this reaſonable foundation, that if a ſtranger uſurps my preſentation, and I do not purſue my right within ſix months, I ſhall loſe that turn without remedy, for the peace of the church, and as a puniſhment for my own negligence; but that turn is the only one I ſhall loſe thereby. *Uſurpation* now gains no right to the uſurper, with regard to any future avoidance, but only to the preſent vacancy: it cannot indeed be remedied after ſix months are paſt; but, during thoſe ſix months, it is only a ſpecies of diſturbance. Blackſt. Comm. book iii. p. 243, &c.

USURPATION *of franchiſes or liberties*, is when a ſubject unjuſtly uſes any royal franchiſes, &c. And this is ſaid to be an *uſurpation* upon the king, who ſhall have the writ of QUO *warranto* againſt the uſurpers.

USURY, USURA, in the general, denotes a gain or profit which a perſon makes of his money, by lending the ſame; or it is an increaſe of the principal exacted for the loan thereof; or the price a borrower gives for the *uſe* of a ſum credited to him by the lender: called alſo *intereſt*, and, in ſome ancient ſtatutes, *dry exchange*. For lawful intereſt, ſee INTEREST.

The word *uſury* is uſually taken in an evil ſenſe, viz. for an unlawful profit which a perſon makes of his money; in which ſenſe it is, that *uſury* is forbidden by the civil and eccleſiaſtical law, and even by the law of nature. In this ſenſe it alſo is, that it is held *uſury* to lend money on pawns, to exact intereſt for money, without ſurrendering the principal, and to ſtipulate intereſt for money which is not employed in trade, nor brings any profit to the perſon who receives it: but, as the Latin word *uſura*, at leaſt the plural thereof, *uſuræ*, may be underſtood of a lawful intereſt, *uſury*, in Engliſh, might alſo be uſed in the ſame harmleſs ſenſe.

However, cuſtom has now diſtinguiſhed betwixt *uſury* and legal intereſt; and appropriated the term *uſury* to that which exceeds the intereſt determined by ſtatute. The legal intereſt is five *per cent.* by 12 Anne, ſtat. 2. cap. 16. commonly called the ſtatute againſt *uſury*, which ordains not only that all contracts for taking more than 5*l.* *per cent.* and proportionally for a greater or leſs ſum, are in themſelves totally void, but alſo that the lender ſhall forfeit treble the value of the money borrowed. And farther if any ſcrivener or broker takes more than 5*s.* *per cent.* procuration money, or more than 12*d.* above the ſtamp duties for making a bond, he ſhall forfeit 20*l.* with coſts, and ſhall ſuffer impriſonment for half a year.

The enemies to intereſt in general make no diſtinction between that and *uſury*, holding any increaſe of money to be indefenſibly uſurious. And this they ground as well on the prohibition of it by the law of Moſes among the Jews, as alſo upon what is laid down by Ariſtotle, that money is naturally barren, and to make it breed money is prepoſterous, and a perverſion of the end of its inſtitution which was only to ſerve the purpoſes of exchange, and not of increaſe. Hence the ſchool divines have condemned the practice of taking intereſt, as being contrary to the divine law both natural and revealed; and the canon law has proſcribed the taking of any, the leaſt, increaſe for the loan of money as a mortal ſin.

But, in anſwer to this, it may be obſerved, that the Moſaical precept was clearly a political, and not a moral precept. It only prohibited the Jews from taking *uſury* of their brethren; but in expreſs words allowed them to take it of a ſtranger: Deut. xxiii. 20. which proves that the taking of moderate *uſury*, or a reward for the uſe, as the word ſignifies, is not *malum in ſe*, ſince it was permitted where any but an Iſraelite was concerned. And as to Ariſtotle's reaſon, deduced from the natural barrenneſs of money, the ſame may be alledged of houſes, which never breed houſes, &c. &c. And though money was originally uſed only for the purpoſes of exchange, yet the laws of any ſtate may be well juſtified in permitting it to be turned to the purpoſes of profit, if the convenience of ſociety ſhall require it. And that the allowance of moderate intereſt tends greatly to the benefit of the public, eſpecially in a trading country, will appear from the generally acknowledged principle, that commerce cannot ſubſiſt without mutual and extenſive credit. Unleſs money, therefore, can be borrowed, trade cannot be carried on; and if no premium were allowed for the hire of money, few perſons would care to lend it; or at leaſt, the caſe of borrowing at a ſhort warning would be entirely at an end. Thus, in the dark ages of monkiſh ſuperſtition and civil tyranny, when intereſt was laid under a total interdict, commerce was alſo at the loweſt ebb, and fell entirely into the hands of the Jews and Lombards; but when men's minds began to be more enlarged, when true religion and real liberty revived, commerce grew again into credit; and again introduced with itſelf its inſeparable companion, the doctrine of loans upon intereſt.

Indeed, when all degrees of profit from loans were diſcountenanced, we find more complaints of *uſury*, and more flagrant inſtances. of oppreſſion, than in modern times, when money may be eaſily had at a low intereſt.

Moderate intereſt is neceſſary in every civil ſtate, if it were but to exclude that exorbitant intereſt to which the truly odious appellation of *uſury* is applied, and which ought never to be tolerated in any well-regulated ſociety.

For, as the whole of this matter is well ſummed up by Grotius (de Jur. Bell. & Pac. lib. ii. cap. 12. ſect 22.) if the compenſation allowed by law does not exceed the proportion of the hazard run, or the want felt, by the loan, its allowance is repugnant neither to the revealed nor the natural law: but if it exceeds thoſe bounds, it is then oppreſſive *uſury*; and though the municipal laws may give it impunity, they never can make it juſt.

The exorbitance or moderation of intereſt, for money lent, depends upon two circumſtances, viz. the general inconvenience of parting with it for the preſent, which reſults from the quantity of ſpecie or current money in the kingdom, and the hazard of loſing it entirely, ſo that the better the ſecurity, the lower will be the intereſt: and therefore the rate of intereſt is generally in a compound ratio, formed of the inconvenience and the hazard.

Upon theſe two principles, compared together, different nations have at different times eſtabliſhed different rates of intereſt. The Romans at one time allowed *uſuræ centeſimæ*, i. e. *one per cent.* monthly, or *twelve per cent.* yearly, to be taken for common loans: but Juſtinian reduced it to *trientes*, or one third of the *as*, or *centeſimæ*, i. e. *four per cent.* but allowed higher intereſt to be taken of merchants, becauſe there the hazard was greater. In like manner Grotius informs us, that in Holland the rate of intereſt uſed to be eight *per cent.* in common loans, but twelve to merchants. Our law eſtabliſhed one ſtandard for all alike, where the pledge or ſecurity is not put in jeopardy, in order to prevent fraud and *uſury*. Blackſt. Com. book ii. p. 455.

UT, a Latin term, ſignifying, literally, *as*; much uſed in the ſtating of ratios and proportions.

Sir Iſaac Newton aſſigns its uſe thus: if indeterminate quantities of divers kinds be compared together, and one of them be ſaid to be *ut*, *as*, any other, directly, or inverſly; the meaning is, that the firſt is increaſed, or diminiſhed, in the ſame ratio as the latter. And if one of them be ſaid to be, *ut*, *as*, two or more others, directly, or inverſly; the meaning is, that the firſt is increaſed, or diminiſhed, in a ratio compounded of the ratios in which the others are increaſed or diminiſhed.

Thus, if A be ſaid to be *as* B directly, and *as* C directly, and *as* D inverſly; the meaning is, it is increaſed, or diminiſhed, in the ſame ratio with $B \times C \times \frac{1}{D}$; that is, A and $\frac{BC}{D}$ are to each other in a given ratio.

Ut, in *Muſic*, the firſt of the muſical notes. See Note. *Ut*, *re*, *mi*, *fa*; the clef of *G*, *re*, *ſol*, *ut*; of *C*, *ſol*, *ut*, &c.

This note, with the reſt, were taken out of the hymn of St. John Baptiſt, compoſed about the year 770, in the time of Charlemagne, according to Poſſevin, by Paulus Diaconus of Aquileia. *Ut queant laxis*, &c. See Music.

UTAMANIA, in *Ornithology*, the name of a bird of the web-footed kind, wanting the hinder-toe. It is common about the iſland of Crete, and is very expert at diving. Is is of the ſize of a teal, and has its head and back black, and its belly white. Its feathers reſemble down rather than plumage; but though they are ſoft and ſlender, they are very firmly affixed to the ſkin. Its beak is ſharp at the edges, and covered in a great part with down. From the deſcription of Bellonius, as well as his figure, this bird approaches to the common razor-bill, if it is indeed eſſentially different from it.

UTAS, *octava*, in *our Statutes*, the eighth day following any feaſt or term; as the *utas of St. Michael*, &c. And any day between the feaſt and the octave is ſaid to be within the *utas*. The uſe of this is in the return of writs, as appears by ſtat. 51 Hen. III.

UTENSIL, Utensile, a little domeſtic moveable, particularly ſuch as belong to the kitchen. Such as pots, pans, plates, &c.

Utensils are more particularly uſed in *war*, for the moveables which the hoſt is obliged to furniſh the ſoldiers quartered with him; which are, a bed with bed cloaths, a pot, and a ſpoon. They are likewiſe to have a place at their hoſt's fire, and candle. *Utenſils* are ſometimes furniſhed in money, and ſometimes in kind.

UTERINE, Uterinus, ſomething belonging to the uterus or womb of women.

Uterine brothers or ſiſters are thoſe born of the ſame mother, but by different fathers.

Uterinus, *furor*, in *Medicine*. See Furor.

Men are ſubject to the like diſeaſe, as well as women; ſo that it might with more propriety be called, the *furor venereus*, or *venereal fury*. It had its name, *furor uterinus*, from an opinion, that it proceeded from vapours, riſing from the womb to the brain.

It has been frequently found, that maids, ſuppoſed to be poſſeſſed, were only ſeized with *uterine fury*.

Uterine *hæmorrhages*. In this dangerous diſorder the styptic *powder* of Helvetius is much recommended; and the ſtibium ceratum has alſo been tried with great ſucceſs. See Vitrum *antimonii ceratum*.

In the Stockholm Acts, 1770, there are ſeveral caſes of *uterine* hæmorrhages cured by $\frac{1}{4}$ or $\frac{1}{2}$ grain of ipecacuanha, rubbed with ſugar, given every four hours or oftener. In one caſe, the hæmorrhage returned on diſcontinuing the medicine, and ceaſed on repeating it. Theſe ſmall doſes had good effects in catarrhal coughs, even in thoſe which attend conſumptions; and if not beneficial, are at leaſt not hurtful, in bloody coughs, in which vomiting has ſeveral times been obſerved to come on, without any increaſe of the hæmorrhage. They may be uſeful in peripneumony and pleuriſy, in which cough is often the moſt troubleſome ſymptom, and in which ſeneka root (which in increaſed doſes proves alſo emetic) has been ſo much recommended.

Uterinus *lapis*, in *Natural Hiſtory*, a name given by ſome authors to a ſtone found in New Spain, and in ſome other parts of America; it is very hard and heavy, of a beautiful black, and capable of a very elegant poliſh. The natives cut it into various ſhapes, and apply it to the navel in diſeaſes of the womb, and pretend that it poſſeſſes very great virtues.

UTERINUM *jecur*. See Jecur.

UTERUS, in *Anatomy*, the *matrix*, or *womb*; that organ of generation, in women, wherein the buſineſs of conception is performed, and wherein the embryo or fœtus is lodged, fed, and grows, during the time of geſtation, or till its delivery. Its deſcription ſee under Womb; its office, &c. under Generation, Conception, Gestation, and Foetus.

Uterus *of fiſh*. Among the fiſh kinds, all thoſe which are oviparous have no *uterus*; but on the contrary, all the viviparous fiſhes have this part. The whales, and all the cetaceous kinds, as alſo many of the cartilaginous ones, have the *uterus* very fair. It is probable that the eel kind alſo have it; but this is leſs certain, the generation of thoſe fiſhes being yet ſomewhat obſcure. The *uterus* in the cetaceous fiſhes is always divided into two proceſſes or horns; but in the cartilaginous ones it is divided into two glandulous bodies, which are pervious, and, according to the opinion of Needham, diſcharge a whitiſh liquor into the womb, and are of great uſe in gravidation.

Uteri, *cornua*, are alſo called horns of the womb.

Uteri, *fundus*. See Fundus.

Uteri, *hydrops*. See Dropsy.

Uteri, *procidentia* and *retroverſio*. See the articles.

Uteri, *vagina* or *cervix*. See thoſe articles.

UTFANGTHEF, in our old *Law-Books*. See Outfanthefe.

UTILE, a Latin term, ſignifying probable, or uſeful; ſometimes uſed, by Engliſh authors, in the ſame ſenſe.

The *utile* and the *dulce*, profit and delight, are both to be aimed at in poetry; but it is diſputed, which of them is to be aimed at in the firſt place. Corneille ſays, expreſly, *Dans la tragedie l'utile n'entre que ſous la forme du delectable*.

In the language of the philoſophers, there is nothing *utile*, but what is juſt and honeſt: *nihil bonum, niſi honeſtum: nihil malum, niſi turpe*. Cic. de Fin. lib. ii.

Utile *dominium*. See Dominium.

UTLAGARIÆ *perdonatio*. See Perdonatio.

UTLAGATIO, in *Law-Terms*, an outlawry.

UTLAGATO *capiendo, quando utlagatur in uno comitatu, & poſtea fugit in alium*, a writ for apprehending a man who is outlawed in one county, and flies into another. See Outlawry.

UTLAGATUM *capias*. See Capias.

UTLAGH, Utlaghus, See Outlaw.

UTLAND, *Outland*, is oppoſed to Inland.

UTLARY, or Utlawry, Utlagaria. See Outlawry.

UTRAQUISTÆ, in *Church Hiſtory*, an appellation given by way of reproach, to thoſe in Bohemia who communicate under both ſpecies, bread and wine.

UTRICULARIA, in *Botany*, the name of a plant uſed by Linnæus for what other authors have called *lentibularia*, or hooded water-milfoil. This, in his ſyſtem of botany, is alſo a diſtinct genus of plants, of the *diandria monogynia* claſs; the characters of which are, that the cup is a two-leaved perianthium; its leaves being very ſmall, of an oval figure, hollow, and falling with the flower; the flower is labiated, and conſiſts of one petal; the upper lip is plain; obtuſe and erect: the lower is large, plain, and undivided; between the two there is a heart-faſhioned palate, ſtanding a little out; the nectarium is corniculated, is ſhorter than the petal, and is produced from its baſe. The ſtamina are two ſhort and crooked filaments; the antheræ are ſmall, and cohere together; the piſtillum has a round germen, a thread-like ſtyle of the length of the cup, and a conic ſtigma. The fruit is a large conic capſule, containing only one cavity: the ſeeds are very numerous. There are eight ſpecies.

UTRICULI *foliorum*, a name given by the writers on the anatomy of plants to a number of ſmall and fine veſſels, which fill up the interſtices between the ſeveral ramifications of the ſurculi, or minuteſt diviſions of the branches of the middle rib.

Theſe are to be examined by good microſcopes, in order to obtain any idea of their ſtructure. This is found to be compoſed of a reticular plexus of fine white and flat filaments, whoſe interſtices are again filled up with other ſmaller *utriculi*; ſo that nature ſeems but forming new bodies, by making congeries of the ſame, but in a more minute ſtate. When the largeſt of theſe are opened by a fine inſtrument, they are found to conſiſt only of a white ſkin, containing a greeniſh matter compoſed of particles ſo fine, that the beſt glaſſes are uſed in vain to diſtinguiſh their figure.

Accident ſometimes offers what all the art in the world would attempt in vain; and the leaves of trees, whoſe cuticle has been eat off on one ſide by ſmall inſects, ſometimes afford views of theſe *utriculi*, which no art could have laid open in ſo nice a manner, or in ſuch various views. Act. Erudit. Ann. 1722. p. 28.

UTRUM, *Juris* Utrum. See Juris, Assise, &c.

UTTER *barriſter*. See Barrister.

UVA, *grape*. See Grape.

Uva *gruina*, in the *Materia Medica*, the name of the fruit of the great American *vitis idæa*, or crane-berries.

Uva *lupina*, *wolf-berries*, in *Botany*, a name given by ſome authors to the common water-elder, and by others to the *herba Paris*, or herb true-love.

Uva *marina*, in *Botany*, the name given by many authors to the *ephedra*, the ſea-grape, or ſhrub ſea-horſe-tail.

Uva *quercus*, in *Natural Hiſtory*, a name given to certain accidental productions of the oak, a tree famous for producing many ſuch, beſides its common fruit: the beſt account we have of this in particular, is from Mr. Marchant. He obſerved a vaſt quantity of this production upon an oak of about twelve feet high; this tree had no acorns, but there hung from almoſt all the branches a great number of greyiſh threads, of two inches or more in length, and of a ſilky flexible matter; to ſeveral parts of theſe there were fixed certain round berries, ſometimes two or three, ſometimes ten or twelve on a thread; theſe were of the ſize of a half-ripe red gooſeberry, but they had no umbilicus, nor any appearance of fibres; they were hard and not hollow, but filled with a cottony matter, very cloſely compacted. The threads on which theſe berries were produced all grew out of the alæ of the leaves, in the very places where the buds of the rudiments of young branches ſhould have come; and over theſe filaments there were often a few ſmall leaves, of the regular ſhape of the oak-leaf.

It is generally aſſerted, that there are eggs of inſects lodged in all theſe extraordinary productions of the oak, which are ſuppoſed to be produced by a wrong derivation of the juices, occaſioned by the puncture of the fly which leaves thoſe eggs; but the moſt accurate ſearch could not diſcover the leaſt appearance of any animal remains in any part of theſe productions, neither in the berries, nor in the threads that ſupport them.

There is another ſpecies of this remarkable production, differing from the former, by not having the long threads on which the berries of that are ſupported; this, however, has been confounded by the generality of naturaliſts under the ſame name, and of this Mr. Marchant has given an equally accurate deſcription. In the month of October he obſerved a young oak of about ſix feet high, in a coppice-wood, in a very flouriſhing condition, very full of branches and leaves, but without fruit. The young branches of this oak were loaded with cluſters of red berries, of the ſhape and ſize of common red gooſeberries; they ſtood principally at or near the extremities of the branches, and were of a very poliſhed and ſhining ſurface, and of a ſpongy and tender ſubſtance. They ſtood in cluſters of three, four, and five together, and each grew immediately to the branch, without any pedicle; they had ſome appearance of fibres, but not the leaſt mark of an umbilicus, as in the regular fruits. On opening theſe berries, they were found full of a mucilaginous and viſcous juice, of a red colour, tolerably fluid, and having ſome fibres intermingled with it; the taſte of this juice was acrid, and its ſmell diſagreeable, and like that of rotten wood; but there appeared not in theſe, any more than in the other ſpecies, any the leaſt appearance of any thing belonging to an animal, no egg, no worm, no fly, nor indeed any foreign body of any ſort whatever.

Theſe berries, though ſo large and ſucculent, are but of a very ſhort duration, for Mr. Marchant going three days after he had ſeen them in the greateſt perfection, to gather ſome of them, with intent to try their juice on different liquors, found they were all become flaccid and withered; and returning again three days after this, they were ſo entirely periſhed and gone, that there remained only a few veſtiges of thin ſkins on the places where they had been fixed to the tree, and ſome few fallen ones among the buſhes, that grew under the tree; and upon inquiring of the people who lived thereabout, to know whether theſe berries were a regular annual production of the tree, they told him that they never remembered to have ſeen any thing of the kind before.

It may not be eaſy perhaps to account regularly for theſe fortuitous productions, for they ſeem merely of the nature of monſters among animals, and it may be allowed no improbable conjecture in regard to them, that the root of theſe ſmall trees having taken in more nouriſhment than they ſhould circulate, when it came to load the tender extremities of the young branches, may have made its way through their laxer texture, and being retained yet in ſome of their membranes, may have ſwelled out more and more, by the addition of freſh matter, and finally have been matured by the ſun's heat into theſe ſeemingly regular productions. Mem. Acad. Par. 1692.

Uva *urſi*, in *Botany*, the name of a ſpecies of Arbutus, with trailing ſtalks and entire leaves, called in Engliſh *bear's whortleberry*. This plant is found on the ſnowy hills of Auſtria and Styria, but more plentifully on the Swediſh hills: it is alſo a native of the Highlands of Scotland, and is now cultivated in ſome of our gardens. The leaves of this plant have a bitteriſh aſtringent taſte, without any remarkable ſmell. Infuſions of them in water ſtrike a deep black colour with ſolution of chalybeate vitriol, but ſoon depoſit the black matter, and become clear. For their uſe in dying, ſee Dying *of Cloths*, &c.

The leaves of *uva urſi* have of late been greatly celebrated in calculous and nephritic complaints, and other diſorders of the urinary organs; the doſe is half a dram of the powder of the leaves every morning, or two or three times a day. See Stone.

De Haen relates, after large experience of this medicine in the hoſpital of Vienna, that ſuppurations though obſtinate and of long continuance, in the kidneys, ureters, bladder, urethra, ſcrotum, and perinæum, without any venereal taint or evident marks of a calculus, were in general completely cured by it; that of thoſe who had a manifeſt calculus, ſeveral found permanent relief, ſo that, long after the medicine had been left off, they continued free from pain or inconvenience in making water, though the catheter ſhewed that the calculus ſtill remained; that others, who ſeemed to be cured, relapſed on leaving off the medicine, and were again ſucceſſively relieved on repeating the uſe of it; while others obtained only temporary and precarious relief. In ſeveral caſes, paregorics were joined to the *uva urſi*, and other mild aſtringents have been recommended for the ſame intentions.

Dr. Lewis obſerves, that the trials of the *uva urſi*, made in this country, have by no means anſwered expectation: in all caſes within his knowledge, it produced great ſickneſs and uneaſineſs, without any apparent benefit, though continued for a month. Mat. Med.

Uva *vulpis*, a name given by ſome authors to the common nightſhade.

UVARIA, in *Botany*, a genus of the *polyandria polygynia* claſs. Its characters are theſe: the calyx has three leaves, the flower has ſix petals, and the berries are numerous, pendulous, and contain four ſeeds. There are two ſpecies.

VUBARANA, in *Ichthyology*, the name of an harengiform fiſh, caught in the American ſeas.

It reſembles in figure our river trout. Its body is very nearly of the ſame thickneſs all the way, but it is elevated a little on the back, and ſomewhat ſlender juſt near the tail. It grows to a foot in length, and to ſix inches in thickneſs. It is a very well taſted fiſh, and is generally dreſſed with the ſcales on, they being not offenſive in eating. Margraave's Hiſtory of Braſil.

UVEA, in *Anatomy*, *aciniformis tunica*, the third tunic, or membrane of the eye.

It is called *uvea*, on account of its reſembling the figure and colour of a grape, called, by the Latins, *uva*. For which reaſon, alſo, ſome have given it the name of *aciniformis*, from *acinus*.

The hind-part of this coat, or that next the orbit of the eye, on each ſide, is called the *choroides*; and is derived from the *pia mater*.

The anterior or fore-part is, like the former, tranſparent, but thinner; and is, by authors, reckoned as a different tunic, and called *uvea*.

Of the duplicature of this part, is formed that ſtripped, variegated circle, called the *iris* of the eye.

And in its middle is a perforation, through which appears a little black ſpeck, which is the ſight, or PUPIL, of the eye; and about which the iris forms a ring.

From the inſide of this membrane ſpring certain fibres, which ſpread themſelves round the cryſtalline humour; ſerving to contract or dilate the ſight, at pleaſure.

Mr. Ferren demonſtrated to the Academy of Sciences at Paris, the lymphatic veſſels of the *uvea* of the human eye. Hiſt. de l'Acad. de Sciences, 1738.

The production of the *uvea* forms the *membrana pupillaris*, which cloſes the pupil in the fœtus. This membrane was diſcovered by the perſon whom Dr. Hunter (Med. Com. part i. p. 63.) calls Dr. F——s S——s, and alſo by M. Waſhendorf, Haller, and Albinus, in 1731. Haller (Opuſcula, p. 342.) ſays, that the time when this membrane diſappears is uncertain, but he is confident that it is never found in a full-grown fœtus.

VULCAN, in *Mythology*, the ſon of Jupiter and Juno, who, on account of his deformity, was caſt down from heaven into the iſland Lemnos, and breaking his leg with the fall, is always repreſented as lame. At Lemnos, he ſet up the trade of a ſmith, and taught the Lemnians, in recompence of the ſuccours they afforded him, the manifold uſes of fire and iron: he is alſo repreſented as the manufacturer of Jupiter's thunder, and the arms of the other gods. The poets deſcribe him as blackened and hardened from the forge; with a face red and fiery, whilſt at his work; and tired and heated after it.

This poor god is almoſt always the ſubject, either of pity or of ridicule. He is the great cuckold of heaven; and his lameneſs ſerves to divert the gods. The great celeſtial deities ſeem to have admitted *Vulcan* among them merely to make them laugh, and to be the butt of the whole company. Spence's Polymetis, p. 81.

Cicero mentions three other *Vulcans*; one the ſon of Cœlum, the ſecond the ſon of the Nile, and the other the ſon of Menalius, who inhabited the Vulcanian iſles.

VULCANALIA, among the *Romans*, a feſtival in honour of Vulcan, which was kept from the twenty-third to the twenty-ninth of Auguſt. On this occaſion the people uſed to throw animals into the fire.

VULGAGO, a name given by ſome botanical authors to the aſarum or aſarabacca, whoſe leaves and root are uſed in medicine.

VULGAR *arithmetic*, *fractions*, and *purgation*. See the ſubſtantives.

VULGATE, a very ancient Latin tranſlation of the Bible; and the only one the church of Rome acknowledges to be authentic.

The ancient *Vulgate* of the Old Teſtament was tranſlated, almoſt word for word, from the Greek of the Septuagint. The author of the verſion is not known, nor ſo much as gueſſed at.

It was a long time known by the name of the *Italic*, or old verſion; as being of very great antiquity in the Latin church. It was the common, or vulgar verſion, before St. Jerom made a new one; whence it has its name *Vulgate*.

Nobilius, in 1558, and F. Morin, in 1628, gave new editions of it; pretending to have reſtored, and re-collated it, from the ancients who had cited it. The *Vulgate* was held, by St. Auguſtine, to be preferable to all the other Latin verſions then extant; as rendering the words and ſenſe of the ſacred text more cloſely and juſtly than any of the reſt. It has ſince been retouched from the correction of St. Jerom; and it is this mixture of the ancient Italic verſion, and ſome corrections of St. Jerom, that is now called the *Vulgate*, and which the council of Trent has declared to be authentic.

It is this *Vulgate* alone that is uſed in the Romiſh church, excepting for ſome paſſages of the ancient *Vulgate* left in the miſſal, and the pſalms; which are ſtill ſung according to the old Italic verſion.

The two principal popiſh editions of the *Vulgate* are thoſe of popes Sixtus the Vth. and Clement the VIIIth. The former was printed in 1590, after pope Sixtus had collected the moſt ancient MSS. and beſt printed copies, ſummoned the moſt learned men out of all the nations of the Chriſtian world, aſſembled a congregation of cardinals for their aſſiſtance and counſel, and preſided over the whole himſelf. This edition was declared to be corrected in the very beſt manner poſſible, and publiſhed with a tremendous excommunication of every perſon, who ſhould preſume ever afterwards to alter the leaſt particle of the edition thus authentically promulged by his holineſs, ſitting in that chair, *in qua Petri vivit poteſtas, et excellit auctoritas.* The other edition was publiſhed in 1592, by pope Clement the VIIIth; which was ſo different from that of Sixtus, as to contain two thouſand variations, ſome of whole verſes, and many others clearly and deſignedly contradictory in ſenſe; and yet this edition is alſo pronounced authentic, and enforced by the ſame ſentence of excommunication with the former. See Kennicott's State of the printed Hebrew Text, &c. vol. ii. p. 198, &c.

VULGATE *of the New Teſtament.* This the Romaniſts generally hold preferable to the common Greek text, becauſe it is this alone, and not the Greek text, that the council of Trent has declared authentic: accordingly that church has, as it were, adopted this edition, and the prieſts read no other at the altar, the preachers quote no other in the pulpit, nor the divines in the ſchools.

Yet ſome of their beſt authors, F. Bouhours, for inſtance, own, that among the differences that are found between the common Greek, and the *Vulgate*, there are ſome wherein the Greek reading appears more clear and natural than that of the Latin; ſo that the ſecond might be corrected from the firſt, if the holy ſee ſhould think fit. But thoſe differences, for the generality, only conſiſt in a few ſyllables, or words: they rarely touch the ſenſe. Beſides, in ſome of the moſt conſiderable, the *Vulgate* is authorized by ſeveral ancient manuſcripts. Bouhours ſpent the laſt years of his life, in giving a French tranſlation of the New Teſtament, according to the *Vulgate*. In 1675, a new edition of the Greek Teſtament was publiſhed by the univerſity of Oxford; and great care taken therein, to compare the common Greek text with all the moſt ancient manuſcripts in England, France, Spain, and Italy; and to note the differences obſerved therein.

In the preface of this work, the editors, ſpeaking of the divers verſions of the Bible in the vulgar tongues, obſerve of the *Vulgate*, that there is no verſion of any language to be compared with it. And this they juſtify, by comparing paſſages that occur in the moſt celebrated Greek manuſcripts, with the ſame paſſages in the *Vulgate*, where there is any difference between that, and the common printed Greek copy. In effect, it is probable, that at the time the ancient Italic, or *Vulgate* verſion of the New Teſtament was made, and at the time it was afterwards compared with the Greek manuſcripts by St. Jerom; as they were then nearer the times of the apoſtles, they had juſter Greek copies, and thoſe better kept, than any of thoſe uſed when printing was firſt ſet on foot.

M. Simon calls the Greek verſion of the Septuagint, before it was reviſed and reformed by Origen, *the ancient* Vulgate *Greek*. Origen's correction was preferred to the ancient Greek, which was conſequently diſuſed; ſo that we have now ſcarce any copies thereof. See SEPTUAGINT.

VULNERARIA, in *Botany*. See LADY's *finger*.

VULNERARY, formed from *vulnus*, *wound*, in *Medicine*, an epithet given to remedies, proper for the cure of wounds and ulcers.

There are divers *vulnerary* herbs; as ariſtolochia, or birth-wort; ſanicle, or ſelf-heal; plaintain, mouſe-ear, veronica, or ſluellin; agrimony, vervain, or the holy herb, &c.

There are alſo *vulnerary* potions, compoſed of various ſimples. *Vulnerary* balſams, unguents, plaſters, &c. See BALSAM, &c.

VULNERARY *water*. See WATER.

VULPANSER, in *Ornithology*, a name given by ſome authors to the ſhell drake, or borrow-duck, a very beautiful ſpecies of duck, common on ſome of our coaſts, and called by the generality of authors TADORNA.

VULPECULA, in *Ichthyology*, a name given by Bellonius and Geſner to the fiſh called by the generality of authors CENTRINE.

VULPECULA *et* **ANSER**, *Fox and Gooſe*, in *Aſtronomy*, a conſtellation made out of unformed ſtars by Hevelius, in which he reckons twenty-ſeven ſtars; but Flamſteed enumerates thirty-five; the longitude, latitude, &c. of which are as follow:

Names and Situation of the Stars.	Bayer's Cha.	Signs.	Longitud.			Latitude. N.			Magnitude.
			°	′	″	°	′	″	
		♑	20	20	24	43	15	10	5
In the right wing of the gooſe			21	47	10	44	49	26	6
In the corner of the ſouthern wing			23	47	36	47	46	35	6
In the head of the gooſe			22	47	43	41	16	27	6
Under the right wing of the gooſe			23	7	12	41	32	43	6
5.									
In the noſe of the fox, before the beak of the ſwan			25	12	34	45	54′	20	4
			24	7	59	41	34	28	5
			25	25	49	46	28	37	6
			25	35	50	40	49	26	6
In the head, at the eye of the fox		♒	0	18	38	46	10	32	6
10.									
			2	41	40	47	28	3	
In the right fore foot of the fox			1	28	49	42	41	50	5
Firſt in the neck			2	43	29	43	58	26	6
			4	7	19	42	40	56	5
Over the back			6	31	37	47	1	43	4.5
15.									
At the left fore foot			5	39	1	44	15	50	5
Firſt at the left ſhoulder			6	36	40	42	41	12	4.5
			9	3	51	45	34	54	6.5
			9	24	14	45	24	28	6
			9	19	24	45	4	48	5.6
20.									
			10	59	28	47	2	8	5.6
Second at the left ſhoulder			9	7	46	42	0	27	5
Second of the informes over the back			11	3	12	46	5	20	4.5
Firſt in the ſide			9	58	47	43	1	53	5
Second in the ſide			11	26	23	42	26	36	6
25.									
In the hip bone			16	10	44	2	45	11	6
			16	42	41	43	13	32	5
			16	4	26	40	54	10	6
In the left hind foot			14	56	59	38	7	7	5
In the thigh			18	22	34	41	30	54	6
30.									
South at the root of the tail	r		21	18	12	42	37	9	6
Firſt of the tail, or north at the root	q		22	28	29	43	18	42	5
In the right hind foot			20	45	4	37	39	42	6
			24	51	36	37	59	50	6
Laſt of the tail		♓	1	14	9	40	0	20	6
35.									

VULPES, in *Zoology*. See FOX.

VULPES *marina*, in *Ichthyology*. See *Sea*-FOX.

VULPINALIA, among the *Romans*, a feaſt celebrated on the nineteenth of April, in which they burnt foxes.

VULTUR, VULTURE, in *Ornithology*, the name of a genus of birds of the HAWK kind: the characters of which are, that the bill is ſtraight, and hooked only at the end; the head has no feathers, and at the baſe of the bill is covered with a naked ſkin, and the tongue is bifid. Of this genus Linnæus enumerates eight ſpecies, viz. the *gryphus* or CONDORE, the *harpyia* or *creſted* EAGLE, the *papa king of vultures*, or *cozcaquauhtli*, the *monachus*, black creſted or Arabic *vulture*, the *aura* or *urubu* of Braſil, the bearded, golden or Bætic *vulture* of Egypt, the *percnopterus*, or ſacred *vulture* of Egypt, and *albiulla* or PYGARGUS.

There are no *vultures* in Great Britain, nor any north of the Baltic: but the various ſpecies are found in the ſouthern parts of Europe, Aſia, Africa, and America, as low as Terra del Fuego. They are a ſluggiſh ungenerous race, preying oftener on dead animals, and even on putrid carcaſes, than on living creatures: their ſenſe of ſmelling is moſt exquiſite: they collect in flocks from great diſtances; and are directed to their prey by the ſagacity of their noſtrils: they fly ſlowly and heavily; are very greedy and voracious to a proverb; and they are bold and fearleſs, preying in the midſt of cities, undaunted by mankind. Pennant's Genera of Birds, p. 2. See *Tab.* V. *Birds*, N° 59.

VULTURIUS, among the *Romans*, a throw of the *tali*, otherwiſe called *canis*. See TALARIUS *ludus*.

VULTURIUS *lapis*, a name given by many to the ſtone called QUANDROS.

VULTURNALIA. See VOLTURNALIA.

VULTUS *de Luca*, the ſame with VERONICA.

VULVA, *quaſi valvæ*, *doors*, a name which ſome phyſicians give to the vagina, and others to the uterus, or womb.

VULVA is ſometimes alſo uſed for the cunnus, or whole pudendum muliebre.

VUNENA, a name given by the people of Guinea to a kind of catch-fly, or lychnis, common in that part of the world, and much uſed by them in a decoction to cure ſwellings of the legs. Petiver has called it *lychnis Guineenſis fructu caryophylloide foliis roris marini*, *hirſutis*, *anguſtioribus*. Phil. Tranſ. N° 232.

UVULA, in *Anatomy*, a round, ſoft ſpongeous body, like the end of a child's finger; ſuſpended from the palate, near the foramina of the noſtrils, perpendicularly over the glottis.

Its uſe is, to break the force of the cold air, and prevent its entering too precipitately into the lungs.

It is formed of a duplicature of the membrane of the palate; and it is called by ſome authors, *columella*, and, by others, *gurgulio*. It is moved by two pair of muſcles, and ſuſpended by as many ligaments. The muſcles are, the *external*, called the SPHENOSTAPHYLINUS, which draws the *uvula* upwards and backwards; and hinders the maſticated aliment from paſſing into the foramina of the noſtrils in deglutition: and the *internal*, called the PTERYGOSTAPHYLINUS: which draws the *uvula* upwards and forwards.

Both theſe muſcles move the *uvula* upwards, to give room for ſwallowing; and ſerve to raiſe it when relaxed, and fallen down. In which caſe it is uſual to promote its riſing, by applying a little beaten pepper on the end of a ſpoon, or ſome other warm aromatic powder to it.

Bartholin ſays, that ſuch as have no *uvula* are ſubject to the phthiſic, and uſually die thereof; becauſe the cold air, entering the lungs too haſtily, ſoon injures them. See PHTHISIS.

The cutting out of the *uvula*, when ſwelled and hanging down, is commonly practiſed in Scotland, and no other remedy applied than a piece of bread and cheeſe. The ſurgeon, who is ſome neighbouring peaſant, uſes alſo no other inſtrument than his knife; and yet all ſucceeds very well.

UVULÆ *prolapſus*, *vel procidentia*. See PROLAPSUS.

UVULARIA, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the flower has no empalement; it has oblong, erect, ſpear-ſhaped petals, and ſix awl-ſhaped ſtamina, terminated by oblong, erect, four-cornered ſummits; it has an oblong, obtuſe, three-cornered germen, ſupporting a ſtyle longer than the ſtamina, crowned by a triple, obtuſe, ſpreading ſtigma; the germen afterwards turns to an oblong obtuſe capſule, with three lobes, and as many cells, filled with flat orbicular ſeeds ranged in a double order. Miller reckons two, and Linnæus three ſpecies.

UVULARIA, in the *Materia Medica*, the name given by authors to the plant called *hypogloſſum*, or double tongue.

UXOR, in the *Language of the Chemiſts*, the mercury of metals. This is the wife, they ſay, and ſulphur is the huſband. See MARITUS.

UXORIUM, in *Antiquity*, a fine, or forfeit, paid by the Romans for not marrying.

UZIFIR, UZUFAR, or UZIFUR, in *Chemiſtry*, a name which ſome authors give to cinnabar.

W.

W, A letter peculiar to the northern languages and people; as the Engliſh, Dutch, Poliſh, and others of Teutonic and Sclavonic original.

The form and the ſound of *w* are excluded from all the languages derived from the Latin; though it is not improbable ſays Dr. Johnſon, that by our *w* is expreſſed the ſound of the Roman *v*, and Eolic *f*. However, the *w* is ſometimes admitted into the French, Italian, &c. in proper names, and other terms borrowed from the languages in which it is originally uſed.

In Engliſh, the *w* is uſually a conſonant; and as ſuch, may go before all the vowels, except *u*; as in *want*, *weapon*, *winter*, *world*, &c.

It is ſometimes alſo a vowel; and, as ſuch, follows any of the vowels *a*, *e*, *o*; and unites with them into a kind of double vowel, or diphthong; as in *law*, *ewe*, *ſow*, &c. The Engliſh *w* is ſounded as in Latin *u*, in *quantum*, *ſuadeo*, *lingua*. Its ſound is commonly like the groſs, or full *u*, rapidly pronounced. In French, the ſound of the *w* does not differ from that of the ſingle *u*, or rather *ou*. See U.

WACHENDORFIA, in *Botany*, a genus of the *triandria monogynia* claſs. Its characters are theſe: the flowers have oblong, acute-pointed ſheaths, which are ranged alternately upon the ſtalks at a diſtance from each other; they are permanent and wither, encloſing the capſule; the flower has ſix oblong petals; three of the upper ſpread open, and are erect, and joined at their tails; the two ſide-petals ſpread each way, and the lower is the keel, which is ſometimes wanting; it has a protuberant nectarium, placed outward on each ſide of the upper petal, and three awl-ſhaped declining ſtamina, which are ſhorter than the petals, and reſt upon the under one, and are terminated by oblong, horizontal ſummits, which join; it has an oval, blunt, three-cornered germen, ſituated within the petals, ſupporting a ſingle awl-ſhaped ſtyle, which always bends to the right, crowned by a ſingle ſtigma; the germen turns to an almoſt oval, three-corned, hairy capſule, having three cells, containing three oval ſeeds, faſtened to the placenta, which is in the centre. There are two ſpecies.

WADD, or **Wadding**, in *Gunnery*, a ſtopple of paper, hay, ſtraw, old rope-yarns, or tow, rolled firmly into the form of a ball, and forced into a gun upon the powder, to keep it cloſe in the chamber; or put up cloſe to the ſhot, to keep it from rolling out, as well as to prevent the powder, when fired, from dilating round the ſides of the ball, by its windage, as it paſſes through the chaſe, which would conſiderably diminiſh the effort of the powder. From ſome experiments recited in the Military Dictionary, it is inferred, that the judicious ramming of a little *wadding* over the powder, adds about one-fourth part of the whole effect.

Wadd-*hook*. See Worm.

Wadd-*mill* is a hollow form of wood, to make the *wadds* of a proper ſize.

Wadd, *black*, in *Natural Hiſtory*, a name given by the miners of Derbyſhire to the *ochra friabilis nigro-fuſca* of Da Coſta, which he deſcribes as a very light, friable, and exceeding fine ochre, which conſiſts of parts extremely ſmall, ſubtile, and even impalpable; of a looſe regular texture, and of a very deep blackiſh, or dark brown colour; it is often variouſly blended with veins of a yellow ochre, and thick ſet with glittering, ſparry particles; its ſurface is even, though very duſty, and it much colours the hands; it adheres firmly to the tongue, melts pretty freely in the mouth, and raiſes a moderately ſtrong ebullition in water, but does not readily break into powder; in the fire it acquires a great hardneſs, and a deep bluiſh black colour. It is found in ſeveral lead-mines, and both with water and oil it makes a very fine colour; and is now employed in conſiderable quantities, and to great advantage, as an oil colour, in ſhip and houſe-painting. In 1751 and 1752 this ſubſtance was found, by ſeveral repeated experiments, to take fire, upon being ſlightly mixed with linſeed-oil; its inflammable property, when mixed with oil, was re-examined in 1782; and Mr. Wedgwood has lately made ſeveral experiments, with a view of analyſing this ſubſtance; from which it appears, that twenty-two parts of this mineral contain nearly two of indiſſoluble earth, chiefly micaceous, one of lead, about nine and a half of iron, and the ſame quantity of mangan eſe; that it ſhould not be claſſed among the ochres not acted upon by acids; and may, with as great propriety, be called mangan eſe ochre. When this mineral was previouſly calcined with a ſlight red heat about half an hour, the mixture of it with linſeed-oil dried much ſooner and harder; and this is a circumſtance which may render it particularly valuable to the painter. Da Coſta's Hiſt. Foſſ. p. 102. Phil. Tranſ. vol. lxxiii. part ii p. 284, &c.

If half a pound of this ſubſtance, or ore of mangan eſe, be dried before a fire, and afterwards ſuffered to cool for about an hour, and then two ounces of linſeed-oil be gradually poured in it, mixing them looſely like yeaſt with flour, little clots will be formed, and in ſomewhat more than half an hour the whole will gradually become hot, and at laſt burſt into a flame: the heat of the room, in the houſe of ſir Joſeph Banks, where this experiment was repeatedly made, was about 50; and the heat to which the ore was expoſed while drying, might be about 130. Kirkwan's Elem. of Min. p. 352.

WAFE. See Waif.

WAFERS for ſealing letters are made by mixing fine flour with glair of eggs, iſinglaſs, and a little yeaſt, and beating the maſs into a paſte; the ſpreading it when thinned with gum-water, on even tin-plates, and drying it in a ſtove, and cutting it for uſe. The different colours may be given by tinging the paſte with brazil or vermilion for red; indigo, or verditer, &c. for blue; ſaffron, turmeric, or gamboge, &c. for yellow, &c.

WAFT, in *Sea Language*, a ſignal diſplayed from the ſtern of a ſhip for ſome particular purpoſe, by hoiſting the enſign, furled up together into a long roll, to the head of its ſtaff. It is particularly uſed to ſummon the boats off from the ſhore to the ſhip whereto they belong; or as a ſignal for a pilot to repair aboard. Falconer.

To waft a ſhip, is to convoy her ſafe, as men of war do by merchants ſhips.

WAFTERS, *waftores*, conductors of veſſels at ſea.

King Edward IV. conſtituted a triumvirate of officers with naval power, whom the patent ſtyles *cuſtodes*, *conductores*, and *waftores*; their buſineſs chiefly was to guard our fiſhermen on the coaſts of Norfolk and Suffolk.

WAGA, or **Vaga**. See Weigh.

Waga, in *Botany*, H. M. a ſiliquous Indian tree, with a tetrapetalous ſtellated flower, and flat pods, three inches in length. It is very like the intſia, but without ſpines, and climbs about high trees. The pods are two inches in breadth, thin, and very flat; when dried, of a reddiſh colour, and have a cortex of a ſnow-white colour on the inſide. The beans are aſtringent, bitter, round, and ſmooth, a little flattiſh, lying in a tranſverſe poſition with reſpect to the pod, and of a green, inclining to a cheſnut colour. It is evergreen, and grows in Malabar.

The juice of this tree, together with lemons and green turmeric, boiled for a conſiderable time in cocoa-nut oil, is a good ointment for the leproſy, and of great uſe in inveterate ulcers. Raii Hiſt. Plant. 1766.

WAGER, *waging*, in *Law*, *vadari*, ſignifies the giving of ſecurity for the performance of any thing.

Thus, to *wage* law, is to put in ſecurity, that you will make law at the day aſſigned, i. e. take the benefit which the law has allowed you.

Our anceſtors conſidered, that there were many caſes in which an innocent man, of good credit, might be overborne by a multitude of falſe witneſſes; and, therefore, eſtabliſhed this ſpecies of trial, by the oath of the defendant himſelf. This method of trial is not only to be found in the codes of almoſt all the northern nations that broke in upon the Roman empire, and eſtabliſhed petty kingdoms upon its ruins, but its original may be traced back as far as the Moſaical law. Exod. xxii. 10. A manifeſt reſemblance may alſo be diſcerned between this ſpecies of trial, and the *canonical* PURGATION of the popiſh clergy, when accuſed of any capital crime. Similar to this is alſo the SACRAMENTUM *deciſionis* of the civil law. But, though a cuſtom ſomewhat like this prevailed formerly in the city of London, yet in general the Engliſh law does not thus, like the civil, reduce the defendant, in caſe he is in the wrong, to the dilemma of either confeſſion or perjury.

The manner of *waging* and making law is this. He that has waged, or given ſecurity, to make his law, brings with him into court eleven of his neighbours; a cuſtom which is particularly deſcribed ſo early as the league between Alfred and Guthrun the Dane. The defendant then, ſtanding at the end of the bar, is admoniſhed by the judges of the nature and danger of a falſe oath; and if he ſtill perſiſts, he is to repeat this or the like oath: "Hear this, ye juſtices, that I do not owe unto Richard "Jones the ſum of ten pounds, nor any penny thereof, "in manner and form as the ſaid R. hath declared "againſt me. So help me God." And thereupon his eleven neighbours, or COMPURGATORS, ſhall avow upon their oaths, that they believe in their conſciences that he ſays the truth; ſo that himſelf muſt be ſworn *de fidelitate*, and the eleven *de credulitate*. Some have maintained, that fewer than eleven compurgators will ſuffice; but ſir Edward Coke is poſitive, that there muſt be this number; and his opinion is approved and ſupported by judge Blackſtone, who obſerves, that as *wager* of law is equivalent to a verdict in the defendant's favour, it ought to be eſtabliſhed by the ſame or equal teſtimony, namely, by the oath of twelve men.

In the old Swediſh or Gothic conſtitution, *wager* of law was not only permitted, as it ſtill is in criminal caſes, unleſs the fact be extremely clear againſt the priſoner, but was alſo abſolutely required, in many civil caſes. But with us in England *wager* of law is never required; and is then only admitted, where an action is brought upon ſuch matters as may be ſuppoſed to be privately tranſacted between the parties, and wherein the defendant may be preſumed to have made ſatisfaction without being able to prove it; as in actions of debt upon ſimple contract, or for an amercement in actions of detinue and of account, where the debt may have been paid, the goods reſtored, or the account balanced, without any evidence of either; and not, when there is any ſpecialty, as a bond or deed to charge the defendant, but when the debt groweth by word only. Nor doth it lie in an action of debt, for arrears of an account, ſettled by auditors in a former action. By ſuch *wager* of law, when admitted, the plaintiff is perpetually barred; for the law, in the ſimplicity of ancient times, preſumed, that no one would forſwear himſelf, for any worldly conſideration. *Wager* of law, however, lie thin a real action, where the tenant alleges he was not legally ſummoned to appear, as well as in mere perſonal contracts. A man outlawed, attainted for falſe verdict, or for conſpiracy or perjury, or otherwiſe become infamous, ſhall not be permitted to *wage* his law. Neither ſhall an infant under the age of twenty-one, for he cannot be admitted to his oath; nor ſhall the defendant, where the plaintiff is an infant, *wage* his law. But a feme-covert, when joined with her huſband, may be allowed to *wage* her law; and an alien ſhall do it in his own language. It is, moreover, a rule, that where a man is compellable by law to do any thing, whereby he becomes creditor to another, the defendant in that caſe ſhall not be admitted to *wage* his law; for then it would be in the power of any bad man to run in debt firſt, againſt the inclinations of his creditor, and afterwards to ſwear it away. But where the plaintiff hath given voluntary credit to the defendant, there he may *wage* his law. In no caſe where a contempt, treſpaſs, deceit, or any injury with force is alleged againſt the defendant, is he permitted to *wage* his law. Executors and adminiſtrators, when charged for the debt of the deceaſed, ſhall not be admitted to *wage* their law. The king alſo has his prerogative; for, as all *wagers* of law import a reflection on the plaintiff for diſhoneſty, therefore there ſhall be no ſuch *wager* on actions brought by him; and this prerogative extends and is communicated to his debtor and accomptant; for, on a writ of *quo minus*, in the exchequer for a debt on ſimple contract, the defendant is not allowed to *wage* his law.

Notwithſtanding all the reſtrictions to which *wagers* of law were ſubject, it was at length conſidered, that it threw too great a temptation in the way of indigent or profligate men; and therefore by degrees new remedies were deviſed, and new forms of action were introduced, wherein no defendant is at liberty to *wage* his law; ſo that *wager* of law is quite out of uſe, being avoided by the mode of bringing the action; but ſtill it is not out of force. And, therefore, when a new ſtatute inflicts a penalty, and gives an action of debt for recovering it, it is uſual to add, in which no *wager* of law ſhall be allowed: otherwiſe a hardy delinquent might eſcape any penalty of the law, by ſwearing he had never incurred, or elſe had diſcharged it. Blackſt. Comm. book iii. p. 341, &c.

WAGER *of battle*. See BATTLE and DUEL, &c.

WAGGEL, in *Ornithology*, a name given by the people of Cornwall to the ſpecies of the *larus*, or ſea-gull, known among authors, by the name of MARTINAZZO.

WAGGON, a kind of vehicle or carriage, in common uſe. There are divers forms of *waggons*, accommodated to the divers uſes they are intended for. The common *waggon* conſiſts of the *ſhafts*, or *rads*, which are the two pieces the hind horſe bears up; the *welds*; the *ſlotes*, which are the croſs pieces that hold the ſhafts together; the *bolſter*, being that part on which the fore-wheels and axle-tree turn, in wheeling the *waggon* acroſs the road; the *cheſt*, or body of the *waggon*, having the ſtaves or rails fixed thereon; the *bales*, or hoops, which compoſe the top; the *tilt*, the cloth thrown over the hoops; beſides the *wheels*, *axle-tree*, &c. See WHEELS *of coaches*, &c.

By 23 Geo. III. cap. 66. there is a yearly duty on *waggons*, wains, and carts, with three or four wheels, of 4*s*. each, and upon thoſe with two wheels of 2*s*. each. But no perſon is obliged to pay the yearly ſum of 4*s*. for more than one carriage employed in agriculture, nor for more than three, otherwiſe employed, and not uſed to hire; nor 2*s*. for any cart employed in agriculture only, and not let out for hire. Entry and payment of the duty are enjoined under a penalty of 5*l*. for every default.

WAGGON, *ammunition*, in *Military Language*, is a *waggon* uſed in carrying all kinds of ſtores, and alſo bread; for which purpoſe it is lined on the inſide with baſket-work.

WAGGON-*maſter-general*, in the *Military Art*, is he who has the ordering and marching of the baggage of the army. On a day of march he meets the baggage at the place appointed in the orders, and marſhals it according to the rank of the brigade or regiment each *waggon* belongs to, which is ſometimes in one column, ſometimes in two; ſometimes after the artillery; and ſometimes the baggage of each column follows their reſpective column.

WAGGONER, in *Aſtronomy*, a kind of conſtellation, called alſo CHARLES's *Wain*.

WAGGONER is alſo uſed for a routier, or book of charts, deſcribing the ſeas, their coaſts, &c.

WAGTAIL, *motacilla*, in *Ornithology*, a genus of *paſſeres*; the characters of which are, that the bill is ſtraight and awl-ſhaped, the mandibles are almoſt equal, the tongue lacerated, and has a rim or margin round it, and the noſtrils ovated. Of this genus Linnæus enumerates forty-nine ſpecies: among which are the NIGHTINGALE, BLACK-*cap*, PETTY-*chaps*, RED-*breaſt*, RED-*ſtart*, *hedge*-SPARROW, *leſſerreed*-SPARROW, STONE-*chatter*, WHEAT-*ear*, WINCHAT, WHITE-*throat*, WREN, *golden creſted* WREN, &c.

The *white wagtail*, or *motacilla alba* of Linnæus, is black on the head, back, and upper and lower ſide of the neck; in ſome the chin is white, and the throat marked with a black creſcent; the breaſt and belly are white; the quill-feathers are duſky; the coverts black, tipt and edged with white; the tail is very long, and always in motion; the bill, inſide of the mouth, and the legs, are black; the hind-claw is very long. This bird frequents the ſides of ponds and ſmall ſtreams, and feeds on inſects and worms. It ſhifts its quarters in the winter, moving from the north to the ſouth of England: in ſpring and autumn it is a conſtant attendant of the plough, for the ſake of the worms thrown up by it.

Yellow wagtail is the *motacilla flava* of Linnæus: the male is a bird of great beauty; the breaſt, belly, thighs, and vent feathers, being of a very lively yellow; the throat is marked with ſome large black ſpots; above the eye is a bright yellow line; beneath that from the bill acroſs the eye is another of a duſky hue; and beneath the eye a third of the ſame colour; the colour of the head, and whole upper part of the body, is an olive green, which brightens in the coverts of the tail; the quill-feathers are duſky; the coverts of the wings olive-coloured, but the lower rows are duſky, tipt with yellowiſh white; the two outmoſt feathers of the tail half white; the others black. The colours of the female are much more obſcure than thoſe of the male; and it wants the black ſpots on the throat. This bird makes its neſt on the ground in corn-fields, and lays five eggs; it migrates i the north of England; but in Hampſhire continues the whole year.

Grey wagtail, a ſpecies deſcribed by Mr. Pennant; the top of the head, upper part of the neck and back, are aſh-coloured, ſlightly edged with yellowiſh green; the ſpace round each eye is aſh-coloured, beneath and above which is a line of white: in the male, the chin and throat are black; the feathers incumbent on the tail are yellow, and the tail is longer, in proportion to its ſize, than that of the other kinds: the two exterior feathers are white, the reſt black; the breaſt and whole underſide of the body are yellow; the quill-feathers are duſky, and thoſe next the back edged with yellow. The colours of the female are uſually more obſcure, and the black ſpot on the throat is wanting. The *wagtails* are much in motion, ſeldom perch, perpetually flirt their tails, ſcream when they fly, frequent waters, feed on inſects, and make their neſts on the ground. Pennant's Brit. Zool. vol. i. p. 361, &c.

WAIF, or **WAFE**, a term primarily applied to ſtolen goods, which a thief, being either purſued, or overburdened, flies, and waives or throws away in his flight.

The king's officer, or the bailiff of the lord within whoſe juriſdiction ſuch *waifs* or *waif* goods were left (having by grant, or preſcription, the franchiſe of *waif*), may ſeize the goods to his lord's uſe; except the owner come with freſh ſuit after the felon, and ſue an appeal of robbery within a year and a day, or give in evidence againſt him, and he be attainted. In which caſes, the owner ſhall have his goods again.

Waived goods do alſo not belong to the king till ſeized by ſomebody for his uſe; for if the party robbed can ſeize them firſt, though at the diſtance of twenty years, the king ſhall never have them. If the goods are hid by the thief, or left any where by him, ſo that he had them not about him when he fled, and therefore did not throw them away in his flight; theſe alſo are not *bona waviata*, but the owner may have them again when he pleaſes.

The goods of a foreign merchant, though ſtolen and thrown away in flight, ſhall never be *waifs*.

Waifs, things loſt, and eſtrays, are ſaid to be *pecus vagrans*, and are *nullius in bonis ubi non apparet dominus*. And therefore they belong to the lord of the franchiſe where they are found; who muſt cauſe them to be cried, and publiſhed in the markets and churches near about: elſe the year and day does not run to the prejudice of him that loſt them. See ESTRAY.

Though *waif* be properly ſpoken of things ſtolen, yet it may alſo be underſtood of goods not ſtolen. As, if a man be purſued with hue and cry, as a felon, and he flies, and leaves his own goods, theſe ſhall be forfeited as goods ſtolen; and they are properly called FUGITIVE *goods*.

WAIN. See CART.

WAIN. See CHARLES's *Wain*.

WAINSCOT, in *Building*, the timber-work ſerving to line the walls of a room; being uſually made in pannels, and painted, to ſerve in lieu of hangings.

Even in halls, it is common to have *wainſcot* breaſt-high, by reaſon of the natural humidity of walls.

It was formerly the cuſtom to *wainſcot* rooms up to the cieling, and to terminate it by a cornice; but it is now commonly raiſed only chair high, or from two to three feet; the reſt of the wall is either covered with paper, which is often paſted on thin cloth, and fixed in frames, to prevent its being ſpoiled by the dampneſs of the wall, or elſe it is finiſhed with ſtucco. Walls ſhould be thoroughly dry before they are *wainſcoted*, and the ſtuff of which the *wainſcot* is made ſhould be dry and well ſeaſoned.

Some joiners put charcoal behind the panels of the *wainſcot*, to prevent the ſweat of ſtone and brick-walls from ungluing the joints of the panels. Others uſe wool for the ſame purpoſe. But neither the one nor the other is ſufficient for ſome houſes: the only ſure way, is by priming over the backſides of the joints with white lead, or Spaniſh brown and linſeed oil.

Wainſcoting is meaſured by the ſquare yard of nine feet; and in taking dimenſions, they uſe a ſtring, which they preſs into all the mouldings; it being a rule, that they are to be paid for all where the plain goes.

The cornice is meaſured and paid by the foot in length.

WAIST *of a ſhip* is that part which is contained between the quarter-deck and fore-caſtle, being uſually a hollow ſpace, with an aſcent of ſeveral ſteps to either of thoſe places. When the *waiſt* of a merchant-ſhip has only one or two ſteps of deſcent from the quarter-deck and fore-caſtle, ſhe is ſaid to be galley-built; but when it is conſiderably deeper, as with ſix or ſeven ſteps, ſhe is called frigate-built. Falconer.

WAIVE, in *Law*, a woman that is put out of the protection of the law. She is called *waive*, as being forſaken of the law; and not *outlaw*, as a man is; by reaſon women cannot be of the decenna, and are not ſworn in leets to the king, nor to the law, as men are; who are therefore within the law; whereas women are not, and ſo cannot be outlawed, ſince they never were within it.

In this ſenſe we meet with *waviaria mulieris*, as of the ſame import with *utlegatio viri*.

WAKE *of a ſhip*, denotes the print or track impreſſed by the courſe of a ſhip on the ſurface of the water. It is formed by the re-union of the body of water, which was ſeparated by the ſhip's bottom whilſt moving through it, and may be ſeen to a conſiderable diſtance behind the ſtern, as ſmoother than the reſt of the ſea. Hence it is uſually obſerved by the compaſs, to diſcover the angle of LEE-*way*.

By this, a gueſs alſo may be made of the ſpeed ſhe makes.

When, in a ſhip's ſtaying, ſhe is ſo quick that ſhe does not fall to leeward upon a tack, but that, when tacked, her *wake* is to the leeward, they ſay, *ſhe ſtays to the weather of her wake*; which is a ſign ſhe feels her helm well, and is nimble of ſteerage.

Alſo, when one ſhip, purſuing another, is got as far into the wind as ſhe, and ſails directly after her, on the ſame track, or on a line ſuppoſed to be formed on the continuation of her keel, they ſay, *ſhe is got into her* wake.

Two diſtinct objects obſerved at ſea are ſaid to be in the *wake* of each other, when the view of the fartheſt is intercepted by the neareſt; ſo that the obſerver's eye, and the two objects, are all placed upon the ſame right line.

WAKE-*robin*, or **CUCKOW**-*pint*, *arum*, in *Botany*, a genus of the *gynandria polyandria* claſs. Its characters are theſe: the flower hath a long, oblong ſpatha, cloſed at the bottom, compreſſed in the middle, and coloured within; the ſpadix is ſingle, ſhaped like a club at the top, and ſhorter than the ſpatha, upon which the germina are ſituated; it hath no petals nor ſtamina, but many four-cornered ſummits, ſituated cloſe to the germina, with a double row of hairs between them, which adhere to the ſpadix; there are many germina, which ſurround the upper part of the ſpadix, which are oval, having no ſtyles, but have bearded ſtigma; the germina afterward become globular berries, with one cell, having round ſeeds. Linnæus enumerates twenty-two, and Miller nineteen ſpecies, ſome of which were known by the name of *ariſarum*, or *friar's cowl*.

This plant is called *wake-robin* from the acrid taſte, which, if eaten, will occaſion a violent pain in every part of the mouth and throat, attended commonly with a great defluxion of water.

All the exotic ſorts of this plant are preſerved in the gardens of thoſe perſons who are curious in collecting foreign plants, for the variety of their leaves; for their flowers have very little beauty, nor do they often appear in this country. The plants are propagated eaſily, by off-ſets from their roots, which they put forth plentifully; theſe muſt be planted in pots filled with rich earth, and plunged in a hot-bed. If they are afterwards continued in the bark-ſtove, they will make great progreſs, and their leaves will be very large. Miller.

The common *arum*, or *wake-robin*, with ſpotted and plain leaves, or *arum maculatum* of Linnæus, is a low, perennial plant, growing wild under hedges, and by the ſides of banks; it flowers in April, and the ſeeds ripen in July; in ſome plants the leaves are ſpotted with black, in others with white ſpots, and in others not ſpotted at all; the black ſpotted ſort is ſuppoſed to be the moſt efficacious, and is, therefore, directed to be uſed by the London college. All the ſorts are ſaid to be ſtronger, when produced in moiſt ſhady ſoils, than in dry, open expoſures. The freſh roots of *arum* have an extremely pungent, acrimonious taſte; ſlightly chewed, they vellicate and burn the tongue, producing a conſiderable thirſt; theſe uneaſy ſenſations are ſometimes alleviated by milk, butter, or oily liquors: the other parts of the plant are likewiſe highly acrid, though leſs ſo than the roots, which, however, loſe the greateſt part of their acrimony on being dried ſo as to become pulverable. Parkinſon obſerves, that the white farinaceous ſtarch-like powder has been uſed in waſhing, and that it has ſometimes bliſtered the hands. The root may be preſerved freſh in ſand for ſeveral months; and if the ſand is ſomewhat moiſt, ſo as to ſuffer it to vegetate, it will be the better ſecured both from rotting, and from loſing its virtue. It appears to be of equal vigour, or at leaſt of ſufficient vigour for medicinal uſe, at all periods of its growth, and in all ſeaſons of the year.

Arum root, newly dried and powdered, is given in doſes of a ſcruple and upwards, for ſtimulating the ſolids, attenuating viſcid juices, and promoting the natural ſecretions; in cold, languid, phlegmatic habits; againſt weakneſs and relaxations of the ſtomach, and catarrhous and rheumatic diſorders. In the officinal powders of *arum*, ſixteen grains of the dry root are accompanied with eight grains of the pungent roots of pimpinella, the ſame quantity of thoſe of the yellow water-flag, four grains of cinnamon, and two grains of ſalt of wormwood, with four grains of crabs-eyes. In the medicine recommended by Sydenham againſt rheumatiſms, the acrid antiſcorbutic herbs are largely joined to it. Juncker obſerves, that a dram of the powder of *arum*, taken with a ſpoonful of brandy, procures a very copious ſweat, even in perſons little diſpoſed to it, whilſt the powder itſelf has no ſuch effect.

The intolerable pungency on the tongue, which has prevented the root from being uſed in a freſh ſtate, ſo as to exert its full virtues, Dr. Lewis has found to be effectually covered by unctuous and gummy materials. The freſh root beaten into a maſs, with the addition of a little teſtaceous powder, which promotes the diviſion of it, may either be mixed with about an equal quantity of powdered gum arabic, and three or four times as much conſerve, ſo as to make them into an electary; or rubbed with a thick mixture of mucilage of gum arabic and ſpermaceti, gradually adding any ſuitable watery liquors and a little ſyrup, ſo as to form an emulſion; two parts of the root, two of gum, and one of ſpermaceti, make an emulſion, which ſcarcely impreſſes any degree of pungency, though kept long in the mouth. In theſe forms Dr. Lewis has given the freſh root from ten grains to upwards of a ſcruple, three or four times a day: it generally occaſioned a ſenſation of ſlight warmth, firſt about the ſtomach, and afterwards in the remoter parts, manifeſtly promoted perſpiration, and frequently produced a plentiful ſweat. Several obſtinate rheumatic pains were removed by this medicine, which Dr. Lewis recommends to farther trial. Mat. Med.

The root of *arum*, dried and powdered, is uſed by the French for waſhing their ſkin, and is ſold at a high price under the name of Cypreſs powder: it is both a good and an innocent coſmetic.

The leaves and flowers of *ariſarum æqualis*, broad-leaved friar's cowl, are deterſive and vulnerary; and applied either in the form of ointment or decoction to malignant ulcers. Its root taken in powder is eſteemed againſt the plague, the doſe being from a ſcruple to a dram. Of the root alſo are made collyria, which are uſed in curing fiſtulas of the eyes. Vide Lemery, des Drog. in voc.

WAKEFULNESS, or WATCHING, *inſomnia*. See WATCHING.

WAKES, formed from the Saxon *wæcce*, *vigilia*, *excubiæ*, *watch*, *vigils*, or *Country*-WAKES, are certain ancient anniverſary feaſts, in ſeveral pariſhes; wherein the people were to be awake at the ſeveral vigils, or hours to go to prayer. See VIGIL.

They are uſually obſerved, in the country, on the Sunday next before the ſaint's day to whom the pariſh-church is dedicated.

The learned Mr. Whitaker, in his Hiſtory of Mancheſter, hath given a particular account of the origin of *wakes* and fairs. He obſerves, that every church at its conſecration received the name of ſome particular ſaint: this cuſtom was practiſed among the Roman Britons, and continued among the Saxons; and in the council of Cealchythe, in 816, the name of the denominating ſaint was expreſly required to be inſcribed on the altars, and alſo on the walls of the church, or a tablet within it. The feaſt of this ſaint became of courſe the feſtival of the church. Thus chriſtian feſtivals were ſubſtituted in the room of the idolatrous anniverſaries of heatheniſm: accordingly at the firſt introduction of Chriſtianity among the Jutes of Kent, pope Gregory the Great adviſed what had been previouſly done among the Britons, viz. Chriſtian feſtivals to be inſtituted in the room of the idolatrous, and the ſuffering-day of the martyr whoſe relics were repoſited in the church, or the day on which the building was actually dedicated, to be the eſtabliſhed feaſt of the pariſh. Both were appointed and obſerved; and they were clearly diſtinguiſhed at firſt among the Saxons, as appears from the laws of the Confeſſor, where the *dies dedicationis*, or *dedicatio*, is repeatedly diſcriminated from the *propria feſtivitas ſancti*, or *celebratio ſancti*. They remained equally diſtinct to the Reformation; the dedication-day in 1536 being ordered for the future to be kept on the firſt Sunday in October, and the feſtival of the patron ſaint to be celebrated no longer. The latter was, by way of pre-eminence, denominated the church's holiday, or its peculiar feſtival; and while this remains in many pariſhes at preſent, the other is ſo utterly annihilated in all, that biſhop Kenner, ſays Mr. Whitaker, knew nothing of its diſtinct exiſtence, and has attributed to the day of dedication what is true only concerning the ſaint's day. Thus inſtituted at firſt, the day of the tutelar ſaint was obſerved, moſt probably by the Britons, and certainly by the Saxons, with great devotion. And the evening before every ſaint's day, in the Saxon-Jewiſh method of reckoning the hours, being an actual part of the day, and therefore like that appropriated to the duties of public religion, as they reckoned Sunday from the firſt to commence at the ſun-ſet of Saturday; the evening preceding the church's holiday would be obſerved with all the devotion of the feſtival. The people actually repaired to the church, and joined in the ſervices of it; and they thus ſpent the evening of their greater feſtivities in the monaſteries of the North, as early as the concluſion of the ſeventh century.

Theſe ſervices were naturally denominated from their late hours *wæccan* or *wakes*, and vigils or eves. That of the anniverſary at Rippon, as early as the commencement of the eighth century, is expreſly denominated the vigil. But that of the church's holiday was named *cyric wæccan*, or church-*wake*, the church vigil, or church-eve. And it was this commencement of both with a *wake*, which has now cauſed the days to be generally preceded with vigils, and the church-holiday particularly to be denominated the church-*wake*. So religiouſly was the eve and feſtival of the patron ſaint obſerved for many ages by the Saxons, even as late as the reign of Edgar, the former being ſpent in the church, and employed in prayer. And the *wakes*, and all the other holidays in the year, were put upon the ſame footing with the octaves of Chriſtmas, Eaſter, and of Pentecoſt. When Gregory recommended the feſtival of the patron ſaint, he adviſed the people to erect booths of branches about the church on the day of the feſtival, and to feaſt and be merry in them with innocence. Accordingly, in every pariſh, on the returning anniverſary of the ſaint, little pavilions were conſtructed of boughs, and the people indulged in them to hoſpitality and mirth. The feaſting of the ſaint's day, however, was ſoon abuſed; and even in the body of the church, when the people were aſſembled for devotion, they began to mind diverſions, and to introduce drinking. The growing intemperance gradually ſtained the ſervice of the VIGIL, till the feſtivity of it was converted, as it now is, into the rigour of a faſt. At length they too juſtly ſcandalized the puritans of the laſt century, and numbers of the *wakes* were diſuſed entirely, eſpecially in the eaſt and ſome weſtern parts of England; but they are commonly obſerved in the north, and in the midland counties.

This cuſtom of celebrity in the neighbourhood of the church, on the days of particular ſaints, was introduced into England from the continent, and muſt have been familiar equally to the Britons and Saxons; being obſerved among the churches of Aſia in the ſixth century, and by thoſe of the weſt of Europe in the ſeventh. And equally in Aſia and Europe, on the continent, and in the iſlands, theſe celebrities were the cauſes of thoſe commercial marts which we denominate FAIRS. The people reſorted in crouds to the feſtival, and a conſiderable proviſion would be wanted for their entertainment. The proſpect of intereſt invited the little traders of the country to come and offer their wares; and thus, among the many pavilions for hoſpitality in the neighbourhood of the church, various booths were erected for the ſale of different commodities. In larger towns, ſurrounded with populous diſtricts, the reſort of the people to the *wakes* would be great, and the attendance of traders numerous; and this reſort and attendance conſtitute a fair, Baſil expreſly mentions the numerous appearance of traders at theſe feſtivals in Aſia, and Gregory notes the ſame cuſtoms to be common in Europe. And as the feſtival was obſerved on a feria or holiday, it naturally aſſumed to itſelf, and as naturally communicated to the mart, the appellation of feria or fair. Indeed, ſeveral of our moſt ancient fairs appear to have been uſually held, and have been continued to our time, on the original church-holidays of the places: beſides, it is obſervable, that fairs were generally kept in church-yards, and even in the churches, and alſo on Sundays, till the indecency and ſcandal were ſo great, as to need reformation. See Burn's Eccl. Law, art. *Churches*.

WALDENSES. See VAUDOIS.

WALDRAPP, in *Ornithology*, a name given by ſome to the wood-raven, or CORVUS *ſylvaticus* of Geſner, a bird of the ſize of a hen, of a gloſſy black, and adorned with a creſt on its head.

WALE-*knot*, or WALL-*knot*, in *Sea Language*, is a particular ſort of large KNOT raiſed upon the end of a rope, by untwiſting the ſtrands, and interweaving them amongſt each other.

WALE-*reared*, an obſolete phraſe, implying WALL-*ſided*.

WALES, in a *Ship*, an aſſemblage of ſtrong planks extending along a ſhip's ſide, throughout her whole length, at different heights, and ſerving to reinforce the decks, and form the curves, by which the veſſel appears light and graceful on the water. As the *wales* are framed of planks broader and thicker than the reſt, they reſemble ranges of hoops encircling the ſides and bows. They are uſually diſtinguiſhed into the main-*wale*, and the channel-*wale*. The ſituation of the *wales*, being aſcertained by no invariable rule, is generally ſubmitted to the fancy and judgment of the builder. The poſition of the gun-ports and ſcuppers ought, however, to be particularly conſidered on this occaſion, that the *wales* may not be wounded by two many breaches. Falconer.

WALE, or WALL-*ſided*, denotes the figure of a ſhip's ſide, when, inſtead of being incurvated ſo as to become gradually narrower towards the upper part, it is nearly perpendicular to the ſurface of the water, like a *wall*; whence the phraſe.

WALINGHURU, in *Botany*, a name by which ſome authors have called the plant, of which the medicinal zerumbeth is the root.

WALK, in the *Manege*, is the floweſt and leaſt raiſed of all a horſe's goings. The duke of Newcaſtle ſays, that this motion is performed with two legs, diametrically oppoſite in the air, and two upon the ground at the ſame time, in form of a St. Andrew's croſs; but this, in reality, is the motion of a TROT; and accordingly all the later writers agree, that this author is miſtaken, and that the *walk* is performed, as any one may obſerve, by the horſe's lifting up its two legs on a ſide, the one after the other, begining with the hind-leg firſt Thus, if he leads with the legs of the right ſide, then the firſt foot he lifts is the far hind-foot, and in the time he is ſetting it down (which in a ſtep is always ſhort of the tread of his fore-foot on the ſame ſide) he lifts his far fore-foot, and ſets it down before his near fore-foot. Again, juſt as he is ſetting down his far fore-foot, he lifts up his near hind-foot and ſets it down again juſt ſhort of his near fore-foot, and juſt as he is ſetting it down, he lifts his near fore-foot, and ſets it down beyond his far fore-foot.

This is the true motion of a horſe's legs in a *walk*; and this is the pace in which many things are beſt taught. For inſtance, when the horſe is to be taught to turn to the right and left, or from one hand to another, he is firſt to be taught it on the *walk*, then on the trot, and finally on the gallop.

WALKÆPETHIGA, in *Botany*, a name by which ſome authors have called the tree, on which the gum lacca of the ſhops is uſually found.

WALKERS, a ſort of foreſt officers, appointed by the king to walk about a certain ſpace of ground, committed to their care and inſpection.

Walkers are the ſame with what we otherwiſe call FORESTERS.

WALKS, in *Gardening*. See ALLEYS. See alſo GRASS and GRAVEL *walks*.

Graſs *walks* in gardens were formerly in great eſteem; but of late years they have juſtly been baniſhed by every perſon of true taſte; for thoſe narrow ſlips were very unſightly, and for the moſt part uſeleſs; being generally too damp for perſons of tender conſtitutions to walk upon; and whenever they were conſtantly uſed they became bare and ugly.

Sand *walks* are now very frequently made in gardens, as being leſs expenſive than others, which in large irregular gardens is a very great article. For as the greateſt part of *walks* in gardens are carried about in an irregular manner, it would be very difficult to keep gravel *walks* handſome, eſpecially under the dripping of trees, which in rainy weather is apt to waſh the gravel into holes; and when wood *walks* are of graſs, they are not proper for walking on after rain. Sand walks, on the contrary, are always dry and wholeſome, and if of that kind that will bind, it will neither fly in windy weather, nor ſtick to the feet after rain; and whenever they appear moſſy, or weeds grow on them, if a hoe is drawn over them, and they are often raked ſmooth, they will appear as freſh and handſome as if new laid.

The breadth of theſe *walks* muſt be proportioned to the ſize of the ground, which in large extent may be twelve or fourteen feet wide; but in ſmall gardens five or ſix feet will be ſufficient: the ſides may be lined with honeyſuckles, ſweet-briars, roſes, and many other ſweet flowering ſhrubs; and all tall trees ſhould be planted at leaſt five or ſix feet from the *walk*, to allow room for theſe.

Theſe ſand *walks* are made, after they are deſigned, and the ground traced out, by digging the earth out of them, and laying it in the quarters. When the ground is dry, the *walks* need not be much elevated above the quarters; and therefore a depth of four or five inches will be ſufficient: but when the ground is wet, the bottom of the *walks* need not be more than two inches below the ſurface, that they may be raiſed high enough to throw off the wet into the quarters. The bottom ſhould be laid with rubbiſh or coarſe gravel, four, five, or ſix inches thick, and well beaten down; then the ſand ſhould be laid upon this about three inches thick; and after treading it down, it ſhould be raked, in order to level the ſurface; the whole being a little rounded, to throw off the wet. The ſand ſhould be of a binding nature; and when the *walks* are laid, they ſhould be well rolled two or three times, in order to ſettle them. If ſand cannot be procured, *walks* of this kind may be laid with ſea-ſhells well powdered, or ſea-coal aſhes, &c. Miller's Gard. Dict.

WALK, *ring*, among *Hunters*. See RING-*walk*.

WALK, *terrace*. See TERRACE.

WALKING-*fire*. See IGNIS *fatuus*.

WALL, in *Architecture*, &c. a work of ſtone, brick, or the like, making the principal part of a BUILDING; as ſerving both to encloſe it, and to ſupport the roof, floors, &c.

Walls, though built very thick and ſtrong, and their foundations laid deep, yet, if carried on ſtraight in a line, are apt to lean, or fall; and ſuch as are built crooked, though thin and weak, are much more laſting. A *wall* raiſed over a river, on arches of pillars, ſtands as firm as others, whoſe foundation is entire.

Hence it appears, that a *wall* built much thinner than uſual, by only having at every twenty feet diſtance an angle ſet out about two feet, or more, in proportion to the height of the *wall*; or by having at the like diſtance, a column, or pilaſter, erected along with it, ſix or eight inches on each ſide, over and above the thickneſs of the reſt of the *wall*, will be much ſtronger than if five times the quantity of materials were uſed in a ſtraight *wall*.

Walls are diſtinguiſhed into divers kinds, from the matter whereof they conſiſt; as *plaiſtered* or *mud-walls*, *brick-walls*, *ſtone-walls*, *flint* or *boulder-walls*, and *boarder-walls*. In all which theſe general rules are to be regarded:

1. That they be built exactly perpendicular to the groundwork.
2. That the maſſieſt and heavieſt materials be the loweſt; as being fitter to bear, than be borne.
3. That the *walls*, as they riſe, diminiſh proportionally in thickneſs, for eaſe both of weight and expence.
4. That certain courſes, or ledges, of more ſtrength than the reſt, be interlaid, like bones, to ſtrengthen the whole fabric.

WALLS, *mud* and *plaiſtered*, are chiefly uſed in ordinary timber-buildings. Theſe *walls*, being quartered and lathed between the timber, or ſometimes lathed over all, are plaiſtered over again with white mortar.

WALLS, *brick*, are the moſt uſual among us. In theſe, particular care is to be taken about the laying of the bricks, viz. that in ſummer they be laid as wet, and in winter as dry, as poſſible, to make them bind the better with the mortar; that in ſummer, as faſt as they are laid, they be covered up, to prevent the mortar, &c. from drying too faſt; and that in winter they be covered well, to protect them from rain, ſnow, and froſt, which are all enemies to the mortar; that they be laid joint on joint in the middle of *walls*, as ſeldom as may be; but good bond made there, as well as on the outſides. Care is likewiſe to be taken, that the angles be firmly bound: in order to which, in working up the *walls* of a building, it is not adviſeable to raiſe any *wall* above three feet high, before the next adjoining *wall* be wrought up to it; that good bond may be made in the progreſs of the work.

Brick-walls are ſometimes wrought part of the way two inches thicker than the reſt of the work, to ſerve for a water-table to the wall.

Laſtly, in building a houſe in the city of London, the *walls* are to be of ſuch thickneſſes as are enjoined by act of parliament. See BUILDING, and PARTY-*walls*.

WALLS, *flint*, or *boulder*, are frequently uſed in divers parts for fence-*walls*, around courts, gardens, &c. and even for *walls* of outhouſes. Sir Henry Wotton obſerves, that the building of *walls* of flint was a thing utterly unknown to the ancients; who obſerving in that material a kind of metallic nature, at leaſt a fuſibility, reſerved it for nobler uſes.

Theſe *walls* are uſually raiſed by a right and left-handed man, who have a hod of mortar poured down on the work, which they part betwixt them; each ſpreading it towards himſelf, and ſo they lay in the flints. The mortar for this work is to be very ſtiff.

WALL, *angle of a*. See ANGLE.

WALL, *coping of a*. See COPING.

WALL, *plinth of a*. See PLINTH.

WALL, *ſcenography of a.* See SCENOGRAPHY.

WALLS, *painting on.* See PAINTING.

WALLS, *party.* See PARTY.

WALL, *Picts.* See PICTS.

WALLS, *fence.* See FENCE, and *Incloſing of* LAND.

WALL, in *Fortification*, &c. See RAMPART.

WALLS, in *Gardening*, &c. The poſition, matter, and form of *walls*, for fruit-trees, are found to have a great influence on the fruit; though authors differ as to the preference.

The reverend Mr. Lawrence directs, that the *walls* of a garden be not built directly to face the four cardinal points, but rather between them, viz ſouth-eaſt, ſouth-weſt, north-eaſt, and north-weſt: in which the two former will be good enough for the beſt fruit, and the two latter for plums, cherries, and baking pears. See EXPOSURE.

Mr. Langford, and ſome others, propoſe garden-*walls* to conſiſt chiefly of ſemicircles, each about ſix or eight yards in front, and including two trees; and between every two ſemicircles, a ſpace of two feet of plain *wall*. By ſuch a proviſion every part of a *wall* will enjoy an equal ſhare of the ſun, one time with another; beſides, that the warmth will be increaſed, by the collecting and reflecting of the rays in the ſemicircles; and the trees within will be ſcreened from injurious winds. But Mr. Miller ſays, there has not been any method yet contrived, which has ſucceeded nearly ſo well as that by making the *walls* ſtraight, and building them upright.

Of all the materials for building *walls* for ripening fruit, brick is generally the beſt, as it reflects a great deal of heat, retains its warmth a great while, and affords, by the ſmallneſs of the joints, the convenience of faſtening up the trees with ſmall nails. If theſe *walls* are coped with free-ſtone, and have ſtone pilaſters at proper diſtances, to break the force of the winds, and ſhelter the fruit-trees, they make the moſt advantageous, as well as the moſt beautiful of all *walls*.

Mr. Lawrence, however, affirms, on his own experience, that *mud-walls*, made of earth and ſtraw tempered together, are better for the ripening of fruit, than either brick or ſtone *walls*: he adds, that the coping of ſtraw laid on ſuch *walls* is of great advantage to the fruits, in ſheltering them from perpendicular blights, rains, &c. This anſwers all the purpoſes of the late invention of placing tiles horizontally to hang over from the tops of the walls.

In ſome parts of England there are *walls* built both of brick and ſtone; ſome having the outſide of ſtone, and the inſide of brick, and others ſtone lined with brick. When the *walls* are built entirely of ſtone, there ſhould be trelliſes fixed up againſt them, for the more convenient faſtening of the branches of the trees.

It is ſometimes an advantageous thing to build theſe *walls* upon arches, that the roots of the trees may have room to ſpread under, and to the other ſide of them. This is neceſſary when the ſoil is a hard gravel; for without this, when the roots of peaches, &c. have reached the gravel, they find not ſufficient nouriſhment, and the trees canker and die. But though Mr. Fairchild had found great advantages from this way of building *walls*, Mr. Miller diſapproves it.

M. Fatio, in a particular treatiſe on the ſubject, inſtead of the common perpendicular *walls*, propoſes to have the *walls* built ſloping, or reclining from the ſun; that what is planted againſt them, may be more expoſed to his perpendicular rays; which muſt contribute greatly to the ripening of fruit in our cold climate.

The angle of reclination is to be that of the latitude of the place; that, when the ſun is in the meridan at the equinoxes, his rays may ſtrike juſt perpendicularly.

Yet ſome others prefer perpendicular *walls*, and even inclining ones, or ſuch as hang forwards to the ſun; as ſuch receive the ſun's rays perpendicularly when he is low; as in ſpring and autumn, or in the evening and morning; which they imagine of more ſervice than the greateſt heat of the ſun at midſummer, upon reclining *walls*.

Add, that in autumn the ſun is moſt wanted to ripen winter pears; in order to which, they ſhould be kept dry, which againſt ſloping *walls* cannot be; the dews, &c. lying much longer thereon, than on thoſe that are perpendicular.

One great advantage, however, of M. Fatios's ſloping *walls*, is, that fruit trees, as vines, &c. being planted againſt them, melon-glaſſes may be ſet on the fruit; which will much forward their ripening.

There are ſome perſons who alſo recommend the painting of *walls* black, or of a dark colour; as they ſuppoſe the dark colour will imbibe more of the ſun's rays, and retain the warmth longer; yet as the fruit is generally ſituated at a ſmall diſtance from the *wall*, it receives no benefit from the warmth of the *wall*; and it is the reflected heat that accelerates the ripening of the fruit. Mr. Miller adviſes to build the *walls* ſubſtantial, both for duration and warmth; and he ſays, that a *wall* two bricks thick will be found to anſwer better than one that is a brick and a half; and if in the building of garden *walls* they are grouted with ſoft mortar, to fill and cloſe all the joints, the walls will be much ſtronger, and the air will not ſo eaſily penetrate through them, as it does through others. As for the height of *walls*, it need not be more than nine or ten feet, unleſs for pears; in which caſe a *wall* with a ſouth aſpect ſhould be raiſed fourteen feet high or more.

When perſons are curious in their fruit, they erect a trellis againſt the *walls*, which projects about two inches from them, to which they faſten their trees; and by this contrivance the fruit will be at a proper diſtance from *walls*, and the *walls* themſelves will be preſerved from the damage attending the driving of nails into their joints. Theſe trelliſes may be adapted to the different ſorts of fruit which are planted againſt them: thoſe deſigned for peaches, nectarines, and apricots, ſhould have their rails three, or at moſt four, inches aſunder every way; but for the other ſorts of fruit, which continue bearing on the old wood, they may be five or ſix inches apart; and thoſe for vines may be at the diſtance of eight or nine inches. Miller.

WALLS, *hot*, in *Gardening*, are *walls* built for the purpoſe of accelerating the ripening of fruit. The ordinary height of theſe *walls* is about ten feet; and as the length of a wall ſufficient to produce early fruit for a middling family cannot be leſs than eighty or a hundred feet, there ſhould be three times this quantity of walling built; ſo that by dividing it into three parts, there will be two years for the trees to recover their vigour between the times of their being forced. Theſe *walls* at their foundation ſhould be four bricks and a half thick, in order to ſupport the flues; but this thickneſs need not be continued more than ſix inches above the ground, where ſhould be the bottom of the firſt flue; then the *walls* may be ſet off four inches on each ſide, which will reduce it to the thickneſs of three bricks and a half, ſo that the back *wall* may be two bricks thick, which is neceſſary to throw the heat out more in front; the wall in front next the fruit ſhould be only four inches thick, whereby there will be an allowance of nine inches for the flues, which may be covered with twelve-inch tiles. The ovens in which the fires are made muſt be contrived on the backſide of the *walls*, and their number ſhould be proportioned to the length of the *walls*. The length uſually allowed for each fire to warm is forty feet, though it will ſerve for fifty feet. The oven ſhould be ſhedded over with bricks and tyles, to keep out the wind and rain; and the ſheds ſhould not be narrower than eight feet in the clear. If the length of walling requires two ovens, both may be included in one ſhed, which ſhould be ten feet long, and ſix broad, having the ſteps into it at one end; and when the ovens are joined together, there ſhould be a partition *wall* at leaſt three bricks thick between them. The lower flue, through which the ſmoke firſt paſſes from the fire, may be two feet and a half deep; therefore the back-*wall* ſhould be at leaſt two bricks thick, as high as to the top of this flue, and then it may be ſet off to a brick and a half, and continued to the top of the *wall*. The ſecond flue, which ſhould return over the firſt, may be made two feet, the third a foot and a half, and the fourth one foot deep; which four flues, with their coverings, will riſe near eight feet in height; ſo that there will be about two feet left for the fixing of the frames at the top to ſupport the glaſſes, and for coping the walls; and theſe four returns will ſuffice to warm the air in the frames. In the carrying up of theſe *walls*, there ſhould be ſtrong hooks at convenient diſtances, projecting about two inches from the *wall*, to which the trellis for ſupporting the trees muſt be faſtened.

The borders, in front of theſe hot *walls*, ſhould be about four feet wide, which will make a ſufficient declivity for the ſloping glaſſes; and in theſe borders there may be a row of dwarf peas planted to come early, or a row of dwarf kidney-beans; on the outſide of theſe borders ſhould be low *walls* erected, which ſhould riſe about an inch or two above the level of the borders, upon which the plate of timber ſhould be laid, on which the ſloping glaſſes are to reſt; and this *wall* will keep up the earth of the border, and alſo preſerve the wood from rotting. The glaſſes, deſigned to cover theſe *walls*, ſhould be divided into two ranges: the frames in which they are placed ſhould be ſo contrived as that the upper row may ſlide down; and by making on one ſide three ſmall holes in the wood-work which ſupports the frames, at about a foot diſtance, and having a ſmall iron pin to fix into them, the top glaſſes may be let down one, two, or three feet, as there may be occaſion to admit air. The lower row of glaſſes may be contrived ſo as to take eaſily out, but as they muſt lie ſloping, and the upper row muſt bear on them, they cannot be contrived to ſlide upwards. The ſloping timbers, which are to ſupport the glaſs frames, muſt be faſtened at bottom into the ground plate in the front of the border, and at the top into ſtrong iron cramps fixed in the upper part of the *walls* for that purpoſe. On the top of theſe ſhould be fixed a ſtrong board, under which the upper row of glaſſes ſhould ſlide. The uſe of this board is to ſecure the upper part of the glaſs from being raiſed by the winds, and alſo to keep the wet from getting to the trees; and therefore it ſhould be joined as cloſe as poſſible to the wall, and ſhould project about two inches over the glaſs frames. At the end of the range of glaſſes there will be an angular ſpace between the glaſſes and the wall, which muſt be cloſely ſtopped, to prevent the air from getting in, which might greatly injure the fruit. If they are cloſed with glaſſes, which may be occaſionally opened to let in air, it would be of great advantage. The ſorts of fruit which are uſually planted for forcing are cherries, plums, peaches, apricots, and nectarines; the two laſt, however, rarely ſucceed well.

In the preparing of the borders for planting theſe fruit-trees, there ſhould be the ſame care as for thoſe in open borders; and the trees muſt be trained up in the ſame manner, when they ſhoot. The time for beginning to make the fires is about the middle or latter end of January, as the ſeaſon is more or leſs favourable; and thoſe trees which are forced into flower by the middle of February will ripen their fruit as early as moſt people will deſire to eat them; for the cherries will ripen early in April, and the apricots in the beginning of May; and ſoon after, the plums, peaches, and nectarines, will be ripe. After the middle of May there will be no want of fires, if the glaſſes are cloſe ſhut every night, or in bad weather; for half an hour's ſun on the glaſſes at this ſeaſon will ſufficiently warm the air incloſed in the glaſſes, for the growth of any of our European fruits.

In ſome parts of England, where moſt of our good kinds of fruit ſeldom ripen, it might be worth while to build ſome of theſe *hot-walls*, in order to obtain good fruit from the beſt kinds of peaches, plums, &c. where the fuel is cheap. Inſtead of glaſs coverings, there may be frames of canvas, or oiled paper may be uſed, the expence of which is not great. For other particulars, relating to the conſtruction and uſe of *hot-walls*, ſee Miller's Gard. Dict. See FORCING.

WALLS, *ſea*. See DIKE.

WALL-*creeper*, in *Ornithology*. See PICUS *murarius*.

WALL-*flower*. See STOCK-*gilly-flower*.

WALL-*moſs*. See MOSS.

WALL-*ſided*, in *Sea Language*. See WALE-*ſided*.

WALL-*trees*. See TREE.

WALL-*wort*, in *Botany*, the dwarf elder. See ELDER.

WALL-*fruit-trees, planting of*. See PLANTING.

WALLA, the name of an officer in the eaſtern nations. The Arabs have the care of the country round about the city of Cairo in Egypt, and a *walla* is obliged to patrole continually about there, eſpecially in the night.

His buſineſs is to take up all perſons who are committing any diſorders, or who cannot give an account of themſelves, or are found abroad at irregular hours; and he often has their heads cut off upon the ſpot. As this officer is naturally the terror of rogues, ſo for preſents made to him he often becomes their protector. Without this they are ſure, one time or other, to fall a ſacrifice to his reſentment; and to him the great people ſend for any villains who have rendered themſelves obnoxious to them, and are ſure to have them delivered up. See Pococke's Egypt, p. 165.

WALLING *of brick*. See BRICK.

WALLING, *lead*. See LEAD-*walling*.

WALNUT-*tree*, *juglans*, in *Botany*, a genus of the *monoecia polyandria* claſs. Its characters are theſe: it hath male and female flowers at diſtances on the ſame tree; the male flowers are diſpoſed in an oblong, cylindrical, imbricated catkin; each ſcale has one flower, with one petal, divided into ſix equal parts; in the centre are ſituated many ſhort ſtamina, terminated by erect, acute ſummits; the male flowers grow in ſmall cluſters, ſitting cloſe to the branches; theſe have a ſhort, erect, four-pointed empalement, ſitting on the germen, and an acute erect petal, divided into four parts; under the empalement ſits a large oval germen, ſupporting two ſhort ſtyles, crowned by large reflected ſtigmas; the germen afterward becomes a large oval, dry berry, with one cell, incloſing a large oval nut, with netted furrows, whoſe kernel has four lobes, variouſly furrowed. Linnæus enumerates five, and Miller ſix ſpecies.

There are ſeveral varieties of the common *walnut*, which are diſtinguiſhed by the following titles: the large *walnut*, the thin-ſhelled *walnut*, the French *walnut*, the late ripe *walnut*, and the double *walnut*; but theſe do all of them vary when raiſed by ſeeds, ſo that the nuts from the ſame tree will produce plants, whoſe fruit will differ; therefore there can be no dependence upon the trees which are raiſed from nuts, till they have produced fruit: ſo that thoſe perſons who plant the trees for the fruit, ſhould make choice of them in the nurſeries when they have the fruit upon them, to prevent their being deceived.

The common *walnut* is propagated in many parts of England for the fruit, and the trees were formerly cultivated for their wood, which was in very great eſteem, till the quantity of mahogany, and other uſeful woods, which have of late years been imported into England, have almoſt baniſhed the uſe of it.

Walnuts, which are propagated for timber, ſhould be ſown where they are to remain; for the roots of theſe trees always incline downward; which being ſtopped or broken, prevent their aſpiring upward; ſo that they afterward divaricate into branches, and become low ſpreading trees; but ſuch as are propagated for fruit, are greatly mended by tranſplanting; for hereby they are rendered more fruitful, and their fruit is generally larger and fairer; it being a common obſervation, that downright roots greatly encourage the luxuriant growth of timber in all ſorts of trees; but ſuch trees as have their roots ſpreading near the ſurface of the ground, are always the moſt fruitful.

In tranſplanting theſe trees, you ſhould always obſerve never to prune either their roots or large branches, both which are very injurious to them; nor ſhould you be too buſy in lopping or pruning the branches of theſe trees while growing, for it often cauſes them to decay; but when there is a neceſſity of cutting any of their branches off, it ſhould be done very early in September, that the wound may heal before the cold increaſes. And the branches ſhould be cut off cloſe to the trunk, otherwiſe the ſtump will decay, and rot the body of the tree.

The beſt ſeaſon for tranſplanting theſe trees, is as ſoon as the leaves begin to decay; at which time, if they are carefully taken up, and their branches preſerved entire, there will be little danger of ſucceeding, even if they are eight or ten years old; though the younger they are removed, the larger the trees will be.

This tree delights in a firm, rich, loamy ſoil, and ſuch as is inclinable to chalk or marle; and will thrive very well in ſtony ground, and on chalky hills.

The diſtance at which theſe trees ſhould be placed, ought not to be leſs than forty feet, eſpecially if regard be had to their fruit; but if intended for timber, their ſtanding nearer promotes their upright growth.

The general opinion, that the beating down of this fruit improves the trees, is wrong; ſince in the doing of this, the younger branches are generally broken and deſtroyed; but as it would be exceedingly troubleſome to gather it by hand, ſo in beating it off, great care ſhould be taken that it be not done with violence, for the reaſon before aſſigned. In order to preſerve the fruit, it ſhould remain upon the trees till it is thoroughly ripe, and drops from the trees; then laid in heaps for two or three days, when the huſks will eaſily part from the ſhells; they ſhould then be dried well in the ſun, and laid up in a dry place, where vermin cannot come to them; by which means they will remain good four or five months. But there are ſome perſons who put their *walnuts* into a gentle oven, where they let them remain four or five hours to dry; and then up put them in oil-jars, or any other cloſe veſſels, mixed with dry ſand; by which means they will keep good ſix months. The heat of the oven dries the germ, and prevents their ſprouting; but if the oven be too hot, it will occaſion them to ſhrink. Miller.

The bark of the *walnut*-tree is a ſtrong emetic, either green, or dried and powdered; the green nuts are cordial, alexipharmic, and ſaid to be of great uſe in all contagious, malignant diſtempers, and the plague itſelf; and they are one of the principal ingredients in treacle water. The nuts preſerved are ſtomachic, and good to be eaten in a morning in time of peſtilential diſtempers, to prevent infection. Two or three ounces of the oil expreſſed from the ripe kernels, is a very good medicine for the ſtone and gravel. The ſhells powdered and burnt are accounted reſtringent, though but ſeldom uſed. Miller's Bot. Off.

Walnuts have a ſingular quality of promoting the menſes when ſuppreſſed, and all other medicines fail. James.

The effluvia of *walnut*-trees are ſaid to be hurtful to the head. Mr. Boyle aſſures us, they cauſed the head-ach in himſelf. Works abr. vol. i. p. 436.

WALOON, or **WALLOON**, a kind of old French; being the language ſpoken by the Walloons, or the inhabitants of a conſiderable part of the French and Auſtrian Low Countries; viz. thoſe of Artois, Hainault, Namur, Luxemburg, and part of Flanders and Brabant.

The *Waloon* is held to be the language of the ancient Gauls, or Celts.

The Romans, having ſubdued ſeveral provinces in Gaul, eſtabliſhed prætors, or proconſuls, &c. to adminiſter juſtice in the Latin tongue. On this occaſion, the natives were brought to apply themſelves to learn the language of their conquerors; and thus they introduced abundance of the Roman words and phraſes into their own tongue.

Of this mixture of Gauliſh and Latin, was formed a new language, called ROMANS; in contradiſtinction to the ancient unadulterated Gauliſh, which is called *Waloon*, or *Walloon*. This diſtinction is kept up to this day; for the inhabitants of ſeveral of the Low-Country provinces ſay, that in France they ſpeak Romans; whereas they ſpeak the *Walloon*, which comes much nearer the ſimplicity of the ancient Gauliſh.

WALRUS, in *Zoology*, the name by which ſome authors call the morſe, or ſea-horſe, called alſo by others *roſmarus*, a creature very different from the *hippopotamus*, or river-horſe. See MORSE.

WALT, in *Sea Language*, an obſolete or ſpurious term, ſignifying CRANK.

WALTHERIA, in *Botany*, the name of a genus of plants of the *monadelphia pentandria* claſs; the characters of which are theſe: the flower has a cup-ſhaped permanent empalement of one leaf, cut into five points at the rim; it has five heart-ſhaped petals, which ſpread, and five ſtamina joined in a cylinder, terminated by looſe ſummits, and an oval germen, ſupporting a ſingle ſtyle, crowned by a bifid ſtigma; the germen turns to an oval capſule, with two valves, and one cell, incloſing one obtuſe ſeed. There are three ſpecies.

WAMPUM, a ſort of ſhells, ſeveral of which, being ſtrung upon threads, are uſed as money among the Indians.

It is made of a ſhell formed into ſmall cylinders of about one quarter of an inch long, and a fifth of an inch over, and being bored as beads, is ſtrung in great numbers upon long ſtrings. In this ſtate it paſſes among the Indians in their uſual commerce, as ſilver and gold among us; but being looſe, it is not ſo current.

It is both white and black; and the meaneſt is in ſingle ſtrings, of which the white goes at five ſhillings a fathom, and the black at ten; or by number, the white ſix a penny, the black at three. The next in value to theſe ſingle ſtrings, is that which is wove into bracelets of about three quarters of a yard long, black and white, in ſtripes, and ſix pieces in a row, the warp conſiſting of leather thongs, and the woof of thread; theſe the gentlewomen among them wear, wound twice or oftener about their wriſts.

The moſt valuable of all is that woven into girdles. Theſe are compoſed of many rows, and the black and white pieces woven into ſquares or other figures. Theſe girdles are ſometimes worn as their richeſt ornaments; but they are oftener uſed in their great payments, and make their nobleſt preſents, and are laid up as their treaſure. Grew's Muſæum, p. 370.

WANDASS. See WINDASS.

WANDERING *ſtars*. See PLANET.

WANDSU, in *Zoology*, the name of a ſpecies of monkey found in the iſland of Ceylon. It is all over of a fine deep black; but has a long white beard hanging from its chin.

WANHOM, in the *Materia Medica*, a name by which Kæmpfer has called the plant, of which the great GALANGAL of the ſhops is the root.

WANLASS, in *Hunting*. See WINDASS.

WANT, in *Zoology*, a name given by many to the MOLE.

WANTI. See GLOVE.

WAPENTAKE, or **WEAPENTAKE**, a diviſion of certain northern counties, particularly thoſe beyond the Trent, anſwering to what in other places is called a *hundred*, or a *cantred*.

Authors differ as to the origin of the word. Brompton brings it from the Saxon *waepen*, and *taecan*, *to deliver*, by reaſon the tenants anciently delivered their arms to every new lord as a token of their homage.

Sir Thomas Smith gives a different account. Muſters, he obſerves, were anciently taken of the armour and weapons of the ſeveral inhabitants of every hundred; and from ſuch as could not find ſufficient pledges for their good abearing, their *weapons* were taken *away*, and delivered to others.

Others give a different account of its riſe; viz. that when firſt the kingdom was divided into *wapentakes*, he who was the chief of the diviſion, and whom we now call *high-conſtable*, as ſoon as he entered upon his office, appeared in the field, on a certain day, on horſeback with a pike in his hand; and all the chief men of the hundred met him with their lances, who, alighting, touched his pike with their lances, as a ſignal they were firmly united to each other, by the touching of their weapons. Whence the denomination *wapentakes*, from the Saxon *waepen*, and *tac*, *touching*.

WAPP, in a *Ship*, that rope wherewith the ſhrowds are ſet taught with wale-knots; one end is made faſt to the ſhrowds, and to the other are brought the laniards.

WAPPE, a ſpecies of *cur*. The name is derived from its note; its only uſe was to alarm the family by barking, if any perſon approached the houſe. See DOG.

WAPPER, in *Ichthyology*, a name given by ſome to the ſmaller ſpecies of the river GUDGEON.

WAR, *bellum*, a conteſt or difference between princes, ſtates, or large bodies of people; which, not being determinable by the ordinary meaſures of juſtice and equity, is referred to the deciſion of the ſword.

Hobbes's great principle is, that the natural ſtate of man is a ſtate of *warfare*; but moſt other politicians hold *war* to be a preternatural and extraordinary ſtate.

The ſole prerogative of making *war* and peace belongs, by the Engliſh conſtitution, to the KING. Levying *war* againſt the king in his realm is a ſpecies of TREASON.

WAR, *civil*, or *inteſtine*, is that between ſubjects of the ſame realm; or between parties in the ſame ſtate.

In this ſenſe we ſay, the *civil wars* of the Romans deſtroyed the republic; the *civil wars* of Granada ruined the power of the Moors in Spain; the *civil wars* in England began in 1641, and ended in the king's death, 1648.

WAR, *gladiators*. See GLADIATORS.

WAR, *holy*, is that anciently maintained by leagues and croiſades, for the recovery of the Holy Land.

WAR, *king's*, *bellum regis*. At the time when particular lords were allowed to make *war* with one another, to revenge injuries, inſtead of proſecuting them in the ordinary courts of juſtice, the appellation *king's war* was given to ſuch *war* as the king declared againſt any other prince, or ſtate: on which occaſion, the lords were not allowed to make private *war* againſt each other; as being obliged to ſerve the king, with all their vaſſals.

WAR, *religious*, is a *war* maintained in a ſtate, on account of religion; one of the parties refuſing to tolerate the other.

WAR, *ſocial*. See SOCIAL *war*.

WAR, *art of*. See MILITARY *art*.

WAR, *council of*. See COUNCIL.

WAR, *habiliments of*. See HABILIMENTS.

WAR-*horſe*. See HORSE.

WAR, *man of*. See SHIP, RATE, &c.

WAR, *officers of*. See OFFICERS.

WAR, *place of*, is a place fortified on purpoſe to cover and defend a country, and ſtop the incurſion of an enemy's army: or it is a place wherein are diſpoſed the proviſions of *war*, for an army encamped in the neighbourhood; or whither an army retires into winter-quarters. See PLACE.

WAR-*cry*, was formerly cuſtomary in the armies of moſt nations, when juſt going to engage. Sometimes they were only tumultuous ſhouts, or horrid yells, uttered with an intent to ſtrike terror into their adverſaries; ſuch as is now uſed by the Indians in America, called the *war-whoop*.

WARASDINS, a kind of Sclavonian ſoldiers, clothed like the Turks, with a ſugar-loaf bonnet inſtead of a hat. Their arms are a fuzee and piſtols; the butt-end of their fuzee ſerves for a ſpade, when they have occaſion to throw up earth.

WARBLERS, in *Ornithology*, a name by which Mr. Pennant diſtinguiſhes an order of birds, comprehending the nightingale, red-ſtart, red-breaſt, black-cap, petty-chaps, hedge-ſparrow, yellow, gold-creſted, and common wren, the ſedge-bird, or leſſer reed-ſparrow, the tit-lark, or graſhopper-lark, the wheat-ear, whinchat, ſtone-chatter, and white-throat: their general characters, are, that the bill is ſlender and weak, the noſtril ſmall and ſunk, and the exterior toe joined at the under part of the laſt joint to the middle toe. Some of theſe birds have tails of one colour, and others have party-coloured tails. Brit. Zool. vol. i. p. 363.

WARBLING *of the wings*, in *Falconry*, is when a hawk, after having mantled herſelf, croſſes her wings over her back.

WARD, *warda*, *cuſtody*, or *keeping*. See GUARD.

WARD is a word uſed in our *Law Books*, in divers ſignifications. Thus, a *ward*, in London, is a part of the city, committed to the ſpecial charge of one of the aldermen of the city. There are twenty-ſix *wards* in London, which are as hundreds, and the pariſhes thereof as towns.

A foreſt is alſo divided into *wards*; ſo alſo are moſt of our HOSPITALS.

A priſon is ſometimes alſo called a *ward*.

The heir of the king's tenant, who held by knights-ſervice, or in capite, was alſo called a *ward*, during his nonage. But this ſort of wardſhip is taken away by the ſtatute 12 Car. II. cap. 24. See GUARDIAN, in *Chivalry*.

WARD, *watch and*. See WATCH.

WARD, *caſtle*. See CASTLE.

WARD, *warda*, *wardagium*, is alſo uſed, in our *Ancient Writers*, for the cuſtody of a town or caſtle, which the tenants and inhabitants were bound to keep at their own charge. See WARDSHIP.

WARDA *eccleſiarum* denotes the guardianſhip of churches; which is in the king during vacancies by reaſon of the regalia, or temporalities. See VACATION.

WARDAGE, *wardagium*, is ſometimes uſed, in our ancient law-writers, in the ſame ſenſe with WARDPENNY. Sometimes it alſo ſeems to denote a being free from wardſhip.

WARDECORNE, among our *Ancient Writers*, a duty incumbent on the tenants, to guard the caſtle, by ſounding a horn upon the approach of an enemy; called alſo CORNAGE.

WARDEN, *guardian*, one who has the charge or keeping of any perſon, or thing, by office. See GUARDIAN.

Such is the *warden of the Fleet*, who is the keeper of the Fleet priſon, and has the charge of the priſoners there; eſpecially ſuch as are committed from the court of chancery for contempt.

Such alſo are, the *warden* of the fellowſhips, *warden* of the marſhes, *wardens* of peace, *warden* of the weſt marſhes, *warden* of the foreſt, *warden* of the alnage, *warden* of the king's wardrobe, &c.

WARDEN, in an univerſity, is the head of a college; anſwering to what in other colleges we call the *maſter* thereof.

WARDEN, or *Lord* WARDEN *of the Cinque Ports*, is the governor of thoſe noted havens; who has the authority of an admiral, and ſends out writs in his own name. See CINQUE-*ports*, and GUARDIAN.

WARDEN *of the mint*, is an officer, whoſe buſineſs is to receive the gold and ſilver bullion brought in by the merchants; to pay them for it, and overſee the other officers. He is alſo called *keeper of the exchange*, and MINT.

WARDENS, *church*. See CHURCH.

WARDEN, *renter*. See RENTER.

WARDER. *Yeomen warder of the Tower*, are officers, forty in number, who are accounted the king's domeſtic ſervants, and are ſworn by the lord chamberlain: their duty is, to attend the priſoners of ſtate, and to wait at the gates.

Ten of them are uſually upon the day's wait, to take an account of all perſons who come into the Tower; to enter their names, and the names of the perſons they go to, in a book, to be peruſed by the conſtable or lieutenant.

WARDFEOH, or WARDFEGH, the value of a ward, or heir under age; or the money paid to the lord of the fee for his redemption.

WARD-HOOK, in *Gunnery*, the ſame with *wad-hook*, or WORM.

WARDMOTE, in London, is a court ſo called, which is kept in every ward of the city; anſwering to the *curiata comitia*, in ancient Rome.

WARDPENNY, *wardpeni*, was formerly a cuſtomary due paid to the ſheriff, or other officer, for maintaining WATCH *and ward*.

It was payable at the feaſt of St. Martin; and is ſtill paid within the manner of Sutton-Colfield, in Warwickſhire; and that with ſome very ſingular ceremonies.

WARDROBE, a cloſet, or little room adjoining to a bedchamber; ſerving to diſpoſe and keep a perſon's apparel in; or for a ſervant to lodge in, to be at hand to wait, &c.

WARDROBE, in a prince's court, is an apartment wherein his robes, wearing apparel, and other neceſſaries, are preſerved; under the care and direction of proper officers.

His majeſty has a *great wardrobe*, a *removing wardrobe*, and divers *ſtanding wardrobes*, belonging to his bed-chamber, in each of his palaces; viz. at Whitehall, Kenſington, Windſor, Hampton-Court, and the Tower; each under its reſpective keeper.

The *removing wardrobe* always attends on the king's perſon; as alſo on ambaſſadors, at chriſtenings, maſques, plays, &c. It is under the command of the lord chamberlain: the under-officers are, a yeoman, two grooms, and three pages.

The *great wardrobe* is of great antiquity. Anciently it was kept near Puddle-wharf, in a houſe purchaſed for that purpoſe by king Edward III. but, after the fire of London, it was kept in York-buildings.

The maſter or keeper thereof is an officer of great dignity: high privileges were conferred on him by Henry VI. and king James I. enlarged the ſame, and erected the office into a corporation.

The officers are, the *maſter* or keeper, his *deputy*, and his *clerk*; beſides ſeveral other officers; and above ſixty tradeſmen, all ſworn ſervants to the king.

This office is to provide for coronations, marriages, and funerals, of the royal family; to furniſh the court with beds, hangings, carpets, &c. to furniſh houſes for ambaſſadors, at their firſt arrival here; preſents for foreign princes, and ambaſſadors; furniture for the lord lieutenant of Ireland, and our ambaſſadors abroad; robes for the knights and officers of the Garter, heralds, purſuivants, miniſters of ſtate; liveries for the officers of the bed-chamber, and other ſervants; liveries for the lord chief juſtices, and barons of the exchequer, and other officers in thoſe courts; as alſo yeomen, warders, trumpets, kettle-drums, meſſengers, coachmen, grooms, &c. with coaches, harneſſes, ſaddles, &c. the watermen, game-keepers; linen and lace for the king's perſon; tilts, &c. for his barges, &c.

WARDS. See COURT *of Wards*.

WARDS *of hoſpitals*. See HOSPITAL.

WARD'S *medicines*, a denomination given to certain medical noſtrums, originally prepared and diſperſed by Mr. Ward, and which were ſome years ago much celebrated for their efficacy in a variety of diſorders.

The methods of compounding the principal of theſe medicines was communicated to the public about thirty years ago by I. Page, eſq. to whom Mr. Ward left his book of receipts; and in order to their being procured at a cheap rate, his late majeſty ſettled a penſion on Meſſrs. White and Oſterman, the two chemiſts who had been employed by Mr. Ward in preparing them, on condition that the profits ariſing from the ſale of them ſhould be applied to the ſupport of the Aſylum and Magdalen charities.

Theſe medicines are the red pill and emetic ſack drop, the white drop, ſweating powders, liquid ſweat, paſte for piles and fiſtulas, dropſy purging powders, and eſſence for the head-ach.

The method of preparing the antimony for the pill and drop, is as follows: the fineſt and pureſt crude antimony is powdered, and ten or twelve ounces of it put into an earthen unglazed pan that holds three or four quarts, and ſet on a fire; the maſs is ſtirred with an iron ſpatula, and the fire raiſed till it ſends forth fumes, and a flame like burning brimſtone; and the ſame degree of fire is continued, and the maſs ſtirred, till no fumes eſcape from it, and it becomes a grey or aſh-coloured powder. If it ſhould melt and run into lumps, it muſt be taken out of the pan, and pounded again, and then put in and ſtirred as before, till it be thoroughly calcined. Then four ounces of the crude matter muſt be added; and the proceſs repeated, till a ſufficient quantity has been thus prepared. The proceſs muſt be performed in a chimney, leſt the fumes ſhould injure the operator. Into a clean crucible, holding about a quart, put about two pounds of the calcined antimony; ſet it in a melting furnace, and make a gradual fire under it; put coals round the crucible nearly to the top; keep the maſs in a ſtate of moderate fuſion, occaſionally ſtirring it with an iron rod. When the matter that adheres to the rod appears bright and tranſparent, which with a proper degree of fire will be in about half an hour after it is in fuſion, pour the vitrified matter on a ſmooth marble, well dried, and heated as hot as the hand can bear; repeat the proceſs, in order to obtain more of the matter, if neceſſary; and thus will be had a fair and pure glaſs of antimony, of a light red colour.

In order to prepare the *pill*, take a quantity of this glaſs of antimony; pound it in a clean iron mortar, and ſift it through a fine lawn ſieve; then grind, or levigate it, on a ſmooth marble, to an impalpable powder: take alſo dragon's blood dried and powdered; and put one ounce of this to four ounces of the levigated glaſs; grind them well together; and with good ſack, or rich mountain wine, make them into a maſs for pills, of about one grain and a half each, which is a full doſe for a man or woman.

The *drop* is made by putting about half an ounce of the levigated glaſs of antimony into a quart of the richeſt Malaga mountain or ſack; ſhake them well together, and let them ſtand two or three days to ſettle, and grow clear; then pour it off gently, to be quite fine. The full doſe for a man or woman is half an ounce; but it is adviſeable to begin with the half or two thirds, according to the age or ſtrength of conſtitution. Theſe medicines, it is ſaid, cannot be ſafely adminiſtered, if the viſcera are unſound. They have been uſually given in diſorders occaſioned by foul ſtomachs and indigeſtion; and the *pill* has been very ſucceſsful in inveterate rheumatiſms: both the *pill* and the *drop* frequently operate upward and downward, but with leſs ſtraining than the emetics uſually given. The *pill* muſt be bruiſed, and taken in a ſpoonful of any ſmall liquid, on an empty ſtomach: if it works upwards or downwards, it will be proper to drink a ſmall quantity of balm or ſage-tea, between each motion; and if it ſweats, as it ſometimes does, let the patient keep himſelf warm, and encourage it by drinking the above ſmall liquors: when it is taken, milk, greens, and fruit, muſt be avoided. The potion, called the *drop*, requires no vehicle: when the ſickneſs comes on, let the patient drink about half a pint of warm water, or thin water-gruel, and continue to do ſo every time it works.

The *white drop* is prepared by bruiſing fourteen pounds of the cleaneſt copperas into a rough powder; then drying it with a gentle heat, and ſpreading it thin, till it becomes a dry and ſubtile powder, reſembling quicklime, but much whiter. When this operation is finiſhed, which requires about ſix or ſeven days, take an equal quantity of good and clean rough nitre, or ſalt-petre, tolerably dry; pound the nitre and copperas together; ſift the powder through a fine hair-ſieve, put it into a large glaſs retort, coated at bottom, and ſet it in a ſand-furnace about an inch from the bottom and ſides of the ſand-pan; fix on with lute a large receiver, leaving a ſmall vent-hole in the joint to prevent the burſting of the retort or receiver; make a gentle fire for the firſt three hours; and gradually increaſe it for three or four hours longer, till the iron pan be red at bottom; continue the fire about thirty hours; and then let it out, and when it is cool, you obtain a very powerful aqua-fortis; put this into a bottle, ſtop it cloſe, and let it ſtand ſix or eight days to digeſt itſelf. Put this aqua-fortis into a glaſs retort about half or two-thirds full; ſet it in the ſand-heat, and fix on a receiver; make a moderate fire, till the aqua-fortis is come over into the receiver, leaving behind only a brown, reddiſh earth: by this proceſs is obtained a very ſtrong and pure aqua-fortis. Put a quantity of this rectified aqua-fortis into a large bolt-head, with a long neck, ſo as to make it about a quarter full; then take of the pureſt and fineſt volatile ſal ammoniac, in which there is not the leaſt acid ſalt, or lime. To ſixteen ounces of the aqua-fortis in the bolt-head, add, by half an ounce at a time, ſeven ounces of the volatile ſal ammoniac, ſtopping the mouth of the bolt-head (a vent-hole excepted) till the fermentation ends; let it ſtand two or three hours, till the fumes are ſettled. Next put it into a ſmaller bolt-head, half full, and ſet it in a moderate ſand-heat; when it is warm, put four ounces of the fineſt quickſilver to each pound of ſixteen ounces of the ſolution, and let it ſtand in the heat till the quickſilver is diſſolved; increaſe the fire, and add quickſilver; and when it will diſſolve no more, take it out of the bolt-head, and put it into an open glaſs veſſel, or a white, large ſtone bowl; ſet it in a moderate ſand-heat, and let it evaporate till a pellicle or ſkin comes over the top of it; then put it in a cool place to congeal. The heavy liquor, or oil, which remains congealed, muſt be poured off, and thoroughly drained, and the remaining ſalt muſt be put into a glaſs body; to each pound adding three pounds of the fineſt roſe-water, and ſtopping the mouth of the glaſs with a piece of double brown paper. Set it again in a ſand-heat with a moderate fire, till the ſalt is wholly diſſolved, which is uſually effected in twenty-four hours; and thus is the *white drop* prepared.

This medicine, it is ſaid, cannot be accounted dangerous; as there is not in two drops, uſually taken in twenty-four hours, half a grain of mercury. It has been adminiſtered with ſucceſs as an antiſcorbutic in all ſtages of the ſcurvy, and even when the diſeaſe has been hereditary. The doſe of two drops is to be taken in a ſmall glaſs of water in the morning, faſting, or at night, going to reſt, for two or three days together; then after an interval of as many days, proceeding as before. It generally produces its effect without any ſenſible operation; except that in ſome conſtitutions it produces one or two motions.

Mr. Ward adminiſtered two ſorts of *ſweating powders*: one ſort is directed to be made by rubbing together in a mortar four ounces of refined nitre, and as much vitriolated tartar, into a powder; and putting into a red-hot crucible half of this maſs, and ſtirring it with an iron rod: when the red fumes that ariſe from it ceaſe, put in the remainder of the matter, and ſtir it till no more fumes ariſe: then pour it into an iron mortar; and when cool, add opium, ipecacuanha, and liquorice powder, of each an ounce: pound and ſift them through a lawn ſieve, and mix all together. When the powders are thus prepared, they ſhould be ſpread thin on white ſtone diſhes, and ſet in a cool place for about two days, mixing them well, and ſpreading them twice a day; then dry them before the fire, or with any other gentle heat. The other ſort of *ſweating powder* is prepared by fulminating together common tartar, and refined nitre, of each one pound, in a crucible or iron pot, which will reduce them to about fifteen ounces: to theſe add white hellebore, and liquorice powder, of each ſix ounces; powder them together, and ſift them through a fine lawn ſieve. The doſe is from twenty-five to fifty grains.

Theſe *ſweating powders* are ſaid to remove rheumatic and other pains, occaſioned by obſtructions: though it is ſaid that the *red pill* has been found to anſwer better in ſtubborn rheumatic caſes, and other ſettled pains in the limbs. They may be taken in any liquid, going to bed between the blankets, and now and then drinking ſome warm diluting liquor, as white wine whey, baum tea, &c. They may be repeated every other night at diſcretion.

The *liquid ſweat* is prepared by putting a gallon of good ſpirits of wine, and half a gallon of good white wine, into a ſtrong bottle, and adding half a pound of ſaffron, four ounces of cinnamon, two ounces of ſalt of tartar, and one ounce of opium, cut into ſmall pieces. Stop the bottle cloſe, and ſet it near the fire for eight days, ſhaking it three or four times a day; then filter the contents through a filtring paper. The doſe is from thirty to ſixty drops, in a glaſs of good white wine.

The *paſte* for the piles and fiſtulas is prepared by pounding ſeparately a pound of elecampane root, three pounds of fennel-ſeeds, and one pound of black pepper, and ſifting the powders through a fine ſieve; then melt two pounds of honey, and two pounds of powder ſugar, over a gentle fire, ſcumming them, till they become bright as amber: when they are cool, mix and knead your powder into them in the form of a ſoft paſte. This paſte is ſaid to be a ſpecific remedy for the fiſtula, piles, &c. The doſe is the quantity of a nutmeg, morning, night, and noon, drinking after it a glaſs of water, or white wine.

The *dropſy purging powder*, as made by Mr. Ward, was formed by powdering ſeparately jalap, cream of tartar, and florentine iris, of each four ounces, and mixing them well: as prepared by Mr. d'Oſterman for Mr. Ward; it conſiſts of a pound of jalap in powder, a pound of cream of tartar, and an ounce of bole armeniac, in fine powder, mixed well together. The doſe is from thirty to forty grains, in broth, or warm water, to be repeated two or three days ſucceſſively, and longer, at proper intervals, if neceſſary.

The *eſſence for the head-ach* was formed by Mr. Ward of four ounces of ſpirits of wine, two ounces of camphor, and two ounces of volatile ſpirit of camphor, well mixed, and applied with the hand. Mr. d'Oſterman prepared it for Mr. Ward, by putting two pounds of true French ſpirit of wine into a large ſtrong bottle, and adding two ounces of roch allum in fine powder, four ounces of camphor cut ſmall, half an ounce of eſſence of lemon, and four ounces of the ſtrongeſt volatile ſpirit of ſal ammoniac. Stop the bottle cloſe, and ſhake it three or four times a day for five or ſix days. The method of applying it is to rub a little of it gently upon the palm of the hand, and then holding it to the part affected, till it is dry. If the pain is not relieved, it ſhould be repeated two or three times.

For ſome remarks on Mr. Ward's *pill* and *drop*, by Mr. Clutton, ſee True and candid Relation of their good and bad Effects, and Med. Eſſ. Edinb. abr. vol. ii. p. 434. 470, &c. and Ed. Med. Eſſ. and Obſ. vol. vi. p. 423.

WARDSHIP, in *Chivalry*. See GUARDIAN, in *Chivalry*, and WARD, ſupra.

WARDSHIP *in copyholds*, is incident only to thoſe of inheritance. It partakes both of that in chivalry, and that in ſocage; like that in chivalry, the lord is the legal guardian, who uſually aſſigns ſome relation of the infant tenant to act in his ſtead; and he, like guardian in ſocage, is accountable to his ward for the profits. See GUARDIAN.

WARDSHIP *in ſocage*. See GUARDIAN and SOCAGE.

WARD-STAFF, the conſtable or watchman's ſtaff.

The manor of Lambourn, in Eſſex, is held by ſervice of the *ward-ſtaff*; viz. by the carrying of a load of ſtraw in a cart with ſix horſes, two ropes, and two men in harneſs, to watch the ſaid *ward-ſtaff*, when it is brought to the town of Abridge, &c.

WARD-WITE, compounded of the Saxon *ward*, *watch*, and *wite*, *mulct*, is defined by Fleta, as ſignifying a being exempted from the duty of watching. Others rather take it for a duty paid towards the charge thereof.

WARE, *earthen*, *queen's*, and *ſtone*. See POTTERY.

WARECTUM, in *Ancient Writings*, ſignifies land that has lain long neglected, and untilled.

In ancient records, we meet with *tempus warecti*, for the time wherein land lies fallow, or elſe the ſeaſon of fallowing.

WAREN. See WARREN.

WARMTH. See HEAT.

WARMTH, in *Painting*, denotes that fiery effect which a ſmall addition of yellow gives to a true red; and that glowing appearance which red imparts to either yellow or blue. By *warmth*, in red, is to be underſtood a ſmall inclination towards orange; by the ſame term, applied to yellow, a like tendency by the admixture of red; and by the ſame again, in the caſe of blue, muſt be underſtood its ſlightly verging on the purple.

WARN, in *Law*, to ſummon a perſon to appear in a court of juſtice.

WARNAS, a name by which ſome of the chemical writers expreſs what others of them call the ACETUM *philoſophorum*, or vinegar of the philoſophers.

WARNING *piece*, in the *Military Art*. See *Evening* GUN.

WARNING-*wheel*, in a clock, is the third or fourth, according to its diſtance from the firſt wheel. See CLOCK.

WARNOTH, in our *Old Writers*, an ancient cuſtom, by which if a tenant, holding of the caſtle of Dover, failed in paying his rent at the day, he was to forfeit double; and for the ſecond failure, treble; and the lands ſo held were called *terris cultis*, and *terris de warnoth*

WARP, in the *Manufactures*, is the threads, whether of ſilk, wool, linen, hemp, cotton, or the like, that are extended lengthwiſe on the weaver's loom, and acroſs which the workman, by means of his ſhuttle, paſſes the threads of the woof, to form a cloth, ribband, fuſtian, or other matter.

For a woollen ſtuff, &c. to have the neceſſary qualities, it is required, that the thread of the *warp* be of the ſame kind of wool, and of the ſame fineneſs, throughout; that they be ſized with Flanders or parchment-ſize, well prepared; and that they be in ſufficient number, with regard to the breadth of the ſtuff to be wrought. See WOOF, CLOTH, &c.

WARP, in a *Ship*, is a ſmall rope employed occaſionally to remove a ſhip from one place to another, in a port, road, or river. Hence,

To WARP, in *Sea Language*, is to change the ſituation of a ſhip, by pulling her from one part of a harbour, &c. to ſome other, by means of *warps*, which are attached to buoys, to anchors ſunk in the bottom, or to certain ſtations upon the ſhore, as poſts, rings, trees, &c. The ſhip is accordingly drawn forwards to thoſe ſtations, either by pulling on the *warps* by hand, or by the application of ſome purchaſe, as a tackle, windlaſs, or capſtern, upon her deck. When this operation is performed by the ſhip's leſſer anchors, theſe machines, together with their *warps*, are carried out in the boats alternately towards the place where the ſhip is endeavouring to arrive; ſo that when ſhe is drawn up cloſe to one anchor, the other is carried out to a competent diſtance before her, and being ſunk, ſerves to fix the other *warp*, by which ſhe is farther advanced.

Warping is generally uſed when the ſails are unbent, or when they cannot be ſucceſsfully employed, which may ariſe from the unfavourable ſtate of the wind, the oppoſition of the tide, or the narrow limits of the channel. Falconer.

WARPENI. See WARDPENNY.

WARRANT, an act, inſtrument, or obligation, whereby a perſon authorizes another to do ſomething, which he had not otherwiſe a right to do.

WARRANT, in *Law*, is a precept under the hand and ſeal of ſome officer to bring any offender before the perſon granting it.

A *warrant* may be granted in extraordinary caſes by the privy-council, or ſecretaries of ſtate; but ordinarily by juſtices of the peace. This they may do in any caſes where they have a juriſdiction over the offence, in order to compel the perſon accuſed to appear before them. And this undoubtedly extends to all treaſons, felonies, and breaches of the peace; and alſo to all ſuch offences as they have power to puniſh by ſtatute.

Sir Edward Coke lays it down, that a juſtice of the peace cannot iſſue a *warrant* to apprehend a felon upon mere ſuſpicion, nor even till an indictment be actually found; but this opinion has been combated by ſir Matthew Hale, who maintains, that a juſtice of peace hath power to iſſue a *warrant* to apprehend a perſon accuſed of felony, though not yet indicted; and that he may alſo iſſue a *warrant* to apprehend a perſon ſuſpected of felony, though the original ſuſpicion be not in himſelf, but in the party that prays his *warrant*. But in both caſes it is proper to examine upon oath the party requiring a *warrant*, as well to aſcertain that there is a felony or other crime actually committed, without which no *warrant* ſhould be granted; as alſo to prove the cauſe and probability of ſuſpecting the party, againſt whom the *warrant* is prayed. This *warrant* ought to be under the hand and ſeal of the juſtice, ſhould ſet forth the time and place of making, and the cauſe for which it is made, and ſhould be directed to the conſtable, or other peace officer, or it may be to any private perſon by name, requiring him to bring the party either generally before any juſtice of the peace for the county, or only before the juſtice who granted it: the *warrant* in the latter caſe being called a *ſpecial warrant*.

A *general warrant* to apprehend all perſons ſuſpected, without naming particularly, or deſcribing any perſon in ſpecial, is illegal and void for its uncertainty; for it is the duty of the magiſtrate, and ought not to be left to the officer, to judge of the ground of ſuſpicion; and a *warrant* to apprehend all perſons, guilty of a crime therein ſpecified, is no legal *warrant*; becauſe the point, upon which its authority reſts, is a fact to be decided upon in a ſubſequent trial; namely, whether the perſon apprehended thereupon be really guilty or not. It is, therefore, in fact, no *warrant* at all; for it will not juſtify the officer who acts under it; whereas a *warrant*, properly penned (even though the magiſtrate who iſſues it ſhould exceed his juriſdiction) will, by ſtatute 24 Geo. II. cap. 44. at all events indemnify the officer, who executes the ſame miniſterially. A practice, indeed, had obtained in the ſecretaries office, ever ſince the Reſtoration, grounded on ſome clauſes in the acts for regulating the preſs, of iſſuing *general warrants* to take up (without naming any perſon in particular) the authors, printers, and publiſhers, of ſuch obſcene or ſeditious libels as were particularly ſpecified in the *warrant*. When thoſe acts expired in 1694, the ſame practice was inadvertently continued, in every reign, and under every adminiſtration, except the four laſt years of queen Anne, down to the year 1763; when ſuch a *warrant* being iſſued, its validity was diſputed; and the *warrant* was adjudged, by the whole court of king's bench, to be void. After which the iſſuing of ſuch *general warrants* was declared illegal by a vote of the houſe of commons. Com. Journ. 22 April, 1766.

When a *warrant* is received by the officer, he is bound to execute it, ſo far as the juriſdiction of the magiſtrate and of himſelf extends. A *warrant* from the chief or other juſtice of the court of king's bench, extends all over the kingdom; and is teſted or dated England, and not any particular county. But the *warrant* of a juſtice of peace in one county muſt be backed, that is, ſigned by a juſtice of the peace in another, before it can be executed there. Formerly, regularly ſpeaking, there ought to have been a freſh *warrant* in every freſh county; but the practice of BACKING *warrants* had long prevailed without law, and was at laſt authorized by ſtatutes 23 Geo. II. cap. 26. and 24 Geo. II. cap. 55. And now, by ſtatute 13 Geo. III. cap. 31. any *warrant* for apprehending an Engliſh offender, who may have eſcaped into Scotland, and *vice verſa*, may be indorſed and executed by the local magiſtrates, and the offender be conveyed back to that part of the united kingdoms, in which ſuch offence was committed. Blackſt. Comm. book iv. p. 287, &c.

WARRANT *of attorney*, is that whereby a man appoints another to do ſomething in his name, and *warrants* his action.

It ſeems to differ from a *letter of attorney*, which paſſes under hand and ſeal of him that makes it, before credible witneſſes; whereas *warrant of attorney*, in perſonal, mixed, and ſome real actions, is put in courſe by the attorneys for the plaintiffs, or defendants, Though a *warrant of attorney*, to ſuffer a common recovery by the tenant, or vouchee, is to be acknowledged before ſuch perſons as the commiſſion for the doing thereof directs.

It is uſual, in order to ſtrengthen a bond creditor's ſecurity, for the debtor to execute a *warrant* of attorney to any one, empowering him to confeſs a judgment by *nihil dicit*, *cognovit actionem*, or *non ſum informatus*, in an action of debt to be brought by the creditor for the ſpecific ſum due; which judgment, when confeſſed, is abſolutely complete and binding.

In the court of common pleas, there is a *clerk of the warrants*, who enters all *warrants of attorney* for plaintiff, and defendant.

WARRANT, *ſearch*. See SEARCH.

WARRANT *officers*. See OFFICERS.

WARRANT, in the *Manege*. A jockey that ſells a horſe is, by cuſtom, in ſome countries, obliged to *warrant* him, that is, to refund the money that was given for him, and re-deliver the horſe in nine days after the firſt delivery, in caſe he ſold him when under ſuch infirmities as may eſcape the view of the buyer, and as are not obviouſly diſcovered. Theſe infirmities are purſiveneſs, the glanders, and unſoundneſs, hot and cold: but he does not *warrant* him clear of ſuch infirmities as may be diſcerned. Not only jockeys or horſe-merchants, but alſo perſons of what quality or condition ſoever, are obliged to take back the horſe, and repay the money, if he is affected with the ſaid diſorders. But the rule of the law of England is, *caveat emptor*, unleſs the ſeller expreſly *warrants*. See Warranty.

WARRANTS, *dividend.* See Dividend.

WARRANTIZANDUM. See Summons *ad Warrantizandum.*

WARRANTO. See Quo *Warranto.*

WARRANTY, Warrantia, in *Law*, a promiſe, or covenant, by deed, made by the bargainer for himſelf, and his heirs, to *warrant* and ſecure the bargainee, and his heirs, againſt all men, for enjoying the thing agreed on or granted between them.

Such *warranty* paſſes from the ſeller to the buyer; from the feoffer to the feoffee; from him that releaſes, to him that is releaſed from an action real. The form of it is thus: *Et ego vero præfatus A. & hæredes mei, prædictas quinque acras terræ cum pertinentiis ſuis præfato B. hæredibus & aſſignatis ſuis, contra omnes gentes* warrantizabimus *in perpetuum, per præſentes.*

Note, under *hæredes*, heirs, are compriſed all ſuch as the firſt *warranter*'s lands come to, whether by deſcent, purchaſe, or the like.

Warranty is either *real*, or *perſonal. Real*, when it is annexed to lands and tenements granted in fee, or for life, &c. which, again, is either *in deed*, or *in law.*

Perſonal either reſpects the property of the thing ſold, or the quality of it.

By the civil law an implied *warranty* was annexed to every ſale, in reſpect to the title of the vendor: and ſo too, in our law, a purchaſer of goods and chattels may have a ſatisfaction from the ſeller, if he ſells them as his own, and the title proves deficient, without any expreſs *warranty* for that purpoſe. But, with regard to the goodneſs of the wares ſo purchaſed, the vendor is not bound to anſwer; unleſs he expreſly warrants them to be ſound and good, or unleſs he knew them to be otherwiſe, and hath uſed any art to diſguiſe them, or unleſs they turn out to be different from what he repreſented to the buyer. And if he, who ſelleth any thing, doth upon the ſale warrant it to be good, the law annexes a tacit contract to this *warranty*, that if it be not ſo, he ſhall make compenſation to the buyer: alſo, it is an injury to good faith, for which an action on the caſe will lie to recover damages. The *warranty* muſt be upon the ſale; for if it be made after, and not at the time of the ſale, it is a void *warranty.* Alſo the *warranty* can only reach to things in being at the time of the *warranty* made, and not to things *in futuro:* as, that a horſe is ſound at the time of buying him, not that he will be ſound two years hence. Any artifice to diſguiſe goods ſhall be equivalent to an expreſs *warranty*, and the vendor is anſwerable for their goodneſs.

A general *warranty* will not extend to guard againſt defects that are plainly and obviouſly the object of one's ſenſes, as if a horſe be warranted perfect, and wants either a tail or an ear, unleſs the buyer in this caſe be blind. Alſo, if a horſe is warranted ſound, and he wants the ſight of an eye, though this ſeems to be the object of one's ſenſes, yet as the diſcernment of ſuch defects is frequently matter of ſkill, it hath been held that an action on the caſe lieth, to recover damages for this impoſition. Black. Com. book iii. p. 165.

Real warranty, again, in reſpect of the eſtate, is either *lineal*, *collateral*, or *commencing by diſſeiſin.*

Lineal warranty was where the heir derived, or might by poſſibility have derived, his title to the land warranted, either from or through the anceſtor who made the *warranty*; as, where a father, or an elder ſon in the life of the father, releaſed to the diſſeiſor of either themſelves or the grandfather, with *warranty*, this was *lineal* to the younger ſon.

Collateral warranty was where the heir's title to the land neither was, nor could have been, derived from the warranting anceſtor; as, where a younger brother releaſed to his father's diſſeiſor, with *warranty*, this was collateral to the elder brother.

But where the very conveyance, to which the *warranty* was annexed, immediately followed a diſſeiſin, or operated itſelf as ſuch (as, where a father tenant for years, with remainder to his ſon in fee, aliened in fee-ſimple with *warranty)*, this, being in its original manifeſtly founded on the tort or wrong of the warrantor himſelf, was called a *warranty commencing by diſſeiſin*; and, being too palpably injurious to be ſupported, was not binding upon any heir of ſuch tortious warrantor. Blackſt. Com. book ii. p. 301, &c.

Warrantia *Chartæ*, a writ that lies for a perſon who is infeoffed in lands and tenements, with clauſe of *warranty*; and is impleaded in an aſſize, or writ of entry, wherein he cannot vouch, or to call to *warranty.* See Voucher.

Warrantia *Diei*, a writ which lies in a caſe where a man, having a day aſſigned perſonally to appear in court to an action wherein he is ſued, is, in the mean time, by commandment, employed in the king's ſervice; ſo that he cannot come at the day aſſigned. It is directed to the juſtices, ordering them not to find or record him in default.

WARREN, Warenna, a franchiſe, or place privileged, either by preſcription, or grant from the king, to keep beasts and *fowl of warren* in; as rabbits, hares, partridges, pheaſants, &c.

A man that has the franchiſe of *warren* is in reality no more than a royal game-keeper: but no man, not even a lord of a manor, could by common law juſtify ſporting on another's ſoil, or even in his own, unleſs he had the liberty of *free-warren.* This franchiſe is almoſt fallen into diſregard, ſince the new ſtatutes for preſerving the game. There are, indeed, many inſtances of eager ſportſmen in ancient times, who have ſold their eſtates, and reſerved the *free-warren*, or right of killing game, to themſelves; by which means it comes to paſs that a man and his heirs have ſometimes *free-warren* over another's ground.

By a ſtatute 21 Edw. III. a *warren* may lie open, and there is no need of cloſing it in; as there is of a park.

If any perſon be found an offender in any ſuch *free-warren*, he is puniſhable for the ſame at common law. See Black *Act*, and Game.

The word *warren* is now generally applied to a piece of ground ſet apart for the breeding and preſerving of rabbits.

In the ſetting up of a *warren*, great caution is to be uſed for the fixing upon a proper place, and a right ſituation. It ſhould always be upon a ſmall aſcent, and expoſed to the eaſt or the ſouth. The ſoil that is moſt ſuitable, is that which is ſandy; for when the ſoil is clayey or tough, the rabbits find much more difficulty in making their burrows, and never do it ſo well; and if the ſoil be boggy or mooriſh, there would be very little advantage from the *warren*, for wet is very deſtructive of theſe animals.

All due precautions muſt be taken, that the *warren* be ſo contrived, that the rabbits may habituate themſelves to it with eaſe. Many would have it that *warrens* ſhould be encloſed with walls; but this is a very expenſive method, and ſeems not neceſſary nor adviſeable; for we find but very few that are ſo, and thoſe do not ſucceed at all the better for it.

Mr. Chomel's opinion is, that it ought to be ſurrounded with a ditch. This indeed is no fence to prevent the rabbits from going out, unleſs there be water in it; but it marks the intended bounds of the *warren*, and the rabbits generally confine themſelves within its circumference, though not neceſſarily compelled to do ſo. The ſpace proper for a *warren* has no limits but the owner's pleaſure; but, in general, the larger it is, the more profitable it alſo proves; and the rabbits, when once accuſtomed to the place, will keep within their bounds, though they are hemmed in neither with walls nor ditches, nor any other fence whatever.

Some have preſcribed the making of deep ditches, and conſtantly keeping them ſupplied with water in the ſummer as well as winter ſeaſon, that they may ſerve as fences to the rabbits; but as it is not found neceſſary to fence them in at all, it is extremely injudicious to do it, by means of a thing known to be ſo very prejudicial to theſe creatures, as water is. If the perſon who has ſet up a *warren* has but few rabbits to ſtock it with, the more patience he muſt have as to the profit of it; but the beſt method of getting quickly into the ſcheme of profit in it, is the buying at firſt a large number of doe-rabbits, all big with young. Theſe being unwieldy and heavy, will naturally ſtay in the place, and the young ones will be habituated to it, as their native place, and will never run from it. Theſe young ones will ſoon breed again, and the *warren* will begin quickly to be ſtocked with inhabitants, almoſt all natives of the place. They ſhould not be hunted at all the two firſt years, and but very moderately the third. After this they will increaſe ſo faſt, that ſcarce any body can conceive the numbers that may be taken, and the profit that may be annually made without hurting it.

The *warren* is the next franchiſe in degree to the PARK, and when ſpoken of in law, the terms uſed are, the liberty and franchiſe of a free *warren*.

A foreſt, which is in dignity the higheſt and greateſt franchiſe, comprehends in it a chaſe, a park, and a free *warren*; for which reaſon the beaſts of the park, and the beaſts and fowls of the free *warren*, are as much privileged within the foreſt, as the beaſts of the foreſt itſelf are.

WARREN is alſo applied to a contrivance for preſerving fiſh in the midſt of a river, to be taken at pleaſure.

WART, *verruca*, a little round hard excreſcence, ariſing on the fleſh like a pea.

Warts are more frequent on the hands than any other part. There are divers ſorts: the moſt uſual are called *porraceæ*; as having heads like leeks, and conſiſting of little threads, reſembling the roots thereof.

Another ſort is called *myrmecia:* this is a little round, callous eminence on the hands of young children: riſing ſuddenly, and diſappearing again.

A third ſort is the ACROCHORDON.

Some phyſicians alſo rank the corns growing on the toes under the claſs of *warts:* theſe the Latins call *clavi*; becauſe they occaſion ſhooting pains, as if one were pricked with the point of a nail.

Warts, if only rooted in the cutis, are eaſily taken away; but if they ariſe from the tendons underneath, there is ſcarce any extirpating them without great danger. The juices of chelidon majus, or eſula, or dens leonis, or tithymal, frequently applied, are ſaid to take off *warts*.

Strong vinegar, charged with as much common ſalt as it will diſſolve, is a very proper application to them. A plaſter may alſo be compoſed of ſal ammoniac and galbanum, which being kneaded up together and applied, ſeldom fails of deſtroying them.

Borelli commends water wherein ſal ammoniac has been diſſolved: which Dr. Mapletoft, formerly profeſſor of phyſic at Greſham College, makes no ſcruple to ſay, is the only ſure remedy he knows of in all medicine.

There are a thouſand ſuperſtitious remedies for *warts*, but none of them are of the leaſt conſequence. The ſurgeon's aſſiſtance is the only true method of getting rid of them. There are ſeveral ways of deſtroying them practiſed by him, as by ligature, extirpation, evulſion, the cauſtic, and the actual cautery. The cure by ligature, is by means of a looſe hair, or a piece of fine and ſtrong ſilk, tied very tight about the root of the *wart*; and by this means the nutritious veſſels being compreſſed, the excreſcence withers and decays.

The method by extirpation, is to take them up with a pair of plyers, and cut them cloſe off with ſciſſars, dreſſing the wound with common cauſtic, or applying a plaſter of diachylon with the gums, to remove the roots, if there be any, which would give riſe to a new tubercle.

The cure by cauſtics is beſt performed by cutting off the hard upper part of the *wart* with a razor or ſciſſars, and then ſurrounding its bottom with a circle of wax, to prevent the ſpreading of the remedies, to touch it daily with oil of tartar, ſpirit of ſalt, ſpirit or oil of vitriol, aqua-fortis, or butter of antimony.

The cure by cautery is performed by chooſing a cautery of a proper ſize, and with that burning down to the root of the *wart*. This is the moſt painful of all the methods of extirpating theſe excreſcences; but the pain is but for a moment, and the *warts* extirpated this way never return again.

The cure by evulſion is performed by anointing them with ſoftening ointment, and then ſeizing them artfully between the thumb and the fore-finger, and forcibly wrenching them out. This is a mountebank method, and a bad one; for it is not only very painful, but the *warts* commonly grow up again.

WARTS, *cancerous*. It is no uncommon thing to find on the face, lips, and about the eyes, *warts* which look blue and livid; theſe are always to be let alone entirely; for when irritated, they frequently degenerate into a cancer, and miſerably torment the parts where they are ſituated. Heiſter.

WART, in the *Manege*, is an excreſcence, or ſuperfluity of ſpongy fleſh, that riſes in the hinder paſterns of coach-horſes, almoſt as big as a walnut. It ſuppurates, and voids red ſtinking matter, and does not heal but for a time, for it returns again.

WART-*wort*, in *Botany*, a name ſometimes given to two very different plants. See NIPPLE-*wort*, and SPURGE.

WARTH, in our *Old Writers*, ſeems to be the ſame with WARD-*penny*, being a cuſtomary payment for ſome caſtle-guard.

WARWICK's, *earl of, powder*. See *Scammony* POWDER.

WASH, the diſtiller's name for the fermentable liquor, made by diſſolving the proper ſubject for fermentation and diſtillation in common water.

The *waſh* of the malt-diſtiller is made by mixing the water hot with the malt ground into meal. If the water be too hot, the mixture will become gluey; and if too cool, a part of the virtue of the malt will be loſt. Under the right application of the water is to be conſidered the proper manner of agitating the maſs, ſo that all the parts of the aqueous fluid may come fully and freely in contact with the ſoluble particles of the ſubject. When once the water is well ſaturated by ſtanding on the malt a proper time, it may be drawn off, and freſh poured on, till at length the whole virtue, or all the ſugary ſweetneſs of the malt is extracted, and nothing but a fixed huſky matter remains behind, incapable of being farther diſſolved by the action of hot or boiling water, or of being advantageouſly waſhed or rinſed out by the bare affuſion of cold. This artificial and external agitation, or ſtirring about of the maſs, is neceſſary not only in the common way of brewing for the malt-diſtillery, but alſo in that more expeditious way, now in uſe with ſome, of reducing the operations of brewing and fermenting to one, and grinding the malt to a fine meal, which is to be kept in the *waſh* during the whole time, and even put into the ſtill with it, and worked together. The ſtirring may be repeated to great advantage more than once in each operation, as at the affuſion of every parcel of freſh water, in the common way, and at any ſhortly diſtant times in the ſhort way, in which it is of greater ſervice.

The difference of ſeaſons is found to require ſome alteration in the direction and management of the buſineſs of brewing for the malt-diſtillery. The water muſt always be uſed colder in ſummer than in winter, and the tincture muſt be cooled ſuddenly in cloſe ſultry weather, to prevent it from becoming eager or ſour. The ſummer ſeaſon alſo gives malt an over-forward diſpoſition to ferment, and this impairs the quantity of ſpirit, and is to be checked by the addition of a quantity of unmalted meal, which being leſs diſpoſed to ferment than the malted meal, will reſtrain and moderate its impetuoſity. The action of fermentation works ſuch a change in the body of the tincture or ſolution, called the *waſh*, as to render it ſeparable by the action of fire, into parcels of matter that are ſpecifically different, and of a nature entirely foreign to what the ſame liquor would have yielded without the fermentation. With reſpect to the proper workings of this liquor, great regard is to be had to the containing veſſel. Its purity, and the proviſion for its occaſional cloſeneſs, are the things to be principally conſidered. Though it is neceſſary that the veſſel be perfectly clean, yet in the cleanſing of it great care muſt be taken that no ſoap, or other unctuous body, be uſed, for this would check the fermentation in it; and for the ſame reaſon all ſtrong alkaline lixiviums are to be avoided. Lime-water, or even the turbid ſolution of quick-lime, however, may be ſafely uſed for this purpoſe; and this is indeed particularly proper to deſtroy a prevailing acid, which is very apt to be generated about the ſides and bottoms of thoſe veſſels, if the warm air has acceſs to them, and thus prevents the order of the fermentation.

It is a very prejudicial miſtake, in the buſineſs of fermenting the *waſh*, to ſuppoſe that the free concourſe or admiſſion of the external air is neceſſary to the operation. The contrary is the truth, and a great advantage will be found in practiſing upon this ſuppoſition. A conſtant influx of the open air, if it does not carry off ſome part of the already formed ſpirit; yet it certainly catches up and diſſipates the fine ſubtle oleaginous and ſaline particles, of which the ſpirit is formed, and thus conſiderably leſſens the quantity to be procured. This inconvenience is wholly avoided by the way of cloſe fermentation, by which all air, except that which is contained in the veſſel, is kept out.

This method of cloſe fermentation is practicable to good advantage in the ſmall way of buſineſs; but it requires ſuch a conſiderable time, that it will never be liked by the large dealers, who are in a manner forced to admit the free air, and thus ſuſtain a very conſiderable loſs in the ſpirit, only to get the operation over in a proper time. Excepting for the neceſſity of expedition of this kind among the large dealers, it is certain that this ſlow and imperceptible vinous fermentation is greatly preferable, on all accounts, to the other.

The operation is known to be over in this cloſe way of fermentation, as ſoon as the hiſſing noiſe ceaſes, and can no longer be heard on applying the ear to the veſſel; and when, on opening it, the liquor is found to be clear, and of a vinous pungent taſte; when it is arrived at this ſtate, it ſhould be ſet by for a time in a cooler place than that in which it was fermented; in this manner it will thoroughly purge itſelf of its lees, and will become perfectly clear, vinous, and pungent; in this ſtate it ſhould be drawn clear off from the lees, and immediately committed to the ſtill; and by this method a perfectly pure vinous ſpirit will be procured, much better than that which can be obtained by the common way, which thoſe who work large quantities fall into, for the ſake of expedition.

The particular intention of the operator may render various other additions neceſſary; thus ſome, to diſpoſe the *waſh* to yield more ſpirit, or to give the ſpirit a greater degree of pungency, and a better flavour, add to it the ſtrong and pungent aromatics: the cheapeſt choſen for this purpoſe, and the moſt uſed, are the cortex Winteranus, ginger, and grains of paradiſe.

In the common way, theſe additions, however, do very little, though, by a proper artifice in the management, they may be made of conſiderable uſe. Upon this foundation ſtands a very inſtructive method, uſed abroad, of making geneva *ab origine*, by mixing the bruiſed juniper-berries among the malt, and brewing the whole together; by this means a compound tincture, or *waſh*, is prepared, which, by fermentation and diſtillation, affords a ſpirit much more intimately and homogeneouſly impregnated with the eſſence of the berry, than that prepared by our diſtillers, in the common way of adding the berry to the malt-ſpirit, and diſtilling it from them again.

Waſh being of a mucilaginous, or ſomewhat glutinous nature, requires management to prevent its ſcorching, and make it work kindly in the ſtill: if it ſhould happen to be burnt in the operation, the ſpirit will have a moſt diſagreeable flavour, and ſuch as can never be got off again, without very great labour, and a particular treatment, not known to every body. To prevent this ill effect, there muſt be three things obſerved; the liquor, or *waſh*, muſt be made dilute, the fire muſt be well regulated, and the whole kept in a conſtant agitation. The manner of making the *waſh* dilute, has been long known among the more judicious diſtillers in this branch, and they have always found their ſpirit the purer for it. The fire is eaſily kept regular, by a conſtant attendance, and avoiding haſty ſtirring it, or throwing on new fuel; and the ſtirring of the liquor in the ſtill is to be effected by means of a paddle, or bar kept in the liquor, till it juſt begins to boil, which is the time for luting on the head; and after which there is no great danger, but from the improper management of the fire: this is the common way, but it is hard to hit the exact time when to lute down the head; and the doing it either too ſoon, or too late, is attended with great inconvenience, ſo that many have found out the other methods, of either putting ſome moveable ſolid bodies into the ſtill with the *waſh*, or placing ſome proper matter at the bottom and ſides of the ſtill, which are the places where the fire acts ſtrongeſt.

There is another inconvenience attending the diſtilling of malt-ſpirit, which is, when all the bottoms, or groſs mealy feculence is put into the ſtill along with the liquor, the thinner part of the *waſh* going off in form of ſpirit, the mealy maſs grows by degrees more and more ſtiff, ſo as to ſcorch towards the latter part of the operation. The method uſed to remedy this, is to have a pipe with a ſtop-cock, leading from the upper part of the worm-tub into the ſtill; ſo that, upon a half, or quarter turn, it may continually ſupply a little ſtream of hot water, in the ſame proportion as the ſpirit runs off, by which means the fear of ſcorching is taken away, and the operation at the ſame time not at all retarded. In Holland, the malt-diſtillers work all their *waſh* thick, with the whole body of the meal among it; yet they are ſo careful in the keeping of their ſtills clean, and ſo regular and nice in the management of their fires, that, though they uſe no artifice at all on this head, only to charge the ſtill while it is hot and moiſt, they very rarely have the misfortune to ſcorch, except now and then in the depth of winter. When ſuch an accident has once happened in a ſtill, they are extremely ſolicitous and careful to ſcrape, ſcrub, and ſcour off the remains of the burnt matter, otherwiſe they find the ſame accident very liable to happen again in the ſame place. But beyond all the other methods in uſe on this occaſion, would be the working the ſtills not by a dry heat, but in a balneum Mariæ, which might poſſibly be ſo contrived by the baſon being large, and capable of working a great many ſtills at once, as to be extremely worth the proprietor's while in all reſpects, Shaw's Eſſay on Diſtillery. See FERMENTATION, and MALT-*diſtillery*.

WASH is alſo uſed for the ſhallow part of a river, or arm of the ſea, as the *waſhes* in Lincolnſhire.

WASH *of an oar*. See OAR.

WASH-*board*, in a *Ship*, a broad thin plank fixed occaſionally on the top of a boat's ſide, ſo as to extend the height thereof; and be removed at pleaſure. It is uſed to prevent the ſea from breaking into a veſſel, particularly when the ſurface is rough, as in tempeſtuous weather. Falconer.

WASHERS, in *Wheel-carriages*, a name given to a flat circular ring which is put on the axle-tree, between the linch-pin and ſmall end of the nave, to prevent the nave rubbing againſt the linch-pin and wearing it, as likewiſe to diminiſh the friction of the nave.

WASHING. See ABLUTION, LOTION, &c.

Waſhing the feet was a common piece of civility among the Jews, practiſed in regard to ſtrangers, viſitors, &c. at their arrival.

Waſhing the feet of twelve poor people, is an anniverſary ceremony to be performed both by the kings of England and France; in commemoration of our Saviour's *waſhing* the feet of his apoſtles. See MAUNDY.

Arnobius, Adv. Gentes, lib. vii. mentions a feaſt in uſe among the ancients, called *lavatio matris Deûm*. See LAVATION.

WASHING *of ores*. See *Dreſſing of* ORES.

WASHING *of a ſhip*, in *Sea-Language*, is when all the guns are brought to one ſide; and the men, getting upon the yards, *waſh* her other ſide, and ſcrape her as far as they can reach.

WASHING, in *Painting*, is when a deſign drawn with a pen, or crayon, has ſome one colour laid over it with a pencil; as Indian ink, biſtre, or the like; to make it appear the more natural, by adding the ſhadows of prominences, apertures, &c. and by imitating the particular matters, whereof the thing is ſuppoſed to conſiſt.

Thus, they *waſh* with a pale red, to imitate brick and tile; with a pale Indian blue, to imitate water and ſlate; with green, for trees and meadows; with ſaffron or French berries, for gold and braſs; and with ſeveral colours, for marbles.

Theſe *waſhes* are uſually given in equal teints, or degrees, throughout; which are afterwards brought down, and ſoftened over the lights with fair water, and ſtrengthened with deeper colours for the ſhadows.

The colours which require only to be diſſolved in water, are, for red, red ink; for blue, litmus; for green, ſap-green and verdigris in vinegar; for yellow, gamboge, the yellow berry waſh and turmeric waſh; for purple, the logwood waſh and archil; for brown, Spaniſh liquorice; and for black, Indian ink.

Mr. Cochin, in order to produce *waſhed* prints much more beautiful than the common, propoſes to print upon the colours inſtead of applying the colours upon the impreſſion, in the following manner.

Having a plate already engraved, with a figure, in which it is required to introduce two or three colours, as the hat grey, the hair browniſh, the cloak red, the coat and the ſtockings of different colours; let another plate of well poliſhed copper be procured, and fitted to the ſize of the firſt: when this ungraved plate is varniſhed with white varniſh, let a proof freſh drawn from the engraved plate be laid upon it exactly in the place where the engraved plate has made the impreſſion, and then ſpread two blankets upon the table of the preſs, and lay the varniſhed plate upon them, with the proof lying upon it; and having covered them with two or three other blankets, paſs them under the roller of the preſs. When the blankets and proof are taken off the plate, the white varniſh will have the ſame impreſſion with that of the proof, in the manner of a counter-proof; and the outlines of the hat, hair, cloak, &c. muſt be traced with a very fine needle, and the plate then gently corroded. After this the varniſh ſhould be taken off the plate; and ſome proofs ſhould be taken from it on ſtrong paper allumed, or upon cartoon very thin and well beaten; which ſhould be previouſly moiſtened by lying in a damp cellar for a night, or two, or by putting it among the paper moiſtened in order to be printed. The proofs being made, and the cartoons or paper on which they were printed being dry, the part encloſed in the outline of the cloak ſhould be coloured with a red ground; that within thoſe of the head with a brown ground of biſtre, and the ſame of the reſt. The ſheet thus coloured muſt then be put into the cellar, in order to moiſten it; and having ſpread ſome of the blankets on the table of the preſs, the coloured ſheet muſt be laid upon them, with the blank ſide downwards. After having inked all the firſt plate, that has the entire engraving upon it, in the manner for printing at other times, it muſt be put upon this leaf with the engraved ſide downwards, ſo that the parts of which the outline is marked on the ſheet, may exactly coincide with thoſe correſponding to them in the plate; and then two or three blankets being laid over them, the whole muſt be paſſed through the rollers. After which, the ſheet being uncovered, will be found printed upon the colours, in a manner that renders the effect much more beautiful than that of thoſe printed and coloured upon the printing, as in the common way. Handmaid to the Arts, vol ii. p. 212, &c.

WASHING *colours*, in *Painting*, a denomination given to ſuch colours as are tranſparent in water; in contradiſtinction from thoſe called *glazing colours*, which are pigments poſſeſſing the property of becoming tranſparent in oil.

WASHING *over of colours*. The *waſhing* or cleanſing of ſome colours may be thus performed: take the colours to be *waſhed*, and put them, after having been well levigated or pounded, into a veſſel of fair water; ſtir it about till the water be all coloured therewith, and if any filth ſwim on the top of the water, ſcum it clean off, and when you think the groſſeſt part of the colour is ſettled at the bottom, then pour off that water into another earthen veſſel, that may contain the firſt veſſel full of water four or five times; then pour more water into the firſt veſſel, and ſtir the remaining colour till the water be thick, and after it is a little ſettled, pour that water alſo into the ſecond veſſel. Let this be repeated till all the fineſt of the colour is drawn off, and nothing but coarſe gritty ſtuff remains behind. Then letting the water in the ſecond veſſel ſtand to ſettle, till it is perfectly clear, pour it off, and reſerve the *waſhed* colour in the bottom of the veſſel for uſe.

The colours to be thus *waſhed* are red-lead, blue and green bice, verditer, blue and green ſmalt, Spaniſh brown, yellow ochre, &c.

WASHINGS, or **WASHES**, among *Goldſmiths*, *Coiners*, &c. are the lotions whereby they recover the particles of gold and ſilver out of the ſweep, i. e. aſhes, earths, ſweepings, &c.

This is either performed by ſimply *waſhing* them again and again, or by putting them in the *waſhing*-mill.

To make one of theſe *waſhes*, they not only gather together the aſhes of the furnaces, and ſweepings of the work-houſes; but they alſo break and pound the old earthen crucibles, and the very bricks whereof the furnaces are built; little particles of gold, &c. being found to ſtick to them, by the flying off natural to thoſe metals, when in their laſt degree of heat.

Theſe matters, being well ground, and mixed together, are put in large wooden baſons, where they are *waſhed* ſeveral times, and in ſeveral waters, which run off, by inclination, into troughs underneath; carrying with them the earth, and the inſenſible particles of the metals, and only leaving behind them the larger and more conſiderable ones, which are viſible to the eye, and are finally taken out with the hand without more trouble.

To get out the finer parts, gone off with the earth, they uſe quickſilver, and a *waſhing*-mill. This mill conſiſts of a large wooden trough, at bottom of which are two metalline parts, ſerving as mill-ſtones; the lower being convex, and the upper, which is in form of a croſs, concave.

At the top is a winch, placed horizontally, which turns the upper piece round; and at bottom is a bung, to let out the water and earth, when ſufficiently ground.

To have a *waſh*, then, the trough is filled with common water; into which they caſt thirty or forty pounds of quickſilver, and two or three gallons of the matter remaining from the firſt lotion. Then turning the winch, they give motion to the upper mill ſtone; which grinding the matter and the quickſilver violently together, the particles of gold and ſilver become the more eaſily amalgated therewith; this work they continue for two hours: when opening the bung, the water and earth runs out, and a freſh quantity is put in.

The earths are uſually thus paſſed through the mill three times; and the ſame quantity of mercury uſually ſerves all the three times. When there is nothing left in the mill but the mercury, united with the gold and ſilver which it has amalgated, they take it out, and *waſhing* it in divers waters, they put it in a ticken bag, and lay it in a preſs, to ſqueeze out the water, and the looſe quickſilver: the remaining quickſilver they evaporate by fire, in a retort, or an alembic. And the metal which remains, they refine with lead, or part it with aqua fortis.

WASP, **VESPA**, in *Zoology*, a genus of the *hymenoptera* order of inſects; the characters of which are theſe: the mouth has maxillæ without any proboſcis; the upper wings are plicated; the ſting is pointed and concealed; the eyes are lunar; and the body naked and ſmooth. Linnæus enumerates twenty-eight ſpecies.

M. Reaumur (Hiſt. Acad. Sci. Paris, 1719), and Dr. Derham (Phil. Tranſ. Nº 382. p. 53. or Abr. vol. viii p. 404), agree in diſtinguiſhing three ſorts of *waſps*; viz. the queens or females, the males, and the common labouring *waſps*, called mules, which, according to Reaumur, are neither males nor females, and conſequently barren. The queens, of which there is a great number, are much longer in the body, and larger than any other *waſp*: they have a large heavy belly, correſponding in ſize to the prodigious quantity of eggs with which they are charged. The males are leſs than the queens, but longer and larger than the common *waſps*, which are the ſmalleſt of the ſpecies: they have no ſtings, with which both the queens and common *waſps* are furniſhed. There are in one neſt two or three hundred males, and as many females; but their number depends on the ſize of the neſt; and Dr. Derham obſerved that the males were bred, or at leaſt moſtly reſided, in the two cells or partings, between the combs, next to the uppermoſt cell. The antennæ or horns of the male *waſps* are longer and larger than thoſe of either of the other ſorts; but the chief difference, ſays Dr. Derham, conſiſts in their parts of generation, which are altogether different from thoſe of other *waſps*.

The mules are the labourers belonging to the neſt, and are employed in procuring materials for the neſts, and in conſtructing them, and alſo in furniſhing the other *waſps*, and the young, with proviſions.

M. Reaumur has obſerved, that when the females that have ſurvived the winter begin, at the return of ſpring, to lay their eggs, they firſt lay thoſe which hatch mules, and at this time they build cells of a ſmaller ſize to lodge the eggs from which they are produced: they afterwards build larger cells, and fill them with the largeſt eggs, which are thoſe of the males and females. This writer ſays, that the copulation of the males and females is viſible, and he has given a particular account of it; obſerving that it is performed in October, like that of all other flies.

At the beginning of winter, the *waſps* deſtroy all the eggs, and all the young ones without exception: all the mules and males, which have been employed in this work, being unfurniſhed with proviſions, periſh; and none ſurvive except ſome few females, which, according to Reaumur, were fecundated in October, and raiſe a new colony in the beginning of ſpring.

The *waſps* conſtruct regular combs, and rear their young in the cells of theſe combs, in the manner of bees: wherever there is a young worm in a cell, the old *waſps* frequently thruſt their heads into it, and caſt up the food for the young one out of their mouths: their cells are hexagonal; and when they have a mind to enlarge their habitation, and make more or bigger combs in them, they are ſeen very buſily coming out of the mouth of the hole, every one loaded with a parcel of earth, till they have carried out as much as is neceſſary for the intended enlargement.

They ſupport their combs, one over another, by croſs pieces of about an inch long, ſo that there is ample room for the *waſps* to paſs in their ſeveral buſineſſes. Thoſe cells which ſtand in the centre of a comb, are always perpendicular; the others all ſtand more or leſs obliquely; and in the centre, the comb is ſomewhat hollowed and depreſſed on the face, and convex on the back; and in this part is inſerted the principal croſs piece that ſerves for a ſupport.

A *waſp's* neſt is commonly round, and made of materials reſembling fine paper. The common covering of it, which is formed of ſeveral leaves or layers, with intermediate ſpaces, is pierced by two holes at a diſtance from one another, one of which is uſed for the entrance of the *waſps*, and the other only for their exit. The ſpace within this covering is cut by a number of horizontal planes, with intervals between them of the ſize of about half an inch; they are ſuſpended from one another by ligaments, and attached to the covering by their edges: they all have hexagonal cells in their lower ſurface.

The eggs of the *waſp* are of an oblong form, and reſemble thoſe of a common fly, but they are larger; they are always faſtened to the angles of a cell, never to the ſides of it. They are uſually placed ſingle; it is very rare to find two in one cell; and, if they are laid ſo, it ſeems that only one ſucceeds; for there is never found more than one worm in a cell.

The heads of all the nymphs are turned toward the centre of the comb, and their tails go obliquely downward toward the baſe of the cell. They are continually ſeen opening their mouths, and moving their forcipes, ſeeming ever hungry, and impatiently waiting for food from their parents. The cells are left open till the nymph is at its full growth; then the *waſps* cover it over with a thin lid, under which the worm undergoes its transformation; and as ſoon as it arrives at the *waſp*-ſtate, it eats its way through this thin cover, and comes to work with the reſt.

Mr. Ray mentions a peculiar ſpecies of *waſp*, which builds a much ſmaller neſt. This is uſually fixed to a beam of ſome old building, and has only one aperture, which is about half an inch wide, and ſerves for the *waſps* to go in and out at. This aperture is always exactly oppoſite to that part of the hive, where it adheres to the beam. The hive or neſt is covered with a thin membranaceous ſubſtance reſembling paper, of a brown colour, with ſtreaks of white, diſpoſed in regular circles. The whole neſt is about three inches in diameter, and is uſually compoſed of about nine cruſts; when theſe are cut away, there appears a round comb in the centre, and a ſmaller above it, fixed up by a pedicle ariſing from the centre of each. In every one of theſe cells, which are hexagonal as thoſe of the common *waſp*, is reared one worm, which, in fine, becomes a *waſp*.

The ſpecies of *waſp*, which builds in this manner, differs from the common *waſp*, in that it is ſomewhat larger; it is ſmoother alſo, and has rings of a deeper yellow on the back: the black ſpots are not ſo regular in this, as in the common *waſp*; and the forehead in this is of a perfect yellow, without any ſpots. Theſe marks, with the difference of hanging a ſmall neſt againſt a beam, and building a large one in the ground, are ſufficient to diſtinguiſh this as an abſolutely different ſpecies. Beſide theſe two, Mr. Ray mentions four other ſpecies of *waſps*.

We have an account in the Philoſophical Tranſactions, N° 476, of ſome *waſp*-neſts made of clay in Penſylvania.

Mr. Reaumur, in his Hiſtory of Inſects, vol. vi. mentions clay-neſts from St. Domingo, ſomewhat different from theſe.

The common *waſp* has four wings and ſix feet; his body is yellow, with black triangular ſpots: the common *waſp* breeds in the ground.

There is another kind much more fierce, but very rare: theſe breed in woods and mountains; they are larger, and have broader bodies, and much more black about them; their ſting is ſo large, that it ſeems diſproportioned to the ſize of their bodies. The application of vinegar is ſaid to be good againſt their ſtinging.

To theſe are to be added the *ichneumon-waſps*, which are ſmaller than the others, and have very ſlender bodies, but of the ſame colours with the common kind: theſe uſually live in the holes of mud-walls, and make a ſort of porch of mud before the doors of their habitations.

There is alſo another *waſp* common about Vienna; this is three times as large as the common kind, and ſeems of two different ſpecies, the one having rough antennæ, and the other ſmooth: they are both variegated with black and a bright yellow. Mouffet's Hiſt. Inſects, p. 6.

WASP, *ichneumon*. See ICHNEUMON, and VESP-*ichneumon*.

WASP-*fly*, in *Natural Hiſtory*, a ſpecies of fly having very much the external figure of a *waſp*, but harmleſs, without a ſting, and with only two wings.

It is black and yellow on the body, and marked exactly as the *waſp*, and is produced from a ſpecies of the rat-tailed fly-worms. See DRONE-*fly*.

But beſide theſe there is another ſmall fly produced of the puceron-eaters, which has extremely the appearance of a ſmall *waſp*; but is perfectly harmleſs, and has only two wings. Reaumur, Hiſt. Inſ. vol. iv. p. 486.

WASP-*tipula*, in *Natural Hiſtory*, the name of an inſect deſcribed by Mr. Reaumur, and being properly a tipula, or long-legs, though greatly reſembling a *waſp*.

This is produced of a worm found in the earth, lodged in the cavites of old trees; the worm has no legs, but has a regularly figured ſcaly head. The fly produced from it has the long legs and the mouth of the tipula, with the remarkable double beard which covers it, and which makes the great character of this claſs of inſects; but then the body is ſhort and thick, whereas the bodies of the common kinds are very bony and thin. This, as alſo the breaſt, is variegated with ſtreaks of black and yellow, in the manner of the *waſp*; and its antennæ are very beautifully feathered, and bearded like thoſe of the males of many of the gnat-kind. The head is black, and the legs are yellowiſh. The wings have a yellowiſh caſt, and near their end have each a large ſpot of brown. The body of the female of this ſpecies is always much thicker than that of the male; and the ſexes are eaſily diſtinguiſhed by this. Reaumur, Hiſt. of Inſ. vol. ix. p. 19.

WASSAILE, or WASSEL, a feſtival ſong, ſung heretofore from door to door, about the time of Epiphany. See WASSEL-*bowl*.

WASSEL-*bowl*, or WESTEL-*bowl*, was a large cup or bowl of ſilver or wood, wherein the Saxons, at their public entertainments, drank a health to one another, in the phraſe *was-heal*; that is, *health be to you*.

This *waſſel-bowl* ſeems plainly to be meant by the word *vaſtellum*, in the Lives of the Abbots of St. Albans, by Matt. Paris; where he ſaith, *Abbas ſolus prandebat ſupremus in refectorio habens* vaſtellum: "He had ſet by him "the *waſſel-bowl* to drink a health to the fraternity; or "the poculum charitatis."

And hence the cuſtom of going a *waſſeling*, ſtill uſed in Suſſex, and ſome other places, ſeems to have taken its name.

WAST, or WASTE, *Vaſtum*, in *Law*, has divers ſignifications.

1. It is uſed for a ſpoil, made either in houſes, woods, lands, &c. by the tenants for life, or for years, to the prejudice of the heir, or of him in reverſion, or remainder.

Waſte is either voluntary, as by pulling down a houſe; or permiſſive, as by ſuffering it to fall for want of neceſſary reparations. Whatever does a laſting damage to the freehold or inheritance is *waſte*: therefore the removing of wainſcot, floors, or other things once fixed to the freehold of a houſe, is *waſte*.

Waſte may alſo be committed in ponds, dove-houſes, warrens, and the like; by ſo reducing the number of erections therein, that there will not be ſufficient for the reverſioner when he comes to the inheritance. To cut down trees, that are deemed timber, as oak, aſh, and elm, and other trees generally uſed in building, or to lop them, or do any other act whereby the timber may decay, is *waſte*. The converſion of land from one ſpecies to another is *waſte*; and alſo to convert one ſpecies of edifice into another, even though it is improved in its value. To open the land to ſearch for mines of metal, coal, &c. is *waſte*: and, in general, whatever tends to the deſtruction, or depreciating the value, of the inheritance, is conſtituted by the law as *waſte*.

In conſequence of the ſtatute of Marlbridge, 52 Hen. III. cap. 23. and that of Glouceſter, 6 Edw. I. cap. 5. all tenants for life, or for any leſs eſtate, are puniſhable or liable to be impeached for *waſte*, both voluntary and permiſſive; unleſs their leaſes be made, as ſometimes they are, without impeachment of *waſte*, *abſque impetitione vaſti*; that is, with a proviſion or protection that no man ſhall *impetere* or ſue them, for *waſte* committed.

The puniſhment for *waſte* committed was, by common law and the ſtatute of Marlbridge, only ſingle damages, except in the caſe of a guardian in chivalry, who alſo forfeited his wardſhip by the proviſions of the great charter, 9 Hen. III. cap. 4. But the ſtatute of Glouceſter directs, that tenants in dower, by courteſy, for life, and for years, ſhall loſe and forfeit the place wherein the *waſte* is committed, and alſo treble damages, to him that hath the inheritance. For this purpoſe a writ of *waſte* is brought by him who hath the immediate eſtate of inheritance in reverſion or remainder, calling upon the tenant to appear and ſhew cauſe, why he hath committed *waſte*; and if the defendant makes default, or doth not appear at the day aſſigned him, then the ſheriff, with a jury of twelve men, is to go to the place alledged to be waſted, and there enquire of the *waſte* done, and the damages; and make a return or report to the court, upon which report the judgment is founded. But if the defendant appears, and afterwards ſuffers judgment to go againſt him by default, or upon a *nihil dicit*, this amounts to a confeſſion of the *waſte*; and the ſheriff ſhall then only make enquiry of the quantum of damages. When the *waſte* and damages are thus aſcertained, by confeſſion, verdict, or enquiry of the ſheriff, judgment is given, in purſuance of the ſtatute of Glouceſter, cap. 5. that the plaintiff ſhall recover the place waſted, for which he has immediately a writ of ſeiſin, and alſo that he ſhall recover treble the damages aſſeſſed by the jury.

The redreſs of this injury of *waſte* is alſo preventive, by writ of ESTREPEMENT: and, beſides, the courts of equity, upon bill exhibited therein, complaining of *waſte* and deſtruction, will grant an injunction to ſtay *waſte*, until the defendant ſhall have put in his anſwer, and the court ſhall thereupon make farther order: which is now become the moſt uſual way of preventing *waſte*. Blackſt. Com. book ii. p. 281. book iii. p. 223, &c.

WASTE *of the foreſt*, is, properly, where a man cuts down his own woods within the foreſt, without licence of the king, or lord chief-juſtice in eyre.

WASTE is alſo taken for thoſe lands which are not in any man's occupation, but lie common.

They ſeem to be ſo called, becauſe the lord cannot make ſuch profit of them as of his other lands; by reaſon of the uſe others have thereof, for paſſing to and fro. Upon this none may build, cut down trees, dig, &c. without the lord's licence.

Year, Day and WASTE. See YEAR, *Day and Waſte*.

WASTE *of a Ship*. See WAIST.

WASTE-*board*. See WASH-*board*.

WASTE-*cloths*, in a *Ship of War*. See FIGHTS.

WASTE *trees*, in a *Ship*, are thoſe timbers which lie in her *waſte*, or WAIST.

WASTEL *bread.* See **Bread.**

WASTORS, in *our Statutes*, a kind of thieves ſo called, and mentioned among robbers, draw-latches, &c.

WATCH, *Guet*, a perſon poſted as a ſpy in any place, to have an eye thereto, and to give notice of what paſſes.

Watch is alſo uſed for a *corps de guarde* poſted at any paſſage; or for a company of guards who go on the patrole. Some officers are exempted from *watch* and guard.

In the ſame ſenſe they ſay, *night-watch*: *guet de nuit*: *watch-word*, *mot de guet*: *royal watch*, and *city watch*.

Chevalier de guet, is a name given by the French to the officer who commands the *royal watch*, &c.

Watch, *vigilia*, in *Roman Antiquities*, a diviſion of their night; being the fourth part of the ſpace of time between ſun-ſet and ſun-riſing, and conſequently varying according to the ſeaſon of the year.

In the Roman army, there were night-guards or vigiles, viz. four in every manipulus, who kept guard three hours, and were then relieved by four others: ſo that there were four ſets in a night, according to the four *watches*. The way of ſetting this nightly guard was by a tally or tessera, with a particular inſcription, given from one centurion to another quite through the army, till it came again to the tribune who firſt delivered it: upon the receipt of this the guard was immediately ſet. Beſides, they had the *circuitio vigilium*, or a viſiting of the *watch*, performed commonly about four times in the night by ſome of the horſe. Upon extraordinary occaſions the tribunes and lieutenant-generals, and ſometimes the general himſelf, made theſe circuits in perſon, and took a ſtrict view of the *watch* in every part of the camp.

Watch, at *Sea*, ſignifies the ſpace of time wherein one diviſion of a ſhip's crew remains upon deck, to perform the neceſſary ſervices, whilſt the reſt are relieved from duty, either when the veſſel is under ſail, or at anchor. The length of the ſea-*watch* is not the ſame in the ſhipping of different nations. It is always kept four hours by our Britiſh ſeamen, if we except the *dog-watch* between four and eight in the evening, that contains two reliefs, each of which is only two hours on deck. The intent of this is to change the period of the night-*watch* every twenty-four hours; ſo that the party watching from eight till twelve in one night ſhall *watch* from midnight till four in the morning on the ſucceeding one. In France the duration of the *watch* is extremely different, being in ſome places ſix hours, and in others ſeven or eight; and in Turky and Barbary it is uſually five or ſix hours.

A ſhip's company is uſually claſſed into two parties: one of which is called the ſtarboard, and the other the larboard, *watch*. It is, however, occaſionally ſeparated into three diviſions, as in a road, or in particular voyages.

In a ſhip of war, the *watch* is generally commanded by a lieutenant, and in merchant ſhips by one of the mates: ſo that if there are four mates in the latter, there are two in each *watch*; the firſt and third being in the larboard, and the ſecond and fourth in the ſtarboard *watch*: but in the navy the officers who command the *watch* uſually divide themſelves into three parts, in order to lighten their duty. Falconer.

Watch-*glaſſes*, in a *Ship*, are glaſſes employed to meaſure the period of the *watch*, or to divide it into any number of equal parts, as hours, half hours, &c. ſo that the ſeveral ſtations therein may be regularly kept and relieved, as at the helm, pump, look-out, &c.

To ſet the **Watch,** in *Sea-Language*, is to appoint one diviſion of the crew to enter upon the duty of the *watch*; as at eight o'clock in the evening.

Watch, *death.* See **Death.**

Watch is alſo uſed for a ſmall portable movement, or machine, for the meaſuring of time; having its motion regulated by a ſpiral ſpring.

Watches, ſtrictly taken, are all ſuch movements as ſhew the parts of time; as clocks are ſuch as publiſh it, by ſtriking on a bell, &c. But commonly, the name *watch* is appropriated to ſuch as are carried in the pocket; and *clock* to the large movements, whether they ſtrike the hour or not.

Spring, or *Pendulum* **Watches,** ſtand pretty much on the ſame principle with pendulum clocks; whence their denomination. If a pendulum, deſcribing little arches of a circle, makes vibrations of unequal lengths, in equal times; it is becauſe it deſcribes the greater with a greater velocity. For the ſame reaſon, a ſpring put in motion, and making greater or leſs vibrations, as it is more or leſs ſtiff, and as it has a greater or leſs degree of motion given it, perform them nearly in equal times. Hence, as the vibrations of the pendulum had been applied to large clocks, to rectify the inequality of their motions; ſo, to correct the unequal motions of the balance of *watches*, a ſpring is added; by the iſochroniſm of whoſe vibrations, the correction is to be effected.

The ſpring is uſually wound into a ſpiral; that, in the little compaſs allotted it, it may be as long as poſſible; and may have ſtrength enough not to be maſtered, and dragged about, by the inequalities of the balance it is to regulate.

The vibrations of the two parts, viz. the ſpring and balance, ſhould be of the ſame length; only ſo adjuſted, as that the ſpring, being more regular in the length of its vibrations than the balance, may, on occaſion, communicate its regularity thereto.

The invention of ſpring, or *pocket-watches*, is owing to the laſt age. It is true, we find mention made of a *watch* preſented to Charles V. in the hiſtory of that prince: but this, in all probability, was no more than a kind of clock to be ſet on a table; ſome reſemblance whereof we have ſtill remaining in the ancient pieces made before the year 1670. In effect, it is between Dr. Hooke, and M. Huygens, that the glory of this excellent invention lies: but to which of them it properly belongs, is greatly diſputed; the Engliſh aſcribing it to the former; and the French, Dutch, &c. to the latter.

Dr. Derham, in his Artificial Clock-maker, ſays expreſly, that Dr. Hooke was the inventor; and adds, that he contrived various ways of regulation. One way was with a load-ſtone. Another with a tender ſtraight ſpring, one end whereof played backwards and forwards with the balance: ſo that the balance was to the ſpring, as a bob to a pendulum; and the ſpring as the rod thereof. A third method was with two balances, of which there were divers ſorts; ſome have a ſpiral ſpring to the balance for a regulator, and others without.

But the way that prevailed, and which continues in mode, was with one balance, and one ſpring running round the upper part of the verge thereof. Though this has a diſadvantage, which thoſe with two ſprings, &c. were free from; in that a ſudden jerk, or confuſed ſhake, will alter its vibrations, and put it in an unuſual hurry.

The time of theſe inventions was about the year 1658, as appears, among other evidences, from an inſcription on one of the double balance *watches*, preſented to king Charles II. viz. Rob. Hook inven. 1658. T. Tompion fecit, 1675. The invention preſently got into reputation, both at home and abroad; and two of them were ſent for by the dauphin of France.

Soon after this, M. Huygens's *watch* with a ſpiral ſpring got abroad, and made a great noiſe in England, as if the longitude could be found by it. It is certain, however, that this invention was later than the year 1673, when his book de Horol. Oſcillat. was publiſhed; wherein he has not one word of this, though he has of ſeveral other contrivances in the ſame way.

One of theſe the lord Brouncker ſent for out of France, where M. Huygens had got a patent for them. This watch agreed with Dr. Hooke's in the application of the ſpring to the balance; only M. Huygens's had a longer ſpiral ſpring, and the pulſes or beats were much ſlower. The balance, inſtead of turning regularly round, as Dr. Hooke's, turns ſeveral rounds every vibration.

Dr. Derham ſuggeſts, that he has reaſon to doubt, whether M. Huygens's fancy was not firſt ſet to work by ſome intelligence he might have of Dr. Hooke's invention, from Mr. Oldenburg, or ſome other of his correſpondents in England: though Mr. Oldenburg vindicates himſelf againſt that charge, in Philoſophical Tranſactions, Nº 118. and 129. See a farther account of the ſtate of this controverſy in Mr. Waller's Life of Dr. Hooke, p. 4. and Birch's Hiſt. of the R. S. vol. iii. p. 320.

Huygens invented divers other kinds of *watches*, ſome of them without any ſtring or chain at all; which he called, particularly, *pendulum watches*.

As it was in England that *watches* had their firſt riſe; ſo it is there, too, they have arrived at their greateſt perfection. Witneſs that exceeding value put on an Engliſh *watch* in all foreign countries, and that vaſt demand made for them.

M. Savary, in his Diction. de Commerce, pretends to match the French *watch-makers* againſt the Engliſh. He aſſerts, "That if the Engliſh be in any condition to "diſpute it with them, they owe it entirely to the great "number of French workmen who took ſhelter here "upon the revocation of the edict of Nantes." He adds, "That three fourths of the *watches* made in England, "are the work of Frenchmen." From what authorities he ſays this, at the time when he wrote, we know not.

It is certain the French have preferred our *watches* to their own; inſomuch that, to have them with the more eaſe, a number of Engliſh workmen were invited over in 1719, and eſtabliſhed with great countenance at Verſailles, under the direction of the famous Mr. Law. But the eſtabliſhment, though every thing promiſed well for it, and the French *watch* and clock-makers ſeemed undone by it, fell to the ground in leſs than a year's time. M. Savary imputes its fall, entirely, to the ſtrong prejudice of the French people, in behalf of the Engliſh workmen, and to their knowing that the *watches* did not come from England. But the truth is, the workmen ſent over, being moſt of them men of looſe characters, grew diſſolute, quarrelled with the prieſts, inſulted the magiſtrates, and were diſmiſſed, of neceſſity.

One of the Engliſh artiſts, who eſtabliſhed a manufactory at Verſailles, was Mr. Henry Sully; and though he returned to England within two years after his firſt ſettlement, he ſoon after went back and eſtabliſhed another manufactory at St. Germain's. He publiſhed an account of a longitude clock he had invented, in 1726; from which, however, his expectations were diſappointed; and died in 1728.

M. Le Roy, a celebrated artiſt of Paris, has not long ſince pointed out ſome inconvenieneſs attending the uſual diſpoſition of the wheels and pinions of *watches*, and propoſed a method of remedying them. Every wheel of a *watch* is fixed in an arbor, which terminates in two pivots, and theſe turn in holes drilled in the plates of the *watch*. Each arbor is charged both with a wheel and a pinion: and it is the pinion which receives the action of the immediately preceding wheel, and tranſmits it to the wheel fixed on its own arbor. M. Le Roy obſerves, that a *watch*-wheel placed near the middle of its arbor is in the moſt advantageous poſition, eſpecially if its pinion be nearly in the ſame poſition; becauſe then, the effort it receives is diſtributed equally between the two pivots; the pivot-holes in the plates wear equally and on the ſame ſide, and their enlargement will always let the wheel continue parallel to the plates; and, therefore, the poſition of the planes of the wheels ſuffering no alteration by ſuch wearing, with reſpect to one another, they drive one another on without any alteration as to the pitching or the friction. But it will be otherwiſe, when the wheel or the pinion are near one of the extremities of the arbor, becauſe the friction ariſing from the action of the wheel is no longer equal on both the pivots; that which is neareſt the pinion receiving almoſt the whole effort of the preceding wheel, whilſt the other is very ſlightly affected by it. Hence it will follow, that the hole of ſuch pivot muſt wear much more, and in a ſhorter time, than the other; the poſition of the arbor will be altered, and conſequently that of the paralleliſm of the planes of the wheels. This is the great defect of common *watches*; the pinion of the ſmall middle wheel or third wheel, and that of the contrate wheel are ſo near one of their pivots, that it is often neceſſary to ſtop or buſh up their holes, and drill them anew in a year or two. M. Le Roy ſet himſelf about remedying this inconvenience; in order to which he was under a neceſſity of inverting the fuſee, ſo that the wide baſe ſhould be at top, and little end at bottom, near the great wheel: and thus the little middle wheel might be made to act upon the pinion of the contrate wheel, near the middle of its arbor. M. Le Roy makes the lower pivots to turn not in the plate of the frame, but in another little plate or cap placed on the outſide of the frame-plate; by which contrivance he renders the effort of the pivots nearly equal, and keeps the oil from quitting the pivots, as it is too apt to do in the common construction. By the inverſion of the fuſee, its baſe being on the ſame ſide as the ſquare of the great pivot, the diameters of the pivots are proportioned to the friction they ſuffer; whereas in Engliſh *watches*, the great pivot is on the ſide where the chain draws neareſt the centre, or on the wrong ſide.

We ſhall add in this place, that the true principles upon which all TIME-*keepers* muſt be conſtructed are clearly laid down, and the means of improvement fully pointed out in an excellent ſhort tract, intitled, Thoughts on the Means of improving *Watches*, by Thomas Mudge.

Watches made by artificers with us are to have the maker's name, &c. under penalty of 20*l*. 9 and 10 W. III. cap. 28.

WATCHES, *ſtriking*, are ſuch as, beſides the proper *watch*-part, for meaſuring of time, have a clock-part, for ſtriking the hours, &c.

Theſe are real clocks; only moved by a ſpring inſtead of a weight. Properly ſpeaking, they are called *pocket-clocks*.

WATCHES, *repeating*; are ſuch as, by pulling a ſtring, &c. repeat the hour, quarter, or minute, at any time of the day or night.

This repetition was the invention of Mr. Barlow, and was firſt put in practice by him in larger movements, or clocks, about the year 1676. The contrivance immediately ſet the other artiſts to work, who ſoon contrived divers ways of effecting the ſame. But its application to pocket-*watches* was not known before king James the Second's reign; when the ingenious inventor above mentioned, having directed Mr. Tompion to make a *repeating-watch*, was ſoliciting a patent for the ſame.

The talk of a patent engaged Mr. Quare to reſume the thoughts of a like contrivance, which he had in view ſome years before: he now effected it; and being preſſed to endeavour to prevent Mr. Barlow's patent, a *watch* of each kind was produced before the king and council; upon trial of which the preference was given to Mr. Quare's.

The difference between them was, that Barlow's was made to repeat, by puſhing in two pieces on each ſide the *watch*-box; one of which repeated the hour, and the other the quarter: whereas Quare's was made to repeat by a pin that ſtuck out near the pendant; which, being thruſt in (as now it is done by thruſting in the pendant itſelf), repeated both the hour and quarter with the ſame thruſt.

The movement of theſe machines will be ſtopped with great cold; and therefore in very cold climates, it is proper to keep them in one's fob by day, and in the bed by night. See Phil. Tranſ. Nº 465. ſect. 2. See TIME-*keeper*.

WATCH-*glaſs*. Mr. Boyle informs us, that to faſhion glaſſes for *watches*, or the like purpoſe, into a convex or concave figure, there is no neceſſity for grinding: for, a ſmooth and flat piece of glaſs, of a competent thickneſs, being carefully laid upon a ſhallow concave cylinder of iron, ſo that the edges of both touch, the heat of a fire, warily applied, will ſoften the glaſs, and ſuffer it to ſink into the form required. See Works Abr. vol. i. p. 135.

WATCH *and ward*, in *Law*, conſtitute one of the principal duties of CONSTABLES, who, by the ſtatute of Wincheſter, 13 Edw. I. cap. 4. are appointed to keep *watch* and ward in their reſpective juriſdictions. Ward, guard or *cuſtodia*, is chiefly intended of the day-time, in order to apprehend rioters, and robbers on the high-ways; the manner of doing which is left to the diſcretion of the juſtices of the peace and the conſtable; the HUNDRED being, however, anſwerable for all robberies committed therein, by day-light, for having kept negligent guard.

Watch is properly applicable to the night only (being called among our Teutonic anceſtors *wacht* or *wacta*), and it begins at the time, when ward ends, and ends when that begins; for, by the ſtatute of Wincheſter, in walled towns the gates ſhall be cloſed from ſun-ſetting to ſun-riſing, and *watch* ſhall be kept in every borough and town, eſpecially in the ſummer ſeaſon, to apprehend all rogues, vagabonds, and night-walkers, and make them give an account of themſelves. The conſtable may appoint watchmen at his diſcretion, regulated by the cuſtom of the place; and theſe, being his deputies, have for the time being the authority of their principal. Blackſt. Com. book i. p. 356.

WATCHING, WAKEFULNESS, *inſomnia*, among *Phyſicians*, denotes a diſorder whereby a perſon is diſabled from going to ſleep.

It is occaſioned by a continual and exceſſive motion of the animal ſpirits in the organs of the body, whereby thoſe organs are prepared to receive, readily, any impreſſions from external objects, which they propagate to the brain; and furniſh the ſoul with divers occaſions of thinking.

This extraordinary flux of ſpirits may have two cauſes: for, 1. The ſenſible objects may ſtrike the organ with too much force. In which caſe, the animal ſpirits being violently agitated, and thoſe agitations continued by the nerves to the brain, they give a like motion to the brain itſelf; the neceſſary conſequence of which is, that the animal muſt wake. Thus, a loud ſhriek, pains, head-ach, gripes, coughing, &c. cauſe *waking*. Add, that the mind's being oppreſſed with cares, or deeply engaged in thinking, contributes to the ſame; ſince, as it acts by the miniſtry of the ſpirits, any cares or meditations, that keep thoſe in motion, muſt produce *watchfulneſs*. Of this kind are the inveterate *wakings* of melancholic perſons; ſome of whom have been known to paſs three or four weeks without a wink of ſleep.

2. The other cauſe is in the ſpirits themſelves; which have ſome extraordinary diſpoſition to receive motion, or to perſiſt in it: as, from their too great heat, or that of the brain in fevers, &c. Hence it is, that the diſorder is moſt frequent in ſummer, in the heat of youth, &c. Long faſting has the ſame effect; the want of food ſubtilizing the ſpirits, and drying the brain. The ſame is likewiſe an ordinary ſymptom in old age, by reaſon the pores of the brain, and the nerves, having been much widened by the continual paſſage of ſpirits, for a great number of years, the ſpirits now paſs and repaſs through them with too much eaſe; and need not any extraordinary motion to keep the mind awake.

There are inſtances of people *waking* for forty-five nights ſucceſſively: and we even read of a melancholy perſon, who never ſlept once in fourteen months. Such *watchings* uſually degenerate into madneſs.

WATCH-WORK is that part of the movement of a clock or watch, which is deſigned to meaſure and exhibit the time on a dial-plate; in contradiſtinction to that part which contributes to the ſtriking of the hour, &c. which is called CLOCK-*work.* See *Tab. Horology, fig.* 1.

The ſeveral members of the *watch*-part are, 1. The *balance*, conſiſting of the *rim*, which is its circular part; and the *verge*, which is its ſpindle; to which belong the two *pallets* or *leaves*, that play in the teeth of the crown-wheel.

2. The *potence*, or *pottance*, which is the ſtrong ſtud in pocket-watches, whereon the lower pivot of the verge plays, and in the middle of which one pivot of the balance-wheel plays; the bottom of the pottance is called the *foot*, the middle part the *noſe*, and the upper part the *ſhoulder*.

3. The *cock*, which is the piece covering the balance.

4. The *regulator*, or *pendulum ſpring*, which is the ſmall ſpring, in the new pocket-*watches*, underneath the balance. See REGULATOR.

5. The *pendulum*; whoſe parts are, the *verge x*, *pallets* 5, 5, *cocks y y y*, the *rod*, the *fork z*, the *flat* × 2, the bob or great *ball* 3, and the *corrector* or regulator 4, being a contrivance of Dr. Derham, for bringing the pendulum to its nice vibrations.

6. The *wheels*, which are the *crown-wheel* F, in pocket-pieces, and *ſpring-wheel* in pendulums; ſerving to drive the balance or pendulum.

7. The *contrate-wheel* E, which is that next the crown-wheel, &c. and whoſe teeth and hoop lie contrary to thoſe of other wheels; whence the name.

8. The *great*, or *firſt wheel* C; which is that the fuſee B, &c. immediately drives, by means of the chain or ſtring of the ſpring box or barrel A; after which are the *ſecond wheel* D, *third wheel*, &c.

Laſtly, between the frame and dial-plate, is the *pinion of report*, which is that fixed on the arbor of the great wheel; and ſerves to drive the *dial-wheel*, as that ſerves to carry the *hand*.

For the illuſtration of this part of the work, which lies concealed, let ABC (*Tab. Horology, fig.* 2.) repreſent the uppermoſt ſide of the frame plate, as it appears when detached from the dial-plate: the middle of this plate is perforated with a hole, receiving that end of the arbor of the centre wheel, which carries the minute hand; near the plate is fixed the pinion of report *a b* of 10 teeth; this drives a wheel *c d* of 40 teeth; this wheel carries a pinion *e f* of 12 teeth; and this again drives a wheel *g h* with 36 teeth.

As in the body of the *watch*, the wheels every where divide the pinions, here, on the contrary, the pinions divide the wheels, and by that means diminiſh the motion, which is here neceſſary; for the hour-hand, which is carried on a ſocket fixed on the wheel *g h* is required to move but once round, while the pinion *a b* moves twelve times round. For this purpoſe the motion of the wheel *c d* is $\frac{1}{4}$ of the pinion *a b*. Again, while the wheel *c d*, or the pinion *e f*, goes once round, it turns the wheel *g h* but $\frac{1}{3}$ part round; conſequently the motion of *g h* is but $\frac{1}{3}$ of $\frac{1}{4}$ of the motion of *a b*; but $\frac{1}{3}$ of $\frac{1}{4}$ is $\frac{1}{12}$; i. e. the hour-wheel *g h* moves once round in the time that the pinion of report, on the arbor of the centre or minute wheel, makes 12 revolutions, as required. Hence the ſtructure of that part of a clock, which ſhews the time, may be eaſily underſtood.

The cylinder A (*fig.* 1.) put into motion by a weight or incloſed ſpring moves the fuſee B, and the great wheel C to which it is fixed by the line or cord that goes round each, and anſwers to the chain of a watch.

The method of calculation is eaſily underſtood by the ſequel of this article: for, ſuppoſe the great wheel C goes round once in 12 hours, then if it be a royal pendulum clock, ſwinging ſeconds, we have $60 \times 60 \times 12 = 43200$ ſeconds or beats in one turn of the great wheel. But becauſe there are 60 ſwings or ſeconds in one minute, and the ſeconds are ſhewn by an index on the end of the arbor of the ſwing wheel, which in thoſe clocks is in an horizontal poſition; therefore, it is neceſſary that the ſwing wheel F ſhould have 30 teeth; whence $\frac{43200}{60} = 720$ the number to be broken into quotients for finding the number of teeth for the other wheels and pinions.

In ſpring-clocks, the diſpoſition of the wheels in the watch part is ſuch as is here repreſented in the figure, where the ſpring-wheel F is in an horizontal poſition; the ſeconds not being ſhewn there by an index, as is done in the large pendulum clocks. Whence in theſe clocks, the wheels are diſpoſed in a different manner, as repreſented in *fig.* 3. where C is the great wheel, D the centre or minute wheel, as before: but the contrate wheel E is placed on one ſide, and F the ſwing-wheel is placed with its centre in the ſame perpendicular line G H, with the minute wheel, and with its plane perpendicular to the horizon, as are all the others. Thus the minute and hour hands turn on the end of the arbor of the minute wheel at *a*, and the ſecond hand on the arbor of the ſwing wheel at *b*.

Theory and calculation of WATCH-WORK. Preliminaries neceſſary to the calculation of the *watch*-part of a movement, are laid down under BEATS, MOVEMENT, CLOCK-WORK, and TURN.

Preliminary rules, common to the calculation of all movements, the *clock* as well as the *watch*-parts; ſee under the article MOVEMENT. Particular rules for the *ſtriking-part*, ſee under the article CLOCK-WORK. Thoſe for the *watch*-part we have from the Rev. Dr. Derham, as follow:

1. The ſame motion, it is evident, may be performed either by one wheel, and one pinion, or many wheels, and many pinions; provided the number of turns of all the wheels bear the proportion to all the pinions, which that one wheel bears to its pinion; or, which is the ſame thing, if the number, produced by multiplying all the wheels together, be to the number produced by multiplying all the pinions together, as that one wheel to that one pinion. Thus, ſuppoſe you had occaſion for a wheel of 1440 teeth, with a pinion of 28 leaves; you make it into three wheels of 36, 8, and 5, and three pinions of 4, 7, and 1. For the three wheels, 36, 8, and 5, multiplied together, give 1440 for the wheels, and the three pinions 4, 7, and 1, multiplied together, give 28 for the pinions. Add, that it matters not in what order the wheels and pinions are ſet, or which pinion runs in which wheel; only, for convenience ſake, the biggeſt numbers are commonly put to drive the reſt.

2. Two wheels, and pinions of different numbers, may perform the ſame motion. Thus, a wheel of 36 drives a pinion of 4; the ſame as a wheel of 45, a pinion of 5; or a wheel of 90, a pinion of 10. The turns of each being 9.

3. If, in breaking the train into parcels, any of the quotients ſhould not be liked; or if any other two numbers, to be multiplied together, are deſired to be varied; it may be done by this rule. Divide the two numbers by any other two numbers which will meaſure them; multiply the quotients by the alternate diviſors; the product of theſe two laſt numbers found, will be equal to the product of the two numbers firſt given. Thus, if you would vary 36 times 8, divide theſe by any two numbers which will evenly meaſure them: ſo, 36 by 4, gives 9; and 8 by 1, gives 8: now, by the rule, 9 times 1 is 9, and 8 times 4, 32; ſo that for 36 × 8, you have 32 × 9; each equal to 288. If you divide 36 by 6, and 8 by 2, and multiply as before, you have $24 \times 12 = 36 \times 8 = 288$.

4. If a wheel and pinion fall out with croſs numbers, too big to be cut in wheels, and yet not to be altered by theſe rules; in ſeeking for the pinion of report, find two numbers of the ſame, or a near proportion, by this rule: as either of the two given numbers is to the other, ſo is 360 to a fourth. Divide that fourth number, as alſo 360, by 4, 5, 6, 8, 9, 10, 12, 15 (each of which numbers exactly meaſures 360), or by any of thoſe numbers that bring a quotient neareſt to an integer. As ſuppoſe you had 147 for the wheel, and 170 for the pinion; which are too great to be cut into ſmall wheels, and yet cannot be reduced into leſs, as having no other common meaſure but unity: ſay, as 170 : 147 :: 360 : 311. Or, as 147 : 170 :: 360 : 416. Divide the fourth number, and 360, by one of the foregoing numbers; as 311, and 360, by 6, it gives 52 and 60; divide them by 8, you have 39, and 45: and if you divide 360 and 416, by 8, you have 45 and 52 exactly. Wherefore, inſtead of the two numbers 147 and 170, you may take 52 and 60, or 39 and 45, or 45 and 52, &c.

5. To come to practice in calculating a piece of *watch-work*, firſt pitch on the train or beats of the balance in an hour; as, whether a ſwift one, of about 20000 beats (the uſual train of a common 30 hour *pocket-watch*), or a ſlower of about 16000 (the train of the new pendulum *pocket-watches*), or any other train. Next, reſolve on the number of turns the fuſee is intended to have, and the number of hours the piece is to go: ſuppoſe, e. g. 12 turns, and to go 30 hours, or 192 hours (i. e. 8 days), &c. Proceed now to find the beats of the balance or pendulum in one turn of the fuſee, by the direction given under the word BEATS. Thus in numbers; 12 : 16 :: 20000 : 26666. Wherefore 26666 are the beats in one turn of the fuſee, or great wheels, and are equal to the quotients of all the wheels unto the balance multiplied together. Now this number is to be broken into a con-

venient parcel of quotients; which is to be done thus: firſt, halve the number of beats; viz. 26666, and you have 13333; then pitch on the number of the crown-wheel, ſuppoſe 17: divide 13333 by 17, and you have 784 for the quotient (or turns) of the reſt of the wheels and pinions; which, being too big for one or two quotients, may be beſt broken into three. Chooſe therefore three numbers; which, when multiplied all together continually, will come neareſt 784: as ſuppoſe 10, 9, and 9, multiplied continually, give 810, which is ſomewhat too much; therefore try again other numbers, 11, 9 8: theſe, drawn one into another continually, produce 792; which is as near as can be, and is a convenient quotient. Having thus contrived the piece from the great wheel to the balance; but the numbers not falling out exactly, as you firſt propoſed, correct the work thus: firſt (by the direction given under the word BEATS), multiply 792, the product of all the quotients pitched upon, by 17 (the notches of the crown-wheel); the product is 13464, which is half the number of beats in one turn of the fuſee; then (by a rule given under the word BEATS) find the true number of beats in an hour. Thus, 16 : 12 :: 13464 : 10098, which is half the beats in an hour. Then find what quotient is to be laid upon the pinion of report (by the rule given under that word). Thus, 16 : 12 :: 12 : 9, the quotient of the pinion of report. Having thus found your quotients, it is eaſy to determine what number the wheels ſhall have; for, chooſing what numbers the pinions ſhall have, and multiplying the pinions by their quotients, the product is the number for the wheels. Thus, the number of the pinion of report is 4, and its quotient is 9; therefore the number for the dial-wheel muſt be 4 × 9, or 36: ſo the next pinion being 5, its quotient 11, therefore the great wheel muſt be 5 × 11 = 55; and ſo of the reſt.

```
4) 36 ( 9
---------
5) 55 (11
5) 45 ( 9
5) 40 ( 8
---------
       17
```

Such is the method of calculating the numbers of a 16 hour *watch*. Which *watch* may be made to go longer, by leſſening the train, and altering the pinion of report. Suppoſe you could conveniently ſlacken the train to 16000: then, by the rule given under the word BEATS, ſay, as $\frac{1}{2}$ 16000, or 8000 : 13464 :: 12 : 20; ſo that this *watch* will go 20 hours. Then for the pinion of report, ſay (by the rule given under that word), as 20 : 12 :: 12 : 7. So that 7 is the quotient of the pinion of report. And as to the numbers, the operation is the ſame as before; only the dial wheel is but 28; for its quotient is altered to 7. If you would give numbers to a *watch* of about 10000 beats in an hour, to have 12 turns of the fuſee, to go 170 hours, and 17 notches in the crown-wheel; the work is the ſame, in a manner, as in the laſt example: and conſequently thus: as 12 : 170 :: 10000 : 141666, which fourth number is the beats in one turn of the fuſee; its half, 70833, being divided by 17, gives 4167 for the quotient: and becauſe this number is too big for three quotients, therefore chooſe four, as 10, 8, 8, $6\frac{3}{5}$; whoſe product into 17 makes 71808, nearly equal to half the true beats in one turn of the fuſee. Then ſay, as 170 : 12 : 71808 : 5069, which is half the true train of your *watch*. And again, 170 : 12 :: 12 : $\frac{144}{170}$, the denominator of which expreſſes the opinion of report, and the numerator is the number of the dial-wheel. But theſe numbers being too big to be cut in ſmall wheels, they muſt be varied by the fourth rule, above, thus:

```
4) 28 ( 7
---------
5) 55 (11
5) 45 ( 9
5) 40 ( 8
---------
       17
```

As 144 : 170 :: 360 : 425;
Or 170 : 144 :: 360 : 305.

Then dividing 360, and either of theſe two fourth proportionals (as directed by the rule); ſuppoſe by 15; you will have $\frac{24}{28}$ or $\frac{20}{24}$; then the numbers of the whole movement will ſtand as in the margin.

```
24) 20 (20/24
-------------
 6) 60 (10
 6) 48 ( 8
 5) 40 ( 8
 5) 33 (6 3/5
-------------
       17
```

Such is the calculation of ordinary *watches*, to ſhew the hour of the day: in ſuch as ſhew minutes, and ſeconds, the proceſs is thus:

1. Having reſolved on the beats in an hour; by dividing the deſigned train by 60, find the beats in a minute; and accordingly, find proper numbers for the crown-wheel, and quotients, ſo as that the minute-wheel ſhall go round once in an hour, and the ſecond wheel once in a minute.

Suppoſe, e. g. you ſhall chooſe a pendulum of ſeven inches, which vibrates 142 ſtrokes in a minute, and 8520 in an hour. Half theſe ſums are 71, and 4260. Now, the firſt work is to break this 71 into a good proportion, which will fall into one quotient, and the crown-wheel. Let the crown wheel have 15 notches; then 71, divided by 15, gives nearly 5; ſo a crown-wheel of 15, and a wheel and pinion, whoſe quotient is 5, will go round in a minute to carry a hand to ſhew ſeconds. For a hand to go round in an hour to ſhew minutes; becauſe there are 60 minutes in an hour, it is but breaking 60 into good quotients (ſuppoſe 10 and 6, or 8 and $7\frac{1}{2}$, &c.), and it is done. Thus, 4260 is broken as near as can be, into proper numbers. But ſince it does not fall out exactly into the above mentioned numbers, you muſt correct (as before directed), and find the true number of beats in an hour, by multiplying 15 by 5, which makes 75; and 75 by 60 makes 4500, which is half the true train. Then find the beats in one turn of the fuſee; thus, 16 : 192 :: 4500 : 54000; which laſt is half the beats in one turn of the fuſee. This 54000 being divided by 4500 (the true numbers already pitched on), the quotient will be 12; which, not being too big for a ſingle quotient, needs not be divided into more; and the work will ſtand as in the margin. As to the hour-hand, the great wheel, which performs only one revolution in 12 turns of the minute-wheel, will ſhew the hour; or it may be done by the minute-wheel.

```
8) 40 ( 5
---------
       15

8) 64 (8
8) 60 (7 1/2
8) 40 (5
---------
       15

9) 108 (12
8)  64 (8
8)  60 (7 1/2
8)  40 (5
---------
       15
```

It is requiſite for thoſe who make nice aſtronomical obſervations, to have watches that make ſome exact number of beats *per* ſecond, without any fraction; which we ſeldom find a watch that does. As four beats *per* ſecond would be a very convenient number, we ſhall here give the train for ſuch a watch, which would (like moſt others) go 30 hours, but is to be wound up once in 24 hours.

The fuſee and firſt wheel to go round in four hours. This wheel has 48 teeth, and it turns a pinion of 12 leaves, on whoſe axis is the ſecond wheel, which goes round in one hour, and carries the minute-hand. This wheel has 60 teeth, and turns a pinion of 10 leaves, on whoſe axis is the third wheel, of 60 teeth, turning a pinion of 6 leaves, on whoſe axis is the fourth (or contrate) wheel, turning round in a minute, and carrying the ſmall hand that ſhews the ſeconds, on a ſmall circle on the dial-plate, divided into 60 parts: this contrate wheel has 48 teeth, and turns a pinion of 6 leaves, on whoſe axis is the crown or balance-wheel of 15 teeth, which makes 30 beats in each revolution.

The crown-wheel goes 480 times round in an hour, and 30 times 480 make 14400, the number of beats in an hour. But one hour contains 3600 ſeconds, and 14400 divided by 3600 quotes 4, the required number of beats in a ſecond.

The fuſee muſt have $7\frac{1}{2}$ turns, to let the chain go ſo many times round it. Then, as 1 turn is to 4 hours, ſo is $7\frac{1}{2}$ turns to 30 hours, the time the watch would go after it is wound up.

WATER, *aqua*, in *Phyſics*, a ſimple, fluid, and liquid body; reputed the third of the four vulgar elements.

Sir Iſaac Newton defines *water* to be a fluid ſalt, volatile, and void of taſte: but this definition Boerhaave ſets aſide; inaſmuch as *water* is a menſtruum, or diſſolvent of ſalts and ſaline bodies, which does not agree with the notion of its being a ſalt itſelf; for we do not know of any ſalt that diſſolves another.

By ſome late experiments of Meſſrs. Lavoiſier, Watt, Cavendiſh, Prieſtley, and Kirwan, it appears, that *water* conſiſts of dephlogiſticated air, and inflammable air or phlogiſton intimately united: or as Mr. Watt conceives, of dephlogiſticated air and phlogiſton, deprived of part of their latent heat.

Whether WATER *be originally fluid?* Though water be defined a *fluid*, it is a point controverted among philoſophers, whether fluidity be its natural ſtate, or the effect of violence: we ſometimes find it appear in a fluid, and ſometimes in a ſolid form; and as the former in our warmer climate is the more uſual, we conclude it the proper one, and aſcribe the other to the extraneous action of cold. Boerhaave, however, aſſerts the contrary, and maintains *water* to be naturally of the cryſtalline kind; ſince, wherever a certain degree of fire is wanting to keep it in fuſion, it readily grows into a hard glebe, under the denomination of *ice*.

Mr. Boyle is much of the ſame opinion. Ice, he obſerves, is commonly reputed to be *water* brought into a preternatural ſtate by cold: but with regard to the nature of things, and ſetting aſide our arbitrary ideas, it might as juſtly be ſaid, that *water* is ice preternaturally thawed by heat. If it be urged, that ice left to itſelf, will, upon the removal of the freezing agents, return to *water*; it may be anſwered, that, not to mention the ſnow and ice which lie during the whole ſummer on the Alps, and other high mountains, even in the torrid zone, we have been aſſured, that, in ſome parts of Siberia, the ſurface of the ground continues more months of the year frozen by the natural temperature of the climate, than thawed by the heat of the ſun; and a little below the ſurface of the ground, the *water* which chances to be lodged in the cavities there, continues in a ſtate of ice all the year round: ſo that when, in the heat of ſummer, the fields are covered with corn, if you dig a foot or two deep, you ſhall find ice, and a frozen ſoil.

Water, however, is very volatile, ſo that it is conſtantly liquid with a leſs degree of heat than is requiſite for vegetation; and hence it is generally conſidered as liquid.

WATER, *no pure, in all nature.* *Water*, if it could be had alone, and pure, Boerhaave argues, would have all the requiſites of an element, and be as ſimple as fire; but there is no expedient hitherto diſcovered for procuring it ſo pure. *Rain-water*, which ſeems the pureſt of all thoſe we know of, is replete with infinite exhalations of all kinds, which it imbibes from the air: ſo that if filtred and diſtilled a thouſand times, there ſtill remain fæces. Farther, the *rain-water*, gathered from the roofs of houſes, is a lixivium of the ſalt of tyles, ſlate, or the like; impregnated with the dungs and fæces of the animals, birds, &c. depoſited thereon; and the exhalations of numerous other things. Add, that all the *rain-water*, gathered in cities, muſt at leaſt be ſaturated with the ſmoke of a thouſand chimneys, and the various effluvia of numbers of perſons, &c. Beſides this, there is fire contained in all *water*; as appears from its fluidity, which is owing to fire alone.

As what is in the air neceſſarily mixes itſelf with *water*, it hence appears impoſſible to have ſuch a thing as pure *water*. If you percolate it through ſand, or ſqueeze it through pumice, or paſs it through any other body of the like kind, you will always have ſalt remaining. Nor can diſtillation render it pure; ſince it leaves air therein, which neceſſarily abounds in corpuſcles of all ſorts.

The *waters* that flow within, or upon the ſurface of the earth, contain various earthy, ſaline, metallic, vegetable, or animal particles, according to the ſubſtances over or through which they paſs.

The pureſt of all *waters* we can any way arrive at, is, that diſtilled from ſnow, gathered in a clear, ſtill, pinching night, in ſome very high place; taking none but juſt the outer or ſuperficial part thereof. By a number of repeated diſtillations, the greateſt part of the earth, and other fæces, may be ſeparated from this: and this is what we muſt be contented to call *pure water*.

Mr. Boyle, indeed, relates, that one ounce of *water*, diſtilled carefully in glaſs veſſels two hundred times, yielded ſix drams of a white, light, inſipid earth, fixed in the fire, and indiſſoluble in *water*: whence he concludes, that the whole *water*, by farther proſecuting the operation, might be converted into earth.

Borrichius, Wallerius, Godfrey, Woulfe, &c. concur in this opinion. But Boerhave, Macquer, and other chemiſts, maintain, that *pure water* is unalterable, and incapable of being decompoſed; ſo that whatever be the ſubſtances with which it is combined, when ſeparated from theſe and ſufficiently purified; and alſo when diſtilled ſingly, or mixed with other ſubſtances, its nature and eſſential properties ſtill remain unchanged.

Boerhaave attributes the earth obtained by diſtillation of *water*, in the experiment of Mr. Boyle, to the duſt floating in the air, and the inſtruments employed in operation; and apprehends, that the water might loſe, in proportion, by getting out at the junctures of the veſſels.

That author aſſures us, that after diſtilling ſome very pure *water*, by a gentle fire, during the ſpace of four months, it appeared perfectly pure; and yet, leaving it to reſt in veſſels exactly cloſed, it would conceive a ſlender kind of weedy matter, ſomewhat like the ſtamina of plants, or the little tufts of a mucilage: yet Schottus ſaw *water* in Kircher's muſeum, that had been kept in a veſſel, hermetically ſealed, upwards of fifty years; yet ſtill remained clear and pure, and ſtood to the ſame height in the veſſel, as at firſt, without the leaſt ſign of ſediment.

Other chemiſts have made experiments to aſcertain the truth of that of Mr. Boyle.

Leidenfroſt found, that when pure diſtilled *water* is diſſipated or evaporated by throwing it into a red-hot iron ſpoon, he always obtained a quantity of earth.

Wallerius obtained a ſcruple and a half of fine white earth by triturating during two hours a dram of diſtilled *water*; and he found that a larger quantity of earth is depoſited from boiling *water* with a ſtrong than with a gentle fire. Swed. Mem. 1760.

M. Margraaf, by diſtillation and alſo by evaporation with the heat of the ſun, of rain *water*, the purity of which had been previouſly aſcertained by thirteen diſtillations, obtained a white, light, ſhining earth; part of which was ſoluble in nitrous acid, and when precipitated by vitriolic acid formed a ſelenites, whence he infers that it is a true calcareous earth; and the other part unfuſible by fire, but convertible by addition of half of its quantity of ſalt of tartar, into a tranſparent glaſs. He obſerves, that earth is more copiouſly depoſited from *water* boiling with a ſtrong than with a gentle heat. The quantity of earth which he obtained in one experiment, from ſeventy-two ounces of diſtilled water, by twelve diſtillations, was nine or ten grains. M. Lavoiſier, however, maintains, that the earth thus obtained by diſtilling *water* proceeds from the veſſels employed.

M. Margraaf proved the exiſtence of the earth in *water* by another experiment. He put two ounces of diſtilled *water* into a glaſs veſſel ten inches high, and from one to two inches in diameter, and cloſed the mouth with a ſmooth glaſs ſtopper. After the *water* had been agitated in this tube eight days, it was obſerved to be turbid, and upon continuing the agitation eight days longer, he obſerved diſtinctly, eſpecially upon expoſing the tube to the rays of the ſun, particles of earth floating in the *water*.

Dr. Prieſtley made many experiments on *water* put into glaſs tubes hermetically ſealed, and expoſed to a long continued heat, with a view of aſcertaining the converſion of *water* into earth; but failed of ſucceſs. He thinks, however, his diſappointment might have been owing to his uſing a greater degree of heat than others had uſed, in order to ſave time; whereas Mr. Woulfe is of opinion that the heat muſt be very moderate, and long continued. After a trial of ſix months, the wiſhed-for effect was not produced; nevertheleſs he candidly adds, that it was ten months before Mr. Godfrey perceived any change in the conſiſtence of his *water*, and fifteen months before its converſion into earth was completed. Obſ. on Air, vol. iv. p. 406, &c.

Boerhaave ſays, that he is convinced nobody ever ſaw a drop of pure *water*; that the utmoſt of its purity known, only amounts to its being free from this or that ſort of matter; and that it can never, for inſtance, be quite deprived of ſalt; ſince air will always accompany it, and air always contains ſalts.

WATER *in all places and bodies.* *Water* ſeems to be diffuſed every where, and to be preſent in all ſpace where there is matter. There are few bodies in nature that will not yield *water*: it is even aſſerted, that fire itſelf is not without *water*. A ſingle grain of the moſt fiery ſalt, which, in a moment's time, will penetrate through a man's hand, readily imbibes half its weight of *water*, and melts, even in the drieſt air imaginable. Thus ſalt of tartar, placed near the hotteſt fire, will attract or imbibe *water*; and, by that means, increaſe conſiderably its weight, in a ſmall time: ſo, in the drieſt ſummer's day, a pewter veſſel, with ice in it, brought up from ſome cold ſubterraneous place, into the hotteſt room, will immediately be covered over with little drops of *water*, gathered from the contiguous air, and condenſed by the coldneſs of the ice.

It is ſurpriſing to conſider the plenteous ſtock of *water* which even dry bodies afford. Oil of vitriol, being expoſed a long time to a violent fire, to ſeparate all the *water*, as much as poſſible, from the ſame, will afterwards, by only ſtanding a few minutes in the air, contract freſh *water* ſo faſt, as ſoon to afford it as plenteouſly as at firſt. Hartſhorn, kept forty years, and turned as hard and as dry as any metal, ſo that, if ſtruck againſt a flint, it will yield ſparks of fire, yet, being put into a glaſs veſſel, and diſtilled, will afford one-eighth part of its quantity of *water*. Bones dead and dried twenty-five years, and thus become almoſt as hard as iron, yet, by diſtillation, have afforded half their weight of *water*. And the hardeſt ſtones, ground and diſtilled, do always diſcover a portion thereof. But hitherto no experiment ſhews, that *water* enters as a principle into the combination of metallic matters, or even into that of vitreſcible ſtones.

Eels, by diſtillation, yielded Mr. Boyle ſome oil, ſpirit, and volatile ſalt, beſides the caput mortuum; yet all theſe were ſo diſproportionate to the *water*, that they ſeemed to have been nothing but that coagulated: the ſame ſtrangely abounds in vipers, though they are eſteemed very hot in operation; and will, in a convenient air, ſurvive for ſome days, the loſs of their heads and hearts. Human blood, itſelf, as ſpirituous and elaborate a liquor as it is reputed, ſo abounds in *water*, that out of ſeven ounces and a half, the ſame author, by diſtillation, drew near ſix ounces of phlegm; before ever any of the other principles began to riſe.

Whether **WATER** *be the common matter of all bodies?* From conſiderations ſomewhat of this kind, Thales, and ſome other philoſophers, have been led to hold, that all things were made of *water*: which opinion, probably, had its riſe from the writings of Moſes; where he ſpeaks of the Spirit of God moving upon the face of the *waters*. But Mr. Boyle does not conceive the *water* here mentioned by Moſes as the univerſal matter to be our elementary *water*: we need only ſuppoſe it an agitated congeries of a great variety of ſeminal principles, and of other corpuſcles fit to be ſubdued and faſhioned by them; and it may yet be a body fluid like *water*, in caſe the corpuſcles it was made up of were, by their Creator, made ſmall enough, and put into ſuch an actual motion, as might make them roll and glide eaſily over one another. However, Baſil Valentine, Paracelſus, Van Helmont, Sendivogius, and others, have maintained the ſame principle; viz. that *water* is the elemental matter, or ſtamen, of all things, and ſuffices alone for the production of all the viſible creation. Thus ſir Iſaac Newton: "All birds, beaſts, and fiſhes, inſects, trees, and vegetables, with their ſeveral parts, do grow out of *water*, and *watery* tinctures, and ſalts; and, by putrefaction, they all return again to *watery* ſubſtances."

Helmont endeavours to prove this doctrine from an experiment recited under *Food of* PLANTS.

The ſame thing is inferred by Mr. Boyle, from a parallel experiment; and the whole is countenanced by ſir Iſaac Newton; who obſerves, that *water*, ſtanding a few days in the open air, yields a tincture; which, like that of malt, by ſtanding longer, yields a ſediment, and a ſpirit; but, before putrefaction, is fit nouriſhment for animals and vegetables.

But Dr. Woodward endeavours to ſhew the whole to be a miſtake: *water* containing extraneous corpuſcles, ſome of which, according to him, are the proper matter of nutrition; the *water* being ſtill found to afford ſo much the leſs nouriſhment, the more it is purified by diſtillation. So that *water*, as ſuch, does not ſeem the proper nutriment of vegetables; but only the vehicle thereof, which contains the nutritious particles, and carries them along with it, through all the parts of the plant. See *Food of* PLANTS.

Helmont, however, carries his ſyſtem ſtill farther; and imagines, that all bodies may be re-converted into *water*. His alkaheſt, he affirms, adequately reſolves plants, animals, and minerals, into one liquor, or more, according to their ſeveral internal differences of parts; and the alkaheſt, being abſtracted from theſe liquors, in the ſame weight, and with the ſame virtues, as when it diſſolved them, the liquors may, by frequent cohobations from chalk, or ſome other proper matter, be totally deprived of their ſeminal endowments, and return, at laſt, to their firſt matter, which is inſipid *water*.

Spirit of wine, of all other ſpirits, ſeems freeſt from *water*: yet Helmont affirms, it may be ſo united with *water*, as to become *water* itſelf. He adds, that it is materially *water*, only under a ſulphureous diſguiſe.

And as to ſalts, ſalt of tartar, well calcined, being laid to liquefy in the air, will depoſit an earth; and if it be then committed to diſtillation, will yield a conſiderable quantity of inſipid *water*; inſomuch that, if it be urged with a vehement fire, the ſalt will almoſt all vaniſh, and nothing ſaline remain, either in the *water*, or the earth. Whence Helmont concludes, that all ſalts might be converted into *water*. Add, that ſea-ſalt, recovered from its own acid ſpirit, and oil of tartar, reſolve into *water*, as much as oil of tartar.

Laſtly, oils run, in great meaſure, into *water*; and, it is probable, might be converted wholly into the ſame.

WATER, *no ſtandard for the weight and purity of*. *Water* ſcarce ever continues two moments exactly of the ſame weight; by reaſon of the air and fire contained therein. Thus a piece of pure limpid ice, laid in a nice balance, never continues in equilibrio. In effect, the expanſion of *water* in boiling ſhews what effect the different degree of fire has on the gravity of *water*. This makes it difficult to fix the ſpecific gravity of *water*, in order to ſettle its degree of purity; but this we may ſay in the general, that the pureſt *water* we can procure is that which, according to the experiments of Mr. Hawkſbee, whoſe determination has been uſually followed, is 850 times as heavy as air: or, according to the experiments of the hon. Mr. Cavendiſh, the thermometer being at 50° and the barometer at 29½, about 800 times as heavy as air. However, neither have we any tolerable ſtandard in air; for *water* being ſo much heavier than air, the more *water* there is contained in the air, the heavier, of courſe, muſt the air be: as, in effect, the principal part of the weight of the atmoſphere ſeems to ariſe from the *water* in it.

WATER, *properties and effects of*. 1. *Water* is a very volatile body. It is entirely reduced into vapours and diſſipated, when expoſed to the fire and unconfined.

Water heated, in an open veſſel, has been obſerved to acquire no more than a certain determinate degree of heat, whatever be the intenſity of the fire to which it is expoſed; which greateſt degree of heat is that which it has when it boils quickly. See *Fixed Points of* THERMOMETERS.

It has been often obſerved, that the degree of heat neceſſary to make *water* boil is variable, according to the purity of the *water* and the weight of the atmoſphere. Within the uſual limits of 28 and 31 inches in the barometer, Boerhaave (Chem. vol. i. p. 171), was of opinion, that there would be a variation in the heat of boiling *water*, amounting to 8 or 9 degrees. This ſubject has lately been examined with great accuracy by M. de Luc, and ſir George Shuckburg; and Mr. Cavallo (on Air, p. 215,) has given us the reſult of their experiments in the annexed table, which is formed according to the ſcale of Fahrenheit's thermometer.

Height of the barometer.	Heat of boiling *Water* according to	
	M. de Luc.	Sir G. Shuckburg.
	Deg. Pts. of a deg.	Deg. Pts of a deg.
26	205,17	204,91
26½	206,07	205,82
27	206,96	206,73
27½	207,84	207,63
28	208,69	208,25
28½	209,55	209,41
29	210,38	210,28
29½	210, 2	211,15
30	212	212
30½	212,79	212,85
31	213,57	213,69

When *water*, or other volatile bodies, are expoſed to a greater degree of heat than is ſuited to their volatility, they are in a violent ſtate; and are, therefore, apt to break any veſſels that confine them, with an exploſion ſo much more violent as they are more ſtrongly compreſſed, and are expoſed to a more violent and more ſuddenly applied heat.

2. *Water* is found the moſt penetrative of all bodies, after fire, and the moſt difficult to confine; ſo that a veſſel, through which *water* cannot paſs, may retain any thing. Nor is it any objection, that ſyrups and oils will ſometimes paſs through bodies which will hold *water*; this not being owing to the greater ſubtilty and penetration of their particles, but to the reſin wherewith the wood of ſuch veſſels abounds, to which oils and ſyrups are as menſtruums; ſo that, diſſolving the reſin, they make their way through the ſpaces left thereby: whereas *water* not acting on reſins, is retained in them.

And yet *water* gradually makes its way, even through all woods, and is only retainable in glaſs and metals; nay, it was found by experiment at Florence, that when ſhut up in a ſpherical veſſel of gold, and then preſſed with a great force, it made its way through the pores even of the gold: ſo that the moſt ſolid body in nature is permeable to *water* under certain circumſtances.

Water is even found more fluid than air; a body being reputed more fluid than another, when its parts will find way through ſmaller pores: now air, it is known, will not paſs through leather, as is evident in the caſe of an exhauſted receiver covered therewith; whereas *water* paſſes with eaſe. Again, air may be retained in a bladder, but *water* ouſes through. In effect, it is found, that *water* will paſs through pores ten times ſmaller than air will.

It muſt not be omitted, however, that M. Homberg accounts for this paſſage of *water* through the narrow pores of animal ſubſtances, which will not admit the air, on another principle; viz. its moiſtening and diſſolving the glutinous matter of the fine fibres of the membranes, and rendering them more pliable and diſtractile; which are things that the air, for want of a wetting property, cannot do. As a proof of this doctrine, he filled a bladder, and compreſſed it with a ſtone, and found no air to come out; but placing the bladder thus compreſſed in *water*, the air eaſily eſcaped. Hiſt. de l'Acad. an. 1700, p. 45.

3. *Water*, then, may even hence, viz. from its penetrative power, be argued to enter the compoſition of all bodies, both vegetable, animal, and foſſil; with this particular circumſtance, that it is eaſily, and with a gentle heat, ſeparable again from bodies it had united with: which cannot be ſaid of any other body. Fire, indeed, will penetrate more than *water*; but it is difficult to procure it again from the bodies it is once fixed in; as is evident in red-lead, &c.

This property of *water*, joined with its ſmoothneſs and lubricity, fits it to ſerve as a vehicle for the commodious and eaſy conveyance of the nutritious matter of all bodies: being ſo fluid, and paſſing and repaſſing ſo readily; it never ſtops up the pores, and leaves room for the following *water* to bring on a new ſupply of nutritious matter.

4. And yet the ſame *water*, as little coheſive as it is, and as eaſily ſeparated from moſt bodies, will cohere firmly with ſome others, and bind them together in the moſt

ſolid maſſes; though it appears wonderful, that *water*, which will be ſhewn an almoſt univerſal diſſolvent, ſhould, nevertheleſs, be a great coagulator.

Water, we ſee, mixed up with earth or aſhes, gives them the utmoſt firmneſs and fixity. The aſhes, e. gr. of an animal, incorporated with pure *water* into a paſte, and baked with a vehement fire, become a coppel; which is a body remarkable for this, that it will bear the utmoſt effort of a refiner's furnace. It is, in effect, upon the glutinous nature of *water* alone, that our houſes ſtand; for take but this out of wood, and it becomes aſhes; or out of tiles, and they become duſt.

Thus, a little clay, dried in the ſun, becomes a powder; which, mixed with *water*, ſticks together again, and may be faſhioned at pleaſure; and this dried again by a gentle fire, or in the ſun, and then baked in a potter's oven by an intenſe fire, becomes little other than a ſtone. So the Chineſe earth, whereof our porcelain veſſels are made, which hold all liquors, and even melted lead itſelf, is diluted and wrought up with *water*.

To ſay no more, all the ſtability and firmneſs ſeen in the univerſe have been aſcribed by ſome writers to *water* alone. Thus, they ſay, ſtone would be an incoherent ſand, did not *water* bind it together; and thus, again, of a fat gravelly earth, wrought up with *water*, and baked, or burnt, we make bricks, tiles, and earthen veſſels, of ſuch exceeding hardneſs and cloſeneſs, that *water* itſelf cannot paſs through them. And theſe bodies, though to appearance perfectly dry, and deſtitute of *water*, yet, being pulverized, and put in a retort, and diſtilled, yield an incredible quantity of *water*.

The ſame, it is ſaid, holds of metals; for the parings or filings of lead, tin, antimony, &c. by diſtillation, yield *water* plentifully; and the hardeſt ſtones, ſea-ſalt, nitre, vitriol, ſulphur, &c. are found to conſiſt chiefly of *water*, into which they reſolve by force of fire.

The *lapis calcarius*, or lime-ſtone, being expoſed to the fire, affords a prodigious quantity of pure *water*; and the more of this *water* is extracted, the more friable does it become, till, at length, it commences a dry calx, or lime, wherein, in lieu of the water ſo expelled, the fire, in the courſe of calcination, enters; and this is expelled again, in its turn, by pouring on cold *water*. Yet the ſame *water* and calx tempered together, produce a maſs ſcarce inferior, in point of ſolidity, to the primitive lime-ſtone.

Many, if not moſt, of the effects here aſcribed to *water* in uniting and conſolidating the parts of various bodies, have been attributed by modern chemiſts and philoſophers to the gas, or *fixable* AIR, which enters into their compoſition; which eſcapes when they are diſſolved, and which is capable in certain circumſtances, of being again reſtored to them. See LIME, and MORTAR.

5. Some have imagined, that *water* is incompreſſible, and, therefore, non-elaſtic; founding their opinion on that famous experiment above mentioned, made by order of the great-duke of Tuſcany: on which the *water*, being, as they ſay, incapable of condenſation, rather than yield, tranſuded through the pores of the metal, ſo that the ball was found wet all over the outſide; till, at length, making a cleft in the gold, it ſpun out with great vehemence.

But the validity of the inferences drawn from this Florentine experiment have been very juſtly queſtioned; Mr. Canton having proved by very accurate experiments, that *water* is actually compreſſed by the weight of the atmoſphere. See COMPRESSION.

Beſides, the diminution of ſize which *water* ſuffers when it paſſes from a greater to a leſs degree of heat, till it begins to freeze, ſufficiently ſhews, that the integrant parts of this fluid are, like thoſe of all other known ſubſtances, capable of approximation.

However, as *water* is compreſſed to any conſiderable degree with difficulty, we ſee the reaſon why blocks of marble ſometimes burſt in cold weather; and why, if a veſſel be filled with *water*, and afterwards, by any means, reduced to a leſs compaſs, the *water* burſts the veſſel, though ever ſo ſtrong. This is obſervable in a piece of braſs cannon, which, being filled with *water*, and the mouth exactly ſtopped, ſo as to prevent all egreſs of *water*, if a cold night happens, ſufficient to contract and conſtipate bodies; the metallic matter undergoing the common fate, and the *water* refuſing to give way, or giving way very reluctantly, is burſt aſunder with incredible violence.

It may be added, that a degree of cold, ſufficient to congeal *water* , or turn it into ice, does expand it. There are many ways to manifeſt this expanſion of *water* by freezing. Mr. Boyle, having poured a proper quantity of *water* into a ſtrong cylindrical earthen veſſel, expoſed it, uncovered, both to the open air in froſty nights, and the operation of ſnow and ſalt; and found, that the ice produced in both caſes, reached higher than the *water* did before it was frozen. Add, that it has been found, that the rain ſoaking into marble, and violent froſts coming on, have burſt the ſtones: and even implements made of bell-metal, careleſly expoſed to the wet, have been broken and ſpoiled by the *water*; which, entering at little cavities of the metal, was there afterwards frozen, and expanded into ice. See FREEZING, and ICE.

From the whole we may be enabled to ſettle ſomething as to the nature of the component particles of *water*; and, 1. That they are, as to our ſenſes, infinitely ſmall; whence their penetrative power.

2. Exceedingly ſmooth and ſlippery, or void of any ſenſible aſperities; witneſs their fluidity, and their being ſo eaſily ſeparable from other bodies which they adhere to.

3. Extremely ſolid.

4. Perfectly tranſparent, and as ſuch inviſible; which we gather hence, that pure *water*, incloſed in a veſſel hermetically ſealed, projects no ſhadow; ſo that the eye ſhall not be able to diſcover whether the veſſel have *water* in it or not; and in that the cryſtals of ſalts, when the *water* is ſeparated from them, loſe their tranſparency.

5. If *water* be conſidered as conſiſting of ſpherical, or cubical particles, hollow within-ſide, and of a firm texture; here will be enough to account for the difficulty of compreſſing it, and alſo for its being light, fluid, and volatile; its firmneſs and ſimilarity will make it reſiſt ſufficiently; and its vacuity renders it light enough, &c. And the little contact between ſpherules (if indeed they touch at all) will account for the weakneſs of its coheſion, &c.

Salt melted into *water*, does not fill the veſſel in proportion to its bulk: whence it follows, that there are little ſpaces between the particles of *water*, to admit thoſe of the ſalt.

6. *Water* is the moſt inſipid of all bodies; the taſte we ſometimes obſerve therein ariſing not from the mere *water*, but from ſalt, vitriol, or other bodies mixed therewith; and accordingly, all the ſapid *waters* recommended for medicinal uſes, are found to depoſit a quantity of ſome of thoſe foſſils.

7. *Water* is perfectly inodorous, or void of the leaſt ſmell. *Water*, then, neither affects ſight, taſte, nor ſmell, provided it be pure; and, conſequently, it might remain for ever imperceptible to us, but for the ſenſe of feeling.

Among the common teſts of the purity of *water*, the leaſt fallacious are, its being lighter and more fluid than impure *water*; its being colourleſs, tranſparent, and void of ſmell and taſte; its wetting more eaſily than the *water* containing metallic and earthy ſalts, called *hard* WATER, and feeling ſofter when touched; its diſſolving ſoap into a ſmooth lather, and mixing eaſily and perfectly with a ſolution of ſoap in ſpirit of wine; its boiling pulſe tender; its not changing the colour of ſyrup of violets or the juices of other blue flowers; and its mingling with alkaline and with acid liquors, with ſolution of ſulphur in alkalies, ſolution of gold in aqua regia, ſolution of ſilver, or of lead, or of mercury in nitrous acid, and a ſolution of ſugar of lead in *water*, without precipitation or change of tranſparency.

We may add, that the pureſt *waters* ſooneſt freeze; hence ice is purer than the *water* that remains unfrozen: on this principle, vinous and ſome ſaline liquors may be freed from a part of their ſulphureous *water* by gentle congelation.

Ice, expoſed to the open air, loſes of its weight, its ſuperficial parts being diſſolved or abraded by the motion of the atmoſphere. This property of ice was known to Hippocrates; who, imagining not the ice in its whole ſubſtance, but ſome of its finer and lighter parts to be diſſipated, was hence led unjuſtly to condemn both melted ice and ſnow as the moſt impure of all *waters*. Lewis, Mat. Med.

The pureſt natural *water* may, however, be rendered ſtill more pure by diſtillation; for which purpoſe let it be put into a well-tinned copper alembic, and the diſtillation promoted by a gentle fire. The firſt portion of *water* that paſſes into the receiver ſhould be thrown away, becauſe it waſhes the alembic and receiver, and is of courſe the moſt impure. When about two-thirds of *water* have nearly paſſed, the diſtillation is to be diſcontinued, becauſe the remainder is impure. The diſtilled *water*, thus obtained, ſhould be put into very clear bottles, and ſtopped with glaſs ſtopples.

Whether WATER *be convertible into air?* It has been diſputed, whether or no *water* be convertible into air; there being numerous inſtances of, at leaſt, an apparent tranſmutation. In the vapours daily raiſed, we find *water* rarefied to ſuch a degree, as to take place in the atmoſphere, and help to compoſe a conſiderable part of what we call *air*; and even to contribute to many of the effects aſcribed to the air. But ſuch a vapour-air has not the characters of true permanent air, being eaſily reducible into water again. So, in digeſtions, and diſtillations, though *water* may be rarefied into vapours, yet it is not really changed into air, but only divided by heat, and diffuſed into very minute parts; which meeting together, preſently return to ſuch *water* as they conſtituted before.

Yet *water* rarefied into vapour in an æolipile, will, for a while, have an elaſtic power, the great and laſt characteriſtic of true air, and will ſtream out perfectly like a blaſt of air: the elaſtic power of this ſtream is manifeſtly owing to nothing elſe but the heat, that expands and agitates the aqueous particles thereof; and, when the heat is gone, the elaſticity, and other aerial properties diſappear likewiſe.

Rapid winds, thus made, ſeem to be no more than mere *water*, broken into little parts, and put into motion; ſince, by holding a ſolid, ſmooth, and cold body, againſt it, the vapours condenſing thereon will preſently cover the body with *water*. Indeed, though no heat intervenes, motion alone, if vehement, may, perhaps, ſuffice to break *water* into minute parts, and make them aſcend upwards in form of air. Mr. Boyle obſerves, that between Lyons and Geneva, where the Rhone is ſuddenly ſtreightened by two rocks very near each other, that rapid ſtream, daſhing with great impetuoſity againſt them, breaks part of its *water* into minute corpuſcles, and gives it ſuch a motion, that a miſt may be obſerved at a conſiderable diſtance, ariſing from the place, and aſcending high into the air.

Mr. Cavendiſh (Phil. Tranſ. vol. lxxiv. part i. p. 128, &c.) recites ſeveral experiments, in which he converted common air into pure water, by decompoſing it in conjunction with inflammable air. Dr. Prieſtley likewiſe, having decompoſed dephlogiſticated and inflammable air, by firing them together by the electric exploſion, found a manifeſt depoſition of *water*, which, as nearly as he could judge, was equal in weight to that of the decompoſed air. He alſo made a number of other curious experiments, which ſeemed to favour the idea of a converſion of *water* into air, without abſolutely proving it. The difficulty which M. de Luc, and others, have found in expelling all air from *water*, is beſt accounted for on the ſuppoſition of the generation of air from *water*; and admitting that the converſion of *water* into air is effected by the intimate union of what is called the principle of heat with the *water*, it appears ſufficiently analogous to other changes, or rather combination of ſubſtances. Is not, ſays Dr. Prieſtley, the acid of nitre, and alſo that of vitriol, a thing as unlike to air as *water* is, their properties being as remarkably different? And yet it is demonſtrable, that the acid of nitre is convertible into the pureſt reſpirable air, and probably by the union of the ſame principle of heat. Phil. Tranſ. vol. lxxiii. part ii. p. 414, &c.

Water is diſtinguiſhed, with regard to the places where it is found, into *marina*, *ſea-water*; *pluvialis*, *rain-water*; *fluviatilis*, *river-water*; *fontana*, *ſpring-water*; *putealis*, *well-water*; *ciſternina*, that of *ciſterns*; and *paluſtris*, that of *lakes*, *moraſſes*, &c. which are each more impure and heterogeneous than the other; and with regard to its qualities, it is farther diſtinguiſhed into ſaline, ſalt-*water*, and dulcis, or FRESH-*water*.

WATER, *ſea*, is an aſſemblage of bodies, wherein *water* can ſcarce be ſaid to have the principal part: it is an univerſal colluvies of all the bodies in nature, ſuſtained and kept ſwimming in water as a vehicle.

Dr. Liſter conſiders it as the fund, or ſource out of which all bodies ariſe. He gives, in ſome meaſure, into the opinion of Thales and Van Helmont; and imagines the *ſea-water* to have been the only element created at the beginning, before any animal, or vegetable, or even before the ſun himſelf. *Freſh-water* he ſuppoſes to have riſen accidentally from the creation of theſe, and to owe its origin to the vapours of plants, the breath of animals, and the exhalations raiſed from the ſun. De Font. Med. Ang.

Dr. Halley is of another opinion. He takes it for granted, that the ſaltneſs of the ſea ariſes from the ſaline matter diſſolved and imbibed by the rivers in their progreſs, and diſcharged with their *waters* into the ocean; and, conſequently, that the degree of ſaltneſs is continually and gradually increaſing. On this hypotheſis he even propoſes a method for determining the age of the world; for two experiments of the degree of ſaltneſs, made at a large interval of time, will, by the rule of proportion, give the time wherein it has been acquiring its preſent degree. Phil. Tranſ. N° 344. See SALTNESS *of the ſea*.

Authors, who write with accuracy of *ſea-water*, diſtinguiſh it as to its degrees of ſaltneſs and virtues, according to the nature of the ſeas where it is taken, and the depths from which it was drawn up. Count Marſigli always divides the *waters* of a deep ſea into three portions; the upper, the middle, and the deep: each of theſe, according to him, reach to one third of the depth of the bed of *water* from the ſuperficies to the bottom. The upper *water* he finds greatly to differ from the lower or deep *water* in its qualities and ſtrength, but the middle portion to be always more nearly allied to one of the others; he therefore never takes any notice of the middle portion, but makes all his obſervations of the differences of *ſea-water* from the upper and lower portions.

The *ſea-water* is brighter and clearer than that of any river or pond, but this is not ſeen, as the whole body of it is viewed together, becauſe then many various colours are reflected from its ſurface; but on taking up a large glaſs of it, and ſetting it in a ſtill place, it is ſeen to have none; the whole ſeries of its colours, when viewed at ſea, being entirely owing to its motion, and the different reflections its waves have in different angles and directions.

The *ſea-water* appears indeed coloured in its ſuperficial part in ſome places, particularly about the mouths of large rivers; which is merely owing to the foul *water* of theſe rivers mixing itſelf with it; and they alſo extend themſelves a great way, and give a foulneſs to the upper part of a vaſt quantity of *ſea-water*, whoſe bottom part is all the while perfectly clear.

The *water* of the ſea, taken up at great depths, is generally clear and bright, as has been obſerved; but this is not always the caſe; for in ſome places a quantity of it taken up in very deep *water*, and that near the bottom, is found fouled in the ſame manner as the ſuperficial part is near the mouths of large rivers; and this, when ſtrictly enquired into, is found to proceed from the ſame cauſe, the mixing of a foul river *water* loaded with particles of earth, which it has waſhed off from the ſubſtances it paſſed through, and containing large quantities of blue, black, or yellow earth, all which it would ſuffer to ſubſide, if ſet by for a time in a ſtill place. Count Marſigli has proved, that as rivers burſt up in many places out of the ſurface of the dry ground, ſo they do alſo in ſeveral parts of the bottom of the ſea: in theſe places they pour in their whole body of freſh *water*, which is fouler than that of our common rivers, becauſe, in its ſubterranean paſſage, it has been ſurrounded on all parts with earth, and confined to a much fouler channel. The foul *waters* theſe mouths of rivers diſcharge from the bottom upwards into the *ſea-water*, cannot but act upon that clear liquor, in the ſame manner as the ſuperficial *waters* do on the ſurface, and both muſt be fouled alike. This author has particularly deſcribed one of theſe ſubterranean rivers opening into the ſea from his own obſervations. The clouds alſo give a ſort of coloured appearance to the ſurface of the *ſea-water*, in regard to our eye, though the *water* itſelf be really colourleſs as that of the pureſt ſpring.

As the clouds in many caſes thus evidently give colour to the *ſea-water*, in regard to our eye, ſo the ſun does the ſame thing in many others: but in all theſe caſes it is to be obſerved, that the colours are ſo far from being real, that the *water* is all the time clear, pellucid, and colourleſs; only its different reflections, from theſe different cauſes, preſent our eyes with colours, as the colourleſs glaſs priſm, or the outſide or edge of a common looking-glaſs does.

Beſide the clouds, the ſun, the foulneſs of rivers, and the different bottoms, it is certain that the winds alſo contribute greatly to give the colours we obſerve in *ſea-water*. A tempeſt in the winter ſeaſon, an hour or two before ſun-ſet, will ſhew all the colours that *ſea-water* is capable of giving, and that without any other accident whatever to aſſiſt in it.

Theſe are all the various colours and appearances that the *ſea-water* puts on in different places, and on various occaſions; and we ſee, in the whole, that theſe differences are in general owing not to the alteration in its nature, but only to its change of parts in their directions to the eye, and in their breaking one againſt another, or receiving more or leſs light, or that from a clear or from a cloudy ſky.

Count Marſigli has gone through a long courſe of experiments upon *ſea-water*, and after a thouſand tedious proceſſes has obſerved, that three liquors alone are of power to ſhew the different nature of the *ſea-water* in various places, and that very readily: theſe only need, therefore, be carried abroad by thoſe who intend to make experiments of this kind. Theſe are an infuſion of mallow-flowers in *water*, made ſo ſtrong as to be of a violet-colour, ſpirit of ſal ammoniac, and oil of tartar. The two laſt of theſe will always keep as long as there is occaſion; the other may be preſerved from decay by ſugar diſſolved in it in different quantities, according to the time it is to be kept, and the climate it is to be carried to; for this ingredient, if added in ſo large a quantity as twice the weight of the liquor, ſo as to make it a true ſyrup, does not prevent it from performing its office in theſe experiments; and in this ſtate it will keep every where, and ever ſo long. When intended for leſs ſevere trials, it may have a ſmaller proportion of the ſugar, and its effects will be then more ſudden and more manifeſt. This infuſion of mallow-flowers, mixed with *ſea-water*, turns it to a greeniſh yellow colour, like that of the chryſolite. The ſpirit of ſal ammoniac, mixed with *ſea-water*, renders it turbid and muddy, and after a time a white ſediment is formed, and ſubſides by ſmall pieces at a time to the bottom of the glaſs. Oil of tartar occaſions the ſame change, but it does it with much more violence.

By mixing theſe liquors with *ſea-water*, taken up in different places, and at various depths, we ſee the different quantity of ſalt it contains manifeſted, by the more or leſs ſudden productions of theſe changes, and by the deepneſs or paleneſs of the colour, and the quantity of matter precipitated. The common attempts of ſweetening *ſea-water* are alſo eaſily proved by this means; for the more ſalt it contains, after theſe pretended ſweetenings, the more colour or precipitation it will occaſion in theſe mixtures; and the mixing of them with it, perfectly freed from its ſalt, will produce no change at all, as is evident by mixing them ſeverally with *ſea-water* carefully diſtilled; for as this proceſs entirely robs it of its ſalt, there is no ſort of alteration made in it by the mixing of theſe liquids. Marſigli, Hiſt. Phyſ. de la Mer.

With reſpect to the temperature of *ſea-water* at different depths, it ſeems reaſonable enough to ſuppoſe, that in ſummer time it will be hotter at the ſurface than at any conſiderable depth below it, and that in winter it will be colder. It has been frequently obſerved, that the ſurface of a pool of *water*, of two feet in depth, has in a ſunny day, even in winter, been five degrees hotter than the *water* at its bottom. There have been various inſtruments contrived for eſtimating the temperature of the ſea, at different depths. Dr. Hales invented a ſea *bucket*-GAGE. The apparatus made uſe of by Mr. Wales, for trying the heat of the *ſea-water* at different depths, conſiſted of a ſquare wooden tube, about eighteen inches long, and three inches ſquare, externally. It was fitted with a valve at the bottom, and another at the top, and had a contrivance for ſuſpending the thermometer exactly in the middle of it. When it was uſed it was faſtened to the deep ſea-line, juſt above the head, ſo that all the way as it deſcended the water had a free paſſage through it, by means of the valves, which were then both open; but the inſtant it began to be drawn up, both the valves cloſed by the preſſure of the water, and of courſe the thermometer was brought up in a body of water of the ſame temperature with that it was let down to. With this inſtrument, which is much the ſame with one formerly deſcribed by Mr. Boyle, in his obſervations about the ſaltneſs of the ſea, *water* was fetched up from different depths, and its temperature accurately noticed, in different ſeaſons and latitudes. Aug. 27, 1772, lat. 24° 40′ S. the heat of the air was $72\frac{1}{2}$, of the *water* at the ſurface 70, and of *water* from the depth of 80 fathoms, 68. Dec. 27, 1772, lat. 58° 21′ S. the heat of the air was $31\frac{1}{2}$; of the *water* at the ſurface 32; and of *water* from the depth of 160 fathoms, $33\frac{1}{2}$. See Aſtronomical Obſervations made in a Voyage towards the South Pole, in 1772, 1773, &c. by W. Wales.

In a voyage to high northern latitudes in 1773, ſimilar experiments were made both with lord Charles Cavendiſh's thermometer, and with a bottle fitted properly by Dr. Irving. The bottle had a coating of wool, three inches thick, which was wrapped up in an oiled ſkin, and let into a leather purſe, and the whole encloſed in a well-pitched canvas bag, firmly tied to the mouth of the bottle, ſo that not a drop of water could penetrate to its ſurface. A bit of lead ſhaped like a cone, with its baſe downwards, and a cord fixed to its ſmall end, was put into the bottle; and a piece of valve leather, with half a dozen ſlips of thin bladder, were ſtrung on the cord, which, when pulled, effectually corked the bottle in the inſide.

The reſult of two of the experiments with this bottle is as follows: Aug. 4, 1773, lat. 80° 30′ N. the heat of the air was 32; of the *water* at the ſurface, 36; and of water fetched up from the depth of ſixty fathoms under the ice, 39. Sept. 4, 1773, lat. 75° N. the heat of the air was $66\frac{1}{2}$; of the *water* at the ſurface, 55; and of *water* at the depth of 683 fathoms, 40. See Voyage towards the North Pole, p. 142, 143. For an account of the reſult of other experiments for aſcertaining the temperature of the ſea in great depths, near the coaſts of Lapland and Norway, and of the inſtrument uſed for this purpoſe by Charles Douglas, eſq. in 1769, ſee Phil. Tranſ. vol. lx. p. 39, &c.

It appears from all theſe experiments, that when the atmoſphere was hotter than the ſurface of the ſea, the ſuperficial *water* was hotter than that at a great depth; and when the atmoſphere was colder than the ſurface of the ſea, it is evident that the ſuperficial *water* was ſomewhat colder than at a conſiderable diſtance below it.

In the year 1779, ſeveral experiments were made with great accuracy, in order to inveſtigate the temperature of the lake of Geneva, and of other lakes in Switzerland, at different depths; from which we learn, that in winter there is very little difference between the heat of the *water* at the ſurface, and at a great depth below it; but that in ſummer the ſuperficial *water* is conſiderably warmer than that which is at a great diſtance from the ſurface. The reſult of ſome of theſe experiments, reduced to Fahrenheit's ſcale, is as follows: heat of the open air variable from 37° to 40°; in the beginning of February, 1779, *water* at the ſurface of the lake of Geneva, $42\frac{1}{6}$; at the depth of 100 feet, $42\frac{1}{8}$; of 250 feet, $42\frac{1}{8}$; of 950 feet, or bottom, $41\frac{27}{48}$; in another part of the lake, open air, the ſame as before; ſurface, 42^{1}; depth of 350 feet, $42\frac{1}{6}$; depth of 620 feet, bottom, $41\frac{27}{86}$. The temperature of the lake of Neufchatel, July 17, 1779: air $75\frac{1}{7}$; ſurface, $73\frac{5}{8}$; depth, 225 feet, bottom 41. See Voyages dans les Alpes, per Horace Benedict de Sauſſure, profeſſor of philoſophy at Geneva, vol. i.

Beſide common alimentary ſalt, the *ſea-water* contains other ſalts, which are found in the bittern, or bitter brine remaining after the ſea-ſalt is extracted. Firſt, it contains a bitter purging ſalt, known in the ſhops under the name of *Epſom-ſalt*. This was firſt extracted from the Epſom, Dulwich, and other purging *waters*, but is now made only from the bittern at Newcaſtle, and other places; and it is chiefly to this bitter ſalt that the *ſea-water* owes its bitter taſte, though that has been ſuppoſed to proceed from bituminous matter contained in it, and often found on its ſurface, or lodged upon the rocks by its motion.

Another ſalt is alſo found in bittern, which is called a muriatic calcareous ſalt, its acid principle being a ſpirit of ſea-ſalt, and its baſis an earth nearly allied to quickſilver. This ſalt remains in the bittern, after the purging ſalt has been extracted from it, and though it is a neutral ſalt, it cannot be made to ſhoot in cryſtals, but may be procured in a dry form by fire; but it is very difficultly kept in this form, being, of all other ſalts, the moſt ready to imbibe the watery particles of the air, and run per deliquium.

Beſide theſe ſalts, the bittern contains a conſiderable portion of a fixed mineral alkali. Theſe principles are all found in boiling the *ſea-water* into ſalt. But beſide theſe there muſt be many other ſubſtances, which eſcape our ſearch in this manner, ſuch as the ſeeds and excrements of innumerable plants and animals, and the tinctures which thoſe plants and animals impart to it in their decay. Theſe, together with divers ſaline and ſulphureous particles, will naturally fall under the obſervation of thoſe who ſhall attempt a perfect analyſis of *ſea-water* by the nicer methods of chemiſtry; a thing yet much wanted in the learned world.

Theſe ſubſtances are found in different quantities and proportions, according to the nature of the waters; but the quantity of common ſalt is always greater than that of any other. Of this the quantity in different ſeas varies, according to the greater or leſs evaporation, and acceſſion of freſh *water*, from about one-fiftieth to near one-twentieth of the weight of the *water*. The Baltic ſea is very weakly impregnated with ſalt; the Engliſh and German ſeas more ſtrongly, and the Mediterranean ſtill more; and the *water* on the coaſt of Moſambique is ſuppoſed to be much ſalter even than this. Mem. Acad. Par. 1711.

The author of the Chemical Dictionary ſtates the quantity of common ſalt contained in *ſea-water* to be to the quantity of *water*, as 3 or 4 to 100; ſo that the *water* is far from being ſaturated with the ſalt; for *water* is capable of diſſolving nearly a fourth part of its weight of common ſalt. *Sea-water* has generally been obſerved to contain more ſalt in hot than in cold climates.

All theſe *waters* have a ſaline, and more or leſs of an acrid, bitteriſh taſte; their colour is greeniſh, and they become fetid by keeping. The acrimony and bitterneſs of theſe waters are generally attributed to the bituminous matters ſuppoſed to be contained in them; but the author of the Chemical Dictionary affirms, that he has made many experiments on large quantities of theſe ſeveral *waters*, and never could find any ſenſible quantity of bitumen. The bitterneſs therefore of theſe *waters*, he ſays, ought to be attributed to the Glauber's ſalt, which is bitter, and eſpecially to the marine ſalt with earthy baſis, which is very bitter and acrid.

Sea-water occaſions a very ſingular nauſea, which is frequently attended with vomiting. This nauſeous ingredient (ſays Bergman, Phyſ. and Chem. Eſſ. vol. i. p. 191.) is not to be found at all, or but very little, in *ſea-water* taken up at the depth of ſixty fathoms; the reaſon of which probably is, that the immenſe quantity of fiſh, worms, and other animals, which inhabit the ocean, dying, are gradually carried up to the ſurface, and there, by the aſſiſtance of the air, are deſtroyed by putrefaction; and the putrefactive proceſs is much aſſiſted by the ſalt, which, at the ſurface, is preſent preciſely in the quantity neceſſary to promote that operation.

Many attempts have been made for rendering *ſea-water* freſh and potable: they have, in general, been little elſe than different modes of diſtillation; though many of the authors of them either from an ignorance of the real nature of *ſea-water*, or from a deſign of rendering their proceſs myſterious, have mixed different ingredients with the *water* either before or after its diſtillation. The method of obtaining freſh water, from the diſtillation of *ſea-water*, was practiſed by ſir R. Hawkins, in the reign of queen Elizabeth, who thus obtained *water* that was wholeſome and nouriſhing. See Purchas's Collect. of Voyages, book vii. chap. 5.

Dr. Hales informs us, that lime was one of the ingredients which ſir Theophilus Oglethorpe, and the reſt of the patentees, in the time of Charles II. called the cement, with which they made diſtilled *ſea-water* wholeſome.

Dr. Liſter propoſes the freſhening of ſea-water by means of ſea-plants; theſe vegetables, like other plants, continually exhaling a large quantity of *water* in form of vapour, and that being all freſh, he propoſes on this baſis a diſtillation, without fire, in this manner. The body of a large ſtill, or alembic, is to be filled three parts with *ſea-water*, ſeveral freſh and growing ſea-plants are to be put into this in their growing poſture, and the head being then fitted on, and a receiver adapted to the noſe, there will be a continual aſcent of vapours from the plant, which will condenſe into *water* in the head, and this will be thence conveyed into the receiver ſweet, clear, and every way fit for drinking. The quantity thus procured, however, though conſiderable in regard to the manner of its being obtained, can be but ſmall in proportion to the wants of a ſhip's company.

Mr. Hauton therefore attempted a more general method of doing it in quantities; to this purpoſe a large quantity of *ſea-water* is to be taken up in a proper veſſel, and as much oil of tartar per deliquium is to be added to this, as will render it turbid, and cauſe a large precipitation. After this the *water* is to be diſtilled, the furnace of the ſtill being ſo contrived as to take up very little room, and conſume but a ſmall quantity of fuel; the ſea itſelf may ſerve for a worm-tub, the worm paſſing out of the ſhip, and in again at another place. When the *water* is thus diſtilled, it is to be mixed with an alkaline earth, and after ſtirring thoroughly about, the earth is to be ſuffered to ſubſide to the bottom, and the *water* poured off clear; it is then ſaid by the inventor of this ſcheme to be perfectly ſweet, and no way diſtinguiſhable from the very pureſt river *water*. Phil. Tranſ. Nº 67. or Abridg. vol. ii. p. 297.

Another method of ſeparating ſalt from *ſea-water*, without fire, is propoſed in the Philoſophical Tranſactions: take a veſſel of wax, hollow within, and every where tight; plunge into the ſea, or other ſalt *water*, and there will be made ſuch a ſeparation, that the veſſel ſhall be full of ſweet *water*, the ſalt ſtaying behind. But though this *water* hath no ſaltiſh taſte, yet a ſalt will be found in the eſſay. Phil. Tranſ. Nº 7. p. 128.

The proceſs of Mr. Appleby, publiſhed by order of the lords of the admiralty in 1734, conſiſted in mixing with twenty gallons of *ſea-water* ſix ounces of a fixed alkali, prepared with quicklime, as ſtrong as lapis infernalis, and ſix ounces of bones, calcined to whiteneſs, and finely powdered, and drawing off in a common ſtill, with a ſlow fire, fifteen gallons. Phil. Tranſ. vol. xlviii. p. 69.

Dr. Butler, inſtead of the lapis infernalis, and calcined bones, propoſed the uſe of ſoap-leys. Dr. Hales, in his Philoſophical Experiments, ſuggeſted a method of keeping the *ſea-water* cloſe ſhut up, till it has putrefied, and has again become ſweet, and then diſtilling the *water*; upon which he found that three-fourths of the *ſea-water* were freed both of the bittern and acid. He ſubjoins a particular detail of the circumſtances which may make this operation eaſy. In another place he directs for this purpoſe the uſe of powdered chalk, and ventilation, by blowing ſhowers of air up through the diſtilling *water*, by means of a double pair of bellows. See Phil. Tranſ. vol. xlix. p. 312, &c. and Treatiſe of Ventilators, part ii. p. 318, &c.

Captain Chapman, in 1757, ſucceeded in obtaining a ſupply of freſh *water*, by diſtilling *ſea-water* with wood-aſhes, inſtead of the ſoap-leys of Dr. Butler.

In 1761 Dr. Lind diſcovered, that *ſea-water* diſtilled, without the addition of any ingredients, afforded a *water* as pure and wholeſome as that obtained from the beſt ſprings; and in 1762 an account of this diſcovery was read to the Royal Society, and ſoon after publiſhed by authority of the lords of the admiralty. The practicability of this operation was alſo evinced by the author of the Chemical Dictionary. In 1765 Mr. Hoffman introduced a ſtill of a new conſtruction, with a ſecret ingredient. About the ſame time experiments were made with a ſtill of the common conſtruction, and Mr. Dove's ingredient.

The manner of procuring freſh water, by the ſimple diſtillation of *ſea-water* ſeems at preſent to have attained a great degree of perfection, both in France and England. M. de Bougainville, in his Voyage round the World, has borne ample teſtimony to the utility of the machine for diſtilling *ſea-water*, which was made public in 1763 by M. Poiſſonnier, its inventor; and lord Mulgrave, in his Voyage towards the North Pole, in 1773, has done equal juſtice to the method of obtaining freſh *water* from the ſea by diſtillation, which was introduced into the Engliſh navy in 1770, by Dr. Irving; for which he obtained a parliamentary reward of 5000*l*.

In order that the reader may have a clear notion of Dr. Irving's method, let us ſuppoſe a tea-kettle to be made without a ſpout, and with a hole in the lid, in the place of the knob; then the kettle being filled with *ſea-water*, the freſh vapour which ariſes from the *ſea-water* as it boils, will iſſue through the whole in the lid; into that hole fit the mouth of a tobacco-pipe, letting the ſtem have a little inclination downwards; then will the vapour of freſh *water* take its courſe through the ſtem of the tube, and may be collected by fitting a proper veſſel to its end. This would be an apt repreſentation of Dr. Irving's contrivance; in which he has adapted a tin, or iron, or copper tube, of ſuitable dimenſions, to the lid of the common kettle uſed for boiling the proviſions on board a ſhip; the freſh vapour, which ariſes from boiling *ſea-water* in the kettle, paſſes through this tube into a hogſhead, which ſerves as a receiver; and in order that the vapour may be readily condenſed, the tube is kept cool by being conſtantly wetted with a mop dipped in a tub of cold *ſea-water*. For a particular account of the advantages attending this method of diſtillation, contraſted againſt the defects and inconveniencies of the other methods that have been propoſed, ſee Voyage towards the North Pole, Append. p. 205, &c.

It appeared from the teſtimony which was delivered to the lords of the admiralty by many reſpectable officers, who were eye-witneſſes to an experiment made on board the Arrogant at Spithead, in January 1771, that eighty gallons of *ſea-water* did, in twenty-five minutes, after being put into the copper, and a fire made, diſtil in the proportion of twenty-five gallons per hour into freſh *water*, perfectly well taſted, and of leſs ſpecific gravity than the beſt ſpring-*water* in that neighbourhood; and the ſaid officers gave it as their opinion, that five hundred gallons of freſh *water* might be diſtilled in the ſpace of twenty-four hours, with the ſame quantity of fuel, in proportion to the time, as is required in the ordinary buſineſs of the ſhip. Every ſhip's kettle is divided into two parts, by a partition in the middle; one of theſe parts is only in uſe when peas or oatmeal are dreſſed, but *water* is at the ſame time kept in the other, to preſerve its bottom. Dr. Irving has availed himſelf of this circumſtance; and by filling the ſpare part of the copper with *ſea-water*, and fitting on the lid and tube, he has ſhewn, that ſixty gallons of freſh *water* may be drawn off, during the boiling of either of the above mentioned proviſions, without the uſe of any additional fuel. He recommends alſo the preſerving of the *water* which may be diſtilled from the coppers in which peas, oatmeal, or pudding, are dreſſed, as both a ſalutary beverage for the ſcorbutic, and the moſt proper kind of water for the boiling of ſalt proviſions. Dr. Irving particularly remarks, that only three-fourths of the *ſea-water* ſhould be diſtilled, as the *water* diſtilled from the remaining concentrated brine is found to have a diſagreeable taſte; and as the farther continuation of the diſtillation is apt to be injurious to the veſſels. For an account of ſeveral experiments made on ſome of the beſt diſtilled *water*, prepared by Dr. Irving from *ſea-water*, by Dr. Watſon, ſee his Chem. Eſſ. vol. ii. p. 168, &c.

Dr. Prieſtley has ſuggeſted a propoſal to give to this diſtilled *water* the briſkneſs and ſpirit of freſh ſpring *water*, and at the ſame time of rendering it, perhaps, a remedy or preventative againſt the ſcurvy, by impregnating it with the gas or fluid called fixed air, obtained by mixing chalk with oil of *vitriol.* See PYRMONT *water.*

We have many accounts of the methods of obtaining freſh *water* by diſſolving frozen *ſea-water*. Bartholine, in his book De Nivis Uſu, ſays, that if the ice of *ſea-water* be thawed, it loſes its ſaltneſs, as, he adds, has been lately tried by a profeſſor in our univerſity: accordingly the thawed ice of *ſea-water* is often uſed in Amſterdam for brewing. Captain Cook, in his Voyage round the world, was furniſhed with freſh *water* from the melting of the ice which was found floating in the ſea; and this *water*, he ſays, was not only freſh, but ſoft and wholeſome. See SCURVY.

Mr. Barker alſo obtained from *ſalt water*, which was left to freeze, ice that, being drained, was quite freſh. Phil. Tranſ. vol. lxvi. part ii. p. 373.

Sea-water has been found of excellent uſe againſt ſtrumous ſwellings and obſtructions of the glands, and different cutaneous foulneſſes. It has been given alſo in the true marine ſcurvy, and found to promote the cure, when aſſiſted by proper vegetables. The doſe of *ſea-water* is from half a pint to a pint, which may be repeated every morning for ſome months. In theſe doſes it gently purges the belly, promotes alſo the other excretions, and ſomewhat warms and ſtrengthens the habit; in large ones, it excites vomiting. In ſcrophulous complaints, and for removing glandular ſwellings, the bark is ſometimes advantageouſly joined with it. It is alſo ſerviceable in purging off groſs humours, that have been the conſequence of intemperance, or an inactive life; and in cleanſing the inteſtines of viſcid mucus, and worms.

This *water*, at firſt, is apt to occaſion great thirſt, which abates with the continued uſe of it, and may be palliated by ſleeping immediately after it is drank. In ſome conſtitutions it produces immoderate heat, and when uſed externally, an itching of the ſkin; and therefore in all inflammatory caſes, and habits prone to phlogoſes, it is hurtful. Theſe ſymptoms ſhould be removed, previous to the uſe of it, by bleeding, purging, and a proper cooling treatment. In many caſes bathing in *ſea-water* may be joined to the internal uſe of it; both as a general corroborant, and as a topical diſcutient and antiſeptic. Accordingly it is excellent in the ſcrophula or king's evil, in hard ſwellings, in the bite of a mad dog, in the rickets, in the dry leproſy and itch, in paralytic and ſcorbutic complaints, and many other caſes. Lewis's Mat. Med. Elliot on Min. Wat. p. 190.

Drinking *ſea-water* with wine is ſaid to prevent people from being ſick at ſea. It is ſaid, that thirſt may be allayed by bathing in warm *ſea-water*, the pores imbibing the *water*, and carrying it to the inteſtines, but not ſuffering the diſſolved ſalt to acompany the *water*.

WATER, *freſh*. See FRESH *water*.

WATER, *hard*, or *crude*, is that in which ſoap does not diſſolve uniformly, but is curdled. The diſſolving power of *hard water* is leſs than that of ſoft; and hence its unfitneſs for bleaching, dying, boiling leguminous vegetables, and for many other purpoſes of œconomy and arts. One cauſe of the hardneſs of *water* is, that it contains ſome ſalt that may be decompoſed by ſoap, the alkali of which uniting with the acid of the ſalt, the oil of the ſoap ſeparates, and the ſoap is ſaid to be curdled. Hardneſs of *water* proceeding from this cauſe may be diſcovered and remedied by adding ſome drops of a ſolution of fixed alkali. The ſalts capable of rendering *water* hard are not only ſelenites, which is a very frequent cauſe of the hardneſs of *water*, but any other earthy or metallic ſalt that may be contained in the *water*, as all theſe are capable of being decompoſed by fixed alkali. Such are the marine ſalt with baſis of magneſia, or of calcareous earth, vitriolic ſalt with baſis of magneſia, called Epſom ſalt, green vitriol, and a nitrous ſalt with earthy baſis, to which Dr. Home attributes the hardneſs of ſeveral *waters* examined by him. The hardneſs of *water* has been attributed by ſome perſons to common ſalt. But Dr. Home, in his Eſſay on Bleaching, has ſhewn, that neither pure common ſalt, nor any other ſalt with baſis of fixed alkali, give any hardneſs to *water*, but that this quality may be given to *water* by the common ſalt which is generally ſold, becauſe this contains ſome part of the earthy ſalts of *ſea-water*, or of the *water* of ſalt ſprings. The gas, which *waters* frequently contains, is another cauſe of the hardneſs of *water*. This gas unites with the alkali of ſoap, renders it mild, and thus weakens its union with the oil. By expoſure of the *water* ſome time in open veſſels, this gas exhales; by which means *water* is rendered ſoft, and any calcareous earth or iron which may be diſſolved in the *water* merely by means of the gas, as Mr. Cavendiſh and Mr. Lane have ſhewn (Phil. Tranſ. 1767 and 1769) is precipitated. See *Fixed* AIR.

By boiling, the hardneſs of water proceeding from gas may be cured, but that from earthy or metallic ſalts cannot be remedied in this way.

Spring *waters* are frequently hard; river *water* is generally ſoft. The ſmall quantity of earthy ſalts contained in rain and ſnow *waters*, according to M. Margraaf's analyſis, does not ſenſibly render them hard. Chem. Dict. Eng. edit.

Hard waters are remarkably indiſpoſed to corrupt, and even preſerve putreſcible ſubſtances for a conſiderable length of time: hence, as Dr. Home obſerves, they ſeem to be beſt fitted for keeping at ſea, eſpecially as they are ſo eaſily ſoftened by a little alkaline ſalt.

WATER, *rain*, is the *water* of the ſea purified by a ſort of diſtillation; or rather, it is the *watery* vehicle, ſeparated from the ſaline, and other matters reſiding therein, by evaporation.

Rain-water is next in purity to *ſnow*-WATER, eſpecially when collected with the ſame precautions, after the rain has continued for ſome time, ſo as to clear the air from inſects, or other light bodies, that float in it. Neither this water nor ſnow-*water* diſcover any heterogeneity in the common trials with acids, alkalies, ſoap, blue vegetable juices, or metallic ſolutions, till great part of the aqueous fluid has been ſeparated by evaporation. Evaporated to dryneſs, it leaves four or five grains of ſolid matter in the gallon. Its ſalt is often nitrous, and its earth in great part calcareous.

The *rain-water*, in ſummer, or when the atmoſphere is in commotion, it is certain, muſt contain infinite kinds of heterogeneous matter: thus, gathering the *water* that falls after a thunder-clap, in a ſultry ſummer's day, and letting it ſettle, a real ſalt is found ſticking at the bottom. But in winter, eſpecially when it freezes, the exhalations are but few, ſo that the rain falls without much adulteration; and hence, what is thus gathered in the morning, is found of good uſe for taking away ſpots in the face; and that gathered from ſnow, againſt inflammation of the eyes.

Yet this *rain-water*, with all its purity, may be filtred and diſtilled a thouſand times, and it will ſtill leave ſome fæces behind it.

WATER, *river*, on ſome occaſions, is to be eſteemed purer than that of ſprings, and next in purity to *rain-water*; and it is ſufficiently ſoft, and fit for all the purpoſes of life. Indeed, if the ſtream, in deſcending from its ſpring, chance to flow over ſtrata, or beds, wherein there is ſalt, ſulphur, vitriol, iron, or the like, it diſſolves and imbibes part thereof. Otherwiſe, *ſpring-water* becomes purer and better as it runs; for, while the river drives on its *waters* in an uninterrupted ſtream, all its ſalts, with the vegetable and animal matters drained into it, either from exhalations, or from the ground it waſhes, gradually either ſink to the bottom, or are driven to the ſhore; and hence, the ancient poets and painters repreſent the deities of ſprings and rivers, as combing and carding their *waters*.

River-waters generally putrefy ſooner than thoſe of ſprings. During the putrefaction, they throw off a part of their heterogeneous matter, and at length become ſweet again, and purer than at firſt. See PUTREFACTION *of water*.

WATER, *ſalt*. See SALT, SALTNESS, and *Sea*-WATER.

WATER, *ſnow*, is the pureſt of all the common *waters*; when produced by ſnow that has been carefully collected on the tops of mountains, or on an open plain. A gallon, ſlowly evaporated, or diſtilled, leaves only two or three grains of ſolid matter. Diſtilled water itſelf leaves nearly as much upon a ſecond, and upon repeated diſtillations; but with this difference, that the reſiduum of *ſnow-water*, like that of all the other natural ones, is browniſh and ſaline; whereas that of the diſtilled is a fine white earth, void of ſaline matter, partly calcareous, and partly indiſſoluble. *Snow-water*, kept in a warm place, in clean glaſs veſſels, not cloſely ſtopped, but covered from duſt, &c. becomes in time putrid; though in well-ſtopped bottles it remains unaltered for ſeveral years. Diſtilled *water* ſuffers no alteration in either circumſtance. The ſaline matter of *ſnow-water* is commonly of the nitrous kind, compoſed of the acid of nitre, united with calcareous earth. Lewis.

WATER, *ſpring*, is in general of all *waters* the hardeſt and moſt impure; though ſome *ſpring-waters* approach in purity to that of rain. Some, even of thoſe which the eye and palate judge to be good *waters*, contain above a hundred grains of ſolid matter in the gallon. The ſaline matter of theſe *waters* is moſt commonly nitrous or muriatic, that is, compoſed of the nitrous or marine acids, united with earths: on adding to them, by little and little, a ſolution of any alkaline ſalt, the liquor becomes turbid and milky, more, and more, till the acid, completely neutralized by the alkali, parts with all the earth, which on ſtanding ſettles to the bottom. The *water* thus corrected, though really no purer than at firſt, is found perfectly ſoft for œconomical uſes, and much leſs, if at all, detrimental to health; its pungent, auſtere, earthy ſalt, being now converted into a mild neutral one.

Spring-water, according to Dr. Halley, is collected from the air itſelf; which, being ſaturated with *water*, and coming to be condenſed by the evening's cold, is driven againſt the cold tops of the mountains; where being farther condenſed and collected, it gleets down, or diſtills, much as in an alembic.

This *water*, which before floated in the atmoſphere, in form of a vapour, being thus brought together, at firſt forms little ſtreams; ſeveral of which, meeting together, form rivulets, and theſe, at length, rivers.

The Italian phyſicians have talked much of cures performed by means of cold *water*, which they eſteemed almoſt an univerſal remedy, giving in a day fifteen, twenty, or twenty-five pounds of *water* made cold by ice, and applying at the ſame time cold water, or ſnow, to ſeveral parts of the body. By this method they treat fevers, the ſmall-pox, dropſy, &c. See Commerc. Norimb. 1736. hebd. 8. ſect. 2.

Water, when applied to animal bodies, and when nearly of the ſame heat with theſe, relaxes their ſolids, and dilutes their fluids.

With regard to the medicinal powers of *pure water*, Dr. Lewis obſerves, that ſimple fluidity, the abſence of every quality that can offend the tendereſt organ, miſcibility with all the animal juices in a ſtate of perfect health, except fat, unfitneſs to dilute and mingle with them when greatly thickened, as in ſome diſeaſes, and a diſpoſition to paſs off by the cutaneous pores more ſpeedily and more plentifully than by the kidneys, in conſequence perhaps of its total want of irritation, conſtitute the principal part of its medical character. To which may be added, that it is the moſt commodious medium for applying to the human body the powerful agents, heat and cold; of which the one expands and relaxes, the other contracts and conſtringes, all the fluid and ſoft parts of the animal machine.

Water putrefying by ſtagnation is extremely dangerous to health. Thus in the holds of ſhips, the bilge-*water*, if the ſhip is tight, and the *water* not pumped out often, ſoon becomes ſo extremely poiſonous, as frequently to ſuffocate thoſe ſeamen, who, as the pumps are ſubject to be clogged with filth, venture down to cleanſe them; and alſo to affect perſons at a diſtance with violent head-achs, cold ſweats, and frequent vomitings, which continue more or leſs, in proportion to the diſtance from the well of the ſhip when the injury was received, and the degree of putrefaction in the *water* and air. Phil. Tranſ. N° 463. p. 63.

To prevent the above mentioned inconveniences many ſchemes have been thought of, particularly the machines of Dr. Hales, and Dr. Deſaguliers; the firſt by an inſtrument, which he calls the VENTILATOR, and may not improperly be called the ſhip's lungs; and the latter by a machine, which is an improvement of the Heſſian bellows.

Putrefied *water* being thus noxious, a method of preventing its putrefaction would be very deſirable, and this ſeems now to be found in the uſe of lime. See LIME-*water*, MAGNESIA, and PUTREFACTION *of water*.

WATER, *ditch*, is often uſed as an object for the microſcope, and ſeldom fails to afford a great variety of animalcules.

This *water* very often appears of a greeniſh, reddiſh, or yellowiſh colour; and this is wholly owing to the multitudes of animals of theſe colours which inhabit it. Theſe animals are uſually of the ſhrimp-kind; and Swammerdam, who very accurately examined them, has called them, from the branched figures of their horns, *pulex aquaticus arboreſcens*. They copulate in May and June; and are often ſo numerous at that ſeaſon, that the whole body of the *water* they are found in, is ſeen to be of a red, green, or yellow colour, according to the colours of their bodies. The green thin ſcum alſo, ſo frequently ſeen on the ſurface of ſtanding *waters* in ſummer, is no other than a multitude of ſmall animalcules of this or ſome of the other kinds. Dunghill-*water* is not leſs full of animals than that of ditches; but is often found ſo thronged with animalcules, that it ſeems altogether alive; this is ſo very much crowded with theſe creatures, that it is proper to dilute it before they can be diſtinctly viewed, by adding clear *water* to it. There are uſually in this fluid a ſort of eels, which are extremely active; and beſide theſe, and many other of the common inhabitants of fluids, there is one ſpecies found in this which ſeems peculiar to it; the middle part of theſe is dark, and beſet with hairs, but both ends are tranſparent; their tails are tapering, with a long ſprig at the extremity, and their motion is ſlow and wadling. Baker's Microſcope, p. 87. See PEPPER-*water*.

WATER, *hay*. See HAY.

WATER, *uſes of*. The uſes of *water* are infinite; in food, in medicine, in agriculture, in navigation, in divers of the arts, &c.

As a *food*, it is one of the moſt univerſal drinks in the world; and, if we may credit many of our lateſt and moſt judicious phyſicians, one of the beſt too. For this uſe, that which is pureſt, lighteſt, moſt tranſparent, ſimple, colourleſs, void of taſte and ſmell, and which warms and cools faſteſt, and wherein herbs and pulſe boil and yield their virtues ſooneſt, is beſt.

Hippocrates, in his treatiſe De Aere, Aquis, & Locis, ſpeaks much in behalf of light *water*. Herodotus relates, that, among the ancients, ſome nations drank a *water* ſo very light, that all woods readily ſunk therein. And Mr. Boyle mentions ſome *water* brought out of Africa into England, which was ſpecifically lighter than ours, by four ounces in a pint, i. e. by one third.

It is eſteemed a good quality in *water*, to bear ſoap, and make a lather therewith. This our river *waters* readily do; but the pump and *ſpring-waters* are found too hard for it; yet may this be remedied in them, by barely letting them ſtand for four or five days.

It has been proved by many inſtances, that *water* alone is capable of ſuſtaining human life a long time. Phyſical writers give us many accounts of people's living four or five days on it; but the Philoſophical Tranſactions furniſh us with a much more memorable inſtance.

Some people at work in a deep coal-pit, near Liege, had the misfortune to pierce into a ſubterranean current of *water*, of ſuch force that it inſtantly filled a great part of the works. The perſon who ſtruck the blow into it was drowned, and ſome that were near the mouth of the pit eſcaped very narrowly by being drawn up; but twenty-four days after, when the mine was cleared of the *water*, and people came down to work in it again, four of the perſons, who had been ſuppoſed drowned, were found alive: they had ſaved themſelves by climbing into a place above the reach of the *water*; they had not the leaſt morſel of bread with them, but had lived all this time on the *water* of a little ſpring which broke out by them. This *water* was examined, and found to have no peculiar matter contained in it, but only the common ſparry ſubſtance found in all *water*, and that not in any abundance. Phil. Tranſ. N° 159.

We have alſo an account in the Philoſophical Tranſactions of a man who lived for eighteen years on no other aliment than *water*, and now and then, though ſeldom, clarified whey. The man was pretty healthy. See N° 466. ſect. 7.

As a *medicine*, it is found, internally, a powerful febrifuge; and excellent againſt colds, coughs, the ſtone, ſcurvy, &c. Externally, its effects are no leſs conſiderable.

In agriculture, and gardening, *water* is allowed abſolutely neceſſary to vegetation: whence Varro places it in the number of the divinities he invokes in his firſt book De Re Ruſtica. *Etiam*, ſays he, *precor*, *Lympha*, *quoniam ſine aqua omnis miſera eſt agricultura*.

The changes *water* is liable to, and the different forms it appears under, are very numerous: ſometimes as ice, then as a vapour, then as a cloud, ſhower, ſnow, hail, fog, &c.

Many naturaliſts have even maintained *water* to be the vegetable matter, or the only proper food of plants; but Dr. Woodward has overturned that opinion, and endeavoured to ſhew, that the office of *water* in vegetation is only to be a vehicle to a terreſtrial matter, whereof vegetables are formed; and that it does not itſelf make any addition to them. All *water*, he allows, contains more or leſs of this terreſtrial matter; ſpring and *rain-water* near an equal quantity; and *river-water* more than either of them. See *Food of* PLANTS.

Water is of the utmoſt uſe in chemiſtry; being one of the great inſtruments by means whereof its operations are all performed.

It acts in various manners and capacities; as a menſtruum, a ferment, a putrefacient, a vehicle, a medium, &c.

1. As a *menſtruum*, it ſeems to be capable of diſſolving a certain quantity of air; for all natural *water*, being placed under an exhauſted receiver, emits many air-bubbles; and it is well known, that large quantities of *water* are raiſed from the earth; and yet the *water*, which is thus elevated, is no more viſible in the air, than a piece of ſugar is viſible in the *water* wherein it happens to be diſſolved; nor is the tranſparency of the air injured by the *water* it has received from the earth; ſo

that the *water* is not only mixed with the air, but really diſſolved in it; a perfect tranſparency of the fluid, in which any body is diſſolved, being eſteemed the moſt unequivocal mark of its ſolution.

There are various ways by which the exiſtence of *water* in air is made apparent. If a bottle of wine be fetched out of a cool cellar, in the hotteſt and drieſt day in ſummer, its ſurface will preſently be covered with a thick vapour, which, when taſted, appears to be pure *water*; and the ſame appearance is obſerved on the outſide of a ſilver or other veſſel, in which iced *water* is put in ſummer-time. *Water* which is cooled by the ſolution of any ſalt, or even ſpring-*water*, which happens to be a few degrees colder than the air, produces a ſimilar condenſation of vapour on the outſide of the veſſel in which it is contained. Theſe and other phenomena of the ſame kind are explicable on the ſame principle. Warm air is able to retain more *water* in ſolution than cold air can; when, therefore, warm air becomes contiguous to the outward ſurface of a veſſel, containing cold liquor, it is cooled, and in cooling is forced to part with ſome of the *water* which it had diſſolved; and this *water*, ceaſing to be ſuſpended by the air, attaches itſelf to the ſurface of the cold veſſel. See EVAPORATION.

Beſides, certain bodies acquire an increaſe of weight by expoſure to the open air; thus, ſalt of tartar, and ſtrong acid of vitriol, attract humidity from the air, and derive from hence a very ſenſible increaſe of weight. The human body, alſo aquires an increaſe of weight from the *water* which the pores of the body imbibe from the air. Keil has proved, that a young man, weakened from want of nouriſhment, but in other reſpects healthy, added eighteen ounces to his weight, in the ſpace of one night, by the abſorption through his pores. Another perſon has been ſeen to gain forty pounds weight, in the ſame manner, in the ſpace of a day. M. de Haen is of opinion, that dropſical patients abſorb more than a hundred pounds weight every day. And it is ſuppoſed, that, in general, the body abſorbs more than one pound every day by the pores. The imbibition of *water* through the pores of the ſkin is an acknowledged fact: it is well known, that perſons, who go into a warm bath, come out ſeveral ounces heavier than they went in; their bodies having imbibed a correſpondent quantity of *water*. The utility of medicated and vapour baths depends partly on this principle of imbibition by the pores. Moreover, it has been ſhewn, that *water* which has loſt a portion of its air, either by being frozen, or heated, or by long continued agitation, or by other means, has the property of re-abſorbing as much air from the atmoſphere as it had loſt; and it has alſo been ſhewn, that this abſorption is the ſtrongeſt at firſt, and becomes leſs and leſs powerful, as the *water* becomes more and more impregnated with air. Such obſervations render it probable that water is as capable of diſſolving a certain portion of air, at it is of diſſolving a certain portion of any particular kind of ſalt. The quantity of air, which *water* is capable of diſſolving and retaining in ſolution, depends partly upon the temperature of the *water*, partly upon the weight of the atmoſphere, and partly, perhaps, on the *water's* purity. Hence authors have given different accounts of the quantity of air contained in water. Boerhaave infers from an experiment which he made, that there may be ſeparated from *water* a quantity of air equal in bulk to the *water*. The abbé Nollet ſays, that *water*, which has been previouſly purged of its air, abſorbs in ſix days one-thirtieth of its bulk. Dr. Hales obtained by diſtillation one cubic inch of air from fifty-four cubic inches of *water*. Mr. Eller is of opinion, that the portion of air contained in *water* does not exceed the hundred and fiftieth part of its bulk. Dr. Prieſtley found, that a pint of his pump-*water* contained about one-fourth of an ounce meaſure of air; i. e. the bulk of the *water* was to that of the air it contained, as 64 to 1. M. Fontana ſays, that the *water* of the Seine at Paris, after being long boiled, abſorbs in forty days one twenty-eighth of its bulk of common air. And Mr. Cavallo obſerves, that in a temperate degree of heat, and when the barometer is about 29½ inches, *water* abſorbs about one-fortieth of its bulk of common air. Boerh. Chem. vol i. p. 521. Hiſt. de l'Acad. 1743. Hales's Veget. Stat. chap. vi. Berl. Mem. 1750. Phil. Tranſ. for 1772, p. 248. Id. for 1779, p. 439. Cavallo on Air, p. 213. See Watſon's Chem. Eſſ. vol. iii. eſſay 3 and 5.

The ſolution of air in *water* is more ſenſible with many kinds of gas, which were till of late confounded with air. The gas which is expelled by the efferveſcence of acids and alkalies, is one of thoſe with which *water* charges itſelf in greateſt quantity. See *Fixed* AIR.

Farther, *water* diſſolves all kinds of ſalts. Air alſo ſeems to diſſolve ſalts; but it is only in virtue of the *water* it contains. Nor has any other body the power of diſſolving ſalts, farther than as it ſhares in this fluid.

The particles of ſalts, we have obſerved, inſinuate themſelves into the interſtices between the particles of *water*; but when thoſe intereſtices are once filled, the ſame *water* will not any longer diſſolve the ſame ſalt; but it will then ſtill diſſolve a ſalt of another kind, by reaſon of the different figure of the particles, which enter and occupy the vacancies left by the former; and thus it will diſſolve a third or fourth ſalt, &c.

Thus, according to Neumann, four ounces of *water*, that have been ſaturated with a dram and a few grains of alum, will ſtill diſſolve five drams of nitre, then half an ounce of green vitriol, ſix drams of common ſalt, three drams of ſoluble tartar, and five drams of ſugar. In the ſame manner alſo, four ounces of *water* ſaturated with half an ounce of nitre, will diſſolve half an ounce of white vitriol, ſix drams of common ſalt, ſix drams of ſal ammoniac, half an ounce of ſoluble tartar, and after all theſe, an entire ounce of ſugar.

Mr. Eller has publiſhed an account of the following experiments, containing the ſolutions of different ſalts in the ſame *water*. Mem. Acad. Berlin, for 1750.

In each experiment he employed eight ounces of diſtilled *water*; and found, that this quantity of *water*, when ſaturated with four ounces of nitre, diſſolved one ounce five drams of fixed alkali, and half an ounce of common ſalt; with three ounces, one dram, and one ſcruple of common ſalt diſſolved three drams of nitre, and five drams of fixed alkali; with three ounces and a half of foſſile ſalt, diſſolved half an ounce of nitre; with half an ounce of cream of tartar, diſſolved half an ounce of Sedlitz ſalt, and half an ounce of fixed alkali; with an ounce and a half of vitriolated tartar, diſſolved half an ounce of fixed alkali; with three ounces and a half of Glauber's ſalt, diſſolved two drams of nitre, and as much ſugar; with four ounces of ſoluble tartar, diſſolved half an ounce of pure nitre; with four ounces of Epſom ſalt, diſſolved half an ounce of fine ſugar; with two ounces and a half of ſal ammoniac, diſſolved five drams of foſſile ſalt; with an ounce and a half of volatile ſalt of hartſhorn, diſſolved an ounce of nitre, and half an ounce of ſugar; with four drams and two ſcruples of borax, diſſolved half an ounce of fixed alkali; with two ounces and a half of alum, diſſolved ſix drams of common ſalt, and one dram of Epſom ſalt; with nine ounces and a half of green vitriol, diſſolved an ounce and a half of Sedlitz ſalt, two drams of nitre, and three ounces of refined ſugar; with nine ounces of blue vitriol, diſſolved an ounce of nitre, three drams of common ſalt, and an ounce of ſugar; with four ounces and a half of white vitriol, diſſolved one ounce of refined ſugar.

Water diſſolves all ſaline bodies, it being the conſtituent character of this claſs of bodies, that they are uninflammable, and diſſoluble in *water*. And it may be ſaid, in general, that every body truly ſoluble in *water* is of a ſaline nature; and that no other body can be diſſolved in *water* but by means of a ſaline ſubſtance. The quantities of the ſaline ſubſtances that could be diſſolved in an ounce of *water*, with the heat of 50° of Fahrenheit's ſcale, according to experiments made by Mr. Spielman, (Inſtit. Chem. p. 48.) are as follow: terra foliata tartari, 470 grains; ſalt of Sedlitz, 384; Epſom ſalt, 324; ſalt of tartar, 240; vegetable ſalt, 212; white vitriol, 210; ſal gem, 200; ſalt of ſoda, 200; ſal ammoniac, 176; common ſalt, 170; ſalt of Glauber, 168; ſalt of Lorrain, 168; ſalt of Sylvius, 160; ſalt of Seignette, 137; blue vitriol, 124; green vitriol, 80; purified nitre, 60; ſal polychreſt of Glaſer, 40; vitriolated tartar, 30; ſublimate mercury, 30; borax, 20; alum, 14; volatile ſalt of amber, 5; arſenic, 5; crude tartar, 4; cream of tartar, 3.

Metallic matters, except the perfect metals, are acted upon by *water*; but eſpecially by the vapour of *water*, together with the concurrence of air: it converts their ſurfaces into ruſt. *Water* ſeems alſo capable of diſſolving a ſmall quantity of calcareous earth; for the moſt limpid, clear *water*, being diſtilled, always depoſits ſome part of this earth. Spirit of wine, and all ardent ſpirits of the ſame kind, may be diſſolved in *water* in all proportions. The ſpiritus rector of vegetable and animal ſubſtances, and moſt of the volatile fluids, called gas, are ſoluble in *water*. Ethereal liquors, as vitriolic, nitrous, marine, and acetous æthers, are ſoluble in *water*, in certain proportions.

Water diſſolves all ſaponaceous bodies, i. e. all alkalious ſalts and oils blended together: though oil itſelf be not diſſoluble in *water*, the admixture of ſalt herewith, rendering it ſaline, brings it under the power of *water*.

M. Beaumé has obſerved, that *water* diſſolves the moſt ſubtle and volatile parts of any oils.

Now, all the humours in the human body are apparently ſaline, though none of them are ſalt itſelf; and the ſame may be ſaid of the juices of all vegetables, excepting their oils; and accordingly they are all diſſolved in *water*.

Water diſſolves glaſs itſelf. This, being melted with ſalt of tartar, becomes ſoluble in *water*.

It diſſolves all gums, and gummous bodies: it being a characteriſtic of a gum, that it diſſolves in *water*, in contradiſtinction from a reſin.

Farther, *water*, mixed with alkali ſalts, diſſolves oil and oily bodies. Thus, though mere *water* poured on greaſy wool be repelled thereby, yet a ſtrong lixivium, or alkali ſalt, being mixed with the *water*, it readily diſſolves and abſorbs all that was greaſy and oleaginous; and thus it is that woollen cloths are uſually ſcoured.

But *water* does not diſſolve reſins; as we conceive a reſin to be no other than an inſpiſſated, or concentrated oil.

Oils and ſulphurs, *water* leaves untouched; and, what is more extraordinary, it repels them; and, by repelling, it drives the oily particles into eddies. Add that it ſeems to repel all oleaginous, ſulphureous, fatty, and adipoſe bodies, wherein oil predominates; and hence alſo it is, that the fatty parts in our bodies eſcape being diſſolved by *water*. And it is, in all probability, by this means that fat is collected in the adipoſe cells of all animals.

Nor does it diſſolve terrene or earthy bodies, but rather unites and conſolidates them; as we ſee in tyles, &c.

After diſſolving a body, the *water* unites and hardens together with it; and, if the body be of the ſaline kind, forms cryſtals, and retains the ſalts in that form.

Salts, while thus joined with *water*, aſſume various figures: the cryſtals of ſea-ſalts, e. gr. are pyramidal; thoſe of nitre, priſmatical; thoſe of ſal gemmæ, cubical, &c. But that *water* is the cauſe of theſe ſalts being in cryſtals is evident hence, that, upon ſeparating the *water*, the cryſtals are no more; their form is loſt, and their tranſparency ceaſes.

2. Without *water* there can no fermentation be raiſed. Thus, if you grind a plant into a duſt, or farina, it will never ferment, even though you add yeſt, or ſpirit of wine, thereto; but *water* being poured on it, the fermentation readily ariſes.

3. All putrefactions, both of animal and vegetable bodies, are likewiſe performed by means of *water* and air; and, without it, there could be no ſuch effect in all nature.

4. *Water* is indiſpenſably required to efferveſcence, which is an inteſtine motion ariſing between contrary ſalts; for no ſuch motion can ariſe from a mixture of contrary ſalts, unleſs there be *water* to diſſolve and keep them in ſolution.

5. A farther uſe is in making ſeparations of oily from ſaline parts, which is a thing of the laſt ſervice: thus, any oleaginous ſubſtance, incorporated with ſalt, being ſhaken ſome time in a proper quantity of *water*, the ſalts, diſſolving, will be extracted from the oil, and imbibed by the *water*; and thus is the body dulcified. So butter, by a continued lotion in fair *water*, becomes inſipid; and aromatic oils, agitated a long while in warm *water*, lay aſide their ſaline ſpirituous parts, and become inert and inodorous.

Spirit of wine, mixed with oil, makes one body therewith; but if you pour *water* thereon, it will repel the oil, and draw all the ſpirit to itſelf: nay, frequently, what the ſpirit had diſſolved in other bodies, *water* will ſeparate from them, by diluting the ſpirit, and letting the other matters precipitate.

6. *Water* is of great ſervice in directing and determining the degree of fire or heat. This was firſt diſcovered by M. Amontons, from an obſervation, that *water* over the fire grows gradually more and more hot, till it comes to boil; but then ceaſes to increaſe, and only maintains its preſent degree of heat, even though the fire were ever ſo much enlarged, or were continued ever ſo long. This, therefore, affords a ſtandard, or fixed degree of heat, all over the world; boiling *water*, providing it be equally pure, being of the ſame heat in Greenland, as under the equator. See WATER, ſupra, and *Fixed points of* THERMOMETERS.

By means hereof they make baths of divers degrees of heat, accommodated to the various occaſions.

Water is of the utmoſt uſe in divers of the mechanical arts and occaſions of life; as, in the motion of mills, and other machines. *Water*, by its fall, may be made to afford wind enough to blow a fire. This is practiſed in the braſs-works of Tivoli, near Rome. And the laws, properties, &c. of this fluid, with reſpect thereto, as its motion, gravitation, preſſion, elevation, action, &c. and the conſtruction of divers engines ſubſervient thereto, or founded thereon, as ſiphons, pumps, &c. make the ſubject of *hydraulics* and *hydroſtatics*.

Water may be uſed with good ſucceſs in taking the height of any acceſſible object, as it naturally becomes parallel to the horizon. The manner of performing this operation is exactly the ſame as with a MIRROR.

The quantity of *water* on this ſide our globe, Dr. Cheyne ſuſpects to be daily decreaſing; ſome part thereof "being continually turned into animal, vegetable, metalline, or mineral ſubſtances; which are not eaſily diſſolved again into their component parts." Philoſoph. Princip. of Relig.

WATER, in *Geography* and *Hydrography*, is a common, or general name, applied to all liquid tranſparent bodies, gliding or flowing on the earth.

In this ſenſe, *water* and earth are ſaid to conſtitute our terraqueous globe.

Some authors have raſhly and injuriouſly taxed the diſtribution of *water* and earth in our globe as unartful, and not well proportioned; ſuppoſing that the *water* takes up too much room.

An inundation, or overflowing of the *waters*, makes a DELUGE.

WATER, in *Natural Hiſtory*, &c. is diſtinguiſhed into *pure*, called alſo *elemental*, *mineral*, and *artificial* or *factitious*.

As to the *pure*, we have already obſerved, that there is, perhaps, none abſolutely ſo.

WATERS, *mineral*, are thoſe which contain ſuch, and ſo many, particles of different natures from *water*, as thence to derive ſome notable property beyond what common *water* has; or *mineral waters* are thoſe which have contracted ſome peculiar virtue, by paſſing through beds of minerals, as alum, vitriol, ſulphur, &c. or by receiving the fumes thereof.

Or, they are ſuch, in which gas, or ſulphureous, ſaline, or metallic ſubſtances, are diſcovered by chemical trials; and as many of them are employed ſucceſsfully in medicine, they are alſo called *medicinal waters*.

The ſubſtances generally found in *medicinal waters* are almoſt always combinations of vitriolic acid, and thoſe of marine acid, together with the ſeveral matters that theſe acids are capable of diſſolving.

The following combinations of vitriolic acid are found in *mineral waters*; viz. volatile ſulphureous acid, which ſeldom occurs; ſulphur, found ſometimes ſingly, but generally formed into a liver of ſulphur by means of calcareous earth, or of mineral alkali; vitriolic ſalts with earthy baſis, which ſalts are frequently ſelenitic; i. e. their acid is combined with a calcareous earth; or they are of the nature of Epſom ſalt, the baſis of which is magneſia; ſometimes, but not ſo often, they are aluminous, when their acid happens to be united with an argillaceous earth; vitriols, as martial vitriol, which is frequently contained in *mineral waters*; vitriol of copper, ſometimes but ſeldom, and vitriol of zinc ſtill more rarely, found in theſe *waters*; the vitriols of other metallic ſubſtances are ſcarcely ever, except in ſingular caſes, found in *water*. Laſtly, vitriolic ſalts with baſis of fixed alkali; this is always Glauber's ſalt; for neither vitriolated tartar, nor vitriolic ammoniacal ſalt, are ever found, unleſs by ſome ſingular accident, in *mineral waters*. The combinations of marine acid that are contained in *mineral waters* are common ſalt, and marine ſalt with earthy baſis.

As to the manner by which *mineral waters* become impregnated with their ſeveral principles, we may obſerve, that the ſelenitic parts of *water* are received by this fluid while it flows through gypſeous earth and ſtones; theſe being compoſed of ſelenites, which is ſoluble in *water*: the mines of ſal gem furniſh the *waters* that flow through them with the common ſalt that they contain; and when *water* once contains common ſalt, it may become impregnated with Glauber's ſalt by paſſing through clay; the vitriolic acid, that is always contained in argillaceous earths, decompoſing a part of the common ſalt of the *water*, with the baſis of which it forms the Glauber's ſalt, while the marine acid, now diſengaged, will unite with the firſt calcareous principles that occur, and form a marine ſalt with earthy baſis, which is accordingly always found in ſea-*water*, and ſalt ſprings. When *water* impregnated, or not, with ſaline principles, flows through parts of the earth containing pyrites in a decompoſed ſtate, it becomes impregnated with ſulphur, with martial vitriol, vitriol of copper, alum, and other ſalts, and frequently with ſeveral of theſe ſubſtances at the ſame time, according to the nature of the PYRITES. The heat of hot *mineral waters* can be only acquired by waſhing large maſſes of pyrites, and other ſimilar minerals, in a ſtate of ſpontaneous decompoſition, during which they always acquire conſiderable heat. Finally, the aerial gas, or fixed air, of ſome *mineral waters* may have been diſcharged from ſome of the principles with which the *water* is impregnated, which were in the act of combination with each other at the time they were diſſolved by the *water*, or which were combined after this ſo-tion. For it is known, that in almoſt all ſolutions much air is extricated; and this air, being diffuſed among the particles of *water*, adheres to them, and in ſome meaſure combines with them ſuperabundantly. This gas, which gives the ſparkling and inebriating qualities to many *mineral waters*, does not differ from the vapour extricated from effervesſcing and fermenting ſubſtances. The honourable Mr. Cavendiſh has diſcovered that, by means of gas, and without the intervention of any acid, calcareous earth is diſſolved in ſome *mineral waters*. He found, that the quantity of this gas contained in Rathbone-place *water*, relatively to the quantity of calcareous earth contained in that *water*, was about twice as much as is uſually combined with an equal quantity of calcareous earth; and that the earth might be precipitated from this *water* by driving off the gas by heat, or by abſorbing it by the addition of lime-*water*.

Mr. Lane alſo diſcovered another inſtance of the diſſolving power of gas upon iron, and has ſhewn the probability that this metal is diſſolved in many *mineral waters* by means only of that gas. He found, that pure diſtilled *water*, having been impregnated with the gas ariſing from effervesſcing or fermenting ſubſtances, was rendered capable of diſſolving a ſenſible portion of iron; and that this artificial chalybeate *water*, by expoſure to air, loſt entirely its property of tinging an infuſion of galls. As ſeveral chalybeate *mineral waters* do alſo by expoſure to air entirely loſe their property of tinging an infuſion of galls; and as *waters* containing iron diſſolved by means of vitriolic acid, though a conſiderable ſediment is depoſited from them, do never entirely loſe this property; he infers, that the former kind of *waters* receive their chalybeate impregnation by means, not of an acid, but of this gas. He farther ſhews, from experiments, that iron cannot be ſo entirely precipitated from its ſolution in any of the mineral acids by means of mild alkalies, or mild calcareous earth, that this ſolution ſhall loſe its power of tinging an infuſion of galls; but that the iron may be ſo perfectly precipitated from the above mentioned ſolutions, by means of cauſtic alkali, or of lime-*water*; and hence he infers, that, in the former caſe, the portion of iron that is not precipitated, is kept ſuſpended or diſſolved by means of the gas extricated by the acid of the ſolution from the mild alkali or earth. See *Fixed* AIR.

The analyſis of *mineral water* is an operation of great importance, in order to a diſcovery of the nature and properties of the ſubſtances which they contain. No traces of the art of accurately examining *waters*, with regard to their contents, that are worthy of obſervation, occur till the ſeventeenth century. Tabernæmontanus, or Jacob Theodore, about the end of the ſixteenth century, enumerates a variety of the *waters* of Germany, but gives no analyſis of them; and Andrea Bacci, an Italian phyſician, in 1596, makes no mention of analyſes of this kind, though he wrote more accurately than any of his predeceſſors on the ſubject of *waters*. It appears, that Mr. Boyle, in 1663, had diſcovered the uſe of ſeveral precipitants, which he enumerates in his experiments on colours, printed in 1663. In 1667, M. Dom. du Clos attempted to examine all the *waters* of France, for which purpoſe he made uſe of various precipitants; and he alſo examined the reſiduum after diſtillation, inveſtigated its figure by the microſcope, its flavour, and its ſolubility in *water*, and put its properties to the teſt of hot iron. See his Examin. des Eaux Min. In 1680, ſome remarkable experiments on this ſubject, made by Urbanus Hierne, were publiſhed in Sweden. In 1685, Mr. Boyle propoſed a number of ſubſtances for the more accurate examination of *waters*; and the ſubject was proſecuted by Nic. Valerius, a Swede, in 1697. About the beginning of the preſent century other ſubſtances were introduced by D. Regis, Didier, Boulduc, and Burlet; and Geoffroy made ſome improvements in the apparatus for diſtillation, ſubſtituting broad open glaſs veſſels for the cloſe retorts that had been uſed before the year 1707.

Upon the whole it appears, that the principal precipitants at preſent known were in uſe at leaſt from the middle of the ſeventeenth century; but the concluſions drawn from an obſervation of their effects were generally unſatisfactory, and often falſe. Alum was long ſuppoſed to be preſent in *waters*; but this was contradicted by du Clos, who mentions a certain ſalt, ſimilar to gypſum. Allen was perhaps the firſt who obſerved in *waters* a ſalt conſiſting of vitriolic acid and lime, which he calls ſelenite. Hierne firſt obſerved natron, or mineral alkali, in the acidulous *waters* of Egra; and Hoffman afterwards diſcovered it in ſeveral medicated ſprings. The nature of this ſubſtance was accurately explained by Boulduc in 1729. The ſal catharticus amarus, or vitriolated magneſia, was in high eſteem at Epſom, from the year 1610, and found in ſeveral *waters*; but its real compoſition was unknown, till Dr. Black, in 1755, accurately examined the nature of magneſia, the preſence of which, in union with fixed air, was afterwards diſcovered in ſeveral *waters*. In 1682, Liſter diſcovered lime in *waters*; and he affirms, that the two ſalts from which *mineral waters* derive their virtues, are common ſea-ſalt, and nitrum calcarium. Le Roy, in 1752, found ſalited lime in the laſt lixivium; Margraaf diſcovered ſalited magneſia in 1759; and Home nitrated lime in 1756.

In the beginning of this century, Hoffman attempted to eſtabliſh a new theory of *mineral waters*, denying that there is in the acidulous *waters* any true acid; and inſiſting, that they are alkaline; the alkali originating from a ſpirit of ſulphur, which, according to the degree of its ſubtlety, would form with lime an alkali, either fixed or volatile; but Henckel thinks the alkali is derived from common ſalt. Dr. Seip ſuppoſes, that the genuine mineral ſpirit is the volatile vitriolic acid. In 1748, Dr. Springfield affirmed, that air was the cauſe by which the contents of the ſubtile *waters* were kept in a ſtate of perfect clear ſolution, which was confirmed by M. Venel in 1755; and by later experiments it has been ſufficiently proved, that the genuine mineral ſpirit of *mineral waters* is *fixed* AIR; and that different ſalts, in different proportions, determine the different ſpecies of theſe *waters*. See on the hiſtory of the analyſis of *waters*, Bergman's Phyſ. and Chem Eſſ. vol. i. p. 91, &c.

Previous to the operation of analyſing *mineral water*, it will be proper to examine the ſituation of the ſpring, and the nature of the ſoil; to obſerve the ſenſible qualities of the *water*, as its ſmell, taſte, and colour; to aſcertain its ſpecific gravity and heat by an hydrometer, or hydroſtatical balance, and by the thermometer; and to notice the changes that are ſpontaneouſly produced upon the *water* in cloſe and open veſſels, and with different degrees of heat; and if by theſe means any matter be cryſtallized or depoſited, it muſt be ſet apart for farther examination. Experiments of this kind are beſt made near the ſpring, if poſſible.

The operation of analyſing, or decompoſing the *water*, may be performed either without addition, and merely by evaporation and diſtillation, or with the addition of other ſubſtances, by means of which the matters contained in the *water* may be precipitated and diſcovered. It is not material which of theſe two methods be firſt practiſed; but an accurate analyſis requires that both of them ſhould be employed. If we begin by evaporation and diſtilling, theſe operations muſt ſometimes be interrupted, that the ſeveral principles which ariſe at different periods of the diſtillation may be obtained and examined ſeparately; and alſo to allow the ſeveral ſalts that may be contained to cryſtallize by evaporation, and by cold. The dry matter left in the retort after diſtillation is to be boiled in ſix times its own weight of pure diſtilled *water*: this being afterwards filtered and ſet to cryſtallize, will give, after a proper evaporation, its own peculiar ſalt in cryſtals; and if more ſorts of ſalts than one ſhould be contained in the *water*, they will be all thus ſeparated by repeated evaporations and cryſtallizations.

Whether theſe ſalts be acids or alkalies, is eaſily found by the common experiments, the acid turning ſyrup of violets red, and the alkali turning ſolution of corroſive ſublimate yellow. The neutral ſalts, waſhed out of the earth by *waters*, are chiefly ſea-ſalt, and ſuch as conſiſt of a vitriolic ſalt, and a ſalt or earth of an alkaline nature. Sea ſalt is diſcovered by its taſte, by the white fume it yields on being mixed with oil of vitriol, and by its figure in cryſtallization; and the other neutral ſalts are diſcovered by their property of producing, or regenerating ſulphur, upon being mixed and melted with ſalt of tartar, and powdered charcoal. Thus, if two ounces of ſuch ſalt be mixed with one ounce of ſalt of tartar, and an ounce of powdered charcoal, and the whole put into a crucible, there will be produced a reddiſh-coloured maſs of a ſulphureous alkaline taſte, and giving a high yellow colour to ſpirit of wine, which will turn ſilver black: and being precipitated by an acid, affords a true lac ſulphuris, which may be ſublimed, and melted into brimſtone like the common.

What remains of the reſiduum, after *water* has ſeparated the ſalt, is properly earth: this is often of more kinds than one, and may be ſeparated by repeating waſhings into bole, ochre, ſand, and whatever elſe it conſiſts of; and theſe may afterwards be tried, as to their nature, by fire in the common ways, the firſt and readieſt of which is the ſeeing whether they will calcine or vitrify; and the next, with proper additions, to try whether they contain any metalline or mineral particles, which may be ſeparable by the ſeveral fluxes; and if the quantity of metalline matter be too ſmall to be collected into a regulus, or ſhew itſelf in the common way, it may be melted with cryſtalline glaſs, and from the colour it gives that glaſs, the metal it contains may be known. See *Concrete* JUICES.

In order to form a right judgment of *mineral waters*, the analyſis of them muſt be confirmed by ſyntheſis. For this purpoſe the pureſt ſnow-*water*, gently diſtilled, and freed from empyreuma, by ſtanding in the open air, ſhould be employed; and when the hetrogeneous matters which have been diſcovered are added in due proportion, the artificial *water* ſhould be preciſely like the natural in every circumſtance.

We ſhall here ſubjoin ſome of the moſt obvious and ſamiliar methods of analyſing, or diſcovering the nature of *mineral waters*, without decompoſing the *waters* by evaporation or diſtillation.

Mineral waters are known to contain iron, by their exhibiting a purple or black colour, with the infuſion of galls; the quantity of iron being determined by the deepneſs of the colour. The iron is alſo diſcovered in theſe *waters* by their ſtriking a blue colour with a ſolution of fixed alkaline ſalts that have been calcined with animal coals, or with a tincture made by digeſting Pruſſian blue in volatile alkaline ſpirits. This phlogiſticated alkali, ſays Bergman, is beſt prepared from four parts of Pruſſian blue, boiled with one part of alkali, in a ſufficient quantity of *water*; the clear liquor, ſaturated with an acid, muſt then be freed by filtration from the ſmall portion of Pruſſian blue which is ſeparated. The method by vegetable aſtringents, as galls, ſerves to diſtinguiſh minute portions of iron, provided the liquor contains no more acid than is ſufficient to keep the metal diſſolved; but if the quantity of acid is very large, aſtringents give no notice of the iron; whereas the tincture of Pruſſian blue diſcovers it univerſally. If the iron be held in ſolution by fixed air, the latter will fly off on expoſing the *water* in an open veſſel, and then the iron will fall to the bottom in the form of a yellowiſh or reddiſh brown powder, or ochre; but if the iron be held in ſolution by the vitriolic acid, in the form of green vitriol, or copperas, this precipitation of ochre does not happen. Some chalybeate *waters* reſemble a ſolution of vitriol of iron in common ſpring-*water*; ſtriking a blue or black colour with galls, depoſiting ſome of their iron in form of an ochre, and retaining part of it for a length of time, and yielding, in evaporation, a ſaline matter, which communicates a ferruginous impregnation to freſh *water*, and which appears to be a true vitriol of iron. Other *waters* reſemble a ſolution of the ſame vitriol, with an admixture of the mineral fixt alkaline ſalt; and like ſuch a mixture, according to the diſcovery of Mr. Reynolds, they ſtrike, when freſh, a purple colour with galls, ſoon depoſit the whole of the iron, and yield, on evaporation, not a vitriol or chalybeate ſalt, but a ſalt compoſed of the acid of vitriol and alkali, and ſometimes a little pure alkali, beſides that which is ſatiated with acid. In general, a blue or black colour, produced with galls, may be regarded as a mark of the abſence of alkaline ſalt; and a purple, as a mark that either the *water* originally contained an alkali, or has become alkaleſcent, or verging to putrefaction, by ſtanding. Chalybeate *water* may be known to be vitriolic by its auſtere, ſtyptic taſte.

The vitriol of copper, or copper diſſolved by any acid, may be diſcovered by adding ſome of the volatile ſpirit of ſal ammoniac, which produces a fine blue colour, or by the addition of clean iron, upon the ſurface of which the copper is precipitated in its metallic ſtate. If any portion of diſengaged acid or alkali be contained in *water*, it may be known by the taſte, by changing the colour of ſyrup of violets, or tincture of turnſole, and by adding the preciſe quantity of acid or alkali that is neceſſary for the ſaturation of the contained diſengaged ſaline matter. When the *water* contains an acid, the addition of ſyrup of violets, or tincture of turnſole, produces a red colour, and changes the colour of paper tinged by ſaturated tincture of turnſole, with a little ſtarch boiled in it, into red. A ſingle grain, ſays Bergman, of highly concentrated vitriolic acid, communicates a viſible red tinge to 172,300 grains, or 408 cubic inches, of the blue tincture of turnſole. The vitriolic acid may be diſcovered in any combination, by mixing with the matter to be examined any inflammable ſubſtance, and expoſing it to a red heat, in which caſe the leaſt particle of the acid will be rendered ſenſible by the ſulphur, or by the volatile ſulphureous acid thence produced.

The ingenious Dr. Percival, in his Eſſay on *Water*, has demonſtrated, that the vitriolic acid, when the ſalt containing it is in a ſtate of ſolution in *water*, is ſeparable by a boiling heat, and that thus the hardeſt *waters*, owing this quality to that ſubſtance, might be rendered ſoft.

If the addition of ſyrup of violets to *water* changes it to a bright green, it ſhews that an alkaline ſalt is contained in the *water*. However, when the *water* is firſt taken up from the well, the alkaline ſalt is uſually ſaturated with fixed air, and therefore does not change the ſyrup green. It is, indeed, often ſuper-ſaturated with fixed air, and therefore turns the ſyrup red. But the air ſoon flies off on expoſure, and the above effect is produced; the *water* is alſo found ſofter than the common *water*, and lathers better with ſoap. But earthy and metallic ſubſtances alſo change ſyrup of violets green. In order to aſcertain the foſſile alkali, add a little fixed alkaline ſalt, and if no powder falls to the bottom, and the *water* does not become turbid, it may be concluded that the *water* is impregnated with the foſſile alkali. The paper tinged with tincture of turnſole, already mentioned, after being made red by diſtilled vinegar, ſerves to diſcover alkalies, by recovering its blue colour more or leſs completely; or the blue colour of the paper is heightened by the alkali. Thus, alſo, the watery tincture of Braſil wood is red, but readily takes a blue colour from alkalies; paper ſteeped in this tincture, with a little ſtarch boiled in it, is alſo red, and equally fit for this purpoſe. Acids induce a yellow colour upon paper, tinged by Braſil wood, and reſtore immediately the original red colour to the paper which has been made blue by alkalies. Watery tincture of turmeric is more or leſs changed to a brown by alkalies; and paper tinged by this tincture, and ſtarch, poſſeſs the ſame property with the foregoing. When *waters*, ſtrongly impregnated with fixed air, are firſt taken up from the fountain, they change ſyrup of violets red. As the air flies off, this redneſs diſappears; and if the *water* contained an alkali, it will, on the farther eſcape of the fixed air, turn green. If *water* contains ſea-ſalt, oil of vitriol dropped into it will cauſe white noxious fumes to ariſe: if a ſufficient quantity of the oil of vitriol be added, and the *water* evaporated, a true Glauber's ſalt will remain inſtead of the ſea-ſalt; the reſiduum of theſe *waters* crackles and flies when placed on a red-hot iron. Common ſalt contained in *waters*, forms, with a ſolution of ſilver in nitrous acid, a white precipitate, or luna cornea; and may alſo be known by its cryſtallization. Marine ſalt with earthy baſis produces the ſame effect upon ſolution of ſilver, and alſo forms a precipitate, when fixed alkali is added; the acrimony, bitterneſs, and deliqneſcency of this ſalt, ſerve to diſtinguiſh it. Glauber's ſalt is diſcovered in *waters* by adding a ſolution of mercury in nitrous acid, and forming with it a turbith mineral; or by cryſtallization; or by adding a ſolution of fixed alkali, which will make the *water* turbid, and the earthy baſis of the ſalt will fall to the bottom in the form of a white powder. Vitriolic ſalts with earthy baſis may be diſcovered in *water*, by either of the methods juſt recited.

Any metallic ſubſtance, diſſolved in *water* by any acid, may be diſcovered in *mineral waters*, by adding ſome of the liquor ſaturated by the colouring matter of Pruſſian blue, which produces no effects upon any neutral ſalts with earthy or alkaline baſes, but decompoſes all metallic ſalts; ſo that if no precipitate be formed upon adding ſome of this liquor, the *water* contains no metallic ſalt; but if a precipitate is formed, the *water* does contain ſome metallic ſalt.

Sulphur, and liver of ſulphur, may be diſcovered in *waters* by their ſingular ſmell, and by the black colour which theſe ſubſtances give to white metals, or to the precipitates, but eſpecially to ſilver. Bergman obſerves, that the preſence of ſulphur in certain *waters* of the fetid kind may be detected by adding a ſmall quantity of concentrated nitrous acid, which corrects and finally deſtroys the fetid ſmell, and precipitates the ſulphur.

If *water* contains an earth deprived of fixed air, it may be diſcovered by adding fixed air to it; for then the *water* will become turbid, and the earth fall to the bottom. But if it contains an earth ſuperſaturated with fixed air, drawing part of it away by the air-pump, or expoſing the *water* to the air, or to warmth, it will alſo precipitate the earth. Bergman informs us, that if the ſmalleſt portion of calcareous earth, or lime, combined in any manner whatever, be contained, even in a large quantity of *water*, a ſmall cryſtal of the *acid* of SUGAR, no larger than the head of a pin, being dropped into it, will produce ſky and clouds, cauſed by a precipitate formed of the calcareous earth, combined with the acid, and which is inſoluble in *water*. Scarce any *water*, he ſays, is perfectly free from calcareous earth; and even with reſpect to that which is the pureſt, this teſt is ſo ſenſible, that when the *water* has ſtood twenty-four hours after it has been dropped into it, it will preſent ſome appearance of this peculiar precipitate. A combination of the ſaccharine acid, with an alkaline ſalt, produces the ſame effect ſtill more ſenſibly, in conſequence of a double affinity. No acid, alkaline, or earthy body whatever, is capable of decompounding the compound thus formed of the ſaccharine acid, and calcareous earth. Finally, *water* may be known to contain fixed air by its ſparkling, on being poured from one veſſel to another, by the exploſion which follows its being ſhook in a phial half filled with it, and by the bubbles which ariſe when placed over the fire, long before it is hot enough to boil.

Waters of this kind alſo precipitate lime from lime-*water*, on admixture with the latter, and corrode, and even diſſolve iron, when freſh taken up. See WATER, ſupra. See alſo, for various teſts of *waters*, ACIDULÆ.

As to the uſe of *mineral waters*, the learned Heiſter obſerves, that in general they are found to agree much better with perſons in the middle ſtages of life than with the very old or very young. If any general rule can be given in this caſe, it is that people ſhould not take them when younger than eighteen, or when older than ſixty. Young people, eſpecially ſuch as are under ten years old, ſhould by no means be allowed to drink the chalybeate *waters*, becauſe of the tender ſtate of their viſcera; and older people than thoſe of ſixty are never found to receive any benefit from them, unleſs they are of very robuſt conſtitutions, or have been long accuſtomed to the drinking of them. In ſome caſes, however, particularly in hectics, young people may be allowed to drink the milder kinds mixed with an equal quantity of milk, and often find great benefit from them.

In confirmed conſumptions, and ulcers of the lungs, the ſtronger chalybeate *waters* are found to do no ſort of ſervice, but rather hurt; but in caſes where the ulcers are but beginning, the drinking of the weaker ones with milk has been known to do great good. In ſpittings of blood ariſing from ulcerations of the lungs, the ſtronger cold chalybeate *waters* do nothing but harm; but in the ſame caſes, where the milder kinds are taken warm, and mixed with an equal quantity of milk, they are found to be very beneficial. They muſt never be taken in caſes of dyſenteries, in confirmed dropſies, nor where there is a ſtone in the bladder or kidneys; but in œdematous ſwellings of the legs and feet, they are often found highly uſeful. In venereal caſes, whether recent, or of long ſtanding, they do not cure, but they diſpoſe the body the more readily to be cured; but in a ſimple gonorrhœa, where there is no venereal taint, they have been often known to cure, when all other methods have failed.

Method of taking them. All people who are of a plethoric habit ought to be blooded before they begin to take them; for by this means there is a freer acceſs given them into the veſſels, and they become much more able to correct the whole maſs. Perſons who are not of a plethoric habit have no occaſion to bleed before they take them, but all ought to take a gentle purge to clear the primæ viæ; and to this purpoſe nothing is more proper than the common purging ſalts of Epſom, or Glauber's; but all the draſtic purges are carefully to be avoided on this occaſion, ſuch as ſcammony, reſin of jalap, and the like. If there be indications for vomiting in the patient, ſuch as pains, and a ſenſation of weight at the ſtomach, with bitterneſs in the mouth, nauſeas, and reachings to vomit, then it is extremely proper to give, a day or two before the beginning of the courſes of the *waters*, a gentle doſe of ipecacuanha.

Time moſt proper. The beſt hour of drinking them is early in the morning; ſix or ſeven o'clock is very proper, becauſe they then have time to finiſh their operation before dinner, but earlier than this is not ſo proper; and thoſe who go to the wells or ſprings at three or four in a morning, are expoſed to all the injuries of a cold and damp air, which prevents perſpiration, and often brings on coughs and other diſorders of the breaſt and head. It was formerly a cuſtom to drink them in an afternoon, but this is at preſent left off, as found to produce many diſorders of the ſtomach; and ſuch as are deſirous of having the utmoſt effects of the *waters*, content themſelves at this time of the day with drinking them at home in ſmall quantities, and mixed with wine.

Seaſon moſt proper. The ſummer is the ſeaſon in which the *mineral waters* are to be drank with the greateſt advantage. The months of June, July, and Auguſt, are more proper for the taking of them than any other time of the year; but upon urgent occaſions, the courſe of them may be begun in May, and continued till September; and in ſome extraordinary caſes, the uſe of them may be allowed even in winter.

Method of drinking them. It is always proper to begin the uſe of them by ſmall quantities, and gradually increaſe them to larger. Thus the firſt day it may be proper to drink about a pint and a half at four draughts; the ſecond day a quart may be drank; and on the third or fourth, three pints: after this the quantity may be increaſed to two quarts a day, and more than this it is not proper to take, unleſs the perſon be of a very robuſt habit; for many people have injured themſelves by taking too large quantities. The quantity that is taken as the moſt the ſtrength will bear, whether it be two, three, or four pints, is to be continued every day for a fortnight or three weeks, or longer, if the nature of the diſeaſe requires it; and when the courſe is to be finiſhed, it muſt be done in the ſame manner in which it was began, by taking leſs and leſs every day, till the uſe is gradually worn off, and no purge or other medicine is neceſſary afterwards.

The *mineral waters* in general operate in ſome conſtitutions by ſtool, and in others by urine ſingly; but in moſt they operate both ways together. Theſe are both very proper ways of excretion, and whichever nature chooſes the *waters* ſhould paſs off by, it is to be judged proper and ſalutary, and by no means to be checked. If the diſcharge by urine be plentiful, and the bowels are moved but once a day, it is very well in many conſtitutions; but where, as in ſome conſtitutions, it happens that the *waters* actually act as aſtringents in the bowels, this is to be prevented, and a ſmall doſe of the common purging ſalts is to be taken in the firſt draught of the *waters* every morning.

In the taking of them it is to be obſerved, that they are not to be poured down as it were all at once; for the ſtomach is often loaded and injured by this; but the firſt glaſs ſhould be ſuffered to paſs off, and then, after walking about for ten minutes or longer, a ſecond is to be taken, and ſo on; and no draught ſhould exceed half a pint in quantity; ſo that the taking of the whole quantity in this manner ſhould be the buſineſs of an hour and a half, or two hours. After this it is proper to uſe moderate exerciſe by walking, or otherwiſe, till dinner time; and in the mean time, if the *waters* would paſs off by urine or ſtool, this muſt be by no means repreſſed. People who have very weak and tender ſtomachs, or who have diſorders of the breaſt, and drink the *waters* in a rainy ſeaſon, ſhould have them gently warmed before they take them: this is beſt done by ſetting a glaſs of them in a veſſel of hot *water*, and they are only to be ſuffered to ſtand thus till moderately hot, and then immediately drank off; for if heated to too high a degree, they eaſily loſe their virtues by evaporation.

All perſons are to regulate the quantity of the *waters* they drink by the ſtrength of their own conſtitution; however ſmall a quantity they perceive to be enough, and to operate in the manner they expect, they are to be contented with that, and never to teize nature to make her bear more.

It is a certain rule in regard to all *mineral waters*, that they are much the beſt when drank at the place, though ſome of them bear carriage much better than others. It is a neceſſary caution, that the motion of the body be never violent in the time of taking the *waters*; for if it produce ſweat it always obſtructs, in ſome degree, their operation by urine or ſtool; and if flatulencies are troubleſome at the time, it would be proper to take candied orange-peel, or ſome other carminative, at the time. In order to have all the good effects of the *waters*, a regulation of diet is extremely neceſſary; it is proper to dine and ſup early, and the dinner ſhould not be too heavy. It is a good rule, indeed, under ſuch a courſe as this, never to eat or drink ſo much as one can, but always to riſe with an appetite. The foods principally to be avoided, during ſuch a courſe, are ſuch as are dried in the ſmoke, or have been long kept in ſalt; and the fleſh of young animals is in general to be greatly preferred to that of old ones; and in general, a too great quantity of vegetables, eſpecially of the flatulent ones, is to be avoided. Lamb, chickens, veal, and the like, are moſt proper for the diet at this time; and to theſe are to be added the tender river-fiſh, as trout and pike. Broths alſo of all kinds are good; and peas, kidney beans, ſpinach, and aſparagus, are all very proper. The bread that is eaten under the courſe ſhould never be ſtale; the moſt proper drink at the time is good wine, and if the perſon is not over thirſty, it is beſt to drink this pure, not mixed with *water*: but in this caſe it is only to be allowed within the bounds of moderation; half a pint, at the utmoſt, at a meal, to thoſe who have not been habituated to it; and to thoſe who have, ſomewhat leſs than their cuſtomary quantity. The liquor next proper after wine, is ſound and well-bodied ale; but ſuch as is either new and fermenting, or ſo old as to be ſtale, is by no means to be uſed. Acids, tea, and other things, which decompoſe theſe *waters*, ſhould not be taken for ſome time before or after drinking them.

Violent exerciſe is wrong; but different conſtitutions will bear different degrees of it; and thoſe of cold and pituitous habits ſhould uſe conſiderably more than others. The ſeaſon of the year is alſo to be regarded; for the ſame degree of exerciſe that is good in a cooler, is too much in a hotter air. The greateſt caution, in the courſe of taking theſe *waters*, is to avoid too much ſitting ſtill, either after the taking of them, or after meals; for the *waters* remaining in the body, or the food remaining undigeſted, from theſe cauſes the conſequence is, that the patient is ſubject to flatulencies, colics, diarrhœas, and pains of the ſtomach. Sleeping immediately after meals is alſo improper, as it occaſions at this time diſorders of the head, and many other complaints.

There are ſome caſes, however, in which the *mineral waters* may be drank with great advantages by perſons confined to their bed: thus, gouty, paralytic, and other extremely emaciated or weak perſons, have often found great benefit by this method. Slare even goes ſo far as to adviſe this as the beſt method of taking them in all caſes; but the more judicious writers all judge him in an error in this, becauſe there are very many reaſons why motion and bodily exerciſe, after the drinking of them, muſt be beneficial. It is proper to abſtain, as much as poſſible, from all ſorts of paſſions, during the courſe of taking theſe *waters.* Violent anger, grief, or terrors and frights, have been known to occaſion more miſchief at ſuch a time than they would otherwiſe have done; and all people are to abſtain as much as may be from venery during the time, leſt it too much debilitate the body, already weakened by the diſcharges, occaſioned by the *waters*, by ſtool and urine. Suppers ſhould be moderate during the courſe, and the wine drank at that meal ſhould be diluted with *water:* it is always very adviſeable, in this caſe alſo, to walk for ſome time after ſupper, that the ſleep may be more quiet, ſound, and refreſhing. And the cold air of the night, eſpecially if it be a damp ſeaſon, is cautiouſly to be avoided, leſt it occaſion catarrhs, and other diſorders; for this reaſon, it is proper to ſup early all the while.

Symptoms attending the taking of theſe waters. Theſe are of many kinds, and differ greatly from the ſame *waters* drank at the ſame ſeaſon, in perſons of different habits and conſtitutions. One of the moſt common is a binding of the bowels; and from this there often ariſe pains in the bowels, colics, and vomitings, with other the like diſorders. People of melancholy, hypochondriac, and hyſteric habits, are more ſubject than any others to this complaint from them: this is a ſymptom eaſily removed by any of the mild cathartics, and nothing in particular is more proper for that purpoſe than a decoction of ſena, tamarinds, and rhubarb, to be taken a few ſpoonfuls at a time, as occaſion ſhall require. A ſmall doſe of the cooling ſalts may alſo be taken, but all the hot and reſinous purges are apt to occaſion hypercatharſes. On the other hand, ſome are thrown into a diarrhœa by them, and this is often a ſalutary ſymptom; and while the patient's ſtrength is unhurt, and he is not found to ſuffer any great inconvenience from it, this is by no means to be checked; for very often the patient is greatly relieved by a copious diſcharge of the noxious humours this way, and, by a continuance in the ſame courſe, becomes abſolutely cured by this means: but when the perſon is perceived to be greatly weakened by this ſymptom, and it is attended with nauſeas, vomitings, and pains in the bowels, it muſt be carefully checked or reſtrained. This is often done by drinking the ſame *waters* in a ſmaller quantity, and warm inſtead of cold; but if this do not prove ſufficient, ſmall draughts of cinnamon-*water* are to be allowed, and, if neceſſary, ſmall doſes of diaſcordium every night. In caſes where the *waters* take this turn violently, it is proper to abſtain from them for ſome days, and then to take to them again with great caution, and in ſmall quantities.

Some perſons, on their firſt entering on a courſe of the *mineral waters*, are thrown into vomitings by them; and theſe are ſometimes ſalutary, ſometimes merely ſymptomatic. If it be ſalutary, the perſon is always the better for it, and the noxious humours are very happily attenuated and diſcharged this way by the *waters:* in this caſe, all the caution neceſſary is not to drink too much of them at a time, and ſometimes, between whiles, to take a little of ſome bitter tincture. But if, on the contrary, the patient is greatly weakened by this vomiting, the method is to drink ſmaller quantities, and to eat and drink more ſparingly at meals. Sometimes this ſymptom ariſes from a redundance of bile, or of pituitous humours from the ſtomach and bowels not having been emptied by a purge before the entering on the courſe: in this caſe a gentle purge is to be given, and after that the common ſtrengthening and bitter ſtomachics, and the *waters* are afterwards to be cautiouſly taken in ſmall quantities.

When the patient is attacked with violent colic pains, and the common method of eating candied orange-peel, and the carminative ſeeds, does not take effect, a gentle purge is to be given to evacuate the humours which occaſion them, and after this, tincture of cardamom ſeeds, or ſome other ſuch carminative, uſually takes effect. In caſes where the pains are more violent and obſtinate, a glyſter of camomile flowers, boiled in milk, with a little ſugar, may be given at times, and the *waters* afterwards muſt be drank in ſmall quantities, and always warmed.

If an immoderate flux of the menſes or hæmorrhoids ſhould happen during the time of taking the *waters*, it will be proper to abſtain from the uſe of them on that occaſion for a few days; but if theſe evacuations are in a moderate degree, the *waters* may be continued, only taking them in ſmaller quantity, and not quite cold.

Sometimes intermittent fevers come on while perſons are drinking the *waters*; but theſe are not to be regarded as any very bad caſe; for if the uſe of the *waters* be continued, and the carminatives and bitters of the common kind taken at times with them, they are uſually ſoon cured. Pains of the gout, rheumatiſm, ſciatica, and teeth, alſo ſometimes return upon people accuſtomed to them, while they are in a courſe of the *waters*; but theſe are not to be greatly regarded; for they uſually go off again very eaſily, only by continuing the uſe of the *waters*, and require no peculiar care: only, during the time the pains laſt, ſome comforting cordial may be taken at times; and if they are violent, a few drops of laudanum may be taken every night going to reſt, or a few grains of the ſtorax pill. See Heiſter's Compend. Medic. Pract. cap. 20. See the following articles.

The kinds of *mineral waters* are various, as are the kinds of compoſitions of the minerals with which they are impregnated.

Some are *ſimple*, as only containing mineral particles of one ſort; others *mixed*, of two, three, four, or more ſorts.

Hence we have, 1. *Metallic waters*, in different parts; as *gold*, *ſilver*, *copper*, *tin*, *leaden*, and *iron waters.*

2. *Saline waters*, viz. *nitrous*, *aluminous*, *vitriolate*, and thoſe of common ſalt.

3. *Bituminous*, *ſulphureous*, *antimonial*, *carbonaceous*, and *amber waters.*

4. *Earthy* and *ſtony waters*; viz. *lime*, *chalk*, *oker*, *cinnabar*, *marble*, and *alabaſter waters.*

To which ſome add *mercurial waters.*

This diviſion of *mineral waters* is taken from their eſſences; that is, from the mineral particles they contain.

Dr. Falconer, from a review of the impregnation of *mineral waters*, divides them, as in the following table, into thoſe impregnated with

Saline Bodies.	Simple,	Acid.	1. Vitriolic acid per ſe.
		Alkali.	2. Foſſile alkali per ſe.
			3. Volatile alkali per ſe.—Very dubious.
	Compound,		4. Glauber's ſalt.
			5. Vitr. ammon. very dubious
			6. Common ſalt.
			7. Sal ammon. very dubious
Inflammable Bodies.	Oil.	Simple,	8. Oil foſſile per ſe.
		Comp.	9. Oil in form of ſoap.
	Sulphur.	Simple,	10. Sulphur per ſe.
		Compound.	11. Hep. ſulph. with an alkali
			12. Hep. ſulph. c. calce vivâ.
Metallic Bodies.	Baſe Metals. in a ſtate of ſolution by	Copper,	13. Vitriolic acid in form of blue vitriol.
		Iron.	14. Fixt vitriolic acid in form of green vitriol.
			15. Vol. vitriolic acid, as in many chalybeates.
			16. Hep. ſulph. with an alkali
			17. Hep. ſulp. with quicklime
			18. Fixable air.
	Semi-metals.	Zinc.	19. Vitriolic acid in form of white vitriol.
Earthy bodies.	Simple,		20. Calcareous earth in ſolution, by being deprived of fixable air.
			21. ————, by being united with it in over-proportion.
	Compound—with vitriolic acid,		22. Calcareous, in form of ſelenites.
			23. Magneſia.—Spurious Glauber's ſalt
			24. Earth of alum—in form of alum.
Aërial Bodies.	Common Air.		25. In ſolution, or mixture?
			26. In diffuſion.
	Fixable Air.		27. Q. In ſolution, diffuſion, or mixture?
	Inflammable Air.		28. Probably only in diffuſion.

The moſt uſual and celebrated diviſion is borrowed from the manner wherein they affect our ſenſes; with regard to which there are ten kinds; viz. *acid*, *bitter*, *hot*, *cold*, *oily* and *fat*, *poiſonous*, *coloured*, *boiling*, *petrifying*, *incruſtating* and *ſaline*.

Some conſiderable naturaliſts and phyſicians, among whom is the learned Dr. Donald Monro, have made a diviſion of *mineral waters* from their difference of temperature into hot and cold, or *thermæ* and *acidulæ*.

WATERS, *acid*, called alſo *acidulæ*, ariſe from the admixture of vitriol, nitre, alum, ſalt, &c. in them. Theſe are *cold*, and are very frequent, there being not reckoned leſs than a thouſand in Germany alone: ſome of which are ſaid to be ſour as vinegar, and to be uſed inſtead thereof; others vinous, and ſerving for wine; others aſtringent, &c.

There is alſo a conſiderable number of *cold* mineral *waters* in England; but the number of hot ones is very ſmall. See ACIDULÆ.

WATERS, *hot*, called THERMÆ, ariſe from the admixture of ſulphureous particles and fumes, &c. Of theſe, the hotteſt is that in Japan, which, it is ſaid, no fire can bring *water* to equal; and which keeps hot thrice as long as common *water* boiled.

The cauſe of the heat of theſe *waters* may be, in ſome inſtances, ſubterraneous fire: in other caſes the heat ariſes from the mineral ingredients with which they are impregnated in their paſſage: and the ſame may be ſaid of thoſe *waters* that are cooler than the common temperature of the atmoſphere. Thus it is known, that quicklime, the pyrites ſtone, and other ſubſtances, thrown into *water*, will make it warm: and on the contrary, ſalts of various kinds make it colder than before.

The *warm waters* poſſeſs many of the virtues and properties of *cold waters*, which are impregnated in the ſame manner; but they are in many caſes preferable, as by their warmth they are more agreeable to the ſtomachs of weak perſons, and promote perſpiration. The *warm waters* are alſo uſed as warm baths; which, by reſtoring the fibres, are uſeful in many diſorders ariſing from rigidity, ſpaſm, &c. Hence is derived their great uſe in rheumatiſms, inflammations, coſtiveneſs, &c. The cure is commonly aſſiſted by the internal uſe of thoſe *waters* at the ſame time. For complaints of a particular part of the body, the part is either fomented with the *warm water*, or the *water* is pumped upon the diſeaſed part.

There are alſo contrivances for converting theſe *waters* into ſteam or vapour; hence called *vapour* BATHS.

Baths are likewiſe made of the mud formed at the bottom of theſe *waters*, and they have been ſerviceable in removing pains and aches, and paralytic and other complaints: the mud being either rubbed on the part, or the part immerſed in it. When the mud is collected in quantity in a reſervoir for theſe purpoſes, it is called the *mud-bath*.

WATERS, *oily* and *fat*, owe their virtues to a bituminous and ſulphureous matter; as ambers, petroleum, pitch, naphtha, &c.

WATERS, *bitter*, are produced from an impure ſulphur, bitumen, nitre, and ſometimes copper. Such are the lacus Aſphaltites.

WATERS, *very cold*, have their riſe from a mixture of nitre and alum; or of mercury, iron, &c. The depth of the ſource or ſpring too may have ſome effect.

WATERS *which change the nature of bodies*. Of theſe there is great variety.

1. Near Armagh in Ireland is a lake, wherein a ſtaff being fixed ſome months, it is aſſirmed, that the part which ſtuck in the mud will be turned into iron; and that part encompaſſed with the *water* into hone-ſtone; the reſt remaining as before. Thus Gyraldus and Miginus; but Brietius very rightly denies it.

2. In the northern part of Ulſter is ſaid to be a ſpring, which, in the ſpace of ſeven years, petrifies wood, or converts it into ſtone. The like *waters* are alſo ſaid to be found in divers other parts, as in Hungary, Burgundy, &c. And Vitruvius mentions a lake in Cappodocia, which converts wood into ſtone in one day: but theſe accounts are not ſufficiently atteſted. See PETRIFACTION, and PETRIFYING *Waters*.

3. There are alſo *waters* ſuppoſed to tranſmute or turn iron into COPPER. See ZIMENT.

4. Others are ſaid to change the colour of the hair. Gyraldus mentions a ſpring in Ireland, wherein if a perſon were waſhed, he inſtantly became grey; but this is incredible.

WATERS, *poiſonous*, are occaſioned by their creeping through arſenical, antimonial, and mercurial earths; or being impregnated by their fumes. Such are the lacus Aſphaltites, and divers *waters* about the Alps, &c. which immediately kill thoſe who drink of them: but theſe are moſt of them filled up with ſtones; which is one reaſon why ſo few are known.

WATERS, *ſaline*, are generated two ways; either they are derived from the ſea, by ſome ſubterraneous paſſage; or they are generated from mineral ſalts, which they meet with in their paſſage, before they arrive at their ſprings.

WATERS, *boiling*, or *bubbling*, are produced either by a current of air, or elſe by a ſulphureous, or a nitrous ſpirit, mixed with the *water* in the earth: if it be ſulphureous, the *water* is hot; if nitrous, cold. For all the *waters* that boil, as if hot, are not ſo; but ſome few are cold: we read both of thermæ and acidulæ that boil. See *Boiling* SPRINGS.

There are divers other *waters*, which have very ſingular properties, not reducible to any of theſe claſſes: ſuch,

1. Is that ſpring in Portugal, which abſorbs all bodies caſt into it, though the lighteſt: and not far from it, there is ſaid to have been anciently another, in which no bodies, not the heavieſt, could ſink.

2. In Andaluſia, we are aſſured by Euſeb. Nirembergenſis, there is a lake which foretels approaching ſtorms, by making a terrible roaring, that may be heard eighteen or twenty miles diſtance.

3. In Granada is ſaid to be a well, whoſe *water* diſſolves ſtones.

4. We read of a ſpring in Arcadia, which rendered thoſe who drank of it abſtemious.

5. In the iſland of Chio is ſaid to be a ſpring, which converts thoſe who drink of it into fools.

6. There are ſprings in divers parts of England, Wales, Spain, &c. which ebb and flow daily with the flux and reflux of the ſea; and ſome are even ſaid to ebb and flow againſt the tide. See SPRINGS.

Add, 7. *Stalactical waters*, which form ſtony icicles from the tops of caverns.

Mineral waters may, again, be diſtributed, according to their medical properties and effects, under the following denominations.

WATERS, *chalybeate*, are thoſe which, beſide iron held in ſolution by means of fixed air, &c. uſually contain ſea-ſalt, the foſſile alkali, a purging ſalt, or other ſubſtances. See *Mineral* WATERS *ſupra*.

The learned Mr. Monro has an enquiry into *chalybeate waters*, in which he conſiders them with regard to their medical uſe, in order to diſcover what their real or comparative ſtrength is, how they bear carriage, and how long they retain their virtues; that phyſicians may judge which of them is moſt proper in the various diſeaſes and circumſtances of patients; which muſt be drank at the fountain-head, and which may be conveniently drank at a diſtance from it. For the reſult of his enquiry, ſee Med. Eſſ. Edinb. vol. iii. art. 7. Abridg. vol. i. p. 126, &c.

Chalybeate waters have a briſk, acidulous, or vinous taſte when freſh, and tinge the ſtools with black. Some of them are rarely obſerved, and ſome ſcarcely ever, to give any black tinge to the fæces, though drank in large quantity; a phenomenon, ſays Dr. Lewis, which, perhaps, may be aſcribed to their depoſiting of their iron in the firſt paſſages in an indiſſoluble and inactive ſtate, rather than to the cauſe which ſome have aſſigned, their carrying it entire into the blood.

Theſe *waters* taken inwardly ſtrengthen the conſtitution in general, increaſe the tone of the fibres, quicken the circulation, and reſtore a proper conſiſtence to the blood when in a too thin and watery ſtate. And hence they are found to invigorate the whole frame. They are good in diſeaſes ariſing from weakneſs; in ſpaſmodic diſeaſes, ariſing from too great irritability and relaxation of the nervous ſyſtem, in the fluor albus, and gleets; in female obſtructions; in hyſteric and hypochondriacal diſorders; in loſs of appetite and digeſtion; and in a variety of other complaints.

Theſe *waters* are taken to the quantity of two or three pints or more in a day, divided into different doſes; and require the ſame caution in their uſe, as the artificial chalybeates. Of theſe *waters* there are thoſe of Iſlington, Malvern, Harrowgate, Llandrindod, Tunbridge, Buxton, Spa, &c.

Theſe *waters* may be imitated by impregnating *water*, in which iron-filings, or wire, have been infuſed with fixed air; or they may be made according to the directions under PYRMONT and SPA *Waters*.

WATERS, *chalybeate purging*, contain a greater proportion of purging ſalt than any other ſolid matter, and, therefore, when taken in ſufficient quantity, e. g. ſeveral pints, they operate by ſtool: and they have this advantage of other purges, that they do not exhauſt the ſtrength. If taken in leſs quantity, as alteratives, they operate chiefly by urine. Of theſe there are the *waters* of Scarborough, Cheltenham, Bagnigge, Pyrmont, Nevil Holt, Jeſſop, &c.

Theſe *waters* may be imitated by adding to a gallon of *water* impregnated with fixed air, two or three ounces of Epſom or other purging ſalt, and a little ſea-ſalt.

WATERS, *ſulphureous*, are thoſe which are impregnated either with actual ſulphur, or with a phlogiſton and an acid, which are the principles of ſulphur, whence they derive their ſulphureous ſmell. They uſually contain, beſides, either the foſſile alkali, ſea-ſalt, a purging ſalt, iron, an earth, or other matter, and commonly ſeveral of theſe in different proportions.

It has been a ſubject of controverſy, whether theſe *waters* contain *ſulphur*. Dr. Hoffman ſeems much to doubt of its exiſtence in the greater number of them; and Dr. Lucas has affirmed, that it is not to be found in the form of ſulphur in any *water* whatever; not even in that of Aix la Chapelle, where a true and perfect ſulphur is found on the upper parts of the conduits through which the *water* paſſes; for he ſays, that, ſtrictly ſpeaking, theſe *waters* do not contain ſulphur ſubſtantially diſſolved in them, but are impregnated with a phlogiſton and an acid, the principles of ſulphur, which, being in a volatile ſtate, are ſublimed, meet on the ſurface of the conduits, and there unite into a true and perfect ſulphur, which did not naturally exiſt in the *water*.

However, Dr. Rutty maintains the exiſtence of ſulphur, in mineral *waters*; and Dr. Shaw and Dr. Short are ſaid to have found ſulphur in Harrowgate *water*.

Notwithſtanding the teſtimony of ſuch eminent perſons, the more recent opinion of a phyſician, whom Dr. Monro conſulted in 1768, is againſt the exiſtence of ſulphur in ſuch *waters*: to this purpoſe, he ſays, that he has never obſerved any appearance of ſulphur in the Harrowgate *waters*, nor any ſcum at the top of the well; and that he could not find any perſon in the neighbourhood, who remembered the appearance of real ſulphur ſublimed, upon taking up the ſtones at the bottom of the well, as mentioned by Dr. Neale.

Dr. Watſon, in 1780, examined theſe waters and found a cruſt adhering to the circular ſtone, contiguous to the ſurface of the *water*, a portion of which, being ſcraped off, and put on a hot iron, burned with the flame and ſmell of ſulphur: whence, it may be inferred, that ſomething is ſublimed from the *water*, which either of itſelf is ſulphur, or which, in conjunction with the air, or ſome other principle, conſtitutes ſulphur. This ingenious writer mentions the following experiment, which throws no inconſiderable light on the impregnation of *ſulphureous waters* in general. The acid of vitriol does not act upon the common Derbyſhire lead ore, except when it is aſſiſted by heat; it then diſſolves it, and a great eſcape of air is obſerved: he made this air, diſcharged from the ore, paſs through a high bended tube into a bottle full of pump *water*: the *water*, in a little time, acquired the fetid ſmell of Harrowgate *water*; its taſte was the ſame as that of ſuch *ſulphureous waters* as contain no ſalt; it was perfectly tranſparent, but in the courſe of twenty-four hours became cloudy, and loſt moſt of its ſmell; it did not ſuffer any precipitation by the addition of the acid of vitriol; ſilver was blackened by being put into this *water*, and by being expoſed to the vapours which aroſe from it: from all theſe circumſtances, it may properly enough, he thinks, be called an *artificial ſulphureous water*.

The ſame phenomena were obſerved by uſing black jack inſtead of lead ore; and air of the ſame kind may be ſeparated from other ſubſtances, and by other means, as well as by the acid of vitriol; and it ſeems very probable, that the *waters* uſually called *ſulphureous* are impregnated with this kind of air, which has been ſeparated in the bowels of the earth, from particular minerals, eſpecially ſulphureous ones: and it has been remarked of Harrowgate *water*, that as it ſprings up it is clear and ſparkling, and throws up a quantity of air-bubbles.

Dr. Watſon ſuggeſts the following ſimple method of impregnating common *water* with the ſulphureous properties of Harrowgate *water*: put into a phial holding four or five ounces, ſome pounded lead ore, and pour upon it ſome acid of vitriol; wrap a few folds of wet linen round one end of a bended tube; inſert this end into the neck of the phial ſo cloſely, that no air may paſs out of the phial except through the tube; the end of the tube being at ſome diſtance from the ſurface of the acid. Put the other end of the tube into a bottle full of *water*; and by ſetting the phial on the hot bar of a grate, or by ſome other means, heat the acid, which, as ſoon as it is heated, will begin to act on the lead ore, and a great quantity of air will be diſcharged, which will paſs through the tube into the *water* in the bottle, and in a few minutes the *water* will be impregnated with the ſulphureous properties of Harrowgate *water*. In order to make the reſemblance complete, the ſalt which *ſulphureous waters* ſeverally hold ſhould be added in due proportion to the *water* impregnated with the air.

There is another way in which the impregnation of *waters* with ſulphur may be ſuppoſed to ariſe, which will account for the ſaline taſte, as well as the ſmell of the *water*. *Water* extracts from the aſhes of ſea-wrack burned to a black coal not only a great quantity of common ſalt, but ſomething elſe alſo, by which, without loſing its tranſparency, it acquires both the ſmell and ſulphureous taſte of Harrowgate *water*, and by which it is enabled, like that *water*, to blacken ſilver and white paint. This ſomething Dr. Watſon is ſenſible may be what chemiſts call liver of ſulphur, or an union of ſulphur with fixed alkali: no ſulphur, however, can be precipitated from the *water* by the acid of vitriol, though that acid turns it, as is the caſe with Harrowgate *water*, a little cloudy.

The air extracted from iron, by the acid of ſea-ſalt, impregnates *water* with a ſmell reſembling that of Harrowgate *water*, but its difference both from the natural and the artificial *ſulphureous waters* may be eaſily diſtinguiſhed, eſpecially after the *water* has ſtood a few hours expoſed to the air. See Watſon's Chem. Eſſ. vol. iii. eſſ. 6. See alſo Falconer's Eſſ. on Bath *Wat.* vol i. p. 103, &c.

It appears from the experiments and obſervations of Bergman, that a real ſulphur is contained in *ſulphureous waters*, in a ſtate of perfect ſolution; and that it may be precipitated from them by the nitrous and dephlogiſticated marine acids, and likewiſe, but more ſlowly, by the atmoſpherical air.

Hence, as air, as well as the nitrous acid, has the property of decompounding theſe *waters*; when the natural *ſulphureous waters* come in contact with the external air, the latter, according to Bergman, ſeiſes the phlogiſtic principle which kept the ſulphur diſſolved in *water*; and thus in time are formed thoſe ſulphureous cruſts, which, as well as even the preſence of actual ſulphur in theſe *waters*, have been the ſubjects of ſo much controverſy among the chemiſts.

Dr. Macbride has ſuggeſted a method of impregnating a ſpring with ſulphur, in its pure ſtate, in the way of ſolution. He made a ſolution of ſulphur in *water* by means of quick-lime, and by injecting currents of fixed air upon the ſurface of it, found the calcareous earth to precipitate, leaving the ſulphur to diſſolve in the *water*.

Bergman (Phil. and Chem. Eſſ. vol. i) informs us, that the proceſs of imitating the warm *ſulphureous waters* conſiſts ſimply in adding the vitriolic acid to hepar ſulphuris, and impregnating water with the peculiar ſpecies of air that ariſes from this mixture. This hepatic air (part of which is fixed air, proceeding from the ſalt of tartar) is very readily abſorbed by *water*; to which it gives the ſmell, taſte, and other ſenſible qualities of the *ſulphureous waters*. A Swediſh cantharus of diſtilled *water* will abſorb about ſixty inches of this hepatic air; and on dropping into it the nitrous acid, it will appear, that a real ſulphur is contained in a ſtate of perfect ſolution in this *water*, to the quantity of eight grains.

The ſaline or other contents peculiar to the *ſulphureous water* to be imitated, muſt be added to the artificial hepatic *water*.

Inſtead of the liver of ſulphur, the operator may uſe a mixture of three parts of filings of iron, and two parts of ſulphur, melted together.

The liver of ſulphur, for impregnating *water* with ſulphureous air, and thus imitating the *ſulphureous mineral waters*, may be prepared by mixing together equal parts of brimſtone and of clean pot-aſhes, or quick-lime well burnt, and placing them in a crucible, or unglazed diſh, over a gentle fire: ſtir them with a ſtick till they are incorporated into a blood-red maſs; and put it, while warm, into a bottle which is to be kept well cloſed. Then to make the *ſulphureous water*, put a ſufficient quantity of this ſubſtance, with oil of vitriol and *water* into the part A of the apparatus deſcribed under PYRMONT *Water* (ſee *Tab.* III. *Pneumatics*, *fig.* 51.), and proceed as impregnating *water* with fixed air: the ſulphureous air will ariſe; the *water* in the middle veſſel B will be impregnated with it, will ſmell ſtrongly ſulphureous, and reſemble the celebrated waters of Aix la Chapelle, &c. The water thus impregnated may be heated, by putting it into a cloſe veſſel, placed in one that contains boiling *water*; and it is then a *warm ſulphureous water*.

If it be not immediately uſed, it ſhould be preſerved in ſtone or glaſs bottles, well corked and cemented, and placed with the corks downward in a cellar.

As the cold *ſulphureous waters* contain both fixed and ſulphureous air, a mixture of liver of ſulphur and chalk may be put into the veſſel A with the oil of vitriol, by which means both theſe airs will be produced, and the *water* of courſe will be impregnated with them.

Sulphureous waters are diuretic and ſtrongly diaphoretic, and, are, therefore, good in cutaneous diſeaſes, uſed both internally and externally. They are alſo good in chronic obſtructions; and in diſorders proceeding from acidity, from worms, &c. Of theſe are thoſe of Harrowgate, Llandrindod, Moffat, Aix la Chapelle, Bath, Matlock, &c.

The *ſulphureous purging waters* differ from the former, as they contain a purging ſalt as the principal ſolid ingredient, and therefore operate by ſtool. They are good in the ſame diſorders as the alterative *ſulphureous waters*, and alſo for foulneſſes of the bowels, &c.

Some of the chalybeate purging *waters* are alſo *ſulphureous*.

WATERS, *acidulous* or *ſaline*, contain the foſſile alkaline ſalt. This ſalt, as the *waters* are taken up from the fountain, is ſaturated, or rather ſuper-ſaturated, with fixed air. Hence the *waters* do not then manifeſt any alkaline quality; on the contrary, they curdle with ſoap, and are termed ACIDULÆ. This fixed air, however, being very volatile, ſoon exhales when the *water* is heated, or ſtands for ſome time expoſed, and then the alkali manifeſts itſelf. For the general virtues of this *water*, ſee SELTZER *Water*.

Of theſe *waters*, there are thoſe of Seltzer, Tilbury, &c.

Theſe *waters* may be imitated, or even excelled, by ſimply impregnating *water* with fixed air; and the ſolid ingredients may be added in the proportions directed under SELTZER *Water*.

WATERS, *ſaline purging*, are impregnated with ſea-ſalt, and alſo with a purging ſalt; either the calcareous Glauber's, or the Epſom. They differ in ſtrength; ſome of them purge ſufficiently in the quantity of a pint, while 2, 3, 4, 5, or 6 pints of others are neceſſary to produce that effect. Some again are ſo weak as to require the addition of Glauber's ſalt, or other purgative. In ſmall quantities they act as diuretics and alteratives. They are good in ſcrophulous and ſcorbutic complaints, ulcers, and other diſeaſes, which make their appearance on the ſkin, and are likewiſe uſed as baths and fomentations in theſe and other diſorders. The virtues of the preceding claſs of *waters* depend, in a great meaſure, on the preſence of their fixed air. The *waters* of this claſs ſeem to derive their virtues principally from the ſaline matters which they contain.

Of theſe *waters*, there are thoſe of Lymington, Dulwich, Holt, Streatham, Kilburn, Bagnigge, Acton, Epſom, Llandrindod, Seidlitz, ſea-*water*, Dog and Duck, Sydenham, &c.

A purging *water*, anſwering, perhaps, all the intentions of theſe, may be made by impregnating three ounces of Epſom, Rochelle, or Glauber's ſalt, in a gallon of *water* with fixed air.

WATERS, *vitriolic*, are impregnated with green vitriol or copperas, and ſtrike a black colour with galls. They are chiefly uſed outwardly for waſhing old ſores, and frequently with good effect. In ſome caſes, they are taken inwardly in ſmall doſes, and then they prove emetic and purgative. But this, ſays Dr. Lewis, is a practice too hazardous to be followed. See VITRIOLIC *Waters*.

WATERS *which contain an earth*, are thoſe of Briſtol, Buxton, &c.

The cold *waters* of this claſs have a petrifying quality. See the ſubſequent articles.

WATERS, *Aix la Chapelle*, ariſe from ſeveral ſources, which ſupply eight baths conſtructed in different parts of the town. In ſmell, they reſemble the waſhings of a foul gun; their taſte is ſaline, bitter, and urinous; their heat is upwards of 100° of Fahrenheit's thermometer; their general operation is by ſtool and URINE, and they alſo promote perſpiration. As an alterative, it is, in general, beſt to begin with a quarter or half a pint in the morning, and afterwards increaſe the doſe to pints, as may be found convenient. When it is required to purge, it ſhould be drank in large and repeated draughts. With regard to bathing, it is beſt to begin with the temperate baths, and to increaſe the heat gradually. Theſe *waters* are efficacious in diſeaſes proceeding from indigeſtion, and foulneſs of the ſtomach and bowels, in rheumatiſms, in the ſcurvy, ſcrophula, and diſeaſes of the ſkin, in hyſteric and hypochondriacal diſorders, in nervous complaints and melancholy, in the ſtone and gravel, in paralytic complaints, &c. They ought not to be uſed in hectic caſes with heat and fever, in putrid diſorders, or where the blood is diſſolved, or the conſtitution much impaired. See AIX LA CHAPELLE and *Sulphureous* WATERS.

An artificial *water* of this kind may be made by impregnating half a dram of ſea-ſalt, a dram of foſſile alkali, a ſcruple of clean chalk, and a gallon of *water*, with ſulphureous air.

WATERS, *Bagnigge*, are thoſe of Bagnigge Wells, ſituated on the north-eaſt ſide of London.

The ſalt purging *water* is uſually quickened with Glauber's, or other ſalts; and the doſe is from a pint to a quart. The chalybeate *water* has a ſlight irony taſte; and when firſt taken to the quantity of three or four glaſſes, is uſually purgative. Its virtues reſemble thoſe of ſimilar chalybeates.

WATERS, *Bath*, are the warm chalybeate *waters* of Bath in Somerſetſhire, which have been long uſed both internally and externally, and extolled for their medical efficacy in a great variety of diſorders.

Of the ſix baths, which are ſupplied from different ſprings with *waters* of the ſame nature, the principal are the king's bath, the queen's bath, the hot bath, and the croſs bath. The temperature of theſe *waters* has been variouſly eſtimated: Dr. Falconer ſtates the heat, as they are commonly drank, of the king's bath at 116°, of the hot bath at 116°, of the croſs bath at 112°, and that of the queen's bath about the ſame with the croſs bath. See BATHS.

The water, when viewed in the baths, has a greeniſh colour; but in a phial, it appears tranſparent and colourleſs, and it ſparkles in the glaſs. It has a ſlight ſaline, agreeably pungent, and light chalybeate taſte. Dr Falconer thinks that the king's bath poſſeſſes the two laſt qualities in the greateſt degree, though others aſcribe their prevalence to the hot bath; and the chalybeate impregnation is moſt obſervable in the *water* of the king's bath. Both the chalybeate taſte and pungency go off entirely on the cooling of the *water*, but are retained for the longeſt time by the *water* of the hot bath; and in this caſe, the ſaline taſte becomes more manifeſt. Some have aſcribed a ſulphureous ſmell to theſe *waters*, eſpecially when the baths are filling; but Dr. Falconer could not diſcover any particular ſmell either in the *waters* themſelves, or in the vapours ariſing from them.

As the *water* riſes from the pump, it contains fixed air, or other volatile acid, in a ſufficient quantity to curdle milk and diſſolve iron: it is alſo ſlightly impregnated with ſea-ſalt.

Dr. Falconer infers from a variety of experiments, that Bath *water* contains the following ingredients, viz. ſaline bodies, ſome of which are ſimple, as vitriolic acid per ſe, the exiſtence of which, however, is very dubious, and others compound, as common ſalt in a ſmall quantity: inflammable bodies, as hepar ſulphuris cum calce viva, in large quantity; metallic bodies, as iron, in the proportion of one thirty-ſeventh and a half of a grain in a pint of the *water*, and lead, which he ſuſpects to be an accidental impregnation; earthy bodies, as ſelenites, in large quantity; and aerial bodies, as common air, probably both in ſolution or mixture and diffuſion, and mephitic air in large quantity.

The primary qualities of the *Bath waters* enumerated by Dr. Falconer, are the following: they are ſtimulant, aſtringent, diuretic, diaphoretic, antiſpaſmodic, and antiſeptic. This ſtimulant quality is manifeſt in their heat, briſk and poignant taſte, and, if largely taken, inebriating effects, as well as by their effect in accelerating and raiſing the pulſe, increaſing the heat of the body, and exciting the ſecretions: and beſides they poſſeſs, as he apprehends, a ſtimulus of a peculiar nature, principally affecting the nervous ſyſtem, and not to be meaſured altogether by the pulſe, heat, or increaſe of ſecretions. This ſtimulus is indicated by the glowing ſenſation in the ſtomach perceived in drinking them, the ſudden increaſe of ſtrength, often procured by their means, and the pain of the head conſequent on taking too large a quantity. This ſtimulant quality is leaſt obſervable in the croſs Bath *water*, and moſt conſiderable in that of the king's bath; and it is aſcribed by Dr. Falconer principally to their impregnation with fixed air. The aſtringent quality of *Bath waters* is evinced by the coſtiveneſs commonly attendant on them; and their effects in reſtoring the tone of the ſtomach and bowels may be probably owing to this quality. The king's bath is moſt remarkable for this quality, and the hot bath is generally thought to have the leaſt of it.

The diuretic quality of theſe *waters*, which Dr. Falconer attributes principally to their fixed air, is well known; and they poſſeſs this quality, that of the croſs bath being thought to be the moſt conſiderable, with no peculiar ſtimulus in either the ſecretory or excretory organs of urine.

The diaphoretic quality of *Bath waters* ſeems to be owing to the ſame cauſe with the former; and Dr. Falconer apprehends it is more prevalent in the king's and hot baths than in the croſs bath.

Their antiſpaſmodic quality, poſſeſſed in the greateſt degree by the hot bath, is obvious in their efficacy in ſeveral ſpaſmodic and nervous caſes: and Dr. Falconer thinks it is chiefly owing to the aerial part of their impregnation, which ſeems to poſſeſs qualities at once ſtimulant and ſedative, which is the foundation of moſt antiſpaſmodics.

The antiſeptic quality of theſe *waters* has been demonſtrated by experiment, and this is alſo aſcribed to fixed air, which is known to be a powerful preventer and corrector of putrefaction; both which qualities ſeem to be poſſeſſed, in ſome degree, by the *Bath waters*: the king's and hot baths, being more largely impregnated with fixed air than the croſs bath, poſſeſs this antiſeptic quality in a much greater degree than the other.

Bath waters poſſeſs alſo ſeveral ſecondary qualities: in this reſpect they are attenuant, antacid, cathartic, expectorant, ſialagogue, and emmenagogue.

As ſtimulants, theſe *waters* are indicated in cachectic diſorders; as the chloroſis incident to women, obſtructions of the viſcera, œdematous ſwellings ſucceeding fevers, or fits of the gout: in paralytic diſorders, ariſing from the bilious colic, fumes of metallic ſubſtances, or fits of the gout or rheumatiſm; and alſo in ſuch paralytic complaints as occur in weak habits, and in conſequence of low diet, damp ſituations, &c. Theſe *waters* are alſo of ſpecial ſervice in the apoplexy, lethargy, and other ſimilar diſorders. Their efficacy, as ſtimulants, is alſo very conſiderable in all diſorders that depend on the inertia of the organs of digeſtion, and in reſtoring the ſtomach to ſuch a degree of tone as enables it to ſend the gout from the noble parts into the extremities.

The *Bath waters*, as aſtringents, are indicated in debility and laxity of the moving fibres, as the rickets; in weakneſs ſucceeding large evacuations either of blood, ſtool, or perſpiration; in reſtraining evacuations by ſtool and by the urinary paſſages, as in the diarrhœa and diabetes, and alſo that diſpoſition to perſpiration which ſometimes attends people of a lax and irritable habit, and likewiſe the fluor albus, and involuntary ſeminal evacuations.

The diuretic power of theſe *waters* renders them peculiarly ſerviceable in dropſical diſorders, many of which have been cured by them in their laſt ſtage; alſo in leprous, ſcrophulous, and ſcorbutic complaints; and in diſcharging gravelly concretions from the kidneys and bladder.

By their diaphoretic quality, they ſtop or moderate habitual laxities of the bowels; and relieve violent reachings: they are ſerviceable in the diabetes, partly by changing the tendency of the fluids from the urinary to the perſpiratory ſecretions; and have been found an efficacious remedy in that kind of dropſy, which ariſes from the check given to perſpiration by ſudden changes of climate: they are alſo of great ſervice in cutaneous eruptions, occaſioned by obſtructed perſpiration, and generally affecting the face; in that kind or ſtage of the rheumatiſm, which is not attended with any conſiderable degree of fever or inflammation; and in allaying the pain and carrying off the paroxyſms of the gout.

Bath waters, by their antiſpaſmodic quality, are of the greateſt ſervice in hyſteric and hypochondriac complaints, ariſing from a weak ſtomach and digeſtion; in the hyſteric colic and bilious vomiting; in the colic of Poictiers, commonly called the dry belly-ach; in icterical complaints, by relaxing the ſpaſmodic constriction of the biliary ducts and opening a paſſage for the bile, and promoting the diſcharge of gall-ſtones; and in removing thoſe menſtrual obſtructions which occur at an early period of life, and in hyſteric conſtitutions: they are alſo by their antiſpaſmodic property, often peculiarly ſerviceable in the gout, when it attacks the ſtomach.

The efficacy of theſe *waters* in cutaneous eruptions, attendant on a ſcorbutic habit of body, may probably be owing, in ſome degree, to their antiſeptic quality correcting the putrid tendency of the humours of the body; and alſo in cachectic complaints, and many other caſes of debility, which theſe *waters* relieve.

In ſome caſes, however, *Bath waters* are hurtful: as in hectic fevers; in ſuppurations of the lungs; in all caſes of inflammation; in hæmorrhages; in plethoric habits; in confirmed obſtructions of the abdominal viſcera; and in caſes, where the ſolids are very tender and friable; and the fluids very thin and acrid, which ſometimes take place in a high degree of the ſcurvy.

It may be obſerved, in general, and with allowances for different conſtitutions and other circumſtances, with regard to the choice of theſe *waters*, that in diſorders to which the ſtimulant, aſtringent, and antiſeptic qualities of the *waters* are adapted, it will be moſt proper to make trial of the king's bath *water:* thoſe for which their diaphoretic and antiſpaſmodic qualities are recommended, will be moſt likely to find relief from hot bath *water:* and where large dilution is required, as in ſome glandular caſes, and the urinary ſecretion is to be promoted, the uſe of the croſs bath will be moſt adviſeable.

As the fixed air and chalybeate impregnation of theſe *waters* are liable to be ſoon diſſipated and deſtroyed, it will be moſt adviſeable, in caſes where their ſtimulant and aſtringent effects are deſired in their full extent, to drink them at the fountain head.

In leprous and cutaneous diſorders, where the effects of the *waters* depend not ſo much on the ſtimulant as on the diaphoretic and diuretic qualities, which are more permanent, they may be drank more at leiſure and at a diſtance from the pump, when their heat is abated: but the *water* ſhould never be ſuffered to ſtand ſo long as to cauſe any precipitation, which would alter its nature.

In all caſes, where the *Bath waters* are meant to act as reſtoratives, they are beſt drank freſh at the ſpring; and their effects may be moderated by leſſening the quantity. Dr. Falconer is of opinion, that theſe *waters* can ſerve very few uſeful purpoſes in medicine, when uſed at a diſtance from the ſpring; their impregnation with fixed air being thus deſtroyed, and the chalybeate and ſulphureous ones nearly ſo.

Theſe *waters* being of a heating nature, it is uſual, previous to a courſe of them, to cool the body by gentle purges, by a low diet, and if neceſſary by bleeding.

As to the quantity to be taken of theſe *waters*, it was formerly much greater than in the preſent practice. Guidott mentions three pints a day as the ſmalleſt quantity commonly taken, and recommends, in ſome caſes, even ten pints a day. But the quantity which he adviſed as the ſmalleſt is now ſcarce ever exceeded. Dr. Falconer thinks that, in general, theſe *waters*, when exhibited with a view to their ſtimulant or aſtringent qualities, might be properly taken by adults from two thirds of a pint to two pints in a day: but with reference to their diuretic, diaphoretic, or antiſpaſmodic qualities, and when the patient is advanced in life, and of an inert habit, and they are uſed at a moderate ſeaſon of the year, he would not adviſe to exceed from 1 pint to 2½ or 3 pints in 24 hours.

In caſes where the *waters* are uſed as diluents, and for waſhing out the lymphatic ſyſtem, as in many glandular and cutaneous diſorders, when there is no danger of an inflammatory complaint, the ſeaſon moderate, and the leſs ſtimulant *water* uſed, as that of the croſs bath or even hot bath, and ſome of its ſtimulant qualities allowed to evaporate; the *water* may be ſafely drank from 1 to 3 quarts, or even more in a day. However, it is always beſt to begin with ſmall quantities, as half a pint, or ⅔ of a pint in a day, and increaſing to any quantity that may be thought proper. And the quantity taken ſhould be divided into ſmall doſes, and taken at proper intervals. It has been the general cuſtom to drink the whole quantity preſcribed before dinner; viz. ⅔ of it before breakfaſt, beween eight and ten, and ⅓ at noon. Some have repeated them again in the interval between dinner and ſupper; and a glaſs of the *water* has been beneficially taken going to bed.

As to the ſeaſon of the year beſt adapted to the uſe of *Bath waters*, this was formerly confined to the ſummer months; and ſince that time the colder ſeaſons have been preferred. Dr. Falconer thinks, they are more likely, in general, to produce good effects in a warm than cool ſeaſon; eſpecially in caſes where their ſtimulant and diaphoretic qualities are likely to be ſerviceable. In caſes where they are meant to act as reſtoratives in debilitated habits, in which their aſtringent and antiſpaſmodic effects, joined to a moderate degree of ſtimulus, would be deſirable, a more moderate ſeaſon would be adviſeable.

Dr. Falconer is of opinon, that the *Bath waters*, when required to act as ſtimulant, as in weak low caſes, eſpecially of the paralytic kind, are in greateſt perfection in the warmeſt ſeaſons, as in the latter part of June, July, and the beginning of Auguſt; when a moderate degree of ſtimulus is required, and their diaphoretic effects deſired to be promoted, the latter part of May and beginning of June, and from the latter part of Auguſt to the end of September, are more proper: and when they are uſed with an intent to promote the urinary evacuations, as mild diuretics, in gravelly complaints and urinary obſtructions, the months of March, April, and beginning of May, and the month of September and beginning of October whould be preferable.

The uſual ſeaſon is in April, May, and June; and in Auguſt, September, and October.

The courſe of drinking theſe *waters*, as ſtimulants, ſhould be, in general, from three weeks to two months: when given with a diphoretic, antiſpaſmodic, or antiſeptic intention, they may be continued, with occaſional intermiſſion, from ſix weeks to three months: as diluents in glandular diſorders, and as gentle diuretics, they may be drank, with occaſional intermiſſion, from two to ſix months.

The courſe of drinking theſe *waters* is uſually continued for a month or ſix weeks; and the quantity toward the cloſe ſhould every day be diminiſhed, as it was increaſed at firſt.

The patient, in the uſe of theſe *waters*, ſhould live upon a light diet, eaſy of digeſtion; uſe proper exerciſe; go early to bed, and riſe betimes in the morning.

Theſe *waters* are alſo uſed externally in a variety of diſorders with good effect; either by bathing or pumping, as occaſion may require, eſpecially if uſed inwardly at the ſame time. The efficacy of bathing in paralytic caſes has been long and generally acknowledged: it has alſo been of great ſervice by its ſtimulant quality in the chloroſis, in cachectic diſorders, in the jaundice, in the hypochondriac diſeaſe, and in caſes of barrenneſs; as antiſpaſmodic, it has been very efficacious in the colica Pictonum, hyſteric colic, aſthma, jaundice, menſtrual obſtructions, preventing abortion, nervous diſeaſes, as the epilepſy, St. Vitus's dance, the hyſteric and the hypochondriac diſeaſe, the nervous head-ach, particularly the hemicrania, ſpaſmodic vomiting, nervous atrophy, muſcular contractions, and paralytic contractions of the extremities: as diaphoretic, the *Bath waters* have been much celebrated in the common rheumatiſm, where the inflammatory diſpoſition is very ſlight, and yet the pain and other ſymptoms grievous and of long duration; eſpecially towards the decline of the paroxyſm; and in thoſe rheumatic pains which ſometimes accompany the colica Pictonum; in every variety of the gout, and the complications of it with many other diſorders; in the ſcurvy, provided that bathing be not uſed if the putrid diſpoſition ſhould be ſo ſtrong as to form external ulcers; in the venereal diſeaſe; in the colic; in habitual diarrhœas; in the diabetes; and in the leproſy: as diuretics, *Bath waters* are uſeful in liver complaints; in cutaneous diſorders; in the calculus; as expectorants, they have been alſo of ſervice in gouty coughs, by promoting a beneficial diſcharge. The external uſe of theſe *waters* is improper in continued fevers, local inflammations, both internal and external, in hæmorrhages, in immoderate menſtrual diſcharges, in plethoric habits, in diarrhœas attended with fever or an extreme degree of irritability, in obſtructions of the viſcera, and in caſes of extreme weakneſs.

As to the choice of the ſeveral baths, Dr. Falconer obſerves, that as a ſtimulant, in paralytic caſes, the hotteſt part of the king's bath or the hot bath is preferable; as an antiſpaſmodic, in the tetanus, hypochondriac complaints, and other nervous diſeaſes, the cooler parts of the king's bath or the queen's are more proper; when a mild diaphoreſis is deſired, the queen's or croſs baths are moſt effectual.

The time of ſtay in the bath is at preſent from ten or even five minutes to an hour. As a ſtimulus, e. g. in the palſy, the common time is from fifteen minutes to half an hour; as an antiſpaſmodic, a longer ſtay is in general adviſeable: when the baths are uſed with a diaphoretic intention, a pretty long ſtay is generally thought neceſſary, in order to procure a copious evacuation by ſweat. After bathing, the patient goes to bed for a ſhort time to compoſe himſelf and cool gradually, rather than for the ſake of promoting any evacuation by the ſkin.

The time of day for bathing has, in the public baths, been by immemorial cuſtom fixed between the hours of five and nine in the morning: however, the abbey baths may be had at any hour of the day, filled with freſh *water* for every perſon that uſes them, of nearly the ſame heat and quality with the king's bath *water*.

Formerly, the uſe of the *Bath waters*, as well externally as internally, was confined to the ſummer months; but for many years paſt, the colder, or rather more moderate ſeaſons, as the ſpring and autumn, have been preferred.

It is the common practice to bathe from one to three or four times a week; but the time of its being continued and the frequency of its being repeated muſt depend on the nature of the caſe.

During a courſe of bathing, attention ſhould be had to the regimen, to the tranquillity of the mind, to exerciſe, and to a moderate laxity of the bowels.

When the complaint is local, pumping is generally preferred to bathing: in this caſe, the *water* is hotter than that of the bath; the ſtream of *water* is generally directed to the limb or part affected, and ſometimes to that part of the ſpine, where the nerves that ſupply the place affected iſſue forth. In this way the *Bath waters* are uſed with great ſucceſs in the palſy, in reducing diſlocations of the vertebræ, in relieving contractions of the limbs, in diſcuſſing incipient white ſwellings, in nervous caſes, in fits of the gout, and rheumatic complaints, and in the tinea capitis or ſcald-head. Pumping and bathing are often uſed at the ſame time; the mud and ſcum of theſe *waters* have been alſo applied with good effect, by way of poultice, in hard ſwellings, weak joints, contractions of the limbs, ſcald heads, running ulcers, &c. and herbs are ſometimes boiled with them in the *Bath water* to a proper conſiſtence for ſuch purpoſe. See Falconer's Eſſ. on the Bath *Waters*, vol. i. and vol. ii. paſſim.

Waters, *Briſtol*, are obtained from ſprings, known by the name of the hot wells.

Theſe *waters* at their origin are warm, clear, pellucid, and ſparkling; and if left to ſtand in a glaſs, cover its inſide with ſmall air-bubbles. They have no ſmell, and are ſoft and agreable to the taſte. They raiſe the thermometer from about 79 to 80°. They contain an earthy matter, ſuſpended by means of fixed air, together with ſea-ſalt, and a ſpecies of Glauber's ſalt, in ſmall quantities.

Dr. Guidott pretends that the *Bath* and *Briſtol waters* are of the ſame virtues, but in a different degree; that both are impregnated with the ſame principles, but the *Bath waters* containing a much greater ſhare of them, and therefore capable of doing that in a little time which thoſe of *Briſtol* could only do in a much longer. But this ſeems to be far from a true ſtate of the caſe.

The *Briſtol waters* are ſuppoſed by many a modern diſcovery, and their uſe but of late date, but this is a very erroneous opinon. Dr. Venner, more than a century ago, has written profeſſedly of them, and given them their true character, and proper commendations in all the diſeaſes in which they are at this time found effectual, the diabetes only excepted, in which their uſe has not been known ſo long. They were not indeed much frequented at that time, nor for ſome years afterwards; but that was merely from the want of the neceſſary accommodations at the place. Dr. Maplet, in the year 1639, writes largely of their virtues, particularly in diſorders of the urinary bladder and kidneys, and adds great praiſes of their external efficacy in curing cancerous ulcers; but with all this praiſe, they never came into an univerſal repute, till their character was eſtabliſhed by Dr. Mead and Dr. Lane.

Theſe *waters* have been recommended in a variety of diſorders: in conſumptions and weakneſs of the lungs; in caſes attended with hectic fever and heat, (in which, beſide other properties, they differ from the *Bath waters*;) in uterine and other internal hæmorrhages, and in immoderate diſcharge of the menſes; in old diarrhœas and dyſenteries; in the fluor albus; in gleets; in the diabetes, for which ſome have extolled them as a ſpecific; and in other caſes, where the ſecretions are too much increaſed, and the humours too thin; in the ſtone and gravel; in the ſtrangury; in colliquative ſweats; in ſcorbutic and ſimilar caſes; in colics; in the gout and rheumatiſm; in loſs of appetite and indigeſtion; and in many other diſeaſes.

The uſual method of drinking theſe *waters* is a glaſs or two before breakfaſt, and about five in the afternoon: on the next day, three glaſſes before breakfaſt, and as many in the afternoon, which quantity is to be continued during the patient's ſtay at the wells. A quarter or half an hour is allowed between each glaſs.

A courſe of theſe *waters* requires no other preparation than to empty the bowels by ſome gentle purge; and if heat or fever requires, to take away a few ounces of blood. Coſtiveneſs ſhould be avoided. Externally they are uſeful in ſore and inflamed eyes; in ſcrophulous and cancerous ulcers, and in other ſimilar caſes.

They are cooling, and quench the thirſt; they are beſt drank at the ſpring head; but will bear carriage tolerably well.

The time of drinking the *Briſtol waters* medicinally is from April to September. Elliot on Min. Wat. p. 114.

Waters, *Buxton*, the *waters* of medicinal ſprings near Buxton in the Peak of Derbyſhire, reſembling thoſe of Briſtol.

Theſe *waters* are the hotteſt of any in England, except thoſe of Bath. See Baths.

The *Buxton waters* break out in ſeveral places thereabouts; what is called Buxton bath takes in ſeveral warm ſprings. Thirty-two yards north-eaſt of this is St. Anne's well, which is chiefly ſupplied from a ſpring on its north ſide. Twenty yards ſouth-eaſt of St. Anne's, in another cloſe, is a place where a hot ſpring and a cold one riſe in the ſame receptacle. About ſixty-three yards ſouth-eaſt of this is that called Bingham's well, called alſo Leigh's *water*, from the great benefit a neighbouring gentleman of that name received from it. A little way eaſt of this is another; and in the ſtreams of the level that carries the *water* from the bath, there riſes another very plentiful one; and about four yards father eaſt there ariſe three or four other ſmall ones. From this account, it may eaſily be conceived that there can be no great difference between the *waters* of theſe ſeveral ſprings, though on trials they ſeem to yield different portions of ſalts and ſediments; at the utmoſt, their difference can be only in degree. They contain calcareous earth, together with a ſmall quantity of ſea-ſalt, and an inconſiderable portion of a purging ſalt: but no iron can be diſcovered in them.

Theſe *waters* taken inwardly are eſteemed good in the diabetes; in bloody urine; in the bilious colic; in loſs of appetite, and coldneſs of the ſtomach; in inward bleedings; in atrophy; in contraction of the veſſels and limbs, eſpecially from age; in cramps and convulſions:

in the dry aſthma without a fever; and alſo in barenneſs. Inwardly and outwardly they are ſaid to be good in rheumatic and ſcorbutic complaints; in the gout; in inflammation of the liver and kidneys, and in conſumptions of the lungs; alſo in old ſtrains; in hard callous tumors; in withered and contracted limbs; in the itch, ſcabs, nodes, chalky ſwellings, ring-worms, and other ſimilar complaints.

As to the difference of age and ſex in patients, there is little caution required in the drinking of them, except that they ſhould be taken more ſparingly by young people, between the ages of twenty-three and thirty, if every full of blood and juices, and by women with child in their firſt and laſt months.

As to the method of uſing them, except the body be coſtive, and the firſt paſſages furred up with groſs humours, it is not only unneceſſary, but hurtful, to prepare the body for them, as it is called, by purging; or at leaſt by any ſtronger purges than manna, cream of tartar, and the like.

The heat of *Buxton waters*, in froſty weather, is equal to that of common river-*water* with which two-fifths of boiling *water* have been immediately mixed.

Beſide the hot *water*, there is alſo a cold chalybeate *water* with a rough irony taſte. See Short's Hiſt. of Mineral *Waters*. Elliot on Min. *Waters*, p. 118.

WATERS, *Carlſbad*, called *Caroline baths*, are *waters* of Carlſbad in Bohemia, which are hot, and impregnated with the foſſile alkali; they are recommended, externally and internally, in female obſtructions; relaxed habits; glandulous obſtructions; diſorders ariſing from viſcid fluids, &c.

WATERS, *Cheltenham*, are ſome of the beſt and moſt noted purging chalybeate *waters* in England; the ſprings of which are at Cheltenham near Glouceſter.

The doſe is from one pint to three or four: they operate with great eaſe, and are never attended with gripings, teneſmus, or ſtraining at ſtool. They are beſt taken a little warm: they create an appetite; are excellent in ſcorbutic complaints; and have been uſed with ſucceſs in the gravel.

WATERS, *Dog and Duck*, are the *waters* of a houſe of that name in St. George's Fields near London; which are clear, with little taſte. They are mildly purgative, and may be drank to the quantity of ſeveral pints; they are commonly quickened by the addition of Glauber's or other purging ſalts.

They are uſeful in ſcrophulous complaints, leproſies, and diſeaſes of the ſkin; and are alſo ſaid to prevent the return of cancerous diſeaſes: for theſe complaints they may be uſed both internally and externally. They are cooling and diuretic; and may be given freely to young people of robuſt conſtitutions; but too cool and relaxing for people in years, and of weak habit.

WATERS, *Dulwich*, contain a purging ſalt, together with ſea-ſalt. They are purging and diuretic; uſeful in complaints ariſing from obſtructions, as thoſe of the liver, ſpleen, and other viſcera; recommended in the green-ſickneſs, jaundice, ſcurvy, difficulty of urine, and gravelly complaints: they are ſaid to ſtrengthen the ſtomach, and create a good digeſtion: they are alſo ſaid to ſtrengthen the nervous ſyſtem, and to be ſerviceable in palſies, apoplexies, and other nervous diſorders, in which caſes it is beſt to take them warm.

The courſe of drinking theſe *waters* is uſually twenty days; three pints a day are to be drank at firſt, and the quantity increaſed to eight pints by the tenth day, and afterwards diminiſhed in the ſame manner.

WATER, *Egra*. See EGRA *water*.

WATERS, *Epſom*, have a ſlight ſaline taſte; they are purgative, when drank to the quantity of two or three pints: they alſo operate by urine: in leſs quantity, or about the third part of a pint taken three times a day, they are a mild alterative. They are eſteemed good for waſhing old ſores. See EPSOM *Salt*, and EPSOM *Water*.

WATERS, *Harrowgate*, are the *waters* iſſuing from four ſprings at Harrowgate in Yorkſhire: as they ſpring up, they are clear and ſparkling, and throw up a quantity of air-bubbles; they have a ſtrong ſmell of ſulphur (ſee *Mineral* WATERS), and a ſalt taſte, as they contain a conſiderable quantity of ſea-ſalt, together with a little purging ſalt; they are purgative, the doſe being about three or four pints; when drank in ſmaller quantities, they are a good alterative, and ſerviceable in the ſcurvy, king's evil, and diſeaſes of the ſkin. They may alſo be uſed outwardly at the ſame time, by way of bath or fomentation. They have been found efficacious in deſtroying worms; and recommended in the gout, jaundice, ſpleen, green-ſickneſs, and other diſorders ariſing from obſtructions. They are uſed externally for removing old aches, ſtrains, paralytic weakneſs, &c. and for the cure of ulcers, ſcabs, the itch, &c.

WATERS, *Holt*, are mineral *waters* at Holt, near Bradford, in Wiltſhire: which contain a purging ſalt, together with a large quantity of earth; they are a very mild purge, the doſe uſually required being two quarts: in leſs quantity they are alterative and diuretic; they are good as a diluent, cooler, and ſtrengthener; and create an appetite. Rags or ſpunge dipped in them, and applied externally, are ſaid to cure ſcrophulous ulcers, attended with carious bones; an internal courſe being obſerved at the ſame time. They are alſo of ſervice in old running ulcers of the legs, and other parts; in cutaneous foulneſſes, though attended with hot corroſive humours; in the piles, in cancerous ulcers, and in ſoreneſſes of the eyes: but in theſe caſes they muſt be uſed both internally and externally. See HOLT.

WATER, *Jeſſop*, is a ſtrong purging *water* at Jeſſop's well near Cobham in Surry, with a nauſeous taſte, and ſlightly chalybeate. This, ſays, Dr. Lewis, is one of the ſtrongeſt purging *waters* in the kingdom; a pint left in evaporation ſeventy-two grains of ſalt; whereas Kilburn and Cheltenham *waters* yielded only ſixty-four grains; that of Acton not fifty, and that of Epſom, leſs than forty. About a quart of this *water* purges briſkly without griping, and operates likewiſe by urine. It enlivens the ſpirits; but loſes its virtues by being kept. In leſs doſes it acts as an alterative; and is a good antiſcorbutic.

WATER, *Iſlington*, is a light chalybeate water, reckoned one of the beſt of the kind about London. The iron in this *water* is held in ſolution by means of fixed air; and when the air has eſcaped, and the air precipitates, if the *water* be left to putrefy, the fixed iron diſengaged by the putrefaction again diſſolves the iron, and cauſes it to be ſuſpended in the *water*: it then recovers its chalybeate taſte, and property of tinging with galls, both which it had loſt before.

This *water* is recommended in indigeſtion and loſs of appetite, in lowneſs of ſpirits, nervous, hyſteric, and hypochondriacal complaints, and relaxed conſtitutions, and raiſes the ſpirits. It is good in the fluor albus, in weakneſs from miſcarriage, in obſtructions of the liver, the kidneys, &c. It is alſo ſerviceable in diſeaſes of the ſkin, in ſcorbutic complaints, in the gravel, and in paralytic diſorders. It operates chiefly by urine, and may be drank to the quantity of ſeveral half pints, or even pints, according to the conſtitution of the patient. This *water* deſerves to be eſteemed and frequented.

WATER, *Lancarim*. See LANCARIM *Water*.

WATERS, *Llandrindod*, are *waters* iſſuing from three mineral ſprings near Llandrindod, in the county of Radnor, South Wales. Theſe ſprings are the ſaline purging *water*, the ſulphureous *water*, and the chalybeate rock *water*.

The *ſaline purging*, or *pump-water*, may be uſed as a purge twice in a week: it is directed to be drank at the fountain-head by half pints, till it begins to operate; the patient riding or walking about between each draught: it operates alſo by urine. As an alterative, about three pints are directed to be drank in a day: a pint and a half before breakfaſt, at three draughts, with the interval of a quarter of an hour: the other pint and and a half at three draughts, one an hour before dinner, another about ſix in the evening, and the third going to bed. This courſe ſhould be continued ſeveral weeks; and the moſt proper ſeaſon is the ſummer. It is alſo uſed as a bath and fomentation. It is recommended both internally and externally in the ſcurvy, leproſy, tetters, king's evil, and all cutaneous foulneſſes. It is alſo preſcribed in the gravel, the hypochondriacal diſeaſe, indigeſtion, and in other complaints.

The *ſulphureous water*, called alſo the black ſtinking *water*, is to be drank in ſmall doſes at firſt, from a pint to a quart in the morning, at repeated draughts: the quantity may be increaſed as the ſtomach will bear. This *water* is alſo uſed outwardly as a bath or fomentation. It is recommended in the king's evil, ſcurvy, leproſy, and all cutaneous diſeaſes; in the jaundice, hypochondriacal and other diſorders ariſing from obſtruction; in the gravel, rheumatiſm, gout, bloody flux, hectic fever, weakneſſes of the limbs, want of digeſtion, &c.

The *chalybeate* or *rock water* is limpid and tranſparent, when taken from the fountain, but on ſtanding ſoon loſes theſe qualities, together with its chalybeate taſte. Mixed with ſugar and rough cyder as it is taken up from the ſpring, it excites a briſk fermentation. It is recommended in ſuch chronic diſorders as proceed from laxity of the fibres, and weakneſs of the muſcular ſyſtem; in weakneſs of the nerves, paralytic complaints, and the like; in ſcorbutic caſes, moiſt and convulſive aſthmas; obſtinate agues, obſtructions of the lower belly, wandering, ſlow, nervous fevers, and diſorders ariſing from obſtruction.

WATERS, *Malvern*, iſſue from two noted ſprings at *Malvern*,

vern, in Glouceſterſhire: they are light and pleaſant chalybeates, and almoſt entirely free from an earthy matter; three quarts of the holy well *water* being evaporated left behind ſcarce the fourth part of a grain of ſediment. Theſe *waters* are recommended as excellent in diſeaſes of the ſkin; in leproſies, ſcorbutic complaints, the king's evil, glandular obſtructions, ſcald heads, old ſores, cancers, &c.: they are alſo of uſe in inflammations and other diſorders of the eyes; in the gout and ſtone; in cachectic, bilious, and paralytic caſes; in old head-achs and female obſtructions.

Theſe *waters* are uſed externally by waſhing the part ſeveral times in a day, and afterwards covering it with cloths dipped in the *water*, and kept conſtantly moiſt. Thoſe who bathe are ſaid to go uſually into the *water* with their linen on, and to dreſs upon it wet, without any inconvenience.

Theſe *waters*, when firſt drank, are apt to occaſion a nauſea in ſome; they purge others briſkly for ſeveral days; but they operate by urine in all. They ſhould be drank freely for ſome days before they are uſed externally.

WATERS, *Matlock*, are warm *waters* ſupplied by ſeveral ſprings at *Matlock*, in Derbyſhire, in their nature reſembling Briſtol *water*, except that they are very ſlightly impregnated with iron, and in their virtues ſimilar to thoſe of Briſtol and Buxton.

The baths are recommended in rheumatic complaints, cutaneous diſorders, and other caſes where warm bathing is ſerviceable.

WATERS, *Moffat*, are mineral *waters* of conſiderable efficacy at *Moffat*, in the county of Annandale in Scotland. They ariſe from two ſprings on the declivity of a hill, which yield about 1360 gallons of *water* daily.

Theſe *waters* have a ſulphureous taſte, and ſmell of the waſhings of a gun-barrel; their colour is milky or bluiſh. The ſeaſon for uſing them is between the middle of April and the end of September; but they may be drank all winter, and if the rains be moderate, the ſtrength of the *water* is not found to be impaired. The *water* of the upper ſpring being too foul for drinking, is made uſe of for bathing, and is, for this purpoſe, made ſomewhat warmer than tepid. The quantities of *water* uſually drank are pretty large, exceeding ſometimes a gallon. It is uſual to join purgatives, and that in great doſes, frequently repeated with the uſe of the *waters*; but this is thought unjuſtifiable by ſome.

The *water* is alterant and diuretic: its purging is owing to the large quantities drank, or to ſome ſingularity in the conſtitution, as a weak ſtate of the ſtomach and inteſtines. Few medicines are ſaid to be ſuperior to theſe *waters* in diſorders of the ſtomach and bowels. It has alſo proved uſeful in nephritic, nervous, and hyſteric colics, melancholy, barrenneſs, female weakneſſes and diſorders, as alſo in old gleets, either natural, or cauſed by venereal diſorders. In rheumatic and ſcorbutic complaints it is advantageous, and in cutaneous eruptions. It is ſaid ſeldom to fail in ſcorphulous diſorders. It is warmed and uſed by way of bath to particular parts, and even to the whole body: the hot ſtream has been ſucceſsfully uſed for relaxing hard ſwelled parts, and ſtiff joints. In ſuch complaints it is uſed both internally and externally. This *water* gives no marks of a chalybeate nature with galls, nor of acidity with tincture of roſes, or ſyrup of violets, neither does it produce any effervеſcence with oil of tartar *per deliquium*, or ſpirit of ſal ammoniac. It ſeems to contain a ſubtile volatile ſulphur, but in ſmall quantity, ſince it ſoon loſes its remarkable ſmell and taſte, when expoſed to the air, and that acid liquors can neither ſeparate nor precipitate it. Upon evaporation there is found a dirty ſalt mixed with earth. This ſalt ſeems not to be nitre, nor ſal ammoniac, but common ſalt; and by a ſlow evaporation of a ſolution of ſea-ſalt, cryſtals not unlike thoſe of the ſalt of *Moffat-water* have been obtained. Med. Eſſ. Abr. vol. i. p. 99. Ibid. p. 101. Ibid. p. 103, ſeq. where other experiments on theſe *waters* may be ſeen.

WATERS, *Montroſe*. Steel ſpas are very numerous in the country about *Montroſe* in Scotland: the principal of theſe are at Aberbrothoc, Kincardin, and Peterhead. That of Aberbrothoc is in greateſt eſteem. Medic. Eſſ. Abr. vol. i. p. 106, 107. Ibid. p. 111.

Beſide theſe, there is a well near *Montroſe*, the *water* of which is of a whitiſh colour, ſoft taſte, and faintly diſcovering the mineral quality. This water is of a different nature from the ſteel-ſprings. The alkali prevails in its ſalt; it reſembles the Scarborough *water*, and no ſalts come up to any analogy with thoſe of the *Montroſe water*, and thoſe of Scarborough, but nitre and ſea-ſalt. See Med. Eſſ. vol. iii. art. 8. Abr. vol. i. p. 112, ſeq. where various experiments with thoſe *waters* are enumerated, and a compariſon inſtituted between them and the Scarborough *waters*.

The *water* of this *Montroſe* well is univerſally diuretic; being drank from two to three pints, it purges; and half the quantity ſucceeds with ſome. It has been found very uſeful in ſtranguries and ſtoppage of urine, ſcorbutic diſorders, flatulencies, ſpaſmodic colic, and ſpitting of blood. In rheums aud ſtrains it has been of good uſe by way of cold pump, where perſons could not bear ſuch uſe of ordinary cold *water*. Med. Eſſ. vol. iii. art. 9. Abr. vol. i. p. 122, ſeq.

WATER, *Nevil Holt*, is a mineral *water* at *Nevil-Holt*, in Leiceſterſhire, which is very clear as it falls from the ſpout, and void of ſmell: it has a briſk auſtere bitter, but not diſagreeable taſte, and abounds in fixed air: expoſed to the air, it ſoon becomes turbid and ſpoils. Drank to the quantity of ſeveral pints, it proves purgative, and operates without griping; it operates alſo by urine and ſweat. In putrid diſorders, it is a powerful antiſeptic. As an alterative, it muſt be taken in ſmall doſes, from a few ſpoonfuls to a quarter or half a pint ſeveral times in a day; and a little brandy may be added to it, if it is cold on the ſtomach.

This *water* is eſteemed an excellent remedy in old dyſenteries and diarrhœas, internal hæmorrhages, the fluor albus, gleets, the gravel, rheumatiſms, and for the *worms*: it is good in atrophies, bloated conſtitutions, dropſical complaints, ſcorbutic diſorders, want of appetite, and other caſes; but in inflammatory complaints, and with an acidity of the humours, it is injurious. Externally, it is a ſpeedy cure for freſh wounds, inflamed eyes, and hectic ulcers, &c. eſpecially, if taken inwardly at the ſame time.

WATERS, *Pyrmont*, *Scarborough*, *Seltzer*, and *Spa*. See the ſeveral articles.

WATER, *Sydenham*, is a purgative *water* at *Sydenham*, near London, of the ſame nature with *Epſom* WATER, but weaker.

WATERS, *Tiberiades*, and *Tilbury*. See the articles.

WATER, *Tunbridge*, is one of the moſt famous chalybeate *waters* in England. The wells are ſituated about five miles from the town of *Tunbridge* in Kent. This is a briſk, light *water*, has a ferruginous taſte, and contains alſo a little ſea-ſalt: expoſed to the air, it ſoon loſes its virtues; as it does alſo in a few days in bottles. It is ſometimes uſual to mix with the firſt glaſs of the *water*, taken in the morning, either a little common ſalt, or ſome other purging ſalt, in order to make it operate by ſtool: with a foul ſtomach it is apt to cauſe a vomiting. The *Tunbridge water* is chiefly reſorted to in June, July, and Auguſt; and is recommended in all the diſorders in which the celebrated Spa *waters* of Germany are ſerviceable: as it poſſeſſes the ſame virtues, in a weaker degree.

WATER, *Witham*, in Eſſex, is a chalybeate *water* of conſiderable ſtrength, and is alſo impregnated with ſea-ſalt; but muſt be drank at the fountain, as it will not bear carriage. It is very diuretic, and has been ſucceſsfully preſcribed in hectic fevers, in weakneſs occaſioned by long diſeaſe, in lowneſs of ſpirits, nervous complaints, want of appetite, indigeſtion, habitual colic and vomiting; in agues, the jaundice, and incipient dropſy; in the gravel, and in aſthmatic and ſcorbutic diſorders.

For a more particular account of the nature, qualities, and various kinds of *mineral waters*, we muſt refer to the treatiſes of Dr. D. Monro, Dr. Rutty, Dr. Short, Dr. Falconer, and Dr. Elliot, on this ſubject. See alſo Chem. Dict. art. *Water*. Lewis's Mat. Med. art. *Aqua*, and Bergman's Chem. Eſſ. vol. i.

WATER, in *Chemiſtry*, by the chemiſts called more uſually PHLEGM, is the fourth of the five chemical principles, and one of the paſſive ones.

WATER *of cryſtallization* is a denomination given to the *water* attracted by the particles of a ſalt during its cryſtallization. This is contained in different quantities in different ſalts, and adheres to them with different degrees of force; though it is eaſily ſeparated from moſt of them, the moderate heat of the atmoſphere being ſufficient to evaporate it from many. When this *water* of cryſtallization is evaporated from any ſalt, the figure of the cryſtals is deſtroyed; the ſalt from being a ſolid tranſparent ſubſtance becomes an opake powder. But though a ſalt, in loſing its *water* of cryſtallization, loſes its cryſtalline form, it does not thereby loſe part of its ſaline quality: for the *water* which is ſeparated from it is pure *water*; and the ſalt, by being re-diſſolved in *water* and re-cryſtallized, will not only regain its former figure, but the whole of its weight.

WATER, *lime*. See LIME-*water*.

WATER, *mercurial*, a name given to a ſolution of mercury in nitrous acid, diluted with a greater or leſs quantity of common *water*. This liquor produces good effects, as an eſcharotic;

eſcharotic, and even as a cauſtic in ſome diſeaſes of the ſkin that are external, local, and eſpecially venereal.

There is alſo a *mercurial water* made with four ounces of quickſilver to two quarts of ſpring *water* boiled to one quart. This is reckoned an efficacious medicine in ſeveral caſes, as the worms and the itch in children, by Dr. Cheyne and others. See AQUA *mercurialis*.

WATER, *mercurial*, for forming pearls. See PEARL.

WATERS, *mother*, a name given to the liquor that remains after as much of the ſaline ſubſtances contained in a *water* has been ſeparated as can be by the uſual methods, evaporation and cooling, and from which, therefore, no more cryſtals can be obtained, without much difficulty, though it ſtill remains impregnated with ſalts.

Theſe *mother waters* are very different according to the kinds of ſalts with which the *waters* are originally impregnated. They are generally very heavy, acrid, and red.

WATER *of Rabel*, a vitriolic acid dulcified by mixture with rectified ſpirit of wine, ſo called from its inventor Rabel. It may be prepared by mixing one part of oil of vitriol with three parts of rectified ſpirit of wine, and digeſting the mixture in a well-cloſed veſſel.

This *water* is employed in medicine as an aſtringent; but it requires to be diluted in ſome proper vehicle, as in potions or juleps.

WATERS, in *Medicine*, *Pharmacy*, *Chemiſtry*, &c. called alſo *artificial*, and *medicated waters*, are a kind of liquors procured or prepared by art from divers bodies, principally of the vegetable tribe; having various properties, and ſerving various purpoſes.

Theſe *waters* are either *ſimple* or *compound*.

WATERS, *ſimple*, are thoſe procured from ſome one vegetable body, by means of common *water*.

A *ſimple water* is not ſuppoſed to be the mere *water*, or phlegm of the body it is drawn from, as is evident both from the taſte and ſmell thereof. The intention of making ſuch *water* is, to draw out the virtues of the herb, ſeed, flower, root, or the like; ſo as it may be more conveniently given in that form than any other. But the phlegm, or *watery* part of any medicinal ſimple, is no better than common *water* undiſtilled: ſo that all thoſe ingredients, which in diſtillation raiſe nothing but phlegm, as may be diſcovered from the ſcent and taſte of what comes over, are not fit for the ſtill. On this principle, a great part of the *waters* retained in the diſpenſatories will appear good for nothing, at leaſt not worth diſtilling.

The means whereby this ſeparation is effected, are either *evaporation*, *infuſion*, *decoction*, or *diſtillation*. The firſt is performed by expoſing the vegetable in a cold ſtill, to a gentle heat, like that of a ſummer's ſun; and catching the effluvia which exhale from it.

The effect of this operation is a *water*, or fluid matter, which is the moſt volatile, fragrant, and aromatic part of the plant; and that wherein its ſpecific virtue reſides. And thus it is, that the fineſt aromatic or odoriferous *waters* of vegetables are to be procured.

The ſecond means, viz. *infuſion*, is performed by putting the vegetable in hot *rain-water*, below the degree of boiling; keeping it to this degree by an equable heat, for the ſpace of half an hour; and then drawing it off. The only *waters* procured this way, in much uſe in the modern practice, are thoſe of frog-ſpawn, and oak-buds.

The third means, viz. *decoction*, only differs from the ſecond in this, that the *water* is kept to the degree of boiling.

The fourth means, viz. *diſtillation*, is performed by infuſing the ſubject in an alembic, with a gentle warmth, for ſome time; and then increaſing the heat, ſo as to make it boil; and laſtly, catching and condenſing the ſteam or vapour ariſing therefrom.

This proceſs furniſhes what we call the *diſtilled waters*, of ſo much uſe in medicine, &c. See DISTILLED *Waters*.

The vegetable ſubjects beſt fitted for it, are the ſapid and odorous, or thoſe of the aromatic tribe; as angelica, aniſeed, baum, carraway, coriander, cumin, dittany, fennel, hyſſop, marjoram, mint, roſes, roſemary, ſaffron, ſage, ſcurvy-graſs, thyme, cinnamon, citron, juniper, lime, myrtle, orange, peach, &c.

The medicinal virtues of *waters* prepared after this manner are the ſame as thoſe of the reſpective plants, &c. they are drawn from. Thus, the diſtilled *water* of mint is ſtomachic; that of wormwood, vermifugous, &c.

The materia medica, it may be obſerved, affords no remedies in this way, but for the intentions either of cordials, emmenagogues, diuretics, or diaphoretics. Were it practicable to raiſe a balſamic, cathartic, or opiate, in this manner, yet would thoſe properties be much more conveniently brought forth by other proceſſes; ſo that nothing is to be looked for in a diſtilled *water*, but ſuch ſubtle and light parts of a medicinal ſimple, as may fall in with the fore-mentioned intentions: indeed, very little comes over under that diviſion, weighty enough to effect even the urinary ſecretions.

The *ſimple waters*, of chief virtue, are the following ones; viz. *dill-water*, *aqua anethi*; *angelica-water*, *aqua angelicæ*; *mint-water*, *aqua menthæ*; *roſemary-water*, *aqua anthos*; *orange-flower-water*, *aqua naphæ*; *black-cherry-water*, *aqua ceraſor. nig.*; *parſley-water*, *aqua petroſellini*; *chamomile*, *chamæm.*; *pennyroyal*, *pulegii*; *fennel-water*, *aqua fœniculi*; *damaſk-roſe-water*, *aqua roſarum dam.*; *hyſſop-water*, *aqua hyſſopi*; *rue-water*, *aqua rutæ*; *juniper-water*, *aqua juniperi bacc.*; *elder water*, *aqua ſambuci flor.*; *lovage-water*, *aqua loviſtici*; *carminative water*, *aqua carminativa*, &c.

It may be here proper to note, that whatever properties any ſimple has from the groſſneſs or ſolidity of its parts, which make it act as an emetic, cathartic, or aſtringent, the reſidue, left after diſtillation, will remain in full poſſeſſion thereof. Thus the purging ſyrup of roſes is as well made after the damaſk-roſe *water* is drawn off, as if the flowers were put into infuſion; becauſe nothing of a cathartic quality riſes with the *water*.

In the diſtillation of *ſimple waters*, a good general rule is this: take as much of the dried herb, as when cut ſmall will fill two thirds of the ſtill to be uſed; pour upon this as much rain *water* as will make the plant float commodiouſly, leaving, however, a fourth of the ſtill empty; digeſt this a while in a gentle heat, and then give fire enough to work the ſtill, and draw off ſo long as the *water* appears thick or milky, and taſtes of the herb. It is a principal caution in this operation to remove the receiver before the more pellucid, acid, faint, and dead *water* comes over, as it will at length do, and by mixing with the reſt will ſpoil the whole, by giving it a vapid or faint taſte, and ſometimes a degree of acidity or vitriolic ſtypticity, or emetic quality; for part of the eſſential ſalt of the plant now riſing, corrodes the head of the ſtill, and carries over with it ſome particles of the metal: for which reaſon, ſuch *waters* ſhould be either diſtilled with a glaſs head, or a pewter one, or elſe the laſt running carefully watched, and not ſuffered to come over and mix with the firſt; for want of this caution, children, and perſons of tender habits, have been often vomited, purged, &c. contrary to the intention of the preſcriber, by a *ſimple-water*.

The *ſimple-waters* diſtilled by this method may often be too ſtrong to give alone, but then it is eaſy to let them down to a proper ſtrength with common *water*; which is beyond all compariſon better than to mix them with their own faints, or the liquor of their ſecond running.

Some recommend putting the freſh herbs, cut and bruiſed, into an alembic placed in a *water*-bath, without adding *water* to them, and diſtilling to dryneſs with a very gentle heat and well-luted veſſels.

There are yet, however, two methods of improving the common *ſimple waters*, which might eaſily be put in practice: the firſt is the cohobating, and carefully digeſting of the plant; the ſecond, the fermenting of it. With regard to the firſt, if the liquor remaining in the ſtill be expreſſed from the herb, and returned, along with all the *water* that came over, upon a freſh quantity of the ſame ſubject, and then diſtilled as before, the *water* thus obtained will be much richer, and more efficacious than before; and if the ſame operation be repeated two or three times, thoſe who have not tried it cannot eaſily conceive how very rich a *ſimple water* may by that means be made: and this is moſt neceſſary in diſtilling the *ſimple waters* of roſes, elder-flowers, baum, and the like ſubjects, which afford but little oil, and otherwiſe make but weak *waters*.

The other method recommended, viz. by fermentation, is performed by adding to the plant and *water*, put together as for diſtillation, a tenth or twelfth part of ſugar or honey, or elſe a fortieth part of yeaſt; then ſetting the whole in a warm place to ferment for three or four days only, ſo that the herb may not fall to the bottom, nor the fermentation be above half finiſhed; then the whole being committed to the ſtill, a *water* may be procured at one operation, extremely rich, or impregnated with the whole virtue of the plant; and thus may *ſimple waters* be made fit for long keeping without ſpoiling, the ſmall quantity of inflammable ſpirit generated in the fermentation ſerving excellently to preſerve them. Shaw's Lectures, p. 199.

The *waters* procured in this manner contain the oil of the plant in great perfection; which makes them of conſiderable uſe in medicine, farther than thoſe raiſed without fermentation; beſide that they keep better and longer; the ſpirit in them preventing their corrupting, or growing mothery.

To procure the *diſtilled waters* of vegetables, or other ſubjects, pure and free from all mixture of the other principles of the body it was extracted from, let the *water*, as diſtilled, be put into a funnel lined with paper to be filtred, and the funnel being kept continually filled up, that the lighter oil may not come in contact with the paper, the *water* will be tranſmitted through, in a great meaſure, without the oil; but there ſtill remains ſome proportion of oily, and commonly of ſaline matter alſo in it. If the ſaline matter be acid, the way to deſtroy it is by mixing chalk, or any alkaline ſalt, with the *water*, which being afterwards diſtilled again, will then riſe pure. If the plant were alkaline, and an alkaline ſalt be ſuſpended in the *water*, let it be made a neutral one, by mixing ſome acid, and then the *water* filtred and diſtilled again. By theſe methods the *water* of vegetables is procured pure; and this is the way of proving, that the chemical principle *water* is lodged in, and may be ſeparated from all ſuch ſubſtances. Shaw's Lectures, p. 150.

WATERS, *compound*, or thoſe wherein ſeveral ingredients are uſed, are very numerous, and make a large article in commerce; ſome prepared by the apothecaries, according to the Diſpenſatory preſcripts, for medicinal uſes; others by the diſtillers, to be drank by way of dram, &c. and others by the perfumers, &c.

They are diſtinguiſhed by different epithets, taken from the Latin, Greek, Arabic, Engliſh, &c. in reſpect either of the ſpecific virtues of the *waters*, or the parts of the body, for the cure whereof they are intended; or the ingredients they are compounded of; or their different uſes, &c.

The moſt conſiderable among the claſs of *compound waters*, we ſhall here enumerate. The manner of making them, it is true, is not always the ſame; eſpecially thoſe intended for drinking; for which every one gives his own method as the beſt. Thoſe we here deliver, are taken from ſuch as have the greateſt reputation in preparing theſe things; or from thoſe who have written beſt of them.

We have only three general remarks to add, with regard to thoſe intended for drinking; 1. That ſuch wherein any thing is infuſed, as bruiſed fruits, pounded herbs, or ground ſpices, muſt be always paſſed through a filtre, to make them finer and purer.

2. That thoſe made with brandy, or ſpirit of wine, are uſually diſtilled after mixing their ingredients; which renders thoſe liquors exceeding ſtrong and dangerous, and confirms the proverb; *Plures occidit gula quam gladius.* In effect, ſome of them are ſo penetrating, that they burn the tongue when taken.

3. That the *waters* which take their name from any particular things, as *cinnamon*, &c. have often ſome other ingredients joined with them, according to the taſte or ſmell required.

In the making of compound ſpirituous liquors, or, as they are called by the apothecaries, *cordial waters*, the great care is to uſe a pure and well-rectified ſpirit, as nearly inſipid as poſſible, that the flavour of it may not mix among the flavours of the other ingredients. It is the general cuſtom to uſe the proof-ſpirit, but it would be infinitely better to uſe the alcohol, or totally inflammable; partly, as the ſtrength of the *water* would be much better aſcertained that way, the proof ſtrength determined by the crown of bubbles being very vague and uncertain, and that of the alcohol or totally inflammable ſpirit perfectly fixed and certain; and becauſe this ſpirit is always more free from the oil of the ingredients it is made from, and on that account not only approaches more to that ſo much deſired thing, a pure and taſteleſs ſpirit, but being free from oil of its own is the more hungry, the more ready to imbibe that of the ingredients added to it, and has no overpowering taſte to give of its own.

If the method of uſing alcohol be not choſen, let a fine, clear, and pure melaſſes ſpirit of the proof ſtrength be uſed, without any farther addition of *water* in the ſtill, an additional quantity of *water* only taking up room to very bad purpoſe, and prolonging and prejudicing the operation; and when alcohol is employed, it ſhould only be mixed with an equal quantity of pure *water*, to reduce it to the proof ſtrength. When the choice of a ſpirit is thus ſettled, the next thing to be had regard to is the matter of digeſtion, for without this many ingredients will not part with their flavour and virtues at all, and many others but very imperfectly. Cinnamon in particular, if not macerated in the ſpirit a long while before diſtillation, will not part with its heavy oil, which will therefore be left in the ſtill, and thrown away, while the ſlightly impregnated ſpirit is ſaved.

When the ingredients have ſtood a due time in digeſtion, according to their ſeveral natures, the ſpirit is to be drawn from them in the manner that beſt tends to bring over their virtues, whereon the character and expectation of the *water* is founded; ſo if the ingredients naturally abound in a heavy viſcous oil, the operation ſhould be performed with a briſker fire, than when the oil is thin, light, and etherial. Thus ſtrong cinnamon-*water*, after a ſufficient digeſtion to looſen the oil, may be drawn over ſmarter, or with a briſker fire, than citron-*water*, the ſpirit of mint, or the like, in which the oil of the ingredient is thin, and will eaſier aſcend with the ſpirit. The capital thing in this compound diſtilling reſts here, that a ſufficient quantity of the fine eſſential oil of the ingredients be received into, and mixed with the ſpirit, while the groſſer, leſs ſubtile, and leſs agreeable oil is thrown out. To effect this to any degree of perfection, requires that the operation be well conducted from the beginning, that the receiver be changed in due time, and that the ſpirit be prudently made up.

When no regard is had to theſe three particulars, as is uſually the caſe among the apothecaries, the conſequence is, that the *cordial-water* becomes a thick, turbid, and milky liquor, and taſtes more like what the diſtillers call faints, than like a *cordial-water*, and is fitter to give ſickneſs rather than to cure it. At leaſt, before it can be uſed, it muſt either ſtand a long time to fine itſelf, if ever it will fine, or have its groſs and terreſtrial parts precipitated by art. On the contrary, when theſe rules are prudently obſerved, the *water* proves, without farther trouble, clean-taſted, clear, briſk, pleaſant, and refreſhing.

The diſtillers in general make their compound *waters* in a much neater manner than the apothecaries; and what has led them into the way of doing ſo, is their ſtrict obſervance of the bubble-proof, a thing which the apothecaries ſeem either not to underſtand, or to pay very little regard to.

The diſtillers, in the making of their compound *waters*, find that if they let the faints run in among the clear ſpirits, it kills the proof, as they call it, before the time; hence they are inſtructed to leave the faints out, and to make up the ſpirit with pure *water*, reſerving the faints to other uſes, to which they are better adapted, as containing a copious oil; or they let the ſtill work longer than the proceſs for making *water* would require, and by this means obtain a larger quantity of oil than is commonly imagined: this they preſerve ſeparate, if the oil of only ſome one ingredient; and they ſell large quantities of the oils of juniper, aniſe, and carraway, and the like, to the druggiſts, chemiſts, and apothecaries. But this a very ſcandalous cheat on the buyer, for there is a very great difference between a pure and clear eſſential oil, that is perfect and entire, and ſuch a one as has, in this manner, been robbed of its lighter and finer parts by diſtillation with a ſpirituous menſtruum.

It is a general rule in this buſineſs to change the receiver as ſoon as the ſpirit runs proof, and make up the quantity with *water*: in this caſe, the whole is certain to be clean and fine; but there are ſome caſes, as in particular in the diſtilling of cinnamon-*water*, where a ſmall quantity of the faints ought to be ſuffered to come into the ſpirit: but this is to be obſerved by way of ſtint, that ſo much is never to be allowed of the faints as will make the *water* milky; for the *water* ſhould always be kept in the ſtate of full proof, as it mellows and ripens, as they expreſs it, much ſooner in this than in any other ſtate. But if the cuſtom could be univerſally introduced, it would be better that all the *waters*, kept by the apothecaries, ſhould be juſt in the ſtate in which they came over, that is, three-fifths of the quantity of the proof ſpirit put into the ſtill: if this were generally brought about, it would be eaſy for the phyſicians to regulate the doſes in their preſcriptions accordingly; every draught and julep that they entered into would be the better for it. Shaw's Eſſay on Diſtillery.

Dr. Shaw in another treatiſe, after obſerving that the apothecaries uſually ſucceed but ill in diſtilling *cordial-waters*, lays down the four following rules, by the obſervance of which the art of making theſe *waters* might be brought to great perfection.

The firſt is, to uſe a well cleanſed ſpirit that is free from its own eſſential oil; for as the deſign of compound diſtillation is to impregnate a ſpirit with the eſſential oil of the ingredients, it ought firſt to be deprived of its own.

The ſecond rule is, to ſuit the time of the digeſtion of the ingredients to their tenacity, or the ponderoſity of their oil; thus rhodium-wood and cinnamon require to be longer digeſted, before they are diſtilled, than calamus aromaticus, or lemon-peel. Sometimes alſo cohobation, or the pouring of the ſpirit, already diſtilled, back upon the ingredients, proves neceſſary, as particularly in making the ſtrong cinnamon *water*, where the eſſential oil is extremely ponderous, and difficultly riſes along with the ſpirit without this cohobation.

The third rule is, to ſuit the degree of fire, or ſtrength of the diſtillation, to the ponderoſity of the oil intended to be raiſed with the ſpirit: thus ſtrong cinnamon-*water* ſhould be diſtilled off briſker than the ſpirit of mint or baum.

The fourth rule is, that a due proportion of only the finer eſſential oil of the ingredients be thoroughly united, or incorporated with the ſpirit, ſo as to keep out the groſſer and leſs fragrant oil. This may chiefly be effected by leaving out the faints, and making up to ſtrong proof with fine ſoft *water* in their ſtead.

The addition of ſugar to *cordial-waters* is a thing of little moment, and may therefore be omitted. If the four rules before laid down be duly obſerved, there is no occaſion for diſtilling in balneo Mariæ, nor for fining down *waters* with alum, whites of eggs, iſinglaſs, or the like, for they will be preſently bright, ſweet, and pleaſant taſted, without any farther trouble. Shaw's Lectures, p. 127.

Waters, *alexipharmic*, or *alexiterial*, are *waters* that reſiſt poiſons, and the plague. Such are thoſe of angelica, ſcorzonera, citron, orange, ſcordium, rue, &c. Such alſo are *treacle-water*, *plague-water*, *milk-water*, *poppy-water*, &c. See Aqua *Alexiteria*.

Water, *alum*, is a vulnerary *water*, thus called, becauſe the baſis, or principal ingredient thereof, is alum. See Aqua *Aluminoſa*.

Water, *angelica*, is uſually prepared of brandy, angelica-roots and ſeeds, carduus, baum, fennel-ſeed, &c. the whole beat together in a mortar; infuſed for a night in French brandy, and then diſtilled. It is reputed a good carminative, and cordial, as alſo a cephalic, &c. See Angelica, and *Alexiteria* Aqua.

Water, *aniſeed*. To ſix ounces of bruiſed aniſeeds, add a gallon of melaſſes ſpirit, and two quarts of *water*; diſtil a gallon, and, if you require it ſugared, add half a pound of clarified ſugar; but many prefer it without: and ſtrain the whole.

The compound *aniſeed water*, commonly kept in the ſhops, is prepared from a mixture of equal parts of the ſeeds of aniſeed and angelica, by drawing off a gallon of proof ſpirit from half a pound of each of the ſeeds. Lewis.

Water, *apricot*. See Apricot.

Waters, *aromatic*, we have already ſpoken of among the ſimple *waters*.

They are ſuch as are impregnated by diſtillation with the ſpiritus rector, or odoriferous principle of aromatic matters. If ſpirit of wine be impregnated in the ſame manner, the *waters*, as they have been called, ought to be diſtinguiſhed by the name of *aromatic ſpirituous waters*. Thoſe that are impregnated with the ſmell of one ſubſtance are called ſimple, and thoſe impregnated by means of ſeveral ſubſtances compound.

Waters, *arthritic*, are *waters* good againſt the gout, palſy, tremors, pains in the joints, &c. Such are thoſe of piony, chamæpitys, betony, roſemary, &c.

Water, *bryony*, is one of the compound *waters* preſcribed in the College Diſpenſatory; prepared from bryony roots, rue, mugwort, ſavin, feverfew, dittany, &c. It is a good hyſteric, opens menſtrual obſtructions, &c.

Water, *carduus*, is made from carduus benedictus pounded in a mortar, and put in an alembic: then a ſufficient quantity of the juice of the ſame plant, drawn by expreſſion, is poured into the alembic: that the herbs ſwimming in the juice may be in no danger of ſticking to the bottom of the curcubit in diſtillation. Laſtly, fitting on the head, and luting the joints, diſtil half as much as you put in. This *water* is ſaid to be ſudorific; and good againſt the plague, malignant fevers, &c.

Water *of ſeparation* or *depart*, is only aqua *fortis*; thus called, becauſe ſerving to ſeparate gold from ſilver. See Depart. It is alſo called

Water, *cauſtic*, and is prepared of a mixture of ſpirit of nitre and vitriol, drawn by force of fire; to which are ſometimes added alum, &c.

It diſſolves all metals, gold only excepted. The invention of aqua fortis is uſually referred to the thirteenth century: though ſome hold it to have been known in the time of Moſes.

Waters, *cephalic*, are *waters* proper to ſtrengthen and comfort the brain. Such are thoſe of roſemary, marjoram, ſage, piony, betony, baum, &c.

Water, *chalybeate*, is a *water* wherein red-hot ſteel has been quenched. It is aſtringent, and good, like ferruginous, or iron *water*, for diarrhœas, &c.

Water, *cherry*. In a quart of *water* cruſh half a pound of cherries, with four or five ounces of ſugar. Strain the whole through a cloth till it be very clear.

Water, *cinnamon*. In a gallon of ſpirit, diſtil a pound of cinnamon: add four ounces of ſugar. Or thus: take a pound of cinnamon, three pounds of *roſe-water*, and as much white-wine: bruiſe the cinnamon, infuſe it fourteen days, then diſtil it. The firſt quart that riſes is the beſt; then the ſecond; then the third. Or, ſteep one pound of cinnamon-bark, bruiſed, in a gallon and a half of *water*, and one pint of brandy, for two days; and then diſtil off one gallon. For a ſpirituous *cinnamon-water*, take of cinnamon, one pound; proof ſpirit and common *water*, of each one gallon: ſteep the cinnamon in the liquor for two days; then diſtil off one gallon.

Water, *citron*. See Citron.

Water, *clary*. See Clary.

Water, *clove*. See Clove.

Water, *copper*. See Ziment.

Waters, *cordial*, or *cardiac*, are *waters* proper to ſtrengthen and comfort the heart. Such are thoſe of endive, chicory, bugloſs, borrage, marigolds, &c. See Cordial.

Waters, *coſmetic*, are *waters* proper to cleanſe, ſmoothen, and beautify the ſkin.

Waters, *diſtilled*, of *laurel leaves*, poiſonous. See Laurel.

Water, *fennel*. Diſtil a pound of dried fennel, with a gallon of *water*. See Fennel.

Water, *gentian*. Take four pounds of gentian-roots, either green or dried; mince them ſmall, infuſe them in white-wine, or only ſprinkle them therewith; then diſtil them, with the addition of a little centaury the leſs. This is frequently uſed as a ſtomachic, and is alſo commended for a deterger; ſerving in dropſies, jaundice; obſtruction of the viſera, &c. but it is really of very little virtue.

Water, *gum*, is that made by letting gum Arabic, incloſed in a linen rag, infuſe in common *water*. The ladies alſo make a thick *water* for their hair, of quince-kernels ſteeped in *water*.

Waters, *hepatic*, are thoſe uſed to cleanſe, ſtrengthen, and refreſh the liver. Such are thoſe of chicory, the capillaries, purſlain, agrimony, fumitory, &c.

Water, *honey*, is a *water* prepared of honey and amber-griſe, diſtilled with ſpirit of wine. The poor people alſo have a drink, which they call by this name; they procure it in places where much honey is made, by waſhing out the honey-combs, and the veſſels they have been in, in common *water*. This gives it a honey taſte, and it afterwards becomes very clear, and the people uſe it as common drink.

Water, *horſe-raddiſh*, *aqua raphani*, is prepared of the juice of ſcurvy-graſs, brook-lime, water-creſſes, white-wine, lemon-juice, bryony-root, horſe-raddiſh, Winter's-bark, and nutmeg, digeſted in ſpirits, and diſtilled. It is a good diuretic; cleanſing and removing obſtructions of the viſcera, promoting perſpiration, &c.

Water, *Hungary*. See Hungary *Water*.

Waters, *hyſteric*, are thoſe proper to ſtrengthen the matrix, or momb, and remedy the diſorders that befal it. Such are thoſe of bryony, matricary or motherwort, hyſſop, fennel, baum, mugwort, ſmallage, &c.

Waters, *iced*, or *frozen*, are certain agreeable and wholeſome *waters*, as *orange-water*, or the like, artificially frozen in ſummer-time, particularly in hot countries, to be uſed in collations, &c. as coolers. The way of making them is thus: the veſſels containing the liquors deſigned to be frozen, are firſt ſet in a pail, in ſuch manner as not to touch each other; then they are covered up, and the void ſpace in the pail filled with common ice, beaten, and mixed with ſalt. Every half-hour they clear out what *water* the thawing ice ſends to the bottom of the pail, by means of a hole at bottom; and at the ſame time ſtir up the liquors with a ſpoon, that they may freeze into ſnow: for were they to ſhoot in form of ice, or icicles, they would have no taſte. Then, covering the veſſels again, they fill up the pail with more beaten ice and ſalt, in lieu of that diſſolved and evacuated. The more expeditious the freezing is required to be, the more ſalt is to be mixed with the ice. See Ice.

Water, *imperial*, *aqua imperialis*, is a *water* diſtilled from cinnamon, nutmeg, citron-peel, cloves, calamus aromaticus, ſantal, and divers other ſimples infuſed in white-wine and *baum-water*. It is a pleaſant cordial dram, and is good againſt diſeaſes of the brain, ſtomach, and womb.

Water, *juniper*, is a compound *water*, made of brandy, and juniper-berries beaten therein, and diſtilled. This is commonly called Geneva.

Water, *lime*, is common *water*, wherein quick-lime has been ſlaked; afterwards filtred. See Lime-*water*.

Water, *milk*, *aqua lactis*, is prepared of mint, wormwood, carduus benedictus, goat's-rue, and meadow-ſweet, bruiſed, infuſed in milk, and drawn off by diſtillation. It is held alexipharmic, and cephalic.

Water, *aqua mirabilis*, or *the wonderful*, is prepared of cloves, galangals, cubebs, mace, cardamoms, nutmeg, ginger, and ſpirit of wine, digeſted twenty-four hours, then diſtilled. It is a good and agreeable cordial, carminative, &c.

WATERS, *nephritic*, are ſuch as ſtrengthen the reins, and help them to diſcharge by urine, any impurities therein. Such are thoſe of the honeyſuckle, pellitory, raddiſh, beans, mallows, &c. See NEPHRITIC.

The *nephritic water* of Dr. Radcliff, popularly called Dr. *Radcliff's water*, was taken into one of the editions of the College Diſpenſatory. It is prepared from the kernels of black cherries, peaches, and bitter almonds, beaten in a mortar into a paſte, with Rheniſh wine; and ſeeds of ſmallage, treacle, muſtard, gromwell, and parſley, beaten likewiſe, and added thereto: to the mixture are put juniper-berries, garlick, onions, leeks, pimpernel, horſe-radiſh, calamus aromaticus, cinnamon, wall-rue, mace, and nutmegs: the whole macerated in Rheniſh, ſpirit of black cherries, &c. and thus diſtilled. It it is ſaid to be one of the moſt powerful detergers and cleanſers known; and good in the dropſy, jaundice, aſthma, pleuriſy, &c.

WATERS, *ophthalmic*, or *eye*, are ſuch as are good in diſorders of the eyes. Such are thoſe of eye-bright, fennel, vervain, plantain, celandine, cyanus, &c.

WATER, *blue eye*. See SAPPHIRINA *aqua*.

WATER, *orange-flower*, is made of common *water* and orange flowers infuſed, and then diſtilled. After the like manner, one may make *waters* of divers other flowers; as violets, jonquils, jeſſamines, tuberoſes, &c.

WATER, *peach*, is made after the ſame manner as *apricot-water*; only with peaches.

WATER, *penny royal*. See PENNY-*royal*.

WATER, *pepper*. See PEPPER-*water*, and PIMENTO.

WATER, *pepper-mint*. See MINT.

WATER, *phagædenic*. See PHAGÆDENIC *Water*.

WATER, *plague*, *aqua epidemica*, is prepared from the roots of maſterwort, angelica, pyony, and butter-bur; viper-graſs, Virginia ſnake-root, rue, roſemary, baum, carduus, water-germander, marigold, dragon, goat's rue, and mint; the whole infuſed in ſpirit of wine, and diſtilled. It is of frequent uſe, as an alexipharmic: it revives the ſpirits, and promotes a diaphoreſis. It is the baſis of many juleps preſcribed, eſpecially in feveriſh caſes.

WATER, *poppy*, is prepared from the flowers of wild poppies, infuſed in white wine, or brandy, and drawn off in a cold ſtill. It is a cordial, and is good againſt the colic, and by ſome called *red plague-water*.

WATER, *pyony*, is made of pyony and lime-flowers, and lily of the valley ſteeped in canary, and diſtilled: to theſe ingredients are added the root of male pyony, white dittany, birth-wort, rue, caſtor, cubebs, cinnamon, betony, &c. It is a good cordial, and is much uſed in nervous caſes.

WATER, *roſe*, is made of damaſk roſes freſh-gathered, ſix pounds being diſtilled with two gallons of common *water*, and drawing off one gallon.

WATER, *ſcordium*, is prepared from the juices of goat's-rue, ſorrel, ſcordium, citrons, and Venice treacle, digeſted and diſtilled. It is an alexipharmic.

WATER, *ſecond*. See *Secunda* AQUA.

WATER, *ſorrance*. See SORRANCE.

WATERS, *ſpecific*, are ſuch as have ſome peculiar virtue, appropriate to certain diſeaſes. Thus *purſlain-water*, wherein mercury has been infuſed, is ſaid to be a ſpecific againſt worms in young children.

WATER, *ſpear-mint*. See MINT.

WATERS, *ſplenetic*, are thoſe proper againſt diſeaſes of the ſpleen. Such are thoſe of the tamariſk, cuſcuta, hart's-tongue, hops, &c. See SPLEEN.

WATERS, *Stephens's*, *aqua Stephani*, is made from cinnamon, ginger, galangals, cloves, nutmegs, paradiſe-grains, aniſeeds, ſweet fennel, carraway, thyme, mint, ſage, penny-royal, pellitory, roſemary, red roſes, chamomile, origany, and lavender, ſteeped in French brandy, or ſpirit of wine, and diſtilled. It is a good cephalic and cardiac, and is alſo reputed an hyſteric.

WATERS, *ſtomachic*, are ſuch as have the virtue to cleanſe, ſtrengthen, and confirm the ſtomach. As red *roſe-water*, *mint-water*, *aniſeed-water*, &c.

WATER, *Stygian*. See AQUA *Regalis*.

WATER *ſtyptic*, is made by boiling blue vitriol and alum, of each an ounce and a half, in one pint of *water*, till the ſalts are diſſolved; then filtering the liquor, and adding to it a dram of the oil of vitriol. This *water* is uſed for ſtopping bleeding at the noſe, and other hæmorrhages; for which purpoſe cloths or doſſils dipt in it muſt be applied to the part. See STYPTIC.

WATER, *ſublimate*, is made by diſſolving eight grains of the corroſive ſublimate in a pint of common *water*. If a ſtronger ſolution be wanted, a double or triple quantity may be uſed. This is principally intended for cleanſing foul ulcers, and conſuming proud fleſh.

WATER, *ſulphur*. See AQUA *ſulphurata*.

WATER, *ſurfeit*. See SURFEIT.

WATER, *tar*. See TAR-*water*.

WATER, *treacle*, *aqua theriacalis*. See TREACLE-*water*.

WATER, *vulnerary*, is a *water* proper for the healing of wounds, prepared from the juice of vulnerary plants; as ſanicle, and the like.

WATER-*calamint*, in *Botany*, the name uſed by ſome for a ſpecies of MINT.

WATER-*creſs*. See CRESSES.

WATER *drop-wort*. See DROP-*wort*.

WATER *elephant*, in *Zoology*. See HIPPOPOTAMUS.

WATER-*germander*. See GERMANDER.

WATER-*hemp-agrimony*. See *Water-Hemp*-AGRIMONY.

WATER-*hen*, in *Ornithology*. See MOOR-*hen*.

WATER-*hog*, in *Zoology*. See CAPYBARA.

WATER-*leaf*. See *Water*-LEAF.

WATER-*lily*. See LILY.

WATER *ouzell*, in *Ornithology*. See OUZELL.

WATER-*parſnep*. See PARSNEP.

WATER-*pepper*. See PEPPER.

WATER-*rail*. See RAIL.

WATER-*rat*. See MUS.

WATER-*ſoldier*, a ſpecies of STRATIOTES.

WATER-*worm*, *reproduction of*, in *Natural Hiſtory*. See REPRODUCTION, and *Water*-WORM.

WATER, in *Anatomy*, &c. is applied to divers liquors, or humours, in the human body.

Such is the aqua phlegmatica, *phlegmatic water*; which is a ſoft ſerous humour contained in the pericardium, and wherein the heart ſwims.

Anatomiſts are divided about it: ſome will not have it natural, but ſuppoſe it ſeparated forcibly during the pangs of death: their reaſon is, the difficulty they meet with in tracing its paſſage, or how it is carried off. The lateſt anatomiſts, however, ſeem to agree to its being a natural and neceſſary humour: and one reaſon is, that it is found even in the pericardiums of fœtuſes.

It has likewiſe been diſputed whence it ſhould be ſeparated. The moſt probable opinion is, that it is ſecreted by ſome glands about the baſis of the heart; and that it diſtils thence, drop by drop, into the cavity of the pericardium, in ſuch quantity, as juſt to ſupply what is expended daily by the motion and warmth of the heart; and ſo needs no evacuation. Its uſe is to moiſten, lubricate, and cool the heart, and prevent the inflammation that might ariſe from the dry friction of the heart and pericardium. So that it does the ſame office to the heart, that the *water* does wherein the fœtus ſwims; which, without it, would not have liberty to move at all.

WATER is alſo uſed in divers ceremonies, both civil and religious. Such are the *baptiſmal water*, *holy water*, &c.

WATER, *holy*, is a *water* prepared every Sunday in the Romiſh church, with divers prayers, exorciſms, &c. uſed by the people to croſs themſelves with at their entrance, and going out of church; and pretended to have the virtue of waſhing away venial ſins, driving away devils, preſerving from thunder, diſſolving charms, ſecuring from, or curing diſeaſes, &c.

The uſe of *holy water* appears to be of a pretty ancient ſtanding in the church: witneſs St. Jerom, in his life of St. Hilarion, and Gretſer, de Benedict. cap. x. &c.— M. Godeau attributes its original to Alexander, a martyr under the emperor Adrian.

Many of the reformed take the uſe of *holy water* to have been borrowed from the LUSTRAL *water* of the ancient Romans: though it might as well be taken from the ſprinkling in uſe among the Jews. See Numbers xix. 17.

Urban Godfrey Siber, a German, has a diſſertation, printed at Leipſic, to ſhew, by proofs brought from church-hiſtory, that one may give *holy water* to drink to brutes.

Bitter WATERS *of jealouſy*. In the Levitical law, we find mention made of a *water*, which ſerved to prove whether or no a woman were an adultreſs. The formula was this: the prieſt, offering her the *holy water*, denounced, "If thou haſt gone aſide to another, inſtead of thy huſband, and if thou be defiled, &c. the Lord make thee "a curſe and an oath among thy people, by making thy "thigh to rot, and thy belly to ſwell; and this *water* "ſhall go into thy bowels, to make thy belly to ſwell, "and thy thigh to rot." And the woman ſhall ſay, *Amen*. "Theſe curſes the prieſt ſhall write in a book, "and blot them out with the *bitter water*." When he "hath made her drink the *bitter water*, it ſhall come to "paſs, that, if ſhe be defiled, the *water* ſhall enter into "her, and become bitter, and her belly ſhall ſwell," &c. "If ſhe be not defiled, ſhe ſhall be free, and conceive "ſeed." Numbers, chap. v.

WATER *ordeal*, or *trial*, was of two kinds; by hot, and by cold *water*. See ORDEAL.

WATER, *interdiction of fire and*. See INTERDICTION.

WATER, among *Jewellers*, is properly the colour or luſtre of diamonds and pearls; thus called, by reaſon theſe were anciently ſuppoſed to be formed, or concreted of *water*.

The term is ſometimes alſo uſed, though leſs properly, for the colour or hue of other precious ſtones.

WATER, *aſcent of*, in *Hydraulics*. See ASCENT, and CAPILLARY *tubes*.

WATER-*bailiff*. See BAILIFF.

WATER-*bearer*, in *Aſtronomy*. See AQUARIUS.

WATER-*bellows*, in *Mechanics*. See BELLOWS.

WATER-*bomb*, a name given by our chemiſt Godfrey to a machine he invented on the plan of Greyl's diſcovery, for the extinguiſhing of accidental fires in houſes. He conſidered firſt, that the unchangeable ſize of Grey's engine was a very great objection, and on this plan contrived a medicated liquor, which was ſuch an enemy to fire, that a very ſmall quantity would extinguiſh as much as a much larger of common *water*; and this liquor had the farther advantage, that it might be kept ever ſo long without corrupting, and by that means the veſſels containing it would remain always fit for uſe; whereas in Greyl's method they muſt have been rotted by the corrupting and fermenting of the *water*, after a few years. The author of this invention tried it twice in public with us, and both times with all the ſucceſs that could be wiſhed; but the ſtructure of the veſſel was ſo much the ſame with that of Greyl's, that Godfrey cannot be allowed any farther merit as an inventor, than that of contriving the medicated liquor inſtead of common *water*. The machine is a wooden veſſel, made very firm and ſtrong, that the liquor, when once put in, cannot leak out any where; in the centre of this is an oblong, cylindric veſſel, which is filled with gunpowder; a tube is brought from this to the head of the barrel; and this being filled with combuſtible matter, and the inner caſe with powder, and both made of plate-iron, that no *water* may get in, the veſſel is then filled with the medicated, or antiphlogiſtic liquor. The top of the tube is then covered, and the thing ſet by for uſe.

When there is occaſion for it, it is only neceſſary to uncover the tube, and ſetting fire to the matter in it, it is conveyed to the veſſel containing the powder, and the whole machine being thrown into the place where the fire is, is torn to pieces by the exploſion, and the extinguiſhing liquor ſcattered every way about, on which the fire is quenched in an inſtant.

The contriver of theſe things propoſed the making of three kinds of them, the one containing five gallons of the liquor: this was the largeſt ſize, and contrived for the largeſt rooms, and moſt urgent neceſſities. The ſecond kind contained three gallons; and the ſmalleſt, which was meant for a cloſet, or other little room, contained only two gallons. The ſmaller kind alſo had ſometimes a peculiar difference in their ſtructure, the powder-veſſel being placed not in the centre, but at the bottom: the intent of this was to fit them for chimneys, when on fire, as by this means the liquor, not being wanted to be ſcattered on all ſides, was carried moſtly upwards. Theſe were fixed on the end of a long pole, and by this means thruſt to a proper height up the chimney; and the tube that communicated the fire was placed downwards.

The manner of uſing the machines for rooms on fire, is this: the perſon who has the care of them is to throw them as nearly as may be into the middle of the room, and then to retire to a little diſtance: as ſoon as he hears the exploſion, he may ſafely enter the room, and with a cloth, or any thing of that kind, put out any remaining ſparks of fire that there may be in particular places. If the room be ſo large, that one of the machines cannot diſperſe the liquor to every part of it, two are to be uſed, one being laid at each end; and if ſeveral rooms are on fire at once, as many of the machines are to be uſed, one being thrown into each room. If a whole houſe is on fire, the lower rooms are firſt to be taken care of, and after theſe the upper, as they aſcend.

Our Godfrey had ſcarce better ſucceſs than his predeceſſor Greyl; for while he was making his public experiments, one Povey, collecting ſome of the fragments of his broken veſſels, found out the ingredient uſed in the medicated liquor, and made and ſold the things in the ſame place where he had proved his right to them. It is probable that the medicated liquor was no other than common *water*, with a large quantity of ſal ammoniac, that ſalt having this virtue of extinguiſhing fire in a very remarkable degree. But it is greatly to be wondered at, that while all the world were convinced by experiments of the uſe of the machine, the author made but little advantage of it, and it is now diſuſed. Act. Erudit. Ann. 1724, p. 183.

The ſociety of arts and manufactures, &c. made trials of balls, prepared in Mr. Godfrey's method, by his grandſon, in a proper edifice erected for this purpoſe; and they found, that, after the fire had prevailed for a conſiderable time, and the flame ſorced its way through the chimney and windows, it diſappeared, and was entirely extinguiſhed by the exploſion of two of theſe balls. See FIRE, *extinguiſhing of*.

WATER-*borne*, in the *Sea-Language*, denotes the ſtate of a ſhip, with regard to the *water* ſurrounding her bottom, when there is barely a ſufficient depth of it to float her off from the ground; particularly when ſhe had for ſome time reſted thereon.

WATER *camblets*. See CAMBLET.

WATER, *cataract of*. See CATARACT.

WATER-*clock*. See CLEPSYDRA.

WATER-*colours*, in *Painting*, are ſuch colours as are only diluted and mixed up with *gum-water*: thus called, in contradiſtinction to *oil-colours*. See WASHING.

The uſe of *water-colours*, makes what we call LIMNING; as that of oil-colours does PAINTING, properly ſo called.

Painters in *water-colours* have been often afflicted with the diſeaſe called COLICA *Pictonum*, occaſioned by the poiſonous quality of ſeveral of the pigments which they uſe; and which, by putting the point of their pencils between their lips, whilſt they are ſtudying their ſubject, they inſenſibly ſwallow. Dr. Fothergill ſays, that, when the vomitings are abated, copious diſcharges by ſtool are procured, and the functions of the bowels in a degree reſtored to their uſual ſtate by the method purſued in the cure of the colica Pictonum; nothing contributes ſo effectually to reſtore the uſe of the limbs, when impaired by theſe cauſes, as the liberal and conſtant uſe of the tinctura guaiacina volatilis; which may be given in ſuch quantity, as to keep the body gently open; mixed with a little common ſugar or honey, and then diluted with any weaker mucilaginous liquor, as thin gruel, or barley-water, or marſhmallows-tea. Med. Obſ. vol. v. p. 394.

WATER-*column*. See COLUMN.

WATER, *cut*. See CUT-*water*.

WATER, *dead*, in the *Sea-Language*. See DEAD-*water*.

WATER-*dog*. See DOG.

WATER-*farcin*. See FARCIN.

WATER, *foul*, in *Sea-Language*. See FOUL.

WATER-*fowl*. See FOWL.

WATER-*engine*, in *Mechanics*, denotes either an engine to raiſe *water*, or any engine that moves by the force of *water*.

WATER-*gage*, an inſtrument to meaſure the depth or quantity of any *water*. See GAGE.

WATER-*gang*, a channel cut to drain a place, by carrying off a ſtream of *water*.

WATER-*gavel*, in our *Old Writers*, a rent paid for fiſhing in, or other benefits received from, ſome river.

WATER-*gilding*. See GILDING.

WATER, *high*. See FLUX, HIGH, and TIDE.

WATER-*level*. See LEVEL.

WATER-*lines*, in a *Ship*, are certain horizontal lines, ſuppoſed to be drawn about the outſide of her bottom, cloſe to the ſurface of the *water* in which ſhe floats. They are accordingly higher or lower upon the bottom, in proportion to the depth of the column of *water* required to float her. See SHIP.

WATER-*logged*, in *Sea-Languoge*, denotes the ſtate of a ſhip when, by receiving a great quantity of *water* into her hold, by leaking, &c. ſhe has become heavy and inactive upon the ſea, ſo as to yield without reſiſtance to the effort of every wave ruſhing over her deck. In this dangerous ſituation of a ſhip, the crew have no reſource, except to free her by the pumps, or to abandon her by the boats as ſoon as poſſible. Falconer.

WATER, *low*. See FLUX, and TIDE.

WATER-*machine*. See MACHINE.

WATER, *to make*, in *Sea-Language*. See MAKE.

WATER-*meaſure*. Salt, ſea-coal, &c. while aboard veſſels in the pool, or river, are meaſured with the corn buſhel heaped up; or elſe five ſtriked pecks are allowed to the buſhel. This is called *water-meaſure*; and this exceeds Wincheſter-meaſure by about three gallons in the buſhel.

WATER *microſcope*. See MICROSCOPE.

WATER-*mill*. See MILL.

WATER, *motion of*, in *Hydraulics*. The theory of the motion of running *water* is one of the principal objects of hydraulics, and many eminent mathematicians have applied themſelves to this ſubject. But it were to be wiſhed that their theories were more conſiſtent with each other, and with experience. The curious may conſult ſir Iſaac Newton's Principles, lib. ii. prop. 36. with the comment. Dan. Bernouilli's Hydrodynamica. Jo. Bernouilli, Hydraulica, Oper. tom. iv. p. 389, ſeq. Dr. Jurin, in the Phil. Tranſ. N° 452, and in Dr. Martyn's Abridg. vol. viii. p. 282, ſeq. s'Graveſande, Phyſic. Elem. Mathemat. lib. iii. par. 2. Polenus, de Caſtellis, and others.

Mr. Maclaurin, in his Fluxions, art. 537, ſeq. has illuſtrated ſir Iſaac Newton's doctrine on this intricate ſubject, which ſtill, notwithſtanding the labours of all theſe eminent authors, remains in a great meaſure obſcure and uncertain. Even the ſimple caſe of the motion of running *water*, which is when it iſſues from a hole in the bottom of a veſſel kept conſtantly full, has never yet been determined, ſo as to give univerſal ſatisfaction to the learned. We ſhall here mention ſome of the phenomena of this motion, as ſtated by Dr. Jurin from Poleni; referring for other obſervations on this ſubject to Fluids, and *Hydraulic Laws of* Fluids.

1. The depth of the *water* in the veſſel, and the time of flowing out being given, the meaſure of the effluent *water* is nearly in proportion to the hole.

2. The depth of the *water*, and the hole being given, the meaſure of the effluent *water* is in proportion to the time.

3. The time of flowing out, and the hole being given, the meaſure of the effluent *water* is nearly in a ſubduplicate proportion to the height of the *water*.

4. The meaſure of the effluent *water* is nearly in a ratio compounded of the proportion of the hole, the proportion of the time, and a ſubduplicate proportion of the depth of the *water*.

5. The meaſure of the *water* flowing out in a given time, is much leſs than that which is commonly aſſigned by mathematical theorems. For the velocity of effluent *water* is commonly ſuppoſed to be that which a heavy body would acquire in vacuo in falling from the whole height of the *water* above the hole; and this being ſuppoſed, if we call the area of the hole F, the height of the *water* above the hole A, the velocity which a heavy body acquires in falling in vacuo from that height V, and the time of falling T; and if the *water* flows out with this conſtant velocity V, in the time T, then the length of the column of *water*, which flows out in that time, will be 2 A, and the meaſure of it will be 2 A F. But if we calculate from Poleni's accurate experiments, we ſhall find the quantity of *water* which flows out in that time to be no more than about $\frac{571}{1000}$ of this meaſure 2 A F. Polem. de Caſtellis, art. 35, 38, 39, 42, 43.

Poleni alſo found, that the quantity of *water* flowing out of a veſſel through a cylindrical tube far exceeded that which flowed through a circular hole made in a thin lamina, the tube and hole being of equal diameter, and the height of the *water* above both being alſo equal; and he found it to be ſo when the tube was inſerted, not into the bottom, which others had obſerved before, but into the ſide of the veſſel.

6. Since the meaſure of the *water* running out in the time T, is $2\ A\ F \times \frac{571}{1000}$, the length of the column of *water*, which runs out in that time, is $2\ A \times \frac{571}{1000}$. Therefore if each of the particles of *water*, which are in the hole in the ſame ſpace of time, paſſes with equal velocity, it is plain that the common velocity of them all is that with which the ſpace $2\ A \times \frac{571}{1000}$ would be gone over in the time T, or the velocity $V \times \frac{571}{1000}$. But this is the velocity with which *water* could ſpring in vacuo to near $\frac{1}{3}$ of the height of the *water* above the hole.

7. But when the motion of *water* is turned upwards, as in fountains, theſe are ſeen to riſe almoſt to the entire height of the *water* in the ciſtern. Therefore the *water*, or at leaſt ſome portion of the *water*, ſpouts from the hole with almoſt the whole velocity V, and certainly with a much greater velocity than $V \times \frac{571}{1000}$.

8. Hence it is evident, that the particles of *water*, which are in the hole in the ſame point of time, do not all burſt out with the ſame velocity, or have no common velocity; though ſome mathematicians have hitherto taken the contrary to be certain.

9. At a ſmall diſtance from the hole, the diameter of the vein of *water* is much leſs than that of the hole. For inſtance, if the diameter of the hole be 1, the diameter of the vein of *water* will be $\frac{21}{25}$, or 0.84, according to ſir Iſaac Newton's meaſure, who firſt obſerved this phenomenon; and according to Poleni's meaſure $\frac{20}{26}$, or $\frac{20\frac{1}{2}}{26}$, that is, taking the mean diameter 0.78, nearly.

As to the manner of accounting for theſe phenomena, we have already obſerved, that authors are not agreed; and it would be far beyond our deſign to ſtate their different theories, we muſt therefore refer to the originals above quoted.

Neither are authors agreed as to the force with which a vein of *water*, ſpouting from a round hole in the ſide of a veſſel, preſſes upon a plane directly oppoſed to the motion of the vein. Moſt authors agree, that the preſſure of this vein, flowing uniformly, is equal to the weight of a cylinder of *water*, the baſis of which is the hole through which the *water* flows, and the height of which is equal to the height of the *water* in the veſſel above the hole. The experiments made by Mariotte, and others, ſeem to countenance this opinion. But Mr. Daniel Bernouilli rejects it, and eſtimates this preſſure by the weight of a cylinder, the diameter of which is equal to the contracted vein (according to ſir Iſaac Newton's obſervation above mentioned), and the height of which is equal to twice the height of the *water* above the hole, or, more accurately, to twice the altitude correſponding to the real velocity of the ſpouting *water*; and this preſſure is alſo equal to the force of repulſion, ariſing from the reaction of the ſpouting *water* upon the veſſel. For he ſays that he can demonſtrate, that this force of repulſion is equal to a preſſure exerted by a vein of ſpouting *water* upon a plain directly oppoſed to its motion, if the whole vein of *water* ſtrikes perpendicularly againſt the plane. From whence it would follow, that the preſſure or force of the vein will be greater in proportion, as its contraction is leſs; and this contraction vaniſhing, as it does when the *water* ſpouts through a ſhort tube, and the vein being at the ſame time ſuppoſed to have the whole velocity it can acquire by theory, the ſpouting water will then exert a preſſure double to what is commonly ſuppoſed. But the actual velocity of the *water* being always ſomething leſs than it ought to be by theory, and the vein of *water* being not uncommonly contracted to almoſt one half, experiments have led authors to think, that the preſſure, exerted by ſpouting *water*, was equal to the weight of a cylinder of the ſame diameter with the vein, and of the height of the *water* above the hole. The ingenious author remarks, that he ſpeaks only of ſingle veins of *water*, the whole of which are received by the planes upon which they preſs; for as to the preſſures exerted by fluids ſurrounding the bodies they preſs upon, as the wind, or a river, the caſe is different, though confounded with the former by writers on this ſubject. Hydrodynamica, ſect. 13. p. 289.

M. Bernouilli endeavours to confirm his theory by a diſſertation in the eighth volume of the Acta Petropolitana; where he obſerves, that the experiments formerly made before the Academy of Sciences at Paris, to eſtabliſh the quantity of the preſſure exerted by a vein of ſpouting *water*, are very far from proving the truth of the rule they are brought to eſtabliſh. For inſtance, in one of thoſe experiments, the height of the *water* in the veſſel above the hole from whence the vein ſpouted, was two feet Paris meaſure; the diameter of the circular hole, which was cut in the horizontal bottom of the veſſel, was four lines; and the force of the vein of *water* was obſerved to be one ounce and three quarters. But the weight of a cylinder of *water* of the diameter of the hole, and of the height of the *water* in the veſſel, is ſcarce equal to one ounce and three eighths. The difference therefore is at leaſt three eighths of an ounce, which is about three elevenths of the whole weight of the before mentioned cylinder of *water*. So that it is ſurpriſing, that this difference ſhould have been aſcribed to the removal of the plane, receiving the impulſe, to ſome diſtance from the hole; for this cauſe, ſuppoſing the plane removed to the diſtance of two inches, could not produce an increaſe of one ſixteenth of an ounce. It appears, therefore, that the common opinion is rather overturned than confirmed by experience. Du-Hamel, Hiſt. Acad. Paris, ann. 1679, ſect. 3. cap. 5.

Mr. Bernouilli, on the other hand, thinks his own theory ſufficiently eſtabliſhed by the experiments he relates; for the particulars of which, we refer to the Acta Petropolitana, vol. cit. p. 122, ſeq.

This ingenious author thinks, that his theory of the quantity of the force of repulſion, exerted by a vein of ſpouting *water*, might be uſefully applied to move ſhips by pumping; and he thinks the motion produced by this repulſive force would fall little, if at all, ſhort of that produced by rowing. He has given his reaſons and computations at length in his Hydrodynamica, p. 293 to 302.

The ſcience of the preſſures exerted by *water*, or other fluids in motion, is what Mr. Bernouilli calls *hydraulico-ſtatica*. This ſcience differs from hydroſtatics, which conſiders only the preſſure of *water* and other fluids at reſt; but hydraulico-ſtatics conſiders the preſſure of *water* in motion. Thus the preſſure exerted by *water*, moving through pipes, upon the ſides of thoſe pipes, is an hydraulico-ſtatical conſideration, and has been erroneouſly determined by many, who have given no other rules in theſe caſes, but ſuch as are applicable only to the preſſure of fluids at reſt. See Hydrodynam. ſect. 12. p. 256, ſeq.

Water-*organ*. See Organ.

Water, *petrifying*. See Petrifying.

Water-*poiſe*. See Hydrometer, and Aræometer. Dr. Hooke has contrived a *water-poiſe*, which may be of good ſervice in examining the purity, &c. of *water*. It conſiſts of a round glaſs ball, like a bolt-head, about three inches in diameter, with a narrow ſtem or neck, one twenty-fourth of an inch in diameter; which being poiſed with red lead, ſo as to make it but little heavier than pure ſweet *water*, and thus fitted to one end of a fine balance, with a counterpoiſe at the other; upon the leaſt addition of even $\frac{1}{2000}$th part of ſalt to a quantity of *water*, half an inch of the neck will emerge above the *water*, more than it did before. Phil. Tranſ. N° 197.

Water, *raiſing of*, in *Hydraulics*. The great uſe of raiſing *water* by engines for the various purpoſes of life, is well known. Machines have in all ages been contrived with this view; a detail of the beſt of which, with the theory of their conſtruction, would be very curious and inſtructive. Monſieur Belidor has executed this part in his Architecture Hydraulique. Dr. Deſaguliers has alſo given us a deſcription of ſeveral engines to raiſe *water*, in his Courſe of Experimental Philoſophy, vol. ii. not to mention the compilers of treatiſes under the title of Theatres of Machines, &c.

Dr. Deſaguliers has ſettled the maximum of engines for raiſing *water*, thus: a man with the beſt *water-engine* cannot raiſe above one hogſhead of *water* in a minute, ten feet high, to hold it all day; but he can do almoſt twice as much for a minute or two.

Dr. Deſaguliers obſerves, that when we come to examine the beſt engines, and thoſe that are moſt extolled, if we look narrowly into them, and meaſure the water they deliver, and at what height they deliver it; or bring to calculation the beſt atteſted relations concerning them, we ſhall find that they do not exceed this maximum, though they may far out-do ſome very bad engine with which they are compared.

Mr. Daniel Bernouilli thinks that a man may, with the moſt perfect machine, raiſe one cubic foot of *water*, in one ſecond of time, to the height of one foot. But by an experiment he made at Geneva with a good pump, he found that a man could not raiſe above four fifths of that quantity. Hydrodyn. p. 199.

Yet the greateſt quantity, mentioned by Mr. Bernouilli, falls ſhort of Dr. Deſaguliers's maximum; for according to the doctor's rule, one hogſhead being equivalent to eight cubic feet, and the raiſing one hogſhead of *water* to the height of ten feet being equivalent to the raiſing of ten hogſheads of *water*, or eighty cubic feet to the height of one foot, it follows, that a man may raiſe eighty cubic feet of *water* in one minute, to the height of a foot. But by Mr. Bernouilli's rule, he can only raiſe ſixty cubic feet of *water* to that height in the ſame time.

Engines for raiſing *water* are either ſuch as throw it up with a great velocity, as in jets; or ſuch as raiſe it from one place to another by a gentle motion. For the general theory of theſe engines, ſee Daniel Bernouilli's Hydrodynamica.

We ſhall here ſubjoin, for the information and amuſement of the reader, an account of the method of raiſing *water* by applying a running ſtream to two curious engines, admirably conſtructed for this purpoſe. The firſt engine is that erected by Mr. Alderſea, at Blenheim, for the duke of Marlborough. Let A A (*Tab.* VII. *Hydraulics*, *fig.* 79.) be a wheel, turned by the fall of *water* B B; and have any number of cranks (e. gr. ſix), as C, D, E, F, G, H, on its axis, according to the force of the fall of *water*, and the height to which the *water* is intended to be raiſed by the engine. As the wheel turns round, theſe cranks move the levers *c*, *d*, *e*, *f*, *g*, *h*, up and down, by the iron rods *i*, *k*, *l*, *m*, *n*, *o*; which alternately raiſe and depreſs the piſtons by the other iron rods *p*, *q*, *r*, *s*, *t*, *u*, *w*, *x*, *y*, in twelve pumps; nine of which, as L, M, N, O, P, Q, R, S, T, appear in the figure; the other three being hid behind the work at V. And as pipes may go from all theſe pumps, to convey the *water* (drawn up by them to a ſmall height) into a cloſe ciſtern, from which the main pipe proceeds, the *water* will be forced into this ciſtern by the deſcent of the piſtons. And as each pipe, going from its reſpective pump into the ciſtern, has a valve in its end in the ciſtern, theſe valves will hinder the return of the *water* by the pipes; and, therefore, when the ciſtern is once full, each piſton upon its deſcent will force the *water* (conveyed into the ciſtern by a former ſtroke) up the main pipe, to the height to which the engine was intended to raiſe it; which height depends upon the quantity raiſed and the power that turns the wheel. When the power upon the wheel is leſſened by any defect of the quantity of *water* turning it, a proportionable number of the pumps may be laid aſide, by diſengaging their rods from the vibrating levers.

When ſuch a machine is placed in a ſtream that runs upon a ſmall declivity, the motion of the levers, and action of the pumps, will be but ſlow; ſince the wheel muſt go once round for each ſtroke of the pumps. But when there is a large body of ſlow running *water*, a cog or ſpur-wheel may be placed upon each ſide of the *water*-wheel A A, upon its axis, to turn a trundle upon each ſide; the cranks being upon the axis of the trundle. And by proportioning the cog-wheels to the trundles, the motion of the pumps may be made quicker, according to the quantity and ſtrength of the *water* upon the firſt wheel; which may be as great as the workman pleaſes, according to the length and breadth of the float-boards, or wings of the wheel. In this manner the engine for raiſing *water* at London-bridge is conſtructed; which we ſhall now proceed to deſcribe. Ferguſon's Lect. p. 77. 4to.

The wheels of the London-bridge *water-works* are placed under the arches of the bridge, and moved by the common ſtream of the tide-*water* of the river. A B (*fig.* 80.) the axle-tree of the *water*-wheel is nineteen feet long, and three feet in diameter; in which C, D, E, F, are four ſets of arms, eight in each place, on which are fixed G G G G, four ſets or rings of felloes, twenty feet in diameter, and the floats H H H, fourteen feet long, and eighteen inches deep, being about twenty-ſix in number. The wheel lies with its two gudgeons, or centre-pins, A, B, upon two braſſes in the pieces M N, which are two great levers, whoſe fulcrum, or prop, is an arched piece of timber L; the levers being made circular on their lower ſides to an arch of the radius M O, and kept in their places by two arching ſtuds fixed in the ſtock L, through two mortiſes in the lever M N. The wheel is, by theſe levers, made to riſe and fall with the tide in the following manner. The levers M N are ſixteen feet long; from M, the fulcrum of the lever, to O, the gudgeon of the *water*-wheel, ſix feet; and from O to the arch at N, ten feet. To the bottom of the arch N is fixed a ſtrong triple chain P, made after the faſhion of a watch-chain, but the links arched to a circle of one foot diameter, having notches, or teeth, to take hold of the leaves of a pinion of caſt iron Q, ten inches diameter, with eight teeth in it moving on an axis. The other looſe end of this chain has a large weight hanging at it, to help to counterpoiſe the wheel, and preſerve the chain from ſliding on the pinion. On the ſame axis is fixed a cog-wheel R, ſix feet diameter, with forty-eight cogs. To this is applied a trundle, or pinion S, of ſix rounds, or teeth; and upon the ſame axis is fixed T, a cog-wheel of fifty-one cogs, into which the trundle V, of ſix rounds, works; on whoſe axis is a winch or windlaſs W, by which one man, with the two windlaſſes, raiſes or lets down the wheel as there is occaſion.

And becauſe the fulcrums of theſe levers M N, are in the axis of the trundle K, viz. at M or X, in what ſituation ſoever the wheel is raiſed or let down, the cog-wheel I I is always equidiſtant from M, and works or geers truly.

By means of this machine, the ſtrength of an ordinary man will raiſe about fifty ton weight.

I, I, is a cog-wheel fixed near the end of the great axis, eight feet diameter, and forty-four cogs working into a trundle K, of four feet and a half diameter, and twenty rounds, whoſe axis or ſpindle is of caſt iron four inches in diameter, lying in braſſes at each end, as at X.

Z Z is a quadruple crank of caſt iron, the metal being ſix inches ſquare, each of the necks being turned one foot from the centre, which is fixed in braſſes at each end in two headſtocks faſtened down by caps. One end of this crank at Y is placed cloſe abutting to the end of the axletree X, where they are at thoſe ends ſix inches diameter, each having a ſlit in the ends, where an iron wedge is put, one half into the end X, the other half into Y, by means of which the axis X turns about the crank Z Z.

The four necks of the crank have each an iron ſpear, or rod, fixed at their upper ends to the reſpective libra, or lever, *a* 1, 2, 3, 4, within three feet at the end. Theſe levers are twenty-four feet long, moving on centres in the frame *b b b b*; at the end of which, at *c* 1, 2, 3, 4, are jointed four rods with their forcing plugs working into *d* 1, 2, 3, 4, four caſt iron cylinders four feet three quarters long, ſeven inches bore above, and nine below where the valves lie, faſtened by ſcrewed flanches over the four holes of a hollow trunk of caſt iron, having four valves in it juſt over *e e e e*, at the joining on of the bottom of the barrels, or cylinders, and at one end a ſucking pipe and grate *f*, going into the *water*, which ſupplies all the four cylinders alternately.

From the lower part of the cylinders *d* 1, *d* 2, *d* 3, *d* 4, come out necks turning upward arch-wiſe, as *g g g g*, whoſe upper parts are caſt with flanches to ſcrew up to the trunk *h h h h*; which necks have bores of ſeven inches diameter, and holes in the trunk above, communicating with them, at which joining are placed four valves. The trunk is caſt with four boſſes, or protuberances, ſtanding out againſt the valves, to give room for their opening and ſhutting; and on the upper ſide are four holes ſtopped with plugs, to take out on occaſion, to cleanſe the valves. One end of this trunk is ſtopped by a plug *i*. To the other, iron pipes are joined, as *i* 2, by flanches, through which the *water* is forced up to any height or place required.

Beſides theſe four forcers, there are four more placed at the other ends of the libræ, or levers (not ſhewn here, to avoid confuſion, but to be ſeen on the left hand) the rods being fixed at *a* 1, 2, 3, 4, working in four ſuch cylinders, with their parts *d d*, &c. *e e*, *f*, *g g*, and *i*, as before deſcribed, ſtanding near *k k*.

At the other end of the wheel (at B) is placed all the ſame ſort of work as at the end A is deſcribed, viz.

The cog-wheel I.	The four levers *a c*, *a c*, &c.
The trundle K.	8 forcing rods *a d*, *a d*, &c.
The ſpindle X.	8 Cylinders *d e*, *d e*, &c.
The crank Y, Z.	4 Trunks, ſuch as *e e*, *h h*.
The ſucking pipes *f*.	2 Forcing pipes, as *i*.

So that one ſingle wheel works ſixteen pumps.

All which work could not be drawn in one perſpective view, without making it very much confuſed.

Mr. Beighton, who has deſcribed the ſtructure and operation of this engine (ſee Phil. Tranſ. abr. vol. vi. p. 358.) has calculated the quantity of *water* raiſed by it in a given time. In the firſt arch next the city there is one wheel with double work of ſixteen forcers; and in the third arch, one wheel with double work at one end, and ſingle at the other, having twelve forcers, a ſecond wheel in the middle having eight forcers; and a third wheel with ſixteen; ſo that there are in all fifty-two forcers: one revolution of a wheel produces in every forcer $2\frac{1}{5}$ ſtrokes; ſo that one turn of the four wheels makes 114 ſtrokes. When the river acts with moſt advantage, the wheels go ſix times round in a minute, and but $4\frac{1}{2}$ at middle *water*; hence the number of ſtrokes in a minute is 684; and as the ſtroke is $2\frac{1}{2}$ feet in a ſeven-inch bore, it raiſes three ale gallons; and all raiſe per minute 2052 ale gallons; i. e. 123120 gallons = 1954 hogſheads per hour, and at the rate of 40896 hogſheads in a day, to the height of 120 feet. Such is the utmoſt quantity they can raiſe, ſuppoſing that there were no imperfections or loſs at all; but Mr. Beighton infers, from experiments performed on engines whoſe parts were large and excellently conſtructed, that they will loſe one fifth and ſometimes one fourth of the calculated quantity. For an eſtimate of the power by which the wheels are moved, ſee Phil. Tranſ. ubi ſupra.

Mr. Beighton obſerves, that, though theſe *water-works* may juſtly be eſteemed as good as any in Europe, yet ſome things might be altered much for the better. If, he ſays, inſtead of ſixteen forcers, they worked only eight, the ſtroke might be five feet in each forcer, which would draw much more *water* with the ſame power in the wheel; becauſe much *water* is loſt by the too frequent opening and ſhutting of the valves; and that the bores that carry off the *water* from the forcers are too ſmall; and that they ſhould be near nine inches in diameter. This objection Dr. Deſaguliers ſays is of no force, unleſs the velocity of the piſtons was very great; but here the velocity of the *water* paſſing through the bores is much leſs than two feet in a ſecond. This laſt writer obſerves, that a triple crank diſtributes the power better than a quadruple one. He adds, that forcers made with thin leather tanned, of about the thickneſs of the upper leather of a countryman's ſhoe, would be much better than thoſe of the ſtiff leather commonly uſed.

Dr. Deſaguliers has formed a compariſon of the powers of this engine with thoſe of the famous machine at Marly. Eſtimating the quantity of *water* merely raiſed by theſe machines, the former raiſes almoſt twice and a quarter as much as the latter; but conſidering that the London-bridge *water-works* raiſe this *water* but 120 feet high, and that the Marly engine raiſes its *water* 533 feet high, he deduces from a calculation formed on theſe different heights, and on the difference of the fall of *water* on both engines, this concluſion, viz. that the effect of the four wheels at London-bridge is three times greater than that of four of the wheels at Marly.

The engine at London-bridge was put up by Mr. Sorocold towards the beginning of this century: the contrivance for raiſing and falling the *water*-wheel was the invention of Mr. Hadley, who put up the firſt of that kind at Worceſter, for which he obtained a patent. Deſaguliers's Experimental Philoſophy, vol. ii. lect. 12. and annot. 3 and 4.

WATER-*rocket*. See ROCKET.

WATER-*ſail*, in a *Ship*, denotes a ſmall ſail, ſpread occaſionally under the lower ſtudding-ſail, or driver-boom, in a fair wind, and ſmooth ſea.

WATER-*ſcape*, of the Saxon *waterſhap*, denotes an AQUEDUCT, drain, or paſſage for *water*.

WATER-*ſhield*. See HYDRASPIS.

WATER-*ſhoot*, a young ſprig, which ſprings out of the root or ſtock of a tree.

WATER-*ſhot*, in the *Sea-Language*. See MOORING.

WATER-*ſpout*. See *Water*-SPOUT.

WATER-*table*, in *Architecture*, is a ſort of ledge, left in ſtone or brick walls, about eighteen or twenty inches from the ground; from which place, the thickneſs of the wall begins to abate. See WALL.

WATER-*wagtail*, in *Ornithology*. See WAGTAIL.

WATER-*way*, in a *Ship*, is a long piece of timber, ſerving to connect the ſides of a ſhip to her decks, and form a ſort of channel to carry off the *water* from the latter by means of SCUPPERS.

WATER-*wheel*, an engine for raiſing *water* in great quantity out of a deep well. See PERSIAN-*wheel*.

WATER-*works*. See *Raiſing of* WATER.

WATERING, in *Gardening*, &c. the application of *water* to the ſoil of plants, &c. when not ſufficiently moiſtened with rain, dew, &c.

After ſowing ſeed of any kind, though the ground be ever ſo dry, they ſhould never be *watered* till they have been forty-eight hours in the ground, and the ground is a little ſettled about them; otherwiſe, a too great glut of nouriſhment at firſt will be apt to burſt them.

Care is to be taken, that the leaves of young and tender plants be not *watered* at all while the weather is cold; only the ground to be wet about them. For hardy plants and ſeeds, if the nights be cold, *water* in the forenoon; otherwiſe, in the evening.

Water that comes out of pits, or deep wells, ſhould ſtand a day in an open veſſel, before it be applied to tender plants in the ſpring. Dung of ſheep, pigeons, or hens, or aſhes, lime, &c. infuſed in the *water*, will forward the growth of plants.

WATERING, in the *Manufactures*. *To* WATER *a ſtuff*, is to give it a luſtre, by wetting it lightly, and then paſſing it through the preſs, or the calender, whether hot or cold. See TABBYING.

WATERLANDIANS, in *Eccleſiaſtical Hiſtory*, a ſect of thoſe that were called the groſs or moderate Anabaptiſts, conſiſting at firſt of the inhabitants of a diſtrict in North Holland, called *Waterland*; whence their name. They were alſo called Johannites from John de Reis, who, aſſiſted by Lubert Gerard, compoſed their confeſſion of faith in 1580. This confeſſion far ſurpaſſes in reſpect both of ſimplicity and wiſdom all the other confeſſions of the Mennonites; though it has been alledged, that it is not the general confeſſion of the *Waterlandians*, but that merely of the congregation, of which its author was the paſtor.

This community, ſays Moſheim, has abandoned the ſevere diſcipline and ſingular opinions of Menno, whom, nevertheleſs, they generally reſpect as their primitive parent and founder. They are, however, divided into two diſtinct ſects, which bear the reſpective denominations of FRIESLANDERS and *Waterlandians*; and are both without biſhops, employing no other eccleſiaſtical miniſters than preſbyters and deacons. Each congregation of this ſect is independent on all foreign juriſdiction, having its own eccleſiaſtical council or conſiſtory, which is compoſed of preſbyters and deacons. The ſupreme ſpiritual power is, nevertheleſs, in the hands of the people, without whoſe conſent nothing of importance can be carried into execution. Their preſbyters are, generally ſpeaking, men of learning, and apply themſelves with ſucceſs to the ſtudy of phyſic and philoſophy; and there is a public profeſſor, ſupported by the ſect at Amſterdam, for the inſtruction of their youth in the various branches of philoſophy, and ſacred erudition. One of theſe *Waterlandian* ſects was divided, in 1664, into two factions, of which the one were called GALENISTS, and the other APOSTOOLIANS, from their reſpective leaders. Moſheim's Eccl. Hiſt. vol. iv. p. 149, &c. vol. v. p. 49, &c.

WATERMEN are ſuch as row in boats, or ply on the river Thames, ultimately ſubject to the direction and government of the lord-mayor of London, and court of aldermen, who ſettle their fares; and as well as other juſtices of peace, have authority to hear and determine offences, &c.

The names of *watermen* are to be regiſtered; and their boats muſt be twelve feet and a half long, and four and a half broad, or be liable to forfeiture; and *watermen*, taking more than the fares aſſeſſed, ſhall forfeit 40*s.* and ſuffer half a year's impriſonment; and refuſing to carry perſons for their fare, ſhall be impriſoned for twelve months. None ſhall ply on the river, but ſuch as have been apprentices to *watermen* for ſeven years. 2 & 3 P. & M. cap. 16. 29 Car. II. cap. 7.

The lightermen and *watermen* conſtitute a COMPANY; and the lord mayor and aldermen yearly elect eight of the latter, and three of the former, to be rulers, and the *watermen* chuſe aſſiſtants; the rulers and aſſiſtants being empowered to make rules, which are required to be obſerved, under penalties. The rulers on their court-days ſhall appoint forty *watermen* to ply on ſundays, for carrying paſſengers acroſs the river, who pay them for their labour, and apply the overplus to the poor decayed *watermen*; and no perſons are allowed to travel on a Sunday with boats, unleſs they are licenſed and allowed by a juſtice, on pain of forfeiting 5*s.* 11 & 12 W. III. cap. 21.

No apprentice ſhall take upon him the care of a boat, till he is ſixteen years of age, if a *waterman's* ſon, and ſeventeen if a landman's; unleſs he hath worked with ſome able *waterman* for two years, under the penalty of 10*s.*; and if any perſon, not having ſerved ſeven years to a *waterman*, &c. row any boat in the river Thames for hire, he ſhall forfeit 10*l.* garderner's boats, dung-boats, fiſhermen's, wood-lighters, weſtern barges, &c. excepted. No apprentice is to be taken under fourteen years, who ſhall be bound for ſeven years, and enrolled in the book of the *watermen's* company, on pain of 10*l.* No tilt-boat, row-barge, &c. ſhall take more than thirty-ſeven paſſengers, and three more by the way; nor any other boat above eight, and two by the way; on forfeiture of 5*l.* for the firſt offence, and 10*l.* for the ſecond, &c. And in caſe any perſon be drowned, where a greater number is taken in, the *waterman* ſhall be deemed guilty of felony, and tranſported. 10 Geo. II. cap. 31.

Tilt-boats uſed between London-bridge and Graveſend ſhall be fifteen tons, and the other boats three tons. Rulers of the *watermen's* company are required to appoint two officers, one at Billingſgate at high water, and another at Graveſend, to ring a bell for the tilt-boats, &c. to put off, and thoſe which do not immediately proceed with two ſufficient men, ſhall forfeit 5*l.* The fares of *watermen*, aſſeſſed by the court of aldermen, are from London-bridge to Limehouſe, Ratcliffe-croſs, &c. for oars, 1*s.* and ſcullers 6*d.*; Wapping-dock, Rotherhithe-church ſtairs, &c. for oars 6*d.* and for ſcullers 3*d.*; from either ſide of the water above the bridge to Lambeth and Vauxhall, for oars 1*s.* and ſcullers 6*d.* For all the ſtairs between London bridge and Weſtminſter, oars 6*d.* and ſcullers 3*d.*

WATERS, among *Farriers*, the name given to a diſtemperature of horſes. The hinder legs of theſe creatures are very ſubject to a defluxion of certain white, ſharp, and corrupt humours, or *waters* as they call them, which happen very rarely to the fore-legs.

This diſeaſe is diſcovered by ſearching the paſterns, where, if a moiſtneſs is felt beneath the hair, and is extremely ſtinking, there is danger of its growing to the utmoſt height of the diſeaſe, in which it will grow all round the paſtern and paſtern joint, and ſometimes almoſt up to the very ham. Theſe *waters* frequently cauſe the paſterns to ſwell, keeping the legs ſtiff, and making the horſe lean; finally they often ſeparate the fleſh from the coronet near the heel. This diſeaſe is very obſtinate and ſtubborn when once rooted in the horſe. It may eaſily be ſtopt in the beginning, but when of any continuance, it is an error to attempt to ſtop it, for if dried up ever ſo often, it will always return again. It is in vain to attempt a cure of this diſeaſe in the winter, unleſs it be but juſt begun; but in the ſummer ſeaſon all attempts ſucceed better; and what the farriers call the white honey charge has ſurpriſing effect, often performing a cure alone.

Some farriers diſtinguiſh between the *waters*, and what they call *watery ſores*, though others call them only degrees of the ſame diſtemper. Thoſe who diſtinguiſh them, deſcribe the *watery ſore* as a white, corroſive, and malignant matter, iſſuing out of the pores of a horſe's leg, uſually on the lower part only, but ſometimes all over it; and beginning from a ſtinking matter, deadening the ſkin of the paſtern and fetlock, and by degrees looſening the hoof from the coronet at the heel. The breaking out of this matter is always uſhered by a ſwelling of the lower part of the leg, and attended with pain; and the humour at length acquiring a ſharp and venomous quality, it is attended with warts, clefts, and nodes, which in proceſs of time over-run the whole part, and render the cure very difficult.

This diſeaſe generally appears firſt on the outſide of the paſtern, and by degrees riſes up to the middle of the leg, peeling off ſome part of the hair all the way. The method of cure ſhould be this: as ſoon as a horſe is ſeized with the diſtemper, he ſhould be blooded ſparingly, at the utmoſt not exceeding two pounds; after this he ſhould take large doſes of decoction of guaiacum, or of box-wood, twice every day for eight days; after this he is to take three or four briſk purges, and then to have recourſe to the decoction again. In the interim, the hair muſt be clean ſhaved off from the diſtempered part of the leg, and it muſt be rubbed with a wiſp of hay very often, and the *watery ſores* in it anointed with the following ointment. Take a pound of black ſoap, three ounces of ſpirit of wine, two ounces of common ſalt, and three ounces of burnt alum; there is to be as much meal or flour added to theſe, as will make the whole into a proper conſiſtence; this is to be laid on all the ſores without any covering or bandage, and the next morning it is to be waſhed off with a ley of aſhes freſh made. This anointing and waſhing are to be repeated every day, and with the effects of this, and of the internal remedies, the diſeaſe ſeldom fails of a cure, if it be not very obſtinate, or of a very long ſtanding.

WATERY *humour*. See AQUEOUS, and HUMOUR.

WATERY *head*. See HYDROCEPHALUS.

WATERY *ſores*. See WATERS.

WATLING-*ſtreet*, in *Roman Antiquity*. See WAY.

WATSONIA, in *Botany*, a genus of plants belonging to the *triandria monogynia* claſs of Linnæus, ſo called by Mr. Miller, who raiſed the plant from ſeeds, in honour of Dr. William Watſon. Its characters are theſe: the flower has a permanent ſpatha, or ſheath, which divides into two parts almoſt at the bottom; it has one petal; the tube is long, a little curved, and ſwells at the upper part; the rim is cut into ſix obtuſe ſegments, which ſpread open; it has three long, ſlender ſtamina, which are terminated by proſtrate, oblong ſummits, and a roundiſh three-cornered germen, ſupporting a ſlender ſtyle, ſomewhat longer than the ſtamina, crowned by three bifid ſtigmas; the germen afterwards turns to a roundiſh three-cornered capſule, having three cells, opening with three valves, each containing three or four roundiſh ſeeds. There is one ſpecies, a native of Æthiopia.

WATTLES, among *Huſbandmen*, grates or hurdles, for folds for ſheep.

The word is alſo uſed for the gills of a cock, and for the naked red fleſh that hangs under a turky's neck.

WAVE, *unda*, in *Phyſics*, a cavity in the ſurface of the water or other fluid, with an elevation aſide thereof. Or, it is a volume of water elevated by the action of the wind upon its ſurface, into a ſtate of fluctuation.

The origin of *waves* may be thus conceived. The ſurface of a ſtanding water being naturally plain, and parallel to the horizon, if by any means it be rendered hollow, as at A (*Tab.* VII. *Hydraulics*, *fig.* 81.) its cavity will be ſurrounded with an elevation BB; this raiſed water will deſcend by its gravity, and with the celerity acquired in deſcending, will form a new cavity; by which motions, the water will aſcend at the ſides of this cavity, and fill the cavity A, while there is a new elevation towards C; and, when this laſt is depreſſed, the water ariſes anew towards the ſame part. Thus ariſes a ſucceſſive motion in the ſurface of the water; and a cavity, which carries an elevation before it, is moved along from A towards C. This cavity, with the elevation next it, is called a *wave*; and the ſpace taken up by the *wave* on the ſurface of the water, and meaſured according to the direction of the *wave's* motion, is called the *breadth of the wave*.

WAVES, *the motion of*, makes an article in the new philoſophy; and the laws thereof being now pretty well determined, we ſhall give the reader the ſubſtance of what is taught thereon.

1. The cavity, as A, is encompaſſed every way with an elevation; and the motion above mentioned expands itſelf every way: therefore the *waves* are moved circularly.

2. Suppoſe, now, AB (*fig.* 82.) an obſtacle, againſt which the *wave*, whoſe beginning is at C, ſtrikes; and we are to examine what change the *wave* ſuffers in any point, as E, when it is come to the obſtacle in that point. In all places through which the *wave* paſſes in its whole breadth, the *wave* is raiſed; then a cavity is formed, which is again filled up; which change while the ſurface of the water undergoes, its particles go and return through a ſmall ſpace; the direction of this motion is along CE, and the celerity may be repreſented by that line. Let this motion be contrived to be reſolved into two other motions, along GE and DE, whoſe celerities are reſpectively repreſented by thoſe lines. By the motion along DE, the particles do not act againſt the obſtacle; but, after the ſtroke, continue their motion in that direction with the ſame celerity; and this motion is

here repreſented by EF, ſuppoſing EF and ED to be equal to one another, but by the motion along GE, the particles ſtrike directly againſt the obſtacle, and this motion is deſtroyed; for though the particles are elaſtic, yet, as in the motion of the *waves* they run through but a ſmall ſpace, going backward and forward, they proceed ſo ſlowly, that the figure of the particles cannot be changed by the blow; and ſo are ſubject to the laws of PERCUSSION of bodies perfectly hard.

But there is a reflexion of the particles from another cauſe: the water which cannot go forward beyond the obſtacle, and is puſhed on by that which follows it, gives way where there is the leaſt reſiſtance; that is, it aſcends; and this elevation, which is greater in ſome than other places, is cauſed by the motion along GE; becauſe it is by that motion alone that the particles impinge againſt the obſtacle. The water, by its deſcent, acquires the ſame velocity with which it was raiſed; and the particles of water are repelled from the obſtacle with the ſame force in the direction EG, as that with which they ſtruck againſt the obſtacle. From this motion, and the motion above mentioned along EF, ariſes a motion above EH, whoſe celerity is expreſſed by the line EH, which is equal to the line CE; and by the reflexion, the celerity of the *wave* is not changed, but it returns along EH, in the ſame manner as if, taking away the obſtacle, it had moved along E*b*.

If from the point C, CD be drawn perpendicular to the obſtacle, and then produced, ſo that D*c* ſhall be equal to CD, the line HE continued will go through *c*; and as this demonſtration holds good in all points of the obſtacle, it follows, that the reflected *wave* has the ſame figure on that ſide of the obſtacle, as it would have had beyond the line AB, if it had not ſtruck againſt the obſtacle. If the obſtacle be inclined to the horizon, the water riſes and deſcends upon it, and ſuffers a friction, whereby the reflexion of the *wave* is diſturbed, and often wholly deſtroyed; and this is the reaſon why very often the banks of rivers do not reflect the *waves*.

If there be a hole, as I, in the obſtacle BL, the part of the *wave* which goes through the hole, continues its motion directly, and expands itſelf towards QQ; and there is a new *wave* formed, which moves in a ſemicircle, whoſe centre is the hole. For the raiſed part of the *wave*, which firſt goes through the hole, immediately flows down a little at the ſides; and by deſcending, makes a cavity which is ſurrounded with an elevation on every part beyond the hole, which moves every way in the ſame manner as was laid down in the generation of the firſt *wave*.

In the ſame manner, a *wave* to which an obſtacle, as AO, is oppoſed, continues to move between O and N, but expands itſelf towards R, in a part of a circle, whoſe centre is not very far from O. Hence, we may eaſily deduce what muſt be the motion of a *wave* behind an obſtacle, as MN.

Waves are often produced by the motion of a tremulous body, which alſo expand themſelves circularly, though the body goes and returns in a right line; for the water which is raiſed by the agitation, deſcending, forms a cavity, which is every where ſurrounded with a riſing.

Different *waves* do not diſturb one another, when they move according to different directions. The reaſon is, that whatever figure the ſurface of the water has acquired by the motion of the *waves*, there may in that be an elevation and depreſſion; as alſo ſuch a motion as is required in the motion of a *wave*.

To determine the celerity of the *waves*, another motion, analogous to theirs, muſt be examined. Suppoſe a fluid in the bent cylindric tube EH (*fig.* 83.); and let the fluid in the leg EF be higher than in the other leg by the diſtance *l*E; which difference is to be divided into two equal parts at *i*. The fluid, by its gravity, deſcends in the leg EF, while it aſcends equally in the leg GH; ſo that when the ſurface of the fluid is arrived at *i*, it is at the ſame height in both legs; which is the only poſition wherein the liquid can be at reſt; but by the celerity acquired in deſcending, it continues its motion, and aſcends higher in the tube GH; and in EF is depreſſed quite to *l*, except ſo much as it is hindered by the friction againſt the ſides of the tube. The fluid in the tube GH, which is higher, alſo deſcends by its gravity, and ſo the fluid in the tube riſes and falls, till it has loſt all its motion by the friction.

The quantity of matter to be moved, is the whole fluid in the tube; the moving force is the weight of the column *l*E, whoſe height is always double the diſtance E*i*; which diſtance, therefore, increaſes and diminiſhes in the ſame ratio with the moving force. But the diſtance E*i* is the ſpace to be run through by the fluid, in order to its moving from the poſition EH, to the poſition of reſt; which ſpace, therefore, is always as the force continually acting upon the fluid: but it is demonſtrated, that it is on this account that all the vibrations of a pendulum, oſcillating in a cycloid, are iſochronal; and, therefore, here alſo, whatever be the inequality of the agitations, the fluid always goes and returns in the ſame time. The time in which a fluid thus agitated aſcends, or deſcends, is the time in which a pendulum vibrates, whoſe length is equal to half the length of the fluid in the tube, or to half the ſum of the lines EF, FG, EH. This length is to be meaſured in the axis of the tube. See PENDULUM.

From theſe principles, to determine the celerity of the *waves*, we muſt conſider ſeveral equal *waves* following one another immediately; as A, B, C, D, E, F, (*fig.* 84.) which move from A towards F: the *wave* A has run its breadth, when the cavity A is come to C; which cannot be, unleſs the water at C aſcends to the height of the top of the *wave*, and again deſcends to the depth C; in which motion, the water is not agitated ſenſibly below the line *hi*: therefore, this motion agrees with the motion in the tube above mentioned; and the water aſcends and deſcends, that is, the *wave* goes through its breadth, while a pendulum of the length of half BC performs two oſcillations, or while a pendulum of the length BCD, that is, four times as long as the firſt, performs one vibration. Therefore, the celerity of the *wave* depends upon the length of the line BCD; which is greater, as the breadth of the *wave* is greater, and as the water deſcends deeper in the motion of the *waves*. In the broadeſt *waves*, which do not riſe high, ſuch a line as BCD does not much differ from the breadth of the *wave*; and in that caſe a *wave* moves its breadth, while a pendulum, equal to that *wave*, oſcillates once.

In every equable motion, the ſpace gone through increaſes with the time and the celerity; wherefore, multiplying the time by the celerity, you have the ſpace gone through; whence it follows, that the celerities of the *waves* are as the ſquare roots of their breadths: for as the times in which they go through their breadths are in that ratio, the ſame ratio is required in their celerities, that the products of the times, by their celerities, may be as the breadths of the *waves*, which are the ſpaces gone through.

This motion of the ſea-water depends greatly on the winds, and on the ſituation of mountains, in regard to the ſea; for the winds are driven back from theſe with great impetuoſity; and in ſome places this occaſions a great and very irregular undulation, beſide that which is produced by the immediate action of the winds on the ſurface of the water in their own direct courſe.

Waves are to be conſidered as of two kinds, and theſe may be diſtinguiſhed from one another by the names of natural and accidental *waves*.

The natural *waves* are thoſe which are regularly proportioned in ſize to the ſtrength of the wind, whoſe blowing gives origin to them. The accidental *waves* are thoſe occaſioned by the wind's reacting upon itſelf by repercuſſion from hills and mountains, or high ſhores, and by the waſhing of the *waves* themſelves, otherwiſe of the natural kind, againſt rocks and ſhoals; all theſe caſes give the *waves* an elevation, which they can never have in their natural ſtate.

The great Mr. Boyle has proved by numerous experiments, that the moſt violent wind never penetrates deeper than ſix feet into the water; and it ſhould ſeem a natural conſequence of this, that the water moved by it can only be elevated to the ſame height of ſix feet from the level of the ſurface in a calm; and theſe ſix feet of elevation being added to the ſix of evacuation, in the part whence that water ſo elevated was raiſed, ſhould give twelve feet for the utmoſt elevation of a *wave*. This is a calculation that does great honour to its author; for count Marſigli meaſured carefully the elevations of the *waves* near Provence, and found that, in a very violent tempeſt, they aroſe only to ſeven feet above the natural level of the ſea, and this additional foot in height he eaſily reſolved into the accidental ſhocks of the water againſt the bottom, which was, in the place he meaſured them in, not ſo deep as to be out of the way of affecting the *waves*; and he allows that the addition of one ſixth of the height of a *wave*, from ſuch a diſturbance from the bottom, is a very moderate alteration from what would have been its height in a deep ſea; and concludes, that M. Boyle's calculation holds perfectly right in deep ſeas, where the *waves* are purely natural, and have no accidental cauſes to render them larger than their juſt proportion.

In deep water, under the high ſhores of the ſame part of France, this author found the natural elevation of the *waves* to be only five feet; but he found alſo that their breaking againſt rocks, and other accidents to which they were liable in this place, often raiſed them to eight feet high.

We are not to ſuppoſe, from this calculation, that no *wave* of the ſea can riſe more than ſix feet above its natural level in open and deep water; for *waves* immenſely higher than theſe are formed in violent tempeſts in the great ſeas. Theſe, however, are not to be accounted *waves* in their natural ſtate, but they are ſingle *waves* formed of many others: for in theſe wide plains of water, when one *wave* is raiſed by the wind, and would elevate itſelf up to the exact height of ſix feet, and no more, the motion of the water is ſo great, and the ſucceſſion of *waves* ſo quick, that, during the time this is riſing, it receives into it ſeveral other *waves*, each of which would have been at the ſame height with itſelf; theſe run into the firſt *wave* one after another, as it is riſing; and by this means its riſe is continued much longer than it naturally would have been, and it becomes accumulated to an enormous ſize. A number of theſe complicated *waves* ariſing together, and being continued in a long ſucceſſion by the continuation of the ſtorm, make the *waves* ſo dangerous to ſhips, which the ſailors in their phraſe call mountains high. Marſigli, Hiſt. Phyſ. de la Mer.

WAVE-*offering*, among the *Jews*, a ſacrifice offered by agitation or *waving* towards the four cardinal points.

WAVED, or WAVY, a term in *Heraldry*, when a bordure, or any ordinary or charge in a coat of arms, has its-lines indented, in manner of the riſing and falling of *waves*. This is alſo called *undy*, *undé*, or *ondé*, and denotes that the firſt of the family in whoſe arms it ſtands, acquired his honours for ſea ſervices, and has this peculiar commemoration ordered in his arms.

To WAVE, is uſed, in the *Sea-Language*, for the making ſigns for a veſſel to come near, or keep off.

WAVESON, in the *Admiralty-Law*, a term uſed for ſuch goods, as, after ſhipwreck, appear ſwimming on the waves.

WAVY. See WAVED.

WAX, *cera*, a ſoft, yellowiſh, concrete matter, collected from vegetables by the bee, and extracted from the combs, after the honey is got out, by heating and preſſing them.

Wax is not the excrement of this laborious inſect, as the ancients, and after them many of the moderns, have imagined

According to Mr. Reaumur, the farina fœcundans of the flowers of plants, contained in their apices, is the matter of which the bees form their *wax*; they either diſlodge this from its cells with their teeth, or elſe merely by rubbing their bodies among the ſtamina and apices, load themſelves with the globules of it, which their hairs keep ſticking upon their body, and which they afterward bruſh off with their legs, and, by degrees, collect into balls or lumps, which they depoſit upon the flat and triangular piece, which makes the third joint of the hinder pair of their legs.

The lumps of *wax* with which we ſee them loaded in this part, and carrying to their hives, he adds, are only the farina of flowers worked up and compreſſed into a maſs or ſort of cake. The ſtamina of the flowers therefore ſuſtain certain caſes, containing a powder, which is the matter of bees-*wax*. This powder, thus collected into lumps on the legs of the bees, is called rough *wax*, and is probably *wax* to all intents and purpoſes, only wanting a little beating together. *Wax*, therefore, ſo long eſteemed an animal ſubſtance, will appear to be a native vegetable production.

If the bees are obſerved when returning to the hive loaded with their lumps of *wax* on their thighs, theſe lumps on ſome will be found to be white, on others yellow, on others red, and on ſome greeniſh: this is owing to the different colours of the farina, yielded by the different plants they have been at work upon. The manufacture of the bee, in moulding this into a lump, has not yet been able to alter the colour of the farina, nor even its figure; for if the lumps be examined by the microſcope, they will all be found to conſiſt of globules of a rounded or oval figure, or of whatever other ſhape they had when on the plant. The bees returning to their hives, after their morning excurſions in the ſpring, are always found to contain in the cells of their palettes large lumps of *wax*; but thoſe, which go out in the heat of the day, return with little or none; the reaſon of this is, that the humidity of the farina, by means of the dew, makes it eaſily formed into a lump or maſs, its particles naturally ſticking together; whereas in the heat of the day this powder is too dry to be formed thus into a compact maſs, and therefore cannot be carried home by the bee. However, it is evident, that the bee does ſomething to the matter of which *wax* is made, in order to the reducing of it into perfect *wax*.

The opinion of Swammerdam and Maraldi was, that the bee added ſome other matter to the rough *wax*, in order to reduce it to this proper ſtate. And as there is no ſubſtance ſo ready for the bee as honey, they ſuppoſed that ſhe mixed honey with this matter, and ſo made *wax* of the compound; but experiment is wholly againſt this; ſince if honey and this matter collected from the bees be mixed in any proportion, the compound has no more the properties of *wax* than it had before, but ſtill remains a quite different ſubſtance. Swammerdam afterwards fell into another opinion, in regard to the matter mixed with the rough *wax*, in order to render it perfect; this was, that the bee mixed with it the venomous liquor, of which ſhe has a bag full near the tail, in order to poiſon the wounds made by her ſting. He made ſome experiments on this plan, which he thought favoured his ſyſtem, and endeavours to ſtrengthen the probability by obſerving, that as the ſting of the bee comes but very little into uſe, it would not have been neceſſary that the creature ſhould have been thus conſtantly ſupplied with a large bag of this matter, if nature had not allotted to it ſome other uſe beſide that regarding the ſting. This opinion prevailed among the learned, till Mr. Reaumur of late proved by experiments, that this liquor had no effect on the matter found on the thighs of the bee, as to the turning it into *wax*; and alſo that ſeveral creatures which make no true genuine *wax*, ſuch as the humble bee, the waſp, and the hornet, whoſe combs are made of a ſort of paper, yet have all this bag of liquor near their ſting.

It is moſt probable ſays this writer, that the method in which the bees turn the farina of flowers into *wax*, is a very ſimple one; and moſt likely it conſiſts only in a ſort of beating the quantities of them, which they collect, till they are very thoroughly united. We have never been able yet to diſcover their manner of doing it; but this appears, he thinks, moſt like the courſe of nature, in the operations of other inſects. If this be the caſe, it would be poſſible, perhaps, for us to imitate their method, and procure for ourſelves *wax* out of the ſtamina of flowers. This would be a diſcovery of the utmoſt importance; for though at preſent the bees which work it for us coſt us nothing in keeping, yet it is to be obſerved, that they are too few in number to collect ſo much as we might wiſh.

The difficulty in the way of the making *wax* from the ſubſtance from which the bees make it, is the poſſibility of its being converted into *wax* within the body of the animal. If this is the caſe, notwithſtanding that we perfectly know the matter of which *wax* is made, we are not to wonder that we are not able to make it, any more than that we are not able to make chyle or blood out of the ſeveral ſubſtances uſed by us as food, and out of which we well know that it is made within our bodies. Reaumur's Hiſt. Inſ. vol. ix. p 382. vol. x. p. 39. &c. For the opinions of other writers, and bee-maſters, on this ſubject, ſee HONEY, PAIN *d'abeilles*, and PROPOLIS.

Wax makes a very conſiderable article in commerce; the conſumption thereof throughout the ſeveral parts of Europe being incredible. There are two kinds, *white* and *yellow*, the yellow is the native *wax*, juſt as it comes out of the hive, after expreſſing the honey, &c. This colour, ſays Thorley, is owing to the age of the combs, and breath of the bees; *wax*, he ſays, both as it is gathered, and wrought into combs, being always white: the white is the ſame *wax*, only purified, waſhed, and expoſed to the air. The preparation of each follows.

WAX, *yellow*. To procure the *wax* from the combs for uſe; after ſeparating the honey from them, they put all the matter remaining in a large kettle, with a ſufficient quantity of water; where, with a moderate fire, they melt it, and then ſtrain it through a linen cloth, by a preſs: before it is cold, they ſcum it with a tile, or a piece of wet wood, and caſt it, while yet warm, in wooden, earthen, or metalline moulds; having firſt anointed them with honey, oil, or water, to prevent the *wax* from ſticking. Some to purify it, make uſe of Roman vitriol, or copperas; but the true ſecret is to melt, ſcum it, &c. properly, without any ingredient at all.

The beſt is that of a high colour, an agreeable ſmell, ſomewhat reſembling that of honey, brittle, and that does not ſtick to the teeth when chewed. When new, it is of a lively yellow colour; it is ſomewhat tough, yet eaſy to break; by age, it loſes its fine colour, and becomes harder and more brittle. The ſmell alſo, by long keeping, and in the proceſs by which it is whitened, is in good meaſure diſſipated. However, *wax* is often ſophiſticated with reſin, or pitch, coloured with rocou, or turmeric.

Wax is lighter than water, but heavier than proof ſpirit. It has ſome properties in common with reſins, on account of which it has been long conſidered as a reſin. It has the ſame conſiſtence, and, like reſins, furniſhes an oil and an acid by diſtillation, and is ſoluble in all oils; but in ſeveral reſpects it differs ſenſibly from reſins. Like theſe, *wax* has not a ſtrong aromatic taſte and ſmell, but a very weak ſmell, and, when pure, no taſte. With the heat of boiling water no principles are diſtilled from it; whereas with that heat, ſome eſſential oil, or, at leaſt, a ſpiritus rector is obtained from every reſin. Farther, *wax* is unſoluble in ſpirit of wine. If *wax* be diſtilled with a heat greater than that of boiling water, it may be decompoſed, but not ſo eaſily as reſins can. By this diſtillation, a ſmall quantity of water is firſt ſeparated from the *wax*, and then ſome very volatile and penetrating acid, accompanied with a ſmall quantity of a very fluid and very odoriferous oil. As the diſtillation advances, the acid becomes more and more ſtrong, and the oil more and more thick, till its conſiſtence be ſuch that it becomes ſolid in the receiver, and is then called *butter of wax*. When the diſtillation is finiſhed, nothing remains but a ſmall quantity of coal, which is almoſt incombuſtible, from the want of ſome ſaline matter. *Wax* cannot be kindled, unleſs it be previouſly heated, and reduced into vapours; in which reſpect it reſembles fat oils. The oil and butter of *wax* may, by repeated diſtillations, be attenuated, and rendered more and more fluid, becauſe ſome portion of acid is thereby ſeparated from theſe ſubſtances; which effect is ſimilar to what happens in the diſtillation of other oils and oily concretes; but this remarkable effect attends the repeated diſtillation of oil and butter of *wax*, that they become more and more ſoluble in ſpirit of wine; and that they never acquire greater conſiſtence by evaporation of their more fluid parts. Boerhaave kept butter of *wax* in a glaſs veſſel open, or careleſsly cloſed, during twenty years, without acquiring a more ſolid conſiſtence. *Wax*, its butter, and its oil, differ entirely from eſſential oils and reſins, in all the above mentioned properties; and in all theſe perfectly reſemble ſweet oils. Hence Macquer concludes, that *wax* only reſembles reſins in being an oil rendered concrete by an acid; but that it differs eſſentially from theſe in the kind of oil, which in reſins is of the nature of eſſential oils; while in *wax* and other analogous oily concretions, it is of the nature of ſweet, unctuous oils, that are not aromatic, and not volatile, and are not obtained from vegetables by expreſſion.

Although *wax* is not diſſoluble at all in watery liquors, yet the gelatinous ſolution obtained by boiling it in ſpirit of wine, by mixture with a thick mucilage of gum arabic, becomes ſoluble in water, ſo as to form therewith an emulſion or milky liquor: the *wax* itſelf is made in like manner ſoluble, without the intervention of ſpirit, by thoroughly mixing it with the gum in fine powder; but when thus diſſolved, it proves ſtill inſipid, and perfectly void of acrimony.

WAX, *white*. The whitening, blanching, or bleaching of *wax*, is performed by reducing the yellow ſort, firſt, into little bits or grains, by melting it, and throwing it while hot, into cold water, or elſe by ſpreading it into very thin leaves or cakes. For this purpoſe, ſome diſpoſe the cauldron in which the *wax* is melted, ſo that it may flow gradually through a pipe at the bottom into a large tub filled with water, in which is fitted a large wooden cylinder, that turns continually round its axis, and upon which the melted *wax* falls. As the ſurface of this cylinder is always moiſtened with cold water, the *wax* falling upon it does not adhere to it, but quickly becomes ſolid and flat, and acquires the form of ribbands. The continual rotation of the cylinder carries off theſe ribbands as faſt as they are formed, and diſtributes them through the tub. This *wax*, thus granulated, or flatted, is expoſed to the air on linen cloths, where it remains night and day, having equally need of ſun and dew. Then they melt and granulate it over again ſeveral times; ſtill laying it out to the air, in the intervals, between the meltings.

When the ſun and dew have at length perfectly blanched it, they melt it for the laſt time, in a large kettle; out of which they caſt it, with a ladle, upon a table, covered over with little round dents or cavities, of the form of the cakes of *white wax*, as ſold by the apothecaries, &c. having firſt wetted thoſe moulds with cold water, that the *wax* may be the more eaſily got out. Laſtly, they lay out theſe cakes to the air for two days, and two nights, to render it more tranſparent and drier.

The yellow colour of the *wax* is evidently deſtroyed by the combined action of the air, of the water, and of the ſun. As the volatile, ſulphureous acid, has the property of deſtroying more quickly almoſt all the colours of vegetables, it is ſuggeſted by the author of the Chemical Dictionary, that this bleaching might perhaps be ſhortened, by expoſing ribbands of yellow *wax* to the vapour of ſulphur, as is practiſed for wool and ſilk. However, the operation of bleaching *wax* above deſcribed, can be performed well only in fine weather, as it depends chiefly on the action of the ſun. This circumſtance being attended with much inconvenience to the manufacturers, the diſcovery of a method of whitening *wax*, independently of the ſeaſons, would be very uſeful, and has been recommended to the attention of chemiſts by ſome œconomical ſocieties.

With a view to diſcover ſuch a method, Mr. Beckman has made experiments, an account of which is publiſhed in the fifth volume of the Novi Commentarii Societatis Regiæ Scientiarum Gottingenſis. According to theſe experiments, thin pieces of yellow *wax* were whitened and hardened, by being digeſted and boiled in diluted and undiluted nitrous acid, in a few hours. But the *wax* thus whitened, being melted by means of boiling water, was obſerved to acquire a yellow colour, leſs intenſe, however, than it was before it had been treated with the mineral acids. The marine and vitriolic acids were leſs effectual than the nitrous. He expoſed *wax* to the flames of burning ſulphur, but without ſucceſs. Yellow *wax* being melted in vinegar, was rendered of a grey colour. The oil of tartar whitened *wax*, but leſs effectually than acids had done; and this *wax* being waſhed in water, and afterwards digeſted in nitrous acid, was rendered ſtill more white; but upon melting it in water, a yellowiſh tinge returned. He liquefied *wax* in ſolutions of nitre, and alum, but without any good effect. Spirit of wine, which is recommended by Mr. Boyle for this purpoſe, did indeed whiten the *wax*, but changed it to a butyraceous ſubſtance, ſo frothy, that its bulk was increaſed thirty times. Reflecting that tartar is purified from its oily particles by means of a calcareous earth, he tried the effects of a kind of fuller's earth, which he threw upon *wax* liquefied in water, and he agitated the mixture. This method rendered *wax* of a greyiſh colour, and is, therefore, recommended by him as preparatory to bleaching; the time neceſſary for which, he thinks, may be thus greatly ſhortened.

This white *wax* is uſed in the making of candles, torches, tapers, flambeaux, figures, and other *wax*-works. See CANDLES, TAPER, FLAMBEAUX, &c.

It is alſo an ingredient, partly for giving the requiſite conſiſtence to other ingredients, and partly on account of its own emollient quality, in plaſters, cerates, and divers pomatums and unguents for the complexion.

The yellow ſort, diſſolved into an emulſion, or mixed with ſpermaceti, oil of almonds, conſerve of roſes, &c. into the form of an electary; or divided, by ſtirring into it, when melted over a gentle fire, as much as it will take up of powdery matter, as the compound crabs-claw powder, is given alſo internally, and often with great ſucceſs, in diarrhœas and dyſenteries, for obtunding the acrimony of the humours, ſupplying the natural mucus of the inteſtines, and healing their excoriations or eroſions.

The empyreumatic oil, into which *wax* is reſolved by diſtillation with a ſtrong heat, is greatly recommended by Boerhaave, and others, for healing chaps and roughneſs of the ſkin, for diſcuſſing chilblains, and with proper fomentations and exerciſe, againſt ſtiffneſs of the joints, and contractions of the tendons. It is, without doubt, ſays Dr. Lewis, highly emollient; but does not appear to have any other quality by which it can act in external applications; it has nothing of the acrimony or pungency, which prevail in all the other known diſtilled vegetable oils; though in ſmell it is not a little diſagreeable and empyreumatic; a circumſtance which occaſions it to be at preſent more rarely uſed than formerly. As the *wax* ſwells up greatly in the diſtillation, it is convenient to divide it, by melting it with twice its weight of ſand; or putting the ſand above it in the retort, that it may mingle with the *wax* when brought into fuſion. The oil, which is preceded by a ſmall quantity of acid liquor, congeals in the neck of the retort, from whence it may be melted down, by applying a live coal, and made fluid by rediſtilling it two or three times without addition. The fæces remaining, after expreſſing the *wax*, have been uſed both by ſurgeons and farriers, with ſucceſs, againſt ſtrains. Dict. Chem. art. *Wax*. Eng. ed. and Lewis's Mat. Med.

Yellow *wax* is made ſoft with turpentine, yet retains its natural colour. Red *wax* is only the white melted with turpentine, and reddened with vermilion or alkanet. Verdigriſe makes it green; and burnt paper, or lamp-black, black. Some travellers tell us of a natural black *wax*; aſſuring us there are bees, both in the Eaſt and Weſt Indies, that make an excellent honey, included in black cells. Of this *wax*, they ſay, it is, that the Indians make thoſe little vaſes, wherein they gather their balſam of Tolu.

WAX, *chafe*. See CHAFE.

WAX, *crude* or *rough*, called by the French *cire brute*, in

Natural Hiſtory, a name given to a ſubſtance called by the ancients *erithace*, *ſandarac*, and *ambroſia*.

We ſeem to have no name for it in Engliſh, but may call it after the name of the French, *rough wax*.

The Dutch call it the food of the bees, and that, perhaps, very properly, there appearing many reaſons to think that the bees eat it.

This is the yellow ſubſtance found on the hinder legs of bees in ſmall lumps, and is the ſubſtance of which, according to Reaumur, wax is made by this inſect. See PAIN *d'abeiles*.

WAX, *myrtle.* See CANDLE-BERRY-*tree.*

WAX, *virgin*, *propolis*, is a ſort of reddiſh *wax*, uſed by the bees to ſtop up the clefts or holes of the hive. It is applied juſt as taken out of the hive, without any art, or preparation of boiling, &c. It is the moſt tenacious of any, and is held good for the nerves. See PROPOLIS.

WAX, *ſealing*, or *Spaniſh* WAX, is a compoſition of gum LACCA, melted and prepared with reſins, and coloured with ſome ſuitable pigment.

There are two kinds of *ſealing-wax* in uſe; the one hard, intended for ſealing letters, and other ſuch purpoſes, where only a thin body can be allowed: the other ſoft, deſigned for receiving the impreſſions of ſeals of office to charters, patents, and ſuch written inſtruments.

The beſt hard red *ſealing-wax*, is made by mixing two parts of ſhell-lac, well powdered, and reſin and vermilion, powdered, of each one part, and melting this combined powder over a gentle fire; and when the ingredients ſeem thoroughly incorporated, working the *wax* into ſticks. Seed-lac may be ſubſtituted for the ſhell-lac; and inſtead of reſin, boiled Venice turpentine may be uſed. A coarſer, hard, red *ſealing-wax*, may be made, by mixing two parts of reſin, and of ſhell-lac, or vermilion and red-lead, mixed in the proportion of one part of the vermilion to two of the red-lead, of each one part; and proceeding, as in the former preparation. For a cheaper kind, the vermilion may be omitted, and the ſhell-lac alſo, for very coarſe uſes. The hard black *ſealing-wax* may be prepared in the ſame manner; uſing for the beſt ſort, inſtead of the vermilion, the beſt ivory black; and for the coarſer ſort, inſtead of the vermilion and red-lead, the common ivory black. For hard green *ſealing-wax*, inſtead, of vermilion, uſe powdered verdegriſe; and for a bright colour, diſtilled, or cryſtals of verdigriſe. For hard blue *ſealing-wax*, inſtead of the vermilion, ſubſtitute well powdered ſmalt, or for a light blue, verditer; or a mixture of both. For yellow hard *ſealing-wax*, ſubſtitute maſticot, or, for a bright colour, turbith mineral, inſtead of the vermilion. The hard, purple *wax*, is made like the red; changing half the quantity of the vermilion for an equal, or greater proportion of ſmalt, as the purple is deſired to be more blue or more red.

For uncoloured ſoft *ſealing-wax*, take of bees-*wax*, one pound; of turpentine, three ounces; and of olive oil, one ounce; place them in a proper veſſel over the fire, and let them boil for ſome time; and the *wax* will be then fit to be formed into rolls or cakes for uſe. For red, black, green, blue, yellow, and purple ſoft *ſealing-wax*, add to the preceding compoſition an ounce or more of any ingredients directed above for colouring the hard *ſealing-wax*, and ſtir the maſs, till the colouring ingredient be incorporated with the *wax*. The hard *ſealing-wax* is formed into ſticks, by rolling the maſs on a copper-plate, or ſtone, with a rolling-board, lined with copper, or block-tin, into rolls of any required ſize. In order to give them the fire-poliſh, or gloſs, a furnace or ſtove, like a pail, with bars at the bottom for ſupporting the charcoal, and notches at the top of the ſides for putting the ſticks of *wax* over the fire, is uſually provided. By means of this ſtove the ſticks of *wax* may be conveniently expoſed to the fire, and turned about, till the *wax* is ſo melted on the ſurface as to become ſmooth and ſhining. Hard *ſealing-wax* may be formed into balls, by putting a proper quantity on the plate or ſtone, and having faſhioned it into a round form, rolling it with the board till it be ſmooth.

The ſoft *wax* is eaſily formed into rolls or cakes, by pouring the melted maſs of the ingredients, as ſoon as they are duly prepared, into cold water, and working it with the hands into any deſired figure. Some perfume both theſe kinds of *wax*, by uſing, for a pound of the *wax*, half an ounce of benjamin, one ſcruple of oil of Rhodium, ten grains of muſk, and of civet and ambergriſe, each five grains; rubbing the oil with the other ingredients powdered; and when the *wax* is ready to be wrought into ſticks, ſprinkling in and well ſtirring the mixture; or by uſing one ounce of benjamin, one ſcruple and a half of oil of Rhodium, and five grains of ambergriſe, in the ſame manner. Lewis's Com. of Arts, p. 370. Handmaid to the Arts, vol. ii. p. 34, &c.

WAX-*candles.* See CANDLE.

By 24 Geo. III. cap. 36. inſtead of the former duty of 8*d.* a pound on *wax*-candles imported, ſhall be paid a duty of 2*d.* a pound on all *wax* imported; which ſhall be ſubject to the additional 5 per cents. impoſed by the acts of 19 Geo. III. cap. 25. and 22 Geo. III. cap. 66. And for every pound of *wax* or ſpermaceti candles made in Great Britain (notwithſtanding the mixture of any ingredients therewith), ſhall be paid a duty of 3*d.* a pound. Moreover, an annual licence duty of 5*l.* ſhall be paid by every perſon making *wax* or ſpermaceti candles, and of 5*s.* for trading in or ſelling the ſame; ſubject alſo to the additional 5 per cents. of the 19th, 21ſt, and 22d Geo. III. Making or trading in ſuch candles without licence, incurs a forfeiture of 20*l.*

WAX, *to imitate fruit*, &c. *in.* Take the fruit, and bury it half-way in clay; oil its edges, and the extant half of the fruit; then nimbly throw on it tempered alabaſter, or plaſter of Paris, to a conſiderable thickneſs. When this is concreted, it makes the half mould, the ſecond half of which may be obtained in the ſame way. The two parts of the mould being joined together, a little coloured *wax*, melted, and brought to a due heat, being poured through a hole made in any convenient part of the mould, and preſently ſhook every way therein, will repreſent the original fruit. Boyle's Works abr. vol. i. p. 136.

Here we muſt not forget that pretty invention of M. Benoiſt, a man famous at Paris for his figures of *wax*. Being, by profeſſion, a painter, he found the ſecret of forming moulds on the faces of living perſons, even the faireſt and moſt delicate, without any danger either to their health or complexion: in which moulds he caſt maſks of *wax*; to which, by his colours, and glaſs eyes imitated from nature, he gave a ſort of life: inſomuch as, when clothed in proper habits, they bore ſuch a reſemblance, that it was difficult diſtinguiſhing between the copy and the original.

WAX, *gilding.* See GILDING.

WAX, *grafting*, is a compoſition ſerving to bind or fix the bud, or graft, in the cleft of the ſtock.

Inſtead of *grafting wax*, the country gardeners, &c. only uſe clay, over which they lay a piece of linen cloth, and ſo keep it moiſt; and to prevent its cracking with the heat of the ſun, they tie moſs over it. But the *wax* ordinarily uſed, is a compoſt of one pound and a half of pitch, a quarter of a pound of *wax*, and an ounce of oil of almonds, melted and mixed together: with the addition, in ſpring or autumn, of a moderate quantity of turpentine.

For cleft-grafting, whip-grafting, and grafting by approach, Mr. Mortimer recommends tempered clay, or ſoft *wax*; but for rind-grafting, clay and horſe-dung.

WAX, *green.* See GREEN *wax.*

WAX, *thorough*, in *Botany.* See HARE's *ears.*

WAX, *painting in.* See ENCAUSTIC *painting.*

WAXING, *ceratio*, in *Chemiſtry*, the preparation of any matter to render it fit and diſpoſed to liquefy, or melt, which of itſelf it was not.

This is frequently done, to enable things to penetrate into metals, or other ſolid bodies.

WAX-SCOT, or WAX-SHOT, *ceragium*, in our *Ancient Cuſtoms*, money paid twice a year towards the charge of maintaining lights, or candles, in the church.

WAY, *via.* See HIGHWAY, ROAD, TURNPIKE, and VIA.

Roman *ways* are divided into *conſular*, *prætorian*, *military*, and *public.*

We have four notable ones of theſe in England; anciently called *chimini quatuor*, and intitled to the privileges of pax regis. The firſt is *Watling-ſtreet*, or *Wathe-ling-ſtreet*, leading from Dover to London, Dunſtable, Towceſter, Atterſton, and the Severn, near the Wrekin in Shropſhire, extending as far as Angleſea in Wales. The ſecond, called *Hekineld*, or *Ikenild-ſtreet*, reaches from Southampton, over the river Iſis at Newbridge, thence by Camden and Litchfield, then paſſes the Derwent near Derby, ſo to Bolſover-Caſtle, and ends at Tinmouth. The third, called *Foſſe-way*, becauſe in ſome places it was never perfected, but lies as a large ditch, leads from Cornwall through Devonſhire, by Tetbury near Stow in the Wolds; and beſide Coventry to Leiceſter, Newark, and ſo to Lincoln. The fourth, called *Erming*, or *Erminage-ſtreet*, ſtretches from St. David's in Weſt Wales, to Southampton.

WAY. See WEIGH.

WAY, *milky.* See GALAXY.

The opinion, long maintained among aſtronomers, but lately controverted, that the *milky way* contains a great number of ſtars, has been confirmed by the obſervations of the ingenious and indefatigable Dr. Herſchel. On applying his teleſcope of the Newtonian form, with an object-ſpeculum of twenty-feet focal length and an aperture of $18\frac{7}{10}$ inches, to a part of this ſpace, he found that it completely reſolved the whole whitiſh appearance into ſmall ſtars; which his former teleſcopes had not light enough to effect. In the tract immediately about the hand and club of Orion, to which his obſervations were particularly directed, the multitude of ſtars of all poſſible ſizes that preſented themſelves to view was aſtoniſhing: and in order to form ſome juſt idea of their number, Dr. Herſchel counted many fields, and computed from a mean of them, what a given portion of the *milky way* might contain. Among many trials of this ſort he found, that ſix fields, promiſcuouſly taken, contained 110, 60, 70, 90, 70, and 74 ſtars each. A mean of theſe gives 79 ſtars for each field. Hence, by allowing 15 minutes of a great circle for the diameter of the field of view, it is inferred, that a belt of 15 degrees in length and 2 in breadth, which is the quantity often obſerved by this excellent aſtronomer to paſs through the field of his teleſcope in one hour's time, could not well contain leſs than fifty thouſand ſtars, that were large enough to be diſtinctly numbered. But, beſides theſe, Dr. Herſchel ſuſpected at leaſt twice as many more, which, for want of light, he could only ſee now and then by faint glittering and interrupted glimpſes.

This author, obſerving that the nebulæ and cluſters of ſtars, of which he has already found 466 not before ſeen by any other perſon, are arranged into ſtrata, which ſeem to run into a great length, conjectures that the *milky way* is nothing but a ſtratum of fixed ſtars; and that the ſun is placed in this ſtratum, though perhaps not in the very centre of its thickneſs. This he infers from the appearance of the galaxy, which ſeems to encompaſs the whole heavens, as it certainly muſt do if the ſun is within the ſame. For, ſuppoſing a number of ſtars arranged between two parallel planes, indefinitely extended every way, but at a given conſiderable diſtance from each other; and calling this a ſidereal ſtratum, an eye placed ſomewhere within it will ſee all the ſtars in the direction of the planes of the ſtratum projected into a great circle, which will appear lucid on account of the accumulation of the ſtars; while the reſt of the heavens, at the ſides, will only ſeem to be ſcattered over with conſtellations, more or leſs crouded, according to the diſtance of the planes or number of ſtars contained in the thickneſs or ſides of the ſtratum.

If this ſituation of the ſun ſhould be admitted, and it be not far from the branching out of a ſecondary ſtratum, it will naturally lead us to gueſs at the cauſe of the probable motion of the ſolar ſyſtem; for the very bright, great node of the *via lactis*, or union of the two ſtrata about Cepheus and Caſſiopeia, and the Scorpion and Sagittarius, points out a conflux of ſtars manifeſtly quite ſufficient to occaſion a tendency towards that node in any ſtar ſituated at no very great diſtance; and the ſecondary branch of the galaxy, not being much leſs than a ſemi-circle, ſeems to indicate ſuch a ſituation of our ſolar ſyſtem in the great undivided ſtratum as the moſt probable. Phil. Tranſ. vol. lxxiv. part ii. p. 439, &c.

WAY *of a ſhip* is ſometimes uſed for the ſame with the RAKE. But the term is more commonly underſtood of the courſe or progreſs which ſhe makes on the water under ſail: thus, when ſhe begins her motion, ſhe is ſaid to be *under way*; when that motion increaſes, ſhe is ſaid to have *freſh way* through the water; when ſhe goes apace, they ſay, *ſhe has a good way*; and they call the account how faſt ſhe ſails by the LOG, *keeping an account of her way*.

And becauſe moſt ſhips are apt to ſail a little to the leeward of their true courſe; they always, in caſting up the log-board, allow ſomething for her LEEWARD-*way*. Hence alſo a ſhip is ſaid to have HEAD-*way* and STERN-*way*.

WAY *of the rounds*, *chemin des rondes*, in *Fortification*, is a ſpace left for the paſſage of the rounds, between the rampart, and the wall of a fortified town.

This is not now much in uſe; becauſe the parapet not being above a foot thick, it is ſoon overthrown by the enemy's cannon.

WAY, *covert*, *foſs*, *gang*, *hatch*, *ſpur*, and *water*. See the ſeveral articles.

WAYS *and means*, *committee of*. See SUPPLIES.

WAYED *horſe*, in the *Manege*, is one that is already backed, ſuppled, and broken, and ſhews a diſpoſition to the manege.

WAYFARING-*tree*, *viburnum*, in *Botany*, a genus of the *pentandria trigynia* claſs. Its characters are theſe: the flower has a ſmall permanent empalement, which is cut into five parts; it has one bell-ſhaped petal, cut at the brim into five obtuſe ſegments which are reflexed; it has five awl-ſhaped ſtamina the length of the petal, terminated by roundiſh ſummits; and a roundiſh germen ſituated under the flower, having no ſtyle, but the place occupied by a roundiſh gland, crowned by three obtuſe ſtigmas: the germen turns to a roundiſh fruit with one cell encloſing one hard ſeed. Linnæus enumerates eight and Miller nine ſpecies. See GELDER-*roſe*.

WAY-WISER, an inſtrument for meaſuring the road, or diſtance gone; called alſo PERAMBULATOR, and *podometer*, or PEDOMETER.

Mr. Lovell Edgworth communicated to the Society of Arts, &c. an account of a *way-wiſer* of his invention; for which he obtained a ſilver medal. This machine conſiſts of a nave, formed of two round flat pieces of wood, one inch thick and eight inches in diameter. In each of theſe pieces there are cut eleven grooves, five-eighths of an inch wide and three-eighths deep; and when the two pieces are ſcrewed together, they encloſe eleven ſpokes, forming a wheel of ſpokes, without a rim: the circumference of the wheel is exactly one pole; and the inſtrument may be eaſily taken to pieces, and put up in a ſmall compaſs. On each of the ſpokes there is driven a ferril, to prevent them from wearing out; and in the centre of the nave, there is a ſquare hole to receive an axle. Into this hole there is inſerted an iron or braſs rod, which has the thread of a very fine ſcrew worked upon it from one end to the other; upon this ſcrew hangs a nut which, as the rod turns round with the wheel, advances or recedes towards or from the nave of the wheel. The nut does this becauſe it is prevented from turning round with the axle, by having its centre of gravity placed at ſome diſtance below the rod, ſo as always to hang perpendicularly like a plummet. Two ſides of this ſcrew are filed away flat, and have figures engraved upon them to ſhew by the progreſſive motion of the nut, how many circumvolutions the wheel and its axle have made: on one ſide the diviſions of miles, furlongs, and poles are in a direct, and on the other ſide the ſame diviſions are placed in a retrograde order.

If the perſon who uſes this machine places it at his right ſide, holding the axle looſely in his hands, and walks forward, the wheel will revolve, and the nut advance from the extremity of the rod towards the nave of the wheel. When two miles have been meaſured, the nut will have come cloſe to the wheel. But to continue this meaſurement, nothing more is neceſſary than to place the wheel at the left hand of the operator; and the nut will, as he continues his courſe, recede from the axletree, till another ſpace of two miles is meaſured.

It appears from the conſtruction of this machine, that it operates like circular compaſſes; and does not, like the common wheel *way-wiſer*, meaſure the ſurface of every ſtone and mole-hill, &c. but paſſes over moſt of the obſtacles it meets with, and meaſures the chords only, inſtead of the arcs of any curved ſurfaces upon which it rolls.

WAYWODE, is properly a title given the governors of the chief places in the dominions of the czar of Muſcovy.

The palatines, or governors of provinces in Poland, alſo bear the quality of *waywodes*, or *waiwodes*. See PALATINE.

The Poles likewiſe call the princes of Walachia and Moldavia *waywodes*; as eſteeming them no other than on the foot of governors; pretending that Walachia and Moldavia are provinces of Poland, which have withdrawn themſelves from the obedience of the republic. Every where elſe theſe are called *hoſpodars*.

Du-Cange ſays, that the name *waywode* is uſed in Dalmatia, Croatia, and Hungary, for a *general of an army*: and Leunclavius, in his Pandects of Turkey, tells us, it uſually ſignifies *captain*, or *commander*.

WEACHIN, in *Botany*, the name given by the Indians of America to the maize, or Indian corn, which they cultivated for bread before we knew them.

WEAK, or *eaſy branch*, in the *Manege*. See BANQUET, and BANQUET-*line*.

WEAK *pulſe*. See PULSE.

WEALD, or WELD, the woody part of a country; as the *weald of Kent*, the word *weald* in Saxon ſignifying a wood. It is miſrepreſented in ſome books and maps, and called the *wilds* of Kent, Suſſex, and Surry.

WEALREAF, in *our Old Writers*, ſignifies the robbing of a dead man in his grave.

The word comes from the Saxon *weal*, *ſtrages*, and *reaf*, *ſpoliatio*.

WEANEL, a country term for a young beaſt newly weaned, or taken from ſucking its dam.

WEANING, *ablactation*. See ABLACTATION.

WEAPONS. See ARMS, and ARMOUR.

WEAPON-*ſalve*, a kind of unguent, ſuppoſed to cure wounds ſympathetically, by being applied, not to the wound, but to the *weapon* that made it. See SYMPATHETIC *Powder*, and TRANSPLANTATION.

WEAR, or WEER, a great ſtank, or dam in a river; fitted for the taking of fiſh, or for conveying the ſtream to the mill. See FISHING.

WEARING, in *Sea-Language.* See Veering.

WEASEL, Weeſel, in *Zoology*, a ſpecies of the Muſtela. The *weaſel*, in ſome parts of England, is called the *foumart*, or *fitchet*. It is a little creature, ſmaller than the *pole-cat*, and the leaſt of the *weaſel*-kind: its back and ſides are reddiſh, and its throat and belly white, the whiteneſs reaching perfectly from the angle of the chin to the inſertion of the tail; but beneath the corners of the mouth on each jaw is a ſpot of brown: its head is ſomething like a dog's, the upper jaw reaches beyond the lower, and is ornamented with ſome briſtles by way of whiſkers. Its fore-teeth are ſix in number in each jaw, and are ſmall and ſet very cloſe together, like the teeth of a comb; thoſe of the under jaw are much ſmaller than the others; the dog-teeth are long, large, and ſtrong; the eyes are ſmall and black, the ears ſhort and broad, and covered with very thick-ſet hairs; and, which is a very remarkable circumſtance, they are doubled in their lower part. The inner cavity of the ear is very large, and full of tubercles. The feet are ſmall, but broad, and each divided into five toes; the legs are ſhort. The heart and liver are, in diſſecting this creature, found remarkably large. (See *Tab.* III. *Quadrupeds*, N° 39.)

This animal, like the reſt of the kind, is very deſtructive to young birds, poultry, and rabbits, and alſo to eggs: it alſo preys upon moles. It frequents houſes, barns, and granaries, clearing its haunts, more effectually than the cat, of rats and mice. It brings five or ſix young at a time: its ſkin and excrements are moſt intolerably fetid.

This animal is confounded by Linnæus with the stoat or ermine. He ſeems unacquainted with our *weaſel* in its brown colour; but deſcribes it in the white ſtate under the title of *ſnomus*, or *muſtela nivalis*.

In Norway, Sweden, Ruſſia, and Siberia, the *weaſel* always changes to white at the approach of winter. In Siberia it is called *laſmitſka*; and the ſkins are ſold to the Chineſe for three or four rubles per hundred. Ray and Pennant.

Weasel-*coot*, in *Ornithology*, the red-headed *ſmew*, or mergus *minutus* of Linnæus.

WEATHER, the ſtate or diſpoſition of the atmoſphere, with regard to moiſture or drought, heat or cold, wind or calm, rain, hail, froſt, ſnow, fog, &c. See Atmosphere, Rain, Heat, Wind, Hail, Frost, &c.

As it is in the atmoſphere that all plants and animals live and breathe, and as that appears to be the great principle of moſt animal and vegetable productions, alterations, &c. there does not ſeem any thing, in all philoſophy, of more immediate concernment to us than the ſtate of the *weather*. In effect, all living things are only aſſemblages, or bundles of veſſels, whoſe juices are kept moving by the preſſure of the atmoſphere; and which by that motion maintain life. So that any alterations in the rarity or denſity, the heat, purity, &c. of that, muſt neceſſarily be attended with proportionable ones in theſe.

What great, yet regular alterations, a little change of *weather* makes in a tube filled with mercury, or ſpirit of wine, or in a piece of ſtring, &c. every body knows, in the common inſtance of barometers, thermometers, hygrometers, &c. and it is owing partly to our inattention, and partly to our unequal, intemperate courſe of living, that we do not feel as great and as regular ones in the tubes, chords, and fibres, of our own bodies.

It is certain, a great part of the brute creation have a ſenſibility and ſagacity, this way, beyond mankind; and yet, without any means or diſpoſition thereto, more than we; except that their veſſels, fibres, &c. being, in other reſpects, in one equable habitude; the ſame or a proportionable cauſe from without, has always a like or proportionable effect on them; that is, their veſſels are regular barometers, &c. affected only from one external principle; viz. the diſpoſition of the atmoſphere; whereas ours are acted on by divers from within, as well as without: ſome of which check, impede, and prevent, the action of others.

We know of nothing more wanting than a juſt theory of the *weather*, on mechanical principles. But, in order to that, a complete hiſtory of the *weather* will be required.

If regiſters were carefully kept in divers parts of the globe, for a good ſeries of years, we ſhould be enabled to determine the directions, breadth, and bounds, of the winds, and of the *weather* they bring with them; the correſpondence between the *weather* of divers places, and the dependence between one ſort and another at the ſame place. In time, no doubt, we might learn to foretel divers great emergencies; as, extraordinary heats, rains, froſts, droughts, dearths, plagues, and other epidemical diſeaſes, &c.

The members of our Royal Society, the French Academy of Sciences, and many authors of note, have made conſiderable eſſays this way; and the practice of keeping meteorological journals has, of late years, become very general. For inſtructions and examples pertaining to this ſubject, ſee Phil. Tranſ. vol. lxv. part ii. art. 16. Eraſ. Bartholin has obſervations of the *weather* for every day throughout the year 1671. Mr. W. Merle made the like at Oxford, for ſeven years, with a very remarkable care and accuracy. Dr. Plott did the ſame at the ſame place, for the year 1684. Mr. Hillier, at Cape Corſe, for the years 1686, 1687. Mr. Hunt, &c. at Greſham College, for the years 1695, 1696. Dr. Derham, at Upminſter in Eſſex, for the years 1691, 1692, 1697, 1698, 1699, 1703, 1704, 1705. Mr. Townley, in Lancaſhire, in 1697, 1698. Mr. Cunningham, at Emin in China, for the years 1698, 1699, 1700, 1701. Mr. Locke, at Oats in Eſſex, 1692. Dr. Scheuchzer, at Zurich, in 1708; and Dr. Tilly, at Piſa, the ſame year. See the Phil. Tranſactions.

The form of Dr. Derham's obſervations we give as a ſpecimen of a journal of this kind; obſerving that he notes the ſtrength of the winds, by 0, 1, 2, 3, &c. and the quantity of rain, as it fell through a tunnel, in pounds and centeſimals.

Phenomena of the Weather, October 1697.

Day.	Hour	Weather.	Wind.		Barometer.		Rain.
27	7	Fair.	S. W.	2	29	37	1 52
	12	Rain.	S. W. by W.	5	29	34	
	9	Stormy.		0	29	88	0 29

We have ſeveral ſchemes for keeping meteorological *journals* or diaries of the *weather*, extant in the Philoſophical Tranſactions, the Medical Eſſays of Edinburgh, and in other books. The Ephemerides Ultrajectinæ may alſo be conſulted. The inſtruments requiſite for ſuch journal, are a barometer, thermometer, anemoſcope, and ombrometer, which ſee in their proper places.

As a ſpecimen of the uſe of ſuch hiſtories, we ſhall add ſome general remarks, drawn from them by Dr. Derham; and, 1. That foggy *weather* makes the mercury riſe in the barometer, as well as the north wind. The cauſe, he ſuggeſts, probably enough, to be the acceſſion of the load of vapour to the former weight of the atmoſphere. *Miſling weather* he likewiſe obſerves to have the like effect.

2. The cold and heats in England and Switzerland begin and end nearly about the ſame time: nay, and any remarkable *weather*, eſpecially if it continue any while, affects one place as well as the other.

3. That the remarkably cold days in June, anno 1708, were found, in Switzerland, to precede ours, commonly by about five days, or more; and that the remarkable heats in the following months began to abate in both places about the ſame time; only ſomewhat ſooner here than there.

4. That though the winds in both places frequently agree, yet they oftener differ.

5. That the barometer is always lower at Zurich than at Upminſter, by ſometimes one, and ſometimes above two Engliſh inches; but the common difference is about half an inch. Which may be ſolved either by ſuppoſing Zurich ſituate one-fourth of a mile higher above the level of the ſea than Upminſter; or elſe, by ſuppoſing that part of the terraqueous globe, as lying nearer the line, to be higher, and more diſtant from the centre than ours is, which lies nearer the pole.

6. That the barometers generally riſe and fall together at far diſtant places: though this agreement of the barometer is not ſo conſtant between Zurich and Upminſter, as in places nearer home; viz. at London and Paris; where, again, the agreement is not ſo great as between Upminſter and Lancaſhire.

7. That the variations of the barometer are greateſt, as the places are neareſt the pole. Thus, e. gr. the mercury at London has a greater range by two or three lines than at Paris; and at Paris, a greater than at Zurich. In ſome places near the equinoctial, there is ſcarce any variation at all. See Barometer.

8. That the rain in Switzerland and Italy is much greater in quantity, throughout the year, than that in Eſſex, yet the rains are more frequent, i. e. there are more rainy days, in Eſſex, than at either of thoſe places. For the proportion of the annual rains that fall in ſeveral places and ſeaſons, ſee Rain.

9. That cold contributes greatly to rain; and that, apparently, by condenſing the ſuſpending vapours, and making them deſcend. Thus, very cold months, or ſeaſons,

ſons, are generally followed immediately by very rainy ones; and cold ſummers are always wet ones.

10. That high ridges of mountains, as the Alps, and the ſnows with which they are covered, not only affect the neighbouring places by the cold, rains, vapours, &c. they produce; but even diſtant countries, as England, often partake of their effects. Thus, the extraordinary colds, December 1708, and the relaxations thereof, were felt in Italy and Switzerland, ſeveral days before they reached us; an indication, Dr. Derham thinks, that they were derived from them to us. See a collection of ingenious obſervations, and meteorological conjectures by Dr. Franklin, in his Experiments, &c. p. 182, &c. See EVAPORATION, RAIN, and WIND.

WEATHER, *prognoſtics of the.* We do not here mean to obtrude the idle, arbitrary obſervations of fanciful people upon our readers. That cloud of popular predictions from the brute world, which partly the ſagacity, and partly the credulity, of our countrymen have eſtabliſhed, we ſet aſide; as not flowing from any natural, neceſſary relations, that we know of, in the things themſelves. Such is the foretelling of rain and wind from water-fowls flocking to land, or land-fowls to the water; from birds pruning their feathers, geeſe cackling, crows cawing loud, and flying in companies, ſwallows chattering, and flying low, peacocks crying much, aſſes braying, deer fighting, foxes and wolves howling, fiſhes playing, ants and bees keeping within-doors, moles caſting up earth, earthworms creeping out, &c. We ſhall offer nothing on this head, but what has ſome viſible foundation in the nature of things; and which lets ſome light into the cauſe and reaſon of the *weather* itſelf, or diſcovers ſome notable effects thereof.

1. Then, *a thick, dark ſky, laſting for ſome time, without either ſun or rain, always becomes firſt fair, then foul,* i. e. it changes to a fair clear ſky, before it turns to rain. This, the rev. Mr. Clarke obſerved, who kept a regiſter of the *weather* for thirty years, ſince put into Dr. Derham's hands by his grandſon the learned Dr. Samuel Clarke: he ſays, he ſcarce ever knew it to fail; at leaſt, when the wind was in any of the eaſterly points; but Dr. Derham has obſerved the rule to hold good, be the wind where it will. And the cauſe is obvious. The atmoſphere is replete with vapours, which, though ſufficient to reflect and intercept the ſun's rays from us, yet want denſity to deſcend; and while the vapours continue in the ſame ſtate, the *weather* will do ſo too. Accordingly, ſuch *weather* is generally attended with moderate warmth, and with little or no wind to diſturb the vapours, and a heavy atmoſphere to ſuſtain them; the barometer being commonly high. But when the cold approaches, and, by condenſing, drives the vapours into clouds or drops, then way is made for the ſun beams; till the ſame vapours, being by farther condenſation formed into rain, fall down in drops.

2. *A change in the warmth of the* weather *is generally followed by a change in the wind.* Thus, the northerly and ſoutherly winds, commonly eſteemed the cauſes of cold and warm *weather*, are really the effects of the cold or warmth of the atmoſphere; of which Dr. Derham aſſures us he has had ſo many confirmations, that he makes no doubt of it. Thus, it is common to ſee a warm ſoutherly wind ſuddenly changed to the north, by the fall of ſnow or hail; or to ſee the wind, in a cold froſty morning, north, when the ſun has well warmed the earth and air, wheel towards the ſouth; and again turn northerly or eaſterly in the cold evening.

3. *Moſt vegetables expand their flowers and down in ſunſhiny* weather; *and towards the evening, and againſt rain, cloſe them again; eſpecially at the beginning of their flowering, when their ſeeds are tender and ſenſible.* This is viſible enough in the down of dandelion, and other downs; and eminently in the flowers of pimpernel; the opening and ſhutting of which, Gerard (Herb. lib. ii.) obſerves, are the countryman's *weatherwiſer*, whereby he foretels the *weather* of the following day. The rule is, if the flowers be cloſe ſhut up, it betokens rain, and foul *weather*: if they be ſpread abroad, fair *weather*.

Eſt & alia (arbor in Tylis) *ſimilis, folioſior tamen, roſeique floris; quem noctu comprimens, aperire incipit ſolis exortu, meridie expandit. Incolæ dormire eum dicunt.* Plin. Nat. Hiſt. lib. xii. cap. 11.

The ſtalk of trefoil, lord Bacon obſerves, ſwells againſt rain, and grows more upright: and the like may be obſerved, though not ſo ſenſibly, in the ſtalks of moſt other plants. He adds, that in the ſtubble-fields there is found a ſmall red flower, called by the country people *pimpernel*; which, opening in a morning, is a ſure indication of a fine day. See *Sleep of* PLANTS, and VIGILIÆ *florum*.

That vegetables ſhould be affected by the ſame cauſes that affect the *weather*, is very conceivable; if we conſider them as ſo many hygrometers, and thermometers, conſiſting of an infinite number of tracheæ, or air-veſſels; by which they have an immediate communication with the air, and partake of its moiſture, heat, &c. Theſe trachææ are very viſible in the leaf of the ſcabioſe, vine, &c.

Hence it is, that all wood, even the hardeſt and moſt ſolid, ſwells in moiſt *weather*; the vapours eaſily inſinuating into the pores thereof; eſpecially of that which is lighteſt and drieſt. And hence we derive a very extraordinary uſe of wood, viz. for breaking rocks for millſtones.

The method at the quarries is this. Having cut a rock into a cylinder, they divide that into ſeveral leſs cylinders, by making holes at proper diſtances round the great one; the holes they fill with ſo many pieces of ſallow wood, dried in an oven, which, in moiſt *weather*, becoming impregnated with the humid corpuſcles of the air, ſwell; and, like wedges, break or cleave the rock into ſeveral ſtones.

Predictions of the WEATHER *from the barometer.* See BAROMETER.

As to the ſuppoſed influence of the moon upon the *weather*, ſee *Influence of the* MOON.

WEATHER, in *Sea-Language*, is uſed as an adjective, and applied by mariners to every thing lying to windward of a particular ſituation: thus, a ſhip is ſaid to have the *weather*-GAGE of another, when ſhe is farther to windward. Thus alſo, when a ſhip under ſail preſents either of her ſides to the wind, it is then called the *weather*-ſide or *weather*-board; and all the rigging and furniture ſituated thereon are diſtinguiſhed by the ſame epithet; as the *weather*-ſhrouds, the *weather*-lifts, the *weather*-braces, &c.

To WEATHER, in *Sea-Language*, is to ſail to windward of ſome ſhip, bank, or head-land.

WEATHER-*bit*, in *Sea-Language*, denotes a turn of the cable of a ſhip about the end of the windlaſs, without the knight-heads. It is uſed to check the cable, in order to ſlacken it gradually out of the ſhip, in tempeſtuous weather, or when the ſhip rides in a ſtrong current. See RING-*ropes*.

WEATHER-*boarding*, among *Carpenters*, &c. denotes the nailing up of boards againſt a wall, and ſometimes the boards themſelves when thus nailed up.

WEATHER-*cock*, or WEATHER-*vane*, a moveable vane, in form of a cock, or of other ſhape, placed on high, to be turned round according to the direction of the wind, and point out what quarter the wind blows from. See VANE.

WEATHER-*cord*. See HYGROMETER.

WEATHER, *hard-a*. See HARD.

WEATHER-*houſe* See HYGROMETER.

WEATHER-*glaſſes* are inſtruments contrived to indicate the ſtate or diſpoſition of the atmoſphere, as to heat, cold, gravity, moiſture, &c. to meaſure the changes befalling it in thoſe reſpects; and, by thoſe means, to predict the alteration of *weather*, as rains, winds, ſnow, &c.

Under the claſs of *weather-glaſſes*, are comprehended *barometers*, *thermometers*, *hygrometers*, *manometers*, and *anemometers*, of each whereof there are divers kinds: ſee their theories, conſtructions, uſes, kinds, &c. under BAROMETER, THERMOMETER, HYGROMETER, &c.

WEATHER-*quoil* or *coile*, in the *Sea Language*, is the turning of the ſhip's head about, ſo as to lie that way which her ſtern did before, without looſing any ſail, but only by bearing up the helm.

WEATHER-*ſhore*, in *Sea Language*, a name given to the ſhore lying to windward.

WEATHER-*tiling*, in *Building*, the covering of the upright ſide of a houſe with tiles.

WEATHERING, a doubling, or ſailing by a point, or place.

WEATHERING, among *Mill-wrights*. See WIND-*mill*.

The WEATHERING *of a hawk*, among *Falconers*, is the ſetting of her abroad to take the air.

WEAVER, in *Manufactures*, one who practiſes the art of WEAVING.

Perſons uſing the trade of a *weaver*, ſhall not keep a tucking or fulling-mill, or uſe dying, &c. or have above two looms in a houſe in any corporation or market-town, on pain of forfeiting 20*s*. a week: and ſhall ſerve an apprenticeſhip for ſeven years to a *weaver* or clothier, or ſhall forfeit 20*l*. &c. ſtat. 2 and 3 Ph. and M.

WEAVER's *alarm*. This contrivance is only a weight faſtened to a packthread, which is placed horizontally, ſo that in a certain time a candle may burn down to it. Then the flame of the candle ſetting fire to the thread, the weight falls, and awakens the ſleeping perſon. See Phil. Tranſ. Nº 477. ſect. 14. where we have a figure to explain the invention, which has got its name from being in frequent uſe among the *weavers*.

WEAVING, the art, or act, of working a web of cloth, ſilk, linen, or other ſtuff, on a loom, with a ſhuttle.

It is difficult to ſay, with any aſſurance, to whom we owe this admirable invention, unleſs we chooſe to aſcribe it to the ſpider, that poiſonous, but ingenious little inſect, which draws certain infinitely fine threads from its own ſubſtance through papillæ near its *anus*. See SILK.

WEAVING *of cloth*. See CLOTH.

WEAVING *of tapeſtry*, &c. See TAPESTRY, &c.

WEAVING, *ſtocking*. See STOCKINGS.

WEB, a ſort of plexus, or texture, formed of threads interwoven with each other; ſome whereof are extended in length, and called the *warp*; and others drawn acroſs them, called the *woof*.

Spider's WEB, or *Cob*-WEB, is a very delicate and wonderful plexus, which that inſect ſpins out of its own bowels; ſerving it as a ſort of toil, or net, to catch flies, &c. See SPIDER.

For the manner wherein the ſpider ſpins his *web*, the admirable mechaniſm of the parts ſubſervient thereto, and the uſes thereof, ſee SILK, and *Ductility of Spider*-WEBS *infra*.

This ſubſtance dried and powdered is eſteemed by ſome, as a good aſtringent and abſorbent.

Dr. Liſter tells us, that, attending nearly to a ſpider weaving a net, he obſerved it ſuddenly to deſiſt in the mid-work; and turning its tail to the wind, it darted out a thread, with the violence and ſtream we ſee water ſpout out of a jet: this thread, taken up by the wind, was immediately carried to ſome fathoms long; ſtill iſſuing out of the belly of the animal. By-and-by the ſpider leaped into the air, and the thread mounted her up ſwiftly. After this diſcovery, he made the like obſervation in near thirty different ſorts of ſpiders; and found the air filled with young and old, ſailing on their threads, and doubtleſs ſeizing gnats and other inſects in their paſſage: there being often manifeſt ſigns of ſlaughter, legs and wings of flies, &c. on theſe threads, as well as in their *webs* below.

Dr. Hulſe diſcovered the ſame thing about the ſame time. In a letter of Dr. Liſter to Mr. Ray, he thinks there is a fair hint of the darting of ſpiders in Ariſtotle, Hiſt. An. lib. ix. cap. 39. and in Pliny, lib. x. cap. 74. But with regard to their ſailing, the ancients are ſilent, and he thinks it was firſt ſeen by him. In another letter to Mr. Ray, dated January, 1670, ſpeaking of the height ſpiders are able to fly to, he ſays, "Laſt October, &c. I took notice, that the air was very full of *webs*; I forthwith mounted to the top of the higheſt ſteeple on the Minſter (in York) and could there diſcern them yet exceeding high above me."

Ductility of Spider-WEBS. M. Reaumur obſerves, that the matter whereof ſpiders and ſilk-worms form their threads, is brittle when in the maſs, like dry gums. As it is drawn out of their bodies, it aſſumes a conſiſtence, much as glaſs-threads become hard, as they recede from the lamp; though from a different cauſe. The ductility of this matter, and the apparatus thereto, being much more extraordinary in ſpiders than in ſilk-worms, we ſhall here only conſider the former. Something alſo has already been ſaid of each under SILK.

Near the anus of the ſpider are ſix papillæ, or teats, repreſented in *Tab. Nat. Hiſt. fig.* 19. The extremities of the ſeveral papillæ are furniſhed with holes, that do the buſineſs of wire-drawers, in forming the threads. Of theſe holes, M. Reaumur obſerves, there are enough in compaſs of the ſmalleſt pin's-head, to yield a prodigious quantity of diſtinct threads. The holes are perceived by their effects: take a large garden-ſpider ready to lay its eggs, and applying the finger on a part of its papillæ, as you withdraw that finger, it will take with it an amazing number of different threads. M. Reaumur has often counted ſeventy or eighty with a microſcope, but has perceived, that there were infinitely more than he could tell. In effect, if he could ſay, that each tip of a papilla furniſhed a thouſand, he is perſuaded, he ſhould ſay much too little. The part is divided into an infinity of little prominences, like the eyes of a butterfly, &c. each prominence, no doubt, makes its ſeveral threads; or rather, between the ſeveral protuberances, there are holes that give vent to threads; the uſe of the protuberances, in all probability, being to keep the threads at their firſt exit, before they are yet hardened by the air, aſunder. In ſome ſpiders thoſe protuberances are not ſo ſenſible; but in lieu thereof there are tufts of hair, which may ſerve the ſame office, viz. to keep the threads a-part. Be this as it will, there may threads come out at above a thouſand different places in every papilla; conſequently, the ſpider having ſix papillæ, has holes for above ſix thouſand threads. It is not enough that theſe apertures are immenſely ſmall: but the threads are already formed before they arrive at the papilla, each of them having its little ſheath, or duct, in which it is brought to the papilla from a conſiderable diſtance.

M. Reaumur traces them up to their ſource, and ſhews the mechaniſm with which they are made. Near the origin of the belly, he finds two little ſoft bodies, which are the firſt ſource of the ſilk. Their form and tranſparency reſemble thoſe of glaſs-beads (ſee *fig.* 20.) by which name we ſhall hereafter denote them. The tip of each bead, as R, goes winding, and makes an infinity of turns, and returns towards the papilla. From the baſe, or root of the bead, proceeds another branch much thicker; which winding variouſly, forms ſeveral knots, and takes its courſe like the other, towards the hind part of the ſpider. In theſe beads and their branches, is contained a matter proper to form the ſilk, only that it is too ſoft. The body of the bead is a kind of reſervoir, and the two branches two canals proceeding from it. A little farther backwards, there are two other leſſer beads, which only ſend forth one branch a-piece, and that from the tip. Beſide theſe, there are three other larger veſſels on each ſide of the ſpider, which M. Reaumur takes for the laſt reſervoirs, where the liquor is collected. They are repreſented (*fig.* 21.) The biggeſt is near the head of the inſect, and the leaſt near the anus. They all terminate in a point; and from the three points of theſe three reſervoirs it is, that the threads, at leaſt the greateſt part of the threads drawn out at the three papillæ, proceed. Each reſervoir ſupplies one papilla. Laſtly, at the roots of the papillæ, there are diſcerned ſeveral fleſhy tubes: probably, as many as there are papillæ. Upon lifting up the membrane, or pellicle, that ſeems to cover theſe tubes, they appear full of threads, all diſtinct from each other, and which, of conſequence, under a common cover, have each their particular one; being kept like knives in ſheaths. The immenſe quantity of threads contained here, M. Reaumur concludes, upon tracing their courſe, does not wholly come from the points of the reſervoirs; but ſome from all the turns, and angles; nay, probably, from every part thereof. But by what conveyances the liquor comes into the beads, and out of the beads into the reſervoirs, remains yet to be diſcovered.

We have already obſerved, that the tip of each papilla may give paſſage to above a thouſand threads; yet the diameter of that papilla does not exceed a ſmall pin's-head: but we were there only conſidering the largeſt ſpiders.

If we examine the young growing ſpiders produced by thoſe, we ſhall find, that they no ſooner quit their egg, than they begin to ſpin. Indeed their threads can ſcarce be perceived; but the *webs* may: they are frequently as thick, and cloſe, as thoſe of houſe-ſpiders; and no wonder: there being often four or five hundred little ſpiders concurring to the ſame work. How minute muſt their holes be? the imagination can ſcarce conceive that of their papillæ! The whole ſpider is, perhaps, leſs than a papilla of the parent which produced it.

This is eaſily ſeen: each big ſpider lays four or five hundred eggs; theſe eggs are all wrapped up in a bag; and as ſoon as the young ones have broke through the bag, they begin to ſpin. How fine muſt their threads at this time be!

Yet is not this the utmoſt nature does: there are ſome kinds of ſpiders ſo ſmall at their birth, that they are not viſible without a microſcope. There are uſually found an infinity of theſe in a cluſter, and they only appear like a number of red points. And yet there are *webs* found under them, though well nigh imperceptible. What muſt be the tenuity of one of theſe threads; the ſmalleſt hair muſt be to one of theſe what the moſt maſſive bar is to the fineſt gold-wire.

The matter whereof the threads are formed, we have obſerved, is a viſcid juice. The beads are the firſt receptacles where it is gathered, and the place where it has the leaſt conſiſtence. It is much harder when got into the ſix great reſervoirs, whither it is carried by canals from the former: this conſiſtence it acquires in good meaſure in its paſſage; part of the humidity being diſſipated in the way, or ſecreted by parts deſtined for that purpoſe.

Laſtly, the liquor is dried ſtill farther, and becomes thread, in its progreſs though the reſpective canals to the papillæ. When theſe firſt appear out at the holes, they are ſtill glutinous; ſo that ſuch as ſpring out of neighbouring holes, ſtick together. The air completes the drying.

By boiling the ſpider, more, or leſs, the liquor is brought to a greater or leſs conſiſtence, fit to draw out into threads; for it is too fluid for that purpoſe while yet incloſed in its reſervoirs.

The matter contained in theſe reſervoirs, when well dried, appears a tranſparent gum, or glue, which breaks when much bent: like glaſs, it only becomes flexible by being divided into the fineſt threads. And probably it was on this account nature made the number of holes ſo immenſe. The matter of ſilk formed in the bodies of ſpiders being much more brittle than that formed in ſilk-worms, needed to be wound ſmaller. Otherwiſe we do not conceive, why ſhould they form a great number of threads, which were afterwards to be re-united: a ſingle canal might elſe have done.

WEB-*caſe*. See CHRYSALIS.

WEB, *pin and*. See PANNUS.

WEDGE, *cuneus*, in *Mechanics*, the laſt of the five powers, or ſimple machines.

The *wedge* is a triangular priſm, whoſe baſes are iſoſceles acute-angled triangles.

Authors are divided about the principle whence the *wedge* derives its power.

Ariſtotle conſiders it as two levers of the firſt kind, inclined toward each other, and acting oppoſite ways. Guido Ubaldus, Merſennus, &c. will have them levers of the ſecond kind. But Fr. de Lanis ſhews, that the *wedge* cannot be reduced to any lever at all.

Others refer the *wedge* to the inclined plane. Others, again, with De Stair, deny the *wedge* to have ſcarce any force at all; and aſcribe much the greateſt part to the mallet that drives it.

Its doctrine (according to ſome writers) is contained in this propoſition. "If a power be applied to a *wedge*, in "ſuch manner, as that the line of direction C D (*Tab.* "VII. *Mechanics*, *fig.* 116.) perpendicular to A B, is to "the reſiſtance to be overcome, as A B to C D; the "power will be equal to the reſiſtance."

Or thus: "If the power directly applied to the head of "the *wedge*, be to the reſiſtance to be overcome by the "*wedge*, as the thickneſs of the *wedge* is to its height; "then the power will be equivalent to its reſiſtance; "and, if increaſed, will overcome it."

In proof of this propoſition, they alledge, that the firmneſs whereby the parts of the obſtacle, ſuppoſe wood, adhere to one another, is the reſiſtance to be overcome by the *wedge*: and that while the *wedge* is driven into the wood, the way or length it has gone is B H (*fig.* 117.); and D C is the way or length gone in the ſame time, by the impediment; that is, the parts C and D of the wood are ſo far divided aſunder: and according as the *wedge* is driven down farther and farther along its height; ſo the parts C and D of the wood are divided more and more, along the thickneſs of the *wedge*.

But Dr. Deſaguliers has proved, that, when the reſiſtance acts perpendicularly againſt the ſides of the *wedge*, the power is to the whole reſiſtance as the length of both ſides of the *wedge*, taken together, is to the thickneſs of its back.

According to the preceding theory, if the thickneſs of the *wedge* (that is, the way of the impediment, and conſequently its velocity) be to the height of the *wedge* (that is, the way, and conſequently the velocity of the power) as the power to the impediment, or reſiſtance; then the momentum of the power, and the impediment, will be equal the one to the other: and conſequently the power, being increaſed, will overcome the reſiſtance.

Hence, 1. The power equivalent to half the reſiſtance, is to it as A C to D C, (*fig.* 116.) that is, as the whole ſine to the co-tangent of half the angle of the *wedge* A D C. And 2. As the tangent of a leſs angle is leſs than that of a greater, the power muſt have a greater proportion to half the reſiſtance, if the angle be greater than if leſs: conſequently, the acuter the *wedge* is, the more does it increaſe the power.

The above proportion is adopted by Wallis (Op. Math. vol. i. p. 1016.) Keil (Int. ad Ver. Phyſ.) and s'Graveſande (El. Math. lib. i. cap. 14.); but s'Graveſande, in his Scholium de ligno findendo (ubi ſupra), obſerves, that when the parts of the wood are ſeparated before the *wedge*, the force by which it is thruſt in is to the reſiſtance of the wood as a line, drawn from a point in the middle of the baſe to the ſide of the *wedge*, and at right angles with the ſide of the ſeparated wood continued, to the height of the *wedge*; but when the parts of the wood are ſeparated no farther than the *wedge* is driven in, the equilibrium will be, when the power is to the reſiſtance as the half baſe of the *wedge* to its ſide.

To this method of eſtimating the power of the *wedge* it has been objected that, by allowing each part of the weight to have moved through a ſpace equal to half the back of the *wedge*, whilſt the power has moved though its height, and the whole weight to have moved through a ſpace equal to the whole back, the whole is made to move farther than its parts.

M. Muſchenbroeck ſtates the proportion of the power to the weight in a ſimple *wedge*, or half the *wedge* (*fig.* 116) biſecting it by a plane paſſing through C D, as its back is to its length, or in that caſe as A C to C D: and in a double *wedge* or the *wedge* ABD, as A B to 2CD. Int. ad Phil. vol. i. p. 132.

Mr. Ferguſon eſtimates the power of the *wedge*, in the two caſes mentioned by s'Graveſande, in the following manner. When the wood does not cleave at any diſtance before the *wedge*, there will be an equilibrium (he ſays) between the power impelling the *wedge* downward, and the reſiſtance of the wood acting againſt the two ſides of the *wedge*, if the power be to the reſiſtance as half the thickneſs of the *wedge* at its back is to the length of either of its ſides: and if the power be increaſed ſo as to overcome the friction of the *wedge*, and the reſiſtance ariſing from the coheſion or ſtickage of the wood, the *wedge* will be drove in, and the wood ſplit aſunder.

But when the wood cleaves at any diſtance before the *wedge* (as it generally does) the power impelling the *wedge* will be to the reſiſtance of the wood as half its thickneſs is to the length of either ſide of the cleft, eſtimated from the top or acting part of the *wedge*: for ſuppoſing the *wedge* to be lengthened down to the bottom of the cleft, the power will be to the reſiſtance as half the thickneſs of the *wedge* is to the length of either of its ſides; or, which amounts to the ſame thing, as the whole thickneſs of the *wedge* is to the length of both its ſides.

In proof of this proportion we may ſuppoſe the *wedge* divided lengthways into two equal parts, and then it will become two equally inclined planes; one of which, as *a b c* (*fig.* 118.) may be made uſe of as a half-*wedge* for ſeparating the moulding *c d* from the wainſcot A B. When this has been driven its whole length *a c* between the wainſcot and moulding, its ſide *a c* will be at *e d*, and the moulding will be ſeparated to *f g* from the wainſcot.

From the property of the *inclined* PLANE it appears, that to have an equilibrium between the power impelling the half-*wedge* and the reſiſtance of the moulding, the former muſt be to the latter, as *a b* to *a c*; that is, as the thickneſs of the back which receives the ſtroke is to the length of the ſide againſt which the moulding acts. Conſequently, ſince the power upon the half-*wedge* is to the reſiſtance againſt its ſide, as the half back *a b* is to the whole ſide *a c*, it is plain, that the power upon the whole *wedge* (where the whole back is double the half back) muſt be to the reſiſtance againſt both its ſides, as the thickneſs of the whole back is to the length of both the ſides, ſuppoſing the *wedge* at the bottom of the cleft; or as the thickneſs of the whole back to the length of both ſides of the cleft, when the wood ſplits at any diſtance before the *wedge*. For when the *wedge* is driven quite into the wood, and the wood ſplits at ever ſo ſmall a diſtance before its edge, the top of the *wedge* then becomes the acting part, becauſe the wood does not touch it any where elſe. And ſince the bottom of the cleft muſt be conſidered as that part where the whole ſtickage or reſiſtance is accumulated, it is plain from the nature of the lever, that the farther the power acts from the reſiſtance, the greater is the advantage.

Some writers have, indeed, advanced, that the power of the *wedge* is to the reſiſtance to be overcome, as the thickneſs of the back of the *wedge* is to the length only of one of its ſides; but this, ſays Mr. Ferguſon, ſeems very ſtrange; for, if we ſuppoſe A B (*fig.* 119.) to be a ſtrong inflexible bar of wood or iron fixed into the ground at C B, and D and E to be two blocks of marble lying on the ground on oppoſite ſides of the bar; it is evident that the block D may be ſeparated from the bar to the diſtance *d* equal to *a b*, by driving the inclined plane or half-*wedge a b o* down between them; and the block E may be ſeparated to an equal diſtance on the other ſide, in like manner, by the half-*wedge c d o*. But the power impelling each half-*wedge* will be to the reſiſtance of the block againſt its ſide, as the thickneſs of that half-*wedge* is to the length of its acting ſide. Therefore the power to drive both the half-*wedges* is to the reſiſtances, as both the half backs are to the length of both the acting ſides, or as half the thickneſs of the whole back is to the length of either ſide. And, if the bar be taken away, the blocks put cloſe together, and the two half-*wedges* joined to make one; it will require as much force to drive it down between the blocks, as is equal to the ſum of the ſeparate powers acting upon the half-*wedges* when the bar was between them. Ferguſon's Lect. p. 40, &c. 4to. See alſo Deſag. Exp. Phil. vol. i. p. 107, &c.

Mr. Ludlam, in an Eſſay on the Power of the *Wedge*, printed in 1770, propoſes, with a particular view to the machines deſcribed by s'Graveſande, Deſaguliers, and Ferguſon, for eſtimating the power of the *wedge*, to determine this power, when two equal forces act on the ſides of an iſoſceles triangle in directions parallel to the back but oppoſite to each other, and are ſuſtained by a third force acting perpendicularly on the back of the *wedge*. For this purpoſe, let ABC (*fig.* 120.) be an iſoſceles *wedge*, whoſe angular point is C, ſides AC and BC, back AB, and perpendicular height HC: let FE repreſent the quantity and direction of the force applied to one of the ſides; this may be reſolved into two other forces FD and DE, the former parallel and the latter perpendicular to the ſide AC; and the oblique force FE will have juſt the ſame effect upon the *wedge* as a leſs perpendicular force DE; the former being to the latter as AC is to HC. But this laſt perpendicular force on the ſide AC is to that on the back which balances it, as AC is to AH; whence compounding theſe ratios, the oblique force againſt one ſide of the *wedge* is to the perpendicular force on the back which balances it, as AC^2 is to $AH \times HC$. The oblique force *fe* on the other ſide of the *wedge*, being equal to FE, will require another perpendicular force on the back to balance it equal to the former perpendicular force; whence the whole force on both ſides of the *wedge* is to the whole force on the back as AC^2 is to $AH \times HC$, or as the ſquare of the ſide of the *wedge* to the rectangle under half the back and the perpendicular height.

For other methods of eſtimating the effect of the *wedge* in various caſes, ſee MECHANICAL *Powers*.

The *wedge* is a very great mechanical power, ſince not only wood but even rocks can be ſplit by it; which it would be impoſſible to effect by the lever, wheel and axle, or pulley; for the force of the blow, or ſtroke, ſhakes the cohering parts, and thereby makes them ſeparate the more eaſily.

To the *wedge* may be referred all edge-tools, and inſtruments which have a ſharp point, in order to cut, cleave, ſlit, chop, pierce, bore, or the like; as knives, hatchets, ſwords, bodkins, &c.

WEDLOCK. See MARRIAGE, WIFE, HUSBAND, &c.

WEDNESDAY, the fourth day of the WEEK, formerly conſecrated by the inhabitants of the northern nations to *Woden* or ODIN, who, being reputed the author of magic and inventor of all the arts, was thought to anſwer to the Mercury of the Greeks and Romans, in honour of whom they called the ſame day *dies Mercurii*.

WEDNESDAY, *Aſh*. See ASH-*Wedneſday*.

WEED, a common name of all rank and wild herbs, that grow of themſelves without particular culture, to the detriment of other uſeful herbs, among which they appear.

No plants are uſeleſs in themſelves; but in reſpect to the farmer they are both uſeleſs and hurtful when they come in this manner and devour the nouriſhment deſtined for the crop of what was ſown.

All *weeds* are pernicious; but ſome much more ſo than others: ſome are very miſchievous, but eaſily killed; ſome leſs hurtful, but more difficultly rooted out; and ſome have both qualities together. The hardeſt to kill are thoſe which grow readily from ſeed, and have roots, every part of which is qualified for becoming a ſtout plant in a ſmall time; the worſt are couch-graſs, colts-foot, melilot, fern, and ſome others of the like kind.

Some of theſe pernicious plants only affect the crop by imbibing its nouriſhment, and thus ſtarving, and leſſening its increaſe; but there are others which add to this miſchief, that of ſpoiling what they leave; theſe infect the crop with their own nauſeous ſmell, ſuch as melilot, garlic, and ſome others.

The farmer finds it impoſſible ever wholly to deſtroy the *weeds* in his lands; and the reaſon ſeems to be, that in many kinds the ſeeds will lie many years in the ground, and ſucceſſively grow, ſome one year, ſome another; ſo that the deſtroying of the crop entirely for one year does not kill them for ſucceeding ones. The ſeed of red poppy will lie twenty years in the ground, in a land all that time occupied by ſaintfoin: and if it be, after that, ploughed for corn, they will all grow, and fill the field.

The ſeeds of theſe plants will never all come up in one year, becauſe they muſt have their exact degrees of depth, moiſture, and covering; the ſeeds, which want any of theſe one year, lie to grow up another. The beſt defence the farmer has hitherto found againſt theſe enemies, is to endeavour their deſtruction by a ſummer fallow. This, if the weather be propitious, does make ſome havock among them, but it never deſtroys them entirely. If the ſeeds lie ſo high that the ſummer's heat parches them up, or ſo deep that it cannot reach them, they do not germinate, and are by that means preſerved for another year. And another thing, which preſerves a very great number of them, is their being able to bear the moiſture of a whole year without growing. Wild oats, and many other ſeeds of *weeds* are of this kind. If you gather theſe when ripe, and ſow them in the moſt careful manner, watering them at times, and taking all the care of them that is neceſſary for the moſt tender plants, they will not grow till the ſecond ſpring after they were ſowed, and ſometimes not till the ſpring after that; that is, two years and a half after the time of putting them into the ground. It is plain from this, that no art can deſtroy theſe by fallowing, or other means, in one year.

The common way of *weeding* among the young corn, turns out to very little good; if this is done while the *weeds* are young, moſt of them are only cut or broken off near the ground: this, inſtead of deſtroying them, gives them new vigour, and they ſhoot up with many heads in the place of one, and draw more nouriſhment than at firſt: if, on the other hand, it is done when they are grown up, the relief comes after the diſeaſe; for by that time they have robbed the corn of all the nouriſhment, or nearly all, they could.

Hand-*weeders* alſo frequently do more harm in the corn, by treading it down, than they do good by taking out the *weeds*. This operation ſometimes coſts the farmer twelve ſhillings an acre, beſide the miſchief done, and yet there remain *weeds* enough for a crop the next year from ſeeds.

The method of horſe-hoeing is a very excellent way of curing lands of this evil, ſo long as it is carefully practiſed; one of the greateſt advantages it will bring the farmer, is, that no *weeds* will grow up but thoſe whoſe ſeeds are brought in the air, and theſe are but very few in compariſon of the other kinds.

WEED, *dyer's*. See DYER'S *Weed*, *Baſtard* ROCKET, and WELD.

WEED, *Fuller's*. See TEAZEL.

WEED, *ſea*. See FUCUS.

WEED, *ſilver*, in *Botany*. See CINQUEFOIL.

WEEDS, in *Mining*, a term uſed by our Engliſh diggers to expreſs any ſort of unprofitable ſubſtance found among the ores of metals. They ſeem to have borrowed the phraſe from the gardeners; and as every thing with them is a *weed*, except what they have planted, and expect to gather, ſo every thing is a *weed* with the miners, except the thing they are ſinking for. See DIGGING.

The principal ſubſtances known in our mines under the name of *weeds*, are mundic or marcaſite; this is of three ſorts, white, yellow, and green; daze, a kind of glittering talcky ſtone, of the telaugium kind, which endures the fire, and is of various colours and hardneſſes; iron-moulds, or pyritæ; caul, which is browniſh and ſpongy; and gliſter, which is a ſort of talc. Phil. Tran. Nº 69.

WEEDS, alſo, denote a peculiar habit, worn by the relicts of perſons deceaſed, by way of mourning. See MOURNING.

WEEK, *ſeptimana*, *hebdomada*, in *Chronology*, a diviſion of time, compriſing ſeven days.

The origin of this diviſion of *weeks*, or of computing time by ſevenths, is greatly controverted. Some will have it to take its riſe from the four quarters or intervals of the moon, between her changes of phaſes, which being about ſeven days diſtant, gave occaſion to the diviſion. Be this as it will, the diviſion is certainly very ancient. The Syrians, Egyptians, and moſt of the oriental nations, appear to have uſed it from all antiquity: though it did not get footing in the Weſt till Chriſtianity brought it in: the Romans reckoned their days not by ſevenths, but by ninths; and the ancient Greeks by decads, or tenths.

Indeed, the Jews divided their time by *weeks*, but it was upon a different principle from the other eaſtern nations. God himſelf having appointed them to work ſix days, and to reſt the ſeventh, in order to keep up the ſenſe and remembrance of the creation; which being effected in ſix days, he reſted the ſeventh.

Some authors will even have the uſe of *weeks*, among the other eaſtern nations, to have proceeded from the Jews; but with little appearance of probability. It is with better reaſon that others ſuppoſe the uſe of *weeks*, among the heathens of the Eaſt, to be a remain of the tradition of the creation, which they had ſtill retained with divers others.

This is the opinion of Grotius, de Veritat. Relig. Chriſt. lib. i. who likewiſe proves, that not only throughout the Eaſt, but even among the Greeks, Italians, Celtæ, Sclavi, and even the Romans themſelves, the days were divided into *weeks*; and that the ſeventh day was in extraordinary veneration. This appears from Joſeph. adv. Apion II. Philo. de Creatione. Clem. Alexand. Strom. lib. v. Though Helmoldus, lib. i. cap. 84. Philoſtratus, lib. iii. cap. 13. Dion. lib. xxxviii. Tibullus, Lucian, Homer, Callimachus, Suetonius, Herodotus, &c. who mention the ſeptenary diviſion of days as very ancient, ſuppoſe it to have been derived from the Egyptians.

The *days of the week* were denominated by the Jews, from the order of their ſucceſſion from the ſabbath. Thus, the day next after the ſabbath, they called the *firſt* of the ſabbath; the next, the *ſecond* of the ſabbath; and ſo of the reſt; except the ſixth, which they call *paraſceve*, or preparation of the ſabbath.

The like method is ſtill kept up by the Chriſtian Arabs, Perſians, Ethiopians, &c. The ancient heathens denominated the days of the *week* from the ſeven planets; which names are ſtill generally retained among the Chriſtians of the Weſt. Thus the firſt day was called *Sun-day*, *dies ſolis*; the ſecond *Moon-day*, *dies lunæ*, &c. a practice the more natural on Dion's principle, who ſays, the Egyptians took the diviſion of the *week* itſelf from the ſeven planets.

In effect, the true reaſon of theſe denominations ſeems to be founded in aſtrology. For the aſtrologers diſtributing the government and direction of all the hours in the *week* among the ſeven planets, ♄ ♃ ♂ ☉ ♀ ☿ ☽, ſo as that the government of the firſt hour of the firſt day fell to Saturn, that of the ſecond day to Jupiter, &c. they gave each day the name of the planet, which, according to their doctrine, preſided over the firſt hour thereof; and that, according to the order ſpecified above; and which is included in the following technical verſe

Poſt SIM SUM *ſequitur*, *pallida* Luna *ſubeſt*.

Wherein, the capital letters SIM SUM, and L, are the initial letters of the planets. So that the order of the planets in the *week*, bears little relation to that in which they follow in the heavens: the former being founded on an imaginary power each planet has, in its turn, on the firſt hour of each day.

Dion. Caſſius gives another reaſon of the denomination, fetched from the celeſtial harmony. For it being obſerved, that the harmony of the diateſſaron, which conſiſts in the ratio of 4 to 3, is of great force and effect in muſic; it was judged meet to proceed directly from Saturn to the Sun; becauſe, according to the old ſyſtem, there are three planets between Saturn and the Sun, and four from the Sun to the Moon.

Our anceſtors the Saxons, before their converſion to the Chriſtian faith, named the ſeven days of the *week* from the Sun and Moon and ſome of their deified heroes, to whom they were peculiarly conſecrated, which names we received and ſtill retain: thus Sunday was devoted to the Sun; Monday to the Moon; Tueſday, according to ſome, to Tuiſto or TUISCO, mentioned by Tacitus, but, according to others, to Thyſa or Dyſa, the wife of Thor, and the goddeſs of juſtice; or, according to others, to TYR; Wedneſday to Woden, the god of war; Thurſday to Thor, who preſided over the air, and was ſuppoſed to govern the winds and clouds; this is the ſame with Lucan's Taranis, ſimilar to the Welch word for thunder; Friday to Friga or Fræa, the wife of Thor, and the goddeſs of peace and plenty; and Saturday to Seater, called alſo Orodo, to whom they prayed for protection, freedom, and concord, and for the fruits of the earth. The origin of the laſt appellation, however, is doubtful; as ſome have obſerved, that the name *Seater* is not mentioned by any writer before Verſtegan. See Verſtegan's Reſtitution of decayed Intelligence, p. 68. Junii Etym. Angl. and Mallet's North. Ant. vol. i. p. 91, &c.

To find the accompliſhment of Daniel's prophecy of the Meſſiah, the deſtruction, rebuilding, &c. of the temple, chap. ix. ver. 24, &c. the critics generally agree to underſtand *weeks of years*, inſtead of *weeks of days*.

Accordingly, Dr. Prideaux, fixing the end of theſe *weeks* at the death of Chriſt, in the year of the Julian period 4746, and in the Jewiſh month Niſan, dates their commencement in the month Niſan, in the year of the Julian period 4256, which was the very year and month in which Ezra had his commiſſion from Artaxerxes Longimanus, king of Perſia, for his return to Jeruſalem, there to reſtore the church and ſtate of the Jews. And thus he finds, that from the one period to the other, there were exactly 70 *weeks* of years, or 490 years. Connect. vol. ii. p. 381, &c.

WEEKS, *Ember*. See EMBER.

WEEKS, *Feaſt of*. See PENTECOST.

WEEK, *Paſſion*, or *the Holy* WEEK, is the laſt *week* in Lent, wherein the church celebrates the myſtery of our Saviour's death and paſſion.

This is alſo ſometimes called *the great week*. Its inſtitution is generally referred, both by Proteſtants and Papiſts, to the times of the apoſtles. All the days of that *week* were held as faſts: no work was done on them; no juſtice was diſtributed; but the priſoners were ordinarily ſet at liberty, &c. even pleaſures, otherwiſe allowed, were at this time prohibited. The oſculum charitatis was now forborn: and divers mortifications practiſed by all ſorts of people, and even the emperors themſelves.

WEEK, *Rogation*. See ROGATION.

WEEK, or WICK *of a candle*, &c. the cotton match in a candle or lamp. See CANDLE, LAMP, &c.

WEEK-*fiſh*, in *Ichthyology*, a name given by ſome to a very delicate fiſh, caught on the Eaſt Indian ſhores, and called by the Dutch there the *wit viſch*. See WIT-FISH.

WEEPING. See TEARS.

WEER. See WEAR.

WEEVER, in *Ichthyology*, the Engliſh name for the fiſh called by Willughby and other authors, the DRACO-*marinus*, or ſea-dragon.

Belon ſays, that this name is a corruption of the French *la vive*, becauſe this fiſh is capable of living long out of the water.

Mr. Pennant deſcribes another ſpecies, under the name of the *great weever*, the *draco major* or *araneus* of Salvian, which inhabits the ſea near Scarborough. Brit. Zool. vol. iii p. 171.

WEEVIL, in *Natural Hiſtory*, the name of a ſmall inſect which does great damage in magazines of corn, by eating into the ſeveral grains, and deſtroying their whole ſubſtance.

This creature is ſomewhat bigger than a large louſe, and is of the ſcarab or beetle kind, having two pretty, jointed, tufted horns, and a trunk or piercer, projecting from the fore part of its head: at the end of this trunk, which is very long in proportion to its body, there is a ſort of forceps or ſharp teeth, with which it gnaws its way into the heart of the grain, either to ſeek its food, or to depoſit its eggs there.

By keeping theſe creatures alive in glaſs tubes, with a few grains of wheat, their copulation and manner of generation have been diſcovered. The female perforates a grain of wheat, and therein depoſits a ſingle egg, or, at the utmoſt, two eggs; and this ſhe does to five or ſix grains every day for ſeveral days together. Theſe eggs, which are not larger than a grain of ſand, in about a week produce as odd a ſort of white maggot, which wriggles its body very much about, but is very little able to move from place to place: this, in about a fortnight, turns to an aurelia, from which is produced the perfect *weevil*. This deſtructive creature is itſelf very ſubject to be deſtroyed; and when in the egg or aurelia ſtate, is very ſubject to be eaten by mites. Baker's Microſ. p. 221. Leewenhoeck, tom. iv. ep. 76.

WEFT, a kind of web, or thing woven: as, a *weſt* or treſs of hair. See WEB, HAIR, TISSUE, &c.

WEIF. See WAIF.

WEIGH, WAY, or WEY, *Waga*, a weight of cheeſe, wool, &c. containing two hundred and fifty-ſix pounds avoirdupois. Of corn, the *weigh* contains forty buſhels; of barley or malt, ſix quarters.

In ſome places, as Eſſex, the *weigh* of cheeſe is three hundred pounds. See MEASURE.

Et decimam caſei ſui de Herting, *præter unam peiſam*, *quæ pertinet ad eccleſiam de A*. Mon. Angl. where *peiſa* ſeems to be uſed for a *weigh*.

Coke alſo ſpeaks of *weighs* of bay ſalt.

WEIGHER, an officer in divers cities, appointed to *weigh* the commodities bought and ſold, in a public balance, &c. Theſe *weighers* are generally obliged by oath to do juſtice to both parties; and to keep a regiſter of the things they weigh.

In Amſterdam there are twelve *weighers*, eſtabliſhed into a kind of office. As it was formerly allowed them to touch the ſtrings of the balance in *weighing*, it was eaſy for them to favour either the buyer or ſeller, according as the one gave them more money than the other. To prevent which abuſe, it was charged on them, by an ordinance of the burgomaſters, in 1719, not to touch the balance in any manner whatever.

WEIGHING, the act of examining a body in the balance, to find its *weight*.

The diſtillers in London *weigh* their veſſels when full; and for a half a hogſhead, which is thirty-one gallons and a half, allow two hundred one quarter and eleven pounds for the caſk and liquor. For a puncheon, they allow ſix hundred one quarter and two pounds; for a Canary pipe, eight hundred a half and ſeventeen pounds.

WEIGHING-*chair*, a machine contrived by Sanctorius, to determine the quantity of matter carried off from the body, and that of food taken at a meal; and to warn the feeder when he had eat his quantum.

That ingenious author, having obſerved, with many others, that a great part of our diſorders ariſes from the exceſs in the quantity of our foods, more than in the quality thereof; as alſo how much a fixed portion, once well adjuſted, would, if kept to regularly, contribute to health; bethought himſelf of an expedient to that purpoſe. The reſult was the *weighing-chair*: which was a chair fixed at one arm of a ſort of balance, wherein a perſon being ſeated at meat, as ſoon as he had eat his allowance, the increaſe of weight made his ſeat preponderate: ſo that, deſcending to the ground, he left his table victuals, and all, out of reach.

Weighing *of the air*. See Weight *of Air*.

Weighing *anchor*, in the *Sea Language*. See Anchor.

WEIGHT, *Gravity*, *Pondus*, in *Phyſics*, a quality in natural bodies, whereby they tend downwards, toward the centre of the earth. See Gravity.

Or, *weight* may be defined, in a leſs limited manner, to be a power inherent on all bodies, whereby they tend to ſome common point, called the *centre of gravity*; and that with a greater or leſs velocity, as they are more or leſs denſe, or as the medium they paſs through is more or leſs rare.

In the common uſe of language, *weight* and *gravity* are conſidered as one and the ſame thing. Some authors, however, make a difference between them; and hold *gravity* only to expreſs a *niſus*, or endeavour to deſcend; but *weight* an actual deſcent.

But there is room for a better diſtinction. In effect, one may conceive gravity to be the quality, as inherent in the body; and *weight*, the ſame quality, exerting itſelf, either againſt an obſtacle, or otherwiſe.

Hence, *weight* may be diſtinguiſhed, like gravity, into *abſolute* and *ſpecific*.

Sir Iſaac Newton demonſtrates, that the *weights* of all bodies, at equal diſtances from the centre of the earth, are proportionable to the quantities of matter each contains. Whence it follows, that the *weights* of bodies have not any dependence on their forms or textures; and that all ſpaces are not equally full of matter.

Hence alſo it follows, that the *weight* of the ſame body is different, on the ſurface of different parts of the earth; becauſe its figure is not a ſphere, but a ſpheroid.

The law of this difference the ſame author gives in the following theorem. "The increaſe of *weight*, as "you proceed from the equator to the poles, is, nearly, "as the verſed ſine of double the latitude; or, which "amounts to the ſame, as the ſquare of the right ſine "of the latitude."

Therefore, ſince the latitude of Paris is $48^\circ\ 50'$; that of a place under the equator $00^\circ\ 00'$; and that of a place under the pole $90^\circ\ 00'$; and the verſed ſines of the double latitudes are 11334,00000 and 20000, the radius being 10000; and the *weight* at the pole is to the *weight* at the equator, as 230 to 229; and the exceſs of *weight* at the pole to that at the equator, as 1 to 229: the exceſs of gravity in the latitude of Paris, to that under the equator will be as $1 \times \frac{11334}{20000}$ to 229, or as 5667 to 2290000; and therefore, the whole *weights*, in thoſe places, will be to each other as 2295667 to 2290000.

Hence, alſo, as the lengths of pendulums that perform their vibrations in equal times, are as their *weights*; and the length of a pendulum, which in the latitude of Paris vibrates ſeconds, is three Paris feet and eight lines $\frac{5}{9}$; the length of a pendulum, that vibrates ſeconds under the equator, will be ſhort of a ſynchronous pendulum at Paris, by one line, and an 87000th part of a line. Phil Nat. Princ. Math. lib. iii. prop. 20. apud Opera Ed. Horſl. tom. iii. p. 43, &c.

A body immerged in a fluid ſpecifically lighter than itſelf, loſes ſo much of its *weight*, as is equal to the *weight* of a quantity of the fluid of the ſame bulk with itſelf.

Hence, a body loſes more of its *weight* in a heavier than in a lighter fluid; and therefore weighs more in a lighter, than a heavier fluid. See *Specific* Gravity.

To find the weight *of any quantity of a fluid*, e. g. of the wine contained in a hogſhead. Find the bulk or quantity of the liquor by the rules of Gauging.

Suſpend a cubic inch of lead therein by a horſe-hair; and by a balance note the *weight* loſt. This will be the *weight* of a cubic inch of the fluid.

Wherefore, ſince in a homogeneous fluid, the *weight* is proportionable to the bulk; the *weight* of the fluid will be found by the rule of three. Thus, if the wine gallon contains 224 cubic inches, and conſequently the capacity of the hogſhead be 14112 cubic inches, or 8,1 cubic feet, and the cubic inch of red wine be 10 pennyweights 11,42 grains, and therefore the cubic foot of wine contains 75,42 pounds: the whole *weight* of the wine will be 610,292 or nearly 611 pounds. See *Cubic* Measures, and *Specific* Gravity.

The *weight* of a cubic foot of water has been determined by ſeveral: but as in different ſprings, &c. the *weight* of the water is different, and there is even a difference in the ſame water at different times; it is no wonder the obſervations of the ſeveral authors ſhould be found very different. Dr. Wiberd, by repeated experiments, found a cubic foot of water to weigh 76 pounds troy.

In the Philoſophical Tranſactions (Nº 458. p. 457, &c.) we have an account of the analogy betwixt Engliſh *weights* and meaſures by Mr. Barlow. He advances, that anciently a cubic foot of water was aſſumed as a general ſtandard for liquids, and weighed 62 pounds and a half. This cubic foot multiplied by 32, gives two thouſand, the *weight* of a ton. And hence 8 cubic feet of water made a hogſhead, and four hogſheads a ton, in capacity and denomination, as well as *weight*.

Dry meaſures were raiſed on the ſame model. A Bushel of wheat, aſſumed as a general ſtandard for all ſorts of grain, alſo weighed 62 pounds and a half. Eight of theſe buſhels made a quarter, and 4 quarters a ton *weight*. Coals were ſold by the Chaldron, ſuppoſed to weigh a ton; or 2000 pounds.

Hence a ton in *weight* is the common ſtandard for liquids, wheat, and coals. If this analogy had been kept up, it would have prevented the confuſion now complained of.

It may be reaſonably ſuppoſed that corn and other commodities, both dry and liquid, were firſt ſold by *weight*, and that meaſures, for convenience, were afterwards introduced, bearing ſome analogy to the weights before uſed.

Mr. Barlow's ſcheme ſhews the reaſon why the word *ton* is applied both to *weight* and liquid meaſure, viz. becauſe the ſame quantity of liquor is a ton, both in *weight* and meaſure. Hence the word *quarter* may alſo be explained. Biſhop Fleetwood (Chron. Pret. p. 72) gueſſed that it ſignified the fourth part of ſome *weight*, and not of any meaſure. And it ſeems plainly to ſignify the fourth part of a ton, or 2000 pounds. Phil. Tranſ. Abr. vol. ix. p. 489.

Weight, *pondus*, in *Mechanics*, is any thing to be raiſed, ſuſtained, or moved by a machine; or any thing that in any manner reſiſts the motion to be produced. See Motion, &c.

In all machines, there is a natural ratio between the *weight* and the moving power. If the *weight* be increaſed, the power muſt be ſo too; that is, the wheels, &c. are to be multiplied, and ſo the time increaſed, or the velocity diminiſhed.

"The centre of gravity F. (*Tab.* VII. *Mechanics*, *fig.* "121.) of a body I H, together with the *weight* of the "body, being given; to determine the point M, in "which, lying on a horizontal plane, a given *weight* G, "hung in L, cannot remove the body I H out of its horizontal ſituation."

Conceive a *weight* hung in the centre of gravity F, equal to the *weight* of the whole body I H, and find the common centre of gravity M, of that and the given *weight* G. If the point M be laid on the horizontal plane; the *weight* G will not be able to move the body H I out of its place.

"The centre of gravity C (*fig.* 122.) of a body A B, "together with its *weight* G, being given; to determine "the points L and M, wherein props M N and L O are "to be placed, that each may bear any given proportion "of the *weight*."

In the horizontal line A B, paſſing through the centre of gravity C, aſſume the right lines M C and C L in the given ratio. Props, then, M N, L O, placed in theſe points, will be preſſed in the given ratio.

Hence, if in the points M, L, in lieu of props, you place the ſhoulders or arms of porters, &c. they will be able to bear the burden alike; if their ſhares be proportioned to their ſtrengths. Thus we have a way of diſtributing a burden in any given ratio.

Weight *of the atmoſphere*. See Atmosphere.

Weight, in *Commerce*, denotes a body of a known *weight* appointed to be put in the balance againſt other bodies, whoſe *weight* is required.

Theſe *weights* are uſually of lead, iron, or braſs; though in divers parts of the Eaſt Indies they are common flints, and, in ſome places, a ſort of little beans.

The ſecurity of commerce depending, in good meaſure, on the juſtneſs of theſe *weights*, there is ſcarce any nation that has not taken proper meaſures to prevent the falſification thereof. The ſureſt means are the ſtamping, or marking of them by proper officers, from ſome original or ſtandard, depoſited where recourſe may be had to them.

This expedient is very ancient; and many authors are of opinion, that what among the Jews was called Shekel *of the* Sanctuary, was not any particular kind of *weight* different from the common one; but a ſtandard original *weight*, preſerved by the prieſts in the ſanctuary.

Thus, alſo, in England, the ſtandard of *weights* is kept in the exchequer, by a particular officer, called the Clerk, or *comptroller of the* Market. In France, the ſtandard *weight* is kept under ſeveral keys, in the cabinet of the cour de monnoyes. See STANDARD, and MEASURE.

Moſt nations wherein there is any thing of commerce flouriſhing, have their particular *weights*: and even ſometimes different *weights* in the different provinces, and for the different kinds of commodities.

This diverſity of *weights* makes one of the moſt perplexing articles in commerce; but it is irremediable. The reducing of the weights of different nations to one, is not only impracticable, but even the reduction of thoſe of the ſame nation: witneſs thoſe vain attempts made for reducing the *weights* in France, by ſo many of their kings, Charlemagne, Philip the Long, Louis XI. Francis I. Henry II. Charles IX. Henry III. Louis XIV.

Weights may be diſtinguiſhed into *ancient* and *modern*, *foreign* and *domeſtic*.

Modern WEIGHTS, *uſed in the ſeveral parts of Europe, and the Levant.*

WEIGHTS, *Engliſh*. By the twenty-ſeventh chapter of *Magna Charta*, the *weights* are to be the ſame all over England (ſee MEASURE); but for different commodities there are two different ſorts, viz. *troy weight*, and *avoirdupoiſe weight*.

The origin from which they are both raiſed is the grain of wheat, gathered in the middle of the ear: 32 of theſe well dried make one penny-weight, 20 penny-weights 1 oz. and 12 oz. 1 lb. troy, ſtat. 51 Hen. III. 31 Edw. I. 12 Hen. VII.

A learned writer has ſhewn that, by the laws of aſſiſe, from William the Conqueror to the reign of Henry VII the legal pound *weight* continued a pound of 12 ounces, raiſed from 32 grains of wheat; and the legal gallon meaſure invariably contained 8 of thoſe pounds of wheat, 8 gallons made a buſhel, and 8 buſhels a quarter.

Henry VII. altered the old Engliſh *weight*, and introduced a pound, under the name of troy, which exceeded the old Saxon pound by $\frac{3}{4}$ of an ounce: in proof of this it is alledged that Henry VIII. when he aboliſhed the old pound in the eighteenth of his reign, and eſtabliſhed the troy, declares that the troy pound exceeded the old pound by $\frac{3}{4}$ of an ounce.

This troy pound, now in uſe, conſiſting of 12 ounces, contains 5760 troy grains, and the ounce therefore contains 480 grains; conſequently 360 grains, equal to $\frac{3}{4}$ of the ounce, deducted from 5760, leave 5400 troy grains, equal to the *weight* of the old Saxon pound which he aboliſhed. It appears, therefore, that the old Saxon pound was $\frac{540}{576}$ of the preſent troy pound, and, as the avoirdupois pound of 16 ounces contains 7000 troy grains, the old Saxon pound was $\frac{54}{70}$ of the preſent avoirdupois pound.

Moreover, it appears, that the braſs buſhel of Henry VII. found in the exchequer in 1688, contained 2145 cubic inches; and it is known by experiment, that 1728 cubic inches of wheat will weigh $58\frac{17}{576}$ pounds troy; and, therefore, 1728 cubic inches : 2145 cubic inches :: $58\frac{17}{576}$ pounds troy : 72 pounds troy, the *weight* of wheat contained in Henry VII.'s buſhel. And dividing 72 by 8, the number of pounds limited by the ſtatute to a gallon, his buſhel appears to have been a meaſure of 9 gallons inſtead of 8; and as 8 buſhels made a quarter, the quarter contained 72 gallons. Now if we divide 2145 by 9, the gallon will appear to contain $238\frac{1}{3}$ cubic inches, i. e. $\frac{1}{16}$th part more than the old Saxon gallon of 224 cubic inches; juſt as the troy pound is $\frac{1}{16}$th part heavier than the old Saxon pound.

Although formerly 32 grains made a penny-weight, it has in later times been thought ſufficient to divide the penny-weights into 24 equal parts called grains, being the leaſt *weights* now in common uſe.

The firſt ſtatute that directs the uſe of the avoirdupois *weight* is that of 24 Henry VIII. which plainly implies it was no legal *weight*, till that ſtatute gave it a legal ſanction; and the particular uſe to which the ſaid *weight* is thus directed, is ſimply for weighing butchers meat in the market. How or when it came into private uſe is not clearly known. Phil. Tranſ. vol. lxv. part i. art. 3. See the following tables.

Table of *Troy Weight*, as uſed by the

Goldſmiths, &c.

Grains.			
24	Penny-weight.		
480	20	Ounce.	
5760	240	12	Pound.

Apothecaries.

Grains.				
20	Scruple. ℈			
60	3	Dram. ʒ		
480	24	8	Ounce. ℥	
5760	288	96	12	Pound.

By troy *weight* are weighed jewels, gold, ſilver, ſilk, and all liquors.

We may here obſerve, that a troy pound of gold is worth 46*l.* 14*s.* 6*d.*; for $44\frac{1}{2}$ guineas are coined from each pound at the mint: a troy ounce is worth 3*l.* 17*s.* 10*d*$\frac{1}{2}$ and a grain is worth 1 penny $3\frac{7875}{10000}$ farthings, in coinage ſtandard.

A troy pound of ſilver (coinage ſtandard) is worth 3*l.* 2*s.* an ounce is worth 5*s.* 2*d.* a penny-weight is worth 3*d.* and $\frac{4}{10}$th parts of a farthing: and a grain is worth about half a farthing. See Tables under MONEY and STANDARD.

The troy pound in Scotland, which by ſtatute is to be the ſame as the French pound, is commonly ſuppoſed equal to 15 ounces and three quarters troy Engliſh *weight*, or 7560 grains. But by a mean of the ſtandard kept by the dean of gild of Edinburgh, it weighs $7599\frac{2}{12}$ or 7600 grains.

Table of *Avoirdupois Weight*.

Drams.					
16	An Ounce.				
256	16	A pound.			
7168	448	28	A quarter.		
28672	1792	112	4	A hundred.	
573440	35840	2240	80	20	A ton.

By this *weight* are weighed all coarſe and heavy goods, as pitch, tar, roſin, tallow, &c. copper, tin, &c. fleſh, butter, &c. and alſo bread by 31 Geo. II. cap. 29 and all grocery wares: and Dr. Ward ſuppoſes that from this uſe of it it was firſt introduced; as it was cuſtomary to allow larger weight of ſuch goods than the law had expreſly enjoined, and this, he ſays, happened to be about a ſixth part more.

Mr. Ferguſon (Lect. on Mech. p. 100. 4to.) has given the following compariſon between troy *weight* and avoirdupois *weight*, with the two tables for ſhewing how much of either of theſe *weights* is contained in any quantity of the other.

175 troy pounds are equal to 144 avoirdupois pounds.
175 troy ounces are equal to 192 avoirdupois ounces.
1 troy pound contains 5760 grains.
1 avoirdupois pound contains 7000 grains.
1 avordupois ounce contains $437\frac{1}{2}$ grains.
1 avoirdupois dram contains 27.34375 grains.
1 troy pound contains 13 oz. 2.651428576 drams avoirdupois.
1 avoirdupois pound contains 1 lb. 2 oz. 11 penny-weights 16 gr. troy.

A Table for reducing Troy Weight *into Avoirdupois* Weight.

Troy weight.		Avoirdupois.			Troy weight.		Avoirdupois.
		lb.	oz.	dr.			Drams.
Pounds	4000	3291	6	13.68	Penny-wts.	19	16.67
	3000	2528	9	2.26		18	15.79
	2000	1645	11	6.84		17	14.92
	1000	822	13	11.42		16	14.04
	900	740	9	2.28		15	13.16
	800	658	4	9.14		14	12.28
	700	576	0	0.00		13	11.41
	600	493	11	6.85		12	10.53
	500	411	6	13.71		11	9.65
	400	329	2	4.57		10	8.78
	300	246	13	11.42		9	7.90
	200	164	9	2.28		8	7.02
	100	82	4	9.15		7	6.14
	90	74	0	13.62		6	5.26
	80	65	13	4.11		5	4.39
	70	57	9	9.60		4	3.51
	60	49	5	15.08		3	2.63
	50	41	2	4.57		2	1.75
	40	32	14	10.05		1	0.88
	30	24	10	15.54	Grains	23	.84
	20	16	7	5.02		22	.80
	10	8	3	10.51		21	.77
	9	7	6	7.86		20	.73
	8	6	9	5.21		19	.69
	7	5	12	2.56		18	.66
	6	4	14	15.90		17	.62
	5	4	1	13.25		16	.58
	4	3	4	10.60		15	.55
	3	2	7	7.95		14	.51
	2	1	10	5.30		13	.47
	1	0	13	2.65		12	.44
Ounces	11		12	1.09		11	.40
	10		10	15.54		10	.36
	9		9	13.98		9	.33
	8		8	12.43		8	.29
	7		7	10.88		7	.26
	6		6	9.32		6	.22
	5		5	7.77		5	.18
	4		4	6.21		4	.14
	3		3	4.66		3	.11
	2		2	13.10		2	.07
	1		1	1.55		1	.04

EXAMPLE.

EXAMPLE.

In 2756 *pounds* 10 *ounces* 15 *penny-weights* 20 *grains troy*, Qu. *How much Avoirdupois* Weight?

	Troy weight	*Avoirdupois* Weight. Pounds.	oz.	drams.
Pounds	2000	1645	11	6.84
	700	576	0	0.00
	50	41	2	4.57
	6	4	14	15.90
Ounces	10	—	10	15.54
Penny-weights	15	—	—	13.16
Grains	20	—	—	·73
	Anſwer	2268	8	8.74

A Table for reducing Avoirdupois Weight *into Troy* Weight.

Avoirdupois weights.	Troy Weight				Avoirdupois weight.	Troy Weight.			
	lb.	zo.	pwt.	gr.		lb.	oz.	pwt.	gr.
Pounds 6000	7291	8	0	0	Ounces 15	1	1	13	10.5
5000	6076	4	13	8	14	1	0	15	5
4000	4861	1	6	16	13		11	16	23.5
3000	3645	10	0	0	12		10	18	18
2000	2430	6	13	8	11		10	0	12.5
1000	1215	3	6	16	10		9	2	7
900	1093	9	0	0	9		8	4	1.5
800	972	2	13	8	8		7	5	20
700	850	8	6	16	7		6	7	14.5
600	729	2	0	0	6		5	9	9
500	607	7	13	8	5		4	11	3.5
400	486	1	6	16	4		3	12	22
300	364	7	0	0	3		2	14	16.5
200	243	0	13	8	2		1	16	11
100	121	6	6	16	1			18	5.5
90	109	4	10	0	Drams 15			17	2.1
80	79	2	13	8	14			15	22.8
70	85	0	16	16	13			14	19.4
60	72	11	0	0	12			13	15.1
50	60	9	3	8	11			12	12.7
40	48	7	6	16	10			11	9.4
30	36	5	10	0	9			10	6.1
20	24	3	13	8	8			9	2.7
10	12	1	16	16	7			7	23.4
9	10	11	5	0	6			6	20.0
8	9	8	13	8	5			5	16.7
7	8	6	1	16	4			4	13.4
6	7	3	10	0	3			3	10.1
5	6	0	18	8	2			2	6.7
4	4	10	6	16	1			1	3.3
3	3	7	15	0	¾				20.5
2	2	5	3	8	½				13.7
1	1	2	11	16	¼				6.8

EXAMPLE.

In 2268 *pounds* 8 *ounces* 9 *drams Avoirdupois*, Qu. *How much Troy* Weight?

	Avoirdupois weight	*Troy Weight* lb.	oz.	pwts.	gr.
Pounds	2000	2430	6	13	8
	200	243	0	13	8
	60	72	11	0	0
	8	9	8	13	8
Ounces	8	—	7	5	20
Drams	9	—	—	10	6.1
	Anſwer	2756	10	16	2.1

From accurate ſtandards of *weights* and meaſures, deduced from experiments made in England and France, and laid up in the archives of the Royal Society of London and Royal Academy of Sciences at Paris, it appears that the Engliſh Avoirdupois pound weighs 7004 troy grains, whence the avoirdupois ounce, whereof 16 make a pound, is found equal to 437,75 troy grains: and conſequently, the troy pound is to the avoirdupois pound as 88 to 107 nearly, for as 88 to 107, ſo is 5760 to 7003,636; and the troy ounce is to the avoirdupois ounce as 80 to 73 nearly, for as 80 to 73, ſo is 480 to 438; and the avoirdupois pound and ounce are to the Paris two marc *weight* and ounce as 63 to 68 nearly, for as 63 to 68, ſo is 7004 to 7559,873.

Moreover it appears, that the Paris half toiſe, as ſet off on the ſtandard in the Royal Society, contains 38,355 Engliſh inches by the ſame ſtandard: whence the Engliſh yard and foot are to the Paris half-toiſe and foot nearly as 107 to 114; for as 107 to 114, ſo is 36 to 38,35514. Hence the Paris FOOT, expreſſed in decimals, is equal to 1,0654 of the Engliſh foot, or contains 12,785 Engliſh inches. Phil. Tranſ. Nº 465. p. 185. or Abr. vol. ix. p. 490.

The moneyers, jewellers, &c. have a particular claſs of *weights*, for gold, and precious ſtones, viz. *carat*, and *grain*; and for ſilver, the *penny-weight*, and *grain*.

The moneyers have alſo a peculiar ſubdiviſion of the *grain* troy: thus,

The	*Grain*	into	20 *Mites.*
	Mite		24 *Droits.*
	Droit		20 *Periots.*
	Periot		24 *Blanks.*

The dealers in wool have likewiſe a particular ſet of *weights*; viz. the *ſac*, *weigh*, *tod*, *ſtone* and *clove*; the proportion of which ſee under WOOL.

The beſt way, ſays Dr. Lewis, of procuring equal ſmall *weights* is by cutting off equal lenghts of the fineſt ſilver wire; the ſilver thread, being kept equally ſtretched by a heavy body at the end, may be coiled cloſe round a thicker piece of large wire, and all the coils cut through at once by a ſharp inſtrument applied lengthwiſe. Silver wire is drawn to ſuch fineneſs, and of ſuch uniform thickneſs, that *weights*, thus made by menſuration, are of greater nicety than it is poſſible for any balance to weigh. Lewis's Com. of Arts, p. 544.

WEIGHTS, *French*. The common or *Paris pound*, which is to the Engliſh troy pound as 21 to 16, and therefore contains 7560 troy grains, is 16 ounces; which they divide two ways: the firſt diviſion is into two *marcs*, the marc into 8 *ounces*; the ounce into 8 *gros*, or drams; the gros, or dram, into 3 deniers, Paris ſcruples or *penny-weights*; the penny-weight into 24 *grains*; the grain equivalent to a grain of wheat. So that the Paris ounce contains $472\frac{1}{2}$ troy grains, and, therefore, is to the Engliſh troy ounce as 63 to 64; the Paris dram, or gros, is equal to 72 Paris grains or $59\frac{1}{2}$ troy grains; the Paris ſcruple or denier, or penny-weight, contains $19\frac{11}{48}$ troy grains; and the Paris grain is the $\frac{1}{9216}$th part of a Paris pound, and is to the troy grain as 7560 to 9216.

The ſecond diviſion of the pound, is into 2 *half-pounds*; the half-pound into 2 *quarters*; the quarter into two *half-quarters*; the half-quarter into 2 *ounces*; and the ounce into two *half-ounces*.

The *weights* of the firſt diviſion are uſed to weigh gold, ſilver, and the richer commodities: and the *weights* of the ſecond diviſion, for commodities of leſs value.

Grains.					
24	Penny-weight.				
72	3	Gros.			
576	24	8	Ounce.		
4608	192	64	8	Marc.	
9216	384	128	16	2	Pound.

Half-ounce.						
2	Ounce.					
4	2	Half-quarter-pound.				
8	4	2	Quarter-pound.			
16	8	4	2	Half-pound.		
32	16	8	4	2	Pound.	
3200	1600	800	400	200	100	Quintal.

But the pound is not the ſame throughout France. At Lyons, e. gr. the city pound is only 14 ounces; ſo that 100 Lyons pounds make only 88 Paris pounds. But, beſide the city pound, they have another at Lyons for ſilk, containing 16 ounces. At Tholouſe, and throughout the Upper Languedoc, the pound is 13 ounces and $\frac{1}{2}$ of Paris *weight*. At Marſeilles, and throughout Provence, the pound is 13 ounces of Paris *weight*. At Rouen, beſides the common Paris pound and marc, they have the *weight* of the *vicomte*; which is 16 ounces and $\frac{1}{2}$ and $\frac{5}{6}$, of the Paris *weight*.

The *weights* enumerated under the two articles of Engliſh and French *weights* are the ſame that are uſed throughout the greateſt part of Europe; only under ſomewhat different names, diviſions, and proportions.

Particular nations have alſo certain *weights* peculiar to themſelves: thus, Spain has its *arrobas*, containing 25 Spaniſh pounds, or $\frac{1}{4}$ of the common quintal: its *quintal macho*, containing 150 pounds, or $1\frac{1}{2}$ common quintal, or 6 *arrobas*: its *adarme*, containing $\frac{1}{16}$ of its ounce. And for gold, it has its *caſtillan*, or $\frac{1}{100}$ of a pound; its *tomin*, containing 12 grains or $\frac{1}{8}$ of a caſtillan. The ſame are in uſe alſo in the Spaniſh Weſt Indies.

Portugal has its *arroba*, containing 32 Liſbon *arratels*, or pounds: Savary alſo mentions its *faratelle*, containing two Liſbon pounds: and its *rottoli*, containing about 12 pounds. And for gold, its *chego*, containing four *carats*. The ſame are uſed in the Portugueſe Eaſt Indies.

Italy, and paticularly Venice, have their *migliaro*, containing four mirres, the *mirre* containing 30 Venice pounds: the *ſaggio*, containing a ſixth part of an ounce. Genoa has five kinds of *weights*; viz. *large weights*, whereby all merchandiſes are weighed at the cuſtom-houſe; *caſh-weights*, for piaſtres, and other ſpecies; the *cantara*, or *quintal*, for the coarſeſt commodities; the *large balance*, for raw ſilks; and the *ſmall balance* for the finer commodities. Sicily has its *rottolo*, 32 and an half pounds of Meſſina. Savar.

Germany, Flanders, Holland, the Hanſe-towns, Sweden, Denmark, ~~Poland,~~ &c. have their *ſchippondt*, which at Antwerp and Hamburg is 300 pounds; at Lubeck, 320; and at Koningſberg, 400 pounds. In Sweden, the *ſchippondt* for copper is 320 pounds; and the *ſchippondt* for proviſions 400 pounds. At Riga, and Revel, the *ſchippondt* is 400 pounds; and at Dantzick, 340 pounds; in Norway, 300 pounds; at Amſterdam, 300; containing 20 *lyſpondts*, each weighing 15 pounds. Idem.

In Muſcovy, they weigh their large commodities by the *bercheroct*, or *berkewits*, containing 400 of their pounds. They have alſo the *poet*, or *poede*, containing 40 pounds, or 1/10 of the *bercheroct*. Idem.

In Turky, at Smyrna, &c. they uſe what they call the *batman*, or *battemant*, containing 6 *occos*; the occo weighing 3 pounds 4/5 Engliſh. They have another *batman* much leſs, conſiſting, as the former, of ſix occos; but the occo only containing 15 ounces Engliſh: 44 occos of the firſt kind make the Turkiſh *quintal*. At Cairo, Alexandretta, Aleppo, and Alexandria, they uſe the *rotto*, *rotton*, or *rottoli*. The *rottoli* at Cairo, and other parts of Egypt, is 144 drams; being ſomewhat more than an Engliſh pound. At Aleppo there are three ſorts of *rottos*; the firſt 720 drams making about 7 pounds Engliſh, and ſerving to weigh cottons, galls, and other large commodities: the ſecond is 624 drams, uſed for all ſilks but white ones, which are weighed by the third *rotto* of 700 drams. At Seyda the *rotto* is 600 drams.

The other ports of the Levant, though not named here, uſe ſome of theſe *weights*; particularly the *occo*, or *ocqua*, the *rottoli*, and *rotto*.

To ſhew the proportion of theſe ſeveral *weights* to one another, we ſhall add a reduction of the divers *pounds* uſed throughout Europe, by which the other *weights* are eſtimated, to one ſtandard pound; viz. the pound of Amſterdam, Paris, and Bordeaux; as calculated with great accuracy by M. Ricard, and publiſhed in the new edition of his excellent Traité de Commerce, in 1722.

Proportion of the WEIGHTS *of the chief Cities in Europe, to thoſe of Amſterdam.*

A hundred pounds of Amſterdam are equal to

108	Pounds of Alicant.
105	*lb.* of Antwerp.
120	*lb.* of Archangel, or three poedes.
105	*lb.* of Arſchot.
120	*lb.* of Avignon.
98	*lb.* of Baſil in Switzerland.
100	*lb.* of Bayonne in France.
166	*lb.* of Bergamo.
97	*lb.* of Berg op Zoom.
95	*lb.* ¼ of Bergen in Norway.
111	*lb.* of Bern.
100	*lb.* of Beſançon.
100	*lb.* of Bilboa.
105	*lb.* of Bois le duc.
151	*lb.* of Bologna.
100	*lb.* of Bourdeaux.
104	*lb.* of Bourg en Breſſe.
103	*lb.* of Bremen.
125	*lb.* of Breſlaw.
105	*lb.* of Bruges.
105	*lb.* of Bruſſels.
105	*lb.* of Cadiz.
105	*lb.* of Cologne.
125	*lb.* of Koningſberg.
107	*lb.* and ½ of Copenhagen.
87	Rottos of Conſtantinople.
113	*lb.* and ½ of Dantzick.
100	*lb.* of Dort.
97	*lb.* of Dublin.
97	*lb.* of Edinburgh.
143	*lb.* of Florence.
98	*lb.* of Franckfort on the Maine.
105	*lb.* of Gaunt.
89	*lb.* of Geneva.
163	*lb.* of Genoa, *caſh-weight.*
102	*lb.* of Hamburg.
106	*lb.* of Leyden.
105	*lb.* of Leipſic.
105	*lb.* and ½ of Liege.
114	*lb.* of Liſle.
143	*lb.* of Leghorn.
106	*lb.* and ½ of Liſbon.
109	*lb.* of London, *avoirdupois weight.*
105	*lb.* of Louvain.
105	*lb.* of Lubec.
141	*lb.* and ½ of Lucca, *light-weight.*
116	*lb.* of Lyons, *city-weight.*
114	*lb.* of Madrid.
105	*lb.* of Malines.
123	*lb.* and ½ of Marſeilles.
154	*lb.* of Meſſina, *light-weight.*
168	*lb.* of Milan.
120	*lb.* of Montpelier.
125	Bercherocts of Muſcovy.
100	*lb.* of Nantes.
106	*lb.* of Nancy.
169	*lb.* of Naples.
98	*lb.* of Nuremberg.
100	*lb.* of Paris.
112	*lb.* and ½ of Revel.
109	*lb.* of Riga.
100	*lb.* of Rochel.
146	*lb.* of Rome.
100	*lb.* of Rotterdam.
96	*lb.* of Rouen, *vicounty-weight.*
100	*lb.* of S. Malo.
100	*lb.* of S. Sebaſtian.
158	*lb.* and ½ of Saragoſa.
106	*lb.* of Seville.
114	*lb.* of Smyrna.
110	*lb.* of Stetin.
81	*lb.* of Stockholm.
118	*lb.* of Tholouſe, and Upper Languedoc.
151	*lb.* of Turin.
158	*lb.* and ½ of Valencia.
182	*lb.* of Venice, *ſmall-weight.*

Mr. Ferguſon has calculated the following table for comparing the Engliſh avoirdupois pound with the foreign pound *weight*.

London pound	1,0000
Antwerp	1,04
Amſterdam	1,1111
Abbeville	1,0989
Ancona	0,78
Avignon	0,8928
Bourdeaux	1,0989
Bologna	0,8
Bruges	1,0204
Calabria	0,73
Calais	0,9345
Dieppe	1,0989
Dantzic	0,862
Ferrara	0,75
Flanders	0,9433
Geneva	1,07
Genoa, groſs	0,7
Hamburgh	1,0865
Liſbon	1,135
Leghorn	0,75
Norimberg	1,1363
Naples	0,71
Paris	1,1235
Prague	1.2048
Placentia	0,72
Rochelle	0,8928
Rome	0,7874
Rouen	1,1089
Seville	0,9259
Tholouſe	0,8928
Turin	0,82
Venice	1,06
Vienna	1,23

Ferguſon's Tab. and Tracts, p. 274.

WEIGHTS *uſed in the ſeveral parts of the Eaſt.* The *Chineſe weights* are, the *pice*, for large commodities: this is divided into 100 *catis*, or *cattis*, though ſome ſay into 125: the cati into 16 *taels*, or *tales*; each tael equivalent to 1⅐ of an ounce Engliſh, or the weight of one rial and 1½, and containing 10 *mas*, or *maſſes*; and each mas 10 *condrins*. So that the Chineſe *pice* amounts to 137 pounds Engliſh avoirdupois, and the cati to 1 pound 8 ounces: the *picol*, for ſilk, containing 66 *catis* and ¼: the *bahar*, *bakaire*, or *barr*, containing 300 catis.

Tonquin has all the ſame *weights*, meaſures, &c. as China. Japan has only one *weight*, viz. the *catti*; which, however, is different from that of China, as containing 20 *taels*. At Surat, Agra, and throughout the ſtates of the great mogul, they uſe the *man*, or *maund*, whereof they have two kinds; the *king's man*, or *king's weight*; and the *man*, ſimply ſo called: the firſt uſed for the weighing of common proviſions, containing 40 *ſeers*, or *ſeres*; and each near a juſt Paris pound. Though Tavernier will have the ſeer near a ſeventh leſs than the Paris pound.

The common *man*, uſed in the weighing of merchandize, conſiſts likewiſe of 40 *ſeers*; but each ſeer is only eſtimated at 12 Paris ounces, or ¾ of another ſeer.

The *man* may be looked on as the common *weight* of the Eaſt Indies, though under ſome difference of name, or rather of pronunciation; it being called *mao* at Cambaya, and in other places *mein*, and *maun*. The *ſeer* is properly the Indian pound, and is of univerſal uſe: the like may be ſaid of the *bahar*, *tael*, and *catti* above mentioned.

The *weights* of Siam are the *pice*, containing two *ſchans*, or ~~*cattis*~~; but the Siameſe *catti* is only half the Japoneſe, the latter containing 20 *taels*, and the former only 10: though ſome make the Chineſe catti only 16 taels, and the Siameſe 8. The *tael* contains 4 *baats*, or *ticals*; each about a Paris ounce: the *baat* 4 *ſelings*, or *mayons*: the mayon 2 *fouangs*: the fouang 4 *payes*: the paye 2 *clams*: the *ſompaye*, half a *fouang*. Savar.

It is to be obſerved, that theſe are the names of their coins, as well as *weights*; ſilver and gold being, there, commodities ſold, as other things, by their *weights*. See COIN, &c.

In the iſle of Java, and particularly at Bantam, they uſe the *gantan*, which amounts to near three Dutch pounds. In Golconda, at Viſagour and Goa, they have the *furatelle*, containing 1 pound 14 ounces Engliſh: as alſo the *mangalis*, or *mangelin*, for weighing diamonds and precious ſtones; weighing at Goa 5 grains, at Golconda, &c. 5¼ grains. They have alſo the *rotolo*, containing 14½ ounces Engliſh: the *metricol*, containing the ſixth part of an ounce: the *vall*, for piaſtres and ducats: containing the 73d part of a rial.

In Perſia, they uſe two kinds of *batmans*, or *mans*; the one, called *cabi*, or *cheray*, which is the kings *weight*; and the other *batman of Tauris*, from the name of one of the chief cities of Perſia. The firſt *weight*, according to Tavernier, 13 pounds 10 ounces Engliſh; the ſecond, 6 pounds ¼. According to ſir J. Chardin, the *king's batman* is 13 pounds 14 ounces, and the *batman of the derhem*, or dram, which is the 50th; the *meſcal*, which is half the derhem; the *dung*, which is the 6th part of the meſchal; being equivalent to 6 *carat-grains*; and laſtly, the *grain*, which is the 4th part of the dung. They have alſo the *vakie*, which exceeds, a little, our ounce: the *ſab cheray*, equal to the 1170th part of the derhem: and the TOMAN, uſed to weigh out large payments of money, without telling: its *weight* is that of 50 *abaſſis*. Savar.

WEIGHTS, *African and American.* We have little to ſay as to the *weights* of America; the ſeveral European colonies there, making uſe of the *weights* of the ſtates or kingdoms of Europe which they belong to. For as to the *aroue* of Peru, which weighs 27 pounds, it is evidently no other than the Spaniſh *arroba*, with a little difference in the name.

As to the *weights* of Africa, there are few places that have any, except Egypt, and the coaſts of Africa, whoſe *weights* are enumerated among thoſe of the ports of the Levant, &c.

As to the coaſts beyond Cape Verde, viz. Guinea, Congo, to Soffola, Mozambica, &c. they have no *weights*; only the Engliſh, French, Dutch, Portugueſe, and Danes, have introduced their own *weights* in their reſpective ſettlements.

The iſle of Madagaſcar, indeed, has its particular *weights*, but it has none that exceed the dram, nor are they uſed for any thing but gold and ſilver. Other commodities they never weigh.

Ancient WEIGHTS.

Jewiſh *Weights* reduced to Engliſh *Troy Weight*.

			lb.	*oz.*	*pwt.*	*gr.*
Shekel.			00	00	09	02 4/7
60	Maneh.		02	03	06	10 2/7
3000	50	Talent.	113	10	01	10 2/7

Note, in reckoning money, 50 *ſhekels* made a *maneh*, but in *weight*, 60 *ſhekels*.

Grecian and Roman WEIGHTS reduced to Engliſh *Troy Weight*.

										lb.	*oz.*	*pwt.*	*gr.*
Lentes.										0	00	00	00 85/112
4	Siliquæ.									0	00	00	03 1/28
12	3	Obolus.								0	00	00	09 3/28
24	6	2	Scriptulum.							0	00	00	18 3/14
72	18	6	3	Drachma.						0	00	02	06 9/14
96	24	8	4	1 1/3	Sextula.					0	00	03	00 6/7
144	36	12	6	2	1 1/2	Sicilicus.				0	00	04	13 2/7
192	48	16	8	2 2/3	2	1 1/3	Duella.			0	00	06	01 5/7
576	144	48	24	8	6	4	3	Uncia.		0	00	18	05 1/7
6912	1728	576	288	96	72	48	36	12	Libra.	0	10	18	13 5/7

For the ſubdiviſions of the Roman as, libra, or pound, ſee AS.

The Roman ounce is the Engliſh avoirdupois ounce, which they divided into ſeven *denarii*, as well as eight *drams*: and ſince they reckoned their denarius equal to the Attic dram, this will make the Attic *weights* one-eighth heavier than the correſpondent Roman *weights*. Arbuth.

Note, the Grecians divided their *obolus* into *chalci* and λεπτα. Some, as Diodorus and Suidas, divided the *obolus* into ſix *chalci*, and every *chalcus* into ſeven λεπτα. Others divided the *obolus* into eight *chalci*, and every *chalcus* into eight λεπτα, or *minuta*. Arbuthnot's Tables, &c.

WEIGHT *of the air*, is equal to the elaſticity thereof.

To find the weight *of a cubic inch of air*. Weigh a round glaſs veſſel full of common air, very accurately; then exhauſt the air out of it; weigh the exhauſted veſſel, and ſubtract the latter *weight* from the former, the remainder is the *weight* of the air exhauſted.

Find, then, the content of the veſſel by the laws of meaſuring; and the ratio of the remaining air to the primitive air. This done, the bulk of the remaining air is found by the rule of three; which being ſubtracted from the capacity of the veſſel, the remainder will be the bulk of air extracted. Or, if the air-pump be very tight, and the exhauſtion continued as long as any air is got out, the remaining air will be ſo ſmall, that it may be very ſafely neglected, and the content of the veſſel taken for the bulk of the exhauſted air.

Having, therefore, the *weight* and bulk of the whole exhauſted air, the *weight* of one cubic inch is eaſily had by the rule of three.

This method was firſt uſed by Otto Guericke, and afterwards by Burcher de Volder; who gives us the following particulars in his experiment. 1. That the *weight* of the glaſs ſpherical veſſel he made uſe of, full of common air, was 7 pounds, 1 ounce, 2 drams, 48 grains; when exhauſted of air, 7 lb. 1 oz. 1 dr. 31 gr. and when full of water, 16 lb. 12 oz. 7 dr. 14 gr. The *weight* of the air, therefore, was 1 dr. 17 gr. or 77 gr. the *weight* of the water 9 lb. 11 oz. 5 dr. 43 gr. or 74743 gr. Conſequently, the ratio of the ſpecific gravity between water and air is 74743 : 77 : : 970$\frac{53}{77}$: 1. Now, De Volder having found a cubic foot of water to weigh 64 pounds, by inferring, as 970 is to 1, ſo is 64 pounds to a fourth proportional, deduced, by the rule of three, the *weight* of a cubic foot of air, viz. 1 ounce 27 grains, or 507 grains nearly. Wolfii Elem. tom. ii. p. 291.

From other later experiments accurately made with the hydroſtatical balance, a cubic inch of air appears to be equal to $\frac{2}{7}$ of a grain, and therefore a cubic foot equal to 493$\frac{5}{7}$ troy grains. There are various ways of eſtimating the *weight* of the air, for which ſee AIR, ATMOSHERE, BAROMETER, *Specific* GRAVITY, &c.

It may be eaſily determined by fitting a braſs cap, with a valve tied over it, to the mouth of a thin bottle or Florence flaſk, whoſe contents are exactly known, and ſcrewing the neck of this cap into the hole of the plate of the air-pump; then, having exhauſted the flaſk of its air and taken it off from the pump, ſuſpend it at one end of a balance, and nicely counterpoiſe it by *weights* in the ſcales at the other end: when this is done, raiſe up the valve with a pin, and the air will ruſh into the flaſk, and cauſe it to deſcend. When it is full of air, put grains into the ſcale at the other end to reſtore the equilibrium; and if the flaſk holds exactly a quart, it will be found, that 17 grains will be ſufficient for this purpoſe, when the quickſilver ſtands at 29$\frac{1}{2}$ inches in the barometer; and this ſhews, that when the air is at a mean ratio of denſity, a quart of it weighs 17 grains; and conſequently a gallon weighs 68 grains: i. e. 231 cubic inches of air are equal in *weight* to 68 grains, and 1728 cubic inches, or a cubic foot of air, weighs 509$\frac{156}{231}$ grains; and as a cubit foot of water weighs about 437702 troy grains, the ſpecific gravity of water will appear to be more than 850 times that of AIR.

The *weight* of *ſea*-WATER is different in different climates. Mr. Boyle having furniſhed a learned phyſician, going on a voyage to America, with an hydroſtatical balance, and recommended him to obſerve, from time to time, the difference of *weight* he might meet withal; this account was returned him: that the ſea-water increaſed in *weight*, the nearer he came to the line, till he arrived at a certain degree of latitude, as he remembers, about the 30th; beyond which, it retained the ſame ſpecific *weight*, till he came to Barbadoes. Philoſ. Tranſ. Nº 18.

The *weight* of a cubical inch of good brandy, rum, or other *proof* SPIRITS, is 235,7 grains; therefore, if a true inch cube of any metal weighs 235,7 grains leſs in ſpirits than in air, it ſhews the ſpirits are proof: if it loſes leſs of its aerial *weight* in ſpirits, they are above proof; if it loſes more, they are under: for the better the ſpirits are, they are the lighter; and the worſe, the heavier.

As all bodies expand with heat and contract with cold, in different degrees, the ſpecific gravities of bodies are not preciſely the ſame in ſummer as in winter. It has been found, that a cubic inch of good brandy is 10 grains heavier in winter than in ſummer; as much ſpirit of nitre, 20 grains; vinegar, 6 grains; and ſpring water 3. Hence it is moſt profitable to buy ſpirits in winter, and ſell them in ſummer, ſince they are always bought and ſold by meaſure. It has been found, that 32 gallons of ſpirits in winter will make 33 in ſummer. Ferguſon's Lect. p. 98, 4to. See *Specific* GRAVITY, and HYDROMETER.

WEIGHTS, *groſs, neat, penny, aſſay of, ancel*, ſee the ſeveral articles.

WEIGHT *of the human body*. It is to be obſerved, that the heat and dryneſs of the air both leſſen the *weight* of the body, and the cold and moiſture of the air both increaſe this *weight*. See MOISTURE.

Much ſleep, much food, and little exerciſe, are the principal things which increaſe the *weight* of the body, and make animals grow fat. Conſequently, if the *weight* of the body be too great for good and uninterrupted health, it may be leſſened by diminiſhing ſleep and food, and by increaſing exerciſe. On the contrary, if the *weight* of the body be too little for good health, it may be increaſed by adding to food and ſleep, and by leſſening exerciſe; and the food muſt be increaſed chiefly by increaſing drink and liquid nouriſhment. For the diſcharges are commonly leſs from drink and liquid nouriſhment, than from dry and ſolid food.

There is but one *weight* under which a body can enjoy the beſt and uninterrupted health, and that *weight* muſt be ſuch, that perſpiration and urine may be nearly equal at all ſeaſons of the year; for by this means the body will be uniformly drained of its moiſture: the inward parts by urine, and the more ſuperficial parts by perſpiration, without any irregular and unnatural diſcharges, and its moving *weight* will continue nearly the ſame at all ſeaſons of the year. Dr. Bryan Robinſon thinks this *weight* may be ſettled by his obſervations in his Treatiſe on the Food and Diſcharges of Human Bodies.

A quick increaſe of *weight* in human bodies often produces diſtempers; the beſt way to prevent this increaſe is either by faſting or exerciſe. But amidſt a variety of diſturbing cauſes, nothing ſo effectually prevents ſuch an increaſe of *weight* as a very exact and regular diet, which may prevent the diſcharges from running into irregularities and diſproportions to one another. See Dr. Bryan Robinſon of the Food and Diſcharges of Human Bodies, p. 82, ſeq.

Men, and other animals of extraordinary *weight*, are often recorded in the writings of the learned. See Phil. Tranſ. N° 479, p. 102.

WEIGHT, *athletic*, in the *Animal Oeconomy*, that *weight* of the body under which an animal has the greateſt ſtrength and activity. Dr. Robinſon thinks this happens when the *weight* of the heart, and the proportion of the *weight* of the heart to the *weight* of the body, are greateſt. For the ſtrength of an animal is meaſured by the ſtrength of its muſcles, and the ſtrength of the muſcles is meaſured by the ſtrength of the heart. Alſo the activity of an animal is meaſured by the *weight* of the heart, in proportion to the *weight* of the body.

If the *weight* of the body of an animal be greater than its athletic *weight*, it may be reduced to that *weight* by evacuations, dry food, and exerciſe. Theſe leſſen the *weight* of the body by waſting its fat, and leſſening its liver, and they increaſe the *weight* of the heart, by increaſing the quantity and motion of the blood; ſo that by leſſening the *weight* of the body, and by increaſing that of the heart, they will ſoon reduce the animal to its *athletic weight*. Thus a game cock, in ten days, is reduced to its *athletic weight*, and prepared for fighting. If the food which, with the evacuations and exerciſe, reduced the cock to its *athletic weight* in ten days, be continued any longer, the cock will loſe his ſtrength and activity.

It is known by experience, that a cock cannot ſtand above twenty-four hours at his *athletic weight*, and that he has even changed for the worſe in twelve hours. When he is in the beſt condition, his head is of a glowing red colour, his neck thick, and his thigh thick and firm; the day after, his complexion is leſs glowing, his neck thinner, and his thigh ſofter; and the third day his thigh will be very ſoft and flaccid. Four game cocks, reduced to their *athletic weight*, were killed, and found to be very full of blood, with large hearts, large muſcles, and no fat.

It is to be obſerved, that the *athletic weight* of an animal is a very dangerous *weight*. Fevers and apoplexies are the diſorders which commonly happen to animals under or near the *athletic weights*. Hence, horſes fed upon dry food are much more ſubject to fevers and apoplexies than horſes fed upon graſs. Robinſon's Diſſertation, p. 117, &c.

WEIGHTS, *ſeſſions for*. See SESSIONS.

WEINMANNIA, in *Botany*, a genus of the *octandria digynia* claſs. Its characters are theſe: the calyx is compoſed of four leaves, the corolla has four petals, and the fruit is a double-celled capſule, with a double ſtem. There is one ſpecies.

WELD, or WOLD, *reſeda luteola* of Linnæus, a plant uſed by the dyers, to give a yellow colour; and for this reaſon called, in Latin, *luteola*, of *luteus, yellow*. For the characters ſee RESEDA; ſee alſo DYER's *Weed*.

This plant grows wild on dry grounds; but it is alſo cultivated for uſe.

This is a very rich commodity among the dyers, and is the more advantageous to the farmer, as it may be raiſed on very poor land, and at a very ſmall expence. Moderately fertile land does beſt for it; but it will grow upon the moſt barren; and if this be but dry and warm, it will require no tillage. The ſeed may be ſown with barley or oats, and only harrowed in with bruſh or furze, or rolled down with a wooden roller. It is a very ſmall ſeed, and the greateſt difficulty about it is the ſowing of it even. It is a ſlow grower; a gallon of ſeed is ſufficient for an acre; and though it makes but little progreſs the firſt ſummer, it begins to grow after the corn is cut, and the next year yields a good crop. However, though *weld* will grow upon very poor ſoil, the crop will be in proportion to the goodneſs of the ſoil.

The beſt way to cultivate it is to ſow it without any other crop. In the beginning or middle of Auguſt, the ground which, unleſs it be poor, wants no dung, being ploughed and harrowed fine, the ſeeds ſhould be ſown in the proportion of a gallon to an acre. In about two months, the plants will come up, ſo as to be diſtinguiſhed from weeds; and ſhould be hoed like turnips, leaving them at about 6 inches diſtance. If this hoeing be performed in dry weather, the plants will be clean from weeds till the ſpring; in March they ſhould be hoed again; and if weeds appear, a third time about the beginning of May. The beſt time to pull the *weld* for uſe is when it begins to flower, though moſt people ſtay till the ſeeds are ripe, being unwilling to loſe the ſeeds: but Mr. Miller adviſes to ſow a ſmall piece of land to remain for a produce of new ſeeds. By drawing off the crop early, as towards the latter end of June, the ground may be ſown with wheat the ſame ſeaſon; and the plants at this time will be in the greateſt vigour, and afford a greater quantity of the dye.

When the plants are pulled, they may be ſet up in ſmall handfuls to dry in the field, and when dry enough, tied up in bundles and houſed dry; care being taken to houſe them looſely, that the air may paſs between them to prevent their fermenting. That which is left for ſeeds ſhould be pulled as ſoon as the ſeeds are ripe, and ſet up to dry; and then beat out for uſe; for if the plants are left too long, the ſeeds will ſcatter. Mortimer and Miller.

Weld is much cultivated in Kent, for the uſe of the London dyers.

With the help of pot-aſhes, it yields a deep lemon colour; but either by the largeneſs of the proportion put into the liquor, or by taking from it a ſtronger or ſlighter tincture, it ſerves to dye all colours between white and a deep yellow. Its dye will hold well, except againſt urine, and tartarous liquors.

Mr. Hellot obſerves, in his Art de Teindre, that for dying with *weld*, the beſt proportions of alum and tartar for the preparatory liquor are four parts of alum, and one of tartar, to ſixteen of the wool; and that the wool, prepared with theſe, is to be boiled again with five or ſix times its quantity of *weld*: that for light ſhades, it is cuſtomary to diminiſh the alum, and omit the tartar; and that, in this caſe, the colour is more ſlowly imbibed, and proves leſs durable.

WELD, or WEALD, in a *Chorographical Senſe*. See WEALD.

WELDING *heat*, a degree of heat which ſmiths give their iron in the forge, when there is occaſion to double up the iron, and to *weld* a work in the doublings; ſo that the iron ſhould grow into a lump thick enough for the purpoſe. It is alſo uſed when two bars of iron are to be joined together at the ends, to make a length. See IRON.

WELL, a hole dug under ground, below the level or ſurface of the water collected in the ſtrata.

It is uſually of a cylindrical figure, and commonly walled with ſtone, and lined with mortar.

M. Blondel informs the Royal Academy of Sciences of a device they uſe, in the Lower Auſtria, which is encompaſſed with the mountains of Stiria, to fill their *wells* with water; viz. that they dig in the earth, to the depth of twenty or twenty-five feet, till they come to a clammy earth, which they bore into, continuing the operation till the water breaks forcibly out; which water, in all probability, comes from the neighbouring mountains, in ſubterraneous channels. Caſſini obſerves, that in many places of Modena and Bologna, they make themſelves *wells* by the ſame artifice. Dr. Derham adds, that the like has been ſometimes found in England, particularly in Eſſex.

In the Philoſophical Tranſactions we are informed, by Mr. Norwood, that, in Bermudas, *wells* of freſh water are dug within twenty yards of the ſea, and even leſs, which riſe and fall with the tides, as the ſea itſelf does. He adds, that, in digging *wells* in that iſland, they dig till they come almoſt to a level with the ſurface of the ſea; and then they certainly find either freſh water, or ſalt: if it proves freſh, yet, by digging two or three feet deeper, they always come at ſalt water. If it be ſandy ground, they uſually find freſh water; but if hard limeſtone rock, the water is commonly ſalt, or brackiſh.

Lay well, near Torbay, ebbs and flows very often every hour; though ſomewhat oftener in winter, than in ſummer. Dr. Oliver obſerves, its flux and reflux ſometimes return every minute; though, at other times, not above twenty-ſix or twenty-eight times in an hour. Philoſ. Tranſ. Nº 104.

In Scotland they have a *well*, which Sibbald has mentioned as foretelling ſtorms. It is a deep and large *well* near Edinburgh, and from the noiſes heard in it at certain times, is called by the people the *routing well*. They go to this to liſten after the preſages of weather, and it is ſaid that ſtorms are particularly foretold by it; and that noiſes are not only heard in it before ſtorms happen, but that they are always heard determinately and diſtinctly on that ſide whence the ſtorm will come.

In the Philoſophical Tranſactions we have an account of a boiling *well*, &c. See SPRING.

WELL-*water*. See WATER.

WELL, in the *Military Art*, denotes a depth which the miner ſinks into the ground, from which he runs out branches or galleries, either to prepare a mine, or find out, and diſappoint, the enemy's mine.

WELL, in a *Ship*, an apartment formed in the middle of a ſhip's hold to encloſe the pumps, from the bottom to the lower deck. It is uſed as a barrier to preſerve thoſe machines from being damaged by the friction or compreſſion of the materials contained in the hold, and particularly to prevent the entrance of ballaſt, &c. by which the tubes would preſently be choaked, and the pumps rendered incapable of ſervice. By means of this encloſure, the artificers may likewiſe more readily deſcend into the hold, in order to examine the ſtate of the pumps, and repair them, as occaſion requires. Falconer.

WELL *of a fiſhing veſſel*, an apartment in the middle of the hold, which is entirely detached from the reſt, being lined with lead on every ſide, and having its bottom pierced with a ſufficient number of ſmall holes, paſſing alſo through the ſhip's floor, ſo that the ſalt water running into the *well* is always kept as freſh as that in the ſea, and yet prevented from communicating itſelf to the other parts of the hold. Falconer.

WELL-*room of a boat*, denotes the place in the bottom where the water lies, between the cieling and the platform of the ſtern-ſheets, from whence it is thrown out into the ſea with a ſcoop. Falconer.

WELL-*hole*, in *Building*, is the hole left in a floor, for the ſtairs to come up through. See STAIRS.

WELLE *coronde, ſandy cinnamon*, a name given by the Ceyloneſe to a ſpecies of cinnamon which feels hard and gritty between the teeth, as if it were full of particles of ſand, though in reality there is no ſand among it.

The bark of this tree comes off very eaſily; but it is not ſo fit to roll up into quills as the right cinnamon, for it is more rigid and ſtubborn, and apt to burſt open. It is of a ſharp but bitteriſh taſte. The roots of all the cinnamon trees yield more or leſs camphor, but this as ſmall a quantity as any of them. Phil. Tranſ. Nº 409.

WELLIA *tagera*, H. M. in *Botany*, a ſiliquous plant of Malabar, with a pentapetalous flower, and long flat pods, with tranſverſe partitions between the contained ſeeds. It grows to the ordinary height of a man, with a ſtem as big as a man's arm, and is tranſplanted into gardens only on account of its beauty. It is an evergreen.

All the parts of this plant, the root excepted, are exhibited, with an addition of cummin, white ſugar, and milk, againſt a virulent gonorrhœa. The leaves boiled in cow's milk, or uſed in baths, expel the gout. The bark, triturated with ſugar and water, is proper for the diabetes. The bark of the root, and green ſaffron mixed with milk, give relief under the nodous gout, called by the Malabarians *ſenida badda*. Raii Hiſt. Plant.

WEN, in *Surgery*, a tumor, or excreſcence, growing on divers parts of the body; conſiſting of a cyſtis, or bag; filled with ſome peculiar matter. See *Encyſted* TUMORS.

Wens are all, uſually, of the like colour with the reſt of the body: they begin from very little, and grow gradually. They are not dangerous, but frequently laſt a long while. Sometimes they degenerate into abſceſſes. The cure is, to cut off the cyſtis by the root, which is always narrow.

In the Philoſophical Tranſactions we have an account of a very extraordinary *wen*, on the lower jaw of one Alexander Palmar, of Keith, in Scotland. It was twenty ſeven years in growing: at length its enormous bulk, and the pain it gave him, together with its emaciating him exceedingly, determined him to have it cut off. Dr. Bowers aſſures us, its baſis was five inches over, which ſhould ſeem too large for the whole face; and that, with blood and all, it weighed one or two and twenty pounds. Its form was ſpheroidal; and, when meaſured, it was thirty-four inches about one way, and twenty-eight another. It ſeemed to be an atheroma, being a glandulous ſubſtance, with ſeveral large blood-veſſels in it, and hair growing on it: it was as ſenſible as any other part. The hemorrhage, after cutting it off, was ſtopped by the vitriolic powder: and, the ordinary dreſſing being uſed, a cure was completed in ſix weeks time.

WENS *of pearl*. See PEARL.

WENDING, at *Sea*, a term for bringing a ſhip's head about, and ſeems only to be a corruption from *winding*. They ſay, *How wends the ſhip?*

WEPOLON, in *Zoology*, the Ceyloneſe name of an Eaſt-Indian ſerpent, of a very long and ſlender body, and in ſome degree reſembling a piece of cane.

WERE, *wera*, in our old *Law-Books*, ſignifies as much as *æſtimatio capitis*, or *pretium hominis*; that is, ſo much as was anciently paid for killing a man.

When ſuch crimes were puniſhed with pecuniary mulcts, not death, the price was ſet on every man's head, according to his condition and quality. *Were ſuum, id eſt, pretium ſuæ redemptionis*, his RANSOM.

WERELADA, among our Saxon anceſtors, the denying of a homicide on oath, in order to be quit of the fine, or forfeiture, called *were*.

Where a man was ſlain, the price at which he was valued was to be paid to the king, and his relations: for, in the time of the Saxons, the killing of a man was not puniſhed by death, but by a pecuniary mulct, called *were*.

If the party denied the fact, he was to purge himſelf, by the oaths of ſeveral perſons, according to his degree and quality. If the guilt amounted to four pounds, he was to have eighteen jurors on his father's ſide, and four on his mother's: if to twenty-four pounds, he was to have ſixty jurors: and this was called *werelada*. *Homicidium wera ſolvatur, aut werelada negetur.*

WEREGILD, *weregeld*, in our *Ancient Cuſtoms*, the price of a man's head: *pretium ſeu valor hominis occiſi, homicidii pretium*; which was paid partly to the king for the loſs of his ſubject, partly to the lord whoſe vaſſal he was, and partly to the next of kin.

This was a cuſtom derived to us, in common with other northern nations, from our anceſtors, the ancient Germans; among whom, according to Tacitus (De Mor. Germ. cap. 21.) *luitur homicidium certo armentorum ac pecorum numero; recipitque ſatisfactionem univerſa domus.* In the ſame manner, by the Iriſh BREHON law, in caſe of murder, the brehon, or judge, compounded between the murderer and the friends of the deceaſed, who proſecuted him, by cauſing the malefactor to give unto them, or to the child or wife of him that was ſlain, a recompence, which they called ERIACH. And thus we find in our Saxon laws, particularly thoſe of king Athelſtan, the ſeveral *weregilds* for HOMICIDE, eſtabliſhed in progreſſive order, from the death of the ceorl, or peaſant, up to that of the king himſelf. And in the laws of king Henry I. we have an account what other offences were then redeemable by *weregild*, and what were not ſo. The proceſs called APPEAL had probably its riſe in the times, when *weregild* was in uſe. Blackſt. Comm. vol. iv. p. 308.

The *weregild* of an archbiſhop, and of an earl, was 15000 thrimſas. That of a biſhop, or alderman, 8000; that of a general, or governor, 4000; that of a prieſt, or thane, 2000; that of a king, 30000; half was to be paid to his kindred, and the other half to the public. The *weregild* of a ceorl was 266 thrimſas.

WERST, or WURST, a Ruſſian meaſure equal to 3500 Engliſh feet. A degree of a great circle of the earth contains about 104 *werſts* and a half. Phil. Tranſ. Nº 445. § 7.

WEST, *occidens, occaſus*, in *Coſmography*, one of the cardinal points of the horizon; diametrically oppoſite to the eaſt.

Weſt is ſtrictly defined, the interſection of the prime vertical with the horizon, on that ſide in which the ſun ſets.

To draw a true weſt *line*. See MERIDIAN.

WEST, in *Aſtronomy*, is chiefly uſed for the place, in or towards which the ſun and ſtars ſink under the horizon.

Thus, we ſay, the Sun, Mars, &c. are in the *weſt*.

The point in which the ſun ſets when in the equator, is particularly called the *equinoctial weſt*, or *point of true weſt*.

WEST, and WESTERN, in *Geography*, are applied to certain countries, &c. ſituated towards the point of ſun ſetting with reſpect to certain others.

Thus, the empire of Rome, anciently, and of Germany, at preſent, is called the *empire of the Weſt*, or *weſtern empire*, in oppoſition to that of Conſtantinople, which is called the *empire of the Eaſt*.

The Latin or Roman church is called the *weſtern church*; in oppoſition to the Greek church.

The French, Spaniards, Italians, &c. are called *weſtern nations*, in reſpect to the Aſiatics; and America, the *Weſt Indies*, in reſpect of the Eaſt Indies.

WEST-*Aſhton water*, is a chalybeate water, reſembling that of Holt. See Phil. Tranſ. Nº 461. ſect. 20.

WEST *wind* is alſo called *Zephyrus*, and *Favonius*. See WIND.

WEST *Saxonlage*, or the law of the Weſt Saxons. See LAW.

WEST *India companies*. See COMPANY, &c.

WEST *dial*. See DIAL.

WEST, *mooring for*. See MOORING.

WESTERN *amplitude*, *church*, *horizon*, and *ocean*. See the ſeveral articles.

WESTERWALD *earth*, a kind of earth mentioned by Agricola, of a whitiſh yellow colour, of a like nature to the terra Sileſiaca, but preferable to it, as yielding more ſalt. He tells us, that it diſſolves ſilver ſo much better than other menſtrua, as to render it potable, and capable of being prepared into a uſeful medicine in cephalic caſes. Boyle's Works, vol. i. p. 501.

WESTING, in *Navigation*, the ſame with DEPARTURE.

WESTPHALIA-*ham*. See HAM.

WET-GLOVER, a dreſſer of the ſkins of ſheep, lambs, goats, &c. which are ſlender, thin, and gentle.

WET *air*. See MOISTURE.

WET *couch*, a term uſed by the malſters for one of the principal articles of malt-making.

In the making of malt, the uſual way is to ſoak the grain in water two or three days, till it becomes plump and ſwelled, and the water is brown; the water is then drained away, and the barley is removed to a floor, where it is throw into a *wet couch*, that is, an even heap of about two feet thick.

In this heap the barley ſpontaneouſly heats, and begins to grow, ſhooting out firſt the radicle, and, if ſuffered to continue growing, ſoon after the blade; but at the eruption of the radicle, the proceſs is to be ſtopped ſhort, by ſpreading the *wet couch* thin over the floor, and turning it once every four or five hours for two days, laying it thicker each time; after this it is thrown into a large heap, and there ſuffered to grow hot of itſelf, and afterwards ſpread abroad again and cooled, and then thrown upon the kiln to be dried criſp, without ſcorching. Shaw's Lectures, p. 186.

WET *dock*. See DOCK.

WEY. See WEIGH.

WHALE, in *Aſtronomy*, one of the conſtellations. See CETUS.

WHALE, *cete*, in the Linnæan ſyſtem of *Zoology*, the ſeventh order in the claſs of *mammalia*; the characters of which are, that the animals of this order have breathing apertures on the head, pectoral fins, the tail placed horizontally, and no claws. The order includes four genera, viz. *monodon*, or *ſea*-UNICORN, *balæna* or *whale*, PHYSETER, and *delphinus*, comprehending the DOLPHIN, PORPESSE, and GRAMPUS. See FISH.

The genus of *balæna*, or *whale*, is diſtinguiſhed by having horny laminæ in the upper jaw, inſtead of teeth, and a double fiſtula or pipe in the head; it includes four ſpecies.

The common WHALE, or *balæna myſticetus* of Linnæus, called alſo *muſculus*, is the largeſt of all animals; it is ſometimes, even at preſent, found in the northern ſeas ninety feet in length; but formerly, when the captures were leſs frequent, and the fiſh had time to grow, it was taken of a much greater ſize. The *whales* of the torrid zone, where they are unmoleſted, are ſo large as a hundred and ſixty feet in length; the head is in ſize about one third that of the fiſh; the under lip is much broader than the upper, which is narrow and oblong; the tongue is compoſed of a ſoft, ſpongy fat, capable of yielding five or ſix barrels of oil; the gullet is very ſmall, in proportion to the large bulk of the fiſh, not exceeding four inches in width; in the middle of the head are two orifices, through which it ſpouts water to a great height, and with a great noiſe, eſpecially when diſturbed or wounded; the eyes are ſmall in proportion to the bulk of the head, being no larger than thoſe of an ox, and placed at a great diſtance from each other; on the back there is no fin, but on the ſides, beneath each eye, are two large ones, which ſerve it for rowing; the penis is eight feet in length, encloſed in a ſtrong ſheath, and the *whales* copulate like land animals; the teats in the female are placed in the lower part of the belly; the body is thick and ſomewhat rounded, but toward the extremity of the back is a ſubacute angle, extending itſelf longitudinally to the tail, which is broad and ſemilunar, placed horizontally, ſo as to enable the animal to riſe ſuddenly to the ſurface of the water, in order to breathe, and ſo ſtrong as even, it is ſaid, to daſh the ſtrongeſt boat in pieces. This *whale* varies in colour; the back of ſome being red, the belly generally white; others are black, ſome mottled, others quite white, according to the obſervation of Marten, who ſays, that their colours in the water are extremely beautiful, and that their ſkin is very ſmooth and ſlippery. The ſubſtance, called WHALE-*bone*, adheres to the upper jaw, and is formed of thin parallel laminæ, called whiſkers, ſome of the longeſt being four yards in length; of theſe there are commonly three hundred and fifty on each ſide, but in very old fiſh more; and of theſe only about five hundred are of a length fit for uſe, the others being too ſhort; they are ſurrounded with long, ſtrong hair, not only that they may not hurt the tongue, but as ſtrainers, to prevent the return of their food, when they diſcharge the water out of their mouths. From theſe hairs, Ariſtotle gave the name of μυϛικητος, or *bearded whale*, to this ſpecies, which, he ſays, had in its mouth hairs inſtead of teeth; and Pliny deſcribes the ſame under the name of *muſculus*. Under the ſkin the *whale* is covered with fat or BLUBBER from ſix to twelve inches thick, and about the under lip it is two feet thick; which has yielded from a hundred to two hundred barrels, ſome ſay three hundred, according to the ſize of the fiſh. See *Whale* FISHERY, and TRAIN-*oil*.

Under this blubber the fleſh is of a reddiſh colour, which is coarſe, and ſaid to taſte like beef. The Greenlanders eat it, eſpecially about the tail; and the Icelanders ſoak it in ſour whey.

The *whale*, though an animal of ſuch immenſe bulk, ſwims very ſwiftly, and generally againſt the wind. The female brings forth only one, or at moſt two young ones at a time, which are nine or ten feet long, and ſuck the dam's teats; when purſued, they wrap them up in their fins, cloſe to their bodies. The food of the *whale* is a certain ſort of ſmall ſnail, and, as Linnæus ſays, the meduſa, or ſea-blubber.

The great reſort of this ſpecies is within the arctic circle, but they ſometimes viſit our coaſts. The food of the *whale* is found in greateſt quantity between Spitzberg, Nova Zembla, John May's iſland, and Greenland; and therefore this fiſh rarely emigrates far from theſe parts; but here they are found in ſuch numbers, that there have been often ſeen three hundred or three hundred and fifty ſhips of different nations, each ſhip having from five to ſeven long boats, in the compaſs of two degrees from the ſeventy-ſeventh to the ſeventy-ninth; and in two months time they catch from eighteen hundred to two thouſand fiſh, without reckoning the wounded ones that eſcape. See *Whale* FISHERY.

In old time the *whale* ſeems never to have been taken on our coaſts, but when it was accidentally flung on ſhore; it was then deemed a ROYAL *fiſh*; and the king and queen divided the ſpoil; the king aſſerting his right to the head, and the queen to the tail. The reaſon of this whimſical diviſion, as aſſigned by our ancient records, was, to furniſh the queen's wardrobe with *whale-bone*.

The anatomy of the bones of the *whale* has been ſo little underſtood, that there have been many very great errors in regard to ſuch of them as have been at times found foſſile, or buried in the earth among the teeth of elephants, and the remains of teſtaceous and other animals. The moſt frequent and moſt ridiculous of all the wrong opinions about theſe, is their having originally belonged to creatures of the human ſpecies; yet many, even among the more intelligent part of the world, have taken them for the remains of giants. The vertebræ of a *whale* have been miſtaken for thoſe of a giant, and a part of its fins for a hand, and ſo of the reſt. While the world, more ready to ſpread the marvel, than to enquire into the truth, have made computations of the height of the man to whom bones of that ſize muſt have belonged, and from their proportion in regard to thoſe of the common human ſize, have found the giant who poſſeſſed them muſt have been ninety or a hundred feet high; much leſs pains in comparative anatomy would have taught them, that they never could have belonged to any human body at all. Mem. Acad. Par. 1727.

Whale, *beaked, bottle-head*, or *nebbe-haul*, is a ſpecies fourteen feet long, and ſeven and a half round; the body very thick, the forehead high, the noſe depreſſed, and equally thick through its whole length, not unlike the beak of a bird; the mouth without teeth; the eyes large; the eye-lids ſmall; the ſpout-hole on the top of the head ſemicircular, with the corners pointed towards the tail; the pectoral fins ſeventeen inches long; the back-fin placed nearer the tail than the head, and a foot long; the breadth of the tail three feet two inches. Theſe fiſh ſometimes grow to the length of twenty feet; they make little noiſe in blowing, are very tame, come very near the ſhips, and will accompany them a great way.

Whale, *fin-back, balæna phyſalus* of Linnæus, called alſo fin-*fiſh*, is diſtinguiſhed from the common *whale* by a fin on the back, placed very low, and near the tail; its length is equal to that of the common kind, but much more ſlender; it is furniſhed with *whale*-bone in the upper jaw, mixed with hairs, but ſhort and knotty, and of little value; the blubber on the body is very inconſiderable; it is alſo extremely fierce and active, ſo that the capture of it is dangerous, and the fiſhermen have neglected it: however, the Greenlanders eſteem it on account of its fleſh: the lips of this ſpecies are brown, and like a twiſted rope; the ſpout-hole is, as it were, ſplit in the top of its head, through which it blows water with greater violence, and to a greater height, than the common *whale*. The fiſhermen are not fond of ſeeing it; for on its appearance the others retire out of thoſe ſeas.

Whale, *pike headed, balæna boops* of Linnæus, is a ſpecies which takes its name from the ſhape of its noſe, which is narrower and ſharper-pointed than that of other *whales*. The length of one taken on the coaſt of Scotland, obſerved by ſir Robert Sibbald, was forty-ſix feet, and its greateſt circumference twenty; the head of an oblong form, ſloping down, and becoming narrower toward the noſe, having two ſpout-holes at ſix feet eight inches from the end of the noſe, ſeparated by a thin diviſion; the eyes ſmall; the pectoral fins five feet long, and one and a half broad; on the back, about eight feet and a half from the tail, inſtead of a back-fin, was a hard horny protuberance; the tail was nine feet and a half broad; the belly uneven, and formed into folds running lengthways; the ſkin extremely ſmooth and bright; that on the back black, and on the belly white.

Whale, *round-lipped, balæna muſculus* of Linnæus, is characterized by having the lower lip broader than the upper, and of a ſemicircular form. That taken in 1692 near Abercorn-caſtle, and deſcribed by Mr. Pennant, was ſeventy-eight feet long, the circumference thirty-five; the rictus, or gape, very wide; the tongue fifteen feet and a half long; the mouth furniſhed with ſhort *whale*-bone, about three feet in length; on the forehead were two ſpouts of a pyramidal form; the eyes were placed thirteen feet from the end of the noſe; the pectoral fins ten feet long; the back-fin about three feet high, placed near the tail, which was eighteen feet broad, and the belly full of folds. This ſpecies is ſaid to feed on herrings.

Whale, *ſpermaceti*. See Cachalot, Physeter, and Spermaceti.

See on the ſubjects of the preceding articles, Pontopiddan's Nat. Hiſt. of Norway, vol. ii. p. 118, &c. Crantz's Hiſt. of Greenland, vol. i. p. 106, &c. Pennant's Brit. Zool. vol. iii. p. 50, &c. Phil. Tranſ. abr. vol. viii. p. 424, &c.

Whale-*bone*, a commodity procured from the whiſkers of the *common whale*, uſed as a ſtiffening in ſtays, fans, buſks, ſcreens, &c.

Whale-*fins*, a name improperly given to *whalebone*.

Whale-*fiſhery*. See Fishery.

WHAME, in *Natural Hiſtory*, the name given by the people of ſome parts of England to the burrel-fly or wringle-*tail*, a ſpecies of bee-fly very troubleſome to horſes.

WHARF, a perpendicular building of wood or ſtone, raiſed on the ſhore of a road or harbour, for the convenience of landing or diſcharging a veſſel, by means of cranes, tackles, capſterns, &c. See *Artificial* Ports.

The fee paid for the landing of goods on a *wharf*, or for ſhipping them off, is called *wharfage*. And the perſon who has the overſight or direction of the *wharf*, receives *wharfage*, &c. is called the *wharfinger*.

WHEAT, *triticum*, in *Botany*, a genus of the *triandria digynia* claſs. Its characters are theſe: it has an oval chaffy empalement, with two valves, which incloſe two or three flowers; the petals have a double valve, as large as the empalement; the outer valve is bellied and acute-pointed, the inner is plain; the flowers have three hair-like ſtamina, terminated by oblong forked ſummits, and a top-ſhaped germen, ſupporting two hairy reflexed ſtyles, crowned by feathered ſtigmas; the germen afterward becomes an oblong oval ſeed, obtuſe at both ends, convex on one ſide, and channelled on the other, wrapped up in the petal of the flower. Miller enumerates four, and Linnæus eleven ſpecies.

The firſt ſort, mentioned by Mr. Miller, is the winter *wheat* without awns, or common *wheat*, which is ſown in moſt parts of England; the ſpikes or ears of this are long; the grains are ranged in four rows, and lie over each other like the ſcales of a fiſh; the chaff is ſmooth, and is not terminated by awns or beards. The ſecond ſort is called ſummer or ſpring *wheat*, which ripens much earlier than the other, and therefore has often been ſown in the ſpring of the year; but in a wet ſeaſon, it grows tall, and has very thin grains; ſo that, unleſs the winter corn is injured, the practice of ſowing *wheat* in the ſpring is rarely uſed. The third ſort is called in ſome places grey *wheat*, in others duck bill *wheat*, and grey pollard; and in Suſſex is generally known by the title of Fuller's *wheat*: this ſort grows very tall, and if it is ſown too thick, is apt to lodge with rain and wind, as the ears are large and heavy; the awns are long, and the chaff hairy, which detains the moiſture; and for this reaſon many people do not chuſe to cultivate it; but where the roots are at a proper diſtance, they will put out many ſtalks, and the ſtalks will be ſtronger; and the grain of this ſort produces more flour in proportion than any of the other ſorts. The fourth ſort is more cultivated in Oxfordſhire and Berkſhire than in any other part of England; the ears are formed like a cone; whence it has had the title of cone *wheat*. Of this ſort there are the white and red. The awns are long and rough; and hence the farmers ſay it guards the grain from birds, and have therefore been induced to ſow it near incloſures, where there are ſhelters for birds. Mr. Tull prefers this ſort for ſowing in drills; but Mr. Miller obſerves, that he has ſeen the third ſort anſwer much better in the horſe-hoeing huſbandry.

It is not eaſy to determine where *wheat* grows naturally; but it has been generally ſuppoſed that Africa is the country; becauſe in the earlieſt accounts of *wheat*, mention is made of its being tranſported from thence to other countries; and Sicily was the firſt country in Europe where this grain was cultivated. However, it has been very juſtly obſerved by the ancients, as well as moderns, that *wheat* will grow in almoſt any part of the world, and that, as it is the plant moſt neceſſary to mankind, ſo it is the moſt general and the moſt uſeful. It grows well not only in the temperate climates, but in the very hot and very cold ones; and when ſown in places where it never grew ſpontaneouſly, ſucceeds as well as where it has been always common.

The ſucceſs of our crops of *wheat* in America plainly prove this; and in Peru and Chili in particular, where, though thoſe countries were very well inhabited, it never was known till the Europeans brought it in, it produces as large crops as in any part of Europe.

Wheat ſhould be ſown in autumn, and always when the ground is moiſt. In the downs of Hampſhire, Wiltſhire, and Dorſetſhire, farmers begin to ſow their *wheat* in Auguſt, if any rain has fallen; in low ſtrong lands, ſome think it ſufficient to get the *wheat* into the ground by the middle of November; nay, it is ſometimes Chriſtmas, or even later, before all the *wheat* is ſown. But this late *wheat*, beſides being apt to run too much to ſtraw, eſpecially if the ſpring be moiſt, is liable to be thrown out of the ground by froſts. In general, all *wheat* ſucceeds beſt upon ſtrong ſoils, eſpecially if they have been well drained, ſo that the corn lies dry; but as ſome ſorts of this grain thrive better in ſome ſoils than in others, particular attention ſhould be had to the nature of the ſoil in the choice of the grain. Some perſons have been curious enough to procure their ſeed *wheat* from Sicily, and it has ſucceeded very well; but the grain of this ſpecies has been too hard for our Engliſh mills to grind.

The beſt time for ſowing *wheat* is about the beginning of September, eſpecially if any rain has fallen; a circumſtance ſo eſſential, that, if the earth be very dry, the farmer had better ſtay till ſhowers have moiſtened his ſoil, than put his corn into ground where it will not grow before it has been wet, whatever be the length of time. Mr. Mortimer ſays, he has known *wheat* to be ſo muſtied and ſpoiled by lying in the ground, before rain came, that it has never grown at all; adding, that he has alſo ſeen very good crops of *wheat* from ſeed ſown in July. At all events, the huſbandman ſhould finiſh the ſowing of his *wheat* by the middle of October. The land which is uſually alloted for *wheat*, is laid fallow the ſummer before the corn is ſown, during which time it is ploughed two or three times, to bring it into a tilth;

and the oftener and better the ground is ploughed, and the more it is laboured with harrows between each ploughing, to break and divide the clods, the better will be the crop, and the fewer weeds will be produced. The dung likewiſe ſhould never be laid on the land faſter than it can be ploughed in; for one load of dung ſo managed, is better than three in the uſual method of ſpreading it on the ground, and letting it lie expoſed to the ſun for a conſiderable time, before it is ploughed into the ground. Early ſowings require leſs ſeed than late ones; becauſe the plants then riſe better, and require ſtrength to reſiſt the winter's cold. More ſeeds ſhould always be allowed for poor lands than for thoſe that are rich; becauſe a greater number of plants will periſh in the former. Rich lands, ſown early, require the leaſt ſeed of any. Another circumſtance which the farmer ſhould carefully attend to in ſowing, is, that his eſtimate of ſeed be formed, not from the capacity of any particular meaſure, but from the number of grains which that meaſure will contain; becauſe the grains of ſome crops of *wheat* are much larger than thoſe of others, though of the ſame ſpecies, and perhaps equally good. It is very natural to ſuppoſe, that a large grained *wheat* will produce larger and finer plants, and larger grain, than a ſmall grained one; but experiments have proved, that the ſmalleſt grained *wheat* produces as large plants as the largeſt, and thoſe with as great ears and as big ſeeds; but the young plants appear ſmaller and poorer. In the choice of the ſeeds for ſowing, particular attention ſhould be paid to the land upon which they grew; for if it is light land, the *wheat* which grew upon ſtrong land is the beſt, and *vice verſa*. See *Change of* SEED, and *Steeping of* SEED.

Inſtead of the uſual allowance of three buſhels of ſeed-*wheat* to an acre of land, repeated trials have ſhewn, that half that quantity is generally more than ſufficient: for the future plants, being crouded together by being ſown too thick, and not having ſpace enough allowed them for their ſuſtenance, cannot yield ſo plentiful a crop as they would otherwiſe produce. A fair trial, ſays Mr. Miller, made with proper care, would ſoon convince farmers of their error in this reſpect; for if they examine a field of corn ſown in the common way, they will find few plants with more than two or three ſtalks, unleſs by chance, where ſome of them ſtand ſo as to have room to ſpread: theſe, indeed, will have ſix, eight, or ten ſtalks, and frequently many more. But a field of *wheat*, ſown with only a buſhel of good corn, has been known to be well covered with healthy, vigorous plants, each of which has had from ſix to fourteen, or more, ſtalks, crowned with long, well-nouriſhed ears, full of fine plump grain, of which it has yielded a much greater quantity than any of the neighbouring grounds ſown with the common allowance. If the land is good, and the roots ſtand at a proper diſtance from each other, few of them will produce leſs than the above mentioned number of ſtalks and ears. But farmers think they ſhall have no crop, if the ground is not covered with the blades of corn by the ſpring; whereas if they would have patience to wait till the roots put out their ſtems, they would be convinced of the contrary; eſpecially if they would draw a weighty roller over the *wheat* in March, which would make it ſpread, and cloſe the earth to the roots, ſo that they would produce the more ſtalks. More ſeed is commonly ſown upon grounds newly broken up, than upon that which has been longer in tillage.

As *wheat* remains a longer time upon the ground than moſt other ſorts of corn, it requires a greater ſtock of nouriſhment to lengthen and fill the ears; and, therefore, if the dreſſing is exhauſted in winter, the corn will have but ſhort lean ears, nor will the grain afford much flour; ſo that it often happens that a light dreſſing of ſoot in the ſpring, at the time the *wheat* is beginning to ſtalk, is more ſerviceable to the crop than a dreſſing of dung laid on the land before it is ploughed. Beſides, deep ploughing, where the ground admits of it, will alſo be of great benefit to the corn; for the ſmall fibres of the roots, which are the mouths that ſupply the nouriſhment, extend themſelves very deep (more than three feet) into the ground; and, therefore, it is of great advantage to the crop to have the ground ſtirred and looſened to a proper depth; as the roots will thus find a ſupply of paſture for the nouriſhment and augmentation of the ears, at the time when they are forming, and when it is moſt required.

The general practice is to ſow *wheat* under furrows, which is moſt adviſeable, if the ſoil is ſhallow, to prevent the plants being thrown out by the winter froſts, or their roots being left bare by the drying winds of ſpring. Some ſow in broad caſt, either with a ſingle caſt, or double bout, harrowing once between; after which the ground is again harrowed ſeveral times, till the ſeed is well covered. However, in this manner of ſowing, much of it will become the prey of birds; and, on the other hand, in planting the corn deep, there is the greateſt danger of its being eaten off by worms between the grain and the blade. It is very neceſſary to guard againſt the rooks, juſt at the time when the *wheat* is ſhooting up. Theſe miſchievous birds perceive it beginning to ſprout much ſooner than the farmer can, and are led by the ſhoot to pick it up. They muſt, therefore, be carefully kept off the ground for a week or ten days at this time, till the blade grows up, and the grain is ſo exhauſted of its flour, as to be of no value to them, and they will give themſelves no trouble in picking it up. The rooks never moleſt the *wheat* which is ſown about Michaelmas; for at this ſeaſon there is ſo much grain of the late harveſt ſcattered about the fields, where it has grown, that they find it more eaſy to gather up that, than to ſearch under ground for it in the new-ſown lands.

No part of huſbandry requires the farmer's attention more than the keeping of his land free from weeds. For this purpoſe Mr. Miller recommends the method now practiſed by good kitchen-gardeners; that is, the making uſe of a ſmall kind of hoes for cleaning the *wheat* early in the ſpring, before the ground is covered with the blades of corn. With theſe inſtruments, all the low as well as the tall weeds will be cut up; and if it is performed in dry weather, the weeds, being then ſmall, will ſoon die. Where the ground happens to be very full of weeds, it may be neceſſary to go over it a ſecond time, about a fortnight after the firſt hoeing, to cut up any remaining weeds. By laying the ground clean at this time, the corn will not be robbed of its nouriſhment; and there will not be time for the weeds to grow, ſo as to prejudice it much afterwards; for the ground will be ſo much ſhaded by the corn, as to keep down the weeds; ſo that they cannot have time to ripen their ſeeds before harveſt. If the roots of corn are cut up where they are too cloſe, at the ſame time, this will be found of great ſervice to thoſe that remain. Both the advantages of having the plants of corn at proper diſtances from each other, and of keeping them quite free from weeds, which cannot be completely obtained in the common method of ſowing, are nevertheleſs fully attainable in the new huſbandry.

We ſhall here add, that Mr. Duhamel and Mr. Miller concur in condemning the practice of turning ſheep into the fields of *wheat*, to eat it down, when it is thought to be too rank; becauſe, they ſay, the leaves or blades of corn are neceſſary to draw in nouriſhment from the air and dews, for the increaſe of the ſtalk and ear. To ſatisfy himſelf of this, Mr. Miller cut off the leaves of ſome plants of *wheat*, alternately, early in the ſpring, and always found the ſtalks of theſe plants much ſmaller, the ears ſhorter, and the grain poorer, than thoſe of the intermediate plants, whoſe blades were not cut. Several experiments made by Mr. Duhamel have proved, not only that all plants are impeded in their growth, and rendered leſs perfect in their productions, but often even killed, by ſtripping them of their leaves; and this is confirmed by Mr. Miller, who adds, that he has frequently obſerved in gardens, that plants, diveſted only of their lower leaves, plucked off by ignorant perſons, upon a ſuppoſition of their drawing the nouriſhment from the head, have been greatly weakened thereby. The ſame will undoubtedly hold good with reſpect to corn; beſides which, cattle, and particularly ſheep, will often bite ſo cloſe, as to deſtroy the crown of the plant, from which its future growth ſhould proceed. However, in many places, and particularly in the iſle of Thanet, where there are excellent farmers, this practice is continued; for when the *wheat* is rank, and the weather dry, they feed it down with their ſheep, which they think makes the *wheat* branch more, and ſettles the earth about the roots of the plant. An experienced farmer obſerves, that ſheep ſhould never be turned into *wheat* after the middle of February: the beſt time, in general, is the latter end or middle of January. Muſ. Ruſtic. vol. iii. p. 151.

Many experiments have been tried to the great purpoſe of multiplying grain, ſome of which are commemorated with an account of their different ſucceſs, in the Philoſophical Tranſactions. Digby mentions a plant of barley, all riſing from one corn, which, by ſteeping in water in which was a ſmall quantity of ſalt-petre, and afterwards being watered every day with the ſame water, brought forth two hundred and forty-ſix ſtalks, and above eighteen thouſand grains; and the laſt edition of Camden mentions a thing very obſervable of this kind, though from another cauſe, which is, that the corn ſown in a field in Cornwall, where a battle had a little time before been fought in the civil wars, brought forth four or five ears upon every ſtalk.

Mr. de la Pryme has fairly tried the common and many other methods, which though they have not had ſuch immenſe products for their ſucceſs as theſe related above, yet may ſet the world right as to what they have to expect from the different ingredients generally uſed, and which of them promiſe moſt fairly for ſucceſs. His trials were made with alum-water, brimſtone-water, ſolution of ſalt of tartar, ſolution of the caput mortuum of ſal ammoniac, common urine, a ſolution of the common nitrum murale, or ſalt of old walls, a ſolution of ſaltpetre in water, and noſtoch, or ſtar-jelly; from which it appeared, that all theſe ſteepings did no viſible ſervice to grain, but that many of them were injurious.

It ſeems very plain, from ſuch experiments, that the multiplying of *wheat* and other grain is rather to be expected from the ſowing of it on a good ſoil, and at a proper diſtance, than from any of theſe liquors contrived to ſteep the ſeed-grain in. As moſt of the liquors contrived for this purpoſe are, however, harmleſs, it will be worth the farmers while to try them at times, and in a regular manner, ſowing the different parts of the ſame field with ſteeped and unſteeped grain, in the ſame proportion.

The experiment of the ſteeping of the grain in the offals of animal ſubſtances, carries with it evident ſucceſs; but we are to remember, that only a third part of the quantity of ſeed is to be uſed to the ſame quantity of ground in that method, as is in the common way; and it is more than poſſible that the increaſe which attends this method, may be owing to this diſtance of the plants, rather than to the good done by the water. Phil. Tranſ. N° 281. p. 1212. See *Steeping of* SEED.

It is evident from experience, that the multiplication of *wheat*, that is, the quantity of *wheat* produced from every grain, is very different in different places, and according to various accidents. It has been often attempted to arrive at the art of cauſing every grain of *wheat* to yield its utmoſt poſſible increaſe; and if this could be brought about on eaſy terms in the large way, ſo as to affect whole fields, it is evident that the advantage would be very conſiderable. This has been attempted by Vallemont in ſeveral different ways, but with moſt ſucceſs in the following: let there be collected together as large a quantity as may be of the bones, ſkins, feathers, and other parts of animals, which are thrown away as refuſe, together with the refuſe of foods and wearing apparel, ſuch as old ſhoes, gloves, or whatever elſe of this kind comes in the way, though horns and hoofs of all animals are excellent; and, in ſhort, let every thing be collected that abounds with ſalts: when a large parcel of theſe things is got together, let them be ſeparated into two or three heaps, according to their different natures; the hardeſt kinds into one heap, the ſofteſt into another, and ſo on. Let each of theſe parcels be put into a large wooden veſſel, and a ſufficient quantity of rain or river-water be poured on them, that they may ſwim at liberty in it. When the water has ſtood ſo long, that it ſtinks very much, ſtrain it off, and keep it in veſſels for uſe. The ſofteſt bodies will give the water this ſtink in five days; the moderately hard ones in ſeven days; and the hardeſt of all in nine days. Theſe laſt are to be broken to pieces before they are put into the water. The liquor prepared from theſe is called the *prepared water*.

Let a quantity of plants of any kind, no matter what, be burnt with their flowers and ſeeds, and let a lixivial ſalt be made from the aſhes in the common way. Then take as many pounds of ſalt-petre as there are acres of land to be employed, and let each pound be diſſolved in twelve quarts of water, and to this ſolution add a ſmall quantity of the lixivial ſalts of the plant. This liquor the author calls the *univerſal matter of vegetation*. When both the liquors are thus made, mix together an equal quantity of each of them; that is, of the prepared water, and of the univerſal matter; and let the whole quantity be ſo much as will ſerve thoroughly to wet and ſoak the quantity of corn that is to be ſown; this is to be ſo much, that it ſtands two fingers breadth above the grain. When the grain and the liquor are thus mixed, the light grains, which will not grow, will ſwim at the top, and may be ſkimmed off, and ſeparated from the reſt. The grain at the bottom of the veſſel is to be ſtirred up and turned every two hours: in this manner, the grain is to be ſoaked twelve hours, and after this the water is to be poured off, and the grain dried, by laying on a ſieve, or being thin ſpread on the floor; and after two or three hours it is to be ſown in the common way.

The quantity of ſeed neceſſary for an acre of ground, when thus ſteeped, is only one third of the quantity commonly uſed, and this will produce infinitely more grain, and is as much as the land can bear. The liquor, poured off from the ſoaking of this quantity of grain, is not to be thrown away, but muſt be ſaved, for it will ſerve as well for ſeveral more parcels as it did for this.

This was tried in the year 1706, which was the year after the book came out, in ſeveral parts of France, and that with ſo much ſucceſs, that the author got great reputation, and his book was tranſlated into the German, and ſome other languages. Whether the method was found afterwards not to ſucceed ſo well, or whether it was dropped through mere inadvertence, the thing has not been regarded ſince that time; but the proceſs is at once ſo cheap and ſo eaſy, that it ſhould ſeem extremely worth while to bring it into trial again. Vallemont Curioſ. de Vegetat.

In the Philoſophical Tranſactions, vol. lviii. for 1768, we have an account of ſome experiments made by Mr. Charles Miller, of Cambridge, on the multiplication of *wheat*, by diviſion and tranſplantation. In the firſt inſtance near two thouſand ears were produced from a ſingle grain. In another inſtance, a ſingle plant was ſeparated into eighteen parts, each of which was planted ſeparately: theſe were again taken up and divided; and the ſecond diviſion produced ſixty-ſeven plants, which remained through the winter; another diviſion of them was made in the ſpring which produced five hundred plants. Theſe were, in general, ſtronger than any of the *wheat* in the fields. Some of them produced upwards of a hundred ears from the ſingle root; and many of the ears meaſured ſeven inches in length, and contained between ſixty and ſeventy grains. The whole number of ears produced from one grain of *wheat* was 21,109, which yielded three pecks and three quarters of clear corn; the weight of which was forty-ſeven pounds ſeven ounces, and the number of grains about 576,840. If a ſecond diviſion had been made in the ſpring, Mr. Miller thinks the number of plants would have amounted, at leaſt, to 2000, inſtead of 500; and the produce much enlarged.

There are four ways of augmenting the crops of *uheat*, not in the number of the plants, but in the ſtalks, ears, and grains.

The firſt is by increaſing the number of ſtalks from one, two, or three, to thirty or forty in each plant, in ordinary field land; and the crop is augmented by bringing up all theſe ſtalks into ear, which is the ſecond way; for if it be diligently obſerved, it will be found that not one half of the ſtalks of *wheat*, ſown in the common way, ever come to ear at all; nay, if a ſquare yard of ſown *wheat* be marked out, and the ſtalks thereon numbered in the ſpring, it will be found that no leſs than nine parts in ten of them are wanting at the harveſt-time.

An experiment of the advantage of this augmentation was made by Mr. Tull in rows of *wheat* that were equally poor; one of theſe rows were increaſed ſo much, as to produce more grains than ten of the other, by bringing up more of its ſtalks into ears, and alſo by augmenting the ears to a much greater bigneſs, which is the third way; for it is very certain that the ears will be much larger or much ſmaller, according to the quantity of nouriſhment that is given them.

The fourth and laſt way of increaſing the crops of *wheat*, is by cauſing the grain to be much larger in the ears. This can no way be done ſo effectually as by late hoeing, eſpecially if it be done juſt after the *wheat* is gone out of the bloſſom. Others, however, have recommended hoeing, juſt before the *wheat* blows. By this means the grains will weigh twice as much as thoſe produced in the ſame ſort of *wheat*, when this late hoeing has been omitted; their number, at the ſame time, is the ſame in the ear; and as the *wheat* is ſold not by tale, but by meaſure, the farmer's gain is double in this caſe, the *wheat* meaſuring juſt twice as much as it would otherwiſe have done.

Thus by increaſing the number of the ſtalks, bringing more of them up into the ear, making the ears larger, and the grains larger, plumper, and fuller in every ear; the method of horſe-hoeing, by which alone this can be effected, makes a larger crop out of the tenth part of the number of plants than in the common way: but all theſe advantages will be loſt by thoſe who, though they give into the horſe-hoeing way, yet will not allow the ſix feet intervals between the rows; for it is owing to this great ſpace of ground alone, that as much nouriſhment may be given to the *wheat* as the farmer pleaſes.

In the method by theſe wide intervals, we can raiſe a larger crop of *wheat* with leſs labour, leſs ſeed, no dung, and no fallowing; but not without a competent quantity of earth, which is the cheapeſt thing given to corn: the earth of a whole good acre being but about the tenth part of the expence, and of indifferent land but about a twentieth.

The crop enjoys all the earth; for between the laſt hoeing and the harveſt, there remains nothing but a ſpace of empty mould in the middle of the intervals. Farmers do not grudge the price of three or four pounds in the buying and carriage of dung for an acre; but they think themſelves undone if they afford an extraordinary eighteen-pennyworth of earth to the wide intervals of an acre, not conſidering that earth is at once the beſt and the cheapeſt entertainment that can be given to plants; for at five and ſix pence rent, which is common to ſome land in many parts of the kingdom, the whole earth belonging to each of the rows coſts only ſix pence; that is, a penny for a foot broad and ſix hundred and ſixty feet long, that being the ſixty-ſixth part of an acre. But the vulgar count this expence of a foot breadth of ground not as they ought, only as part of the rent, but as an eleventh part of their own uſual charges added to the rent.

If the intervals are narrower in deep land, there might be earth enough in them; but there would not be room enough to pulverize it.

The horſe-hoe, well applied, ſupplies the uſe of dung and fallow; but it cannot ſupply the uſe of the earth, though it can infinitely increaſe the virtue of it, where there is any reaſonable quantity.

The mean price of *wheat*, between dear and cheap, is reckoned by Mr. Tull at five ſhillings a buſhel; and therefore an acre of land that ſhould produce every year eight buſhels, without any expence, would be accounted a very profitable one. Now an acre of land drilled with *wheat*, and horſe-hoed, will produce ſixteen buſhels of *wheat* eaſily, with the expence only of ten or fifteen ſhillings, and this is a third part more profitable.

It is commonly computed that the farmer cannot live, if *wheat* be ſold under five ſhillings a buſhel; he muſt therefore keep his *wheat* when it is ſold cheaper than that in the markets; and the common method is to keep it in the ſtraw, taking care to keep away the mice. The ſecureſt method of all is to dry the *wheat* in the grain; but this many are afraid to practiſe.

Some people, who have known this ſecret, have made great profit by buying up the *wheat*, when under three ſhillings a buſhel in the markets, and then preſerving it in this manner till a dearer time. The method is to dry it in a malt-kiln; but with no other fuel than *wheat*-ſtraw, never ſuffering it to have any ſtronger heat than that of the ſun. The longeſt time the *wheat* need lie in this heat, is twelve hours, but ſometimes four hours are ſufficient; according to its dampneſs when bought, and the time it is intended to be kept, it requires a longer or ſhorter drying. The only thing that cauſes the decay of *wheat*, and gives way to that devouring animal the weevil in it, is its too great dampneſs; this is carried off in this manner, by a heat no greater than that which the ſun might have given to the grain. The vegetating power thereſore is not deſtroyed by this; and the bakers have acknowledged that the flour of this *wheat* does rather better for the working into bread, than that of freſh *wheat*.

Though all ſorts of vegetables may have great benefit from the hoe, becauſe it ſupplies them with plenty of food at the time of their greateſt need; yet they do not all equally require hoeing; but the plant that lives longeſt ſhould always have the greateſt ſtock of nouriſhment provided for it, and ſhould therefore be moſt frequently hoed of any plant. *Wheat* generally lives, or ought to live, longer than any other corn; for if it be not ſowed before ſpring, its grain will be thin, and will have but little flour in it; and when it is ſown late in the winter it is in great danger of being killed by the froſts, while weak and tender.

To prevent theſe inconveniences, *wheat* is generally ſown in autumn; and by this means, having thrice the time to be maintained that ſpring-corn hath, it requires a larger ſupply of nouriſhment, in proportion to that longer time; not that the *wheat* in its infancy conſumes the ſtock of food that it afterwards does, but becauſe, during that long interval between winter and the ſpring ſeed-times, moſt of the artificial paſture, or benefit from former tillage, is loſt both in light and ſtrong lands.

This is the reaſon why all that extraordinary pains in fallowing and dunging of the ſoil is neceſſary for *wheat*; and yet all this trouble and expence are ſo far loſt, that if a part of the ſame field unfallowed and undunged be ſown in April, after good ploughing, it will raiſe as fair a crop in all reſpects as the other, only that the flour will be in leſs quantity, by wanting time in the groundf or filling the grains.

Poor light land, in the common way of huſbandry, muſt be extremely well manured, in order to the maintaining of *wheat* a year, which is the uſual time that it is in it; and if it be ſown late, the greater part of it uſually periſhes, not being able to ſurvive the winter while ſo poor, and on ſuch land; and if it be ſown very early on ſtrong land, though rich, well tilled, and dunged, the crop will be worſe than on poor light land ſown early. The new method of horſe-hoeing gives both to ſtrong and to light land all the advantages neceſſary, and takes off all the diſadvantages of both. By this method the ſtrong land may be planted with *wheat* as early as the light, if ploughed dry; and the hoe-plough, if rightly applied, will be able to give it nouriſhment equal to that of dung in both ſorts of land.

The tops of the ridges for the drilling of *wheat* muſt not be left quite ſo narrow and ſharp as they are for drilling of turneps; *wheat* being generally to be ſowed in treble rows, and the turnep only in ſingle ones. In reaping the *wheat* thus ſown, it is to be cut as near to the ground as poſſible, and this is eaſier done in this than in *wheat* ſown in the common way, becauſe in this drilled method the ſtalks all ſtand cloſe together. When the *wheat* is cut thus low in the reaping, the ſtubble is no great impediment to the preparing of the land for the ſucceeding crops.

As ſoon as conveniently may be, after the carrying off a crop of *wheat*, if the trench in the middle of each wide interval be left deep enough by the laſt hoeing, the farmer is to go as near as he can to the ſtubble with a common plough, and turn two large furrows into the middle of the intervals, which will make a ridge over the place where the trench was; but if the trench be not deep enough, it is beſt to go firſt in the middle of it with one furrow: this, with two more taken from the ridges, will be three furrows in each interval; and this ploughing is to be continued as long as the dry weather laſts, and then the whole is to be finiſhed by turning the partitions on which the laſt *wheat* grew up to new ridges, which is uſualy done at two great furrows; theſe laſt furrows, which complete the ridges, may be ploughed in wet weather. By this ſort of management, the *wheat* being planted in rows, at ſix feet intervals, the ſame piece of ground will produce every year a new crop of *wheat* in the intervals, without any fallowing or manure, only by means of ſufficiently breaking the ſurface with ploughing and horſe-hoeing.

It is a general rule, that all ſorts of grain proſper beſt where they are ſown at a time when the ground is ſo dry that it is broken to a ſort of powder by the plough. *Wheat alone* is an exception to this rule; and the reaſon of this is, that as *wheat* is to endure the ſeverities of a whole winter, after it is ſown, it therefore ſucceeds beſt by being ſown in wetter weather, when the ground is not to be broken ſo very ſmall, and is preſſed down cloſe upon the ſeeds, and covers them better. If *wheat* were as hardy as rye, and its roots were as hardy and patient of the cold, it might be ſown in as dry a ſeaſon as the rye, and would profit as much by it; but, on the contrary, it requires ſo much covering, that it is a very good practice of ſome farmers to turn their ſheep over very light land, as ſoon as it is ſown with *wheat*, in order to tread the ſurface of it hard, and then the cold of winter cannot ſo eaſily kill or penetrate the roots. And as *wheat* requires to have the earth lie harder on and about it in the winter, ſo it alſo requires more dung, or ſomewhat elſe, to diſſolve the earth about its roots, after the cold weather is paſt, than the rye does, whoſe roots were not ſo confined by the preſſing of the earth about them.

It is another general rule, that all vegetables thrive beſt when ſown on freſh tilled ground, immediately after it is ploughed; but *wheat* is alſo an exception to this rule; for the beſt way for it is to plough the ground when very dry, and then to let it lie, even though it be many weeks, till ſome rain come to moiſten it, and then drill the *wheat*. The harrows and the drill, in this caſe, will move a ſufficient part of the ground, which will ſtick together for the defence of the ſmall roots during the winter, the reſt of the mould lying open, and divided underneath until ſpring, to moiſten and nouriſh them.

There is a ſort of binding ſand, which requires not only to be ploughed dry, but to be ſowed dry alſo, or elſe the *wheat* will dwindle in the ſpring, and fail of being a good crop. What is meant here by dry ploughing, is not, however, that the ground ſhould be ſo dry that the duſt ſhould fly; but it muſt not be ſo wet as to ſtick together in lumps; neither ſhould the ground be drilled when it is as wet as pap: it ſuffices that it is moiſt; only the lighter lands ought to be more moiſt than the ſtrong.

Strong land ploughed wet in November, will be harder in the ſpring than if ploughed dry in Auguſt, though it would then have three months longer to lie. See HOEING, and HUSBANDRY.

The horſe-hoeing huſbandry practiſed and recommended by Mr. Tull has been generally rejected by our farmers; who ſtill adhere to the BROAD-*caſt* huſbandry. Innovations,

tions, however advantageous, are introduced ſlowly, and require many repeated experiments to evince their uſe, and eſtabliſh their credit. It is much to be wiſhed that his new method of huſbandry were univerſally practiſed; for thoſe, who have made ſufficient trial of it, have found their crops anſwer much better than in the common, or old method of huſbandry; and the French, deriving their information concerning it from Mr. Tull's book, have ſet a laudable example of ardour in the proſecution of it. Nor have there been wanting many in our own country who have borne ample teſtimony to its utility; notwithſtanding the prejudice at firſt conceived againſt it; a prejudice partly owing to Mr. Tull's poſitive aſſertion, that the ſame land would nouriſh the ſame ſpecies of plants without changing the crops, for ever, and this without the aid of manure.

Mr. Miller recites the following experiments, which evince the utility of Mr. Tull's method of huſbandry in the culture of *wheat*. The firſt experiment was in a field of *wheat*, which was ſown partly in broad-caſt in the common method, and partly according to Tull's method. Thoſe parts of the field that were ſown in Mr. Tull's method, were in rows at two feet diſtance, and ſtood thin in the rows; the roots of the *wheat* in theſe ſpots had from ten to thirty ſtalks upon a root, which continued upright till the corn was reaped; whereas few of the roots in the common method had more than two or three ſtalks, and moſt of theſe were lodged before harveſt; ſo that upon trial of the grain when threſhed, there was near a third part more in weight and meaſure, than from the ſame extent of ground, taken in the beſt part of the field ſown in the common way.

Another trial was made in ſowing of the corn at different diſtances, with ſome ſown in two parts of the ground broad-caſt. The event was, that all which was ſown broad-caſt in the uſual way was lodged, as was alſo moſt of that where the rows were ſix or nine inches aſunder: thoſe which ſtood at a foot diſtance eſcaped better; but the rows two feet aſunder were the beſt, and the produce much greater than any of the other; which plainly ſhews the abſurdity of that practice, in ſowing a great quantity of ſeeds to have a better produce, which is the opinion of moſt of the old farmers.

It may be proper to add, that Mr. Tull began his ſcheme of ſucceſſive *wheat* crops with four rows; afterwards he found that three rows were better, and was in that practice of drilling three rows upon a ridge, when he publiſhed his Eſſay in 1733. Upon farther experience he found, that two rows produced as good crops as three or four, and were more eaſily managed. This he recommends as his laſt and beſt method; and he altered his drill-plough to his practice of planting only two rows upon a ridge, of which he gives a figure and deſcription in his Addenda, publiſhed in 1738, and Concluſion, publiſhed in 1739. By this alteration, his drill is much leſs complicated, and leſs difficult to manage, than that for planting three rows, deſcribed in his Eſſay. However thoſe, who are promoting the new huſbandry abroad, have adopted the practice of planting three rows upon every ridge; and the drill-ploughs invented by M. Duhamel and M. de Chateauvieux, are conſtructed for ſowing three rows.

In the additions made by Mr. Tull to his Eſſay, there occur ſeveral material improvements in the manner of hoeing and cultivating *wheat*, and other crops; and we may here ſee, that the reports of his bad ſuceeſs, in repeated *wheat* crops, are without ſufficient foundation. In his Addenda he informs us, that the real produce of an acre of horſe-hoed *wheat* was thirty-two buſhels; whereas from a computation of the crop on his other hundred and ſix acres, the amount appears, upon an average, to have been about twenty buſhels of *wheat* per acre. He adds an account of other experiments, which prove, that pulverization by inſtruments very much exceeds the benefit of common manure; and concludes upon the whole, from a practice of thirteen years, that he has never had the leaſt reaſon to ſuſpect the truth of his principles.

In his Eſſay he directs, that the hoe-plough ſhould be brought as near as poſſible to the rows, at firſt, and when the plants are young; but that the ſubſequent hoeings ſhould be at ſome diſtance from the rows, leſt the plough ſhould tear off too many of the roots, and deſtroy the plants; and alſo that the laſt hoeing ſhould throw the earth of the intervals up to the plants, which he thought neceſſary for their better nouriſhment, when they were grown large. But his laſt practice was different in both theſe reſpects. For in the Concluſion to his Eſſay, p. 272, he ſays, "at the ſecond hoeing the plough goes in the furrow of the firſt, making it deeper and nearer to the *wheat*; the third hoeing fills up this furrow; and then, at the fourth hoeing, the plough goes in the ſame place as the ſecond, turning the mould into the intervals. He adds, it is remarkable, that though the furrows of the ſecond and fourth hoeings be deep and near to the rows, ſeeming to deprive the *wheat* of the mould which ſhould nouriſh it; whence one would imagine, that theſe furrows, lying long open, ſhould weaken or ſtarve it; but, on the contrary, it grows more vigorous; and it is the obſervation of my ploughmen, that they cannot at theſe hoeings go too near to the rows, unleſs the plough ſhould tear out the plants."

The produce of an acre of *wheat* is various, according to the goodneſs of the ſoil. In ſome of the ſhallow, chalky, down lands, where there have been near four buſhels of corn ſown, Mr. Miller ſays that he has known the produce not more than double of the ſeed, which is not ſufficient to defray the expence. But upon good land, where the corn has ſtood thin upon the ground, he has known eight or ten quarters reaped from an acre, over the whole field, and ſometimes much more. Mr. Miller has been informed by perſons of credit, that on good land which was drilled and managed with the horſe-hoe, they have had twelve quarters from an acre of land, which is a great produce; and this is with greater certainty, if the ſeaſons prove bad, than can be expected by the common huſbandry. See HUSBANDRY.

Wheat is known to be ripe, when its ſtraw has turned yellow, its ears hang, no greenneſs appears in the middle of them, and the grain is hard when bitten. It was formerly a cuſtom among farmers to delay reaping their *wheat* till it was very ripe; but they now find their account in cutting it greener; for ſuch *wheat* has a better colour than that which is thoroughly ripe, and ſells for more money at market: it is alſo ſaid, that *wheat* reaped early is heavier by the buſhel than the ſame *wheat* when it ſtands to be thoroughly ripe.

It is a well known maxim, that *wheat* ſhould be left for ſome days in the field, after it is cut, before it is houſed; this the farmers think, and not without reaſon, improves its quality; the dews plumping the kernels, and the ſun bringing it to a proper and perfect ſtate of maturity.

An ingenious farmer ſuggeſts, that when *wheat* is wet, and by reaſon of an unfavourable ſeaſon in danger of growing, it is moſt adviſeable to carry it home, and to provide cutting boxes, in which the ears ſhould be cut off from the wet ſheaves; theſe ſhould be put up looſely in ſacks, and gradually dried in a malt-kiln. By this management, he ſays, the farmer will find great advantages; and his *wheat* will, with a very inconſiderable additional expence, be nearly, and ſometimes quite as good in a wet harveſt, as if it had been houſed in ever ſuch good weather. Miller's Gard. Dict. Tull's Horſe-hoeing Huſbandry. Farmer's Dictionary.

By 10 Geo. III. cap. 39. in force for ſeven years, and 17 Geo. III. cap. 44. in force for ſeven years more, the juſtices at Michaelmas ſeſſions, yearly, ſhall order returns to be made weekly of the prices of *wheat*, rye, barley, oats, and beans (and in Scotland of bear or bigg), from ſuch market-towns as they ſhall think proper, and appoint a proper perſon to make ſuch returns. In London, the meal-weighers ſhall take an account of the prices of *wheat*, &c. at the markets within the city, and return the average prices weekly to the perſon appointed to receive the ſame; and a ſtandard Wincheſter buſhel of eight gallons ſhall be kept at each market-town, from whence the return ſhall be made. The commiſſioners of the treaſury ſhall appoint a fit perſon to receive the returns at the treaſury, who ſhall enter them in a book, and once in every week cauſe them to be publiſhed in the London Gazette; and four times in every year tranſmit a certificate to the clerk of the peace for each county or diviſion, and to the court of the mayor and aldermen of London, of the returns which have been ſeverally made.

The laws relating to the importation and exportation of *wheat*, and other CORN, are as follow. When corn doth not exceed the following prices, the cuſtom and poundage for corn imported ſhall be as follow: *wheat* not above 53*s*. 4*d*. a quarter, ſhall pay 16*s*. if above 53*s*. 4*d*. and not above 4*l*. it ſhall pay 8*s*. Rye, not above 40*s*. a quarter, ſhall pay 16*s*. Barley and malt, not above 32*s*. a quarter, ſhall pay 16*s*. Buck-*wheat*, not above 32*s*. a quarter, ſhall pay 16*s*. Oats, not above 16*s*. a quarter, ſhall pay 5*s*. 4*d*. Peaſe or beans, not above 40*s*. a quarter, ſhall pay 16*s*. 22 Car. II. cap. 13. But when the prices exceed theſe rates, then the duties, payable before this act, ſhall only be paid, viz. for every quarter of *wheat* imported 5*s*. 4*d*. of rye, 4*s*. barley or malt, 2*s*. 8*d*. buck-*wheat*, 2*s*. oats, 1*s*. 4*d*. peaſe or beans, 4*s*. 15 Car. II. cap. 7.

Whenever the price of middling Britiſh *wheat*, at the ports and places where *wheat* ſhall be imported, ſhall be at or above 48*s*. a quarter; rye, peaſe, or beans, 32*s*. barley, bear, or bigg, 24*s*. oats, 16*s*. all cuſtoms and duties payable on importation ſhall ceaſe; and in lieu thereof ſhall be paid on importation a duty of only 6*d.* a quarter for *wheat*; 2*d.* a hundred weight for *wheat* flour; 3*d.* a quarter for rye, peaſe, and beans; and 2*d.* a quarter for barley, bear, bigg, and oats; and the ſame may be carried coaſtwiſe, under the ſame regulations as corn, flour, or grain, of the growth of this kingdom. 13 Geo. III. cap. 43. Whenever the price of middling Britiſh *wheat*, at any port or place from whence the ſame ſhall be intended to be exported, ſhall be at or above 44*s.* a quarter, no perſon ſhall export, or cauſe to be laid on board for exportation, any *wheat*, *wheat*-meal, or flour, malt, bread, biſcuit, or ſtarch made of *wheat*. When the price of rye, peaſe, or beans, ſhall be at or above 28*s.* a quarter, no perſon ſhall export, &c. any rye, peaſe, or beans, ground or unground, or any bread or biſcuit made of rye, peaſe, or beans. When the price of barley, bear, or bigg, ſhall be at or above 22*s.* a quarter, no perſon ſhall export, &c. any barley, &c. or malt, bread, or biſcuit, made of barley, &c. And when the price of oats ſhall be at or above 14*s.* a quarter, no perſon ſhall export, &c. any oats or oatmeal, or malt, bread, or biſcuit, made of oats; under penalty of forfeiture of the commodities and veſſel, &c. and alſo 20*s.* for every buſhel of *wheat*, &c. the maſter or mariners aſſiſting ſhall on conviction be impriſoned for three months. 13 Geo. III. cap. 43. By the ſame ſtatute the former bounties on exportation ſhall ceaſe; and inſtead thereof there ſhall be allowed, on the exportation of corn or grain, either ground or unground, being the growth of this kingdom, and put on board in Britiſh ſhipping, the maſter, and at leaſt two thirds of the mariners, being his majeſty's ſubjects, the ſeveral bounties following; viz. when the price of middling Britiſh *wheat* ſhall be under 44*s.* a quarter, there ſhall be allowed a bounty of 5*s.* for every quarter of *wheat*, and 5*s.* for every quarter of malt, made of *wheat*. When rye ſhall be under 28*s.* a quarter, there ſhall be allowed a bounty of 3*s.* for every quarter of rye. When barley, bear, or bigg, ſhall be under 22*s.* a quarter, there ſhall be allowed a bounty of 2*s.* 6*d.* for every quarter of barley, bear, or bigg; and 2*s.* 6*d.* for every quarter of malt made of barley, &c. And when oats ſhall be under 14*s.* a quarter, there ſhall be allowed a bounty of 2*s.* for every quarter of oats, and 2*s.* 6*d.* for every quarter of oatmeal, computed at the rate of two hundred and ſeventy-ſix pounds avoirdupois to a quarter.

WHEAT, *brining of.* See BRINING.

WHEAT, *ſetting of.* See SETTING.

WHEAT, *buck, fagopyrum*, in *Botany*, a ſpecies of POLYGONUM in the Linnæan ſyſtem.

Buck-wheat is cultivated in many parts of England, and is a very great improvement of dry barren lands. The beſt ſeaſon for the ſowing of it is in May, and one buſhel of the ſeed is enough for an acre; the ground is to be dreſſed for it exactly as for barley; and if the ſoil is not very clean, it will yield a very large increaſe, as fifty buſhels an acre, and is excellent food for hogs and poultry. The flour of it is alſo very white, and mixed with wheat flour is eaten in ſome countries, and when broken in a mill, makes a fine addition to corn for horſes, making them ſoon grow fat. It is commonly late in the ſeaſon before it is ripe, but it is in no danger from ſtanding; when it is cut, it is uſually laid many days to dry before it is houſed. Beſides theſe uſes ſome people ſow it very thick, and ſuffer it to grow up till it is near flowering, they then plough it in, and it makes a very good land for wheat or rye. But the beſt way is, juſt before it bloſſoms, to feed it with cattle, eſpecally with milch-cows, which it cauſes to yield a great deal of milk, and that ſuch as affords very good cheeſe and butter. It is food for the cattle in the very drieſt time, when all the common graſs in paſtures is burnt up; and proves a very great improvement for the land. For this purpoſe they ſow it thicker than for others, ſometimes three or four buſhels on an acre. Mortimer's Huſbandry, p 137.

WHEAT, *cow, melampyrum*, in *Botany*, a genus of the *didynamia angioſpermia* claſs. Its characters are theſe: the flower has a permanent empalement of one leaf, which is tubulous, and cut into four ſegments at the brim; the flower is of the lip-kind, having an oblong recurved tube, compreſſed at the brim; the upper lip is formed like a helmet, and compreſſed and indented at the top; the under lip is plain, erect, and cut into three ſegments, which are unequal and obtuſe; it hath four awl-ſhaped ſtamina, which are curved under the upper lip, two of which are ſhorter than the other, terminated by oblong ſummits; in the centre is ſituated an acute-pointed germen, with a ſingle ſtyle, crowned by an obtuſe ſtigma; the empalement afterwards turns to an oblong, acute-pointed capſule, with two cells, encloſing two pretty large oval ſeeds. Miller reckons four, and Linnæus five ſpecies.

The *cow-wheat*, with purpliſh tops, is a delicious food for cattle, particularly for fattening oxen and cows; for which purpoſe it may be cultivated. The ſeed ſhould be ſown in the autumn, ſoon after they are ripe, otherwiſe they ſeldom grow the firſt year; they ſhould be weeded while young, and the cattle may be turned in upon it, as ſoon as the flowers begin to appear; but they ſhould be confined to a certain ſpace, and not permitted to run at large, and trample it about. In Weſt Frieſland and Flanders it grows plentifully among the corn. Miller.

WHEAT, *white cone*, a term uſed by our huſbandmen, to expreſs a peculiar kind of WHEAT, which is very ſtrong, and has a large ear.

It is the beſt kind for ſowing in fields ſubject to the blight; for the ſtalks of it being, for the moſt part, ſolid or full of pith, like a ruſh, not hollow, like thoſe of common *wheat*; the inſects that cauſe the blight, ſeizing on the ſtalks of other *wheat*, do this no injury, even though they ſhould attack it; the ſtalks of this kind being often found full of the black ſpecks, which are always the marks of that inſect having been there, and yet the ear full, and the grain good.

This *wheat* makes very good bread, if the miller does not grind it too ſmall, or the baker make his dough too hard, it requiring to be ſomewhat larger than other *wheat*-flour, and ſomewhat ſofter in the dough. A buſhel of *white-cone-wheat* will make conſiderably more bread than a buſhel of Lammas *wheat*; but it gives it a ſomewhat yellowiſh caſt.

WHEAT, *Indian.* See MAIZE.

WHEAT, *Smyrna*, a peculiar kind of *wheat* that has an extremely large ear, with many leſſer or collateral ears coming all round the bottom of the great one.

As this is the largeſt of all ſorts of *wheat*, ſo it will diſpenſe with the nouriſhment of a garden, without being over-fed, and requires more nouriſhment than common huſbandry in the large way can give it. In the common way its ears grow not much larger than thoſe of our common *wheat*.

This ſort of *wheat* ſeems, of all others, the moſt proper for the new method of horſe-hoeing huſbandry, as that method ſeems capable of giving as much nouriſhment as the farmer pleaſes, by often repeating the hoeing. Next to this, the *white-cone-wheat* is beſt for this ſort of huſbandry; then the grey-cone-*wheat*.

WHEAT-*bird*, a name given by the people of Virginia to a ſpecies of bird, which, after the time of the ſowing of the *wheat* in that country, made its appearance annually at the ſeaſon of its beginning to ripen, and was never ſeen there before. See *Birds of* PASSAGE.

WHEAT-*ear*, in *Ornithology*, the Engliſh name of the common œnanthe, or *motacilla œnanthe* of Linnæus, called alſo the *white-tail*, and the *fallow-finch*. See *Tab.* V. *of Birds*, N° 60.

It is ſomething large than the common ſparrow; its head and back are of a greyiſh colour, with ſome admixture of redneſs; the rump is white, whence the bird has its name of the *white-tail*; though this is ſometimes not the caſe, the rump being of the ſame colour with the reſt of the back; over each eye is a white line, and beneath it a broad black ſtroke, paſſing acroſs each eye to the hind part of the head; the under ſide of the body is white, tinged with yellow; on the neck it inclines to red; the quill-feathers are black, edged with reddiſh brown. The colours of the female are more dull; it wants the black ſtroke acroſs the eye; and the bar of white on the tail is narrower. Theſe birds feed on beetles, and other inſects, and build in the deſerted burrows of rabbits, &c. They are extremely plentiful in Suſſex, and ſome other counties of England, after harveſt-time, when they are extremely fat, and very much eſteemed at table. They are much fatter in a rainy ſeaſon than a dry one, becauſe they feed on earth-worms, which then come out of the ground, as well as inſects. About Eaſtbourn, in Suſſex, they abound, becauſe of a certain fly which frequents the adjacent hills for the ſake of the wild thyme with which they are covered; and they are taken in great numbers in ſnares made of horſe-hair, placed under a long turf, into which, being very timid, they are eaſily driven. The number annually caught there is ſaid to amount to eighteen hundred and forty dozen; and yet the number that return the following year do not appear to be leſſened. They lay from ſix to eight eggs, of a light blue colour. Theſe birds begin to viſit us about the middle of March, and continue coming till the beginning of May; the females arriving about a fortnight before the males. They diſappear in September, at leaſt from the northern parts of the kingdom; but in Hampſhire many of them continue the whole winter. Ray and Pennant.

WHEE, or WHEY, a word uſed in the northern counties for a heifer or young cow.

WHEEL, *rota*, in *Mechanics*, a ſimple machine, conſiſting of a round piece of wood, metal, or other matter, which revolves on an axis.

For an account of the *wheel* and *axle*, as a mechanical power, ſee AXIS *in peritrochio*, and MECHANICAL *powers*.

The *wheel* is one of the principal mechanic powers. It has place in moſt engines: in effect it is of an aſſemblage of *wheels* that moſt of our chief engines are compoſed. Witneſs clocks, mills, &c.

Its form is various, according to the motion it is to have, and the uſe it is to anſwer. By this it is diſtinguiſhed into *ſimple*, and *dented*.

WHEELS, *ſimple*, are thoſe whoſe circumference and axis are uniform, and which are uſed ſingly, and not combined. Such are the *wheels* of carriages, which are to have a double motion; the one circular, about their axis; the other rectilinear, by which they advance along the road, &c. which two motions they appear to have; though, in effect, they have but one: it being impoſſible the ſame thing ſhould move, or be agitated, two different ways at the ſame time.

This one is a ſpiral motion; as is eaſily ſeen, by fixing a piece of chalk on the face of a *wheel*, ſo as that it may draw a line on a wall, as the *wheel* moves. The line it here traces is a juſt ſpiral, and ſtill the more curve, as the chalk is fixed nearer the axis.

The fact, however, has been diſputed; and it has been alledged, that nothing is more eaſy than for any one, who will take the trouble to make the experiment, to prove its falſhood. Place the chalk on the face of the *wheel*, as directed, and you will find that, ſo far from its deſcribing a juſt ſpiral, and that ſtill the more curve as the chalk is fixed nearer the axis, the chalk, if placed on the periphery of the *wheel*, will deſcribe a cycloid, and the nearer it is placed to the axis, the nearer will the line it deſcribes approach to the ſtraight line which is deſcribed by the axis itſelf. Moreover, it is not true, nor pretended to be ſo, that the ſame thing moves two ways at once in the rectilinear and circular motion of *wheels*. The local motion, or motion of the *whole wheel*, is rectilinear only; that of the *parts* of the *wheel* circular. Nor can this latter motion with any propriety be called that of the *wheel*, unleſs the ſame thing could alſo move quick and ſlow at the ſame time, which the different parts of the *wheel*, in revolving round its axis, evidently do. Jacob's Obſ. on the Structure and Draught of *Wheel*-Carriages, 1773, p. 28, &c.

For a very nice phenomenon, in the motion of theſe *wheels*, ſee ROTA *Ariſtotelica*.

We ſhall add, that, in *wheels*, of this kind, the height ſhould always be proportioned to the ſtature of the animal that draws or moves them. The rule is, that the load and the axis of the *wheels* be of the ſame height with the power that moves them; otherwiſe, the axis being higher than the beaſt, part of the load will lie upon him; or, if it be lower, he pulls to diſadvantage, and muſt exert a greater force. Though Stevinus, Dr. Wallis, &c. ſhew, that, to draw a vehicle, &c. over waſte, uneven places, it were beſt to fix the traces to the *wheels* ſomewhat lower than the horſe's breaſt. See WHEELS *of coaches*, &c.

The power of theſe *wheels* reſults from the difference of the radii of the axis, and circumference. The canon is this: "As the radius of the axis is to that of the circumference, ſo is any power to the weight it can ſuſtain hereby."

This is alſo the rule in the AXIS *in peritrochio*; and, in effect, the *wheel*, and the axis in peritrochio, are the ſame thing; only, in theory, it is uſually called by the latter name, and in practice by the former.

WHEELS, *dented*, are thoſe either whoſe circumference, or axis, is cut into teeth, by which they are capable of moving and acting on one another, and of being combined together.

The uſe of theſe is very conſpicuous in clocks, jacks, &c.

The power of the *dented wheel* depends on the ſame principle as that of the ſimple one. It is only that to the ſimple axis in peritrochio, which a compound lever is to a ſimple lever.

Its doctrine is compriſed in the following canon; viz. "The ratio of the power to the weight," in order for that to be equivalent to this, "muſt be compounded of the ratios of the diameter of the axis of the laſt *wheel* to the diameter of the firſt; and of the ratio of the number of revolutions of the laſt *wheel*, to thoſe of the firſt, in the ſame time." But this doctrine will deſerve a more particular explanation.

1. Then, if the weight be multiplied into the product of the radii of the axes, and that product be divided by the product of the radii of the *wheels*, the power required to ſuſtain the weight will be found. Suppoſe, e. gr. the weight A (*Tab.* VII. *Mechanics*, *fig.* 123.) $= 6000$ pounds, $BC = 6$ inches, $CD = 34$ inches, $EF = 5$ inches, $EG = 35$ inches, $HI = 4$ inches, $HK = 27$ inches: then will $BC \times EF \times HI = 120$; and $CD \times EG \times HK = 32130$. Hence the power required to ſuſtain the weight, will be $6000 \times 120 \div 32130 = 22\frac{1}{3}$ very nearly; a ſmall addition to which will raiſe it.

2. If the power be multiplied into the product of the radii of the *wheels*, and the factum be divided by the product of the radii of the axes; the quotient will be the weight which the power is able to ſuſtain. Thus, if the power be $22\frac{1}{3}$ pounds; the weight will be 6000 pounds.

3. A power and weight being given, to find the number of *wheels*, and in each *wheel* the ratio of the radius of the axis, to the radius of the *wheel*; ſo as that the power, being applied perpendicularly to the periphery of the laſt *wheel*, may ſuſtain the given weight.

Divide the weight by the power; reſolve the quotient into the factors which produce it. Then will the number of factors be the number of *wheels*; and the radii of the axes will be to the radii of the *wheels*, as unity to the ſeveral *wheels*. Suppoſe, e. gr. a weight of 3000 pounds, and a power of 60, the quotient of the former by the latter is 500, which reſolves into theſe factors, 4. 5. 5. 5. Four *wheels* are, therefore, to be made; in one of which, the radius of the axis is to the radius of the *wheel*, as 1 to 4; in the reſt, as 1 to 5.

4. If a power move a weight by means of two *wheels*, the revolutions of the ſlower *wheel* are to thoſe of the ſwifter, as the periphery of the ſwifter axis is to the periphery of the *wheel* that catches on it.

Hence, 1. The revolutions are as the radius of the axis FE to the radius of the *wheel* DC. 2. Since the number of teeth in the axis FD, is to the number of teeth in the circumference of the wheel M as the circumference of that to the circumference of this; the revolutions of the ſlower *wheel* M are to the revolutions of the ſwifter N, as the number of teeth in the axis, to the number of teeth in the *wheel* M, which it catches.

5. If the factum of the radii of the *wheels* GE, DC, be multiplied into the number of revolutions of the ſloweſt *wheel*, M, and the product be divided by the factum of the radii of the axes which catch into them, GH, DE, &c. the quotient will be the number of revolutions of the ſwifteſt *wheel* O. E. gr. If $GE = 8$, $DC = 12$, $GH = 4$, $DE = 3$, and the revolution of the *wheel* M be one; the number of revolutions of the *wheel* O will be 8.

6. If a power move a weight by means of divers *wheels*, the ſpace paſſed over by the weight, is to the ſpace of the power, as the power to the weight. Hence, the greater the power, the quicker is the weight moved; and *vice verſa*.

7. The ſpaces, paſſed over by the weight and the power, are in a ratio compounded of the revolutions of the ſloweſt *wheel*, to the revolution of the ſwifteſt; and of the periphery of the axis of that, to the periphery of this. Hence, ſince the ſpaces of the weight and the power are reciprocally as the ſuſtaining power is to the weight; the power that ſuſtains a weight, will be to the weight, in a ratio compounded of the revolutions of the ſloweſt *wheel*, to thoſe of the ſwifteſt, and of the periphery of the axis of that, to the periphery of this.

8. The periphery of the axis of the ſloweſt *wheel*, with the periphery of the ſwifteſt *wheel*, being given; as alſo the ratio of the revolutions of the one, to thoſe of the other; to find the ſpace which the power is to paſs over, while the weight goes any given length.

Multiply the periphery of the axis of the ſloweſt *wheel* into the antecedent term of the ratio, and the periphery of the ſwifteſt *wheel*, into the conſequent term; and to theſe two products, and the given ſpace of the weight, find a fourth proportional: this will be the ſpace of the power. Suppoſe, e. gr. the ratio of the revolutions of the ſloweſt *wheel*, to thoſe of the ſwifteſt, to be as 2 to 7, and the ſpace of the weight 30 feet; and let the periphery of the axis of the ſloweſt *wheel* be to that of the ſwifteſt, as 3 to 8: the ſpace of the power will be found 280. For $2 \times 3 : 7 \times 8 :: 30 : 280$.

9. The ratio of the peripheries of the ſwifteſt *wheel*, and of the axis of the ſloweſt; together with the ratio of their revolutions, and the weight, being given: to find the power able to ſuſtain it.

Multiply both the antecedents and the conſequents, of the given ratios into each other, and to the product of the antecedents, the product of the conſequents, and the given weight, find a fourth proportional: that will be the power required. Suppoſe, e. gr. the ratio of the peripheries 8 : 3; that of the revolutions 7 : 2, and the weight 2000 : the power will be found $214\frac{2}{7}$. For 7 × 8 : 2 × 3 : : 2000 : $214\frac{2}{7}$. After the ſame manner may the weight be found ; the power, and the ratio of the peripheries, &c. being given.

10. The revolutions the ſwifteſt *wheel* is to perform while the ſloweſt makes one revolution, being given ; together with the ſpace the weight is to be raiſed, and the periphery of the ſloweſt *wheel* ; to find the time that will be ſpent in raiſing it.

Say. As the periphery of the axis of the ſloweſt *wheel* is to the given ſpace of the weight ; ſo is the given number of revolutions of the ſwifteſt *wheel* to a fourth proportional : which will be the number of revolutions performed while the weight reaches the given height. Then, by experiment, determine the number of revolutions the ſwifteſt *wheel* performs in an hour ; and, by this, divide the fourth proportional found before. The quotient will be the time ſpent in raiſing the weight. Wolf. Elem. Math. tom. ii. p. 214, &c.

WHEELS *of a clock*, &c. are the CROWN *wheel*, contrat *wheel*, great *wheel*, ſecond *wheel*, third *wheel*, STRIKING *wheel*, DETENT *wheel*, &c. See CLOCK and WATCH.

WHEELS *of coaches*, *waggons*, &c. With reſpect to theſe the following particulars are collected from the experiments and reaſonings of Camus, Deſaguliers, Beighton, Ferguſon, &c.

1. The uſe of *wheels*, in the draught of carriages, is twofold ; viz. that of diminiſhing, or of more eaſily overcoming the reſiſtance ariſing from the friction of the carriage, and that of more readily ſurmounting obſtacles, which form angular prominences on the plane over which they are drawn, and which muſt be either depreſſed by the weight of the carriage, or render it neceſſary for the carriage, with its load, to be lifted over them. They ſerve in their firſt uſe to transfer the friction from the under ſurface of the carriage, and the plane ſupporting it, to the ſurfaces of the axle, and nave of the *wheel*. The common method of accounting for this advantage is by ſaying, that the reſiſtance, ariſing from friction in planes of equal aſperity, increaſes with the velocity of the motion ; ſo that this velocity muſt be compared with that of the power neceſſary to move the machine, and overcome the friction ; and it is obvious, at the ſame time, that the velocity of a circular motion diminiſhes gradually from the circumference to the centre. See FRICTION.

But to this poſition it has been objected, that the illuſtration is not applicable to the caſe : for, granting that, in the friction of ſledges or flat ſurfaces, the reſiſtance increaſes in proportion to the velocity of their motion, this is not a parallel caſe with that of a circular ſurface rolling over a flat plane. On the contrary, the velocity of motion, in the outer ſurface of a *wheel*, is greater than that of its nave, moving under the axle ; while at ſuch outer ſurface there is little or no friction at all ; whereas at the nave, moving much ſlower, there is much more. Indeed, the friction, which the *wheel* would have againſt its ſupporting plane, if it did not turn round its axis, is by its turning round transferred almoſt wholly to the axis and nave ; whoſe circular motion is notwithſtanding ſo much ſlower. It is, indeed, notorious, that the great friction of the *wheels* of carriages lies between the axle and nave ; and how then can it be properly aſſerted, that ſuch friction is diminiſhed at the axle, as the velocity of the circular motion is there diminiſhed ? Accordingly it has been alledged by a late writer, that friction is not diminiſhed by the uſe of *wheels*, but merely transferred from the outer ſurface of the *wheel* to its nave and axle ; and that in the caſe of a *wheel* rolling along the ground, the ſpokes act only as ſingle levers, to overcome the friction of the periphery againſt the plane of its ſupport, the prominences, conſtituting the roughneſs of the plane over which it moves, being the fulcra upon which they turn, and not the common centre of theſe ſpokes, as others have maintained, who ſay that the *wheel* acts, in overcoming friction, as an axis in peritrochio. However, in obviating the friction of the *wheels* in loaded carriages, their ſpokes act as double levers, reſting on a fulcrum at each end. See the author's method of illuſtrating and evincing theſe principles, in Jacob's Obſ. on *Wheel*-Carriages, p. 23, &c.

If carriages were to move along ſmooth horizontal planes, *wheels* would be uſeful only in overcoming friction ; but as they are drawn along roads covered with looſe ſtones, indented with cavities, they are farther uſeful in ſerving to depreſs, or raiſe the carriage over the one, and in raiſing it out of the other.

2. The *wheels* of all carriages ought to be exactly round ; and the fellies ſhould be at right angles to the naves, according to the inclination of the ſpokes, i. e. the plane of the curvature of the *wheel* ſhould cut the nave at right angles, though it need not paſs through the place where the ſpokes are inſerted into the nave.

3. The ſpokes ſhould be inclined to the naves, ſo that the *wheels* may be diſhing or concave. If, indeed, the *wheels* were always to go upon ſmooth and level ground, it would be beſt to make the ſpokes perpendicular to the naves, or at right angles with the axles ; becauſe they would then bear the weight of the load perpendicularly, which is the ſtrongeſt way for the wood. But becauſe the ground is generally uneven, one *wheel* often falls into a cavity or rut, when the other does not, and then it bears much more of the weight than the other does ; in which caſe diſhing *wheels* are beſt, becauſe the ſpokes become perpendicular in the rut, and therefore have the greateſt ſtrength when the obliquity of the road throws moſt of its weight upon them ; whilſt thoſe on the high ground have leſs weight to bear, and therefore need not be at their full ſtrength.

4. The axles of the *wheels* ought to be perfectly ſtraight, and at right angles to the ſhafts, or to the pole. When the axles are ſtraight, the rims of the *wheels* will be parallel to each other, and then they will move the eaſieſt, becauſe they will be at liberty to go on ſtraight forwards. But in the uſual way of practice, the axles are bent downwards at their ends ; which brings the ſides of the *wheels* next the ground nearer to one another than their higher ſides are ; and this not only makes the *wheels* to drag ſideways as they go along, and gives the load a much greater power of cruſhing them than when they are parallel to each other, but alſo endangers the overturning of the carriage when any *wheel* falls into a hole or rut, or when the carriage goes on a road which has one ſide lower than the other, as long the ſide of a hill. Thus, in the hind view of a waggon or cart, let A E and B F (*Tab.* VII. *Mechanics*, *fig.* 124.) be the great *wheels* parallel to each other, on their ſtraight axle K, and H C I the carriage loaded with heavy goods from C to G. Then as the carriage goes on in the oblique road A *a* B, the centre of gravity of the whole machine and load will be at C ; and the line of direction C *d* D falling within the *wheel* B F, the carriage will not overſet. But if the *wheels* be inclined to each other at the ground, as A E and B F are (*fig.* 125.), and the machine be loaded as before from C to G, the line of direction C *d* D falls without the *wheel* B F, and the whole machine tumbles over. When it is loaded with heavy goods which lie low it may travel ſafely upon an oblique road, ſo long as the centre of gravity is at C (*fig.* 124.), and the line of direction C *d* D falls within the *wheels* ; but if it be loaded high with lighter goods from C to L (*fig.* 126.), the centre of gravity is raiſed from C to K, which ſhews the line of direction K *k* without the loweſt edge of the *wheel* B F, and then the load overſets the waggon. Mr. Beighton has offered ſeveral reaſons to prove, that the axles of *wheels* ought not to be ſtraight ; for which we muſt refer to Deſaguliers's Exp. Phil. vol. ii. Appendix, p. 540, &c. Moreover, if the axle were not at right angles to the pole or ſhaft, but this was on one ſide, then the coach or carriage would be drawn on one ſide, and almoſt all the weight would bear upon one horſe.

5. Large *wheels* are always more advantageous for rolling than ſmall ones, in any caſe, or upon any ground whatever. If we conſider *wheels* with regard to their friction upon the axles, it is evident that ſmall *wheels* muſt turn as much oftener round than the large ones, as their circumferences are leſs ; and, therefore, a *wheel* which is twice as large as another will have twice the advantage in reſpect of the friction, the holes of the naves and axles, and the weights upon them, being equal. Again, if we conſider the *wheels* as they ſink into the earth, or fall into holes, the bearing of the great *wheel* being double that of the ſmall one, it would ſink but half ſo deep ; and if the ſmall *wheel* ſhould meet with a hole of the ſame diameter with itſelf, it would wholly ſink in, whilſt only a ſegment leſs than half of the great *wheel* would fall in : the ſame thing would alſo happen in marſhy ground, where the ſmall *wheel* would ſink wholly in the ſame hole which the great one would ſink into but in part. The large *wheel* would alſo have the advantage of a ſmall one in riſing over eminences or rubs that occurred ; ſo that the former would go over rubs much higher than the latter ; and indeed over any eminences, provided their height be not equal to its ſemidiameter. Deſaguliers has reduced this matter to a mathematical calculation, in his Exp. Phil. vol. i. p. 171, &c.

A late writer has alſo proved, that a *wheel* of eight feet diameter has ſomewhat more than twice the advantage in overcoming obſtacles of a *wheel* of two feet ; and he found, in practice, that if it requires a certain power to draw a carriage of a certain weight over a certain obſtacle, with *wheels* of any determinate diameter, it will require *wheels* of four times that diameter, to draw the ſame carriage over the ſame obſtacle with half that power. This writer alſo obſerves, that, in the draught of carriages aſcending inclined planes, the moving power acts not only againſt the vis inertiæ, which is always equal to the abſolute gravity of the load, but alſo againſt its relative gravity, which increaſes with the inclination of the plane; and with reſpect to carriages raiſed on *wheels*, it is to be obſerved that the higher the axle is removed from the plane, the farther is the centre of gravity removed out of the perpendicular line of ſupport; ſo that the lower the *wheel*, the leſs is the relative gravity of the carriage. Hence he infers, that ſuppoſing the friction of two carriages of equal weight, but of different ſized *wheels*, to be equal, the low-wheeled one would be drawn, up hill, on a ſmooth plane, much more eaſily than the high-wheeled one; though on a ſmooth, horizontal plane, the latter would be drawn more eaſily than the former. On the contrary, in going down hill, the high-wheeled carriage will be urged forward, by its relative gravity, more than the low-wheeled one. Jacob, ubi ſupra, p. 63, &c.

It appears, therefore, that the larger *wheels* are, the more advantageous they are in proportion, provided that they are not more than five or ſix feet in diameter; for when they exceed theſe dimenſions, they become heavy; or if they are made light, their ſtrength is proportionably diminiſhed, and the ſpokes, being long, are more liable to break: beſides, horſes applied to ſuch *wheels*, would be incapable of exerting their utmoſt ſtrength, by having the axles higher than their breaſts, ſo that they would draw downwards; as in ſmall *wheels* the draught is made more difficult, by the horſes drawing upwards.

6. Carriages with four *wheels*, as waggons or coaches, are much more advantageous than carriages with two *wheels*, as carts and chaiſes; for in applying horſes to a carriage with two *wheels*, it is plain that the tiller carries part of the weight, in whatſoever manner it be kept in equilibrio upon the axle. In going down a hill, the weight bears upon the horſe; and in going up hill, the weight falls the other way, and lifts the horſe, by which means part of his force is loſt. Beſides, as the *wheels* ſink into the holes in the road, ſometimes on one ſide, ſometimes on the other, the ſhafts ſtrike againſt the tiller's flanks, which is the deſtruction of many horſes. Add to this, that when one of the *wheels* ſinks into a hole or rut, half the weight will fall that way, whereby the carriage will be in danger of being overturned.

7. It would be much more advantageous to make the four *wheels* of a coach or waggon large, and nearly of a height, than to make the fore-*wheels* of only half the diameter of the hind-*wheels*, as is uſual in many places. The fore-*wheels* of carriages have commonly been made of a leſs ſize than the hind ones, both on account of turning ſhort, and to avoid cutting the braces. Crane-necks have alſo been invented for turning yet ſhorter, and the fore-*wheels* have been lowered, ſo as to go quite under the bend of the crane neck. See an account of an ingenious contrivance for this purpoſe, under PERCH.

Some carriers and coachmen have, indeed, abſurdly alledged, that when the fore-*wheels* are much lower than the hind ones, they ſerve to puſh them on. However, many diſadvantages attend this conſtruction. A conſiderable force is loſt that would be effectual, if they were large: the carriage would go much more eaſily, if the fore-*wheels* were as high as the hind ones; and the higher the better, becauſe their motion would be ſo much the ſlower on their axles, and conſequently the friction proportionably diminiſhed. The jolting and uneaſy motion, occaſioned by low *wheels*, has induced perſons to contrive ſprings, in order to prevent it. But nothing can be more inconſiſtent even with this end, than the common method of fixing the braces to the bottom of the body of a carriage. In conſequence of this practice, the centre of gravity of the ſuſpended body is ſo high above the centre of its motion, that it is liable to be continually agitated by the jolting of the carriage, and its danger of overturning increaſed: whereas if, inſtead of practiſing this method, the body were ſuſpended as near as poſſible to its centre of gravity, the agitation of the carriage, as well as its danger of overturning, would be in a great meaſure avoided.

There is alſo an inconvenience which attends the uſual method of loading carriages; for when a carriage is loaded equally heavy on both axles, the fore axle muſt endure as much more friction, and conſequently wear out as much ſooner than the hind-axle, as the fore-*wheels* are leſs than the hind ones. However, the carriers commonly put the heavier part of the load upon the fore-axle of the waggons; which not only makes the friction greateſt, where it ought to be leaſt, but alſo preſſeth the fore-*wheels* deeper into the ground than the hind-*wheels*, although the fore-*wheels*, being leſs than the hind ones, are with ſo much the greater difficulty drawn out of a hole, or over an obſtacle, even ſuppoſing the weights on their axles were equal; for the difficulty, with equal weights, will be as the depth of the hole, or height of the obſtacle, is to the ſemidiameter of the *wheel*. Moreover, ſince a ſmall *wheel* will often ſink to the bottom of a hole, in which a great *wheel* will go but a very little way, the ſmall *wheels* ought to be loaded with leſs weight than the great ones; and then the heavier part of the load would be leſs jolted upward and downward, and the horſes tired ſo much the leſs, as their draught raiſed their load to leſs heights. When the waggon-road, indeed, is much up-hill, there may be danger in loading the hind-part much heavier than the fore-part; for then the weight would overhang the hind-axle, eſpecially if the load be high, and endanger tilting up the fore-*wheels* from the ground. In this caſe, the ſafeſt way would be to load it equally heavy on both axles; and then as much more of the weight would be thrown upon the hind-axle than upon the fore-one, as the ground riſes from a level below the carriage. But as this ſeldom happens, a ſmall temporary weight might be laid upon the pole between the horſes, which would overbalance the danger.

There is another great diſadvantage attending ſmall fore-*wheels*, viz. that as their axle is below the level of the horſes breaſts, the horſes not only have the loaded carriage to draw along, but alſo part of its weight to bear, which tires them ſooner, and makes them grow much ſtiffer in their hams, than they would be if they drew on a level with the fore-axle; and for this reaſon, coach-horſes ſoon become unfit for riding. So that on all accounts it is plain, that the fore-*wheels* of all carriages ought to be ſo high as to have their axles even with the breaſts of the horſes; which would not only give them a fair draught, but likewiſe cauſe the machine to be drawn by a leſs degree of power.

Mr. Beighton diſputes the propriety of fixing the line of traction on a level with the breaſt of a horſe, and ſays it is contrary to reaſon and experience. Horſes, he ſays, have little or no power to draw, but what they have from their weight; otherwiſe they could take no hold of the ground, and then they muſt ſlip, and draw nothing. Common experience alſo teaches, that if a horſe is to convey a certain weight, he ought, that he may draw the better, to have a proportionable weight on his back or ſhoulders. Beſides, when a horſe draws hard, he bends forward, and brings his breaſt near the ground; and then if the *wheels* are high, he is pulling the carriage againſt the ground. A horſe tackled in a waggon will draw two or three ton, becauſe the point or line of traction is below his breaſt, by reaſon of the *wheels* being low. And it is very common to ſee, when one horſe is drawing a heavy load, his fore-feet will riſe from the ground; and he will nearly ſtand on end; in which caſe it is uſual to add a weight on his back, to keep his fore-part down, by a perſon mounting on him, which will enable him to draw that load, without which he before could not move. The greateſt ſtreſs, or main buſineſs of drawing, ſays this ingenious writer, is to overcome obſtacles; for on level plains the drawing is but little, and then the horſe's back need be preſſed but with a ſmall weight. Moſt or all of theſe obſtacles may be conſidered as inclined planes. In order to draw the *wheel* AB (*Tab.* VII. *Mechanics, fig.* 127.) over the obſtacle D, M. de Camus, agreeably to the principles above laid down, would have the horſe draw in the line HC; whereas Mr. Beighton ſays, ſince the obſtacle is D, and the tangent of the earth, or line of the floor, is at B, and the line to be moved in is BD, an inclined plane; the eaſieſt poſition of drawing, to get the *wheel* over D, is to draw in the poſition of that inclined plane BT, or its parallel Cb. As all the radii of a *wheel* are equal, the pulling at the centre is the ſame as a balance in equilibrio; viz. there is the ſame force at A as at B. But in the caſe of drawing in the horizontal line HC, when the obſtacle is at D, the whole force which the horſe has for drawing is by the ſhort end or the brachium $= eD$, againſt the force or weight of the long end of the brachium $fD = eC$, which muſt be very diſadvantageous; therefore, he ſays, the line or traction ſhould be bC. Deſag. Exp. Phil. vol. ii. App. p. 542, &c.

8. The utility of broad *wheels*, in amending and preſerving the roads, has been ſo long and generally acknowledged, as to have occaſioned ſeveral acts of the legiſlature to enforce their uſe. (See TURNPIKE.) At the ſame time, the proprietors and drivers of carriages ſeem to be convinced by experience, that a narrow-wheeled carriage is more eaſily and ſpeedily drawn by the ſame number of horſes than a broad-wheeled one of the ſame burthen. And though government allowed them to draw with more horſes, and carry greater loads than uſual, they were perſuaded with difficulty to comply with the requiſition of legiſlature; and methods have been uſed to evade it. Their principal objection has been, that as a

broad-*wheel* muſt touch the ground in many more points than a narrow-*wheel*, the friction muſt of courſe be ſo much the greater; not conſidering, that if the whole weight of the waggon, and load in it, bears upon many points, each ſuſtains a proportionable leſs degree of weight and friction than when it bears only upon a few points; ſo that what is wanting in one is made up in the other, and, therefore, will be juſt equal under equal degrees of weight, as appears by the following plain and eaſy experiment propoſed by Mr. Ferguſon.

Let one end of a piece of packthread be faſtened to a brick, and the other end to a common ſcale for holding weights; then having laid the brick edgeways on a table, and letting the ſcale hang under the edge of the table, put as much weight into the ſcale as will juſt draw the brick along the table. Then taking the brick to its former place, lay it flat on the table, and leave it to be acted upon by the ſame weight in the ſcale as before, which will draw it along with the ſame eaſe as when it lay upon its edge. In the former caſe, the brick may be conſidered as a narrow *wheel* on the ground; and in the latter as a broad *wheel*. And ſince the brick is drawn along with equal eaſe, whether its broad ſide or narrow edge touches the table, it ſhews that a broad *wheel* might be drawn along the ground with the ſame eaſe as a narrow one, ſuppoſing them equally heavy, even though they ſhould drag, and not roll as they go along. Beſides, as narrow *wheels* are always ſinking into the ground, eſpecially when the heavieſt part of the load lies upon them, they muſt be conſidered as conſtantly going up hill, even on level ground; and their edges muſt ſuſtain much friction, by rubbing againſt the ſides of the ruts made by them. But both theſe inconveniences are avoided by broad *wheels*; which, inſtead of cutting and ploughing up the roads, roll them ſmooth, and harden them: though, after all, it muſt be confeſſed, that they will not do in ſtiff, clayey croſs roads; becauſe they would ſoon gather up as much clay as would be almoſt equal to the weight of an ordinary load; and alſo in paſſing along roads abounding with looſe ſtones and other obſtacles, which a narrow *wheel* may avoid paſſing over, and a broad one muſt ſurmount, the broad-*wheel* carriage will certainly be drawn leſs eaſily and leſs ſpeedily than a narrow-wheeled one, though not on account of any additional friction ariſing from the preſſure of the weight on a greater quantity of ſurface. Broad *wheels* are likewiſe more liable to an inequality of preſſure between the axle and box than narrow ones, and conſequently to a greater wear and tear.

9. According to the uſual method of conſtructing *wheels*, their peripheries are compoſed of a number of pieces or felloes joined together; but theſe are weak, and ſubject to ſeveral inconveniences. As the joints are the weakeſt parts of the *wheel*, they are moſt liable to yield inward; for which reaſon the wheelwrights leave them higher than the other parts of the rim, in conſequence of which the *wheel* is not at firſt exactly round, and of courſe its motion uniform. Beſides, the felloes, being ſegments of a circle, ſawed or hewn out of ſtraight wood, they are on this account rendered ſo brittle, from the croſs direction of the grain near the joints, that they are with difficulty kept together, even though almoſt twice the quantity of timber be employed that would otherwiſe be neceſſary. The ſtrength of ſuch a wheel depends on the thickneſs of the iron tier or rim that ſurrounds it, and hence the carriage is loaded with an uſeleſs weight both of wood and iron. To obviate theſe inconveniences, Mr. Viny invented a proceſs for bending timber into a circular form, practiſed for ſome time by Meſſrs. Jacob and Viny, and now continued by Mr. Viny. In *wheels* made of timber thus bent, the rim conſiſts either of a ſingle piece of wood, or two felloes only, and is caſed with a ſingle hoop of iron. By this mode of conſtruction, the grain of the wood is kept parallel throughout, ſo that the periphery of the *wheel* is every where equally ſtrong; its thickneſs is conſiderably leſſened, inſomuch that though little more than half the uſual quantity of timber is employed, the *wheel* is of itſelf ſtrong enough to ſuſtain the common burthen laid on ſuch *wheels*, without the aſſiſtance of iron tiers, which are only applied to them as a ſafe-guard, to preſerve the wood from the injuries to which it would otherwiſe be neceſſarily expoſed from the roads; and hence a leſs quantity of iron is ſufficient, and even that will be fairly worn out before it becomes uſeleſs. Beſides, the *wheel* is rendered much lighter, and at the ſame time much ſtronger and more durable than *wheels* conſtructed of detached pieces of wood and iron in the uſual manner. Jacob's Obſ. on the Structure and Draught of *Wheel*-Carriages, 1773, p. 81, &c. See on the ſubject of the preceding article, Deſag. Ex. Phil. vol. i. p. 201, &c. Ferguſon's Lect. p. 56, &c. 4to. Martin's Phil. Brit. vol. i. p. 229, &c.

There is a yearly duty on COACHES, &c. with four *wheels*, kept by any perſons for their own uſe, or let out to hire (licenſed hackney-coaches and poſt-chaiſes excepted) of 6 *l.* each; and on every chaiſe, &c. with two *wheels*, under the ſame circumſtances, of 40 *s.* and 20 *s.* more, if kept by any perſon for his own uſe. And for every coach, &c. kept as public ſtage-coaches, 5 *l.*; entry, and payment to be made under a penalty of 20 *l.* 20 Geo. II. cap. 10. 16 Geo. III. cap. 34. 22 Geo. III. cap. 63. See WAGGON.

By 24 Geo. III. cap. 27. an additional duty of 5 *s.* per week is laid on hackney-coaches.

WHEEL, *blowing*, a machine contrived by Dr. Deſaguliers for drawing out the foul air of any place, or for forcing in freſh, or doing both ſucceſſively, without opening doors or windows. See Phil. Tranſ. Nº 437.

The intention of this machine is the ſame as that of Dr. Hales's ventilator, but not ſo effectual, nor ſo convenient. See Deſagul. Courſe of Exper. Philoſ. vol. ii. p. 563. 568.

This *wheel* is alſo called a *centrifugal wheel*, becauſe it drives the air with a centrifugal force.

WHEEL, *water*, *of a mill*, that which receives an impulſe of the ſtream by means of ladle-boards or FLOAT-*boards*. M. Parent, of the Academy of Sciences, has determined the greateſt effect of an under-ſhot *wheel* to be, when its velocity is equal to the third part of the velocity of the water that drives it.

In fixing an under-ſhot *wheel*, the workmen ought to conſider whether the water can run clear off, ſo as to occaſion no back-water to ſtop its motion. For a farther account of *water-wheels*, ſee Deſaguliers, Experim. Phil. vol. ii. p. 422, ſeq. See alſo a variety of experiments and obſervations relating to under-ſhot and over-ſhot *wheels*, by Mr. Smeaton, in Phil. Tranſ. vol. li. p. 100, &c. See MILL.

WHEEL, *Ariſtotle's*. See ROTA *Ariſtotelica*.

WHEEL, *meaſuring*. See PERAMBULATOR.

WHEEL, *Orffyreus's*. See ORFFYREUS.

WHEEL, *Perſian*. See PERSIAN.

WHEEL, *potter's*. See POTTERY.

WHEEL is alſo a name of a kind of puniſhment, which great criminals are put to in divers countries.

In France, their aſſaſſins, parricides, and robbers on the highway are condemned to the *wheel*; i. e. to have their bones firſt broken with an iron bar on a ſcaffold, and then to be expoſed and left to expire on the circumference of a *wheel*. In Germany they break their bones firſt on the *wheel* itſelf.

This cruel puniſhment was unknown to the ancients; as is obſerved by Cujas. It is not certain who was the inventor. Its firſt introduction was in Germany. It was, indeed, but rarely practiſed any where elſe, till the time of Francis I. of France; who, by an edict of the year 1534, appointed it to be inflicted on robbers on the highway. Richelet dates the edict in the year 1538, and quotes Brodæus, Miſcell. lib. ii. cap. 10.

WHEEL, in the *Military Art*, is the word of command, when a battalion or ſquadron is to alter its front, either one way, or the other.

To wheel to the right, the man in the right angle is to turn very ſlowly, and every one to *wheel* from the left to the right, regarding him as their centre; and *vice verſa*, when they are to *wheel to the left*.

When a diviſion of men are on the march, if the word be, *wheel to the right*, or *to the left*; then the right or left-hand man keeps his ground, turning only on his heel, and the reſt of the rank move about quick, till they make an even line with the ſaid right or left-hand man.

Squadrons of horſe *wheel* after much the ſame manner.

In *wheeling*, the circle is conceived to be divided into four parts; whence *wheeling* to the right or left reſpects only a quarter of the circle; and *wheeling* to the right or left about, refers to half of the circle. In performing this motion, each man moves more quickly or ſlowly, according to his diſtance from the right to the left.

WHEEL-*animals*, *brachionus*, in *Zoology*, a genus of animalcules, which have an apparatus of arms for taking their prey. This apparatus has been ſuppoſed, by microſcopical writers, to be a kind of *wheels*. This is one of the ſmaller animalcules; and is deſcribed by Dr. Hill to be, when at reſt, of a plain ſmooth body, conic figure, obtuſe at the poſterior extremity, and open at the anterior, of a duſky olive colour, and ſemi-tranſparent. When in motion, it protrudes from the open extremity a part of its naked body, to the whole of which this outer conic body ſeems to be but a caſe or ſheath; from the end of this exerted part of the body, it thruſts out two protuberances, which give it the appearance of a double head; and in each of theſe is diſcovered an apparatus in continual motion, appearing to be a rotatory one, though really a vibratory one very quickly repeated. Each of theſe protruded bodies has ſix arms inſerted into it, which it continually ſhuts and opens over one another. Each of the arms is furniſhed with a double ſeries of fibres at its edge, which, being expanded, cauſe it to ſpread to a conſiderable breadth. There are ſeveral ſpecies of this genus.

The *wheel-animal*, deſcribed by Mr. Baker, has two ſeeming *wheels*, with a great many teeth or notches, coming from its head and turning round, as it were on an axis. On the leaſt touch, this animalcule draws its *wheel* into its body into the ſheath; but when every thing is quiet, throws them out and works them again. See *Tab. of Microſcopical Objects, Claſs* 1.

In order to find theſe animalcules, chooſe ſuch roots of duck-weed as are long, and proceed from ſtrong old plants, for the young roots ſeldom afford any; they ſhould not be covered with that rough matter which is frequently found about them, nor any way tending to decay, as they will often be.

In the water found remaining in the leaden pipes, or gutters on the tops of houſes, there are alſo found great numbers of theſe *wheel-animals*. Theſe are of a different ſpecies from the former; and when the water dries away, they contract their bodies into a globular or oval figure, and are then of a reddiſh colour, and remain mixed with the dirt, growing together into a lump as hard as clay. This, whenever it is put in water, in half an hour's time diſcovers the animals living again, and as briſk as ever; and they have been found to be living in this manner, after the matter had been kept dry twenty months.

It ſhould ſeem from this, that as the water dries up, their pores become ſhut in the manner of thoſe of ſuch animals as remain torpid for the winter; and that when they find water come on again from rain, they then unfold themſelves, and live and feed as long as it laſts. Baker's Microſcope, p. 91.

WHEEL-*barometer*. See BAROMETER.

WHEEL-*fire*, among *Chemiſts*, a fire uſed for calcining metallic ſubſtances; properly called *ignis rotæ*.

It is a fire which only encompaſſes the crucible, coppel, or melting-pot, around the ſides, without touching it in any part.

WHEELER, among *Brickmakers*. See BRICK.

WHEEZING, a name given by our farriers to a diſtemperature in horſes, in which they draw their breath with difficulty and noiſe.

The generality of people make this and purſineſs, in horſes, the ſame diſtemper; but the more judicious always diſtinguiſh it, as wholly different from that. Purſineſs proceeds always from a ſtuffing or oppreſſion of the lungs; but this *wheezing* is only owing to the narrowneſs of the paſſage between the bones and griſtles of the noſe.

The horſes that are moſt of all afflicted with this diſtemper, do not want wind; for notwithſtanding that they *wheeze* exceſſively when they are exerciſed, yet all the time their flanks are not moved, but kept in the ſame condition that they were when the creature ſtood ſtill. The dealers call this ſort of horſes *blowers*, and though there is no real harm in the thing, it is a diſagreeable quality, and few people will chooſe them, that have much ſervice for them.

There are ſome horſes that have a natural defect in their breathing, which makes it at all times attended with ſome difficulty, but not with the *wheezing* before mentioned; theſe are called thick-winded horſes.

People who are careful in the buying of horſes, will purchaſe neither of theſe kinds; but there is this caution to be obſerved in regard to this defect, that it often ſeems to be in horſes where it really is not. When a horſe has been kept a long time in the ſtable without exerciſe, he will at the firſt riding be out of breath, and fetch it in a difficult and painful manner, though he be neither a blower nor thick-winded; but all this will go off with a little exerciſe.

There are ſome temporary *wheezers* and *blowers* among horſes: theſe at times rattle, and make a great noiſe through their noſes in taking breath; but the complaint goes off and returns. This is only occaſioned by a great quantity of phlegm, for their flanks do not redouble with it at the worſt of times, nor have they any cough with it; ſo that there is no danger of their being purſy.

WHELKS, *buccina*, in *Natural Hiſtory*. See SHELLS, and TRUMPET-*ſhell*.

WHELPS. See HOUND.

WHELPS, in a *Ship*. See CAPSTAN.

WHERLICOTES, a ſort of open chariots, of the ancient Briton's invention, uſed by perſons of quality, before the invention of coaches.

WHERN, in *Natural Hiſtory*, a name given by ſome of our miners to a kind of ſtone found in ſtrata, but of the hardneſs and fineneſs of flint. It is called alſo *chert* and *nicomia*.

WHERRY. See VESSEL, BOAT, &c.

WHETSTONE, *cos portabilis* vel *aquaria*, the *pſadurium friabile pallidè fuſcum* of Hill, and the *ſaxum arenarium fuſco-albidum* of Da Coſta, is a ſpecies of ſand-ſtone not acted upon by acids, of a very feint yellowiſh white colour, harſh and heavy, of a ſomewhat lax and ſpongy ſtructure, and readily friable or broken between the fingers. It is compoſed of an angular grit, cemented by a debaſed cryſtalline matter, intermixed with numerous ſmall ſpangles of a ſilvery talc; it cuts free, but takes no poliſh, and water readily pervades it. It will not ſtrike fire with ſteel; it burns to a reddiſh white colour. It is dug chiefly in Derbyſhire, and the northern counties; alſo at Blackdown-hill, in Devonſhire, and in many other parts of Europe, and is greatly uſed for whetting of ſcythes, knives, &c. The ſand-ſtone, coarſe ſcythe-ſtone, or rubber is only a variety of this kind. Many authors confound the grind-ſtone and ſcythe-ſtone. Hill aſſerts that the harder parts of the ſtratum make the common rough *whetſtones*, and that the coarſer parts are cut into grind-ſtones; but de Coſta ſays, this is a great error; the GRIND-*ſtone* and *whetſtone*, though agreeing in many particulars, being two very different ſpecies of ſand-ſtone. See COS.

WHEWER, a name uſed in ſome parts of England for the common WIGEON.

WHEY, the ſerum, or watery part of milk.

In many diſorders of the human body, where the ſtomach will not bear milk, or when it is not proper, for other reaſons, *whey* may be given with great ſucceſs.

We have a diſſertation of Fred. Hoffman on this ſubject, De Saluberrima ſeri Lactis Virtute. Oper. tom. vi. p. 9. This author recommends a particular kind of ſerum or *whey*, made by evaporating milk to a drineſs, and mixing the reſiduum with water. See MILK.

There are various methods of making *whey*, vulgarly known. That with oranges is very agreeable, and much recommended by Dr. Cheyne, in his Nat. Method of curing Diſeaſes.

WHEY, *alum*, *ſerum aluminoſum*, a *whey* made with alum; in the proportion of two drams of alum to one pint of cow's milk boiled.

This *whey* is beneficial in an immoderate flow of the menſes, and in a diabetes, or exceſſive diſcharge of urine. The doſe is two, three or four ounces, as the ſtomach will bear it, three times a day.

WHEY, *muſtard*, is made by boiling of bruiſed muſtard-ſeed, an ounce and a half, in milk and water, of each a pint, till the curd is perfectly ſeparated, and ſtraining the *whey* through a cloth. This, ſays Dr. Buchan, is the moſt elegant, and by no means the leaſt efficacious method of exhibiting MUSTARD: it warms and invigorates the habit, and promotes the different ſecretions. Hence, in the low ſtate of nervous fevers, it will often ſupply the place of wine: it is alſo of uſe in the chronic rheumatiſm, palſy, dropſy, &c. The doſe is a tea-cup-full four or five times a day, which may be ſweetened with a little ſugar.

WHEY, *ſcorbutic*, is made by boiling half a pint of the ſcorbutic juices in a quart of cows milk. The ſcorbutic plants are bitter oranges, brook-lime, garden ſcurvy-graſs, and water-creſſes.

WHIFF, in *Ichthyology*, the name of a ſort of flounder.

WHIFFLER *of a company*, in London, a young freeman, who goes before, and waits on the company, on occaſions of public ſolemnity.

WHIGS, a party, or faction, in England, oppoſite to the TORIES.

The origin of the names of theſe two mighty factions is very obſcure. If ſome little trivial circumſtance or adventure, which eſcapes the knowledge of mankind, gives name to a party, which afterwards becomes famous, poſterity labours in vain to find the original of ſuch a name: it ſearches the ſources, forms conjectures, invents reaſons, and ſometimes, indeed, meets the truth, but always without knowing it aſſuredly.

Thus, in France, the Calviniſts are called HUGUENOTS; yet nobody was ever able certainly to aſſign the cauſe of that appellation.

Whig is a Scottiſh, and ſome ſay too, an Iriſh word, literally ſignifying *whey*. *Tory* is another Iriſh word, ſignifying a *robber*, or *highwayman*.

Under the reign of king Charles II. while his brother, then duke of York, was obliged to retire into Scotland, there were two parties formed in that country. That of the duke was ſtrongeſt, perſecuted the other, and frequently reduced them to fly into the mountains and woods; where thoſe unhappy fugitives had often no other ſubſiſtence, for a long time, but cows milk. Hence, they called theſe their adverſaries *tories*, q. d. *robbers*; and the tories, upbraiding them with their unhappineſs, from the milk on which they lived, called them *whigs*. From Scotland the two names came over with the duke, into England.

Others give a different origin and etymology of the two words, for which ſee Tories.

Biſhop Burnet gives another etymology of the term *whigs*. The ſouth-weſt counties of Scotland, he ſays, are ſupplied with corn from Leith; and from a word *whiggam* uſed by the carriers in driving their horſes, all that drove were called *whiggamors*, and by contraction *whigs*.

He adds, that in the year 1648, after the news of the defeat of duke Hamilton, who was charged with being a confederate with the malignants, or royal party, in England, the miniſters animated their people to riſe, and march to Edinburgh: who came up marching each at the head of his pariſh, with an un-heard of fury, praying and preaching all the way as they came. The marquis of Argyle and his party came and headed them. This was called the *whiggamoor's* inroad; and ever after, all that oppoſed the court were contemptuouſly called *whigs*: and from Scotland the term was brought into England. Burnet's Hiſt. of his Own Times, vol. i. p. 43.

For the diſtinguiſhing principles and characters of the *whigs*, ſee Tories.

WHIMBREL, in *Ornithology*. See Wimbrel.

WHIN, in *Botany*. See Gorse.

Whin, *petty*, a name given to a ſpecies of *ononis*, or rest-*harrow*.

WHINCHAT, in *Ornithology*, the Engliſh name of the motacilla *rubetra* of Linnæus.

It is of the common ſize of the water-wagtail. Its head, neck, and back, are of a reddiſh brown, with regular rows of black ſpots. Over each eye is a narrow white ſtroke, and beneath that a broad bed of black, extending from the bill to the hind part of the head; the breaſt is of a reddiſh yellow; the belly paler; the quill-feathers are brown, edged with a yellowiſh brown; the upper part of the wing is marked with two white ſpots; the lower part of the tail is white, the two middle feathers excepted, which are wholly black; the upper part of the others is of the ſame colour.

The colours are very uncertain in this bird, and it often much reſembles the stone-*chatter*; but may always, by an accurate obſerver, be diſtinguiſhed from that bird by the white ſpots in its wings, by the whiteneſs of the under part of its tail, and the white lines on its head.

The colours of the female are much leſs agreeable than thoſe of the male; in lieu of the white and black marks on the cheeks is one broad pale brown one; and the white on the wings is in much leſs quantity than that of the male.

In the north of England, the *whinchat* is a bird of paſſage; in the ſouth he continues the whole year. Ray and Pennant.

WHINE, a hunting term, uſed in reſpect of the cry of an otter.

WHIP, or Whip-Staff, in a *Ship*, a piece of timber in form of a ſtrong ſtaff, faſtened into the helm, for the ſteerſman, in ſmall ſhips, to hold in his hand; thereby to move the rudder, and direct the ſhip. See *Tab. Ship. fig.* 2. *n.* 103.

Whip denotes alſo a ſort of ſmall tackle, formed by the communication of a rope either with a ſingle immoveable block, or with two blocks, one of which is fixed, and the other moveable. It is generally uſed to hoiſt light bodies, as empty caſks, &c. out of a ſhip's hold, which is accordingly called whipping them up. Falconer.

To Whip, is to tie a piece of pack-thread, ſpun-yarn, &c. about the end of a rope, to prevent it from being untwiſted and looſened.

Whip-*grafting*. See Engrafting.

Whip-*ſaw*. See *Whip*-Saw.

WHIPLADE, in *Huſbandry*, a term uſed by the farmers in ſome places for a particular ſort of cart, whoſe hinder part is made up of boards after the manner of a dung-cart, having alſo a head of boards, and ſhambles over the thills; this head being made ſo as either to be taken out or left in. The cart may be indifferently uſed to carry dung or other things; dung when the head is in, and corn, &c. when it is taken out.

WHIPPER. See Fishing.

WHIPPING, a term uſed by *Anglers*, when they faſten a line to the hook or rod.

The word is alſo taken for the caſting in of the hook, and drawing it gently on the water.

Whipping, in *Law*, denotes an ignominious puniſhment inflicted on perſons guilty of petty larceny, &c.

WHIPT *ſyllabub*. See Syllabub.

WHIRL-POOL, an eddy, vortex, or gulf, where the water is continually turning round. See Gulph, Eddy, Vortex, &c.

Theſe in rivers are very common, from various accidents, and are uſually very trivial, and of little conſequence. In the ſea they are more rare, but more dangerous. Sibbald has related the effects of a very remarkable marine *whirlpool* among the Orcades, which would prove very dangerous to ſtrangers, though it is of no conſequence to the people who are uſed to it. This is not fixed to any particular place, but appears in various parts of the limits of the ſea among thoſe iſlands. Wherever it appears, it is very furious, and boats, &c. would inevitably be drawn in and periſh with it; but the people who navigate them are prepared for it, and always carry an empty veſſel, a log of wood, or large bundle of ſtraw, or ſome ſuch thing, in the boat with them; as ſoon as they perceive the *whirl-pool*, they toſs this within its vortex, keeping themſelves out; this ſubſtance, whatever it be, is immediately received in the centre, and carried under water; and as ſoon as this is done, the ſurface of the place where the *whirl-pool* was, becomes ſmooth, and they row over it with ſafety; and in about an hour they ſee the vortex begin again in ſome other place, uſually at about a mile diſtant from the firſt. Sibbald's Prodr. Hiſt. Scotl.

WHIRLING-TABLE, a machine contrived for exhibiting and demonſtrating the principal laws of gravitation and of the planetary motions in curvilinear orbits. A A (*Tab.* IV. *Aſtronomy, fig.* 98.) is a ſtrong frame of wood, B a winch fixed on the axis C of the wheel D, round which is the catgut-ſtring F, which alſo goes round the ſmall wheels G and K, croſſing between them and the great wheel D. On the upper end of the axis of the wheel G, above the frame, is fixed the round board *d*, to which may be occaſionally fixed the bearer M S X. On the axis of the wheel H is fixed the bearer N T Z, and when the winch B is turned, the wheels and bearers are put into a *whirling* motion. Each bearer has two wires, W, X, and Y, Z, fixed and ſcrewed tight into them at the ends by nuts on the outſide; and when the nuts are unſcrewed, the wires may be drawn out in order to change the balls U, V, which ſlide upon the wires by means of braſs loops fixed into the balls, and preventing their touching the wood below them. Through each ball there paſſes a ſilk line, which is fixed to it at any length from the centre of the bearer to its end by a nut-ſcrew at the top of the ball; the ſhank of the ſcrew going into the centre of the ball, and preſſing the line againſt the under ſide of the hole which it goes through. The line goes from the ball, and under a ſmall pulley fixed in the middle of the bearer; then up through a ſocket in the round plate (S and T) in the middle of each bearer; then through a ſlit in the middle of a ſquare top (O and P) of each tower, and going over a ſmall pulley on the top comes down again the ſame way, and is at laſt faſtened to the upper end of the ſocket fixed in the middle of the round plate above mentioned. Each of theſe plates S and T has four round holes near their edges, by which they ſlide up and down upon the wires which make the corner of each tower. The balls and plates being thus connected, each by its particular line, it is plain that if the balls be drawn outward, or towards the ends M and N of their reſpective bearers, the round plates S and T will be drawn up to the top of their reſpective towers O and P.

There are ſeveral braſs weights, ſome of two, ſome of three, and others of four ounces, to be occaſionally put within the towers O and P, upon the round plates S and T: each weight having a round hole in the middle of it, for going upon the ſockets or axes of the plates, and being ſlit from the edge to the hole, that it may ſlip over the line which comes from each ball to its reſpective plate.

For a ſpecimen of the experiments which may be made with this machine, we ſhall ſubjoin the following.

1. Removing the bearer M X, put the loop of the line *b* to which the ivory ball *a* is faſtened over a pin in the centre of the board *d*, and turn the winch B; and the ball will not immediately begin to move with the board, but, on account of its inactivity, endeavour to remain in its ſtate of reſt. But when the ball has acquired the ſame velocity with the board, it will remain upon the ſame part of the board, having no relative motion upon it. However, if the board be ſuddenly ſtopped, the ball will continue to revolve upon it, until the friction thereof ſtops its motion: ſo that matter reſiſts every change of ſtate; from that of reſt to that of motion; and *vice verſâ*.

2. Put a longer cord to this ball; let it down through the hollow axis of the bearer M X and wheel G, and fix a weight to the end of the cord below the machine; and this weight, if left at liberty, will draw the ball from the edge of the *whirling*-board to its centre. Draw off the ball a little from its centre, and turn the winch;

then the ball will go round and round with the board, and gradually fly farther from the centre, raiſing up the weight below the machine; and thus it appears that all bodies, revolving in circles, have a tendency to fly off from theſe circles, and muſt be retained in them by ſome power proceeding from or tending to the centre of motion. Stop the machine, and the ball will continue to revolve for ſome time upon the board; but as the friction gradually ſtops its motion, the weight acting upon it will bring it nearer and nearer to the centre in every revolution, till it brings it quite thither. Hence it appears, that if the planets met with any reſiſtance in going round the ſun, its attractive power would bring them nearer and nearer to it in every revolution, till they fell into it.

3. Take hold of the cord below the machine with one hand, and with the other throw the ball upon the round board as it were at right angles to the cord, and it will revolve upon the board. Then, obſerving the velocity of its motion, pull the cord below the machine, and thus bring the ball nearer the centre of the board, and the ball will be ſeen to revolve with an increaſing velocity, as it approaches the centre: and thus the planets which are neareſt the ſun perform quicker revolutions than thoſe which are more remote, and move with greater velocity in every part of their reſpective circles.

4. Remove the ball *a*, and apply the bearer M X, whoſe centre of motion is in its middle at *w*, directly over the centre of the *whirling*-board *d*. Then put 2 balls (V and U) of equal weights upon their bearing wires, and having fixed them at equal diſtances from their reſpective centres of motion *w* and *x* upon their ſilk cords, by the ſcrew nuts, put equal weights in the towers O and P. Laſtly, put the catgut ſtrings E and F upon the grooves G and H of the ſmall wheels, which, being of equal diameters, will give equal velocities to the bearers above, when the winch B is turned; and the balls U and V will fly off toward M and N, and raiſe the weights in the towers at the ſame inſtant. This ſhews, that when bodies of equal quantities of matter revolve in equal circles with equal velocities, their centrifugal forces are equal.

5. Take away theſe equal balls, and put a ball of ſix ounces into the bearer M X, at a ſixth part of the diſtance *w z* from the centre, and put a ball of one ounce into the oppoſite bearer, at the whole diſtance $xy = wz$; and fix the balls at theſe diſtances on their cords, by the ſcrew nuts at the top: then the ball U which is ſix times as heavy as the ball V, will be at only a ſixth part of the diſtance from its centre of motion; and conſequently will revolve in a circle of only a ſixth part of the circumference of the circle in which V revolves. Let equal weights be put into the towers, and the winch be turned; which (as the catgut-ſtring is on equal wheels below) will cauſe the balls to revolve in equal times: but V will move ſix times as faſt as U, becauſe it revolves in a circle of ſix times its radius, and both the weights in the towers will riſe at once. Hence it appears, that the centrifugal forces of revolving bodies are in direct proportion to their quantities of matter multiplied into their reſpective velocities, or into their diſtances from the centres of their reſpective circles.

If theſe two balls be fixed at equal diſtances from their reſpective centres of motion, they will move with equal velocities; and if the tower O has ſix times as much weight put into it as the tower P has, the balls will raiſe their weights exactly at the ſame moment: i. e. the ball U, being ſix times as heavy as the ball V, has ſix times as much centrifugal force in deſcribing an equal circle with an equal velocity.

6. Let two balls, U and V, of equal weights be fixed on their cords at equal diſtances from their reſpective centres of motion *w* and *x*; and let the catgut-ſtring E be put round the wheel K (whoſe circumference is only half that of the wheel H or G) and over the pulley *s* to keep it tight, and let four times as much weight be put into the tower P, as in the tower O. Then, turn the winch B, and the ball V will revolve twice as faſt as the ball U in a circle of the ſame diameter, becauſe they are equi-diſtant from the centres of the circles in which they revolve; and the weights in the towers will both riſe at the ſame inſtant, which ſhews that a double velocity in the ſame circle will exactly balance a quadruple power of attraction in the centre of the circle: for the weights in the towers may be conſidered as the attractive forces in the centres, acting upon the revolving balls; which, moving in equal circles, are as if they both moved in the ſame circle. Whence it appears that, if bodies of equal weights revolve in equal circles with unequal velocities, their centrifugal forces are as the ſquares of the velocities.

7. The catgut-ſtring remaining as before, let the diſtance of the ball V from the centre *x* be equal to 2 of the diviſions on its bearer; and the diſtance of the ball U from the centre *w* be 3 and a ſixth part; the balls themſelves being equally heavy, and V making two revolutions by turning the winch, whilſt U makes one; ſo that if we ſuppoſe the ball V to revolve in one moment, the ball U will revolve in two moments, the ſquares of which are 1 and 4: therefore, the ſquare of the period of V is contained 4 times in the ſquare of the period of U. But the diſtance of V is 2, the cube of which is 8, and the diſtance of U is $3\frac{1}{6}$, the cube of which is 32 very nearly, in which 8 is contained 4 times: and therefore, the ſquares of the periods of V and U are to one another as the cubes of their diſtances from *x* and *w*, the centres of their reſpective circles. And if the weight in the tower O be 4 ounces, equal to the ſquare of 2, the diſtance of V from the centre *x*; and the weight in the tower P be 10 ounces, nearly equal to the ſquare of $3\frac{1}{6}$, the diſtance of U from *w*; it will be found, upon turning the machine by the winch, that the balls U and V will raiſe their reſpective weights at very nearly the ſame inſtant of time. This experiment confirms the famous propoſition of Kepler, viz. that the ſquares of the periodical times of the planets round the ſun are in proportion as the cubes of their diſtances from him; and that the ſun's attraction is inverſely as the ſquare of the diſtance from his centre.

8. Take off the ſtring E from the wheels D and H, and let the ſtring F remain upon the wheels D and G; take away alſo the bearer MX from the *whirling*-board *d*, and inſtead of it put on the machine A B (*Tab.* VI. *Aſtronomy, fig.* 99.), fixing it to the centre of the board by the pins *c* and *d*, ſo that the end *e f* may riſe above the board to an angle of 30 or 40 degrees. On the upper part of this machine, there are two glaſs tubes *a* and *b*, cloſe ſtopped at both ends; each tube being about three quarters full of water. In the tube *a* is a little quickſilver, which naturally falls down to the end *a* in the water; and in the tube *b* is a ſmall cork, floating on the top of the water, and ſmall enough to riſe or fall in the tube. While the board *b* with this machine upon it continues at reſt, the quickſilver lies at the bottom of the tube *a*, and the cork floats on the water near the top of the tube *b*. But, upon turning the winch and moving the machine, the contents of each tube will fly off towards the uppermoſt ends, which are fartheſt from the centre of motion; the heavieſt with the greateſt force. Conſequently, the quickſilver in the tube *a* will fly off quite to the end *f*, occupying its bulk of ſpace and excluding the water, which is lighter than itſelf: but the water in the tube *b*, flying off to its higher end *e*, will exclude the cork from that place, and cauſe it to deſcend toward the loweſt end of the tube; for the heavier body, having the greater centrifugal force, will poſſeſs the upper part of the tube, and the lighter body will keep between the heavier and the lower part.

This experiment demonſtrates the abſurdity of the Carteſian doctrine of vortices; for, if the planet be more denſe or heavy than its bulk of the vortex, it will fly off in it farther and farther from the ſun; if leſs denſe, it will come down to the loweſt part of the vortex, at the ſun: and the whole vortex itſelf, unleſs prevented by ſome obſtacle, would fly quite off, together with the planets.

9. If a body be ſo placed upon the *whirling*-board of the machine (*fig.* 98.) that the centre of gravity of the body be directly over the centre of the board, and the board be moved ever ſo rapidly by the winch B, the body will turn round with the board, without moving from its middle; for, as all parts of the body are in equilibrio round its centre of gravity, and the centre of gravity is at reſt in the centre of motion, the centrifugal force of all parts of the body will be equal at equal diſtances from its centre of motion, and therefore the body will remain in its place. But if the centre of gravity be placed ever ſo little out of the centre of motion, and the machine be turned ſwiftly round, the body will fly off towards that ſide of the board on which its centre of gravity lies. Then, if the wire C (*fig.* 100.) with its little ball B be taken away from the ſemi-globe A, and the flat ſide *e f* of the ſemi-globe be laid upon the *whirling*-board, ſo that their centres may coincide; if then the board be turned ever ſo quickly by the winch, the ſemi-globe will remain where it was placed: but if the wire C be ſcrewed into the ſemi-globe at *d*, the whole becomes one body, whoſe centre of gravity is at or near *d*. Fix the pin *c* in the centre of the *whirling*-board, and let the deep groove *b* cut in the flat ſide of the ſemi-globe be put upon the pin, ſo that the pin may be in the centre of A (ſee *fig.* 101. where the groove is repreſented at *b*) and let the board be turned by the winch, which will carry the little ball B (*fig.* 100.) with its wire C, and the ſemi-globe A,

round the centre-pin *c i*; and then, the centrifugal force of the little ball B, weighing one ounce, will be ſo great as to draw off the ſemi-globe A, weighing two pounds, until the end of the groove at *e* ſtrikes againſt the pin *c*, and ſo prevents A from going any farther: otherwiſe, the centrifugal force of B would have been great enough to have carried A quite off the *whirling*-board. Hence we ſee that, if the ſun were placed in the centre of the orbits of the planets, it could not poſſibly remain there; for the centrifugal forces of the planets would carry them quite off, and the ſun with them; eſpecially when ſeveral of them happened to be in one quarter of the heavens. For the ſun and planets are as much connected by the mutual attraction ſubſiſting between them, as the bodies A and B are by the wire C fixed into them both. And even if there were but one planet in the whole heavens to go round ever ſo large a ſun in the centre of its orbit, its centrifugal force would ſoon carry off both itſelf and the ſun: for the greateſt body placed in any part of free ſpace could be eaſily moved; becauſe, if there were no other body to attract it, it would have no weight or gravity of itſelf, and conſequently, though it could have no tendency of itſelf to remove from that part of ſpace, yet it might be very eaſily moved by any other ſubſtance.

10. As the centrifugal force of the light body B will not allow the heavy body A to remain in the centre of motion, even though it be 24 times as heavy as B; let the ball A (*fig*. 102.) weighing ſix ounces be connected by the wire C with the ball B, weighing one ounce; and let the fork E be fixed into the centre of the *whirling*-board; then, hang the balls upon the fork by the wire C in ſuch a manner, that they may exactly balance each other, which will be when the centre of gravity beween them, in the wire at *d*, is ſupported by the fork. And this centre of gravity is as much nearer to the centre of the ball A than to the centre of B, as A is heavier than B; allowing for the weight of the wire on each ſide of the fork. Then, let the machine be moved, and the balls A and B will go round their common centre of gravity *d*, keeping their balance, becauſe either will not allow the other to fly off with it. For, ſuppoſing the ball B to be only one ounce in weight, and the ball A to be ſix ounces; then, if the wire C were equally heavy on each ſide of the fork, the centre of gravity *d* would be ſix times as far from the centre of B as from the centre of A, and conſequently B will revolve with a velocity ſix times as great as A does; which will give B ſix times as much centrifugal force as any ſingle ounce of A has: but then, as B is only one ounce, and A ſix ounces, the whole centrifugal force of A will exactly balance that of B; and therefore, each body will detain the other, ſo as to make it keep in its circle.

Hence it appears, that the ſun and planets muſt all move round the common centre of gravity of the whole ſyſtem, in order to preſerve that juſt balance which takes place among them.

11. Take away the forks and balls from the *whirling*-board, and place the trough A B (*fig*. 103.) thereon, fixing its centre to that of the board by the pin H. In this trough are two balls D and E of unequal weights, connected by a wire *f*, and made to ſlide eaſily upon the wire C ſtretched from end to end of the trough, and made faſt by nut-ſcrews on the outſide of the ends. Place theſe balls on the wire C ſo that their common centre of gravity *g* may be directly over the centre of the *whirling*-board. Then, turn the machine by the winch ever ſo ſwiftly, and the trough and balls will go round their centre of gravity, ſo as neither of them will fly off; becauſe, on account of the equilibrium, each ball detains the other with an equal force acting againſt it. But if the ball E be drawn a little more towards the end of the trough at A, it will remove the centre of gravity towards that end from the centre of motion; and then, upon turning the machine, the little ball E will fly off, and ſtrike with a conſiderable force againſt the end A, and draw the great ball B into the middle of the trough. Or, if the great ball D be drawn towards the end B of the trough, ſo that the centre of gravity may be a little towards that end from the centre of motion, and the machine be turned by the winch, the great ball D will fly off, and ſtrike violently againſt the end B of the trough, and will bring the little ball E into the middle of it. If the trough be not made very ſtrong, the ball D will break through it.

12. Mr. Ferguſon has explained the reaſon why the tides riſe at the ſame time on oppoſite ſides of the earth, and conſequently in oppoſite directions, by the following new experiment on the *whirling*-table. For this purpoſe, let *a b c d* (*fig*. 104.) repreſent the earth, with its ſide *c* turned toward the moon, which will then attract the water ſo as to raiſe them from *c* to *g*: and in order to ſhew, that they will riſe as high at the ſame time on the oppoſite ſide from *a* to *e*; let a plate A B (*fig*. 105.) be fixed upon one end of the flat bar D C, with ſuch a circle drawn upon it as *a b c d* (*fig*. 104.) to repreſent the round figure of the earth and ſea; and an ellipſe as *e f g h* to repreſent the ſwelling of the tide at *e* and *g*, occaſioned by the influence of the moon. Over this plate A B ſuſpend the three ivory balls *e*, *f*, *g*, by the ſilk lines *h*, *i*, *k*, faſtened to the tops of the crooked wires H, I, K, ſo that the ball at *e* may hang freely over the ſide of the circle *c*, which is fartheſt from the moon M at the other end of the bar; the ball at *f* over the centre, and the ball at *g* over the ſide of the circle *g*, which is neareſt the moon. The ball *f* may repreſent the centre of the earth, the ball *g* water on the ſide next the moon, and the ball *e* water on the oppoſite ſide. On the back of the moon M is fixed a ſhort bar N parallel to the horizon, and there are three holes in it above the little weights *p*, *q*, *r*. A ſilk thread *o* is tied to the line *k* cloſe above the ball *g*, and paſſing by one ſide of the moon M goes through a hole in the bar N, and has the weight *p* hung to it. Such another thread *n* is tied to the line *i*, cloſe above the ball *f*, and paſſing through the centre of the moon M and middle of the bar N, has the weight *q* hung to it, which is lighter than the weight *p*. A third thread *m* is tied to the line *h*, cloſe above the ball *e*, and paſſing by the other ſide of the moon M, through the bar N, has the weight *r* hung to it, which is lighter than the weight *q*. The uſe of theſe three unequal weights is to repreſent the moon's unequal attraction at different diſtances from her; ſo that if they are left at liberty, they will draw all the three balls towards the moon with different degrees of force, and cauſe them to appear as in *fig*. 106. in which caſe they are evidently farther from each other than if they hung freely by the perpendicular lines *h*, *i*, *k*. Hence it appears, that as the moon attracts the ſide of the earth which is neareſt her with a greater degree of force than ſhe does the centre of the earth, ſhe will draw the water on that ſide more than the centre, and cauſe it to riſe on that ſide; and as ſhe draws the centre more than the oppoſite ſide, the centre will recede farther from the ſurface of the water on that oppoſite ſide, and leave it as high there as ſhe raiſed it on the ſide next her. For, as the centre will be in the middle between the tops of the oppoſite elevations they muſt of courſe be equally high on both ſides at the ſame time.

However, upon this ſuppoſition, the earth and moon would ſoon come together; and this would be the caſe, if they had not a motion round their common centre of gravity, to produce a degree of centrifugal force, ſufficient to balance their mutual attraction. Such motion they have; for as the moon revolves in her orbit every month at the diſtance of 240000 miles from the earth's centre, and of 234000 miles from the centre of gravity of the earth and moon, the earth alſo goes round the ſame centre of gravity every month at the diſtance of 6000 miles from it, i. e. from it to the centre of the earth. But the diameter of the earth being, in round numbers, 8000 miles, its ſide next the moon is only 2000 miles from the common centre of gravity of the earth and moon, its centre 6000 miles from it; and its fartheſt ſide from the moon 10000 miles. Conſequently the centrifugal forces of theſe parts are as 2000, 6000, and 10000; i. e. the centrifugal force of any ſide of the earth, when it is turned from the moon, is five times as great as when it is turned toward the moon. And as the moon's attraction, expreſſed by the number 6000, at the earth's centre keeps the earth from flying out of this monthly circle, it muſt be greater than the centrifugal force of the waters on the ſide next her; and conſequently, her greater degree of attraction on that ſide is ſufficient to raiſe them; but as her attraction on the oppoſite ſide is leſs than the centrifugal force of the water there, the exceſs of this force is ſufficient to raiſe the water juſt as high on the oppoſite ſide.

To prove this experimentally, let the bar D C with its furniture be fixed on the *whirling*-board of the machine (*fig*. 98.) by puſhing the pin P into the centre of the board; which pin is in the centre of gravity of the whole bar with its three balls *e*, *f*, *g*, and moon M. Now, if the *whirling*-board and bar be turned ſlowly round by the winch, till the ball *f* hangs over the centre of the circle, as in *fig*. 107. the ball *g* will be kept towards the moon by the heavieſt weight *p* (*fig*. 105.) and the ball *e*, on account of its greater centrifugal force, and the leſs weight *r*, will fly off as far to the other ſide, as in *fig*. 107. And thus, whilſt the machine is kept turning, the balls *e* and *g* will hang over the ends of the ellipſe *l f k*. So that the centrifugal force of the ball *e* will exceed the moon's attraction juſt as much as her attraction exceeds the centrifugal force of the ball *g*, whilſt her attraction juſt balances the centrifugal force of the ball *f*, and makes it keep in its circle. Hence it is evident, that the tides muſt riſe to equal heights at the ſame time on oppoſite ſides of the earth. See Ferguſon's Lectures on Mechanics, lect. 2. and Deſag. Ex. Phil. vol. i. lect. 5.

WHIRL-*wind*, a wind that riſes ſuddenly, and is exceedingly rapid and impetuous, when riſen, but is ſoon ſpent. There are divers ſorts of *whirl-winds*, diſtinguiſhed by their peculiar names: as the *preſter*, *typho*, *turbo*, *exhydria*, and *ecnephias*.

The *preſter* is a violent wind, breaking forth with flaſhes of lighthing. This is rarely obſerved; ſcarce ever without the *ecnephias*. Seneca ſays, it is a *typho*, or *turbo*, kindled or ignited in the air.

The *ecnephias* is a ſudden and impetuous wind, breaking out of ſome cloud; frequent in the Ethiopic ſea, particularly about the Cape of Good Hope. The ſeamen call them *travados*.

The *exhydria* is a wind burſting out of a cloud, with a great quantity of water. This only ſeems to differ, in degree, from the *ecnephias*, which is frequently attended with ſhowers.

A *typho*, or *vortex*, moſt properly called a *whirl-wind*, or *hurricane*, is an impetuous wind, turning rapidly every way, and ſweeping all round the place. It frequently deſcends from on high. The Indians call it *orancan*; the Turks, &c. *oliphant*. It is frequent in the Eaſtern ocean, chiefly about Siam, China, &c. and renders the navigation of thoſe parts exceeding dangerous.

Dr. Franklin, in his Phyſical and Meteorological Obſervations, read to the Royal Society in 1756, ſuppoſes a *whirl-wind* and a water-ſpout to proceed from the ſame cauſe; their only difference being, that the latter paſſes over the water and the former over the land. This opinion is corroborated by the obſervations of M. de la Pryme, and many others, who have remarked the appearances and effects of both to be the ſame. They have both a progreſſive as well as a circular motion; they generally riſe after calms and great heats, and occur moſt frequently in the warmer latitudes: the wind blows every way from a large ſurrounding ſpace both to the water-ſpout and *whirl-wind*; and a water-ſpout has, by its progreſſive motion, paſſed from the ſea to the land, and produced all the phenomena and effects of a *whirl-wind*: ſo that there is no reaſon to doubt their being meteors ariſing from the ſame general cauſe, and explicable upon the ſame principles, furniſhed by electrical experiments and diſcoveries. See HURRICANE, and *Water*-SPOUT.

For Dr. Franklin's ingenious method of accounting for both theſe phenomena; ſee his Letters and Papers, &c. vol. i. p. 191, &c. p. 216, &c.

WHISKY, a term ſignifying *water*, and applied in the Highlands and iſlands of Scotland and in Ireland to ſtrong water or diſtilled liquor. The ſpirit drank in the North is drawn from barley; and is ſaid to be preferable to any Engliſh malt brandy: it is ſtrong, but not pungent, and free from the empyreumatic taſte or ſmell.

WHISPERING. See HEARING, ATTENTION, &c.

WHISPERING-*places* depend on this principle, that the voice being applied to one end of an arch, eaſily paſſes by repeated reflections to the other.

Thus, let A B C (*Tab.* V. *Pneumatics*, *fig.* 71.) repreſent the ſegment of a ſphere; and ſuppoſe a low voice uttered at D, the vibrations extending themſelves every way, ſome of them will impinge upon the points E, E, &c. and thence be reflected to the points F, F, &c. thence to G, G, &c. till at laſt they meet in C; where, by their union, they cauſe a much ſtronger ſound than in any part of the ſegment whatever, even at D the point whence they firſt proceeded.

Accordingly, all the contrivance in a *whiſpering-place* is, that near the perſon who whiſpers there be a ſmooth wall, arched either cylindrically, or elliptically. A circular arch will do, but not ſo well.

Places famed for the conveyance of *whiſpers* are, the priſon of Dionyſius at Syracuſe, which increaſed a ſoft *whiſper* to a loud noiſe; the clap of one's hand to the ſound of a cannon, &c. The aqueducts of Claudius, which caried a voice ſixteen miles; and divers others enumerated by Kircher in his Phonurgia.

The moſt conſiderable in England are, the dome of St. Paul's, London, where the ticking of a watch may be heard from ſide to ſide; and a very eaſy *whiſper* be ſent all round the dome: this Dr. Derham found to hold not only in the gallery below, but above upon the ſcaffold, where a *whiſper* would be carried over one's head round the top of the arch, though there be a large opening in the middle of it into the upper part of the dome: and the famous *whiſpering*-place in Glouceſter cathedral, which is no other than a gallery at the eaſt-end of the choir, leading from one ſide thereof to the other. It conſiſts of five angles, and ſix ſides, the middlemoſt of which is a naked window; yet two *whiſperers* there hear each other at the diſtance of twenty-five yards. See Birch's Hiſt. of the Royal Society, vol. i. p. 120.

WHIST, or WHISK, a well-known game at cards. Several caſes of this game have been the object of mathematical computations. Thus M. de Moivre has ſolved this problem: to find the odds that any two of the partners, that are pitched upon, have not the four honours? M. de Moivre concludes from this ſolution.

1. That it is 27 to 2, nearly, that the dealers have not the four honours.
2. That it is 23 to 1, nearly, that the eldeſt have not the four honours.
3. That it is 8 to 1, nearly, that neither one ſide nor the other have the four honours.
4. That it is 13 to 7, nearly, that the two dealers do not reckon honours.
5. That it is 20 to 7, nearly, that the two eldeſt do not reckon honours.
6. That it is 25 to 16, nearly, that either one ſide or the other do reckon honours, or that the honours are not equally divided.

The ſame learned author alſo determines, that the odds for the partners who have eight of the game, if dealers, againſt thoſe who have nine, is nearly as 17 to 11. But if thoſe who have eight of the game are eldeſt, the odds will be nearly as 95 to 77. And that without conſidering whether thoſe who have eight are dealers, or eldeſt, there is one time with another the odds of ſomewhat leſs than 7 to 5; and very nearly that of 25 to 18.

It is a queſtion likewiſe belonging to this game, what the probability is that a player has a given number of trumps dealt him; particularly, it has been often taken as an equal wager, that the dealer has at leaſt four trumps. Mr. de Moivre has computed the following tables; ſhewing for the dealer, as well as the other gameſters, what the probability is of taking preciſely any aſſigned number of trumps in one deal. And thence by a continual addition of the numbers, or of ſuch part of them as is neceſſary, it is eaſily found what the probability is of taking at leaſt that number.

	Chances of the Dealer to have beſides the Card turned up.	Trumps.	Chances of any other Gameſter to have preciſely.	
	3910797436	0	8122425444	
	20112672528	I.	46929569232	
	41959196136	II.	110619698904	
	46621329040	III.	139863987120	
	30454255260	IV.	104897990340	
	12181702104	V.	48726808416	
	3014663652	VI.	14211985788	
	455999544	VII.	2583997416	
Tab. I.	40714245	VIII.	284999715	Tab.II.
	2010580	IX.	18095220	
	48906	X.	603174	
	468	XI	8892	
	1	XII.	39	
	Sum = 158753389900 is the common denominator; being the combinations of 12 cards in 51.		476260169700 = ſum, is the common denominator; being the combinations of 13 in 51.	

By the help of theſe tables ſeveral uſeful queſtions may be reſolved; as, 1. If it is aſked, what is the probability that the dealer has preciſely III trumps, beſides the trump card? The anſwer, by *Tab.* I. is $\frac{4662}{15875}$; and the probability of his having ſome other number of trumps is $\frac{11213}{15875}$. But if the queſtion had been, what is the probability that ſome other gameſter, the eldeſt hand for inſtance, has preciſely IV trumps? The anſwer *Tab.* II. is $\frac{104898}{76260}$.

2. To find the chance of the dealer's not having fewer than IV trumps: add his chances to take 0, I, II, which are 39108, 201127, 419592; and their ſum 659827 taken from the denominator 1587534, and the remainder made its numerator, the probability of the dealer having IV or more trumps will be $\frac{927707}{1587534}=\frac{329}{563}$, a little above $\frac{7}{12}$. The wager therefore that the dealer has not IV trumps is ſo far from equal, that whoever lays it throws away above $\frac{1}{5}$ of his ſtake.

But if the wager is that the dealer has not V trumps, then 466213 (the chances of his having III beſides the trump card) is to be added to the chances for 0, I, II; which will make the chance of him who lays this wager to be nearly $\frac{317}{455}$; and that of his adverſary $\frac{138}{455}$.

And hence, if wagers are laid that the dealer has not IV trumps, and has not V trumps, alternately; the advantage of him who lays in this manner will be nearly $11\frac{1}{4}$ per cent. of his ſtakes.

3. To find the odds of laying that the eldeſt hand has at leaſt III, and at leaſt IV trumps, alternately; the numerator of the one expectation is (by *Tab.* II.) 31501119, and of the other 17514720, to the denominator 47626017; whence the advantage of the bet will be $\frac{15}{514}$, or 3 per cent. nearly.

Again, if it is laid that the trumps in the dealer's hand ſhall be either I, II, III, or IV; the diſadvantage of this bet will be only 15*s.* 4*d.* or about $\frac{3}{4}$ per cent.

In like manner, the odds of any propoſed bet of this kind may be computed: and from the numbers in the tables, and their combinations, different bets may be found which ſhall approach to the ratio of equality; or if they differ from it, other bets may be aſſigned, which, repeated a certain number of times, ſhall balance that difference.

4. And if the bet includes any other condition beſides the number of trumps, ſuch as the quality of one or more of them; then proper regard is to be had to that reſtriction.

Let the wager be that the eldeſt has IV trumps dealt him; and that two of them ſhall be the ace and king. The probability of his having IV trumps preciſely is, by *Tab.* II. $\frac{104898}{476200}$: and the different fours in 12 cards are $\frac{12}{1} \times \frac{11}{2} \times \frac{10}{3} \times \frac{9}{4}$. But becauſe 2 out of the 12 trumps are ſpecified, all the combinations of 4 in 12 that are favourable to the wager, are reduced to the different two's that are found in the remaining 10 cards, which are $\frac{10}{3} \times \frac{9}{2}$. And this number is to the former as 1 to 11: the probability therefore is reduced by this reſtriction to $\frac{1}{11}$, of what elſe it had been: that is, it is reduced from near $\frac{1}{5}$ to about $\frac{1}{52}$. De Moivre's Doctrine of Chances, p. 172, &c. ed. 3d.

WHISTLE, *boatſwain's*. See CALL.

WHISTLE-*fiſh*, a name given by the people of Cornwall to a ſpecies of gadus, with only two fins on the back, otherwiſe called *muſtela fluviatilis*. See GADUS, and MUSTELA.

WHITE, one of the colours of natural bodies.

White is not ſo properly ſaid to be any one colour, as a compoſition of all the colours; it being demonſtrated by ſir Iſaac Newton, that thoſe bodies only appear *white*, which reflect all the kinds of coloured rays alike, and that the light of the ſun is only *white*, becauſe conſiſting of all colours.

From the multitude of rings of colours, which appear upon compreſſing two priſms, or object-glaſſes of teleſcopes together, it is manifeſt, that theſe do ſo interfere and mingle with one another at laſt, as, after eight or nine reflexions, to dilute one another wholly, and conſtitute an even and uniform *whiteneſs*: whence, as well as from other experiments, it appears, that *whiteneſs* is certainly a mixture of all colours; and that the light which conveys it to the eye, is a mixture of rays endued with all thoſe colours.

The ſame author ſhews, that *whiteneſs*, if it be moſt ſtrong and luminous, is to be reckoned of the firſt order of colours; but if leſs, as a mixture of the colours of ſeveral orders: of the former ſort he reckons *white* metals; and of the latter, the *whiteneſs* of froth, paper, linen, and moſt other *white* ſubſtances. And as the *white* of the firſt order is the ſtrongeſt that can be made by plates of tranſparent ſubſtances, ſo it ought to be ſtronger in the denſer ſubſtances of metals, than in the rarer ones of air, water, and glaſs.

Gold or copper mixed either by fuſion, or amalgamation with a very little mercury, with ſilver, tin, or regulus of antimony, become *white*; which ſhews, both that the particles of *white* metals have much more ſurface, and therefore are ſmaller than thoſe of gold or copper; and alſo, that they are ſo opake, as not to ſuffer the particles of gold or copper to ſhine through them. And as that author doubts not, but that the colours of gold and copper are of the ſecond or third order, therefore the particles of white metals cannot be much bigger than is requiſite to make them reflect the *white* of the firſt order. See COLOUR, and *Colours from* METALS.

Hevelius affirms it as a thing moſt certain, that, in the northern countries, animals, as hares, foxes, bears, &c. become *white* in the winter time; and in ſummer reſume their natural colours.

Black bodies are found to take heat ſooner than *white* ones; by reaſon the former abſorb or imbibe rays of all kinds and colours, and the latter reflect all.

Thus, black paper is ſooner put into a flame, by a burning glaſs, than *white*; and hence black cloths, hung up by the dyers in the ſun, dry ſooner than *white* ones. See BLACK.

WHITE *arſenic*, *aſhes*, and *bait*. See the ſubſtantives.

WHITE *bear*. See POLAR *Bear*.

WHITE *cinnamon*, *copperas*, *cordage*, *diachylon*, *eagle*, and *egg-ſhell*. See the ſubſtantives.

WHITE *of the eye*, denotes the firſt tunic or coat of the eye, called ALBUGINEA, and *conjunctiva*, becauſe ſerving to bind together or incloſe the reſt. See ADNATA.

WHITE-*face*, or BLAZE, in the *Manege*, a *white* mark upon a horſe, deſcending from the forehead almoſt to the noſe. It is called in French CHANFRIN *blanc*.

WHITE-*foot*, in the *Manege*, called in French *balzane*, is a *white* mark that happens in the feet of a great many horſes, both before and behind, from the fetlock to the coffin. The horſes thus marked are either tramelled, croſs-tramelled, or *white* all four. Some horſemen place an unlucky fatality in the *white* of the far foot behind. See CHAUSSE' *trop-haut*, and TRAMELLED.

WHITE *flag*, *flake*, and *froſt*. See the ſubſtantives.

WHITE-*friars*, a name common to ſeveral orders of monks, from their being clothed in a *white* habit.

Such are, the regular canons of St. Auguſtine, the Premonſtratenſes, and Bernardines. See CARMELITES.

WHITE *glaſs*. See GLASS.

WHITE-*hart ſilver*, *candidi cervi argentum*, a tribute or mulct paid into the exchequer, out of certain lands in or near the foreſt of *White-hart*, in Dorſetſhire; which was continued from Henry III.'s time, who firſt impoſed it upon Thomas de la Linde, and others, for killing a beautiful *white* hart, which that king had purpoſely ſpared in hunting.

WHITE-*hellebore*. See HELLEBORE.

WHITE-*horſe-fiſh*, in *Ichthyology*, a common Engliſh name for the *raia aſpera noſtras* of Willughby, and the *raia fullonica* of Rondeletius and Linnæus. Its back is rough and ſpiny; the noſe is ſhort and ſharp: at the corner of each eye are a few ſpines; the nictitating membrane is fringed; the teeth are ſmall and ſharp: on the upper part of the pectoral fins are three rows of ſpines pointing toward the back, and crooked, like thoſe of the fuller's inſtrument; whence its name *fullonica* and *fuller*. On the tail are three rows of ſtrong ſpines: the tail is ſlender, and rather longer than the body. The colour of the upper part of the body is cinereous, uſually marked with many black ſpots; the lower part *white*. This fiſh grows to a ſize equal to that of the ſkate. Pennant.

WHITE-*land*, in *Agriculture*, a tough clayey ſoil, naturally of a ſomewhat whitiſh hue when dry, eſpecially when it has lain ſome time untilled, but becoming blackiſh after rain; this appears of a light greyiſh colour, when turned up by the plough, and ſlides off from the plough-ſhare with eaſe, and with a ſmooth gloſſy ſurface.

It has often a yellowiſh hue with the grey, and is often veined with large parcels of a blue marly earth. See *Clay* SOIL.

WHITE *lead* is a ſort of ruſt of lead, or lead diſſolved with vinegar; much uſed by painters. See CERUSSE.

WHITE *line*, among *Printers*, a void ſpace, greater than uſual, left between two lines. See PRINTING.

WHITE *line*, in *Anatomy*. See LINEA *alba*.

WHITE *linen* is cloth of hemp, or flax, bleached by divers lays, and waterings on the ground.

WHITE *meats* include milk, butter, cheeſe, white pots, cuſtards, and other foods conſiſting of milk, or eggs. Some add, alſo, fiſh, veal, and chickens.

WHITE *money*, *libræ albæ*. See MONEY.

WHITE *mortar*. See MORTAR.

WHITE *order*. See ORDER.

WHITE *paper* is that intended for writing, printing, &c. in contradiſtinction to *brown paper*, *marbled paper*, *blotting paper*, &c.

WHITE, *pearl*. See PEARL.

WHITE *pepper*. See PEPPER.

WHITE-*pot* denotes milk or cream baked with the yolks of eggs, fine bread, ſugar, and ſpice, in an earthen pot.

The cooks furniſh us with a variety of diſhes under this form and denomination: ſuch are *Norfolk white-pot*, *Weſtminſter white-pot*, *rice white-pot*, &c.

WHITE *precipitate*. See MERCURY.

WHITE *rent*, a rent or duty of 8*d.* payable yearly, by every tinner in the county of Devon, to the duke of Cornwall. See BLANCH *fermè*.

WHITE *ſalt* is common or ſea-ſalt dried and calcined by the fire, ſo as not to leave any moiſture therein. The chemiſts call it *decrepitated ſalt*.

There are ſome ſalts naturally *white*, and others that need to be *whitened*, either by diſſolving and purifying them in fair water, which is afterwards evaporated; or by means of fire; or by the ſun. See SALT.

WHITE *ſauce*, a ſort of ſauce made of blanched almonds, and the breaſt of a capon, pounded together with cloves, cinnamon, &c. We alſo hear of *white broth*, which is a ſort of broth enriched with ſack and ſpices, having blanched almonds ſcraped into it, and the whole thickened with the yolks of eggs, &c.

WHITE *ſoap*. See SOAP.

WHITE, *Spaniſh*, is a kind of fucus uſed by the ladies to *whiten* the complexion, and hide the defects thereof, called alſo MAGISTERY of *biſmuth*.

The uſe of this, as well as of ceruſſes, is pernicious; and ſhould be particularly avoided during the taking of any ſulphureous water, which may change the complexion quite black. Indeed, all phlogiſtic vapours, and even the ſun itſelf, tend to give both the magiſtery of biſmuth and ceruſſe a yellow colour: an obſervation which ſerves to explain a paſſage in Martial, where a ceruſed lady is ſaid to fear the ſun.

> *Cretata timet Fabulla, nimbum,*
> *Ceruſata timet Sabella, ſolem.*
> Ep. lib. ii. Ep. 41.

WHITE, *Spaniſh*, is alſo a name given to TROY *white*.

WHITE *ſpurs*. See SPUR, and ESQUIRE.

WHITE *ſtar*, and *ſugar*. See the ſubſtantives.

WHITE-*ſwelling*. See TUMORS.

We have ſeveral examples of ſucceſsful cures of *white-ſwellings* of the joints, or tumors from inſpiſſated lymph, by a ſmall ſtream of warm water falling from a height on them.

When the water is impregnated with penetrating medicines, or natural minerals, its virtues are greater. The application of bladders containing warm water, to the parts affected, is alſo recommended. See Le Dran, Obſ. Chirurg. tom. ii. Obſ. 93, 94.

WHITE-*tail*, in *Ornithology*. See WHEAT-*ear*.

WHITE *tartar*. See TARTAR.

WHITE-*throat*, in *Ornithology*, the name of a ſmall bird, very common in our gardens and hedges, and ſeeming to have been deſcribed under the name of *ſpipola* by Aldrovandus and ſome others, though moſt approaching to the *ficedula* claſs.

Its beak is black above, and whitiſh below; its feet of a yellowiſh brown; its neck and back are of a browniſh-grey; its head more grey than either, and the upper part of the throat *white*, the reſt reddiſh; its breaſt and belly are alſo a little reddiſh; but in the female, the breaſt is perfectly *white*. The edges of the long wing-feathers are ſome whitiſh and others browniſh, and the tail is variegated with black and white, and ſome grey or aſh-colour intermixed. It is extremely common in our gardens and orchards in ſummer, and feeds on flies, ſpiders, and other inſects, but leaves us in winter. It builds in buſhes, at a ſmall height from the ground, with ſtubble and horſe-hair, and lays five browniſh-green eggs, with black ſpots. Its note is continually repeated, and often attended with odd motions of the wings: it is harſh and diſpleaſing. This bird is ſhy and wild, and ſeems of a pugnacious diſpoſition. Ray and Pennant.

WHITE, *troy*. See TROY-*white*.

WHITE-*varniſh*, and *vitriol*. See the ſubſtantives.

WHITE *wax*, is yellow wax blanched, and purified by the ſun and dew. See WAX.

WHITE *upon white*, in the *Porcelain Manufactory*, a name given by the Engliſh merchants to a particular china-ware, which is formed of three different *white* ſubſtances, the body being of one, the flowers of another, and the varniſh which covers theſe of a third. See HOACHE.

WHITE *wine* is that of a clear, bright, tranſparent colour, bordering on *white*. It is thus called to diſtinguiſh it from the red wines, or clarets.

The generality of *white wines* are made from *white* grapes; though there are ſome from black ones, only the ſkins are carefully kept from tinging them.

WHITES, the popular name of a diſorder incident to women. See FLUOR *albus*.

WHITENING *of bones*, for a ſkeleton. See BONE.

WHITENING *of cloth*. See BLEACHING.

WHITENING *of hair*. See HAIR.

WHITENING *of wax*. See WAX.

WHITING, in *Ichthyology*, the Engliſh name of a common fiſh of the aſellus kind, commonly diſtinguiſhed by the writers in ichthyography by the name of *aſellus mollis*, though by ſome called *aſellus albus* and *merlangus*.

According to the Artedian ſyſtem of ichthyology, the *whiting* is one of the *gadi*, diſtinguiſhed by that author by the name of the *gadus*, with three fins on the back, without beards, with a white body, and with the upper jaw longer than the under.

The *whiting*, or GADUS *merlangus* of Linnæus, is a fiſh of an elegant form; the upper jaw is the longeſt; the eyes are large, the noſe ſharp, and the teeth of the upper jaw long, appearing above the lower when cloſed: the firſt dorſal fin has fifteen rays, the ſecond eighteen, and the laſt twenty. The colour of the head and back, is a pale brown; the lateral line white and crooked; the belly and ſides ſilvery; the laſt ſtreaked lengthways with yellow.

Whitings appear in large ſhoals in our ſeas in the ſpring, keeping at the diſtance of about half a mile to that of three miles from the ſhore. They are the moſt delicate and wholeſome of any of the genus; and ſeldom grow to more than ten or twelve inches in length. Pennant.

No *whiting* is to be taken in the Thames or Medway of leſs ſize than ſix inches from the eye to the end of the tail, or at any time except from Michaelmas-day to Ember week. 30 G. II. cap. 21. Nor under ſix inches any where elſe. 1 G. I. ſtat. 2. cap. 18.

WHITING-*pollack*. See HUITINGO *pollachius*, and POLLACK.

WHITING-*pout*. See POUTING.

WHITLOW, or WHITLOE, *paronychia*, derived from παρα, *near*, and ονυξ, *nail*, in *Surgery*, a painful kind of tumor, or abſceſs, ariſing at the ends of the fingers, and the roots of the nails; otherwiſe called *panaritium* and *panaris*.

Becket derives the term *whitlow* from *white*, and *hawe*, an old Engliſh word ſignifying a ſwelling of any part; whence, he ſays, proceeds *white hawe*, and afterwards *whitflaw*. Phil. Tranſ. Abr. vol. viii. p. 655.

The humour, or matter of the *paronychia*, is ſometimes ſo ſharp as to corrode the tendons, nerves, the perioſteum, and even the bone itſelf.

It is either lodged between the integuments, or between the perioſteum and bone. The deeper it lies, the more dangerous it is.

Accordingly Heiſter diſtinguiſhes three ſpecies of *whitlow*: the firſt kind is that in which only the integuments are affected at the end of the finger, near the nail; in this ſort the pain is pretty tolerable, and does not extend beyond the finger: the ſecond kind is, when the perioſteum is inflamed or eroded; in which caſe the ſymptoms are more violent, and the pain very intenſe, though ſtill confined to the finger, inſomuch as to occaſion ſometimes a fever, convulſions, delirium, &c. without much apparent tumor or inflammation: the third and worſt kind is that which infects the nervous coverings of the tendons belonging to the flexor muſcles of the fingers, or even the adjacent nerves or tendons themſelves; in this caſe the pain is excruciating, and the diſorder ſpreads through the whole hand and arm.

The firſt kind is not very dangerous and uſually terminates in the loſs of the nail: the ſecond ſort is more painful, and has been attended with a caries of the bones of the finger, as a conſequence of the preceding inflammation and ſuppuration: but the third ſpecies is really dangerous; the intenſe pains, abſceſs, gangrene, tumor, and inflammation of the whole arm, together with a fever and other malignant ſymptoms, frequently deſtroying the patient, unleſs its progreſs is prevented.

The true and proximate cauſe of a *whitlow*, according to Heiſter, muſt be referred to an inflammation of the adjacent integuments, chiefly of the perioſteum, from an inſpiſſation of the blood, or an obſtruction of its ſmall veſſels; and the inflammation may proceed from either internal or external cauſes, as from an inſpiſſation or acrimony of the blood and lymph, induced by a tenſe fibre, a heating regimen, or an abuſe of the non-naturals, or from a contuſion, wound, or puncture.

The moſt approved method for removing the inflammation and obſtruction by diſcuſſion, is to let the patient hold his finger ſeveral hours in ſpirits of wine highly rectified, or camphorated with theriaca. For the ſame purpoſe may be uſed, with ſucceſs, a decoction of garlick and leaves of ſcordium and ſavin, in which hot liquor the finger ſhould either be immerged for ſeveral hours, or elſe fomented with it by linen rags. Others recommend frequently dipping and holding the diſordered finger a little while in ſcalding water. But if a ſuppuration is formed, an inciſion is the only remedy; and the ſuppuration may be forwarded by dipping the finger in a decoction of mallow-flowers boiled in milk, or by applying to it a poultice of bread and milk; which may be rendered ſtill more active and ripening by adding a few white lily roots, or a little honey. A ſuppuration may be alſo promoted by the application of a diachylon plaſter with the gums.

But in the ſecond or third ſpecies of this diſorder, where the perioſteum or bone is affected, this practice would be pernicious, increaſe the pain, and induce an abſceſs, caries, and gangrene of the whole arm. For the cure of theſe two ſpecies, an inciſion is neceſſary for the diſcharge of the offending matter; the wound ſhould be dreſſed with dry lint and diachylon plaſter, and a compreſs dipped in ſpirit of wine; each being retained with a proper bandage. Fungous, or proud fleſh, if it appears, may be eaſily removed either with the ſciſſars, or by ſome eſcharotic mixed with digeſtive ointment. The wound is afterwards to be treated like thoſe, in which the bones are affected, with eſſence of myrrh, balſam of Peru, &c. and if the bone is foul, kept open with lint dipped in tincture of myrrh, till there is either an exfoliation of the morbid from the ſound parts, or till the whole bone comes away entire; after which the wound may be deterged and healed without difficulty.

For the third ſpecies, Garengoet directs to open the tumor by making an inciſion longitudinally down in the capſula of the tendon, which will diſcharge a kind of lymph or ſerum very much to the patient's eaſe. When the matter makes its way, without any inciſion through the capſula of the tendon, and about its external opening, a caruncle or fleſhy ſubſtance appears, he adviſes to paſs a director through the opening into the eroded capſula of the tendon, and then to make an inciſion through the parts incumbent on the director, by which means a thicker matter will be found concealed in the divided ſinus. For a fuller account of the treatment of the different ſpecies, and particularly of the laſt, ſee Heiſter's Surgery, vol. ii. p. 324, &c.

WHITLOW *graſs, or mountain knot-graſs, paronychia* or *illecebrum*, in *Botany*, a genus of the *pentandria monogynia* claſs. Its characters are theſe: the empalement of the flower is five-cornered, and compoſed of five coloured leaves, which are permanent; the flower has no petals, but has five hair-like ſtamina within the empalement, terminated by ſingle ſummits, and an oval acute germen, ſitting upon a ſhort ſtyle, crowned by an obtuſe ſtigma; the empalement afterwards turns to a roundiſh capſule with one cell, opening with five valves, containing one large, roundiſh, acute-pointed ſeed. Linnæus enumerates twelve, and Miller two ſpecies, cultivated, which grow naturally in Spain.

WHITLOW-*graſs* is alſo a name given to ſome ſpecies of DRABA.

WHITLOW-*graſs, rue-leaved*, a ſpecies of SAXIFRAGE.

WHITSUN *farthings*. See PENTECOSTALS.

WHITSUNTIDE, the fiftieth day after EASTER.

The ſeaſon properly called PENTECOST, is popularly called *Whitſuntide*; ſome ſay, becauſe in the primitive church, thoſe who were newly baptized came to church between Eaſter and Pentecoſt in *white* garments.

WHOLE, *totum*, in *Arithmetic*, &c. See PART, DIVISION, PARTITION, &c.

WHOLE, in *Logic*, is diſtinguiſhed into four kinds; viz. a *metaphyſical*, when the eſſence of a thing is ſaid to conſiſt of two parts, the genus and the difference; *mathematical* or *integral*, when the ſeveral parts which go to make up the *whole*, are really diſtinct from one another, and each of them may ſubſiſt apart; *phyſical* or *eſſential*, uſually denoting and including the two eſſential parts of man, body and ſoul, but more properly including all the eſſential modes, attributes, or properties, contained in the comprehenſion of any idea; and *logical*, called alſo *univerſal*, the parts of which are all the particular ideas to which this univerſal nature extends. Watt's Logic, p. 117.

WHOLE *blood, meaſure, number*, and *fine*. See the ſubſtantives.

WHOLESOME *ſhip*, in the *Sea-Language*, one that will try, hull, and ride well, without rolling, or labouring in the ſea. A long ſhip that draws much water, may try, hull, and ride well; but if ſhe draws little water, ſhe may try and ride well, but never hull well; and a ſhort ſhip, that draws much water, may hull well, but neither ride nor try well; and ſuch is called an *unwholeſome* ſhip.

WHOODINGS, or HOODINGS, a ſea-term, uſed for planks joined and faſtened along the ſhip's ſides into the ſtem. See RABBET.

WHORE, ſee COURTISAN, HARLOT, CONCUBINE, &c.

WHORLBAT, or HURLBAT, a kind of gauntlet, or leathern ſtrap, loaden with plumbets; uſed by the ancient Romans in their ſolemn games, and exerciſes; and by them called CÆSTUS.

WHORLES *of flowers*, among *Herbaliſts*, are rows of leſſer flowers, ſet at certain diſtances about the main ſtalk or ſpike, as in penny-royal, &c.

WHORTLE-*berry*, BILBERRY, or CRANBERRY, *vaccinium*, in *Botany*, a genus of the *octandria monogynia* claſs. Its characters are theſe; the flower has a ſmall permanent empalement ſitting upon the germen; it is bell-ſhaped, of one petal, ſlightly cut into four ſegments at the brim, which turn backward; it has eight ſtamina, terminated by horned ſummits, having two awns on their back-ſide which ſpread aſunder. The germen is ſituated below the flower, ſupporting a ſingle ſtyle longer than the ſtamina, crowned by an obtuſe ſtigma; it afterwards turns to an umbilicated globular berry with four cells, containing a few ſmall ſeeds. Miller enumerates five, and Linnæus twelve ſpecies.

The *whortle-berry* with one flower upon each footſtalk, oval ſawed leaves which fall off in winter, and an angular ſtalk, called *black whorts*, or *bilberries*, grows very common upon large wild heaths, in many parts of England, but is never cultivated in gardens, it being with great difficulty tranſplanted; nor will it thrive long when moved thither. The fruit is gathered by the poor inhabitants of thoſe villages which are ſituated in the neighbourhood of their growth, and carried to the market-towns. Theſe are by ſome eaten with cream or milk; they are alſo put into tarts, and much eſteemed by people in the North, but they are ſeldom brought to London.

The ſhrub on which theſe grow, riſes about two feet high, having many ſtems which are garniſhed with oblong leaves, ſhaped like thoſe of the box-tree, but ſomewhat longer, and a little ſawed on their edges. The flowers are ſhaped like thoſe of the arbutus, or ſtrawberry-tree, of a greeniſh-white colour, changing to a dark red toward the top. The fruit is about the ſize of large juniper-berries, and of a deep purple colour, having a flue upon it when untouched, like the blue plums, which is rubbed off with handling.

The *whortle-berry* with nodding bunches of flowers terminating the branches, and oval leaves which are entire, turned back and punctured on their under ſide, called *vitis idæa*, and *red whorts*, is an ever-green ſhrub, ſeldom riſing above ſix or eight inches high, with leaves like thoſe of the dwarf-box, which grows upon moors in ſeveral parts of the North, but is not capable of being eaſily tranſplanted: the berries are red, and have a more agreeable acid flavour than thoſe of the firſt ſort.

The *whortle-berries* with oval, entire, reflexed leaves, and naked, ſlender, creeping ſtalks, called *moſs-berries, moor-berries*, and *cran-berries*, produce branches ſmall as thread, and trailing upon the moſſy-bogs, which are garniſhed with leaves reſembling thoſe of thyme, with the upper ſurface of a ſhining green, and white underneath. The berries, which grow upon long ſlender foot-ſtalks, ſucceeding the flowers, are round, red, and ſpotted, of a ſharp acid flavour, and much eſteemed for taſte, or eaten with milk or cream. This is a native of bogs, and cannot be propagated upon dry land.

There are ſeveral other ſpecies of this genus, ſome of which are natives of Spain and Portugal, others of Germany and Hungary, and ſeveral of the northern parts of America; from whence thoſe large fruit are brought to England which are uſed by the paſtry-cooks of London, during the winter ſeaſon, for tarts. But as all theſe ſorts grow naturally in ſwamps and bogs, they are not eaſily tranſplanted into gardens in their native country ſo as to thrive or produce fruit; therefore, there can be little hope of cultivating them to advantage. Miller.

WHORTLE-*berry, African*, a ſpecies of ROYENA.

WHORTLE-*berry, bear's*. See UVA *urſi*.

WHUR, in *Falconry*, denotes the fluttering of partridges, or pheaſants, as they riſe.

WIC, denotes a place on the ſea-ſhore, or on the bank of a river. Though in the original Saxon, it more properly ſignifies a *ſtreet, village*, or *dwelling-place*; as alſo a *caſtle*. See WYKE.

We often meet with *wic* in the Saxon writers, as a termination of the name of a town, which had a complete name without it: as, *Lunden-wic*; that is London town; which ſignifies no more than *London*. In the Saxon Annals, it is mentioned, that king Ethelbert made Melitus biſhop of *Lunden-wic*.

So, Ipſwich is written in ſome old charters, *villa de Gippo*, and ſometimes *villa de Gippo wico*; which is no variation, but the ſame thing; for *Gipps* is the complete name, and *Gipp-wic* is Gipps-town.

WICKER, a twig of the oſier ſhrub, ſingle or wrought.

WICKER-*tree*, a name given by the Engliſh to a tree common in China, and deſcribed by Kircher and others. It is, as it were, a rope twiſted by nature, about an inch thick, and creeps along the earth often for above a hundred paces together, much embarraſſing the way, but ſerving for cables of ſhips, ſeats, hurdles, beds, mats, and various other neceſſary uſes. It endures no vermin, and is much valued for being cool and refreſhing in the hot ſeaſons.

WICKET, of the French *guichet*, a little door within a gate; or a hole in a door, through which to view what paſſes without.

WICKLIFFISTS, or WICKLIFFITES, in *Eccleſiaſtical Hiſtory*, a religious ſect, who had their riſe in England in the 14th century, and their name from their leader *John Wickliffe*, born about the year 1324, a profeſſor of divinity in the univerſity of Oxford, and afterwards rector of Lutterworth.

To that immortal author it is we owe the firſt hint of the great reformation, effected about one hundred and fifty years after him.

The firſt occaſion, on which *Wickliffe* began to diſtinguiſh himſelf was in 1360, when he defended the ſtatutes and privileges of the univerſity of Oxford againſt the order of Mendicants or Begging Friars, who from their firſt ſettlement in Oxford, A.D. 1230, had diſturbed the chancellor and ſcholars, endeavoured to eſtabliſh an exempt juriſdiction, and took all opportunities of enticing the ſtudents from the colleges into their convents. He alſo wrote and publiſhed ſeveral tracts againſt the begging trade of the friars, and in order to reform the abuſes of the clergy. In conſequence of the credit he acquired by his writings, he was advanced in 1361 to be maſter of Baliol college, and in 1365 to be warden of Canterbury-hall, then newly founded. However, in 1367, he was deprived of the wardenſhip by Simon Langham, archbiſhop of Canterbury, who ſubſtituted a monk in his place; and upon his appeal to pope Urban V. of whoſe claim of homage and tribute from king Edward III. he had in the preceding year publiſhed a refutation, the ſentence of the archbiſhop againſt him was confirmed. Exaſperated at this treatment, he threw off all reſtraint, and not only attacked the monks, and their ſcandalous irregularities, but even the pontifical power itſelf, and other eccleſiaſtical abuſes, both in his ſermons and writings. He afterwards proceeded to expoſe and refute the abſurd notions that were generally received in religious matters, and not only exhorted the laity to ſtudy the Scriptures, but furniſhed them with an Engliſh verſion of the Bible, that the peruſal of it might thus become more univerſal. In a treatiſe which he publiſhed *Of the Truth of the Scripture*, and in a *prologue* or preface to his tranſlation, he vindicates his deſign againſt the objections of his adverſaries, and reaſons on the importance and uſe of underſtanding the Scriptures in a manner very honourable to himſelf, conſidering the age in which he lived. The truth of the faith, ſays he, ſhines the more by how much the more it is known—nor are thoſe heretics to be heard who fancy that ſeculars ought not to know the law of God, but that it is ſufficient for them to know what prieſts and prelates tell them by word of mouth; for the Scripture is the faith of the church, and the more it is known in an orthodox ſenſe the better; therefore, as ſecular men ought to know the faith, ſo it is to be taught them in whatſoever language is beſt known to them. Beſides, ſince the truth of the faith is clearer and more exact in the Scripture than the prieſts know how to expreſs it—it ſeems uſeful that the faithful ſhould themſelves ſearch out and diſcover the ſenſe of the faith, by having the Scriptures in a language which they underſtand.—The laws which the prelates make are not to be received as matters of faith; nor are we to believe their words or diſcourſes any farther or otherwiſe than they are founded on the Scripture—with much more to the ſame purpoſe and in the ſame admirable ſtrain. In this preface, and ſeveral other publications and treatiſes, ſtill in manuſcript, he reflected ſeverely on the corruptions of the clergy, condemned the worſhip of ſaints and images, and the doctrine of indulgences, denied the corporal preſence of Chriſt in the ſacrament, inveighed againſt the wanton exerciſe of the papal power, and oppoſed the making of the belief of the pope's being head of the church an article of faith and ſalvation, cenſured the celibacy of the clergy, expoſed various errors and irregularities in the hierarchy and diſcipline of the church, and earneſtly exhorted all people to the ſtudy of the Scriptures.

Wickliffe denied that biſhops were of a different order from prieſts, and that by virtue of their office they had any power to do what prieſts have not; and that in the apoſtolic times the two orders ſubſiſting in the church were thoſe of prieſt and deacon. With regard to tithes he obſerves, that we do not read in the Goſpel where Chriſt paid tithes, or commanded any man ſo to do; and that if they were due by God's commandment, there ſhould be every where in Chriſtendom one manner of tithing; and that thoſe things which are due to prieſts ſhould be given freely, without exaction or conſtraining.

In oppoſition to the papal claims of ſupremacy and dominion he maintained, that the grants of emperors may be reſumed; that St. Peter and his ſucceſſors have no rights conferred upon them of civil or political dominion; that the perſons of the clergy and the goods of the church are not exempted from the civil powers; and that bulls of abſolution or excommunication are conditional and not abſolute, and depend for their effects on the diſpoſition and character of thoſe to whom they pertain.

Wickliffe defines hereſy to be error maintained againſt holy writ, and that in life and converſation, as well as in opinion. Concerning the ſalvation of a baptized infant, he declares himſelf unable to determine on either ſide.

The number of tracts he wrote and publiſhed, both in Latin and Engliſh, is very conſiderable. From two large volumes of his works, intitled *Aletheia*, i. e. *Truth*, and a third under the title of *Trialogus*, John Huſs is ſaid to have derived moſt of his doctrines. We have a full and complete Hiſtory of the Life and Sufferings, and various Writings of *Wickliffe*, both printed and MS. publiſhed in octavo at London, in the year 1720, by Mr. John Lewis; who alſo publiſhed, in 1731, *Wickliffe*'s Engliſh Tranſlation of the New Teſtament from the Latin Verſion, called the Vulgate. This tranſlation is enriched with a learned preface by the editor, in which he enlarges upon the life, actions, and ſufferings, of this eminent reformer.

But to return to his hiſtory.—The monks, whom *Wickliffe* had principally exaſperated, commenced a violent proſecution againſt him at the court of Gregory XI. who, in 1377, ordered Simon Sudbury, archbiſhop of Canterbury, to take cognizance of the affair at a court held at London. *Wickliffe* eſcaped this danger by the intereſt of the duke of Lancaſter, and ſome other peers, who had a high regard for him. When the ſchiſm which embroiled the Romiſh church on the death of Gregory XI. was tolerably ſettled, the proceſs againſt *Wickliffe* was revived by William Courtney, archbiſhop of Canterbury, in 1382, and was carried on with great vehemence in a court of ſelect biſhops and others aſſembled in the monaſtery of the Preaching Friars at London. The event was, that of twenty-four articles exhibited againſt him, ten were condemned as hereſies, and fourteen as errors. It has been ſaid that *Wickliffe* made a public recantation of the opinions with which he was charged; but of this no ſufficient evidence appears. Some have ſaid, that king Richard baniſhed him out of England: but if that was the caſe, he returned in ſafety to Lutterworth, where he died peaceably in the year 1384. He left many followers in England, and other countries, who were called *Wickliffites* and LOLLARDS, and who held their opinions in private without making any public profeſſion of them; though they were generally known by their diſparaging the ſuperſtitious clergy, whoſe corruptions were ſo notorious and their cruelty ſo enraged, that it was no wonder the people were much prejudiced againſt them. Wherever they could be found, they were terribly perſecuted by the inquiſitors, and other inſtruments of papal vengeance; and, in the council of Conſtance, in 1415, the opinions of *Wickliffe*, amounting to forty-five articles, were condemned by a ſolemn decree, he himſelf was declared an obſtinate heretic, and his bones ordered to be dug up, which part of the ſentence was executed about thirteen years after, when they were taken up and publicly burnt. Lewis's Hiſtory, &c. 8vo. paſſim. Moſh. Eccl. Hiſt. vol. iii. p. 166. 8vo. Burnet's Hiſt. Reform. vol. i. p. 23.

WICRANGLE, in *Ornithology*, an Engliſh name for the MATTAGESS, or greater BUTCHER-*bird*, the *lanius cinereus major* of authors.

WICRANTUM, in *Natural Hiſtory*, a name given by the people of the Eaſt-Indies to certain foſſile bodies, of the nature of the pyrites, of the ſize of peas, and formed into variouſly angular figures.

They look black and gloſſy, and much of the nature of blende, or mock-lead; but when put into the fire, they ſhew us by their ſmell that they contain ſulphur. They are found in the diamond-mines.

The natives firſt powder them; and then mixing them with the juices of certain plants, they dry them, and then calcine them again. Theſe proceſſes they repeat at leaſt ſixty times; but the firſt calcinations are made with a mixture of divers urines, as that of the horſe, the camel, the cow, and the like.

After this tedious preparation, they are given in coughs and colds, and are ſaid to be a remedy even in conſumptions.

WIDE-*eared*, in the *Manege*, is applied to a horſe, when the root, or lower part of his ear is placed too low, and the ear itſelf is too large. The French uſe the term *oreillard* for ſuch a horſe.

WIDOW, *vidua*, a woman that has loſt her huſband.

Some alſo uſe the term WIDOWER, for a man who has loſt his wife. Marriage with a *widow*, is a kind of BIGAMY in the eye of the canon law.

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Mr. Kerſeboom has given us a table, ſhewing how long four hundred and thirty-two *widows* lived, and finds, that at a medium, each lived fourteen years. Phil. Tranſ. Nº 468. ſect. 3.

It appears that, in Germany, the number of *widows* dying annually is four times the number of widowers: thus, in Dreſden alone, the number of *widows* who died in 4 years, was 584; the number of widowers, 149: i. e. 4 to 1. At Wittenberg, during 11 years, 98 widowers, died, and 376 *widows*. At Gotha, during 20 years, 210 widowers died, and 760 *widows*. And as *widows* are certainly, one with another, ſeveral years younger than widowers: it may be concluded that the number of the former in life together could not be leſs than five times the latter.

Thus alſo, in 1770, the number of *widows* in life, derived from the whole body of profeſſors and miniſters in Scotland, was 380; but the number of widowers among them has, one year with another, been ſcarcely 90; i. e. not ſo much as a quarter of the number of *widows*. Price's Obſerv. on Rev. Paym. eſſ. 4.

Theſe facts cannot be accounted for without admitting the greater mortality of males. See MARRIAGE, and MORTALITY.

There have been many ſchemes eſtabliſhed for providing annuities for *widows*, for an account of ſeveral of which, ſee Price's Obſerv. &c. chap. ii. ſect. 1, 2, 3.

Among the ancient Greeks, *widows* had the care of the eternal fire of *Veſta* committed to them; which charge among the Romans, could be performed by virgins only, who from their office were called veſtals. See VESTAL.

WIDOW *of the king*, was ſhe, who, after her huſband's death, being the king's tenant in capite, was driven to recover her dower by the writ *De dote aſſignanda*; and could not marry again without the king's conſent.

WIDOW *bench*, in the county of Suſſex, is that ſhare which a *widow* is allowed of her huſband's eſtate, beſides her jointure.

WIDOW's *chamber*, a name given in London to the apparel and furniture of the bed-chamber of the *widow* of a freeman, to which ſhe is entitled.

WIDOW *wail*, in *Botany*. See CNEORUM.

WIDURIS, in *Natural Hiſtory*, the name of a ſtone found in Java, Malabar, and ſome other places, and deſcribed by Rumphius. Some ſpecies of this are all over of a fine white; others are of a duſky colour, with ſtreaks of white; the ſimply white ones are ſemi-pellucid, and look very like the white of an egg. Some alſo have called this the *hyalops*, or *achates vitreæ perſpicuitatis*.

WIECK. See WEEK.

WIFE, *uxor*, a married woman; or one joined with, and under the protection of, a huſband. See MARRIAGE.

A *wife*, in our Engliſh law, is termed FEME *covert*; *fœmina viro co-operta*; her condition during marriage is called her COVERTURE; and, in the judgment of the law, is reputed to have no will, as being ſuppoſed entirely under, and ſubject to, that of her huſband: *uxor fulget radiis mariti*.

A man cannot grant any thing to his *wife*, or enter into covenant with her; for the grant would ſuppoſe her ſeparate exiſtence, and to covenant with her would be only to covenant with himſelf; and, therefore, it is generally true, that all compacts made between huſband and *wife*, when ſingle, are void by the intermarriage. A woman, however, may be attorney for her huſband; and a huſband may bequeath any thing to his *wife* by will; for that cannot take effect till the coverture is determined by his death.

From the unity of perſon that ſubſiſts between the huſband and *wife*, in conſequence of marriage, it follows, that whatever perſonal property belonged to the *wife* before marriage, is by marriage abſolutely veſted in the huſband. In a real eſtate, he only gains a title to the rents and profits during coverture; for that, depending upon feodal principles, remains entire to the *wife*, after the death of her huſband, or to her heirs, if ſhe dies before him; unleſs by the birth of a child, he becomes tenant for life by the curteſy. But in chattel intereſts, the ſole and abſolute property veſts in the huſband, to be diſpoſed of at his pleaſure, if he chuſes to take poſſeſſion of them: for, unleſs he reduces them to poſſeſſion, by exerciſing ſome act of ownerſhip upon them, no property veſts in him, but they ſhall remain to the *wife*, or to her repreſentatives, after the coverture is determined.

There is, however, a conſiderable difference in the acquiſition of this ſpecies of property by the huſband, according to the ſubject-matter; viz. whether it be a CHATTEL *real* or *perſonal*? and of chattels perſonal, whether it be in *poſſeſſion*, or in *action* only.

A *chattle real* veſts in the huſband, not abſolutely, but *ſub modo*. As, in caſe of a leaſe for years; the huſband ſhall receive all the rents and profits of it, and may, if he pleaſes, ſell, ſurrender, or diſpoſe of it during the coverture: if he be outlawed or attainted, it ſhall be forfeited to the king; it is liable to execution for his debts; and if he ſurvives his *wife*, it is to all intents and purpoſes his own. Yet if he has made no diſpoſition thereof in his life-time, and dies before his *wife*, he cannot diſpoſe of it by will; for, having never been transferred from the *wife*, after his death ſhe ſhall remain in her ancient poſſeſſion, and it ſhall not go to his executors. Thus alſo with regard to chattels perſonal (or *choſes in action*), as debts upon bond, contracts, and the like; theſe the huſband may have if he pleaſes; that is, if he reduces them into poſſeſſion by receiving or recovering them at law: in which caſe, they are abſolutely and entirely his own; and ſhall go to his executors or adminiſtrators, or as he ſhall bequeath them by will, and ſhall not reveſt in the *wife*. But if he dies before he has reduced them into poſſeſſion, ſo that at his death they ſtill continue *choſes in action*, they ſhall ſurvive to the *wife*.

Thus in both the ſpecies of property the law is the ſame, in caſe the *wife* ſurvives the huſband; but, in caſe the huſband ſurvives the *wife*, the law is very different with reſpect to *chattels real* and *choſes in action*; for he ſhall have the *chattel real* by ſurvivorſhip, but not the *choſe in action*; except in the caſe of arrears of rent, due to the *wife* before her coverture, which in caſe of her death are given to the huſband by the ſtatute 32 Hen. VIII. cap. 37.

As to *chattels perſonal* (or *choſes* in *poſſeſſion*), which the *wife* hath in her own right, as ready money, jewels, houſhold goods, and the like, the huſband hath therein an immediate and abſolute property, devolved to him by the marriage, which can never again reveſt in the *wife* or her repreſentatives.

The *wife* alſo, by marriage, acquires a property in ſome of her huſband's goods, called her PARAPHERNALIA, which ſhall remain to her after his death, and ſhall not go to his executors. Theſe, ſignifying the apparel and ornaments of the *wife*, ſuitable to her rank and degree, the huſband cannot deviſe by his will; though during his life perhaps he hath the power (if unkindly inclined to exert it) to ſell them or give them away. But if ſhe continues in the uſe of them till his death, ſhe ſhall afterwards retain them againſt his executors and adminiſtrators, and all other perſons, except creditors where there is a deficiency of aſſets. And her neceſſary apparel is protected even againſt the claim of creditors.

The *wife* can make no contract without her huſband's conſent; and, in all law-matters, *ſine viro reſpondere non poteſt*.

The huſband is bound to provide his *wife* with neceſſaries by law, as much as himſelf; and if ſhe contracts debts for them, he is obliged to pay them; but for any thing beſides neceſſaries, he is not chargeable. Alſo if a *wife* elopes, and lives with another man, the huſband is not chargeable even for neceſſaries; at leaſt if the perſon, who furniſhes them, is ſufficiently apprized of her ELOPEMENT.

If the *wife* be indebted before marriage, the huſband is bound afterwards to pay the debt. If the *wife* be injured in her perſon or property, ſhe can bring no action for redreſs without her huſband's concurrence, and in his name, as well as her own; neither can ſhe be ſued, without making the huſband a defendant. There is indeed one caſe where the *wife* ſhall ſue and be ſued as a FEME *ſole*, viz. where the huſband has abjured the realm, or is baniſhed; for he is then dead in law. See CUSTOM of *London*.

In criminal proſecutions, the *wife* may be indicted and puniſhed ſeparately; for the union is only a civil union. But in trials of any ſort, they are not allowed to be evidence for, or againſt, each other. However, where the offence is directly againſt the perſon of the *wife*, this rule has been uſually diſpenſed with; and therefore, by ſtatute 3 Hen. VII. cap 2. in caſe a woman be forcibly taken away and married, ſhe may be witneſs againſt ſuch her huſband, in order to convict him of felony. See FORCIBLE *Abduction*.

In the civil law the huſband and *wife* are conſidered as two diſtinct perſons; and may have ſeparate eſtates, contracts, debts, and injuries; and therefore, in our eccleſiaſtical courts, a woman may ſue and be ſued without her huſband.

But, though our law in general conſiders man and *wife* as one perſon, yet there are ſome inſtances in which ſhe is ſeparately conſidered; as inferior to him, and acting by his compulſion. And, therefore, all deeds executed, and acts done by her during her COVERTURE, are void; except it be a fine, or the like matter of record, in which caſe ſhe muſt be ſolely and ſecretly examined, to learn if her acts be voluntary. She cannot by will deviſe lands to her huſband, unleſs under ſpecial circumſtances; for at the time of making it ſhe is ſuppoſed to be under his coercion. And in ſome felonies, and other inferior crimes, committed by her through conſtraint of her huſband, the law excuſes her; but this extends not to treaſon and murder. See FEME *covert*.

The huſband alſo, by the old law, might give his *wife* moderate correction; but this power of correction was confined within reaſonable bounds, and the huſband was prohibited from uſing any violence to his *wife*. The civil law gave the huſband the ſame, or a larger authority over his *wife*; allowing him, for ſome miſdemeanors, *flagellis et fuſtibus acriter verberare uxorem*; for others, only *modicam caſtigationem adhibere*. But, with us, in the politer reign of Charles II. the power of correction began to be doubted; and a *wife* may now have ſecurity of the peace againſt her huſband, or in return, a huſband againſt his *wife*. The courts of law will ſtill permit a huſband to reſtrain a *wife* of her liberty, in caſe of any groſs miſbehaviour. Blackſt. Com. book i. p. 443, &c. book ii. p. 433, &c.

If a *wife* bring forth a child during her huſband's abſence, though of many years; yet if he lived all the time *inter quatuor maria*, within the iſland, he muſt father the child; and the child, if firſt born, ſhall inherit. See BASTARD.

If a *wife* bring forth a child begot by a former huſband, or any other perſon, before marriage, but born after marriage with another man; this latter muſt own the child; and that child ſhall be his heir at law.

The *wife*, after her huſband's death, having no JOINTURE ſettled before marriage, may challenge the third part of his yearly rent of land, during her life; and, within the city of London, a third part of all her huſband's moveables for ever. See DOWER, INTESTATE, and CUSTOM *of London*.

The *wife* partakes of the honour and condition of her huſband; but none of the *wife*'s dignities come, by marriage, to her huſband.

Yet, the huſband, who marries a woman ſeiſed of lands in fee-ſimple or fee-tail, i. e. of any eſtate of inheritance, and has by her iſſue born alive, which was capable of her eſtate, ſhall on the death of his *wife*, hold the lands for his life, as TENANT by the CURTESY of England.

The Engliſh laws are generally eſteemed by foreigners, as very hard, in reſpect of the women; and yet Chamberlayne is of a very different opinion, aſſerting, that the condition of *wives* in England is better than in any other country.

The diſabilities, to which the *wife* is ſubject, are for the moſt part intended for her protection and benefit. So great a favourite (ſays judge Blackſtone) is the female ſex of the laws of England.

Tertullian has two books, on the ornaments and attire of *wives*. In the ſecond, he labours to prove that a Chriſtian *wife* cannot, in conſcience, endeavour to pleaſe by her beauty, which ſhe knows to be naturally liable to raiſe looſe deſires; and that ſhe ought not only to avoid all affected beauty, but even to conceal and cover her natural beauty.

WIFE, *mid, obſtetrix*. See DELIVERY.

WIGEON *penelope*, *anas penelope*, of Linnæus, in *Ornithology*, is a well-known bird. Its bill is lead-coloured, and the end of it black; the head, and upper part of the neck, of a bright light bay; the forehead paler, in ſome almoſt white; the plumage of the back, and ſides under the wings, are elegantly marked with narrow, black and white undulated lines; the breaſt is of a purpliſh hue, ſometimes, though rarely, marked with round black ſpots; the belly white; and the vent-feathers black. In ſome birds the coverts of the wings are almoſt wholly white; in others of a pale brown, edged with white; the greater quill-feathers are duſky; the outmoſt webs of the middle feathers of a fine green, the tips black; the laſt are elegantly ſtriped with black and white: the two middle feathers of the tail are longer than the others, black and ſharp pointed; the reſt aſh-coloured; the legs duſky.

The head of the female is of a ruſty brown, ſpotted with black; the back of a deep brown, edged with a paler; the tips of the leſſer quill feathers white; the belly white. Pennant.

WILDERNESS, in *Gardening*. There is nothing ſo great an ornament to a large garden as a *wilderneſs*, when properly contrived, and judiciouſly planted.

The *wilderneſs* ſhould always be proportioned to the ſize of the garden, and ſhould never be ſituated too near the houſe; becauſe the trees perſpire ſo large a quantity of watery vapours, as makes the air very unwholeſome: though vegetables ſerve, as modern experiments have ſufficiently aſcertained, to purify and meliorate the air. See *Phlogiſticated* AIR.

The *wilderneſs* ſhould never be ſo placed as to block up a good proſpect; but where the view naturally ends with the verge of the garden, or little more, nothing terminates it ſo well as a fine plantation of trees. The ſize of the trees ſhould be conſidered, and tall growing ones ſhould be planted in larger places; ſmaller, in leſs extenſive; ever-greens alſo ſhould be kept by themſelves, and placed moſt in ſight, not mingled confuſedly among the trees which caſt their leaves. The walks ſhould be large and not numerous; the large walk is beſt made ſerpentine, and this ſhould not be entered upon the grand walks of the garden, but by ſome private walk.

It is too common a method to diſpoſe the trees in *wilderneſſes*, in form of regular ſquares, triangles, &c. but this is faulty; for as nature ſhould be ſtudied in theſe works of fancy, the moſt irregular is the moſt pleaſing plantation. The walks for the ſame reaſon are much more pleaſing when they run in wild meanders, than when they interſect one another in ſtudied and regular angles. The winding walks ſhould be made to lead to an open circular piece of graſs, with a ſtatue, an obeliſk, or a fountain; or, if an opening large enough for a banqueting-houſe be contrived in the middle, it will afford a very pleaſing ſcene. The trees ſhould gradually riſe from the ſides of the walks and openings, one above another to the middle of the quarters, where the largeſt trees ſhould ſtand, by which means the heads of all the trees will appear in view, but their ſtems will not appear in ſight.

Not only the growth of trees is to be conſidered in the planting of a *wilderneſs*, but their nakedneſſes are to be conſidered and hid. The larger growing trees are allowed a proportionable diſtance, and their ſtems hid by honeyſuckles, roſes, ſpiræas, and other low flowering ſhrubs. Theſe may alſo be planted next all the walks and openings; and at the foot of theſe, near the walks, may be ſet rows of primroſes, violets, and daffodils, with other the like flowers; behind the firſt rank of lower flowering ſhrubs ſhould be planted thoſe of a ſomewhat higher ſtature, as the *althæa-frutices*, the cytiſuſes and gelder-roſes; and behind theſe may be rows of the talleſt flowering ſhrubs, as the lilacs, laburnums, and the like; and behind theſe, the heads only of the lower growing trees will appear, which ſhould be backed gradually with thoſe of higher growth, to the centre of the quarter; from whence the heads of the trees ſhould deſcend every way to the walks, or openings. The grand walks and openings ſhould always be laid with turf, and kept well mowed; but, beſide theſe, there ought to be ſmaller ſerpentine walks through the ſeveral quarters, where perſons may retire for privacy: theſe ſhould be left with the bare earth, only kept clear of weeds, and laid ſmooth.

Theſe walks ſhould be made as winding as poſſible, and a few wood-flowers planted along their ſides will have a very good effect. The ever-greens ſhould be allotted a peculiar part of the *wilderneſs*, and ſuch as fronts the houſe; and in the planting of theſe, the ſame regard is to be had to their growth, that the talleſt trees be planted hindmoſt, and their ſtems hid by ſhorter ones, and ſo on, down to the verge: as in the firſt row may be planted lauruſtines, boxes, ſpurge laurels, junipers, and ſavins; behind theſe, laurels, hollies, and arbutuſes; next behind theſe, yews, alaternuſſes, phillereys, cypreſſes, and Virginian cedars; behind theſe Norway and ſilver firs, and the true pine; and finally, behind theſe, the Scotch pine and pinaſter. Theſe will have a very beautiful appearance, as their tops will only be ſeen, and make a ſheet of green, which may alſo be very beautifully varied, from the artful admixtures of the ſeveral ſhades of green which the various plants have.

In all theſe plantations, the trees, however, ſhould not be ſet in formal ſtiff rows, but in a looſe variety, proportioned to their manner of growth. Miller.

WILD-*fire*, *ignis gregalis*, or *Græcus*. See *Wild*-FIRE.

WILD-*fire arrows*, ſuch as were trimmed with *wild-fire*, and ſhot burning, to ſtick in the ſails or rigging of ſhips in a fight. See FIRE-*arrow*.

WILD-*fire*, alſo denotes a diſeaſe in cattle; which is infectious, deadly, and even reputed incurable.

WILD-*fowl*. See *Water*-FOWL, and DECOY.

WILD-*gooſe chace*. See CHACE.

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The *widow* of a freeman of London may uſe her huſband's trade as long as ſhe continues a *widow*.

Mr. Kerſeboom has given us a table, ſhewing how long four hundred and thirty-two *widows* lived, and finds, that at a medium, each lived fourteen years. Phil. Tranſ. Nº 458. ſect. 3.

It appears that, in Germany, the number of *widows* dying annually is four times the number of widowers: thus, in Dreſden alone, the number of *widows* who died in 4 years, was 584; the number of widowers, 149: i. e. 4 to 1. At Wittenberg, during 11 years, 98 widowers, died, and 376 *widows*. At Gotha, during 20 years, 210 widowers died, and 760 *widows*. And as *widows* are certainly, one with another, ſeveral years younger than widowers: it may be concluded that the number of the former in life together could not be leſs than five times the latter.

Thus alſo, in 1770, the number of *widows* in life, derived from the whole body of profeſſors and miniſters in Scotland, was 380; but the number of widowers among them has, one year with another, been ſcarcely 90; i. e. not ſo much as a quarter of the number of *widows*. Price's Obſerv. on Rev. Paym. eſſ. 4.

Theſe facts cannot be accounted for without admitting the greater mortality of males. See MARRIAGE, and MORTALITY.

There have been many ſchemes eſtabliſhed for providing annuities for *widows*, for an account of ſeveral of which, ſee Price's Obſerv. &c. chap. ii. ſect. 1, 2, 3.

Among the ancient Greeks, *widows* had the care of the eternal fire of *Veſta* committed to them; which charge among the Romans, could be performed by virgins only, who from their office were called veſtals. See VESTAL.

WIDOW *of the king*, was ſhe, who, after her huſband's death, being the king's tenant in capite, was driven to recover her dower by the writ *De dote aſſignanda*; and could not marry again without the king's conſent.

WIDOW *bench*, in the county of Suſſex, is that ſhare which a *widow* is allowed of her huſband's eſtate, beſides her jointure.

WIDOW'S *chamber*, a name given in London to the apparel and furniture of the bed-chamber of the *widow* of a freeman, to which ſhe is entitled.

WIDOW *wail*, in *Botany*. See CNEORUM.

WIDURIS, in *Natural Hiſtory*, the name of a ſtone found in Java, Malabar, and ſome other places, and deſcribed by Rumphius. Some ſpecies of this are all over of a fine white; others are of a duſky colour, with ſtreaks of white; the ſimply white ones are ſemi-pellucid, and look very like the white of an egg. Some alſo have called this the *hyalops*, or *achates vitreæ perſpicuitatis*.

WIECK. See WEEK.

WIFE, *uxor*, a married woman; or one joined with, and under the protection of, a huſband. See MARRIAGE.

A *wife*, in our Engliſh law, is termed FEME *covert*; *fœmina viro co-operta*; her condition during marriage is called her COVERTURE; and, in the judgment of the law, is reputed to have no will, as being ſuppoſed entirely under, and ſubject to, that of her huſband: *uxor fulget radiis mariti*.

A man cannot grant any thing to his *wife*, or enter into covenant with her; for the grant would ſuppoſe her ſeparate exiſtence, and to covenant with her would be only to covenant with himſelf; and, therefore, it is generally true, that all compacts made between huſband and *wife*, when ſingle, are void by the intermarriage. A woman, however, may be attorney for her huſband; and a huſband may bequeath any thing to his *wife* by will; for that cannot take effect till the coverture is determined by his death.

From the unity of perſon that ſubſiſts between the huſband and *wife*, in conſequence of marriage, it follows, that whatever perſonal property belonged to the *wife* before marriage, is by marriage abſolutely veſted in the huſband. In a real eſtate, he only gains a title to the rents and profits during coverture; for that, depending upon feodal principles, remains entire to the *wife*, after the death of her huſband, or to her heirs, if ſhe dies before him; unleſs by the birth of a child, he becomes tenant for life by the curteſy. But in chattel intereſts, the ſole and abſolute property veſts in the huſband, to be diſpoſed of at his pleaſure, if he chuſes to take poſſeſſion of them: for, unleſs he reduces them to poſſeſſion, by exerciſing ſome act of ownerſhip upon them, no property veſts in him, but they ſhall remain to the *wife*, or to her repreſentatives, after the coverture is determined.

There is, however, a conſiderable difference in the acquiſition of this ſpecies of property by the huſband, according to the ſubject-matter; viz. whether it be a CHATTEL *real* or *perſonal*? and of chattels perſonal, whether it be in *poſſeſſion*, or in *action* only.

A *chattle real* veſts in the huſband, not abſolutely, but *ſub modo*. As, in caſe of a leaſe for years; the huſband ſhall receive all the rents and profits of it, and may, if he pleaſes, ſell, ſurrender, or diſpoſe of it during the coverture: if he be outlawed or attainted, it ſhall be forfeited to the king; it is liable to execution for his debts; and if he ſurvives his *wife*, it is to all intents and purpoſes his own. Yet if he has made no diſpoſition thereof in his life-time, and dies before his *wife*, he cannot diſpoſe of it by will; for, having never been transferred from the *wife*, after his death ſhe ſhall remain in her ancient poſſeſſion, and it ſhall not go to his executors. Thus alſo with regard to chattels perſonal (or *choſes* in *action*), as debts upon bond, contracts, and the like; theſe the huſband may have if he pleaſes; that is, if he reduces them into poſſeſſion by receiving or recovering them at law: in which caſe, they are abſolutely and entirely his own; and ſhall go to his executors or adminiſtrators, or as he ſhall bequeath them by will, and ſhall not reveſt in the *wife*. But if he dies before he has reduced them into poſſeſſion, ſo that at his death they ſtill continue *choſes in action*, they ſhall ſurvive to the *wife*.

Thus in both the ſpecies of property the law is the ſame, in caſe the *wife* ſurvives the huſband; but, in caſe the huſband ſurvives the *wife*, the law is very different with reſpect to *chattels real* and *choſes in action*; for he ſhall have the *chattel real* by ſurvivorſhip, but not the *choſe in action*; except in the caſe of arrears of rent, due to the *wife* before her coverture, which in caſe of her death are given to the huſband by the ſtatute 32 Hen. VIII. cap. 37.

As to *chattels perſonal* (or *choſes* in *poſſeſſion*), which the *wife* hath in her own right, as ready money, jewels, houſhold goods, and the like, the huſband hath therein an immediate and abſolute property, devolved to him by the marriage, which can never again reveſt in the *wife* or her repreſentatives.

The *wife* alſo, by marriage, acquires a property in ſome of her huſband's goods, called her PARAPHERNALIA, which ſhall remain to her after his death, and ſhall not go to his executors. Theſe, ſignifying the apparel and ornaments of the *wife*, ſuitable to her rank and degree, the huſband cannot deviſe by his will; though during his life perhaps he hath the power (if unkindly inclined to exert it) to ſell them or give them away. But if ſhe continues in the uſe of them till his death, ſhe ſhall afterwards retain them againſt his executors and adminiſtrators, and all other perſons, except creditors where there is a deficiency of aſſets. And her neceſſary apparel is protected even againſt the claim of creditors.

The *wife* can make no contract without her huſband's conſent; and, in all law-matters, *ſine viro reſpondere non poteſt*.

The huſband is bound to provide his *wife* with neceſſaries by law, as much as himſelf; and if ſhe contracts debts for them, he is obliged to pay them; but for any thing beſides neceſſaries, he is not chargeable. Alſo if a *wife* elopes, and lives with another man, the huſband is not chargeable even for neceſſaries; at leaſt if the perſon, who furniſhes them, is ſufficiently apprized of her ELOPEMENT.

If the *wife* be indebted before marriage, the huſband is bound afterwards to pay the debt. If the *wife* be injured in her perſon or property, ſhe can bring no action for redreſs without her huſband's concurrence, and in his name, as well as her own; neither can ſhe be ſued, without making the huſband a defendant. There is indeed one caſe where the *wife* ſhall ſue and be ſued as a FEME *ſole*, viz. where the huſband has abjured the realm, or is baniſhed; for he is then dead in law. See CUSTOM of *London*.

In criminal proſecutions, the *wife* may be indicted and puniſhed ſeparately; for the union is only a civil union. But in trials of any ſort, they are not allowed to be evidence for, or againſt, each other. However, where the offence is directly againſt the perſon of the *wife*, this rule has been uſually diſpenſed with; and therefore, by ſtatute 3 Hen. VII. cap 2. in caſe a woman be forcibly taken away and married, ſhe may be witneſs againſt ſuch her huſband, in order to convict him of felony. See FORCIBLE *Abduction*.

In the civil law the huſband and *wife* are conſidered as two diſtinct perſons; and may have ſeparate eſtates, contracts, debts, and injuries; and therefore, in our eccleſiaſtical courts, a woman may ſue and be ſued without her huſband.

But, though our law in general conſiders man and *wife* as one perſon, yet there are ſome inſtances in which ſhe is ſeparately conſidered; as inferior to him, and acting by his compulſion. And, therefore, all deeds executed, and acts done by her during her COVERTURE, are void; except it be a fine, or the like matter of record, in which caſe ſhe muſt be ſolely and ſecretly examined, to learn if her acts be voluntary. She cannot by will deviſe lands to her huſband, unleſs under ſpecial circumſtances; for at the time of making it ſhe is ſuppoſed to be under his coercion. And in ſome felonies, and other inferior crimes, committed by her through conſtraint of her huſband, the law excuſes her; but this extends not to treaſon and murder. See FEME *covert*.

The huſband alſo, by the old law, might give his *wife* moderate correction; but this power of correction was confined within reaſonable bounds, and the huſband was prohibited from uſing any violence to his *wife* The civil law gave the huſband the ſame, or a larger authority over his *wife*; allowing him, for ſome miſdemeanors, *flagellis et fuſtibus acriter verberare uxorem*; for others, only *modicam caſtigationem adhibere*. But, with us, in the politer reign of Charles II. the power of correction began to be doubted; and a *wife* may now have ſecurity of the peace againſt her huſband, or in return, a huſband againſt his *wife*. The courts of law will ſtill permit a huſband to reſtrain a *wife* of her liberty, in caſe of any groſs miſbehaviour. Blackſt. Com. book i. p. 443, &c. book ii. p. 433, &c.

If a *wife* bring forth a child during her huſband's abſence, though of many years; yet if he lived all the time *inter quatuor maria*, within the iſland, he muſt father the child; and the child, if firſt born, ſhall inherit. See BASTARD.

If a *wife* bring forth a child begot by a former huſband, or any other perſon, before marriage, but born after marriage with another man; this latter muſt own the child; and that child ſhall be his heir at law.

The *wife*, after her huſband's death, having no JOINTURE ſettled before marriage, may challenge the third part of his yearly rent of land, during her life; and, within the city of London, a third part of all her huſband's moveables for ever. See DOWER, INTESTATE, and CUSTOM *of London*.

The *wife* partakes of the honour and condition of her huſband; but none of the *wife*'s dignities come, by marriage, to her huſband.

Yet, the huſband, who marries a woman ſeiſed of lands in fee-ſimple or fee-tail, i. e. of any eſtate of inheritance, and has by her iſſue born alive, which was capable of her eſtate, ſhall on the death of his *wife*, hold the lands for his life, as TENANT by the CURTESY of England.

The Engliſh laws are generally eſteemed by foreigners, as very hard, in reſpect of the women; and yet Chamberlayne is of a very different opinion, aſſerting, that the condition of *wives* in England is better than in any other country.

The diſabilities, to which the *wife* is ſubject, are for the moſt part intended for her protection and benefit. So great a favourite (ſays judge Blackſtone) is the female ſex of the laws of England.

Tertullian has two books, on the ornaments and attire of *wives*. In the ſecond, he labours to prove that a Chriſtian *wife* cannot, in conſcience, endeavour to pleaſe by her beauty, which ſhe knows to be naturally liable to raiſe looſe deſires; and that ſhe ought not only to avoid all affected beauty, but even to conceal and cover her natural beauty.

WIFE, *mid*, *obſtetrix*. See DELIVERY.

WIGEON *penelope*, *anas penelope*, of Linnæus, in *Ornithology*, is a well-known bird. Its bill is lead-coloured, and the end of it black; the head, and upper part of the neck, of a bright light bay; the forehead paler, in ſome almoſt white; the plumage of the back, and ſides under the wings, are elegantly marked with narrow, black and white undulated lines; the breaſt is of a purpliſh hue, ſometimes, though rarely, marked with round black ſpots; the belly white; and the vent-feathers black. In ſome birds the coverts of the wings are almoſt wholly white; in others of a pale brown, edged with white; the greater quill-feathers are duſky; the outmoſt webs of the middle feathers of a fine green, the tips black; the laſt are elegantly ſtriped with black and white: the two middle feathers of the tail are longer than the others, black and ſharp pointed; the reſt aſh-coloured; the legs duſky.

The head of the female is of a ruſty brown, ſpotted with black; the back of a deep brown, edged with a paler; the tips of the leſſer quill-feathers white; the belly white. Pennant.

WILDERNESS, in *Gardening*. There is nothing ſo great an ornament to a large garden as a *wilderneſs*, when properly contrived, and judiciouſly planted.

The *wilderneſs* ſhould always be proportioned to the ſize of the garden, and ſhould never be ſituated too near the houſe; becauſe the trees perſpire ſo large a quantity of watery vapours, as makes the air very unwholeſome: though vegetables ſerve, as modern experiments have ſufficiently aſcertained, to purify and meliorate the air. See *Phlogiſticated* AIR.

The *wilderneſs* ſhould never be ſo placed as to block up a good proſpect; but where the view naturally ends with the verge of the garden, or little more, nothing terminates it ſo well as a fine plantation of trees. The ſize of the trees ſhould be conſidered, and tall growing ones ſhould be planted in larger places; ſmaller, in leſs extenſive; ever-greens alſo ſhould be kept by themſelves, and placed moſt in ſight, not mingled confuſedly among the trees which caſt their leaves. The walks ſhould be large and not numerous; the large walk is beſt made ſerpentine, and this ſhould not be entered upon the grand walks of the garden, but by ſome private walk.

It is too common a method to diſpoſe the trees in *wilderneſſes*, in form of regular ſquares, triangles, &c. but this is faulty; for as nature ſhould be ſtudied in theſe works of fancy, the moſt irregular is the moſt pleaſing plantation. The walks for the ſame reaſon are much more pleaſing when they run in wild meanders, than when they interſect one another in ſtudied and regular angles. The winding walks ſhould be made to lead to an open circular piece of graſs, with a ſtatue, an obeliſk, or a fountain; or, if an opening large enough for a banqueting-houſe be contrived in the middle, it will afford a very pleaſing ſcene. The trees ſhould gradually riſe from the ſides of the walks and openings, one above another to the middle of the quarters, where the largeſt trees ſhould ſtand, by which means the heads of all the trees will appear in view, but their ſtems will not appear in ſight.

Not only the growth of trees is to be conſidered in the planting of a *wilderneſs*, but their nakedneſſes are to be conſidered and hid. The larger growing trees are allowed a proportionable diſtance, and their ſtems hid by honeyſuckles, roſes, ſpiræas, and other low flowering ſhrubs. Theſe may alſo be planted next all the walks and openings; and at the foot of theſe, near the walks, may be ſet rows of primroſes, violets, and daffodils, with other the like flowers; behind the firſt rank of lower flowering ſhrubs ſhould be planted thoſe of a ſomewhat higher ſtature, as the *althæa-frutices*, the cytiſuſes and gelder-roſes; and behind theſe may be rows of the talleſt flowering ſhrubs, as the lilacs, laburnums, and the like; and behind theſe, the heads only of the lower growing trees will appear, which ſhould be backed gradually with thoſe of higher growth, to the centre of the quarter; from whence the heads of the trees ſhould deſcend every way to the walks, or openings. The grand walks and openings ſhould always be laid with turf, and kept well mowed; but, beſide theſe, there ought to be ſmaller ſerpentine walks through the ſeveral quarters, where perſons may retire for privacy: theſe ſhould be left with the bare earth, only kept clear of weeds, and laid ſmooth.

Theſe walks ſhould be made as winding as poſſible, and a few wood-flowers planted along their ſides will have a very good effect. The ever-greens ſhould be allotted a peculiar part of the *wilderneſs*, and ſuch as fronts the houſe; and in the planting of theſe, the ſame regard is to be had to their growth, that the talleſt trees be planted hindmoſt, and their ſtems hid by ſhorter ones, and ſo on, down to the verge: as in the firſt row may be planted lauruſtines, boxes, ſpurge laurels, junipers, and ſavins; behind theſe, laurels, hollies, and arbutuſes; next behind theſe, yews, alaternuſſes, phillereys, cypreſſes, and Virginian cedars; behind theſe Norway and ſilver firs, and the true pine; and finally, behind theſe, the Scotch pine and pinaſter. Theſe will have a very beautiful appearance, as their tops will only be ſeen, and make a ſheet of green, which may alſo be very beautifully varied, from the artful admixtures of the ſeveral ſhades of green which the various plants have.

In all theſe plantations, the trees, however, ſhould not be ſet in formal ſtiff rows, but in a looſe variety, proportioned to their manner of growth. Miller.

WILD-*fire*, *ignis gregalis*, or *Græcus*. See *Wild*-FIRE.

WILD-*fire arrows*, ſuch as were trimmed with *wild-fire*, and ſhot burning, to ſtick in the ſails or rigging of ſhips in a fight. See FIRE-*arrow*.

WILD-*fire*, alſo denotes a diſeaſe in cattle; which is infectious, deadly, and even reputed incurable.

WILD-*fowl*. See *Water*-FOWL, and DECOY.

WILD-*gooſe chace*. See CHACE.

WILD *honey*. See HONEY.

WILDS, a term uſed by our farmers to expreſs that part of a plough by which the whole is drawn forwards.

The *wilds* are of iron, and are of the form of a gallows, whence they are by ſome called the GALLOWS of the *plough*, but improperly; the gallows of the plough being properly that part formed by the crow-ſtaves, and the tranſverſe piece into which they are mortiſed at the top.

The *wilds* conſiſt of two legs, and a tranſverſe top-piece: one of the legs, and the top-piece, are all of one piece of iron, and the other leg, which is looſe, has a hole in the top, into which the end of the tranſverſe piece is received; both theſe legs paſs through the box of the plough, which is that tranſverſe timber through which the ſpindles of the wheels run: theſe legs are pinned in behind the box with iron pins: the holes through the box at which theſe legs paſs, are not made at right angles, but ſlanting upwards, ſo that the forepart of the *wilds* is higher than the hinder-part; were it not for this, the upper part of the crow-ſtaves would lean quite back, when the plough is drawn.

The uſe of the notches in the *wilds* is to give the plough a broader or narrower furrow; if the links are moved to the notches on the right hand, it brings the wheels toward the left, which gives the greater furrow; and, on the contrary, a ſmaller furrow is made when the links are moved to the notches on the left. The legs of the *wilds* ſhould be nineteen inches, and their diſtance eight inches and a half; they muſt be made ſtrong, and the links muſt be placed in different notches, that the front of the plough may be kept ſteady, and the wheels not be drawn one before the other. Theſe links are of iron alſo, and are each ſix inches and a half long, and to theſe are faſtened the chains of the harneſs, by which the whole plough is drawn along.

WILL, *voluntas*, is uſually defined a faculty of the mind, whereby it embraces or rejects any thing repreſented to it, as good or evil, by the judgment.

Others will have it to be the mind itſelf, conſidered as embracing or refuſing; adding, that as the underſtanding is nothing elſe but the ſoul, conſidered as *perceiving*; ſo the *will* is nothing elſe but the ſoul conſidered as *willing*, &c.

Mr. Locke more intelligibly defines the *will*, a faculty which the ſoul has of beginning, or forbearing, continuing or ending, ſeveral actions of the mind, and motions of the body, barely by a thought or preference of the mind, ordering, or as it were commanding, the doing, or not doing, ſuch and ſuch a particular action. This power which the mind has, to order the conſideration of any idea, or the forbearing to conſider it; or to prefer the motion of any part of the body to its reſt, and *vice verſa*, is what we call the *will*. See POWER.

The actual exerciſe of that power, is what we call *volition*, or *willing*; and the doing or forbearing of any action conſequent on ſuch order of the mind, is called *voluntary*. So far, according to this writer, as a man has a power to think or not to think, to move or not to move, according to the preference or direction of his own mind, ſo far he is free: and hence LIBERTY, he ſays, is not an idea belonging to volition, or preferring; but to the perſon having the power of doing, or forbearing to do, as the mind ſhall chuſe or direct. On the other hand, wherever any performance or forbearance is not equally in a man's power; wherever doing or not doing will not equally follow upon the preference of his mind; there he is not free, though perhaps the action may be voluntary. Accordingly where thought is wholly wanting, or the power to act or forbear according to the direction of thought, there NECESSITY takes place; this, in an agent capable of volition, when the beginning or continuation of any action is contrary to the preference of his mind, is called *compulſion*: when the hindering or ſtopping of any action is contrary to his volition, it is called *reſtraint*. Agents that have no thought, no volition at all, are in every reſpect neceſſary agents.

Father Malebranche lays it down, that the *will* is that to the ſoul, which motion is to the body; and argues, that as the Author of nature is the univerſal cauſe of all the motions in matter, ſo he is of all the inclinations in the mind; and that as all motions are direct, unleſs their courſe be diverted and changed by ſome foreign cauſe; ſo all inclinations are right, and could have no other end but the enjoyment of truth and goodneſs, were there not ſome foreign cauſe, to determine the natural impreſſion to evil ends.

Accordingly, he defines *will* to be the impreſſion, or natural motion, which carries us towards good indeterminately, and in the general; and the power the mind has, to direct this general impreſſion towards any particular object that pleaſes it, is what he calls LIBERTY.

Ariſtotle diſtinguiſhes two kinds of acts of the *will*, viz. *βȣλησις*, *willing*, *volition*; and *προαιρεσις*, *election*. The firſt, that employed about the ultimate end; the latter, about the means.

The ſchoolmen alſo diſtinguiſh the actions of the *will*, into *elicit* and *commanded*. Elicit acts, *actiones elicitæ*, are thoſe immediately produced by the *will*, and really inherent therein; ſuch are *willing*, and *nilling*. Commanded acts, *actiones imperatæ*, are effects produced by other powers; v. gr. the ſenſitive, intellective, or locomotive powers, at the command or inſtigation of the *will*. As to *follow*, *ſtay*, *fight*, *fly*, &c.

But others will have the former kind properly to belong to the underſtanding; and only the latter to the *will*.

The word *will* is taken in three ſenſes; 1. For the power or faculty of *willing*, in which ſenſe it is, we have conſidered it above.

2. For the act or exerciſe of this power; as, when we ſay, No man *wills* his own deſtruction.

3. For a habit, or a conſtant diſpoſition and inclination to do any thing. In which ſenſe, juſtice is defined a conſtant *will* to give every one what belongs to him: *Juſtitia eſt conſtans & perpetua voluntas jus ſuum unicuique tribuendi*. Inſtit. Juſtin.

WILL, *antecedent*. See ANTECEDENT.

WILL, *free*. See LIBERTY, and FREEDOM.

WILL, *Laſt* WILL, or *Teſtament*, in *Law*, a ſolemn act, or inſtrument, whereby a perſon declares his mind and intention as to the diſpoſal of his goods, effects, &c. after his death. See TESTAMENT.

This act or inſtrument is emphatically ſtyled the *will* of the deceaſed, becauſe it directs the diſpoſal of the whole or part of his property, by written or oral inſtructions properly witneſſed and authenticated, according to his pleaſure. Some have diſtinguiſhed between a teſtament and a *will*: a *will* being properly limited to land, and a teſtament only to chattels, requiring executors, which a *will* only for land doth not require: ſo that every teſtament is a *will*, but every *will* is not a teſtament. However, the words have been commonly uſed indiſcriminately.

WILLS, *hiſtory of*. *Wills* or teſtaments, ſays judge Blackſtone, are of very high antiquity. We find them among the ancient Hebrews: not to mention what Euſebius and others have related of Noah's teſtament, made in writing and witneſſed under his ſeal, whereby he diſpoſed of the whole world, a more authentic inſtance of the early uſe of teſtaments occurs in the ſacred writings (Gen. chap. xlviii.), wherein Jacob bequeaths to his ſon Joſeph a portion of his inheritance double to that of his brethren; which *will* we find executed many hundred years afterwards, when the poſterity of Joſeph were divided into two diſtinct TRIBES, thoſe of Ephraim and Manaſſeh, and had two ſeveral inheritances aſſigned them; whereas the deſcendants of each of the other patriarchs formed only a ſingle tribe, and had only one lot of inheritance. Solon was the firſt legiſlator that introduced *wills* into Athens; but in many other parts of Greece they were totally diſcountenanced. In Rome they were unknown, till the laws of the Twelve Tables were compiled, which firſt gave the right of bequeathing; and among the northern nations, particularly among the Germans, teſtaments were not received into uſe. Hence it appears, that the right of making *wills* and diſpoſing of property after death, is merely a creature of the civil ſtate, which has permitted it in ſome countries and denied it in others, and ſubjected it to various reſtrictions and regulations, where the law allows it.

With us in England, this power of bequeathing is coeval with the firſt rudiments of the law; not indeed, that it extended originally to *all* a man's perſonal eſtate. See RATIONABILI *parte bonorum*.

It is alſo ſufficiently clear that, before the Conqueſt, lands were deviſable by *will*. But, upon the introduction of the military tenures, the reſtraint of deviſing lands naturally took place, as a branch of the feodal doctrine of non-alienation without the conſent of the lord. By the common law of England ſince the Conqueſt, no eſtate, greater than for term of years, could be diſpoſed of by teſtament; except only in Kent, and in ſome ancient burghs, and a few particular manors, where their Saxon immunities by ſpecial indulgence ſubſiſted. But when eccleſiaſtical ingenuity had invented the doctrine of USES, as a thing diſtinct from the land, uſes began to be deviſed very frequently, and the deviſee of the uſe could in chancery compel its execution. However, when the ſtatute of uſes, viz. 27 Hen. VIII. cap. 10. had annexed the poſſeſſion to the uſe, theſe uſes, being now the very land itſelf, became no longer deviſable: whereupon the ſtatute of *wills* was made, viz. 32 Hen. VIII. cap. 1. explained by 34 Hen. VIII. cap. 5. which enacted, that all perſons being ſeiſed in fee-ſimple (except feme-coverts, infants, ideots, and perſons of nonſane memory) might by *will* and teſtament in writing deviſe to any other perſon, except to bodies corporate, two-thirds of their lands, tenements, and hereditaments, held in chivalry, and the whole of thoſe held in ſocage: which, now, through the alteration of tenures by the ſtatute of Charles II. 12 Car. II. cap. 25, amounts to the whole of their landed property, except their copyhold tenements. As for copyhold and other cuſtomary lands, theſe are deviſable or not, according to the cuſtom of the reſpective manors. And generally, a deviſe of copyhold will not paſs, without a SURRENDER to the uſe of the *will*. In the caſe of a child or widow, a court of equity, in favour of theſe, will ſupply a defect of ſurrender: ſo alſo, when there is a general deviſe of real eſtate to pay debts, and there is no real eſtate but copyhold: alſo where a copyhold is in the hands of truſtees, the perſon for whom the lands are holden in truſt may deviſe the ſame without ſurrender. And if a man, ſeiſed of copyhold lands, ſurrenders the ſame to the uſe of his *will*, and executes a *will*, not atteſted by any witneſſes, yet it ſhall direct the uſes of the ſurrender. See MORTMAIN.

WILLS, *perſons capable of making*. Every perſon hath full power and liberty to make a *will*, that is not under ſome ſpecial prohibition by law or cuſtom: which prohibitions are principally upon three accounts; for want of ſufficient diſcretion; for want of ſufficient liberty and free *will*; and on account of their criminal conduct.

In the firſt claſs are to be reckoned infants, under the age of fourteen if males, and twelve if females; which is the rule of the civil law. By ſtatute 34 and 35 Hen. VIII. cap. 5. *wills* or teſtaments made of any manors, lands, tenements, or other hereditaments, by any perſon within the age of twenty-one years, ſhall not be taken to be good or effectual in law. But by cuſtom in particular places, they may deviſe lands before the age of twenty-one. If the teſtator is not of ſufficient diſcretion, whatever be his age, that will overthrow his teſtament. Accordingly, madmen, or otherwiſe *non compotes*, ideots or natural fools, perſons grown childiſh by age or diſtemper, ſuch as have their ſenſes beſotted with drunkenneſs; all theſe are incapable, by reaſon of mental diſability, to make any *will* as long as ſuch diſability laſts. To this claſs may alſo be referred ſuch perſons as are born deaf, blind, and dumb; who, as they have always wanted the common inlets of underſtanding, are incapable of having *animum teſtandi*, and their teſtaments are therefore void. It has been maintained that perſons deaf and dumb, who underſtand what a teſtament meaneth, and that are deſirous of making one, may by ſigns and tokens declare their teſtament: and that a blind perſon may make a nuncupative teſtament, by declaring his *will* before a ſufficient number of witneſſes: and that he may make his teſtament in writing, provided the ſame be read before witneſſes, and in their preſence acknowledged by the teſtator for his laſt *will*. Swinb. 95, 96.

Perſons of the ſecond deſcription are by the civil law of various kinds; as priſoners, captives, and the like. But the law of England does not make ſuch perſons abſolutely inteſtable; but only leaves it to the diſcretion of the court to judge, upon the conſideration of their peculiar circumſtances of dureſs, whether they could be ſuppoſed to have *liberum animum teſtandi*. With regard to feme-coverts, our laws differ ſtill more materially from the civil. Among the Romans, a married woman was as capable of bequeathing as a feme-ſole. But with us, a married woman is not only utterly incapable of deviſing lands, being excepted out of the ſtatute of *wills*, 34 and 35 Hen. VIII. cap. 5. but alſo ſhe is incapable of making a teſtament of chattels, without the licence of her huſband, who frequently, upon marriage, covenants with her friends to allow her that licence: his aſſent, therefore, muſt be given to the particular *will* in queſtion, without which it will not be a complete teſtament. Her *will*, therefore, operates in the nature of an appointment, the execution of which the huſband by his bond, agreement, or covenant, is bound to allow. The QUEEN-*conſort* is an exception, for ſhe may diſpoſe of her chattels by *will*, without the conſent of her lord; and any feme-covert may make her *will* of goods, which were in her poſſeſſion *in auter droit*, as executrix or adminiſtratrix; for theſe can never be the property of her huſband: and if ſhe has any pin-money or ſeparate maintenance, it is ſaid ſhe may diſpoſe of her ſavings thereout by teſtament, without the controul of her huſband. But if a feme-ſole makes her *will*, and afterwards marries, ſuch ſubſequent marriage is eſteemed a revocation in law, and entirely vacates the *will*.

Perſons of the third claſs are firſt, all traitors and felons, from the time of conviction; for then their goods and chattels are forfeited to the king. Neither can a *felo de ſe* make a *will* of goods and chattels, for they are forfeited by the act and manner of his death; but he may make a deviſe of his lands, for they are not ſubjected to any forfeiture. Outlaws alſo, though only for debt, are incapable of making a *will*, ſo long as the outlawry ſubſiſts, for during that time their goods and chattels are forfeited; but he that is outlawed in an action perſonal, may make his teſtament of lands; for they are not forfeited. For Coke obſerves, that an excommunication (meaning the greater excommunication), is worſe than an outlawry. As for perſons guilty of other crimes, ſhort of felony, who are by the civil law precluded from making teſtaments (as uſurers, libellers, and others of a worſe ſtamp) by the common law their teſtaments may be good.

WILL, *nature and incidents of a*. *Wills* or teſtaments are divided into two ſorts, viz. *written* and *verbal* or *nuncupative*: of which the former is committed to writing; the latter depends merely upon oral evidence, being declared by the teſtator *in extremis* before a ſufficient number of witneſſes, and afterwards reduced to writing. A CODICIL is a ſupplement to a *will*.

As *nuncupative wills* and codicils are liable to great impoſitions, and may occaſion many perjuries, the ſtatute of frauds, 29 Car. II. cap. 3. hath laid them under many reſtrictions; except when made by mariners at ſea, and ſoldiers in actual ſervice. As to all other perſons, it enacts, 1. that no written *will* ſhall be revoked or altered by a ſubſequent nuncupative one, except the ſame be in the life-time of the teſtator reduced to writing, and read over to him and approved; and unleſs the ſame be proved to have been ſo done by the oaths of three witneſſes at leaſt; who, by 4 and 5 Ann. cap. 16. muſt be ſuch as are admiſſible upon trials at common law.

2. That no *nuncupative will* ſhall be good, where the eſtate bequeathed exceeds 30*l*. unleſs proved by three ſuch witneſſes, preſent at the making of it, and unleſs they or ſome of them were ſpecially required to bear witneſs to it by the teſtator; and unleſs it was made in his laſt ſickneſs, in his own habitation, or where he had previouſly reſided at leaſt ten days, except he be ſurpriſed with ſickneſs on a journey, or from home, and dies without returning to his dwelling.

3. That no *nuncupative will* ſhall be proved by the witneſſes after ſix months from the making, unleſs it were put in writing within ſix days: nor ſhall it be proved till fourteen days after the death of the teſtator, nor till proceſs hath firſt iſſued to call in the widow, or next of kin, to conteſt if they think proper.

As to *written wills* (viz. thoſe that concern not the deviſe of lands) they need not any witneſs of their publication. A teſtament of chattels, written in the teſtator's own hand, though it has neither his name nor ſeal to it, nor witneſſes preſent at its publication, is good; provided ſufficient proof can be had that it is his hand-writing. And though written in another man's hand, and never ſigned by the teſtator, yet if proved to be according to his inſtructions and approved by him, it hath been held a good teſtament of the perſonal eſtate. However, it is the ſafer and more prudent way, and leaves leſs in the breaſt of the eccleſiaſtical judge, if it be ſigned or ſealed by the teſtator, and publiſhed in the preſence of witneſſes.

The ſtatute of frauds and perjuries, 29 Car. II. cap. 3. directs, that all deviſes of lands and tenements ſhall not only be in writing, but ſigned by the teſtator, or ſome other perſon in his preſence, and by his expreſs direction; and be ſubſcribed, in his preſence, by three or four credible witneſſes. In the conſtruction of this ſtatute, it has been adjudged that the teſtator's name, written with his own hand at the beginning of his will, as, "I John Mills do make this my laſt *will*," &c. is a ſufficient ſigning, without any name at the bottom; though the other is the ſafer way. It has alſo been determined, that though the witneſſes muſt all ſee the teſtator ſign, or at leaſt acknowledge the ſigning, yet they may do it at different times. But they muſt all ſubſcribe their names as witneſſes in his preſence, leſt by any poſſibility they ſhould miſtake the inſtrument. In one caſe determined by the court of king's bench, the judges would not allow any legatee, nor conſequently a creditor, where the legacies and debts were charged on the real eſtate, to be a competent witneſs to the deviſe. This determination occaſioned the ſtatute 25 Geo. II. cap. 6. which reſtored both the competency and credit of ſuch legatees, by declaring void all legacies given to witneſſes, and thereby removing all poſſibility of their intereſt affecting their teſtimony. The ſame ſtatute likewiſe eſtabliſhed the competency of creditors, by directing their teſtimony to be admitted; but leaving their credit (like that of all other witneſſes) to be conſidered, on a view of all the circumſtances, by the court and jury before whom ſuch *will* ſhall be conteſted. And in a much later caſe, M. 31 George II. the teſtimony of three witneſſes, who were creditors, was held to be ſufficiently credible, though the land was charged with the payment of debts.

No teſtament is of any effect till after the death of the teſtator; and, therefore, if there be many teſtaments, the laſt overthrows all the former; but the republication of a former *will* revokes one of a later date, and eſtabliſhes the firſt again.

From the above accounts it follows, that teſtaments may be avoided three ways: 1. If made by a perſon labouring under any of the incapacities before mentioned. 2. By making another teſtament of a later date. And 3. By cancelling or revoking it.

The Romans were wont to ſet aſide teſtaments, as being *inofficioſa*, deficient in natural duty, if they diſinherited or totally paſſed by (without aſſigning a true and ſufficient reaſon) any of the children of the teſtator. But if the child had any legacy, though ever ſo ſmall, it was a proof that the teſtator had not loſt his memory or his reaſon, which otherwiſe the law preſumed. Hence probably, ſays Blackſtone, has ariſen that groundleſs vulgar error of the neceſſity of leaving the heir a ſhilling or ſome other expreſs legacy, in order to effectually diſinherit him; whereas the law of England, though the heir or next of kin be totally omitted, admits no *querela inofficioſa*, to ſet aſide ſuch teſtament. Burn's Eccl. Law, vol. iv. art. WILL. Blackſt. Com. book ii. p. 373, &c. 489, &c.

WILL, *qualification and office of the executor of a.* See EXECUTOR, EXECUTOR *de ſon tort*, and JOINT-*Executors*. See alſo DEBTS, DEBTEE-*Executor*, INVENTORY, and LEGACY.

WILL, *probate of a.* See PROBATE.

The STAMP-*duty* impoſed on receipts for legacies, according to their ſeveral amounts, by 20 Geo. III. cap. 48. is doubled by 23 Geo. III. cap. 58; which enacts, that an additional duty of 20*s.* be paid for every ſum of 100*l.* provided that this ſhall not extend to charge with the additional duties impoſed by 23 Geo. III. cap. 58. any legacy or diſtributive ſhare to the wife, children, or grand-children of the deceaſed.

Eſtate at WILL, in *Law*, is where lands and tenements are let by one man to another, to have and to hold at the *will* of the leſſor; and the tenant by force of this leaſe obtains poſſeſſion. Every eſtate of this kind is at the *will* of both parties, landlord and tenant: ſo that either of them may determine his *will*, and quit his connexion with the other at his own pleaſure, under certain reſtrictions. For, if the tenant at *will* ſows his land, and the landlord, before the corn is ripe, or reaped, puts him out, the tenant ſhall have the EMBLEMENTS, and free ingreſs and egreſs to cut and carry away the profits. But where the tenant himſelf determines the *will*, the landlord ſhall have the profits of the land. The law is careful, that no ſuch ſudden determination of the *will* by one party ſhall tend to the manifeſt and unforeſeen prejudice of the other. This appears in the caſe of emblements juſt mentioned; and alſo, the leſſee after the determination of the leſſor's *will* ſhall have reaſonable ingreſs and egreſs to fetch away his goods and utenſils. And if rent be payable quarterly or half-yearly, and the leſſee determines the *will*, the rent ſhall be paid to the end of the current quarter or half-year. Upon the ſame principle, courts of law have of late years inclined as much as poſſible againſt conſtruing demiſes, where no certain term is mentioned, to be tenancies at *will*: but have rather held them to be tenancies from year to year, ſo long as both parties pleaſe, eſpecially where an annual rent is reſerved: in which caſe they will not ſuffer either party to determine the tenancy even at the end of the year, without reaſonable notice to the other. Blackſt. Com. vol. ii. p. 145, &c.

WILL *with a wiſp.* See IGNIS *Fatuus*.

WILLIAM, *ſweet*, in *Botany*. See DIANTHUS, and PINK.

WILLOW, *ſalix*, in *Botany*, a genus of the *dioecia diandria* claſs. Its characters are theſe: it has male and female flowers on ſeparate plants; the male flowers are diſpoſed in one common oblong imbricated katkin, the ſcales have each one oblong ſpreading flower which has no petal, but a cylindrical nectarious gland in the centre; it has two ſlender erect ſtamina terminated by twin ſummits, having four cells; the female flowers are diſpoſed in katkins like the male, but have neither petals nor ſtamina, but an oval narrowed germen ſcarcely diſtinguiſhable from the ſtyle, crowned by two bifid erect ſtigmas; the germen becomes an oval awl-ſhaped capſule with one cell opening with two valves, containing many ſmall oval ſeeds, crowned with hairy down. There are many ſpecies, ſome of which are low creeping ſhrubs of no uſe; Linnæus enumerates thirty, and Miller fourteen ſpecies which are cultivated.

All the ſorts of *willow* may be readily propagated by cuttings or ſetts, either in ſpring or autumn, which eaſily take root; but when they are propagated for the timber which is very uſeful to turners, as well as in other articles, they ſhould be propagated by young ſhort branches, which ſhould be planted almoſt their whole length in the ground, and when the buds have made one year's ſhoot they ſhould be all cut off, except the ſtrongeſt and beſt ſituated, which muſt be trained up to a ſtem like other timber trees; by which means they will riſe with upright ſtems forty or fifty feet high: the rows ſhould be four feet aſunder, and the ſets two feet diſtant in the rows.

The weeping *willow*, or *ſalyx babylonica* of Linnæus, with ſmooth, ſawed, linear, ſpear-ſhaped leaves and hanging branches, grows naturally in the Levant, and has been ſeveral years cultivated in the Engliſh gardens.

The ſallows are commonly planted in February, in cuttings from ſtrong ſhoots of the former year, about three feet long; placed at about three feet row from row, and eighteen inches aſunder in the rows. Theſe are cut every year, and if the ſoil is good, yield a profitable crop.

The common ſallow, broad-leaved *willow*, or *ſalix caprea*, requires a drier ſoil than the other ſpecies, and will thrive upon the higheſt hills: hence it is called mountain oſier. The wood of this is ſmooth, ſoft, and flexible: it is converted into charcoal for making gunpowder and drawing pencils. The Laplanders make a ſort of leather of the bark, which they manufacture into gloves: and they give a decoction of the leaves for the heart-burn.

The *common-willow*, or *ſalix alba*, loves a moiſt and open ſituation, grows quick, and bears lopping. The bark of this tree, gathered in ſummer when full of ſap, and dried by a gentle heat, has lately been found by the Rev. Mr. Stone an uſeful medicine in agues; of which many perſons have been cured by taking a dram of this powdered bark every four hours during the intermiſſions; though in ſome caſes it was neceſſary to join to it a fifth part of Peruvian bark. Phil. Tranſ. vol. liii. p. 195.

To the taſte this bark diſcovers a pretty ſtrong bitterneſs and aſtringency: with ſolution of chalybeate vitriol it ſtrikes an inky blackneſs. This bark will tan leather.

Our common *willows*, in the ſpring ſeaſon, when they are in flower, produce a quantity of cottony matter, which might be put to ſome uſe.

The Chineſe are induſtrious enough to collect this cotton as it falls from their *willows*; and the women and children among the poorer people, card it, and pick out the ſeeds, and render it fit for many uſes in the place of cotton.

The poor people, in ſome part of the Indies, make a ſort of liquor of the flowers of their *willows* before they are opened, which intoxicates them very ſuddenly; and the dry huſks of the ſame tree remaining after the flowers and ſeeds are fallen, are wholeſome as food, people in time of famine having lived upon them, boiled in water.

The wood of the *willow*, though in itſelf very light and ſpongy, is yet of a nature to bear the injuries of wet better than almoſt any other kind. It is uſed by the Chineſe on this occaſion, in the making of their wells, and on all other occaſions where wood is to ſtand under water, and ſucceeds perfectly well. Obſerv. ſur les Coutumes de l'Aſia.

WILLOW-*galls*, in *Natural Hiſtory*, the name given by authors to certain protuberances found very frequently on the leaves of the ſeveral ſpecies of *willow*, which are properly galls, each containing the worm of a fly, and owing its exiſtence to that inſect.

The galls are uſually of a roundiſh or oblong figure, and are equally protuberant on each ſide of the leaf: they are of a pale green at firſt; but they afterwards become yellowiſh, and finally reddiſh. The ſurface of theſe is ſeldom perfectly even, but uſually has ſeveral little prominences and cavities in it. When this gall is opened, there is found in it a worm reſembling a caterpillar in figure, having a ſmooth annulated body, a hard brown head, and twenty legs: and by Reaumur called falſe or baſtard-caterpillar. This creature, when the gall is young, is blue; it afterwards becomes greeniſh; and finally, when the gall becomes red, it is white. This inſect ſeems to eat in its priſon more voraciouſly than any other gall-inſect whatever; for while the gall grows in ſize, it becomes alſo thinner in every part; ſo that the creature, at the proper time, has but little difficulty to get out. Reaum. Hiſt. Inſect. vol. vi. p. 211.

When the time of the laſt change of this inſect draws nigh, it leaves the tree, and deſcending to the earth makes its way into it in a proper place, and then becomes a nymph, a nymph, out of which at a proper time iſſues a four-winged fly.

The flies which are produced in April, copulate almoſt as ſoon as freed from their exuviæ of the chryſalis ſtate, and the females ſoon after lodge their eggs in the leaves of the *willows*. This is all done before the end of April, and the young ones hatched of theſe eggs, live but a ſhort time before they paſs into the chryſalis ſtate, and living flies are hatched from theſe in June. The young ones of this brood paſs their chryſalis ſtate in the earth, and appear not during the whole winter, till the ſpring ſun enlivens them again. There is, beſide theſe, another kind of galls of the *willow*-leaves, which are of the claſs of thoſe, each of which contains ſeveral cells; in each cell of theſe there is found a ſmall white maggot, the offspring of the egg of a two-winged fly, which, after paſſing the chryſalis ſtate in the earth, alſo comes out in the form of its winged parent. The cells in the galls are different in number in the ſeveral galls, and are from four or five to twenty: they have no communication with one another, but each worm lives in its own cell.

Beſide theſe there is alſo ſometimes found in theſe galls a worm of a browniſh white colour, having two hooks in its head, and no legs at all. This has all the appearance of a carnivorous animal, and probably was depoſited there in the egg-ſtate by its parent, not to feed on the gall, but on its defenceleſs inhabitant. This worm finally becomes a ſmall bluiſh beetle, and is often found alone in the cavity of the gall, often in company with its proper inhabitant, ſucking its juices as it feeds on thoſe of the plant. There ſeem to be ſeveral ſpecies of theſe devourers common to theſe galls; ſince Valliſnieri obſerved, in the boxes where he kept theſe galls to produce the animals from thence, many ſpecies of ſmall beetles, and ſeveral diſtinct kinds of flies, which were probably the laſt ſtate of ſeveral kinds of carnivorous worms, which had preyed upon the proper inhabitant of the galls. Valliſnieri, Dialog. des Inſect.

WILLOW-*herb*, or *French* **WILLOW**, *epilobium*, in *Botany*, a genus of the *octandria monogynia* claſs. Its characters are theſe: the empalement of the flower is compoſed of four oblong pointed leaves, which are coloured; the flower has four bordered petals which ſpread open, and eight ſtamina which are alternately ſhorter, terminated by oval compreſſed ſummits; under the flower is ſituated a long cylindrical germen, which becomes a cylindrical furrowed capſule with five cells filled with oblong ſeeds, crowned with down. Linnæus enumerates ſeven, and Miller two ſpecies, that are cultivated; one of which makes a good appearance when in flower, and is very proper to cut for baſons to adorn chimnies in the ſummer ſeaſon. The other is found wild on the ſides of ditches; the leaves of which being rubbed, ſmell like ſcalded apples, which has obtained for it the name of codlins and cream.

WILLOW-*herb* is a name ſometimes given to the *lythrum* or *purple* LOOSE-*ſtrife*.

WILLOW, *ſweet*, *Dutch* **WILLOW**, **GALE**, or *Candleberry* **MYRTLE**, in *Botany*. See CANDLE-*berry-tree*, and *Candle-berry* MYRTLE.

WIMBREL, in *Ornithology*, the Engliſh name of a bird of the curlew kind, the SCOLOPAX *phæopus* of Linnæus, and known among authors by the name of *arquata minor*, or the leſſer curlew, and called in the Venetian markets *taraniola*.

It is much of the ſhape of the common curlew, but is not more than half its ſize. Its beak is about three fingers-breadth long, duſky above and red below; its feet are greeniſh; the feathers on the head and neck brown tinged with red, marked in the middle with an oblong black ſpot; the upper part of the back, coverts of the wings, ſcapulars, and fartheſt quill-feathers of the ſame colour with the neck, but the black ſpots ſpread out tranſverſely on each web; the quill-feathers duſky, their ſhafts white, and their exterior webs marked with large ſemi-circular white ſpots; the breaſt, belly, and lower part of the back are white; the coverts of the tail and tail are of a pale whitiſh brown, croſſed with black bars. Its haunts and food are much the ſame with thoſe of the curlew, but it is much leſs frequent on our ſhores. Pennant. See *Tab.* V. *Birds*, Nº 61.

WIMPEL, of the Dutch *wimpel*, a muffler, a plaited linen cloth, which nuns wear to cover their necks and breaſts.

The word is alſo ſometimes uſed for a ſtreamer, or flag.

WIN, at the beginning or end of the names of places, ſignifies that ſome great battle was fought, or a victory gained there. The word is formed from the Saxon *winnan*, *to win*, or *overcome*.

WINCH, a popular term for a WINDLASS.

WINCH alſo denotes the crooked handle for turning round wheels, grind-ſtones, &c.

WINCHING, in the *Manege*, is ſaid of a horſe when he kicks, ſpurs, or throws out his hind feet.

WINCRANTUM, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a foſſile ſubſtance reſembling, in ſome degree, the plated lead-ores of Europe, but containing very little of that metal; it is properly a ſpecies of blende, or mock-lead, of a talcky appearance; it is conſiderably hard, and is uſually found in other ſtones. It is given in medicine in the Indies as a provocative to venery, being firſt calcined and beat to powder.

WIND, *ventus*, a ſenſible agitation of the air, whereby a large quantity thereof flows in a current or ſtream out of one place, or region, into another.

The *winds* are divided into *perennial*, *ſtated*, and *variable*.

They are alſo divided into *general*, and *particular*.

WINDS, *perennial*, or *conſtant*, are ſuch as always blow the ſame way.

Of theſe we have a very notable one between the two tropics, blowing conſtantly from eaſt to weſt; called the *general trade-wind*.

WINDS, *ſtated*, or *periodical*, are ſuch as conſtantly return at certain times. Such are the ſea and land-breezes, blowing from ſea to land in the evening; and from land to ſea in the morning.

Such alſo are the *ſhifting*, or *particular trade-winds*, which, for certain months of the year, blow one way, and the reſt of the year, the contrary way. See TRADE-*winds*.

WINDS, *variable*, or *erratic*, are ſuch as blow now this, now that way; and are now up, now huſhed, without any rule or regularity, either as to time or place.

Such are all the *winds* obſerved in the inland parts of England, &c. though ſeveral of theſe claim their certain times of the day. Thus, the *weſt wind* is moſt frequent about noon; the *ſouth wind* in the night; the *north* in the morning, &c.

WIND, *general*, is ſuch a one, as at the ſame time blows the ſame way, over a very large tract of ground, almoſt all the year. Such only is the *general trade-wind*.

But even this has its interruptions: for, 1. At land it is ſcarce ſenſible at all, as being broken by the interpoſition of mountains, valleys, &c. 2. At ſea, near the ſhore, it is diſturbed by vapours, exhalations, and particular *winds* blowing from landward; ſo that it is chiefly conſidered as *general*, only at mid ſea: where, 3. It is liable to be diſturbed, by clouds driving from other quarters.

WINDS, *particular*, include all others, excepting the *general trade-winds*.

Thoſe peculiar to one little canton, or part, are called *topical* or *provincial winds*. Such is the north *wind*, on the weſtern ſide of the Alps, which does not blow above one or two leagues lengthwiſe, and much leſs in breadth: ſuch alſo is the pontias in France, &c.

WINDS, *phyſical cauſe of*. Some philoſophers, as Des Cartes, Rohault, &c. account for the general *wind*, from the diurnal rotation of the earth; and from this general *wind* derive all the particular ones. The atmoſphere, ſay they, inveſting the earth, and moving round it; that part will perform its circuit ſooneſt, which has the ſmalleſt circle to deſcribe: the air, therefore, near the equator, will require a ſomewhat longer time to perform its courſe in, from weſt to eaſt, than that nearer the poles. Thus, as the earth turns eaſtward, the particles of the air near the equinoctial, being exceedingly light, are left behind; ſo that, in reſpect of the earth's ſurface, they move eaſtwards, and become a conſtantly eaſterly *wind*. This opinion ſeems confirmed by this, that theſe *winds* are found only between the tropics, in thoſe parallels of latitude where the diurnal motion is ſwifteſt. But the conſtant calms in the Atlantic ſea near the equator, the weſterly *winds* near the coaſt of Guinea, and the periodical weſterly moonſons under the equator in the Indian ſeas, declare the inſufficiency of this hypotheſis.

Beſides, the air, being kept cloſe to the earth by the principle of gravity, would, in time, acquire the ſame degree of velocity, that the earth's ſurface moves with, as well as in reſpect of the diurnal rotation, as of the annual about the ſun, which is about thirty times ſwifter. See TRADE-*Winds*.

Dr. Halley, therefore, ſubſtitutes another cauſe, capable of producing a like conſtant effect, not liable to the ſame objections, but agreeable to the known properties of the elements of water and air, and the laws of the motion of fluid bodies. Such a one is the action of the ſun's beams upon the air and water, as he paſſes every day over the ocean, conſidered together with the quality of the ſoil, and the ſituation of the adjoining continents.

According to the laws of ſtatics, the air, which is leſs rarefied, or expanded by heat, and conſequently is more ponderous, muſt have a motion towards thoſe parts thereof, which are more rarefied, and leſs ponderous, to bring it to an equilibrium; alſo, the preſence of the ſun continually ſhifting to the weſtward, that part towards which the air tends, by reaſon of the rarefaction made by his greateſt meridian heat, is, with him, carried weſtward; and, conſequently, the tendency of the whole body of the lower air is that way.

Thus a general eaſterly *wind* is formed, which being impreſſed upon the air of a vaſt ocean, the parts impel one the other, and ſo keep moving till the next return of the ſun, whereby ſo much of the motion as was loſt, is again reſtored; and thus the eaſterly *wind* is made perpetual.

From the ſame principle it follows, that this eaſterly *wind* ſhould, on the north ſide of the equator, be to the northward of the eaſt, and in ſouth latitudes to the ſouthward thereof; for, near the line, the air is much more rarefied than at a greater diſtance from it; becauſe the ſun is twice in a year vertical there, and at no time diſtant above 23½ degrees; at which diſtance, the heat, being as the ſine of the angle of incidence, is but little ſhort of that of the perpendicular ray; whereas under the tropics, though the ſun ſtay longer vertical, yet he is a long time 47 degrees off; which is a kind of winter, wherein the air ſo cools, as that the ſummer heat cannot warm it to the ſame degree with that under the equator. Wherefore, the air towards the north and ſouth being leſs rarefied than that in the middle, it follows, that from both ſides it ought to tend towards the equator.

This motion, compounded with the former eaſterly *wind*, accounts for all the phenomena of the general trade-*winds*, which, if the whole ſurface of the globe was ſea, would undoubtedly blow quite round the world, as they are found to do in the Atlantic, and the Ethiopic oceans. But ſeeing that ſo great continents do interpoſe, and break the continuity of the ocean, regard muſt be had to the nature of the ſoil, and the poſition of the high mountains, which are the two principal cauſes of the variations of the *wind*, from the former general rule; for if a country lying near the ſun prove to be flat, ſandy, and low land, ſuch as the deſerts of Lybia are uſually reported to be, the heat occaſioned by the reflexions of the ſun's beams, and the retention thereof in the ſand, is incredible to thoſe who have not felt it; whereby the air being exceedingly rarefied, it is neceſſary, that the cooler, and more denſe air, ſhould run thitherwards, to reſtore the equilibrium. This is ſuppoſed to be the cauſe, why, near the coaſt of Guinea, the *wind* always ſets in upon the land, blowing weſterly inſtead of eaſterly, there being ſufficient reaſon to believe, that the inland parts of Africa are prodigiouſly hot, ſince the northern borders thereof were ſo very intemperate, as to give the ancients cauſe to conclude, that all beyond the tropics was uninhabitable by exceſs of heat.

Mr. Clare, in his Motion of Fluids, p. 302. mentions a familiar experiment, that ſerves to illuſtrate this matter, as well as the alternate courſe of land and ſea-breezes. Fill a large diſh with cold water, and in the middle of it place a water-plate, filled with warm water: the firſt will repreſent the ocean, the other an iſland, rarefying the air above it. Then holding a wax-candle over the cold water, blow it out, and the ſmoke will be ſeen, in a ſtill place, to move toward the warm plate, and riſing over, it will point the courſe of the air (and alſo of VAPOUR) from ſea to land. And if the ambient water be warmed, and the plate filled with cold water, and the ſmoking wick of a candle held over the plate, the contrary will happen. For the phenomena of the *wind*, obſerved by Dr. Halley, and explained by his theory, ſee WIND, in *Navigation*.

From the ſame cauſe it happens, that there are ſo conſtant calms in that ſame part of the ocean, called the *rains*; for this tract being placed in the middle, between the weſterly *winds* blowing on the coaſt of Guinea, and the eaſterly trade *winds* blowing to the weſtward thereof; the tendency of the air here is indifferent to either, and ſo ſtands in equilibrio between both; and the weight of the incumbent atmoſphere being diminiſhed by the continual contrary *winds* blowing from hence, is the reaſon that the air here holds not the copious vapour it receives, but lets it fall in ſo frequent rains.

But, as the cold and denſe air, by reaſon of its greater gravity, preſſes upon the hot and rarefied, it is demonſtrable, that this latter muſt aſcend in a continued ſtream, as faſt as it rarefies; and that, being aſcended, it muſt diſperſe itſelf, to preſerve the equilibrium; that is, by a contrary current, the upper air muſt move from thoſe parts where the greateſt heat is: ſo, by a kind of circulation, the north-eaſt trade-*wind* below will be attended with a ſouth-weſterly *wind* above; and the ſouth-eaſt, with a north-weſt *wind* above.

That this is more than a bare conjecture, the almoſt inſtantaneous change of the *wind* to the oppoſite point, which is frequently found in paſſing the limits of the trade-*winds*, ſeems ſtrongly to aſſure us; but that which above all confirms this hypotheſis, is the phenomenon of the MONSOONS, by this means moſt eaſily ſolved, and without it hardly explicable.

Suppoſing, therefore, ſuch a circulation as above, it is to be conſidered, that to the northward of the Indian ocean there is every where land, within the uſual limits of the latitude of 30°; viz. Arabia, Perſia, India, &c. which, for the ſame reaſon as the Mediterranean parts of Africa, are ſubject to inſufferable heats, when the ſun is to the north, paſſing nearly vertical; but yet are temperate enough when the ſun is removed towards the other tropic, becauſe of a ridge of mountains at ſome diſtance within the land, ſaid to be frequently, in winter, covered with ſnow, over which the air, as it paſſes, muſt needs be much chilled. Hence it happens, that the air coming, according to the general rule, out of the north-eaſt, to the Indian ſea, is ſometimes hotter, ſometimes colder, than that which, by this circulation, is returned out of the ſouth-weſt; and, by conſequence, ſometimes the under-current, or *wind*, is from the north-eaſt, ſometimes from the ſouth-weſt.

That this has no other cauſe, is clear from the times wherein theſe *winds* ſet, viz. in April: when the ſun begins to warm theſe countries to the north, the ſouth-weſt monſoons begin, and blow, during the heats, till October, when the ſun being retired, and all things growing cooler northward, and the heat increaſing to the ſouth, the north-eaſt *winds* enter, and blow all the winter, till April again. And it is, undoubtedly, from the ſame principle, that to the ſouthward of the equator, in part of the Indian ocean, the north-weſt *winds* ſucceed the ſouth-eaſt, when the ſun draws near the tropic of Capricorn. Phil. Tranſact. N° 183. or Abridg. vol. ii. p. 139.

Some philoſophers, diſſatisfied with Dr. Halley's theory above recited, or not thinking it ſufficient for explaining the various phenomena of the *wind*, have had recourſe to another cauſe, viz. the gravitation of the earth and its atmoſphere towards the ſun and moon, to which the TIDES are confeſſedly owing. They allege that, though we cannot diſcover aerial tides, of ebb or flow, by means of the barometer, becauſe columns of air of unequal height, but different denſity, may have the ſame preſſure or weight; yet the protuberance in the atmoſphere, which is continually following the moon, muſt, they ſay, of courſe produce a motion in all parts, and ſo produce a *wind* more or leſs to every place, which, conſpiring with, or counteracted by the *winds* ariſing from other cauſes, makes them greater or leſs. Several diſſertations to this purpoſe were publiſhed, on occaſion of the ſubject propoſed by the Academy of Sciences at Berlin, for the year 1746. M Muſchenbroeck, however, will not allow that the attraction of the moon is the cauſe of the general *wind*; becauſe the eaſt *wind* does not follow the motion of the moon about the earth; for in that caſe there would be more than twenty-four changes, to which it would be ſubject in the courſe of a year, inſtead of two. Introd. ad Phil. Nat. vol. ii. p. 1102.

Mr. Henry Eeles, apprehending that the ſun's rarefying of the air cannot ſimply be the cauſe of all the regular and irregular motions which we find in the atmoſphere, aſcribes them to another cauſe, viz. the aſcent and deſcent of VAPOUR and exhalation, attended by the electrical fire or fluid; and on this principle he has endeavoured to explain at large the general phenomena of the weather and barometer. Phil. Tranſ. vol. xlix. art. 25. p. 124.

The induſtry of ſome late writers having brought the theory of the production and motion of *winds* to ſomewhat of a mathematical demonſtration; we ſhall here give it the reader in that form.

WINDS, *laws of the production of*. If the ſpring of the air be weakened in any place, more than in the adjoining places; a *wind* will blow through the place where the diminution is.

For, 1. Since the air endeavours, by its elaſtic force, to expand itſelf every way; if that force be leſs in one place than another, the effort of the more, againſt the leſs elaſtic, will be greater than the effort of the latter againſt the former. The leſs elaſtic air, therefore, will reſiſt with leſs force than it is urged by the more elaſtic: conſequently, the leſs elaſtic will be driven out of its place, and the more elaſtic will ſucceed.

If, now, the exceſs of the ſpring of the more elaſtic above that of the leſs elaſtic air, be ſuch as to occaſion a little alteration in the baroſcope; the motion both of the air expelled, and that which ſucceeds it, will become ſenſible, i. e. there will be a *wind*.

2. Hence, ſince the ſpring of the air increaſes, as the compreſſing weight increaſes, and compreſſed air is denſer

than air leſs compreſſed; all *winds* blow into rarer air, out of a place filled with a denſer.

3. Wherefore, ſince a denſer air is ſpecifically heavier than a rarer; an extraordinary lightneſs of the air in any place muſt be attended with extraordinary *winds*, or ſtorms.

Now, an extraordinary fall of the mercury in the BAROMETER, ſhewing an extraordinary lightneſs of the atmoſphere, it is no wonder if that foretels ſtorms.

4. If the air be ſuddenly condenſed in any place, its ſpring will be ſuddenly diminiſhed: hence, if this diminution be great enough to affect the barometer, there will a *wind* blow through the condenſed air.

5. But ſince the air cannot be ſuddenly condenſed, unleſs it have before been much rarefied, there will a *wind* blow through the air, as it cools, after having been violently heated.

6. In like manner, if air be ſuddenly rarefied, its ſpring is ſuddenly increaſed: wherefore, it will flow through the contiguous air, not acted on by the rarefying force. A *wind*, therefore, will blow out of a place, in which the air is ſuddenly rarefied; and on this principle, in all probability, it is, that,

7. Since the ſun's power in rarefying the air is notorious, it muſt neceſſarily have a great influence on the generation of *winds*.

8. Moſt caves are found to emit *wind*, either more or leſs.

M. Muſchenbroeck has enumerated a variety of cauſes that produce *winds*, exiſting in the bowels of the earth, on its ſurface, in the atmoſphere, and above it. See Intr. ad Phil. Nat. vol. ii. p 1116, &c.

The riſing and changing of the *wind* are determined experimentally, by means of weather-cocks, placed on the tops of houſes, &c. But theſe only indicate what paſſes about their own height, or near the ſurface of the earth: Wolfius aſſures us, from obſervations of ſeveral years, that the higher *winds*, which drive the clouds, are different from the lower ones, which move the weather-cocks. And Dr. Derham obſerves ſomething not unlike this. Phyſ. Theol. lib. i. cap. 2.

The author laſt mentioned relates, upon comparing ſeveral ſeries of obſervations made of the *winds* in divers countries; viz. England, Ireland, Switzerland, Italy, France, New England, &c. that the *winds* in thoſe ſeveral places ſeldom agree; but when they do, it is commonly when they are ſtrong, and of long continuance in the ſame quarter; and more, he thinks, in the northerly and eaſterly than in other points. Alſo, that a ſtrong *wind* in one place is oftentimes a weak one in another, or moderate, according as the places are nearer, or more remote. Phil. Tranſ. N° 267 and 321.

WIND, *laws of the force and velocity of.* *Wind* being only air in motion, and air being a fluid ſubject to the laws of other fluids, its force may be regularly brought to a preciſe computation: thus—"The ratio of the ſpecific gravity of any other fluid to that of air, together with the "ſpace that fluid, impelled by the preſſure of the air, "moves in any given time, being given; we can determine the ſpace through which the air itſelf, acted on "by the ſame force, will move in the ſame time." By this rule:

1. As the ſpecific gravity of air is to that of any other fluid; ſo, reciprocally, is the ſquare of the ſpace, which that fluid, impelled by any force, moves in any given time, to the ſquare of the ſpace which the air, by the ſame impulſe, will move in the ſame time.

Suppoſing, therefore, the ratio of the ſpecific gravity of that other fluid to that of air, to be $= \frac{b}{c}$; the ſpace deſcribed by the fluid to be called s; and that which the air will deſcribe by the ſame impulſe, x. The rule gives us $x = \sqrt{\frac{bs^2}{c}}$.

Hence, if we ſuppoſe water impelled by the given force, to move two feet in a ſecond of time, then will $s = 2$; and ſince the ſpecific gravity of water to the air is as 800 to 1, we ſhall have $b = 800$, and $c = 1$; conſequently, $x = \sqrt{800 \times 4} = \sqrt{3200} = 57$ feet nearly. The velocity of the *wind*, therefore, to that of *water*, moved by the ſame power, will be as 57 to 2; i. e. if water move two feet in a ſecond, the *wind* will fly 57 feet.

2. Add, that $s = \sqrt{\frac{cx^2}{b}}$; and therefore the ſpace any fluid, impelled by any impreſſion, moves in any time, is determined, by finding a fourth proportional to the two numbers that expreſs the ratio of the ſpecific gravities of the two fluids, and the ſquare of the ſpace the *wind* moves in, in the given time. The ſquare root of that fourth proportional is the ſpace required.

Mr. Mariotte, e. gr. found, by various experiments, that a pretty ſtrong *wind* moves 24 feet in a ſecond of time, which is at the rate of 1440 in a minute; i. e. at the rate of ſomewhat more than 16 miles in an hour: wherefore, if the ſpace which the water, acted on by the ſame force as the air, will deſcribe in the ſame time, be required; then will $c = 1$, $x = 24$, $b = 800$; and we ſhall find $s = \sqrt{\frac{576}{800}} = \frac{24}{28}$ nearly.

3. "The velocity of *wind* being given, to determine the "preſſure required to produce that velocity;" we have this rule. The ſpace the *wind* moves in one ſecond of time, is to the height a fluid is to be raiſed in an empty tube, in order to have a preſſure capable of producing that velocity, in a ratio compounded of the ſpecific gravity of the fluid to that of the air, and of quadruple the altitude a body deſcends in the firſt ſecond of time, to the aforeſaid ſpace of the air.

Suppoſe, e. gr. the ſpace through which the air moves in a ſecond, $a = 24$ feet, or 288 inches; call the altititude of the fluid x; and the ratio of mercury to air, $\frac{b}{c} = \frac{800 \times 14}{1} = \frac{11200}{1}$; and the altitude through which a body deſcends in the firſt ſecond of time, 16 feet 1 inch; then, by the theorem, we ſhall have $288 : x :: 11200 \times 762 : 288$, and conſequently $x = \frac{288 \times 288}{11200 \times 762}$ $= ,01$, &c. of an inch. Hence we ſee why a ſmall, but ſudden change in the barometer, is followed with violent *winds*.

Philoſophers have uſed various methods for determining the velocity of the *wind*, which is very different at different times. The method uſed by Dr. Derham was that of letting light downy feathers fly in the *wind*, and accurately obſerving the diſtance to which they were carried in any number of half ſeconds. This method he preferred to that of Dr. Hooke's mola alata, or pneumatica (ſee Phil. Tranſ. N° 24. and Birch's Hiſt. Roy. Soc. vol. iv. p. 225.) He tells us, that he thus meaſured the velocity of the *wind* in the great ſtorm of Auguſt, 1705, and by many experiments found, that it moved at the rate of thirty-three feet per half-ſecond, or of forty-five miles per hour: whence he concludes, that the moſt vehement *wind* (as that of November, 1703) does not fly at the rate of above fifty or ſixty miles per hour, and that at a medium the velocity of *wind* is at the rate of twelve or fifteen miles per hour. Phil. Tranſ. N° 313. or Abr. vol. iv. p. 411.

Mr. Brice obſerves, that experiments with feathers are ſubject to uncertainty: as they ſeldom or ever deſcribe a ſtraight line, but deſcribe a ſort of ſpirals, moving to the right and left, and riſing to very different altitudes in their progreſs. He, therefore, conſiders the motion of a cloud, or its ſhadow, over the ſurface of the earth, as a much more accurate meaſure of the velocity of the *wind*. In this way he found, that the *wind*, in a conſiderable ſtorm, moved at the rate of 62,9 miles per hour; and that, when it blew a freſh gale, it moved in the ſame time about twenty-one miles; and that in a ſmall breeze, the *wind* moved at the rate of 9,9 miles per hour. Phil. Tranſ. vol. lvi. p. 226.

The velocity and force of the *wind*, are determined experimentally by a peculiar machine, called an *anemometer*, or *wind-meaſurer*. Of theſe there have been many, variouſly conſtructed. See ANEMOMETER, and ANEMOSCOPE.

M. Bouguer has contrived a very ſimple inſtrument, by means of which we may immediately diſcover the force which the *wind* exerts on a given ſurface. This is a hollow tube AABB (*Tab. V. Pneumatics, fig. 72.*) in which a ſpiral ſtring CD is fixed, that may be more or leſs compreſſed by a rod FSD, paſſing through a hole within the tube at AA; then having obſerved to what degree different forces or given weights are capable of compreſſing the ſpiral, mark diviſions on the rod in ſuch a manner, that the mark at S may indicate the weight requiſite to force the ſpring into the ſituation CD; afterwards join at right angles to this rod at F, a plane ſurface EFE of a given area, either greater or leſs, at pleaſure; then let this inſtrument be oppoſed to the *wind*, ſo that it may ſtrike the ſurface in the directions VE, VE, parallel to that of the rod, and the mark at S will ſhew the weight to which the force of the *wind* is equivalent. See WIND-*gage*.

A TABLE of the different velocities and forces of the *winds*, conſtructed by Mr. Rouſe with great care, from a conſiderable number of facts and experiments, and communicated to Mr. Smeaton.

Velocity of the *wind*.		Perpendicular force on one ſquare foot, in avoirdupois pounds.	Common appellations of the forces of *winds*.
Miles in one hour.	= feet in one ſecond.		
1	1.47	.005	Hardly perceptible.
2	2.93	.020	Juſt perceptible.
3	4.40	.044	
4	5.87	.079	Gentle pleaſant *wind*.
5	7.33	.123	
10	14.67	.492	Pleaſant briſk gale.
15	22.00	1.107	
20	29.34	1.968	Very briſk.
25	36.67	3.075	
30	44.01	4.429	High *wind*.
35	51.34	6.027	
40	58.68	7.873	Very high.
45	66.01	9.963	
50	75.35	12.300	A ſtorm or tempeſt.
60	88.02	17.715	A great ſtorm.
80	117.36	31.490	A hurricane.
100	146.70	49.200	A hurricane that tears up trees, and carries buildings, &c. before it.

The force of the *wind* is as the ſquare of its velocity; as Mr. Ferguſon has ſhewn by experiments on the WHIRLING-*table*; and in moderate velocities this will hold very nearly.

It is obſerved, with regard to this table, that the evidence for thoſe numbers, where the velocity of the *wind* exceeds fifty miles an hour, does not ſeem of equal authority with that of thoſe of fifty miles, or under. Phil. Tranſ. vol. li. p. 165.

Dr. Hales found (Statical Eſſ. vol. ii. p. 326.) that the air ruſhed out of a pair of ſmith's bellows, at the rate of 68,73 feet in a ſecond of time, when compreſſed with a force equal to the weight of one inch perpendicular depth of mercury, lying on the whole upper ſurface of the bellows. The velocity of the air, as it paſſed out of the trunk of his VENTILATORS, was found to be at the rate of three thouſand feet in a minute; which is at the rate of thirty-four miles in an hour. Dr. Hales ſays, that the velocity with which impelled air paſſes out at any orifice, may be determined by hanging a light valve over the noſe of a bellows, by pilant leathern hinges, which will be much agitated and lifted up from a perpendicular to a more than horizontal poſition by the force of the ruſhing air. There is another more accurate way, he ſays, of eſtimating the velocity of air, viz. by holding the orifice of an inverted glaſs ſiphon full of water, oppoſite to the ſtream of air, whereby the water will be depreſſed in one leg, and raiſed in the other, in proportion to the force with which the water is impelled by the air. Deſcript. of Ventilators, 1743. p. 12, &c.

WIND, *qualities and effects of*. 1. "A *wind* blowing from "the ſea, is always moiſt: in ſummer, it is cold; and "in winter, warm, unleſs the ſea be frozen up." This is demonſtrated thus: there is a vapour continually riſing out of all water (as appears even hence, that a quantity of water, being left a little while in an open veſſel, is found ſenſibly diminiſhed), but eſpecially if it be expoſed to the ſun's rays; in which caſe, the evaporation is beyond all expectation. By this means, the air incumbent on the ſea becomes impregnated with a quantity of vapour. But the *winds*, blowing from off the ſea, ſweep theſe vapours along with them; and conſequently they are always moiſt.

Again, water in ſummer, &c. conceives leſs heat than terreſtrial bodies, expoſed to the ſame rays of the ſun, do; but in winter, ſea-water is warmer than the earth covered with froſt and ſnow, &c. Wherefore, as the air contiguous to any body is found to partake of its heat and cold, the air contiguous to ſea-water will be warmer in winter, and colder in ſummer, than that contiguous to the earth. Or thus: vapours raiſed from water by the ſun's warmth in winter, are warmer than the air they riſe in (as appears from the vapours condenſing, and becoming viſible, almoſt as ſoon as they are got out into air.) Freſh quantities of vapour, therefore, continually warming the atmoſphere over the ſea, will raiſe its heat beyond that of air over the land. Again, the ſun's rays reflected from the earth into the air, in ſummer, are much more than thoſe from the water into air: the air, therefore, over the earth, warmed by the reflexion of more rays than that over water, is warmer. Hence, *ſea-winds* make thick, cloudy, hazy weather.

2. "*Winds*, blowing from the continent, are always "dry; in ſummer, warm; and cold in winter." For there is much leſs vapour ariſing from the earth, than from water; and therefore the air over the continent will be impregnated with much fewer vapours. Add, that the vapours, or exhalations, raiſed by a great degree of heat out of the earth, are much finer, and leſs ſenſible, than thoſe from water. The *wind*, therefore, blowing over the continent, carries but little vapour with it, and is therefore dry.

Farther, the earth in ſummer is warmer than water expoſed to the ſame rays of the ſun. Hence, as the air partakes of the heat of contiguous bodies, that over the earth in ſummer will be warmer than that over the water: therefore the *wind*, &c.

After the like manner it is ſhewn, that the *land-winds* are cold in winter. Hence, we ſee why *land-winds* make clear, cold weather.

Our northerly and ſoutherly *winds*, however, which are commonly eſteemed the cauſes of cold and warm weather, Dr. Derham obſerves, are really rather the effect of the cold or warmth of the atmoſphere. Hence it is, that we frequently ſee a warm ſoutherly wind, on a ſudden, changed to the north, by the fall of ſnow or hail; and that in a cold, froſty morning, we ſee the *wind* north, which afterwards wheels about toward the ſoutherly quarter, when the ſun has well warmed the air; and again, in the cold evening, turns northerly, or eaſterly.

For the manner wherein north-eaſterly *winds* contribute to blights, ſee BLIGHT. For the effect of *winds* on the barometer and thermometer, ſee BAROMETER, &c.

The utility of *winds* has been univerſally acknowledged. The ancient Perſians, Phœnicians, Greeks, and Romans, ſacrificed, and erected temples to the *winds*; as we learn from Voſſius, Theolog. Gentil. lib. iii. part i. cap. 1. Beſide their uſe in moving bellows, mills, and other machines, applied in various ways to the ſervice of mankind, and the benefits reſulting from them to navigation and trade, they ſerve to purify and refreſh the air, to convey the heat or cold of one region to another, to produce a regular circulation of vapours from the ocean to countries remote from it; and to ſupply, by wafting them in their progreſs againſt hills, &c. ſprings and rivers.

Wind has been, by many authors, made the baſis of many different diſeaſes: among others, Dr. Reyn has given it as his opinion, in a Treatiſe on the Gout (De Arthritid.) that flatuſes, or *wind* incloſed between the perioſteum and the bone, are the true cauſe of that diſeaſe; and accordingly, that all the method of cure ought to tend to the expelling of that *wind*. He ſuppoſes this *wind* to be of a dry, cold, and malignant nature, conveyed by the arteries to the place affected, where forcibly ſeparating that ſenſible membrane the perioſteum, and diſtending it, the pain muſt needs be very great.

He is alſo of opinion, that head-achs, palpitations of the heart, tooth-ach, pleuriſy, convulſions, colics, and many other diſeaſes, are originally owing to the ſame cauſe, and only differ in regard to the place affected, and to the various motions and determinations of the *wind*. The moveableneſs of the pain in gouty perſons from one part to another, he looks on as a proof of this, and thinks that the curing of the gout by burning moxa, or the cotton of the mugwort leaves, upon it, is owing to its giving way to the *wind* in the part to evaporate itſelf.

That theſe *winds* are cold appears from the ſhivering fits which generally precede a paroxyſm of the gout, and that the ſhiverings in the beginnings of fevers, and before all fits of agues, are owing to the ſame cauſe, is ſuppoſed by this author a natural concluſion from the former obſervations.

The *winds*, according to this author and Fienus, are a ſort of halituous ſpirits, raiſed by the improper degree of our native heat, or out of our meat and drink; or, finally, out of an abundance of black choler.

Their differences, he ſays, principally proceed from the various ferments producing in us a variety of humours; which, acting upon one another, do in their effervescences create *winds* of various effects, and denominate diſeaſes from the places which are the ſcenes of their action. It is on this account that the acupunctura, or pricking with long needles, among the Chineſe, is of uſe: the Japoneſe, and other neighbouring nations, having no other cure for moſt diſeaſes than the pricking with the needle, and the burning of the moxa on the part.

The huſbandman often ſuffers extremely by high *winds*, in many different reſpects. Plantations of trees at a ſmall diſtance from the barns and houſes, are the beſt ſafeguard againſt their ſuffering by *winds*; but they muſt not be planted ſo near as that their fall, if it ſhould happen, would endanger them. Yews grow very ſlowly, otherwiſe they are the beſt of all trees for this defenſive plantation. Trees ſuffer by *winds*, being either broken or blown down by them; but this may be in a great meaſure prevented by cutting off great part of the heads and branches of them, in places where they ſtand moſt expoſed.

Hops are the moſt ſubject to be injured by *winds* of any crop; but this may be in a great meaſure prevented by a high pale, or very thick thorn-hedge; this will both keep off the ſpring *wind*, which nips the young buds, and be a great ſafeguard againſt other *winds* that would tear the plants from their poles. The poles ſhould always be very firm in the ground; and the beſt ſecurity to be added to this, is a row of tall trees all round the ground.

Winds attended with rain do great injury to the corn, by laying it flat to the ground. The beſt method of preventing this, is to keep up good encloſures; and if the accident happens, the corn ſhould be cut immediately, for it never grows at all afterwards. It ſhould be left on the ground, in this caſe, ſome time after the cutting, to harden the grain in the ear. Mortimer's Huſbandry, p. 302.

WIND, in *Navigation*, is the ſame agitation of the air, conſidered as ſerving for the motion of veſſels on the water.

If the *wind* blows gently, it is called a BREEZE; if it blows harder, it is called a GALE, or a ſtiff gale; and if it blows very hard, it is called a STORM.

The following obſervations on the *wind* have been made by ſkilful ſeamen, and particularly by Dr. Halley.

1ſt, Between the limits of 60°, viz. from 30° of north latitude to 30° of ſouth latitude, there is a conſtant eaſt *wind* through the year, blowing in the Atlantic and Pacific oceans, called the TRADE-*wind*.

2d, The trade-*winds* near their northern limits blow between the north and eaſt; and near their ſouthern limits they blow between the ſouth and eaſt.

3d, Theſe general motions of the *wind* are diſturbed on the continents, and near their coaſts.

4th, In ſome parts of the Indian ocean there are periodical *winds*, which are called MONSOONS.

5th, In the Atlantic ocean, near the coaſts of Africa, at about a hundred leagues from the ſhore, between the latitudes of 28° and 10° north, ſeamen conſtantly meet with a freſh gale of *wind* blowing from the N. E.

6th, Thoſe bound to the Caribbee iſlands, acroſs the Atlantic ocean, find, as they approach the American ſide, that the ſaid N. E. *wind* becomes eaſterly; or ſeldom blows more than a point from the eaſt, either to the northward or ſouthward. Theſe trade-*winds*, on the American ſide, are extended to 30, 31, or even to 32° of N. latitude; which is about 4° farther than they extend to on the African ſide: alſo to the ſouthward of the equator, the trade-*winds* extend three or four degrees farther toward the coaſt of Braſil, on the American ſide, than they do near the Cape of Good Hope, on the African ſide.

7th, Between the latitudes of 4° N. and 4° S. the *wind* always blows between the ſouth and eaſt: on the African ſide the *winds* are neareſt the ſouth; and on the American ſide, neareſt the eaſt. In theſe ſeas Dr. Halley obſerved, that when the *wind* was eaſtward, the weather was gloomy, dark, and rainy, with hard gales of *wind*; but when the *wind* veered to the ſouthward, the weather generally became ſerene, with gentle breezes, next to a calm. Theſe *winds* are ſomewhat changed by the ſeaſons of the year; for when the ſun is far northward, the Braſil S. E. *wind* gets to the ſouth, and the N. E. *wind* to the eaſt; and when the ſun is far ſouth, the S. E. *wind* gets to the eaſt, and the N. E. *winds* on this ſide of the equator veer more to the north.

8th, Along the coaſt of Guinea, from Sierra Leone to the iſland of St. Thomas, under the equator, which is above five hundred leagues, the ſoutherly and ſouth-weſt-*winds* blow perpetually; for the S. E. trade-*wind*, having paſſed the equator, and approaching the Guinea coaſt within eighty or a hundred leagues, inclines toward the ſhore, and becomes ſouth, then S. E. and by degrees, as it comes near the land, it veers about to ſouth, S. S. W. and in with the land it is S.W. and ſometimes W.S.W. This tract is troubled with frequent calms, violent ſudden guſts of *wind*, called tornadoes, blowing from all points of the horizon.

9th, Between the fourth and tenth degrees of north latitude, and between the longitudes of Cape Verd, and the eaſtermoſt of the Cape Verd iſles, there is a tract of ſea ſubject to perpetual calms, attended with frequent thunder and lightning, and rains: ſhips in ſailing theſe ſix degrees are ſaid to have been ſometimes detained whole months.

The three laſt obſervations account for two circumſtances which mariners experience in ſailing from Europe to India, and in the Guinea trade.

The *firſt* is the difficulty which ſhips, in going to the ſouthward, eſpecially in the months of July and Auguſt, find in paſſing between the coaſts of Guinea and Braſil, although the breadth of this ſea is more than five hundred leagues. This happens, becauſe the S. E. *winds* at that time of the year commonly extend ſome degrees beyond the ordinary limits of four degrees N. latitude; and beſides coming ſo much ſoutherly, as to be ſometimes ſouth, ſometimes a point or two to the weſt; it then only remains to ply to windward: and if, on the one ſide, they ſteer W. S. W. they get a *wind* more and more eaſterly; but then there is a danger of falling in with the Braſilian coaſt, or ſhoals; and if they ſteer E. S. E. they fall into the neighbourhood of the coaſt of Guinea, from whence they cannot depart without running eaſterly as far as the iſland of St. Thomas; and this is the conſtant practice of all the Guinea ſhips.

Secondly. All ſhips departing from Guinea for Europe, their direct courſe is northward; but on this courſe they cannot go, becauſe the coaſt bending nearly eaſt and weſt, the land is to the northward: therefore as the *winds* on this coaſt are generally between the S. and W. S. W. they are obliged to ſteer S. S. E. or ſouth, and with theſe courſes they run off the ſhore; but in ſo doing they always find the *winds* more and more contrary; ſo that when near the ſhore, they can lie ſouth, at a greater diſtance they can make no better than S. E. and afterwards E. S. E.; with which courſes they commonly fetch the iſland of St. Thomas and Cape Lopez, where finding the *winds* to the eaſtward of the ſouth, they ſail weſterly with it, till coming to the latitude of four degrees ſouth, where they find the S. E. *winds* blowing perpetually.

On account of theſe general *winds*, all thoſe that uſe the Weſt India trade, even thoſe bound to Virginia, reckon it their beſt courſe to get as ſoon as they can to the ſouthward, that ſo they may be certain of a fair and freſh gale to run before it to the weſtward; and for the ſame reaſon thoſe homeward-bound from America endeavour to gain the latitude of thirty degrees, where they firſt find the *winds* begin to be variable; though the moſt ordinary *winds* in the north Atlantic ocean come from between the ſouth and weſt.

10th, Between the ſouthern latitudes of ten and thirty degrees in the Indian ocean, the general trade-*wind* about the S. E. by S. is found to blow all the year long in the ſame manner as in the like latitude in the Ethiopic ocean; and during the ſix months from May to December, theſe *winds* reach to within two degrees of the equator; but during the other ſix months, from November to June, a N. W. *wind* blows in the tract lying between the third and tenth degrees of ſouthern latitude, in the meridian of the north end of Madagaſcar; and between the ſecond and twelfth degree of ſouth latitude, near the lontitude of Sumatra and Java.

11th, In the tract between Sumatra and the African coaſt, and from three degrees of ſouth latitude quite northward to the Aſiatic coaſts, including the Arabian ſea and the gulf of Bengal, the monſoons blow from September to April on the N. E.; and from March to October on the S. W. In the former half year the *wind* is more ſteady and gentle, and weather clearer than in the latter ſix months; and the *wind* is more ſtrong and ſteady in the Arabian ſea than in the gulf of Bengal.

12th, Between the iſland of Madagaſcar and the coaſt of Africa, and thence northward as far as the equator, there is a tract, wherein from April to October there is a conſtant freſh S. S. W. *wind*; which to the northward changes into the W. S. W. *wind*, blowing at that time in the Arabian ſea.

13th, To the eaſtward of Sumatra and Malacca on the north of the equator and along the coaſts of Cambodia and China, quite through the Philippines as far as Japan, the monſoons blow northerly and ſoutherly; the northern ſetting in about October or November, and the ſouthern about May: the *winds* are not quite ſo certain as thoſe in the Arabian ſeas.

14th, Between Sumatra and Java to the weſt, and New Guinea to the eaſt, the ſame northerly and ſoutherly *winds* are obſerved; but the firſt half year monſoon inclines to the N. W. and the latter to the S. E. Theſe *winds* begin a month or ſix weeks after thoſe in the Chineſe ſeas ſet in, and are quite as variable.

15th, Theſe contrary winds do not ſhift from one point to its oppoſite all at once; in ſome places the time of the change is attended with calms, in others by variable *winds*; and it often happens on the ſhores of Coromandel and China, towards the end of the monſoons, that there are moſt violent ſtorms, greatly reſembling the hurricanes in the Weſt Indies; wherein the *wind* is ſo very ſtrong, that hardly any thing can reſiſt its force.

All navigation in the Indian ocean muſt neceſſarily be regulated by theſe *winds*; for if mariners ſhould delay their voyages till the contrary monſoon begins, they muſt either ſail back, or go into harbour, and wait for the return of the trade-*wind*. See Phil. Tranſ. Nº 183, or Abr. vol. ii. p. 133, &c. Robertſon's Elem. of Nav. book vi. ſect. 6.

The *winds* are divided, with reſpect to the points of the horizon from which they blow, into *cardinal* and *collateral*.

Winds, *cardinal*, are thoſe blowing from the four cardinal points; eaſt, weſt, north, and ſouth.

Winds, *collateral*, are the intermediate *winds* between any two cardinal *winds*. The number of theſe is infinite, as the points from which they blow are; but only a few of them are conſidered in practice; i. e. only a few of them have their diſtinguiſhing names.

The ancient Greeks, at firſt, only uſed the four cardinal ones; at length they took in four more. Vitruvius gives us a table of twenty, beſides the cardinals, which were in uſe among the Romans.

The moderns, as their navigation is much more perfect than that of the ancients, have given names to twenty-eight collateral *winds*; which they range into *primary* and *ſecondary*; and the ſecondary they ſubdivide into thoſe of the *firſt* and *ſecond order*.

The Engliſh names of the primary collateral *winds* and points are compounded of the names of the cardinal ones, north and ſouth being ſtill prefixed.

The names of the ſecondary collateral *winds* of the firſt order are compounded of the names of the cardinals, and the adjacent primary one. Thoſe of the ſecond order are compounded of the names of the cardinal, or the next adjacent primary; and the next cardinal, with the addition of the word *by*. The Latins have diſtinct names for each; all which are expreſſed in the following table.

Names of the *winds*, and points of the compaſs.		Diſtances of the points, &c. from the north.	
English.	Latin and Greek.		
1. *North*.	*Septentrio*, or *Boreas*.	0°	0′
2. North-by-eaſt.	Hyperboreas. Hypaquilo. Gallicus.	11	15
3. North-north-eaſt.	Aquilo.	22	30
4. North-eaſt-by-north.	Meſoboreas. Meſaquilo. Supernas.	33	45
5. *North-eaſt*.	*Arctapeliotes.* *Borapeliotes.* *Græcus.*	45	
6. North-eaſt-by-eaſt.	Hypocæſias.	56	15
7. Eaſt-north-eaſt.	Cæſias, Helleſpontius.	67	30
8. Eaſt-by-north.	Meſocæſias. Carbas.	78	45
9. *Eaſt*.	*Solanus*, *ſubſolanus*, *apeliotes*.	From the eaſt. 0°	0′
10. Eaſt-by-ſouth.	Hypeurus, or hypereurus.	11	15
11. Eaſt-ſouth-eaſt.	Eurus, or volturnus.	22	30
12. South-eaſt-by-eaſt.	Meſeurus.	33	45
13. *South-eaſt*.	*Notapeliotes*, *euraſter*.	45	
14. South-eaſt-by-ſouth.	Hypophœnix.	56	15
15. South-ſouth-eaſt.	Phœnix, phœnicias, leuco-notus, gangeticus.	67	30
16. South-by-eaſt.	Meſophœnix.	78	45
17. *South*.	*Auſter*, *notus*, *meridies*.	From the ſouth 0°	0′
18. South-by-weſt.	Hypolibonotus, alſanus.	11	15
19. South-ſouth-weſt.	Libonotus, notolibycus, auſtro-africus.	22	30
20. South-weſt-by-ſouth.	Meſolibonotus.	33	45
21. *South-weſt*.	*Noto-zephyrus.* *Noto-libycus.* *Africus.*	45	
22. South-weſt-by-weſt.	Hypolibs. Hypafricus. Subveſperus.	56	15
23. Weſt-ſouth-w.	Libs.	67	30
24. Weſt-by-ſouth.	Meſolibs. Meſozephyrus.	78	45

Names of the *winds*, and points of the compaſs.		Diſtances of the points, &c. from the weſt.	
English.	Latin and Greek.		
25. *Weſt*.	*Zephyrus*, *favonius*, *occidens*.	0°	0′
26. Weſt-by-north.	Hypargeſtes. Hypocorus.	11	15
27. Weſt-north-weſt	Argeſtes. Caurus, corus, iapyx	22	30
28. North-weſt-by-weſt.	Meſargeſtes. Meſocorus.	33	45
29. *North-weſt*.	*Zephyro-boreas*, *borolibycus*, *olympias*.	45	
30. North-weſt-by north.	Hypocircius. Hypothraſcias. Scirem.	56	15
31. North-north-weſt.	Circius, thraſcias.	67	30
32. North-by-weſt.	Meſocircius.	78	45

Note, the ancient names are here, after Ricciolus, adapted to the modern ones; not that the *winds* formerly denoted by thoſe were preciſely the ſame with theſe (for the ancient number and diviſion being different from the modern, the points they refer to will neceſſary be ſomewhat different), but as theſe are what come the neareſt. Thus, Vitruvius, only reckoning twenty-four *winds*, diſpoſes the points they refer to in a different order; as in the following table.

Names of the *winds*.	Diſtance from north.	Names of the *winds*.	Diſtance from eaſt.
1 *Septentrio.*	0° 0′	7 *Salanus.*	0° 0′
2 Gallicus.	15	8 Ornithias.	15
3 Supernas.	30	9 Cæſias.	30
4 Aquilo.	45	10 Eurus.	45
5 Boreas.	60	11 Volturnus.	60
6 Carbas.	75	12 Euronotus.	75
Names of the *winds*.	**Diſtance from ſouth**	**Names of the *winds*.**	**Diſtance from weſt.**
13 *Auſter.*	0° 0′	19 *Favonius.*	0° 0′
14 Alſanus.	15	20 Eteſiæ.	15
15 Libonotus.	30	21 Circius.	30
16 Africus.	45	22 Caurus.	45
17 Subveſper.	60	23 Corus.	60
18 Argeſtes.	75	24 Thraſcias.	75

The following table ſhews the angles which every RHUMB, or point of the compaſs, makes with the meridian: by means of which the direction of the *wind*, &c. may be determined.

NORTH.	SOUTH.	Points.	D. M.	NORTH.	SOUTH.
		0 ¼ 0 ½ 0 ¾	2 49 5 37½ 8 26		
N. by E.	S. by E.	1 0	11 15	N. by W.	S. by W.
		1 ¼ 1 ½ 1 ¾	14 04 16 52½ 19 41		
N. N. E.	S. S. E.	2 0	22 30	N. N. W.	S. S. W.
		2 ¼ 2 ½ 2 ¾	25 19 28 07½ 30 56		
N. E. by N.	S. E. by S.	3 0	33 45	N. W. by N.	S. W. by S.
		3 ¼ 3 ½ 3 ¾	36 34 39 22½ 42 11		
N. E.	S. E.	4 0	45 00	N. W.	S. W.
		4 ¼ 4 ½ 4 ¾	47 49 50 37½ 53 26		
N. E. by E	S. E. by E.	5 0	56 15	N. W. by W.	S. W. by W.
		5 ¼ 5 ½ 5 ¾	59 04 61 52½ 64 41		
E. N. E.	E. S. E.	6 0	67 30	W. N. W.	W. S. W.
		6 ¼ 6 ½ 6 ¾	70 19 73 07½ 75 56		
E. by N.	E. by S.	7 0	78 45	W. by N.	W. by S.
		7 ¼ 7 ½ 7 ¾	81 34 84 22½ 87 11		
EAST.	EAST.	8 0	90 00	WEST.	WEST.

For the uſe of the *winds* in navigation, &c. ſee SAILING.

Wind, *freſh*. See FRESH.

Wind, *to haul the*. See HAUL.

Wind, *large*, in the *Sea-Language*. See LARGE.

Wind, *quarter*, at *Sea*. See Quarter.

Winds, *reigning*. See Reigning.

Winds, *tropic*. See Trade-*winds*, and Wind, ſupra.

Wind, *ſide*, at *Sea*, that which blows on the ſide of the ſhip.

To **Wind** *a ſhip* or *boat*, in *Sea-Language*, is to change her poſition, by bringing the ſtern to lie in the ſituation of the head; or directly oppoſite to its former ſituation.

Wind, in the *Manege*. A horſe that carries in the *wind*, is one that toſſes his noſe as high as his ears, and does not carry handſomely.

The difference between carrying in the *wind*, and beating upon the hand is, that a horſe who beats upon the hand, ſhakes his head, and reſiſts the bridle; but he who carries in the *wind*, puts up his head without ſhaking, and only ſometimes beats upon the hand. The oppoſite to carrying in the *wind*, is arming and carrying low.

Wind, *whirl*. See Whirl-*wind*.

Wind-*colic*. See Colic.

Wind-*dropſy*. See Tympany.

Wind-*egg*, an addle egg, or an egg that has taken *wind*. See Egg.

Wind-*fall* denotes fruit blown off the tree by the *wind*.

Wind-*flower*, in *Botany*. See Anemone.

Wind-*furnace*. See Furnace.

Wind-*gage*, in *Pneumatics*, an inſtrument ſerving to determine the velocity and force of the *wind*. See Anemometer, Anemoscope, and *Laws of the force*, &c. *of the* Wind, ſupra.

Dr. Lind, of Edinburgh, has contrived an apparatus of this kind, which is ſimple, and eaſy of conſtruction, and which ſeems to be well adapted for meaſuring the force of the *wind* with a ſufficient degree of accuracy. This inſtrument conſiſts of two glaſs tubes A B, C D (*Tab.* V. *Pneumatics*, *fig*. 73.) five or ſix inches in length, and about four-tenths of an inch in bore; which are connected together, like a ſiphon, by a ſmall bent glaſs tube *a b*, the bore of which is one-tenth of an inch in diameter. On the upper end of the leg A B there is a tube of latten braſs, which is kneed or bent perpendicularly outwards, and has its mouth open towards F; on the other leg C D is a cover, with a round hole G in the upper part of it, two-tenths of an inch in diameter. This cover and the kneed tube are connected together by a ſlip of braſs *c d*, which ſtrengthens the whole inſtrument, and ſerves to hold the ſcale H I. The kneed tube and cover are fixed on with hard cement, or ſealing-wax. To the ſame tube is ſoldered a piece of braſs *e*, with a round hole in it, to receive the ſteel ſpindle K L, and at *f* another ſuch piece of braſs is ſoldered to the braſs hoop *g h*, which ſurrounds both legs of the inſtrument. There is a ſmall ſhoulder on the ſpindle at *f*, upon which the inſtrument reſts, and a ſmall nut at *i*, to prevent it from being blown off the ſpindle by the *wind*. The whole inſtrument is eaſily turned round upon the ſpindle by the *wind*, ſo as always to preſent the mouth of the kneed tube toward it. At the end of the ſpindle there is a ſcrew, by which it may be ſcrewed to the top of a poſt or ſtand: it has alſo a hole at L, to admit a ſmall lever for ſcrewing it into wood with greater facility. A thin plate of braſs *k* is ſoldered on the kneed tube, about half an inch above the round hole G, ſo as to prevent rain from falling into it. There is alſo a crooked tube A B (*fig*. 74.) to be put occaſionally upon the mouth of the kneed tube F, in order to prevent rain from being blown into the mouth of the *wind-gage*, when it is left expoſed to the rain.

This inſtrument ſerves to aſcertain the force of the *wind*, by filling the tube half full of water, and puſhing the ſcale a little up or down, till 0 upon the ſcale, when the inſtrument is held perpendicularly, be on a line with the ſurface of the water, in both legs of the *wind-gage*. The inſtrument being thus adjuſted, hold it up perpendicularly, and turning the mouth of the kneed tube toward the *wind*, obſerve how much the water is depreſſed by it in one leg, and how much it is raiſed in the other. The ſum of the two is the height of a column of water, which the *wind* is capable of ſuſtaining at that time; and every body that is oppoſed to that *wind*, will be preſſed upon by a force equal to the weight of a column of water, having its baſe equal to the ſurface that is oppoſed, and its height equal to the altitude of the column of water, ſuſtained by the *wind* in the *wind-gage*. Hence the force of the *wind* upon any body, where the ſurface oppoſed to it is known, may be eaſily found; and a ready compariſon may be made betwixt the ſtrength of one gale of *wind*, and that of another, by knowing the heights of the columns of water which the different *winds* were capable of ſuſtaining. The heights of the column in each leg will be equal, provided that the legs are of equal bores; but unequal, if their bores are unequal. For ſuppoſe the legs equal, and the column of water ſuſtained by the *wind* to be three inches, the water in the leg, which the wind blows into, will be depreſſed $1\frac{1}{2}$ inch below 0, and raiſed as much in the other leg. But if the bore of the leg which the *wind* blows into be double that of the other, the water in that leg will be depreſſed only one inch, whilſt it is raiſed twice as much, or two inches, in the other, and *vice verſa*.

The force of the *wind* may likewiſe be meaſured with this inſtrument, by filling it till the water runs out at G. For if it be then held up to the *wind* as before, a quantity of water will be thrown out; and if both legs of the inſtrument are of the ſame bore, the height of the column ſuſtained, will be equal to double the column of water in either leg, or the ſum of what is wanting in both legs. But if the legs are of unequal bores, neither of theſe will give the true height of the column of water which the *wind* ſuſtained. For obtaining, in this caſe, the true height, Dr. Lind has ſubjoined the requiſite formulæ. The uſe of the ſmall tube of communication *a b* (*fig*. 73.) is to check the undulation of the water, ſo that the height of it may be read off from the ſcale with eaſe and certainty; and alſo to prevent the water from being thrown up to a much greater or leſs altitude than the true height of the column, which the *wind* is able at that time to ſuſtain. The author has calculated a table, by means of which, having the height of the column of water ſuſtained in the *wind-gage*, the force of the *wind* upon a foot ſquare may be determined. On the ninth of May, 1775, Dr. Lind obſerved, that the *wind* ſupported a column of water in his *wind-gage* $6\frac{7}{10}$ inches in height; and from his table it appeared, that the force of the *wind* in this hurricane, which did great damage to the gardens in his neighbourhood, was equal to 34.921 pounds avoirdupois, on every ſquare foot.

If the velocity and denſity of the *wind* in any particular caſe were accurately determined, this inſtrument, which gives its force or momentum, would enable us to aſcertain the velocity in every other caſe, the denſity being known: for the force of the *wind* is as the ſquare of its velocity. Phil. Tranſ. vol. lxv. part ii. art. 34. p. 353, &c.

Mr. Martin, from a hint firſt ſuggeſted by Dr. Burton, contrived an anemoſcope, or *wind-gage*, of the following conſtruction. ABCDEFGHI (*fig*. 75) is an open frame of wood, firmly ſupported by the ſhaft or poſtern I. In the two croſs pieces, HK, LM, is moved an horizontal axis QM, by means of the four ſails *a b*, *c d*, *e f*, *g h*, in a proper manner, expoſed to the *wind*. Upon this axis is fixed a cone of wood, MNO, upon which, as the ſails move round, a weight S is raiſed by a ſtring on its ſuperficies, proceeding from the ſmall to the largeſt end NO. Upon the great end or baſe of the cone is fixed a ratchet-wheel *i k*, in whoſe teeth falls the click X, to prevent any retrograde motion from the depending weight.

From the ſtructure of this machine, it is eaſy to underſtand, that it may be accommodated to eſtimate the variable force of the *wind*, becauſe the force of the weight will continually increaſe, as the ſtring advances on the conical ſurface, by acting at a greater diſtance from the axis. And therefore, if ſuch a weight be put on, on the ſmalleſt part at M, as will juſt keep the machine in equilibrio with the weakeſt *wind*; then as the *wind* becomes ſtronger, the weight will be raiſed in proportion, and the diameter of the baſe of the cone N O may be ſo large in compariſon of that of the ſmaller end or axis at M, that the ſtrongeſt *wind* ſhall but juſt raiſe the weight to the great end.

Thus, for example, let the diameter of the axis be to that of the baſe of the cone NO as 1 to 28; then if S be a weight of one pound at M on the axis, it will be equivalent to twenty-eight pounds, or $\frac{1}{4}$ of an hundred, when raiſed to the greateſt end. If, therefore, when the *wind* is weakeſt, it ſupports one pound on the axle, it muſt be twenty-eight times as ſtrong to raiſe the weight to the baſe of the cone. Thus may a line or ſcale of twenty-eight equal parts be drawn on the ſide of the cone, and the ſtrength of the *wind* will be indicated by that number therein from which the ſtring ſhall at any time hang.

Furthermore, the ſtring may be of ſuch a ſize, and the cone of ſuch a length, that there ſhall be ſixteen revolutions of the ſtring between each diviſion of the ſcale on the cone; ſo will the ſtrength of the *wind* be expreſſed in pounds and ounces. And if greater exactneſs be required, let the periphery of the cone's baſe be divided into ſixteen equal parts; then whenever the equilibrium happens, the ſtring will leave the conic ſurface againſt one of thoſe diviſions, and thus ſhew the force of the *wind* to a dram avoirdupois weight. Martin's Phil. Brit. vol. ii. p. 211, &c.

WIND-*gall*, in *Horſes*, a ſoſt, flatulent tumour, or bladder, ariſing on the ſetlock-joint, and cauſing great pain, eſpecially in hot-weather, and hard ways.

It is uſually owing to a violent ſtrain, extreme labour and heat, a horſe's ſtanding on a ſloping floor, a blow from another, or the like.

In this caſe there are bladders full of a corrupt jelly, which, when let out, is thick, and of the colour of the yolk of an egg.

They vary in ſize, but are more uſually ſmall than large. Their place is about the fetlock-joint, and they grow indifferently on all four legs, and are often ſo painful, eſpecially in the ſummer ſeaſon, when the weather is hot, and the ground dry and hard, that they make the creature frequently ſtumble, or fall abſolutely down.

The general method of cure is to open the ſwelling about the length of a bean, and to preſs out the jelly: when this is done, they apply a mixture of the oil of bays and the white of an egg, covering it with tow.

Another method is, after the jelly is all ſqueezed out, to wrap round the part a wet woollen cloth; and then applying a taylor's hot iron, this is to be rubbed over till all the moiſture is carried away; it is then to be daubed all over with pitch, maſtic, and reſin, boiled together, laying tow in plenty over all.

The *wind-galls* that are ſituated near the ſinews, are much the moſt painful of all, and ſooneſt make the horſe lame.

The general cauſe of *wind-galls* is ſuppoſed to be extreme work or exerciſe in very hot weather; but it is to be obſerved, that thoſe horſes, which have long joints, will be *wind-galled*, if they work never ſo little. The worſt *wind-galls* are thoſe of the hinder legs; all the above mentioned will frequently miſs of ſucceſs in theſe, and nothing but fire will cure them.

WIND-*gun*, a machine ſerving to explode bullets, and other ſhot, with great violence, by the force of the air.

This ſort of arm, charged with air, has an effect ſcarce inferior to that of a common fire-arm charged with gun-powder, but it diſcharges itſelf with a much leſs report; and it is this which, in all probability, gave occaſion to the fable of white gun-powder.

There are *wind-guns* of divers contrivances; the moſt eaſy and portable one is repreſented *Tab.* V. *Pneumatics*, *fig.* 76. It is made of braſs, and has two barrels; the inſide barrel K A of a ſmall bore, from which the bullets are ſhot, and a larger barrel E S C D R, on the outſide of it. In the ſtock of the gun there is a ſyringe SMNP, whoſe rod M draws out to take in air, and piſton SN drives the air before it through the valve EP into the cavity between the two barrels. The ball K is put down into its place in the ſmall barrel with the rammer, as in another gun. There is another valve at SL, which, being opened by the trigger O, permits the air to come behind the bullet, ſo as to drive it out with great force. If this valve be opened and ſhut ſuddenly, one charge of condenſed air may make ſeveral diſcharges of bullets, becauſe only part of the injected air will go out at a time, and a new bullet may be put into the place K; but if the whole air be diſcharged on a ſingle bullet, it will drive it out more forcibly. This diſcharge is effected by means of a lock *k l* (*fig.* 77.) placed here, as in other guns; for the trigger being pulled, the cock *k* will go down, and drive a lever *o*, that will open the valve, and let in the air upon the bullet K.

Dr. Macbride (Exper. Eſſ. p. 81.) mentions an improvement of the *wind-gun* by Dr. Ellis; in which the chamber for containing the condenſed air is not in the ſtock, which makes the machine heavy and unwieldy, but has five or ſix hollow ſpheres belonging to it, of about three inches diameter, fitted to ſcrew on the lock of the gun. Theſe ſpheres are contrived with valves, to confine the air, which is forced into their cavities, ſo that a ſervant can carry them ready charged with condenſed air; and thus the gun of this conſtruction is rendered as light and portable as one of the ſmalleſt fowling-pieces.

Magazine **WIND**, or *air-gun*, is an improvement of the common air-gun, invented by an ingenious artiſt, called L. Colbe. By his contrivance, ten bullets are ſo lodged in a cavity, near the place of diſcharge, that they may be drawn into the ſhooting barrel, and ſucceſſively ſhot ſo quickly, as to be nearly of the ſame uſe as ſo many different guns; the only motion required (when the air has been previouſly injected) being that of ſhutting and opening the hammer, and cocking and pulling the trigger. In *fig.* 78. is exhibited a ſection of the gun, as large in every part as the gun itſelf; and ſo much of its length is ſhewn, as is neceſſary to give a complete idea of the whole. AEE is part of the ſtock; G is the end of the injection ſyringe, with its valve H, opening into the cavity FFFF between the barrels. KK is the ſmall or ſhooting barrel, which receives the bullets one at a time, from the magazine ED, which is a ſerpentine cavity, wherein the bullets *b*, *b*, &c. are lodged, and cloſed at the end D. The circular part S I *s k* M *i* is the key of a cock, having a cylindrical hole IK through it, equal to the bore of the ſmall barrel, and forming a part of it in the preſent ſituation. When the lock is taken off, the ſeveral parts Q, R, T, S, W, &c. come into view, by means of which the diſcharge is made, by puſhing up the pin P *p*, which raiſes and opens a valve V, to let in the air againſt the bullet I, from the cavity FFF; which valve is immediately ſhut down again by means of a long ſpring of braſs NN. This valve V, being a conical piece of braſs, ground very true in the part which receives it, will of itſelf be ſufficient to confine the air. To make a diſcharge, pull the trigger ZZ, which throws up the ſeer *y x*, and diſengages it from the notch *x*; upon which the ſtrong ſpring WW, moves the tumbler T, to which the cock is fixed. The end *u* of this tumbler bears down the end *v* of the tumbling lever R, which, by its other end *m*, raiſes the flat end *l* of the horizontal lever Q; by which means the pin P *p* is puſhed up, and opening the valve V, diſcharges the bullet; all which is evident from a bare view of the figure.

To bring another bullet inſtantly to ſucceed I, there is a part H, called the hammer, repreſented in *fig.* 79. and 80. which by a ſquare hole goes upon the ſquare end of the key of the cock, and turns it about ſo as to place the cylindric bore of the key I *k* in any ſituation required. Thus, when the bullet is in the gun, the bore of the key coincides with that of the barrel KK; but when it is diſcharged, the hammer H is inſtantly brought down to ſhut the pan of the gun; by which motion the bore of the key is turned into the ſituation *i k*, ſo as to coincide with the orifice of the magazine; and upon lifting the gun upright, the ball next the key tumbles into its cavity, and falling behind two ſmall ſprings *s s* (*fig.* 78.) is by them detained. Then opening the hammer again, the ball is brought into its proper place, near the diſcharging valve, and the bore of the key again coincides with that of the ſhooting barrel.

It appears how expeditious a method this is of charging and diſcharging a gun; and if the force of condenſed air was as great as that of gun-powder, ſuch an air-gun would actually anſwer the end of many guns, and prove the beſt defence againſt highwaymen or robbers; becauſe when there is reaſon to ſuſpect them, they might then make five or ſix diſcharges before the robber can come within piſtol ſhot. However, in this kind of gun, and in all caſes which require a very conſiderable condenſation of air, it will be requiſite to have the ſyringe of a ſmall bore, viz. not exceeding half an inch in diameter; becauſe the preſſure againſt every ſquare inch is about fifteen pounds, and againſt every circular inch about twelve pounds. If, therefore, the ſyringe be one inch in diameter, when one atmoſphere is injected, there will be a reſiſtance of twelve pounds againſt the piſton; when two, of twenty-four pounds; and when ten are injected, there will be a force of a hundred and twenty pounds to overcome; whereas ten atmoſpheres act againſt the circular half inch piſton, whoſe area is but one-fourth part ſo big, with a force but one-fourth ſo great, viz. thirty pounds, or forty atmoſpheres may be injected with ſuch a ſyringe, as well as ten with the other. Deſaguliers's Exp. Phil. vol. ii. p. 398, &c. Martin's Phil. Brit. vol. ii. p. 189, &c.

WIND-*hatch*, in *Mining*, a term uſed to expreſs the place at which the ore is taken out of the mines.

The word *hatch* is the general term uſed by the miners to expreſs an opening from the ſurface into the mine, or in the attempting to find a mine.

Thus the word *eſſay-hatches* ſignifies the openings made in ſearch of the trains of ſhoad-ſtones; and the *tin-hatch* in Cornwall is the name of the opening by which they deſcend into a tin-mine.

The word *wind-hatch* ſeems to be a corruption of *winder-hatch*; for at theſe places they have a *winder* conveying two buckets, the one conſtantly up, the other conſtantly down; the man below fills the bucket that deſcends; and when that which aſcends full is emptied at the mouth of the hatch, the perſon who has the care of that part of the work, delivers it empty to go down again. Phil. Tranſ. Nº 69.

WIND-*hover*, in *Ornithology*, the name of a ſpecies of hawk, called alſo by ſome the *ſtannel*, but more uſually the *keſtrel*, and known among authors by the names of the TINNUNCULUS and *cenchris*.

WIND-*inſtruments*, in *Muſic*, are inſtruments played by *wind*, chiefly by the breath; in contradiſtinction to *ſtring-inſtruments*, and inſtruments of the *pulſative* kind.

The *wind-inſtruments* known to the ancients, were the *tibia*, *fiſtula*, or *ſyringa* of Pan, conſiſting of ſeven reeds, joined ſidewiſe; alſo *organs*, *tubæ*, *cornua*, and the *lituus*.

Thoſe of the moderns, are the *flute*, *bagpipe*, *hautboy*, *trumpet*, &c.

Wind-*mill*, a kind of mill which receives its motions from the impulſe of the *wind*.

The *wind-mill*, though a machine common enough, has yet ſomewhat in it more ingenious than is uſually imagined. Add, that it is commonly allowed to have a degree of perfection, which few of the popular engines have attained to, and which the makers are but little aware of: though the new geometry, &c. has furniſhed ample matter for its improvement.

Wind-*mill*, *ſtructure of the*. The internal ſtructure of the *wind-mill* is much the ſame with that of water-mills. The difference between them lies chiefly in an external apparatus, for the application of the power.

This apparatus conſiſts of an axis E F (*Tab.* V. *Pneumatics*, *fig.* 81.) through which paſs two arms, or yards, A B and C D, interſecting each other at right angles in E, whoſe length is uſually about thirty two-feet; on theſe yards are formed a kind of ſails, vanes, or flights, in the figure of trapeziums, with parallel baſes; the greater whereof, H I, is about ſix feet; and the leſs, F G, determined by radii drawn from the centre E, to I and H.

Theſe ſails are to be capable of being all ways turned to the *wind*, that they may receive its impreſſion: in order to which there are two different contrivances, which conſtitute the two different kinds of *wind-mills* in uſe.

In one, the whole machine is ſuſtained upon a moveable arbor, or axis, perpendicular to the horizon, on a ſtand, or foot; and turned, occaſionally, this way, or that, by means of a lever.

In the other, only the cover, or roof, of the machine, with the axis and ſails, turns round. In order to which, the cover is built turret-wiſe, and the turret encompaſſed with a wooden ring, wherein is a groove, at the bottom whereof are placed, at certain diſtances, a number of braſs truckles; and within the groove is another ring, upon which the whole turret ſtands. To the moveable ring are connected beams *a b*, and *f c*; and to the beam *a b* in *b*, is faſtened a rope, which, at the other extreme thereof, is fitted to a windlaſs, or axis, in peritrochio: this rope being drawn through the iron hook G, and the windlaſs turned, the ſails will be moved round, and put in the direction required.

The internal mechaniſm of a *wind-mill* is exhibited in *fig.* 82. AHO is the upper room; H *o z* the lower one; A B the axle-tree paſſing through the mill; S T V W the ſails, covered with canvas, ſet obliquely to the *wind*, and turning round in the order of the letters; C D the cog-wheel, having about forty-eight cogs, *a*, *a*, *a*, &c. which carry round the lantern E F, having eight or nine trundles *c*, *c*, *c*, &c. together with its axis G N; I K is the upper mill-ſtone, and LM the lower one; QR is the bridge ſupporting the axis or ſpindle G N; this bridge is ſupported by the beams *c d*, X Y, wedged up at *c*, *d*, and X; *z* Y is the lifting-tree, which ſtands upright; *ab* and *ef* are levers, whoſe centres of motion are *z* and *e*; *f g h i* is a cord, with a ſtone *i*, going about the pins *g* and *h*, and ſerving as a balance or counterpoiſe. The ſpindle *t* N is fixed to the upper millſtone IK, by a piece of iron called the rynd, and fixed in the lower ſide of the ſtone, which is the only one that turns about, and its whole weight reſts upon a hard ſtone, fixed in the bridge QR at N. The trundle E F, and axis G *t*, may be taken away; for it reſts by its lower part at *t* by a ſquare ſocket, and the top runs in the edge of the beam *w*. By bearing down the end *f* of the lever *f e*, *b* is raiſed, which raiſes *z* Y, and this raiſes Y X, which lifts up the bridge QR, with the axis N G, and the upper ſtone IK; and thus the ſtones are ſet at any diſtance. The lower immoveable ſtone is fixed upon ſtrong beams, and is broader than the upper one: the flour is conveyed through the tunnel *n o* into a cheſt; P is the hopper, into which is put the corn, which runs along the ſpout *r* into the hole *t*, and ſo falls between the ſtones, where it is ground. The axis G *t* is ſquare, which ſhaking the ſpout *r*, as it goes round, makes the corn run out; *r s* is a ſtring going about the pin *s*, and ſerving to move the ſpout nearer to or farther from the axis, ſo as to make the corn run faſter or ſlower, according to the velocity and force of the *wind*. And when the *wind* is great, the ſails S, T, V, W, are only in part or one ſide covered; or perhaps only one half of two oppoſite ſails. Toward the end B of the axle-tree is placed another cog-wheel, trundle, and mill-ſtones, with an apparatus like that already deſcribed; ſo that the ſame axle-tree moves two ſtones at once; and when only one pair is to grind, the trundle E F, and axis G *t*, are taken out from the other; *x y l* is a girt of pliable wood, fixed at the end *x*; and the other end *l* is tied to the lever *k m*, moveable about *k*; and the end *m* being put down, draws the girt *x y l* cloſe to the cog-wheel; and thus the motion of the mill is ſtopped at pleaſure; *p q* is a ladder for aſcending to the higher part of the mill; and the corn is drawn up by means of a rope, rolled about the axis AB, when the mill is at work. See Mill.

Theory of the motion of a **Wind**-*mill*, *with the poſition of the ſails*, *or vanes*, *thereof*. The angle, which the ſails are to make with their common axis, ſo as that the *wind* may have the greateſt effect or the degree of *weathering*, as the mill-wrights call it, is a matter of nice enquiry, and has much employed the thoughts of the mathematicians.

To conceive why a *wind-mill* moves at all, the theory of compound motions muſt be ſuppoſed. A body moving perpendicularly againſt any ſurface, ſtrikes it with all its force. If it move parallel to the ſurface, it does not ſtrike it at all: and if it move obliquely, its motion, being compounded of the perpendicular and parallel motion, only acts on the ſurface, conſidered as it is perpendicular, and only drives it in the direction of the perpendicular. So that every oblique direction of a motion is the diagonal of a parallelogram, whoſe perpendicular and parallel directions are the two ſides. Add, that if a ſurface, which, being ſtruck obliquely, has only received the perpendicular direction, be faſtened to ſome other body, ſo as that it cannot purſue its perpendicular direction, but muſt change it for ſome other; in that caſe, the perpendicular itſelf becomes the diagonal of a new parallelogram, one of whoſe ſides is the direction, which the ſurface may follow; and the other, that which it cannot.

Thus, a rudder faſtened obliquely to the keel of a veſſel, being ſtruck by the current of water parallel to the keel, and, of conſequence, obliquely with regard to itſelf; it will appear, by drawing the line of perpendicular impulſe, that it tends to tear the rudder from the keel, and to carry it away: and that this direction, perpendicular to the rudder, is oblique to the keel. The rudder, then, would be carried off in an oblique direction; but as, in reality, it is ſo ſecured, that it cannot be torn, and carried off, we are only to conſider, in this compound motion, that of the two directions wherewith it can move without being torn from the keel; and leave the other, which would tear it off, as uſeleſs.

Now, the direction in which it can move without parting from the keel, is that which carries it circularly about its extremity, as about a centre. So that the effect of the oblique impulſe of the water on the rudder is reduced, firſt to a perpendicular impreſſion, which is again reduced to the mere turning of the rudder round; or, if the rudder be immoveable, to the turning of the veſſel.

Now, in an oblique and compound motion, where only one of the directions is of ſervice; the greater ratio the other has thereto, the leſs effect will the motion have, and *vice verſa*. In examining the compound motions of the rudder, we find, that the more oblique it is to the keel, the ratio of the direction that ſerves to turn it to the other, is the greater. But, on the other hand, the more obliquely it is to the keel, and, of conſequence, to the courſe of the water which is ſuppoſed parallel thereto, the more weakly it ſtrikes. The obliquity of the rudder, therefore, has, at the ſame time, both an advantage, and a diſadvantage; but as thoſe are not equal, and as each of them is ſtill varying with every different poſition of the rudder, they become complicated variouſly; ſo that ſometimes the one prevails, and ſometimes the other.

It has been a point of enquiry to find the poſition of the rudder, wherein the advantage ſhould be the greateſt. M. Renau, in his famous theory of the working of ſhips, has found, that the beſt ſituation of the rudder is, when it makes an angle of fifty-five degrees with the keel. See Rudder.

If, now, a *wind-mill*, expoſed directly to the *wind*, ſhould have its four ſails perpendicular to the common axis wherein they are fitted, they would receive the *wind* perpendicularly; and it is viſible that impulſe would only tend to overturn them. There is a neceſſity, therefore, to have them oblique to the common axis, that they may receive the *wind* obliquely.

For the greater eaſe, let us only conſider one vertical ſail. The oblique impulſe of the *wind* on this ſail is reducible to a perpendicular impulſe; and that direction, as the ſail cannot abſolutely keep to it, is compounded of two; one whereof tends to make it turn on its axis, and the other to fall backwards. But it is only the firſt of theſe directions that can be obeyed. Of conſequence, the whole impulſe of the *wind* on the ſail has no other effect but to make it turn from right to left, or from left to right, as its acute angle turns this way or that. And the ſtructure of the machine is ſo well contrived, that the three other ſails are determined, from the ſame cauſes, to move the ſame way.

The obliquity of the ſails, with regard to their axis, has preciſely the ſame advantage, and diſadvantage, with the obliquity of the rudder to the keel. And M. Parent, ſeeking, by the new analyſis, the moſt advantageous ſituation of the ſails on the axis, finds it preciſely the ſame angle of fifty-five degrees.

For the farther illuſtration of this point, let A B (*fig.* 83.) be the axis of the mill, C D a ſail, and its angle of obliquity (viz. that which it makes with the axis) be E C G; then if G C be the force of the *wind* in the direct poſition of the ſail, G E (the ſine of the angle of incidence G C E) will be the force of the *wind* in its oblique poſition; but the force G E is reſolvable into two others, E F and G F; of which the latter, being parallel to the axis, avails nothing in turning the ſails about it; but the other, E F, being perpendicular to it, is wholly ſpent in compelling the ſail to turn round. The force of the *wind* on the ſail will be as the ſquare of the ſine of incidence, or as GE^2; and if the area of the ſail, and the velocity of the *wind*, be ſuppoſed conſtant, the force of the *wind* in the direct poſition will be to that in the oblique one, as G C to GE^2; but when G E is the whole force, that part which turns the ſail is repreſented by E F; and $GE : EF\ (:: GC : CE) :: GE^2 : \frac{CE \times GE^2}{GC}$ = to the force which turns the ſail, when the whole force is repreſented by GE^2. This expreſſion $\frac{CE \times GE^2}{GC}$ begins from nothing, when the angle of incidence begins to be oblique, and increaſes with the obliquity of the ſaid angle to a certain number of degrees; becauſe that part of the force which is parallel to the axis, becomes leſs in proportion to that which is perpendicular to it; but after it has paſſed this limit, it again decreaſes, and becomes nothing, when the angle of incidence vaniſhes. There is, therefore, one certain poſition of the ſail, in which the force of the *wind* upon it is a *maximum*. In order to find this, put radius $GC = a$, $EC = x$; and we have $GE^2 = aa - xx$, and conſequently the force $\frac{CE \times GE^2}{GC} = \frac{aax - xxx}{a}$, which muſt be a *maximum:* therefore its fluxion $aa\dot{x} - 3x^2\dot{x} = 0$: whence $aa = 3xx$, and ſo $x = \sqrt{\frac{aa}{3}}$ = (in logarithms) $\frac{20{,}000000 - 0{,}477121}{2} = 9{,}761439$, which is the logarithmic ſine of the angle $35^\circ\ 16' = CGE$; and therefore the angle $ECG = 54^\circ\ 44'$, when the force of the *wind* is a *maximum*. Thus, alſo, if *l m* (*fig.* 75.) parallel to the axis Q M, be equal to *a*, and repreſent the whole force of the *wind* on the ſail; this force is reduced to *l n*, and this again to *no*, which acts perpendicularly to the axis, and turns the ſail. This force, putting $mn = x$, is expreſſed by $\frac{aax - x^3}{a}$, and thus, as before, when it is a *maximum*, $x = \sqrt{\frac{aa}{3}} = a\sqrt{\frac{1}{3}}$; and the angle $lmn = 54^\circ\ 44'$. Martin's Phil. Brit. vol. i. p. 220, vol. ii. p. 212.

This angle, however, is only that which gives the *wind* the greateſt force to put the ſail in motion, but not the angle which gives the force of the *wind* a *maximum* upon the ſail when in motion: for when the ſail has a certain degree of motion, it yields to the *wind*; and then that angle muſt be increaſed, to give the *wind* its full effect. Mr. Maclaurin, in his Fluxions, vol. ii. p. 734, has ſhewn, how to determine this angle. See alſo on this ſubject the article MECHANICS.

It may be obſerved, that the increaſe of this angle ſhould be different, according to the different velocities from the axis to the extremity of the vane or ſail. At the axis it ſhould be 54° 44′, and thence continually increaſe, giving the vane a twiſt, and ſo cauſing all the ribs of the vane to lie in different planes.

It is obſerved, that the ribs of the vane or ſail ought to decreaſe in length from the axis to the extremity, giving the vane a curvilineal form; ſo that no part of the force of any one rib be ſpent upon the reſt, but all move on independent of each other. The twiſt above mentioned, and the diminution of the ribs, are exemplified in the wings of birds. As the end of the ſail neareſt the axis cannot move with the ſame velocity which the tips or fartheſt ends have, although the *wind* acts equally ſtrong upon them, Mr. Ferguſon (Lect. on Mechanics, p. 52.) ſuggeſts, that perhaps a better poſition than that of ſtretching them along the arms directly from the centre of motion, might be, to have them ſet perpendicularly acroſs the farther ends of the arms, and there adjuſted lengthwiſe to the proper angle. For, in that caſe, both ends of the the ſails would move with the ſame velocity; and being farther from the centre of motion, they would have ſo much the more power, and then there would be no occaſion for having them ſo large as they are generally made; which would render them lighter, and, conſequently, there would be ſo much the leſs friction on the thick neck of the axle, when it turns in the wall.

WIND *mill, elliptical.* M. Parent conſiders what figure the ſails of a *wind-mill* ſhould have, to receive the greateſt impulſe from the *wind*; and he determines it to be a ſector of an ellipſis, whoſe centre is that of the axis, or arbor, of the mill; and the little ſemi-axis the height of thirty-two feet: as for the greater, it follows neceſſarily from the rule that directs the ſail to be inclined to the axis in an angle of 55 degrees.

On this foundation he aſſumes four ſuch ſails, each whereof is one fourth of an ellipſis: which, he ſhews, will receive all the *wind*, and loſe none, as the common ones do. Theſe four ſurfaces multiplied by the lever, with which the *wind* acts on one of them, expreſs the whole power the *wind* has to move the machine, or the whole power the machine has when in motion.

The ſame manner of reaſoning, applied to a common *wind-mill*, whoſe ſails are rectangular, and their length about five times their breadth, ſhews, that the *elliptic wind-mill* has about ſeven times the power of the common one. A prodigious advantage! and worthy, ſure, to have the common practice ſet aſide for, could ſo common a practice be eaſily changed.

A *wind-mill*, with ſix elliptic ſails, he ſhews, would ſtill have more power than one with only four. It would only have the ſame ſurface with the four; ſince the four contain the whole ſpace of the ellipſis, as well as the ſix. But the force of the ſix would be greater than that of the four, in the ratio of 245 to 231. If it were deſired to have only two ſails, each being a ſemi-ellipſis, the ſurface would be ſtill the ſame; but the power would be diminiſhed by near one-third of that with ſix ſails; by reaſon the greateſt of the ſectors would much ſhorten the lever with which the *wind* acts.

WIND-*mills, beſt form and proportion of rectangular.* But, as elliptical ſails would be ſomething ſo new, that there is little room to expect they will come into common uſe, the ſame author has conſidered which form, among the rectangular ones, will be the moſt advantageous; i. e. which, the product of whoſe ſurface by the lever of the *wind*, will be the greateſt. And by the method *de maximis & minimis*, he finds it very different from the common ones.

The reſult of this enquiry is, that the width of the rectangular ſail ſhould be nearly double its length; whereas the length is uſually made almoſt five times the width. Add, that as we call height or length the dimenſion which is taken from the centre of the axis, the greateſt dimenſion of the new rectangular ſail will be turned toward the axis, and the ſmalleſt from it; quite contrary to the poſition of the common ſails.

The power of a *wind-mill*, with four of theſe new rectangular ſails, M. Parent ſhews, will be to the power of four elliptic ſails nearly as 13 to 23; which leaves a conſiderable advantage on the ſide of the elliptic ones; yet will the force of the new rectangular ſails be conſiderably greater than that of the common ones.

M. Parent likewiſe conſiders what number of the new ſails will be moſt advantageous; and finds, that the fewer the ſails, the more ſurface there will be, but the leſs power. The ratio of the power of a *wind-mill* with ſix ſails, will be to another with 4, nearly as 14 to 13. And the power of another with 4, will be to that with 2, nearly as 13 to 9.

As to the common *wind-mill*, its power ſtill diminiſhes as the breadth of the ſails is ſmaller, in proportion to the length. The uſual proportion, therefore, of 5 to 1 is exceedingly diſadvantageous.

The uſes of this new theory of *wind-mills* are very obvious. The more power a *wind-mill* has, the ſwifter it turns, the more it diſpatches, and the leſs *wind* it needs. Add, that on this theory one may have a *wind-mill* whoſe ſails ſhall be much ſhorter, and yet the power greater, than in the common one.

For a variety of curious experiments and obſervations concerning the conſtruction and effects of *wind-mill* ſails, by the ingenious Mr. Smeaton, ſee Phil. Tranſ. vol. li. p. 138, &c.

WIND-*ſails*, in a *Ship*, are made of the common ſail-cloth, and are uſually between twenty-five and thirty feet long, according to the ſize of the ſhip, and are of the form of a cone ending obtuſely: when they are made uſe of, they are hoiſted by ropes to about two thirds or more of their height, with their baſis diſtended circularly by hoops, and their apex hanging downwards in the hatch-ways of the ſhip; above each of theſe, one of the common ſails is ſo diſpoſed, that the greateſt part of the air, ruſhing againſt it, is directed into the *wind-ſail*, and conveyed, as through a funnel, into the upper parts of the body of the ſhip. Phil. Tranſ. N° 463. p. 65.

Theſe, of which there are generally three or four in our capital ſhips of war, have the advantage of taking little room, of requiring no labour in working, and of a ſimple contrivance, ſo that they can fail in no hands. But their powers are ſmall in compariſon with thoſe of Dr. Hales's VENTILATORS: they cannot be put up in hard gales of *wind*, and are of no efficacy in dead calms, when a refreſhment of air is moſt wanted.

WIND-*ſeed*, in *Botany*. See ARCTOTIS.

WIND-*ſhock*, a name given by our farmers to a diſtemperature to which fruit-trees, and ſometimes timber-trees, are ſubject.

It is a ſort of bruiſe and ſhiver throughout the whole ſubſtance of the tree; but the bark being often not affected by it, it is not ſeen on the outſide, while the inſide is twiſted round, and greatly injured.

It is by ſome ſuppoſed to be occaſioned by high *winds*; but others attribute it to lightning. Thoſe trees are moſt uſually affected by it, whoſe boughs grow more out on one ſide than on the other.

The beſt way of preventing this in valuable trees, is to take care in the plantation, that they are ſheltered well, and to cut them frequently in a regular manner, while young.

The *winds* not only twiſt trees in this manner, but they often throw them wholly down: in this caſe, the common method is to cut up the tree for firing, or other uſes; but if it be a tree that is worth preſerving, and it be not broken, but only torn up by the roots, it may be proper to raiſe it again by the following method: let a hole be dug deep enough to receive its roots, in the place where they before were; let the ſtraggling roots be cut off, and ſome of the branches, and part of the head of the tree; then let it be raiſed; and when the turn-up roots are replaced in the earth in their natural ſituation, let them be well covered, and the hole filled up with rammed earth; the tree will, in this caſe, grow as well, and perhaps better than before. If nature be left to herſelf, and the tree be not very large, the pulling off the roots will raiſe it. Mortimer's Huſbandry, vol. ii. p. 79.

WIND-*tackle blocks*, in a *Ship*. See WINDING-*tackle*.

WIND-*taught*, in *Sea-Language*, denotes the ſame as ſtiff in the *wind*. Too much rigging, high maſts, or any thing catching or holding *wind* aloft, is ſaid to hold a ſhip *wind-taught*; by which they mean, that ſhe ſtoops too much in her ſailing, in a ſtiff gale of *wind*.

Again, when a ſhip rides in a main ſtreſs of *wind* and weather, they ſtrike down her top-maſts, and bring her yards down, which elſe would hold too much *wind*, or be too much diſtended and *wind-taught*.

WIND-*thruſh*, in *Ornithology*, a name given by ſome to the RED-*wing*, and ſuppoſed to be given from their generally firſt appearing with us in windy ſeaſons; but it appears more probably to be derived from the German name *wint-troſſel*, or vine-thruſh, from its doing great miſchief there in the vineyards, by eating and deſtroying the grapes. Ray.

WIND-*tumors*. See TUMOR.

WIND-*ward*, in *Sea Language*, denotes any thing towards that point from whence the *wind* blows, in reſpect of a ſhip.

WIND-*ward, ſailing to*. See SAILING.

WIND-*ward tide*, denotes a tide which runs againſt the *wind*.

WINDAGE *of a gun*, is the difference between the diameter of the bore, and the diameter of the ball.

The *windage* is not the ſame in England as it is abroad. With us, if the diameter of the ſhot is divided into twenty equal parts, then the diameter of the bore is twenty-one of theſe parts. The French ſuppoſe the diameter of the ſhot divided into twenty-ſix parts, and the diameter of the bore to be twenty-ſeven. Mr. Muller obſerves, that the leſs *windage* there is, the truer the ſhot will go, and having leſs room to bounce from one ſide to another, the gun will not be ſpoiled ſo ſoon. Accordingly, he divides the diameter of the ſhot into twenty-four equal parts, and makes the bore twenty-five, which is a medium between the Engliſh and French method. Artillery, p. 84.

Dr. Hutton alſo recommends the diminiſhing of the *windage*. See GUNNERY.

WINDASS, WANDASS, or WANLASS, an ancient term in hunting. Thus, to drive the *windaſs*, ſignifies the chaſing of a deer to a ſtand, where one is ready with a bow, or gun, to ſhoot. This is one of the cuſtomary ſervices of fiefs.

—— *Omnes illi qui tenuerunt in bondagii tenura, ſolebant vocari cuſtumarii: et quotieſcunque dominus ad venandum venerit, illi cuſtumarii ſolebant fugare* windaſſum, *ad ſtabulum, in venatione ferarum beſtiarum ſecundum quantitatem tenuræ ſuæ*. MS. de Conſuetud. Manerii de Sutton Colfield. an. 3 Ed. II.

WINDER-*meb*, in *Ornithology*, the name of a bird of the larus or gull-kind, the *larus cinerarius* of Linnæus, moderately large, and deſcribed by Aldrovand under the name of *larus major*.

Its head is remarkably large and thick, and is of a mottled colour of white and grey; its breaſt and belly are alſo variegated with the ſame colours, but they are ſomewhat paler; its beak is thick and ſtrong, of a yellow colour, and very ſharp, and the opening of its mouth very wide; its wings are variegated with white, grey, and cheſnut-colour, and both theſe and the tail have much black in them; the feet are webbed and yellow, the claws are ſharp, and the hinder toe larger than in moſt birds of this kind. Ray's Zoology, p. 267.

WINDERS *of wool*. See WOOL-*winders*.

WINDING *a call*, in *Sea-Language*, denotes the act of blowing or piping upon a boatſwain's whiſtle, ſo as to communicate the neceſſary orders of hoiſting, heaving, belaying, ſlackening, &c. See CALL.

WINDING-*tackle*, in a *Ship*, a name uſually given to a TACKLE formed of three fixed, and two or three moveable ſheaves. It is principally employed to hoiſt up any heavy materials into or out of a ſhip, in the exerciſes of landing and delivering. Falconer.

WINDING *of ſilk*. We have an excellent machine for this purpoſe at Derby, contrived by meſſieurs Thomas and John Lombe; but as the proprietors are not willing that a deſcription of it ſhould be made public, the following general account of it muſt ſuffice.

It conſiſts of no leſs than 26586 wheels, and 97746 movements, continually working, except on Sundays. This grand machine is diſpoſed of in ſeveral ſtories of large rooms, one above another, comprehending in all its building no leſs than half a quarter of a mile in length; and one water-wheel communicates motion to all the reſt of the wheels and movements, of which any one may be ſtopped ſeparately and independently of the reſt. One fire-engine conveys air to every part of the machine; and one regulator governs the whole work; 73728 yards of ſilk are *wound* every time the water-wheel goes round, which is three times every minute; ſo that 318,504,960 yards of ſilk may be *wound* every day and night, and conſequently 99,373,547,550 yards of ſilk in one year. See Deſaguliers's Experim. Philoſoph. vol. i. p. 70.

The model of this machine is ſaid to have been taken by the brother of the late ſir Thomas Lombe, merchant of the city of London, from the original in the king of Sardinia's dominions, who, under the diſguiſe of a common workman, or by ſome other artifice, ſecretly drew the plan of it upon paper, and then made his eſcape to England, and communicated the ſame to his brother ſir Thomas; who, acting in concert with him, employed an excellent practical mechanic, called Soracle, and completed the whole piece of machinery, which has ſaved a great deal of money to the nation, formerly paid for organzine, or thrown ſilk, to the Piedmonteſe. In the fifth year of George I. a patent paſſed to ſecure to ſir Thomas Lombe the ſole property of this machine for fourteen years; but the neceſſary buildings and engines, and the inſtruction of proper perſons to work them, took up ſo much time, that the term of fourteen years was nearly elapſed before ſir Thomas could make any advantage of this curious machinery; upon which he applied to parliament, which granted him in 1732 (5 Geo. II. cap. 8.) 14,000*l.* on condition that he ſhould allow a perfect model to be taken of his three engines, for ſecuring and perpetuating the art of making the ſame. Anderſon's Hiſt Com. vol. ii. p. 284.

WINDING *ſtairs*. See STAIR.

WINDLASS, or WINDLACE, a machine uſed for raiſing heavy weights, as guns, ſtones, anchors, &c.

It is very ſimple, conſiſting only of an axis, or roller, ſupported horizontally at the two ends by two pieces of wood and a pulley. The two pieces of wood meet at top; being placed diagonally, ſo as to prop each other. The axis, or roller, goes through the two pieces, and turns in them. The pulley is faſtened at top, where the pieces join.

Laſtly, there are two ſtaves, or hand-ſpikes, which go through the roller, whereby it is turned; and the rope, which comes over the pulley, is wound off and on the ſame.

WINDLASS, *in a ſhip*, is a machine uſed in merchant-ſhips to heave up the anchors from the bottom, &c.

This *windlaſs* is a cylindrical piece of timber, ſupported at the two ends by frames of wood, *a*, *b* (*Tab.* VII.

Mechanics, fig. 128.) placed on the oppoſite ſides of the deck, near the fore-maſt, called knight-heads, and turned about in this poſition as upon an axis, by levers, called hand-ſpikes, or hand-ſpecs, which are, for this purpoſe, thruſt into holes bored through the body of the machine. The lower part of the *windlaſs* is uſually about a foot above the deck. It is, like the capſtern, furniſhed with ſtrong pauls, *c, d,* to prevent it from turning backwards by the effort of the cable, when charged with the weight of the anchor, and ſtrained by the violent jerking of the ſhip in a tempeſtuous ſea. The pauls, which are formed of wood or iron, fall into notches, cut in the ſurface of the *windlaſs*, and lined with plates of iron. Each of the pauls, being accordingly hung over a particular part of the *windlaſs*, fall eight times into the notches at every revolution of the machine, becauſe there are eight notches placed on its circumference under the pauls. So that if the *windlaſs* is twenty inches in diameter, and purchaſes five feet of the cable at every revolution, it will be prevented from turning back, or loſing any part thereof, at every ſeven inches nearly, which is heaved in upon its ſurface.

As this machine is heaved about in a vertical direction, it is evident that the effort of an equal number of men acting upon it, will be much more powerful than on the capſtern; becauſe their whole weight and ſtrength are applied more readily to the end of the lever employed to turn it about; whereas in the horizontal movement of the capſtern, the exertion of their force is conſiderably diminiſhed. It requires, however, ſome dexterity and addreſs to manage the hand-ſpec to the greateſt advantage; and to perform this, the ſailors muſt all riſe at once upon the *windlaſs*, and, fixing their bars therein, give a ſudden jerk at the ſame inſtant, in which movement they are regulated by a ſort of ſong or howl, pronounced by one of their number. Falconer.

WINDOW, q. d. *wind-door*, an aperture, or open place, in the ſide of a houſe, to let in the air and light.

Before glaſs *windows* came into uſe (for the antiquity and firſt introduction of which, ſee GLASS), the *window* caſements were commonly made of a tranſparent ſtone called *ſpecularis lapis*, and thence called *ſpecularia*; and before the *ſpecularia*, veils were the only defence they had againſt the weather. Pitiſc. Lex. Antiq. in voc. *Specularia.*

We have various kinds and forms of *windows*; as glaſs *windows*, wire *windows*, horn *windows*, &c. Arched *windows*, circular *windows*, elliptical *windows*, ſquare and flat *windows*, round *windows*, oval *windows*, Gothic *windows*, regular *windows*, ruſtic *windows*; to which add ſky-lights.

The chief rules with regard to *windows*, are, 1. That they be as few in number, and as moderate in dimenſions, as may conſiſt with other reſpects; inaſmuch as all openings are weakenings.

2. That they be placed at a convenient diſtance from the angles, or corners of the building; becauſe thoſe parts ought not to be opened and enfeebled, whoſe office is to ſupport and faſten all the reſt of the building.

3. That care be taken the *windows* be all equal one with another, in their rank and order; ſo that thoſe on the right-hand may anſwer to thoſe on the left, and thoſe above be right over thoſe below; for this ſituation of *windows* will not only be handſome and uniform, but alſo, the void being upon the void, and the full upon the full, it will be a ſtrengthening to the whole fabric.

As to their dimenſions, care is to be uſed, to give them neither more nor leſs light than is needful; therefore regard is to be had to the bigneſs of the rooms which are to receive the light. It is evident, that a great room needs more light, and, conſequently, a greater *window*, than a little room; and *e contra.*

The aperturers of *windows*, in middle-ſized houſes, may be four and a half, or five feet, between the jambs; and in the greater buildings, ſix and a half, or ſeven feet; and their height may be double their length at the leaſt. But in high rooms, or larger buildings, their height may be a third, a fourth, or half their breadth, more than double the length.

Such are the proportions for *windows* of the firſt ſtory; and, according to theſe, muſt thoſe in the upper ſtory be for breadth; but, as to height, they muſt diminiſh; the ſecond ſtory may be one-third part lower than the firſt; and the third ſtory, one-fourth part lower than the ſecond.

WINDOWS, *architrave*. See ARCHITRAVE.

WINDOWS, *dormer*, or *Lutherns*. See LUTHERNS, &c.

WINDOWS, *ſcenography of*. See SCENOGRAPHY.

WINDOWS, *tranſom*. See TRANSOM.

WINDOW *and houſe-tax*, is a tax ſubject to the management of the commiſſioners of the land-tax. The yearly duty for every dwelling-houſe inhabited, by 6 Geo. III. cap. 38. is 3*s.*; and by the ſame act, for every *window* or light in every ſuch houſe, an additional yearly ſum, as follows; viz.

Nº of *windows.*	Duty on each.		Nº of *windows.*	Duty on each.	
	s.	*d.*		*s.*	*d.*
7, and no more.	0	2	14 to 19 —	1	6
8 —	0	6	20 —	1	7
9 —	0	8	21 —	1	8
10 —	0	10	22 —	1	9
11 —	1	0	23 —	1	10
12 —	1	2	24 —	1	11
13 —	1	4	25 and upwards	2	0

And by 24 Geo. III. cap. 38. an additional duty is laid upon houſes and *windows*, to be levied as the former duties, which the act expreſſes to be in lieu of the duty on TEA, thereby repealed. The additional duty on houſes is 3*s.* upon every houſe charged by former acts with the duty of 3*s.* The additional duty upon *windows* appears in the following table.

Nº of *windows.*	Addit. duty.			Nº of *windows.*	Addit. duty.			Nº of *windows.*	Addit. duty.		
	l.	s.	d.		l.	s.	d.		l.	s.	d
7	0	6	0	22 —	3	5	0	85 — 89	10	0	0
8	0	8	0	23 —	3	10	0	90 — 94	10	10	0
9	0	10	6	24 —	3	15	0	95 — 99	11	0	0
10	0	13	0	25 to 29	4	0	0	100 — 109	12	0	0
11	0	15	6	30 — 34	4	10	0	110 — 119	13	0	0
12	0	18	0	35 — 39	5	0	0	120 — 129	14	0	0
13	1	1	0	40 — 44	5	10	0	130 — 139	15	0	0
14	1	5	0	45 — 49	6	0	0	140 — 149	16	0	0
15	1	10	0	50 — 54	6	10	0	150 — 159	17	0	0
16	1	15	0	55 — 59	7	0	0	160 — 169	18	0	0
17	2	0	0	60 — 64	7	10	0	170 — 179	19	0	0
18	2	5	0	65 — 69	8	0	0	180 and upwards }	20	0	0
19	2	10	0	70 — 74	8	10	0				
20	2	15	0	75 — 79	9	0	0				
21	3	0	0	80 — 84	9	10	0				

A perſon occupying three or more houſes ſhall not be ſubject to the payment of theſe additional duties for more than two of thoſe houſes, which ſhall be thoſe that contain the greateſt number of *windows.* Moreover, by 18 Geo. III. cap. 26. and 19 Geo. III. cap. 59. for every dwelling houſe inhabited, &c. worth the yearly rent of 5*l.* and upwards, and under 20*l.* ſhall be paid the yearly ſum of 6*d.* in the pound; if worth the yearly rent of 20*l.* and upwards, and under 40*l.* the yearly ſum of 9*d.* in the pound; if worth the yearly rent of 40*l.* and upwards, the yearly ſum of 1*s.* in the pound. This duty is charged on the inhabitants or occupiers, and not on the landlord. Cottages, the occupiers of which are exempted from payment to the church and poor, hoſpitals, and farm-houſes, not valued at more than 10*l.* a year, are not chargeable with this duty. But each chamber or apartment in any college or hall in the univerſities, or the inns of court and chancery, ſhall pay as if it were an entire houſe.

WINDOW, in *Anatomy*, &c. See FENESTRA.

WINDY *tumors*. See TUMOR.

WINE, *vinum*, a briſk, agreeable, ſpirituous, and cordial liquor, drawn from vegetable bodies, and fermented. See FERMENTATION.

The character of a *wine*, according to Boerhaave, is, that the firſt thing it affords by diſtillation be a thin, oily, inflammable fluid, called a *ſpirit.*

This diſtinguiſhes *wines* from another claſs of fermented vegetable juices, viz. *vinegars*; which, inſtead of ſuch ſpirit, yield, for the firſt thing, an acid, uninflammable matter.

All ſorts of vegetables, fruits, ſeeds, roots, &c. may be made to afford *wine*; as grapes, currants, mulberries, elder, cherries, apples, pulſe, beans, peas, turneps, radiſhes, and even graſs itſelf.

Hence, under the claſs of *wines*, or vinous liquor, come not only *wines*, abſolutely ſo called, but alſo ale, cyder, &c.

And we may obſerve, in general, that all vegetable and animal matters, which have a taſte ſweet, agreeable, and more or leſs ſaccharine, and which are nutritive, are ſuſceptible of the ſpirituous fermentation. Accordingly, *wine* may be made of all the juices of plants, the ſap of trees, the infuſions and decoctions of farinaceous vegetables, the milk of frugivorous animals, which is poſſeſſed of the above mentioned qualities, and likewiſe of all ripe ſucculent fruits, which alſo are poſſeſſed of theſe qualities; but all theſe ſubſtances are not equally proper to be changed into a good and generous *wine.*

As the production of ardent ſpirit is the reſult of the ſpirituous fermentation, we may conſider that *wine* as eſſentially the beſt, which contains moſt of this ſpirit. But of all ſubſtances ſuſceptible of the ſpirituous fermentation, none is capable of being converted into ſo good *wine*, as the juice of the grapes of France, or of other countries that are nearly in the ſame latitude, or in the ſame temperature. Hence, Wine is, in a more particular manner, appropriated to that which is drawn from the fruit of the vine, by ſtamping its grapes in a vat, or cruſhing and expreſſing the juice out of them in a preſs, and then fermenting, &c.

There is a great variety of grapes, colourleſs, yellowiſh, bluiſh, and red; more or leſs ſweet, and of more or leſs flavour. The colour is lodged not in the juice, but in the ſkin of the grape; though the juice, as a menſtruum, frequently extracts and becomes impregnated with it, during its expreſſion from the fruit. The ſame kind of grape proves very different in taſte and flavour, according to the climate, and expoſure to the ſun. Among the Tokay *wine* hills, there is one which directly fronts the ſouth, and called, from the peculiar ſweetneſs of its grapes, the ſugar-hill. This, ſays Neumann, affords the moſt delicious of all the Hungarian *wines*, and is appropriated to the uſe of the imperial family.

In very warm dry ſeaſons, the grapes at the bottoms of the hills are beſt; in warm and moiſt ones, thoſe at the top; ſuch as grow in the middle region being always good. In dry ſummers the grapes are ſweeteſt, but leaſt juicy; in rainy ones, they abound with juice, which is proportionably weaker, and more dilute. Froſts in autumn promote their ripening; but froſts ſucceeding heavy rains diſpoſe them to burſt, and ſhed their juice. In ſome places, the grape is rendered richer, by ſuffering it to remain on the tree till great part of its watery moiſture has exhaled; the ſtem of each cluſter being cut half through, when the fruit is ripe, to prevent the afflux of any freſh juice from the plant. The ſweet Hungarian and Spaniſh *wines* are made from grapes that have been thus half dried.

The juice of the grape, before its fermentation, is called MUST; and different ſorts of muſt are obtained from the ſame kind of grape, produced in the ſame vineyard, according to the method of management. The beſt is that which iſſues upon breaking, bruiſing, or treading the picked fruit; inferior ſorts are extracted by forcibly preſſing the entire cluſter, with its ſtalks. Dilute watery muſts are enriched by infuſing in them dried grapes, or by inſpiſſating part of the liquor, and adding this to the reſt. By ſuch means, ſtrong full-bodied *wines* are obtainable from the pooreſt juices: and by a ſimilar management even the better ſorts of grape *wines* are imitable with the juices of other fruits, artificially concentrated, or heightened with the ſimple ſweetneſs of ſugar. Hence it appears, that the difference of flavour, taſte, colour, and body of *wines*, is, perhaps, as much owing to the different manner and time of gathering, preſſing, fermenting, &c. the grape, as to the difference of the grape itſelf.

The proceſs of fermentation in the operation of making *wine*, is briefly as follows. The muſt, or fermentable liquor, being put into a veſſel in a place moderately warm, ſoon begins to ſwell; an inteſtine motion is excited among its parts, accompanied with a hiſſing noiſe, and evident ebullition; bubbles riſe to the ſurface, and, at the ſame time, is diſengaged a vapour, which is ſo ſubtle and dangerous, that it is capable of killing inſtantly men and animals, expoſed to it in a place where the air is not renewed. The ſkins, ſtones, and other groſſer matters of the grapes, are buoyed up by the particles of diſengaged air that adhere to their ſurface, are variouſly agitated, and are raiſed in the form of a ſcum, or ſoft and ſpongy cruſt, that covers the whole liquor. During the fermentation this cruſt is frequently raiſed, and broken by the air diſengaged from the liquor, which forces its way through it: afterwards the cruſt ſubſides, and becomes entire as before. Theſe effects continue while the fermentation is briſk, and at laſt gradually ceaſe; then the cruſt, being no longer ſupported, falls in pieces to the bottom of the liquor. At this time, in order to have a ſtrong and generous *wine*, all ſenſible fermentation muſt be ſtopped; which is done by putting the *wine* into cloſe veſſels, and carrying theſe into a cellar or other cool place. If we examine the *wine* produced by this firſt fermentation, it will be found to differ entirely and eſſentially from the juice of grapes before fermentation, or that which is called *ſweet* Wine. Its ſweet and ſaccharine taſte is changed into one that is very different, though ſtill agreeable, and ſomewhat ſpirituous and piquant. It has not the laxative quality of muſt, but affects the head, and occaſions drunkenneſs; and, if diſtilled, it yields, inſtead of the inſipid water obtained from muſt by diſtillation with the heat of boiling water, a volatile, ſpirituous, and inflammable liquor, called SPIRIT *of wine*, or ardent ſpirit.

It has been found by experience, that a *wine*, the fermentation of which is very ſlow and tedious, is never good and very ſpirituous; and therefore when the weather is too cold, the fermentation is uſually accelerated by heating the place in which the *wine* is made; and it has been propoſed to employ a greater than the uſual heat, to accelerate the fermentation of *wine*, in thoſe years in which grapes have not been ſufficiently ripened, and when the juice is not ſufficiently diſpoſed to fermentation. There is alſo reaſon to apprehend, that a too haſty and violent fermentation is hurtful, on account of the diſſipation and loſs of ſome of the ſpirit. However, we may diſtinguiſh, in the ordinary method of making *wine* of grapes, two periods in the fermentation; the firſt of which laſts during the appearance of the ſenſible effects above mentioned, in which the greateſt number of fermentable particles do ferment: theſe effects ſenſibly diminiſh, and ought to be ſtopped. In this ſtage, the heterogeneous parts that were ſuſpended in the *wine* by this motion, and which render it muddy, are ſeparated, and form a ſediment, called the lees; after which the *wine* becomes clear. In this new *wine* ſome degree of fermentation ſtill continues, during a longer or ſhorter time, although in an imperceptible manner; and this ſecond period of the ſpirituous fermentation may be called the imperceptible fermentation, the effect of which is the gradual increaſe of the quantity of ſpirit in *wine*. It has alſo another effect no leſs advantageous, namely, the ſeparation of a ſaline, acid, earthy matter, called tartar, from the *wine*. This matter is, therefore, a ſecond ſediment that is formed in the *wine*, and which adheres to the ſides of the containing veſſels. As the taſte of tartar is harſh and diſagreeable, it is evident that the *wine*, which, by means of the inſenſible fermentation, has acquired more ſpirit, and has diſengaged itſelf of the greateſt part of its tartar, ought to be better and much more agreeable; and for this reaſon chiefly old *wine* is univerſally preferable to new *wine*. However, if a ſufficient time has not been allowed for the firſt period of the fermentation, the unfermented matter that remains, being in too large a quantity, will then ferment in the bottles, or cloſe veſſels, in which the *wine* is put, and will occaſion effects ſo much more ſenſible, as the firſt fermentation ſhall have been ſooner interrupted: hence theſe *wines* are always turbid, emit bubbles, and ſometimes break the bottles, on account of the large quantity of air and vapours that are diſengaged during the fermentation. We have an inſtance of theſe effects in the white *wine* of Champagne, and in others of the ſame kind. The ſenſible fermentation of theſe *wines* is interrupted, or rather ſuppreſſed, that they may have this ſparkling quality. Theſe *wines*, it is well known, make the corks fly out of the bottles, ſparkle and froth when they are poured into glaſſes, and have a taſte much more lively and poignant than *wines* that do not ſparkle; but this ſparkling quality, and all the effects depending upon it, are only cauſed by a conſiderable quantity of air which is diſengaged during the confined fermentation which the *wine* has undergone in cloſe veſſels. This air, not having an opportunity of eſcaping, and of being diſſipated as faſt as it is diſengaged, and being interpoſed betwixt all the parts of the *wine*, combines, in ſome meaſure, with theſe, and adheres in the ſame manner as it does to thoſe mineral waters that are called ſpirituous, in which it produces nearly the ſame effects. When this air is entirely diſengaged from theſe *wines*, they no longer ſparkle, they loſe their poignancy of taſte, become mild, and even almoſt inſipid. Dr. Hales found, from many experiments, that fermented liquors generate air during the time of their fermentation, and that afterwards they are in an imbibing ſtate; and by means of this fact he was enabled to account for the diſagreeable taſte which the *wines* of Italy have been found to acquire about the month of September, and to propoſe a method of preventing this evil. As *wine*, during the firſt year after it is made, continues fermenting more or leſs, and generates a great quantity of air, the cold of September puts a ſtop to its fermentation, after which it is in an imbibing ſtate. The *wine*, by abſorbing this air, which is of a rancid nature (like that of the Grotto del Cano), becomes foul, and acquires a rancid taſte; for the prevention of which he propoſes to inſert in the bung-hole of a veſſel filled with *wine* a glaſs tube about two feet long, and about two inches in bore, fixing it with a pewter ſocket cloſely cemented; and in this tube to cloſely fix another, of about half an inch in bore; the lower tube ſhould always be kept about half full of *wine*, which will ſupply the veſſel, as the wine in it ſubſides; ſo that there will be no room left in the upper part of the veſſel to contain any generated air, which will paſs off through the upper ſmall tube, left always open for this purpoſe. As the *wine* in the lower tube ſubſides, it may be refilled, by introducing a ſlender funnel through the ſmall tube, as far as the ſcum upon the ſurface of the *wine* in the larger tube, ſo as to prevent its being broken by the too violent fall of the *wine* upon it. This curious experiment has ſucceeded in the management of *wines*, wherever it has been tried.

Wines for daily uſe ought to have undergone ſo completely the ſenſible fermentation, that the ſucceeding fermentation ſhould be almoſt inſenſible. *Wine*, in which the firſt fermentation has too far advanced, is liable to worſe inconveniences than that in which the firſt fermentation has been too quickly ſuppreſſed; becauſe, from the time of the completion of the ſpirituous fermentation, or even before, the *wine* begins to undergo the acid or acetous FERMENTATION. This is very ſlow and inſenſible, when the *wine* is included in very cloſe veſſels, and in a cool place; but it gradually advances, ſo that in a certain time the *wine*, inſtead of being meliorated, becomes at laſt ſour.

Heat alſo is capable of producing the ſame effect. Thus, *wine*, which might have been long preſerved in a cool place, very quickly becomes ſour when placed in a bad cellar; and even as the beſt cellars have during winter a degree of heat much greater than that of the atmoſphere, it would be very proper, when *wine* diſpoſed to become ſour is to be preſerved, to bring it from the cellar in the beginning of winter, and leave it expoſed to the air during all that ſeaſon. Accordingly, the *wines* of Champagne, which have not body enough to maintain them, if they are permitted to ferment all the ſummer, are kept in winter in cellars above ground; but when the weather becomes warmer in ſpring, they are removed down into their vaults, where they are cooler than in the cellars; and this method of removing the *wines* from the cellars to the vaults, and back again into the cellars, as the ſeaſons of the year require, is found of great ſervice in preſerving them in perfection.

The acidity of *wine* is an evil which cannot be remedied, becauſe the fermentation may advance, but cannot be reverted. *Wine*-merchants, therefore, when their *wines* become ſour, can only conceal or abſorb their acidity by certain ſubſtances, as by alkalis, and abſorbent earths. But theſe ſubſtances give to *wine* a dark-greeniſh colour, and a taſte which, though not acid, is ſomewhat diſagreeable. Beſides, calcareous earths accelerate conſiderably the total deſtruction and putrefaction of the *wine*. Calces of lead, having the property of forming with the acid of vinegar a ſalt of an agreeable ſaccharine taſte, which does not alter the colour of the *wine*, and which has, beſides, the advantage of ſtopping fermentation and putrefaction, and of giving richneſs to meagre *wines*, might be very well employed to remedy the acidity of *wine*, if lead and all its preparations were not pernicious to health, as they occaſion moſt terrible colics, and even death, when taken inwardly. If there be any perſons who make this uſe of lead, they muſt be conſidered as the poiſoners and murderers of the public. In Germany, Dr. Watſon apprehends, this adulteration is puniſhed with death: he adds, it is to be wiſhed that it met with that puniſhment every where.

If *wine* contains litharge, or any other calx of lead, it may be diſcovered by evaporating ſome pints of it to dryneſs, and melting the reſiduum in a crucible, at the bottom of which a ſmall regulus of lead may be found after the fuſion; but an eaſier and more expeditious proof is by pouring into the *wine* ſome liquid liver of ſulphur. If the precipitate occaſioned by this addition of the liver be white, or only coloured by the *wine*, we may know that no lead is contained; but if the precipitate be dark-coloured, brown, or blackiſh, we may be certain that lead is contained in it. For this purpoſe, let an ounce of quick-lime, and half an ounce of flowers of brimſtone, be boiled in a pint of water, and when the liquor, which will be of a yellow colour, is cold, let it be poured into a bottle, and, corking it up, reſerved for uſe. A few drops of this liquor, being let fall into a glaſs of *wine* or cyder containing lead, will change the whole into a colour more or leſs brown, according to the quantity of lead which it contains. If the *wine* be wholly free from lead, it will be rendered turbid by the liquor, but the colour will be rather a dirty white than a blackiſh brown. The only ſubſtances that cannot abſorb or deſtroy, but cover and render tolerable the ſharpneſs of *wine*, without any inconvenience, are ſugar, honey, and other ſaccharine alimentary matters; but theſe can ſucceed only when the *wine* is but very little acid, and when an exceeding ſmall quantity of theſe ſubſtances is ſufficient to produce the deſired effect; otherwiſe the *wine* would have a ſweetiſh, tart, and not agreeable taſte. Sweet *wines* have been ſometimes impregnated with mercury ſublimate, and with arſenic; the latter may be detected by a ſolution of lead in aqua fortis, and the former by volatile alkaline ſpirits, or by a ſolution of fixed alkaline ſalts.

Wine is alſo liable to other changes; as to become ropy and mucilaginous, by the continuance of the fermentative motion. This is an indication that it is very near being ſour; and vintners and *wine*-coopers have uſed many methods for remedying it.

The goodneſs and wholeſomeneſs of *wine* conſiſt in its being neat, dry, fine, bright, and briſk, without any taſte of the ſoil, of a clean, ſteady colour; having a ſtrength without being heady; a body, without being ſour; and keeping, without growing hard, or eager: to which Neumann adds, its paſſing freely by urine, exciting appetite, producing a gentle ſweat in the night, keeping the belly open next day; without being followed by any head-ach, heavineſs of the limbs, or other uneaſineſs.

Wine being a liquor moſtly of foreign produce, the divers names, forms, kinds, diſtinctions, &c. thereof, are borrowed from the countries where it is produced; the principal whereof, at this day, is France: to *wines* of which country, a good part of what we have to ſay of this noble liquor, will more immediately belong.

Wine, in France, is diſtinguiſhed, from the ſeveral degrees and ſteps of its preparation, into,

Mere-goutte, mother-drop; which is the virgin *wine*, or that which runs of itſelf out of a tap of the vat wherein the grapes are laid, before the vintager enters to tread, or ſtamp, the grapes.

Muſt, *ſurmuſt*, or *ſtum*, which is the *wine*, or liquor, in the vat, after the grapes have been trodden, or ſtamped.

Wine, *preſſed*, *vin de preſſurage*, which is that ſqueezed with a preſs out of the grapes, when half-bruiſed by the treading. The huſks left of the grapes are called *rape*, *murk*, or *mark*; by throwing water upon which, and preſſing them afreſh, they make a liquor for ſervants uſe, anſwerable to our cyder-kin, and called *boiſſon*; which is alſo of ſome uſe in medicine, for the cure of diſorders occaſioned by viſcid humours.

Wine, *ſweet*, *vin doux*, is that which has not yet worked, or fermented. This is turbid, and has an agreeable and very ſaccharine taſte. It is very laxative, when drunk too freely, or by perſons diſpoſed to diarrhœas, it is apt to occaſion theſe diſorders. Its conſiſtence is ſomewhat leſs fluid than that of *water*, and it becomes almoſt of a pitchy thickneſs when dried.

Bouru, that which has been prevented working, by caſting in cold water.

Cuvé, or *worked wine*, that which has been let work in the vat, to give it a colour.

Cuit, or *boiled wine*, that which has had a boiling before it worked; and which, by that means, ſtill retains its native ſweetneſs.

Paſſé, or *ſtrained wine*, a ſort of raiſin *wine*, made by ſteeping dry grapes in water, and letting it ferment of itſelf.

Wines are alſo diſtinguiſhed with regard to their colour into *white wine*, *red wine*, *claret wine*, *pale wine*, *roſe*, or *black wine*. And, with regard to their country, or the ſoil which produces them, into *French wines*, *Spaniſh wines*, *Rheniſh wines*, *Hungarian wines*, *Greek wines*, *Canary wines*, &c. And, more particularly, into *Port wine*, *Madeira wine*, *Burgundy wine*, *Champagne wine*, *Falernian wine*, *Tokay wine*, *Schiras wine*, &c.

Wines again, are diſtinguiſhed, with regard to their quality, into *ſweet wines*, *rough* or *dry wines*, and *rich* or *luſcious wines*, *vins de liqueur*; of which laſt ſome are exceedingly ſweet, others ſweet and poignant; and all chiefly uſed by way of dram after meals, &c.

Such are French *Frontiniac*, *Madeira*, the *Canary*, the *Hungary*, *Tokay*, the Italian *Montefiaſcone*, the Perſian *Schiras*, the *Malmſey wines* of Candia, Chio, Leſbos, Tenedos, and other iſlands of the Archipelago, which anciently belonged to the Greeks, but now to the Turks. Theſe are ſometimes called *Greek wines*, and ſometimes *Turkey wines*.

The principal *wines* drank in Europe are as follow. 1. The Madeira iſland, and Palma, one of the Canaries, afford two kinds: the firſt called *Madeira ſec*, the latter, which is the richeſt and beſt of the two, *Canary*, or *Palm ſec*. The name *ſec* (corruptly written *ſack*) ſignifies dry; thoſe *wines* being made from half-dried grapes. There is another ſort of *ſec wine*, prepared about Xeres, in Spain, and hence called, according to our orthography, *Sherris*, or *Sherry*. 2. The *wines* of Candia and Greece are of common uſe in Italy. *Malmſey* was formerly the produce of thoſe parts only, but is now brought chiefly from Spain: it is a ſweet *wine*, of a golden or browniſh-yellow colour, and to this is applied an Italian proverb, ſignifying, *Manna to the mouth, and balſam to the brain.* Almoſt all the *wines* uſed in the Venetian territories come from Greece and the Morea. 3. Italy produces the *vino Greco*, which is a gold-coloured unctuous *wine*, of a pungent ſweetneſs, the growth of mount Veſuvius, but much ſophiſticated by the Neapolitans. In the neighburhood of mount Veſuvius is made the *Mangiaguerra wine*, and a thick, blackiſh one, called *Verracia*; and at the foot of the hill, the delicious *vino vergine*. The kingdom of Naples affords the *Campania* or *Pauſilippo*, *Muſcatel*, *Salernitan*, and other excellent *wines*, and alſo the *Chiarello*, much drank at Rome. But the principal is the red, fat, ſweet, and grateful poignant one called *Lachryma Chriſti*. 4. The Eccleſiaſtical State produces the bright, pleaſant *Albano*, and the ſweet *Monteſiaſcone*, a yellowiſh not very ſtrong *wine*, reſembling good Florence, &c. 5. In Tuſcany are the excellent white and red *Florence*; the celebrated hot, ſtrong, red *wine*, *de Monte Pulciano*, &c. 6. In Lombardy, the *Modeneſe* and *Montſerrat* are tolerable; between Nizza and Savona is produced an incomparable *Muſcadine*. 7. Piedmont and part of Savoy have excellent light *wines*. 8. The Sicilian, Sardinian, and Corſican *wines* are alſo good. 9. Moſt of the Spaniſh *wines* are compoſed of fermented or half-fermented *wine* mixed with inſpiſſated muſt, and variouſly manufactured, or of an infuſion of dry grapes in weak muſt. Of theſe *wines* there are a few in Germany, as the *Alicant*, which is a thick, ſtrong, very ſweet, and almoſt nauſeous *wine*, *Sherry*, *Spaniſh Malmſey*, &c. 10. In Portugal there is plenty of *red Port*, which is much drank in England. The beſt *Vino tinto*, a blackiſh-red *wine* uſed by the coopers for colouring other *wines*, is ſaid to be the produce of Portugal. This kingdom alſo deals largely in *Madeira*. 11. In France there is a great variety of *wines*; of which the ſtrong, ſweet, full-bodied, ſpirituous ones, are called *Vins de liqueur*. Languedoc and Provence afford the ſweeteſt *wines*, and the ſame provines, with Champagne and Burgundy, the ſtrongeſt; the *wines* of the northern parts, as Picardy and Bourdeaux, are the worſt, and thoſe about the middle of the kingdom, as Paris and Orleans, of a middling kind. The moſt celebrated of the French *wines* are *Champagne*, *Burgundy*, *Vin de beaune* or partridge-eye *Frontiniac*, *Hermitage*, &c. 12. In Switzerland, the beſt *wines* are the *Neufchatel*, *Velteline*, *Lacote*, and *Reiff*: the *Velteline* ſtraw-*wine*, ſo called from the grapes being laid for ſome time upon ſtraw before they are preſſed, is particularly celebrated. 13. The dry-grape *wines* of the Upper Hungary are in general excellent, and much ſuperior to thoſe of the Lower. 14. Among the German *wines*, thoſe of *Tyrol* are very delicate, but do not keep. 15. Of Auſtrian *wines*, thoſe of *Kloſter-Newburg* and *Broſenberg* are deemed the beſt: and there are alſo good *wines* in other parts of the Imperial dominions. 16. In the Palatinate, the beſt wine is that of *Worms*, eſpecially the ſort called Women's Milk. 17. Among the more eſteemed German *wines* may be reckoned alſo *Rheniſh*, *Mayne*, *Moſelle*, *Neckar*, and *Elſaſs*: a certain writer calls the *Rheniſh* made in Hockheim (Hock) the prince of the *wines* of Germany.

Wine is alſo variouſly denominated, according to its ſtate, circumſtances, qualities, &c.

WINE, *natural*, is ſuch as comes from the grape, without farther mixture, or ſophiſtication.

WINE, *brewed*, or *adulterated*, is that wherein ſome drug is added, to give it ſtrength, fineneſs, flavour, briſkneſs, ſweetneſs, or ſome other quality which is wanted.

WINE, *pricked*, or *eager*, is that turned ſouriſh.

WINE, *flat*, is that fallen weak and vapid, for want of being drank in time.

WINE, *ſulphured*, is that put in caſks wherein ſulphur has been burnt; in order to fit it for keeping, or for carriage by ſea.

WINE, *colour*, is a thick *wine*, of a very deep colour, ſerving to dye the *wines* that are too pale, &c. as the *black wine*, in uſe among vintners.

WINE, *chip*, is that poured on chips of beech wood, to fine or ſoften it.

WINE, *rape*, is that put in a caſk half-full of freſh grapes picked for the purpoſe, to recover the ſtrength, briſkneſs, &c. which it had loſt by keeping, &c.

WINE, *burnt*, is that boiled up with ſugar, and ſometimes with a little ſpice.

There is alſo a ſort of *Malmſey wine*, made by boiling of muſcadine.

WINE, *method of making and fining*. In the ſouthern parts of France their way is, for *red wines*, to tread, or ſqueeze the grapes between the hands, and to let the whole ſtand, juice and huſks, till the tincture be to their liking; after which they preſs it. But, for *white wines*, they preſs the grapes immediately.

When preſſed, they tun the muſt, and ſtop up the veſſel; only leaving the depth of half a foot, or more, empty, to give room for it to work. At the end of ten days, they fill this ſpace with ſome other proper *wine*, that will not provoke it to work again. This they repeat from time to time; new *wine* always ſpending itſelf a little before it comes to perfection.

About Paris, and in the northern parts of France, they let the murk and muſt ſtand two days and nights for *white wines*, and at leaſt a week for *claret wines*, before they tun it. While it continues working, it is kept as warm as poſſible. Some, upon ſtopping it up for good and all, roll the caſk about the cellar, to mix the liquor with the lees; and after ſettling a few days, rack it off with great improvement.

To fine it down, they put ſhavings of green beech into the veſſel; having firſt taken off all the rind, and boiled them an hour in water, to extract their rankneſs, and afterwards dried them in the ſun, or in an oven: a buſhel of theſe ſerve for a tun of *wine*. Theſe put the liquor in a gentle working, and purify it in twenty-four hours. They alſo give it an agreeable flavour. The ſame chips, being waſhed, ſerve again and again, till almoſt quite conſumed.

The Grecians have a peculiar way of promoting the FINING and ripening of their ſtrongeſt and moſt generous *wines*, by adding to them, when they begin to work, a proportionate quantity of ſulphur and alum. And it is ſaid that ſome merchants put into every pipe of their Greek *wine* about the quantity of a gill of the chemical oil of ſulphur. But of all the ways of haſtening the CLARIFICATION and ripening of *wine*, none ſeems to be more eaſy or leſs noxious than that borrowed from one of the ancients by lord Bacon; which is by putting the *wine* into veſſels well ſtopped, and letting it down into the ſea. That this practice is very ancient is maniſeſt from the diſcourſe of Plutarch (Quæſt. Nat. 27.) about the efficacy of cold upon muſt. The general and principal remedy for the commotions incident to *wines* after their firſt clarification, and tending to their impoveriſhment or decay, is racking, or drawing them from their lees into freſh veſſels; and ſome vintners, as a farther preſervative, pour into them a large quantity of new milk.

Some ſweeten their *wines* with raiſins of the ſun, trodden in the vat with the grapes, having been plumped by boiling: others, by boiling half the muſt, ſcumming it, and tunning it up hot with the other.

For Engliſh *wine*, the method recommended by Mr. Mortimer is, firſt, to gather the grapes when very dry; and Mr. Miller recommends the ſpreading of them in a large dry room upon wheat ſtraw, and thus expoſing them to the air for a fortnight, three weeks, or a month; to pick them from the ſtalks, then to preſs them, and let the juice ſtand twenty-four hours in the vat covered. Afterwards, to draw it off from the groſs lees, and then put it up in a caſk, and to add a pint or quart of ſtrong red or white port, to every gallon of juice; and let the whole work, bunging it up cloſe, and letting it ſtand till January; and then bottle it, in dry weather.

By this method, he aſſures us, he has made Engliſh *wine* as good as any of the beſt and pureſt French *wines*, drank either in Paris or Champagne.

Mr. Bradley chooſes to have the liquor, when preſſed, ſtand with the huſks, ſtalks, and all, in the vat, to ferment for fifteen days.

He adds, that according as the vines have been managed, the *wine* will be ſtronger or weaker. Thoſe, e. gr. which run at liberty up high trees, and are never pruned, make the ſmalleſt *wines*: thoſe kept tied to ſtakes about four feet high, and which ha[illegible]heir branches duly pruned, yield ſtronger *wines*: and thoſe neareſt the ground the ſtrongeſt.

According to the directions given by Mr. Miller, when the grapes have been well picked and preſſed, for red *wine*, the huſks and ſtones ſhould be put into the liquor, and if the ſeeds or ſtones are broken in the preſs, the *wine* will have greater ſtrength; which muſt be put into a large vat, and ferment for five or ſix days: after which it ſhould be drawn off and put into large caſks, leaving the bung-hole open to give vent to the generated air. But if the *wine* in this ſtate does not ferment in a day or two, it will be proper to add a little warmth to the room by fires.

For white *wine*, the huſks of the grapes ſhould not remain in the liquor above twelve hours; and when it is drawn off and put into other veſſels, it ſhould not remain there above two days before it is drawn off again, and this muſt be repeated three or four times, which will prevent its taking any tincture from the huſks in fermenting. When the fermentation begins to ſubſide, the *wine* ſhould be drawn off into freſh caſks, which muſt be filled to the top; the bung-hole being left open for three weeks or a month, to give vent to the air and ſcum; and as the *wine* ſubſides in the caſk it ſhould be carefully refilled with *wine* of the ſame ſort from a ſtore-caſk. When it has remained in this ſtate a month or ſix weeks, the bung-hole ſhould be ſtopped with the addition of the apparatus mentioned in the former part of this article, and recommended by Dr. Hales. But after the *wine* has paſſed its fermentation in the vat, and is drawn off into the caſks, it will require ſomething to feed upon; ſo that a few bunches of the beſt grapes ſhould be preſerved, and when there is occaſion, picked off the ſtalks, and two or three handfuls of them put into each caſk according to its ſize.

The method commonly practiſed to give the red colour to *wine* is to let it ferment a few days upon the ſkins, which are preſſed two or three times in order to make them diſcharge their contents: but when a deep-coloured rough *wine* is deſired, a quantity of a grape, whoſe juice is red, and well known with us by the name of the claret-grape, is put into each vat.

This red *wine* will not require to be drawn off into caſks more than at firſt from the vat; but it may remain in the ſame veſſel till it is fit to be bottled off, which Mr. Miller ſays ſhould not be done till the *wine* is two years old.

The force of the fermenting *wine* is very great; being able, if cloſe ſtopped up, to burſt through the ſtrongeſt caſk. The readieſt way to ſtop or abate the fermentation, is by the fume of burning ſulphur.

Add, that when *wine* already made is upon the fret, or, by any alteration in the air, begins to ferment again, the way uſed by the vintners and wine-coopers to ſave it, is by the flame of common SULPHUR, or a lighted match dipped in it; this, held under a caſk juſt ready to burſt its hoops, calms its fury, and makes it immediately ſubſide. See MATCHING.

The method of converting white *wines* into red, ſo much practiſed by the modern *wine*-coopers, is this: put four ounces of turnſole rags into an earthen veſſel, and pour upon them a pint of boiling water; cover the veſſel cloſe, and leave it to cool; ſtrain off the liquor, which will be of a fine deep red, inclining to purple. A ſmall proportion of this colours a large quantity of *wine*. This tincture might be either made in brandy, or mixed with it, or elſe made into a ſyrup, with ſugar for keeping. A common way with the *wine*-coopers is to infuſe the rags cold in *wine* for a night or more, and then wring them out with their hands; but the inconveniency of this method is, that it gives the *wine* a diſagreeable taſte; or, what is commonly called the taſte of the rag, whence the *wines*, thus coloured, uſually paſs among judges, for preſſed *wines*, which have all this taſte from the canvas rags in which the lees are preſſed.

The way of extracting this tincture, as here directed, is not attended with this inconvenience; but it loads the *wine* with water; and if made into a ſyrup, or mixed in brandy, it would load the *wine* with things not wanted, ſince the colour alone is required. Hence the colouring of *wines* has always its inconveniences. In thoſe countries which do not afford the tinging grape, which affords a blood-red juice, where with the *wines* of France are often ſtained, in defect of this, the juice of elderberries is uſed, and ſometimes log-wood is uſed at Oporto.

The colour, afforded by the method here propoſed, gives *wines* the tinge of the Bourdeaux red, not the Port; whence the foreign coopers are often diſtreſſed for want of a proper colouring for red *wines* in bad years. This might perhaps be ſupplied by an extract made by boiling ſtick-lack in water. The ſkins of tinged grapes might alſo be uſed, and the matter of the turnſole procured in a ſolid form, not imbibed in rags. Shaw's Lectures, p. 211. See on the ſubject of this article Chem. Dict. art. *Wine*. Neumann's Chem. by Lewis, p. 441, &c. Miller's Gard. Dict. art. *Wine*.

WINES, *condenſing of*, a phraſe uſed by Stahl, and ſome other writers, to expreſs what is more uſually called the concentrating of them, that is, the freeing of them from what ſuperfluous humidity they contain, and by that means rendering them more rich and noble, freeing them from their taſteleſs part, reducing them to a ſmaller bulk, and by that means making them fitter for tranſportation, and finally rendering them more durable in their perfect ſtate, and much leſs ſubject to the various accidents that make them decay.

Various methods have been attempted for the effecting of this, as by means of heat and evaporation, or by percolation, &c. and great objections found in the way of all of them, except the lateſt, brought into uſe by Stahl, and ſince recommended greatly to the world by Dr. Shaw in his Chemical Eſſays.

If any kind of *wine*, but particularly ſuch as has never been adulterated, be, in a ſufficient quantity, as that of a gallon or more, expoſed to a ſufficient degree of cold in froſty weather, or be put in any place where ice continues all the year, as in our ice-houſes, and there ſuffered to freeze, the ſuperfluous water that was originally contained in the *wine*, will be frozen into ice, and will leave the proper and truly eſſential part of the *wine* unfrozen, unleſs the degree of cold ſhould be very intenſe, or the *wine* but weak and poor. This is the principle on which Stahl founds his whole ſyſtem of condenſing *wine* by cold.

When the froſt is moderate, the experiment has no difficulty, becauſe not above a third or fourth part of the ſuperfluous water will be froze in a whole night; but if the cold be very intenſe, the beſt way is, at the end of a few hours, when a tolerable quantity of ice is formed, to pour out the remaining fluid liquor and ſet it in another veſſel to freeze again by itſelf.

If the veſſel, that thus by degrees receives the ſeveral parcels of the condenſed *wine*, be ſuffered to ſtand in the cold freezing place where the operation is performed, the quantity lying thin in the pouring out, or otherwiſe, will be very apt to freeze anew; and if it be ſet in a warm place, ſome of this aqueous part thaws again, and ſo weakens the reſt. The condenſed *wine* therefore ſhould be emptied in ſome place of a moderate degree as to cold or heat, where neither the ice may diſſolve, nor the vinous ſubſtance mixed among it be congealed. But the beſt expedient of all is to perform the operation with a large quantity of *wine*, or that of ſeveral gallons, where the utmoſt exactneſs, or the danger of a trifling waſte, needs not be regarded.

If the *wine* now once concenterated, ſhould, by a long continuance in the freezing cold, be again congealed to the utmoſt (unleſs the cold were very ſevere indeed) and then again be drained from its ice, there, ſoon after this, falls to the bottom of the veſſel, a pure white powder or tartar, and even the icy part afterwards depoſits alſo a little of the ſame ſubſtance after thawing; and after ſtanding two or three days, there is always more and more of this tartar precipitated, and that conſtantly the more in proportion as the *wine* was more auſtere, or leſs adulterated with ſugar, brandy, or the like; for theſe things contain no tartar.

The ice of the ſecond operation on a quantity of *wine* differs in nothing from that of the firſt, provided only that the *wine* was poured clear off from it, before the ice is ſet to melt, by which means it diſſolves into a clear phlegm. This ſhews the excellency of the operation; as it loſes not its efficacy upon repetition, but brings away mere water as well at laſt as at firſt, without robbing the *wine* of any of its genuine or truly valuable parts. The remaining unfrozen liquor is a real concentrated *wine*, as appears by its colour, conſiſtence, taſte, and ſmell, and is actually become a nobler and richer *wine* than could have been procured without ſuch a contrivance.

This operation, though it be perfect in regard to *wines*, yet does not ſucceed ſo well in regard to the malt-liquors. The experiment has been fairly tried by Stahl on a gallon of ſtrong malt-drink, and the ſucceſs was as follows: the ice ſeparated in the firſt operation, when thawed by heat, reſolved into a liquor of the colour and taſte of ſmall-beer; and the ſecond concentration afforded an ice of much the ſame kind, which might have paſſed for ordinary ſmall-beer, but for a flaſhy watery taſte that manifeſtly predominated in it. The liquor unfrozen was but a pint and half by meaſure, but it was extremely rich and thick, and ſeemed very ſtrong and ſpirituous, and perfectly aromatic, or highly flavoured. The conſiſtence was ſomething like that of a thin ſyrup, and it had a pleaſing ſoftneſs that ſheathed the acrimony of the ſpirit, and covered the bitter taſte of the hop.

The mucilaginous nature, which is predominant in all malt-liquors, occaſions a great inaccuracy in this experiment, as not ſuffering the water to run clear, or be ſeparated from the richer tincture of the malt, nor letting the condenſed liquor be obtained clean from the ice; but as the loſs occaſioned by this is not great, and the liquor is much cheaper than *wine*, if this ſhould ever come into uſe in the large way, the thawed liquor of the ice might be uſed again in a new brewing, and ſo the loſs of that part of the ſtrength which was carried away by the freezing be recovered.

Wines in general may by this method be reduced to any degree of vinoſity or perfection. Thus for example, if a *wine* of a moderate ſtrength hath a third part of its water taken away, in form of ice, by congelation, the remaining part will thereby be doubled in ſtrength and goodneſs: for if we allow, in the better ſorts of *wine*, that one third-part, which is near the truth, is truly good or vinous, and two-third parts are nothing but water, one-third part of the good *wine* being blended among the two-third parts of water, of no ſtrength or value; it follows, that if one of theſe third parts of water be taken away, and all the *wine* left, that which was before but one-third *wine*, is now one-half *wine*, no way reduced in its ſtrength, and therefore the whole muſt be ſtronger in that proportion.

But if this operation of congelation be carried to the utmoſt, and be practiſed on a large quantity of *wine*, and with a very intenſe cold, and the ice taken away ſeveral times, and the *wine*, thus freed from a part of its water, again and again expoſed, it will be found that good *wines* will be reduced to one ſixth part of their original quantity; and the vintner will eaſily find out the uſe of this remaining ſixth part, which is a true quinteſſence of *wine*, and will be of the utmoſt benefit, by mixing it in ſmall quantities with poor and low-flavoured *wines*, to meliorate and improve them; and even to convert the low-flavoured and leaſt valuable ones into thoſe very *wines* from which this condenſed part was procured.

This method is not practicable to advantage in the *wine* countries alone. Dr. Shaw aſſures us, that he has himſelf experimented it here, and with the uſe of proper freezing mixtures, has reduced *wines* in England to a much ſmaller quantity, in proportion to the whole, than in the ſtrongeſt of Stahl's experiments. It is evident that, by how much the quantity is ſmaller, by ſo much it is richer and ſtronger, provided that the operation has been properly performed. The doctor aſſures us, the noble eſſence or rob, thus prepared, is capable of working almoſt miracles, by turning water into *wine*, and the like; but that, in order to its ſucceeding well, there requires great care in the operator, when the congelation is repeated the laſt times. Shaw's Chem. Eſſ. Stahl's Schediaſm. de Concentrat. Vin.

Wine, *fining of.* See Fining, and Clarification.

Fining of wine is an operation relating to *wine*, which is practiſed in Germany in the following manner: they have in ſome vaults three or four ſtoves, which they heat very hot: others make fires almoſt before every vat; by which means the muſt is made to ferment with great vehemence. When the ebullition, fermentation, and working ceaſe, they let the *wine* ſtand, and then rack it. This *fining* is only uſed in cold years, when the *wine* happens to be green.

Wine, *forcing of.* See Forcing.

The uſes of Wine are very great, not only as a drink, but as a medicine. Several phyſicians recommend it as an excellent cordial, and particularly ſerviceable in fevers, the lues venerea, &c.

In a dietetical view, the moderate uſe of *wine* is of ſervice to the aged, the weak, and the relaxed, and to thoſe who are expoſed to warm and moiſt, or to corrupted air: in the oppoſite circumſtances, it is leſs proper, or prejudicial.

Wine abounds with the antiſeptic gas or fixed air, more perhaps than any other vegetable ſubſtance; and if the grateful taſte of it be added, it may well be ranked firſt in the liſt of antiſcorbutic liquors. The uſe of *wine* may be known not to ſuit a perſon, when, after drinking moderately of it, his breath acquires a vinous ſmell; when it occaſions ſour belchings and ſlight pains in the head; and when, after drinking it more plentifully than uſual, it produces ſtupefaction, nauſea, and drunkenneſs of the moroſe, peeviſh, iraſcible kind. The diſeaſes, to which perſons of this deſcription, who perſiſt habitually in the free uſe of *wine*, are moſt ſubject, are obſtructions in the liver, in the meſenteric glands, and in other abdominal viſcera, which are almoſt always ſucceeded by an incurable dropſy.

Thoſe who digeſt *wine* well do not ſuffer, or much leſs ſenſibly, the above mentioned effects of drinking it: their drunkenneſs is accompanied with vivacity and joy; but exceſs injures even ſuch perſons; their conſtitution (ſays the author of the Chemical Dictionary) generally changes before ſixty years of age; and the inheritance of their old age is either a ſevere gout or palſy, ſtupidity, imbecility, or an accumulation of theſe diſeaſes.

Wine, conſidered as a medicine, is a valuable cordial in languors and debilities; more grateful and reviving than the common aromatic infuſions and diſtilled waters, particularly uſeful in the low ſtage of malignant or other fevers, for raiſing the pulſe and ſupporting the vis vitæ, promoting a diaphoreſis, and reſiſting putrefaction.

The acid obtained from *wine* by diſtillation, apparently of a different nature from the acetous, as well as from the native vegetable acids, ſeems to deſerve ſome regard, both as a medicine, and as a more elegant menſtruum, for iron and ſome other bodies, than the common acids. There are five ſorts of *wine* employed in the ſhops as menſtrua, for medicinal ſubſtances, viz. mountain, French white *wine*, Canary or ſack, Rheniſh, and red Port.

With regard to the medical differences of *wines*, Dr. Lewis obſerves, that the effects of the full-bodied are much more durable than thoſe of the thinner; that all ſweet *wines* are in ſome degree nutritious; the others not at all, or only accidentally ſo, by promoting appetite and ſtrengthening the organs concerned in digeſtion; that ſweet *wines* in general do not paſs freely by urine, and that they heat the conſtitution more than an equal quantity of any other, though containing full as much ſpirit: that thoſe which are manifeſtly acid paſs freely by the kidneys, and gently looſen the belly; and that moſt of the red ones are ſub-aſtringent, and tend to reſtrain immoderate excretions.

Pliny mentions Staphylus as the firſt who mixed *wine* with water; but Athenæus gives the credit thereof to Amphitryon, king of Athens. On this occaſion a fable was invented, that Bacchus, having been ſtruck by a thunderbolt, and being all inflamed, was preſently caſt into the nymphs bath, to be extinguiſhed.

The age of Wine, is properly reckoned by leaves. Thus they ſay, *wine* of two, four, ſix leaves, to ſignify a *wine* of two, four, or ſix years old; taking each new leaf put forth by the vine, ſince the *wine* was made, for a year. Among the Romans, the age of *wines* was, as it were, the criterion of their goodneſs. Horace, in his *odes*, which one may call *Bacchic ſongs*, boaſts of his drinking Falernian *wine*, born, as it were, with him, or which reckoned its age from the ſame conſuls.

Pliny mentions *wines* kept above one hundred years, and yet potable. Others he ſpeaks of kept two hundred years, which, by that time, were reduced to the conſiſtence of honey. But the moderns keep no *wines* to any ſuch age. Where they are kept the longeſt, as in Italy and Germany, there are ſcarce any to be found of above fifteen leaves. In France, the *wines* that keep beſt, as thoſe of Dijon, Nantz, and Orleans, are reckoned ſuperannuated at five or ſix years old.

Wine kept in a cool vault, and well ſecured from the external air, will preſerve its texture entire in all the conſtituent parts, and ſufficiently ſtrong for many years, as appears not only from old *wines*, but other foreign fermented liquors, particularly thoſe of China, prepared from a decoction of rice, which being well cloſed down in the veſſel, and buried deep under ground, will continue, for a long ſeries of years, rich, generous, and good, as the hiſtories of that country univerſally agree in aſſuring us.

Sir Edward Barry, in his Obſervations hiſtorical, critical, and medical, on the Wines of the Ancients, ſuggeſts, that our beſt modern *wines*, eſpecially thoſe of a delicate texture and flavour, may be more effectually preſerved in earthen veſſels of a larger ſize than our bottles, well glazed externally and internally: that dry ſand is preferable for covering the bottles in the binns to ſawduſt; and that a ſmall anti-cellar, built before all large cellars, would be a conſiderable defence and improvement.

Wine, *diſeaſes of.* All *wines*, malt-liquors, and vinegars, which are well made, and perfect in their kind, will grow fine of themſelves, barely by ſtanding; ſo that if they do not thus grow fine in a reaſonable time, it is a ſign that they labour under ſome diſeaſe; that is, they are too aqueous, too acid, too alkaline, or they tend to putrefaction, or the like. In all theſe caſes, which may properly enough be called the *diſeaſes of wines*, ſuitable remedies are required before the *wines* will grow fine. The moſt general remedy hitherto known for all the diſeaſes of *wines*, is a prudent uſe of tartarized ſpirit of *wine*, which not only enriches, but diſpoſes all ordinary *wines* to grow fine. Shaw's Lectures, p. 209.

For a particular account of the different diſeaſes of *wine*, and their uſual remedies, ſee Miller's Gard. Dict. art. *Wine*; and Birch's Hiſt. Roy. Soc. vol. i. p. 156, &c.

Wines, *pricked.* An eaſy method of recovering *pricked wines* may be learned from the following experiment: take a bottle of red Port that is pricked, add to it half an ounce of tartarized ſpirit of *wine*; ſhake the liquor well together, and ſet it by for a few days, and it will be found very remarkably altered for the better.

This experiment depends upon the uſeful doctrine of acids and alkalies. All perfect *wines* have naturally ſome acidity, and when this acidity prevails too much, the *wine* is ſaid to be pricked, which is truly a ſtate of the *wine* tending to vinegar: but the introduction of a fine alkaline ſalt, ſuch as that of tartar, imbibed by ſpirit of *wine*, has a direct power of taking off the acidity, and the ſpirit of *wine* alſo contributes to this, as a great preſervative in general of *wines*. If this operation be dexterouſly performed, pricked *wines* may be abſolutely recovered by it, and remain ſaleable for ſome time: and the ſame method may be uſed to malt-liquors juſt turned ſour. Shaw's Lectures, p. 214.

Wine, *laws relating to.* By the 1 Geo. II. ſtat. 2. cap. 17. no *wine* (except of the growth of Tuſcany, Turky, or the Levant), ſhall be imported in veſſels leſs than 25 gallons, on pain of forfeiture. By 18 Geo. III. cap. 27. no *wines* of the growth of Spain or Portugal, and no French *wines*, ſhall be imported in any ſmaller veſſel than a hogſhead, on pain of forfeiture.

For the ſtamp-duties on *wine*-licences, ſee Stamp-*duties*.

By 30 Geo. II. cap. 19. no perſon ſhall ſell *wine* by retail, or in leſs quantity than ſhall be equal to the meaſure of the veſſel in which the ſame hath been lawfully imported, without a licence renewed yearly, on pain of 100*l.*; and every retailer of *wine* ſhall cauſe the word WINE to be legibly inſcribed in a viſible part in the front of his houſe, vault, &c. under penalty of 10*l.*

The lord chancellor, lord treaſurer, lord preſident, lord privy-ſeal, and two chief-juſtices, or any three of them, ſhall yearly ſet the prices of foreign *wines* ſold in groſs; and any perſon offending againſt the ſaid aſſeſſment ſhall forfeit for every veſſel 40s. 28 Hen. VIII. cap. 14. 37 Hen. VIII. cap. 23. 12 Ch. II. cap. 25.

No perſon ſelling *wine* ſhall mix *wines* together, nor with any other thing, on pain that the ſeller in groſs ſhall forfeit 100*l.* and the retailer 50*l.*

By 5 Ann. cap. 27. 231 cubical inches ſhall be a *wine* gallon, 63 gallons a hogſhead, 126 gallons a butt or pipe, and 252 gallons a ton.

The nett duties on importation are as follow: for Portugal and Madeira *wine* 49*l.* 14*s.* 4*d.* $\frac{16}{20}$ths per ton, by Britiſh ſubjects, and 54*l.* 13*s.* 4*d.* $\frac{16}{20}$ths per ton, by aliens; for Spaniſh and Levant *wines* 50*l.* 16*s.* 4*d.* $\frac{16}{20}$ths, by Britiſh, and 55*l.* 15*s.* 4*d.* $\frac{16}{20}$ths, by aliens; for French *wine* 99*l.* 8*s.* 9*d.* $\frac{10}{20}$ths, by Britiſh, and 104*l.* 7*s.* 9*d.* $\frac{12}{20}$ths, by aliens; and for Rheniſh, Germany, and Hungary *wines* 54*l.* 13*s.* 4*d.* $\frac{16}{20}$ths by Britiſh, and 59*l.* 12*s.* 4*d.* $\frac{16}{20}$ths, by aliens.

Wine, *lees of*, are the impurities thereof, or the thick ſediment remaining at the bottom of the caſks, when the *wine* is drawn out.

The diſtillation of *wine-lees* into ſpirit is conducted very much in the ſame manner with that of the malt-waſh. when diſtilled with the mealy part in it: the principal difference is on this account, that the oil of the malt being very nauſeous and diſagreeable, the utmoſt care is to be uſed to keep it back in all the proceſſes of primary diſtillation, and of rectification; whereas, on the other hand, the oil of the *wine* lees being a very agreeable and pleaſant one, as much care as poſſible is to be taken to bring it over with the ſpirit. Glauber has written a peculiar treatiſe on this ſubject, in which, without touching upon the moſt advantageous production of all, he has proved the work to be ſo very profitable, that the whole uſually paſſes for one of his wild flights, rather than a ſolid buſineſs.

The method of diſtilling a liquid ley for its ſpirit, is a thing very univerſally known; but the advantageous thing, on this baſis, is the diſtilling of a dry ley preſſed and preſerved, and the managing of the buſineſs in ſuch a manner as at firſt or laſt to procure and ſeparate all its valuable parts. The ſolid ley, here mentioned, is that uſually ſold to the hatters in England, and is the ſame thing that in France and other *wine* countries the vinegar-makers diſpoſe of in cakes, after they have preſſed out all the *wine*, and which was afterwards burnt, and makes what Lemery and others call *cineres clavellati*; and the Engliſh *gravelled aſhes*, a fixed alkali ſalt-like pot-aſh.

This ley, when uſed for diſtilling, ſhould be that of the French *wines*, and either ſuch as is newly preſſed, or has been well ſecured by packing in a cloſe manner in tight caſks, with ſome proper contrivance of dry ſand, or the like, to keep its external ſurface from the contact of the air, which is very apt to corrupt or putrefy it.

If this ley is intended to be kept many months, it will be very proper to ſecure it by ſprinkling the layers as they are packed up with a little brandy. The expence of this is nothing, for the brandy is recovered again in the operation. Shaw.

Wine, *oil of*, a very precious liquid, kept as a ſecret in the hands of ſome dealers in ſpirits, and uſed to give the brandy flavour to ſpirits of leſs price. It is certain, that all the ſpirits we uſe take their flavour from the eſſential oil of the ſubſtance they are made from; that of malt is very nauſeous and offenſive, and renders the ſpirit horribly diſagreeable, if not carefully kept back in the diſtillation of it; that of the grape, on the other hand, is extremely agreeable, and is what gives the delicious flavour to French brandy; this therefore is to be carefully brought over among the ſpirit in diſtillation.

This is that *oil of wine* ſo much celebrated among our diſtillers, and is for their uſe made ſeparate, and is of ſuch effect, that half an ounce of it will determine a pure and clear malt ſpirit to be French brandy, ſo as to ſtand the teſt of the niceſt palate, and all the trials that can be invented, provided the oil and the ſpirit have both been carefully made.

The manner of making the oil is this: they take ſome cakes of dry *wine*-lees, ſuch as are uſed by our hatters, and diſſolving them in ſix or eight times their weight of water, they diſtil the liquor with a ſlow fire, and ſeparate the oil by the ſeparating pot, reſerving for this nice uſe only that which comes over firſt, the oil that follows being coarſer, and more reſinous. To render this buſineſs perfectly ſucceſsful, there muſt be ſeveral things obſerved: 1. The ley muſt be of the right kind, that is, of the ſame nature with the French brandy propoſed to be imitated. 2. The malt ſpirit muſt be extremely pure. 3. The doſe of the oil muſt be very well proportioned: and, 4. The whole muſt be artificially united into one ſimple and homogene liquor. Theſe cautions all regard only the taſte, and beſides theſe, in order to come up to a nice counterfeit, ſeveral other particulars muſt be attended to; ſuch as the colour, proof, tenacity, ſoftneſs, and the like; ſo that, in ſhort, the operation has too much nicety in it to be hit off by every ordinary dealer.

When this fine *oil of wine* is procured, it may be mixed into a quinteſſence, with pure diſtilled alcohol, or the totally inflammable ſpirit of *wine*, to prevent its growing diſtaſteful, rancid, or reſinous; and thus it may be long preſerved in full poſſeſſion of its flavour and virtues.

The ſtill bottoms, or remaining matter after the diſtillation of this oil, will yield many productions to advantage, particularly tartar, and ſalt of tartar, as alſo an empyreumatic oil, and a volatile ſalt, like that of animals. Some kind of lees afford all theſe in much greater quantity than others; the lees of Canary and Mountain *wines* yield very little of them; and indeed, ſcarce any tartar, or fixed ſalt at all; but the white French lees of thoſe thin *wines* that afford the ordinary brandies, yield them all very copiouſly, inſomuch, that ſometimes a ſingle hogſhead of dry and cloſe-preſſed lees will afford, by this proceſs, three gallons of brandy, forty pounds of clean tartar, a large proportion of empyreumatic oil, and volatile ſalt, beſide full four pounds of good ſalt of tartar. It is not to be expected, however, that every parcel of this ley ſhould yield fully in this proportion. Shaw's Eſſay on Diſtillery.

Wine, *piece of*. See Piece.

Wine-*preſs*, a machine contrived to ſqueeze the juice out of grapes, and conſiſting of ſeveral pieces of timber, variouſly diſpoſed, which compoſe three bodies of timber-work, cloſely united to the axis, which ſerves as a ſwing whereby it may be moved by the vice. Of theſe there are different ſizes as well as different conſtructions; for an account of which, illuſtrated by figures, ſee Miller's Gard. Dict. art. Wine-*preſs*.

Wine, *priſage of*. See Prisage.

Wine, *racking of*. See Rack.

Wine, *ſpirit of*. See Spirit.

Wine-*ſpirit*, a term uſed by our diſtillers, and which may ſeem to mean the ſame thing with the phraſe *ſpirit of wine*; but they are taken in very different ſenſes in the trade.

Spirit of wine is the name given to the common malt-ſpirit, when reduced to an alcohol, or totally inflammable ſtate; but the phraſe *wine-ſpirit* is uſed to expreſs a very clean and fine ſpirit, of the ordinary proof-ſtrength, and made in England from *wines* of foreign growth.

The way of producing it is by ſimple diſtillation; and it is never rectified any higher than common bubble-proof. The ſeveral *wines* of different natures, yield very different proportions of ſpirit; but, in general, the ſtrongeſt yield one-fourth, the weakeſt in ſpirits one-eighth part of proof-ſpirit; that is, they contain from a ſixteenth to an eighth part of their quantity of pure alcohol.

Wines that are a little ſour, ſerve not at all the worſe for the purpoſes of the diſtiller; they rather give a greater vinoſity to the produce. This vinoſity is a thing of great uſe in the *wine-ſpirit*, whoſe principal uſe is to mix with another that is tartarized, or with a malt-ſpirit, rendered alkaline by the common method of rectification. All the *wine-ſpirits* made in England, even thoſe from the French *wines*, appear very greatly different from the common French brandy; and this has given our diſtillers a notion that there is ſome ſecret art practiſed in France, for giving the agreeable flavour to that ſpirit; but this is without foundation.

When we diſtil Sicilian or Spaniſh *wines*, we do not produce Sicilian or Spaniſh brandies; and the true reaſon of this is, that the *wines* which they diſtil on the ſpot into brandy, are very different from thoſe which they export as *wines*.

Thoſe they diſtil are ſo poor and thin, that they will not keep many months, nor can poſſibly bear exportation. If we had in England thoſe poor *wines* they diſtil into brandy near Bourdeaux, Cognac, or up the Loire, there is no doubt but the ſpirit we made from them would be univerſally allowed to be French brandy. We have proof of this from ſome of the Scotch diſtilleries, where they, with no peculiar art, or ſecret method, procure from ſome of the poor pricked and damaged *wines* received here, brandy ſo nearly reſembling that of France, that a good judge will ſcarcely be able to make the diſtinction. *Wine-ſpirits* and brandies therefore are the ſame thing, only with this difference, that the former is the product of a rich *wine*, and the latter of a poor one; or, at the utmoſt, they differ only as our two home products, the cyder-ſpirit and the crab-ſpirit do.

The *wine-ſpirit*, diſtilled in England, is not eaſy to be had pure and unmixed at our diſtillers, nor under a price almoſt equal to that of French brandy; ſo that if it ever be required out of the trade, it is as well to uſe the French brandy, which will, in all caſes, ſerve the ſame purpoſes, unleſs where a high flavour or a copious eſſential oil are required. All other ſpirits are carefully diveſted of their oil in the rectifications; but the *wine-ſpirit* is coveted only for its oil, and all that can be obtained is preſerved in this, its principal uſe being to give a flavour to a worſe ſpirit, and to cover the taſte of a diſagreeable oil in it.

When a caſk of *wine* chances to turn ſour in private hands, it is worth while to diſtil it for the ſpirit. The lees alſo, if in any conſiderable quantity, will yield ſuch a proportion of the ſame ſort of ſpirit, as to render it worth while; and as the high flavour is not required in this intent, it will be beſt to draw off the ſpirit very gently, either by the cold or hot ſtill, and afterwards it may be rectified without any addition, and reduced to the ſtandard-ſtrength of proof. It thus makes a very clean and pleaſant ſpirit, though very different from the brandy from the ſame country whence the *wine* came. Shaw's Eſſay on Diſtillery. See SPIRIT.

WINE, *philoſophic ſpirit of*, in the writings of ſome chemiſts and phyſicians, a phraſe that often occurs as the name of a liquid prepared from *wine*, and endued with very remarkable properties.

It is generally ſuppoſed that this was the ſame ſort of liquor, which we at this time call by the name of *ſpirit of wine*; but this is a very erroneous opinion, and has led many into errors, about the operations in which it was concerned. It was truly no diſtilled liquor, but the ſpirituous parts of *wine* condenſed and concentrated by the freezing of the more aqueous part.

WINES, *ſtooming of*. See STOOMING.

WINES, *low*, in the *Diſtillery*, the term for the ſpirituous liquors diſtilled immediately from the fermented matter, and continued running ſo long, that the laſt of it is not at all inflammable. This liquor is afterwards rectified to a proof ſpirit of the ſtrength of brandy, and thence to a rectified ſpirit, called *alcohol*, or ſpirit of *wine*. Shaw's Lectures, p. 216.

By 24 Geo. III. cap. 46. from Nov. 1, 1784, the duties on *low wines* and ſpirits for home conſumption ſhall be diſcontinued for two years, and new duties are ſubſtituted in lieu thereof, viz. for every gallon of fermented waſh brewed for extracting ſpirits for home conſumption, from malt, grain, or mixture therewith, to be paid by the maker, 5*d.*; from any other ſort of Britiſh materials, 4*d.*; from melaſſes or ſugar mixed therewith, 7½*d.*; for every gallon of foreign refuſed *wine*, or foreign cyder or waſh prepared from foreign materials (except melaſſes and ſugar), or any mixture therewith, 10*d.* No wort or waſh in the poſſeſſion of a diſtiller ſhall be removed from his entered premiſes or concealed, on pain of forfeiture, and of the diſtiller and receiver forfeiting 10*s.* a gallon; and no waſh for diſtilling ſpirits for home conſumption ſhall be removed from the veſſel in which it was fermented, until the officer has gaged it, on pain of 200*l.* By the ſame act, the additional duties upon rum and ſpirits imported into Great Britain, being the produce of the Britiſh ſugar iſlands, and the additional impoſts of the ſeveral 5 per cents. and all penalties in reſpect thereof, ſhall be ſuſpended for two years, from September 1, 1784.

By 24 Geo. III. cap. 41. every diſtiller, or maker of *low wines* or ſpirits for ſale or exportation, and every rectifier of ſpirits, ſhall take out a licence, which ſhall be charged with a yearly ſum equal to the amount of one halfpenny a gallon of the contents of every ſtill or ſtills of each deſcription, which ſhall have been in the poſſeſſion of ſuch diſtiller or rectifier within the year, ending the 5th day of July in each year, previous to his taking out the licence. Every brandy dealer, or perſon ſelling brandy or other ſpirituous liquors, not being a retailer, and not a rectifier, ſhall take out a licence, and pay for the ſame 5*l.* Every maker of MEAD for ſale ſhall pay for a licence 1*l.*

WINE, *extemporaneous*. A hundred weight of good treacle will produce, according to the art of the diſtiller, from four to ſeven gallons of pure alcohol; that is, from eight to fourteen gallons of the common-proof melaſſes ſpirit. The ſtill-bottoms have many uſes. The diſtillers ſcald and recover their muſty caſks with them, and they may be uſed for all thoſe purpoſes of cleanſing where argol is required. Mr. Boyle's acid ſpirit of *wine*, or a ſpirit very like it, may alſo be procured from them, and a matter analogous to that Beccher calls the *media ſubſtantia vini*. This liquor gives a durable *extemporaneous wine*.

WINES, *domeſtic*, are thoſe made of raiſins, commonly called SWEETS or made *wines*.

In the Muſeum Ruſticum we have the following directions for making raiſin *wine*: put thirty gallons of ſoft water into a veſſel at leaſt one-third bigger than ſufficient to contain that quantity; and add to it one hundred weight of Malaga raiſins, groſly picked from their ſtalks. Mix the whole well together, and cover it partly with a linen cloth. When it has ſtood a little while in a warm place, it will begin to ferment, and muſt be well ſtirred about twice in twenty-four hours, for twelve or fourteen days. When the ſweetneſs is nearly gone off, and the fermentation much abated, which will be perceived by the ſubſiding and reſt of the raiſins, ſtrain off the fluid, preſſing it, firſt by the hand, and afterwards by a preſs, out of the raiſins. Let this liquor be put into a ſound *wine*-caſk, well dried and warmed, adding eight pounds of Liſbon ſugar, and a little yeaſt, and reſerving part of the liquor to be added from time to time, as the decline of the fermentation will give room. In this ſtate the liquor muſt remain for a month, with the bung-hole open; and having filled the veſſel with the reſerved liquor, let it be cloſely ſtopped, and kept for a year or longer, and then bottled off. At the end of a year and a half it may be drank, but will improve for four or five years.

Some ſaving may be made in the expence, by diminiſhing the quantity of raiſins and increaſing that of the ſugar in the proportion of four pounds of raiſins for one of ſugar; or by diminiſhing the proportion of both raiſins and ſugar, and adding clean malt-ſpirits, when the bung of the caſk is cloſed up. Any other large raiſins may be uſed, as well as the Malaga; but the thinner the ſkins and the ſweeter the pulp, the ſtronger will be the *wine*.

If this *wine* be perfectly fermented, and kept a long time, ſo that no ſweetneſs remain, it will reſemble Madeira.

An artificial Frontiniac may be made of this *wine*, in which the proportion of ſugar or of malt ſpirits to the raiſins is large, and the whole body weaker: the muſcadel flavour being communicated by an infuſion of the flowers of meadow-ſweet. In the making of this artificial Frontiniac, the ferment ſhould be ſtopped, by cloſing the caſk and adding the ſpirit, while a conſiderable degree of ſweetneſs remains, and the *wine* may be drank after it has been a little while in the bottles.

Cyprus *wine* may be imitated by the ſame means, uſing three or four pounds more of ſugar than the quantity above preſcribed, and ſtopping the fermentation while a conſiderable degree of ſweetneſs remains.

Artificial mountain may be made by preſerving a ſmall degree of ſweetneſs, giving the nut-like flavour, and keeping the beſt kind of the above *wine* to a due age. The flavour may be obtained by the infuſion of the Florentine orris root, powdered, with a very ſmall proportion of orange and lemon-peel; and the *wine* may be rendered more dry or ſweet, by continuing the fermentation for a greater or leſs time, and adding a correſponding proportion of clean malt ſpirits, when the fermentation is ſtopped ſooner. The adding of ſome of the ſtony ſeeds of the raiſins well bruiſed will give the nut-like flavour; and the putting in a part of the ſtalks will add a ſharpneſs, found generally in this kind of *wine*.

The racy taſte of Canary, commonly called ſack, may be counterfeited by the addition of a proper quantity of the juice of white currant-berries to the *wine*, made with a large proportion of ſugar to the raiſins, and left very ſweet in the fermentation. But it is ſaid that a ſpirit, diſtilled from the leaves of clary and clean malt-ſpirits, put to the *wine*, will give it a very ſtrong reſemblance of ſack. It is ſaid alſo, that the juice of the bramble-berries, added to the mixture of the *wine*, before the fermentation, will give both the colour and flavour of claret: but in this caſe the quantity of raiſins ſhould be conſiderably diminiſhed, and that of the ſugar increaſed, as the fermentation muſt be continued till the ſweetneſs be wholly deſtroyed.

Wines of this kind ſhould be kept at leaſt a year, before they are drank.

By 31 Geo. II. cap. 31. the act of the 30th Geo. II. cap. 19. is extended to *ſweets*; and no perſon is allowed to retail in any quantity leſs than twenty-five gallons *ſweets* or *made wines* without a licence, under a penalty of 100*l.*

By 24 Geo. III. cap. 41. the maker of any kind of ſweets (mead excepted) for ſale, ſhall pay for a licence 5*l.*

For the duty on made *wines*, ſee SWEETS; to which duty are added, on its produce and amount, three 5*l.* per cents. by 19 Geo. III. cap. 25. 21 Geo. III. cap. 17. and 22 Geo. III. cap. 66.

WINE is alſo a denomination, applied in medicine and pharmacy, to divers mixtures, or compoſitions, wherein the juice of the grape is a principal ingredient: ſuch as bitter, bleſſed, chalybeat, elecampane, emetic, hog-lice, pectoral, viper, &c. See VINUM.

WINE *of ſquills.* See SQUILLS.

WINE-*meaſure.* See MEASURE, and *Laws relating to* WINE.

WINE-*fly*, in *Natural Hiſtory*, the name of a ſmall black fly, found in empty *wine*-caſks, and about *wine*-lees, and called by the Latins, BIBIO.

It is produced of a ſmall red worm, very common in the ſediment of *wine*.

The drippings of *wine* or beer-veſſels, the preſſings of the *wine* or cyder-preſs, the pots in which honey has been kept, and in which a little remains ſticking to the ſides, and turning ſour, all afford vaſt numbers of a ſmall ſpecies of worm or maggot. This is of a white colour, and has two hooks placed near the head; in ſhort, it reſembles in all the parts, the maggot of the common fleſh-fly. Multitudes of theſe ſmall creatures live and move very briſkly about in theſe ſubſtances for ſeveral weeks together; but at the end of that time, when they have arrived at their full growth, they enter into the nymph-ſtate under a covering or caſe made of their own ſkin, which dries, and becomes of a brown colour. After eight or nine days in this ſtate, the caſe is opened by the falling off of a ſmall piece at the end, and the fly makes its way out. The fly is extremely ſmall when its wings are not extended.

It does not exceed the ſize of the head of a middling pin; it is however very beautiful; the breaſt and body are yellow, the reticulated eyes are red, and the wings have all the rainbow-colours. The beſt way of procuring theſe little flies, which make a very beautiful microſcopic object, is to keep the matter, in which the worms are placed, in a glaſs, covered down with a paper; as ſoon as the cover is taken off, at the time of their being in the fly-ſtate, they riſe up at once in the form of a cloud; enough of them for obſervation will however remain about the ſides of the veſſel. When examined, they are found to have all the regular parts of the larger flies; their antennæ are oval and flatted, and their legs, and every other part, are as elegantly perfect, as they are ſeen to be in the moſt elegant large fly.

It is not known whether they are oviparous or viviparous; but this is to be obſerved, that they give us great light into the origin of animalcules in different fluids.

Since we ſee in theſe the evident courſe of nature in their origin, what prevents but that there may be numbers of flies yet ſmaller than theſe, whoſe eggs may be depoſited in the fluids in which we find our microſcopic animalcules. Reaum. Hiſt. Inſ. vol. ix. p. 82.

WING, in *Ornithology.* See FEATHER and FLYING.

The *wings* are adapted for flight in all birds, except the dodo, oſtriches, great auk, and the penguins, whoſe *wings* are too ſhort for the uſe of flying: but in the dodo and oſtrich, when extended, they ſerve to accelerate their motion in running; and in penguins perform the office of fins, in ſwimming or diving. The *wings* have near their end an appendage covered with four or five feathers, called the *baſtard wings*: the leſſer coverts are the TECTRICES: the greater coverts are thoſe which lie beneath the former, and cover the quill-feathers and the ſecondaries. The quill-feathers, or *primores*, ſpring from the firſt bones of the *wings*, are ten in number, and broader on their inner than exterior ſides: the ſecondaries are thoſe that ariſe from the ſecond part, or cubitus, are about eighteen in number, and equally broad on both ſides. The primary and ſecondary *wing*-feathers are called REMIGES. The tertials are a tuft of feathers placed beyond the ſecondaries, near the junction of the *wings* with the body. This, in water-fowl, is generally longer than the ſecondaries, and cuneiform. The ſcapulars are a tuft of long feathers ariſing near the junction of the *wings* with the body, and lie along the ſides of the back, but may be eaſily diſtinguiſhed, and raiſed with one's finger. The inner coverts are thoſe that clothe the under ſide of the *wing*.

The *wings* of ſome birds are inſtruments of offence: the anhima of Marcgrave has two ſtrong ſpines in the front of each *wing*; a ſpecies of plover has a ſingle one on each; as have alſo the whole tribe of jacana, and the gambo or ſpur-winged gooſe of Willughby. Pennant's Genera of Birds, pref. p. 4.

WINGS, among the *Fly claſs*, afford ſeveral ſubordinate diſtinctions of the genera of thoſe animals, under the ancient general claſſes.

Several ſpecies of flies, while they are in a ſtate of reſt, or only walking, ſhew ſeveral regularly diſtinct manners of carrying their *wings*. The much greater numbers, however, carry them in a parallel or plain poſition: ſome being perpendicular to the length of the body without covering it, others covering the body without covering one another: the *wings* of others croſs one another on the body of the animal, ſome of which round themſelves there, the upper wing being more elevated on the middle of the body than on the ſides. Some flies have their *wings* placed on their backs, and applied againſt one another, in a perpendicular poſition: the *wings* of others are applied obliquely, againſt their ſides and meet above the body by their inner edges, forming a kind of hollow roof under which the body is placed; others form at their junction on the back a flat depreſſed roof, and others have them meeting under their bellies.

The ſtructure of the *wings* of different flies might alſo furniſh matter of farther diſtinctions. The greater part of them are of a fine ſtructure, and repreſent the fineſt gauſe, and are equally tranſparent, or nearly ſo, in all parts. Some flies, however, have *wings* of a leſs degree of tranſparence, and ſome even opake ones. Others of the four-winged flies have obſcure ſpots alſo diſtributed near their very tranſparent texture; ſuch are the *wings* of the ſcorpion-fly; and ſome of the two-winged flies have *wings* partly opake, partly pellucid, the opake ſpots being ſeparated by tranſparent lines. Reaumur's Hiſt. Inſ. tom. iv. p. 136, &c.

WINGS *of butterflies.* The beautiful *wings* of this genus of inſects, are diſtinguiſhed from thoſe of the fly-kind, by their not being thin and tranſparent, like them, but thicker and opake. This opacity in them is owing only to the duſt which comes off of them, and ſticks to the fingers in handling them, and it is alſo to this duſt that they owe all their beautiful variety of colours. The earlier naturaliſts, for this reaſon, diſtinguiſhed theſe inſects by the appellation of ſuch as had farinaceous *wings*. The uſe of the microſcope has taught us, that this duſt is not the reſult of ſome other ſubſtance broken into fragments; but every particle of it is a regularly figured body, made for the place and order it has in the covering of the *wing*.

The ſeveral ſpecies of butterflies, and even the different parts of the ſame *wing*, afford theſe bodies of different ſhapes and figures. Moſt of the authors who have written of microſcopic objects, have given the figures of the principal varieties of theſe; but no one has given ſo many as Bonani in his Micrographia, in which work the figures of the various kinds take up four quarto plates.

It has been the general cuſtom of authors to call theſe feathers; but they are by Mr. Reaumur, with much greater juſtice, called ſcales. Their ſtructure has no reſemblance to that of feathers, for they are little flat and thin bodies, of more or leſs length, and always having a ſhort pedicle which enters into the ſubſtance of the *wing*.

When the *wing* of a butterfly is viewed by a microſcope, the arrangement of theſe ſeveral bodies in it is ſeen to be extremely beautiful and regular. The ſcales lie as regularly and evenly one over another, as the tiles on a houſe, or the ſcales on the fiſh-kind, every ſeries of them covering a ſmall part of that ſeries which runs below it. The upper and under part of the *wing* are equally furniſhed with theſe, and there is no ſpecies of this creature, in every *wing* of which there are not ſeveral figures of theſe ſcales in ſeveral parts.

The ſtructure of the *wing* itſelf which ſupports theſe ſeveral ſcales, hairs, &c. is very worthy our attention. In order to examine this, it is neceſſary to rub off all the duſt or ſcales. We then find that the *wing* itſelf is framed of ſeveral large and ſtrong ribs, which all take their origin at that part where the *wing* is fixed to the body, and thence extend themſelves along the ſeveral ſides of the *wing*. The largeſt and thickeſt of theſe ſurrounds the outer edge of the *wing*, the largeſt next to this extends itſelf round the interior edge, and the others direct their courſe along the middle of the *wing*, and then divaricate and become ramified in the manner of the ribs in the leaves of plants. The ſubſtance which connects and fills up the ſpaces between theſe ribs, is of ſo peculiar a nature, that it is not eaſy to find any name to deſign it by, at leaſt there is no ſubſtance that enters the compoſition of the bodies of the larger animals, that is at all analogous to it: it is a white ſubſtance, tranſparent and friable, and ſeems indeed to differ in nothing from that of the large and thick ribs, but in that it is extended into thin plates; but this is ſaying but little toward the determining what it really is, ſince we are as much at a loſs to know by what name to call the ſubſtance they are compoſed of. Malpighi indeed calls them bones; but though they do ſerve in the place of bones, rendering the *wing* firm and ſtrong, without making it heavy, and are, when cut tranſverſely, found to be hollow; yet, when ſtrictly examined, they do not appear to have any thing of the ſtructure of bones, but appear rather of the ſubſtance of ſcales, or of that ſort of imperfect ſcales, of which the covering of thoſe inſects which we call cruſtaceous is compoſed.

The *wings* of butterflies, thus large, and thus light, are very well able to ſuſtain them a long time in the air, and thus they might be expected to fly better than moſt other inſects; but many people have obſerved the irregular manner in which theſe inſects uſually fly, which is not ſtraight forward, but up and down, and to one ſide and the other: this has been ſuppoſed owing to ſome imperfection of the *wings*; but, in reality, it is their great perfection that enables the creatures to do this, and this manner of flying is abſolutely neceſſary to the preſervation of their life, as birds of many kinds are continually after them while they are on the *wing*; and it is a pleaſant ſight to obſerve, in what manner this ſort of dodging motion in the butterfly diſappoints the bird that flies ſtraight at it, and often preſerves it ſafely for a long way together.

The beautiful variety of colours, ſeen in the wings of theſe inſects, is owing to the ſcales and feathers. Reaumur's Hiſt. Inſ. vol. i. part i. p. 255, &c.

Wings *of gnats*. Theſe are of a very curious ſtructure, and well worthy the uſe of the microſcope, to ſee them diſtinctly.

It is well known that on touching the wings of butterflies, a coloured powder is left on the fingers, which, though to the naked eye it appear a mere ſhapeleſs duſt, yet when examined by the microſcope, it is found to be very regularly figured beautiful bodies, encompaſſed with a furbelow of long feathers, and with veins or ribs that ſeem to ſtrengthen them, in form of feathers or ſcales, or ſometimes beſet with prickles: theſe are of various figures, and all of them very elegant. The generality of flies have nothing of this kind; but the cloſe examination of the *wings* of the gnat will ſhew, that they are not wholly deſtitute of them; they are much more ſparingly beſtowed indeed upon the gnat than on the butterfly; but then they are arranged with great regularity. Between the ribs of the *wings* there is extended a very thin tranſparent membrane, full of little black ſharp-pointed hairs, ranged throughout with the utmoſt regularity. The *wings* in different ſorts of gnats are very different; ſome have a border of long feathers, others of ſhort ones, and others have none at all. Reaumur's Hiſt. Inſ. vol. iv. p. 577. Baker's Microſc. 8vo. 1743. p. 204.

Wings, *warbling of the*. See Warbling.

Wings, in *Heraldry*, are borne ſometimes ſingle, ſometimes in pairs, in which caſe they are called *conjoined*; when the points are downward, they are ſaid to be *inverted*; when up, *elevated*.

Wing, *ala*, or *axilla*, in *Botany*, the angle which the leaves of a plant, or the pedicles of the leaves, form with the ſtem, or a branch of the plant.

This angle is commonly acute, and always turned upward. It has its name from its reſembling the angle which the *wings* of a bird form with the body; or rather from the angle which a man's arms make with his trunk; which is called *ala, wing*.

Wings, in *Gardening*, &c. denote ſuch branches of trees, or other plants, as grow up aſide of each other.

Quintiny ſays, the term is particularly applied to artichokes, whoſe *wings*, or *alæ*, are the leſſer heads, or fruits that grow up with the principal one on the ſame ſtalk.

Wings, *alæ*, in the *Military Art*, are the two flanks, or extremes of an army, ranged in form of battle; being the right and left ſides thereof, and including the main body.

The cavalry are always poſted in the *wings*, i. e. on the flanks, on the right and left ſides of each line; to cover the foot in the middle.

Pan, one of Bacchus's captains, is ſaid to have been the firſt inventor of this method of ranging an army; whence, ſay they, it is, that the ancients painted him with horns on his head; what we call *wings*, being by them called *cornua, horns*. This at leaſt, is certain, that the method of arranging in *wings*, is very ancient. The Romans, we know, uſed the term *alæ*, or *wings*, for two bodies of men in their army; one on the right, the other on the left, conſiſting each of four hundred horſe, and four thouſand two-hundred foot uſually, and wholly made up of confederate troops. Theſe were deſigned to cover the Roman army, as the *wings* of a bird cover its body.

The troops in theſe *wings* they called *alares* and *alares copiæ*; and we, at this day, diſtinguiſh our armies into the *main body*, the *right* and *left wings*.

Wings are alſo uſed for two files, that terminate each battalion, or ſquadron, on the right and left. The pikes uſed to be ranged in the middle, and the muſqueteers in the *wings*.

Wings, in *Fortification*, denote the longer ſides of horn-works, crown-works, tenailles, and the like outworks, including the ramparts and parapets, with which they are bounded on the right and left, from the gorge to their front.

Theſe *wings*, or ſides, are capable of being flanked, either with the body of the place, if they ſtand not too far diſtant, or with certain redoubts; or with a traverſe made in their ditch.

Wings, in *Sea-Language*, denote thoſe parts of a ſhip's hold, which are neareſt to the ſides, or fartheſt removed from the middle of her breadth.

Wings are alſo the ſkirts or extremities of a fleet, when it is ranged into a line a-breaſt, or when bearing away upon two ſides of an angle.

It is uſual alſo to extend the *wings* of a fleet in the daytime, in order to diſcover any enemy which may fall into their track. To prevent ſeparation, however, they are commonly ſummoned to draw nearer to the centre of the ſquadron before night, by a ſignal from the commander in chief, which is afterwards repeated by ſhips in the intervals. Falconer.

Wings, *gooſe*. See Goose.

Wing, *St. Michael's*, is the name of a military order in Portugal, inſtituted, according to the Jeſuit Mendo, in 1165; or, according to di Michieli, in his Teſoro Militar. de Cavalleria, in 1171. Its inſtitutor was Alphonſus Henry I. king of Portugal; and the occaſion was a victory gained by him over the king of Savil, and his Saracens; for which he thought himſelf beholden to St. Michael, whom he had choſen for his patron in the war againſt the infidels.

The banner they bore was a *wing* reſembling that of the archangel, of a purple colour, encompaſſed with rays of gold. Their rule was that of St. Benedict; the vow they made was to defend the Chriſtian religion, and the borders of the kingdom, and to protect orphans. Their motto, *Quis ut Deus!*

WINGED, in *Botany*, a term applied to ſuch ſtems of plants as are furniſhed, all their length, with a ſort of membranous appendage.

Several kinds of thiſtles have *winged* ſtalks, and branches.

Winged *leaves*, are ſuch as conſiſt of divers little leaves, ranged in the ſame direction, on each ſide of a rib or ſtalk, ſo as to appear no more than one and the ſame leaf. Such are the leaves of agrimony, acacia, aſh, &c.

Winged *ſeeds*, are ſuch as have down or hairs on them; whereby the wind taking hold, blows them to a diſtance.

Winged *ſtalk*. See Stalk.

Winged, in *Heraldry*, is applied to a bird, when its *wings* are of a different colour, or metal, from the body.

Winged is alſo applied to any thing repreſented with *wings*, though contrary to its nature; as *winged*, or *flying hart*, &c.

WINNOW, ſignifies *to fan*, or ſeparate corn from the chaff by wind.

WINTER, one of the four ſeaſons, or quarters of the year.

Winter properly commences on the day when the ſun's diſtance from the zenith of the place is the greateſt, and ends on the day when its diſtance is at a mean between the greateſt and leaſt.

Notwithſtanding the coldneſs of this ſeaſon, it is proved, in aſtronomy, that the ſun is really nearer to the earth in *winter* than in ſummer. The reaſon of the decay of heat, &c. ſee under Heat.

Under the equator, the *winter*, as well as the other ſeaſons, return twice every year; but all other places have only one *winter* in the year; which, in the northern hemiſphere, begins when the ſun is in the tropic of Capricorn; and in the ſouthern hemiſphere, when in the tropic of Cancer: ſo that all places in the ſame hemiſphere have their *winter* at the ſame time.

Winter, among *Printers*, that part of the printing-preſs, ſerving to ſuſtain the *carriage*, &c. See Printing-*preſs*.

Winter's-*bark*, *Cortex* Winteri, or Winteranus. See Cortex.

This is one of the largeſt foreſt-trees upon Terra del Fuego, often riſing to the height of fifty feet. Dr. Solander has given an accurate botanical deſcription of it, illuſtrated by a figure, in Med. Obſ. and Inq. vol. v. p. 46, &c. Its leaves are ever-green, ſmooth, oval, and entire: the flowers conſiſt of ſeven petals, with from fifteen to thirty ſtamina, and from three to ſix germina; terminating in as many ſtigmata; each germen becomes a ſeed-veſſel, containing ſeveral ſeeds: the bark of the trunk of the tree is externally grey, and very little wrinkled. The pieces of this bark brought over by the Dolphin are about three or four inches ſquare, of different degrees of thickneſs, from one-fourth to three-fourths of an inch. It is of a dark brown cinnamon colour, an aromatic ſmell if rubbed, and of a hot, pungent, ſpicy taſte, which is laſting on the palate, though imparted ſlowly. A watery infuſion of it ſtruck a black colour with a ſolution of green vitriol. An infuſion of two ounces, coarſely powdered, yielded on evaporation two drams and twenty-four grains of extract: the ſame quantity, with rectified ſpirit, afforded two drams of extract.

This bark, though much celebrated as an antiſcorbutic by the firſt diſcoverers, is unknown in the practice of phyſic; the canella alba, which is totally different from it, having been confounded with it in the ſhops; and no quantity having been brought to Europe, except as a curioſity, till the return of the ſhips ſent out on an expedition to the South Seas.

From ſome experiments on this bark by Dr. Morris, it appears to be an aſtringent of a particular kind, and, therefore, likely to be of uſe in ſeveral manufactures; and that water is the proper diſſolvent of it.

It is hoped that this tree, no leſs uſeful than elegant, may be cultivated in our country, where it would probably grow luxuriantly, as in a much warmer region than its own, and furniſh, not only a valuable ever-green, bearing our ſevereſt *winters*, but alſo a valuable medicine. Med. Obſerv. ubi ſupra.

WINTER-*berry*, *prinos*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the flower hath a permanent empalement of one leaf, cut into ſix ſmall plain ſegments; it hath one wheel-ſhaped petal, with no tube, cut into ſix plain ſegments; it hath ſix awl-ſhaped ſtamina, ſhorter than the petal, terminated by obtuſe ſummits, and an oval germen ſitting upon the ſtyle, crowned by an obtuſe ſtigma; the germen afterwards turns to a round berry, containing ſix ſeeds.

There are two ſpecies; the one growing naturally in Virginia, the other in Canada.

WINTER-*bloom*. See AZALEA.

WINTRR-*cherry*. See CHERRY.

WINTER-*creſſes*. See CRESSES.

WINTER-*green*, *pyrola*, in *Botany*, a genus of the *decandria monogynia* claſs. Its characters are theſe: the flower has a permanent empalement cut into five parts; it has five roundiſh concave ſpreading petals, and ten awl-ſhaped ſtamina, terminated by large nodding ſummits, with two riſing horns, and a roundiſh germen ſupporting a ſlender ſtyle, which is longer than the ſtamina, crowned by a thick ſtigma: the germen becomes a roundiſh depreſſed five-cornered capſule, with five cells opening at the angles, filled with ſeeds. Linnæus enumerates ſix, and Miller four ſpecies.

The greater round-leaved *winter-green*, or *pyrola rotundifolia major*, is ordered by the College of Phyſicians to be uſed in medicine, and is generally brought over from Switzerland with other vulnerary plants, in which claſs it is ranged, and by ſome greatly commended. Miller.

WINTER-*green*, *ivy-flowering*. See KALMIA.

WINTER-*green*, with *chickweed flowers*. See TRIENTALIS.

WINTER-*heyning*, in our *Statutes*, a ſeaſon between the eleventh day of November, and the three-and-twentieth of April, which is excepted from the liberty of commoning in the foreſt of Dean, &c. Stat. 20 Car. II. cap. 3. Blount.

WINTER-*quarters*. See QUARTERS.

WINTER-*rig*, among *Huſbandmen*, ſignifies to FALLOW, or till the land in *winter*.

WINTER-*ſolſtice*. See SOLSTICE.

WINTERANIA, in *Botany*, a genus of the *dodecandria monogynia* claſs. Its characters are theſe: the calyx hath three lobes; the petals are five; the antheræ are ſixteen, joined to a pitcher-ſhaped nectarium; the fruit is a three-celled berry, containing two ſeeds.

There is one ſpecies, viz. the *winterania canella* of Linnæus. The inner bark of this tree, which grows in the low lands of Jamaica, and other American iſlands, called CANELLA *alba* and *white* CINNAMON, is brought over in the form of quills, and has hitherto been rarely employed in medicine, unleſs as a ſubſtitute for WINTER's *bark*, which it much reſembles, and has been commonly miſtaken for. The London college has now received it in two officinal compoſitions, for alleviating the ill flavour of aloes; and the Edinburgh in their tinctura amara.

WINTONIÆ *rotulus*. See ROTULUS.

WIOCHIST, among the *Indian Natives of Virginia*, is their prieſt, who is alſo generally their phyſician; and is the perſon in the greateſt honour amongſt them, next to their king, or great war-captain. Phil. Tranſ. Nº 454. ſect. 1.

WIRE, **WIAR**, **WIER**, or **WYRE**, a piece of metal, drawn through the hole of an iron, into a thread, of a fineneſs anſwerable to the hole it is paſſed through.

Wires are frequently drawn ſo fine, as to be wrought along with other threads of ſilk, wool, or hemp: and thus they become a conſiderable article in the manufactures. The metals moſt commonly drawn into *wire* are gold, ſilver, copper, and iron. And hence we have *gold wire*, *ſilver wire*, *iron wire*, &c. See GOLD *Wire*, and DUCTILITY.

WIRE, *ſilver*, is the ſame with gold *wire*, except that the latter is gilt, or covered with gold, and the other is not. There are alſo counterfeit gold and ſilver *wires*: the firſt made of a cylinder of copper, ſilvered over, then covered with gold; and the ſecond of a like cylinder of copper ſilvered over, and drawn through the iron, after the ſame manner as gold and ſilver *wire*.

By 10 Ann. cap. 26. a duty is impoſed on all gilt *wire* made in Great Britain of 8*d.* an ounce, and on ſilver *wire* 6*d.* an ounce, troy weight: which duties are liable to the three five per cents. of 19 Geo. III. cap. 25. 21 Geo. III. cap. 17. and 22 Geo. III. cap. 66. The duty muſt be paid in ſix weeks after entry on pain of double duty. The places of making *wire* muſt be entered at the next office, on pain of 20*l.*; and the penalty of obſtructing officers in ſurveying, &c. is 20*l.* An allowance of one-fifth is made for waſte in reducing the big *wire* to ſmall *wire*. Removing *wire* before it is ſurveyed incurs a penalty of 40*l.*; and unſurveyed *wire* is to be kept ſeparate, on pain of 10*l.*; and the puniſhment of concealing *wire*, &c. is a forfeiture of 20*l.* The *wire* made ſhall be entered every month, on oath, on pain of 100*l.* By 15 Geo. II. cap. 20. the ingots or bars, deſigned for gilt *wire*, are to be weighed in the preſence of the exciſe officer, and marked after the gold is laid on, under a forfeiture of 20*l.*

By 15 Geo. II. cap. 20. and 22 Geo. II. cap. 36. no foreign embroidery, or gold or ſilver brocade, thread, lace, fringe, or work made thereof, or of copper, braſs, or other inferior metal, or gold or ſilver *wire*, or plate, ſhall be imported. And by 10 Ann. cap. 26. if any perſon ſhall export any gold or ſilver thread, or lace or fringe made of plate *wire* ſpun upon ſilk, he ſhall have a drawback after the rate of 5*s.* a pound avoirdupois, of ſuch ſilver thread, lace, or fringe, and of 6*s.* 8*d.* a pound of ſuch gold thread, lace, or fringe.

For regulations concerning the true making of gilt and ſilver *wire*, ſee the ſtatute 15 Geo. II. cap. 20. and for prohibiting the ſelling or working up of foreign gold or ſilver lace or thread, ſee 22 Geo. II. cap. 36.

WIRE, *braſs*, is drawn after the ſame manner as the former. Of this there are divers ſizes, ſuited to the divers kinds of works. The fineſt is uſed for the ſtrings of muſical inſtruments, as ſpinets, harpſichords, manichords, &c.

The pin-makers likewiſe uſe vaſt quantities of *wire* of ſeveral ſizes, to make their pins of. See PIN.

WIRE, *iron*, is called by the French, *fil d'archal*; the reaſon of which their authors are not agreed about. That celebrated etymologiſt, M. Menage, derives it from *filum & aurichalcum*; but others, more converſant in the commerce thereof, deduce it from one Richard Archal, the firſt inventor thereof.

Iron wire is made from ſmall bars of iron, which are firſt drawn out to a greater length, and to about the thickneſs of one's little finger, at a furnace, with a hammer, gently moved by water. Theſe thinner pieces are bored round, and put into a furnace to anneal for twelve hours. A pretty ſtrong fire is uſed in this operation.

After this they are laid under water for three or four months, the longer the better; then they are delivered to the workmen called *rippers*, who draw them into *wire* through two or three holes. After this they anneal them again for ſix hours, and water them a ſecond time for about a week, and they are then delivered again to the rippers, who draw them into *wire* of the thickneſs of a large packthread. They are then annealed a third time, and then watered for a week longer, and delivered to the ſmall *wire*-drawers, called *overhouſe-men*.

In the mill where this work is performed, there are ſeveral barrels hooped with iron, which have two hooks on their upper ſides, on each whereof hang two links, which ſtand a-croſs, and are faſtened to the two ends of the tongs, which catch hold of the *wire*, and draw it through the hole. The axis on which the barrel moves does not run through the centre, but is placed on one ſide, which is that on which the hooks are placed, and underneath there is faſtened to the barrel a ſpoke of wood, which they call a *ſwingle*, which is drawn back a good way by the cogs in the axis of the wheel, and draws back the barrel, which falls to again by its own weight. The tongs hanging on the hooks of the barrel, are by the workmen faſtened to the end of the *wire*, and by the force of the wheel, the hooks being pulled back, draw the *wire* through the holes.

The plate in which the holes are, is iron on the outſide, and ſteel on the inſide; and the *wire* is anointed with train oil, to make it run the eaſier.

The firſt *wire*-mill in England was ſet up by a Dutchman at Sheen, near Richmond, in 1663.

For the tenacity of *iron-wire*, ſee Iron.

There are various ſizes of this *wire* from $\frac{1}{2}$ an inch, to $\frac{1}{10}$ of an inch diameter. The ſmalleſt ſizes are uſed for ſtringing muſical inſtruments, particularly harpſichords, pſalteries, &c.

Vaſt quantities of *iron wire* are brought yearly hither from the Baltic; and are partly ſpent at home, and partly exported to France, &c.

Wire-*drawing*. For the ſeveral manners of drawing gold and ſilver, ſee Ductility, and Gold-*Wire*.

The firſt iron that runs from the ſtone, when melting, being the ſofteſt and tougheſt, is uſually preſerved to make *wire* of. See *Iron* Wire ſupra.

Wires *of aſteriæ*, in *Natural Hiſtory*, a name given by authors to a ſort of extraneous foſſil belonging to the asteriæ, and being a ſort of branches from the body of that column.

Wire *of Lapland*. The ſavage inhabitants of Lapland have a ſort of ſhining ſlender ſubſtance in uſe among them on ſeveral occaſions, which is much of the thickneſs and appearance of our ſilver-*wire*; and is therefore called, by thoſe who do not examine its ſtructure or ſubſtance, *Lapland-wire*.

The people of this miſerable country find many uſes in every thing nature has afforded them, and, among the reſt, that ſpecies of ſtag called the rein-deer, which is the moſt frequent animal among them, is not only ſerviceable in furniſhing them with meat, cloaths, houſes, and the means of carriage and travelling; but its bones make many of their moſt neceſſary utenſils; and the ſinews, which are all carefully ſeparated in the eating, are, by the women, after ſoaking in water, and beating, ſpun into a ſort of thread, which is of admirable fineneſs and ſtrength, when wrought to the ſmalleſt filaments; but when larger, is very ſtrong, and fit for the purpoſes of ſtrength and force. Their *wire*, as it is called, is made of the fineſt of theſe threads, covered with tin. The women do this buſineſs, and the way they take is to melt a piece of tin, and placing at the edge of it a horn with a hole through it, they draw theſe ſinewy threads, covered with the tin, through the hole, which prevents their coming out too thick covered. This drawing is performed with their teeth, and there is a ſmall piece of bone placed at the top of the hole, where the wire is made flat, ſo that we always find it rounded on all ſides but one, where it is flat.

This *wire* they uſe in embroidering their cloaths as we do with gold and ſilver; and they often ſell it to ſtrangers, under the notion of its having certain magical virtues. Scheffer, Hiſt. Lapland.

WISDOM, *ſapience*, uſually denotes a higher and more refined knowledge of things, immediately preſented to the mind, as it were by intuition, without the aſſiſtance of ratiocination.

In this ſenſe, *wiſdom* may be ſaid to be a faculty of the mind, or at leaſt a modification and habit thereof.

Sometimes the word is more immediately uſed in a moral ſenſe, for what we call *prudence* or *diſcretion*; which conſiſts in the ſoundneſs of the judgment, and a conduct anſwerable thereto.

The ſchool-divines ſometimes reſtrain *wiſdom* to the knowledge of the more ſublime and remote objects, as that of God, &c. In which ſenſe, theology is properly ſaid to be *wiſdom*.

The Latin word for *wiſdom* is *ſapientia*, which literally expreſſes the ſenſe of taſting; to which *wiſdom* is ſuppoſed to have ſome conformity. The ſight, and other ſenſes, only repreſent to us the ſurface of things: taſte goes deeper, and penetrates into the ſubſtances; ſo that what, e. gr. to the feeling ſeemed cold, to the taſte will be found hot: ſo *wiſdom*, ariſing from a deep attention to our ideas, goes farther, and frequently judges otherwiſe than the common apprehenſions of men would reach to.

WIST, **Wista**, a quantity or meaſure of land among our Saxon anceſtors; of different dimenſions, in different places. In the Monaſticon, it is ſaid to be half a hide, or ſixty acres: in an old chronicle of the monaſtery of Battle, it is ſaid to be forty-eight acres.

WIT, a faculty of the mind, conſiſting, according to Mr. Locke, in the aſſembling, and putting together, of thoſe ideas with quickneſs and variety, wherein can be found any reſemblance or congruity; whereby to make up pleaſant pictures, and agreeable viſions, in the fancy.

This faculty, the ſame great author obſerves, is juſt the contrary of *judgment*, which conſiſts in the ſeparating carefully from one another, of ſuch ideas wherein can be found the leaſt difference, thereby to avoid being miſled by ſimilitude, and, by affinity, to take one thing for another: and hence he accounts for the reaſon of that common obſervation, that men who have much *wit* and prompt memories, have not always the cleareſt judgment, or deepeſt reaſon.

It is the metaphor and alluſion, wherein, for the moſt part, conſiſt the entertainment and pleaſantry of *wit*; which ſtrikes in ſo lively a manner on the fancy, and is therefore ſo acceptable to all people, becauſe its beauty appears at firſt ſight, and there is required no labour of thought, to examine what truth or reaſon there is in it. The mind, without looking any farther, reſts ſatisfied with the agreeableneſs of the picture, and the gaiety of the imagination; and it is a kind of affront to go about to examine it by the ſevere rules of truth, or reaſon. Whence it ſhould ſeem, that *wit* conſiſts in ſomething that is not perfectly conformable to them. Eſſay on Human Underſt. book ii. chap. xi. ſect. 2.

Another ingenious writer has obſerved upon Mr. Locke's deſcription of *wit*, that every reſemblance of ideas is not that which we call *wit*, unleſs it be ſuch an one, that gives delight and ſurprize. Theſe two properties, he ſays, ſeem eſſential to *wit*, more particularly the latter of them. In order, therefore, that the reſemblance in the ideas be *wit*, it is neceſſary they ſhould not lie too near one another in the nature of things; for where the likeneſs is obvious, it gives no ſurpriſe. Spectator, vol. i. Nº 62.

From this account of the nature of *wit*, it is eaſy to perceive what good reaſon Cicero had for ſaying (De Orat. lib. ii. cap. 54.) *Wit is a thing not to be learned*: it is the offspring of nature, and proper effect of a bright and lively fancy. Cicero reduces *wit* to two kinds, viz *cavillatio*, which, in our language, may be called *continued wit*, or humour, and *dicacitas*, which may be termed *conciſe wit*, or jesting.

For the nature of *wit* in general, the different kinds of it, its uſe to an orator, and the manner in which it ought to be conducted, ſee Ward's Orat. vol. ii. p. 195, &c.

Wit is alſo an appellation, given to perſons poſſeſſed of the faculty called *wit*, *eſprit*.

A French author, who, in 1695, publiſhed a *Treatiſe of Wit, du Bel Eſprit*, lays down four characters thereof.

1. A man, who, with an open air, and eaſy motions, affects thoſe he converſes with agreeably; and on any ſubject that preſents itſelf, advances new thoughts, and adorns them with a ſprightly turn; is, all the world over, a *wit*.

2. Another, who, leſs ſolicitous about the choice and delicacy of his ſentiments, knows how to make himſelf valued by I know not what elevation of diſcourſe; who draws much attention, and ſhews great vivacity in his ſpeaking, and readineſs in his anſwers; is likewiſe acknowledged a *wit*.

3. A third, who takes leſs care about thinking than about ſpeaking well: who affects fine words, though perhaps low and poor in matter; who pleaſes by an eaſy pronunciation, and a certain tone of voice, is placed in the ſame rank.

4. Another, whoſe chief aim is not to make himſelf eſteemed, ſo much as to raiſe mirth and laughter; who jokes pertinently, rallies pleaſantly, and finds ſomething to amuſe himſelf with in every petty ſubject; is likewiſe allowed a *wit*.

Yet, it may be obſerved, that in all theſe caſes, there is nothing of real *wit*, as above defined; but the whole is *imagination*, or *memory* at moſt: nay the whole is no more than what temperament may give.

A true *wit* muſt have a juſt faculty of diſcernment; muſt have, at the ſame time, both great energy, and peculiar delicacy, in his ſentiments; his imagination muſt be noble, and at the ſame time happy and agreeable; his expreſſions polite and well turned; without any thing of parade or vanity in his diſcourſe, or his carriage. It is not at all eſſential to a *wit*, to be ever hunting after the brilliant; ſtill ſtudying fine thoughts, and affecting to ſay nothing but what may ſtrike and ſurpriſe.

This is a fault very frequent in dramatic perſons: the duke of Buckingham rallies it very juſtly.

"What is that thing which we *ſheer wit* do call?
"'Tis when the *wit* of ſome great writer ſhall
"So overflow, that is, be none at all,
"That ev'n his fools ſpeak ſenſe——."

Humour, ſay our critics, is the genuine *wit* of comedy.

Wit, *child*. See Child-*Wit*.

Wit-*fiſh*, in *Ichthyology*, a name given by the Dutch in the Eaſt Indies to a fiſh common on thoſe coaſts, and ſeeming to be of the tænia kind. It is of the ſize of our common whiting. Its back is ſtraight and even, and its belly prominent; its ſnout is pointed ſomewhat upwards, and tail forked. It has one ſingle ſpine or prickle on its back, and has a long belly-fin reaching from the head to near the tail; its whole body is ſtriated, and it has two long filaments or beards hanging from its ſnout, and is a very fine and delicate fiſh. Ray.

Wit *fiſh* is alſo the name given by the Dutch to an Eaſt Indian fiſh, called by Mr. Ray, ALBULA *Indica*.

WITCH-*hazle*, in *Botany*. See HAZLE.

Witch-*craft*, the crime of SORCERY, eſpecially in women. Many think there may be ſome foundation for what we call *faſcination*, and *witchcraft*. We have innumerable inſtances, and hiſtories to this purpoſe; which it would not be fair to ſet aſide, merely becauſe they are not reconcileable to our philoſophy: but, as it happens, there ſeems to be ſomething in philoſophy to countenance ſome of them.

Indeed, the ridiculous ſtories that are generally told, and the many impoſtures and deluſions that have been diſcovered in all ages, are ſufficient to demoliſh all faith in ſuch a dubious crime; if the contrary evidence were not alſo extremely ſtrong. Wherefore, (ſays Judge Blackſtone), it ſeems to be the moſt eligible way to conclude, with an ingenious writer of our own (Spect. N° 117.) that in general there has been ſuch a thing as *witchcraft*, though one cannot give credit to any particular modern inſtance of it. Some readers will, however, probably diſſent from this inference of Mr. Addiſon, and the opinion of the learned judge, and incline to conſider *witchcraft* in general as a ſpecies of impoſture. See MAGICIAN, and MIRACLE.

What the writers in favour of the opinion advance, as their reaſons, is as follows:

All living things, they ſay, emit effluvia, both by the breath and the pores of the ſkin. All bodies, therefore, within the ſphere of their perſpiratory, or expiratory effluvia, will be affected by them; and that, in this or another manner, according to the quality of the effluvia; and in this or that degree, according to the diſpoſition of the emittent and recipient parts.

This, indeed, is inconteſtible; nor need we produce inſtances of animals exhaling ſweet or ſtinking ſmells; or of infectious diſeaſes conveyed by effluvia, &c. in confirmation thereof.

Now, of all parts of an animal body, the eye, we know, is the quickeſt. It moves with the greateſt celerity, and in all the variety of directions. Again, its coat and humours are permeable as any other part of the body (witneſs the rays of light it ſo copiouſly receives). The eye, therefore, no doubt, emits its effluvia like the other parts. The fine humours of the eye muſt be continually exhaling. The heat of the pervading rays will rarefy and attenuate them: and that, with the ſubtile juice, or ſpirit of the neighbouring optic nerve, ſupplied, in great abundance, by the vicinity of the brain, muſt make a fund of volatile matter to be diſpenſed, and, as it were, determined by the eye.

Here, then, we have both the dart, and the hand to fling it. The one furniſhed with all the force and vehemence, and the other with all the ſharpneſs and activity, one would require. No wonder if their effects be great!

Do but conceive the eye as a fling, capable of the ſwifteſt and intenſeſt motions and vibrations: and, again, as communicating with a ſource of ſuch matter, as the nervous juice elaborated in the brain; a matter ſo ſubtile and penetrating, that it is ſuppoſed to fly inſtantaneouſly through the ſolid capillaments of the nerves; and ſo active and forcible, that it diſtends and convulſes the muſcles, and diſtorts the limbs, and alters the whole habitude of the body, giving motion and action to a maſs of inert, inactive matter. A projectile of ſuch a nature, flung by ſuch an engine as the eye, muſt have an effect wherever it ſtrikes: and the effect will be limited and modified by the circumſtances of the diſtance, the impetus of the eye, the quality, ſubtilty, acrimony, &c. of the juices, and the delicacy, coarſeneſs, &c. of the object it falls on.

This theory, it is ſuppoſed by many, may account for ſome of the phenomena of *witchcraft*, particularly of that branch called FASCINATION. It is certain the eye has always been eſteemed the chief ſeat, or rather organ, of *witchcraft*; though, by moſt, without knowing why, or wherefore: the effect was apparently owing to the eye; but how, was not dreamed of. Thus, the phraſe, to have an *evil eye*, imports as much as to be a *witch*. And hence Virgil

Neſcio quis teneros oculus mihi faſcinat agnos.

Again, old, bilious perſons, are thoſe moſt frequently ſuppoſed to have the faculty; the nervous juice in them being depraved, and irritated by a vicious habitude of body; and ſo rendered more penetrating and malignant. And young perſons, chiefly children and girls, are moſt affected by it; becauſe their pores are patent, their juices incoherent, and their fibres delicate, and ſuſceptible. Accordingly the *witchcraft*, mentioned by Virgil, only reaches to the tender lambs.

Laſtly, the faculty is only exerciſed when the perſon is diſpleaſed, provoked, irritated, &c. it requiring ſome extraordinary ſtreſs and emotion of mind to dart a proper quantity of the effluvia, with a ſufficient impetus, to produce the effect at a diſtance. That the eye has ſome very conſiderable powers, is paſt diſpute.

The ancient naturaliſts aſſure us, that the baſiliſk, and opoblepa, kill other animals merely by ſtaring at them. If this fail of credit, a late author aſſures us to have ſeen a mouſe running round a large ſnake, which ſtood looking earneſtly at it, with its mouth open: ſtill the mouſe made leſs and leſs circles about it; crying all the while, as if compelled thereto; and, at laſt, with much ſeeming reluctance, ran into the gaping mouth, and was immediately ſwallowed.

Who has not obſerved a ſetting-dog; and the effects of its eye on the partridge? The poor bird, when once its eyes meet thoſe of the dog, ſtands as if confounded, regardleſs of itſelf, and eaſily lets the net be drawn over it. We remember to have read of ſquirrels alſo ſtupified, and overcome, by a dog's ſtaring hard at them, and thus made to drop out of the trees into his mouth.

That man is not ſecure from the like affections, is matter of eaſy obſervation. Few people but have, again and again, felt the effects of an angry, a fierce, a commanding, a diſdainful, a laſcivious, an intreating eye, &c. Theſe effects of the eye, at leaſt, make a kind of *witchcraft*.

The old laws made in England and Scotland againſt conjuration and *witch-craft* are repealed by a late ſtatute, and no perſon is to be proſecuted for any ſuch crime, 9 Geo. II. cap. 5. See CONJURATION.

Witch *of Endor*, in *Biblical Hiſtory*, a woman who had a familiar ſpirit, and who was employed by Saul to conſult the deceaſed Samuel concerning the iſſue of his conteſt with the Philiſtines. See 1 Sam. xxviii.

The explication of this part of ſacred hiſtory has greatly perplexed commentators and critics. Some, in deference to the authority of the ancient fathers of the Chriſtian church, who aſcribed to magicians and necromancers the power of calling up the ſouls of the dead, have given a literal interpretation of this hiſtory, and ſuppoſed that Samuel actually appeared to Saul. But to this opinion it has been juſtly objected, that it is repugnant to the order of the natural world, and to the doctrines of revelation reſpecting the ſtate of the dead. It cannot be ſuppoſed conſiſtent with a juſt reverence of God to believe, that he has ſubjected the ſouls of the departed (not excepting thoſe of the moſt eminent ſaints and prophets), to be remanded back from their diſtinct abodes, by the practice of the moſt execrable rites and at the call of ſome of the vileſt mortals, and compelled to reveal what he has ſeen fit to conceal. Natural reaſon confirms the ſuffrage of ſcripture, when it brands the whole magic art, to which evocations of the dead, and all necromantic divinations appertain, as founded in impoſture. Others who cannot admit that *witches* are able to diſturb the ſouls of good men, much leſs of prophets, are nevertheleſs of opinion, that theſe wretched women can cauſe the devil to counterfeit the ſouls of the dead; and that in the caſe before us, an evil ſpirit appeared before Saul in the likeneſs of Samuel. See Patrick on 1 Sam. xxviii. 12. But this opinion gives an unwarrantable advantage for the ſupport of idolatry to thoſe impoſtures that were practiſed by heathen ſorcerers and diviners. Beſides the very apparition of a ſpiritual and incorporeal being, and the gift of prophecy, are real miracles, and cannot take place but by divine appointment: and laſtly, the hiſtorian calls the appearance to Saul, Samuel, which he could not do with truth, if it was no other than the devil, who here appears, not as a tempter, but as a very ſevere reprover of impiety and wickedneſs.

Many learned men have, therefore, maintained, that it was neither Samuel, nor an evil ſpirit, who here appeared to Saul; but that the whole was the work of human impoſture. In ſupport of this opinion, it may be pleaded, that the woman, to whom Saul applied to call up Samuel, was merely a VENTRILOQUIST, poſſeſſing an art very ſerviceable to thoſe who counterfeited the anſwers of the dead. This opinion, however, like the foregoing one, contradicts the ſacred hiſtorian, who not only repreſents the Pythoneſs as affirming, but himſelf affirms, that ſhe ſaw Samuel, and that Samuel ſpoke to Saul: nor has he dropt the leaſt hint, that it was not the real Samuel of whom he was ſpeaking.

Others have ſuppoſed, that the appearance of Samuel to Saul was a divine miracle: though whether the miracle conſiſted in raiſing Samuel, or in preſenting an image or repreſentation of him before Saul, it is not neceſſary to determine. Accordingly, the apparition muſt be aſcribed ed, not to the power of inchantment, but to the immediate appointment of God, as a rebuke and puniſhment to Saul. This opinion is maintained by Dr. Waterland, in his Sermons, vol. ii. p. 267. and defended by Dr. Delany in his life of David; but combated by Dr. Chandler, with objections which, as far as they affect the ſcripture hiſtory of this matter, are anſwered or obviated by Mr. Farmer, in his Diſſertation on Miracles, p. 486, &c.

WITCHES-*butter*, a name given by the common people of England to a ſort of TREMELLA growing on the bark of old trees, in form of a corrugated membrane.

WITHERNAM, in *Law*, a repriſal, or taking of other goods or cattle, in lieu of thoſe unjuſtly taken and eſſoined, or otherwiſe with-holden.

The word is compounded of the Saxon *wither*, *contra*, *againſt*; and *nam*, *captio*, *taking*. See NAAM.

Where goods are taken by colour of diſtreſs, and driven to a hold, or out of the county, ſo that the ſheriff cannot, upon replevy, make deliverance thereof, to the party diſtrained; in this caſe the writ of *capias in withernam*, or *de vetito namio*, is iſſued, directed to the ſheriff, for the taking as many of the party's beaſts, as he did thus unlawfully reſtrain; or as much goods of his, till he has made deliverance of the firſt diſtreſs: and, therefore, goods taken in *withernam* cannot be replevied, till the original diſtreſs is forth-coming.

WITHERNAM, *homine capto in*. See HOMINE.

WITHERS *of a horſe*, the juncture of the ſhoulder-bones at the bottom of the neck and main, towards the upper part of the ſhoulder.

Theſe parts ſhould be well raiſed and pretty ſtrong, for this is a ſign of ſtrength and goodneſs in the horſe. They keep the ſaddle from coming forward upon the horſe's ſhoulders and neck, which immediately galls and ſpoils him. A hurt in this part is very difficult to cure, and, for this reaſon, they ſhould be lean rather than fleſhy, as they are then leſs ſubject to be bruiſed and hurt by the ſaddle.

When there are ſores on the *withers*, the cauſe muſt be looked to, in order to determine a proper cure, and prevent a return. If the hurt be cauſed by the largeneſs of the ſaddle bands, provided that it be not too great, it may eaſily be cured by the following remedy: take the whites of ſix eggs, beat them with a piece of alum as big as an egg for a quarter of an hour, or till the whole is reduced to a thick ſcum or froth; let the ſwelling be rubbed well with this mixture, and then covered over with more of the froth; this is to be left to dry on, and the application is to be repeated every ten or twelve hours; notwithſtanding that the heat and ſwelling remains, this, by degrees, will take place, though not at firſt.

If the hurt be great, recourſe muſt be had to bleeding; and this may be repeated after two days, if the ſwelling and inflammation continue.

If a tumor, with great inflammation, follow a bruiſe with the ſaddle-bows, the part affected is to be rubbed with lime-water, and covered with a lamb's ſkin, the woolly part next the back: after the waſhing, the ointment, well known among our farriers by the name of the *duke's ointment*, is to be applied; and if the tumor inclines to ſuppurate, the ointment muſt be waſhed off with a mixture of vinegar and water, warmed, mixed with a handful of ſalt to every quart of it: an ointment is then to be made of half a pound of populeon, and a quarter of a pound of black ſoap, and as much honey: theſe are to be thinned with a large glaſs of ſpirit of wine, and the part is to be well rubbed with ſome of this three or four times a-day, covering it afterwards with a lamb's ſkin. Some uſe, inſtead of this ointment, a poultice made of powder of cummin-ſeed, linſeed-oil, and pigeons-dung, which does as well.

WITHERS *of the bow of a ſaddle*, in the *Manege*. See BOW.

WITHER-*band*, in the *Manege*, a band or piece of iron laid underneath a ſaddle, about four fingers above the *withers* of the horſe, to keep tight the two pieces of wood that form the bow.

WITHER-*wrung*, in the *Manege*. A horſe is ſaid to be *wither-wrung*, when he has got a hurt in the *withers*; which ſort of hurts it is very hard to cure. See WITHERS, *ſupra*.

WITHERING, in *Medicine*. See ARIDURA.

WITHERING *of a cow*, is when, after calving, ſhe does not caſt her cleanſing, which if not timely remedied will kill her.

WITHY, a large ſpecies of WILLOW, fit to be planted upon high banks and ſides of ditches, within reach of the water, or on the weeping ſides of hills.

WITNESS, *teſtis*, a perſon who certifies, or aſſerts the truth of, any fact.

All *witneſſes* are deemed *competent*, who, having the uſe of their reaſon, are neither infamous nor intereſted in the event. See EVIDENCE.

Among the Romans, it was a cuſtom to pull or pinch the ears of *witneſſes* preſent at any tranſaction; that they might remember it when they were called to give in their teſtimony. Two *eye-witneſſes*, or *de viſu*, not ſuſpected, are to be deemed a concluſive proof.

Falſe *witneſſes*, ſuborners of *witneſſes*, &c. in England are puniſhed with the pillory; in ſeveral other countries, with death. See PERJURY, SUBORNATION, &c.

In a ſynod at Rome, under Conſtantine, in the year 320, it was decreed, that there ſhould be ſeventy two *witneſſes* heard, to condemn a biſhop; which was called *libra teſtium*, a pound of *witneſſes*. Accordingly there were ſeventy-two *witneſſes* heard againſt pope Marcellinus; who, ſays the hiſtorian, *erant electi libra occidua*.

Anciently there were ſynodal *witneſſes*, *teſtes ſynodales*, in each pariſh, choſen by the biſhop, to inquire into the hereſies, and other crimes, of the pariſhioners; and to make oath thereof on the relics of the ſaints. See SYNODALES.

WITNESS, *Attic*. See ATTIC.

Trial by WITNESSES, in *Law*, is a ſpecies of trial, without the intervention of a jury. This is the only method of trial known to the civil law; in which the judge is left to form in his own breaſt his ſentence upon the credit of the *witneſſes* examined: but it is very rarely uſed in our law, except only that when a widow brings a writ of dower, and the tenant pleads that the huſband is not dead; this is, in favour of the widow and for greater expedition, allowed to be tried by *witneſſes* examined before the judges; and alſo in ſome other caſes mentioned by ſir Edward Coke, as, to try whether the tenant in a real action was duly ſummoned, or the validity of a challenge to a juror: who obſerves, that in every caſe the affirmative muſt be proved by two *witneſſes* at the leaſt. Blackſt Com. book iii. p. 336.

WITTENA-*gemot*, among our *Saxon Anceſtors*, a term literally ſignifying a council, or aſſembly of ſages, or wiſe men; applied to the great council of the land, in later days called PARLIAMENT. See GEMOTE.

In the Saxon times this was the chief court of the kingdom, where all matters, both civil and criminal, and thoſe relating to the revenue, were determined. In civil and criminal matters, it was a court, in the firſt inſtance only, for facts ariſing in the county where it ſat; but it heard and determined cauſes from all other counties, by way of appeal. To this court were ſummoned the earls of each county, and the lords of each leet, as alſo the repreſentatives of towns, who were choſen by their burgeſſes.

WITWALL, a common Engliſh name for the great ſpotted WOOD-*pecker*, the *picus varius major* of authors.

WOAD, *iſatis*, in *Botany*, a genus of the *tetradynamia ſiliquoſa* claſs. Its characters are theſe: the empalement of the flower is compoſed of four oval coloured leaves, which ſpread open and fall away; the flower has four oblong petals placed in form of a croſs, narrow at their baſe but broad and obtuſe at their ends: it has ſix ſtamina, four of which are as long as the petals, the other two are ſhorter; theſe are terminated by oblong lateral ſummits; it has an oblong compreſſed germen, crowned by an obtuſe ſtigma; the germen becomes an oblong compreſſed pod with one cell, having two valves incloſing one oval compreſſed ſeed in the centre. There are four ſpecies.

The broad-leaved *woad* is cultivated in ſeveral parts of England for the purpoſes of dying, being uſed as a foundation for many of the dark colours.

This is a biennial plant, which flowers in July, and whoſe ſeeds ripen in the beginning of September. As the goodneſs of *woad* conſiſts in the ſize and fatneſs of the leaves, the only method to obtain it of this quality is by ſowing the ſeed upon ground at a proper ſeaſon, allowing the plants proper room to grow, and keeping them clean from weeds. The ſoil ſhould not be too light and ſandy, nor too ſtiff and moiſt, but a gentle hazel loam, whoſe parts will eaſily ſeparate. This ſhould be ploughed juſt before winter, and laid in narrow high ridges; in the ſpring ploughed again croſſways, and laid in ſimilar ridges: when the weeds begin to grow, it ſhould be well harrowed to deſtroy them. In June the ground ſhould be plouged a third time, with narrow furrows, and ſtirred as deep as the plough will go; and the weeds, as ſoon as they appear, deſtroyed by harrowing. Toward the end of July or Auguſt, it ſhould be ploughed the laſt time and laid ſmooth: and when there is a proſpect of ſhowers, harrowed for receiving the ſeeds, which ſhould be ſteeped one night in water, and ſown eitheir in rows with the drill plough, or in broad-caſt, and in this laſt mode of ſowing well harrowed in. The plants, from good ſeeds and in a favourable ſeaſon, will appear in a fortnight, and in a month or five weeks be fit to hoe. In the firſt hoeing, they ſhould be ſeparated to the diſtance of three or four inches, and at the laſt to ſix inches: the ground ſhould be hoed a ſecond time in October. In the middle they will need hoeing again, both for deſtroying the young weeds and ſtirring the ſoil. The ground thus treated will remain clean till the firſt crop of *woad* is gathered, after which, and alſo after the gathering of each crop, it will be clean, and the plants thrive the better. If the land, in which this ſeed is ſown, ſhould have been in culture before for other crops, and be not in good heart, it will require a dreſſing of rotten dung, which ſhould not be laid on till the laſt ploughing before the ſeeds are ſown, and ſpread only as the land is ploughed. The quantity of dung ſhould not be leſs than twenty loads to each acre.

The beſt ground will not admit of being ſown with *woad* more than twice, and if it is oftener repeated, the crop ſeldom pays the charges of culture.

The time for gathering the crop is according to the ſeaſon; but it ſhould be performed as ſoon as the leaves are fully grown, while they are perfectly green. If the land is good, and well huſbanded, it will produce three or four gatherings; but the two firſt are the beſt. An acre of land will produce a ton of *woad*, and, in a good ſeaſon, near a ton and a half.

When the planters intend to ſave the ſeeds, they cut two crops of the leaves, and then let the plants ſtand till the next year for ſeed; but if only one crop is cut, and that merely of the outer leaves, the plants will grow ſtronger, or produce a much greater quantity of ſeeds. Theſe ſeeds are kept two years, but it is beſt to ſow new ſeeds when they can be obtained. When the pods turn to a dark colour, the ſeeds ſhould be gathered; for this purpoſe the ſtalks may be reaped like wheat, and ſpread in rows upon the ground; and in four or five days the ſeeds will be fit to threſh out, provided that the weather be dry.

Some feed down the leaves of *woad* in winter with ſheep; a practice which Mr. Miller condemns. Miller's Gard. Dictionary.

Woad grows wild in ſome parts of France, and on the coaſts of the Baltic ſea: the wild *woad*, and that which is cultivated for the uſe of dyers, appear to be of the ſame ſpecies.

The preparation of *woad* for dying, as practiſed in France, is minutely deſcribed by Aſtruc, in his Memoirs for a Natural Hiſtory of Languedoc. The plant puts forth at firſt five or ſix upright leaves, about a foot long and ſix inches broad: when theſe hang downwards, and turn yellow, they are fit for gathering: five crops are gathered in one year. The leaves are carried directly to a mill, much reſembling the oil or tan-mills, and ground into a ſmooth paſte. If this proceſs was deferred for ſome time, they would putrefy, and ſend forth an inſupportable ſtench. The paſte is laid in heaps, preſſed cloſe and ſmooth, and the blackiſh cruſt, which forms on the outſide, re-united if it happens to crack: if this was neglected, little worms would be produced in the cracks, and the *woad* would loſe a part of its ſtrength. After lying for fifteen days, the heaps are opened, the cruſt rubbed and mixed with the inſide, and the matter formed into oval balls, which are preſſed cloſe and ſolid in wooden moulds. Theſe are dried upon hurdles: in the ſun, they turn black on the outſide; in a cloſe place, yellowiſh, eſpecially if the weather be rainy: the dealers in this commodity prefer the firſt, though it is ſaid the workmen find no conſiderable difference betwixt the two. The good balls are diſtinguiſhed by their being weighty, of an agreeable ſmell, and when rubbed, of a violet colour within. For the uſe of the dyer, theſe balls require a farther preparation: they are beat with wooden mallets, on a brick or ſtone floor, into a groſs powder; which is heaped up in the middle of the room to the height of four feet, a ſpace being left for paſſing round the ſides. The powder, moiſtened with water, ferments, grows hot, and throws out a thick fetid fume. It is ſhovelled backwards and forwards, and moiſtened every day for twelve days; after which it is ſtirred leſs frequently, without watering, and at length made into a heap for the dyer.

The powder thus prepared gives only browniſh tinctures, of different ſhades, to water, to rectified ſpirit of wine, to volatile alkaline ſpirits, and to fixed alkaline lixivia: rubbed on paper, it communicates a green ſtain. On diluting the powder with boiling water, and after ſtanding ſome hours in a cloſe veſſel, adding about one twentieth part of its weight of lime newly ſlacked, digeſting in a gentle warmth, and ſtirring the whole together every three or four hours, a new fermentation begins, a blue froth ariſes to the ſurface, and the liquor, though it appears itſelf of a reddiſh colour, dyes woollen of a green, which, like the green from indigo, changes in the air to a blue. This is one of the niceſt proceſſes in the art of dying, and does not well ſucceed in the way of a ſmall experiment.

Aſtruc propoſes the manufacturing of freſh *woad* leaves in Europe, after the ſame manner as the indigo plant is manufactured in America; and thus preparing from it a blue fecula ſimilar to indigo, which from his own experiments he has found to be practicable. Such a management would doubtleſs be accompanied with ſome advantages, though poſſibly *woad* ſo prepared might loſe thoſe qualities which now render it, in a large buſineſs, preferable on ſome accounts to indigo, as occaſioning greater diſpatch when once the vat is ready, and giving out its colour leſs haſtily, ſo as to be better fitted for dying very light ſhades. Neumann's Chem. by Lewis, p. 437, &c.

The ancient Britons uſed to dye their bodies herewith; and ſome hold, that it was from this plant, glaſs took its denomination; though others derive both *glaſs*, and *glaſtum*, from the Britiſh *glaſs*, which, to this day, denotes a blue colour.

A *woad blue* is a very deep blue, almoſt black; and is the baſe of ſo many ſorts of colours, that the dyers have a ſcale, whereby they compoſe the divers caſts or degrees of *woad*, from the brighteſt to the deepeſt.

Beſide the plant properly ſignified by the name *woad*, which dies a blue colour, we have two others known in our Engliſh herbals under that name, as alſo that of *wold* or WELD. Theſe are both called by the common people *dyer's weed*, and are the *luteola* and the *geniſta tinctoria*.

The ancients confounded all theſe three plants alſo under the ſame names. Paulus Ægineta ſeems to make them all the ſame plant; and Neophytus, ſpeaking of the *iſatis*, or our *woad*, properly ſo called, ſays, that it was called by the Latins, *lutum*. This *lutum* has been by ſome underſtood to mean the *luteola*, and by others the *geniſta tinctoria*; but the latter opinion only is right, for it is deſcribed to us by the ancients as having leaves like the *linum*, or flax, and flowers like the broom.

WODEN, in *Mythology*. See ODIN.

WOLD, ſignifies a plain down, or open champain ground, hilly, and void of wood.

Hence the names Stow in the *Wold*, and *Cotſwold*, in Glouceſterſhire; whence alſo that part of Leiceſterſhire, which lies northward beyond the Wrekin, is called the *Wold of Leiceſterſhire*.

WOLD, or WELD, among *Dyers*. See WELD.

WOLF, in *Aſtronomy*. See LUPUS.

WOLF, *lupus*, in *Zoology*, the *canis lupus* of Linnæus, a beaſt of prey, of the dog-kind, with the tail bending inwards, and the largeſt and fierceſt of that race of animals. It is extremely like the domeſtic dog in ſhape, and if the head, which is long, with a pointed noſe, did not differ a little in figure, one would be apt to declare it the very ſame animal. It has a very fierce look about the face, its eyes are glaring and ſavage, and its teeth, which are large and ſharp, and the opening of its mouth, fierce and frightful. The ancients had an opinion, that the neck of the *wolf* was all of one ſolid bone; but, on the contrary, this creature is able to turn and twiſt it about better than the dog-kind.

The *wolf* as well as all the other beaſts of prey, can endure hunger a long time, though very voracious when it meets with food. The *wolf* differs from the dog in his note, for inſtead of the barking of the dog this creature only howls; his ears, which ſtand erect, and his tail make him alſo greatly reſemble the fox

The hair of the *wolf* is long; the legs are long; the head and neck cinereous: and the body generally pale brown, tinged with yellow; ſometimes found white; in Canada ſometimes black; and taller than a large greyhound. See *Tab.* V. *Quadrupeds*, Nº 65.

The *wolf* inhabits the continents of Europe, Aſia, Africa, and America.

In 1281, theſe animals infeſted ſeveral of the Engliſh counties; but after that period, our records make no mention of them. The laſt *wolf* known in Scotland was killed in 1680, and in Ireland one was killed in 1710.

The wolves of North America are the ſmalleſt; and when reclaimed, are the dogs of the natives; thoſe of Senegal the largeſt and fierceſt; and they prey in company with the lion. Thoſe of the Cape are grey ſtriped black; others are black.

They are cruel, but cowardly animals; they fly from man, except when impelled by hunger; in which caſe, they prowl by night in great droves through villages, and deſtroy any perſons they meet; and having once got the taſte of human blood, give it the preference. In hard weather *wolves* aſſemble in large troops, and join in dreadful howlings. They have a fine ſcent, and hunt by the noſe: between them and the dogs a mutual enmity ſubſiſts; they go with young ten weeks, and bring from five to nine at a birth. Ray and Pennant.

Wolf, *golden.* See Jackall.

Wolf, *marine.* See Hyæna.

Wolf, *Mexican*, *canis Mexicanus*, a ſpecies that inhabits the hot parts of Mexico, agreeing in its manners with the European *wolf*. Its head, jaws, and teeth are large, in the upper lips are ſtrong briſtles bent backwards, of a grey and white colour; the ears are large, erect, and cinereous, and the ſpace between them marked with broad tawny ſpots; the head aſh-coloured, croſſed with duſky ſtripes; the neck fat and thick, and marked with a tawny ſtroke; on the breaſt is another of the ſame kind; the body is aſh-coloured ſpotted with black, and the ſides ſtriped with the ſame colour; the belly cinereous, the tail long, of the ſame colour, tinged in the middle with tawny; the legs and feet ſtriped with black and aſh-colour. Pennant's Hiſt. Quad. vol. i. p. 234.

Wolf, in the *Hiſtory of Inſects*, the name of a ſmall white worm or maggot, which infeſts granaries, and does very great damage there.

It is in this ſtate of the worm that it does the miſchief; but this is not its perfect form, for it is afterwards transformed into a ſmall moth, with white wings ſpotted with black.

This little maggot has ſix legs, and as it creeps along, there iſſues from its mouth an extremely fine thread or web, by which it faſtens itſelf to every thing it touches, ſo that it cannot fall. Its mouth is furniſhed with a pair of reddiſh forceps, or biting inſtruments, by means of which it gnaws its way not only into wheat and other grain, but perforates even beams of wood, boxes, books, and every thing it meets with.

Towards the end of ſummer theſe pernicious inſects may be ſeen crawling up the walls of corn-chambers, infeſted with them in great numbers; they are then ſearching a proper place where they may abide in ſafety during their aurelia ſtate; for when the time of their undergoing this change approaches, they forſake their food, and the little cells they had formed of hollowed grains of corn clotted together, by means of the web coming from their mouths. They now wander about till they find ſome wood, or other ſubſtance into which they gnaw holes with their fangs, capable of concealing them; and there enveloping themſelves in a covering of their own ſpinning, they ſoon become a dark-coloured ſort of aurelia. They remain in this ſtate all the winter; but in April or May they come forth in their moth-ſhape, and are then ſeen in vaſt numbers taking ſhort flights, and creeping up the walls. In this ſtate they eat nothing; but they ſoon copulate and lay eggs, which are in the ſhape of a hen's egg, but no larger than a grain of ſand. Each female lays ſixty or ſeventy eggs, which ſhe depoſits in the little wrinkles of the grains of corn, where in about ſixteen days they hatch, and the minute maggots immediately perforate the grain, and eat out all its ſubſtance, and with the threads which come from their mouths cement other grains to it, which they, in the ſame manner, ſcoop out and deſtroy.

The watchful obſerver has two opportunities of deſtroying theſe devourers from among his corn. One is, when they forſake their food, and aſcend the walls, which they will ſometimes almoſt cover. The other, when they appear in the moth-ſtate. At both theſe times they may be cruſhed to death againſt the walls in great numbers, by clapping ſacks upon them; but they may be exterminated more effectually by cloſing up all the windows and doors, and burning brimſtone on a pan of charcoal, letting the room be full of the fumes of it for twenty-four hours. This certainly deſtroys the animals and does no ſort of injury to the grain, not communicating the ſlighteſt ſcent to it. Baker's Microſ. p. 222.

Wolf's *bane*, *Aconitum*, in *Botany*, a genus of the *polyandria trigynia* claſs. Its characters are, that the flower hath no empalement, but conſiſts of five unequal petals; the *galea* or hood is tubulous, and covers the other parts of the flower like a friar's cowl, whence it is called helmet-flower and monk's-hood; the lateral petals incloſing the ſtamina and ſtyle are equal, concave, and ſlightly indented in the middle; the two lower petals are narrow and oblong; in the bottom of the flower are placed two nectariums, upon which are ſituated the ſtyles, which are forked, and ſtretched out beyond the ſtamina, which are numerous and irregular: the germen becomes oblong ſeed-veſſels terminating in a point, and coaleſcing at their baſe; theſe have one cell, which is filled with angular rough ſeeds. Miller enumerates ten, and Linnæus ſix ſpecies. See Aconite.

Moſt of the ſpecies of this plant are poiſonous; but thoſe with blue flowers are ſuppoſed to be of a much ſtronger quality than the yellow or white flowered kinds. It is confidently affirmed that the huntſmen on the Alps, who hunt the wolves and other wild animals, dip their arrows into the juice of theſe plants, which renders the wounds occaſioned by them mortal. There is one ſpecies which is deemed an antidote to thoſe that are called poiſonous called ANTHORA, and thoſe that are poiſonous are called THORA. Miller.

The blue *wolf's bane*, or *aconitum napellus* of Linnæus, has been long known as one of the moſt virulent of the vegetable poiſons. It occaſions convulſions, giddineſs, inſanity, violent purgings both upward and downward, faintings, cold ſweat, and death itſelf. Dr. Stoerk was the firſt who ventured to introduce it into medicine. He found that the extract, given to the quantity of ten, twenty, and even thirty grains, excited a ſweat without inconvenience; and by perſiſting in the uſe of it, great relief was obtained in fixed rheumatic and arthritic pains, ſcirrhous glandular tumors, venereal nodes, anchyloſis, amauroſis, and other ſimilar complaints. Other practitioners have experienced the ſame good effects in ſome degree, and the Edinburgh college has admitted the extract as an officinal. Lewis's Mat. Med. 1784.

Wolf's *bane*, *winter's*, a ſpecies of HELLEBORE.

Wolf-*fiſh*. See Lupus *Marinus*.

Wolf's *grapes*. See Lycostaphylæ.

Wolf-*Net*, a term uſed by the ſportſmen for a kind of net uſed in fiſhing, which takes great numbers, and has its name from the deſtruction it cauſes.

It is uſed both in rivers and ponds, and is of the nature of the rattle, excepting only the wanting of the four *wings*. The trunk or coffer conſiſts of ſeven feet, beſides the two gullets. It is ſupported by hoops, and is to be placed in ſome part where there is an abundance of ſedges, ruſhes, and water-graſs. There is to be a place made for the net here, by the uſe of a paring-knife, cutting away all the weeds and other matter, for the ſpace that will contain it; and when the net is placed, there are to be two alleys cut or cleared in the ſame manner, one on each ſide of the net, that the fiſh may be invited into them, and by them into the net. There muſt be ſome ſtones or leaden weights uſed to ſink the net, and a long pole faſtened to the upper part of the mouth of it, by means of which, when it is well filled with fiſh, it may be lifted up and taken to the ſhore.

Wolf's *peach*. See Lycopersicon.

WOLFESHEAD, or Wulvershead, Saxon, *wulferheafod*, compounded of *wulf*, *wolf*, and *heafod*, *head*, *caput lupinum*, denoted the condition of thoſe outlawed for criminal matters in the Saxon time, and not yielding themſelves to juſtice. For if they could have been taken alive, they muſt have been brought to the king; and if they, for fear of being apprehended, did defend themſelves, they might be ſlain, and their heads brought to the king; for their head was no more to be accounted of than a *wolf's head*. LL. Edw. in Lamb. fol. 127. and Bract. lib. iii. tract. 2. cap. 11. See Caput *lupinum*, and Outlawry.

Wolf-*moneth*, a name given by our Saxon anceſtors to the month of January, on account of the ravages committed by the wolves in that month through the ſeverity of the cold.

WOLFRAM, *ſpuma lupi*, in *Natural Hiſtory*, a refractory mineral, of a black or brown-ſhining colour, of a radiated or foliated texture, in appearance reſembling the ore of tin, and generally found in tin mines. It is moderately hard, and ſometimes ſo brittle as to be eaſily broken between the fingers, but very weighty; its ſpecfiic gravity being 7,119. When ſcratched it exhibits a red trace, whereby it is diſtinguiſhed from TUNGSTEN: and when powdered it is red. It is ſcarcely ſoluble in acids, and very difficult of fuſion.

Wallerius conſiders it as an ore of iron mineraliſed by arſenic, which ſometimes contains tin. According to Cronſtedt, it is a kind of magneſia, or mangaueſe, containing a ſmall portion of iron and of tin. According to Lehman, it conſiſts of ſiliceous earth, calx of iron, and a ſmall proportion of that of tin; and from Lehman's experiments Mr. Kirwan (El. of Min. p. 285.) inclines to think that it contains mangancſe.

WOVERENE. See Glutton.

WOLVES *teeth*, of a horſe, are overgrown grinders, the points of which, being higher than the reſt, prick the creature's tongue and gums in feeding, ſo as to hinder chewing of the meat.

They are ſeldom met with but in young horſes; but if they be not daily worn by chewing, they will grow up even to pierce the roof of the mouth.

There are uſually two of theſe *wolves*-teeth, which are ſmall, and grow in the upper-jaw, next to the great grinding-teeth: theſe are ſo tender and painful, that the horſe cannot chew his meat, but is forced to let a great part of it fall out of his mouth, or ſwallow it half chewed.

The remedy, in this caſe, is to tie up the horſe's head to ſome part of the rafter, and open his mouth with a cord; then, with an inſtrument like a carpenter's gouge, and a mallet, the teeth that are thus troubleſome are to be knocked out, and the holes filled up with ſalt.

If the upper-jaw teeth hang over thoſe of the under-jaw, and by that means cut the mouth, the ſame inſtrument is to be uſed, and the teeth are to be pared ſhorter by little and little. When they are ſufficiently pared down, they muſt be filed ſmooth, and the mouth waſhed with vinegar and ſalt, and the whole complaint will be thus removed.

WOLVES, *rout of*. See ROUT.

WOMAN, FOEMINA, *Mulier*, the female of man.

A *woman*, in England, as ſoon as ſhe is married, with all her moveables, is wholly *in poteſtate viri*, or at the will and diſpoſal of her huſband.

There are divers conſiderable things relating to *women* in the laws of England, which ſee under WIFE.

St. Auguſtine calls *women* the *devout ſex*; at leaſt, this is the common opinion; though others rather think, that in the prayer uſually attributed to that father, and ſtill rehearſed in the Romiſh church to the holy Virgin, the words *intercede pro devoto fœmineo ſexu*, are to be underſtood of *women* devoted, or conſecrated to God in religious houſes; which had been ſufficiently expreſſed by the words, *ora pro populo, interveni pro clero*.

It is a popular tradition among the Mahometans, which obtains to this day, that *women* ſhall not enter paradiſe.

An anonymous author, about the cloſe of the ſixteenth century, publiſhed a little Latin diſſertation, to prove that *women* are not men; that is, are not reaſonable creatures: *Diſſertatio perjucunda, qua anonymus probare nititur* mulieres *homines non eſſe*. He alſo endeavours to prove, what naturally follows from this principle, viz. that *women* ſhall not be ſaved, that there is no future life, or happineſs for them. His proofs are all taken from Scripture, or founded on Scripture. Though, after all, his aim is not ſo much to degrade *women* to the condition of brutes, as to ridicule the principle or method of many Proteſtants, who, in points of controverſy, admit of no proofs or conſiderations but what are taken from Scripture alone. This appears from the concluſion of the work. *Probavi, opinor, invictiſſimis SS. literarum teſtimoniis,* mulierem *non eſſe hominem, nec eam ſalvari: quod ſi non effeci, oſtendi tamen univerſo mundo, quomodo hujus temporis hæretici, & præſertim Anabaptiſtæ, ſacram ſoleant explicare Scripturam, & quo utantur methodo ad ſtabilienda ſua execranda dogmata.*

Yet, Simon Gediccus, a Lutheran divine, wrote a ſerious confutation of this piece in 1595, wherein the *women* are reſtored to the expectation of heaven, on their good behaviour.

The ancient Marcionites allowed their *women* to baptize; as we are aſſured by St. Epiphanius, Hær. 42. cap. 4, the Montaniſts admitted *women* to the prieſthood, and even the epiſcopate, Epiph. Hær. 49. cap. 2. The modern Quakers alſo permit their *women* to preach and propheſy, on an equal footing with the men.

It is a point much controverted, how far learning and ſtudy become the ſex? Eraſmus handles the queſtion at large in one of his letters to Budæus. Lud. Vives, in his Inſtitutio *Fœminæ* Chriſtianæ, has a chapter expreſs on the ſame ſubject. Madam Schurman, a German lady, has gone beyond them both, in a treatiſe on this problem, *Num* fœminæ *Chriſtianæ conveniat ſtudium literarum?*

Several of the *women* remarkable for learning have been alſo diſtinguiſhed for their want of conduct. The reaſon, no doubt, lay in this; that their firſt ſtudies lying in books of gallantry and intrigue, the imagination was early turned that way, and the memory filled with a ſort of ideas, which a favourable diſpoſition, and age, adopted too eaſily, and improved too faſt. It is not that ſtudy in itſelf has any natural tendency to produce ſuch effects; rather the contrary: the cloſe abſtracted reſearches of metaphyſics, logics, mathematics, phyſics, criticiſm, &c. no doubt, would be the ſureſt means to ſecure and eſtabliſh the virtue of continency in a *woman*.

WOMEN, *appeals of*. See APPEAL.

WOMEN, *jury of*. See *Jury of* MATRONS.

WOMEN, *ſtealing*, or *ſeduction of*, is puniſhable by the ſtatute 4 and 5 Ph. & Mar. cap. 8. which enacts, that if any perſon above the age of fourteen, unlawfully ſhall convey or take away any *woman* child unmarried (which is held to extend to baſtards as well as to legitimate children) within the age of ſixteen years, from the poſſeſſion and againſt the will of the father, mother, guardians, or governors, he ſhall be impriſoned two years, or fined at the diſcretion of the juſtices: and if he deflowers ſuch maid or *woman* child, or, without the conſent of parents, contracts matrimony with her, he ſhall be impriſoned five years, or fined at the diſcretion of the juſtices, and ſhe ſhall forfeit her lands to her next of kin, during the life of her ſaid huſband. But this latter part of the act is now rendered almoſt uſeleſs, by proviſions of a very different kind, which make the marriage totally void, in the ſtatute 26 Geo. II. cap. 33. See MARRIAGE. See alſo FORCIBLE *Abduction*, RAPE, and RAVISHMENT.

WOMB, *Matrix*, or *Uterus*, in *Anatomy*, that part of the female of any kind, wherein the fœtus is conceived, and nouriſhed till the time of its delivery.

The ancient Greeks called the *matrix*, μητρη, from μητηρ, *mother:* whence diſorders of the womb are ſtill frequently called *fits of the mother*. They alſo called it υϛηρα, as being the laſt of the entrails, by its ſituation. Sometimes they alſo called it φυσις, or *natura*; and *vulva*, from *volvo, to fold*, or *envelope*, or from *valvæ, doors.*

The *womb* in women is ſituate in the pelvis, or capacity of the hypogaſtrium, between the urinary bladder and the inteſtinum rectum, and reaches as far as the flanks: it is ſurrounded and defended by very ſtrong bones; before, by the os pubis; behind, by the ſacrum; on each ſide, by the ilium and iſchium. It is a body inwardly hollow, outwardly of a whitiſh colour, of a pretty ſolid ſubſtance, and, except in time of pregnancy, in figure ſomewhat like a flat flaſk, or dried pear. In women with child it expands, and receives different forms, according to the different times and circumſtances of geſtation. It has ſeveral coats, arteries, veins, nerves, and ligaments; and is interwoven with ſeveral different kinds of fibres.

Anatomiſts divide the *womb* or *matrix* into the *fundus*, and *cervix*; a broad part, and a neck. Its ſituation is oblique, the fundus being turned backward and upward, the neck forward and downward; the broad ſides lie next the rectum and bladder, and the narrow ſides are lateral. It is in extent, from the extremity of the one to that of the other, about three inches in length; its breadth at the fundus is about two, and ſcarcely one at the other end, and its thickneſs one inch. It has but one cavity, unleſs we diſtinguiſh between the cavity of the uterus, and that of its neck. The cavity of the *uterus* is flat, and reſembles an oblong triangle, the ſhorteſt ſide of which anſwers exactly to the fundus, and the two longeſt ſides lie, one on the right hand, the other on the left, and they are all bent inward or toward the cavity formed by them. Of the three angles of this cavity, the two which terminate the fundus are perforated each by a narrow duct, which with difficulty admits a hog's briſtle. The third angle forms a flat duct wider than the former, which perforates the neck of the *uterus* lengthwiſe, and terminates at the extremity of that neck, by a tranverſe opening. At the bottom of the neck, towards the fundus, it grows very narrow in virgins, ſo that only a ſmall ſtilet can be paſſed through it: the extremity of it is called the *oſculum internum*. In pregnant women it opens, more eſpecially toward the time of delivery. At the edge of this orifice are ſeveral ſmall holes, anſwering to the ſame number of glandular corpuſcles which diſcharge a viſcid lympha. The other and lower orifice of the neck, towards the vagina, called *oſculum externum*, is a little prominent, reſembling, in ſome meaſure, the glans of the virile organ. See *Tab. Anat.* (*Splanch.*) *fig.* 9.

The inner ſurface of the cavity of the *womb* is lined by a very fine membrane, which at the fundus is ſmooth and even, but in the narrow portion that leads to the orifice, it is wrinkled in a particular manner. That portion of this membrane, which covers the bottom of the cavity, is perforated by a great number of holes, throughout which paſs ſmall drops of blood, when the *womb* is compreſſed; and it ſometimes appears to have very ſmall hairs or villi; and both the villi and holes are obſerved to be more or leſs tinged with blood, in thoſe women who die in the time of their menſes. In the narrow part, each ſide is divided into two lateral parts, by a kind of prominent longitudinal line, which is larger in the upper or anterior ſide than in the lower or poſterior. On each ſide of theſe longitudinal lines, there are lines or rugæ obliquely tranſverſe; between and round which there are ſmall lacunæ, through which a mucilaginous fluid is diſcharged that cloſes the orifice of the *uterus*.

The ſubſtance of the *womb* is membranous and carnous: it conſiſts of three tunics; or according to ſome, who deny that name to the middle ſubſtance, of two only. The external tunic, called alſo *communis*, is derived from the peritonæum, and conſiſts of two lamellæ; the exterior of which is pretty ſmooth, the interior rugged and uneven: this membrane inveſts the whole *matrix*, and connects it to the inteſtinum rectum, bladder, &c. The middle tunic is very thick, and compoſed of ſtrong fibres, variouſly diſpoſed; ſome think it contributes to the excluſion of the fœtus, though others imagine, it ſerves only to recover the tone of the part, aſter any violent diſtention. The inner tunic is nervous.

The *womb* is connected by its neck to the vagina; behind, by its outward common membrane; and before, by the ſame to the bladder; its ſides are tied to other parts; but the fundus is left looſe, that it may expand and dilate more freely. Its ligaments are four, two of which are called *broad*, and two *round*, from their figure. The broad ligaments are membranous, looſe, and ſoft; whence they have been compared by ſome to the wings of bats, and called *alæ* VESPERTILIONUM. The round ligaments are of a firmer texture, and conſiſt of a double membrane, wrapped up in its arteries, veins, nerves, and lympheducts. Theſe run in the great duplicature of the broad ligaments, from each corner of the fundus uteri as far as the annular openings of the abdominal muſcles. See LIGAMENT.

The blood-veſſels, both in theſe and the round ligaments, interwoven and connected together by a fine cellular ſubſtance, make a great part of what is called their *ſubſtance*. Theſe, as well as the others, ſerve to keep the *womb* in a right poſition; and are very liable to be injured by unſkilful midwives.

On each ſide of the fundus of the *womb*, ariſes a duct, which opens into the *womb* with a ſmall orifice; but in its progreſs enlarges, and towards the end is contracted again: at the end next the ovaria, which is at liberty, it expands again into a kind of foliage fringed round; which expanſion Fallopius, the firſt diſcoverer, imagined like the end of a trumpet; whence he called the whole duct, *tuba*. It conſiſts of a double membrane. Both veins and arteries are very numerous in theſe tubes, eſpecially the latter, which, by various ramifications and contorſions, make the main ſubſtance of them. Dr. Wharton gives them valves; but other anatomiſts diſallow that. See FALLOPIAN *Tubes*, OVARY, and SPERMATIC.

Several bundles of muſcular fibres enter the ſtructure of the *womb*. The innermoſt of theſe, being diſpoſed in a vortical or turbinated manner, gave occaſion to M. Ruyſch to deſcribe them particularly by the name of muſculus uteri orbicularis; which orbiculary muſcle Mr. Monro ſays, he has alſo ſeen. Vide Med. Eſſ. Edinb. vol. ii. p. 128. and Ruyſch, Epiſtolæ de Muſc. in Fund. Uteri.

The human uterus has numerous orifices of veſſels opening into its cavities, to pour out liquors there.

Towards the fundus of the *womb* eſpecially, theſe orifices are found to be the extremities of canals that come out from larger cavities, lodged within the ſubſtance of the *womb*. Theſe cavities are commonly called ſinuſes. See SINUS *of the Womb*.

The nerves of the *uterus* proceed from the lumbares ſacri, and ſympathetici maximi; the lymphatic veſſels run chiefly in the coats continued from the peritonæum.

It is a queſtion among anatomiſts and phyſiologiſts, whence the cavity in the *womb* is formed, which in the laſt months contains the infant, the greateſt part of the waters, and all the ſecundines, except the placenta? As to which, the curious may conſult the learned Dr. Thomas Simpſon's Diſſertation in the Med. Eſſ. Edinb. vol. iv. art. 13.

It is the opinion of Boyle (Diſſertationes Medicæ), that as in the earth, which is the fruitful *womb* of all the ſeeds of plants, ſo in the *wombs* of all animals, while in a fit and proper ſtate for conception, there muſt concur three things; a benign heat to cheriſh, a due fermentation to agitate and dilate, and a due proportion of moiſture, ready to enter with eaſe into the pores opened by the fermentation.

To theſe qualities is owing in all probability the menſtrual diſcharge of women, the blood being agitated and rarefied, in a part deſtined to theſe offices, for the uſe of an included fœtus; and when that is not there, this fluid ſwells, and opens the veſſels, ſo as to burſt out into a profluvium. It is remarkable that the *womb* in the human, and one more ſpecies of animal beſide, that is, the monkey, diſcharges this blood regularly; all other animals, at the time of the efferveſcence in that part, which is at intervals of longer periods, diſcharging only a ſmall quantity of an aqueous matter, as is ſeen in mares, cows, &c. It is obſerved by the medical writers, that there is an evident conſent of many parts of the body with the *womb*, that is, ſeveral parts which are always affected with it, and owe their being affected to ſome diſorder in that part, which it propagates and continues to them.

WOMB, *dropſy of the*. See DROPSY.

WOMB, *falling down of the*. See PROCIDENTIA *uteri*.

WOMB, *inflammation of the*. See INFLAMMATION.

WOMB, *ſuffocation of the*. See SUFFOCATION.

WOMB, *ulcers of the*. See ULCERS.

WONDER. See MIRACLE.

The *ſeven wonders of the world*, as they are popularly called, were the *Egyptian pyramids*; the *mauſoleum*, erected by Artemiſia; the *temple of Diana* at Epheſus; the *walls* and *hanging gardens* of the city of Babylon; the *coloſſus*, or brazen image of the ſun at Rhodes; the *ſtatue of Jupiter Olympius*; and the *pharos*, or watch-tower, of *Ptolemy Philadelphus*: inſtead of the latter ſome reckon the royal palace of Cyrus, built by Menon, the ſtones of which were cemented with gold. See PYRAMID.

WONDERFUL *water*. See WATER.

WOOD, *lignum*, a ſubſtance, whereof the trunks and branches of trees conſiſt; deriving its growth from certain juices in the earth.

The *wood* is all that part in a tree, included between the bark and the pith.

Dr. Grew, in his Anatomy of Plants, has diſcovered, by means of the microſcope, that what we call *wood* in a vegetable, notwithſtanding all its ſolidity, is only an aſſemblage of infinite minute canals, or hollow fibres; ſome of which riſe from the root upwards, and are diſpoſed in form of a circle; and the others, which he calls *inſertions*, tend horizontally from the ſurface to the centre; ſo that they croſs each other, and are interwoven like the threads of a weaver's web.

The ſtructure and organization of *wood* are a ſubject on which many have employed their thoughts; but perhaps none with greater ſucceſs than the celebrated monſieur Buffon, of the Royal Academy of Sciences at Paris, 1740. This gentleman obſerves, that the organization of *wood* is yet unknown in all its parts; and that though the world is greatly indebted to the obſervations of Grew, Malpighi, and Hales, yet when he entered on the ſubject, he found there was much more unknown than known, and determined to obſerve from its firſt ſtate, the growth of trees, and the formation of their *woody* part.

The ſeed of a tree, ſuppoſe an acorn, if put into the earth in the ſpring ſeaſon, produces, after a few weeks, a tender ſhoot, of an herbaceous ſtructure, which enlarges, extends itſelf, and hardens by degrees, and in the firſt year's growth, has in it a ſlender filament of a *woody* ſubſtance. At the extremity of this young tree there is a little button formed, which opens the next year into leaves, and from which there is propagated a ſecond ſhoot, in all reſpects like that of the firſt year, except that it is more vigorous, grows faſter, and hardens much more conſiderably. This is alſo terminated by a button like that of the precedent year, and in this is contained the ſhoot of the third year; and in this manner is the growth of the tree carried on, till it has acquired its whole height.

Each of theſe buttons is a ſort of ſeed, which contains the ſhoot of the ſucceeding year, juſt as the ſeed itſelf did that of the firſt: and the growth of a tree in height is carried on therefore by a ſeries of annual productions, exactly like one another, and the full-grown tree is, though perhaps a hundred feet high, compoſed only of a number of ſhort trees, joined end to end, the longeſt of which is not above two feet in length. Theſe little trees of the ſeveral years never at all alter their height or length, or even their thickneſs; they remain even in a tree of a hundred years old, of their original length and diameter, and ſuffer no change, but in becoming harder. This then is the manner in which trees grow in height; how they grow in thickneſs is next to be enquired into.

The button, which makes the ſummit of the tree of the firſt year, draws its nouriſhment through the very ſubſtance of that little tree; but the principal tubes or veſſels, which ſerve to convey the ſap, are placed between the bark and the *woody* filament.

The action of this ſap, in moving, dilates and enlarges theſe veſſels, while the button, in raiſing itſelf up in growth, elongates them; the ſap alſo, in continually paſſing them, leaves behind it certain fixed parts, which augment the ſolidity. Thus the ſecond year's little tree contains in its middle a *woody* filament in form of an elongated cone, which is the production of the *wood* of a former year, and a *woody* bed for it, which is alſo of a conic ſhape, and which ſurrounds the firſt filament, and reaches beyond it in length; and this is the production of the ſecond year. The third bed forms itſelf altogether like the ſecond, and all the ſucceeding ones are formed by the ſame law, and in the ſame order, and envelope one another in a continued ſucceſſion or ſeries, ſo that a large tree is compoſed of a number of *woody* cones, which enfold, cover, and envelope one another, as the tree increaſes in thickneſs.

When the tree comes to be cut down, one eaſily counts, in a tranverſe ſection of the trunk, the number of theſe cones, the ſections of which make ſo many concentric circles; and the age of the tree is known by the number of theſe circles, for they are diſtinctly ſeparate from one another; in a vigorous and well-grown oak, theſe lines are each of a ſixth of an inch or more in thickneſs, and the ſubſtance of theſe lines or circles is very hard and firm, but the ſubſtance of the *wood*, which lies between, and unites theſe to each other, is much leſs ſo. This intermediate matter is always the weak part of the *wood*, and its ſtructure and organization are perfectly different from that of the *woody* cones, and depend entirely on the manner in which thoſe cones are united to one another. This is thus explained:

The veſſels which are longitudinally diſpoſed in the *wood*, and convey the nouriſhment to the button, not only are extended and hardened by the action of the ſap in motion, and by the firm particles it depoſits; but they are ever attempting alſo an extenſion of another kind; they are ramified all along as they go, and break into numberleſs extremely minute filaments, which iſſue from them like ſo many branches; theſe, on the one part, are deſtined to the production of the bark of the tree; and on the other, are connected to the *wood* of the preceding year, and form between the two *woody* beds a ſort of ſpongy reticular work, which, when cut tranſverſely, even to a great thickneſs, ſhews numberleſs little cavities and holes, reſembling a ſort of lace-work. The *woody* beds are therefore united to one another by a ſort of net-work; this net-work, however, does not occupy nearly the ſpace of the *woody* circles which it ſeparated, and is uſually indeed but about a ſixth part of their thickneſs. This thickneſs is much the ſame in all the trees of the ſame ſpecies, whereas the *woody* beds vary in them very conſiderably in thickneſs; in the oak they are found from a ſixth to a four-and-twentieth part of an inch in thickneſs.

By this expoſition of the texture of *wood*, it is eaſy to diſcover that the longitudinal coherence of the particles of it muſt needs be vaſtly greater than the tranſverſe: one ſees alſo that, in little pieces of *wood*, as in a bar of an inch thickneſs, if there are fourteen or fifteen of theſe *woody* beds, there will alſo be thirteen or fourteen of theſe intermediate ſpaces; and conſequently it will be much weaker than if there were but five or ſix of theſe *woody* beds in it, and conſequently but four or five of theſe intermediate ſpaces.

It may alſo be obſerved, that in thoſe little bars of *wood* there are two or three of the *woody* beds wounded, which is often the caſe; the ſtrength of the bar muſt be thence greatly impaired; but the greateſt fault theſe ſmall pieces of *wood* are ſubject to, is the different diſpoſition of theſe beds in the different parts of the ſame tree; and this difference is ſo great, that the force or ſtrength of a large beam of any *wood*, cannot be computed by proportion, from that of a ſmall piece of the ſame *wood*; which, were it poſſible, would make calculations of this kind extremely eaſy. The ingenious author of this paper has from hence calculated the force and ſtrength of timber uſed in building. See TIMBER.

All kinds of *wood* are to be preſerved from the worm, and from many other occaſions of decay, by oily ſubſtances, particularly the eſſential oils of vegetables. Oil of ſpike is excellent, and oil of juniper, turpentine, or any other of this kind, will ſerve the purpoſe; theſe will preſerve tables, inſtruments, &c. from being eaten to pieces by theſe vermin, and linſeed-oil will ſerve in many caſes to the ſame purpoſe; probably nut-oil will do alſo, and this is a ſweeter oil, and a better varniſh for *wood*.

The ingenious Dr. Hales, whoſe attention was uniformly directed to ſchemes of domeſtic or national benefit, was induced by the great damage done to ſhipping by worms to propoſe various methods for preventing it. Oily, unctuous materials, he apprehends, are not likely to penetrate deep into oak, which has a watery ſap; but oil is known to penetrate far into fir, and to give it a very conſiderable degree of toughneſs. He therefore propoſes to mix with oil applied to the fir-boards with which ſhips are ſheathed ſome ingredient that is diſagreeable to the worms; and he apprehends that a ſmall proportion of verdigriſe uſed in the operation of paying would be of great ſervice: or if copper-filings were mixed with the paying, ſea-water would turn them into verdigriſe. It might be uſeful to ſoak planks in water ſtrongly impregnated with verdigriſe.

Mr. Reid recommends the trial of the acid juice of tar, prepared either with copperas or oker, for preſerving ſhips either from rotting or worms.

In the Eaſt Indies it is ſaid they have an effectual way of preventing worms from deſtroying their ſhips, by paying them firſt with a mixture of muſtard, oil, and lime of ſhells, and hog's blood: they then ſheath the ſhip, and renew it after ſome years.

The following receipt has been recommended by a perſon, who never knew it fail of ſucceſs. Take 100lb. of the fineſt pitch; melt it over a ſlow fire of coal, and add to it, when melted, 30lb. of roll brimſtone groſly bruiſed, and boil the whole till 30lb. are waſted. The matter thus prepared muſt be kept in caſks in a dry place; and when it is to be uſed, melt 100*lb.* of it, and add gradually 35lb. of brick-duſt or marble-duſt ſifted, and well beaten. The compoſition, when uſed, muſt be very hot, and the boards dry.

An ingenious ſhip-builder obſerves, that turpentine and brimſtone form the beſt compoſition he has met with, and comes home from a voyage with leaſt damage.

Eaſt India ſhips are firſt ſheathed, and that SHEATHING is filled with ſmall broad-headed nails, which is a ſafe and effectual defence from the worms, and ſoon becomes a continued cake of ruſt, and not liable to be damaged by cables or common accidents. See PAY, and SHIPS.

The following, ſays Dr. Hales, is an approved method of preſerving the boards and timber of out-door work: viz. melt 6lb. of pitch, and add, by ſifting, 1lb. of dried brown Spaniſh or whiting, and a quart of linſeed oil. Hale's Ventilators, part i. p. 164. part ii. p. 289, &c.

Dr. Lewis obſerves that, though tar has been uſed for preſerving *wood*, and alſo for coating common tiles, in imitation of the black glazed tiles, which are ſold at a much higher price, both tar and pitch are of themſelves too ſoft for theſe intentions, being liable to be melted off by the ſummer heat: and, therefore, different powdery ſubſtances, as aſhes, ochres, and other mineral pigments, have been mixed with them.

In the Swediſh Tranſactions for 1742 and 1740, two compoſitions are recommended, which are ſaid to be firm, durable, and gloſſy. One is prepared by melting the tar over a gentle fire, ſo as to make it fluid but not to boil, and ſtirring in as much coal-duſt or powdered charcoal as will render it thick: the other is prepared by mixing the melted tar with a ſufficient quantity of lamp-black. Coatings formed of theſe mixtures are, however, liable to be conſiderably ſoftened by the heat of the ſun. The mixture of powdered pit-coal and melted tar, made of ſuch a conſiſtence as to be freely ſpread while warm with a bruſh, is leſs liable to ſoften than either of the other two. The TAR obtained from coal, in the method lately diſcovered by the earl of Dundonald, appears from various teſtimonies of thoſe who have tried it to be much better calculated to preſerve *wood* and iron, as well on land as in water, than vegetable tar. It has alſo this peculiar advantage, that it will not admit or harbour thoſe worms that are ſo injurious to the bottoms of ſhips at ſea. See an Account of the Qualities and Uſes of Coal and Coal-varniſh, &c. by the earl of Dundonald. 8vo. 1785.

Dr. Lewis obſerves, that the coating or painting of *wood* does not in all caſes contribute to its preſervation: unleſs the *wood* be very thoroughly dry, eſpecially thoſe kinds of *wood* whoſe juices are not oily or reſinous, the painting, by confining the watery ſap, haſtens the corruption. Com. Phil. Techn. p. 363, &c. See *Preſerving of* TIMBER.

Some of the Weſt Indian trees afford a ſort of timber which, if it would anſwer in point of ſize, would have great advantages over any of the European *wood*, in ſhip-building for the merchant-ſervice, no worm ever touching this timber. The acajou, or tree which produces the caſhew-nut, is of this kind; and there is a tree of Jamaica, known by the name of the *white-wood*, which has exactly the ſame property, and ſo have many other of their trees. Phil. Tranſ. Nº 36.

To ſeaſon *wood* expeditiouſly for ſea-ſervice, it has been uſual to bake it in ovens.

The art of moulding *wood* is mentioned by Mr. Boyle as a deſideratum in the art of carving. He ſays he had been credibly informed of its having been practiſed at the Hague; and ſuſpects that it might have been performed by ſome menſtruum that ſoftens the *wood*, and afterwards allows it to harden again, in the manner that tortoiſe-ſhell is moulded. Or, perhaps, by reducing the *wood* into a powder, and then uniting it into a maſs with ſtrong but thin glue. And he adds that, having mixed ſaw-duſt with a fine glue made of iſinglaſs, ſlightly ſtraining out what was ſuperfluous through a piece of linen, the remainder formed into a ball and dried, became ſo hard as to rebound when thrown againſt the floor. Works abr. vol. i. p. 130. See GLUE.

The people who work much in *wood*, and that about ſmall works, find a very ſurpriſing difference in it, according to the different ſeaſons at which the tree was cut down, and that not regularly the ſame in regard to all ſpecies, but different in regard to each. The button-mould-makers find that the *wood* of the pear-tree, cut in ſummer, works tougheſt; holly, on the contrary, works tougheſt when cut in winter; box is melloweſt when it has been cut in ſummer, but hardeſt when cut about Eaſter; hawthorn works mellow when cut about October, and the ſervice is always tough if cut in ſummer. Merret's Notes on Neri, p. 263.

It is a very well known quality of metals, to be longer and larger when hot, and ſhorter and ſmaller when cold; a thouſand experiments prove this, and the books of experimental philoſophy have ſufficiently expatiated upon it; on the contrary, it is found to be the property of *wood*, that it is longeſt in cold weather and ſhorteſt in hot; this change is owing to the remains of the ſap yet in the *wood*, which being condenſed by cold, is enlarged in its ſurface, as all liquors are, when frozen into ice; and ſhrinks into a leſs ſpace or bulk again, when liquated by heat.

It follows from this, that all *wood* muſt change it sſurface more or leſs, according as it contains more or leſs ſap, and this may be made a teſt of great uſe for the determining what kinds of *wood* have moſt, and what leaſt ſap. This would be a very valuable piece of knowledge, ſince there are many uſes for which that ſort of *wood* muſt always ſerve beſt, which has the ſmalleſt quantity of ſap remaining in it. See HYGROSCOPE.

Thus, in the great article of preſerving of FLOUR, no barrels are at preſent uſed but thoſe of ſeaſoned dry oak; the whole advantage of this *wood* is, that it contains leſs ſap than others; for the ſap in the *wood* makes the flour damp, and it then becomes rancid, and breeds worms. See MEAL. So that if any other *wood* can by this means be found out to contain leſs ſap, when dried in the common way, than oak does, it will be ſo much the better for this purpoſe; or if a cheaper *wood* ſhould be found only to contain as little ſap as the oak, it would do as well, and the price of oak would be ſaved in theſe veſſels.

A proper way of trying when the ſap was ſufficiently exhaled out of trees, might alſo be found by this experiment, and much benefit would accrue from it; for our ſhips, when made of timber not ſufficiently dried, prove injurious to the health of people on board; and it has been remarked, both by the French and ourſelves, that many more men in general die in the firſt voyage of a new ſhip than in the ſame time in an old one; and indeed the firſt ſix months are uſually obſerved in this caſe to be moſt fatal. The exhalation of the ſap from the *wood* of the veſſel is certainly the occaſion of this, and if it could be contrived to have this ſap properly exhaled before the timber was uſed, it would not only prevent this mortality among the men, but the veſſel itſelf would be the ſounder, and the better for it. Deſlandes, Trait. De Phyſ.

Woods are diſtinguiſhed into divers kinds, with regard to their natures, properties, virtues, and uſes. Of wood, conſidered according to its qualities, whether uſeful, curious, medicinal, &c. the principal is that called TIMBER, uſed in building houſes, laying floors, roofs, machines, &c.

Woods valued on account of their curioſity, are *cedar*, *ebony*, *mahogany*, *walnut-tree*, *box*, *calambo*, &c. which, by reaſon of their extraordinary hardneſs, agreeable ſmell, or beautiful poliſh or grain, are made into cabinets, tables, combs, beads, &c.

The *medicinal woods* are, *guaiac*, which the Spaniards call *ligno ſancto*; *aloes*, or *agallochum*; *ſaſſafras*, *nephriticum*, *ſantal*, *logwood*, *aſpalathum*, *eagle-wood*, or *pao d' aquila*, &c.

Woods uſed in dying, are the *Indian wood*, *Brazil*, *Campeche*, &c.

Wood uſed for fuel is required of various kinds, in regard to the various works to be performed by it.

Neri every where commends oak for the *wood* to be burnt in the glaſs-houſes, as the propereſt *wood* for making a ſtrong and durable fire with a good flame.

Imperato, on the contrary, commends aſh on the ſame occaſion; becauſe, as he ſays, it gives a ſubſtantial rather than a great flame: and Camerarius deſervedly commends juniper *wood*, as affording a laſting, ſtrong, and ſweet fire, could plenty of it be had. Among the ancients, Pliny commends light dry *wood*; and Plutarch, the tamariſk in particular, for making the glaſs-houſe fires; but glaſs-making requires ſo great a fire, as cannot be eaſily made from ſuch *wood*. Nor can aſh be proper, becauſe, though it gives a good fire, it ſoon decays. Merret's Notes on Neri, p. 275.

WOOD, *cord*, denotes *wood* for the fire, generally the branches or loppings of trees, piled up in order. See CORD.

WOOD, *foſſil*, *ſubterraneous*. There are divers places where *wood* is found under ground: ſuppoſed to have been overturned, and buried there from the time of the deluge, or at ſome other period.

Whole trees, or parts of them, are very frequently found buried in the earth, and that in different ſtrata; ſometimes in ſtone, but more uſually in earth; and ſometimes in ſmall pieces looſe among gravel. Theſe, according to the time they have lain in the earth, or the matter they have lain among and in the way of, are found differently altered from their original ſtate; ſome of them having ſuffered very little change, and others being ſo highly impregnated with cryſtalline, ſparry, pyritical, or other extraneous matter, as to appear mere maſſes of ſtone or lumps of the common matter of the pyrites, &c. of the dimenſions, and more or leſs of the internal figure of the vegetable bodies into the pores of which they have made their way.

The *foſſil wood*, which we find at this day, may, according to theſe differences, be arranged into three kinds: 1. The leſs altered. 2. The pyritical. And, 3. The petrified.

Of the trees or parts of them leſs altered from their original ſtate, the greateſt ſtore is found in digging to ſmall depths in bogs, and among what is called peat or turſ-earth, a ſubſtance uſed in many parts of the kingdom for fuel. In ſome places there are whole trees ſcarcely altered except in colour; the oaks in particular being uſually turned to a jetty black: the pines and firs remain as inflammable as ever, and often contain between the bark and *wood* a plain reſin. Parts of trees have been alſo found unaltered in the ſtrata of clay and loam, among gravel, and ſometimes even in ſolid ſtone. See *Foſſil* PLANTS, and *Bog* WOOD.

It is idle to imagine, that theſe have been thus buried either at the creation, or, as many are fond of believing, at the univerſal deluge: at the firſt of theſe times the ſtrata muſt have been formed before trees were yet in being, and the peat *wood* is ſo far from being of antediluvian date, that much of it is well known to have been growing within theſe three hundred years, in the very places where it is now found buried. See MORASS.

The ſubſtances that are more altered are the larger and longer branches of trees found bedded in the ſtrata of ſtone, and partly aſſuming its nature; and the ſhorter and ſmaller branches found in pits of blue clay, which externally bear the reſemblance of what they once were, but, having their pores filled with the matter of the common vitriolic pyrites, internally appear to be maſſes of that matter.

The irregular maſſes or fragments of *wood* are principally of oak, and moſt uſually found among gravel, but variouſly altered by the inſinuation of cryſtalline and ſtrong particles. Theſe make a beautiful figure when cut and poliſhed, as they commonly keep the regular grain of the *wood*, and ſhew the ſeveral circles which mark the different year's growth. Theſe, according to the different matter which has filled their pores, aſſume various colours, and the appearance of the various foſſils that have impregnated them. Of theſe ſome pieces have been found with every pore filled with pure pellucid cryſtal, and others in large maſſes, part of which is wholly petrified, and ſome mere ſtone, while the reſt is crumbly and unaltered *wood*.

All theſe pieces of *petrified wood* are uſually capable of a high and elegant poliſh. Hill's Hiſtory of Foſſils, p. 638, &c.

Wood has been found in ſalt-mines, incloſed in a maſs of hard ſalt, and its pores filled with the matter of the ſalt in which it lay. *Wood* has likewiſe been found converted as it were into iron, or thoroughly impregnated with the particles of this metal. Act. Erud. ann. 1710.

WOOD, *petrified*: the opinions of the judicious part of the world have been very different in regard to the bodies preſerved in the cabinets of the curious, under the name of *petrified wood*; ſome affirming theſe bodies to have been only pebbles, or flints accidentally formed in this ſhape, and with veins reſembling thoſe of the *wood*; and others affirming, with equal warmth, that they have been really *wood*, into which ſtony matter has been brought by water.

Many ſubſtances, it is certain, have been preſerved in the cabinets of collectors, under the title of petrified *wood*, which have very little right to that name. But where the whole outer figure of the *wood*, the exact lineaments of the bark, or the fibroſe and fiſtular texture of the ſtriæ, and the veſtiges of the utriculi and tracheæ or air-veſſels are yet remaining, and the ſeveral circles yet viſible, which denoted the ſeveral years growth of the tree, none can deny ſuch ſubſtances to be real *foſſil wood*.

Many good arguments have been produced on both ſides the queſtion, but Mr. De la Hire has attempted to bring the diſpute to a certain concluſion, by means of ſome peculiarly happy ſpecimens, which were of the palm-tree petrified, found in the deſarts of Africa: theſe on comparing them with pieces of the palm-tree cut out of the recent *wood*, appeared to have every where the beautiful and regular veins of that *wood*, and left no room to doubt, but that they certainly had been once the vegetating *wood* of that tree, though now converted into hard ſtone; the petrified pieces were perfect ſtone, in all its qualities; they had its hardneſs, its ſound when ſtruck upon, and were, as many other ſtones are, opake in ſome places, and tranſparent in others; they were found on weighing them to be often of the ſpecific gravity of recent pieces of the palm *wood*, of the ſame dimenſions.

Father Duchat alſo, an author of unqueſtioned credit, affirms, from his own perſonal knowledge, that in the kingdom of Ava there is a river, whoſe waters petrify recent *wood* into flint; and that he has often ſeen trees ſtanding in it, whoſe bottom part, ſo far as covered with the water, has been true flint, while all above was mere dry *wood*, and fit for firing. Mem. Acad. Par. 1692.

Wood, *ſhining*. There are a great many things in which a piece of rotten *wood* that ſhines in the dark, agrees with a burning coal; and there are alſo many things, in which they differ. They agree in theſe particulars: 1. They have light reſiding in them, and are not like bodies which are only luminous according to the quantity of light which falls upon them from other bodies, and which they reflect. 2. Both ſhining *wood* and burning coals require the preſence of the air to keep them ſhining, and both require alſo an air of a conſiderable denſity; and both having been deprived of their ſhining quality by the pumping out of the air, will recover it again on the admitting of freſh air to them. 3. Both of them will eaſily be quenched by putting them into water, and many other liquors. And, 4. As a live-coal will not be extinguiſhed by any coldneſs of the air, neither will the *ſhining wood* be deprived of its light on any additional coldneſs in that element.

However, they differ in the following particulars: 1. A burning coal is eaſily put out by compreſſion, the treading on it and ſqueezing it together readily diveſting it of its light; on the other hand, compreſſion or cruſhing of any kind ſeems not to have any effect upon the *ſhining wood*; its bruiſed parts ſhining as brightly as its entire ones. If a piece of this *ſhining wood* be ſqueezed between two glaſſes, this experiment will be moſt fairly tried; and in this caſe, though the contexture of the whole be evidently broken, and the parts ſeparated, the light is as ſtrong in them as while the piece was entire. 2. A burning coal extinguiſhed by the drawing out of the air, will after a few minutes, be irrecoverable, on the admiſſion of air in any manner; but, on the contrary, the *ſhining wood*, when thus extinguiſhed and kept extinct for half an hour, will be immediately re-kindled on admitting the air to it. 3. A live coal, included in a ſmall glaſs, will continue ſhining but a few minutes; but a piece of *ſhining wood*, in the ſame circumſtances, will continue bright for ſeveral days. 4. The coal, while it burns, ſends forth ſmoke and other exhalations; the rotten *wood* ſends out none, and conſequently a coal all the while that it is ſhining waſtes itſelf at a great rate; but the rotten *wood* does not waſte itſelf at all. And finally, the burning coal is actually and vehemently hot; the rotten *wood*, though it ſhines, is not ſo much as warm. Phil. Tranſ. N° 32.

The light of ſhining fleſh and fiſh, when putrefied, is wholly of the ſame nature with that of rotten *wood*, as to its dependence on the air for its ſplendor; and in the ſame manner loſes its light in the exhauſted receiver, and regains it on the admiſſion of the air into it again, in the ſame ſudden manner. Phil. Tranſ. N° 31. See LIGHT, and PUTREFACTION.

Wood, *bog*, or *ſubterraneous*, a name given by the inhabitants of many parts of this kingdom to ſuch *wood* as is found buried in the earth in boggy places, and which is found hard and ſtrong at this time. See *Foſſil* WOOD, *ſupra*.

We have in the Philoſophical Tranſactions (N° 275. p. 983, &c.), an account of vaſt quantities of this ſort of *wood* found under ground in Hatfield Chace. Many of the roots and bodies of trees are found there; which are of all growths, and are moſtly ſuch trees as are the growth of our own ſoil, ſuch as oaks, firs, birch, beech, yew, holly, willow, aſh, and the like. The roots of all theſe trees ſtand in their natural poſitions as when growing, and ſtand as thick together as they could grow in a foreſt. The bodies are uſually broken off, and laid all along juſt by them.

The large trees are uſually found fallen in a north-eaſt direction, and the ſmaller ones lying all ways; the fir-tree or pitch-tree is more common than any other kind, and is found ſometimes of twenty, thirty, and thirty-five yards long, and ſo ſound and firm that many of them have been ſold to make maſts for ſhips. Oaks have been found of the ſame length, though wanting ſome yards of their natural tops; theſe have been ſold at ten or fifteen pounds a-piece, and are as black as ebony, and very ſound and laſting in whatever ſervice they are put to. The aſh-trees do not preſerve their firmneſs in this manner, many of them are ſo ſoft that the workman's ſpade cuts through them; and when expoſed to the air, they uſually fall to pieces; but the willows, though a much ſofter *wood* than the aſh, preſerve their texture, and are found very ſtrong and firm. In ſome of the fir-trees it is very obſervable, that they have ſhot out ſide-branches after they were fallen, which have grown into large trees. Many of theſe foſſil trees appear plainly to have been burnt; the fir-trees are particularly very common in this ſtate: and of theſe ſome are burnt quite through, others only on one ſide. Some of theſe alſo have been found with the plain marks of human work upon them; many with their branches chopt off, and their trunks cut into two or three pieces. Some ſquared and others in part cleft, and the *wooden* wedges uſed in cleaving them are ſtill found remaining in the cracks. Stones are found in ſome of them in the place of *wooden* wedges, but in none iron ones. The heads of axes are alſo ſometimes found; they are of a ſtrange form, and ſomewhat repreſent the ſacrificing axes of the ancients. Theſe are found at ſuch depths, that it is impoſſible they ſhould have ever been lodged there ſince the time of this place's being a foreſt; nor ever could have been found, but by means of the ground's being drained by a late invention. The general opinion as to theſe trees is, that they were buried in this manner at the time of the univerſal deluge; but they are plainly of later origin, as foſſils, the coins of ſome of the Roman emperors having been found buried under them.

The earth of bogs is not the only ſoil that preſerves theſe trees; for in the low parts of Lincolnſhire between the towns of Burningham and Brumley, there are ſeveral large hills compoſed only of looſe ſand, and as this blows away there are continually diſcovered whole trees, or parts of trees, and particularly the roots and ſtumps of firs, and ſome other kinds, all with the marks of the axe upon them, and looking as freſh as if done but yeſterday. Under theſe hills and in the bogs before mentioned, not only the *wood* of the fir-tree, but its cones are found in immenſe number; many buſhels being often laid in a heap together. In cutting a drain for a river of a conſiderable depth, there were found at the very bottom ſeveral parcels of cut *wood*, in poles, beams, and the like; the head of an axe was alſo found ſomewhat reſembling the ancient battle-axe, and a coin of the Roman emperor Veſpaſian; but what was yet more remarkable, was, that what they were now ſunk to ſeemed to be the original ſurface, the ground not being looſe, like all above it, but ſound and firm, and lying in ridges and furrows, with the evident marks of having formerly been ploughed. So that all the bog-earth above ſeems plainly to have been added ſince; and that the foſſil *wood*, ſuppoſed of antediluvian origin, is but of the time of the ancient Romans, or leſs than that.

All the bogs in this kingdom afford in like manner foſſil trees; and not only thoſe, but other places, have at all times accidentally diſcovered them. Giraldus Cambrenſis tells us, that ſo long ſince as in king Henry the Second's time, the ſands on the ſhores of Pembrokeſhire were driven off by peculiar ſtorms and tempeſts, and that deep under thoſe ſands there were then diſcovered great numbers of the roots and bodies of trees in their natural poſtures; and many of theſe had the ſtrokes of the axe upon them, the marks at that time remaining as plain as when firſt made. Some of theſe reſembled ebony; and many other ſuch trees were diſcovered at Neugall in the ſame county, in the year 1590. Camden tells us of ſuch *wood* found in the bogs in Somerſetſhire, Cheſhire, Lancaſhire, Weſtmoreland, Yorkſhire, Staffordſhire, and Lincolnſhire; and ſince his time many other counties have been found to be as fruitful in it. Dr. Plot mentions them in many parts of his Hiſtory of Staffordſhire, and by their ſtanding in their natural poſtures, as to the roots at leaſt, properly concludes, that they certainly once grew there, and were not brought from elſe where.

Dr. Leigh, in his Hiſtory of Lancaſhire, gives an account of the ſame ſort of trees found in the draining of the boggy lands at Martin-Meer; and determines them not to have been of the ancient date many pretend, in referring them to the deluge.

He obſerves, that they are plainly of no older date than the time of the ſavage inhabitants of England, about the time of the Roman conqueſts; for in this place, beſide the roots and bodies of trees and their fruit, there were found eight canoes, or ſmall boats, ſuch as the wild inhabitants uſed at that time. And in another moor in the ſame county, a braſs kettle, with a ſmall mill-ſtone, and ſome beads of wrought amber. In the ſame place were alſo found ſeveral human bodies whole and entire, at leaſt to outward appearance, and the whole head of an hippopotamus or river-horſe. This is perhaps the hardeſt thing to be accounted for of the whole ſet, as to its coming there. The boggy places in Angleſea, and the Iſle of Man, are all full of buried trees of the ſame kind; and the bogs of Ireland abound no leſs with them. England, and its adjacent iſlands, are not the only places where this buried *wood* is found; for Verſtegan tells us, that the moors in the Netherlands abound with them; they all lie north-eaſt as ours do. Helmont alſo mentions the Peel there, a moraſs of eight or nine miles broad, which is full of them. The French naturaliſts tell us of foſſil-trees alſo, in their country; and in Switzerland and Savoy; but all in the low grounds.

Ramazzini tells us, that in the territories of Modena, which are now a dry and fruitful country, yet in the time of the Cæſars were only a great lake, there are found at the depth of thirty, forty, and even fifty feet, the ſoil of a low marſhy country, with ſedges, water-graſs, and other marſh-weeds; and under this there lie the trunks of trees, and their roots ſtand near them in a natural poſture as when growing. Many old coins of the Roman emperors are alſo found there; as alſo ſeveral buſts, wrought marble, and ſquared ſtones, evidently ſhewing the work of ſuch tools as the Romans have been known to uſe. Some of the trees in theſe places ſtand upright. See more on this ſubject under the article MORASS.

WOOD, *cutting in.* See CUTTING.

WOOD, *meaſure of.* See MEASURE.

WOOD, *painting on.* See PAINTING.

WOOD, *ſculpture in.* See SCULPTURE.

WOOD, *ſtack of.* See STACK.

WOOD, *ſtaining of.* See DYING *of Wood*, &c.

Wood may be ſtained yellow, by bruſhing it over ſeveral times with the tincture of turmeric root, made by putting an ounce of the powdered root to a pint of ſpirit, and after it has ſtood ſome days, ſtraining off the tincture. A redder caſt may be given to the colour by adding a little dragon's blood. A cheaper, and leſs bright and ſtrong yellow may be given to *wood* by rubbing it over ſeveral times with the tincture of French berries, made boiling hot; and when the *wood* is dry, bruſhing it over with a weak alum-water uſed cold.

In order render theſe ſtains more beautiful and durable, the *wood* ſhould be bruſhed after it is coloured, and then varniſhed with the ſeed-lac varniſh, or with three or four coats of ſhell-lac varniſh.

For a bright red ſtain for *wood*, make a ſtrong infuſion of Braſil in ſtale urine, or water impregnated with pearl-aſhes in the proportion of an ounce to a gallon; to a gallon of either of which add a pound of the *Braſil wood*. With this infuſion, after it has ſtood, with frequent ſtirring, two or three days, ſtrained and made boiling hot, bruſh the *wood* over till it appears ſtrongly coloured; and while it is wet, bruſh it over with alum-water made in the proportion of two ounces of alum to a quart of water.

For a leſs bright red, bruſh over the *wood* with a tincture made by diſſolving an ounce of dragon's blood in a pint of ſpirit of wine.

For a pink or roſe red, add to a gallon of the above infuſion of *Braſil-wood* two ounces of pearl-aſhes, and uſe it as before: obſerving to bruſh the *wood* over often with the alum-water. Theſe reds may be varniſhed as the yellows.

Wood may be ſtained blue by means either of copper or indigo. The brighter blue may be obtained by bruſhing a ſolution of copper (ſee VERDITER) while hot ſeveral times over the *wood*: and then bruſhing a ſolution of pearl-aſhes in the proportion of two ounces to a pint of water hot over the *wood*. It is ſtained blue with indigo, by bruſhing it with the indigo prepared with ſoap-lees as when uſed by the dyers, boiling hot: and then with a ſolution of white tartar or cream of tartar, made by boiling three ounces of either in a quart of water, bruſhing over the *wood* plentifully before the tincture of indigo be quite dry. Theſe blues may be ruſhed and varniſhed as the reds, if neceſſary.

Wood may be ſtained green by diſſolving verdigriſe in vinegar, or the cryſtals of verdigriſe in water, and with the hot ſolution bruſhing over the *wood* till it be duly ſtained.

A light red brown mahogany colour may be given to *wood* by means of a decoction of madder and fuſtic *wood*, ground in water, in the proportion of half a pound of madder and a quarter of a pound of fuſtic to a gallon, or inſtead of the fuſtic, an ounce of the yellow berries may be uſed. Bruſh over the *wood* with this ſolution, while boiling hot, till the due colour be obtained. The ſame effect may to a conſiderable degree be produced by the tincture of dragon's blood and turmeric root, in ſpirit of wine.

For the dark mahogany, take the infuſion of madder as above, and ſubſtitute for the fuſtic two ounces of logwood: and when the *wood* has been bruſhed over ſeveral times, and is dry, bruſh it over ſlightly with water in which pearl-aſhes have been diſſolved, in the proportion of about a quarter of an ounce to a quart. The *wood*, in the better kind of work, ſhould be afterwards varniſhed with three or four coats of ſeed-lac varniſh; but for coarſe work, with the varniſh of reſin and ſeed-lac, or they may be well rubbed over with drying oil.

Wood may be ſtained purple by bruſhing it over ſeveral times with a ſtrong decoction of logwood and Braſil, made in the proportion of one pound of the logwood and a quarter of a pound of the Braſil, to a gallon of water, and boiled for one hour or more. Let the *wood*, well coloured, dry, and be then ſlightly paſſed over by a ſolution of one dram of pearl-aſhes in a quart of water. A ſolution of gold in ſpirit of ſalt or aqua regia will give a durable purple ſtain to *wood*.

For a deep black the *wood* is bruſhed over four or five times with a warm decoction of logwood, made as above without the Braſil, and afterwards as often with a decoction of galls, made by putting a quarter of a pound of powdered galls to two quarts of water, allowing it to dry thoroughly between the ſeveral applications of the liquors: thus prepared, it receives a fine deep black colour, from being waſhed over with a ſolution of vitriol in the proportion of two ounces to a quart: in the room of which ſome uſe a ſolution of iron in vinegar, keeping the vinegar for this purpoſe upon a quantity of the filings of the metal, and pouring off a little as it is wanted. A pretty good black is alſo obtained, more expeditiouſly, by bruſhing over the *wood*, firſt with the logwood liquor, and afterwards with common ink.

A very fine black may be produced by bruſhing the *wood* ſeveral times over with a ſolution of copper in aqua fortis, and afterwards with the decoction of logwood, repeated till the colour be of ſufficient force, and the greenneſs produced by the copper overcome. Theſe blacks may be varniſhed as the other colours.

Where the ſtains are deſired to be very ſtrong, as in the caſe of *wood* uſed for fineering, it is generally neceſſary it ſhould be ſoaked, and not bruſhed; for which purpoſe the *wood* may be cut into pieces of a proper thickneſs for inlaying. Lewis's Phil. Com. Techn. p. 97. 434. Handmaid to the Arts, vol. i. p. 508, &c.

WOOD, *ſtealing of.* See LARCENY.

WOOD, *ſylva*, in *Geography*, a multitude of trees, extended over a large continued tract of land, and propagated by nature, or without culture.

Many great *woods* only conſiſt of trees of one kind. At Cape Verd in Africa, are *woods* of orange and lemon-trees; in Ceylon, are *woods* of cinnamon-trees; in the Molucca iſlands, *woods* of clove-trees; in the iſlands of Nero, Lontour, Loſgain, &c. *woods* of nutmeg-trees; in Brazil, *woods* of Brazil-trees, &c.; in Numidia, *woods* of date-trees; in Madagaſcar, *woods* of tamarind-trees, &c.

WOOD, in *Gardening.* See GROVE.

WOOD-*coppices.* In the firſt raiſing of *coppices* two things are to be conſidered; firſt, the nature of the ſoil, that ſuch trees may be planted in it as will thrive well there; and ſecondly, the uſes that the *wood* is intended to be ſold for, that ſuch kinds may be planted as will be moſt proper for thoſe uſes.

If the principal vent for *wood* be for the fire, the beſt trees for *fire-wood* muſt be planted, ſuch as the oak, beech, hornbean, or other hard *woods*. Theſe are the moſt profitable for felling as *fire-wood*, and one or more of theſe grow in any ſoil.

If there be a demand in the country where the *coppice* is to be planted for hoops and hop poles, then the aſh, the cheſnut, the oak, alder and hazel, are to be planted.

According to the profits of the UNDERWOOD, the thickneſs of the ſtandard-trees is to be regulated, for as they ſtand more or leſs thick, they more or leſs injure the underwood. It is alſo to be conſidered at what growth the underwood is to be ſold. The taller and larger the underwood of a coppice in general is, the more profitable will it be for firing, and all other uſes, and the ſtandards will be the better for its being left to grow to a proper height, for their bodies will be always, unleſs very great accidents occur, carried up ſtraight as far as they are ſhaded by the coppice-*wood*.

A deep ſoil makes the ſhrubs as well as trees grow more vigorouſly than any other, and they will be ſooner fit for cutting in ſuch places. The perſon who owns theſe *woods* muſt contrive to cut down only a certain quantity of them every year, and regulate this ſo that he may have a conſtant ſucceſſion of a like quantity; that part of the *wood*, which was at firſt felled, may be grown up to its ſize for felling again by that time the laſt is cut. This is, in different places, to be calculated to all the various numbers between eight years and twenty or thirty.

The cutting of *wood* ſeldom yields the more and the better timber; but the cutting of it oftener has greater advantages, in that it makes it grow thicker, and gives the ſeedlings time to come up. If many timber-trees grow in the coppice, and are to be cut down, they and the underwood ſhould be felled together, cutting off the ſtumps as cloſe to the ground as may be, in the trees, and in the ſhrubs and underwood the ſtumps ſhould be left about half a foot high, and cut ſlanting and very ſmooth.

Sawing is the beſt method of felling timber-trees; but it ſometimes kills the root; and if this is obſerved to be the caſe in the coppice, no new ſhoots ariſing from the root, then it is proper to ſtub up the root, that it may not unneceſſarily encumber the ground, and that the other young plants may have the benefit of it.

In the firſt raiſing of coppices from ſeed, the ground muſt be prepared by good tillage, as much as if it were intended for corn. The ſeeds of the ſeveral trees are to be ſown in February, and if the ſoil be ſhallow, the ground ſhould be ploughed into great ridges: this will make the ſoil lie the thicker upon the top of each ridge, by which means the roots will have more depth to run to for nouriſhment, and in a few years the furrow will be filled up to the level of the reſt with the dead leaves; and theſe, as they rot at the bottom, will make a kind of ſoil, through which the young ſhoots will ſpread, and be conducted from one ridge to another, and ſo the whole ground will be occupied by them. If the coppice be to be raiſed on the ſide of a hill, plough the ridges croſs-way of the deſcent of the hill, that the water may be detained among them, and not ſuffered to run off, as it otherwiſe would, by the furrows; but if it happen that the ground be over-wet, which is more rarely the caſe, then the contrary method is to be obſerved, and the furrows ploughed deep and ſtraight downwards, that all water may be carried off by them, as by ſo many trenches or drains.

Some ſow a crop of corn along with the ſeeds of the underwood, for the advantage of the firſt year; but as the ſeaſon of ſowing the ſeeds of the trees is too late for the ſowing of the corn, it ſeldom turns to much advantage. It is better to ſow the trees alone, and keep them well weeded the two firſt years; after which they are ſtrong enough to take care of themſelves againſt ſuch enemies.

In very barren ground, where the young trees can hardly ſtand the heat in ſummer, it is proper, after ſowing them, to ſcatter a quantity of furze-ſeed over the land; the furze will grow quick, and over-top the trees at firſt, but it will ſerve as a guard to them at this time, defending them from injuries, and keeping the ground moiſt about their roots. In a few years the trees will grow up beyond theſe buſhes, and they will then ſoon deſtroy them by their dropping.

In the raiſing of coppices, the neareſt diſtance for the plantations ought to be five feet for the underwood, but as to what number, and ſcantlings of timber are to be left on each acre, the ſtatutes in this caſe direct; but it is an ordinary coppice, which will not afford three or four firſts, fourteen ſeconds, twelve thirds, and eight wavers, according to which proportion the ſizes of young trees in coppices are to ſucceed one another. In coppice or underwood felled at twenty-four years growth, there are to be left twelve ſtore-oaks upon every acre, or, in defect of them, the ſame number of elms, beech, or aſh: theſe are to be ſtraight-bodied trees, and are to be left till they are ten inches in diameter, at a yard from the ground; but it is better for the owner to have a much greater number of timber-trees, eſpecially in places where underwood is cheap; and as to the felling, it is always neceſſary to begin regularly with one ſide, that the carriages, neceſſary to the taking off the *wood*, may come on without injury to the reſt: and in large *woods*, a cart-way ſhould always be left in the middle, quite through the *wood*. The timber of the underwood may be cut from the month of October to February; but the laſt month is much the beſt, in places where there is but a ſmall quantity to be felled, and it can all be got down before the ſpring is too much advanced. All the *wood* ſhould be carried out by Midſummer, and made up by April at the lateſt; for when the rows and bruſh lie longer than this, unmade up, and unbound, many of the ſhoots and ſeedlings are ſpoiled by them. It is always worth the owner's while to incloſe the coppice well the winter before felling, to keep out the cattle, which would elſe greatly damage the ſupply from the ſeedlings and young ſhoots.

New-weaned calves are the leaſt prejudicial to newly cut *woods* of any creatures, and may be put in where there is much graſs; the next in harmleſsneſs to theſe are young colts, which, at about a year old, may be put in to feed in the ſame manner; but about May they muſt all be put out.

If the *woods* happen to be cropped by cattle, it is beſt to cut them up, and they will make new ſhoots; for that which has been bitten by the cattle, will not grow for ſeveral years in any degree.

If coppice-*woods* are too thin, this is to be remedied by laying down the longeſt and ſmalleſt ſhoots of thoſe ſhrubs or trees which are the moſt advantageous, in the place, or of ſuch as are neareſt the bare place; theſe will each ſend forth a great number of ſuckers, and the whole *wood* will be thickened as much as deſired in a very little time. Mortimer's Huſbandry, vol. ii. p. 64.

Wood, *almiggim*. See Almiggim.

Wood *anemone*. See Anemone.

Wood-*bine*, or Wood-*bind*, in *Botany*, a ſpecies of *lonicera*. See Honey-*ſuckle*.

Wood-*bind*, *Spaniſh*, a ſpecies of *ipomoea*. See Quamoclit.

Wood-*chat*, in *Ornithology*, *lanius minor primus* of Aldrovand, a ſpecies of Butcher-*bird*, with a horn-coloured bill; the feathers at the baſe are whitiſh; above is a black line drawn acroſs the eyes, and then downwards on each ſide the neck; the head and hind part of the neck are of a bright bay; the upper part of the back duſky; the coverts of the tail grey; the ſcapulars white; the coverts of the wings duſky; the quill-feathers black, having a white ſpot at the bottom; the throat, breaſt and belly of a yellowiſh white; the legs black. In the female, the upper part of the head, neck, and body are reddiſh, ſtriated tranſverſely with brown; the lower parts of the body are of a dirty white, rayed with brown; the tail of reddiſh brown, marked near the end with duſky, and tipt with red. Pennant.

Wood-*cock*, *ſcolopax ruſticola* of Linnæus, called by other writers *la becaſſe*, in *Ornithology*, a well-known bird diſtinguiſhed by its ſize, which is ſomewhat ſmaller than that of the partridge, and by its colour, which is on the back a variegation of black, grey, and a reddiſh brown; on the forehead the black predominates; the quill-feathers are duſky, indented with red marks; and on the belly a pale grey, variegated with tranſverſe ſtreaks of brown. Its beak is three inches long, duſky toward the end, and reddiſh at the baſe, and the upper chap a little longer than the under: the tongue ſlender, long, ſharp, and hard at the point; the eyes large, and placed near the top of the head, that they may not be injured when the bird thruſts its bill into the ground: from the bill to the eyes is a black line; the forehead is a reddiſh aſh-colour; the chin is of a pale yellow; the tail conſiſts of twelve feathers, duſky or black on the one web, and marked with red on the other; the tips above are aſh-coloured, below white: the legs and toes are livid, the latter divided almoſt to their origin, having only a very ſmall web between the middle and interior toes.

Theſe birds, during ſummer, are inhabitants of the Alps, Norway, Sweden, Poliſh Pruſſia, the March of Brandenburg, and the northern parts of Europe; whence they emigrate at the approach of winter, into milder climates, where the ground is open and adapted to their manner of feeding. The time of their appearance and diſappearance in Sweden coincides exactly with that of their retreat from and arrival in Great Britain. They live on worms and inſects, which they ſearch for with their long bills in ſoft ground and moiſt woods. They generally arrive here in flocks, taking advantage of the night or a miſt; they ſoon ſeparate; but before they return to their native haunts, pair. They feed and fly by night; beginning their flight in the evening, and returning the ſame way to their day-retreat.

They leave England the latter end of February, or beginning of March; though they have been known to continue here accidentally. In Caſewood, near Tunbridge, a few breed almoſt annually. During incubation they are very tame. They come over to the coaſt of Suffolk ſparingly in the firſt week of October, the greater number not arriving till the months of November and December, and always after ſun-ſet. They are determined in their flight by the wind, and arrive ſeparate and diſperſed. When the Red-*wing* appears on the coaſt in autumn, the *wood-cocks* are at hand; and when the Royſton crow is arrived, they are come. Between the 12th and 25th of March they flock towards the coaſt to be ready for their departure, having the red-wings for their harbingers in ſpring, as in autumn. If the wind be favourable, they immediately depart; but otherwiſe, they are detained in the neighbouring woods, or among the ling and furze on the coaſt: as ſoon as a fair wind ſprings up, they are ſuddenly gone.

In the ſame manner they are known to quit France, Germany, and Italy; making the northern and cold ſituations their general ſummer rendezvous. In the winter they are found as far ſouth as Smyrna and Aleppo, and alſo in Barbary; and ſome have appeared as far ſouth as Egypt, which ſeems to be the limit of their migration in that way. In Japan they are found very common. Thoſe that reſort into the countries of the Levant probably come from the deſarts of Siberia or Tartary, or the cold mountains of Armenia.

Our ſpecies of *wood-cock* is unknown in North America; but they have a ſort of *wood-cock* reſembling ours in its general appearance; about half its ſize, and wanting the bars on the breaſt and belly. Pennant.

They hate flying high, and they are afraid to fly among trees, becauſe, like the hare, they ſee but very badly ſtraight before them; and it is owing to this imperfection in their ſight, that they are ſo eaſily taken in nets ſpread in their places of reſort.

The draw-net, in countries which are very *woody*, is extremely profitable in this ſport, it being no uncommon thing to take ten or a dozen *wood-cocks* at a time in it.

There is another method of taking theſe birds in high *woods*, with thoſe nets called *hays*, of the nature of the rabbit-hays, only with ſmaller meſhes. The *wood-cocks* are to be driven into theſe, and there ſhould always be at leaſt two or three of them planted together. When the ſportſman has provided himſelf with nets, he is to take five or ſix perſons into the *wood* with him. The proper *woods* for this purpoſe, are thoſe of ſeven or eight years growth; and the people are to go into ſome part of them near the middle. The nets or hays are to be placed in the ſame manner as they are for taking of rabbits, but two or three joining together at the end, and hanging over ſlopewiſe that way which the *wood-cocks* are intended to be driven.

The nets being thus fixed, let the company go to the end of the *wood*, placing themſelves at about ten rods diſtance from one another; they muſt all have ſticks in their hands, and they are to move forward ſlowly towards the nets, making a noiſe by ſtriking the ſticks againſt the trees and branches, and by hallooing with their voices: in this manner they are to move up to the net; and the *wood-cocks* in that part of the *wood* will all be terrified before them, but will not take wing, but run along upon the ground, and thus be driven along like a drove of beaſts, ſo that when the company come up, they will find almoſt all of them in the net. When that part of the *wood* is thus drove, the nets are to be turned the other way, and placed ſlopewiſe in the contrary direction, and the company retiring to the other end of the *wood*, are to drive the *wood cocks* that are in that part with the ſame noiſe, till they have ſent them into the nets in the ſame manner.

Thus all the *wood-cocks* in the *wood* may be taken with very little trouble, and this may be done equally at any time of the day.

Another way of taking this bird is by means of NOOZES or SPRINGES.

The *wood-cock* and the ſnipe are both eaſily taken with bird-lime, when their places of reſort are known, but they are not ſo eaſily found as many other birds.

The cuſtom of the *wood-cock* is uſually to be upon the banks under hedges, and by the ſides of ditches toward the ſun; and they will ſuffer the ſportſmen to come nearer them in the day-time after a moon-ſhiny night, than after a dark-one. The reaſon of which is, that having fed well by moon-light, they are only fit for reſt the day following; but when the night has been dark, they are ſeeking food all day long.

The ſnipes naturally lie by the ſides of rivers, when the plaſhes and ponds are frozen, and they always lie with their heads up or down the ſtream, never tranſverſely.

In order to take either of theſe birds by bird-lime, the ſportſman muſt be provided with a large number of ſmall and ſmooth twigs, neatly and evenly covered with good bird-lime. Theſe muſt be placed ſloping, ſome one way, ſome another, and the whole place about where they reſort muſt be covered with them. The ſportſman then muſt conceal himſelf very carefully, that the ſight of him may not frighten away the game. See COCK-*Road*.

WOOD-*cock-ſhell*, a name given by the Engliſh naturaliſts to a peculiar kind of the purpura. It is called in French, *becaſſe*, from the length of its beak. There are two ſpecies of this, a prickly and a ſmooth one.

The prickly kind is an extremely beautiful and elegant ſhell. It is of a yellowiſh colour; and its tail or beak (for the hinder extremity of the ſhell, which runs out into an immoderate length, is ſometimes called by the one, ſometimes by the other of theſe names) is furniſhed with four rows of large and very long ſpines: between the rows of theſe, there are alſo rows of ſmall and ſhort ſpines. The body of the ſhell is furrowed very deep, with a number of tranſverſe circular lines; and both this and the clavicle are beſet with ſeveral rows of long ſpines.

The ſmooth *becaſſe*, or *wood-cock-ſhell*, is a very elegant ſpecies, but much leſs ſo than the other. It is of a yellowiſh colour, radiated with black and grey lines. It is all over deeply furrowed, and the ridges are beſet with tubercles, the clavicle is elevated, and the tail extremely long, and hollowed into a ſort of tube. The mouth of this, as well as of the other, is ſmall and roundiſh, and in this ſpecies is of a light fleſh-colour.

WOOD *and wood*, in the *Sea-Language*, is when two pieces of timber are ſo let into each other, that the *wood* of the one joins cloſe to the other.

WOOD-*corn* is a certain quantity of oats, or other grain, anciently given by cuſtomary tenants to their lord, for the liberty to pick up dead or broken *wood*.

WOOD-*geld*, WOODGELDUM, in our ancient cuſtoms, the gathering or cutting of *wood* within the foreſt. Or it may denote the money paid for the ſame, to the foreſters. Sometimes it alſo ſeems to ſignify an immunity from this payment, by the king's grant. Crompton ſays expreſly, it ſignifies to be free from the payment of money for taking of *wood* in a foreſt. See GELD.

WOOD-*hay*, an ancient cuſtom at Exeter; whereby a log out of every ſeam of *wood* brought over Ex-bridge, is taken towards the reparation of that bridge. Antiq. of Exeter.

WOOD-*land*, in *Agriculture*, a term uſed by the farmers of many counties of England, for a ſort of ſoil, from its conſtant humidity and dark colour, reſembling the ſoil in *woods*, which, of whatever nature it originally is, will always be made to appear thus from the continual dropping of trees, and the want of a free air and ſun, together with the fall of leaves, deſtroyed and waſhed to pieces by the wet.

This ſoil in the open countries has a conſiderable quantity of clay in it, and holds the water a long time that once falls upon it: in wet weather it ſticks firmly to the plough-ſhare, and in dry is very apt to crack. In uncultivated places it uſually produces ruſhes and ruſh-graſs. A moiſt and dripping year is extremely detrimental to this ſort of land. Morton's North. p. 38.

WOOD-*lark*, in *Ornithology* See *Wood*-LARK.

WOOD *of life*, in *Botany*. See GUAIACUM.

WOOD-*louſe*. See MILLEPEDES.

WOOD-*meil*, a coarſe, hairy kind of ſtuff, made of Iceland-wool, with which the ſhip-carpenters, in ſome of his majeſty's yards, line the ports of ſhips of war.

WOOD-*mite*, in *Natural Hiſtory*, the name of a little animal frequently made the ſubject of microſcopical obſervations, and by ſome called the *wood-louſe*; though that leſs properly, as there is another larger animal generally known by that name.

The *wood-mite* is in ſhape and colour very like a louſe and is frequently found running very nimbly, but always by ſtarts and jumps, on old books and rotten *wood*. The eyes of this creature are of a fine gold colour, and can be thruſt out or drawn in at pleaſure; and when examined by the microſcope the periſtaltic motion of the guts is ſeen very diſtinctly, and beautifully; and what is more wonderful, there is obſerved a very diſtinct and regular motion in the brain.

This probably is the ſame animal with the pediculus pulſatorius, deſcribed by Dr. Derham, as one of the DEATH-*watches*. Baker's Microſcope, p. 185.

WOOD-*men*, certain foreſt-officers appointed to take care of the king's *woods*.

WOOD-*mote*, the ancient name of that foreſt-court, now called *the* COURT *of* ATTACHMENT.

WOOD-*pecker*, in *Ornithology*, the Engliſh name of ſome ſpecies of PICUS.

The *green wood-pecker*, *picus viridis* of Linnæus, called alſo the RAIN-*fowl* and PLUVIAIS *avis*, weighs about ſix ounces and a half, is thirteen inches long, and twenty and a half broad; the bill is duſky, triangular, and near two inches long; the crown of the head is crimſon, ſpotted with black; the eyes are ſurrounded with black, beneath which the males have a crimſon mark; the back, neck, and leſſer coverts of the wings are green; the rump of a pale yellow; the greater quill-feathers are duſky, ſpotted on each ſide with white; the tail conſiſts of ten ſtiff feathers with black tips, and barred alternately with duſky, and deep green; the whole hinder part of the body is of a very pale green; the thigh and vent are marked with duſky lines; the legs and feet all of a cinereous green.

The *greater-ſpotted wood-pecker*, *picus major* of Linnæus, called alſo *witwall*, weighs two ounces three-fourths, is nine inches long and ſixteen broad; the bill is one inch and a quarter long, of a black horn colour; the irides are red; the forehead is of a pale buff colour; the crown of the head of a gloſſy black; the hind part marked with a rich deep crimſon ſpot; the cheeks white, bounded beneath by a black bar paſſing from the corner of the mouth, and ſurrounding the hind part of the head; the neck is encircled with a black colour; the throat and breaſt are of a yellowiſh white; the vent-feathers of a light crimſon; the back, rump, and coverts of the tail, and leſſer coverts of the wings are black; the ſcapular feathers and coverts, adjoining to them, are white; the quill-feathers black, elegantly marked on each web with round white ſpots: the four middle feathers of the tail are black; the next tipt with yellow; the bottom of the two outmoſt black, the upper parts a dirty white; the exterior feather marked on each ſide with two black ſpots; the next with two on the inner web, and one on the other; the legs are of a lead colour. The female wants the crimſon ſpot on the head. This ſpecies is much more uncommon than the preceding; and keeps altogether in the woods. See *Tab.* V. *Birds*, N° 62.

The *middle wood-pecker* or *picus medius* of Linnæus, agrees wth the preceding in ſize and colours, except that the crown of the head in this is of a rich crimſon; the crown of the head in the male of the former being black, and the crimſon in form of a bar on the hind part.

The *leſſer ſpotted wood-pecker*, *picus minor* of Linnæus, is alſo called HICKWALL, and has all the characters and actions of the greater kind, but is more rare. Pennant.

WOOD-*pigeon* See *Ring*-DOVE.

WOOD-*plea-court*, is a court held twice a year in the foreſt of Clun, in Shropſhire, for determining all matters relating to *wood*, and the feeding of cattle there. Perhaps it was originally the ſame with *wood-mote-court*.

WOOD-*pucerons*, in *Natural Hiſtory*, a name given by Mr. Reaumur, to a ſmall ſpecies of inſect of the puceron kind, of a greyiſh colour, and diſtinguiſhed by its two hollow horns on the hinder part of its body.

Theſe animals very much reſemble, both in ſhape and ſize, the pucerons of the alder; but as thoſe live always on the ſurface of the ſtalk, theſe make their way deep into the *wood* of a tree.

Mr. Reaumur found large quantities of theſe lodged at a conſiderable depth in the *wood* of ſome elms, after they were cut down; the paſſages, by which they had made their way in, were not to be found; but they were lodged in large and long holes, of the diameter of a gooſe-quill, and running many inches along the tree in a longitudinal direction.

All the pucerons found in thoſe places appear to be females, and none have wings; they all have vaſt numbers of young ones of different degrees of maturity within them, and theſe may be forced out with preſſing their bodies. Reaum. Hiſt. Inſect. vol. vi. p 61.

WOOD-*roof*, or WOOD-*ruffe*, *aſperula*, in *Botany*, a genus of the *tetrandria monogynia* claſs. Its characters are, that the corolla has one petal, and is funnel-ſhaped; and it has two globoſe ſeeds. Linnæus enumerates eight ſpecies.

The common *wood-roof* grows wild in ſhady *woods* in many parts of England, and flowers in April or May: it is ſometimes uſed in medicine, but as it grows wild, it is rarely admitted into gardens.

The leaves and roots dried, have been eſteemed aperient and diuretic: and recommended in obſtructions of the liver, and thence ſuppoſed efficacious in the jaundice: but they are now diſuſed. See ASPERJULA.

WOOD-*ſage.* See SAGE.

WOOD-*ſorrel*, in *Botany*. See *Wood*-SORREL.

WOOD-*ſpite*, in *Ornithology*, an Engliſh name given by many to the common green WOOD-*pecker*.

WOODWARD, an officer of the foreſt, whoſe function is to look after the *woods*, and obſerve any offences either in vert, or veniſon, committed within his charge; and to preſent the ſame; and in caſe any deer are found killed, or hurt, to inform the verderer thereof and preſent the delinquents at the next court of the foreſt.

Woodwards may not walk with bows and ſhafts, but with foreſt-bills. *Arcum & calamos geſtare in foreſta non licet, ſed (ut reſcripti utar verbo) hachetum tantummodo.* Term. Hil. an. 13 Ed. III.

WOODY *nightſhade.* See NIGHTSHADE.

WOOF, among *Manufacturers*, the threads which the weavers ſhoot acroſs, with an inſtrument called the *ſhuttle*, between the threads of the warp, to form the web.

The *woof* is of different matter, according to the piece to be wrought. In taffety, both *woof*, and wrap are ſilk. In mohairs, the *woof* is uſually flax, and the wrap ſilk. In ſattins, the warp is frequently wool, and the *woof* ſilk.

WOOFE, a name given in ſome parts of England to the ſea-wolf, or LUPUS *marinus*.

WOOL, *lana*, the hair, or covering of ſheep; which, waſhed, ſhorn, dreſſed, combed, ſpun, woven, &c. makes divers kinds of ſtuffs, cloths, &c. for apparel, furniture, &c.

While the *wool* remains in the ſtate it was firſt ſhorn off the ſheep's back, and not ſorted into its different kinds, it is called *fleece*.

Each fleece conſiſts of *wool* of divers qualities, and degrees of fineneſs, which the dealers therein take care to ſeparate.

The fineſt grows on the pole of the ſheep; the coarſeſt about the tail; the ſhorteſt on the head and on ſome parts of the belly; the longeſt on the flanks.

Wool is either ſhorn, or pulled off the ſkin after the ſheep is dead: this latter ſort is ſhort and finer; if it be ſhort, it is uſed for hats, and not in the manufacture of cloth, unleſs mixed in fleeces.

The French and Engliſh uſually ſeparate each fleece into three ſorts; viz. 1. *Mother-wool*, which is that of the back and neck. 2. The *wool* of the tails and legs. 3. That of the breaſt, and under the belly.

The Spaniards make the like diviſion into three ſorts, which they call *prime*, *ſecond*, and *third*; and, for the greater eaſe, mark each bale or pack with a capital letter, denoting the ſort. If the triage, or ſeparation, be well made, in fifteen bales there will be twelve marked R; that is, refine, or prime; two marked F, for fine, or ſecond; and one S, for thirds.

The firſt thing which the Spaniards do after their ſheep are ſheared (one hundred and twenty-five ſhearmen being employed to ſhear a flock of ten thouſand ſheep) is to weigh the whole pile of *wool*; and the next is to divide each fleece into three ſorts of *wool:* the back and belly give the ſuperfine; the neck and ſides the fine; the breaſt, ſhoulders, and thighs the coarſe *wool*. A different price is fixed upon theſe three claſſes, though the general cuſtom is to ſell the whole pile together at a mean price. An ingenious writer obſerves, that the SHEEP of Andaluſia, which never travel, have coarſe, long, hairy *wool*; but that the itinerant ſheep have ſhort, ſilky, white *wool:* and he infers, from a few experiments and long obſervation, that if the fine-*wooled* ſheep ſtaid at home in the winter, their *wool* would become coarſe in a few generations, and that if the coarſe-*wooled* ſheep travelled from climate to climate, and lived in the free air, their *wool* would become fine, ſhort, and ſilky, in a few generations: the fineneſs of the *wool* is owing to the animal's paſſing its life in an open air of equal temperature.

The *wools* moſt eſteemed are the Engliſh, chiefly thoſe about Leominſter, Coteſwold, and the Iſle of Wight; the Spaniſh, principally thoſe about Sarragoſſa for the province of Arragon, and about Segovia for Caſtile; and the French in Rouſillon, Languedoc, Berry, and Lower Normandy: thoſe of Berry are ſaid to have this peculiar property, that they will knot or bind with any other ſort; whereas the reſt will only knot with their own kind. See SHEEP.

Among the ancients, the *wools* of Attica, Megara, Laodicea, Apulia, and eſpecially thoſe of Tarentum, Parma, and Altino, were the moſt valued. Columella ſets the two laſt even above that of Tarentum, lib. viii. cap. 2. And Varro aſſures us, the people there uſed to clothe their ſheep with ſkins, to ſecure the *wool* from being damaged. De Re Ruſt. lib. ii. cap. 2.

Tavernier affirms that the *wools* in Aſia are incomparably finer than thoſe of Europe; and that there is no doubt but that *wool* was the golden fleece ſought for at Colchis. The fineſt fleeces in the world are thoſe of Caramania, reſerved entirely for the moulhaes and prieſts; thoſe of Cachemire excellent; and the lamb-ſkins of Bucharia exquiſite. See SHAUL, and SHEEP.

The art of preparing and working *wool* is attributed, by the ancients to Minerva; who, accordingly, is made the genius and protectreſs thereof.

WOOL, *Engliſh*. The *wools* of England have always been in the higheſt repute; and that always more abroad than at home. Some we have, which, manufactured by our own clothiers, Chamberlayne obſerves, does, both for ſoftneſs and fineneſs, vie with the choiceſt ſilks. *Spaniſh wools*, we know, bear a great price among us; but it is certain, much the greateſt part of that, which, when manufactured, our clothiers, &c. call *Spaniſh cloth*, grows in England. Add, that the French can make no good cloth of their own *wool*, without, at leaſt, one-third of Engliſh *wool* mixed with it. It has been ſaid, that the goodneſs of the Spaniſh *wool* is owing to a few Engliſh ſheep ſent over into Spain, as a preſent, by Henry II. of England; or, as others will have it, by Edward IV. in 1468.

The Coteſwold ſheep, which were tranſported by Edward at this time, on occaſion of the alliance with Arragon, multiplied in Spain, and proved very detrimental to the *wool*-trade of England. However, it is certain, that the growth of *wool* had been cultivated in Spain long before this period; for Henry II. in the 31ſt year of his reign (A. D. 1186.) granted a patent to the weavers of London, importing, that if any cloth were found to be made of Spaniſh *wool*, mixed with Engliſh *wool*, the mayor of London ſhould ſee it burnt. The increaſe and improvement of the breed of ſheep in Spain were, indeed, principally owing to don Pedro IV. who aſcended the throne of Caſtile in 1350; who obtained permiſſion to tranſport from Barbary into Spain a great number of rams and ewes of an excellent ſort; ſuch as had been brought from Africa to the neighbourhood of Cadiz by Marcus

Columella in the time of the emperor Claudius; though the breed then introduced had been for many ages neglected.

Cardinal Ximenes, at the commencement of the 16th century, followed the example of don Pedro, and introduced ſeveral ſheep from Barbary to the neighbourhood of Segovia: and it is well known, that the œconomy of the Spaniſh ſhepherds has for ſeveral years been admirable; as is alſo the attention to the improvement of their *wool*, which is extremely fine, by the annual migration of their flocks. See SHEEP.

It is ſaid, that Henry VIII. obtained from Charles V. a grant of three thouſand white Spaniſh ſheep, and that the propagation of this ſpecies in England was entruſted to the care of commiſſioners. The breed was alſo improved by a mixture of Spaniſh rams with the common ſheep. Encyclopedie.

The fineneſs and plenty of our *wools* are owing, in great meaſure, to the ſweet, ſhort graſs in many of our paſtures and downs; though the advantage of our ſheep's feeding on this graſs all the year, without being obliged to be ſhut up in folds during the winter, or to ſecure them from wolves at other times, contributes not a little thereto.

The Scottiſh and Iriſh *wools* are commonly ſold abroad for Engliſh; and upon the ſame footing. But foreigners, ſkilled in thoſe matters, find they come far ſhort of it in fineneſs; though, in ſome markets, the Iriſh is even ſaid to be preferred to the Engliſh.

The yearly produce of *wool* in England, towards the cloſe of the laſt century, was calculated by Dr. Davenant, and Mr. King, at two millions ſterling. See WOOLLEN *Manufactory*.

Anciently, the principal commerce of the nation conſiſted in *wool* unmanufactured; which foreigners, eſpecially the French, Dutch, and Flemiſh, bought of us: inſomuch that the cuſtoms of Engliſh *wool* exported in Edward the Third's reign, amounted, at 50*s.* a pack, to 250,000*l.* per annum. An immenſe ſum in thoſe days! See COMMERCE.

This exceſſive cuſtom on the export of unmanufactured *wool* ſet our people to the making of it into cloth themſelves: in which they ſucceeded ſo well, that, under the reign of queen Elizabeth, the exportation of any *wool* at all was abſolutely prohibited; and the ſtatute 8 Eliz. cap. 3. makes the tranſportation of live ſheep, or embarking them on board of any ſhip, for the firſt offence forfeiture of goods, and impriſonment for a year; and that at the end of the year the left hand ſhall be cut off in ſome public market, and there nailed up in the moſt open place; and the ſecond offence is felony.

From that time England has been exceedingly jealous of its *wool*. To prompt their vigilance, the judges, king's counſel at law, and maſters in chancery, in parliament, are ſeated on *wool*-packs. Accordingly, ſcarce a parliament but has renewed and reinforced the prohibition; particularly about the middle of the ſeventeenth century, the exporting of *wool* was made felony. 13 & 14 Car. II. cap. 18. But this was repealed by 7 & 8 W. cap. 28. which ordains, that the exportation of *wool* incurs a forfeiture of the veſſel and of the goods, and their treble value; and all perſons aiding herein ſhall ſuffer three years impriſonment. Alſo, by 12 Car. II. cap. 32. no perſon ſhall export *wool*, &c. or yarn made of *wool*, or fuller's earth, or fuller's clay, on pain of forfeiting the ſame, and 3*s.* for every pound weight. And the maſters and mariners, knowing the offence and aſſiſting, ſhall forfeit all their goods and chattels, and be impriſoned three months: the owners ſhall forfeit all their intereſt in the ſhip and cargo; and any merchant, &c. offending herein, ſhall be diſabled to require any debt from any factor or other perſon. And the ſtatute 4 Geo. I. cap. 11. (amended and farther enforced by 12 Geo. II. cap. 21. & 19 Geo. II. cap. 34.) makes it tranſportation for ſeven years, if the penalties be not paid.

By 13 & 14 Car. II. cap. 13. no tobacco-pipe clay ſhall be exported on pain of 3*s.* a pound, except to the Britiſh ſugar colonies and plantations in the Weſt Indies, 17 Geo. III. cap. 43. 20 Geo. III. cap. 19.

Wool, in limited quantities, may be exported from Southampton to Jerſey, Guernſey, Sark, and Alderney.

By 12 Geo. II. cap. 21. no coverlids, &c. capable of being reduced to *wool* again, or beds, &c. ſtuffed with *wool*, ſhall be exported, on the like pain as for exporting *wool*; and no *wool*, or yarn, &c. ſhall be packed otherwiſe than in packs of leather or pack-cloth, marked on the outſide with the words WOOL or YARN, on pain of forfeiture, and 3*s.* for every pound weight.

No *wool*, &c. ſhall be put on board any veſſel to be carried coaſt-wiſe, without notice to the officers of the port, and bond for the landing of it, and licence for ſo doing, on pain of forfeiting the ſame, with the veſſel and furniture: and none of the ſaid goods ſhall be landed but in preſence of the officers, on pain of forfeiture, and 3*s.* for every pound. And to prevent colluſive ſeizures, or fraudulent agreements for the evaſion of penalties, none but officers of the cuſtoms, exciſe, or ſalt, and officers of guardſhips particularly mentioned, ſhall enter informations of ſeizures of *wool* or woollen goods; and the penalty of colluſive ſeizure, &c. in ſuch officers is a forfeiture of 200*l.* and diſqualification for any office of the revenue; and the owner ſhall forfeit treble value: and obſtruction of officers, or reſcue of the goods ſeized incurs the penalty of tranſportation for ſeven years: and offering a bribe to any officer is liable to a forfeiture of 300*l.* Perſons, who by way of inſurance, undertake to carry *wool* abroad, ſhall forfeit 500*l.* and all inſurances of *wool* ſhall be void.

By 1 W. cap. 32. perſons carrying *wool* from port to port, or by land near the coaſt, whence the ſame may be exported, are required to make an entry thereof at the port whence it is to be conveyed, containing mark and number, on pain of forfeiting the ſame, and alſo the horſes and carriages: and alſo of ſuffering and forfeiting, as by other laws againſt exportation of *wool*: and a regiſter ſhall be kept at the cuſtom-houſe in London of all the *wool* ſent from port to port in this kingdom.

By 7 & 8 W. cap. 28. no *wool*, &c. ſhall be carried by land within five miles of the coaſt, but between ſun-riſe and ſun-ſet, on pain of forfeiting the ſame, and the horſes and carriages: and the hundred is liable to forfeit treble value with treble coſts. In Kent and Suſſex, every owner of *wool*, within ten miles of the ſea, ſhall give an account in writing, within three days after ſhearing, of his number of fleeces to the next officer of the cuſtoms, and not remove them without a certificate, for which he pays 6*d.* on pain of forfeiting the *wool*, and 3*s.* for every pound; and no perſon within fifteen miles of the ſea ſhall buy any *wool* without entering into a bond with ſureties, that the *wool* ſhall not be ſold to any perſon within fifteen miles of the ſea; and if *wool* be found carrying towards the ſea-ſide, unleſs it be firſt entered, and ſecurity be given, it ſhall be forfeited, and alſo 3*s.* a pound; and no *wool* lodged, after ſhearing, within ten miles, ſhall be lodged within fifteen miles of the ſea, in the ſaid counties, on pain of forfeiture, or 3*s.* a pound: and *wool* laid within fifteen miles of the ſea, and unentered, ſhall be ſeized and forfeited.

By ſeveral of the foregoing acts, the exportation of woollen manufactures out of Ireland was prohibited under the ſame penalties as the exportation of *wool*; but it is enacted by 20 Geo. III. cap. 6. that ſo much of the 10 and 11 W. and of other acts which prohibit the exportation of cloth, ſerge, &c. made up with *wool* from the kingdom of Ireland into foreign ports ſhall be repealed. But all theſe precautions are ineffectual; the Engliſh themſelves, particularly thoſe about the coaſt of Suſſex, making uſe of the long winter nights to waft over their *wools* to France: being ſure of carrying them to a good market: they deſpiſe the penalty, with an intrepidity that the reſt of Europe are amazed at.

M. Colbert, a perſon the French manufactures and commerce are infinitely indebted to, had entertained a deſign of procuring ſome of our Engliſh ſheep, and propagating them in France; hoping, that by chooſing for them, in the provinces of that kingdom, ſuch paſtures, and ſuch a ſky as they had in their own iſland, they might there be perpetuated; and France be no longer obliged precariouſly to depend on the clandeſtine ſupplies of *wool* from the Engliſh owlers. But the count de Cominges, then ambaſſador of France at the Engliſh court, laid the impoſſibility of having ſuch an export of ſheep, and the almoſt equal impoſſibility of keeping and making them multiply there, ſo ſtrongly before him, that he abandoned the deſign.

Wool is reckoned by the *ſack*, containing two weighs; the *weigh* ſix tod and a half; the *tod*, two ſtones; the *ſtone*, two cloves, and the *clove*, ſeven pounds. Twelve ſacks make a *laſt*, or 4368 pounds.

A *ſack of wool*, or three hundred and ſixty-four pounds, is ſufficient for four ſtandard cloths, to render them true breadth, i. e. ſix quarters and a half; true weight, i. e. ſixty pounds; and the true length, i. e. twenty-four yards.

For the divers preparations of *wool*, ſee CARDING, COMBING, SPINNING, WEAVING, FULLING, and CLOTH.

WOOL, *pocket of*. See POCKET.

WOOL, *ſarplar of*. See SARPLAR.

WOOL-*balls*, in *Natural Hiſtory*, maſſes of *wool* compacted into firm and hard balls, and found in the ſtomachs of ſheep, as the hair-balls are in oxen and other animals.

Theſe are doubtleſs formed in the ſame manner as thoſe hair-balls, of the outer covering of the animal; but they are much more uncommon; they are found in numbers, three, four, or five, in the ſtomach of the ſame animal. Their outſide has commonly much the ſame appearance of a puff-ball, and is uſually either in part or wholly covered with a very thin and ſoft blackiſh ſmooth ſkin; the inner ſubſtance is entirely *wool*, but that wrought together as cloſely as the hatter does his furs in the making of them into hats.

They are uſually ſoft, ſmooth, and ſomewhat elaſtic, of a pale buff-colour, very light, and of irregular figures rather cubic than globular, and ſeldom of any great ſize, an inch in diameter being their common ſtandard Moreton's Northampt. p. 451. See Balls.

WOOLDING, in the *Sea-Language*, denotes the winding of ropes about a maſt, in order to ſtrengthen it, in a place where it may have been fiſhed or ſcarfed.

Woolding is alſo the rope employed in this ſervice.

WOOL-DRIVERS, are thoſe who buy *wool* of the ſheep-owners in the country, and carry it on horſeback to the clothiers, or market-towns, to ſell it again.

WOOLLEN *manufactory*, includes the ſeveral ſorts of commodities into which *wool* is wrought; as *broad cloths*, *long* and *ſhort kerſeys*, *bays*, *ſerges*, *flannel*, *ſays*, *ſtuffs*, *frize*, *ſtockings*, *caps*, *rugs*, &c.

Each whereof, ſee under its reſpective article, Cloth, &c.

The *woollen manufactory*, which now makes the principal article both in our foreign and domeſtic trade, being that which furniſhes the cargoes of our veſſels, that employs our people, &c. may be ſaid to have had its riſe, or rather to have received great improvement, in the fourteenth century.

Till that time our *wool* was chiefly ſold in the fleece, to ſuch of our neighbours as came to fetch it. Among our cuſtomers, however, the principal were the Flemings and Brabanters; and particularly the merchants of Ghent and Louvain, who took off vaſt quantities to ſupply two manufactories that had flouriſhed in thoſe two cities from the tenth century, and had furniſhed the greateſt part of Europe, and even England itſelf, with all ſorts of *woollen* cloths, &c. But the richneſs of the manufactories of Ghent, and the incredible number of hands employed therein, having ſpirited up the inhabitants to revolt divers times, particularly in the years 1300 and 1301, againſt their ſovereigns, on account of certain taxes which they refuſed to pay, the ſeditious were at length puniſhed and diſperſed; and part of them took refuge in Holland, and the reſt in Louvain.

Theſe laſt, together with their art of manufacturing cloths, carried with them their ſpirit of ſedition. And it was not long before ſeveral of them, to avoid the puniſhment they had deſerved for killing ſome of the magiſtrates, removed into England; where they inſtructed our people how to work their own *wools*.

About the year 960, or rather ſomewhat ſooner, the *woollen* manufacture of Flanders, and other parts of the Netherlands, took its riſe; and therefore it was probably prior to the Linen *manufacture*, which came from Egypt into Greece and Italy, and thence travelled weſtward to France and Flanders, and probably next into Germany and England, before it got ground in the more northern and north-eaſt parts of Europe, where it has ſince proſpered very much: others, however, think, that the Carthaginians firſt introduced it into Europe.

With reſpect to the *woollen* manufacture, Anderſon (Hiſt. Com. vol. i. p. 51.) remarks, that (at leaſt) ſome ſort of *woollen* cloth muſt ever have been made in all civilized countries; and that wherever the Romans planted colonies, they there introduced the weaving of cloth. Camden, in his Britannia, ſpeaking of the antiquity and eminence of the city of Wincheſter, ſays, that there the Roman emperors ſeem to have had their imperial weaving houſes for cloths, both of *woollen* and linen for the emperor and the army; and moſt probably that neceſſary art was preſerved in Britain after the Romans quitted it, though perhaps in a plainer kind, till the fourteenth century, when king Edward III. introduced the fine manufacture from the Netherlands.

Lord chief juſtice Hale, in his Primitive Origination of Mankind, p. 241, refers to the ancient guilds, erected in England for the *woollen* manufacture, at Lincoln, York, Oxford, and ſeveral other cities. as evidences of the flouriſhing ſtate of that art in this kingdom in the time of Henry II. and Richard I. But by the troubleſome wars in the time of king John, Hen. III. Edward I. and Edward II. this manufacture was wholly loſt, and all our trade ran out in *wools*, woolfels, and leather, carried out in ſpecie; and that manufacture, during thoſe warlike times, had its courſe in France, the Netherlands, and the Hanſe-towns. But by the wiſdom and peaceable times of Edward III. he regained that art hither again, after near a hundred years diſcontinuance.

From this account the learned writer infers, that we are not to conclude, that every new appearance of any art or ſcience is the firſt production of it. King Edward III. attentively obſerving the riches and power of the provinces of Flanders and Brabant, proceeding merely from their *woollen* manufacture, and conſidering farther, that they owed this wealth and power to his Engliſh *wool*, might naturally infer, that if he could gain the manufacturers to ſettle in England, the trade would ſoon proſper in this kingdom. Accordingly in Rymer's Fœd. tom. iv. fol. 496, we find a letter of protection granted by the king to John Kemp, of Flanders, a *woollen* cloth-weaver, coming over to exerciſe his trade in England, A. D. 1331, and to teach it to ſuch of our people as were inclined to learn it: the king hereby taking him and all his ſervants and chattels into his royal protection, and promiſing the ſame likewiſe to all others of his occupation, and alſo to all dyers and fullers, who were diſpoſed to ſettle in England. In conſequence of this encouragement, ſeventy families of Walloons were in this ſame year brought over to England. Thus we find, that, though king Edward III. did not, ſtrictly ſpeaking, introduce the *woollen* manufacture into England, as many hiſtorians have repreſented the matter, he nevertheleſs taught his people to make and dreſs fine *woollen* cloths, by means of the Netherlanders whom he brought hither, and thus laid the foundation of that great manufacture, which England has long ſince brought to perfection.

In the eleventh year of Edward III. ſeveral laws were enacted for promoting the *woollen* manufacture of England; and the tumults of Ghent and Louvain, already mentioned, which happened not long before this time, contributed to promore our *woollen* manufacture in its infant ſtate.

The preſident Thuanus attributes the eſtabliſhment of the *woollen* manufactures in England to queen Elizabeth, and the troubles about religion, which the ſeverity of the duke of Alva and the Spaniſh inquiſition had occaſioned, and kept up ſo long in the Low Countries. But what that noble author ſays, is rather to be underſtood of their perfection than their firſt eſtabliſhment; and of the ſeveral great manufactures then ſet up at Norwich, Colcheſter, Sandwich, Southampton, &c. For in the Engliſh and Flemiſh hiſtorians we find mention made of the manufacturers of London, long before any part of the ſeventeen provinces had attempted to throw off the Spaniſh yoke.

As this manufacture ſtood about the cloſe of laſt century, Dr. Davenant and Mr. King computed the produce thereof to be eight millions per annum; three-fourths whereof are conſumed at home, and the reſt exported. Davenant's Works, vol. ii. p. 413. vol. vi. p. 78, 96.

The year 1614 produced the diſcovery of a new ſpecies of *woollen* manufacture in England. The ſtates general of the United Netherlands having prohibited the importation of any Engliſh *woollen* cloth, that was dyed in the cloth, the Engliſh clothiers ingeniouſly deviſed the method of making mixtures dyed in the *wool*, rather than loſe all the profits of dying and dreſſing. This has ever ſince obtained the name of *medley cloth*; all *woollen* cloth before this time being only of one ſingle colour dyed in the cloth, as black, blue, red, &c.

So jealous are we now become of our *woollens*, that, beſides the precautions taken to uſe all our own *wools* ourſelves, we have added that of ſelling them ourſelves, and of carrying them to the places where they are required; not admitting ſtrangers to come and buy any in England. And hence the eſtabliſhment of thoſe famous magazines in Holland, the Levant, and the North, where our *woollens* were repoſited, to be vended by factors, or commiſſioners. See Staple.

Beſides ſeveral regulations tending to the improvement of the *woollen* manufacture in England, and laws prohibiting the importation of *woollen* cloth (11 Ed. III. cap. 3. 4 Ed. IV. cap. 1. ſee Wool), and allowing *woollen* manufactures to be exported cuſtom-free (11 & 12 W. cap. 20.) it is enacted by 30 Car. II. cap. 3. that no corpſe ſhall be buried in any other covering but that which is made of ſheep's *wool* only, of which an affidavit ſhall be made, on pain of the forfeiture of 5*l*.

The dying and dreſſing of white *woollen* cloth in England was brought to perfection by means of perſons who arrived from the Netherlands in 1667. It appears from ſundry conſiderations laid before parliament in 1739, that more than 1,500,000 people were then employed in our Britiſh *woollen* manufacture; and if theſe earn one with another 6*d* per day for 313 working days in the year, it will amount to 11,737,500*l*.; a ſum which ſufficiently evinces the immenſe benefit of this manufacture.

We learn from Roger Coke's Second Diſcourſe on Trade, publiſhed in 1670, that about the year 1636 or 1637, a hundred and forty families from Norfolk and Suffolk removed to Leyden, Alcmar, and other parts of Holland, and there eſtabliſhed, or greatly promoted, the *woollen* manufactures of thoſe places.

According to Savary's Dict. Univ. de Com. the manufacture of fine *woollen* cloth was firſt ſet on foot in 1646, at Sedan in France, by three Frenchmen, who had a patent for twenty years, and had each of them a penſion of five hundred livres for life; their children were alſo thereby ennobled in France, and their foreign workmen declared to be denizens of France, free from being quartered with ſoldiers, and from all taxes and exciſes.

Moreover, in 1669, Colbert, then prime miniſter, introduced five hundred workmen from Holland to Abbeville, in Picardy, where a new manufacture for ſuperfine *woollen* broad cloth was very ſucceſsfully eſtabliſhed. And the French king, beſides the immunities and pecuniary grants beſtowed on the workmen, raiſed the credit of their manufacture, by allowing even the nobleſſe to be concerned in it, without detracting from their nobility.

We ſhall only add on this ſubject, that many have erroneouſly imagined that the fine broad cloth of France is principally ſupported by our Engliſh run *wool*; whereas the real ſuperfine cloth muſt every where be made entirely of Spaniſh *wool*; hence called Spaniſh cloth. And though the ſecond ſort of French cloth is much meliorated by the help of our fine ſhort *wool*, yet the beſt *wool* of France alone may do well enough for their coarſe cloths. And it is principally for their fine ſtuffs, hoſe, caps, &c. that the French find our ſoft and long combing *wool* (the beſt of its kind in Europe) abſolutely neceſſary: becauſe, without a certain proportion of it, mixed up with their own *wool*, they cannot make theſe fine goods fit for the markets of Spain, Portugal, and Italy. Moreover, by running of our *wool* to Hamburg, Holland, Flanders, France, &c. thoſe countries are enabled to manufacture thoſe ſtuffs and ſtockings, to the great detriment of our own manufactures. Anderſon's Hiſt. Com. vol. ii. p 137.

A pack, or 240 pounds weight of ſhort *wool*, it is computed, employs ſixty-three perſons a week, to manufacture it into cloths; viz. three men to ſort, dry, mix, and make it ready for the ſtock-carder; five to ſcribble, or ſtock-card it; thirty-five women and girls, to card and ſpin it; eight men to weave it; four men and boys to ſpoole it; and reed quills; eight men and boys to ſcour, burl, mill, or full it; row, ſhear, pack, and preſs it.

A pack of large, long, combing *wool*, made into ſtuffs, ſerges, ſagathies, &c. for the Spaniſh trade, will employ, for one week, 202 perſons whoſe wages amount to 43*l.* 10*s.* Thus, 7 combers, 3*l.* 10*s.* dyers, 5*l.* 150 ſpinners, 18*l.* 20 throwers and doublers, 5*l.* 25 weavers and attendants, 12*l.*

A pack of *wool* made into ſtockings, will employ, for one week, 184 perſons, who will earn 56*l.* Thus, 10 combers, 5*l.* 5*s.* the dyer, 1*l.* 6*s.* 102 ſpinners, 15*l.* 12*s.* doublers and throwers, 4*l.* 10*s.* 60 ſtocking-weavers, 30*l.*

Woollens, *bleaching of.* See Bleaching.

WOOLLY-*paſhnum*, in *Natural Hiſtory*, a name given by the Eaſt-Indians to a ſpecies of native red arſenic, or orpiment, found in that part of the world.

It is of a paler colour than the red orpiment of Germany.

WOOL-STAPLE, denotes a city or town where *wool* uſed to be ſold. See Staple.

WOOLSTED. See Worsted.

WOOL-WINDERS, are perſons employed in winding up fleeces or *wool* into bundles, to be packed, and ſold by weight. Perſons *winding* and ſelling deceitful *wool*, ſhall forfeit for every fleece, 6*d.* Theſe are ſworn to do it truly between the owner and the merchant. 8 Hen. VI. cap. 22. 23 Hen. VIII. cap. 17.

WORD, in *Language*, is an articulate ſound, deſigned to repreſent ſome idea.

Word, in *Writing*, is an aſſemblage of ſeveral letters, forming one or more ſyllables, and ſignifying ſome thing.

The Port-royaliſts define *words* to be diſtinct articulate ſounds, agreed on by mankind, to convey their thoughts and ſentiments by.

The proper character of a *word*, according to the ingenious Mr. Harris, is that of its being a ſound ſignificant, of which no part is of itſelf ſignificant; and hence he infers, that *words* are the ſmalleſt parts of ſpeech.

The firſt and moſt obvious diſtinction of *words* is into ſuch as are ſignificant abſolutely or by themſelves, and ſuch as are ſignificant by relation: the former may be called principals, and the latter acceſſories. Moreover, all *words* whatever, ſignificant as principals, are either SUBSTANTIVES or ATTRIBUTIVES; and thoſe, which are ſignificant as acceſſories, acquire a ſignification either from being aſſociated to *one word*, in which caſe they only define and determine, and may juſtly be called DEFINITIVES, or to *many words at once*, in which caſe they ſerve to no other purpoſe than to connect, whence they are called CONNECTIVES. Accordingly, Mr. Harris refers all words to theſe four ſpecies. See Speech. Hermes, p. 20, &c.

Grammarians divide *words* into eight claſſes, called *parts of ſpeech*; which are the *noun*, *pronoun*, *verb*, *participle*, *adverb*, *conjunction*, *prepoſition*, and *interjection*; to one or other of which, all the *words* and terms in all languages, which have, or may be invented to expreſs our ideas, are reducible. See each.

Words, again, are divided into *primitives* and *derivatives*, *negative* and *poſitive*, *ſimple* and *complex*, *common* and *proper*, *abſtract* and *concrete*, *ſynonymous* and *equivocal*.

With regard to their ſyllables, *words* are farther divided into *monoſyllables* and *polyſyllables*.

The grammatical figures of *words*, which occaſion changes in the form, &c. thereof, are *ſyncope*, *apocope*, *apoſtrophe*, *diæreſis*, *aphæreſis*, *proſtheſis*, *epentheſis*, *paragoge*, *metatheſis*, &c. See Syncope, Apocope, &c. See alſo Figure.

The uſe of *words*, we have obſerved, is to ſerve as ſenſible ſigns of our ideas; and the ideas they ſtand for in the mind of the perſon that ſpeaks, are their proper ſignifications.

Simple and *primitive words* have no natural connection with the words they ſignify; whence there is no rationale to be given of them: it is by a mere arbitrary inſtitution and agreement of men, that they come to ſignify any thing. Certain *words* have no natural propriety or aptitude, to expreſs certain thoughts, more than others; were that the caſe, there could have been but one language.

But in derivative and compound words, the caſe is ſomewhat different. In the forming of theſe, we ſee a regard is to be had to agreement, relation, and analogy: thus moſt *words* that have the ſame ending, have one common and general way of denoting or ſignifying things; and thoſe compounded with the ſame prepoſitions, have a ſimilar manner of expreſſing and ſignifying ſimilar ideas in all the learned languages where they occur.

For the perfection of language, it is not enough, Mr. Locke obſerves, that ſounds can be made ſigns of ideas; unleſs theſe can be made uſe of, ſo as to comprehend ſeveral particular things; for the multiplication of *words* would have perplexed their uſe, had every particular thing needed a diſtinct name to be ſignified by.

To remedy this inconvenience, language had a farther improvement in the uſe of general terms, whereby one *word* was made to mark a multitude of particular exiſtences; which advantageous uſe of ſounds was obtained only by the difference of the ideas they were made ſigns of: thoſe names becoming general, which are made to ſtand for general ideas; and thoſe remaining particular, where the ideas they are uſed for are particular.

Some of our philoſophers have complained much of the great uſe, or rather abuſe, of vague and general terms, which have no preciſe, definite ſignification. To diſtinguiſh theſe, F. Malbranche obſerves, that every thing that is, and conſequently every thing that is intelligible, is either a being, or a mode and manner of being. Hence it is evident, that every term, which does not ſignify either of theſe, ſignifies nothing, and is an obſcure and confuſed term. In metaphyſics, the uſe of ſuch terms, he ſays, is ſometimes neceſſary and allowable, as in ſpeaking of the divine perfections, &c. But in phyſics it is always miſchievous, however common.

It is obſervable, that the *words* which ſtand for actions, and notions quite removed from ſenſe, are borrowed from ſenſible ideas; as, to imagine, apprehend, comprehend, underſtand, adhere, conceive, inſtil, diſguſt, diſturbance, tranquillity, &c. which are all taken from the operations of things ſenſible, aud applied to modes of thinking. *Spirit*, in its primary ſignification, is no more than breath; *angel*, a meſſenger. By which we may gueſs what kind of notions theſe were, and whence derived, which filled the minds of the firſt beginners of languages; and how nature, even in the naming of things, unawares, ſuggeſted to men the originals of all their knowledge: whilſt, to give names that might make known to others any operations they felt in themſelves, or any other ideas that came not under their ſenſes, they were forced to borrow *words* from the ordinary and known ideas of ſenſation.

The ends of language, in our diſcourſe with others, are chiefly three: firſt, to make our thoughts or ideas known one to another. This we fail in, 1. When we uſe names without clear and diſtinct ideas in our minds. 2. When we apply received names to ideas, to which the common uſe of that language doth not apply them. 3. When we apply them unſteadily, making them ſtand now for one, and anon for another idea.

Secondly, to make known our thoughts with as much eaſe and quickneſs as is poſſible. This men fail in, when they have complex ideas, without having diſtinct names for them; which may happen either through the defect of a language, which has none; or the fault of the man, who has not yet learned them.

Thirdly, to convey the knowledge of things. This cannot be done, but when our ideas agree to the reality of things. He that has names without ideas, wants meaning in his *words*, and ſpeaks only empty ſounds. He that has complex ideas without names for them, wants diſpatch in his expreſſion. He that uſes his *words* looſely and unſteadily, will either not be minded, or not underſtood. He that applies names to his ideas, different from the common uſe, wants propriety in his language, and ſpeaks gibberiſh; and he that has ideas of ſubſtances, diſagreeing with the real exiſtence of things, ſo far wants the materials of true knowledge.

Words, *diviſion of*. See Division.

Words, *general*. See General.

Words *of command*. See Exercise.

Word, *Watch*-**Word**, in an *Army*, or *Garriſon*, is ſome peculiar *word* or ſentence, by which the ſoldiers are to know and diſtinguiſh one another in the night, &c. and by which ſpies, and deſigning perſons, are diſcovered.

It is uſed alſo to prevent ſurprizes. The *word* is given out in an army every night by the general, to the lieutenant, or major-general of the day, who gives it to the major of the brigades, and they to the adjutants; who give it firſt to the field-officers, and afterwards to a ſerjeant of each company, who carry it to the ſubalterns.

In garriſons it is given, after the gate is ſhut, to the town-major, who gives it to the adjutants, and they to the ſerjeants.

Word, in *Heraldry*, &c. See Motto.

Words *defamatory*, *treaſonable*, &c. in *Law*. See Defamation, Scandal, and Treason.

WORK, in the *Manege*. To *work* a horſe, is to exerciſe him at pace, trot, or gallop, and ride him at the manege.

To *work* a horſe upon volts, or head and haunches in or between two heels, is to paſſage him, or make him go ſideways upon parallel lines.

To **Work**, in *Sea-Language*, is to direct the movements of a ſhip, by adapting the ſails to the force and direction of the wind. A ſhip is alſo ſaid to *work*, when ſhe ſtrains and labours heavily in a tempeſtuous ſea, ſo as to looſen her joints of timbers. See Rolling.

Work, *carpenters*, *clock*, *crown*, *field*, *fire*, *fret*, *groteſque*, *horn*, *moſaic*, *out*, *regimen of the*, *ruſtic*, *ſcratch*, *ſtream*, *vermicular*, and *wax*. See the ſeveral articles.

WORK-HOUSE, a place where indigent, vagrant, and idle people are ſet to *work*, and maintained with cloathing, diet, &c. See House *of correction*.

Such are the Bridewells, and ſeveral other places about the city, or ſuburbs; ſuch alſo was the foundation of that in Biſhopſgate-ſtreet, for employing the poor children of the city and liberties, who have no ſettlement; and that for the pariſh of St. Margaret's, Weſtminſter, called the *Grey-coat* HOSPITAL.

By 43 Eliz. cap. 2. the church-wardens and overſeers, with the conſent of two juſtices, are empowered to ſet to work the children of the poor, and other deſtitute perſons, and to provide for the relief of the lame, old, blind, and ſuch as are poor, but not able to work; and they may erect, with the leave of the lord of the manor, on any waſte or common, of which the pariſh is parcel, convenient houſes of dwelling for the poor. By 3 C. 4. they may ſet up and uſe any trade, merely for the employment and relief of the poor. By 9 G. cap. 7. they may contract for the maintainance and employment of the poor in houſes purchaſed or hired: and poor perſons refuſing to be lodged and maintained in ſuch houſes, ſhall be put out of the pariſh-books, and not entitled to receive relief from the church-wardens and overſeers; and two or more pariſhes are allowed to unite in lodging their reſpective poor in one houſe; and the officers of one pariſh are allowed to contract with thoſe of another for the maintenance, &c. of their poor. Moreover, by 8 and 9 W. cap. 30. pariſh poor that are relieved are required to wear on the ſhoulder of the right ſleeve of the uppermoſt garment, in red or blue cloth, a large Roman P, together with the firſt letter of the name of the pariſh or place to which they belong. By 24 Geo. II. cap. 43. no ſpirituous liquor ſhall be ſold or uſed in any *work-houſe*, or houſe of entertainment for pariſh poor. The ſtatute 22 Geo. III. cap. 83. eſtabliſhes many new regulations with regard to the maintenance of the poor; but leaves it optional in any pariſh or place whether they will adopt theſe, or retain the preſent mode.

At Amſterdam they have a famous *work-houſe*, or houſe of correction, called the *Raſphuyſe*, which, by a privilege granted in 1602, has alone the right of ſhaving and cutting the dyer's woods, as brazil, ſantal, campechy, ſaſſafras, &c.

Each perſon, tolerably ſtrong, kept in the houſe, is obliged to furniſh two hundred and fifty pounds of raſped wood per day; and the weaker, a certain proportionable quantity of chips.

WORKING *to windward*, in *Sea Language*, denotes the operation by which a ſhip endeavours to make a progreſs againſt the wind. See Beating, Plying, Tacking, and Turning.

Working *furnace*. See Furnace.

Working *of glaſs*. See Glass.

WORKS, *opera*, in *Fortification*, the ſeveral lines, trenches, ditches, &c. made round a place, an army, or the like, to fortify and defend it. See *Tab.* II. *Fortif. fig.* 21. See alſo Line, Parallel, and Trench.

The principal *works*, in a fortreſs, or fortified place, ſee under Fortified *place*, Fortification, &c.

Works, *covenant of*, in *Theology*. See Covenant.

WORLD, *mundus*, the aſſemblage of parts which compoſe the UNIVERSE.

The *duration of the world* is a thing which has been greatly diſputed. Plato, after Ocellus Lucanus, held it to be eternal, and to have flowed from God, as rays flow from the ſun. Ariſtotle was much of the ſame mind: he aſſerts, that the *world* was not generated, ſo as to begin to be a *world*, which before was none; and, in effect, his whole eighth book of Phyſ. and firſt book de Cœlo, are ſpent in proving the eternity of the *world*.

He lays down a pre-exiſting and eternal matter, as a principle; and thence argues the *world* eternal. His argument amounts to this, that it is impoſſible an eternal agent, having an eternal paſſive ſubject, ſhould continue long without action.

His opinion was long generally followed; as ſeeming to be the fitteſt to end the diſpute among ſo many ſects about the firſt cauſe.

Epicurus, however, though he makes matter eternal, yet ſhews the *world* to be but a new thing, and ſays it was formed out of a fortuitous concourſe of atoms. See Lucretius, lib. v.

Some of the modern philoſophers refute the imaginary eternity of the *world*, by this argument: that, if it be ab æterno, there muſt have been a generation of individuals, in a continual ſucceſſion from all eternity; ſince no cauſe can be aſſigned why they ſhould not be generated, viz. one from another. Therefore, to conſider the origin of things, and the ſeries of cauſes, we muſt go back in infinitum, i. e. there muſt have been an infinite number of men, and other individuals, already generated; which ſubverts the very notion of number. And if the cauſe which now generates have been produced by an infinite ſeries of cauſes, how ſhall an infinite ſeries be finite, to give room for new generations? See God.

Dr. Halley ſuggeſts a new method of finding the age of the *world*, from the degree of SALTNESS of the ocean.

It is another popular topic of controverſy, whether the *world* be finite, or infinite? See the arguments on both ſides, under Universe.

It is likewiſe diſputed, whether the plurality of *worlds* be poſſible? See Plurality.

Some hold the affirmative, from an opinion of the infinite power of the Deity; it being a ſetting bounds to omnipotence, to ſay, that he created ſo many bodies at firſt, and that he could not create more.

The Carteſians maintain the negative, upon theſe principles: that it is a contradiction to ſay, there are ſeveral *worlds* exiſting at the ſame time, ſince this implies ſeveral univerſes of created beings, the *world* being the τὸ πᾶν. That if there were ſeveral *worlds*, they muſt either be at a diſtance from one another, or contiguous; but neither can be ſaid: for were they contiguous, they would only conſtitute one; and were they diſtant, there muſt be ſomething between. But what can be between? If it be extended, it is corporeal; and, inſtead of ſeparating the ſeveral *worlds*, it will connect them all into one.

The *exiſtence of an external world* has been much controverted. The arguments on either ſide, ſee under Abstraction, Body, and Existence.

The *world* is ſometimes divided into *upper*, and *lower*.

World, *lower*, or *ſublunary*, is the globe of our EARTH.

World, *upper*, includes the heavens, and heavenly bodies.

World, *axis of the*. See Axis.

World, *map of the*. See Map.

World, *ſoul of the*. See Anima *mundi*.

World, *ſyſtem of the*. See System.

WORMS, in the *Linnæan Syſtem of Nature*, the ſixth claſs of animals, including five orders, viz. *inteſtina*, *molluſca*, *teſtacea*, *lithophyta*, and *zoöphyta*; eighty genera, and eleven hundred and ſixty-ſix ſpecies. The animals of this claſs are diſtinguiſhed by having the heart with one ventricle, and no auricle, and a cold, colourleſs ſanies; and they are particularly diſtinguiſhed from inſects, which are antennated, by being tentaculated.

WORMS, in *Huſbandry*, are very prejudicial to corn-fields, eating up the roots of the young corn, and deſtroying great quantities of the crop.

Sea-ſalt is the beſt of all things for deſtroying them. Sea-water is proper to ſprinkle on the land where it can be had; where the ſalt-ſprings are, their water does as well; and where neither are at hand, a little common or bay ſalt melted in water does as well.

Soot will deſtroy them in ſome lands, but it is not to be depended upon, for it does not always ſucceed. Some farmers ſtrew on their land a mixture of chalk and lime; and others truſt wholly to their winter fallowing to do it; if this is done in a wet ſeaſon, when they come up to the ſurface of the ground, and ſome nails with ſharp heads be driven into the bottom of the plough.

If they are troubleſome in gardens, the refuſe brine of ſalted meat will ſerve the purpoſe, or ſome walnut leaves ſteeped in a ciſtern of water for a fortnight or three weeks, will give it ſuch a bitterneſs that it will be a certain poiſon to them.

A decoction of wood-aſhes, ſprinkled on the ground, will anſwer the ſame purpoſe; and any particular plant may be ſecured both from worms and ſnails by ſtrewing a mixture of lime and aſhes about its roots. It is a general caution among the farmers to ſow their corn as ſhallow as they can, where the field is very ſubject to worms. Mortimer's Huſbandry, p. 328.

WORMS, *lumbrici*, or *vermes*, in *Medicine*, a diſeaſe ariſing from ſome of thoſe reptiles being generated, and growing in the body; whence, frequently, terrible ſymptoms proceed.

The ordinary place of the *worms* is the inteſtines; though there is ſcarce any part of the body but is ſometimes infected with them: for, beſides the *vermes inteſtinales*, there are *dentales*, *gingivales*, *pulmonarii*, *cardiaci*, *ſanguinarii*, *cutaneous*, *umbilical*, *hepatic*, *ſalival*, &c.

They are all uſually ſuppoſed to be engendered from the eggs of inſects depoſited in ſomething that is taken into the body by way of food, or ſome other way; an hypotheſis, however, which will hardly account for certain ſpecies of theſe inſects not to be found but in the bodies of animals. A ſolution of this difficulty will, perhaps, be hard to find, without having recourſe to the firſt ſtamina of animals, and the principles of generation.

Valliſnieri (Obſ. Med.) has proved, that *worms* in the human bowels are not produced from the eggs ſwallowed down with our drink or otherwiſe, but that they really propagate their ſpecies within us, and are owing to parents of the ſame kind hid in ſome parts of our inteſtines. Redi has given ſuch deſcriptions of the lumbrici rotundi, or common *worms*, as to render the fact with regard to them unqueſtionable; and this author has proved as much in regard to the tænia, or tape-*worm*.

There are three ſpecies of *worms*, moſt frequent in the human body: the *teretes*, or round and thick, moſtly bred in the ſmall guts, and ſometimes in the ſtomach; the *latus*, or flat, called alſo *tænia*, generally bred either in the ſtomach, or ſmall inteſtines; and the round and ſmall, found in the rectum, called *aſcarides*. Sometimes, indeed, there are anomalous *worms* expelled; as horned, hairy, four-footed, &c. *worms*.

The Memoirs of the French Academy, for 1708, furniſh a remarkable account of an obſtinate pain cauſed by a *worm*, on the lower part of a woman's forehead toward the right ſide, and very near the top of the noſe. In the ſpace of two years this pain extended itſelf to the temple on the ſame ſide, and became continual and much more violent, ſo as occaſionally to diſorder the ſenſes of the patient. After many ineffectual attempts and applications of a medical kind, the cure was inſtantaneouſly effected by the violent ſneezing occaſioned by taking ſome ſnuff, which threw out of her noſe a *worm* wrapped up in a maſs of pituitous matter, tinged with a little blood; and the noſtril of the diſordered ſide bled a little for two or three days. This *worm* was about half a quarter of an inch broad, and not leſs than ſix inches long, though in the curled ſtate which it uſually aſſumed, it was only about two inches long; its colour was a deep brown; its back was rounded, and belly flat; and it was covered, except on the head, with large ſcales, between which there grew on each ſide fifty-ſix legs, fine as a hair, and about one-twelfth of an inch long; in the head were diſcovered two eyes, two horns, and a pair of forceps, made up of four arms, and the tail was armed with two points, longer, thicker, and ſharper pointed than the legs. The ſeat of the pain indicates plainly, that the *worm* muſt have lived in the cavity of the frontal ſinus. Between this ſinus and the noſtril there is a ſmall hole, through which it is apprehended, the egg incloſing this animal was ſnuffed up with the air, rather than by the round of circulation, and through the ſame paſſage the animal was diſcharged.

As to the cauſes of *worms*, they are various; however they are ſeldom found, except in weak and relaxed ſtomachs, where the digeſtion is bad: ſedentary perſons are conſequently more ſubject to them than the laborious and active.

Worms are often the effects of eating great quantities of unripe fruit, or raw herbs and roots; they are frequently a ſymptom of fevers, and other acute diſeaſes; and there ſeems to be an hereditary diſpoſition in ſome perſons to this diſeaſe.

The common ſymptoms of *worms* are paleneſs of the countenance, and, at other times, an univerſal fluſhing of the face; itching of the noſe, though this is doubtful, as children pick their noſes in all diſeaſes; ſtarting and grinding of the teeth in ſleep; ſwelling of the upper lip; the appetite ſometimes bad, at other times quite voracious; looſeneſs; a ſour or ſtinking breath; a hard, ſwelled belly, great thirſt; urine frothy, and ſometimes of a whitiſh colour; griping, or colic pains; an involuntary diſcharge of ſaliva, eſpecially when aſleep; frequent pains of the ſide, with a dry cough, and unequal pulſe; palpitations of the heart; ſwoonings, drowſineſs, cold ſweats, palſy, epileptic fits, and many other unaccountable nervous ſymptoms, formerly aſcribed to witchcraft, or the influence of evil ſpirits. The long round *worms*, in particular, occaſion ſqueamiſhneſs, vomiting, a diſagreeable breath, gripes, looſeneſs, ſwelling of the belly, ſwoonings, loathing of food, or voracious appetite, dry cough, convulſions, epilepſy, fits, and ſometimes privation of ſpeech. Theſe *worms* have been known to perforate the inteſtines, and get into the cavity of the belly. The effects of the tape-*worm* are nearly the ſame, but more violent.

Beſide the other common ſymptoms, thoſe affected with this, have one peculiar to them; which is, that with their ſtools they frequently diſcharge ſeveral little bodies, like gourd-ſeeds. See TAPE-*worm*.

Andry ſays, the following ſymptoms attend the ſolium, which is a ſpecies of the tape-*worm*, viz. ſwoonings, privation of ſpeech, and a voracious appetite. The round *worms* called *aſcarides*, beſides an itching of the anus, cauſe ſwoonings, and teneſmus, or an inclination to go to ſtool.

In Perſia, &c. there are alſo very long ſlender *worms*, ſix or ſeven yards long, bred in the legs, and other parts of men's bodies; when arrived at a certain pitch they put out their heads, necks, &c. and withdraw them (if diſpleaſed or hurt) again, cauſing intolerable pain, fevers, &c. See DRACUNCULI.

Ariſtotle obſerves, that moſt deer have *worms* under their tongues. Sheep's noſes often abound with them.

Fiſh are, apparently more ſubject to *worms*, than other animals; the cod has often ſmall ſlender *worms*, coiled up like ſnakes, on the ſurface of its liver. The bleak is alſo much diſtreſſed about the month of July, by a long flat *worm*, which, by eating its liver, makes it tumble about on the ſurface of the water, and either die ſuffocated, or becomes a prey to its enemies. Ariſtotle (Hiſt. An. lib. viii. cap. 20.) gives a ſimilar account of the ballerus and tillo.

There is alſo a ſpecies of dropſy incident to bullocks and ſheep, which is owing to a ſmall flat *worm*, found in the gall-duct, and encloſed within a kind of ſtony tube, that ſtops the paſſage of the gall. Young bullocks are ſubject to a diſeaſe called the huſk, and aſcribed by Dr. Nicholls to a ſimilar cauſe. See COUGH. Phil. Tranſ. vol. xlix. p. 246, &c.

In the Philoſophical Tranſactions, Nº 113. we have accounts of divers remarkable operations, whereby *worms* were taken out of divers unſuſpected parts of the body, the operators being chiefly women. Mrs. Mary Haſtings is there recorded as famous for the diſcovering of *worms* hid in the face, gums, tongue, &c. which ſhe managed with ſuch addreſs that ſhe took them out of any part affected, with a gooſe-quill. Mr. Dent relates, that he himſelf was cured of certain odd tumors on his tongue, by one of thoſe *worm*-doctreſſes, Mrs. French, who, piercing the parts affected with a lancet, drew out five or ſix *worms* at a time. In leſs than eight days, he aſſures us, ſhe took out of his tongue above a hundred *worms*, and thirty out of his gums.

Many effects have been by the ignorant attributed to *worms*, in which they have had no ſhare; and many things called *worms*, have no right to that name.

We to this day vulgarly call the little black prominent ſpots in people's faces *worms*; but they are not ſo, nor any thing living. We owe the true knowledge of theſe to the ſagacious Mr. Leewenhoeck, who, examining them by the microſcope after they were taken out of the face, found them only to be bundles of hairs, or imperfect hairs in ſmall portions enveloped in thin films; in ſome, the fragments of hairs are evident, being ſtrong and rigid; but in others they ſeem ſoft and pulpy.

We have accounts in the Acta Leipſienſia, of *worms* not only voided by urine, but let out of the veins in blood-letting; but there want more teſtimonies of ſuch marvellous things to procure them a general belief.

Sir Theodore Mayerne aſſures us, in the Philoſophical Tranſactions, N° 211. that the famous ſugar, or remedy given by Pontæus (a celebrated chemical empiric) for the *worms* in children, is fifteen grains of mercurius dulcis, with five grains of ſcammony, and two or three times as much ſugar made up in lozenges. He adds, that this doſe of the ſcammony which in France purges grown perſons, is ineffectual in England to perſons of above fifteen years old, and ought to be augmented.

There is a great variety of medicines given for deſtroying the *worms* which breed in human bodies; but as they are of very different kinds, there is great caution required in ſelecting ſuch as are moſt proper for each peculiar caſe.

Acids, in general, are eſteemed good in theſe caſes; and lemon juice, vinegar, and other vegetable acids, ſuch as pomegranate and currant-juice, and the like are given; and ſometimes the mineral ones, as the ſpirit of vitriol, ſulphur, and the like. All theſe are properly given when there is a preternatural heat, and feveriſh diſpoſition; for they not only allay the heat, but reſiſt putrefaction.

Bitters in general are alſo reckoned among the medicines good againſt *worms*; of this kind are wormwood, ſmall centaury, rue, and the like; and to theſe are to be added the purging bitters, ſuch as rhubarb, aloes, and coloquintida. Theſe medicines do not act merely as bitters; for it is well known, that many inſects will endure the bittereſt ſubſtances unhurt, and worms will breed in the gall-bladder; but they correct and alter the crude and viſcid matter in the inteſtines by which theſe animals are nouriſhed, and by ſtimulating the fibres of the inteſtines they often diſcharge the noxious matter, and *worms* themſelves with it. They alſo correct the inactivity of the bile, which in children and perſons of moiſt habits is the general cauſe of the breeding and living of theſe inſects.

Oily medicines of all kinds are by ſome greatly extolled in caſes of *worms*; and there ſeems this reaſon for it, that all inſects are deſtroyed by being put into oil, and that flies and many other ſmall animals, which, after ſeeming dead on the being immerſed in other liquors, would come to life again on the being expoſed to the ſolar rays, never revived again after being drowned in oil. To this it is to be added, that very good effects always follow the giving of oils, in caſes of the greateſt torment from *worms*; for they relax the ſpaſmodically contracted coats of the inteſtines, and as it were defend and line them with a ſort of mucilage, in ſuch a manner that the more acrid purging medicines, neceſſary to the utter deſtruction of the animals themſelves, may be given with more ſafety. Thus it is a very good method to give a child over night half an ounce or more of oil of ſweet almonds, and in the morning following a briſk purge of the reſin of jalap, mercurius dulcis, or any thing elſe of this kind. Or, an ounce of ſallad-oil, and a table-ſpoon-ful of common ſalt, may be taken in a glaſs of red Port-wine thrice a day, or oftener, if the ſtomach will bear it. But the more common mode of uſing oils is in clyſters; oily clyſters, ſweetened with ſugar or honey, are very efficacious in bringing away the ſhort round *worms* called aſcarides, and likewiſe the teres.

Saline ſubſtances in general are alſo greatly celebrated by many in caſes of *worms*, and they are indeed capable of acting in a double capacity againſt them, at once deſtroying the tender ſtructure of many of them, and vellicating the inteſtines, ſo as to promote the diſcharge of them. The common bitter purging ſalts, as the Glauber's ſalt, and the natural ſalt contained in the purging waters of different places, are the beſt of all for this purpoſe: if the natural waters are drank, it ſhould be in conſiderable quantities; and if the factitious ſalt be taken, it ſhould be diſſolved in large portions of water.

Many people who live on the ſea-coaſts give their children ſea-water for the ſame purpoſe; and ſome uſe the broth of recent oyſters, with pepper and other ſpices, and lemon-juice. If ſea-water cannot be had, water in which common ſalt has been diſſolved may be drank; ſome flour of ſulphur may be taken at night, and the ſalt-water in the morning.

Salts of the vitriolic kind have alſo long been celebrated as remedies for *worms*; and the common ſalt of ſteel, as alſo the Pyrmont waters, which are highly impregnated with particles of that metal, are found very uſeful in all caſes of this kind.

Harrowgate-water is an excellent medicine for expelling *worms*, eſpecially the ASCARIDES. Hence we may infer that ſulphur is a good medicine: accordingly, ſome have adminiſtered ſulphur with great ſucceſs. It ſhould be made into an electary with honey or treacle, and taken in ſuch quantity as to purge the patient.

But if any diſorder admits of ſpecific remedies we might expect that this malady would; for theſe purpoſes many extol ſome of the gums, as aſſa-fœtida, galbanum, and myrrh, and the leaves of ſome plants, as wormwood, tanſy, and rue. Onions and garlick, and Indian pink, are alſo greatly commended; and bitter almonds and wormſeed have long been famous. All theſe are found peculiarly deſtructive of *worms*; but the powder of tin with Æthiops mineral, and the purges of rhubarb and calomel, are more to be depended upon.

Among the minerals we find alſo one remedy greater than all theſe, that is quickſilver; this has been given in many various forms, and found more or leſs ſucceſsful in all. Water, in which crude quickſilver had been boiled, was firſt given by Helmont, and that with great ſucceſs; the efficacy of which has been attributed to a portion of arſenic, which it takes up from this mineral: after this Meibom infuſed crude mercury in Rheniſh wine, and found this more effectual than the former. But the moſt ſucceſsful method ſeems the giving of proper doſes of mercurius dulcis, with ſome purging medicines, as the reſin of jalap.

Æthiops mineral, which is a mixture of quickſilver and ſulphur, is found alſo of great uſe; and quickſilver, rubbed to a mixture with ſugar-candy, is preferred by Hoffman to all the other preparations.

The beſt purge for an adult, ſays Dr. Buchan, is jalap and calomel; twenty-five or thirty grains of the former with ſix or ſeven of the latter, mixed in ſyrup, may be taken early in the morning for a doſe: in which caſe the patient ſhould keep the houſe all day, and drink nothing cold. The doſe may be repeated once or twice a week, for a fortnight or three weeks. On the intermediate days the patient may take a dram of the powder of tin, twice or thrice a day, mixed with ſyrup, honey or treacle. Thoſe who do not chuſe to take calomel, may uſe the bitter purgatives, as aloes, hiera picra, tincture of ſena, and rhubarb, &c. For a child of four or five years old, ten grains of rhubarb, five of jalap, and two of calomel, may be mixed in a ſpoonful of ſyrup or honey, and given in the morning. In this caſe the child ſhould avoid cold. The doſe may be repeated twice a week for three or four weeks. On the intermediate days the child may take a ſcruple of powdered tin, and ten grains of Æthiops mineral, in a ſpoonful of treacle, twice a day. Theſe doſes may be increaſed or diminiſhed, according to the age of the patient.

Biſſet ſays, the great baſtard black hellebore, or bear's foot, is a moſt powerful vermifuge for the long round *worms*. He orders the decoction of about a dram of the green leaves, or about fifteen grains of the dried leaves in powder, for a doſe, to a child between four and ſeven years of age. This doſe is to be repeated two or three times. He adds, that the green leaves, made into a ſyrup with coarſe ſugar, are almoſt the only medicine he has uſed for round *worms* for ſome years. Before the juice is preſſed out, he moiſtens the bruiſed leaves with vinegar, which corrects the medicine: the doſe is a tea-ſpoonful at bed-time, and one or two next morning.

Dr. Buchan ſays, he has frequently known theſe big bellies, which in children are commonly reckoned a ſign of *worms* quite removed, by giving them white ſoap in their pottage, or other food. Ball's purging vermifuge powder is a very powerful medicine: it is made of equal parts of rhubarb, ſcammony, and calomel, with as much double refined ſugar, as is equal to the weight of all the other ingredients: theſe muſt be well mixed together, and reduced to a fine powder. The doſe for a child is from ten grains to twenty, once or twice a week. An adult may take a dram for a doſe. See *Worm*-POWDER.

Dr. Storck ſays, that he hath deſtroyed all ſorts of *worms*, viz. the round, the aſcarides, and tape-*worm*, by the following mixture. ℞ Sal polychreſt. pulv. rad. jalap. & rad. valer. ſilv. pulv. āā ʒ j. ox. ſcillit. ℥ iv. m. exhibeatur adultis quater per diem ℥ ß. junioribus vero ʒ j. aut ʒij.

After a cure by theſe means, the patient ſhould be prevented from a relapſe, by abſtaining for a time from fleſh and fiſh; and, after this, from milk and cheeſe. Acrid purgatives, or hot remedies are never to be given, where there is any febrile heat; and when there is cauſe to ſuſpect that the duodenum is full of an acrid bile, then mercurials are to be avoided; as are all the draſtic purges; for theſe medicines, in theſe circumſtances, often bring on inflammations of the bowels.

Before the expelling of the *worms* from the ſmall inteſtines, it is proper to give clyſters of milk and honey, to allure all the *worms* together to that part. In caſes of the aſcarides lodged in the inteſtines, clyſters of milk with tanſy, garlic, and ſcordium boiled in it, have great effects; and clyſters of brine, or ſalt and water, with aloes added to it, are alſo found of great benefit. As theſe troubleſome *worms* are uſually lodged in the rectum, theſe clyſters take immediate effect.

It is proper alſo to give a vomit during the courſe of cure, to diſlodge ſuch *worms* as may have got into the inteſtinum cœcum, ſince purging medicines cannot reach them while they remain there. External applications alſo of bull's gall, aloes, and coloquintida, are of ſervice, laid in form of a cataplaſm to the belly.

As *worms*, though expelled, will ſoon breed again, if the ſtomach remains weak and relaxed; for the prevention of this the Peruvian bark is recommended. Half a dram of it in powder may be taken in a glaſs of red Port wine, three or four times a day. Lime-water is alſo good for this purpoſe, or a table-ſpoonful of the chalybeate wine taken twice or thrice a day. Infuſions or decoctions of bitter herbs may likewiſe be drank; as the infuſion of tanſy, water-trefoil, camomile-flowers, tops of wormwood, the leſſer centaury, &c. Moreover, children liable to *worms* ſhould not be nouriſhed with food difficult to digeſt. Dr. Tiſſot cautions againſt ſtuffing them with oils, which, though they ſhould kill ſome of the *worms*, increaſe the cauſe, which diſpoſes them to generate others; and he ſays, that a long-continued uſe of filings of iron is the remedy that moſt effectually deſtroys this diſpoſition to generate *worms*. Dr. Buchan warns thoſe of their danger, who buy cakes, powders, and other *worm* medicines, at random from quacks, and give them to their children without proper care. The principal ingredients in moſt of them is mercury, which is never to be trifled with. Hoffm. Oper. tom. iv. Buchan's Dom. Med. chap. xxxv. Tiſſot's Advice, &c. p. 390.

Tin is often recommended as a good remedy againſt *worms*, particularly of the flat kind. Dr. Alſton, in the Med. Eſſ. Edinb. vol. v. art. 7. directs an ounce and a half of the powder of pewter-metal to be mixed in half a Scotch mutchkin, or about half a pint Engliſh meaſure of treacle, for children; but to grown perſons, he gives two ounces of the powder of pure tin, paſſed through the fineſt hair-ſieve, and mixed with eight ounces of treacle. As to the adminiſtration of this medicine, the original receipt directs half of it to be taken the Friday before the change of the moon; the day after, half the remainder, and the reſt on Sunday. On the Monday a purge is to be taken. The doctor thinks there is probably nothing in the particularities of the day; but ſays, the medicine ſucceeds well in ſeveral ſpecies of *worms*.

The efficacy of FERN-*root* againſt *worms* was known in the time of Dioſcorides; and towards the beginning of this century, meſſieurs Andry and Marchant publiſhed accounts of ſucceſsful modes of exhibiting it in theſe caſes. But it has been principally celebrated of late as a ſpecific in the cure of the tænia, or TAPE-*worm*.

Dr. Prieſtley, conſidering how fatal nitrous air is to inſects, and likewiſe its great antiſeptic power, conceived that conſiderable uſe might be made of it in medicine, in the form of clyſters; and he apprehends, that if nitrous air was diluted with common air, or fixed air, the bowels might bear it better, and that it might ſtill be deſtructive to *worms* of all kinds, and be of uſe to check or correct putrefaction in the inteſtinal canal, or other parts of the ſyſtem. Prieſtley's Obſ. on Air, vol. i. p. 227.

WORMS, *aquatic*. See *Water* WORMS.

WORM, *aſcaris*, in the *Linnæan Syſtem*, a genus of the order of *inteſtina*, and claſs of *vermes*; the characters of which are, that the body is round and filiform, and attenuated towards both ends. There are two ſpecies. See ASCARIDES.

WORM, *bee*. See *Generation of* BEES.

WORM, *butterfly*. See AURELIA, and CATERPILLAR.

WORM, *canker*. See SCARABÆUS.

WORM, *chur*. See *Mole* CRICKET.

WORM, *cochineal*. See COCHINEAL.

WORM, *Connough*, or *Connaught*, in *Natural Hiſtory*, a name given by the common people of Ireland to a kind of caterpillar found in many parts of that kingdom; and, from its ugly aſpect, reputed to be poiſonous.

It is ſaid to be the only poiſonous creature of that kingdom, and many miſchievous effects are attributed to its ſting, and to its poiſonous quality, when eaten by cattle. As to the firſt of theſe opinions, it is evidently erroneous; the creature having no power to ſting at all. The other is not ſo eaſily proved falſe, but is much to be ſuſpected. The reaſons on which it is founded, are theſe: the cattle in Ireland are ſubject to a very terrible diſeaſe, which is moſt frequent in autumn; about the time when theſe animals are in the greateſt plenty.

It is moſt frequent alſo among thoſe cattle which feed in low and marſhy grounds, where this creature lives and feeds; cows and hogs which feed in theſe places are the only creatures ſubject to the diſtemper, and this is imputed to the cow's eating by large mouthfuls, becauſe ſhe chews the cud a ſecond time; and the hogs feeding ſo foul and greedily, as to eat things which other creatures refuſe. Finally, the great cauſe of aſſigning this diſeaſe to this creature, is, that the *worm* only appears in great numbers about once in ſeven years; and in theſe, and theſe years only it is, that the diſtemper among the cattle is common.

The ſymptoms by which this diſeaſe is diſtinguiſhed from all others are, great ſwelling of the head, and a falling down of the anus; the gut often hanging out to the length of ſix or ſeven inches. The common cure among the more intelligent people is a ſtrong decoction of the plant called bearsfoot, or great black hellebore, with ſome rue and garlic given with butter and beer; this is found to have great ſucceſs with the cows. The hogs are cured only by mixing reddle, or the common red ochre powdered, with butter-milk, and making them eat a large quantity of it.

The Iriſh peaſants have recourſe to many idle remedies; but theſe are found often of real ſervice. The caterpillar, ſuppoſed to occaſion this diſeaſe, feeds on the common ragwort, and is larger than moſt other creatures of this kind, being of the length and thickneſs of a man's finger; it is marked with two large ſpots behind the head, which are ſuppoſed by the vulgar to be the eyes, but are only round variegations, of the nature of thoſe common on other caterpillars; and what they take to be a ſting in the tail, is no other than a horn in that part, which is not peculiar to this caterpillar, but found on many others. That the common people are deceived in regard to the external parts of this creature, is evident; but experiments are required yet to prove whether or not they are ſo, in regard to its poiſonous quality.

One trial is remarked by Mr. Molyneux to have been made on a dog, who eating the ſkin of only one of the creatures was found dead about three days after; another dog, which drank the juices expreſſed from that ſkin, received no hurt. The inſect is deſcribed in Liſter's edition, under the name of the elephant caterpillar. Phil. Tranſ. N° 168. p. 880.

WORM, *earth*, *lumbricus*, a genus of the order of *inteſtina*, including two ſpecies. See EARTH-*worm*.

WORM, *flower-root*. See FLOWER.

WORM, *fly*, in *Natural Hiſtory*, the *worm* or maggot produced of the egg of a fly, and afterwards to be transformed into one.

Theſe *worms* are to the fly, what the caterpillar is to the butterfly it produces. The cuſtom of the world has appropriated the term caterpillar to that one ſpecies of the flying inſects firſt ſtate; but we have unfortunately no term of diſtinction yet eſtabliſhed for any of the firſt ſtate of any of the other flying inſects, the creature produced by the egg of the fly ſcarce being indeterminately called *worm*. Till more expreſſive names ſhall be invented for theſe, it may not be improper to diſtinguiſh thoſe of the different claſſes by the additional name of the inſect they are to be changed into, and to call that which is to become a beetle, the *ſcarab-worm*; that which is to be hereafter a fly, the *fly-worm*; and ſo of the reſt.

Thoſe which are to be hereafter winged creatures of the fly-claſs, are extremely different one from another in form and figure, and may very properly be arranged into ſeveral claſſes.

The moſt remakable and ſtriking differences between the claſſes of theſe creatures, are thoſe of the form and ſhape of their heads. Many of them have heads which it is not eaſy to diſtinguiſh to be ſuch, as they carry no one mark of the head of an animal viſibly about them. There are many, whoſe heads are variable at the pleaſure of the creature, and which at times are ſeen to be more or leſs long, more or leſs thick, more or leſs flat, more or leſs ſhortened at pleaſure by the animal, and eaſily bent and turned about in any direction. The heads of theſe creatures are compoſed of a very ſoft and flexible fleſh.

There are others, whoſe heads are hard, and which always retain the ſame regular figure. The firſt general arrangement of theſe *worms* may be into thoſe which have a variable, and thoſe which have an invariable head. The ſubordinate diſtinctions may be deduced from the number, diſpoſition, ſtructure, and form of the other parts. Some *worms* of this kind have no legs; thoſe of others are membranous or ſcaly; and others have them both membranous and ſcaly. Some *worms* have the power of altering the figures of their bodies at pleaſure, both as to length and bulk: the bodies of others are rigid,

gid, and incapable of theſe changes. Some, again, have a thin, membranous coat; whereas that of others is firm and ſcaly, or cruſtaceous. Moreover, conſiderable differences are obſervable with regard to the poſition, number, and figure, of their organs of reſpiration.

Among the *fly-worms* of variable heads, the diſpoſition of the ſtigmata, or air-holes, at which the tracheæ of theſe animals terminate, will afford ſeveral diſtinctions of genera: e. gr. the *worms* of the common fleſh-fly has in its ſtigmata ſix apertures, three in each, reſembling button-holes; but the *worms* of many other flies have only one ſmall eminence in each: others have them cylindric and hollow, and projecting like horns, of which ſome have two, and others three, differently ſituated and diſpoſed. The number and figure of the hooks, which ſerve theſe creatures for teeth, may alſo ſerve for matter of diſtinction. The common *worm* of the fleſh-fly has two hooks, with a dart between them; others have hooks without a dart; ſome have one hook, and others none. The figure of the body, and the differences of ſize and colour, may furniſh farther diſtinctions with regard to the genera of the firſt claſs.

Thoſe of the ſecond claſs, which have variable heads, and differ from the former in having legs like thoſe of the caterpillar claſs, have often a ſort of hooks faſtened to them: they have alſo a long fleſhy tail, capable of being lengthened or contracted at pleaſure, and reſembling the tail of a rat; whence theſe are called *rat-tailed worms*. In theſe *worms* the tail is the principal organ of reſpiration; its end being always open, and ſupplying the office of the ſtigmata of the other genera.

The *fly-worms* of the third claſs, which have invariable heads, and have nothing analogous to the organization of moveable jaws, have pointed heads, or ſuch as ſeem truncated, and no ſcaly legs: theſe form a very numerous family both in the terreſtrial and aquatic kingdom, and all of them furniſh two-winged flies. Under this claſs Reaumur enumerates and deſcribes eight genera. This ingenious writer mentions *worms* of another claſs, which uſually produce four-winged flies, having heads of an invariable figure, and two teeth or moveable jaws, near the aperture of the mouth, without ſcaly legs, and with the ſtigmata placed on the ſides of their bodies. The flies produced from theſe are the bees, waſps, ichneumons, gall-flies, &c. There is another claſs of the hexapode, or ſix-legged *worms*, which are transformed into ſome ſpecies of the libellæ; which have no mouth, but two openings at the top of their antennæ, through which their aliment may paſs. The formica leo, and the puceron eaters, belong to this claſs. There is another claſs, which have bodies like thoſe of the caterpillar claſs, and ſix legs, beſides two other ſhorter legs or hooks, near their hinder part, which ſerve for motion and for fixing themſelves. The water *worms*, which make for themſelves caſes of different materials, and are transformed into papilionaceous flies, are of this claſs. There is alſo a claſs of *worms*, called falſe or baſtard caterpillars. See FAUSSE *chenille*. See the more particular deſcription of theſe claſſes, and their ſubordinate genera, in Reaumur's Hiſt. Inſ. tom. iv. p. 161, &c.

WORM, *gourd*, the name of a ſpecies of *tænia*, or TAPE-*worm*; the body of which is of an oblong form, flat on the belly, and rounded on the back; its ſkin is ſoft, and its mouth large, horizontal, and emarginated, or dented in the middle. It reſembles the common gourd in figure, and from thence has got this name of *vermis cucurbitinus*, or the *gourd-worm*. It is frequently found in the inteſtines of animals.

WORM, *golden*. See APHRODITA.

WORM, *Guinea*, or *Hair*-WORM. See CHÆTIA, AMPHISBÆNA, and DRACUNCULI.

WORM, *gally*, *glow*, *gnat*, *gooſeberry*, *hay*, *horſe*, *lyſimachia*, *muſhroom*, *oyſter*, *pile*, *ſheep-noſe*, *ſilk*, *ſolitary*, *ſpermatic*, and *truffle*. See the reſpective articles.

WORMS, *meal*. There are two very different inſects found in our meal or flour; the one is ſo ſmall, that it is only to be ſeen by the microſcope; all that the naked eye can diſcover of it is, that ſomething is alive in the place, from the whole ſubſtance of the flour being in motion. See FLOUR.

The other *meal-worm* is larger, and more frequently offers itſelf to our obſervation; it conſiſts of eleven rings, and has three pair of legs. The mouth of this *worm* is made into a kind of forceps, and from this ariſe, on each ſide, a great number of ſmall ſpinulæ; theſe ſerve inſtead of teeth, and the animal feeds by means of them. They are found ſometimes very ſoft and tender, ſometimes hard and firm; at ſome ſeaſons they are very briſk and lively, at others they have ſcarce any life in them.

The moſt remarkable thing in regard to theſe *worms*, is, that they are always exactly of the colour of the flour which they live among. Ray has obſerved, that the white flour breeds white ones; the coarſer flour breeds larger and greyer ones; and that flour which has the bran among it, breeds brown ones of the ſame colour with that of itſelf. This is a proviſion of nature for the ſafety of the animal, ſince were it of a colour different from that of the flour, it muſt be eaſily diſcovered among it, and would be picked out and thrown away. The caterpillar tribe are thus preſerved, by being of the colour of the leaves they feed on; their green uſually ſuiting itſelf exactly to that of the tree or plant. Deſlandes, Trait. Phyſ.

WORMS *of the ſea*. The ſea-*worms* are of the number of thoſe animals, which, with the oyſter and ſeveral other ſhell-fiſh, furniſh us an inſtance of animals which remain all their lives fixed in the manner of plants to one ſpot, whence there is no probability of their moving themſelves.

Theſe *worms* are included in a ſort of caſes or pipes, and may be divided into two claſſes, according to the nature of thoſe caſes. In the one ſpecies theſe only are made of grains of ſand, fragments of ſhells, and the like, faſtened together by a viſcous humour; and in the other they are compoſed of a true ſhelly matter.

Thoſe *worms* which have ſhelly caſes are fixed ſometimes to the ſand at the bottom of the ſea, ſometimes to ſtones, or ſea-ſubſtances, and ſometimes to the ſhells of other fiſhes; their ſhells are rounded, and, in ſome degree, conic, as they always gradually grow wider from their point or apex to the mouth; as to the reſt, their ſhape is different in almoſt every individual, forming divers irregular curves, and often reſembling the ſhapes into which a common earth *worm* curls and twiſts itſelf in its various motions.

When we conſider the effects of the glutinous juice iſſuing from the body of this animal, in faſtening together any looſe ſubſtances it meets with, ſo as to form a caſe for it, it may be eaſily ſuppoſed that the adheſion of the *balani-marini*, and other the like ſhells, which remain all their lives fixed to ſome one ſpot, is performed in the ſame manner. Mem. Acad. Par. 1711. See VERMICULUS.

WORMS, *water*. Of theſe there are ſome which transform themſelves by a ſingular proceſs, without any viſible change in its exterior form, into flies, and belong to the third claſs of *fly*-WORMS. They are particularly deſcribed by M. Reaumur. Hiſt. Inſ. tom. iv. p. 310, &c. See *Tab.* III. *Inſects*, *fig.* 40, &c.

There is a ſingular ſpecies of theſe creatures, which is found to be capable of reproduction or multiplication from cuttings, in the manner of the POLYPE.

The diſcovery Mr. Trembley made of this ſtrange property in the polype, gave occaſion to the trying of the experiment in regard to ſome other inſects. *Worms* were the moſt natural objects of theſe experiments; and though they failed in many ſpecies, they yet ſucceeded in ſome, and proved, that nature has not given that amazing property of reproduction of its moſt eſſential parts, to only one ſpecies of animals.

Mr. Bonet tried the experiment on a very nimble kind of *water-worm*, by cutting it into two in the middle, and the ſucceſs perfectly anſwered the expectation; for the two pieces continued alive and vigorous, and in a little time became two complete *worms*. The ſtructure of theſe *worms*, though it appear ſimple to the naked eye, is very worthy the examination of the microſcope, and when viewed with this aſſiſtance, there are diſcovered in it parts extremely deſerving our attention. Phil. Tranſ. Nº 469. p. 470.

Dr. Hales, in his Vegetable Statics, relates a curious experiment, by which it is proved that the bones of animals, when they are oſſified to a certain degree, do not grow any longer, except at their extremities; and the caſe is the ſame in regard to theſe *worms*; for the old piece, which is the middle of the animal, never lengthens itſelf, but the addition of new rings to each end makes the increaſe of length in the *worm*.

In all theſe pieces the liquor, which ſerves as blood to the animal, is found circulating from the tail-part towards the head, in the uſual way; and by this motion of the blood it is always eaſy to know, even in the ſmalleſt pieces, which is the head and which the tail-end, and the new head and tail are always ſeen to come regularly from the proper ends. Phil. Tranſ. Nº 469. p. 470, &c. See REPRODUCTION.

WORM, in *Chemiſtry*, denotes a long, winding pewter-pipe, which diſtillers and apothecaries place in a tub of water, to cool and condenſe the vapour in the diſtillation of ſpirits.

This the chemiſts alſo call a *ſerpentine*. Formerly, this *worm*, or ſomething like it, was placed above the head of the STILL, with a refrigeratory at the upper end of it, which is uſeful enough in the diſtilling of ſpirit of wine.

Worm, in *Gunnery*, is a ſingle or double-wired iron ſcrew, mounted on a wooden handle by means of a ſocket, or fixed on the end of a rammer, to pull out the wad of a cannon, firelock, carabine, or piſtol; it is the ſame with the *wad-hook*, only the one is more proper for ſmall fire-arms, and the other for cannon.

This inſtrument ſerves to draw out the wadding, or pieces of cartridges, which remain in the gun after frequent firing, and which would otherwiſe accumulate ſo much, that other cartridges could not be rammed home enough to reach the priming, whereby the gun would miſs fire.

To **Worm** *a cable*, or *hawſer*, in the *Sea-phraſe*, ſignifies to ſtrengthen it, by winding a ſmall line, or rope all along between the ſtrands.

Worm-*bark trees.* See Cabbage-*bark tree.*

Worm-*powders.* See Powder.

Worm-*ſeed*, *ſemen contra*, *ſemen ſanctum*, or *ſemen ſantonicum*, is a hot, bitter, drying kind of ſeed, proper to deſtroy *worms* generated in a human body, and particularly in children.

This ſeed is light, ſmall, of a browniſh colour, an oblong figure, a bitter taſte, and a ſtrong ſmell. It muſt be choſen new, greeniſh, of a ſharp, bitter, aromatic taſte, not a little diſagreeable.

The place where it is produced is Perſia, about the frontiers of Muſcovy. It is brought to us from Aleppo, &c. Naturaliſts have not been agreed about the plant that produces it.

J. Bauhine has a large diſſertation on the ſubject. Some will have it the ſpecies of abſynthium, or wormwood, called *ſantonicum*, or *marinum abſinthium*; others will have it the *tanacetum*, others the *abrotanum*; but it is now ſuppoſed to be the produce of a ſpecies of *artemiſia*, reſembling in its general appearance our fine leaved Mugwort, called by Linnæus *artemiſia ſantonica*, and the *artemiſia auſtriaca* of Jacquin.

Mr. Tournefort gives us the following account of this notable drug, in the ſecond volume of his Travels. The ſementine, or *worm-powder*, is not gathered like our ſeeds. The plant grows in the meadows, and muſt be let ripen; and the miſchief is, that as it grows near to maturity, the wind ſcatters a good part of it among the graſs, where it is loſt; and this makes it ſo dear.

As they dare not touch it with the hand, for fear of making it ſpoil the ſooner, when they would gather what is left in the ear, they have recourſe to this expedient. They take two hand-baſkets, and, walking along the meadows, ſweep the baſkets, the one from right to left, the other from left to right, as if they were mowing; by this means the ſeed is ſhaken out into the baſkets.

Theſe ſeeds have been chiefly recommended as anthelmintics, and commonly taken, in this intention, either along with melaſſes, or candied with ſugar. For other purpoſes they appear to be a ſtrong bitter. They give out their virtue both to water and ſpirit. The extract made by rectified ſpirits, appears to be the moſt eligible preparation of the ſantonicum for the purpoſes of an anthelmintic; and the watery extract, or a tincture drawn from it, for the more general intentions of bitter medicines.

Worm-*tincture*, in *Chemiſtry*, a name given by many to a medicine prepared by Hoffman, from earth-*worms*; and in many parts of Germany eſteemed one of the greateſt medicines in the world, though leſs known in other places.

The preparation is this: the *worms* are to be collected in the ſpring or ſummer months, and the larger ſort are the beſt. They are to be carefully dried, and reduced to a fine powder; this powder is to be mixed up into the conſiſtence of a poultice, with oil of tartar per deliquium, and this is to ſtand twenty-four hours; then ſpirit of wine is to be poured on it, ſo as to reach three fingers-breadth above it, and a dram of ſaffron, and half a dram of caſtor, are to be added, and the whole is to ſtand three days in infuſion, and after this be filtred off for uſe. Some add a ſmall quantity of opium to the tincture, but as it is often wanted in caſes where opium is not proper, it is better to keep it ſeparate thus made; and when there is occaſion to have it opiated, to add as many drops of laudanum as is judged neceſſary.

The oil of tartar in this caſe penetrates the very innermoſt ſtructure of the *worms*, and is a means of extracting ſuch a tincture from them, as no art could otherwiſe contrive to make; and the medicine becomes, according to Hoffman, much more an anodyne, from the admixture of the ſalt of tartar in the tincture.

When it is intended to be made with opium, it is always proper to add alſo ſome of the hound's tongue root, which is found as an anodyne to emulate the virtues of opium.

This tincture, which ever way prepared, is excellent in abating the pains of diſeaſes, that do not admit a cure. The fits of the gout are rendered eaſier by every doſe of it; and even in cancers, the pain is quieted in a wonderful manner by it, and life rendered much more ſupportable. Hoffman's Act. Laborator. Chym.

WORMWOOD, *abſinthium*, in *Botany*, a genus of plants, according to Tournefort and Miller, the characters of which are theſe: there are many female and hermaphrodite flowers included in the ſame ſcaly empalement; the latter, which occupy the middle, are tubulous, conſiſting of one leaf, divided into five parts at the top; the former are ranged round the border. The only diſtinction between the *wormwood* and SOUTHERNWOOD is, that the empalement of the former is more globular than that of the latter, and the ſeeds have ſmall hairs fixed to their bottom. Miller enumerates thirty-three ſpecies. Linnæus ranges the *wormwood* under the genus of ARTEMISIA.

The common *wormwood*, *artemiſia abſinthium* of Linnæus, grows wild about dunghills, and on dry waſte grounds, flowers in June or July, and may be propagated by ſlips in March or October, or raiſed from ſeeds ſown ſoon after they are ripe. The leaves have a ſtrong offenſive ſmell, and a very bitter nauſeous taſte; the flowers are equally bitter but leſs nauſeous; the roots are warm and aromatic, without the bitterneſs and offenſiveneſs of the other parts: the leaves loſe part of their ill ſmell by being dried and kept for ſome time.

Wormwood leaves give out nearly the whole of their ſmell and taſte both to aqueous and ſpirituous menſtrua; the former, prepared without heat, being the leaſt ungrateful. Rectified ſpirit elevates little from this plant in diſtillation; water brings over nearly the whole of its ſmell and flavour. Along with the aqueous fluid there ariſes an eſſential oil, which ſmells ſtrongly, and taſtes nauſeouſly of the *wormwood* though not bitter. The oil drawn from the freſh herb is commonly of a dark green; from the dry, of a deep yellowiſh brown colour. The quantity of oil varies according to the ſeaſon and ſoil in which the *wormwood* is produced: in ſome years ten pounds have afforded upwards of two ounces; in others, twenty pounds have yielded little more than one ounce. Geoffroy obſerves (Mem. Acad. Par. 1721.) that, in rainy ſeaſons and moiſt ſoils, it yields the moſt oil; that in dry years the oil is accompanied with a reſinous matter, and proves of a fine green colour; and that in wet ſeaſons it is leſs reſinous, and not green. A decoction of *wormwood* in water, long boiled, and inſpiſſated to the conſiſtence of an extract, loſes the ſmell and flavour of the plant, but retains its bitterneſs. An extract, made with rectified ſpirit, contains, along with the bitter, nearly the whole of the nauſeous part; the watery extract gives out its ſimple bitterneſs, not only to water again, but to rectified ſpirit.

Wormwood is a moderately warm ſtomachic and corroborant: for theſe intentions it was formerly in common uſe, but it has now given place to bitters of a leſs ungrateful kind. An infuſion of the leaves, which the addition of fixed alkali ſalt, is a powerful diuretic in dropſical caſes. The eſſential oil is ſometimes given, in doſes of a drop or two, properly diluted by ſolution in ſpirit of wine, as a mild antiſpaſmodic. Its more frequent uſe is a vermifuge; for which purpoſe it is both applied to the belly, and taken in pills made with crumb of bread. Dr. Lewis, however, ſays that the ſpirituous extract promiſes to be, in this intention, preferable to the pure oil; as it contains, along with the oil, all the bitter matter of the *wormwood*. This plant very powerfully reſiſts putrefaction, and is made a principal ingredient in antiſeptic fomentations. Boerhaave commends, in tertian agues, a medicated liquor, prepared by grinding about ſeven grains of the oil with a dram of ſugar, and two drams of the alkaline ſalt extracted from the aſhes of *wormwood*, and afterwards diſſolving the compound in ſix ounces of the diſtilled water of the plant. Two hours before the fit is expected, the patient is to bathe his feet and legs in warm water, and then drink half an ounce of the liquor every quarter of an hour, till the two hours are expired: by this means, he ſays, caſes of this kind are generally cured with eaſe and ſafety, provided there is no ſcirrhoſity or ſuppuration.

Dr. Lewis obſerves, that this medicine is a very ſerviceable aperient, where obſtructions of the viſcera prohibit the immediate uſe of the bark, and in ſuch obſtructions as the imprudent uſe of the bark may have occaſioned. Its virtues, he ſays, might be improved by an addition of the bitter watery extract; though the compound, thus laboriouſly prepared, would not be at all ſuperior to a ſimple infuſion of the plant in pure water, impregnated with a due proportion of fixt alkaline ſalt.

The roots of *wormwood*, ſays Dr. Lewis, promiſe to be applicable to ſome uſeful purpoſes: their virtue reſides chiefly in the cortical part; and rectified ſpirit extracts their

their flavour more perfectly than watery liquors. The Edinburgh college, in their laſt edition, direct a tincture of the dried flowering tops of *wormwood*, in the proportion of ſix ounces to a quart of rectified ſpirit, under the title of *tinctura abſinthii*. Lewis's Mat. Med.

The aſhes of *wormwood* afford a more pure alkaline ſalt than moſt other vegetables, excepting bean-ſtalks, broom, and the larger trees. In the Amœn. Acad. vol. ii. p. 160. Linnæus mentions two caſes, in which an eſſence, prepared from this plant, and taken for a conſiderable time, prevented the formation of ſtones in the kidneys or bladder; the patients forbearing the uſe of wine and acids.

Many nauſeous inſects are deſtroyed, or driven away by the ſmell of this plant; and it is no uncommon practice among the good women in the country, to preſerve their cloaths from moths, by laying bundles of dried *wormwood* among them.

Some of our brewers have a method of uſing *wormwood* inſtead of the hops, to give the bitter taſte to their malt-liquors, and to preſerve them. It is found to anſwer the latter purpoſe very well; but the taſte is ſo diſagreeable, that it is much complained of. The reaſon of this is, that the people who uſe it do not underſtand the time of gathering it.

All plants are fulleſt of juice while in the ſhoot, but fulleſt of virtue when they have their ſeeds on them. This is the caſe with *wormwood*, as well as a thouſand others; and though, in the feeding time, it produces much more flavour than when younger, yet it is without that nauſeous bitter of the crude juice, which gives us the diſtaſte to the plant.

Some people have found the proper way of managing *wormwood*, and have given a flavour with it to their malt-liquors, even preferable, in the opinion of all palates, to that given in the common way by hops.

The method is this: the plant is to be gathered when fully ripe, and the ſeeds upon it, and in this ſtate hung up in ſmall bunches to dry. When thoroughly dried, a certain quantity of good ſtrong malt-liquor is to be impregnated with it to the utmoſt ſtrength that it can poſſibly give it. This is to be ſet by for uſe, to add to all the reſt.

When the hops ſhould, in the common way, be added to the beer, this liquor is to be added in a proper quantity, making the taſte the judge when there is enough of it. By this means, juſt what degree of bitter is required may be given to the liquor, and the bitter of this common plant, thus managed, is as perfectly agreeable as that of any vegetable in the world.

The *wormwood* for this purpoſe ſhould have its ſeeds carefully preſerved in the drying, and it is beſt, if not uſed till the year after it was gathered. Phil. Tranſ. N° 124.

The eſſential ſalt of *wormwood* is afforded in great quantity, and poſſeſſes, in many reſpects, the virtues of the plant.

Wormwood ſhares with all other bitters the virtues of an abſterſive deobſtruent, and is in ſome degree purgative, as all bitters are. *Wormwood* is one of thoſe plants which the chemiſts have generally choſen for their proceſſes of the reſuſcitation of plants from their aſhes; and though the pretended principles of this art are falſe, yet there have been ſome of the artiſts ſo cunning as to form repreſentations of this plant, that have deceived and puzzled the greateſt unbelievers, though they have not convinced them. Phil. Tranſ. N° 74.

Wormwood, *ſea*, *artemiſia maritima* of Linnæus, falſely called in our markets *Roman wormwood*, and ſubſtituted for it, grows plentifully about our ſalt marſhes, and in ſeveral parts on the ſea-coaſt. In taſte and ſmell it is leſs unpleaſant than the common *wormwood*; and hence is preferred by the college as an ingredient in ſome of the diſtilled waters; the eſſential oil is leſs ungrateful, and the watery extract is leſs bitter than thoſe of the common ſort. The virtues are the ſame, differing only in degree. It is leſs effectual as an antiſeptic and anthelmintic, but more eligible as a ſtomachic. A conſerve of the tops, made by beating them with thrice their weight of fine ſugar, is kept in the ſhops.

Wormwood, *Roman*, *artemiſia pontica* of Linnæus, has more numerous, more finely divided, and darker coloured leaves than the former, and is hoary only underneath, whereas that is hoary all over. This is a foreign ſpecies, but as hardy and as eaſily raiſed as the others. It is conſiderably leſs ungrateful than either of the former ſpecies; its ſmell is weaker, and its bitterneſs is mixed with a kind of aromatic flavour. This appears to be the moſt eligible of the three, as a ſtomachic and corroborant; in which intention a conſerve of the tops has been greatly recommended.

Wormwood, *mountain*, *artemiſia glacialis* of Linnæus, is fine leaved, and covered with a gloſſy ſilk-like down. The *mountain wormwood* of Valais, or *abſinthium ſeriphium montanum candidum* C. B. is covered with a cotton-like down, and the leaves are curled about the edges. Haller informs us, that the firſt of theſe plants is frequent in ſtony grounds on the Alps; and the ſecond by the ſides of ſandy roads, in the territory of Valais, in Switzerland; that the former is bitteriſh and aromatic, of great eſtimation among the inhabitants of the Alps, and the common remedy againſt the intermittent fevers, which often rage there, and for exciting the menſtrual diſcharges, checked by the cold; and that the latter has an acrid aromatic ſmell and taſte, without bitterneſs, and promiſes, from its ſenſible qualities, to be a plant of great virtues. They have not yet been introduced into practice in this country. Lewis.

Wormwood-*fly*, in *Natural Hiſtory*, a very ſmall black fly, found on the ſtalks of the common *wormwood* in June and July.

Wormwood-*wine*, *vinum abſinthites*. See Vinum, and Absinthites.

WORRALI, in *Zoology*, an animal of the lizard kind, of about four feet long and eight inches broad, with a forked tongue, which it puts out like a ſerpent, but without teeth.

It is a harmleſs animal, and feeds only on large flies, and the ſmaller ſpecies of lizards. It is found in Egypt only during the hotteſt months, and principally frequents the grottos and caverns in the mountains on the weſt of the Nile, where it ſleeps during the winter ſeaſon.

It is ſaid to be greatly affected by muſic; but experiment ſhews this to be an erroneous opinion. Pococke's Egypt, vol. i. p. 208.

WORSHIP *of God*, *cultus Dei*, amounts to the ſame with what we call RELIGION.

This *worſhip* conſiſts in paying a due reſpect, veneration, and homage to the Deity, under a certain expectation of reward.

And this internal reſpect, &c. is to be ſhewn and teſtified by external acts; as prayers, ſacrifices, thankſgivings, &c.

The Quietiſts, and ſome other myſtic divines, ſet aſide not only all uſe of external *worſhip*, but even the conſideration of rewards and puniſhments.

Yet, even the heathens had a notion, that God did not require us to ſerve him for nought: *Dii quamobrem colendi ſint*, ſays Cicero, *non intelligo, nullo nec accepto ab illis nec ſperato bono*.

The ſchool-divines divide *worſhip* into divers kinds, viz. *latria*, that rendered to God; and *idololatria*, that rendered to idols, or images. To which the Romaniſts add, *dulia*, that rendered to ſaints; and *hyperdulia*, that to the Virgin.

Some theological writers have obſerved, that the Greek word προσκυνεω, *to worſhip*, is not deſcriptive only of the honour which is appropriated to God, but is indifferently uſed to ſignify the honour and reſpect which are paid to ſuperiors of all kinds, in heaven or on earth. Accordingly, they have diſtinguiſhed between *civil* and *religious worſhip*.

WORSTED, or **Woolsted**, in matters of commerce and manufacture, is a kind of woollen thread.

Worſted is, properly, a thread ſpun of wool that has been combed; and which, in the ſpinning, is twiſted harder than ordinary.

It is chiefly uſed either to be knit or woven, into ſtockings, caps, gloves, or the like.

The name *worſted* is ſuppoſed to be borrowed from a town thus called, in Norfolk, noted for fine ſpinning. They who write it *woolſted*, do it on ſuppoſition of the word's being formed from *wool*, the matter of this thread.

It appears from an ancient record, that king Edward III. in 1348, eſtabliſhed the town of Calais as a ſtaple for wool, and woollen cloth made in England, and for other woollen cloths of *worſteds* brought from other countries: from which accounts we may infer, that *worſteds* were but lately introduced into England; whereas in 1394 they were made in England in great variety; and likewiſe that *worſted* was ſo named as a foreign manufacture; and therefore ſome have concluded, that this manufacture gave name to the town. And. Hiſt. Com. vol. i. p. 179.

WORT, in the *Materia Medica*, is the ſweet infuſion of malt; firſt propoſed by Dr. Macbride as a dietetic article to ſcorbutic perſons, from an apprehenſion that it would ferment in their bowels, and give out its fixed air, by the antiſeptic powers of which the ſtrong tendency to putrefaction in this diſeaſe might be corrected. It was ſome time before a fair trial of this propoſed remedy could be obtained, and different reports were made concerning it. In 1762 the lords of the admiralty gave orders to have the *wort* tried in the naval hoſpitals at Portſmouth and

Plymouth; but the murmurs of the patients, on account of reſtrictions that were neceſſary for determining its efficacy, put a ſtop to the farther exhibition of it; and indeed Dr. Huxham, in 1764, informed the ingenious and benevolent propoſer of this remedy, that it had been tried with very bad effects. But Dr. Macbride aſſures us, on the teſtimony of a gentleman, who made uſe of the *wort*, that it may be taken for a length of time, to the quantity of a quart in the day, without producing any ill effect whatever; and he refers to Van Swieten's Commentary, vol. iv. p. 673. where we learn, that the baron's lady, when a nurſe, uſed regularly to drink a pint of it every night going to bed, in order to increaſe her milk.

After the failure of ſucceſs in the naval hoſpitals, orders were iſſued to have the *wort* adminiſtered on ſhip-board, where no temptations of freſh vegetables would offer to make the men uneaſy. But a conſiderable time elapſed before any reports were made either of its good or bad effects. Dr. Macbride, however, perſiſted in recommending it, and lived to publiſh ſeveral caſes, in a poſtſcript to the ſecond edition of his work, in 1767, from which it appears, that ſcorbutic complaints of the moſt dangerous kind have actually been cured at ſea by the uſe of *wort*. Its general effects were, to keep the patients open, and to prove highly nutritious and ſtrengthening; it ſometimes purged too much; but this effect was eaſily obviated by the tinctura thebaica. Other unqueſtionable caſes of its ſucceſs in this diſeaſe are to be ſeen in the London Med. Obſ. and Inq. vol. v. p. 61. See alſo SCURVY.

The uſe of *wort* has hence been adopted in other caſes, where a ſtrong putrid diſpoſition in the fluids appeared to prevail, as in cancerous and phagædenic ulcers; and inſtances are publiſhed of its remarkable good effects in theſe caſes. See London Med. Obſ. and Inq. vol. iv. p. 367, &c. Prieſtley on Air, vol. i. Appendix.

As the efficacy of the malt infuſion depends upon its producing changes in the whole maſs of fluids, it is obvious that it muſt be taken in large quantities for a conſiderable length of time, and rather as an article of diet than medicine The quantity of one to four pints has generally been directed. For the method of preparing it, ſee SCURVY.

WORTHIEST *of blood*, in *Law*, an expreſſion denoting the preference given in deſcents to ſons before daughters.

WOVEN *ſtockings*. See STOCKINGS.

WOUGHS, in *Mines*, are the walls or ſides ſometimes of hard ſtones, and ſometimes ſoft; when ſoft, the miners ſay they are rotten: theſe are the bounds of an entry. Betwixt them all ſorts of earth, ſtones, and ore lie; or, as philoſophers ſay, grow.

WOULD, or WELD, among *Dyers*. See WELD, and DYER's *weed*.

WOULDING. See WOOLDING.

WOUND, *vulnus*, in *Medicine* and *Surgery*, a recent ſeparation made in the ſoft or fleſhy parts of the body, from an external cauſe, and particularly from the action of ſome hard and ſharp inſtrument.

Or, it is a ſolution of the continuity of a fleſhy part, made by the violent application of ſome penetrating body, while it yet remains freſh, bloody, and without putrefaction; by which circumſtances a *wound* is diſtinguiſhed from an ULCER or ABSCESS, which is the ſolution of the external parts, proceeding from an internal cauſe.

A like ſeparation, happening in a bony part, is called a FRACTURE.

Some, indeed, have taken a greater latitude, and call every external hurt of the body, by what cauſe ſoever produced, a *wound*. *Wounds* are generally inflicted on the ſofter parts of the human body: nevertheleſs the more ſolid parts, as the bones, are ſometimes injured by ſharp inſtruments.

All *wounds* proceed either from puncture, inciſion, or contuſion, according to the nature and make of the inſtrument they were cauſed by.

Wounds are uſually divided, with reſpect to their cauſe, circumſtances, cure, &c. into *ſimple*, and *compound*.—*Simple wounds* are thoſe made by puncture, inciſion, or contuſion, ſeparately; thoſe of the outer ſkin, without any conſiderable loſs of ſubſtance, or hurting any remarkable veſſel; and thoſe not complicated with any dangerous ſymptoms.

Compound wounds are thoſe made both by puncture and inciſion at the ſame time, to which is ſometimes alſo added contuſion; thoſe attended with great loſs of fleſh, or the hurt of ſome conſiderable veſſel; add, thoſe made by envenomed inſtruments, or attended with violent ſymptoms.

The hiſtory of a *wound* is thus delivered by Boerhaave. Immediately upon the ſolution, the *wounded* parts recede farther and farther from each other. The blood guſhes out, at firſt, with ſome violence, but ſtops of itſelf; then a bloody ſcab is formed in the cavity of the *wound*, and a thin ruddy humour ouſes out; the lips of the *wound* begin to redden, ache, ſwell, and turn black; and (in great *wounds*) a fever and thirſtineſs ſucceed. On the third or fourth day there is found a white, viſcid pus; upon which, the heat, redneſs, tumor, &c. abate, and the cavity gradually fills up from the bottom upwards, and from the circumference to the centre, with growing fleſh. Laſtly, the *wound* dries, and cicatrizes. But note, theſe ſymptoms vary according to the nature and cauſe of the *wound*. Thus, if it be by inciſion, and a large blood-veſſel be cut, the hæmorrhage is more violent, eſpecially if it be an artery; in which caſe florid blood flies out impetuouſly, and by ſtarts: if only a vein be cut, the flux is more moderate and equal, and the blood is of a darker colour. If the *wound* be attended with contuſion, the hæmorrhage is ſmall.

In *wounds*, where any large artery is quite cut in two, the flux uſually proves mortal; and though the hæmorrhage ſhould be reſtrained by ligature, it is almoſt impoſſible to prevent the limbs, which lie below the diviſion of the artery, and which receive the nouriſhment by that channel, from becoming paralytic, and, ſometimes, from mortifying. This is almoſt conſtantly the caſe, when the trunk of the brachial or crural artery is divided. A leſſer artery, cut tranſverſly, flies back among the ſolid parts, and will have its mouth ſtopped: if an artery be not quite cut off, there ariſes a perpetual flux; or, if that be ſtopped, an ANEURISM. This will often be the caſe, when only the external coat of the artery is wounded; for by this means the internal coat of the artery is left to ſuſtain the whole impetus of the pulſe, to which being unequal, it is forced by degrees into a tumor like a bag, from which very calamitous conſequences frequently enſue. A nerve, being cut off, flies back, produces a pain and obſtruction about the *wound*, and below it, a numbneſs and waſting, with immobility: the caſe is much the ſame in *wounded* tendons and membranes. *Wounds* of the temporal muſcle are rarely cured, but generally bring on horrible convulſions.

In young children, and aged perſons, *wounds* frequently prove mortal, which ſeemed but ſlight. Thoſe *wounds* generally prove troubleſome which happen in an ill ſtate of body, and eſpecially with a low or ſpare diet. All *wounds* are reputed more dangerous and difficult of cure in winter than ſummer, in autumn than in ſpring.

There is nothing will give a truer light into the nature and conſequence of a deep *wound* than a due conſideration of thoſe natural actions of the body that are impeded thereby. For inſtance, in *wounds* of the breaſt, when the patient draws his breath with ſhortneſs and difficulty, and is at the ſame time attended with an hæmoptyſis and hiccough, we may rationally conjecture that the lungs, or the diaphragm are wounded; ſo in *wounds* of the abdomen, when chyle is voided, it is a plain indication that the ſtomach, ſmall inteſtines, or lacteals, are wounded: when excrements paſs by the *wound*, the large inteſtines are wounded. In the ſame manner, bilious blood ſhews the liver or gall bladder to be divided: if urine paſſes by the *wound*, the urinary bladder or elſe the ureters are wounded; but bloody urine denotes a blow on the kidneys, or a *wound* of the bladder. But when there are large profuſions of blood this way, it is a ſign that ſome of the larger blood-veſſels are wounded: vomiting of blood indicates the ſtomach to be the injured organ: voilent pains, attended with convulſive twitches, ſhew that a nerve is wounded, or elſe that ſome foreign ſubſtance is left in the *wound*. Whenever the ſenſes are diſordered after a *wound* received on the head, a concuſſion of the brain is much to be feared. It is of bad conſequence for a *wound* to be attended with a large tumor; but it is of the laſt conſequence if it is attended with no degree of tumor at all; the firſt is an indication of great inflammation; the laſt of mortification; ſome degree of tumor is always, therefore, beſt in *wounds*.

In order to enquire what *wounds* admit of cure, and what are incurable, Heiſter divides them into three ſorts.

1. We properly ſtyle thoſe *wounds* abſolutely mortal, which are not to be remedied by all the art and induſtry of man. Thus, *wounds* are of this kind which are attended with ſo violent an hæmorrhage, as to produce inſtant death: of this ſort are reckoned *wounds* that penetrate the cavities of the heart, and all thoſe *wounds* of the viſcera, where the larger blood-veſſels are opened: ſuch are large *wounds* of the lungs, liver, ſpleen, kidneys, ſtomach, inteſtines, meſentery, pancreas, uterus, of the aorta, of the iliac, cœliac, renal, meſenteric, and carotid arteries, eſpecially if they are wounded near their origin; of the ſubclavian alſo, or vertebral; of the vena cava, the iliac vein, the internal jugular, vertebral, renal,

meſenteric, of the vena porta, and of the other larger veins that lie deep in the body, becauſe their ſituation will not admit of proper applications to reſtrain the flux of blood. Heiſter thereſore reckons, very juſtly, theſe among the wounds that are abſolutely incurable, ſince they are not remediable either by aſtringents, ligature, or fire. To the ſame claſs may alſo be referred the *wounds* of the brachial artery, near its origin; the large effuſion of blood generally deſtroying the patient before aſſiſtance can be procured; more eſpecially if the artery and vein are both wounded together.

Thoſe *wounds* alſo are not leſs mortal than the former, which obſtruct, or entirely cut off the paſſage of the animal ſpirits to the heart; ſuch are *wounds* of the cerebellum, of the medulla oblongata, and all violent ſtrokes of the brain itſelf. There is reaſon to apprehend very great danger, when the ſmall veins or arteries, which are contained in the cranium, are injured; for the blood, flowing from them into the internal ſinuſes of the brain, either produces too great a preſſure upon thoſe very tender parts of the brain, and ſo obſtructs the courſe of the blood and ſpirits; or elſe, being corrupted, it putrefies the brain itſelf, if it cannot be evacuated by the aſſiſtance of the trepan, which is the caſe when this accident happens at the lower part of the cranium, or in the ſinuſes of the brain; nor is there leſs danger where the nerves, which tend to the heart, or the cerebellum, are wounded, or entirely divided; for after this, it is impoſſible for the heart to continue its motion.

To this claſs are to be referred alſo all *wounds* which entirely deprive the animal of the faculty of breathing; there is, therefore, great danger where the aſpera arteria is entirely divided; for, where it is only divided in part, it may be healed again by the aſſiſtance of an expert ſurgeon: to this place alſo belong violent ſhocks of the bronchia, mediaſtinum, and diaphragm, eſpecially the tendinous part of it; or any injuries of the principal nerves, as the par vagum, or intercoſtals.

Thoſe *wounds* alſo, which interrupt the courſe of the chyle to the heart, are no leſs incurable than the former; ſuch are *wounds* of the ſtomach, inteſtines, receptacle of the chyle, thoracic duct, and large lacteals; to which may be alſo added *wounds* of the œſophagus, if they are large; though death is not ſo ſudden an attendant on theſe *wounds*; but, for want of nouriſhment, the perſons afflicted by them are weakened by degrees, and at length die conſumptive.

In this account, thoſe *wounds* alſo are not to be omitted which are inflicted upon membranous parts, that are ſituated in the abdomen, and contain ſome ſecreted fluid, as on the bladder, either of the bile or urine, the ureters, the ſtomach, inteſtines, receptable of chyle, and lacteal veſſels. The fluids contained in theſe parts, when once they are let looſe into the cavity of the abdomen, cannot be properly diſcharged, and therefore eaſily corrode the internal parts of the body; and the membranes that contained them are generally ſo fine, that they will not admit of agglutination, eſpecially ſince no medicine from without can be applied. A few indeed have recovered after ſlight *wounds* in theſe parts; but ſince the number of theſe inſtances is but ſmall, and the cure in them has been accidental, and not performed by the ſurgeon's art, theſe may very juſtly be added to the liſt of mortal *wounds*.

2. Many *wounds* there are which, though the experienced ſurgeon could remedy, yet prove fatal, if neglected, or left to nature: of this number are thoſe which produce inſtant death, unleſs relieved by preſent aſſiſtance; ſuch are *wounds* of the larger external blood-veſſels, which might be remedied by ligature, by the application of aſtringent medicines, or the actual cautery. Of this kind are *wounds* of the brachial, or crural artery, unleſs they are too near the trunk of the body; *wounds* in the large arteries of the cubit, or tibia; of the branches of the external carotid, or temporal artery; to theſe alſo may be added *wounds* of the jugular and other veins, ſituated upon the external parts of the body; but in theſe caſes no help can be given, unleſs the ſurgeon be brought before there has been a vaſt profuſion of blood.

3. *Wounds* are properly ſaid to become mortal by accident, where the patient's death is occaſioned either by the ill conduct of the patient himſelf, or by the neglect or ignorance of his ſurgeon, the *wound* itſelf being of the number of thoſe deemed curable by the judicious practitioner. Under this head are to be reckoned thoſe *wounds* which the ſurgeon has neglected to cleanſe ſufficiently, though he had it in his power to do it; as when ſome foreign body, which might eaſily have been extracted, is left in the *wound* by the careleſſneſs of the ſurgeon, and produces inflammations, hæmorrhages, convulſions, and finally death itſelf. So in *wounds* of the thorax and abdomen; if the ſurgeon does not uſe his utmoſt diligence to evacuate the grumous blood, it will corrupt there, and by drawing the neighbouring parts into conſent, will expoſe the patient to death; great care muſt therefore be taken that the lips of the *wound* do not cloſe till the blood, which is collected in the cavity of the body, be all evacuated, if poſſible, which will be perceived by the difficulty of breathing, and other bad ſymptoms going off; but if any of the larger internal veſſels are wounded, then all attempts to diſcharge the blood are vain; for the violence of the hæmorrhage takes off the patient.

Wounds are alſo to be accounted mortal by accident, which are treated or ſearched in too rough a manner by the ſurgeon; for if *wounds* are handled roughly which are full of nervous parts, or of large blood-veſſels, there is great danger of bringing on hæmorrhages, convulſions, inflammations, gangrenes, and finally death itſelf.

The caſe is alſo the ſame in external *wounds*, which are ſlight of themſelves, but under which the patient is loſt by the inflammation which is brought on, and increaſed, by the ſurgeon's injudicious treatment; or when any one is taken off by the violence of the hæmorrhage, from a *wound* of the hand or foot; for, in this caſe, the ſurgeon might eaſily have ſtopped the blood, by the application of proper remedies, or by ligature: or, when the patient is guilty of any intemperance, either in eating or drinking; or of any exceſs of paſſion; of expoſing himſelf to the cold air, or of uſing violent exerciſe; for by theſe means *wounds*, more eſpecially thoſe of the head, by being liable to freſh hæmorrhages, and other dangerous accidents, frequently become mortal, notwithſtanding that they naturally would not prove ſo, and though the ſurgeon uſes his utmoſt care and ſkill.

Among theſe alſo are to be accounted thoſe *wounds* of the head, where the patient is loſt by the vaſt quantity of blood, which is extravaſated in the cavity of the cranium, and is confined there; but where he might have been relieved, if the trepan had been applied in time; for though *wounds* of this kind generally prove incurable, yet as there is, at leaſt, a poſſibility of ſaving a perſon in theſe circumſtances, by the uſe of the trepan, this may properly be reckoned among the doubtful caſes, and not deemed abſolutely mortal: and laſtly, a bad habit of body frequently prevents the cure of *wounds*, which would admit of an eaſy cure in a healthful ſubject; ſo we frequently ſee the ſlighteſt puncture in the hand or foot of an hydropical, conſumptive, or ſcorbutic perſon, ſhall produce a gangrene, and prove mortal, though the ſurgeon ſpares no care nor application to prevent it.

The cure of *wounds* conſiſts in uniting the divided parts; which is the work of nature alone, and which the ſurgeon can only contribute to by removing external impediments, and applying ſuitable vulneraries and balſamics. Mankind, indeed, generally imagine, that certain herbs, ointments, and plaſters, are poſſeſſed of wonderful healing powers, and that no *wound* can be cured without the application of them. It is, however a fact, that no external application whatever contributes towards the cure of a *wound* in any other way than by keeping the parts ſoft and clean, and defending them from the external air, which may as effectually be done by dry lint, as by the moſt pompous applications, while it is free from many of the bad conſequences attending them.

And as for internal applications, they only promote the cure of *wounds* ſo far as they tend to prevent a fever, or to remove any cauſe that might impede the operations of nature.

The cure of *ſlight wounds* is generally performed with great eaſe, by applying to the part a ſmall portion of ſcraped lint, well ſaturated with ſpirit of wine, oil of turpentine, or St. John's wort, liniment of Arcæus, or balſam of capivi, Gilead, or Peru, and ſecuring the dreſſing with a plaſter; this dreſſing ſhould be renewed once in a day or two, and the lips of the *wound* will preſently agglutinate.

In ſlight *wounds*, which do not penetrate much deeper than the ſkin, the beſt application is a bit of gold-beater's ſkin, or of the common black ſticking plaſter; which will keep the lips of the *wound* together, and prevent the air from hurting it; and this will often be ſufficient. But wounds that penetrate deep, and that are attended with ſome danger, where the ſubſtance of the wounded part is not impaired, are firſt to be cleanſed from the extravaſated blood, ſordes, &c. In the next place, if a bullet, the point of a ſword, or any part of the cloathing, a piece of glaſs, or any other foreign body, remains in the *wound*, it is to be removed either with the fingers, or a pair of forceps, or other proper inſtruments. The hæmorrhage is to be ſtopped at the firſt dreſſing; the divided parts are to be brought as near to each other as poſſible, and their ſituation ſhould be ſo maintained, by proper bandages, that the cicatrix which is left may appear even.

Where there are no extraneous bodies to be removed, the grumous blood is to be wiped away with a ſoft ſpunge, or a parcel of fine lint wrung out of hot wine or brandy; and when this is done, the next ſtep is to ſtop the hæmorrhage; but before the ſurgeon attempts the removal of extraneous bodies, it behoves him well to conſider whether it be more proper to do it inſtantly, or to wait a more convenient time; for if the patient is become extremely faint, from the loſs of blood he has already ſuſtained, it will be neceſſary, in this caſe, to ſtop the hæmorrhage, and then, in ſome meaſure, to endeavour to revive him by moderate draughts of warm broths, white-wine whey, or ſome cordial medicine; for if theſe precautions are neglected, the patient may not improbably die in the operation: ſo alſo where you have reaſon to fear, that in the extracting of the broken point of a ſword, or other weapon, you are in danger of wounding a large blood-veſſel or nerve, it will be better to wait a little, either till the patient is ſomewhat come to himſelf, or till the *wound* is enlarged by ſuppuration.

When a *wound* penetrates into any of the cavities of the body, as the breaſt, the bowels, &c. or where any conſiderable blood-veſſel is cut, a ſkilful ſurgeon ought immediately to be called; otherwiſe the patient may loſe his life. But ſometimes the diſcharge of blood is ſo great, that if it be not ſtopped, the patient may die even before a ſurgeon can arrive. In this caſe, if the *wound* ſhould be in any of the limbs, the bleeding may generally be ſtopped by applying a tight ligature or bandage round the member, a little above the *wound*. The beſt method of doing this is to put a ſtrong broad garter round the part, but ſo ſlack as eaſily to admit a ſmall piece of ſtick to be put under it, which muſt be twiſted, in the manner practiſed by a waggoner on a cart-rope to ſecure his loading, till the bleeding ſtops. Whenever this is the caſe, he muſt take care to twiſt it no longer; as ſtraining it too much might occaſion an inflammation of the parts, and endanger a gangrene. See TOURNIQUET.

In parts where this bandage cannot be applied, various other methods may be tried to ſtop the bleeding, as the application of ſtyptics, aſtringents, &c. Cloths dipped in a ſolution of blue vitriol in water, or the ſtyptic water of the diſpenſatories, may be applied to the *wound*. Where theſe cannot be obtained, ſtrong ſpirits of wine may be uſed. Some recommend the AGARIC of the oak as preferable to any of the other ſtyptics: this is eaſily obtained, and ought to be kept in every family, in caſe of accidents. A piece of it muſt be laid upon the *wound*, and covered with a good deal of lint, over which a bandage may be applied ſo tight as to keep it firmly on. Where the agaric cannot be had, ſponge may be uſed in its ſtead.

Although ſpirits, tinctures, and hot balſams may be uſed, in order to ſtop the bleeding when it is exceſſive, they are improper at other times; as, inſtead of promoting, they retard the cure, and often change a ſimple *wound* into an ulcer.

Among the number of ſimple *wounds* are reckoned thoſe which are made by punctures; for the treatment of which, ſee PUNCTURE.

Wounds, which are made by a cutting inſtrument, where no part of the fleſh is taken off, and the accident happens to the external parts of the body, and does not penetrate deep, after they are cleanſed, ſhould be dreſſed with ſome vulnerary balſam, and the lips of the *wound* ſhould be cloſed and kept in that ſituation; either by placing the wounded and divided parts, as ſoon as they are dreſſed, in ſuch a ſituation as may be moſt likely to keep them in conſtant contact; or by a proper bandage, tying up the parts ſo that the lips may meet, and ſo eaſily unite; or by a proper ſuture, for the choice and conduct of which, ſee SUTURE.

In a *wound* that penetrates deep, it is not ſafe to keep its lips quite cloſe, ſo that the orifice may be healed before its internal parts, which will be apt to feſter. In this caſe, the beſt way is to fill the *wound* with ſoft lint, commonly called *caddis*: but this muſt not be ſtuffed in too hard. The caddis may be covered with a cloth dipped in oil, or ſpread with the common wax plaſter; and the whole muſt be kept on by a proper bandage. The firſt dreſſing may be kept on for at leaſt two days; after which it may be removed, and freſh lint applied as before. If any part of the firſt dreſſing ſticks ſo cloſe as not to be removed with eaſe or ſafety to the patient, it may be allowed to continue, and freſh lint dipped in ſweet oil laid over it; by which means it will be ſoftened, and come off eaſily at the next dreſſing. Afterwards the *wound* may be dreſſed twice a day till it be quite healed. Thoſe who are fond of ſalves or ointments may, after the *wound* is become very ſuperficial, dreſs it with the yellow baſilicum.

When there is a loſs of ſubſtance, *wounds* will not unite either by the help of plaſters, or the ſuture, or by any other method, till they are filled up with new fleſh. For this purpoſe, lint dipped in oil, or ſpread over with ſome vulnerary balſam or ointment, and applied to the bottom of the *wound*, is very ſerviceable, covering it with a plaſter, compreſs, and proper bandages: and this dreſſing is to be repeated daily. There ought to be a balſamic and emollient quality in theſe ſarcotic medicines, that they may not only reſiſt putrefaction, but alſo ſoften the new fleſh, ſo that it may eaſily receive additions from the blood, and ſuffer itſelf to be elongated.

As hot or cold air is very hurtful to *wounds*, it ſhould be carefully kept from them: and, therefore, the ſurgeon ſhould be careful not to remove the old dreſſings till the freſh ones are got ready, and be as expeditious as poſſible in applying them.

When a white, ſmooth, thick matter appears in the *wound*, it ſhould be dreſſed, as there is occaſion, every day, or every other day; and the ſuperfluous matter ſhould be wiped away with a very light hand; for wiping the *wound* roughly hinders the growth of new fleſh, but a little matter being left, performs the office of oil or balſam, in keeping the parts moiſt. If this method be obſerved, new fleſh will ſoon ſpring up, and the *wound* unite. In order to obtain an even cicatrix, it will be proper to dry gradually, and to harden the ſurface of the new fleſh, by the application of dry lint, covered with a tight compreſs and bandage; or, if this be inſufficient, it may be neceſſary to uſe ſome of the drying powders, as thoſe of tutty, calaminaris, maſtich, or colophony.

When any foulneſs is perceived in a *wound*, i. e. if the fleſh is putrid, fungous, black, pale, or livid, it muſt be well cleanſed before any attempt be made to heal it; for which purpoſe may be applied a digeſtive ointment, made with turpentine, yolk of eggs, and honey of roſes; if this be not ſtrong enough, there may be ſubſtituted the Egyptian ointment, or ſpirit of wine diluted; to which may be added a ſmall quantity of myrrh or aloes: and if greater ſtrength be required, the red precipitate of mercury may be uſed. The *aqua phagædenica* is a good detergent. Applications of this kind are to be continued, till the *wound* is entirely clean, after which recourſe is to be had to the methods already preſcribed.

If the new fleſh ſhould be luxuriant, and riſe up ſo to prevent the formation of an even cicatrix, it muſt be taken down by the blue vitriol, or a powder compoſed of burnt alum and the red mercurial precipitate: making at the ſame time a proper preſſure with the plaſters, compreſſes, and bandages.

When a *wound* is much inflamed, the moſt proper application is a poultice of bread and milk, ſoftened with a little oil or freſh butter: this may be applied inſtead of a plaſter, and changed twice a day. If the *wound* be large, and there is reaſon to fear an inflammation, the patient ſhould be kept on a very low diet. He muſt abſtain from fleſh, ſtrong liquors, and every thing that is of a heating nature; if he be of a full habit, and has loſt but little blood from the *wound*, he muſt be bled; and if the ſymptoms be urgent, the operation may be repeated. But when the patient has been greatly weakened by loſs of blood from the *wound*, it will be dangerous to bleed him, even though a fever ſhould enſue: as nature ſhould never be exhauſted, and it is always moſt ſafe to let her ſtruggle with the diſeaſe in her own way, than to ſink the patient's ſtrength by exceſſive evacuations.

Wounded perſons ſhould be kept very tranquil and eaſy; every thing that ruffles the mind or moves the paſſions, as love, anger, fear, exceſſive joy, &c. being very hurtful; they ought, above all things, to abſtain from venery. The body ſhould be kept gently open, either by laxative clyſters, or by a cool vegetable diet; as roaſted apples, ſtewed prunes, boiled ſpinage, and ſuch like. Heiſter's Surg. book i. c. i. p. 27, &c. Tiſſot's Advice, &c. p. 437, &c. Buchan's Dom. Med. p. 625, &c.

WOUNDS, *gun-ſhot*, are attended with much worſe conſequences than *wounds* made by ſharp inſtruments; for the parts are more ſhattered and torn, eſpecially when the ſhot falls upon the joints, bones, or any conſiderable part. *Wounds* of this kind have an eſchar formed upon them, and are, therefore, attended with little or no hæmorrhage at firſt, unleſs ſome conſiderable veſſel is wounded; but as ſoon as this eſchar falls off, the hemorrhage is ſometimes ſo violent as to endanger the life of the patient, unleſs the aſſiſtance of a ſurgeon can be readily had. For the five or ſix firſt days there is little or no diſcharge of matter from theſe *wounds*; there is therefore no wonder, that *gunſhot-wounds* exceed all others in violence of ſymptoms, ſuch as inflammation, pain, gangrene, &c.

The eſchar, which is formed upon theſe *wounds*, is not occaſioned ſo much by the heat of the bullets as by the rapidity with which they deſtroy the parts, and the violence of the ſymptoms is owing chiefly to this manner of wounding, and to the extravaſated blood, long confined under the eſchar. Neither is there any thing poiſonous in theſe *wounds*, as has been by ſome imagined, for nothing poiſonous enters the compoſition, either of powder or ball.

Gunſhot-wounds are ſome deeper than others, and in ſome the muſcular parts alone are hurt; in others the veſſels, bones, or viſcera, are wounded. Sometimes the ball paſſes clear through, and ſometimes it remains fixed in the *wound*, and frequently carries part of the cloaths, or wadding with it. From the difference of theſe circumſtances very different ſymptoms ariſe.

Gunſhot-wounds in the cranium and temporal muſcles, even the ſlighteſt of them, are attended with very great danger, and frequently bring on terrible ſymptoms, by the concuſſion of the internal parts, which they occaſion; inſomuch, that it is ſurpriſing to ſee how ſmall an external *wound* upon this part will bring on death, if not prevented by the trepan. Internal *wounds* of this ſort are alſo extremely dangerous, but if no large veſſel is wounded, they are frequently cured.

When they are inflicted on the bones or joints, they are attended with very bad ſymptoms; for in this caſe it is next to impoſſible to eſcape inflammation, gangrene, caries, and dangerous fiſtulæ, which either require amputation of the limb, or leave it without ſenſe or motion.

If any part of the cloaths, wadding, or any other extraneous body, be forced into the *wound*, it muſt be removed before you can attempt to heal the *wound*; and the ſame caution is to be obſerved in regard to any ſplinters of bone: when theſe are removed, the hæmorrhage is to be ſtopped, then ſuppuration is to be promoted, and new fleſh encouraged, and care taken to procure an even cicatrix.

Extraneous bodies are much eaſieſt to be removed from theſe *wounds* at firſt; for after ſome delay, the tumor and inflammation of the part render it difficult and painful: beſides, the bullets will by degrees work themſelves deeper, and be buried under the muſcles, which will occaſion fiſtulæ, rigidity of the limb, and other inconveniences. In extracting balls that lie deep, you muſt take great care not to lay hold of blood-veſſels, nerves, or tendons; which accident will be beſt avoided, by introducing the forceps ſhut, and not opening them till you feel the ball.

Sometimes the orifice of theſe *wounds* is ſo narrow, that it is impoſſible to come at the body you are to extract, without making a larger opening; this then muſt be done on the moſt convenient ſide, always obſerving that no nerve, blood-veſſel, tendon, or ligament, lies in the way. When the parts are very much inflamed, and ſwelled, an opening of this kind is frequently of ſervice; for by this means the obſtructed blood is diſcharged, and the bad conſequences of the inflammation are prevented. When the extraction of the ball is attempted, the patient muſt be put into the ſame poſture and ſituation that he was in when he received the *wound*. When the ball has penetrated ſo deep, that it may be eaſily felt with the finger on the oppoſite ſide, it is ſometimes better to make an inciſion there, and take it out in that place, than to attempt the getting of it back the other way. If the *wound* cannot ſafely be enlarged, nor the ball extracted at firſt, without great pain and danger, it muſt be left in the *wound*, either till the pain is abated, or the *wound* is ſo enlarged by ſuppuration, that it either can work itſelf out, or be extracted with leſs danger. On the other hand, all other extraneous bodies are inſtantly to be removed, where there is danger of their bringing on pain, inflammation, and convulſions, by being left behind. If a ball is paſſed into the cavities of the body, it is beſt not to attempt to extract it, but to heal the *wound*, leaving it there. Perſons have carried a ball thus in them for many years without inconvenience, and, at one time or other, it frequently happens that it will work itſelf into ſome part of the body, out of which it may be extracted with ſafety.

Balls lodged in the bones, are either to be extracted immediately, or, if fixed firmly in the bone, to be left to be ſet at liberty by the ſuppuration of the parts; but balls that are thrown into the joints, are always to be extracted with all poſſible expedition, for delays are very dangerous; and indeed, in moſt caſes of this kind, the amputation of the limb is found abſolutely neceſſary. In *wounds* from large guns, the joint or bone is frequently grievouſly ſhattered; and in this caſe, the moſt prudent method is always to take off the limb at once, not to ſpend time in fruitleſs attempts to make a cure.

If a large artery is wounded by the ball, either in the arms or legs, which will be known by the loſs of blood, the tourniquet muſt be applied, and the blood being ſtopt, the veſſel muſt be taken up by a crooked needle; but if this cannot be done, or little hopes of a cure appear from future dreſſings, it will he prudent to take off the limb juſt above the *wound*. When *wounds* of this kind have been well cleaned, and the blood ſtopped, the firſt intention is to uſe the utmoſt endeavours to prevent, or aſſwage the tumor and inflammation. The *wound* ſhould be dreſſed with lint dipped in warm ſpirit of wine, and covered with a compreſs wetted with the ſame liquor, or with camphorated ſpirit of wine, either alone, or diluted with lime-water. Having done this, the next intention is to forward the ſuppuration of the bruiſed and torn parts; to which end, it is common to uſe the common digeſtive made of turpentine diſſolved in the yolk of an egg, or a mixture of baſilicon and Arcæus's liniment, ſoftened with ſpirit of wine and oil; and where there is a very great corruption of the parts, a little myrrh and aloes are to be added, as alſo Venice-treacle, the brown ointment; and, where the occaſion requires it, and the nerves do not lie bare, a little of the red precipitate.

In deep *wounds*, where the ball has gone quite through, a ſkein of thread being drawn through the eye of a blunt needle, and well ſaturated with the digeſtive ointment, is to be paſſed through the *wound* in manner of a SETON, and kept there till the *wound* is found in a condition to heal, and then the common methods purſued to heal and cicatrize. Heiſter's Surgery, cap. iii. p. 55, &c.

WOUNDS *of the abdomen*. See ABDOMEN.

WOUNDS *of the arteries*. See ANEURISM.

WOUNDS *of the bones, cheek, ear, eye, head, inteſtines, neck, ſkull, thorax*, &c. ſee the ſeveral articles. See alſo FISSURE, CONTRAFISSURE, EXTRAVASATION, CONTUSION, FRACTURE, GASTRORAPHY, TREPAN, &c.

WOUNDS *in horſes*. The moſt terrible *wounds* theſe creatures are ſubject to, are thoſe got in the field of battle. The farriers that attend camps have a coarſe way of curing theſe; but it is a very expeditious and effectual one. If the bullet be within reach, they take it out with a pair of forceps; but if it lie too deep to be come at, they leave it behind, and dreſs up the *wound* in the ſame manner as if it were not there.

They firſt drop in ſome varniſh from the end of a feather, and when the bottom is thus wetted with it, they dip a pledget of tow in the ſame varniſh, which they put into the *wound*, and then cover the whole with the following charge: take a quarter of a pound of powder of bole armenic, half a pound of linſeed-oil, and three eggs, ſhells and all; add to theſe four ounces of bean-flour, a quart of vinegar, and five ounces of turpentine; this is all to be mixed over the fire, and the *wound* covered with it. This application is to be continued four or five days, then the tent put into the *wound* is to be dipped in a mixture of turpentine and hog's-lard; by this means a laudable matter will be diſcharged, inſtead of the thin ſharp water that was at firſt. Then the cure is to be completed by dreſſing it with an ointment made of turpentine, firſt well waſhed, and then diſſolved in yolks of eggs, and a little ſaffron added to it.

This is the practice in deep *wounds* that do not go through the part; but in caſes where the bullet has gone quite through, they take a few weavers linen-thrumbs, made very knotty; theſe they make up into a kind of link, and dipping it in varniſh, they draw it through the *wound*, leaving the ends hanging out at each ſide; by means of theſe they move the link or ſkein three or four times a day, always wetting the new part that is to be drawn into the *wound* with freſh varniſh. They put on a charge of the bole armenic, &c. as before deſcribed, on each ſide of the wounded part, and continue this as long as the *wound* diſcharges thin watery matter, or the ſides continue ſwelled. After this they dreſs it with the ointment of turpentine, yolks of eggs, and ſaffron, till it is perfectly cured.

The other methods are, the dreſſing of the *wound* with an ointment made of wax, turpentine, and lard, and covering it with linen rags wetted with cream; or the dreſſing, with a mixture of yolks of eggs, honey, and ſaffron, and covering it up with cream and baum-leaves beaten together.

When the *wound* is ſo dangerous as to require the aſſiſtance of internal medicines, they give the following pills: take aſſafœtida, bay-berries, and native cinnabar, of each a pound; beat up the whole into a maſs with brandy, and roll it into pills of fourteen drams each. Theſe are to be laid in a ſhady place to dry, after which they will keep ever ſo long without any damage. The horſe is to take two of theſe every other day, or, if neceſſary, every day, till he has taken eight or ten of them, and he is to ſtand bridled two hours before and after the taking of them.

When the *wound* ſeems at a ſtand, not appearing foul, and yet not gathering new fleſh, there muſt be recourſe had to the following powder, whoſe effect in bringing new fleſh is wonderful: take dragon's blood, and bole-armenic, of each two ounces; maſtic, olibanum, and ſarcocolla, of each three drams; aloes, round birth-wort, and common iris-root, of each one dram and a half; make the whole into a fine powder. This is ſometimes uſed dry, ſprinkling it on the *wound*; but ſometimes it is mixed with turpentine, ſometimes with juice of wormwood, and ſometimes with honey of roſes, and either way does very well.

When the *wound* grows foul, and requires a detergent to cleanſe it, the common liquor for this purpoſe is a phagedenic water, which they make of lime-water, and ſublimate in this manner: take two pounds and a half of newly made and unſlaked lime, put it into a pewter veſſel, and pour on it five quarts of boiling water. When the bubbling is over, let it ſtand to reſt two or three days, ſtirring it often with a ſtick; then pour it clear off after due time for the lime to ſettle, and filtre it through ſome whited brown paper, made for the lining of funnels, on this occaſion. To a quart of the clear lime-water, thus prepared, add eight ounces of ſpirit of wine, and one ounce of ſpirit of vitriol; when theſe are well mixed, by ſhaking them together, then add an ounce of corroſive ſublimate in fine powder; mix all well together, and keep the whole in a bottle, to be uſed for the cleanſing of theſe foul *wounds*, and on any other occaſions, where there may be a detergent of this powerful kind neceſſary. It will keep good many years.

If this water will not thoroughly cleanſe the *wound*, but there ſtill will remain a quantity of foul matter in it, and there is danger of a gangrene, they add to it as much arſenic in fine powder, as there was of the corroſive ſublimate; that is, at the rate of an ounce to a quart and half a pint.

Theſe are all the medicines that the farrier need carry with him on account of *wounds*; and they are all ſuch as may be prepared at home, and will continue good ſo long as he has occaſion to keep them, or much longer; and what is left of one year will ſerve for others.

When the neceſſary applications are thus ſettled, it may not be improper to add the general rules by which they conduct themſelves in the cure.

1. The *wound* muſt be probed at firſt, but very gently, and afterwards as gently and as ſeldom as may be, for the horſes fleſh is the moſt eaſy of all others to be contuſed in wounded parts, and to fall into a gangrene from the hurt. 2. The *wound* muſt be kept continually as clean as poſſible, and free from proud fleſh. 3. The neceſſary revulſion muſt always be made by bleeding, as ſoon as the *wound* is dreſſed the firſt time; this prevents inflammation, and a great many other bad accidents. 4. If the *wound* be in ſuch a place, that the horſe can get at it with its tongue to lick it, great care muſt be taken to prevent his doing ſo, as it will greatly retard the cure. 5. The farrier never is to proceed to ſuppuration in any caſe in which the humours can be either diſſolved or repelled, and eſpecially in parts that are full of ſinews and ligaments, or that are near the bones. 6. If a *wound* be accompanied with a great contuſion, or if it be of a round or circular figure, inciſions are often neceſſary about its edges, and ſometimes the application of cauſtics. 7. The *wound* muſt be always carefully covered, for the acceſs of the air retards the cure. 8. The callous lips of a *wound* muſt always be cut to the quick, before they can be united together. Theſe may ſerve for general rules, that hold good in all caſes; and to theſe may be added ſome that are principally applicable to peculiar circumſtances of the *wounds*.

Wounds of the breaſt are to be cured with tents and folds of ſoft linen laid over them, ſteeped in the following mixture: take verdigriſe, vitriol, and alum, of each one ounce; vinegar eight ounces; honey a pound; let all theſe be boiled together till they become red.

Wounds in the belly can only be cured by ſewing up the peritonæum with ſtrong woollen thread, not ſilk, leaving the extremities without the ſkin. The ſkin is to be ſewed together with ſtrong hempen thread waxed, joining the lips of the *wound* together, by this means, in form of a buckle. This is to be covered with the common ointment for *wounds*; and if an inflammation comes on, chalk diſſolved in vinegar is to be added.

If the wound be ſuch that the guts come out at it, the horſe may ſtill be recovered, if proper caution be uſed: the guts are to be immediately returned into their place; but they muſt not in this be touched with the hand, but with a ſpunge dipped in warm water. And, in order to the making them more readily get into their places, it is proper to make the creature vomit, by thruſting down his throat a feather dipped in oil. If the *wound* through which they fell is not big enough to return them eaſily by, it muſt be enlarged by cutting; but if the guts are found to be bruiſed or wounded, it is in vain to attempt any thing, for death muſt follow.

There is alſo a certainty of death when, after a *wound* of any kind in the belly, the horſe voids blood at the fundament.

When a horſe is wounded near the groin, he eaſily falls into convulſions; in this caſe he is to be kept from drinking as much as poſſible: he is alſo to be covered well up, and kept quiet, and to have green things given him to eat.

Wounds on the knees are very difficult to cure, becauſe the part is in motion almoſt continually, and there is very little fleſh to work upon. When the *wounds* are but ſlight, and in the muſcular parts of the body, a mixture of honey and tallow, boiled together, will often prove a cure; when the *wound* is more conſiderable, turpentine melted in a little common oil, and applied hot, is the general remedy.

If a *wound* happens between the ſhoe and the hoof, care muſt be taken that no foreign matter be left in it, and it muſt be dreſſed with any of the ointments that have verdegriſe in them; and a charge of bruiſed elder-leaves is very proper to be applied over all. If the *wound* be deep and narrow, it muſt be enlarged at the orifice, and turpentine and wax, melted in lard, muſt be poured into it. The ſame rule of opening the orifice holds good in all deep and narrow *wounds*.

If a nerve happens to be cut, it muſt be cloſed, and a defenſative muſt be applied, to prevent a concourſe of humours to the part; a fomentation made of oil, wine, and honey, mixed together, is alſo very proper, whereever a nerve is hurt, and a poultice may be applied over all, made of marſhmallow-roots boiled ſoft, with bread and milk.

If the horſe happens to be wounded by a piece of wood, bone, or any other hard ſubſtance, part of which remains in the *wound*, this muſt be carefully taken out, whatever pain it may coſt the creature to do it, and the *wound* muſt then be dreſſed with the common *wound*-ointments. In this, or any other caſe of a freſh *wound*, the waſhing it with oil of turpentine is an excellent method of preventing ill conſequences.

WOUND-*wort*, in *Botany*, the name given to ſeveral ſpecies belonging to different genera.

WOUND-*wort of Achilles*. See ACHILLEA.

WOUND-*wort*, *clown's*, a ſpecies of *ſtachys*. See *Baſe* HOREHOUND.

WOUND-*wort*, *Hercules's*, or *all-heal*, the LASERPITIUM *chironium* of Linnæus: this is a native of the warmer climates, and bears the colds of our own. Both the ſeeds and roots of this ſpecies are conſiderably warmer than thoſe of the *garden* and *wild* PARSNEP. The roots and ſtalks have a ſtrong ſmell and taſte, reſembling thoſe of opopanax: and Boerhaave relates, that on wounding the plant in ſummer, he obtained a yellow juice, which, being inſpiſſated a little in the ſun, agreed perfectly, in both reſpects, with that exotic gum-reſin. Lewis.

WOUND-*wort*, *Saracen's*, *ſolidago*. See GOLDEN-*Rod*.

WOUND-*wort*, *true Saracen's*, a ſpecies of *ſenecio*. See GROUNDSEL.

WRACK. See WRECK.

WRACK, in *Natural Hiſtory*. See WRECK.

WRASSE, in *Ichthyology*, the name of a fiſh called by authors *turdus vulgaris*, and by ſome *tinca-marina*, the *ſea-tench*, and ſometimes *old wife*.

The *wraſſe*, or *labrus tinca* of Linnæus, reſembles the carp in figure, and is covered with large ſcales. Its uſual ſize is about five or ſix inches in length, and it grows to the weight of four or five pounds: its colour is very variable; red, yellow, and browniſh, being very frequently mixed in the ſcales; and it has five or ſix longitudinal lines, alternately of a pale yellow, an olive-colour, and a duſky red. Its noſe is long, and bent upwards, and it has thick and fleſhy lips extended over the jaws. Its mouth is ſmall, and its teeth, which are diſpoſed in two rows, the firſt conic, the ſecond very minute, are not very ſharp; in the throat, juſt before the gullet, are three bones, two above of an oblong form, and one below of a triangular ſhape; with the ſurface of each riſing into roundiſh protuberances: theſe are of ſingular uſe to the fiſh for grinding its ſhelly food before it arrives at the ſtomach; the dorſal fin conſiſts of ſixteen ſharp and ſpiny rays, and nine ſoft ones, longer than the others: the pectoral fins are large and round, and compoſed of fifteen rays, the ventral of ſix; the firſt ſharp and ſtrong; the anal of three ſharp ſpines, and nine flexible: its tail is rounded at the end, and is formed of fourteen ſoft branching rays; the membranes of the fins and tail are variegated with red and blue ſpots, and the anterior rays of the back-fin are prickly. It is caught in plenty on the Engliſh ſhores, and is ſold among the poorer ſort of people in Wales and Cornwall; but is not eſteemed a very delicate fiſh. It is found in deep water, adjacent to the rocks; it will take a bait, though its uſual food is ſhell-fiſh, and ſmall cruſtacea. Willughby's Hiſt. Piſc. p. 320. and Pennant.

Wrasse, *bimaculated*, *labrus bimaculata* of Linnæus, has a body pretty deep, and of a light colour, marked in the middle on each ſide with a round brown ſpot, and another on the upper part of the baſe of the tail: the lateral line is incurvated; the branchioſtegous rays are ſix; the fiſt fifteen rays of the dorſal fin are ſpiny, the other eleven ſoft, and lengthened by a ſkinny appendage; the pectoral fins conſiſt of fifteen rays; the ventral of ſix, the firſt ſpiny, the ſecond and third ending in a ſlender briſtle; the anal-fin is pointed; the four firſt rays being ſhort and ſpiny, the reſt long and ſoft. This is an inhabitant of the Mediterranean.

Mr. Pennant has deſcribed ſome other ſpecies of *wraſſe*, as the *trimaculated*, *ſtriped*, and *gibbous*, taken on the coaſt of Angleſea, and another called *ballan*, numbers of which appear during ſummer near Scarborough, which is of the form of the common *wraſſe*, except that between the dorſal fin and the tail it has a conſiderable ſinking; above the noſe a deep ſulcus; and on the fartheſt cover of the gills a depreſſion radiated from the centre. Pennant's Brit. Zool. vol. iii. p. 246, &c.

WREATH, in *Natural Hiſtory*. See Turbo.

Wreath, in *Heraldry*, a roll of fine linen, or ſilk (like that of a Turkiſh turbant), conſiſting of the colours borne in the eſcutcheon; placed in an atchievement, between the helmet and the creſt, and immediately ſupporting the creſt. *Tab.* IV. *Heraldry*, *fig.* 131.

WRECK, **Wrack**, *Sea*-**Wreck**, or *Sea Oak*, the fucus *veſiculoſus* of Linnæus, in *Natural Hiſtory*, a ſoft, very ſlippery, marine plant, common among rocks that are left dry at the ebb tide, with leaves ſomewhat reſembling thoſe of the oak-tree; the ſtalk running along the middle of the leaves, and terminated by watery bladders containing either air or a ſlippery fluid: the veſicles begin in March to fill with a thin juice; and about the end of July they burſt, and diſcharge a matter as thick as honey.

In ſome places it is uſed to manure the ground. In Normandy, and other parts, they burn it; and of the aſhes make a kind of ſoda, or pot-aſh, which they uſe in the making of common green glaſs, to promote the fuſion or vitrification of the other materials.

Dr. Ruſſel relates, that he found this plant an uſeful aſſiſtant to ſea-water in the cure of diſorders of the glands; that he gave it in powder to the quantity of a dram, and that in large doſes it nauſeated the ſtomach; that by burning in the open air, it was reduced into the black ſaline powder; which ſeemed, as an internal medicine, greatly to excel the officinal burnt ſpunge; which was beneficially uſed as a dentrifice, for correcting laxities of the gums; and which indicated a remarkable degree of detergent virtue by its effect in cleaning the teeth: that the juice of the veſicles, after ſtanding to putrefy, yielded, on evaporation, an acrid pungent ſalt, amounting to above a ſcruple from two ſpoonfuls; that the putrefied juice, applied to the ſkin, ſinks in immediately, excites a ſlight ſenſe of pungency, and deterges like a ſolution of ſoap; that one of the beſt applications for diſcuſſing hardneſs, particularly in the decline of glandular ſwellings, is a mixture of two pounds of the juicy veſicles, gathered in July, with a quart of ſea-water, kept in a glaſs veſſel for ten or fifteen days, till the liquor comes near to the conſiſtence of very thin honey: the parts affected are to be rubbed with the ſtrained liquor twice or thrice a day, and afterwards waſhed clean with ſea-water. Lewis's Mat. Med. See Æthiops *vegetabilis*.

Wreck, in *Sea-Language*, denotes the ruins of a ſhip which has been ſtranded or daſhed to pieces on a ſhelf, rock, or lee-ſhore, by tempeſtuous weather.

Wreck, **Wreccum**, called alſo *Ship*-**Wreck**, or *Ship*-**Wrack**, in *Law*, &c. is when a ſhip periſhes in the ſea, and no man eſcapes alive out of it.

The civilians term it *naufragium*. The goods in the ſhip which are brought to the land by the waves, belong to the king, or him to whom he aſſigns the right thereof. Thus, in the Stat. Prærog. Reg. 17 Edw. II. cap. 11. *Rex habebit* wreckum maris *per totum regnum*, *balænas* & *ſturgiones captas in mari*, *vel alibi intra regnum*, *exceptis quibuſlibet privilegiatis locis*, &c.

Thus alſo the matter ſtood by the ancient common law; but the rigour of the law of *wrecks* has been gradually ſoftened in favour of the diſtreſſed proprietors. Accordingly it was firſt ordained by king Henry I. that if any perſon eſcaped alive out of the ſhip, it ſhould be no *wreck*; and afterwards king Henry II. by his charter, 26 May, A. D. 1174, declared, that if on the coaſts of England, Poictou, Oleron, or Gaſcony, any ſhip ſhould be diſtreſſed, and either man or beaſt ſhould eſcape or be found therein alive, the goods ſhould remain to the owners, if they claimed them within three months; but otherwiſe ſhould be deemed a *wreck*, and belong to the king, or other lord of the franchiſe. This was again confirmed, with improvements, by Richard I. who, in the ſecond year of his reign, not only eſtabliſhed theſe conceſſions, by ordaining that the owner, if he was ſhipwrecked and eſcaped, "*Omnes res ſuas liberas et quietas haberet*," but alſo, that if he periſhed, his children, or in default of them his brethren and ſiſters, ſhould retain the property; and in default of brother or ſiſter, then the goods ſhould remain to the king. And by the law, as laid down by Bracton in the reign of Henry III. if not only a dog (e. g.) eſcaped, by which the owner might be diſcovered, but if any certain mark were ſet on the goods, by which they might be known again, it was held to be no *wreck*. Afterwards, in the ſtatute of Weſtm. 1. 3 Edw. I. cap. 4. the time of limitation of claims, given by the charter of Henry II. is extended to a year and a day, according to the uſage of Normandy; and it enacts, that if a man, a dog, or a cat, eſcape alive, the veſſel ſhall not be adjudged a *wreck*. And it is now held, that not only if any living thing eſcape, but if proof can be made of the property of any of the goods or lading which come to ſhore, they ſhall not be forfeited as *wreck*. The ſtatute farther ordains, that the ſheriff of the county ſhall be bound to keep the goods a year and a day (as in France for one year, agreeable to the maritime laws of Oleron, and in Holland for a year and a half), that if any man can prove a property in them, either in his own right or by right of repreſentation, they ſhall be reſtored to him without delay; but if no ſuch property be proved within that time, they then ſhall be the king's. If the goods are of a periſhable nature, the ſheriff may ſell them, and the money ſhall be liable in their ſtead. This revenue of *wrecks* is frequently granted out to lords of manors, as a royal franchiſe; and if any one be thus entitled to *wrecks*, in his own land, and the king's goods are *wrecked* thereon, the king may claim them at any time, even after the year and the day. In order to conſtitute a legal *wreck*, the goods muſt come to land. If they continue at ſea, the law diſtinguiſhes them by the barbarous appellations of *jetſam*, *flotſam*, and *ligan*.

Wrecks, in their legal acceptation, are now not very frequent; the owner being ſeldom unable to aſſert his property within the year and day limited by law. And in order to preſerve his property entire, our laws have made many humane regulations, very oppoſite in their ſpirit to thoſe which formerly prevailed in all the northern regions of Europe, and a few years ago were ſtill ſaid to ſubſiſt on the coaſts of the Baltic ſea; permitting the inhabitants to ſeize on whatever they could get as lawful prize. To what the reader will find under salvage to this purpoſe, we ſhall here add, that all perſons who ſecrete any goods of a *wreck* ſhall forfeit their treble value; and if they wilfully do any act whereby the ſhip is loſt or deſtroyed, by making holes in her, ſtealing her pumps, or otherwiſe, they are guilty of felony without benefit of clergy. Moreover, by the ſtatute 26 Geo. II. cap. 19. the plundering of any veſſel either in diſtreſs, or wrecked, whether any living creature be on board or not, or the preventing the eſcape of any perſon that endeavours to ſave his life, or the wounding of him, with intent to deſtroy him, or the putting out of falſe lights in order to bring any veſſel into danger, are all declared to be capital felonies, in like manner as the deſtroying of trees, ſteeples, or other ſtated ſea-marks is puniſhed, by 8 Eliz. cap. 13. with a forfeiture of 100*l.* or outlawry. Alſo by the ſtatute of Geo. II. the pilfering of any goods caſt a-ſhore is declared to be petty larceny; and many other ſalutary regulations are made for the more effectually preſerving ſhips of any nation in diſtreſs.

By the civil law, to deſtroy perſons ſhip-wrecked, or prevent their ſaving of the ſhip, is capital; and to ſteal even a plank from a veſſel in diſtreſs, or wrecked, makes the party liable to anſwer for the whole ſhip and cargo. The laws alſo of the Wiſigoths, and the moſt early Neapolitan conſtitutions, puniſhed with the utmoſt ſeverity all thoſe who neglected to aſſiſt any ſhip in diſtreſs, or plundered any goods caſt on ſhore. Blackſt. Com. book i. p. 291, &c.

In divers charters, and old writngs, it appears, that *wreck*, anciently, not only comprehended goods which came from a periſhing ſhip, but whatever elſe the ſea caſt upon land: whether it were precious ſtones, fiſh, ſea-weed, or the like.

This *wreck*, in the Grand Cuſtomary of Normandy, cap. 17. is called *vorech*, and Latined *veriſcum*; and in ſome of our ancient charters, *wreche*, *werec*, *werech*, and *ſcupwerp*, q. d. *ſea-upwerp*, of *ſea*, and *upwerpen*, *to caſt up*.

WRECK, in *Metallurgy*, a veſſel in which the third waſhing is given to the ores of metals.

In Cornwall, when the tin ore has been twice waſhed, they take the head tin, or that part of the tin ore that lies uppermoſt, out of the buddle, and throwing it into this veſſel, they pour water on it, and work it about with wooden rakes, till it is cleared from whatever other extraneous matter there may ſtill have remained mixed with it, and is, after this, fit for the blowing-houſe to be run into metal.

WREN, or *Jenny* WREN, in *Ornithology*, the *paſſer troglodytes* of Geſner, and the *motacilla troglodytes* of Linnæus, has the head and upper part of the body of a deep reddiſh brown; above each eye is a ſtroke of white; the back, and coverts of the wings, and tail, are marked with ſlender, tranſverſe, black lines; the quill-feathers with bars of black and red; the throat is of a yellowiſh white; the belly and ſides croſſed with narrow duſky and pale reddiſh-brown lines; and the tail is croſſed with duſky bars. Pennant.

This bird, though very ſmall, is of a very chearful diſpoſition, and has a very agreeable voice, which he throws out with great chearfulneſs and ſprightlineſs, uſually cocking up his tail all the time he is ſinging; and continues his ſong through the winter, except during the froſts. See SONG *of Birds*.

The ſemale breeds twice in the year, firſt in the latter end of April, and afterwards in the middle of June. The neſt is uſually placed among cluſters of moſs and ivy, in ſuch a manner that it is very hard to diſcover it. It is made of dry moſs and leaves put together in a very artificial manner, being cloſed all round except for a ſmall hole left to go in and out at; they lay a great number of eggs, not leſs than eighteen; and it has been often found that they all hatch except one or two; and thus ſixteen young ones have been found together in one neſt. Theſe are brought up ſo well as to ſhift for themſelves by the end of May; and then another brood is provided for by the middle of the month ſollowing. The young ones may be eaſily raiſed. They ſhould for this purpoſe be taken out of the neſt at about fourteen days old, and fed with ſheep's, calf's, or ox's heart, cut ſmall, with eggs minced among it. When they are able to peck this meat for themſelves, they may be put into cages; but they muſt ſtill be fed for ſome days, leſt they ſhould neglect themſelves and die of hunger after the greateſt part of the trouble is thus over.

When they are grown up they may be fed with paſte, and will need no more heart. Afterward it will be a great feaſt to them to give each a ſpider or two once in two or three days; and after they are grown up, they may either be left to ſing their own wild notes, which are very agreeable, or if it be deſired that they ſhould whiſtle tunes, they will eaſily be taught it. Ray and Pennant.

WREN, *creſted*, or *Golden-creſted* WREN, *regulus criſtatus*, or *motacilla regulus* of Linnæus, in *Ornithology*, the name of a very beautiful little bird, the ſmalleſt of all the Britiſh birds. Its whole weight is not more than ſeventy-ſix grains; and the crown of its head is adorned with a very beautiful ſaffron-coloured or orange-red ſpot, which is called its creſt, and by ſome its crown, and from this golden crown the bird has obtained the name of the *regulus*, *tyrannus*, *baſileus*, and other appellations of royalty. This beautiful ſcarlet mark on the head is bounded on each ſide by a fine yellow line. The bill is duſky; the feathers of the forehead are green; from the bill to the eyes is a narrow white line; the back and hind part of the neck are of a dull green; the covers of the wings duſky, edged with green, and tipped with white; the quill-feathers and tail duſky, edged with pale green; the throat and lower part of the body white, tinged with green; the legs are of a dull yellow colour; and the claws are very long.

This bird frequents woods, and is found principally in oak-trees. It is common about the Peak in Derbyſhire, and is ſeen in autumn as far north as the Shetland iſles, but quits that country before winter. It lays ſix or ſeven eggs, not larger than peas. This bird has been obſerved ſuſpended in the air for a conſiderable time over a buſh in flower, whilſt it ſung very melodiouſly. The note does not much differ from that of the common *wren*, but is very weak. Ray and Pennant.

WREN, *yellow*. See LUTEOLA.

WRESTLING, a kind of combat, or engagement, between two perſons unarmed, body to body, to prove their ſtrength and dexterity; and try which can throw his opponent to the ground.

Wreſtling, *palæſtra*, is an exerciſe of very great antiquity and fame. It was in uſe in the heroic age; witneſs Hercules, who *wreſtled* with Antæus.

It continued a long time in the higheſt repute; and had very conſiderable rewards and honours aſſigned it at the Olympic games. It was the cuſtom of the athletæ, or wreſtlers, to anoint their bodies with oil, to give the leſs hold to their antagoniſt. See PALÆSTRA.

Ablancourt obſerves, that Lycurgus ordained the Spartan maids to *wreſtle* in public, quite naked, to break them of their too much delicacy and niceneſs; to make them appear more robuſt, and familiarize the people, &c. to ſuch nudities.

WRINGLE-*tail*, a name given by the people of ſeveral parts of England, to the *curvicauda*, a ſpecies of bee-fly, very much reſembling the bee in ſhape, but having only two wings and no ſting.

It is very troubleſome to horſes, but does not ſuck their blood, but only lays its eggs in their ſkins; it is called in other countries the *whame* and the *barrel-fly*.

WRIST, *carpus*, in *Anatomy*, conſiſts of eight ſmall, unequal, and irregular bones, all of which taken together repreſent a ſort of grotto, of a regular quadrangular figure, and connected principally with the baſis of the radius. See *Tab. Anat.* (*Oſteol.*) *fig.* 3. N° 9. 7. and N° 12. Conſidered in this manner, the whole connection of them has two ſides and four edges: one of the ſides is convex and external, the other concave and internal. The convexity of the outſide is pretty regular and even; but the concavity of the inſide has four eminences, one on each corner. One of the four edges touches the fore-arm, and is, as it were, the head of the carpus; another of the edges touches the metacarpus, and may be called the baſis; the third is toward the point of the radius, and the fourth toward the point of the ulna; the firſt of theſe latter two may be called the ſmall edge, the latter the larger.

The bones of the carpus are divided into four rows, the firſt of which lies next the fore-arm, the ſecond next the metacarpus; each row conſiſts of four bones; but the fourth of the firſt row lies in a manner out of its rank. Each bone has ſeveral cartilaginous ſurfaces, for their mutual articulations, and, in ſome of them, for their articulations with the radius, and bones of the metacarpus and thumb.

It is to no purpoſe to diſtinguiſh the three ordinary dimenſions in any of theſe bones, except one; but in moſt of them we may conſider ſix ſides, one external, turned toward the convex ſurface of the carpus; one internal, toward the concave ſurface; one toward the fore-arm, which may properly be called the brachial ſide; one toward the fingers, to be called the digital ſide; one toward the point of the radius, or the radial ſide, and one toward the point of the ulna, or the cubital ſide.

Of theſe ſides ſome are bony, others are cartilaginous or articular; theſe laſt Winſlow calls ſides, the others ſurfaces, as being portions of the carpus's ſurface in its natural ſituation: to diſtinguiſh theſe bones from each other, they have been called the firſt, ſecond, third, and fourth, bones, of the firſt or ſecond row, beginning to count from the radius or thumb.

But Lyſerus has been at the pains of giving a particular name to each of them: he called the firſt of the row the *os* SCAPHOIDES or NAVICULARE; the ſecond, the *os* LUNARE; the third, the *os cuneiforme*, which appears like a wedge ſticking between the two rows, having a rough ſurface with a ſmall tubercle upon it, forming the greateſt part of the cubital edge of the carpus, and four articular ſides; the fourth, the *os piſiforme*, *orbiculare*, or *lenticulare*, which is irregularly round, having one cartilaginous ſide irregularly orbicular, and the reſt of the bone being rough, convex, and irregularly round, and making one of the four eminences on the concave ſide of the carpus; the firſt bone of the ſecond row, the *os* TRAPEZIUM; the ſecond, *os* TRAPEZOIDES; the third, *os* MAGNUM; and the fourth, *os* UNCIFORME.

The bones of the carpus are articulated with one another by arthrodia; but the firſt row forms a ſort of ginglymus with the ſecond; becauſe the head of the os magnum may turn in the cotyloide cavity of the firſt row, while the two firſt bones of the ſecond row ſlide upon the digital ſide of the os ſcaphoides, and the os unciforme in the ſame manner on the os cuneiforme.

When all theſe bones are in their natural ſituation, a tranſverſe depreſſion is formed in the convex ſide of the carpus, by which the two rows are diſtinguiſhed. This depreſſion appears moſt between the os ſcaphoides, and the three laſt bones of the ſecond row, and looks like a fold, by which the ſecond row is thrown back upon the firſt. The four eminences on the concave ſide of the carpus are for the inſertion of a ſtrong tranſverſe ligament. The inner ſubſtance of all theſe bones is ſpongy, and their ſurfaces are not very compact. There are ſix muſcles, that perform the motions of the carpus on the fore-arm, viz. ULNARIS *internus*, RADIALIS *internus*, ULNARIS *externus*, RADIALIS *externus primus* and *ſecundus*, and ULNARIS *gracilis*. Winſlow.

WRIST *fractured.* The bones of the *wriſt* are very ſeldom ſubject to fracture, on account of their ſmallneſs. And when they are fractured, there is but little hope of a cure; for the ligaments and tendons are here ſo numerous, and the bones ſo very ſmall, that it is ſcarce poſſible to reduce them to their places, or to make them grow together again.

On this account the joint of the hand generally becomes ſtiff and immoveable after theſe accidents, or elſe abſceſſes, ſuppurations, fiſtulæ, and caries of the bones follow them; and theſe, on account of the ſoftneſs of the bones, and the difficulty of diſcharging the matter, are ſeldom remedied, but by amputating the hand. What can be done, however, toward the curing of a fracture in this part, is this: the aſſiſtant muſt lay hold of the hand above the *wriſt* and below it, and extend them as far as is neceſſary in oppoſite directions; the ſurgeon is, while this is doing, to replace the bones with his fingers, and when they are all replaced, to bind the hand up with a proper bandage. Heiſter.

WRIST, *ligaments of the.* See *Ligaments of the* HAND.

WRIST, *luxation of the.* See *Luxation of the* HAND.

WRIST, in the *Manege.* The bridle *wriſt* is that of the cavalier's left hand. A horſeman's *wriſt* and his elbow ſhould be equally raiſed, and the *wriſt* ſhould be two or three fingers above the pummel of the ſaddle. To ride a horſe from hand to hand, i. e. to change hands upon one tread, you need only to turn your *wriſt* to that ſide you would have the horſe to turn to, without advancing your hand. But if your horſe ſtops, you muſt make uſe of both your legs. See HAND, and LEG.

WRIT, formed from the Saxon, *writan, to write*, *Breve*, in *Law*, a precept of the king in writing, under ſeal, iſſuing out of ſome court to the ſheriff or other perſon, whereby any thing is commanded to be done, touching a ſuit or action, or giving commiſſion to have it done. As, the ſummoning of a defendant, taking a diſtreſs, redreſſing a diſſeiſin, or the like. Or according to Fitzherbert, a *writ* is a formal letter of the king, in parchment ſealed with a ſeal, and directed to ſome judge, officer, or miniſter, &c. at the ſuit or plaint of a ſubject, requiring to have a thing done, for the cauſe briefly expreſſed, which is to be diſcuſſed in the proper court according to law. See BREVE, BRIEF, and PRECIPE.

Writs are variouſly divided, and in various reſpects. Some, with regard to their order, or manner of granting, are termed *original*, and others *judicial*.

WRITS, *original*, are thoſe ſent out of the high court of chancery, to ſummon the defendant in a perſonal, or tenant in a real action; either before the ſuit begins, or to begin the ſuit thereby. See ORIGINAL.

Royal *writs* are held to be demandable of common right, on paying the uſual fees; for any delay in the granting of them, or ſetting an unuſual or exorbitant price upon them, would be a breach of Magna Charta, cap. 29. "*Nulli vendemus, nulli negabimus, aut differemus juſtitiam vel rectum.*"

Original writs are either optional or peremptory, or, in the language of our law, they are either a PRECIPE, or a SI TE *fecerit ſecurum*.

WRITS, *judicial*, are thoſe ſent by order of the court where the cauſe depends, upon emergent occaſions, after the ſuit begins.

Judicial writs are diſtinguiſhed from original, in that their teſte bears the name of the chief-juſtice of that court whence they come; whereas the original ſay, *teſte meipſo*, in the name, or relating to the king.

The *original writ* is always made returnable at the diſtance of at leaſt fifteen days from the date or TESTE, and upon ſome day in one of the four TERMS: and all *judicial writs*, being grounded on the ſheriff's RETURN, muſt reſpectively bear date the ſame day on which the *writ* immediately preceding was returnable. See PROCESS.

Judicial writs, if erroneous, may be amended: whereas *original writs* are not amendable, if the error be by default of the party who gave inſtruction; yet a new original may be taken out, where it is not amendable.

Writs are alſo diſtinguiſhed, according to the nature of the ACTION, into *real* or *perſonal*.

Real, are either touching the poſſeſſion, called *writs of* ENTRY; or the property, called *writs of right*. See RECTO.

Perſonal writs, are thoſe relating to goods, chattels, or perſonal injuries.

To which may be added, *mixt writs*, for the recovery both of the thing and damages.

Some *writs*, again, are at the ſuit of the party; ſome, of office; ſome, ordinary; ſome, of privilege. A *writ of privilege*, is that which a privileged perſon brings to the court for his exemption, by reaſon of ſome privilege which he enjoys.

But the moſt common *writs* in daily uſe are in debt, detinue, treſpaſs, action upon the caſe, account, and covenant, &c. which, as well as others, muſt be rightly directed, or they will be naught.

Writs may be renewed every term, until a defendant is arreſted; but in the court of king's bench if the LATITAT be not renewed in five terms, a new *writ* is to be taken out, and the plaintiff is not allowed to renew the old one.

The ſheriff's bailiffs cannot execute a *writ* directed to the ſheriff, without his warrant; and if ſeveral perſons are included in a *writ* (for four defendants may be in one *writ*) there muſt be ſeveral warrants from the ſheriff to execute the ſame. All *writs* are to be returned and filed in due time, to avoid POST-TERMINUMS.

Attachment lies againſt ſheriffs, &c. for not executing a *writ*, or for doing it oppreſſively by force, extorting money thereon, or not doing it effectually, by reaſon of any corrupt practice.

WRIT *of aſſiſe.* See ASSISE.

WRIT *of aſſiſtance*, that iſſuing out of the exchequer, to authoriſe ſome perſon to take a conſtable, or other public officer, to ſeize goods or merchandize prohibited, and uncuſtomed, &c.

There is alſo a *writ* of this name iſſuing out of chancery, to give poſſeſſion of lands. Stat. 14 Car. II. cap. 1.

WRIT *of capias.* See CAPIAS.

WRIT *of diſtringas.* See DISTRINGAS.

WRIT *of election to parliament.* See PARLIAMENT.

WRIT *of entry.* See ENTRY.

WRIT *of inquiry of damages*, a judicial *writ* that iſſues out to the ſheriff upon a judgment by default, in an action of the caſe, covenant, treſpaſs, trover, &c. commanding him to ſummon a jury to enquire what damages the plaintiff hath ſuſtained, *occaſione præmiſſorum*; and when this is returned with the inquiſition, the rule for judgment is given upon it; and if nothing be ſaid to the contrary, judgment is thereupon entered. 2 Lill. Abr. 721.

WRIT *of mainpriſe.* See MAINPRISE.

WRIT *of neifty.* See NEIFTY.

WRIT *of rebellion.* See COMMISSION *of Rebellion.*

WRIT *of right.* See RECTO.

WRITS *vicountiel.* See VICOUNTIEL.

WRIT, *action of a.* See ACTION.

WRIT, *appeal by.* See APPEAL.

WRIT, *attachment by.* See ATTACHMENT.

WRIT, *continuance of a.* See CONTINUANCE.

WRITER *of the tallies*, an officer of the exchequer, being clerk to the auditor of the receipt; who writes upon the tallies the whole letters of the tellers bills. See TALLY, and EXCHEQUER.

WRITING, *ſcriptura*, the art, or act, of ſignifying and conveying our ideas to others, by letters, or characters viſible to the eye.

Or, *writing* may be defined to be the art of exhibiting to the ſight the conceptions of the mind, by means of marks or characters, ſignificant of the ſounds of language, which enable us to transfer ideas from the eye to the ear, and *vice verſa*.

Written characters are of two ſorts: they are either ſigns for things, or ſigns for words. Of the former ſort are the pictures, hieroglyphics, and ſymbols, employed by the ancient nations; of the latter ſort are the alphabetical characters, now employed by all Europeans. Pictures were, undoubtedly, the firſt eſſay towards *writing*; accordingly, we find in fact, that this was the only ſort of *writing* known in the kingdom of Mexico, when America was firſt diſcovered. By hiſtorical pictures, the Mexicans are ſaid to have tranſmitted the memory of the moſt important tranſactions of their empire. See Warburton's Divine Legat. of Moſes, vol. ii. part i. p. 67, &c. vol. iii. p. 73. Robertſon's Hiſt. Am. vol. iii. p. 203, &c. and Appendix, note 26. p. 440. edit. 8vo. But as pictures could do no more than delineate external events, without exhibiting their connections, deſcribing ſuch qualities as were not viſible to the eye, or conveying any idea of the diſpoſitions, or words, of men, there aroſe in proceſs of time, for ſupplying this defect, the invention of hieroglyphical characters; which may be conſidered as the ſecond ſtage of the art of *writing*.

HIEROGLYPHICS conſiſt in certain ſymbols, which are made to ſtand for inviſible objects, on account of an analogy or reſemblance which ſuch ſymbols were ſuppoſed to bear to the objects. Among the Mexicans, were found ſome traces of hieroglyphical characters, intermixed with their hiſtorical pictures. But Egypt was the country where this ſort of *writing* was moſt ſtudied, and brought into a regular art. However, this ſort of *writing* could be no other than ænigmatical and confuſed, in the higheſt degree; and muſt have been a very imperfect vehicle of knowledge of any kind.

As *writing* advanced from pictures of viſible objects to hieroglyphics, or ſymbols of things inviſible; from theſe latter it advanced, among ſome nations, to ſimple arbitrary marks which ſtood for objects, though without any reſemblance or analogy to the objects ſignified. Of this nature was the method of *writing* practiſed among the Peruvians; who made uſe of ſmall cords, of different colours, and by knots upon theſe, of various ſizes, and differently arranged, contrived ſigns for giving information, and communicating their thoughts to one another. Of this nature, alſo, are the written characters which are uſed to this day in China. The Chineſe have no alphabet of letters, or ſimple ſounds, which compoſe their words; but every ſingle character, which they uſe in *writing*, is ſignificant of an idea: it is a mark which ſtands for ſome one thing or object; and conſequently, the number of theſe characters muſt be immenſe. This CHINESE *writing*, probably, began, like the Egyptian, with pictures and hieroglyphical figures; which figures being, in their progreſs, abbreviated in form, for the ſake of more eaſily *writing* them, and greatly enlarged in number, paſſed at length, into thoſe marks or characters, which they now uſe, and which have ſpread themſelves through ſeveral nations of the Eaſt. For it is ſaid, that the Japaneſe, the Tonquineſe, and the Coroeans, who ſpeak different languages from one another, and from the inhabitants of China, uſe the ſame written characters with them, and thus intelligibly correſpond with each other in *writing*, though ignorant of the language ſpoken in their ſeveral countries. Our European arithmetical figures are ſignificant marks, preciſely of the ſame nature with the Chineſe characters. Thus far nothing has appeared which reſembles our letters, or which can be called *writing*, in the ſenſe now given to that term. What we have hitherto ſeen were all direct ſigns for things, and made no uſe of the medium of ſound, or words; either ſigns by repreſentation, as the Mexican pictures; or ſigns by analogy, as the Egyptian hieroglyphics; or ſigns by inſtitution, as the Peruvian knots, the Chineſe characters, and the Arabian cyphers. At length, in different nations, men became ſenſible of the imperfection, the ambiguity, and the tediousneſs of each of theſe methods of communication with one another, and began to conſider the advantage reſulting from employing ſigns, which ſhould ſtand not directly for things, but for the words which they uſed in ſpeech for naming theſe things; and they alſo conſidered that, though the number of words in every language be very great, yet the number of articulate ſounds, uſed in compoſing theſe words, is comparatively ſmall. Hence they were led to invent ſigns, not for each word by itſelf, but for each of thoſe ſimple ſounds that are employed in forming words; and they obſerved that, by joining together a few of thoſe ſigns, it would be practicable to expreſs, in *writing*, the whole combination of ſounds which our words require.

The firſt ſtep, in this new progreſs, was the invention of an alphabet of ſyllables, which probably preceded the invention of an alphabet of letters, among ſome of the ancient nations; and which is ſaid to be retained, to this day, in Ethiopia, and ſome countries of India. By fixing upon a particular mark or character, for every ſyllable in the language, the number of characters, neceſſary to be uſed in *writing*, was reduced within a much ſmaller compaſs than the number of words in the language. Still, however, the number of characters was great; and muſt have continued to render both reading and *writing* very laborious arts. At laſt ſome happy genius aroſe; and tracing the ſounds made by the human voice to their moſt ſimple elements, reduced them to a very few vowels and conſonants; and, by affixing to each of theſe the ſigns which we now call letters, taught men how, by their combinations, to put into *writing* all the different words, or combinations of ſound, which they employed in ſpeech. By being reduced to this ſimplicity, the art of *writing* was brought to its higheſt ſtate of perfection, and, in this ſtate, we now enjoy it in all the countries of Europe.

To whom we are indebted for this admirable and uſeful diſcovery does not appear. There ſeems reaſon to conclude, from the books which Moſes has written, that, among the Jews, and probably among the Egyptians, letters had been invented prior to his age. The univerſal tradition among the ancients is, that they were firſt imported into Greece by Cadmus the Phœnician, who, according to the common ſyſtem of chronology, was contemporary with Joſhua; but according to ſir Iſaac Newton's ſyſtem, contemporary with king David. As the Phœnicians are not known to have been the inventors of any art or ſcience, though, by means of their extenſive commerce, they propagated the diſcoveries made by other nations, the moſt probable and natural account of the origin of alphabetical characters is, that they took riſe in Egypt, the firſt civilized kingdom of which we have any authentic accounts, and the great ſource of art and polity among the ancients. In that country, the favourite ſtudy of hieroglyphical characters had directed much attention to the art of *writing*. Their hieroglyphics are known to have been intermixed with abbreviated ſymbols, and arbitrary marks; whence, at laſt, they caught the idea of contriving marks, not for things merely, but for ſounds. Accordingly, Plato (in Phædro) expreſly attributes the invention of letters to Theuth or Thoth, the Egyptian, who is ſuppoſed to have been the Hermes, or Mercury, of the Greeks. Cadmus himſelf, though he paſſed from Phœnicia to Greece, as ſeveral of the ancients have affirmed, was originally of Thebes in Egypt. Moſt probably Moſes carried with him the Egyptian letters into the land of Canaan; and there being adopted by the Phœnicians, who inhabited part of that country, they were tranſmitted into Greece.

It is curious to obſerve, that the letters, which we uſe at this day, can be traced back to the alphabet of Cadmus. The Roman alphabet, which obtains with us and moſt of the European nations, is plainly formed on the Greek, with a few variations. And all learned men obſerve, that the Greek characters, eſpecially according to the manner in which they are formed in the oldeſt inſcriptions, have a remarkable conformity with the Hebrew or Samaritan characters, which, it is agreed, are the ſame with the Phœnician, or the alphabet of Cadmus. If the Greek characters are inverted from left to right, according to the Phœnician and Hebrew manner of *writing*, they will appear to be nearly the ſame. Beſide the conformity of figure, the names or denominations of the letters, alpha, beta, gamma, &c. and the order in which they are arranged, in all the ſeveral alphabets, Phœnician, Hebrew, Greek, and Roman, agree ſo much as to amount to a demonſtration that they were all originally derived from the ſame ſource. The letters were, at firſt, written from the right hand to the left; and this manner of *writing* obtained among the Aſſyrians, Phœnicians, Arabians, and Hebrews; and from ſome very old inſcriptions, it appears to have obtained alſo among the Greeks. Afterwards the Greeks adopted the method of *writing* their lines alternately from the right to the left, and from the left to the right, called BOUSTROPHEDON. At length, however, the motion from the left hand to the right being found more natural and commodious, the practice of *writing*, in this direction, prevailed throughout all the countries of Europe. See more on this ſubject under LETTERS.

Writing was long a kind of engraving. Pillars, and tables of ſtone, were firſt employed, and afterwards, plates of the ſofter metals, ſuch as lead: but as *writing* became more common, lighter and more portable ſubſtances were employed. The leaves, and the bark of certain trees, were uſed in ſome countries; and in others tablets of wood, covered with a thin coat of ſoft wax, on which the impreſſion was made with a ſtylus of iron. See BOOK, BARK, and STYLE.

In later times, the hides of animals, properly prepared and poliſhed into PARCHMENT, were the moſt common materials: our preſent method of *writing* on PAPER is an invention of no greater antiquity than the fourteenth century.

The advantages of *writing* above SPEECH are, that *writing* is both a more extenſive, and a more permanent method of communication: nevertheleſs ſpoken language has a great ſuperiority over written language, in point of energy or force. See Warburton, ubi ſupra. Blair's Lectures on Rhetoric, &c. vol. i. lect. 7.

An ingenious and learned writer has lately diſcuſſed the ſubject of this article in a very elaborate manner. He obſerves that there is a difference, deſerving particular attention in the enquiry, concerning the origin and progreſs of *writing*, between imitative characters and ſymbolic or arbitrary marks. The former derive their origin from that imitative faculty, which is ſo conſpicuous in the human ſpecies; the latter are founded in neceſſity or convenience, and become ſignificant by compact: the one comprehends ſymbols and marks for ſounds, ſignificant of ideas; and the other have an immediate reference to ſenſible objects which preſent themſelves to ſight, and are applicable to hieroglyphic repreſentations. Accordingly all repreſentations, marks, or characters, which were ever uſed by any nation or people, muſt have been either imitative or ſymbolic.

This writer controverts the opinion of M. Fourmont, biſhop Warburton, and M. Gebelin, who have endeavoured to ſhew, that alphabets were originally formed of hieroglyphic characters; alledging, that the letters of an alphabet were eſſentially different from the characteriſtic marks deduced from hieroglyphics, which are marks for things and ideas, like the ancient and modern characters of the Chineſe; whereas the former are only marks for ſounds; and that, though there be a ſufficient reſemblance between the Mexican picture-*writing*, the Egyptian hieroglyphics, and the Chineſe characters, yet theſe are foreign to alphabetic letters, and, in reality, do not bear the leaſt relation to them. The hieroglyphic characters of the Chineſe, are, it is ſaid, in their nature imitative, and do not combine into words, like arbitrary marks for ſounds or letters, which are very few, and of a ſymbolic nature.

Letters, it is maintained, do not derive their powers from their forms, but originally their forms entirely depended on the fancy or will of thoſe who made them.

Many learned men have ſuppoſed, that the alphabet was of divine origin; and ſeveral writers have aſſerted, that letters were firſt communicated to Moſes by God himſelf; whilſt others have contended, that the Decalogue was the firſt alphabetic *writing*. But if this art had been a new diſcovery in the time of Moſes, he would probably have commemorated it; nor is there any reaſon to ſuppoſe, that God was the immediate revealer of the art, for Moſes could never have omitted to have recorded the hiſtory of ſo important a circumſtance, as the memory of it would have been one of the ſtrongeſt barriers againſt idolatry.

It appears, however, that the art of *writing* is of great antiquity, and that the ancients, who aſcribed the invention of it to the gods, had very imperfect ideas of its true origin. When it is conſidered that letters muſt have been the produce of a certain degree of civilization among mankind, the inquirers into their original have been naturally led to ſeek it in the hiſtory of thoſe nations that appear to have been firſt civilized. Accordingly, many authors have decided in favour of the Egyptians. See Letters.

Others have vindicated the claim of the Phœnicians to the invention of letters; urging the teſtimony of Sanconiatho, the moſt ancient and alſo the moſt celebrated Phœnician hiſtorian, corroborated by Pliny, Curtius, Lucan, Euſebius, &c. as well as their very early and high degree of civilization. The Chaldæans have alſo had ſeveral learned advocates, who have attributed the invention of letters to the patriarch Abraham: and ſir Iſaac Newton, in particular, admits, that letters were known in the Abrahamic line for ſome centuries before Moſes.

It is needleſs to mention the claims of the Tuſcans, Indians, and Arabians. Mr. Aſtle, ubi infra, declares in favour of the Phœnicians; and obſerves that, as the Chaldæans, Syrians, Phœnicians, and Egyptians, all bordered upon each other, and as the Phœnicians were the greateſt, as well as the moſt ancient commercial nation, it is very probable, that they communicated letters to the Egyptians; the ports of Tyre and Sidon, and thoſe of the Egyptians, being not far diſtant from each other. This author adds, that before the time when Mizraim went into Egypt, in the year before Chriſt 2188, and 160 years after the flood, Taaut, his ſon, had invented letters in Phœnicia; and if this invention took place ten years before the migration of his father into Egypt, as Mr. Jackſon ſuppoſes, we can trace letters as far back as the year 2178 before Chriſt, and 150 after the deluge recorded by Moſes: and beyond this period, the written annals of mankind, which have been hitherto tranſmitted to us, will not enable us to trace the knowledge of them, though this want of materials is no proof, that letters were not known until a century and a half after the deluge.

An opinion ſeems to be gaining credit among the learned, that arts and letters took their riſe in the northern parts of Aſia, and that they were cultivated in thoſe parts, long before they were practiſed in Phœnicia or Egypt. Some travelled ſouthwards, others ſtaid behind; and thoſe who afterwards emigrated from the Eaſt were generally called Scythians, and ſometimes Hunns, who overſpread the northern parts of Europe. Many ſettlements were made in Germany long before the Chriſtian æra.

It has been aſſerted by many writers, that all alphabets are derived from one; but Mr. Aſtle maintains, that there are various alphabets uſed in different parts of Aſia, which differ from the Phœnician, ancient Hebrew or Samaritan, in name, number, figure, order, and power. In ſeveral of theſe alphabets, there are marks for ſounds peculiar to the language of the Eaſt, which are not neceſſary to be employed in the notation of the languages of Europe.

The following alphabets, ſays this learned writer, ſeem to be immediately derived from the Phœnician; viz. the ancient Hebrew, or Samaritan; the Chaldaic; the Baſtulan, or that of the colony of Phœnicians or Canaannites, who are ſaid to have fled from Joſhua, and to have ſettled themſelves, in the moſt early ages, in that part of Spain now called Andaluſia and Grenada; the Punic, Carthaginian, or Sicilian; the Pelaſgian Greek, and its derivatives, which are written in the Eaſtern manner, from right to left; and the Ionic Greek, written from left to right. This laſt mentioned branch from the Pelaſgic ſtock is the ſource from whence not only moſt of the alphabets of Europe are derived, but alſo of many others, which have been adopted in different parts of Aſia and Africa. From the Ionic Greek are derived the Arcadian, the Latin or Roman, the ancient Gauliſh, the ancient Spaniſh, the ancient Gothic, the Coptic, the Ruſſian, the Illyrian or Sclavonian, the Bulgarian, and the Armenian: the Runic is immediately derived from the Gothic.

The alphabets derived from the Roman are the Lombardic, the Viſigothic, the Saxon, the Gallican, the Franco-Gallic or Merovingian, the German, the Caroline, the Capetian, and the Modern Gothic. The firſt relates to the MSS. of Italy; the ſecond, to thoſe of Spain; the third, to the MSS. of Great Britain; the fourth and fifth, to thoſe of France; the ſixth, to Germany; the ſeventh, eighth, and ninth, to all the countries of Europe where Latin is read. The ſix former alphabets are before the age of Charlemagne; the three latter follow it. The characters of theſe are more diſtinguiſhed by their names than by their forms, which indicate that they are all of Roman extraction. The Lombardic, introduced into Italy by the Lombards in 569, was uſed by the popes in their bulls, and ſometimes called Roman in the eleventh century: it ceaſed in the thirteenth century. The Viſigothic or Spaniſh Gothic, was introduced into Spain by the Goths or Viſigoths; it was aboliſhed in a provincial ſynod, held at Leon in 1091, when the Latin letters were eſtabliſhed for all public inſtruments; though theſe characters were occaſionally uſed in private tranſactions, for upwards of three centuries afterwards. Saxon *writing* admits of various diſtinctions, viz. the Anglo-Saxon, Britanno-Saxon, and Dano-Saxon. The Gauls, on being ſubdued by the Romans, adopted their mode of *writing*; and by additions of their own, gave riſe to the Gallican or Roman Gallic. The Franks, a people of Germany, having conquered part of Gaul, introduced their characters called Franco-Gallic, or Merovingian, becauſe this kind of *writing* was practiſed under the kings of the Merovingian race. It took place about the cloſe of the ſixth century, and prevailed till the beginning of the ninth. The Caroline was derived from the improvement of Charlemagne; this declined in the twelfth century, and totally diſappeared in the thirteenth, when it was ſucceeded in Germany by the Modern Gothic. The Caroline *writing* was reſtored by Hugh Capet, about the year 987, and called Capetian: it was much practiſed till about the middle of the twelfth century; but in the thirteenth it degenerated into the Modern Gothic. The Capetian *writing* was uſed in England and in Germany, as well as France, during the above mentioned period. The Modern Gothic, which ſpread itſelf over Europe in the twelfth and thirteenth centuries, is improperly ſo called; becauſe it does not derive its origin from the *writing* anciently uſed by the Goths and Viſigoths in Italy and Spain, but it is the moſt barbarous kind of *writing*: it took its riſe, in the decline of the arts among the lazy ſchoolmen, who had the worſt taſte; it is nothing more than the Latin *writing* degenerated. It began in the twelfth century, and was generally uſed (eſpecially by monks and ſchoolmen) in all parts of Europe, till the reſtoration of the arts in the fifteenth century, and longer in Germany and the northern nations. Our ſtatute-books are ſtill printed in Gothic letters.

The learned are not agreed with reſpect to the origin of what is called *national writing*. Some will have it, that the Roman manner prevailed throughout the Weſt, untill the irruption of the barbarous nations of the North, in the fifth and ſixth centuries: the Goths (they ſay) firſt introduced their mode of *writing* into Italy, inſtead of the Roman manner; the Viſigoths did the like in Spain; the Franks in Gaul; the Saxons in England; and the Lombards in Italy.

According to others, the Romans were in poſſeſſion of various forms of *writing*; but it is ſuppoſed, that the barbarous nations introduced ſome of their own letters in the *writings* compoſed of capitals and ſmall letters; that the running-hand, peculiar to each nation, was uſed in grants and contracts, and found admittance likewiſe in manuſcripts after the middle of the ſeventh century.

Mr. Aſtle, however, is of opinon, that the different modes of *writing* in Italy, Spain, France, England, and Germany, were derived from the Roman alone.

While Rome continued the centre of all the provinces of the empire, her manner of *writing* generally prevailed in each; but the empire being diſmembered, and all the weſtern provinces diſunited, a change was produced; the conquerors diſfigured the Roman-*writing*, and by their falſe taſte and ignorance, diſtinguiſhed their *writing* from that of their neighbours: the genius and diſpoſition of the different people having no ſmall ſhare in producing this diverſity.

This notion greatly aſſiſts in diſcovering the age of manuſcripts; for if a *writing* is Merovingian, it cannot be ſubſequent to the ninth, nor prior to the fifth century; if another is Lombardic, it muſt be poſterior to the middle of the ſixth, and anterior to the thirteenth; if Saxon, it cannot be earlier than the ſeventh, nor later than about the middle of the twelfth.

With regard to the forms of letters, many authors are of opinion, that they are derived from the poſitions of the organs of ſpeech in their pronunciation. Accordingly, M. Van Helmont hath taken great pains to prove, that the Chaldaic characters are the genuine alphabet of nature, becauſe, he ſays, no letter can be rightly ſounded, without diſpoſing the organs of ſpeech into an uniform poſition with the figure of each letter.

Mr. Nelme publiſhed a work, in which he endeavours to ſhew that all elementary characters or letters derive their form from the line and the circle. Mr. Gebelin deduces them from hieroglyphic repreſentations, and he hath given ſeveral delineations of human figures, trees, &c. in confirmation of his hypotheſis. Mr. Aſtle obſerves, that, as letters are only marks for ſounds, their forms entirely depended upon the taſte, fancy, will, or caprice, of thoſe who firſt formed them. In this point of view, they may be conſidered as arbitrary marks, or ſecret cyphers, which, by being made known and adopted, would become of general uſe, wherever they were received by agreement. For the number and forms of the letters of various alphabets, illuſtrated by figures, we muſt refer to Mr. Aſtle's account, *ubi infra*.

After the moſt diligent inquiry it doth not appear, ſays Mr. Aſtle, that the Britons had the uſe of letters before their intercourſe with the Romans: and though, from the coming of Julius Cæſar till the time when the Romans left the iſland in the year 427, the Roman letters were familiar to the eyes of the inhabitants, he is of opinion, that *writing* was very little practiſed by the Britons till after the coming of St. Auguſtin, about the year 596.

The *writing*, which prevailed in England from this time to the middle of the eleventh century, is generally termed Saxon, and may be divided into five kinds; viz. the Roman Saxon, which is very ſimilar to the Roman, and prevailed in England from the coming of St. Auguſtin till the eighth century; the ſet Saxon, which took place toward the middle of the eighth century, continued till about the middle of the ninth, and was not entirely diſuſed till the beginning of the tenth century; the running-hand Saxon, which came into uſe toward the latter end of the ninth century, when learning was diffuſed in England under the auſpices of king Alfred, in whoſe reign many books were written in this iſland, in a more expeditious manner than formerly; the mixed Saxon, occurring, in the ninth, tenth, and in the beginning of the eleventh centuries, in many MSS. which were written in England in characters partly Roman, partly Lombardic, and partly Saxon; and the elegant Saxon, which took place in England early in the tenth century, laſted till the Norman conqueſt, but was not entirely diſuſed till the middle of the twelfth, and is more beautiful than the *writing* in France, Italy, and Germany, during the ſame period.

The *writing* introduced into England by William I. is uſually called Norman, and is compoſed of letters nearly Lombardic, which were generally uſed in grants, charters, public inſtruments, and law proceedings, with very little variation, from the Norman conqueſt till the reign of king Edward III.

About the reign of king Richard II. variations took place in *writing* records and law proceedings; the charters from the reign of king Rich. II. to that of king Henry VIII. were compoſed partly of characters called ſet chancery and common chancery, and of ſome of the letters called court-hand; which three different ſpecies of *writing* are derived partly from the Norman, and partly from the modern Gothic. The modern Gothic began to take place in England in the twelfth century; the old Engliſh, about the middle of the fourteenth century; the ſet chancery and common chancery, in the decline of the ſame century, and are ſtill uſed in the enrollments of letters patents, charters, &c. and in exemplifications of recoveries; the court-hand was contrived by the Engliſh lawyers, and took its riſe about the middle of the ſixteenth century, and continued till the beginning of the late reign, when it was aboliſhed by law. The court-hand characters were nothing more than the Norman characters very much corrupted and deformed.

In the ſixteenth century the Engliſh lawyers engroſſed their conveyances and legal inſtruments in characters called ſecretary, which are ſtill in uſe.

The French call their *writing* by the names of the different races of their kings, in whoſe time they were written: theſe were the Merovingian, the Carlovingian, the Capetian, the Valeſian, and the Bourbonian.

The *writing* called Merovingian began in France ſoon after the time of Merovæus, ſon of Pharamond; who was made king, A. D. 460; this race end with Childeric, who died in 752. The Caroline race properly began with Pepin, who was made king of France upon the death of Childeric. This prince was ſucceeded by Charlemagne, A. D. 814, whoſe line in France ended with Lewis V. A. D 987. The Capetian race began with Hugh Capet, who ſucceeded Lewis V. and ended with Charles IV. A. D. 1327. The Valeſian race began with Philip IV. the ſucceſſor of Charles IV. and ended with Henry III. the laſt of this line, who was ſlain in 1589. The Bourbonian line began with Henry IV. A. D. 1589, whoſe deſcendants now fill the throne of France.

The MSS written in the northern parts of Scotland and in Ireland are in characters ſimilar to the Saxon. The learned and ingenious colonel Vallancey thinks, indeed, that the Iberians, who migrated from the borders of the Euxine and Caſpian ſeas, and ſettled in Spain, learned letters and arts from the Phœnicians: that a colony of the ancient Spaniards, by the name of Scots or Scythians, ſettled in Ireland about a thouſand, or perhaps ſix hundred years before Chriſt, and that they brought elementary characters with them into Ireland. He obſerves, that the Iriſh alphabet differs from that of all other nations, in name, order, number, and power, and ſuppoſes that they might have received their alphabet from the Carthaginians, who alſo ſettled a colony in Ireland about ſix hundred years before Chriſt; and adds, that this opinion is the more to be credited, as the Iriſh language appears to have a radical identity with the Punic.

In order to diſcover what real pretenſions the Iriſh have to the early uſe of letters, for which they eagerly contend, Mr. Aſtle has examined their ſtone monuments, their coins, and their MSS. and appealed to the hiſtorians of that country. The letters upon the moſt ancient of their monuments are apparently of Roman, and Roman-Britiſh original; and none of theſe inſcribed monuments are ſo ancient as to prove that the Iriſh were poſſeſſed of letters before the Romans had intercourſe with the Britons; though they prove that they had letters before the arrival of St. Patrick in that kingdom, which, Mr. Whitaker, with great probability of truth, ſays, were wafted over from the Caledonians, who uſed the Roman letters. Sir James Ware ſays, that the Iriſh alphabet was borrowed from the Britiſh, and that the Saxon characters were nearly the ſame as the Iriſh; and adds, that Mr. Camden inclined to this opinion.

Moreover, there are no Iriſh coins, inſcribed with letters, till long after the twelfth century; except coins ſtruck by ſome of our Saxon kings, who made incurſions into that country, and ſtruck money there in the Saxon manner.

The oldeſt Iriſh MS. which has been diſcovered is the Pſalter of Caſhel, written in the latter end of the tenth century.

The teſtimony of approved hiſtorians is likewiſe unfavourable to the ancient literature of Ireland. Mr. Innes, in his Eſſay on the Antiquities of Scotland and Ireland, and Mr. James Macpherſon, in the third edition of his Introduction to the Hiſtory of Great Britain and Ireland. maintain, that Ireland was firſt peopled from Britain; and that the manners of the old Iriſh were inconſiſtent with the knowledge of letters.

It ſeems probable, that the interior parts of Europe were immediately peopled from the northern parts of Aſia, and the maritime parts from Phœnicia, and the ſouthern and weſtern parts of that quarter of the globe. If this be the caſe, it is not ſurpriſing that ſome eaſtern cuſtoms prevailed in Great Britain and Ireland, and that many Celtic words are ſtill preſerved both in the Iriſh and in the Welch languages.

The Norman characters, it is obſerved, were generally uſed in England from the coming of William I. and the Saxon characters were entirely diſuſed in the very beginning of the twelfth century; but the Iriſh and Scots preſerved the ancient forms of their characters till the end of the ſixteenth century.

The Gaelic or Erſe language, uſed in the Highlands of Scotland, and the Iberno-Gaelic, are nearly the ſame, and their letters are ſimilar to each other, as Mr. Aſtle has ſhewn by various ſpecimens. The curious will find much information on the ſubject of this article in Aſtle's Origin and Progreſs of *Writing*, 4to. 1784.

J. Ravenau has a treatiſe intitled Des Inſcriptions en Faux, wherein he ſhews how to revive and reſtore old *writings* almoſt effaced, by means of galls ground in white wine, and diſtilled; and thus rubbed over the *writings*.

To *write* without blacking the fingers: prepare the paper with a fine powder, made of three parts of calcined copperas, two of galls, and one of gum Arabic, thoſe being freſh mixed, rub them with a hare's ſoot into the pores of the paper, and then *write* with fair water, and the black letters will immediately appear.

To make new *writing* appear old, moiſten it with oil of tartar per deliquium, more or leſs diluted with water, as you deſire the ink to appear more or leſs decayed.

We may write without ink or its materials; for this purpoſe, take a fine powder of calcined hartſhorn, of clean tobacco-pipes, or rather of mutton-bones burnt to a perfect whiteneſs, and rub it upon the paper, and then *write* with a ſilver bodkin, or the like. Boyle's Works Abr. vol. i. p. 114, 115. See INK.

The diſcharging of ink out of parchment, paper, &c. is commonly done by aqua fortis diluted ſufficiently with water, that it may not deſtroy the paper. The like may be done with oil, or ſpirit of vitriol diluted. The juice of lemons, or ſtrong vinegar, will take ink out of linen more ſafely, as the mineral acids are apt to deſtroy the linen, unleſs great care be uſed in diluting them.

We may *write* on iron with corroſive ſublimate wetted with common water: for this purpoſe, the parts of metal we would preſerve untouched ſhould be covered with wax, and that taken off in the proper places to make way for the corroding ſubſtance. Boyle, ib. p. 528.

The like may be practiſed by means of aqua fortis.

Mr. Boyle mentions a method he had of copying a whole page of *writing* at once. But we do not find his deſcription of it any where. Ib. p. 136.

A machine has been lately invented and conſtructed by Meſſrs. Watt and Co. of Birmingham; by means of which letters and other *writings* may be copied. For an account of the ſtructure and uſe of this machine, we muſt refer to the directions for copying with it, furniſhed by the inventors: obſerving, however, that the date, at which a *writing* will yield a copy, is extremely uncertain, from the weather, as it is more or leſs drying, and from the ſtate of the ink. In general the purpoſe will be anſwered to the end of twenty-four hours, and ſometimes of three or four days; but it is moſt adviſeable to copy letters as ſoon after they are written as may prove convenient.

Mr. Boyle informs us of a method of imitating *writing* on copper-plates. The copy to be engraved is to be wrote with a peculiar kind of ink, and the copper-plate being moderately warmed, is rubbed over with a white varniſh, and ſuffered to cool; then the paper being gently moiſtened, that it may readily communicate its ink, the *writing* is applied to the prepared ſurface of the plate, and paſſed through a rolling-preſs; by which means the ink, adhereing to the varniſh, leaves the letters very conſpicuous. And hence it is eaſy with a needle to trace the ſtrokes, through the varniſh upon the plate, which being afterwards cleaned, the letters are finiſhed with the graver, and the work printed off in a rolling preſs, as common cuts.

Mr. Boyle does not mention what the varniſh or ink, uſed by the artificer from whom he received this method, was; but he tells us, that he himſelf uſed the purer ſort of virgin wax, for a varniſh; and for his ink he took fine Frankfort black, carefully ground with water, till it obtained the conſiſtence of common ink; but no gum was added, leſt it ſhould hinder the ink from coming off. He alſo obſerves that *written* characters may be taken off without the help of a preſs, by laying the moiſtened paper ſmooth upon the varniſhed copper, and rubbing it on hard with a convex piece of glaſs. See *Sympathetic* INK.

In law, we ſay, deeds, conveyances, &c. are to be in *writing*. A WILL may either be in *writing*, or by word of mouth.

We alſo ſay, *written law*, *lex ſcripta*, in oppoſition to common law, which is called *lex non ſcripta*. We have alſo *written* and *unwritten* TRADITIONS, &c.

Authentic *writings* of any contract, ſealed and delivered, make the evidences thereof.

La Vayer has a curious diſſertation on the proof of facts by compariſon of hand-*writings*, wherein he endeavours to ſhew this method of proof to be very ſuſpicious and fallacious.

WRITING, *Gothic*. See GOTHIC.

WRITING, *ſecret*. See CRYPTOGRAPHY, STEGANOGRAPHY, SCYTALA, CIPHER, DECIPHERING, &c.

WRITING, *ſhort*. See BRACHYGRAPHY, and TACHYGRAPHY.

WRITINGS, *ſtealing of*. See LARCENY.

WRITTEN *evidence*. See EVIDENCE.

WRITTEN *tradition*. See TRADITION.

WRONG, in a *Logical Senſe*. See ERROR, FALSHOOD, and TRUTH.

WRONG, in a *Legal Senſe*, *injury*, *tort*. See INJURY, and TORT.

Wrongs are diviſible into two ſorts, viz. *private* and *public*. The former are an infringment or privation of the private or civil rights belonging to individuals, conſidered as ſuch; and are frequently termed *civil injuries*; the latter are a breach and violation of public rights and duties, which affect the whole community, conſidered as ſuch; and are diſtinguiſhed by the harſher appellation of CRIMES and MISDEMEANOURS.

WRONG, *executor of his own*. See EXECUTOR *de ſon tort*.

WRONG-*lands*, in our *old Writers*, ſeem to denote trees that will never prove timber; ſuch as *wrong* the ground they grow in.

WRY-*neck*, *jynx*, in *Ornithology*, a bird called alſo the *torquilla*, which Linnæus has made a diſtinct genus of the *picæ*, under the denomination of *yunx*: the characters of which are, that the bill is ſlender, round, and pointed; the noſtrils are concave and naked; the tongue is very long, very ſlender, cylindric, and terminated by a hard point; and the feet are formed for climbing.

There is only one ſpecies, viz. the *jynx torquilla*. The colours of this bird are elegantly pencilled, though its plumage is marked with the plaineſt kinds: a liſt of black and ferruginous ſtrokes divides the top of the head and back; the ſides of the head and neck are aſh-coloured, beautifully traverſed with fine lines of black and reddiſh-brown; the quill-feathers are duſky, but each web is marked with ruſt-coloured ſpots; the chin and breaſt are of a light yellowiſh-brown, adorned with ſharp-pointed bars of black; the tail conſiſts of ten feathers, broad at their ends and weak, of a pale aſh-colour, powdered with black and red, and marked with four equidiſtant bars of black: the irides are of a yellowiſh colour.

The *wry-neck*, Mr. Pennant apprehends, is a bird of paſſage, appearing with us in the ſpring before the cuckow. Its note is like that of the keſtril, a quick-repeated ſqueak: its eggs are white, with a very thin ſhell; this bird builds in the hollows of trees, making its neſt of dry graſs. It has a very whimſical way of turning and twiſting its neck about, and bringing its head over its ſhoulders, whence it had its name *torquilla*, and its Engliſh one of *wry-neck*: it has alſo the faculty of erecting the feathers of the head like thoſe of the jay. It feeds on ants, which it very dexterouſly transfixes with the bony and ſharp end of its tongue, and then draws them into its mouth. Ray and Pennant. See *Tab.* V. *of Birds*, N° 63.

WRY-*necked*, in *Surgery*. See *Wry*-NECK.

WURST, a Ruſſian meaſure. See WERST.

WULVESHEVED, or WULVESHEAD. See WOLFESHEAD.

WYCH-*houſe*, a houſe in which ſalt is boiled. See SALT.

In the places where there are ſalt-ſprings, and ſalt-works are carried on at them, the work-houſe where the ſalt is made is always called the *wych-houſe*; and hence we may naturally conclude, that *wych* was an old Britiſh word for ſalt, which is the more probable in that all the towns in which ſalt is made end in *wych*; as *Namptwych*, *Droitwych*, *Middlewych*, &c.

WYDRAUGHT, a water-courſe, or water-paſſage, to carry off the filth and ſuillage of a houſe; properly a ſink, or common-ſewer.

WYKE, anciently denoted a farm, hamlet, or little village.

WYTA, or WITA *Plena*, ſignified a forfeiture of a hundred and twenty ſhillings. *Si pundbreche fiat in curia regis*, plena wita *ſit*; *alibi*, *quinque marcæ*.

To ſwear according to the *wyte*, *ſecundum* witam *jurare*, was to purge one's ſelf by the oaths of ſo many witneſſes, as the nature of the crime, and the puniſhment or *wyte*, did require.

Hence, alſo, *bloodwite*, *legerwite*, *ferdwite*, *childwite*, *wardwite*, &c. See FERD-*wite*, CHILD-*wite*, &c.

WYTE, WYTA, or WITE, WITA, in our *Ancient Cuſtoms*, a pecuniary penalty, or mulct.

—*Jurat ſecundum* witam, *quod nec fuerat furti conſcius*, *nec coadjutor in eo*. Leg. Inæ.

The Saxons had two kinds of puniſhments, WERE, and *wyte*; the firſt for the more grievous offences.

The *wyte* was for the leſs heinous ones. It was not fixed to any certain ſum; but left at liberty, to be varied according to the caſe.

Hence alſo *wyte*, or *wittree*, one of the terms of privilege granted our ſportſmen; ſignifying a freedom or immunity from fines, or amerciaments: or, as it is vulgarly conceived, from being liable to be begged for fools, for lack of *wit*.

WYTHE, in *Law*, the ſame as WAIF.

WYTHERS. See WITHERS.

X.

X, A double conſonant, and the twenty-ſecond letter in the Engliſh alphabet; which, however, begins no Engliſh word.

The *x* of the Latins, and ξ of the Greeks, are compounded of *c s*, and κ σ; whence to this day, the letter *x* in the Engliſh and French, has the ſame ſound with *c s*, or *k s*. Thus we pronounce *Alexander*, exactly as if written *Alecſander* or *Alekſander*.

The Italians have no *x* at all in their language, but both ſpeak and write *Aleſſandro*. The Spaniards pronounce the *x*, like our *c* before *a*; viz, *Alexandro*, as it it were *Alecandro*. The Portugueſe pronounce it like *ſh*.

In foreign words, uſed in Engliſh, we ſometimes ſoften the *x* into a double *ſ*; as *Bruſſels*, for *Bruxelles*, &c.

The letter is not known in the Hebrew, or other oriental languages; but, in lieu of it, they write the two ſimple letters whereof it is compounded. And the like do the modern Germans.

Peter Diaconus relates, that the letter X was introduced into the Roman alphabet in the time of Auguſtus; and that, before his reign, the Romans ſupplied the want of it by the letters C and S. But Mr. Aſtle obſerves, that this is a miſtake; the letter X being found in the Duilean pillar, inſcribed in the year of Rome 494, and 259 before Chriſt. Origin and Progreſs of Writing, p. 78.

X is alſo a numeral letter, and ſignifies ten; as repreſenting two V's placed one at top of the other. See V.

X *Supra denos numero tibi dat retinendos*

When laid flat, thus ⋈, it ſignifies a thouſand; and when a daſh is added over it, $\overline{X}$, it ſignifies ten thouſand. I before X denotes the ſubtraction, and after X the addition of unit: thus IX = 9, and XI = 11. X before L or C, denotes the ſubtraction of 10 from 50, or 100. Thus XL = 40, and XC = 90.

X on the French coins, denotes thoſe ſtruck at Amiens.

We often meet with the Greek letters X and P joined in this manner ☧, on ancient medals. The firſt we find are on ſome large braſs coins of the Ptolemies, kings of Egypt, where it was placed on a civil account.

Some writers have taken it for a date, and others for the initial letters of a proper name; but as no reaſons are aſſigned for either of thoſe conjectures, Mr. Ward rather ſuppoſes it an abbreviation of the word XPHMA, *money*, impreſſed on thoſe pieces, to denote their currency as money; which might be thought proper, as they have not the heads of kings ſtamped upon them, like their ſilver and gold coins; but always that of a Jupiter on the front, and an eagle perched on a thunderbolt on the reverſe.

This character was afterwards applied to a very different purpoſe by Conſtantine the Great, who made uſe of it to denote XPICTOC, both in his coins and military enſigns; wherein he was followed not only by ſome ſucceeding emperors, but alſo by private perſons, who out of devotion put it on their lamps and other utenſils.

It afterwards came to be uſed merely as a critical note, to point out remarkable paſſages in manuſcripts; and then it ſtood for the initials of XPHCIMON, *uſeful*; as we learn from Iſidore, Orig. lib. i. cap. 20. See Phil. Tranſ. N° 474. ſect. 1.

XAMDELLILAH, an Arabian term, uſed as a grace or thankſgiving after meat.

The greateſt men of that nation will often call in the meaneſt, even the beggars, to eat with them; who, as ſoon as they have done, always riſe and pronounce this word, which ſignifies God be praiſed. Pococke's Egypt, p. 183.

XAMI, a name given by ſome of the old writers to the *ceration* of the Greeks, or CAROB-*tree*. See CHARNUB.

XANTHICA, Ξανθικα, in *Antiquity*, a Macedonian feſtival, ſo called, becauſe it was obſerved in the month Xanthus, at which time the whole royal family with the army were purified. See LUSTRATION.

XANTHIUM, in *Botany*. See *Leſſer* BURDOCK.

XANTHON, a name given by ſome of the ancients to a ſpecies of marble of a yellowiſh green colour, much uſed in ornamenting the inner parts of houſes; and from its equal hardneſs with the Tænarian marble, and the equal high poliſh it was capable of, ſuppoſed by the workmen to be of the ſame ſpecies.

The word *xanthon* is of very dubious meaning, but is ſuppoſed as the name of this marble to have expreſſed a green colour, as this was otherwiſe called *marmor herboſum*. See TÆNARIUM, and HERBOSUM *marmor*.

XANTHOXYLUM, in *Botany*. See TOOTH-*ach tree*.

XANTHURUS *Indicus*, in *Ichthyology*, the name of a fiſh, called by the Dutch *geel-ſtardt*.

It is of the ſize and ſhape of the bream; its jaws are armed with ſtraight and very ſharp teeth, which ſtand almoſt ſtraight out; its back is yellow, and its tail very ſtrongly tinged with that colour; its belly is of a bluiſh white; its head brown, and its fins of a fine red. It is caught with hooks among the rocks on the ſhores of the Eaſt Indies, and is a very wholeſome and well-taſted fiſh. Ray.

XANTHUS, in the *Natural Hiſtory of the Ancients*, the name of an iron ore of the hæmatites or blood-ſtone kind, and uſually accounted a ſpecies of it, and called by others ELATITES.

It was of a pale yellowiſh white, or the colour of the French pale yellow ochre, uſed by our painters; but like all other ferrugineous bodies it became red by burning.

Theophraſtus gives us expreſly the etymology of the name, obſerving that it was called ſo from its colour; the Dorians calling a yellowiſh white ξανθος, *xanthus*.

XANXUS, in *Natural Hiſtory*, a name given by ſome authors to a large ſpecies of ſea-ſhell, ſomewhat like that with which the Tritons of old were painted. It is found in great abundance near Ceylon, and is uſed there in medicine as an alkali and abſorbent. in the ſame caſes in which we give the teſtaceous powders.

XATHOS, in *Ichthyology*, a name given by Appian to the fiſh, called by the generality of authors the ERYTHRINUS, or *rubellio*.

XEBEC, in *Sea Language*, a ſmall three-maſted veſſel, navigated in the Mediteranean ſea, and on the coaſts of Spain, Portugal, and Barbary. See *Tab.* II. *Ship. fig.* 13

The ſails of the *xebec* are, in general, ſimilar to thoſe of the POLACRE, but the hull is extremely different from that and almoſt every other veſſel. It is furniſhed with a ſtrong prow, and the extremity of the ſtern, which is a ſort of railed platform or gallery, projects farther behind the counter and buttock than that of any European ſhip. The *xebec*, generally equipped as a corſair, is conſtructed with a narrow floor, to be more ſwift in purſuit of the enemy; and of a great breadth, to enable her to carry a great force of ſail for this purpoſe, without danger of overturning. As theſe veſſels are uſually very low built, their decks are formed with a great convexity from the middle of their breadth toward the ſides, in order to carry off the water, which falls aboard, more readily by their ſcuppers. But as this extreme convexity would render it difficult to walk thereon at ſea, particularly when the veſſel rocks by the agitation of the waves, there is a platform of grating along the deck from the ſides of the veſſel toward the middle, whereon the crew may walk dry-footed, whilſt the water is conveyed through the grating to the ſcuppers.

When a *xebec* is equipped for war, ſhe is occaſionally navigated in three different methods, according to the force or direction of the wind. Thus, when the wind is fair, and nearly aſtern, it is uſual to extend ſquare ſails upon the main-maſt, and frequently upon the fore-maſt; and as thoſe ſails are rarely uſed in a ſcant wind, they are of an extraordinary breadth. When the wind is unfavourable to the courſe, and yet continues moderate, the ſquare yards and ſails are removed from the maſts, and laid by, in order to make way for the large lateen yards and ſails, which ſoon after aſſume their place; but if the foul wind increaſes to a ſtorm, theſe latter are alſo lowered down and diſplaced, and ſmall lateen yards, with proportional ſails, are extended on all the maſts. The *xebecs*, which are generally armed as veſſels of war by the Algerines, mount from ſixteen to twenty-four cannon, and carry from three hundred to four hundred and fifty men, two-thirds of whom are generally ſoldiers. Falconer.

XEL, in the *Materia Medica of the Ancients*, a name given to the fruit SEL.

XENEXTON, a word uſed by Paracelſus, to expreſs a ſort of amulet to be worn about the neck, to preſerve people from infection in the plague.

XENIA, Ξηνια, q. d. *gifts*, in ſome *Ancient Cuſtoms*, were gifts, or preſents, made to the governors of provinces, by the inhabitants thereof.

The word occurs pretty frequently in charters of privileges; where, *quietos eſſe à* xeniis, denotes an exemption from making ſuch preſents to kings and queens, upon their travelling through ſuch precincts.

XENINEPHIDEI, a word uſed to expreſs a ſort of imaginary ſpirits, mentioned by the adepts, as delighting to diſcover the occult qualities of bodies to men.

XENISMI, Ξενισμοι, in *Antiquity*, ſacrifices offered at the Athenian feſtival ANACEIA.

XENODOCHUS, formed of ξενος, *ſtranger*, and δεχομαι, *I receive*, an eccleſiaſtical officer of the Greek church, the ſame with the HOSPITALER, or a perſon who takes care of the reception and entertainment of ſtrangers.

St. Iſidore, a prieſt and ſolitary, ſurnamed *Xenodochus*, lived in the fourth century. He was thus called, becauſe entruſted with that office in the church of Alexandria.

XENOPAROCHUS, formed of ξενος, *ſtranger*, and παροχος, of παρεχω, *I furniſh*, among the Romans, an officer who provided ambaſſadors with all kinds of neceſſaries, at the public expence.

XERANTHEMUM, *Auſtrian ſneeze-wort*, in *Botany*. See ETERNAL *flower*.

XERASIA, in *Medicine*, the name of a diſeaſe, a ſpecies of alopecia, in which the hair falls off through a dryneſs of the part, and want of due nouriſhment.

XEROMYRON, formed of ξηρος, *dry*, and μυρον, *ointment*, a word uſed by the ancients to expreſs what they do at other times call in expreſs words a dry ointment. It was a compoſition of warm and aromatic drugs, or of other things fit for external uſe, but without the fatty ingredients, by which they were uſually reduced into the form of ointments.

XEROPHAGY, Ξηροφαγια, formed of ξηρος, *dry*, and φαγω, *I eat*, among the *Ancients*, the feeding only on dry victuals, which was the practice of the athletæ.

In the firſt ages of the church, ſome, not contented with ſimple faſting, added the *xerophagy* thereto; abſtaining not only from fleſh and wine, but alſo from all freſh, ſucculent, and vinous fruits. And ſome even brought themſelves to bare bread and water.

Tertullian, in his book De Abſtinentia, cap. 9. ſpeaks of the *xerophagia* as a thing commendable in time of perſecution.

XEROPHTHALMIA, Ξηροφθαλμια, compounded of ξηρος, *dry*, and οφθαλμος, *eye*, a kind of OPHTHALMIA, wherein the eyes itch, and are red, but without ſwelling, or watering.

XEROTRIBIA, formed of ξηρος, *dry*, and τριβω, *I rub*, a term uſed by authors to expreſs a dry friction, a rubbing of ſome affected part with the hand or otherwiſe, to recall the warmth and circulation.

XESTA, Ξεστης, an Attic meaſure of capacity, anſwering to the Roman SEXTARY.

XIMENIA, in *Botany*, a genus of the *octandria monogynia* claſs; the characters of which are, that the calyx is quadrifid; it has four hairy petals, which turn backward, and the fruit is a monoſpermous drupe. There are two ſpecies.

XIPHIAS, Ξιφιας, the name of the SWORD-FISH. It is alſo uſed to expreſs a fiery METEOR, in form of a ſword. See ACONTIAS.

XIPHIAS, in *Aſtronomy*. See DORADO.

XIPHION, in *Botany*. See IRIS.

XIPHOIDES, Ξιφοειδης, in *Anatomy*, a cartilage placed at the bottom of the STERNUM, called alſo *enſiformis*.

It is about an inch long, and ſhaped like the point of a ſword. Whence its appellation, from ξιφος, *ſword*, and ειδος, *figure*.

XIPHOS, Ξιφος, among the Athenians, a capital puniſhment, by beheading with the ſword.

XIR, a word uſed by the chemiſts to expreſs mercury.

XISINUM, a word uſed by ſome of the chemical writers to expreſs vinegar.

XOCHIOCOTZO, in *Botany*, a name uſed by ſome authors for the tree which produces the liquid amber, and is called the ſweet gum by the inhabitans of the Weſt Indies.

XOCHITENACATL, in *Ornithology*, a name given by ſome to the TOUCAN, or American great-beaked magpye.

XOCHITENACATL *alia*, in *Ornithology*, the name of a bird deſcribed by Nieremberg, of the nature of the toucan, or Braſilian magpye.

It is of the ſize of a pigeon, its beak is large and thick, and is black and pointed; its wings and tail are variegated with black and white; it has a large black mark reaching from its back to the breaſt; the anterior part of the wings is yellow, the reſt of its body of a pale colour, and the legs and feet brown. It always is found among the ſweet-flowering trees, and is not uncommon in many parts of South America. Ray.

XOCOXOCHITL, the Indian name of the clove-berry-tree, or the *caſſia caryophylluta*, the bark of which is uſed in medicine.

XOMOTL, in *Ornithology*, the name of an American bird, of which the Indians are very fond, making a part of their garments of its feathers.

Nieremberg has given this ſhort account of it. It is a web-footed fowl; its back and the upper part of its wings are black, and its breaſt is brown. When it is angry, it raiſes up the feathers of its head in form of a creſt. Ray.

XOXOUHQUITICPATLI, an American name of a ſtone of the jaſper kind, and of a beautiful green, but uſually pale, and ſometimes with a mixture of grey, and variegated in ſeveral places with ſpots of a deeper green.

It is found among the ſeveral kinds of *lapis nephriticus*, with which that country abounds, and moſt of which the Indians celebrate for their virtues againſt diſeaſes; they are not however acquainted with any medicinal virtues of this ſpecies.

XV. VIR, *Quindecimvir*. See QUINDECIMVIR.

Authors, and eſpecially antiquaries, make uſe of ſuch abbreviations, which they borrow from medals, and other monuments of antiquity, where thoſe names are ſo expreſſed.

XUCAHA, or XUCAAHI, in *Botany*, the name of a plant much famed for its virtues among the ancient Arabians, but unknown at this time.

XYLAGIUM, a name given by ſome authors to the lignum ſanctum or guaiacum.

XYLO-ALOE, compounded of ξυλον, *wood*, and αλον, *aloes*, in *Medicine*, the lignum aloes; called alſo AGALLOCHUM. See alſo ALOE, and CALAMBAC.

XYLO-BALSAMUM, Ξυλοβαλσαμον, compounded of ξυλον, *wood*, and βαλσαμον, *balſam*, a name which naturaliſts, &c. give to the wood of the tree, which yields that precious gum, known to the Latins by the name of OPOBALSAMUM, and, among us, by the name of BALSAM, or *balm of Gilead*.

We have branches of this tree brought us from Cairo. They are very ſtraight, brittle, unequal, and full of knots; their bark is reddiſh without, and greeniſh within. The wood is whitiſh, and full of pith; and, when broken, yields an agreeable ſmell, reſembling that of the balſam.

The *xylo-balſamum* is reputed good to ſtrengthen the brain and ſtomach, and to expel poiſon.

XYLOCARACTA, or XYLOCARACTE, in the *Materia Medica*, a name by which ſome authors have called the CAROB, or ſiliqua dulcis, the ſweet pipe-tree.

This was called by ſome of the Greek writers *xyloceraton*, the tree bearing pods, and from a corruption of this name the other has been formed.

XYLOCARPASUM, in *Natural Hiſtory*, a name given by ſome authors to a poiſonous kind of wood.

It was the wood of that tree whoſe gum was called CARPASUM and *opocarpaſum*.

XYLOCASIA. See CASSIA.

XYLOCOCCUM, in the *Materia Medica*, a name given by ſome of the later Greek writers to the carob-tree, or *ſiliqua dulcis*.

XYLOCOLLA, a word uſed by ſome of the ancient writers to expreſs what was more uſually called *taurocolla*, glue made of the ears and genitals of a bull.

XYLOCOPIA, Ξυλοκοπια, among the Greeks, a puniſhment with a cudgel. See FUSTIGATION.

XYLOGLYCON, in *Botany*, a name given to the carob, or ſiliqua dulcis, by ſome of the old Greek writers.

The word expreſſes a ſweet, or ſweet-fruited tree.

XYLOIDES, or HYLOIDES, in *Botany*, a term uſed by many of the ancient writers to diſtinguiſh thoſe plants which had woody ſtalks, though they never grew up to any conſiderable ſize; ſuch as the garden-thyme, marjoram, and the like.

XYLON, in *Botany*. See BOMBAX.

Xylon, Ξυλον, among the Athenians, a puniſhment inflicted, by putting the offender into the ſtocks.

XYLOPIA, in *Botany*, a genus of the *gynandria polyandria* claſs. Its characters are, that it has one ſtyle, a ſingle-leaved calyx, and ſix petals; that the ſix exterior ſtamina are the thickeſt, and that the fruit is a dry drupe. There are two ſpecies.

XYLOSTEON, in *Botany*, a name by which ſome authors have called the ſmall red-berried double-fruited *chamecerasus*.

XYLOSTEUM, in *Botany*, a name given by Tournefort to the genus of plants called *lonicera* by Linnæus. See *Upright* HONEYSUCKLE.

XYLOSTROTON, formed of ξυλον, *wood*, and ϛρωτος, *laid*, among the *Ancients*, an appellation given to Moſaic or chequered work.

XYMPATHESIS, a word uſed by ſome of the old medical writers for ſympathy.

XYNERESIS, formed of ξυν, or συν, *together*, and αιρεω, *I ſeize*, a word uſed by Hippocrates, and others of the ancients, to expreſs a firm coheſion or connection of any two things. Some uſe it to expreſs that firm ſhutting together, or clenching of the teeth, which happens in convulſions.

XYNOECIA, formed of ξυν, or συν, *with*, and οικεω, *I inhabit*, a feaſt among the ancient Athenians, inſtituted on occaſion of Theſeus's uniting all the petty communities of Attica into one commonwealth; the aſſemblies whereof were to be held at Athens, in the Prytaneum.

XYRIS, in *Botany*, a genus of the *triandria monogynia* claſs, whoſe characters are, that the flower-cup is a ſort of roundiſh ſpike, made up of roundiſh, hollow, imbricated ſcales, which divide the flowers; the huſk is ſmall and bivalve, each of the valves being compreſſed, arched, and in the ſhape of a little boat; they are alſo acute, and naturally incline toward one another; the flower conſiſts of three petals, which are large, flat, expanded, with notched edges, and narrow ends, of the length of the cup they are immerſed in: the ſtamina are three ſlender filaments, which are ſhorter than the flower; the antheræ are oblong and erect; the germen of the piſtil is roundiſh; the ſtyle is ſingle and thread-like, and the ſtigma divided into three parts; the fruit is a roundiſh capſule, contained within the cup, with three cells, and three valves; the ſeeds are very numerous, and extremely ſmall. There is one ſpecies.

XYSTARCHA, in *Antiquity*, the maſter or director of the xyſtus.

In the Greek gymnaſium, the *xyſtarcha* was the ſecond officer: the firſt was the gymnaſiarch. The *xyſtartha* was his lieutenant, and preſided over the two xyſti, and all exerciſes of the athletæ therein.

XYSTICI, among the *Ancients*, a deſignation given to the athletæ, becauſe they performed their exerciſes in the XYSTUS.

XYSTUS, Ξυϛος, formed of ξυειν, *to poliſh* or *rub*, in the *Ancient Architecture*, among the Greeks, was a long ſpacious portico, either open, or covered over; wherein the athletæ, and others, practiſed wreſtling and running.

The *xyſtus* made a neceſſary part of a gymnaſium. The athletæ, who practiſed therein, were thence called *xyſtici*.

Xystus, among the Romans, was an alley, or double row of trees, meeting arbor-wiſe at top, and forming a ſhade to walk under.

Y.

Y, The twenty-third letter in the Engliſh alphabet, borrowed, originally, from the Greek υ.

It is occaſionally both vowel, and conſonant.

As a vowel, ſome authors have judged it unneceſſary in our language, in regard its ſound is preciſely the ſame with that of the *i*. Accordingly, it is but little uſed, except in words borrowed from the Greek, to denote their origin, by repreſenting the Greek *υψιλον*.

The vowel *y*, however, has a place even in ſome words purely Engliſh; and that both in the middle thereof, as in *dying*, *frying*, &c. and at the end, as in *lay*, &c.

Some aſcribe the uſe of the *y*, in pure Engliſh and French words, and thoſe that have no *y* in Latin or Greek, to this; that anciently each of thoſe words were written with a double ii; which having ſomething aukward in it, the *y* was ſubſtituted in lieu thereof.

Others ſay, that thoſe words being anciently written, as well as pronounced, with a double ii, as they ſtill are in the Walloon, as *paiing*, *paiiſan*, &c. to avoid their being miſtaken for an u with two dots over it, they made the ſecond i longer than the firſt, and ſo formed the *y* without deſigning it. Some give a particular reaſon, why words ending in i came to be written with *y*; viz. that the copiſts found the tail of the *y* very commodious, in adorning the margins and bottoms of pages.

Y was much uſed by the Saxons; whence it is found for *i* in the old Engliſh writers.

When the *y* follows a conſonant, and at the end of words, it is a vowel, and has the ſound of *i*; and when it precedes a vowel, or diphthong, and at the beginning of words, it is a conſonant.

Some have thought that *y* is in all caſes a vowel; but Dr. Johnſon obſerves of *y*, as of *w*, that it follows a vowel without any hiatus, as *roſy youth*.

The Romas uſed the *y* for the vowel *u*, which they had no character for, diſtinct from the *v* conſonant; their way being to pronounce the common *u*, as we do the diphthong *ou*; and the Greek *υψιλον*, as the Engliſh and French *u*.

Peter Diaconus obſerves, that Auguſtus firſt took the letters *y* and *z* from the Greeks, which were not uſed by the Romans before his time; *s s* being written for *z*, and *i* for *y*. But Mr. Jackſon ſhews, that the *y* was uſed before the time of Auguſtus, though probably (ſays Aſtle, Orig. and Prog. of Writing, p. 78.) it was not much older.

In our own, and ſome other modern tongues, authors begin to diſpenſe more and more with the preciſe orthography, which requires all words that have an upſilon, in the Greek, to be written with a *y*. And with reaſon; ſince our Greek *y* has loſt the ſound it had, in the language whence we borrow it. But it is certainly ridiculous to uſe it, as many do, in words which indeed have a Greek origin, but have no *u* in the Greek, as in *eclipſe*: yet ſome affect to do this.

Y is alſo a numeral letter, ſignifying 150, or, according to Baronius, 159; as in the verſe,

Y *dat centenos & quinquaginta novenos.*

When a daſh was added at top, Ȳ, it ſignified 150 thouſand.

Pythagoras uſed the Y as a ſymbol of human life; the foot repreſenting infancy, and the forked top the two paths of vice and virtue, one or the other of which people are to enter upon, after attaining to the age of diſcretion.

Y on the French coins, denotes thoſe ſtruck at Bourges.

YACHT, or YATCH, denotes a veſſel of ſtate, uſually employed to convey princes, ambaſſadors, or other great perſonages, from one kingdom to another.

The word ſeems derived from the Dutch *iacht*, *hunting*, by reaſon of the lightneſs of theſe veſſels.

As the principal deſign of a *yacht* is to accommodate the paſſengers, it is uſually fitted with a variety of convenient apartments, with ſuitable furniture, according to the quality or number of the perſons contained in it.

The royal *yachts* are commonly rigged as ketches, except the principal one reſerved for the ſovereign, which is equipped with three maſts like a ſhip. They are, in general, elegantly furniſhed, and richly ornamented with ſculpture; and always commanded by captains in his majeſty's navy.

Beſide theſe, there are many other *yachts* of a ſmaller kind, employed by the commiſſioners of the exciſe, navy, and cuſtoms; or uſed as pleaſure-boats by private gentlemen. Falconer.

YAGATH, in *Mythology*, a deity adored by the ancient Arabian idolaters, under the figure of a lion.

YAM, or YAMMES, in *Botany*, a ſpecies of the DIOSCOREA, which is much cultivated by the inhabitants of the iſlands in America, and is of great uſe to them for feeding their Negroes; and the white people make puddings of their roots, when ground to a ſort of flour. The roots are as big as a man's leg, of an irregular form, and of a dirty brown colour on the outſide, but white and mealy within. The ſtalks of this plant are triangular and winged, and the leaves are heart-ſhaped, with two ears, like thoſe of ARUM.

The plants are propagated by cutting the roots into pieces, and preſerving an eye or bud in each, as in planting of potatoes; from each of which three or four large roots will be produced. The roots after having lain ſix or eight months in the ground, are roaſted or boiled for food, and ſometimes made into bread.

Theſe plants grow wild in the woods in the iſland of Ceylon, and on the coaſt of Malabar; and they are ſuppoſed to have been brought from the Eaſt to the Weſt Indies. Miller.

YAPON, in *Botany*, a ſpecies of *ilex*. See HOLLY.

YARD, *virga*, a long meaſure, uſed in England and Spain; chiefly to meaſure cloth, ſtuffs, &c.

The Engliſh *yard* contains three feet. It was firſt ſettled by Henry I. from the length of his own arm. See MEASURE.

The Engliſh *yard* is juſt ſeven-ninths of the Paris ell; ſo that nine *yards* make ſeven ells. To reduce ells, therefore, into *yards*, ſay, if ſeven ells give nine *yards*, how many *yards* will the given number of ells give?

Yards are converted into ells Flemiſh, by adding a third part; into ells Engliſh, by ſubſtracting a fifth part; or multiplying by 8, and caſting off the right-hand figure. Ells Engliſh are converted into *yards*, by adding a fourth. To turn ells Flemiſh into *yards*, ſubtract one quarter.

The Spaniſh vara, or *yard*, chiefly uſed at Seville, is, in ſome places, called *barra*. It contains ſeven twenty-fourths of the Paris ell; ſo that ſeventeen ells make twenty-four Spaniſh *yards*.

YARD, iu *Anatomy*, the PENIS, or virile member; ſerving for the evacuating of the urine, and ſeed.

YARD-*fallen*, a term uſed among our farriers to expreſs a malady to which horſes are ſometimes ſubject, which is the hanging down of the penis from its ſheath between the legs, the creature not being able to draw it up again. This is cauſed by weakneſs of the peculiar muſcles which ſhould act in the drawing up; and proceeds ſometimes from a violent ſlip or ſtrain; ſometimes from a blow on the back, and ſometimes from extreme wearineſs in long journeys.

The method of curing this, is firſt to waſh it with oil of roſes, after this with warm white wine, and finally, to anoint it with a mixture of oil of roſes and honey; it is then to be returned into its place, and kept from falling down again by a little canvas bolſter. It is to be thus dreſſed once in twenty-four hours, till the cure is perfected.

There are ſome other diſtemperatures to which this part is ſubject in a horſe, as the being foul at the end, ſo that the creature voids his urine in the ſheath; in this caſe the method of cure is to draw out the penis, and cleanſe the end of it from any foulneſs that may be found there; then it is to be waſhed with butter and white-wine vinegar melted together: ſometimes there is a diſcharge of yellow ſtinking matter from the penis; this is peculiar to ſtone-horſes, and principally affects them after the time of their covering of mares.

This running is attended with a ſwelling of the penis, and with a pain in voiding the urine; the creature alſo finds a difficulty in drawing up the penis into the ſheath. The method of cure is, to diſſolve in a pint of white-wine an ounce of roach-alum by boiling; and four or five times a day this is to be uſed, injecting it up into the *yard* with a ſyringe, blood-warm. This will prove a certain cure.

Yard-Land, *virgata terræ*, or *virga terræ*, is a certain quantity of land, but that various, according to the place. At Wimbleton, in Surry, it is only 15 acres; but in moſt other counties it contains 20, in ſome 24, in ſome 30, and in others 40, or 45 acres.

Virgata terræ continet 24 *acras*; *&* 4 *virgatæ conſtituunt unam hidam, & quinque hidæ conſtituunt feodum militare.* MS. Abbat. Malmeſ. See Carrucate, Hide, and Knight's fee.

Yards, or *Sail*-**Yards**, of a ſhip, are long pieces of timber, tapering at each end, fitted acroſs the ſeveral maſts, to carry the ſails, and extend them to the wind.

The ſails are faſtened to the *yards* at the heads; ſo as to be hoiſted up, and let down together with them, by ropes, called *halliards*.

The main-*yard* is that of the main-maſt. The mizen-*yard*, the bolt-ſprit-*yard*, &c. are thoſe of the mizen, &c. See *Tab. Ship. fig.* 1. *n.* 2. 20. 37. 44. 67. 86. 93. 109. 126. 138.

All *yards* are either ſquare or lateen; the former of which are ſuſpended acroſs the maſt at right angles, and the latter obliquely. The *ſquare yards* (*Tab.* II. *Ship. fig.* 3.) are nearly of a cylindrical ſurface; they taper from the middle, which is called the *ſlings*, towards the extremities, which are termed the *yard-arms*; and the diſtance between the ſlings and the *yard-arms* on each ſide is divided, by the artificers, into quarters, which are diſtinguiſhed into the firſt, ſecond, third quarters, and *yard-arms*. The middle quarters are formed into eight ſquares, and each of the end-parts is figured like the fruſtum of a cone. All the *yards* of a ſhip are ſquare, except that of the mizen.

The proportions for the length of *yards*, according to the different claſſes of ſhips in the Britiſh navy, are as follow:

			Guns.
1000 : gun-deck : :	560 :	main-*yard* expreſſed by *d*, *Tab.* II. *Ship. fig.* 3. N. B. The figure repreſents the *yards* and ſails of a ſhip of 74 guns.	100
	559 :		90, 80
	570 :		70
	576 :		60
	575 :		50, 24
	561 :		44
1000 : main-*yard* : :	880 :	fore-*yard*	100, 90, 80
	874 :		all the reſt.

To apply this rule to practice, ſuppoſe the gun-deck 144 feet: the proportion for this length is, as 1000 : 575 : : 144 : 83, which will be the length of the main-*yard* in feet; and ſo of all the reſt.

1000 : main-*yard* : :	820 :	mizen-*yard*	100, 90, 80, 60, 44.
	847 :		70
	840 :		24
1000 : main-*yard* : :	726 :	main-top-ſail-*yard e*, *fig.* 3.	24
	720 :		all the reſt.
1000 : fore-*yard* : :	719 :	fore-top-ſail-*yard.*	70
	726 :		24
	715 :		all the reſt.
1000 : main-top-ſail-*yard* : :	690 :	main-top-gall. *yard.*	All the rates.
1000 : fore-top-ſail-*yard* : :	696 :	fore-top-gal. *yard f*, *fig.* 3.	70
	690 :		all the reſt.
1000 : fore-top-ſail *yard* : :	768 :	mizen-top-ſail-*yard.*	70
	750 :		all the reſt.

The croſs-jack and ſprit-ſail-*yards* are equal to the fore-top-ſail-*yard*. The ſprit-top-ſail-*yard* is equal to the fore-top-gallant-*yard*.

The diameters of *yards* are in the following proportions to their length; viz. the main and fore *yard* five-ſevenths of an inch to a yard; the top-ſail, croſs-jack, and ſprit-ſail-*yards*, nine-fourteenths of an inch to a yard; the top-gallant, mizen-top-ſail, and ſprit-ſail-top-ſail-*yards*, eight-thirteenths of an inch to a yard; the mizen-*yard* five-ninths of an inch to a yard; all ſteering ſail-booms and *yards*, half an inch to a yard in length.

The lifts of the main-*yard* are exhibited in *fig.* 3. by *g*; the horſes and their ſtirrups by *h*, *i*; the reef-tackles, and their pendants, by *k*, *l*; and the braces, and brace-pendants, by *m*, *n*.

The *lateen-yards* evidently derive their names, from having been peculiar to the ancient Romans. They are uſually compoſed of ſeveral pieces, faſtened together by wooldings, which alſo ſerve as ſteps, whereby the ſailors climb to the peek, or upper extremity, in order to furl or caſt looſe the ſail. The mizen-*yard* of a ſhip, and the main-*yard* of a bilander, are hung obliquely on the maſt, almoſt in the ſame manner as the lateen-*yard* of a xebec, ſetter, or polacre. Falconer's Mar. Dict. Murray's Ship-Building, Supp. p. 111, &c.

They have ſeveral phraſes, and words of command, relating to the management of the *yards*: as, *Brace the yards*, which ſignifies to traverſe them about the maſts, ſo as to form greater or leſſer angles with the ſhip's length. *Square the yard*, is as much as to ſay, ſee that it hang right acroſs the ſhip, and one *yard*-arm not traverſed more than the other. See Lift, Square, and Topping.

Yard-*arm* is that half of the *yard* which is on either ſide the maſt, when it lies athwart the ſhip.

Yard alſo denote places belonging to the navy, where the ſhips of war, &c. are laid up in harbour. See Dock-*yards*.

YARE, among *Sailors*, implies as much as, nimble, ready, quick, expeditious. Hence, *to be yare at the helm*, as ſome ſay, ſignifies to ſet a freſh man at the helm.

YARIN, a word uſed by ſome of the chemical writers to expreſs the flos æris.

YARN, denotes ſpun wool.

Yarn, *marking.* See Marking.

Yarn, *rope.* See Rope.

Yarn, *ſpun*, on board a *Ship*. See Spun.

YARRINGLES, or **Yarringle**-*blades*, a kind of reel, or inſtrument, with which hanks of yarn are wound on to clues, or balls.

YARROW, *Achillea*, or *Millefolium*, in *Botany*. For its characters, ſee Achillea.

The leaves and flowers of the common *yarrow*, or *achillea millefolium* of Linnæus, which is in flower on our ditch-banks, and in dry paſtures, the greateſt part of the ſummer, are greatly recommended by ſome of the German phyſicians, as mild corroborants, vulneraries, and antiſpaſmodics, in diarrhœas, hæmorrhages, hypochondriacal, and other diſorders. They promiſe, ſays Dr. Lewis, by their ſenſible qualities, to be of no inconſiderable activity. They have an agreeable, though weak, aromatic ſmell, and a bitteriſh, roughiſh, ſomewhat pungent taſte. The leaves having the greateſt bitteriſhneſs and auſterity, are chiefly directed for medicinal uſe; the flowers have the ſtrongeſt and moſt ſubtile ſmell, are remarkably acrid, and promiſe to be of greateſt efficacy, if the plant has any ſuch efficacy, as an anodyne or antiſpaſmodic. The virtue of both leaves and flowers is extracted by watery and ſpirituous menſtrua; the aſtringency moſt perfectly by the former; their aromatic warmth and pungency by the latter; and both of them equally by a mixture of the two. The flowers, diſtilled with water, yield a penetrating eſſential oil, poſſeſſing the flavour, of the milfoil in perfection; in conſiſtence ſomewhat thick and tenacious; in colour very variable, from a greeniſh yellow to a deep green, and bluiſh green and fine blue, which differences depend in great meaſure on the ſoil in which the plant is produced; the flowers gathered from moiſt, freſh grounds, yielding generally a blue oil, and thoſe collected from dry commons a green one, with a greater or leſs admixture of yellow. The extract, obtained by inſpiſſating the yellowiſh tincture made in rectified ſpirit, is more agreeable in ſmell than the flowers, of a moderately warm, penetrating taſte, ſomewhat like that of camphor, but much milder, accompanied with a ſlight bitteriſhneſs and ſubaſtringency. The *achillea ptarmica* of Linnæus, called *ſneezewort*, or *baſtard pellitory*, is perennial, grows wild on heaths, and in moiſt ſhady grounds, and is found in flower from June to the end of ſummer. The roots of this plant have a hot, biting taſte, approaching to that of pellitory of Spain, with which they nearly agree in their pharmaceutic properties, and for which they have been ſometimes ſubſtituted in the ſhops. They are by ſome recommended internally as a warm ſtimulant and attenuant; but their principal uſe is as a maſticatory and ſternutatory. Lewis.

Yarrow, *water.* See *Water* Violet.

YARWHELP, or **Yarwip**, an Engliſh name uſed in ſome places for the *ægocephalus* of authors. See Godwit.

YASSA, in *Modern Hiſtory*, the name given among the Tartars to a body of laws, aſcribed to the famous conqueror Gengis-Kan, which are ſtill obſerved among the Tartars of Crimea, and other parts of Aſia. M. de la Croix has given, in his Life of Gengis-Kan, an extract of thoſe laws, comprising twenty-one articles: the firſt of which inculcates the belief of one God, the creator of heaven and earth, and to whom belong the abſolute diſpoſal and dominion of events. Encyclopedie.

YATCHES. See Yacht.

YAW, in *Sea-Language*, denotes the movement by which a ſhip deviates from the line of her courſe towards the right or left in ſteering. See Steady.

YAWL, in *Sea-Language*, a ſhip's boat, ſomething leſs than a cutter, nearly of the ſame form, and uſed for ſimilar ſervices. It is generally rowed with four or ſix oars.

YAWNING, *oſcitatio*, an involuntary opening of the mouth, occaſioned by a vapour, or ventoſity, endeavouring to eſcape, and generally witneſſing a troubleſome wearineſs, or an inclination to ſleep.

The remedy Hippocrates preſcribes againſt continual *yawnings*, is to make long breathings, or reſpirations. The ſame he alſo recommends againſt the hiccough.

The nervous membrane of the œſophagus has been held the ſeat of *yawning*; which, according to the uſual ſyſtem, is produced, whenever any irritation determines the ſpirits to flow thither in too great abundance. The cauſe of the irritation is ſuppoſed to be ſome troubleſome humour, wetting the inner membrane of the œſophagus; which humour may proceed either from the glands ſpread throughout the membrane, or from acid vapours ariſing from the ſtomach, and condenſing on the ſides of the œſophagus. By ſuch means, the nervous fibres of the membranes of the gullet being irritated, dilate the gullet; and the mouth is conſtrained to follow the ſame motion, as being lined with the ſame membrane. But this ſyſtem of oſcitation has, of late, given way to a better, and more mechanical one.

Yawning is, in reality, performed by expanding almoſt all the muſcles of voluntary motion at the ſame time, but moſt conſiderably thoſe of the lungs; by ſpringing a great quantity of air, very ſlowly, and after retaining it ſome time, and rareſying it, by expelling it again, ſlowly, and reſtoring the muſcles to their natural ſtate.

Hence, its effects are to move, accelerate, and diſtribute all the humours of the body, equably through all the veſſels; thereby diſpoſing the organs of ſenſation, and all the muſcles of the body, for the performance of their reſpective functions. Vide Boerh. Inſt. Med. ſect. 638.

YAWS, in *Medicine*, is a diſtemper epidemical, or rather endemial to Guinea, and the hotter climates in Africa, ſeldom failing to attack each individual one time or other of their lives, but moſt commonly in childhood or youth; it makes its firſt appearance in little ſpots on the cuticle, level with the ſkin, no larger than the point of a pin, which increaſe daily, and become protuberant like pimples: ſoon after, the cuticle frets off, and then, inſtead of pus or ichor in this ſmall tumor, white ſloughs or ſordes are only found, under which is a ſmall red fungus growing out of the cutis, increaſing gradually to different magnitudes, ſome leſs than the ſmalleſt wood-ſtrawberry, ſome as big as a raſpberry, and others even exceeding in bigneſs the largeſt mulberries, which they very much reſemble. While they are coming to this height, the black hair, which grows out of the part now covered with the *yaws*, changes gradually white.

It is impoſſible to calculate the exact time which this diſtemper requires to go through theſe different ſtages. Some negroes who were in good plight, and had full nouriſhment, in a month after diſcovering the white ſpots, have had ſeveral *yaws* as big as a mulberry; and in other negroes that were low in fleſh, and had but a poor ſcanty diet, in three months time none of the *yaws* have exceeded a common ſtrawberry.

The *yaws* appear on all parts of the body; but the moſt and biggeſt are generally on the groins, about the privities and anus, in the arm-pits and face. When they are very large, they are few in number; and when they are many in number, they are ſmall in ſize. All this time the patient is in good health, does not loſe his appetite, and ſeems to have no other uneaſineſs than what the naſtineſs of the ſores occaſions; for they are not painful, except touched too roughly. This is the natural appearance of the diſtemper, when left to itſelf, and in this ſtate it will continue a long time, without any ſenſible alteration.

The *yaws* do not prove often dangerous, if the cure is undertaken ſkilfully at a proper time, and the patient has not undergone any courſe of phyſic for them before; but if the patient has been once ſalivated, or taken any quantity of mercury, and the ſkin once cleared, and they appear again, they are always very difficult, and often impoſſible to cure.

The chief part of the cure is by gentle ſalivation with calomel, in ſmall doſes, not exceeding five grains, and repeated once, twice, or thrice a day, that it may neither vomit nor purge. But previous to this, the following bolus ſhould be adminiſtered every night for two or three weeks, or till the *yaws* are at their height; viz. one ſcruple of flowers of ſulphur, five grains of camphor diſſolved in ſpirit of wine, one dram of theriaca Andromachi, and as much ſyrup of ſaffron as is neceſſary to form the ingredients into a bolus. After the ſalivation, the patient is ſweated twice or thrice in a frame or chair, with ſpirit of wine; and two drams of the following electary are to be taken morning and evening, viz. an ounce and a half of Æthiops mineral, half an ounce of gum guaiacum, one ounce of theriaca Andromachi, and as much conſerve of red roſes, twenty drops of oil of ſaſſafras, and the neceſſary quantity of ſyrup of ſaffron. The patient's drink is the decoction of guaiacum and ſaſſafras, fermented with melaſſes.

Sometimes one large *yaw*, high-knobbed, red and moiſt, called the *maſter-yaw*, remains after the reſt are fallen off, and the ſalivation is over. And to ſubdue this, ſome have thought new ſalivations neceſſary; but it requires only to be deſtroyed by a gentle cauſtic, or mild eſcharotic, as equal parts of red precipitate and burnt alum; digeſted with one ounce of yellow baſilicon, and one dram of red precipitate, and cicatrized with lint preſſed out of ſpirit of wine, and with the vitriol ſtone.

The ſalivation ſhould not be begun before the *yaws* are at the height, which is diſcovered by their being at a ſtand, neither increaſing in ſize or number. Their coming to the height ſhould be accelerated by proper medicines. If the patient be ſalivated before this time, the diſtemper will return ſoon after the ſalivation. Med. Eſſ. Edinb. vol. v. part ii. art. 76.

The venereal *diſeaſe* and *yaws* are ſaid to be diſtinct diſtempers; but the ſymptoms, in conſequence of the latter ill cured, ſo much reſemble thoſe of the former in an inveterate degree, that it is difficult to diſtinguiſh them

YAYAUHQUITOTOTL, in *Ornithology*, the name of an Indian bird deſcribed by Nieremberg, remarkable for having two feathers of its tail much longer than the reſt, and naked for a great way, but at the end ornamented with black and blue hairs. The bird is of the ſize of the ſtarling, and is beautifully variegated with green, blue, yellow, and grey.

Mr. Ray is of opinion, that this is the bird deſcribed by Marggrave under the name *guaira-guainumbi*.

YCONOMUS. See Oeconomus.

YDRARGYROS, Hydrargyros, or *Quickſilver*. See Mercury.

YDRINUS, or Hydrinus, a name given by ſome to the *ophites*, or ſerpent-ſtone.

YEANING, a term uſed for an ewe's lambing.

YEAR, *annus*, in the full extent of the word, is a ſyſtem, or cycle of ſeveral months; uſually twelve.

Others define *year*, in the general, a period, or ſpace of time, meaſured by the revolution of ſome celeſtial body in its orbit.

Thus, the time wherein the fixed ſtars make a revolution, is called the *great year*. And the times wherein Jupiter, Saturn, the ſun, moon, &c. finiſh their revolutions, and return to the ſame point of the zodiac, are reſpectively called the *years of Jupiter*, and *Saturn*; and the *ſolar*, and the *lunar years*.

Year, properly, and by way of eminence ſo called, is the *ſolar year*; or the ſpace of time wherein the ſun moves through the twelve ſigns of the ecliptic.

This, by the obſervations of Caſſini, Bianchini, and de la Hire, contains 365 days, 5 hours, and 49 minutes; which is the quantity of the *year* aſſumed by the authors of the Gregorian calendar.

But, in the civil, or popular account, this *year* only contains 365 days; except every fourth, which contains 366.

The viciſſitude of ſeaſons ſeem to have given occaſion to the firſt inſtitution of the *year*. Man, naturally curious to know the cauſe of that diverſity, ſoon found it was the proximity and diſtance of the ſun; and, upon this, gave the name *year* to the ſpace of time wherein that luminary, performing his whole courſe, returned to the ſame point of his orbit.

And hence, as it was on account of the ſeaſons, in a great meaſure, that the *year* was inſtituted, their chief regard and attention was, that the ſame parts of the year ſhould always correſpond to the ſame ſeaſons; i. e. that the beginning of the *year* ſhould always be when the ſun was in the ſame point of his orbit; and that they ſhould keep pace, come round, and end together.

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Thus far we have conſidered *years* and months, with a view to the principles of aſtronomy, whereon the diviſion is founded. By this the various forms of civil *years* that have anciently obtained, or ſtill do obtain in divers nations, are to be examined.

YEAR, *ancient Roman*, was the *lunar year*, which, as firſt ſettled by Romulus, only conſiſted of ten months; viz. 1. March, containing 31 days. 2. April, 30. 3. May, 31. 4. June, 30. 5. Quintilis, 31. 6. Sextilis, 30. 7. September, 30. 8. October, 31. 9. November, 30. 10. December, 30. in all 304 days; which came ſhort of the true lunar *year* by 50 days; and of the ſolar, by 61 days. Hence, the beginning of Romulus's *year* was vague, and unfixed to any preciſe ſeaſon; to remove which inconvenience, that prince ordered ſo many days to be added yearly as would make the ſtate of the heavens correſpond to the firſt month, without incorporating theſe additional days, or calling them by the name of any month.

Numa Pompilius corrected this irregular conſtitution of the *year*, and compoſed two new months, January and February, of the days that were uſed to be added to the former *year*. Thus, Numa's *year* conſiſted of twelve months; viz. 1. January, containing 29 days. 2. February, 28. 3. March, 31. 4. April, 29 days. 5. May, 31. 6. June, 29. 7. Quintilis, 31. 8. Sextilis, 29. 9. September, 29. 10. October, 31. 11. November, 29. 12. December, 29; in all 355 days, which exceeds the quantity of a lunar civil *year* by one day; and that of a lunar aſtronomical *year* by 15 hours, 11 minutes, 24 ſeconds, but comes ſhort of the common ſolar *year* by ten days; ſo that its beginning alſo was vague, and unfixed.

Numa, however, deſiring to have it fixed to the winter-ſolſtice, ordered 22 days to be intercalated in February every ſecond *year*, 23 every fourth, 22 every ſixth, and 23 every eighth *year*.

But this rule failing to keep matters even, recourſe was had to a new way of intercalating; and, inſtead of twenty-three days every eighth *year*, only fifteen were added; and the care of the whole was committed to the pontifex maximus; who neglecting the truſt, let things run to the utmoſt confuſion. And thus the Roman *year* ſtood till Julius Cæſar made a reformation. See CALENDAR. For the manner of reckoning the days of the Roman months, ſee CALENDS, NONES, and IDES.

YEAR, *Julian*, is a ſolar *year*, containing, commonly, 365 days; though every fourth *year*, called BISSEXTILE, it contains 366.

The months, &c. of the Julian *year*, ſtand thus. 1. January, 31 days. 2. February, 28. 3. March, 31. 4. April, 30. 5. May, 31. 6. June, 30. 7. July, 31. 8. Auguſt, 31. 9 September, 30. 10 October, 31. 11. November, 30. 12 December, 31. But every *biſſextile year* a day is added after the 28th of February; which month then contains 29 days.

The aſtronomical quantity, therefore, of the *Julian year* is 365 days, 6 hours; which exceeds the true ſolar *year* by ſomewhat more than eleven minutes; which exceſs, in 131 *years*, amounts to a whole day. So that the times of the equinoxes go backward, and fall earlier by one day in about 131 or 130 *years*. And thus the Roman *year* ſtood, till the reformation made therein by pope Gregory.

For this form of the *year*, we are indebted to Julius Cæſar; who, in the contrivance thereof, was aſſiſted by Soſigenes, a famous mathematician, called over from Egypt for this very purpoſe; who, to ſupply the defect of ſixty-ſeven days, which had been loſt through the fault of the pontifices, and to fix the beginning of the *year* to the winter ſolſtice, made that year to conſiſt of 15 months, or 445 days; which, for that reaſon, is uſed to be called *annus confuſionis*, the *year of confuſion*. See *Julian* CALENDAR.

YEAR, *Gregorian*, is the *Julian year* corrected by this rule; that, whereas, on the common footing, every ſecular or hundredth *year* is biſſextile; on the new footing, three of them are common *years*, and only the fourth is biſſextile.

The error of eleven minutes in the *Julian year*, little as it was, yet, by being repeated over and over, at length became conſiderable; and from the time when Cæſar made his correction, was grown into thirteen days, by which means the equinoxes were greatly diſturbed. In the queror Gengis-Kan, which are ſtill obſerved among the Tartars of Crimea, and other parts of Aſia. M. de la Croix has given, in his Life of Gengis-Kan, an extract of thoſe laws, compriſing twenty-one articles: the firſt of which inculcates the belief of one God, the creator of heaven and earth, and to whom belong the abſolute diſpoſal and dominion of events. Encyclopedie.

YATCHES. See Yacht.

YAW, in *Sea-Language*, denotes the movement by which a ſhip deviates from the line of her courſe towards the right or left in ſteering. See Steady.

YAWL, in *Sea-Language*, a ſhip's boat, ſomething leſs than a cutter, nearly of the ſame form, and uſed for ſimilar ſervices. It is generally rowed with four or ſix oars.

YAWNING, *oſcitatio*, an involuntary opening of the mouth, occaſioned by a vapour, or ventoſity, endeavouring to eſcape, and generally witneſſing a troubleſome wearineſs, or an inclination to ſleep.

The remedy Hippocrates preſcribes againſt continual *yawnings*, is to make long breathings, or reſpirations. The ſame he alſo recommends againſt the hiccough.

The nervous membrane of the œſophagus has been held the ſeat of *yawning*; which, according to the uſual ſyſtem, is produced, whenever any irritation determines the ſpirits to flow thither in too great abundance. The cauſe of the irritation is ſuppoſed to be ſome troubleſome humour, wetting the inner membrane of the œſophagus; which humour may proceed either from the glands ſpread throughout the membrane, or from acid vapours ariſing from the ſtomach, and condenſing on the ſides of the œſophagus. By ſuch means, the nervous fibres of the membranes of the gullet being irritated, dilate the gullet; and the mouth is conſtrained to follow the ſame motion, as being lined with the ſame membrane. But this ſyſtem of oſcitation has, of late, given way to a better, and more mechanical one.

Yawning is, in reality, performed by expanding almoſt all the muſcles of voluntary motion at the ſame time, but moſt conſiderably thoſe of the lungs; by ſpringing a great quantity of air, very ſlowly, and after retaining it ſome time, and rareſying it, by expelling it again, ſlowly, and reſtoring the muſcles to their natural ſtate.

Hence, its effects are to move, accelerate, and diſtribute all the humours of the body, equably through all the veſſels; thereby diſpoſing the organs of ſenſation, and all the muſcles of the body, for the performance of their reſpective functions. Vide Boerh. Inſt. Med. ſect. 638.

YAWS, in *Medicine*, is a diſtemper epidemical, or rather endemial to Guinea, and the hotter climates in Africa, ſeldom failing to attack each individual one time or other of their lives, but moſt commonly in childhood or youth; it makes its firſt appearance in little ſpots on the cuticle, level with the ſkin, no larger than the point of a pin, which increaſe daily, and become protuberant like pimples: ſoon after, the cuticle frets off, and then, inſtead of pus or ichor in this ſmall tumor, white ſloughs or ſordes are only found, under which is a ſmall red fungus growing out of the cutis, increaſing gradually to different magnitudes, ſome leſs than the ſmalleſt wood-ſtrawberry, ſome as big as a raſpberry, and others even exceeding in bigneſs the largeſt mulberries, which they very much reſemble. While they are coming to this height, the black hair, which grows out of the part now covered with the *yaws*, changes gradually white.

It is impoſſible to calculate the exact time which this diſtemper requires to go through theſe different ſtages. Some negroes who were in good plight, and had full nouriſhment, in a month after diſcovering the white ſpots, have had ſeveral *yaws* as big as a mulberry; and in other negroes that were low in fleſh, and had but a poor ſcanty diet, in three months time none of the *yaws* have exceeded a common ſtrawberry.

The *yaws* appear on all parts of the body; but the moſt and biggeſt are generally on the groins, about the privities and anus, in the arm-pits and face. When they are very large, they are few in number; and when they are many in number, they are ſmall in ſize. All this time the patient is in good health, does not loſe his appetite, and ſeems to have no other uneaſineſs than what the naſtineſs of the ſores occaſions; for they are not painful, except touched too roughly. This is the natural appearance of the diſtemper, when left to itſelf, and in this ſtate it will continue a long time, without any ſenſible alteration.

The *yaws* do not prove often dangerous, if the cure is undertaken ſkilfully at a proper time, and the patient has not undergone any courſe of phyſic for them before; but if the patient has been once ſalivated, or taken any quantity of mercury, and the ſkin once cleared, and they appear again, they are always very difficult, and often impoſſible to cure.

The chief part of the cure is by gentle ſalivation with calomel, in ſmall doſes, not exceeding five grains, and repeated once, twice, or thrice a day, that it may neither vomit nor purge. But previous to this, the following bolus ſhould be adminiſtered every night for two or three weeks, or till the *yaws* are at their height; viz. one ſcruple of flowers of ſulphur, five grains of camphor diſſolved in ſpirit of wine, one dram of theriaca Andromachi, and as much ſyrup of ſaffron as is neceſſary to form the ingredients into a bolus. After the ſalivation, the patient is ſweated twice or thrice in a frame or chair, with ſpirit of wine; and two drams of the following electary are to be taken morning and evening, viz. an ounce and a half of Æthiops mineral, half an ounce of gum guaiacum, one ounce of theriaca Andromachi, and as much conſerve of red roſes, twenty drops of oil of ſaſſafras, and the neceſſary quantity of ſyrup of ſaffron. The patient's drink is the decoction of guaiacum and ſaſſafras, fermented with melaſſes.

Sometimes one large *yaw*, high-knobbed, red and moiſt, called the *maſter-yaw*, remains after the reſt are fallen off, and the ſalivation is over. And to ſubdue this, ſome have thought new ſalivations neceſſary; but it requires only to be deſtroyed by a gentle cauſtic, or mild eſcharotic, as equal parts of red precipitate and burnt alum; digeſted with one ounce of yellow baſilicon, and one dram of red precipitate, and cicatrized with lint preſſed out of ſpirit of wine, and with the vitriol ſtone.

The ſalivation ſhould not be begun before the *yaws* are at the height, which is diſcovered by their being at a ſtand, neither increaſing in ſize or number. Their coming to the height ſhould be accelerated by proper medicines. If the patient be ſalivated before this time, the diſtemper will return ſoon after the ſalivation. Med. Eſſ. Edinb. vol. v. part ii. art. 76.

The venereal *diſeaſe* and *yaws* are ſaid to be diſtinct diſtempers; but the ſymptoms, in conſequence of the latter ill cured, ſo much reſemble thoſe of the former in an inveterate degree, that it is difficult to diſtinguiſh them

YAYAUHQUITOTOTL, in *Ornithology*, the name of an Indian bird deſcribed by Nieremberg, remarkable for having two feathers of its tail much longer than the reſt, and naked for a great way, but at the end ornamented with black and blue hairs. The bird is of the ſize of the ſtarling, and is beautifully variegated with green, blue, yellow, and grey.

Mr. Ray is of opinion, that this is the bird deſcribed by Marggrave under the name *guaira-guainumbi*.

YCONOMUS. See Oeconomus.

YDRARGYROS, Hydrargyros, or *Quickſilver*. See Mercury.

YDRINUS, or Hydrinus, a name given by ſome to the *ophites*, or ſerpent-ſtone.

YEANING, a term uſed for an ewe's lambing.

YEAR, *annus*, in the full extent of the word, is a ſyſtem, or cycle of ſeveral months; uſually twelve.

Others define *year*, in the general, a period, or ſpace of time, meaſured by the revolution of ſome celeſtial body in its orbit.

Thus, the time wherein the fixed ſtars make a revolution, is called the *great year*. And the times wherein Jupiter, Saturn, the ſun, moon, &c. finiſh their revolutions, and return to the ſame point of the zodiac, are reſpectively called the *years of Jupiter*, and *Saturn*; and the *ſolar*, and the *lunar years*.

Year, properly, and by way of eminence ſo called, is the *ſolar year*; or the ſpace of time wherein the ſun moves through the twelve ſigns of the ecliptic.

This, by the obſervations of Caſſini, Bianchini, and de la Hire, contains 365 days, 5 hours, and 49 minutes; which is the quantity of the *year* aſſumed by the authors of the Gregorian calendar.

But, in the civil, or popular account, this *year* only contains 365 days; except every fourth, which contains 366.

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YEAR, *the emboliſmic*, or *intercalary*, conſiſts of thirteen lunar civil months, and, therefore, contains 384 days. See EMBOLISMIC.

Thus far we have conſidered *years* and months, with a view to the principles of aſtronomy, whereon the diviſion is founded. By this the various forms of civil *years* that have anciently obtained, or ſtill do obtain in divers nations, are to be examined.

YEAR, *ancient Roman*, was the *lunar year*, which, as firſt ſettled by Romulus, only conſiſted of ten months; viz. 1. March, containing 31 days. 2. April, 30. 3. May, 31. 4. June, 30. 5. Quintilis, 31. 6. Sextilis, 30. 7. September, 30. 8. October, 31. 9. November, 30. 10. December, 30. in all 304 days; which came ſhort of the true lunar *year* by 50 days; and of the ſolar, by 61 days. Hence, the beginning of Romulus's *year* was vague, and unfixed to any preciſe ſeaſon; to remove which inconvenience, that prince ordered ſo many days to be added yearly as would make the ſtate of the heavens correſpond to the firſt month, without incorporating theſe additional days, or calling them by the name of any month.

Numa Pompilius corrected this irregular conſtitution of the *year*, and compoſed two new months, January and February, of the days that were uſed to be added to the former *year*. Thus, Numa's *year* conſiſted of twelve months; viz. 1. January, containing 29 days. 2. February, 28. 3. March, 31. 4. April, 29 days. 5. May, 31. 6. June, 29. 7. Quintilis, 31. 8. Sextilis, 29. 9. September, 29. 10. October, 31. 11. November, 29. 12. December, 29; in all 355 days, which exceeds the quantity of a lunar civil *year* by one day; and that of a lunar aſtronomical *year* by 15 hours, 11 minutes, 24 ſeconds, but comes ſhort of the common ſolar *year* by ten days; ſo that its beginning alſo was vague, and unfixed.

Numa, however, deſiring to have it fixed to the winter-ſolſtice, ordered 22 days to be intercalated in February every ſecond *year*, 23 every fourth, 22 every ſixth, and 23 every eighth *year*.

But this rule failing to keep matters even, recourſe was had to a new way of intercalating; and, inſtead of twenty-three days every eighth *year*, only fifteen were added; and the care of the whole was committed to the pontifex maximus; who neglecting the truſt, let things run to the utmoſt confuſion. And thus the Roman *year* ſtood till Julius Cæſar made a reformation. See CALENDAR. For the manner of reckoning the days of the Roman months, ſee CALENDS, NONES, and IDES.

YEAR, *Julian*, is a ſolar *year*, containing, commonly, 365 days; though every fourth *year*, called BISSEXTILE, it contains 366.

The months, &c. of the Julian *year*, ſtand thus. 1. January, 31 days. 2. February, 28. 3. March, 31. 4. April, 30. 5. May, 31. 6. June, 30. 7. July, 31. 8. Auguſt, 31. 9 September, 30. 10 October, 31. 11. November, 30. 12 December, 31. But every *biſſextile year* a day is added after the 28th of February; which month then contains 29 days.

The aſtronomical quantity, therefore, of the *Julian year* is 365 days, 6 hours; which exceeds the true ſolar *year* by ſomewhat more than eleven minutes; which exceſs, in 131 *years*, amounts to a whole day. So that the times of the equinoxes go backward, and fall earlier by one day in about 131 or 130 *years*. And thus the Roman *year* ſtood, till the reformation made therein by pope Gregory.

For this form of the *year*, we are indebted to Julius Cæſar; who, in the contrivance thereof, was aſſiſted by Soſigenes, a famous mathematician, called over from Egypt for this very purpoſe; who, to ſupply the defect of ſixty-ſeven days, which had been loſt through the fault of the pontifices, and to fix the beginning of the *year* to the winter ſolſtice, made that year to conſiſt of 15 months, or 445 days; which, for that reaſon, is uſed to be called *annus confuſionis*, the *year of confuſion*. See *Julian* CALENDAR.

YEAR, *Gregorian*, is the *Julian year* corrected by this rule; that, whereas, on the common footing, every ſecular or hundredth *year* is biſſextile; on the new footing, three of them are common *years*, and only the fourth is biſſextile.

The error of eleven minutes in the *Julian year*, little as it was, yet, by being repeated over and over, at length became conſiderable; and from the time when Cæſar made his correction, was grown into thirteen days, by which means the equinoxes were greatly diſturbed. In the year 1582, the equinoxes were fallen ten days, and the full moons four days, more backwards than they were in the time of the Nicene council; i. e. the equinox, which in the *year* 325, when that council was held, fell on the twentieth of March, was in 1582 thrown back to the tenth, and the full moon was removed from the fifth to the firſt of April. To remedy this irregularity, which was ſtill increaſing, pope Gregory XIII. in the year juſt mentioned, called together the chief aſtronomers of his time, and concerted this correction; and, to reſtore the equinoxes to their place, threw out the ten days that had been got from the time of the council of Nice, and which had ſhifted the fifth of October to the fifteenth. He exchanged the lunar cycle for that of the epacts; and in order to reſtore the ſpring equinox to the Nicene ſtandard, ſubtracted ten days out of the month of October, in that year (1582), making the fourth to be the fifteenth; and by this means the vernal equinox has been reſtored to the twenty-firſt of March. Moreover, it was endeavoured, by the omiſſion of three intercalary days in four hundred *years*, to make the civil *year* keep pace with the ſolar for time to come. See CALENDAR.

In the *year* 1700, the error of ten days was grown to eleven; upon which the proteſtant ſtates of Germany, to prevent farther confuſion, accepted the Gregorian correction. See *Reformed* CALENDAR, and STYLE.

Yet is even the *Gregorian year* far from being perfect; for we have ſhewn that in four centuries, the *Julian year* gains three days, one hour, twenty minutes; but it is only the three days that are kept out in the *Gregorian year*; ſo that there is ſtill an exceſs of one hour, twenty minutes, in four centuries, which, in ſeventy-two centuries, amount to a whole day.

The *Gregorian year* is now uſed in moſt countries in Europe. From the difference between this and the Julian *year* ariſes the diſtinction of the old, or Julian, and new, or *Gregorian* STYLE.

Year, *Egyptian*, called alſo the *year of Nabonaſſar*, on account of the EPOCHA *of Nabonaſſar*, is the ſolar *year* of 365 days, divided into twelve months, of thirty days each, beſides five intercalary days, added at the end.

The names, &c. of the months are as follow: 1. Thoth. 2. Paophi. 3. Athyr. 4. Chojac. 5. Tybi. 6. Mecheir. 7. Phamenoth. 8. Pharmuthi. 9. Pachon. 10. Pauni. 11. Epiphi. 12. Meſori; beſide the ἡμεραι επαγομεναι.

Hence, as the *Egyptian year* in every four *years* loſes a whole day of the *Julian year*, becauſe it neglects the ſix hours, which make a leap-day once in four years, its beginning, in the ſpace of 1460 *years*, runs through every part of the *Julian year*; which ſpace elapſed, they meet again; and, therefore, it is juſtly called the *erratic year*. And becauſe it returns to the ſame day of the Julian *year* after 1460 Julian *years*, this circle is called the Sothic period. See CANICULAR *year*.

This *year* is uſed by Ptolemy, in his Almageſt; ſo that the knowledge thereof is of great uſe in aſtronomy, for comparing the ancient obſervations with the modern.

This deſultory form was applied by the Egyptians to civil uſes, till Antony and Cleopatra were defeated; and the mathematicians and aſtronomers uſed it till the time of Ptolemy.

The ancient Egyptians, we are told by Diodorus Siculus, lib. i. Plutarch, in the Life of Numa, and Pliny, lib. vii. cap. 48. meaſured their *years* by the courſe of the moon. At firſt, they were only one month, then three, then four, like that of the Arcadians; and then ſix, like that of the people of Acarnania. Thoſe authors add, that it is on this account they reckon ſuch a vaſt number of *years* from the beginning of the world; and that, in the hiſtory of their kings, we meet with ſome who lived 1000, or 1200 *years*.

But Herodotus is ſilent on this point: he only ſays, that the Egyptian *year* conſiſted of twelve months, as we have above repreſented it. Beſides, we learn from Scripture, that from the times of the flood, the *year* was compoſed of twelve months; Cham, conſequently, and his ſon Miſraim, the founder of the Egyptian monarchy, muſt have had that cuſtom; and it is no way probable his deſcendants ſhould alter it. Add, that Plutarch ſpeaks of it with great uncertainty, and as no more than a report; and Diod. Siculus, as only a conjecture of authors whom he does not name; and who, in all probability, might have framed this hypotheſis to reconcile the Egyptian chronology to that of ſome other nations.

F. Kircher, however, maintains, that beſides the ſolar *year*, there were ſome of the nomes, or cantons of Egypt, who uſed a lunar one; and that in the remoteſt ages there were ſome who took a revolution of the moon, that is, a month for a *year*; and others, who finding the *year* too ſhort, made it two months, others three, and others four, &c. Oedip. Egypt. tom. ii. p. 252.

A late author obſerves, that Varro has affirmed of all nations, what we have here quoted of the Egyptians; and adds, that Lactantius takes him to taſk on that ſubject. We do not know in what places of Varro, or Lactantius, he has ſeen this: all we can ſay is, that Lactantius, Divin. Inſt. lib. iii. cap. 13. where he gives Varro's opinion, only repreſents him as ſpeaking of the Egyptians. However, St. Auguſtine, De Civit. Dei, lib. xv. cap. 14. ſhews, that the *years* of the patriarchs mentioned in Scripture, are like ours, and not one of ours equal to ten of theirs, as, it appears, had been the opinion of ſome people.

Upon the Egyptians being ſubdued by the Romans, they received the *Julian year*, though with ſome alteration; for they ſtill retained their ancient months, with the five ἡμεραι επαγομεναι, and, every fourth *year*, intercalated another day between the 28th and 29th of Auguſt. Add, that the beginning of their *year*, or the firſt day of the month Thoth, anſwered to the 29th of Auguſt of the *Julian year*, or to the 30th if it happened to be leap-*year*.

This *year*, thus reformed, and called the fixed Egyptian *year*, was called the *annus Actiacus*, as being inſtituted ſoon after the battle of Actium.

Year, *ancient Greek*, was lunar; conſiſting of 12 months, which, at firſt, had 30 days a-piece, then alternately 30 and 29 days, computed from the firſt appearance of the new moon; with the addition of an emboliſmic month of 30 days, every 3d, 5th, 8th, 11th, 14th, 16th, and 19th *years* of a cycle of 19 *years*; in order to keep the new and full moons to the ſame terms or ſeaſons of the *year*.

Their *year* commenced with the new moon, the full moon of which comes next after the ſummer ſolſtice. The order, &c. of their months was thus: 1. Ἑκατομϐαιων, containing 29 days. 2. Μηταγειτνιων, 30. 3. Βοηδρομιων, 29. 4. Μαιμακτηριων, 30. 5. Πυανεψιων. 29. 6. Ποσειδεων, 30. 7. Γαμηλιων, 29. 8. Ανθεστηριων, 30. 9. Ελαφηϐολιων, 30. 10. Μȣνυχιων, 30. 11. Θαργηλιων, 29. 12. Σκιροφοριων, 30.

The Macedonians had other names for their months; ſo had the Syro-Macedonians, Smyrnæans, Tyrians; ſo alſo the Cyprians, Paphians; and ſo the Bithynians, &c.

Year, *ancient Macedonian*, is a lunar *year*, only differing from the Attic, in the names and order of the months; the firſt Macedonian month agreeing with the Attic Mæmacterion: as the Macedonian year commenced not at the ſummer ſolſtice, but at the autumnal equinox. The months ſtand thus: 1. Διος, 30 days. 2. Απελλαιος, 29. 3 Αυδυναιος, 30. 4. Περιτιος, 29. 5. Δυστρος, 30. 6. Ξανθικος, 29. 7. Αρτεμισιος, 30. 8. Δαισιος, 29. 9. Πανεμος, 30. 10. Λωος. 11. Γορπιαιος, 30. 12. Ὑπερϐερεταιος.

Year, *modern Macedonian*, is a ſolar *year*, whoſe beginning is fixed for the firſt of January of the *Julian year*, with which it perfectly agrees.

This *year* was particularly called the *Attic year*; and the intercalary month, after Poſideon, was called Ποσειδεων β, or *latter Poſideon*.

Year, *ancient Jewiſh*, is a lunar *year*, conſiſting, commonly, of eleven months, which alternately contain 30 and 29 days.

It was made to agree with the ſolar *year*, either by the adding of 11, and ſometimes 12 days, at the end of the *year*, or by an emboliſmic month.

The names and quantities of the months ſtand thus: 1. Niſan, or Abib, 30 days. 2. Jiar, or Zius, 29. 3. Siban, or Siwan, 30. 4. Thamuz, or Tamuz, 29. 5. Ab, 30. 6. Elul, 29. 7. Tiſri, or Ethanim, 30. 8. Marcheſvam, or Bul, 29. 9. Ciſleu, 30. 10. Tebeth, 29. 11. Sabat, or Schebeth, 30. 12. Adar, in the emboliſmic *year*, 30. Adar, in the common *year*, was but 29.

Note, in the defective *year*, Ciſleu was only 29 days; and in the redundant *year* Marcheſvam was 30.

Year, *Modern Jewiſh*, is likewiſe lunar, conſiſting, in common *years*, of 12 months, but of 13 in emboliſmic *years*; which in a cycle of 19 *years*, are the 3d, 6th, 8th, 11th, 14th, 17th, and 19th. Its beginning is fixed to the new moon next after the autumnal equinox.

The names, &c. of the months are, 1. Tiſri, containing 30 days. 2. Marcheſvan, 29. 3. Ciſleu, 30. 4. Tebeth, 29. 5. Schebeth, 30. 6. Adar, 29. 7. Veadar, in the emboliſmic *year*, 30. 8. Niſan, 30. 9. Iiar, 29. 10. Sivan, 30. 11. Thamuz, 29. 12. Ab, 30. 13. Elul, 29.

Year, *Syrian*, is a ſolar *year*, having its beginning fixed to the beginning of October, in the Julian *year*; from which it only differs in the names of the months, the quantities being the ſame; as follows:

1. Tiſhrin, anſwering to our October, and containing 31

days. 2. Latter Tiſhrin, containing, like our November, 30. 3. Canun, 31. 4. Latter Canun, 31. 5. Shabat, 28, or 29 in a leap-*year*. 6. Adar, 31. 7. Niſan, 30. 8. Aiyar, 31. 9. Haziram, 30. 10. Tamuz, 31. 11. Ab. 31. 12. Elul, 30.

YEAR, *Perſian*, is a ſolar *year*, of 365 days, conſiſting of 12 months of 30 days each, with 5 intercalary days added at the end.

The months are as follow; 1. Aſrudia meh. 2. Ardihaſcht meh. 3. Cardi meh. 4. Thir meh. 5. Merded meh. 6. Schabarir meh. 7. Mehar meh. 8. Aben meh. 9. Adar meh. 10. Di meh. 11. Behen meh. 12. Aſſirer meh.

This *year* is called the *yezdegerdic year*, to diſtinguiſh it from the fixed ſolar *year*, called the *gelalean year*, which the Perſians began to uſe in the year 1079, and which was formed by an intercalation made ſix or ſeven times in four *years*, and then once every fifth *year*.

The yezdegerdic *year*, it may be obſerved, is the ſame with Nabonaſſar's *year*, differing from it only in the names of the month; and the commencement of the epocha; for whereas the Nabonaſſarean began on Feb. 26, this began on June 16. As to the gelalean *year*, it is abſolutely the beſt and juſteſt of all the civil *years* yet invented, as being found, by calculation, to keep the ſolſtices and equinoxes preciſely to the ſame days, and anſwering very accurately to the ſolar motions; which no other civil *year* does, not even the Gregorian, for want of ſo commodious an intercalation.

YEAR, *Arabic*, *Mahometan*, and *Turkiſh*, called alſo the *year* of the HEGIRA, is a lunar *year*, equal to 354 days, 8 hours, and 48 minutes, and conſiſting of 12 months, which contain, alternately 30, and 29 days.

Though ſometimes it contains 13 months; the names, &c. whereof are as follow: 1. Muharram, containing 30 days. 2. Saphar, 29. 3. Rabia, 30. 4. Latter Rabia, 29. 5. Jomada, 30. 6. Latter Jomada, 29. 7. Rajab, 30. 8. Shaaban, 29. 9. Ramadan, 30. 10. Shawal, 29. 11. Dulkaadah, 30. 12. Dulheggia, 29; and in the emboliſmic *year* 30. An intercalary day is added every 2d, 5th, 7th, 10th, 13th, 15th, 18th, 21ſt, 24th, 26th, 29th, in a cycle of 29 *years*.

The months commence not from the real new moon, but from its firſt appearance after conjunction.

YEAR, *Ethiopic*, is a ſolar *year* perfectly agreeing with the Actiac, except in this, that the names of the month are different. It commences with the Egyptian *year*, on the 29th of Auguſt of the Julian *year*.

Its months are, 1. Maſcaram. 2. Tykympt. 3. Hydar. 4. Tyſhas. 5. Tyr. 6. Jacatil. 7. Magabit. 8. Mijazia. 9. Ginbat. 10. Syne. 11. Hamel. 12. Hahaſe. Intercalary days 5.

YEAR, *Actian*. See ACTIAN, and *Egyptian* YEAR.

YEAR, *Attic*. See *Macedonian* YEAR.

YEAR, *Canicular*. See CANICULAR.

YEAR, *Yezdegerdic*. See *Perſian* YEAR.

YEAR, *Gelalean*. See *Perſian* YEAR.

YEAR, *Nabonaſſar's*. See *Egyptian* YEAR, and NABONASSAR.

YEAR, *ſabbatic*, *annus ſabbaticus*, among the ancients, was every ſeventh *year*; during which, the Jews let their lands lie at reſt. Levit. xxv. 8.

Every ſeventh *ſabbatic year*, i. e. every 49th *year*, was called the *year of* JUBILEE; and held with ſolemnity extraordinary.

YEAR, *anomaliſtical*. See ANOMALISTICAL.

YEAR, *climacteric*. See CLIMACTERIC.

YEAR, *emergent*. See EMERGENT.

YEAR, *enneatical*. See ENNEATICAL.

YEAR, *holy*. See HOLY.

YEAR, *Platonic*, or *great*. See PLATONIC.

YEAR *of the Hegira*. See HEGIRA, and *Arabic* YEAR.

New YEAR'*s day*, or the day wherein the *year* commences, has always been very different, in different nations; and yet in all has been held in great veneration.

Among the Romans, the firſt and laſt day of the *year* were conſecrated to Janus; on which account it was that they repreſented him with two faces.

To them we owe the ceremony of wiſhing *an happy new year*; which appears to be very ancient. Before the firſt day was ſpent, they not only viſited and complimented each other, but alſo preſented ſtrenæ, and offered vows to the gods for the preſervation of each other.

Lucian repreſents it as a practice of a very ancient ſtanding, even in his time; and refers it to Numa.

Ovid intimates the ſame ceremony, in the beginning of his Faſti:

> *Poſtera lux oritur, linguiſque animiſque favete:*
> *Nunc dicenda bono ſunt bona verba die.*

And Pliny more expreſly, lib. xxviii. cap. 1. *Primum anni incipientis diem lætis precationibus invicem fauſtum ominantur.*

The civil, or *legal* YEAR, in England, formerly commenced on the day of the Annunciation, i. e. on the 25th day of March; though the hiſtorical *year* began on the day of the Circumciſion; i. e. the firſt of January, on which day the German and Italian *year* alſo begins.

Stow obſerves, that William the Conqueror having been crowned on the firſt of January, that thenceforth became the firſt of the *year* for hiſtorians, &c. though, in all civil affairs, they retained the ancient manner of accounting, which began the 25th of March.

The part of the *year* between thoſe two terms was uſually expreſſed both ways, as 1748-9, or $174\frac{8}{9}$. But by the act for altering the ſtyle, the civil *year* now commences with January 1. See *New* STYLE.

Since the Conqueror, the king's patents, charters, proclamations, &c. are uſually dated by the year of the king's reign.

The church, as to her ſolemn ſervice, begins the *year* on the firſt Sunday in Advent, which is always that next St. Andrew's day, or the 30th of November.

The Jews, as moſt other nations of the Eaſt, had a civil *year*, which commenced with the new moon in September; and an eccleſiaſtical *year*, which commenced from the new moon in March.

The month TISRI, which began about the time of the autumnal equinox, was the firſt month of the Jewiſh *year*, till it was changed at the time of the coming up of the children of Iſrael out of Egypt. For that happening in the month of ABIB, afterwards called NISAN, this month was for this reaſon reckoned the firſt month of the *year*, in all eccleſiaſtical matters. Before this period Tiſri was reckoned the commencement of the year, becauſe it was thought that the world was created and firſt began at the time of the autumnal equinox. And for this reaſon the Jews do ſtill in their æra of the creation of the world, as well as in their æra of contracts, compute the beginning of the *year* from the firſt of Tiſri, and all their bills, and bonds, and all other civil acts and contracts, are ſtill dated among them according to the ſame computation; and from this month alſo they began all their jubilees, and ſabbatical *years*. And therefore, although their eccleſiaſtical *year* began from Niſan, and all their feſtivals were computed from it, yet their civil *year* was ſtill reckoned from Tiſri, and the firſt day of that month was their new *year's* day: and for the more ſolemn celebration of it the feaſt of trumpets ſeems to have been appointed.

The French *year*, during the reigns of the Merovingian race, began on the day whereon the troops were reviewed; which was the firſt day of March. Under the Carlovingians it began on Chriſtmas-day; and, under the Capetians, on Eaſter-day; which, therefore, varied between the 22d of March, and the 25th of April. The eccleſiaſtical *year* in France begins on the firſt Sunday of Advent. But for the civil, Charles IX. appointed, in 1564, that for the future it ſhould commence on the firſt of January.

The Mahometans begin their *year* the minute the ſun enters Aries. The Perſians in the month anſwering to our June. The Chineſe, and moſt of the Indians, begin it with the firſt moon in March. The Brachmans begin it with the new moon in April; on which day they hold a feaſt called *ſamwat ſaradi puduga*, q. d. *feaſt of New-year's-day*. The Mexicans, according to d'Acoſta, begin the *year* on our 23d of February, when the leaves begin to grow green: their *year* conſiſts of eighteen months, having twenty days each, which make three hundred and ſixty days; the remaining five days are ſpent in mirth, and no buſineſs is ſuffered to be done, nor even any ſervice at the temples. Alvarez relates much the ſame of the Abyſſinians; who begin their year on the 26th of Auguſt, and have five idle days at the end, which they call *pagomen*. At Rome there are two ways of computing the *year*; the one beginning at the Nativity of our Lord: this the notaries uſe, dating *a Nativitate*. The other on the 25th of March, on occaſion of the Incarnation; and it is by this the bulls are dated, *anno Incarnationis*. The Greeks begin their *year* of the world from the firſt of September.

Years are alſo diſtinguiſhed with regard to the epochas whence they are numbered: thus, *years of our Lord*, are thoſe reckoned from the birth of Jeſus Chriſt. *Years of the world*, are thoſe elapſed ſince the creation. *Years of Rome*, *of the Hegira*, *of Nabonaſſar*, &c. See the difference between theſe *years*, under the article EPOCHA.

YEAR is alſo a word uſed by ſome of the chemical writers to expreſs any product of their operations, which may ſerve as a medicine, whether internally or externally.

Year *and Day*, in *Law*, &c. is a time that determines a right in many caſes, and is in ſome an uſucaption, and in others a preſcription.

Thus, in the caſe of an eſtray, if the owner, proclamation being made, challenge it not within a *year and day*, it is forfeit. In like manner is the *year and day* given in caſes of appeal, of deſcent, of entry or claim, of non-claim upon a fine, or writ of right, of the death of a man ſore bruiſed, or wounded; of protections, eſſoins in reſpect of the king's ſervice; of a wreck, and on many other occaſions.

Year, *day, and waſte, annus, dies, & vaſtum*, is a part of the king's prerogative, whereby he challenges the profits of the lands and tenements of perſons attainted for petit-treaſon, or felony, for the ſpace of a *year* and a day; whoſoever is lord of the manor to which they belong.

Formerly the king had only a liberty of committing waſte on the lands of felons, by pulling down their houſes, extirpating their gardens, ploughing their meadows, and cutting down their woods. But this tending greatly to the prejudice of the public, it was agreed in the reign of Henry I. that the king ſhould have the profits of the land for one *year and a day*, in lieu of the deſtruction he was otherwiſe at liberty to commit: and, therefore, *Magna Charta* provides, that the king ſhall only hold ſuch lands for a *year and a day*, and then reſtore them to the lord of the fee; without any mention made of *waſte*. But the ſtatute 17 Edw. II. *de prærogativa regis*, ſeems to ſuppoſe, that the king ſhall have his *year*, *day*, and *waſte*, and not the *year* and *day* inſtead of *waſte*; which ſir Edward Coke, and the author of the Mirror, before him, very juſtly look upon as an encroachment, though a very ancient one, of the royal prerogative.

This *year*, *day*, and *waſte*, are now uſually compounded for; but otherwiſe they regularly belong to the crown: and, after their expiration, the land would naturally have deſcended to the heir (as in gavel-kind tenure it ſtill does) did not its feodal quality intercept ſuch deſcent, and give it by way of eſcheat to the lord. Black. Com. book iv. p. 379.

Year-*books*, in *Law*. See Reports.

Eſtate for **Years**, in *Law*, is a contract for the poſſeſſion of lands or tenements, for ſome determinate period: and it happens when a man letteth them to another for the term of a certain number of *years*, agreed upon between the leſſor and the leſſee, and the leſſee enters thereon.

If the leaſe be but for half a *year*, or a quarter, or any leſs time, this leſſee is reputed as a leſſee or tenant for *years*, and is ſo ſtyled in ſome legal proceedings: a *year* being the ſhorteſt term which the law in this caſe takes notice of. An eſtate of this kind, even for a thouſand *years*, is only a chattel, and reckoned part of the perſonal eſtate; and, therefore, a leaſe for *years* may be made to commence *in futuro*, though a leaſe for life cannot.

With regard to emblements, or profits of land ſowed by tenant for *years*, there is this difference between him and tenant for life: that where the term of tenant for *years* depends upon a certainty, as if he holds from Midſummer for ten *years*, and in the laſt year ſows a crop of corn, and if it is not ripe and cut before Midſummer, the end of his term, the landlord ſhall have it; for the tenant knew the expiration of his term, and therefore it was his own folly to ſow what he never could reap the profits of. But where the leaſe for *years* depends upon an uncertainty; as, upon the death of the leſſor, being himſelf only tenant for life, or being a huſband ſeiſed in right of his wife; or if the term of *years* be determinable upon a life or lives: in all theſe caſes, *the eſtate for years* not being certainly to expire at a time foreknown, but merely by the act of God, the tenant or his executors ſhall have the emblements in the ſame manner as a tenant for life or his executors ſhall be intitled thereto. But not ſo, if it determine by the act of the party himſelf; as if tenant for *years* does any thing that amounts to a forfeiture; in which caſe the emblements ſhall go to the leſſor, and not to the leſſee, who hath determined his eſtate by his own default. Blackſt. Com. vol. ii. p. 140, &c.

YEARN, in *Hunting*, ſignifies to bark, as beagles properly do, at their prey.

YEARNING. See Earning.

YEAST, Yest, or Barm, the foam or flower of beer, or other liquor in fermentation.

The *yeaſt* of beer is uſed for a leaven or ferment in the making of bread: as ſerving to ſwell or puff it up very conſiderably in a little time, and to make it much lighter, ſofter, and more delicate. But when there is too much of it, it renders the bread bitter.

The uſe of *yeaſt* in bread is but of late ſtanding among us: it is not above a century ſince the avarice of the bakers firſt introduced it; and then it was only done by ſtealth. Though Pliny witneſſes it to have been uſed by the ancient Gauls.

The faculty of medicine of Paris, by a decree of the 24th of March, 1688, ſolemnly maintained it noxious to the health of the people; yet even that cenſure could not prevent its progreſs.

Common ale-*yeaſt* may be kept freſh and fit for uſe ſeveral months, by the following method: put a quantity of it into a cloſe canvas bag, and gently ſqueeze out the moiſture in a ſcrew-preſs, till the remaining matter be as firm and ſtiff as clay.

In this ſtate it may be cloſe packed up in a tight caſk, for ſecuring it from the air; and will keep freſh, ſound, and fit for uſe for a long time.

This is a ſecret that might be of great uſe to the brewers and diſtillers here, who, though they employ very large quantities of *yeaſt*, ſeem to know no method of preſerving it, or raiſing nurſeries of it; for want of which they ſuſtain a very conſiderable loſs; whereas the brewers in Flanders make a very great advantage of ſupplying the malt-diſtillers of Holland with *yeaſt*, which is rendered laſting, and fit for carriage, by this eaſy expedient. Shaw's Lectures, p. 195.

Mr. Henry has repeatedly prepared an *artificial yeaſt*, by impregnating flour and water with fixed air, with which he has made very good bread, without the aſſiſtance of any other ferment: and he propoſes this method of procuring freſh fermented bread at ſea.

The proceſs is as follows: boil flour and water together to the conſiſtence of treacle; when the mixture is become cold, fill a ſmall caſk with it. This caſk is to be filled up in the manner repreſented in *Tab.* III. *Pneumatics, fig.* 56. and deſcribed under Pyrmont water, for the impregnation of water with fixed air; and the proceſs is to be conducted in a ſimilar way, except that the caſk is to be agitated, as often as the mixture riſes to about two thirds of the capacity of the funnel *k*; and after each agitation, which ſhould continue during ſeveral minutes, the unabſorbed air is to be let out, by withdrawing the plug from the orifice *m*, till that part of the mixture which remained in the funnel has returned into the caſk. The orifice at *i* ſhould alſo be larger than is neceſſary in the other operation, on account of the ſuperior viſcidity of the mixture. When, after repeated agitation, the mixture, which has aſcended into the funnel, does not ſubſide into the caſk, it may be ſuppoſed incapable of abſorbing more air.

Pour the mixture, thus ſaturated, into one or more large bottles, or narrow-mouthed jars; cover it over looſely with paper, and upon that lay a ſlate or board with a weight to keep it ſteady. Place the veſſel in a ſituation, where the thermometer will ſtand from 70 to 80°, and ſtir up the mixture two or three times in twenty-four hours. In about two days, ſuch a degree of fermentation will have taken place, as to give the mixture the appearance of *yeaſt*.

With the *yeaſt* in this ſtate, and before it has acquired a thoroughly vinous ſmell, mix the quantity of flour intended for bread, in the proportion of ſix pounds of flour to a quart of the *yeaſt*, and a ſufficient portion of warm water. Knead them well together in a proper veſſel, and covering it with a cloth, let the dough ſtand for twelve hours, or till it appears to be ſufficiently fermented, in the forementioned degree of warmth. It is then to be formed into loaves and baked.

Mr. Henry adds, that perhaps the *yeaſt* would be more perfect, if a decoction of malt were uſed inſtead of ſimple water.

When the operation is finiſhed, the caſk, in order to prevent its contracting a diſagreeable taint, ſhould be well waſhed. Henry's Account of a Method of preſerving Water at Sea, &c. p. 26. 1781.

YELION, a word uſed by ſome of the barbarous writers to expreſs glaſs.

YELLOW, a bright colour, reflecting the moſt light of any after white.

The word is formed from the Italian *giallo*, or the German *geel*, which ſignifies the ſame; or from the Latin *galbanus*, *bright*, *gay*.

There are divers *yellow* ſubſtances that become white, upon wetting and drying them again ſeveral times in the ſun: ſuch as wax, linen-cloth, &c. See Bleaching.

And the ſame bodies, if they be already white, and continue a long time in the air without being wetted, turn *yellow*.

Paper and ivory, applied near the fire, become ſucceſſively *yellow*, red, and black. Silk, when turned *yellow*, is whitened again with the fumes of ſulphur.

YELLOW, in *Dying*, is one of the five ſimple and mother colours.

For the fineſt *yellows*, they firſt boil the cloth, or ſtuff, in alum and pot-aſhes, or tartar; and then give the colour with the weld, or wold.

Turmeric likewiſe gives a good *yellow*, though not the beſt.

Wollen cloth, impregnated with a ſolution of alum and tartar, acquires on being boiled with the watery decoction, an elegant, but not very durable orange *yellow* or gold-coloured dye. It is rarely made uſe of by the dyers on account of its price and the periſhableneſs of its colour.

There is alſo an Indian wood that gives a *yellow* colour bordering on gold. This wood, called FUSTICK, is a ſpecies of mulberry-tree, of a deep ſulphur-*yellow* colour, which it readily gives out both to water and ſpirit. The watery decoction dyes prepared woollen of a very durable orange *yellow*: the colour is imbibed by the cloth in a moderate warmth, without boiling.

The *fuſtet* or *fuſtel* of the French is a *yellow* wood or root, very different from our fuſtic: it gives a fine orange dye to woollen, but the colour is extremely periſhable in the air. This is called *cotinus coriaria* or *Venice* SUMACH.

The leaves of many kinds of herbs and trees give a *yellow* dye to wool or woollen cloth that has been previouſly boiled with a ſolution of alum and tartar. WELD in particular affords a fine *yellow*, and is commonly made uſe of for this purpoſe by the dyers. There is, indeed, no colour for which we have ſuch plenty of materials as for *yellow*.

Mr. Hellot obſerves, in his Art de Teindre, that all leaves, barks, and roots, which on being chewed, diſcover a ſlight aſtringency, as the leaves of the almond, peach, and pear-trees, aſh-bark (eſpecially that taken off after the firſt riſing of the ſap in ſpring), the roots of wild patience, &c. (ſee LEAF) yield durable *yellows*, more or leſs beautiful, according to the length of time that the boiling is continued, and the proportions of alum and tartar in the preparatory liquor: that a large quantity of alum makes theſe *yellows* approach to the elegant *yellow* of weld; that if the tartar is made to prevail, it inclines them to an orange: and that if the roots, barks, or leaves, be too long boiled, the *yellow* proves tarniſhed, and acquires ſhades of brown. Neumann's Chemical Works, by Lewis, p. 384. 434. See WELD.

The Chineſe are famous for their *yellows* in dying, which never change with waſhing. They make this dye of the flowers of the acacia, in a manner in which we might uſe ſeveral of our productions to a great adtage.

It is thus: they gather the flowers before they are perfectly ripe, and dry them in an earthen veſſel over a gentle heat, till they criſp up in the manner of tea-leaves: they then add to them the ripe ſeeds of the ſame tree in different proportions; and then boiling them in river water with alum, they give the *yellow* in any degree that they pleaſe.

They have three kinds of *yellow*, which they diſtinguiſh by the names of *Ngo-hoang*, *king-hoang*, and *hoang* alone.

The firſt of theſe is the brighteſt *yellow*; to dye five or ſix ells of ſilk of this colour, they uſe a pound of the flowers of the acacia, about two ounces of the ſeeds, and four ounces of alum.

The *king-hoang* is a ſomewhat deeper *yellow*; to dye this, they uſe the ſame ingredients in the ſame proportion as in the former caſe; and when the ſilk is dry from the dipping in this, they give it a ſecond dipping in a ſlight tincture of Braſil wood: this brings it to the fine ſtrong *yellow* we ſee.

The *hoang*, or pale *yellow*, is made of the ſame ingredients as the firſt, only inſtead of four ounces of alum they put in but three ounces: river-water is found to be greatly preferable to any other, for the extracting of theſe colours; but even in that there is great difference, ſome doing the buſineſs much better than others.

The Chineſe are ſo expert in judging on this occaſion, that they can tell by the taſte of water whether it will or will not do; and if it taſte faint they know it is faulty; but they dip the pieces twice into it inſtead of once, and the colour ſucceeds well.

The flowers of the acacia, when they have been prepared by roaſting in this manner, may be kept all the year round, and employed in dying as occaſion requires, only there is to be longer boiling for the dried flowers than the freſh ones; and it is always found that the freſh flowers give the brighteſt colour. Obſ. ſur les Coutum. de l'Aſie, p. 254.

Greens are uſually made of *yellow* and blue mixed. With *yellow*, madder red, and goat's-hair prepared with madder, are made the golden *yellow*, Aurora, panſy, nacarate, Iſabella, and chamois colour; which are all caſts or ſhades of *yellow*.

Mr. Peter Woulfe has given the following receipt for making the *yellow* dye: take half an ounce of powdered indigo, and mix it in a high glaſs veſſel, with two ounces of ſtrong ſpirit of nitre, which ſhould be previouſly diluted with eight ounces of water, for preventing the indigo's being ſet on fire by the ſpirit; becauſe two ounces and a half of ſtrong ſpirit of nitre will ſet fire to half an ounce of indigo; let the mixture ſtand for a week, and then digeſt it in a ſand-heat for an hour or more, and add four ounces more of water to it; filter the ſolution, which will be of a fine *yellow* colour. If the indigo be digeſted twenty-four hours after the ſpirit of nitre is poured upon it, it will froth and boil over; but, after ſtanding about a week, it has not that property.

One part of the ſolution of indigo in the acid of nitre, mixed with four or five parts of water will dye ſilk or cloth of the paleſt *yellow* colour, or of any ſhade to the deepeſt, and that by letting them boil more or leſs in the colour. The addition of alum is uſeful, as it makes the colour more laſting: according as the ſolution boils away, more water muſt be added. None of the colour in the operation ſeparates from the water, but what adheres to the ſilk or cloth; and conſequently this colour goes far in dying.

Cochineal, Dutch litmus, orchel, cudbear, and many other colouring ſubſtances treated in this manner, will all dye ſilk and wool of a *yellow* colour.

The indigo which remains undiſſolved in making *Saxon* BLUE, and collected by filtration, if digeſted with ſpirit of nitre, dyes ſilk and wool of all ſhades of brown, inclining to a *yellow*.

Cloth and ſilk may be dyed green with indigo; but they muſt firſt be boiled in the *yellow* dye, and then in the blue. Phil. Tranſ. vol. lxi. part i. p. 129, &c. See DYING.

Painters and enamellers make their *yellow* of maſſicot, or, as ſome write it, maſticot, which is ceruſſe raiſed to a *yellow* colour by the fire; or with *yellow* oker. Limners and illuminers make it with ſaffron, and French berries, orcanette, &c.

Mr. Boyle tells us a moſt beautiful *yellow* may be procured by taking good quick-ſilver, and three or four times its weight of oil of vitriol, drawing off, in a glaſs retort, the ſaline menſtruum from the metalline liquor, till there remains a dry ſnow-white calx at the bottom: on pouring a large quantity of fair water on this, the colour changes to an excellent light *yellow*.

He ſays he fears this colour is too coſtly to be uſed by painters, and he does not know how it would agree with every pigment, eſpecially oil colours. Works abr. vol. ii. p. 91. See VITRIOL.

Branton obſerves, that it was anciently the cuſtom to paint a man's door *yellow*, and ſtrew his houſe with ſalt, to declare him a traitor to his king.

YELLOW, or *French berries*. See AVIGNON, and LYCIUM.

YELLOW *fever*. See *Burning Bilious* FEVER.

YELLOW-*hammer*, in *Ornithology*, the name of a very common Engliſh bird, called by authors *emberiza lutea*; and by Linnæus EMBERIZA *citrinella*; and by ſome *hortulanus*; by others *luteus*; and by others *chloreus*.

The bill is of a duſky hue; the crown of the head is of a pleaſant pale yellow; in ſome almoſt plain, in others ſpotted with brown; the hind part of the neck is tinged with green; the chin and throat are *yellow*; the breaſt is marked with an orange-red; the belly *yellow*; the leſſer coverts of the wings are green; the others duſky, edged with ruſt colour; the back of the ſame colours; the rump of a ruſty red; the quill-feathers duſky, edged on their exterior ſides with yellowiſh green; the tail is a little forked; the middle feathers are brown; the two middlemoſt edged on both ſides with green, the others on their exterior ſides only; the interior ſides of the two outmoſt feathers are marked obliquely near their ends with white.

This ſpecies makes a large flat neſt on the ground, near a buſh or hedge, of moſs, dried roots, and horſe-hair: it lays ſix eggs, of a white colour, with dark purple veins; and in winter frequents our farm-yards with other ſmall birds. Pennant.

There is beſide this another kind, which is much ſmaller and of a browner colour on the back; this is called by ſome authors ZIVOLO.

YELLOW *jaundice*, in *Medicine*. See JAUNDICE.

YELLOW, *king's*, is a pure ORPIMENT, or arſenic coloured with ſulphur, uſed for painting in oil and varniſh; of an extreme bright colour, and when good a true *yellow*: when uſed alone, it will ſtand well; but mixed with white lead, and ſeveral other pigments, its colour flies or changes. It is ſometimes mixed with blue pigments to form a green colour. This pigment may be prepared by mixing ſulphur and arſenic by ſublimation: taking of arſenic powdered, and flowers of ſulphur, in the proportion of twenty parts of the firſt to one of the ſecond, and putting them into a ſublimer, and ſubliming them in a ſand-heat by means of a furnace particularly adapted to the purpoſe. When the operation is completed, the *king's yellow* will be found in the upper part of the glaſs, which muſt be ſeparated with care from any foul parts adhering to it in the glaſs, and levigated into an uniform powder. It may be alſo obtained from common orpiment by ſubliming it in the ſame manner. This pigment may be rendered warmer, or more inclined to orange, by increaſing the proportion of the ſulphur; and *vice verſâ*. Handmaid to the Arts, vol. i. p. 17.

Yellow, *Naples*. See Giallolino.

Yellow *ochre*. See Ochre.

Yellow-*berry waſh* is a ſolution of the gum of the French berries in water; and may be prepared by boiling a pound of the berries in a gallon of water with half an ounce of alum, in a pewter veſſel, and filtering the fluid; and by evaporating the fluid in the boiler till the colour appears to be of the requiſite degree of ſtrength.

This is uſed as a waſhing colour in water-painting: it will ſtand extremely well, and being more diluted or laid on thicker, will, in conſequence of its tranſparency, give a variety of ſhades.

Yellow *waſh of ſaffron*. See *Tincture of* Saffron.

Yellow *waſh of turmeric*. See Turmeric.

YELLOWS, a diſeaſe in a horſe, much the ſame with that called *jaundice* in man.

There are two kinds of it, the *yellow* and the *black*.

The *yellows* is a very frequent diſorder, ſay the farriers, ariſing from obſtructions in the gall-pipe, or the little ducts opening into the ſame, occaſioned by viſcid or gritty matters lodged therein, or a fulneſs or compreſſion of the neighbouring blood-veſſels; by means whereof, the matter that ſhould be turned into gall, is taken up by the vein, and carried into the maſs of blood: which it tinctures *yellow*: ſo that the eyes, inſide of the lips, and other parts of the mouth capable of ſhewing the colour, appear *yellow*.

The effect whereof is, that a horſe will be dull, heavy, and low-ſpirited; eaſily jaded by the leaſt labour or exerciſe, &c. See Jaundice.

YEOMAN, the firſt, or higheſt degree among the plebeians of England; next in order to the gentry.

The *yeomen* are properly the freeholders, who have land of their own; ſo called from the Saxon *gemane*, or *geman*, *common*.

The word *yongman* is uſed for *yeoman* in the ſtatute 33 Hen. VIII. and in old deeds it is ſometimes alſo written *jeman*, which, in the German, ſignifies *any-body*.

According to ſir Thomas Smith, a *yeoman* is a free-born Engliſhman, who can lay out of his own free-land in yearly revenue to the ſum of forty ſhillings ſterling.

The *yeomanry* of England are capable of holding lands of their own to a good value; are adjudged capable of certain offices, as conſtables, church-wardens, jury-men; and are alſo to vote in elections to parliament, and to ſerve in the army, and to do any other act, where the law requires one that is *probus et legalis homo*.

The *yeomen* were famous, in ancient times, for military valour, being particularly expert at the management of the bow; whence the infantry was compoſed chiefly of them.

In many caſes, the law conceives a better opinion of the *yeomanry* that occupy lands, than of tradeſmen, artificers, &c.

By a ſtatute, 2 Hen. IV. it is enacted, that no *yeoman* ſhall take or wear a livery of any lord, upon pain of impriſonment, and a fine at the king's pleaſure.

Yeoman is alſo a title of office in the king's houſhold, of a middle place or rank between a gentleman and a groom. Such are the *yeoman* of the buttery; *yeoman* of the ſcullery; *yeoman* of the wine-cellar, ewry, wood-yard, &c. There are alſo the *yeoman* of the mouth, *yeoman* of the kitchen, *yeomen*-porters, &c.

Yeoman, in *Sea-Language*, an officer under the boatſwain or gunner of a ſhip of war, uſually charged with the ſtowage, account, and diſtribution of their reſpective ſtores.

Yeomen *warders*. See Warders *of the Tower*.

Yeomen *of the guard*, properly called *yeomen of the guard of the king's body*, were anciently two hundred and fifty men, of the beſt rank under gentry, and of larger ſtature than ordinary; every one being required to be ſix feet high.

At preſent there are but one hundred *yeomen* in conſtant duty, at 39*l*. 11*s*. 3*d*. per annum each; eight of whom are called uſhers, who have 10*l*. per annum each more than the other *yeomen*; and ſeventy more not on duty; and as one of the hundred dies, his place is ſupplied out of the ſeventy.

The officers are a captain, who has 1000*l* per annum, a lieutenant at 500*l*. per annum, an enſign at 300*l*. and four exons at 150*l*. per annum each; a ſecretary, and clerk of the checque at 150*l*. per annum.

Their origin is traced to the year 1485, when king Henry VII. aſcending the throne, immediately after his coronation, inſtituted a guard of fifty archers, to attend him and his ſucceſſors. They were probably then, as they are now, called the *yeomen of the guard*.

It is obſerved, that this is the firſt inſtance of any eſtabliſhed or permanent military guard in England: its kings, till that time, except in times of war and inſurrection, contenting themſelves with the guard of their proper domeſtics and retinue. And. Hiſt. Com. vol. i. p. 302.

They go clad after the manner of king Henry the Eighth's times. They formerly had diet as well as wages when in waiting; but this was taken off in the reign of queen Anne.

Their attendance is on the ſovereign's perſon, both at home and abroad; and they have a room allotted for them only, called the *guard-chamber*.

The officers and *yeomen* are at the diſpoſal of the captain; but the captain is at the appointment of the king.

Yeoman *of the ſalt ſtores*. See Acatery.

YERKING, in the *Manege*, is when a horſe ſtrikes with his hind legs, or flings and kicks back with the whole hind quarters; ſtretching out the two legs nearly together, and even to their full extent. See Eparer.

YERVA-*mora*, in *Botany*. See Bosea.

YEST. See Yeast.

YETTUS, in *Natural Hiſtory*, a name given by the writers of the middle ages, to a ſpecies of marble of a deep red: which was uſed by ſome as a touch-ſtone.

YEVA *charrum*, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a kind of litharge; which is very common in that part of the world, and is ſaid to be made partly from lead and partly from zinc.

It is leſs heavy than our yellow litharge, and of a paler colour. It is uſed as a cauſtic in all the occaſions of ſurgery there.

YEW, *taxus*, in *Botany*, a genus of the *diœcia monadelphia* claſs. Its characters are theſe: the male flowers are for the moſt part produced on ſeparate trees from thoſe with the fruit; they have neither empalement nor petals, but the germ is like a four-leaved cover; they have a great number of ſtamina, which are joined at the bottom in a column longer than the germ, terminated by depreſſed ſummits having obtuſe borders, and eight points opening on each ſide their baſe, and caſting their farina. The female flowers are like the male, having no empalement nor petals, but having an oval acute-pointed germen, but no ſtyle, crowned by an obtuſe ſtigma; the germen becomes a berry lengthened from the receptacle, globular at the top, covered by a proper coat at bottom, open at the top, full of juice, of a red colour, including one oblong oval ſeed, whoſe top without the berry is prominent. Linnæus enumerates two ſpecies.

We have but one ſpecies, which grows naturally in England; and is of great uſe in gardens to form hedges for the ſhelter of exotic plants. They are but of ſlow growth, yet in time arrive to a great ſize. The timber is greatly eſteemed for many uſes.

They may be eaſily propagated by ſowing their berries in autumn, as ſoon as they are ripe, upon a ſhady bed of undunged ſoil, covering them about the thickneſs of half an inch with the ſame earth. In the ſpring the bed muſt be cleared from weeds, and in a dry ſeaſon refreſhed with water. The plants, when they come up, ſhould alſo be kept always clear from weeds. After remaining in this bed for two years, they ſhould be removed in October into a ſpot of freſh undunged ſoil, and planted in beds about four or five feet wide, in rows about a foot aſunder, and ſix inches from each other; laying mulch upon the ſurface of the ground about their roots, and watering them in dry weather till they have taken root. From theſe beds, where they may remain two or three years, they ſhould be removed in autumn into a nurſery, and placed in rows at the diſtance of three feet, and at the diſtance of eighteen inches from one another: when they have continued three or four years in the nurſery, they may be tranſplanted into the ground where they are to remain; removing them in autumn into very dry ground, and in ſpring into cold moiſt land. Miller.

Yew is derived from the Greek ἰπτω, *to hurt*; and probably becauſe before the invention of guns, our anceſtors made their bows of this wood; they therefore took care to plant the trees in the church-yards, where they might be often ſeen and preſerved by the people.

Yew is alſo a term uſed by the ſalt-workers of Lymington, and ſome other parts of England, to expreſs the firſt riſing of a ſcum upon the brine in boiling.

In the places where they uſe this term, they add no clarifying mixtures to the brine, for it ferments in the ciſterns, and all its foulneſs ſinks to the bottom in form of a thin mud; they admit only the clear liquor into the pan; and boil this briſkly till it *yews*, that is, till a thin ſkin of ſalt appears upon its ſurface; they then damp the fire, and carefully ſkim off this film, and clear only the ſcratch or calcareous earth, which ſeparates to the bottom.

They do not collect this into ſcratch-pans, as at many of the other works, but they rake it up to one ſide of the pan, and take it out; they there add a piece of butter, and continue the fire moderately ſtrong till the ſalt is granulated. They keep a briſker fire on this occaſion at Lymington than in moſt of the other works; ſo that they will work three pans in twenty-four hours. See Salt.

YEZDEGERDIC *year*. See *Perſian* Year.

YGROMETER. See Hygrometer.

YIELD, or *Slack the* Hand, in the *Manege*. See Slack.

YIELDING *and paying*, a law-phraſe, formed by corruption from the Saxon *geldan*, or *gildan*, *to pay*. Hence, in Domeſday, *gildare* is frequently uſed for *ſolvere*, *reddere*; the Saxon *g* being eaſily converted into a *y*. See Geld, and Gild.

YIN, a word uſed by ſome of the chemical writers to expreſs verdigriſe.

YNCA, Yncan, or Inca, an appellation anciently given to the kings of Peru, and the princes of their blood; the word ſignifying literally, *lord*, *king*, *emperor*, and *royal blood*.

The king himſelf was particularly called *capac ynca*, i. e. great lord. His wife, *pallas*, and the princes ſimply *yncas*. Theſe *yncas*, before the arrival of the Spaniards, were exceeding powerful. Their people revered them to exceſs, as believing them to be ſons of the ſun, and never to have committed any fault. If any perſon offended the royal majeſty in the ſmalleſt matter, the city he belonged to was totally demoliſhed.

When they travelled, whatever chamber they lay in on the road, was walled up as ſoon as they departed, that nobody might ever enter in after them. The like was done to the room wherein the king died; in which, likewiſe, all the gold, ſilver, and precious furniture, were always immured, and a new apartment was built for his ſucceſſor.

His beloved wives, domeſtics, &c. likewiſe ſacrificed themſelves, and were buried alive in the ſame tomb along with him. See the Hiſtory of the Yncas, by Garcilaſſo de la Veſia. See Inca.

YOAK, or Yoke, in *Agriculture*, a frame of wood, fitted over the necks of oxen; whereby they are coupled together, and harneſſed to the plough, &c. See Plough.

It conſiſts of ſeveral parts, as the *yoke*, properly ſo called, which is a thick piece of wood, lying over the neck; the *bow*, which compaſſes the neck about; the *ſtitchings* and *wreathings*, which hold the bow faſt in the *yoke*; and the *yoke-ring* and *ox-chain*.

Yoak, *jugum*, in *Antiquity*. The Romans made the enemies they ſubdued paſs under the *yoke*, which they called *ſub jugum mittere*; that is, they made them paſs under a ſort of *furcæ patibulares*, or *gallows*, conſiſting of a pike, or other weapon, laid acroſs two others planted upright in the ground. This done, they treated them with humanity enough, and ſent them home again. See Furca.

The ſame meaſure was ſometimes dealt them by their enemies upon the ſame occaſion. Thus Cæſar, lib. ii. obſerves, that the conſul L. Caſſius had been killed by the Swiſs, and his army defeated, and made to paſs under the *yoke*.

Yoak *of land*, *jugata terræ*, in our *Ancient Cuſtoms*, was the ſpace which a *yoke* of oxen, that is, two oxen, may plough in one day. See Hide, Yard-*Land*, &c.

YOCKLET. See Jocklet.

YOKE, in *Sea-Language*, a name formerly given to the tiller, when communicating with two blocks or ſheaves affixed to the inner end of the tiller. It is now applied to a ſmall board or bar which croſſes the upper end of a boat's rudder at right angles, and having two ſmall cords extending from its oppoſite extremities to the ſtern-ſheets of the boat, whereby ſhe is ſteered as with a tiller. Falconer.

YOIDES, in *Anatomy*. See Hyoides.

YOLK, or Yelk, in *Natural Hiſtory*, the yellow part in the middle of an egg.

The chicken is formed out of, and nouriſhed by, the white alone, till it be grown to ſome bulk: after which, the *yolk* ſerves it for nouriſhment; which it likewiſe does, in part, after it is hatched. For a good part of the *yolk* remains after excluſion; being received into the chicken's belly: and being there reſerved, as in a ſtorehouſe, is by the ductus inteſtinalis, as by a funnel, conveyed into the guts, and ſerves inſtead of milk. Willughby's Ornithol. lib. i. cap. 3.

This was even known to Pliny: *Ipſum animal ex albo liquore ovi corporatur: cibus ejus in luteo eſt*. lib. x. cap. 53.

YORK, *cuſtom of*. See Rationabili *parte bonorum*.

YOUNG. See Generation, Conception, Gestation, Embryo, Foetus, Delivery, Child, &c.

In the army, that regiment, or officer, is ſaid to be the *younger*, *junior*, which was laſt raiſed, or whoſe commiſſion is of lateſt date, whatever be the age of the man, or however long he may have ſerved in other capacities.

YOUNKERS, among *Sailors*, are the *younger* ſailors, otherwiſe called *foremaſt-men*; whoſe buſineſs is to take in the top-ſails, furl the ſails, ſling the yards, &c.

YOUTH, *adoleſcence*. See Age, and Adolescence.

The renovation of *youth* has been much ſought after by chemical adepts; and many of them pretended to various ſecrets for this purpoſe: but unluckily the death of the pretenders proved a ſufficient refutation of their doctrine. Paracelſus talks of the mighty things he could do with his *ens primum*; and even Mr. Boyle tells us ſome ſtrange things about the ens *primum* of balm. Boyle's Works abr. vol. i. p. 75. But Mr. Boyle gives theſe wonderful ſtories on the credit of a French chemiſt, and not on his own.

Youth, *Juventus*, or Juventas, in the *Pagan Theology*, a goddeſs worſhipped among the Romans, who, together with the gods Mars and Terminus, kept her place in the Capitol along with Jupiter, when the other deities were turned out: whence the Romans drew a lucky omen for the durableneſs of their empire. Mem. Acad. Inſcrip. vol. i. p. 71. ſeq.

This ſtate of life was, by the ancients, compared to autumn. In which ſenſe, Horace ſpeaking of one approaching to puberty, ſays,

Jam tibi lividos
Diſtinguet autumnus racemos,
Purpureo varius colore.

The moderns, on the contrary, when they ſpeak of one in the autumn of his age, mean one that is upon the decline; and chuſe rather to uſe the compariſon of the ſpring, to denote *youth*.

YPSILOIDES, ὑψιλοειδης, in *Anatomy*, the third genuine ſuture of the cranium; thus called from its reſembling a Greek *y*, or upſilon.

Some alſo call it λαμϐδοειδης, *lambdoides*.

There is alſo a bone at the root of the tongue, called *ypſiloides*, and hyoides.

YQUETAYA, in *Natural Hiſtory*, a plant growing in Braſil, long uſed as a medicine in that country; and lately diſcovered to the Europeans by a French ſurgeon.

It has been ſince found in France; where being cultivated and examined by Marchant, it appears to be no other than the common water-betony, or ſcrophularia aquatica.

It has this remarkable property, that it takes away from ſena all its ill taſte and ſmell; which property of correcting the infuſion of ſena was before wholly unknown.

To uſe this plant, it muſt be dried ten or twelve days in the ſhade, and afterwards expoſed to the ſun, till quite dry.

YS, in *Ichthyology*, a name given by Athenæus and ſome other of the Greek writers, to the fiſh called *mus* and *ſus* by others. It is the capriſcus of later writers. See Goat-*Fiſh*.

YSAMBRA, a word uſed by ſome as a name for hellebore, and by others to expreſs a ſpecies of poiſon prepared in Spain, of which hellebore is an ingredient.

YSARD, in *Zoology*, a name given to the chamois.

YSOPUS, a term uſed by ſome to expreſs the chemical art of ſeparation.

YSPAR, a name by which ſome of the chemical writers call iron.

YTZAIMPATLI, in the *Materia Medica*, a name given by ſome to the cevadilla, or *hordeum cauſticum*, the *cauſtic Indian barley*.

YUCCA, *Indian*, or *Adam's needle*, *yucca*, in *Botany*, a genus of the *hexandria monogynia* claſs. Its characters are theſe: the flower has no empalement; it has a bell-ſhaped flower compoſed of ſix large petals, whoſe tails are joined, and ſix ſhort reflexed ſtamina terminated by ſmall ſummits, and an oblong three-cornered germen, longer than the ſtamina, having no ſtyle, crowned by an obtuſe ſtigma with three furrows; the germen afterwards turns to an oblong three-cornered capſule, divided into three cells, filled with compreſſed ſeeds lying over each other in a double arrangement. There are four ſpecies.

YXIR, a word uſed by ſome of the old chemiſts, to expreſs any thing good in medicine.

YZQUAUHTLI, in *Ornithology*, the Indian name for a bird deſcribed by Nieremberg, and called the *creſted* EAGLE.

YZQUIEPATL, in *Zoology*, the name of an American animal of the weaſel-kind, with a ſhort ſlender noſe; ſhort ears and legs; black body, full of hair; long tail, of a black and white colour; its length from noſe to tail is about eighteen inches. It inhabits Mexico, and perhaps other parts of America. It lives in the caves and in the hollows of rocks, where it breeds, and brings up its offspring. It feeds on worms, beetles, and other inſects, and ſmall animals: when purſued, it breaks wind backward with an inſupportable ſtench. See CONEPATL.

Profeſſor Kalm was one night in danger of being ſuffocated by one that was purſued into a houſe where he ſlept; and it affected the cattle ſo, that they bellowed through pain.

Another, which was killed by a maid-ſervant in a cellar, ſo affected her with its ſtench, that ſhe lay ill for ſeveral days; and all the proviſions in the place were tainted to ſuch a degree, that the owner was obliged to throw them away.

Nevertheleſs, the fleſh is reckoned good meat, and not unlike that of a pig: but it muſt be ſkinned as ſoon as killed, and the bladder taken carefully out. Pennant.

Z.

Z, The laſt letter in the alphabet, and one of the double conſonants, both among the Latins and Greeks.

Its pronunciation is much more ſoft and obtuſe than that of the *x*; which makes Quintilian call it *jucundiſſima*, and *dulciſſima*. Nevertheleſs, the ſound was not always the ſame as it is now; which is but, as it were, half that of an *s*: or, that, expreſſed by its name *izzard* or *s hard*, of an *s* uttered with cloſer compreſſion of the palate by the tongue, as *freeze*, *froze*.

It had ſomething originally in it of the d; but only what ſounded very ſmoothly: thus, *Mezentius* was pronounced as if it had been *Medſentius*, &c.

The Z had alſo an affinity with the g: thus Capella; z *à Græcis venit, licet etiam ipſi primo* g *Græca utebantur.*

Z begins no word originally Engliſh; although it is found in the Saxon alphabets, ſet down by grammarians, it is read in no word originally Teutonic. Johnſon.

Z was alſo a numeral letter, ſignifying two thouſand; according to the verſe:

Ultima Z tenens, finem bis mille tenebit.

When a daſh was added at the top $\overline{Z}$, it ſignified two thouſand times a thouſand.

This letter formerly ſtood as a mark for ſeveral ſorts of weights. Sometimes it ſignified an ounce and half, and very frequently it ſtood for half an ounce: ſometimes for the eighth part of an ounce, that is, a dram Troy-weight; and it has in earlier times been uſed to expreſs the third part of an ounce, or eight ſcruples.

On French coins Z denotes thoſe ſtruck at Grenoble.

ZZ; theſe letters were uſed by ſome of the ancient phyſicians, to expreſs myrrh. At preſent they are often uſed to ſignify *zinziber*, or *ginger*.

ZAARA, a word uſed by the Arabian phyſicians, to expreſs the *vigilia morboſa*, or continual watchings of perſons in many illneſſes.

ZACINTHA, in *Botany*, a ſpecies of *lapſana*. See NIPPLE-*wort*.

This is what has uſually been called by authors *chicorium verrucoſum*, the wart gum-ſuccory.

ZACYNTHUS, an epithet uſed by the ancients to a liquid bitumen, from the iſland Zant.

ZADURA, in the *Materia Medica* of the ancients, a name given to a foreign root, which was round and ſmooth and of the colour of ginger.

It was at that time imported from the Indies, and greatly eſteemed in peſtilential caſes.

ZAFFABEN, a word uſed by ſome of the chemical writers to expreſs putty.

ZAFFER, ZAFFRE, or SAFFRE, in *Chemiſtry*, is the reſiduum of COBALT, after the ſulphur, arſenic, and other volatile matters of this mineral have been expelled by calcination: ſo that it is a kind of calx of cobalt, of a grey or reddiſh colour. It is uſed to produce a very fine blue colour, when it is melted with fuſible and vitrifiable matters.

The blue colour produced by the vitrification of *zaffer* proceeds from the earth or calx of a ſemi-metallic ſubſtance contained in cobalt, called by chemiſts *regulus of cobalt*. This is proved by melting *zaffer* with a reducing flux, like any other roaſted ore, by which means the regulus will be obtained. The ſcoria in this fuſion has alſo a blue colour, proceeding from a portion of the calx of the regulus that is not reduced, but is vitrified together with the ſcoria. The calx, therefore, or metallic earth of the regulus of cobalt, is the ſole cauſe of the blue colour produced by *zaffer*.

But as this is contained in cobalt in various quantities, ſome *zaffers* produce more blue than others. The heterogeneous, fixed matters contained in cobalts contribute, according to their quantity, not only to the greater or leſs intenſity of the blue colour, but alſo to its luſtre and beauty; and, therefore, thoſe who manufacture *zaffer* from cobalt make frequent eſſays of the roaſted ore, by mixing it with vitreous matters, in order to diſcover the intenſity and beauty of the blue colour.

Good cobalt calcined would form too deep a blue, and almoſt a black glaſs, if it were not previouſly mixed with a certain quantity of vitreous fritt. In the manufacture of *zaffer*, therefore, the calx of cobalt, the ſtrength of which has been determined by previous eſſays, is mixed with ſuch a quantity of ſand, or of powdered flints and quartz, that with the addition of ſome ſaline flux, a deep blue glaſs may be formed. See COBALT.

The *zaffer* that is commonly ſold, and which comes from Saxony, is a mixture of calx of cobalt with ſome vitrifiable earth: it is of a grey colour, and ſome *zaffers* are clearer than others, according to the intenſity of the colour, which they are capable of producing.

Zaffer is employed in the manufacture of pottery and of porcelain, for painting the ſurface of the pieces of ware, upon which it is applied, together with ſome ſaline flux, previouſly to the baking or glazing, that the ſame fire may vitrify this colouring material.

The blue of *zaffer* is the moſt ſolid and fixed of all the colours that can be employed in vitrification; it ſuffers no change from the moſt violent fire. It is ſucceſsfully employed to give ſhades of blue to enamels, and to the cryſtal glaſſes made in imitation of ſome opake and tranſparent precious ſtones, as the lapis lazuli, the turquois, the ſapphire, and others of this kind. Chem. Dict.

To prepare *zaffer* for uſe in the glaſs-trade, put it in groſs pieces into earthen pans, and let it ſtand half a day in the furnace; then put it into an iron ladle to be heated red-hot in the furnace; take it out while thus hot, and ſprinkle it with ſtrong vinegar: and when cold, grind it on a porphyry to an impalpable powder, then throw this into water in glazed earthen pans; and when it has been well ſtirred about, let it ſettle, and pour off the water: repeat this waſhing often, and the foulneſs of the *zaffer* will be thus wholly ſeparated. Dry the powder, and keep it for uſe.

ZAFFRAMEN, a word uſed by ſome medical writers, to expreſs ſaffron.

ZAFFRAM, a word uſed often in authors to expreſs ſaffron, but ſometimes as the name of other things of a yellow colour; thus ochre was called by this name.

ZAFRANIA, in *Colours*, a term uſed by the Greeks, to expreſs the yellow of ſaffron. The barbarous writers of the after-ages, tranſlated it into the Latin *crocietas*, or ſaffron-colour.

The later Greek writers only uſe it, and they have taken it literally from the Arabians, Avicenna and Serapio. This was a term uſed by them to expreſs the colour of the fine bole-armenic of Galen, which they tell us ſtained paper to a fine and beautiful gold-colour.

ZAGI. See ZEGI.

ZAGU, in the *Materia Medica*, the name given by ſome authors to the ſago-tree, the *todda pauna*, or, *palma fructu pruniforme*.

ZAHIA, a word uſed by the Arabian phyſicians, to expreſs a ſort of dyſentery, in which there was a very large diſcharge of blood from the rectum, attended with an evident ſenſation of abraſion, or pain in the bowels.

ZAIBAC, one of the many names by which the ancient chemiſts have called mercury.

ZAIDIR, a name by which ſome of the chemical writers, have called verdigriſe, or the ruſt of copper; and others, the metal itſelf; and ſome braſs.

ZAIM, a portion of land allotted for the ſubſiſtence of a horſeman in the Turkiſh militia; called alſo *timar*. See TIMARIOT.

ZAIN, in the *Manege*. A horſe is called in French *zain*, that is of a dark colour, neither grey nor white, and without any white ſpot or mark upon him.

ZAIRAGIA, or ZAIRAGIAH, a kind of divination in uſe among the Arabs; performed by means of divers wheels, or circles, placed concentric to one another, and noted with ſeveral letters, which are brought to anſwer to each other, by moving the circles according to certain rules.

This is alſo called *zariah*, becauſe the circles of this machine, which are called *mutazariat*, *laſlak*, &c. are intended to correſpond to the orbs of the planets, and the atmoſpheres of the ſeveral elements.

ZAKEPH GADHOL, *rex pauperrimus*, one of the Hebrew ACCENTS, ſometimes denoting no kind of pauſe, and marked over a letter thus (ב֕).

ZAKEPH-*katen rex*, one of the Hebrew accents, conſtituting either a *comma* or ſemicolon, and marked over a letter thus (ב֔).

ZAMECH, a name given by ſome writers to the lapis lazuli.

ZAMIA, in *Botany*, a genus of *palmæ* in Linnæus's Appendix; the characters of which are, that the fructification is obſcure, and the ſtructure of the flowers like that of the *equiſetum*. There is one ſpecies.

ZAMPOGNA, in the *Italian Muſic*, is uſed to denote any inſtrument that ſounds like a flute; and particularly a bagpipe, being an aſſemblage of divers pipes of different ſizes. It is alſo taken for a common flute.

ZANNA, the name of a medicinal earth, deſcribed by Oribaſius; he ſays, it is found in Armenia, in that part which borders on Cappadocia; and that it is very drying and of a pale colour, and eaſily diſunited by water, falling into a fine powder like lime.

It is called by the natives *zarina*, and the mountain from which it is taken is near the city Baganona. It is of a drying and aſtringent nature.

ZANNICHELLIA, *triple-headed pond-weed*, in *Botany*, a name given by Micheli, to a genus of plants of the *monoecia monandria* claſs; called by others *algoides*, *aponogeton*, and *gramine folia*. The characters are theſe: it produces diſtinct male and female flowers, which always ſtand very near one another; the male flower has neither cups nor petals, but conſiſts only of one erect ſtamen or filament, which is conſiderably long, and is terminated by an oval anthera: the female has a bellied perianthium, compoſed of one leaf divided into two at the end; there are no petals; the piſtil has corniculated germina, with as many ſimple ſtyles with plain ſtigmata of an oval figure; the ſeeds follow theſe, and are as many in number as there were horns or germina; they are oblong, pointed at each end, and gibbous on one ſide, and are covered with a ſkin or rind. There is one ſpecies.

ZANONIA, in *Botany*, the name of a genus of plants of the *dioecia pentandria* claſs. The characters are theſe: it produces ſeparate male and female flowers; in the male flower the cup is a perianthium, compoſed of three leaves of an oval figure, expanding every way, and ſhorter than the flower; the flower is monopetalous, but divided into five ſegments, and has an open mouth; the ſegments are jagged, and are equal in ſize, and bend backwards; the ſtamina are five filaments of the length of the cup, ſtanding open at their ends, and terminated by ſimple apices; the female flowers grow on ſeparate plants, and have the cup and flower the ſame as in the male, only that the cup ſtands upon the germen of the piſtil; this germen is oblong, and from it are propagated three reflex conic ſtyles; the ſtigmata are bifid and curled; the fruit is a long and very large berry, truncated at the end, and very ſmall at the baſe; it contains three cells, and has a curled ſuture near the apex; the ſeeds are two; they are of an oblong figure, and flat. There is one ſpecies.

ZANTHENES, in *Natural Hiſtory*, a name given by the ancients to a foſſile ſubſtance found in Media. Pliny quotes Democritus for ſaying, that if rubbed in palm-wine and ſaffron, it became ſoft as wax, and yielded a very ſweet ſmell.

ZANTHOXYLUM, in *Botany*. See TOOTH-*ach Tree*.

ZAPATA, or SAPATA, a kind of feaſt, or ceremony, held in Italy, in the courts of certain princes, on S. Nicholas's day, wherein people hide preſents in the ſhoes or ſlippers of thoſe they would do honour to; in ſuch manner, as to ſurpriſe them on the morrow, when they come to dreſs.

The word is originally Spaniſh, *capato*; and ſignifies a ſhoe, or ſlipper.

It is done in imitation of the practice of S. Nicholas; who uſed, in the night-time, to throw purſes of money in at the windows, to marry poor maids withal.

F. Meneſtrier has deſcribed theſe *zapatas*, their origin, and different uſages, in his Treatiſe des Ballets Anciens & Moderns.

ZAPHOR, a name given by ſome writers to ZAFFER.

ZARFA, in *Botany*, a name given by Leo Africanus, and others, to the *lotus*, or nettle-tree.

ZARIFU, a word by which ſome of the chemical writers have expreſſed tin.

ZARNAB, in the *Materia Medica*, a term uſed by Avicenna and Serapio to expreſs the CARPESIA of the ancient Greeks.

ZARNACH, the ſame as the word ZARNICH; the name of the orpiment of the Arabians.

It was not confined however to this ſenſe alone, but was uſed as a name for other things uſed in painting, and particularly for the *lapis armenus*. However, Dioſcorides and Theophraſtus call the *lapis armenus* by the name of *armenion*, and the *zarnach* by that of *arrenecon*, that is orpiment.

ZARNICH, in *Natural Hiſtory*, the name of a genus of foſſils, the characters of which are theſe: they are inflammable ſubſtances, not compoſed of plates or flakes, but of a plain, ſimple, and uniform ſtructure, not flexile nor elaſtic, ſoluble in oil, and burning with a whitiſh flame, and noxious ſmell like garlic.

That theſe foſſils are really ſulphurated arſenics is evident from ſundry experiments. When ſet on fire, the arſenical, as well as the ſulphureous ſmell, is plainly diſtinguiſhable. If triturated with quickſilver, and expoſed to a ſuitable heat, the ſulphur is detained by the mercury, and a pure white arſenic ſublimes. A mixture of fixt alkaline ſalt, with any vegetable or animal ſubſtance, as the compound called by the aſſayers black flux, in like manner keeps down the ſulphur, and at the ſame time revives the arſenic into its reguline or metallic form. Theſe native minerals have been uſed as medicines in the eaſtern countries, and by ſome imprudently recommended in our own. Lewis.

Of this genus there are four known ſpecies; a red one, which is the true SANDARACH; a yellow one found in the mines of Germany, and brought to us under the name of orpiment; a greeniſh one, common alſo in the mines of Germany, and ſold in our colour ſhops under the name of a coarſe orpiment; it is alſo found in the tin-mines of Cornwall; and a whitiſh one, which has the property of turning black ink into a florid red, common in the mines of Germany, but of little value. Hill's Hiſt. Foſſ. p. 406.

ZARUTHAN, in *Surgery*, a word uſed by ſome to expreſs a hard and unequal tumor of the breaſt, attended with a burning heat, and a violent but not continual pain.

This is by ſome referred to the cancer, and accounted a ſpecies of that terrible diſorder: its cauſe is ſuppoſed to be a ſharp ichorous humour in the blood.

ZAUROS, in *Ichthyology*, a name given by the ancient Greeks to that fiſh which we call SAURUS and LACERTUS, and which is called at Rome the *tarantula*.

It is diſtinguiſhed by Artedi by the name of the oſmerus, with eleven rays in the pinna ani; and in the Linnæan ſyſtem it is the SALMO *ſaurus*, with ten rays in the pinna ani.

ZEA, in *Botany*. See MAIZE.

In the writings of the ancient Greeks, this word ſometimes is uſed to expreſs the libanotis. Dioſcorides tell us, that the libanotis was by ſome called *zea*, and by others *cachrys*.

The word *zea*, when taken out of this ambiguity, and aſcertained as the name of a corn alone, is yet not certain and determinate in its ſenſe in the various writers; moſt indeed make it the name of the ſpelta, or ſpelt-corn; and this certainly is keeping up to the ſenſe of Dioſcorides, whoſe *zea* is evidently the ſpelt-corn. He mentions two kinds of it, the monococcous and the dicoccous; that is, ſuch as has only one grain or two in a huſk.

ZEAL, ZELUS, Ζηλος, the exerciſe of a warm animated affection, or paſſion, for any thing.

Some will have jealous *zeal* to be properly a mixt, or compound ſenſation, where one affection is raiſed or inflamed by another. On theſe principles, jealouſy may be defined an affection ariſing from love and indignation, which cannor bear a thing to be given to another, that a perſon deſires for himſelf, or one whom he loves and favours. Others make it conſiſt in an eager ſtudy, or deſire, to keep any thing inviolate; or a fervour of mind, ariſing from an indignation againſt thoſe who abuſe or do evil to a perſon beloved.

The Greek philoſophers make three ſpecies of *zeal*. The firſt, of *envy*; the ſecond, of *emulation*, or imitation; the third, of *piety*, or devotion; which laſt makes what the divines call *religious zeal*.

Joſephus ſpeaks much of a party, or faction, called the *Zealous*, or *Zealots*, which aroſe among the Jews during the war with Veſpaſian and Titus. Lib. xiv. cap. 6. Antiq. and lib. iv. cap. 12. de Bello Judaico.

ZEBET, a word uſed by ſome of the chemical writers to expreſs dung.

ZEBLICIUM *marmor*, in *Natural Hiſtory*, a name given by ſeveral authors to a ſoft green marble variegated with black and white; and though the authors who have deſcribed it have not obſerved it, yet it no way differs from the white ophites of the ancients. See Ophites.

ZEBRA, in *Zoology*, is the EQUUS *zebra* of Linnæus, or horſe with a ſhort erect mane; having its head and body ſtriped downward with lines of brown, on a pale buff ground; and the legs and thighs ſtriped croſsways; its tail is like that of an aſs, furniſhed with long hairs at the end; and its ſize is that of a common mule. See *Tab.* V. *Quadrupeds*, N° 66.

This moſt elegant of quadrupeds inhabits the plains, from Congo and Angola, acroſs Africa, to Abyſſinia, and ſouthward as low as the Cape; but on ſight of men, diſappears in the woods. It is called by the Portugueſe *burro di matto*, or wild aſs. Theſe animals are gregarious, vicious, untameable, and uſeleſs: they are very ſwift. The *zebra* will couple with an aſs.

The animal called the female *zebra*, is ſtriped like the former on the head and body, but with fewer lines; the flanks ſpotted, and the rump plain; the ground-colour of the head, neck, body, and rump, a bright bay; the belly, thighs, and legs white, and free from all marks. This animal differs from the female of the *zebra*, not only in its marks, but alſo in being thicker and ſtronger made, and in being more tractable. The Hottentots alſo diſtinguiſh it from the former by the names of *quacha* and *opeagha*. Ray and Pennant.

ZEBU, in *Zoology*, a name given by M. de Buffon to the BOS *Indicus* of Linnæus. See *Tab. Quadrupeds*, N° 6.

ZECHARIAH, or the *Prophecy of Zechariah*, in *Biblical Hiſtory*, a canonical book of the Old Teſtament.

Zechariah was contemporary with Haggai, and propheſied in the ſecond year of Darius Hyſtaſpes. The deſign of the firſt part of this prophecy is the ſame with that of Haggai, viz. to encourage the Jews to go on with rebuilding of the temple, by giving them aſſurance of God's aſſiſtance and protection: from whence the author proceeds to foretel the glory of the Chriſtian church, the true temple of God, under its great high prieſt, and governor Chriſt Jeſus, of whom Zerubbabel and Joſhua the high prieſt were figures. The latter part of the prophecy from chap. ix. probably relates to the ſtate of the Jews under the Maccabees, and then fortels their rejection of the Meſſiah, and ſome remarkable incidents that ſhould happen to them in the latter ages of the world.

Mr. Mede and ſome other learned men think that the 9th, and following chapters of *Zechariah*, are parts of the prophecy of Jeremiah.

ZECHIN, or Zecchino. See Sequin.

ZEDOARY, Zedoaria, a medicinal root, belonging to a plant growing in the Eaſt Indies (the *amomum ſcapo nudo, ſpica laxa truncata*, of Berg. Mat. Med.) whoſe leaves are like thoſe of ginger, only longer and broader. The root is brought over in oblong pieces, about the thickneſs of the little finger, and two or three inches in length; or in roundiſh ones (the *zerumbeth* of the Paris Pharmacopeia) about an inch in diameter; it is of an aſh-colour on the outſide, and white within. The difference of theſe, in ſtrength, if any, is very inconſiderable, and, therefore, the college allows both to be uſed indiſcriminately.

This root has an agreeable ſmell, and a bitteriſh aromatic taſte. It impregnates water with its ſmell, a ſlight bitterneſs, a conſiderable warmth and pungency, and a yellowiſh brown colour; the reddiſh-yellow ſpirituous tincture is in taſte ſtronger, and in ſmell weaker, than the watery. In diſtillation with water, it yields a thick ponderous eſſential oil, ſmelling ſtrongly of the *zedoary*, in taſte very hot and pungent: the decoction, thus deprived of the aromatic matter, and concentrated by inſpiſſation, proves weakly and diſagreeably bitter and ſubacrid. A part of its odorous matter riſes alſo in the inſpiſſation of the ſpirituous tincture; the remaining extract is a very warm, not fiery, moderately bitter aromatic, in flavour more grateful than the *zedoary* in ſubſtance.

Zedoary root is a very uſeful warm ſtomachic; and has been commended in colics, and hyſteric affections, for promoting the menſes, &c. It has been employed by ſome as a ſuccedaneum to gentian root; but from the above analyſis it appears to be not entirely ſimilar to that ſimple bitter; its warm aromatic part being the prevailing principle, in virtue of which its ſpirituous extract (the moſt elegant preparation of it), is made an ingredient in the cordial confection of the London Pharmacopeia. Lewis's Mat. Med.

The *zedoary* waſh, which is a cooler yellow than ſaffron, though full as bright, and valuable for many purpoſes in painting with water-colours, may be prepared by boiling an ounce of the root in a quart of water, till the water is ſufficiently tinged to make a ſtain on paper, of a full yellow colour; and ſtraining the liquor through a linen filtre. This waſh may be dried in ſhells, and will again diſſolve and ſpread kindly with the addition of water.

ZEFR, a word by which ſome of the chemical authors expreſs pitch.

ZEGI, or Zagi, a word uſed by Avicenna and others, to expreſs all the ſeveral vitriolic minerals. See Chalcitis, and Colcothar.

ZEHERECH, a word uſed by ſome of the chemical writers to expreſs flowers of braſs.

ZEITRABRA, a term uſed by ſome of the chemiſts to expreſs any thing that is fluxile.

ZELEM, in the *Materia Medica of the Ancients*, a name given by Avicenna and others to a fruit common in Africa in their time, and much eſteemed by the people of that country, and called there by ſome *piper nigrorum*, the black people's pepper, or negro-pepper.

Avicenna tells us, that the *zelem* was a fattiſh ſeed, of the ſize of a chich, and of a high flavour, in colour yellow on the outſide, and white within, and that it was brought from Barbary.

He adds, that there was another plant, properly called *fulful alſuaden*, that is, PIPER *nigrorum*. This, he ſays, was a ſeed contained in pods like kidney-beans, and was black, and of a pungent and acrid taſte.

ZELPHI. See Zenda.

ZEMA, a word uſed by many of the old writers for a decoction or apozem.

ZEMASARUM, a word uſed by ſome of the chemical writers as a name for cinnabar.

ZEMECH, a word uſed by ſome writers as a name for *lapis lazuli*.

ZEMIA, Ζημια, among the *Athenians*, is ſometimes taken in a large and general ſenſe for any kind of puniſhment; but more frequently for a pecuniary mulct or fine laid upon the criminal, according to the degree of his offence.

ZEMPHYRUS, in the *Materia Medica of the Ancients*, a name given to a precious ſtone, the fragments of which they uſe as a cordial and ſudorific.

It appears by their accounts, that this ſtone was blue; and hence many have too haſtily judged, that it was the *lapis lazuli*; but in truth it was the SAPPHIRE.

The word *zemphyrus* is no where uſed, but in the writings of the later Greeks, and it is plainly formed, as moſt of their names of things are, on the Arabian word, expreſſing the ſame thing. This Arabian word is *ſemphir*; and this, in Avicenna and Serapio, is always uſed as the name of a ſapphire, never as that of any other gem. We find alſo by their accounts, that this ſapphire was not the ſapphire of the ancient Greeks; but the fine blue pellucid gem we now know by that name; for the ſapphire of Theophraſtus, and the other old writers, was only a kind of *lapis lazuli*.

ZENDA, a general term coined by Paracelſus, by which he and his followers expreſs extraneous or equivocal generation, or the production of bodies without a ſeminal principle. The word *zerunda* is uſed to expreſs this particular ſort of generation of men, and *zelphi* in regard to other animals.

ZENDAVESTA, by contraction Zend, and, as it is vulgularly pronounced *Zundaveſtow* and *Zund*, in *Antiquity*, denotes the book, aſcribed to Zoroaſter, and containing his pretended revelations; and which the ancient Magians and modern Persees, called alſo Gaurs, obſerve and reverence in the ſame manner, as the Chriſtians do the Bible, and the Mahometans the Koran, making it the ſole rule both of their faith and manners.

The word, it is ſaid, originally ſignifies any inſtrument for kindling fire, and is applied to this book to denote its aptitude for kindling the flame of religion in the hearts of thoſe who read it.

It has been much diſputed, among learned writers, and ſtill remains undetermined, who Zoroaſter was, and in what age he lived. The learned Dr. Hyde, and after him Dr. Prideaux and ſeveral others, are of opinion, that Zoroaſter was the ſame with the Zerduſht of the Perſians, who was a great patriarch of the Magians, and that he lived between the beginning of the reign of Cyrus, and the latter end of that of Darius Hyſtaſpis. See Magi.

Dr. Warburton (Legation, vol. ii. part i. p. 8.) cenſures Hyde and Prideaux for making an early Bactrian lawgiver to be a late Perſian falſe prophet, and ſays this whole ſtory of him is mere fable, contradicting all learned antiquity, and ſupported only by the romantic relations of later Perſian writers under the caliphs.

Dr. Baumgarten likewiſe (Anc. Un. Hiſt. Suppl. vol. ii. p. 365, &c.) repreſents it as doubtful, whether the Perſian Zoroaſter ever exiſted, calls in queſtion the credibility of the oriental writers who give his hiſtory, and makes the whole to be a forgery in later times by the fire-worſhippers of Perſia.

The learned Mr. Bryant (Anal. Anc. Mythol. vol. ii. p. 107.) obſerves, that there are more perſons than one ſpoken of under the character of Zoroaſter; though there was one principal, to whom it more truly related. Of men, ſtyled Zoroaſter, he ſays, the firſt was a deified perſonage, reverenced by ſome of his poſterity, whoſe worſhip was called Magia, and the profeſſors of it Magi. This worſhip was tranſmitted from the ancient Babylonians and Chaldeans to the Perſians, who, ſucceeding to the ſovereignty of Aſia, renewed under their princes, and particularly under Darius the ſon of Hyſtaſpes, thoſe rites which had been in a great degree effaced and forgotten. The Perſians, ſays this learned writer, originally derived their name from the deity Perez, or Parez, the ſun; whom they alſo worſhipped under the title of Zor-Aſter. Under occaſion of the diſtreſs to which they were reduced upon the death of their laſt king Yeſdegerd, they retired into Gedroſia and India, where people of the ſame family had for ages reſided, and carried with them ſome ſhattered memorials of their religion in writing, whence the Sadder, Shaſter, Vedam, and *Zendaveſta*, were compiled: and upon theſe the religion of the Brahmins and Perſees is founded. The perſon who is ſuppoſed to have firſt formed a code of inſtitutes for this people is ſaid to have been one of the Magi, named Zerduſht; the ſame, as Hyde and others ſuppoſe, both in character and name with Zoroaſter: but Mr. Bryant diſcovers no reſemblance between them. There were, indeed, many perſons of this name in different parts of the world, who were magi or prieſts, and denominated from the rites of Zoroaſter, which they followed. We read of an Aſſyrian, Medo-Perſian, Proconneſian, Bactrian, Pamphylian, Chineſe, &c. Zoroaſter, ſuppoſed by Dr. Hyde to have been one and the ſame. But Mr. Bryant thinks that their reſpective hiſtories furniſh evidence ſufficient of their being different perſons; and beſides, there ſeems to have been one perſon more ancient and celebrated than the reſt. As for the Zoroaſter or Zerduſht of Hyde, he lived in the reign of Darius, the father of Xerxes, about the time of the batte of Marathon, and conſequently not a century before the birth of Eudoxus, Xenophon, and Plato. This Zerduſht, who was the renewer of the Sabian rites, could not be the perſon ſo much celebrated by the ancients, and referred to the firſt ages. Xanthus Lydius makes him above ſix hundred years prior to the reign of Darius. Suidas places him five hundred years before the war of Troy; Hermadorus Platonicus, Hermippus, and Plutarch refer him to five thouſand years before that æra. Eudoxus ſuppoſed him to have flouriſhed ſix thouſand years before the death of Plato. And Pliny places him many thouſand years before Moſes. Upon the whole it appears, that no memorial upon record is placed ſo high as the ancient writers have carried this perſonage; and though their accounts are for the moſt part exaggerated, yet they fully aſcertain the antiquity of this perſon.

The title Zoroaſter, Mr. Bryant conceives, originally belonged to the ſun, and was metaphorically beſtowed on ſacred and enlightened perſonages. Some have thought that the firſt among men to whom this title was applied was Ham; others have taken him for Chus, for Mizraim, and for Nimrod, and Huetius for Moſes. But Mr. Bryant, after examining the primitive characters given of him by different writers, ſuppoſes that they concur only in Noah, who was the firſt deified mortal, and the prototype in the Magian worſhip. This writer ſuppoſes, that, as the object of the Perſic and Chaldaic worſhip was the ſun, and moſt of their titles were derived thence, Zoroaſter denoted Sol Aſterius; Zor being the ſun, and aſter ſignifying ſtar.

The abbé Foucher, in a long ſeries of memoirs, inſerted in the 25th, 26th, 27th, 28th, 30th, and 31ſt volumes of the Hiſtoire de l'Academie Royale des Inſcriptions et Belles Lettres, &c. Paris, has given an ample account of the religion of the Perſians. This learned author maintains, on the authority of Pliny, that the moſt celebrated Zoroaſter was an ancient ſage, who lived under Cyaxares, king of the Medes, reſtored the worſhip of fire, was revered by the Perſians as a celeſtial prophet, and whoſe extacies, prodigies, and revelations, made a great noiſe in the world. The Zoroaſter, who was the author of the *Zend*, the abbé repreſents as an apoſtate Jew, a ſubtle philoſopher, and an obſequious artful courtier, who inſinuated himſelf into the favour of Darius Hyſtaſpis; and he ſays that his great deſign was to reconcile the Hebrew with the Perſian religion by a mixture of the leading and eſſential doctrines of each, to revive the credit of the Magi, and to accommodate, by a proper colouring, the Jewiſh religion to the weakneſs and prejudices of the Medes and Perſians, by taking from it that excluſive character that rendered it offenſive to other nations, and mixing with it the viſions and reveries of the ancient Zoroaſter. M. Anquetil du Perron, to whoſe account we ſhall refer more at large in the ſequel of this article, has taken pains, in the 37th volume of the above cited work, to prove that Zoroaſter lived under Hyſtaſpes, the father of Darius, in the ſixth century before Chriſt.

The *Zendaveſta*, or *Zend*, contains the ſyſtem of doctrine and duty, which is ſaid to have been ſupernaturally communicated to Zoroaſter, and which his followers hold in very extraordinary veneration. A copy of this book is kept, ſays Dr. Prideaux, to this day in every oratory and fire-temple, and portions of it are read at ſtated times by the prieſts to the people: and to this they appeal as the ſtandard of the good and evil of their actions.

Dr. Hyde gives us the following account of it. The *Zend* is the general name of the book, which is alſo called the book of Abraham; and it conſiſts of twenty-one or twenty-two ſeparate parts, with diſtinct names. Its contents were originally written on twelve hundred ſkins; and the ancient copies of it, like the original, are in the pure old Perſian language; but the later copies are in the ſame language, mixed with modern Perſic or Arabic words, ſerving to explain ſuch as were becoming obſolete. Some part of the *Zend* contain the original text, and others contain Zerduſht's ſecond thoughts ſubjoined, for more fully explaining his doctrine. Some writers ſuggeſt, that Zerduſht firſt intended to compriſe his book in four parts, viz. the *Zend* containing the liturgy and chief doctrine of his religion, and the *Pazend*, or commentary upon the former; and that the farther additions were occaſioned by the oppoſition of adverſaries, and unforeſeen circumſtances that occurred. The character in which the *Zend* is written is that of the old Perſian, called Pehlavi; and the Pazend character differs in a ſmall degree from this.

Dr. Hyde has given a catalogue of the ſeveral parts of the *Zend*, each of which is called *noſh* or *nuſh*.

In proceſs of time, when the old Perſian language became antiquated, and little underſtood, one of their deſtours, or biſhops (about A. D. 1500.) compoſed the *Sadda*, which is a compendium, in the vulgar or modern Perſic tongue, of thoſe parts of the *Zend* that relate to religion, or a kind of code of canons and precepts, drawn from the theological writings of Zoroaſter, ſerving as an authoritative rule of faith and practice for his followers. This Sadda is written in a low kind of Perſic verſe, and, as Dr. Hyde informs us, it is *bonorum & malorum farrago*, having many good and pious things, and others very ſuperſtitious and trifling.

The *Zend* contains a reformed ſyſtem of Magianiſm; teaching that there is a ſupreme Being, eternal, ſelf-exiſtent, and independent, who created both light and darkneſs, out of which he made all other things; that theſe are in a ſtate of conflict, which will continue till the end of the world; that then there ſhall be a general reſurrection and judgment; and that juſt retribution ſhall be rendered unto men according to their works; and that the angel of darkneſs with his followers ſhall be conſigned to a ſtate of everlaſting darkneſs and puniſhment, and the angel of light with his diſciples introduced into a ſtate of everlaſting light and happineſs; after which light and darkneſs ſhall no more interfere with each other. The *Zend* alſo enjoins the conſtant maintenance of ſacred fires and fire-temples for religious worſhip, the diſtinction of clean and unclean beaſts, the payment of tithes to prieſts, which are to be of one family or tribe, a multitude of waſhings and purifications, reſembling thoſe of the Jewiſh law, and a variety of rules and exhortations for the exerciſe of benevolence and charity.

Dr. Prideaux charges the *Zend* with allowing the worſt kind of inceſt, and Dr. Hyde alſo intimates that it was allowed by Zoroaſter, till it was at length aboliſhed; but no authority has been cited to juſtify this charge.

The above mentioned doctrines of the *Zend* are accommodated to the eaſtern taſte by a great intermixture of fable.

In this book there are many paſſages evidently taken out of the Scriptures of the Old Teſtament, particularly out of the Pſalms of David: the author repreſents Adam and Eve as the firſt parents of all mankind, gives in ſubſtance the ſame account of the creation and deluge with Moſes, differing indeed with regard to the former by converting the ſix days of the Moſaic account into ſix times, comprehending in the whole three hundred and ſixty-five days; and ſpeaks alſo of Abraham, Joſeph, Moſes, and Solomon. Moreover, Dr. Baumgarten (Univ. Hiſt. Suppl. vol. ii. p. 367, &c.) aſſerts, that this work contains doctrines, opinions, and facts, actually borrowed from the Jews, Chriſtians, and Mahometans; whence, and from other circumſtance, he concludes, that both the hiſtory and writings of this prophet were probably invented in the later ages, when the fire-worſhippers under the Mahometan government thought fit to vindicate their religion from the ſuſpicion of idolatry. See Hyde's Religio Veterum Perſarum. Prideaux's Conn. of the Old and New Teſtament, vol. i. p. 317, &c. edit. 9th. Univ. Hiſt. vol. ii. p. 206, &c. fol.

The account lately given both of the Perſees and *Zend*, by M. Anquetil du Perron, differs in ſeveral particulars from that of Dr. Hyde, This gentleman made a voyage to India, and employed himſelf between the years 1755 and 1761, in ſtudying the Perſic and Samſcretam languages, and in collecting and tranſlating manuſcripts, many of which he brought with him, and depoſited in the king of France's library. His account was read to the Royal Academy of Sciences at Paris, and a tranſlation of it was publiſhed in the Gentleman's Magazine for 1762, and alſo in Dodſley's Annual Reg. for 1762, part ii. p. 101—127. Of the Perſees or Parſſes, the diſciples of Zoroaſter, he ſays, a very numerous body has been eſtabliſhed more than nine hundred years in Guzarate, to which place they came fugitives from Kirman, A. D. 767, on account of the Mahometan perſecutions, where their genius for commerce and induſtry, which are their known characteriſtics, procured for them very conſiderable ſettlements. Concerning the hierarchy of the Parſſes, this writer obſerves, that their miniſters of religion are divided into five claſſes, viz. erbeds, mobeds, deſtours, deſtour mobeds, and deſtouran deſtours or deſtours of deſtours. An erbed is a perſon who has ſubmitted to the purification directed by the law, who has read, during four days without interval, the Izeſchne and the Vendidad, and who is inſtructed in the ceremonies of the worſhip eſtabliſhed by Zoroaſter. If the erbed afterwards continues to read publickly the *Zend* works, which conſtitute the liturgy, and to perform the miniſterial functions, he becomes a mobed, though he does not underſtand the *Zendaveſta*; but if he contents himſelf with ſtudying the law, the *Zend* and the Pehlvi, without exerciſing the miniſterial functions, he is called a deſtour.

The deſtour mobed is he who unites the qualifications of the mobed and deſtour; and the deſtouran deſtour is the principal deſtour of a city or province, who decides caſes of conſcience, and determines points of law, and to whom the Parſſes pay a tythe of their revenues.

As for thoſe *Zend* writings, which the Parſſes attribute to their legiſlator, and for which they have the ſame veneration as the Jews have for their Hebrew text, M. du Perron inclines to think, though he does not affirm, that they are really the works of Zoroaſter, whoſe reputation has been acquired by laws that have ſubſiſted two thouſand five hundred years.

The law, which was either framed or regulated by Zoroaſter, was divided, as we are told by modern authors, into twenty-one noſks, or parts: ſeven treat of the creation and hiſtory of the world; ſeven of morality, and civil and religious duties; and ſeven of phyſic and aſtronomy. Among the Parſſes it is an univerſally received tradition, that Alexander the Great condemned theſe twenty-one volumes to the flames, after having cauſed them to be tranſlated into Greek. Thoſe which eſcaped are the Vendidad, the Izeſchne, the Viſſpered, the Jeſchts, and the Neaeſchs, in *Zend*, and ſome other Pehlvic tranſlations of *Zend* originals. The Parſſes have alſo a great number of prayers, which they call nerengs, and which in general are written in modern Perſic, with *Zend* characters, which they affect to uſe in all writings that treat of religion, though compoſed in modern Perſic.

The writings of Zoroaſter, which ſtill remain, ſpeak of the creation of the univerſe, of the terreſtrial paradiſe, and the diſperſion of mankind; of the cauſe of the reſpect paid to fire, of the origin of evil, natural and moral; of the angels appointed to the government of the univerſe: of ſeveral particulars relating to the end of the world, and the reſurrection, &c. &c. They alſo contain predictions with reſpect to the latter times, ſome excellent moral precepts, and a very extenſive ceremonial code.

The *Zend*, according to Du Perron, is not the name of Zoroaſter's writings, but merely of the characters, though generally uſed to ſignify the language itſelf, in which they were written; the language of the original text is called *Aveſta*, and is a dead language, and was entirely unknown to the Parſſes before the time of Zoroaſter, who, he apprehends, brought it from the mountains; and is totally different from the Pehlvi or ancient Perſic, ſpoken in the time of Zoroaſter. He farther ſuppoſes, that the works of Zoroaſter, ſtill extant in the Pehlvi, were tranſlations made into that language during the life of this legiſlator, or ſoon after his death.

The Pahzend, which Dr. Hyde makes to be the name of a work, is, according to Du Perron, the name of a language, which is a dialect or corruption of the Aveſta, and almoſt extinct, except that a few words of it are preſerved in the Pehlvic tranſlation. The characters of the Aveſta and Pehlvi are different; the former, which are properly the *Zend* letters, being much the neateſt, the Pahzend has no peculiar alphabet, but adopts that of the *Zend* or Pehlvic indifferently. For M. du Perron's account of the eighteen MSS. of which he brought duplicate copies with him, and an abſtract of their contents, we muſt refer to the Ann. Reg. &c. ubi ſupra.

This writer has publiſhed a tranſlation of the *Zend-aveſta*, with remarks and illuſtrations, &c. in 3 vols. 4to. at Paris, in 1771. Some, indeed, have queſtioned the authenticity of the work which he has tranſlated, or its being a genuine remain of Zoroaſter.

Mr. Richardſon, in his Diſſertation on the Languages, Literature, and Manners of the Eaſtern Nations, originally prefixed to his Perſian, Arabic, and Engliſh Dictionary, 1778, (chap. i. ſect. 2.) is very ſevere both on Dr. Hyde and M. Du Perron. Thoſe fragments of the ſuppoſed works of Zoroaſter, which Dr. Hyde has given us, under the title of *Sodder*, are, he ſays, the wretched rhymes of a modern Parſi deſtour or prieſt, who lived about three centuries ago; whilſt the publications of M. Anquetil Du Perron carry palpable marks of the total or partial fabrication of modern times. The *Zend* language, he ſays, is not genuine; and M. Du Perron has produced no diſcovery which can ſtamp his publication with authority.

He adds, the ſpecimens of old Perſian in Hyde's Religio Vet. Perſ. are ſimply modern language in ancient characters.

In the Memoirs of the Royal Society of Gottingen for 1779, i. e. Commentationes Societatis Regiæ Scientiarum Gottengenſis, &c. vol. ii. we have a memoir by M. Chriſtopher Meiners, who enters into a critical examination of the authenticity and antiquity of the books publiſhed by M. Anquetil Du Perron, as genuine writings of Zoraſter; and alledges many plauſible arguments to prove them recent and ſpurious. He ſhews, that they contain a multitude of fables, totally unknown to the ancient Perſians, and contrary to the ſpirit of their laws and religion; and alſo many opinions and ceremonies, which had their firſt riſe many ages after Zoroaſter.

Some have thought, that the truths which are obſervable in *Zend-aveſta*, Vendidad Sadi, and other writings of the Eaſtern nations, were derived from the diſciples of Neſtorius, who were found very early on the coaſt of Malabar. But this, Mr. Bryant thinks, is a groundleſs ſurmiſe; becauſe the religious ſects, among which theſe writings have been preſerved, are widely ſeparated, and moſt of them have no connexion with Malabar or the Chriſtians of that quarter. And beſides, the Brahmins and Banians adhere cloſely to their own rites, and abhor all other perſuaſions: and they are influenced by cuſtoms and ſcruples, which prevent their intercourſe with other people. In their writings there occurs no trace of Chriſtianity, or of its founder: and thence Mr. Bryant infers, that whatever truths may be found in the writings of theſe people, they were derived from a higher ſource, and by a different channel. See Anal. of Anc. Mythology, vol. iii. p. 599, &c.

We ſhall terminate this article with adding, that Dr. Hyde preſented the copy of part of the *Zend* writings in his poſſeſſion to the univerſity of Oxford; and that the whole *Zend* was afterwards brought from India by Mr. Frazer, and is lodged with his other oriental MSS. in the Radcliff library at Oxford.

ZENECHDON, a term uſed by the Arabian phyſicians for a preparation of arſenic, for external uſe; *zeech* being their name for arſenic.

ZENEXTOR, one of the many names by which the chemiſts have called mercury.

ZENGIFUR, a word by which ſome of the chemical writers have expreſſed cinnabar.

ZENI, a word uſed by many of the chemical writers as a name for vitriol.

ZENICON, the name of a poiſon, compoſed of ſeveral ingredients, and uſed to poiſon the tips of the arrows with which the Celtic hunters ſhot at the beaſts they purſued for food. The poiſon was known to be of that quick ſpreading nature, that as ſoon as the beaſt was fallen, the huntſman ran up to it, and cut out a large piece of the fleſh about the wound, immediately to hinder the venom from ſpreading farther. The antidote to this poiſon was ſuppoſed to be the leaves of oak, beech, and other trees.

ZENITH, in *Aſtronomy*, the vertical point; or a point in the heavens directly over our head.

Or, the *zenith* is a point, as Z (*Tab. Aſtronomy, fig.* 52.) in the ſurface of the ſphere; from which a right line, drawn through the ſpectator's head, paſſes though the centre of the earth.

Hence, there are as many *zeniths* as there are different places on earth, where the heavens may be ſeen: and, upon the changing of our place, we alſo neceſſarily change our *zenith*.

The *zenith* is alſo called the *pole of the horizon*, becauſe it is ninety degrees diſtant from each point thereof.

It is alſo the pole of all the almucantars, or parallels of the horizon, whereby the altitude of the ſtars is eſtimated.

Through the *zenith* paſs the vertical circles, or azimuths.

The point diametrically oppoſite to the *zenith*, is called the *nadir*; which is the point directly under our feet.

The nadir is the *zenith* to our antipodes; as our *zenith* is the *nadir* to them.

ZENITH-*diſtance* is the complement of the ſun's or a ſtar's meridional altitude; or, it is what the meridian altitude wants of ninety degrees.

ZENITH is alſo a word uſed by ſome medical writers to expreſs the firſt appearance of the menſes in young women.

ZENSUS, in *Arithmetic*, a name which ſome authors give to a ſquare number, or the ſecond power.

The higher powers they call *zenſizenſus*, *zenzicubus*, *zenſizenzenſus*, *zenſurdeſolidus*, &c. See POWER.

ZENUPH, in the *Jewiſh Antiquities*, a kind of tiara worn by the kings of Judah. See CIDARIS.

ZEOLYTE, *Zeolites*, in *Natural Hiſtory*, a name given by Mr. Cronſtedt to a ſtone deſcribed by him in the Tranſactions of the Academy of Sciences at Stockholm for 1756, the peculiar properties of which have induced that mineralogiſt to conſider it as forming a diſtinct order of earths, called *zeolites*.

According to Mr. Kirwan, it is a ſpecies of argillaceous earth, compoſed of argill united to two, three, or eight times its weight of ſilex, about half its weight of pure calcareous earth, and from once to twice its weight of water, without any iron except by accident.

This ſtone is found of different degrees of tranſparency, or perfectly opake, either colourleſs, whitiſh, yellowiſh, greeniſh, or reddiſh; its ſhape is either pyramidical, columnar, tabular, oval, capillary, or amorphous; its texture either granular, ſcaly, or radiated; the filaments diverging, as from a central point, or indiſtinguiſhable.

The *zeolite* that conſiſts of particles of no determinate form, is either pure and white, or mixed with ſilver and iron, which latter kind is of a blue colour, and is commonly called *lapis lazuli*.

The ſparry *zeolyte* reſembles calcareous ſpar, but is more brittle, and of a light red, or orange-colour.

The cryſtallized *zeolyte* is found in groups of cryſtals, under the form of white or yellow balls, conſiſting of many pyramids with their apices uniting in the centre, or of white priſms with truncated angles, or of white capillary cryſtals.

The ſpecific gravity of *zeolyte* is from 2,1 to 3,15. It is a little harder than the fluors, and calcareous ſpars; it does not give fire with ſteel; it diſſolves very ſlowly, and without effervescence, in acids, as in oil of vitriol and ſpirit of nitre; but when concentrated vitriolic acid is poured on powdered *zeolyte*, a heat ariſes, and the powder is changed into a gelatinous maſs; though this property is not peculiar to *zeolyte*, and there are ſome few ſtones of this kind that do not become gelatinous: when expoſed to a ſtrong heat it dilates and ſwells, more or leſs, according to the proportion of water contained in it, and afterwards melts, without addition, more or leſs eaſily according to the proportion of calcareous earth, into a frothy ſlag, which cannot, without great difficulty, be rendered ſolid and tranſparent; and in the moment of fuſion it yields a phoſphoric light.

Cryſtallized *zeolyte*, when melted, boils, as borax does: it may be diſſolved in the fire more eaſily by mineral alkali than by borax, or by the fuſible ſalt of urine: it does not effervesce with the fuſible ſalt of urine as calcareous ſtones do, nor with borax as gypſeous ſtones do.

The dilatability of *zeolyte* is the ſureſt criterion whereby to diſtinguiſh it. *Zeolyte* has in the fire nearly the ſame properties as boles have.

There is a ſiliceous *zeolyte*, which is white, and found at Mæſſiberg, differing from the argillaceous genus only in its giving fire with ſteel. Dict. Chem. Eng. ed. Cronſtedt's Miner. ſect. 108. Kirwan's Miner. p. 95. 125.

ZEOPHILOS, a word uſed by Quercetan as the name of an antimonial medicine.

ZEOPHYRUM, in the *Materia Medica*, the name of the *triticum æſtivum*, or *hordeum nudum*, as it is called by ſome authors, the naked barley.

ZEPHANIAH, a canonical book of the Old Teſtament, containing the predictions of Zephaniah, the ſon of Cuſhi, and grandſon of Gedaliah; being the ninth of the twelve leſſer prophets. He propheſied in the time of king Joſiah, a little after the captivity of the ten tribes, and before that of Judah; ſo that he was contemporary with Jeremiah. He propheſies chiefly againſt Judah; who continued very corrupt, notwithſtanding the king's pious zeal for reformation, and the good example he gave to his ſubjects.

ZEPHYRI *fœtus*, a term uſed by Hartman, and ſome other writers, to expreſs a mole, or falſe conception.

ZEPHYRUS, or ZEPHYR, Ζεφυρος, the weſt wind; a wind blowing from that cardinal point of the horizon oppoſite to the eaſt.

The poets perſonify it, and repreſent *Zephyrus* as the mildeſt and moſt gentle of all the deities of the woods: the character of his perſonage is youth and gentleneſs.

It is alſo called *Favonius*, and *occidens*; and, by many, has been confounded with the *Africus*.

ZERDA, in *Zoology*, a name given by the Moors to an animal which inhabits the deſert of Saara, extending beyond mount Atlas.

Pennant claſſes it under the genus of dog; and deſcribes it as having a pointed viſage, long whiſkers, large bright black eyes, very large ears of a bright roſe-colour, internally lined with long hairs, and orifice ſo ſmall, as not to be viſible, probably covered with a valve or membrane; legs and feet like thoſe of a dog, and taper tail; its colour is between a ſtraw and pale brown; its length from noſe to tail ten inches, its ears three inches and a half long, tail ſix, and height not five. It burrows in the ſandy ground, and is ſo exceſſively ſwift, that it is very rarely taken alive; feeds on inſects, eſpecially locuſts; ſits on its rump; is very vigilant; barking like a dog, but with a ſhriller ſound, and chiefly in the night; and is never obſerved to be ſportive.

Mr. Buffon ſays of this animal, that it is found to the ſouth of the Palus Tritonides, in Lybia; that it has ſomething of the nature of the hare, and ſomething of the ſquirrel, and that it lives on the palm-trees, and feeds on the fruits. Pennant's Hiſt. Quadrupeds, vol. i. p. 248. See *Tab.* V. *Quadrupeds*, *fig.* 67.

ZERICHUM, a name given by ſome of the chemical writers to arſenic.

ZERNA, a word uſed by ſome of the chemical writers to expreſs an ulcerated lepra or impetigo; the chemical authors uſe it alſo as a name for the foulneſſes which they call the *lepræ metallorum*, or leproſies of metals.

ZERTA, the *zerte*, a fiſh caught in the rivers of Italy, and ſome other places, of the figure of the chub, and called by authors, *capito anadromus*, and the *blike*. It ſeldom grows to more than two pounds weight, and, at times, lives in rivers, at times in the ſea; and is eſteemed a very well taſted fiſh, eſpecially a little before the ſeaſon of its ſpawning. Ray.

The *zerte* is that ſpecies of cyprinus deſcribed by Geſner and others under the name of *capito anodromus*.

ZERUMBETH, in the *Materia Medica*. See ZEDOARY.

ZEST, the woody, thick ſkin, quartering the kernel of a walnut. Some phyſicians preſcribe this *zeſt*, dried, and taken with white wine, as a remedy againſt the gravel.

The word is alſo uſed for a chip of orange or lemon-peel; ſuch as is uſually ſqueezed into ale, wine, &c. to give it a flavour; or for the fine thin oil that ſpurts out of that peel on ſqueezing it.

Hence, to *zeſt* an orange or lemon, among confectioners, is to cut the peel from top to bottom into ſmall ſlips, as thin as poſſible; or, to *zeſt*, is to ſqueeze the peel over the ſurface of any thing.

ZESTOLUSIA, a term uſed by ſome medical authors to expreſs bathing in warm water, by way of diſtinction from *pſuchroluſia*, or bathing in cold water.

ZETA, or ZETECULA, a little cloſet, or withdrawing-chamber, with pipes running along the walls, to receive from below either the cool air, or the ſteam of warm water.

The word is formed either from ζηειν, *to be warm*; or of ζην, *vivere*, *to live*, on account of the uſe made hereof for love and enjoyment.

ZETETÆ, Ζητηται, among the *Athenians*, were officers appointed upon extraordinary occaſions, to enquire after the public debts, when, through the neglect of the receivers, or by other means, they were run up to large ſums, and began to be in danger to be loſt, if not called in.

ZETETICE, Ζητητικη, formed from ζητεω, *I ſeek*, or ZETETIC *method*, in *Mathematics*, the method made uſe of to inveſtigate, or find the ſolution of a problem.

The ancient Pyrrhonians were ſometimes called *Zetetici*, q. d. *ſeekers*.

ZETUS, a word uſed by ſome of the chemical writers as a name for vitriol.

ZEUGITÆ, Ζευγιται, among the *Athenians*, the third claſs of the people, or thoſe who had an eſtate of two hundred medimns.

ZEUGMA, Ζευγμα, literally denoting a joining together; from ζευγνυω, *I join*, a figure in *Grammar*, whereby an adjective, or verb, which agrees with a nearer word, is alſo, by way of ſupplement, referred to another more remote.

Thus Terence, *Utinam aut hic ſurdus, aut hæc muta facta ſit.* So Virgil, *Hic illius arma, hic currus fuit.* In which caſes, the words *facta ſit* agreeing primarily with *hæc muta*, are alſo made to agree or extend to *hic ſurdus*: and the verb *fuit* is not only referred to *hic currus*, which it properly reſpects, but farther, to *hic illius arma.*

Of this ſpecies of ellipſis, which differs from the ELLIPSIS properly ſo called, in that the word which is to be underſtood once or oftener, has been already mentioned, Meſſieurs De Port Royal enumerate three ſorts, viz. when we repeat the noun or verb in the ſame manner it has been already expreſſed; or, when the word expreſſed cannot be repeated without receiving ſome alteration, in gender, caſe, number, or perſon; or when, after a word which includes the whole, a diſtribution of the parts is made without repeating the verb. Latin Gram. vol. ii. p. 183.

The Latins, it may be here obſerved, take a liberty in conſtructions, which ſome of the nicer critics among the moderns, particularly the French, will not allow in the modern tongues.

ZEUS, in *Ichthyology*, a genus of fiſh, of the order of the *thoracici*, the characters of which are, that the head is compreſſed and declining; the upper lip is fornicated by means of a tranſverſe membrane; the tongue is awl-ſhaped; the branchioſtege membrane has ſeven perpendicular rays, the loweſt placed tranſverſely; and the body is compreſſed. There are four ſpecies; viz. the VOMER, the *gallus* or ABACATUAIA, the *faber* or DOREE, and APER.

ZIBELLINA. See Sable.

ZIBETHUM, or Zibeta, in *Natural Hiſtory*, *civet*, a perfume contained in a bladder, in the groin of a civet-cat. See Civet.

ZIBIBIÆ, in *Natural Hiſtory*, a name given by ſome authors to a large ſort of raiſins, reſembling the ſtones of dates in ſhape; they have much pulp, but very little moiſture.

ZICCARA, a name of an Indian fruit, reſembling a pine-cone, and containing twenty, thirty or more, kernels, of no known uſe in medicine.

ZIDRACH, in *Natural Hiſtory*, the name given by Cuba, and ſome other authors, to that ſpecies of the ſyngnathus of Artedi, commonly called the HIPPOCAMPUS.

ZIFIUS, in *Ichthyology*, a name given by Albertus to the *xiphias*, or SWORD-*fiſh*.

ZIGER, a word uſed by ſome of the old writers, to expreſs a very fine kind of caſſia, extremely aromatic to the taſte, and of a purpliſh black colour.

ZIGURELLA, in *Ichthyology*, the name by which ſome have called the JULIS, a ſmall but very beautiful fiſh, common about Genoa, and in ſome degree approaching to the nature of the turdus or wraſſe.

It is a ſpecies of the *labrus*, according to Artedi, and is diſtinguiſhed by the name of the *palmaris labrus*, with two large teeth in the upper jaw.

ZIMENT-*water*, or Copper-*water*, in *Natural Hiſtory*, the name by which ſome have called water found in places where there are copper-mines, and lightly impregnated with particles of that metal.

The moſt famous ſpring of this kind is about a mile diſtant from Newſol in Hungary, in the great copper-mine called by the Germans, *herrn grundt*.

The water in this mine is found at different depths, and is received into baſons, for the purpoſe of ſeparating the copper from it: in ſome of theſe it is much more ſated with this metal than in others, and will make the ſuppoſed change of iron into that metal much ſooner. The moſt common pieces of iron uſed in the experiments, are horſe-ſhoes, nails, and the like; and they are found very little altered in ſhape, after the operation, except that their ſurfaces are more raiſed.

The water appears greeniſh in the baſon, where it ſtands; but if a glaſs of it be taken up, it looks clear as cryſtal: it has no ſmell, but a ſtrong vitriolic aſtringent taſte, inſomuch that the lips and tongue are bliſtered and ſcorched upon taſting it.

The miners are well acquainted with the virtues of this water, in changing the metals; but they alſo uſe it as a medicine; whatever ſickneſs they are ſeized with, they firſt attempt its cure by a large doſe of this water, which uſually both vomits and purges them very briſkly.

They alſo uſe it in diſorders of the eyes, in ſome of which it muſt be of great power; but in others, it is very improper; ſo that upon the whole, they do more harm than good with it.

The copper produced from theſe waters is valued by the people much beyond any other copper, as being much more ductile, and running eaſier in the fire; the people in the neighbourhood have many veſſels of it; but it is to be obſerved, that its ductility and hardneſs increaſe after it is taken out of the water, for while immerſed in it, it is friable.

It is obſerved, that after great rains the ſprings are always fuller than at other times, and the virtues of the water conſiderably leſs.

A pound of this water, when ſtrongeſt, evaporated over a gentle fire, becomes firſt turbid, and afterwards depoſits a yellowiſh ſediment, which, evaporated to dryneſs, weighs two ſcruples and a half; and when warm water is poured upon this and filtred, ſix grains of yellowiſh earth will be left in the filter; and the greeniſh ſolution being again evaporated to a pellicle, and the operation being ſeveral times repeated, ſomewhat more than two ſcruples of a bluiſh-green vitriol will be ſeparated in ſmall cryſtals.

A ſmall quantity of oil of tartar being added to a pound of this water, the whole becomes turbid, and on filtration leaves a large reſiduum in the filtre, which, dried, weighs about two ſcruples and a half, and is found to be a cupreous vitriol, with a ſmall mixture of a neutral ſalt. If a pint of this water be put into a bottle, and a ſmall piece of iron thrown into it, bubbles will appear on the iron, which will gradually be changed to a copper-colour. On the ſecond day the water will be turbid, and afterwards whitiſh, and white filaments will gather about the bottom and ſides of the glaſs, and about the iron, which will appear throughout of a coppery-colour. From theſe experiments we may eaſily underſtand what the true nature of the water is; that it contains a large quantity of vitriol of copper, which it probably owes to a ſolution of that metal, by means of the acid of the common pyrites and water; when this is known, the effects are not difficultly accounted for, there being no real change of one metal into another; but the true ſtate of the caſe being that the particles of one metal are diſſolved and carried away, and thoſe of another metal depoſited in their place. A water thus impregnated is a menſtruum capable of diſſolving iron, and in the ſolution of that metal becomes ſo weakened as to let go the copper it before contained, in ſmall parcels. This is ſeen to be the caſe, by examining the changed metal while it lies in the water, the copper then appearing not a ſoft malleable and even maſs, but a congeries of granules, cloſely placed together, and reſembling the ſmall granules, or ova, in the ſpawn of fiſhes; and it is very friable and fragile while in this ſtate.

This ſolution of one metal and depoſition of the particles of another in its place, is a thing very familiar in chemiſtry, and is ſeen every day in numerous inſtances; but in none ſo familiar as in a like caſe, or ſolution of iron and copper in the ſame menſtruum. Thus, if a piece of copper be diſſolved in aqua fortis, and when this ſolution is perfected a piece of iron be thrown into the liquor, the ſame thing will be ſeen that is in this ſpring, for the iron will be diſſolved, and the copper which was before diſſolved in the menſtruum will be ſlowly precipitated and depoſited in the place of it. Phil. Tranſ. Nº 479. p. 355, &c. See on this ſubject the articles Copper, and Vitriol.

ZIMEX, a word uſed by ſome of the old chemical writers, for verdigriſe.

ZINARIA, a word uſed by the Arabians, for a kind of vitiated bile, called æruginous bile.

ZINC, or Zink, in *Natural Hiſtory*, a ſemi-metal, of a brilliant white colour, approaching to blue; called alſo *ſpelter* and *tutenag*.

Zinc, *hiſtory of*. This ſemi-metal was not known, ſo much as by name, to the ancient Greeks and Arabians. The name firſt occurs in Theophraſtus Paracelſus, though the origin of the appellation is unknown. Agricola calls it *contreſayn*; Boyle, *ſpeltrum*; by others it is denominated *ſpeauter*, and Indian tin. Albertus Magnus, who died in 1280, is the firſt who makes expreſs mention of this ſemi-metal, calling it golden marcaſite, and aſſerting that it approaches to a metallic nature, and that it is inflammable. J. Mattheſius, in 1562, mentioned a white and a red *zinc*; but the yellow and red colours are only to be underſtood of the ores. The eaſtern Indians have been long in poſſeſſion of the method of extracting pure *zinc* from the ore; at leaſt, in the courſe of the laſt century. This metal was brought from them into Europe. Jungius mentions the importation of *zinc* from India in 1647; and a metal of this kind, under the name of TUTENAG, is ſtill brought from thence, which, however, muſt be carefully diſtinguiſhed from the compound metal of that name. G. E. Van Lohneiſs informs us, in 1617, that a long time before *zinc* had been collected by fuſion at Goſlar. It has, indeed, been for a long time uſual to form orichalcum from the ores of *zinc*, by the addition of copper; but it does nor appear when this art was invented. Pliny (Hiſt. Nat. xxx. cap. 2.) mentions the orichalcum, and alſo three ſpecies of Corinthian vaſes, one of which is yellow, and of the nature of gold. Eraſmus Ebner, of Norimberg, in 1550, was the firſt who uſed the cadmia of Goſlar for this purpoſe. In 1721, Henckel mentioned, that *zinc* might be obtained from lapis calaminaris, by means of phlogiſton; but he conceals the method. In 1735, Brandt proved, that the pſeudo-galena contained *zinc*. In 1742, or, as others ſay, in 1738, Anton. Van Swab extracted it from the ores, and particularly from the Bolognian pſeudo-galena, which poſſeſſes a metallic ſplendor, by diſtillation, at Weſterwick, in Dalecarlia; which was afterwards effected, in larger quantity, by Meſſrs. Cronſtedt and Rinman. The baron Funch, in 1744, determined the preſence of *zinc* in pſeudo-galena, from the flame and the flowers. The celebrated Margraaf, not knowiug what had been done by the Swediſh mineralogiſts, publiſhed, in 1746, a method of performing this operation, which he had diſcovered. It is alſo ſaid, that Dr. Lawſon firſt publicly aſſerted and demonſtrated, that *lapis* CALAMINARIS was the ore of *zinc*. Till Margraaf ſhewed the method of extracting *zinc* from calamine, all Europe was ſupplied with this ſemi-metal either from India or from Germany. However, a manufactory of this metallic ſubſtance has not many years ago been eſtabliſhed in our own country, and the copper-works near Briſtol have ſupplied Birmingham with *zinc* extracted from calamine. From the works erected by Van Swab in Sweden, the eſtabliſhers of our Engliſh manufactory probably derived the hint; and Dr. Watſon ſays (Chem. Eſſ. vol. i. p. 45.) that he has been well informed, that they purchaſed the ſecret from him when he was in England.

Zinc, *chemical properties of*. *Zinc* is the moſt malleable of all the ſemi-metals; and, when well furniſhed with phlogiſton, in the manner propoſed by Margraaf, it poſſeſſes a ſemi-ductility, which renders it capable of being flattened into thin plates. This property, joined to its hardneſs, prevents its being pulveriſed, like the other ſemi-metals; and, therefore, when it is required in a divided ſtate, it muſt be melted and granulated, or filed, like metals.

Zinc, when broken, appears to conſiſt of many flat, ſhining plates, which are larger when ſlowly than when haſtily cooled. When heated, it is very brittle. Like tin, it crackles when it is bent. Its ſpecific gravity is from 6,9 to 7,24. According to Muſchenbroeck's table of ſpecific gravities, Indian *zinc* is to water, as 7,2401 to 1; and *zinc* of Goſlar as 7,215 to 1. *Zinc*, like tin, is not eaſily calcined or covered with ruſt by the action of air or water; it is leſs fuſible than tin and lead, but melts at a lower heat than ſilver or copper. In the degree of heat juſt neceſſary for its fuſion, its ſurface is reduced to a grey calx; but in a moderate white heat, it flames, and exhibits a very beautiful and brilliant appearance, owing to the phlogiſton of *zinc*, which is very combuſtible; and it ſublimes into a light white calx, called *flowers of* ZINC.

Mr. Malouin relates, that *zinc* being melted ſix times, and the fuſion continued fifteen hours each time, it became more and more hard, brittle, unfuſible, and uncalcinable. He ſays, that its colour became grey after the ſecond fuſion, brown after the third, black after the fourth, blue like a ſlate after the fifth, and a clear violet colour after the ſixth.

This ſubſtance, being the moſt combuſtible of all metals, detonates more violently than any other metal with nitre.

Zinc, in its metallic form, and in that of the calx or flowers, diſſolves readily in all acids, and precipitates from them almoſt all the other metallic bodies. Six parts of good vitriolic acid, diluted with an equal weight of water, can diſſolve entirely, by help of gentle heat, one part of *zinc*; the neutral ſalt reſulting from this ſolution is cryſtallizable, and called *white* VITRIOL.

Zinc appears to have a ſtronger affinity with vitriolic acid than any other metallic ſubſtance; for by means of this ſemi-metal, the vitriols of copper and of iron may be decompoſed; and yet the vitriol of *zinc*, according to Junker, is decompoſed, and its acid ſeparated, by a leſs heat than the martial vitriol.

Zinc unites more ſtrongly to acids not only than any other metal, but than even ſome earths. Mr. Pott ſays, that it precipitates the earthy baſis from a ſolution of alum; and that *zinc* cannot be precipitated from aqua fortis by crabs-eyes. He alſo ſays, that it may be precipitated by volatile alkali, but that this precipitate is quickly diſſolved. M. de la Laſſone (Hiſt. de l'Acad. Roy. Sc. Paris, for 1775.) eſtabliſhes, what had been before conjectured, viz. the ſolubility of *zinc* in volatile alkali. He proves, that volatile alkali, in a fluid form, diſſolves the filings of *zinc* with efferveſcence, and the flowers of *zinc* without efferveſcence: the alkaline liquor muſt be ſaturated and employed immediately after the volatile alkali has been procured from ſal ammoniac by the intervention of fixed alkali. Hence he was led to examine the nature of this ſemi-metal, and to evince its being totally diſtinct from iron, though it has ſome reſemblance to it, and is ſometimes mixed with it; for in endeavouring to procure Pruſſian blue, by precipitating the *zinc* from its ſolution in volatile alkali, he ſucceeded only when he employed the *zinc* that is the object of commerce, or acids which contained a ſmall portion of iron; whereas the *zinc* that had been previouſly purified in his laboratory, and the acids which had been carefully prepared, yielded no Pruſſian blue.

Mr. Hellot, who has given a very accurate analyſis of *zinc* (Mem. Acad. Sc. Paris, 1735.), has tried the different acid menſtrua upon it with very great care and attention to their effects.

Diſtilled vinegar was firſt tried. Eight ounces of this diſſolved, in ten days time, over a gentle fire, an ounce wanting ſix grains of *zinc*; and after this it ceaſed to act upon the metal any longer, and was ſweetened in the manner of vinegar which has diſſolved lead: this, however, is an experiment not proper to be tried by the taſte, the ſolution being very miſchievous. Six ounces and two drams of an inſipid phlegm were diſtilled from this ſolution, and after this, the fire being increaſed, ſtriæ began to appear on the top of the retort; the receiver being changed, there ſucceeded to theſe ſtriæ a ſublimation of very white and beautiful flowers of *zinc*; and after this a few drops of an oil, yellow at firſt, and afterwards green, came over into the receiver. The diſtillation yielded alſo about four drams of a ſulphureous liquor, inflammable as ſpirit of wine. This liquor being poured into a phial of water, at firſt ſwam upon it, and immediately afterwards blended with it in the manner of ſpirit of wine, and left only the few drops of oil ſwimming on the ſurface. This was reddiſh in colour, and of an aromatic ſmell.

This is the famous liquor called by the chemiſts oil of TALC, and ſuppoſed to have ſo many great virtues, one of which is the fixing of ſilver; that is, in other words, the concentrating of it to the weight of gold, and making it indiſſoluble in aqua fortis, rendering it like gold ſoluble only in aqua regia; but in all probability, this oil is really nothing but the eſſential oil of the grape from which the wine was made, whence the vinegar had been obtained; and then how idle muſt appear all theſe expectations from it.

The flowers ſublimed to the neck of the retort, or head of the cucurbit, during the diſtillation, burnt at the flame of a candle, emitting a fine blue flame. Three ounces of ſpirit of ſalt diſſolve perfectly three drams, except two grains, of *zinc*; a great heat is perceived while this ſolution is making; and this acid, as well as diſtilled vinegar, leaves untouched a ſmall blackiſh reſiduum, from this metal. Some authors have ſuppoſed, that this reſiduum contained mercury; but experiments prove the contrary; and its lightneſs alone makes ſuch a conjecture very improbable.

Mr. Hellot has ſhewn, that it cannot even be reduced into a metallic ſubſtance. Neumann ſays, that this black matter was ſeparated during the ſolution of this ſemi-metal in vitriolic and marine acids, and that two or three days afterwards it was re-diſſolved.

The ſolution, in marine acid, being diſtilled, yielded two ounces of phlegm, two drams of a weak ſpirit of ſalt, of a very agreeable ſmell; and afterwards, on changing the receiver, a few drops of a very acid and yellowiſh ſpirit, and ſome flowers raiſed themſelves to the neck of the retort.

Six ounces of ſpirit of nitre diſſolve five drams and a half of *zinc*, without leaving any remainder; and the remainder left in the ſolutions of it by diſtilled vinegar, and by ſpirit of ſalt, is itſelf ſoluble in this menſtruum. This ſolution being diſtilled, there were ſeparated four ounces of phlegm, and afterwards ſix drams of ſpirit of nitre; this was but very weak, and no more could be raiſed; the ſtronger part of the acid remaining intimately mixed with the *zinc* at the bottom of the veſſel, in form of a viſcous tranſparent ſubſtance, of a yellow orange-colour.

Three ounces of oil of vitriol, with an equal quantity of water, diſſolved ſix drams and twenty grains of *zinc*. When the liquor was thus far ſaturated, there began to be formed regular cryſtals; and after two months ſtanding, the whole liquor was evaporated, and a cake of tranſparent vitriol left in the bottom of the veſſel.

Zinc may be allayed with all metallic ſubſtances, excepting biſmuth and nickel: the allay of *zinc* with iron is not effected without difficulty; but that with copper ſucceeds well, and is much uſed. It has been commonly affirmed, that *zinc* is incapable of uniting with ſulphur; though Mr. Cramer ſays, that if it remains long in a moderate fire, and be covered over with ſulphur at ſeveral times, and continually ſtirred with a poker, it will at laſt be changed into a very brittle, dark-coloured ſubſtance; which the editor of the Chemical Dictionary aſcribes to the iron of the poker, as he has never been able to unite ſulphur with pure *zinc*, when they were ſtirred with a tobacco-pipe. Hence the method of purifying *zinc*, and of aſcertaining its purity, propoſed by Mr. Cramer, is to throw upon it, when melted in a large crucible, ſuet and ſulphur alternately, and the latter in larger quantities than the former. If the *zinc* is pure, the ſulphur burns freely on its ſurface; but if it is allayed, the ſulphur combines with the other metals, and forms with them a kind of ſcoria, which muſt be taken off. This alternate projection of ſuet and ſulphur upon *zinc* is continued till the ſulphur be burnt on the ſurface of the melted *zinc*, without forming any ſcoria.

M. de Morveau, in a late memoir concerning the combination of *zinc* with ſulphur (Nouv. Mem. de l'Acad, de Dijon, part i. for 1783. Paris, 1784.) ſeems to have evinced the poſſibility of diſſolving *zinc* by ſulphur, and of forming, what he calls *la blende artificielle*, not only by the direct combination of ſulphur with calx of *zinc*, but alſo by combining ſulphur with *zinc* in its metallic ſtate.

For the affinities of *zinc*, ſee AFFINITY.

Some authors, as Wallerius and Cronſtedt, ſay, that filings of *zinc* are attracted by magnets. The celebrated Rinman, after calcining the white lapis calaminaris of Aix-la-Chapelle for the ſpace of eleven days, in one of the furnaces uſed for the preparation of ſteel, found that it adhered to the magnet almoſt in the ſame manner as filings of iron.

M. de la Laſſone (Hiſt. Acad. Sc. Paris, for 1772.) endeavours, by a ſeries of experiments, to eſtabliſh a ſtriking reſemblance between *zinc* and the phoſphorus of urine. *Zinc*, expoſed to a conſiderable degree of heat, affords a very dazzling light; during its deflagration, it emits an odour like that of garlic, as phoſphorus does. The fulguration of both depends on a free acceſs of air. *Zinc* and phoſphorus exhibit ſimilar phenomena, in conſequence of the action of the air, or aqueous vapours of the atmoſphere, by which they are decompoſed; the calx, with which the ſurface of *zinc*, expoſed to the air, becomes covered, he ſuppoſes, contains the phoſphoric acid, ſince, on reſtoring phlogiſton to it, it is rendered capable of producing a deflagration, perfectly reſembling that of phoſphorus. Phenomena, in many reſpects ſimilar, likewiſe attend *zinc* and phoſphorus, when expoſed to the action of water. From many other inſtances of reſemblance which he relates, and collateral obſervations, he concludes, that the concentrated phoſphoric acid is contained even in the calx or flowers of *zinc*; that is, after it has loſt the greateſt part of its phlogiſton, in the deflagration. The hypotheſis of M. Laſſone ſeems to be confirmed by the experiments of M. Margraaf, in the Berlin Memoirs for 1746. On mixing the ſal microſcomicus, or fuſible ſalt of urine, which is known to be the baſis of phoſphorus, with lead and tin, and ſubjecting the mixture in cloſe veſſels to a violent heat, he found both the metals conſiderably changed, and the latter, in particular, converted into a ſubſtance reſembling *zinc* in thoſe properties which peculiarly diſtinguiſh it; particularly that of deflagrating *per ſe*.

ZINC, *flowers of*, are the metallic earth of *zinc*, deprived of almoſt all its phlogiſton, and raiſed in light flocks from deflagrating *zinc*.

To make theſe flowers, *zinc* is to be put into a large open crucible, ſet in a furnace which draws air well.—When a white heat is raiſed, the *zinc* kindles and burns with a white, vivid, dazzling flame, accompanied with a conſiderable quantity of white ſmoke. This ſmoke is condenſed in white light flocks, which float all around the laboratory. The greateſt part of them, however, fix themſelves to the ſides of the crucible, and the *zinc*. They have been called by different names: ſome have denominated them TALC, and a ſolution of them in vinegar, *oil of talc*, to which they have attributed very extraordinary qualities. By others they have been called *ſericum*, *aqua ſicca philoſophorum*, *philoſophic cotton* or *wool*, *nihil album*, and *pompholyx*.

Theſe flowers are very fixed, like metallic earths, when well dephlogiſticated, and ſo incapable of being again ſublimed, that they reſiſt the moſt violent fire, and are ſooner melted than ſublimed. They, as well as *zinc* itſelf, are ſoluble in acids, probably becauſe they retain ſome phlogiſton; but they are difficultly reducible into *zinc*, and were believed to be incapable of reduction, till M. Margraaf publiſhed a method of reviving them, by expoſing them to a ſtrong heat together with ſome inflammable ſubſtance, in cloſe veſſels. In the crucible uſed for the preparation of *flowers of zinc*, a conſiderable quantity of them is found fixed to its ſides, and to the ſurface of the *zinc*, if any remains unburnt. Theſe latter flowers, having been produced by the part of the *zinc* which burns leſs vehemently than the reſt, are much leſs white and lighter than the former. Their colour is greyiſh, from a certain quantity of phlogiſton which they contain, *Flowers of zinc* are alſo obtained from furnaces in which minerals containing *zinc* are ſmelted; they adhere in great quantities to the upper part of the internal ſurface of the walls of the furnaces; but as they ſuſtain a great heat, they are half fuſed and agglutinated together, forming maſſes, which muſt be frequently taken off, in order to clear the furnaces. In this ſtate the *flowers of zinc* are called CADMIA *fornacum*, or POMPHOLYX.

By careful management in the operation for producing the *flowers of zinc*, there may be collected a greater weight of flowers than that of the *zinc* employed in the operation. Mr. Pott ſays, that the additional weight is equal to one-tenth part of the ſemi-metal employed.

M. de la Laſſone, in his memoirs on *zinc* above cited, erroneouſly aſcribes the additional weight, which this and ſome other metallic ſubſtances acquire by calcination, to the aqueous vapours in the atmoſphere, which he ſuppoſes to be attracted by them. The true cauſe of their additional weight, firſt ſuggeſted by Jean Rey, in the beginning of the laſt century, has been lately very ſatisfactorily aſcertained by Dr. Prieſtley, and M. Lavoiſier; who have ſhewn, that they acquire it from air, fixed, atmoſpherical, or dephlogiſticated, which they attract from the atmoſphere, and which, in a fixed or ſolid ſtate, becomes a conſtituent part of their ſubſtance. See CALCINATION, and *Potential* HEAT.

The fumes of *zinc* have a ſtrong ſmell of garlic, and are very noxious to the lungs.

ZINC, *ores of, and method of ſmelting them*. The difficulties, occaſioned by the volatile and combuſtible nature of this ſemi-metal, for a long time retarded the diſcovery of the ores containing it; and, therefore, it has been conſidered as compoſed of two or three ingredients. Albertus Magnus thinks iron an ingredient: Paracelſus called it a ſpurious ſon of copper; Lemery maintains it to be a ſpecies of biſmuth; Glauber, and many alchemiſts, conſider it merely as an immature, ſolar ſulphur; Homberg, as a mixture of tin and iron; Kunckel, as a coagulated mercury; Schluter, as tin made brittle by ſulphur, &c.

Zinc has not yet been found native; that which is mentioned by Bomare is ſaid to have been produced by art. The ores containing *zinc* differ much in appearance and properties: Bergman diſtributes them into two claſſes; ſome containing the ſemi-metal deprived of phlogiſton, the others holding it mineralized, either by ſome acids, as the aerial or vitriolic, or united to ſulphur by means of iron. The calciform ores of *zinc*, according to Cronſtedt, are pure or mixed. The pure are indurated, and ſometimes cryſtallized, reſembling lead-ſpar. The mixed ore contains alſo ſome calx of iron: this is calamine, which has been conſidered as the proper ore of *zinc*. It is whitiſh, yellowiſh, reddiſh, or brown. This is not worked directly to obtain *zinc* from it, becauſe the operation would ſucceed only in cloſe veſſels, and conſequently with ſmall quantities; but it is ſucceſsfully employed for the converſion of copper into braſs by cementation, by which the exiſtence of *zinc* in that ſtone is ſufficiently proved.

Zinc is mineralized, 1. By ſulphurated iron, which Cronſtedt calls particularly the ore of *zinc*. Wallerius ſays, that lead is ſometimes contained in this ore: it is white, blue, or brown. 2. By ſulphur, arſenic, and iron, under the names of *blende*, or *ſpeudo-galena*, or *falſe galena*, or *black-jack*. Theſe are of various colours, white, yellowiſh, brown, reddiſh, greeniſh, black. They conſiſt of ſcales, or are teſſelated. Mr. Cronſtedt thinks, that in blends the *zinc* is mineralized in the ſtate of a calx, and in the ore of *zinc*, in its metallic ſtate. The ingenious Mr. Kirwan enumerates four ſpecies of ores of *zinc*; of which, excluding the native, there are the following ones; viz. 1. The calciform, or thoſe mineralized by the aerial acid, of which he deſcribes four varieties: the pure calx of *zinc*, or vitreous *zinc* ore, or *zinc* ſpar, 100 grains of which contain about 65 of the calx of *zinc*, 28 of aerial acid, 6 of water, 1 of iron, and ſometimes a little of ſilex; that mixed with a notable proportion of iron, called *tutenago*, containing, in various ſpecimens brought from China, from 60 to 90 per cent. of *zinc*; the remainder being iron, and a ſmall proportion of argill; that mixed with iron and clay in various proportions, or the *calamine*; the ſpecific gravity of the beſt ſort of which, or the grey, is 5,000, and from 100 parts of which, Mr. Bergman obtained 84 of calx of *zinc*, 3 of iron, 1 of argill, and 12 of ſilex; a good ore of this kind ſhould afford at leaſt 30 per cent. of the calx, and its ſpecific gravity be about 4,400 or 5,000; calamines ſometimes contain a mixture of calcareous earth and lead; and moſt of the Engliſh calamines contain lead; and the fourth variety is zeolytiform, and mixed with a conſiderable proportion of ſilex; of which 100 grains were found, by the analyſis of M. Pelletier of Paris, to contain from 48 to 52 of quartz, 36 of calx of *zinc*, and 8 or 12 of water. 2. *Zinc* mineralized by the vitriolic acid. See Vitriol *of zinc*. 3. *Zinc* mineralized by ſulphur, by means of iron, as the *blende*, *pſeudo-galena*, or *black jack*. Of this he enumerates ſeven varieties, which are generally of a ſcaly texture, and frequently of a quadrangular form; loſing much of their weight when heated, and burning with a blue flame; their ſpecific gravity is inferior to that of galena. Almoſt all contain a mixture of lead-ore; moſt of them exhale a ſulphureous ſmell when ſcraped, or at leaſt when vitriolic or marine acid is dropped upon them. The varieties are the bluiſh-grey, of a metalline appearance, or glanz blende, the black, or peche blende, the red or reddiſh-brown, or rod ſlag of the Swedes, the phoſphoreſcent blende, the greyiſh yellow blende, the white blende, and the yellow blende.

Although the minerals above enumerated have been known, from their property of converting copper into braſs, to be ores of *zinc*, yet the method of eſſaying them ſo as to obtain the contained *zinc*, was not known, or at leaſt not publiſhed, before Mr. Margraaf's Memoir of the Berlin Academy, in 1746, upon that ſubject. He has ſhewn, that *zinc* may be obtained from its ores, from the flowers, or from any other calx of *zinc*, by treating theſe with charcoal-duſt, in cloſe veſſels, to prevent the combuſtion of the *zinc*, which happens immediately upon its reduction, when expoſed to air. For this purpoſe he put a quantity of finely powdered calamine, or roaſted blende, or other calx of *zinc*, well mixed with an eighth part of charcoal-duſt, in a ſtrong luted earthen retort, to which he fitted a receiver. Having placed his retort in a furnace, and raiſed the fire, he applied a violent heat during two hours. When the veſſels were cold and broken, he found the *zinc* in its metallic form adhering to the neck of the retort. The chief difficulty in this operation is to get an earthen retort ſufficiently compact to retain the vapour of the *zinc*, and at the ſame time ſufficiently ſtrong to reſiſt the violent fire, which, according to Mr. Margraaf, the reduction of the ore of *zinc* requires. Mr. Margraaf obſerves, that the *zinc* which he had obtained by this proceſs was leſs brittle than what is obtained from the fuſion of ores; which may proceed from its greater purity, or from its better combination with phlogiſton.

A pretty exact eſſay of an ore of *zinc* may be made in the following manner. Mix a quantity of pulverized roaſted ore, or calx of *zinc*, with an eighth part of charcoal-duſt: put this mixture into a crucible capable of containing thrice the quantity; diffuſe equally among this mixture a quantity of ſmall grains, or thin plates of copper, equal to that of the calamine or ore employed, and upon the whole lay another quantity of grains or plates of copper; and laſtly, cover this latter portion of copper with charcoal-duſt. Lute a lid upon the crucible, and apply a red-heat during an hour or two: the copper, or part of it, will unite with the vapour of the *zinc*, and be thereby converted into braſs. By comparing the weight of all the metal after the operation, with the weight of the copper employed, the weight acquired, and conſequently the quantity of *zinc* united with the copper, will be known. The copper which has not been converted into braſs, or more copper with freſh charcoal-duſt, may be again added in the ſame manner to the remaining ore, and the operation repeated with a heat ſomewhat more intenſe, that any *zinc* remaining in the ore may be thus extracted. It is a curious circumſtance, that a much greater heat is required to obtain *zinc* from its ore, by diſtillation, than in the operation now deſcribed, of making braſs; in which the ſeparation of the *zinc* from it ore ſeems to be facilitated, by its diſpoſition to unite with copper.

Schluter has particularly deſcribed the proceſs for extracting *zinc*, and the cadmia of the furnaces, from the Rammelſberg ore at Goſlar, and an abſtract of his account may be ſeen in the Chem. Dict. art. *Smelting*. But *zinc* is alſo extracted in great works from lapis calaminaris, and calcined blende, by a diſtillation ſimilar to that by which Mr. Margraaf eſſayed ores of *zinc*. The firſt work of that kind was erected in Sweden by Mr. Van Swab, and has been already mentioned: the ore treated was a kind of blende; this ore, when calcined, powdered, and mixed with charcoal, was put into iron or ſtone retorts, and the *zinc* was obtained by diſtillation by *aſcent*. In the manufactory eſtabliſhed at Briſtol, *zinc* is obtained by diſtillation by *deſcent*.

The conſtruction of the furnace for this purpoſe, of which a vertical ſection is exhibited in *Chemiſtry, Tab.* IV. *fig.* 59. nearly reſembles that commonly uſed for the making of glaſs. It is a reverberatory vaulted furnace, the plan of which is circular: the hearth is ſupported by arched pillars: on the hearth ſix large pots, each of which is about four feet high, and contains ſome hundreds of pounds of ore of *zinc*, and of charcoal, or other inflammable matter, are placed in a circular row: two of theſe pots (2, 2) are repreſented in the figure; a circular hole (4) is left in the hearth for the paſſage of the flame from the fire-place into the reverberatory, from which it eſcapes at a hole in the arch (9). In the head of each of theſe pots there is a hole for the introduction of the ore, which hole is ſtopped, during the operation, with a ſtopple of baked earth (1, 1); and there is alſo a hole in the bottom, correſponding with a hole on that part of the hearth on which the pot is placed; through each of theſe latter holes is inſerted an iron tube (3, 3) cloſely luted to the contiguous parts of the pot and hearth of the furnace. The pots are to be filled with the mixture of ore and coal in the following manner: the ſtopple (1) of the mouth of a pot is to be removed, and into this mouth one end of an iron tube or funnel is to be inſerted, through a hole (8) in the vault immediately above the pot, while the other end of the tube or funnel remains without the furnace. Through this tube the mixture of ore and coal is introduced into the pot; then the tube is removed, the ſtopple is fitted and luted with freſh clay to the mouth of the pot, and the hole in the vault (8) is to be covered with a lid. When the ore, thus introduced, is ſufficiently heated, the *zinc* is revived or reduced by the inflammable matter mixed with it, riſes in the ſtate of vapour, which finding no other vent, paſſes down the tube (3). The lower end of this tube (3) being in contact with the external air, is ſufficiently cold to condenſe this vapour of *zinc*; and the *zinc* accordingly flows out of the lower end of the tube in the ſtate of a melted metal, and falls or drops into a veſſel (7) containing water, where it becomes ſolid. Thus *zinc* is obtained from its ores by the kind of diſtillation called *per deſcenſum*. When the diſtillation is finiſhed, which is generally in three or four days, according to the heat applied, the nature of the ore, and other circumſtances, the tube (3) is removed, the reſiduum is thruſt out of the hole in the bottom of the pot by means of an iron bar, or poker, introduced through the opening of the vault (8), and the upper mouth of the pot. When the pot is emptied of the exhauſted ore, the tube (3) is to be replaced, freſh ore and coal are to be introduced in the manner above mentioned, and the operation is to be repeated, without cooling the furnace, or removing the veſſels.

Zinc, in *Medicine*, and the *Arts*. This ſemi-metal has been lately received in the ſhops in its own form; in which, ſays Dr. Lewis, it deſerves a place, as affording preparations ſuperior to the ores or productions of it now made uſe of. A white vitriol, made from pure *zinc*, by diſſolution in the diluted vitriolic acid and cryſtallization, is doubtleſs preferable for medicinal uſe to the common impure white vitriol; and the white flowers, into which it is changed by deflagration, to the very impure calamine and tutty. Moderately pure white flowers, ſublimed from it in the braſs or other furnaces, wherein *zinc* or its ores are melted with other metals, were formerly kept in the ſhops, under the names of POMPHOLYX, and *nihil album*.

The flowers of *zinc* were firſt uſed as an internal medicine by the celebrated chemiſt Glauber, but were little known in practice, till Dr. Gaubius, of Leyden, gave an account of their virtues, in his Adverſaria. They have ſince been much employed in convulſive and ſpaſmodic diſeaſes, and ſometimes with good effects. Even obſtinate epilepſies have been rendered much leſs violent by the uſe of them. However, like all other medicines in diſeaſes of this claſs, their good effects are often only temporary, and they often fail altogether. When the flowers are genuine, a grain or two generally at firſt excites nauſea or ſickneſs, but by degrees a conſiderable doſe may be taken with little or no ſenſible effect. As they are liable to be adulterated, it may be proper to mention, as teſts of their purity, that they make no efferveſcence with acids; and that, when expoſed to a ſtrong heat, they become yellow, but in cooling, turn white again. An application for external uſe, made by mixing one part of flowers of *zinc* with ſix of the ſimple liniment of wax and oil, is directed in the Edinburgh Pharmacopœia.

The chief uſe of *zinc* is as an ingredient in the compoſition of BRASS. It has the property of uniting with copper in a conſiderable proportion; e. gr. one part of *zinc* to four or three parts of copper, without much diminution of the ductility of copper. *Zinc* added to copper renders this metal leſs ſubject to ruſt, and gives to it a yellow colour, reſembling that of gold. Hence chemiſts have been induced to ſearch for the means of communicating to copper the true colour of gold; and they have actually ſucceeded in the compoſitions or allays called TOMBAC, SIMILOR, PINCHBECK, and *Prince's* METAL. According to Becher, equal parts of copper and *zinc* mixed together, gave a colour to the touch ſtone like that of the gold from the Rhine. Stahl ſays, this proportion of *zinc* is too great, but does not determine what it ought to be. Since that time, the due proportion has been inveſtigated, and ſeveral fine imitations of gold have been formed. The Engliſh were the firſt who ſucceeded, and they called their invention *Prince's* METAL, or *Prince Rupert's metal.*

From the experiments of M. Geoffroy (Mem. Acad. Sc. 1725.) it appears, that an equal quantity of *zinc* is too much, with regard to the ductility of the allay; but that equal quantities produce the fineſt colour. From ſome experiments, ſeen by the author of the Chemical Dictionary, he inclines to think, that a fine-coloured mixture cannot be obtained, particularly of a deep enough yellow, if as much *zinc* as copper actually remain. See GOLD-*coloured metal.*

One part of *zinc* is ſaid to be capable of deſtroying the ductility of a hundred parts of gold. An allay of equal parts of *zinc* and gold is very hard, white, capable of receiving a fine poliſh, and not ſubject to ruſt or tarniſh: hence it is propoſed by Mr. Malouin as a good material for making ſpecula of teleſcopes. *Zinc* gives hardneſs to tin, and is, therefore, added in ſome compoſitions for making pewter. Mr. Malouin has alſo propoſed to ſubſtitute *zinc* for tin in the operation upon iron plates, &c. called TINNING.

From the whiteneſs and brilliancy of the flame produced by the detonation of *zinc* with nitre, it has been employed with very good effect as an ingredient in compoſitions for fire-works. *Zinc*, which yields inflammable air with oil of vitriol, has lately been much employed in the operation of filling balloons, or aeroſtatic machines. *Zinc* is alſo an ingredient in the amalgama uſed by electricians. Some direct it to be made by melting five parts of quickſilver, and one of *zinc*, with a ſmall quantity of bee's-wax. See *Experiments*, &c. in ELECTRICITY.

We have an account in the Phil. Tranſ. N° 482. ſect. 6. of the application of *zinc*, or ſpelter, to ſo large a work as the cylinder of a fire engine, by Mr. Ford, of Colebroke Dale, in Shropſhire. It runs eaſier, and caſts as true as braſs, and bores ſull as well or better, when warmed a little. While cold it is as brittle as glaſs; but the warmth of the hand will make it ſo pliant, that a ſhaving of it may be wrapped round the finger like a bit of paper. This metal never ruſts, and therefore works better than iron; the ruſt of which, upon the leaſt intermiſſion of working, reſiſts the motion of the piſton. See on the ſubject of the preceding article, Dict. Chem. Eng. ed. 1777. Bergman's Phyſ. and Chem. Eſſays, by Cullen, vol. ii. p. 311, &c. Kirwan's Elem. of Mineral. p. 312, &c. Lewis's Mat. Med. by Aikin.

ZINDIKITES, a ſect among the Mahometans; ſo denominated from their leader Zindik; whom Grotius makes to be one of the magi, and a follower of Zoroaſter.

The *Zindikites* believe no providence nor reſurrection: they allow no other God but the four elements; and, in this ſenſe, they aſſert, that man, being a mixture of thoſe ſimple bodies, returns to God when he dies.

ZINETUS, a word uſed by Paracelſus, as a name for one of the braſs-like marcaſites.

ZINGAR, a word uſed by ſome of the chemical writers for verdigriſe; and by others for the flos æris, or flowers of copper or braſs.

ZINGI, in the *Materia Medica*, the name of a ſeed, ſometimes alſo called the aniſum ſtellatum, or ſtarry-headed aniſe.

ZINGIBER. See ZINZIBER.

ZINIAR, a name given by ſome of the chemical writers for verdigriſe.

ZINIAT, a word uſed by the old chemical writers, to expreſs either the action of fermentation, or any thing that is capable of exciting it in bodies.

ZINK. See ZINC.

ZINNIA, in *Botany*, a genus of the *ſyngeneſia polygamia ſuperflua* claſs; the characters of which are, that the receptacle is chaffy, the down furniſhed with two erect beards, the calyx ovato-cylindric, and imbricated, and the floſculi are compoſed of five permanent, entire rays. There are two ſpecies.

ZINZIBER *ginger*. See GINGER.

ZINZIBER *rubrum*, *red ginger*, a name by which ſome authors have called the officinal caſſumunar-root.

ZINZIBER *caninum*, *dog's ginger*, in *Botany*, a name given by ſome of the old writers to the *perſicaria urens*, or biting arſmart; a plant which is very hot, and pungent to the taſte, and grows in watery places. It had hence the name of *hydropiper*, water-pepper, among the Greeks, and was called *zinziber caninum*, or dog's ginger, by Avicenna and others, from its heat, and from an opinion that it would poiſon dogs that eat of it.

The Arabian name is *zinzibil alkeleb*.

ZINZIBER *caninum* is alſo a name given by ſome authors to the *capſicum*, or Guinea-pepper. Ger. Emac. Ind. 2.

ZINZILLA, a name by which ſome medical writers have called that ſpecies of the herpes, which we uſually call the SHINGLES.

ZIRBALIS *hernia*, a term uſed by medical writers to expreſs that kind of rupture which is cauſed by a deſcent of the omentum into the ſcrotum.

ZIRBUS, the name by which the Arabian phyſicians have called the omentum.

ZISEL, in *Zoology*, a name given by Buffon to the earleſs marmott, or MUS *citellus* of Linnæus. See CITELLUS.

ZIVOLO, in *Ornithology*, a name by which ſome authors have called the ſmaller ſpecies of YELLOW-*hammer*, from its conſtant note, which is only *zi*, *zi*.

It is of the ſize of the common ſparrow; its beak is thick and ſhort, its breaſt and belly yellowiſh, ſpotted with brown; and its head, back, wing, and tail, of a duſky brown, but two of the tail-feathers on each ſide have a variegation of white.

The difference between the male and female in this ſpecies is, that the male is yellower, and has ſome yellow ſpots on its neck and ſides, which are wanting in the female. It is almoſt always ſeen on the ground, and feeds on ſeeds, &c. It ſeems but little if at all eſſentially to differ from the common yellow-hammer: and Mr. Ray has ſome ſuſpicion, that they are the ſame ſpecies.

ZIZANIA, in *Botany*, a name uſed by ſome for the LOLIUM, or darnel.

ZIZANIA, according to Linnæus, is a genus of plants diſtinct from the *lolium*, of the *monoecia hexandria* claſs; and its characters are theſe: it produces male and female flowers on the ſame plant; the male flowers have no cup, but the flower is a bivalve glume, compoſed of two equal pointed leaves without awns, which ſurround one another; the ſtamina are ſix very ſhort filaments; the antheræ are oblong and ſimple. In the female flowers alſo there is no cup, but the flower is a one-valved glume of a convoluted figure, having ſix nerves running along it, and ending in a point terminated by a long awn or beard. The germen of the piſtil is oblong, the ſtyle is divided into two parts, and the ſtigmata are plumoſe; the fruit conſiſts of the flower itſelf, which continues rolled up, and finally parts off horizontally at the baſe: in this is contained one oblong ſeed. There are two ſpecies.

ZIZERIA, a word uſed by Apicius, and ſome other authors, to expreſs the inteſtines of fowls of the gallinaceous kind, often uſed in decoctions for glyſters, &c.

ZIZIPHORA, in *Botany*. See *Syrian Field* BASIL.

ZIZITH, in the *Jewiſh Cuſtoms*, a name given by the Jews to the tufts or fringes they uſed anciently to wear at the four quarters of their upper garments, but which they now only wear under their cloths, fixed to a ſquare piece of cloth, which repreſents the garment they anciently wore in their own country before their diſperſion. The *zizith* of the modern Jews is a tuft made of eight threads of yarn, ſpun on purpoſe for this uſe; each having five knots, which take up half the length. That which is not knotted, being furled out, makes a kind of tuft or fringe. Numb. xv. 38. Deuter. xxii. 12. Leo of Modena, Cerem. of the Jews, part i. chap. 5. Calmet. Dict. Bibl. in voc.

ZIZYPHA, or ZIZYPHUS, a name ſometimes given to a kind of fruit, more uſually called JUJUBE.

ZMILACES, in *Natural Hiſtory*, a name given by Pliny to a ſtone found in the river Euphrates, reſembling marble, and of a bluiſh-green colour.

ZMILAMPIS, in *Natural Hiſtory*, the name of a gem, deſcribed by Pliny and the ancients, which they tell us was very like the Proconneſian marble, except that in the centre of the ſtone there was always a bluiſh ſpot, reſembling the pupil of an eye.

The Proconneſian marble of the ancients was of a fine clear and elegant white, variegated with irregular black veins. Pliny's deſcription is ſo ſhort, that it has been ſuppoſed from him that the *zmilampis* was a ſort of marble: he only ſays of it, that it was like the Proconneſian mar[illegible], but blue in the middle. Many had inferred from this, that he meant no more by it than that this was a ſtone, which had blue veins inſtead of the black ones in the Proconneſian kind. But when we examine the reſt of the ancients, and find that it was a ſmall ſtone, found in the river Euphrates, and worn in rings, and that its blue ſpot was like a pupil of an eye, we may eaſily determine that it was one of thoſe gems which we call *oculus beli*, or *bellocchio*; of which there is a vaſt variety found in the rivers of the Eaſt Indies, and many have a fine opake white ground, and a bluiſh or greeniſh ſpot for the pupil.

ZMILANTHES, in *Natural Hiſtory*, a name given by Solinus and ſome others, to a gem called by the more correct writers ZMILAMPIS.

ZOCCO, ZOCCOLO, ZOCLE, or SOCLE, in *Architecture*. See SOCLE.

ZOCHINACAZTLIS, in *Botany*, a name by which ſome authors have called the *flos auriculæ*, a flower of New Spain, uſed in the making of the Spaniſh chocolate.

ZODIAC, *zodiacus*, in *Aſtronomy*, a faſcja, or broad circle, whoſe middle is the ecliptic, and its extremes two circles paralled thereto, at ſuch diſtance from it, as to bound, or comprehend, the excurſions of the ſun and planets.

The word is formed from the Greek *ζωον*, *animal*; by reaſon of the conſtellations therein, which have the forms of animals given them; others derive it from *ζωη*, *life*; from an opinion, that the planets have a great influence on animal life.

The ſun never deviates from the middle of the *zodiac*; i. e. from the ecliptic: the planets all do more or leſs. Their greateſt deviations, called latitudes, are the meaſure of the breadth of the *zodiac*; which is broader, or narrower, as the greateſt latitude of the planets is made more or leſs. Accordingly, ſome make it 16, ſome 18, and ſome 20 degrees broad.

The *zodiac*, cutting the equator obliquely, makes an angle therewith of 23 degrees and a half; or, more preciſely, of 23° 29′; which is what we call the *obliquity of the zodiac*, and is the ſun's greateſt declination. See ECLIPTIC.

The *zodiac* is divided into twelve portions, called SIGNS; and thoſe diviſions, or ſigns, are denominated from the conſtellations which anciently poſſeſſed each part. But the *zodiac* being immoveable, and the ſtars having a motion from weſt to eaſt, thoſe conſtellations now no longer correſpond to their proper ſigns; whence ariſes what we call the PRECESSION *of the equinoxes*.

When a ſtar, therefore, is ſaid to be in ſuch *a ſign of the zodiac*, it is not to be underſtood of that ſign, or conſtellation, of the firmament, but only of that twelfth part of the *zodiac*, or dodecatemory thereof.

Caſſini has alſo obſerved a tract in the heavens, within whoſe bounds moſt of the comets, though not all of them, are obſerved to keep, which, for this reaſon, he calls the *zodiac of the comets*.

This he makes as broad as the other *zodiac*, and marks it with ſigns, or conſtellations, like that; as Antinous, Pegaſus, Andromeda, Taurus, Orion, the Leſſer Dog, Hydra, the Centaur, Scorpion, and Sagittary.

ZODIACAL *light*, a bightneſs reſembling that of the milky way, and which is ſometimes perceived in the heavens, at certain times of the year, after ſun-ſet, or before its riſe. The form of this light reſembles that of a pyramid, lying lengthways in the *zodiac*, within which its point and axis are always incloſed, its baſe being placed obliquely with reſpect to the horizon. This phenomenon was firſt diſcovered, deſcribed, and named by Mr. Caſſini the elder, in 1683. It was afterwards obſerved by M. Fatio, in 1684, 1685, and 1686, and by M. Kirch and Eimmart, in 1688, 1689, 1691, 1693, and 1694. See Mairan, Suite des Mem. de l'Acad. Royale des Sciences, 1731. p. 3.

The *zodiacal light*, according to M. de Mairan's ingenious and plauſible hypotheſis, is nothing but the ſolar atmoſphere, a rare and ſubtile fluid, either luminous by itſelf, or made ſo by the rays of the ſun ſurrounding its globe; but in a greater quantity, and more extenſively, about its equator, than any other part.

The *zodiacal light* is more or leſs viſible, according to circumſtances; but the ſolar atmoſphere is not always viſible by means of this light, though it be always ſeen about the globe of the ſun in total eclipſes.

One of the moſt eſſential circumſtances for the perception of the ſolar atmoſphere by the *zodiacal light*, is its having ſufficient length on the *zodiac*; for, without this, its brightneſs is entirely hid from us by the twilights.

M. de Mairan ſays, it may be proved from many obſervations, that the ſun's atmoſphere ſometimes reaches as far as the earth's orbit, and there meeting with our atmoſphere, produces the appearance of an AURORA *borealis*.

The length of the *zodiacal light* varies ſometimes in reality, and ſometimes in appearance only, from various cauſes.

The oblique poſition of this light, little different from that of the plane of the ecliptic, does not permit us to ſee it diſtinctly, and ſufficiently elevated above the horizon; but ſome time after ſun-ſet, towards the end of the winter, and in ſpring, or before ſun-riſing in autumn, and towards the beginning of winter. Several cauſes hinder our ſeeing it, any more than the milky way; ſuch as moonlight and ſtrong twilights, among others.

Mr. Caſſini often mentions the great reſemblance of the *zodiacal light* to the *tails of* COMETS. Mr. Fatio has made the ſame obſervation; and Mr. Euler has lately endeavoured to prove them owing to ſimilar cauſes. Decouverte de la Lumiere Celeſte que paroit dans le *Zodiaque*, art. 41. Lettre à Mr. Caſſini, printed at Amſterdam, 1686. Euler, in Mem. de l'Acad. de Berlin, tom. ii.

The figure of this ſolar atmoſphere muſt be lenticular, or that of a flatted ſpheroid. Mr. de Mairan gives us a draught of its appearance and projection.

The extent of the *zodiacal light* from the ſun to its point, is ſeldom leſs than 50 or 60 degrees in length, and more than 20° in breadth. It has even been known to extend to 100 and 103°, and from 8 to 9° broad.

This light ſeems to have no other motion than that of the ſun itſelf.

Mr. Euler obſerves, that if the ſun has an atmoſphere, the force of the impulſe of light iſſuing from that globe, muſt drive particles of that atmoſphere before it; but as gravity is very ſtrong at the ſun, this impulſe would never drive thoſe particles beyond the limits of their atmoſphere, were it not for the centrifugal force ariſing from the ſun's motion round its axis. This being oppoſite to the action of gravity, diminiſhing its effects, the impulſe of the light may conſiderably dilate the figure of the ſolar atmoſphere, from what it would be if it aroſe from the gravity and centrifugal force of its particles only: and this dilatation will be very conſiderable near the ſun's equator, and very ſmall towards its poles. The action of light thus diminiſhing the action of gravity, Mr. Euler attempts to calculate how far this diminution of gravity may increaſe the extent of the ſun's atmoſphere about its equator. He finds a cubic equation, the roots of which expreſs the ſemi-axis, or greateſt amplitude of this atmoſphere. He adds, that this equation having three real roots, it is poſſible that the ſolar atmoſphere may become a ring ſurrounding the ſun's globe, as the ring of Saturn ſurrounds the body of that planet.

As the electric fluid is now generally acknowledged to be the cauſe of the AURORA *borealis*, which M. de Mairan aſcribes to the ſolar atmoſphere, which produces the *zodiacal light*, and which is thrown off principally and to the greateſt diſtance from the equatorial parts of the ſun, in conſequence of his rotation on his axis, and extending viſibly, in the form of a luminous pyramid, as far as the orbit of the earth, falls into the upper regions of our atmoſphere, and is collected chiefly towards the polar parts of the earth, in conſequence of the diurnal revolution, where it forms the aurora borealis: it is no improbable conjecture, that the ſun may be the fountain of the electric fluid, and that the *zodiacal light*, and the tails of comets, as well as the aurora borealis, lightning, and artificial electricity, are its various and not very diſſimilar modifications. See *Theory of* ELECTRICITY.

ZOEGEA, in *Botany*, a genus of the *ſyngeneſia polygamia fruſtranea* claſs; the characters of which are, that the receptable is briſtly, the rays of the corolla are in the form of a bandage, and that the calyx is imbricated. There is one ſpecies.

ZONA, a word uſed by ſome authors for that ſpecies of herpes, which others call the *zinzilla*, and we term the SHINGLES.

ZONE, *zona*, *ζωνη*, q. d. *belt*, *girdle*, in *Geography* and *Aſtronomy*, a diviſion of the terraqueous globe, with reſpect to the different degrees of heat found in the different parts thereof.

A *zone* is the fifth part of the ſurface of the earth, contained between two PARALLELS.

The *zones* are denominated *torrid*, *frigid*, and *temperate*.

ZONE, *torrid*, is a faſcia, or band, ſurrounding the terraqueous globe, and terminated by the two tropics.

Its breadth, therefore, is 46° 58′. The equator running through the middle of it, divides it into two equal parts, each containing 23° 29′.

The ancients imagined the *torrid zone* uninhabitable.

ZONES *temperate*, are two faſciæ, or bands, environing the globe, and contained between the tropics and the polar circles. The breadth of each is 43° 2′.

ZONES, *frigid*, are ſegments of the ſurface of the earth, terminated, the one by the antarctic, and the other by the arctic circle; or included between theſe circles and the poles. The breadth of each is 46° 58′.

The difference of *zones* is attended with a great diverſity of phenomena. 1. In the torrid *zone*, the ſun paſſes through the *zenith* twice a year; and his receſs from the equator towards the pole, which is above the horizon, is twice a year equal to the height of the pole.

2. In the temperate and frigid *zones*, the leaſt height of the pole exceeds the greateſt diſtance of the ſun from the equator; and therefore, to the inhabitants thereof, the ſun never paſſes through the zenith; yet if, on the ſame day, the ſun riſes, at the ſame time, to a greater height, the height of the pole is the leſs, ſince the inclination of the circles of diurnal revolution to the horizon is leſs.

3. In the temperate and torrid *zones* the ſun riſes and ſets every natural day, becauſe the diſtance of the ſun from the pole always exceeds the height of the pole; yet every where but under the equator, the artificial days are unequal, and the inequality is the greater as the place is leſs diſtant from the frigid *zone*.

4. Where the temperate *zones* terminate on the frigid, the height of the pole is equal to the ſun's diſtance from the pole, when in the neighbouring tropic; and conſequently, once a year, the ſun, in its diurnal motion, performs an entire revolution, without going down under the horizon.

5. Every where, in a frigid *zone*, the height of the pole is greater than the leaſt diſtance of the ſun from the pole; and therefore, during ſome revolutions of the earth, the ſun is at a diſtance from the pole leſs than the pole's height; and, during all that time, does not ſet, nor ſo much as touch the horizon. Where the diſtance from the pole, as the ſun recedes from it, exceeds the height of the pole, or latitude of the place, the ſun riſes or ſets every natural day.

ZONITES, in the *Materia Medica of the Ancients*, a name given to a kind of tutty, called alſo *placitis*. It had the latter name from the Greek πλακος, a *cruſt*, it being formed by way of cruſt on the ſides of the furnaces. The latter name *zonites* was given it from its being formed of ſeveral coats, which, when broken tranſverſely, had the appearance of belts or zones. See TSAPHARI, and TUMEX.

ZONITIS *cadmia*, a name given by ſome authors to a kind of CADMIA *fornacum*, from its uſually ſurrounding the upper parts of the furnaces like a girdle or belt.

ZONNAR, a kind of belt, or girdle, of black leather, which the Chriſtians and Jews of the Levant, particularly thoſe of Aſia, and the territories of the grand ſignior, are obliged to wear, to diſtinguiſh themſelves from the Mahometans.

The word is corrupted from the vulgar Greek; a contraction of *ζωναριον*, or *ζωνη*, *girdle*.

It was Motavakkel X. kaliph, of the family of the Abaſſides, that firſt enjoined the Chriſtians, &c. to wear the *zonnar*.

The ordinance to this effect was publiſhed in the year of the Hegira 235.

Hence, as moſt of the Chriſtians of Syria, Meſopotamia, &c. are either Neſtorians or Jacobites, thoſe ſectaries are often called *Chriſtians of the girdle*.

ZOOGRAPHY, formed of *ζωον*, *animal*, and *γραφω*, *I deſcribe*, denotes a deſcription of animals.

ZOOLATRIA, Ζωολατρια, compoſed of *ζωον*, an *animal*, and *λατρια*, *worſhip*, a ſpecies of idolatry, wherein divine worſhip was offered to animals.

ZOOLOGIA, *zoology*, Ζωολογια, compounded of *ζωη*, *life*, or *ζωον*, *animal*, and *λογος*, *ſpeech*, *diſcourſe*, a diſcourſe or treatiſe upon animals, or living creatures.

Zoology makes a conſiderable article in natural hiſtory, comprehending what relates to the form, ſtructure, method of living, feeding, propagating, &c. of the divers ſpecies of brute creatures, and the deſcriptions of every kind. This makes one of the three kingdoms, as they are called, of natural hiſtory; the vegetable and the mineral being the two others: in theſe, however, there is this difference made by writers, that while vegetables and minerals are treated of together, as all of a piece in each, the ſubjects of *zoology* are divided, and it is made to compoſe, as it were, ſeveral kingdoms. Whoever is to write on plants and minerals, calls his work a treatiſe of botany, or mineralogy; and we have no words to expreſs any ſubdiviſion of them into kingdoms; but, in *zoology* we treat, as different ſubjects, the different parts of it; and the hiſtory of birds is ſeparated by ſome from the reſt under the name of *ornithology*; that of quadrupeds, under the name of *tetrapodology*; and we have for the reſt, the words *entomology*, *amphibiology*, and the like, expreſſing thoſe things which are properly but the parts of *zoology*, as ſo many diſtinct and ſeparate ſtudies.

This may eaſily be amended by our conſidering the animal world as we do the vegetable and mineral, and dividing it, as we do the others, into its proper families; it will then be found that theſe are no better diſtinctions than thoſe of the families of theſe things, and that the authors may as well ſet up ſeparate ſtudies under the names of *bulbology*, *umbelliferology*, and the like, as thoſe.

A natural diviſion of the ſubjects of *zoology*, on this principle, will afford ſix ſeveral families of its ſubjects. 1. The hairy quadrupeds. 2. The birds. 3. The amphibious animals, ſuch as ſerpents, lizards, frogs, and tortoiſes. 4. The fiſhes. 5. The inſects. And, ſixthly, thoſe loweſt order of animated beings the *zoophytes*. Artedi's Ichthyol. See QUADRUPED, BIRD, FISH, &c.

ZOOMINERALIA, a word uſed by ſome writers to expreſs certain ſubſtances which are of animal origin, yet have ſomewhat of the nature of ſtones, as pearls.

ZOOPHORIC *column*. See COLUMN.

ZOOPHORUS, or ZOPHORUS, in the *Ancient Architecture*, the ſame thing with the FREEZE in the modern.

It was thus called in Greek becauſe anciently adorned with the figures of animals; from *ζωον*, *animal*, and *φερω*, *I bear*.

The Greeks ſometimes alſo call the *zodiac*, *zoophorus*; becauſe of the ſigns and conſtellations therein.

ZOOPHTHALMUS, in *Botany*, a name given by the ancient Greeks to the *ſedum majus*, or common great houſeleek.

It had this name from the Greek *ζωον*, an *animal*; and *οφθαλμος*, an *eye*, as expreſſing a reſemblance to the eyes of large animals, in the round and radiated growth of its cluſters of leaves. They alſo called it *ambroſia*.

ZOOPHYTON, *zoophyte*, Ζωοφυτον, compounded of *ζωον*, *animal*, and *φυτον*, *plant*, q. d. *plant-animal*; in *Natural Hiſtory*, a kind of intermediate body, ſuppoſed to partake both of the nature of an animal and a vegetable.

In the Linnæan ſyſtem, the *zoophytes*, which conſtitute the fifth order of *worms*, are compoſite animals, reſembling a flower, and ſpringing from a vegetating ſtem. This order contains fifteen genera, of which nine are fixed, as the ISIS or red CORAL, *ſea-fan* or GORGONIA, ALCYONIUM, SPONGE, FLUSTRA, TUBULARIA, CORALLINES, SERTULARIA, and VORTICELLA; and the others are locomotive, as the *hydra* or POLYPE, the *pennatula* or *ſea*-PEN, TÆNIA, VOLVOX, FURIA, and *chaos*, or the aſſemblage of chaotic or microſcopical animals. The ſpecies under this order are 156.

The fœtus, while in the womb, appears to many to be a real *zoophyte*, growing to the mother by the funiculus umbilicalis, as plants do to the earth by their ſtem.

Concerning the *zoophyte*, called *borametz*, ſee AGNUS *Scythicus*.

ZOOPHYTE-*marygold*. See MARYGOLD.

ZOOTOMY, Ζωοτομη, compounded of *ζωον*, *animal*, and *τεμνω*, *I cut*, the art, or act, of diſſecting animals, or living creatures.

Zootomy amounts to the ſame with *anatomy*; or rather *comparative anatomy*.

ZOPHOCIDELUS, in *Botany*, a word uſed ſometimes as an epithet with the word *chamæleon*, and ſometimes ſingly as the name of a plant, in both caſes expreſſing the black chamæleon-thiſtle, which the ancients carefully diſtinguiſhed, in their writings, from the white kind; the former being a poiſonous plant, the other not ſo.

ZOPHORIC. See ZOOPHORIC.

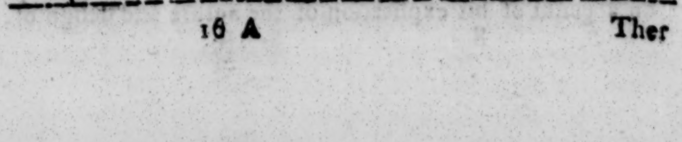
ZOPHORUS. See ZOOPHORUS.

ZOPISSA, *Ζωπισσα*, *naval pitch*, a kind of mixture of pitch and tar, ſcraped off from the ſhips that have been a long time at ſea. See *Naval* PITCH.

The word ſeems formed from *ζεω*, *bullio*, *I boil*, and *πισσα*, *pitch*; q. d. *concocted pitch*.

This matter, by being gradually penetrated by the ſalt of the ſea, becomes impregnated with its qualities; and, being applied to the body externally, is found reſolutive and deſiccative.

ZOPPO, in the *Italian Muſic*, is applied to all thoſe counterpoints, deſcribed under the article OBLIGATO, &c. Thus they ſay, *contra-punto alla zoppa*, a lame or hopping counter-point; becauſe, in theſe, a note is placed between two others, each of half its value in time. When this comes to be played or ſung, the voice or inſtrument ſeems to proceed by unequal leaps or ſteps, like thoſe of a lame perſon. See the example here annexed.



There are *contra-punto alla zoppa ſopra il ſogetto*, as well as *ſotto il ſogetto*, i. e. above and below the ſubject. See SOGETTO.

ZORABA, a word uſed by ſome of the chemical writers to expreſs vitriol.

ZORILLE, in *Zoology*, a ſpecies of weeſel, having the back and ſides marked with ſhort ſtripes of black and white, the laſt tinged with yellow; the tail long and buſhy, partly white, and partly black; the legs and belly black. This animal inhabits Peru, and other parts of South America: its peſtilential vapour overcomes even the panther of America, and ſtupefies that formidable enemy. Pennant.

ZOSTER, a word uſed by ſome to expreſs that kind of herpes, called by others *zona* and *zingilla*, and by us uſually known under the name of the SHINGLES.

ZOSTERA, *graſs-wrack*, in *Botany*, a genus of the *gynandria polyandria* claſs; the characters of which are, that the ſpadix is linear, fructiferous at the ſide, without calyx and corolla; the ſtamina are alternate, and the ſeeds ſingle and alternate. There are two ſpecies.

ZOTHECA, among the *Ancients*, the place where the animals deſigned for ſacrifice were kept.

ZOZONISIUS, in *Natural Hiſtory*, a name of one of the gems of the ancients, but of which our accounts are ſo ſhort, that we can make no conjecture of what it was. Pliny only tells us that it was found in the river Indus, and uſed by the magi.

ZUFFOLO, in the *Italian Muſic*, a little flute or flagelet, having a very ſhrill ſound, like the whiſtling of ſmall birds.

ZUINGLIANS, a branch of ancient Reformers or Proteſtants; denominated from their author Ulric, or Huldric Zuinglius.

This eminent divine was born at Wildehauſen, in the county of Toggenbourg, in Switzerland, in 1487. After having finiſhed his ſtudies in theology, and received the doctor's cap at Baſil, in 1505, he applied himſelf to preaching; and that with good ſucceſs.

It appears that Zuingle, from his early years, had been ſhocked at ſeveral of the ſuperſtitious practices of the church of Rome; and that ſo early as the year 1516 he had begun to inveigh againſt them, and to explain the Scriptures to the people. See REFORMATION.

Luther proceeded very ſlowly to that exemption from the prejudices of education, which Zuingle, by the force of an adventurous genius, and an uncommon degree of knowledge and penetration, eaſily got rid of. And we learn from the moſt authentic records of hiſtory, that he had explained the Scriptures to the people, and called in queſtion the authority and ſupremacy of the pope, before the name of Luther was known in Switzerland. In proceſs of time, after Luther had taken up arms againſt Rome, Zuinglius, being then miniſter of the chief church in Zurich, concurred with him; preaching openly againſt indulgences, then againſt the interceſſion of the ſaints, then againſt the maſs, the hierarchy, the vows and celibacy of the clergy, abſtinence from fleſh, and alſo many things which Luther was diſpoſed to treat with toleration and indulgence; ſuch as images, altars, wax-tapers, the form of exorciſm, and private confeſſion, &c.

In a conference held with the deputies of the biſhop of Conſtance, in 1523, he procured moſt of the external ceremonies of religion to be aboliſhed.

As to the euchariſt, interpreting *hoc eſt corpus meum*, by *hoc ſignificat corpus meum*, he maintained, that the body and blood of Chriſt were not *really* preſent in the euchariſt; and that the bread and wine were no more than external *ſigns* or *ſymbols*, deſigned to excite in the minds of Chriſtians the remembrance of the ſufferings and death of the divine Saviour, and of the benefits which ariſe from them. This opinion was embraced by all the friends of the reformation in Switzerland, and by a conſiderable number of its votaries in Germany. On the other hand, Luther held his doctrine, which was CONSUBSTANTIATION, with the utmoſt obſtinacy; and hence aroſe, in 1524, a tedious and vehement controverſy, which terminated, at length, in a fatal diviſion between thoſe who had embarked together in the ſacred cauſe of religion and liberty. From this time, Zuingle propagated his doctrine concerning the euchariſt in a public manner by his writings, after having entertained and taught it privately before that period.

With a view of bringing this controverſy to an amicable iſſue, Philip, landgrave of Heſſe, invited, in 1529. to a conference at Marpurg, Luther and Zuingle, together with ſome of the other principal leaders of their reſpective parties; who diſputed, during four days, in preſence of the landgrave. Luther attacked Oecolampadius, and Melancthon diſputed againſt Zuingle. In this conference Zuingle was accuſed of hereſy, not only on account of his explication of the nature and deſign of the Lord's ſupper, but alſo in conſequence of the falſe notions he was ſuppoſed to have adopted relating to the divinity of Chriſt, the efficacy of the divine word, original ſin, and ſome other parts of the Chriſtian doctrine. But though he cleared himſelf to the ſatisfaction even of Luther from the greateſt part of theſe accuſations, their diſſenſion concerning the manner of Chriſt's preſence in the euchariſt ſtill remained. Nor did it terminate with the death of Zuingle in 1530, nor with that of Luther in 1546. Melancthon and Calvin made ſeveral attempts towards promoting a reconciliation between the contending parties. With this view Calvin propoſed a ſyſtem with reſpect to the euchariſt, more conformable to the doctrine of the Lutheran church than that of Zuingle. He acknowledged a ſpiritual preſence of Chriſt in this ſacrament, and ſuppoſed that a certain divine virtue or efficacy was communicated by Chriſt with the bread and wine to thoſe who approached this holy ſacrament with a lively faith, and with upright hearts; and to render this notion ſtill more ſatisfactory, he expreſſed it in almoſt the ſame terms which the Lutherans employed in inculcating their doctrine of Chriſt's real preſence in the euchariſt. But whilſt the followers of Zuingle aſſerted, that all Chriſtians, without diſtinction, whether regenerate or unregenerate, might be partakers of the body and blood of Chriſt, Calvin confined this privilege to the pious and regenerate believer alone. Beſides, the ſentiments of the *Zuinglians*, with regard to the divine decrees, differed very little from that of the PELAGIANS; nor did they heſitate in declaring, after the example of Zuingle himſelf, that the kingdom of Heaven was open to all who lived according to the dictates of right reaſon; whereas Calvin maintained, that the everlaſting condition of mankind in a future world was determined from all eternity by the unchangeable order of the Deity, and that this abſolute determination of his will and good pleaſure was the only ſource of happineſs or miſery to every individual. Moreover, Zuingle and Calvin differed in their notions of eccleſiaſtical government. The former aſcribed an abſolute and unbounded power, in religious matters, to the civil magiſtrate; allowing at the ſame time of a certain ſubordination among the miniſters of the church, and placing at their head a perpetual preſident or ſuperintendent, with a certain degree of inſpection and authority over the whole body; but Calvin, on the contrary, reduced the power of the magiſtrate, in religious matters, within narrow bounds; declaring the church a ſeparate and independent body, endowed with the power of legiſlation for itſelf, and maintaining that it was to be governed, like the primitive church, only by preſbyters and ſynods, i. e. by aſſemblies of elders, compoſed both of the clergy and laity; and leaving to the civil magiſtrate little elſe than the privilege of protecting and defending the church, and providing for what related to its external exigencies and concerns. Theſe and other circumſtances prevented the union of the Lutheran and reformed churches; though in proceſs of time almoſt all the latter churches adopted the theological ſyſtem of Calvin. Moſh. Eccl. Hiſt. Eng. ed. 8vo. vol. iii. p. 318, &c. vol. iv. p. 66, &c.

ZURNAPA, in *Zoology*. See CAMELOPARDAL.

ZYGÆNA. See SHARK.

ZYGASTICUM, Ζυγαϛικον, formed of ζυγος, a *balance*, among the *Ancients*, money paid for weighing things.

ZYGITÆ, in the Roman *Galleys*, a term uſed to expreſs thoſe rowers in the triremes, or three-rowed galleys, who ſat on the ſecond row, that is above the thalamitæ, and below the thranitæ.

ZYGOMA, Ζυγωμα, in *Anatomy*, a bone of the head; otherwiſe called os jugale.

The word is formed from ζευγνυμι, *I join*; ſo that *zygoma*, properly ſpeaking, is the juncture of two bones.

The *zygoma* is no ſingle bone, but an union, or aſſemblage, of two proceſſes. or eminences of bone; the one from the os temporis, the other from the os malæ. See *Tab. Anat. Oſteol. fig.* 2. *lit. c.*

Theſe two eminences, or apophyſes, are joined together by a ſuture; thence called *zygomaticus*. See *Oſſa* MALARUM.

ZYGOMATICUS, a muſcle of the head, which has its origin in the proceſſus jugalis, or zygoma; and, paſſing obliquely, is inſerted near the angle of the lips. It helps to draw the lips obliquely upwards. See *Tab. Anat.* (*Myol.*) *fig.* 1. *n* 9. *fig.* 6. *n.* 4. *fig.* 7. *n* 2.

There are two of theſe muſcles, viz. one on each ſide. Each muſcle is thin, oblique, and fixed by one extremity to the lower edge of that portion of the os malæ; which is connected with the zygomatic apophyſis of the os temporis; from thence it runs down obliquely from behind forward, being, in its paſſage, commonly involved in fat. It ends at the commiſſure of the two lips, adhering ſtrongly to the buccinator, which covers it. This muſcle is often very complex. Theſe muſcles, which are common to the two lips, are called *zygomatici majores* by way of diſtinction from thoſe two that lie above them and almoſt parallel to them, called *zygomatici minores*; which are proper to the upper lip. The ſuperior extremity of theſe ſeems to be a detachment from the lower fibres of the orbicularis palpebrarum; but they may be always diſtinguiſhed. Their lower extremity unites with the neighbouring inciſorius. Theſe muſcles are quite buried in fat, and for that reaſon often diſappear. Winſlow. See Lips.

Zygomaticus is alſo an epithet given to the ſuture that binds the two proceſſes of the zygoma together.

ZYGOPHYLLUM, in *Botany*, the name of a genus of plants deſcribed by Linnæus, the ſame with the *fabago* of Tournefort. See Bean-*caper*.

ZYGOSTATES, among the *Ancients*, an officer who was the overſeer of weights, and was to take care that tradeſmen uſed none but what were juſt.

ZYMAR, a name given by ſome of the chemical writers to verdigriſe.

ZYME, a word uſed by many authors to expreſs ferment or leaven.

ZYMOLOGY, in *Chemiſtry*, a term uſed by ſome writers to expreſs a treatiſe on fermentation, or the doctrine of fermentation in general.

Dr. Sympſon has written a treatiſe on this ſubject, wherein he refers the whole to the internal conflicts of acid and ſulphur in bodies, and ſeems to think that the phenomena of hot baths, the generation of minerals, and the production of mineral waters, the grand appearances of light, heat, and fire, and the generality of the ſubterranean phenomena of damps, earthquakes, and fiery eruptions, and the appearance of meteors, may be all explained by the doctrine of fermentation, eſtabliſhed on this baſis. Sympſon's Zymol. Chym.

ZYMOSIMETER, formed from ζυμωσις, *fermentation*, and μετρον, *meaſure*, an inſtrument propoſed by Swammerdam, in his book De Reſpiratione, wherewith to meaſure the degree of fermentation occaſioned by the mixture of different matters; and the degree of heat which thoſe matters acquire in fermenting; as alſo the heat, or temperament, of the blood of animals.

ZYMOSIS, a word uſed by ſome to expreſs fermentation, and by others for a flatulent tumor of the liver, or other of the viſcera.

ZYTHOGALA, formed of ζυθος, *cerevisia*, and γαλα, *lac*; *beer poſſet*, a drink recommended by Sydenham, as good to be taken after a vomit, for allaying the acrimonious and diſagreeable taſte it has occaſioned, as well as to prevent gripes. Syden. Obſerv. de Morb. acut. p. 39.

ZYTHUM, or Zythos, a ſort of malt liquor, in uſe among the ancient Germans.

Matthiolus repreſents the ancient *zythum*, and *curmi*, as the ſame with our beer and ale.

FINIS.

MVSEVM
BRITAN
NICVM